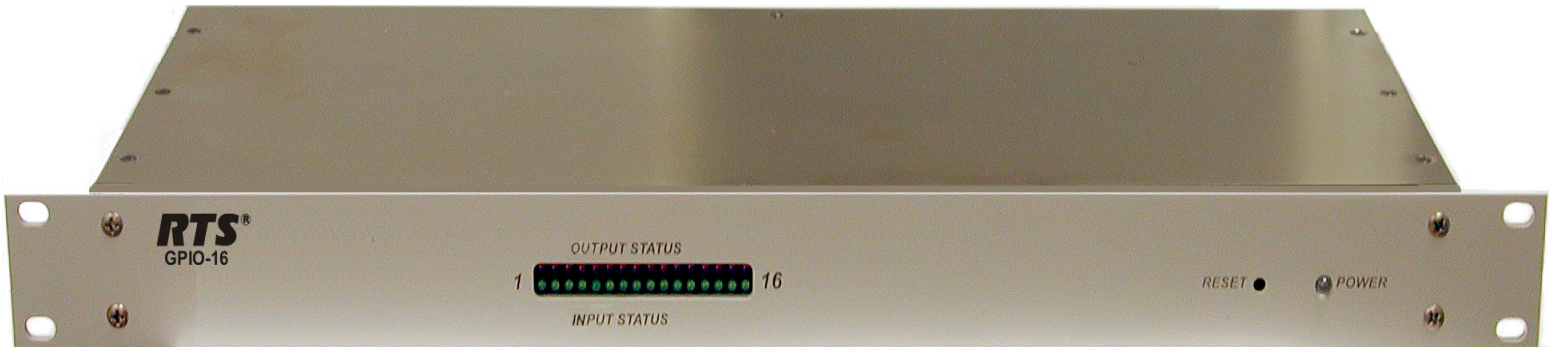
RTS® Digital Matrix Series
Intercom Systems

Model GPIO-16
General Purpose Input Output Frame

User Manual
upto and including version 0.0.2



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CUSTOMER SUPPORT

Technical questions should be directed to:

Customer Service Department
RTS/Telex Communications, Inc.
12000 Portland Avenue South
Burnsville, MN 55337 USA
Telephone: 800-392-3497
Fax: 800-323-0498

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Customer Service Department
Telex Communications, Inc. (Lincoln, NE)
Telephone: 402-467-5321
Fax: 402-467-3279
Factory Service: 800-553-5992

Please include a note in the box which supplies the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

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Factory Service Department
Telex Communications, Inc.
8601 East Cornhusker Hwy.
Lincoln, NE 68507 U.S.A.
Attn: Service

This package should include the following:

QTY	DESCRIPTION	PART NO.
1	Final Assembly - GPIO-16	9010-7842-000
1	Warranty	38110387
1	AC Cord	8800102668
1	GPIO-16 User Manual	93507842000

Table of Contents

CHAPTER 1

Description and Specifications

Introduction

This manual describes the installation, programming, and operating procedures for the RTS Model GPIO-16 General Purpose Input Output Frame. GPIO-16 inputs and outputs are generally assigned using AZedit (intercom system configuration software). For more information on AZedit, see the AZedit User Manual (9350-7532-000).

GPIO-16 (with Ethernet support) Firmware Requirements:

AZeditVersion 3.3.0

MCII-eVersion 1.5.0

PeriphII-e with DBXVersion 1.18.0

Cronus Version 1.4.0

NOTE: The GPIO-16 works with the standard Master Controller in serial mode only. While using the standard master controller, the GPIO-16 RUNS exactly like a UIO-256.

Description

Each GPIO-16 provides 16 GPI (**General Purpose Inputs**) and 16 GPO (**General Purpose Outputs**). The GPIs can be set up as remotely controlled keypanel keys to activate intercom ports, party lines, GPOs, etc. within the intercom system. the GPOs are typically assigned for activation from keypanel keys. They can be used to control lighting or to key remote transmitters, paging systems, etc.

Theory of Operation

The GPIO-16 exchanges control signals with the intercom system via an Ethernet or RS-485 data connection. Multiple GPIO-16s may also be interconnected using a multi-drop configuration.

GPI/Os are connected via optical isolators and a 50-pin telco connector on the back of the GPIO-16. Each input requires +5 to +15 VDC for activation. The positive and negative input and common connections may be provided from a remote source. Or, +15 VDC is supplied at the connector by the GPIO-16, and may be used for input activation, with the user supplying the external switch.

