

Critical Environment Technologies

MCS SERIES MULTI-CHANNEL GAS DETECTION SYSTEM PROGRAMMABLE CONTROLLER



Installation / Operation Manual

REV: D OCT-26-2001 (For Software Version 171A27)

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1.0 INTRODUCTION

The model MCS-80700 series systems are programmable gas detection control panels designed for all types of Commercial, HVAC and Industrial applications. They have been designed to operate with any 4 - 20 mA analog sensor / transmitter manufactured by Critical Environment Technologies They will also operate with any 4-20 mA analog gas transmitter that runs on 24 VDC (**check to make sure the target gas is listed on our menu**). These systems are very cost effective for small, medium and very large size projects. They are 100% field programmable without the need of a computer. The light weight enclosure is water and dust tight and has a double locking hinged door with a Lexan door label. The system has a powerful, programmable microprocessor providing the end user with audible and visual status of the entire gas detection system as well as quantitative sensor readings. The scrolling LCD digital display has two lines and twenty characters to display "sensor number", "alarm status", "gas type" and "quantitative measurement". The system also has a common set of alarm LED lights, very loud audible alarm and silence / acknowledge push-button. Through the use of "plug-in" electronic modules, the system can easily be expanded to accommodate from 1 to 66 analog 4 - 20 mA sensor / transmitter inputs and from 8 to 48 alarm relay outputs.

The system has been designed to operate from 110 VAC to 240 VAC at 50 Htz to 60 Htz. (Power requirements must be advised at the time of order). The system has two complete sets of fuses for maximum protection of the electronics. Two standard size glass fuses on the input power side and six automatic resetting thermal overload fuses (rated 2 amps each) on the output power side. The system provides 24 VDC nominal output power for the remote mount transmitters. There are six (6) separate 24 VDC outputs each capable of providing enough power for up to eleven (11) remote sensor / transmitters. The "positive" and "negative" outputs are designed to be "daisy-chained" to each of the eleven transmitters in each run to minimize the wiring requirements. The only other wiring required is one return "signal" wire (4-20 mA loop) from each remote transmitter back to the analog input module inside the system enclosure.

The system microprocessor has an automatic "alarm priority" scrolling feature. eg: If a particular system has twenty sensor / transmitters connected and six of them are in various stages of gas alarm, the microprocessor automatically scrolls through the alarm channels only in sequence of alarm priority (Fail, High, Mid, Low). Oxygen is the exception. Alarm priority for Oxygen is Fail, High, Mid, Low. As the alarm channels drop out of alarm state, the system automatically reverts back to scrolling through all the channels.

All system parameters and operating functions can be programmed with the use of the supplied hand-held programmer. The programmer has only six function push-buttons (no alpha or numeric buttons). The end user enters the menu and simply "scrolls and selects". The system has a very large pre-programmed default memory to reduce programming time. All programming details and instructions are provided in later chapters of this manual. The MCS-80700 series system controllers are one of the best values available today for gas detection system applications.

2.0 SYSTEM SPECIFICATIONS

2.1 ENCLOSURE MATERIALS

- * Fiberglass reinforced polyester with stainless steel hinges
- * Double locking door mechanism
- * Lexan (polycarbonate) door label

2.2 DIMENSIONS & RATINGS

- * 16" X 16" X 8" (406 mm X 406 mm X 203 mm) up to 55 channels & 8 relays or 44 channels & 16 relays or 33 channels & 24 relays
- * 20" X 24" X 10" (508 mm X 610 mm X 254 mm) up to 66 channels & 48 relays
- * NEMA-4X (IP66)

2.3 POWER REQUIREMENTS

- * 110 - 125 VAC, 50 Htz. or 60 Htz.
- * 200 - 240 VAC, 50 Htz. or 60 Htz.

2.4 FUSES

- * Input power: Two (2) standard glass fuses 1.0 amp or more (system size dependent)
- * Output power: Six (6) 2.0 amp "automatic resetting" thermal fuses

2.0 SYSTEM SPECIFICATIONS CONT'D.....

2.5 ALARM INDICATORS

- * Visual: a) two line 20 character LCD digital display
b) One common set of five (5) extra-bright LED light indicators
- * Audible: a) Loud 90 dB @ 10' (continuous) with "silence" push-button

2.6 ALARM LEVELS

- * Gas: Three: "LOW", "MID", "HIGH"
- * Fault: One: "FAIL"

2.7 INPUTS & OUTPUTS

- * Inputs: Maximum of sixty-six (66). Analog expansion modules of eleven (11) channels each.
- * Outputs: Maximum of forty-eight (48) dry contact S.P.S.T. relays rated 5 amps @ 240 VAC each.

2.8 OUTPUT POWER

- * Regulated 24 VDC (for remote analog transmitters)

2.9 FIELD WIRING

- * Output power: 18 gauge
- * Return Signal: 20 - 22 gauge

2.10 CERTIFICATIONS

- * CSA & UL signal appliance (electrical safety) "Pending"
- * CE (EMI & RFI signals) "Pending"

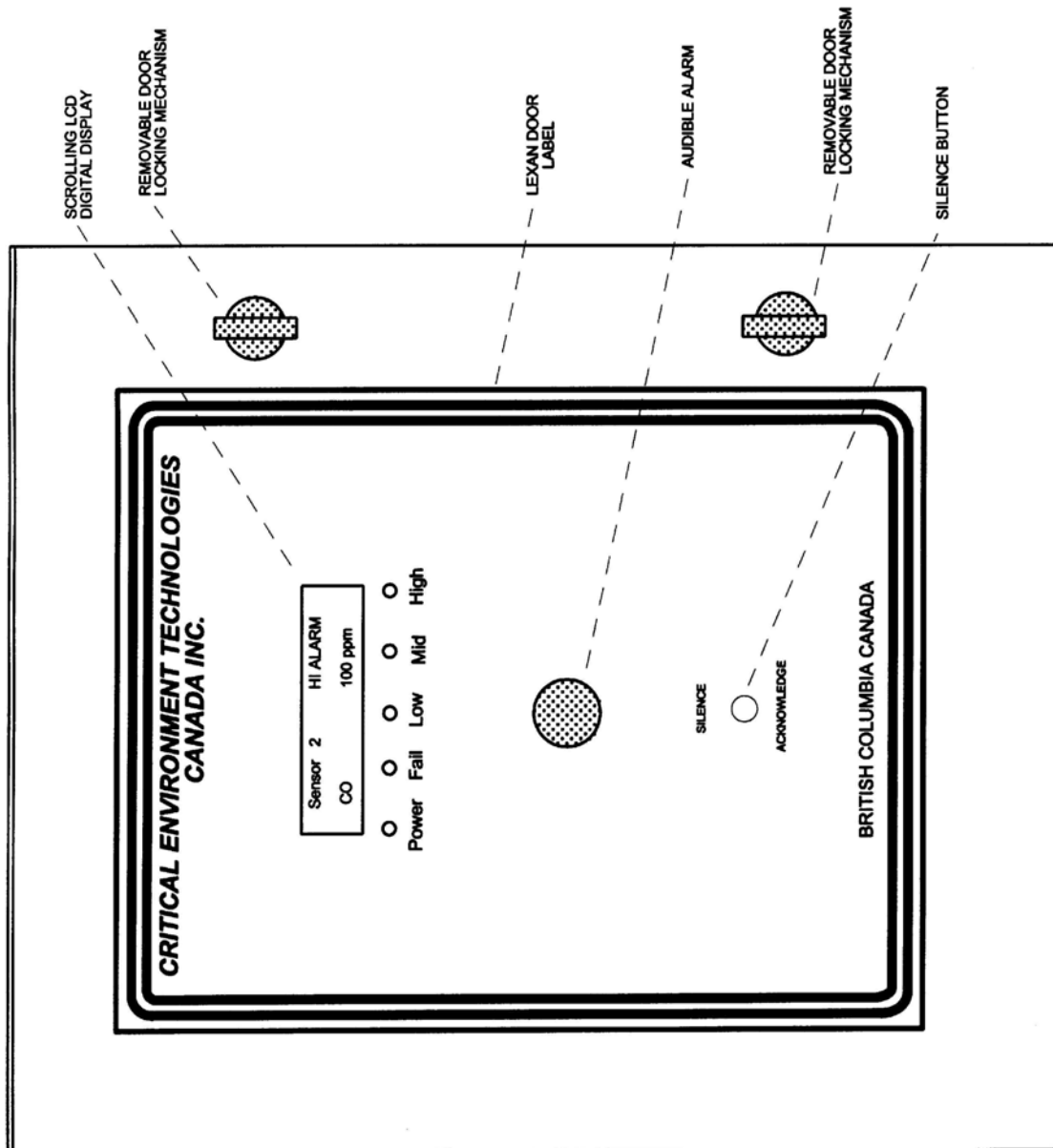
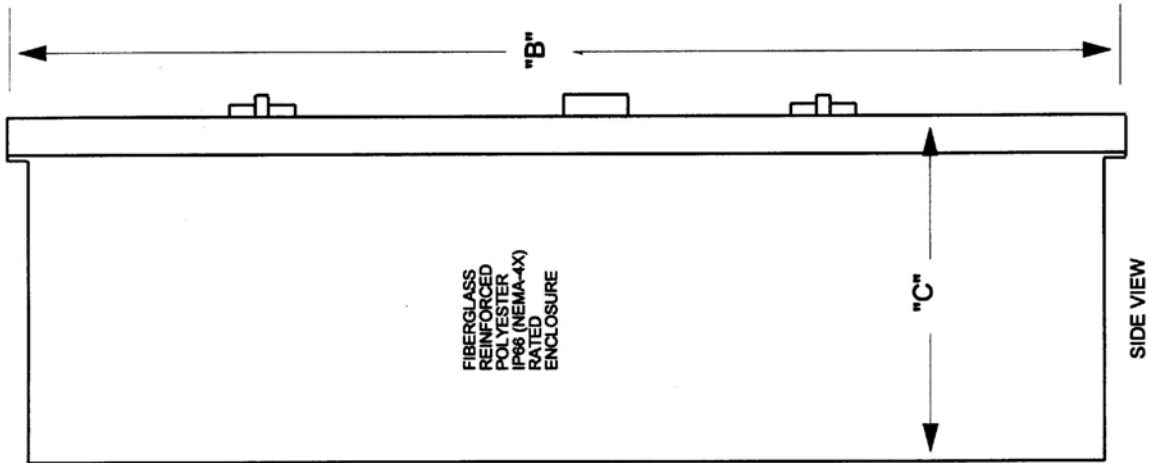
2.11 OPTIONS

