

ELK-MM447

Magic Module Automation Controller (MM443) with Built-in Voice Annunciator (MV480) and Caddx Security Interface (ML8)

Features

- MM443 Programmable Logic Controller
 - Four (4) supervised inputs with analog or digital sensing.
 - Four (4) dry contact SPDT relay outputs.
 - RS-485 four-wire data bus for networking to other Magic Modules and accessories, or to a personal computer.
 - Interface connection for X-10 Powerline control or for ELK Access Control module.
 - Four (4) Accumulator Counters, range 0 to 255.
 - Four (4) Timers, range 1/10 second to over 255 hours.
 - 16,384 program bytes using SIMPLE programming language.
 - EEPROM “non-volatile” memory maintains program in the event of power loss.
- MV480 400 Channel Recordable Voice Annunciator
 - Eight (8) minutes (480 seconds) of recordable audio.
 - Four hundred (400) addressable message channels.
 - On-demand playback.
 - Each message is 1.2 seconds in length but may be combined to produce longer messages.
 - Messages may be recorded via a built-in microphone or downloaded as .WAV files from a computer & ELK-129.
 - 24 Watt built-in audio amplifier with adjustable volume control.
- ML8 Caddx Security Control Interface
 - ¹ Works with most Caddx NX Security Controls(except “E” series) and mounts directly into a Caddx NX6 or NX8 Box.

Specifications

- Operating Voltage: 10.25 to 15 Volts D.C., well regulated.
- Nominal Current Draw: ~120mA., Max. draw with voice annunciator at full volume: ~1.2 amps w/ 8 ohm speaker load.
- Maximum speaker load: 4 ohms.
- Analog Inputs: Rated for 0 to 13.6 volts. Optional 2k ohm End-of-line resistor supervision. Inputs have selectable pull up or pull down jumper but may be left floating. Software programmable high/low threshold levels.
- Analog Input impedance (floating input) - 100K ohms.
- Relay outputs: Rated for 10 Amps at 120VAC, or 7 Amps at 28VDC general purpose; Relays 3 & 4 may be configured as open collector transistor outputs, 100 ma. Maximum.
- X-10 or Access Control Interface Connector: Telephone style RJ-11 4 wire female connector is compatible with PL513 and PSC04 1-way modules, TW523 and PSC05 2-way modules, or with MA290 Access Module.
- Accessory Connector (J1), 5 pin male: For optional MC100 Real Time Clock or MT100 Temperature Sensor Module.
- RS-485 Data Bus: For connection of additional data bus devices. Maximum length - 4000 feet w/22 AWG wire.
- Board Size: 9.25" W x 3.375" H x 1" D.

* Since the MM447 accepts RS485 data only, an RS232 to RS485 Data Converter (ELK-MB485) may be needed.



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OVERVIEW

The MM447 product is a Magic Module (MM443), a Recordable Voice Annunciator (MV480), and a Caddx NX Security Interface (ML8) integrated onto a single printed circuit board. It was specifically designed to mount into a Caddx NX series Control¹ allowing for quicker and easier implementation of integration and automation applications such as the popular HomeControl.

The MM447 has virtually no limits and can be used as a stand alone field programmable controller in a vast array of applications from timers, door controllers, simple process controllers, etc. or as a networked controller with other modules connected on a common RS-485 data bus. All data bus modules are assigned a device type and up to 31 of each type may interconnected together. A telephone style RJ-11 connector allows an X-10 Power Line Interface to be added for transmitting and receiving signals across the AC power line. This same connector can alternately be used with our Access Interface (MA290) for reading Dallas iButton™ ID devices or Proximity cards for identification and access control applications.

The MM447 uses the same programming software as the MM443 and MV480. The software and peripheral components are available in our Programming Kit (MK485) or Starter Development Kit (MK400). Programming is accomplished by way of a PC using ELK's Magic Module Development software. Programs may be written using either the automatic Code Writer or Application Writer interfaces which construct programs from a visual question list into a lower level Intermediate Code. The Intermediate Code, known as **SIMPLE**, is a Basic-like high level language that compiles the Intermediate Code into code byte's. The code is then downloaded from the PC to the MM447 over the data bus using the PC's serial port and a RS-232 to RS-485 converter (MB485 included in the programming kit). The code is stored in Electrically Erasible Programmable Read Only Memory (EEPROM memory). The microprocessor reads out of EEPROM memory and executes the code through a built in operating system. Once programmed, the MM447 may be disconnected from the data bus or the PC may be turned off. The latest updates to the ELK Product's Magic Module Development Software are available at: www.elkproducts.com.

INSTALLATION and HOOKUP

1. Set the RS-485 DATA BUS ADDRESS Jumpers. Each MM447 must be set to its own individual data bus address. There are 5 plug-on DATA BUS ADDRESS Jumpers located along the top of the board. See Figure 1. Each jumper has a position of [0] or [1] and a binary value (1, 2, 4, 8, 16) which can be read directly above each jumper. The addition of the binary values (sum total) for jumper(s) set to the [1] position determines the data bus address. For example: Data bus address 5 is set by placing jumpers 1 and 4 in the [1] position ($1 + 4 = 5$). All five jumpers are required to set the address, none can be missing.

2. Set the VOICE ADDRESS Jumpers. Even though the MV480 Voice Annunciator is "on-board" it must still have a Data Bus address of either 1, 2, or 3 assigned to it. There are 2 plug-on VOICE ADDRESS jumpers located along the top of the board. See Figure 1. Each jumper has a position of [0] or [1] and a binary value (1, 2) which can be read directly above each jumper. The addition of the binary values (sum total) for jumper(s) set to the [1] position determines the data bus address. For example: Data bus address 3 would be set by placing both jumpers in the [1] position ($1 + 2 = 3$). Both jumpers are required to set the address, none can be missing.

3. Connect the four wires of the RS-485 Data Bus to any remote or additional modules, or to an MB485 RS232 to RS485 PC Serial Interface adapter. For proper operation Data "A" must connect to Data "A" and Data "B" must connect to Data "B" on the other modules. There are two sets of Data Bus connections:

- A. Screw Terminals A & B
- B. Four pin header connector J2 - Pin 3 is Data "A" and pin 2 is Data "B".

4. Connect the Inputs as needed. Four analog or digital inputs with programmable low and high level switching thresholds accepting input voltages directly up to 13.6 volts DC are available at terminals 5 thru 10. Higher voltages can be used by using resistors on the input as a voltage divider. Each input is jumper programmable for a 2K ohm input resistor pulled to 12VDC, ground, or no resistor input voltage bias. The input loop response time may be adjusted with the **set INxFilter** command in 1/10-second increments from 100 milliseconds to 25.5 seconds.

