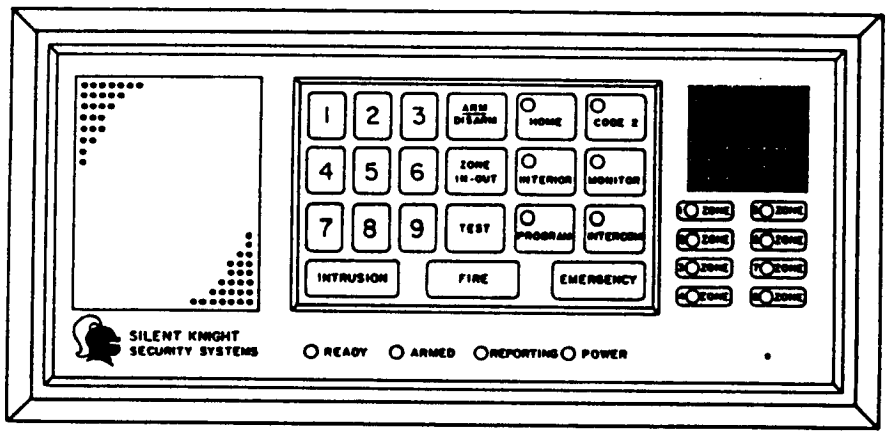
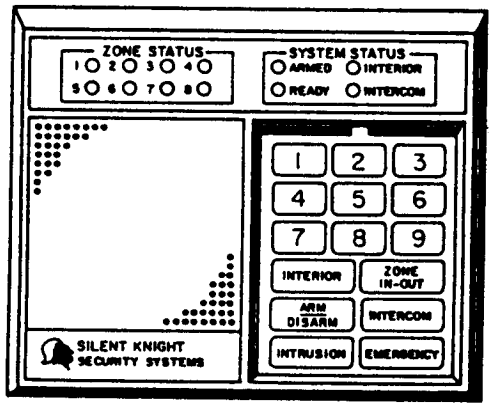
SQUIRE SYSTEM 2420

INSTALLATION MANUAL





IMPORTANT: Read complete introduction before beginning installation sequence.

SILENT KNIGHT
SECURITY SYSTEMS
DIVISION OF WAYCROSSE, INC.

1700 FREEWAY BLVD. NORTH
MINNEAPOLIS, MN 55430
TELEPHONE: 612/566/0510

P/N 150096 3/86

NOTICE: This is the EEPROM version of the Model 2420 control panel. This version of the 2420 control allows the use of the Model 2482 intercom control. When using the 2420 with the Model 2482, remote CM and CDM modules may be used if they have a date stamp of (6-84) or newer. If older CM and CDM modules are used, speaker noise may occur.

IMPORTANT: Silent Knight products should be tested every month (under no circumstances less than every three months) to insure complete and proper operation and proper input and output connections.

LIMITED WARRANTY

Silent Knight Security Systems warrants that the products of its manufacture shall be free from defects in materials or workmanship for one year from the date of invoice if such goods have been properly installed, are subject to normal proper use, and have not been modified in any manner whatsoever. Upon return of the defective product to the nearest Silent Knight dealer, Silent Knight will, at its sole discretion, either repair or replace, at no cost to the customer, such goods as may be of defective material or workmanship. Customers outside the United States are to return products to their distributor for repair.

SILENT KNIGHT SECURITY SYSTEMS SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM LOSS OF PROPERTY OR OTHER DAMAGE OR LOSSES OWING TO THE FAILURE OF SILENT KNIGHT SECURITY SYSTEMS PRODUCTS BEYOND THE COST OF REPAIR OR REPLACEMENT OF ANY DEFECTIVE PRODUCTS.

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INTRODUCTION

The Silent Knight Model 2420 is a complete security control system designed to provide a high level of protection against the following conditions:

1. Fire
2. Intrusion
3. Emergency
4. Auxiliary

These alarm conditions are visually and audibly reported by the Squire system.

If the optional Model 2360 Digital Communicator is installed, the system will automatically call a central message receiver and report the alarm conditions and the user's account number.

In addition to the alarm conditions listed above, the Model 2360 will report the following conditions:

1. Low standby battery
2. Fire circuit trouble
3. Duress

The Model 2420 Combination Control panel is the center of every Squire system. Every module or accessory in the system either plugs into, or is wired to the 2420. The remote modules and accessories available from Silent Knight are listed below.

Remote Modules

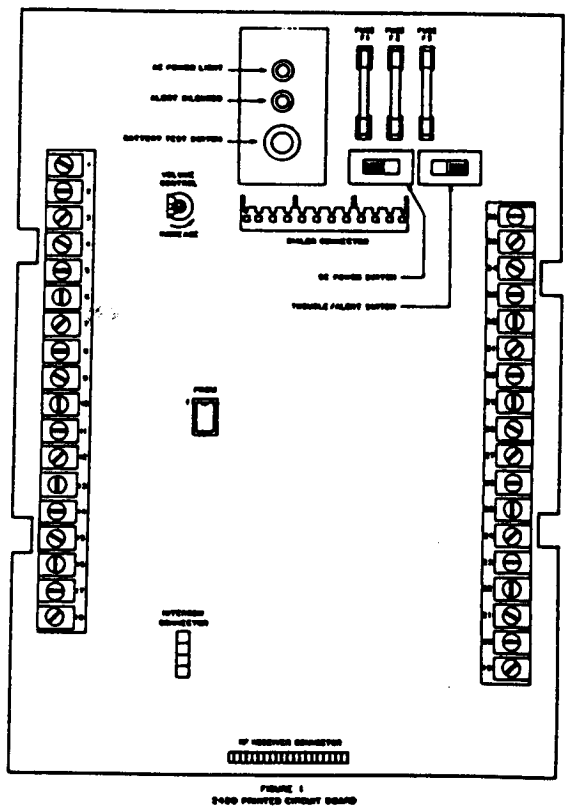
Model 2480 Control/Display Module
Model 2280 Control Module

Accessories

Model 2360 Digital Telephone Communicator
Model 6812 Battery
Model 7140 Phone Line Seizure Module
Model 7150 Phone Line Monitor
Model 2482 Intercom Control Module
Model 2484 Intercom Speaker
Model 7360 Audio Listen-In Module
Model 7380 Audio Pick-Up Module
Model 7620 Smoke/Heat Detector
Model 7810 Furnace Failure Detector
Model 7860 Dialer Connector Cord

Model 2420 Control Panel

The 2420 is a 4 channel control unit designed for residential security systems.
These channels are fire, intrusion, emergency, and auxiliary. The intrusion channel is subdivided into 11 different input circuits, or zones, in order to locate the exact cause of an alarm and to enhance system control. The 2420 accepts input signals from various types of sensors and converts those signals into output signals for speakers, display lamps, automatic digital dialer, and other accessories.



The 2420 is powered by the Model 9220 Class II Transformer. The 9220 is UL Listed and rated at 16.5 volts, 35 VA. This transformer plugs directly into any 120 VAC 60 HZ outlet. It provides sufficient power for the 2420, remote modules, input circuits, and standby battery charging.

Figure 1 is a representation of the 2420 printed circuit board. This board has various switches, fuses, and indicators which are described in the following paragraphs.

DC Power Switch
This switch is the main power control for the entire system. In the "off" position the system is completely deenergized with one exception. The standby batteries are still supplied with charging current if AC power is on. When this switch is in the "on" position, the entire system is supplied with 12 VDC operating power.

Trouble/Alert Switch
This switch controls the supervisory input for the fire alarm circuit. In the "normal" position, the fire loop circuit is supervised. That is, if this loop becomes, or is, defective the 2420 will sound a steady, low volume. "Trouble" tone on all the internal speakers. The "trouble" tone can be disabled by placing this switch in the "silence" position. All other system speaker tones will operate normally.

AC Power Light
This light is normally on and will remain lit unless one or more of the following conditions occur:
1. AC power is off.
2. DC power switch is off.
3. Fuse F1 defective.
4. Low battery voltage during test.

Alert Silenced Light
This light indicates the position of the "trouble/alert" switch. If the switch is in the "normal" position, this light will be off. If the switch is in the "silenced" position the light will be on.

Battery Test Switch
When this switch is pushed, AC power to the 2420 is disabled. This forces the panel to run on standby battery power only. The "AC Power" light should remain on while this switch is pushed. If it goes out, battery power is inadequate and must be checked. This light may blink upon release of the test switch.

Fuse F1
1/2 amp fast-blow. This fuse protects the Fire loop power on terminal 6.

Fuse F2
2 1/2 amp fast-blow. This fuse protects the module/accessory power on terminal 3.

Fuse F3
2 1/2 amp fast-blow. This fuse protects the external speaker power on terminal 4.

Volume Control
This potentiometer is used to control the volume of low level tones such as key beeps, entry/exit warning tone, and trouble tone. It has no effect on the alarm tones. In order to increase volume, turn the control counter clockwise.

EEPROM I.C.
This memory integrated circuit is used to select the various options that are available in the 2420. The EEPROM must be installed for the 2420 to function properly. When installed, pin 1 of the EEPROM must be towards the top of the panel. Refer to the section on EEPROM programming for further information.

Model 2480 Control/Display Module

Figure 2 represents the 2480. This module is typically installed in a master bedroom and/or near a

commonly used door. Every 2420 based Squire system requires at least one 2480 to operate properly. The 2480 is connected to the 2420 by five wires.
These are:
1. Serial I/O
2. + 12 VDC
3. Common
4. Audio
5. Audio common

The 2480 is based around a micro-computer that sends and receives data from the 2420 by the serial I/O wire. The 2480 tells the 2420 which keys have been pushed and conversely, the 2420 tells the 2480 which lights to turn off or on.

The 2480 has a built-in speaker that is used for sounding alarms and for information tones, such as key beeps or entry/exit warning tone. When the 2480 is being used as an intercom station, the speaker serves as a microphone.

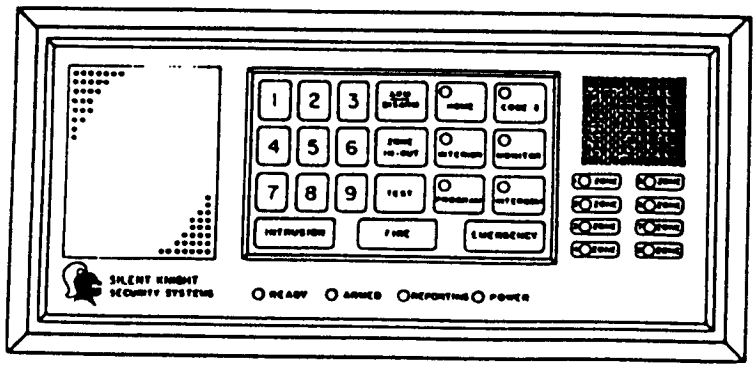


FIGURE 2
2480 CONTROL/DISPLAY MODULE

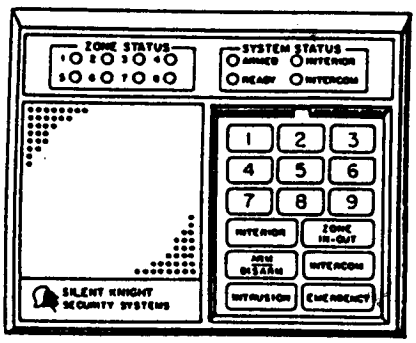


FIGURE 3
2280 CONTROL MODULE

Model 2280 Control Module

Figure 3 represents the 2280. This module only includes the most commonly used features of the 2480. The 2280 connects and operates the same as the 2480.

Alarm Channel Input Circuits

The four alarm channels, fire, emergency, auxiliary, and intrusion, each have their own separate input or loop circuits. These input circuits must be held in alarm condition for at least 50 milleseconds to be detected by the 2420 as a valid alarm. All the input circuits are latching. This means that once an alarm condition is detected, the 2420 will stay in alarm even if the cause of the alarm is removed. The unique characteristics of each type of input circuit will be described below.

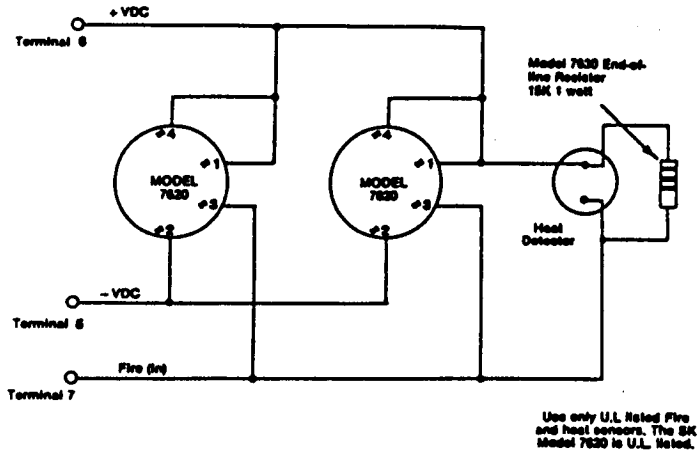
Fire Input Circuit

Figure 4 represents typical fire circuit wiring. The fire channel accepts inputs on a 24 hour basis. That is, a fire alarm can be initiated regardless of system status. This channel accepts only sensors with normally open alarm contacts, such as heat or smoke detectors. The fire channel has the only supervised input circuit. Refer to the "trouble/alert" switch descripton for supervisory circuit operation. A 15k OHM resistor must be installed across the contacts of the last sensor in order for the supervisory circuit to operate properly. This channel has another unique characteristic. When the user attempts to reset a fire alarm condition from a remote module, power to the fire circuit is interrupted for about 2 seconds. This is done in order to reset any latching type smoke detectors.

