Touch • PLS™

(PLS with Graphical Operator Interface)

Instruction & Operation Manual

Sales and Marketing ▼
343 St. Paul Blvd.
Carol Stream, IL 60188
Tel: (630)668-3900
FAX: (630)668-4676

Factory Customer Service/Order Entry ▼
4140 Utica Ridge Rd.
Bettendorf, IA 52722
Tel: (319)359-7501
(800)711-5109
FAX: (319)359-9094

Application Hotline
1 (800) TEC-ENGR (832-3647)

Vist our web site at: www.avg.net

MAN-M7251-001
REV 00 11/11/98

Touch • PLS™
Instruction and Operation Manual

WARNING

In the application of AVG Automation programmable control devices, you should consider them components. Therefore, provisions other than the programmable control device must be taken to protect personnel in the event of a programmable control device malfunction. Programmable control devices should not be used as stand-alone protection in any application. Unless proper safeguards are used, unwanted start-ups could result in equipment damage or personal injury. If programmable controllers are used with operator interface and like devices, this hazard should be of primary importance. The operator should be made aware of this hazard and appropriate precautions should be taken.

In addition, consideration should be given to the use of an emergency stop function that is independent of the programmable controller.

The diagrams and examples in this user's manual are included for illustrative purposes only. The manufacturer cannot assume responsibility or liability for actual use based on the diagrams and examples.

CAUTION

Do not press the Touch•PLS touchscreen with any sharp objects. This practice may damage the unit irreparably.

Touch • PLS™
by AVG

MANUFACTURING
4140 Utica Ridge Rd. • Bettendorf, IA 52722-1327

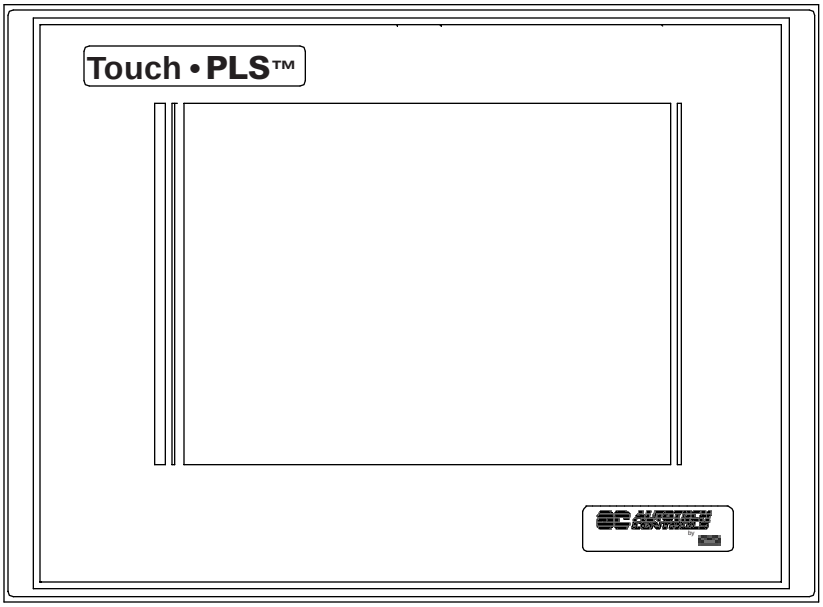
CUSTOMER SERVICE / SALES / MARKETING / ADMINISTRATION
343 St. Paul Blvd. • Carol Stream, IL 60188

Application HOTLINE: **1-800-TEC-ENGR (832-3647)** • Phone: **630-668-3900** • Fax: **630-668-4676**

1st printing — 11/98

Manual Number MAN-M7251-001

1 Overview



Congratulations **on your choice to put the Touch•PLS to work for your control system. AVG Autotech, the company that invented the first microprocessor-based programmable limit switch (PLS) back in 1975, now introduces you to yet another revolutionary concept in PLS technology—a PLS with a *Graphical Operator Interface that you can customize to suit your particular needs.***

The Touch•PLS uses a resolver as a position transducer (such as AVG Autotech's RL100, E7R and E8R Series resolvers). Unlike incremental encoders, the resolver, along with its noise-immune ratiometric converter, always gives true machine position, even if the machine has moved during a power outage. The resolver is constructed to be rugged and reliable, even in temperature and humidity extremes, and under prolonged exposure to mechanical shock and vibration.

The Touch•PLS brings operator-friendly touchscreen control of the PLS to your application, but also offers you the *most advanced PLS Features*. These features are described below:

- **Leading and Trailing Edge Speed Compensation**

  The Touch•PLS features Leading and Trailing Edge Speed Compensation (Rate Offset) to compensate for speed variations. The Rate Offset, individually programmable for each channel, is used to advance the PLS settings as a function of the machine speed.

- **Pulse Programming**

  Touch•PLS can be fine-tuned while your machine is running. Either or both of the ON and OFF Setpoints can be incremented or decremented, or a fixed dwell can be incremented or decremented as needed.

- **Angle ON / Time OFF**

  The Touch•PLS can be programmed to have its outputs turned ON at an angle and turned OFF after a programmed time by touching the screen. For example, channel 12 can be turned ON at an angle of 100° and stay ON for a period of 2.45 seconds.

- **Programmable Functionality: Brake Wear and ModZ**

  The Touch•PLS features a dynamic zeroing or ModZ (Modification Zero) to modify the zero reference point independent of the actual resolver position. After the PLS receives the ModZ input, the resolver position is reset to zero. The Touch•PLS can also perform Brake Wear Monitoring to satisfy the OSHA requirement. This PLS can be field programmed to have either ModZ or Brake Wear Monitoring functionality. (You must select one or the other, the PLS *cannot* perform both ModZ and Brake Wear functions at the same time.)

- **Flexible Group Assignment**

  When it is desirable to control several different machines linked to the same drive shaft, the Touch•PLS's Flexible Group Assignment can be a powerful and useful feature. Output channels may be grouped into one of five independent sections. The Base Group is always PLS, while the other Groups 1-4 may be defined as PLS or ModZ type. Each PLS Group has its own Group Offset, while each ModZ Group has its own ModZ Inhibit Zone.

- **Built-in Motion Detector and Tach**

  The Touch•PLS has a built-in Tachometer and Motion Detector. In the Tach Mode, the Touch•PLS displays the machine shaft speed in RPM. The Motion Detector energizes a relay when the RPM is between the programmed Low and High Limits.

- **Password Protection**
  The Touch•PLS has a Password Protection feature eight-levels deep. Up to eight different passwords (user programmable from the touchscreen) allow access to different screens in the Touch•PLS, providing ultimate protection and security of machine settings.

1.1 Touch•PLS as Stand-alone Product or as Part of Control System

Used as a stand-alone product, the Touch•PLS comes with a preloaded "Core Program" in its memory. Simply connect the resolver and power leads, turn it on, and the factory-installed program provides all of the screens essential to setup and monitor your PLS. Each screen consists of displayed text and graphics, plus pushbuttons, all implemented for quick operator access directly on the configurable touchscreen.

If this is all your application demands, follow the instructions to configure your PLS and you're ready to run. For secure backup, and as an aid to customizing the Touch•PLS to your application, a copy of the Core Program Software has been provided on a 3.5" Floppy Disk.

When you need more than a simple stand-alone application, integrating the Touch•PLS with a PLC offers almost limitless possibilities. Touch•PLS's PowerPanel touchscreen operator interface is fully ready to integrate the power of a PLS and a PLC into a seamless system, bringing the ease of touchscreen control to your machinery in the simplest manner yet devised.

Because the operator interface uses two processors, one for the PLS operation, and the other to manage, display, and communicate with the PLC, the Touch•PLS can share PLS information with the PLC, while displaying the data from both on a single screen. Bar code readers, printers, and a marquee can also be connected and configured with the Touch•PLS.

Also included with your unit is a copy of *u*WIN Programming Software (P/N 10F64). You will need it to install *u*WIN on a PC so you can modify the Core Program, as needed.

Over 30 models of PLCs can be accommodated by the Touch•PLS's library of drivers and new drivers are continually being added. (Contact AVG Autotech if your PLC is not in the following list.)

PLC's

Allen-Bradley Remote I/O
Allen-Bradley Data Highway Plus
Allen-Bradley SLC500 AIC
Allen-Bradley SLC500 DF1
Allen-Bradley PLC5 DF1
CTC 2200 and 2600 Series
GE Fanuc Series 90 SNP/SNPX
GE Genius I/O
IDEC
Keyence
Klockner-Moeller PS 306/316
Klockkner-Moeller PS4-201-MM1
Koyo (PLC Direct)
Magnetek
Mitsubishi
Modicon AEG
Modicon Modbus
Modicon Modbus Plus
Omron Host Link
Profibus
Reliance Automate 15/20/30/40
Square D Symax
Siemens/TI Series 5x5
Siemens/TI Series 100
Siemens S7
Texas Instruments
Toshiba
UTICOR Director 6001

1.2 Easy, Economical, Flexible

More than just a touchscreen-based replacement for hard-wired switches, pilot lights, LEDs, etc., the Touch•PLS can accommodate changing production requirements, often in minutes, with its advanced graphical operator interface—and you can make these changes online, offline, or even remotely (with a modem connection you can access and change your Touch•PLS program at any time, from just about anywhere!)

The OI part of the Touch•PLS offers you functionality that is not possible with discrete operator panels. It's not only an *economical replacement for common hard-wired panel components*, such as pushbuttons, pilot lights, and selector switches, it also provides complete flexibility—with the Touch•PLS, your panel is never obsolete! Additionally, panels based on Touch•PLS can be made far less cluttered by displaying only the necessary controls, thereby reducing possible operator confusion.

The PowerPanel touchscreen used in the Touch•PLS has been designed to interchange and display graphical data from a programmable limit switch (PLS) by merely touching the screen.

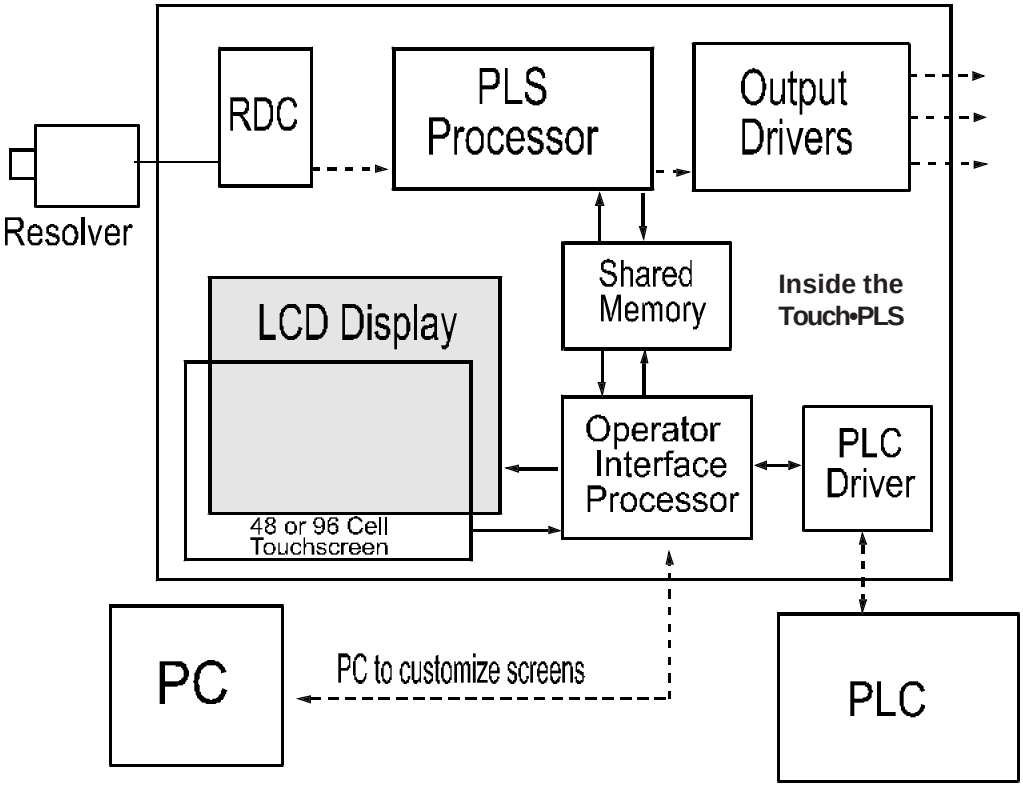
The Touch•PLS is available in four display types designed to suit any application and budget. Any of these display types may be ordered with eight or 16 outputs and N-Type or P-Type output polarity. All other features remain the same, except for the size and availability of colors on the screen. The four display types are listed below:

- **5" Color** The 5-inch TFD color model offers 16 bright colors, high contrast with 320 x 240 pixel resolution, and an 8 x 6 touch-cell grid.
- **5" Color** The 5-inch passive color model offers 16 colors with 320 x 240 pixel resolution, and an 8 x 6 touch-cell grid.
- **6" Monochrome** The 6-inch monochrome model provides 320 x 240 resolution with 3 shades of grayscale and an 8 x 6 touch-cell grid.
- **10" Color** The 10-inch color model comes with a bright 640 x 480 resolution, 16 color display and a 16 x 12 touch-cell grid.

1.3 How does the Touch•PLS work?

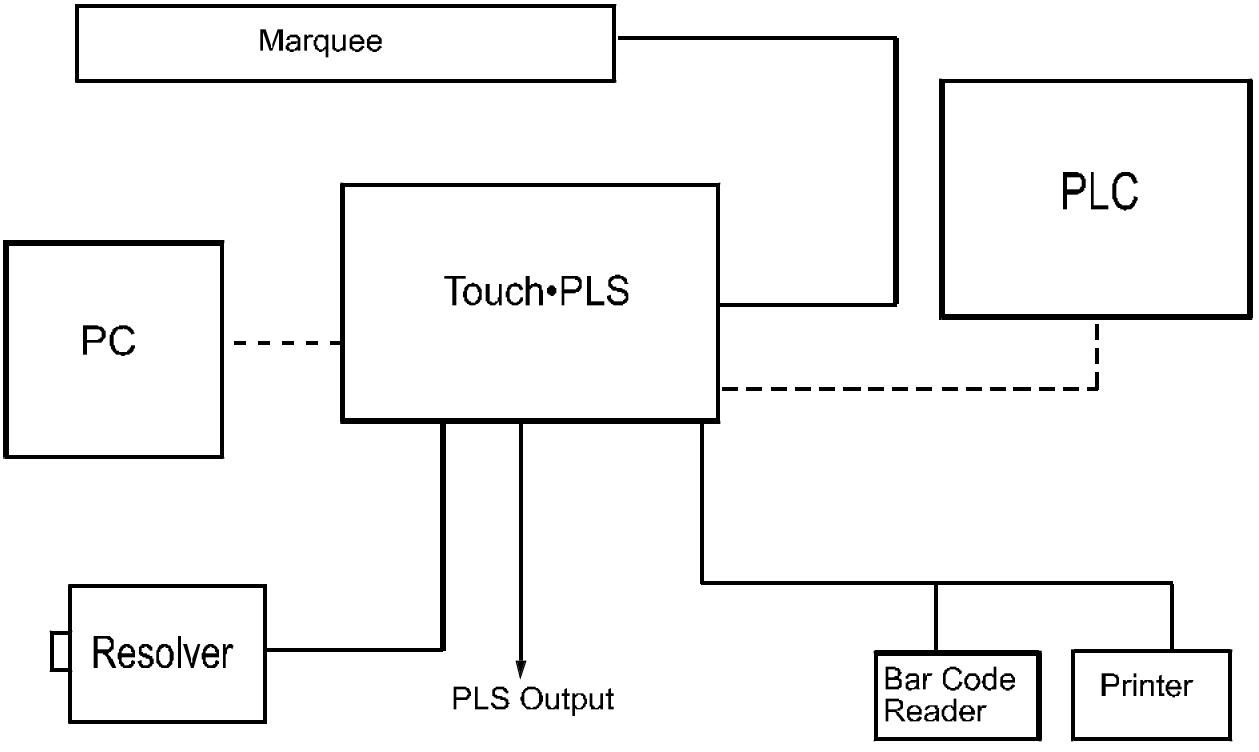
Principle of Operation
The Touch•PLS, as shown in the block diagram below, uses two processors, one for the PLS and the other to manage, display and communicate to the PLC, if used. The PLS processor reads its position signals from the resolver mounted on the machine shaft. It controls position-based outputs independent of the interface processor, providing fast repeatable outputs. There are 2,048 registers available for mapping the PLS. The PLS processor and the interface processor share information using a 1,024 register-shared memory. The dynamic information, such as position, RPM, and output status, is available to the interface processor for display through registers.

The interface processor also shares data with the connected PLC through the first set of 1,024 registers. (Registers 1,025 through 2,048 may only be used as internal registers or mapped to the PLS). This arrangement makes it easy to display data from both the PLS and the PLC on one screen. 32 registers (16 in each direction) are used to exchange time-critical information between the PLC and PLS through the interface processor. These registers can be used to send position, RPM, and output status information to the PLC.



Touch•PLS Total Integration

Until the advent of the Touch•PLS, the only way you communicated your machine position, speed, or PLS status to a PLC network, was through hard-wired discrete outputs. As far as the PLS program settings were concerned, they were simply not available to the PLC. The Touch•PLS can communicate to more than 30 different PLCs and their networks through a serial connection such as A-B DH+, A-B Remote I/O, Modbus Plus, or Profibus. The entire PLS program can either be uploaded or downloaded to the PLC through this serial bus connection. PLS status can also be fed to the PLC through the same bus connection. Hard PLS outputs are available to activate machine solenoids directly.



1.4 Manual Organization

All of the information that you will need to use the Touch•PLS is in this manual. This manual will take you through the steps necessary to get your Touch•PLS up and running in the shortest possible time. Although your familiarity with programmable graphic operator interface devices will determine how quickly you move through the steps—we provide you with simple, easy-to-follow instructions and examples throughout this manual. The remaining Sections of this manual are listed below and show you where the information you need is to be found!

Section 2

Provides you with the instructions you need to install the Touch•PLS. Included are:

- Mounting Dimensions
- Wiring Requirements and DIP Switch Settings
- Setup Instructions

Section 3

Remember that the Touch•PLS is shipped to you with pre-programmed screens for PLS operation—we'll show you how easy it is to setup and monitor your PLS with the Touch•PLS.

Once you have the Touch•PLS installed you are ready to operate the software. Included in this Section are instructions for:

- PLS Functions
- User-Defined Parameters
- Speed Compensation
- Modification to Zero (ModZ)
- Brake Wear Monitor Time Limit
- Error Messages

Section 4

Section 4 describes the Core Program that is factory installed in your Touch•PLS. The Core Program is unique to the particular Touch•PLS Model you have received (e.g., 8 output vs 16 output models). Because the display is larger in the 10" Color Touch•PLS, some of the screens that appear in the 5" and 6" display size units have been combined. Core Program Screen Maps are provided for the 10" model, and the 5"/6" models, along with many actual screen shots for both, with a brief description of their function. All significant differences in the screens between model types are shown.

Section 5

Please note that you can start designing your screen offline immediately after installing *u*WIN—you don't need to have the hardware installed!

You will refer to section 5 when modifying the Core Program. We'll show you how to:

- install and access *u*WIN Programming Software.
- use *u*WIN to modify or "customize" screens for the Touch•PLS series of operator interfaces.

.

1.5 What you need to get started:

Hardware

- Touch•PLS
- RS-232C or RS-422A/485A interface cable
- Power Lead
- An IBM or compatible PC with
  - Mouse
  - Separate Serial Port
  - VGA display
  - 4 Mbytes RAM (8 Mbytes recommended)
  - Windows 3.x or higher

Software

- *u*WIN Programming Software (P/N 10F64) (if modifying or customizing the core program to fit your particular application)

1.6 Need HELP?

Touch screen here (on HELP pushbutton for Help)

On-screen HELP
Help screens are available in the Core Program. Just PRESS the HELP pushbutton to access applicable Help screens. If you are modifying your core program using *u*WIN, extensive online Help is available. CLICK on the word Help on the Main Menu Bar. Also, one of the most important features of the *u*WIN programming software is the availability of context sensitive, on-screen Help. To access the Help windows, simply press the F1 function key while on the topic where you need help. For example, if you need Help while working with base screens, hit the F1 function key while in that area and a pop-up window will be displayed.

Fly-Over HELP
When in *u*WIN, and the mouse cursor comes to rest over any toolbar or toolbox button for a short while, a small window will appear containing a brief description of the function of that particular button. The window will disappear as soon as the cursor is moved.

Still Need HELP?

Technical Support
Although most questions can be answered with the Core Program Help screens, *u*WIN HELP, or the manuals, if you are still having difficulty with a particular aspect of installation or operation, technical support is available at our **Application HOTLINE** 1-800-TEC-ENGR (832-3647) or FAX us at 1-630-668-4676. ***Visit us at our website www.AVG.net.***

1.7 Specifications

Position Resolution: 1 part in 1,000

Update Time: 1.5 msec

Programmable Parameters:
Scale Factor
Position Offset
On / Off Setpoints
Setups
Speed Compensation
Motion Limits : High & Lo (RPM)
Brake-Wear Monitor Limits: Caution & Danger (9.99 sec. max.)

Scale factor:
Programmable from 16 to 999, common to all PLS setup

Position Offset:
Programmable to full -scale factor value, common to all PLS setup

Number of PLS On / Off Set points:
112 per PLS setup (56 per group of eight outputs)

Number of PLS Setups: eight

Speed Compensation:
Programmable in scale factor units per 100 RPM, up to full-scale factor value. Each PLS output (channel) has its own leading and trailing edge speed compensation

Motion Detector:
Low and High motion limits, common to all PLS setups, programmable from 0 to 999 RPM

Brake-wear Monitor:
Caution and Danger Limit, 9.99 sec. max.

Number of PLS outputs: 16 total

Dynamic Zero or ModZ Input or Brake Input:
Modification Zero on the fly with an external input (edge triggered) or brake input

Serial Communication: via RS-485A port

Broken Resolver Wire Detection:
Indication for broken wire in I/O Status

Discrete (hard-wired) Outputs/Inputs Operation

(On = Logic True, Off = Logic False)

Caution Output
On = if stopping time exceeds the caution limit
Off = if stopping time is within the caution limit

Danger Output (fail safe)
On = if stopping time is within the danger limit
Off = if stopping time exceeds the danger limit

PLS Outputs
On = if current position is within the dwell (on/off setpoint)
Off = if current position is outside the dwell (on/off setpoint)

PE (Program Enable) Input
On = Programming Enabled
Off = Programming Disabled

Brake Input
On = Run Mode
Off = Brake Mode

Note: The timer for the Stopping Time monitoring will start when the Brake input goes from the On (Run Mode) to Off (Brake Mode) state.

Specifications *(continued)*

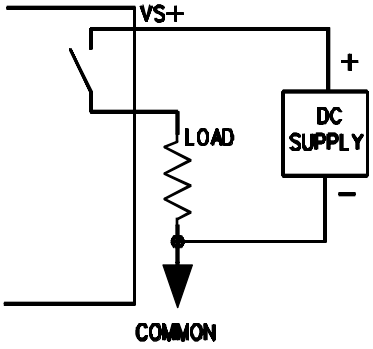
Model	5" Passive Color	5" Active Color	6" Monochrome	10" Color
Display Type	5" Passive (STN) Color	5" Active (TFD) Color	6" Monochrome LCD, 3 levels grayscale	10" Color - 16 Colors
Display Size	4.04 x 3.03" (102.6 x 77.0 mm)		4.7 x 3.5" (119.4 x 88.9 mm)	8.3 x 6.2" (210.8 x 157.5 mm)
Screen Pixels	320 x 240			640 x 480
Touchscreen	48 resistive touch cells (8 x 6)			192 resistive touch cells (16 x 12)
Service Power	21.6 - 32 VDC Input			21.6 - 32 VDC Input 115/230 VAC/DC Input
Power Consumption 24 VDC 115/230 VAC/DC	 18 W ---		 12 W ---	 1.25 A < 40 VA < 40 VA
Fuse	1.5 A @ 24 VDC		3/4 A @ 24 VDC	2 A @ 24 VDC 1 A @ 115/230 VAC/DC
Enclosure	NEMA 4			NEMA 4X
Operating Temperature	32 to 122 °F (0 to 50 °C)	32 to 131 °F (0 to 55 °C)	32 to 104 °F (0 to 40 °C)	32 to 113 °F (0 to 45 °C)
Storage Temperature	-40 to +149 °F (-40 to +65 °C)	-40 to 167 °F (-40 to +75 °C)	32 to 133 °F (-20 to +60 °C)	
Humidity	10 to 95% R. H., noncondensing			
Electrical NoiseTolerance	NEMA ICS 2-230 showering arc, ANSI C37.90a-1974 SWC, ANSI C37.90a- 1974 SWC Level C Chattering Relay Test			
Burn-In	All AVG UTICOR products are temperature cycled 96 hours and then are fully, functionally tested			
User Memory	256 Kbytes			256 Kbytes or 512K RAM or Flash
Real-Time Clock	+1, -2 min. per month error maximum			+30, -60 sec. per month error maximum
PLC Interface	Direct Register Access (program port or remote I/O)			
Serial Interface COM Port 1 Extra Printer PLC Port COM Port 2	 RS-232C, RS-422A RS-232C, RS-422A RS-232C, RS-422A RS-422A		 RS-232C RS-232C,RS-422A/485A RS-232C,RS-422A/ 485A, Current Loop RS-422A	 RS-232C, RS-422A/485A RS-232C, RS-422A/485A RS-232C, RS-422A/485A RS-422A/485A
NOTE: When the unit is in RS-422A or RS-485A mode, the RD (receive data) lines may be terminated by 150 Ohms through the user accessible switch selection.				

