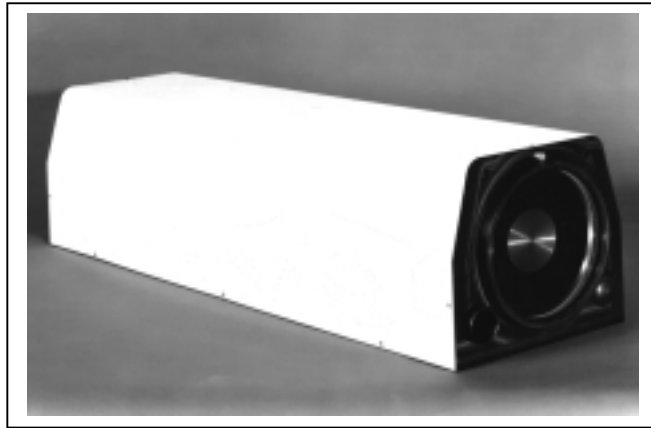


QUESTAR STEP ZOOM 182 TELESCOPE

SURVEILLANCE SYSTEM

SOFTWARE SETUP AND OPERATION INSTRUCTION MANUAL



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**Setup computer, install software
and operation manual**

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Introduction

This document provides a description of the Installation, Setup, and Use of the ‘Questar SZ-182 Console program’. For purposes of readability, the ‘Questar SZ-182 Console program’ will be referred to as the ‘Console program’ through the remainder of this document. This guide assumes at least a working knowledge in the use of a Personal Computer (PC) running Windows 95, 98 or NT. In addition, this guide also assumes the reader understands the basic capabilities and accessories available on the Questar SZ-182 Scope and Pan systems. If this unit was purchased with a computer the software will be installed and tested prior to shipment. The software can be installed from the set of 3 installation discs or CD-ROM provided. As with all installations of software please exit any programs that are currently running. Failure to do so may cause setup errors.

Installation and Setup

Program Installation

To install the Console program, the user selects the following from the Windows Start menu;

Start >
Run...

When the Run form is displayed, the user types in the filename “**a:\setup.exe**” and clicks the “OK” button. If a CD version is provided please make appropriate drive letter change or use the browse button.

From this point, the installation process is simply a matter of reading the prompts and responding by clicking form buttons and changing discs to proceed through the installation process. In order to install the program using predefined file locations and program configuration parameters, the setup process requires no user typed responses and should take no longer than 5 minutes. In most instances the program will have to restart the computer for new drivers and system changes to take effect. The default installation directory is C:\Program Files\SZ-182 Console.

After the installation process has completed, the Console program is configured as the Questar SZ 182 **Main** Console and has default settings in the Questar Console .INI file. Each unit generally has different options and internal settings that will have to be set by the user. Questar will ship a custom Console .INI file that will replace the default file, the user must copy this file manually after the installation is completed. The Questar

Console program is also set to default for a stand alone single control PC using PC COM PORT # 1 to communicate with the SZ182 and other Questar hardware. Please refer to section 7 to change COM port if this is required due to a conflict with another device. If your computer is equipped with an internal RS422 communication card, card ports should be setup to be COM3 and or COM4 and the Questar.Ini file should be modified as in section 7. See RS 422 card instructions for more detailed information. To run this program, the user selects the following from the Windows 95

Starting the Console Program

To activate the Questar Console program, the operator selects the following from the Windows Start menu

Start menu;

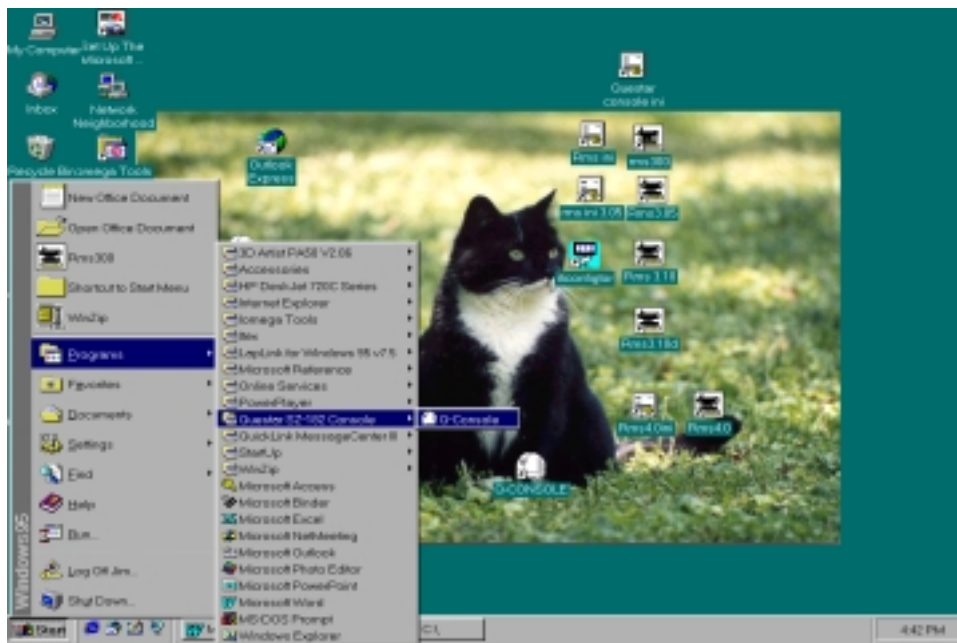
Start >
 Programs >
 Questar SZ-182 Console >
 Q-Console >

Additional Setup

The user may also setup an Icon to access the program from the desktop.

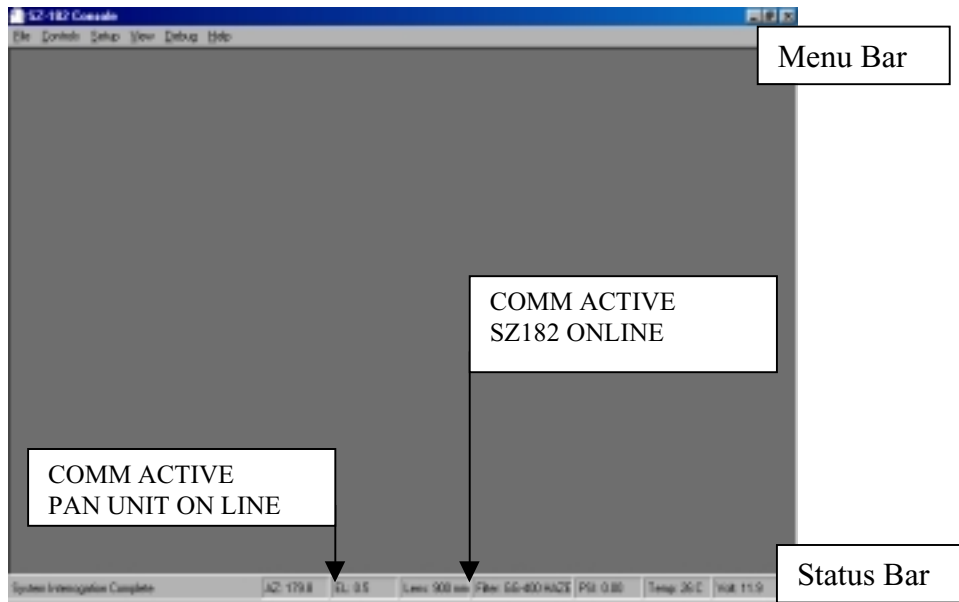


Please follow instructions for setting up Windows desktop
In addition to the Console program installation and configuration, the operator should become familiar with the options and configuration parameters available in the '*Setup Forms*' described elsewhere in this guide.



Console Windows

When the Console program is activated, the operator is presented with a display called the Console Window, which initially fills the Windows Desktop. The Console Window provides the work area for all other control and setup forms, which can be activated and displayed. Current program status is displayed in the Status Bar located at the bottom of the Console window. All control and setup forms can be activated by using the Menu Bar located along the top of the Console window some forms can be activated by clicking on the bottom bar displayed information.



Status Bar

The Status Bar is located at the bottom of the Console window and provides information on general processing status, Pan unit Azimuth and Elevation positions, Scope unit filter and lens selections, Enclosure pressure, SZ182 temperature and SZ182 voltage. It also shows if the SZ182 and Pan units are online and actively communicating with the Console program (dark numbers). If the numbers gray then the units are off line or temporarily handling data received from the host computer. In addition, the Pan / Tilt Control form can be activated by double-clicking either the Az or El portions of the Status Bar. Likewise, double-clicking either the Lens or Filter portions of the Status Bar can activate the Scope Control form. The status bar may change depending on equipment purchased.

Menu Bar

The Menu Bar is located along the top of the Console window and provides menu selections for activating all system control and setup forms. The table below describes the functions available by selecting an item in a particular menu.

