21. LDM
BEFORE 2006

W. S. DARLEY & CO.

REPAIR SERVICE INSTRUCTIONS
TYPE LDM MIDSHIP FIRE PUMP

REMOVAL OF PUMP AND TRANSMISSION FROM TRUCK CHASSIS

NOTE**:** It will be beneficial to have a second person present to assist during removal and reinstallation of the pump.

CAUTION: Always have chassis wheels sufficiently blocked with wheel chocks before working on the pump!

1. Remove the drive shafts from the pump transmission.
2. Disconnect the following items from the pump:
   Heater Piping
   Gage Line Tubing
   Primer Tubing
   Drain Line Tubing
   Tachometer Drive Cable
3. Remove any other accessory that will prevent lowering the pump and transmission assembly.
4. Drain oil from gear case. Inspect oil for debris, or cloudiness (entrapped water).
5. Provide a jack or overhead hoist to support pump weight of 800 pounds for removing the pump.

NOTE: If pump is to be lowered for removal, the floor jack must be positioned to securely support the pump. Also tie two loops of rope around the pump casing discharge flange. Loop the rope around the discharge manifolding or a beam above the truck. The rope will be used to keep the pump upright on the jack while lowering.

6. Loosen four 5/8” bolts that fasten the suction extensions to the truck frame fail support brackets.
7. Loosen all pony suction, tank to pump lines, etc. by unbolting the companion flanges at the suction extensions.
8. Remove the forty 3/8” cap screws that hold the suction heads to the suction extensions.
9. Remove the twelve 3/8” nuts that hold the discharge head to the pump casing.
10. Some prying may be required to loosen the gasket between the discharge and pump, and the suction and pump. Lowering the pump will require a coordinated effort between the man operating the floor jack and the man on top with the rope that is holding the pump upright.
11. Unless the truck is raised with approximately three feet of clearance at the running boards, the pump will have to be tipped to get it out from under the truck.

PUMP AND TRANSMISSION DISASSEMBLY FOR OVERHAUL
Refer to Drawings DLC0100 (pump) & DLC0101 (transmission)

1. Remove eight 3/8-16 NC cap screws. Remove relief valve elbow(39) from relief valve(40) and pump casing(24).
2. Remove four 3/8-16 NC nuts and remove relief valve assembly (40) from outboard suction head (35).
3. Remove four 1/4-20 NC cap screws and remove bearing cap (20).
4. Remove bearing (17) using a suitable puller.
5. Make alignment marks to align the inboard and outboard heads (35 and 13) with the pump casing (24). A cold chisel works well for this.
6. Remove twelve 1/2-13 NC nuts holding outboard suction head to pump casing (24).

7. Pry outboard suction head off pump casing (24). Keep head square with casing bore to avoid damage to parts. Two 5/16-18 NC tapped puller holes in flange will facilitate flange separation.
8. Press oil seal (19) out of outboard suction head.
9. If necessary to replace outboard stuffing box (16), remove three 1/4-20 NC brass flat head screws and press outboard stuffing box out of outboard suction head. Replace stuffing box o'ring (15).

   NOTE: Pumps older than Dec. 1989 may not have flat head screws. If this is the case with the pump you are repairing, remove the 1/4-20 NC locking set screw, and press stuffing box out of outboard suction head. See drawing DLM0501.

10. If necessary to replace, pry or tap seal ring (37) out of outboard suction head.
11. Remove o'ring (22) from outboard suction head.
12. Remove impeller retaining ring (36) from impeller shaft (32).
13. Mark outboard side of impeller (38) with indelible marker. Slide impeller off impeller shaft (32).
14. Remove second impeller retaining ring (36).
15. Remove twelve 1/2-13 NC nuts holding pump casing (24) to inboard suction head.
16. Pry pump casing (24) away from inboard suction head. Two 5/16-18 NC puller holes in flange will help separation.
17. Remove casing gaskets (25) from pump casing (24).
18. Remove four 3/8-16 NC cap screws and bearing cap (59) from gear case (66). Two 5/16-18 NC tapped puller holes in flange will assist separation. Discard gasket (62).
19. Remove three 1/2-13 NC and two 3/8-16 NC cap screws holding inboard suction head to gear case (66). Separate the two parts and slide the inboard head/impeller shaft assembly out of and away from gear case (66).
20. Tap impeller shaft (32) out of inboard suction head.
21 Press oil seal (31) out of inboard suction head.
22. If necessary to replace inboard stuffing box (34), remove three 1/4-20 NC brass flat head screws and press stuffing box out of inboard head. Replace stuffing box o'ring (15).

NOTE: Pumps older than Dec. 1989 may not have the flat head screws. If this is the case with the pump you are repairing, remove the 1/4-20 NC locking set screw, and press the stuffing box out of the inboard suction head.

23. If necessary to replace, pry or tap seal ring (37) out of inboard suction head.
24. Remove o'ring (22) from inboard suction head.
25. Press bearing (3) off impeller shaft (32).
26. Press bearing (61) off impeller shaft (32).
27. Press pinion gear (1) and pinion spacer (63) off impeller shaft (32) together.
28. Remove retaining ring (6) from impeller shaft (32), and slide backup washer (4) off impeller shaft.

LDM TRANSMISSION DISASSEMBLY FOR OVERHAUL
Refer to Drawings DLC0101

29. Place the gear case assembly on a bench.
30. Remove twelve 5/16 NC cap screws (30) and transmission cover (31) from side of gear case (66). Discard gasket (29).
31. Remove eight 3/8-16 NC cap screws and separate rear bearing bracket (51) assembly from gear case.
32. Cut safety wire (50) and remove lock bolt (52) from shift yoke (53). Remove yoke and shift bar (16) from gear case.

NOTE: LDM pumps prior to July 1988 did not have a lock bolt shift yoke. To remove shift yoke remove three retaining rings from shift yoke (53) end of shift bar (16) to remove yoke and shift bar from gear case.

33. Tap bearing (36) off transmission shaft (20) with sliding clutch gear (35).
34. Remove four 3/8-16 NC cap screws and separate front bearing bracket (25) from gear case.

    NOTE: It may be necessary to apply heat up to 500 degrees F (260 degrees C) to the front bearing bracket (25) to break it loose from the bearing (26). The front bearing bracket (25) may be held with retaining compound that was applied to its bore during assembly.
35. Remove six 5/16-18 NC cap screws (32) to separate pump clutch gear (34) and bearing retainer (19) from drive gear (18). It may be necessary to apply heat up to 500 °f (260°C) to the threaded end of the 5/16-18 NC cap screws to break loose the thread locker that was applied to the threads during assembly.
36. Push transmission shaft (20) out of drive gear toward bearing retainer end.
37. Press bearing (22), bearing retainer (19), spacer (21) and bearing (26) off transmission shaft (20) all at once.
38. Press second bearing (22) off transmission shaft (20).
39. Remove eight 3/8-16 NC cap screws and bearing caps (57 and 9). Discard gaskets (14 & 58).
40. Place gear case with tachometer shaft (55) side down on an arbor press table and push idler gear shaft (8) through idler gear (7), spacer (11), and bearing (13) on top side. Use a pusher 1-5/32 O.D. or less by 3-5/8 long.
41. Press bearing (13) off idler gear shaft (8).

REAR BEARING BRACKET DISASSEMBLY

42. Remove lock nut (46) from tail shaft (48).
43. Slide universal joint end yoke (44) off tail shaft (48).
44. Press rear drive shaft (48) out of bearing bracket (51) which removes bearing (41) from shaft.
45. Remove four 3/8 – 16NC cap screws and separate bearing cap (42) from rear bearing bracket (51).
46. Discard o'ring (358).
47. Press bearing (37) off rear drive shaft (48).
48. Pull oil seals (38 and 40) out of rear bearing bracket (51) with a hooked seal puller.
49. Press bearing (41) out of bearing cap (42). It may be necessary to apply heat up to 500 degrees F (260 degrees C) to the bearing cap to break loose the bearing (41) that is held with retaining compound that was applied to the bore of the bearing cap during assembly.
50. Press oil seal (49) out of bearing cap (42).

PUMP PARTS INSPECTION AND MEASUREMENT

1. Clean all parts and examine carefully for wear or deterioration. Replace any questionable parts.
2. Measure the impeller seal rings and impellers for wear. Use the following table for comparison:

Impeller Seal Ring O.D.	5.235 - 5.237
Impeller Seal Ring I.D.	4.999 - 5.001
Stationary Seal Ring O.D.	5.249 - 5.251
Stationary Seal Ring I.D.	4.985 - 4.987
Clearance O.D. (original)	0.012 - 0.016
Clearance I.D. (original)	0.012 - 0.016

3. If clearance exceeds 0.025" on diameter, impeller seal rings can be restored to original size by soldering a ring over trued surface which retains 0.090" min. wall thickness. Stationary seal rings should also be replaced or you may purchase undersize seal rings. Call customer service for details.

4. Measure the impeller shaft and stuffing boxes for wear. Use the following table for comparison:

	OUTBOARD	INBOARD
Impeller shaft diameter at packing area	1.561 - 1.562	1.749 - 1.750
Stuffing box bore - new	1.571 - 1.572	1.759 - 1.760
Stuffing box bore - max.	1.575	1.763
Clearance - original	0.005 - 0.008	0.009 - 0.011
Clearance - max. allowable	0.014	0.014

5. Measure bearing housing bores for proper size. Use the following table for comparison. If any bore exceeds the high limit by 0.0005", the part must be replaced.

PART	REP. NO.		ORIGINAL BORE DIAMETER 2" SHAFT	2 1/2" SHAFT
Bearing Cap	9		2.4409 - 2.4416	2.4409 - 2.4416
Bearing Cap	57		2.4409 - 2.4416	2.4409 - 2.4416
Bearing Cap	59		2.8346 - 2.8353	2.8346 - 2.8353
Front Brg Bkt	25		3.9370 - 3.9379	4.7244 - 4.7253
Drive Gear	18		3.5433 - 3.5442	3.9370 - 3.9379
Rear Brg Bkt	51	front	3.7402 - 3.7411	4.3307 - 4.3316
		rear	3.9370 - 3.9379	4.7244 - 4.7253
Rear Drive Shaft	48		2.0472 - 2.0479	2.4409 - 2.4416
Outboard Brg Cap	20		2.8346 - 2.8353	2.8346 - 2.8353
Suction Head	13 & 35		4.3307 - 4.3316	4.3307 - 4.3316
Pump Clutch Gear	34		3.5433 - 3.5442	N.A.
Bearing Retainer	19		3.5433 - 3.5442	N.A.

6. Measure shaft bearing journals for proper size. Use the following table for comparison. The low limit under bearing is required to insure a press fit with inner ball bearing race.

PART	REP. NO.		ORIGINAL JOURNAL DIAMETER 2" SHAFT	2 1/2" SHAFT
Impeller Shaft	5	outboard	1.1812 - 1.1816	1.1812 - 1.1816
		center	1.9686 - 1.9690	1.9686 - 1.9690
		front	1.1812 - 1.1816	1.1812 - 1.1816
Idler Gear Shaft	8		1.1812 - 1.1816	1.1812 - 1.1816
Trans. Shaft	20	pilot	0.7875 - 0.7879	0.9844 - 0.9848
			2.1655 - 2.1660	2.5592 - 2.5597
Rear Drive Shaft	48	front	2.3623 - 2.3628	2.7560 - 2.7565
		rear	2.1655 - 2.1660	2.5592 - 2.5597

7. The original impeller shaft diameter under the pinion gear is 1.7490 to 1.7495. The original pinion gear bore is 1.7495 to 1.7500 providing a 0.0000 to 0.0010 clearance. The parts are still serviceable up to 0.0015 clearance. Pinion gear may be reversed to work other side of gear teeth.
8. The original idler gear shaft diameter under the idler gear is 1.3775 to 1.3780. The original idler gear bore is 1.3775 to 1.3780 providing a 0.0005 press fit to 0.0005 clearance. The parts are still serviceable up to 0.0010 clearance. Idler gear may be reversed to work other side of gear teeth.

LDM PUMP AND TRANSMISSION ASSEMBLY
Refer to Drawings DLC0100 (pump) & DLC0101 (transmission)

LDM TRANSMISSION ASSEMBLY
Refer to Drawings DLC0101 & DLM0101

1. If necessary to install, apply a light coat of oil to tachometer drive nut (55) and press it evenly into the hole at the shoulder end of idler gear shaft (8). Nut must extend out from the idler shaft 3/8".
2. Place gear case (66) on bench with tachometer drive side up and place idler gear (7) inside gear case. Tachometer side is opposite to pump mounting side.

3. Apply a light coat of oil to idler gear shaft (8). Place key (10) in idler gear shaft keyway. Align with keyslot in gear (7) and press shaft evenly into idler gear bore until shaft shoulder is tight against side of gear.
4. Apply a light coat of oil to bore of bearing (13) on tachometer side and press evenly on idler gear shaft (8) until tight against shaft shoulder.
5. Turn gear case over and place spacer (11) on idler gear shaft (8).
6. Apply a light coat of oil to bore of second bearing (13) and press evenly onto idler gear shaft until spacer, idler gear, and inner race of bearing are tight together.
7. Place gear case on a bench with tachometer drive side up and place two X3847 bearing support bars between idler gear (7) and bearing (13). This is necessary to prevent 22206 spherical roller bearing from cocking out of line when installing bearing cap (57). Insert bars from pinion gear bored hole in gear case with 0.825 side between gear and bearing.
8. Place gasket (58) into position against flange surface of bearing cap (5).
9. Tap bearing cap (57) with soft hammer over bearing (13) until cap touches X3847 support bars. Remove bars and continue tapping until cap is against gear case. Apply Loctite 243 (or equivalent) or equivalent thread locker to the threads of four 3/8-16 NC x 7/8 cap screws and attach bearing cap (57) to gear case. Torque to 23 ft/lb.
10. Place gasket (14) into position against flange surface of bearing cap (9).
11. Turn gear case over and place two X3847 bearing support bars between idler gear (7) and bearing (13) with 0.840 side between gear and bearing.
12. Tap bearing cap (9) with a soft hammer over second bearing (13) until cap touches X3847 support bars. Remove bars and continue tapping until cap is against gear case. Apply Loctite 243 (or equivalent) to the threads of four 3/8-16 NC x 7/8 cap screws and attach bearing cap to gear case.
13. Place oil seal (56) on assembly plug X3852 and plug into end of tachometer drive nut (55). Press oil seal into bearing cap (57) with lip spring of seal facing bearing. Fill grease cavity with grease and lubricate oil seal lips.
14. Press bearings (22) onto transmission shaft (20) until inner races are tight against shaft shoulders.
15. Oil lubricate bore of drive gear (18) and place inside gear case with six smaller, 5/16" diameter, holes on pump clutch gear (34) side of gear case.
16. Press transmission shaft (20) with bearings (22) into drive gear (18). Slide pump clutch gear (34) into position in drive gear. Slide bearing retainer (19) into position at front of drive gear.
17. Drive gear assembly procedure:
    a.) Clean the mating faces of the drive gear and pump clutch gear using isopropyl alcohol or another solvent that dries without leaving a residue, removing all grease and oil. Do not use a Loctite primer product.
    b.) Apply Loctite 680 to both mating faces, taking care not to spill any on to any bearing or bearing journals. Do not apply anything to the threaded bearing retainer.
    c.) Apply Loctite 262 to the threads of the six grade 9, zinc dichromate plated hex head cap screws that mount the pump clutch gear to the drive gear.
    d.) Tighten the screws in a crisscross pattern until they are snug.
    e.) Use a torque wrench calibrated to +/- 4% for the tightening procedure.
    f.) Torque the screws in a crisscross pattern to 17.5 ft-lb.
    g.) Using a crisscross pattern, tighten the screws to their final torque value of:

    Screw Size: 5/16-18UNC, assembled with Loctite 262

Description:	Torque Value:
Grade 9, Zinc Dichromate Plated	22 ft-lb

h.) Drive gear assembly must be allowed to cure for one hour before oil is added and the pump is started.

18. Slide spacer (21) over transmission shaft (20) and against bearing (22). Press bearing (26) onto transmission shaft against spacer.
19. Press oil seal (24) into front bearing bracket (25), flush with face of bracket, with lip spring of seal facing bearing. Fill grease cavity with grease and lubricate oil seal lips.
20. Apply a thin layer of Loctite Master Gasket 518 (or equivalent) to gasket flange surface of front bearing bracket (25) and place gasket (27) into position against Loctited surface. Tap bearing bracket over bearing (26) and against gear case. Apply Loctite 243 to the threads of four 3/8-16 NC x 1-1/4 cap screws and attach bearing bracket to gear case. Tap transmission shaft from rear until bearing is seated in front bearing bracket. Torque to 23 ft/lb.

    NOTE: If bearing (26) has "BL213Z" marked on it side then you will have to apply Loctite 603 (or equivalent) to the bore of the front bearing bracket (25), taking care not to spill any on the faces that touch the side of the bearing (26)

21. Lubricate bore and place sliding clutch gear (35) on spline of transmission shaft (20) with external gear teeth forward.
22. Press bearing (36) onto transmission shaft (20) until tight against shaft shoulder.
23. Apply silicone lubricant to o'ring (15) and install in groove in gear case shift bar hole. Lubricate shift bar hole.
24. Lubricate shift bar (16) with oil and slide into gear case.
25. Saturate oil wicks in shift yoke (53) ears with oil.
26. Place shift yoke (53) in groove of sliding clutch gear (35) and slide shift bar (16) through hole in yoke. Align groove in shift bar with bolt hole in yoke. Apply Loctite 243 (or equivalent) to the threads of lock bolt and install in shift yoke and torque to 23 ft/lbs. Attach safety wire through hole in head of lock bolt and in end groove of shift bar. See drawing DLM0400.

NOTE: LDM pumps prior to July 1988 did not have a lock bolt shift yoke. If this is the case with the pump you are repairing, place shift yoke (53) into groove of sliding clutch gear (35) and slide shift bar (16) through hole in yoke. Install retaining ring on shift bar at rear of yoke.

Install retaining rings on front side of shift bar and in front of shift yoke (85) location. See drawing DGM0700 which shows sharp corner side of retaining ring in proper position to take thrust load.

REAR BEARING BRACKET ASSEMBLY

27. Press oil seals (38 and 40) into rear bearing bracket (51) with lip spring of seal facing bearing. Be sure to press the oil seals in until they are flush or slightly below the face of the rear bearing bracket they are sealing. Fill grease cavity with grease and lubricate oil seal lips.
28. Press bearing (37) onto rear drive shaft (48) at truck gear end.
29. Place oil seal assembly sleeve X3851 over splined end of rear drive shaft (48) or wrap splines with shim stock to prevent damage to oil seals. Make sure the largest diameter step at splined end of shaft is covered. Slide shaft into rear bearing bracket (51) from the front. Remove sleeve or shim stock. Place bearing backup washer (43) on rear drive shaft.

NOTE: Pumps older than August of 1997 will have a grease zerk (39) on the rear bearing bracket (51) and a 3/16" grease vent hole in the rear bearing retainer (42).

These features are no longer used.

If a grease zerk is present, you need to remove the grease zerk (39) and replace it with a 1/8" NPT pipe plug.

The bearing (41) now used is a maintenance free double shielded bearing.

30. Press the double shielded bearing (41) onto the rear drive shaft (48) against backup washer (43).

31. Apply a thin layer of Loctite Master Gasket 518 (or equivalent) to the flange of rear bearing bracket (51). Place rear bearing bracket assembly into position at rear of gear case so bearing enters bore at gear end of tail shaft. Use two 3/8-16 NC x 1-1/2 cap screws, and lock washers to draw flange up to gear case mounting surface. Apply Loctite 243 (or equivalent) to, and install remaining five 3/8-16 NC x 1-1/2 cap screws and lock washers and one 3/8-16 NC x 1 socket head cap screw and high collar washer at the housing extension flange. Torque to 23 ft/lb.
32. Press oil seal (49) into bearing retainer (42) with lip spring of seal facing bearing. Fill grease cavity of oil seal 1/3 – 2/3 full and lubricate oil seal lips. Apply Loctite 603 (or equivalent) to bore of the bearing retainer (42), taking care not to spill any on the faces that touch the sides of the bearing (41).
33. Slide o'ring (358) over bearing (41) until it is touching the rear bearing bracket (51).
34. Attach bearing retainer (42) to rear bearing bracket (51) with four 3/8-16 NC x 1-1/4 cap screws, Loctite 243 (or equivalent), and lock washers. Torque to 23 ft/lb.
35. Slide rear yoke (44) onto rear drive shaft (48). Install universal joint retaining nut (46), and torque to 150 - 200 ft/lb.

LDM PUMP ASSEMBLY
Refer to Drawings DLC0100

36. Apply a light coat of oil to impeller shaft (32). Place pinion key (2) in impeller shaft keyway, align with keyway in pinion gear (1). press shaft evenly into pinion gear until shaft shoulder is tight against side of gear.
37. Place retaining ring (6) on impeller shaft (32) with sharp edge facing pinion gear (1).
38. Slide backup washer (4) onto impeller shaft (32).
39. Apply a light coat of oil to bore of bearing (3). Press bearing evenly onto impeller shaft (32) until it contacts backup washer (4).
40. Slide pinion spacer (63) onto impeller shaft (32) with flat side against pinion gear (1).
41. Apply a light coat of oil to bore or bearing (61). Press bearing onto impeller shaft (32) until inner race of bearing is tight against spacer (63).

NOTE: Pumps older than Dec. 1989 may not have the flat head screws holding stuffing boxes in. If this is the case with the pump you are repairing, apply Loctite 603 or equivalent to inboard stuffing box (34). Align packing guide hole and water supply hole in inboard stuffing box (34) with holes in inboard suction head and press stuffing box into inboard suction head until seated. Install 1/4-20 NC locking set screw. See drawing DLM0501.

42. Apply a silicone lubricant to stuffing box o'ring (15), and place in groove of inboard head.
43. Align stuffing box (34) with inboard suction head by placing three 1/4-20 NC x 3 cap screws through mounting holes of stuffing box and screw into corresponding tapped holes of inboard head. Press stuffing box into position using tool X5950 and remove alignment cap screws. Apply Loctite 243 (or equivalent) to threads of, and install three 1/4-20 NC stainless steel flat head screws (14) to secure stuffing box in inboard suction head. Torque to 72 in-lbs. See drawing DLM0502
44. Press seal ring (37) into inboard suction head until seated tight against shoulder.
45. A depth micrometer or a caliper and straightedge may be used to check the stuffing box and seal ring for parallelism (.002 is acceptable).
46. Apply grease to water slinger (33) and place in position on inboard stuffing box (34).
47. Press oil seal (31) into inboard suction head with lip spring of seal facing bearing. Fill grease cavity with grease and lubricate oil seal lips.
48. Insert impeller shaft (32) into inboard stuffing box (34). Tap in until bearing (3) is seated in bearing pocket in inboard suction head.
49. Slide water slinger (33) into its groove on impeller shaft (32).

