

SECTION II INSTALLATION

2.0 INTRODUCTION

The MODICON 484 Controller is a microprocessor-based controller. Its circuitry allows relay ladder diagram control logic to be programmed.

Section II describes the system configuration and gives information necessary for installation.

2.1 SYSTEM CONFIGURATION

2.1.1. MAINFRAME CODE

The 484 is manufactured with several basic options. The customer chooses from six memory sizes, two power supply variations, and three instruction sets. These choices are reflected in the Mainframe Code shown in Table II-1.

Table II-1. C484 Mainframe Code

Code: C484-XYZ		
X represents Instruction Set	Y represents Power Supply	Z represents Memory Size
O-Basic	5-50Hz 115VAC	1 - 1/4K
1-Enhanced I	6-60Hz 115VAC	2 - 1/2K
2-Enhanced II		3 - 1K
		4 - 2K
		5 - 4K
		6 - 8K

A C484-162, for example, indicates a C484 with an Enhanced I Instruction set, 60Hz 115 VAC Power Supply, and a 1/2K Memory Size.

2.1.2 HARDWARE CONFIGURATION

A typical system layout is shown in Figure II-1. This figure includes mounting dimensions for all major components of the system.

For proper heat flow, all units should be mounted vertically. Vertical orientation allows the fullest removal of heat via the heavy-duty housing fins. A full-size mounting template may be purchased from any MODICON sales office.

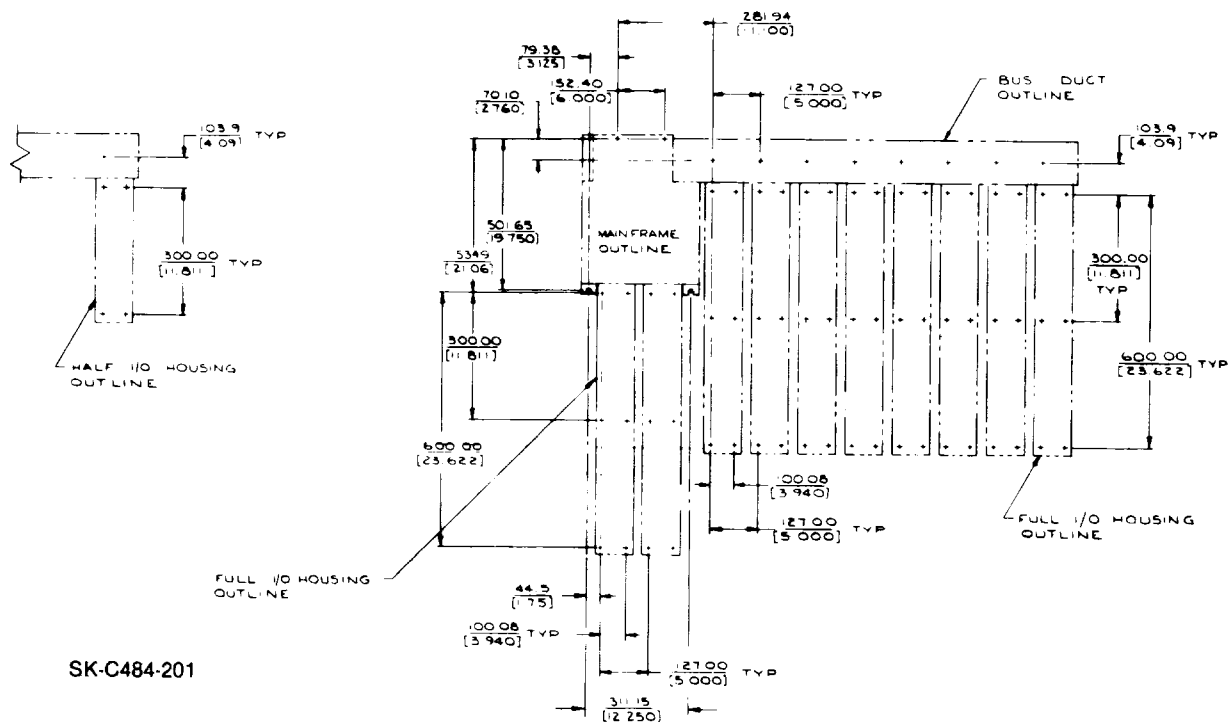


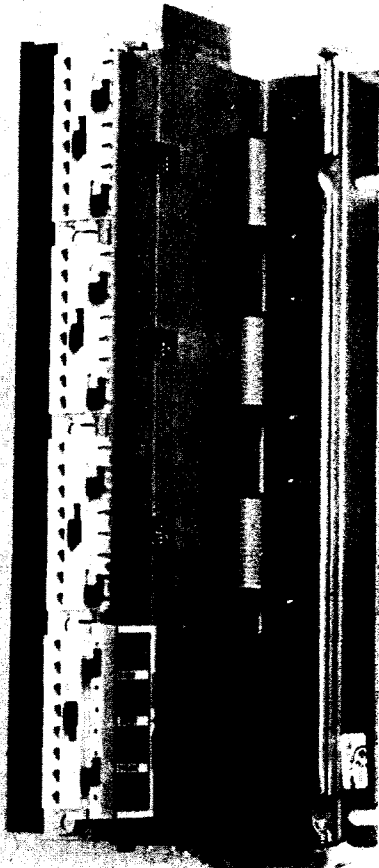
Figure II-1. Typical System Layout

Another system layout frequently used is shown in Figure II-2. This configuration is referred to as Half-Housing. The housing is four I/O modules in the vertical orientation and up to 16 modules in the horizontal orientation.

