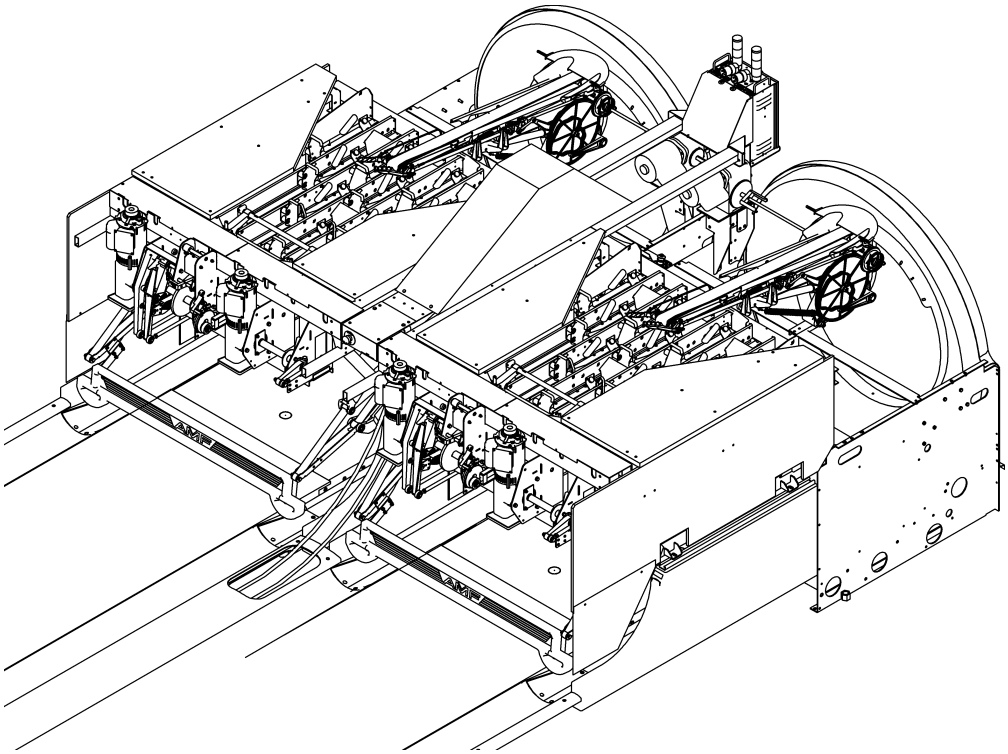
70XL*i*
PINSPOTTER UPGRADE

Installation Guide



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QubicaAMF Bowling Products, Inc., ♦ Technical Support ♦ (International) 804 730-4000 ♦ (Domestic) 1-866-460-7263

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QubicaAMF Bowling Products, Inc. reserves the right to revise and/or update this manual at any time without obligation to notify any person or entity of such revision. The document number, revision level, and date below indicate the edition of this manual.

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QubicaAMF Bowling Products, Inc.
8100 AMF Drive
Mechanicsville, VA. 23111

70XL*i* Pinspotter Upgrade Installation Guide Rev. B

Summary of Changes

Change No.	ECR No.

List of Effective Pages

Page	Change No.	Effective Date
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1.0 GENERAL

1.1 OVERVIEW

These instructions are written to be used by QubicaAMF-certified 70XLi installation technicians. Details and drawings are specific to pinspotters using AMF *AccuScore Plus* scoring, but may be adapted to accommodate other scoring systems. These instructions are not intended to cover all circumstances that may be encountered in the field, especially when QubicaAMF components are connected to non-QubicaAMF equipment.

DISCONNECT THE POWER PLUG BEFORE WORKING ON ANY PINSPOTTER EQUIPMENT AND BEFORE ENTERING AN OPERATING PORTION OF THE MACHINE.

Unless noted, when items are removed they are to be properly discarded with the following exceptions:

- All chassis, motors, and gearboxes removed as part of this upgrade are to be shipped back to QubicaAMF unless specified differently in the sales contract.

- Bolts, screws, washers, and other fasteners that are removed should be kept until the installation process is complete and then discarded.

1.2 SAFETY TIPS

1. **REMOVE THE POWER PLUGS BEFORE WORKING ON A PINSPOTTER OR ASSOCIATED EQUIPMENT.** Never work on a machine while it is in operation.

2. Be sure all safety guards are securely in place before operating a pinspotter.

3. Do not extend any part of the body under, over, or around any guard while the machine is in operation.

4. Do not touch or handle any machine wiring while the power plug is connected. **ELECTRICAL SHOCK CAN BE FATAL.**

5. Do not manually crank motors with the motor plugged in.

6. Crank the sweep to the guard position when working in the machine.

7. Be aware of the danger of springs under tension.

8. All electric power tools should be grounded or double insulated.

9. Keep the pinspotter area and workshop clean at all times.

NOTES

2.0 PREINSTALLATION

A preinstallation visit should be conducted just prior to the center upgrade. This visit is conducted to verify that all equipment is working correctly and to determine if any conditions exist that may not be acceptable. **During this visit, the 70XLi Upgrade Pre-installation Survey Checklist must be completed for each lane pair to be upgraded. (See Attachment A in this manual.)**

Make sure that spare table and sweep drive shafts are available in case some are chipped or worn out. New shafts are not part of the upgrade kit. The center manager is responsible for ensuring that bad shafts are replaced before the installation begins.

Electric power and grounding should be as per QubicaAMF specifications. See Attachment B for the requirements.

Inform the center manager should problems be found. Repair of existing problems is not part of the 70XLi upgrade program.

NOTES

3.0 INSTALLATION

Ensure that 230-volt power is available to the pinspotters in accordance with Attachment B.

These instructions contain the steps for upgrading the pinspotters for one lane pair. Simply repeat the applicable steps for the remaining pinspotters to be upgraded.

3.1 VERIFY MATERIALS

1. Open the upgrade package and verify contents against the Bill of Materials list in Attachment C. **Do not begin the installation without the proper upgrade components.**

3.2 INSTALL MANAGER'S CONTROL UNIT (MCU)

1. Run one home run cable from the first pinspotter of the series to the location chosen for the Manager's Control Unit (MCU). Refer to the MCU manual (400-088-008) for all other details.

2. Install the MCU. (Leave the existing manager's control box in place).

3.3 PREPARE FOR UPGRADE

1. Run (but do not connect) the underlane cables (power and communication cables from the cameras to the pinspotter chassis, cables from the ball detectors, foul detectors, ball return, and 10^{th} frame switches to the chassis) for all the lanes being upgraded.

2. Install cameras on all lanes being upgraded.

   NOTE: Some installations may not contain some or all of these components.

3. Remove pins from the pin deck and pinspotters of the lane pair to be upgraded.

4. Unplug power to the lane pair to be upgraded.

5. Lay down lane protection paper on the pin deck and on several feet of the lane surface of the lane pair to be upgraded.

6. Unplug the chassis, control boxes, table and sweep drive motors, and back-end drive motors for both pinspotters.

7. Unplug any interface cables including scoring, mask, ball detector, A & MC box, ball return, etc., connected to the wiring harnesses or chassis/control boxes.

3.4 BACK END (BE) EQUIPMENT REMOVAL

1. Remove and discard the distributor drive shaft assemblies.
2. Remove and discard the rear wireway covers.
3. Remove the springs from the ball lift belt tightener assemblies.
4. Loosen the lower end of the ball lift by removing the four clamp studs. Retain the studs for reuse.
5. Remove the back-end drive motor and gearbox assemblies.
6. Remove the back-end motor drip pans.
7. Disconnect the top of both cushion shock absorbers from their mounting brackets.
8. Remove the pin elevator wheel guard support braces.
9. Remove the pin elevator wheel belt tightener assemblies.
10. Remove the pit signal/trouble call electrical box. If you do not have a trouble call system, but still have the electrical box, remove the box.
11. Remove the back-end control boxes. See Figure 3-1.

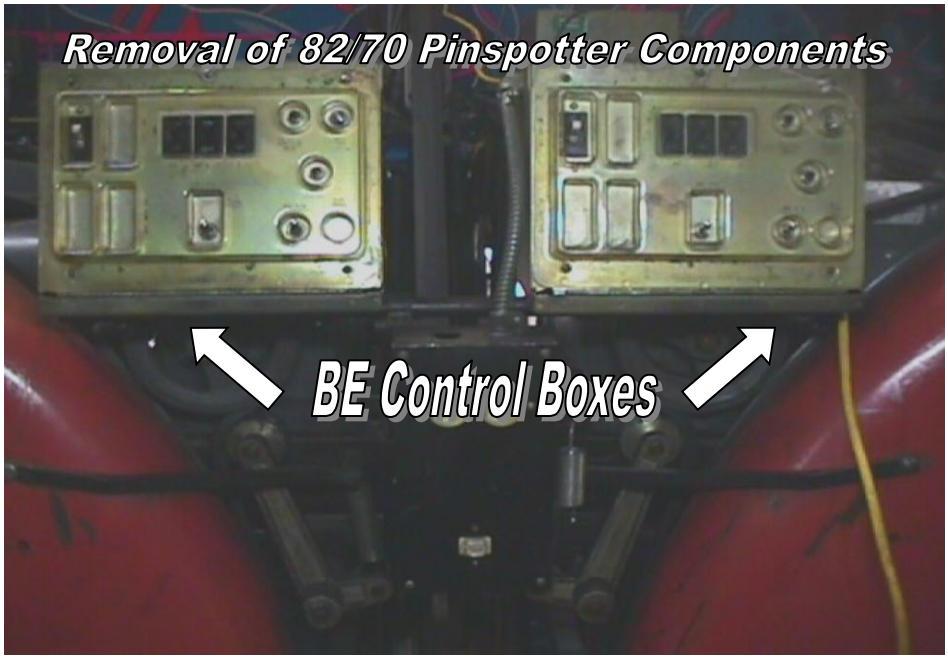


Figure 3-1

12. Remove the back-end control box mounting brackets.

13. Remove the back-end motor mount tie plate.

14. Remove the back-end gearbox mounting brackets. See Figure 3-2.

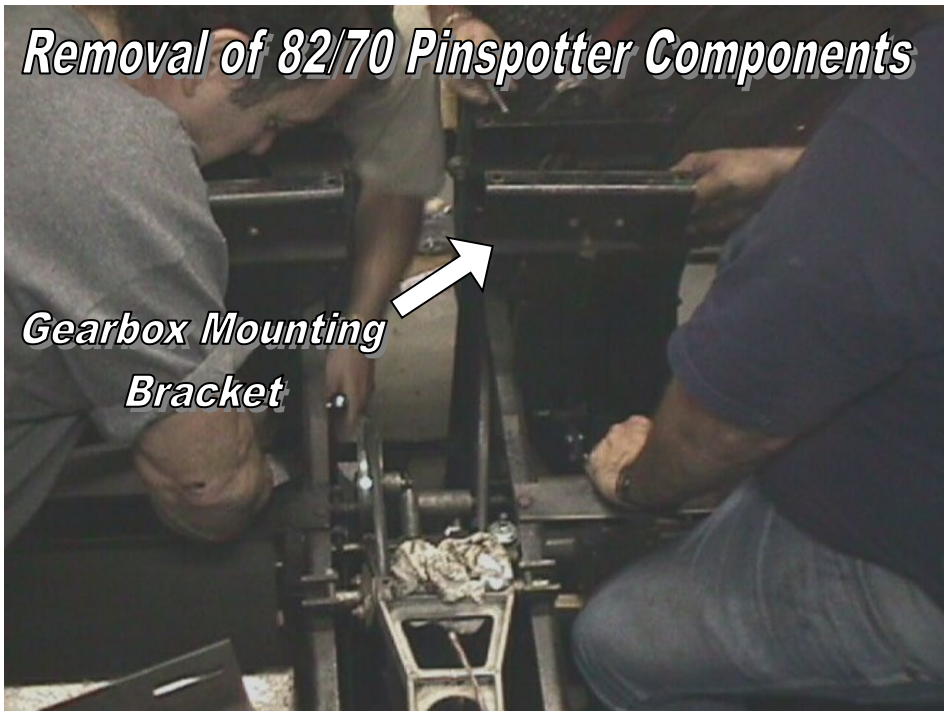


Figure 3-2

15. Remove the control wires going to the bin switches.

16. Unbolt the back-end wireway channel, and carefully place the wireway and harness on top of the bin.

17. Remove the pin elevator wheel drive pulleys, carpet drive pulleys, and keys from the back-end gearboxes. **Save these items.**

3.5 FRONT END (FE) EQUIPMENT REMOVAL

1. If a pit light duplex receptacle exists, disconnect the power supply wires from it. See Figure 3-3. If the pit light is hard wired to the wiring harnesses, cut the pit light power supply wires inside the crossbeam wireways and remove the receptacle. Remove the pit lights and discard.

