4100/4120-0136 and 4100-6045 Fire Alarm Controls Decoder Module Installation Instructions

Overview

This publication describes the installation and operation of the Simplex 4100/4120-0136 and 4100-6045 Decoder Module.

The decoder module is field-programmed to recognize the codes of the devices that it will monitor. It appears as two adjacent MAPNET II channels on the 4100 bus, and reports recognized codes to the 4100 master controller as if the coded devices were addressable MAPNET II MBZAM devices. A maximum of five decoder modules are allowed, providing that the system point capacity is not exceeded.

Inspecting Contents of Shipment

Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify your Simplex product supplier.

Related Documentation

- *Field Wiring Diagram for 4100 Power Limited* (841-731) or,
- *Field Wiring Diagram for 4100 Non Power Limited* (841-995)
- *4100ES Fire Alarm System Installation Guide* (574-848)

In this Publication

This publication discusses the following topics:

Cautions and Warnings

ELECTRICAL HAZARD - Disconnect electrical field power when making any internal adjustments or repairs. All repairs should be performed by a representative or authorized agent of your local Simplex product supplier.

STATIC HAZARD - Static electricity can damage components. Handle as follows:

- Ground yourself before opening or installing components.
- Prior to installation, keep components wrapped in anti-static material at all times.

Introduction to the Decoder Module

Overview

The decoder module is a 4100-family slave card. It uses six inches of mounting space, and requires a connection to the 4100 POWER and COMM buses, either by harness from an adjacent bay, or from the P1 edge connector and an adjacent card on the bus. Figure 1, below, is an illustration of the decoder module.

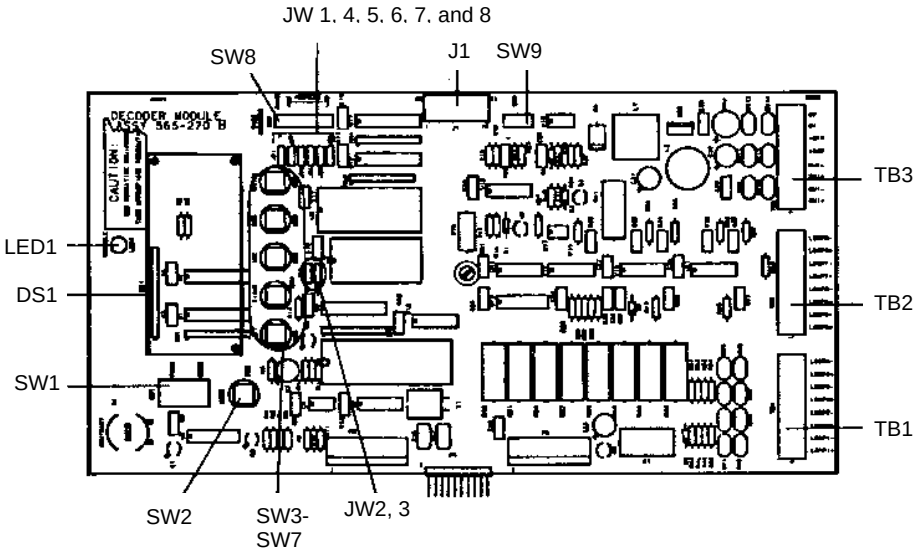

Figure 1. Decoder Module (565-270)

LED and LCD

LED 1. Lights during initialization until communications are established with the 4100 Master and whenever communications are lost with the Master.

DS 1. 16-character, 2-line LCD that is used in programming the decoder module. Potentiometer R1 is used to adjust the LCD contrast for best viewing.

Specifications

Refer to Table 1 for electrical and environmental requirements.

Table 1. Specifications

Description	Specification
Input Voltage Range	19 VDC to 33 VDC
Remote Location Connections	24 VDC and 2-wire RUI communications
Current	85 mA Supervisory, 163 mA Alarm
Code Pulse Timing	100 ms minimum, with repetition tolerance of ± 25%
Digit Space	1.25 to 5 times digit pulse
Round Space	> maximum digit space < 12.3 seconds
Temperature	32° to 120° F (0° to 49° C)
Humidity	93% non-condensing relative humidity at 90° F (32° C)

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Terminal Blocks

TB1 and TB2 = Connection to coded stations or relay contacts.

TB3 = Power and RUI Connections

TB3-1	= RUI+
TB3-2	= RUI-
TB3-3	= RUI+
TB3-4	= RUI-
TB3-5	= +24 V
TB 3-6	= +24 V
TB3-7	= 0 V
TB3-8	= 0 V

How the Decoder Works

Decoding Coded Initiating Devices

Many types of coded initiating devices can be encountered in retrofit applications. These devices include electromechanical code wheel-type pull stations and flow switches, through microprocessor-controlled electronic devices.

Since the operation of the newer microprocessor-controlled coded devices is usually intended to mimic the operation of the earlier-generation devices, decoding rules can be defined that will allow the decoder to dynamically interpret incoming codes from such devices as well.

Coder Operation and Terminology

A **CODE** is a series of ON and OFF signals that represent the physical location of an alarm signal. The code is intended to be interpreted by a person listening to an alarm bell, with each sounding of the bell being counted as part of a code digit.

A **CODE PULSE** is the ON signal, and is represented as a single sounding of the alarm bell. The interval between code pulses is a **PULSE SPACE**.

A **CODE DIGIT** is made up of a series of code pulses and pulse spaces that can be audibly recognized as a digit. The space between code digits, or **DIGIT SPACE**, must be audibly recognized as longer than the pulse time. A combination of code digits and digit spaces make up the code. A code can consist of from one to six digits. (For example, Alarm Code 3-7-2.)

An Alarm Code is repeated three or four times; each repetition is termed one **CODE ROUND**. The **ROUND SPACE** is the pause between successive code rounds, and must be audibly recognized as longer than the digit space.

A **VALID CODE** is defined as two successive code rounds that are stored in the decoder nonvolatile EEPROM memory. An **UNRECOGNIZED CODE** is defined as two successive code rounds that are not stored in the decoder memory, or part of a code that is interrupted by another code. If a code “hangs” after coding starts, and transmits either a continuous pulse or space (more than 12.5 seconds), the decoder will interpret this fault as an UNRECOGNIZED CODE. A **CODER TROUBLE** is defined as a single round of a recognized code, *not* followed by another code.

Coders can be wired in a manner termed Non-Interferent Serial (NIS), which results in coders electrically “closer” to the Fire Alarm Control Panel (FACP) being able to interrupt coders “further away” in the transmission of their code. This will occur if, after a “distant” coder goes into alarm, a coder “closer” to the panel comes into alarm. The closer coder will interrupt the coder further away, and prevent the decoder from recognizing the distant coder’s code.

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Coder Timing and Rules

The decoder determines valid timing for a received code based on a minimum pulse duration, and uses a series of rules to differentiate between the various code elements. These rules are briefly listed in the following paragraphs.

The scan rate for decoder inputs is 50 mS. The minimum pulse of space recognized is 100 mS, or two scans.

A code may consist of one to six digits. However, the code is limited in that it must fit on a 16-character line. If a code is six digits in length, at least one digit must consist of only one character. The largest digit recognized by the decoder is 15. Zero is not a valid digit. In addition, the following codes must be entered into the decoder as a "single-digit" code.

Table 2. Code Conversion

Actual Code	Code Entered in decoder
1-1	2
1-1-1	3
1-1-1-1	4
1-1-1-1-1	5
1-1-1-1-1-1	6

The following definitions apply specifically to the decoder.

Code Pulse: A pulse of 100 mS (minimum duration), or one sounding of the bell.

Pulse Space: A pulse space of 100 mS (minimum duration), or the pause between soundings.

