9360

Programmable Keyboard

Technical Manual

13362400A
01/01 (08/92).01

This manual describes the operation and functionality of the 9360 programmable keyboard.

CUSTOMER FEEDBACK

If you have a problem with this product, or just a suggestion on how we can serve you better, please fill out this form and send it to us. Your feedback will help us to improve product performance, quality and service. If you are in the United States, you can mail this postpaid form to the address on the reverse, or fax it to (614) 438-4355. If you are outside the United States, please apply the appropriate amount of postage before mailing. You may also fax it the number above.

Your Name:	Date:
Organization Name:	Mettler Toledo Order Number
Address:	Part / Product Name:
	Part / Model Number:
	Serial Number:
Phone Number: ( ) Fax Number: ( )	Company Name of Installation:
E-mail Address:	Contact Name:
	Phone Number:

How well did this product meet your expectations in its intended use?		Comments:
	Met and exceeded my needs	
	Met all needs	
	Met most needs	
	Met some needs	
	Did not meet my needs	

PROBLEM:

UNACCEPTABLE DELIVERY:

- ☐ Shipped late
- ☐ Shipped early
- ☐ Shipped to incorrect location
- ☐ Other (Please Specify)

OUT OF BOX ERROR:

- ☐ Wrong item
- ☐ Wrong part
- ☐ Missing equipment
- ☐ Equipment failure

- ☐ Wrong documentation
- ☐ Missing documentation
- ☐ Incorrectly calibrated
- ☐ Other (Please specify)

Comments:

DO NOT WRITE IN SPACE BELOW; FOR METTLER TOLEDO USE ONLY

☐ Retail ☐ Light Industrial ☐ Heavy Industrial ☐ Systems

RESPONSE: Include Root Cause Analysis and Corrective Action Taken.

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USA

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Declaration of conformity

Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
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We/Wir/Nous/WIJ/Noi: **Mettler-Toledo, Inc.**
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USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
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Model/Type: 9360

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
Waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
A cui si riferisce questa dichiarazione è conforme alla/e sequente/i norma/e o documento/i normativo/i.

CE Conformity / CE-Konformität / Conformité CE
89/336/EU EMC Directive / EMU-Richtlinie / Directive concernant la CEM

EN55022, B 01.04.87	Emissions / Funkstörungen
EN50081-1	Immunity

73/23/EU Low Voltage / Niederspannung / basse tension

EN61010	el. Safety / el. Sicherheit / sécurité el.

Other Directives and Standards / Andere Richtlinien und Normen / Autres documents
corresponding to local requirements / entsprechend lokalen Anforderungen / correspondant aux exigences locales

UL1950	el. Safety / el. Sicherheit / sécurité el. (if UL mark is applied)
C22.2 No. 950-M89	el. Safety / el. Sicherheit / sécurité el. (If CUL mark is applied)
FCC, Part 15, class A	Emissions / Funkstörungen

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures
Worthington, Ohio USA
September, 1995

according to EN45014

PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

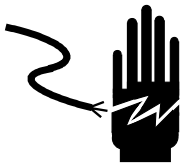
FOLLOW these instructions carefully.

SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL METTLER TOLEDO for parts, information, and service.

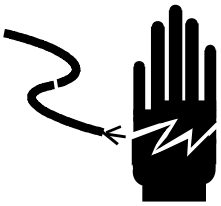


⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

CONTENTS

1 Introduction

General Overview

The Model 9360 is a programmable module which permits up to four serial input/output devices to be interfaced together, while also providing an alphanumeric display and keyboard for operator functions. Addition I/O also provides sixteen (16) parallel I/O lines (eight (8) for inputs and eight (8) for outputs).

The programmability feature of the Model 9360 is designed to permit the development of a simple program which may be fitted to suit particular weighing and data collection needs. The program resides in the unit at all times. More than one (1) program may reside in the unit at the same time, however; only one (1) may be assigned to run on power up. This allows for fast and easy program enhancements or corrections.

Features

The programming language for the 9360 is Lbase. This language is developed specifically for weighing applications and consists of 19 easy-to-learn instructions.

Program capacity for up to 2000 program lines plus 27K storage for data files.

Scale interface program routines are provided to interface with standard Toledo and Masstron scale instruments.

The programs are stored in nonvolatile memory. Data variables are stored in memory protected by a rechargeable NICAD battery. Powered down battery life is 90 days, typical, and 30 days, minimum.

19 character dot matrix display with .413" high characters.

Input connections for use of an optional programming console and reporting device.

Enclosure is available in stainless steel NEMA 4X construction or mild steel, painted NEMA 12 construction. Both styles are suitable for desk or wall mounting. Also available in stainless steel panel mount.

Front panel has a 64 position, tactile feedback keyboard. Actual key arrangement is a 36 position alpha keypad with a QWERTY layout, a 12 position numeric keypad, and a 12 position function keypad.

Operational Description

The Model 9360 Programmable Keyboard is intended for applications in which operator prompting and/or data input station is required. Operator interaction is via a nineteen character dot matrix display with each character having a height of 0.413 inches. The operator also has access to a sixty-four position keyboard used for data input.

Data Interface

The Model 9360 interfaces to METTLER TOLEDO digital indicators and printers using standard RS232, RS242 or 20 mA current loop communication links.

Available for external use on the 9360 are four (4) bi-directional communications channels and one (1) parallel input/output port. Refer to the following paragraphs for a detailed description of these ports.

Serial Channels

There are four bi-directional serial communications channels, which are used to receive data from and/or transmit data to an external device such as a digital indicator, printer, host computer, or a bar code reader. The actual operation of these channels is dependent on the application program.

Each serial channel has two (2) circuit types, which may be used for device interfacing. This configuration permits the connection of eight (8) external devices (four (4) inputs and four (4) outputs). If a device uses both the input and output of a port, the number of available devices is decreased by one. For example, four scales and four non-responding printers can be connected to the 9360. But if one of the printers uses XON/XOFF only three scales could be connected for a total of seven (7) devices. A brief description of the four channels follows. For a detailed description of these channels, refer to Appendix 4.5.

Channel 1

This channel is capable of communications using RS232 or RS242 (four wire type).

Channel 2

This channel is capable of communications using RS232 or 20 mA current loop (active or passive transmit, passive receive).

Channel 3

This channel is capable of communications using RS232 or RS242 (four wire type).

Channel 4

This channel is capable of communications using RS232 or 20 mA current loop (active or passive transmit, passive receive).

Parallel Port

This parallel port has sixteen (16) independent input/output lines, eight (8) lines are available for input/output control signals and eight (8) are available for output control signals. Also available on this port are two fused supply voltages, which may be used to trigger the I/O lines. Refer to the Appendices section of this manual for a detailed description of this port.

! WARNING

IF THIS DEVICE IS USED TO CONTROL MOVING MACHINERY, ALL USERS MUST PROVIDE A HARD WIRED EMERGENCY STOP CIRCUIT OUTSIDE THE Model 9360 CIRCUITRY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY

Specifications

The 9360 is designed to operate at temperature from -10º C (14º F) to + 40º C (104º F), in areas with a non-condensing relative humidity of 0 to 95%.

The mild steel enclosure is constructed for NEMA 12 rating.

The stainless steel enclosure is constructed for NEMA 4X rating.

The panel mount front is constructed for NEMA 4X rating.

The 9360 meets or exceeds the FCC conducted and radiated emissions requirements.

The 9360 and power supply are not designed for any hazardous (classified) locations. For hazardous (classified) locations contact your local METTLER TOLEDO representative.

Physical

The mild steel and stainless steel enclosures overall dimensions (without mounting brackets installed) are 10″ H x 13″ W x 2.5″ D. Use of the mounting bracket permits wall or desktop installation with the front panel positioned at about a 30-degree angle from the mounting surface.

The panel mount overall dimensions are 10.5″ H x 14.5″ W x 2.5″ D.

Electrical

The 9360 operates on 120 VAC ± 10% (optional -240 VAC) at a line frequency of 49 to 61.5 Hz. (Actual voltage used by the 9360 is 12 VDC.)

Power to the unit is provided via an externally mounted 12 VDC transformer.

The 120 VAC Power Supply is U.L. Listed and CSA Certified.

Power consumption is 26 VA maximum.

! CAUTION

ALL UNITS ARE SHIPPED FOR 120 VAC OPERATION. FOR APPLICATIONS REQUIRING VOLTAGES OTHER THAN 120 VAC, CONSULT YOUR LOCAL TOLEDO SCALE REPRESENTATIVE.

Cleaning

Clean the keyboard and enclosure with a soft, clean cloth that has been dampened with a mild cleaner. DO NOT USE ANY TYPE OF INDUSTRIAL SOLVENT. DO NOT SPRAY CLEANER DIRECTLY ONTO THE UNIT.

NOTES

2 Installation Instructions

Preliminary Information

Inspect the outer case for loose or damaged parts. If any damage is found, immediately notify the freight carrier.

Inspect and install the 9360 in conformance with all instructions provided in this Technical Manual or Programmer's Manual (P/N 90016600A) and any system drawings, which may have been supplied.

For equipment being stored while awaiting installation, the most common dangers are the possibility of unintentional mechanical damage and effects of excessive moisture or condensation. The best protection is for the equipment to remain boxed or covered by material provided for shipping. The equipment should not be unpacked, except as may be required for inspection or ventilation, until just before it is installed.

! WARNING

WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

! WARNING

THIS DEVICE AND ITS ASSOCIATED EQUIPMENT MUST BE INSTALLED, ADJUSTED, AND MAINTAINED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE SYSTEM AND POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

Initial Installation

At this time determine the actual mounting configuration that is to be used for this installation. The 9360 is configured such that both the NEMA 12 and the NEMA 4X enclosures may be either desk or wall mounted. The position of the included mounting brackets for the NEMA 12 and 4X units are used to determine the mounting configuration. Refer to the following appropriate paragraph for installing the mounting brackets.

Desk-top Installation

For desktop mounting applications, install the mounting brackets as shown in Figure 2.1.

