

SILENT KNIGHT
MODEL 4150
AUXILIARY CONTROL MODULE
INSTALLATION MANUAL
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1 INTRODUCTION

The Model 4150 is a UL Listed accessory item for the Model 4720 Control/Communicator. The eight (8) outputs of the 4150 can be controlled locally from any of the 4720's keystations or remotely from the central station. The four (4) inputs of the 4150 can remotely report to the central stations Security Communication Computer or Silent Knight Model 9000 Digital Receiver. You MUST use the SIA Format with phone #4 when using the Model 4150.

2 INSTALLING THE 4150

Mount the 4150 cabinet as close as possible to the 4720 control panel. Connect one end of the 12-wire cable (provided) to the connector on the 4150 printed circuit board. Connect the other end of the cable to the EXPANSION connector on the 4720. The Model 4150 must be mounted within 3 feet of the 4720 Control/Communicator.

CAUTION: Incorrect connection may result in damage to the 4150.

2.1 4150 OUTPUTS

The 4150 provides 8 pairs of relay contacts, which may be programmed as Normally Open or Normally Closed. The terminals labeled "I" 1 thru 8 are the common contact of the relays. The terminals labeled "O" 1 thru 8 are the Normally Open contacts of the relays. Normally Open is defined as "Contacts are open when the door is open." Normally Closed is defined as "Contacts are closed when the door is open."

There are two (2) types of relay activation (Continuous and Momentary).

2.2 CONTINUOUS ACTIVATION

When a relay is selected for continuous activation it operates as follows:

When a relay is activated, it toggles to its opposite state and remains in that state until it is activated again.

EXAMPLE: If a relay is programmed as Normally Closed and it is activated, it will switch to the Open state. The contacts will remain open until the relay is activated a second time.

2.3 MOMENTARY ACTIVATION

When a relay is selected for momentary operation, the time that the relay will remain closed (or open) can be programmed from 1 to 255 seconds.

EXAMPLE 1: If an Activation Time of 10 seconds is programmed, the relay will toggle to its opposite state for 10 seconds and then return to its normal state.

EXAMPLE 2: If you use a Normally Open relay with an Activation Time of 10 seconds, it will respond as follows: When the relay is activated it will toggle to the Closed state. 10 seconds after it closes, it will return to its Normally Open state.

There are four (4) methods to activate the relays.

1. They can be activated manually from a keystation.
2. They can be activated automatically according to a programmed time schedule.
3. They can be activated by the central stations Security Communications computer.
4. They can be activated by the A/D (analog to digital) converters of the 4150.

NOTE: The type of relay activation must be selected during programming.

2.4 MANUAL ACTIVATION

DISARMED

To activate a relay when the panel is Disarmed, enter the number of the relay followed by the <DOOR> key (commercial keypads) or the <CODE 2> key (residential keypads).

ARMED (or Disarmed when AUX CODE has been selected)

To activate a relay when the panel is Armed, enter the number of the relay followed by the <DOOR> key or the <CODE 2> key. The display will ask for your access code. Entering your code will then activate the relay.

2.5 AUTOMATIC ACTIVATION

To use the Automatic Activation you must program the OPENING and CLOSING times. The 4150 allows you to select a "Normal" time window and a "Special" time window. You will also be required to select the days that you will be using each window. The example below shows how the two types of windows may be used.

EXAMPLE 1: If you have one of the relays connected to a doorstrike you may want a "Normal" time window from 8:00 AM to 5:00 PM Monday thru Friday and a "Special" time window from 11:00 AM to 3:00 PM on Saturday and Sunday.

NOTE: During programming you will have the option to NOT activate a relay on any given day. You also have the option of being able to manually activate a relay that is programmed not to toggle on that day.

EXAMPLE 2: If you have selected a "Normal" time window From 8:00 AM to 5:00 PM and you have selected an Activation time of 10 seconds, the relay will act in the following way: At 8:00 AM the relay will toggle. 10 seconds later, it will return to its normal state. At 5:00 PM the relay will toggle. 10 seconds later, it will return to its normal state.

2.6 SECURITY COMMUNICATIONS COMPUTER

Refer to the 5540 uploading/downloading software manual for instructions on using the computer.

2.7 ANALOG TO DIGITAL ACTIVATION

The Model 4150 has 4 A/D converters that can be programmed to activate relays 1 thru 4 respectively when there is an Alarm condition or to report to the central station or both.

3 4150 INPUTS

The four terminals labeled IN1, IN2, IN3, and IN4 are the inputs to the Analog to Digital Converters. These inputs may be used for sensing such things as temperature, air flow, humidity, and fluid level. Figure 3A shows a typical wiring diagram for using Silent Knight sensors. Installation instructions for the various sensors may be found in Appendix A (Section 14) of this manual.

NOTE: The Model 4151, 4152, 4153 and 4154 sensors are not recognized by Underwriters Laboratories.