- * a) MIL spec audible alarm (for washdown environments)
- * b) Sealed "Silence" push-button
- * c) Battery back-up system (up to 24 hours of continuous power for system in power out situations). *** Currently under development!**
- * d) Top mounted strobe light
- * e) Top mounted siren (110 dB).

2.12 MENU DEFAULT SENSOR RANGES & SET POINTS

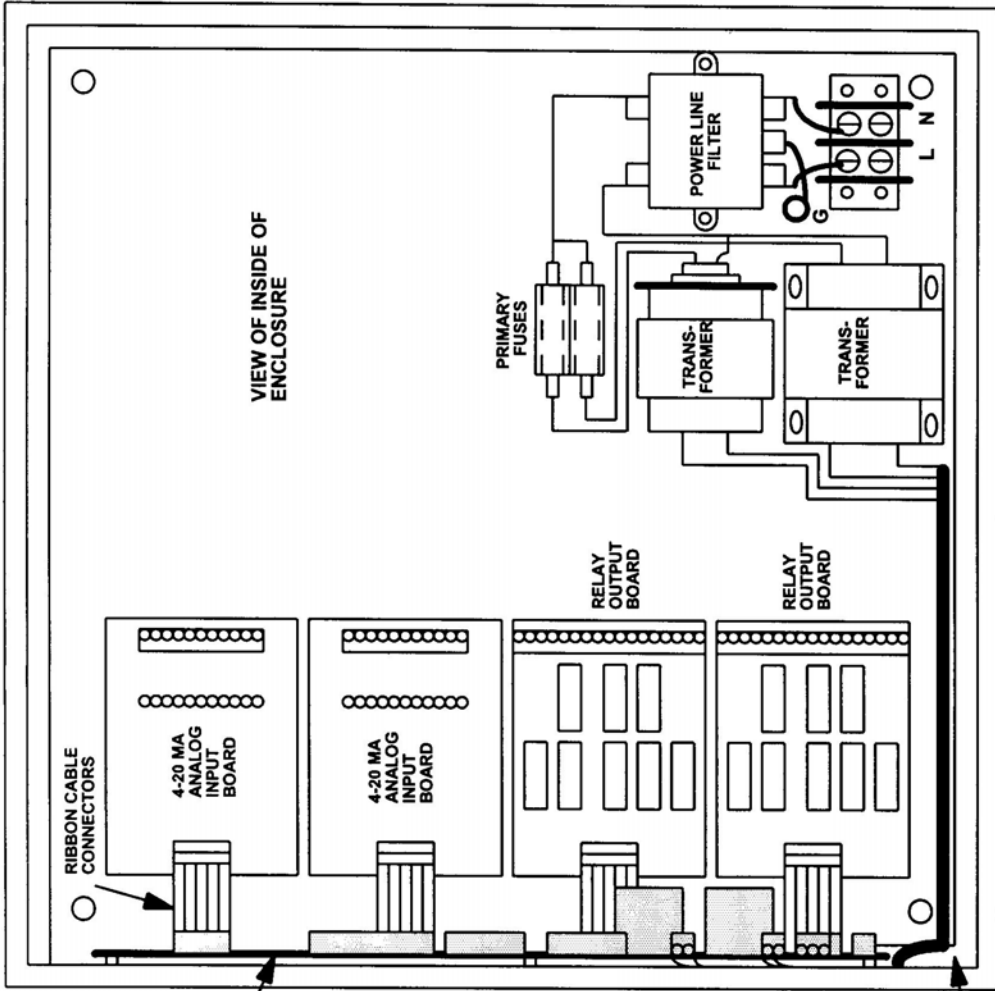
<u>SENSOR</u>	<u>SENSOR TYPE</u>	<u>RANGE</u>	<u>LOW SET</u>	<u>MID SET</u>	<u>HIGH SET</u>
Carbon Monoxide (SS)	CO - Solid-state	0 - 200 ppm	50 ppm	75 ppm	100 ppm
Carbon Monoxide (EL)	CO - Electrochemical	0 - 250 ppm	25 ppm	35 ppm	75 ppm
Carbon Dioxide	CO2 - Infrared	0 - 50,000 ppm	600 ppm	800 ppm	1000 ppm
Propane (SS)	C3H8 - Solid-State	0 - 50% LEL	10% LEL	15% LEL	20% LEL
Propane (SS)	C3H8 - Catalytic	0 - 100% LEL	10% lel	15% lel	20% LEL
Ammonia (SS)	NH3 - Solid-State	0 - 1000 ppm	35 ppm	100 ppm	300 ppm
Ammonia (EL)	NH3 - Electrochemical	0 - 100 ppm	25 ppm	35 ppm	50 ppm
Nitric Oxide	NO - Electrochemical	0 - 100 ppm	25 ppm	50 ppm	75 ppm
Nitrogen Dioxide	NO2 - Electrochemical	0 - 5.0 ppm	1.0 ppm	2.0 ppm	3.0 ppm
Oxygen	O2 - Electrochemical	0 - 25%	18.0% Vol.	19.0% Vol.	23.0% Vol.
Ozone	O3 - Solid-State	0 - 2.0 ppm	0.3 ppm	0.5 ppm	1.0 ppm
R11 Refrigerant	R11 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R12 Refrigerant	R12 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R22 Refrigerant	R22 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R123 Refrigerant	R123 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R134A Refrigerant	R134A - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R507 Refrigerant	R507 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R407A Refrigerant	R407A - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R408A Refrigerant	R408A - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
R404A Refrigerant	R404A - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
HP62 Refrigerant	HP62 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
HP80 Refrigerant	HP80 - Solid-State	0 - 2000 ppm	100 ppm	500 ppm	1000 ppm
N/A	N/A	N/A	N/A	N/A	N/A
Methane (SS)	CH4 - Solid-State	0 - 50% LEL	10% LEL	15% LEL	20% LEL
Methane (CT)	CH4 - Catalytic	0 - 100% LEL	10% LEL	15% LEL	20% LEL
Chlorine	Cl2 - Electrochemical	0 - 5 ppm	0.5 ppm	1.0 ppm	3.0 ppm

3.0 SYSTEM ENCLOSURE DRAWING (EXTERIOR)



NO.	1 - 44 Sensors / 8 - 16 Relays	1 - 44 Sensors / 8 - 24 Relays	1 - 66 Sensors / 8 - 24 Relays
A	15.7" (400 mm.)	15.7" (400 mm.)	19.7" (500 mm.)
B	15.7" (400 mm.)	23.6" (584 mm.)	23.6" (599 mm.)
C	7.9" (200 mm.)	9.0" (230 mm.)	9.0" (230 mm.)

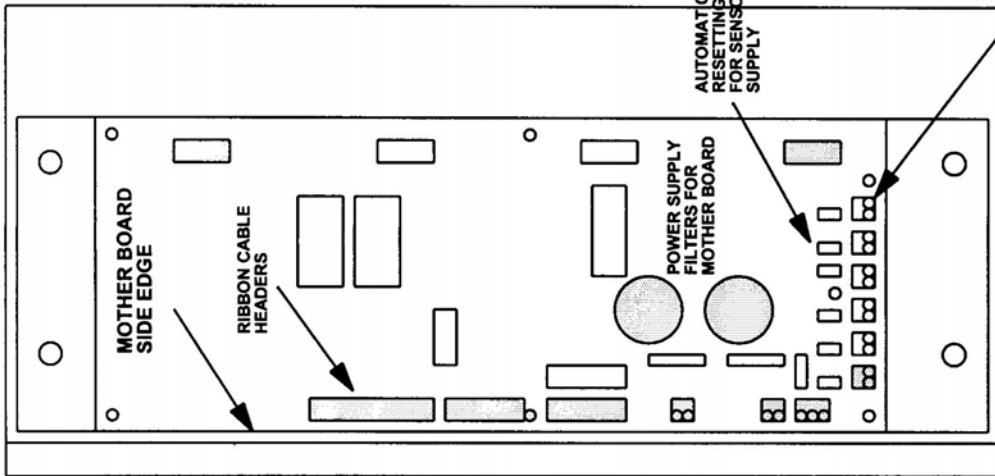
3.1 SYSTEM ENCLOSURE DRAWING (INTERIOR LAYOUT)



MOTHER BOARD INSTALLED ON LEFT INNER SIDE WALL OF ENCLOSURE BASE. THIS VIEW IS LOOKING DOWN FROM THE SIDE EDGE OF THE MOTHER BOARD.