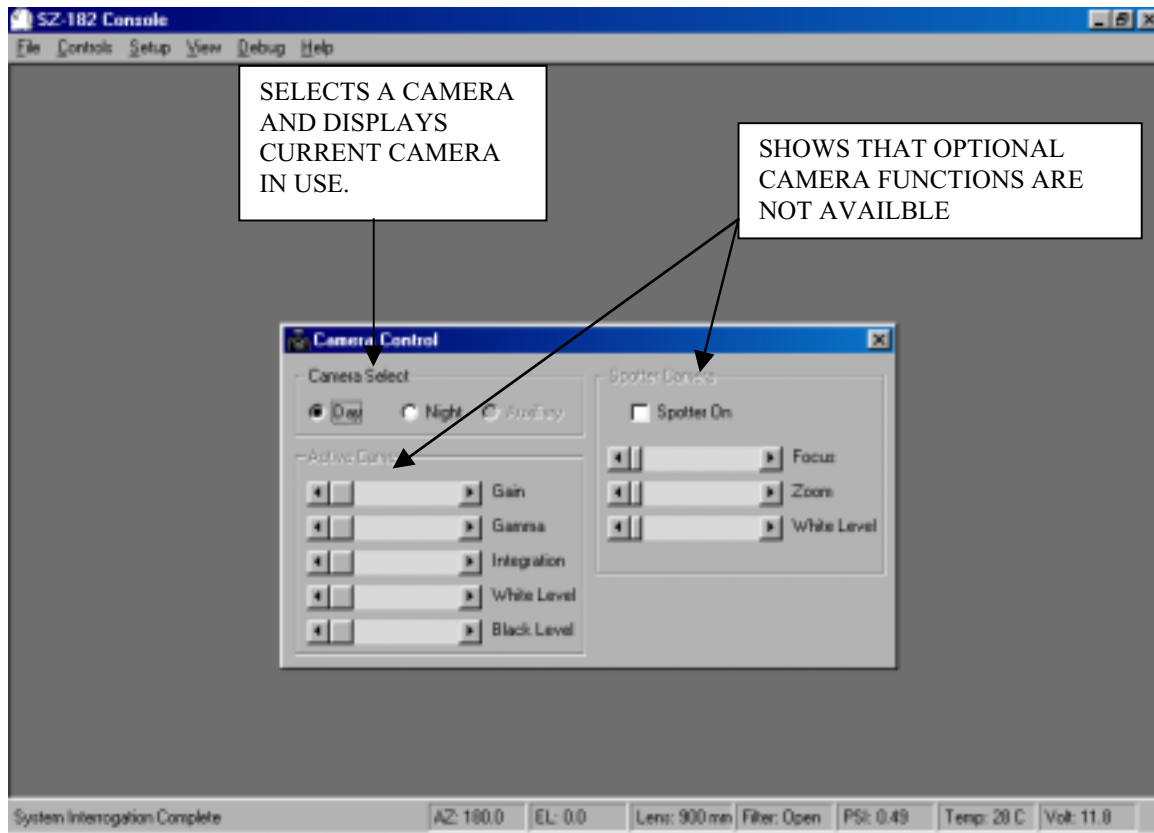
Menu Bar function table

Menu / Item	Functional Description
File	
Exit	Terminates the Console program.
Controls	
Camera...	Activates the Camera control form
Pan / Tilt ...	Activates the Pan Controls Form
Scope ...	Activates the Scope Control Form
System ...	Activates the System Control Form
Setup	
Configure ...	Activates the Configuration and speed adjustment Setup Form for scope and pan units
Pan...	Activates the Pan Calibration Setup Form
View	
Compass ...	Activates the Pan Compass window
Debug	Activates debug windows and message monitoring. This window is will be enabled by a Questar technician to help diagnose system problems.
Help	
About ...	Displays Program version information

Control Forms

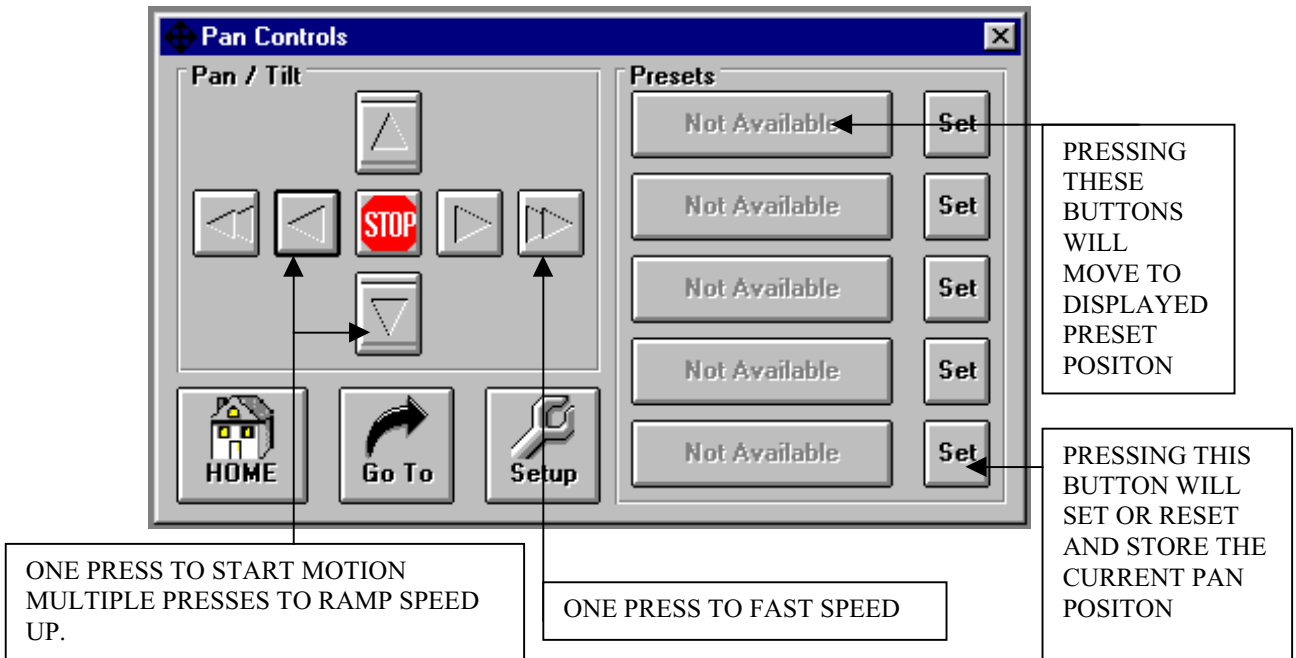
Camera Control Form

The Camera Control form provides for the selection of the camera you want to use and camera internal control via RS 232 control if camera is equipped and controllable and was purchased as an upgrade. Day, Night and or if equipped a third camera (auxiliary) can be selected. The selection of cameras will depend on camera purchased and available to user. Optional control settings for performance levels for the currently active camera can be selected and adjusted to improve camera performance if that function is available. The current finder is a standard 1/3 " format CCD that is active at all times. It is a fixed focus finder with an internal AGC circuit. The Camera Control form is shown below. Un-highlighted group areas mean that this option or function is not installed or supported.



Pan Controls Form

The Pan Controls form provides for the control of the Pan/Tilt unit including directional control, setting and selecting Azimuth and Elevation presets, moving to **HOME** position, moving directly to a position based on Range/Bearing (**GOTO**), and **SETUP** to adjust velocity and acceleration. Pan position displayed information may not be accurate until the system is setup and calibrated to its local environment (**reference position**) see Setup Pan forms. The Pan Controls form is shown below.



The Pan/Tilt buttons provide directional controls for moving left, right, up and down. The Pan/Tilt buttons with a single arrow are used for normal movement. One left mouse click on the button will start the motion until the stop button is pressed. Multiple clicks on one of these buttons will accelerate Pan unit in the direction indicated by the arrow until the user clicks on stop, pan unit reaches a limit or decelerates to a stop by repeated quick clicking on the opposing direction button. Movement will always continue at this final velocity until the "Stop" button is clicked or the Pan unit reaches a limit. The Pan/Tilt buttons with the double arrows are used for "warping" type motion. When these buttons are clicked, the pan unit will accelerate to a predefined final velocity in the direction indicated by the arrow. Movement will continue until the "Stop" button is clicked or the Pan unit reaches a limit. The final velocity and acceleration is determined by the velocity and acceleration selected by user. Please refer to Velocity and acceleration settings.

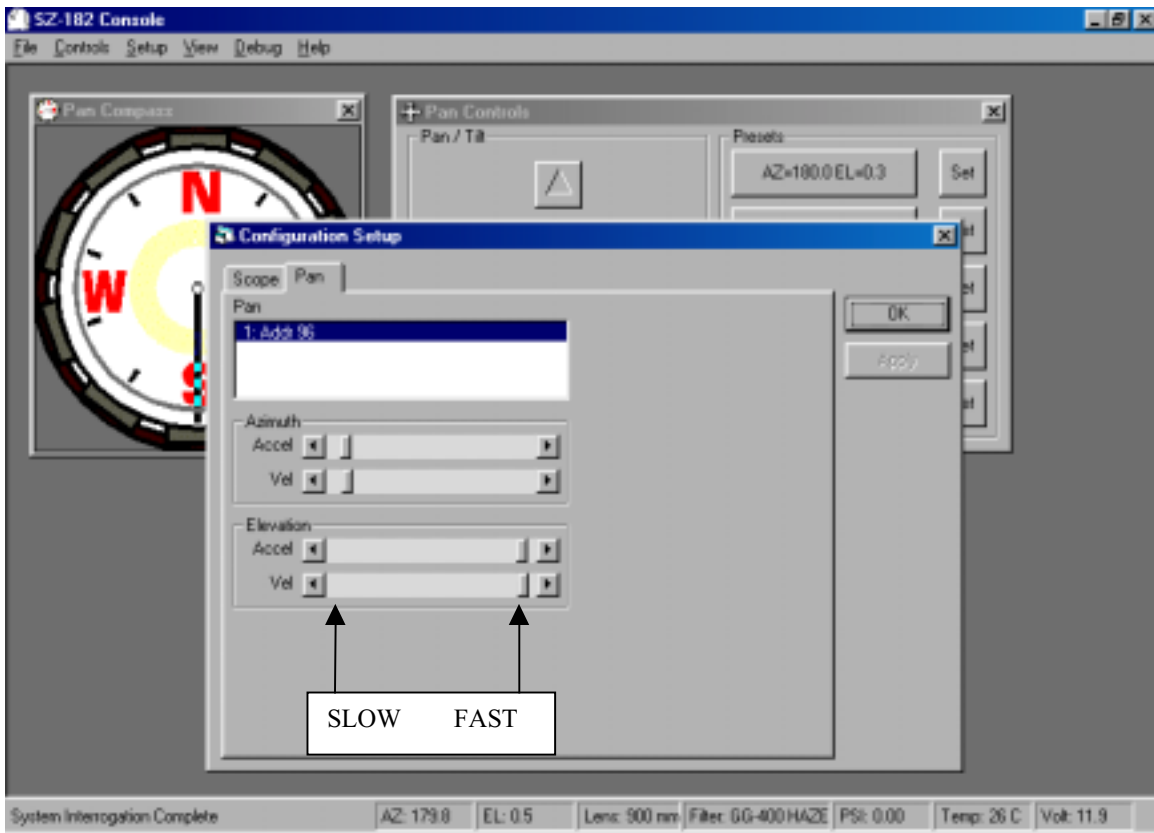
The **Presets** buttons are provided for setting and selecting up to five (5) Azimuth and Elevation pairs. When a Set button is clicked, the current Azimuth and Elevation positions are saved and indicated on the Preset button located to the left of the **Set** button. When the Preset button is clicked, the Pan unit will be positioned at the Azimuth and Elevation indicated on the button. The **Set** button will save position and store in CPU Ram.

The **HOME** button provides for the one step positioning of the Pan unit to a previously defined Azimuth and Elevation position. This position is set differently and is generally uses as a specific reference position that the system can be moved to check system accuracy. It also can be the most commonly used position. The Home position actually gives the user a sixth preset position. The home position is defined by using the Pan Control Setup Pan form that is described under the Section “Setup Forms” below. As you can see this position can not be changed as in the Presets above. It requires you to move to a different form. You generally will enter this position when you calibrate the Pan/ Tilt unit at initial startup.