Reference View

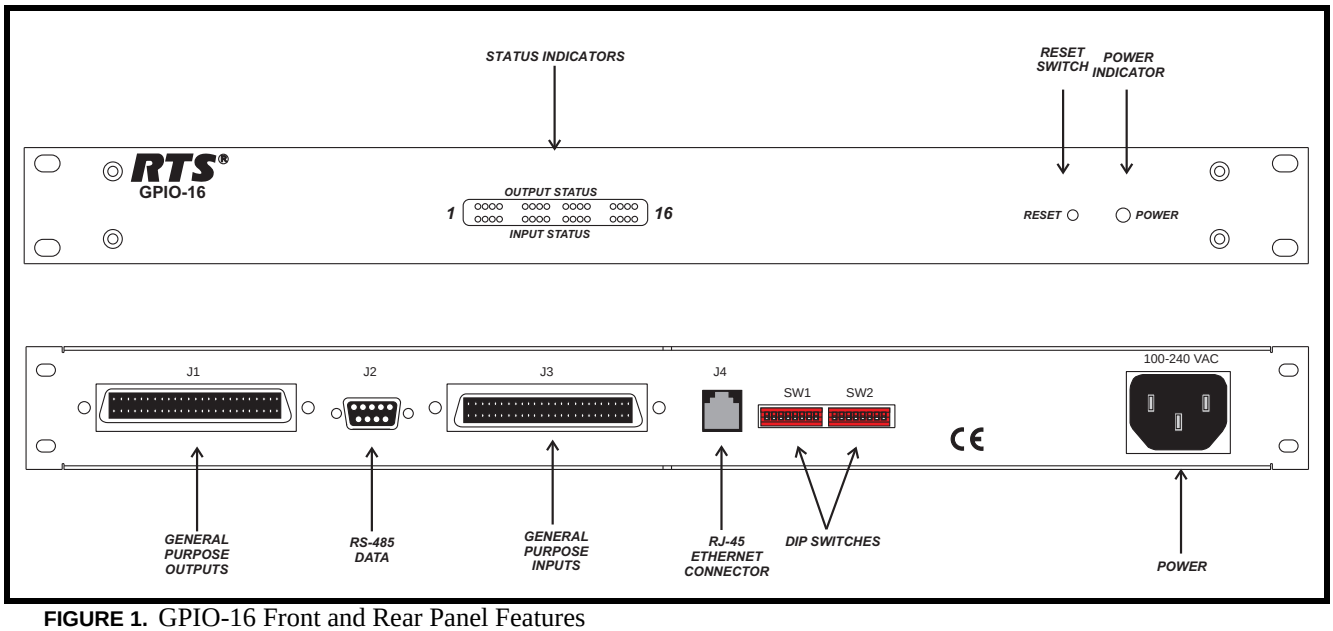

FIGURE 1. GPIO-16 Front and Rear Panel Features

Status Indicators - The top row of LEDs indicate the status of the outputs connected to the GPIO-16. The bottom row of LEDs indicate the status of inputs connected to the GPIO-16. When an external device is connected to the GPIO-16 the corresponding port LED lights red. When an external device is connected to the GPIO-16 the corresponding port LED lights green.

Reset Switch - The Reset switch resets the GPIO-16 device. The GPIO-16 supports both Ethernet and Serial communications. Once the GPIO-16 establishes a link with one of these communication modes, it will use the mode exclusively until the device is reset.

Power Indication - The Power Indication LED lights green when the GPIO-16 is powered up.

General Purpose Outputs - 50-pin Telco Connector. See Table 3 on page 11.

RS-485 Data Connection - DB-9 Serial connection (RS-485)

General Purpose Inputs Connection - 50-pin Telco Connector. See Table 4 on page 12.

RJ-45 Ethernet Connector - Ethernet, supports either 10 Mbps or 100 Mbps connection.

SW1 & SW2 DIP Switches - Two, eight switch DIP switch banks. For information on DIP switch settings, see Table 2 on page 8

Power - 100-240 VAC, 50/60Hz

Specifications

Power	100~240 VAC, 50/60Hz (dynamic switching)
Dimensions	1RU high x 7” (178mm) deep behind front panel
General Purpose Inputs	Type: Optically coupled Input Requirements: 5-15 VDC
General Purpose Outputs	Type: DPDT Relays with common, normal-open and normal-closed contacts Contact Ratings: 0.3A at 120 VAC; 1A at 30 VDC; 30W (DC),375 VA(AC)

Connections

Serial Connection

Type: DB-9

Pin 1 Data +

Pin 2 Data -

Ethernet Connection

Type: RJ-45

J1 TX+
J2 TX-

J3 RX+
J6 RX-

J4 N/A
J5 N/A

J7 N/A
J8 N/A

Type: 50-pin Telco

OPTICALLY ISOLATED INPUT NUMBERS		
PIN NO	**CHAN**	**DESC**
34	1	+ Input
9	1	- Input
35	2	+ Input
10	2	- Input
36	3	+ Input
11	3	- Input
37	4	+ Input
12	4	- Input
38	5	+ Input
13	5	- Input
39	6	+ Input
14	6	- Input
40	7	+ Input
15	7	- Input
41	8	+ Input
16	8	- Input
26	9	+ Input
1	9	- Input
27	10	+ Input
2	10	- Input
28	11	+ Input
3	11	- Input
29	12	+ Input
4	12	- Input
30	13	+ Input
5	13	- Input
31	14	+ Input
6	14	- Input
32	15	+ Input
7	15	- Input
33	16	+ Input
8	16	- Input
17		No Connection
23		No Connection
42		No Connection
48		No Connection
18		+15 VDC
19		+15 VDC
20		+15 VDC
21		+15 VDC
22		+15 VDC
43		+15 VDC
44		+15 VDC
45		+15 VDC
46		+15 VDC
47		+15 VDC
24		Ground
25		Ground
49		Ground
50		Ground