The **Inputs** may be used as:

- A. **Normally Open** (Short to ground). Set **JP1** thru **JP4**, according to the input, to the "1" (+12V) pull up setting.
- B. **Normally Open** (Short to +12VDC). Set **JP1** thru **JP4** to the "0" (GND) pull down setting.
- C. **End Of Line Resistor** (EOLR) at 2000 ohms with **Normally Open** contacts across the resistor and/or **Normally Closed** contacts in series with the resistor. Set **JP1** thru **JP4** to the "1" (+12V) pull up setting.
- D. **Analog Voltage Input** (0 to 13.6 VDC). **Remove** the **JP1** thru **JP4** jumper. Use the **if Inx <= value** to select what to do next in the program according to the input voltage level.

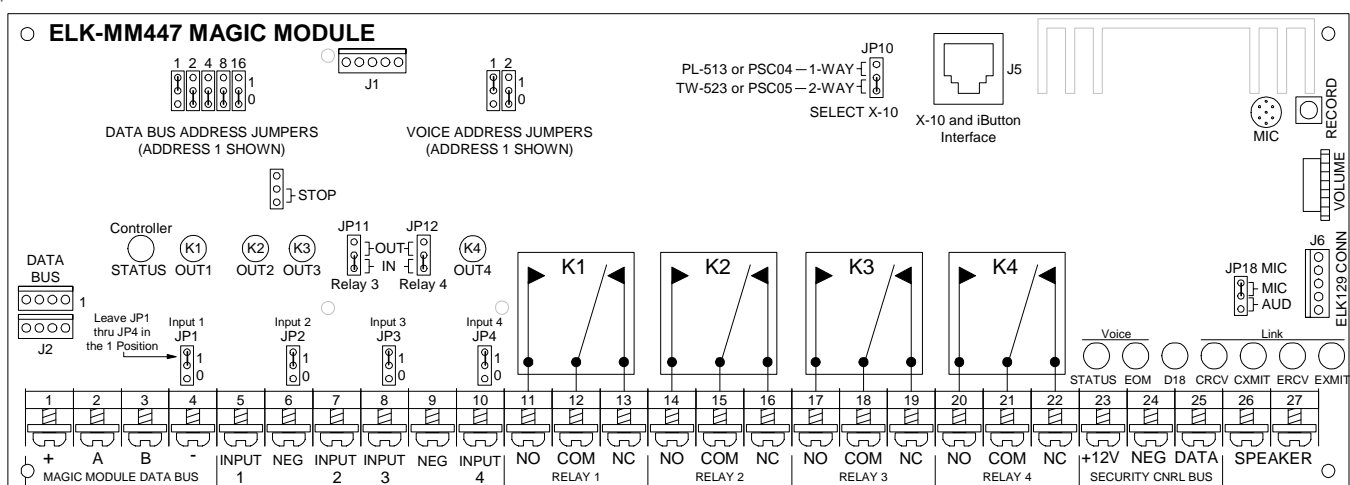
5. Connect the Relay Outputs as needed. Four form C relay outputs with contacts rated at up to 10 amps are available at screw terminals 11 thru 22. Two relay outputs are jumper programmable (JP11 for relay 3 & JP12 for relay 4) to switch the output through an open collector NPN transistor (100 ma maximum) to the COM terminal instead of through the relay for higher speed applications such as flashing LED's where the click of the relay is not desired.

6. Connect the Speaker(s) to the two screw terminals labeled SPEAKER. Maximum speaker load is 4 ohms. Multiple speakers may be wired in series to add more speakers to the system. There is a Volume Control Knob to set the output level.

Application Note: To connect the Voice Module to a low level line input going into a paging system or an audio amplifier refer to Figure 3. When using this connection adjust volume level to no greater than one quarter turn.

7. Connect an X-10 or Access Interface as needed. To communicate over the AC powerline connect a PL513 or PSC04 X10 module (transmit only), or a TW-523 or PSC05 X10 module (two-way) to connector **J5** using a single RJ-11 four wire telephone cable. Jumper **JP10** selects between the one way or two way modules. Alternatively, for Access control applications you may connect an ELK-290 Proximity/iButton Reader Interface to connector **J5**. The MM447 supports both Proximity Cards and Dallas iButtons. Note: X-10 and Prox/iButton applications cannot be used simultaneously.

- 8. Connect Power** from a well regulated 12VDC power source using any of four different locations on the printed circuit board.
- A. If a Caddx NX Alarm Control¹ is present it may be used to power the MM447 from the **Security CNTRL Bus** screw terminals.
- +12V** (terminal 23) connects to Caddx NX **KP POS** terminal.
 - NEG** (terminal 24) connects to Caddx NX **KP COM** terminal.
 - DATA** (terminal 25) connects to Caddx NX **KP DATA** terminal.
- B. **Magic Module Data Bus** (RS-485) screw terminals **1(+12V)** and **4(NEG)**.
- C. **RS-485 Data Bus** Four pin header connector, **J2**, Pins **4(+)** and **1(-)**.
- D. **X-10 and iButton Interface** Eight pin telco type connector, **J5**, Pins **2(+)** and **7(-)**.



Terminal Descriptions

1. **+12VDC** • Positive Power Supply input.
2. **A** • RS-485 data bus. Connect all data bus "A" terminals in together.
3. **B** • RS-485 data bus. Connect all data bus "B" terminals in together.
4. **NEG** • Common Negative/ground Power Supply input.
5. **INPUT 1** • Input 1
6. **NEG** • Common Negative/ground and return on Inputs 1 & 2.
7. **INPUT 2** • Input 2
8. **INPUT 3** • Input 3
9. **NEG** • Common Negative/ground and return on Inputs 3 & 4.
10. **INPUT 4** • Input 4
11. **NO** • Relay 1 Normally Open
12. **COM** • Relay 1 Common
13. **NC** • Relay 1 Normally Closed
14. **NO** • Relay 2 Normally Open
15. **COM** • Relay 2 Common
16. **NC** • Relay 2 Normally Closed
17. **NO** • Relay 3 Normally Open
18. **COM** • Relay 3 Common
19. **NC** • Relay 3 Normally Closed
20. **NO** • Relay 4 Normally Open
21. **COM** • Relay 4 Common
22. **NC** • Relay 4 Normally Closed
23. **+12V** • Connect to Caddx NX Control KP POS.
24. **NEG** • Connect to Caddx NX Control KP COM.
25. **DATA** • Connect to Caddx NX 6/8 KP DATA.
26. **SPEAKER** • Connect an 8 ohm 15 Watt (or greater) speaker.
27. **SPEAKER** • Connect an 8 ohm 15 Watt (or greater) speaker.