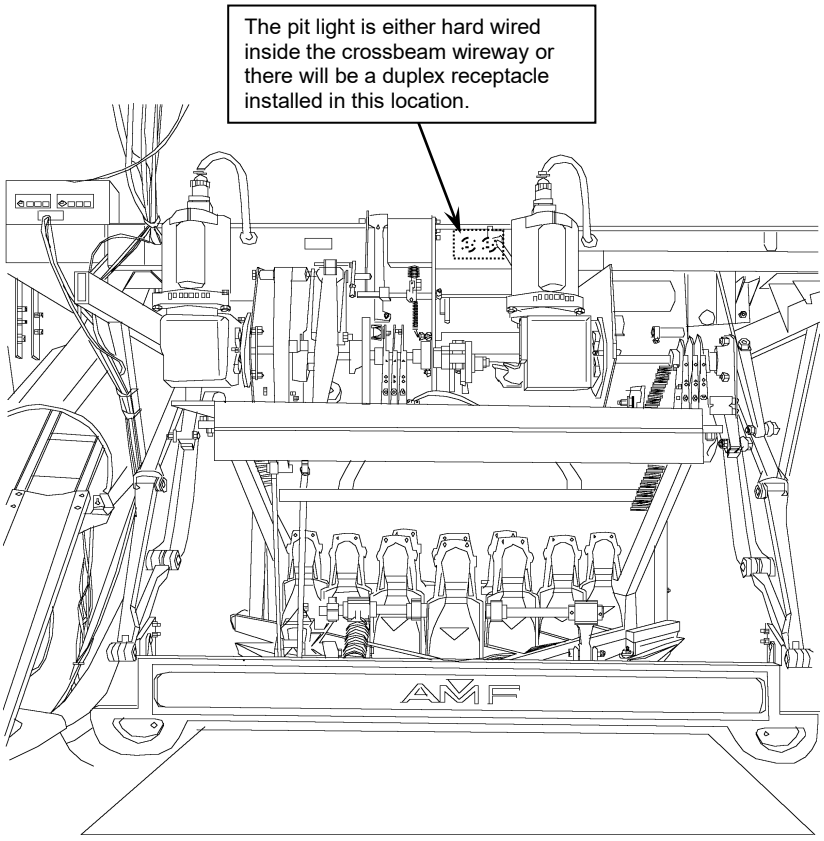


Figure 3-3

2. Disconnect the wire harness from the spot solenoid on each machine.

3. Remove the chassis and the chassis frame weldments.

4. Unscrew the terminal strips and capacitor mounting brackets from inside the crossbeam wireways. See Figures 3-4 and 3-5.

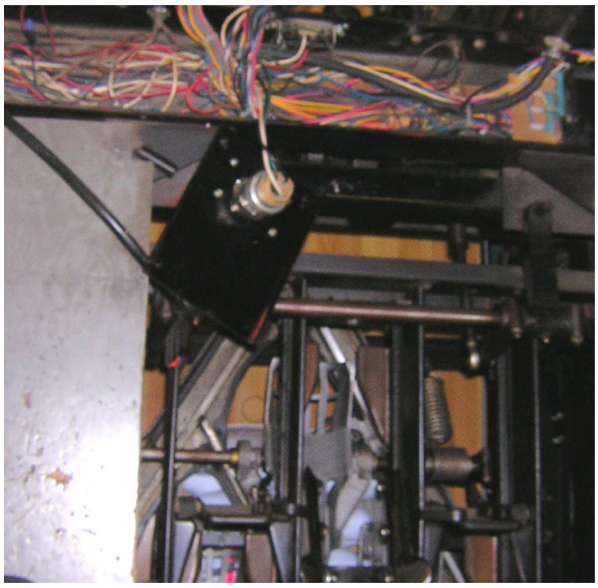


Figure 3-4

Figure 3-5

5. Disconnect and remove the table drive motor power cables and the sweep drive motor power cables from the cutouts in the crossbeam wireways.

6. Disconnect the wires from the off-spot switch, and then remove the wires.

7. Disconnect the cable leading down to the table. Remove all wires from the table assembly and the table harness cables running from the box beam to the table.

8. Remove the front wiring harness including the terminal strips and capacitors.

9. Lay 2 or 3 pins on the pin deck and crank the table drive motors until the table is resting on the pins. There should be no pressure on the table drive clevis.

10. Crank the sweep motor until the sweep is in the guard position.

11. Remove the table drive motor and gearbox. See Figure 3-6.

12. Remove the sweep drive motor and gearbox. See Figure 3-6.

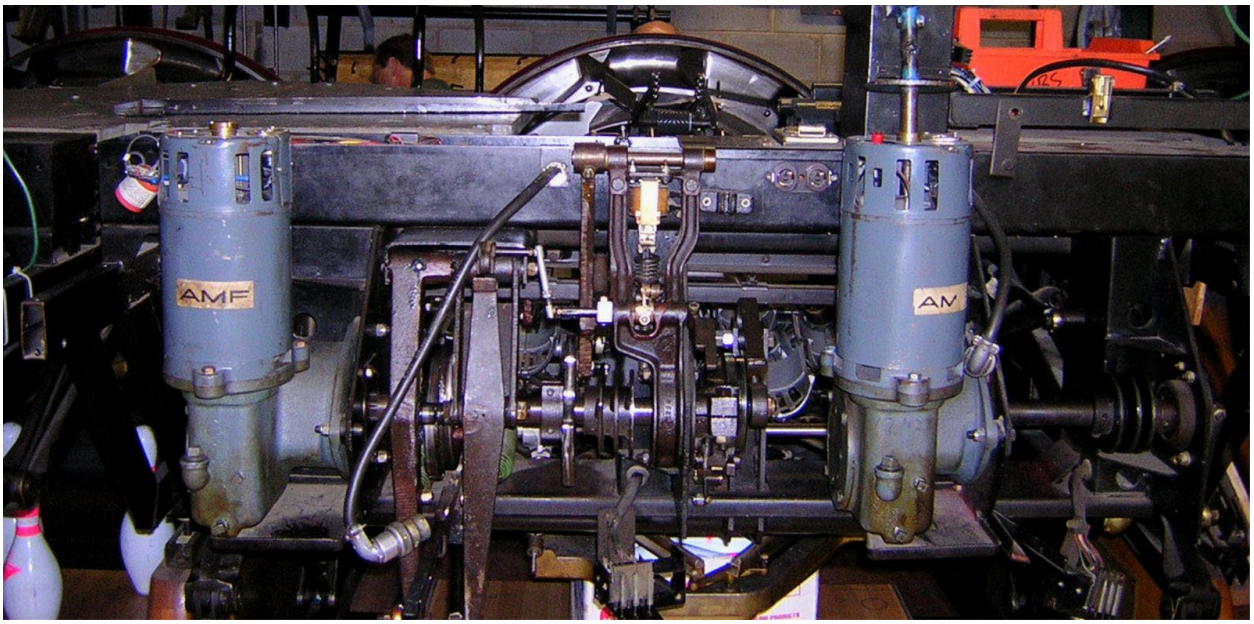


Figure 3-6

13. Remove the start switch for the automatic scoring.

14. Remove the table and sweep cam switch assemblies from the frame. See Figure 3.7.

15. Disconnect the control wires from the cam switch assemblies and discard the switch assemblies.

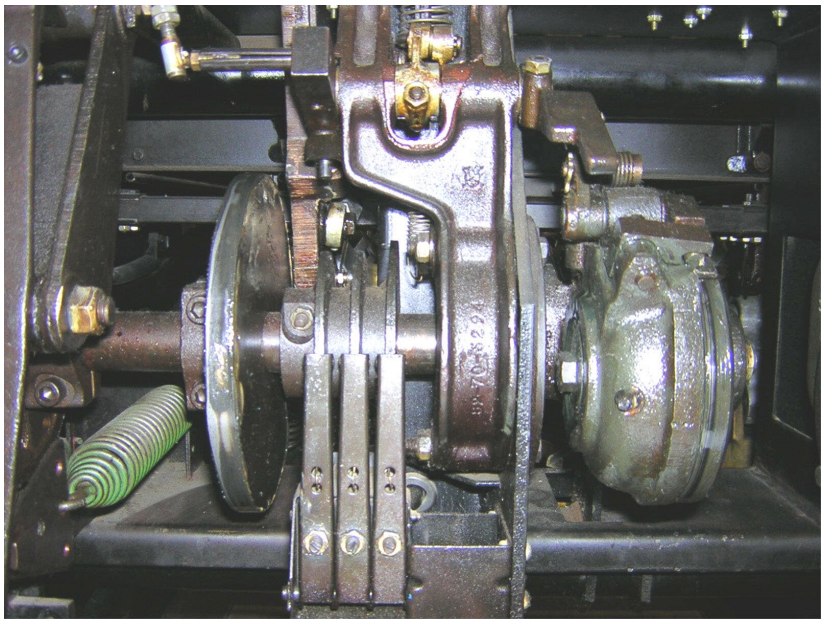


Figure 3-7

16. Disconnect the connecting rod from the crank arm on the end of the sweep drive shaft.

17. Unlock the collar on the sweep drive shaft by loosening the setscrew and turning the locking collar in the anticlockwise direction.

18. Remove the sweep cam weldments (SA, SB, SC) from the sweep shaft. Do not reinstall the shaft after removing the cams. See Figure 3.8.

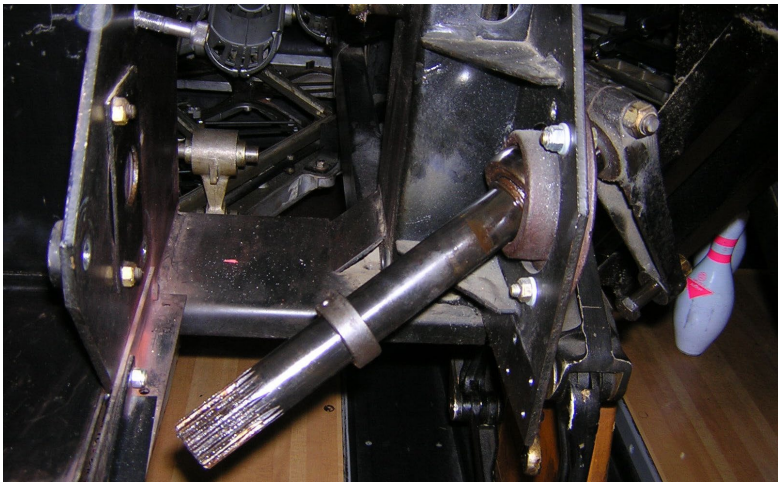


Figure 3-8

19. Remove the spot solenoid and discard.

20. Remove the bolt that connects the clevis to the table torque tube assembly.

21. Remove the table drive eccentric and clevis. Save the key and eccentric assembly.

22. Remove the spring from the shuttle to the bin. Disconnect the spot and respot lever springs and connecting rods.

23. Loosen the cap screws that secure the spot/respot cams to the drive shaft. The cams need to be loose to allow shaft removal. Save the key.

24. Unlock the collar of the table shaft by loosening the setscrew and turning the locking collar in the anticlockwise direction.

25. Disconnect the shuttle connecting rod to remove pressure from the shuttle cam.

26. Loosen the (TA1, TA2, TB) cam locking stud.

27. Gently tap on the table shaft with a plastic hammer to slide the shaft out of the flange bearing.

28. Remove table cam weldments (TA1, TA2, TB) from the table shaft.

29. Repeat Steps 1 through 28 for the other pinspotter.

3.6 FRONT END (FE) INSTALLATION

1. Route the wire harness cable ends using the same wireway accesses that the old cable ends used (see Figure 3-9a showing a Left Hand machine). Secure the table and sweep power cables in the cutouts in the crossbeam wireways using the cable restraints already installed on the power cables.