Code Digit: A code digit consists of 1 to 15 code pulses, separated by pulse spaces.

Digit Space: The pause between digits.

Code Round: A single transmission of all code digits

Round Space: The pause between code rounds; greater than the maximum digit space, but less than 12.5 seconds.

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Coder Timing and Rules

One complete round of a code is shown in Figure 1. The various parts of the code are labeled, and the code is identified as **2-3-2**.

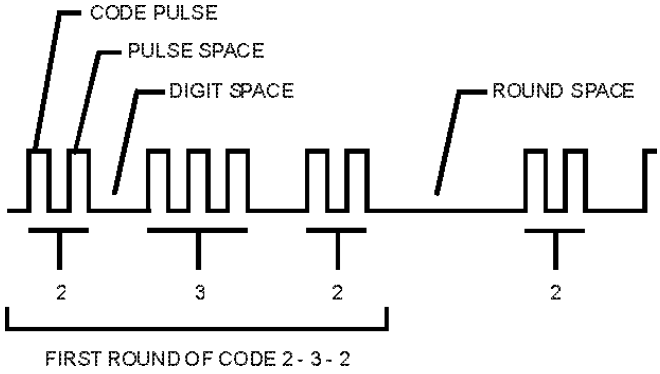

Figure 2. ON/OFF Pulse Train Code Round

Leading Edge Detection

There is a second type of pulse train that is prevalent with coded initiating devices that does not correspond to the simple "ON/OFF" type. This pulse train system is used with single stroke devices, and therefore does not have the "OFF" times required to determine the difference between pulses, digits, and rounds.

The determining factor with this pulse train system is **the time between leading edge transitions from low to high**. The pulse train in this equipment goes high with the first code digit pulse, and stays high until 200 mS before the next sounding. The positive transition results in the sounding of the alarm bell. A "leading edge" pulse train corresponding to the code **2-3-2** is shown in Figure 2.

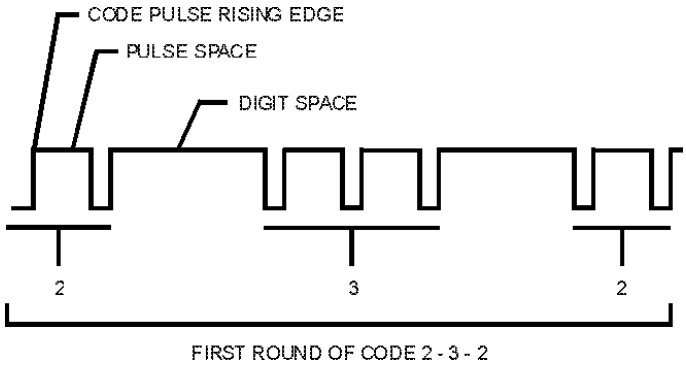

Figure 3. Leading Edge Pulse Train Code Round

The way to decode this pulse train is to **measure the time between the leading edges (or positive transitions) of pulses in this train**. After the final sounding of the alarm bell, the equipment holds the line high for two to three seconds, and then returns the line to its "normal" low state. The decoder module uses this leading edge detection method.

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Decoder Programming Interface

The hardware interface for programming the decoder consists of a 2-line by 16-character LCD, 6 push-button switches, and a 2-position slide switch. One slide switch position is used for "Program" mode; the other position is used for "Normal" mode. The labels and functions of the six push-button switches are:

LEFT	Move cursor left
RIGHT	Move cursor right
INC	Place cursor under number and press to increment
DEC	Place cursor under number and press to decrement
ENTER	Press to enter data
MODE	Press to toggle between "Clear all Codes" and "Program Codes"

The LCD displays information pertinent to the device being programmed or decoded. The device addresses are stored in the EPROM, providing nonvolatile storage of the site-programmed data.

Decoding the Coder Loops

Each decoder can monitor up to eight coder loops. The coders operate much like fire alarm zone circuits, and supervise for open circuit troubles. There are two methods of monitoring coder outputs.

- Monitoring Method One – Monitor normally-open (N.O.) contacts per loop, and supervise wiring to a 3.3 K end-of-line (EOL) resistor harness across the relay contacts.
- Monitoring Method Two – Directly monitor the coder loop.

In Method One, the loop monitors a set of dry contacts that track coded station output. The N.O. contacts are wired across the zone, and contact closure is monitored to decode the pulses. Figure 3 illustrates Monitoring Method One.

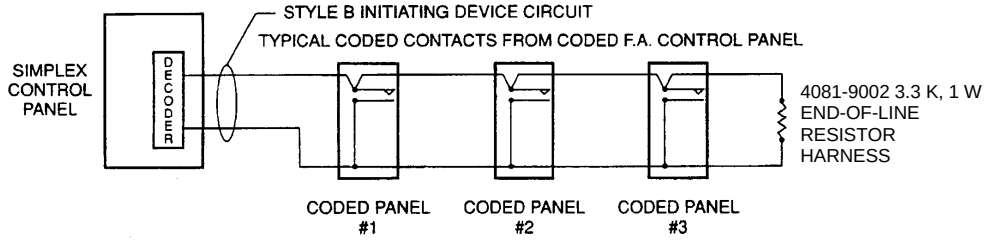

Figure 4. Monitoring Method One

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Decoding the Coder Loops

In Method Two, the decoder acts as the "monitor zone" for the loop. A critical limit with this method is that the line resistance from the "plus" loop output to the "return" **must not exceed** 800 Ohms through *any* alarm contact on the loop. This 800-Ohm limit includes line resistance to the contact plus contact resistance plus line resistance back to the panel. It cannot be assumed that the further away the coder is from the panel, the higher the resistance. It is very possible that a coder close to the panel has contact resistance that exceeds the wire resistance. Some coder contacts may have high "ON" resistance, especially after having been used in AC loop applications. These contacts can be rubbed/polished to remove carbon buildup or oxide coating, and thus lower contact resistance. Figure 4 illustrates Monitoring Method Two.

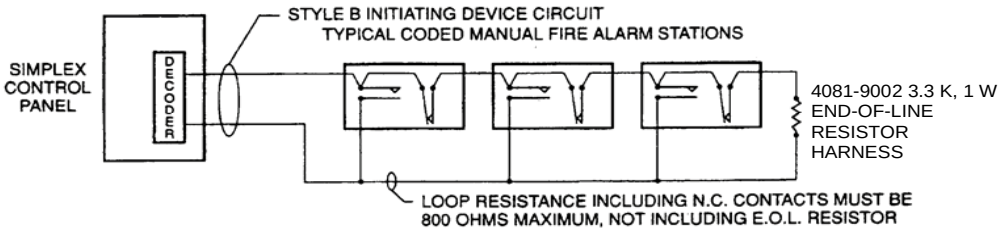

Figure 5. Monitoring Method Two

Note: If you determine that the coder contacts cannot be used for direct connection, use Monitoring Method One.

Configuring the Module

Overview

This section describes how to configure the decoder module using the various DIP switches and on-board jumpers.

Programming Switches

SW1 – Program/Normal Switch

- Up = Program mode (allows codes of the stations connected to the decoder to be entered). While in this mode, alarm reporting is disabled, and a "MAPNET Communications Failure" message is indicated at the 4100 front panel.
- Down = NORMAL mode (enables Alarm Decoding and reporting).

SW2 – SW7

Push button switches used in programming the decoder.

Table 3. Programming Switches

Switch	Function	Switch	Function
SW2	Selects programming mode	SW5	Increment Key
SW3	Move Left	SW6	Decrement Key
SW4	Move Right	SW7	Enter Key

Note: All of the following must agree:

- The binary value of switch positions SW8-2 through SW8-8 (see next paragraph).
- Card address as shown on motherboard's address label.
- Card address as determined by the Programming Unit.