The **GoTo** button provides for the quick positioning of the Pan unit based on a operator defined Bearing (degrees), Range (meters) or elevation angle entry. When the GoTo button is clicked, a dialog box asking for Bearing and Range is displayed to the operator. See View selection later in this document for more information about GoTo.

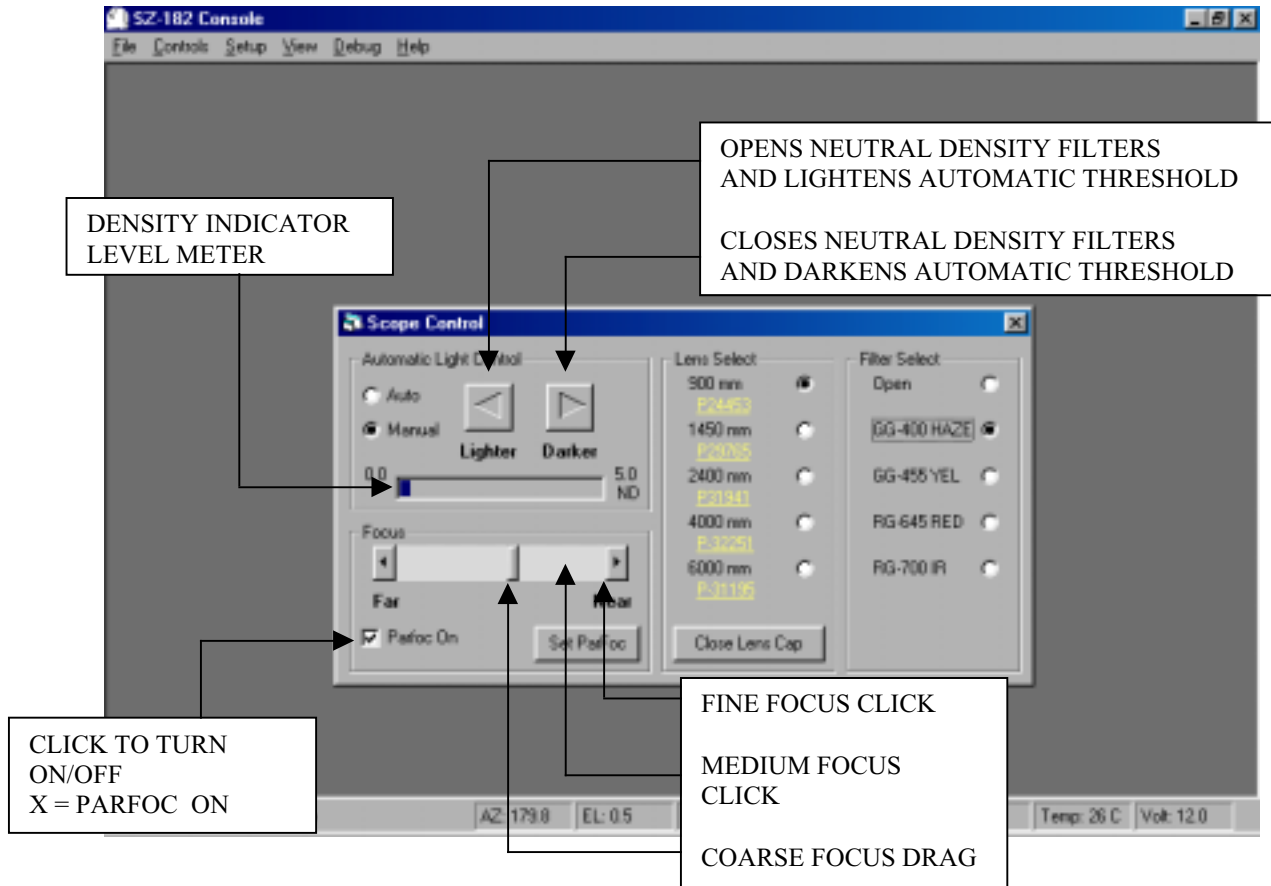
The **Setup** button provides a method of activating the Pan Control Setup form, which allow the user to change velocity and acceleration settings. See Section “Setup Forms”.

The Console window below shows the some of the forms described above. Please review the Setup form section 5 for a better under standing of system control and function.



Scope Control Form

The Scope Control form provides for the control of the Scope Automatic Light Control (ALC) manual and auto, Focus, Parfocal, Lens, Filter selection and Lens Cap control. The Scope Control form is shown below.



The **ALC** Controls provide for the options selection of either Automatic or Manual ALC. While in **Manual** ALC the left and right arrow buttons are used to control the light level. When the buttons are depressed by holding down the left mouse button, the ALC will open or close in the direction indicated by the arrows (Lighter or Darker) until the mouse button is released. The level meter provides a relative indication of the current light level neutral density selected. If you purchased the optional Automatic light control module the following control function will be available to the user.

When the **Auto** mode is selected the light and dark button are used to set the automatic function threshold of light and darkness video level on an electronic circuit built into the SZ182 electronic package. The auto mode will automatically adjust to varying light conditions to keep the video system from over or under exposing. This keeps user input to a minimum so the user can do other functions. The user can vary the sensitivity threshold by holding down the light or dark buttons. When you select the manual mode the threshold settings are saved and will be used again when you switch back to auto. There will be certain conditions that cause a constant oscillation of density filters, if this

occurs and is distracting to the user then click manual button to hold current density position.

The **Focus** controls provide for fine and coarse adjustment of the Scope focus. Clicking or holding the left mouse button down on the arrows on the slide bar gives the operator very fine adjustment of the focus. Clicking between the arrow and the indicator bar gives a quicker (medium) focus adjustment. The operator can also drag the indicator to any position within the slide bar to obtain coarse adjustment of the focus.

The '**Set ParFoc**' button saves the current focus position for the currently selected Lens. The user can select any Lens and focus position and then save this combination by pressing set. Only one focus position can be stored for each lens. Pressing the set will over write previous data stored. The most common use of this function is to store infinity focus settings for each lens. The '**Parfoc On**' check box indicates the current status of ParFocalization, and allows the operator to turn Parfocalization on or off. When ParFocalization is turned on, the focus position saved for each Lens is displayed below and to the left of each Lens option. When you turn on Parfoc the focus will automatically move to the stored focus position of Lens that is currently selected. When Parfoc is "**On**" the stored position under the lens is P0000 then there is no stored data. Manual focus is always available using the focus buttons as described above. If you want to return to a stored focus position just turn Parfoc **Off** then **On**.

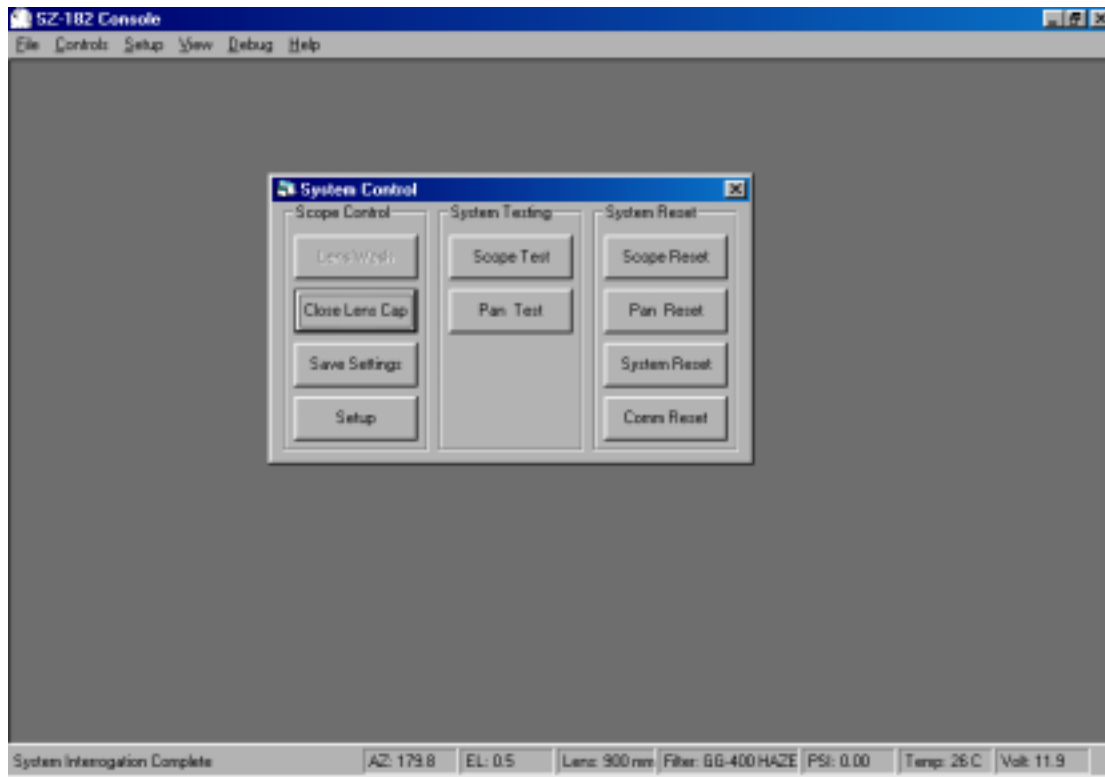
The **Lens** and **Filter** options provide for display of current settings and allow the operator to select different combinations of Lens/Filter pairs. With ParFocalization turned on, the selection of a Lens option will also automatically move the focus to the previously saved focus position indicated below and to the left of the Lens option. The Current lens select is also shown on the bottom Status bar. Remember also that you can turn on the Scope Control form by double clicking on these displayed values.

The descriptions of each of the Lens / Filter options can be configured by the operator by activating the 'Configuration Setup Form' described elsewhere in this guide. The user can change the names of these items or enable or disable. Please refer to Software set and Console .INI file shipped with each unit. Please be aware that changing these settings will not change actual hardware installed by Questar. It will only change what is displayed.

The **Lens Cap** button opens or closes the SZ182 Lens cap if it is installed and configured for your system. The activation button will determine the Lens cap position. If the button displays **OPEN** then the cap is closed. If this button or text is gray then the function is not available or has been disabled.

System Control Form

The System Control form provides for the activation of the Scope Maintenance functions. System Testing, System Reset and Scope Controls not available from the Scope control form. The System Control form is shown below. A brief description of each button and function follows the form. If the button or text is gray then the function is not available or has been disabled.



Lens Wash: This button is used to access an external relay, which can be used to turn on an external motor or other device. The current configuration and software is set up for a washer with 90 second timed wash cycle. If this button or text is gray then the function is not available or has been disabled. The sample above shows that this function is not available.

Open Lens Cap: This button is the same as on the Scope Control form. Is used to Open or Close a lens cap if installed and configured. The activation button will determine the Lens cap position. If the button displays **OPEN** then the cap is closed. If this button or text is gray then the function is not available or has been disabled.