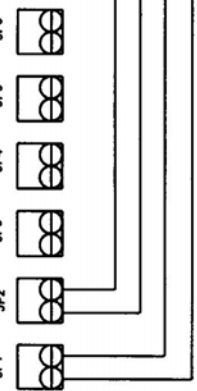
SHADED COMPONENTS ARE INSTALLED ON MOTHER BOARD AND CORRESPOND WITH SHADED COMPONENTS INDICATED ON FLAT DRAWING OF MOTHER BOARD TO THE LEFT

WIRING BUNDLE FROM TRANSFORMERS TO MOTHER BOARD



SENSOR POWER WIRING TERMINAL LEGEND

POS NEG JP1 POS NEG JP2 POS NEG JP3 POS NEG JP4 POS NEG JP5 POS NEG JP6



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TITLE: MCS SERIES PROGRAMMABLE MULTI-CHANNEL CONTROLLER INTERIOR LAYOUT & WIRING HOOK UP

DRAWING NUMBER: MCS-014 REV: "A" FEB-06-2001

DRAWN BY: F. B. ENGINEER: F. B.

4.0 SYSTEM INSTALLATION INSTRUCTIONS

4.1 MOUNTING: Each system is supplied with four non-metallic mounting feet. The mounting feet have been turned inward for easier shipping and handling of the enclosure package. Loosen and remove the individual screw that secures the mounting feet to the enclosure. Remove the mounting feet and turn them around so they are sitting in the desired mounting position to suit your specific application. The mounting feet fit snugly into specially moulded octagonal openings at the rear of the enclosure (see drawing # 3 below). Once all four mounting feet have been moved into the desired position, insert and tighten the securing screws. Secure the enclosure to the wall (any flat surface).

4.2 WIRING: a) Note: Conduit entry ports are not pre-drilled in these enclosures because of the NEMA-4X rating. Be careful when drilling holes for conduit, not to damage any internal system components or circuit boards. If application is for a water / dust tight enclosure, be sure and use the appropriate water-tight conduit fittings.

b) Main Power: The terminal strip for incoming 110 or 240 VAC "mains" power wires is located in the bottom right side of the system enclosure. Reference drawing # 2, page 9.

c) Transmitter Power: Two 18 gauge or heavier wires are required for each run of eleven remote analog sensor / transmitters. These wires run from the output power terminal strips (24 VDC - positive & negative) located along the bottom edge of the mother board (mother board is located at the left side of the metal, inner, white, bottom mounting plate) to the first transmitter and then are "daisy-chained" to the next and the next and so on. Each output is individually fused. Reference drawing # 2, page 9 and drawing #3, page 11.

d) Signal Wires: One individual "signal" wire (20 - 22 gauge) is required from each remote analog transmitter back to the "analog input expansion module" terminal strip. The analog input expansion modules are located along the right side of the mother board (also along the left side of the smaller "docking boards"). Docking boards are used only when larger systems requires a large number of analog input modules and relay output modules. The docking board is located on a metal inner plate mounted on the right inner wall of the enclosure. Reference drawing # 2, page 9 and drawing #3, page 11.




e) Relay Contacts: Control wiring (14 - 16 gauge) for fan "mags", etc. should be pulled into the system enclosure and attached to the terminal strips located along the edge of the "relay expansion module". Relay expansion modules are located beside or near to the analog input expansion modules. The control wiring for eg: exhaust fans should be connected to the "COM" and "NC" terminals strips. Basic system programming sets up the circuit to be "Fail-Safe", meaning that the alarm relays are kept energized 100% of the time, unless there is a gas alarm or fail condition. At this point, the relays "drop out" and anything controlled by the system alarm relays "run" or operate continuously until either the gas alarm state goes away or there is a true fail condition. Reference drawing # 2, page 9 and drawing #3, page 11.

4.3 SET-UP: a) All system controllers come partially or completely pre-programmed from the factory, *if the basic programming details are provided.*

b) Once the system wiring has been completed and checked for accuracy, power may now be applied to the system. Once power has been applied to the system, the LCD display will start scrolling through all the programmed channels and the green "power" LEDs along the bottom edge of the mother board will illuminate. The system is now ready for any final or late programming instructions. See further on in this manual for programming instructions.

4.4 SYSTEM WIRING HOOK-UP

WIRING LEGEND

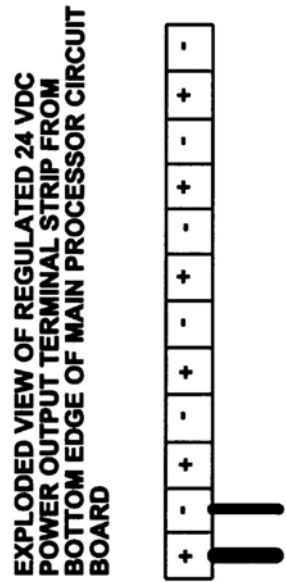
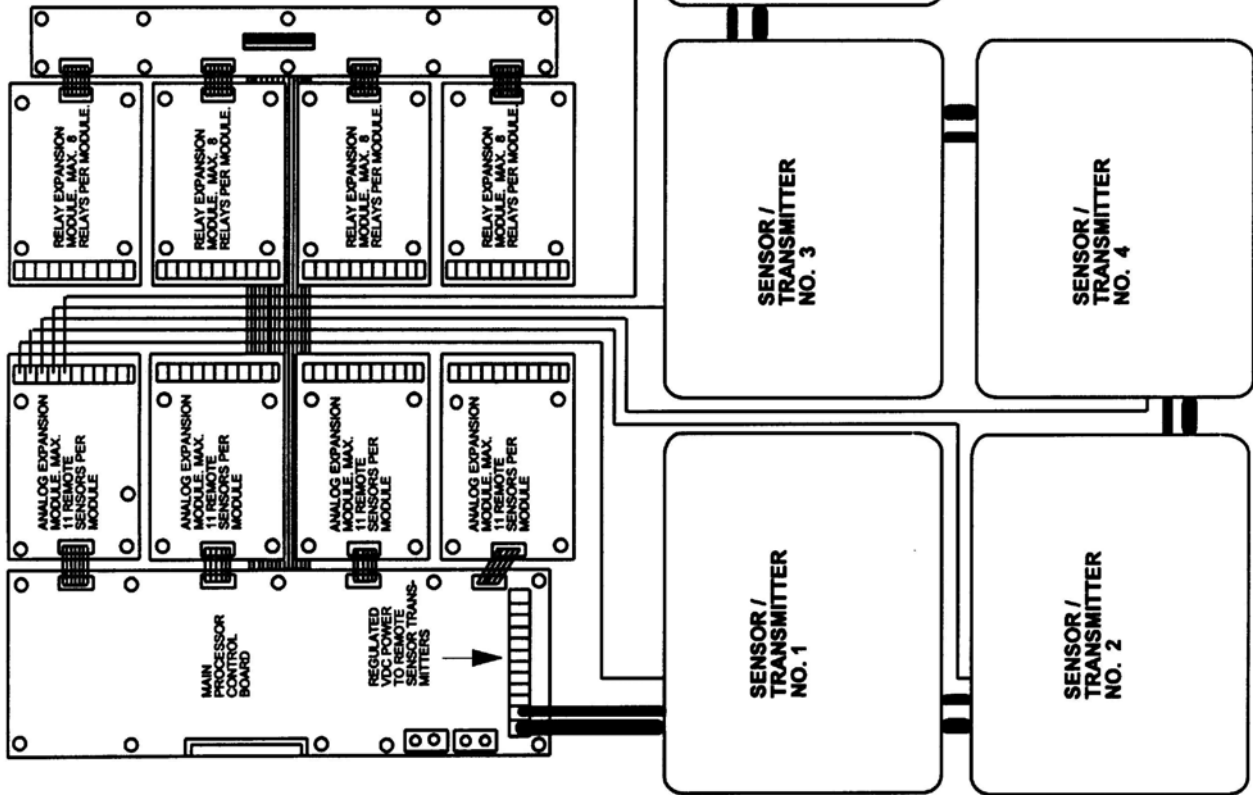
-  COMMON POSITIVE "+-" TO REMOTE TRANSMITTERS
-  COMMON NEGATIVE "-." TO REMOTE TRANSMITTERS
-  INDIVIDUAL SIGNAL WIRES FROM TRANSMITTERS

NOTE-1: EACH RUN OF "COMMON POSITIVE" AND "COMMON NEGATIVE" WILL PROVIDE REGULATED 24 VDC POWER FOR A MAXIMUM OF ELEVEN (11) REMOTE TRANSMITTERS.