LED Indicators

- STATUS (Controller)** blinks for normal operation.
- OUT1** indicates Output (Relay) 1 is ON.
- OUT2** indicates Output (Relay) 2 is ON.
- OUT3** indicates Output (Relay) 3 is ON (see JP11 for optional use)
- OUT4** indicates Output (Relay) 4 is ON (see JP12 for optional use)
- VOICE STATUS** blinks for normal voice operation, lit while recording messages.
- VOICE EOM** blinks at end of voice message, lit while recording messages.
- D18** is for proper circuit operation only.(does not lite)
- CRCV** flashes if MM447 is enrolled and receiving data from the Caddx bus, on continuous if the Link Interface is not enrolled.
- CXMIT** blinks when the Link Interface transmits to the Caddx.
- ERCV** blinks when Link Interface sees data on the ELK bus.
- EXMIT** blinks when Link Interface transmits data on the ELK bus.

Plug-on Connectors, Jumpers, etc.

- J1 ACCESSORY CONNECTOR** for optional ELK-MC100, ELK-MT100 modules.
- J2 DATA BUS** Twin connectors for plug-on RS-485 data bus ribbon cables.
- J5 X-10 CONN** for X10 interface or ELK-MA290 Access Reader Interface.
- J6 ELK129 CONN** for ELK-129 downloading of sound (.WAV) files.
- DATA BUS ADDRESS** jumpers set the Controller's RS-485 bus address.
- VOICE ADDRESS** jumpers set the Voice Controller's RS-485 bus address.
- JP1** "1" = 2K pull "up" resistor, or "0" = pull "down" resistor on INPUT 1.
- JP2** "1" = 2K pull "up" resistor, or "0" = pull "down" resistor on INPUT 2.
- JP3** "1" = 2K pull "up" resistor, or "0" = pull "down" resistor on INPUT 3.
- JP4** "1" = 2K pull "up" resistor, or "0" = pull "down" resistor on INPUT 4.
- JP10** "1 way" or "2 way" X-10 interface communication on connector J5.
- JP11** "IN" = Relay 3 dry-contacts, "OUT" = Pull to ground transistor output.
- JP12** "IN" = Relay 4 dry-contacts, "OUT" = Pull to ground transistor output.
- JP18** "MIC" =record from onboard microphone, "AUD" = record with ELK-129.
- RECORD SWITCH** used for manually recording from on-board microphone.
- VOLUME ADJUST** controls audio output level to speaker.

FIGURE 1 MM447 Terminals, Indicators, and Jumpers

PLAYBACK OF MESSAGES

The Voice Annunciator messages may be played back using commands from the controller, a personal computer, or from many popular brands of controls and equipment that have an RS-232 or RS-485 serial port and are capable of transmitting ASCII strings*. Message channels are factory recorded (See Table 1) but may be custom recorded using the on-board microphone or computer WAV files. Refer to the Magic Module programming manual and software for procedures on playing messages.

PROGRAMMING NEW MESSAGES

Programming of new messages requires the following basic items: 1) A personal computer equipped with Windows 95 or higher and an available RS232 serial port. 2) A Magic Module Programmers (MK485) Kit. The kit contains the ELK Development software, a RS-232 to RS-485 data bus interface, a 9 pin serial cable, a 4 pin ribbon cable, and a 12 Volt DC Power Pack. Figure 4 shows the hardware connections. Install the development software on your PC and follow the directions.

1. Start the Magic Module Development software and click on the VOICE tab.
2. Set the System box (top left corner) to MV480 and the Address box to match the VOICE ADDRESS of the board.

Programming directly using the on-board microphone

- 3a. Estimate the message length to determine how many message locations will be needed. Each location is 1.2 seconds.
- 4a. Highlight the message location(s) (1 to 400) by clicking or dragging the mouse pointer. Enter a description and click the purple **Replace**. The message start and ending locations will be reflected in the **Start and Stop Boundary** window.
- 5a. Click the yellow **Microphone Program** button. Instructions will be sent to the Voice Annunciator and a message box will inform you to press the **Record switch** while speaking into the on-board microphone. Release the switch when finished. The message will automatically play back. If you speak longer than the length set by the start and stop boundary then a portion of your message will be lost. In that event re-record the message and either increase the number of messages channels or shorten your message. **If the record switch is not pressed within 45 seconds after the record command is received the command cancels and the unit returns to normal operating mode.**

Application Note: Instead of using the on-board microphone to record your spoken phrases, we recommend using the Windows Sound Recorder to record and store those phrases into .WAV files. WAV files are easier to program into the MM447 as shown below. In addition, they may be reused on future programming sessions.

Programming using computer stereo sound card and stored .WAV files

If your computer is equipped with a speaker output jack, you have the option of using computer sound .WAV files for messages. In addition to the basic hardware requirements you will need an ELK-129 Sound Card Interface. This connects between the computer's speaker output and the MM447 as shown in Figure 4. The software that comes with the ELK-129 is not required.

Note: When using an ELK-129 with an MM447, DO NOT CONNECT an AC Transformer to the ELK-129's 12VAC input terminals.

- 3b. To use a computer .WAV file, highlight the location (1 to 400) where you want the message to begin. Click the tan **Browse** button and find the desired .WAV file. Double click on the file or click Open. The .WAV filename will appear in the selected location. A message of 1.2 seconds or less will occupy one location. Messages longer than 1.2 seconds overrun into the following location(s) as indicated by the "...". This allows for longer messages, but it decreases the total number of available messages. Note: Location 400 cannot overrun. **The software supports .WAV files recorded at sampling rates of 11khz, 22 khz, or 44khz.**
- 4b. To hear the .WAV file, click the green **Play Computer WAV File** button. The volume slider can be used to individually lower the volume of loud wavs in your message list. Continue to add more WAV files into your list.
- 5b. When you have finished selecting .WAV files and are ready to program you may either click the orange **Program all WAV'S** button or highlight message(s) number(s) and click the green **Program A WAV**. The appropriate message(s) will then automatically record into the Voice Annunciator.
6. To playback a programmed message(s) highlight the message(s) and click the yellow **Play Voice Module Message** button.
7. A listing of your programmed messages can be saved onto your computer as a .VCM file for future use. Click **File, Save As**, and type in a descriptive filename.
8. The purple **Find Messages** button can be used to scan the MM447 and return message lengths stored in it's memory.