Save Settings: This button is used to store user defined system information that will be stored in the SZ182 unit CPU's RAM that has a rechargeable back up battery. This information will be retrieved when you do a Scope or Pan Test, a Scope or Pan Reset or turn power off to SZ182 system and restart before the battery backup power runs out. All user-input information is stored in the CPU's RAM.

The following is stored when the user presses the **Save Settings** button.

Scope unit stored information includes:	Default
Parfocal focus positions for each lens	P0000
Parfoc ON/OFF	off
<i>Focus current position</i>	far
<i>Lens and Filter current positions</i>	900 and open
Velocities and Accelerations	3/4
ALC ON/OFF	off

This button **does not** store Pan information. The Pan unit stores this information when the user saves or **Sets** any placement position. These buttons are **Set Home, Preset Set** and **Reference Position Set**. The Pan unit stored information includes:

Pan unit stored information includes:	Default
Reference Position and Calibration	none
<i>Home</i>	_ travel
Presets	left limit, down limit
Velocities and Accelerations	_, 1/4

Battery backup: Both Pan and Scope units are equipped with internal batteries that are recharged when unit has power. Battery backup power should last for approximately 48hr period if the batteries are fully charged. If the system is not turned back on within this period all above information will be lost and hard coded CPU default settings will be used. The battery back up condition is monitored and checked when a **TEST** is initiated. During this test the CPU looks for stored data in the backup RAM. If there is no stored data present or it is corrupted then the battery may be bad. There must be stored information in this RAM or this test will mark **BATTERY – Fail**. Refer to above paragraph for how to save information.

Setup: This button opens the Configuration Setup Form. This form allows the user to change or enable certain system functions. All motor velocities and acceleration profile are set from this form. It also displays system address information and current Lens and Filter descriptions. See Configuration Form for more detailed information.

Scope and Pan Test: Pressing these buttons will initiate a SZ182 or a Pan self test sometimes referred to as a BIT (Built In Test). It will test all basic function and report back a status. During this test all motors and limits will be tested. This test will return the SZ182 to its user-defined settings as determined by stored information in the CPU's RAM. Refer to Save Settings above. The *italicized* information will be the placement of units after the test is completed. If information is corrupt or not available, it will use defaults. These tests do not need to be used unless you suspect a problem with either the SZ182 or the Pan unit. During any Test or Reset the unit under test will not be accessible until the test is completed. The tests and or resets could last as long as 2 or 5 minutes depending on installed components. The display below is a sample of what will be

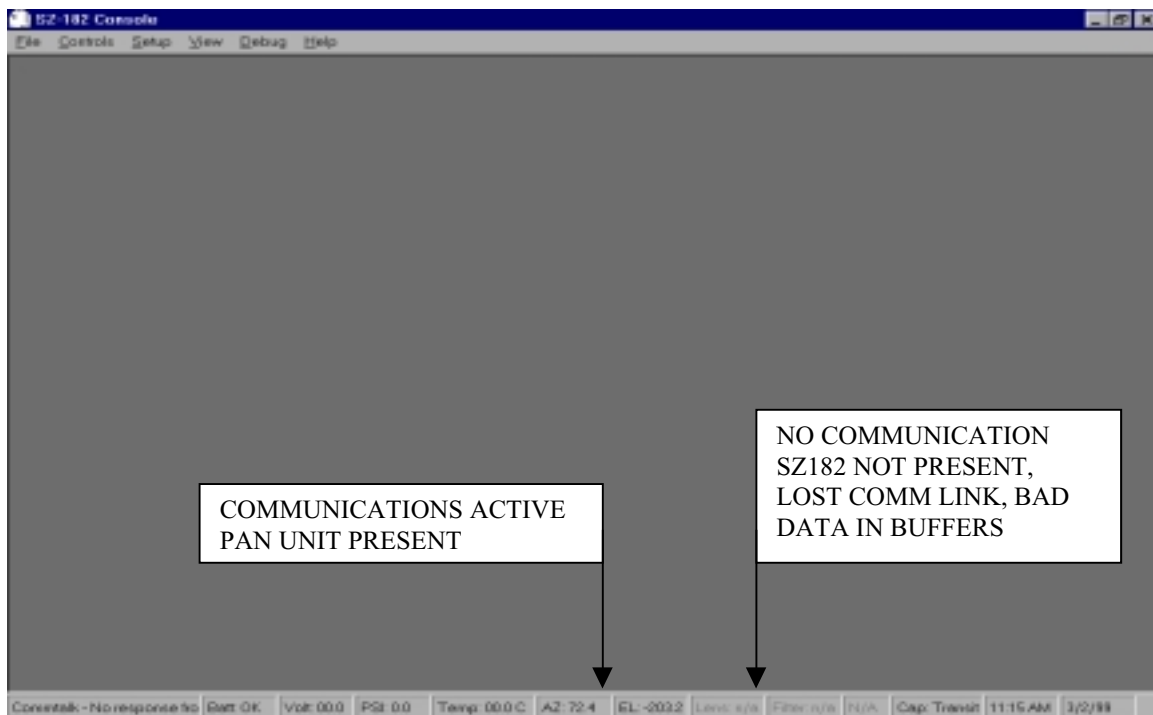
displayed during the test. It will display Testing, Pass, Fail or N/A., if your system is not configured or does not have the appropriate hardware it will display N/A. Please note that there are two windows for each BIT test displayed for demonstration purposes only. They are testing and the completed. When this test is running the screen will update as the tests are completed. If certain functions fail they will be disabled and unavailable to user for control during system use. If a fail is displayed the system may need repair. Please refer to system failure and trouble section 10.

Scope BIT Results		Scope BIT Results		Pan BIT Results		Pan BIT Results	
BIT in Progress ... Please wait		BIT Complete		BIT in Progress ... Please wait		BIT Complete	
Communication	Testing..	Communication	Pass	Communication	Testing..	Communication	Pass
CPU	Testing..	CPU	Pass	CPU	Testing..	CPU	Pass
Battery	Testing..	Battery	Pass	Battery	Testing..	Battery	Pass
Focus	Testing..	Focus	Pass	Pan	Testing..	Pan	Pass
Lens	Testing..	Lens	Pass	Tilt	Testing..	Tilt	Pass
Filter	Testing..	Filter	Pass	<input type="button" value="Close"/>		<input type="button" value="Close"/>	
Lens Cap	Testing..	Lens Cap	Pass				
Light Control	Testing..	Light Control	Pass				
Camera Switcher	Testing..	Camera Switcher	n/a				
Voltage	Testing..	Voltage	Pass				
Pressure	Testing..	Pressure	Fail				
Temperature	Testing..	Temperature	Pass				
<input type="button" value="Close"/>		<input type="button" value="Close"/>					

Scope and Pan Reset: These buttons will start a built in reset function for the item selected. It has similar function to tests above but has more error correction value. Reset will try and correct errors with SZ182 or Pan unit. It will access the CPU's Ram data then restore unit to correct stored values and startup positions. As with the BIT the *italicized* information will be the placement of units after the reset is completed. If information is corrupt or not available, it will use defaults. This test should be done if a failure is detected during the Test function. This test will cause a hardware reset and limit to limit excursion on reset items.

Comm reset: This button will initiate a communications reset from PC to CPU's on SZ182 and Pan unit it will also remove bad data and reestablish communication and ask for an individual status update form each unit. It will remove corrupted information and try and establish a Comm Link between PC and external devices. Communications between devices is always active as long as SZ182 or Pan unit has power. The PC and Console program will always try and establish a Comm link to external devices. When the external device is turned on it will go through a hand shaking routine. The PC and

Console software will acknowledge and then bottom status display bar will become active (Dark Numbers) see sample below. There is no display box. Use this if you have trouble with communication link between console and system or your bottom status display is not responding or updating to commands. Closing Console program and restarting program has a similar effect. The Console program will initiate a system search for devices and initialize and establish communications between Console program and devices.



Communication to SZ182 and Pan unit must be active in order to send and receive any control information from Console to external devices. If you can control external devices (TX) but your display is inactive or none responsive there must be corrupted data being received (RX) by the Console program. Conversely if you are receiving (RX) updated information but can not control external devices, then there must be corrupted data being transmitted (TX) by the Console program. If a Comm reset or a program restart does not establish an active Comm link then there is a communication problem. Possible problems are the following: external device may not be turned on, the PC COM port is not configured correctly in the console.INI file, the PC COM port may not be active or there is a break or high noise level in the RS422 communication lines between PC and external device.

System reset: This button is used to reset system and clear battery RAM. Be ware that this reset button will **erase** all user defined and stored information that is present in the both the SZ182 and Pan units CPU's RAM and restore factory default settings. This button should only be used when the system has been corrupted to point where all other Tests and Resets fail to recover the units.

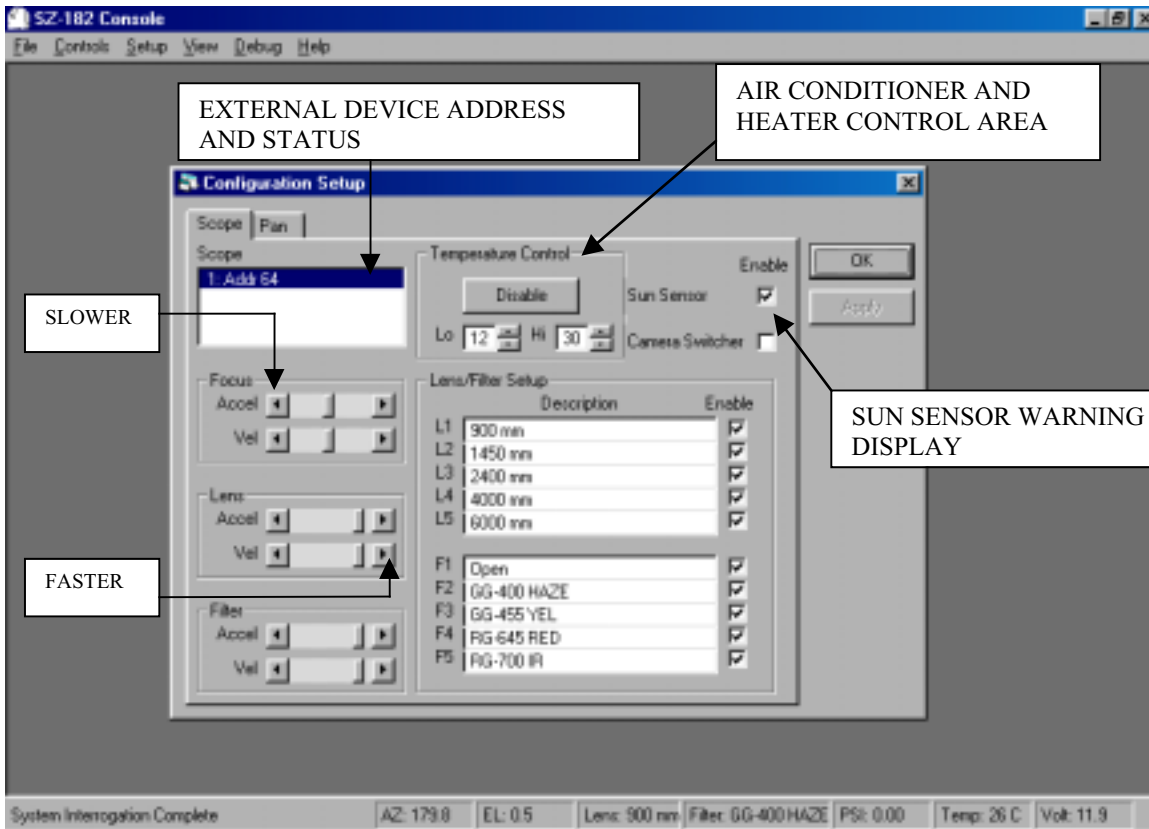
Setup Forms

Video Window

The Video window, if this option has been activated, is located within the Console window. This window provides real-time video from the Scope camera through the ITI frame-grabber board installed in the Console PC. This window can be sized, zoomed, and moved within the Console window. This window is only available when the Video option has been integrated activated.

