Proprietary Notice

This document contains proprietary information which may not be disclosed to others or used in manufacturing, or any other purpose, without written permission from Sierra Automated Systems. The information and design disclosed herein were originated by and are the property of Sierra Automated Systems. All patent, proprietary design, manufacturing, reproduction, use and sales rights are reserved except where those rights are expressly granted to others.

Copyright Notice

Copyright 1997 by Sierra Automated Systems & Engineering Corporation, Burbank, California, USA. All rights reserved. Reproduction in whole or in part without prior written permission from Sierra Automated Systems is prohibited.

Service Manual for the GPI-1600 Salvo Sequence Generator.

Revision: P.6
This manual is published by the Engineering Department of Sierra Automated Systems & Engineering Corporation, which is responsible for its contents. Address all communication regarding this publication to:

Director of Engineering
Sierra Automated Systems
2625 North San Fernando Blvd.
Burbank, California 91504
USA
Tel (818) 840-6749 Fax (818) 840-6751 www.sasaudio.com

Limited Warranty

The products of Sierra Automated Systems & Engineering Corporation are warranted to be free from defects in materials and workmanship for a period of one year from the date of sale.

Sierra Automated Systems' sole obligation during the warranty period is to provide, without charge, parts and labor necessary to remedy covered defects appearing in products returned prepaid to Sierra Automated Systems, 2625 North San Fernando Blvd. Burbank CA. 91504, U.S.A.. This warranty does not cover any defect, malfunction or failure caused beyond the control of Sierra Automated Systems, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the Technical Manual or the Owner's Manual, defective or improper associated equipment, attempts at modification and repair not authorized by Sierra Automated Systems, and shipping damage. Products with their serial numbers removed or effaced are not covered by this warranty.

This warranty is the sole and exclusive express warranty given with respect to Sierra Automated Systems products. It is the responsibility of the user to determine before purchase that this product is suitable for the user's intended purpose.

ANY AND ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY ARE LIMITED TO THE DURATION OF THIS EXPRESS LIMITED WARRANTY.

SIERRA AUTOMATED SYSTEMS IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.

GPI 1600 *System Automation*

Section **Page**

1.0 General Description 2

2.0 Installation 3
2.1 Getting Started, Connecting to the PC 3
2.2 Connection to SAS Switching Systems 3
2.3 Software Installation & Setup 4
2.4 Connection to ESE Time Source 5
2.5 Connection to Relay Outputs 5
2.6 Connection to Opto Inputs 5

3.0 Operation 6
3.1 Software Description 6
3.2 Software Operation 7
Command Summary 8
Figures 9

4.0 Specifications 10

Drawings

GPI16S01	Schematic Diagram, Overall, GPI 1600
CPP3S01/03	Schematic Diagram, CPP-3 Processor Board
RIA16S01/03	Schematic Diagram, RIA-16 Relay Assembly
OIA16S1	Schematic Diagram, OIA-16 Opto Assembly

1.0 System Description

The GPI 1600 Automation / Sequence Generator is a compact automation system that can be integrated with SAS switching and mixing systems, or be used as a stand alone sequence generator. The GPI 1600 is packaged in a single rack unit chassis and houses 16 form C relays for general purpose machine control and 16 opto-isolated inputs for event triggers. Direct connection to SAS switching systems allows time based XY switcher commands combined with general purpose relay closures / opto triggers.

Event programming is accomplished using a PC which is connected to the GPI via RS-232. Easy to use, menu driven software is included. An unlimited number of events are available on a 7 day / 24 hour programming schedule. Each event may activate an audio crosspoint and / or activate a relay. Each event may be programmed to occur on any or all days of the week.

The automation system will use the internal time clock of the PC by default. An optional ESE Model PC-471 time code reader card for the PC is available to synchronize the PC clock with station reference time. The PC-471 will read both ESE 24 hour clock and SMPTE code.

2.0 Installation

The Model GPI-1600 requires a 1 rack unit space. Locate a suitable area close to the central switching rack where there is adequate room for rear panel wiring.

2.1 Getting Started

Sierra Automated Systems recommends that the IBM compatible personal computer which will run the automation software be dedicated exclusively to router control and not used for general computer tasks. Also, the machine should meet the following minimum requirements:

1. Intel based 80486 - 66 Mhz processor.
2. VGA color monitor and video card (640x480 16 color).
3. Eight (8) megabytes of RAM (If Windows is to be used).
4. Two (2) RS-232 serial I/O ports.
5. A fast hard drive with a 2 meg disk cache (Microsoft SmartDrive).
6. One (1) 3 1/2" 1.44 meg floppy disk drive.