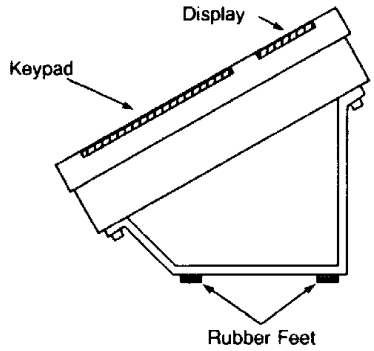


Figure 2. 1 Desk Top Mounting Brackets

Wall-mount Installation

For wall mounting applications, install the mounting brackets as shown in Figure 2.2.

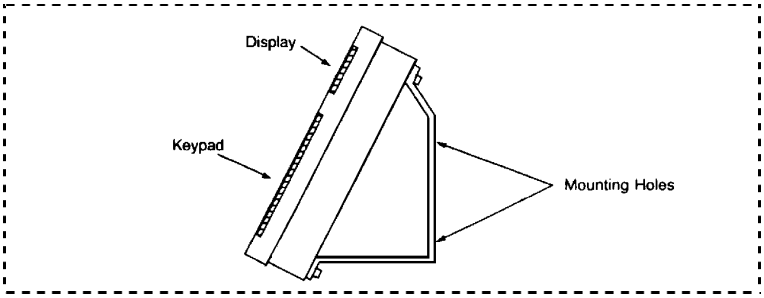


Figure 2.2 Wall Mounting Brackets

After completing the bracket installation it is necessary to install the unit in the actual operating location. This procedure differs for the NEMA 12 and NEMA 4X installations. Refer to the following appropriate paragraph for a detailed installation description.

NEMA 12 installation (9360 0001 - mild steel enclosure)

This type of installation is easier of the three. The only considerations required for this type is the physical location of the unit and the routing of the necessary data and power cables. If wall mounting this unit, refer to section 2.11 for mounting dimensions. DO NOT apply AC power to the unit at this time.

NOTE: Before connecting the external power supply to the power plug, located on the back of the 9360 enclosure, it is necessary to install the rubber gasket onto the plug. This gasket is in a small plastic bag located in the shipping carton.

NEMA 4X installation (9360 0002 - stainless steel enclosure)

This type of installation requires some special considerations in order to maintain the NEMA 4X rating. These considerations are:

Use of the NEMA 4X painted fiberglass enclosure to house the external power supply.

All cables entering or exiting the enclosures must do so thru CGB type connectors.

All cables not rated for NEMA 4X installations must be routed inside sealed conduit.

NOTE: The NEMA 4X Power Supply is not U.L. or CSA approved.

If wall mounting this unit, refer to section 2.11 for mounting dimensions.

After mounting the enclosures it is necessary to connect the AC power to the power supply assembly and install the power cable from the power supply to the 9360. Refer to Figure 2.3 for these connections. When making these connections use a minimum wire size of 22 gauge, stranded. This wire is to be supplied by the installer. DO NOT apply AC power to the unit at this time.

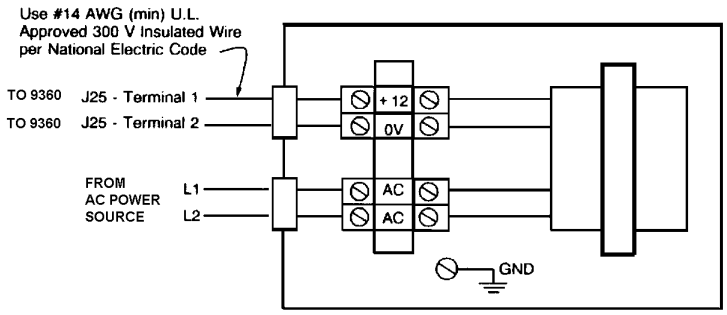


Figure 2.3 Power Supply Cable Connections

If installing the stainless steel enclosure (9360 0002) into a non-washdown environment (not rated NEMA 4X) it is not necessary to use the painted fiberglass enclosure for the external power supply. However, when installing the standard NEMA 12 external power supply it is necessary to first remove the round 12 VDC power connector as the stainless steel unit requires the connection of the supply wires to be made on the Connector PCB, located inside the enclosure. Red wire is + 12V, black wire is 0V.

NOTE: When installing the standard power supply with the stainless steel version of a NEMA 4X rating is not obtainable. The standard power supply limits the rating to NEMA 12.

Panel-mount Installation

When installing this unit into a new or existing panel, make certain the supplied enclosure gasket is used. Refer to section 2.11 for cutout dimensions.

NOTE: Before connecting the external power supply to the power plug, located on the back of the 9360 enclosure, it is necessary to install the rubber gasket onto the plug. This gasket is in a small plastic bag located in the shipping carton.

Initial Setup

Open the instrument and continue the inspection. Insure that all interconnecting harnesses and miscellaneous hardware are securely fastened.

! WARNING

BEFORE GAINING ACCESS TO ANY INTEGRAL PARTS OF THIS UNIT, ALWAYS REMOVE POWER FROM THE UNIT BY UNPLUGGING THE AC LINE CORD. BEFORE PERFORMING ANY SERVICE ON THIS EQUIPMENT, THIS MANUAL MUST BE REVIEWED AND UNDERSTOOD.

This instrument is opened by flipping the wing-type handle of each fastener up and turning them 180 degrees counter clockwise. (One fastener is equipped with a hex nut mounted in place of the wing-type handle).

NOTE: A small tube of sealant is supplied with the stainless steel enclosure. DO NOT DISCARD this tube; it must be applied to the front panel gasket to ensure a watertight seal.

Mounting Dimensions

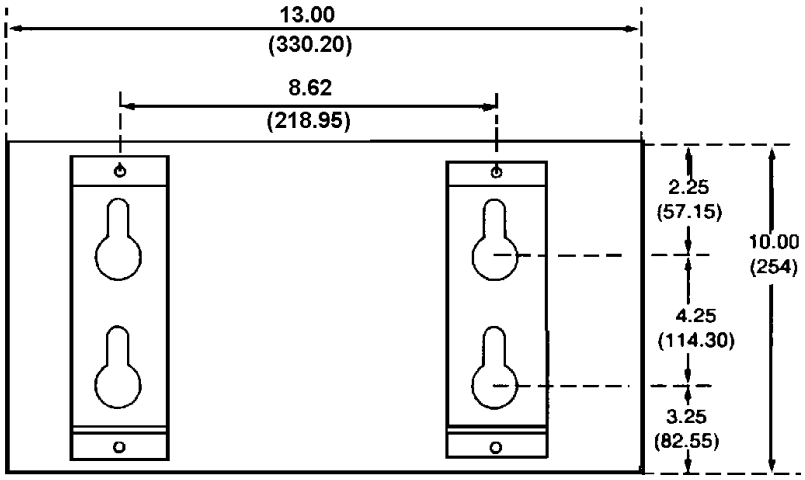


Figure 2.4 9360 Wall Mount

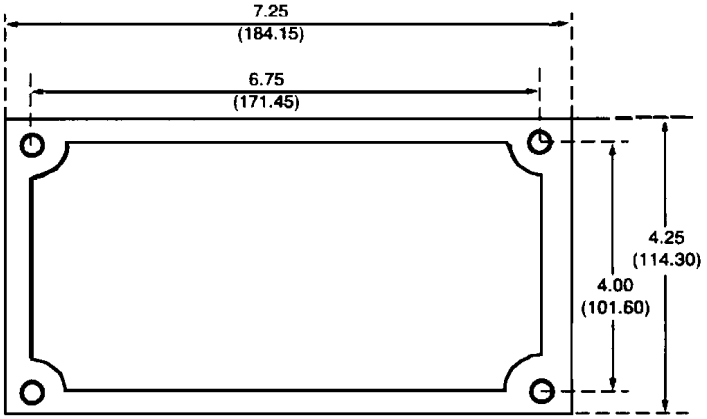
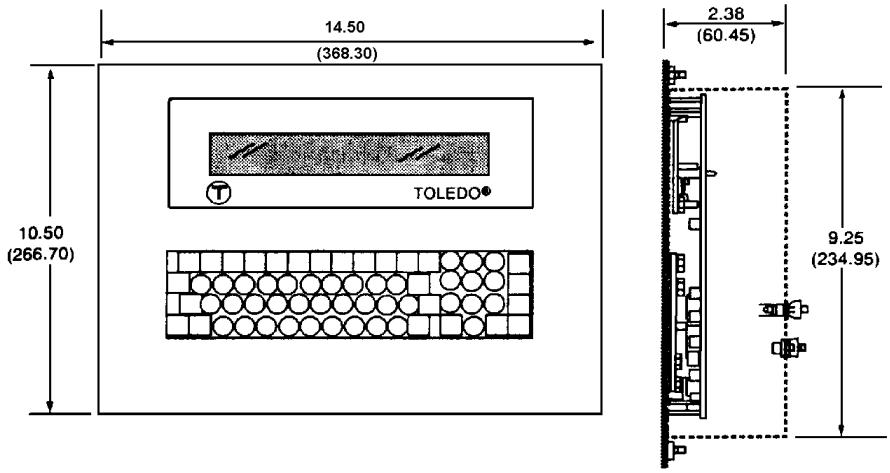
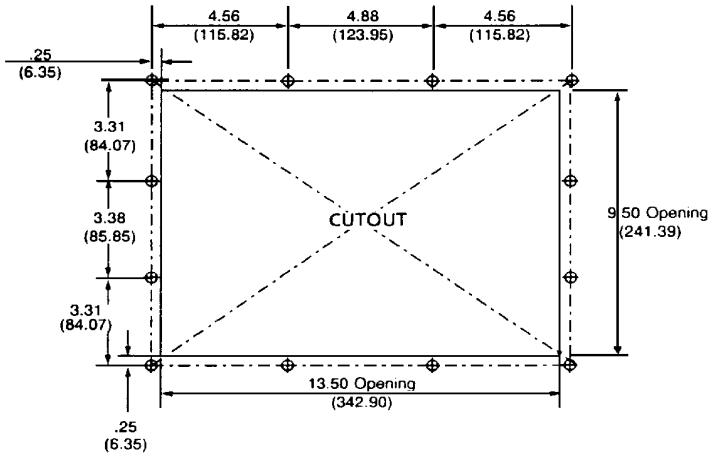


Figure 2.5 NEMA 4X Power Supply Assembly



Front View (Stainless Steel Front)



Panel Cutout Dimensions Inches (mm)
Figure 2.6 Model 9360 Panel Mount (model 9360-0003)

External Wiring Instructions

120 VAC, 60 Hz, (240 VAC, 50 Hz with optional supply) isolated, regulated power source to be furnished by others. METTLER TOLEDO recommends the use of a computer grade isolated transformer. The transformer shall be sized such that at least 50-70% of the VA rating will be drawn at minimum load.