Configuration Setup Form

The Configuration Setup form provides for the status and selection of multiple Scope/Pan units (if available), setup of scope and pan unit accelerations and velocities, setting the descriptions and availability of Lens and Filters. The enabling of optional equipment such as the Sun Sensor, Camera Switcher options, Temperature Control options is also available from this menu. Clicking on the item tab will allow switching between Pan and Scope. Clicking the OK or APPLY button will save the changes. Motor speed and velocity changes will not take effect while a motor is moving. They will become effective on the next motion. The Configuration Setup form is shown below.



The Configuration Setup Functional description

Scope and Pan Windows: These windows will show any external systems that are connected to the RS422 communication lines. If there are more than one system the user can select which pair or unit (SZ182) that he wants to communicate with and control. The Questar SZ182 and Pan units are setup to work as pairs. The user can not operate a Pan unit that is not paired to the SZ182 he will be trying to use for viewing.

Acceleration and Velocity: These are standard Windows slider bars and arrow buttons that allow the user to vary the motor setting of listed items. Acceleration will control the ramping up speed of the motor. High acceleration will cause the motor to reach the final velocity faster than the slow acceleration. Generally this setting should be about half way. Too high acceleration may cause the motor to stall. Velocity is what speed the motors will travel at once they have accelerated. The full range of speeds is available to the user. The Scope setting should be adequate for most users. The factory defaults are loaded at startup unless the user has modified these settings.

The Pan unit velocities most likely will need to be modified on a regular basis when trying to track a target. The user will have a large range of speed settings on both azimuth and elevation. The direction buttons on the Pan Control form access these settings to determine the speeds that the pan will move. Again remember that changing the settings will not take effect until the motor has stopped and told to move again. The Warp buttons and GoTo command also get information from these settings. If you have the speed settings too slow the above motions may be slow. The factory defaults are loaded at startup unless the user has modified these settings. User should experiment to find the best setting for his or her application and the lens power selected. The lens power (mm) will change the magnification and reduce the field of view on the video monitor. Higher power will make object appear to move faster. The following is for reference only to guide the user about Pan and tilt velocities.

Positional accuracy .03°	Arrow button Sliders slow	Arrow button Sliders fast	GoTo /fast button Sliders slow	GoTo /fast button Sliders fast
Azimuth	.01°/sec	1°/sec	3°/sec	15°/sec
Elevation	.009°/sec	.02°/sec	.6°/sec	2°/sec

Position accuracy is error based on gear backlash and mechanics, which cause deviations in return to a given position or displayed position.

Lens/ Filter Setup: The user does have the ability to rename these to suite their need. Questar supplies a custom configuration and Console.INI file for each system shipped. Please remember to keep a backup copy of this file to resort system to Questar supplied setting. The descriptions listed are actual hardware Questar installed into the system when purchased. The user can disable a specific Lens or Filter if he decides not to use it. When it is disabled the system will skip that selection and not allow the user to access it from the Scope Control form.

Sun Sensor: This button will enable or disable the Console program to be notified by the external optional hardware that the Sun Sensor is activated. When the sun sensor is activated the video main system will momentarily go blank and a window message will appear to notify the user if this button is checked. When the sun shutter opens the message will disappear. The sun sensor system is set up to close off the optical path in front of the main camera if it detects too much sunlight to keep the main camera from being damaged. The finder camera does not have this protection. The sensitivity is factory set to engage when the scope unit is in close proximity to the sun approximately $\pm 4^\circ$. This option is an internally controlled system that has not user input or override. The only way to open the shutter when closed is to move scope unit away from sun. If you did not purchase this option then you should not click this option. It may cause the warning windows to pop up by mistake. See warning message section later in this manual.

Camera Switcher: This button will enable the Console program to control a third camera or a switching stage if the hardware is installed in the SZ182 system. It may activate the Auxiliary camera control button depending on installed hardware. If the hardware is not installed this button will not function even if it looks active on the Camera control form.

Temperature Control: Temperature control is and optional software and or hardware upgrade. You must purchase the hardware in order to have control from this area. The SZ182 enclosure must be outfitted with the Peltier AC and or AC/Heating unit to have the ability to change enclosure temperatures.

Enable/Disable button will enable the user to activate SZ182 CPU on board temperature control and allow the user to enter values to turn on the air conditioner and heater unit inside the SZ182 unit. If you **Disable** CPU control, the air conditioner and heater unit will work from its own built-in protection thermostat. The current hardware temperature settings are 35°C to turn on air conditioner unit and 10°C to turn on heater unit.

Hi: will let the user set values from 29 to 34°C . When the internal temperature reaches this value the air conditioner will turn. It will stay on until the internal temperature is lowered 2°C from the turn on setting.

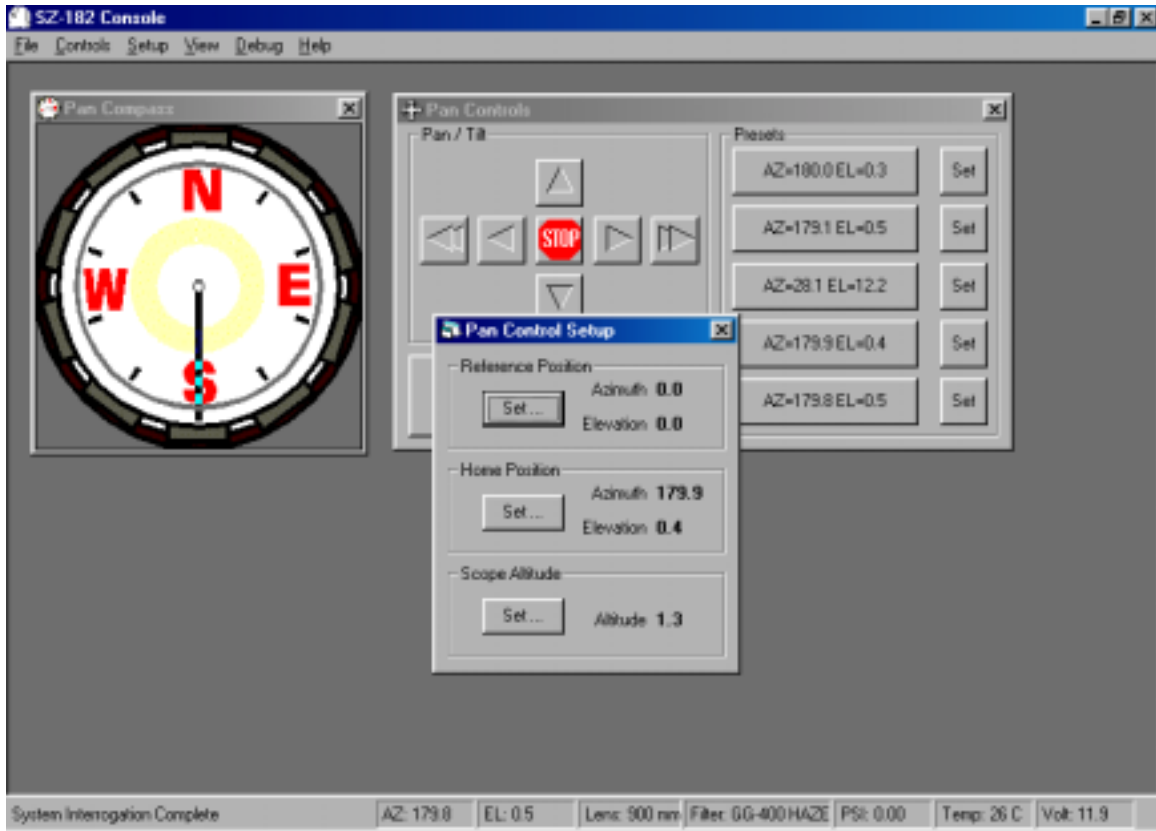
Lo: will let the user set values from 11 to 16°C . When the temperature raises 2°C the heater will turn off.

Temperature Control setting should be set once and only adjusted if required. All internal electronics are rated at least to 50°C.

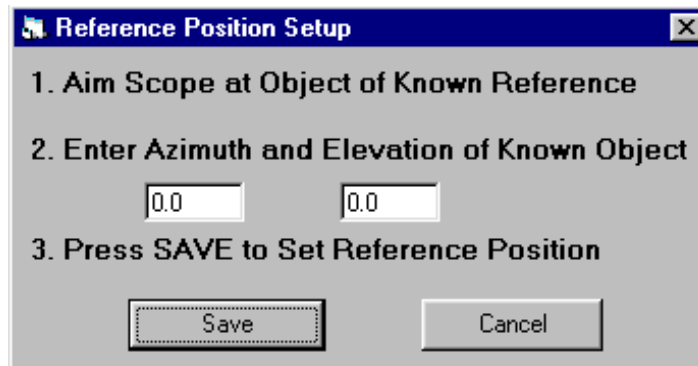
Please refer to Setup and Install hardware manual and the specific data book for the Peltier air conditioner and heater unit if you need more specifics about this unit.