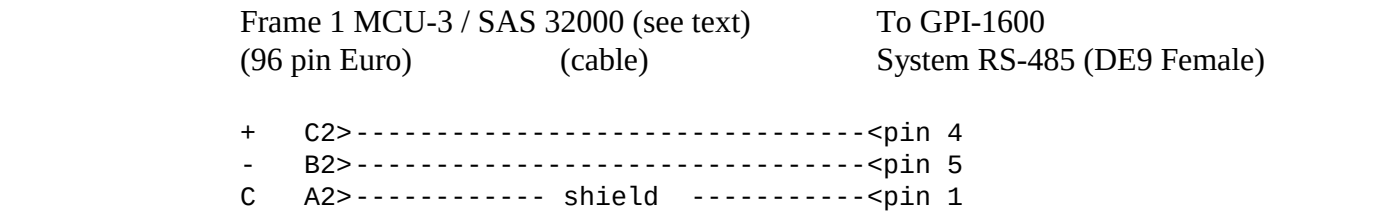
Connect the PC serial port to the GPI 1600. Note that the SAS software defaults to COM 2, but may be changed via command line switches as required (see below).
A 25 pin D female connector on the GPI 1600 rear panel provides an RS-232C serial port, 19.2K baud, 1 start bit, 1 stop bit, no parity.

GPI-1600 DB25-S (female) (TERMINAL)	(cable)	PC RS-232 25 Pin D (male) Serial Port	9 Pin D (male)
Gnd pin 7	shield	Gnd pin 7	Gnd Pin 5
TX pin 3		RX pin 3	RX pin 2
RX pin 2		TX pin 2	TX pin 3

2.2 Connection to Switching System.

The GPI 1600 Salvo Sequence Generator connects to the SAS switching system RS-485 XY serial bus. Reference your system specific wiring information. The 32000 Series systems have one common RS-485 XY Party Line. A typical connection is shown below to pins [C2, B2 (A2) ; +, - (shield)]. The 64000 Series systems have up to six RS-485 XY busses. A typical connection would be to XY bus 2 [C3, B3 (A3) ; +, - (shield)].

The ‘System RS-485 bus’ connects to the central XY control panel and other units which have access to all outputs and inputs. The 16000 Series has 16 universal RS-485 ports. Enable the port to which the GPI 1600 will connect as an ‘XY device’. The GPI-1600 provides a DE9P (male) connector on the rear panel for connection to the system RS-485.



Communication to the system can be verified by the SYSTEM OK LED on the front panel of the GPI-1600. Ensure steady / pulsating ON state. Disruption or communication errors are indicated by OFF state or occasional flickering.

The relay status will be displayed on the front panel of the GPI-1600 LED display "OUTPUT TRIGGER STATUS". This display will indicate any relay that is Active.

2.3 Software Installation & Startup

To install the SAS Automation Software insert the software disk in the computers floppy drive, switch to the drive letter for the floppy drive (either A: or B:) and type "INSTALL A: C:" (without the quotes). The install batch file will create a directory on the computers hard drive called C:\SASAUTO and copy the program files into it. The software may be installed in a different drive/directory by manually creating a directory in the desired location and copying the program files into it.

Before starting the software make sure the P.C’s **TIME** and **DATE** are correct then change to the directory containing the program files and type " SASAUTO.EXE " (without the quotes) followed by any command line switches necessary to configure the software for the system. The command line options are listed in the following section along with the program defaults. If the defaults are acceptable no command line switches are necessary.

When the program is started for the first time there will be no event.dat file and no events displayed on the screen. To enter the first event press the < Insert > key and a blank event dialog box will pop up. Fill in the various information fields describing the event by typing text and number information (title, time, input/output num & relay num) and using the space bar to toggle on/off the various button fields (days active, event status, type of relay command & type of crosspoint command). When the information is complete and correct press the < F10 > key to save the event to the hard disk. As soon as the first event is defined the event.dat file is created and will store all event information.

Everytime the software is started, the event.dat file will be read. Any events defined will be displayed in the scrolling event window and **Run At Their Defined Times**. If the automation software is not running, the events **Will Not Be Executed**!!. For this reason SAS recommends that this software be run on a computer dedicated to router control only. If multi-tasking software such as Microsoft Windows is used, and properly configured, the computer may also be used to run the terminal software for setup and control of the routing switcher.

2.4 Connecting Station ESE Time Clock Source

The PC may have an ESE Model PC-471 time code reader card installed to synchronize the PC clock to station reference time. The automation system uses the PC time for event execution. The ESE PC-471 can be configured to read ESE or SMPTE time codes.

2.5 Connecting the Relays

The GPI-1600 provides 16 form C relay contact closures. The relays are accessible from the rear panel via two (2) 25 pin D female connectors. One connector for relays 1-8, the second connector for relays 9-16. Refer to drawings RIA16.S02 and RIA16.S03 for connector pinouts.

