

# CAUTION – ELECTRICALLY OPERATED PRODUCT

NOT RECOMMENDED FOR CHILDREN  
UNDER 12 YEARS OF AGE.

**AS WITH ALL ELECTRIC PRODUCTS,  
PRECAUTIONS SHOULD BE OBSERVED DURING  
HANDLING AND USE TO REDUCE THE RISK OF SHOCK.**

## ELECTRICAL SPECIFICATIONS:

INPUT 120VAC 60HZ

OUTPUT — MODE I - 0-20VDC, 16VAC

TOTAL OUTPUT 100VA

MODE II - 0-14VDC 80VA MAX, 16VAC

TOTAL OUTPUT 100VA

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## OPERATING INSTRUCTIONS FOR THE CONTROLMASTER 20

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**IMPORTANT! Please read the following instructions, warnings and directions carefully and completely before attempting operation of your train control!**

CONGRATULATIONS! You have just purchased one of the most advanced train controls on the market. MRC's new CONTROLMASTER 20 with a filtered and regulated DC output, WALKAROUND HAND HELD CONTROLLER with 15 feet of cable and high power output makes this pack the latest in train control technology. The CONTROLMASTER 20 is designed to fulfill the needs of G scale models as well as HO, N and other DC operated models. One of the most exciting features of the CONTROLMASTER 20 is its output waveform which is "FLATLINE DC." This train control uses a special circuit that provides slow speed operation without overheating the most delicate can motors, while still providing the power needed for larger scale locomotives.

The CONTROLMASTER 20 is provided with a WALKAROUND HAND HELD CONTROLLER that comes with a 15 foot coil cord for those who want convenience and total command of their layouts. The WALKAROUND features a unique brake system that can be operated easily by left or right handed operators. The supplied cord is a 4 conductor telephone cord with standard plugs that connect to modular jacks in both the hand held unit and the main console.

**PLEASE NOTE:** The CONTROLMASTER 20 is designed for use by experienced modelers and should not be used by children under 12 years of age. YOU and YOU ALONE are responsible for the safe operation of this train control and your layout.

# MAIN CONSOLE

## CONTROLS:

**POWER SWITCH:** The POWER ON-OFF switch disconnects the input power from your CONTROLMASTER 20 and shuts the unit down completely.

**NUDGE SWITCH:** The NUDGE switch in the ON position permits better low speed operation for your locomotive, such as in coupling or uncoupling cars during switching maneuvers. Keep the switch in the OFF position for mainline, medium to high speed operation of your locomotive.

**MODE SWITCH:** In the G SCALE (I) position, the CONTROLMASTER 20 will provide more track voltage for G scale locomotives. In the HO/N (II) SCALE position, the track voltage is lowered for the operation of HO or N scale locomotives. NOTE: Operating your G scale locomotive in the HO/N SCALE position will not damage your locomotive; however, the voltage will be low and this will affect the top speed or pulling power of the locomotive. For HO/N scale operation with the switch in the G SCALE position, at the lower THROTTLE settings, the output voltage is low (under 12 volts) which will not cause any damage to the locomotive. However, the higher THROTTLE settings in the G SCALE mode will cause HO/N scale locomotives to run faster due to the higher voltage. High voltage for HO/N scale locomotives can shorten the life of the motors and can cause damage. It is best to run your locomotive with the MODE SWITCH in the proper position that matches the scale of the locomotive.

## INDICATOR:

**POWER MONITOR:** The Light Emitting Diode (LED) provided on the main console is used to give an approximate indication of track output voltage. As the THROTTLE setting is increased, the brightness of the LED increases. As the THROTTLE setting is decreased, the brightness of the LED decreases. A slight flickering of this light during operation is normal and does not indicate a problem.

The POWER MONITOR also can indicate if a short circuit condition exists. If there is a short circuit condition in your track DC circuit, the LED will go out and then begin to blink. If there is a

short circuit condition in one of your AC accessories, the LED will go out and stay out until the short circuit condition is corrected. In either case, shut off your CONTROLMASTER 20 and correct the fault in your layout immediately.

### **TERMINALS:**

**CAUTION:** Never make any connections when the unit is on. Always shut the power switch off before attaching any wires to the terminals.

**CAUTION:** Use only 22 gauge or thicker wire for your connections. Any wire thinner than 22 gauge may burn under a short circuit condition.

**16VAC TERMINALS:** These two terminals are for use with AC accessories only; such as switch machine controls, lights, and an MRC Tech II Cab Control, etc. Hook up polarity does not matter.

**TRACK DC TERMINALS:** These terminals are for the attachment of your CONTROLMASTER 20 to the mainline of your layout. If the direction of your locomotive does not match the position of the DIRECTION switch, simply reverse the wiring going to these terminals. For BEST operation, the DIRECTION switch on the HAND HELD unit should be in the left side position for mainline control. In this position the internal relay control is in its normally closed position.

**METER HOOK UP TERMINALS:** These terminals are marked with numbers. Terminals numbered 1 and 2 are for a volt meter hook up. These terminals are labeled with a plus (+) sign and a minus (-) sign. Please observe polarity when connecting the volt meter to these terminals. The volt meter should have a range of at least 0 to 25 volts DC.

