IOE-850
I/O EXPANDER
ASSEMBLY

INSTRUCTION BOOK

INDUSTRIAL INDEXING SYSTEMS, Inc.

Revision - E
Approved By:

ER-6017

ERRATA SHEET, IB-11B010 REV. E

Date	Rev.	ECN No.	DR	CHK	CHK
01/08/99	0	ECN-98-429 (See Note 1)	RB		

Notes:

1)   Added Appendix A - Declaration of Conformity

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1.0   INTRODUCTION

1.1   About this instruction Book

This document provides information about the IOE-850 I/O Expander Assembly (Figure 1-1) including a product overview, product description, product specifications, description of controls and indicators, and connection diagrams. The IOE-850 I/O Expander Assembly is used in the MSC series of Motion Control Systems.

1.2   Product Overview

The IOE-850 I/O Expander Assembly is a panel mounted assembly with 16 positions for optically isolated OPTO 22 type input and output modules. Each position is equipped with a red LED for indication of the active versus inactive status of the module. I/O Modules are shown only for clarity, and are not included in the IOE-850 I/O Expander Assembly.

The IOE-850 I/O Expander Assembly is connected through a C-901YYY I/O Expander Cable to the I/O Expander Port on the MSC series of Motion Control System Unit.

The IOE-850 I/O Expander Assembly is an upgraded IOE-800 I/O Expander Assembly. An increase in operation speed is one of the upgrades. Also, an external DC power supply is no longer required.

For European Applications:
To help meet the low voltage directive of the European Community, the end used must cover the IOE-850 with a shield which prevents possible contact with the power supply voltage for the device (120 VAC, 50/60 Hz) or the I/O terminal strip if AC type modules are used (32V ~ or greater or 60vdc or greater). This shield must protect a technician from casual contact with hazardous live voltages.

When selecting I/O modules for this device, it is the responsibility of the end user to select modules that meet the appropriate safety standards for their particular application. Select modules that meet UL, CSA, VDE and CE standards as appropriate.

It is also required that the IOE-850 must be mounted on an electrical panel and that panel mount inside an electrical enclosure. The enclosure must meet the requirments of the European Community.
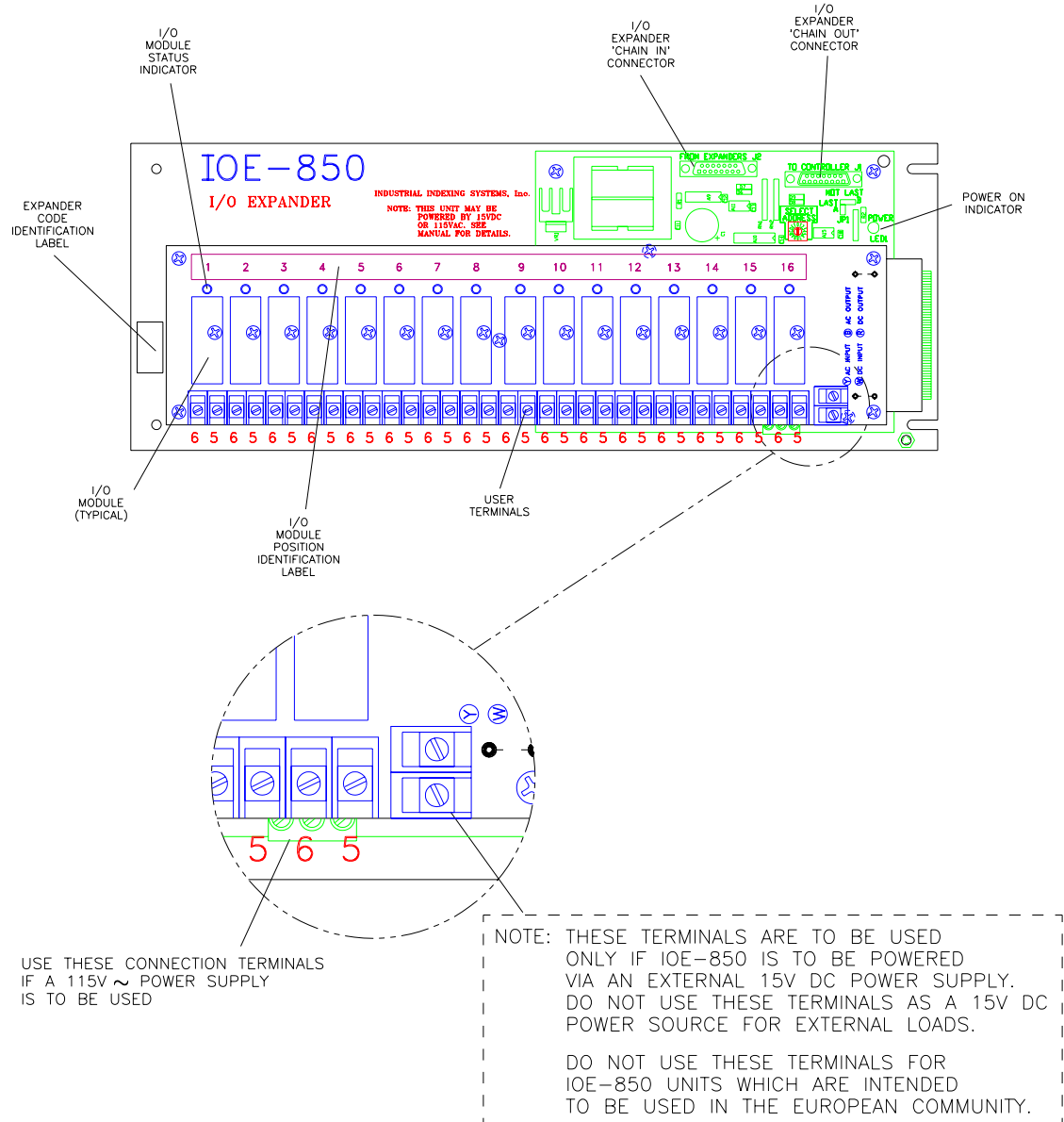
Figure 1-1 IOE-850 I/O Expander Assembly