* Since the MM447 accepts RS485 data only, an RS232 to RS485 Data Converter (ELK-MB485) may be needed.

TABLE 1 FACTORY RECORDED VOCABULARY

1	One	81	Condition	158	Indicator	235	Pound	312	Warning	318	What		
2	Two	82	Connect	159	Input	236	Power	313	Water	319	When	324	Yard
3	Three	83	Container	160	Inside	237	Press	314	Way	320	Where		
4	Four	84	Control	161	Interior	238	Program	315	Wednesday	321	Will	325	Zero
5	Five	85	Cool	162	Intruder	239	Programming	316	Welcome	322	Window	326	Zone
6	Six	86	Curtain	163	Intrusion	240	Protected	317	West	323	With		
7	Seven			164	Is	241	Pump						
8	Eight	87	Data										
9	Nine	88	Day	165	Keep	242	Ready	327	AC Power Loss, Check Transformer and Power Circuit				
10	Ten	89	Defective	166	Key	243	Record	328	" "				
11	Eleven	90	Degrees	167	Keypad	244	Relay	329	" "				
12	Twelve	91	Delay	168	Kitchen	245	Repeat	330	Enter Code to Disarm				
13	Thirteen	92	Delivery			246	Report	331	" "				
14	Fourteen	93	Denied	169	Lamp	247	Reporting	332	Enter Code				
15	Fifteen	94	Department	170	Laundry	248	Reserved	333	Enter Function Number				
16	Sixteen	95	Detector	171	Leak	249	Reset	334	" "				
17	Seventeen	96	Device	172	Leave	250	Return	335	Exit Expires In Ten Seconds				
18	Eighteen	97	Dial	173	Less	251	Room	336	" "				
19	Nineteen	98	Digits	174	Level	252	Running	337	Exit Immediately				
20	Twenty	99	Dim	175	Light			338	" "				
21	Thirty	100	Dining Room	176	Line	253	S (plural)	339	Not Secure				
22	Forty	101	Door	177	Living Room	254	Saturday	340	Record Message After The Beep				
23	Fifty	102	Down	178	Load	255	Second	341	" "				
24	Sixty	103	Drive	179	Location	256	Secure	342	System is Armed				
25	Seventy			180	Locked	257	Security	343	" "				
26	Eighty	104	East	181	Log	258	Select	344	System is Disarmed				
27	Ninety	105	Emergency	182	Low	259	Sensor	345	" "				
28	Hundred	106	Empty			260	Sent	346	Then Call The Monitoring Station				
29	Thousand	107	Enabled	183	Machine	261	Service	347	" "				
30	200ms silence	108	End	184	Macro	262	Set	348	A C Power Loss / h				
31	800hz Tone	109	Energy	185	Mail	263	Setting	349	" "				
		110	Enter	186	Main	264	Shunted	350	" "				
32	A	111	Entry	187	Malfunction	265	Side	351	Access Denied / h				
33	Access	112	Equals	188	Manual	266	Sign	352	" "				
34	Account	113	Erase	189	Master	267	Silence	353	Access Granted /h				
35	Activate	114	Error	190	Medical	268	Sliding	354	" "				
36	Activated	115	Evacuate	191	Memory	269	Smoke	355	Activated / h				
37	Activation	116	Event	192	Menu	270	Someone	356	Alarm, Unauthorized Access /h				
38	Active	117	Exhaust	193	Message	271	South	357	" "				
39	Address	118	Exit	194	Minus	272	Stairs	358	Alarm / h				
40	Adjust	119	Exterior	195	Minute	273	Stairway	359	Bedroom 2 / h				
41	Air			196	Missing	274	Star	360	DiningRoom / h				
42	Alarm	120	Fahrenheit	197	Mode	275	Start	361	Enter Code to Disarm / h				
43	All	121	Fail	198	Module	276	Status	362	" "				
44	A M	122	Failure	199	Monday	277	Stay	363	Exit Expires in 10 seconds / h				
45	An	123	Family Room	200	More	278	Stop	364	" "				
46	And	124	Fan	201	Motion	279	Storage	365	Exit Immediately / h				
47	Answer	125	Feed	202	Motor	280	Summary	366	" "				
48	Any	126	Feet			281	Sunday	367	Family Room / h				
49	Appliance	127	Fire	203	Negative	282	Switch	368	Hallway / h				
50	Are	128	Followed	204	Next	283	System	369	Kitchen / h				
51	Area	129	Friday	205	Night			370	Living Room / h				
52	Arm	130	Front	206	Normal	284	Tank	371	Main Entry / h				
53	At	131	Full	207	North	285	Telephone	372	Master Bedroom / h				
54	Authorities	132	Function	208	Not	286	Temperature	373	Not Secure / h				
55	Authorized	133	Furnace	209	Notified	287	Temporarily	374	Please Close the Door /h				
56	Automatic	134	Fuse	210	Number	288	Test	375	" "				
57	Auxiliary					289	Thank You	376	System is Armed / h				
58	Away	135	Garage	211	Of	290	That	377	" "				
		136	Gas	212	Off	291	The	378	Then Call The Monitoring Station / h				
59	Back	137	Gate	213	Office	292	Thee	379	" "				
60	Bad	138	Glass	214	O K	293	Thermostat	380	Window / h				
61	Basement	139	Go	215	On	294	Thursday	381	At 5 5 5 - 1 2 3 4 / h				
62	Battery	140	Good	216	Online	295	Time	382	" "				
63	Bedroom	141	Greeting	217	Only	296	Toggle	383	" "				
64	Been			218	Open	297	Transformer	384					
65	Break	142	Hallway	219	Or	298	Trouble	385					
66	Bright	143	Hangup	220	Output	299	Tuesday	386					
67	Building	144	Has	221	Outside	300	Turn	387					
68	By	145	Have	222	Oven	301	Twice	388					
		146	Heat					389					
69	Call	147	Help	223	Parking	302	Undefined	390					
70	Cancel	148	High	224	Partition	303	Unit	391					
71	Carbon Monoxide	149	Home	225	Patio	304	Unlocked	392					
72	Card	150	Hot	226	Percent	305	Up	393					
73	Change	151	Hour	227	Personnel	306	Utility	394					
74	Check	152	House	228	Play			395					
75	Chime	153	Humidity	229	Please	307	Valve	396					
76	Circuit			230	Plus	308	Violated	397					
77	Clear	154	If	231	P M	309	Visitor	398	Locations 384 - 400 were intentionally left blank				
78	Closed	155	Immediately	232	Police	310	Volts	399	so that custom words, phrases, greetings, etc.				
79	Code	156	In	233	Pool			400	may be recorded.				
80	Cold	157	Inches	234	Porch	311	Warehouse						