Intrusion Input Circuits

The intrusion channel is divided into 11 separate input circuits. They are: zone 1 through zone 8, interior, delayed interior, and tamper. The tamper input is the

only 24 hour circuit of this group. The system must be armed for the rest of these inputs to initiate an alarm. All the intrusion inputs accept normally open and/or normally closed sensors. Figures 5, 6, and 7 show typical input circuit configurations. Notice that all these inputs require a 15k OHM end-of-line resistor. If one or more of these inputs are not used, the EOL resistor must be connected at the terminal strip. Any number of sensors can be connected to any of these inputs. The only limitation is that the wiring must have a resistance of less then 100 OHMs to and from the EOL resistor. Zones 1-8 are assigned by EEPROM option to belong to one of four types of intrusion circuits. These are exterior, exterior delayed, interior, and interior delayed. The delayed circuits allow the user a brief time to enter or exit the house without setting off an alarm. This also lets the control modules be installed inside of the protected area to avoid tampering or vandalism. The exterior and interior circuits will cause an immediate alarm if they are violated while the system is armed. Refer to the descriptions of the "interior" and "zone in-out" touch switches for more information.



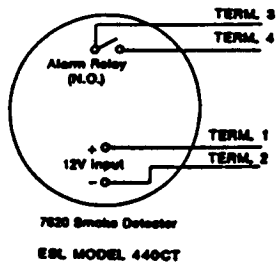


Figure 4 Fire Circuit Wiring

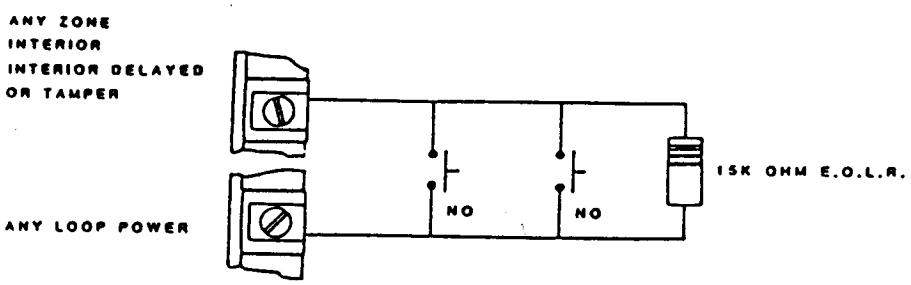


FIG 5

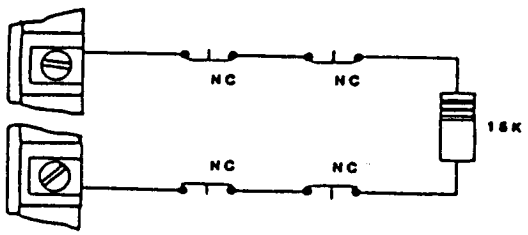


FIG 6

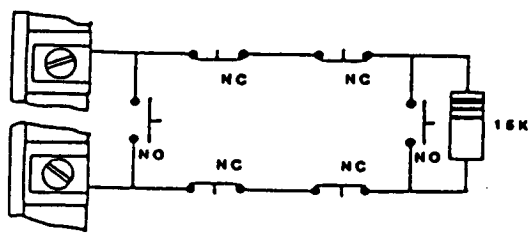


FIG 7

Emergency Input Circuit
Figure 8 represents typical emergency circuit wiring. This channel will only accept sensors or switches with normally open contacts. This channel is a 24 hour circuit and is typically used to summon immediate medical aid or to call attention to some other emergency. This is the only channel that has a silent alarm option.

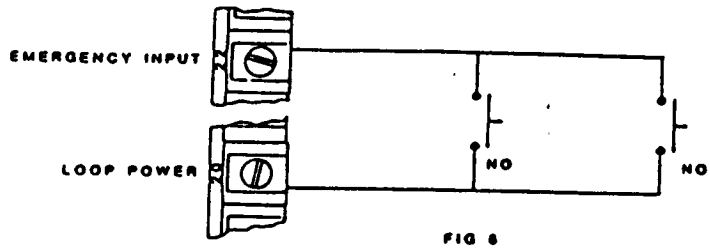


FIG 8

Auxiliary Input Circuit
Figure 9 represents typical auxiliary circuit wiring. This channel will only accept sensors or switches with normally open contacts. This channel is a 24 hour circuit and is typically used for such things as furnace failure or freezer failure.

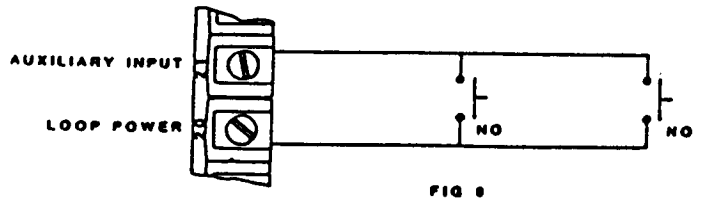


FIG 9

Alarm Output Circuits
There are four alarm annunciating circuits in the 2420. These are the external speaker circuit, the internal speaker circuit, the alarm output, and the delay output. The 2420 generates three distinct alarm tones. One for fire, one for intrusion, and one for both the auxiliary and emergency channels.

External Speaker Circuit
Figure 10 shows the proper connection of the external speakers to the 2420. This circuit is designed to drive a maximum load of two 8 OHM speakers tied in parallel. These speakers should have a power rating of at least 10 watts. This circuit will produce approximately 105DB of alarm tone at 10 feet.

Internal Speaker Circuit*
Figure 11 shows how to connect the internal speakers to the 2420. These speakers are contained in the models 2480 and 2280. The maximum load that can be applied to this circuit is 3 model 2480's and 5 model 2280's. This is approximately equal to 1.5 OHMs of impedance. This circuit will produce about 90 DB of alarm tone at 10 feet.

* NOTE: If the 2482 Intercom Control is to be installed, do not connect the internal speakers in this manner. Refer to the 2482 Installation Manual.

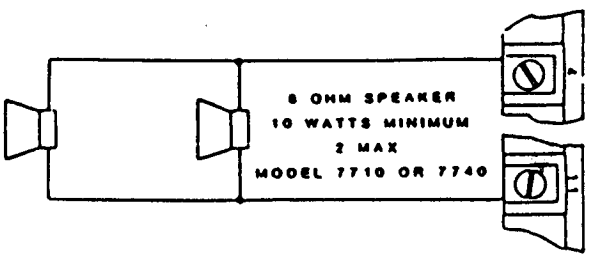


FIG 10

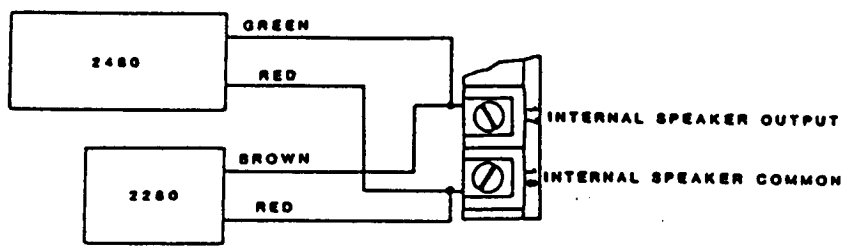


FIG 11

Alarm Output Circuit

This output provides a short circuit to common when the 2420 is in any type of alarm condition. When there is no alarm condition, this output is an open circuit. The maximum current that can be drawn from this output is 250 ma. This output is typically used to run a strobe light or a bell. If a bell is used, model 7800 transient suppressor must be installed directly across the contacts as shown in figure 12.

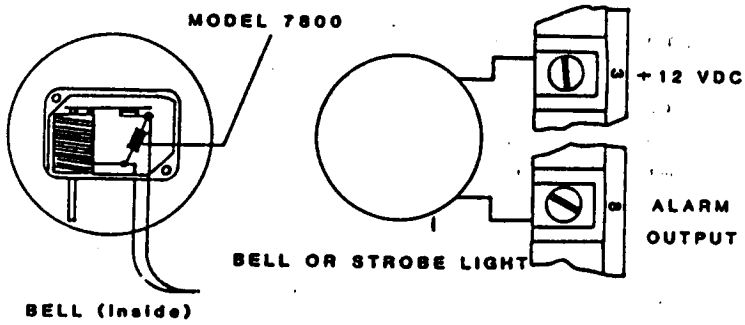


FIG 12

* See Bell Addendum Sheet Page 24

Delay Output

This output provides a short circuit to common when the 2420 is in the entry/exit delay time. All other times this output is an open circuit. The maximum current available at this output is 100ma. This output is typically used to run a lighting control relay. Figure 13 shows how to connect such a relay.

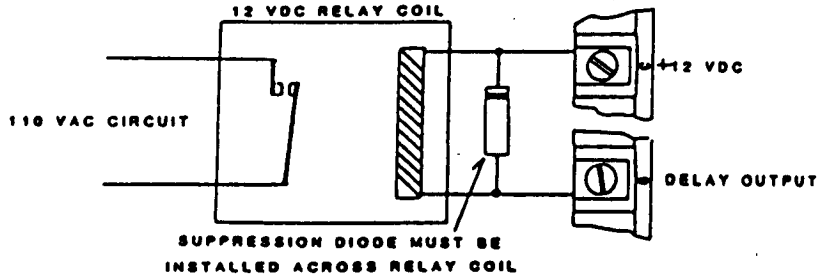


FIG 13

System Operation and Features

This section will discuss how to use the various touch switches and indicator lights on the models 2480 and 2280.

--Program-- When the "DC power" switch is first turned on, or if the programming mode is initiated from a 2480, the user will have 1 minute to enter his access code and the secondary access code. During this time, the "program" light will be blinking. The user must now enter the digits for the access code by using the numbered touch switches. The access code and the secondary access code will each be 3, 4, or 5 digits in length, depending on EEPROM option. When the last digit of the access code is entered, the "code 2" light will come on. This is to remind the user to enter the secondary access code. Each time a digit is entered, the programming time will be extended. When the last digit of the secondary access code is entered, the "program" and the "code 2" lights will go off.

If the user fails to enter both of these codes during the time allowed, the previous access codes will read from the EEPROM. If this happens, the "program" light will remain on and the system will arm itself. The "program" light will go off the next time the system is disarmed.

During normal operation, the "program" light will be off. If the user wishes to change his access codes, he must first make sure that the system is not armed and that "code 2" light is off. He now enters the access code followed by the "program" switch. The "program" light will now begin to blink and the system is ready for new codes to be entered.

light must be on before the system can be armed. The "ready" light will be on if all unlocked zones are in a non-alarm condition. Refer to the instructions for the "zone in-out" switch for zone lockout procedure. To arm the system, the user enters his access code and then pushes the "arm/disarm" switch. At this time, the "ready" light will go off, and the "armed" light will come on. If the "code 2" light had been on, the user could have used the secondary access code to arm the system. The same procedure as arming is used to disarm the system. When disarmed, the "armed" light will go out. Disarming the system will reset any alarm condition except 24 hour circuits that are being held in alarm.

---Code 2--- This switch is used to enable or disable the secondary access code. When the "code 2" light is on, the secondary code can be used in the same manner as the access code. To enable it, the user must enter his access code and then push the "code 2" switch. To disable the secondary access code, the user must enter the access code or the secondary access code followd by the "code 2" switch. This feature is typically used to give system control to a house guest or a servant.

-- Zone -- The section on intrusion input circuits
--In-Out-- described how the intrusion channel had 8 numbered zones and 2 dedicated interior zones. Zones 1-8 each have their own indicator lights. If a particular zone light is off, it means that this zone is not in alarm condition. If a zone light is blinking, it means this zone is in alarm condition or it had previously caused an alarm. If a zone light is on steady, it means that this zone is locked out. A locked out zone cannot cause an alarm condition. There are two procedures for locking or unlocking zones. Depending on whether or not the system is armed. If the system is disarmed, and the user wants to lock out a zone, he enters the number of the zone and then pushes the "zone in-out" switch. This is repeated for each zone to be locked out. If the user wants to unlock all zones, he pushes the "zone in-out" switch only. If the system is armed, and the user decides to lock out a zone, he must first enter the access code, then the zone number, and finally the "zone in-out" switch. If more zones are to be locked out, the access code does not have to be entered again as long as the additional zones are entered within seven seconds of the last switch pushed. After the seven seconds has elapsed, the system forgets that the access code has been entered. If the user wants to unlock zones while the system is armed, he again must first enter the access code and then the "zone in-out" switch. At this time, all locked out zones that are not in alarm condition will be unlocked. Any zones that are in alarm condition will remain locked out in order to avoid an unintentional intrusion alarm.

If a zone causes an intrusion alarm, the system will remember it even if the zone is returned to its nonalarm condition. As mentioned above, this is indicated by a blinking zone light. To clear or reset blinking zone lights caused by alarm, the system must first be disarmed, and then the "zone in-out" switch must be pushed. If the user fails to do this, it will be automatically done the next time the system is armed.