2.1.3 PROCESSOR/POWER SUPPLY

The latest techniques in CMOS semi-conductor memory with battery backup are used in the 484 Controller. Controller memory is not affected when the AC power supply is lost provided good batteries are installed in the unit. Batteries can be removed while the system is operating on primary AC power. When loss of primary power occurs, the alkaline batteries will maintain memory for approximately 1-1/2 years. Shelf life is two years. Lithium batteries that maintain memory for approximately five years are available as an option. Their shelf life is ten years. Battery life is calculated for worst case temperature, memory size, and bit configuration.

The processor is mounted directly onto a back panel for other vertical support. The power supply is joined to the front door of the processor. It may be removed separately. System operation is not interrupted when the door is opened. The internal components of the processor and power supply may, therefore, be accessed without halting the system. System operation is halted only when the power supply is completely halted. Table II-2 summarizes the AC power requirements.



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Figure II-2. Half-Housing Configuration

Table II-2. Summary of Required AC Power

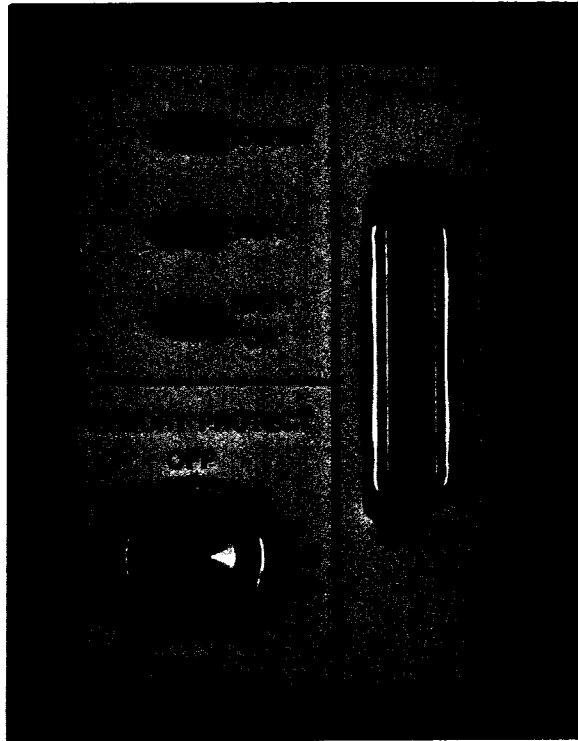
Normal Voltage:	
Standard	115V RMS \pm 15% (100-130V RMS)
Optional	220V RMS \pm 15% (187-265V RMS)
Transient Voltage (Standard):	
Max. 10 seconds	115V RMS \pm 30% (80-150V RMS)
Max. 17 m sec	115V RMS \pm 100% (0-200V RMS)
Transient Voltage (Optional):	
Max. 10 seconds	220V RMS \pm 30% (160-300V RMS)
Max. 17 m sec	220V RMS \pm 100% (0-400V RMS)
Line Spikes:	100V max 500 usec duration, (0.5% max duty cycle)
Frequency:	
Standard	60 Hz \pm 5% (57-63 Hz)
Optional	50 Hz \pm 5% (47.5-52.5 Hz)
Normal Load:	50 Volt-amps min 150 Volt-amps max (depending upon I/O and peripheral de- vices connected)
Recommended Distribution:	
Transformer	500 Volt-amps (fuse secondary at 5 amps) (3 amp peak ON transient)

On the front of the processor power supply unit are three LED indicators, a memory protect lockswitch, an interface connector, and AC power connections (Figure II-3). They are as follows:

- o LED Indicators

The three LED indicators show proper operation of:

The power supply:	POWER
The controller:	RUN
The batteries:	BATT OK



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Figure II-3. Mainframe Controls and Indicators

- o Memory Protect

The MEMORY PROTECT lockswitch protects the user logic from being changed or lost when the lockswitch is in the ON position. Items that must change during normal operation are not included in the operation of the MEMORY PROTECT lockswitch.

- o Interface Connector

The connector next to the indicators is used to connect the auxilliary devices to the controller. P180 CRT Programmer is connected directly to this receptacle when used with no other auxilliary devices. Adapter J470 is connected to this receptacle when additional peripheral devices are required.

o AC Power Connections

Below the Mainframe Controls and Indicators is a terminal board to which AC power is supplied (Figure II-4).