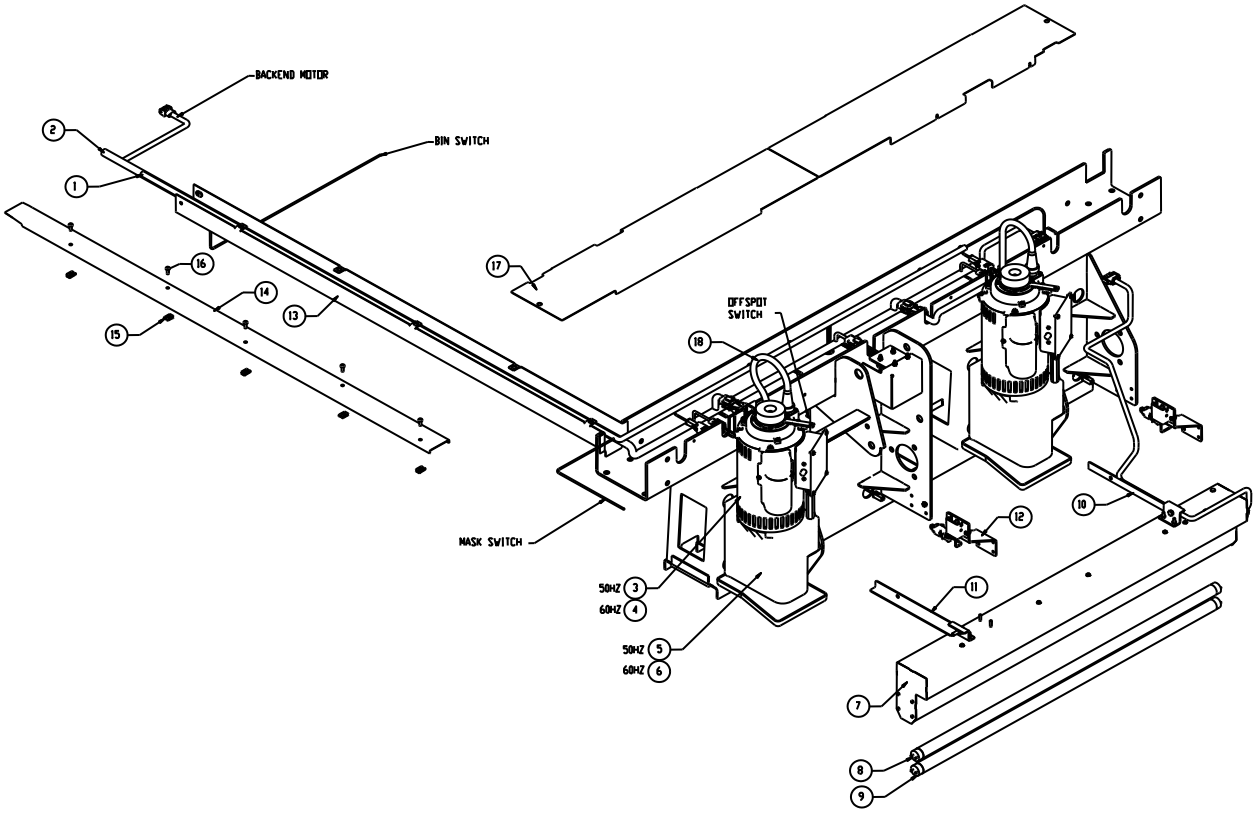


Figure 3-9a

ITEM	DESCRIPTION
1	EVEN MACHINE SIGNAL CABLE
2	EVEN MACHINE POWER CABLE
3	FRONT-END MOTOR 50HZ
4	FRONT-END MOTOR 60HZ
5	FRONT-END GEARBOX, 50HZ
6	FRONT-END GEARBOX, 60HZ
7	DUAL PIT LIGHT FIXTURE ASSEMBLY, DUAL INPUT
8	LAMP, BLACK LIGHT T8 36", 30W
9	LAMP, DAY LIGHT T8 36", 30W
10	PIT LIGHT BRACKET, RH

ITEM	DESCRIPTION
11	PIT LIGHT BRACKET, LH
12	HOME SENSOR ASSEMBLY
13	FRONT WIREWAY
14	WIREWAY COVER
15	U-NUT, 10-32
16	SCREW, 10-32 X .50, RD HD
17	BOX BEAM COVER
18	MOTOR CABLE
19	FRONT-END DRIVE UNIT, 50HZ
20	FRONT-END DRIVE UNIT, 60HZ

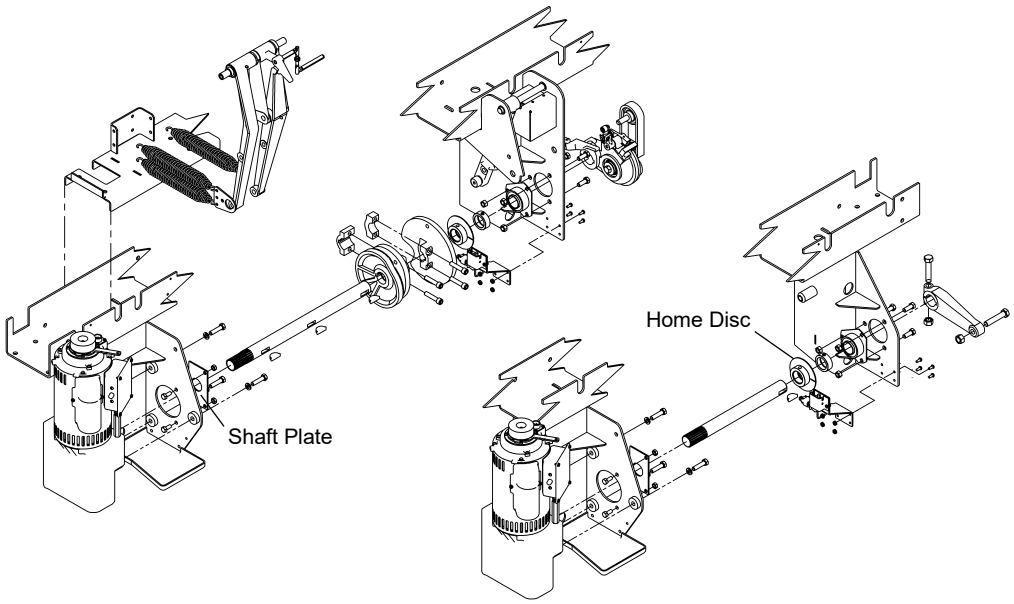


Figure 3-9b

2. Install the new home discs on the table and sweep drive shafts. Position the home disc's collar with setscrew on the left (see Figure 9b). Do NOT tighten the setscrews at this time.

3. Reinstall the table and sweep drive shafts. The shafts are positioned correctly when the scribe marks at the splined ends of the shafts align with the shaft plates.

4. Lock the shafts to the flange bearings by positioning the locking collars against the flange bearings and rotating them in the clockwise direction. Tighten the setscrews.

5. Reposition the spot/respot cams in line with the cam followers. Use the key to locate the cams correctly. Leave the cams loose for now.

6. Clean the front-end gearbox drip pans.

7. Coat the table and sweep drive shaft splines with SAF-T-EZE anti-seize compound.

8. Install the new table and sweep drive motor and gearbox assemblies. Tighten the bolts evenly when installing the gearbox assemblies to prevent misalignment. The front-end drive motors and gearboxes are interchangeable.

9. Remove the table and sweep gearbox fill plugs, and install the vent plugs provided.

10. Attach the connecting rod to the sweep drive shaft's crank arm.

11. Install the eccentric and key onto the end of the table drive shaft. Attach the clevis to the table torque tube.

12. Reconnect the shuttle connecting rod to the operating rod lever.

13. Check the alignment of the shuttle cam and cam follower. Adjust the shuttle cam's position if necessary, and reconnect the shuttle spring. Tighten the shuttle cam mounting bolts.

14. Reconnect the spot and respot rods to the spot and respot levers, and install the tension springs.

15. Install the new solenoid. Adjust the position of the spring clip so that the solenoid latches sufficiently and releases smoothly and completely. If the solenoid buzzes when activated, adjust the position of the solenoid and/or the four mounting screws.

16. Install the home sensor assembly in the old cam switch location (Figures 3-10a & b). The slot in the sensor should straddle the home disc.

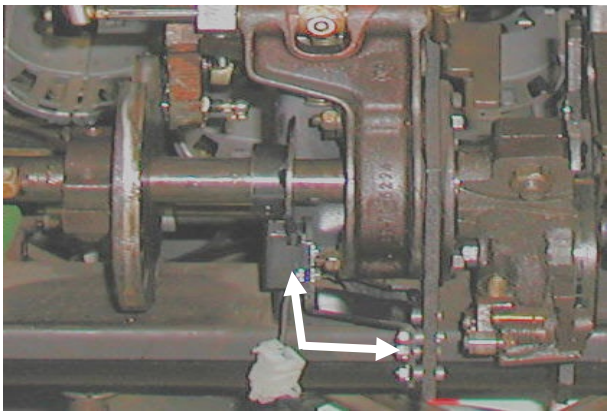


Figure 3-10a

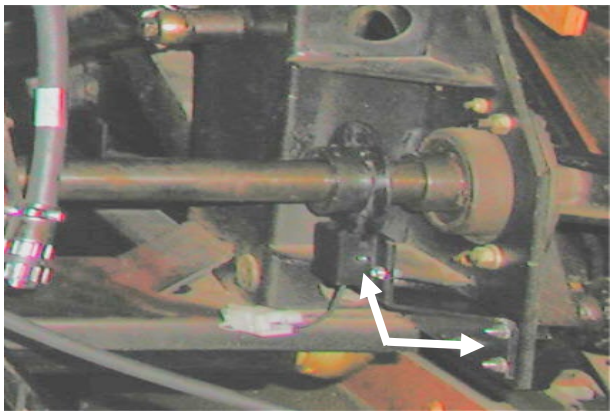


Figure 3-10b

17. Plug in the home sensor assemblies to cables TH and SH.

18. Install the new dual pit light in the same location as the original pit light.

19. Plug in the pit light to the pit light connector on the wire harness.

20. Connect the appropriate wire harness wires to the *common* and the *normally closed* terminals (end terminals) on the off-spot switch. The two wires may be installed on either terminal. Secure the cable with a cable clamp. See Figure 3-11.

21. Repeat Steps 1 through 20 for the other pinspotter.

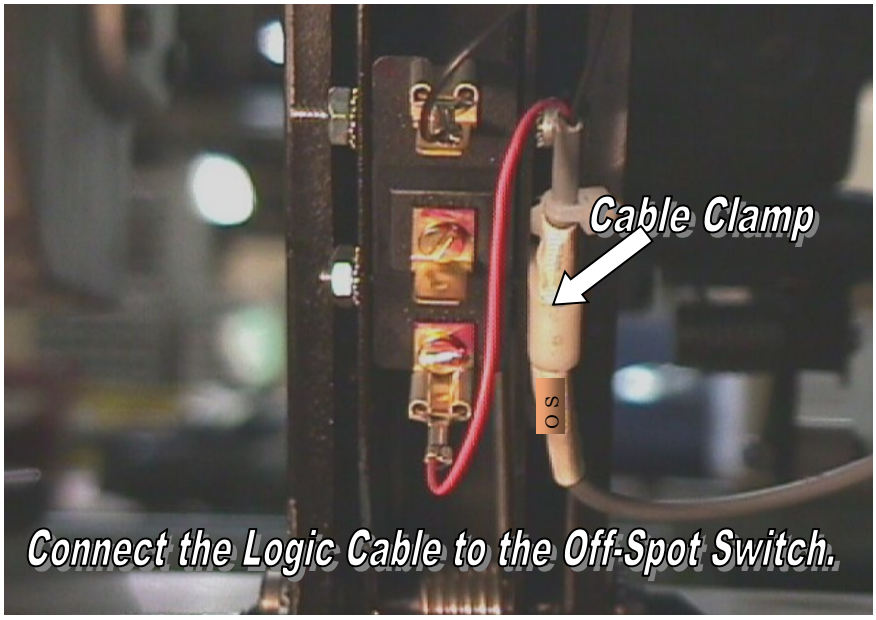
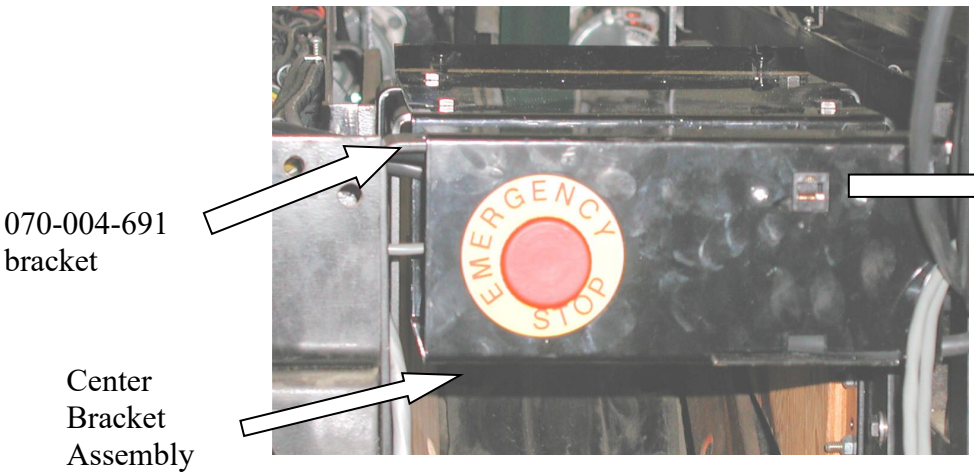


Figure 3-11

22. Install the Center Bracket Assembly (that houses the E-Stop and technician's handheld unit connection. See Figure 3-12b.), between the two pinspotters on the six angle brackets above the down sweep. Some installations may require the installation of the six angle brackets (070-004-691). This requirement will have been identified during the pre-installation survey, and the appropriate brackets will have been included in the kit. Connect the E-Stop cable and handheld run cable to the pinspotter chassis. Feed the cables along either of the pinspotter wireways.