2.6 Connecting the Optos

The GPI-1600 provides 16 opto-isolated inputs. The optos are accessible from the rear panel via one 37 pin D female connector. The optos will function from 5VDC / 1 milliamp to 24 VDC / 8 milliamp. The unit provides 5 VDC and Common on two sets of pins on the connector for use with dry contacts or if the driving equipment does not have power available.

3.0 Software Description & Operation

3.1 Software Description

The SAS P.C. Automation Software provides an interface with the GPI-1600 to execute router and GPI-1600 operations. Events may be programmed to activate at a time or with an opto activation. The time may be based on the P.C's internal clock or the station time as read by the GPI-1600 (/G command line switch). A single event may include a crosspoint command such as TAKE, SUM ON or SUM OFF and a relay command such as MOMENTARY, LATCH ON or LATCH OFF. A single event may be programmed to run at it's assigned time on multiple days (MON thru SUN).

Several options are available to control the operation of an event. The event may be entered and made "active", in which case it will run at it's programmed time on it's assigned days. An event may be made "inactive" in which case it will remain in the event list but will not run until it's status is changed to "active". A "one-time" event will run once at it's assigned day and time and then will delete itself from the list and an event set to "skip" will miss it's next assigned time slot and then resume it's normal operation.

When the GPI-1600 receives an event from the P.C. it attempts to execute that command via the system 'X-Y' bus. If it is successful it signals the P.C. that a command was successfully completed and the P.C. writes an entry into a log file on the hard drive describing the event and the time it took place (according to the PC's time clock). This log file (TALLY.DAT) may be viewed, edited, printed, trimmed or deleted entirely with a standard text editor. If the file is deleted or moved it will be restarted when the next successful event is run. The logging function may be defeated with the /L command line switch.

Several parameters of the automation software are set with command line switches. These command switches are typed on the command line in any order in the following manner:

```
C:\SASAUTO\sasauto.exe /P=1 /G /L
```

In the above example the automation software is started using serial port 1 (/P=1), using the GPI-1600's time reference (/G) and no tally log file is created (/L).

3.2 Software Operation

Events are displayed in the scrolling event window located in the top section of the screen. The events are displayed sorted first by day, MON thru SUN; then by time 00:00:00 thru 23:59:59; and then by opto. The opto events show up at the end of the time list for the day(s) on which they are programmed. If an event is to be run on multiple days a separate event is shown for each day (figure 1.1). At the bottom section of the screen a three event history window lists the last three events which have run and a single event window displays the next event to be executed. The very bottom of the screen displays the keyboard commands available for the current screen.

To edit an existing event move the screen cursor bar to the event to be edited and press <ENTER>. A dialog box displaying information about the event (figure 1.2) will appear and you may edit any of the event information by moving the blinking cursor to the appropriate location and entering the new information. When you are finished editing pressing the <F10> key will save the modified event by overwriting the old event with
the new information, pressing the <F5> key will retain the original event and add a new event with the modified information or pressing <ESC> will abort the changes and restore the original event data.

To create a new event the <INS> key is pressed and a blank dialog box is displayed. Once the information describing the event has been entered pressing the <F10> key saves the new event to the hard drive list. Pressing the <ESC> key at this point would close the dialog box without saving the event. To move the cursor from field to field within the dialog box the <UP ARROW>, <DOWN ARROW> or <TAB> keys may be used. The <LEFT ARROW> and <RIGHT ARROW> keys are used to position the cursor within the field to be edited. The Spacebar key or the mouse may be used to toggle button fields.

Error detection has been provided to prevent invalid time information or out of range input, output and relay numbers from being entered. The current system time is displayed at the top of the screen along with an indication if GPI-1600 time sync is being used, two information fields in the middle of the screen indicate the number of events in the list (Total Events), and the number of events to be processed (List Size). One event, active on 4 days equals Total Events[1] and List Size[4].

Current system status may be obtained using a dialog box which is activated by the F4 key. The system status box (figure 1.3) displays the current serial port settings, the amount of RAM memory left available on the P.C, the status of the serial connection with the GPI-1600, which time clock is currently active (PC or GPI), the version number of the software and contact information for Sierra Automated Systems.

MAIN SCREEN KEYBOARD COMMANDS:

PgUP - Displays the previous screenfull of 8 events.
PgDn - Displays the next screenfull of 8 events.
Home - Displays the first 8 events in the list.
End - Displays the last 8 events in the list.
DnKey - Moves the cursor down 1 event.
UpKey - Moves the cursor up 1 event.
Enter - Displays information about the current event for editing.
Ins - Displays blank dialog box for new event to be entered.
Del - Deletes the event at the cursor position.
F1 - Displays system help (Esc exits help screen).
F2 - Writes an events report to the hard drive (report.txt).
F3 - Forces cursor bar to next event to run.
F4 - Displays program information and comm status.
Esc - Exits the program (or help screen if active).