Setup Pan Control Form

The Pan Control Setup form provides for the setup of the Pan unit Reference Position, Home Position, and Scope Altitude (height above sea level in meters). The Pan Control Setup form is shown below. Access this via the **Setup** drop down menu and click on **Pan**



The **Reference Position** is used to determine a known reference point for calibrating the Pan unit to its actual compass location. When the 'Set...' button is clicked in the Reference Position, the following form is displayed;



You will now need to open the Pan control form to position Pan unit. Move the Pan unit until you have acquired your known target. Center the target on your monitor and zoom up to medium power say 2400mm. Reposition Pan unit to center target on monitor. Now enter the compass Azimuth and elevation information and save to set. Azimuth values are degree headings from a compass, which range from 0 to 359.9 degrees. Elevation values are from -15 to + 15 degrees. There are many ways to calibrate Pan unit. The more accurately you calibrate the unit the better position display information you will get. If there is no known target, you will have to calibrate the Pan unit with a precision compass and precision level or inclinometer. The procedure is as follows:

Move Pan unit to mid points in azimuth and elevation between limits, this position will point the viewing end of the SZ182 away from the pan power cable and place the SZ182 close to horizontal. This does not have to be exact. Generally on first power up the Pan unit will move to mid points if there is no stored information in RAM. Refer to Pan unit installation instructions for viewing area setup and placement.

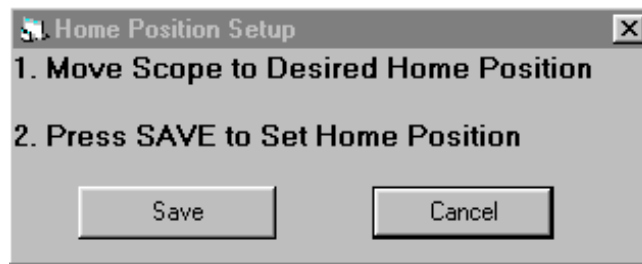
Go out to Pan unit and take position information manually. Use the compass to get a reference azimuth position in degrees. The viewing end of the SZ182 is where the scope will be pointing. You will need to determine this direction in relationship to a compass heading. If the SZ182 is pointing east the azimuth will be 90. If pointing south it will be 180. West =270, North = 0

Use a level or inclinometer to determine tilt angle in + or - degrees. If the viewing end of SZ182 is tilting up or above level then the angle will be a (+) tilt degree. Conversely if it is pointing down to ground then it will be a (-) tilt angle.

Record all information and then enter data into above setup screen and click save. After you do this, the Pan unit will calibrate its positional information to coincide with the data that was entered. Your bottom status display bar will now show you where you are looking. It should be the information you just entered. Now, the user should find a landmark or a target such as a building by moving the Pan unit until it is displayed on the monitor. Record the displayed information from the bottom status display and save for future use. Please use the page at rear of this manual to record your data.

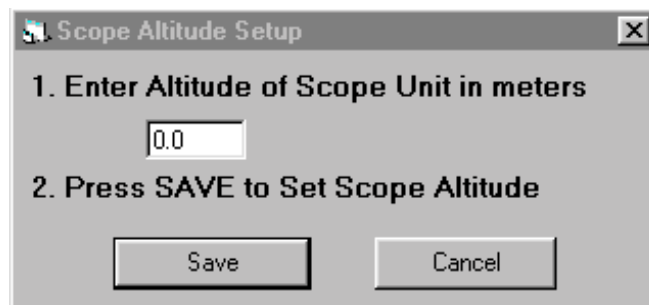
This information can be used to setup Pan unit if the RAM is erased or becomes corrupted. You would move Pan unit to display the landmark on monitor and then follow Pan unit setup procedures above. Enter the azimuth and elevation information into the setup screens and the system will be calibrated. In most cases this position will be set to **Home**.

The **Home Position** is used to provide a one step method for moving the Pan unit to a preferred Azimuth and Elevation. When the 'Set...' button is clicked in the Home Position Setup it will store this position as **Home**. The following form is displayed.



Home can be any point that you desire but may be a point of importance (landmark) to verify pointing and reposition accuracy. If you set home in this fashion you will be able to verify Pan accuracy by just pressing the Home button on the Pan control form. **Home** position will also become the startup position for Pan Test and Pan Reset.

The **Scope Altitude** (height above sea level in meters) is used as a reference point when the Pan Controls form 'GoTo' function is used to position the Scope based on Bearing and Range to a target. When the 'Set...' button is clicked in the Scope Altitude group, the following form is displayed. Enter the appropriate information and then save.

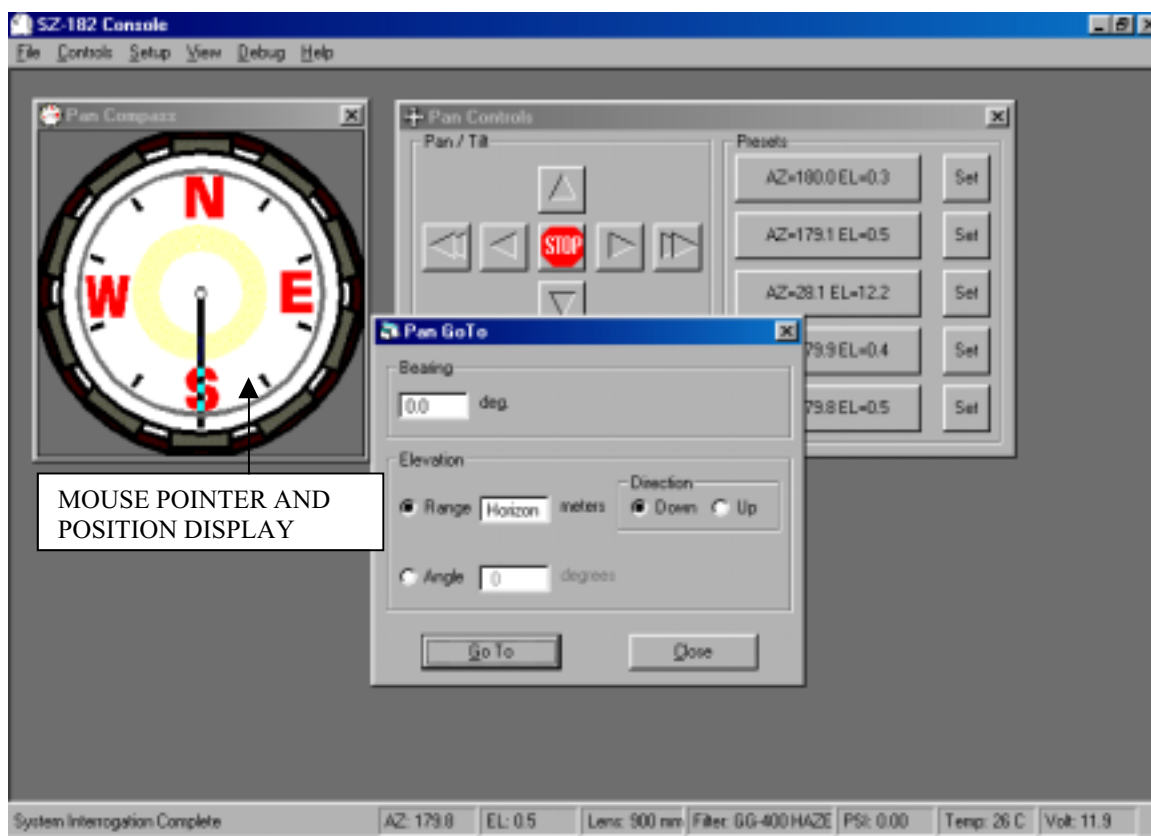


All the above settings and entered information can be changed by the user at any time. Once this information is changed it will change all related positional displays. The Pan test and reset will not effect this information. This information will only be removed when "System Reset" button is used in the System control form or the battery backup RAM has been lost.

View

Compass: Is a visual GUI compass display that tells you where the SZ182 is pointing or viewing. The above Pan setup forms have now oriented the scope to a compass heading if you have set the reference position. If you move the pan unit the compass will move and update to follow actual motion. This is useful reference tool to assist the user in getting a general idea of where he is looking.

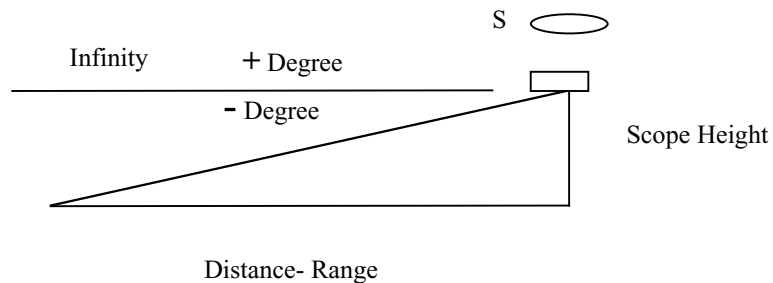
Compass functional tools: These tools are available as an upgrade on some units. They will allow the user to drag and drop the directional pointer or point to a location and click to move pan unit. Placing the mouse pointer on the compass will display a position you want it to move to, click the mouse to move. This is a similar function as **GoTo** but not as accurate.



GoTo: This is very useful function and can be used to point the system at a target if you know the targets compass location and range (distance). If the user were using a radar system he would just enter the information from his radar into the appropriate boxes and click **GoTo**. The Pan unit will move the system to the correct location and the target will now be on the video screen. From this same screen the user can also adjust position by changing entered information by small amounts. If the user only wants to change elevation he could click on the angle button and then change displayed angle setting, then press **GoTo**. As shown above the User has the ability to have multiple active windows to control the Pan Unit.

The **GoTo** screen can also be used to determine Compass heading and range to a target. If the user finds a target while moving the Pan unit, he can open the GoTo screen and the information will be displayed.

GoTo accuracy is based on the information that the user entered in the Pan Setup windows. It uses this information to triangulate range (distance), angle and bearing (compass heading). The internal calculator uses standard 90-degree triangle information and does the calculation for you. Range will display Horizontal when the target is at infinity, meaning the elevation angle is 0 and that the elevation is parallel to the ground. The following diagram depicts the basic concept.



Console INI setup

Console INI file: The Console software uses this file when the user starts the Questar SZ182 Console program. This file sets up program displayed information, COM port and enable some hardware function. The most important function in this file is the setup of COM port. This port is how the software will communicate with the SZ182 and Pan unit.

Changing COM port: The installation software will automatically install Console software and support drivers to control communication. These drivers will support Windows 95, 98 and NT. The installation process will set the COM port to COM 1, which is the most common port available. You will have to check your computer to determine if this port is available. Some older systems use this port to control the mouse. If this is the case you will have to modify the .INI settings to change to next available COM port. See the following sample to demonstrate this change.

