SIEMENS

INSTRUCTION AND INSTALLATION

INTELLIGENT PROCESSOR ISLAND (IPI) AND IPI TRACK CIRCUIT (IPITC)

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DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
1.0	5-23-1997	- - - - -	Preliminary
2.0	8-7-1997	- - - - -	Review Copy
3.0	8-8-1997	ALL	Formal Review Copy
A	10-21-1997		Update
B	11-4-1998		Update
C	11-4-1999		Update
D	2-15-2000		Update
D.1	10-11-2002		Revision
D.2	10-21-04		Revision
D.3	5-5-2014	ALL	Convert to Siemens Format

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NOTES, CAUTIONS, AND WARNINGS

Throughout this manual, notes, cautions, and warnings are frequently used to direct the reader's attention to specific information. Use of the three terms is defined as follows:

WARNING

⚠ WARNING

INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. WARNINGS ALWAYS TAKE PRECEDENCE OVER NOTES, CAUTIONS, AND ALL OTHER INFORMATION.

CAUTION

⚠ CAUTION

REFERS TO PROPER PROCEDURES OR PRACTICES WHICH IF NOT STRICTLY OBSERVED, COULD RESULT IN A POTENTIALLY HAZARDOUS SITUATION AND/OR POSSIBLE DAMAGE TO EQUIPMENT. CAUTIONS TAKE PRECEDENCE OVER NOTES AND ALL OTHER INFORMATION, EXCEPT WARNINGS.

NOTE

NOTE

Generally used to highlight certain information relating to the topic under discussion.

If there are any questions, contact Siemens Industry, Inc. Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Industry, Inc. has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Use integrated circuit extractor/inserter tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROM's (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter (or equivalent) are highly recommended).
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233. ESD Awareness Classes and additional ESD product information are also available through the Technical Support Staff.

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SECTION 1
INTRODUCTION

1.0 INTRODUCTION

1.1 GENERAL DESCRIPTION

The Intelligent Processor Island (IPI) is a single-board, microprocessor-based, multi-frequency, modulated, short-range track occupancy detector. It is frequency programmable via an on-board jumper and provides a simple automated process for calibration of the track circuit. An on-board four-character alphanumeric display indicates the selected operating frequency plus calibration process status and diagnostic troubleshooting codes.

The IPI is designed to detect poor shunting conditions in the IPI track circuit. If poor shunting is detected, the IPI initiates an internal loss-of-shunt timer that prevents relay drive from energizing during the poor-shunting episode.

The IPI is available in three plug-in module sizes that are direct replacements for the 62509, 62710, and 80011 island modules produced by Siemens. All three IPI module configurations function identically. Each IPI module configuration is assigned a unique part number and is designed for use in specific Siemens equipment as follows:

IPI Module Applications

IPI Module Part Number	Island Module Replaced	Siemens Equipment Application
62609	62509	500 MS, 525 MS, 550 MS, 585/590 MS, 600 MS/GCP, 71010 SMTC, 7A408 PSO-II Crossing System, 71150 IPITC
62810	62710	660 MS/GCP
80211	80011	2000 MS, 3000 GCP

The 62609 IPI module is also available as a stand-alone system. This IPI Track Circuit (IPITC), part number 71150 (see Section V), is a replacement for the 71010 SMTC.

1.2 IPI OPERATING MODES

The IPI module system operating modes are as follows:

Mode	Description	Comments
Initialization (includes Power Up & Soft Reset)	Boots the IPI to full operation, then transfers control to the next appropriate mode. During initialization, the IPI relay drive is held de-energized	This mode is selected automatically when power is applied or after calibration occurs
Operating	Monitors the track and de-energizes relay drive when the circuit is occupied	IPI enters this mode automatically following successful initialization
Calibration	Used to establish shunting sensitivity level. Relay drive is held de-energized during calibration	User selectable via Calibration Select push button (figure 2-1)
Failure Processing	Determines health of the IPI. Processes error codes and transitions the IPI to the initialization mode or calibration mode as appropriate	Activates automatically if irregularity detected in either software or hardware

1.3 SPECIFICATIONS

Input Power:

Voltage	9.8-16.5 VDC
Current	550 mA (nominal)
Transmitter Output Current:	0.2 ampere (maximum)
Field Selectable Frequencies:	2.14, 2.63, 3.24, 4.00, 4.90, 5.90, 7.10, 8.30, 10.0, 11.5, 13.2, 15.2, 17.5, and 20.2 kHz
Microprocessor:	Motorola 68332
Relay Drive Output:	400 to 1,000-ohm load
Island Circuit Length:	Determined by island track wire connections (120-350 feet) **(GCP applications)**
Track Circuit Length:	Determined by track wire connections (50-500 feet) **(SMTC applications)**
Surge Protection:	Secondary protection built-in, Primary protection required
Environmental:	
Temperature	-40°F to +160°F (-40°C to +71°C)
Humidity	95%, noncondensing
Weight:	1 pound (0.45 kilogram) (approximate)
Pickup Delay Time	0, 2, 4, 6 seconds (software version A01E and later only)

WARNING

DO NOT OPERATE EQUIPMENT OUTSIDE OF SPECIFIED APPLICATION OR OPERATIONAL LIMITS.

1.4 ORDERING INFORMATION

To order, specify: Intelligent Processor Island Module, plus the applicable part number from the following chart.

Siemens Equipment Where IPI Module To Be Used	IPI Module Part Number		
	62609 (62509) (1)	62810 (62710) (1)	80211 (80011) (1)
Model 500 Motion Sensor	X		
Model 525 Motion Sensor	X		
Model 550 Motion Sensor	X		
Model 585 Motion Sensor	X		
Model 590 Motion Sensor	X		
Model 600 Motion Sensor/Grade Crossing Predictor	X		
Model 660 Motion Sensor/Grade Crossing Predictor		X	
Model 2000 Motion Sensor			X
Model 3000 Grade Crossing Predictor			X
Short Modulated Track Circuit, 71010	X		
PSO II Crossing System, 7A408	X		
IPI Track Circuit, 71150 (2)	X		

NOTES:
(1) Part numbers in parenthesis indicate existing modules replaced by the IPI Module,
(2) The IPI Track Circuit uses the 62609 module. To order the IPITC as a complete unit, specify part number 71150.

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SECTION 2
FAMILIARIZATION

2.0 FAMILIARIZATION

2.1 GENERAL

The three IPI module configurations are operationally pin-for-pin compatible with the island modules they are designed to replace (see Table 2-1). However, minor differences exist between control and indicator functions on the IPI module and existing island modules as described in paragraph 2.2.