I/O Electrical Specifications

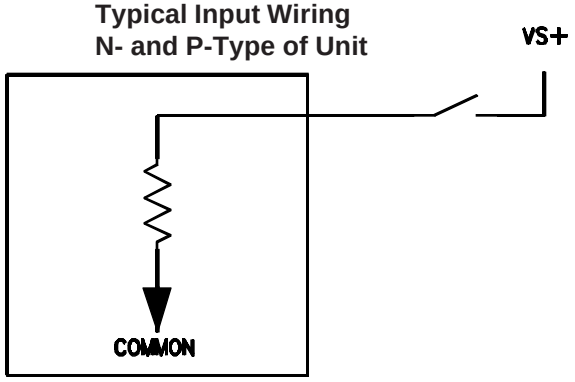
I/O Power Input: 24 VDC Nominal (20-30 VDC) @ 100 mA + user loads.
Customer supplied: 24 VDC Power VS+, VS-; 20 to 30 VDC @ 100 mA plus current used by user's loads and inputs.

To maintain optical isolation, I/O power should be separate from Service Power

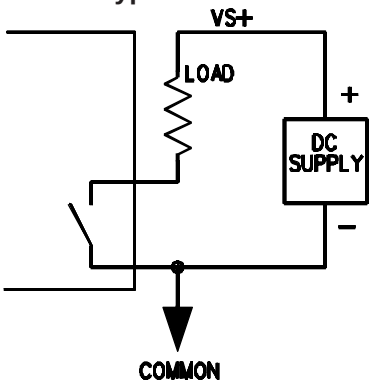
Typical Output Wiring
P-Type of Unit



Typical Input Wiring
N- and P-Type of Unit



N-Type of Unit



N-TYPE UNIT (SINKING)

Output Logic Levels:
Logic True: MOSFET On, 0.2 V Max. @ 100 mA
Logic False: MOSFET Off, 0.05 mA leakage @ 30V
Max. Current per Output: 600 mA
Max. Current per Card (all Outputs): 2 A
Output Isolation: 1,500 V

Input Logic Levels:
Logic True: 6–30 VDC
Logic False: 0–1.5 VDC
Input Isolation: 1,500 V

P-TYPE UNIT (SOURCING)

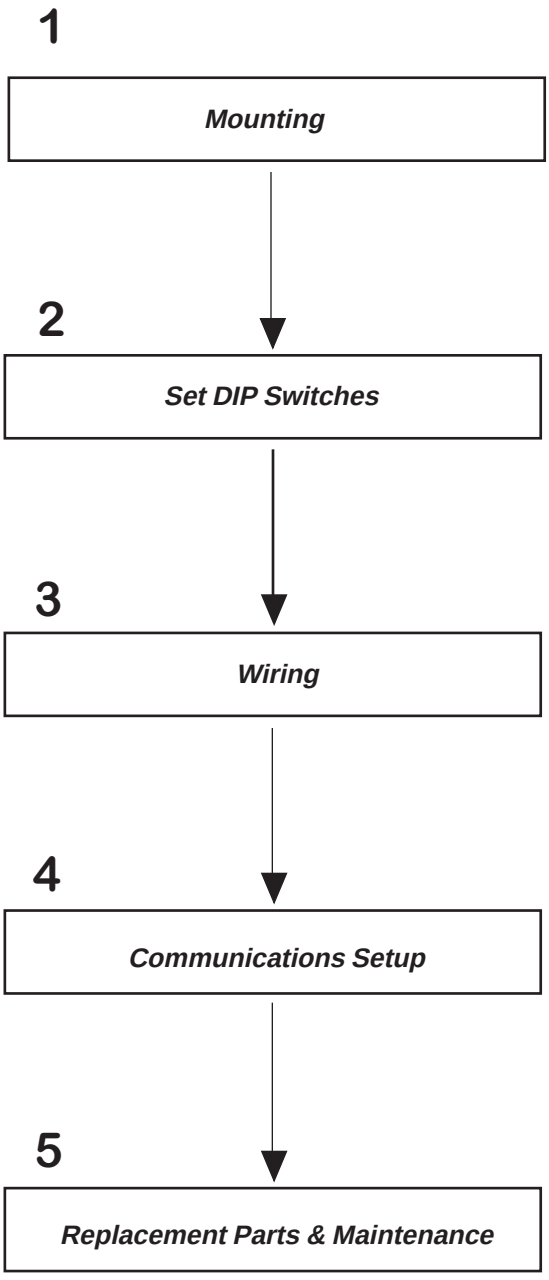
Output Logic Levels:
Logic True: MOSFET On, 0.5 V Drop @ 100 mA
Logic False: MOSFET Off, 0.05 mA leakage @ 30 V
Max. Current per Output: 600 mA
Max. Current per Card: 2 A
Output Isolation: 1,500 V

Input Logic Levels:
Logic True: 6–30 VDC
Logic False: 0–1.5 VDC
Input Isolation: 1,500 V

This page intentionally left blank.

2 Touch • PLS Installation

Installing the Touch•PLS requires the following major steps:



The Touch•PLS is a front-panel mounted unit. Mounting the unit requires a panel cutout, and drilling six holes for the mounting screws. Please see the following Section 2.1, pages 14–17, for dimensions.

Now that your Touch•PLS is mounted, you are ready to set the DIP switches for the PLC port type (if used), for the AUX port type (if using a printer, bar code reader, etc.) and COM port type. The Touch•PLS's PLC Port supports RS-232C, RS-422A, and RS-485A connections. Based on your PLC's requirements, set DIP Switches on the back of the unit to select the appropriate Port type. See Section 2.2 for more information.

In this step, you will be shown how to wire the Touch•PLS to the Resolver, Power Supply, and (if used) the PLC, Computer, Bar Code Reader, and Printer. Note Touch•PLS is a DC-powered unit (24 VDC). See Section 2.2 for diagrams and wiring information.

Touch•PLS has some user-defined parameters, such as: communication settings (baud rate, parity, etc.). The unit is shipped with factory default values for these parameters. Check default settings (provided in Section 2.3, page 31). To change any value, please enter "Set-up Mode" on power-up and follow the procedures provided in Section 2.3, beginning on page 29.

Batteries, fluorescent bulbs, and fuses will, from time to time, have to be replaced. Replacement parts information is provided in Section 8, page 71. Also provided in this section is a brief description of how to maintain the touchscreen (page 73).

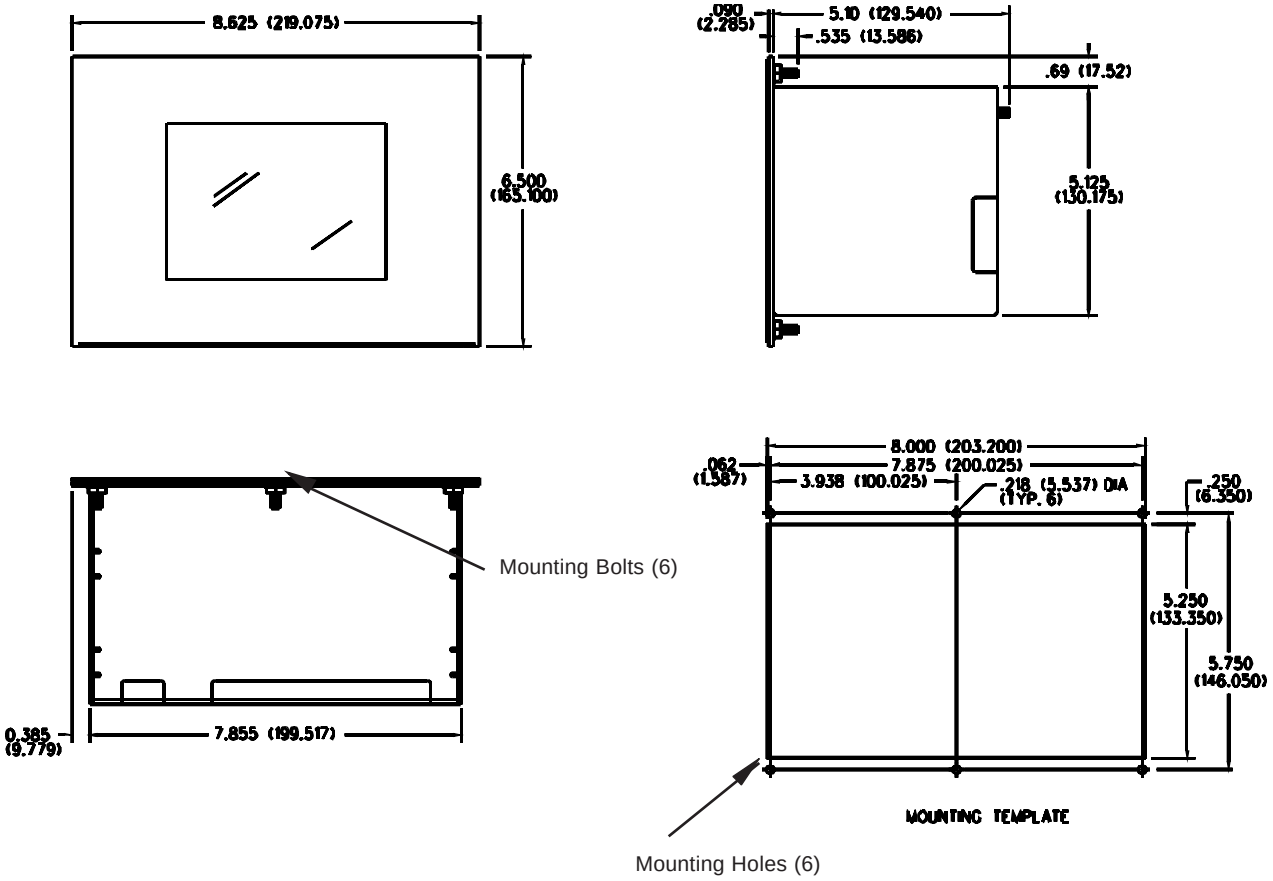
2.1 Touch •PLS Mounting

The Touch•PLS is a available in four models. This section provides the outline and mounting dimensions.

Use the outline and mounting dimensions to install the Touch•PLS.

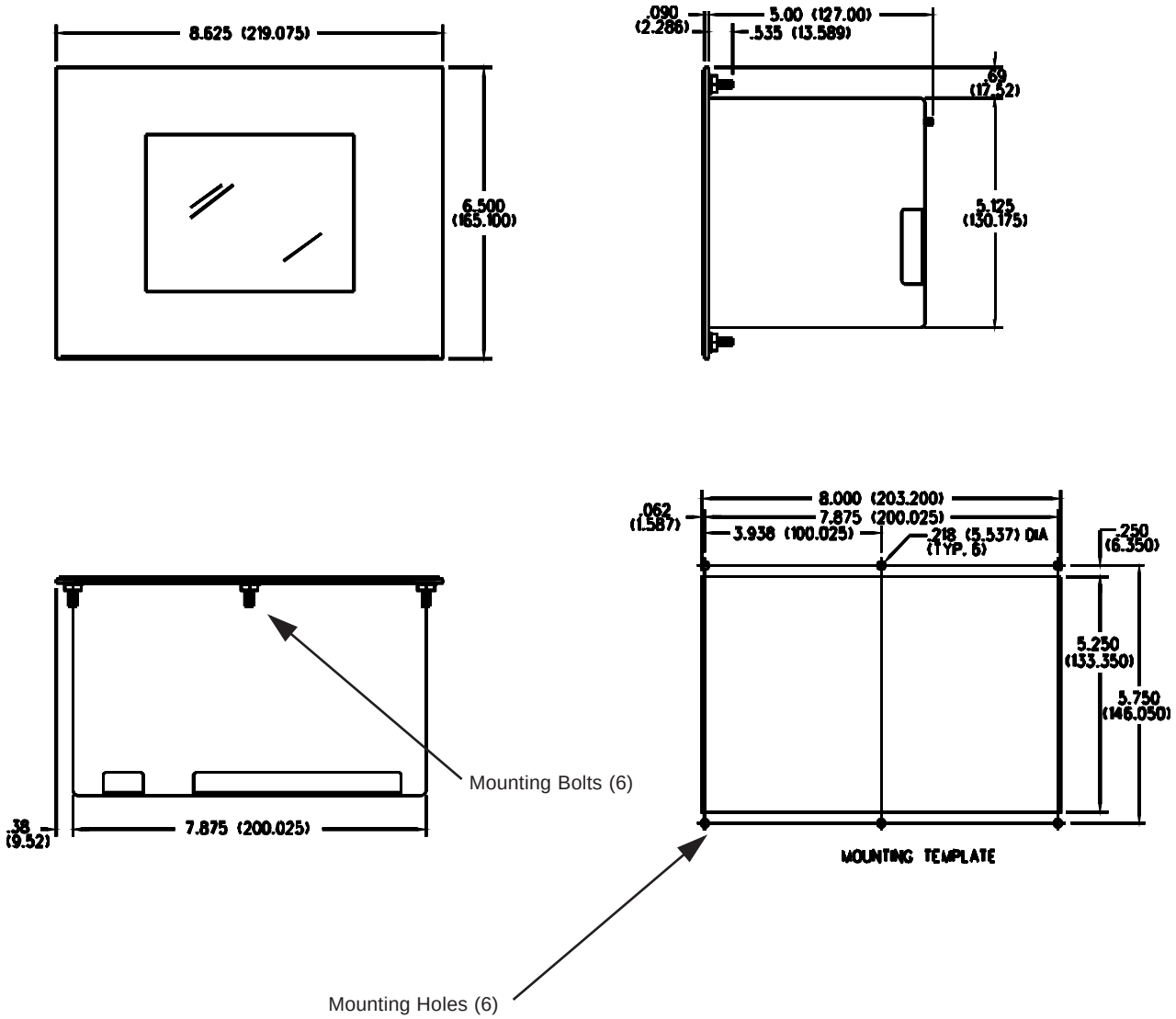
The 5- and 6-inch models require 6 screws and nuts with captive washers. The 10-inch model requires 10 screws and nuts with captive washers. All the necessary mounting hardware is provided with the unit.

5-inch Color Model



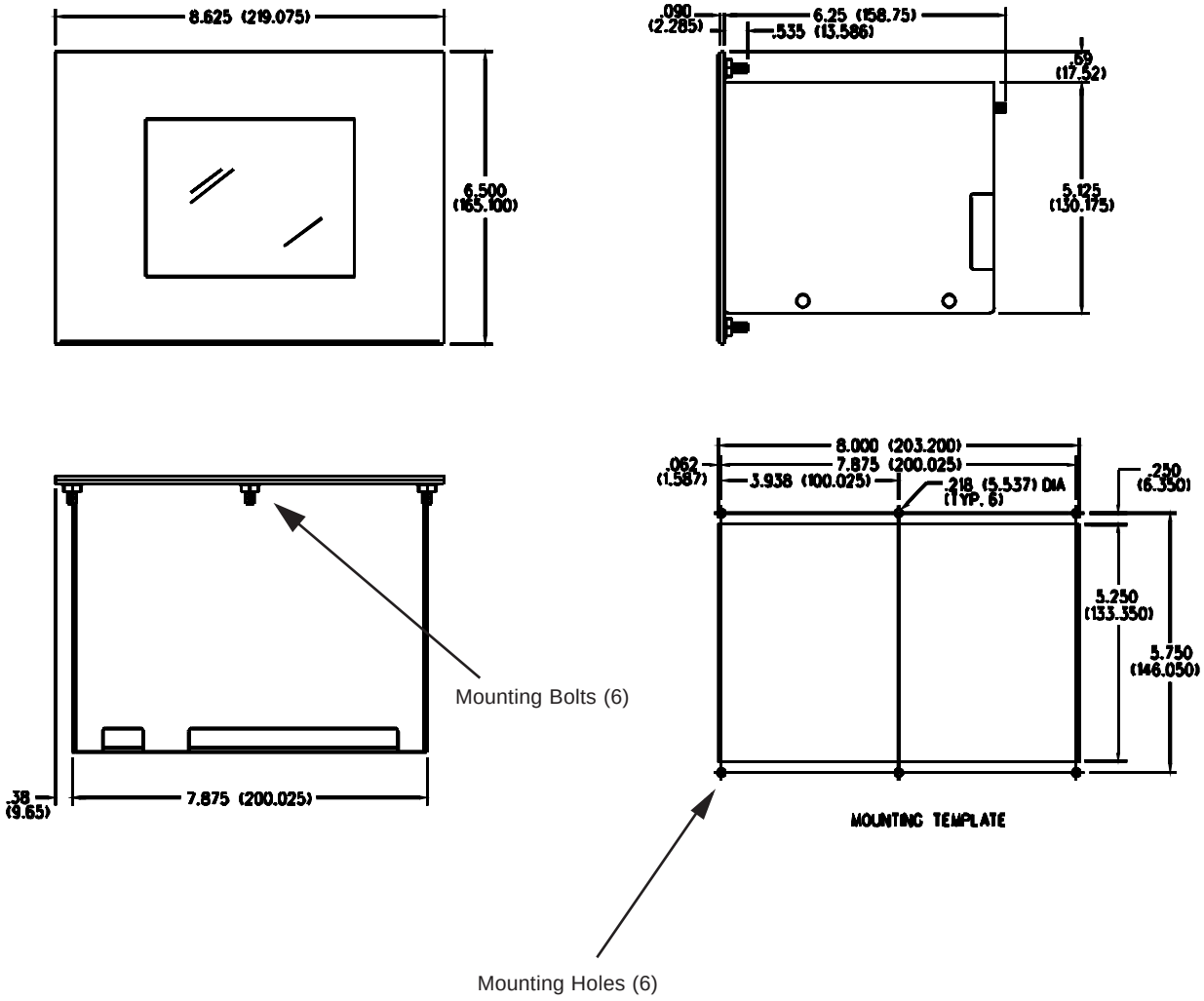
Outline Dimensions & Mounting Template

5-inch TFD Color Model



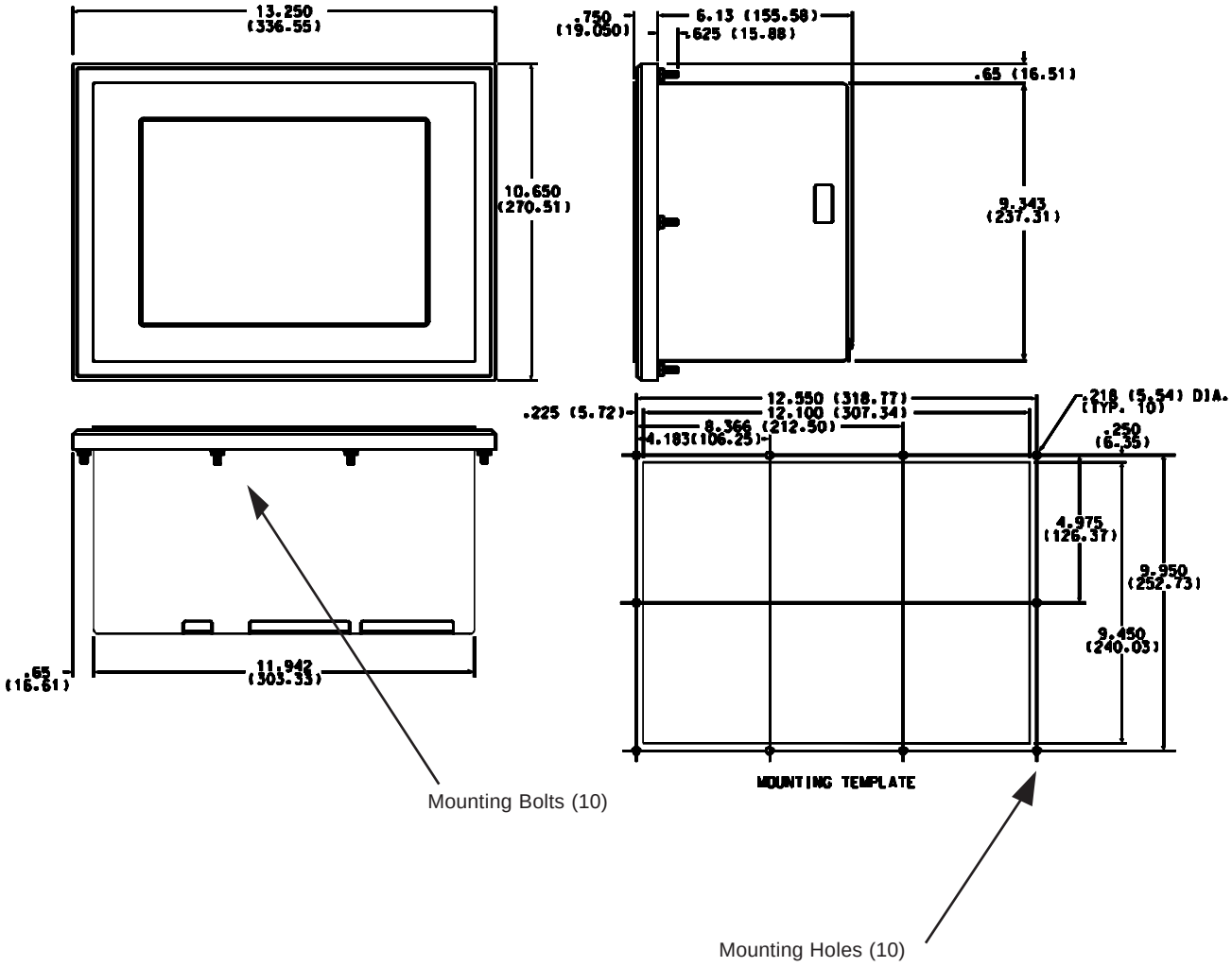
Outline Dimensions & Mounting Template

6-inch Monochrome Model



Outline Dimensions & Mounting Template

10-inch Color Model

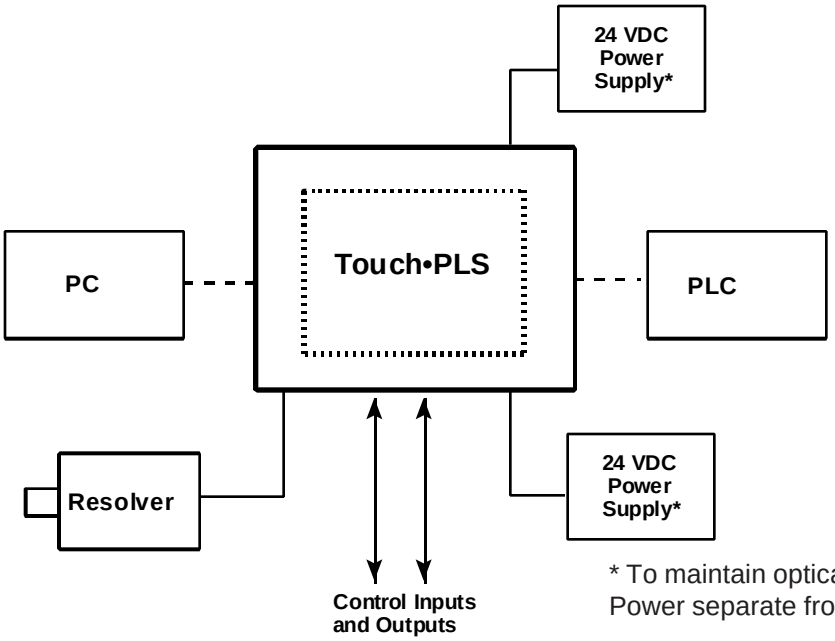


Outline Dimensions & Mounting Template

2.2 Set DIP Switches and Wiring

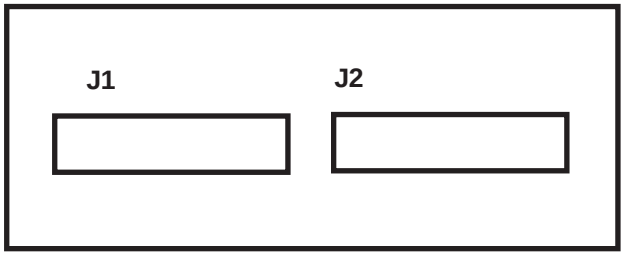
The first consideration (after mounting the unit and before hard wiring) should be setting the DIP Switches. The settings will change depending upon whether or not the Touch•PLS will be connected to a PLC, Bar Code Reader, Printer, or Computer.

- Set DIP Switches (See page 20 for 5" Color, 5" TFD Color, and 6" Monochrome Model or page 23 for 10" Color Model)
- Wire Power
- Wire Resolver
- Wire Inputs/Outputs
- Wire PLC, if used
- Wire PC *(only needed for screen changes)*
- Wire any Peripheral Devices—if used.



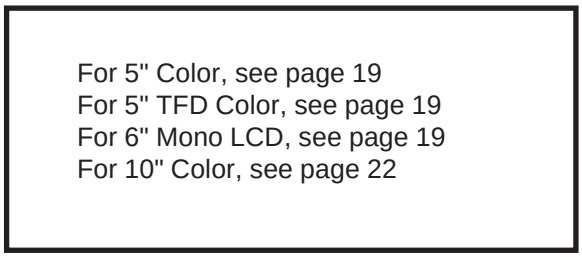
* To maintain optical isolation, keep I/O Power separate from Service Power

Bottom View



All Resolver, PLS Control Inputs, and PLS Outputs are on the bottom of the unit on connectors J1 and J2. See page 25 for details

Rear View



Rear panel has connectors for wiring of PLC, PC, Power, and DIP Switches for port configuration. See appropriate page (as provided above) for details.