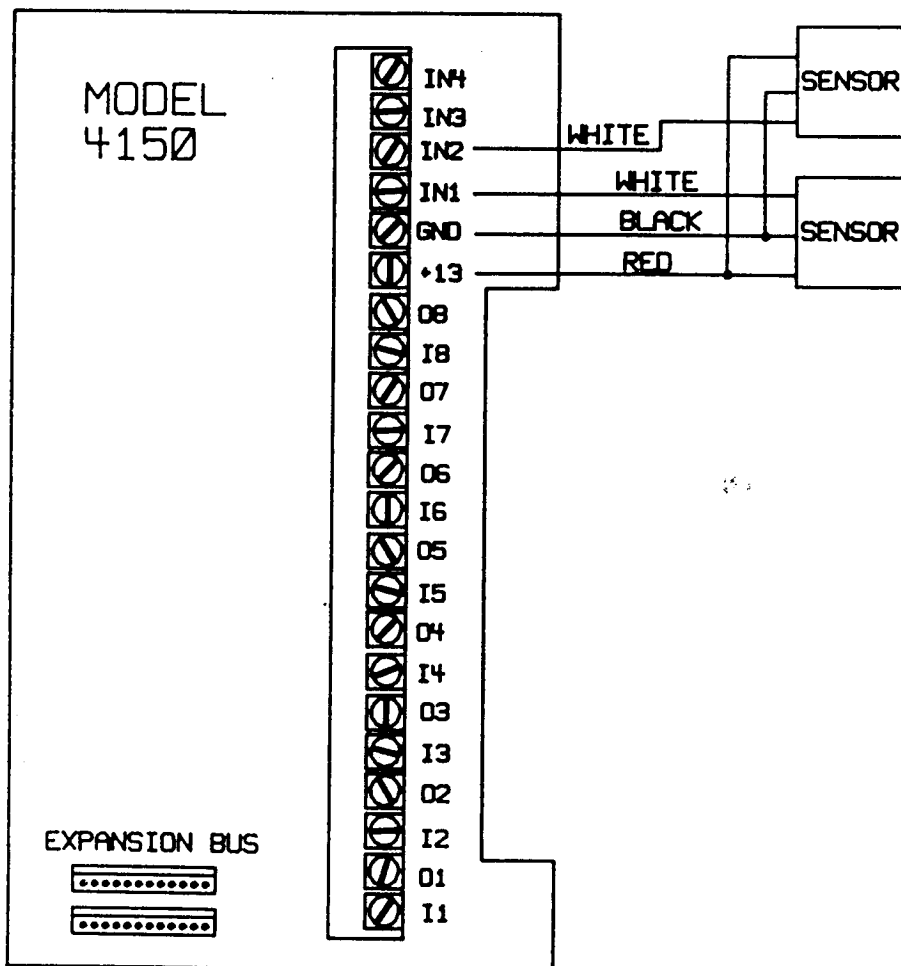


FIGURE 3A: SENSOR WIRING

4 PROGRAMMING THE MODEL 4150 (using a full function keystation)

SPECIAL KEYSTATION FUNCTIONS

When a full function keystation is being used to program the 4150, individual keys may have more than one function or may be used for functions other than the one for which they are labeled. The illustration below shows a residential keystation laid out for the programming modes. Note that keys with diagonal lines are used for a function other than the one for which they are labeled, and keys with horizontal lines are not used.

NOTE: Five digital keystations are being replaced by newer models. The Model 4200 is being replaced by the Model 4203, the Model 4430 by the Model 4433, the Model 4530 by the 4533, the Model 4550 by the Model 4553 and the Model 4560 by the Model 4563. The Model 4540 has been discontinued. (Models 4200 and 4203 are not recognized by Underwriters Laboratories.) On the new keystations, the <SHUNT> key has been renamed the <BYPASS> key, and the <NOT READY> key has been renamed the <STATUS> key. Throughout the manual, the old key name will be shown in parentheses after the new name.

MON	A	TUE	B	WED	C	THU	D	FRI	E	ENTER		DISPLAY	SHIFT
1	PM	2		3		4		5		TEST	ALARM MEM	STATUS (NOT READY)	BYPASS (SHUNT)
SAT	F							SUN		CLEAR	EXIT		ADDRESS
6		7		8		9		0	AM		MUTE	CODE 2	CHIME/INTERIOR

FIGURE 4A: RESIDENTIAL KEYSTATION

KEYPAD SUMMARY

KEY	FUNCTION
<0>-<9>	Digit 0-9.
<BYPASS> (<SHUNT>)	Shift next digit (1-6 becomes A-F).
<TEST>	Enter the data, advance the address.
<CLEAR>	Clear the display.
*<CHIME/INTERIOR>	Set ADDRESS Mode (press <CHIME/INTERIOR>, then the address you wish to go to, then <TEST> to display it).
<STATUS> (<NOT READY>)	Toggle data display between HEX and BINARY.
<MUTE>	Press twice to exit Mode 6.
other keys	Do not use while programming.