All the user has to do is change "Port=1" to the port that is available on your PC. The other settings should not be changed unless you are directed to do so by Questar.

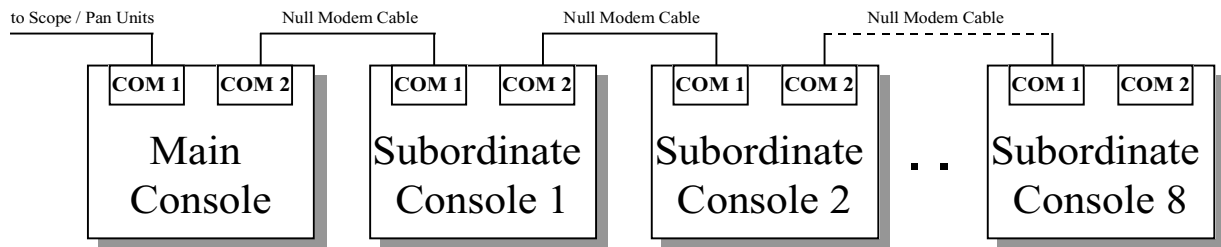
```
[DataComm]
Modem=0
Port=1      ;;( 1,2,3,4)
Mode=9600,N,8,1
Protocol=Kermit
DialingTimeout=25
MaxReSend=5
FailMax=1
TimeOut=200
```

Enable hardware and equipment: There are many lines of information within this file that will change as you change configurations within the program itself. They will change when you close the Console program automatically. Refer back to Configuration menu for user information input. Questar recommends that no other settings be changed. All correct information pertaining to your system is contained in the Custom .INI file shipped with your unit. Changing settings may adversely effect the function of your system.

**Multi-Console
setup**

Multi-Console Configuration

The Console program is capable of running as either the Main Console to the Questar SZ-182 Scope and Pan system, or as a Subordinate Console in a Multi-Console configuration as pictured below.

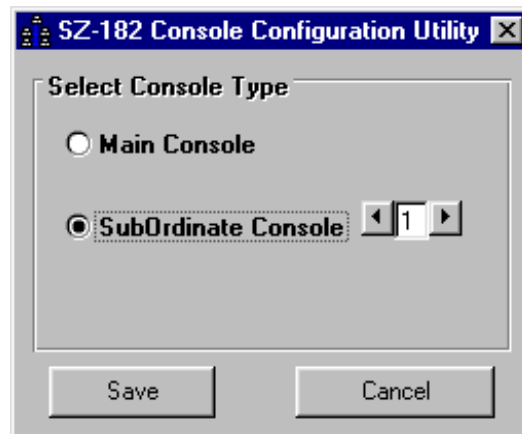


After the installation process has completed, the Console program is configured as the Main Console. In order to designate the PC as a Subordinate Host in a Multi-Console configuration another step must be performed to complete the installation and setup process. The “Console Configuration Utility” program will be provided for this purpose so it can be loaded onto the PC if this upgrade was purchased. To run this program, the user selects the following from the Windows.

Start menu;

- Start >
- Programs >
- Questar SZ-182 Console >
- Console Configuration Utility**

Once the Console Configuration Utility program is started, the user is presented with the following form;



The user then selects either the “Main Console” or “Subordinate Console” options. If the “Subordinate Console” option is selected, then the user must select a Host number by the using the arrow buttons. Once this is done, the user clicks on the “Save” button to complete the configuration of the Console program.

Setup Information Record sheet

Setup Information for Pan Unit

Landmark Description: _____

Azimuth: _____

Elevation: _____

Altitude: _____

Range: _____

Setup Information for SZ182 Lens and Filter Display

Lens #1: _____

Filter #1: _____

Lens #2: _____

Filter # 2: _____

Lens # 3: _____

Filter #3: _____

Lens #4: _____

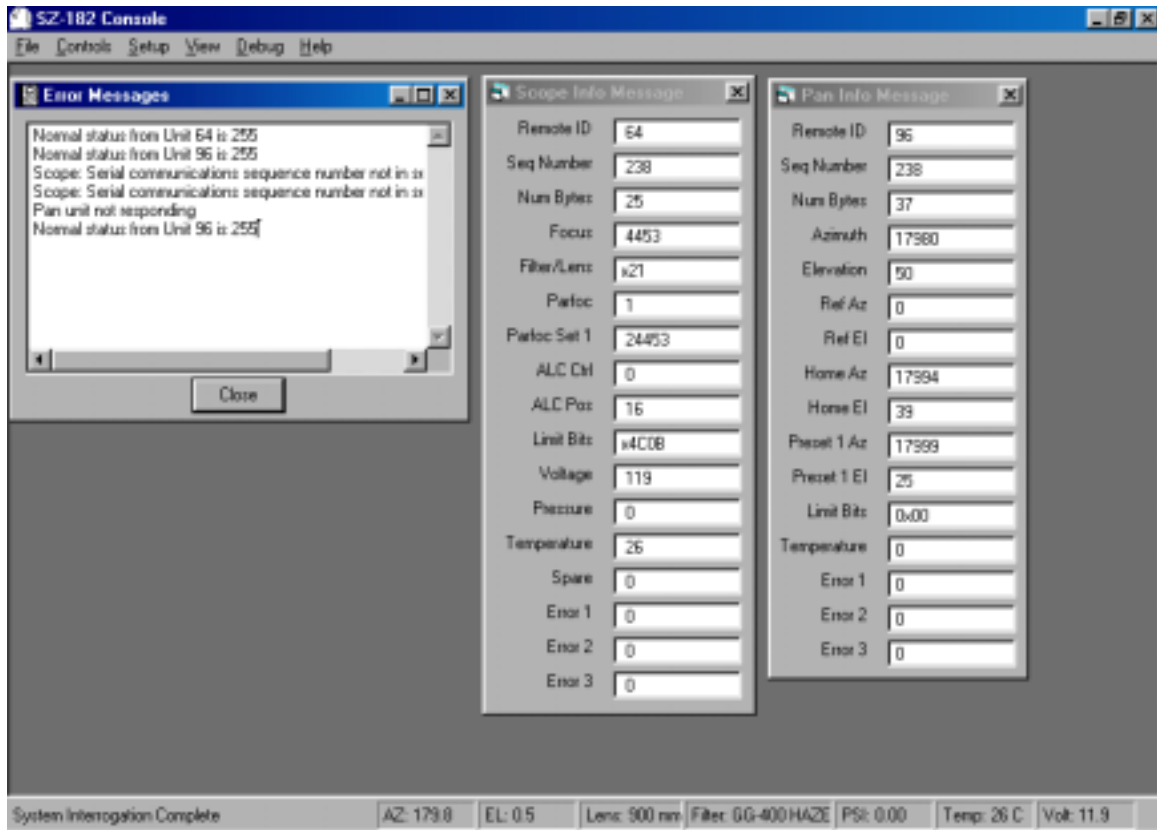
Filter #4: _____

Lens #5: _____

Filter #5: _____

Debug

This drop down menu is a diagnostic tool to help locate problems with the SZ182, Pan/Tilt and Console program. This menu option should be disabled unless advised by a Questar technician. It may slow down Console application if run on a constant basis. The windows available are shown below.

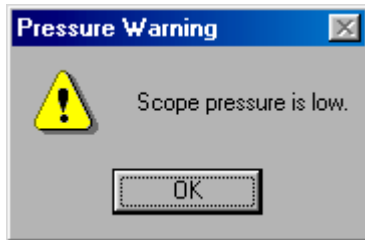


Error Message Window: This window is used to help diagnose problems with the system. It is a visual display for Scope and Pan communication information tracking. If the external devices are on line and there are no problems the message window should display similar information as depicted above. This window generally does show some errors. Errors do not always mean there is a problem. If continuous error messages appear there could be problems developing. The console program has error monitoring and correcting software built in to keep the Comm link open. If it receives bad packets of information it will ask for it again to correct faulty information received.

Info Message Window: This window gives basic information about each unit and the status and position of components in each unit. You will see this info change as you move components in each unit.

Warning Message Windows

The SZ182 Scope has several warning messages to alert the user that may effect operation. The warning message windows must be closed to continue operation of the system. Clicking on the **X** button will close the warning message and allow the user to proceed with operation of the unit. These messages will reappear at predefined time intervals to remind the user to correct the problem if it still needs attention. The following are examples of messages and a brief description of function.



Pressure Warning:

This message is to advise the user that the enclosure pressure is low. It will reappear every couple of hours until the enclosure is pressurized back to more than .1psi. This window must be closed in order to proceed with any other control function. The Scope and Pan will then function properly. This warning is only to advise the user to schedule a service to check and pressurize the enclosure. The pressure inside the enclosure will change hourly depending on the temperature outside and inside the enclosure. The general rule is a .02 psi variation / 1° C change in inside temperature. An increase in temperature will increase pressure while a decrease in temperature will decrease pressure. The enclosure is equipped with a pressure relief valve that will prevent the enclosure from over pressurization. This valve is factory set to .5 psi. The pressure sensor inside the SZ182 will display up to 1.0 psi. Please refer to the setup and install hardware manual for information about the enclosure pressurization and the pressure system.