5" Color and 6" Monochrome Models

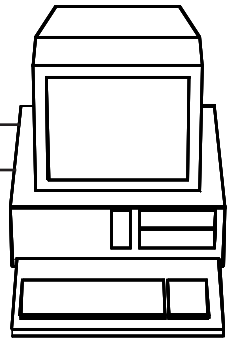
Rear View

Computer Wiring — you may use an RS-232C connector (5" Color and 6" Mono) or an RS-422A connector (5" Color only)

RS-422A Cable (no standard connector or pin-out — see page 28, *Computer Interface*) 5" Color only

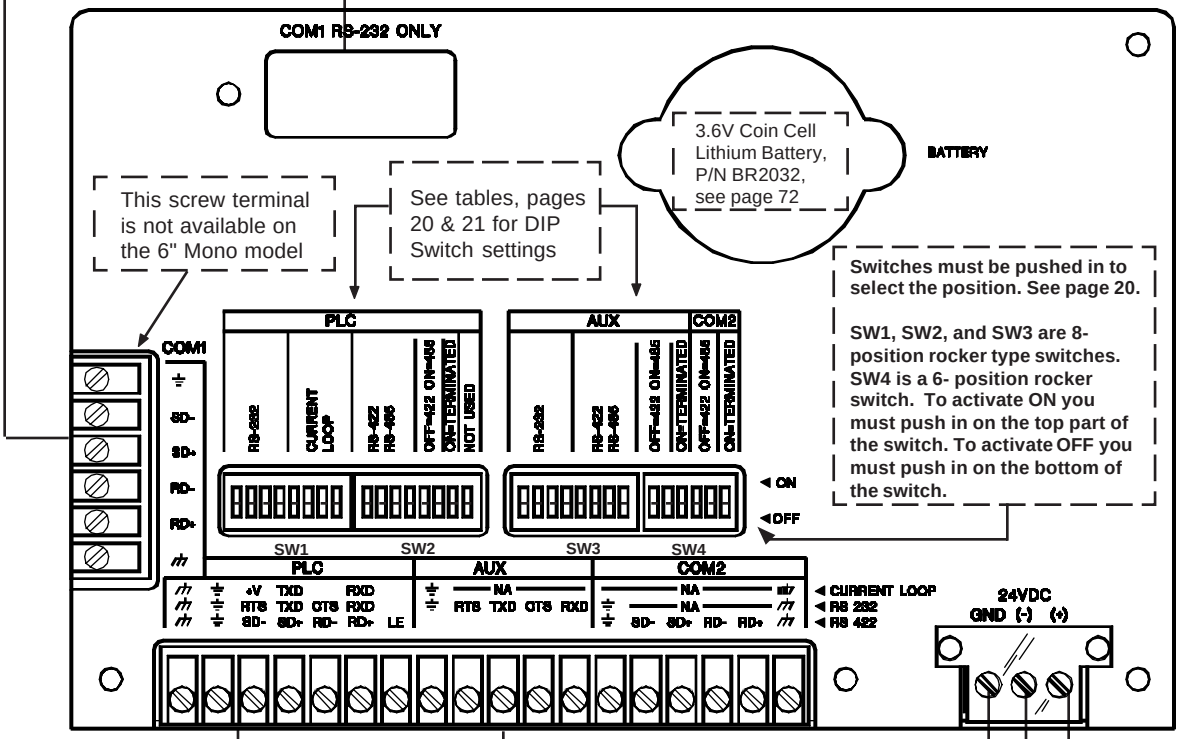
or

RS-232C Cable P/N 43962



For wiring J_1 and J_2 Connectors on the bottom of the unit, see page 25.

Rear View Touch•PLS



PLC Wiring

Power 24 VDC

GND

See page 28 for AUX connections

Programmable Logic Controller

PLC Cable (see page 68, for Cable P/Ns applicable to your type PLC)

24 VDC ±10 V 1 A Power Source

–

+

Connect (+) on the unit to the (+) lead of your power source; (-) on the unit is connected to the (-) lead and GND (on the unit) is connected to the chassis ground of the cabinet. It is recommended you use a regulated power source isolated from relays, valves, etc.

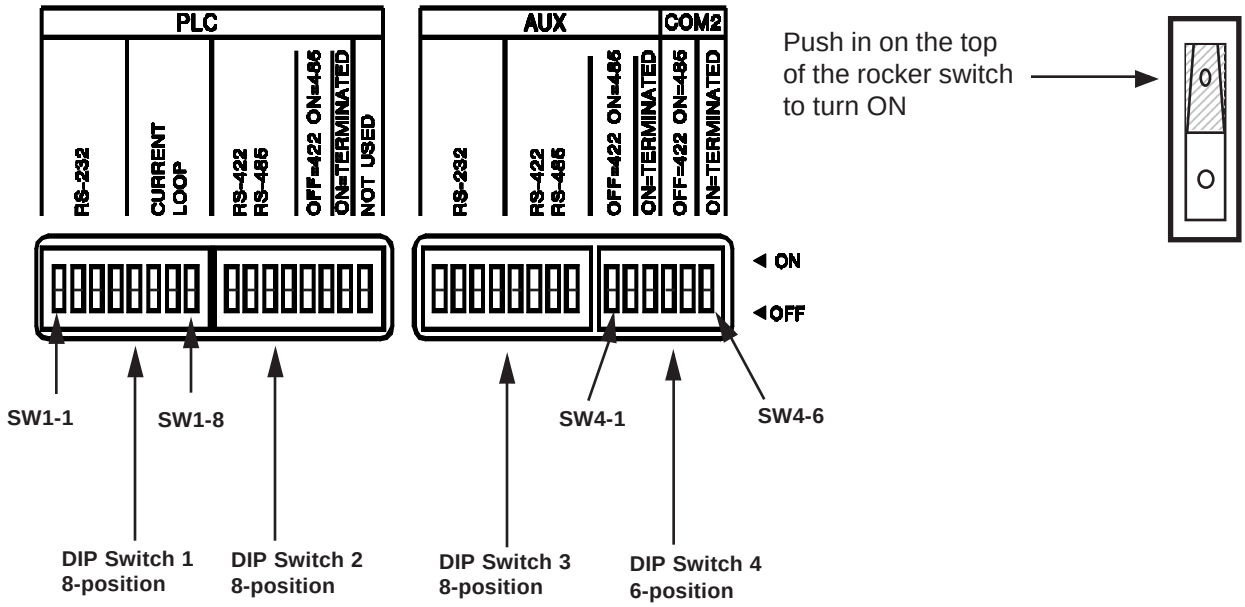
DIP Switch Settings

5" Color and 6" Monochrome Models

These are the DIP Switches on the rear of the 5" Color or 6 " Monochrome units. To set the DIP Switches for the type of connection you are using, refer to the tables beginning on the bottom of this page and continuing on page 21.

Switches must be pushed in to select the position.

SW1, SW2, and SW3 are 8-position rocker-type switches. SW4 is a 6-position rocker switch. To activate ON you must push in on the top part of the switch. To activate OFF you must push in on the bottom of the switch.



COM 1 Port

To set COM 1 Port as RS-422A, SW2-8 as "Termination." *

* "Termination," as used above and in the following tables, refers to 120 Ohm termination resistor option for use with RS-422A and RS-485A. Switch to ON to enable resistor.

COM 2 Port

To Set COM 2 (Port D) as:	Set DIP Switches as follows:		
	SW4-4	SW4-5	SW4-6
RS-422A	OFF		Termination
RS-485A	ON		Termination

PLC Port (for DIP Switch location on rear of Touch•PLS, see previous page 20)

Set DIP Switches as follows:	*To set PLC COM (port C) as:*			
	Current Loop	**RS-232C**	**RS-422A**	**RS-485A**
SW1-1	OFF	ON	OFF	OFF
SW1-2				
SW1-3				
SW1-4				
SW1-5	ON	OFF		
SW1-6				
SW1-7				
SW1-8	OFF	ON	ON	ON
SW2-1	OFF	OFF	ON	ON
SW2-2				
SW2-3				
SW2-4				
SW2-5				
SW2-6			OFF	
SW2-7				
SW2-8			Termination	Termination

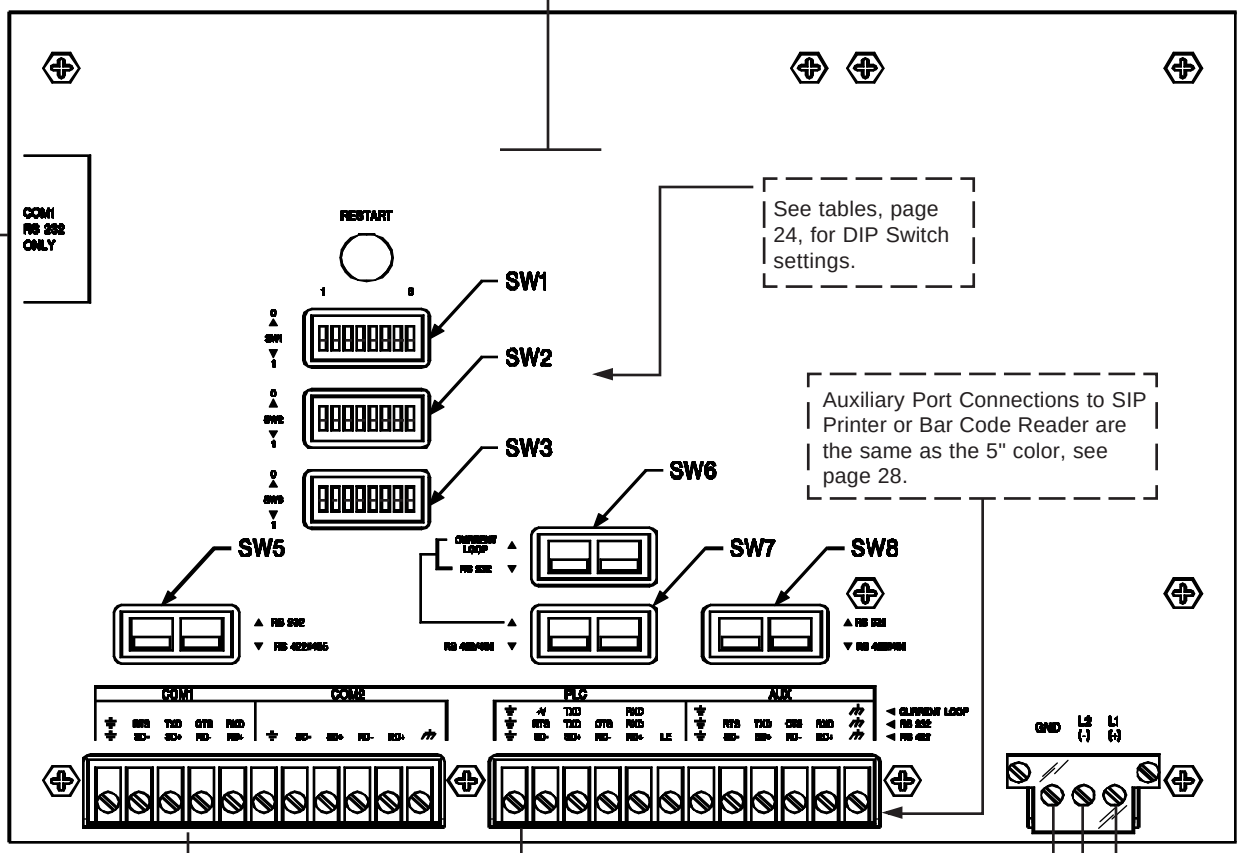
AUX Port (for DIP Switch location on rear of Touch•PLS, see previous page 20)

Set DIP Switches as follows:	*To set AUX (Port B) as:*		
	RS-232C	**RS-422A**	**RS-485A**
SW3-1	ON	OFF	OFF
SW3-2			
SW3-3			
SW3-4			
SW3-5	OFF	ON	ON
SW3-6			
SW3-7			
SW3-8			
SW4-1	OFF	OFF	ON
SW4-2			
SW4-3		Termination	Termination

Rear View

10" Color Model Wiring Diagram

Open unit to replace 1/2 AA, 3.6 V Lithium Battery (see Section 7, page 71, for instruction on battery removal.)

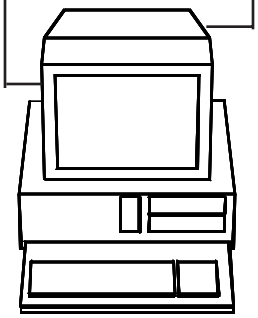


See tables, page 24, for DIP Switch settings.

Auxiliary Port Connections to SIP Printer or Bar Code Reader are the same as the 5" color, see page 28.

Computer Wiring

— you may use an RS-232C *or* an RS-422A connector



Programmable Logic Controller

PLC Cable (see page 68, for Cable P/Ns applicable to your type PLC)

GND

120 VAC or 24 VDC +/- 10% Power Source

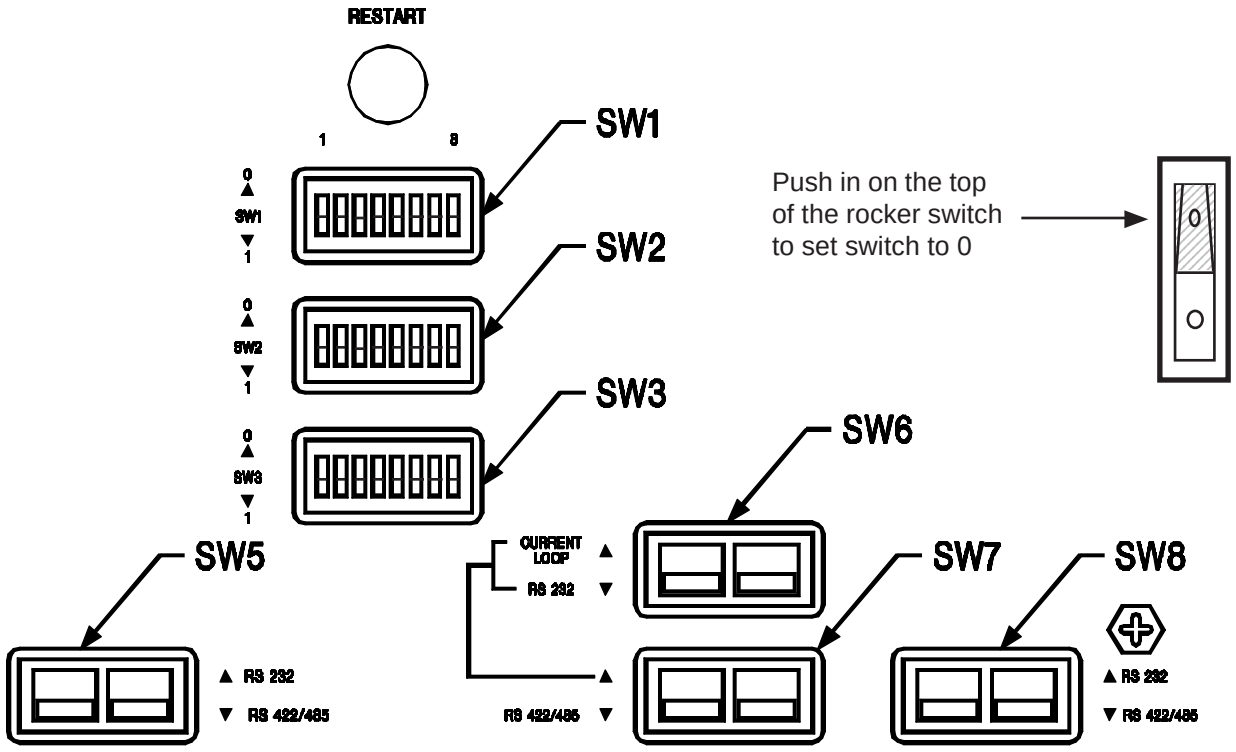
– +

Connect (+) on the unit to the (+) lead of your power source; (-) on the unit is connected to the (-) lead and GND (on the unit) is connected to the chassis ground of the cabinet. It is recommended you use a regulated power source isolated from relays, valves, etc.

DIP Switch Settings

10" Color Model Wiring Diagram

Switches must be pushed in to select the position. It is important to know that DIP switch SW1-1 is used to disable the setup mode on power up. Setup and run modes are enabled if the switch is in the 1 position. If the switch is set to 0 then the buttons are not displayed. The switches are on the rear of the unit, as shown below. Use the table to on the next page (24) to set DIP switches as required.



For DIP Switch location on rear of Touch•PLS, see previous pages 22 and 23.

To set COM 1 Port as:	Set DIP Switches as follows:				
	SW2-1	SW3-1	SW3-2	SW5-1	SW5-2
RS-232C	1			RS-232C	
RS-422A	1			RS-422A/485A	
RS-485A (Not Terminated)	1	0		RS-422A/485A	
RS-485A (Terminated)	0			RS-422A/485A	

To set COM 2 Port as:	Set DIP Switches as follows:		
	SW2-4	SW3-7	SW3-8
RS-422A	1		
RS-485A (Not Terminated)	1	0	
RS-485A (Terminated)	0		

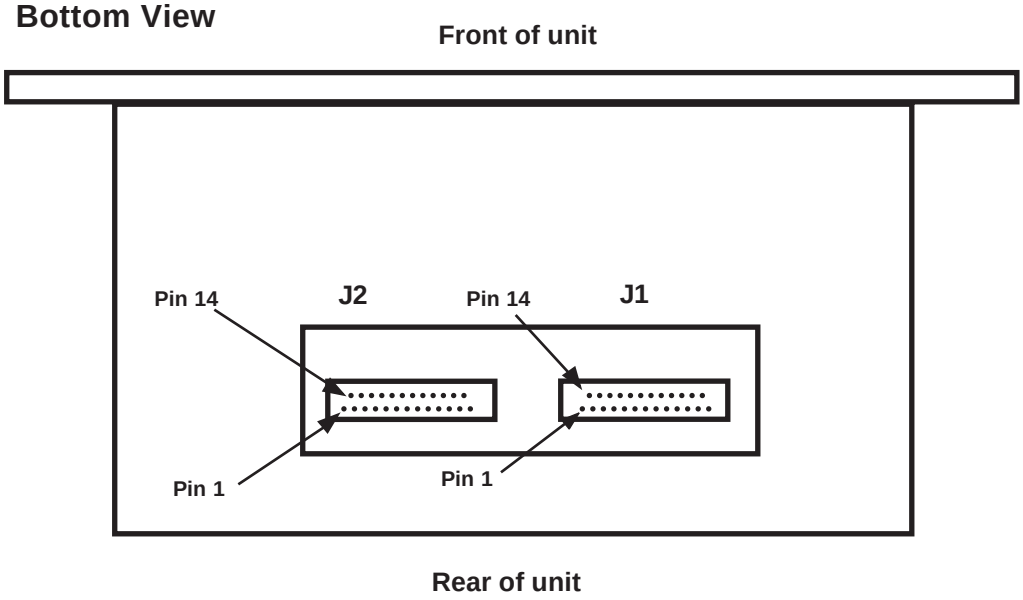
To set PLC Port as:	Set DIP Switches as follows:							
	SW2-3	SW2-8	SW3-5	SW3-6	SW6-1	SW6-2	SW7-1	SW7-2
RS-232C	1	0	1		RS-232C			
RS-422A	1	0	1		RS-232C		RS-422A	
RS-485A (Not Terminated)	1	0			RS-232C		RS-485A	
RS-485A (Terminated)	0				RS-232C		RS-485A	
Current Loop	1				Current Loop		RS-232C	

To set AUX Port as:	Set DIP Switches as follows:				
	SW2-2	SW3-3	SW3-4	SW8-1	SW8-2
RS-232C	1			RS-232C	
RS-422A	1			RS-422A	
RS-485A (Not Terminated)	1	0		RS-485A	
RS-485A (Terminated)	0			RS-485A	

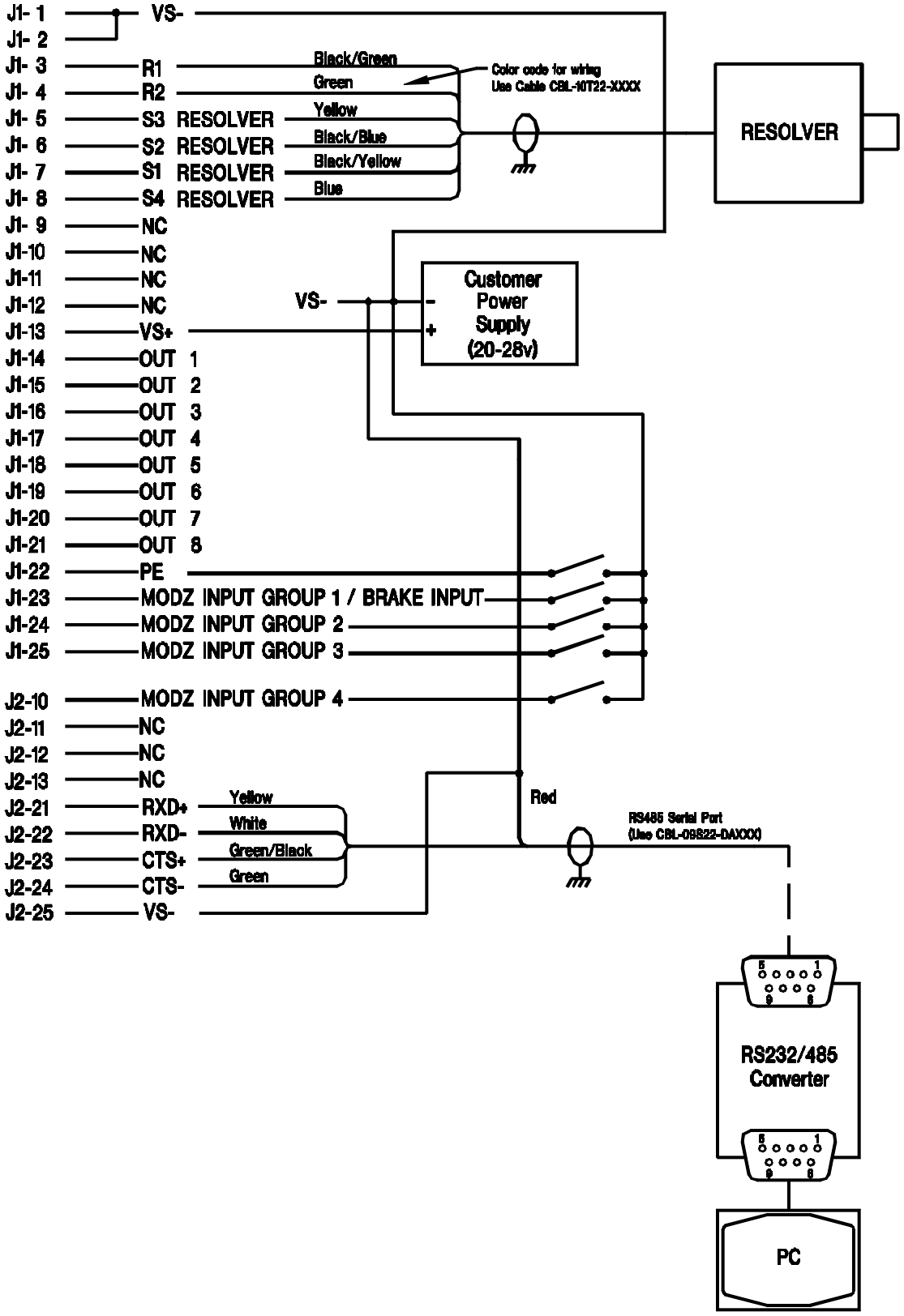
Resolver Inputs and Outputs Wiring

On the bottom of the Touch•PLS unit you will find two female D-sub connectors, J1 and J2, as shown below. All resolver, PLS Control Inputs and PLS Outputs connections are made here. Multi-function terminal block adapter kits are available and can be added to the Touch•PLS. Use part number 58K19 for the 5" Color and 6" Monochrome models, and part number 58K21 for the 10" Color Model. Reference the pin out diagrams on pages 26 and 27 for connections to Touch•PLS with 8 outputs and with 16 outputs.