Table 2-1 IPI Module Applications

IPI Module Part Number	Island Module Replaced	Siemens Equipment Application	Module Dimensions
62609 (see note below)	62509	500 MS, 525 MS, 550 MS, 585/590 MS, 600 MS/GCP, 71010 SMTC, 7A408 PSO-II Crossing System, 71150 IPITC	8” x 7.375”
62810	62710	660 MS/GCP	8” x 9”
80211	80011	2000 MS, 3000 GCP	8” x 8.9”

NOTE

NOTE

When the 62609 IPI is used as a replacement for the 62509 SMTC module in a 71010 SMTC case, the IPI message display will be upside down. Siemens can provide an adapter board (P/N 62615) to correct the problem. The adapter is placed between the display and the display socket and can be added by the user in the field. See Appendix A for further information.

2.2 IPI MODULE CONTROLS & INDICATORS

The IPI module is inserted in a card edge connector in a card cage or case. Located at or near the front edge of the module are various controls and indicators and an ejector lever which is attached to the top front corner. The controls and indicators are identified in Figure 2-1and described in the following paragraphs.

2.2.1 STATUS (Relay Drive) Indicator

The STATUS indicator is located immediately below the ejector lever and is identified by the label “STATUS” on the board surface adjacent to the indicator. During normal operation, the STATUS indicator is lit steady, but extinguishes to provide indication of track occupancy. If a failure occurs on the module, the STATUS indicator flashes at a fast rate (8 Hz) to indicate the presence of the failure.

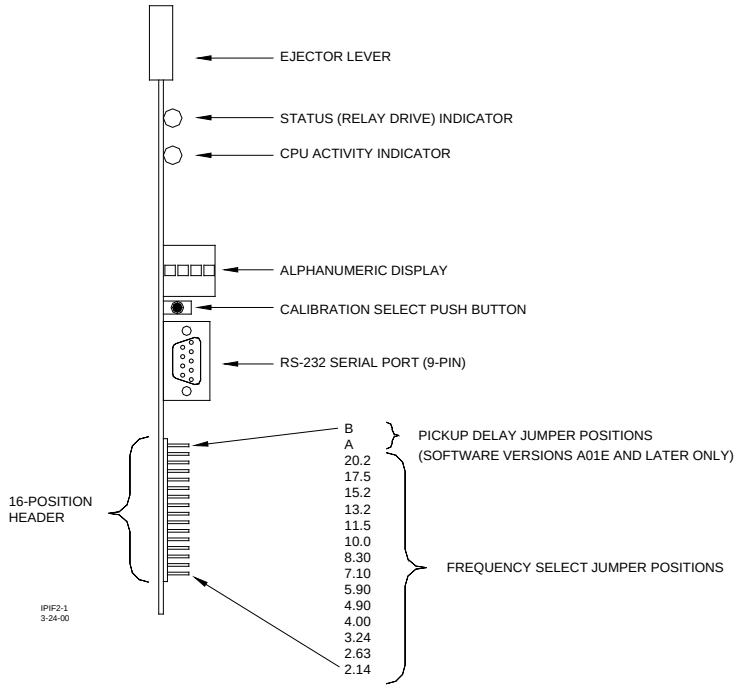

Figure 2-1 IPI Module Control and Indicator Locations

2.2.2 ACTIVITY Indicator

The ACTIVITY indicator is located immediately below the STATUS indicator and is identified by the label “ACTIVITY” on the board surface adjacent to the indicator. It provides an indication of system operation and CPU activity. When the IPI is in the operate mode, the ACTIVITY indicator flashes at a slow rate (1 Hz). It does not flash during initialization, calibration, or if a module failure occurs.

2.2.3 Alphanumeric Display

A four-character alphanumeric display provides a variety of messages. These messages and the length of time they remain on the display are shown in Table 2-2. The display also provides error codes which generally indicate an IPI module hardware failure. These error codes are listed in Table 2-3.

2.2.4 Calibration Select Push Button

The push-button switch located immediately below the alphanumeric display is used in conjunction with the display to initiate IPI calibration (see Section III).

2.2.5 RS-232 Serial Port Connector

The 9-pin, female, D-type connector, located immediately below the calibration select push button, provides the RS-232 serial interface for downloading a new software revision from a PC to the IPI.

Table 2-2 IPI Display Messages

Message(s) Displayed	Length Of Time Message(s) Displayed	Comments
BOOT	9 seconds	Appears when IPI is powered up, at the end of the automated calibration process, and after any IPI errors are corrected
Software version display ..... Example: **A01E**	5 seconds	Appears once the BOOT process is complete
REL (release)	2 seconds	Appears after calibration select push button is pressed and held for 2 seconds to initiate automated calibration.
CAL*	4 seconds	Appears while automated calibration is in progress **NOTE** *The asterisk symbol (*) in the **CAL*** message is actually a rotating bar that indicates calibration in progress.*
DONE	Momentary	Appears momentarily at the end of the calibration process indicating that calibration is complete. The IPI then starts the BOOT process
ARMD (armed)	2 seconds	Appears while the IPI is initiating the calibration process. It appears following REL on the display once the calibration select push button is released, and indicates that the automated calibration process is armed or ready to be started
Actual operating frequency ..... example: **10.0** Pickup Delay Time Setting ..... example: **PU+4** (indicates pickup delay of 4 seconds)	**For software level A01D and earlier**: Frequency only displayed indefinitely **For software level A01E and later**: Operating frequency alternates with pickup delay time. Frequency displayed for 8 seconds, then pickup delay setting for 2 seconds	Appears and remains on the display following successful completion of the IPI calibration, and indicates that the IPI is operational (no internal problems) and ready for in-service operation **⚠ WARNING** **THE IPI MUST ALWAYS BE RECALIBRATED FOR THE CROSSING IT CONTROLS PRIOR TO PLACING IT IN SERVICE.**
FAIL	Remains until calibration select push button is pressed and calibration tried again	Appears if automated calibration process does not run to completion. Calibration should be retried if FAIL appears.
CALR	Flashes intermittently	Appears if frequency jumper has been moved to a new frequency selection on 16-position header, but the IPI has not been recalibrated for the new frequency.

