



Redkoh Industries

**MICROPROCESSOR RAPPER CONTROL
MODEL MRC-NT**

TROUBLESHOOTING GUIDE

The following troubleshooting instructions are based on controls that have been installed correctly and have operated properly for some period of time.

If you are having problems while installing the control, upon initial operation, or if you have followed all the troubleshooting procedures and are still having a problem, please us at 908-874-5588.

ALARM DEFINITIONS AND DESCRIPTIONS

If an alarm message appears in the display, either a malfunction has occurred, or the control is being operated in other than a normal manner.

A rapper is automatically disabled when the control senses improper levels of current. A rapper is disabled the second consecutive time the fault occurs. This prevents a rapper from being disabled due to electrical noise.

Whenever a failure is associated with an individual rapper, the device is automatically disabled from the control. Repetitive alarms will not occur because the logic circuit will not call for the disabled device to be energized. The control will continue to operate as programmed for all the remaining devices.

A device may be placed back in operation by using the ENABLE key (follow instructions in operating manual). If the problem associated with the device is still present, the control will re-alarm after the device has been energized twice.

By pressing the Alarm Check Key the number of the disabled device(s) is displayed. Repetitive keying of the Alarm Check key will cause alarmed devices to be displayed, one at a time, in sequential order. The alarm messages are as follows:

Low Level Alarm - Open Rapper Coil or Line

Medium Level Alarm - 2 Rappers Firing due to Shorted Output

High Level Alarm - Shorted Rapper Coil or field wiring

Sequence Mode -The control has been programmed to operate in the Sequence mode.

Repeat Mode - The control has been programmed to operate in the Repeat mode.

Communications Error - Communications error has occurred between the Keypad & Display Unit and the Power Board.

RAPPER ALARM TROUBLE SHOOTING PROCEDURES

Rapper alarms are determined by monitoring the voltage across the current sensing resistors located on the rapper power module. When a rapper fires, the rapper power board measures the voltage across this resistor. Depending on this voltage the rapper control will perform one of the following operations.

Normal operation

If the voltage across the current monitoring resistor is acceptable, the control will allow the rapper to fire.

Low Level Alarm

When a rapper fires and there is less than the normal voltage (note: This voltage signal is only 167 ms long. It is necessary to use an oscilloscope to measure the peak-to-peak value across the current sensing resistor.) the control will store this specific device ID in memory. When this device ID comes due to energize again the control will again monitor the voltage across the current sensing resistor. If this voltage has remained below the normal voltage, the control will display a Low Level Alarm. If the voltage is acceptable during the second energization, then the control will erase this ID from memory and continue on.

Items that can cause Low Level Alarms are:

1. All or almost all rappers have Low Level alarmed.

Blown control fuses or a failed Power Module or Power Board. To determine which has failed, you will need to monitor the fire LED on the Power Board. If this fire LED blinks when the control tries to fire a device then the Power Board is functioning properly. You should next check the fuses and supply transformer associated with the power system in question. If all these items check out OK, then replace the associated Power Module.

2. One or few devices have Low Level alarmed.

At the control field wiring terminal points, and with the control power off, check for resistance between the common return and the devices in question. Depending on the manufacturer of the rapper and the field wiring resistance, this resistance should be approximately 4.0 ohms. If the circuit is open, then check for this resistance at the rapper assembly. This will verify if the device is open, or the field wiring is open.

If device and field wiring checks verify that everything is OK, replace the Output Board(s) associated with the failed device(s).

Medium Level Alarm

When a device energizes and the voltage across the current sensing resistor is more than the normal voltage but less than High Level Alarm voltage, for two consecutive energization attempts, the rapper control will display a Medium Level Alarm and will take this device out of service. During the first two attempts to fire a device under this condition, the control will only fire for 4 half cycles. This is to protect the components of the control from high current. After correcting the alarm condition an operator must clear the alarm (see operation manual).

Items that can cause Medium Level Alarms are:

1. Two devices firing at one time.

This is the result of a shorted steering SCR/triac on one or more Output Boards. This sometimes can be difficult to trouble shoot. First clear all alarms. Then enable the Sequence All function of the rapper control. Allow the rapper control to sequence through the entire program twice. After the control has sequenced through twice you should find that all the devices except one has a Medium Level Alarm (use the Alarm Check key to show alarmed devices). The device that has not shown a Medium Level Alarm is located on the defective output board. This is because the shorted steering SCR/triac is firing this device whenever any other device fires. Thus causing the control to think the other devices are shorted. But when the device with the shorted steering SCR/triac is due to fire, it fires by itself thus not drawing excessive current.