- Interior - The "interior" switch is used to lock or unlock all the interior zones at once. These include the two dedicated interior zones and any of the numbered zones that are assigned by EEPROM option to the interior. When the "interior" light is on, the interior zones are unlocked. Conversely, when the "interior" light is off, all the interior zones are locked out. If the system is disarmed, the "interior" switch and the interior zones will

all toggle on or off. If the system is armed, the user may have to enter the access code before using the "interior" switch. This will be determined by one of the EEPROM options. When the system is armed, and the user turns on the interior circuit, any interior zones that are in alarm condition will remain locked out. Again, this is done to avoide an unintentional intrusion alarm.

The dedicated interior zones do not have status lights like the numbered zones, but, they do have an effect on the "ready" light. Arming or disarming the system will not affect the status of the interior zones. When the system goes into an intrusion alarm. The interior zones will be automatically enabled.

The "zone in-out" switch can be used to lock out numbered interior zones individually, but, it cannot control the two dedicated interior zones.

--Home--The "home" switch is used to enable or disable the delay time in exterior delayed zones. When the "home" light is off, the delayed exterior zones work in their normal mode. The user has the delay time to enter or exit the residence while the system is armed. When the "home" light is on, all exterior zones respond instantly to an alarm condition if the system is armed. The "home" switch will only operate when the system is disarmed. To use this switch, the user simply pushes it and the "home" light will toggle on or off. This feature is typically used at night when everyone is home and going to stay in until the system is disarmed in the morning.

NOTE: Interior delay zones are not affected by the "home" switch.

--Monitor-- The "monitor" switch has two functions. The first function is to enable or disable the door chime or annunciator feature. When the "monitor" light is on, and the system is disarmed, a short two note tone will sound each time an exterior zone is put into alarm condition. Interior zones cannot cause the chime to sound. The user pushes the "monitor" switch to turn this feature on or off.

The second function of the "monitor" switch is to turn on and off the control output. This output is generally used to control lighting or an appliance through a relay interface. this interface is the same as shown in figure 13 for the delay output. To toggle this output, the user must enter the access code and then the "monitor" switch. The "monitor" light will not change states in this case.

--Intercom-- The operation of the intercom will be detailed in the manual supplied with the Intercom module, Model 2482. If the model 2482 is not used, the "intercom" switch will not affect the system and the "intercom" light will not come on.

-Test- In order to enable the test routine, the system must be disarmed, and the user must enter the access code and then push the "test" switch. When this is done, a sequence will be started that will display each alarm lamp along with a sample of the audio alarm tone associated with it. These alarm tones will be at reduced volume except for the last note, which is at full volume. This is done to verify that the external speakers are in working order. If the optional dialer is installed, it will be activated and report a test code to the central station.

FIRE
INTRUSION
EMERGENCY

These three switches can initiate an alarm at any time. In order to avoid false alarms, they must be pushed for at least one second before the alarm condition will be stated. These switches are disabled during the test and programming modes.

Power - When this light is ON, it is an indication that AC power is being supplied to the system. If the light is off, the system is running off of the battery power.

Report - This light is ON when the dialer is communicating with the central station. If no dialer is installed, the "REPORT" light will always be OFF.

Duress - This feature is only usable on systems that have the optional dialer installed. To activate the duress feature, the user must enter the access code, then digit "9". The "arm/disarm" switch could then be used to disarm the system. This will ause the dialer to call the central station and report the duress code. The "report" light will not come on during a duress call. The duress channel will be reset the next time that the system is armed. This feature would be employed if the user was being forced to disarm his system by threat. NOTE: Only Revisions E or later Model 2360 communicators will have this feature. If communicator replacement is necessary, be sure to use only the latest revision !!!

Keypad Lights - These lights are normally lit very dimly. When any switch is touched, the lights will go bright for about 15 seconds. If AC power is lost, these lights will be turned OFF in order to conserve standby battery current.

EEPROM Programming Options - There are many aspects of 2420 operation that can be altered to suit a particular installation. These will be described in the following paragraphs. Note: The 2420 has a programmed EEPROM installed. If it is desired to change the factory selected options, Silent Knight Model 5506 or 5510 programmer is required.

Access Code - If the user fails to enter an access code and a secondary accessd code during the time allowed in the programming mode, The 2420 wil load the previous code from the EEPROM. If this happens, the "program" light will be ON steady. This situation could occur if the residence is unoccupied for a long period. If AC power is lost during this period, the standby batteries ma be depleted. Upon restoration of AC power, the system will load in the previos code and arm itself. The initial code programmed in is 1-2-3-4 and 9-8-7-6 for code 2.

NOTE: Since a "9" preceded by the access code triggers a duress signal, it is best to avoid using the digit "9" in the access code. If the "9" is used, there is a much greater chance of a false activation of duress.

Access Code Length - The access code can be 3, 4, or 5 digits in length. The factory setting is 4. The user must decide the trade off between convenience and security. The number of possible combinations are as follows:

DIGITS	COMBINATION
3	729
4	6561
5	59049

Reset/Shutdown Time - This option selects the amount of time that the 2420 will sound an alarm before it resets the alarm or goes into the siren shutdown mode. The alarm will reset if the cause of the alarm is removed before the

reset/shutdown time elapses. If the cause of the alarm is still present when the reset/shutdown time elapses, the alarm sound will cease, but the alarm lamp on the 2480 will remain on. The choices for reset/shutdown time are 4, 8, 16, or 32 minutes. The factory setting is 4 minutes. The 2420 will continue to try and reset an alarm each time the selected time interval elapses.

Shutdown Disable

Any or all of the four alarm types can have the siren shutdown feature disabled. If this is done, once the alarm is initiated, the siren will sound until the cause of the alarm is removed and reset occurs or until the user disarms the system. All alarm types are factory set to shutdown.

Entry/Exit Time

When the system is armed, the user has a preset time to leave through a door protected by a delayed zone. If this door is still open when the exit time expires, the 2420 will sound a low volume warning tone to indicate that an intrusion alarm is about to be initiated. In order to avoid this alarm, the system must be disarmed. Upon return, the user enters the residence and initiates the warning tone. He must disarm the system before the entry time expires. The choices available for entry time are 15, 30, and 60 seconds. Exit time is double entry time. The factory setting is 15 seconds.

Interior Switch Security

When the system is disarmed, the "interior" switch will toggle on or off each time the user touches it. When the system is armed, there are two choices for using the "interior" switch. In the first choice, the "interior" switch will still toggle when pushed by itself. In the second choice, the access code must be entered before the "interior" switch will work. The factory setting is the second choice.

Zone Type

Each of the 8 numbered zones must be assigned to one of the four zone types. These types are exterior, exterior delayed, interior, and interior delayed. Refer to the descriptions of the "home", "interior", and "zone in-out" switches for operation of the various zone types. The factory selections are zones 1 and 2 exterior delayed and zones 3-8 exterior.

Silent Emergency

The emergency alarm is the only type that can be made to be silent while in alarm condition. If any other alarm occurs while a silent emergency alarm is in progress, the new alarm will sound. The emergency alarm is factory set to be audible.

Digital Communicator

The digital communicator employed in the Squire system is a five channel telephone dialer designed to plug into the 2420 panel. It employs full memory reporting, meaning that if more than one channel is activated, it will report all active channels in ascending order. The communicator will report in the Silent Knight/Ademco format, the Sescoa/Franklin format, or the high speed FSK format.

The alarm codes are transmitted as follows:

	Silent Knight/ Ademco format	Sescoa/Franklin Format
Channel 1 (intrusion)	Code 1	Code 3
Channel 2 (fire)	Code 2	Code 1
Channel 3 (emergency)	Code 3	Code 2
Channel 4 (auxiliary)	Code 4	Code 6
Channel 5 (duress)	Code 5	Code 5
Low Battery	Code 8	Code 8
"Trouble" in the Fire loop	Code 8	Code 8
Restore-to-Normal	Code 7 *	Code 7 *
Test	Code 9	Code 9

* A code (7-9) will be transmitted when channel (2) is restored to normal.

Options Description

There are 4 jumper options on the communicator. These option wires are either cut or left intact to select the following options:

"Restore to Normal" (jumper 1)

When this jumper is left (IN), not cut, the communicator will report only the alarm condition and will not report "Restore to Normal".

With the jumper (OUT) the communicator reports a "Restore" condition of the alarm channel inputs if:
a. The initiating alarm input(s) was present continuously during the reporting sequence.
b. The initiating input(s) is restored after the reporting sequence is completed (Kiss-off received).
c. All other inputs are also in their normal (non-alarm) states.

Jumper 2 - not used, leave intact.

Silent Knight or Sescoa Format (Jumper 3)

With this jumper left (IN) the communicator will report alarm conditions to Silent Knight and Ademco receivers.

When this jumper is taken (OUT) the communicator will report alarm conditions to Sescoa, Franklin and DCI receivers.

Standard or FSK Data Transmission (Jumper 4)

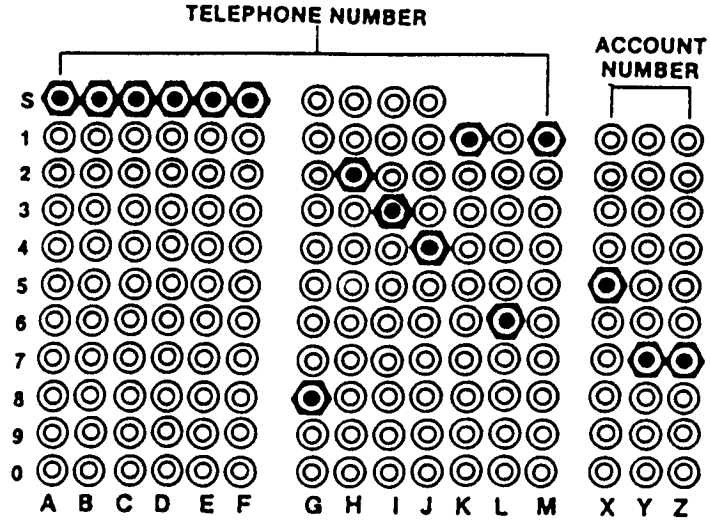
With this jumper left (IN) the communicator will report the alarm data in the standard formats to receivers as stated for Jumper 3.

When this jumper is taken (OUT) the communicator will report the alarm data in FSK (frequency shift keying) and report only to a Silent Knight Model 8520 and then "only" if the 8520 is equipped with the FSK receiver board #5.

Programming the Communicator

The communicator can be programmed to dial as many as thirteen (13) digits or as few as three (3) digits. Programming is as follows:

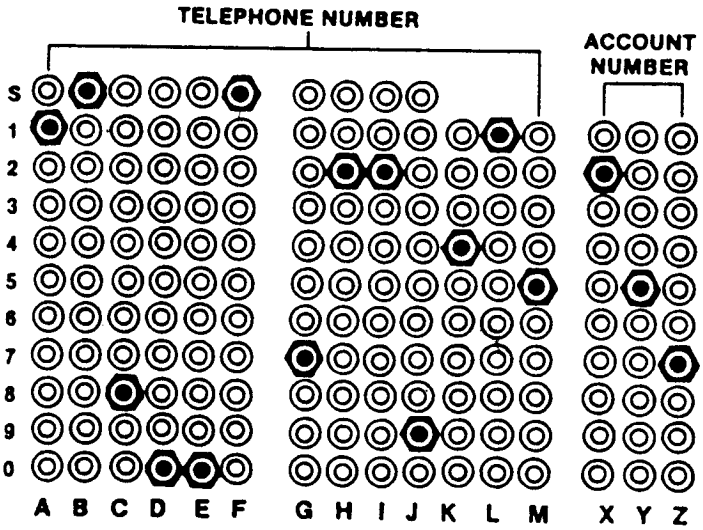
The central station telephone number and the client's account number are selected in the colums A through M and X through Z. If the usual 7 digit telephone number is used, it must be programmed in colums G through M. The account number is always placed in columns X, Y and Z.



EXAMPLE: 823-4161, Act. 577

If long distance number must be dialed, it will be necesary to use columns A-F. An example of an 800 number is shown below. Note that two (S) position screws are placed in colums B and F. This allows a 1.5 second pause after the long distance access number (1) and toll free (800) number prefix. This may be necessary with some older telephone networks.

NOTE: Placing two (S) screws in consecutive columns may cause "operator interrupt" to occur. Avoid this if possible.



EXAMPLE:1-S-800-S-722-9416, Act.257

NOTE: Always insert a program screw in the S or (SKIP) column whenever a number in that column is not used.

Communicator Installation

Install the 2360 in the white socket located on the front of the 2420 printed circuit board. Refer to figure 1.

CAUTION: When inserting the dialer into the connector, make sure the pins are mating correctly.

Digital Communicator Telephone Line Connection

Before connecting this device the telephone company must be notified and provided with the following information:

a) Manufacturer (Silent Knight)
b) Model number - 2360
c) F.C.C. registration number (AC698R-69188-AL-R)
d) Ringer equivalence - 0.0B
e) Type of jack (to be installed by the telephone company) RJ31X

NOTE: The telephone company must also be notified if this device is permanently disconnected!

This device may not be directly connected to coin telephone or party line services.

The telephone company, under certain circumstances, may temporarily discontinue service and/or make changes in its facilities and services which may affect the operation of this device; however, the telephone company is required to give adequate notice in writing of such changes or interruptions.