2.0   DESCRIPTION

2.1   General

The IOE-850 I/O Expander Assembly is a serially operated device that provides a means of expanding the discrete I/O capabilities of the MSC series of Motion Control Systems.

2.2   I/O Module Addressing

The address select code is set through a sixteen-position switch located on the IOE-850 I/O Expander Assembly (Figure 4-1). The Position of the switch sets the flags of the individual I/O module positions.

The I/O Modules are addressed by the motion control system through a serial loop. A jumper located on the I/O Expander Assembly is positioned to close the loop (refer to Figure 6-1).

Table 2-1 Address Select Code Settings

SWITCH POSITION	I/O EXPANDER ASSEMBLY	PROGRAM FLAGS
A	1	8 thru 23
B	2	24 thru 39
C (Note)	3	40 thru 55
D (Note)	4	56 thru 71

Note: C and D are for use in the MSC-850 System only.

2.3   I/O Expander Operation

On power-up of the IOE-850 I/O Expander Assembly, each position defaults to an input function regardless of the type of I/O module installed in that position. In order to set up a position as an output, the controller must initialize the selected outputs to be on or off.

Any combination of AC and DC input or output modules can be used in any location.

2.4   Operating Power

The IOE-850 may be powered from either a 15v DC Power Supply or directly connected to 115v ~. (For applications intended for use in the European Community, power must be supplied by 115v ~ only. This power should be installation category II.) For 115v ~, the power is brought in through connector J4. For 15v DC operation, the power is brought in the two position terminal block on the top board (see Figure 6.6).

2.5   Definition of Warnings and Symbols

⚠ This symbol, yellow background with black lettering, is used to guide the installer to the following:
CAUTION: refer to accompanying documents.

⏚ This symbol is to guide the installer that the terminal adjacent to this symbol is the protective conductor terminal.

⚡ This symbol is used to warn.
CAUTION: Risk of electric shock.

⏚ This symbol represents chassis or frame terminal.

Note of Caution: If the IOE-850 is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

3.0   SPECIFICATIONS

3.1   Functional Characteristics

I/O Modules
      Quantity   16 per IOE-850 I/O Expander Ass'y

      Types   IAC15, OAC15, IDC15, or ODC15
      (OPTO 22 or equivalent that meet the low voltage directive 73/23/EEC and 89/336/EEC EMC Directives if used in the European Community.)

Cable Requirements
      Length   in 5 foot increments, but not to exceed 25 feet†.

      †(Please consult with IIS for cable lengths greater than 25 feet).

3.2   Performance Characteristics

Power Requirements
  115V AC ~
      Voltage Range AC ~   100v AC to 130v AC ~
      Current AC ~   500mA AC ~ Max.
      Frequency   50/60 Hz.

  Branch Circuit Protection   10 A maxim branch circuit protection is required to protect No. 16 Awg wiring. This device has an installation category II.

      <u>or</u>

  15V DC (Optional) (Not for use in applications for European Community use)
      Voltage Range DC   14v DC to 16v DC
      Current DC   750mA DC Max.

Response Time   Controller dependent -
      See IB-11B012 for MSC-250
      See IB-11B001 for MSC-850
      See IB-11B014 for MSC-250/32

AC Input Module (IAC15)
      Voltage Range   90 to 140v AC ~
      Off Voltage   30v AC Max. ~
      On Current   11mA Max.
      Input Impedence   14K

AC Output Module (OAC15)
      Voltage Range   12 to 140v AC ~
      Current Rating   2A
      Output Voltage Drop   1.6V peak
      Off-state Leakage   5mA RMS

DC Input Module (IDC15)

Voltage Range	10 to 32v DC
Off Voltage	3v
On Current	25mA
Off Current	1mA
Turn-on Time	5 ms Max.
Turn-off Time	5 ms Max.

DC Input Module - High Speed (HSI-250)

Input Voltage	5vdc or 15vdc Jumper Selectable
Input Current at Max. Line	25 mA
Input Allowed For No Output	2v
Isolation Input-to-output	2500 vac
Turn-on Time	100u Sec Max.
Turn-off Time	100u Sec Max.

DC Output Module (ODC15)

Voltage Range	5 to 60v DC
Current Rating	2.75A Max.
Output Voltage Drop	1.6v Max.
Off-state Leakage	1mA

Environmental

Operating Temperature	32 to 140 F (0 to 60 C)
Operating Humidity	30 to 90% (Non-condensing)

3.3   Physical Characteristics

IOE-850 I/O Expander Assembly with I/O Modules installed

Dimensions

Height	6 in. (147mm)
Width	15¾ in. (400mm)
Depth	2 in. (51mm)

Weight 3 lbs. (1.36 Kg.)