Unless otherwise specified, all external wiring must be in steel conduit.

All external AC power and control lines must be in separate conduit from other external control and logic wiring.

All conduit should enter the enclosure through insulated bushings.

METTLER TOLEDO recommends all wires and/or cables be tagged for future identification.

METTLER TOLEDO recommends two (2) spare wires be run in each conduit; maximum ten (1) wires - minimum two (2) wires. All spare wires entering the enclosure should be electrically terminated to the ground lug.

All electrical wiring to conform to appropriate national and local area electrical codes for this type of installation.

3 Diagnosis

Error Code Descriptions

Error Message		Description
INVALID COMMAND	-	The operation attempted does not exist in the 9360.
INVALID TERMINATOR	-	The command was not followed by an expected key. "ENTER" is expected for most commands.
MISSING PARAMETER	-	This command requires a parameter (program name, etc.)
PROGRAM NOT FOUND	-	Program does not exist in memory.
PROGRAM NAME EXISTS	-	New program to be created via the COPY command already exists in memory.
INVALID ENTRY	-	Entry given is not valid. See description of the actual prompt for correct entries.
1ST LINE NOT FOUND	-	First line number given on a DELETE command does not exist. This line must exist in order to perform this command.
MEMORY FULL	-	Program memory is full
NO LINES IN PROGRAM	-	There are no lines in this program to be listed.
NOT ENOUGH MEMORY	-	There is not enough program memory available to perform the COPY command.
DEVICE NOT FOUND	-	This instruction specifies a device number that has not been setup via EDIT device.
INVALID PROG. NAME	-	Program names must consist of only alphanumeric characters.
TABLE NOT SET UP	-	This instruction specifies a table number that has not been setup via EDIT table.
A.R. PROG. NOT FOUND	-	Auto run program has been selected IN. The program name specified to be run is not found in memory.

NOTE: Press "ENTER" to recover from any of the above listed error codes.

Runtime and Compile Error Codes

Error Code	Description
01	Program Not Found - Program does not exist in memory.
02	Device Has Not Been Setup - This instruction specifies a device number that has not been setup via EDIT device.
03	Table Has Not Been Setup - This instruction specifies a table number that has not been setup via EDIT table.
04	Line Number Not Found - Line number does not exist in this program.
05	Too Many Nested Calls - A maximum of 10 nested CALL instructions can be performed.
06	Device Incorrectly Setup - A device has been incorrectly setup for this instruction. For example trying to do a GET on an OUTPUT only device.
07	"+" Opcode Does Not Follow "O" Opcode - Continuation instructions must follow an OUTPUT instruction.
08	More than 255 Characters - An output instruction utilizing Standard Protocol has more than 255 characters for the data string.
09	Register Not In Table Setup - A register has been specified in a TABLE instruction that is not setup in the TABLE definition.
10	Length Too Large - On a FIND or VERIFY instruction the length specified for the key is too large.
11	Offset Too Large - On a FIND or VERIFY instruction the offset specified for the key is too large.

Test Function Error Messages (Function Key F10)

Message	Recommended Action
EPROM TEST FAILURE	Replace PCB
RAM TEST FAILURE	Replace PCB
EEPROM TEST FAILURE	Replace PCB
INTERNAL LOOP FAULT	Replace PCB
INTERRUPT FAILURE	Replace PCB
EXTERNAL LOOP FAULT	Check selected channel external wiring. Tx must connect to Rx.
* I/O FAIL *******	Check external loop wiring.

NOTE: See Programmers Manual for error message details.