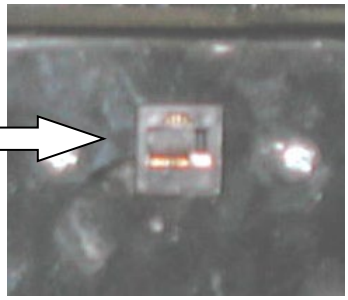


Figure 3-12b

Figure 3-12a

23. Install the top plate to cover the Center Bracket Assembly.

24. Mount the mask interface box, if required, on the curtain wall. See Figure 3-13.

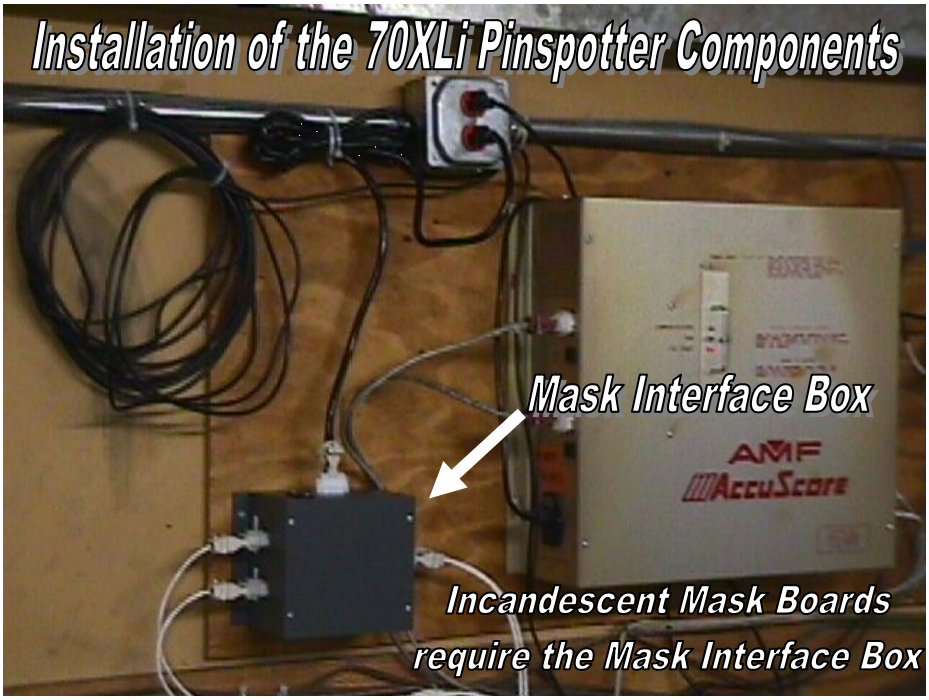


Figure 3-13

25. Verify that the voltage selector switch on the top surface of the Mask Interface Box is selected to the correct voltage (see Figure 3-14).

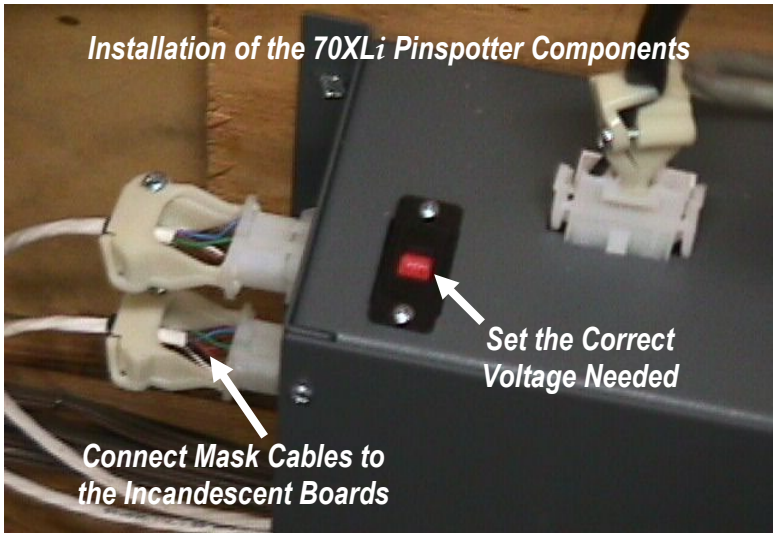


Figure 3-14

26. Mount the APS box (Figure 3-15) to the right of the AccuScore chassis on the curtain wall.

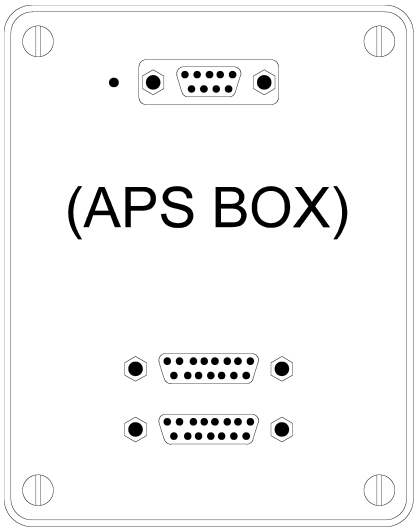


Figure 3-15

27. Connect the two short cables between the APS box and the AccuScore chassis.

28. Connect the upper cable from the APS Box to the pinspotter chassis's camera/scoring port.

29. Connect the mask cables in the wiring harness to the Mask Interface Box.

30. Connect the cables between the Mask Interface Box and the mask indication panels. Because of the numerous mask configurations, it may be necessary to reconfigure the connectors or hard-wire the cables to the mask indication panels. The individual wires of these cables are not marked. Refer to the mask cable wiring pinout in Attachment E to help determine the correct wiring configuration.

31. Plug the even and odd mask cables into the appropriate receptacles on the Mask Interface Box.

32. If the pinspotter ground wires have been removed, reattach them to the frame of the machines.

33. Connect the underlane cables as follows:
    a. Run the power and communication cables from the cameras to the pinspotter chassis (Accuscore may go to the curtain wall chassis).
    b. Connect the ball detector, foul detector, and ball return cables to the chassis.
    c. Remove the ball return shroud. Disconnect the existing pinspotter wires, and connect the new pinspotter wires to the appropriate terminals inside the ball lift control box. The QubicaAMF ball lift control box contains a wiring diagram inside the cover. The hookup of the ball lift control box must be in accordance with the manufacturer's specifications.

d. If there is a 10th frame switch harness, follow the instructions from the 10th frame switch adapter kit (610-088-018).

e. Reinstall the shroud.

34. Connect the power cables to the table and sweep driver motors. Connect the encoder cables (TE and SE) and brake cables (TB and SB) for both motors.

35. Fasten all wires in neat runs using wire ties.

36. Replace the existing small crossbeam wireway covers with the new covers provided (070-010-631).

37. Install guard covers on the chassis.

3.7 FOUL DETECTOR

1. Unless you have the Radaray XL foul detectors or the detectors already in place have been determined to be compatible with the 70XLi chassis, remove the old units and install the new Foul Detectors.

2. Remove the cover from the foul detector and connect the underlane cable. Depending on the type of foul detectors installed, it may be necessary to hard-wire the cable to the detector. Reinstall the cover.

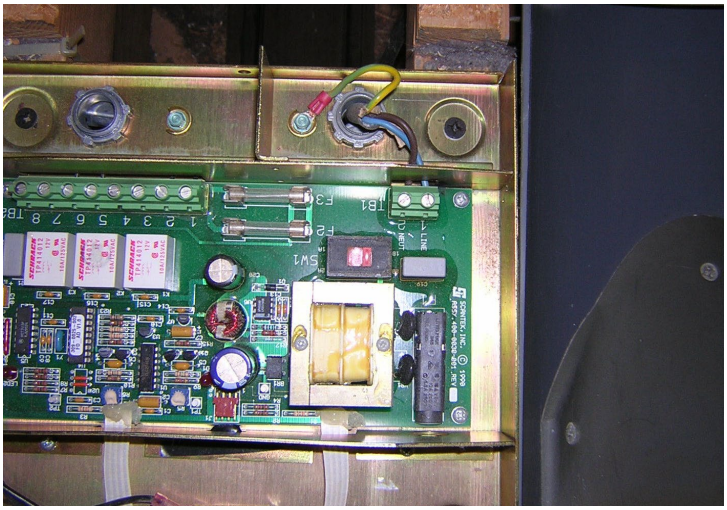


Figure 3-16

3. Replace the outside reflector units. Line up the sensors in the foul detector unit.

4. Plug in the LEDs in the cover and attach it to the center unit.

5. Connect the cable from the foul detector to the chassis.

3.8 BALL DETECTOR

1. The ball detector should be mounted approximately 59” away from the 7-10 line as shown in figure 3-17a. This measurement is to the centerline of the ball detectors and the reflectors. This location will put the ball detector under the downsweep track and just in front of the pinspotter sweep bar at first guard position.

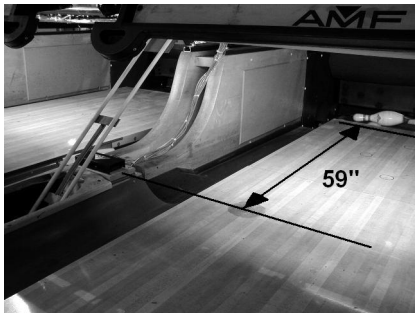


Figure 3-17a

2. Installation will require a hacksaw to cut lane capping, a saw for lumber cutting, a 3/8” electric drill for drilling mounting holes, a 5/32” drill bit, a Phillips No.3 screwdriver, a 5/16” nut driver bit, a tape measure, a level, an 088-000-124 ball detector alignment tool, and a chalk line for alignment of reflectors and ball detectors across the center.

3. Route the 088-000-014 ball detector cable from the pinspotter chassis to the ball detector mounting position. The cable must be routed through the machine wire duct and down the side frame. Use wire ties to keep the cable away from any moving parts. Excess cable can be stored between the kickbacks.

4. In most installations, the lane coverboard behind the downsweep track must be modified. This must be done to make room for the construction of a wood mounting platform for the ball detector. Cut away a 7-inch section of coverboard material as shown in figure 3-17b.

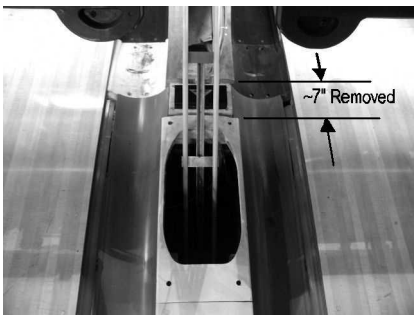


Figure 3-17b

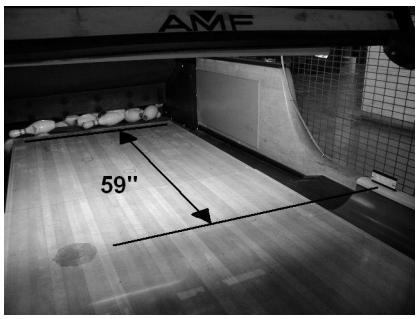


Figure 3-17c

5. On one of the end machines of the group of pinspotters being modified, measure 59” from the 7-10 line and make a mark on the outside lane capping. Run a screw into the capping at this point and use a chalk line to snap a line across all of the lanes. This chalkline, which is 59” away from the 7-10 line, will be the centerline of the reflector brackets and the ball detectors across the house.

6. Mount the reflector brackets 088-000-128 on the top of the narrow lane cappings. Reflector brackets should be centered on the chalkline as shown in figure 3-17c. Brackets should be mounted such that they are perpendicular to the top surface of the lane and parallel to the length of the lane.

7. Measure the height 'H' from the top of the lane capping to the lane surface (see figure 3-17d). The ball detector mounting platform should be 5/16" higher than the measured height 'H'. Using lumber and shim combinations, build up a flat, level mounting platform from the lane foundation to the proper height above the lane surface. Make sure the mounting platform is level in both length and width directions. See figure 3-17e.

