MOORE INDUSTRIES

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USER'S MANUAL

RLM

Redundant Link Module

February 1990

Table of Contents

Introduction

This manual contains user information for the configuration and installation of Moore Industries' Redundant Link Module (RLM). Also contained in this manual are supportive tables and illustrations, as well as a functional description of the RLM. This manual has been prepared to provide adequate technical information for users of the RLM. If additional technical assistance is required, we recommend the user contact Moore Industries' Customer Service Department.

Description

The RLM is an electronically-controlled switch that automatically backs-up the RS-485 communication link, used by Moore Industries' Cable Concentrator System (CCS). The RLM automatically switches from a primary, to a secondary link when a communication link fault occurs on a CCS® module. Two RLM's are required for a single CCS; one for the input module (IMM) and one for the output module (OMM). Multiple IMM's and OMM's may be connected through a single pair of RLM's. The RLM interfaces RS-485 data over cable lengths of up to two miles.

When a fault occurs in the RS-485 communication link, the fault relay in the CCS changes to either an open- or closed-contact state. This contact state is present at the FAULT terminals on the front of the CCS. If, and only if, the CCS is configured to output an open-contact state when a communication link fault occurs, the RLM will switch from the primary to the secondary link. Switching links may be initiated by either RLM in a system. Once the secondary link has been selected, the RLM's latch to it until the modules are reset.

Each RLM has a RESET pushbutton located on the front panel. Pressing the RESET button momentarily, on either RLM, resets both the RLM's to the primary link.

To press the reset pushbutton requires a pointed object, i.e., pencil, pen, paperclip end, small screwdriver, etc. A green or a red LED on the front panel of each RLM indicates which link is in use: green for primary or red for secondary.

Pressing the RESET pushbutton while the secondary link is used, or applying power to the RLM, switches the communication line from the secondary to the primary link. For the next 60 seconds, it ignores the condition of the CCS fault signal. This 60-second delay allows the CCS time to establish communication on the primary link. If communication has not been established on the primary link within 60 seconds, the CCS generates a fault and the RLM automatically switches to the secondary link. Pressing the RESET pushbutton when communication is through the primary link will only activate the 60-second inhibit timer at that particular RLM and will not disrupt communication. If power is removed from the RLM, the secondary link is used to maintain the RS-485 communication link.

Two jumper-selectable options are available with the RLM. The user may select which type contact state represents a fault condition and which represents the link currently in use. These two contact states are present at terminals on the front panel of the RLM. Using internal solderless jumpers, the user can set the state to be normally open or normally closed for either of these functions. These contact states may be used externally for remote indications.

The RLM is packaged in an all-aluminum DIN-style housing that is similar to an IMM or an OMM. Like the CCS, the RLM also snaps directly onto standard DIN rails. This packaging allows the RLM to be mounted adjacent to the CCS.

Table 1 contains the equipment specifications for the RLM.

RLM

Table 1. *RLM Equipment Specifications*

Characteristic	Specification
Input/Output Terminals	Two 4-terminal interface connections for Primary and Secondary Links, includes shield tie-points and chassis ground. One 2-terminal interface connection for CCS Comm Link
Power Requirements	18-30 Vdc or 24 Vac +10%/–20%, 50/60 Hz, 3.5 watts typical. **Current Consumption:** 150 mA maximum at 24VDC.
Contact Ratings	**Cable:** 250 mA, 24 Vdc maximum (resistive) **Fault Output:** 0.5 A, 115 Vac; or 1 A, 24 Vdc (resistive)
Operating Temperature	32 to 158 °F (0 to 70 °C)
Performance	**Operating Temperature Range (Ambient):** 0 to 70°C (32 to 158°F) **Isolation:** Galvanic isolation between Power, Comm lines, CCS Fault line, Fault Status and Pri/Sec Status.
Weight	1 lb. 7oz. (652 grams)
Housing	**DIN:** Aluminum DIN-style rail-mount housing snaps onto a standard G-type DIN rail.

Configuration Options

The RLM can be field configured to provide two local contact states. Both these conditions are supplied to terminals on the front panel of the RLM. Internal solderless jumpers are used to determine whether a normally-open or normally-closed relay contact state is present at the designated terminals. One of the jumper-selectable functions is the fault contact output (FAULT) of the RLM. The state of the FAULT terminals on the RLM is directly affected by the fault condition provided by the CCS. The other function (STAT) indicates which link is currently in use by providing either an open- or closed-contact state.