Default Addresses for the RVON Product Line

TABLE 1. Default Addresses for the RVON Product Line

Product	Default IP Address	Default Subnet Mask
RVON-I/O	192.168.0.1	255.255.0.0
RVON-8	192.168.0.2.	255.255.0.0
RVON-1	192.168.0.3	255.255.0.0
RVON-C	192.168.0.4	255.255.0.0
RVON-16	192.168.0.5	255.255.0.0
GPIO-16	192.168.0.6	255.255.0.0

CHAPTER 2

Installation and Operation

Installation

DIP Switch Functions

SW1-1:	OPEN - Normal Operation (Default) CLOSED - Erase All Configuration
SW1-2:	OPEN - Normal Operation (Default) CLOSED - Ignore saved Master Controller IP Address
SW1-3	OPEN - Ethernet Parameters are Configurable (Default) CLOSED - Locks Ethernet Parameter Configuration
SW1-4 to SW1-7	Frame number/Polling ID (RS-485) See Table 2 on page 8.
SW1-8	OPEN - Normal Operation (Default) CLOSED - Force Bootloader
SW2-1	OPEN - Normal Operation (Default) CLOSED - Test Mode
SW2-2 through 8	Not Used

Mounting

GPIO-16 Frames are generally mounted in the front of an equipment rack near a Master Controller Breakout Panel for ADAM intercom systems or near the matrix frame for ADAM CS intercom systems. When positioning a GPIO-16, consideration should be given to the visibility of the front panel status indicators and access to the reset switch. Also, consider access to the rear panel for changes to the DIP switch settings. There are no ventilation requirements.

FRAME NUMBER	SW1-4	SW1-5	SW1-6	SW1-7	GPI INPUT/ OUTPUT NUMBERS
1	Open	Open	Open	Open	001-016
2	Closed	Open	Open	Open	017-032
3	Open	Closed	Open	Open	033-048
4	Closed	Closed	Open	Open	049-064
5	Open	Open	Closed	Open	065-080
6	Closed	Open	Closed	Open	081-096
7	Open	Closed	Closed	Open	097-112
8	Closed	Closed	Closed	Open	113-128
9	Open	Open	Open	Closed	129-144
10	Closed	Open	Open	Closed	145-160
11	Open	Closed	Open	Closed	161-176
12	Closed	Closed	Open	Closed	177-192
13	Open	Open	Closed	Closed	193-208
14	Closed	Open	Closed	Closed	209-224
15	Open	Closed	Closed	Closed	225-240
16	Closed	Closed	Closed	Closed	241-256

TABLE 2. GPIO-16 DIP Bank SW-1, 4 through 7 Frame Number/Polling ID Configuration.

