TECHNICAL MANUAL

TYPE 4020

FIRE INDICATOR PANEL

SIMPLEX
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Simplex International Time Equipment Pty Ltd
The 4200 Fire Indicator Panel is manufactured by:

SSL CERTIFICATE OF COMPLIANCE NUMBER: AS1603.4
APPROVALS: AUSTRALIAN STANDARDS AS1603.4

MANUFACTURERS DETAILS

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4200 TECHNICAL MANUAL
Appendix A

Appendix B

Appendix C

Appendix D

4020 Circuit Diagrams

4020 Field Wiring Diagram

List of Installed Devices

4020 Interconnection Diagram

A Appendix A

MICRO - RS232 INTERFACE PART NO: 002-101

4 POINT CONTROL CARD (ACF EXPANSION MODULE) PART NO:002-09A

8 POINT MONITOR CARD (ACF EXPANSION MODULE) PART 55

LCD DISPLAY PART NO:002-080

8 ZONE MASTER CONTROLLER PART NO:002-078

4020 SUB ASSEMBLIES

4020 Parts List

Board Installation

Board Removal

Board Connections

Servicing

MICRO INTERFACE

RS-232 INTERFACE

Functional Description

Specification

Overview

MICRO - RS232 INTERFACE MODULE
<table>
<thead>
<tr>
<th>ISSUE</th>
<th>SECTION/PAGES AMENDED</th>
<th>DATE AMENDED</th>
<th>ECN No.</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NIL</td>
<td>1-10-92</td>
<td>Original</td>
<td></td>
</tr>
</tbody>
</table>
This manual makes reference to the following Australian Standards:

1.1.2 STANDARDS ASSOCIATION OF AUSTRALIA

Document No: 001.979 - 4420 Operating Manual

The following additional documents are available from Simplex Australia:

1.1.1 SIMPLEX AUSTRALIA

1.1. ASSOCIATED DOCUMENTATION

- Trained to install and service microprocessor based fire alarm equipment
- Familiar with the operation of the 4420 FLP

It is assumed that users of this manual are:

Manual maintenance of the 4420 FLP and is to be used in conjunction with the 4420 Operating

This manual provides information for the personnel engaged in the commissioning and

INTRODUCTION
ROM
RAM
PSU
PCB
N.C
N.O
MCU
LED
LCD
IC
FIP
EPROM
E²PROM
CPU
AZF
ACP

1.2 TERMINOLOGY

4020 TECHNICAL MANUAL
Figure 2.1 - 420 System Block Diagram

The 420 system provides a variety of detection applications. The system is divided into non-programmable and programmable sections. The non-programmable section includes the fire panel, keyboard, and display, while the programmable section includes the alarm and control facilities such as alarm bells, control valves, and automatic fire detection and alarm systems.

The 420 fire panel is a microprocessor-based fire detection and alarm system. The system is designed in accordance with the requirements of Australian Standard AS1603.4 for alarm and detection systems. The panel features a variety of detection and alarm options, including automatic fire detection and alarm systems, and alarm strobes.

2.1 System Overview

Panel Description
Any combination of the above two expansion modules, Figure 2.1 represents a block.

A maximum of up to five additional expansion modules can be added and can comprise of:

4 Point Ancillary Control Module - Assy No. 002-010

8 Point Alarm Zone Monitor Module - Assy No. 002-009

(2)

(1)

Duplex are required then the following expansion modules can be added to the system:

If further capacity is required above the basic 8 zones or if additional Ancillary Control
a supervised alarm bell control and Fire Brigade Interface relays.

These two modules provide all the functions for an 8 zone the indicating panel including:

Front Panel Display Module - Assy No. 002-080

Master Controller Module - Assy No. 002-078

(2)

(1)

In its basic configuration, the 40/20 FIP comprises of the following modules:
22.4 Indicators and Display

NC
Volume fuse relay contacts (2A @ 30V dc) N.O. or N.C
Power Fail (Fault) sensor alarm
Volume fuse relay contacts (2A @ 30V dc) N.O. or N.C

Acuility (2)
Bridged (2)
Bell

22.3 Outputs

Supervised door monitored Manual Call Point
Bell Isolate, ACP Isolate
24mA

Standard 20V detectors

22.2 Inputs

10% to 90% in non-condensing
5°C to 45°C
Chamber High/Low Battery Low/Full
27V6 DC (nominal) @ 0.6A
24V Saline lead acid each 7Ah or 12Ah
24V DC @ 1.5A
240V AC @ 60% - 100%, 50/60Hz

14KΩ (without batteries)
Wall Mount
Washing Ripped
Power Coated
1.5mm Mild Grade steel
40H x 500W x 10D

Minimum 8 alarm zone circuits
Maximum 8 alarm zone circuits

22.1 General

Specifications

4020 Technical Manual
2.2.8 Expansion Cards
Serial RS232

2.2.7 Communications Port
Input/Output, control, delay time, door isolate

2.2.6 Programming Function
Isolate, Battery Test and Lamp Test
20 keys including: Alarm Test, Fault Test,

2.2.5 Keypad Controls
Fire fighters keypad, Next, acknowledge, reset, isolate,

Page 6
3) PANASONIC RANGE:

Type A heater detector
Type C heater detector
Type B heater detector
Type D heater detector
Type D smoke detector
Type C smoke detector
Type B smoke detector
Type A smoke detector

PSS-1
PSS-P
PSS-D
PSS-C
PSS-B
PSS-A

4) VISON RANGE:

LED indicator base
Plan - non-indicating base
Ultraviolet smoke detector
Photosensitive smoke detector
Photosensitive smoke detector
Heater detector cable
Heater detector tube
Heater detector base

V4ID/Y422
T56D
T56B
T54D
R24B
P29B
P24B
FW8T
C29B
C24B
B11BD

5) HOCHIKI RANGE:

HPF-RM/A4AH
HPF-R3A
HPF-24A MK 1
SIC-A/MK 1
SLK-A
SIH-AM
SPA-AB
DC-60BLK
DC-60B
DC-90D
DC-A-90

The following detectors have been approved as compatible devices for use with the 4020 COMPARABLE ACTUATING DEVICES.
The following series of batteries are compatible with the 4020 RP:

2.210 Compatible Batteries

1. Power-Sonic PS12 Series
2. Sonnenbatterie A200 Series
3. Sonnenbatterie A300 Series
4. YNCASA NP Series
2.2 All the components of the 4020 FP are housed in a single enclosure as shown in figure.