This device cannot be adjusted or repaired in the field; in case of trouble with the device, notify the installing company or return to:

Silent Knight Security Systems
1700 Freeway Boulevard North
Minneapolis, Minnesota 55430

NOTE: The blue and orange leads of the 7860 connecting cable terminate within the RJ31X jack on two (2) "flying" leads. These leads, if connected together, could provide a supervisory circuit between the Dialer and the telephone jack by including them in the normally-closed loop.

Figure 14 shows telephone line connection between the 2420 and the RJ31X via the Model 7860 Connector Cord.

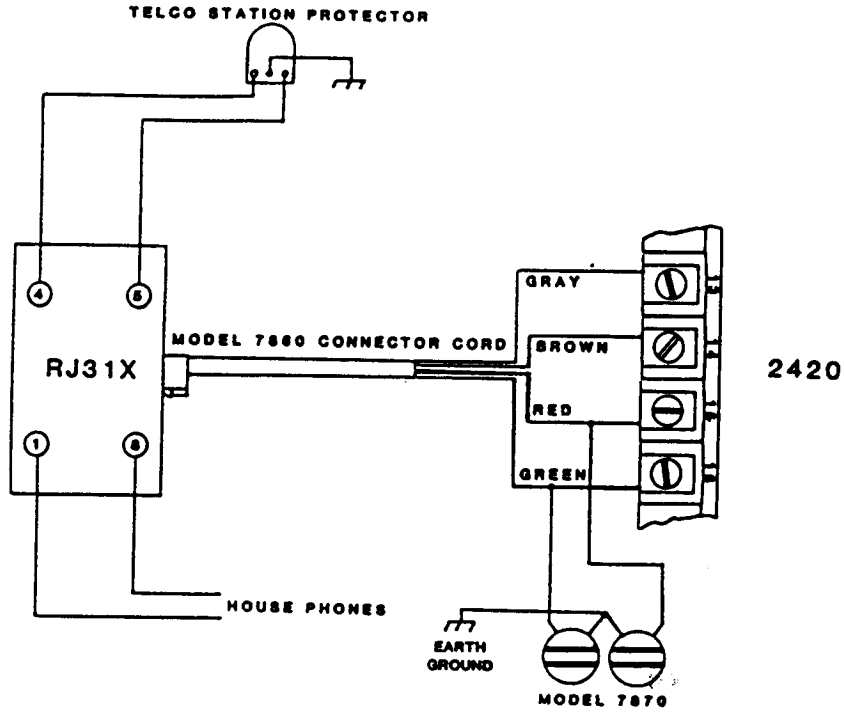


FIGURE 14

Communicator Accessories

If it is desired to increase the level of protection and isolation of the 2420 from the phone lines, the model 7140 line seizure module can be used. Figure 15 shows how to make the connections to the 7140.

The incoming telephone line can be protected by using the model 7150 telephone line monitor. If the telephone line is cut or becomes defective, the 7150 will activate its alarm contacts. These contacts are usually connected to an exterior zone input. Refer to figure 16 for 7150 connection.

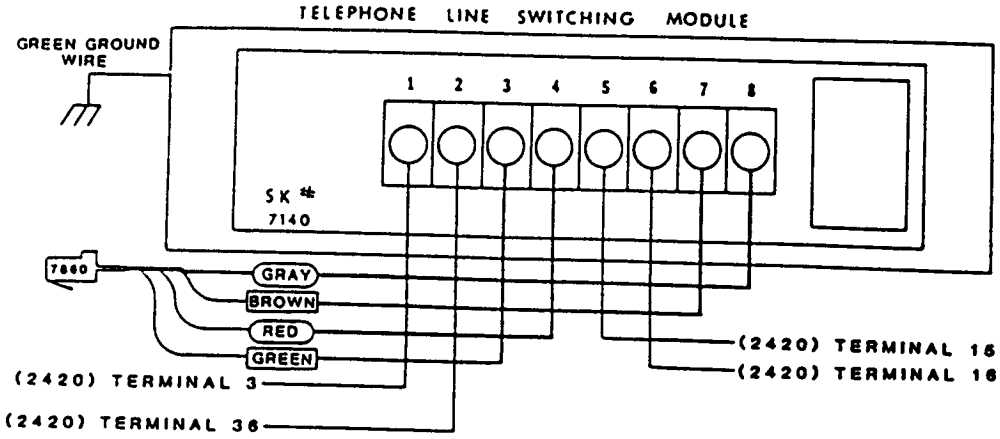


FIGURE 15

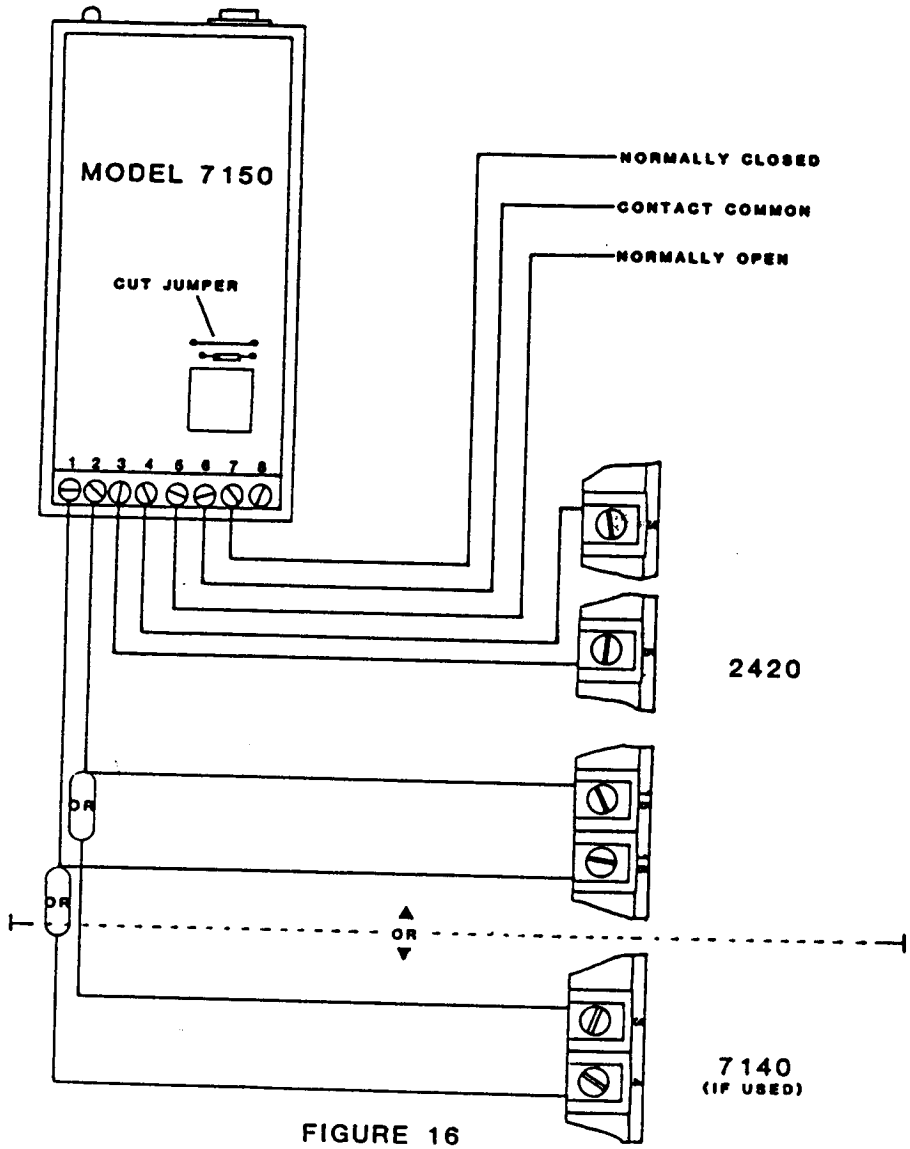


FIGURE 16

Model 6812 Standby Battery

The Model 6812, rechargeable battery is a sealed, electrolyte battery. Maximum charging rate of a fully discharged battery is 700 ma. Nominal trickle charge current is 5ma. Two sets of battery cables are attached to each 2420 P.C. Board for connection of the 6812 battery.

> CAUTION: Careful observation of polarity is important. The red wire goes to positive (+); black wire to negative (-). Connecting these wires in the reverse may result in damage to the 2420.

The current drain for each of the remote modules and accessories which require standby power from the 6812 battery is shown in Table 1.

Model Number	Standby Current (ma)
2420	140
2480	75
2280	65
2360	40
7620	5

Table 1

To determine the current load of the 2420 system, add all the current drains of all the remote modules as shown in Table 1. The approximate standby time can then be calculated from Figure 17 which shows the expected hours of standby for various current loads using (2) 4.5 amp. hour 12 volt batteries (Model 6812).

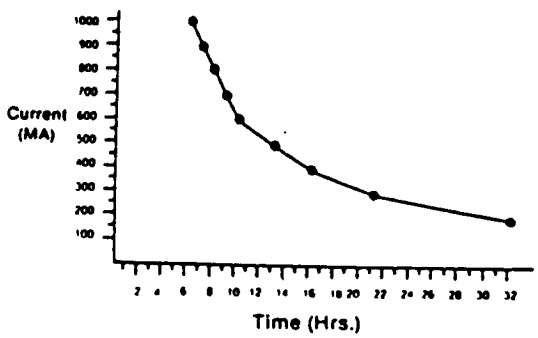


Figure 17

Squire System Installation Procedures

Installation of the Squire system usually proceeds in two steps: (1) pre-installation set-up of the 2420 Control Panel, and (2) field wiring of the modules and accessories to the 2420 at the installation site.

Pre-Installation Set-Up

Pre-installation set-up is usually done in the shop before going to the site. Pre-installation set-up includes the following steps:

1. Unpacking of the Squire system components and carefully checking them for damage. NOTE: Damage must be reported within 10 days to the carrier that delivered the system. Silent Knight is not responsible for damage that occurs in shipment.

2. Programming the option EEPROM to suit the needs of the particular installation.

3. Optional shop test of the 2420 control panel.

CAUTION: The printed circuit board of the 2420 contains MOS micro-circuit components that are subject to damage by electrostatic charges. The enclosure of the 2420 and the protective wiring circuits protect these circuits in normal operation. But, when the option EEPROMis being inserted, care must be taken not to touch the circuit board without touching a hand, or a metal tool, to the ground wire of the 2420. This removes any charge that may have accumulated from walking across a carpet, etc.

EEPROM Insertion And Removal

To insert EEPROM:

Loop EEPROM puller (plastic loop) between the two rows of pins on the EEPROM and carefully press into place in the socket. Pressure must be applied evenly so that the EEPROM goes in squarely.

Be sure to insert the EEPROM with the notched end facing the top of the panel.

Be sure that all 8 pins have gone into the socket and have not been folded under. Bent pins can be carefully straightened with tweezers or small pliers.

To Remove EEPROM:

Pull straight out on the EEPROM puller (plastic loop). Save the loop for re-use.

If the loop is missing, use a small screwdriver to gently lever out the EEPROM. Slip the screwdriver under one end of the EEPROM and raise it slightly. Then move to the other end and finish removal.

2420 Field Installation And Wiring

The installation of a typical squire system involves fairly complex field wiring. In order to minimize problems with new installations, the wiring should be done in two stages. (1)Connection of the 2480's and 2280's to the 2420 and (2)connection of the alarm input circuits and accessories.

2480,2280, and 2420 Connection

First,the 2420 must be mounted in a suitable location. When selecting a mounting location, the following factors must be considered:

-Lack of temperature extremes and freedom from moisture.

-Accessibility to "main drop" wiring runs.

-Mounting surface (use a plywood interface when mounting on a concrete surface).

-Location well within the secured area.

-User accessibility for testing and resetting.

The "DC Power" switch should be turned off while connections are made to the 2420.
Connect the 9220 transformer as shown in figure 19. Be sure that the transformer is not plugged into a switched outlet. Connect the 6812 standby batteries, being careful to observe polarity. RED to (+), and BLACK to (-).
Temporarily connect a 15k ohm resistor from each zone input, interior input, delayed interior input, and tamper input to a loop power terminal. Temporarily connect a 15k ohm resistor from the Fire loop power output to the Fire input terminal.
Connect a 2480 as shown in figure 19. Turn on the "DC Power" switch and go to the 2480. The "Program" light should be blinking and the "Interior" light should be on. Enter an access code and a secondary access code. The "Program" light should stop blinking and the "Ready" and "Power" lights should come on. Test all the touch switches on the 2480 for their appropriate function. Repeat this procedure for each 2480 and 2280.

Alarm Input Connection

Connect all the intrusion inputs as shown in figures 5,6,7, and 19. Make sure that every sensor in every input circuit can affect the "Ready" light, except for those used in the Tamper circuit. Test the sensors in the tamper circuit by initiating an alarm with each one. If any intrusion input circuits are not going to be used, they must still have a 15K ohm resistor tied to a loop power output.