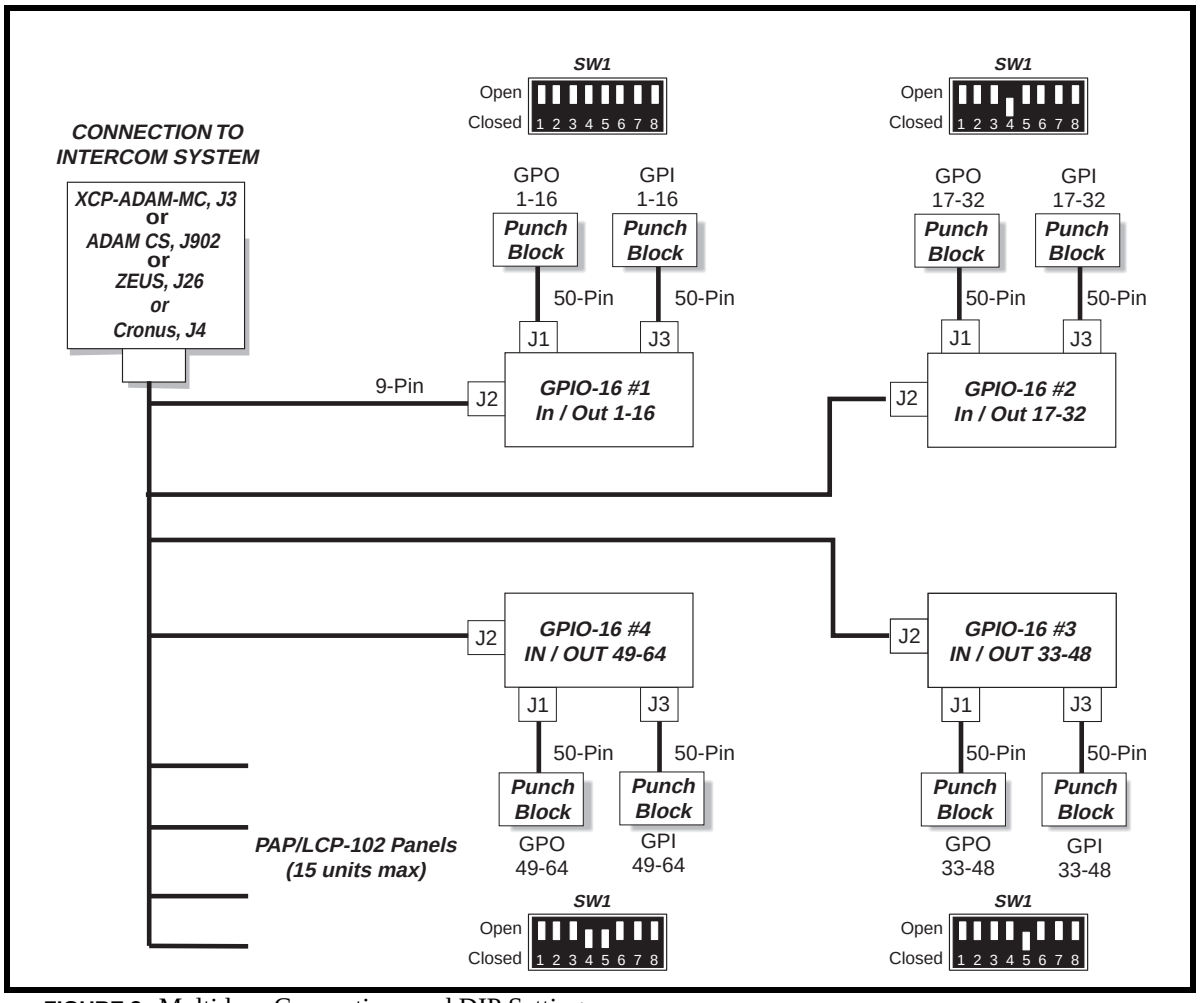

FIGURE 2. Multidrop Connections and DIP Settings

Multi-drop Connections

GPIO-16 to ADAM System

Connect the end of the 9-pin cable marked ADAM System to J3 of the XCP-ADAM-MC Master Controller Breakout Panel. Connect the end marked GPIO-16 to J2 of the GPIO-16 frame. If you need a long cable, you can construct one using the wiring diagram in Figure 3 on page 10.

GPIO-16 to ADAM CS System

For ADAM CS intercom systems, the connector marked “ADAM System” on the 9-pin cable must be replaced with the provided female connector. Disconnect the wires and reconnect them to the same pin numbers.

After modifying the cable, connect the newly attached female connector to J902 of the ADAM CS frame. Connect the end marked GPIO-16 to J2 of the GPIO-16 frame. If you need a longer cable, you can construct one using the wiring diagram in Figure 4 on page 10.

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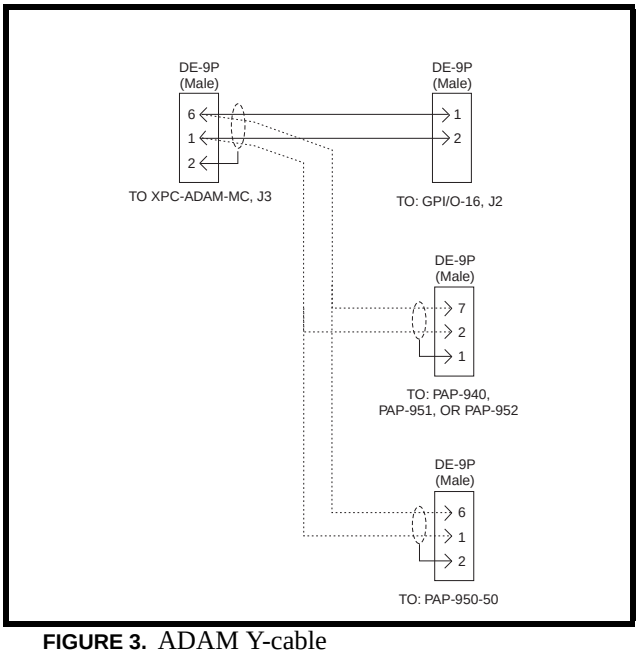