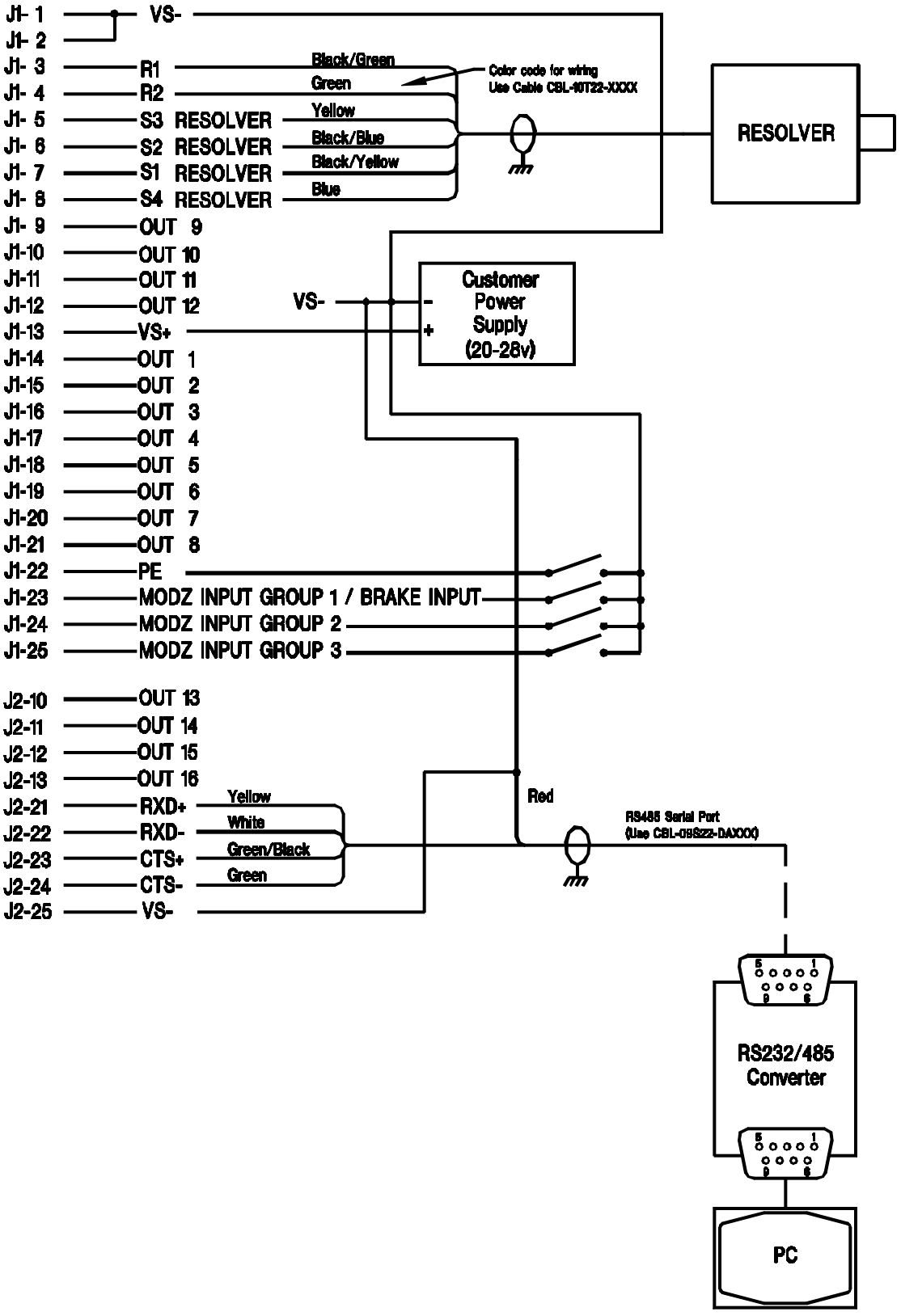
Bottom View



Resolver Wiring Diagram — Touch•PLS with 8 Outputs



Resolver Wiring Diagram — Touch•PLS with 16 Outputs



Computer Interface and Peripheral Device Wiring (for all Touch•PLS Models)

Computer Interface

The Touch•PLS requires a computer connection for programming only. During normal operation, the computer need not be connected to the Touch•PLS. The 5" Color offers the choice of RS-232C and RS-422A for computer connection (6" Monochrome is RS-232C only). Use the port that matches the type of Port used in the programming PC to wire the Touch•PLS. These units are equipped with a female RS-232C 9-pin D-subconnector (COM1 RS-232C ONLY) on the rear of the unit and screw terminal RS-422A (COM1) Port (5" color models only) located on the side and to the rear of the unit. The RS-232C 9-Pin Cable part number is 43962.

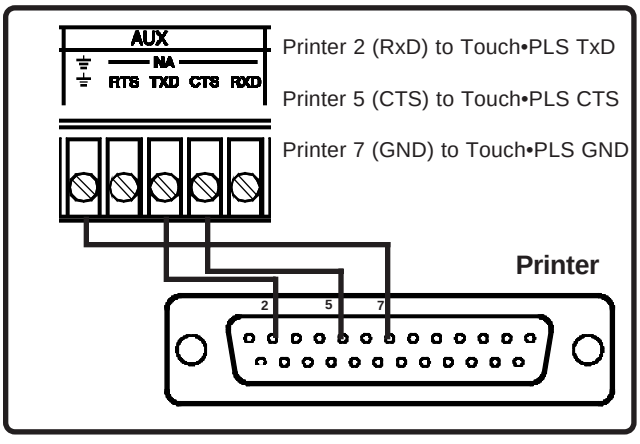
If you are using an RS-422A connector, use screw terminal (COM1) connections (SD-, SD+, RD-, RD+) located on left rear of 5" color unit.

Because RS-422A has no standard connector defined, a cable will have to be constructed based on pinouts and the PC connector.

Use *only* pins 2 (Receive Data), 3 (Transmit Data) and 5 (Signal GND) to connect RS-232C to your computer, use of other pins may cause communication problems. See table below.

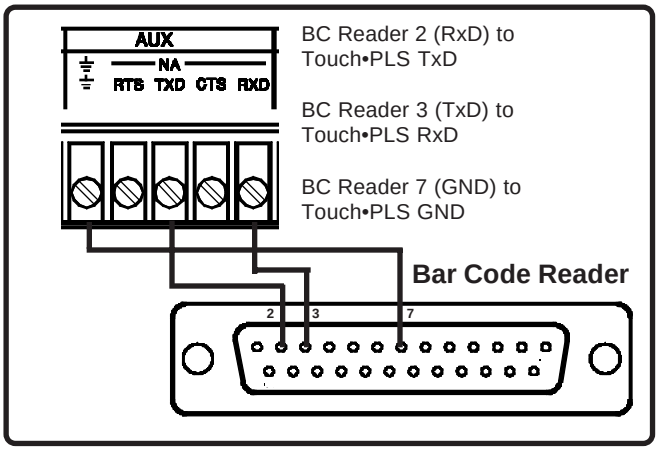
Function	Touch•PLS 9 Pin DB	PC 9 Pin DB	PC 25 Pin DB
RxD	2	2	3
TxD	3	3	2
GND	5	5	7

SIP Printer Connections



Bar Code Reader Connections

(PSC® Data Logic Scanner Model 5312-2002)

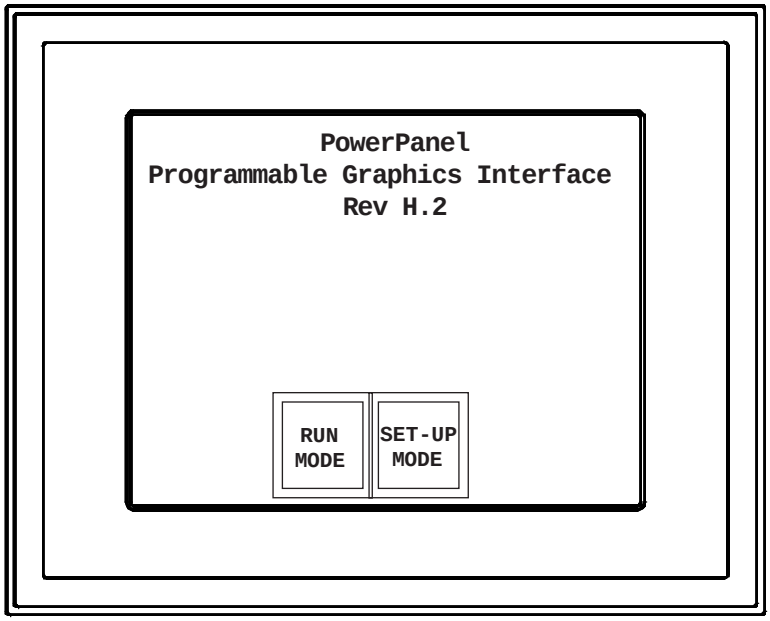


(All Touch•PLS models are wired as shown above)

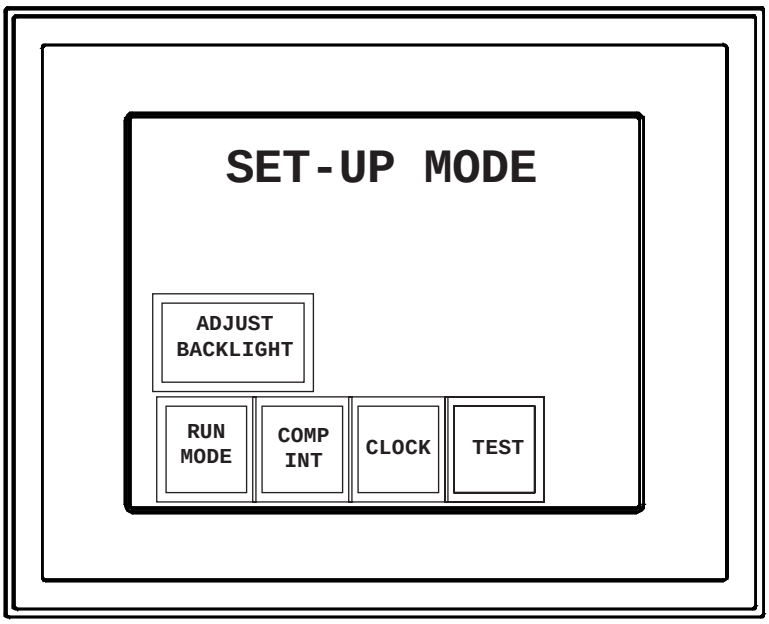
You will need to install uWIN programming software to set the Touch•PLS Auxiliary Port parameters for the SIP Printer or Bar Code Reader. See Section 4 of this manual for instructions on how to load the uWIN software. The Auxiliary Port (AUX) CANNOT be used for printing if a Bar Code Reader is connected.

2.3 Communications Setup Mode

After power up, press the pushbutton icon "**SET-UP MODE**" on the screen (as shown below.) This will display the SET-UP MODE screen. You only have a few seconds to press "**SET-UP MODE**" before the unit will automatically enter "**RUN MODE**."



There are five pushbutton icons that reside here: **ADJUST BACKLIGHT** (or **ADJUST CONTRAST**), **RUN MODE, COMP INT, CLOCK,** and **TEST**.



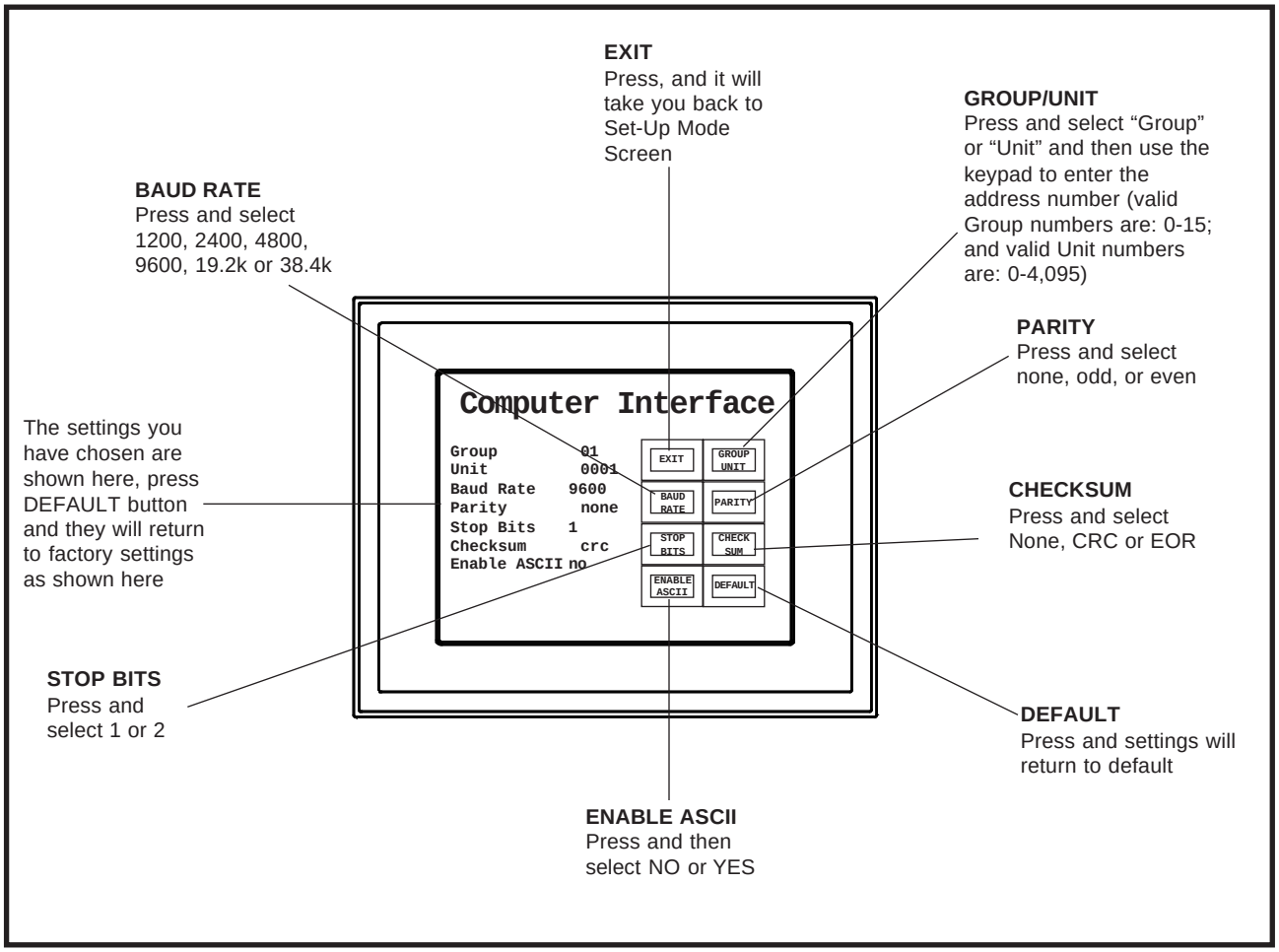
ADJUST BACKLIGHT OR CONTRAST—The backlight (brightness) adjustment or the contrast adjustment feature (depending upon the model) allows you to optimally adjust the backlight for your environment. Ideally, it should be set at the installation site after it has reached operating temperature. Press the **UP** or **DOWN** pushbuttons to adjust the display brightness or contrast.

RUN MODE—This pushbuttons allows the Touch•PLS Unit to enter its normal operating mode. When the Touch•PLS is in the RUN MODE the initial base screen specified in the system attributes will be displayed. In addition, the Unit monitors the interfaces for new input values. The Unit will be in the RUN MODE if communicating. The only way to exit from the RUN MODE is to restart the Unit.

PLEASE NOTE

Computer interface commands are supported while in the main setup mode screen.

COMP INT—This pushbutton allows you to set the Unit's address and computer port parameters. ***The programming PC running uWIN must have identical communication parameters to communicate properly.*** The following screen will appear.



PLEASE NOTE
Valid Group and Unit numbers are as follows:
Groups: 0–15
Units: 0– 4,095

Group and Unit Number—Each Touch•PLS is assigned a Unit address, and is selected through the Group/Unit pushbutton on the screen. Each Unit Address consists of two identifiers which represent the Group and Unit Numbers. The Unit Addresses are divided into the Group and Unit Numbers to allow the PC to address the specific Touch•PLS networked to it.

Group and unit number possibilities:

- Group 00, Unit 0000 — addresses all units in all groups.
- Group XX, Unit 0000 — addresses all units in group XX.
- Group XX, Unit XXXX — addresses the specific unit indicated.

Factory Parameter Presets (Default):	
Group	**01**
Unit	**0001**
Baud Rate	**9600**
Parity	**None**
Stop Bits	**1**
RS-485A	**no**
Checksum	**CRC**
Enable ASCII	**no**

Selection of Remaining Parameters—Baud Rate, Parity, Stop Bits, RS-485A, Checksum, and Enable ASCII are all selected using the touchscreen, basically in the same manner. For example, when the Baud Rate is selected, a screen displaying the available Baud Rates appears. To change the unit's Baud Rate, simply touch the pushbutton with the Baud Rate you want.

This simple method is used to set the rest of the unit's parameters. Simply press the pushbutton icon for the parameter you wish to change.

Finally, the unit is equipped with a Default pushbutton. Pressing the Default pushbutton resets the unit's parameters to the factory preset values.

CLOCK—Press the **CLOCK** button to access the screen that allows you to set the unit time and date. Press the **12 HOUR** or **24 HOUR** button to select and then press the **DEC** and **INC** (decrement and increment) buttons next to **Hour, Minute,** and **Second,** or **Day, Month,** and **Year** to adjust the settings. Touch•PLS is ***Y2K Compliant,*** and its programming will not be confused by the year 2000.

TEST— Press the **TEST** button to go the **TEST MENU** screen. Listed on this screen are the results of four system tests that are automatically performed when **TEST** is pressed—**SYSTEM RAM, VIDEO CHIP, VIDEO RAM,** and **BATTERY**. From this screen you may also run unit diagnostics for **TOUCH PAD, DISPLAY, PLC INT** (PLC interface test)**, USER MEMORY,** and **SERIAL PORT** by pressing the applicable pushbutton. Follow the on-screen instructions to run the diagnostic for that unit feature.

This page intentionally left blank.

3. PLS Functions

Touch•PLS brings many capabilities to your application. Before examining these capabilities, a few concepts need explaining:

- **Program**
- **Group**
- **Channels**

Program

Programs (also called “Job Setups”) contain all of the parameters, commands, etc., necessary to perform the requirements of a particular application. Up to 16 channels or outputs can be controlled by a single program.

Touch•PLS may contain up to eight distinct programs (also called “Jobs” and numbered from 1 to 8) and can implement each as needed—but, **only one Program may be active at a time.**

Once a program is stored in Touch•PLS, unless there’s a change or deletion, the program never needs to be entered again.

Groups

Each Output Channel may be associated with one of a number of Groups (as shown in the drawing). The BASE GROUP is ***always*** designated as a standard PLS with the ON/OFF function referenced to the base offset.

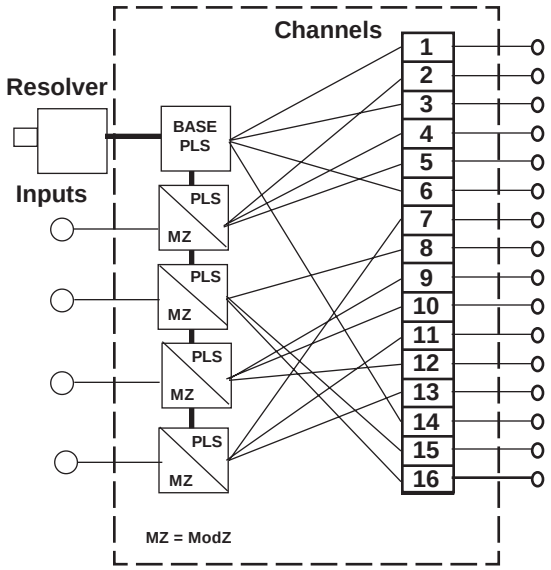
Groups 1–4 may be defined either as a ModZ or PLS type, and **each Group can have its own offset**.

This creates the effect of having up to five independent PLSs running from the same resolver. This can be a very powerful and useful feature when it is desirable to control several different types of processes all being driven by a common shaft. Each ModZ Group has its input and a ModZ Inhibit Zone (more on ModZ Inhibit Zones later).

NOTE: If the “Brake Wear Monitor” function has been selected (by defining Caution and Danger Limits), NO Group may be selected as a ModZ Group (more later).

Channels

There are 16 independent output channels, each of which contains its own setpoints (used to turn the output ON or OFF at specific shaft angles). Each channel also contains its own speed compensation factor (so that the response time of field devices, such as relays/solenoids, may be compen-



Groups and Channels Relationship

sated.)
Each channel is independent.

Each channel is associated with one of the five Groups; the BASE GROUP is the default.

The figure shows the relationship between groups and channels.

3.1 User-Defined Parameters

Touch•PLS has some Global and some Program-Specific programmable parameters.

Global Parameters are common to all programs. They are summarized in

Global Parameters

Parameter	Definition	Range
Scale Factor	Maximum number of counts per revolution, minus 1 (i.e., 999 Scale Factor gives 1000 counts/revolutions).	16 to 999 Default: 359 to work in degrees
Base Offset	Counts to be added to resolver position. It is used to align resolver zero to machine zero.	0 to Scale Factor Default: 0
Motion Limits, High & Low	Motion output energizes if resolver moves within these limits.	0 to 999
Program Number	Setup or Program number.	1 to 8 Default: 1
Station Number	Unique node number for serial communication.	0 to 255 Default: 16
Baud Rate	Serial communication baud rate.	110, 300, 600, 1200, 2400, 4800, 9600 Default: 9600

the “Global Parameters” table, below:
Program-Specific Parameters are identified with a given program number. These user-defined parameters may change with a program selection. They

Program-Specific Parameters

Parameter	Definition	Range
Speed Compensation	A constant number in scale factor units to advance setpoints (dwells based on resolver speed. Programmed in counts per 100 RPM. You may program different compensations for leading and trailing edges.	0 to Scale Factor Default: 0 Programmed for each channel separately.
Caution & Danger Limits	Caution and Danger Limits for Brake Wear Monitoring control outputs 7 and 8, respectively, If limits are 0, the outputs function as normal PLS outputs.	0 to 9.99 sec. Default: 0 Caution Limit is less than Danger Limit
Setpoints, ON & OFF as many channels as required	The associated output is energized at ON setpoint, and de-energized at OFF setpoint or TIme-Off.	0 to Scale Factor Multiple dwell possible in a channel. Maximum number of dwells = 56 per 8 channels. Default: 0

are summarized in the “Program-Specific Parameters” table, below:

3.2 Program-Specific Parameters

3.2.1 Speed Compensation

Speed Compensation allows you to dynamically advance or retard a programmable output based on a resolver speed. This is useful for compensating field device response time. Each Touch•PLS output (channel) has its own leading-edge and trailing-edge speed compensation.

Speed Compensation is only needed for variable-speed situations. Once the compensation value has been calculated and entered into the unit, Touch•PLS automatically calculates and applies the proper compensation for the present speed.

For **example**, consider an output driving a solenoid with a turn ***ON*** time of 10 ms and a turn ***OFF*** time of 5 ms. For this application, the output needs to be triggered accurately at 120° to 160° over a speed range of 60 RPM to 120 RPM. The table at the bottom of the next page (36) demonstrates the effect of the speed compensation. ***Note: The Leading or Trailing Edge Speed Compensation Values must be a whole number.***

CALCULATION:

@ 60 RPM number of degrees per second = 360°
Therefore, in 10 ms, the resolver shaft rotates 3.6°, in 5 ms, the resolver shaft rotates 1.8°.

From the table below, it can be seen that without speed compensation, the output @ 120 RPM number of degrees per second = 360°

Therefore, in 10 ms, the resolver shaft rotates 7.2 degrees, and in 5 ms, the resolver shaft rotates 3.6 degrees.

EXAMPLE 1
At 60 RPM, it can be seen that a 10 ms propagation delay in the solenoid causes the output to turn ON 3.6° after the programmed ON point and the same is true for the 5 ms turn OFF delay causing the solenoid to turn OFF 1.8° after the OFF point.

If the application is to run at 60 RPM constantly, we can use these values to adjust the setpoints to compensate for the delays in the solenoid actuation. However, in a variable speed application this no longer holds true as the propagation delays result in larger positional error at higher speed.

EXAMPLE 2
At 120 RPM, it can be seen that a 10 ms propagation delay in the solenoid causes the output to turn ON 7.2° after the programmed ON point, and the same is true for the 5 ms turn OFF delay causing the solenoid to turn OFF 3.6° after the OFF point.

Speed compensation is applied linearly over the speed range and is entered as an amount of compensation to be added over a 100 RPM range. From this example, the speed compensation for the leading edge is as follows:

SC=7.2°/100 RPM *(Note: Actual value entered is 7 since it must be a whole number.)*

Note: Speed Compensation values MUST be a whole number—round off where necessary.

Example	Resolver Speed (RPM)	On Setpoint	Off Setpoint	Speed Compensation Enable	Leading Compensation	Trailing Compensation	Effect
1	60	120°	180°	No	0°	0°	ON 123° OFF 182°
2	60	120°	180°	Yes	3.6°	1.8°	ON 116.4° OFF 178.2°
3	120	120°	180°	Yes	7.2°	3.6°	ON 112.8° OFF 176.4°

3.2.2 Modification to Zero (ModZ)

Modification to Zero (ModZ), or dynamic zeroing, enables the user to modify the zero reference point independent of the resolver's actual position.

If the Brake Wear Monitor function is being used, ModZ *CANNOT* be used. If Brake Wear is not being used, then each group may be either ModZ or Standard PLS.

- If a Group is defined as ModZ, all of the Channels specifically belonging in that Group are defined as ModZ Channels.
- If you do not select a Channel as ModZ, it will function as a normal PLS Channel, and the Group will function as a Normal PLS Group.
- A ModZ Group is controlled by the corresponding ModZ Input.
- When a False-to-True transition is detected on the ModZ Input, the current angle of the resolver becomes the new reference "0" point and all setpoints for all Channels in the Group are then referenced to this value.
- The ModZ Cycle terminates when one full resolver revolution is made.
- Selection of Setpoints is crucial. Setpoints crossing "0" may give undesirable results when programmed into a ModZ Output Channel because Touch•PLS will react as if two Setpoints were programmed—one beginning at Zero and the other ending at Zero.
- When programming ModZ Setpoints *and* Speed Compensation Values into a Touch•PLS Channel, too much Speed Compensation could cause a similar Setpoint split, or even cause a Beginning of Cycle Setpoint to occur at the end of the Cycle.
- To start a new ModZ Cycle, the ModZ Input must make a new False-to-True transition.

