



Installation & Service Manual

Frameworkx Tel-E-Foul

July 2005 / 53-900676-000

Brunswick[®] 
CUSTOMER SERVICE
A tradition in excellence.

Frameworkx Tel-E-Foul Installation Manual

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Reorder Part No. 53-900676-000

Notice: If available, updates to this manual can be found on-line at www.brunswickbowling.com.

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Warranty and Service Policy

If any defects in material or workmanship appear during the first three months after installation, the defective part will be repaired or replaced, at Brunswick's option, with no charge to the Customer.

If any defects in material appear during the nine months following the initial three month warranty period, the defective part will be repaired or replaced, at Brunswick's option, with no charge to the Customer for parts. The Customer must assume all other costs in making the repair or replacement.

All service calls during the first three months of the warranty period, resulting from the inability of the Customer's mechanics to perform required adjustments or maintenance, will be billed directly to the Customer.

Brunswick reserves the right to change the design of any product, but assumes no responsibility to incorporate such design changes on products already sold.

The warranty applies only to new products installed by Brunswick and extends only to the original purchaser. Repairs or replacements made by anyone not approved by Brunswick void the warranty.

Under no circumstances shall the Seller or Manufacturer be liable for loss of profits or other direct or indirect costs, expenses, losses, or damages arising out of defects in or failure of parts.

Replacement Parts Under the Warranty

All service parts are F.O.B. the installation site both during and after the warranty period. The price of parts includes delivery by standard means, such as United Parcel Service (UPS). Any expense resulting from expedited delivery, such as air freight, will be billed to the Customer.

During the one year period, parts which are faulty due to material or workmanship will be replaced or repaired free of charge only if the old part is properly identified and turned in for credit. Identify the defective part by attaching a tag containing the part name and part number. Light bulbs are not covered by the warranty.

Service parts are ordered through the Brunswick Bowling and Billiards Corporation toll free number: 1-800-YES-BOWL or for international, 1-231-725-3300. Refer to the "General Information" section of the *Bowling Service Parts Catalog* for address and order information. When ordering service parts, specify part numbers and descriptions to simplify handling. ***Use only Genuine Brunswick Replacement Parts.***

Brunswick Tel-E-Foul Standard Packaging

1	L2-510001-101	Package Brunswick Tel-E-Foul Equipment (1 per ball return)
1	53-861068-000	Package, Tel-E-Foul
1	53-600177-000	Assembly, Tel-E-Foul
1	53-860299-000	Package, Reflector Kit, Tele-E-Foul
2	53-860299-001	Bracket, Reflector Mounting, 1-1/4" Diameter
2	53-860299-002	Reflector, 1-1/4" Diameter
2	53-860299-003	Bracket, Reflector Mounting
2	53-860299-004	Screw, Self Tapping, #8 x 1-1/4"
2	53-860299-005	Screw, Pan Head, #6-32 x 5/16"
1	53-861071-000	Package, Hardware, Tel-E-Foul Mounting
4	53-861071-001	Screw, Self Tapping #8 x 1-1/4"
2	53-861068-001	Wire Tie, Nylon, 6"
1	L2-510010-230	
1	*53-860326-230	Transformer Kit, Tel-E-Foul, 230V
1	53-600180-230	Transformer, Tel-E-Foul, 230V 50 HZ
1	53-860326-001	Connector, IEC, Power
1	53-860326-002	Bracket, Mounting, Transformer
4	53-860326-003	Screw, Self Tapping, #8 x 3/4"
1	L2-510010-115	
1	*53-860327-115	Transformer Kit, Tel-E-Foul, 115V
1	53-600180-115	Transformer, Tel-E-Foul, 115V 60 HZ
1	53-860327-001	Connector, IEC, Power
1	53-860326-002	Bracket, Mounting, Transformer
4	53-860327-003	Screw, Self Tapping, #8 x 3/4"
1	L2-510009-100	
1	*53-860326-100	Transformer Kit, Tel-E-Foul, 100V
1	53-600180-100	Transformer, Tel-E-Foul, 100V 50 HZ
1	53-860326-001	Connector, IE C, Power
1	53-860326-002	Bracket, Mounting, Transformer
4	53-860326-003	Screw, Self Tapping, #8 x 3/4"

1	**53-861069-000	Package, Remote Sensor Kit, (see <i>Figure 12</i> page 10)
1	53-600177-002	Plate, Sensor Mounting
4	53-861069-001	Screw, Self Tapping, #6-32 x 1-1/4"
1	53-861069-002	Wire Harness, Remote Sensor, 120"

***NOTE:** *Transformer dependant upon country of installation site.*

****NOTE:** *Used in non-standard lane installation only.*

General Description

The Brunswick Tel-E-Foul is a microprocessor based unit which operates on 12 volt AC power and uses an infrared signal for foul detection. The Tel-E-Foul unit gives two signals to indicate a foul; a buzzer and a red light. The Tel-E-Foul also provides a third signal for use at centers with automatic scorers.

The Tel-E-Foul microprocessor is designed to perform a functional test when the unit is turned on. It will test the infrared signal for proper reflection strength, and test for burned out foul indicator lights. If an error is detected during these tests, the buzzer will be turned on for a short time and then the left-hand and right-hand foul indicator lights will alternately turn off and on for a short time. If the infrared signal is weak, approximately two signal strength indicator lights on, the buzzer gives a short signal. If it is the left-hand lane, the sound will be constant and if it is the right-hand lane, there will be a pulsing sound. If there is no infrared signal there will be a long constant sound for the left-hand lane and a long pulsing sound for the right-hand lane. After the buzzer alerts the mechanic, the lamp will alternately turn off and on to indicate which lane has a Tel-E-Foul problem.

Shipped with the Tel-E-Foul package is a transformer that reduces a high voltage supply furnished by the customer, to the 12VAC required to operate the Tel-E-Foul assembly.

Prior to installation of the Tel-E-Foul the customer must provide appropriate power according to the chart labeled *Figure 3*.

Replacement parts for the Brunswick Tel-E-Foul are shown in the *Bowling Service Parts Catalog* (part number 28-201739-000)

Parts Identification

The Brunswick Tel-E-Foul consists of the following components: one mounting plate, two sensor assemblies with mounting platform, two foul indicator light assemblies with mounting platform, one buzzer, one printed circuit board, one two-conductor power supply cable and a four wire cable to provide a foul signal to a scorer console. Refer to *Figure 1*.

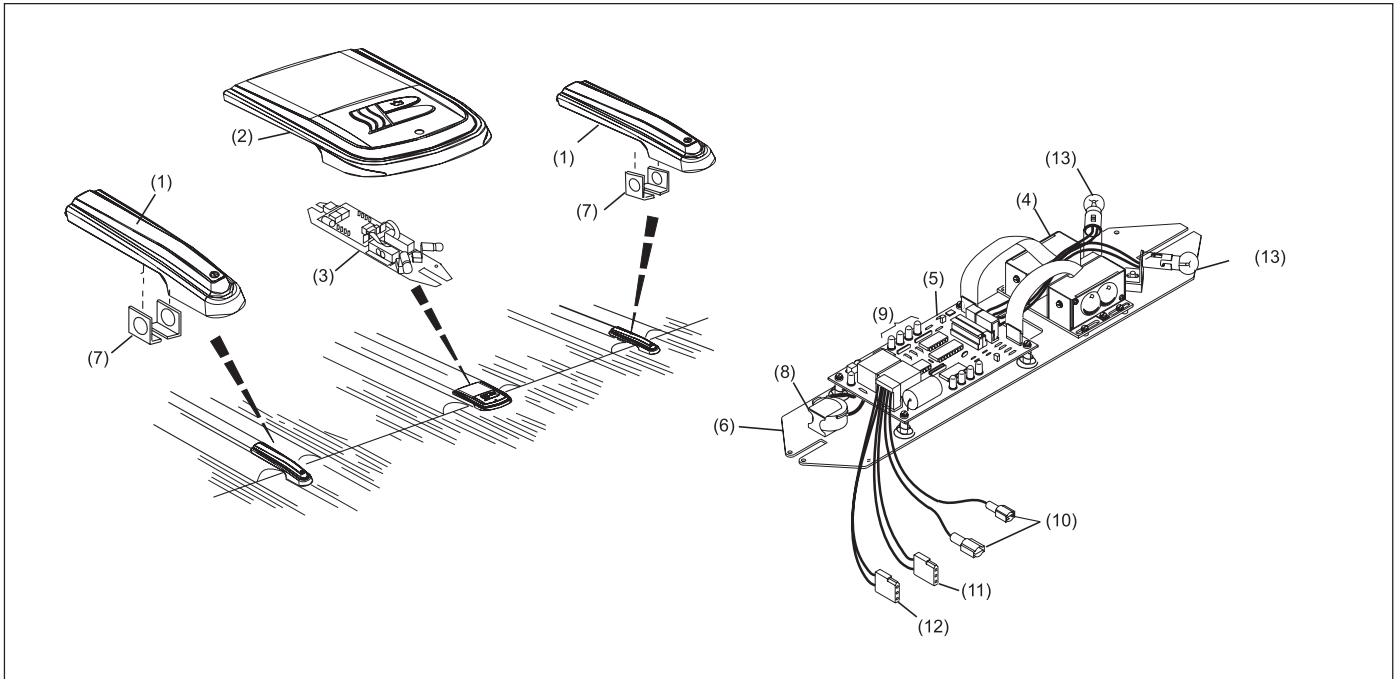


Figure 1.

- | | | |
|----------------------------|---|---|
| (1) DIVISION HOUSING | (2) RETURN HOUSING | (3) TEL-E-FOUL UNIT |
| (4) OPTICAL SENSORS | (5) PRINTED CIRCUIT BOARD | (6) MAIN CHASSIS |
| (7) REFLECTOR | (8) BUZZER | (9) LEDs |
| (10) 12VAC POWER CABLE | (11) RIGHT LANE (GREEN/YELLOW) SCORER CABLE | (12) LEFT LANE (GRAY/ORANGE) SCORER CABLE |
| (13) FOUL INDICATOR LIGHTS | | |

Electrical Power Requirements

The Tel-E-Foul power cables are to be provided and installed by the customer's electrician. Refer to *Figures 2* and *3*. On new installations, this should be done after the lane foundation is completed. Junction box locations and power cable routings for both new and modernization installations are shown in *Figures 2, 3, 4* and *5*.

- (1) TEL-E-FOUL POWER CABLE FURNISHED BY CUSTOMER
- (2) INCOMING ELECTRICAL SERVICE
- (3) JUNCTION BOX

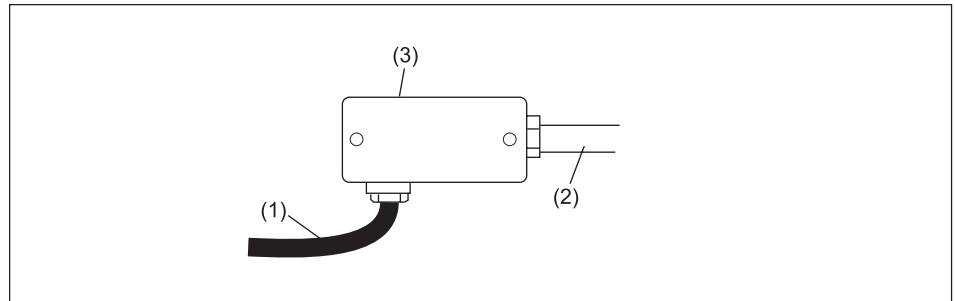


Figure 2.

Electrical Power Supply Responsibility	
Customer to furnish 1 of the power supplies listed below as required by country of installation site.	Brunswick
115 VAC Single Phase 60 Hz 100 VAC Single Phase 50 Hz 230 VAC Single Phase 50 Hz	1 each IEC 320 Connector 1 each Transformer

Figure 3.

- (1) BALL RETURN
- (2) 24" (610 mm) LONG PLYWOOD SHELF
- (3) 18" (457 mm) FROM FOUL LINE
- (4) SUGGESTED METHOD OF WIRING FOR SUBWAY BALL RETURN JUNCTION BOX
- (5) JUNCTION BOX AND POWER CORD
- (6) SUBWAY BALL RETURN

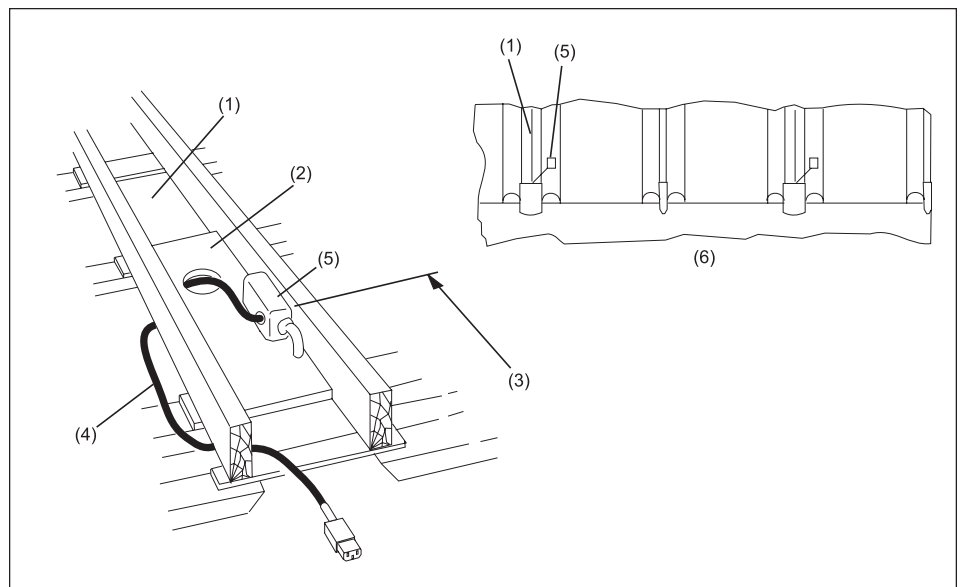


Figure 4.

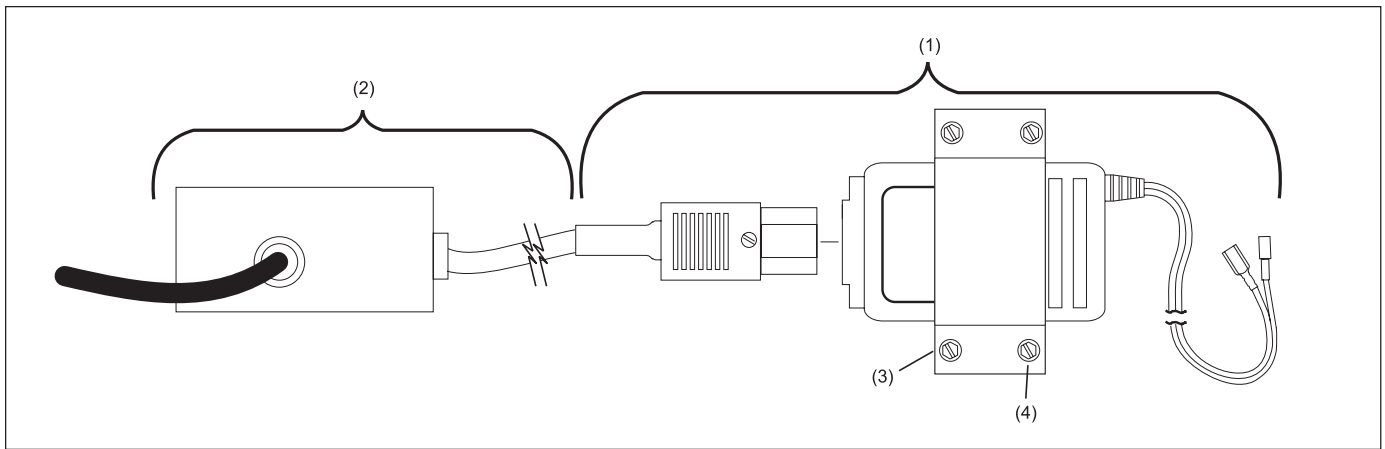


Figure 5.

- (1) BRUNSWICK SUPPLIED TRANSFORMER (2) CUSTOMER SUPPLIED POWER SOURCE (3) TRANSFORMER MOUNTING BRACKET AND IEC 320 CONNECTOR
 (4) #8 X 3/4 HEX HEAD SCREW

NOTE: Secure the transformer to foundation (out of the way of ball return) with four #6 x 3/4" hex head screws.

Installation Procedure

Subway Return (10-1/2")

1. On stringer or crib foundations notch the anchor strips and install the 9" x 2-3/4" x 3/4" Tel-E-Foul mounting plate using #14 x 1-1/2" flat head wood screws. The top of the mounting plate should be flush with the top of the approach fill. Refer to Figure 6.

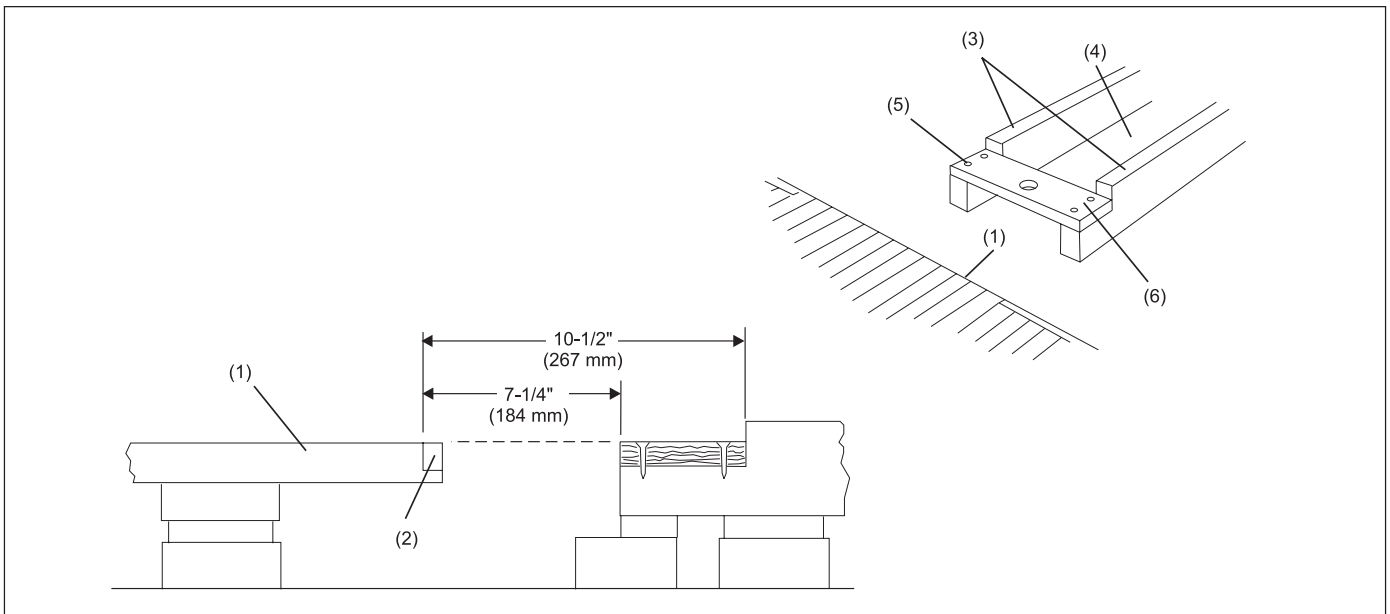


Figure 6.

- (1) APPROACH FILL (2) FOUL LINE (3) ANCHOR STRIPS
 (4) BALL RETURN (5) #14 X 1-1/2" FLAT HEAD WOOD SCREW (6) MOUNTING PLATE

2. Connect the power cable to the Tel-E-Foul unit. Refer to *Figure 7*.

- (1) POWER CABLE
- (2) TEL-E-FOUL UNIT
- (3) BLACK
- (4) WHITE
- (5) RIGHT-LANE (YELLOW AND GREEN) SCORER CABLE
- (6) LEFT-HAND (ORANGE AND GRAY) SCORER CABLE

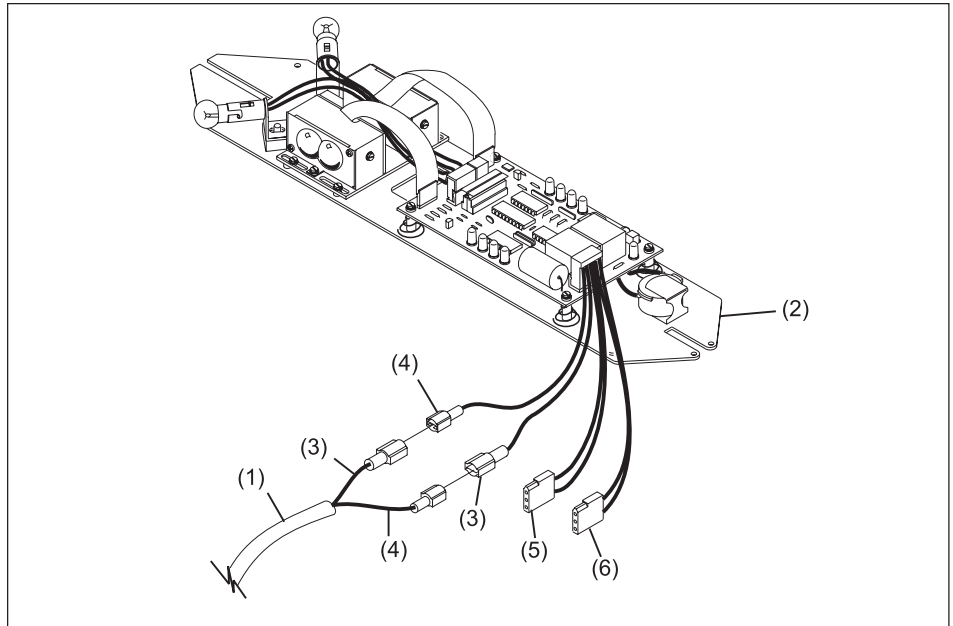


Figure 7.

NOTE: Set jumpers for Brunswick or AMF scorers as shown in *Figure 8*.

IMPORTANT: If the AMF position is used on a Brunswick system, damage may result to the automatic scorers.

- (1) SET FOR BRUNSWICK SCORES
- (2) SET FOR AMF SCORERS

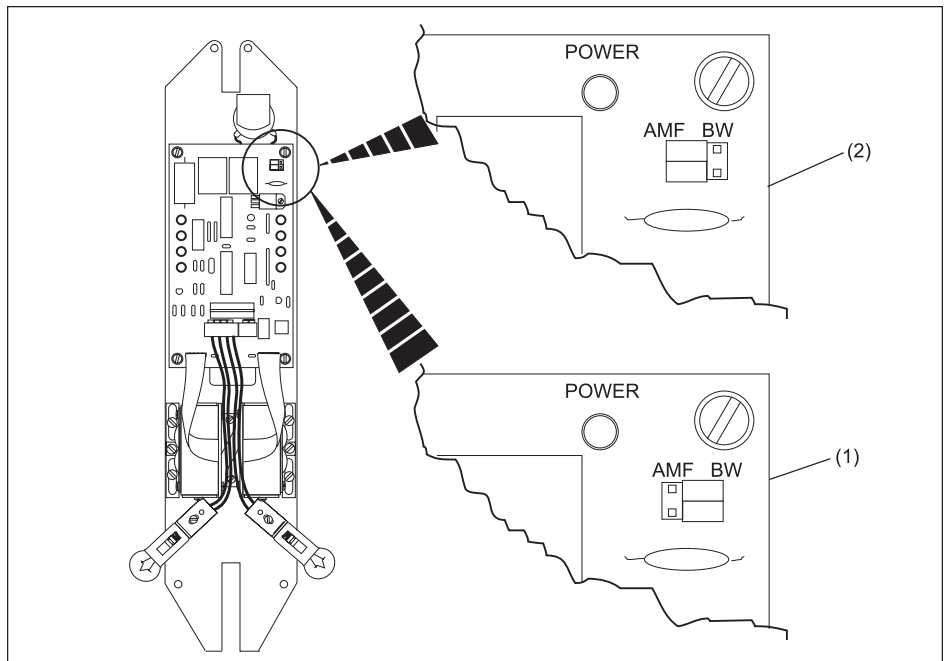


Figure 8.

- Position the Tel-E-Foul unit with the center of the optical head lenses on the center of the foul line and the unit centered on the ball return. Refer to *Figure 9*.

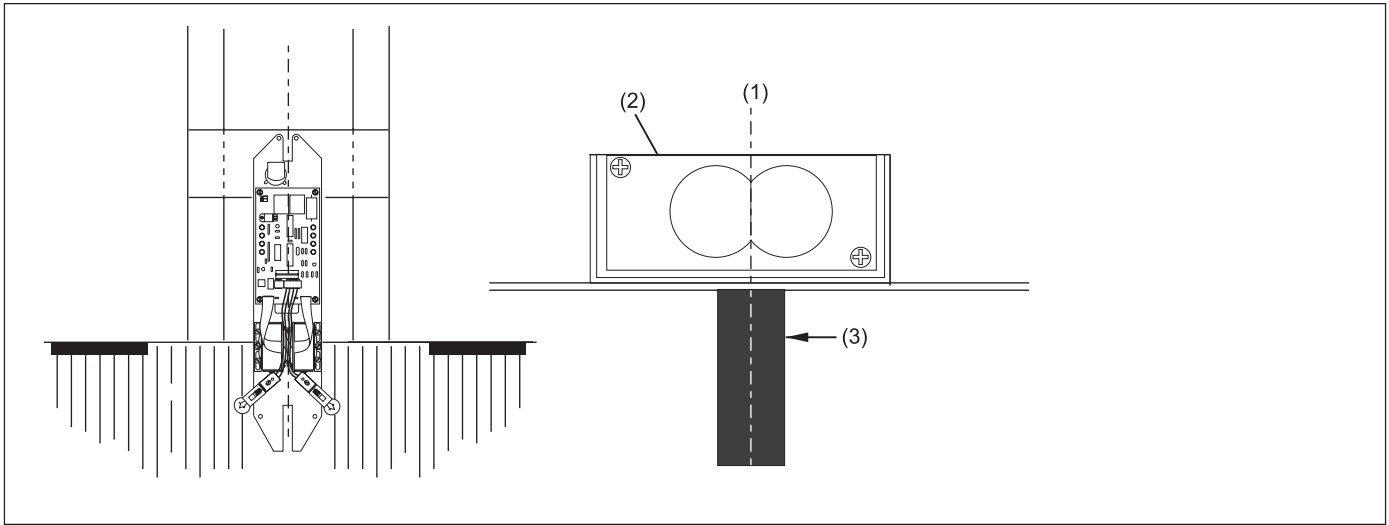


Figure 9.

(1) CENTER LINE OF SENSOR

(2) SENSOR

(3) FOULLINE

- Mark the mounting hole locations, set the units aside, and drill holes for the mounting screws. Use two 1/4 x 2" lag screws, one in the mounting plate and one in the approach fill. Replace the unit and mount in place. Refer to *Figure 10*.

NOTE: On laminate lanes drill a 5/16" (7.93 mm) clearance hole through the laminate before installing the 1/4" lag screws.

(1) 1/4 X 2" LAG SCREW

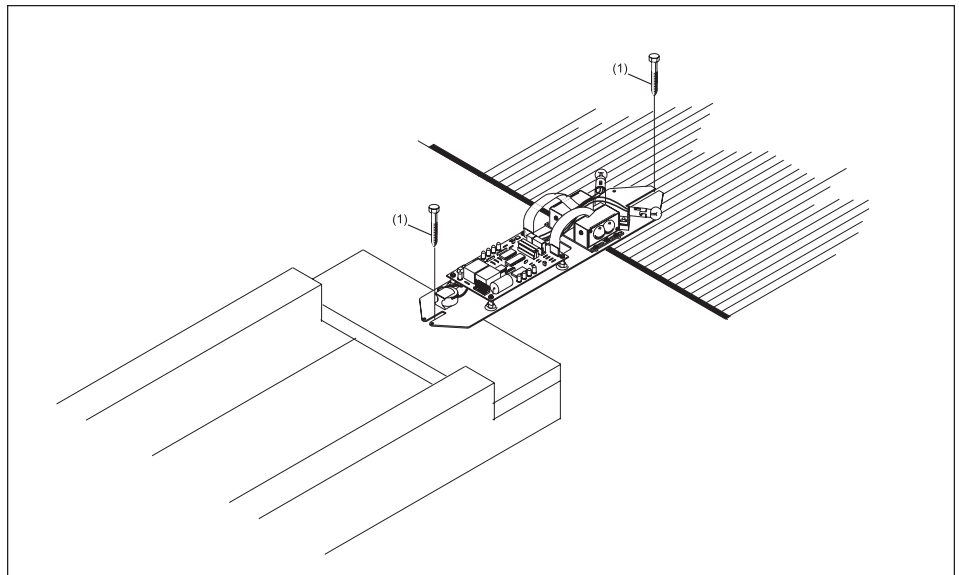


Figure 10.

- Position the cover over the unit and trim the gutter and capping for a smooth fit and a clear opening for the optical beam to the reflector. Openings in the side of the cover should be centered on the optical sensors. Mark the mounting hole locations using the cover as a template. Drill a 1/2" diameter hole in the approach and install a Tap-Loc insert. Install a T-nut in the mounting plate. Install the cover using the hardware shown in *Figure 11*.

NOTE: On laminate lanes drill a 1/2" clearance hole in the laminate before drilling the hole for the Tap-Loc insert.

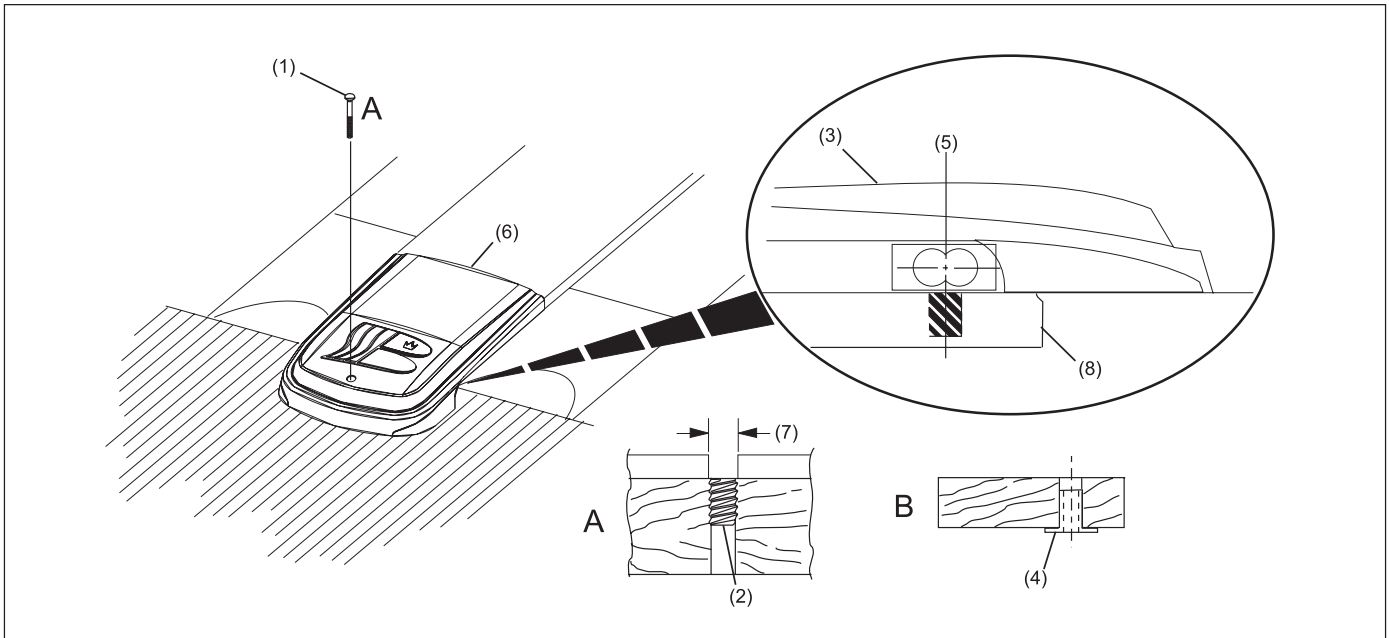


Figure 11.

- SELF TAPPING SCREW, #8 X 1-1/4"
- TAP-LOC
- COVER
- T-NUT
- CENTER LINE OF OPENING AND LENS
- TRIM GUTTER AND CAPPING
- 1/2" CLEARANCE HOLE IN LAMINATE
- WOOD LANE

Non-Standard Lane Pair

At centers with a separation of up to 60" (1.5 m) between lanes at a ball return use conversion kit 53-861069-000 and perform the following steps:

1. Disconnect the sensor cable from the printed circuit board and remove the sensor assembly from the Tel-E-Foul assembly for use on the separate lane.
2. Install the sensor assembly on the separated lane with the hardware in package 53-861009-000.
3. Connect the 120" long sensor cable assembly part number 53-861069-002 to the Tel-E-Foul assembly printed circuit board, route cable under the lane and connect to remote sensor. Refer to *Figure 12*.

- (1) TEL-E-FOUL DIVISION COVER
- (2) TEL-E-FOUL BALL RETURN COVER
- (3) TEL-E-FOUL ASSEMBLY
- (4) 60" REMOTE SENSOR CABLE
- (5) REFLECTOR ASSEMBLY
- (6) REMOTE SENSOR
- (7) LANE BREAK UNDER 60" (1.5 m)

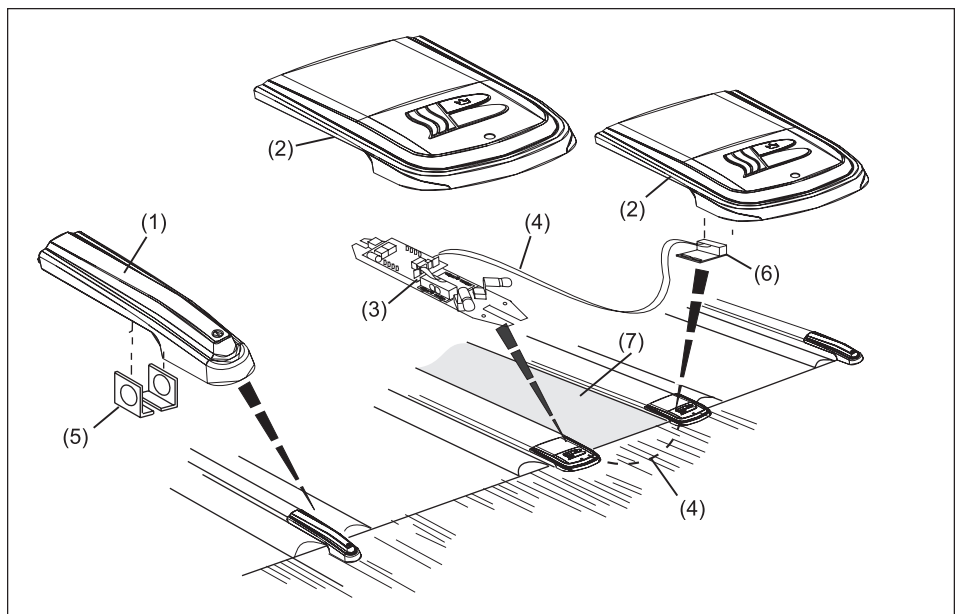


Figure 12.

Brunswick Tel-E-Foul Reflector

1. Locate and pilot drill mounting holes for four #8 x 1-4/4" self tapping screw. Refer to *Figure 13*.

- (1) CENTERLINE OF DIVISION
- (2) CENTER LINE OF FOUL LINE

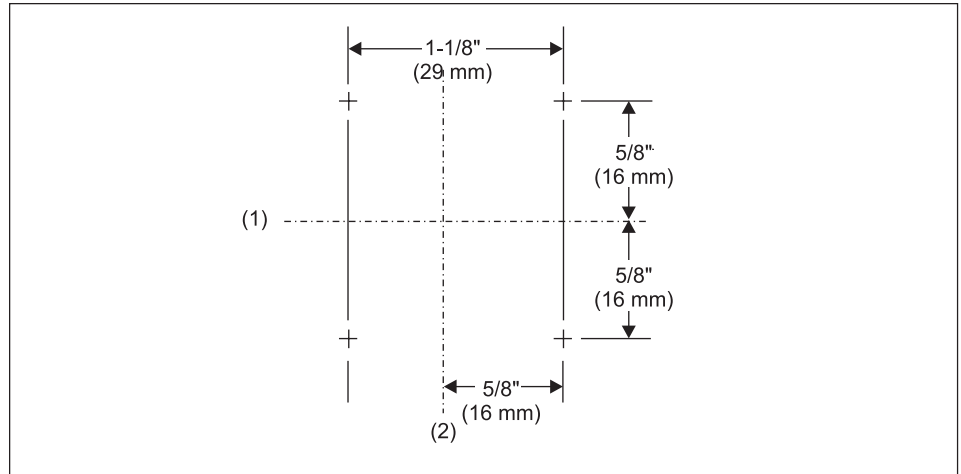


Figure 13.

2. Position reflector in bracket with flat area down (toward floor). Secure reflector to bracket with two #6-32 x 5/16" pan head screws and two star washers. Refer to *Figure 14*.

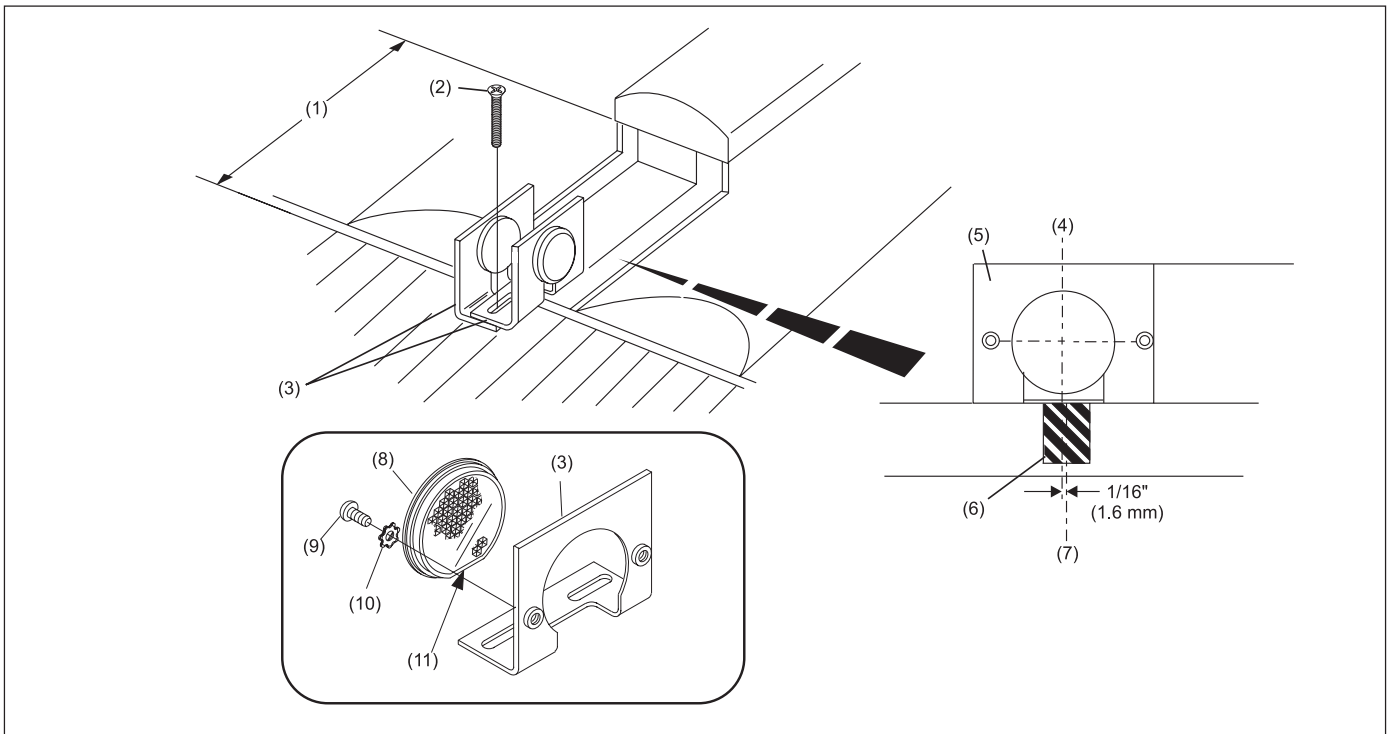


Figure 14.

- | | | |
|--|-------------------------------------|---------------------------------|
| (1) 12-1/2" (318 mm) APPROACH SIDE OF FOULLINE | (2) SELF TAPPING SCREW, #8 X 1-1/4" | (3) REFLECTOR BRACKETS |
| (4) CENTER LINE OF REFLECTOR | (5) REFLECTOR ASSEMBLY | (6) FOULLINE |
| (7) CENTER LINE OF FOUL LINE | (8) REFLECTOR | (9) PAN HEAD SCREW #6-32 X 5/16 |
| (10) EXTERNAL TOOTH LOCKWASHER | (11) FLAT AREA | |

3. Position the mounting bracket with reflectors centered 1/16" (1.6 mm) toward the approach side of the center of the foul line and mount the brackets using four #6 x 3/4" round head wood screws. Refer to *Figure 14*.
4. Position the cover over the unit and trim the division capping and gutter for a smooth fit and a clear opening for the optical beam to return to the sending unit. Refer to *Figure 15*.

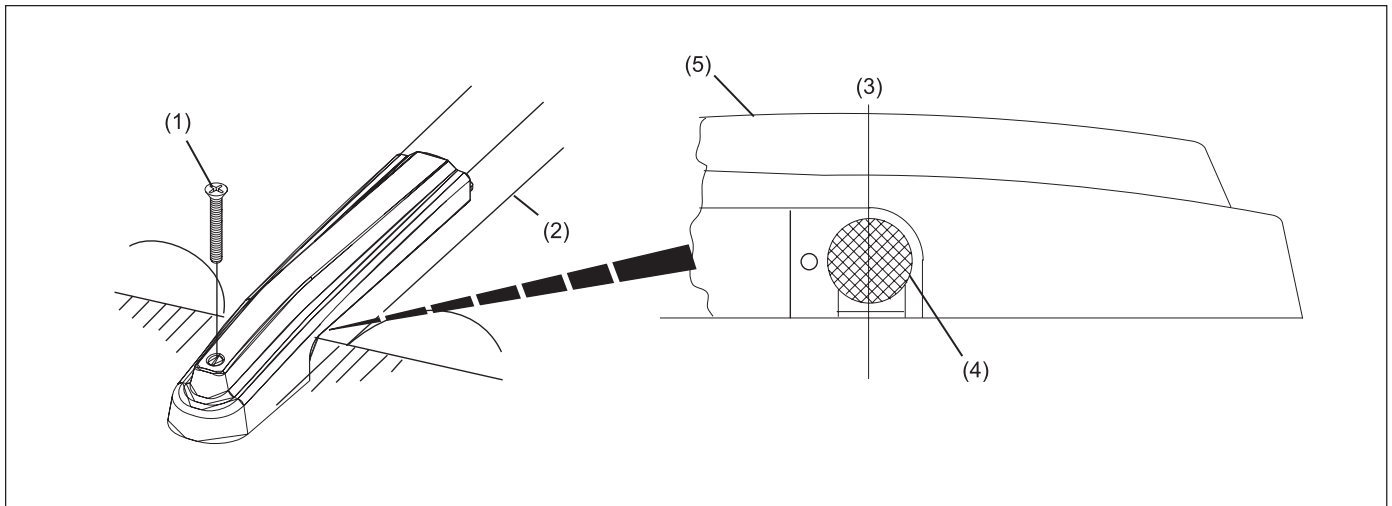


Figure 15.

(1) SELF TAPPING SCREW, #8 X 1-1/4"

(2) TRIM CAPPING AND GUTTER

(3) CENTER LINE OF OPENING AND REFLECTOR

(4) REFLECTOR

(5) COVER

5. Mark the mounting hole locations, drill two 5/16" diameter holes, and install the Tap-Loc inserts. Mount the cover using the hardware shown in *Figure 15*.

Sensor Adjustment

1. Turn the Tel-E-Foul on and check the red signal indicator LEDs. All four indicator lights for each lane should be on. Adjust sensor assembly as required if all lights are not on. Refer to *Figure 16*.

NOTE: The unit will function with two indicator lights on, but four lights indicate the maximum signal strength has been achieved.

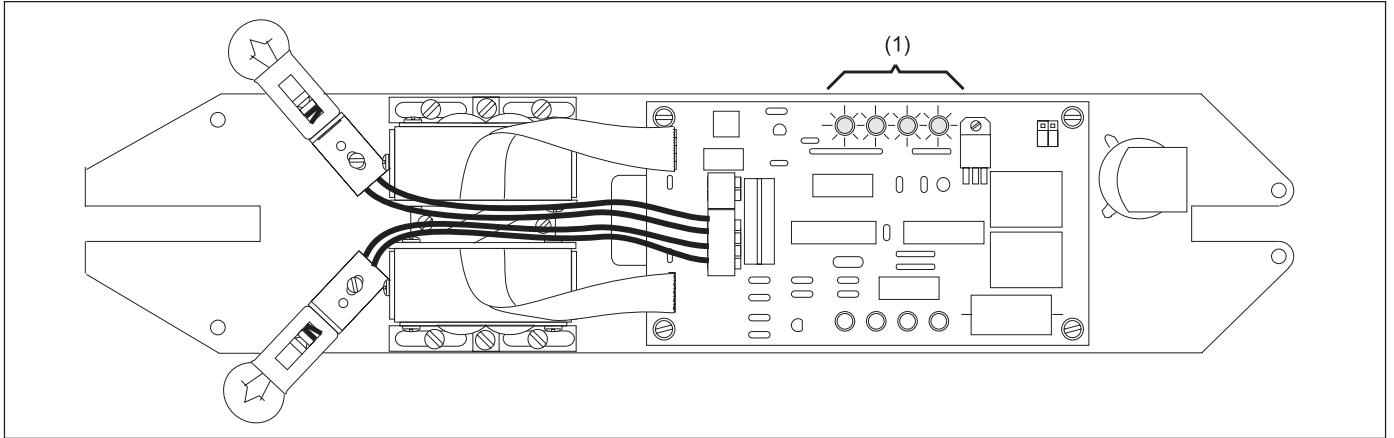


Figure 16.

(1) OPTIMUM SIGNAL SETTING

Brunswick Scorer Connections (AMF and Brunswick Pinsetters)

Brunswick Pinsetter

1. Connect the wires from P-5 to the automatic scorer cables. The orange and gray wires are for the left-hand lane the yellow and green wires are for the right-hand lane. Use wire nut to splice the wires.

AMF Pinspotter

1. Connect the orange wire to the left-hand lane brown ground cable and gray wire to the left hand-lane brown signal cable.
2. Connect the yellow to the right-hand lane brown ground cable and the green wire to the right-hand signal cable. Refer to *Figure 17*.

Brunswick Foul Detector			Pinsetter Type	
TERMINAL J7	WIRE	LANE	AMF	BRUNSWICK
4	ORANGE	ODD	GROUND (BRN)	BLACK
3	GRAY	ODD	SIGNAL (BRN)	RED
2	YELLOW	EVEN	GROUND (BRN)	BLACK
1	GREEN	EVEN	SIGNAL (BRN)	YELLOW

Figure 17.

3. If you can't identify the ground cables on AMF machines, take the following steps:
 - a. Turn off the power to the pair of machines.
 - b. Identify the scorer wires from the left-hand pinspotter as "A" and "B" and the two wires from the right-hand pinspotter as "C" and "D" .
 - c. Using an ohm meter measure the resistance between "A" and "C", "A" and "D", "B" and "C", and "B" and "D". The pair of wires with the least resistance (approximately 50 ohms) are ground wires.
 - d. If the foul signal appears on the wrong lane, switch the location of the two signal wires.