Continued on next page

Table 2-2 concluded

Message(s) Displayed	Length Of Time Message(s) Displayed	Comments
FRQ?	Flashes intermittently	This indicates that the frequency selection jumper has come off or that there is more than one frequency selected on the 16-position header.
SIG (signature)	Momentary	A status message that appears whenever on-frequency interference is sufficiently high to prevent the IPI modulation signature signal from being decoded on the IPI module.
LOS	**For software level A01F and earlier**: Approximately 10 seconds **For software level A01H and later**: 2 seconds. Repeats at 2 second intervals.	Appears whenever the IPI detects a loss of train shunting in the island. **NOTE** *Loss of shunt is detected when rust or other material insulates the island track from the train wheels.*

Table 2-3 IPI Internal Failure Error Codes

Error Code	Error Description	Action Indicated
BATT	Battery voltage out of range	Check battery condition
CALC	Calibration parameters are corrupted.	Try recalibration. If the problem persists, replace the IPI module.
CRIT	Critical check failure	If the problem persists, replace the IPI module.
GB	Guard Band failure	If the problem persists, replace the IPI module.
HWSW	Hardware/Software incompatibility.	If the problem persists, replace the IPI module.
IRO	Island Relay Output failure	If the problem persists, replace the IPI module.
ISRX	Interrupt Service Routine failure	If the problem persists, replace the IPI module.
PHLT	Programmed Halt	If the problem persists, replace the IPI module.
PIRO	Primary Island Relay Output waveform failure	If the problem persists, replace the IPI module.
PS_I	Intermediate power supply output incorrect	If the problem persists, replace the IPI module.
PS5A	5-volt analog supply output incorrect	If the problem persists, replace the IPI module.
PS5D	5-volt digital supply output incorrect	If the problem persists, replace the IPI module.
PS25	Internal reference supply voltage incorrect	If the problem persists, replace the IPI module.
RAM	RAM failure	If the problem persists, replace the IPI module.
ROM	ROM failure	If the problem persists, replace the IPI module.
SIRO	Secondary Island Relay Output waveform failure	If the problem persists, replace the IPI module.

Continued on next page

Table 2-3 concluded

Error Code	Error Description	Action Indicated
STKG	Guardband error	If the problem persists, replace the IPI module.
STKP	Stack Pointer has exceeded its limits	If the problem persists, replace the IPI module.
TIME	Time comparisons failure	If the problem persists, replace the IPI module.
XCPT	Exception failure	If the problem persists, replace the IPI module.
PASS	All internal errors have been corrected	none

2.2.6 16-Position Header – Frequency Selection

The 16-position header located below the RS-232 serial port permits selection of the IPI frequency (see Figure 2-2). Each of the lower 14 header positions corresponds to a different IPI operating frequency and consists of a pair of pins. Frequency selection is made by placing a jumper (shorting block) across the appropriate pair of pins. If the shorting block is moved to a new frequency select position, the operating frequency of the IPI does not change until the IPI is recalibrated (**CALR** appears on the display to indicate that calibration is required).

Each IPI module is furnished with one shorting block for frequency selection. Placement of the frequency select shorting block is generally done at the time of calibration. Header positions for frequency selection are labeled on the board surface adjacent to the header and are identified on Figure 2-2. All indicated frequencies are in kilohertz (kHz).

2.2.7 16-Position Header – Pickup Delay Time Selection (Software Level A01E or later)

On IPI modules running software version A01E or later, positions A and B of the 16-position header permit selection of additional pickup delay time if required (see Section III). Each IPI module is furnished with two shorting blocks for pickup delay selection (Figure 2-2). Following any change of the pickup delay jumper(s), the IPI must be recalibrated in order to store the new pickup delay time value and make it active.

The pickup delay time setting appears on the IPI display alternating with the frequency display. The frequency is displayed for 8 seconds followed by the pickup delay time for 2 seconds. The format of the pickup delay time display is as follows:

Pickup Delay Time	IPI Display
No delay	PU+0
2-seconds	PU+2
4-seconds	PU+4
6-seconds	PU+6

The pickup delay feature is not available on IPI modules running software version A01D or earlier (software version identified on IPI display for approximately 5 seconds at power up). Therefore, positions A and B are not used with the earlier software.

NOTE

NOTE

Only one frequency selection jumper is allowed. A missing frequency jumper, or two or more frequency jumpers, render an invalid selection.

NOTE

NOTE

Modules running software version A01E and later are supplied with two pickup delay time selection jumpers.

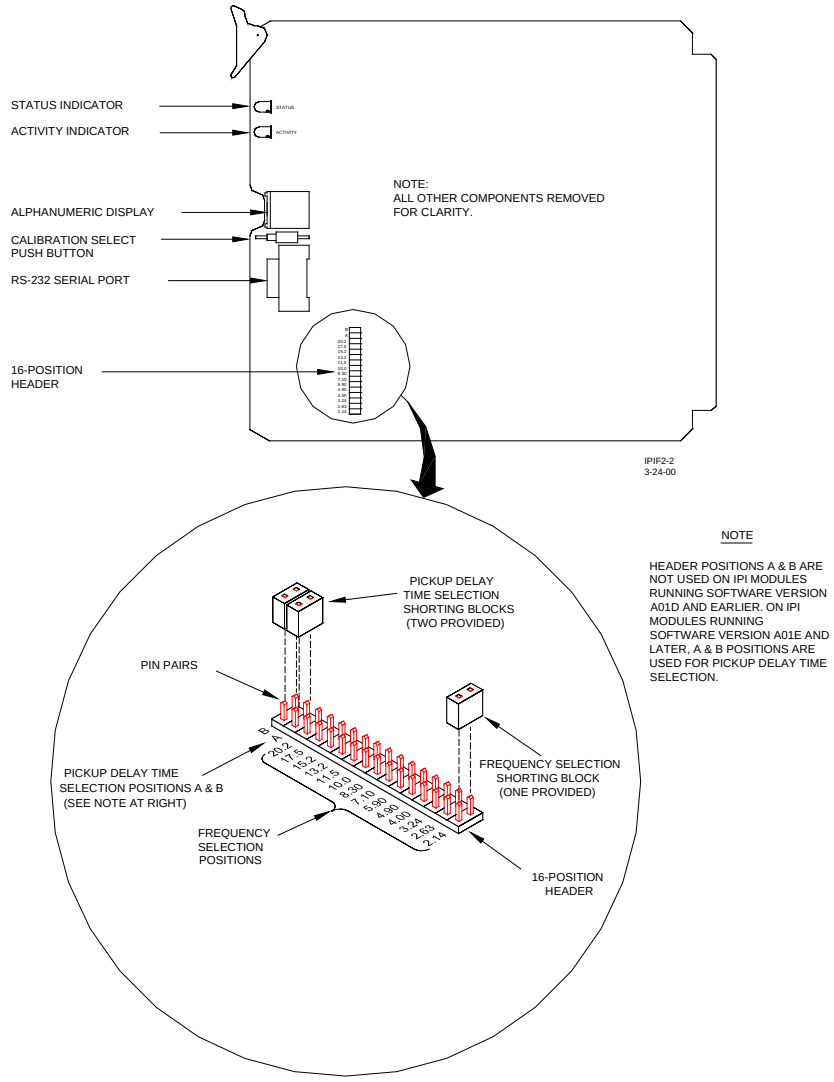

Figure 2-2 Jumper Positions On 16-Position Header

2.3 FUNCTIONAL DIFFERENCES OF CONTROLS AND INDICATORS

Each of the island modules replaced by the IPI module is equipped with a gain adjust potentiometer and an indicator lamp on the front edge of the board. The functions of these controls and indicators are handled differently by the IPI module as explained in Table 2-4.

