

MAN080

**Model JR - 1
Current Interrupter
Reference Manual**

MCM# 12820



February 17, 2011

MCM JR-1 Current Interrupter

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Warranty

M.C. Miller Co., Inc. warrants each new instrument manufactured and sold to be free from defects in material, workmanship, and construction except for batteries, which may be contained therein. When used in accordance with this Operating Manual the unit will perform to applicable specifications for a period of one year after shipment.

If examination by M.C. Miller Co., Inc. discloses that the product is defective, then its obligation is limited to the repair or replacement of the defective unit or its components at the option of M.C. Miller Co., Inc.

M.C. Miller Co., Inc. is not responsible for products, which have been subject to misuse, alteration, accident, or for repairs not performed by M.C. Miller Co., Inc.

Instruments must be returned properly packed with the transportation charge prepaid to:

M.C. Miller Co., Inc.

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Sebastian, Florida 32958

Return transportation charges will be F.O.B. factory. No parts shall be returned without prior authorization, which shall be furnished upon request.

The foregoing warranty constitutes M.C. Miller Co., Inc.'s sole liability and is in lieu of any other warranty of merchantability or fitness. M.C. Miller Co., Inc. shall not be responsible for any incidental or consequential damages arising from any breach of warranty.



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General

The MCM Model JR-1 is a microprocessor controlled, high current interrupter featuring a high stability, temperature compensated time base. The JR-1 was specifically designed for the interruption of multiple rectifier cathodic protection systems in order to conduct synchronized instant off testing for extended periods.

Capabilities

The JR-1's capabilities include DC interruption in excess of 900 watts loads and AC interruption in excess of 5 KW loads (Reactive). Also, multiple unit synchronous operation is guaranteed for a normal five-day workweek. The JR-1 is sync and program compatible with all other models of the Model JR family of current interrupters.

Features

- Synchronization with any number of Model JR current interrupters;
- Five functions - programmable from the front panel keypad;
- Night latch - automatically stops relay in closed position when the **STOP SET** is programmed. The operation resumes when the **START SET** time is reached;
- Relay Condition - Displayed as **ON** or **OFF** along with a count down of time remaining in that condition;
- Start Condition – The switch is selectable to **Open** or **Closed** and is defined to include the **STOP SET** or **Night Latch**;
- Self Diagnostic - Automatically performs a system test at start up and displays **Pass** if the JR-1 is ready to proceed;



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- An examination of the programmed parameters may be done at any time by pressing the appropriate function key;
- Memory – The last entry made for each function is Remembered by the JR-1. There is no need to re-program for each start up;
- Synchronization - Multiple units may be synchronized before or during operation;
- Re-synchronization – The JR-1 calculates when the relay should be switching, based on start time. This allows the re-synchronization of an existing unit or insertion of additional units during a test in progress;
- Charging System - A unique three-step system provides faster recharging, longer battery life, and temperature compensation. This allows for indefinite float charging during storage;
- State-of-Charge Indicator - This indicator changes from **RED** to **GREEN** when 80% capacity is reached;

Specifications

DISPLAY: 5-1/2-digit liquid crystal with battery and relay condition annunciators. Character height: .5 in. Operating temperature: -20 to +195 degrees F. (-30 to +90 degrees C.)

TIME BASE: 2 MHz Temperature Compensated Crystal Oscillator, 0.5 Sec. per 24 Hr.

KEYBOARD: Sealed, Tactile feedback, 16 key Arrangement: 5 function keys -Time Set, Start Set, Stop Set



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(6), On cycle, Off cycle, 10 digit keys: 0- 9, 1 Enter Key:
ENTER

CYCLE RANGE: .2 to 999.9 seconds, On Cycle and
Off Cycle.

AUTO START: Start Set: Programmable delayed Start from
1 minute to 24 hours, in one-minute increments.

AUTO STOP: Stop Set (6). Programmable Stop from
1 minute to 24 hours, in one-minute increments.

NOTE: Always stops with respect to the **Start Relay** switch
position (Open or Closed).