The contact state present at the FAULT and STAT terminals on the RLM are selected using jumpers J1, J2, J3, and J4. J1 or J2 is used to set the state of the FAULT terminals, and J3 or J4 is used to set the state of the STAT terminals. Figure 1 shows the location of these jumpers. To access the jumpers, the right-side panel of the RLM must be removed. A Phillips-head screwdriver is required to remove this panel.

The CCS must be configured to provide an open-contact condition to the RLM when a communication link fault occurs (*set J201 in CCS*). The open-contact condition activates the fault relay in the RLM, causing it to de-energize. If a fault occurs with J1 set, the FAULT terminals on the RLM are normally open (NO). With J1 set, when no fault condition exists, the FAULT terminals are normally closed (NC). If J2 is set, the FAULT terminals are normally open (NO). If a fault occurs with J2 set, the FAULT terminals change to normally closed (NC).

The state of the STAT terminals can be either normally open or normally closed by setting J3 or J4. Either state may be used for remote indication of the link currently in use. If J3 is set, a closed-contact state exists when the primary link is in use. If the links switch, the STAT terminals change to an open-contact state. If J4 is set, an open-contact state exists when the primary link is in use. If the links switch, with J4 set, the STAT terminals change to a closed-contact state.
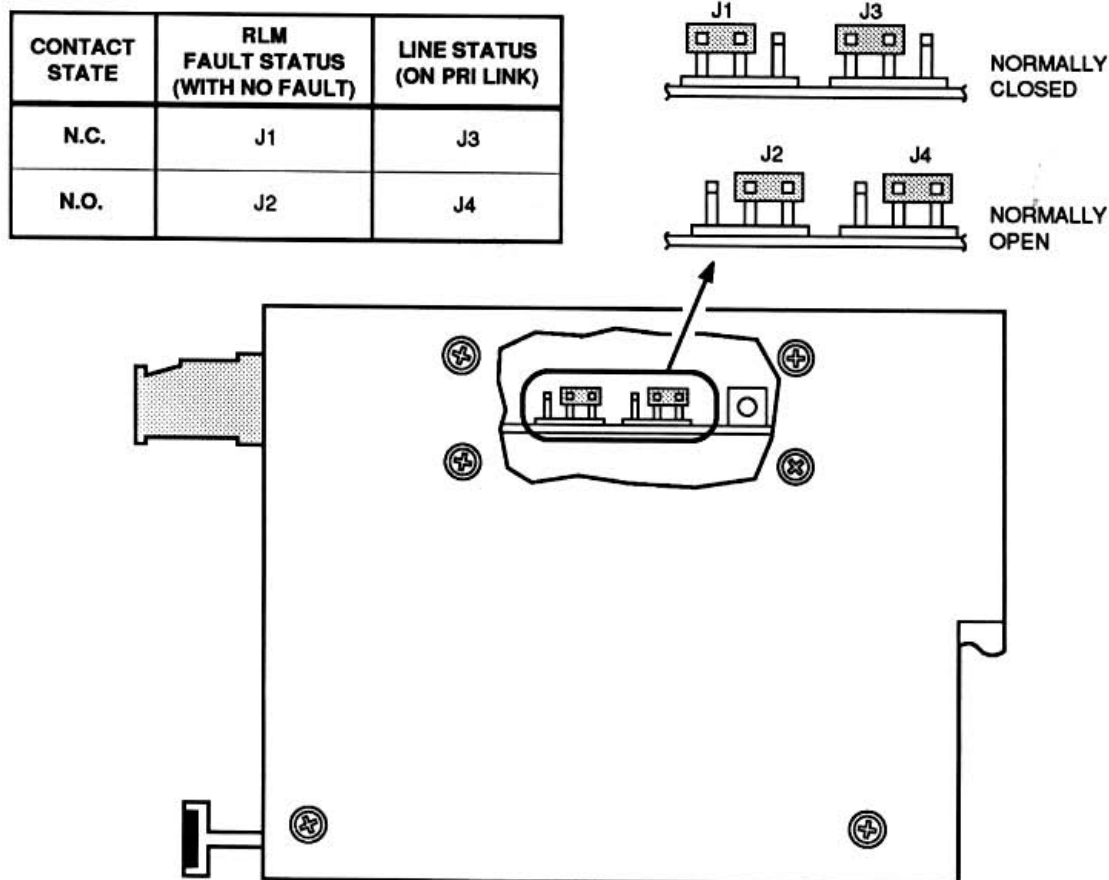
CONTACT STATE	RLM FAULT STATUS (WITH NO FAULT)	LINE STATUS (ON PRI LINK)
N.C.	J1	J3
N.O.	J2	J4

J1   J3

NORMALLY CLOSED

J2   J4

NORMALLY OPEN

Figure 1. *Jumper Locations*

Bench Check

The RLM can be bench checked using a 24 Vdc power source, an ohmmeter, and a jumper wire. The jumper wire is used to buss the RLM's CCS terminals together to prevent the RLM from seeing a fault condition. The ohmmeter is used to check continuity between various terminals on the RLM.