NOTE-2: THERE ARE A TOTAL OF SIX (6) POWER RUNS AVAILABLE TO PROVIDE REGULATED POWER FOR MAXIMUM OF SIXTY-SIX (66) REMOTE TRANSMITTERS. THESE REGULATED POWER TERMINAL AND WIRING RUNS DO NOT AFFECT ZONING PROGRAMMING IN ANYWAY.

NOTE-3: THE EXAMPLE SHOWN INDICATES ONLY FIVE (5) TRANSMITTERS ON A RUN. AS INDICATED ABOVE ELEVEN (11) IS THE MAXIMUM.

NOTE-4: THE WIRE GAUGE FOR THE COMMON "POSITIVE" AND COMMON "NEGATIVE" WIRES SHOULD BE APPROXIMATELY 16-18 GAUGE (HEAVY ENOUGH TO HANDLE THE CURRENT LOAD OF A MAXIMUM OF ELEVEN TRANSMITTERS). WIRE GAUGE FOR SIGNAL WIRES CAN BE 20-22 GAUGE.



5.0 SYSTEM OPERATION DETAILS

Once power has been applied to a fully installed, wired, programmed system, the LCD display on the enclosure front door will start to scroll through all programmed channels, displaying “**Sensor #**”, “**Alarm Status**”, “**Sensor (gas) type**”, and “**Sensor Reading**” (ppm, % LEL or % Volume). If any of the programmed channels are in a state of alarm, the display will automatically default to scrolling only through the alarm channels, in order of “**alarm priority**”. The system alarm priority is: “**Fail**”, “**High**”, “**Mid**”, and “**Low**” (except Oxygen, which is “**Fail**”, “**Low**”, “**High**”, “**Mid**”). If all programmed channels do not receive a good signal, the display will indicate this by scrolling through all channels displaying only “**Sensor #**” and “**Failed!**”. Once all alarm channels drop out of alarm condition, the display defaults back to scrolling through all programmed channels. The pause rate for the display can be changed if desired through the system programming menu.

The MCS series systems deal with Oxygen alarms in a unique way. A Low Oxygen alarm on the system display is the most serious Oxygen gas alarm. This means that the environment being monitored is experiencing low Oxygen levels or a state of Oxygen Deficiency. A High Oxygen alarm on the system display is the next most serious Oxygen gas alarm. This means that the same environment is experiencing high Oxygen levels or Oxygen Enrichment. A Mid Oxygen alarm on the system display indicates a state of dropping Oxygen levels.

The system also provides one common set of five LED light indicators, labelled “**Power**” (green), “**Fail**” (red), “**Low**” (amber), “**Mid**” (red), “**High**” (red). In normal non gas alarm state with system power applied, the green “**Power**” LED illuminates all the time. Whenever any of the channels is in a state of alarm, it is indicated by the LED indicators. If any of the channels are in “**High**” alarm state, the audible alarm will emit a very loud steady tone. A 15 second audible alarm delay has been programmed to allow the system to stabilize on initial power up. The audible alarm can be silenced by pressing the “**Silence**” (red) button situated below the door mounted audible alarm. The audible alarm can be addressed to operate with High (default), Mid or Low alarms. The audible alarm is disabled during all programming functions.

Specific fail conditions can also be identified at the analog input expansion module. If the 4-20 mA loop has not been installed properly for a specific channel(s), the red “**Loop**” indicator LED illuminates. After system power up, the six green LED light indicators (output power to remote transmitters) along the bottom edge of the main (mother) board will illuminate continuously. If one of the green LEDs is not illuminated, it may mean that the fuse has blown. The fuses are automatic resetting thermal style rated at 2 amps each. To correct the situation, first ensure that no more than eleven (11) remote transmitters are powered from each output and that there are no ground loop faults. Next, carefully feel the fuse. If it is hot, then it has blown. Find the source of the “**short**” and correct it. To reset the fuse, simply disconnect one of the two power wires from the specific output terminal strip and allow the fuse several minutes to cool down. It will then automatically reset itself. Carefully re-connect the power wires.

If a powered up system is not displaying all connected channels or does not react as described above, the programming may have to be changed. To make programming changes, see section #7.0, further on in this manual. The supplied hand-held programmer is used to make all desired programming changes (computer not required). The software in all systems defaults all relays to a “**Fail-safe**” state (relays normally energized in non-alarm state). This can be changed if desired, through the system programming menu.

If the remote mount analog sensor / transmitters have not been powered for awhile, they may output a high signal, indicated at the controller as a gas alarm, while they warm-up and stabilize. This is normal. They can take from several minutes to several hours to warm-up and stabilize, depending on the sensor type and the length of time they have been without power.

Quantitative sensor readings are continuously updated and indicated on the LCD display, during normal operation. The software in the MCS series system has self-diagnostics and will automatically update itself for daylight savings time changes. For a detailed list of operational / programmable system features, refer to section 7.0 (page 16).

Analog inputs are completely independent, allowing the mixture of a wide variety of different gas sensors. Relay zoning can be achieved through the hand-held programmer. Zoning is the process of matching up one or more sensors with one or more relays to provide a measure of programmed control. The system provides one set of zones for each analog input. One “**Primary**” and one “**Secondary**” zone each. Through the use of two distinctive zones, the system provides a very large number of zoning combinations to address just about any zoning application.

A variety of time delays can also be achieved. The time delays are applied from both the input (sensors) and the output (relays) sides of the menu. Time delays on “**Make**” are addressable only with CO sensor choices. The system provides two, user programmable “**Peak Period**” overrides for controlling devices connected to the system alarm relays. Start and stop times will allow the system to override sensor activation of the relays (continuous manual override) for peak periods throughout the day. This can also be achieved by depressing the silence button for 10 seconds (display says “**Relays Unlatched**”). To reverse this situation, simply depress the silence button once.

5.0 SYSTEM OPERATION DETAILS CONT'D.....

Relay expansion modules are supplied with built-in "EMI" filters to help dissipate electromagnetic interference that may come from devices controlled by the system relays. The system also incorporates a "watchdog" to automatically reset the microprocessor if an interfering signal causes it to lock-up.

The system has two replaceable glass fuses located next to the main transformers. The value of these fuses is dependent upon the size of the system. All other fuses are of the automatic resetting type and do not require replacement if blown. The system incorporates a certified powerline filter at the mains input to provide protection from power surges.

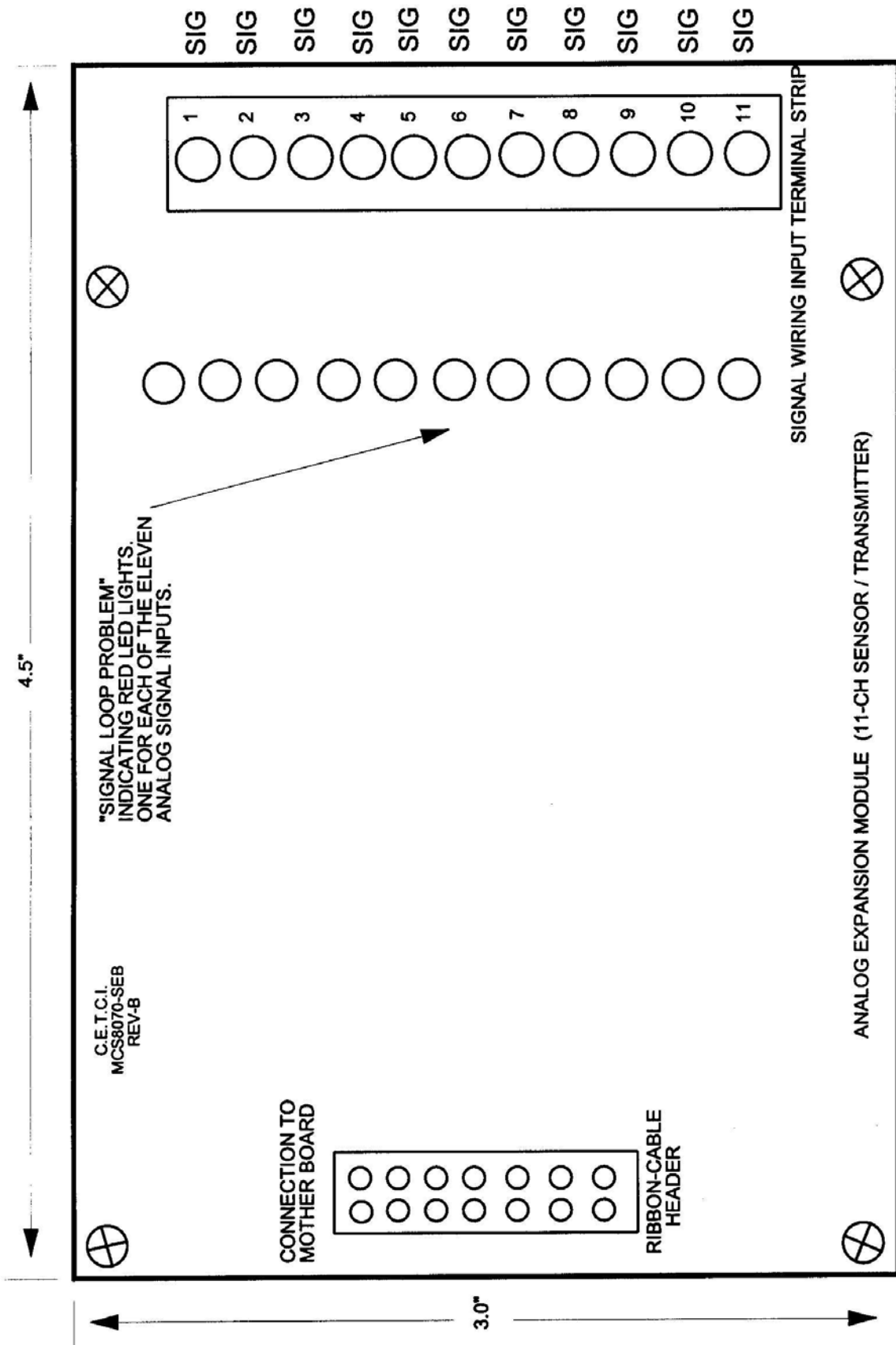
The system enclosure has two swivelling knobs that lock the enclosure when turned counter-clockwise (turn clockwise to unlock). They can easily be removed to provide a tamper-proof locked enclosure (grasp knob and tug on it). Only one knob is required to lock or unlock a system enclosure and all knobs are the same for all enclosures. If lost, knobs can be purchased as a separate item.