2.3 FIG 2.2 4020 INTERNAL LAYOUT

The expansion cards can be located over the existing expansion cards to provide space for an additional three more expansion modules bringing the total system capacity to 12.

- Optional 4 Point Auxiliary Control Module - Assy No. 002-010 (4)
- Optional 8 Point Alarm Zone Monitor Module - Assy No. 002-009 (3)
- Front Panel Display Module - Assy No. 002-080 (2)
- Master Controller Module - Assy No. 002-078 (1)

Panel Description

Page 9
The 8 Port Control Card Assy. No. 002-010 provides additional auxiliary control outputs above the four outputs contained on the Master Controller board. Each card contains 4 test and reference signals.

The card connects to the Master Controller via an expansion bus interface providing data, 8 point Monitor cards or 40 additional zones.

Controller Module. Zone expansion is in groups of 8 zones with a maximum limit of 5. The card provides alarm zone expansion above the basic 8 zones contained on the Master Anomalous devices such as Smoke and Heat detectors, Manual Call Points, Pressure switch etc.

The 8 Port Monitor Board Assy. No. 002-009 is designed to interface with Alarm

In the event of a loss of communications to the Master Controller board, the connection is supported and a fault condition is announced on the LCD display. If the connection is still not available, displays the physical link for 48V power bus and serial communications for 1 minute. If communication is established within the 1 minute period, the LCD displays an LED to the user indicating the recovery.

The LCD display board is connected to the master controller via a 14-way ribbon cable. Information transmitted from the master controller to the LCD display board or vice versa is displayed on a 40-character by 2 line Liquid Crystal Display. From panel keys pressed, information transmitted from the master controller is formed into messages displayed on the LCD.

The Master Controller board is the heart of the 420 system and contains all the signals and functions of the 4020 Technical Manual.
3.1 OVERVIEW

MASTER CONTROLLER MODULE

Terminations for field wiring
- Serial Interface for operator Keyboard/Display module
- Control modules
- Expansion port for connection of additional alarm zone modules or auxiliary
- Serial port configurable for 2120 communications, remote mimic interface
- Power supply/battery charger
- Bridge connections
- 4 output circuits (bell, alarm and two uncommitted output circuits for fire)
- 8 alarm zone circuits

The master controller board is the heart of the 4020 system and contains all the elements for an 8 zone alarm panel.
24V/12V Power, Battery Boost Charge

Metal Oxide Variacs (MOV) connected to system earth

Jumper selectable

24V DC fused @ 2 Amp nominal

24V DC @ 1.5A or 4A nominal

Battery charger, Charger Low, Battery Fault

1.2 Amp - 12AH Battery

0.6 Amp - 7AH Battery

4 off single pole N.O or N.C contacts 2 Amp @ 30 Volt

8 off, fixed with 3K Ohm, 1/2W and of line resistors

8 x 32K - RAM

E:ROM - 8 x 32K

E:PRON - 8 x 8 or 64K x 8

Signaling: 800/252-8 bit microcontroller

F5 - External 24V field supply - 2 Amp

F4 - Bell - 2 Amp

F3 - Internal 24V supply - 2 Amp

F2 - Battery Charger - 2 Amp

F1 - Transformer Secondary - 3 Amp or 6 Amp(3 Amp PSU)

260mA Alarm (2 zones in alarm)

120mA Quiescent

18 to 32 VDC
3.2 Alarm Zone Inputs

- Holding the reset push button HIGH will disable the alarm by pressing the inputs.
- The push button provides a means of externally resetting the microcontroller.
- Generates power failure warning.
- Generates the watchdog timer signal.
- Generates the microcontroller reset pulse (complimentary delay before reset).

The supervisory IC U1A provides the following key functions:

U1A directly provides protection for the RAM.

U1B provides protection for the RAM. When the supervisory IC U1A provides the address decoding for the RAM (U4), the RAM address decoder is connected in the dual-2048-byte RAM. The address decoders are connected to the 256-byte of each RAM. The address decoder provides the control for the memory and the data to be read. The data from the A2 x 92 K-bit external RAM (U4) is provided to the X8 E2PROM (U2) through the I/O ports.

The system monitor function is contained in an external E2PROM (U2). The I/O ports allow the microcontroller to control all the operational functions of the Master Controller.

3.31 Microcomputer Circuits

The following functional blocks:

- Microcontroller provides system control, supervision, and interaction with all Master Controller boards. The Master Controller board is the heart of the 4020 System and contains all the I/O ports, 6-bit A/D converter, and 8-bit microcontroller. The 8-bit microcontroller provides an 8-bit high-speed microcontroller coprocessor and expansion port.

The high-speed microcontroller coprocessor includes the following features:

- Expansion port for additional I/O interface for additional I/O devices and additional display devices.
- 8-bit microcontroller coprocessor provides system control, supervision, and interaction with all Master Controller boards.

The high-speed microcontroller coprocessor provides system control, supervision, and interaction with all Master Controller boards.
The metal oxide varistors V1 and V2 connected in series each with the resistor R4 are connected in the Z1 and Z2 alarm circuits. The voltage across the varistors is limited to 7.4V max via an on-board 390 ohm Zener diode. The 24V supply voltage does not affect the zone detector. The Z1 alarm zone contains a 3K ohm Zener diode. The 3K ohm and the detector circuit via the transistor switch U8. The negative input (-) on each zone provides the negative input (+) to the positive input on each zone connected to power connected to the power supply. Each zone contains a circuit breaker that can be turned on or off as each zone circuit is deselected. The following description will refer to one zone only.

