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GENERAL DESCRIPTION

This manual describes subplate assemblies that connect to Fenwal 6000 or Kidde Aries fire detection systems, providing drivers for LED indicators on annunciators. The subplates is a receive-only device that controls LEDs in response to messages received from the RS-232 printer port of the fire detection system. Information is extracted from the messages to control individual outputs. They are custom products manufactured by Automation Displays Incorporated in Eau Claire, Wisconsin.

Each interface contains a pre-programmed microprocessor which communicates over a three-wire RS-232 serial interface. The three wires are: Transmit Data (TxD), Receive Data (RxD), and Data Ground (GND). A terminal strip connection is provided for the RS-232 signals.

A lamp test feature is built in to the subplates. A terminal is provided for a push-button switch to command the microprocessor to turn on all of the output drivers. The required push-button has a normally open momentary contact, switched to DC common. Other remote switches may be wired in parallel with these contacts.

After the lamp test sequence is over, the annunciator returns to the current display status. Activating lamp test does not interfere with normal data communication. Messages received during lamp test are internally buffered.

The controller board is Automation Displays Z-Card (PCB 2000-180). This circuit board includes a Zilog Z180 processor and 80 output drivers. It also includes EPROM memory which holds the operating program, static RAM for temporary memory, and non-volatile memory for storage of the lookup table. An RS-232 serial port is included to connect the Z-Card to the fire panel during operation, and to a personal computer or dumb terminal during programming. A second serial port is available for remote annunciators.

Non-volatile memory (NOVRAM) stores the database for the annunciated points. This memory is retained even when all power is removed from the unit. No batteries are required. To program the database, a CRT terminal is attached to the RS-232 serial port of

the annunciator interface, and the PROGRAM/RUN DIP switch is set to the PROGRAM position. The CRT screen prompts the operator for information with simple English language commands.

This user-programmable database correlates the fire detection system's device numbers to the LEDs on the graphic. The installer may program the LEDs to respond to a variety of conditions (see: PROGRAMMING THE TRANSLATION TABLE).

When the database programming is complete and the table is saved, the CRT terminal is removed from the annunciator subplate's serial port, the PROGRAM/RUN switch is set to the RUN position, and the microprocessor is reset. Then, the serial port is available for direct connection to the fire detection system.

The database can be re-programmed, altered, or extended at any time via the CRT terminal. If required, Automation Displays can pre-program the database for specific applications.

An external watchdog circuit is included on a small separate PCB to monitor the microprocessor and prevent a loss of service. It provides a relay contact output so that the fire system can monitor the operation of the annunciator.

The Z-Card can drive (80) external LEDs by itself. Additional driver cards can be added to provide (80) more outputs per card.

A DC-DC converter provides internal power to the annunciator from externally supplied 24 volt DC power. The power supply is protected by a fuse. Terminals are provided for the user-supplied 24 volt DC wires. The only way to turn the annunciator interface on or off is by controlling the externally supplied 24 volt DC power.

DATA COMMUNICATION WITH THE FIRE DETECTION SYSTEM:

The annunciator communicates with the fire detection system using an RS-232 serial data interface. The annunciator interface is a receive-only device to the fire detection system. The data communication hook up requires only two wires: RECEIVE DATA (RxD) and DC COMMON (GND).

The RS-232 port in the annunciator is configured as follows:

CHARACTER CODES	=	ASCII
STOP BITS	=	TWO BITS (see below)
PARITY CHECK	=	NONE
DATA BITS	=	8 BITS
BAUD RATE	=	9600 BAUD

(See DIP SWITCH OPTIONS)

Although the Z-Card is programmed to transmit two stop bits, the receiver only requires one stop bit.

FENWAL 6000/KIDDE Aries SYSTEM COMMUNICATION MESSAGES

If a key word sequence is detected, the annunciator looks for a device address in the message. The following LED types can be controlled by messages from the printer port of the Fenwal 6000/Kidde Aries system: ALARM, TROUBLE, ABORT & AGENT RELEASE

Alarm, Trouble and Abort addresses consist of three ASCII decimal digit characters in the range 001 to 255, followed by a single "space" character. The characters before and after the key word sequence do not affect recognition of the keywords.