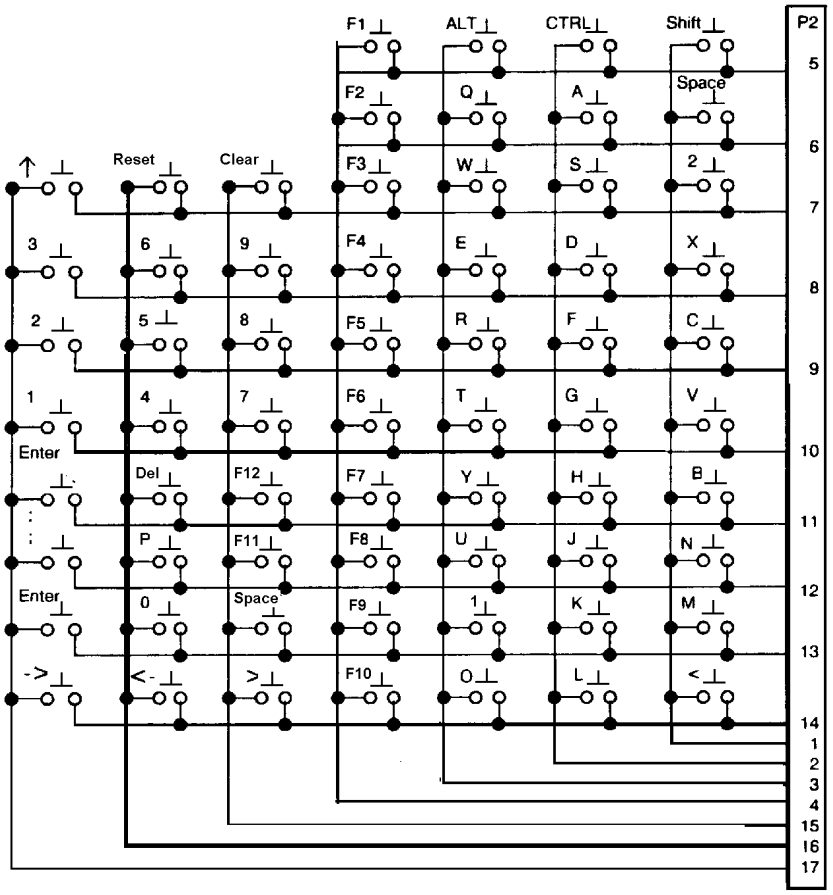


Figure 3.1 Keyboard Diagram

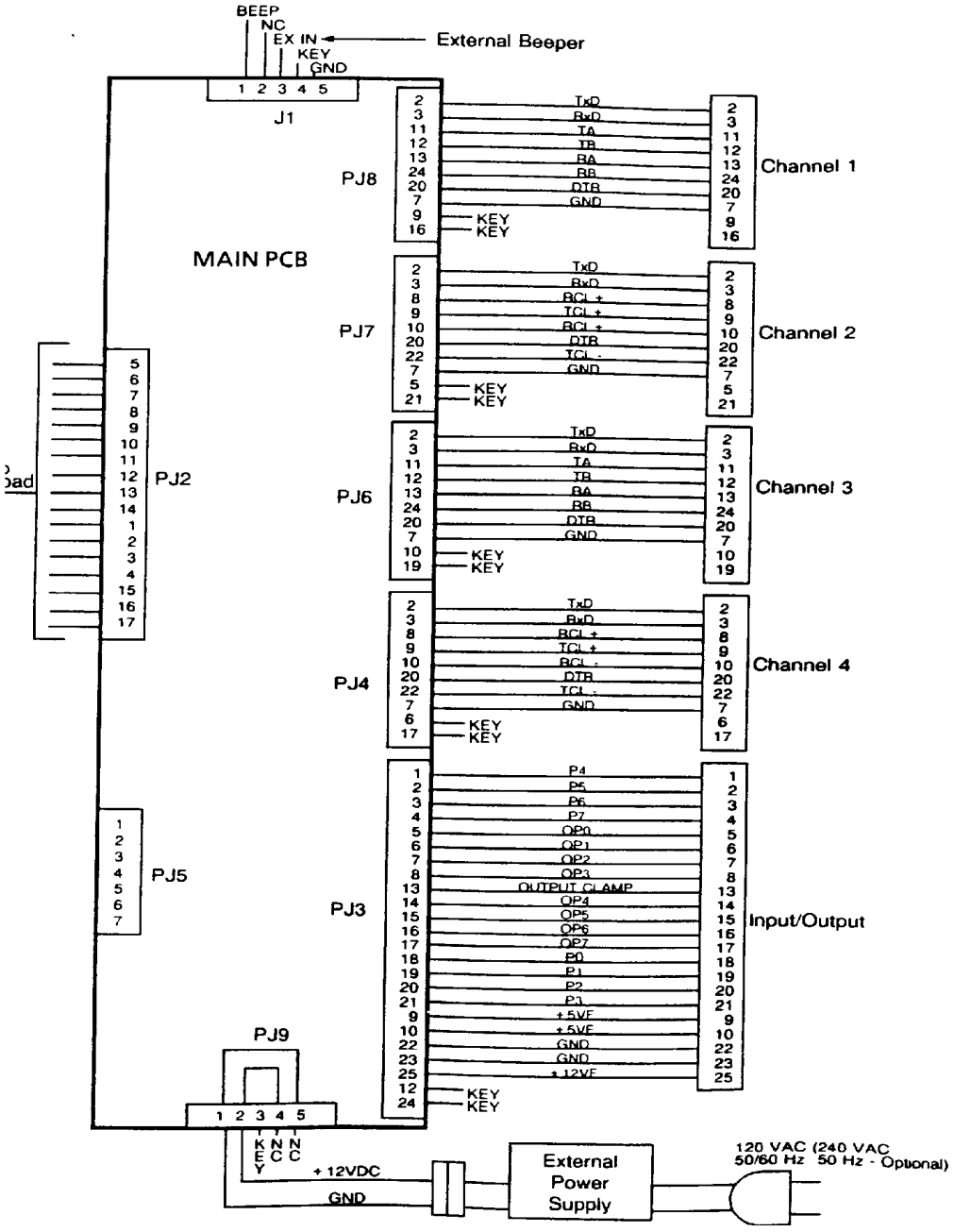


Figure 3.2 NEMA 12 and Panel Mount Interconnecting Diagram

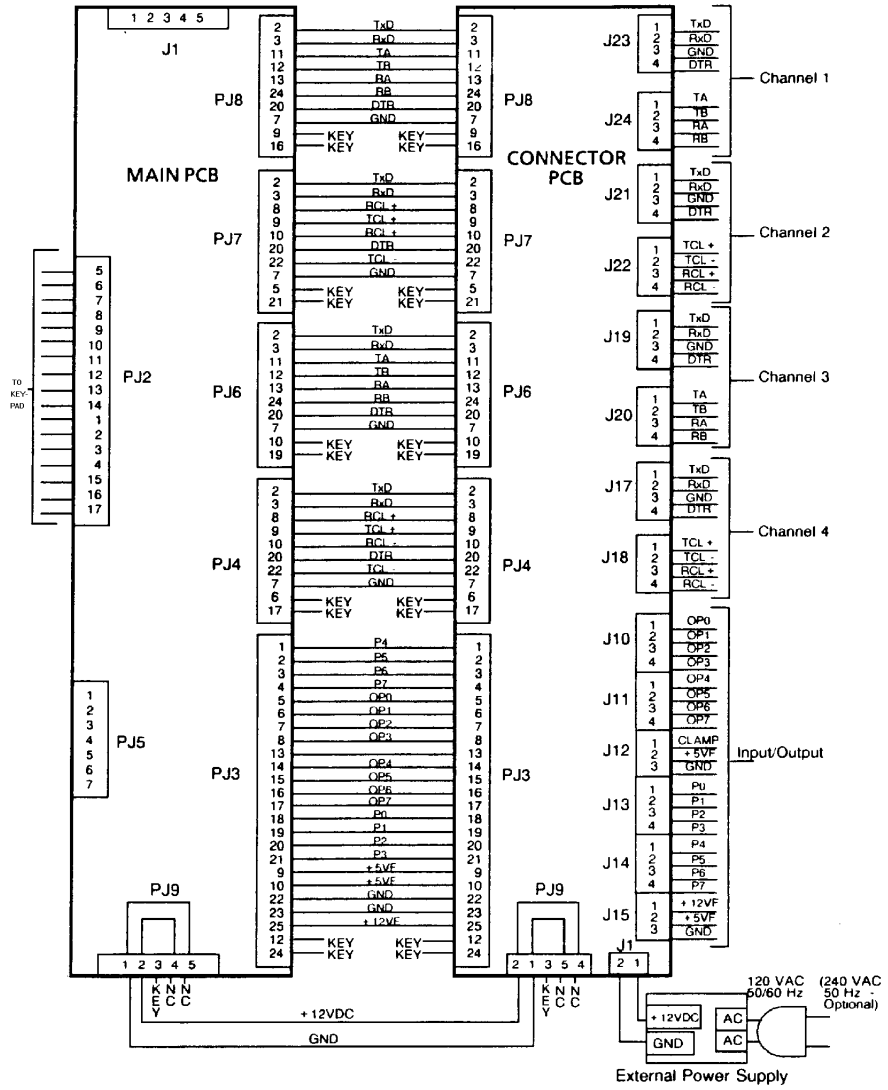


Figure 3.3 NEMA 4X Interconnecting Diagram

NOTES

4 Appendix

Standard Protocol

FORMAT: <STX> <DATA> <ETX> <BCC>

A STX (02H) will be output at the beginning of the string of data. An ETX (03H) followed by a <BBC> will be output at the end of the string of data.

The block check character (BCC) is defined as the exclusive OR of the lower 7 bits of all characters send, excluding the STX but including the ETX.

NOTE: The data string cannot exceed 255 characters. All data sent out on an input/output device that utilizes Toledo Standard protocol will be in the above format. The 9360 will expect a response from the transmission. If an ACK (06H) is received the error flag 'FE' will be set OFF. If there is no response or something other than an ACK is received the error flag FE will be set ON and the 'RC' register will be set to the following:

1 (31H) - No Response

2 (32H) - NAK received followed by code. Code received will be in register 'RN'.

3 (33H) - Something other than ACK or NAK received.

4 (34H) - NAK received, but did not receive a following code.

NOTE: The data string received (excluding STX, ETX and BCC) cannot exceed the length specified in the GET instruction.

All data received on an input/output device that utilizes Toledo Standard protocol is expected to be in the above format. The error flag 'FE' will be set OFF if a valid string is received. The number of characters received excluding the STX, ETX, and BCC is stored in register 'GC'. If a valid string is not received the error flag FE will be set ON and the 'RC' register will be set to the following:

1 (31H) - No Response, within timeout.

2 (32H) - Partial String received.

3 (33H) - Too many characters received.

4 (34H) - Invalid Checksum.

5 (35H) - EOT received.

Control and Special Character Entry

When setting up string literals it is sometimes necessary to use control characters and other characters not available on the 9360 keyboard. The following is a chart identifying the control character sequence. To enter a control character when working on a CONSOLE device press "CTRL" followed by the character defined key.

Example: If an <STX> character is desired, press and then release "CTRL" then press and release "B".

ASCII CONTROL CHARACTER	HEX EQUIVALENT	ENTRY
NULL	00H	Press CTRL then F4
SOH	01H	Press CTRL then A
STX	02H	Press CTRL then B
ETX	03H	Press CTRL then C
EOT	04H	Press CTRL then D
ENQ	05H	Press CTRL then E
ACK	06H	Press CTRL then F
BEL	07H	Press CTRL then G
BS	08H	Press CTRL then H
HT	09H	Press CTRL then I
LF	0AH	Press CTRL then J
VT	0BH	Press CTRL then K
FF	0CH	Press CTRL then L
CR	0DH	Press CTRL then M
SO	0EH	Press CTRL then N
SI	0FH	Press CTRL then O
DLE	10H	Press CTRL then P
DC1	11H	Press CTRL then Q
DC2	12H	Press CTRL then R
DC3	13H	Press CTRL then S
DC4	14H	Press CTRL then T
NAK	15H	Press CTRL then U
SYN	16H	Press CTRL then V
ETB	17H	Press CTRL then W
CAN	18H	Press CTRL then X
EM	19H	Press CTRL then Y
SUB	1AH	Press CTRL then Z
ESC	1BH	Press CTRL then F7
FS	1CH	Press CTRL then F8
GS	1DH	Press CTRL then F9
RS	1EH	Press CTRL then F10
US	1FH	Press CTRL then F11
DEL	7FH	Press CTRL then F12
CTRL	-	Press CTRL then CTRL

Control and Special Character Entry (CONTINUED)

Special characters are entered on the 9360 keyboard by pressing the "SHIFT", "ALT", OR "CTRL" followed by a function key. The following is a chart of these special characters.

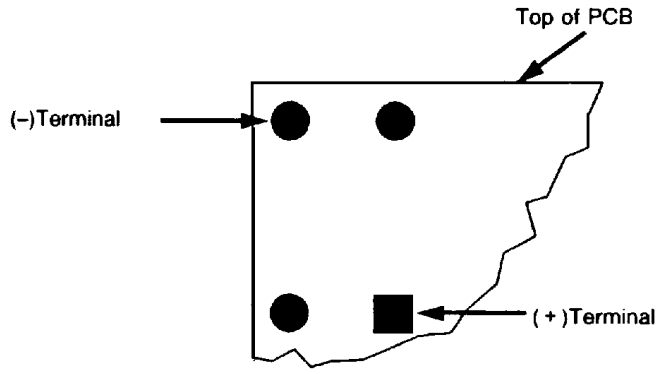
	CHARACTER	HEX EQUIVALENT	ENTRY
*	(asterisk)	2AH	Press SHIFT then F1
/	(slash)	2FH	Press SHIFT then F2
=	(equal sign)	3DH	Press SHIFT then F3
<>	(not equal)	n/a	Press SHIFT then F4
<=	(less than or equal to)	n/a	Press SHIFT then F5
>=	(greater than or equal to)	n/a	Press SHIFT then F6
!	(exclamation mark)	21H	Press SHIFT then F7
"	(double quotation mark)	22H	Press SHIFT then F8
#	(number sign)	23H	Press SHIFT then F9
$	(dollar sign)	24H	Press SHIFT then F10
%	(percent sign)	25H	Press SHIFT then F11
&	(ampersand)	26H	Press SHIFT then F12
`	(single quotation mark)	60H	Press ALT then F1
'	(apostrophe)	27H	Press ALT then F2
^		5EH	Press ALT then F3
@	(at sign)	40H	Press ALT then F4
(	(opening parenthesis)	28H	Press ALT then F5
)	(closing parenthesis)	29H	Press ALT then F6
[	(opening bracket)	5BH	Press ALT then F7
\	(backslash)	5CH	Press ALT then F8
]	(closing bracket)	5DH	Press ALT then F9
~		5EH	Press ALT then F10
?	(question mark)	3FH	Press ALT then F11
_	(underscore)	5FH	Press ALT then F12
{		7BH	Press CTRL then F5
}		7DH	Press CTRL then F6
|		7CH	Press CTRL then ;

Power Supply Voltages

The 9360 uses an external transformer to supply DC voltage to the Main/Display PCB. This transformer converts the AC Line Voltage input into a + 12 VDC output used by the 9360 to generate the various DC voltages. The voltages generated by the power supply section of the Main/Display PCB are: + 5 VDC and + 12 VDC. Also available on this PCB is a + 2.4 VDC battery supply (used for memory backup during a power failure), a + 12 VDC fused supply and a + 5 VDC fused supply (used for parallel I/O control).