50. Apply Loctite Master Gasket 518 (or equivalent) to flange surface of inboard suction head.
51. Slide impeller shaft-suction head assembly into position in gear case (66). Line up inboard suction head so it is square with gear case.
52. Attach inboard suction head to gear case with one 1/2-13 NC x 2 cap screw and lock washer on top, two 1/2-13 NC x 1-1/2 cap screws and lock washers at sides, and two 3/8-16 NC x 1 cap screws and lock washers at bottom. Use Loctite 243 (or equivalent) on the threads.
53. Position gasket (62) against flange surface of bearing cap (59).
54. Apply Loctite 243 (or equivalent) to four 3/8-16 NC x 1 cap screws and attach bearing cap (59) to gear case (66).
55. Apply a silicon lubricant to suction head o'ring (22) and place on inboard suction head.
56. Place casing gasket (25) on pump casing studs.
57. Push pump casing (24) into position on inboard suction head. Spin on twelve 1/2-13 NC light nuts, but do not tighten. Snug up two nuts on top and two nuts on bottom.
58. Place impeller retaining ring (35) on impeller shaft (32) with sharp edge toward gear case.
59. Slide impeller (38) onto impeller shaft (32).
60. Place second impeller retaining ring (35) on impeller shaft (32) with sharp edge away from impeller (38).

NOTE: Pumps older than Dec. 1989 may not have the flat head screws holding stuffing boxes in. If this is the case with the pump you are repairing, apply Loctite 603 or equivalent to outboard stuffing box (16). Align packing guide hole and water supply hole in outboard stuffing box with holes in outboard suction head and press stuffing box into outboard suction head until seated. Install the 1/4-20 NC locking set screw. See drawing DLM0501.

61. Apply a silicone lubricant to stuffing box o'ring (15), and place in groove of outboard head.
62. Align stuffing box (16) with outboard suction head by placing three 1/4-20 NC x 3 cap screws through mounting holes of stuffing box and screw into corresponding tapped holes of outboard head. Press stuffing box into position using tool X5950 and remove alignment cap screws. Apply Loctite 243 (or equivalent) to the threads of, and install three 1/4-20 NC stainless steel flat head screws (14) to secure stuffing box in outboard suction head. Torque to 72 in-lbs. See drawing DLM0502
63. Press seal ring (37) into outboard suction head until seated tight against shoulder.
64. A depth micrometer or a caliper and straightedge may be used to check the stuffing box and seal ring for parallelism (.002 is acceptable).
65. Apply a silicon lubricant to suction head o'ring (22) and place on outboard suction head.
66. Place casing gasket (25) on pump casing studs.
67. Push outboard suction head onto pump casing (24). Spin on twelve 1/2-13 NC light nuts, but do not tighten. Snug up two nuts on top and two nuts on bottom.
68. Line up alignment marks on suction heads with marks on pump casing (24) or use a straightedge to align inboard and outboard heads. Tighten all nuts.
69. Push water slinger (18) onto impeller shaft (32).
70. Press oil seal (19) into outboard suction head by tapping around circumference with a wooden driving block. Insert with lip spring of seal facing bearing. Fill grease cavity with grease and lubricate oil seal lips.
71. Apply oil to end of impeller shaft (32) and tap bearing (17) onto shaft.
72. Apply Loctite Master Gasket 518 (or equivalent) to flange surface of bearing cap (20). Tap bearing cap over bearing (17) and attach to outboard suction head with four 1/4-20 NC x 7/8 cap screws and lock washers.
73. Place relief valve o'ring(s) suction head(s). Attach relief valve(s) to suction head with four 3/8-16 NC light nuts.

74. Apply silicon lubricant to relief valve o'ring(s) and insert into relief valve assembly(s) (40).
75. Apply silicon lubricant to relief valve elbow o'ring and insert into relief valve elbow (39).
76. Attach relief valve elbow (39) to pump casing (24) with four 3/8-16 NC cap screws with lock washers.
77. Attach relief valve elbow (39) to relief valve assembly (40) with four 3/8-16 NC cap screws.
78. Pack and adjust stuffing boxes using the instructions "Darley Injection Type Stuffing Box Adjustment".

INSTALLING PUMP IN TRUCK CHASSIS

- Reverse the procedures outlined under removal instructions.
- Lubricate universal joint slip yoke on pump drive shaft.
- Fill gear case with SAE80W/90 gear lube oil to the bottom of the 3/8" NPT fill plug located in the face of the gear case.

IF FURTHER INFORMATION IS NEEDED, CALL W.S. DARLEY & CO. AT CHIPPEWA FALLS, WI. AT 800-634-7812 or 715-726-2650

W. S. DARLEY & CO.

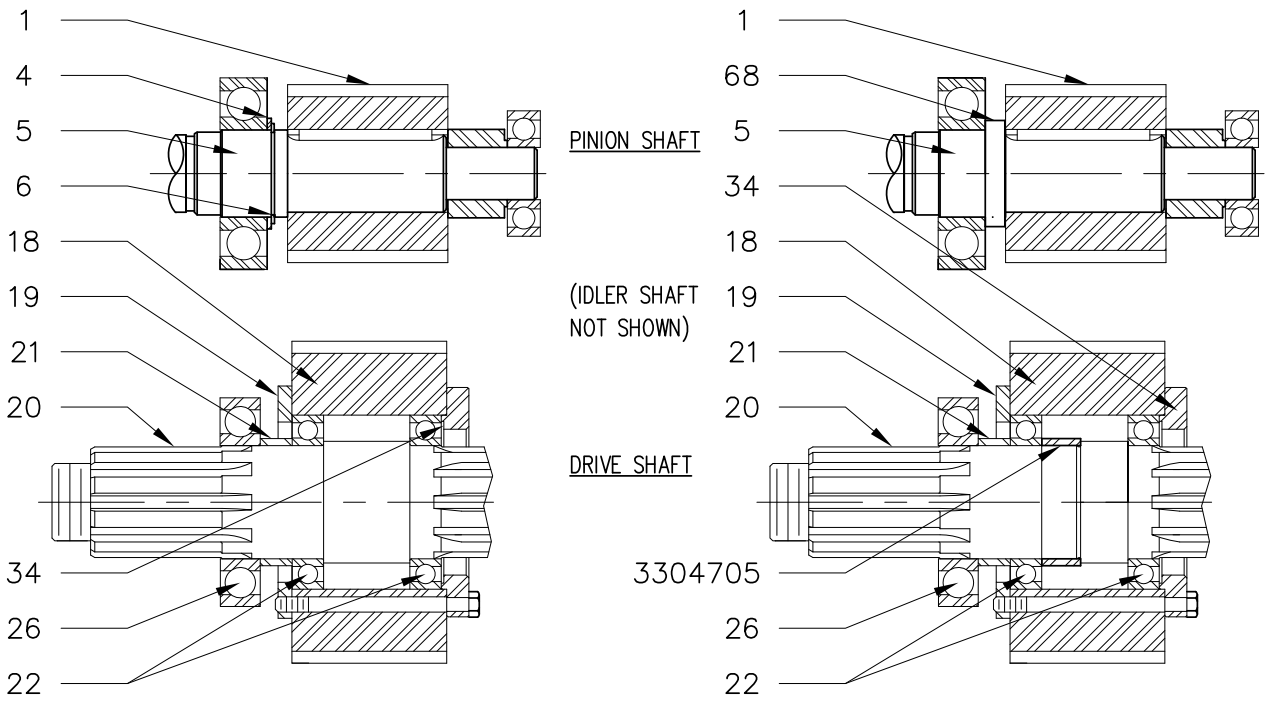
REPAIR SERVICE SPECIAL INSTRUCTIONS
TYPE EM, LDM, N, & PSM FIRE PUMPS

IMPORTANT NOTICE:

When assembling a transmission on a type EM, LDM, N, or PSM pump, with gears that are approximately 2.62 wide, do not use gaskets between the bearing cap flanges and the gear case. If provisions for an o-ring seal have not been provided for, use Loctite 518 “Master Gasket” or equivalent in place of the gaskets.

When assembling a transmission on a type EM, LDM, N, or PSM pump, with gears that are approximately 3.50 wide, use gaskets between the bearing cap flanges and the gear case as specified in the repair instruction for the type of pump you are working on.

If further information is needed, call W.S. Darley & Co. at Chippewa Falls, WI at 800-634-7812 or 715-726-2650



REP. NO.	DESCRIPTION	QTY.
1	PINION GEAR	1
4	BACK UP WASHER	1
5	IMPELLER SHAFT	1
6	RETAINING RING	1
7	IDLER GEAR	1
18	DRIVE GEAR	1
19	BEARING RETAINER	1
20	TRANSMISSION SHAFT	1
21	TRANSMISSION SHAFT SPACER	1
22	BEARING – TRANSMISSION SHAFT	2
26	BEARING – TRANSMISSION SHAFT	1
34	PUMP CLUTCH GEAR	1
68	REPLACEMENT SHAFT SHOULDER REPLACES 3600414 RETAINING RING & 3603026 BACKUP WASHER	1

OLD
DRIVE & PINION SHAFTS:

DRIVE SHAFT: 5009700.
PINION SHAFT: 5001200, 5001201, 5008300, 5008302, 5015000.

REPLACEMENT
DRIVE & PINION SHAFTS:

DRIVE SHAFT: 5009701.
PINION SHAFT: 5001205, 5001206, 5008305, 5008306, 5015002.

INCH
[MILLIMETER]

THIRD ANGLE PROJECTION

MATERIAL DESCRIPTION: —	MATERIAL NO. —	OLD PART NO. — / PATTERN NO. —	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	DR'N DLW; CHKD MCR; TRCD

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

DWG – LDM, REPL. SHAFT INSTALL DRIVE & PINION SHAFT

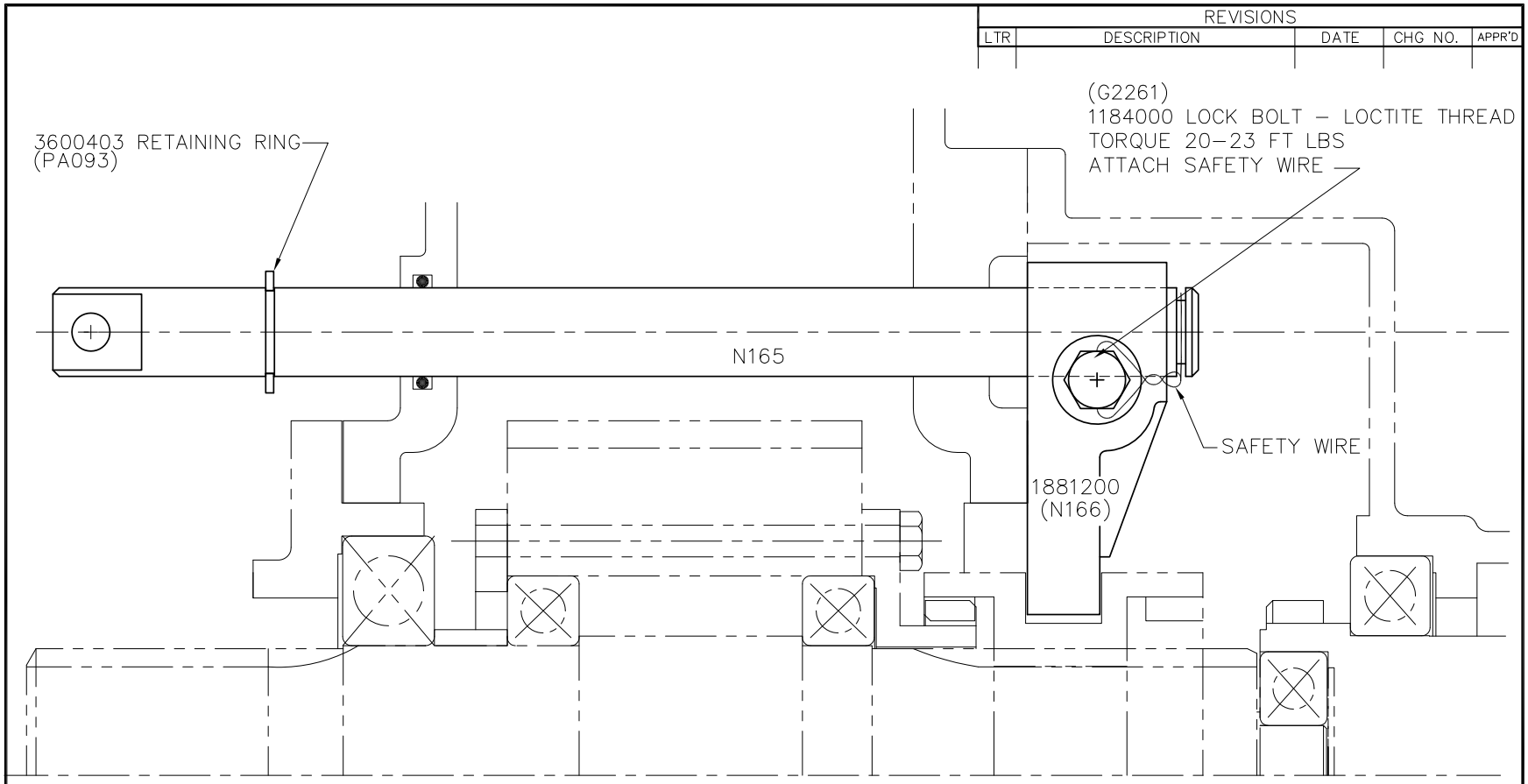
DATE 18NOV99
SCALE 1/4

DLM0101

21.11

1200008

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D

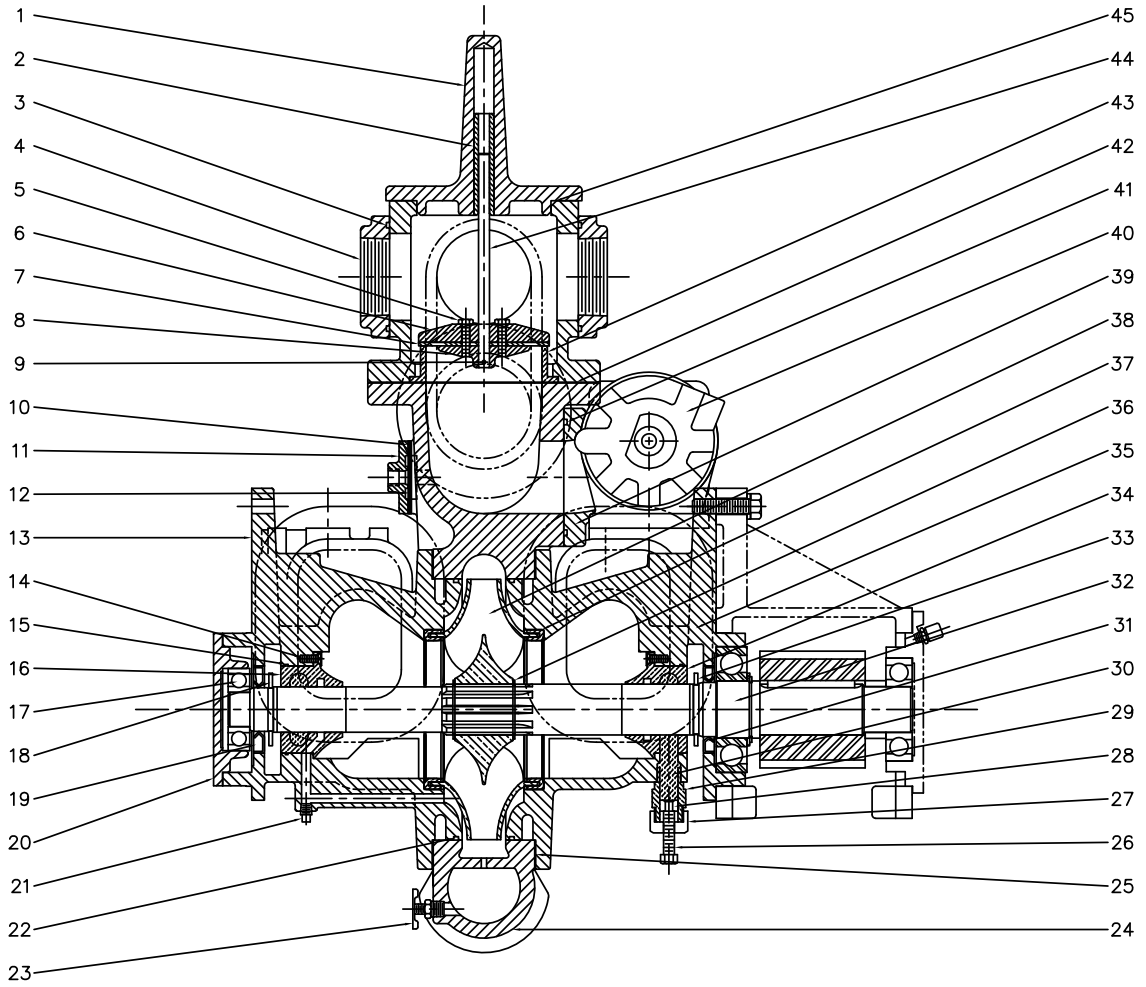


NOTICE:
PART NUMBERS LISTED ON THIS DRAWING ARE FOR INTERNAL REFERENCE ONLY, AND ARE NOT CORRECT FOR ALL APPLICATIONS!

INCH [MILLIMETER] — THIRD ANGLE PROJECTION

MATERIAL DESCRIPTION: –	MATERIAL NO. –	OLD PART NO. L80 / PATTERN NO. –	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. DARLEY & Co. MELROSE PARK, IL – CHIPPEWA FALLS, WI
				DWG – LDM, SHIFT BAR INSTALLATION LOCK BOLT
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	DR'N SEITZ / CHKD / TRCD	DATE JUL07,88 / SCALE 1/1 — DLM0400

REP. NO.	DESCRIPTION	QTY.
1	DISCHARGE HEAD CAP	1
2	CHECK VALVE BUSHING	1
3	O'RING – DISCHARGE FLANGE	2
4	DISCHARGE FLANGE	2
5	HEX HEAD CAP SCREW	2
6	CHECK VALVE PLATE	1
7	CHECK VALVE RUBBER	1
8	CHECK VALVE DIFFUSER	1
9	BRASS PIN	1
10	STRAINER FLANGE GASKET	2
11	STRAINER FLANGE	1
12	STRAINER	1
13	SUCTION HEAD – PRIMER SIDE	1
14	STUFFING BOX SCREW	6
15	O'RING – STUFFING BOX	2
16	STUFFING BOX – OUTBOARD	1
17	BEARING – IMPELLER SHAFT	1
18	WATER SLINGER – OUTBOARD	1
19	OIL SEAL – OUTBOARD	1
20	BEARING CAP	1
21	1/8" NPT PLUG	2
22	O'RING – SUCTION HEAD	2
23	DRAIN COCK	1
24	VOLUTE	1
25	GASKET – VOLUTE	2
26	PACKING PLUNGER SCREW	2
27	PACKING PLUNGER NUT	2
28	PACKING PLUNGER PISTON	2
29	PACKING PLUNGER GUIDE	2
30	PUMP PACKING	
31	OIL SEAL – INBOARD	1
32	IMPELLER SHAFT	1
33	WATER SLINGER – INBOARD	1
34	STUFFING BOX – INBOARD	1
35	SUCTION HEAD – RELIEF VALVE SIDE	1
36	RETAINING RING	2
37	SEAL RING	2
38	IMPELLER	1
39	RELIEF VALVE ELBOW	1
40	RELIEF VALVE ASSEMBLY	1
41	O'RING – RELIEF VALVE ELBOW	1
42	GASKET – DISCHARGE HEAD	1
43	CHECK VALVE SEAT	1
44	CHECK STEM	1
45	O'RING – DISCHARGE HEAD CAP	1



INCH [MILLIMETER]

TOLERANCE EXCEPT AS NOTED .XX ±.03 .XXX ±.010 ANGLES ±1°

W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI

LDM PUMP ASSEMBLY

OLD PART NO. L115

DRN S. LEE DATE MAR06,93

CHKD

TRCD SCALE 1/2

DLC0100

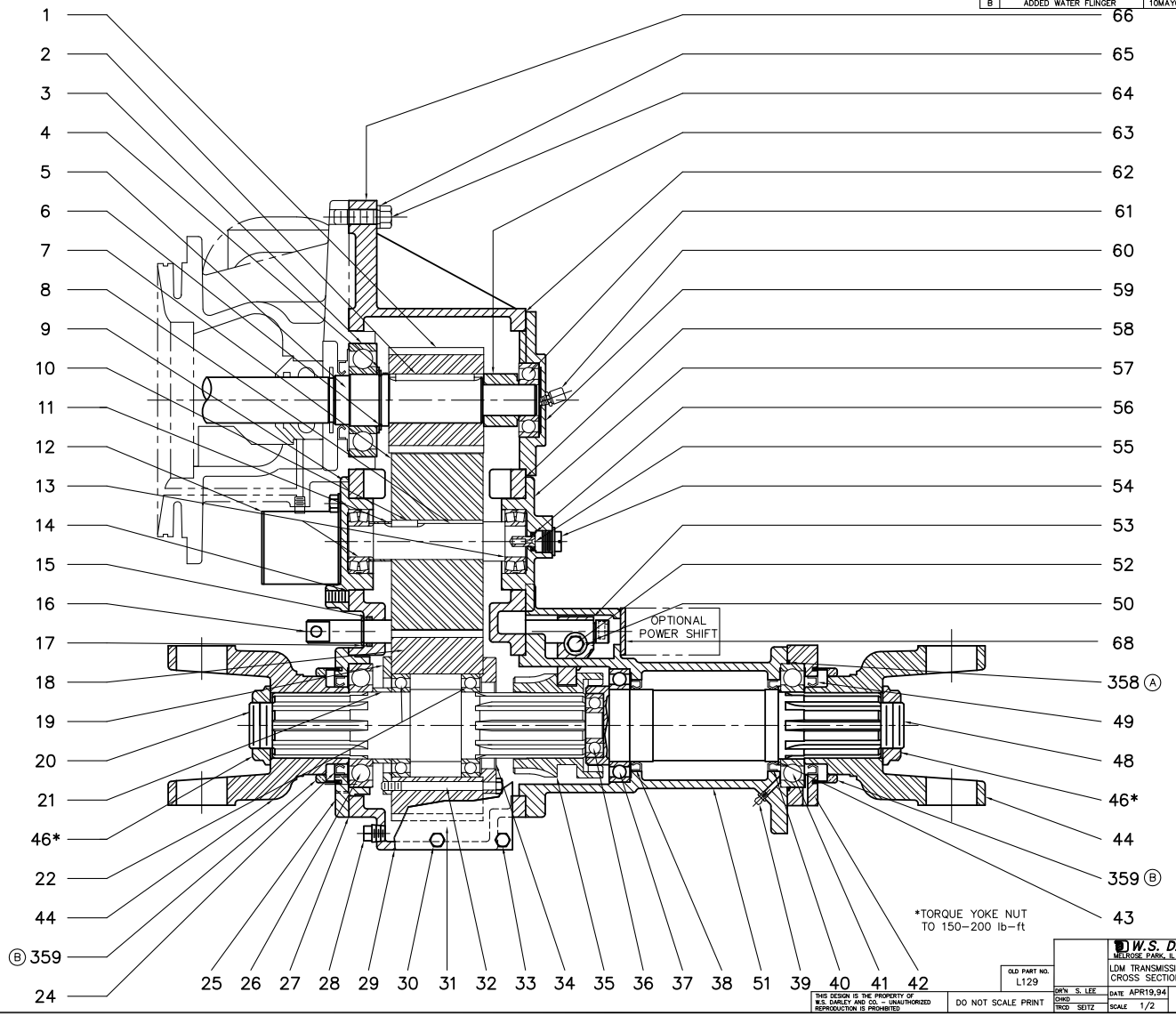
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED

ALL DIMENSIONS IN INCHES UNLESS NOTED

DO NOT SCALE PRINT

REP. NO.	DESCRIPTION	QTY.
1	PINION GEAR	1
2	KEY – PINION GEAR	1
3	BEARING – IMPELLER SHAFT	1
4	BACK UP WASHER	1
5	IMPELLER SHAFT	1
6	RETAINING RING	1
7	IDLER GEAR	1
8	IDLER GEAR SHAFT	1
9	BEARING CAP – IDLER	1
10	KEY – IDLER GEAR	1
11	IDLER GEAR SPACER	1
12	WATER SHIELD	1
13	BEARING – IDLER SHAFT	2
14	GASKET – BEARING CAP	1
15	O'RING – SHIFT BAR	1
16	SHIFT BAR	1
17	RETAINING RING	1
18	DRIVE GEAR	1
19	BEARING RETAINER	1
20	TRANSMISSION SHAFT	1
21	TRANSMISSION SHAFT SPACER	1
22	BEARING – TRANSMISSION SHAFT	2
24	OIL SEAL – FRONT YOKE	1
25	FRONT BEARING BRACKET	1
26	BEARING – TRANSMISSION SHAFT	1
27	GASKET – BEARING BRACKET	1
28	OIL DRAIN PLUG	1
29	GASKET – GEARCASE COVER	1
30	HEX HEAD CAP SCREW	12
31	GEARCASE COVER	1
32	BOLT – DRIVE GEAR	6
33	LOCKWASHER	12
34	PUMP CLUTCH GEAR	1
35	SLIDING CLUTCH GEAR	1
36	BEARING – TRANSMISSION SHAFT	1
37	BEARING – REAR DRIVE SHAFT	1
38	OIL SEAL – REAR DRIVE SHAFT	1
39	GREASE ZERK – OMITTED AFTER AUG. 1997	1
40	OIL SEAL – REAR DRIVE SHAFT	1
41	BEARING – REAR DRIVE SHAFT	1
42	BEARING RETAINER	1
43	BACK UP WASHER	1
44	END YOKE	2
46*	U-JOINT RETAINING NUT	2
48	REAR DRIVE SHAFT	1
49	OIL SEAL – REAR YOKE	1
50	SAFETY WIRE	10"
51	REAR BEARING BRACKET	1
52	LOCK BOLT	1
53	CLUTCH SHIFT YOKE	1
54	TACHOMETER PLUG	1
55	TACHOMETER DRIVE SHAFT	1
56	OIL SEAL – TACHOMETER SHAFT	1
57	BEARING CAP – IDLER	1
58	GASKET – BEARING CAP	1
59	BEARING CAP – PUMP SHAFT	1
60	VENT PLUG	1
61	BEARING – PUMP SHAFT	1
62	GASKET – BEARING CAP	1
63	PINION SPACER	1
64	GEARCASE BOLT	1
65	LOCKWASHER	3
66	GEARCASE	1
67	COVER – POWER SHIFT OPENING	1
Ⓐ358	O-RING	1
Ⓑ359	WATER FLINGER	2

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D
A	ADDED O-RING	05JUN02	2002-114	JSS
B	ADDED WATER FLINGER	10MAY04	2004-111	JSS



DO NOT SCALE PRINT

OLD PART NO. L129

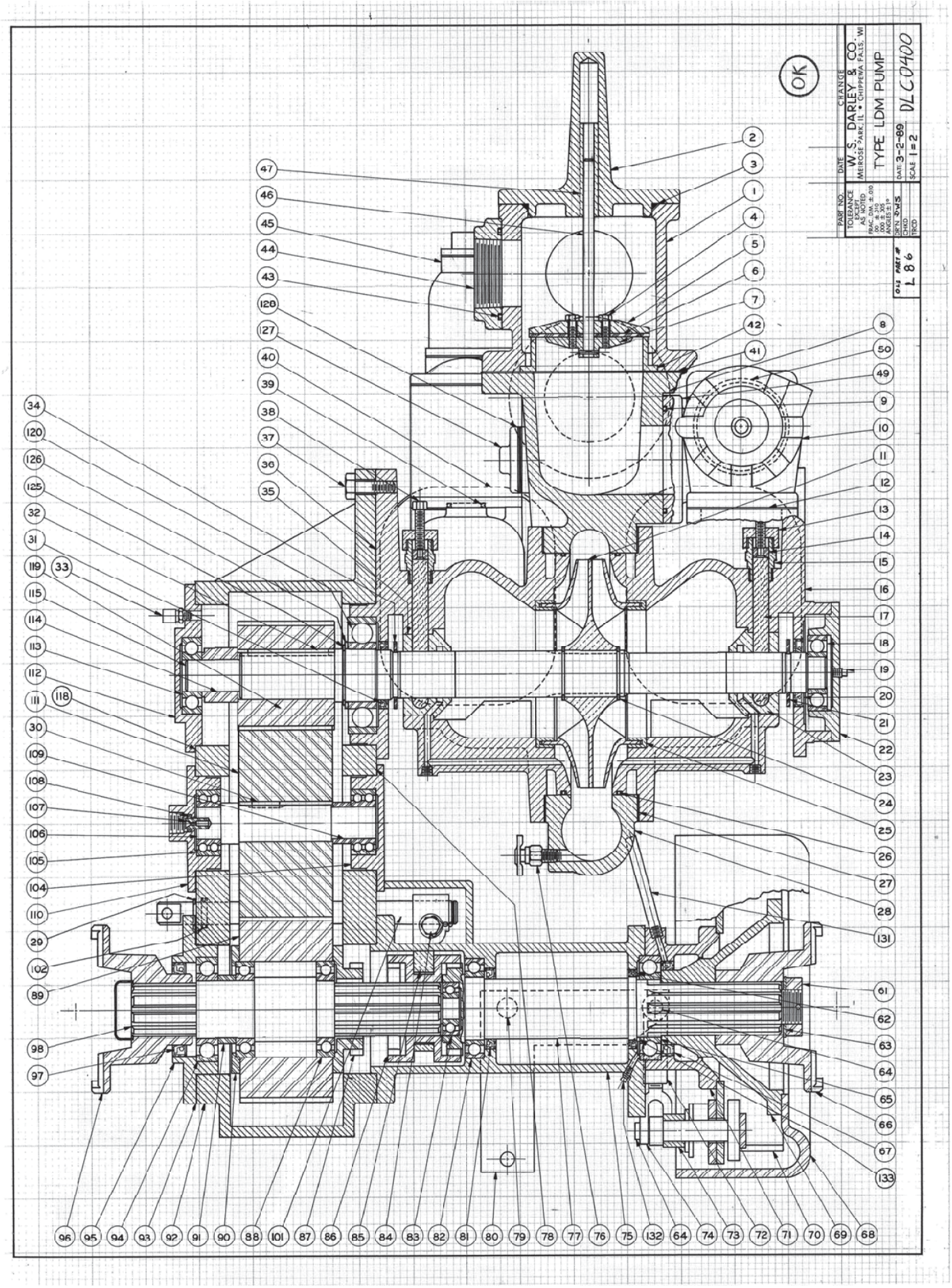
DR'N S. LEE
CHK'D TRCD SEITZ

W.S. DARLEY & Co.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

LDM TRANSMISSION ASSEMBLY
CROSS SECTION

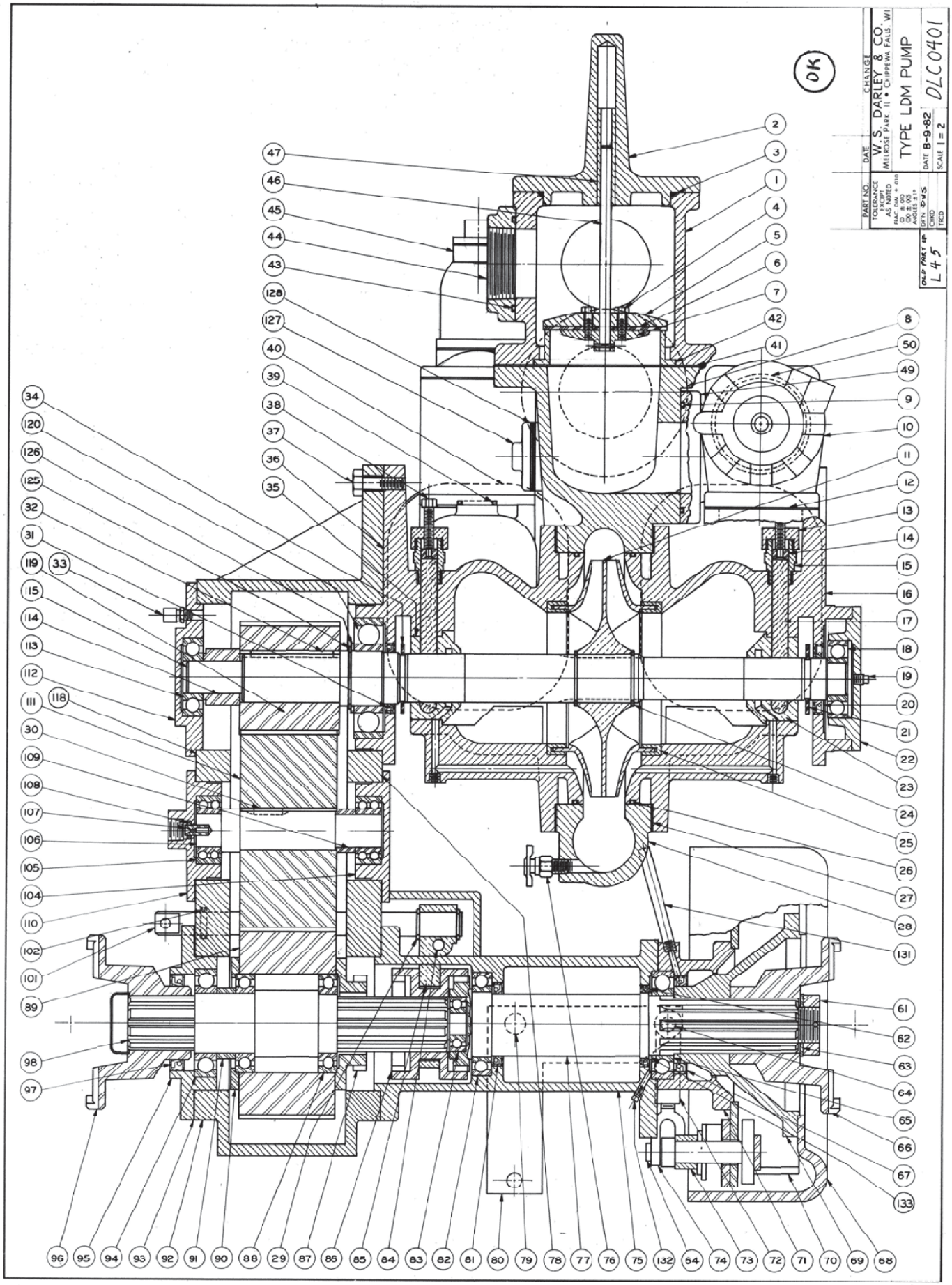
DATE APR19,94
SCALE 1/2

DLC0101


OK
W.S. DARLEY & CO.
MELROSE PARK, IL • CHIPPEWA FALLS, WI
TYPE LDM PUMP
DLC0400
DATE 3-2-89
SCALE 1=2
OLD PART # L86
PART NO.
CHANGE
DATE
TOLERANCE UNLESS NOTED AS NOTED
FRAC. DIM. ± .010
.00 ± .030
.000 ± .005
ANGLES ± 1°
DRN. CWS
CHKD.
TRCD.
47 46 45 44 43 128 127 40 39 38 37 36 35
2 3 1 4 5 6 7 42 41 8 50 49 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 131
34 120 126 125 32 31 119 33 115 114 113 112 111 118 30 109 108 107 106 105 104 110 29 102 89
61 62 63 64 65 66 67 133
98 97
96 95 94 93 92 91 90 88 101 87 86 85 84 83 82 81 80 79 78 77 76 75 132 64 74 73 72 71 70 69 68

PARTS LIST - TYPE LDM FIRE PUMP
DRAWING NO. DLC0400

Rep. No.	Name of Part
1	Discharge Head
2	Discharge Head Cap
3	O-Ring
4	Cap Screw
5	Check Valve Plate
6	Check Valve Rubber
7	Check Valve Diffuser
8	Disch. Extension & Gasket
9	Relief Valve Elbow O-ring
10	Relief Valve
11	Impeller
12	Relief Valve Gasket
13	Packing Plunger Nut
14	Packing Piston
15	Packing Cylinder
16	Suction Head - R.V. Side
17	Packing
18	Outboard Bearing
19	Lubrication Plug
20	Oil Seal
21	Outboard Water Slinger
22	Outboard Stuffing Box
23	Outboard Retaining Ring
24	Impeller
25	Seal Ring
26	Suction Head O-Ring
27	Casing Gasket
28	Pump Casing
29	Retaining Ring - Shift Bar
30	Idler Gear Key
31	Oil Seal
32	Pinion Key
33	Gearcase Vent
34	Inboard Water Slinger
35	Inboard Stuffing Box
36	Suction Head - Primer Side
37	Gearcase Retainer Bolts
38	Packing Screw
39	Primer O-Ring
40	Suction Extension & Gaskets
41	Discharge Head Gasket
42	Check Valve Seat
43	Adapter Flange O-Ring
44	Adapter Flange
45	Double Float Primer
46	Check Valve Stem
47	Check Valve Bushing
49	Relief Valve Elbow
50	Relief Valve O-Ring
61	Nut
62	Oil Seal
63	Washer
64	Clevis Pin Assembly
65	Bearing
66	Rear Yoke
67	Oil Seal
68	Brake Drum
69	Brake Drum Flange
70	Brake Assembly
71	Brake Yoke
72	Plain Yoke
73	Lever Assembly
74	Adjustable Yoke
75	Rear Bearing Bracket
76	Drain
77	Rear Drive Shaft
78	Gasket
79	Bellcrank Pin
80	Bellcrank
81	Oil Seal
82	Bearing
83	Pilot Bearing
84	Shift Yoke Lock Screw
85	Clutch Shift Yoke
86	Sliding Clutch Gear
87	Pump Clutch Gear
88	Bearing
89	Drive Gear
90	Bearing Retainer
91	Transmission Shaft Spacer
92	Gear Case - Lower
93	Gasket
94	Bearing
95	Front Bearing Bracket
96	Front Yoke
97	Oil Seal
98	Transmission Shaft
101	Shift Bar
102	O-Ring
104	Bearing Cap
105	Idler Bearing
106	Idler Gear Shaft
107	Tach Drive Nut
108	Oil Seal
109	Gear Spacer
110	Bearing Cap
111	Idler Gear
112	Bearing cap
113	Bearing
114	Pinion Spacer
115	Impeller Shaft
118	Bearing Cap Gasket
119	Pinion Gear
120	Bearing
125	Retaining Ring
126	Backup Washer
127	Strainer Flange
128	Screen & Gaskets
131	Vent Pipe
132	Grease Zerk
133	Backup Washer


OK
CHANGE
DATE
W. S. DARLEY & CO.
MELROSE PARK, IL • CHIPPEWA FALLS, WI
TYPE LDM PUMP
DLC0401
PART NO.
TOLERANCE
EXCEPT
AS NOTED
DATE 8-9-82
SCALE 1 = 2
DRN
CHKD
TRCD
OLD PART #
L45
2 3 1 4 5 6 7 42 41 8 50 49 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 131 61 62 63 64 65 66 67 133
47 46 45 44 43 128 127 40 39 38 37 36 35
34 120 126 125 32 31 119 33 115 114 113 112 111 118 30 109 108 107 106 105 104 110 102 101 89 98 97
96 95 94 93 92 91 90 88 29 87 86 85 84 83 82 81 80 79 78 77 76 75 132 54 74 73 72 71 70 69 68

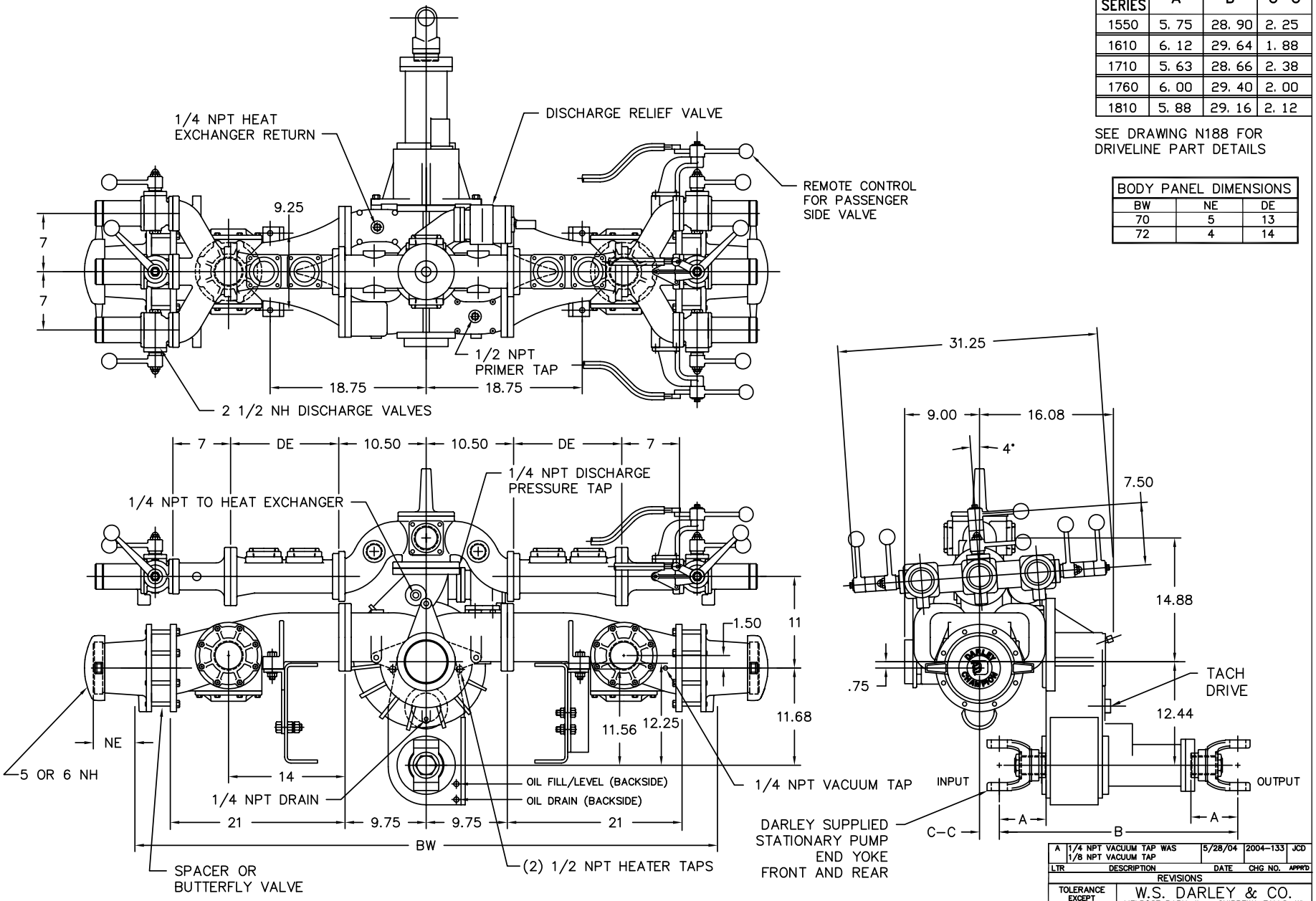
PARTS LIST - TYPE LDM FIRE PUMP
DRAWING DLC0401

