Troubleshooting Guide

B2000 Cyclone® Bender

GAR_TL_045_0717

SERVICE INSTRUCTIONS

These Service instructions are intended for use by a qualified personal at Authorized Gardner Bender Service Centers. Users of Gardner Bender equipment should see the bender instruction sheet for installation, operation and maintenance information.

SAFETY ISSUES

⚠ **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.
⚠ **CAUTION** is reserved for conditions and actions that can cause injury or instrument damage.

⚠ WARNING:

- **Do not locate the bender on damp or wet surfaces. Do not stand on damp or wet surfaces when repairing or operating the bender.**
- **To avoid electrical shock, always unplug the bender power cord before removing end plates, motor or any electrical wiring.**

⚠ CAUTION:

- **To avoid physical injury, use two people to remove and install the bending shoe or to move it from place to place.**
- **Keep hands, clothing and electrical power cords away from moving rollers, bending shoe and exposed gears.**
- **Prior to installation: apply a coat of molycoat or equivalent to all shafts. When installing shafts, use soft head mallets to seat in position.**

REQUIRE TOOLS AND TEST EQUIPMENT

- Torque Wrench
- Allen Wrench
- Open Wrench ½" and 9/16"
- Sockets
- Lithium Grease
- Soft Head Mallet
- 2" EMT and Rigid Conduit
- Silicone sealant
- Multimeter
- Strap Wrench
- Repair Parts Sheet
- Instructions Manual

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1.0 TROUBLESHOTTING GUIDE

***Note: Troubleshooting or maintenance that requires the B2000 to be disassembled in any way should be done by a professional indicated by Gardner Bender to avoid permanent damage to the machine. Contact nearest Gardner Bender Service Center for guidance.**

PROBLEM	POSSIBLE CAUSE	ACTION
Bending shoe does not move when switch is in bend or return position.	Circuit break / power switch in the off position.	Check that power switch (Part Number – CB25) is in the "ON" position. When the bender is ON, the two LEDs on the Rear Handle End Plate (Part Number – HC12) will flash red, then green to indicate normal function. The green power light on the control pendant (Part Number – PO5C) should be lit.
	No power to bender.	Check for voltage at power source. Use 110 VAC, 15 amp outlet.
	Blown Fuse.*	*THIS PROBLEM WILL NOT OCCUR ON MODELS B2000-5 THROUGH B2000-7 (SERIAL NUMBERS BEGINNING WITH LETTERS "F" - "K" OR BENDERS MANUFACTURED BETWEEN 2001 AND 2007). THESE MODELS DO NOT HAVE A FUSE. Inspect 15 amp fuse and perform continuity check for a short. If no continuity, replace fuse with new 15 amp, 125 volt fuse. Fuse located behind handle mounting plate in the left corner of the control panel. Refer to "Circuit Board" in "DISASSEMBLY" section (page 7) for instructions.
	12V DC power supply failed.	Unplug bender power cord. On P.C. board, remove cover on plug. Connect positive meter lead on black wire and negative lead on green wire. Plug in the power cord. Meter should indicate 12V DC. If not, replace P.C. board, Part Number- EC2006 or HC12 Refer to "Circuit Board" in "DISASSEMBLY" section (page 7) for instructions.
	Remote pendant wiring harness is malfunctioning.	Remote pendant wiring in the harness may be pinched or cut in a way that causes bending to malfunction despite the indicator LEDs on Rear Handle End Plate and Remote Pendant illuminating. Replace wire harness. (Refer to Repair Parts List for illustration and additional part numbers). Refer to "Circuit Board" in "DISASSEMBLY" section (page 7) for instructions.
	Power circuit on P.C. board is malfunctioning.	Control circuit is not activating bender. Replace P.C. board, Part Number- EC2006 or HC12
	Motor overload or/ overheated.	Allow time for motor to cool. Activate bender. If motor will not run, perform continuity check. If there is continuity, motor is damaged and must be replaced, Part Number – CL43259 Refer to "Electric Motor" in "DISASSEMBLY" section (page 7) for instructions.
Roller Housing and Upper Roller do not properly lock the conduit into place.	Upper Roller pivot is in incorrect position.	If the Upper Roller has been disassembled in the past, the pivot may be in the wrong position. While facing the B2000 push handles, remove the Upper Roller (Part Number – CK994900) and look down the bearing shaft. There will be an off-center hole at the bottom of the bearing. If the Upper Roller is correctly installed facing to the right, this hole should be closer to you to ensure that the pivot is in the right position. Refer to "Roller Housing" in "DISASSEMBLY" section (page 7) for instructions.
	Incorrect rollers used.	If the Roller Housing (Part Number – CU295900K) has been disassembled in the past, the rollers may have been incorrectly reassembled. The middle set of 1½" nylon rollers (Part Numbers – CU299281 and CU319281) must be placed in the correct position and are not interchangeable. The upper set of 1¼" rollers (Part Number – CU300281) can be swapped and the lower set of 2" rollers (Part Number – CU298281) can be swapped. Refer to "Roller Housing" in "DISASSEMBLY" section (page 7) and "Roller Housing" in "RE-ASSEMBLY" section (page 9) for instructions on assembling the rollers.
	Rollers are damaged	Replace damaged rollers. Refer to "Roller Housing" in "DISASSEMBLY" section (page 7) for instructions.

Drive belt tensioning seems loose.	Belt is worn out.	Belt may be worn or damaged and must be replaced, Part Number – CL310014. Refer to “Drive Sprocket Assembly” in “DISASSEMBLY” section (page 8) for instructions.
	Tensioner failure.	Tensioner may be damaged and must be replaced, Part Number – CL306900. The motor must be removed in order to remove the tensioner. Refer to “Electric Motor” in “DISASSEMBLY” section (page 5) for instructions.
	Motor pulley is lose.	If the motor has been disassembled in the past, thread-locking fluid may not have applied to the containing screw of the motor pulley (Part Number – CL311019) when reassembling the motor assembly (Part Number – CL43259). Apply thread-locking fluid on containing screw and assemble it to the motor pulley. Refer to “Electric Motor” in “DISASSEMBLY” section (pages 7 & 8) for instructions.
Bend switch does not function, return switch functions.	Remote pendant bend switch or wiring inoperative.	Unplug bender power cord, test for continuity at hard¬ness to pendant. Attach leads to black and white wires. Press bend switch. If no continuity, check switch under pendant cover. Place ohm meter on leads for black wire and white wire. Depress bend switch. If continuity exists, replace switch, Part Number - DA9687372. If no continuity, wire harness is faulty. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Bend limit switch or harness to limit switch is malfunctioning.	Unplug bender power cord. Perform continuity check on green and orange wires. Press bend limit switch actu¬ator tab. If continuity exists, replace switch, Part Number - DA9687372. If no continuity, check wiring harness. (Refer to Repair Parts List for illustration and additional part numbers). If no continuity exists on wire harness, it must be replaced. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions
	Plunger on bend limit switch is not being tripped by the shoe post.	Remove shoe indicator plate (Part Number – CM801950). Observe the shoe post as it passes the bend limit switch (Part Number - DA9687372). The shoe post should trip the plunger on the bend limit switch as it passes over the limit switch. If the shoe post is not tripping the plunger, replace the limit switch, Part Number- DA9687372. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Printed circuit board malfunctioning.	Replace P.C. board, Part Number- EC2006 or HC12 Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
Bend function works, return switch does not.	Pendant return switch is malfunctioning.	Unplug bender power cord. Perform continuity check on pendant return switch. Attach leads to black wire and white wire, depress return switch. *The colors described here are not present on the model B2000-7 and B2000-8 pendant harness (B2000 SERIAL NUMBERS BEGINNING WITH LETTERS “J” - “N” OR BENDERS MANUFACTURED AFTER 2007). However, the same troubleshooting actions should be taken. If continuity exists, replace switch, Part Number - DA9687372. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Wiring is malfunctioning.	If no continuity, check wire harness. Attach ohm meter leads to orange and blue wires. Depress return switch. If no continuity; replace wire harness, Part Number – CL¬712647SR. Refer to “Drive Sprocket Assembly” in “DISASSEMBLY” section (page 8) for instructions.

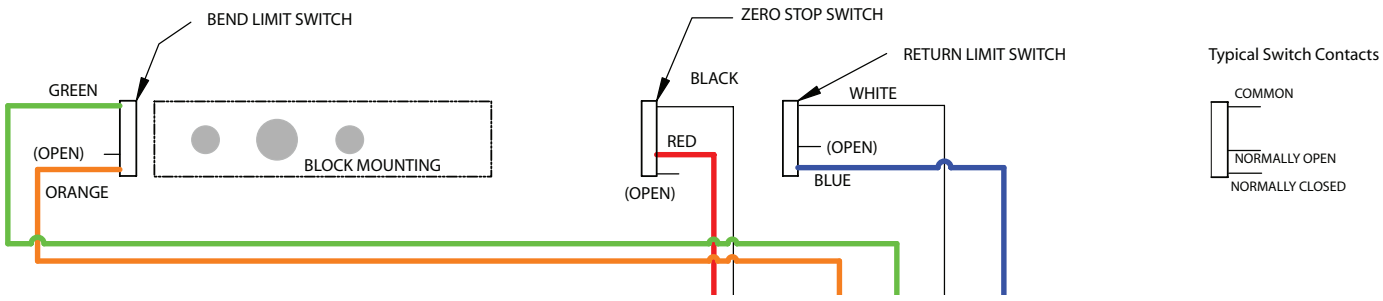
Bender shoe will not return when pressing return and jog button.	Jog button malfunctioning.	Unplug bender power cord. Perform continuity check on wire harness. Attach leads to red and green wires, Depress override (jog) button. *The colors described here are not present on the model B2000-7 and B2000-8 pendant harness (B2000 SERIAL NUMBERS BEGINNING WITH LETTERS “J” - “N” OR BENDERS MANUFACTURED AFTER 2007). However, the same troubleshooting actions should be taken. If continuity exists, check jog switch in pendant control, (Parts Not Available). Remove cover, place leads on red and green wires at switch. Depress jog switch. If there is continuity, replace switch (Parts Not Available). Refer to “Circuit Board” in “DISASSEMBLY” section (page 8) for instructions
	Wire harness to pendant damaged.	If no continuity exists, fault lies in wire harness. Replace wire harness. (Refer to Repair Parts List for illustration and additional part numbers). Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
	Pendant damaged or malfunctioning.	Replace pendant switch, Part Number – PO5C If model B2000-4 or older (SERIAL NUMBERS BEGINNING WITH LETTERS “A” - “E” OR BENDERS MANUFACTURED BEFORE 2001), customer may need to upgrade to current model B2000. Older model pendant switch is no longer available. For models B2000-5 and B2000-6 (SERIAL NUMBERS BEGINNING WITH LETTERS “F” - “H” OR BENDERS MANUFACTURED BETWEEN 2001 AND 2004), customer may be able to adapt new pendant (P05C) to older models.
Bender shoe successfully returns to zero, indicator light on top of Pendant Control malfunctions and does not light.	Zero limit switch is malfunctioning and is not receiving voltage.	Unplug bender power cord. Perform continuity check on harness from pendant control. Attach leads to black and red wires. Refer to “Circuit Board” in “DISASSEMBLY” section (page 5) for instructions. If continuity exists, check the zero limit switch (see illustration in Repair Parts List). Attach the leads to black and red wires at the limit switch. Depress limit switch actuator tab. If continuity exists, replace switch, Part Number- DA9687372. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Harness to switch is malfunctioning and is not receiving voltage.	Unplug bender power cord. Perform continuity check on wire harness from limit switch. If no continuity exists, the wire harness is malfunctioning. Remove and strip wire harness wire ends, crimp on female terminals (Part Number – 21-161F), and reconnect terminals to limit switches. If problem continues, replace wire harness. In order to replace the limit switch wire harness, the following components need to be disassembled: bender shoe (item #1), sprocket (item #8), end plate (item #26), and handle (item #38). Please refer to Figure 1 to identify listed parts. Refer to “Bender Shoe”, “Drive Sprocket”, and “Limit Switch” in “DISASSEMBLY” section (pages 7 & 8) for instructions.
Bender consistently develops over bends.	Bend angle is not correctly indicated.	Ensure that the flat edge of the pointer (Part Number – 802950N) is on a line indicating the exact degree of bend desired, not the angled edge. Failure to do this will lead to inaccurate bends. Refer to Instruction Sheet for operation instructions.
	Bender zero adjustments are necessary.	Ensure bender zero adjustment has been performed. This is required after every re-assembly. Refer to “ZERO SET ADJUSTMENT” section (page 10) for mechanical adjustment instructions.
	Bender angle adjustments are necessary.	Differences in conduit characteristics and other variations can lead to incorrect scale indications. Loosen the size scale (for type material being bent) mounting screws. Slide the scale clockwise as many degrees as the over bend (if bend is 5° over, move indicator 5° clockwise). The degree of movement is observed by watching one of the size marks as it moves past the angle disc scale. Tighten the mounting screws. Refer to Instruction Sheet for more Angle Adjustment instructions.