SYNCHRONIZATION: Multiple Unit capability, compatible
with all JR versions.

ACCURACY: Less than +/- .5 sec. in 24 hours (one day).

RELAY: Latching relay with spare contacts.

MAXIMUM RATINGS: CURRENT
35A @ 28VDC 35A @ 125VAC

MAXIMUM RATINGS: VOLTAGE
28 DC @ 35 A 240VAC @ 5A

BATTERY: Sealed, rechargeable, 6 Volt, 2.6A/H
Charger supplied.

BATTERY LIFE: Approx. 50 hrs. @ .4 sec ON and
1.6 sec OFF.

SIZE: 10" H x 10.75" W x 5" D, (26 x 28 x 13 cm)

WEIGHT: 7bs. Net weight. (3.2 Kg)

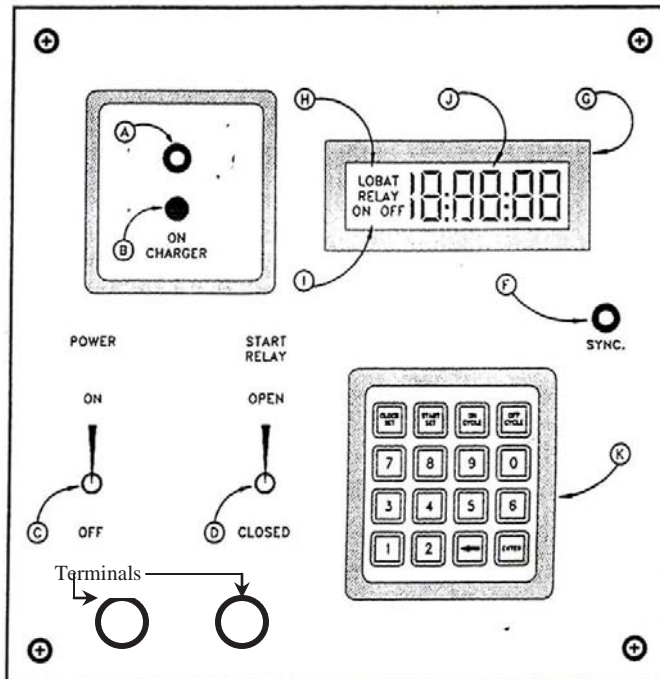


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Panel Controls

- A. Battery Charging Receptacle;
- B. Battery Charging Indicator Light;
- C. Power Switch;
- D. Relay Starting Position Switch;
- F. Synchronizing Receptacle;
- G. LCD Display Window;
- H. Low Battery Indicator;
- I. Rectifier Condition Indicator;
- J. Display Area for Clock Time, Starting Time, Countdown Timing, and Settings for ON Cycle and OFF Cycle;
- K. Keyboard for Setting Times, ON Cycle, OFF Cycle and Activating Clock.



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Operations Overview

- A. Turn Power Switch **ON**;
- B. Select **Start Relay** switch position, **Open** or **Closed**.
(Also applies to **Stop** or **Night Latch**, i.e., **Start Closed - Stop Closed**;
- C. Enter operating time requirements under the five function keys;
- D. Synchronize all units to be used, to each other;

The JR-1 contains an EEPROM, which retains the last entry made under the five function keys. Factory testing will leave an existing program, which will be overwritten by the next entries.

The uses for the JR-1 are too numerous to list. The following examples will serve as both a set up (programming) and typical use guide. These examples assume instant-off testing of multiple rectifier cathodic protection on a structure.

Note: ALWAYS USE THE MILITARY TIME FORMAT WHEN ENTERING TIME DATA.