EVENT DIALOG BOX COMMANDS:

UpKey - Moves the cursor up to the previous information field.
DnKey - Moves the cursor down to the next information field.
Tab - Moves the cursor down to the next information field.
Enter - Moves the cursor down to the next information field.
Left Key - Moves the cursor left within the information field.
Right Key - Moves the cursor right within the information field.
BkSpace - Deletes character left of the cursor (inactive in time field).
Del - Deletes the character at the cursor location.
SpaceBar - Toggles button fields on/off (days active, event type, etc).
F5 - Adds edited event as a new event and maintains original event.
F10 - Exits event dialog box and SAVES any changes made.
Esc - Exits event dialog box and abandons any changes made.

COMMAND LINE OPTION SWITCHES:

/? - Displays a listing of all available command line switches.
/H - Displays a listing of all available command line switches.
/G - Sets the automation software to use the GPI-1600 station time.
/L - Defeats the event logging function to the TALLY.DAT file.
/P=x - Specifies which com port is to be used (1 through 4).
/B=xxxx - Specifies baud rate for the active port.
/S=x - Specifies stop bits used for the active port.
/D=x - Specifies data bits used for the active port.
/T=x - Specifies parity for the active port (E=even, N=none, O=odd)

Default settings are: Com2, 19200 baud, 8N1, Use P.C's time clock and Event logging Active.

MAIN SCREEN:

SYSTEM TIME: Mon Jun 10 08:05:08 1996 | SIERRA AUTOMATED SYSTEMS

Day	Time Of Day	Event Title	Active
MON	09:00:00	This is the Title For Event #1	YES
MON	10:15:00	This is the Title For Event #2	YES
MON	11:45:00	This is the Title For Event #3	YES
MON	13:10:00	This is the Title For Event #4	YES
TUE	09:00:00	This is the Title For Event #1	YES
TUE	10:15:00	This is the Title For Event #2	SKIP
WED	09:00:00	This is the Title For Event #1	YES
THU	09:00:00	This is the Title For Event #1	YES

Total Events[4] - EVENT HISTORY AND UPCOMMING LIST - List Size[8]

MON	09:00:00	This is the Title For Event #1

Press ENTER to edit highlighted Event, F1 Help, F2 To Create A Report,
F3 For Next To Run, F4 For Info, INS/DEL To Add/Remove An Event, ESC To Quit

Figure 1.1

EVENT DIALOG BOX:

[EVENT INFORMATION]

Event Title This is the Title For Event #1
Time(hr:mn:sc) 09:00:00 Opto( )

Output [5] Input [5] Take(*) Sm On( ) Sm Off( )
Relay [1] Mom( ) Lt On( ) Lt Off( )

Event Active Yes(*) No( ) Skip( ) One Time( )

Active Days

Mon(*) Tue(*) Wed(*) Thu(*) Fri( ) Sat( ) Sun( )

Figure 1.2

SYSTEM INFORMATION BOX:

PORT(COM2) BAUD(19200) CONN(YES)
FREEMEM 56K, 21823488K TIME(PC)