Bender consistently develops over bends	Braking resistor on P.C. board is malfunctioning.	Unplug bender power cord. Perform resistance measurements on braking resistor. Remove chassis from rear of bender. Attach ohm meter across to brown and gray wires. If meter reads above 11 ohms, replace resistor. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
	P.C. board circuit is malfunctioning.	Remove and replace P.C. Board, Part Number- EC2006 or HC12. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
Bender does not stop at selected bend angle.	Bender is incorrectly set up.	Ensure bender angle adjustment and zero adjustment has been performed. This is required after every re-assembly. Refer to “ZERO SET ADJUSTMENT” section (page 10) for mechanical adjustment instructions. Refer to Instruction Sheet for Angle Adjustment instructions and correct set up instructions.
	Bend limit switch is not being actuated by shoe post.	Remove shoe indicator plate. Observe the tabs as they pass the bend limit switch. Adjust switch until tabs correctly contact the posts. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Bend limit switch is malfunctioning.	Unplug the bender power cord. Attach leads to orange and green wires at the switch. Continuity should exist. Push the actuator tab (on the switch). Continuity should be broken. If not, replace the switch. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Braking resistor is malfunctioning.	Unplug the bender power cord. Perform resistance measurement on braking resistor. Attach leads across terminals. A 9-11 ohms (+ 1 ohm) resistance is normal. Other readings are unacceptable. Replace braking resistor, Part Number – RA19. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
	Brake circuit (P.C. board) is malfunctioning.	If all other tests are positive, replace P.C. board, Part Number– EC2006 or HC12. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
During return function, bender shoe does not stop at zero point.	Plunger on return limit switch is not being tripped by the trip ring tab.	Remove limit switch assembly. Observe tab to return limit switch contact. If switch is not contacting tab, adjust switch position. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Bend limit switch is malfunctioning.	If post to switch is correct, perform bend limit switch continuity check. Attach leads to orange and green wires. Press limit switch tab. Continuity should result. If not, replace switch. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Return limit switch is malfunctioning.	Unplug the bender power cord. Perform return limit switch continuity check. Attach leads to white and blue wires. Continuity should be broken. If not, replace return limit switch. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.
	Brake resistors are malfunctioning.	Unplug the bender power cord. Perform resistance measurement on each resistor. Place ohm meter leads on gray and brown wires. Meter should read 9-11 ohms. If reading is over 11 ohms, replace resistor. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
Bender shoe does not stop rotating in both the return and bend directions.	Limit switches assembled incorrectly on the switch arm.	If the Limit Switch has been disassembled in the past, the switches may have been reassembled incorrectly on the switch arm. The switch arm must have two limit switches (blue face, facing away from arm) on the long side of the arm, and one limit switch (black face, facing away from arm) on the short side of the arm. Refer to “Limit Switch” in “DISASSEMBLY” section (page 7) for instructions.

Bend function works, return function results in bending direction.	Direction circuit on P.C. board is malfunctioning.	Replace P.C. board. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
Return function works, bend function results in shoe moving in return direction.	Brake circuit on P.C. board is malfunctioning.	If all other tests are positive, replace P.C. board. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.
Return function works. Depressing bend switch, shoe moves in return.	Direction circuit on P.C. board is malfunctioning.	Replace P.C. board. Refer to “Circuit Board” in “DISASSEMBLY” section (page 7) for instructions.

2.0 PENDANT (P05C) TROUBLESHOOTING

1. Verify continuity for both wires traveling from the zero limit switch down to the wire harness.



2. Verify that the black wire goes to the pin on the limit switch that is separate from the other two, and that the red wire is connected to the middle pin.

3. Test Zero Light - Take a multimeter and set it to the diode ( ) function and place the red lead on the orange wire in the harness and the black lead to the red (pink) wire in the harness. This should illuminate the green Zero LED

4. Test Power LED - Take a multimeter and set it to the diode ( ) function and place the red lead on the orange wire and black lead on the yellow wire. This should illuminate the red Power LED.

5. Test Bend Button - Set a multimeter to the continuity or ohms function. Place one meter lead to the pin of the Black wire in the pendant wire harness, and place the other lead on the pin for the Blue with Black strip wire. While the probe tips are making contact with the pins in the harness, press the bend button. When the button is pressed, 0 Ohms and/or the continuity buzzer should go off.

6. Test Return Button - Set a multimeter to continuity or ohms function. Place one meter lead on the pin of the Black wire in the pendant wire harness. Place the other meter lead to the pin of the Blue wire in the harness. With the probes still making contact with the pins, press the Return button. When the button is pressed, 0 Ohms and/or the continuity buzzer should go off.

7. Test Jog Button - Set a multimeter to the continuity or Ohms function. Place one meter lead to the pin of the Black wire in the pendant wire harness, and place the other lead on the pin for the Brown wire. While the probe tips are making contact with the pins in the harness, press the bend button. When the button is pressed, 0 Ohms and/or the continuity buzzer should go off.

3.0 DISASSEMBLY INSTRUCTIONS

IMPORTANT: To avoid unnecessary service, the bender should be tested prior to any service work. Please refer to the maintenance section in the instructions manual and Troubleshooting section.

Limit Switch (Figure 3)

1. Prior to removing components of the limit switch and angle adjustments, the bending shoe, trip ring and sprocket housing must be marked to aid in re-assembly.
2. Position the bending shoe to the zero point by pressing the pendant in “RETURN. Continue holding the switch until the shoe stops and the zero light comes on.
3. Unplug the bender power cord.
4. Scribe a mark on the side of the trip ring (Figure 1) and a matching mark on the bending shoe.
5. Scribe a mark on the lower portion of the bending shoe and on the sprocket housing (Figure 1).
6. Remove the silicone packing from the trip ring mounting screws (Figure 3). Remove the mounting screws and the top plate assembly (Figure 3), the size indicator plates must not be removed.
7. Remove and tag the wires attached to the limit switches (Figure 3). Leave the switches (Figure 3) attached unless they require replacement.
8. Remove the springs and the three screws from the plate assembly (Figure 3).
9. Leave actuator and clamp attached to upper plate assembly unless damaged.
10. Examine all components for signs of wear or damage. Use troubleshooting procedures to electrically check switches. Repair or replace items that are worn, damaged or non-functional.
11. Refer to “RE-ASSEMBLY” section of this manual.

Roller Housing (Figure 4 & 5)

1. Remove the pin (Figure 5 Item #6) securing the upper roller arm (#5). Remove the nut (Figure 5 Item #10) and remove the cap screw (Figure 5 #9) securing the arm in the Cam Shaft (Figure 5 Item #7).
2. Remove the cap screw (Figure 5 Item #12) and the washer (Figure 5 Item #13). Lift the roller housing (Figure 4 Item #1) from the shaft. Remove the thrust washers (Figure 1 Item #21) and the shims (Figure 1 Item #22).
3. Inspect all rollers, the housing and shaft for wear and damage. Replace worn or damaged items.
4. All nylon rollers should be secured in the housing by retaining rings around the roller shafts (Figure 4). Be sure that the correct rollers are reassembled in the exact location they were in originally. All new rollers contain factory installed bearing.

Bender Shoe (Figure 1 & 2)

1. Prior to removing the bending shoe, the limit switch assembly must be removed. Refer to “LIMIT SWITCH” in the disassembly procedures.
2. Remove the four bolts (Figure 1 Item #9) and washers (Figure 1 Item #10) located on the flat portion of each side of the shoe (Figure 2 Item # 1).
3. Two people are required to lift the bending shoe. Lift at two places (180° apart) and pull the shoe straight up until it clears the shoe shaft.
4. Inspect the shoe for worn grooves, cracks or other damage. Each conduit groove should be checked for wear by placing a piece of conduit (of correct size and material) into the groove. It should fit easily without excessive gaps above, below or behind it.
5. If shoe damage is suspected, a dye penetrate may be required to locate cracks in the casting.
6. Refer to Re-Assembly procedures.

Circuit Board (Figures 7 / Insert B)

1. The printed circuit board is mounted inside of the sprocket housing. Access is gained by removing the handle assembly.

   WARNING: To avoid electrical shock, unplug the bender power cord prior to removing the handle and access plate.
2. Remove the four screws and washers (Figure 7 Items #13 & 17).
3. Remove the handle assembly (Figure 1 Item# 38)

   NOTE: Hold the handle to prevent it from falling and causing damage to electrical connectors inside the sprocket housing.
4. Lower the handle and plate assembly. Unplug the power cord receptacle (Figure 7 Item #3) from the P.C. board plug. Unplug the pendant receptacle (Fig. 7 Item #7) from the P.C. board plug.
5. Conduct testing procedures described in the “Troubleshooting” section. See Insert B for wiring diagram.

Electric Motor (Figure 6)

WARNING: Unplug bender power cord prior to removing motor or wiring.

1. Remove acorn nuts securing the motor bottom cover.
2. Remove electrical wires from bottom of motor. Refer to (Page 14 Insert A).
3. Remove bolt and washer (Figure 6 Item #26 & 27) which secures the locking plate (Figure 6 Item #37) to the bottom of the sprocket housing. Remove bolt (Figure 6 Item #38), lock washer (Figure 6 Item #39) and washer (Figure 6 Item #40) which secures the sprocket shaft in the locking place.
4. Rotate the sprocket shaft by placing the locking plate over the shaft flats. Turn the shaft until the sprocket belts and chains are loose.
5. Remove the conduit nut (Figure 6 Item #15) from the motor connection. Slide the flexible conduit out of the

elbow and pull the wires out.