EXAMPLE: 18:00 INSTEAD OF 6:00PM

Installation of the Interrupter in the Rectifier

In general, it is physically easier to interrupt across the taps of the rectifier. In addition the tap location is best because breaking AC causes less wear on the relay. This is due to the AC crossing zero volts and extinguishing the arc, whereas DC depends on the distance of the gap to extinguish the arc. The next best location to interrupt is the AC power supply. The DC side may also be interrupted at the anode or structure leads (+) or (-) output of the rectifier. When using the JR-2, the polarity should be observed to

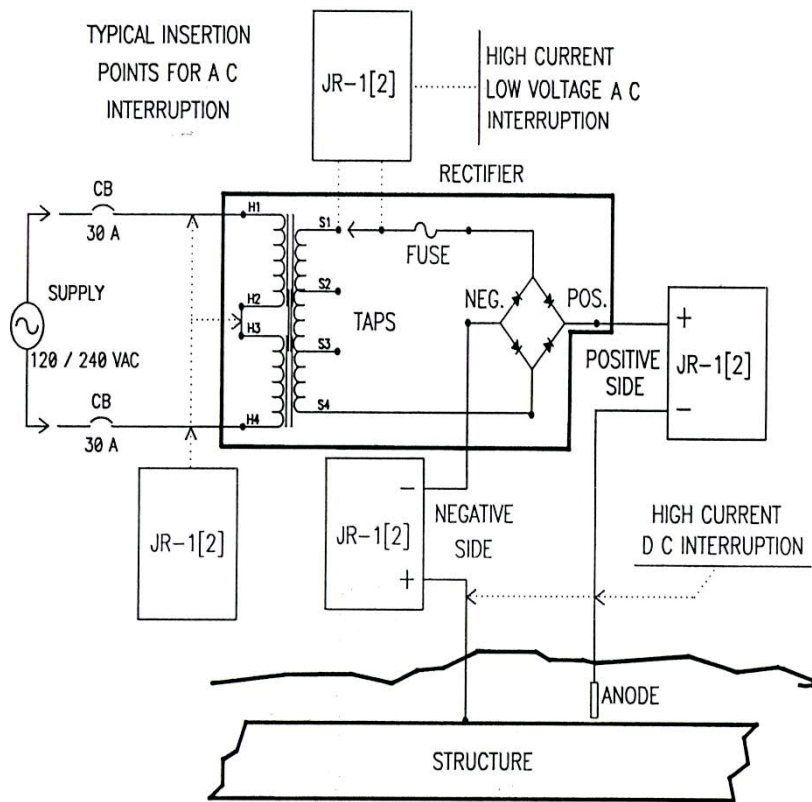


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reduce wear of the plating on the plunger of the mercury relay.

Warning: Always observe the proper safety procedures when working on electrical equipment. Turn off all live wires before inserting the current interrupter.



Typical connections for MCM Model JR current interrupters.



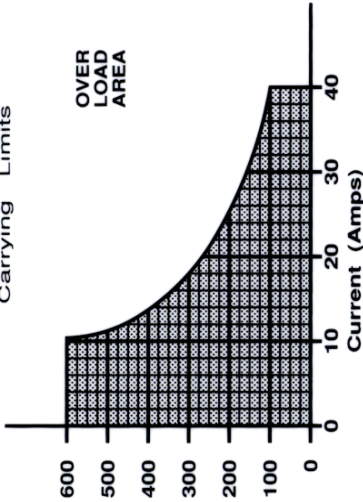
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RE-SYNC. A SINGLE JR

1. Turn on slave, relay switch closed
2. Set 5 functions same as master
3. Enter slave Clock Set 1 min. ahead of master
4. Connect Sync. Cable
5. Wait < 1 min. for colons to flash or relay to start

JR - 1 AC Current Carrying Limits

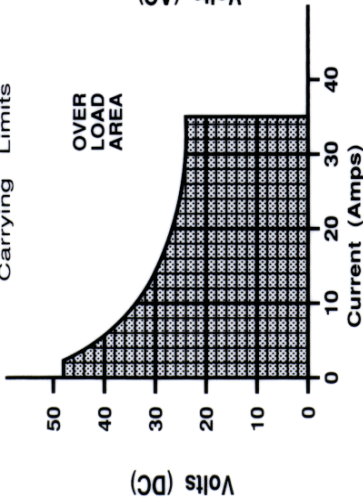


600 VAC @ 10A
 440 VAC @ 12A
 220 VAC @ 22A
 120 VAC @ 35A

GROUP SYNC.

