

MC-4025

Multichannel Remote

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Manual Part #: 180-0213B

PRODUCTION THROUGH TECHNOLOGY

AMR.

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Description and Use of MC-4025-ID

Description

The MC-4025-ID is a modified MC-4025 Remote that is used in conjunction with MC-4000 gas sensors (CO, NO, NO₂, O₂, etc.) that are connected to the MC-4000 System communication data line to monitor and record diesel vehicle emission levels. The unit consists of a MC-4025 Remote Station with three additional parts mounted to the cover. These parts are a two digit BCD switch, a push-button switch, and an LED indicator.

Use

The vehicle operator pulls up to the diesel check station and places the gas sensing panel a few feet down stream from the vehicle. The operator waits two minutes for the sensors to respond to the gases. The operator enters the two digit vehicle identification number and pushes the record button and the LED indicator comes **ON**. The monitor system master station records the gas levels and lets the vehicle operator know that the values have been saved by turning the LED indicator **OFF**.

The MC-4025 is a line-powered multichannel remote. Line-powered meaning that it receives its power from the data transmission cable and does not have a power supply itself. This unit has four analog inputs, eight status inputs, and two control outputs.

Summary of Changes

Made to Remote MC-4025 Software Version A1.2 Dated 4/12/94

1. Using dip switch S1 position #2, the option is now available to de-energize the two control relays if communications to the MC-4025 is lost.

1.A Specifications

1.A.1 Physical

Temperature:	0-70 Deg C
Humidity:	0-90% R.H. (no condensation)
Weight:	12 lbs.
Dimensions:	12"H x 8.25"W x 4.75"D

1.A.2 Electrical

Operating Voltage:	12-28 VDC
Operating Current:	35-45 mA depending upon configuration. *Add 10 mA for each additional control relay. *Add 20 mA for each additional current loop.
Baud Rate:	Normal (4800) and Fast (38.4k)
Analog Inputs:	(4) 0-5VDC or 4-20 mA Current Loop
Status Inputs:	(8) 12-120 VDC or VAC, 100K Impedence
Control Outputs:	(2) 120 VAC @ 7 Amps resistive load

2. Installation

Installing the MC-4025 is a simple series of tasks which will be explained in the following sections. A summary checklist of this procedure is listed in Section 3.

2.A Switch Settings

Baud Rate

The MC-4000 System offers two different data rates as summarized below...

4800 Baud

- Low current allowing more devices to be placed on a data line before the power has to be repeated.
- Almost any type of data cable can be used.

38.4 kBaud

- Requires 16 gauge low-capacitance data transmission line.

The baud rate is selected with position 1 of the Setup Switch (Figure 1) where 'ON' is 38.4 k and 'OFF' (OPEN) is 4800.