6. Remove the rear access plate by removing 4 cap screws and washers.
7. Remove the four cap screws and washers (Figure 6 Item #18 & 19) securing the motor to the sprocket housing, Remove the motor, unhook the drive belt from the motor shaft.
8. Remove the belt tensioner (Figure 6 Item #2) by removing nut and washer. The tensioner shaft is spring loaded. Remove the tensioner assembly spring and shaft from inside the sprocket housing.

Drive Sprocket Assembly (Figure 6)

1. Separate the drive chain (Figure 1 Item #8) by removing the master link.

   NOTE: The master link is assembled with clip on top – it must be reassembled the same way.
2. Remove drive sprocket (Figure 1 Item #7) from shoe shaft (Figure 6 Item # 31), Remove spacer (Figure 1 Item #5) and DU Washer (Figure 1 Item #6).
3. Remove dust cap (Figure 1 Item #36) from sprocket housing.
4. Remove cap screw (Figure 6 Item #22) and washer (Figure 6 Item #47 / 23). Lightly tap bottom of roller housing shaft (Figure 6 Item #11) to remove it from the sprocket housing.

   NOTE: Use brass drift pin or leather mallet to remove shafts.
5. Rotate sprocket (Figure 6 Item # 34) until the master link for chain (Figure 6 Item #28) appears in the access opening.
6. Remove the master link and remove the chain from the sprocket housing.
7. Remove the cap screw (Figure 1 Item #22) and washer (Figure 1 Item #23 / 47). Carefully remove shoe shaft (Figure 6 Item #31) by holding the limit switch wires inside the sprocket housing and lifting the shaft out of the housing. Remove bearing (Figure 6 Item# 21).
8. While removing the sprocket shaft (Figure 6 Item #33), hold the sprocket down, tap the shaft (from the bottom) and remove it from the sprocket housing.
9. Remove sprocket assemblies (#8) and (#9) from the housing and remove thrust washer (#10).
10. Remove sprocket assembly (#11) and thrust washer (#12) from the housing.
11. Clean the sprocket housing (inside), wipe away grease and dirt. Use lower pressure air hose to remove any accumulation of debris.
12. Clean all sprockets, gear teeth and chains. Check for worn gear teeth and worn or damaged bearings. Check chains and drive belt for wear and/or damage. Replace damaged or worn items.

4.0 RE-ASSEMBLY INSTRUCTIONS

Drive Belt And Sprockets (Figure 6)

1. Position drive belt sprocket (Figure 6 Item #24) and shoe sprocket (Figure 6 Item #29) on a flat surface. Connect 3/8” chain (Figure 6 Item #10) to drive belt sprocket (upper gear) and to shoe bracket (large lower gear). Insert master link (pin up).
2. Lift the belt sprocket, slip the belt (Figure 6 Item # 1) under the sprockets and position it in the sprocket grooves. Lift the shoe sprocket, position the belt so it is around sprocket shaft boss (Figure 6).
3. Pull the belt tight around the belt sprocket. Fasten the loose end together with a rubber band to keep the belt snug on the sprocket.
4. Insert drive sprocket (Figure 6 Item #34) into the housing (large gear up) and position the gear through the hole (under bracket). Place small blocks between the gear and the housing to hold the sprocket against the inside of the housing.
5. Position shoe sprocket (Figure 6 Item #29) and belt sprocket into the housing, from the motor end. The belt sprocket is aligned under the drive sprocket and the shoe sprocket is positioned under the shoe shaft hole. The loose belt end belongs toward the motor end of the housing. Position thrust washer (Figure 6 Item #20) between the belt sprocket and drive sprocket, bearing surface facing up.
6. Place the thrust washer (Figure 6 Item #20) under the shoe sprocket.
7. Align drive sprocket (Figure 6 Item #34) and belt sprocket (Figure 6 Item #24) with the center hold (under bracket on housing). Place bearing (Figure 6 Item #35) on top of sprocket. Remove blocks.
8. Mark high point on end of sprocket shaft (Figure 6 Item #33). Lubricate shaft with light coat of general purpose grease. Insert shaft (flats first) through the sprockets. Drive flush with the top sprocket.
9. Insert cap screw (Figure 6 Item #27) through washer (Figure 6 #26) and locking plate (Figure 6 Item #37). Torque to 28 – 32 ft. lb. Install cap screw into sprocket shaft under housing. Install cap screw (Figure 6 Item #38) and washer (Figure 6 Item #39 /40) in hole aligned with lock plate slot. Torque to 19 – 21 ft. lb.
10. Mark the middle link of chain (Figure 6 Item #28). Put the chain over the small (upper) gear teeth of sprocket (Figure 6 Item #29). Place chain around large gear of sprocket (Figure 6 Item #34).
11. Install master link through the access hole in the housing (pins up).
12. Install tensioner assembly by inserting shaft (Figure 6 Item #1) through the inside of the sprocket housing (threads outward). Assemble the lock washer (Figure 6 Item #2) and nut and tighten.
13. From inside the sprocket housing slide the spring over the shaft, then slide the tension roller over the shaft (roller toward drive belt). Place something under the tension bracket to wedge it in place away from the drive belt.

Motor Assembly (Figure 6 / Insert A)

1. Remove restraint from drive belt.
2. Place gasket (#1) on motor flange. Insert motor into the sprocket housing. Install one mounting screws and washers into mounting hole closer to the belt
3. Position the drive belt over the motor pulley. Align the belt to ride at the same height on the motor pulley and grooved sprocket.
4. Using a strap tool put it around the motor to help align the mounting holes with the motor. Install the 3 mounting screws and washers.
5. Remove the wedge from beneath the tension bracket. The roller should engage the belt.
6. Connect wiring to base of motor. (Figure 1 Insert B).

Shoe Shaft (Figure 6)

1. Position the shoe shaft (Figure 6 Item #31) in the sprocket housing (Figure 6 Item #32) with the hole for the wiring facing the hole in the housing.
2. Insert the D.U. bearing (Figure 6 Item #21) between the shoe sprocket and the sprocket housing (Figure 6 Item #32).
3. Push the shoe sprocket (Figure 1 Item #7) into the sprocket until it rests on the housing. Install two washers (Figure 6 Item #23 / 47) and cap screw (#22) through bottom of housing and tighten to secure shoe shaft. Torque 68-82 ft. lbs.
4. Install connector into bottom of sprocket housing and tighten. Install bushing in wire hole (housing) near the shoe shaft.
5. Install limit switch wires (Figure 1 Item #3) from inside sprocket housing, through the bushing and into the side of the shoe shaft. Push the wires up and through the top of the shaft. Pull at least six inches out of the shaft.
6. Position shoe drive sprocket (Figure 1 Item #7) over the shoe shaft. Install the drive chain around the shoe sprocket and the drive sprocket (Figure 1 Item #8) (under housing bracket).
7. Install master link, pins down. Support the sprocket with blocks to level the chain and fasten the master link.
8. Place the thrust washer (Figure 1 Item #6) and washer (#5) on the shoe shaft. Place the bending shoe over the shaft and align the mounting holes with the sprocket holes. Use alignment marks placed during removal, to position the shoe on the shaft. Install four cap screws (Figure 1 Item #9) and washers (#10) to secure the shoe and sprocket. Torque to 68-92 ft. lbs.

Roller Housing (Figure 4 & 5)

1. Insert roller housing shaft (Figure 6 Item #11) into sprocket housing until it seats in bottom of the housing.
2. Secure the shaft with washer (Figure 6 Item #23) and cap screw (Figure 6 Item #22) from the bottom of the sprocket housing.
3. Place shim (Figure 1 Item #22) and washers (Figure 1 #21) over the shaft. Install the complete roller housing on the shaft. Secure with cap screw (Figure 5 Item #12) and washer (Figure 5 #13).
4. Before securing cam shaft (Figure 5 Item #7) to shaft (Figure 6 Item #11), notice that the hole located on bracket is off center. Make sure that the hole is closer to the handle of the bender and secure cam shaft with cap screw (Figure 5 Item #12) and washer (#13).
5. Position the upper roller arm (Figure 4 Item #11) in the bracket and install mounting bolt (Figure 5 Item #9), washer (#10), nut washer (#11) and pin (#6).

Printed Circuit Board (Figures 7 / Insert B)

1. Connect the sprocket harness receptacle to the board plug. Connect motor wire receptacle to the board plug.
2. Connect the pendant receptacle to the P.C. board plug. Connect power cord receptacle to P.C. board plug. Be sure the harness ground wires are attached to the end plate.
3. Position the handle assembly against the sprocket housing and attach with 4 washers and screws.

Limit Switch Assembly & Wiring (Figure 3 / Insert B)

1. Insert the four wires from the main harness into the conduit connecter, through the conduit and connecter (Figure 6 #16 / 17).
2. Attach wires to motor. See Insert A for wire colors and terminal locations. Install motor cap using cap nuts.
3. Pull any excess wire into the sprocket housing. Be sure main harness is fastened to the housing with the (J) clip.
4. Insert the limit switch wires through the plate assembly (Figure 3 Item #9). Position the thrust washer and plate into the bending shoe and fasten with lock washers (Figure 3 Item #9) and cap screws (included).
5. Install the return limit switch and zero stop switch, secure with screws to the switch arm (Figure 3 #7 / 8 / 9).
6. Install the Bend limit switch and secure to switch arm with screws (Figure 3 Insert B).
7. Connect wires to switches as shown in Insert B and set the switch arm onto the plate assembly (#9).
8. Insert clamp assembly (#1) through the trip ring assembly (#5) and secure the actuator (#6).
9. Place the trip ring (#5) on the shoe and align the marks scribed, during disassembly, on the trip ring and bending shoe. Secure trip ring with screws.

5.0 ZERO SET ADJUSTMENT

TO ENSURE ACCURATE BENDS, THE BENDER ZERO ADJUSTMENT MUST BE ACCOMPLISHED AFTER RE-ASSEMBLY.

1. Plugs bend power cord into 110/115V outlet. Push upper roller assembly against the stop on the sprocket housing (Figure 19).
2. Press and hold “ADVANCE” on pendant switch until RIGID side of shoe is facing the upper roller housing.
3. Place a straight edge against the shoe (clamp surface) and toward the upper roller shaft.
4. Jog the bender until 2 ½ inches exists between the straight edge and the shoe clamp (See Figure 4).
5. Loosen the trip ring mounting screws (See Figure 5). Rotate the trip ring until the zero light, on the pendant, is on (Figure 6). Tighten the mounting screws and cover screws and cover screw slot with a clear silicone sealant.