Mounting type   Panel

I/O Modules

Color

IAC15	Yellow
OAC15	Black
IDC15	White
ODC15	Red

4.0   CONTROLS AND INDICATORS

4.1   General

The IOE-850 I/O Expander Assembly is equipped with 17 status indicators (Figure 4-1). 1 of the 17 is dedicated to the incoming power source, and each of the other 16 indicators are related to the 16 I/O Module positions on the assembly.

The power indicator is a green LED. When power is applied to the assembly, the green LED is lighted.

The 16 I/O Module status indicators are red LEDs. When an I/O Module is installed in the position and the I/O Module is activated (on state), the red LED (adjacent to the terminals associated with the I/O Module) is lighted.

The Address Select Code switch is a 16-position switch which is used to set the software flag relationship of each module.

In a MSC series Motion Control System, the last assembly in the daisy chain is configured with the jumper in the 'A' (last) position. On all other IOE-850 Assemblies in the daisy chain, the jumper is put in the 'B' (not last) position. If only 1 IOE-850 I/O Expander Assembly is used, the jumper on that assembly is put in the 'A' (last) position.
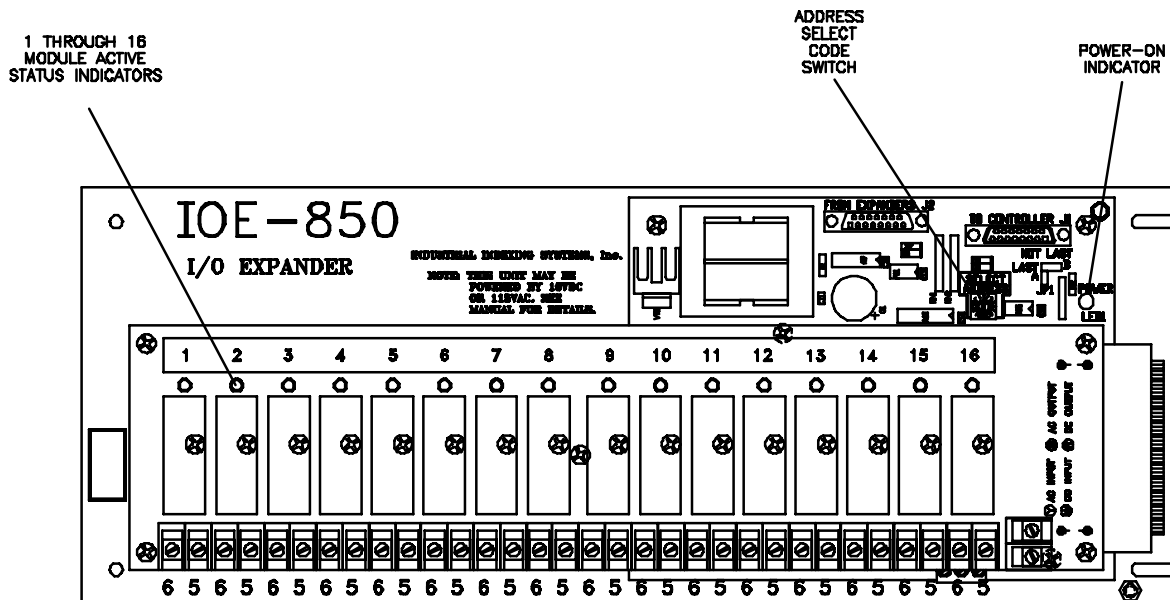

Figure 4-1 Location of Controls and Indicators

5.0   FUNCTIONALITY TESTS

5.1   General

The IOE-850 Expander Assembly is connected to the I/O expander port on the MSC series Motion Control Systems. Additional IOE-850 I/O Expander Assemblies can be daisy-chained to the first IOE-850 I/O Expander Assembly (see specific product instruction booklet for I/O expansion capabilities).

The functionality tests given in this section can be used to isolate the faulty component(s).

5.2   Status Indicators

1.   Turn on the system power. Be sure that the IOE-850 I/O Expander Assembly(ies) are getting power (See Section 3.2).

2.   Observe that the green indicator on each of the IOE-850 Assemblies is lighted (Figure 5-1). If the LED is not lighted, replace the IOE-850 I/O Expander Assembly.

3.   Observe that the red indicator directly above the module for each module is lit when the corresponding input is activated.

4.   Observe that the red indicator directly above the module is lit when the Macroprogram instruction activates an output module.

> If any <u>one</u> indicator does not respond as expected, replace the corresponding module and rerun the test.

> If no LEDs are lit, check the ribbon cable for proper seating.

> Check the address select switch for correct setting.

> Check the C-901YYY cable for a tight connection and any damage, and replace if necessary.

> Check the 'A' (last)/'B' (not last) jumper for correct setting.

> Replace IOE-850 I/O Expander Assembly if above suggestions fail.

5.   Solid State outputs may exhibit leakage currents sufficient to cause a solid state input to develop enough off-state voltage to be at an indeterminate state. Check all input modules' on-state and off-state voltages for proper specifications (Section 3.2).

> If off-state voltages are too high, add bleeder resistors (Figure 6-2 and Figure 6-4).

5.3 Using the MPDEBUG Routine to test the I/O Modules (for MSC series only)

---

* NOTE *

This procedure requires the use of the MSC Toolkit. Familiarity with the operation of the MSC Toolkit is required!