1. Turn all the units on, relay switch closed
2. Set 5 functions to the same setting on all JR's
3. Daisy chain all JR's with Sync. cables
4. Press enter on one of the units twice
5. Disconnect Sync. cables

JR - 1 DC Current Carrying Limits



48 VDC @ 2A
 30 VDC @ 14A
 24 VDC @ 35A

PRESS FUNCTION KEYS TO VIEW STATUS

Clock Set: Present time indicated on your watch
 Start Set: Time when interruption is to begin ie. 07:00
 Stop Set: Time when relay latches shut ie. 13:00
 Add 24:00 Hr. to Start Set to start interrupt tomorrow



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Example 1: Delayed Start – Interruption Begins Later

The units will be put in place before the interruption cycle begins. In other words, the units will be synched before the **Start** cycle time has occurred.

It is 7:00AM and the JR-1's are in one location ready to be synched. They will be installed in the rectifiers before 8:00AM. At 8:00AM, the JR-1's will start their On / Off cycle and remain cycling until 5:00PM the same evening. At this time, the JR-1s will shut the relay and wait until 8:00AM the next morning before resuming interruption.

Test Requirements: On Cycle -2 seconds; Off Cycle -.5 second.

Work Schedule: Start at 8:00AM, Stop at 5:00PM, and repeat for XXX days, as necessary.

The present time is 7 :00AM

Procedure - All Units	Display Reading
1. Power Switch ON	PASS
2. Start Relay-Closed	PASS
3. Press START SET, 8,0,0, ENTER (8AM)	8:00
4. Press STOP SET (6),1,7,0,0 ENTER(5PM)	17:00
5. Press ON CYCLE, 2,0, ENTER (2 sec)	2.00
6. Press OFF CYCLE, 5, ENTER (0.5 sec)	,50



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7. Interconnect SYNC jacks on all units, daisy chain fashion.
8. Press CLOCK SET, 7, 0,1 ENTER 7:01
9. When present time (your wrist watch) reads 7:01, press **ENTER** once on one unit only 7:01
10. At 7:02AM, all units will begin running as evidenced by a flashing colon (:).

The sync cables may now be removed and the JR-1s distributed to their various locations for installation. Testing may begin at 8:00AM.

Example 2: Immediate Start – Cycle Begins Now

The JR-1's will be put in place after interruption cycle begins. In other words, the units will be synched after the **Start** cycle time has occurred.

It is 2:30 in the afternoon and the JR-1s are in one location ready to be synched. They will be installed in the rectifiers later. The JR-1's will start their On/Off cycle immediately and remain cycling until 5:00PM in the evening. At that time, they will shut the relay and wait until 8:00AM the next morning before resuming interruption.

Test Requirements: On Cycle -2 sec.; Off Cycle -.5 sec.

Work Schedule: Start 8:00AM, Stop 5:00PM, and repeat for XXX days, as necessary.

The present time is 2:30AM



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Procedure - All Units	Display Reading
1. Power Switch ON	PASS
2. Start Relay Switch Closed	PASS
3. Press START SET, 8,0,0, ENTER (8AM)	8:00
4. Press STOP SET (6), 1,7,0,0, ENTER (5PM)	17:00
5. Press ON CYCLE, 2,0, ENTER (2 sec)	2.00
6. Press OFF CYCLE, 5, ENTER (0.5 sec)	.50
7. Interconnect "SYNC" jacks on all units, daisy chain fashion.	
8. Press CLOCK SET, 1,4,3,2. (2:32PM) (press ENTER)	14:32
9. When present time (your wrist watch) reads 2:32PM, press ENTER once on one unit only.	14:32
10. At 14:32, all units will display	LOCh #

This is a countdown operation to show that the units are performing a calculation. When the calculation is complete, all the units will immediately commence cycling. Since the relays are now in operation, try to maintain them in an upright position during transport and installation.