FIGURE 3. ADAM Y-cable

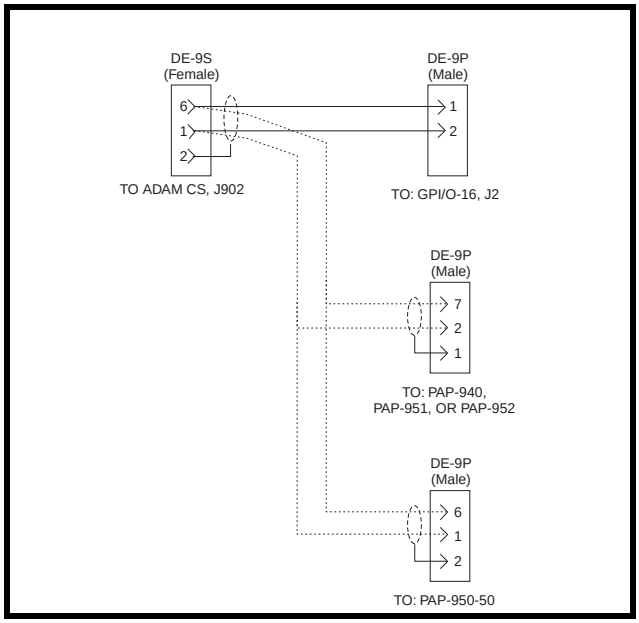


FIGURE 4. ADAM CS Y-cable

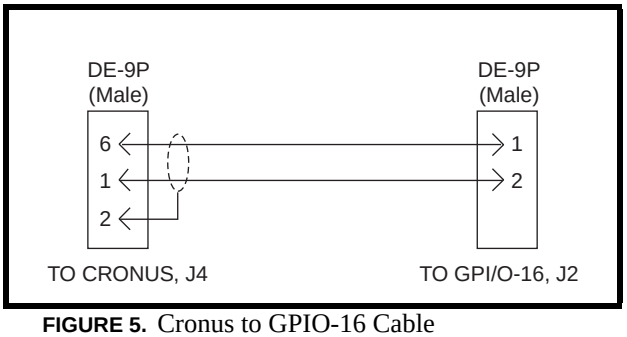


FIGURE 5. Cronus to GPIO-16 Cable

GPIO-16 Frame Interconnections

If more than one GPIO-16 or PAP frame is used, construct a Y-cable as shown in Figure 3 or Figure 4 with additional DB-9S connectors in parallel with the ADAM and ADAM CS connector. Connect the additional connectors to the J2 connector on each additional GPIO-16.

GPIO-16 to Zeus System

Use the DIP switch information for ADAM and ADAM CS. Also, Zeus is limited to 64 GPIs and 64 GPOs. Since each GPIO-16 has 16 of each, this means that you can only use up to four GPIO-16 frames with Zeus. When setting frame numbers, only frame numbers 1 through 4 are allowed.

Treat the Zeus the same as an ADAM for wiring purposes, except connect to J26 on the Zeus back panel instead of J3 of the XCP-ADAM MC breakout panel.

GPIO-16 to Cronus System

Use the DIP switch information for ADAM and ADAM CS. Also, Zeus is limited to 64 GPIs and 64 GPOs. Since each GPIO-16 has 16 of each, this means you can only use up to four GPIO-16 frames with Cronus.

GP Output and Input Connections

Use 50-pin Telco cables to connect from the GP input and output connectors to each GPIO-16 to punch blocks or similar breakout devices. Pinouts for the connectors and punch blocks are summarized in Table 3 on page 11 and Table 4 on page 12.

Power Connection

Plug in the supplied power cord for each GPIO-16. The GPIO-16 POWER indication LED lights green when power is supplied to the unit.

	RELAY OUTPUT NUMBERS[a]																RELAY CONTACT PIN NUMBERS[b]		
	FRAMES																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	NC	Common	NO
CHANNELS	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	38	13	40
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	39	14	15
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	41	16	43
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	42	17	18
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	44	19	46
	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	45	20	21
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	47	22	49
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	24/8	48	23	24
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	26	1	28
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	27	2	3
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	29	4	31
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	30	5	6
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	32	7	34
	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	33	8	9
	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	35	10	37
	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	36	11	12

TABLE 3. GPIO-16 Relay Output Connector (J5) Pinouts

a. Dependent on GPIO-16 DIP Switch SW1 settings for Input/Output range as summarized in Table 2 on page 8.
b. The relay contacts are rated for 0.5A at 120 VAC; 1A at 24 VDC; 0.3A at 60 VDC

Assigning the GPIO-16 Inputs and Outputs

Using AZedit

Assign the GPIs by using the GPI Input setup screen. This is accessible by clicking the GPIs button on the AZedit toolbar. Assign GPOs using the RY setup screen (RY button on the toolbar).

NOTE: AZedit requires the number of GP Ins and Outs to be set through the Intercom Configuration menu (select Options>Intercom Configuration from the menu bar). This will require the unit to be reset. All data will be lost. Be sure to save your setup BEFORE reconfiguring the frame.

Using Keypanel (Outputs Only)

On keypanels that permit key assignment, you can assign GPOs using the procedures for assigning relays. It is not possible to assign GPIs from keypanels.