In the following examples, 123 is used to represent the device address. The command is given on the left in italics, and the interpretation is on the right in normal font.

Alarm LED commands:

<i>123 ALARM ON</i>	ALARM LED on
<i>123 PREALARM ON</i>	ALARM LED on
<i>123 PRE-ALARM ON</i>	ALARM LED on
<i>123 ALARM OFF</i>	ALARM LED off*
<i>123 PREALARM OFF</i>	ALARM LED off*
<i>123 PRE-ALARM OFF</i>	ALARM LED off*

Trouble LED commands:

<i>123 TROUBLE OPEN ON</i>	TROUBLE LED on
<i>123 CONTACT FAILURE ON</i>	TROUBLE LED on
<i>123 TROUBLE OPEN OFF</i>	TROUBLE LED off
<i>123 CONTACT FAILURE OFF</i>	TROUBLE LED off

Abort LED commands:

<i>123 ABORT ON</i>	ABORT LED on
<i>123 ABORT OFF</i>	ABORT LED off*

Other types of LEDs use unique address formats. Some examples are listed below. The programming screen prompts provide information about each LED type's valid address range.

In the following commands, the Agent Release device address must be in the range of 1 thru 8. The following examples use device address 1.

<i>AR1 AGENT RELEASED</i>	AGENT RELEASE LED on
<i>AR1 OPEN CIRCUIT ON</i>	AGENT RELEASE LED on

<i>AR1 SHORT CIRCUIT ON</i>	AGENT RELEASE LED on**
<i>AR1 OPEN CIRCUIT OFF</i>	AGENT RELEASE LED off*
<i>AR1 SHORT CIRCUIT OFF</i>	AGENT RELEASE LED off**

System messages:

<i>SYSTEM RESET</i>	Clears all LEDs except TROUBLE LEDs
<i>PANEL RESET</i>	Clears all LEDs except TROUBLE LEDs
<i>POWER ON RESET</i>	Clears all LEDs

PROGRAMMING THE TRANSLATION TABLE

A typical annunciator may not have a separate LED for every addressable device in a system. A system is provided to correlate a device address (or range of addresses) to each LED on the annunciator. This is accomplished with an operator-programmable translation table. The annunciator can be programmed to associate several device addresses to one LED. In that case, one or more active devices can illuminate the LED.

Also, the same device address may be programmed into more than one LED. Using this method, you may configure one LED (usually red) to indicate alarm, and another (usually yellow) to indicate trouble. Combinations of groupings can be used to provide zone indications.

To program the table, a CRT terminal is required. This terminal is connected to the annunciator's RS-232 port in place of the fire detection system.

When the CRT terminal is connected, place the annunciator's PROGRAM/RUN switch into the PROGRAM position, and press the RESET switch.

The CRT will then display a screen full of information for the

first LED, along with prompts to help you edit that information.

The screen will look something like this:

```
LED # 1                TYPE = ????
```

The device numbers associated with this LED are:

```
M-D #
```

```
Bytes used = 70        Bytes free = 4025
```

Press:

```
I to Insert an RCU, D to Delete an RCU, T to
change Type, N for Next LED, P for Previous LED, G
to Go to a LED, L to List points, C to Clear the
table, S to Save the table, X to transfer files
(upload/download), V to View checksum...
```

Pressing "I" causes the CRT to prompt you for a device number:

```
Insert an RCU number between 001 and 255 ->
```

If you enter a number that is out of range, the CRT will inform you of the error and provide a sample list of valid address ranges. If the entry is within range, then the CRT displays the main screen again, with the new device number inserted.

You can enter multiple device addresses with one command by inserting a module-device using a slightly different format. table. For example:

```
001-050
```

will cause RCU numbers 001 thru 050 to be added to the table.

Pressing "D" works the same way, except that devices are deleted from the current LED's listing.

Pressing "T" allows you to edit the TYPE of the LED. Currently supported types are:

ALARM, TROUBLE, ALARM & TROUBLE, ABORT , AGENT RELEASE

The screen prompt looks like this:

```
Press T=Trouble, A=Alarm, B=Both alarm &
      trouble, S=Supervisory, A=Abort, G=aGent
      release ->,
```

After an entry is made, the CRT returns to the main screen and displays the new type for the current LED.