Table 2-4 Functional Differences of Controls and Indicators

Island Module	Control/ Indicator	Island Module Control/Function	IPI Module Functionality
62509	LED	This indicator is lit when island relay drive is present	The IPI STATUS indicator has a dual function: 1. Is lit steady when island relay drive is present 2. Flashes at a fast rate (8 Hz) when an IPI failure is detected
	Gain adjust potentiometer	Island gain potentiometer used during island calibration.	This function performed automatically on the IPI during calibration.
62710	LED	This indicator is lit when island relay drive is present	The IPI STATUS indicator has a dual function: 1. Is lit steady when island relay drive is present 2. Flashes at a fast rate (8 Hz) when an IPI failure is detected
	Gain adjust potentiometer	Island gain potentiometer used during island calibration.	This function performed automatically on the IPI during calibration.
80011	STATUS	This indicator is lit when island relay drive is present	The IPI STATUS indicator has a dual function: 3. Is lit steady when island relay drive is present 4. Flashes at a fast rate (8 Hz) when an IPI failure is detected
	Gain adjust potentiometer	Island gain potentiometer used during island calibration.	This function performed automatically on the IPI during calibration.

2.4 IPI FIRMWARE UPDATES

The operating program for the IPI module is contained in a flash memory device located on the module. When revisions to the operating program are issued by Siemens Industry, Inc., Rail Automation, the flash device firmware is updated by simply downloading the new program from a PC to the IPI via the RS-232 serial port (see paragraph 2.1.5). Instructions for installing new software will be provided by Siemens when a new software revision level is issued.

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SECTION 3
INSTALLATION AND CALIBRATION

3.0 INSTALLATION AND CALIBRATION

Refer to the chart below and verify that the correct IPI module is being used for the application.

NOTE

NOTE

For IPITC installation information, refer to Section V of this manual.

IPI Module Part Number	Island Module Replaced	Applicable Siemens Equipment
62609	62509	500 MS, 525 MS, 550 MS, 585/590 MS, 600 MS/GCP, 71010 SMTC, 7A408 PSO-II Crossing System, 71150 IPITC
62810	62710	660 MS/GCP
80211	80011	2000 MS, 3000 GCP

NOTE

NOTE

Due to software enhancements, an additional calibration step is available for IPI modules running software versions A01E and later. The additional step covers the use of the A and B header positions for pickup delay time settings.

Software versions are in alphabetical order by the last character of the version identifier. The software version is identified on the IPI display for approximately 5 seconds at power up.

3.1 CALIBRATION

All three configurations of the IPI module operate identically and require the same calibration procedure. There are three simple procedures that must be performed before placing the IPI in service. The first is to select the operating frequency by installing a jumper on the IPI module. The second is to configure jumper(s) for pickup delay time if required (IPI modules running software version A01E and later only). And the third is to perform the automated calibration of the island circuit.

WARNING

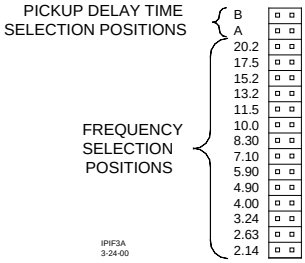
AFTER INSTALLATION OR AFTER ANY ISLAND CHANGES HAVE BEEN MADE, RECALIBRATE THE IPI AND TEST FOR PROPER OPERATION.

- **IPI FREQUENCY SELECTION**

NOTE

If the IPI module is already installed in the case, remove power from the case and then remove the IPI module.

1. Select the desired IPI operating frequency by installing the provided shorting block across the appropriate pair of frequency selection pins on the 16-position header (see figure 2-2 or the inset to the right). **Only one frequency jumper is allowed.**



- **IPI PICKUP DELAY TIME SELECTION (SOFTWARE VERSION A01E AND LATER ONLY)**

NOTE

The A and B positions on the 16-position header are not used on IPI modules running software version A01D or earlier. However, the A and B positions are used for pickup delay time selection on modules running software version A01E or later.

2. Additional pickup delay time may be added to the IPI module when needed using the A and B header positions. Refer to the chart below for proper jumper placement.

Install Jumper In these Header Positions	Pickup Delay Time Added (seconds)
A & B	0
A	2
B	4
no jumper on A or B	6

NOTE

Pickup delay time jumper(s) must be configured (if needed) prior to IPI track circuit calibration.

- **IPI TRACK CIRCUIT CALIBRATION**

3. Install the IPI module in the case.

4. Make sure that power is applied to the IPI module for a minimum of 20 seconds before proceeding with calibration.

5. Temporarily install a **hardwire** shunt at the appropriate distance beyond the receiver rail connections as specified in the shunt distance chart below.

NOTE

NOTE

The island circuit shunting sensitivity chart below provides shunt distance values for shunting sensitivities of 0.12 and 0.3 ohm plus 0.4 and 0.5 ohm for areas where poor shunting is a problem.

Island Frequency (kHz)	0.12 ohm Sensitivity Shunt Distance (Feet)	0.3 ohm Sensitivity Shunt Distance (Feet)	0.4 ohm Sensitivity Shunt Distance (Feet)	0.5 ohm Sensitivity Shunt Distance (Feet)
2.14	20.0	50	67	84
2.63	17.0	43	58	72
3.24	13.0	33	44	55
4.0	10.5	27	36	45
4.9	9.0	23	31	39
5.9	7.5	19	26	32
7.1	6.5	17	23	29
8.3	6.0	15	20	25
10.0	5.0	13	18	22
11.5	4.5	12	16	20
13.2	4.0	10	14	17
15.2	3.5	9	12	15
17.5	3.0	8	11	14
20.2	3.0	8	11	14

NOTE

NOTE

For all installations where poor shunting has been experienced or is anticipated, a 4-second pickup delay jumper setting and 0.3 ohm shunting sensitivity calibration are recommended.

6. To calibrate the IPI, press and hold the IPI calibration select push button for 2 seconds until **REL** (release) appears on the display. Immediately release the push button and then momentarily press it again within 2 seconds. This starts the automated calibration process (**CAL*** appears on the display).