Communications/Control Relay Enable

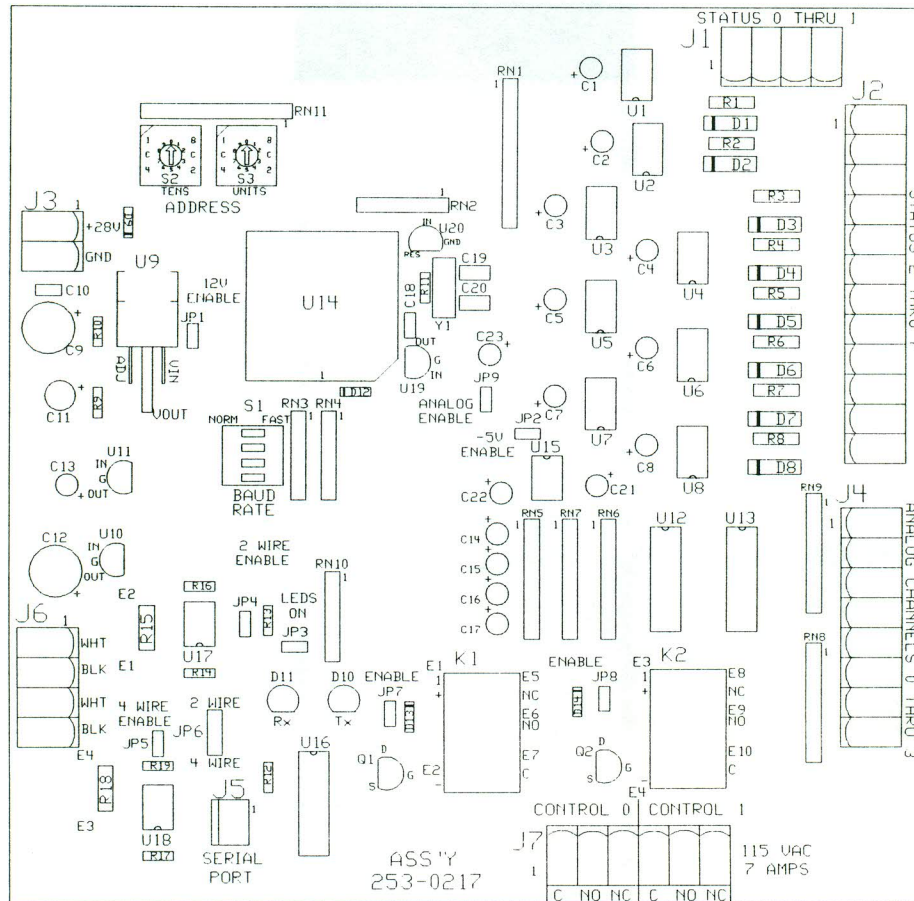
Position 2 of dip switch S1 placed in the 'ON' condition will enable the Communications/Control Relay Enable function. Communications to the remote is monitored for two conditions: 1) if no communication activity is detected for a period of 10 seconds then both relays will be de-energized; 2) if there is communications activity but the remote address is not being polled for a period of 20 seconds then both relays will be de-energized.

Positions 3 and 4 of the Setup Switch are not used in this card's application as an MC-4025 and should be set to 'OFF'.

Remote Address

Each remote station in the MC-4000 system must have a different address. The address switches, SW2 and SW3 (Figure 1), are self-explanatory. Simply dial up the desired address where SW3 represents the 'ones or units' place and SW2 represents the 'tens' place.

Figure 1, MC-4025 PCB



CONNECTORS

- J1 - STATUS INPUTS 0 & 1
- J2 - STATUS INPUTS 2-7
- J3 - POWER INPUT
- J4 - ANALOG INPUTS 0-3
- J5 - SERIAL PORT (EXPANSION)
- J6 - DATA IN/OUT
- J7 - CONTROL OUTPUTS 0 & 1
- E1,E2 - TERMINATE 2 WIRE
- E3,E4 - TERMINATE 4 WIRE

SWITCHES

- S1 POSITION 1 - BAUD RATE SELECT
- S1 POSITION 2 - COMMUNICATIONS/ENABLE RELAYS
- S2,S3 - ADDRESS SELECT

PROGRAM JUMPERS

- JP1 - ENABLE RELAYS (12VDC)
- JP2 - ENABLE ANALOG (-5VDC)
- JP3 - RX/TX LED ENABLE
- JP4 - 2 WIRE DATA ENABLE
- JP5 - 4 WIRE DATA ENABLE
- JP6 - 2/4 WIRE DATA CONFIGURE
- JP7 - RELAY K1 ENABLE
- JP8 - RELAY K2 ENABLE
- JP9 - ENABLE ANALOG (5VDC)

2.B Data Line Connections

The MC-4025 is designed for either two wire or four wire (optional) operation. Configure the programming jumpers as follows:

Two wire - Install JP4, remove JP5, and install jumper across pins 1 & 2 at JP6.

Four wire - Install JP5, remove JP4, and install jumper across pins 2 & 3 at JP6.