NOTE: The system enclosure rating is NEMA-4X and to maintain this rating, the installer should ensure that the proper, certified, water-tight conduit fittings are installed wherever a conduit entry hole is drilled. Please ensure that caution is used when drilling holes into the system enclosure and any drilling dust or particles are cleaned from enclosure after installation, so as not to cause any potential interference with internal microprocessor electronics.

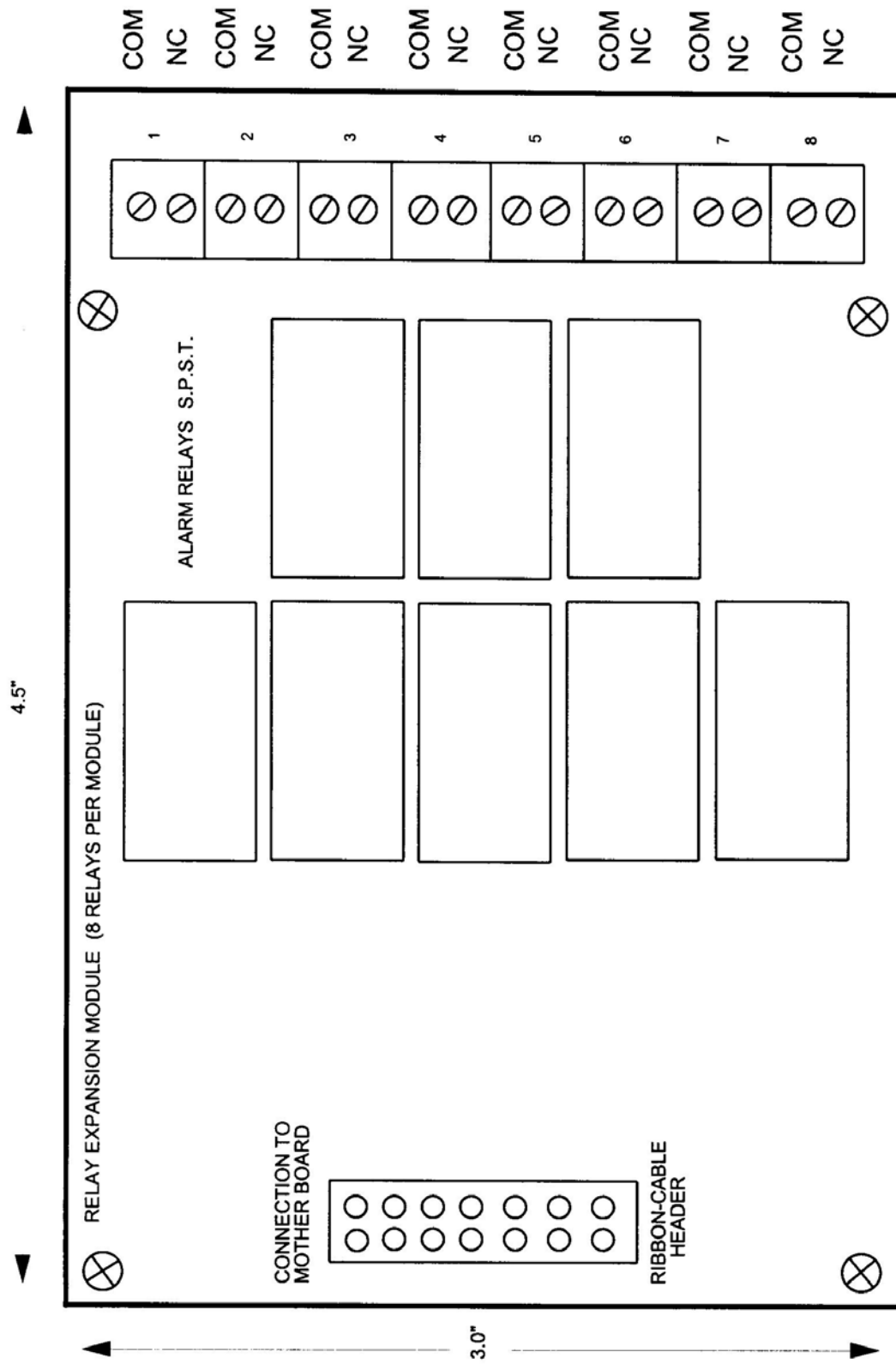
The internal memory of the MCS system is non-volatile, meaning all programming will be retained if system power is lost. For situations where it is imperative that the gas detection system not go down if power is lost, optional battery back-up systems are available. The system circuit provides the source of power for charging the batteries and the switch-over to battery power is instantaneous.

NOTE: DETAILED PROGRAMMING FLOW CHARTS CAN BE FOUND ON PAGES 16 THROUGH 21 OF THIS MANUAL.

6.0 ANALOG INPUT EXPANSION MODULE DRAWING



6.1 RELAY OUTPUT EXPANSION MODULE DRAWING



7.0 MENU STRUCTURE

The MCS series systems have a substantial menu driven software allowing the end user to completely program the system functions with a supplied simple, hand-held programmer (no computer required). The hand-held programmer plugs directly into the main (mother) circuit board (J2 position on board). It is keyed to fit in only one position, has only six buttons and allows the end user to simply scroll through menu selections and select functions or values. It is used to assign sensors, relays and zones and set or modify system parameters, as they relate to specific applications. No alpha/numeric information can be input to the menu, to avoid the potential for errors. The following describes the buttons (keys) of the hand-held programmer.

UP / DOWN arrow buttons: These buttons allow the user to scroll through major menu items. The user can increment "UP" or decrement "DOWN". through specific parts of the system menu.