Figure 3-17d

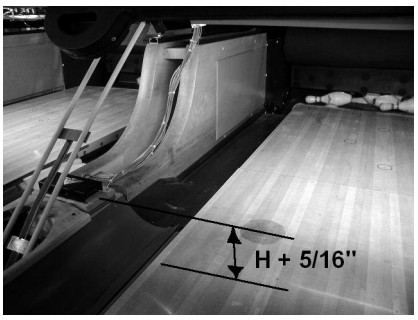


Figure 3-17e

8. Mount the ball detector, centered on the chalk line, using the three screws provided. Use a 5/32" drill bit to drill pilot holes for the screws. **The ball detector must be oriented so that it's electrical connector is facing the back of the pinspotter.** See figure 3-17f. Connect the signal cable to the ball detector.

Figure 3-17f

9. Align the ball detector with the reflectors by loosening the mounting screws and rotating the entire unit until all of the four sensors have a solid orange LED. A sensor will have a steady orange indicator light when properly aligned. A flashing indictor means that the signal is weak. No indication means that beam is blocked or is not aligned at all. If one or more sensors are not in alignment after the ball detector base is aligned, then the vertical alignment of individual sensors may be adjusted by gently bending an individual sensor bracket up or down by hand until the signal indicator LED is solid orange. **Do not adjust horizontal (left to right) alignment** of individual sensors. Sensors are aligned at the factory to be parallel at two inches apart. Changing the horizontal position of individual sensors can cause the beams to overlap one another and result in failure to detect a bowling ball. The Ball detector alignment tool (088-000-124) can also be used to assist in alignment of a ball detector to the reflectors.

10. **Make sure that the sweep does not break either of the ball detector beams.** Do this by cranking the sweep down to the 1st guard position and back to the home position. If the sweep passes through a sensor beam, the sensor indicator will flash. If it does, move the ball detector mounting position away from the sweep until the sweep clears the beam. In addition, make sure that bumpers, when actuated, do not pass through the ball detector beams. It may be necessary to cut some length off the bumper rails if it passes through the ball detector beam. You will need to remove the bumper lights, if any, before doing this.

11. When all the ball detectors are properly aligned across the house, make sure all hardware is tight and install the ball detector covers. Check to make sure machines cycle properly when balls are rolled into the machines.

3.9 BACK END PREASSEMBLY

1. Verify that all motors are set to the proper voltage. The default voltage is 230 volts.

2. Check the gearbox oil level. If necessary, add lubricant using QubicaAMF Gear Lube P/N 715-021-716. See the Gearbox manual (Part# 400-088-007) for oil level details.

3. Install breather plug adapters and breather plugs in the gearboxes.

NOTE: The back-end gearboxes are specific to left and right machines and are <u>NOT</u> interchangeable.

4. Apply a coating of SAF-T-EZE anti-seize lubricant to each back-end motor shaft and attach the back-end drive motors to the back-end gearboxes. Position the starting capacitors on the same side as the gearbox's distributor drive output shaft. Use a 3/16 x 3/16 x 1 3/8 key on the motor shaft and 3/8 -16 x 1¾-inch bolts and split lock nuts (flex nuts) in the top two positions and a 3/8 -16 x 1½-inch bolt in the bottom position.

5. Install the new distributor drive shaft housings (weldments) (Figure 3-18, item 6) on the appropriate back-end gearbox shafts. Ensure that the appropriate shaft keys are in place and that the setscrews are tightened.

6. Install the left and right pin elevator wheel drive pulleys (Figure 3-18, item 5) on the left and right gearbox shafts. Use the pin elevator wheel drive pulleys that were removed from the existing equipment. Ensure that the appropriate shaft keys are in place and that the setscrews are tightened.

7. Install the left and right carpet drive pulleys (Figure 3-18, item 16) on the left and right gearbox shafts. Use the carpet drive pulleys that were removed from the existing equipment. Ensure that the appropriate shaft keys are in place and that the setscrews are tightened.

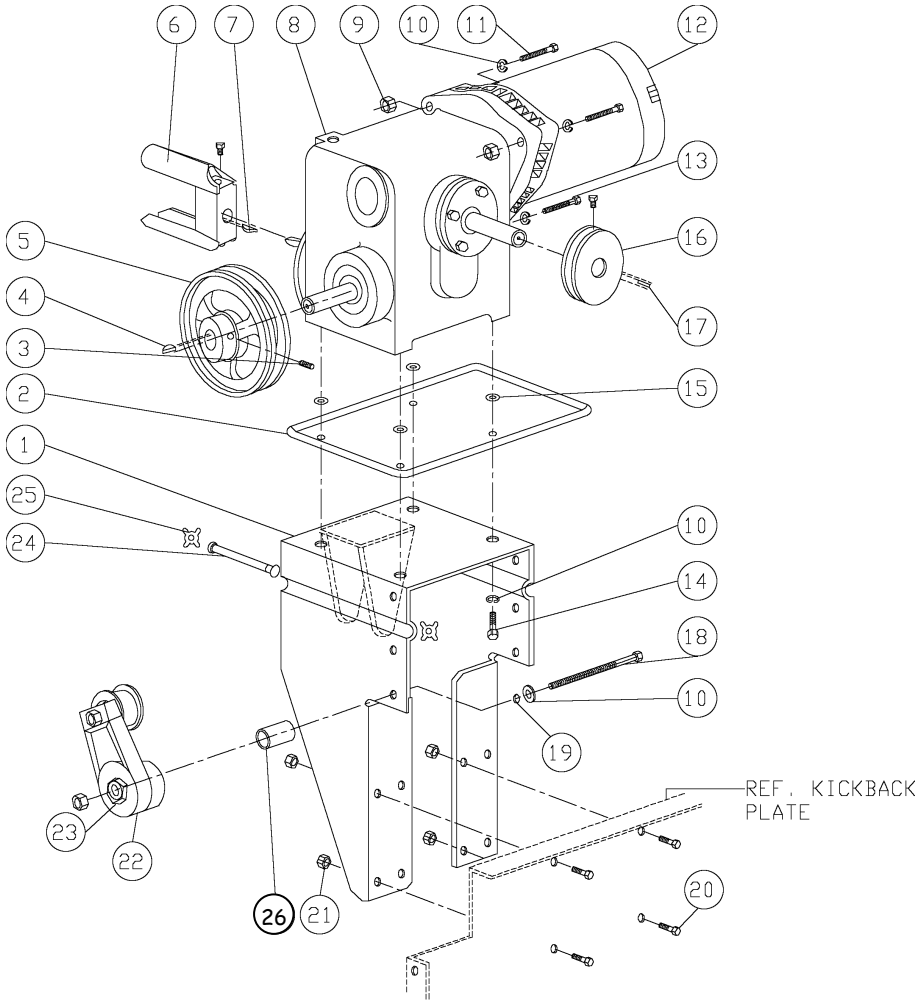


Figure 3-18, Back-End Gearbox & Bracket Assemblies

3.10 BACK END (BE) INSTALLATION

1. Install the back-end gearbox mounting brackets (Figure 3-18, item 1) in the same location as the original gearbox mounting brackets.

2. Attach the upper end of each cushion shock absorber to the rear hole in the gearbox mounting bracket's interior bracket. See Figure 3-19.

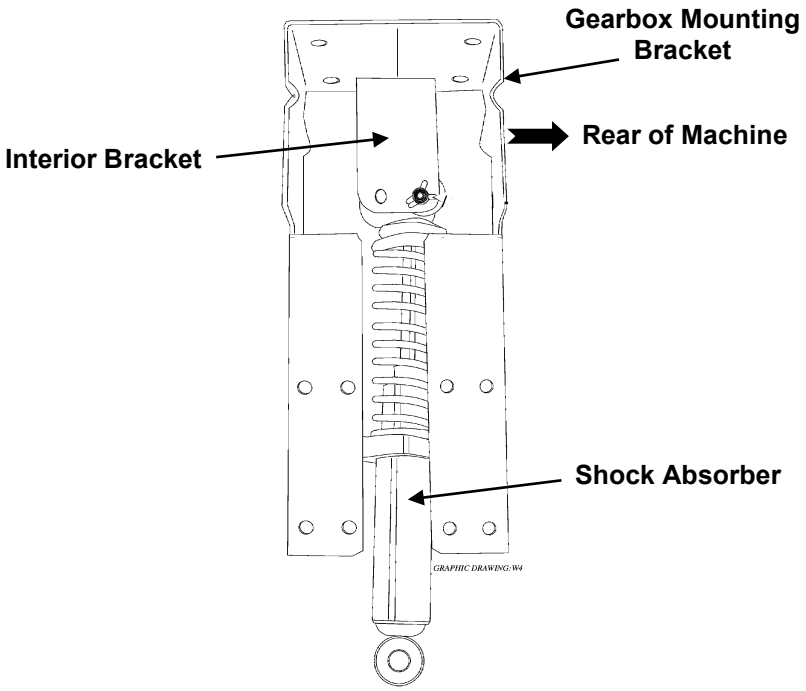


Figure 3-19

3. Install the tie plate between the two back-end motor mounts. Before tightening the hardware, ensure that the motor mounts are level from side to side. They must be level for the proper operation of the distributor. It may be necessary to use a clamp or turnbuckle to level the tops of the motor mounts. Use 5/16 – 18 x 3/4 screws and Stover lock nuts to attach the bracket. See Figure 3-20.

PARTS KEY

1	90XLi PINSPOTTER CONTROLLER
2	CHASSIS MOUNTING BRACKET ASSEMBLY
3	NUT, 1/4-20, JAM, ZINC
4	SCREW, 1/4-20 X 3/4, HEX HD, BLACK
5	CHASSIS SUPPORT BRACKET
6	WASHER, PLAIN, 5/16 ID X 1/16 THICK
7	NUT, STOVER LOCK, 1/4-20
8	SCREW, 5/16-18 X 3/4, HEX HEAD, GRADE 8
9	WASHER, ¼ ID, FLAT, BLACK
10	TIE PLATE
11	NUT, STOVER LOCK, 5/16-18, ZINC
12	CHASSIS COVER ASY

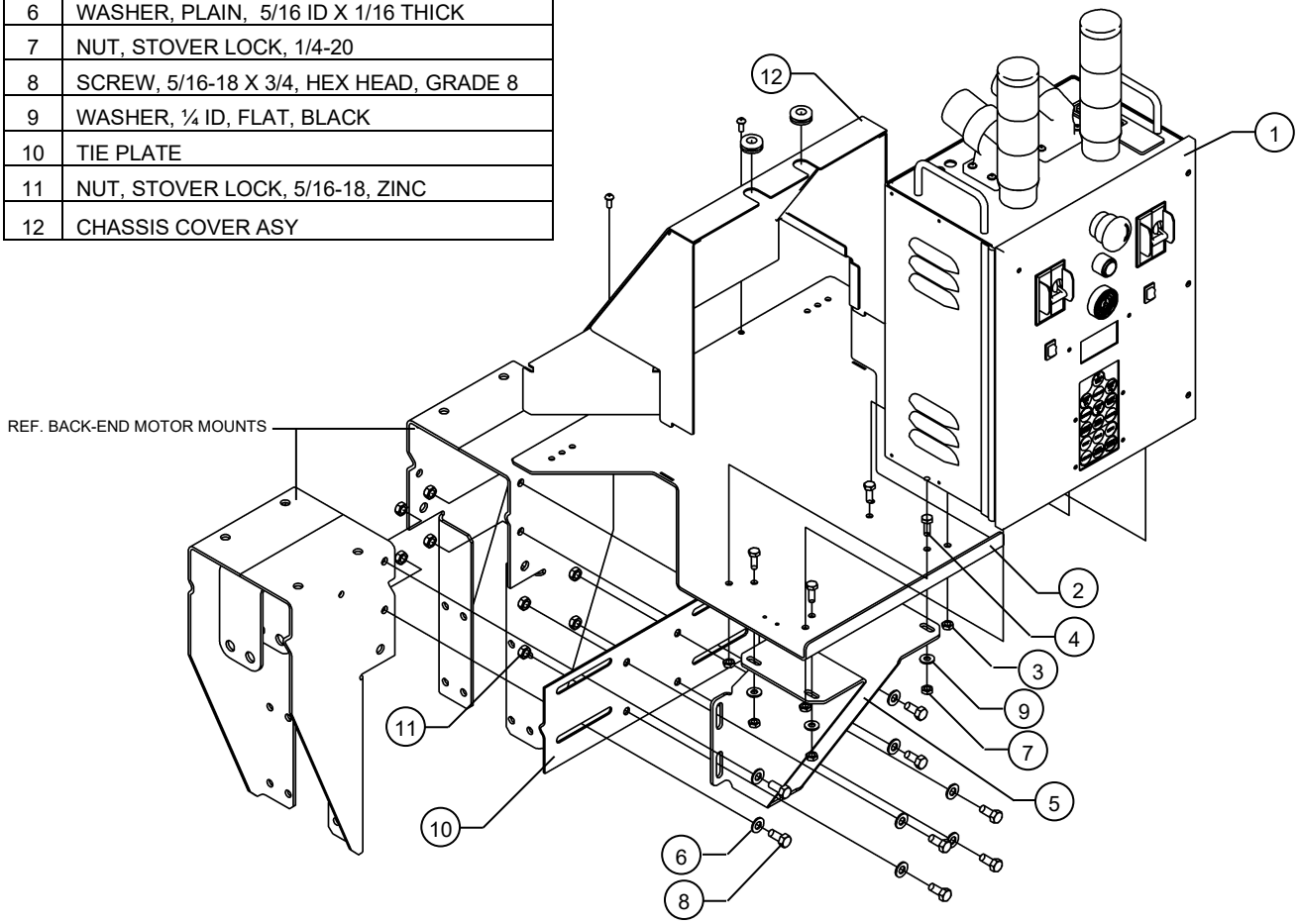


Figure 3-20

4. Install the left and right back-end gearbox drip pans and gearbox assemblies. The back-end gearboxes are specific to the right or left side and are not interchangeable. A paper gasket washer must be installed between the gearbox and the drip pan for each mounting bolt. Place lock washers on the head side of the bolts.