**3.3.1 Alarm Zone Description**

![Figure 3.2 Alarm Zone Parameters](image)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Test Current (Max)</td>
<td>7.4mA</td>
</tr>
<tr>
<td>Fault Test Current (Min)</td>
<td>2.8mA</td>
</tr>
<tr>
<td>EOL Test Current (Max)</td>
<td>6.3mA</td>
</tr>
<tr>
<td>EOL Test Current (Min)</td>
<td>2.16mA</td>
</tr>
<tr>
<td>Alarm Current (Max)</td>
<td>15.7mA</td>
</tr>
<tr>
<td>Alarm Current (Min)</td>
<td>2.8mA</td>
</tr>
<tr>
<td>Maximum Alarm Current (Short Circuit across zone)</td>
<td>26.7mA</td>
</tr>
<tr>
<td>DC Supply Voltage</td>
<td>24V</td>
</tr>
</tbody>
</table>

*Note: The parameters listed above are the supply voltage range.*

**4020 TECHNICAL MANUAL**

Page 16
<table>
<thead>
<tr>
<th>Time Delay</th>
<th>Mean Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>170 Sec</td>
<td>AVP</td>
</tr>
<tr>
<td>10 Sec</td>
<td>AVP</td>
</tr>
<tr>
<td>10 Sec</td>
<td>AVP</td>
</tr>
<tr>
<td>5 Sec</td>
<td>AVP</td>
</tr>
</tbody>
</table>

The processing of alarm zone delay is handled by the MCU firmware program. Detector reset is provided by removing power to each zone via the transistor switch U8. The network when energizing the fault reset voltage is effectively switched out of the circuit. The test voltage is generated by the diode network formed by R12 and R13 and R14.

\[
V = 1.25V = 390 \times 3.2\text{mA} = 390\text{ ohm} \times (3.2\text{mA} - 20\%) \]

Fault Test Voltage = R21 x (Vp fault current @ 2.6V - 20%)

\[
V = 4.68V = 390 \times 12\text{mA} = 390\text{ ohm} \times (10\text{mA} + 20\%) \]

Alarm Test Voltage = R21 x (Vp alarm current @ 2.6V + 20%)

Recalling to figure 3.4 these values are determined as follows:

- Panel thresholds at the minimum supply voltage of 2.16V
- Fault conditions are set to a value 20% outside the typical upper alarm and lower alarm limits.
- The test voltage equals the voltage developed across the sense resistor R21 under alarm and fault conditions via this network D22 across the zone input.

Alarm and Fault simulation is achieved by disabling the Zone supply voltage and applying

Figure 3.3 Alarm Zone Circuit

![Alarm Zone Circuit Diagram]
controller.

ribbon connector P5 and is supplemented for loss of communication with the master
receiver channel (pin 24/34). When the MCO on-board UART connection is made the
proper signals for the LCD display panel. The panel data link is via the transducer and
The LCD Display interface provides a serial data link together with reset and 24V dc

3.3.5 LCD Display Board INTERFACE

connector P4 is provided to supply 24V DC to each expression card.

controller modules (ASSY 02-000) V 16 way ribbon connector connects each of the
Control modules (ASSY 02-100) or 4 point modules can be either & the same number modules (ASSY 02-010)
A maximum of 3 of the expansion modules can be added to the system. The expansion
connector P7 to provide data, reset and reference signals to interface to expansion modules.

The display for the expression cards via the socket and 139 pins on 4 of the MCO provides
are fed to the expansion cards via the socket and 139 pins on 4 of the MCO provides
are fed to the expansion cards via the socket and 139 pins on 4 of the MCO provides
The display is analog to digital converter (D/A) for expansion cards and digital to

3.4.4 EXPANSION BUS INTERFACE

via the back channel U9.

normally closed (N.C.) contact. The relay operates under program control from the MCO
of the V-AUX (AC/2) relay K4, relay K3, relay K2 and relay K1 relay K4 and relay K4
normally closed (N.C.) contact.

indication that the panel has failed. A link allows the selection of normally open (N.O).
On the main panel volume to ensure correct panel operation. The
position of the MCO and de-energise the relay which then moves the panel
toward the corner of the MCO and de-energise the relay which then moves the panel

The FAULT circuit is a set of fail-safe contacts forming a set of

bell operation which are provided with protection on the bell output lines.

Meena x(2) relays V19 and V20 provide momentary connection when the
of the alarm circuit is connected by the panel door switch and is equalled when the
ADC converter channel 1 (pin 45/1) of the MCO. Under normal circumstances, the operation
bell is of a reverse polarity and in the range 6V-8V DC. The bell volume is monitored via
of the main circuit. Under normal circumstances, the operation of the bell
of the main circuit. Under normal circumstances, the operation of the bell

The BELL circuit provides a switched 24V DC output to relay K2 and is processed

AC/4 provides the signal outputs are provided namely: BELL, FAULT, ALARM, AC/4

3.3.3 SIGNAL OUTPUTS

4020 TECHNICAL MANUAL

Page 18
3.3.7.1 24V POWER SUPPLY

A 20V ac voltage is read at 2.5 Aamps for the Battery Charger circuit.

A 20V ac voltage is read at either 1.5 or 4 Aamps for the 24V dc power supply circuit.

Transformer T1, which provides the following two windings:

1. Supplies the voltage connections for the batteries, and
2. Supplies the voltage connections for the mains.

The Power Supply / Battery Charger consists of two separate circuits, one for the 24V DC circuit connected to the mains for the battery charger, and one for the 24V DC circuit connected to the 220V mains.

3.3.7 POWER SUPPLY / BATTERY CHARGER

<table>
<thead>
<tr>
<th>4800</th>
<th>4800</th>
<th>2200</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prin.</td>
<td>Prin.</td>
<td>Mimi</td>
<td>Mimi</td>
</tr>
</tbody>
</table>

Baud Rate Setting

The baud rate setting is done manually when configuring the device type in the panel program mode.

Termination on external devices is via terminal blocks. Each interface can provide user-configurable rate settings:

- 2200 baud rate
- 1200 baud rate
- 2700 baud rate

Cables should be connected to the Serial Port.

3.3.6 SERIAL PORT

The USB provides a dedicated serial port for interfacing to either of the following:

<table>
<thead>
<tr>
<th>1200</th>
<th>2200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rem.</td>
<td>Rem.</td>
</tr>
</tbody>
</table>

Page 19

4020 TECHNICAL MANUAL
Voltage is adjustable via R72 over the range 27V - 29 Vols. With maximum charging current limited to 0.2 Amps, in this mode, the charger operates in the Throttle Charge mode. Voltage regulation VR2 provides a constant charger voltage.