Terminals numbered 3 and 4 are for an ammeter hook up. These terminals are labeled with a plus (+) sign and a minus (-) sign. Please observe polarity when connecting the ammeter to these terminals. There is a shunt bar that connects these two terminals together. This shunt bar must be removed when you hook up your ammeter. It must be reconnected when no ammeter is connected to these terminals. If you are having problems with the output power, please check and make certain that this shunt bar is connecting these two terminals. The ammeter should have a range of at least 0 to 6 amps DC.

**SPECIAL IMPORTANT NOTE:** When connecting wires to any terminals, care must be taken that the wires do not touch more than one terminal at a time. Loose wires are a DANGER to your layout. Be certain that wires are properly wrapped around the terminal screws and that the screws are properly tightened. **Never make any connections when the unit is on! Always shut the power switch off before attaching any wires to the terminals.**

**Because of the high power in this unit, you must only use 22 gauge or thicker wire for any connection. Any wire that is thinner than 22 gauge may burn under a short circuit condition.**

**The Controlmaster 20 is equipped with automatic reset thermal protectors, a factory set current limiting circuit in the track DC circuit. Even with all of these safety features, care must be taken to avoid any short circuit condition.**

#### **CONTROLLER SOCKET:**

There is a standard modular telephone jack in the main console. This socket is for the connection of the coil cord cable from the WALKAROUND HAND HELD CONTROLLER. You will know when the plug is properly connected when you hear a distinct "click" sound, indicating that this plug is fully inserted into the jack. To remove it, simply depress the small plastic tab on the plug and pull it out.

### **OPERATING INSTRUCTIONS FOR THE WALKAROUND CONTROLLER**

The WALKAROUND HAND HELD CONTROLLER is light in weight and easy to use. As you operate your layout with the WALKAROUND unit, you will appreciate the convenience and quality design of this type of control.

The POWER switch on the CONTROL MASTER 20 console must be ON for the system to operate. The WALKAROUND CONTROLLER must be connected to the main console with the THROTTLE turned down to zero (0) and have the MOMENTUM and DIRECTION switches moved to the left position before you turn ON the main console.

**COIL CABLE:** This is the link between the main console and the HAND HELD CONTROLLER. The cable is equipped with standard

4 conductor telephone plugs that insert into the modular jacks located in the main console and the HAND HELD unit. If you wish to extend the length of the COIL CABLE, use only premium quality telephone extension cables for the best results. DO NOT EXCEED 40 FEET IN TOTAL LENGTH FOR THE CABLE; for example, the maximum length extension cable should be a 25 foot length used with the supplied 15 foot COIL CABLE (25' + 15' = 40'). A GREATER LENGTH OF CABLE THAN SPECIFIED MAY CAUSE THE WALKAROUND CONTROLLER TO MALFUNCTION.

### CONTROLS:

**THROTTLE CONTROL:** The THROTTLE is used to set the speed of the locomotive you are controlling. The response to changes in the THROTTLE setting is immediate only when the MOMENTUM switch is in the OFF position. Your locomotive will immediately accelerate to the speed dictated by the THROTTLE and will decrease immediately when the THROTTLE is turned down. Please read the paragraph on the MOMENTUM SWITCH on how this switch affects the operation of the THROTTLE.

**DIRECTION:** The DIRECTION switch reverses the polarity of the voltage applied to the track and thereby reverses the direction of your locomotive. THIS SWITCH SHOULD ONLY BE OPERATED WHEN THE LOCOMOTIVE IS NOT MOVING. If you operate this switch while the locomotive is moving, you could damage your locomotive and may do damage to the relay that is in your CONTROLMASTER 20 unit. This switch should be set to the left side position before turning the unit ON.

**MOMENTUM SWITCH:** The MOMENTUM switch in the WALKAROUND unit allows operation in either of two modes. With the switch in the OFF position, a change in the THROTTLE setting results in an immediate change in locomotive speed. With the MOMENTUM switch in the ON position, the locomotive moves slowly and gradually like a real locomotive. This switch will add substantially to your model railroading enjoyment. When a real locomotive is given an increase in the throttle setting, there is a lag until the preset speed is reached. The heavier the load of cars being drawn, the longer the lag time or delay. Similarly, when braking, a real locomotive needs considerable distance to stop. Since lightweight models do not mimic this delay on their own, momentum circuitry, as in this unit, is used to create it electrically.

The rate of acceleration is constant; the maximum speed reached is dependent on the THROTTLE position. However, deceleration, while also constant, can be speeded up by applying the BRAKE, as noted in the next paragraph.

**BRAKING:** The BRAKING function in the HAND HELD CONTROLLER is quite unique. There are two buttons that can be used for braking whether you are right or left handed. This makes it easy to use the BRAKE and very comfortable to operate. An operator can use either the thumb or index finger when controlling the BRAKE. The BRAKE will operate either with the MOMENTUM switch turned ON or OFF, but the locomotive will operate more realistically with the MOMENTUM turned ON. With the MOMENTUM turned OFF, the locomotive will gradually come to a stop if the BRAKE is constantly applied, but it will quickly accelerate to the speed set by the THROTTLE when the BRAKE is released. To protect your locomotive, you should turn the THROTTLE down to zero (0) when braking with the MOMENTUM switch turned OFF. For realistic deceleration of a locomotive, have the MOMENTUM switch turned ON and constantly apply the BRAKE.