Individual modules can be exercised using the MSC Software Toolkit. To perform this type of testing, determine the flag number of the I/O module to be tested.

Output Modules can be tested entirely from within the MSC Software Toolkit.

Input Modules are tested by changing the state of the corresponding switch located on the machine, and observing the change with the MSC Toolkit.

---

* NOTE *

When testing input modules, care must be taken not to set the output driver for that module's position to on. If this is done, then the module cannot respond to input changes from the machine.

5.3.1 Test Equipment Required

IBM compatible PC complete with monitor and MS-DOS 3.0 or greater.

MSC Software Toolkit

5.3.2 Test Setup

1. Connect the PC (Figure 5-1) through and RS-232C Serial Communications Cable to the communication port on the Motion Controller.
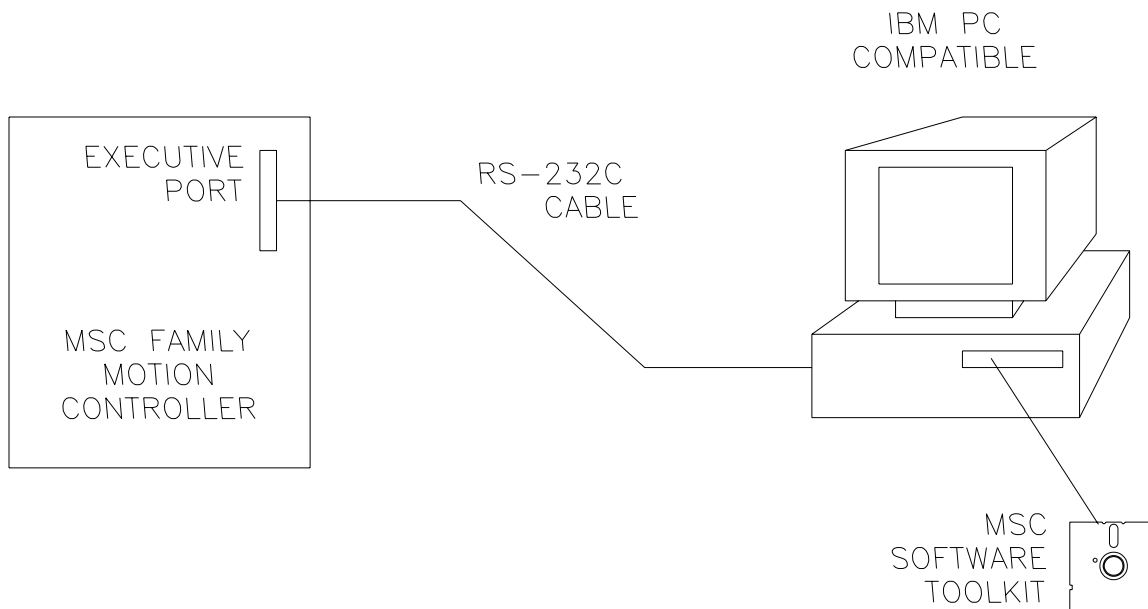
2. Invoke the MSC Software Toolkit of the PC.

Figure 5-1 Test Set-up, Block Diagram

5.3.3 Output Module Testing
Move the cursor to 'MPDEBUG', and

---

* NOTE *
This test assumes that the user checked all other components and that the   IOE-850 Assembly has the proper address and jumper set-up (Refer to Paragraph 4.1).

---

* CAUTION *
Activating output modules can cause outputs to go to an indeterminate state. Be sure that the machine can handle these conditions,

---

press ENTER.   The main menu is displayed when communications are established.

Press function key F1 (STOP PROGRAM).

Press function key F3 (WRITE).

Press function key F5 (FLAG CONT).

Enter the correct flag number for the module under test (Table 2-1) and press ENTER.

Toggle the output on and off by pressing F3 (SET FLAG) and F4 (CLEAR FLAG) alternately.   Observe that the red indicator associated with that output module follows the toggling instructions.

If the module does not respond as expected, replace the module.   If this does not correct the problem, check the components as in section 5.2.

To test additional modules, press function key F1 (EXIT WRITE) and redo steps 5 through 8.

5.3.4 Input Module Testing

> *** NOTE ***
> **This test assumes that the user checked all other components and that the   IOE-850 Assembly has the proper address and jumper set-up (Refer to Paragraph 4.1).**

From MPDEBUG press function key F2 (READ).

Press function key F5 (FLAG CONT).

> *** NOTE ***
> **In step 5, as many as 4 flags can be selected at once. If less than 4 are selected, the ENTER key must be pressed for each unselected position to start the test.**

Enter the correct flag number(s) for the module(s) under test, then press ENTER.

Observe the state of each input module.

Cause the corresponding switch device to change state.

On the PC Monitor, observe that the I/O Module status, associated with that input module, follows the change in state of the machine switch. Also, observe that the red indicator associated with that input module follows the change-in-state of the machine's switch (on when activated, and off when deactivated).

If the module does not respond as expected, replace the module. If this does not correct the problem, check components as suggested in section 5.2.

To test additional input modules, press function key F8 (EXIT READ), and redo steps 4 through 9.

6.0　DIAGRAMS

6.1　General

This section contains the electrical diagrams for connecting the IOE-850 I/O Expander Assembly to a MSC series Motion Control System, and for daisy-chained multiple assemblies together.