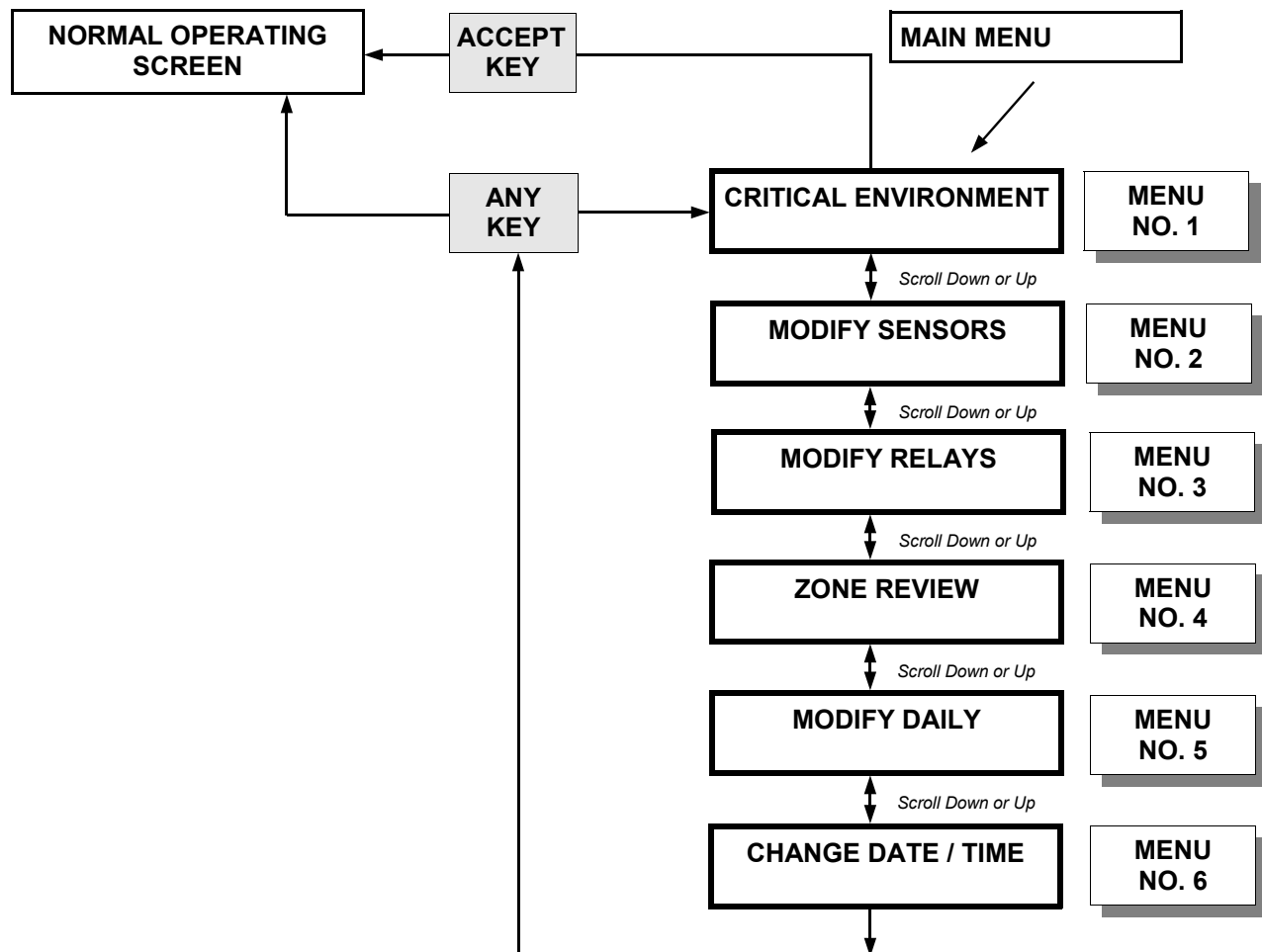
LEFT / RIGHT arrow buttons: These buttons are used for moving between single menu items and making modifications to values.

ENTER: This button drops the user into the lower level menu (sub-menu) structure and allows entry into the "CHANGE" parameter mode.

ACCEPT: This button accepts any changes made and takes the user one step back up the menu structure, every time this button is pressed, until the normal operating screen is reached.

7.1 MAIN MENU

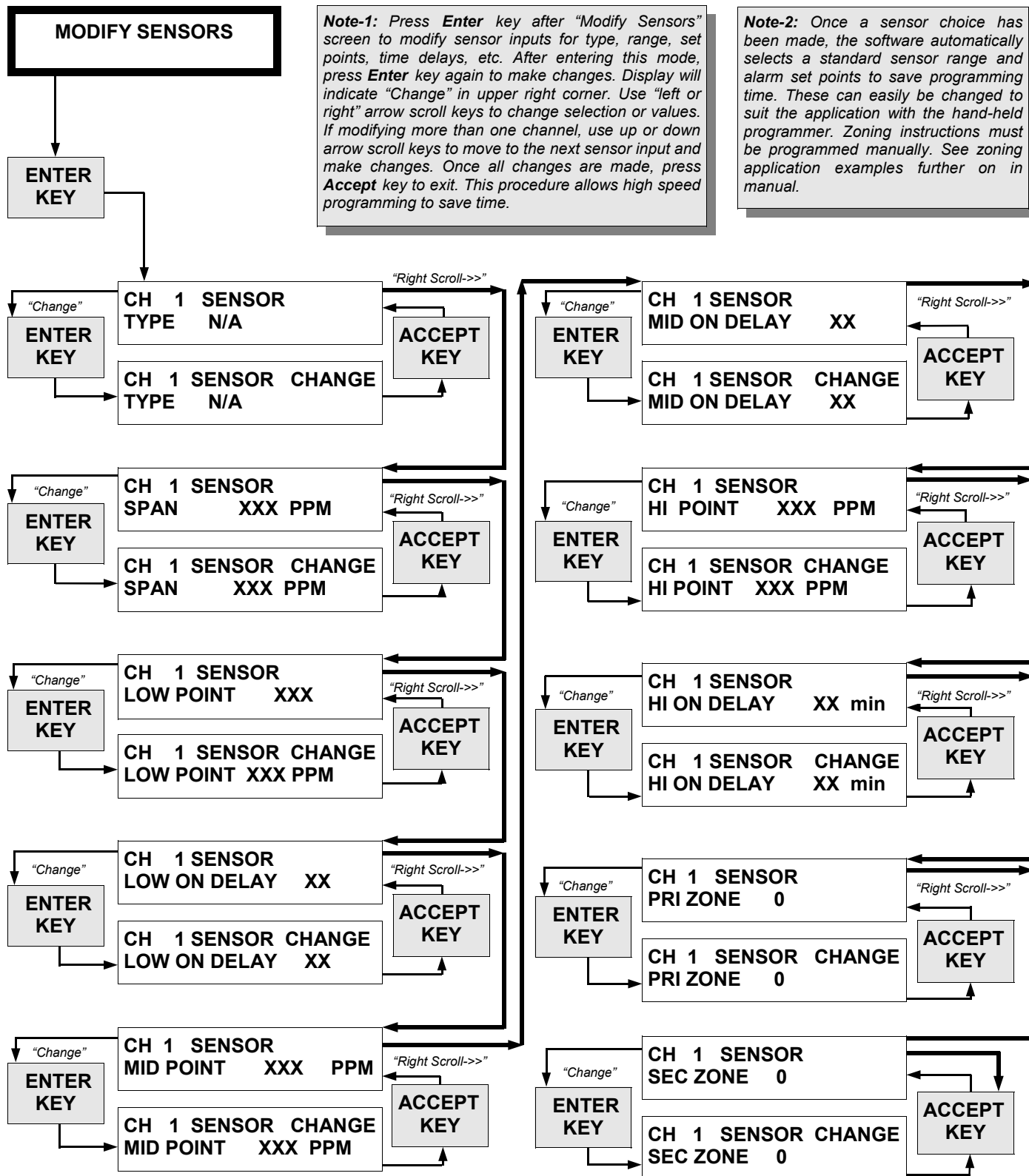
The main menu has six menu branches as indicated in the flow chart below. Press any button on the hand-held programmer and this will take you into the main menu branch as indicated in the first outlined box below "Critical Environment Technologies Canada". From here, use the up or down arrow scroll buttons to scroll to each of the menu branches or press "enter" and scroll through the sub-menus of the first menu branch "A".



7.2 PROGRAMMING FUNCTIONS NOTES

- A.** When sensor choices have been made for specific channels, through menu programming, the program automatically sets default ranges and alarm set points (see below for a list of default settings). This feature saves on programming time. The sensor ranges can be changed to suit the end user requirements, as long as the range of the specific remote mount analog transmitter is also changed to match. Check to ensure that the desired range is attainable within the specifications of the analog transmitter. The alarm set points can also be changed to suit the end user requirements.
- B.** When programming specific channel alarm set points, note that each level of gas alarm cannot be set higher than the next higher level of gas alarm. Program the "High" alarm set point first, then the "Mid" alarm set point, then the "Low" alarm set point last to avoid conflict.
- C.** Under the menu "MODIFY SENSORS", note that the time delay "ON" option applies only to the solid-state Carbon Monoxide sensor choice. So, if you try to enter this option, you will not be allowed to make a change unless you have selected the solid-state CO sensor "CO (SS)" for a specific channel.
- D.** The system program provides one primary and one secondary zone for each analog input. Eg. a basic 11-channel system provides eleven primary and eleven secondary zones. This combination of zones provides the end user with a huge array of potential zoning configurations to suit just about any application. Any zone programming performed can be confirmed through the "ZONE REVIEW" menu.
- E.** Under the menu "MODIFY RELAYS", note that if a specific relay is not to be used, this relay must be programmed as "NONE". Also remember to change any zones related to that relay to "0".
- F.** Under the menu "MODIFY SYSTEM PARAMETERS", note that changing the amount of time a specific channel's information is displayed "system display hold" is limited to a maximum of ten seconds. The maximum audible alarm delay is fifteen seconds.