NOTE

NOTE

The IPI module remains in the automatic Calibration mode for approximately 20 seconds. During this time, the display indicates **CAL*** for 6 seconds, **DONE** momentarily, **BOOT** for 9 seconds, and then the software revision level is displayed for 5 seconds. When the calibration process is complete, the IPI operating frequency is displayed (alternates with pickup delay setting when running A01E and later software versions).

NOTE

NOTE

If **FAIL** appears on the display, the calibration process did not complete. Should this happen, cycle the IPI power and then repeat step 6. If **FAIL** appears again, replace the IPI module.

7. Once the calibration cycle is complete and the IPI operating frequency (and pickup delay setting if applicable) appears on the display, verify the following:

   - That the frequency is correct
   - That the pickup delay setting is correct (if applicable)
   - That the IPI STATUS indicator is off
   - That the IPI relay drive voltage is 0 VDC

8. Remove the hardwire shunt installed in step 5 and then verify the following:

   - That the IPI STATUS indicator is lit
   - That the IPI relay drive voltage is more than 10 VDC

9. Verify proper IPI operation by observing train moves.

SECTION 4
APPLICATION GUIDELINES

4.0 APPLICATION GUIDELINES

4.1 GCP APPLICATIONS

The application guidelines for using the IPI module in a GCP are as follows:

1. When the IPI is used as an island circuit in a GCP, the minimum length of the island circuit should be 120 feet between track wire connections.

2. Maximum island length should not exceed 350 feet.

3. Track wires should be #6 AWG.

4. Connections between the track and the GCP case should use twisted pair wires with at least two turns per foot. Provide as much separation between the transmit and receive wire pairs as possible.

5. Island circuit wiring from the GCP case to the track should be as short as possible and should not exceed 600 feet total wiring distance, including the lengths of both the transmit and receive pairs.

6. Frequencies of 10 kHz and lower should be used on island lengths of 200 feet or longer, or if lumped ballast at the crossing is anticipated.

7. Island frequencies should not be repeated in the same track section within 3000 feet, unless separated by insulated joints.

8. At multiple track installations, use different frequencies for each island circuit.

9. On adjacent tracks, island frequencies should not be repeated within 1500 feet.

10. The IPI track circuit calibration should generally be performed using 0.12 ohm shunting sensitivity. However, if poor shunting is a problem, or in areas of transit operation, use a minimum of 0.3 ohm shunting sensitivity.

11. Use proper primary surge protection on both the track and battery wires.

4.2 TRACK CIRCUIT APPLICATIONS (SMTC)

The application guidelines for using the IPI module in a track circuit application are as follows:

1. When the IPI is used in a track circuit application, the minimum length of the track circuit should be 50 feet between track wire connections.

2. Maximum track circuit length should not exceed 500 feet.

3. Track wires should be #6 AWG.

4. Connections between the track and the IPI case should use twisted pair wires with at least two turns per foot. Provide as much separation between the transmit and receive wire pairs as possible.

5. Frequencies of 10 kHz and lower should be used on track circuit lengths of 200 feet or longer, or if lumped ballast at the crossing is anticipated.

6. As a general rule, frequencies should not be repeated in the same track section within 3000 feet, unless separated by insulated joints. Contact Siemens Engineering for other options (1-800-793-7233).

7. At multiple track installations, use different frequencies for each track circuit.

8. On adjacent tracks, track circuit frequencies should not be repeated within 1500 feet.

9. The IPI track circuit calibration should generally be performed using 0.12 ohm shunting sensitivity. However, if poor shunting is a problem, or in areas of transit operation, use a minimum of 0.3 ohm shunting sensitivity.

10. Use proper primary surge protection on both the track and battery wires as shown in Figure 5-2.

SECTION 5
IPITC INSTALLATION

5.0 IPITC INSTALLATION

5.1 GENERAL

The IPI Track Circuit (IPITC), part number 71150, is stand-alone system designed as a replacement for the 71010 SMTC. The IPITC system consists of a single plug-in module (62609) housed in a metal case. Standard AAR terminals provide external connections (see Figure 5-1).