Batteries of 12 Amps for 12V battery packs.

Table 3.1 Battery Status Thresholds

<table>
<thead>
<tr>
<th>Battery Status</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 24 Vols</td>
<td>Battery Fault</td>
</tr>
<tr>
<td>Below 27 Vols</td>
<td>Charger Low</td>
</tr>
<tr>
<td>27 - 28 Vols</td>
<td>Normal</td>
</tr>
<tr>
<td>Above 28 Vols</td>
<td>Charger High</td>
</tr>
</tbody>
</table>

The battery charger can operate in either of two modes: Throttle Charge or Boost Charge.

Table 3.1

Announced if the battery is disconnected or if the voltage is outside the limits as shown in the Battery Status is continuously monitored by the microcontroller and a fault condition is indicated.

The battery charger provides short-circuit protection for the battery. This relay is normally open and provides protection against short-circuit.

The battery charger has been designed to charge sealed lead-acid cells and provides a wide range of voltage and current settings.

3.3.2 Battery Charger

Battery Power Source

Supply source. Under mains fail conditions, relay KG de-energizes to select standby power. If this relay is normally energized under mains condition, the AC power is connected to standby battery operation is controlled via the bridge rectifier BR2 and relay KG.
The battery test resistor provides two happenings to cater for either 7Ah or 12Ah batteries.

If the voltage is less than 2.4V, a battery fault condition is indicated.

For a period of 1 minute, at the end of the discharge period, the battery voltage is checked.

\[
I(diss) = \frac{C}{10} \quad C = \text{Battery Capacity} - \text{7Ah or 10Ah}
\]

discharge the batteries at the following rate:

Table 3.2 Battery Character Modes

<table>
<thead>
<tr>
<th>Battery Charge</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28V &gt; V batt &lt; 24V</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2 Battery Charge Modes

<table>
<thead>
<tr>
<th>Battery Mode</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V &gt; V batt &lt; 26V</td>
<td></td>
</tr>
</tbody>
</table>

Selection of charger operating mode is done automatically by the MCU.
3.42 BOARD JUMPER SETTINGS

Connected expansion cards:

16 Way ribbon connection to expansion cards. It is located on the rear side of the board and connects data, test and reference signals between the master controller and connected expansion cards.

and 25 and 24V power connection.

6 Pin connector to Power Board.

4 Pin connector to ribbon cable (V2)

3 Pin connector to battery test resistor

3 Pin connector to battery

3 Pin connector to transformer secondary windings

3.4 BOARD CONNECTIONS

Replacement only.

Contact your local qualified repair firm or consult the manufacturer's service manual before any work is done on the card.

SERVICING

4020 TECHNICAL MANUAL
Page 22
3.4.4 BOARD INSTALLATION

STEP 1
Plug-in the expansion bus ribbon connector P7 located on the rear side of the board.

STEP 2
Locate the board over the six (6) pad mounting posts and mount using the six pad mounting screws.

STEP 3
Disconnect the following internal wire harnesses:
- and TP2.

STEP 4
Remove the six (6) pad mounting screws.

STEP 5
Plug-in the expansion bus ribbon connector P7 located on the rear side of the board.

3.4.3 BOARD REMOVAL

STEP 1
Disconnect batteries (if needed) and disconnect AC power to the panel by switching the MAIN switch OFF.

STEP 2
Disconnect and mark any field wiring connected to Termination blocks TBL.

STEP 3
Disconnect the following internal wire harnesses:
- and TP2.

STEP 4
Remove the six (6) pad mounting screws.

STEP 5
Plug-in the expansion bus ribbon connector P7 located on the rear side of the board.
AC power FIRST and batteries last
When removing power from the panel, disconnect batteries FIRST
When connecting power to the system, connect AC power FIRST

CAUTION - POWERING REQUIREMENT

STEP 1
Re-connect the batteries and press the CPU RESET switch to reset the system.

STEP 2
Connect the display

STEP 3
Locate positioner RY1 on the main PCB and press the CPU RESET switch.

STEP 4
Turn RY1 and clockwise until a BATTERY HI condition is indicated on the display.
Press the CPU RESET switch. Then adjusting RY1 clockwise, count the number of times until a BATTERY LO condition is indicated on the display.

STEP 5
Turn RY1 and clockwise to clear the current BATTERY fault condition.

STEP 6
The display should now indicate BATTERY OK condition. Then turn RY1 and clockwise by half the number of turns obtained in step 5.

STEP 7
If the battery fault condition is present prior to before

NOTE:
If the battery fault condition is present prior to

NOTE:

To set the battery charger output voltage to the correct level and set the thresholds for battery charger high and low fault conditions, use the following procedure (Figure 3.4).
FIGURE 3.4 MAIN PCB - BATTERY CHARGER ADJUSTMENT POINTS
3.4.7 Fuses

- F5 External 24V field supply
- F4 Bell fuse
- F3 Internal 24V supply fuse
- F2 Battery charger fuse
- F1 Transformer secondary fuse

3.4.6 LED Indicators

- LDI Indicates the presence of 24 Volt power
- LDT Indicates the Batteries are charging in Boost charge mode
- LDD Indicates the Boost mode is active.
4.2 SPECIFICATION

In the event of a loss of communications to the master controller board, the connection is supervised and a fault condition is announced on the LCD display board. The connection is provided the physical link for 24V power bus and serial communications connection which provides the master controller via a 14 way ribbon cable.

The LCD display board is connected to the master controller via a 14 way ribbon cable.

4.1 OVERVIEW

4 LCD DISPLAY

Page 28

4020 TECHNICAL MANUAL
FIGURE 4.2 BLOCK DIAGRAM LCD DISPLAY BOARD

LED
INDICATORS

DRIVER
BEZER & LED

KEYBOARD
MEMBRANE

DISPLAY
LCD

CPU

VOLTAGE REG

POWER SUPPLY

DC

5 V DC

24 V

U2

U3

MASTER CONTROLLER

SERIAL COMM

P1
Click the piezo buzzer B2
If a valid keypress is detected, the MCU
interprets the keypress and sends an
appropriate command to the keypad.

4.3.3 Membrane Keypad

The keypad is a full membrane type. The switch matrix is connected to inputs port P0 of
the MCU. The MCU communicates with the keypad through Port C and Port D of
the MPU.