Pressing "N" increments to the next LED present in the table. When the end of the table is reached, it wraps around to the beginning. The "P" command decrements to the previous LED.

Pressing "G" allows the operator to go to a specific LED without having to step through each LED in sequence. After pressing "G", the CRT will then display the following message:

```
Enter a LED # (0 thru 639):>
```

At the prompt, enter a LED number and press <ENTER>. If you enter a number that is not in the valid range, a message will inform you of the error and allow you to try again. If you make a mistake while entering the number, you can use the backspace key to erase it.

After the LED number is entered, the annunciator searches its translation table for a matching entry. If none is found, then a blank table entry is created for that LED.

Pressing "L" switches the CRT display to a "list" screen which shows ten LEDs at one time, along with their associated module-device numbers. It is useful for looking quickly at the table. No editing is allowed in this screen. You must press "Q" to return to the editing

mode.

Pressing “C” clears the entire table. In case the “C” was hit inadvertently, the CRT gives you a second chance to change your mind by displaying the following prompt:

The whole list will be erased - are you sure? (Y/N)...>

If you type “N” at this point, then no action will be taken and the CRT will return to the main screen.

Finally, pressing “S” saves the table in non-volatile memory. **If you do not save the table, it will be forgotten when the unit is powered down.**

After saving the table, you can press “V” to view the table’s checksum. This number can be recorded and used to verify a table at a later date.

Here is how the non-volatile storage works:

1) Every time the microprocessor is initially powered up (or reset), it checks for the existence of non-volatile memory (NOVRAM). If this memory is not found, a message is displayed on the CRT (in the PROGRAM mode) to inform the operator of the error.

2) When the interface is turned on, it looks for a pre-existing table. When it is found, the microprocessor transfers it from NOVRAM (which is slow) to RAM (which is very fast). This process takes a few seconds. In the PROGRAM mode, the CRT will print “.” characters while the table is loaded, to indicate that progress is being made.



3) When the operator uses the CRT in the PROGRAM mode to save the table, the contents of RAM are copied into NOVRAM for storage. Again, this process may take several minutes. In the PROGRAM mode, the CRT will print “.” characters while the table is saved, to indicate that progress is being made.

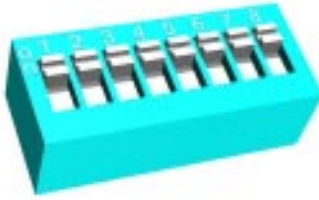
FILE TRANSFER FUNCTIONS

File transfer functions can speed up the programming of annunciators, and can also be used to provide valuable database backups. You should have experience manually programming the translation table before you attempt to use the file transfer functions. The translation table is exchanged as a simple text file. The best way to see what it should look like is to manually program a short table using one of each type of LED you intend to have in the final table. Then, select the file transfer function #2 from the menu:

FILE TRANSFER MENU:

- 1) FROM Z-Card to PC (raw ASCII)
- 2) FROM Z-Card to PC (formatted ASCII)
- 3) FROM PC to Z-Card (formatted ASCII)

This will give you an example of how the file should look. You can save it as a test file and edit to your requirements. The exact number of space characters doesn't matter. You will need XON/XOFF handshaking enabled on your terminal program in order to do file transfers. Windows' HyperTerminal works fine, when set to the correct baud rate. To load the table from your computer to the annunciator, use file transfer function #3. Then use your terminal program to do a text file transfer.



DIP SWITCH OPTIONS

The Z-Card has an eight-position DIP switch that allows selection options listed below. Press the reset switch after changing DIP switch settings.

- SW. #1: Must be OFF

- SW. #2: ON= 9600 baud (Z-Card w/ 24.576 MHz crystal)
4800 baud (Z-card w/ 12.288 MHz crystal)
OFF= 19200 baud (Z-Card w/ 24.576 MHz crystal)
9600 baud (Z-Card w/ 12.288 MHz crystal)

- SW. #3: ON= Watchdog enabled
OFF= Watchdog disabled, contact always closed

- SW. #4: ON= Watchdog timeout=5 minutes (if enabled) on 12.288 Mhz Z-Card. Watchdog timeout= 2 - 1/2 minutes (if enabled) on 24.576 Mhz Z-Card.
OFF= Watchdog timeout=240 minutes (if enabled) on 12.288 MHz Z-Card. Watchdog timeout=120 minutes (if enabled) on 24.576 MHz Z-Card.