Fire Circuit Connection

Install and connect the fire sensors and smoke detectors as shown in figure 4 and 19. For minimum protection, smoke detectors must be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms and on each additional story of the

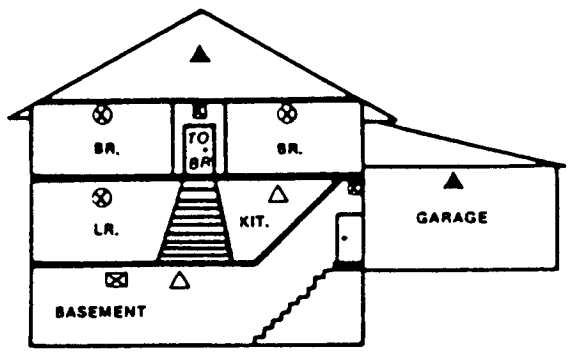
family living unit, including basements and excluding crawl spaces and unfinished attics. For increased protection, additional smoke and heat detectors can be installed in the living room, bedroom, kitchen, attic, furnace room, utility room, basement, integral or attached garage, and hallways. Each smoke detector and sensor should be tested to make sure that it can initate a Fire alarm.

Emergency and Auxiliary Circuit Connection

Connect the Emergency and Auxiliary sensors as shown in figures 8,9,and 19. Each of these sensors should be tested to make sure that they can initiate an alarm.

Accessory Connection

The External speakers and any other accessories should now be connected and tested. The central station should be advised before testing the 2360 communicator.



⊠ Smoke detectors for minimum protection

⊛ Smoke detectors for additional protection

Δ 135°F heat activated detectors

▲ 190°F heat activated detectors

Figure 18. Typical installation layout of a residential Fire security system. This installation should conform to the NFPA Standard 74. To obtain a copy, write to:

National Fire Prevention Association
470 Atlantic Avenue
Boston, Massachusetts 02110

Test Frequency

The installed Squire System should be tested periodically according to the following schedule.

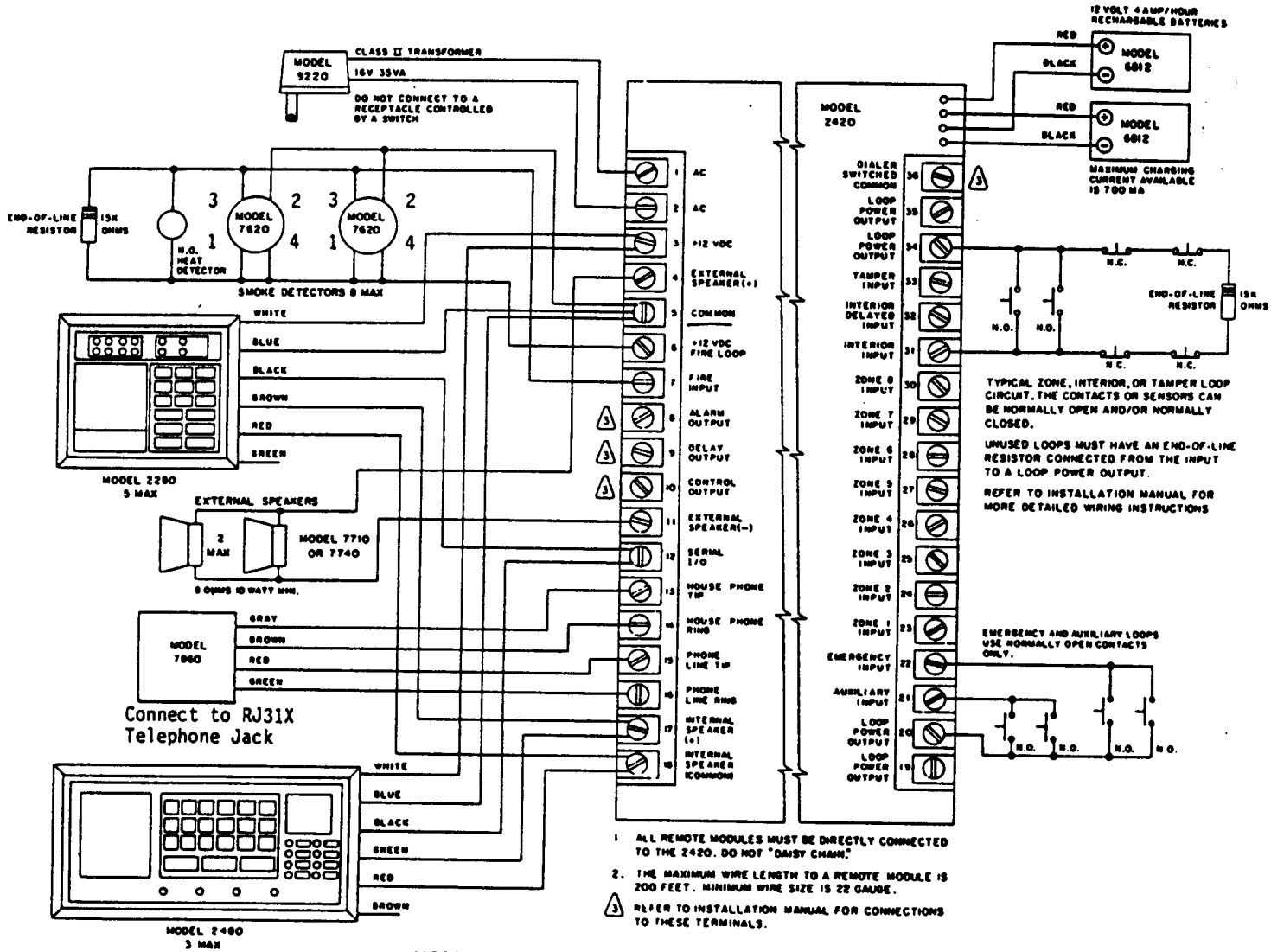
System Test (from a 2480)	Weekly
Battery Test	Weekly
Intrusion Sensors	Weekly
Emergency Sensors	Monthly
Auxiliary Sensors	Monthly
Heat and Smoke Detectors	Every 6 Months

Terminal Strip Description

1-2 AC power input terminals. These terminals are designed to be connected to the model 9220 class II transformer. The voltage measured on these terminals will vary from 12 to 20 VAC, depending on the loads connected to the 2420 and the mode of operation.

3 +12VDC
This terminal supplies power to the remote modules and to various other accessories. When AC power is on, the voltage will be 13 to 14VDC. When the system is operating on the standby batteries alone, this voltage will vary from 13 to 10 VDC, depending on the charge state of the batteries. This terminal can provide up to 250 ma of current to run accessories such as motion detectors and relays.

4 External Speaker Power
This terminal is an unregulated DC output. The voltage will vary from 20 to 10 VDC. The higher reading will occur when AC is present and there is no alarm condition. The lower reading will occur when in alarm condition with no AC power.



MODEL 2420
WIRING DIAGRAM

FIGURE 19

5 Common or Ground
This terminal should not be connected to earth ground. All DC voltages are referenced to this common.

6 +12VDC Fire Circuit Power
This terminal provides power to the fire loop circuit and the smoke detectors. Its voltage readings will be the same as terminal 3. This terminal will turn off for 2 seconds if the user disarms the system during a fire alarm condition. This is done to attempt to unlatch any smoke detectors that have caused an alarm.

7 Fire Circuit Input
This terminal will normally be at 2.5 VDC. In fire alarm condition, the voltage will be the same as terminal 6. If the wiring is defective, there will be no voltage present, and a trouble condition will be initiated.

8 Alarm Output
This is a switched common type output that is on during any type of alarm. When active, the voltage will be from .5 to 2 VDC. When inactive, the voltage will float up to approximatiely 12 VDC. The maximum current supplied by this output is limited to 250 ma.

9 Delay Output
This is a switched common type output that is on during entry/exit delay times. Voltage readings will be similar to terminal 8. The maximum current supplied by this output is limited to 100 ma.

10 Control Output
This is a switched common type output that is turned on or off by the user. Its characteristics are the same as terminal 9.

11 External Speaker Output
This output supplies a pulsed DC output to the external speakers during an alarm condition. When there is no alarm condition, the voltage on this terminal should read the same as terminal 4.

12 Serial Input/Output
Serial messages are sent and received on this terminal from the remote modules. This terminal should read 4 VDC. The serial messages can not be detected on a voltmeter because of their short duration.

13-14 House Phone
These terminals will be connected to the telephone(s) installed in the residence if the communicator is installed. When an alarm occurs, the house telephones are disconnected by the line seizure relay until the alarm is reported to the central station.

15-16 Phone Line
The incoming phone line is connected to these terminals. Refer to the instructions for the digital communicator for proper phone line connection.

17 Internal Speaker Output
This terminal provides alarm tones and low volume informational tones. The signal voltage will vary widely with the number of remote modules and the type of tone being generated.

18 Internal Speaker Common
This common output is electrically the same as the common on terminal 5, but, it is connected to the speaker separately in order to reduce static and to give maximum alarm volume.

19,20,34,35 Loop Power Outputs
These terminals are all current limited DC voltage outputs. The voltage readings will be similar to terminal 3. These outputs are provided to supply power to the following alarm input circuits. Auxiliary, emergency, tamper, zones 1-8, interior, and the delayed interior.

21 Auxiliary Input
This input will be at 0VDC when out of alarm condition. While in alarm condition, the voltage will be the same as the loop power terminal it is connected to.

22 Emergency Input
This input will behave in the same manner as the auxiliary input.

23-33 Intrusion Zone Inputs
All these terminals are similar in behavior. When there is no alarm condition, the input will be at 2.5VDC. If a normally open sensor is closed, the input will be at the same voltage as the loop power terminals. If a normally closed sensor is opened, the input will go to 0VDC.

36 Dialer Switched Common
This switched common output is only on when the dialer is active.

Listen-in

Figure 20 shows the connection of a model 7360 Listen-in module. The Listen-in feature allows your central station to hear voice messages or to hear the noise of a break-in as it occurs, after the digital communicator has transmitted its data. Microphone pick-up modules (Model 7380) should be located away from alarm speakers or bells to enable monitoring. A typical use of the Model 7360 would be as medical alert pickup. In this case, the Emergency channel would be programmed as a silent alarm channel. Locate a Model 7380 near a CDM or a CM. If medical assistance is required, the "Emergency" panic button may be pressed allowing transmission of a medical alarm at your customer's location then your customer may give additional information in regard to the present situation via the 7380 microphone. Keeping the Emergency channel silent allows the installation a Model 7380 near a CDM or CM, and lessens the anxiety of the person requiring medical attention. The Listen-in module will also activate during duress alarms to aid in gathering information during such circumstances.

Figure 21 shows the connection of a Model 7360 to enable listen-in through the speaker of a model 2480. When connected in this manner, the Model 7360 will turn off the alarm siren of the 2480 during the listen-in period only (cut the diode adjacent to terminal #3 of the 7360 to enable this feature). Keeping in mind that no alarm sounds or low level sounds will be heard during listen-in time, so additional speakers or CDM's should be strategically located for proper Fire alarm annunciation, and connected in the normal manner, away from the CDM with listen-in.

When wiring a 2480 for listen-in, use a shielded or twisted pair wire, as shown in figure 20, to eliminate wire induced noise during listen-in. The model 7360 is normally connected to the House Phone side of the telephone network to lessen the possibility of interference with the digital communicator data.