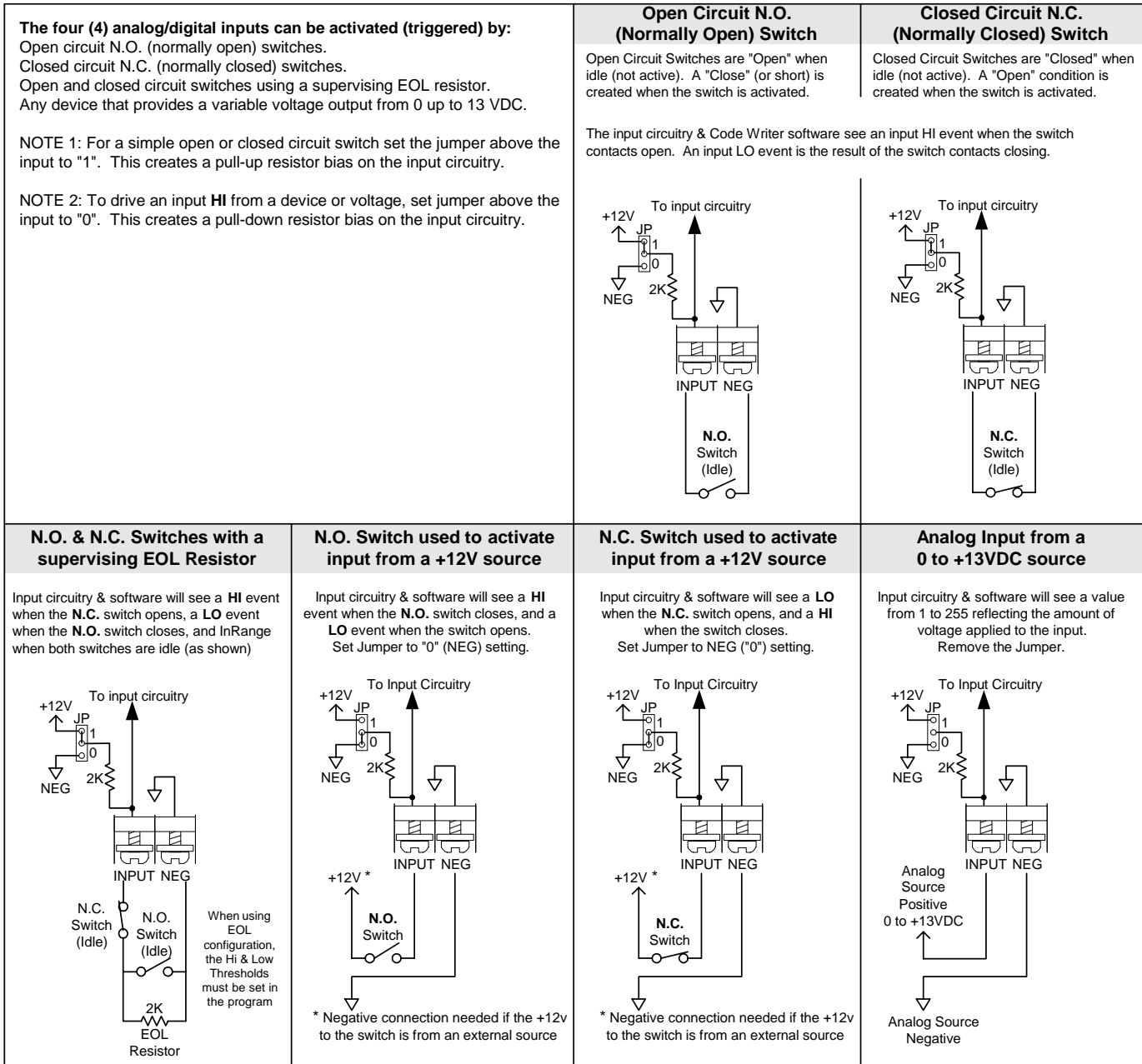


FIGURE 2 Configuration and Connections of Inputs

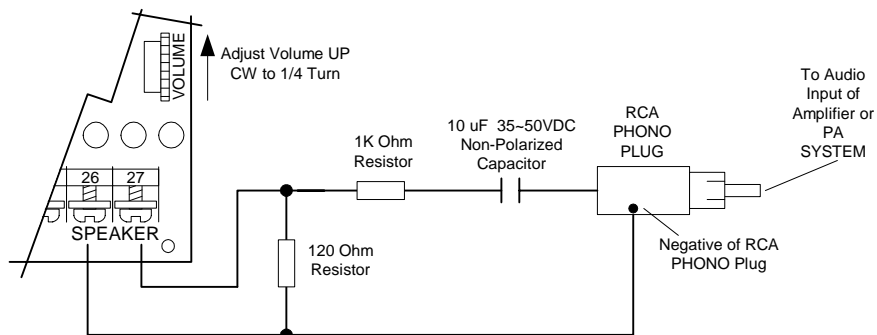


FIGURE 3 Line Level Audio Output

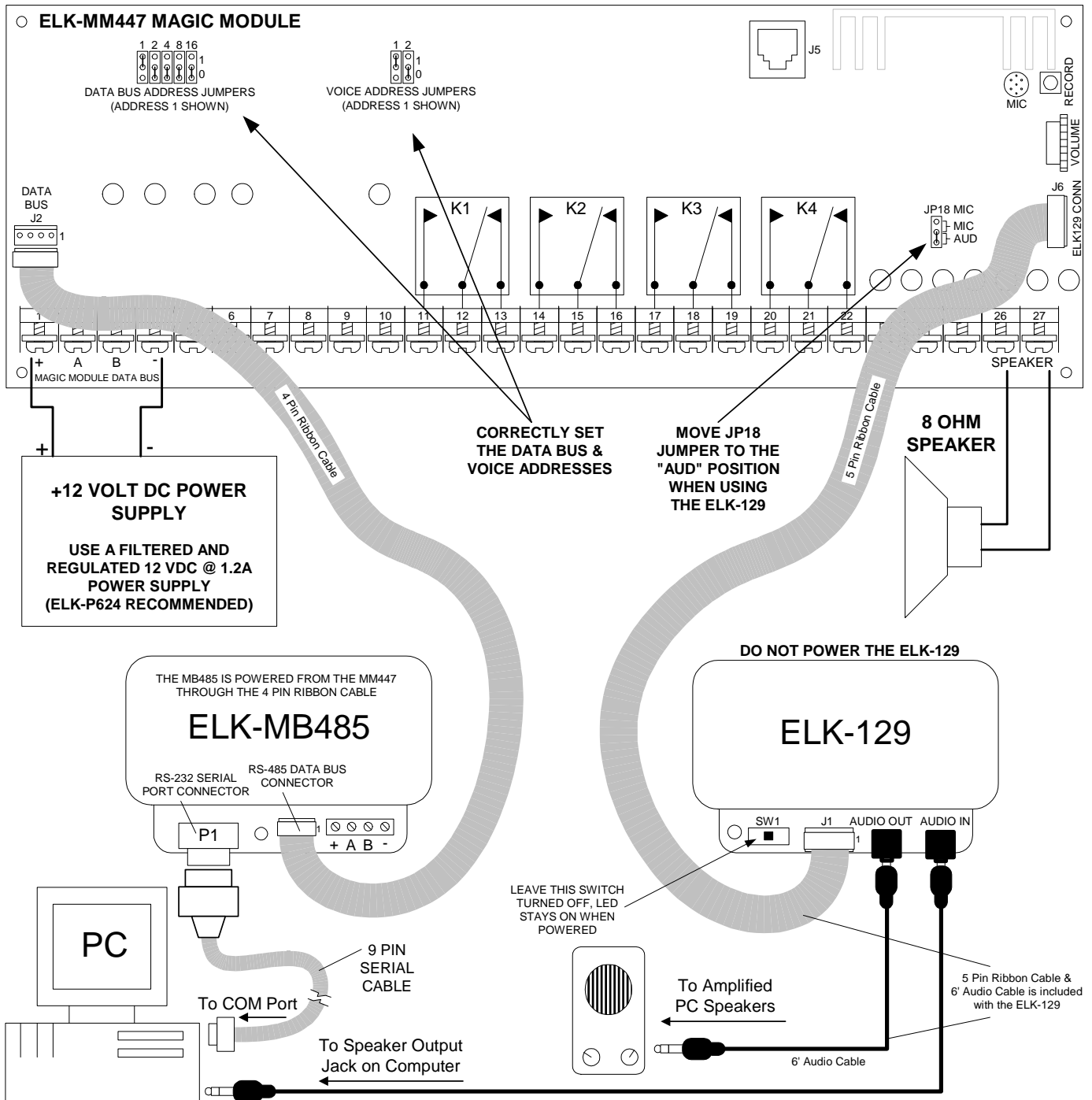


Figure 4 Optional ELK-129 Connection for PC Recording

APPENDIX A HomeControl (ELK-MKHOME1 rev. 2) Software Application

The MM447 is shipped programmed with the software application "HomeControl" which was developed as an automation application to interface with a Caddx "NX" Security Control¹ and focuses on the interaction of the security system to automate tasks within a typical home. Existing security sensors along with the control's arming status are utilized to trigger true automation operations such as setback of heating, cooling, and lighting subsystems when the building is not occupied, voice annunciation of key events, plus the added safety and security deterrent that automatic lighting can provide during the crucial moments of exiting and entry.

To fully complete the application simply add a Two-Way X-10 Transceiver (PSC05) and a speaker (ELK-73). By connecting this to a Caddx NX8, NX6, or NX4 Security Control¹ and some X-10 modules, it's possible to have a powerful lighting control and voice messaging automation system up and running in less than one hour. Energy savings are but a short step away with the addition of an electric Water Heater controller such as the ELK-9100, or an HVAC Setback Thermostat such as the ELK-MTHT. Many of the automation functions are controlled by time and day utilizing the clock/calendar from the NX Security Control.

The MM447 communicates with the NX Security Control via the Link Interface. There are 16 event conditions from the control which are monitored. These events are assigned to perform one or more of the following: 1) Transmit X-10 commands, 2) Activate a scene macro, 3) Activate a relay, 4) Announce a message. Changes can be made with "push-button" ease from a Windows 95/98 PC using our new "Application Writer" software included in the ELK-MK485 Programming Kit (sold separately).

INSTALLATION