Operation

Status Indicators

Activating a keypanel key that is assigned to a GPO will cause the appropriate OUTPUT STATUS indicator on the GPIO-16 front panel to light red, and the relay contact for that output will activate. Activating a GPI from an external device will cause the appropriate INPUT STATUS indicator to light green, and the keypanel key assignment or other device within the intercom system that is assigned to that GPI will activate.

When using multiple GPIO-16 frames, the status of the first 16 GPOs and GPIs will be indicated by the status indicators on the first GPIO-16. The status indicators on the second GPIO-16 will indicate status of outputs and inputs 17 to 32 and so forth as summarized in Table 3 on page 11.

GPIO-16 Frame Reset

The GPIO-16 firmware has been designed to detect and recover from errors caused by such things as lost or bad data packets. However, in the extremely unlikely event the unit stops functioning during operation, try pressing the reset switch on the front panel of the GPIO-16.

OPTICALLY ISOLATED INPUT NUMBERS[a]																	**Input Pin Numbers[b]**	
	FRAMES																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	-Input	+Input (5-15VDC)
CHANNELS 1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	9	34
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	10	35
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	11	36
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	12	37
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	13	38
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	14	39
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	15	40
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	16	41
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	1	26
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	2	27
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	3	28
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	4	29
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	5	30
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	6	31
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	7	32
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	8	33

TABLE 4. GPIO-16 GPI Connector (J7) Pinouts

a. Dependent on GPIO-16 DIP Switch SW1 settings for Input/Output range as summarized in Table 2 on page 8

b. 16 Inputs will sink 85mA maximum at a maximum input voltage of +15VDC. For operation from an external DC voltage source, connect the external control voltage to the positive "+" input pin, and connect the external common to the negative "-" input pin. The GPIO-16 also has an internal 15VDC source which is available at pins 18~22 and 43~47. Ground is available at pins 24,25 and 49,50. To use the internal 15VDC source. ground the "-" input for the desired control input, then use an external switch to connect from the 15VDC internal source to the "+" input pin.

CHAPTER 3

GPIO-16 and AZedit

Configuring the GPIO-16 using AZedit

NOTE: Verify you are using the following versions:

GPIO-16Version 0.0.1 or later
MCII-eVersion 1.18.0 or later
PeriphII-eVersion 1.18.0 or later
DBXVersion 1.18.0 or later
AZeditVersion 3.3.0 or later

NOTE: The GPIO-16 works with the standard Master Controller in serial mode only. While using the standard master controller, the GPIO-16 RUNS exactly like a UIO-256.

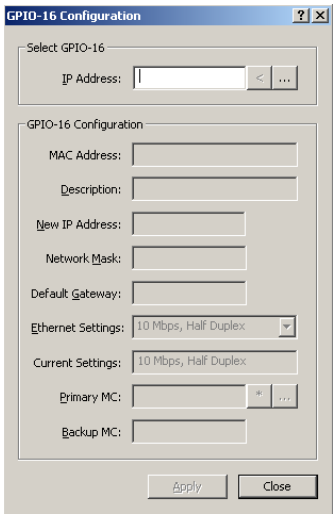
When configuring your GPIO-16 device, you must do the following

Step 1	Configure the GPIO-16 device.
Step 2	Assign the GPIO-16 device to the relay group.

To **configure the GPIO-16**, do the following:

1. From the Options menu in AZedit, select **GPIO-16 Configuration**.
   The GPIO-16 Configuration window appears.

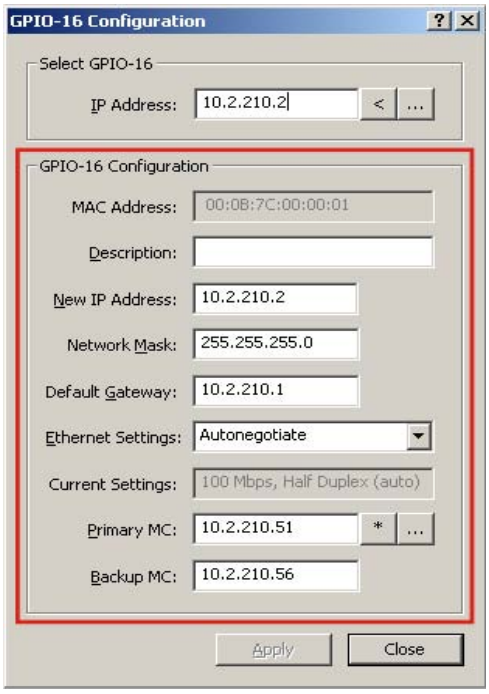
NOTE: If this is the first time you are using the GPIO-16 with AZedit, the IP Address may not display, however the MAC address will. A MAC (**Media Access Control**) address is a hardware address that uniquely identifies each node (or device) of a network



2. In the IP Address field, enter the **IP Address** of the GPIO-16. Or use the browse button ... to browse to the IP Address of the GPIO-16 device.
   Once the IP Address field is populated, the GPIO-16 Configuration fields automatically populate.

