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♦M-1 Infrared Foul Unit Manual♦

Foul Unit Theory

All foul units manufactured by BOWL-TRONICS work on the same principle. An infrared beam is projected across the foul line which is then reflected back to the unit. When a bowler crosses the foul line the foul unit detects this and turns on the indicator light for that lane and also activates the buzzer. There is approximately a 150 millisecond delay on the detection circuit to allow for the ball to break the infrared beam. As the foul unit turns on the indicator light it also signals the scoring system letting it know that a bowler has fouled.

The foul unit consists of one main component that makes it very easy to install and maintain. The M1PC-1 does all of the processing of signals and also has the infrared optics hard soldered to the circuit board which essentially makes troubleshooting a very easy matter. Also as an added feature there is an alignment LED to make foul unit alignment a snap.

All of the switching functions that the board performs are done by way of solid state switching. With this method many years of functionality are added to the foul unit. It is not uncommon for a BOWL-TRONICS Foul Unit to operate for many years without being serviced.

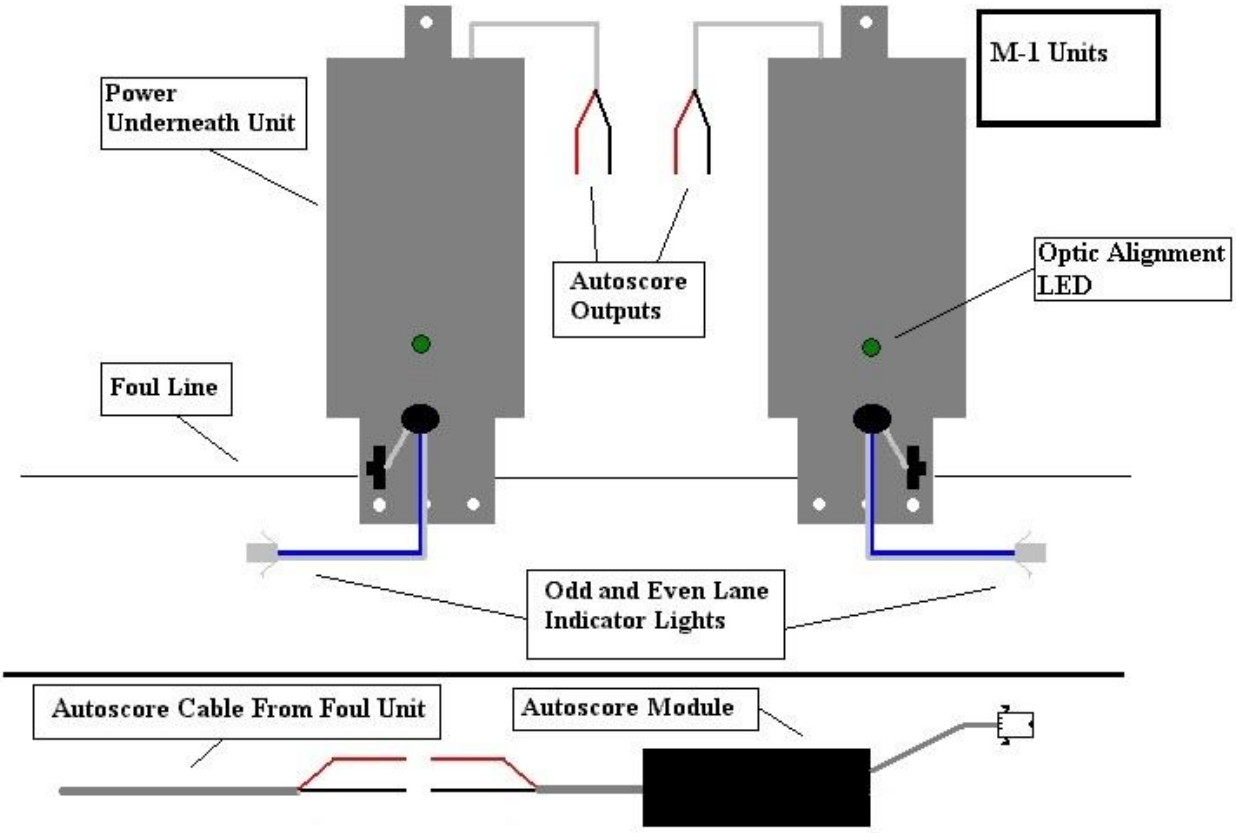
Power for the foul unit

The foul unit is powered by 120 VAC or *(240 VAC on special order).* This line voltage is normally available at the foul line. Most Brunswick replacements will have cannon plug that screws on. If your center does not have this type, a black cable will be supplied with your unit. Please consult the power section on page #3 if this is the case. If your center is not equipped with line voltage at the foul line a power pack will be supplied with your unit. This will save on the added cost it would have taken to run a 120 volt line to the front, and also allow you the same flexibility to turn the foul units on or off from behind the counter. The power pack mounts in the back where the old foul unit was and a low voltage cable is then run to the foul line to power the unit. The connections for this type of system can also be found in the power section on page #3.