* <CHIME/INTERIOR> key is labeled <CHIME> on commercial keystations.

NOTE: After you have been in the PROGRAM Mode for 3 minutes and you have not pressed any keys, the second line of the display will indicate how many seconds are left before the system returns to the NORMAL Operating Mode. If the system returns to the NORMAL Mode, you will have to re-enter the PROGRAMMING Mode before you can enter any more data.

<SHIFT> The **<SHIFT>** (**<BYPASS>**) key is used to shift a digit key to its Hexadecimal equivalent. Press the **<SHIFT>** (**<BYPASS>**) key followed by the Hexadecimal digit that you wish to enter.

EXAMPLE: To enter a Hexadecimal "F", press **<SHIFT>** (**<BYPASS>**) then the digit **<6>**.

To enter two Hex digits in succession, press **<SHIFT>** (**<BYPASS>**) then the first digit followed by the **<SHIFT>** (**<BYPASS>**) key and the second digit. The **<SHIFT>** (**<BYPASS>**) key must be pressed before every Hex digit.

<ENTER> The **<ENTER>** (**<TEST>**) key must be pressed after all of your data has been entered into a particular address location to store it in memory. You may use the **<ENTER>** (**<TEST>**) key to step one address location at a time without changing existing data.

<STEP> The **<STEP>** (**<CHIME/INTERIOR>**) key is used to jump to a desired address location.

EXAMPLE: If you wish to jump to address location \$50, press **<STEP>** (**<CHIME/INTERIOR>**), then **<5>** **<0>**, followed by **<ENTER>** (**<TEST>**).

5 SPECIAL WINDOW TIMES

Table 1 shows the address locations for programming the "Special" window times for relays 1 thru 8. The Activation time (if momentary) or Opening and Closing times (if continuous) must be entered using Military time. (See Section 10.1.) Entering "FF" in any location will disable the operation for that relay. To enter "FF", press <BYPASS>, <6>, <BYPASS>, <6>.

TABLE 1

CONTINUOUS	MOMENTARY	HOURS	MINUTES	
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	00 02	01 03	RELAY #1
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	04 06	05 07	RELAY #2
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	08 0A	09 0B	RELAY #3
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	0C 0E	0D 0F	RELAY #4
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	10 12	11 13	RELAY #5
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	14 16	15 17	RELAY #6
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	18 1A	19 1B	RELAY #7
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	1C 1E	1D 1F	RELAY #8

NOTES: The digits shown in the Hours and Minutes columns are Hexadecimal Address Locations.

At OPENING time, a Normally Open relay will open and a Normally Closed relay will close. At CLOSING time, a Normally Open relay will close and a Normally Closed relay will open.

Follow the directions below to program the "Special" time windows.

1. Apply power to the 4720. (Skip Steps 1 and 2 if you are currently in the NORMAL operation mode.)
2. The system is now in the SET TIME mode. Enter the Time and Date (see 4720 installation manual) or Press the <MUTE> key twice to enter the NORMAL operation mode.
3. Press the digit <5>, then <TEST>, followed by Code 0. (Unless you have changed Code 0, it is factory programmed as "1-2-3-4-5-6"). This places the system in the ADDRESS Mode.
4. The display now shows "\$00". This is address location \$00. Press <TEST> to enter the DATA Mode. The display will show "\$00:XXXXX". You can now enter your data. Location \$00 is where you enter the first Activation or Opening Hour for Relay #1. After entering the hour (in military time), press <TEST>.
5. The display now shows "\$01". Enter the first Activation or Opening Minutes in this location and press <TEST>.

EXAMPLE: This example shows how to enter an Opening time of 1:26 PM. At address location \$00, enter <1> <3> and press <TEST>. The display will show "\$01". Enter <2> <6> and press <TEST>.

6. The display now shows "\$02". Referring to Table 1, address location \$02 is where you enter the second Activation or Closing Hour for Relay #1. After entering the hour (in military time), press <TEST>.

7. The display now shows "\$03". Enter the second Activation or Closing Minutes in this location and Press <TEST>.

Repeat Steps 4 thru 7 to enter the times for Relays 2 thru 8. Remember to enter "FF" in the address locations of relays that you will not be using.

6 NORMAL WINDOW TIMES

Table 2 shows the address locations for entering the "Normal" window times for Relays 1 thru 8. Enter the times the same way as for the "Special" windows.

TABLE 2

CONTINUOUS	MOMENTARY	HOURS	MINUTES	
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	20 22	21 23	RELAY #1
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	24 26	25 27	RELAY #2
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	28 2A	29 2B	RELAY #3
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	2C 2E	2D 2F	RELAY #4
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	30 32	31 33	RELAY #5
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	34 36	35 37	RELAY #6
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	38 3A	39 3B	RELAY #7
OPENING CLOSING	ACTIVATION 1 ACTIVATION 2	3C 3E	3D 3F	RELAY #8

NOTE: The digits shown in the Hours and Minutes columns are Hexadecimal Address Locations.