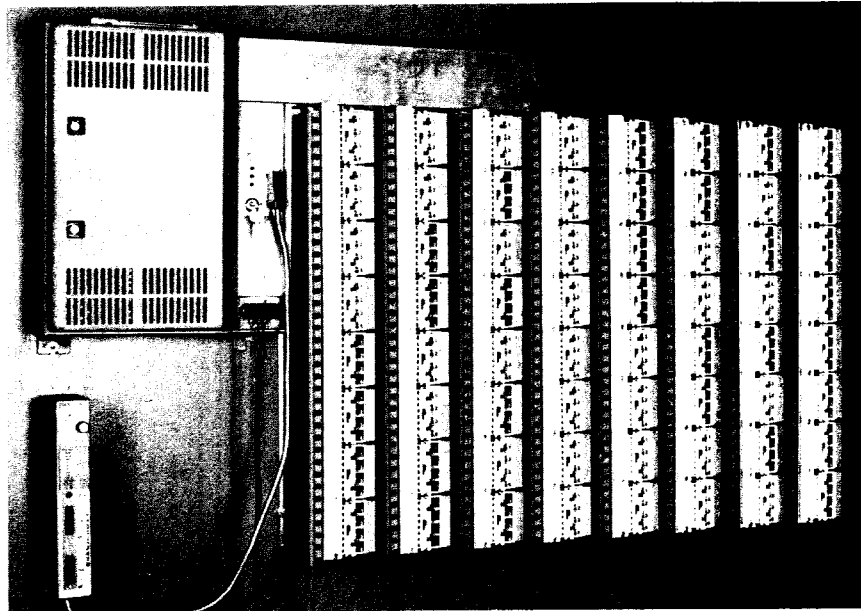


Figure II-4. Mainframe AC Power Connections

Voltage sensing circuitry is provided in the power supply to detect out-of tolerance line voltages. If the AC power is not within the specifications (Table II-2), the processor may stop operating. Operation will be automatically restored when AC power is within tolerances. There will be a one-scan delay in restoring processor operation after a failure. During this time the processor goes through its power-up sequence.

2.1.4 INPUT/OUTPUT (I/O) CHANNELS

All 484 Controllers communicate with an I/O channel. Each channel has a maximum of 128 input points and 128 output points (Figure II-5). The system can be expanded to 256 input points and 256 output points with the use of the Enhanced II Instruction Set and a Model J471 Expander.



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Figure II-5. Typical 484 with Single I/O Channel

Specific I/O circuitry is provided on I/O modules (Figure II-5). This circuitry converts various voltages to input/output signal levels compatible with the processor. Input/output modules have four circuits each which must be used as either all input or all output.

The modules are installed in I/O housings which accommodate up to eight modules of either type. Usually, eight housings are connected to a processor making one complete channel.

2.1.5 INPUT/OUTPUT (I/O) BUS CONNECTOR CABLE

The I/O Bus Connector Cable is connected to the processor and to the I/O channel. Processor board connection locations are found on the right and left top of the processor board (Figure II-6).

Connections on the I/O channel are made on intermediate connectors on each housing (Figure II-7). These connections are shielded in an I/O duct which mechanically connects the I/O section to the processor. Up to eight discrete I/O housings can be connected to a single bus cable.