+ 2.4 VDC Battery Supply

The battery is permanently affixed to the PCB and not replaceable. In normal service it is trickle charged from the +5 VDC logic supply on the PCB. There are no defined test points on the PCB, so checking this voltage involves placing the meter probes on the PCB pads (see diagram below). Viewed from the back, locate the battery pads in the upper left corner of the PCB. Measure from the square pad to the diagonally opposite pad above it.



Upper left corner of the PCB viewed from the rear. VOLTAGE = 2.7 VDC ± 0.2 VDC with a fully charged battery and the circuit power applied.

Replace the entire PCB if the battery voltage is below 2.4 VDC after the PCB has been removed from the system for at least one hour.

+ 5 VDC Fused Supply

This voltage is generated on the Main/Display PCB and is fused by F2* see section 4.3.4 for current ratings. This supply is not used on the PCB, but is made available on the parallel I/O port for control of the I/O lines. It is generated on the PCB using an LM340 voltage regulator and is filtered by a 4.7 uF capacitor. Operating tolerance of this supply is ± 0.20 VDC with a maximum AC ripple of 0.04 VAC. A good test point for this voltage is Pin 9 to Pin 22 (GND) of the I/O port connector, or J12 - Terminal 2 to J12 Terminal 2 to J12 Terminal 3 on the stainless steel enclosure type.

+12 VDC Supply

This + 12 VDC supply is generated by the external transformer and is used as a raw supply for the +5 VDC, it is also used to operate the various communication circuits. This voltage is filtered by two 4700 uF capacitors which are part of the external power supply assembly. Voltage specifications are:

Loaded Output (at nominal line voltage input)

12.5 VDC, ± 0.5 VDC at 1.5 amps

Unloaded Output (at 120 VAC input)

19.5 VDC Maximum

+ 12 VDC Fused Supply

This voltage is taken directly from the standard ± 12 VDC supply and is available on the parallel I/O port. This supply is fused by F1* and may be used for control of the output lines. A good place to test this voltage is Pin 25 of the I/O port connector to pin 23 (GND), or J15 - Terminal 1 to J15 Terminal 3 on the stainless steel enclosure type. This voltage may vary from 10 to 18 VDC depending on load and line conditions.

NOTE: *These fuses are located on the Main/Display PCB.

F1 = .125 Amps on 13379100A and 13533800A PCBs.

F1 = .25 Amps on 136444000A PCB.

F2 = .3 Amps on 13379100A and 13566800A.

F2 = .25 Amps on 13644400A PCB.

interconnecting Cables

Device	Source	Length	Part Number	Ram Number
307	9360-0001 9360-0002	6′ 20′	A119714 00A 900450 00A	0900-0191 0960-0139
MP750	9360-0001 9360-0002	6′ 20′	900451 00A 900452 00A	0960-0140 0960-0141
8804/8806	9360-0001 9360-0002	6′ 20′	A115544 00A 900453 00A	0900-0136 0960-0142
8840/8842/8843	9360-0001 9360-0002	6′ 20′	128220 00A 900454 00A	0900-0214 0960-0143
8855	9360-0001 9360-0002	6′ 20′	B119722 00A 900455 00A	0900-0197 0960-0144
8140/8142/8146/8530 Desk and Rack	9360-0001 9360-0002	6′ 20′	900456 00A 900457 00A	0960-0150 0960-0151
8140/8142/8146/8530 Wall	9360-0001 9360-0002	6′ 20′	900458 00A 900459 00A	0960-0152 0960-0153
M5000	9360-0001 9360-0002	6′ 20′	900460 00A 900461 00A	0960-0154 0960-0155
High Level I/O	9360-0001 9360-0002	6′ 20′	900335 00A 900464 00A	0960-0160 0960-0161
Programming CRT and 8860	9360-0001 9360-0002	6′ 20′	900462 00A 900463 00A	0960-0158 0960-0159
8860 Washdown	9360-0001	20′	KB580651 020	0960-0145
8520 Desk & Wall	9360-0001	6′	KB580652 020	0900-0258

Table 4-1 Interconnecting Cable Part Numbers

NOTE: 9360 - 0003 (panel mount) requires the same cables as the 9360-0001.

Serial Channels

There are four (4) bi-directional serial channels available; with each channel having two separate transmit and receive lines of different circuit types. All channels have RS232 full duplex capability. This configuration permits the connection of up to eight (8) different external devices.

NOTE: Only one circuit type per channel may be selected for use. The use of two external devices per channel is based on the devices being one transmit only device and the second being a receive only device. The following paragraphs discuss in detail the possible wiring configurations and pin out description for these channels.

Channel 1

Channel one supports bi-directional communication using either RS232 or RS242 circuit types. The following chart lists the available communication types and the pin number, on the connector, where these signals can be located.

Signal Description	Desk/Panel/Wall (NEMA 12) Pin Number	Wall (Stainless) Terminal Number
RS232 Transmit (TxD)	2	J23 - Terminal 1
RS232 Receive (RxD)	3	J23 - Terminal 2
Signal Ground	7	J23 - Terminal 3
RS422 Transmit A	11	J24 - Terminal 1
RS422 Transmit B	12	J24 - Terminal 2
RS422 Receive A	13	J24 - Terminal 3
RS232 DTR	20	J23 - Terminal 4
RS422 Receive B	24	J24 - Terminal 4

Table 4-2 Channel 1 External Connections

NOTE: PINS NOT LISTED ARE NOT USED.

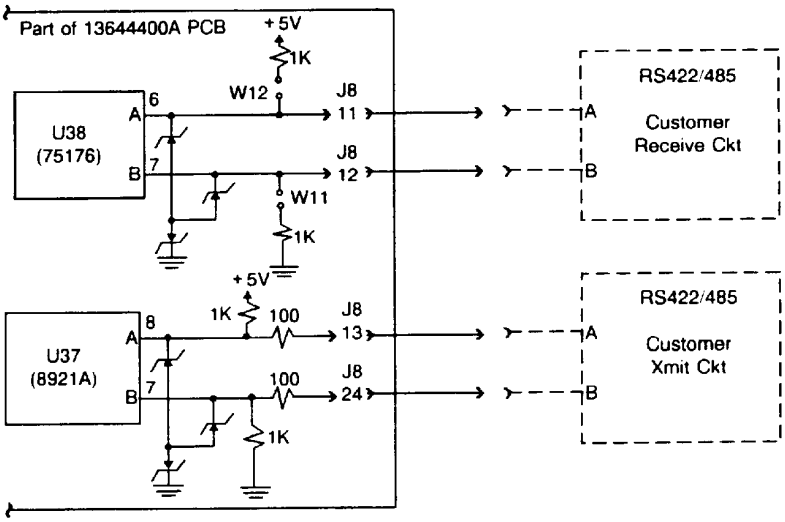


Figure 4.1
Channel 1
RS422/485 Transmit and Receive Circuitry

Channel 2

Channel two supports bi-directional communications using either RS232 or 20 mA Current Loop circuit types. The 20 mA current loop available on this channel is configured for Transmit Active and Receive Passive at the factory. Other transmit combinations are possible by changing W14 on the 1364400A PCB (see example below). The following chart lists the available communication types and the pin number, on the connector, where these signals can be located.

Signal Description	Desk/Panel/Wall (NEMA 12) Pin Number	Wall (Stainless) Terminal Number
RS232 Transmit (TxD)	2	J21 - Terminal 1
RS232 Receive (RxD)	3	J21 - Terminal 2
Signal Ground	7	J21 - Terminal 3
RS422 Transmit A	8	J22 - Terminal 3
RS422 Transmit B	9	J22 - Terminal 3
RS422 Receive -	10	J22 - Terminal 4
RS232 DTR	20	J21 - Terminal 4
20 mA Transmit -	22	J24 - Terminal 2

Table 4-3 Channel 2 External Connections (Supports RS232 and 20 mA Current Loop)

NOTE: PINS NOT LISTED ARE NOT USED.

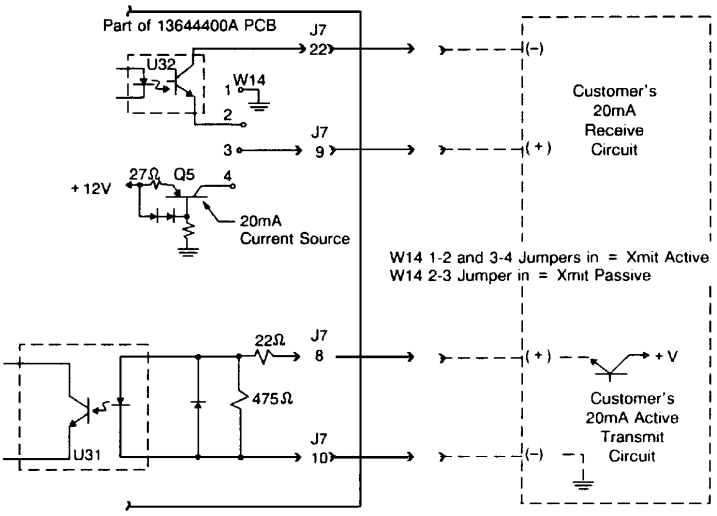


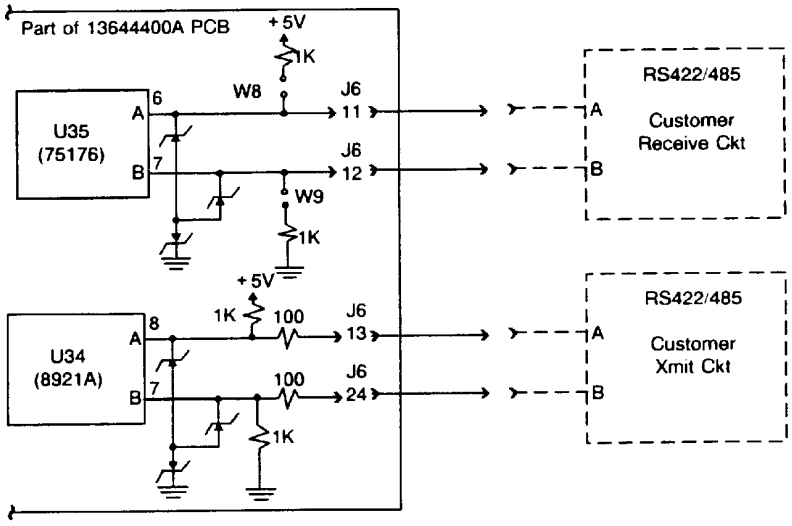
Figure 4.2 Channel 2 20 mA Transmit and Receive Circuitry

Channel 3

Channel three supports bi-directional communications using either RS232 or RS242 circuit types. The following chart lists the available communication types and the pin number, on the connector, where these signals can be located.