Remember to enter "FF" in the address location of relays that you will not be using.

7 SENSOR TYPE (If not using the A/D inputs, skip this section)

To skip this section, key in:

<STEP> <5> <2> <ENTER>

After you have entered all the data for the relays, you must enter what type of sensor you will be using with the A/D inputs. The following list shows the four types of sensors that may be used and the code that must be entered to select each sensor.

SENSOR TYPE	CODE
	FF NOT USED
TEMPERATURE	01 (MODEL 4151)
AIR FLOW	02 (MODEL 4152)
HUMIDITY	03 (MODEL 4153)
FLUID LEVEL DETECTOR	04 (MODEL 4154)

1. The display now shows "\$40". Enter the sensor code for the type of sensor you will be using on Input #1, then press <TEST>.
2. The display now shows "\$41". Enter the sensor code for the type of sensor you will be using on Input #2, then press <TEST>.
3. The display now shows "\$42". Enter the sensor code for the type of sensor you will be using on Input #3, then press <TEST>.
4. The display now shows "\$43". Enter the sensor code for the type of sensor you will be using on Input #4, then press <TEST>.

8 A/D INPUT REPORTING TYPE (Skip if not using the A/D inputs)

Address locations \$44 and \$45 are where you choose what action will be taken when one of the inputs is activated.

1. To report to the central station ONLY, select the input # in address location \$44 ONLY.
2. To Open or Close the relays but not report to a central station, select the input # in location \$45 ONLY.
3. To Open or Close the relays AND report to the central station, select the input # in BOTH locations \$44 and \$45.

NOTE: Input numbers 5 thru 8 are not used. Entering these numbers will have no effect on the system.

EXAMPLE: Address \$44 = -234---- REPORT
Address \$45 = 1-3----- O/C RELAY

INPUT #1 will Open or Close Relay #1 ONLY.

INPUT #2 will Report to the central station ONLY.

INPUT #3 will Open or Close Relay #3 AND report to the central station.

INPUT #4 will Report to the central station ONLY.

9 INPUT TRIP LEVELS (Skip if not using A/D inputs)

The 4150 allows you to set the HIGH and LOW trip points for Temperature, Pressure (Fluid Level), and Humidity sensors. You must select the settings within the given ranges or they will be ignored by the 4150. The ranges available are:

TEMPERATURE = 0 TO 250 DEGREES FAHRENHEIT
FLUID LEVEL = 0 TO 120 INCHES OF WATER ***
HUMIDITY = 10 TO 90 % RELATIVE HUMIDITY

*** The Model 4154 Fluid Level Detector determines the level of fluids by measuring the pressure at the bottom of the container. It was designed to measure the level of water which has a density of .323 grams per cubic centimeter. If you wish to measure a different liquid, you will have to make adjustments to the high and low trip points so that the 4150 can accurately detect the level. The correction formula is given in Section 9.1.

For Temperature, Fluid Level and Humidity sensors, the relays operate in the following manner:

	LOW TRIP POINT		HIGH TRIP POINT
	Normally Open relay closes	Normally Open relay is open	Normally Open relay closes
	Normally Closed relay opens	Normally Closed relay is closed	Normally Closed relay opens

9.1 FLUID LEVEL CORRECTION FORMULA

$$\frac{.323 * A}{D}$$

.323 = Density of water

* = "times"

A = Actual trip point

D = Density of the liquid being measured.

EXAMPLE: For this example we will figure out the correction factor for measuring the level of ACETONE and we want the 4150 to have a HIGH trip point of 40 inches.

1. Determine the density of ACETONE. (.260)
2. Multiply the density of water (.323) times the actual number of inches that you want to detect (40).

$$.323 * 40 = 12.92$$

3. Divide the result from Step 2 by the density of ACETONE (.260).

$$12.92 / .260 = 49.7$$

4. Round off the result from Step 3 to the nearest whole number (50).

To make the 4150 activate when there is 40 inches of ACETONE, you must enter "50" as the HIGH trip point.

9.2 AIR FLOW

Although you do not set high and low trip points for Air Flow, you still have to enter data to determine what the sensor will report. Refer to the table below to enter this information.

	AIR FLOW DATA	
	LOW	HIGH
To report the presence of Air Flow enter:	000	089
To report a No Air Flow condition enter:	078	000
To report both conditions enter:	078	089

1. The display shows "\$46". Enter the LOW trip point for Input #1 and press **<TEST>**.
2. The display shows "\$47". Enter the HIGH trip point for Input #1 and press **<TEST>**.
3. The display shows "\$48". Enter the LOW trip point for Input #2 and press **<TEST>**.
4. The display shows "\$49". Enter the HIGH trip point for Input #2 and press **<TEST>**.
5. The display shows "\$4A". Enter the LOW trip point for Input #3 and press **<TEST>**.
6. The display shows "\$4B". Enter the HIGH trip point for Input #3 and press **<TEST>**.
7. The display shows "\$4C". Enter the LOW trip point for Input #4 and press **<TEST>**.
8. The display shows "\$4D". Enter the HIGH trip point for Input #4 and press **<TEST>**.