*** Components are not installed to enable four wire operation unless requested by the customer.**

For convenience, two terminal blocks are available for incoming and outgoing trunk line. Connect the data line to TB1 or TB2, positions marked COM (+) and (-). Connections to the board connector J6, positions 1 COM (-) and 2 COM (+), are pre-wired. These connections are shown in Figure 3.

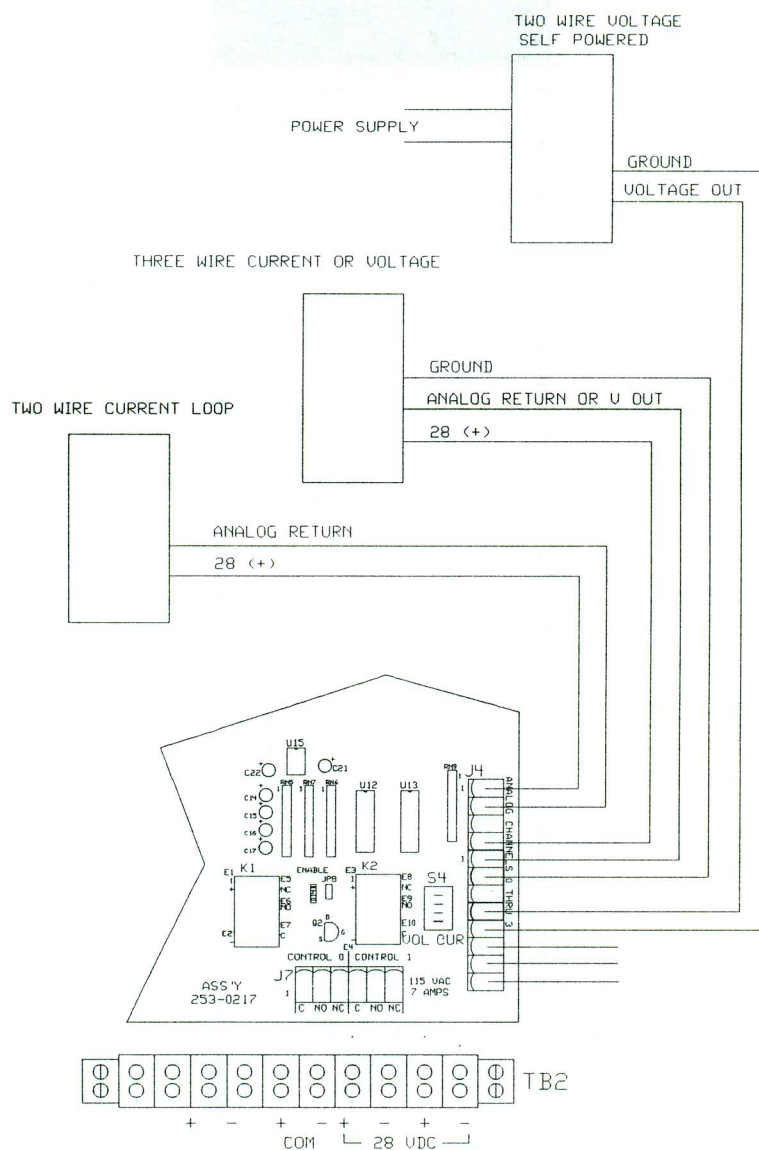
Four wire data communications would require using spare positions of TB1 and TB2. Connections to the board connector J6, positions 1 RX COM (-) and 2 RX COM (+), have been pre-wired, while connections from the terminal blocks to connector J6, positions 3 TX COM (-) and 4 TX COM (+) would have to be added.

If you are installing this unit as the last device on the trunk line, insert a 120 ohm terminating resistor at position R15, E1 & E2 (also at position R18, E3 & E4 for four wire application). Refer to Figure 1 for the resistor locations.