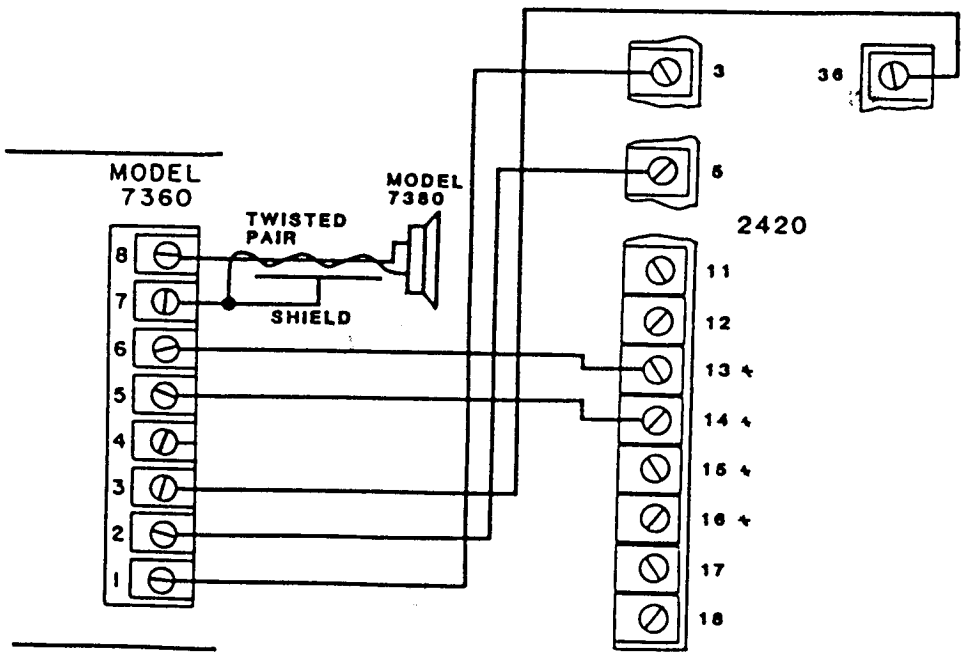


FIGURE 20

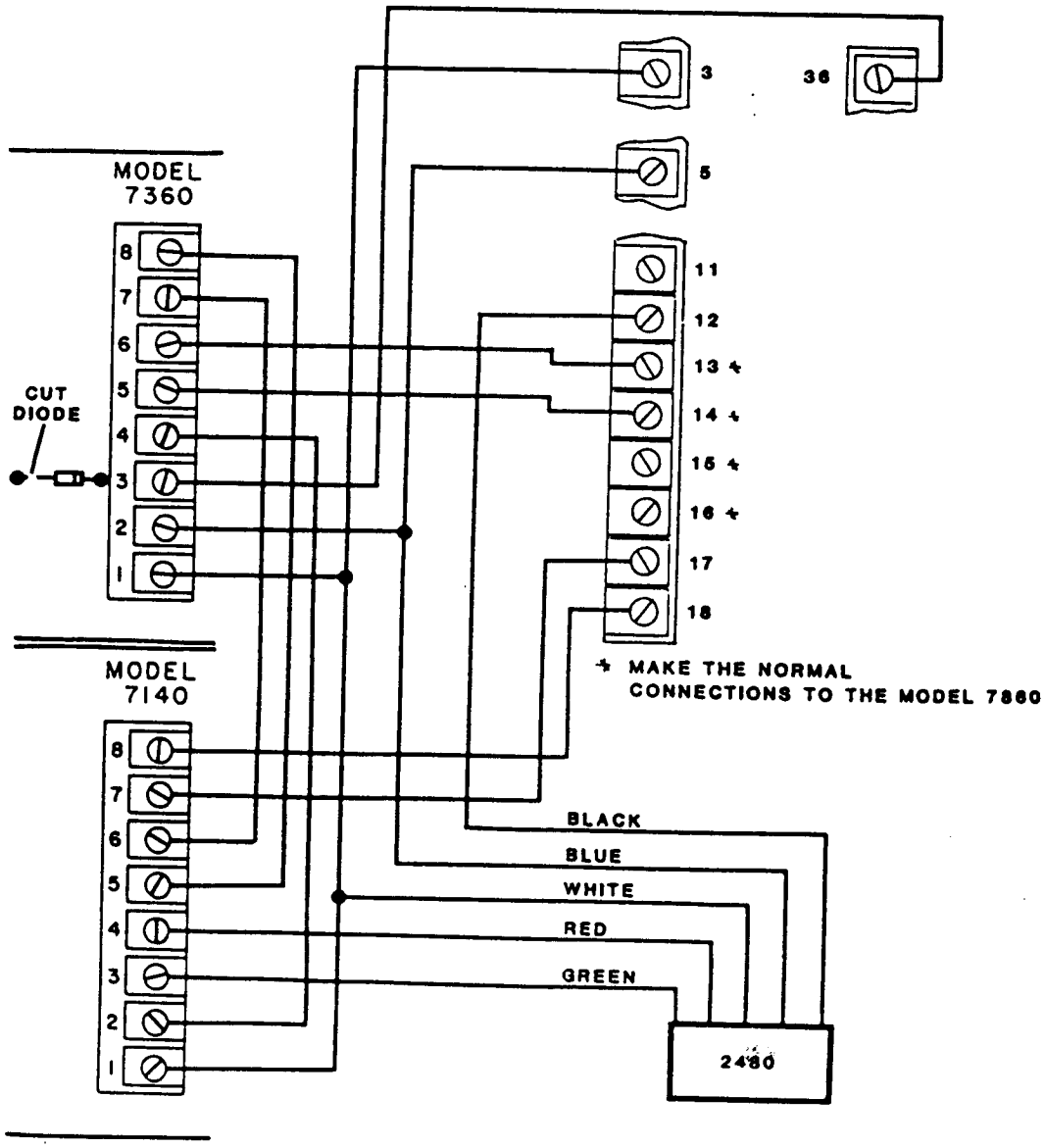

MODEL
7360
8
7
6
5
4
3
2
1
CUT
DIODE
MODEL
7140
8
7
6
5
4
3
2
1
3
36
5
11
12
13 *
14 *
15 *
16 *
17
18
* MAKE THE NORMAL
CONNECTIONS TO THE MODEL 7860
BLACK
BLUE
WHITE
RED
GREEN
2480

FIGURE 21

2480 Installation

Figure 22 shows a side view of a proper 2480 installation just before hanging the CDM on the wall brackets.
Using the provided template, mark the screw hole locations. Between the two bracket locations, test for the hollow location by knocking and listening for the hollow sound to avoid cutting into a wall stud. Now cut a small hole for the CDM wires to be pulled through.
Once the CDM wires are pulled through the hole, remove the CDM wire harness from the 2480 noting how they were plugged in. Make your wire connections to the harness using type "B" low voltage wire connectors (see figures 11 and 19).
Now drill the four holes for the wall bracket screws and anchors. Use the right anchors and screws for the job. Figure 22 shows a typical sheetrock installation. When mounting on a wood surface, different screws may be required.
Once the wall brackets are installed, turn in the two top set screws of the model 2480 until they are almost flush with the frame. Plug in the wire harness with the wires pointing away from the speaker.
Note: The plug on harness for the 2480 has six wires, but only five are used. be sure the black wire is connected to the 2480. Now hang the top of the 2480 on the wall brackets and then tighten the two bottom set screws all the way until the model 2480 has been leveled.

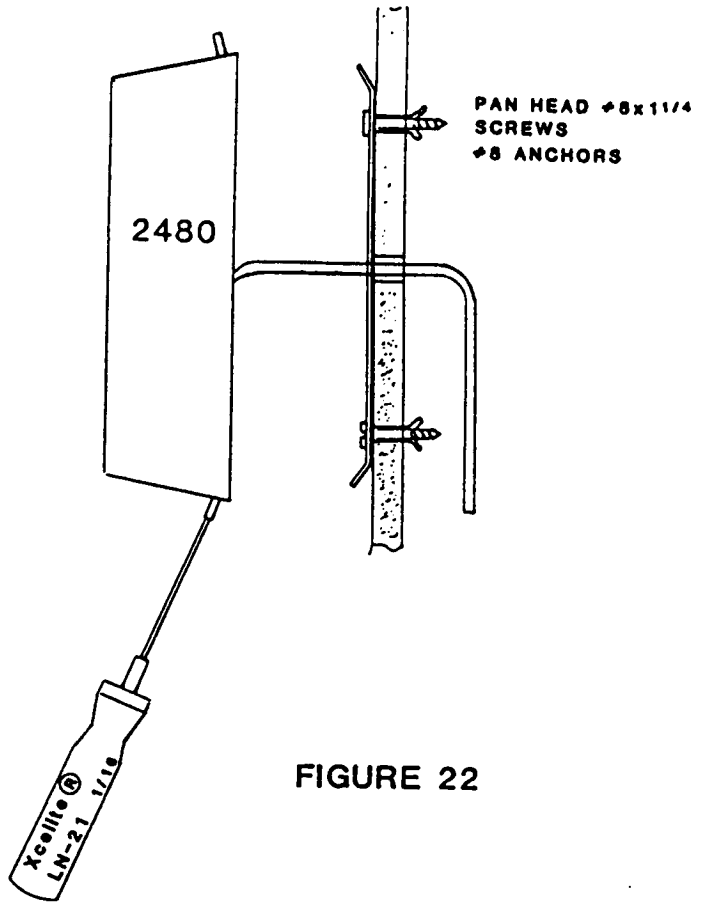


FIGURE 22

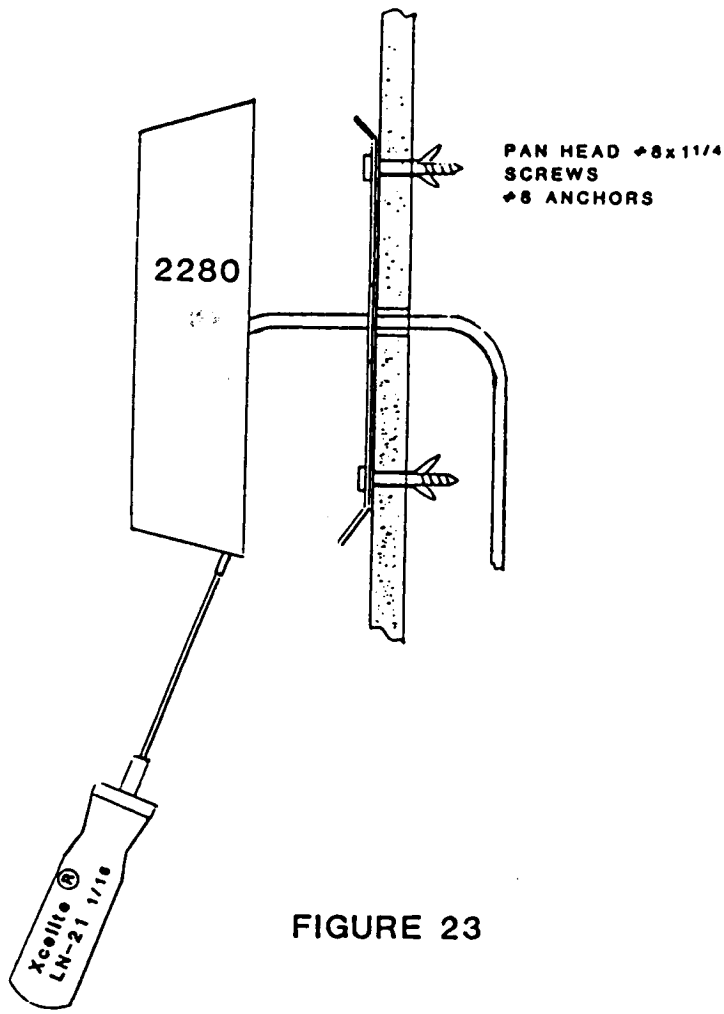


FIGURE 23

Prewire

A one or two gang electrical box or mud ring may be used when prewiring for a model 2280. Run a six conductor 22 gauge stranded wire for each 2480 and 2280 back to the 2420. For wiring runs longer then 100 ft, use 18 gauge wire. Do not daisy chain these wires! If the Model 2482 Intercom is going to be used with the system, a twisted or shielded pair of wires must be run to each 2480 and 2420 for the

speaker. In this case, a four conductor cable is adequate to connect the rest of the CDM or CM functions.

2280 Installation

Figure 23 shows a side view of a proper 2280 installation just before hanging the CM on the wall brackets.
The basic installation procedure for the model 2280 is the same as that for the model 2480 with a few exceptions.
The wall bracket for the model 2280 has a top and bottom. The top catch hooks are smaller then the bottom. The top of the 2280 frame hinges on the top two catch hooks, and there are only two screws to tighten.
The 2280 wall bracket is designed to be mounted directly to the wall or to a one or two gang electrical box or mud ring. Prewire the model 2280 the same as you would for a model 2480.

If a Bell must be used, it should be a Wheelock series 45 which operates at 9 to 15.6 VDC at .125amps or an equivalent. The Bell must be located at least 25ft away from the 2420 control panel. Bell circuit wires should not run in parallel with CDM or CM control wires.

EEPROM Programming Instructions

(Use Prom Form on page 27)

When programming the model 2420, the model 5506 or 5510 programmer must be used.

To program, first turn on the programmer. The display will read "Hello". Press the "ENTER" TOUCH SWITCH ONCE. The display will read "0...0". Now press the numbers "2-4-2-0" and press "ENTER". The display will read "1...1". This means that you are at STEP 1 in the program and that presently the first digit of the access code is (1). You may change this digit to any other number by pressing the "Clear" touch switch once and then pressing the number you wish to have as the first digit of the access code. Once you have selected and pressed your number, press the "Enter" touch switch.

You will now be at Step 2 and the display will read "2...2". Use the same program process with these next 4 steps as you did with the first step.

Steps 6 through 10 are for the secondary access code. The numbers stored in the first ten steps are the only ones that can be changed once the EEPROM is installed into the 2420.

Step 11 selects the length of the ADC (arm/disarm code). This code may be 3-5 digits in length. The program display will now read "11...4" normally, so if a 3 or 5 digit ADC is required, first press the "Clear" switch, then either a 3 or 5. Even if 5 access code numbers (steps 1-5) were entered, you may still select a 3 digit or 4 digit ADC code length. It doesn't matter what number is entered into the unused ADC digits.

Steps (12-15) are yes/no selections. All steps are normally "yes", but may be changed to "no" by first pressing "Clear" and then the No or 0 touch switch. When using the programmer, a "yes" is always represented by the digit "1" and a "no" is represent by by the digit "0". Always press the "Enter" switch once you have made your step selection. This will scroll the programmer to the next step.

Step 16 selects the Entry delay time factor. There are only 3 selections that are acceptable (1,2 and 4): 1=15 seconds, 2=30 seconds, and 4=60 seconds. Exit time is double the Entry time.

Step 17 selects how the "interior" touch switch of the models 2480 and 2280 will function. If a (1) is left in step 13, the ADC must be entered prior to pressing the "interior" switch before any change in the interior circuit can be made, if the system is armed. If Step 17 is changed to display a (0), then the interior switch will function without first entering the (ADC).

Step 18 selects either audible or silent emergency alarm. Enter (1) for silent or (0) for audible.

Step 19 selects the number of minutes the alarm will sound before the 2420 will shut off the sirens and attempt to rearm the system. Enter 4,8,16, or 32.

Steps (20-23) select how each of the 8 zones will respond when activated.