4.3.2 LCD Display

The on-board serial port is utilized to provide the serial communication port to the master
controller.

The on-board serial port is utilized to provide the serial communication port to the master
controller.

RWM (E1) provides additional memory to supplement the 256 bytes of in-built RAM.

The microcontroller

The microcontroller circuit (MCU) consists of all the operational functions of the display

4.3.1 Microcomputer Circuits

Following functional blocks

Figure 4.1 contains the block diagram of the Display Board which is divided into the

4.3 Functional Description
4.3.4 ALARM/FAULT SOUNDER AND LED DRIVER

The Alarm/Fault Sounder and LED Driver circuit is implemented using a serial clocked high current data latch U5. On/Off control signals in the form of serial data is transmitted to the latch from the CPU to control the Sounder B1. The latch is also used to control the LED backlighting for the LCD display via resistor R4.

4.3.5 POWER SUPPLY

The 24V DC power from the Master Controller is regulated down to 5V via the Voltage regulator VR1. The 5V supply is used to power the CPU, LCD display and memory circuits. The 24V supply is also used to drive the LCD backlighting, buzzer and LED indicators.
4.42 BOARD JUMPER SETTINGS

Jumper J2 selects the signal route from the Transmitter and Receiver signals to the Display Board CP. Default setting is J27 position.

Jumper J3 selects the initial display from either 256K (J58) or 512K

4.43 BOARD CONNECTORS

Jumper J1 selects whether the CPU reset signal is generated locally or from the Master Control Board. Default setting is J12 position.

The location of the board jumper settings are shown in Figure 4.2 and these settings are described below:

4.44 INTERCHANGEABLE COMPONENTS

Except for incomming any field replaceable components except fuse. Repair of a faulty card is by card and servicing of the card is limited to the advisements set out below. The card does not replace 4020 TECHNICAL MANUAL Page 32
FIGURE 4.2 LOCATION OF JUMPERS

4.3 LCD VIEWING ANGLE AND CONTRAST ADJUSTMENT

Trim pot TR1 located on rear of the display board, allows the viewing angle and contrast of the LCD display to be adjusted to optimum level.
STEP 3

Disconnect the following internal wiring harnesses:

STEP 1

Locate the board over the four pop mounting posts and mount using the

STEP 2

Four pop mounting screws.

STEP 4

Remove the four (4) pop mounting screws.

STEP 3

Unscrew the keyboard retaining snap.

STEP 2

Disconnect the following internal wiring harnesses:

STEP 1

Switching the MAIN Switch OFF.

Discotnect battery (if fitted) and disconnect AC power to the panel by

4.4.5 BOARD INSTALLATION

Re-connect the keyboard retaining snap.

KEYBD - 10 way flex cable keyboard membrane connector.

PI - 14 way ribbon connector to Master Controller board.

Re-connect the following internal wiring harnesses:

Turn AC power to the panel ON by switching the MAIN switch ON and

STEP 5

connect the brackets if fitted.

4.4.4 BOARD REMOVAL

4020 TECHNICAL MANUAL
4.4.6 LED Indicators

LD6 Bell Isolated LED
LD5 Mains Power ON LED
LD4 Isolated ACF LED
LD3 Common Isolate LED
LD2 Common Fault LED
LD1 Common Alarm LED
5.3.1 Expansion bus interface

The expansion bus interface comprises of input/output expander, expander, and address.

5.3 Functional description

Terminations: Secure terminal blocks maximum size 2.5mm²

Dimensions: 98mm x 140mm

Temperature:+40 deg C at 95% relative humidity.
-5 deg C to +55 deg C dry heat.

Alarms: 100mA + 70mA max per shunted zone

Specifications:

- 8 point monitor card as per 002-009, is designed to interface with

5.1 Overview

8 point monitor card.

Page 36

Volume Range: 18 to 32 VDC

Current drain: 0.8 mA @ 28 VDC - 100mA

Quickset 8 DC - 100mA

Temperature range:

Connected ancillary devices:

Each input in sequence to determine zone status, alarm, normal or fault status of the connected ancillary devices.

The Master Controller address each card via a 4-way DIP switch located on the location from 0 to 4. Each card address is set via a 4-way DIP switch located on the 2-wire normally open contact auxiliary device. Each card occupies a particular address.

The Monitor Card provides eight (8) separate zone input circuits, each monitoring.
### Table: AZF Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Test Current</td>
<td>I_F TC</td>
<td>2.0mA</td>
</tr>
<tr>
<td>Min (2%)</td>
<td>I_F TC</td>
<td>3.0mA</td>
</tr>
<tr>
<td>3.8mA</td>
<td>P</td>
<td>4.0mA</td>
</tr>
<tr>
<td>5.7mA</td>
<td>EOL Resistor Max (%)</td>
<td>4.7mA</td>
</tr>
<tr>
<td>GQ MAX Current (including 6.3mA, 6.7mA, 7.0mA, 7.4mA, 7.7mA, 10.6mA, 12.4mA)</td>
<td>Min (5%)</td>
<td>6.7mA</td>
</tr>
<tr>
<td>9.5mA</td>
<td>P</td>
<td>7.4mA</td>
</tr>
<tr>
<td>10mA</td>
<td>EOL</td>
<td>11.1mA</td>
</tr>
<tr>
<td>13.7mA</td>
<td>Alarm Threshold Max (%)</td>
<td>12mA</td>
</tr>
<tr>
<td>15.7mA</td>
<td>Alarm Test Current (circuit access zone)</td>
<td>12.4mA</td>
</tr>
<tr>
<td>17.4mA</td>
<td>Maximum Alarm Current (short)</td>
<td>15.7mA</td>
</tr>
</tbody>
</table>

#### 5.3.2 Alarm Zone Impulses

- The 24V power bus to each card is fused via F1. The on-board voltage regulator VR1 is used to provide 5 V output to power the expansion bus interface circuitry.
- Each IC address is decoded by the 4-way DIP switch SW1, which selects signal path for IC.
- The 4-way DIP switch SW1 is used to select each card's address. The address is decoded by the multiplexer IC. Port 6 (60H-6F) is programmed as an output and is used to control the 24V alarm zone supply voltage via the 8-bit addressable latch IC and output driver IC.