2. Excessive electrical noise.

This is generally associated with random Medium Level Alarms. Poor or no grounding of rapper rods and rapper housings can cause electrical noise to travel from the precipitator thru the rapper coil and into the control. This noise fools the control by raising the voltage across the current sensing resistor to alarm levels. Just one poor ground can cause this condition, so it's very important to check all grounds and replace or repair any that are defective.

High Level Alarm

This condition is similar to a Medium Level Alarm but is the result of the voltage across the current sensing resistor exceeding the Medium Level Alarm voltage. When this condition is present the control will only fire for 1 half cycle. This is to protect the components from excessive current.

Items that can cause High Level Alarms are:

1. Shorted Rapper Coil.

Check the resistance of the rapper coil in question and compare it to the manufacturer's specification. Remember to allow for filed wiring resistance when measuring at the control cabinet.

Communications Error

Problem: Loss of communication between Keypad And Display Unit and Power Board.

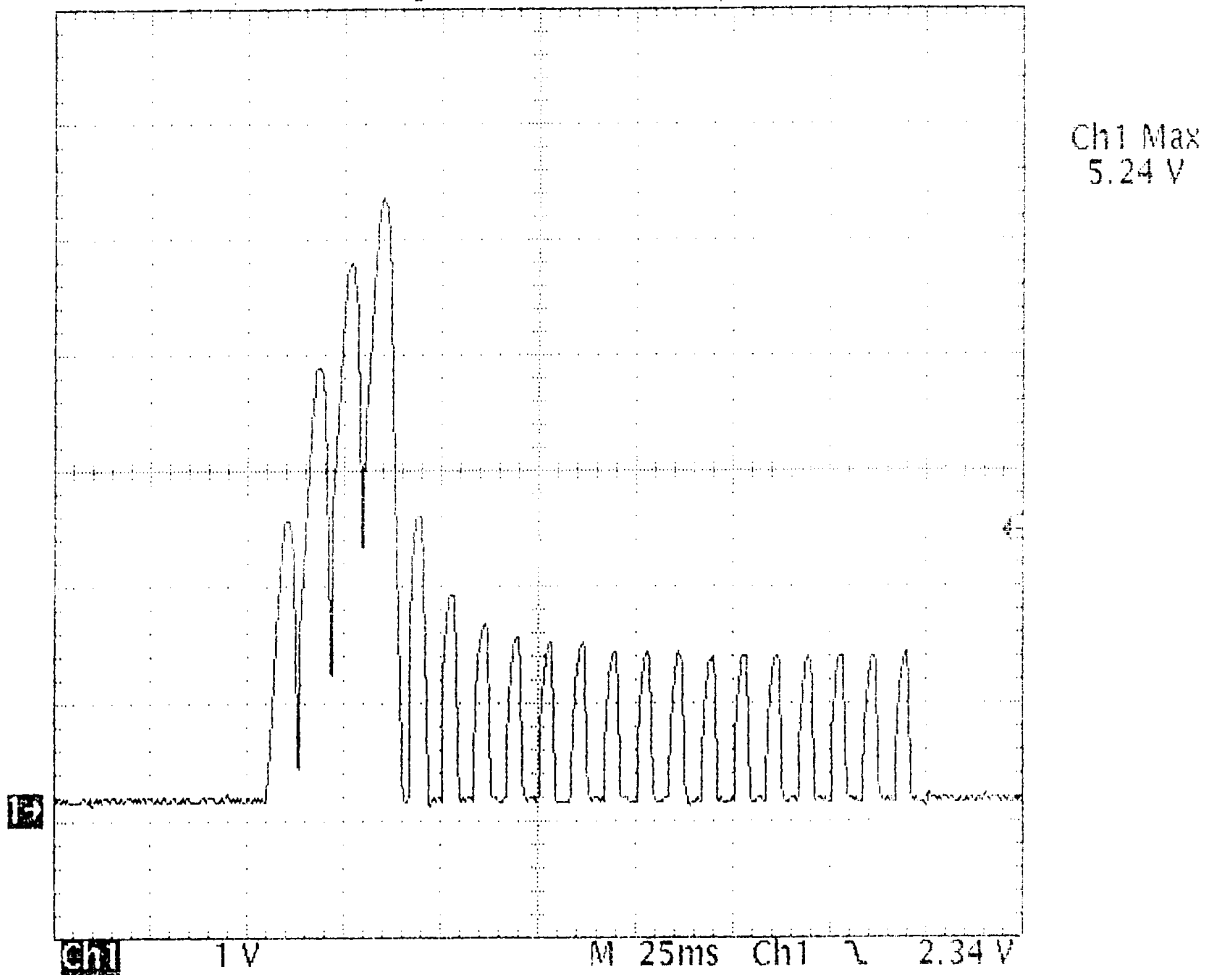
Items that can cause Communication alarm are:

