

# Working with CSWin32 Software

CSWin32 provides a PC interface for Coiltek's ultrasonic control products. The software expands the palette of control features of the CS-5000 and CS-6100 series controls; tools that can help solve difficult loop control issues. This document supplements, but does not replace the Operating Manual for either control.

## Connection

Connect your PC to the control's dB9 connector using a straight pin-to-pin serial cable. To open the serial port on the control, follow this procedure. Turn off power to the control. Flip all 4 Range switches on SW1 to the OFF position. Make sure that switch 4 (CAL/RUN) on SW1 is ON. Restore power. The port is now open and you can boot up the CSWIN32 software.

## Main Screen

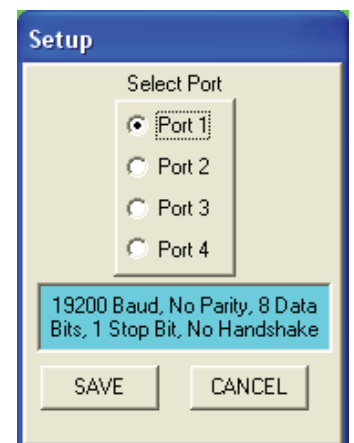
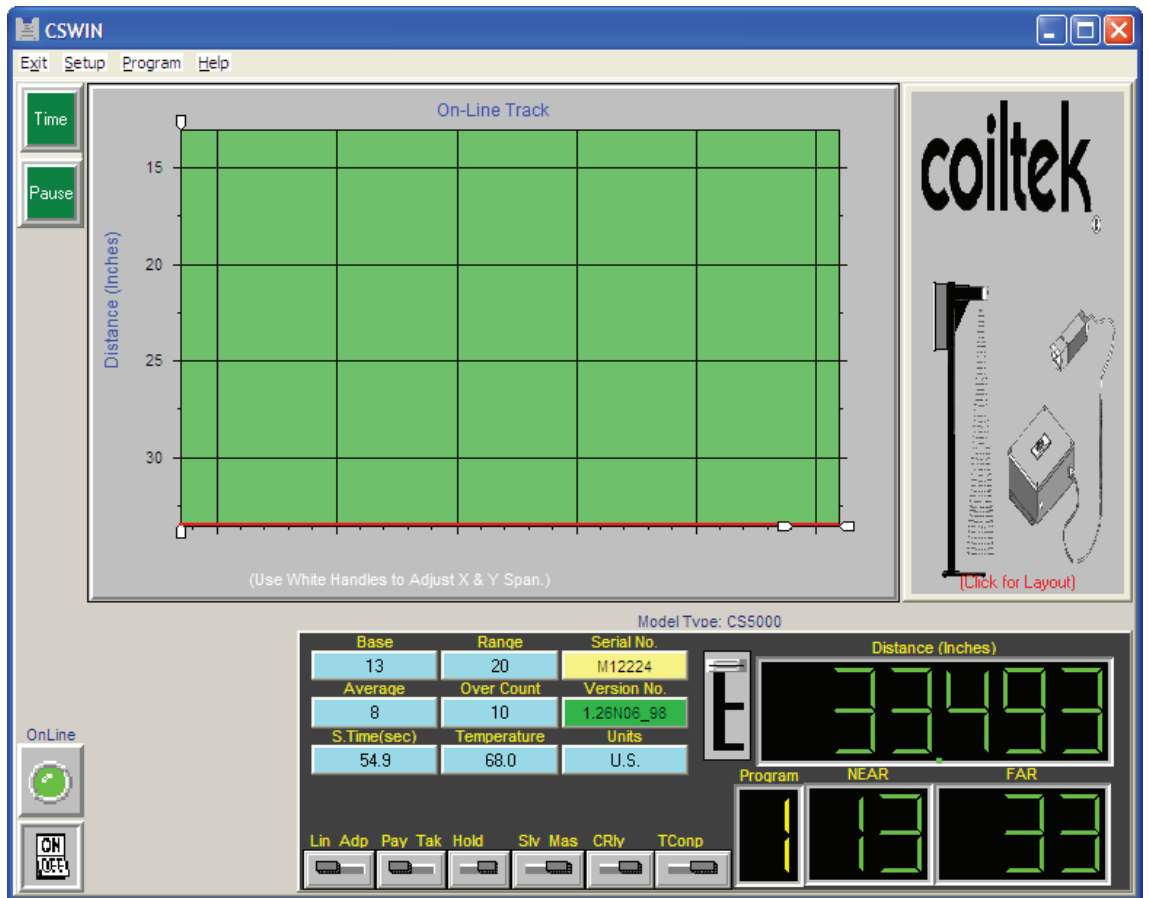
The screen at right will pop up.