Also provided are the individual connection specifications for the standard I/O Modules that can be used on the assembly (Figures 6-2 through 6-5). Figure 6-6 illustrates the correct method of connecting either the 15V DC power source, or directly connecting the 115V AC power source to the IOE-850. See Figure 6-7 for mounting specifications for the IOE-850 Assembly.

The 15V DC supply is not to be used as the supply source for units intended to be used in the European Community.

---

* NOTE *

For 115V AC, the power is brought in through connector J4.

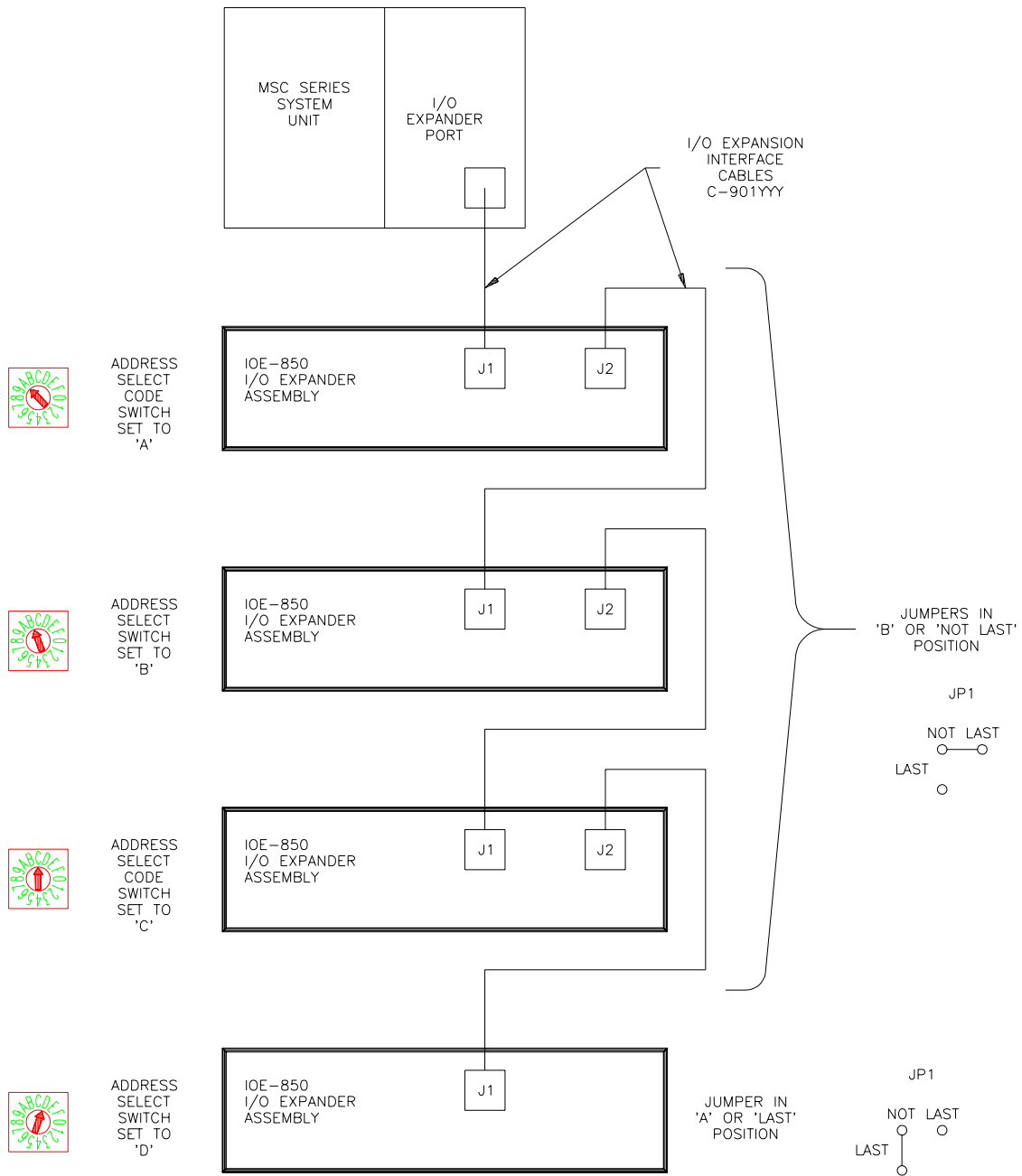**For 15V DC, the power is brought in through the 2-position terminal blocks on the top circuit board.**

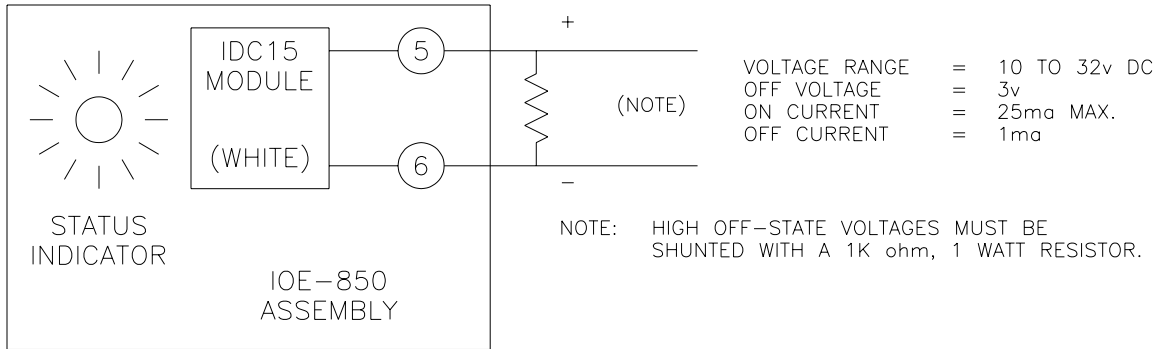**Figure 6-1 IOE-850 Assembly to MSC series System connections**