2.C Analog Inputs

The four analog inputs of the MC-4025 accept sensors with 0 to 5 VDC, or 4-20 mA outputs. Switch S4 is used to change between these modes. Plug in resistors (100 ohm) are provided for current loop operation. These resistor values can be changed to accommodate particular sensor requirements. To use the analog inputs you must first install programming jumpers at positions JP2 & JP9. The most basic configuration where the sensor is self-powered and only the signal and ground are connected to the analog input. The next possible sensor configuration would be a 3-wire hookup where the sensor is powered from the MC-4025. Finally, an example of a current loop sensor is shown, along with the other configurations, in Figure 2.

Figure 2, Analog Input Examples



J4 PIN DESIGNATIONS

- 1 - 28 VDC (+)
- 2 - ANALOG 0
- 3 - GROUND
- 4 - 28 VDC (+)
- 5 - ANALOG 1
- 6 - GROUND
- 7 - 28 VDC (+)
- 8 - ANALOG 2
- 9 - GROUND
- 10 - 28 VDC (+)
- 11 - ANALOG 3
- 12 - GROUND

NOTES:

Switch S4 is used to switch between voltage mode and current mode inputs

Resistors R20-R23 are switched in series with the analog input when in the current loop mode.

Resistors R20-R23 are in sockets to allow value changes for custom sensor applications

2.D Status Inputs

The MC-4025 provides eight optically coupled status (or digital) inputs. These inputs can be used to monitor either “wet” or “dry” contacts or switches. The eight status inputs accept a wide voltage range of 12 to 120 volts AC or DC. For “wet” (voltage present when open) contacts or switches, simply connect the monitored voltage to the selected input on connectors J1 (channel 0 and 1) or J2 (channels 2 thru 7). For “dry” (no voltage present) the contacts must be biased with a voltage in the accepted range, then connect to the same connectors J1 or J2. Note that for DC voltage monitoring, the status inputs are polarity sensitive. See Figure 3, for examples of status monitoring.

2.E Control Outputs

Control relays K1 and K2 are provided for remote control of small devices (120 VAC at 7 amps). Larger loads can be controlled by use of an external auxiliary relay or contactor. Enable the control relays by installing programming jumpers at position JP1 and then JP7 and/or JP8 depending on the relay(s) used. Normally open and normally closed contacts are provided at J7.