Caution:

- ***Always remove power before installing foul units!!***
- ***Always remove power when removing or installing circuit boards!!***
- ***Never short out any of the outputs or autoscore cables!!***
- ***Only use light bulbs that the unit was designed for!! (GE 1891) or equivalent***
- ***Mount the foul unit as level and straight as possible!!***

♦Infrared Foul Unit Diagram♦



♦Installation Instructions♦

Remember to remove power before performing any installation!!

Replacing Gold Crown Surface Return Units (M-1)

After removing the power going to the foul unit, remove the division cover. Remove the old Gold Crown foul unit and replace it with the new M-1 Foul Unit. For most centers there will be a screw type cannon plug for the power. If your center has this type you just screw it onto the corresponding cannon plug on the M-1 Unit. If your center does not have this type, a black cable will be supplied with the unit for the power connections. (*See page #3*) Position the Foul Unit with the optic tube centered on the front edge of the foul line and use the optic alignment LED to align the optic. The LED will be lit when the optic is aligned. Fasten the unit down with the screws provided. Mount the indicator light just in front of the foul unit.

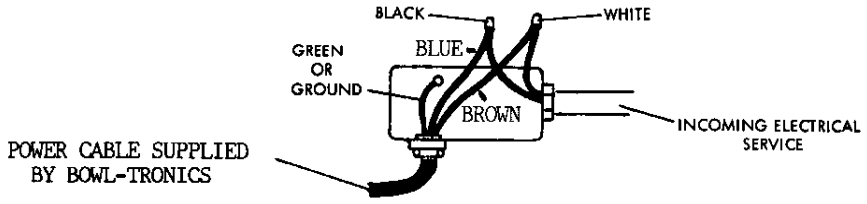
Remove the small cover over the light source assembly and replace the assembly with the reflectors provided. Mount the reflector centered over the foul line. These are special high output reflectors and should be used with the M-1 Foul Unit. Consult the autoscore section of this manual for all autoscore connections. After connecting you're scoring to the foul unit, restore the power and test for proper operation. You can now replace the cover.

♦Power Connections for Foul Units♦

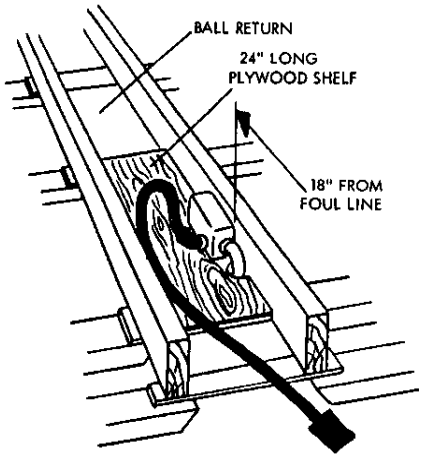
Remove the power before making electrical connections!
Take care in making these connections as damage to the unit can result if done improperly!

Electrical power requirements for foul units are 120 vac @ 50/60 Hz (220 VAC on special order) There will be a black three wire cable plug coming from the foul unit or the powerpack. <u>It is recommended that the power cord be fastened to the woodwork to prevent damage</u>. All centers that are not equipped with power up front will have a powerpack included with the foul unit. The powerpack should always be installed where the old foul unit was. The connections of the power cable from either the powerpack or the foul unit to the electrical box are as follows.