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Example 3: Extended Delayed Start (Next Day)

Test Requirements: Same as Example 1.

Work Schedule: Testing to begin 8:00AM the next morning.

Present Time: 1:30PM

Procedure: With the following exceptions, follow Example 1.

Display Reading

1. Press **START SET**, 3, 2, 0, 0, **ENTER** 32:00

In short, add 24:00 to desired start time, i.e.

31:00 would be 7:00AM plus 24 hours = 31:00

Miscellaneous Features:

If **STOP SET** is not desired, (continuous cycling), program

STOP SET to an illegal time, i.e., 24:01.

To create a "MASTER" unit which never starts cycling, program **STOP SET** to equal **START SET**.

Correcting Keypad Entry Errors:

Press the letter **O** until display reads 00:00. Enter the correct numeric sequence.

EXAMPLE: 1,3,0 was entered for 1:30PM. Press the letter **O** four times, and then press 1,3,3,0 **ENTER**. The correct entry reads 13:30.



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Example 4: Re-Synchronizing a Model JR-1

Suppose there are five JR-1s in the field and one is accidentally turned off and needs to be restarted and resynchronized. All the units could be brought back to a single location, daisy chained together, and started as in example 1 or 2. This procedure will work, but is rather inefficient. Therefore, the JR-1s are constructed so that any one of the operating units may be used as a master to restart the failed slave unit. Simply take the slave unit to the working master location and follow the procedure below. The JR-1s automatically output a trigger pulse to the SYNC receptacle once a minute when running.

Procedure:

1. Turn the slave unit to be resynched OFF, and then ON.
2. Check or set the functions on the slave to the same as those on the master. Press the function key on both the master and the slave to display their settings.
 - a. START SET;
 - b. ON CYCLE;
 - c. OFF CYCLE;
 - d. STOP SET;
 - e. START RELAY SWITCH CLOSED.
3. Press **CLOCK SET** on the slave and enter a time, which is a minute or two ahead of the MASTER.



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4. Press **ENTER** and then connect the SYNC cable when less than one minute remains between **CLOCK SET** and the time shown on Master Unit. Display the master time by pressing **CLOCK SET** on the master.
5. Remove SYNC cable when the display shows some activity, such as a flashing colon, or **LOCh #**.
6. The slave is now resynched and may be returned to service.

NOTE: The above method may be used to synch the JR-1s one at a time, as needed. For example, if there were 6 JR-1s to be installed over a long distance by one individual. One JR-1 could be started and kept in the vehicle as a master. At each location, a single JR-1 could be started and installed using the above method.

Maintenance

A few routine maintenance steps will insure the maximum life for your JR-1.

- A. Maintain the battery in as near a fully charged state as possible;
- B. There is no requirement to observe polarity when interrupting DC.



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Repairs

With the exception of the battery and the relay, there are no field replaceable parts in the JR-1. No one other than qualified electronic technicians should attempt servicing the JR-1. Contact M. C. Miller Co., Inc. if a problem arises.

Relay Replacement

The relay used in the JR-1 is designed with two sets of contacts. Only one set is used at a time. Therefore, if one set becomes damaged or wears out, it is possible to reverse the relay to utilize the second set.

The following instructions describe the procedure for replacing a relay and for reversing one to make use of the spare contact set.

To replace a RELAY (see diagram at the end of this manual).

1. Carefully remove all wire connectors from the relay;
2. Remove the two 6-32 mounting screws and lift out the relay;
3. Install the new relay in accordance with the diagram. Be certain to position the relay so that the letters "**POS**" that is stamped on the frame is located as shown on the diagram.

Warning: When installing the terminal connectors, be very careful not to bend the relay frame inward. This can result in a shorted relay.



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To Reverse A Relay

See **Diagram B** at the end of this manual.

1. Carefully remove all wire connectors from the relay;
2. Remove the two 6-32 mounting screws and lift out the relay;
3. Rotate the relay 180 degrees. Be sure the spare contacts are located next to the terminal connectors;
4. Connect all wires as shown in the diagram.

