



**Kintronic Laboratories Inc.
RMC-1LR Main / Auxiliary / Dummy Load Controller
Manual**

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**Kintronic Laboratories Inc.
RMC-1LR Controller**

GENERAL DESCRIPTION

The features of Kintronic Lab's RMC-1LR Programmable Logic Controller (PLC)-based controller are described in this manual. Documentation of the logic and interconnection wiring for the controller is supplied with the unit and should be referenced for the specific details and features. This document is intended to provide a general description of the controller's operation.

The controller provides the command, status and interlock functions required by the RF contactor for switching either of the transmitters to the antenna or dummy load.

TECHNICAL SPECIFICATIONS

AC Power Required: 80VAC to 240VAC

Size: 19"W x 18"D (Including Connectors) x 5-1/4"H (3 Rack Units)

Paint Scheme: Kintronic Labs Black

Weight: Approximately ___16___ lbs.

OPERATION INSTRUCTIONS

RMC-1LR Controller

A. General Operation

1. Mode Selection

The on-air transmitter is selected locally by the depression of a front panel illuminated pushbutton switch or remotely by the application of a momentary dry closure or a ground to the appropriate pins on connector TB1. e.g. Transmitter #1 is Pins “A” and “B”. The controller responds with a status dry closure (TB1) to verify the selected transmitter. The dry closures indicate the completion of the interlock circuit for the selected mode. Following the selection of the transmitter, the LED in the corresponding pushbutton switch will illuminate if the interlocks are complete. If a RF contactor does not switch to the required position, the interlock will be broken and the corresponding pushbutton and status lights will not be illuminated.

2. Failsafe Switching

The control system is designed to temporarily mute the transmitters and permit RF contactor switching only when the transmitter RF is turned off to prevent damage to the RF switch contacts. The sequence of operation is as follows for the case of Main Transmitter selection: Selecting the Main Transmitter energizes input %I0.0 (MAIN_R_P_SELECT) resulting in (1) latching coil %M5 (MAIN_AUX_LATCHING) being set which opens the previous interlock circuit, and (2) energizes %M17 (MAIN_BUTTON_PUSHED). NOTE – The “%” is the PLC memory designation, with %I – Input Bit, %M – Memory Bit, %Q – Output Bit. Please refer to the PLC documentation for further information. Energizing %M17 also initiates the timing function %TM1 (KK4), which energizes coil %M4 (KK4_ON) for a preset period. This time delay function begins its timing interval as soon as the command is withdrawn and limits the duration that AC is applied to the contactor solenoids. The time base for this timer is 10 milliseconds. A typical setting for this timer to prevent solenoid burnout is 150 (1.5 seconds). When the interlock circuit is opened, the transmitter enable Outputs (relays), %Q0.0 (MAIN_TX_ENABLE) and %Q0.1 (AUX_TX_ENABLE) are simultaneously de-energized. This mutes the RF for all transmitters via the normally open or closed contacts on TB2 and results in the initiation of the timing function %TM0 (KK3). KK3 begins its timing interval as soon as it is initiated, and energizes coil %M3 (KK3_ON) after a preset time and until %Q0.0 or %Q0.1 is energized. The time base for this timer is 10 milliseconds. A typical setting for this timer is 100 (1 seconds). %M3 and %M4 being energized along with %M5 latching being set results in the energizing of output %Q0.4 (MAIN_SELECT) for the remainder of time interval of KK4. Switching will not occur until %M3 is energized. The resulting delay allows transmitters to have time to dissipate RF energy in the time between when a switch command is issued and when switching actually occurs.

This system can use slave relays or directly apply AC voltage to the contactor.

Slave Panel Operation. The switching ground %Q0.4 (MAIN_SELECT) or %Q0.5 (AUX_SELECT) is applied to the slave panel at the contactor location. The slave relays in turn apply the AC voltage to the appropriate solenoids for the transmitter selected.