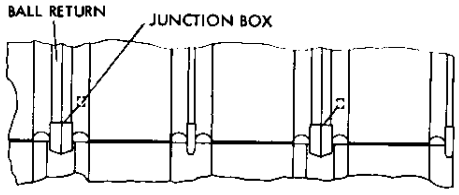
<u>From Unit</u>		<u>from Electrical Box</u>
Brown or white	⇔	**White**
Blue or black	⇔	**Black**
Green	⇔	**Green or chassis ground**



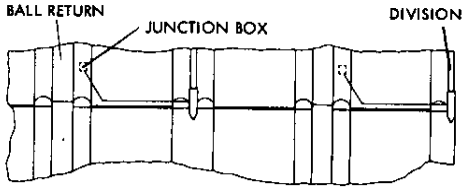
JUNCTION BOX LOCATIONS & POWER CABLE ROUTINGS



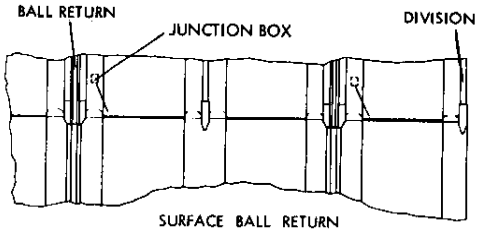
SUGGESTED METHOD OF WIRING FOR SUBWAY BALL RETURN



SUBWAY BALL RETURN



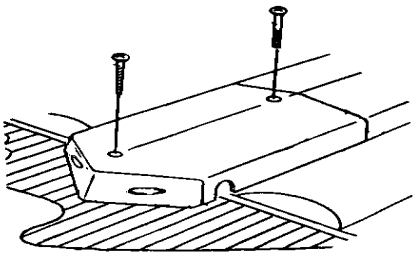
CONCEALED SURFACE BALL RETURN



SURFACE BALL RETURN

♦Installing New Covers♦

The approach should be flush with the pit side of the foul line. Notch anchor strips as shown and install the mounting board. <u>The top of the mounting board should be flush with the top of the approach.</u> (See *Figure # 1 below*)



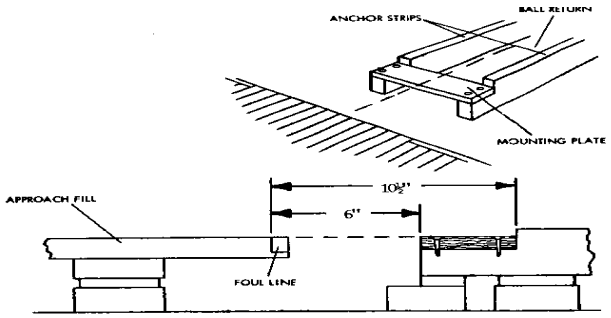
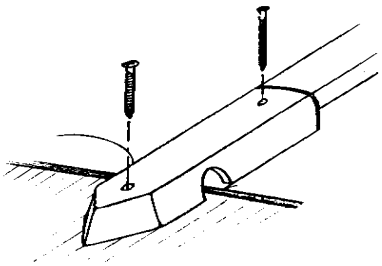


FIGURE 1



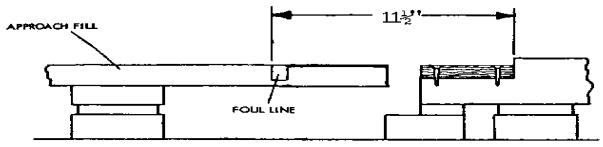


FIGURE 2

♦Autoscore Section♦

All Bowl-Tronics M-1 Foul Units will come with a two wire output for autoscore. <u>If the center has Brunswick or Computerscore a special autoscore module will be supplied with the unit</u>. (*See page #2*) This autoscore module (ASM-S) changes the 12 VAC output to point closure, which is what these two autoscore systems require. <u>All other autoscore systems to date require a 12 VAC output</u>. The two wire gray cable coming from the foul unit connects to the autoscore cables from the scoring. The color code is as follows:

<u>From Foul Unit</u>		<u>To Scoring</u>
Red	⇔	**12VAC Output**
Black	⇔	**common or ground**

If the unit functions properly and the bulb lights, then a signal is being sent to the scorer. If the scorer is not showing a foul, then the scoring is connected improperly as the scorer output is taken directly from the foul light output.

♦Troubleshooting♦

Troubleshooting the foul unit is easy and straightforward. Most problems can be attributed to a dirty or missing reflector. After making a visual inspection of the unit, and making certain that it is receiving power, check for proper alignment by using alignment LED Also, make sure that the hole size is large enough and that the optics are pointed in a straight line thru the hole. Check that the bulbs are good and that the fuse is not blown. If none of these procedures work then try putting in a circuit board from another pair of lanes that you know to be working. If the problem goes away, then the circuit board is at fault and should be sent back to Bowl-Tronics for service. <u>All products manufactured by BOWL-TRONICS carry a one-year parts and labor warranty.</u> Call our tech support if the problem can not be solved and we will do our best to try to solve it.

For repair visit: www.bowl-tronics.com/service

Fill out our service request form and ship to the address that is shown.

Notes: