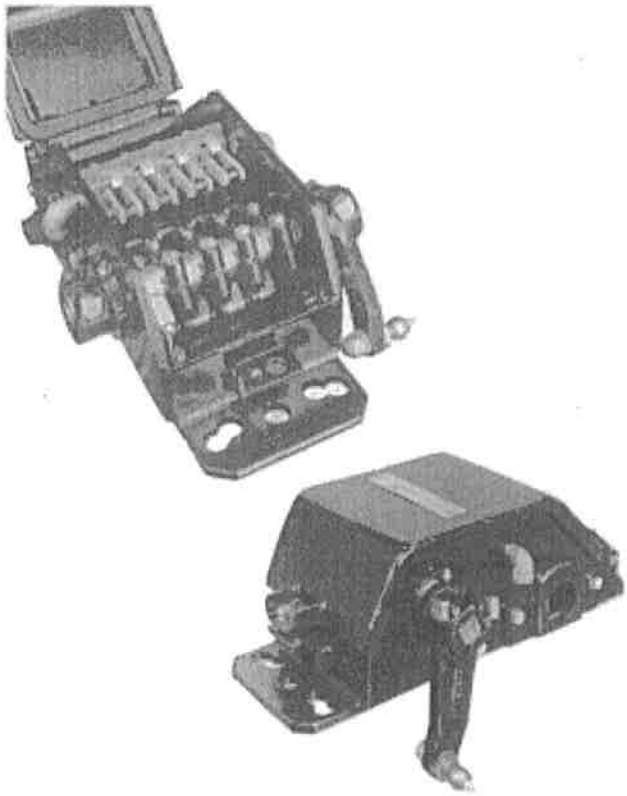
Model 100 Circuit Controllers



Unusually Durable
- 3/8 inch plate steel construction tough to break easy to repair.
- 1-1/2" diameter shaft.

Many Configurations
- 2 and 4 cam/contact set units
- 2 position cams
- With or without return spring
- Two crank arm options
- Non-insulated and insulated ball studs

Reliable
- Contacts positively driven in both directions
- Quick response, three degree movement of crank arm actuates contacts

Adaptable
- Six mounting holes, two slotted holes at each end on 4"/5" centers, one at each end on center line of case
- Wide variety of accessories

Particular attention has been paid to design requirements established for Operating Shafts, Operating Cams, Contacts, Cam/Contact Responsiveness, Cam/Contact Inter-relationship and Unit Dielectric Characteristics.

General Comment

Circuit controllers are used to provide positive electrical indication of the position or condition of switch points, derails, bridges, slide fences, etc. Such indication can modify signal aspects to restrict train movement, actuate crossing signals or turn on alarms of various types. Circuit controllers are capable of controlling relay circuits or shunting track circuits. Usually a heavy (1" dia) steel rod connects the circuit controller to the device being checked. Units can be purchased with internal return spring that will "detect" a broken operating rod by moving the operating shaft so that the cams cause contacts to open, resulting in a restrictive or alarm condition.

Design concepts for the Model 100 Circuit Controller have evolved over time and address the need of the railroad industry. These needs include durability through a wide range of abusive environmental conditions, reliable performance to precise and exacting standards and a device that presents a very low maintenance burden over an extended service life.

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Unit Specifications

Physical Characteristics

Case
1. Drainage Hole: 1/4", plugged
2. Wire Openings: Two holes, 3 sq. in., one each side
3. Mounting Lug Offset: 1/8", to permit drainage
4. Over-all Height 7"

Cover
1. Furnished with weather-proof gasket
2. Removable when unlocked and fully opened
3. Secured with railroad spring hasp.

Separate openings on lock tabs permit use of private lock with 3/8" dia. shackle

Ventilation
Two hooded ventilators, each 1/4 sq. in., one each side.

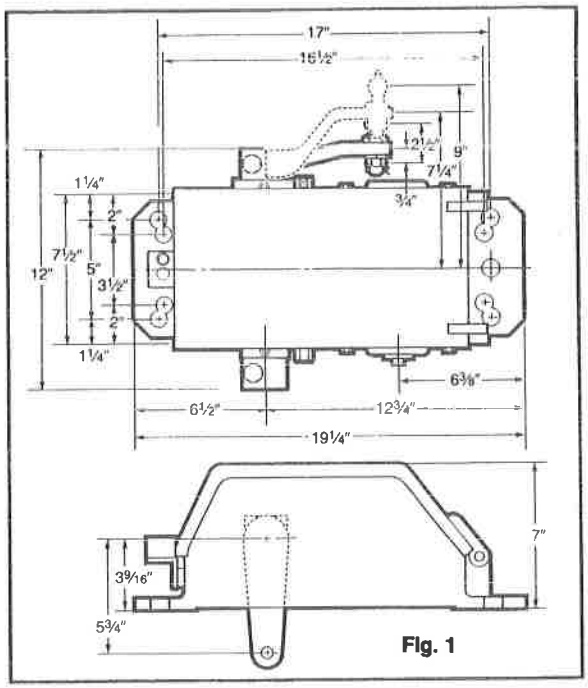

Fig. 1

Shaft
1. Diameter: 1-1/4" steel
2. Bearings: 1" long, I.D., 0.003" larger than O.D. of shaft, with annular grease grooves
3. Operating crank and/or shield can be mounted to either end
4. Shaft has hobbed threads to permit micrometer adjustment of cams.

Electrical Characteristics
1. Contact Rating: 15A continuous
2. Dielectric Capacity: 3000 VAC between all parts of electrical circuits and other parts insulated therefrom, for one minute
3. Surface Leakage: Not less than 1/4" between any exposed current carrying part and any other metallic part

Contacts
1. Gap: Not less than 1/16" when opposite contact just closes
2. Travel: Not less than 1/4"
3. Wipe: Not less than 1/32"
4. Pressure: In closed position, not less than 3 lbs., 8 oz.

Cams
1. Separately adjustable with micrometer adjusting screws. Independent lock screws provided to secure cams in proper position.
2. Cams force and mechanically retain contacts in all positions.
3. Throw-Maximum 9" without return spring option. Will accommodate normal track switch (3-1/2" - 5-1/2") and derail (EB-5-1/ 2", HB-6-1/4") throw with return spring
4. Two position cams can be used as three position cams by using two/contact spaces for each three position circuit

Terminal Board and Terminals
1. Terminal board of linen-based bakelite for strength and durability. 3/4" thick
2. Terminals retained in terminal board to prevent turning, on 1-7/16" horizontal centers, 1-1/8" vertical centers
3. Temperature range — 40°F to + 185°F

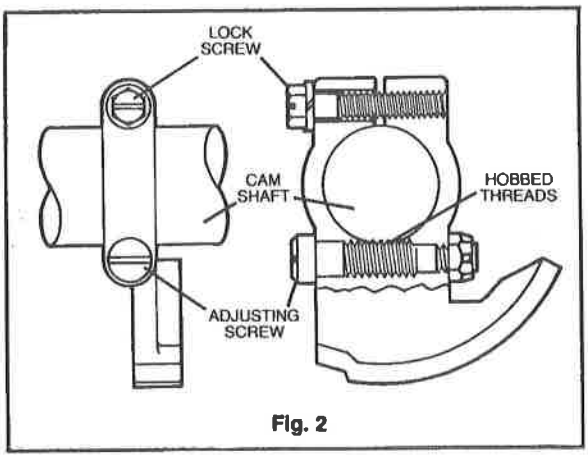

Fig. 2

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Theory of operation

Model 100 Circuit Controllers are used to make or break electrical circuits, in response to the movement of derails, switch points, etc. A heavy (1" dia.) operating rod connects the Circuit Controller Crank to the device being checked for movement. In the "on", "closed", etc. position the device is considered to be in the "normal" position. (See Figure 3, below.) When the device comes "off", "opens", etc., the Crank Arm rotates, positioning cams and contacts in the "reverse" position. (See Figure 4, below.) Note that the "normal" and "reverse" positions depicted in Figures 3 and 4 are themselves reversed when the circuit controller is used with the Model EB Hinge Derail.

Because the W-C-H Model 100 Circuit Controler, is twice reversible (box can be turned end-for-end and Crank Arm can be mounted on either side), "normal" and "reverse" positions for the cam/contact sets are determined by the position they take when the Circuit Controller is installed and connected to the device being checked. The usual installation orientation for the Model 100 Circuit Controller is with the cover hinges toward the field (away from the track). All installation and circuit diagrams in this brochure are shown assuming such installation orientation. Note that with such installation orientation the "normal" and "reverse" contact closures for the Model EB Hinge Derail will be reversed.

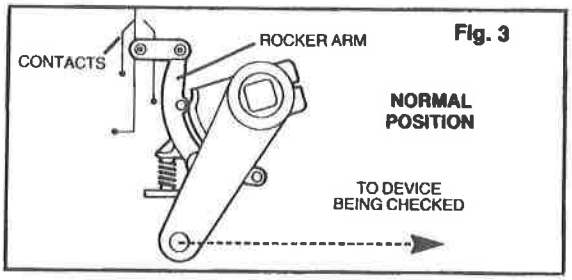

Fig. 3

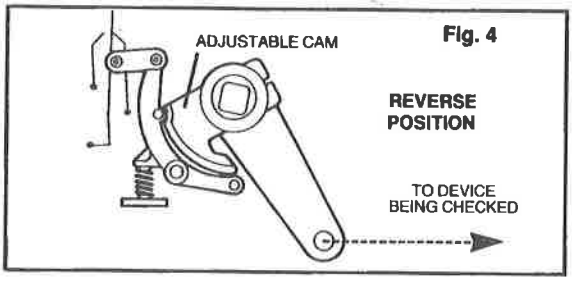

Fig. 4

Derail Applications

Derails are safety devices used to protect people and equipment from injury or damage. The need to have a reliable means to detect the position of the derail is obvious. W-C-H Model 100 Circuit Controllers are used for this purpose. Where the method employed to move the derail is manual, manual (but electrically locked), or electrically powered, safety is enhanced with the use of a Circuit Controller. Once you have determined which derail is appropriate for your particular application (if in doubt consult W-C-H personnel), the remaining considerations take care of themselves. Figures No. 5 and 6, below, depict typical installations for manually operated derails. Consult factory or appropriate catalog section if Circuit Controller is being used with Eldo or DeLectric Derail Operators. Circuiting can be by either method shown on Page No. 23-5 or a variation thereof. Note that with Model EB Hinge Derail, the "normal" and "reverse" contact closures depicted will be reversed.

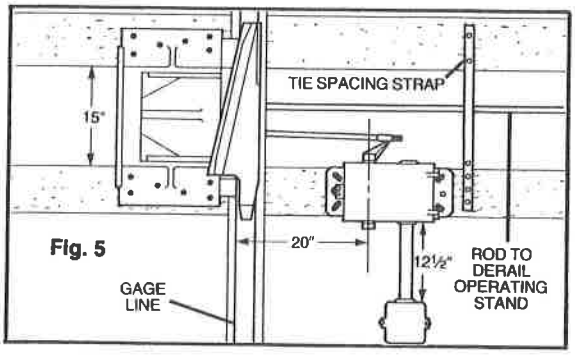

Fig. 5

Model 100 Circuit Controller installed with model HB Sliding Derail. Suggest using circuit controller Piece No. 38-0100-99, or 38-0100-105 (see page 23-6), and operating rod Piece No. 38-0100-201 (see page 23-7). Use terminal housing 1182-22 in this application.

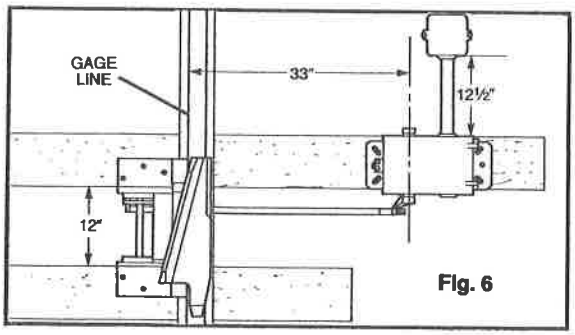

Fig. 6

Model 100 Circuit Controller installed with model EB Hinge Derail. Suggest using controller Piece No. 38-0100-99, or 38-0100-105 (see page 23-6), and operating rod Piece No. 38-0100-215 (see page 23-7). Use terminal housing 1182-22 in this application.

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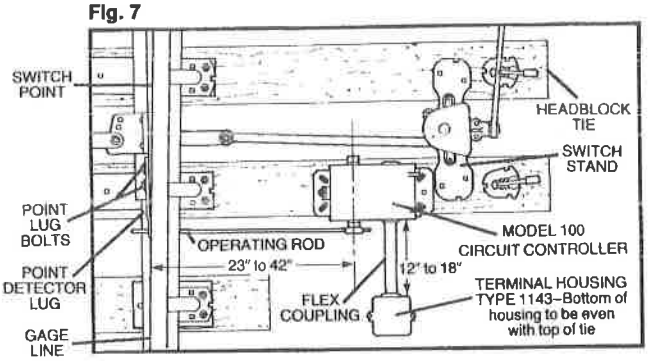
Track Switch Applications

In areas where train movements are controlled for safety or productivity purposes, reliable indication of track switch position is essential and requires the use of a circuit controller. A typical installation, with key components identified, is depicted at right in Figure No. 7.

Fig. 7



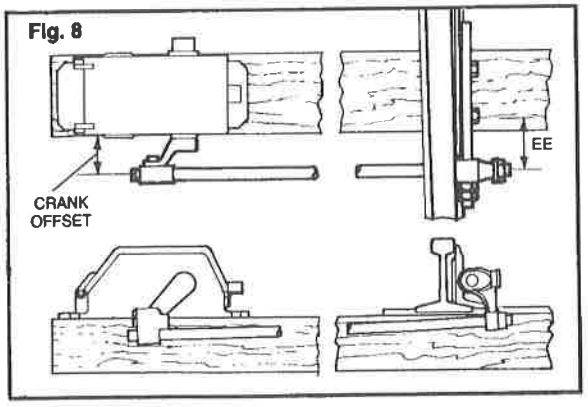
Application Considerations

Using a Model 100 Circuit Controller with a track switch requires that the design engineer take several factors into consideration.

1. Cam Position Types – Two-position cam applications result in circuiting that indicates when the switch points are at their full "normal" and/or full "reverse" locations. Three-position cam applications permit an additional indication, that of the switch points being "in transition" between full "normal" and full "reverse". A Model 100 Circuit Controller with two-position cams may also be used for three-position applications by using two cam/contact sets for each circuit and making the necessary cam adjustments. Because circuits using two-position cams are most common, they are depicted in this brochure.

2. Use of the Optional Return Spring – Purpose of the return spring is to force open the contacts to permit a restrictive train signal indication should the Operating Rod become broken or disconnected. This option is available on Model 100 Circuit Controllers.

Fig. 8



Model 100 Circuit Controller connected to near switch point. To determine crank offset, first select proper Point Detector Lug. Consider Dimension "EE" when selecting lug.

3. Crank Offset – Two offsets are offered. Consider tie location and Dimension "EE" of Point Detector Lug (See below and Pages 23-2, 23-8) to determine proper crank offset. Alignment of the operating rod between the point detector lug and the Model 100 Circuit Controller should be as close to perpendicular as possible.

4. Ball Stud – Insulated and non-insulated ball stud options are available. In locations where the operating rod linkage to the Model 100 Circuit Controller could cause problems with track signal circuits or electric propulsion power, an insulated ball stud should be used.

5. Operating Rod – When selecting the operating rod, keep in mind that the point detector lug should be installed on the normally closed switch point. (See Fig. 7, 8 and 9). The intended installation location of the Model 100 Circuit Controller is the other primary consideration. Select the appropriate "near" or "far-point" type operating rod of the desired length (See Page 23-7).

6. Point Detector Lug – As with the crank offset, tie location determines which point detector lug you should use (See Fig. 8, Fig. 9 and Page 23-8). Alignment of the operating rod between the point detector lug and the Model 100 Circuit Controller should be as close to perpendicular as possible. Also determine proper bolt size to match mounting holes in the switch point.

7. Terminal Housing – Terminal housings are used to terminate signal circuit wiring between the Model 100 Circuit Controller and the signal control case. Doing so helps to prevent damage to expensive control apparatus and makes repairs to underground wiring easier. It is recommended that the Type 1143 Terminal Housing be used for this purpose. (See Page 23-8 for details).

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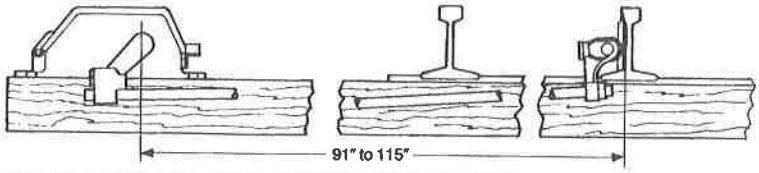
Track Switch Applications (cont'd)

Fig. 9



Model 100 Circuit Controller connected to far switch point. See Fig. 8 comment on crank offset and point detector lug section.

Circuiting For All Applications

Below are shown two typical circuits with proper Circuit Controller Terminal Board hook-ups. These circuits employ "two-position" type Cams and assume that the "normal" location is with the Crank to the left. Installation orientation of the Model 100 Circuit Controller is assumed to be with the cover hinges toward the field (away from the crack). Circuits and hook-ups shown will vary if installation varies from these conditions.

Note: Due to the operating characteristics of the Model EB Hinge Derail, the circuiting depicted here should be reversed when such a derail is used with the Circuit Controller.

Circuit With Normal Position Indication

Fig. 10

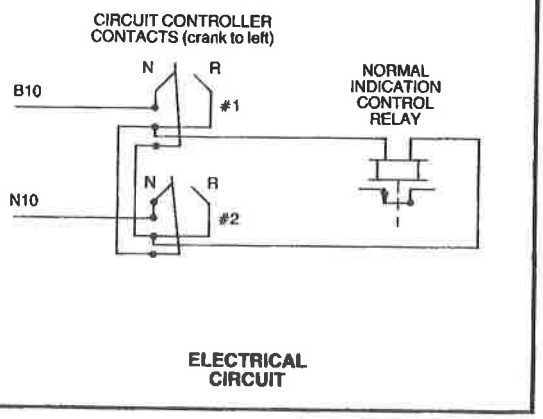
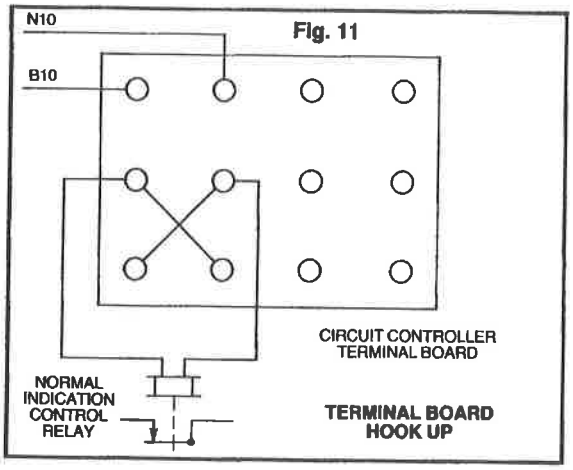


Fig. 11



Circuit With Normal And Reverse Position Indications

Fig. 12

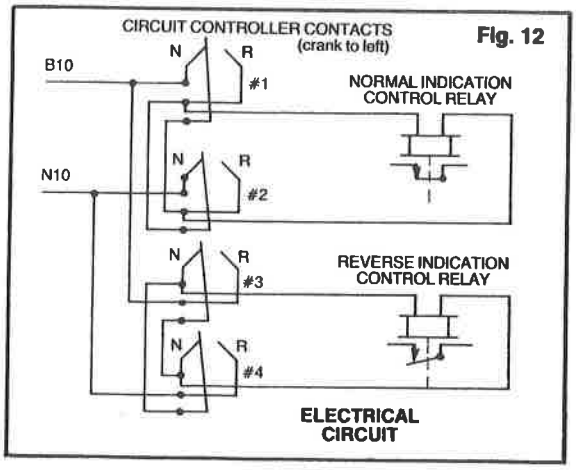
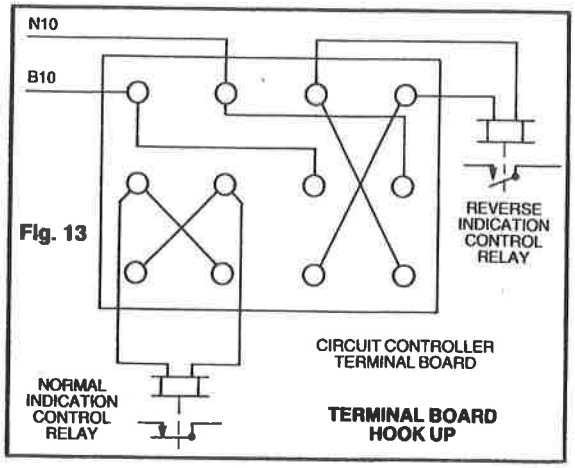


Fig. 13



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Model 100 Circuit Controller

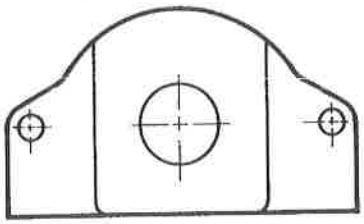
Ordering References

Cam Configuration	Return Spring	Crank Offset				Part No.
		3/4" Offset		2-3/32" Offset		
		Insulated Ball Stud	Non-Ins. Ball Stud	Insulated Ball Stud	Non-Ins. Ball Stud	
2-2 Pos	No		Yes			38-0100-98
2-2 Pos	No				Yes	38-0100-99
4-2 Pos	No		Yes			38-0100-100
4-2 Pos	Yes		Yes			38-0100-101
4-2 Pos	No				Yes	38-0100-105
4-2 Pos	Yes				Yes	38-0100-106
4-2 Pos	No	Yes				38-0100-110
4-2 Pos	Yes	Yes				38-0100-111
4-2 Pos	No			Yes		38-0100-115
4-2 Pos	Yes			Yes		38-0100-116

When ordering, specify a total of two cover plates from chart below.

Cover Plates

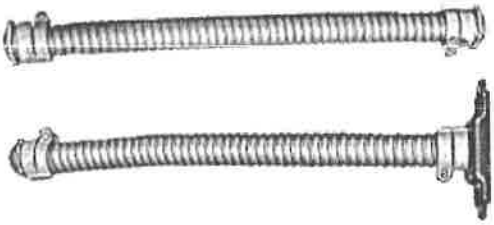
Ref. 1



Flex Coupling w/wo Cover Plates

Ref. 2

Ref. 3



Ordering References

Ref.	Description	Part No.
1	Cover Plate w/hole for 1-1/2" squeeze connnector	1705-1A
1A	Above, but w/2" NPT hole	1705-1B
1B	Above, but no hole	1705-1D
1C	Above, but 1-1/4" – NPT hole	1705-1E
1D	Above, but w/45° squeeze connector for 1-1/2" flex coupling	38-0100-175
1E	1" NPT hole	1705-1-G

Ordering References

Ref.	Description	Part No.
2	Flex Coupling, 1-1/2" Dia. x 18" lg. w/two squeeze connectors	1703-2
3	Flex Coupling, 1-1/2" Dia. x 18" lg. w/one squeeze connector and Cover Plate	1705-12
3A	Above, but 2" OD x 19-1/2" lg. Rubber Hose	1182-24U

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