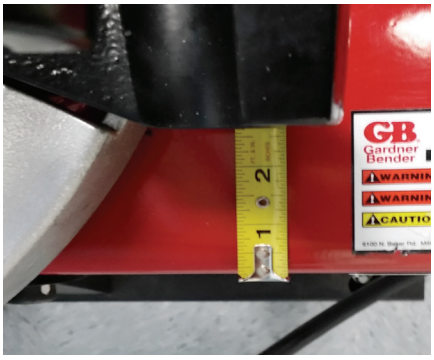


Figure 4

Figure 5

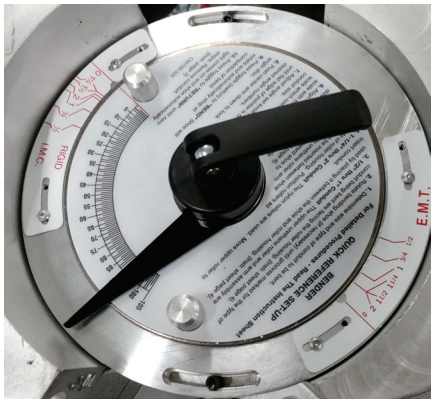
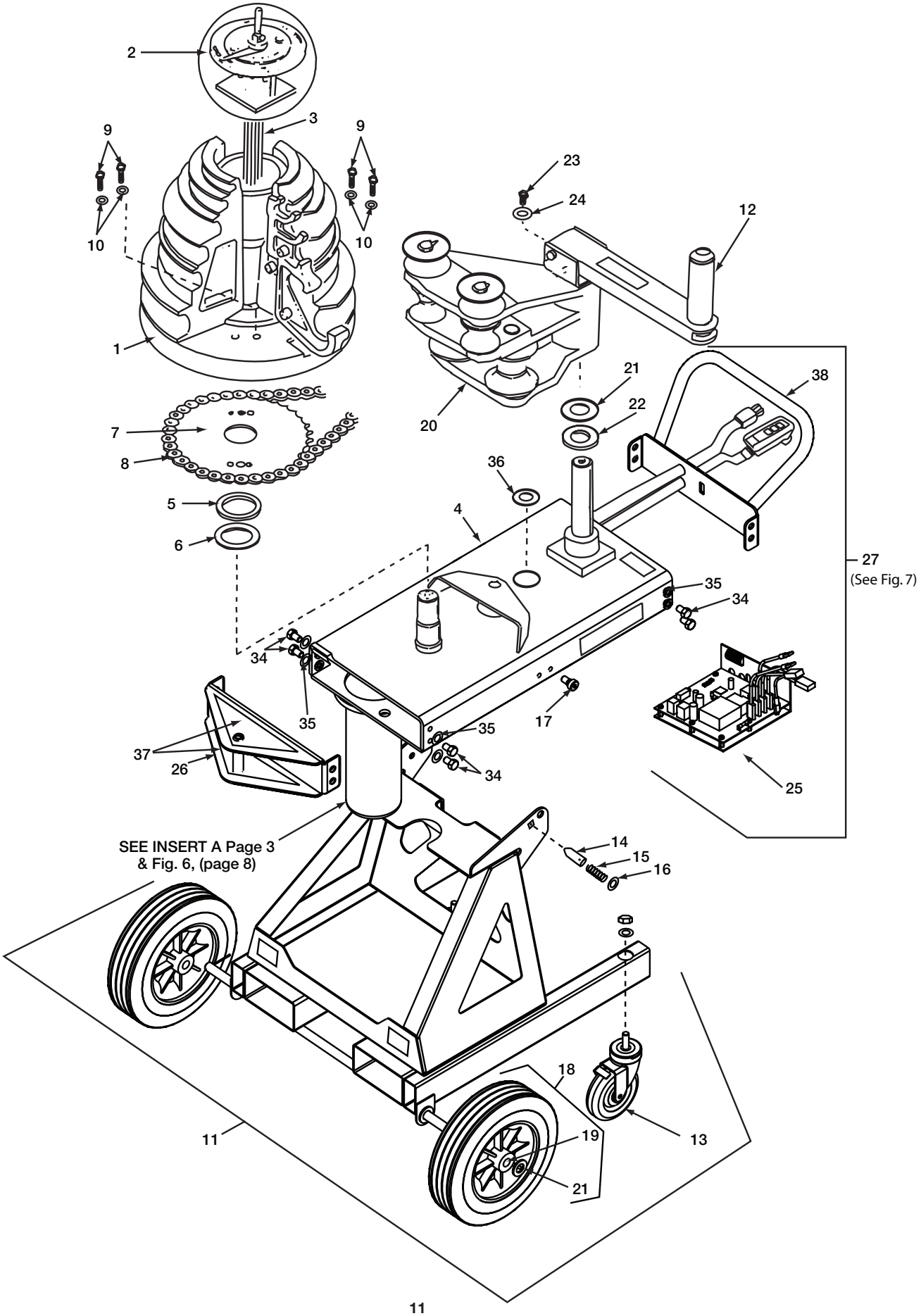


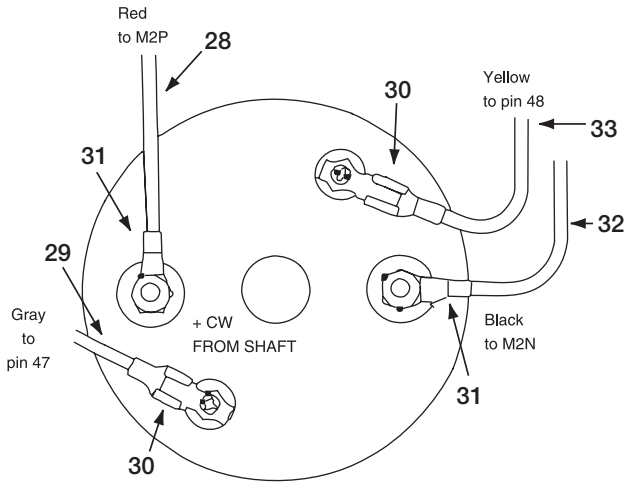
Figure 6

Figure 1

B2000 Bender Assembly



INSERT A

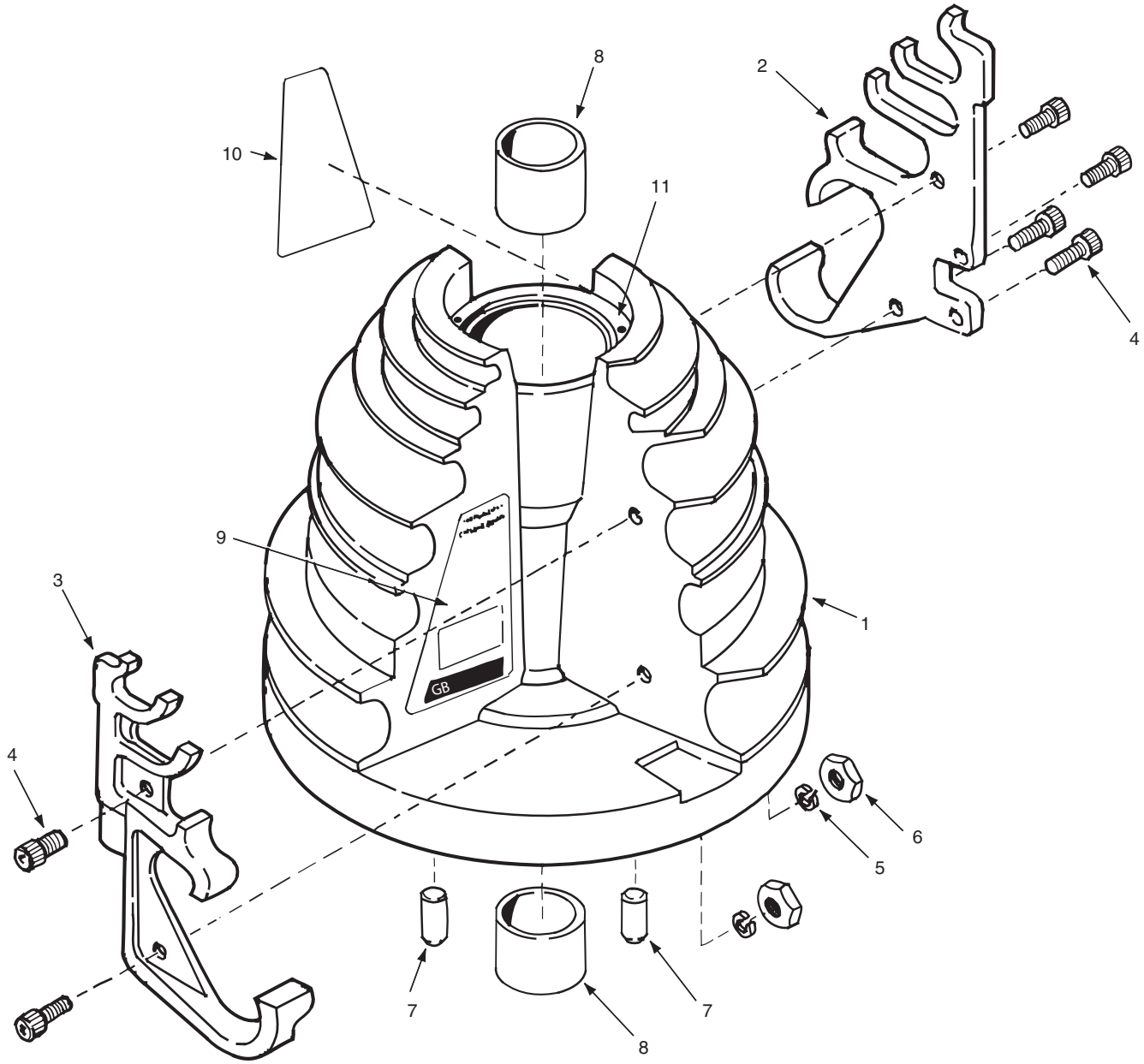


Bottom of Electric Motor
Parts List Below

B2000 Bender Assembly			
Item #	Part #	# Req'd	Description
1	Figure 2, pg. 4	1	Shoe Sub Assm
2	Figure 3, pg. 5	1	Limit Switch Assm
3	CL712647SR	1	Cable, Limit and Switch
4	SHM115	1	Sprocket Housing
5	CL157108	1	Washer, Shoe
6	CL221108	1	Washer, Thrust
7	CL170228	1	Shoe Sprocket
8	CL333066	1	Chain
9	Common Repl. Part	4	⅜"-24 x 2-½ Grade 5 Zinc Plated Hex Cap Screw
10	Common Repl. Part	4	¾" plu SAE Flat Washer
11	LA205	1	Leg Assembly (incl. 13, 19 & 21)
12	CK994900	1	Upper Roller and Handle (Figure 5)
13	CB208	2	Casters Assm (Hardware incl.)
14	CL185061	1	Locking Pin
15	CL183110	1	Spring
16	F57044	1	Ring
17	M00084	2	Screw, Shoulder
18	WB207	2	Wheel Assm (incl. 19 & 21)
19	Common Repl. Part	2	3/32" x 1-¼" Zinc plated cotter pin