ModZ Inhibit Zone

If the Group Type is ModZ, Group Offset is not used. Instead, there is a parameter called the "Inhibit Zone." The ModZ Inhibit Zone is an angular zone in which the ModZ cycle may not be triggered. The Inhibit Zone begins when the ModZ cycle is originally triggered (angle = 0), and continues up to a preprogrammed angle. Once the ModZ cycle has progressed beyond this Inhibit Zone, the ModZ cycle may be restarted by retriggering the ModZ Input.

3.2.3 Brake Wear Monitor Time Limits

This measurement can warn that the press' brakes are wearing out and may need to be replaced for safety reasons.

To use the Brake Wear Monitor feature, you have to set a CAUTION Limit value and a DANGER Limit value.

Outputs 7 and 8 are used to indicate the CAUTION/DANGER conditions. If Touch•PLS is not used for Brake Wear Monitoring, Outputs 7 and 8 are available for other uses.

To use the Brake Wear Monitor feature, the RUN/STOP Signal from the machine must be wired to the Brake Input of Touch•PLS.

When Touch•PLS receives the machine's STOP signal, its internal Brake Stop Timer begins counting. If the shaft stops turning before the Caution Limit value is reached/exceeded, Outputs 7 and 8 will reflect a SAFE condition (7 OFF, 8 ON).

In all Brake Monitor examples, OFF = De-energized and ON = Energized.

However, if the stopping time occurs between the CAUTION Limit value and the DANGER Limit value, the CAUTION condition appears at Outputs 7 and 8 (7 and 8 ON).

If the machine's shaft fails to stop before reaching the DANGER Limit, the DANGER output condition will appear at Outputs 7 and 8. (7 ON, 8 OFF).

Brake Output Conditions on Outputs 7 and 8		
Condition	Output 7 (Caution)	Output 8 (Danger)
Safe	OFF	ON
Caution	ON	ON
Danger	ON	OFF
OFF: De-energized		ON: Energized

3.3 Error Messages

There are two types of error messages that may occur when using the Touch•PLS. The first group are preprogrammed error messages that may occur when you are working in the Core Program to program the PLS. They are as follows:

01 Attempt to fine-tune nonexisting dwell
02 New dwell is out of range
03 Programming a parameter during motion
04 Value out of range
05 Function module busy
06 Program enable input not active
07 Attempting fine tuning on bad address
08 Access to fine tuning control word not available
09 Attempt fine tune in time off mode

These error messages only appear for a few seconds and will go away on their own. You will need to correct the error in order to continue programming.

The second group of error messages are alarm messages and were created to warn you of a system communication problem. To clear these messages, you should press the CLEAR FAULT Button. They are as follows:

01 SYSTEM FAULT
02 BROKEN WIRE DETECTED
03 MOTION FAULT
04 EXCEEDED BRAKE CAUTION
05 EXCEEDED BRAKE DANGER TIME

IMPORTANT NOTE: If you are not using the Brake Danger Option, error message 05 "EXCEEDED BRAKE DANGER TIME" will always be displayed at the bottom of the screen.

Also, error messages 04 and 05 will remain on the screen until there is a successful machine cycle. This is true even after you press the CLEAR FAULT Button.

This page intentionally left blank.

4. Touch•PLS Core Program

4.1 Introduction

The Core Program included with the Touch•PLS is intended to be a complete operator interface for the PLS functionality. It is comprised of about 80 screens. The screen map for the 5" Active and Passive Color and 6" Monochrome (Figures 4-1 through 4-4), and the screen map for the 10" Color (Figures 4-5 through 4-8), lists all of the screens in the Core Program and shows how they are organized. **The arrows between the screens in the screen map indicate that a pushbutton is provided on the screen at the base of the arrow (from) that will allow selection of the screen at the point of the arrow (to).**

The following maps for the Touch•PLS Core Software Program are subdivided into 4 parts each. Again, the arrows indicate that there is a button allowing you to access the next screen or go back to a previous screen. The numbers in parentheses are the numbers of the screens. You can reference the screens via these numbers when using *u*WIN to modify the Core Pro

Figure 4-1. 5" Color and 6" Monochrome Touch•PLS Core Program Screen Map

(Top Level)

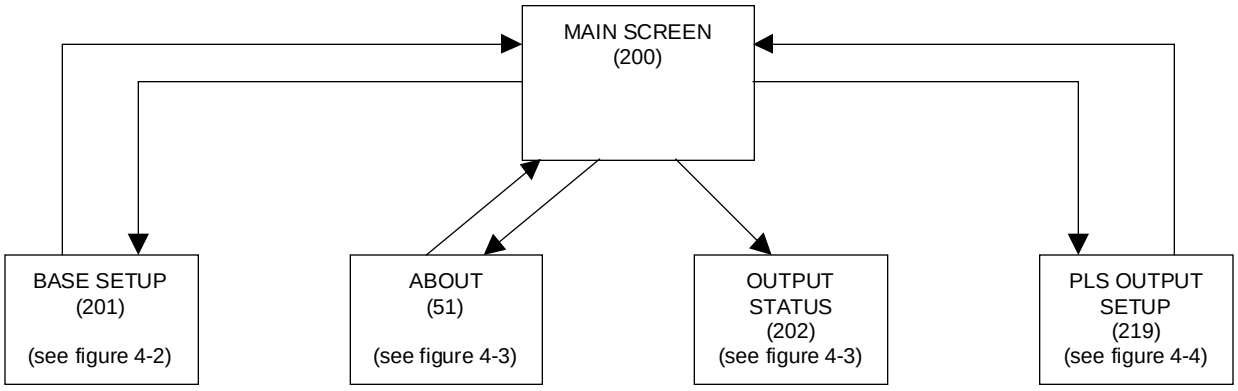


Figure 4-2. 5" Color and 6" Monochrome Touch•PLS Core Program Screen Map

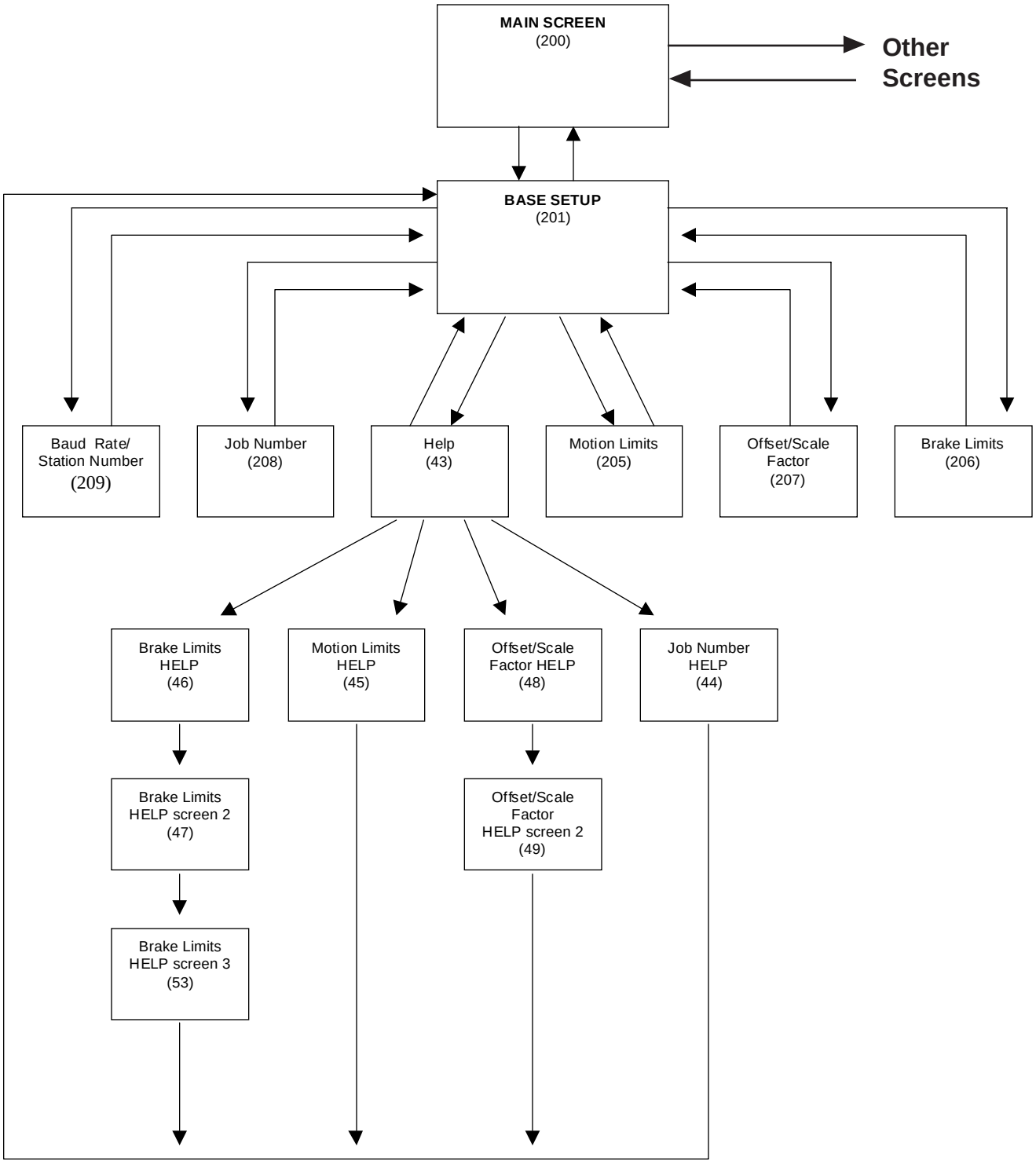


Figure 4-3. 5" Color and 6" Monochrome Touch•PLS Core Program Screen Map

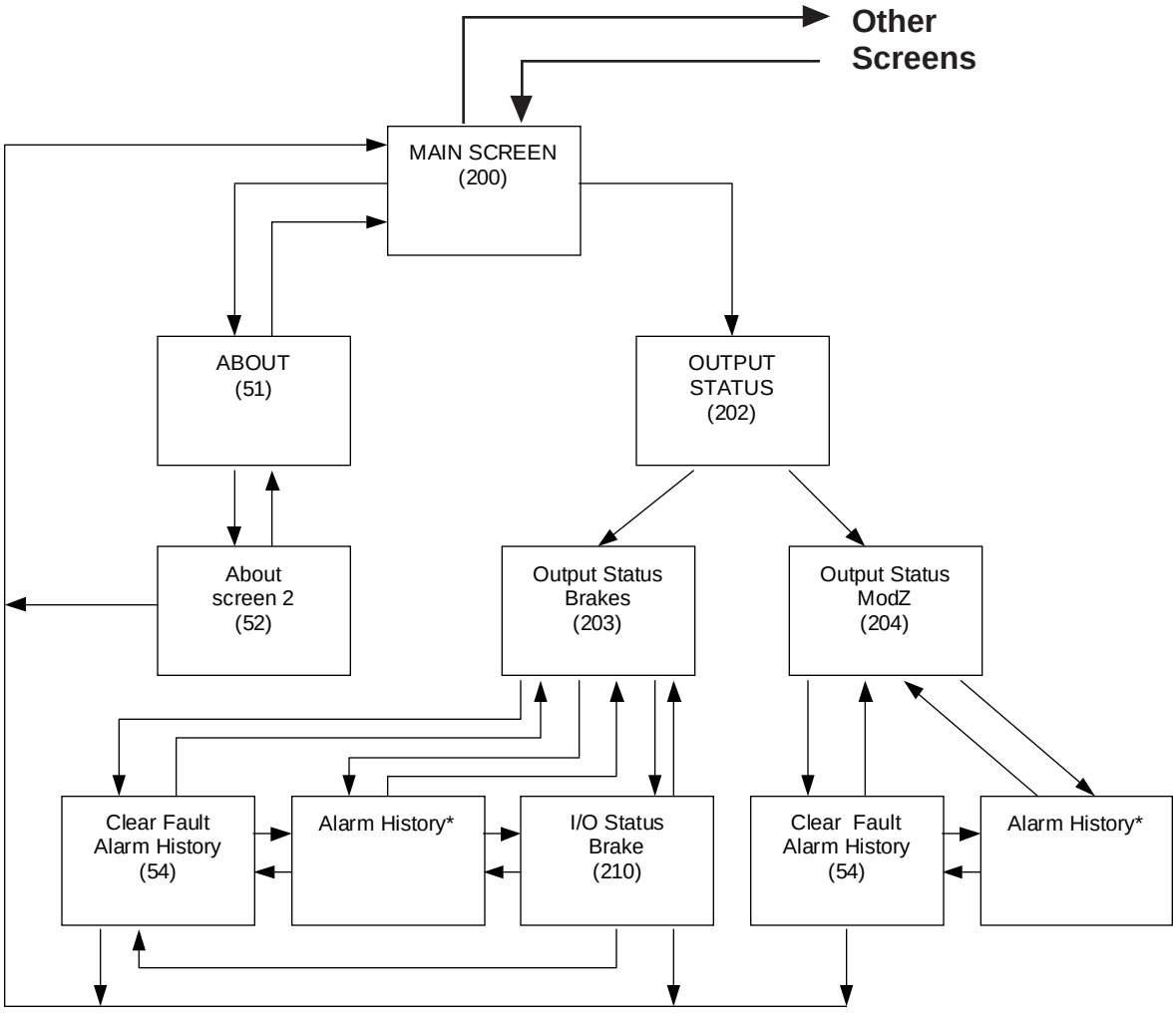


Figure 4-4. 5" Color and 6" Monochrome Touch•PLS Core Program Screen Map

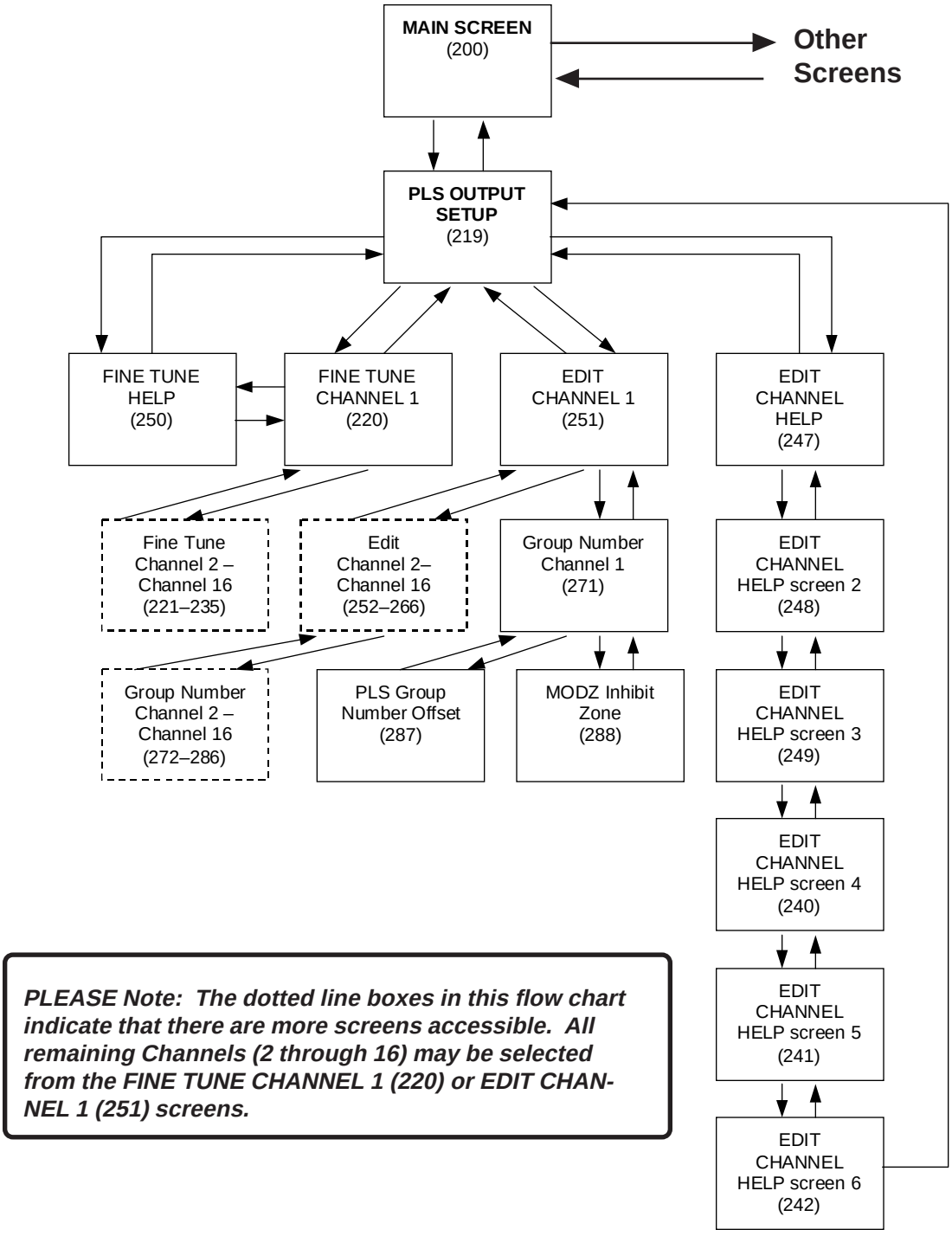


Figure 4-5. 10" Color Touch•PLS Core Program Screen Map

(Top Level)

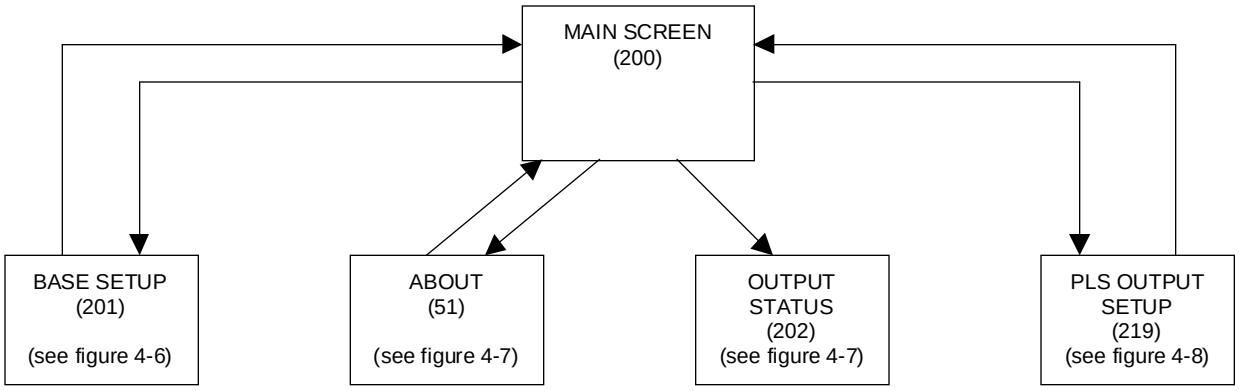


Figure 4-6. 10" Color Touch•PLS Core Program Screen Map

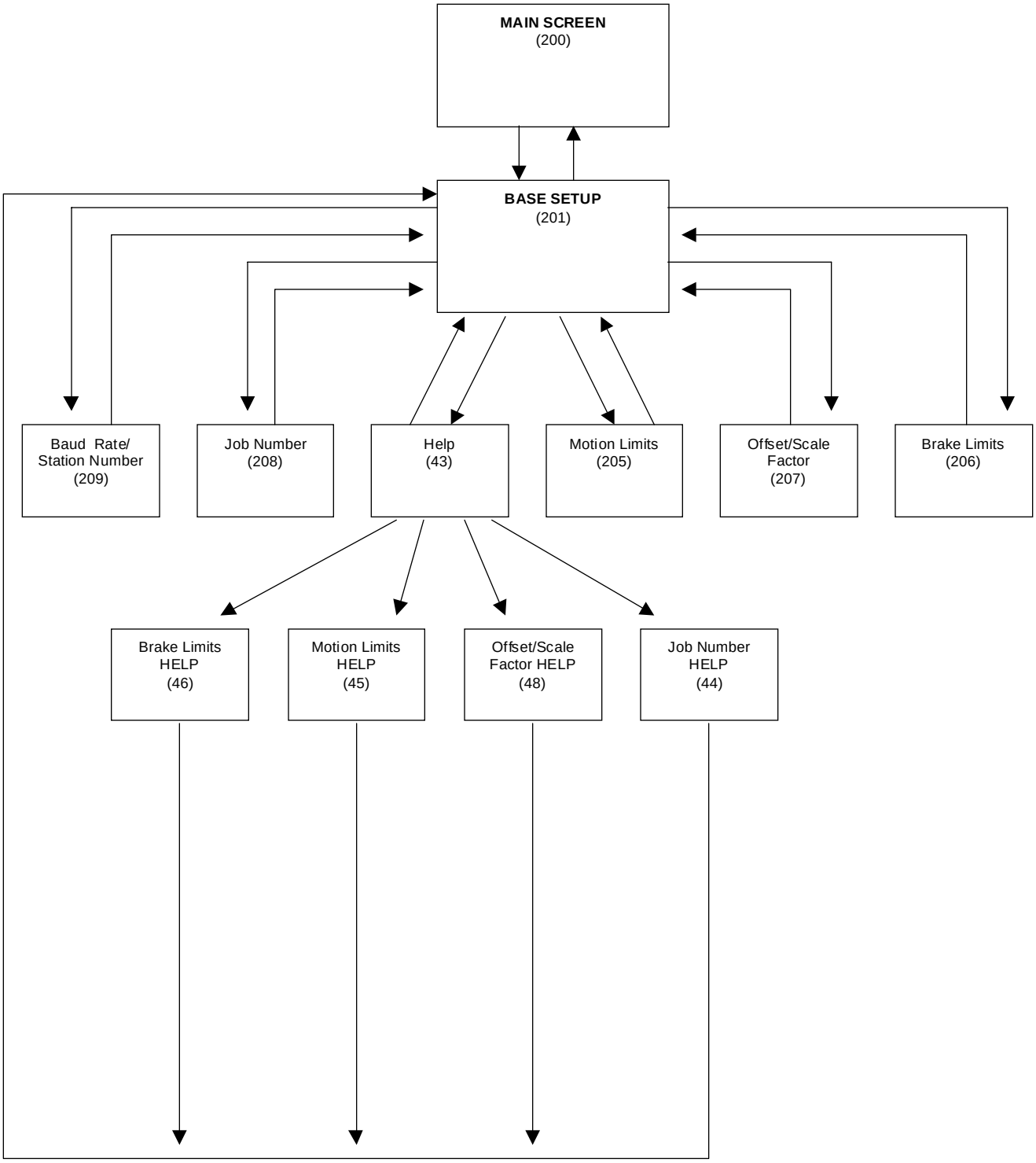


Figure 4-7. 10" Color Touch•PLS Core Program Screen Map

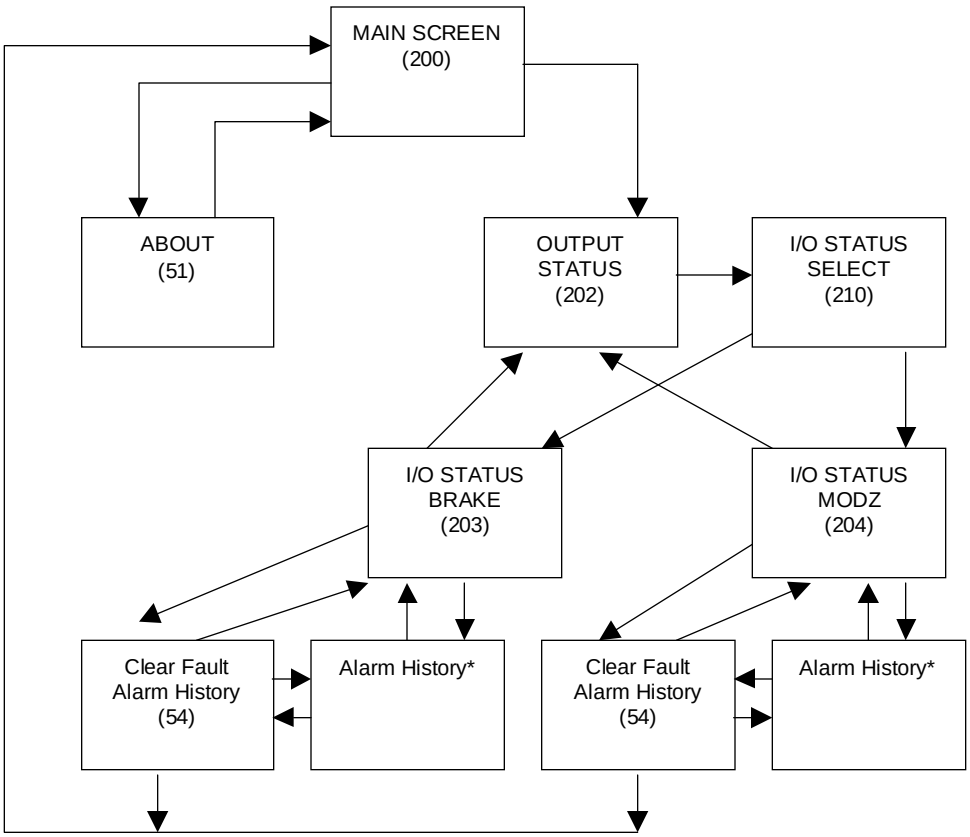
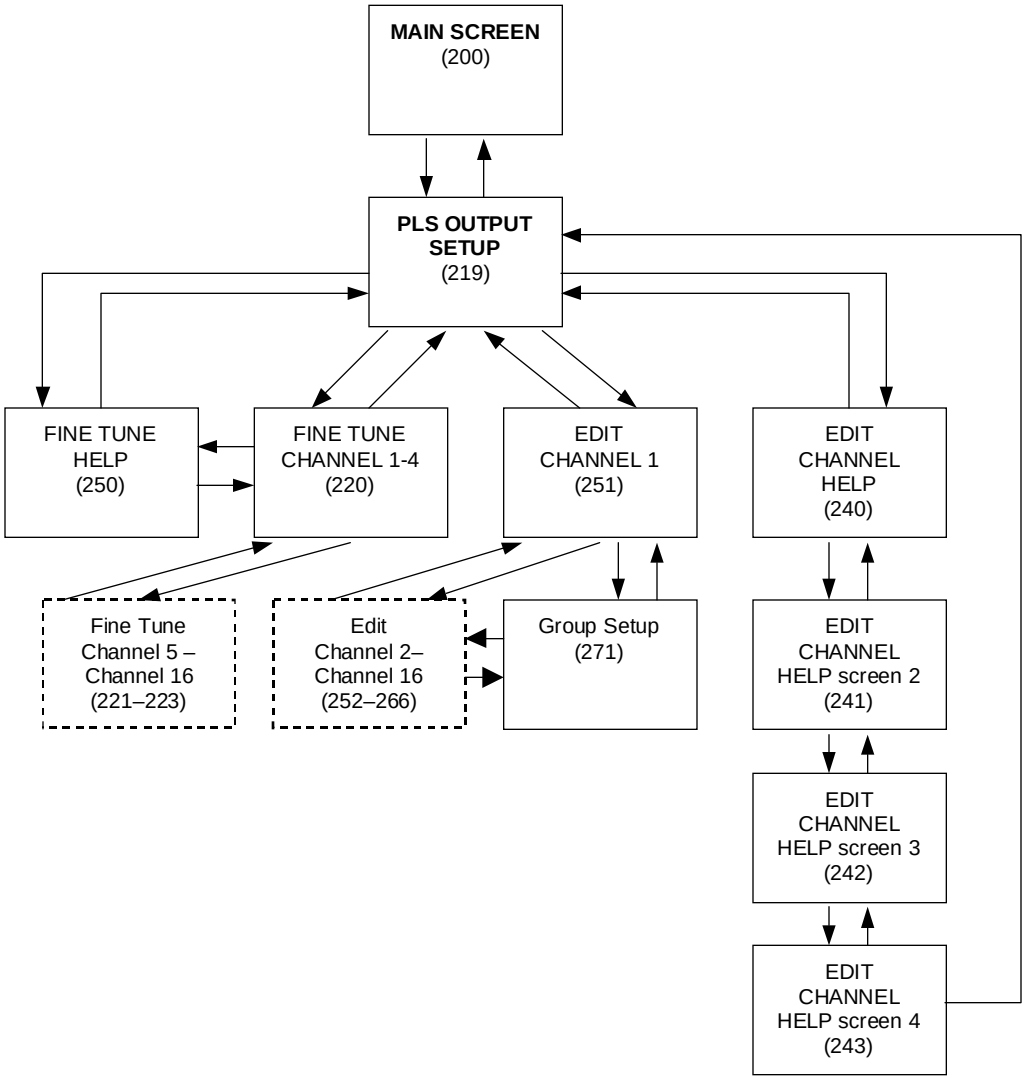