SYSTEMS AUTOMATION SOFTWARE 3.00

Sierra Automated Systems
2112 N. Glenoaks Blvd.
Burbank, CA 91504
(818) 840.6749

Figure 1.3

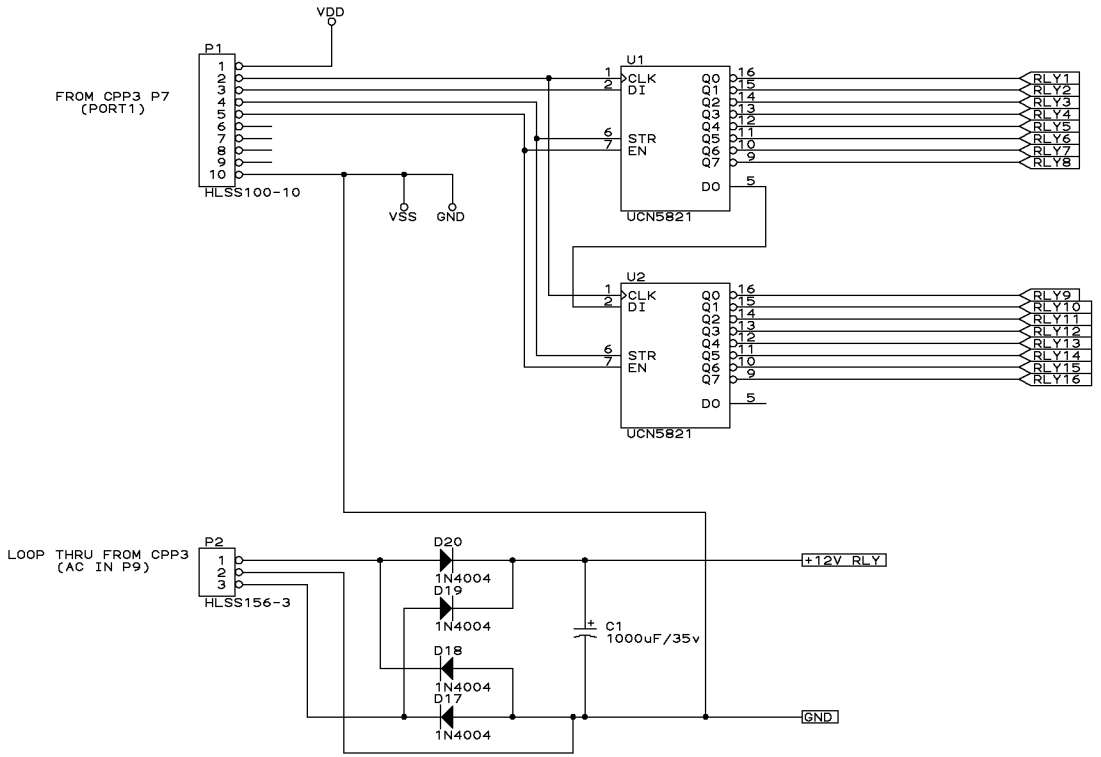
4.0 Specifications

System

SAS Switcher Interface	RS-485 Format, 76.8Kbaud Protocol: Internal SAS32000 XY bus
General purpose outputs (16)	Relay, Form C Contact, dual gold bifurcated crossbar 500 milliamp maximum Momentary closure duration 500 mSec
Opto-isolator inputs (16)	5 VDC / 1 milliamp minimum 24 VDC / 8 milliamp maximum Polarity sensitive
Serial Interface (to PC)	RS-232 Format, 19.2Kbaud 8 bits, 1 start, 1 stop, no parity
ESE Serial Interface	RS-232 Format, 1200 baud 8 bits, 1 start, 1 stop, no parity Requests time every 20 mSec
Internal Time Clock	PC clock

General

Power Requirements	115/230 VAC ±10%, 10 VA max.
Physical Size	1.725" X 19" X 10" (1 RU)