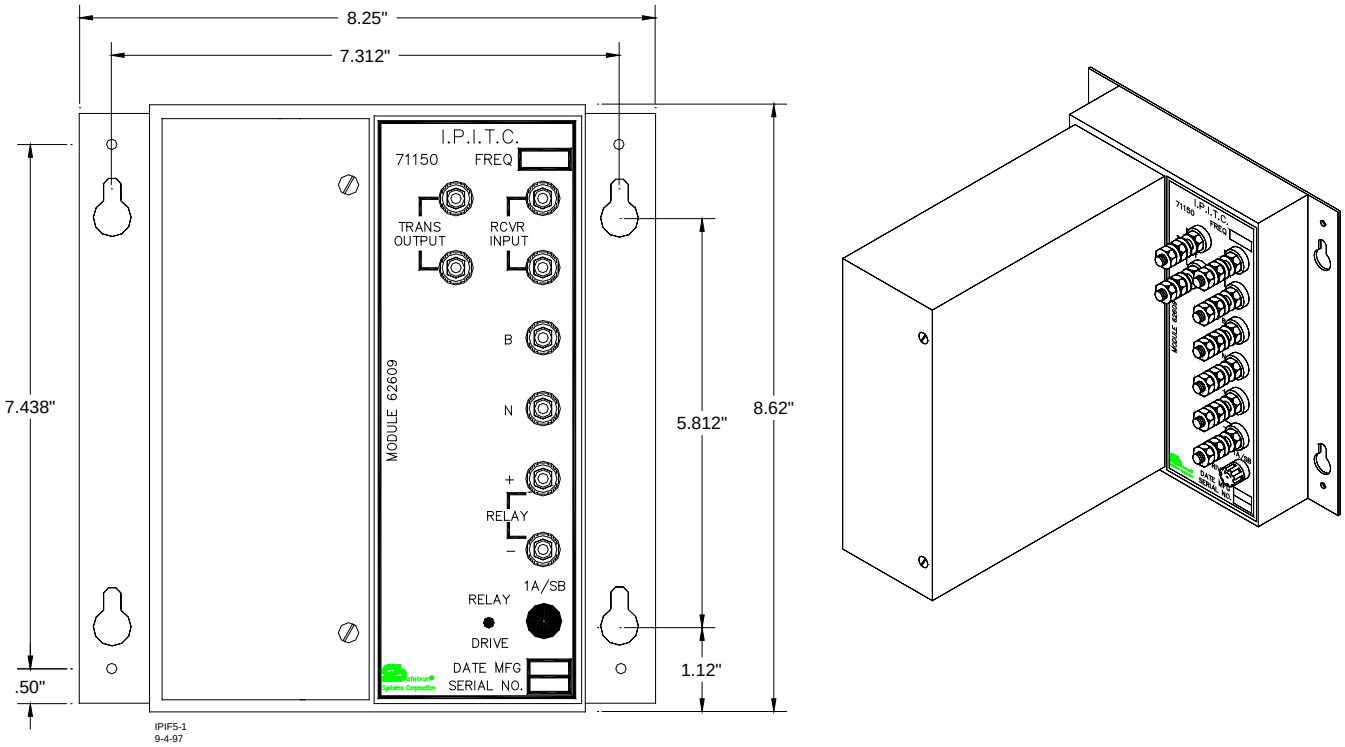


Figure 5-1 IPI Track Circuit (IPITC), A71150

5.2 IPITC INSTALLATION

Although installation of the IPITC is relatively simple, it is recommended that the installation in general follow the typical installation drawing provided in Figure 5-2, especially in regards to surge protection. Terminals on the IPITC are standard AAR types and normal railroad wiring practices are applicable to the IPITC installation. The IPITC case may be shelf or wall mounted.

5.3 IPITC TRACK WIRING REQUIREMENTS

Wiring from the IPITC to the track should be as short as possible and should not exceed 600 feet total wiring distance, including wiring to both the transmitter (TRANS OUTPUT) and receiver (RCVR INPUT) terminals. All track wiring should be #6 AWG or larger wire size. Transmit and receive wire pairs between the track and the IPITC should be twisted pair with at least two turns per foot. Provide as much separation between the transmit and receive pairs as possible.

5.4 IPITC TERMINAL CONNECTIONS

Make the wiring connections to the IPITC case as described in the following steps.

1. Remove the fuse from the IPITC unit.
2. Connect the transmit track wires to the “TRANS OUTPUT” terminals on the IPITC.
3. Connect the receive track wires to the “RCVR INPUT” terminals on the IPITC.
4. Connect the battery wires to the “B” (+) and “N” (-) terminals on the IPITC. **Ensure correct polarity**.
5. Connect a relay coil to the “RELAY +” and “RELAY –“ terminals on the IPITC. The relay should be a standard railroad type with a coil resistance of 400 to 1000 ohms.
6. Reinstall the fuse in the IPITC unit and proceed with the calibration procedure as specified in Section III, Calibration.

5.5 TYPICAL IPITC INSTALLATION DIAGRAM

Refer to Figure 5-2 on the following page for a typical IPI Track Circuit installation diagram.