With no power applied to the module, continuity should exist between the COMM terminals (A and B) and the secondary link terminals (A and B). An open condition should exist between the COMM terminals and the primary link terminals (A and B). When power is applied, continuity should exist between the COMM terminals (A and B) and the primary link terminals (A and B); an open condition should exist between the COMM terminals and the secondary link terminals, and the green LED should be illuminated. After 60 seconds with power applied, the RLM switches to the secondary link. The red LED on the front of the module illuminates indicating the secondary link is in use.

RLM

The FAULT terminals on the RLM indicate when a fault is present on the CCS. The contact state of these terminals is set by J1 or J2, and changes when a communication link fault occurs. Placing an ohmmeter across the FAULT terminals indicates when continuity exists. With no fault detected, J1 makes the state of these terminals normally closed and J2 makes them normally open.

The CCS (fault-contact) terminals on the RLM must be closed for the RLM to remain on the primary link after being reset. Bussing these two terminals together allows the RLM to remain on the primary link after the 60-second delay. The green LED on the front panel of the RLM remains illuminated as long as the Primary Link is in use. When the jumper wire is removed from the CCS terminals after the 60-second delay, the RLM responds to the fault condition by switching immediately to the secondary link and illuminating the red LED.

Pressing the RESET pushbutton, or removing and reapplying power, causes the RLM to try establishing communications on the primary link. If the CCS terminals on the RLM are bussed together, the RLM remains on the primary link and the green LED is illuminated. If the jumper wire is removed after the 60-second delay, the

RLM switches immediately to the secondary link, and the red LED illuminates. Using an ohmmeter, a change is also seen across the STAT terminals. The contact state at the STAT terminals changes when the links change. The contact state of these terminals is set by J3 or J4, and changes when a communication link fault occurs. Placing an ohmmeter across the STAT terminals indicates when continuity exists. With the RLM on primary, J3 makes the state of these terminals normally closed and J4 makes them normally open.

Installation

Installation of the RLM is divided into two phases: mounting and electrical connections.

Mounting. The RLM is packaged in an all-aluminum DIN-style housing that snaps directly onto standard DIN rails. Figure 2 shows the mounting dimensions of the RLM. The RLM should be mounted in close proximity to the corresponding CCS module. The area in which the RLM is mounted should be free from excessive dust, moisture, and corrosive elements.
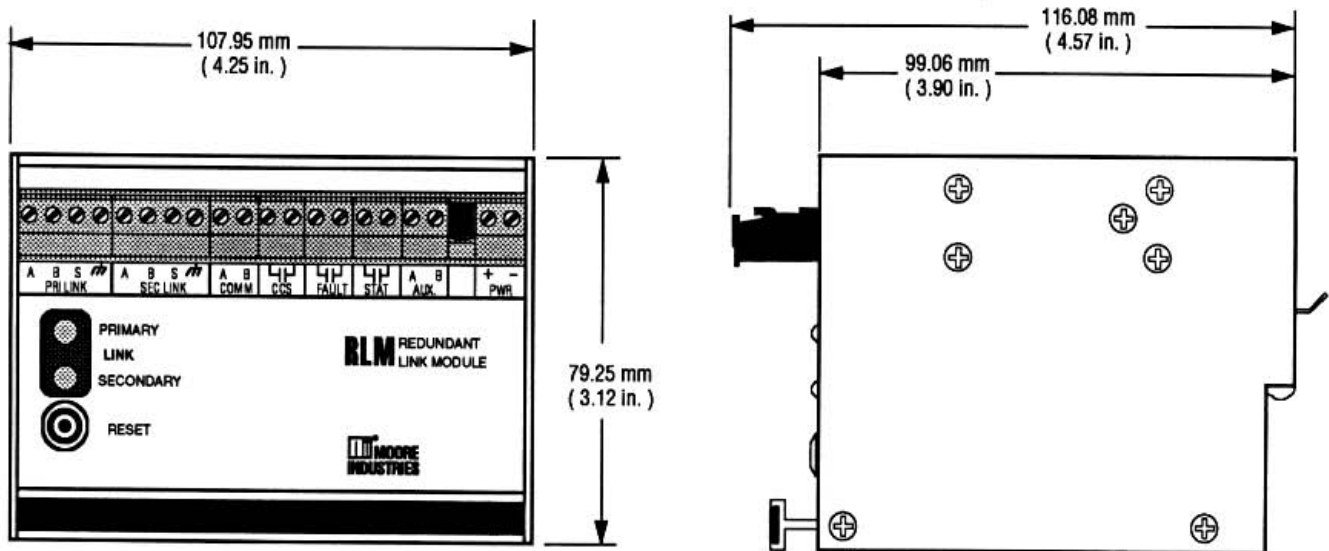