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Setting the Device Address and Baud Rate

SW8

The decoder takes two addresses on the 4100 bus. The first address is set with the decoder's 8-bit base address DIP switch, SW8. The second address is **automatically** set one higher than the first address. All coded station alarm and trouble messages are reported to the panel as MAPNET II device states.

Switch SW8 on the 4100 decoder is a bank of eight DIP switches. From left to right (see Figure 11, below) these switches are designated as SW1-1 through SW1-8. The function of these switches is as follows:

- **SW8-1**. This switch sets the baud rate for the internal 4100 communications line running between the card and the 4100 CPU. Set this switch to ON.
- **SW8-2 through SW8-8**. These switches set the card's address within the 4100 FACP. Refer to Table 2 for a complete list of the switch settings for all of the possible card addresses.

Note: You must set these switches to the value assigned to the card by the 4100 Programmer.

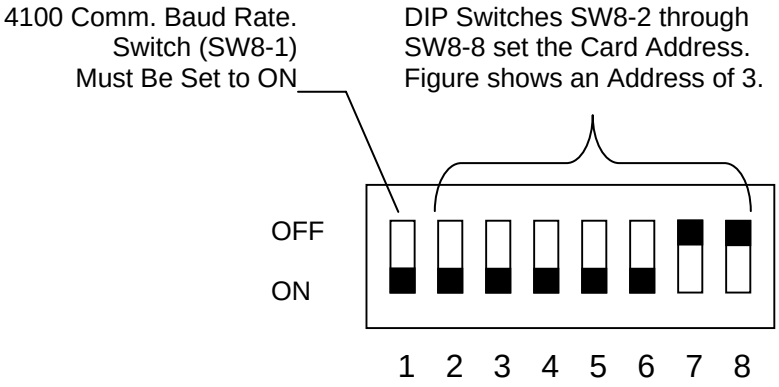

Figure 6. DIP Switch SW8

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Setting the Device Address and Baud Rate

Table 4. Card Address Switch Settings

Address	SW 2-2	SW 2-3	SW 2-4	SW 2-5	SW 2-6	SW 2-7	SW 2-8	Address	SW 2-2	SW 2-3	SW 2-4	SW 2-5	SW 2-6	SW 2-7	SW 2-8
1	ON	ON	ON	ON	ON	ON	OFF	61	ON	OFF	OFF	OFF	OFF	ON	OFF
2	ON	ON	ON	ON	ON	OFF	ON	62	ON	OFF	OFF	OFF	OFF	OFF	ON
3	ON	ON	ON	ON	ON	OFF	OFF	63	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	ON	ON	ON	ON	OFF	ON	ON	64	OFF	ON	ON	ON	ON	ON	ON
5	ON	ON	ON	ON	OFF	ON	OFF	65	OFF	ON	ON	ON	ON	ON	OFF
6	ON	ON	ON	ON	OFF	OFF	ON	66	OFF	ON	ON	ON	ON	OFF	ON
7	ON	ON	ON	ON	OFF	OFF	OFF	67	OFF	ON	ON	ON	ON	OFF	OFF
8	ON	ON	ON	OFF	ON	ON	ON	68	OFF	ON	ON	ON	OFF	ON	ON
9	ON	ON	ON	OFF	ON	ON	OFF	69	OFF	ON	ON	ON	OFF	ON	OFF
10	ON	ON	ON	OFF	ON	OFF	ON	70	OFF	ON	ON	ON	OFF	OFF	ON
11	ON	ON	ON	OFF	ON	OFF	OFF	71	OFF	ON	ON	ON	OFF	OFF	OFF
12	ON	ON	ON	OFF	OFF	ON	ON	72	OFF	ON	ON	OFF	ON	ON	ON
13	ON	ON	ON	OFF	OFF	ON	OFF	73	OFF	ON	ON	OFF	ON	ON	OFF
14	ON	ON	ON	OFF	OFF	OFF	ON	74	OFF	ON	ON	OFF	ON	OFF	ON
15	ON	ON	ON	OFF	OFF	OFF	OFF	75	OFF	ON	ON	OFF	ON	OFF	OFF
16	ON	ON	OFF	ON	ON	ON	ON	76	OFF	ON	ON	OFF	OFF	ON	ON
17	ON	ON	OFF	ON	ON	ON	OFF	77	OFF	ON	ON	OFF	OFF	ON	OFF
18	ON	ON	OFF	ON	ON	OFF	ON	78	OFF	ON	ON	OFF	OFF	OFF	ON
19	ON	ON	OFF	ON	ON	OFF	OFF	79	OFF	ON	ON	OFF	OFF	OFF	OFF
20	ON	ON	OFF	ON	OFF	ON	ON	80	OFF	ON	OFF	ON	ON	ON	ON
21	ON	ON	OFF	ON	OFF	ON	OFF	81	OFF	ON	OFF	ON	ON	ON	OFF
22	ON	ON	OFF	ON	OFF	OFF	ON	82	OFF	ON	OFF	ON	ON	OFF	ON
23	ON	ON	OFF	ON	OFF	OFF	OFF	83	OFF	ON	OFF	ON	ON	OFF	OFF
24	ON	ON	OFF	OFF	ON	ON	ON	84	OFF	ON	OFF	ON	OFF	ON	ON
25	ON	ON	OFF	OFF	ON	ON	OFF	85	OFF	ON	OFF	ON	OFF	ON	OFF
26	ON	ON	OFF	OFF	ON	OFF	ON	86	OFF	ON	OFF	ON	OFF	OFF	ON
27	ON	ON	OFF	OFF	ON	OFF	OFF	87	OFF	ON	OFF	ON	OFF	OFF	OFF
28	ON	ON	OFF	OFF	OFF	ON	ON	88	OFF	ON	OFF	OFF	ON	ON	ON
29	ON	ON	OFF	OFF	OFF	ON	OFF	89	OFF	ON	OFF	OFF	ON	ON	OFF
30	ON	ON	OFF	OFF	OFF	OFF	ON	90	OFF	ON	OFF	OFF	ON	OFF	ON
31	ON	ON	OFF	OFF	OFF	OFF	OFF	91	OFF	ON	OFF	OFF	ON	OFF	OFF
32	ON	OFF	ON	ON	ON	ON	ON	92	OFF	ON	OFF	OFF	OFF	ON	ON
33	ON	OFF	ON	ON	ON	ON	OFF	93	OFF	ON	OFF	OFF	OFF	ON	OFF
34	ON	OFF	ON	ON	ON	OFF	ON	94	OFF	ON	OFF	OFF	OFF	OFF	ON
35	ON	OFF	ON	ON	ON	OFF	OFF	95	OFF	ON	OFF	OFF	OFF	OFF	OFF
36	ON	OFF	ON	ON	OFF	ON	ON	96	OFF	OFF	ON	ON	ON	ON	ON
37	ON	OFF	ON	ON	OFF	ON	OFF	97	OFF	OFF	ON	ON	ON	ON	OFF
38	ON	OFF	ON	ON	OFF	OFF	ON	98	OFF	OFF	ON	ON	ON	OFF	ON
39	ON	OFF	ON	ON	OFF	OFF	OFF	99	OFF	OFF	ON	ON	ON	OFF	OFF
40	ON	OFF	ON	OFF	ON	ON	ON	100	OFF	OFF	ON	ON	OFF	ON	ON
41	ON	OFF	ON	OFF	ON	ON	OFF	101	OFF	OFF	ON	ON	OFF	ON	OFF
42	ON	OFF	ON	OFF	ON	OFF	ON	102	OFF	OFF	ON	ON	OFF	OFF	ON
43	ON	OFF	ON	OFF	ON	OFF	OFF	103	OFF	OFF	ON	ON	OFF	OFF	OFF
44	ON	OFF	ON	OFF	OFF	ON	ON	104	OFF	OFF	ON	OFF	ON	ON	ON
45	ON	OFF	ON	OFF	OFF	ON	OFF	105	OFF	OFF	ON	OFF	ON	ON	OFF
46	ON	OFF	ON	OFF	OFF	OFF	ON	106	OFF	OFF	ON	OFF	ON	OFF	ON
47	ON	OFF	ON	OFF	OFF	OFF	OFF	107	OFF	OFF	ON	OFF	ON	OFF	OFF
48	ON	OFF	OFF	ON	ON	ON	ON	108	OFF	OFF	ON	OFF	OFF	ON	ON
49	ON	OFF	OFF	ON	ON	ON	OFF	109	OFF	OFF	ON	OFF	OFF	ON	OFF
50	ON	OFF	OFF	ON	ON	OFF	ON	110	OFF	OFF	ON	OFF	OFF	OFF	ON
51	ON	OFF	OFF	ON	ON	OFF	OFF	111	OFF	OFF	ON	OFF	OFF	OFF	OFF
52	ON	OFF	OFF	ON	OFF	ON	ON	112	OFF	OFF	OFF	ON	ON	ON	ON
53	ON	OFF	OFF	ON	OFF	ON	OFF	113	OFF	OFF	OFF	ON	ON	ON	OFF
54	ON	OFF	OFF	ON	OFF	OFF	ON	114	OFF	OFF	OFF	ON	ON	OFF	ON
55	ON	OFF	OFF	ON	OFF	OFF	OFF	115	OFF	OFF	OFF	ON	ON	OFF	OFF
56	ON	OFF	OFF	OFF	ON	ON	ON	116	OFF	OFF	OFF	ON	OFF	ON	ON
57	ON	OFF	OFF	OFF	ON	ON	OFF	117	OFF	OFF	OFF	ON	OFF	ON	OFF
58	ON	OFF	OFF	OFF	ON	OFF	ON	118	OFF	OFF	OFF	ON	OFF	OFF	ON
59	ON	OFF	OFF	OFF	ON	OFF	OFF	119	OFF	OFF	OFF	ON	OFF	OFF	OFF
60	ON	OFF	OFF	OFF	OFF	ON	ON								