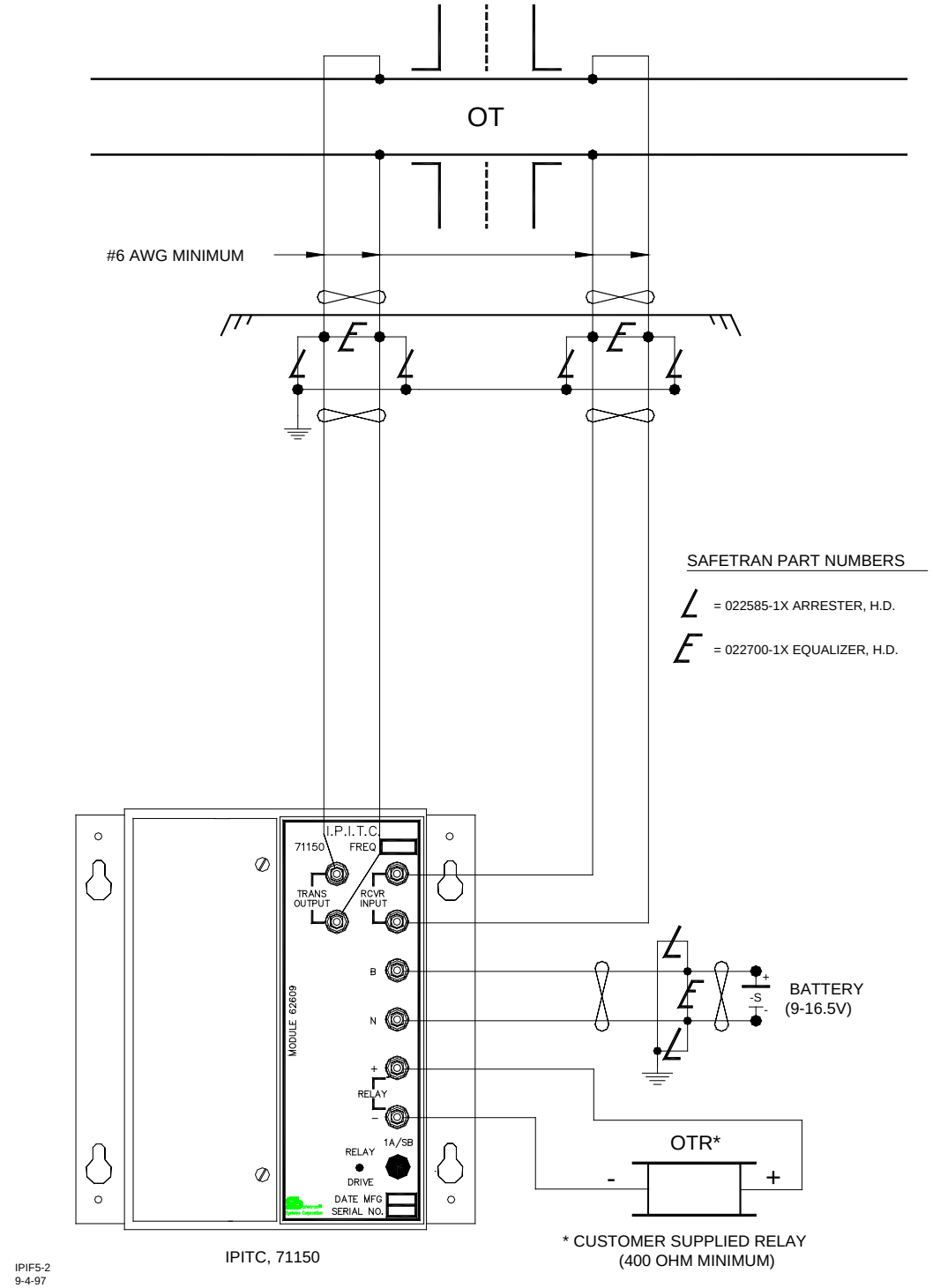


Figure 5-2 Typical IPITC Installation

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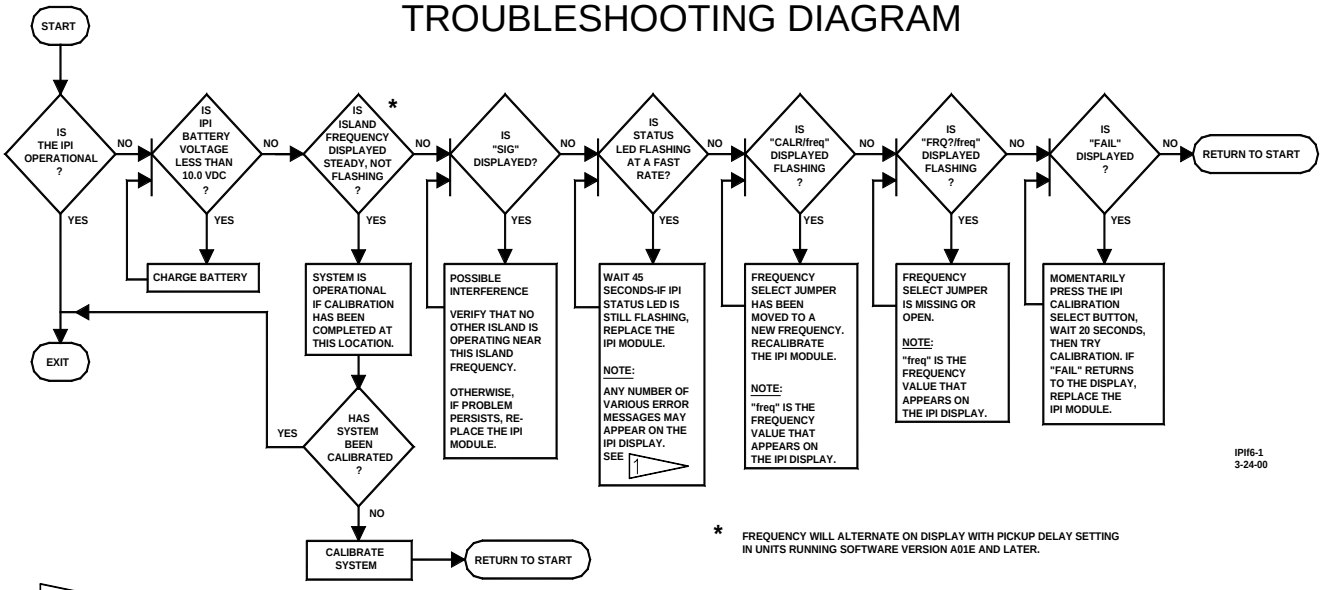
SECTION 6
TROUBLESHOOTING

6.0 TROUBLESHOOTING

INTELLIGENT PROCESSOR ISLAND (IPI)
TROUBLESHOOTING DIAGRAM



1

Internal Error Codes
(For Reference Only)

CALC
CRIT
GB
HWSW
IRO
ISRX
PHLT
PIRO
PS_I
PS5A
PS5D
PS25
RAM
ROM
SIRO
STKG
STKP
TIME
XCPT

NOTE

NOTE

If any of the internal error codes listed to the left appear on the IPI display, typically the IPI module should be replaced if the problem persists. See Section II, Table 2-3 IPI Internal Failure Error Codes, for a description of these codes.

NOTE

NOTE

For software level A01F and earlier:

If a loss-of-shunt is detected, 10 seconds is added to island recovery and the LOS indication flashes on the display for approximately 10 seconds.

For software level A01H and later:

If a loss-of-shunt is detected, 2 seconds is added to island recovery and the LOS indication flashes on the display for 2 seconds. Display repeats at 2-second intervals.

APPENDIX A
INSTALLING 62615 DISPLAY ADAPTER ON 62609 INTELLIGENT PROCESSOR ISLAND (IPI) MODULE

A.0 APPENDIX A – INSTALLING 62615 DISPLAY ADAPTER ON 62609 INTELLIGENT PROCESSOR ISLAND (IPI) MODULE

This appendix is derived from the following document:

INSTALLATION INSTRUCTIONS

INSTALLING 62615 DISPLAY ADAPTER ON 62609 INTELLIGENT PROCESSOR ISLAND (IPI) MODULE

Dated: September 1999

Document Number: SIG-00-99-08
Version A

The IPI module, 62609, can directly replace the 62509 module in the following equipment:

- Model 500 Motion Sensor
- Model 525 Motion Sensor
- Model 550 Motion Sensor
- Model 585/590 Motion Sensor
- Model 600 Motion Sensor/Grade Crossing Predictor
- 71010 Short Modulated track Circuit (SMTC)
- 7A408 Phase Shift Overlay II (PSO II) Crossing System
- 71150 Intelligent Processor Island Track Circuit (IPITC)

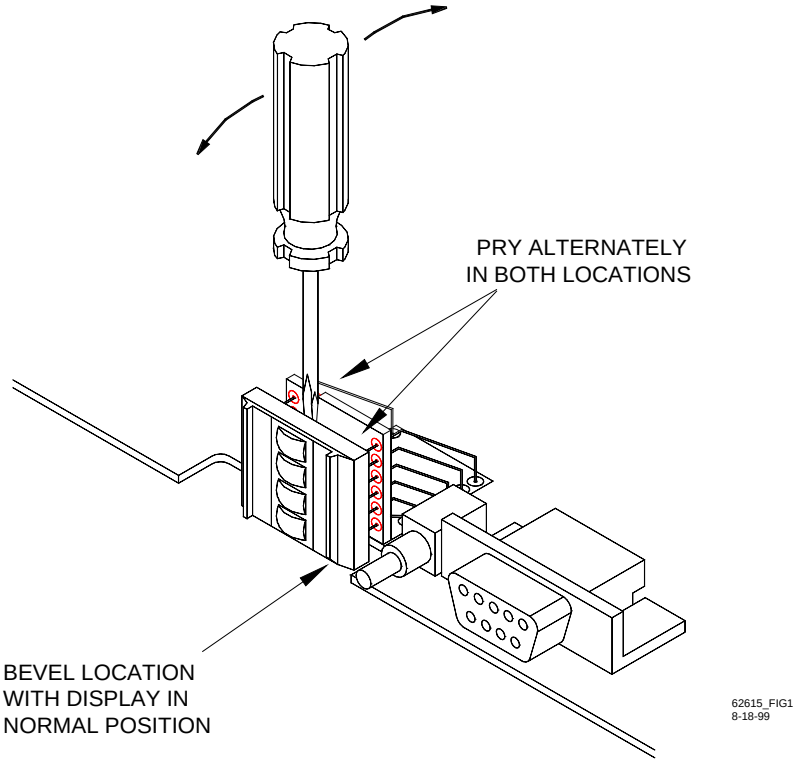
When used in the 71010 SMTC case, the IPI module alphanumeric display will be upside down. A small display adapter board (62615) is available that can be installed on the 62609 module in the field to turn the display 180 degrees for easier viewing. The adapter may be obtained from Siemens Customer Service by calling 1-800-793-7233. Request part number 6000-62615-0001.