5. Install the chassis support bracket.

6. Install the chassis mounting bracket.

7. Install the new back-end wireways between the existing front-end wireways and the new chassis mounting bracket. See Figures 3-21 and 3-22.

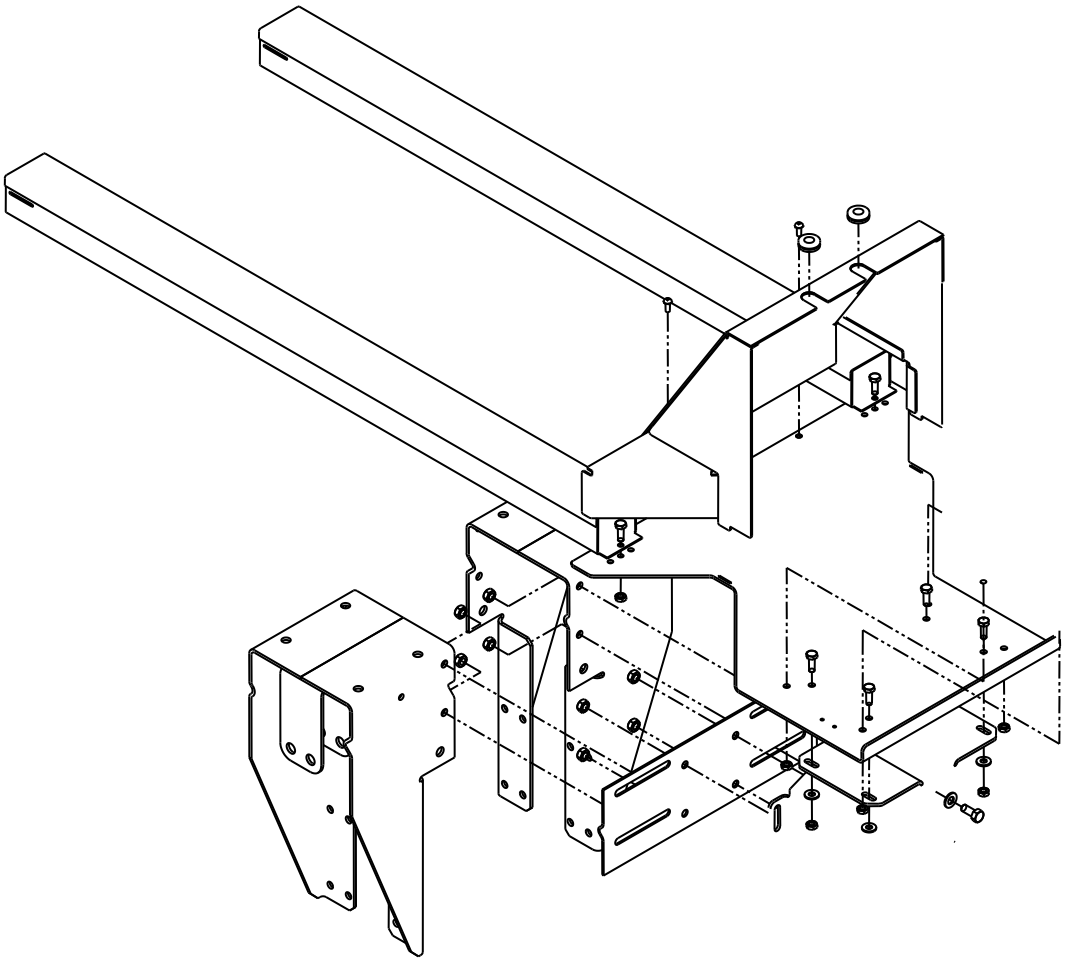


Figure 3-21

8. Adjust the height of the chassis support bracket to obtain up to an inch gap between the top of the back-end motors and the bottom of the back-end wireway. Tighten securely.

9. Install the new chassis (see Figure 3-20) on the chassis mounting bracket.

10. Lay in the new wiring harnesses. The large cable plugs are placed to the back end of the pinspotter. Note that the harnesses are specific to either the left or right machines and are not interchangeable. The wire tags on the cables indicate the necessary connection details. Plug the applicable connectors into the corresponding receptacles on the chassis. See Figure 3-22.

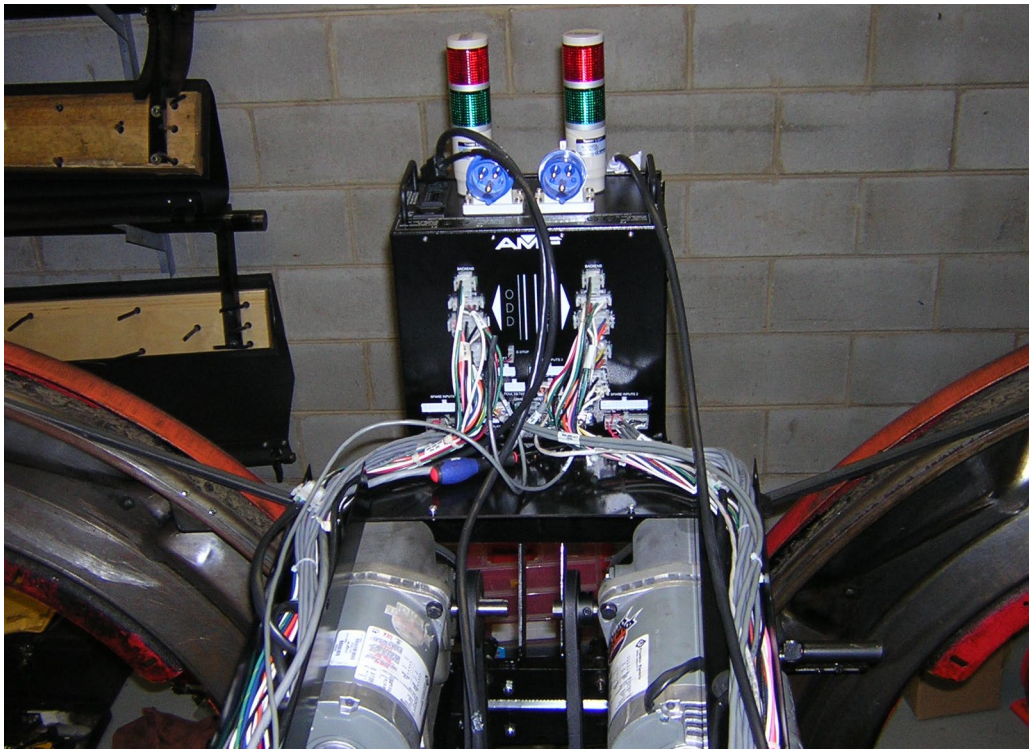


Figure 3-22

11. Run the daisy chain cable from the chassis back to the previous lane pair's chassis. Route the cable forward along the wireway, across the pinspotter along the crossbeam wireway, and back to the previous lane pair's chassis along its wireway. If this is the first lane pair in the series, connect the home run cable to the chassis instead.

12. Install the pin elevator wheel belts on the pin elevator drive pulleys.

13. Place a lock washer on a pin elevator wheel belt tensioner bolt (Figure 3-23, item 18). Place the bolt through the back-end motor mount, through the wide spacer (item 26), and then add enough washers to shim the tensioner into alignment with the pin elevator wheel belt. Screw the bolt finger tight into the tensioner (item 22). The 15/16-inch nut (item 23) on the tensioner must be facing outward.

14. Repeat step 13 for the other belt tensioner.

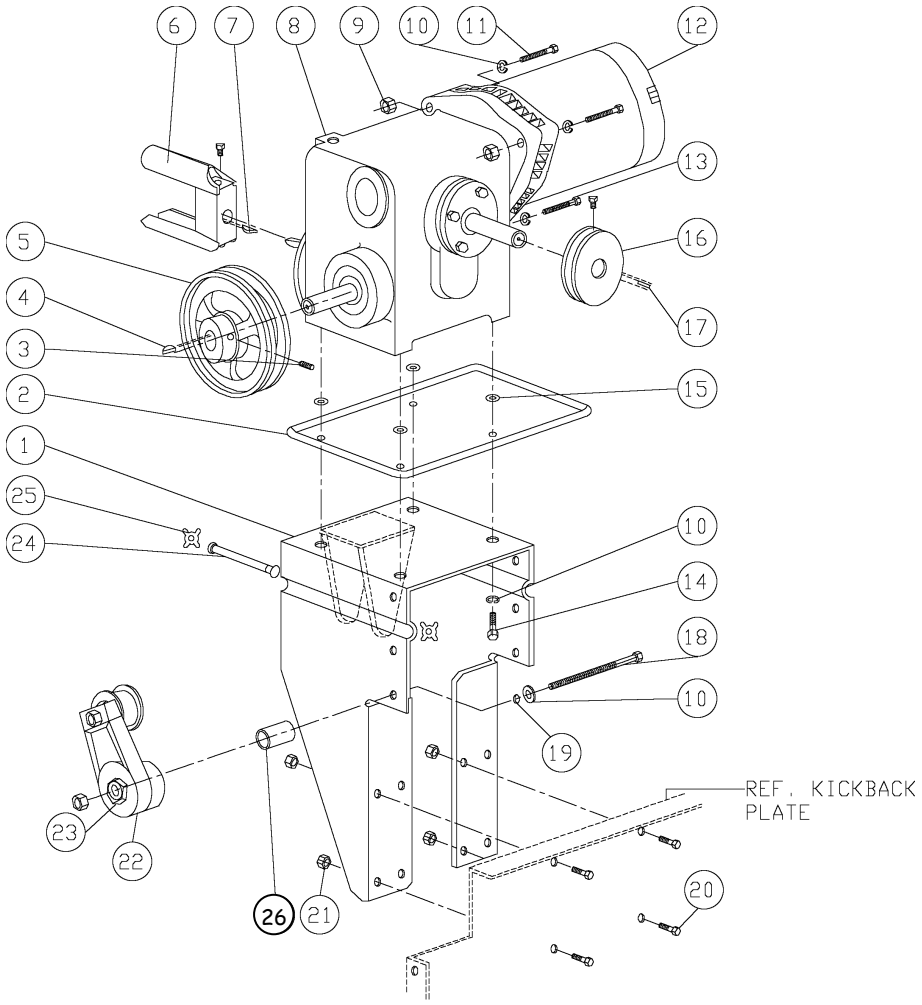


Figure 3-23, Back-End Gearbox and Mounting Bracket

15. Adjust the pin elevator wheel belt tensioners. With the bolt that attaches the pin elevator wheel belt tensioner slightly loose, use a 15/16-inch socket on a long bar to turn the tensioner in the direction of the belt. Apply tension until the tensioner's fixed alignment mark aligns with the third mark on the tensioner's moveable section, and while holding the tension, tighten the bolt (item 18). Repeat for the other tensioner.

16. Install the new carpet drive belts and secure the ball lift with the clamp studs that were removed earlier.

17. Reinstall the ball lift belt tensioning springs.

18. Install the new pin elevator wheel guard support braces (070-011-891). See Figure 3-24.

Figure 3-24

19. Install the new distributor drive shaft assemblies. These assemblies are specific to the left and right machines and are not interchangeable.

    The XLi chassis has a built-in trouble-call feature, which eliminates the need for a separate pit signal kit. If there is a pit signal kit already installed, disconnect it and remove.