1. Mount the MM447 board in the NX cabinet as shown in Figure 4. Connect it to the keypad input (3 wires: Red, Green, and Black). This will centrally power it from the NX Control. If you prefer (or need) to power the MM447 from another source, leave off the Red +12V wire from the KP POS and connect another DC power source to the +12V and Neg terminals
2. Mount an ELK-73 Speaker near the entry/exit keypad and connect it to the speaker terminals using two (2) wires.
4. Connect the four (4) wire modular cord from connector J5 to a X-10 Transceiver Module (PSC05). NOTE: One 1 or more X-10 or Leviton brand powerline modules (Lamp or Appliance type) are need to utilize the lighting/energy saving modes.

OPERATION OVERVIEW

To understand the automation processes of HomeControl it is necessary to know the parameters and conditions it uses to "Cause" each action, along with the "Effects" of each action. The following text and diagrams explain HomeControl in detail.

CADDX EVENTS

HomeControl is programmed to monitor the following sixteen (16) events (conditions) from the NX Control. When an event first occurs it is said to be "activated". When that event resets it is said to be "deactivated."

Activated	Deactivated	Activated	Deactivated
1. Armed		Disarmed	9. Zone 1 Fault
2. Armed (Home Mode)		Away Mode	10. Zone 2 Fault
3. Chime Mode On		Chime Mode Off	11. Zone 3 Fault
4. Entry Delay Active		Expired	12. Zone 4 Fault
5. Exit Delay Warning		End	13. Zone 5 Fault
6. Alarm Active		Silenced	14. Zone 6 Fault
7. AC Failure		Restored	15. Zone 7 Fault
8. Error Beep (3 beep)		End	16. Zone 8 Fault
			Zone 1 Restored
			Zone 2 Restored
			Zone 3 Restored
			Zone 4 Restored
			Zone 5 Restored
			Zone 6 Restored
			Zone 7 Restored
			Zone 8 Restored

LINE CARRIER (X-10) TRANSMISSIONS

X-10 House and Unit codes are pre-assigned to correspond to areas of a typical home. These are transmitted in response to the activated/deactivated events described above. For example: HomeControl transmits a C1 ON during arming or entry delay activation. If you want lights to be turned on, connect them to X-10 modules programmed to C1.