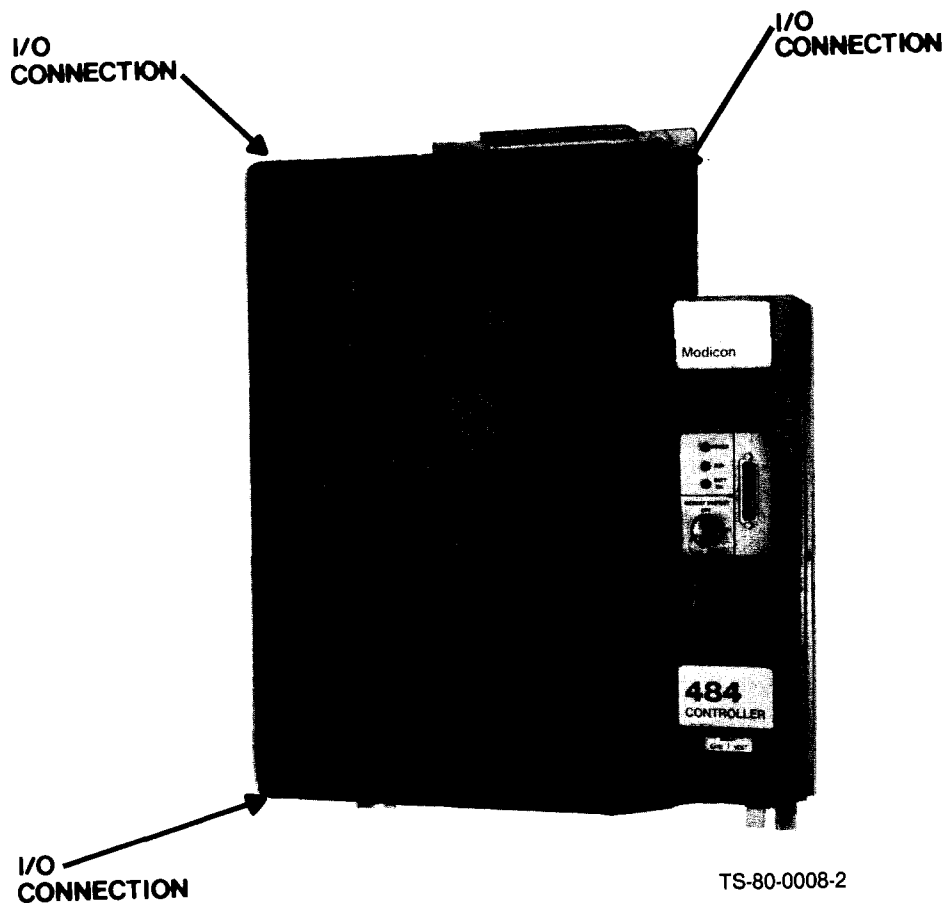


Figure II-6. Processor I/O Connection Options

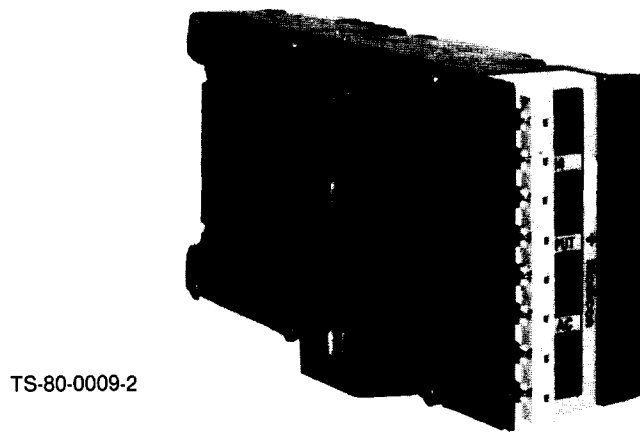
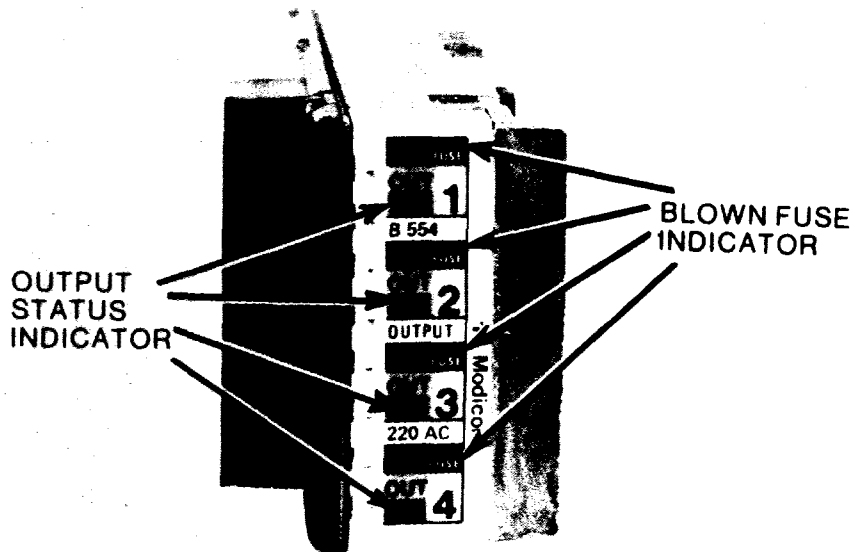


Figure II-7. Typical I/O Module

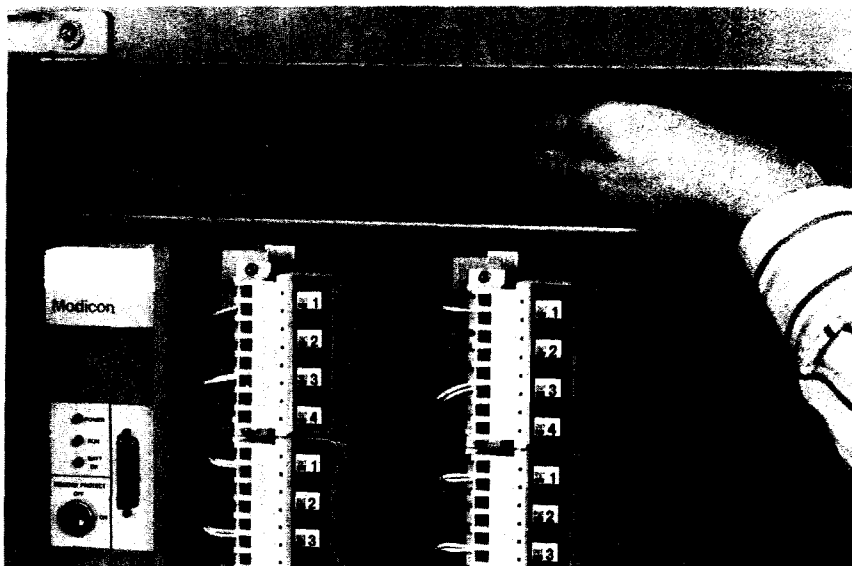
2.1.6 I/O MODULE FUSES AND BUS CONNECTIONS

All output circuits (AC or DC) have field replaceable fuses and a blown-fuse indicator. The blown-fuse indicator is viewable from the front of the module (Figure II-8). There is one blown-fuse indicator per circuit. To replace fuses the module must be removed from the housing. Fuses are located on the left side of the module. Figure II-9 shows bus connections also viewable from the front of the module.



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Figure II-8. Input/Output Module Indicators



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Figure II-9. Input/Output Bus Connections

2.1.7 I/O ADDRESSING

Addressing is done within the channel at each housing. At the top of each housing is a set of four switches to address the housing (Figure II-10).