Rep. No.	Name of Part
1	Discharge Head
2	Discharge Head Cap
3	O-Ring
4	Cap Screw
5	Check Valve Plate
6	Check Valve Rubber
7	Check Valve Diffuser
8	Disch. Extension & Gasket
9	Relief Valve Elbow O-ring
10	Relief Valve
11	Impeller
12	Relief Valve Gasket
13	Packing Plunger Nut
14	Packing Piston
15	Packing Cylinder
16	Suction Head - R.V. Side
17	Packing
18	Outboard Bearing
19	Lubrication Plug
20	Oil Seal
21	Outboard Water Slinger
22	Outboard Bearing Cap
23	Outboard Stuffing Box
24	Outboard Retaining Ring
25	Seal Ring
26	Suction Head O-Ring
27	Casing Gasket
28	Pump Casing
29	Retaining Ring - Shift Bar
30	Idler Gear Key
31	Oil Seal
32	Pinion Key
33	Gearcase Vent
34	Inboard Water Slinger
35	Inboard Stuffing Box
36	Suction Head - Primer Side
37	Gearcase Retainer Bolts
38	Packing Screw
39	Primer O-Ring
40	Suction Extension & Gaskets
41	Discharge Head Gasket
42	Check Valve Seat
43	Adapter Flange O-Ring
44	Adapter Flange
45	Double Float Primer
46	Check Valve Stem
47	Check Valve Bushing
49	Relief Valve Elbow
50	Relief Valve O-Ring
61	Nut
62	Oil Seal
63	Washer
64	Clevis Pin Assembly
65	Bearing
66	Rear Yoke
67	Oil Seal
68	Brake Drum
69	Brake Drum Flange
70	Brake Assembly
71	Brake Yoke
72	Plain Yoke
73	Lever Assembly
74	Adjustable Yoke
75	Rear Bearing Bracket
76	Drain
77	Rear Drive Shaft
78	Gasket
79	Bellcrank Pin
80	Bellcrank
81	Oil Seal
82	Bearing
83	Pilot Bearing
84	Shift Yoke Lock Screw
85	Clutch Shift Yoke
86	Sliding Clutch Gear
87	Pump Clutch Gear
88	Bearing
89	Drive Gear
90	Bearing Retainer
91	Transmission Shaft Spacer
92	Gear Case - Lower
93	Gasket
94	Bearing
95	Front Bearing Bracket
96	Front Yoke
97	Oil Seal
98	Transmission Shaft
101	Shift Bar
102	O-Ring
104	Bearing Cap
105	Idler Bearing
106	Idler Gear Shaft
107	Tach Drive Nut
108	Oil Seal
109	Gear Spacer
110	Bearing Cap
111	Idler Gear
112	Bearing cap
113	Bearing
114	Pinion Spacer
115	Impeller Shaft
119	Pinion Gear
120	Bearing
125	Retaining Ring
126	Backup Washer
127	Strainer Flange
128	Screen & Gaskets
131	Vent Pipe
132	Grease Zerk

YOKE SERIES	A	B	C–C
1550	5. 75	28. 90	2. 25
1610	6. 12	29. 64	1. 88
1710	5. 63	28. 66	2. 38
1760	6. 00	29. 40	2. 00
1810	5. 88	29. 16	2. 12

SEE DRAWING N188 FOR DRIVELINE PART DETAILS

BODY PANEL DIMENSIONS		
BW	NE	DE
70	5	13
72	4	14



FOR MOUNTING BRACKET DIMENSIONS SEE DETAIL DRAWING DGM1300

NET WEIGHT: 1200 LBS

LTR	DESCRIPTION	DATE	CHG NO.	APPR'D
A	1/4 NPT VACUUM TAP WAS 1/8 NPT VACUUM TAP	5/28/04	2004–133	JCD

REVISIONS

TOLERANCE EXCEPT AS NOTED
FRAC DIM ±.01
.00 ±.01
.000 ±.005
ANGLES ±1°

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

DWG – LDM, PUMP FORWARD
–

OLD PART NO. L112

DR'N S. LEE
CHKD
TRCD DWS

DATE DEC09,91
SCALE 1/8

DLD0000

ALL DIMENSIONS IN INCHES UNLESS NOTED

DO NOT SCALE PRINT

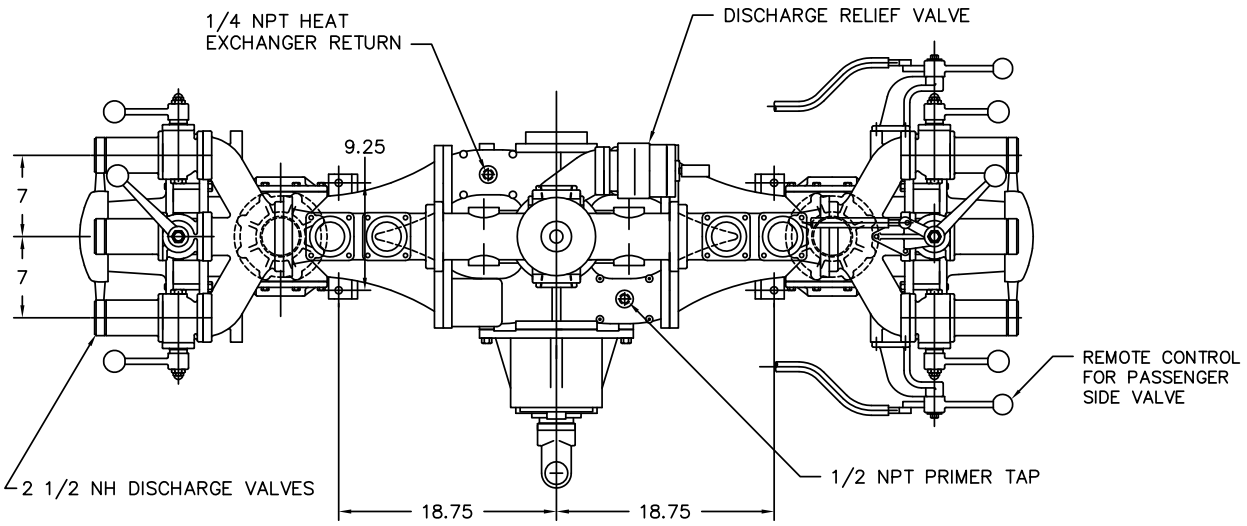
1200008

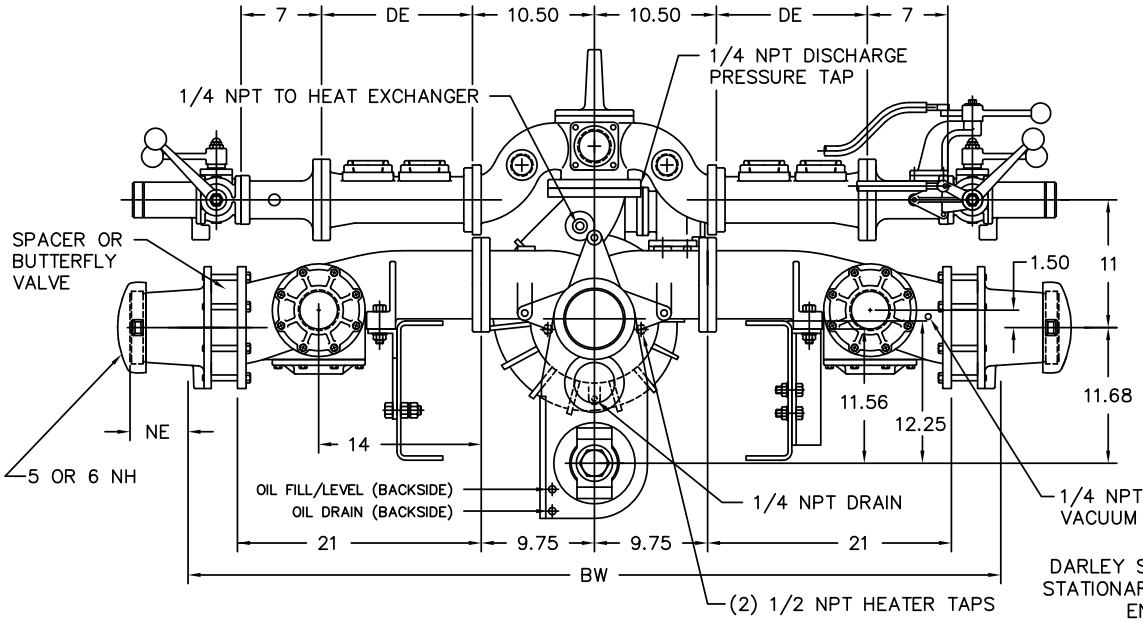
21.20

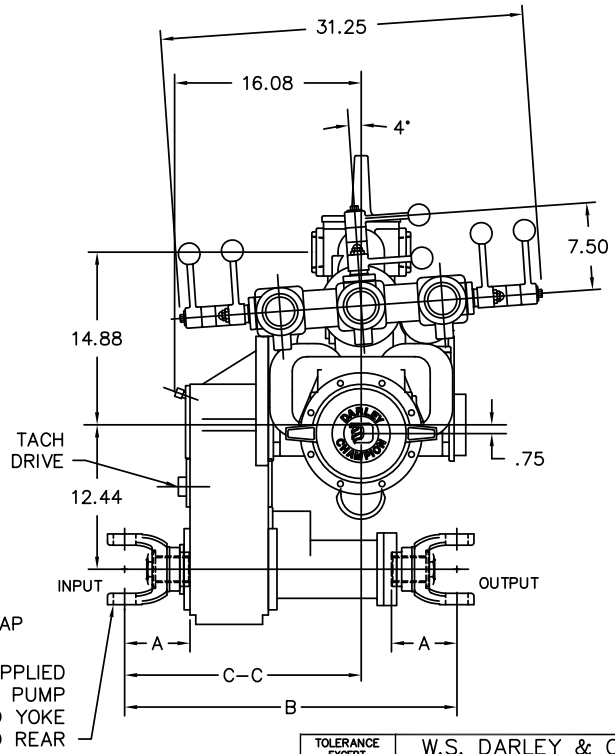
YOKE SERIES	A	B	C–C
1550	5. 75	28. 90	20. 50
1610	6. 12	29. 64	20. 88
1710	5. 63	28. 66	20. 38
1760	6. 00	29. 40	20. 75
1810	5. 88	29. 16	20. 63

SEE DRAWING DNM0000 (N188)
FOR DRIVELINE PART DETAILS

BODY PANEL DIMENSIONS		
BW	NE	DE
70	5	13
72	4	14







FOR MOUNTING BRACKET
DIMENSIONS SEE DETAIL
DRAWING DLM0300 (L100)

LTR	DESCRIPTION	DATE	CHG NO.	APPR'D
A	1/4 NPT VACUUM TAP WAS 1/8 NPT VACUUM TAP	5/28/04	2004–133	JCD

REVISIONS

ALL DIMENSIONS IN INCHES UNLESS NOTED

DO NOT SCALE PRINT

NET WEIGHT: 1200 LBS

OLD PART NO. L113

TOLERANCE EXCEPT AS NOTED
FRAC DIM ±.01
.00 ±.01
.000 ±.005
ANGLES ±1°

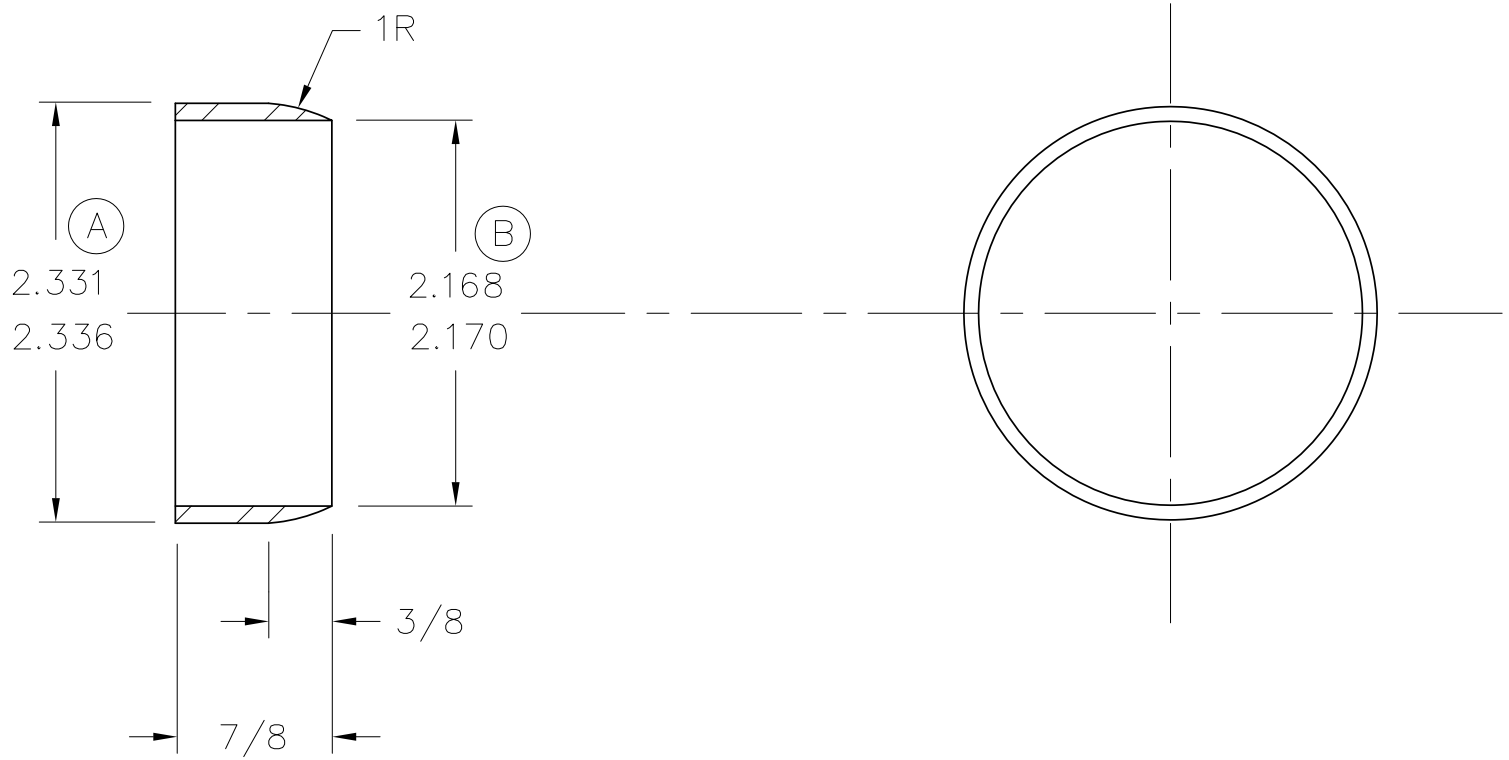
DR'N S. LEE
CHKD
TRCD DWS

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

DWG – LDM, PUMP REAR
–

DATE DEC11,91
SCALE 1/8

DLD0050



X3851–1	2–9–88	B=2.562/2.564 A=2.750/2.745
PART NO.	DATE	CHANGE

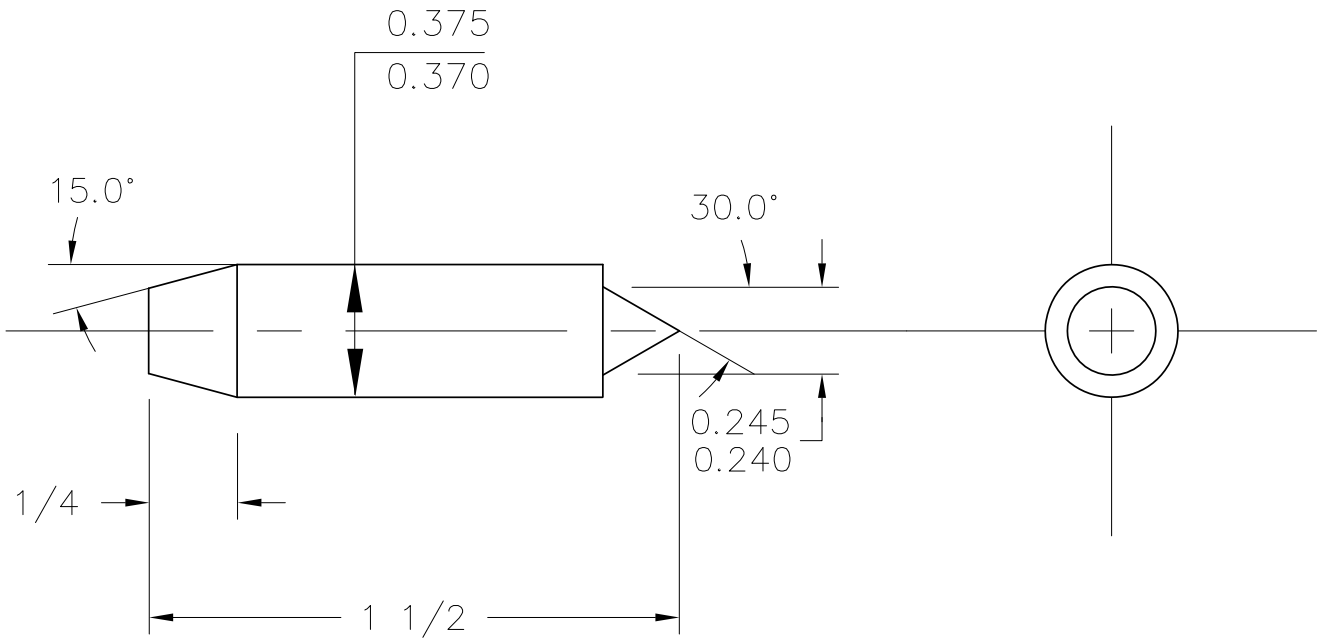
MATERIAL: 2 3/8" OD X 1" LG CRS 2 3/4" OD X 1" LG CRS FOR –1	PATTERN NO.	
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT

TOLERANCE EXCEPT AS NOTED FRAC DIM ±.01 .00 ±.01 .000 ±.005 ANGLES ±1°	W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI	
	OIL SEAL ASSEMBLY SLEEVE	
DR'N JCM	DATE FEB9,88	X3851
CHKD		
TRCD	SCALE 1/1	

21.21

1200008

1200008



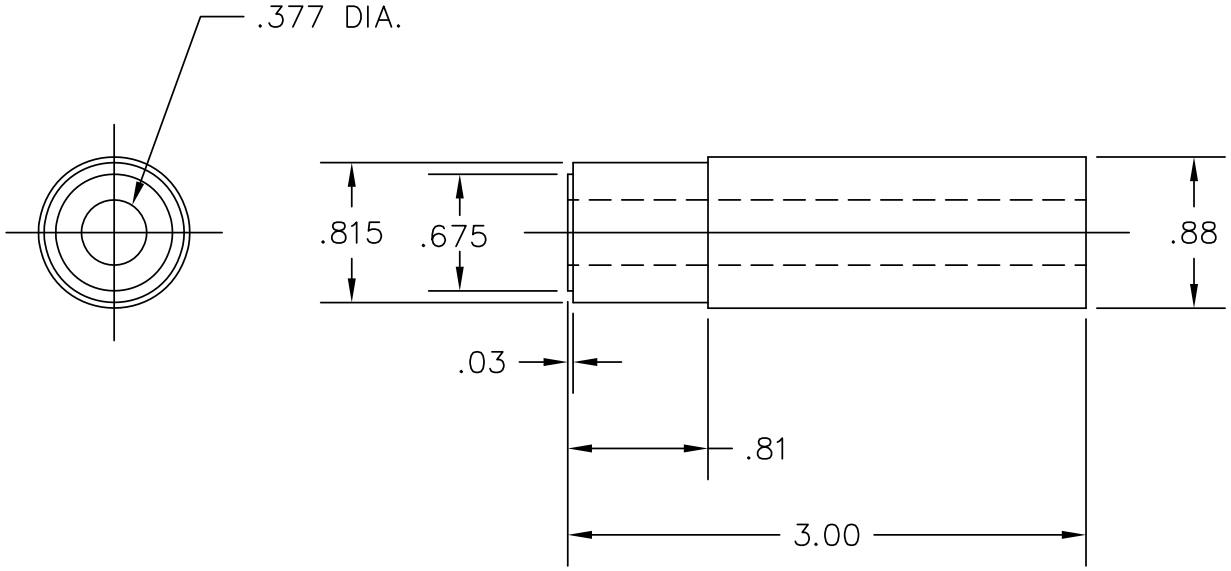
PART NO.	DATE	CHANGE

TOLERANCE EXCEPT AS NOTED FRAC DIM ±.01 .00 ±.01 .000 ±.005 ANGLES ±1°	W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI	
	OIL SEAL ASSEMBLY PLUG	
DR'N JCM CHKD TRCD	DATE FEB9,88 SCALE 2/1	X3852

MATERIAL: 3/8" OD X 1 5/8" LG 360 BRASS		PATTERN NO. 1100606
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT

21.22

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D



REMOVE SHARP EDGES

INCH
[MILLIMETER]

THIRD ANGLE PROJECTION

MATERIAL DESCRIPTION: .875 X 3.12 360 BRASS	MATERIAL NO. 1100613	OLD PART NO. — / PATTERN NO. —	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. DARLEY & Co. MELROSE PARK, IL – CHIPPEWA FALLS, WI
				OIL SEAL ASSEMBLY TOOL
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	DR'N S. LEE CHKD CKE TRCD	DATE MAY6,02 SCALE 1/1
				X3852-1