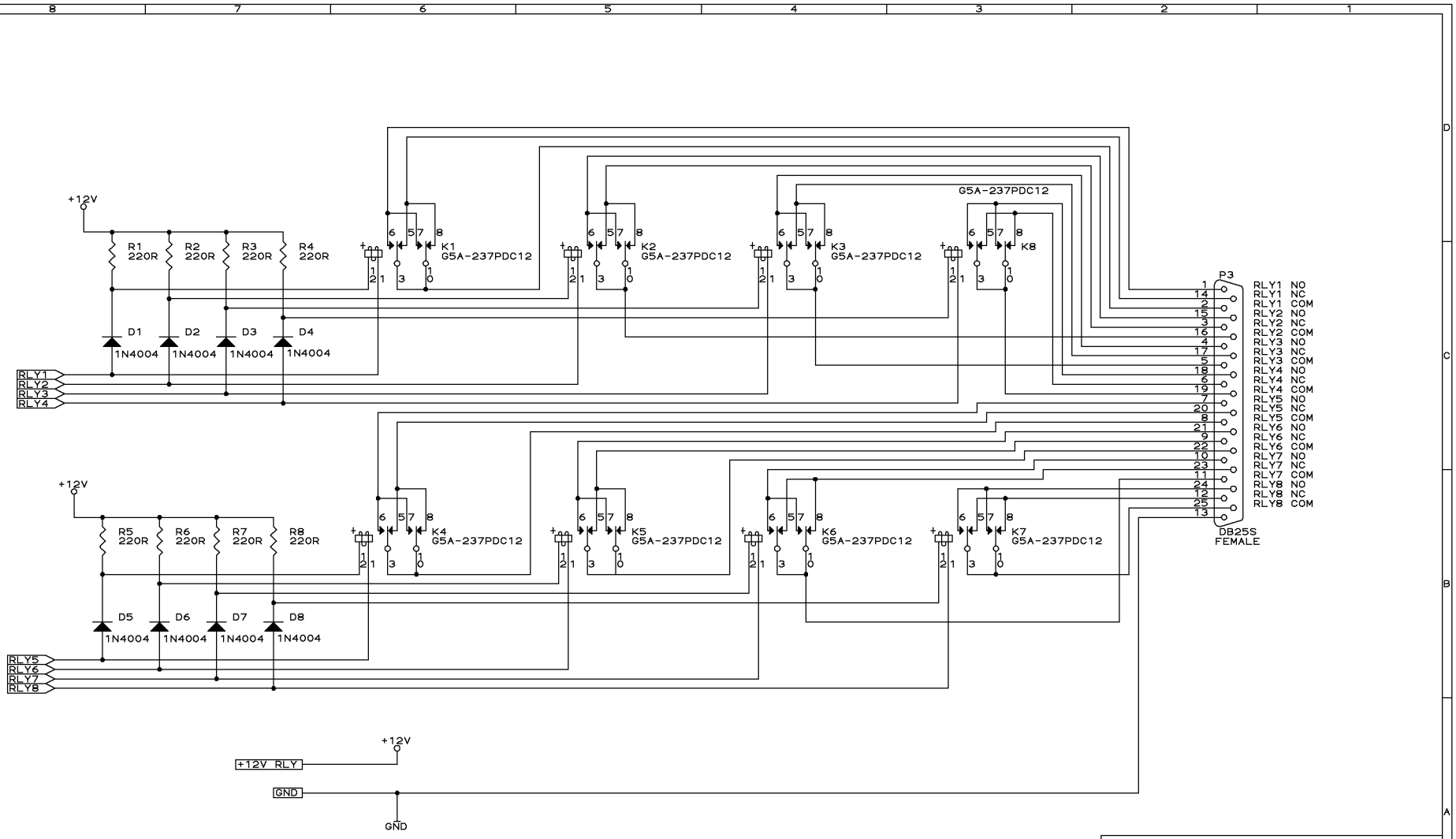
REVISIONS	
B	CORRECT DIODE #S
	CHANGE DOCUMENT NUMBER FROM RIA16.SO1

SIERRA AUTOMATED SYSTEMS

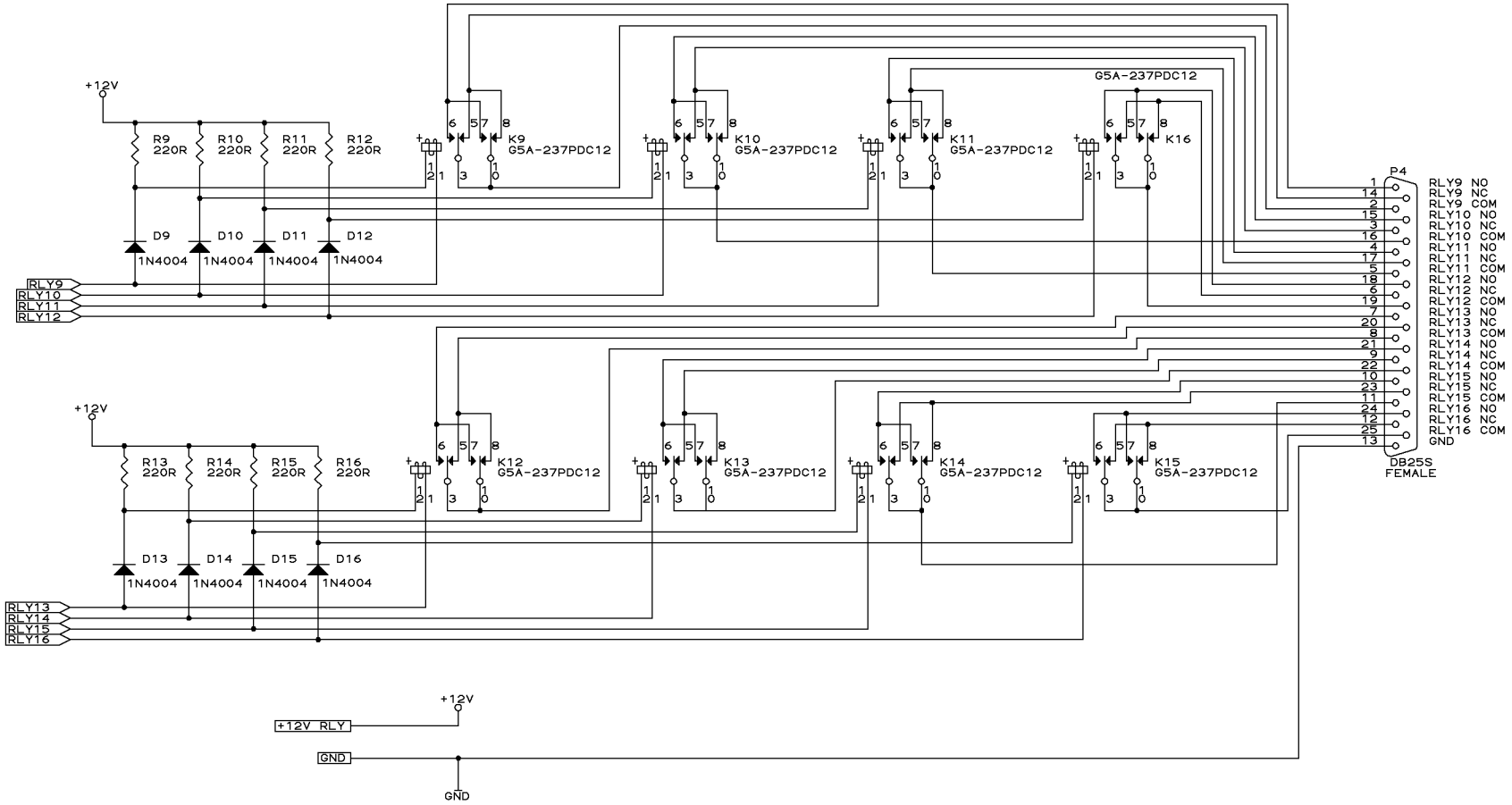
Title: RIA-16 RELAY INTERFACE ADAPTER

Size	Document Number	REV
B	RIA16S1	B

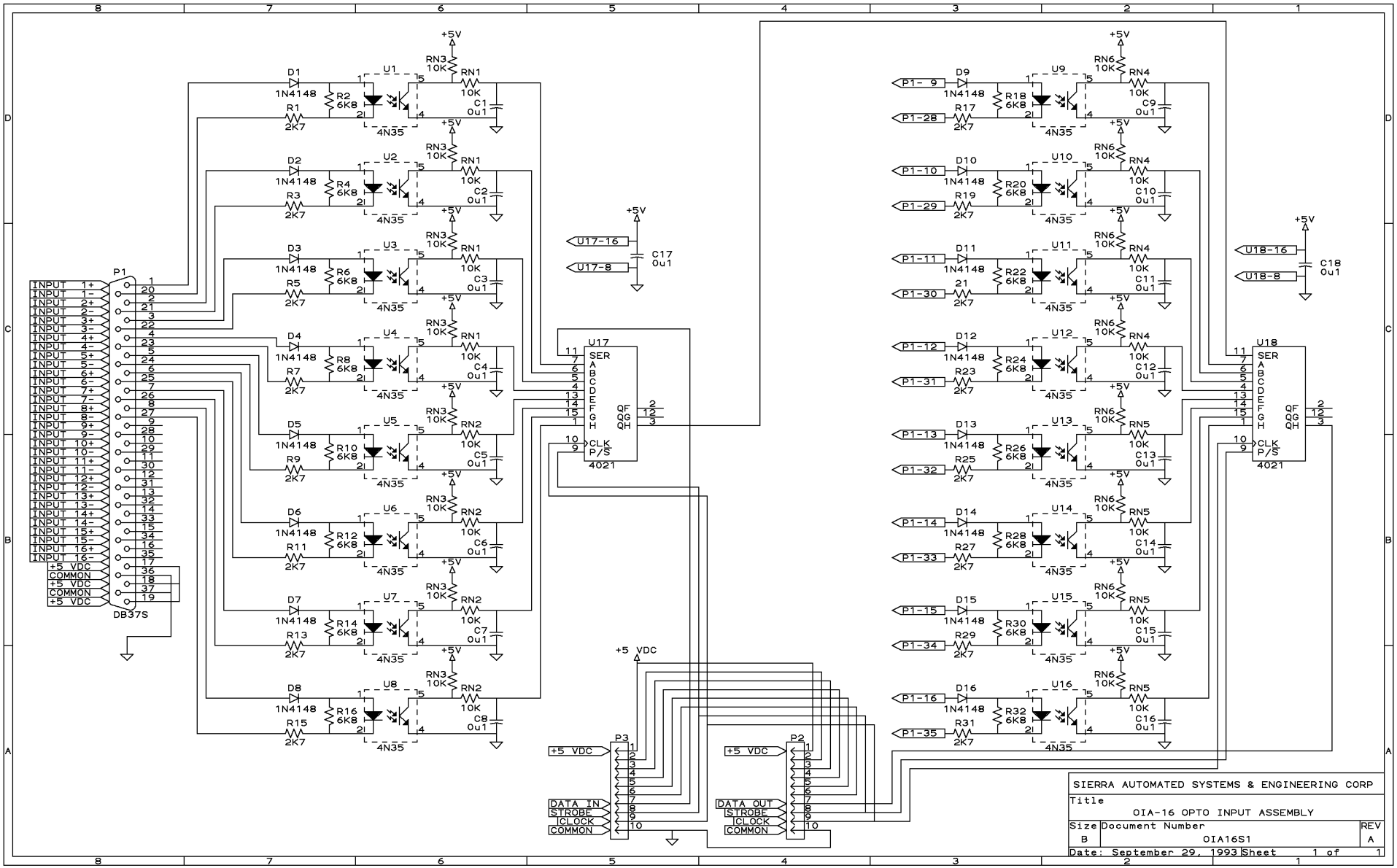
Date: September 16, 1994 Sheet 1 of 3



SIERRA AUTOMATED SYSTEMS		
Title: RIA16 RELAY SECTION A		
Size: B	Document Number: RIA16S1	REV: B
Date: September 16, 1994	Sheet 2 of 3	



SIERRA AUTOMATED SYSTEMS		
Title: RIA16 RELAY SECTION B		
Size: B	Document Number: RIA16S3B	REV: B
Date: September 16, 1994	Sheet 3 of 3	


P1
INPUT 1+
INPUT 1-
INPUT 2+
INPUT 2-
INPUT 3+
INPUT 3-
INPUT 4+
INPUT 4-
INPUT 5+
INPUT 5-
INPUT 6+
INPUT 6-
INPUT 7+
INPUT 7-
INPUT 8+
INPUT 8-
INPUT 9+
INPUT 9-