Signal Description	Desk/Panel/Wall (NEMA 12) Pin Number	Wall (Stainless) Terminal Number
RS232 Transmit (TxD)	2	J19 - Terminal 1
RS232 Receive (RxD)	3	J19 - Terminal 2
Signal Ground	7	J19 - Terminal 3
RS422 Transmit A	11	J20 - Terminal 1
RS422 Transmit B	12	J20 - Terminal 2
RS422 Receive A	13	J20 - Terminal 3
RS232 DTR	20	J19 - Terminal 4
RS422 Receive B	24	J20 - Terminal 4

NOTE: PINS NOT LISTED ARE NOT USED.



Channel 3 RS422/485 Transmit and Receive Circuitry

Channel 4

Channel four supports bi-directional communications using either RS232 or 20 mA Current Loop circuit types. The 20 mA current loop available on this channel is configured for Transmit Active and Receive Passive at the factory. Other transmit combinations are possible, by changing W13- (see example below on 1364400A PCBs). The following chart lists the available communication types and the pin number, on the connector, where these signals can be located.

Signal Description	Desk/Panel/Wall (NEMA 12) Pin Number	Wall (Stainless) Terminal Number
RS232 Transmit (TxD)	2	J17 - Terminal 1
RS232 Receive (RxD)	3	J17 - Terminal 2
Signal Ground	7	J17 - Terminal 3
RS422 Transmit +	8	J18 - Terminal 3
RS422 Transmit +	9	J18 - Terminal 1
RS422 Receive -	10	J18 - Terminal 4
RS232 DTR	20	J17 - Terminal 4
RS422 Transmit -	22	J18 - Terminal 2

Table 4-5 Channel 4 External Connections

NOTE: PINS NOT LISTED ARE NOT USED.

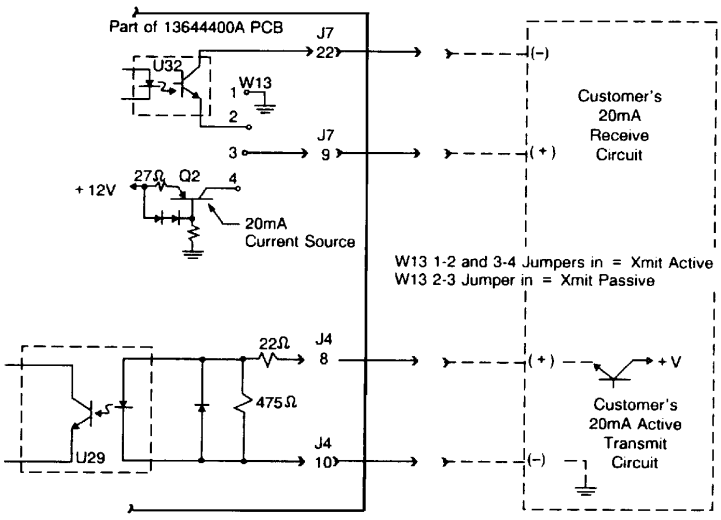


Figure 4.4 Channel 4 20 mA Transmit and Receive Circuitry

Parallel Input/Output Channel

This I/O port is designed to operate sixteen (16) separate control lines; eight (8) input and eight (8) output lines. Also available are two (2) fused supply voltages which may be used to control any external solid state device. These I/O lines are negative true logic. That is, the lines are in a high condition when OFF and a low sinking condition when turned ON.

! CAUTION

THE SIGNALS FROM THIS PORT COME DIRECTLY FROM IC'S ON THE MAIN PCB. THEY ARE NOT FURTHER BUFFERED. THEREFORE IT IS RECOMMENDED THAT THE LINES FROM HERE BE PROTECTED FROM THE EFFECTS OF TRANSIENT SPIKES, CAUSED BY EXTERNAL SWITCHING, RFI OR EMI. FAILURE TO COMPLY WITH THIS REQUIREMENT MAY RESULT IN POOR OPERATION OR POSSIBLE DAMAGE TO THE UNIT. LIMIT CABLE LENGTH TO 15 FEET.

Signal Description	Desk/Panel Mount Pin Number	Wall Mount Terminal Number
Input #0	18	J13 - Terminal 1
Input #1	19	J13 - Terminal 2
Input #2	20	J13 - Terminal 3
Input #3	21	J13 - Terminal 4
Input #4	1	J14 - Terminal 1
Input #5	2	J14 - Terminal 2
Input #6	3	J14 - Terminal 3
Input #7	4	J14 - Terminal 4
Output #0	5	J10 - Terminal 1
Output #1	6	J10 - Terminal 2
Output #2	7	J10 - Terminal 3
Output #3	8	J10 - Terminal 4
Output #4	14	J11 - Terminal 1
Output #5	15	J11 - Terminal 2
Output #6	16	J11 - Terminal 3
Output #7	17	J11 - Terminal 4
Output Clamp	13	J12 - Terminal 1
+ 12 VDC (.25A)*	25	J15 - Terminal 1
+5 VDC (.25A)*	9	J12 - Terminal 2
+ 5 VDC (.25A)*	10	J15 - Terminal 2
Ground	22	J12 - Terminal 3
Ground	23	J15 - Terminal 3

Table 4-6 Parallel I/O Signal Identification

NOTE: PINS NOT LISTED ARE NOT USED.

* Current ratings are for 13644400A PCB. See Section 4.3.4 for other combinations.

Input Lines

The input control lines are TTL level signals operating on negative true logic. Each input uses a 100 ohm resistor and a 0.1 uf capacitor installed for filtering.

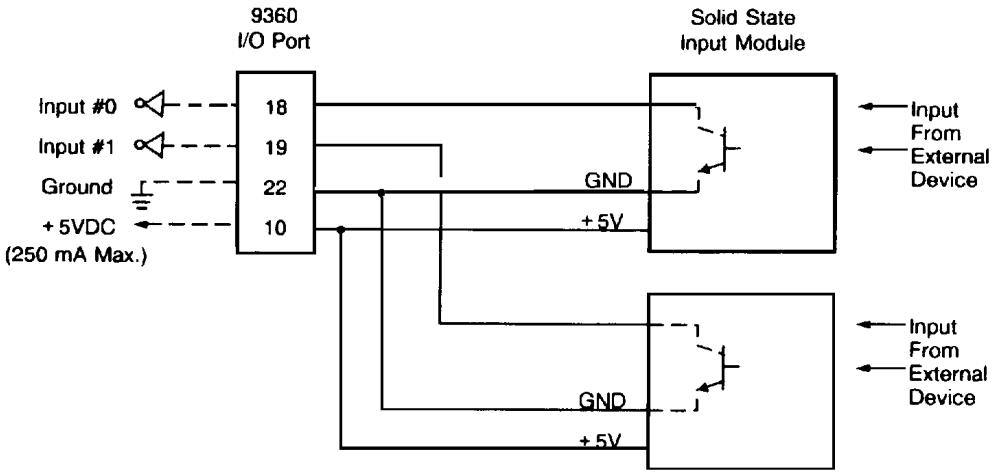


Figure 4.5 Input Wiring Example

Output Lines

The output lines are an open collector design operating on negative true logic. Each line is capable of sinking 100 mA.

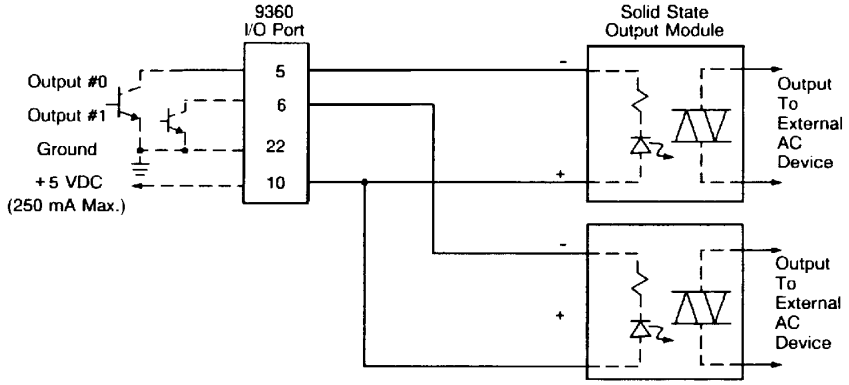


Figure 4.6 Output Wiring Example

This example shows two (2) output lines (output #0 and output #1) being used. In this example each solid state device requires 27 mA, total current used is 54 mA. (Maximum current available on the +5 VDC supply is 250 mA.) In this example each output line is required to sink 27 mA (0.27 amps).

Jumper and Switch Descriptions

This section details the functions as well as the physical location of the various hardware jumpers and switches located on the Main/Display PCB. Each jumper has two possible selections, the selections shown are the required setting for proper operation of the Model 9360.

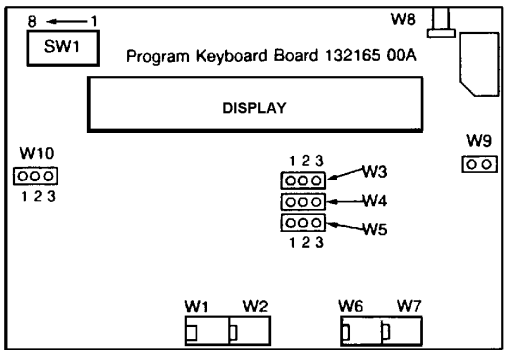


Figure 4.7 Jumper and Switch Location Diagram (13379100A PCB Only)

Jumper Settings (400 Line PCB #13379100A Only)

W1=RS422, (Terminator for Channel 3)

OUT - For normal operation of the RS422 communication lines.