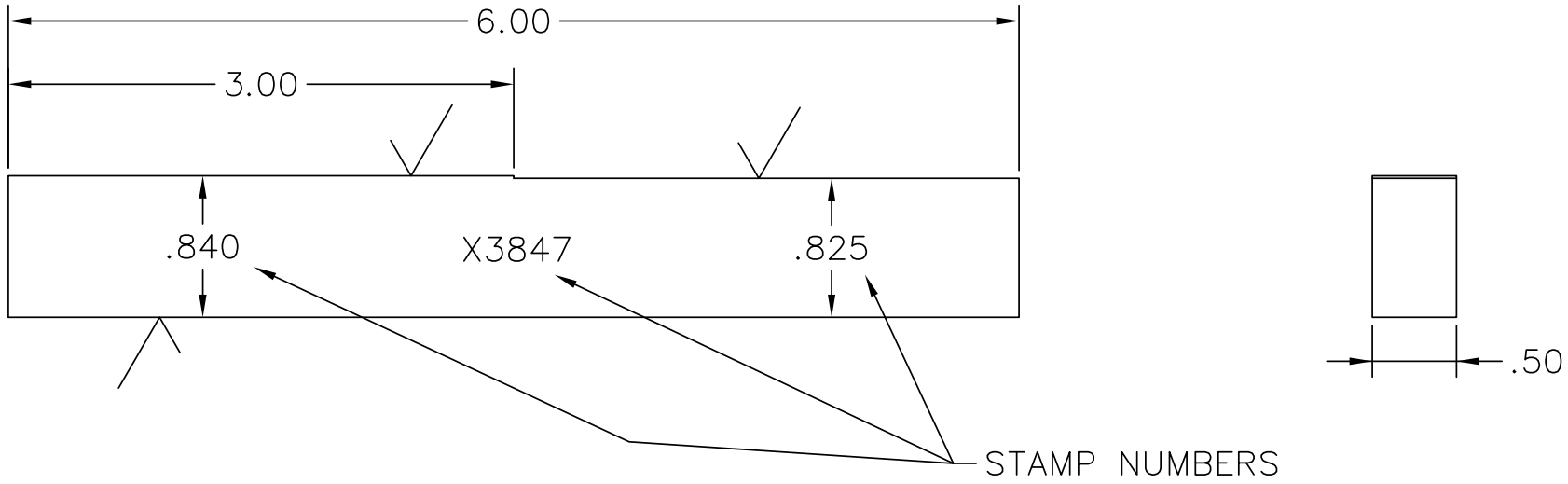
21.23

1200008

1200008

21.24

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D



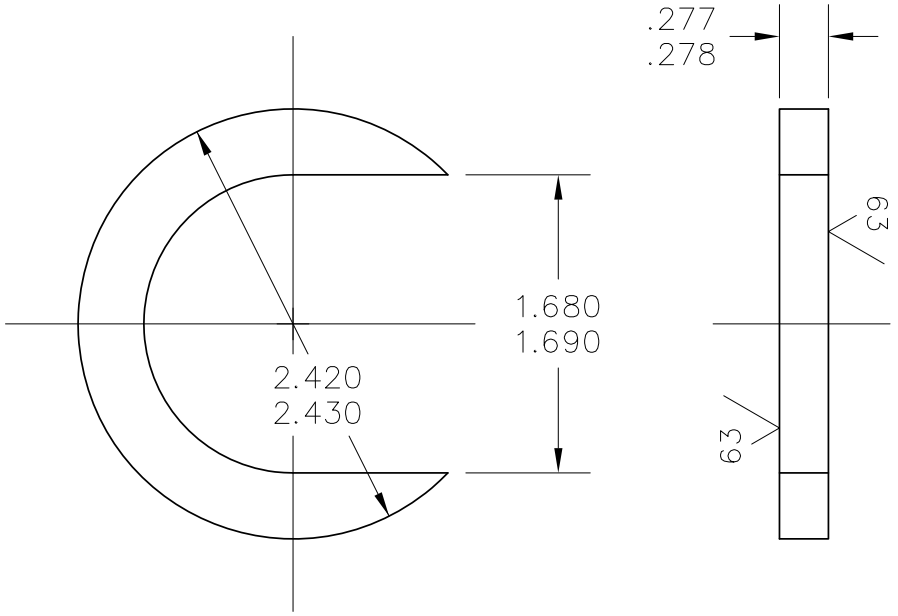
NOTE: (2) PC. REQ'D FOR BEARING SUPPORT

MATERIAL: 1/2" X 1" X 6" LG. CRS	PATTERN NO.	TOLERANCE EXCEPT AS NOTED FRAC DIM ±.01 .00 ±.01 .000 ±.005 ANGLES ±1°	W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI
		DR'N JCM	22206 BEARING INSTALL. SUPPORT BARS
		CHKD	DATE JAN21,88
		TRCD TED062294	SCALE 1/1
			X3847

ALL DIMENSIONS IN INCHES UNLESS NOTED

DO NOT SCALE PRINT

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D



REMOVE SHARP EDGES

INCH
[MILLIMETER]

THIRD ANGLE PROJECTION

		OLD PART NO. —	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI
MATERIAL DESCRIPTION: 2.50 DIA CRS	MATERIAL NO. 1100013	PATTERN NO. —		BEARING SUPPORT WASHER MIDSHIP ASSEMBLY TOOL
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	DR'N SJL CHKD GDZ TRCD	DATE 18NOV,99 SCALE 1/1

X5144

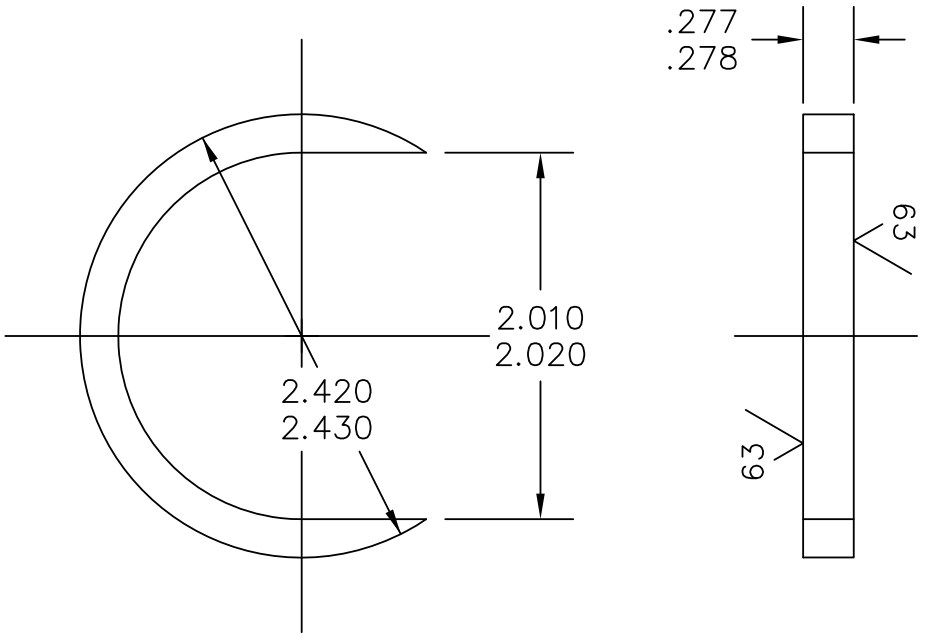
21.25

1200008

1200008

21.26

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D



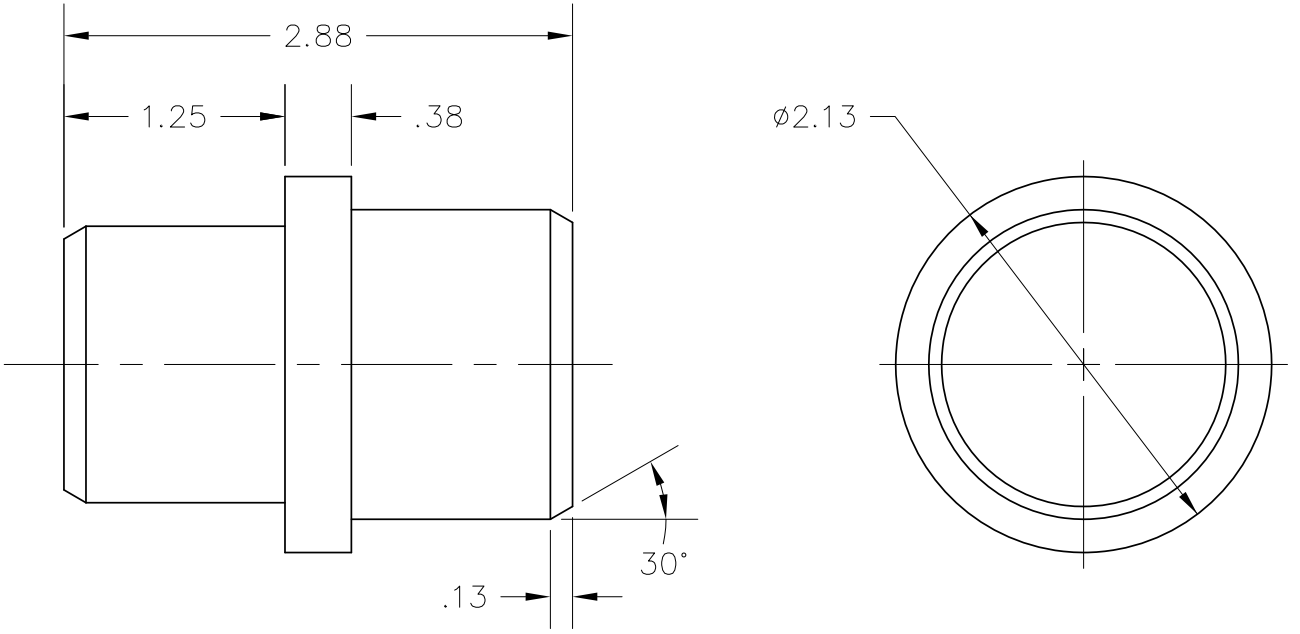
REMOVE SHARP EDGES

INCH
[MILLIMETER]

THIRD ANGLE PROJECTION

MATERIAL DESCRIPTION: 2.50 DIA CRS	MATERIAL NO. 1100013	OLD PART NO. — / PATTERN NO. —	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. DARLEY & CO. MELROSE PARK, IL – CHIPPEWA FALLS, WI
				BEARING SUPPORT WASHER MIDSHIP ASSEMBLY TOOL
			DR'N SJL CHKD GDZ TRCD	DATE 10NOV,05 SCALE 1/1
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT		X5144-2

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D



REMOVE SHARP EDGES

INCH
[MILLIMETER]

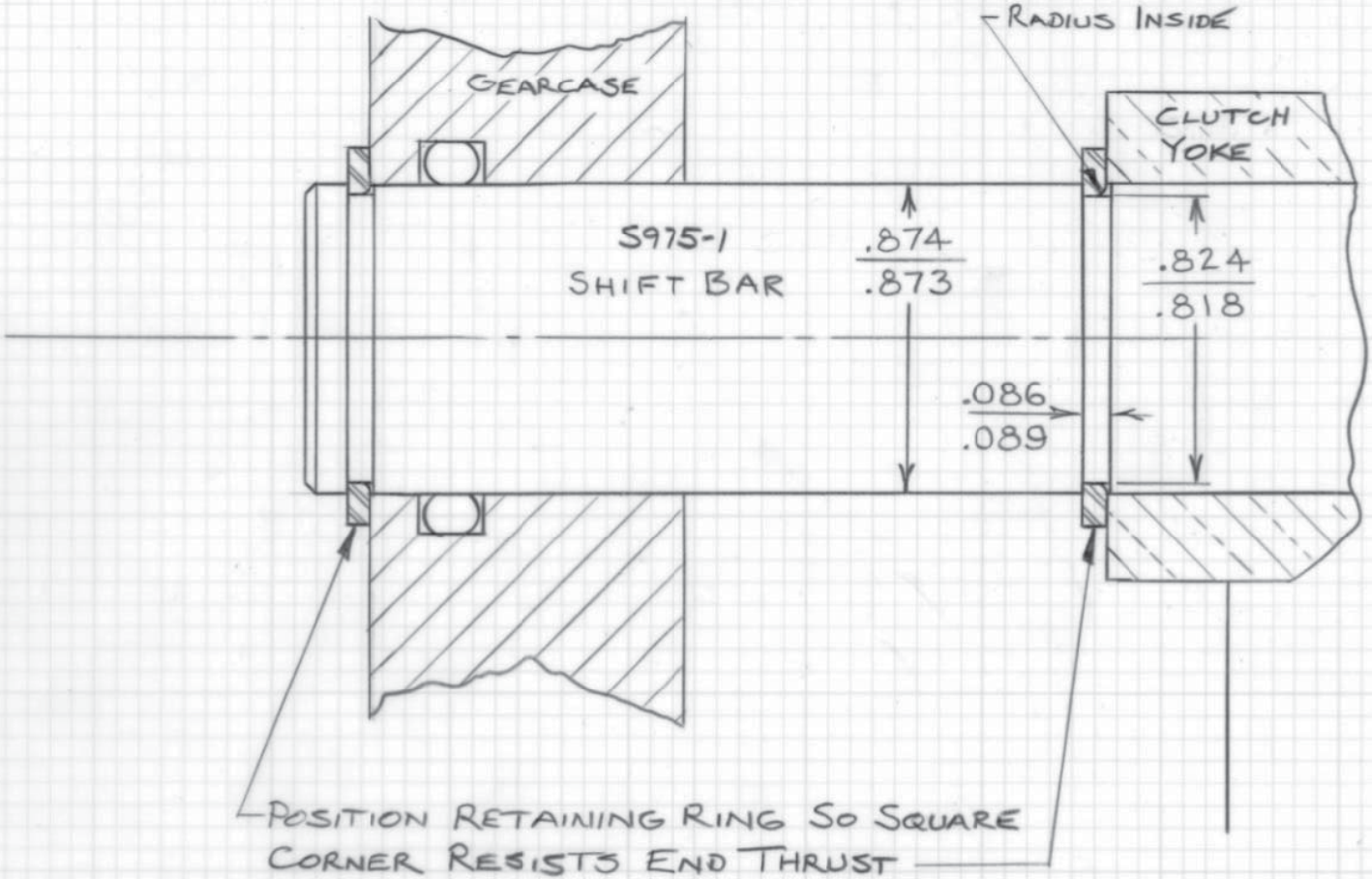
THIRD ANGLE PROJECTION

		OLD PART NO. —	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°	W.S. DARLEY & Co. MELROSE PARK, IL – CHIPPEWA FALLS, WI
MATERIAL DESCRIPTION: BAR – ROUND, ø2.12 x 2.88 LONG, CRS	MATERIAL NO. —	PATTERN NO. —	DR'N CKE	LDM STUFFING BOX ASSY TOOL 2153601 & 2153602
			CHKD SJL	DATE 12DEC,2003
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	TRCD	SCALE 1/1
				X5950

21.27

1200008

1200008



NOTE: TO INSTALL RETAINING RINGS USE S-K No. 7640 PLIERS AND BEND TIPS AT RIGHT ANGLE TO HANDLES

DO NOT OVERSTRESS RING

OK

PART NO.	DATE	CHANGE

TOLERANCE EXCEPT AS NOTED
FRAC. DIM. ±.010
.00 ±.010
.000 ±.005
ANGLES ±1°

W.S. DARLEY & CO.
MELROSE PARK, IL • CHIPPEWA FALLS, WI

SHIFT BAR RETAINING RING

MATERIAL:

OLD PART # X3494

PATTERN NO.

DR'N DWS
CHKD
TRCD

DATE 9-21-84

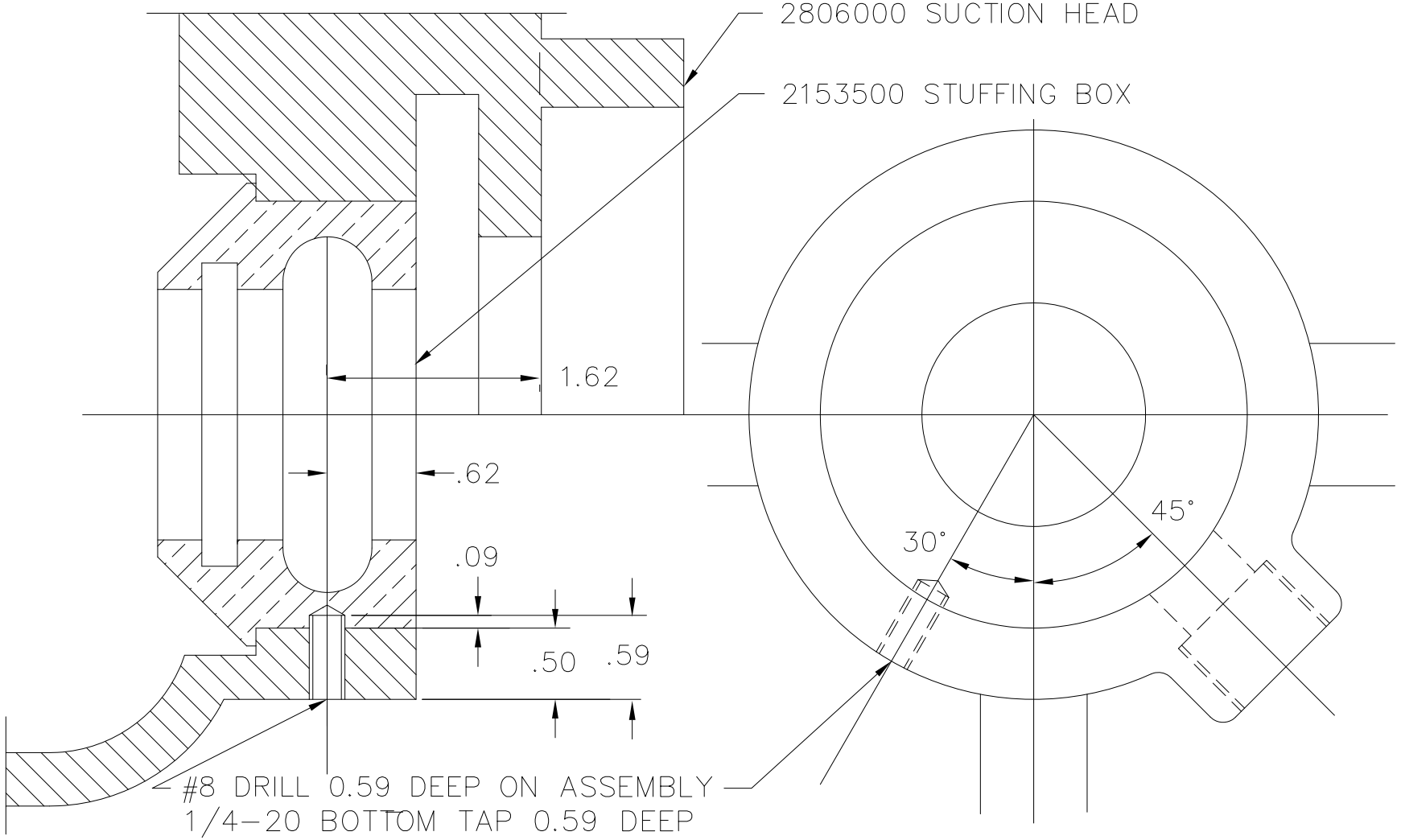
SCALE 2/1

DGM0700

ALL DIMENSIONS IN INCHES UNLESS NOTED.

DO NOT SCALE PRINT

21.28



PART NO.	DATE	CHANGE

TOLERANCE EXCEPT AS NOTED
FRAC DIM ±.01
.00 ±.01
.000 ±.005
ANGLES ±1°

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

SET SCREW DETAIL FOR LDM PUMP

MATERIAL:

OLD PART NO
X3975

DR'N JCM
CHKD
TRCD

DATE MAY15,89
SCALE 1/1

DLM0501

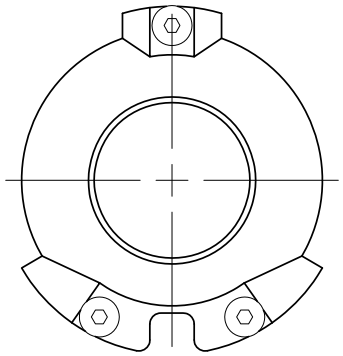
ALL DIMENSIONS IN INCHES UNLESS NOTED

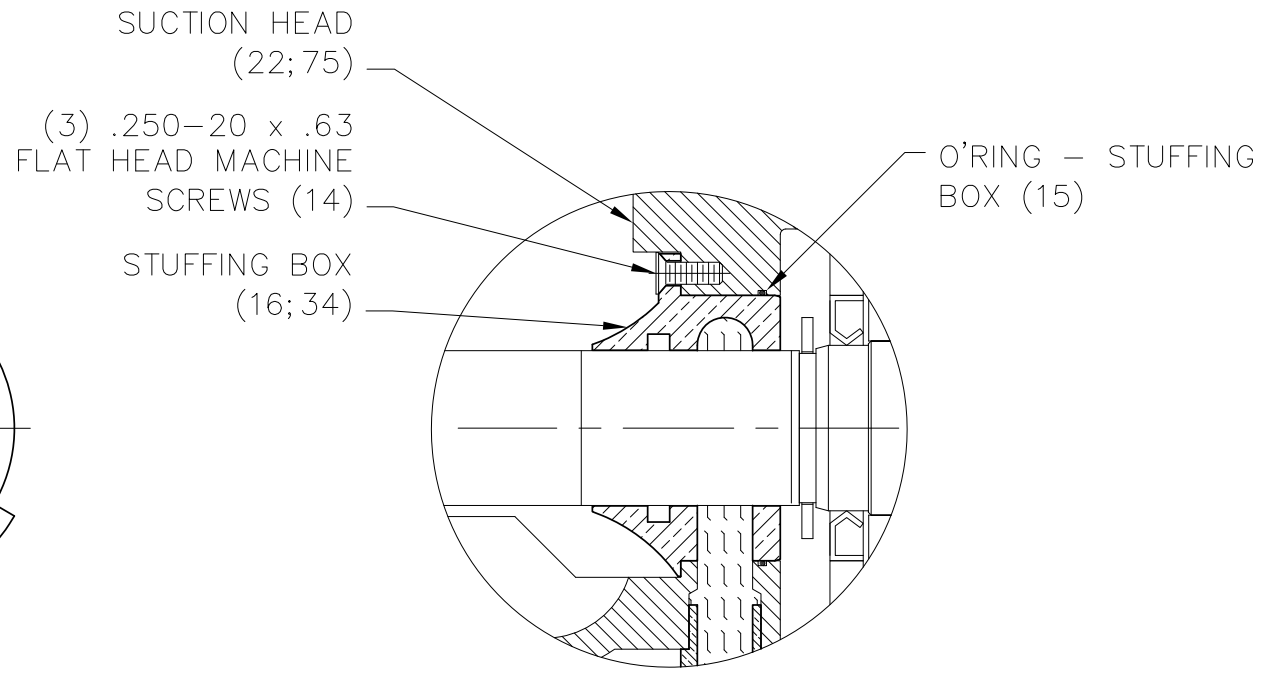
DO NOT SCALE PRINT

1200008

21.30

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D





INSTALL (3) 1/4–20NC x 0.63 LONG
STAINLESS STEEL FLAT HEAD MACHINE
SCREWS WITH LOCTITE 243 (OR EQUIVALENT).
TORQUE TO 72 IN–LBS.

INCH
[MILLIMETER]

THIRD ANGLE PROJECTION

MATERIAL DESCRIPTION: –	MATERIAL NO. –	PATTERN NO. –	OLD PART NO. –	TOLERANCE EXCEPT AS NOTED .00 ±.03 .000 ±.010 ANGLES ±1°
THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	DR'N CKE CHKD SJL TRCD	DATE 11DEC,2003 SCALE 1/2

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

DWG – PACKING, FLAT HD SCREWS LDM

DLM0502

W.S. DARLEY & CO.
REPAIR SERVICE INSTRUCTION
SECOND STAGE HIGH PRESSURE PUMP

TO REMOVE SECOND STAGE FROM MAIN TRANSMISSION
REFER TO DRAWING DLC0104

1. Disconnect shift bar linkage. Do not remove adjustable yoke from bearing caps (23) (46).

2. Remove four 3/8" NC cap screws holding inlet flange (32) to pump casing (32).

3. Remove twelve 1/4" NC cap screws holding gear case (19) to main pump transmission case. Use gear case cap screws in tapped puller holes on top and bottom of gear case to separate flanges.

4. If second stage pump is to be returned to factory for repairs, disconnect suction tube, plug opening in main pump discharge elbow, and cover transmission case opening with the blank cover provided.

CAUTION: If pump is returned to service without the third stage pump, refill transmission with SAE 80W/90 gear lube oil to the level of the 1/8" NPT gage plug.