2.F Power Conservation

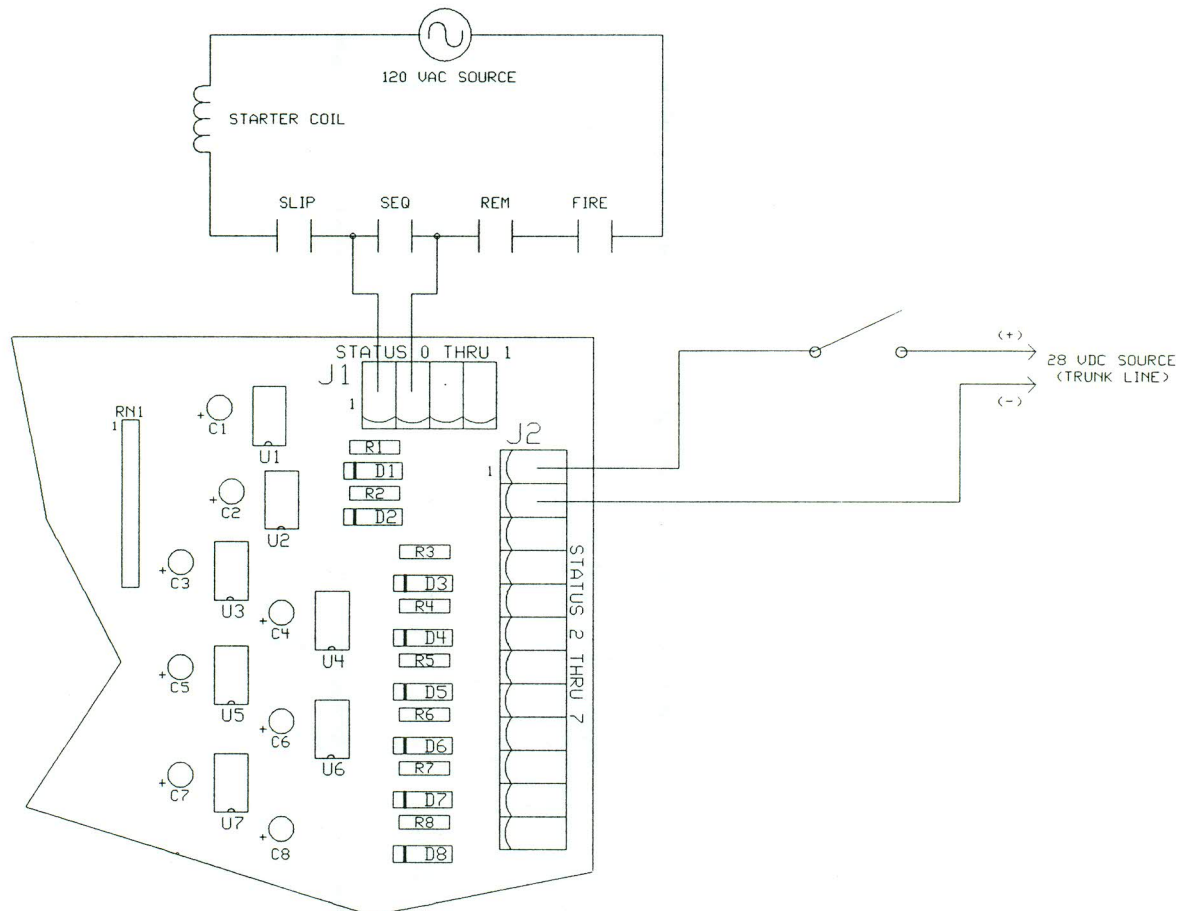
The MC-4025 has provisions to lower the overall current consumption based on functions not used. The two control relay outputs are disabled by removing programming jumper JP1. For single control output use, jumpers JP7, and JP8 disable control relay 0 and 1 respectively. The analog inputs are disabled by removing jumpers JP2 and JP9.

Two LEDs that blink when the system is active are located in the lower right corner of the card to help with troubleshooting. To conserve power, these LEDs can be disabled by removing programming jumper JP3, Located above them as shown in Figure 1.

2.G Powering the Unit

The MC-4025 remote is powered by connecting the trunk line power to terminal block TB1 or TB2 positions marked (+) and (-) 28 VDC. The two blocks are provided for convenience: use one terminal block for incoming trunk line, and the other for outgoing trunk line. Connections from the terminal block to the board connector J3 are pre-wired, position 1 being TRUNK (+) and position 2, TRUNK (-). These connections are shown in Figure 4.