9.3 HYSTERESIS (Skip if not using the A/D inputs)

A hysteresis factor is entered to keep the 4150 from constantly reporting minor changes to the central station. You must enter a hysteresis for Temperature, Pressure, and Humidity sensors. Air Flow sensors are preset.

EXAMPLE 1: If you choose a hysteresis of 5 degrees and your LOW trip point is 10 degrees, the 4150 will act in the following manner.

1. When the temperature drops below 10 degrees, the input will be activated.
2. The temperature must climb above 15 degrees ($10 + 5$) then drop below 10 degrees before the input will be activated a second time.

EXAMPLE 2: If you choose a hysteresis of 5 degrees and your HIGH trip point is 100 degrees, the 4150 will act in the following manner.

1. When the temperature rises above 100 degrees, the input will be activated.
2. The temperature must drop below 95 degrees ($100 - 5$) then rise above 100 degrees before the input will be activated a second time.

9.4 HYSTERESIS PROGRAMMING

1. The display shows "\$4E". Enter the hysteresis for Input #1 and press **<TEST>**.
2. The display shows "\$4F". Enter the hysteresis for Input #2 and press **<TEST>**.
3. The display shows "\$50". Enter the hysteresis for Input #3 and press **<TEST>**.
4. The display shows "\$51". Enter the hysteresis for Input #4 and press **<TEST>**.

10 RELAY PROGRAMMING

10.1 ACTIVATION TIME

You must enter an activation time for both Continuous and Momentary relays.

Entering an Activation Time of 0 seconds selects the Continuous Activation Mode. If you wish to enter an Activation Time for Momentary operation, it must be in the range of 1 to 255 seconds.

1. The display shows "\$52". Enter the Activation Time for Relay #1.
2. The display shows "\$53". Enter the Activation Time for Relay #2.
3. The display shows "\$54". Enter the Activation Time for Relay #3.
4. The display shows "\$55". Enter the Activation Time for Relay #4.
5. The display shows "\$56". Enter the Activation Time for Relay #5.
6. The display shows "\$57". Enter the Activation Time for Relay #6.
7. The display shows "\$58". Enter the Activation Time for Relay #7.
8. The display shows "\$59". Enter the Activation Time for Relay #8.

10.2 RELAY ACTIVATION DAYS

For this section you must select which days that the relays use the "Normal" and "Special" time windows. If you do not wish to use the relays on any given day, DO NOT enter a day code in either address location ("Normal" or "Special"). A given relay cannot be designated as both "Normal" and "Special" on the same day.

SUNDAY = 0
MONDAY = 1
TUESDAY = 2
WEDNESDAY = 3
THURSDAY = 4
FRIDAY = 5
SATURDAY = 6
NOT USED = 7

1. The display shows "\$5A". Select the days that you wish to have Relay #1 use the "Normal" window times and press <TEST>.
2. The display shows "\$5B". Select the days that you wish to have Relay #1 use the "Special" window times and press <TEST>.
3. The display shows "\$5C". Select the days that you wish to have Relay #2 use the "Normal" window times and press <TEST>.
4. The display shows "\$5D". Select the days that you wish to have Relay #2 use the "Special" window times and press <TEST>.
5. The display shows "\$5E". Select the days that you wish to have Relay #3 use the "Normal" window times and press <TEST>.
6. The display shows "\$5F". Select the days that you wish to have Relay #3 use the "Special" window times and press <TEST>.
7. The display shows "\$60". Select the days that you wish to have Relay #4 use the "Normal" window times and press <TEST>.
8. The display shows "\$61". Select the days that you wish to have Relay #4 use the "Special" window times and press <TEST>.
9. The display shows "\$62". Select the days that you wish to have Relay #5 use the "Normal" window times and press <TEST>.
10. The display shows "\$63". Select the days that you wish to have Relay #5 use the "Special" window times and press <TEST>.
11. The display shows "\$64". Select the days that you wish to have Relay #6 use the "Normal" window times and press <TEST>.
12. The display shows "\$65". Select the days that you wish to have Relay #6 use the "Special" window times and press <TEST>.
13. The display shows "\$66". Select the days that you wish to have Relay #7 use the "Normal" window times and press <TEST>.
14. The display shows "\$67". Select the days that you wish to have Relay #7 use the "Normal" window times and press <TEST>.
15. The display shows "\$68". Select the days that you wish to have Relay #8 use the "Normal" window times and press <TEST>.
16. The display shows "\$69". Select the days that you wish to have Relay #8 use the "Special" window times and press <TEST>.