DISASSEMBLY OF SECOND STAGE PUMP FOR OVERHAUL

1. Make alignment marks on the pump casing (32) and gear case (19). A center punch or cold chisel works well for this.

2. Remove sixteen 3/8" NC nuts and holding pump casing (32) to gear case (19) and separate flanges.

3. Remove cotter key (2), impeller nut (3) and impeller washer (5) from pump shaft (16). Place a hardwood block against idler gear (42) engaged with pinion gear (18) to keep shaft from rotating.

4. Pry impeller (33) off of pump shaft (16), using a pair of flat bars between back of impeller and stuffing box at opposite sides. Bear against impeller where vanes provide support. Remove space (6).

5. Make alignment marks on stuffing box (7) and gear case (19) with indelible marker.

6. Remove two 5/16" NC cap screws and remove packing plunger guide (11) from stuffing box (7).

7. Remove six 1/4" flat head brass machine screws holding stuffing box (7) to gear case (19) and separate.

8. Slide water slinger (9) off of pump shaft (16).

9. Remove four retaining rings from shift bar (48) and slide shift bar out of shift collar (17) and gear case (19).

10. Remove shift bar o-ring (47) and shift bar oil seal (37) from gear case (19).

11. Remove eight 5/16" NC cap screws and remove bearing caps (23), (46) from gear case (19).

12. Use a heavy flat puller bar with two tapped holes 3-1/4" apart with a 13/32" clearance hole centered in between the pull idler gear shaft (40) and bearing (36) out of idler gear (42) and gear case (19) using the 3/8" NC tapped puller hole in the end of shaft.

13. Press bearing (36) off of idler gear shaft (40).

14. Remove bearing (36) at pump end with a hooked pry bar.

15. Push pump shaft (16) assembly through gear case toward bearing cap end.

16. Press bearing (21), spacer (20), and pinion gear (18) off of pump shaft (160 together.

17. Press bearing (15) off of pump shaft (16).

18. Pull or tap oil seal (10) out of gear case (19).

PUMP PARTS INSPECTION AND MEASUREMENT

1. Clean all parts and inspect carefully for wear or deterioration. Replace all questionable parts.

2. Measure the impeller seal rings and the impeller for wear. Use the following table for comparison

Impeller Seal Ring O.D.	1.868-1.870"
Impeller Seal Ring I.D.	1.626-1.628"
Seal Ring O.D.	1.878-1.880"
Seal Ring I.D.	1.616-1.618"
Stuffing Box Seal Ring O.D.	1.878-1.880"
Stuffing Box Seal Ring I.D.	1.616-1.618"
Clearance O.D. - original	0.008-0.012"
Clearance I.D. - original	0.008-0.012"

3. If clearance exceeds 0.025” on diameter, impeller seal rings can be restored to original size by soldering a ring over trued surface which retains at least 0.090” wall thickness. Stationary seal ring (31) and stuffing box (7) should also be restored or you may purchase undersize seal rings. Call customer service for details.

4. Measure the impeller shaft and stuffing box for wear. Use the following table for comparison.

Impeller Shaft diameter at packing area	0.870-0.871"
Stuffing Box bore- Original	0.875-0.877"
Stuffing Box bore - maximum	0.882"
Clearance - original	0.004-0.007"
Clearance - maximum allowable	0.012"

5. Measure bearing housing bores for proper size. Use the following table for comparison. If any bore exceeds the high limit by 0.0005”, the part should be replaced.

PART	REP NO.		ORIGINAL BORE DIAMETER
Pump Head	19	all	2.4410-2.4416'

6. Measure shaft bearing journals for proper size. Use the following table for comparison. The low limit under bearing is required to insure a press fit with inner ball bearing race.

PART	REP NO.		ORIGINAL JOURNAL DIA.
Pump Shaft	16	pump side	.09842-0.9846"
			0.6692-0.6695"
Idler Shaft	40		1.1808-1.1812"'

7. The original idler gear shaft diameter under the idler gear is 1.3775-1.3780”. the original idler bore is 1.3785-1.3790” providing a 0.0005 to 0.0015” clearance. The parts are still serviceable up to 0.0020” clearance.

ASSEMBLY OF SECOND STAGE HIGH PRESSURE PUMP
Refer to Drawing DLC0104

1. Apply grease to shift bar oil seal (37) and insert into groove in gear case (19) with inside lip facing gear case.

2. Apply grease to shift bar o-ring (47) and insert into groove in gear case (19).

3. Press oil seal (10) into gear case (19) flush with face, with lip spring of seal facing bearing . Fill grease cavity with grease and lubricate oil seal lips.

4. Press bearing (15) onto pump shaft (16) tight against shoulder.

5. Apply oil to splines of pump shaft (16). Slide pinion gear (18) onto pump shaft with shift groove end towards pump side. Slide pinion spacer (20) onto pump shaft.

6. Apply a light coating of grease to bore of bearing (21). Press bearing onto pump shaft (16) until inner race of bearing is tight against spacer.

7. Wrap splined end of pump shaft (16) in shim stock to prevent damage to oil seal as shaft is inserted.

8. Press pump shaft (16) assembly into gear case (19) from bearing cap end until bearing (15) contacts the shoulder of its bearing pocket.

9. Tap idler shaft bearing (36) into bearing pocket on pump side of gear case (19) until bearing contacts the shoulder.

10. Position idler gear (42) and spacer (39) in gear case and push idler shaft (40) in by hand until resistance is felt. Rotate gear on shaft to line up keyways.

11. Insert idler gear key (44) to hold keyways in line and press idler shaft (40) all the way into bearing (36). Tap key all the way into keyway.

12. Tap remaining idler shaft bearing (36) onto idler gear shaft (40) and into bearing bore of gear case (19).

13. Trim bearing cap gaskets (22) so that they do not interfere with bearing (21) and (36).

14. Apply as thin lay of Loctite 518 equivalent to gasket flange surface of bearing cap (23), (46). Place bearing cap gaskets (22) on bearing caps.

15. Attach bearing cap (23), (46) to gear case (19) with eight 5/16” NC x 3/4” cap screws and lock washers.

16. Apply oil to shift bar (48) and slide shift bar half-way into gear case (19).

17. Engage large side of shift collar (17) in groove of pinion gear (18) and slide shift bar (48) into shift collar and all the way into pump head.

18. Place four retaining rings (24), on shift bar(48). Make sure shift collar (17) is between two closely spaces grooves near center of bar. See Drawing DGM0700, which shows sharp corner side of retaining ring in proper position to take thrust load. All retaining rings should be tight in groove. Replace any loose rings.

19. Slide water slinger(9) onto pump shaft (16).

20. Apply a thin layer of Loctite 518 or equivalent to gasket flange surface of stuffing box (7). Place stuffing box gasket (35) in position.

21. Slide stuffing box (7) over pump shaft (16). Line up alignment marks on stuffing box (7) and gear case (19). Apply thread tape and Loctite 243 or equivalent to the thread of six 1/4" x 1" flat head brass machine screws. Attach stuffing box to pump head with these screws.

22. Trim gasket around stuffing box and clean off Loctite.

23. Slide impeller spacer (6), impeller (3), and impeller washer (5) onto pump shaft (6).

24. Clean and dry shaft thread and impeller nut (3), removing dirt, grease, and oil. (Loctite Klean N' Prim, Part No. 2556, can be used to clean parts and shorten cure time.)

25. Apply Loctite 243 or equivalent to shaft thread and nut thread.

26. Tight impeller nut (3) until it contact impeller washer (5), then turn to next cotter key hole. **(DO NOT OVER TIGHTEN).**

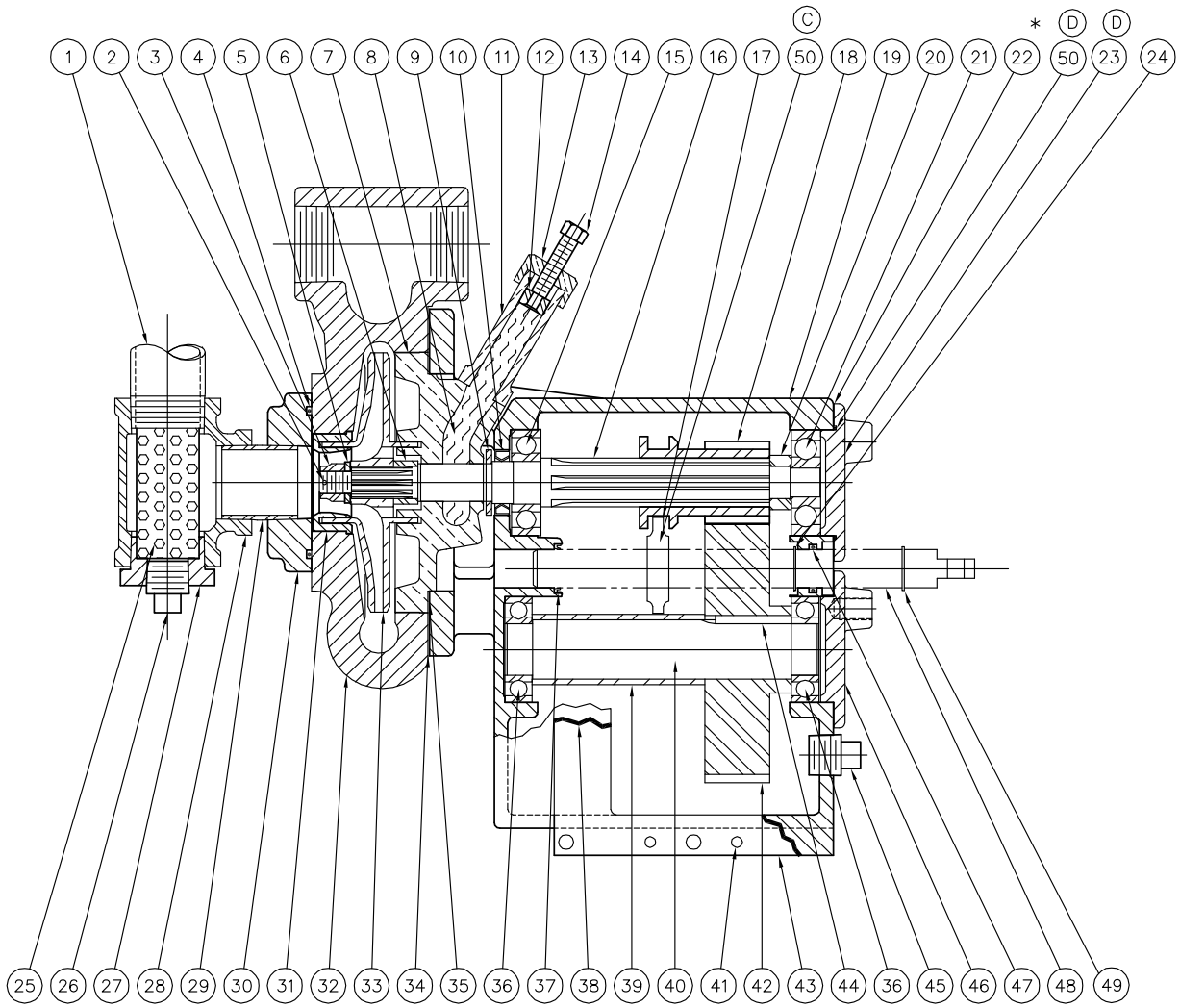
27. Install a 3/32" x 1-1/4" STAINLESS STEEL cotter key (2) in pump shaft cotter key hole.

28. Place pump casing gasket (34) on studs of pump casing (32).

29. Line up alignment marks and push pump casing (32) onto gear case (19). Attach with sixteen 3/8" NC nuts on studs.

30. Attach packing plunger guide (1) to stuffing box (7) with two 5/16" NC x 3/4" cap screws and lock washers.

31. Apply a thin layer of Loctite 518 or equivalent to gasket flange surface of stuffing box (7) and place gasket in position.



(D) REPL 2302600 W/ 2302604 AND 3601007 23SEP05 2005–285 CKE

(C) 2002–134 SHCS ADDED 09SEP02 JSS

* GASKET REMOVED 5/94

(49) ADDED 3–23–90

THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. – UNAUTHORIZED REPRODUCTION IS PROHIBITED	ALL DIMENSIONS IN INCHES UNLESS NOTED	DO NOT SCALE PRINT	OLD PART NO. L88	TOLERANCE EXCEPT AS NOTED FRAC DIM ±.01 .00 ±.01 .000 ±.005 ANGLES ±1°

W.S. DARLEY & CO.
MELROSE PARK, IL – CHIPPEWA FALLS, WI

DWG – LDM SECOND STAGE CROSS SECTION PUMP ASSY

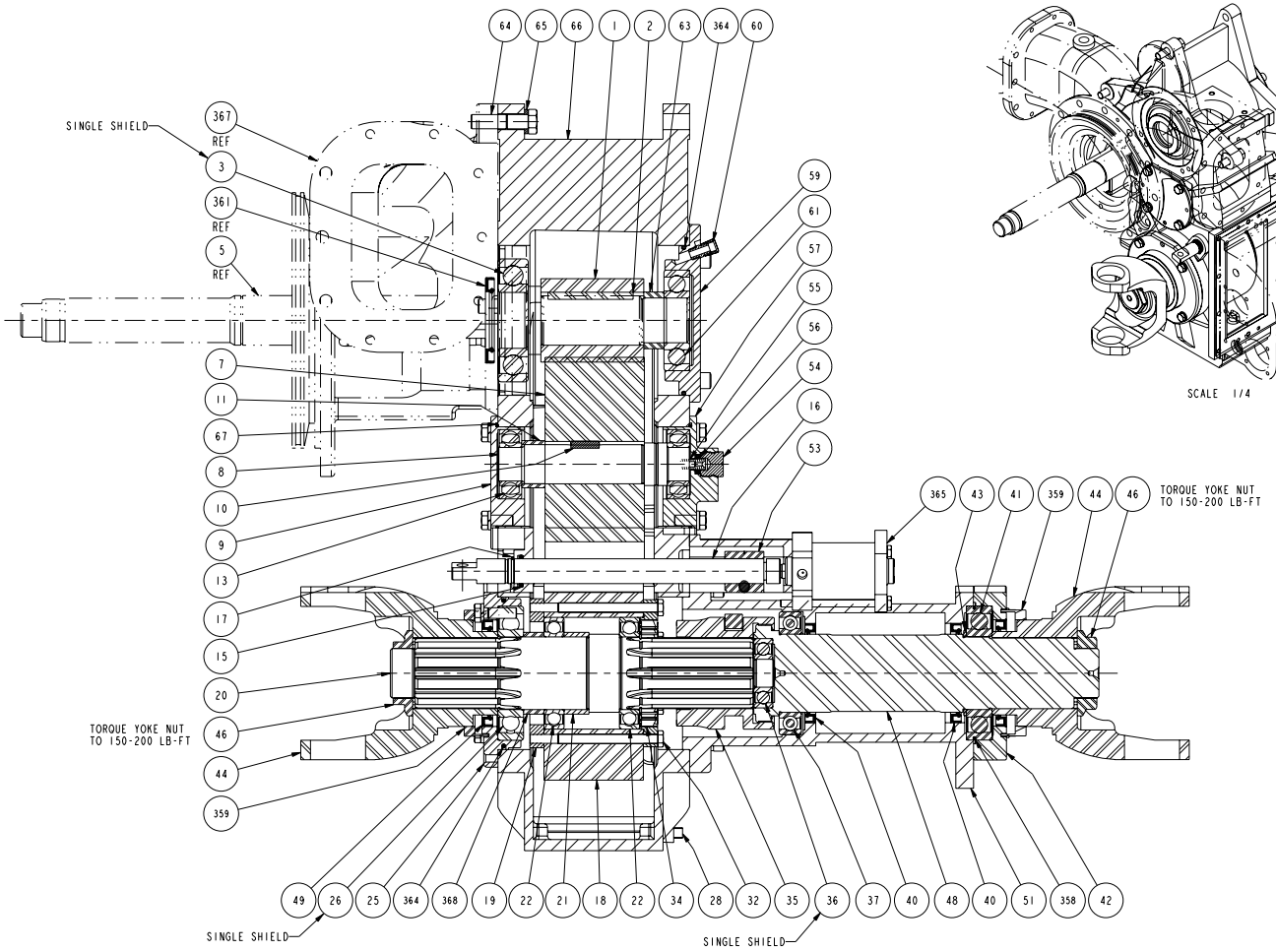
DR'N S. LEE
CHKD
TRCD
DATE AUG28,89
SCALE 1/2

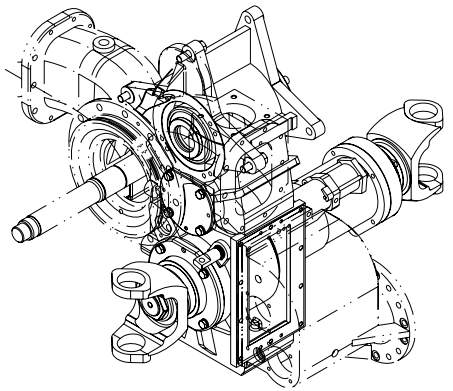
DLC0104

LDM SECOND STAGE PUMP
DRAWING NO. DLC0104

Rep. No.	Name of Part	Qty
1	Inlet Pipe	1
2	Cotter Pin	1
3	Impeller Nut	1
4	Flange O-Ring	1
5	Impeller Washer	1
6	Impeller Spacer	1
7	Stuffing Box Head	1
8	Pump Packing	10
9	Water Slinger	1
10	Impeller Shaft Oil Seal	1
11	Packing Cylinder	1
12	Gland Stud Piston	1
13	Gland Nut	1
14	Packing Screws	1
15	Impeller Shaft bearings	1
16	Impeller Shaft	1
17	Shift Collar	1
18	Pump Drive Pinion	1
19	Gear Case	1
20	Pinion Spacer	1
21	Impeller Shaft bearing	1
22	Bearing Cap Gasket	2
23	Bering Cap	1
24	Retaining Ring	4
25	Strainer Sleeve	1
26	Pipe Plug	1
27	Strainer Fitting	1
28	Inlet Pipe	1
29	Close Nipple	1
30	Inlet Flange	1
31	Seal Ring	1
32	Pump Casing	1
33	Impeller	1
34	Pump Casing Gasket	1
35	Stuffing Box Gasket	1
36	Idler Shaft bearing	2
37	Shift Bar Oil Seal	1
38	Gearcase Gasket	2
39	Idler Shaft Spacer	1
40	Idler Shaft	1
41	Alignment Pin	2
42	Idler Gear	1
43	Gearcase Spacer	1
44	Idler Gear Key	1
45	Oil Level & Fill Plug	1
46	Bearing Cap	1
47	Shift Bar O-Ring	1
48	Shift Bar	1
49	External Retaining Ring	1
50	O-ring, Bearing Cap	1

NO.	DESCRIPTION	PART NO.	QTY.
1	GEAR - PINION	-	1
2	KEY - SQ., 0.25 X 3.00 GR2	-	1
3	BEARING-BALL, 310SF	-	1
5	SHAFT - PUMP, LDM	-	1
7	GEAR - IDLER	-	1
8	SHAFT - IDLER GEAR, N	-	1
9	BEARING CAP, IDLER	-	1
10	KEY - SQ., 0.25 x 1.00, GR2	-	1
11	SPACER - 1.38 x 1.66 x 0.82	-	1
13	BEARING - 22206 PC-3	-	2
15	O-RING - 0.88 x 1.12 x 0.12	-	1
16	SHIFT BAR - PSM	-	1
17	RING - RETAINER, 5160-87	-	1
18	GEAR - DRIVE, LDMH	-	1
19	RETAINER - BEARING, N	-	1
20	SHAFT - TRANSMISSION	-	1
21	SPACER - 2.56 x 2.88 x 0.87	-	1
22	BEARING-BALL, 113KSFF	-	2
25	BRACKET - BEARING, FRONT, N	-	1
26	BEARING-BALL, 213SF	-	1
28	PLUG - PIPE, 0.375, MAG SQ HD	-	1
32	HHCS - .313-18 X 4.50, F-911	-	6
34	GEAR - PUMP CLUTCH	-	1
35	GEAR - SLIDING CLUTCH, N	-	1
36	BEARING-BALL, 305SFF	-	1
37	BEARING-BALL, 114KSFCO	-	1
40	OIL SEAL - 2.750 ID X 3.505 OD	-	2
41	BEARING-BALL, 213SFF	-	1
42	REAR BEARING CAP, N	-	1
43	WASHER - 2.56 x 3.00 x .09 STL	-	1
44	END YOKE	-	2
46	LOCKNUT	-	2
48	SHAFT - TRANSMISSION	-	1
49	OIL SEAL - 2.938 ID X 3.756 OD	-	2
50	WIRE - SAFETY	-	1
51	BRACKET - BEARING, REAR NO BRK	-	1
52	LOCK BOLT - SHIFT BAR	-	1
53	SHIFT YOKE	-	1
54	PLUG - TACH, .88-18UNS	-	1
55	NUT - CABLE DRIVE, KDM, 0.104	-	1
56	OIL SEAL - 0.375 ID X 0.688 OD	-	1
57	CAP - BEARING, IDLER, TACH	-	1
59	CAP - BEARING, PUMP SHAFT	-	1
60	VENT	-	1
61	BEARING-BALL	-	1
63	SPACER - 1.57 X 2.00 X 0.71	-	1
64	HHCS - .500-13 x 2.00, GR5	-	1
65	WASHER - LOCK, 0.500 ID	-	3
66	GEARCASE - LDMH	-	1
67	O-RING - 3.50 x 3.69 X 0.09	-	2
68	WASHER - LOCK, HC, 0.375 ID	-	8
101	SHCS - .375-16 x 1.50, GR8	-	7
102	WASHER - LOCK, 0.375 ID	-	16
103	HHCS - .500-13 x 1.75, GR5	-	2
104	SHCS - .375-16 x 1.00, GR8	-	5
105	HHCS - .375-16 x 0.88, GR5	-	8
106	HHCS - .375-16 x 1.25, GR5	-	4
107	HHCS - .375-16 x 1.75, GR5	-	4
124	PIN - DOWEL, .250 X 0.62, GR8	-	2
125	PIN - DOWEL, .313 X 1.00, MIL-SPEC	-	2
358	O-RING - 4.50 x 4.69 x 0.09	-	1
359	FLINGER - WATER	-	2
361	OIL SEAL - 1.875 ID X 3.005 OD	-	1
362	PELLET - OIL WICK	-	6
363	O-RING - 20MM x 25MM x 2.5MM	-	1
364	O-RING - 5.00 x 5.25 x 0.12	-	2
365	AIR CYLINDER - 1.75 BORE	-	1
366	DIPSTICK - M22x2.5 THR'D	-	1
367	HEAD - SUCTION, LDM, PACKING	-	1
368	SPACER - 2.56 X 2.88 X 0.72	-	1