Figure 4-8. 10" Color Touch•PLS Core Program Screen Map

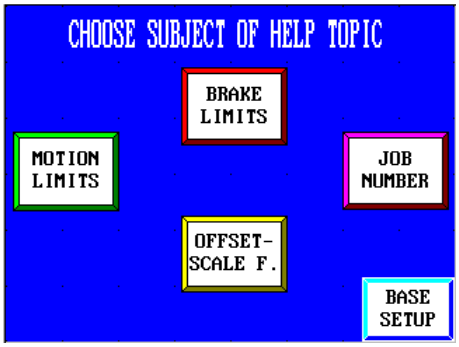


PLEASE Note: The dotted line boxes in this flow chart indicate that there are more screens accessible. All remaining Channels (2 through 16) may be selected from the FINE TUNE CHANNEL 1 (220) or EDIT CHANNEL 1 (251) screens.

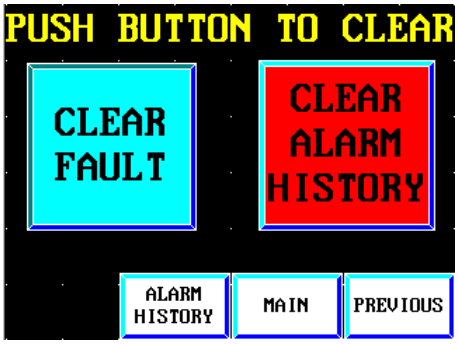
4.2 PLS Programming Screens

5" Color and 6" Monochrome Programming Screens

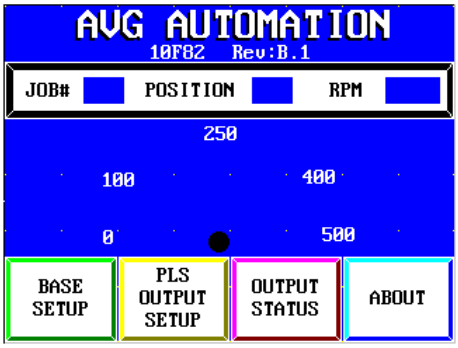
Each screen has been assigned a number. The following screen views and their descriptions are placed in numerical order.



Help Screen (43)—this screen provides a menu of pushbuttons that will lead to Help Screens for the functions under the Base Setup Screen.

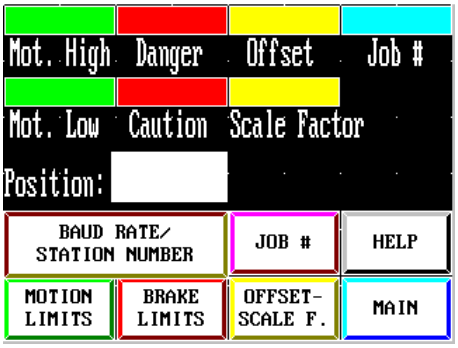


Clear Fault / Clear Alarm History Screen (54)—this screen has pushbuttons which can be used to clear a PLS Faults or the Alarm History Log. Other pushbuttons allow display of the Alarm History Log or to return to the Main Screen or the Output Status Brake Screen.

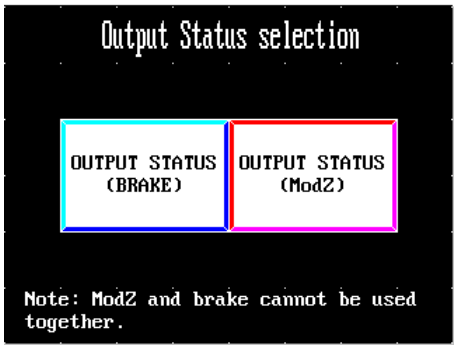


Main Screen (200)—When the unit is powered up and in Run Mode, the Main Screen is displayed. It displays the number of the currently selected "Job," the current position of the resolver and the rotation speed of the resolver (both numerically and as an analog meter). The Main Screen has four pushbuttons that allow selection of the following:

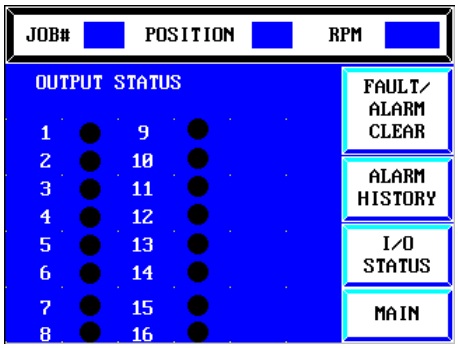
- **Base Setup**—programming of items relating to the entire machine
- **PLS Output Setup**—programming of items relating to the PLS outputs for a specific job
- **Output Status**—monitoring of PLS outputs' status and alarm status
- **About**—some Help Screens



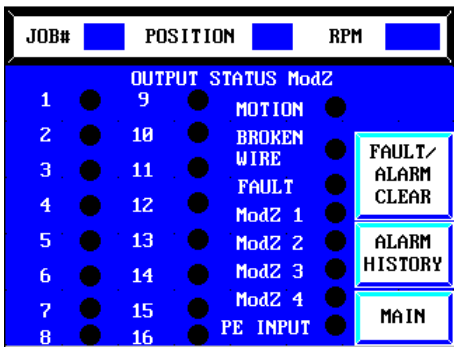
Base Setup Screen (201)—displays the current settings for Motion Limits, Brake Limits, PLS Scale Factor and Offset and the currently selected Job Number. Pushbuttons are provided to allow access to screens that will program those parameters. A pushbutton is also provided to give access to the Baud Rate/Station Number Screen.



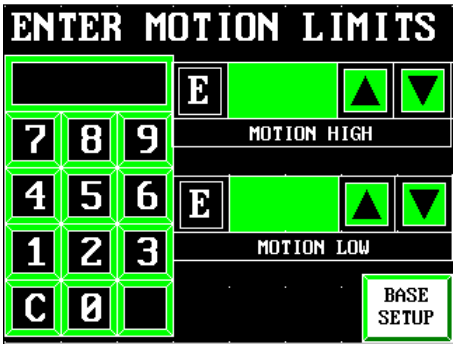
Output Status Screen (202)—has two pushbuttons to allow selection of screens to show output status. You should select the Output Status Brake pushbutton if you have the PLS programmed to monitor Brake Stopping times (see Brake Limits Screen paragraph). You should select Output Status ModZ if you are not using the Brake functions.



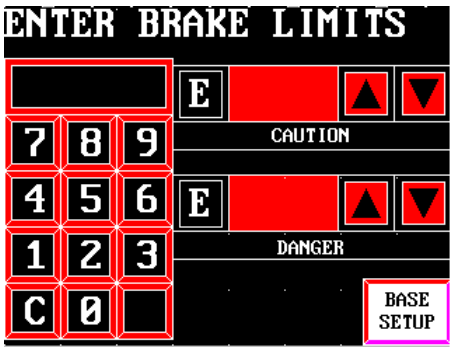
Output Status Brake (203)—this screen displays the current Job Number, Position and RPMs at the top of the screen. It also displays 8 or 16 indicators (depending upon unit type) that correspond to the 8 or 16 PLS outputs. If the indicator is red, the corresponding output is ON. (Note that outputs 7 and 8 are Brake Caution and Danger outputs). Pushbuttons are provided here to allow you to access screens for more I/O Status, to clear Faults and to view the Alarm History Screen.



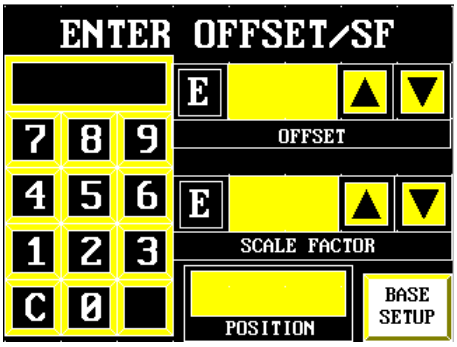
Output Status ModZ Screen (204)—this screen displays the current Job Number, position and RPMs at the top of the screen. It also displays 8 or 16 indicators (depending upon unit type) that correspond to the 8 or 16 PLS outputs. If the indicator is red, the corresponding output is ON. Eight more indicators show the status of Motion and Broken Wire Faults, the four MODZ Inputs and the PE (Program Enable) Input. Pushbuttons are provided here to allow you to access screens to Clear Faults and to view the Alarm History Screen.



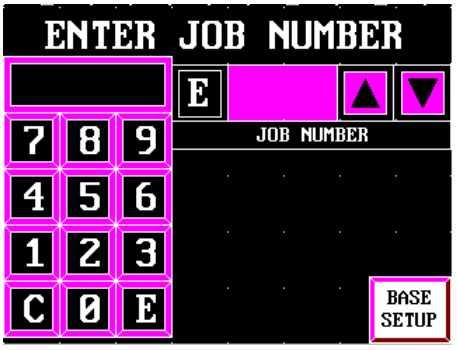
Motion Limits Screen (205)—this screen provides a keypad and up/down arrow keys to allow specification of the High and Low Motion Limits. You may enter the value for a Motion Limit on the keypad and then press the "E" key next to the label for Motion High or Motion Low to set that parameter. You may also jog to the next higher or lower value for either parameter by pressing the Up or Down arrow keys next to the appropriate label.



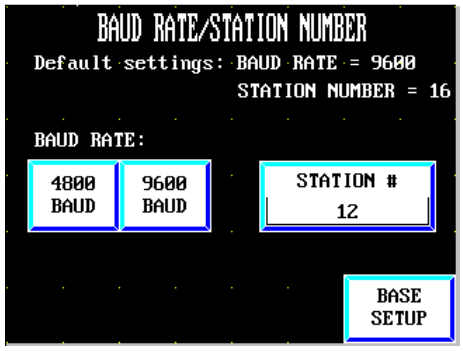
Brake Limits Screen (206)—this screen allows selection of the values for Stopping Time Fault Monitoring. You may use the keypad and Up/Down arrow keys to specify the Brake Caution and Brake Danger Time Limits (in seconds from 0 to 9.99 seconds). The Brake Danger Limit must be higher than the Caution Limit. Outputs 7 and 8 and the first two ModZ inputs will be switched to Brake I/O if either of these limits is nonzero.



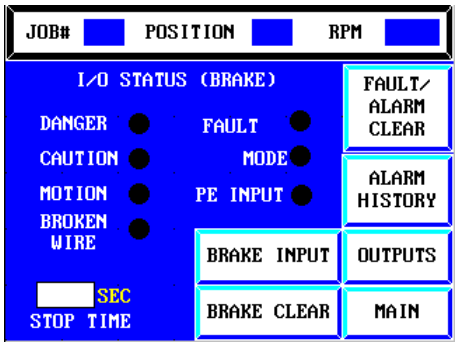
Offset/Scale Factor Screen (207)—this screen allows you to choose the Scale Factor (number of increments which one turn of the resolver will be divided into) and offset (number of increments by which the indicated zero position will differ from the resolver's actual zero position). You may enter the value for either parameter using the keypad. Press the "E" key next to the label of the parameter that you wish to set. A field at the bottom of the screen displays the current position of the resolver (adjusted by the programmed Scale Factor and Offset).



Job Number Screen (208)—this screen provides a keypad push-buttons for selection of the Job Number that the PLS is to use, both for operation and editing. The functions under the PLS Output Setup Screen will operate on the PLS outputs associated with the Job Number selected here. Enter the number of the job to be selected (1 to 8) on the keypad and press the "E" key or press the Up or Down arrow keys to change the job number by +/1.

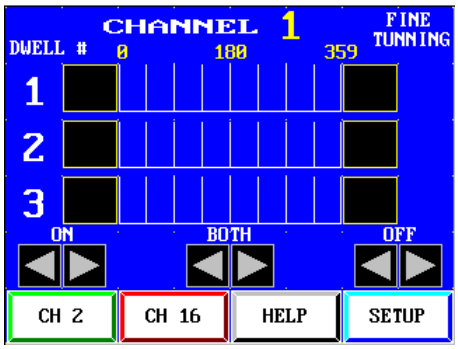


Baud Rate/Station Number Screen (209)—this screen allows selection of the Baud Rate (4800 or 9600) and Station Number (1 to 16) that the PLS will use for its RS-485A port.



I/O Status Brake Screen (210)—this screen displays more I/O Status for the PLS and has pushbuttons to provide access to the Fault Clear and Alarm History Screens. The status of the Brake Danger, Brake Caution, Motion Limits, Broken Wire, and Fault outputs are shown with colored indicators. The status of the Program Enable Input and the Brake Input are shown as well. Pushbuttons are provided to allow the Brake Clear and Brake Inputs to be toggled. A field at the bottom of the screen displays the stopping time in seconds from the last time the Brake Input was turned off (STOP).

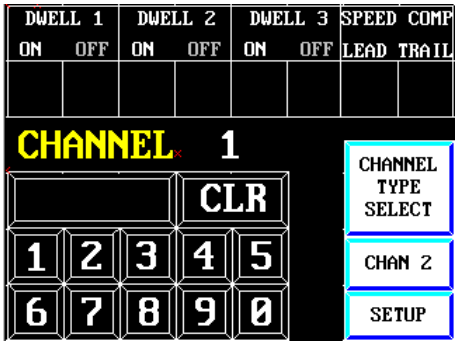
PLS Output Setup Screen (219)—displays four pushbuttons that allow you to choose to Edit the Current Job's PLS settings, Fine Tune the PLS settings, or display Help for those two functions.



Fine Tune Channel 1 (220)— this screen allows Fine Tuning of the three Dwells of the Channel 1 PLS output. Bar graphs and numeric values of the Current Dwells are displayed on the screen. Press the number on the left side of the screen that corresponds with the Dwell to be Fine Tuned. Its number will then be highlighted. Then use the arrow keys at the bottom of the window to increase or decrease the angle of Leading Edge (ON), the Trailing Edge (OFF) or of the entire Dwell (BOTH). This screen is set up for a Scale Factor of 359. If you change the Scale Factor to another value, the bar graphs' ranges will not be correct. This can be easily changed with the *u*WIN Software. Pushbuttons are also provided to allow access to the Fine Tune Screen for Channel 2 and Channel 16. Each Fine Tune Screen allows access to the next and previous screens. Another pushbutton is provided to access the HELP for fine tuning.

Edit Help (247)—this screen is the first of six screens that display information about Editing the PLS Channels.

Fine Tune Help (250)—this screen displays some information about using the Fine Tuning functions.

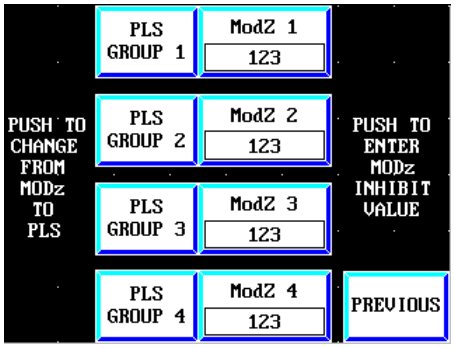


Edit Channel 1 (251)—this screen provides the means by which PLS Output Channel 1's Dwells and Speed Compensation are programmed. To set the ON and OFF angles for Channel 1, simply enter the desired angle using the keypad and press the touch screen where the numbers for the ON or OFF angle for the Dwell to be programmed is located. You may program up to three Dwells per Channel using this screen. Up to seven Dwells per Channel can be accommodated by the Touch•PLS, but you will have to modify the program, using *u*WIN. The speed compensation for the Leading and Trailing Edges for Channel 1 are set in a similar manner.

This screen also provides pushbuttons to allow you to move to the Channel Type Select Screen and also to the Edit Channel 2 Screen. Each channel's Edit Screen allows movement to the next channel's screen, through all 16 possible channels.

Channel 1 Group Number/Type (271)—this screen allows the Channel to be assigned to the base PLS or one of four Groups. It also allows the four Groups to be selected as PLS or ModZ Groups. Pushbuttons are provided to give access to screens where the Groups' Offsets can be specified and the ModZ Inhibit Zones can be specified. Buttons labeled "BASE – ANGLE ON/OFF", "GR 1– ANGLE ON/ANGLE OFF" indicate that the Channel is currently selected to use ANGLE ON and ANGLE OFF settings to control the Dwells. If you press this pushbutton, its label will change to ANGLE ON/TIME OFF and the Channel will be selected to use ANGLE ON and TIME OFF settings for the Dwell. Only one Dwell can be programmed for ANGLE ON/TIME OFF. The TIME OFF settings are in msec.

Group Number Offset (287)—this screen shows a pushbutton for each of the four Groups. When the pushbutton is pressed, a keypad is displayed which is used to specify the Offset Angle for the selected Group.

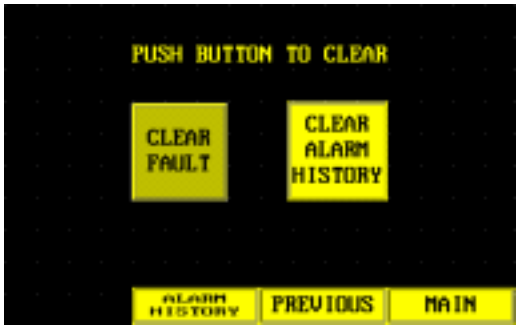


ModZ Inhibit Zone (288)—this screen works exactly like the above Group Offset screen, except the number specified is the ModZ Inhibit Zone for the Group.

10" Color Model Programming Screens

Each screen has been assigned a number. The following screen views and their descriptions are placed in numerical order.

Help Screen (43)—this screen provides a menu of pushbuttons that will lead to Help Screens for the functions under the Base Setup Screen.

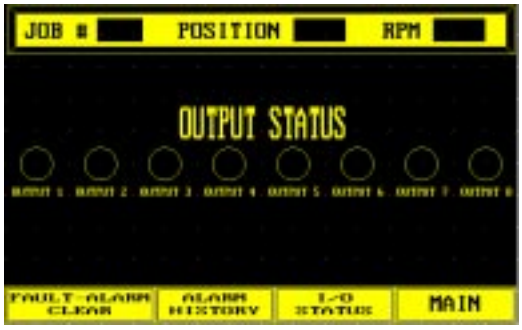


Clear Fault / Clear Alarm History Screen (54)—this screen has pushbuttons which can be used to clear a PLS Faults or the Alarm History Log. Other pushbuttons allow display of the Alarm History Log or to return to the Main Screen or the Output Status Brake Screen.

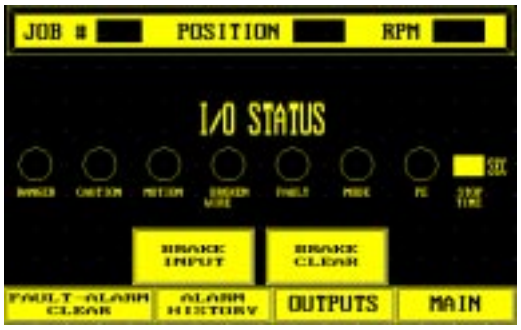
Main Screen (200)—When the unit is powered up and in Run Mode, the Main Screen is displayed. It displays the number of the currently selected "Job," the current position of the resolver and the rotation speed of the resolver (both numerically and as an analog meter). The Main Screen has four pushbuttons that allow selection of the following:

- **Base Setup**—programming of items relating to the entire machine
- **PLS Output Setup**—programming of items relating to the PLS outputs for a specific job
- **Output Status**—monitoring of PLS outputs' status and alarm status
- **About**—some Help Screens

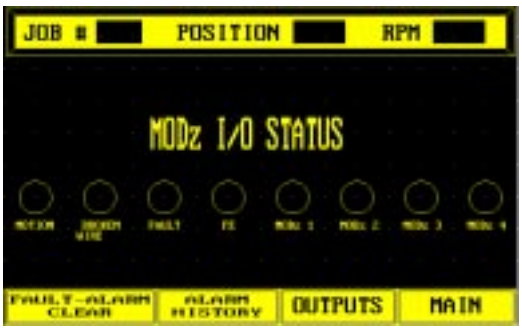
Base Setup Screen (201)—displays the current settings for Motion Limits, Brake Limits, PLS Scale Factor and Offset and the currently selected Job Number. Pushbuttons are provided to allow access to screens that will program those parameters. A pushbutton is also provided to give access to the Baud Rate/ Station Number Screen.



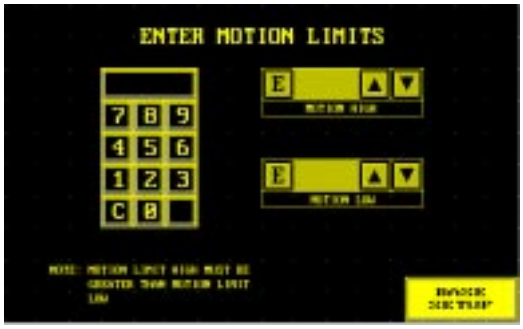
Outputs Screen (202)—this screen displays the current Job Number, Position and RPMs at the top of the screen. It also displays 8 or 16 (depending upon unit type) indicators that correspond to the 8 or 16 PLS outputs. If the indicator is red, the corresponding output is ON. (Note that outputs 7 and 8 are Brake Caution and Danger outputs). Pushbuttons are provided here to allow you to access screens for I/O Status, to clear Faults and to view the Alarm History Screen.



Brake I/O Status Screen (203)—this screen displays I/O Status for the PLS and has pushbuttons to provide access to the Fault—Alarm Clear, Clear and Alarm History Screens. The status of the Brake Danger, Brake Caution, Motion Limits, Broken Wire, and Fault outputs are shown with colored indicators. The status of the Program Enable Input and the Brake Input are shown as well. Pushbuttons are also provided to allow the Brake Clear and Brake Inputs to be toggled. A field at the center, extreme right, of the screen displays the stopping time in seconds from the last time the Brake Input was turned off (STOP).