10.3 ACTIVATION TYPE

In this section you will select whether the relays can be activated Automatically, Manually, or both.

1. To select Automatic ONLY, enter the relay # in location \$6A ONLY.
2. To select both Automatic and Manual, enter the relay # in locations \$6A AND \$6B.
3. To select Manual ONLY, enter the relay # in location \$6B ONLY.

10.4 RELAY CONTACT TYPE

At power-up (OPENING), all doors are open, Normally Open contacts are open and Normally Closed contacts are closed.

1. To select the relay contacts for Normally Open operation, DO NOT enter the relay # in address location \$6C.
2. To select the relay contacts for Normally Closed operation, enter the relay # in address location \$6C.

After you have programmed location \$6C, press <TEST>. The display will show "\$6D". Press the <MUTE> key twice to exit the programming mode.

NOTE: Exiting the programming mode places the relays in their normal state.

11 PROGRAMMING THE 4150 (using a Model 5520 programmer)

Carefully read the Model 5520 Programmer Instruction Manual before attempting to program the 4150 using the programmer.

The following paragraphs describe the function of each option when using the Model 5520 programmer.

11.1 RELAY TIMES

If you do not wish to have a relay activate on any given day, select "FF:FF" for the OPENING and CLOSING times.

SPEC RELAY #1

OPEN AT 00:00 - Select the OPENING time for Relay #1 when it is used on "Special" days.

SPEC RELAY #1

CLOSE AT 00:00 - Select the CLOSING time for Relay #1 when it is used on "Special" days.

After selecting the "Special" OPENING and CLOSING times for Relay #1, you will be asked to select the "Special" OPENING and CLOSING times for Relays #2 thru #8.

NORM RELAY #1

OPEN AT 00:00 - Select the OPENING time for Relay #1 when it is used on "Normal" days.

NORM RELAY #1

CLOSE AT 00:00 - Select the CLOSING time for Relay #1 when it is used on "Normal" days.

After selecting the "Normal" OPENING and CLOSING times for Relay #1, you will be required to select the "Normal" OPENING and CLOSING times for Relays #2 thru #8.

11.2 RELAY DAYS

NORMAL DAYS #1 - Select the days that Relay #1 will use the "Normal" OPENING and CLOSING times. This may be done by entering the digits 0 thru 6 for Sunday thru Saturday respectively.

SPECIAL DAYS #1 - Select the days that Relay #1 will use the "Special" OPENING and CLOSING times. This may be done by entering the digits 0 thru 6 for Sunday thru Saturday respectively.

After selecting the "Normal" and "Special" days for Relay #1, continue on by selecting the "Normal" and "Special" days for Relays #2 thru #8. A given relay cannot be designated as both "Normal" and "Special" on the same day.

11.3 ANALOG INPUTS

SENSOR TYPE #1 - Using the digits 1 thru 5, enter the type of sensor that will be used on Analog Input #1.

- 1 = INPUT NOT USED
- 2 = TEMPERATURE
- 3 = AIR FLOW
- 4 = HUMIDITY
- 5 = FLUID LEVEL

Continue by selecting the Sensor Types for Analog Inputs 2 thru 4.

REPORT INPUT - Using the digits 1 thru 4, select the input number of the inputs which will report to the central station.

LINK-INP-RELAY - Using the digits 1 thru 4, select the input number of the inputs that will activate their corresponding relay.

INPUT TRIP #1 LOW (0-255) - Select the LOW trip point for Input #1.

INPUT TRIP #2 HIGH (0-255) - Select the HIGH trip point for Input #2.

Continue by selecting the Trip Points for Analog Inputs 2 thru 4.

SENSOR RANGE

- TEMPERATURE = 0 TO 250 DEGREES FAHRENHEIT
- * FLUID LEVEL = 0 TO 120 INCHES OF WATER
- HUMIDITY = 10 TO 90 % RELATIVE HUMIDITY

If you are measuring a fluid other than water, consult the fluid level correction formula in Section 9.1 of this manual.

NOTE: Although you do not set High and Low trip points for Air Flow, you still have to enter data to determine what the sensor will report. Refer to the chart below to enter this information.

AIR FLOW DATA

LOW	HIGH
-----	------

To report the presence of Air Flow enter:	00	89
To report a No Air Flow condition enter:	78	00
To report both conditions enter:	78	89

HYSTERESIS #1 (Refer to HYSTERESIS explanation on page 10)

Continue by selecting the Hysteresis for inputs 2 thru 8.

11.4 ADDITIONAL RELAY SETTINGS

DURATION #1 - Select the amount of time that the Relay #1 will remain active (Momentary Activation). Select "0" if you wish the relay to use Continuous Activation.

Continue by selecting the Duration for Relays #2 thru #8.