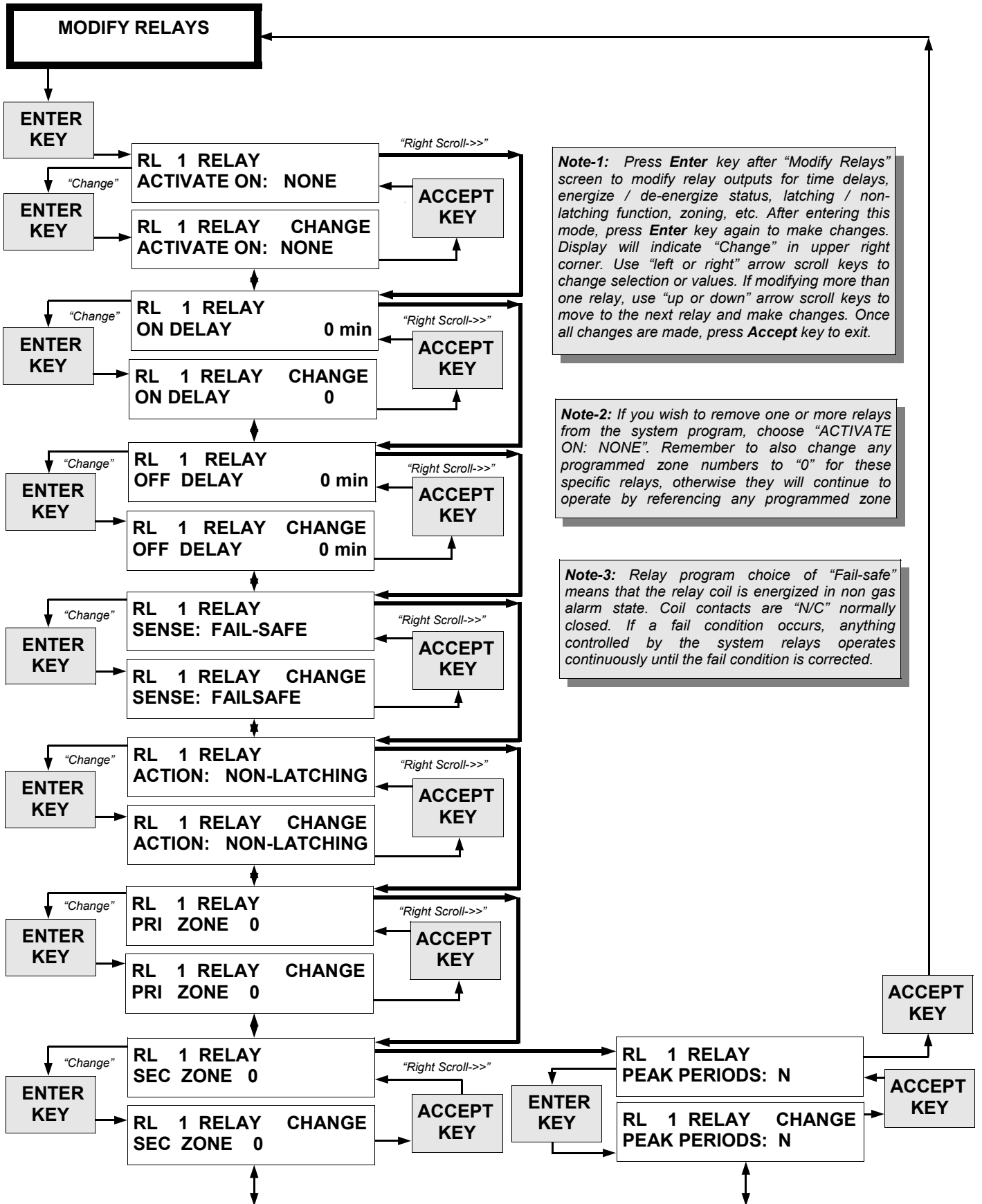
7.4 MENU BRANCH NO.2 "MODIFY SENSORS"



Note-3: Time delays "ON" for Low, Mid or High apply **only** to Carbon Monoxide sensors selected. Even though the option is indicated on the LCD display for other sensor choices, it has been locked out for safety reasons.

Note-4: Once zoning instructions have been programmed on the "sensor side" (Modify Sensors), they must also be programmed on the "relay side" (Modify Relays), to ensure each relay functions as required for your application.

7.5 MENU BRANCH NO.3 "MODIFY RELAYS"

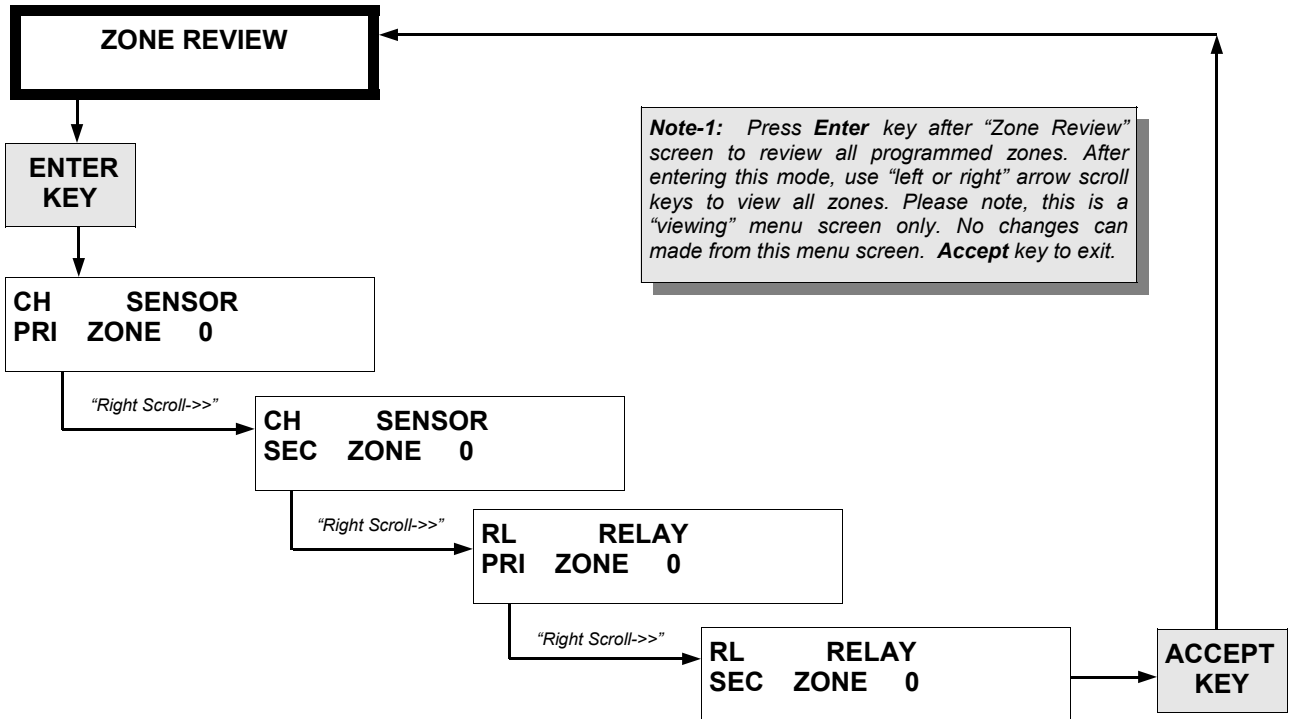


Note-1: Press **Enter** key after "Modify Relays" screen to modify relay outputs for time delays, energize / de-energize status, latching / non-latching function, zoning, etc. After entering this mode, press **Enter** key again to make changes. Display will indicate "Change" in upper right corner. Use "left or right" arrow scroll keys to change selection or values. If modifying more than one relay, use "up or down" arrow scroll keys to move to the next relay and make changes. Once all changes are made, press **Accept** key to exit.