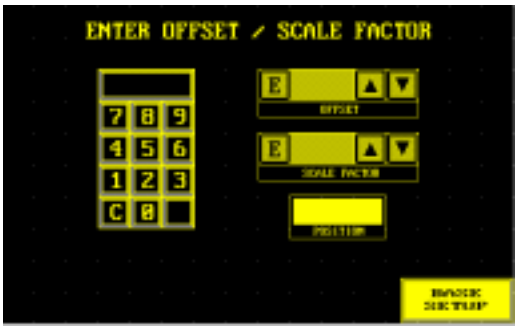


MODz I/O Status Screen (204)—this screen displays the current Job Number, position and RPMs at the top of the screen. Eight indicators show the status of Motion and Broken Wire Faults, the four MODZ Inputs and the PE (Program Enable) Input. Pushbuttons are provided here to allow you to access screens to Clear Faults and to view the Alarm History Screen.

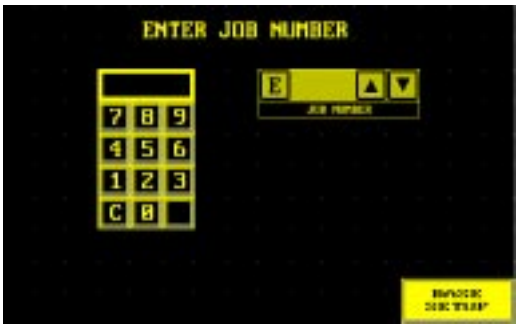


Motion Limits Keypad Screen (205)—this screen provides a keypad and up/down arrow keys to allow specification of the High and Low Motion Limits. You may enter the value for a Motion Limit on the keypad and then press the “E” key next to the label for Motion High or Motion Low to set that parameter. You may also jog to the next higher or lower value for either parameter by pressing the Up or Down arrow keys next to the appropriate label.

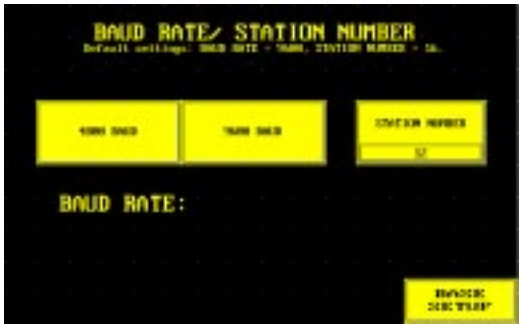
Brake Limits Screen (206)—this screen allows selection of the values for Stopping Time Fault Monitoring. You may use the keypad and Up/Down arrow keys to specify the Brake Caution and Brake Danger Time Limits (in seconds from 0 to 9.99 seconds). The Brake Danger Limit must be higher than the Caution Limit. Outputs 7 and 8 and the first two ModZ inputs will be switched to Brake I/O if either of these limits is nonzero.



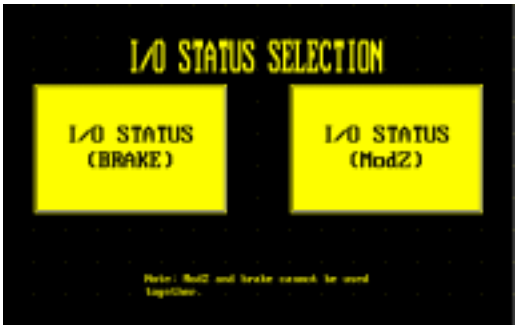
Offset/Scale Factor Screen (207)—this screen allows you to choose the Scale Factor (number of increments which one turn of the resolver will be divided into) and offset (number of increments by which the indicated zero position will differ from the resolver’s actual zero position). You may enter the value for either parameter using the keypad. Press the “E” key next to the label of the parameter that you wish to set. A field at the bottom of the screen displays the current position of the resolver (adjusted by the programmed Scale Factor and Offset).



Job Number Screen (208)—this screen provides a keypad pushbuttons for selection of the Job Number that the PLS is to use, both for operation and editing. The functions under the PLS Output Setup Screen will operate on the PLS outputs associated with the Job Number selected here. Enter the number of the job to be selected (1 to 8) on the keypad and press the “E” key or press the Up or Down arrow keys to change the job number by +/1.

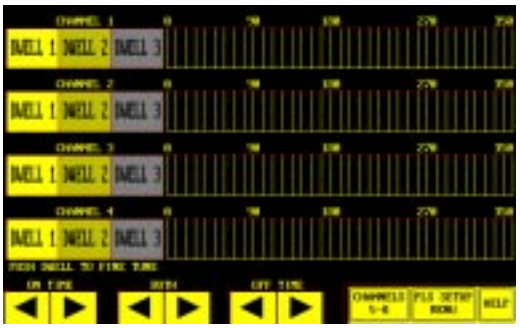


Baud Rate/Station Number Screen (209)—this screen allows selection of the Baud Rate (4800 or 9600) and Station Number (1 to 16) that the PLS will use for its RS-485A port.

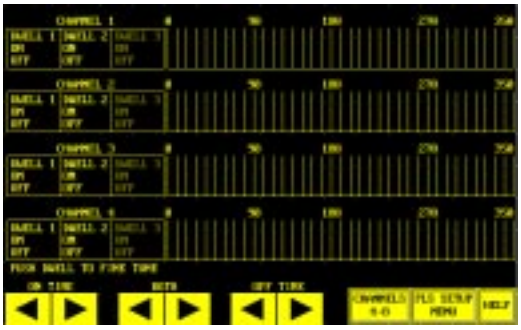


I/O Status Choice Screen (210)—this screen has two push-buttons to allow selection of screens to show I/O Status. You should select the I/O Status (Brake) pushbutton if you have the PLC programmed to monitor Brake Stopping times. (See Brake I/O Status Screen—203.) You should select I/O Status (ModZ) if you are not using the Brake functions. (See MODz I/O Status Screen—204.)

PLS Output Setup Screen (219)—displays four pushbuttons that allow you to choose to Edit the Current Job's PLS settings, Fine Tune the PLS settings, or display Help for those two functions.

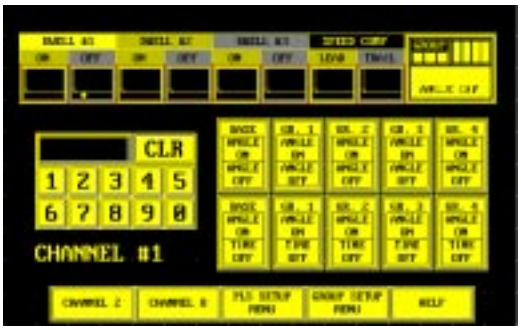


Fine Tune Channel 1 (220)— this screen allows Fine Tuning of the three Dwells of Channel 1 through 4 PLS outputs. Bar graphs and numeric values of the Current Dwells for each of the 4 channels are displayed on the screen. Press the Dwell 1, Dwell 2, or Dwell 3 pushbutton on the left side of the screen to Fine Tune that Dwell. The ON and OFF setpoints for that Dwell are revealed. Use the arrow keys at the bottom of the window to increase or decrease the angle of Leading Edge (ON), the Trailing Edge (OFF) or of the entire Dwell (BOTH). This screen is set up for a Scale Factor of 359. If you change



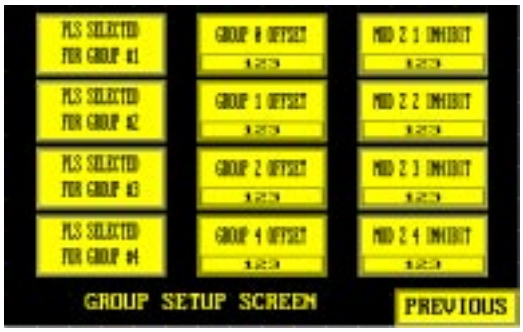
the Scale Factor to another value, the bar graphs' ranges will not be correct. This can be easily changed with the *u*WIN Software. Pushbuttons are also provided to allow access to the Fine Tune Screens for Channels 5 through 8, 9 through 12, or 13 through 16. (This depends upon the type of unit and subsequently, the number of Channels available, 8 or 16.) Each Fine Tune Screen allows access to the next 4 Channels and/or the previous 4 Channels. Another pushbutton is provided to access the PLS SETUP MENU and HELP for fine tuning.

Fine Tune Help (250)—this screen displays some information about using the Fine Tuning functions.



Channel 1 Edit (251)—this screen provides the means by which PLS Output Channel 1's Dwells and Speed Compensation are programmed. To set the ON and OFF angles for Channel 1, simply enter the desired angle using the keypad and press the touchscreen where the numbers for the ON or OFF angle for the Dwell to be programmed is located. You may program up to three Dwells per Channel using this screen. Up to seven Dwells per Channel can be accommodated by the Touch•PLS, but you will have to modify the program, using *u*WIN. The speed compensation for the Leading and Trailing Edges for Channel 1 are set in a similar manner.

Pushbuttons labeled "ANGLE ON/OFF" indicate that the Channel is currently selected to use ANGLE ON and ANGLE OFF settings to control the Dwells. If you press this pushbutton, its label will change to ANGLE ON/TIME OFF and the Channel will be selected to use ANGLE ON and TIME OFF settings for the Dwell. Only one Dwell can be programmed for ANGLE ON/TIME OFF. The TIME OFF settings are in msec. This screen also provides pushbuttons to allow you to move to the Channel 2 Group Number Screen and also to the Edit Channel 2 Screen. Each channel's Edit Screen allows movement to the next channel's screen, through all 16 possible channels.



Group Setup Menu (271)—this screen allows the Channel to be assigned to the base PLS or one of four Groups. It also allows the four Groups to be selected as PLS or ModZ Groups. It also displays a pushbutton for each of the four Groups. When the pushbutton is pressed, a keypad is displayed which is used to specify the Offset Angle for the selected Group. The ModZ Inhibit Zone pushbuttons works exactly like the Group Offset screen, except the number specified is the ModZ Inhibit Zone for the Group.

5. Modification of Core Program

Not all applications have the same requirements. There are two cases in which you might need to modify the Core Program. One—in a stand-alone application, you may find it necessary to add or modify the Touch•PLS's screens to suit your application's unique requirements. Two—if you are going to use the Touch•PLS as an operator interface to your PLC as well, you'll need to add some screens.

Whether you need to modify existing screens or create new screens, you must install the *u*WIN Programming Software included with the unit.

*u*WIN enables you to select the PLC driver you need and set the parameters. Also, you use *u*WIN to set any peripheral device parameters (such as a bar code reader or printer), and to set the password protection level.

5.1 Install *u*WIN

a. Connect a PC to your Touch•PLS as shown in Section 2.2 of this manual.

b. Load the Touch•PLS *u*WIN Software on your PC by placing the first of three 3.5" program Disks into your system's external drive.

c. From the Windows File Menu, select RUN. Type: **A:\install**

d. Follow the prompts and select only the PLC drivers you need. (Selecting all the PLC drivers will take up about 4 Meg of hard drive space.) Refer to the *u*WIN's Software User's Manual (P/N 79769) for additional information.

5.2 Run *u*WIN

Once the program has been installed, you will have a new Program Group listed in your Windows Program Manager. To run the programming software, use the mouse to double CLICK on the *u*WIN Software icon. Once the software has been launched, you will see the Start Project Selection screen. Here you choose the Programming Level you wish to work at:

- Basic
- Advanced.

To have access to all the programming screens and functions, select Advanced.

From the Start Project Selection screen, CLICK on "Open Existing Project" to work offline, or CLICK on "Open Remote Project" to work online.

5.3 Online or Offline?

You may upload and then modify the Touch•PLS Core Program on your PC by working offline (not connected to a Touch•PLS.) You may also work online with the Touch•PLS unit to make changes to the Core Program.

Working offline you may use *u*WIN to redesign your Touch•PLS screens in your office or home—or even while on travel. Your project becomes as portable as your laptop, and your Touch•PLS is not "down" while you are redesigning or making modifications as your unique application needs grow or change.
Working online allows you to make quick fixes or design changes to an installed Touch•PLS and its existing programming. You can eliminate a step or two and save time by downloading these changes directly to your Touch•PLS. Now you can see the effect of the screen design changes you have made immediately, eliminating the traditional "edit-compile-download" cycle. Most of you will employ both methods at one time or another, but whether working offline or online—you will certainly appreciate the versatility provided by the Touch•PLS and its easy-to-use *u*WIN Software.

If working offline, your project may be uploaded to the Touch•PLS at any time. The upload function allows you to select a project to be loaded to the Touch•PLS. From *u*WIN's Main Menu Bar, select File>Remote Transfer> Upload File to Unit. When "Upload File to Unit" is selected, a dialog box similar to the Open File dialog is shown. The file to upload is selected from that dialog box.

If working online you may download the core program to your PC. The download function ("Download File from Unit") allows you to load a project from the Touch•PLS to your PC. From *u*WIN's Main Menu Bar, select File>Remote Transfer>Download File from Unit. Select the file to be downloaded and simply click OK. The internal register map, file protection and passwords, PLC attributes, system attributes, the initial values of the internal registers and image screens are saved to disk.

The "how to's" are explained in greater detail in the *u*WIN Software Manual. Consult the manual or *u*WIN Help for more information.

5.4 Open Core Program

Included with your hardware is a disk with your "Core Program." If working offline, install this disk and select the Core Program to open and then edit the Core Program. If working online, download CORE Program from your Touch•PLS unit.

For an example of how to use the Touch•PLS to modify the Core Program to meet an example application, see Section 5.6.

5.5 How do I change my Core Program?

There are only a few steps needed to modify any part of the Core Program. You will need to have the *u*WIN Software User's Manual (P/N 79769) with you for ready reference.

a. Download the Core Program from your Touch•PLS to your PC. You will find the correct file name for your core program on the list provided in the previous section. (See the *u*WIN Software User's Manual for details on how to do this.) Save the program with a new name (use Save As).

b. Determine the register and bit to be monitored by the application. We've provided a copy of the Register Map in your unit's memory and Bit Maps for your convenience in Appendix A. However, if you are modifying a Touch•PLS that has been already installed, print out a copy of the Register Map of your unit to ensure you have the proper information about any changes that may have been made to your unit at some earlier time. We explain how to print out a copy later (see paragraph 5.5.1).

c. Implement your modification (see example in Section 5.6).

d. Rename and save your modified program. Remember, Touch•PLS can hold up to eight different programs in its memory (depending on the sizes of the programs).

e. Upload your new program.

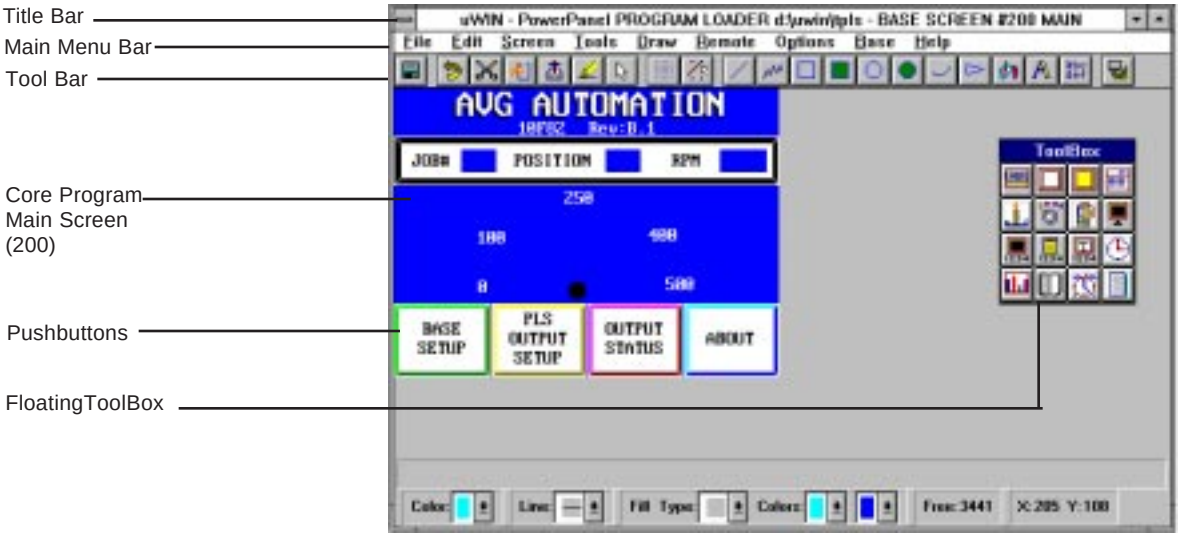
f. Test the program.

g. Fix any problems.

h. Retest.

i. RUN. **That's it—you're up and running!**

In Section 5.6 we provide a simple example application.



5.5.1 How to Print Out a Copy of Your Touch•PLS Core Program's Register Map.

To print out a copy of the memory map, follow these steps (reference page 29 of the *u*WIN Software User's Manual for details):

a. CLICK on the word File on the Main Menu Bar (see figure, above).
b. On the menu, CLICK on the word Print.
c. The **PRINT PROJECT SCREEN** will appear.
d. UNCHECK all screens except **PRINT REGISTER MAP**.
e. CLICK OK button. Your printer will print out a copy of the **REGISTER MAPPING AND INITIAL VALUES** table.

5.6 Example:

*You have a hot melt applicator that must turn **ON** at 15 degrees and **OFF** at 20 degrees to assure a proper bead. You want to add a pilot light to the **BASE** Screen (200) that turns **ON** and **OFF** to inform the operator when and if the hot-melt applicator has been activated. Assume that we are using Channel 1 to control the melt application.*

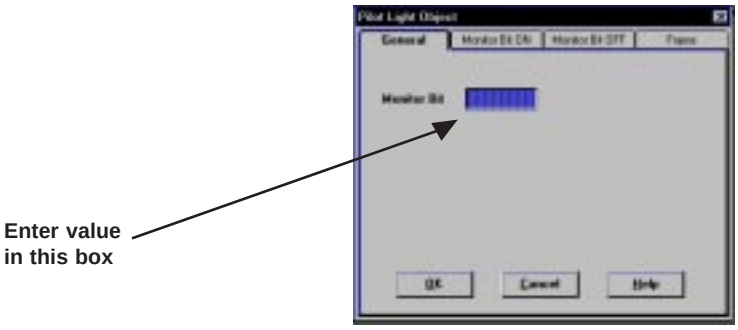
With *u*WIN running on your PC, **download the Core Program from your Touch•PLS unit.**

a. Use the menu path Screen > Select > Base to go to **SELECT BASE SCREEN**.

b. SCROLL to **200–MAIN** Screen and Select it. The **MAIN** Screen will appear.

c. Pick the **PILOT LIGHT OBJECT** from the TOOLBOX and place it at the desired location on the Screen. (See page 63 of the *u*WIN Software User's Manual for details.)

d. We need to determine which bit is mapped to Output Channel 1. From Appendix A (the list of mapped registers) it is in 1104/0. Enter this number in the Monitor Bit field of the PILOT LIGHT OBJECT-General Tab Screen (see figure below).



e. Complete configuring the Pilot Light's other properties, such as color, border, etc.

f. Save the changes you've made and CLICK the word Remote on the Menu Bar. On the menu that appears, CLICK on the words Warm Start. This will upload the changes to your Touch•PLS.

g. Enter the dwell values, turn the resolver. If the pilot light lights up, you're done. If not, retrace your steps and fix the error.

This page intentionally left blank.

6. How to Order

6.1 Touch•PLS

Part Number	Display Type	Number of Outputs	Output Polarity
100GT5S1R0K	5” STN Color	8	N
100GT5S1R0L	5” STN Color	16	N
100GT5S1R0M	5” STN Color	8	P
100GT5S1R0N	5” STN Color	16	P
100GT5A1R0K	5” TFD Color	8	N
100GT5A1R0L	5” TFD Color	16	N
100GT5A1R0M	5” TFD Color	8	P
100GT5A1R0N	5” TFD Color	16	P
100GT5L1R0K	6” Monochrome	8	N
100GT5L1R0L	6” Monochrome	16	N
100GT5L1R0M	6” Monochrome	8	P
100GT5L1R0N	6” Monochrome	16	P
100GT1S1R0K	10” STN Color	8	N
100GT1S1R0L	10” STN Color	16	N
100GT1S1R0M	10” STN Color	8	P
100GT1S1R0N	10” STN Color	16	P

6.2 Compatible Transducer/Resolvers

The Touch•PLS requires a single-turn resolver as an input device, such as AVG Autotech’s RL100, RL101, RL500, RL501, E1R, E7R, E8R or E9R Series of resolvers. Please see appropriate Position Transducer Manual (MAN-RPXDU-000, MAN-E1/9R-010, MAN-RL500-000, or MAN-RL501-500) for complete ordering information on resolvers, cables, and appropriate accessories.

6.3 Cable *(See appropriate Position Transducer Manual for ordering cable)*

PLC Cable: See the table on the next page for the cable part number applicable to your type PLC.

CBL-10T22-Cxxx: 22 AWG, 10-conductor (5 twisted pairs) overall foil shielded cable, without connector. “xxx” length must be ordered as 010, 020,050 feet and increments of 50 feet (i.e. 100, 150, etc.).

CBL-10T22-Mxxx: 22 AWG, 10-conductor (5 twisted pairs) overall foil shielded cable, with 10-pin MS connector (ECM-10REC-ITT) on one end. “xxx” length must be ordered as 010, 020, 050 feet and increments of 50 feet (i.e. 100, 150, etc.).

6.4 Terminal Block Adapter Kits

Terminal block adapter kits are available for multi-function applications.
58K19: Adapter Kit for 5" Color and 6" Monochrome Models
58K21: Adapter Kit for 10" Color Model

6.5 PLC Cable Part Numbers (for all Touch•PLS Models)

Cable Part #	PLC Manufacturer	PLC Model	PLC Connector Type
43933	Allen-Bradley	SLC 500 Programming Port (DH-485A)	8-position phone plug w/shield
43976		SLC 500 DF1 (RS-422A)	9-position female d-sub
44314		SLC 500 DF1 (RS-232C)	9-position female d-sub
43978		SLC 500 DF1 (RS-485A)	9-position female d-sub
44313		PLC5 DF1 (RS-485A)	25-position male d-sub
43983		SLC 500 AIC Link Coupler Module	8-position phone plug w/shield
44394	CTC	CTC 2200/2600 (RS-232C)	6-position modular phone-type plug
43939	General Electric	Series 90-30, 90-70 SNP	15-pin plug d-sub
43939		Series 90-30, 90-70 SNP-X	15-pin plug d-sub
44315	IDEC	FA2/FA2J/FA3S/FA25M	25-position male d-sub
44385	Keyence	KV-10t (RS-232C)	6-position modular phone-type plug
43947	Klockner-Moeller	PS 306/316 (RS-485A)	DIN 5-pin right-angle plug
44307		PS4 (RS-232C)	DIN 5-pin right-angle plug
44381	Koyo	DL305 Series (DL340/350), or DL405 Series (DL430/440/450) (RS-422A)	25-position male d-sub
44383		DL305 Series (DL340/350), or DL405 Series (DL430/440/450) (RS-232C)	25-position male d-sub
43150		DL205 Series (DL240/250), or DL 405 Series (DL450) (RS-232C)	Phone jack type connector
44390	Mitsubishi	MELSEC FX Series Converter (RS-422A)	25-position male d-sub
44389		MELSEC FX Series Converter (RS-232C)	25-position male d-sub
44312	Modicon	Modbus (RS-232C)	9-position male d-sub
44399		AEG Modicon Micro	9-position male d-sub
44318		AEG Series A120 (RS-232C)	9-position male d-sub
44311	Omron	Host Link (RS-232C)	25-position male d-sub
44309	Reliance	Automate (RS-232C)	25-position male d-sub
43970	Siemens/TI	545 (RS-422A)	9-position male d-sub
44310		545 (RS-232C)	9-position female d-sub
44387		S7 HMI Adaptor (RS-232C)	9-position female d-sub
43934	Square D	SY/MAX (RS-422A)	9-position male d-sub
44317	Toshiba	Prosec T Series (RS-232C)	9-position male d-sub
44316		Prosec T Series (RS-422A)	15-pin plug d-sub
44226	UTICOR	Director 6001 PLC (RS-422A/485A)	9-position male d-sub
44227		Director 6001 PLC (RS-232C)	9-position male d-sub

7. Troubleshooting

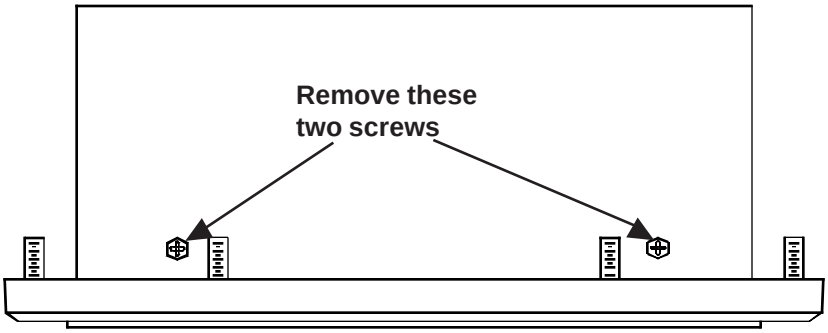
Symptom	Possible Causes
Unable to program unit parameters (Scale Factor, Offset, etc.)	1. Is the Program Enable Input (PE) false? (i.e., the voltage level at the customer VS+/VS- input is incorrect.) 2. Is the machine moving? Programming of several parameters (Scale Factor, Program Number) is disabled if the resolver is turning faster than 3 RPM. 3. Have the required passwords been entered? 4. If unable to program setpoints, the PLS program may already have the maximum of 7 setpoints assigned to that channel. You cannot assign more than 7 setpoints per channel.
Program memory is changing by itself.	1. Has the program number been changed to a different number? 2. Have proper grounding and shielding practices been applied? 3. Is the Program Enable input TRUE? While this will not cause the program to change itself -- keeping it FALSE when not actually programming the unit ensures that the memory cannot be programmed.
Outputs are shifting or turning ON/OFF sooner then they should.	1. Programming speed compensation can cause the output to shift and turn the output On /Off sooner then its programmed value. 2. Remove or insert 0 in the speed compensation of this output to eliminate this effect.
Position and RPM readings are incorrect.	1. Is the resolver correclty wired? Follow the steps below for a quick check. a. turn power off to Touch•PLS unit. b. Measure the following terminals on J1 (located on the bottom of the unit) : term. 3 to term. 4 (R1 to R2) = 15 to 50 ohms term. 7 to term. 5 (S1 to S3) = 50 to 150 ohms term. 8 to term. 6 (S4 to S2) = 50 to 150 ohms
Broken wire bit in I/O status word.	1. Is the resolver cable properly grounded and shielded? Supply (VS+, VS-) less than 20 VDC? 2. Is resolver wiring correct? Follow instructions for ohming out resolver wiring above.
Mechanical Zero drifts.	1. Is the mechanical resolver linkage loose? 2. Has the offset value been changed?
If all fails --	Call AVG Autotech @ (630) 668-3900 for service.