AUTOMATIC - Use the digits 1 thru 8 to select which relays will be Automatically activated.

MANUAL - Use the digits 1 thru 8 to select which relays can be Manually activated.

N.C. CONTACTS - Use the digits 1 thru 8 to select the relays which will have Normally Closed contacts.

12 MESSAGES

There are four messages that can be displayed at the Model 9000 Receiver from the 4150. The messages below will appear on the internal printer of the 9000.

TEMPERATURE 0-250F
AIRFLOW? Y OR N
PRESSURE 0-120 INCHES
HUMIDITY 10-90 PRCT.

13 RATINGS

*NOTE: The 4150 is UL Listed as an accessory to the 4720 Control/Communicator.
It is listed as process management equipment.*

Standby Current Drain - 220 mA
Relay Contacts - 12 VAC/DC @ .75 A.
Analog Inputs - 14 VDC MAX.

14 APPENDIX A

The following paragraphs explain how to install the various sensors that may be used with the Model 4150.

NOTE: Use 3-wire, 16-gauge shielded cable to connect the sensors to the Model 4150. Mount the sensors as close as possible to the 4150. Wire length should not exceed 50 feet.

14.1 MODEL 4151 TEMPERATURE SENSOR

1. Select a location to mount the 4151.
2. Mount the 4151 so that the sensor is facing the area where it will be monitoring the temperature.
3. Connect the Red wire from the 4151 to the terminal labeled +13 on the 4150.
4. Connect the Black wire from the 4151 to the terminal labeled GND on the 4150.
5. Connect the White wire from the 4151 to the one of the input of the 4150 that you have selected for the temperature sensor.

14.2 MODEL 4152 AIR FLOW SENSOR

1. Select a location to mount the 4152.
2. Mount the 4152 so that the sensor is in the area where it will be monitoring air flow.
3. Connect the Red wire from the 4152 to the terminal labeled +13 on the 4150.
4. Connect the Black wire from the 4152 to the terminal labeled GND on the 4150.
5. Connect the White wire from the 4152 to the input on the 4150 that you have selected for sensing air flow.
7. When the 4152 is first powered up, it will indicate that there is flow even if there is not. Wait at least one minute for the 4152 to settle thus giving you a correct reading.
8. To make the 4152 more or less sensitive to air flow, follow the directions below.
 - a. Measure the DC voltage between the ground terminal on the 4150 and the air flow input. This voltage should be between .45 volts and .33 volts.
 - b. A potentiometer is located inside of the 4152 case to change the sensitivity. The case may be opened by removing the two screws on each side of the unit.
 - c. To make the 4152 more sensitive, turn the potentiometer counter-clockwise while monitoring the voltage as described in Step a. DO NOT adjust the voltage any lower than .33 VDC. This may cause improper operation.
 - d. To make the 4152 less sensitive, turn the potentiometer clockwise while monitoring the voltage as described in Step A. DO NOT adjust the voltage any higher than .45 VDC. This may cause improper operation.
 - e. When you have set the sensitivity to the desired level, replace the cover of the case and put the screws back in.

NOTE: Making the 4152 more sensitive to air flow will cause it to be less sensitive to a No Air Flow situation and vice versa.

14.3 MODEL 4153 HUMIDITY SENSOR

1. Select a location to mount the 4153.
2. Mount the 4153 so that the sensor is in the area where it will be monitoring humidity.
3. Connect the Red wire from the 4153 to the terminal labeled +13 on the 4150.
4. Connect the Black wire from the 4153 to the terminal labeled GND on the 4150.
5. Connect the White wire from the 4153 to the input on the 4150 that you have selected for sensing humidity.

NOTE: When power is first applied to the 4153 it will take a minimum of 2 minutes to report an alarm and a maximum of 4 minutes depending on the trip level that is selected.

14.4 MODEL 4153 CALIBRATION

Although the Model 4153 is calibrated at the factory it may become necessary to recalibrate it after it has been installed. You will need a very small flat-blade screwdriver such as a jeweler's screwdriver, a digital voltmeter and a hygrometer (humidity gauge).

1. First check to see if the 4153 is properly calibrated by following the steps below.
 - a. Using the hygrometer, determine the correct humidity in the area in which the 4153 will be used.
 - b. Measure the DC voltage between the 4153 input and circuit ground at the 4150. The voltage should be proportional to the actual humidity. For example: If the actual humidity is 60%, you should measure .6 VDC at the 4150. Likewise, if the actual humidity is 45%, you should measure .45 VDC at the 4150.
2. If the 4153 is found to be out of calibration, follow the steps below.
 - a. Using the hygrometer, determine the correct humidity in the area in which the 4153 will be used.
 - b. Referring to Figure 14.4A, find the calibration hole on the 4153 and use the screwdriver to adjust the 4153 until the voltage at the 4150 is directly proportional to the actual humidity. If the actual humidity is 53%, adjust the 4153 for a voltage reading of .53 VDC.
 - c. After setting the correct voltage level, let the 4153 sit for 5 minutes, then verify that it is still calibrated.