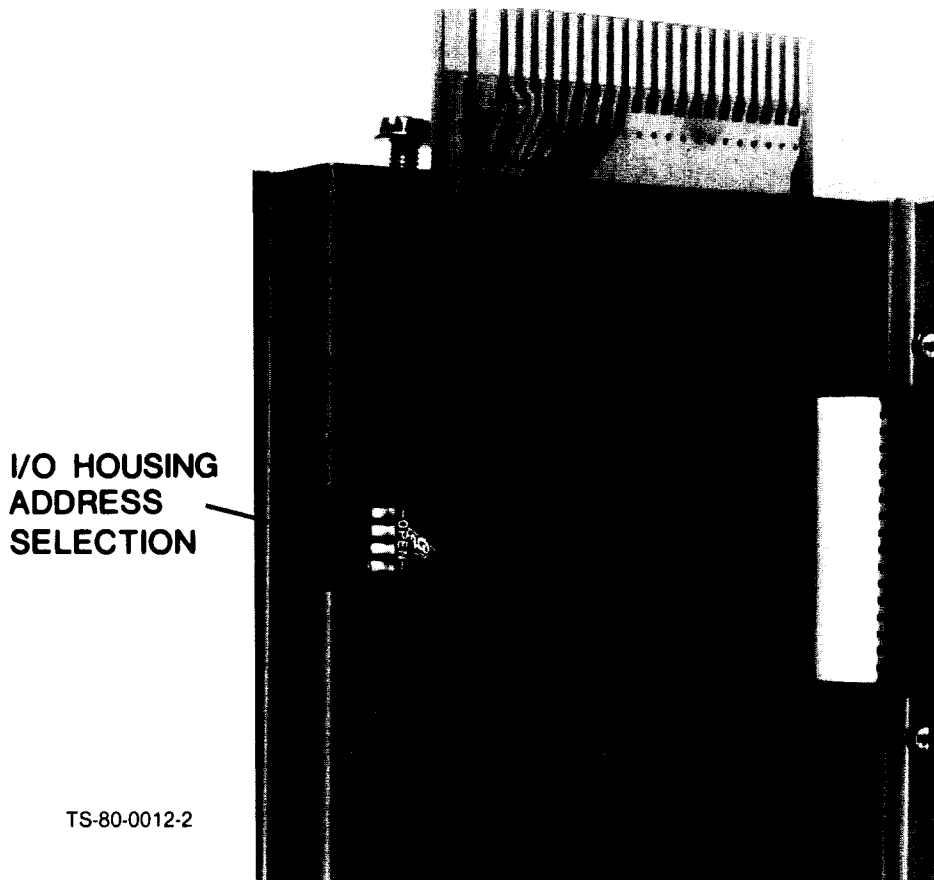


Figure II-10. Address Selecting of I/O Housings

One switch is closed to select address. Any housing can have any address from one to four. Within a housing, the eight modules can be of any type, input or output. However, since there are a maximum of eight housings and only four index positions, two housings can have the same address selected. Any two housings with the same address must have I/O configuration which are opposite from each other. Thus, the top module in one must be an input and the other an output if the housings are addressed the same. The same is true for every module position in the housing pair.

A channel with four I/O housings can be addressed one to four and I/O modules may be inserted in any order. There is no

restriction relative to the mixing of voltages. Beyond four housings, each housing must contain the exact opposite of the previously similarly addressed housing.

2.1.8 I/O FIELD WIRING

Field wiring can be installed on the I/O housings either before or after the I/O modules are installed. However, for user convenience, it is recommended that the field wiring be installed prior to I/O modules. The I/O housing address can be readjusted at any time by removing the I/O modules (Figure II-11).



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Figure II-11. Field Wiring in I/O Housing Conduit

2.2 SYSTEM INSTALLATION

The various parts of the MODICON 484 Controller system are packaged in separate containers as follows:

<u>Container</u>	<u>Contents</u>
C484	Processor unit with power supply.
B545/546	Discrete I/O Housing (up to four housings per box).
B547/548	Register I/O Housing (up to four housings per box).
5540/5541	Input/output Duct with I/O cable.
BXXX	Input/output Modules (up to four modules per box; 4, 8, or 12 boxes per carton).
J 471	Discrete I/O Expander.
B571/570	Register Multiplexers (up to four multiplexers per box).
J470	EIA Adapter.

The 484 Controller is easily installed on any vertical surface capable of sustaining its specified weight. Each unit has holes for mounting. Figure II-1 shows a typical mounting plan. This may be used to mark the wall prior to bolt-hole drilling. Input/output housings can be mounted to the left of the processor, to the right of the processor, or below the processor. A maximum of two locations may be used.

Regardless of the location of mounting, no more than 32 input and 32 output modules can be connected to the processor unless a J471 Expander is also used. Table II-3 summarizes the installation requirements of the 484 Controller.