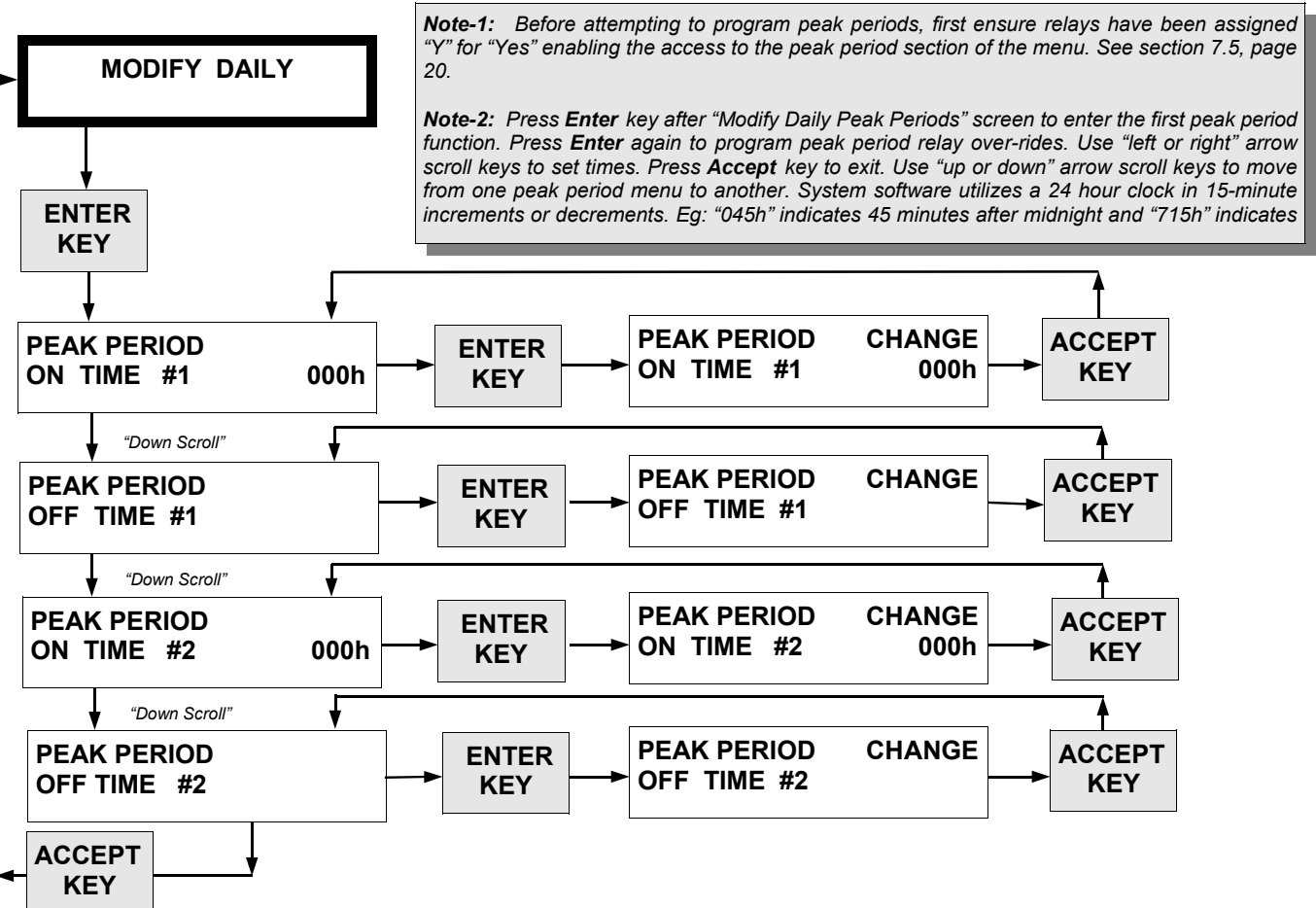
Note-2: If you wish to remove one or more relays from the system program, choose "ACTIVATE ON: NONE". Remember to also change any programmed zone numbers to "0" for these specific relays, otherwise they will continue to operate by referencing any programmed zone

Note-3: Relay program choice of "Fail-safe" means that the relay coil is energized in non gas alarm state. Coil contacts are "N/C" normally closed. If a fail condition occurs, anything controlled by the system relays operates continuously until the fail condition is corrected.

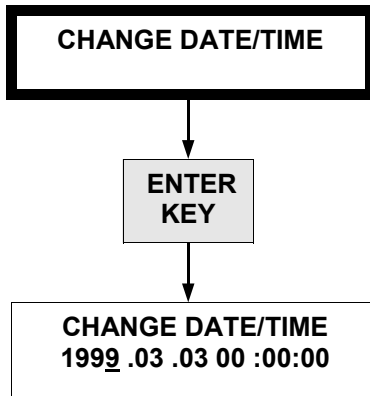
7.6 MENU BRANCH NO. 4 "ZONE REVIEW"



7.7 MENU BRANCH NO. 5 "MODIFY DAILY PEAK PERIODS"



7.8 MENU BRANCH NO. 6 “CHANGE DATE / TIME”



Note-1: Press **Enter** key after “Change Date/Time” screen to make changes in the system date and time settings. This produces an underscore cursor, appearing first under the year. After entering this mode, use “left or right” arrow scroll keys to move from the “year” to the “month”, etc. To make changes in each setting, use the “up or down” arrow scroll keys. Press **Accept** key to

7.9 ZONING

Zoning is a feature that allows the user to assign and match a sensor or groups of sensors with a relay or groups of relays to provide automatic and specific control of devices that are wired into the control panel system relays. The software in the MCS series systems provide one “Primary” and one “Secondary” zone for each analog channel input. Zone numbers are used to group a channel or set of channels (sensor inputs) with a relay or sets of relays (outputs). A zone number assigned to an input channel is also assigned to a specific relay(s). This ensures that this relay(s) is activated when the same zoned channel(s) goes into alarm state. The same zone number can be in either Primary or Secondary zone grouping.

Primary and secondary zoning allows for overlapping input channel or relay control. Zone numbers are normally assigned in sequence as you are laying out the sensor / relay groupings, but may be skipped if necessary. However, zone numbers may not be duplicated in the secondary zone if those numbers were previously assigned in the primary zone. The configuration of Primary and Secondary zones provides the user with a very wide range of potential configurations to address just about any type of desired zoning.

Note-1 example. If you wish to activate relay 2 at low level alarm state from input channel 1 and the next available zone number is 3, assign both the input channel and the relay zone to “Primary 3” and program relay 2 to activate on “L” (Low). If you want relay 2 to stay activated after low alarm, as the sensor rises through mid and high alarm states, program it to activate on “L,M,H” (Low, Mid, High).

Application Example-1. You have **four sensors** and wish to control **three fans** plus provide **one** master alarm **contact** for a building management system. You want fan-1 to activate when sensor-1 and sensor-2 rise to low alarm status, fan-2 to activate when sensor-2 and sensor-3 rise to high alarm status, fan-3 to activate when sensor-3 and sensor-4 rise to mid alarm status, and the last relay to activate from all sensors for high alarm status.

The table below indicates the solution: Notice the overlap in zone-3 and zone-4 so that sensor-2 and sensor-3 control relay-2. Also, zone-2 has been placed in the secondary side so that relay-4 can pick up both primary zone-1 and secondary zone-2, making it possible to alarm if any sensor hits the high alarm status.

SENSOR NUMBER	PRIMARY ZONE	SECONDARY ZONE	FAN NUMBER	RELAY NUMBER	PRIMARY ZONE	SECONDARY ZONE	ACTIVATE ON
1	1		1	1	1		L, M, H
2	1	3	2	2	4	3	H
3	4	2	3	3		2	M, H
4		2	CONTACT	4	1	2	H

7.9 ZONING CONT'D.....

Application Example-2. Four-level parking garage. You have *twenty-four sensors* (six on each level) and wish to control *eight two-speed exhaust fans* (two on each level). Sensors 1, 2 & 3 on level one control EF-1 (exhaust fan # 1). Sensors 4, 5 & 6 on level one control EF-2. Sensors 7, 8 & 9 on level two control EF-3. Sensors 10, 11 & 12 on level two control EF-4. Sensors 13, 14 & 15 on level 3 control EF-5. Sensors 16, 17 & 18 on level 3 control EF-6. Sensors 19, 20 & 21 on level 4 control EF-7. Sensors 22, 23 & 24 on level 4 control EF-8. All exhaust fans shall operate at low speed from low alarm and operate at high speed from high alarm. **System model number: MCS-3316.**

The table below indicates the solution:

INPUT (SENSOR) SIDE			OUTPUT (RELAY) SIDE				
SENSOR NUMBER	PRIMARY ZONE	SECONDARY ZONE	FAN NUMBER	RELAY NUMBER	PRIMARY ZONE	SECONDARY ZONE	ACTIVATE ON
1	1		1	1	1		L
2	1			2	1		H
3	1		2	3	2		L
4	2			4	2		H
5	2		3	5	3		L
6	2			6	3		H
7	3		4	7	4		L
8	3			8	4		H
9	3		5	9	5		L
10	4			10	5		H
11	4		6	11	6		L
12	4			12	6		H
13	5		7	13	7		L
14	5			14	7		H
15	5		8	15	8		L
16	6			16	8		H
17	6						
18	6						
19	7						
20	7						
21	7						
22	8						
23	8						
24	8						

9.0 REPLACEMENT PARTS & ACCESSORIES

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
MCS-8070-03-001	MOTHER (MAIN) CIRCUIT BOARD
MCS-8070-03-002	LCD DISPLAY CIRCUIT BOARD
MCS-8070-03-003	ANALOG (SENSOR) INPUT EXPANSION CIRCUIT BOARD
MCS-8070-03-004	RELAY (OUTPUT) EXPANSION CIRCUIT BOARD (8) RELAYS PER BOARD
MCS-8070-03-005	DOCKINGCIRCUIT BOARD
MCS-8070-03-008	SYSTEM POWER TRANSFORMER (SPECIFY SIZE OF SYSTEM)
MCS-8070-03-009	REMOTE TRANSMITTER POWER TRANSFORMER (SPECIFY SIZE OF SYSTEM)
MCS-8070-03-006	POWER LINE FILTER
MCS-8070-01-001	FIBERGLASS REINFORCED POLYESTER ENCLOSURE (1 to 44 CHANNEL)
MCS-8070-01-002	FIBERGLASS REINFORCED POLYESTER ENCLOSURE (45 TO 66 CHANNEL)
MCS-8070-02-002	AUDIBLE ALARM (90 DB)
MCS-8070-02-004	SILENCE PUSH-BUTTON
MCS-8070-02-006	ENCLOSURE KNOBS (FOR LOCKING & UNLOCKING ENCLOSURE DOOR)
MCS-8070-02-007	MOUNTING FEET
MCS-8070-04-001	INSTALLATION / OPERATION MANUAL

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