INPUT 10+
INPUT 10-
INPUT 11+
INPUT 11-
INPUT 12+
INPUT 12-
INPUT 13+
INPUT 13-
INPUT 14+
INPUT 14-
INPUT 15+
INPUT 15-
INPUT 16+
INPUT 16-
+5 VDC
COMMON
+5 VDC
COMMON
+5 VDC
DB37S
D1 1N4148
R1 2K7
R2 6K8
U1 4N35
RN3 10K
RN1 10K
C1 0u1
D2 1N4148
R3 2K7
R4 6K8
U2 4N35
RN3 10K
RN1 10K
C2 0u1
D3 1N4148
R5 2K7
R6 6K8
U3 4N35
RN3 10K
RN1 10K
C3 0u1
D4 1N4148
R7 2K7
R8 6K8
U4 4N35
RN3 10K
RN1 10K
C4 0u1
D5 1N4148
R9 2K7
R10 6K8
U5 4N35
RN3 10K
RN2 10K
C5 0u1
D6 1N4148
R11 2K7
R12 6K8
U6 4N35
RN3 10K
RN2 10K
C6 0u1
D7 1N4148
R13 2K7
R14 6K8
U7 4N35
RN3 10K
RN2 10K
C7 0u1
D8 1N4148
R15 2K7
R16 6K8
U8 4N35
RN3 10K
RN2 10K
C8 0u1
+5V
U17-16
U17-8
C17 0u1
U17 4021
SER
A
B
C
D
E
F
G
H
QF
QG
QH
CLK
P/S
P3
+5 VDC
DATA IN
STROBE
CLOCK
COMMON
P2
+5 VDC
DATA OUT
STROBE
CLOCK
COMMON
P1- 9