Setting the Communications Type

SW9

The decoder communicates with the panel via either the internal 4100 COMM Bus or RUI 2-wire communications. The communications method is selected by DIP switch SW9, as shown in Table 5.

Table 5. Communications Select Switch SW9 Configurations

DIP Switch Position	RUI COMM	4100 COMM Bus
SW9-1	ON	OFF
SW9-2	ON	OFF
SW9-3	OFF	ON
SW9-4	OFF	ON

Jumpers

JW1 and **JW4** through **JW8** = RAM selection

- **JW1**, **JW4**, **JW5** installed, **JW6** through **JW8** removed — 8K x 8I SRAM
- **JW6** through **JW8** installed, **JW1**, **JW4**, **JW5** removed — 32K x 8 or 128K x 8 SRAM

JW2, JW3 = ROM selection

- **JW2** inserted, **JW3** removed — 32K x 8 EPROM (27C256)
- **JW3** inserted, **JW2** removed — 64K x EPROM (27C512)

Installing the Decoder Assembly into Back Boxes

Overview

The decoder is a 4100-family "slave" card. It uses six inches of mounting space, and requires connection to the 4100 POWER and COMM buses, either by harness from an adjacent bay, or from the "P1" edge connector and an adjacent card on the bus. Decoders must be mounted to the right of other slave cards, to facilitate access to the programming interface. When used on the 4100 bus, the decoder will take COMM and +24 V power from the P1 connector. When used in an RUI application, two-wire COMM and +24 V power are connected to TB3.

The decoder module can be mounted to either 4100 Back Boxes (PID series 2975-91*xx*) or 4100U/4100ES Back Boxes (PID series 2975-94*xx*).

- The 4100/4120-0136 version is used for systems with 4100 Back Boxes (non-4100U/4100ES).
- The 4100-6045 version is used for systems with 4100U/4100ES Back Boxes.

General Guidelines

Review the following guidelines before mounting the assembly into the 4100 , 4100U, or 4100ES.

- If a power supply is installed in the bay, it must be installed on the far right of the bay and any relay modules must be installed in the slots immediately to its left.
- Relay cards must be installed in the rightmost possible slots. This is necessary to allow for the proper routing of non-power limited wiring (typically 120 VAC wiring), which could be connected to a relay module.
- If a 4100/4120-0155 SDACT, 4100-6052 Event Reporting DACT, 4100-6053 Point Reporting DACT, or a 4100/4120-0153 CCDACT is installed in the bay, it must be installed in the far left or far right slot. Neither of these modules contains the J1 or P1 connectors, which are used to distribute power and communications to adjacent modules.

Non-4100U/4100ES Guidelines

Review the following guidelines before mounting the assembly into a 4100 system.

- Only the 4100/4120-0136 module with a 617-655 Mounting Plate can be mounted into a 4100 Back Box.
- The mounting plate takes up 6 inches of space in the bay.
- *Master controller bay only:* If the 575-274 Master Motherboard is used, it must be installed in the leftmost position of this bay. If the 575-274 Master Motherboard is not used, the CPU motherboard must be installed in the leftmost position of the bay.

4100U/4100ES Guidelines

Review the following guidelines and instructions before mounting the assembly into a 4100U/4100ES system.

- Only the 4100-6045 module can be mounted into a 4100U/4100ES Back Box.
- The mounting plate takes up 6 inches of space in the bay.

To mount in this type of bay, standoffs must be used. Follow the instructions below.

1. Screw four metal hollow threaded standoffs into the screwholes on the chassis.
2. Orient the motherboard with the connector labeled J1 on the right and the header labeled P1 on the left.
3. Secure the motherboard to the standoffs using four #6 torx screws and hex nuts.

Wiring Guidelines

Overview

This section contains guidelines for decoder field wiring.

General Guidelines

Make sure these guidelines are accounted for before wiring:

- All wires must be between 12 and 18 AWG, or as the local code dictates.
  - For one decoder, the maximum RUI wiring distance is 2,500 feet for 12 and 14 AWG, and 1,200 feet for 18 AWG.
  - RUI communications lines must be 18 AWG, twisted shielded pairs with a maximum length of 2,500 feet.
- *RUI only:* Communications line power: 32 VDC (max), 130 mA (max), 1200 or 9600 baud.
- *RUI only:* Power to the decoder must be from a power supply commoned to the main power supply. Decoder power is 85 mA at 28.5 VDC (nominal), 90 mA at 28.5 VDC (max), no loops shorted. Alarm current depends on the duty cycle of the coded station. Maximum current with one loop shorted is 163 mA at 28.5 VDC.
- *Coded station wiring only:* Supervised circuit: 28.5 VDC, 8.6 mA.
- *Coded station wiring only:* Maximum current: 75 mA (shorted) at 28.5 VDC.
- *Coded station wiring only:* Do not connect any other devices to loops. Connect coded devices or contacts **only**, to decoder loops.
- *Coded station wiring only:* 800 Ohms maximum resistance per loop, including through any coder contact.
- All wiring is supervised.
- Conductors must test free of all grounds.
- All wiring must be done using copper conductors only, unless noted otherwise.
- If shielded wire is used,
  - the metallic continuity of the shield must be maintained throughout the entire cable length.
  - the entire length of the cable must have a resistance greater than 1 Megohm to earth ground.
- Underground wiring must be free of all water.
- In areas of high lightning activity, or in areas that have large power surges, the 2081-9027 Transient Suppressor should be used on monitor points (refer to 574-803).
- Wires must not be run through elevator shafts.
- Wires that run in plenum must be in conduit.
- Splicing is permitted. All spliced connections must either be soldered (resin-core solder), crimped in metal sleeves, or encapsulated with an epoxy resin. When soldering or when crimped metal sleeves are used, the junction must be insulated with UL-listed electrical tape that is as sound as the original insulating jacket. Shield continuity must be maintained throughout.
- A system ground must be provided for earth detection and lightning protection devices. This connection must comply with approved earth detection per NFPA780.
- Only system wiring can be run together in the same conduit.