Table II-3. C484 Controller Installation Specifications

Power Requirements:	
Standard	115 + 15%, 60Hz + 5% 150 Volt amp (max). 3 amp peak start-up transient (2 amp on 220V).
Optional	115/220 VAC + 15%, 50Hz + 5% 150 Volt amps (max). 3 amp peak start-up transient (2 amp on 220V).
Environmental Requirement:	
Ambient Temperature	0° C to 60° C.
Humidity	0% to 95% (non-condensing).
Dimensions (WxHxD):	
Processor (w/Power Supply)	15 in. x 20.5 in. x 6.5 in. (380 mm x 520 mm x 165 mm).
Single I/O Housing (One channel)	5 in. x 32 in. x 6 in. (130 mm x 815 mm x 155 mm).
Eight Housings (One channel)	40 in. x 32 in. x 6 in. (1020 mm x 815 mm x 155 mm).
Weight:	
Processor (w/Power Supply)	33 lbs (15 Kg).
I/O Module	1 lb (0.5 Kg).
Single I/O Housing (w/Modules)	16 lbs (7.5 Kg).
Eight Housings (w/Modules & Duct)	136 lbs (62 Kg).

2.2.1 MOUNTING PROCEDURES

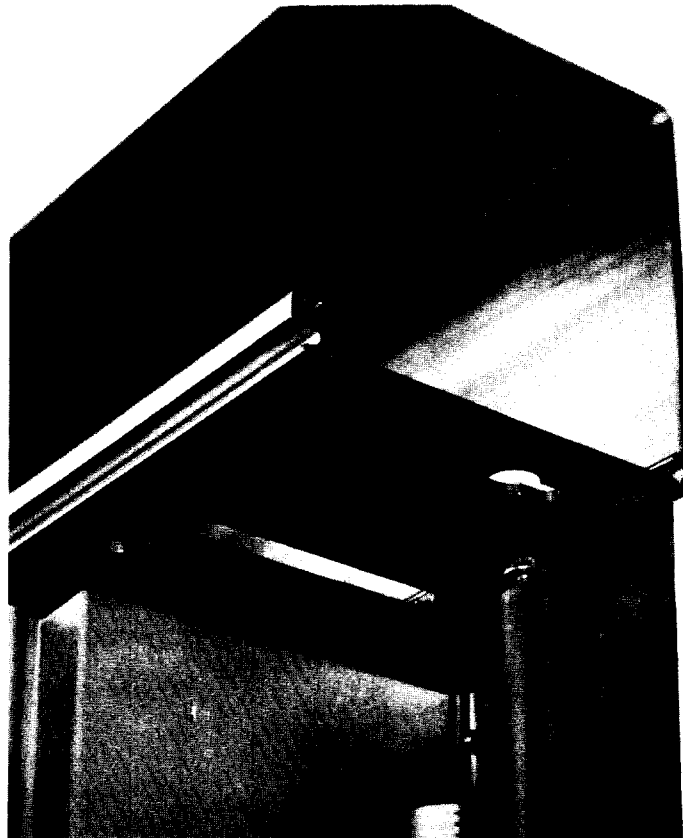
Figure II-5 shows a typical system mounted with one full channel of eight housings, each with eight I/O modules.

Mounting hardware is not provided with the controller. It is suggested the 5/16 x 1-1/2 inch machine bolts (24UNF) be used.

<u>Step</u>	<u>Procedure</u>
1.	Select type 5540 I/O Duct and mount in place at top of mounting surface. Bolt duct in place. Do NOT install cover.
2.	Select one B545 or 546 I/O housing.
3.	Insert the housing into the bottom of the duct. Keyhole slots are available in the duct to support the I/O housings (Figure II-12).
4.	Bolt the I/O housing in place.

CAUTION

THE KEYHOLE SLOTS ARE NOT CAPABLE OF SUPPORTING FULL I/O MODULES. SECURE THE HOUSING PRIOR TO WIRING AND INSERTING I/O MODULES.



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Figure II-12. Installation of I/O Housing into I/O Duct

Step

Procedure

5. Repeat steps 2 through 4 for all remaining I/O housings.
6. Start bottom bolts for mounting of processor.
7. Remove end plate from processor where I/O duct is to be connected (Figure II-6). Place processor onto bottom two bolts and secure with top two bolts.

NOTE

To reduce weight of processor to 12 pounds, remove the power supply. Disconnection and reconnection procedures for Power Supply are found in Section IV of this manual.

8. If I/O housings are to be installed at the bottom of the processor, perform steps 2 through 4 for these two housings. I/O duct is built into bottom of processor. To expand I/O duct to three housings, use Underduct Expander 5566-003.
9. If I/O housings are to be placed on both sides of the processor, repeat steps 1 through 5 for opposite side.
10. Model B547 and B548 I/O Housings are used to mount register type modules, analog or multiplexer. These housings can be placed at any duct position. This does not reduce the number of discrete I/O housings. Follow steps 2 through 4 for installation of register type modules.
11. Obtain I/O bus cable shipped with I/O duct. Connectors are spaced about five inches apart except the ends. The end connectors are 15 inches from the closest connector. Place cable(s) into duct(s) with widely spaced connector at the processor. Red side of cable is facing the rear duct.
12. Open processor and locate I/O connectors (Figure II-13). Route I/O bus cable(s) to I/O connectors and insert (Figure II-14) with red side of cable facing sides of processor. Close processor.
13. Within I/O duct, insert connectors on I/O bus cable into printed circuit board edge connector at top of each I/O housing (Figure II-9).