1. Improper connection of communication cable at either end.
2. Damaged communication cable.
3. ID switch on the Power Board is set incorrectly.
3. Defective Power Board.
4. Defective Keypad And Display Unit.

Waveforms

The oscilloscope waveforms shown on the next four pages show the voltage waveform across the current sensing resistor for normal and abnormal control operating conditions. Use them as a guide in troubleshooting the control.

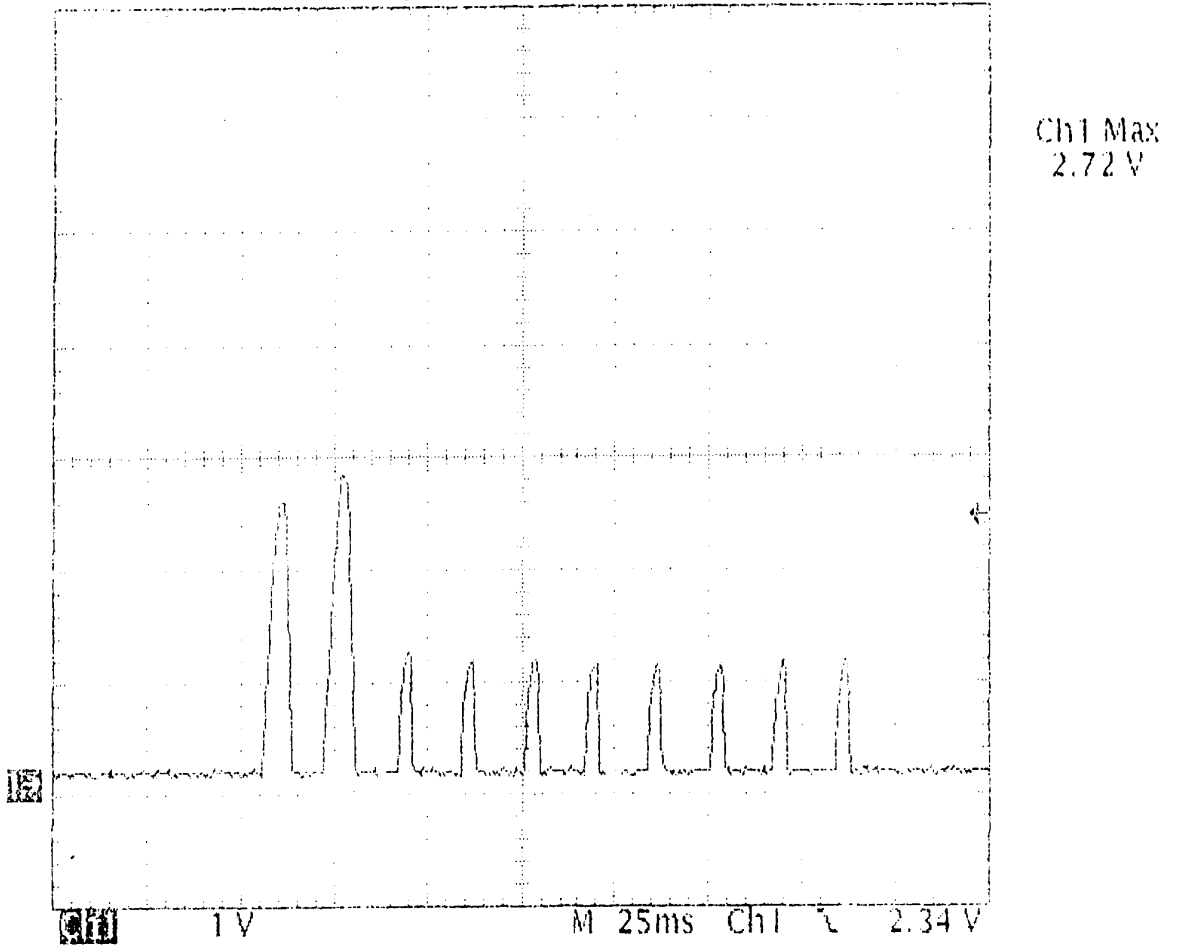
Normal Operation Waveform



Vertical = 1 volt/division Horizontal = 5 ms/division

Oscilloscope waveform obtained across the current sensing resistor on the Power Module showing normal and proper rapper energization.