**INDICATOR:** The WALKAROUND unit is equipped with a Light Emitting Diode (LED) indicator to make you aware of when the MOMENTUM switch is in the ON position. The green LED will glow whenever MOMENTUM is engaged, even if the locomotive is not moving, assuming that the WALKAROUND is connected to the main console.

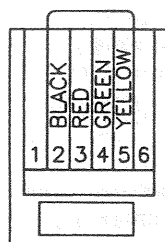
**MEMORY CONTROL:** The main console circuitry in conjunction with the WALKAROUND CONTROLLER incorporates a memory circuit. This operates when you are controlling a locomotive on your layout and you disconnect the coil cord plug from either the main console or the CONTROLLER. The locomotive will remain running at the rate of speed when the cord was unplugged. This becomes extremely useful when you have installed several modular jacks around your layout. You can operate your locomotive from one section of your layout, disconnect and reconnect at a different point, and still maintain the layout in operation. For example, this type of control becomes extremely helpful when you have loco derailments. Normally you would have to shut down your layout and go to the location of the derailment, rerailed the loco and cars, and then return to the main console to turn the unit back ON, only to find out that the loco, cars, etc. are still not rerailed properly.

With this CONTROLLER and its modular jack system, you can wire several of these modular jacks around your layout. Now when a loco derails, you simply turn down your throttle, disconnect the plug, go to the derailment point, reconnect your CONTROLLER with its 15 foot cord into the closest jack, and reset your loco, cars, etc. Before you leave you can turn ON your CONTROLLER and determine if you have properly rerailed the train. This is a time saver.

NOTE: if you add extra sockets to your layout, you must maintain the same wiring scheme, otherwise the WALKAROUND CONTROLLER will fail to operate properly.

### WIRING DIAGRAM

When wiring 6 position Modular line cord sockets for use in your layout, please follow the diagram for proper operation.



### PARENTS' NOTE:

Parents, please note: As with any electrically operated unit, it is always best to periodically examine it and have repaired or replaced any potentially hazardous part. This product is not recommended for children under 12 years of age. SAFETY FIRST — Exercise common sense when using any product that plugs into a wall outlet.

NOTE: You must save the original carton for possible future use. Because the CONTROLMASTER 20 unit weights over 8¼ pounds, **YOU MUST ADEQUATELY PACKAGE THIS UNIT IF YOU HAVE TO RETURN IT FOR SERVICE. THIS IS A REQUIREMENT FOR WARRANTY SERVICE.** Place this unit back into its original carton and then into an outer carton with a minimum of three (3) inches of packing material all around. **PACKAGE THE UNIT CAREFULLY.** This should minimize the risk of damage to your CONTROLMASTER 20 unit.

## **FOR YOUR PROTECTION**

1. Never reverse a locomotive without stopping it first. To do so may damage the locomotive engine.
2. Never connect a DC locomotive to the AC terminals of your CONTROLMASTER 20. This may damage your locomotive motor.
3. Turn the power switch off at the end of a day's operation.
4. Use only 22 gauge or thicker wire for hookup to your CONTROLMASTER 20. Any hookup wire that is thinner than 22 gauge may burn under a short circuit condition.
5. When a short circuit or overload occurs, turn the CONTROLMASTER 20 off and correct the short or overload. Allow 2 to 5 minutes for the protection devices to reset before turning your unit back on.
6. Avoid prolonged overloads and short circuits. While your CONTROLMASTER 20 is equipped with several safety devices to prevent accidental damage due to short circuits and overloads, it is unwise to subject it to these frequently.
7. Do not store the unit in a damp area.
8. When mounting the main console, allow at least 4 inches of free air space around each vent for proper ventilation. Do not allow moisture, loose objects, or pointed objects to enter the vents.
9. For the best performance, keep wheel and track surfaces clean. Intermittent and jerky operation is often caused by an oxide coating which has formed on the track or wheels.
10. Before returning your unit for repair, make certain it is defective. Do not shut down your layout unnecessarily.
11. If it is necessary to return your unit, repack it in its original carton and then in an outer carton, place at least 3 inches of packing material on each side, send the unit to:

**MODEL RECTIFIER CORPORATION**  
**80 NEWFIELD AVENUE • EDISON, NJ 08837**

BE CERTAIN TO SEND THE UNIT BY PARCEL POST OR UNITED PARCEL SERVICE, INSURED AND INCLUDE A LETTER WITH YOUR NAME AND ADDRESS PRINTED CLEARLY, DESCRIBING THE PROBLEM THAT YOU ARE EXPERIENCING.

All of us at MRC would like to wish you many happy years of model railroading with your CONTROLMASTER 20.

MODEL RECTIFIER CORPORATION  
PRINTED IN THE U.S.A.

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INS-2265