---

Page 37
minimum supply voltage of 2.16V to a value 20% outside the physical upper alarm and lower fault thresholds at the voltage developed across the sense resistor. At alarm and fault conditions, and is set to a test voltage via the chopper network D1 across the zone input. The test input enables the alarm and fault simulation is achieved by derating the zone supply voltage and applying

The transistor T2 is connected to system earth and with the resistor divider RG and R10

Zone short circuit current is limited to 74mA (max) via an onboard 390 ohm sense

24V supply voltage do not effect the zone thresholds. 24V can be directly connected to the 390 ohm sense resistor and 390 ohm sense resistor causes that changes in the voltage across the test detection or detector in the zone. The voltage divider configuration of the relay and 390 ohm end of the remaining resistor

Each monitor zone is supervised and requires a 3K ohm end of the remaining resistor

Figure 3.3 Alarm Zone Circuit

The return current path for zone monitoring circuitry, detector circuits via the transistor switch ICS. The negative input(-) on each zone provides (refer Fig. 2). The positive input(+) on each zone provides 24V DC to power connected

As each zone circuit is identical the following description will refer to one zone only

5.3.2.1 Alarm Zone Description
Table 5.1: AZF Processing Time delays.

<table>
<thead>
<tr>
<th>TIME DELAY</th>
<th>MEAN VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>170 Sec</td>
<td>AVF Commutation</td>
</tr>
<tr>
<td>10 Sec</td>
<td>AVF Reset</td>
</tr>
<tr>
<td>10 Sec</td>
<td>AZF Reset</td>
</tr>
<tr>
<td>5 Sec</td>
<td>AZF Alarm</td>
</tr>
</tbody>
</table>

The processing of alarm zone time delays is handled by the MCU firmware program, which provides the delays as shown in Table 5.1 below.

Detector reset is provided by removing power to each zone via the transistors switch Q2. The Test Voltage (AVF TEST VOLTAGE) is generated by the Master Controller board and applied through the transistors switch Q2.

\[
\text{V}_{\text{L25V}} = \frac{3.2}{0} \times 3.2\text{V} \\
\text{V}_{\text{FMI Test Voltage}} = \frac{R_{21} \times \text{typ. fault current @ 2.6V - 20%}}{390 \text{ ohm x (24mA - 20%)}} \\
\text{V}_{\text{L68V}} = \frac{4.68}{0} \times 12\text{mA} \\
\text{V}_{\text{Alarm Test Voltage}} = \frac{R_{21} \times \text{typ. alarm current @ 2.6V + 20%}}{390 \text{ ohm x (10mA + 20%)}}
\]

Returning to Figure 5.1, these values are determined as follows:

Page 39
### DIP Switch

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>4</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>3</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>2</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>1</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>0</td>
</tr>
</tbody>
</table>

- Switches 1, 2, and 3 select the card address. The card address is always set to address 0. The following table shows the card address.

#### 5.4.2 Switch Settings

**End of Line Resistor:** 3.3k Ohm, 1/2W

- **TBI:** Eliminates the 8th zone.
- **P1:** 24 volt power bus connection. If connected to the 24VDC system supply.
- **P2:** Is used to connect the card to the CPU bus.

#### 5.4.1 Board Connections

Replacement only.

- Disconnect any fixed replaceable components except fuses. Replace or fix any card and plug card into the card of the substitute set-out below. The card does not

---

**5.4 Servicing**

Page 40 Technical Manual 4020
5.4.6 Fuses

Connect the fuses as shown. Then power to the panel ON by switching the MAIN switch ON and

STEP 5

Re-connect any sealed white to terminal blocks TBL.

STEP 4

Locate the board over the your PDB mounting posts and mount using the

STEP 3

Plug-in the 24 volt power bus connector PL.

STEP 2

Plug-in the expansion bus ribbon connector PZ located on the rear side of

STEP 1

5.4.5 Board Installation

Unplug the expansion bus ribbon connector PZ located on the rear side of

STEP 5

Unplug the 24 volt power bus connector PL.

STEP 4

Remove the four (4) PDB mounting screws.

STEP 3

Disconnect and mark any sealed white connected to termination blocks TBL

STEP 2

Switching the MAIN switch OFF;

Disconnecting banana leads (if fitted) and disconnect AC power to the panel by

STEP 1

5.4.4 Board Removal

When this occurs the LED flashes rapidly.

Purpose is to indicate the absence of an end of line resistor on one or the zones.

Remember to include the end bus power and is being pulled by the CPU. This second

LED ACTIVE led provided for two purposes. Firstly the LED flashes every few

5.4.3 LED Indications

Page 41

4020 TECHNICAL MANUAL
Screw Terminal blocks maximum wire size 2.5mm²

Specifications:

- Dimensions: 98mm x 140mm
- Operating Temperature: +40°C to 55°C
- Humidity: 95% relative humidity
- Input: 24VA with 10K ohm End of Line Device
- Supply: 24V or 50V AC or 28V DC
- Relay: Single Pole Normally Open
- Relay Output: 4 Relay Outputs Supervised or Unsupervised
- Current Draw: 40mA + 20mA per supervised relay @ 28V DC
- Voltage Range: 18 to 32 VDC

6.1 Overview

4 point Control Card

6.2 Specification

- Selected for Supervised or non-Supervised Input Monitoring
- Each card can control and scan each output for supervision
- Each card occupies a particular address location from 0 to 3
- The 4 Point Control Card provides four (4) supervised or non-supervised single pole N.O. contacts. Each card occupies a particular address location from 0 to 3.
Figure 6.1 - Typical Circuit Supervised Output

Configuration to ensure that connected loads devices will operate under normal conditions. The output at the \( V_O \) terminals must be within the \( V_I \) range, meaning the output is connected to the voltage at the \( V_I \) terminals to ensure proper operation.

When relay \( R_1 \) is energized, the relay contacts connect the voltage at the \( V_I \) terminals to the load.

DC power is supplied to the isolation transformer, but the power is initiated through the \( V_O \) terminals by energizing relay \( R_1 \) and creating a current path through the load. A schematic of the circuit is shown in Figure 6.1. When the isolation transformer is energized, a current flows through the load, ensuring proper operation.