SCALE 1/4

NOTE: DIPSTICK, OIL-WICK PELLET, AND FASTENERS SHOWN ON EXPLODED VIEW (SHEET 2)
NOTE: BEARINGS WITH SINGLE SHIELDS - SHIELDED SIDE GOES TOWARD OUTSIDE OF TRANSMISSION

REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D

REMOVE SHARP EDGES | INCH [MILLIMETER] | THIRD ANGLE PROJECTION | OLD PART NO. | TOLERANCE EXCEPT AS NOTED .99 ± 0.03, .500 ± 0.010, ANGLES ± 2°

MATERIAL DESCRIPTION: - | MATERIAL NO. - | PATTERN NO. -

THIS DESIGN IS THE PROPERTY OF W.S. DARLEY AND CO. - UNAUTHORIZED REPRODUCTION IS PROHIBITED | ALL DIMENSIONS IN INCHES UNLESS NOTED | DO NOT SCALE PRINT

DR'N CKE | CHKD SJL | TRCO

MODEL NAME DLC0301 | MDL CREATED 12/13/05 | SHEET 1/2 D

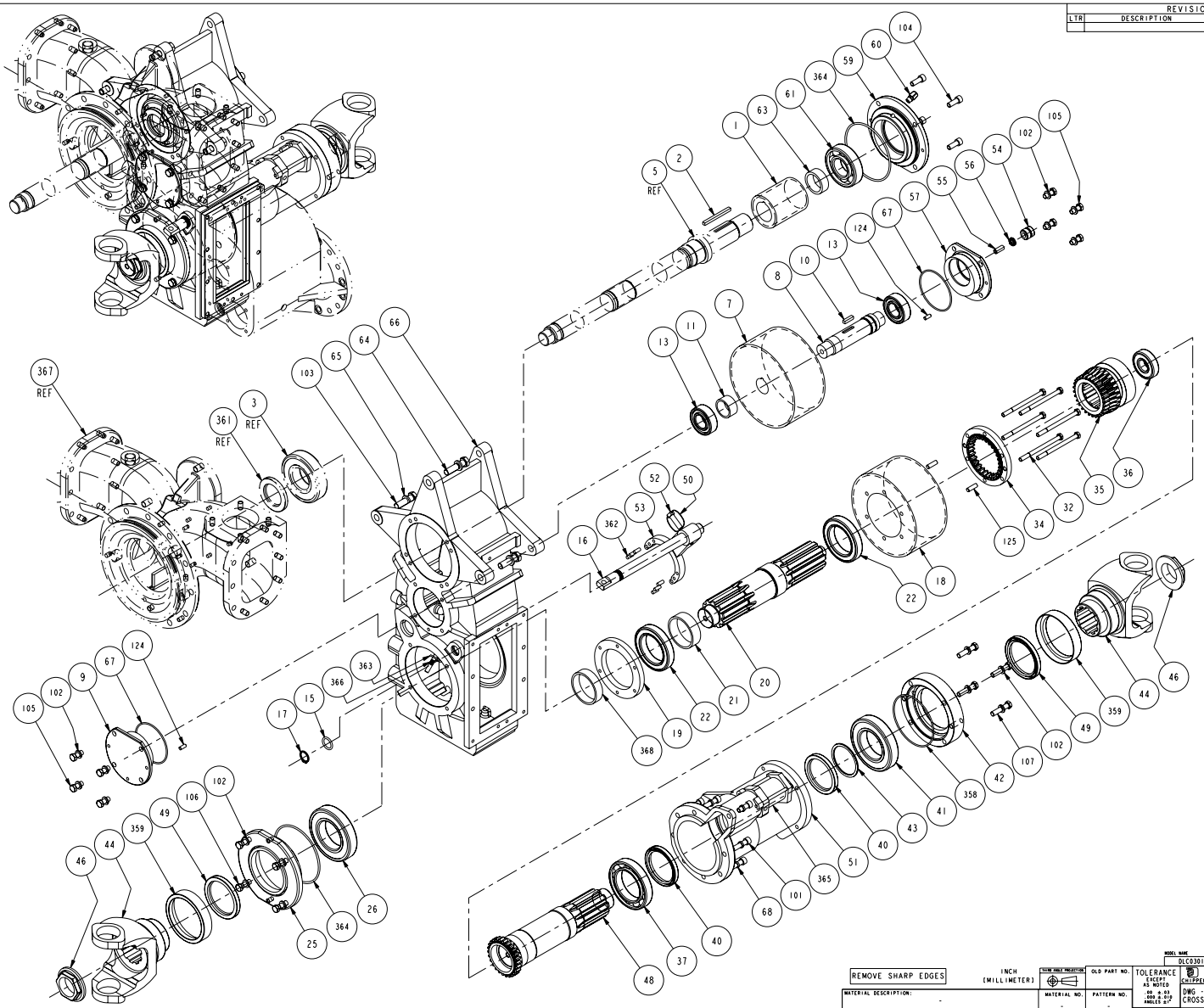
W.S. Darley & Co. CHIPPEWA FALLS, WI. - MELROSE PARK, IL

DWG - LDMH, TRANS, O'RING CROSS SECTION / EXPLD VIEW

DATE 27-Dec-05 | SCALE 1/8

DLC0301

NO.	DESCRIPTION	PART NO.	QTY.
1	GEAR - PINION	-	1
2	KEY - SQ., 0.25 X 3.00 GR2	-	1
3	BEARING-BALL, 310SF	-	1
5	SHAFT - PUMP, LDM	-	1
7	GEAR - IDLER	-	1
8	SHAFT - IDLER GEAR, N	-	1
9	BEARING CAP, IDLER	-	1
10	KEY - SQ., 0.25 x 1.00, GR2	-	1
11	SPACER - 1.38 x 1.66 x 0.82	-	1
13	BEARING - 22206 PC-3	-	2
15	O-RING - 0.88 x 1.12 x 0.12	-	1
16	SHIFT BAR - PSM	-	1
17	RING - RETAINER, 5160-87	-	1
18	GEAR - DRIVE, LDMH	-	1
19	RETAINER - BEARING, N	-	1
20	SHAFT - TRANSMISSION	-	1
21	SPACER - 2.56 x 2.88 x 0.87	-	1
22	BEARING-BALL, 113KSFF	-	2
25	BRACKET - BEARING, FRONT, N	-	1
26	BEARING-BALL, 213SF	-	1
28	PLUG - PIPE, 0.375, MAG SQ HD	-	1
32	HHCS - .313-18 X 4.50, F-911	-	6
34	GEAR - PUMP CLUTCH	-	1
35	GEAR - SLIDING CLUTCH, N	-	1
36	BEARING-BALL, 305SFF	-	1
37	BEARING-BALL, 114KSFCO	-	1
40	OIL SEAL - 2.750 ID X 3.505 OD	-	2
41	BEARING-BALL, 213SFF	-	1
42	REAR BEARING CAP, N	-	1
43	WASHER - 2.56 x 3.00 x .09 STL	-	1
44	END YOKE	-	2
46	LOCKNUT	-	2
48	SHAFT - TRANSMISSION	-	1
49	OIL SEAL - 2.938 ID X 3.756 OD	-	2
50	WIRE - SAFETY	-	1
51	BRACKET - BEARING, REAR NO BRK	-	1
52	LOCK BOLT - SHIFT BAR	-	1
53	SHIFT YOKE	-	1
54	PLUG - TACH, .88-18UNS	-	1
55	NUT - CABLE DRIVE, KDM, 0.104	-	1
56	OIL SEAL - 0.375 ID X 0.688 OD	-	1
57	CAP - BEARING, IDLER, TACH	-	1
59	CAP - BEARING, PUMP SHAFT	-	1
60	VENT	-	1
61	BEARING-BALL	-	1
63	SPACER - 1.57 X 2.00 X 0.71	-	1
64	HHCS - .500-13 x 2.00, GR5	-	1
65	WASHER - LOCK, 0.500 ID	-	3
66	GEARCASE - LDMH	-	1
67	O-RING - 3.50 x 3.69 X 0.09	-	2
68	WASHER - LOCK, HC, 0.375 ID	-	8
101	SHCS - .375-16 x 1.50, GR8	-	7
102	WASHER - LOCK, 0.375 ID	-	16
103	HHCS - .500-13 x 1.75, GR5	-	2
104	SHCS - .375-16 x 1.00, GR8	-	5
105	HHCS - .375-16 x 0.88, GR5	-	8
106	HHCS - .375-16 x 1.25, GR5	-	4
107	HHCS - .375-16 x 1.75, GR5	-	4
124	PIN - DOWEL, .250 X 0.62, GR8	-	2
125	PIN - DOWEL, .313 X 1.00, MIL-SPEC	-	2
358	O-RING - 4.50 x 4.69 x 0.09	-	1
359	FLINGER - WATER	-	2
361	OIL SEAL - 1.875 ID X 3.005 OD	-	1
362	PELLET - OIL WICK	-	6
363	O-RING - 20MM x 25MM x 2.5MM	-	1
364	O-RING - 5.00 x 5.25 x 0.12	-	2
365	AIR CYLINDER - 1.75 BORE	-	1
366	DIPSTICK - M22x2.5 THR'D	-	1
367	HEAD - SUCTION, LDM, PACKING	-	1
368	SPACER - 2.56 X 2.88 X 0.72	-	1



REVISIONS				
LTR	DESCRIPTION	DATE	CHG NO.	APPR'D

REMOVE SHARP EDGES | INCH [MILLIMETER] | THIRD ANGLE PROJECTION | OLD PART NO.

MATERIAL DESCRIPTION: - | MATERIAL NO. - | PATTERN NO. -

TOLERANCE EXCEPT AS NOTED .XX ± .03 .XXX ± .010 ANGLES ± 1°

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DR'N CHE | CHKD SJL | TRCD

MODEL NAME DLC0301 | MDL CREATED 12/13/05 | SHEET 2/2 | D

W.S. Darley & Co. CHIPPEWA FALLS, WI. MELROSE PARK, IL.

DWG - LDMH, TRANS, O'RING CROSS SECTION / EXPLD VIEW

DATE 04-Jan-06 | SCALE 1/4

DLC0301

W.S. DARLEY & CO.

WATER FLINGER INSTALLATION INSTRUCTION

- Place ***4431200*** assembly tool on bed of press
- Place ***3206100*** water flinger over 4431200 assembly tool as shown in Fig 1a. Apply Loctite #603 to inside flinger surface.

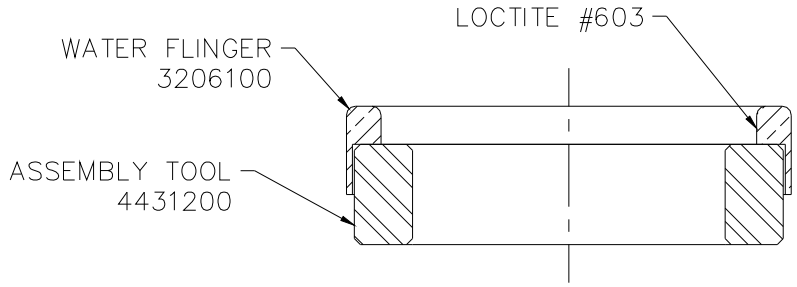


Fig 1a

- Position drive yoke on top of water flinger keeping it straight and centered. (See Fig 1b)

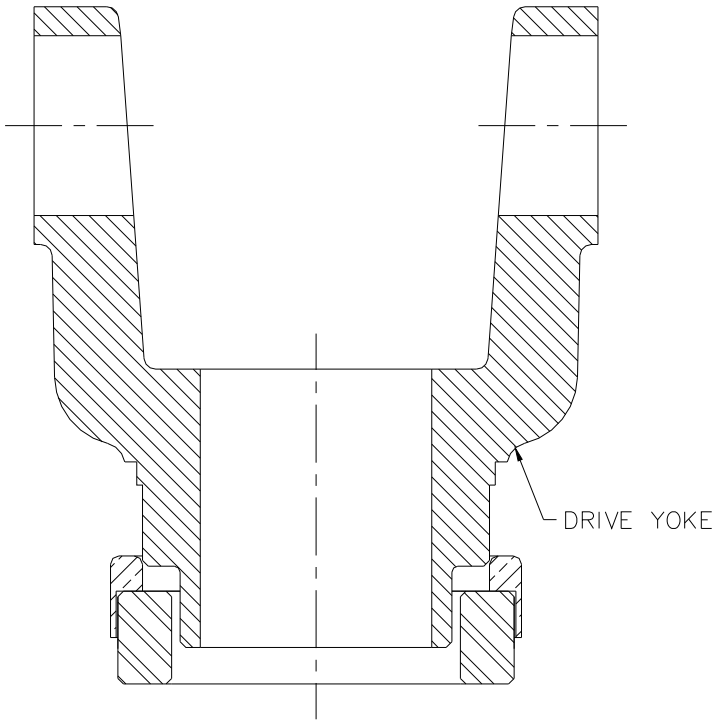


Fig 1b

- When yoke is positioned properly, press into place. Yoke will stop when it is fully seated as shown in Fig 2a.

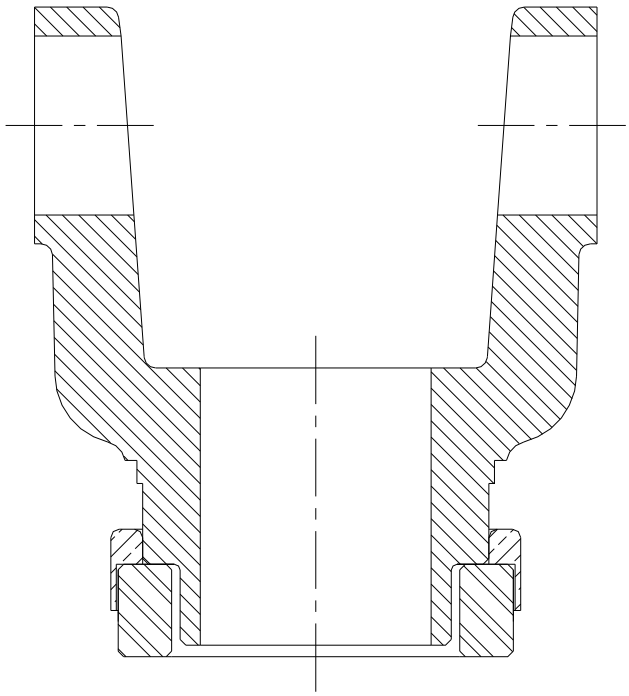


Fig 2a

- Inspect flinger/yoke assembly to make sure faces are flush as shown in Fig 2b.

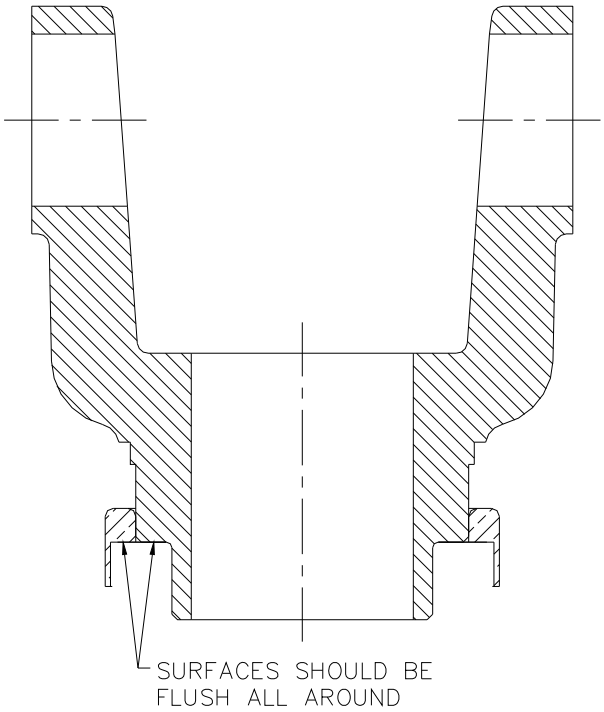
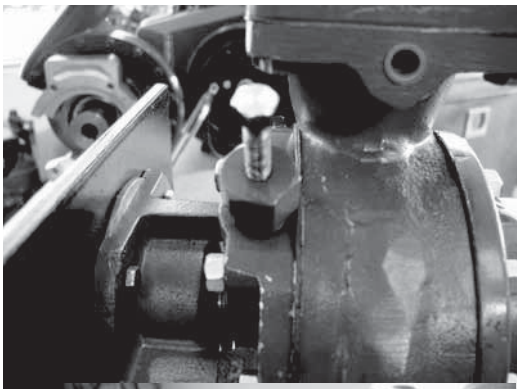
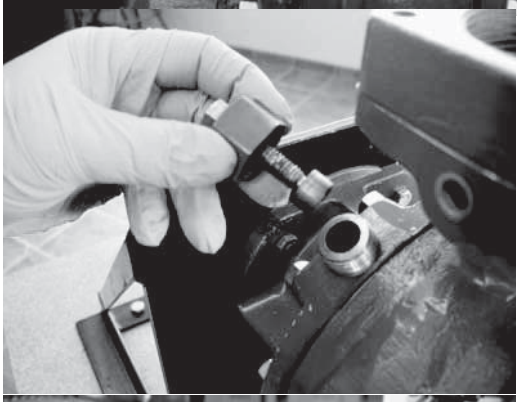


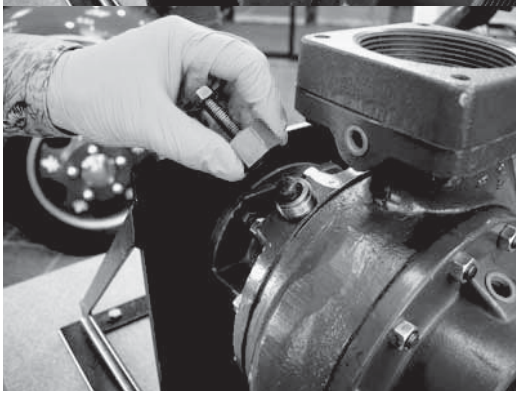
Fig 2b

W. S. DARLEY & CO.

DARLEY INJECTION TYPE STUFFING BOX ADJUSTMENT







Prop 65 Warning: This product contains lead, a chemical known to the State of California to cause cancer, birth defects, and other reproductive harm. Wash hands after handling.

Caution: Do not attempt to use anything but Darley injection packing. Using the wrong packing material in your pump may cause catastrophic failure of the pump shaft sealing components.

Only use W.S. Darley & Co.'s plastallic injection packing material. It is made of a special composition of shredded fibers, and a special bonding and lubricating compound.

It is important that the stuffing box is completely filled solid with packing and compressed firm during adjustment to prevent formation of voids and excessive leakage.

To pack the stuffing box when empty and assembled in the pump, remove the packing screw and nut assembly, and insert pellet form packing into the packing plunger guide. Replace the packing screw assembly and use a hand speed wrench to force the pellets into the gland. DO NOT USE A POWER TOOL! Repeat pellet additions while turning the impeller shaft by hand until resistance to turning is felt when the stuffing box is almost full. Continue turning packing screw by hand using a standard 6" long 9/16" end wrench until 4 lb. of force is felt at the end of the wrench. This is equivalent to 2 ft-lb or 24 in-lb torque. Continue turning until a few flakes of packing are extruded out the opening between the impeller shaft and the stuffing box hole. The gland is now ready for pressure testing or pumping.

After priming the pump with water, start the pump and raise the discharge pressure to 50 psi. Tighten the packing screw using a 6" long 9/16" end wrench until 4 lb. force is felt at the end of the wrench (24 in-lb torque). Continue operating the pump at 50 psi for 5 minutes to dissipate packing pressure against the shaft and permit cooling water to flow between the shaft and stuffing box hole. Make sure that water actually does come through before operating pump at any higher pressure. The normal drip rate may vary between 5 and 60 drops per minute.

Operate the pump for 10 minutes at the highest normal operating pressure flowing sufficient water to prevent overheating. Do not run the pump blocked tight. Lower discharge pressure to 50 psi and repeat the packing screw tightening procedure outlined above.

The pump may now be operated for any time period required within its rated capacity. However, the drip rate should be monitored more frequently during the first few hours, and adjusted if necessary to achieve a stable flow rate. Several more adjustments may be required.

For a list of approximate quantity of packing pellets required by model (completely repacked), see below:

Model	Approximate # Packing Pellets
A	6
2BE	6
EM	15
H	8
JM	8
KD	10
KS	8
LD	15
LS	9
P	10
U2	5
U4	10

If further information is needed, call **W.S. DARLEY & CO.**
at Chippewa Falls, WI. at 800-634-7812 or 715-726-2650

W.S. Darley & Co.

INSTRUCTIONS – MECHANICAL SEAL

RETRO-FIT KIT - LDM PUMP

FOR USE WITH RETRO FIT KIT KA00054, 55

Summary: This manual is written in reference to replacing the packing seal system with a mechanical seal system only. To rebuild the pump and gear-case refer to document 1200008.doc – REPAIR SERVICE INSTRUCTIONS TYPE LDM MIDSHIP FIRE PUMP.

When retrofitting from packing seal system to a mechanical seal system for the high pressure stage refer to documents 1201012.doc – BOOSTER PUMP MECHANICAL SEAL RETRO FIT and 1201013.doc – SEAL FLUSH INSTALLATION.

Review document 1201024, CRANE SEAL INSTALLATION, CARE, AND HANDLING INSTRUCTIONS before starting seal replacement.

PUMP DISASSEMBLY

Referring to 1200008, REPAIR SERVICE INSTRUCTIONS TYPE LDM PUMP MIDSHIP FIRE PUMP, remove pump from chassis and disassemble. Perform parts inspection per instruction sheet and replace as required.

PUMP SEAL REPLACEMENT

Refer to Drawings DLC0600, DLC1400 & DLC1401

Unless otherwise noted, all reference numbers refer to drawings DLC1400/1401

Note: Use mechanical seal pump shaft (38) supplied with retro-fit kit. Refer to Drawing DLC0600

1. Apply a light coating of oil to pump shaft (5) on pinion & tail bearing area. Slide pinion spacer (120) onto shaft. Place pinion gear key (2) in pump shaft keyway, align with key slot in pinion gear (1) and press pump shaft into pinion gear bore until spacer shoulder is tight against side of gear.
2. Press bearing (3) onto pump shaft (5) until it contacts shoulder of impeller shaft (5).
3. Slide pinion spacer (63) onto pump shaft (5).
4. Press bearing (60) onto pump shaft (5) until pinion gear (1), pinion spacer (63), and inner race of bearing are tight together.