4.0 POST INSTALLATION

1. Connect the Logic Power and Main Power cables to the chassis.

2. Set the chassis address (it is set electronically) in accordance with the instructions in the chassis manual.

4.1 Sweep Home Position Adjustment

1. Set the Sweep's Home position as follows:

   The Sweep Home Disc has a slot in it that provides feedback to the chassis via a sensor when the drive shaft reaches the home position. The Sweep's home position should be at the highest point in its cycle. The Sweep's Stabilizing Link should be approximately ½ inch from the pinspotter's frame (see Figure 4-2). To adjust the Sweep's home position:

   a. Manually crank or run the Sweep to the highest point of its travel. Manual cranking requires disengaging the brake. Do this using the hand release lever as shown in figure 4-1.

   b. Rotate the Home Disc until the light on the senor comes on indicating that the slot in the disc is aligned with the sensor's optics, and then tighten the setscrew in the collar on the Home Disc.

   c. Reengage the brake before cycling the pinspotter.

   d. Run the Sweep through several cycles, and verify it is stopping at the desired position.

A slight amount of overtravel is normal. If the Sweep runs considerably past the home position and consistently stops at the same point, reset the home disc with the Sweep at a slightly lower position. **Excessive coasting of the Sweep past the home position could indicate a motor brake problem. Check the drive motor's brake release lever and ensure the brake is engaged**. **The brake should only be manually disengaged for hand cranking.**

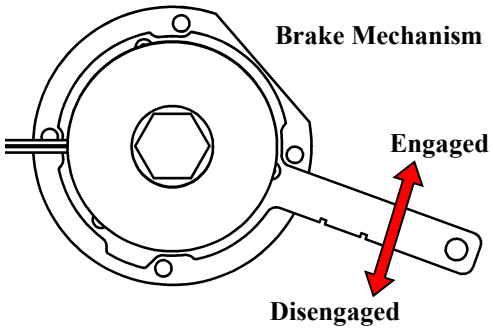


Figure 4-1

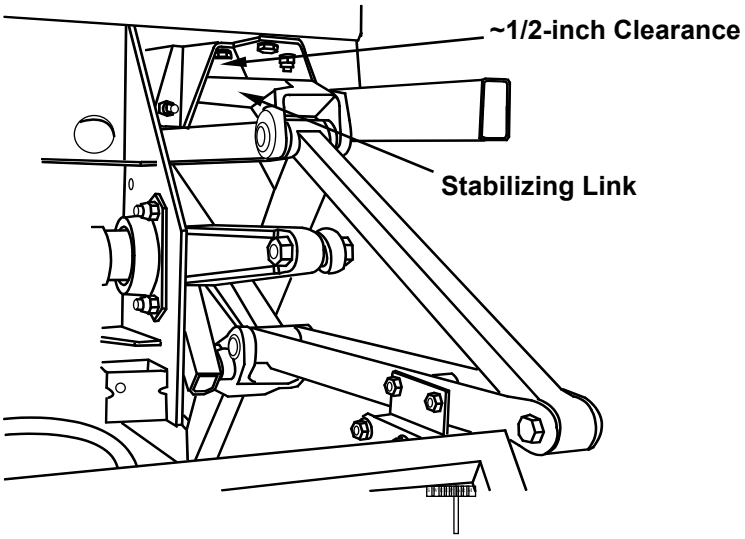


Figure 4-2

4.2 Table Home Position Adjustment

1. Set the Table's Home position as follows:

   The Table's Home Disc has a slot in it that provides feedback to the chassis via a sensor when the drive shaft reaches the home position. The Table's home position should be just before the Table reaches the highest point in its cycle, at approximately the 355-degree point of the drive shaft's rotation. To adjust the Table's home position:

   a. Release the brake and manually crank or run the table to just before top dead center. Looking down on the table drive eccentric, there should be a gap of approximately 1/2" between the white nylon roller and the cam link.

   b. Rotate the disc until the light on the sensor comes on indicating that the slot in the disc is aligned with the sensor's optics, and then tighten the setscrew on the Home Disc's collar.

   c. Reengage the brake before cycling the pinspotter.

   d. Run the Table through several cycles, and then verify it is stopping at the desired position.

   Because of the Table's inertia, it may come to a stop slightly past the home position. This is normal. If the Table runs considerably past the home position and stops consistently at the same position, it will be necessary to reset the Home Disc. To reset the Home Disc, increase the gap between the roller and the Cam link slightly, before locking down the Home Disc. If the table continues to coast past the home position or begins to drift backwards, check the brake and make sure that it is engaged.

4.3 Sweep 1st and 2nd Guard Position Adjustment

If any mechanical adjustments are required for the sweep, such as home position or rearward limit of travel, these must be done before setting the 1st and 2nd guard positions.

1. The 1st and 2nd guard positions are set electronically in the pinspotter chassis under the *Guard Set Menu*. In the Guard Set Menu, the current settings for the 1st and 2nd guard positions are displayed in degrees of sweep output shaft rotation. These are the factory default settings. Due to differences in the pin deck heights and sweep adjustments, these preset settings may not work for everyone and may need to be field adjusted. Refer to the Chassis Manual (400-088-008) for details about making chassis adjustments. When making adjustments, increase or decrease the value in 1º increments, and test the stopping position by pressing the <*CYCLE*> button and letting the sweep cycle several times. When an adjustment is made, the chassis will make the correction in increments, so it will take multiple cycles to fully realize a multidegree setpoint change. Repeat for the 2nd guard position if necessary.

2. Energize and ring out the pinspotter, scoring, mask indication, foul detection, and ball return**.** Make adjustments as necessary.

3. Ensure everything is cleaned, swept, and picked up.

4. Repeat the applicable steps for the remaining pinspotters to be upgraded.

NOTES

5.0 ATTACHMENTS

This section contains the following forms and diagrams to assist you in the installation process:

- Attachment A –70XLi Upgrade Preinstallation Survey Checklist
- Attachment B – Electrical Requirements
- Attachment C – Parts Lists
- Attachment D – XLi Wiring Diagram
- Attachment E – Mask Cable Pinout List

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QUBICAAMF

70XLi UPGRADE
PREINSTALLATION SURVEY CHECKLIST

Conduct a preinstallation survey and complete a checklist for each lane pair scheduled to receive the 70XLi upgrade. The purpose of this survey is to verify that the required prerequisites have been completed, determine the need for the addition of alternate or additional parts, and to identify equipment that is not functioning properly.

The 70XLi Upgrade is <u>not</u> designed to fix existing problems other than those that are repaired as a result of the replacement of a faulty component with a new one that is part of the 70XLi upgrade kit.

Bowling Center _____ **Lane Pair** _____ **Survey Performed by** _____ **Date** _____

ODD LANE

➢ ***Pinspotter, Foul Light, Mask & Scoring***

- Normal Cycles 1ST Ball _____ 2nd Ball _____ Strike _____
- Foul Cycles 1ST Ball _____ 2nd Ball _____
- Spots Pins Correctly _____
- Table and Sweep Drive Shafts OK? _____
- Foul Light Operation _____
- Masking Units 1ST Ball _____ 2nd Ball _____
  Strike Indication _____ Foul Indication _____
- Fouls Indicate on Monitor _____ or N/A
- Strikes Indicate on Monitor _____ or N/A

EVEN LANE

➢ ***Pinspotter, Foul Light, Mask & Scoring***

- Normal Cycles 1ST Ball _____ 2nd Ball _____ Strike _____
- Foul Cycles 1ST Ball _____ 2nd Ball _____
- Spots Pins Correctly _____
- Table and Sweep Drive Shafts OK? _____
- Foul Light Operation _____
- Masking Units 1ST Ball _____ 2nd Ball _____
  Strike Indication _____ Foul Indication _____
- Fouls Indicate on Monitor _____ or N/A
- Strikes Indicate on Monitor _____ or N/A

➢ ***Test Ball Return***

- Ball Lift Turns ON and OFF with Pinspotter _____
- 10th Frame Switch Operation ODD Lane _____ EVEN Lane _____

Type of Foul Detection _____

Type of Scoring _____ Type of Front Desk _____

Type of Ball Return _____

Type of Masking _____

Have the following electrical requirements been met?

- Is there a 15-amp circuit for logic power for every eight (8) pairs of pinspotters? _____
- Is there a power drop separate from the 15-amp logic power circuits for each pinspotter? _____
- Have 3rd-wire grounds been installed in place of conduit grounds for existing branch circuits? _____
- Have existing outlets been relocated as needed? _____
- Are there four angle brackets (070-004-691) located above the down sweep? (If not, add to kit) _____

Comments: _____

The person performing the survey should provide the Bowling Center Manager with a copy of any checklist that identifies an equipment malfunction or other discrepancy.

ATTACHMENT B: Electrical Requirements for 70XLi Pinspotters and 70XLi Field Upgrade

Overview

Existing 82/30 and 82/70 machines have a (190-250V) 15-Amp service drop to each pinspotter. New power supply cables will be supplied by QubicaAMF to be installed by the center's electrician at the service junction boxes. In addition, a separate, 15-amp circuit is required for every eight pairs of lanes for logic power. All power to a pair of pinspotters shall be wired from the same phase of a service panel. This would include both the service drops and the additional branch circuit (Logic Power).

Checklist

The center's electrician will need to do the following:

- ☐ Relocate the switch boxes for the drop cords.
- ☐ Provide a 15-amp circuit for every eight pairs of pinspotters.
- ☐ Install positive 3rd wire ground for branch circuits.
- ☐ Install new pinspotter and logic box drop cords.

Grounds

In older centers that utilized conduit ground, a positive 3rd wire ground must be installed.

Electrical Prints

The required installation prints are:
610-903-685 Basic Building foundation 82-90.
610-903-686 Basic Electrical layout and specifications.
610-903-687 Detail Basic Electrical 82-90 pinspotter.
610-903-688 Basic Electrical layout 3 Phase
610-903-689 Basic Electrical layout single phase.
These may be obtained by contacting QubicaAMF Customer Service at 1-800-DIAL-AMF. The circuit requirements for a 70XLi pinspotter are the same as the 82-90 pinspotter. (Note: in the electrical drawings, change the references of 25 Amp to 15 Amp.)

Installation

The electrical installation should be coordinated with the arrival of the pinspotters. If updating the existing service is necessary, that and the addition of the new branch circuit can be done before the pinspotters arrive.

Attachment C: Parts Lists

Part Number: 610-880-050
82-70 to XLi 220V 50HZ

ITEM	QTY	PART NO.	DESCRIPTION
1	A*	612-440-020	PINSENSE KIT SCORED
2	A*	612-440-025	PINSENSE KIT NON-SCORED
3	A*	612-440-030	PINSENSE KIT AS80/90 w/ADAPTER
4	A*	612-440-032	PINSENSE KIT AS80/90 w/o ADAPTER
5	1	610-088-007	FRONT END INSTALLATION KIT 220V
6	1	610-880-054	82-70 TO XLi SUB KIT BOX 1
7	1	610-880-055	82-70 TO XLi SUB KIT BOX 2
8	B*	715-010-307	LUBE, 1LB
9	B*	088-000-033	MOTOR CRANK
10	B*	715-011-803	LUBRICANT-ANTISEIZE, ST-1 (1OZ)
11	B*	715-021-716	LUBE OIL - MOBILE 600W-QUART
12	B*	610-700-917	PAPER-LANE PROTECT 42” X 320’ ROLL
13	1	610-088-053	GUIDE, 70XLi UPGRADE
14	1	090-003-512	GEARMOTOR COMPLETE 50HZ RH
15	1	090-003-513	GEARMOTOR COMPLETE 50HZ LH
16	4	088-000-150	FRONT END DRIVE UNIT 50HZ
17	1	088-000-001	XLi PINSPOTTER CONTROLLER
18	1/ORDER	610-880-057	MCU BOX KIT XLi
19	1/ORDER	610-088-750	70XLi PINSPOTTER MANUAL SET
20	2	088-000-024	DUAL PIT LIGHT, DUAL INPUT
21	1/ORDER	610-880-059	TECHNICIAN’S HANDHELD UNIT KIT
22	1	088-000-080	BALL DETECTOR
23	C*	610-088-030	SEPARATION KIT XLi
24	C*	610-088-031	SPLIT KIT XLi