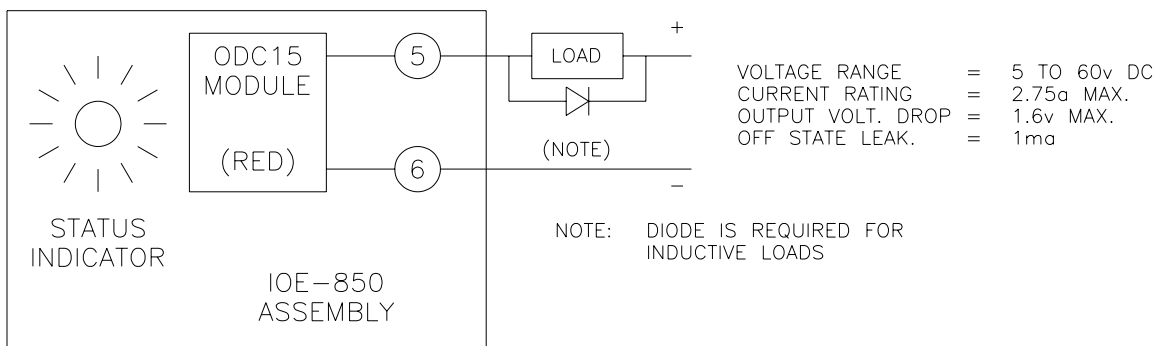**Figure 6-2 DC Input Module, connection specifications**
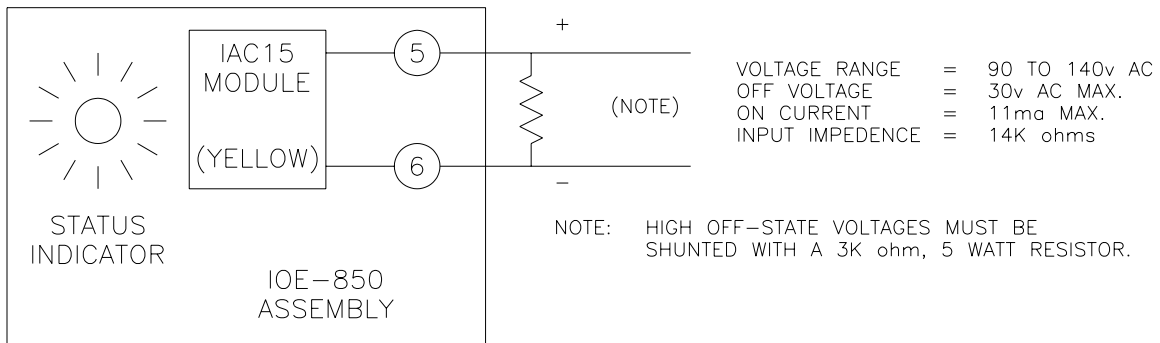

Figure 6-3 DC Output Module connection specifications
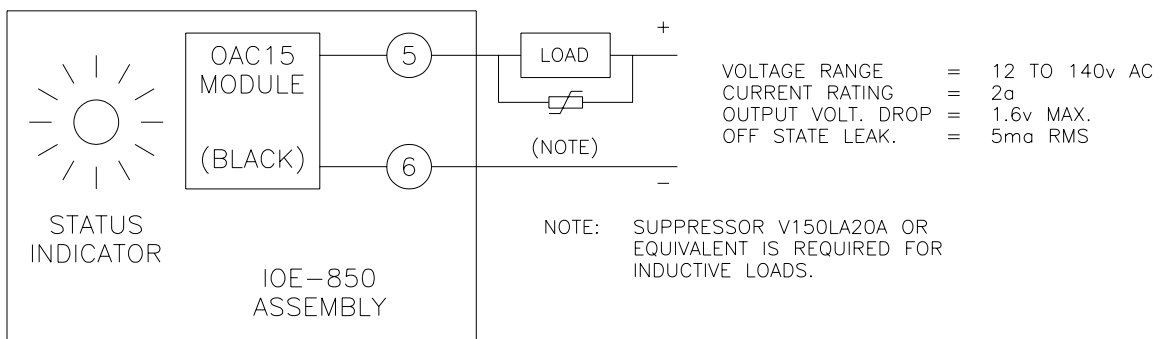
Figure 6-4 AC Input Module, connection specifications

VOLTAGE RANGE   =   90 TO 140v AC
OFF VOLTAGE   =   30v AC MAX.
ON CURRENT   =   11ma MAX.
INPUT IMPEDENCE =   14K ohms

NOTE: HIGH OFF-STATE VOLTAGES MUST BE
        SHUNTED WITH A 3K ohm, 5 WATT RESISTOR.

Figure 6-5 AC Output Module connection specifications

VOLTAGE RANGE   =   12 TO 140v AC
CURRENT RATING   =   2a
OUTPUT VOLT. DROP =   1.6v MAX.
OFF STATE LEAK.   =   5ma RMS

NOTE: SUPPRESSOR V150LA20A OR
        EQUIVALENT IS REQUIRED FOR
        INDUCTIVE LOADS.