B2000 Bender Assembly, cont.			
Item #	Part #	# Req'd	Description
20	CU295900K	1	Roller Housing Assm (Figure 4)
21	CK696108	1	Washer
22	CL229248	4	Shim
23 Part	Common Repl.	1	⅜" -16 x 1" g. Low Carbon Hex Head Cap Screw Zinc plated
24	Common Repl. Part	1	5/16" Zinc plated USS Flat Washer
25	EC2006	1	Relay Control Assm (Figure 9)
26	LP204	1	End Plate (incl. 34 & 35)
27	HC12	1	Handle & Ctrl Ckt Assm (Figure 7)
28	call tech support	1	Wire Assembly (See Above)
29	call tech support	1	Wire Assembly (See Above)
30	E1001104	2	Push-on Connector (See Above)
31	E1001021	2	Ring-Tongue Connector (See Above)
32	call tech support	1	Wire Assembly (See Above)
33	call tech support	1	Wire Assembly (See Above)
34	Common Repl. Part	8	½"-13 x ⅞" Alloy Plain Finish Socket Head Cap Screw
35	Common Repl. Part	8	½" Plain Finish High Collar Lock Washer
36	CM129006	1	Seal
37	LK15	2	Decal Kit
38	H905	1	Rear Handle

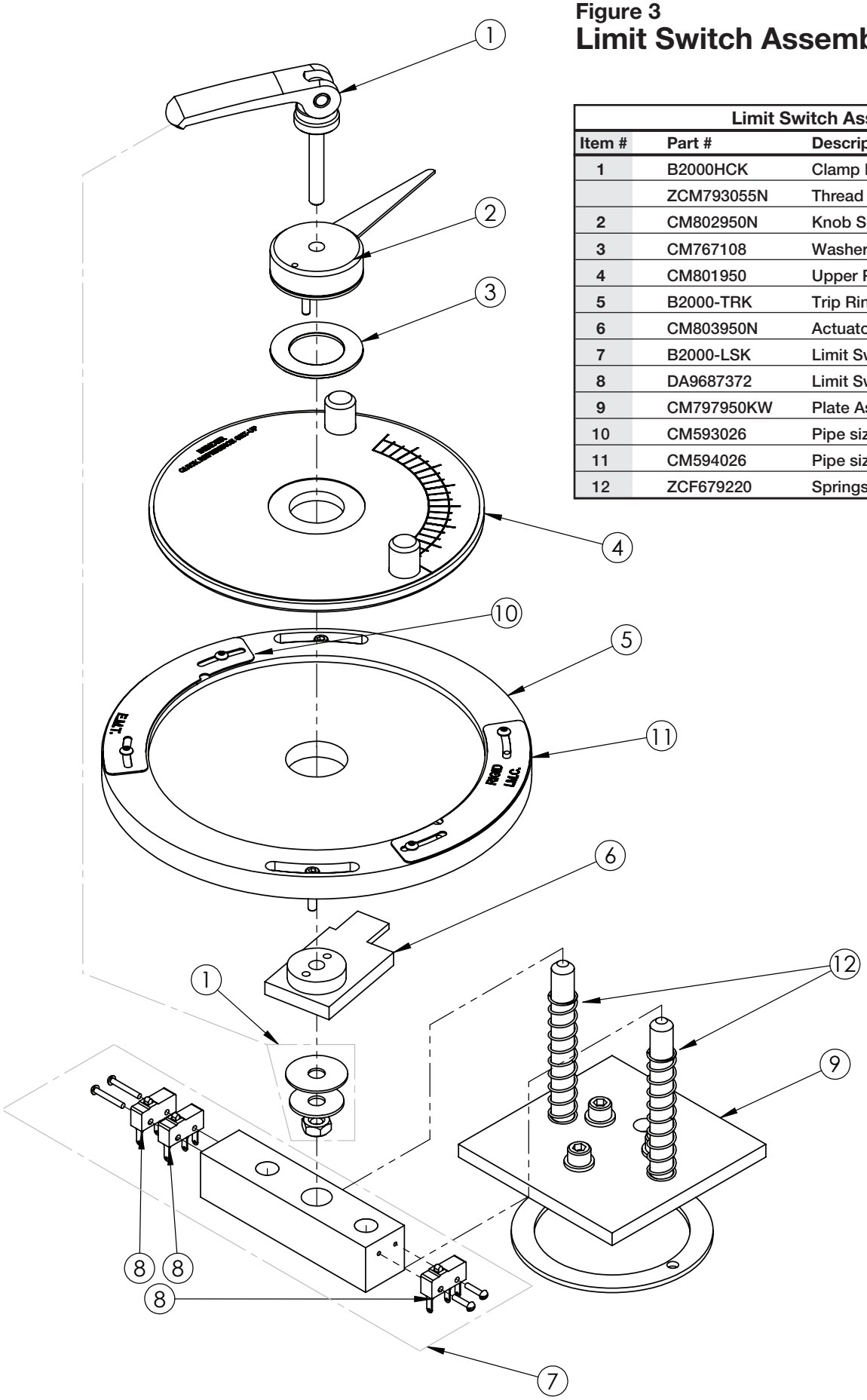
Figure 2
Shoe Subassembly



Shoe Subassembly			
Item #	Part #	# Req'd	Description
1	CL199809K	1	Shoe Bending (Incl. items 7, 8, 9 and 10)
2	CN542005	1	Clamp, IMC (Incl. items 4, 5, 6)
3	CN541005	1	Clamp, EMT (Incl. items 4, 5, 6)
4	Common Replaceable Part	6	⅝" -18 x 2¼" Plain Alloy Socket Head Cap Screw
5	Common Replaceable Part	6	⅝" Plain Finish Medium Split Lock Washer
6	Common Replaceable Part	6	⅝" -18 Low Carbon Plain Finish Finished Hex Nut

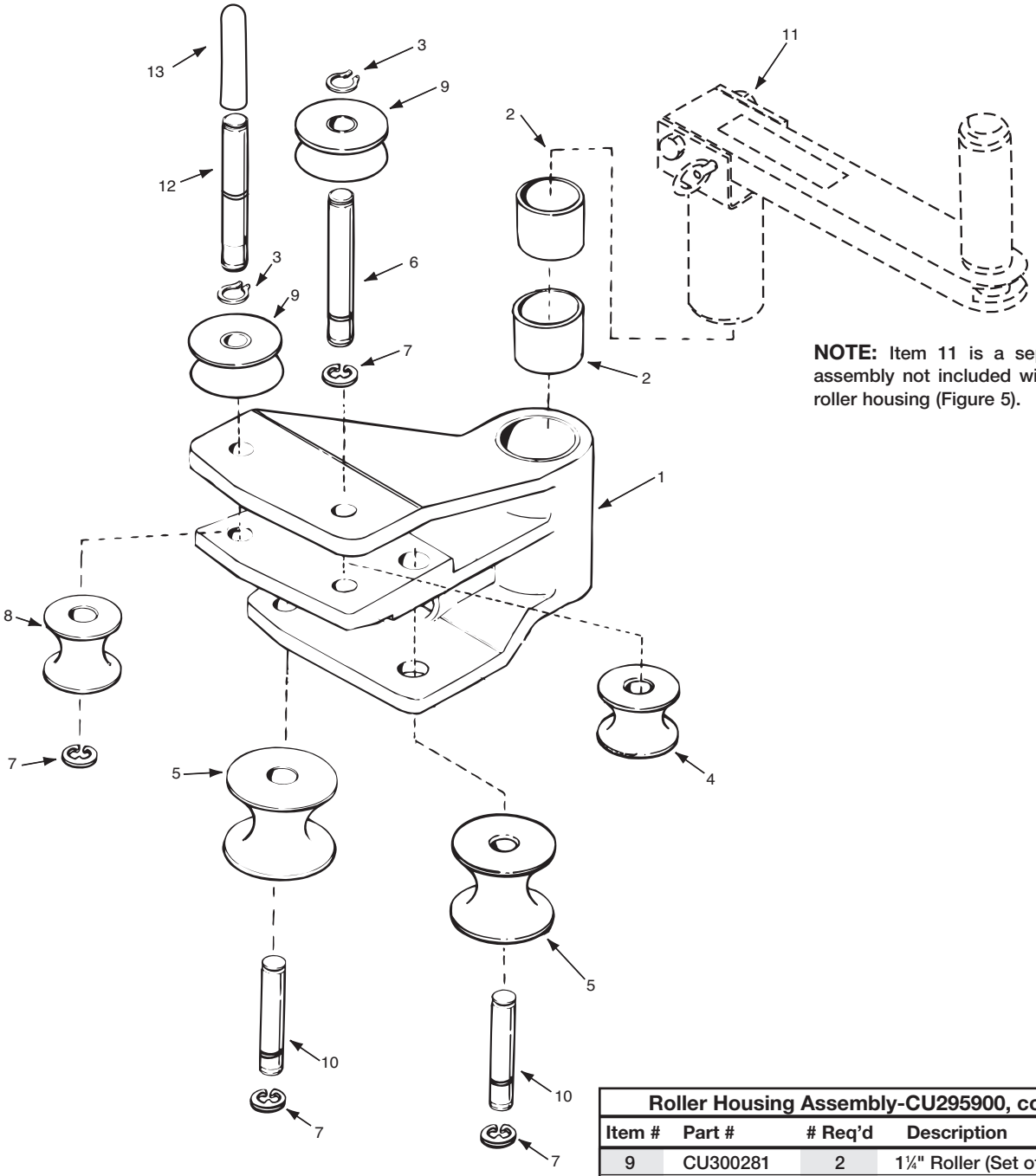
Shoe Subassembly, cont.			
Item #	Part #	# Req'd	Description
7	CK691061	2	Pin
8	CL61107	2	Bearing (includes 2)
9	CM126026	1	Instruction Decal - Stub-Up
10	CM127026	1	Instruction Decal - Offset
11	CM627028	2	Insert, Shoe

Figure 3
Limit Switch Assembly



Limit Switch Assembly		
Item #	**Part #**	**Description**
1	B2000HCK	Clamp Kit
	ZCM793055N	Thread Locker (for #1) *not pictured*
2	CM802950N	Knob Sub Assembly Kit
3	CM767108	Washer
4	CM801950	Upper Plate Assembly
5	B2000-TRK	Trip Ring Assembly Kit (Incl. #10 & #11)
6	CM803950N	Actuator Kit
7	B2000-LSK	Limit Switch Kit
8	DA9687372	Limit Switching (3-Pack)
9	CM797950KW	Plate Assembly Kit
10	CM593026	Pipe size decal EMT
11	CM594026	Pipe size decal Rigid/IMC
12	ZCF679220	Springs

Figure 4
Roller Housing Assembly – CU295900K



NOTE: Item 11 is a separate assembly not included with the roller housing (Figure 5).

Roller Housing Assembly-CU295900K			
Item #	**Part #**	**# Req'd**	**Description**
1	*CU296037K	1	Housing, Roller
2	CL61107	2	Bearing
3	Common Repl. Part		⅞" External Retaining Ring
4	CU299281	1	1½" Roller
5	CU298281	2	2" Roller (Set of 2)
6	CN452104K	1	Shaft, Roller
7	Common Repl. Part	4	⅞" Carbon Spring Steel E-Clip
8	CU319281	1	1½" Roller

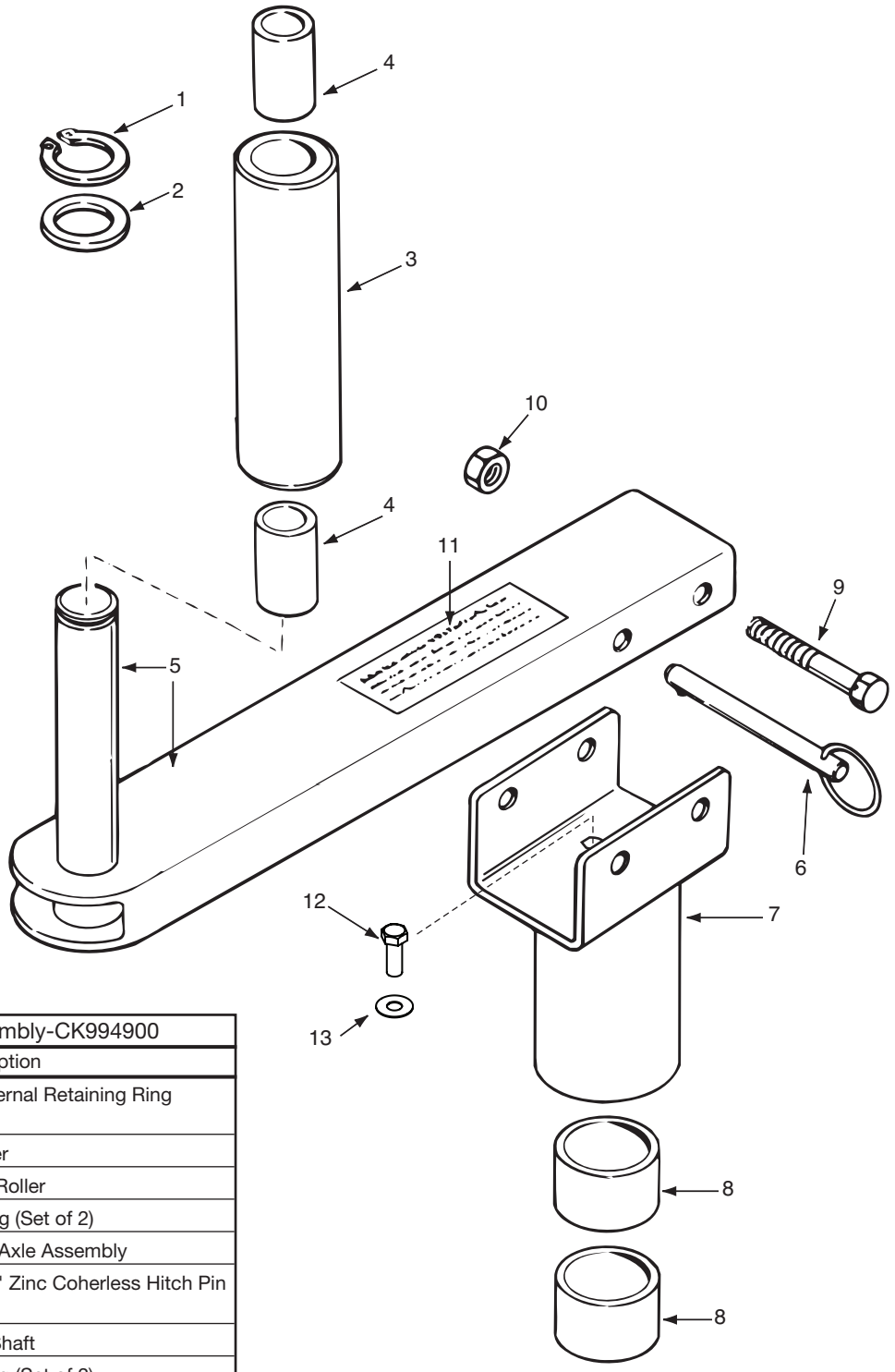
*When the housing is ordered, the bearings will be pre-installed.

Roller Housing Assembly-CU295900, cont.			
Item #	**Part #**	**# Req'd**	**Description**
9	CU300281	2	1¼" Roller (Set of 2)
10	CU297104	2	Shaft, Roller
11	CK994900	1	Upper Roller Assm (see Figure 5)
12	DC694104	1	Axle
13	CL343550	1	Grip, Handle

B2000-RK Kit includes: Roller and Ring Kit		
Part#		**Qty**
#4	1½" Roller	1
#5	2" Roller (Set of 2)	2
#8	1½" Roller	1
#9	1¼" Roller (Set of 2)	2
#3	⅞" External Retaining Ring	2
#7	⅞" Carbon Spring Steel E-Clip	4

Figure 5

Upper Roller and Handle Assembly – CK994900

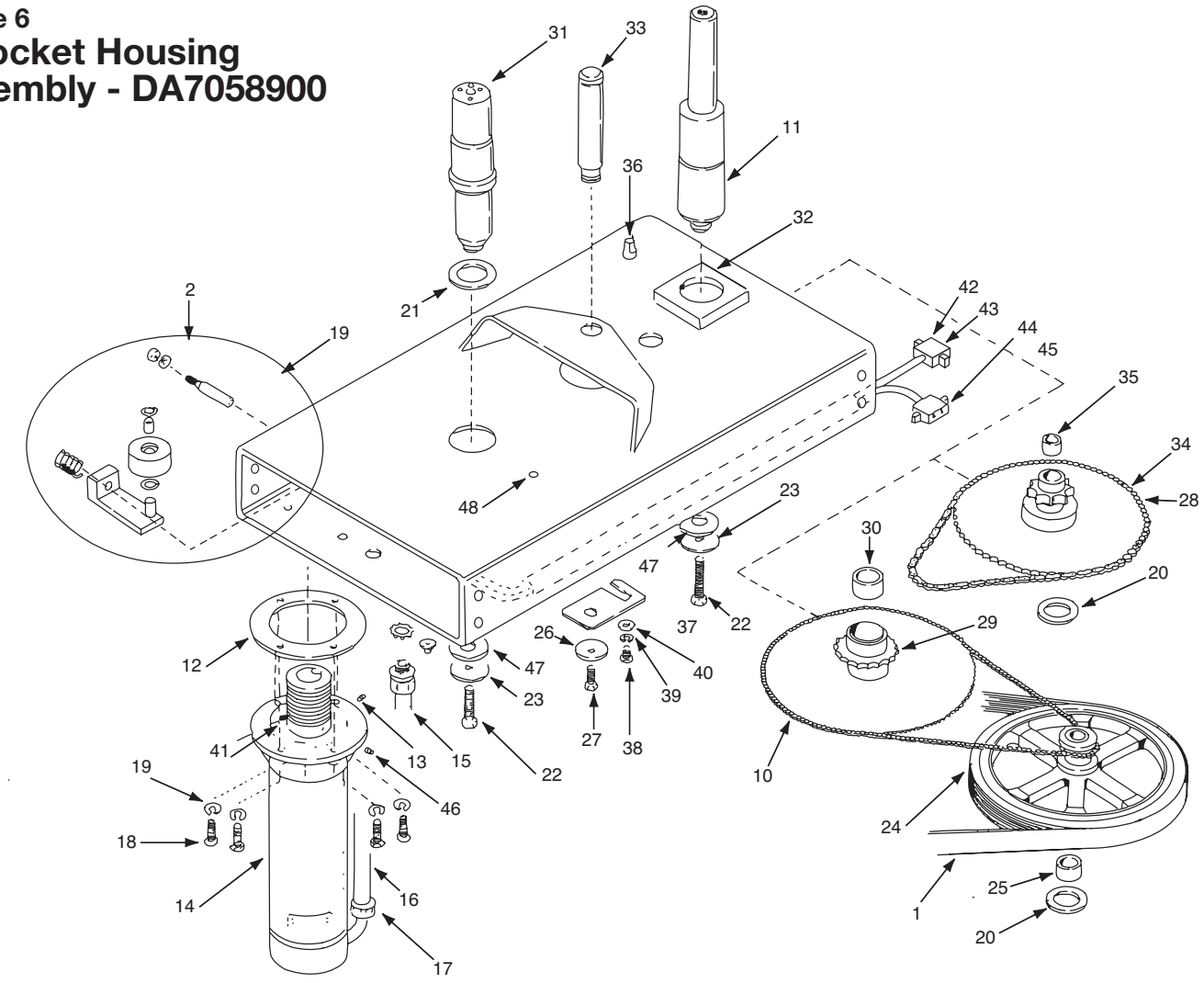


Upper Roller and Handle Assembly-CK994900			
Item #	Part #	# Req'd	Description
1	Common Repl. Part	1	1" External Retaining Ring
2	CK569108	1	Washer
3	*CK575281K	1	½"-1" Roller
4	CK295107	2	Bearing (Set of 2)
5	CL30900	1	Roller Axle Assembly
6	*Common Repl. Part	1	⅜" x 3" Zinc Coherless Hitch Pin
7	CL662950KW	1	Cam Shaft
8	CK693107	2	Bearing (Set of 2)
9	Common Repl. Part	1	⅜" -16 x 3" A307A Low Carbon Zinc Plated Hex Bolt
10	Common Repl. Part	1	⅜" - 16" Lock Nut- Nylon
11	Order Kit LK15	1	Decal, Caution
12	Common Repl. Part	1	⅜" - 16 x 1" 1g. Low Carbon Hex Head Cap Screw, Zinc Plated
13	Common Repl. Part	1	5⁄16" Zinc Plated USS Flat Washer