6.3.2.1 Supervised Output

ON-TERM: The fuse is rated at 2 amp.

OFF-TERM: Each output is protected through an in-line fuse connected in series with the 10k resistor. Each output is monitored to ensure they are properly initiated. If the relay coils are continuously monitored to ensure they are properly supervised, an inductive charging circuit is used to prevent improper operation. The four relays \( R_1 \) - \( R_4 \) provide a normally open contact for controlling auxiliary loads.

6.3.2 Control Outputs

The 24V power bus to each card is fused via two fuse links, the on-board voltage regulator \( V_R \), and the output fuse link. Power is provided to the expansion bus interface circuit to power the expansion bus interface circuit.

The 4-way DP switch \( SW_1 \) is used to select each card address which is decoded by address decoder. Each output is independent and is controlled by the user, allowing the output to be turned on and off independently. The expansion bus interface consists of an interface board, a network controller, and a display interface board. The expansion bus interface connects the interface board to the network controller, allowing the user to select and control the outputs.
End of Line Resistor: 10K Ohm, 1/2W

Provides field termination for the four outputs.

TBI - Provides field termination for the four outputs.

P1 - 24 Volt power bus connection. It connects the card to the 24 VDC system supply.

P2 - 24 Volt power bus connection. It connects the card to the Master Controller Expansion bus.

6.4.1 BOARD CONNECTIONS

Servicing only. Replacement of any field replaceable components except fuses, relay of a faulty card is by card replacement only. Replacement of the card is limited to the anti-aliased versions set-out below. The card does not contain any field replaceable components except fuses. Repair of a faulty card is by card replacement only. Replacement of the card is limited to the anti-aliased versions set-out below. The card does not contain any field replaceable components except fuses.

6.4 SERVICING

Figure 6.2 - Typical Output Circuit Unsupervised

Figure 6.2 shows the circuit configuration of a relay output selected as asupervised

6.3.2 Unsupervised Output

Figure 6.2 shows the circuit configuration of a relay output selected as a

420 TECHNICAL MANUAL

Page 44
STEP 1
Disconnect and mark any lead with connection to termination blocks TP1.

STEP 2
Disconnect the MAIN switch OFF.

STEP 3
Remove the four (4) PCP mounting screws.

6.4.4 BOARD REMOVAL

When this occurs the LED flashes rapidly. The purpose is to indicate the absence of an end of line resistor on one of the zones.

1. IDI, CARD ACTIVE. LED provided for two purposes. Firstly the LED flashes every few seconds to indicate the card has power and is being polled by the CPU. Its second function is to indicate the absence of an end of line resistor on one of the zones.

6.4.3 LED INDICATOR

TABLE 6.1 SW1 DIP SWITCH SETTINGS

<table>
<thead>
<tr>
<th>DIP SW1</th>
<th>ADDRESS</th>
<th>CARD NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>4</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>3</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>2</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>1</td>
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<td>OFF</td>
<td>OFF</td>
<td>0</td>
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<tr>
<td>ON</td>
<td>ON</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

6.4.2 SWITCH SETTINGS

Dip switch SW1 selects the card address 0. The following table 6.1 shows the card address.
6.45 BOARD INSTALLATION

STEP 1
Plug in the 24 volt power connector P2 located on the rear side of the board.

STEP 2
Plug in the expansion bus ribbon connector P2 located on the rear side of the board.

STEP 3
Locate the board over the four pop mounting posts and mount using the four pop mounting screws.

STEP 4
Reconnect any flex wiring to terminal blocks TFI.

STEP 5
Turn AC power to the panel ON by switching the MAIN switch ON.

6.46 FUSES

STEP 1
Pass each relay output lead @ Camp.

STEP 2
Pass incoming 24 volt supply lead @ 0.2 amp.

STEP 3
Pass load relay output lead @ Camp.
Dear signal lines and power supply bus from the Master Controller board, the
required Interfacing Voltage Levels are provided by the physical connections for
the 5V Signal Levels from the dual-channel serial port on the Master Controller Card to the
RS-232 port on the same card. Essentially, a level converter, converting
the "Micronic " module provides an serial RS232 port and a

7.3 FUNCTIONAL DESCRIPTION

Terminals:

Dimensions: 38mm x 107mm

Temperature: +40°C C at 95% Relative Humidity,
-5°C to +55°C C dry heat

RS-232 Commands: +/-9V

Binary Commands: 0V/+24V

Communication Voltage Levels:

- RS-232 Commands: 4800
- RS-232 Commands: 1200

Band Rate: 80mA @ 28V DC

Current drain: 18 to 32 VDC

7.4 SPECIFICATION

A 10ft distance of 75Ohm cable is recommended for the serial serial port to drive up to 9 devices with over
1000 point Card. The serial module can drive up to 9 remote units over
serial communications (SDI Modem) using the simple serial command units (SCU) or
serial modems. The serial message is used to drive simplex remote
controllerCard to the required Interfacing Voltage Levels. The RS-232 port is normally
configured to drive a serial printer. The serial message is used to drive simplex remote
controller. Converting the 5V Signal Levels from the dual-channel serial port on the Master
converter, converting the 5V Signal Levels from the dual-channel serial port on the Master

7.1 OVERVIEW

7 MICC - RS232 INTERFACE MODULE

Page 47

40-20 TECHNICAL MANUAL
7.32 MINIC INTERFACE

Figure 7.1 Signal Interface to RS-232 Serial Printer

<table>
<thead>
<tr>
<th>SIG and CTS</th>
<th>TXD</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXD</td>
<td></td>
</tr>
</tbody>
</table>

7.40 MINIC - RS232 INTERFACE

RS-232 SERIAL PRINTER

Termination via DTE terminal blocks.

Transmitters VI, V2, V5, V6 provide transmitter protection on the external RS-232 lines.

Interconnection to a scaled printer are shown in Figure 7.1.

The following interconnection signals are provided: TXD, RXD, CTS and RTS all set to normal levels. The following interconnection signals are provided: TXD, RXD, CTS and RTS all set to normal levels. The following interconnection signals are provided: TXD, RXD, CTS and RTS all set to normal levels.
Step 4

Remove the four (4) pop mounting screws.

Step 3

Remove and mark any shield wires connected to Termination blocks.