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General Guidelines

- Contacts must be dry (no external voltage present) and suitable for use at 28.5 VDC, 8.8 mA supervisory, and at 75 mA when shorted across the initiating circuit.
- While only three devices are shown in the reference diagrams (Figure 7), the maximum number allowed is determined by circuit resistance and decoding requirements.
- Exact wiring depends on the specific coding device in the circuit. Inspect the device and/or the device wiring instructions for proper connections.

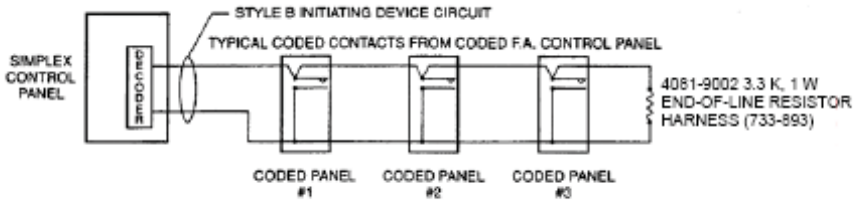

DIAGRAM 1. CODED CONTACTS ARE DIRECTLY ACROSS INITIATING CIRCUIT

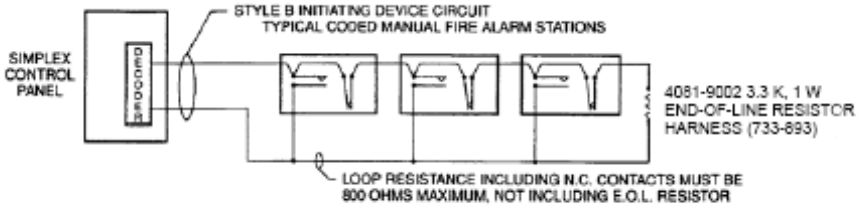

DIAGRAM 2. INITIATING CONTACTS ARE CONNECTED THROUGH CODED DEVICE PRIORITY CONTACTS

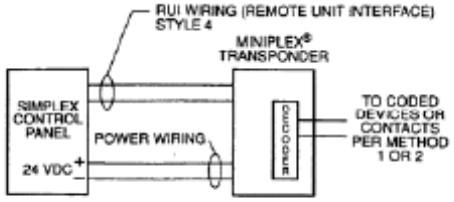

DIAGRAM 3. DECODER MOUNTED IN MINIPLEX® TRANSPONDER

Figure 7. Decoder Installation Reference Diagrams

Continued on next page

Power-Limited Guidelines

Make sure these guidelines are accounted for before wiring for power-limited systems:

- Non-power limited field wiring (AC power, batteries, City connection) must be installed and routed in the shaded areas shown in Figure 8.
- Power-limited field wiring must be installed and routed in the non-shaded areas shown in Figure 8, with the exception of City wiring.
- Excess slack should be kept to a minimum inside the back box enclosure. The wiring should be neatly dressed and bundled together using the wire ties provided with the equipment. Anchor power-limited wiring to tie points, as shown in Figure 8.

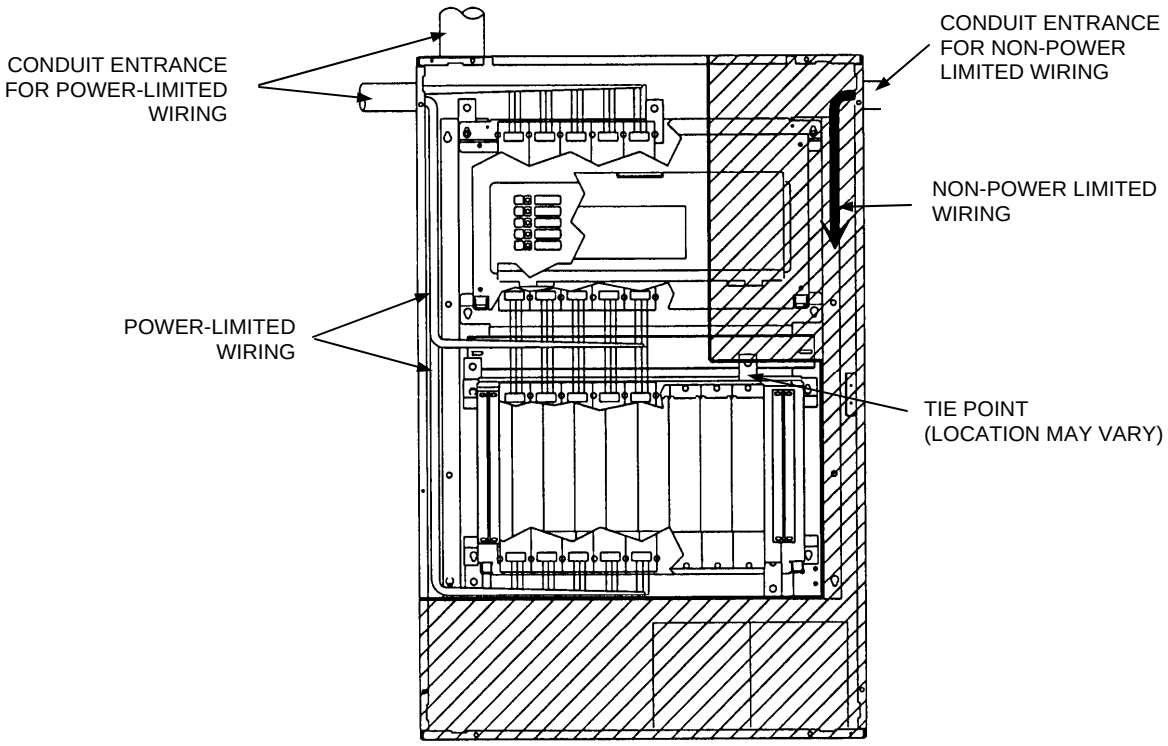

Figure 8. Power-Limited Wiring

- Tie the wiring located between bays to the internal wiring troughs, if applicable.
- When powering remote units or switching power through relay contacts, power for these circuits must be provided by a UPS-style power supply, the 4100-1108 Power Supply (8A), or a power-limited power supply that listed for fire-protective signaling use.

Power Limited Guidelines

- *Auxiliary power only*: In order to connect a circuit using power-limited wiring, the devices being powered must all be addressable, or a UL Listed EOL relay must be used to supervise the circuit. Refer to Figure 9 for wiring directions for the EOL relay (the 2098-9739 Relay is used as an example. Other UL-Listed EOL relays can be used, depending on the application).