P1-28
P1-10
P1-29
P1-11
P1-30
P1-12
P1-31
P1-13
P1-32
P1-14
P1-33
P1-15
P1-34
P1-16
P1-35
D9 1N4148
R17 2K7
R18 6K8
U9 4N35
RN6 10K
RN4 10K
C9 0u1
D10 1N4148
R19 2K7
R20 6K8
U10 4N35
RN6 10K
RN4 10K
C10 0u1
D11 1N4148
21 2K7
R22 6K8
U11 4N35
RN6 10K
RN4 10K
C11 0u1
D12 1N4148
R23 2K7
R24 6K8
U12 4N35
RN6 10K
RN4 10K
C12 0u1
D13 1N4148
R25 2K7
R26 6K8
U13 4N35
RN6 10K
RN5 10K
C13 0u1
D14 1N4148
R27 2K7
R28 6K8
U14 4N35
RN6 10K
RN5 10K
C14 0u1
D15 1N4148
R29 2K7
R30 6K8
U15 4N35
RN6 10K
RN5 10K
C15 0u1
D16 1N4148
R31 2K7
R32 6K8
U16 4N35
RN6 10K
RN5 10K
C16 0u1
U18-16
U18-8
C18 0u1
U18 4021
SER
A
B
C
D
E
F
G
H
QF
QG
QH
CLK
P/S
SIERRA AUTOMATED SYSTEMS & ENGINEERING CORP
Title
OIA-16 OPTO INPUT ASSEMBLY
Size B
Document Number OIA16S1
REV A
Date: September 29, 1993
Sheet 1 of 1