NOTE: The **browse button**, ..., is used to display the IP Addresses of all the GPIO-16 devices on the local network that can respond to a broadcast.

The **lookup button**, <, is used to look up an IP address you manually enter in the IP Address field. The lookup button is most commonly used when you know the IP of a GPIO-16, but is on the other side of a gateway and cannot respond to a broadcast. If the GPIO-16 at that address exists and can communicate with AZedit, then its configuration is loaded into the GPIO-16 Configuration Area (outlined in red below).



3. In the Description field, enter a **unique description** of the GPIO-16 device, if desired.
4. In the New IP Address field, enter the **new IP Address** of the GPIO-16 device, if applicable.
5. In the Network Mask field, enter the **network mask** of the GPIO-16 device, if applicable.
6. In the Default Gateway field, enter the **default gateway address** of the GPIO-16 device, if applicable.
7. From the Ethernet Settings drop down menu, select the **ethernet setting** you want to use.

   10 Mbps, Half-Duplex
   100Mbps, Half Duplex
   10Mbps, Full Duplex
   100Mbps, Full Duplex
   Auto-negotiate - the GPIO-16 will automatically alternate between 100Mbps half-duplex and 10Mbps half-duplex, in an attempt to determine what link speeds are supported.

NOTE: The ***Current Settings*** display field displays the current ethernet speed selected by the auto-negotiate menu item. This field actively displays only when auto-negotiate is selected.

8. In the Primary MC field, enter the **IP Address** of the primary master controller of the intercom the GPIO-16 is connected.
   Once the IP Address for the Primary MC is entered, the Backup MC IP Address field automatically populates with the Backup MC IP Address.

   Use the **current intercom button**,  , to select the IP Address of the intercom to which AZedit is communicating.

   Use the **browse button**,  , to display all intercoms (on the local network, that can respond to a broadcast).
9. Click **Apply** to apply the changes you have made. Otherwise, click **Close**.

NOTE: From the configuration window, you can browse ANY GPIO-16 device (on the local network, that can respond to a broadcast). However, in the GPIO-16 system window (see “Configuring the GPIO-16 using AZedit” on page 13), you can check or uncheck the Use Ethernet option, and enter a GPIO-16 IP Address. If you use the browse button in this window, you only see the GPIO-16 devices used by the current intercom system (for example, only those not already configured to talk to another intercom, or those that have a DIP switch set allowing the current intercom to take control of them if they are configured for another intercom but are not currently talking to that intercom).

Assign the GPIO-16 device to the relay group in AZedit

Once you have assigned the IP Address to the GPIO-16 device, you need to assign it to a group of relays. By default, AZedit is configured for six (6) groups (each consisting 16 relays). You can assign up to 16 groups (with a maximum of 256 relays).

To **assign the GPIO-16 device to a group of relays**, do the following:

1. From the System menu, select **GPIO-16**.
   The GPIO-16s window appears.
2. Select and double-click the **relay group** you want to assign to a GPIO-16 device.
   The Edit GPIO-16 window appears.
3. Select the **Ethernet Connection** checkbox if you are operating over Ethernet.
4. In the IP Address field, enter the **IP Address** of the GPIO-16. Or use the browse button ... to display a list of GPIO-16 IP Addresses connected to the intercom.
5. Click **Done**. Otherwise, click **Next** to configure the next group of relays.

NOTE: In the GPIO-16 system window, you can check or uncheck the Use Ethernet option, and enter a GPIO-16 IP Address. If you use the browse button in this window, you only see the GPIO-16 devices used by the current intercom system (for example, only those not already configured to talk to another intercom, or those that have a DIP switch set allowing the current intercom to take control of them if they are configured for another intercom but are not currently talking to that intercom). However, from the configuration window (see “Assign the GPIO-16 device to the relay group in AZedit” on page 16), you can browse ANY GPIO-16 device (on the local network, that can respond to a broadcast).