***These items come with bearings installed.**

Figure 6

Sprocket Housing Assembly - DA7058900



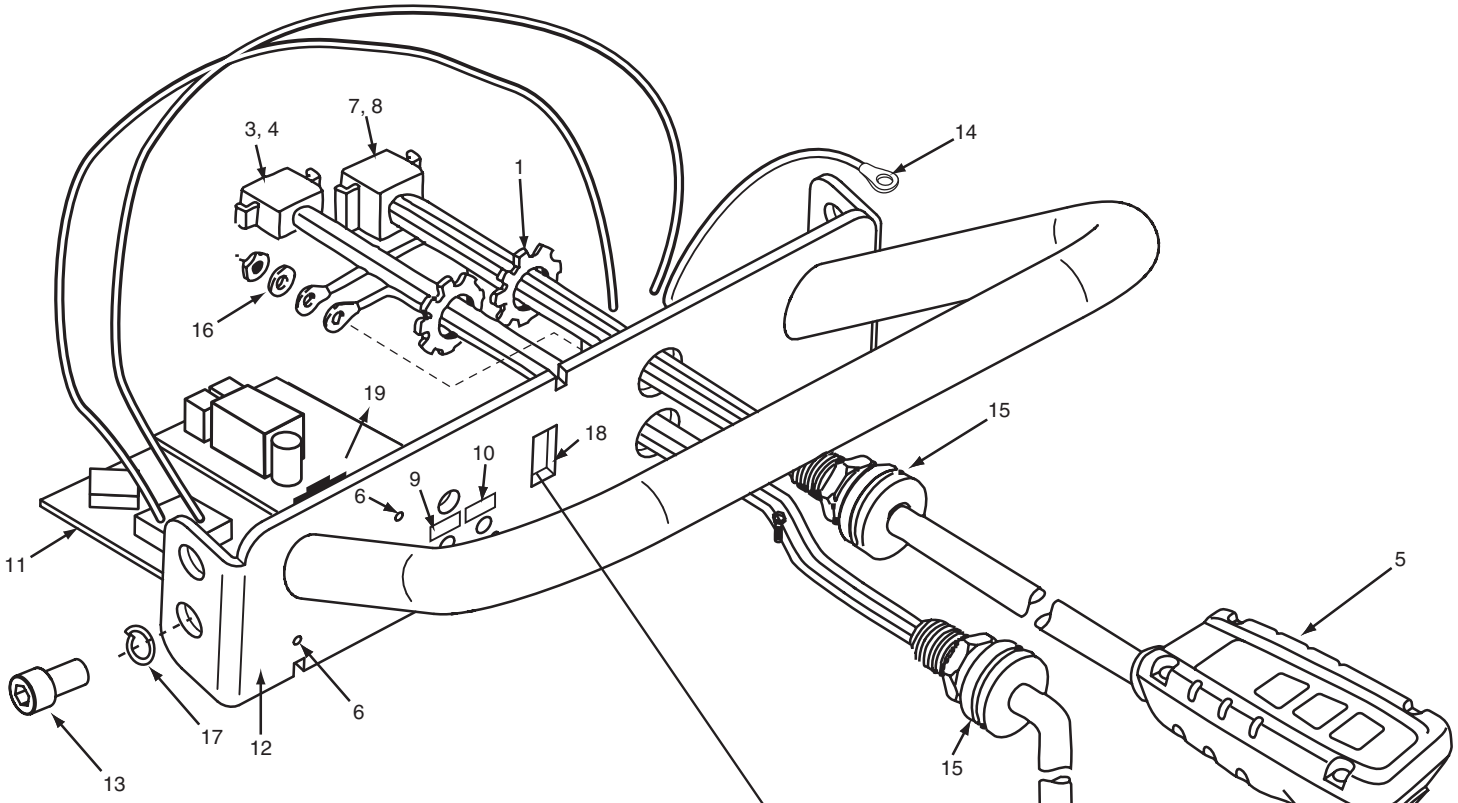
Sprocket Housing Assembly - DA7058900			
Item #	Part #	# Req'd	Description
1	CL310014	1	Drive Belt
2	CL306900		Includes:
		1	Tensioner Assembly
		1	Snap Ring
		1	Roller
		1	*Bearing
		1	Washer, Thrust
		1	Tensioner Weldment
		1	Spring
		1	Shaft Tensioner
		1	Nut, .375-16
10	CL335066	1	Chain, .375 Pitch
11	CW172104	1	Shaft, Roller Housing
12	C550357	1	Gasket, Motor
13	Common Repl. Part	1	Screw (10-32)
14	CL43259	1	Motor Assembly
15	CL674096	1	Connector
16	CL673228	1	Conduit, Flexible
17	CL675096	1	Connector
18	Common Repl. Part	4	⅜" - 24 x 1" Grade S Plain Finish Hex Cap Screw
19	Common Repl. Part	5	⅜" Plain Finish Medium Split Lock Washer
20	CL54108	2	Washer, Thrust
21	CL656108	1	Bearing
22	Common Repl. Part	2	½" - 30 x 3" Grade 5 Plain Finish Hex Cap Screw
23	*Common Repl. Part	4	½" Belleville Washer
24	CU541950W	1	Sprocket Assembly w/ Bearings

Sprocket Housing Assembly - DA7058900, cont.			
Item #	Part #	# Req'd	Description
25	CL53107	2	Bearing
26	CL12108	1	Washer
27	Common Repl. Part	1	⅜" - 16 x 2" Grade 5 Zinc Plated Hex Cap Screw
28	CL334066	1	Chain, .625 Pitch
29	*CU542950K	1	Sprocket Assembly w/ Bearings
30	CL670107	2	Bearing
31	CU674104	1	Shaft, Shoe
32	SHM115	1	Housing, Sprocket
33	*CL309104	1	Shaft, Sprocket
34	CL667950KW	1	Sprocket Assembly w/ Bearings
35	CL53107	2	Bearing
36	CL224028	1	Stop Screw
37	CL669101	1	Locking Plate
38	Common Repl. Part	1	5/16" - 24 x ½" LG Grade 5 Med. Carbon Stl. Zinc Plated
39	Common Repl. Part	1	5/16" Zinc Plated USS Flat Washer
40	Common Repl. Part	1	¼" Plain Finish USS Flat Washer
41	CL311019	1	Pulley, 10 Groove
42	DA6153006	1	Connector (Body 40) - limit switch
43	CM26006	8	Terminal, Female - limit switch
44	CM33006	1	Connector (M-1) - motor
45	CM28006	2	Terminal, Female - motor
46	Common Repl. Part	1	#10 -32 x 3/32" LG.
47	CU675108	2	Washer
48	Common Repl. Part	1	CAP

***These items come with bearings installed.**

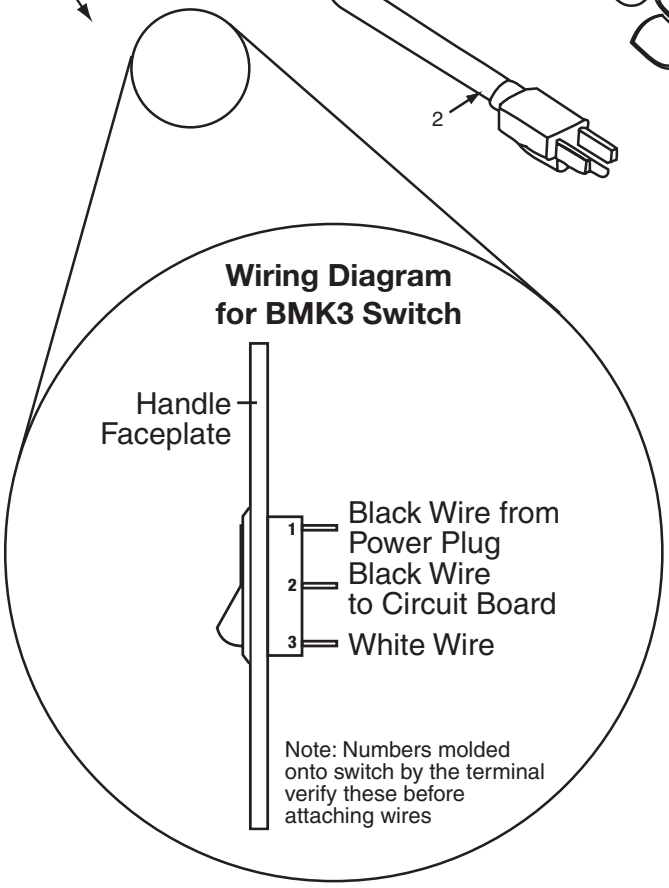
Figure 7

Handle and Control Circuit Assembly – HC12

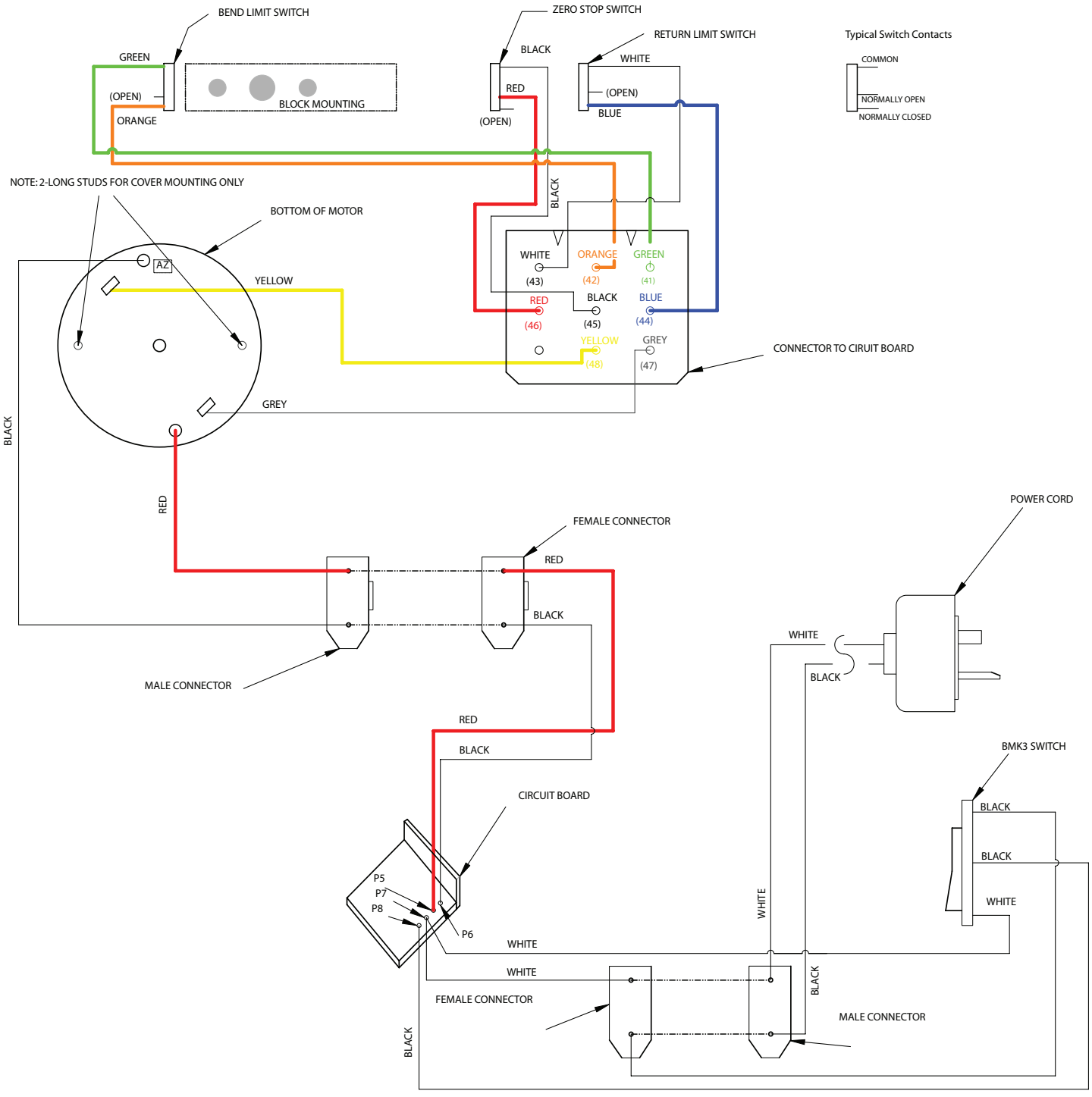


HC12 Contents			
Item #	Part #	# Req'd	Description
1	CJ458885	1	Locknut
2	CM178647SR	1	Plug Assembly
3	CM32006	1	Receptacle, Power Cord
4	CM25061	2	Pin, Cord Receptacle
5	PO5C	1	Pendant Station Assm
6	Common Repl. Part	3	#6 -32 X ⅜" LG. Button Hd. Cap Screw
7	DA6152006	1	Receptacle, Pendant
8	CM27061	8	Pin, Receptacle
9	LK15	1	Decal, Kit
10	LK15	1	Decal, Kit
11	EC2006	1	Circuit Board
12	H905	1	Handle Assembly
13	Common Repl. Part	4	½" - 13 x ⅞" Alloy Plain Finish Socket Head Cap Screw
14	DA7046900	1	Wire, Jumper
15	F1550	1	Grip, Cord
16	Common Repl. Part	1	#10 Hi-Collar Helical Spring Lock Washer
17	Common Repl. Part	4	½" Plain Finish High Collar Lock Washer
18	CB25	1	Switch
19	RA19	1	Braking Resistor