This page intentionally left blank.

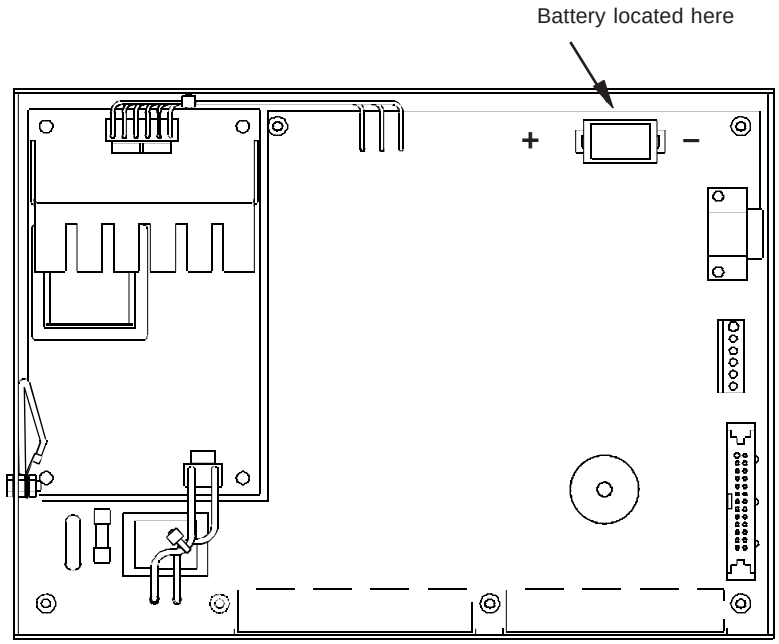
8. Replacement Parts & Maintenance

8.1 Lithium Battery Replacement on the 10" Model.

a. Remove four screws (two per side, as shown in figure below) and lift back plate from unit.



b. With the Touch•PLS top pointed away from you, the battery location is in the upper-right as shown in figure below. Remove old battery and replace with a 1/2 AA, 3.6 V Lithium Battery.

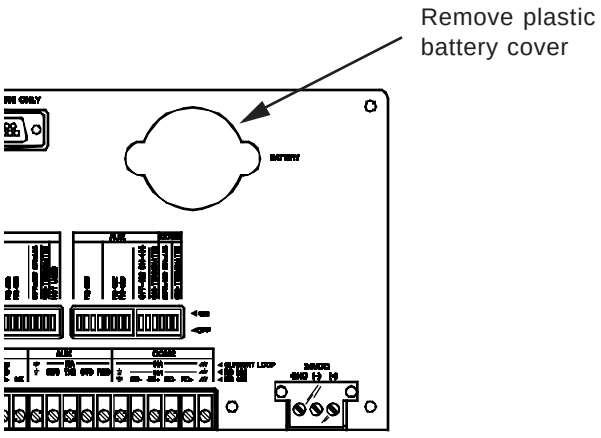


8.2 Lithium Battery Replacement on the 5" Color and 6" Monochrome Models

a. Remove plastic battery cover on back of unit (see figure below) to access the coin cell battery.

b. Lift up on edge of battery to release and then slide it out from under the retaining clip. Remove from unit.

c. When installing a new 3.6 V Coin Cell Lithium Battery (Generic P/N BR2032), ensure that the positive (+) side is facing up.



8.3 Fuse Replacement

The fuses may need to be replaced. Use a **1.5 Amp, 250V, 2AG Slow Blow** fuse for the 5" Active Color, the 5" Passive Color, and the 6" Monochrome Touch•PLS. Use a **1.0 Amp, 250V, 2AG Slow Blow** fuse for the 10" Color Touch•PLS.

8.4 Fluorescent Backlight Bulb Replacement

A replacement kit is available for the fluorescent backlight bulb used in the color and monochrome Touch•PLS. Call technical support to determine your display type and P/N of bulb used.

8.5 Maintenance of the Touch•PLS

To ensure the longevity and effectiveness of the Touch•PLS please take note of the following precautions:

- Do not press sharp objects against the screen.
- Do not strike with the panel with hard objects.
- Do not press the screen with excessive force.
- If the panel is mounted horizontally, do not place any objects over the touchscreen. This will result in heat buildup and may damage the unit.

The Touch•PLS touchscreen has a polycarbonate surface. The touchscreen has a scratch resistant coating. This adds a slight chemical barrier to the screen, but the coating's primary purpose is to protect the screen from abrasion, and it should not be considered when evaluating the use of the listed chemicals. The Touch•PLS touchscreen should be cleaned daily with warm, soapy water.

There is a removable protective screen overlay available. P/N 58457 is for the monochrome display and P/N 58461 is used with the color display. Contact AVG for more information.

This page intentionally left blank.

Index

Symbols

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

Y

Notes

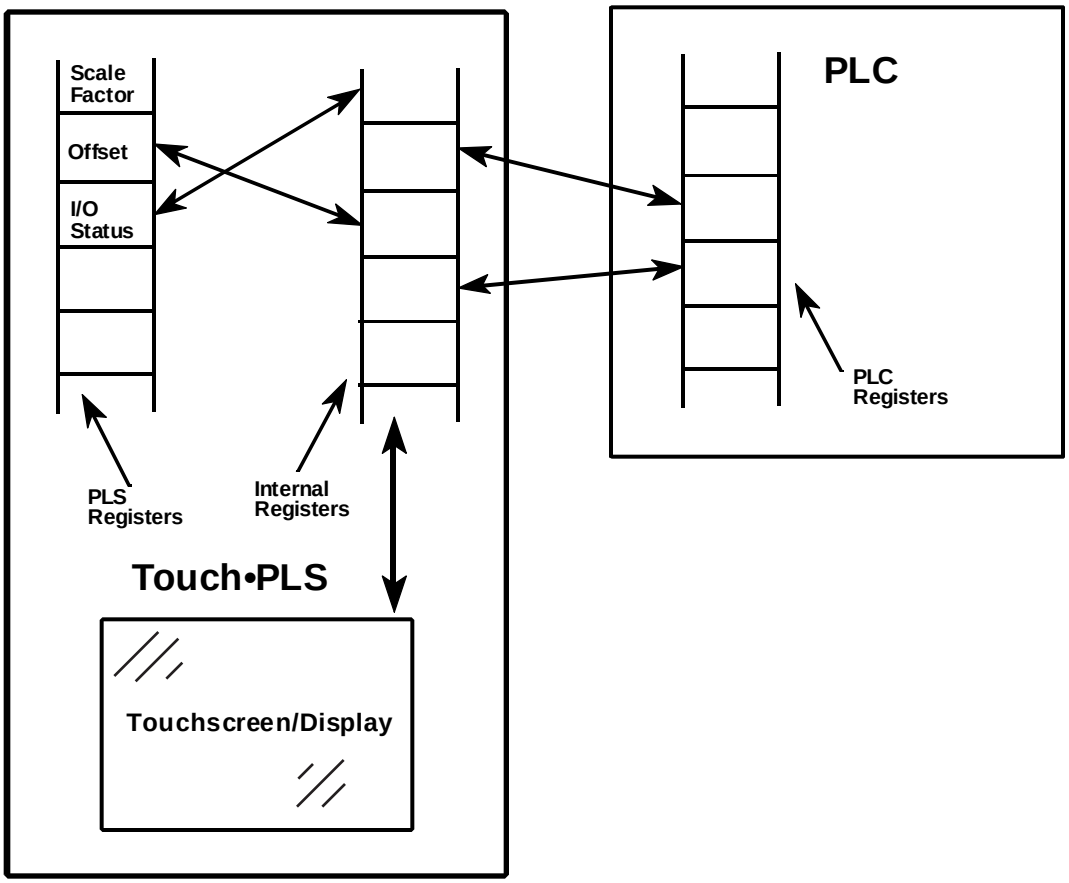
Appendix A

Register Mapping and Bit Maps

Mapping Registers

Registers are already mapped in the core program. If you need to modify the Core Program and map registers, the following section is provided to assist you.

Registers are used to hold data or commands. Data used by the PLS consists of values such as RPM, Dwell, ModZ, Offset, Leading Edge, Trailing Edge, etc. The Touch•PLS comes with 2,048 registers; 1,024 registers used by the PLS, and 1,024 registers that are available to a PLC (if used).



Register	Mapping Command	Default Value	Range of Values	Description
1204		0		
1101	R-Position		0-999	Resolver Position
1102	R-RPM		0-2,047	Resolver RPM
1103	R-I/O Status		16 bits	I/O Status
1104	R-Outputs		1-16	Outputs
1105	R-StoppingTime		0-999	Stopping Time
1106	W-ModZ&BrakeInputs			ModZ & Brake Inputs
1107	R/W-Scale Factor	359	16-999	Scale Factor
1108	R/W-Offset	0	0-scale factor	Offset
1109	R/W-HighMotion		0-999	Motion Limit—High
1110	R/W-LowMotion		0-999	Motion Limit—Low
1111	R/W-ProgramNumber	1	1-8	Program Number
1112	R/W-CautionLimit	0	0-9.99	Brake Caution Limit
1113	R/W-DangerLimit	0	0-9.99	Brake Danger Limit
1114	W-WriteFineTune			Fine Tuning Address
1115	. . . Mapped . . .			Fine Tuning Address
	Leading and Trailing Edge Speed Compensation Registers for Each Channel (1116-1147)			
1116	R/W-LEChan 1	0	0-scale factor	Lead Edge Speed Compensation for Channel 1
1117	R/W-TEChan 1	0	0-scale factor	Trail Edge Speed Compensation for Channel 1
1118	R/W-LEChan 2	0	0-scale factor	Lead Edge Speed Compensation for Channel 2
1119	R/W-TEChan 2	0	0-scale factor	Trail Edge Speed Compensation for Channel 2
1120	R/W-LEChan 3	0	0-scale factor	Lead Edge Speed Compensation for Channel 3
1121	R/W-TEChan 3	0	0-scale factor	Trail Edge Speed Compensation for Channel 3
1122	R/W-LEChan 4	0	0-scale factor	Lead Edge Speed Compensation for Channel 4
1123	R/W-TEChan 4	0	0-scale factor	Trail Edge Speed Compensation for Channel 4
1124	R/W-LEChan 5	0	0-scale factor	Lead Edge Speed Compensation for Channel 5
1125	R/W-TEChan 5	0	0-scale factor	Trail Edge Speed Compensation for Channel 5
1126	R/W-LEChan 6	0	0-scale factor	Lead Edge Speed Compensation for Channel 6
1127	R/W-TEChan 6	0	0-scale factor	Trail Edge Speed Compensation for Channel 6
1128	R/W-LEChan 7	0	0-scale factor	Lead Edge Speed Compensation for Channel 7
1129	R/W-TEChan 7	0	0-scale factor	Trail Edge Speed Compensation for Channel 7
1130	R/W-LEChan 8	0	0-scale factor	Lead Edge Speed Compensation for Channel 8
1131	R/W-TEChan 8	0	0-scale factor	Trail Edge Speed Compensation for Channel 8
1132	R/W-LEChan 9	0	0-scale factor	Lead Edge Speed Compensation for Channel 9
1133	R/W-TEChan 9	0	0-scale factor	Trail Edge Speed Compensation for Channel 9
1134	R/W-LEChan 10	0	0-scale factor	Lead Edge Speed Compensation for Channel 10
1135	R/W-TEChan 10	0	0-scale factor	Trail Edge Speed Compensation for Channel 10
1136	R/W-LEChan 11	0	0-scale factor	Lead Edge Speed Compensation for Channel 11
1137	R/W-TEChan 11	0	0-scale factor	Trail Edge Speed Compensation for Channel 11
1138	R/W-LEChan 12	0	0-scale factor	Lead Edge Speed Compensation for Channel 12
1139	R/W-TEChan 12	0	0-scale factor	Trail Edge Speed Compensation for Channel 12
1140	R/W-LEChan 13	0	0-scale factor	Lead Edge Speed Compensation for Channel 13
1141	R/W-TEChan 13	0	0-scale factor	Trail Edge Speed Compensation for Channel 13
1142	R/W-LEChan 14	0	0-scale factor	Lead Edge Speed Compensation for Channel 14
1143	R/W-TEChan 14	0	0-scale factor	Trail Edge Speed Compensation for Channel 14
1144	R/W-LEChan 15	0	0-scale factor	Lead Edge Speed Compensation for Channel 15
1145	R/W-TEChan 15	0	0-scale factor	Trail Edge Speed Compensation for Channel 15
1146	R/W-LEChan 16	0	0-scale factor	Lead Edge Speed Compensation for Channel 16
1147	R/W-TEChan 16	0	0-scale factor	Trail Edge Speed Compensation for Channel 16
	Group Number Assignment Registers for Each Channel (1148-1167)			
1148	R/W-Group#Chan 1		0-15	Assigns Group # for Channel 1
1149	R/W-Group#Chan 2		0-15	Assigns Group # for Channel 2
1150	R/W-Group#Chan 3		0-15	Assigns Group # for Channel 3
1151	R/W-Group#Chan 4		0-15	Assigns Group # for Channel 4
1152	R/W-Group#Chan 5		0-15	Assigns Group # for Channel 5
1153	R/W-Group#Chan 6		0-15	Assigns Group # for Channel 6

Register	Mapping Command	Default Value	Range of Values	Description
1154	R/W-Group#Chan 7		0-15	Assigns Group # for Channel 7
1155	R/W-Group#Chan 8		0-15	Assigns Group # for Channel 8
1156	R/W-Group#Chan 9		0-15	Assigns Group # for Channel 9
1157	R/W-Group#Chan 10		0-15	Assigns Group # for Channel 10
1158	R/W-Group#Chan 11		0-15	Assigns Group # for Channel 11
1159	R/W-Group#Chan 12		0-15	Assigns Group # for Channel 12
1160	R/W-Group#Chan 13		0-15	Assigns Group # for Channel 13
1161	R/W-Group#Chan 14		0-15	Assigns Group # for Channel 14
1162	R/W-Group#Chan 15		0-15	Assigns Group # for Channel 15
1163	R/W-Group#Chan 16		0-15	Assigns Group # for Channel 16
1164	R/W-BaudRate		4,800-9,600	Baud Rate
1165	R/W-StationNumber	16	0-255	Station Number
1166				
1167	R/W GroupTypes		PLS or ModZ	Group Type Assignment
1168	R/W-Group Offset 1		0-scale factor	Group Offset Value 1
1169	R/W-Group Offset 2		0-scale factor	Group Offset Value 2
1170	R/W-Group Offset 3		0-scale factor	Group Offset Value 3
1171	R/W-Group Offset 4		0-scale factor	Group Offset Value 4
1172	R/W-ModZInhibit 1		0-scale factor	ModZ Inhibit Value 1
1173	R/W-ModZInhibit 2		0-scale factor	ModZ Inhibit Value 2
1174	R/W-ModZInhibit 3		0-scale factor	ModZ Inhibit Value 3
1175	R/W-ModZInhibit 4		0-scale factor	ModZ Inhibit Value 4
	ON and OFF Setpoint Values for Each Channel (1201-1356)			
1201	R/W-Ch 1 SP 1	0	0-scale factor	ON Setpoint 1 Channel 1
1202	. . . Mapped . . .	0	0-scale factor	OFF Setpoint 1 Channel 1
1203	R/W-Ch 1 SP 2	0	0-scale factor	ON Setpoint 2 Channel 1
1204	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 1
1205	R/W-Ch 1 SP 3	0	0-scale factor	ON Setpoint 3 Channel 1
1206	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 1
1211	R/W-Ch 2 SP 1	0	0-scale factor	ON Setpoint 1 Channel 2
1212	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 2
1213	R/W-Ch 2 SP 2	0	0-scale factor	ON Setpoint 2 Channel 2
1214	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 2
1215	R/W-Ch 2 SP 3	0	0-scale factor	ON Setpoint 3 Channel 2
1216	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 2
1221	R/W-Ch 3 SP 1	0	0-scale factor	ON Setpoint 1 Channel 3
1222	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 3
1223	R/W-Ch 3 SP 2	0	0-scale factor	ON Setpoint 2 Channel 3
1224	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 3
1225	R/W-Ch 3 SP 3	0	0-scale factor	ON Setpoint 3 Channel 3
1226	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 3
1231	R/W-Ch 4 SP 1	0	0-scale factor	ON Setpoint 1 Channel 4
1232	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 4
1233	R/W-Ch 4 SP 2	0	0-scale factor	ON Setpoint 2 Channel 4
1234	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 4
1235	R/W-Ch 4 SP 3	0	0-scale factor	ON Setpoint 3 Channel 4
1236	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 4
1241	R/W-Ch 5 SP 1	0	0-scale factor	ON Setpoint 1 Channel 5
1242	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 5
1243	R/W-Ch 5 SP 2	0	0-scale factor	ON Setpoint 2 Channel 5
1244	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 5
1245	R/W-Ch 5 SP 3	0	0-scale factor	ON Setpoint 3 Channel 5
1246	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 5
1251	R/W-Ch 6 SP 1	0	0-scale factor	ON Setpoint 1 Channel 6
1252	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 6
1253	R/W-Ch 6 SP 2	0	0-scale factor	ON Setpoint 2 Channel 6
1254	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 6

Register	Mapping Command	Default Value	Range of Values	Description
1255	R/W-Ch 6 SP 3	0	0-scale factor	ON Setpoint 3 Channel 6
1256	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 6
1261	R/W-Ch 7 SP 1	0	0-scale factor	ON Setpoint 1 Channel 7
1262	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 7
1263	R/W-Ch 7 SP 2	0	0-scale factor	ON Setpoint 2 Channel 7
1264	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 7
1265	R/W-Ch 7 SP 3	0	0-scale factor	ON Setpoint 3 Channel 7
1266	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 7
1271	R/W-Ch 8 SP 1	0	0-scale factor	ON Setpoint 1 Channel 8
1272	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 8
1273	R/W-Ch 8 SP 2	0	0-scale factor	ON Setpoint 2 Channel 8
1274	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 8
1275	R/W-Ch 8 SP 3	0	0-scale factor	ON Setpoint 3 Channel 8
1276	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 8
1281	R/W-Ch 9 SP 1	0	0-scale factor	ON Setpoint 1 Channel 9
1282	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 9
1283	R/W-Ch 9 SP 2	0	0-scale factor	ON Setpoint 2 Channel 9
1284	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 9
1285	R/W-Ch 9 SP 3	0	0-scale factor	ON Setpoint 3 Channel 9
1286	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 9
1291	R/W-Ch 10 SP 1	0	0-scale factor	ON Setpoint 1 Channel 10
1292	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 10
1293	R/W-Ch 10 SP 2	0	0-scale factor	ON Setpoint 2 Channel 10
1294	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 10
1295	R/W-Ch 10 SP 3	0	0-scale factor	ON Setpoint 3 Channel 10
1296	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 10
1301	R/W-Ch 11 SP 1	0	0-scale factor	ON Setpoint 1 Channel 11
1302	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 11
1303	R/W-Ch 11 SP 2	0	0-scale factor	ON Setpoint 2 Channel 11
1304	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 11
1305	R/W-Ch 11 SP 3	0	0-scale factor	ON Setpoint 3 Channel 11
1306	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 11
1311	R/W-Ch 12 SP 1	0	0-scale factor	ON Setpoint 1 Channel 12
1312	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 12
1313	R/W-Ch 12 SP 2	0	0-scale factor	ON Setpoint 2 Channel 12
1314	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 12
1315	R/W-Ch 12 SP 3	0	0-scale factor	ON Setpoint 3 Channel 12
1316	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 12
1321	R/W-Ch 13 SP 1	0	0-scale factor	ON Setpoint 1 Channel 13
1322	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 13
1323	R/W-Ch 13 SP 2	0	0-scale factor	ON Setpoint 2 Channel 13
1324	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 13
1325	R/W-Ch 13 SP 3	0	0-scale factor	ON Setpoint 3 Channel 13
1326	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 13
1331	R/W-Ch 14 SP 1	0	0-scale factor	ON Setpoint 1 Channel 14
1332	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 14
1333	R/W-Ch 14 SP 2	0	0-scale factor	ON Setpoint 2 Channel 14
1334	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 14
1335	R/W-Ch 14 SP 3	0	0-scale factor	ON Setpoint 3 Channel 14
1336	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 14
1341	R/W-Ch 15 SP 1	0	0-scale factor	ON Setpoint 1 Channel 15
1342	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 15
1343	R/W-Ch 15 SP 2	0	0-scale factor	ON Setpoint 2 Channel 15
1344	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 15
1345	R/W-Ch 15 SP 3	0	0-scale factor	ON Setpoint 3 Channel 15
1346	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 15
1351	R/W-Ch 16 SP 1	0	0-scale factor	ON Setpoint 1 Channel 16
1352	. . . Mapped	0	0-scale factor	OFF Setpoint 1 Channel 16
1353	R/W-Ch 16 SP 2	0	0-scale factor	ON Setpoint 2 Channel 16
1354	. . . Mapped	0	0-scale factor	OFF Setpoint 2 Channel 16
1355	R/W-Ch 16 SP 3	0	0-scale factor	ON Setpoint 3 Channel 16
1356	. . . Mapped	0	0-scale factor	OFF Setpoint 3 Channel 16

Bit Map for I/O Status (16 Bit)

MSD[1]															LSD[1]
X	X	X	X	DNGR	CTN	MOT	BW	MZ4	MZ3	MZ2/BC	MZ1/BI	FO	X	X	PE

X = Not Used

DNGR = Danger Output; fail safe
0 = Stopping time exceeds the danger limit
1 = Stopping time is within the danger limit

CTN = Caution Output
0 = Stopping time is within the caution limit
1 = Stopping time exceeds the caution limit

MOT = Motion Output
0 = RPM exceeds the Motion Hi/Low Limit
1 = RPM within the Motion Hi/Low Limit

BW = Broken Wire
0 = Broken wire fault
1 = No broken wire fault

MZ1/BI = Mod Z Input 1 (Modification to zero) or Brake Input
Mod Z Input 1:
0 = No input
1 = Input present
Brake Input:
0 = Brake input present (Brake Mode)
1 = Brake input not present (Run Mode)

MZ2/BC = Mod Z Input 2 (Modification to zero) or Brake Clear
0 = No input
1 = Input present

MZ3 = Mod Z Input 3 (Modification to zero)
0 = No input
1 = Input present

MZ4 = Mod Z Input 4 (Modification to zero)
0 = No input
1 = Input present

FO = Fault Output (diagnostic); fail safe
0 = Fault
1 = No fault

PE = Program Enable
0 = No input
1 = Input present

(Either hard wired input or MZ1 in ModZ and Brake inputs)

Bit Map for ModZ (Modification to Zero) & Brake Inputs (16 Bit)

MSD															LSD
X	X	X	X	X	X	X	X	X	X	X	X	MZ4	MZ3	MZ2/BC	MZ1/BI

X = Not Used
MZ1 = Mod Z/Brake Input
Brake: 0 = input present, 1 = not present
MZ2 = Mod Z/ Brake Clear
MZ3 = Mod Z
MZ4 = Mod Z
(ModZ and brake cannot be used together)

[1] **MSD = Most significant digit**
LSD = Least significant digit

Bit Map for Read/Write Error and Address (14 Bit)

MSD													LSD
EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	ENUM	ENUM	ENUM	ENUM

EADD = Error Address
ENUM = Error Number
01 Attempt to fine tune nonexisting dwell
02 New dwell is out of range
03 Programming a parameter during motion
04 Value out of range
05 Function module busy
06 Program enable input not active
07 Attempting fine tuning on bad address
08 Access to fine tuning control word not available
09 Attempt fine tune in time off mode

Bit Map for Group Types (14 Bit)

MSD													LSD
X	X	X	X	X	X	X	X	X	X	GN4	GN3	GN2	GN1

X = Not used
GN1– GN4 = Group Number 1, 2, 3, or 4
0 = PLS
1 = MODZ

Bit Map for Group# + 256* Channel Type (14 Bit)

MSD													LSD
X	X	X	X	X	ALCH	X	X	X	X	X	GRP	GRP	GRP

X = Not used
ALCH = All Channels
0 = ANGE On/Off
1 = ANGE On/Time Off

GRP = Group
000 = 0
001 = 1
010 = 2
011 = 3
100 = 4