5. Prepare inboard head (13) by assembling seal ring (37), oil seal (29), seal housing (17) and mechanical seal primary ring.

5.1. Plug 1/8”NPT ports with 1/8”NPT stainless steel socket head plug (30) on both suction heads (13) These 1/8” NPT ports are located in web on bottom of suction head.

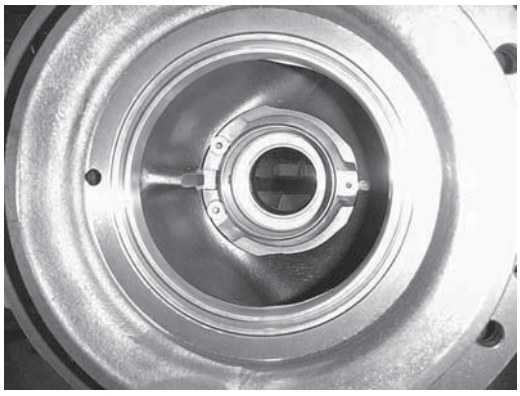
5.2. Press seal ring (37) into suction heads (13) until bottomed out.

5.3. Use a depth micrometer or a caliper and straightedge to check seal ring (37) for squareness.

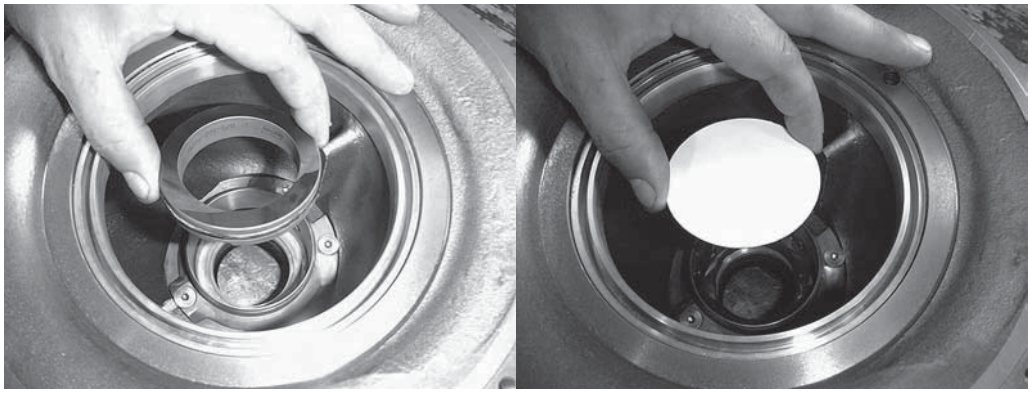
5.4. Press oil seal (29) into inboard suction head (17) with lip spring of seal facing bearing. Lubricate oil seal lips with oil.

5.5. Apply light grease or oil to housing o-ring (22) and position in groove.

5.6. Place inboard mechanical seal housing (17) into position in the inboard suction head (13). Then install 1/4NC x .62 flat head screws (12) with Loctite 243 or equivalent applied to the threads through holes of inboard mechanical seal housing (17) and into tapped holes of the inboard suction head (13). Torque to 7 ft-lbs.

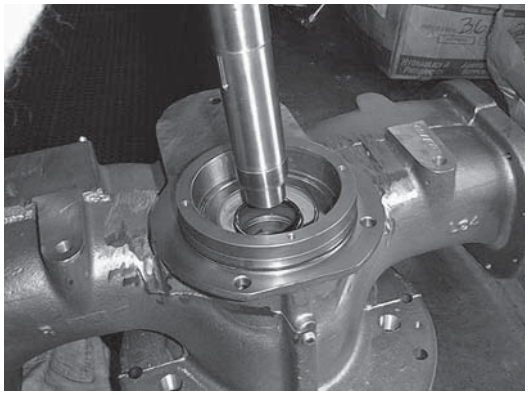


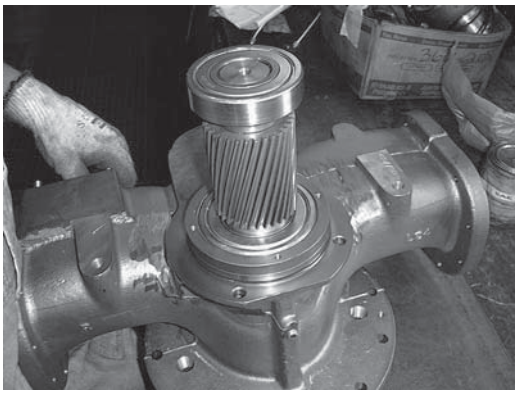
6. Carefully unwrap the inboard mechanical seal (36) using extreme care not to damage or contaminate the lapped surfaces of the mating or primary ring. While holding the mating ring by the inside diameter, lubricate the outside diameter and the o-ring with P-80 Rubber Lubricant, KY jelly or equivalent water-soluble lubricant. Insert mating ring into housing (17) with mirror surface facing out. Place clean cardboard circle on ring and press squarely into housing. Confirm that mating ring has been seated firmly into pocket.



7. Position head on workbench with bearing pocket (5) up. Slide slinger (40) into opening in head and lay on top of seal housing. Lubricate bearing pocket with light oil.

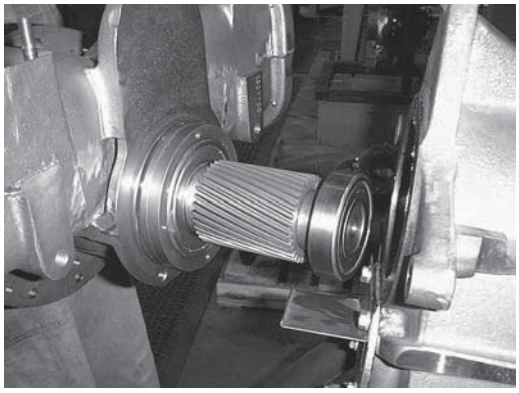
8. Insert pump shaft assembly (38) into inboard suction head (13). Guide shaft through the water slinger and mechanical seal housing being careful to avoid contact with the seal mating ring. Tap on end of pump shaft with a rubber mallet until bearing is seated in bearing pocket in inboard head. Using care not to mar impeller shaft, position slinger (25) into groove. This is best accomplished by locating tip of a small flat blade screw driver between the slinger and housing (17), lift slinger lip slightly, and rotating the shaft until the slinger springs into the groove.





9. Apply light grease or oil to head o-ring (25) and position in groove.

10. Slide suction head and shaft assembly (13) into position in gear-case. Make sure the pump shaft does not slide out of the outboard head while assembling the inboard suction head to the gear-case. Align head squarely with gear case.



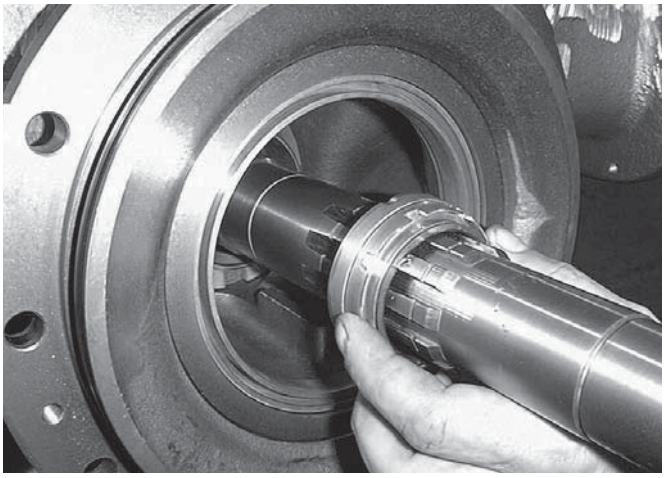
11. Attach inboard suction head (13) to gear-case with one 1/2NC x 2 cap screw on top, two 1/2NC x 1-1/2 cap screws at sides, and two 3/8NC x 1 cap screws on bottom.

12. Apply Loctite Master Gasket 518 on flange surface of pump shaft bearing cap (DLC0600-59).

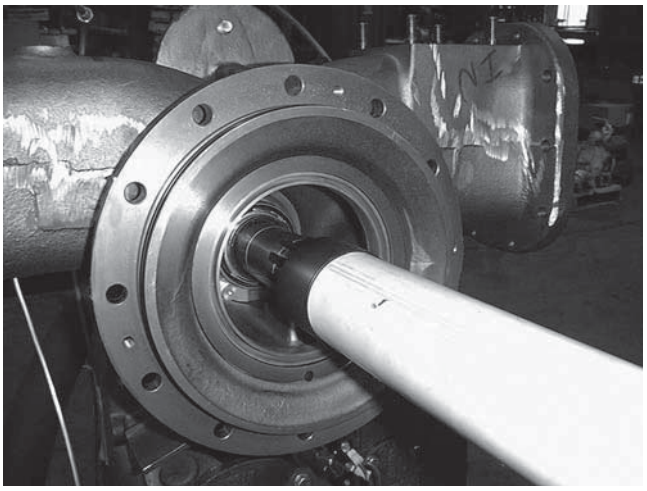
13. Slide bearing cap (DLC0600-59) over pump shaft bearing (DLC0600-61) until tight against gear-case.

14. Apply Loctite 243 or equivalent to four 3/8NC x 1 cap screws, and attach bearing cap to gear-case.

15. Being careful not to damage or contaminate the lapped sealing surface, lubricate the inboard head primary ring (36) elastomer bellows with P-80 Rubber Lubricant, KY jelly or equivalent water-soluble lubricant. Apply thin coat of lubricant to impeller shaft where bellows (36) slides onto and seats on shaft. With lapped sealing surface facing mating ring, slide primary ring bellows assembly squarely onto shaft.



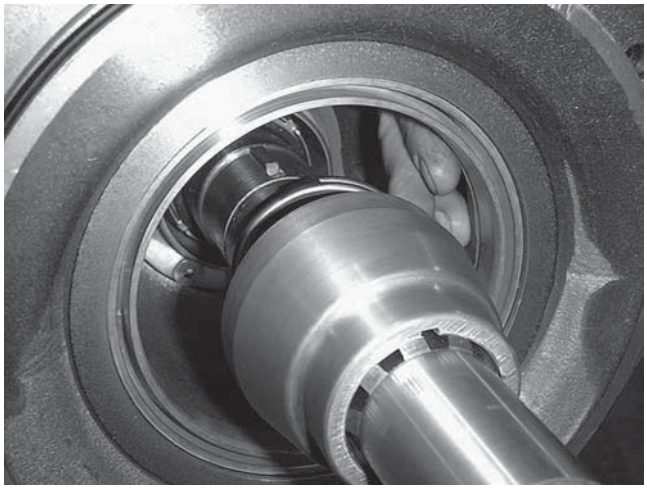
16. Using properly sized pusher tube, carefully push primary ring bellows assembly onto the shaft until primary ring contacts the mating ring. Use care to avoid hard contact between the two surfaces.



17. Insert 3/16 sq. x .75 stainless steel key (20) into key slot.

18. Slide seal compression spring (discard thin brass spring holder) onto shaft and position on primary ring pilot.

19. Slide enclosure (10) onto shaft and align with drive key (20).

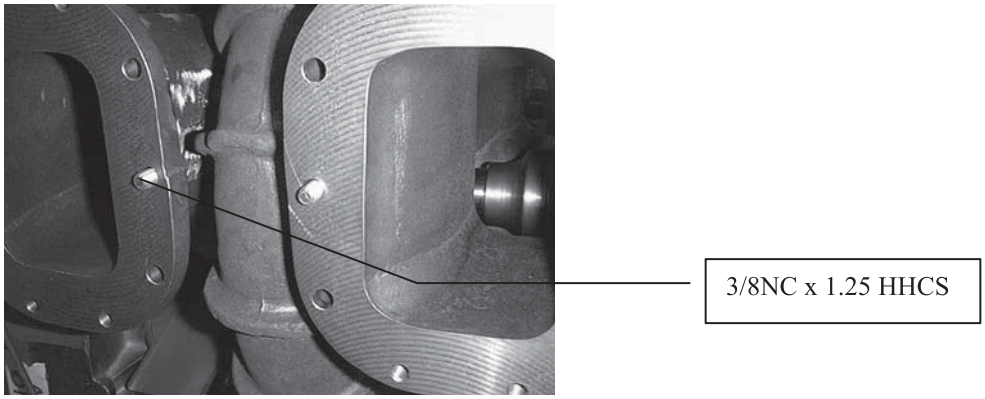


20. Using appropriately sized retaining ring pliers, expand retaining ring (33) just enough so it will slide over the shaft up to enclosure (10) with sharp edge of retaining ring facing impeller. Compressing spring, continue to slide enclosure and retaining ring toward the seal until retaining ring (33) snaps into groove. A soft material pusher tube may be used push the enclosure and retaining ring the last ½ inch of travel. Confirm the proper placement and security of the retaining ring.

21. Apply silicone lubricant to pump casing seal o-rings (26) and (27) and position on inboard head.

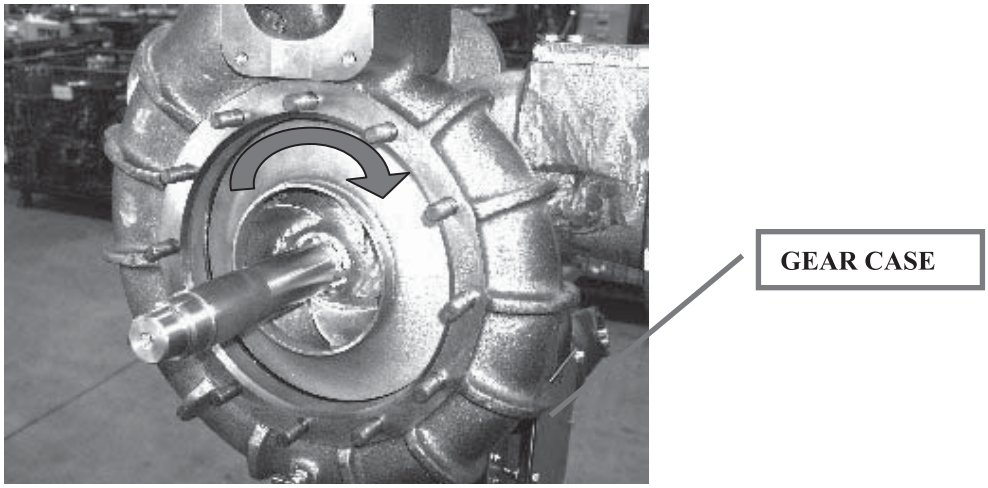
22. Place inside impeller retaining ring on impeller shaft with sharp edge of ring facing the gear case.

23. Place (1) 3/8NC x 1.25 HHCS through the passenger side suction extension-mounting flange. This is necessary due to reduced clearance once the pump casing is installed.



24. Apply a thin layer of silicone lubricant to pump casing (31) bore surfaces. Assemble casing (31) onto inboard head and secure with (12) ½-13NC light hex nuts.

25. Slide impeller (19) onto shaft (38). Note rotation of impeller.

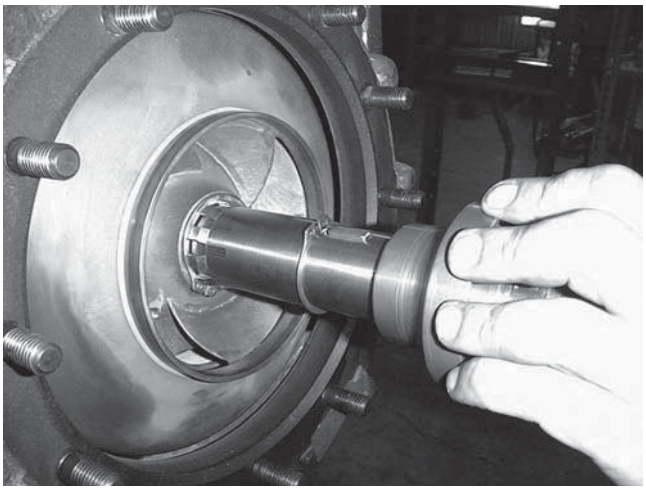


26. Place second impeller retaining ring (33) on impeller shaft (38) with sharp edge facing away from the impeller.

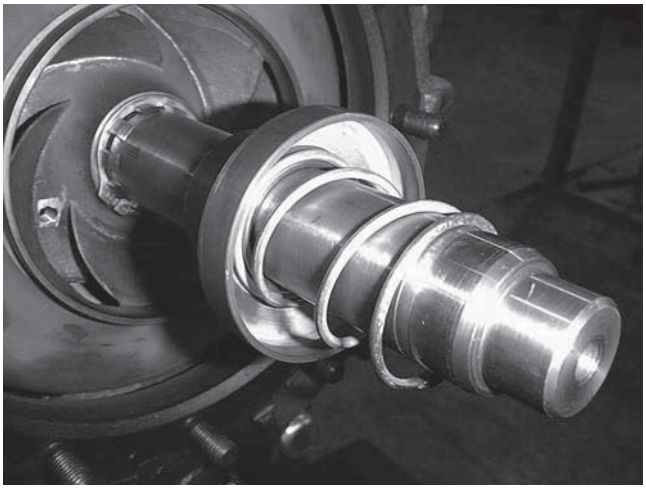
27. Referring to steps 5 and 6 above, prepare outboard head assembly. Omit step 5.5, oil seal installation at this time.

28. Apply silicone lubricate to casing seal o-rings (26) and (27) and position on outboard head.

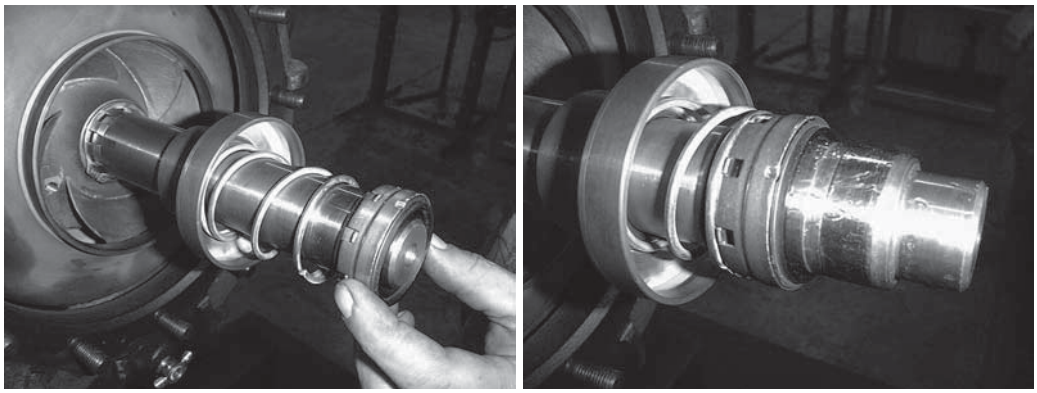
29. Assemble retaining ring (32), sharp edge of retaining ring facing impeller, key (20), and enclosure (11) to shaft (38).



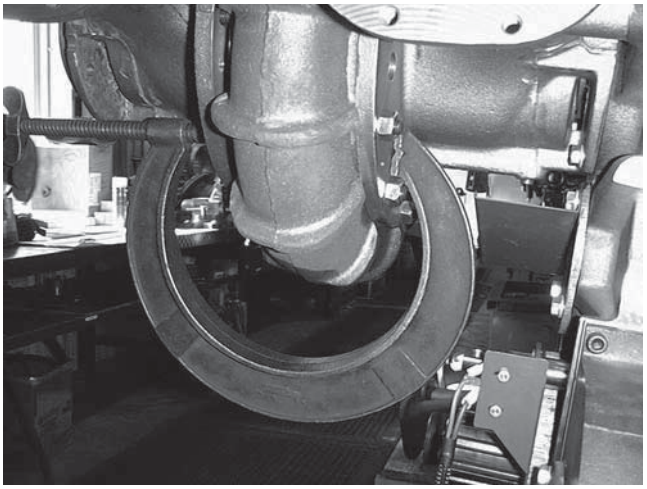
30. Slide mechanical seal (35) spring holder onto shaft up to the inside face of the enclosure. Slide spring onto spring holder.



31. Being careful not to damage or contaminate the lapped sealing surface, lubricate the outboard primary ring (35) elastomer bellows with P-80 Rubber Lubricant, KY jelly or equivalent water-soluble lubricant. With lapped sealing surface facing away from the impeller, slide primary ring squarely onto shaft. Position spring on bellows pilot. Using a properly sized pusher tube, (ID larger than seal surface but smaller than brass seal holder), push the primary ring onto the shaft ¼" past the slinger groove.

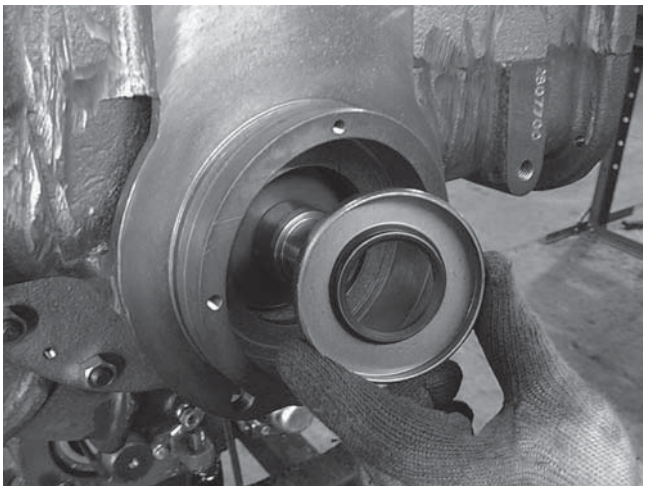


32. With lifting assistance, carefully position and assemble previously prepared outboard head assembly onto shaft and into pump casing. Do not allow shaft to disturb or contaminate already position mechanical seal mating ring. It may be necessary to use a pair of large C-clamps to close seal spring enough to start 1/2NC stud nuts. It is important to insert head pilot into casing squarely without cocking. Remove clamps once stud nuts are started. Tighten nuts equally until all are tight.



33. Push water slinger (39) onto pump shaft (38) and position in groove.

34. Push oil seal (28) into head with open side toward outboard bearing (4). Lubricate oil seal lips with oil.



35. Apply oil to end of pump shaft (38) and tap bearing (4) onto shaft until tight against shaft shoulder.

36. Lubricate bore of bearing cap (6). Apply Loctite Master Gasket 518 to flange surface of bearing cap (6). Tap bearing cap (6) over bearing (4) and attach to outboard head with (4) ¼-20NC x 7/8 cap screws and lock washers.

37. Refer to standard LDM service instructions (1200008.doc) for the remainder of assembly.