- SW. #5: ON= Alarm & Abort LEDs remain on until SYSTEM RESET, PANEL RESET, or POWER ON RESET command is received.
OFF= LEDs are not latched - they can be cleared by individual "off" commands.

- SW. #6: Not used
- SW. #7: Not used

- SW. #8: ON= PROGRAM mode
OFF= RUN mode.

THE WATCHDOG TIMER (INTERROGATION CONTACTS)

The watchdog is a hardware circuit that detects missing pulses. The pulses are provided thru the Z-Card and are generated by software. A relay contact is provided so that an external monitoring circuit can check the annunciator to verify that it is on-line and operating. If the unit is in the PROGRAM mode, or if there is a hardware or power failure, then the software stops providing pulses to the watchdog circuit, which then opens the relay contact. The relay contact will also open if a time period elapses without any communication with the fire system (see DIP SWITCH SETTINGS).

CONNECTING EXTERNAL LEDES

External LEDs are wired by the customer to the two 44-pin card edge connectors provided on each driver board. Each driver board can control up to (80) LEDs. The driver board's part number is 8171-80. A schematic with the same number is included at the back of this manual. An annunciator can incorporate up to eight of these driver boards, for a maximum of 640 LEDs.

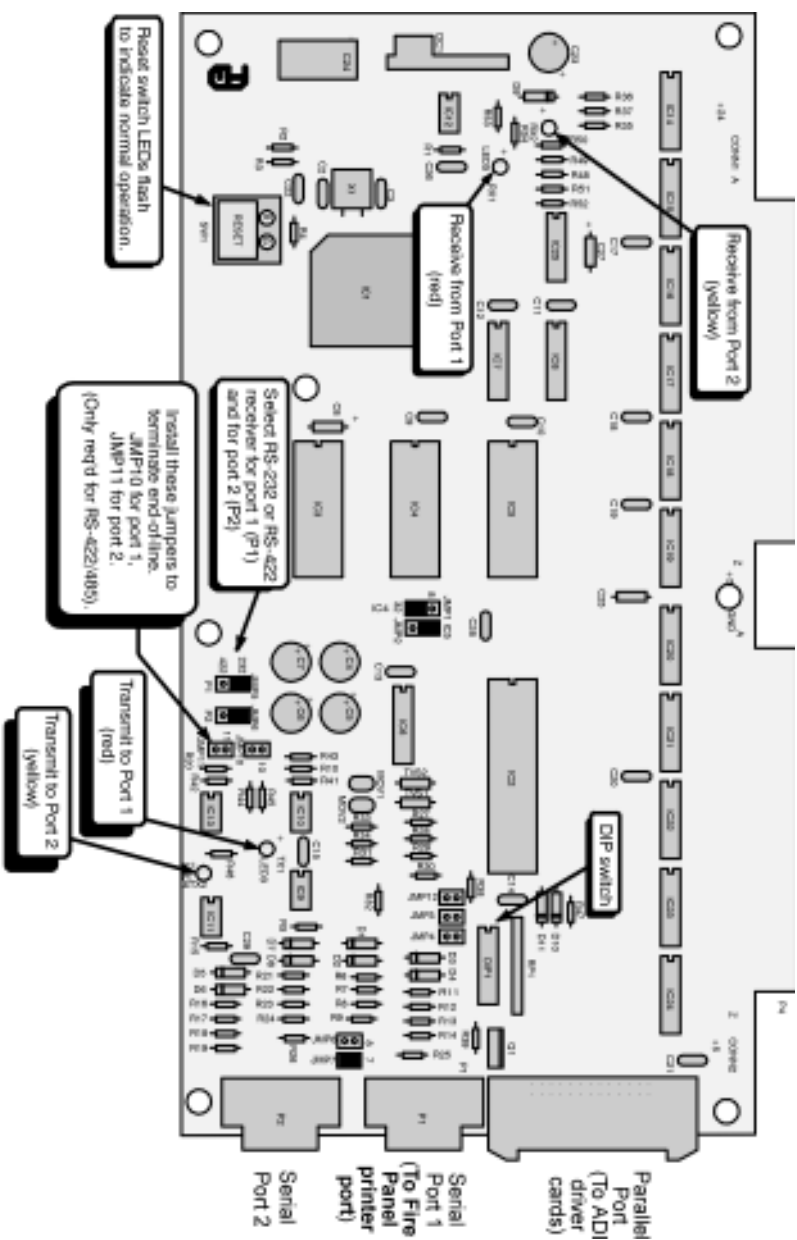
The LEDs should be wired with a positive common, as shown by the "typical LED" on the schematic. A current-limiting resistor must be wired in series with the LED. Most LEDs require an operating current of about 15 to 20 milliamps. A typical resistor for a dot LED, driven by five volts DC, would be 180 ohms. When using five volt power, a 1/4 watt resistor rating is sufficient. Higher values of resistors must be used when the LEDs are driven by voltages greater than five volts.