Step 2

Disconnect the MAIN switch OFF.

Step 1

Disconnect battery (if wired) and disconnect AC power to the panel by

7.42 BOARD REMOVAL

Shield Termination, the shield is terminated at the 4020 panel end only.

Shield, common return.

Signal for send common line, +

Positive switching side of send common line, Voltage levels 0V/24V

WHILE CONNECTED:

GND

Signal common return.

Transmitting to the remote device.

CTS = Clear To Send line. This line is used for data flow control (handshaking).

Request to Send line. This line is asserted when data is ready to be accepted from the remote device.

RXD = Receive Data line. Receives serial data from the remote device.

TXD = Transmits Data line. Outputs serial data to the remote device.

RS-232 CONNECTIONS:

TBI = Provides field terminations for the Minilm and RS-232 Interface Ports.

+24V power supply bus to operate circuits on the card.

and +5V power supply bus to operate circuits on the card.

A ribbon cable. The cable carries the serial data signal lines as well as the +24V.

16 way header socket used to connect the card to the Master Controller Board via

7.41 BOARD CONNECTIONS

There are no service adjustments to be cared out on this card. The card does not

7.4 SERVICING

Page 49

4020 TECHNICAL MANUAL
STEP 1
Locate the board over the four pop mounting holes and mount using the
four pop mounting screws.

STEP 2
Re-connect any held wire to terminal blocks TB1.

STEP 3
Re-connect the interface ribbon connector to socket PI.

STEP 4
Turn AC power to the panel ON by switching the MAIN switch ON and
connect the battery at hand.
<table>
<thead>
<tr>
<th>PART NO.</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-03-00</td>
<td>Switch Door Micro</td>
</tr>
<tr>
<td>908-668-00</td>
<td>Switch Assy (Main)</td>
</tr>
<tr>
<td>806-100</td>
<td>Spacer M6 x 20 (Ribs)</td>
</tr>
<tr>
<td>97-170</td>
<td>Spacer M6 x 10 (Display)</td>
</tr>
<tr>
<td>860-000</td>
<td>Seal Door Rubber (Roll)</td>
</tr>
<tr>
<td>680-030</td>
<td>Screw M4 x 15</td>
</tr>
<tr>
<td>680-030</td>
<td>Screw M5 x 6</td>
</tr>
<tr>
<td>680-030</td>
<td>Screw M6 x 12</td>
</tr>
<tr>
<td>680-030</td>
<td>Screw 8BA x 12mm</td>
</tr>
<tr>
<td>680-030</td>
<td>Ribbon Exp (5 Card)</td>
</tr>
<tr>
<td>680-030</td>
<td>Ribbon Exp (2 Card)</td>
</tr>
</tbody>
</table>

4020 TECHNICAL MANUAL

Page 52
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>99, R24</td>
<td>RES 3900 SW 8 01-395</td>
</tr>
<tr>
<td>101, R42</td>
<td>RES IX 2 378-198</td>
</tr>
<tr>
<td>102, R44</td>
<td>RES IC 2 378-195</td>
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<td>103, R45</td>
<td>RES XX 2 378-897</td>
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<td>104, R48</td>
<td>RES 24X 1 9-1400</td>
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<td>112, R19</td>
<td>IC 74LS30 5 1-500</td>
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<td>113, R18</td>
<td>IC 74174 3 1-500</td>
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<td>114, R17</td>
<td>IC 74LS12 2 1-500</td>
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<tr>
<td>115, R16</td>
<td>IC 74LS36 1 1-500</td>
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<tr>
<td>116, R15</td>
<td>IC 74LS24 1 1-500</td>
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<td>117, R14</td>
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<td>119, R12</td>
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<td>IC 74LS15 1 1-500</td>
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---

**8.2 Zone Master Controller**

Part No: 002078

**Part No:**

Page 53

---

4020 Technical Manual
### All Capacitors are 10% Tolerance

<table>
<thead>
<tr>
<th>Capacitor Value</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100uF, 10V DC</td>
<td>101-00-100</td>
</tr>
<tr>
<td>100uF, 16V DC</td>
<td>101-00-164</td>
</tr>
<tr>
<td>100uF, 25V DC</td>
<td>101-00-254</td>
</tr>
<tr>
<td>100uF, 50V DC</td>
<td>101-00-504</td>
</tr>
</tbody>
</table>

### All Resistors are 1/4 Watt

<table>
<thead>
<tr>
<th>Resistor Value</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Ω</td>
<td>101-00-644</td>
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**Table of Resistors:**

- **Resistor Value:**
  - 10Ω R1
  - 100Ω R2
  - 1kΩ R3
  - 10kΩ R4
  - 100kΩ R5

**Table of Capacitors:**

- **Capacitor Value:**
  - 100μF, 10V DC V1
  - 100μF, 16V DC V2
  - 100μF, 25V DC V3
  - 100μF, 50V DC V4

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**4020 Technical Manual**

Page 54
### All capacitors are rated at 35V

**NOTE:** Unless otherwise specified, all resistors are 1/4 Watt.

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**Bill of Materials**

8.3 LCD DISPLAY PART NO: 002-080

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**Technical Manual**

Page 55
### Components

- **IC**: 74LS00, 74LS04, 74LS08, 74LS10, 74LS12, 74LS14
- **R**: 10, 100, 1K, 10K, 100K
- **C**: 1000pF, 1nF
- **RES**: 1K, 10K, 100K, 1M
- **DIP**: 8-pin, 16-pin
- **LED**: green, red

### Notes

- All capacitors are rated at 35V.
- All other components specified are 1/4 watt.

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**N O T E:** Unless otherwise specified all resistors are 0.1 Watt and all capacitors are rated at 35V.
APPENDIX A

4020 INTERCONNECTION DIAGRAM
LIST OF INSTALLED DEVICES

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APPENDIX C

4020 FIELD WIRING DIAGRAM

Page 67
APPENDIX D

4020 CIRCUIT DIAGRAMS

4020 MINIC-RS232 INTERFACE CARD
4020 4 POINT CONTROL CARD
4020 8 POINT MONITOR CARD
4020 LCD DISPLAY BOARD
4020 MASTER CONTROLLER

ASSY NUMBER

MODULE