Figure 2. RLM Mounting Dimensions

Electrical Connections. All electrical connections for the RLM are made to removable terminal blocks on the front of each module. Compression-screws on the terminal blocks are used to secure wires to each terminal. Terminal blocks connect groups of two or four wires to the terminal pins, which are marked on the front panel of the RLM. Figure 3 shows the terminal designations for the RLM.

The RS-485 connections for the primary and secondary links are made at terminals marked PRI LINK, A, B, and S; and SEC LINK, A, B, and S. The S terminals are tie-points only for the cable shield. These terminals are not connected anywhere in the RLM. These tie-points are bussed to their adjacent chassis grounds only when appropriate. The primary and secondary terminals are where the two RLM's connect to one another.
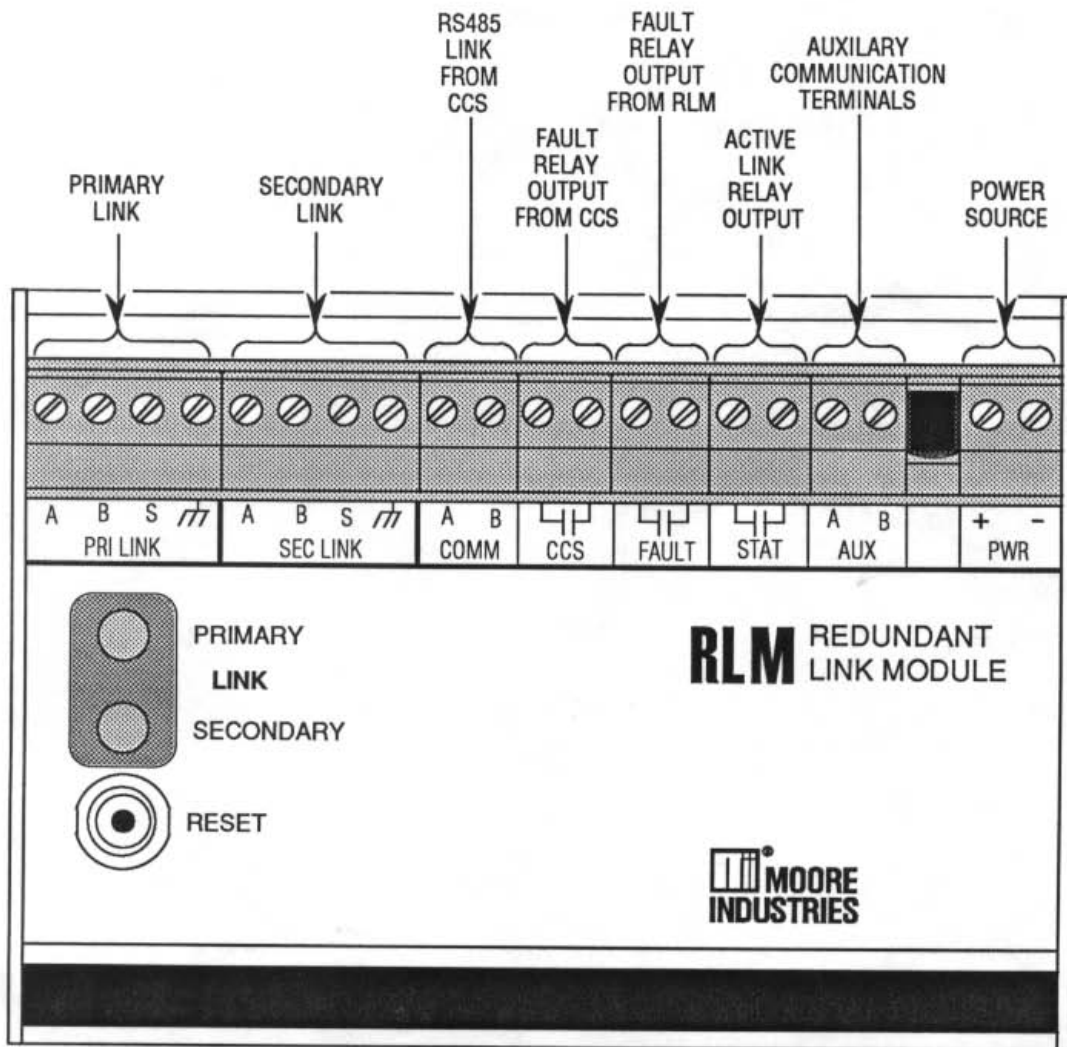
Figure 3. RLM Terminal Designations