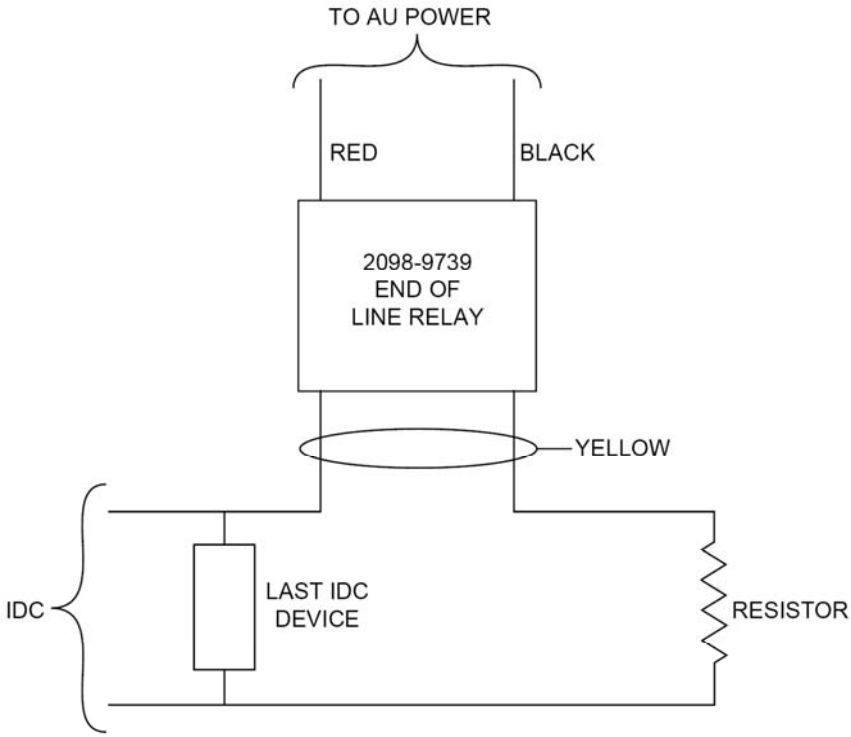

Figure 9. The EOL Relay

Field Wiring

Overview

Refer to the instructions in this section to connect the decoder module to field wiring for RUI and system devices.

RUI Style 4 (Class B)

Before wiring, review the following guidelines:

- For one decoder, the maximum RUI wiring distance is 2,500 feet for 12 and 14 AWG, and 1,200 feet for 18 AWG.
- RUI communications lines must be 18 AWG, twisted shielded pairs with a maximum length of 2,500 feet.
- Communications line power: 32 VDC (max), 130 mA (max), 1200 or 9600 baud.
- Power to the decoder must be from a power supply commoned to the main power supply. Decoder power is 85 mA at 28.5 VDC (nominal), 90 mA at 28.5 VDC (max), no loops shorted. Alarm current depends on the duty cycle of the coded station. Maximum current with one loop shorted is 163 mA at 28.5 VDC.

Use the instructions and figure below for Class B RUI wiring.

1. Make sure that SW9-1 and SW9-2 are ON, and that SW9-3 and SW9-4 are OFF.
2. Using the 733-716 Harness, connect to the "+" and "-" RUI terminals as Figure 10 shows.
3. Complete the wiring connection as shown in Figure 10.

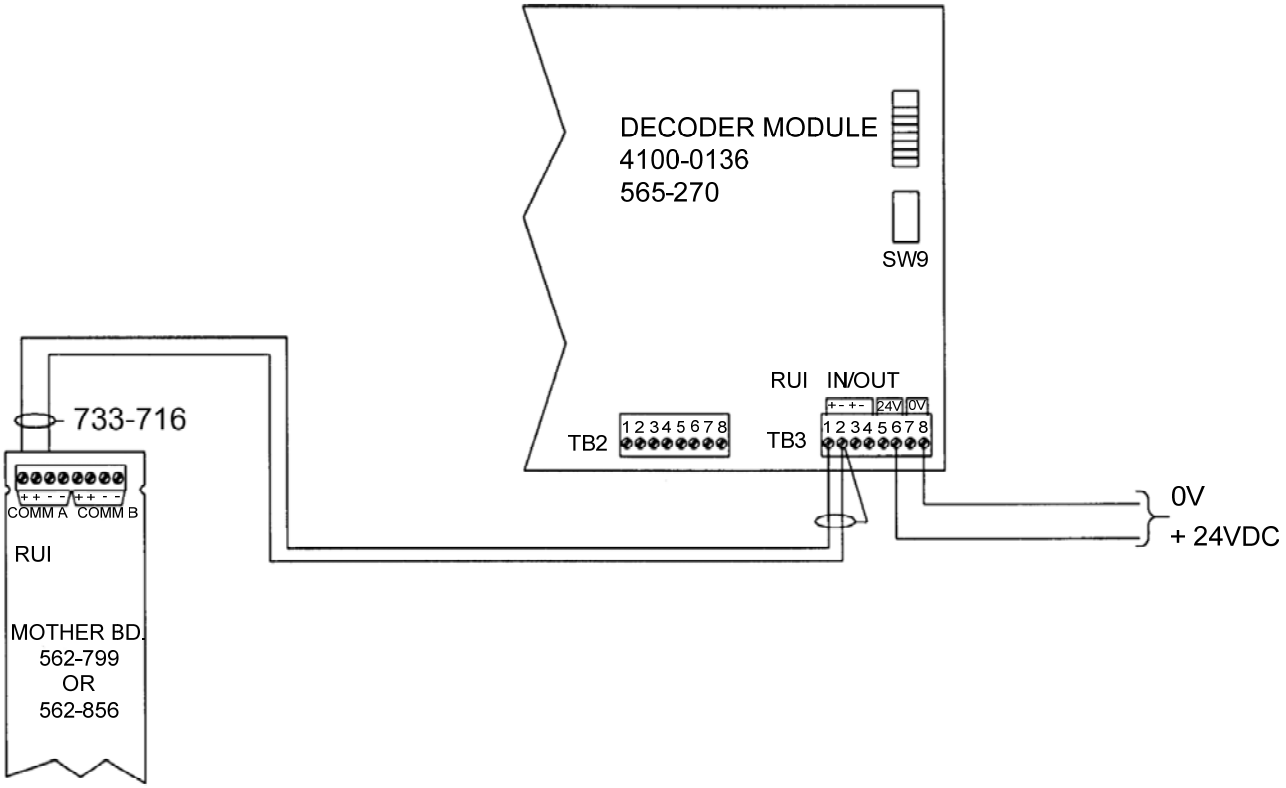

Figure 10. Decoder Module Wired RUI Style 4 (Class B)

Continued on next page

RUI Style 6 (Class A)

Before wiring, review the following guidelines:

- For one decoder, the maximum RUI wiring distance is 2,500 feet for 12 and 14 AWG, and 1,200 feet for 18 AWG.
- RUI communications lines must be 18 AWG, twisted shielded pairs with a maximum length of 2,500 feet.
- Communications line power: 32 VDC (max), 130 mA (max), 1200 or 9600 baud.
- Power to the decoder must be from a power supply commoned to the main power supply. Decoder power is 85 mA at 28.5 VDC (nominal), 90 mA at 28.5 VDC (max), no loops shorted. Alarm current depends on the duty cycle of the coded station. Maximum current with one loop shorted is 163 mA at 28.5 VDC.

Use the instructions and figure below for Class A RUI wiring.

1. Make sure that SW9-1 and SW9-2 are ON, and that SW9-3 and SW9-4 are OFF.
2. Using the 733-716 Harness, complete the connections to the "+" and "-" RUI terminals as Figure 11 shows.