House Code	Unit Code	Assignment	House Code	Unit Code	Assignment
C	1	Main Entry Light	C	9	Nightlight(s)
C	2	Hall Light(s)	C	10	Bathroom Light(s)
C	3	Living Room Light(s)	C	11	Other (User Defined) Light(s)
C	4	Dining Room Light(s)	C	12	Other (User Defined) Light(s)
C	5	Family Room Light(s)	C	13	Walkway Light(s)
C	6	Kitchen Light(s)	C	14	Porch Light(s)
C	7	Master Bedroom Light(s)	C	15	Flood Light(s)
C	8	Bedroom 2 Light(s)	C	16	Heavy Duty Module for Electric Water Heater

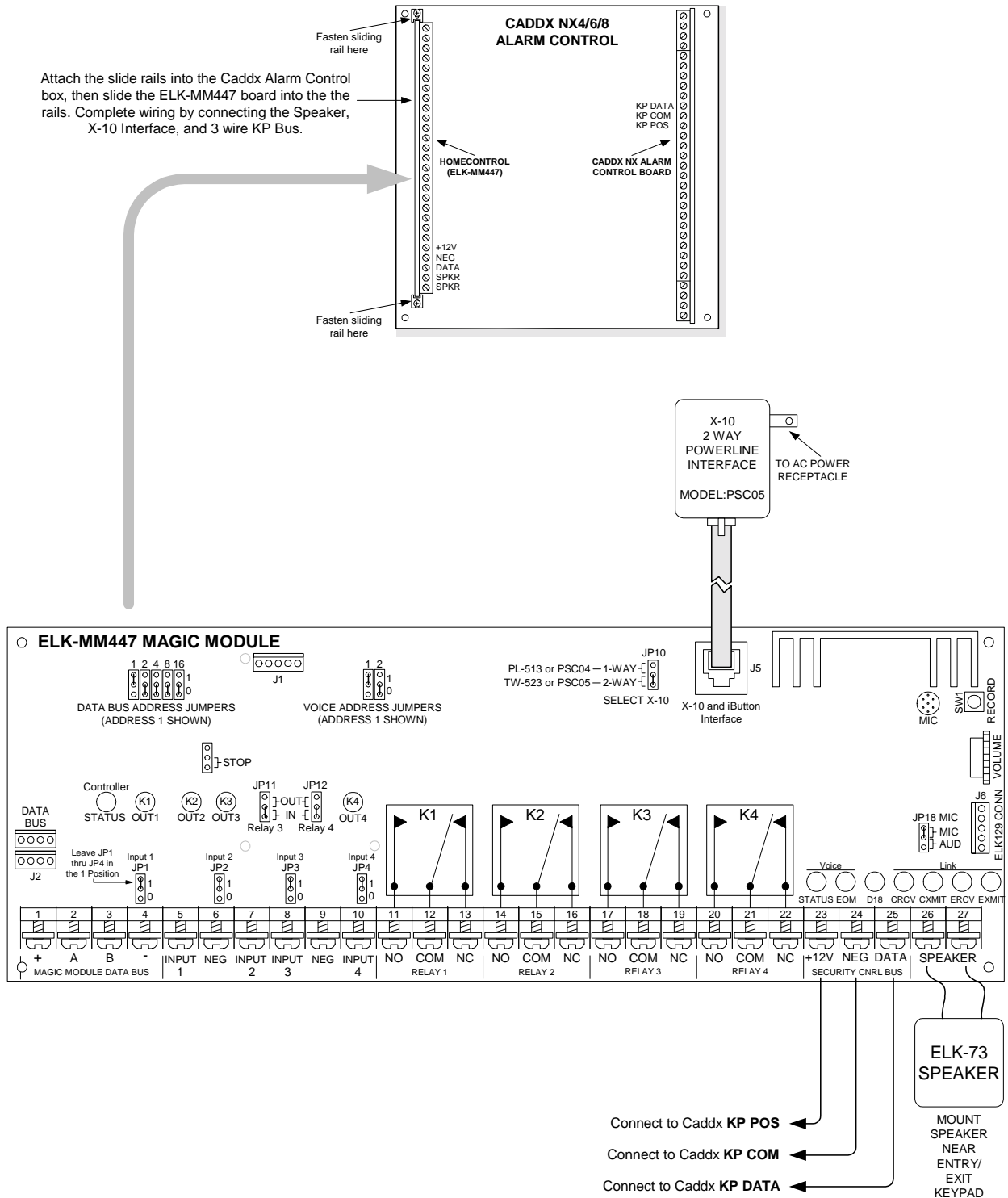
HARDWARE INPUTS

The four (4) hardwire inputs on the MM447 are not assigned in the factory default programming.

RELAY OUTPUTS

The four (4) dry contact relay outputs on the MM447 are assigned for use as:

- 1 Control of a high voltage electrically actuated water heater contactor. (Not needed if using an X-10 water heater module)
- 2 Control of an HVAC setback thermostat.
- 3 [available]
- 4 Optional control of the speaker(s) wires to the Voice Annunciator for selective muting of voice messages.