Half Wave Operation

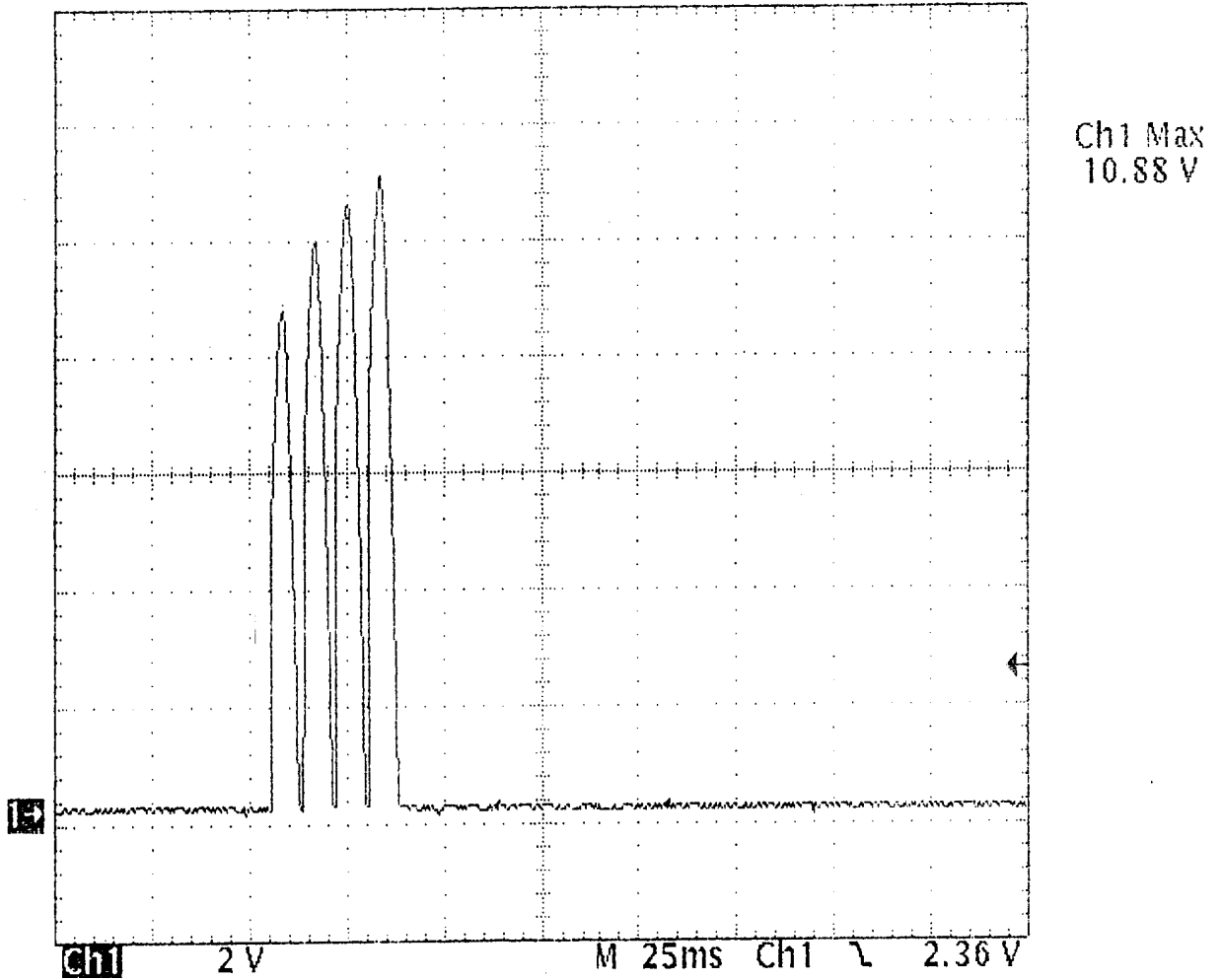


Vertical = 1 volt/division

Horizontal = 5 ms/division

Oscilloscope waveform obtained across the current sensing resistor on the Power Module showing one SCR not firing or a blown fuse.