RLM

The CCS connections for the RS-485 link are made at the COMM, A and B terminals of the RLM. Cable shields are not required for this connection.

The CCS fault relay output is connected to the RLM at the RLM's CCS terminals. See figure 4.

The FAULT terminals on the RLM are contact states that may be used for remote indication of a fault occurring in the local CCS. The STAT terminals are contact states that may be used for remote indication of which link is currently in use. Refer to the Configuration Options Section of this manual for details.

The AUX, A and B terminals may be used when the primary link is in use. These terminals allow access to the inactive secondary link, which runs between the RLM's only. This pair of wires may be used for various two-wire communication needs. If a communication fault occurs, the RLM automatically switches to the secondary link and terminates the use of the AUX terminals.

The RLM requires a power source of 18-30 Vdc or 24 Vac +10%/−20%. The power source is connected to the PWR terminals marked + (positive) and − (negative).

Figure 4 is a hookup diagram for the RLM. Each IMM and OMM may have up to 16 active data channels. Multiple IMM's and OMM's may be connected through a single pair of RLM's. Figure 5 illustrates a typical example.
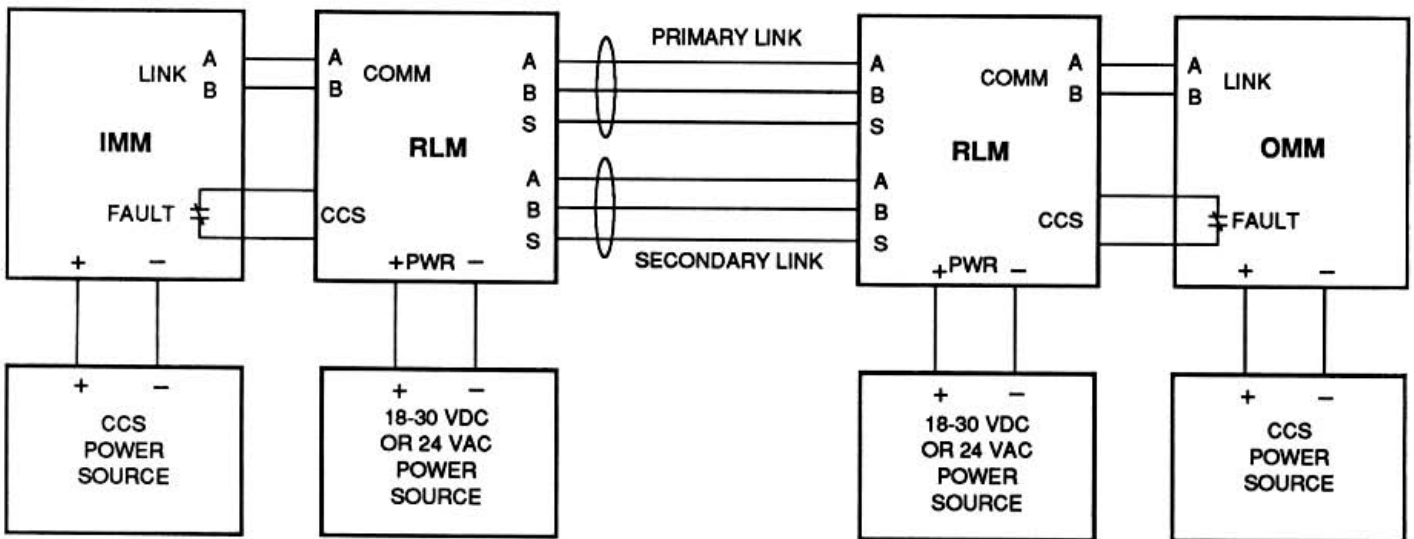
Figure 4. RLM Hookup Diagram

When used with the CCS or any other device, the CCS or the device must be configured to provide an open-contact condition to the RLM when a communication link fault occurs (**set J201 jumper in the CCS**).