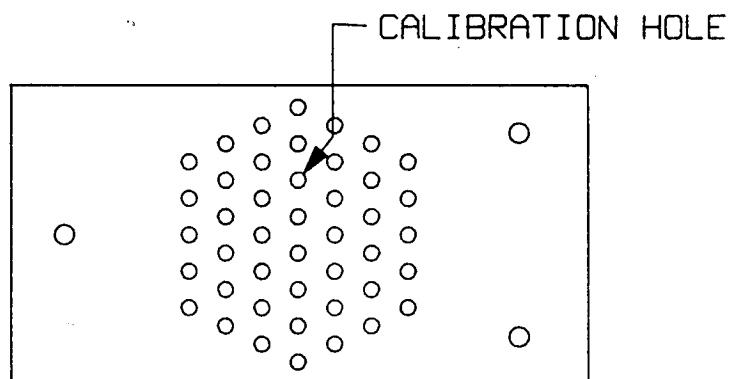


FIGURE 14.4A: MODEL 4153 CALIBRATION HOLE

14.5 MODEL 4154 FLUID LEVEL DETECTOR

1. Select a location to mount the 4154. The ideal situation would be to mount the 4154 next to the 4150 and run the sensor tubing (not provided) to the container where the fluid is to be measured. The sensor tubing is nothing more than a Tygon hollow tube that has one end attached to the stem of the 4154 and the other end placed at the bottom of the fluid container.

CAUTION: For proper operation, all splices in the sensor tube must not be allowed to leak. If the sensor tube leaks, the 4154 cannot accurately measure the fluid level.

2. Connect the Red wire from the 4154 to the terminal labeled +13 on the 4150.
3. Connect the Black wire from the 4154 to the terminal labeled GND on the 4150.
4. Connect the White wire from the 4154 to the input on the 4150 that you have selected for sensing fluid level/pressure.
5. Although the 4154 is factory adjusted, it is a good idea to make sure that the 4154 is reporting accurate information. With the sensor tube out of the fluid, measure the DC voltage between the GND terminal and the 4154 input terminal on the 4150. This voltage should be between 1.49 VDC and 1.51 VDC. If the voltage is not within this range, open the case and adjust the potentiometer until the voltage is between 1.49 VDC and 1.51 VDC.
6. Place the end of the sensor tube at the bottom of the fluid container and the 4154 is ready for operation.

14.6 SPECIAL NOTE:

The accuracy of the Fluid Level sensor is ± 1 inch of water when the environment is between 50 and 100 degrees F. The accuracy is ± 2 inches of water when the temperature is between 100 and 200 degrees F. For every 20 feet of wiring over the recommended 30 feet, add an accuracy deviation of ± 1 inch of water.

15 4720 POWER SUPPLY NOTE

When using the 4720's power supply to power auxiliary relays, doorstrikes etc., a diode must be added across the coil of the device in order to prevent inductive kickback into the Model 4720 Control/Communicator. The cathode (stripe) of the diode should be connected to the positive side of the doorstrike wire or terminal. A standard diode, such as 1N4001 or an equivalent diode type, can be used for this purpose.

16 ANALOG SENSOR SPECIFICATIONS

Model 4151 - Temperature Sensor
Dimensions - 3.4" X 2.1" X 1.4"
Housing - .030 Brushed Aluminum
Shipping Weight - .75 LBS.
Operating Voltage - 12 VDC Nominal
Standby Current - 10 mA
Sensing Range - 0 to 250 degrees F.
Accuracy - ± 2 degrees F.

Model 4152 - Air Flow Sensor

Dimensions - 3.4" X 2.1" X 1.4"

Housing - .030 Brushed Aluminum

Shipping Weight - .75 LBS.

Operating Voltage - 12 VDC Nominal

Standby Current - 10 mA

Sensing Range - Adjustable/Programmable for Air Flow,
No Airflow, or Both

Accuracy - Does Not Apply

Model 4153 - Humidity Sensor

Dimensions - 4.0" X 2.1" X 1.2"

Housing - .030 Brushed Aluminum

Shipping Weight - .75 LBS.

Operating Voltage - 12 VDC Nominal

Standby Current - 10 mA

Sensing Range - 10 to 90% Relative Humidity

Accuracy $\pm 2\%$ Relative Humidity

Model 4154 - Fluid Level/Pressure Sensor

Dimensions - 3.4" X 2.1" X 1.4"

Housing - .030 Brushed Aluminum

Shipping Weight - .75 LBS.

Operating Voltage - 12 VDC Nominal

Standby Current - 20 mA

Sensing Range - 0 to 120 inches of water

Accuracy - ± 1 inch of water when operated between
50 and 100 degrees F.
 ± 2 inches of water when operated between
100 and 200 degrees F.

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