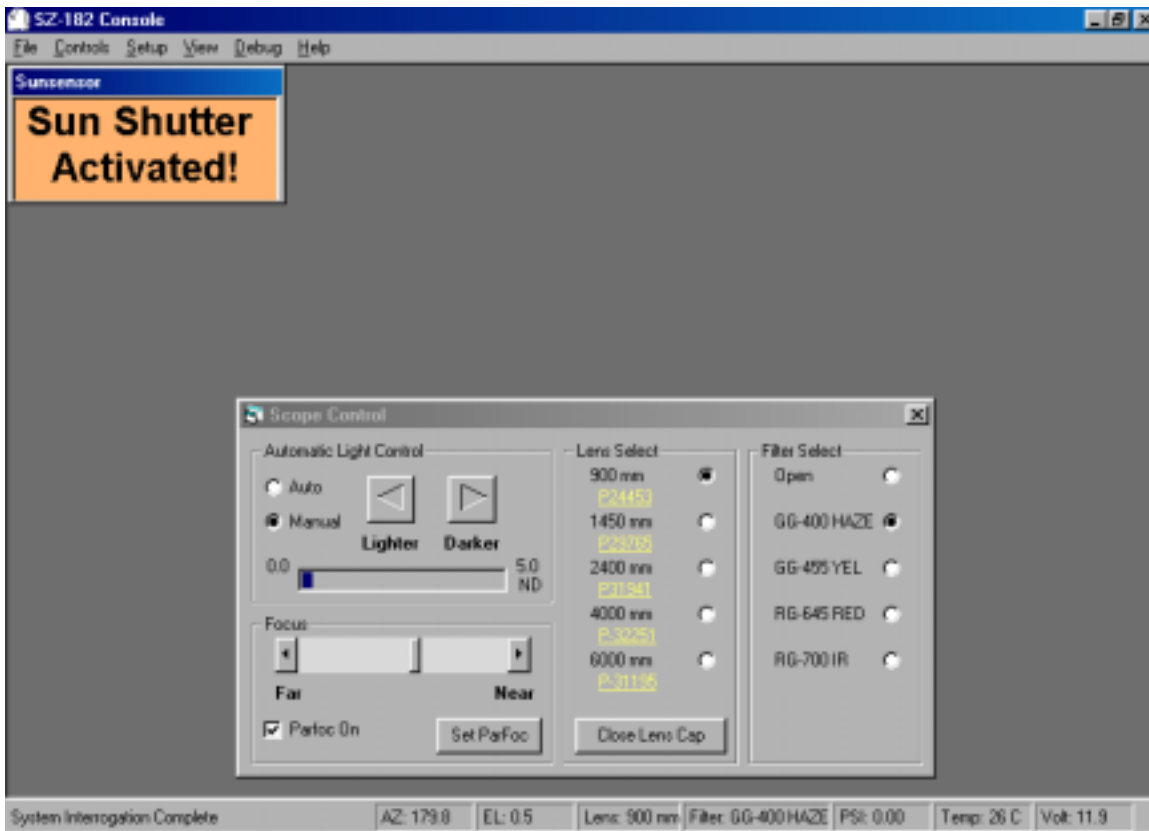
Voltage Warning:

This message is to advise the user that the SZ182 scope unit 12 VDC power supply is outside of usual tolerances and may be experiencing some problem. It will reappear every 30 minutes until the power is within normal specification. This window must be closed in order to proceed with any other control function. The Scope and Pan will then function properly. The SZ182 scope unit will function properly from 10 VDC to 13.0 VDC regulated 6.5 AMP low noise power supply.

The pan unit power is not monitored.

Please refer to Setup and install hardware manual for more information on power supplies and system power requirements. Both power supplies are fuse protected and may require replacement if power fails.

Sun Shutter Activated:



Sun Shutter Activated:

This message is to advise the user that the sun sensor system has activated. When this message appears, the SZ182 on board hardware has sensed that the unit is in close proximity to the sun and will activate a shutter to close down the optical light path to the main camera. This will block the image to the main camera and make the video image go blank until it opens. The user has no control over this function if the hardware is installed. The only way to open the shutter is to move the SZ182 away from the bright object, which is illuminating the sensing unit. It will reappear every time the SZ182 is pointed toward the bright object. You may disable the message by un-clicking the Sun Sensor box in the Configure Setup area but you will not disable the hardware if you purchased this option. The sun sensor system does not effect the SZ182 finder system. The finder system is always active if your have this option. It is a separate camera from the main system camera.

Please consult the Setup and Install Hardware manual for more information about the SZ182 finder system.

USER INFORMATION

The following information is meant to help the user and give a perspective to what is displayed on the video monitor. It is only meant as a guide and not information will be 100% accurate.

Field Of View

The chart below will give a rough estimate of actual **field of view** seen on the video monitor while using the SZ182 scope. The numbers to the right side are the lens selections available from the Scope Control form. The top numbers are distance in meters. The numbers just under the distance is the camera chip size. You will have to know what chip size is in the camera that is installed in the SZ182 unit. The number under the chip size is the approximate field width in meters. Please note the 200mm is the approximate EFL of the finder system.

STEP ZOOM FIELD OF VIEWS (METERS)										
	75 METERS					1000 meters				
SZ-182										
	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER
200MM					1.84					24.50
900MM	0.40	0.53	0.74	1.48		5.33	7.11	9.89	19.78	
1450MM	0.25	0.33	0.46	0.92		3.31	4.41	6.14	12.28	
2400MM	0.15	0.20	0.28	0.56		2.00	2.67	3.71	7.42	
4000MM	0.09	0.12	0.17	0.33		1.20	1.60	2.23	4.45	
6000MM	0.06	0.08	0.11	0.22		0.80	1.07	1.48	2.97	
	1500 METERS					5000 METERS				
SZ-182										
	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER
200MM					36.75					122.50
900MM	8.00	10.67	14.67	29.67		26.67	35.56	48.89	98.89	
1450MM	4.97	6.62	9.10	18.41		16.55	22.07	30.34	61.38	
2400MM	3.00	4.00	5.50	11.13		10.00	13.33	18.33	37.08	
4000MM	1.80	2.40	3.30	6.68		6.00	8.00	11.00	22.25	
6000MM	1.20	1.60	2.20	4.45		4.00	5.33	7.33	14.83	
	10,000 METERS					20,000 METERS				
SZ-182										
	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER	1/3CCD	1/2 CCD	2/3CCD	1" CCD	FINDER
200MM					245.00					490.00
900MM	53.33	71.11	97.78	197.78		106.67	142.22	195.56	395.56	
1450MM	33.10	44.14	60.69	122.76		66.21	88.28	121.38	245.52	
2400MM	20.00	26.67	36.67	74.17		40.00	53.33	73.33	148.33	
4000MM	12.00	16.00	22.00	44.50		24.00	32.00	44.00	89.00	
6000MM	8.00	10.67	14.67	29.67		16.00	21.33	29.33	59.33	
	THE ABOVE NUMBER ARE IN METERS									

Example: Approx. distance 5000m, chip size 2/3, the lens selected is 2400mm. Field size would be approx. 18.3m

Using the chart above you can determine approximate size of object. Point the SZ182 at an object. If you know the distance then select the distance in meters from the chart above. You can use an estimate for most purposes. You should know the camera chip size. You would read down the column under the chip size and distance to determine field width. You would then be able to estimate the target size by how much width the target fills up across the screen.

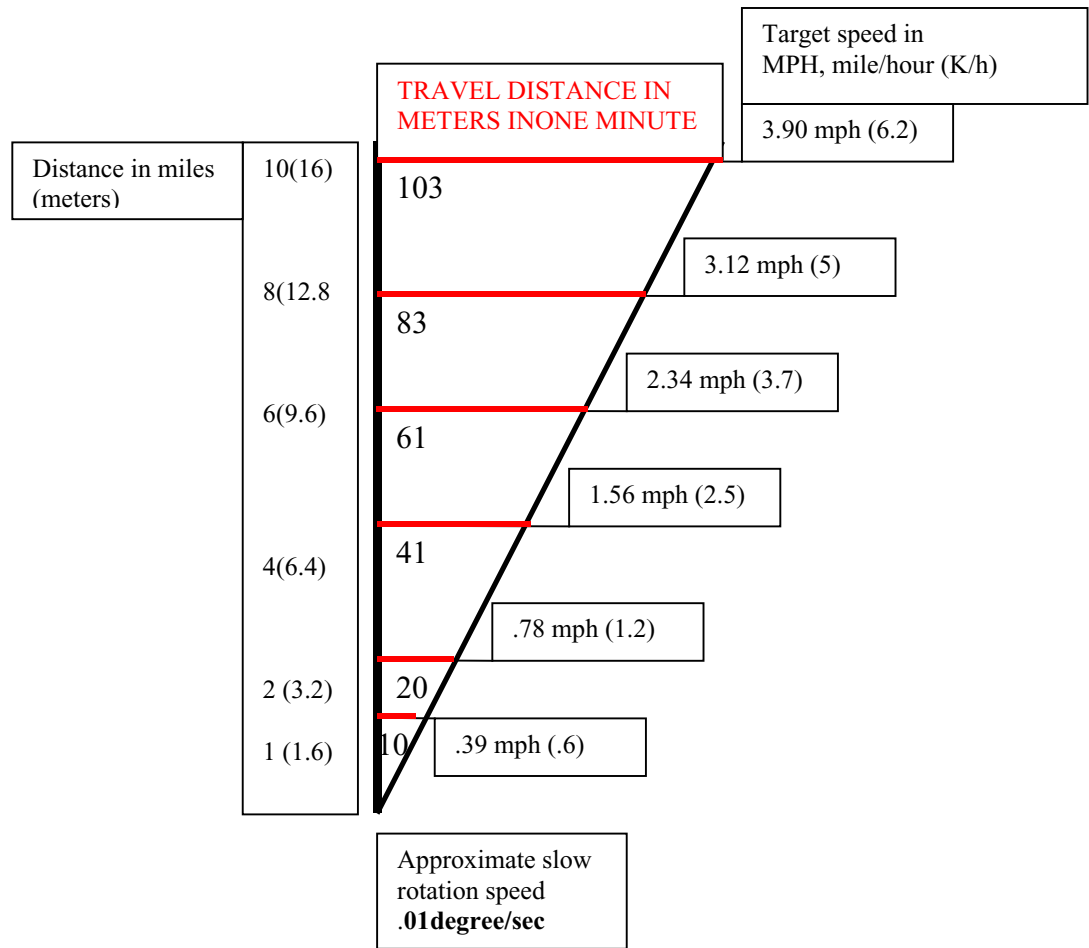
The target now fills about 1/3 of the video monitor across. You know from the chart above that the field width is 18.3m. 1/3 of 18.3 meters is approximately 9 meters. You know that the target is about 9 meters wide.



The sample picture above depicts a target at 75 meter, 900mm lens, 2/3 CCD sensor and a target size of 10" x 12" (.25 X .3 m). The target is less than _ the field of .74m which is approximately .37m.

Target Speed and Distance:

The chart below will give a rough estimate of target speed versus distance as seen on the video monitor while using the SZ182 scope. The numbers to the left side are distances to target. The right is the linear speed of a target assuming the pan is rotating at a slow speed. The colored lines represent the travel distance of a target in one (1) minute. You should now be able to refer back to the field of view chart to get an estimate of the different lens selections and relative speed of target based on the Pan speed.



Basic System Connections Reference chart

SCOPE AND PAN UNIT					INTERFACE BOX					PC CARD RS422	
CPU		SCOPE	PAN	16 PIN	CABLE 1:1	16 PIN	DB-9	12 PIN	CABLE	PIN	SIGN
SIGN	PIN	DB-9	DB-9	M/F	SZ/PAN	M/F	M/F		COM		
TX+	3	2	2	B	B:B	B	2	B	B:9	9	RD B (+)
TX-	4	7	7	A	A:A	A	7	A	A:1	1	RD A (-)
GND	5	3	3	E	E:E	E	3	E	E:5	5	GND
RX-	7	4	4	C	C:C	C	4	C	C:3	3	TDA (-)
RX+	8	9	9	D	D:D	D	9	D	D:2	2	TDB (+)