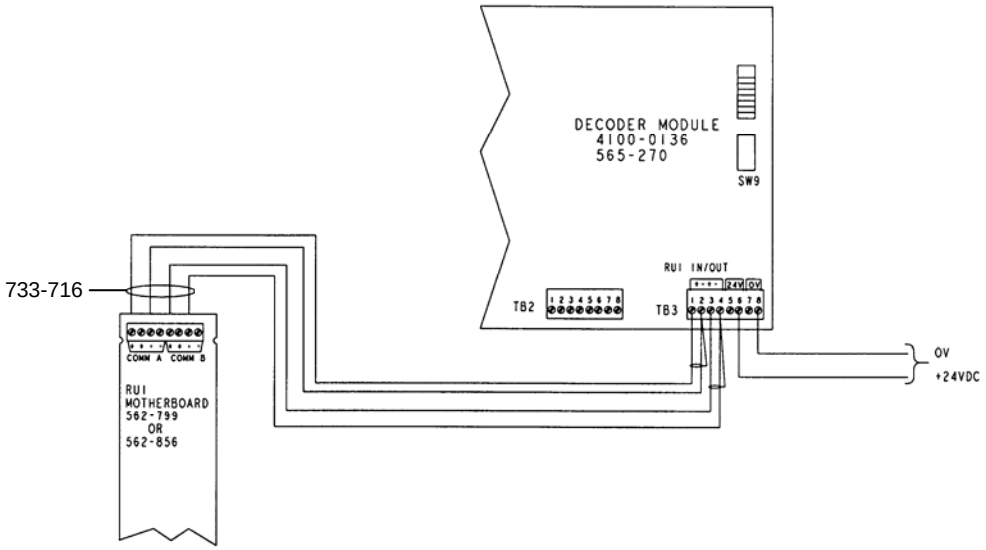

Figure 11. Decoder Module Wired RUI Style 6 (Class A)

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Style B (Class B) with Coded Station/Contact Wiring to Decoder

Before wiring, review the following guidelines:

- Supervised circuit: 28.5 VDC, 8.6 mA.
- Maximum current: 75 mA (shorted) at 28.5 VDC.
- Do not connect any other devices to loops. Connect coded devices or contacts **only**, to decoder loops.
- 800 Ohms maximum resistance per loop, including through any coder contact.

Use Figure 12 below to connect Style B coded station/contact wiring.

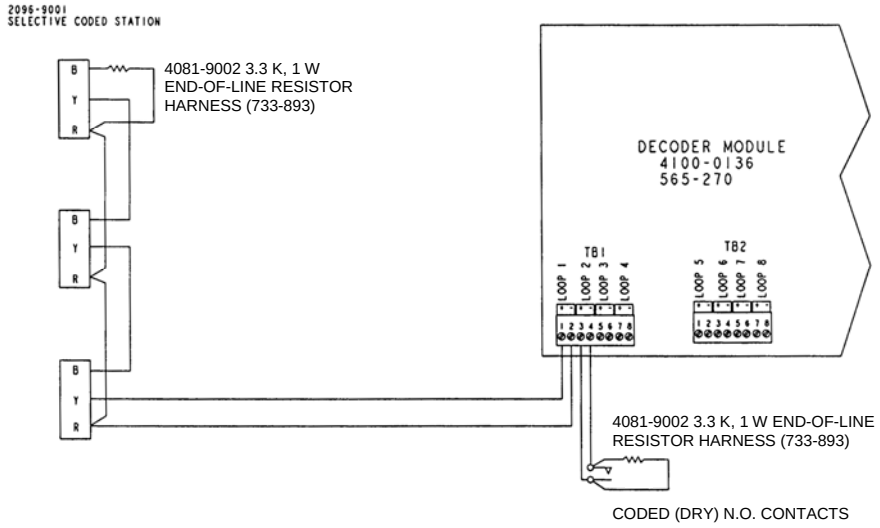

Figure 12. Decoder Module Style B (Class B) with Coded Station/Contact Wiring to Decoder

Labels

Overview

The 4100 Programming Unit is used to program the coder devices so they are seen by the 4100 panel as Style B Monitor ZAM (MBZAM) points of any type (Alarm, Waterflow, and so on). The Programming Unit is used to enter any desired custom labels for these points. It is recommended that the custom label reflect each device's code and/or physical location, as this custom label will be displayed on the operator Interface Panel LCD should an Alarm or Trouble Condition occur.

Each decoder module is supplied with a set of labels that identify both the decoder's place in the system, and each coded station's assigned MAPNET II address. A coded station usually has a metal plate affixed to it which is stamped with the station code. Place the adhesive MAPNET II address label next to this metal plate. Figure 13 shows the various labels associated with the decoder.

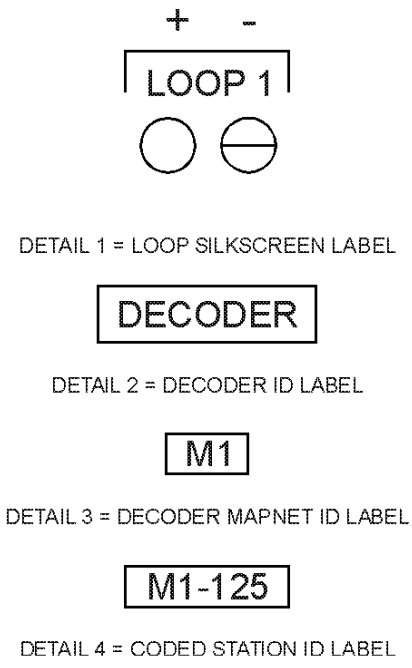

Figure 13. Decoder Labels

Note: To match the Operator Interface Panel display, the Channel 10 label reads "MO".

Device Programming

Overview

The decoder appears exactly like two 4100 MAPNET II cards to a 4100 Master Controller. The decoder scans its eight loop inputs for alarm or trouble conditions and reports all status changes as appropriate (e.g., an open loop is reported as if the condition were an open MAPNET II line).

Note: Programming of the decoder module is performed at the PCB level and should be accomplished using standard ESD precautions.

Configuring the Programming Unit

The 4100 Programming Unit "Card Configuration Editor" handles the decoder as if it were two open MAPNET II cards (i.e., two open MAPNET II cards must be allocated for each decoder module). A total of 250 devices may be assigned to the decoder, 125 on each of two MAPNET channels. Each coder device is added as if it were an addressable "MBZAM" device on a open MAPNET II channel. A custom label relative to the coder's location and/or code must be entered for each device.

Note: Due to programming considerations, device addresses 126 and 127 must be used to report these conditions, even if a system has fewer than 125 devices.

Devices 126 and 127 **must** be programmed as MBZAM, alarm-type devices. The custom label for Device 126 **MUST** be programmed with this label:

UNPROGRAMMED CODE

The custom label for Device 127 MUST be programmed with this label:

UNRECOGNIZED/INCOMPLETE CODE

Device numbers 126 and 127 are reserved so that the decoder can report an alarm should either a received code not be programmed, or a code not be successfully transmitted.

Programming the Decoder

When the decoder board is first powered up (with switch SW1 set up to the NORM [normal] position), the board's LCD display shows the following message:

```
DECODER STARTUP
in progress ....
```

Continued on next page

Programming the Decoder

1. Place switch SW1 in the <PROG> position (see Figure 1 for the location of SW1 if necessary). The decoder LCD displays the code for the first device on the decoder's first MAPNET II channel.

```
CHNL A DEV 001
CODE 12-07-01
```

2. Press the <MODE> key. The display shows the following message.

```
PRESS "ENTER" TO
CLEAR ALL CODES
```

3. Press the <ENTER> key if you want to erase all of the codes previously entered. When you press the <ENTER> key, the decoder responds with the following verification message.

```
VERIFY CLEAR
ALL CODES Y/N
```

Press the <ENTER> key if you want all of the codes cleared from the EPROM. As soon as the <ENTER> key is pressed, the decoder LCD displays the screen for the first device on the decoder's first MAPNET II channel, as shown below. Skip ahead to step 4 if and after you press the <ENTER> key.

```
CHNL A DEV 001
CODE
```

However, if you do not want to clear all the coded information, but rather want only to make changes to some of the device codes, press the <MODE> key again. The LCD shows the following message.

```
PRESS "ENTER" TO
PROGRAM CODES
```

Press the <ENTER> key. The decoder shows the screen for the first device on the decoder's first MAPNET II channel with the previously programmed device code, as shown below.

```
CHNL x DEV xxx
CODE
```

4. Select the desired channel by placing the cursor under the channel letter and pressing the <INC> (Increment) key or <DEC> (Decrement) key.