Installing 62615 Adapter On The 62609 Module
And Reinstalling The Display Rotated 180 Degrees

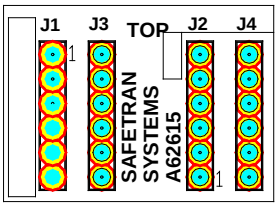
1. If already installed in the host unit, remove power from the unit and remove the 62609 module to an ESD-safe work area.

2. Using a small screwdriver or other suitable tool, carefully pry the display unit out of the socket. The display unit pins are easily bent; therefore, pry one side of the display and then the other to remove it from the socket evenly (see figure 1).

Figure 1



3. As shown in figure 2, the 62615 display adapter board contains four rows of sockets labeled J1, J2, J3 and J4. The word ”TOP” appears between the J2 and J3 labels.



62615_FIG2
8-18-99

Figure 2

4. Position the 62615 board so that the word “TOP” is farthest away from the 62609 board surface and the socket pins for J3 and J4 line up with the socket holes on the existing display socket (figure 3).

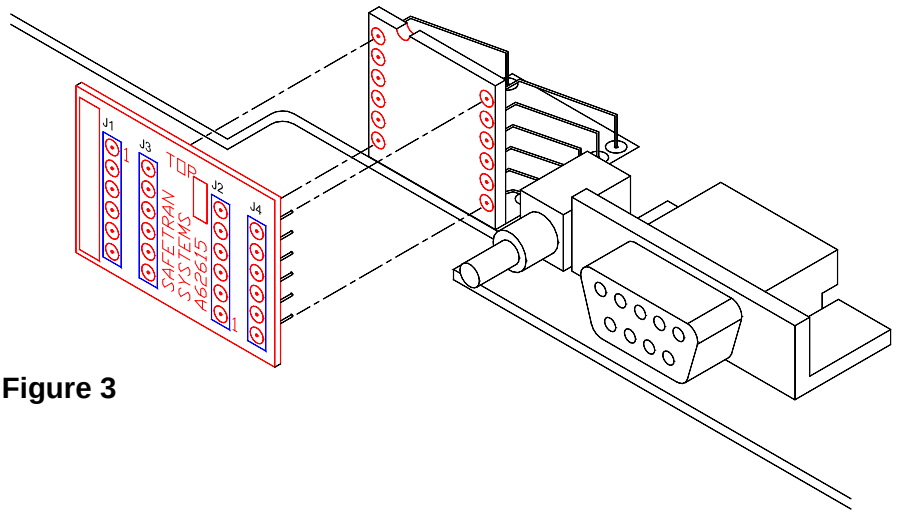


Figure 3

5. With the pins positioned correctly, press the 62615 adapter into the display socket until the pins are fully seated.

NOTE

NOTE

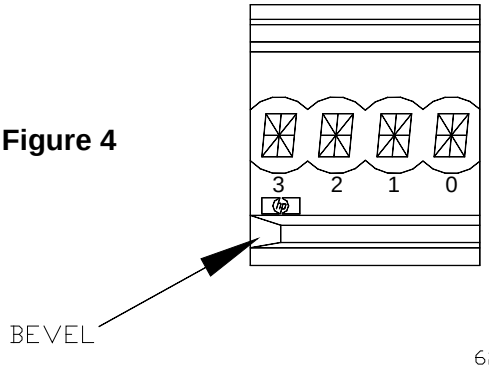
The display adapter sockets allow the display unit to be installed in the normal position or rotated 180 degrees. Once installed, the adapter can remain in place allowing the 62609 to be used in any of the other applications listed above by simply returning the display unit to the normal position.

6. Examine the display unit and note the small bevel at one corner (figure 4).

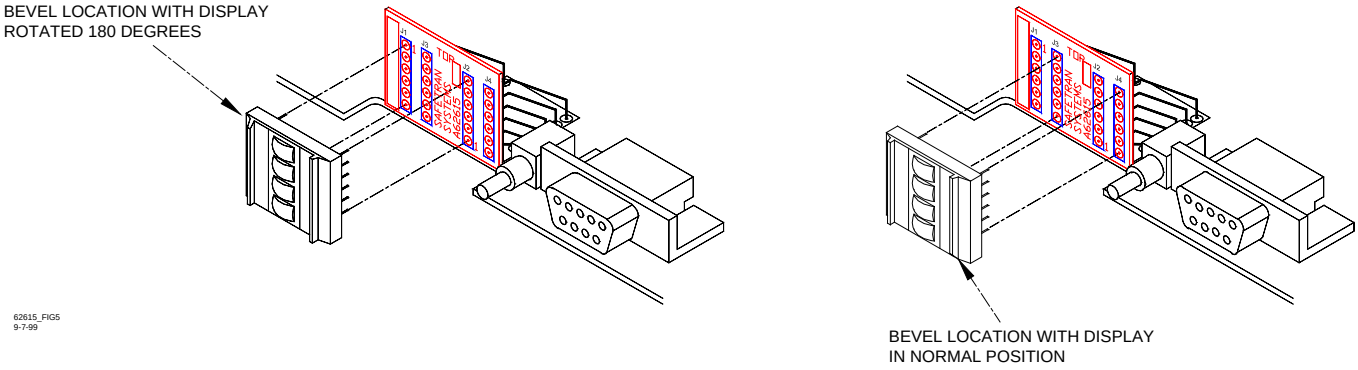
7. To install the display unit rotated 180 degrees for use in the 71010 case, position the display unit so the bevel is farthest away from the 62609 board surface (figure 5).

8. Align the display unit pins with adapter sockets J1 and J2 and carefully press the display into position until the pins are fully seated.

Figure 4



62615_FIG4
9-7-99



DISPLAY ROTATED 180 DEGREES

NORMAL DISPLAY

Figure 5

9. Return the unit to service.

NOTE

NOTE

The display unit can be installed in the normal viewing position with the 62615 adapter installed on the 62609 module. Instructions are provided below.

Installing The Display In The Normal Viewing Position

1. Position the display unit so the bevel is closest to the 62609 board surface. This is the normal viewing position (figure 5).

2. Align the display unit pins with adapter sockets J3 and J4 and carefully press the display into position until the pins are fully seated.

3. Return the unit to service.

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NOTES

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