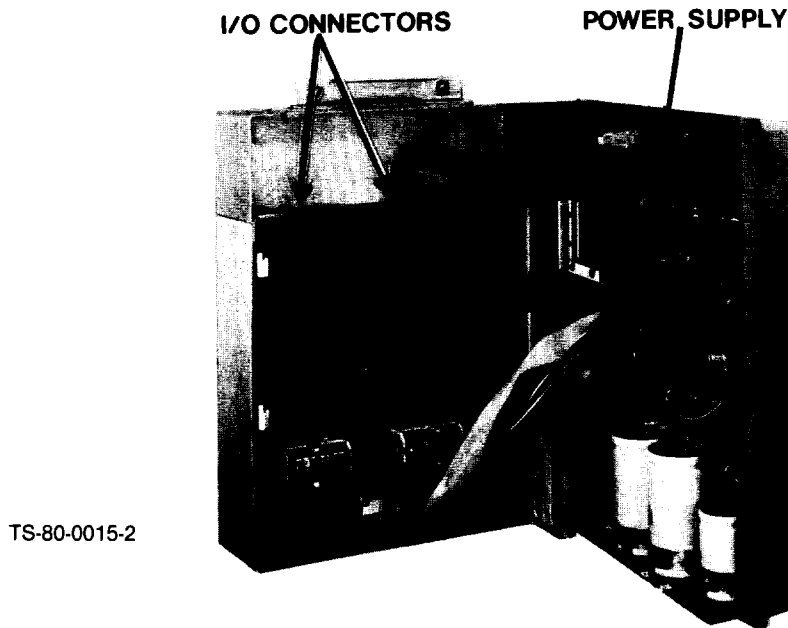


Figure II-13. Processor - Internal Components

NOTE

Extra connectors on I/O bus cable can be left in duct for future expansion or maintenance purposes.

Step

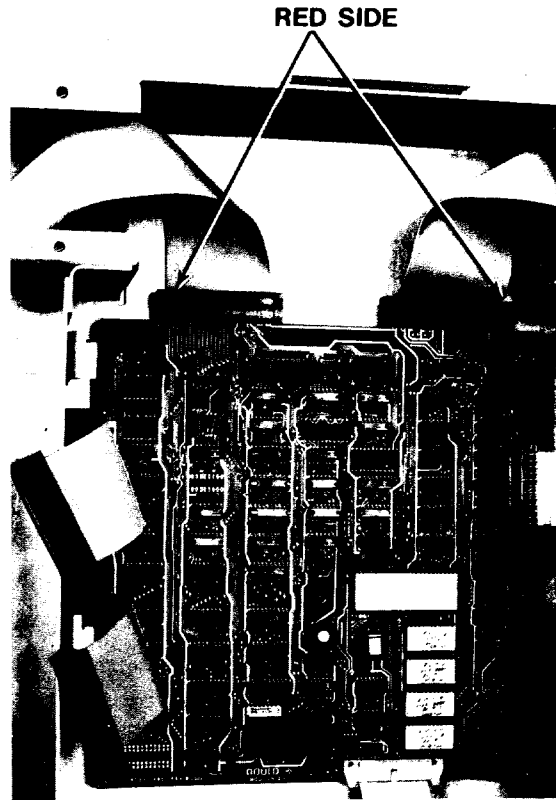
Procedure

14. If the J471 I/O Expander is to be installed, remove the end plate from an I/O duct. The expander can be located anywhere near the end of the I/O duct that the optional ten-foot cable used with the expander will reach. Mount expander following procedures used in steps 6 and 7 to mount processor. Route cable to open end of I/O duct and insert end into I/O duct. Secure end plate provided as part of cable to end of I/O duct and connect expander cable to connector I/O bus cable. Expander end of W513 cable is similarly secured to expander. Connection within expander is installed with red side of cable to sides of expander.

CAUTION

MISARTICULATION MAY RESULT IN DAMAGE TO CONNECTOR, J471, OR BOTH.

15. Secure cover of I/O duct by pushing cover onto duct with sharp blow.



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Figure II-14. Processor with Memory Module Removed

Step

Procedure

16. If J470 EIA Adapter is to be used, mount the adapter along-side processor whenever I/O connection is NOT made (left, right or bottom). Insert three-foot cable attached to adapter into processor communications connector (Figure II-4).

NOTE

Field wiring can be installed or altered with I/O modules installed. For user convenience, it is recommended that the field wiring be installed prior to the installing of the I/O modules.

17. Install field wiring through conduit on left side of I/O housing (Figure II-11). Connect to screw-down terminals. Each terminal is capable of accomodating eight (Model 545) or four (Model 546) I/O modules, each with eight terminals. Terminal one is at top of each module.