W2=RS422, (Terminator for Channel 3)

OUT - For normal operation of the RS422 communication lines.

W3=Alarm Interrupt (ALM)

Pins 2 to 3 - Connects the alarm interrupt to the "Restart 5.5" line.

W4=Interrupt A (INTA)

Pins 1 to 2 - Connects Interrupt A to the "Restart 5.5" line.

W5=Interrupt B (INTB)

Pins 1 to 2 - Connects Interrupt B to the "Restart 5.5" line.

W6=RS422, (Terminator for Channel 1)

(This jumper not required for 9360 configuration)

OUT - This setting is the normal position for standard RS422 communications.

W7=RS422, (Terminator for Channel 1)

(This jumper not required for 9360 configuration)

W8=Battery Backup

* IN - Shorting the two pins. This connects the battery to the RAM memory for retention of data during a power failure.

OUT - This setting disconnects the battery from the RAM memory. In this position any data stored in the RAM memory will be lost during a power failure.

NOTE: This jumper is set to the OUT position for shipping and storage. At the time of installation, this jumper must be moved to the IN position.

W9=Debug Connector

This jumper is used for factory testing and should not be connected.

W10=EEPROM Memory Type Selection

Pins 1 to 2 - This setting is used when a 64 K EEROM is installed.`

4.7.2 Jumper Settings (2000 Line PCB #13533800A)

W1=Watch dog timer and time duration selections.

W2=Watch dog timer and time duration selections.

See Table 4-7 below for W1 and W2 settings.

W3=Alarm Interrupt (ALM)

Pins 2 to 3 - Connects the Alarm Interrupt to the "Restart 5.5" line.

W4=Interrupt A (INTA)

Pins 1 to 2 - Connects Interrupt A to the "Restart 6.5" line/

W5=Interrupt B (INTB)

Pins 1 to 2 - Connects Interrupt A to the "Restart 6.5" line.

W6=Debug Switch

OUT - For factory use.

W7=Watchdog Timer (WDT)

* IN - Enables (WDT)

W8, W9 - Not Used

W10=IC "A2" Power Supply

* 1-2 - A2 powered by +5 VDC supply.

2-3 - A2 powered by battery

W1	W2	Description
OUT*	OUT*	1.6 Second Timeout
IN	OUT	100 Millisecond Timeout
OUT	IN	1 Second Timeout
IN	IN	Not Valid

Table 4-7 W1, W2 Jumper Settings

NOTE: *Required setting.

Jumper Settings (2000 Line PCB #13644400A Only)

W1, W2	Both Out*	Watchdog Timeout = 1.6 Sec. Reset = 50 MS
	1 In, 2 Out	Watchdog Timeout = 100 MS Reset = 50 MS
	1 Out, 2 In	Watchdog Timeout = 1 Second Rest = 500 MS
	Both In	Watchdog Timeout and Reset Disabled
W3	Out	Disable Alarm Interrupt
	1-2	Alarm Interrupt - RST 6.5
	2-3*	Alarm Interrupt - RST 5.5
W4	1-2*	UART #1 Interrupt = RST 6.5
	2-3	UART #1 Interrupt = RST 5.5
W5	1-2*	UART #1 Interrupt = RST 6.5
	2-3	UART #1 Interrupt = RST 5.5
W6	Out*	Power Fail Detect Enabled
		Power Fail Detect Enabled
W7	Out	Disable Watchdog
	In	Enable Watchdog
W8	Out*	Channel 3 RS485 TA Pullup Out
	In	Channel 3 RS485 TA Pullup In
W9	Out*	Channel 3 RS485 TB Pulldown Out
	In	Channel 3 RS485 TB Pulldown In
W10	1-2*	U5 EEPROM Select
	2-3	U5 SRAM Select
W11	Out*	Channel 1 RS485 TA Pullup Out
	In	Channel 1 RS485 TA Pullup In
W12	Out*	Channel 1 RS485 TB Pulldown Out
	In	Channel 1 RS485 TB Pulldown In
W13	1-2 & 3-4*	Channel 4 20 mA Loop Xmit Active
	2-3	Channel 4 20 mA Loop Xmit Passive
W14	1-2 & 3-4*	Channel 2 20 mA Loop Xmit Active
	2-3	Channel 2 20 mA Loop Xmit Passive

NOTE: * Required setting.

The 9360 includes eight (8) switches which may be used for various functions. These switches and their description follows:

SW1-1 = Lost Password Recovery (Refer to paragraph 4.8 for details)

SW1-2 = Cleaning EEPROM (Refer to paragraph 4.9 for details)

SW1-3 = Setup Mode Access

ON - Setup Mode Disabled

OFF - Setup Mode Enabled

SW1-4 = Time and Date Format

ON - European Format, DD/MM/YY

OFF - U.S. Format, MM/DD/YY

SW1-5 thru SW1-8 =Not Used - should be in the OFF position.

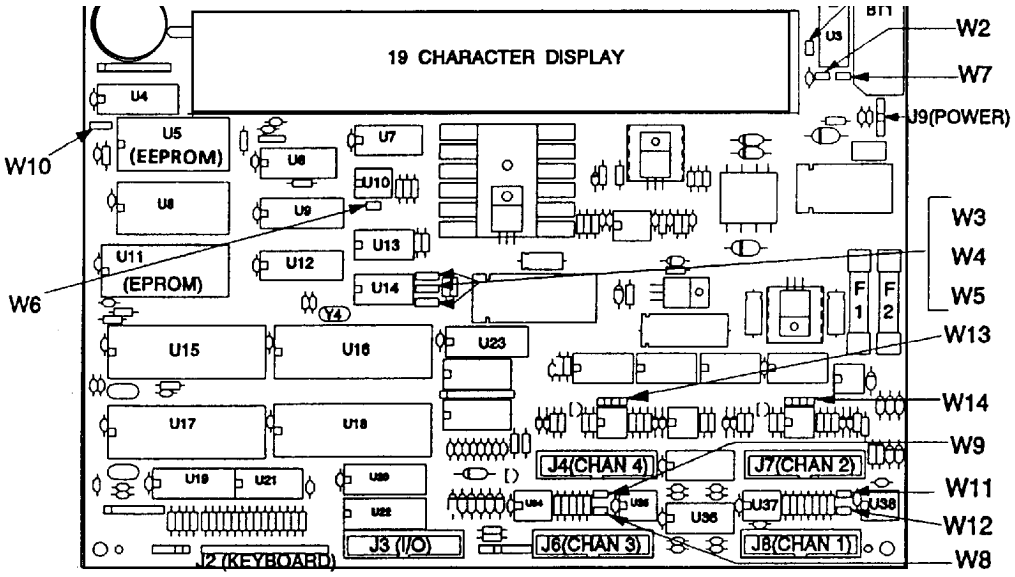


Figure 4.8 Jumper and Switch Location (13644400A)

Recovering from a Lost Password

This procedure details the necessary steps to enter the setup mode if the customer's password has been lost or forgotten.

NOTE: This is the only place in the Technical Manual that this procedure is located. If this manual is made available to personnel who should not have access to this procedure, remove this page.

- Remove AC power
- Locate SW1-1 on the Main/Display PCB.
- Turn this switch to the ON position.
- Reapply the AC power.
- With the "PASSWORD?" prompt displayed, enter the number 865336.
- Once inside the setup procedure, change and document the new password.
- After this change and any other changes required, exit the setup procedure and remove the AC power.
- Turn SW1-1 to the OFF position
- Reapply the AC power.

Clearing EEPROM (Clearing all programs from memory)

This procedure details the necessary steps to perform a "cold start" on the EEPROM. A cold start will cause all programs, device and table setup, and literal data to be cleared from memory.

NOTE: This is the only place in the Technical Manual that this procedure is located. If this manual is made available to personnel who should not have access to this procedure, remove this page.

- Remove AC power.
- Locate switch SW1-2 on the Main/Display PCB.
- Turn this switch to the ON position.
- Reapply the AC power.
- The display will show "CLEAR E2?". Press "Y" followed by the <ENTER> key.
- The display will show "PASSWORD?". Enter the number 865336 followed by the <ENTER> key.
- The display will show "E2 COLD START". Press <ENTER> and wait until the "R:" prompt appears.
- Remove the AC power
- Turn SW1-2 to the OFF position.
- Reapply the AC power.

Serial Communication Standards

This section of the manual contains various items of interest when dealing with communication circuit types, signal identification, and data formats.

Communication Circuit Types

RS232 (All Channels)

50 feet maximum cable length. RS232 has low noise immunity due mainly to the equipment common ground return for data. Longer lengths of successful communications are highly dependent on the electrical environment. Performance of the RS232 communication link can be improved by avoiding bundling the cables with other wiring and routing the cable away from devices which produce electrical noise.

Pin 2, Transmit Data, (TxD). This output transmits Serial ASCII data to an external device.

Pin 3, Receive Data, (RxD). This input accepts Serial ASCII data sent from an external device.

Pin 7, Signal Ground, (GND)

Pin 20, Data Terminal Ready (DTR). This output signal will always be at +12 VDC whenever the 9360 has AC power.

RS232 (Channels 1 & 3 Only)

4000 feet maximum cable length. RS422 has a medium amount of noise immunity. Long lengths of successful communications are highly dependent on the electrical environment. Performance of the RS422 communication link can be improved by avoiding bundling the cables with other wiring and routing the cable away from devices which produce electrical noise.

Pin 11, Transmit A (TA)

Pin 12, Transmit B (TB). These outputs are used to transmit Serial ASCII data to an external device.

Pin 13, Receive A (RA)

Pin 24, Receive B (RB). These inputs accept Serial ASCII data sent from an external device.

20 mA Current Loop (Channels 2 &4 Only)

1000 feet maximum cable length, up to 1500 feet if routed in separate conduit. 20 mA current loop offers good electrical noise immunity. Distance to 1500 feet are possible when the cable is placed in separate conduit which is mounted close to the ground.