Warning: When installing the terminal connectors, be very careful not to bend the relay frame inward. This can result in a shorted relay.

Low Battery Indication

When the battery has discharged to a factory-set level, a **LO BAT** indication will display in the upper left portion of the display window. Approximately two hours of operating time remains when the indicator displays.

Wall Plug-In Transformer

This JR-1 is supplied with a slide switch selectable input voltage of 120VAC or 240VAC, 50 or 60Hz. For safety, a thermal circuit breaker is built in. This will automatically reset when the JR-1 is cool. The output to the JR-1 charger receptacle is 12VDC at 1.25A.



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Note: The JR-1 and JR-2 RND battery chargers are **NOT** interchangeable. The JR-1 is an 8VAC charger for its 6VDC battery. The JR-2 RND is a 15VAC charger for its 12VDC battery.

Charging the Battery

Power for the JR-1 is furnished by a sealed lead acid gel-cell battery.

A unique charging circuit, designed to maximize battery life, will quickly return the battery to a state of full charge. The front panel indicator, displaying state-of-charge, will be **RED** during the fast charge stage. When 80% of battery capacity is attained, the charging indicator will turn **GREEN** through the float stage and remain **GREEN** for the trickle stage. Charging may take place during operation or storage, periodically, or on a continuous basis. If continuous charging during storage is performed, the circuit will automatically maintain a full charge, regardless of the temperature. Normal recharge times will be 3 -5 hours for fast charge and 2 -4 hours for float

Replacement Parts

Battery 6 Volt, AH MCM
Battery Charger, 9VDC @ 1.25A

Part # BAT600
Part # BAT595

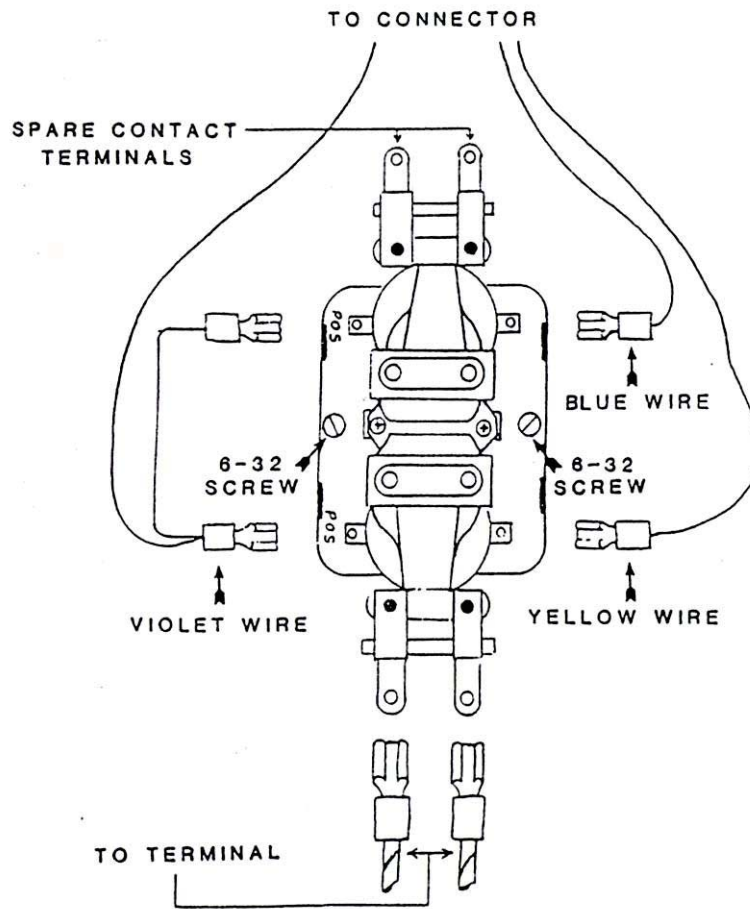


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Diagram A

REPLACE RELAY



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Diagram B

REVERSE RELAY