115V AC POWER CONNECTION

THIS CONNECTION MUST
BE MADE FOR PROTECTIVE
EARTHING PURPOSES.

AN APPROPRIATE RING LUG
MUST BE FITTED ON THE WIRE
USED. A STAR WASHER AND
NUT MUST BE USED TO SECURE
THIS CONNECTION. USE GRN/YEL
WIRE.

H N

115v AC IN ∼

15V DC POWER CONNECTION

NOTE: THESE TERMINALS ARE TO BE USED
ONLY IF IOE-850 IS TO BE POWERED
VIA AN EXTERNAL 15V DC POWER SUPPLY.
DO NOT USE THESE TERMINALS AS A 15V DC
POWER SOURCE FOR EXTERNAL LOADS.

DO NOT USE THIS POWER SOURCE
FOR APPLICATIONS INTENDED FOR USE
IN THE EUROPEAN COMMUNITY.

15v DC
REGULATED
POWER
IPS-15
OR
EQUIVALENT
(NOTE)

FROM   15v RET.
            IPS-15 TB1-5

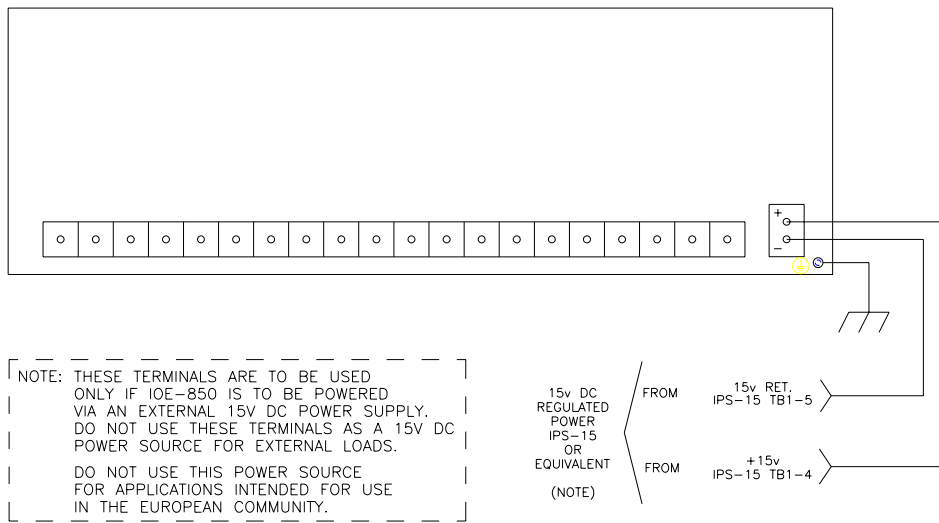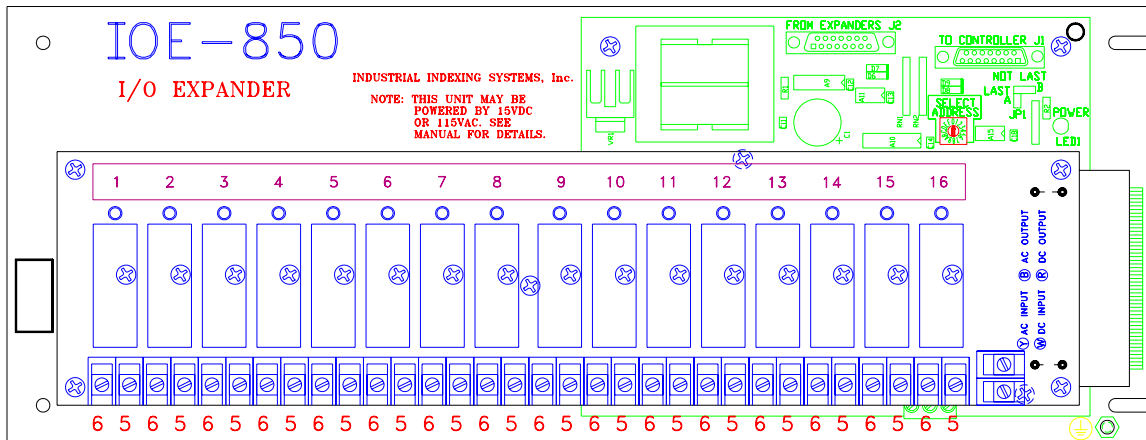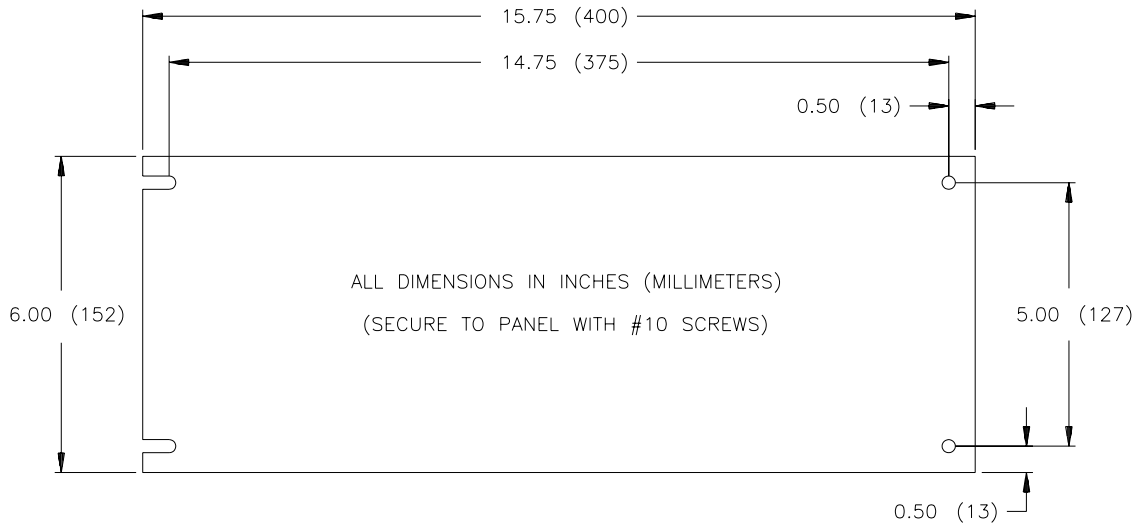FROM   +15v
            IPS-15 TB1-4