Step

Procedure

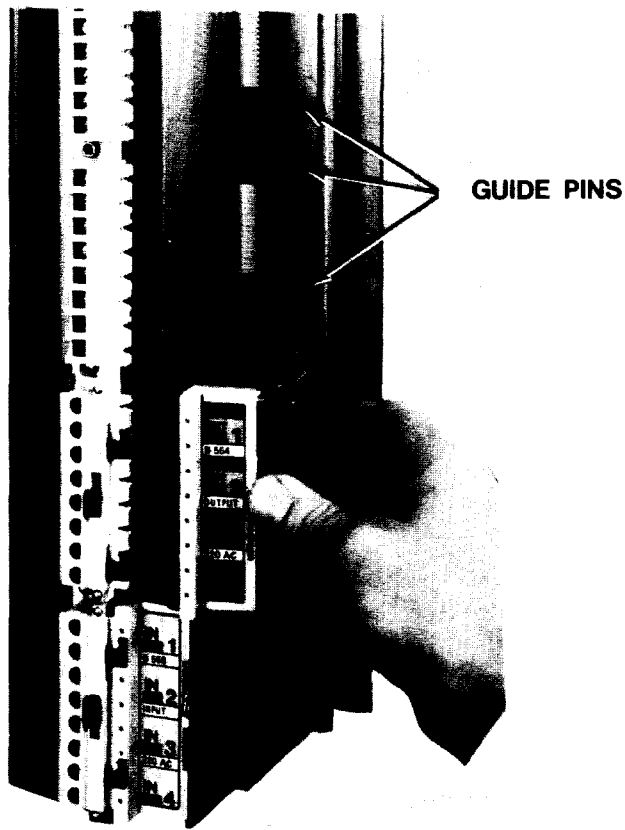
18. Prior to installing the upper module in each I/O housing the housing's address must be established. Behind a small opening to the left of the top of the I/O module is a series of four dip switches (Figure II-10). One of these switches must be depressed (moved toward the wiring conduit) to establish the address of the housing.

NOTE

For proper operation of the I/O channel, only one switch must be selected. If two switches are selected, all housings in that channel with either of these two addresses will respond in parallel.

NOTE

Up to two housings in one channel can have same address. Between two housings with same address, I/O modules must be installed from top to bottom with exact opposite inputs versus outputs.



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Figure II-15. Installation of I/O Modules

Step

Procedure

19. After addressing I/O housings, insert I/O modules. I/O modules are inserted straight into I/O housing using large guide pins (Figure II-15) to align module into rear connector. Once engaged at rear, module is rotated towards wiring conduit to engage field terminals.

NOTE

Red slide lock can be either up or down to allow insertion. It must be down to allow module removal and up to lock module in place.

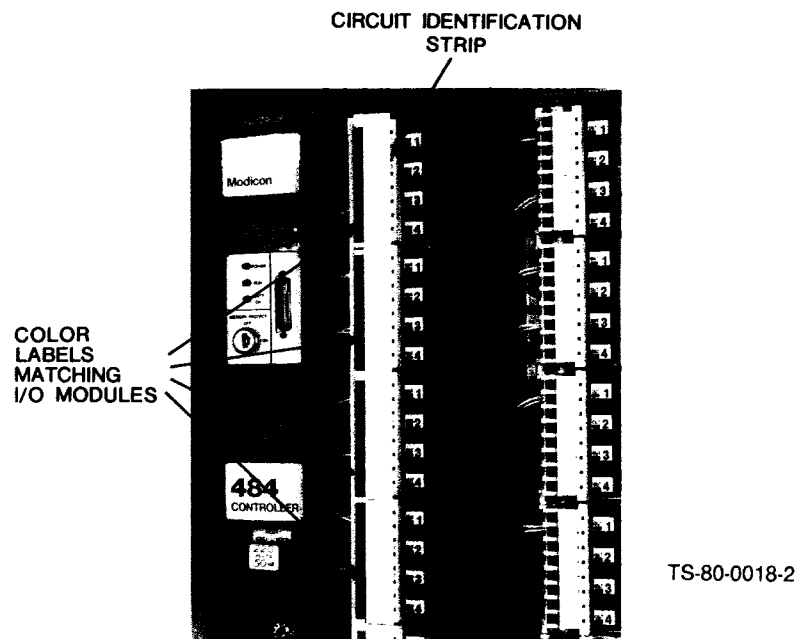


Figure II-16. Installation of I/O Module Labels

20. After I/O modules are inserted the housing identification strip can be inserted (Figure II-16). This plastic strip covers recessed field terminals along entire height of housing. Space is provided on this strip for color coded labels to identify various I/O modules (Table II-4) as well as user identification of field circuits.
21. Finally, AC power is connected to the processor. Single phase, three wire (ground, neutral, and hot) connections are made (Figure II-4). Electrical loads are summarized in Table II-4 and required voltage characteristics are defined in Table II-3.

Table II-4. I/O Module Colors

Module	Type	PMS* Code	Color
B550	115 VAC Output	199	Red
B551	115 VAC Input	197	Pink
B552	DC True High Output	286	Dark Blue
B553	DC True High Input	284	Light Blue
B554	220 VAC Output	151	Orange
B555	220 VAC Input	149	Melon
B556	5V TTL Output	259	Violet
B557	5V TTL Input	264	Light Purple
B558	DC True Low Output	314	Turquoise
B559	DC True Low Input	311	Blue
B560	120 Vdc Output	307	Blue
B561	120 Vdc Input	305	Blue

*Pantone Matching System