Medium Level Alarm

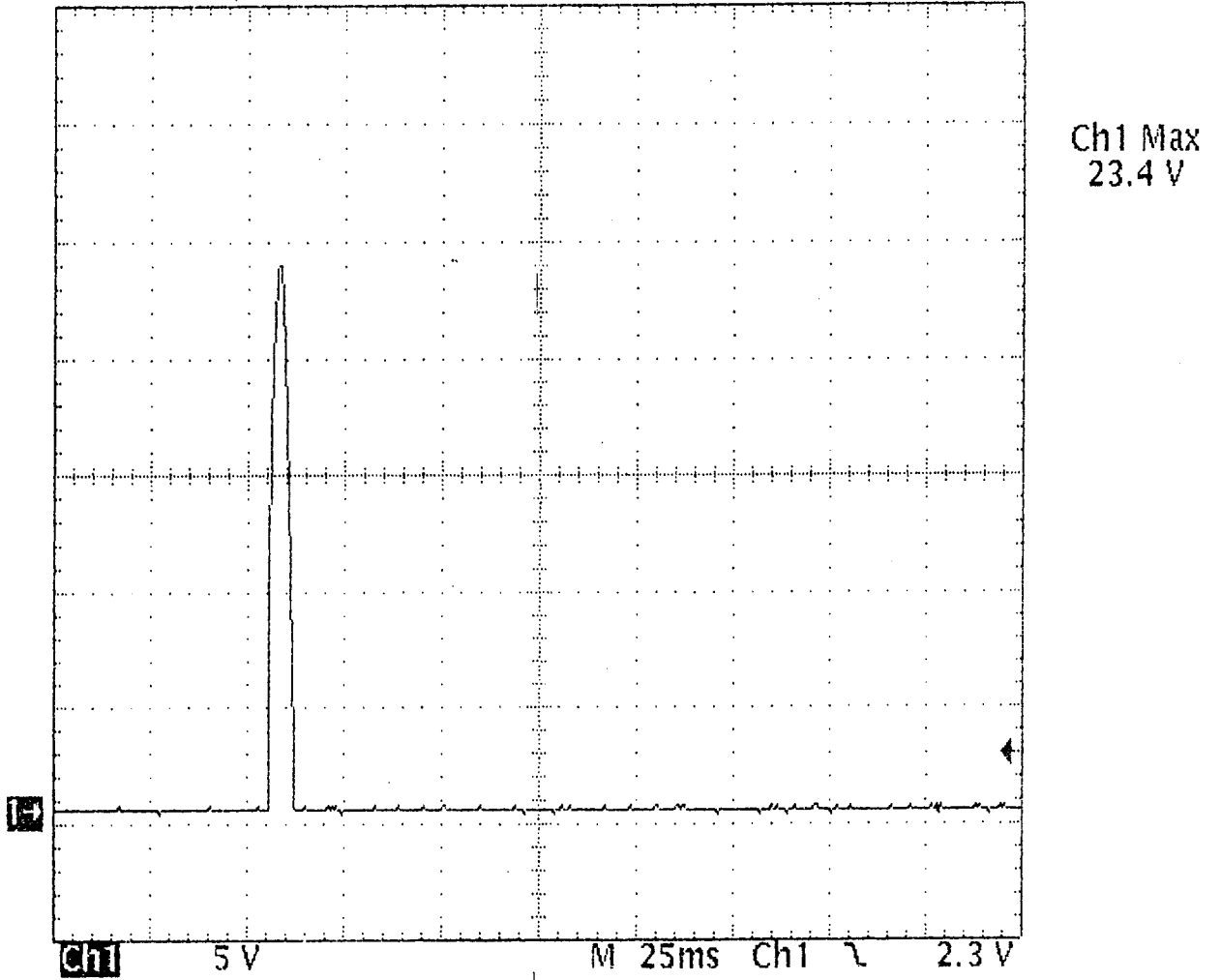


Vertical = 1 volt/division

Horizontal = 5 ms/division

Oscilloscope waveform obtained across the current sensing resistor on the Power Module showing two rappers firing at the same time.

High Level Alarm



Vertical = 1 volt/division

Horizontal = 5 ms/division

Oscilloscope waveform obtained across the current sensing resistor on the Power Module showing an High Level Alarm (electrical short) condition.