Figure 6-6 IOE-850 I/O Expander Assembly power connections

Assembly, Full View

MOUNTING SPECIFICATIONS

Figure 6-7 IOE-850 Assembly and mounting requirements

TRADEMARKS

Industrial Indexing Systems, Inc. reserves the following trademarks:

        Macroprogram
        MSC-850 Motion Control System Unit
        MSC-250 Motion Control System Unit
        MSC-850/32 Motion Control System Unit
        VSC-850 Motion Control System Unit
        Macroprogram Development System

The following trademarks are used in this publication:

        OPTO 22 is a trademark of OPTO 22

INDUSTRIAL INDEXING SYSTEMS, INC.
U.L. RECOGNIZED PRODUCT

NMTR2   September 30, 1997
Component - Miscellaneous Apparatus

INDUSTRIAL INDEXING SYSTEMS INC   E177320 (M)
    626 FISHERS RUN, VICTOR NY 14564
   Miscellaneous apparatus, Models DMBPS-115/24, -220/24, -220/220.
     Models DRGN-11.25/1120, -15/880, -22.5/655, -45/420.
     Model IOE-850.
     Model MSC-250.
   Marking: Company name and model designation.

   See General Information Preceding These Recognitions.
   For use only in equipment where the acceptability of the combination is determined by Underwriters
Laboratories Inc.
Reports: **September 30, 1997; October 2, 1997; October 3, 1997; September 29, 1997.**

789913001   Underwriters Laboratories Inc.®   D1I/0329496

NMTR8   September 30, 1997
Component - Miscellaneous Apparatus Certified For Canada

INDUSTRIAL INDEXING SYSTEMS INC   E177320 (M)
    626 FISHERS RUN, VICTOR NY 14564
   Miscellaneous apparatus, Models DMBPS-115/24, -220/24, -220/220.
     Models DRGN-11.25/1120, -15/880, -22.5/655, -45/420.
     Model IOE-850.
     Model MSC-250.
   Marking: Company name, model designation and the Recognized Component Mark for Canada ⁿ🅡🅤 .

   See General Information Preceding These Recognitions.
   For use only in equipment where the acceptability of the combination is determined by Underwriters
Laboratories Inc.
Reports: **September 30, 1997; October 2, 1997; October 3, 1997; September 29, 1997.**

789913001   Underwriters Laboratories Inc.®   D1I/0329497

Declaration of Conformity

Manufacturer's name: Industrial Indexing Systems, Inc.

Manufacturer's address: 626 Fishers Run
Victor, New York 14564

Declares that the following product herewith complies with the requirements of the:
Low-Voltage Directive 72/23/EEC, as amended by 93/68/EEC.

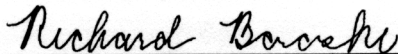Product Name: I/O Expander Assembly
Model Number: IOE-850

This product complies with the following harmonized European standards and as a result presumes compliance with the essential safety requirements of the Low-Voltage Directive.

Low-Voltage: EN 61010 Part 1 (with amendment AMD 8961)

We have an internal production control system that ensures compliance between the manufactured products and the technical documentation. As manufacturer we declare under our sole responsibility that this equipment follows the provisions of the Low-Voltage Directive as stated above.
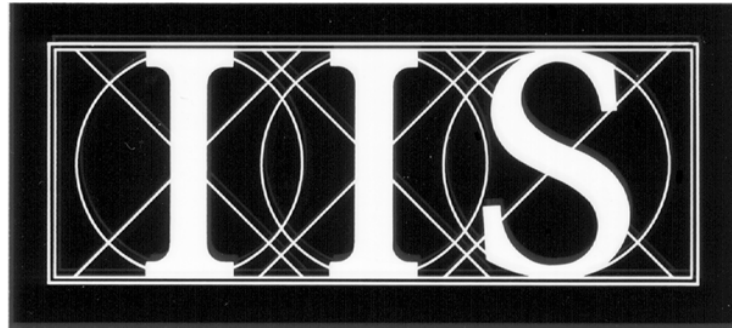
Industrial Indexing Systems, Inc.   Friday, January 08, 1999

Richard Boroski

Richard Boroski
Production Engineer

INDUSTRIAL INDEXING SYSTEMS INC.

626 FISHERS RUN
VICTOR, NEW YORK 14564

(585) 924-9181
FAX: (585) 924-2169