For example: Any zone circled in Step 20 should be entered in the orogrammer at Step 20. This one(s) will now function as an exterior (instant perimeter) zone. Step 20 normally displays zones (3-8), so any change in the display must be preceded by pressing the "Clear" switch which will blank the display. The display only has room for 4 characters, so it will toggle from zones (1-4) to zones (5-8).

Programming Steps 21, 22, and 23 is done in the same manner. DO NOT program any zone in more than one type of selection.

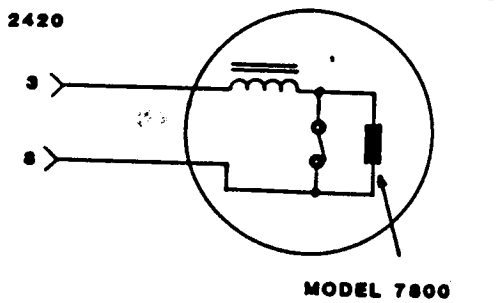
After step 23 is entered, the display should read "2420". The EEPROM should now be locked into the socket (#1 for 5506), with its notch to the left. Once it is in the socket, simply press the "program" touch switch. The display should now read "PASS". The prom is programmed.

WARNING: This equipment generates and uses radio frequency energy, and if not installed and used properly, that is, in strict accordance with the instructions manual, may cause harmful interference to the radio communications. This equipment has been tested and found to comply with the limits for a Class A Computing Device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonalbe protection against such interference when operated in a commercial environment.

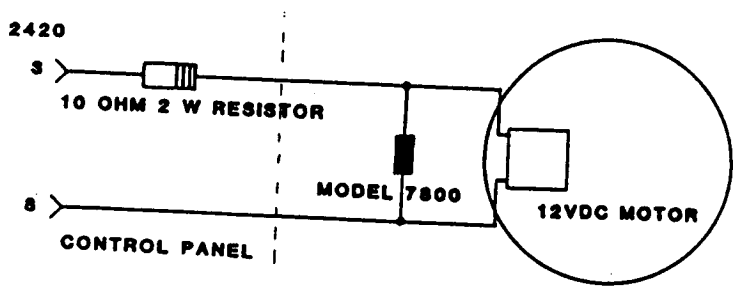
Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Bell Addendum Sheet

COIL DRIVEN BELL WIRING INSTRUCTIONS



MOTOR DRIVEN BELL WIRING INSTRUCTIONS



INSTRUCTION SHEET

MODEL 7890 TRANSIENT-SURGE PROTECTOR

The Model 7890 Protector, when properly installed with shielded two-conductor cable, will clamp the AC output of the Class II transformer (Model 9220) of the Silent Knight control panels. It reduces transient voltages frequently present on the power lines-caused by lightning and other sources-to manageable levels.

The AC power lines are the most common source of transient/lighting damage in alarm systems.

The Model 7890 consists of two bi-polar transient suppressors with lugs at its connecting points.

CAUTION: Before connecting, verify that the center mounting screw in the AC wall plate, to which the transfomer is to be connected, is grounded to earth ground. This can be checked by measuring the AC voltage between the mounting screw and each side of the outlet.

There must be approximately 117 VAC between the mounting screw and one side of the outlet, and 0 VAC between the mounting screw and the other side of the outlet.

If these voltages are not identical the outlet does not have an earth ground and must be grounded by running a #18 gauge wire from the outlet to a good ground; for example, a cold water pipe.

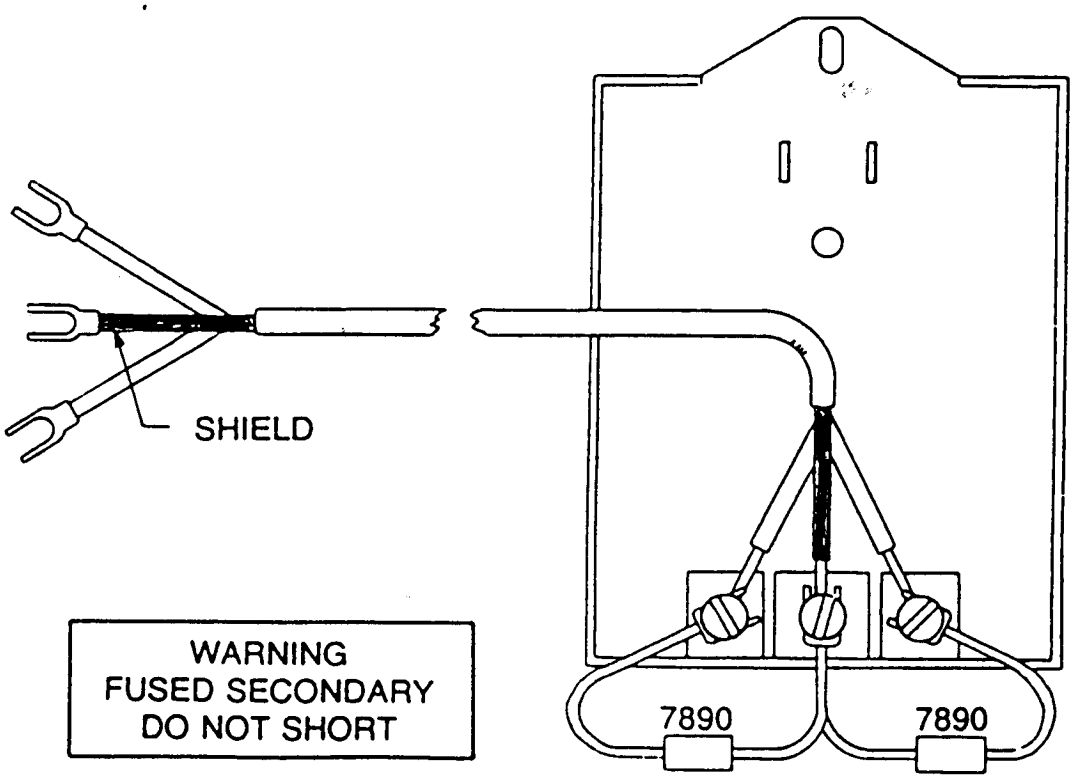
WIRING

1) With the transformer unplugged, connect the open ends of the 7890 to the two AC screws of the transformer. Connect the common end of the 7890 to the screw containing the case assembly of the transformer.

2) Connect the shielded cable as shown; the black and white wires to the AC output screws and the shield to the screw marked GRD.

CAUTION!BE SURE THE SHIELD CONDUCTOR CANNOT COME IN CONTACT WITH THE AC OUTPUT SCREWS.

3) Connect the other end of the shielded cable to the control



panel; the black and white wires to the AC input, and the shield to the earth ground (the same point as the green ground wire in the panel).

4) Plug in the transformer and securely fasten the mounting tab to the center mounting screw on the AC cover.

CAUTION--TO REDUCE THE RISK OF ELECTRICAL SHOCK, DISCONNECT POWER TO THE RECEPTACLE BEFORE INSTALLING OR REMOVING THE UNIT. WHEN REMOVING RECEPTACLE COVER SCREW, COVER MAY FALL ACROSS PLUG PINS OR RECEPTACLE MAY BECOME DISPLACED.

USE ONLY WITH DUPLEX RECEPTACLE HAVING CENTER SCREW.

SECURE UNIT IN PLACE BY RECEPTACLE COVER SCREW.

CAUTION--TO REDUCE RISK OF FIRE OR ELECTRICAL SHOCK, CONNECT DIRECTLY TO A GROUNDING RECEPTACLE--3 PRONG.

IMPORTANT: DO NOT USE THE 7870 TELEPHONE LINE TRANSIENT SUPPRESSOR IN PLACE OF THE 7890 (OR VISA VERSA). A SHORT CIRCUIT WILL RESULT.

LIGHTNING PROTECTION

As with any electronic equipment, precautions should be taken when installing this control panel to protect against high energy transients which can be generated by lightning. The following steps, if observed, will provide maximum protection against these transients.

1) Insure that the A.C. outlet that you intend to use for the plug-in transformer has a "good" connection to earth ground. This can be done at the outlet, using a digital voltmeter, by measuring the A.C. voltage between the "hot" side of the outlet and neutral, then comparing that voltage to the voltage reading made between the "hot" side and the ground connection. The difference between these two readings should not exceed .2 vac.

2) Verify at the breaker or fuse box, that there is a ground wire from the neutral buss bar in the box, to the main cold water pipe at a point closest to where the pipe enters the house. If there is a water meter at this point, be sure that the ground wire is bonded to the pipe at both sides of the meter.

CAUTION: In newer construction the water supply pipe may be plastic. If this is the case, check to see if the breaker box has been bonded to a ground rod. If not, an electrician should be called and a ground rod driven into a moist area close to the building and then bonded to the breaker box.

3) Verify that the neutral buss block in the breaker or fuse box, has a bonding screw connecting it to the box itself.

4) Install the Model 7890 transient suppressor and a shielded two conductor 18 guage cable to the secondary side of the Class II transformer. Connect the shield and the ground wire of the Model 7890 to the ground screw terminal of the Class II transformer provided. (Refer to figure A)

5) Connect the green ground wire shipped with the control panel to a good earth ground. Use a "J" clamp to connect to a "cold water" pipe. Be sure this pipe does not connect through plastic couplings or is insulated from earth ground location that the electrical system of the building is connected to. Install a ground rod if necessary. Connect the shield of the two conductor AC power cable to the same point that the green ground wire is connected to in the control panel.

6) If a Digital Communicator is used, verify that the phone connector block at the point where the phone lines enter the building have Gas Tube lightning arrestors and not the carbon resistor type (if you have any doubt, call the telephone company.)

7) Verify that the phone block has a ground wire bonded either to the breaker box or to a cold water pipe.

CAUTION: If the ground wire from the phone block is connected to a cold water pipe, verify that the pipe is in turn grounded to the breaker box.

8) At the TELCO input of the communicator, connect the two single outside leads of the Model 7872 (supplied) to Tip and Ring respectively. (This is typically the same two points that the red and green leads of the S K Model 7860 telephone inter-connect cable are connected to.) Now connect the two center tap leads of the Model 7872 to the earth ground point of the control panel. (See figure A)

9) Wire routing should avoid parallel runs with AC wires (including the AC line connected to the control panel), and the protective ground wire installed on the control panel. Route the telephone wire away from all other system wires.

When installing wires into the control panel, use separate panel "knock outs" for the AC and ground wires, telephone line, and control/loop wires. This will avoid "ground loops" and any inductive problems.

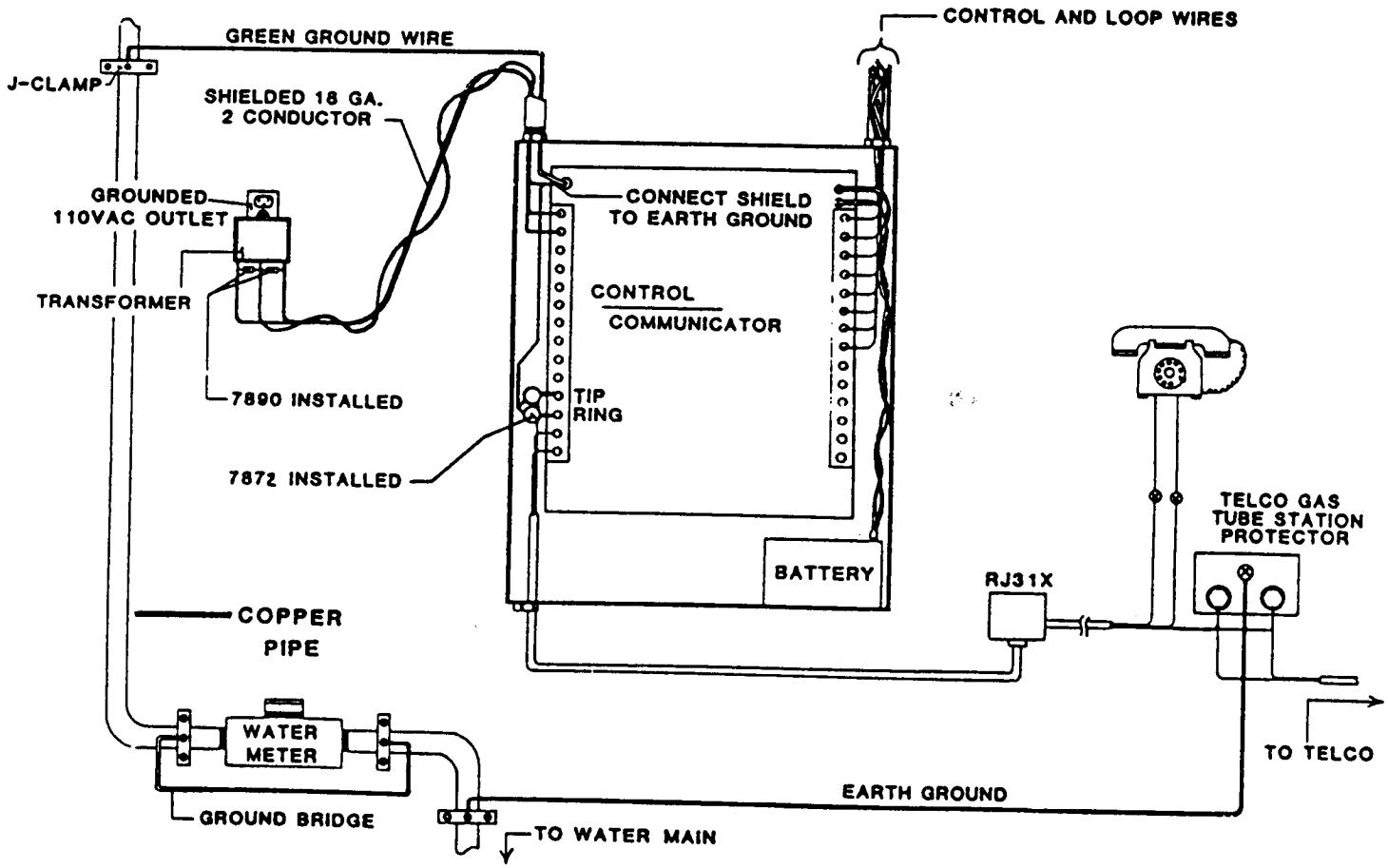


FIGURE A

NOTE: Figure A represents a typical control/communicator. Refer to the wiring diagram in the installation manual for exact terminal locations.