Direct Drive Operation. The switching ground %Q0.4 (MAIN_SELECT) or %Q0.5 (AUX_SELECT) is applied to the switching relays of either Main (KK9) or Auxiliary (KK10) transmitter, depending on which has been selected. Then the switching relays apply AC voltage directly to the contactor.

It should be noted that as soon as timing function %TM1 (KK4) times out, the AC voltage is removed from the RF contactor solenoids in order to protect the solenoids from damage in the event of a mechanical failure. Under normal operation this provides secondary protection, as the

microswitches on each contactor remove the AC voltage from that contactor's active solenoid as soon as the contactor is in position.

3. Status and Interlock

The status of the RF contactor is determined by feedback from the contactor microswitches. The microswitch for each contactor position controls an input on the PLC. See Appendix B for PLC I/O addresses and description. The contactor microswitches also control the front panel LED status lights. The interlock string can be seen in the Twidosoft program Documentation. Main Transmitter interlock is implemented in Rungs 9 (for Dummy Load) and 10 (For Antenna). Auxiliary Transmitter interlock is implemented in Rungs 11 (For Dummy Load) and 12 (For Antenna).

The following example is for the case of Transmitter #1 enabled to the Antenna. Rung 10 of the PLC ladder logic processes the Main Transmitter to Antenna Interlock String Complete. The interlock string consists of a normally open contact of %I0.5 (CABINET_INTERLOCK), a normally open contact of %I0.3 (K1_MAIN) and a normally open contact of %M5 (MAIN_AUX_LATCHING). If all conditions are satisfied then the output %Q0.0 (MAIN_TX_ENABLE) and coil %M27 (MAIN_TO_ANT_ON) are energized. This completes the Main Transmitter to Antenna interlock string. The interlock process is similar for the Aux Transmitter to Antenna mode.

4. Timer Adjustment

The Operator Display on top of the PLC unit is used to adjust the timers %TM0 (KK3) and %TM1 (KK4). Figure 1 shows how the operator display looks during normal operation. The following example is for adjusting timer %TM1 (KK4). Depressing the Right Arrow button changes the



Figure 1



Figure 2



Figure 3

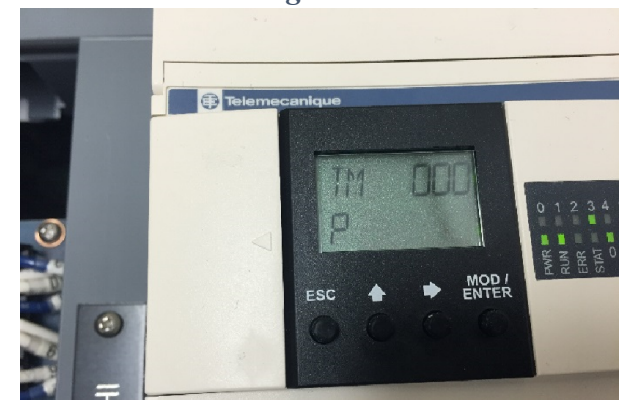


Figure 4

display to look like figure 2. Then press the MOD/ENTER button. The “I” will start flashing. Next press the Up Arrow button until the display shows Figure 3. Press the Right Arrow to move the cursor the letter “V”. Then press the Up Arrow until the letter “P” is displayed (Figure 4). Next