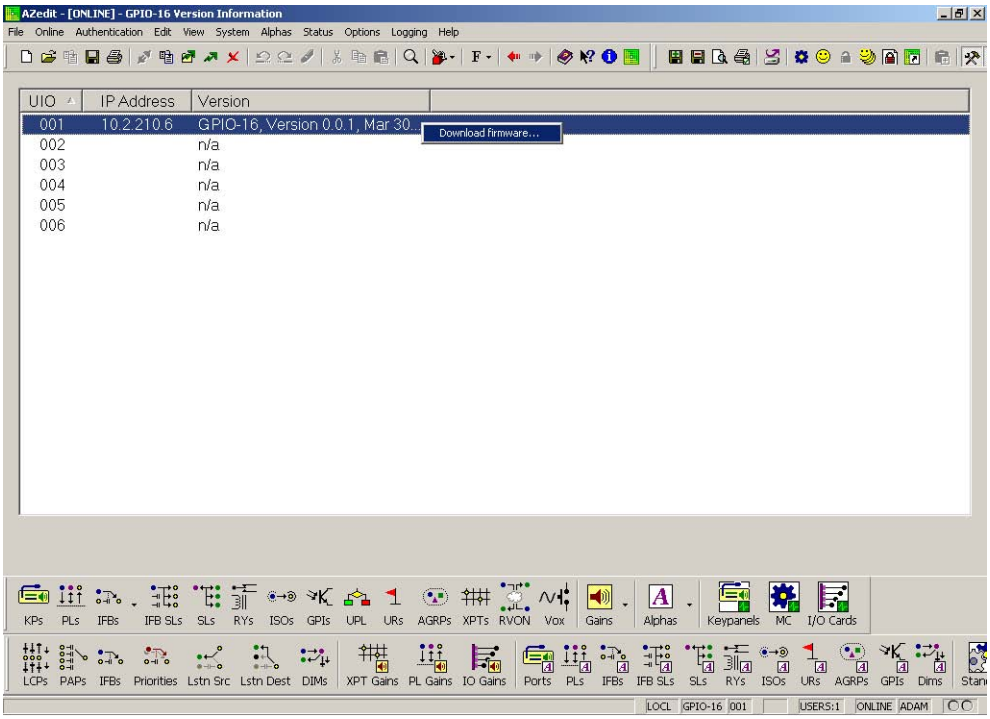
Upgrade the GPIO-16 Firmware

NOTE: At least one (1) relay group (see, “Assign the GPIO-16 device to the relay group in AZedit” on page 16) must be assigned before you can download firmware to the GPIO-16 device.

To upgrade the GPIO-16 firmware, do the following:

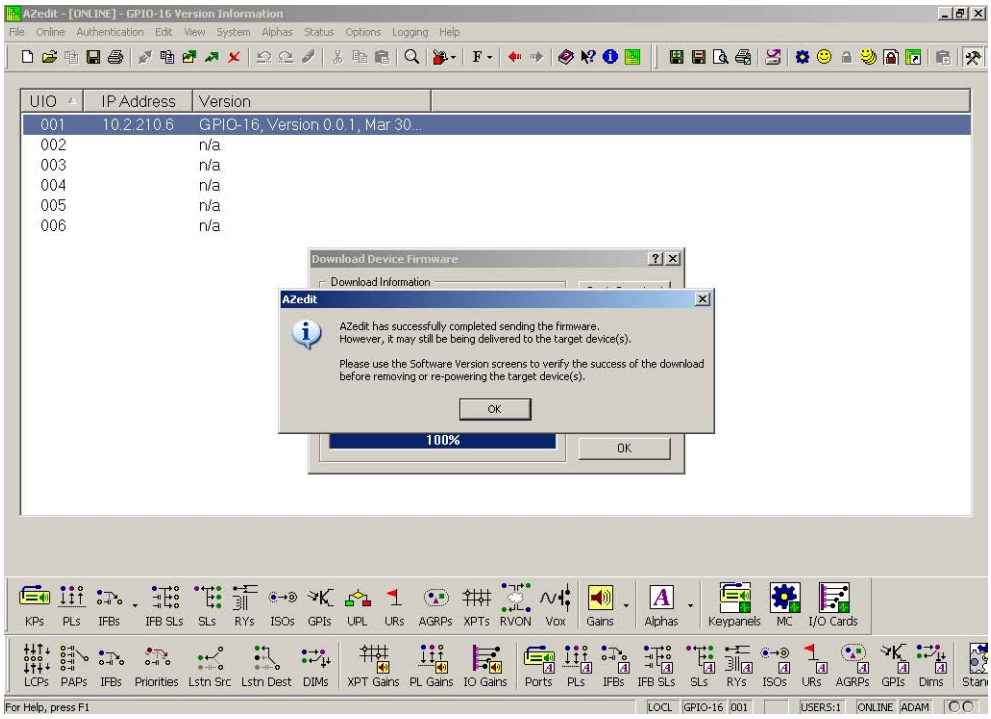
1. From the Status menu, select **Software Versions**.
   The Software Versions popup menu appears.
2. From the Software Versions popup menu, select **GPIO-16**.
   The GPIO-16 Version Information window appears.

3. Right-click the **GPIO-16** you want to upgrade.
A popup menu appears.



4. From the popup menu, select **Download Firmware**.
The Download Firmware window appears.
5. Navigate to the **firmware file** (*typically a .hex file*) you want download to the device and click **Open**.
The Download Device Firmware window appears.

6. Click **Begin Download**.
   The firmware download begins. Once the firmware has finished, a message appears on the screen. The download may take a few minutes more after the message appears.



7. Click **OK**.
8. Verify the **version upgrade** in the GPIO-16 Version Information window is correct.

Notes