Item 3 is packed with item 4 loose.
Item 7 is packed with item 8 loose.
Instructions provided for assembling loose connectors.
DA 7070900 Limit Switch Jumper (not shown) (for older units)

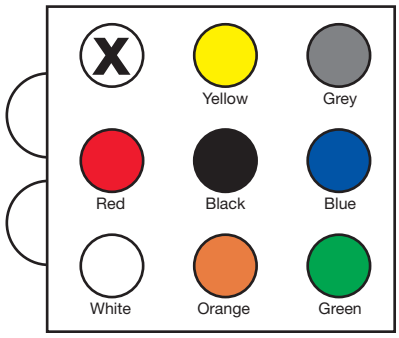


Wiring Schematic

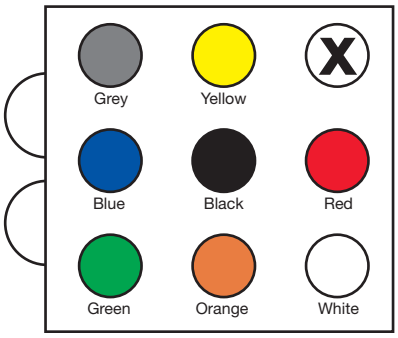


Limit Switch Wiring Diagram:

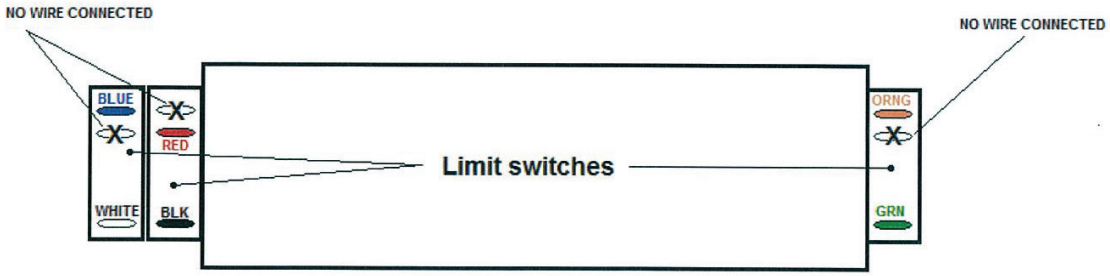
Rear view
(insert terminals)



Front view
(face connects to PC board)



	Yellow – from motor	Grey – from motor
Red – from zero stop switch	Black – from zero stop switch	Blue – from return limit switch
White – from return limit switch	Orange – from bend limit switch	Green – from bend limit switch



9.0 MAINTENANCE

A troubleshooting aid exists on the printed circuit board mounted to the inside of the operating handle. If all systems are functional, a white L.E.D. (pictured in Figure 13) will flash once every two seconds while the machine is powered up.

Error codes consist of different light patterns.

1. Blink twice = the motor is over heated.
2. Blink 3 times = limit switch has failed.
3. Blink 4 times = pendant control malfunction.

In addition the L.E.D. will be steady on if the bend or return button is being pressed.

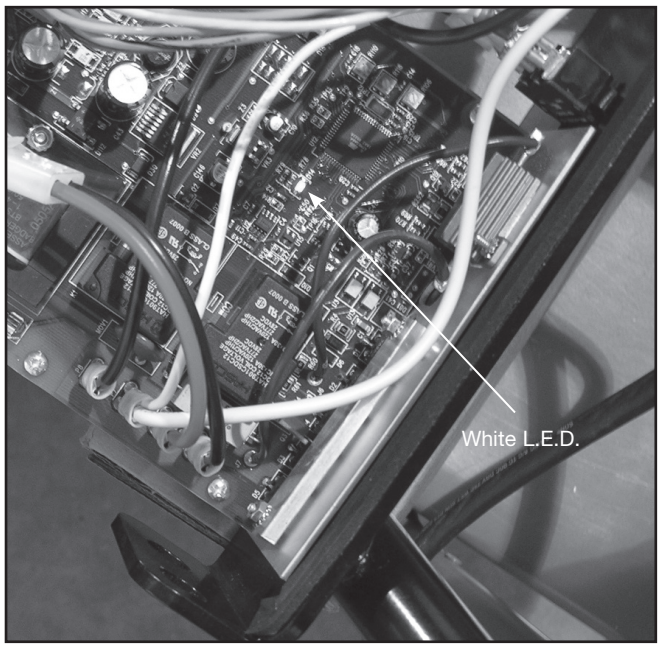


Figure 13. L.E.D. Location

10.0 INTERCHANGEABLE PART COMPATIBILITY

The part descriptions listed in the table below have variations between models of the B2000 and may not be compatible with every model. Part Numbers listed as “Interchangeable” are compatible with the B2000-8 and have the same Part Number. Part Numbers listed as “N/A” are not used on that Model. If the part description is not listed in the table below, that part is interchangeable between all models unless otherwise noted.

Model	B2000-8 (CURRENT)	B2000-7	B2000-6	B2000-5	B2000-4	B2000-3	B2000-2	B2000-1	B2000 (ORIGINAL)
Serial Number Beginning With	N	J K	H	F G	E	D	C	B	A
Approximate Manufacturing Date	03/2014	07/2007	10/2004	03/2001	07/1997	05/1986	08/1984	01/1983	02/1982
SHOE SUBASSEMBLY[1]									
Shoe Insert	CM627028	Interchangeable	Interchangeable (CM627028)	N/A	N/A	N/A	N/A	N/A	N/A
IMC/Rigid Clamp	CN542005	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CN542005)	CL214005	CL214005
EMT Clamp	CN541005	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CN541005)	CL215005	CL215005
Washer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	B1040108
LIMIT SWITCH SUBASSEMBLY[2]									
Clamp Kit	B2000HCK	B2000-BCK	B2000-BCK	B2000-BCK	B2000-BCK	B2000-BCK	B2000-BCK	B2000-BCK	B2000-BCK
Knob Sub Assembly Kit	CM802950N	CM802950	CM802950	CM802950	CM802951	CM802952	CM802953	CM802954	CM802955
Upper Plate Assembly	CM801950	CM801950KW	CM801950KW	CM801950KW	CM801950KW	CM801950KW	CM801950KW	CM801950KW	CM801950KW
Actuator Kit	CM803950N	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW

Model	B2000-8 (CURRENT)	B2000-7	B2000-6	B2000-5	B2000-4	B2000-3	B2000-2	B2000-1	B2000 (ORIGINAL)
Serial Number Beginning With	N	J K	H	F G	E	D	C	B	A
Approximate Manufacturing Date	03/2014	07/2007	10/2004	03/2001	07/1997	05/1986	08/1984	01/1983	02/1982
LIMIT SWITCH SUBASSEMBLY[2]									
Limit Switch Kit	B2000LSK	Interchangeable	Interchangeable	Interchangeable	Interchangeable (B2000LSK)	CL789103 CL254372	CL789103 CL254372	CL789103 CL254373	CL789103 CL254374
Spring – Middle Shaft	N/A	CF679110	CF679110	CF679110	CF679110	CF679110	CF679110	CF679110	N/A
Shaft	N/A	CM772104	CM772104	CM772104	CM772104	CM772104	CM772104	CM772104	N/A
Bushing	N/A	CM782039	CM782039	CM782039	CM782039	CM782039	CM782039	CM782039	N/A
Plate Guide	CM770071N	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	CM803950KW	N/A
Spring – Supporting Shaft	CF679220	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cap Screw	N/A	CM474028	CM474028	CM474028	CM474028	CM474028	CM474028	CM474028	N/A
ROLLER HOUSING SUBASSEMBLY[3]									
Handle Grip	CK575281	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CK575281)	N/A	N/A	N/A	N/A
Axle	DC694104	Interchangeable	Interchangeable	Interchangeable	Interchangeable (DC694104)	N/A	N/A	N/A	N/A
UPPER ROLLER AND HANDLE SUBASSEMBLY									
Hex Head Cap Screw	B1077046	Interchangeable	Interchangeable	Interchangeable (B1077046)	N/A	N/A	N/A	N/A	N/A
Flat Washer	CL944108	Interchangeable	Interchangeable	Interchangeable (CL944108)	N/A	N/A	N/A	N/A	N/A
Lock Nut	CU438055	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CU438055)	C425120	C425120	N/A
Lock Washer	N/A	N/A	N/A	N/A	N/A	N/A	C432108	C432108	N/A
Lock Pin	CK218061	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CK218061)	ZCK218061
Hex Bolt	CH400028	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CH400028)	N/A
DU Bearing	CK295107	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CK295107)	CK693107
SPROCKET HOUSING SUBASSEMBLY									
Housing	SHM115	Interchangeable	Interchangeable (SHM115)	CL323001	CL323001	CL323001	CL323001	CL323001	CL323001
Bushing/CAP	CL714980	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CL714980)	N/A	N/A	N/A	N/A
Sprocket	CU542950	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CU542950)	CL329950K	CL329950K	CL329950K
Belt Sprocket	CU541950	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CU541950)	ZCU543950	CL308950K	CL308950K	CL308950K
HANDLE AND CONTROL CIRCUIT SUBASSEMBLY[4]									
Pendant + Cord Assembly	P05C	Interchangeable (P05C)	CN982900W	CN982900W	CN982900W	CN982900	CN982900	CL718950	CL718950
Voltage Decal (High & Low)	LK15	Interchangeable (LK15)	DA6987026	DA6987026	DA6987026	N/A	N/A	N/A	N/A
Circuit Board	EC2006	EC2006	BH201	BH201	BH201	CN985900	CN985900	CN985900	CN985900
Handle	H905	H905	LP204	LP204	LP204	CL723070	CL723070	CL723070	CL723070
Switch	CB25	CB25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bolts	M00085	Interchangeable	Interchangeable (M00085)	N/A	N/A	N/A	N/A	N/A	N/A
Screw	N/A	N/A	N/A	B1487046	B1487046	B1487046	B1487046	N/A	N/A
Bracket	N/A	N/A	N/A	CM16950W	CM16950W	CM16950W	CM16950W	N/A	N/A
Lock Washer	B36	Interchangeable	Interchangeable (B36)	N/A	N/A	N/A	N/A	N/A	N/A
GnD. Screw	CH307028	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CH307028)	CK478028	CK478028	CK478028	CK478028
GnD. Washer	CW401028	Interchangeable	Interchangeable	Interchangeable	Interchangeable (CW401028)	M2231108	M2231108	M2231108	M2231108