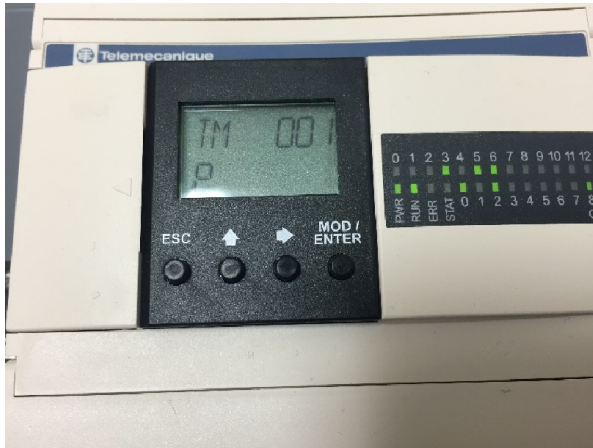


Figure 5

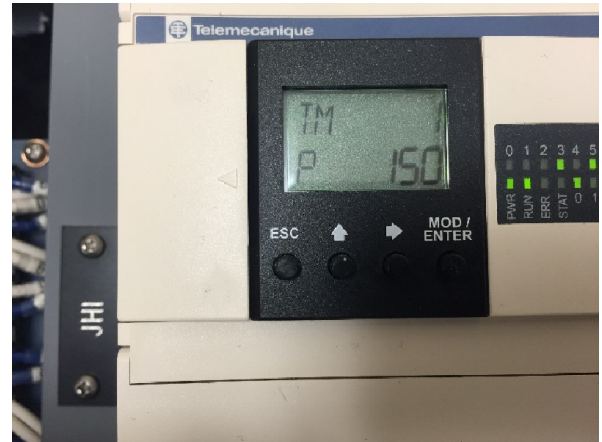


Figure 6

press the Right Arrow until the third “0” is flashing. Press the Up Arrow to change this to a “1” (Figure 5). Press the MOD/ENTER button to select this timer. The display will look like Figure 6. The time base for the timers is 10 milliseconds. A typical setting for timer %TM1 to prevent solenoid burnout is 150 (1.5 seconds). To adjust the timer preset, press the MOD/ENTER button. Then use the Right Arrow to move the cursor to the appropriate digit. Next use the Up Arrow to adjust the time setting. When you have adjusted the timer, Press the MOD/ENTER button to complete the change.

5. Additional Features

A two-position, key-operated, interlock-bypass switch is supplied to permit the off-air transmitters to be operated into the dummy load. There are 4 front panel LEDs (2 green and 2 red) which show which transmitter is connected to the antenna and to the dummy load. A white LED shows if the dummy load is ready of operation (air flow interlock enabled). The dummy load Air or Water Interlock is connected to provide a closure across terminal block TB2 pins 11 and 12. This is shown on the drawing as the AIR INTERLOCK. A jumper should be placed in this location if no air or water interlock is available. When the dummy load LED is on, turn the key switch to the ON position will energize the off-air transmitter into the dummy load and light the transmitter pushbutton.

B. Electrical Interconnection

Controller AC power is applied to the controller via a male AC outlet with switch wired to TB-AC (See DWG 12057-CNTL-01). This controller has an AC voltage range of 80 to 240 VAC. If the system is used for direct drive operation, the AC voltage needs to be the same as the contactor operation voltage. If the system uses slave relays, AC power is also required to be supplied directly to the slave panels at the contactor locations.

The controller to contactor interconnection depends on contactor operation (Direct Drive or Slave Panel), and the terminal strips are sequentially labeled. The interconnection is made between TB1A to TB1B (See DWG 12057-CNTL-01). Wire according to drawing 12057-CNTL-01 and Table 1.

TABLE 1.

Slave Panel		Direct Drive	
TB1A	TB1B	TB1A	TB1B
Pin B	Pin 9	Pin A	Pin 7
Pin C	Pin 1	Pin B	Pin 6
Pin D	Pin 3	Pin F	Pin 3
Pin E	Pin 4	Pin H	Pin 4
Pin I	Pin 8	Pin J	Pin 5
Pin K	Pin 2	Pin K	Pin 2
		Pin L	Pin 1

That concludes our general description of the PLC controller operation. Please refer to the Electrical Schematics and PLC Documentation for more information. If you have any questions or comments please feel free to contact us. Thank You.

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APPENDIX

A. Electrical Schematics

1. 12057-CNTL-01 Wiring Schematic

B. Twidosoft PLC Program Documentation

Note: CD includes pdf files of everything in this manual