TO AVOID PROBLEMS

It is also important to recognize poor electrical ground situations during the installation of any alarm system.

Old and/or corroded earth ground connections to both the electrical and telephone systems may cause a "ground loop" effect.

When lightning finally strikes, it will always follow the easiest path to earth ground. If the control panel or communicator is the closest or best earth ground available when lightning strikes, damage will almost always result.

The following figures will picture this effect:

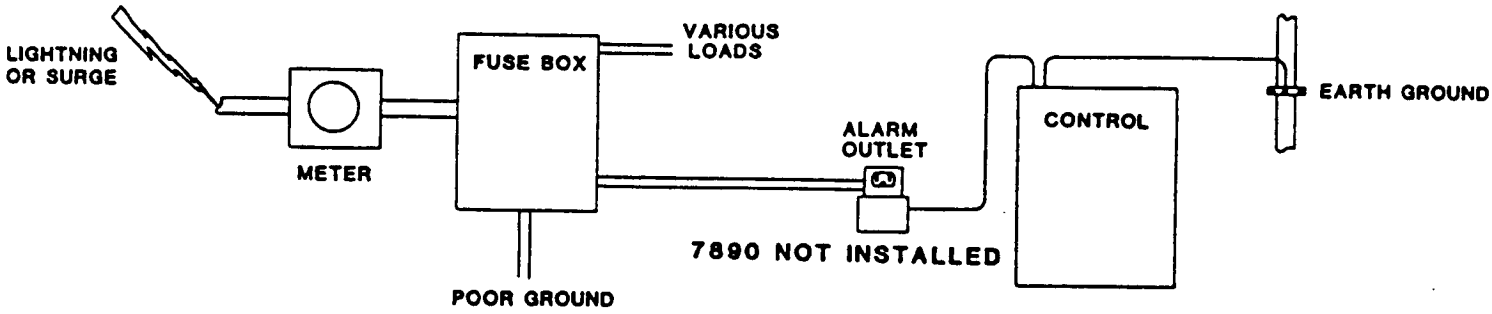


FIGURE B

In figure B, a high voltage source is introduced to the electrical system of a building in which an alarm control panel has been installed. A loose earth ground wire connection to the "load box" or "fuse box" allows the transient energy to seek earth ground through the alarm control panel. Even with proper suppresssion devices installed, damage to the control electronics may still occur. A simple check of all electrical system earth ground connections would have prevented problems.

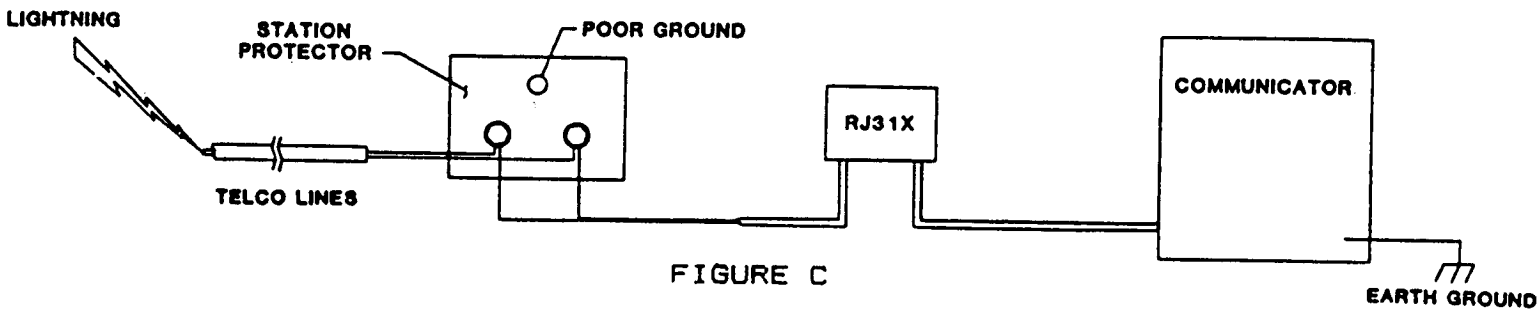


FIGURE C

Figure C is similar to figure B in that the important earth ground connection at the telephone block station protector is poor or was omitted, only this time it concerned the telephone system. This situation could be dangerous to anyone using the telephone during an electrical storm. Keep in mind that older telephone systems are most prone to this type of problem. Earth grounds once installed years ago, may have been eroneously disconnected or damaged over time.

In review, all three electrical systems must be earth grounded properly:

1. The building power system.

2. The telephone system.

3. The alarm system.

Poor grounds on any one of these three systems will negate any positive steps you may have taken to protect your equipment from transient damage.

PROTECTION EQUIPMENT SPECS

Model 7890 AC Transient Surge Protector

The 7890 provides lighting and other transient voltage source protection on the low voltage AC input of any alarm instrument. AC power lines are the most common source of damaging transient voltage. This voltage is effectively "clamped" by the 7890--reducing it to levels that may be tolerated by transient protectors typically found in most alarm devices. The 7890 is mounted directly on the external Class II transformer and used with shielded cable.

The 7890 will absorb about 600 watts of energy for 1 millisecond at a clamping speed of 1 pico-sec. It is designed to operate at 33 volts. Transients in excess of this energy may cause the device to short-circuit--but maintain protection of the equipment. For transients within the energy limit, the voltage is clamped at approximately 48 volts.

Model 7140 Protector-Seizure Module

The model 7140 is strongly recommended for all communicator installations. It provides three critical functions for equipment protection against lightning and other transient energy, as well as telephone line seizure:

1. High-speed energy clamping.

2. Physical separation between equipment and transient energy.

3. Telephone line seizure.

The model 7140 may be used with the following control panels and communicators:

1400/1410, 1450, 2120, 2420.

IMPORTANT: A relay, without transient protection and physical separation, provides only marginal protection against transient voltages.

The gas discharge arrestors in the 7140 will arc when exposed to high voltage, clamping the voltage to only 16 volts--until the external voltage decays to the sufficiently low level. The devices used in the 7140 trigger at 350 volts for transients with a rise time of 100 volts/second, and, at 800 volts, with a transient rise time of 5000 volts/micro-second. These devices handle relatively large energy spikes without self-destructing.

The 7140 should be used with any 6 or 12VCD communicator. It may also be used as a line reversal relay in dedicated line systems.

Model 7872 Transient Suppressor

The Model 7872 is a fast-acting transient voltage suppressor recommended for use on any device such as a digital communicator which is connected to the telephone line. The 7872 provides protection in addition to the transient protection provided by line seizure relays--offering a greater immunity to transient voltage damage induced through telephone lines.

This type of protector on the phone line is a metal oxide varistor. It provides 40 joules of energy absorption and operates continuously at 130 VAC rms to allow proper ring voltage. During clamping operation, the maximum voltage is 340 volts. This devices switches quite quickly (in the nano second range) and absorbs quite large amounts of transient energy. It serves as secondary lightning protection via the phone company gas tube protector. Further primary protection is provided with the use of 7140 Line Seizure Module.

PROM CODING FORM FOR 2420

E²Prom MODELS USING X2443P or X2444P CHIP.

Step #	Data	Function
0	2420	Model Number (2420)
1	-	1st Digit of 1st code (1-9) 0
2	-	2nd Digit of 1st code (1-9) 0
3	-	3rd Digit of 1st code (1-9) 0
4	-	4th Digit of 1st code (1-9) 0
5	-	5th Digit of 1st code (1-9) 0
6	-	1st Digit of 2nd code (1-9) 0
7	-	2nd Digit of 2nd code (1-9) 0
8	-	3rd Digit of 2nd code (1-9) 0
9	-	4th Digit of 2nd code (1-9) 0
10	-	5th Digit of 2nd code (1-9) 0
11	-	Arm/Disarm code Length (3-5) 4
12	-	Fire Shutdown (1)=yes (0)=no 1
13	-	Intrusion Shutdown (1)=yes (0)=no 0
14	-	Emergency Shutdown (1)=yes (0)= no 0
15	-	Auxiliary Shutdown (1)=yes (0)=no 0
16	-	Entery/Exit Time Time = 15 sec X (1,2,4) 1
17	-	Interior Option (1)= Arm/Disarm Code Must be Entered (0)=Always active
18	-	Emergency Alarm (1) = Silent (0) = Audiable 1
19	--	Reset Shutdown Time (4,8,16,32) 64

In steps 20-23 circle the desired zones.

20	1 2 3 4 5 6 7 8	Exterior Zones (1-8)
21	1 2 3 4 5 6 7 8	Interior Zones (1-8)
22	1 2 3 4 5 6 7 8	Exterior Delayed Zones (1-8)
23	1 2 3 4 5 6 7 8	Interior Delayed Zones (1-8)

!!!!!! USE SOCKET 1 !!!!!!

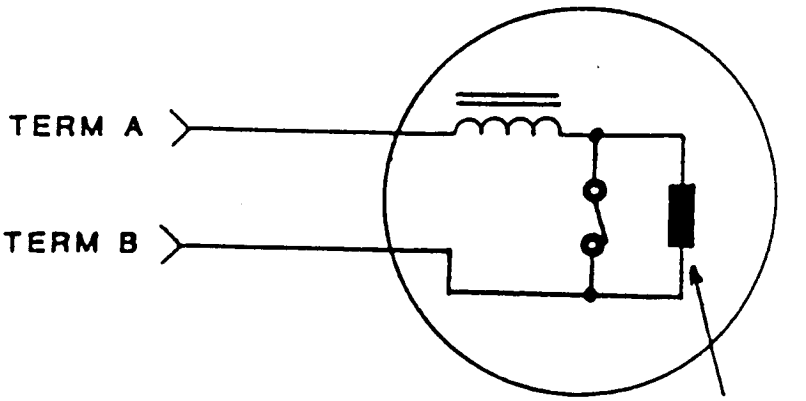
Bell Installation Addendum

Either coil driven or motor driven bells may be used with this control panel when used according to the following instructions. Failure to follow these instructions could cause irratic microprocessor operation.

In either application, the model 7800 noise suppressor must be installed as shown below:

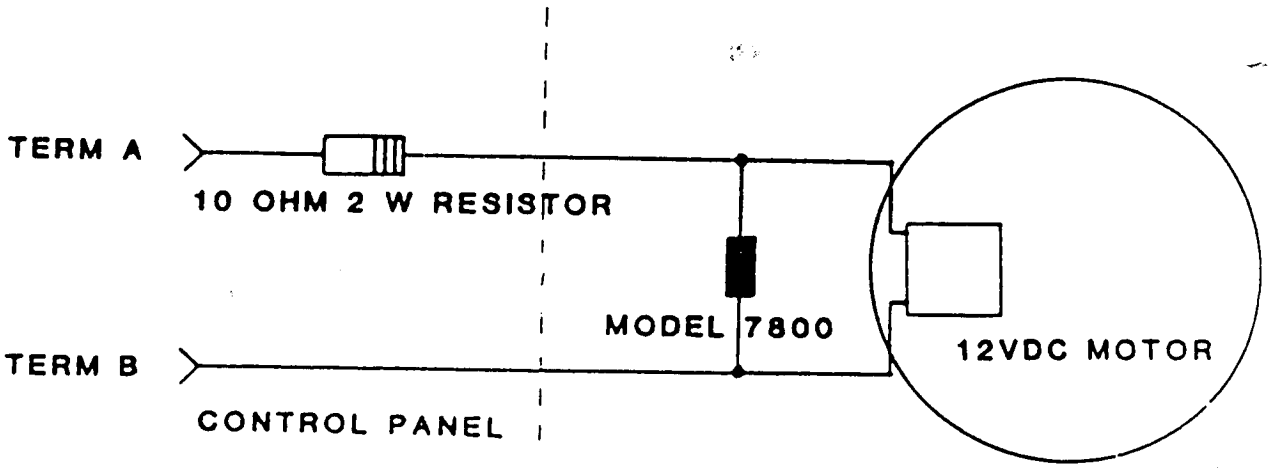
COIL DRIVEN BELL WIRING INSTRUCTIONS

BELLS USED MUST DRAW LESS THAN 350 ma.



PANEL MODEL #	2120	2620	3320	2420
TERM A	23	3	7	3
TERM B	31	17	11	8

MOTOR DRIVEN BELL WIRING INSTRUCTIONS



PANEL MODEL #	2120	2620	3320	2420
TERM A	40	4	8	3
TERM B	31	17	11	8