A* = INCLUSION BASED ON SCORING TYPE

B* = QTY BASED ON NUMBER OF LANES IN ORDER

C* = EXTRA MCU('S) FOR SEPARATIONS

Part Number: 610-880-060
82-70 to XLi 220V 60HZ

ITEM	QTY	PART NO.	DESCRIPTION
1	A*	612-440-020	PINSENSE KIT SCORED
2	A*	612-440-025	PINSENSE KIT NON-SCORED
3	A*	612-440-030	PINSENSE KIT AS80/90 w/ADAPTER
4	A*	612-440-032	PINSENSE KIT AS80/90 w/o ADAPTER
5	1	610-088-007	FRONT END INSTALLATION KIT 220V
6	1	610-880-054	82-70 TO XLi SUB KIT BOX 1
7	1	610-880-055	82-70 TO XLi SUB KIT BOX 2
8	B*	715-010-307	LUBE, 1LB
9	B*	088-000-033	MOTOR CRANK
10	B*	715-011-803	LUBRICANT-ANTISEIZE, ST-1 (1OZ)
11	B*	715-021-716	LUBE OIL - MOBILE 600W-QUART
12	B*	610-700-917	PAPER-LANE PROTECT 42” X 320’ ROLL
13	1	610-088-053	GUIDE, 70XLi UPGRADE
14	1	090-003-514	GEARMOTOR COMPLETE 60HZ RH
15	1	090-003-515	GEARMOTOR COMPLETE 60HZ LH
16	4	088-000-160	FRONT END DRIVE UNIT 60HZ
17	1	088-000-001	XLi PINSPOTTER CONTROLLER
18	1/ORDER	610-880-057	MCU BOX KIT XLi
19	1/ORDER	610-088-750	70XLi PINSPOTTER MANUAL SET
20	2	088-000-024	DUAL PIT LIGHT, DUAL INPUT
21	1/ORDER	610-880-059	TECHNICIAN’S HANDHELD UNIT KIT
22	1	088-000-080	BALL DETECTOR
23	C*	610-088-030	SEPARATION KIT XLi
24	C*	610-088-031	SPLIT KIT XLi

A* = MAY OR MAY NOT BE INCLUDED

B* = QTY BASED ON NUMBER OF LANES IN ORDER

C* = EXTRA MCU('S) FOR SEPARATIONS

Part Number: 610-880-056
82-70 TO XLi HARDWARE KIT BOX 3

ITEM	QTY	PART NO.	DESCRIPTION
1	8	000-021-792	WASHER
2	8	000-023-758	GASKET WASHER, 3/8 ID X 7/8 OD
3	2	070-003-221	SCREW, SWEEP LINK ASSEMBLY
4	2	090-004-519	SPACER
5	2	250-001-046	GROMMET
6	6	744-107-013	CLAMP, NYLON, 1/8"
7	20	770-011-010	TY-RAP 14.19" LONG
8	10	770-011-029	TY-RAP 7.31" LONG
9	12	809-849-125	SCREW, HEX 1/4-20 X .75
10	18	809-857-125	SCREW, HEX 3/16-18 X .75
11	8	809-865-165	SCREW, HEX 3/8-16 X 1.00
12	13	809-865-285	SCREW, HEX 3/8-16 X 1.75
13	8	818-227-402	SCREW, ROUND HEAD, 6-32 X 2.50
14	6	818-233-082	SCREW, SEMS ROUND HEAD, 8-32 X .50
15	12	826-032-060	SCREW, SELF-TAPPING, #8-3/8
16	4	828-133-082	SCREW, THREAD-CUTTING, ROUND HEAD 8-32 X .50
17	6	835-549-002	NUT, HEX JAM 1/4-20
18	24	839-665-002	NUT, FLEX 3/8-16
19	8	843-127-002	NUT, KEPS 6-32
20	6	843-133-002	NUT, KEPS 8-32
21	20	844-049-002	NUT, STOVER LOCK 1/4-20
22	18	844-057-002	NUT, STOVER LOCK 5/16-18
23	3	907-000-300	KEY
24	3	907-201-000	KEY, SQ .1875 X 1.25
25	6	907-202-500	KEY, SQ .1875 X 1.375
26	2	907-202-600	KEY, SQ .1875 X 1.875
27	8	948-753-102	WASHER, FLAT 9/32 X 5/8 X 1/16
28	4	948-761-112	WASHER, FLAT 11/32 X 11/16 X 1/16
29	10	951-164-002	WASHER, SPLIT LOCK 3/8
30	4	963-600-002	X-WASHER, 1/4 9000-16
31	4	818-240-082	SCREW, PHILLIPS PAN HEAD 10-32 X .50 SEMS
32	8	843-140-002	NUT, KEPS, 10-32
33	4	818-240-122	SCREW, PHILLIPS PAN HEAD 10-32 X .75 SEMS
34	4	250-001-544	OUTLET COVER SPACERS
35	2	807-358-060	SETSCREW, 5/16-24 X 3/8
36	2	809-857-365	SCREW, HEX 5/16-18 X 2.25
37	2	844-057-002	NUT, STOVER LOCK 5/16-18
38	4	907-000-900	KEY

Part Number: 610-088-020
Cable Kit 70 to XLi

ITEM	QTY	PART NO.	DESCRIPTION
1	1	088-000-014	BALL DETECTOR SIGNAL CABLE
2	1	088-000-016	BALL LIFT SIGNAL CABLE
3	1	088-000-017	MASK UNIT SIGNAL CABLE
4	2	090-005-855	MACHINE POWER CABLE (CE)
5	1	090-005-706	CHASSIS POWER CABLE
6	1	610-903-696	BOX, ELEC INSTALL KIT
7	12	821-438-082	SCREW, SELF-TAPPING HEX HEAD #10 X 1/2
8	1	090-005-749	DAISY CHAIN CABLE
9	1	088-000-080	BALL DETECTOR

Part Number: 610-880-054
82-70 to XLi Sub Kit Box 1

ITEM	QTY	PART NO.	DESCRIPTION
1	1	090-004-513	TIE PLATE
2	2	090-004-517	BACK END MOTOR DRIP PAN
3	1	088-000-004	CHASSIS COVER
4	1	088-000-110	CENTER BRACKET ASSEMBLY
5	1	088-000-005	EVEN MACHINE LOGIC CABLE
6	1	088-000-006	EVEN MACHINE POWER CABLE
7	1	088-000-007	ODD MACHINE LOGIC CABLE
8	1	088-000-008	ODD MACHINE POWER CABLE
9	2	090-005-723	SOLENOID, 220V
10	4	090-005-876	FRONT END MOTOR CABLE
11	1	612-860-092	BOX, 37-1/4 X 14-7/8 X 6-7/8
12	4	088-000-107	HOME ASSEMBLY
13	4	088-000-038	HOME DISC ASSEMBLY
14	1	070-007-016	EVEN BELT GUARD
15	1	070-007-017	ODD BELT GUARD

Part Number: 610-880-055
82-70 to XLi SUB KIT BOX 2

ITEM	QTY	PART NO.	DESCRIPTION
1	2	070-001-631	FRONT WIREWAY COVER
2	2	070-011-891	WHEEL GUARD BRACE
3	2	090-001-130	DISTRIBUTOR DRIVE HOUSING
4	2	090-003-508	TENSIONER ASSEMBLY
5	2	090-003-509	BACK END MOTOR MOUNT WELDMENT
6	1	088-000-068	CHASSIS SUPPORT BRACKET
7	1	088-000-112	CHASSIS MOUNTING BRACKET ASSEMBLY
8	2	090-004-520	V-BELT
9	2	090-005-031	REAR WIREWAY CABLE DUCT
10	2	090-005-032	REAR WIREWAY COVER
11	1	090-006-102	DISTRIBUTOR DRIVE SHAFT
12	1	090-006-103	DISTRIBUTOR DRIVE SHAFT
13	1	610-880-056	82-70 TO XLi HARDWARE KIT BOX 3
14	1	612-860-092	BOX, 37-1/4 X 14-7/8 X 6-7/8

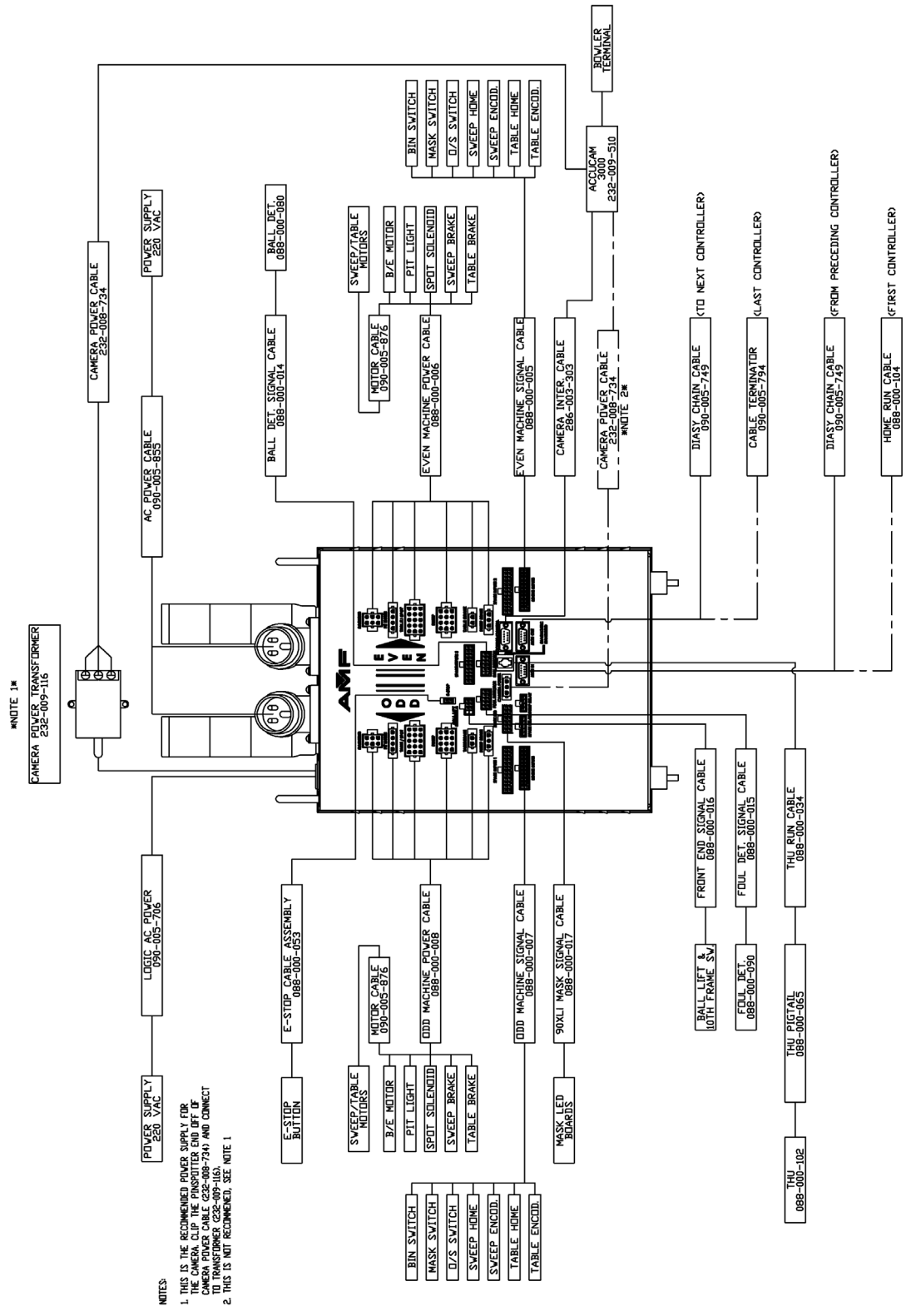
Part Number: 610-880-057
MCU BOX KIT XLi

ITEM	QTY	PART NO.	DESCRIPTION
1	1	088-000-101	MANAGER'S CONTROL UNIT (MCU)
2	1	088-000-104	MCU HOME RUN CABLE
3	1	090-005-794	CABLE TERMINATOR
4	1	610-903-696	BOX, ELECTRICAL INSTALLATION KIT

Part Number: 610-880-059
THU (Technicians Handheld Unit) KIT

ITEM	QTY	PART NO.	DESCRIPTION
1	1	088-000-102	TECHNICIAN'S HANDHELD UNIT (THU)
2	1	088-000-057	THU BRACKET ASSEMBLY
3	1	816-457-080	THUMBSCREW, 5/16-18 X .50
4	1	N/A	BOX, HANDHELD UNIT

Attachment D – Chassis XLi Wiring Diagram



ATTACHMENT E: Pinout List for the Mask Cable

610-905-723 mask Adapter Box Output Wiring

J2/J3 Output to Mask Cable

Pin	Wire Color	Signal
1	Red	12 VDC (unregulated Supply Voltage)
2	Black	Foul
3	White	Strike
4	Blue	2nd Ball
5	Green	12 VDC (Same as Pin 1)
6	Brown	1st Ball (Always on)

Wiring Changes to the mask being adapted may be necessary. Older streamline 21, MOD IV and Magic Triangle Masks may need the second 12VDC supply for the strike and foul lights to function. Discard pins and plugs in the kit if not required to adapt to older masks.