Note: The decoder refers to its channels as "A" and "B", since the MAPNET II channel numbering information used by the 4100 panel is not available to the decoder.

Continued on next page

Programming the Decoder

5. Select the desired device address.

   Use the <RIGHT> key to move the cursor beneath the right-most digit of the device address. Press either the <INC> or <DEC> key to select the desired address. For this example, the device address is 125, as shown below.

```
CHNL A DEV 125
CODE
```

6. Select the desired device code.

   Use the <RIGHT> key to move the cursor to the CODE position on the display. As soon as the cursor is placed in the CODE position, the decoder shows the following display.

```
CHNL A DEV 125
CODE 00-
```

Note: The display now shows a dash after the left-most digit. The dash (or hyphen) signifies the space between digits.

Use the <INC> and <DEC> keys to change the first pair of digits. The number under the cursor can be incremented or decremented to program any valid code.

Note: While the range of the digit pair is from 00 to 15, a 00 code indicates that the digits to the left of the 00 represent the complete code. Hence, the 00 digit pair cannot be used as the first digit pair.

After you are satisfied with the first digit pair, press the <RIGHT> key, and program the second pair of digits. Continue pressing the <RIGHT> key to obtain more digit pairs. Six digit pairs are available for coding. However, due to space limitations, the sixth digit pair is presented as a hexadecimal (HEX) number with a range of from 0 to F. (For example, the number 12 in HEX is “C”.)

Note: Since a zero digit pair signifies that the digits to the left of that pair represent the complete code, once you have selected a zero digit pair, you will be unable to move the cursor to the right to obtain more digit pairs.

7. Store the selected code against the displayed address by pressing the <ENTER> key, and cycle the display to the next address to be programmed.
8. Verify the codes that you’ve programmed against the Master List.
9. Attach the new code labels to the proper coded stations.
10. Verify that all codes are properly recognized after programming.

    It is important that you verify the programmed codes against the Master List, and that the paper labels are attached to the correct coded stations. Also, you should verify that all codes are properly recognized after programming.

Continued on next page

Other Programming Tips

At any time during programming, you can access the Data Clear function by pressing the <MODE> key. If you press the <ENTER> key in response to the "Clear All Codes" screen, you effectively start over. You do get a second chance, however. If you press the <ENTER> key, a second message on the LCD display asks you to "VERIFY CLEAR ALL CODES". If you select "Y" with the cursor, all programming will be erased and you will be returned to the original LCD display shown below.

```
CHNL A DEV 001
CODE
```

If extra devices are programmed (meaning that more codes are programmed at the decoder than MBZAM devices are programmed in the 4100 Programming Unit), the decoder will accept the programmed codes, but will report **EXTRA MAPNET DEVICE** troubles for all of the extra points.

If the same code is programmed twice (meaning two addresses represent a single code), the decoder indicates this error by displaying a "DUPLICATE CODE" message. For example, if you enter a code for a device that is a duplicate of the code entered for Device A-001 and press the <ENTER> key, the decoder responds with the message shown below.

```
DUPLICATE CODE.
SAME AS A-001_
```

You must either change the entry, or use the <INC> or <DEC> key to scroll to the other entry.

Continued on next page

Other Programming Tips

When all codes have been entered, return the unit to normal operation using the PROG/NORM switch, SW1. When you place switch SW1 in the NORM position, the decoder responds with the message shown below.

```
SAVE CHANGES Y/N
```

Note that the cursor is below the “Y”. Pressing the <ENTER> key indicates acceptance of any changes that you may have made while in program mode. The data stored in SRAM will now be burned into the EEPROM. After this task is accomplished, the decoder will establish normal communications with the 4100 Master Controller.

If you do not want to make the changes from this programming session, use the <RIGHT> key to move the cursor beneath the “N”, and press the <ENTER> key. The decoder responds with the message shown below.

```
EXIT WITHOUT SAVING
Y/N
```

The default position of the cursor is under the “Y”. If you respond by pressing the <ENTER> key, the program changes that you made will be lost. The decoder will return to normal operation, using the data previously stored in the EPROM.

If you want to save the changes from this programming session, use the <RIGHT> key to move the cursor beneath the “N”, and press the <ENTER> key. The decoder responds with the initial exit screen message shown below.

```
SAVE CHANGES Y/N
```

Decoding a Code

The decoder software will translate a received code to the appropriate MAPNET II device address, and report the device state to the 4100 Master Controller. If two rounds of a code are received, and that code is not stored in memory (not a programmed code), an alarm is indicated for Channel A, Device 126. Device 126 is programmed at the 4100 Programming Unit as an alarm-type device with the custom label "UNRECOGNIZED/INCOMPLETE CODE". All alarms will be cleared on reset. If a single round of code is received with no following codes, the decoder will report a trouble against the appropriate MBZAM if the code is recognized, and against Channel A, Device 126 if the code is not known. The trouble will be indicated at the 4100 panel as an open circuit trouble, and will clear on reset. As a code is processed, the decoder will display the message shown below.

```
DECODING........
CODE
```

The decoder will display the Code digits when one round of the code has been received. After the code is verified the decoder will display the point address and device code as shown below.

```
CHNL A-125 ALARM
12-7-1
```

The last received code will be displayed until system reset. If an UNPROGRAMMED code (Device 126) is received, the decoder will transmit an Alarm to the 4100 panel against Device 126, and the message "ALARM – UNKNOWN CODE" will be displayed on the decoder LCD. If a single round of code is received, the display will be similar to the one shown below.

```
CHNL A-125 TBL
12-7-1
```

Continued on next page

4100 Operator Interface Panel Operation

The front panel operations relating to coded devices reported by the decoder module will be the same as with MBZAM devices with few exceptions. Sample 4100 LCD displays for the Alarm, Trouble, and Disable states of a coded station are shown below.

```
CUSTOM LABEL  (40 CHARACTER MAXIMUM)
FIRE MONITOR ZONE                      ALARM
```

```
CUSTOM LABEL  (40 CHARACTER MAXIMUM)
FIRE MONITOR ZONE       OPEN CIRCUIT TROUBLE
```

```
CUSTOM LABEL  (40 CHARACTER MAXIMUM)
FIRE MONITOR ZONE            DISABLE TROUBLE
```

The disable function is used to prevent a point from causing an alarm at the Operator Interface Panel. A point that alarms while disabled will not be indicated as an alarm at the Operator Interface Panel, but will be indicated on the decoder LCD. When the point is enabled from the Operator Interface Panel, a 60-second timer will count down to zero. After the timer expires, alarms from the coded stations are enabled.

Since the decoder is not actually communicating with the coded stations, some troubles associated with MAPNET II communication errors are different, or not applicable. A “WRONG DEVICE” trouble will be indicated if a coded station is not programmed as an MBZAM device. The “BAD ANSWER” trouble is not applicable, and is not used. If a device is programmed in the 4100, but no code is indicated at the decoder, a “NO ANSWER” trouble will be indicated for that device. If devices are programmed at the decoder, but not at the 4100, an “EXTRA DEVICE” trouble will be indicated for that decoder channel.