Pin 9, Transmit + (TCL +, 20 mA Current Source)

Pin 22, Transmit - (TCL -, Switched Current Sink). This output is used to send active 20 mA loop data to a passive receive device.

Pin 8, Receive + (RCL +)

Pin 10, Receive - (RCL -). This input accepts 20 mA current loop serial ASCII data from an active source.

Data Format

Word Length

Word length defines a character or number of bits in a sequence that is handled as a unit and that can be stored in one location. The word length and format are the same for RS232, RS422, and 20 mA current loop serial communication formats. A serial data word consists of four parts: a Start Bit, seven (7) Data Bits (which identify the specific character being transmitted), a Parity Bit, and one (1) or more Stop Bits.

The Start Bit is used to signal the beginning of a character and the next seven bits are the character itself. These seven data bits are sent in ASCII code and identify the actual character being sent. The Parity Bit must be present but may be selected as an odd or even parity type.

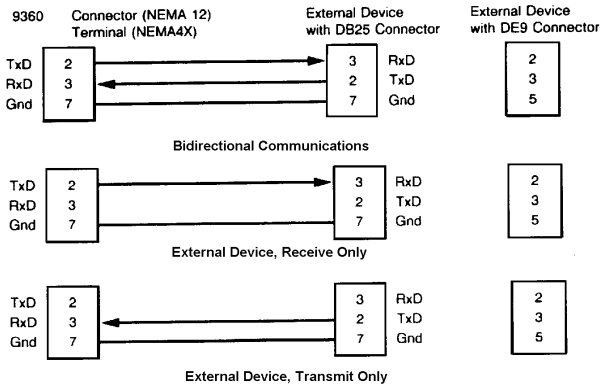
The Stop Bit is the last bit in a character and is used to insure that the Start Bit of the next character will be recognized. The transmission may use one or more Stop Bits.

Baud Rate

Baud Rate is defined as the number of bits per second that are sent through the serial communication interface. The 9360 may be set for baud rates of 300, 600, 1200, 2400, 4800, or 9600.

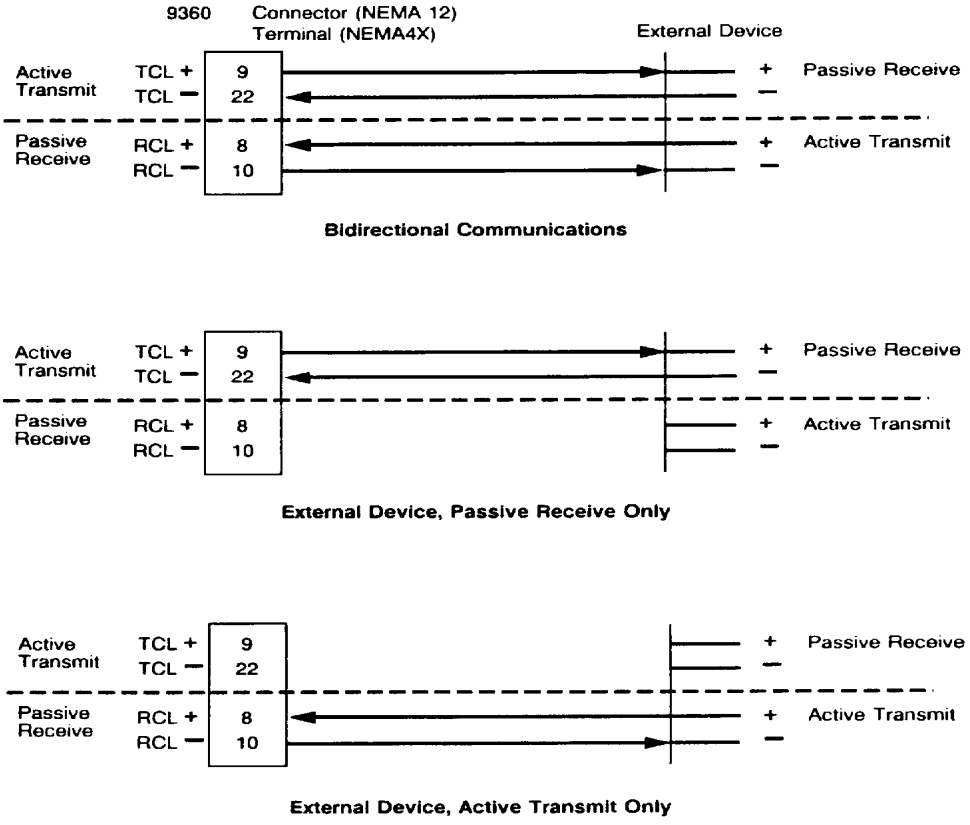
Typical Wiring Connections for External Devices

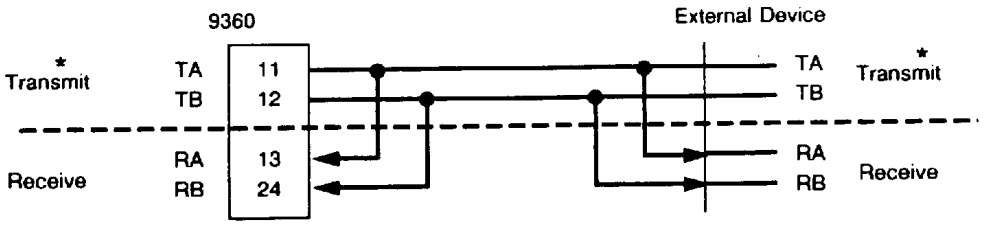
The following diagrams illustrate various serial interface connection arrangements. In all examples the installer must use a good quality shielded cable with at least #33 gage. (20 gage preferred) wires. The shield must be terminated to the chassis of either the 9360 or external device, <u>but not both</u>. Contact METTLER TOLEDO if in doubt.



External Device, Transmit Only
Figure 4.9 RS232, Typical Wiring Examples

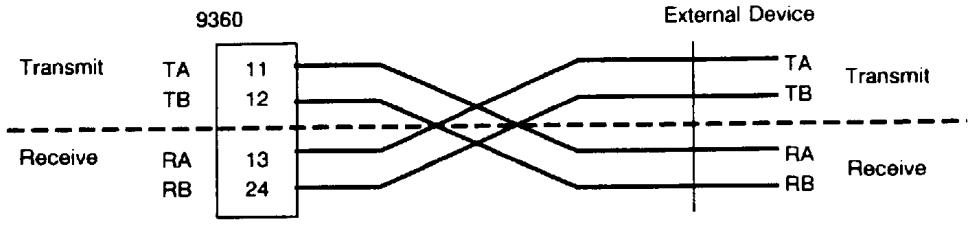
Figure 4.10 20 mA Current Loop, Typical Wiring Examples



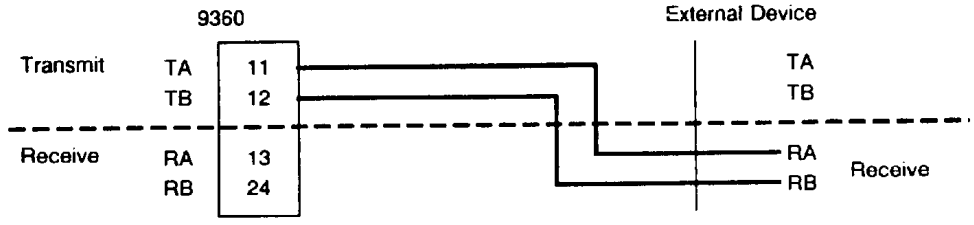


Bidirectional Communications (Half Duplex)

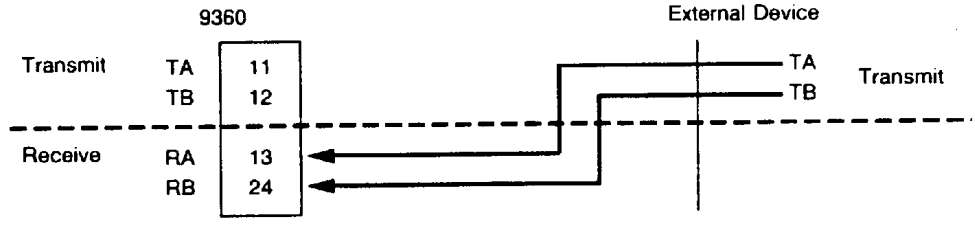
***NOTE:** Transmit device(s) must have ability to disconnect when not transmitting allowing other devices to take control of line. Early versions of 9360 did not have "transmit disconnect" capability. Consult Toledo Scale before this mode is attempted.



Bidirectional Communications (Full Duplex)



External Device, Receive Only



External Device, Transmit Only

Figure 4.11 RS422 Typical Wiring Examples

Spare Parts Listing

The following list contains the part numbers of the various components used in a standard 9360 configuration.

(9360 0001 - Mild Steel Enclosure and 9360-0003 - Panel Mount)

Part Number	Description
*13644400A	Main/Display PCB (Programmed)
*13362500A	Keyboard Assembly
*12888100A	25 Pin Mating Connector KOP
*13216000B	External Power Supply Assembly (120 VAC)
*13379500B	External Power Supply Assembly (240 VAC)
*13274200A	Fuse, 0.125 AMP(13379100A & 13533800A PCB's Only)
*13274300A	Fuse, 0.3 AMP (13379100A & 13533800A PCB's Only)
*09592000A	Fuse, 0.25 AMP (13644400A PCB Only)
Switchcraft #760	DC Supply Connector

NEMA 4X (9360 0002 - Stainless Steel Enclosure)

Part Number	Description
*13644400A	Main/Display PCB (Programmed)
*13214200A	Connector PCB
*13362500A	Keyboard Assembly
*13274200A	Fuse, 0.125 AMP (13379100A & 1353800A PCB's Only)
*13274300A	Fuse, 0.3 AMP (13379100A & 13533800A PCB's Only)
*09592000A	Fuse, 0.25 AMP (13644400A PCB Only)
*13216000A	Power Supply (120 VAC) - Contained inside NEMA 4X Enclosure
*13379500A	Power Supply (240 VAC) - Contained inside NEMA 4X Enclosure

* = Part numbers may have a letter prefix.

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