Viewed from the edge, a connector's pins are numbered like this:



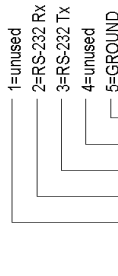
These pins are located on the schematic above the upper row upper row of driver chips for 22/44 connector #1, and below the

Z-Card_CONNECTOR_2 (LEDS)			Z-Card_CONNECTOR_1 (LEDS)		
ADDR	DESCRIPTION	TERM	ADDR	DESCRIPTION	TERM
0		PIN 21	40		PIN 21
1		PIN Y	41		PIN Y
2		PIN 20	42		PIN 20
3		PIN X	43		PIN X
4		PIN 19	44		PIN 19
5		PIN W	45		PIN W
6		PIN 18	46		PIN 18
7		PIN V	47		PIN V
8		PIN 17	48		PIN 17
9		PIN U	49		PIN U
10		PIN 16	50		PIN 16
11		PIN T	51		PIN T
12		PIN 15	52		PIN 15
13		PIN S	53		PIN S
14		PIN 14	54		PIN 14
15		PIN R	55		PIN R
16		PIN 13	56		PIN 13
17		PIN P	57		PIN P
18		PIN 12	58		PIN 12
19		PIN N	59		PIN N
20		PIN 11	60		PIN 11
21		PIN M	61		PIN M
22		PIN 10	62		PIN 10
23		PIN L	63		PIN L
24		PIN 9	64		PIN 9
25		PIN K	65		PIN K
26		PIN 8	66		PIN 8
27		PIN J	67		PIN J
28		PIN 7	68		PIN 7
29		PIN H	69		PIN H
30		PIN 6	70		PIN 6
31		PIN F	71		PIN F
32		PIN 5	72		PIN 5
33		PIN E	73		PIN E
34		PIN 4	74		PIN 4
35		PIN D	75		PIN D
36		PIN 3	76		PIN 3
37		PIN C	77		PIN C
38		PIN 2	78		PIN 2
39		PIN B	79		PIN B

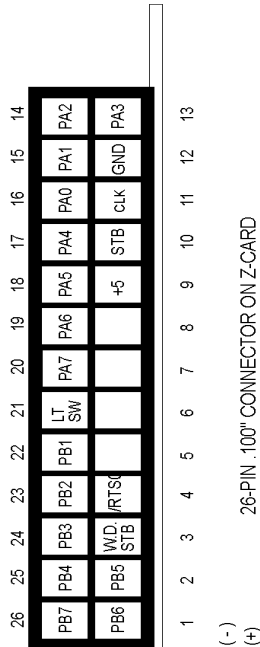
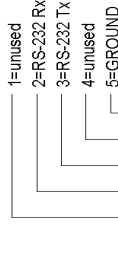


Z-Card Jumper Settings & Status LEDs

Serial Port #2
DB-9M



Serial Port #1
DB-9M



26-PIN .100" CONNECTOR ON Z-CARD

Z-Card Parallel & Serial Port Pinouts

Recently several customers have reported GROUND FAULT and COMM FAULT error messages from newer FN2000 units when connecting directly to the ADI subplate's power supply and communication terminal strip. This diagram shows a new CTS terminal connection and a diode added in an effort to eliminate this problem.