HomeControl Mounting & Hookup Diagram

"HomeControl" (MKHOME1 rev. 2) Programming for Event Cause and Effects

Events received from NX8 Security Control	NX8 Zone No.	Name assigned to Zone	Powerline Carrier (X-10) Code Transmissions (House and Unit Code)	Relay1 Water Heater	Relay2 HVAC Setback	Relay 3	Relay 4	Scene	Voice Message when event occurs	Voice Message when arming with a zone fault	Voice Message during an alarm	Voice Message at disarm after alarm
Common & Normally Closed contacts												
Armed Away	n/a	n/a	C1 Timed ON for 30 seconds - C16 (Water Heater) Off	Open	Open	-	-	3	System is armed - exit immediately	-	-	-
Disarmed	n/a	n/a	C16 (Water Heater) On	Closed	Closed	-	-	5	-	-	-	-
Armed Home	n/a	n/a	C16 (Water Heater) On	Closed	Closed	-	Open	5	-	-	-	-
Armed Away	n/a	n/a	C16 (Water Heater) Off	Open	Open	-	Closed	-	-	-	-	-
Chime Mode On	n/a	n/a	-	-	-	-	Open	-	-	-	-	-
Off	n/a	n/a	-	-	-	-	Closed	-	-	-	-	-
Entry Delay Active	n/a	n/a	C1 Timed ON for 30 seconds	-	-	-	-	-	System is armed - Enter code to disarm	-	-	-
Expired	n/a	n/a	-	-	-	-	-	-	-	-	-	-
Exit Delay Warning	n/a	n/a	-	-	-	-	-	-	Exit expires in 10 seconds	-	-	-
Expired	n/a	n/a	-	-	-	-	-	-	-	-	-	-
Alarm Active	n/a	n/a	C all lights ON, all lights OFF at approximately 2 sec. rate	-	-	-	Closed	-	Alarm activated - Enter code to disarm	-	-	-
Disarmed	n/a	n/a	-	-	-	-	-	-	-	-	-	-
AC Failure	n/a	n/a	-	-	-	-	-	-	AC power Loss - check transformer and power circuit	-	-	-
Restored	n/a	n/a	-	-	-	-	-	-	-	-	-	-
Error Beep (see note 1 below)			-	-	-	-	-	-	-	-	-	-
Zone 1 Faulted	1	Main Entry	C1 Timed ON for 30 seconds	-	-	-	-	-	-	Main Entry not secure	Alarm - Main Entry	Alarm activated - Main Entry
Restored			-	-	-	-	-	-	-	-	-	-
Zone 2 Faulted	2	Hallway	C2 Timed ON for 30 seconds	-	-	-	-	-	-	Hallway not secure	Alarm - Hallway	Alarm activated - Hallway
Restored			-	-	-	-	-	-	-	-	-	-
Zone 3 Faulted	3	Living Room	C3 Timed ON for 30 seconds	-	-	-	-	-	-	Living Room Window not secure	Alarm - Living Room	Alarm activated - Living Room
Restored			-	-	-	-	-	-	-	-	-	-
Zone 4 Faulted	4	Dining Room	C4 Timed ON for 30 seconds	-	-	-	-	-	-	Dining Room not secure	Alarm - Dining Room	Alarm activated - Dining Room
Restored			-	-	-	-	-	-	-	-	-	-
Zone 5 Faulted	5	Family Room	C5 Timed ON for 30 seconds	-	-	-	-	-	-	Family Room not secure	Alarm - Family Room	Alarm activated - Family Room
Restored			-	-	-	-	-	-	-	-	-	-
Zone 6 Faulted	6	Kitchen	C6 Timed ON for 30 seconds	-	-	-	-	-	-	Kitchen not secure	Alarm - Kitchen	Alarm activated - Kitchen
Restored			-	-	-	-	-	-	-	-	-	-
Zone 7 Faulted	7	Master Bedroom	C7 Timed ON for 30 seconds	-	-	-	-	-	-	Master Bedroom not secure	Alarm - Master Bedroom	Alarm activated - Master Bedroom
Restored			-	-	-	-	-	-	-	-	-	-
Zone 8 Faulted	8	Bedroom 2	C8 Timed ON for 30 seconds	-	-	-	-	-	-	Bedroom 2 not secure	Alarm - Bedroom Two	Alarm activated - Bedroom Two
Restored			-	-	-	-	-	-	-	-	-	-

Note1: The purpose of the error beep event is to instruct Magic Module to scan the zones for possible faults.

[011501]

"HomeControl" (MKHOME1 rev. 2) Programming for Scenes

Scenes are like macros. Multiple X10 Devices, Magic Module Relays, and Magic Voice Messages may be triggered by simply activating any one of the 6 scenes. A scene may be activated at a specific time and day of the week via 2 different schedules (A or B), by any of the 16 NX received events, or by any of the 4 Magic Module inputs. It is important to understand that scenes are one-way (activate only) actions. Scenes can be activated, but they cannot be turned on or off. Therefore, a second scene is required to reverse or change the state of a light or group of lights controlled by a previous scene. For example: at 5:30am Mon-Fri the pre-dawn scene (1) will be activated and the Mstr Bdrm light (C7) will be turned on. This light will be turned off by the Day/Away scene when the alarm system is armed. By the same token, this light or a group of lights may also be controlled by an NX event, a Magic Module input, or by another X-10 controller.

		Powerline Carrier (X-10) Signal Transmissions HOUSE CODE=C																			
No.	Name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	Relay1	Relay2	Relay3	Relay4
		Main Entry Light	Hall Lights	Living Room Lights	Dining Room Lights	Family Room Lights	Kitchn Lights	Mstr Bdrm Lights	Bdrm 2 Lights	Night Light	Bathrm Lights	Other Lights	Other Lights	Walk Way Lights	Porch Lights	Flood Lights	X10 Water Heater	Water Heater	HVAC		
																		Common & N/C contacts			
1	Pre-Dawn	-	-	-	-	-	-	ON	-	-	ON	ON	OFF	-	-	-	ON	Closed	Closed		
2	Dawn	-	-	-	ON	-	ON	-	-	OFF	-	OFF	ON	-	ON	-	-				
3	Day/Away	-	-	-	OFF	-	OFF	OFF	-	-	OFF	OFF	OFF	-	OFF	-	OFF	Open	Open		
4	Dusk	ON	-	-	-	ON	ON	-	-	ON	-	ON	OFF	ON	ON	ON	-				
5	Home	-	ON	ON	-	ON	ON	-	-	-	-	OFF	ON	-	-	-	ON	Closed	Closed		
6	Bedtime	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Open	Open		

Note: Water heater may be controlled either by an X10 powerline type device ie: ELK-9100 or by an electrical isolation contactor triggered from Relay 1.

	SCENE	Schedule A Scene Activation by Time of Day								Schedule B Scene Activation by Time of Day							
		Sun	Mon	Tue	Wed	Thu	Fri	Sat	Time 24hr	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Time 24hr
1	Pre-Dawn	-	Yes	Yes	Yes	Yes	Yes	-	5:30a	Yes	-	-	-	-	-	Yes	6:30a
2	Dawn	-	Yes	Yes	Yes	Yes	Yes	-	7:00a	Yes	-	-	-	-	-	Yes	8:00a
3	Day/Away	-	Yes	Yes	Yes	Yes	Yes	-	9:00a	-	-	-	-	-	-	-	-
4	Dusk	Yes	Yes	Yes	Yes	Yes	Yes	Yes	17:30p		-	-	-	-	-	-	5:30p
5	Home	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-
6	Bedtime	-	Yes	Yes	Yes	Yes	Yes	-	23:00p	Yes	-	-	-	-	-	Yes	00:30a

Note: The purpose of Schedules A & B are to allow each scene to be activated at different times on different days.

[011501]