RLM
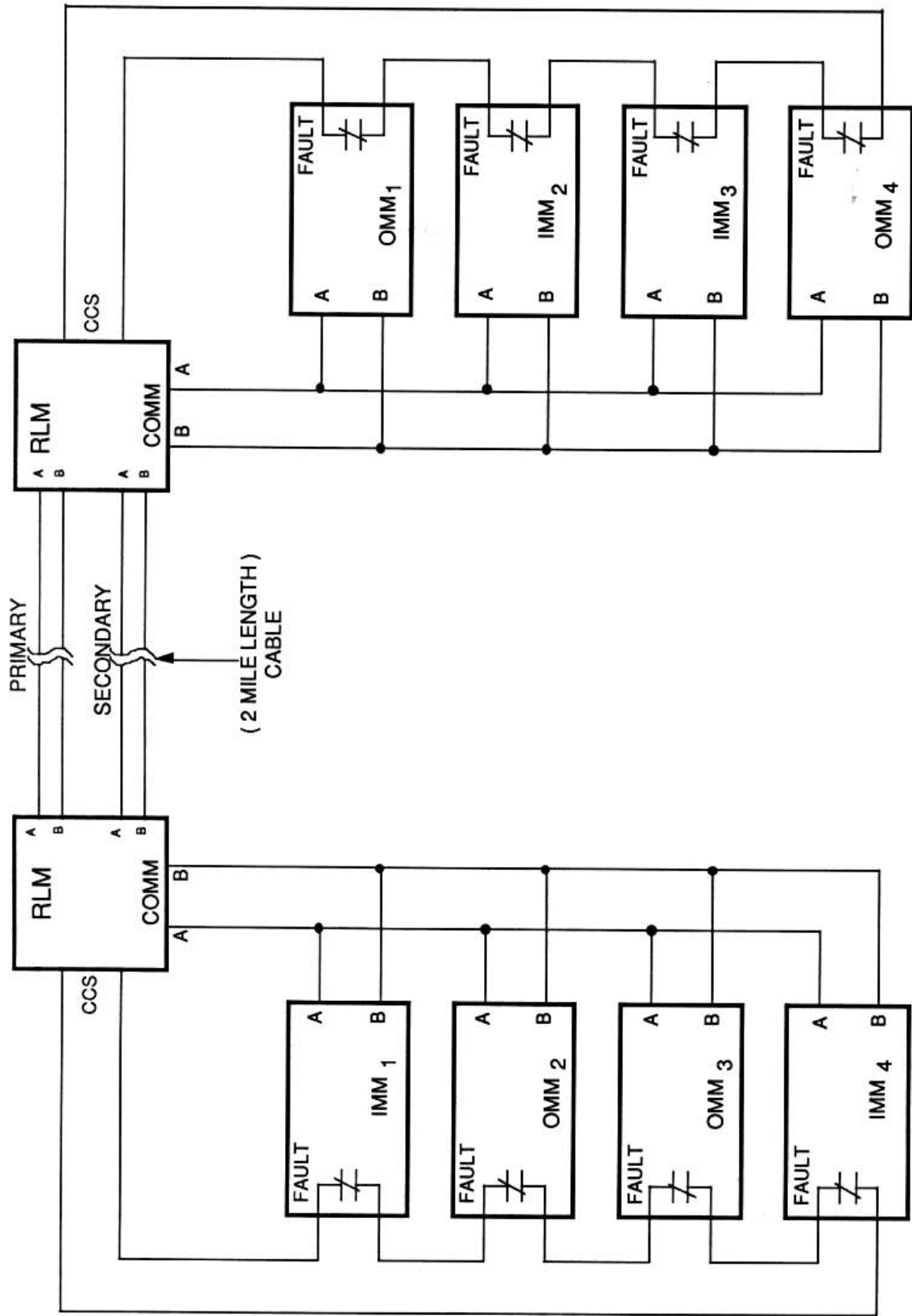
FIG 5. *RLM MULTI LINK Hookup Diagram*

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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