Figure 3, Status Input Examples

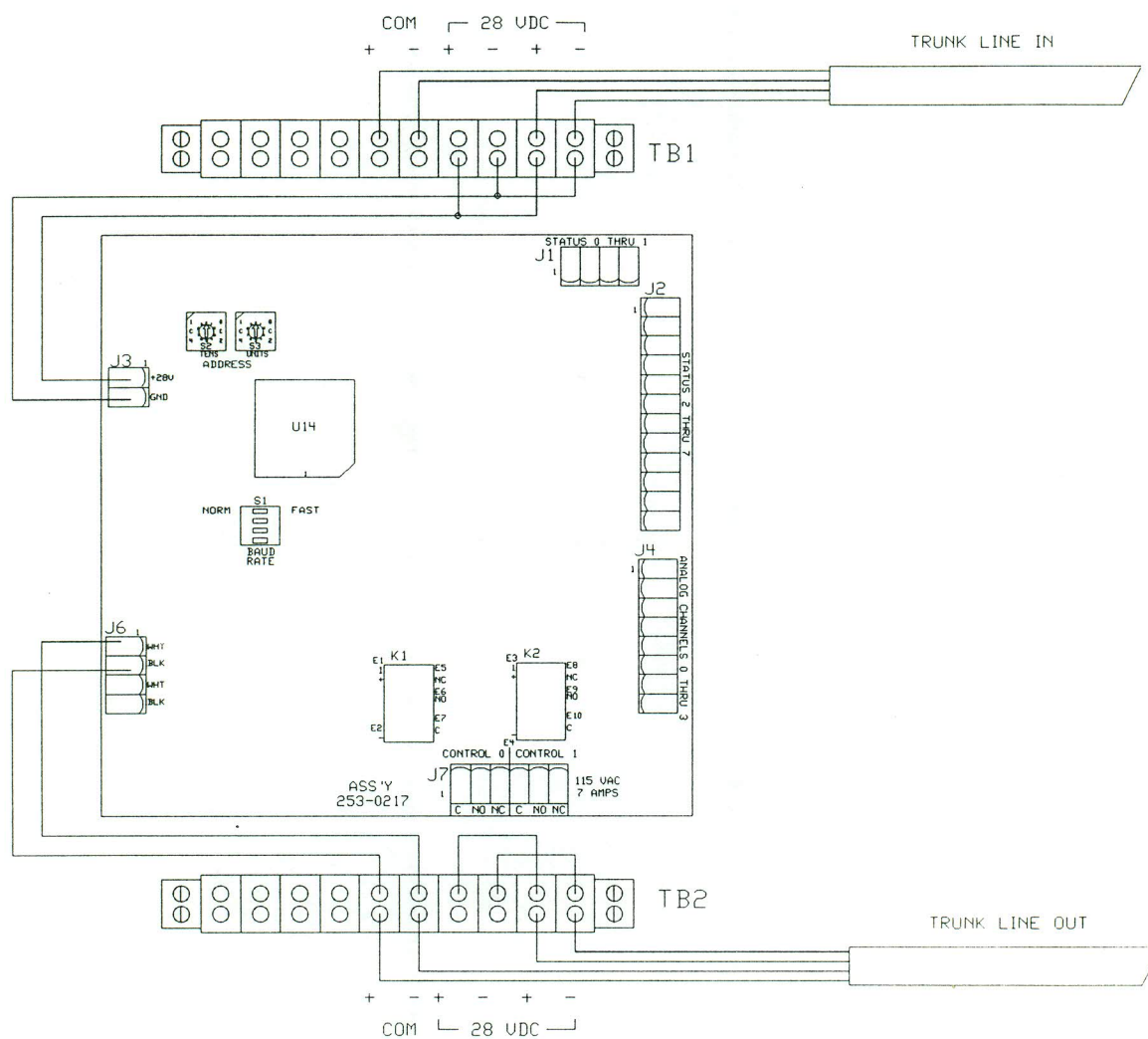


J1 PIN DESIGNATIONS

- 1 - STATUS 0 (+)
- 2 - STATUS 0 (-)
- 3 - STATUS 1 (+)
- 4 - STATUS 1 (-)

J2 PIN DESIGNATIONS

- | | |
|------------------|-------------------|
| 1 - STATUS 2 (+) | 7 - STATUS 5 (+) |
| 2 - STATUS 2 (-) | 8 - STATUS 5 (-) |
| 3 - STATUS 3 (+) | 9 - STATUS 6 (+) |
| 4 - STATUS 3 (-) | 10 - STATUS 6 (-) |
| 5 - STATUS 4 (+) | 11 - STATUS 7 (-) |
| 6 - STATUS 4 (-) | 12 - STATUS 7 (-) |



3 Installation Checklist

Set the baud rate (Section 2.A).

Set the address (Section 2.A).

Set the communications/enable control relay (Section 2.A).

Connect the data line to the input (Section 2.B).

Add or remove terminating resistors (Section 2.B).

If desired, connect sensor(s) to the analog inputs (Section 2.C).

If desired, connect contact monitoring to the status inputs (Section 2.D).

If desired, connect control(s) to the control outputs (Section 2.E).

Configure power consumption where applicable (Section 2.F).

Connect trunk line power (Section 2.G).