Go to the lower left corner of the screen and click on the ON/OFF switch. If you have set things up properly (correct cable, port opened per procedure above), the light above the switch will turn green. If it does not, you may have a serial protocol issue. Go to the next section on Setup.

The screen provides both readout from the control and access to control functions by means of drop-down menus. Most of the active screen displays real-time data transmitted from the loop control to the PC. The graph shows the position of a target (if present in the control range) with respect to time. The fields below indicate current set-up, near and far limits, etc. The instantaneous target position is also displayed numerically.

## Setup

The software sets Port 1 as a default. If your PC uses a USB to RS232 converter, or has multiple serial ports, you may have to select a port other than Port 1. Click on Setup at the top of the screen. This menu pops up allowing you to select an alternate port. Usually, a USB converter works on Port 4.

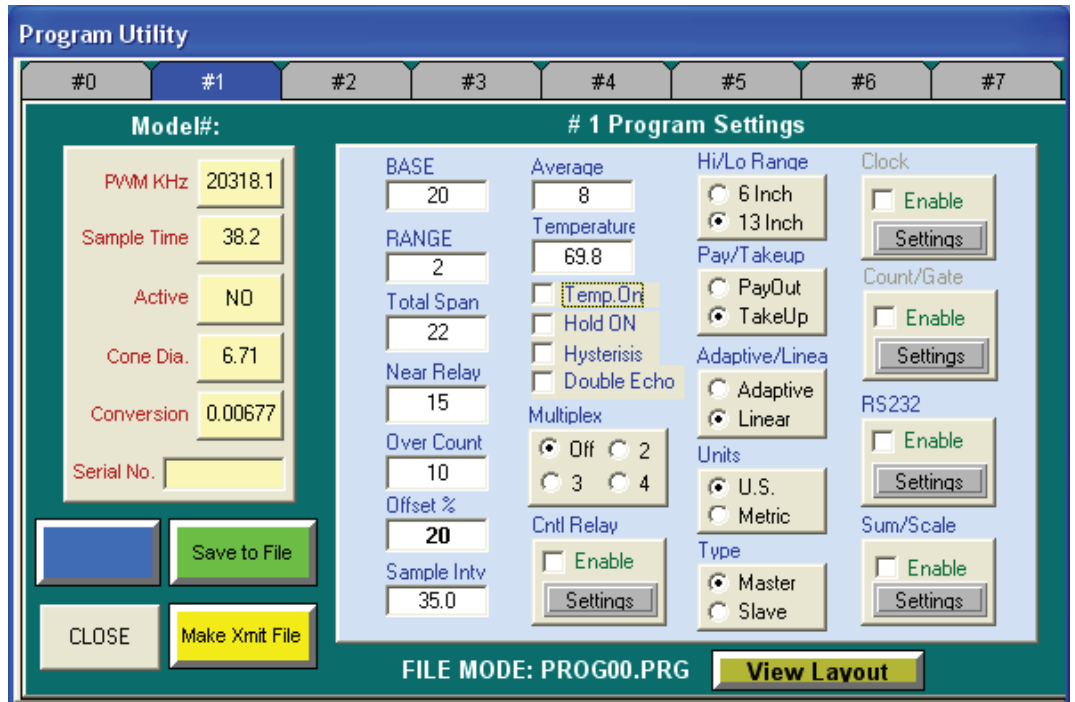


Note the serial protocol listing. CSWin attempts to set them automatically. But some industrial software programs, notably RSLogix, lock the serial protocols. If you have difficulty communicating with the control (green light on the main screen stays gray), this may be the problem. Take note of the protocols and set them in Windows Device Manager.

## Program Utility

Once you have a green light, you are connected. All control functions can be set from your PC. Click on Program at the top of the screen, and select remote. The program utility window will pop up. This window allows where remote set-up of all control functions.

All Coiltek controls can store 8 different program presets. The card-file tabs at the top of the screen select the desired preset. Preset 0 is the working 'scratchpad' set-up, used to program the control manually with the DIP switches. As such, it is subject to "tinkering". (1-7). For this reason, we recommend that you set and store your working program(s) in presets 1 - 7. After you've programmed the desired preset, you need only select that preset on the Coiltek main board, then perform a system reset. The preset value corresponds to the preset switches on the control in a Boolean manner. This chart should help. Note that it is also possible to select program presets 1,2 & 3 from a remote switch. The schematic and 3-position switch truth table is listed on page 7 in the current CS-5000 manual (available on our website [www.coiltek.com](http://www.coiltek.com)).



Switch Settings			
Preset Value	Preset 1	Preset 2	Preset 3
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

Now let's look at other areas of the Remote screen. The box in the upper left corner list a number of read-only parameters.

### ***PWM kHz***

refers to the frequency of the processor's pulse-width-modulation output. This output is filtered to produce a 0-10 VDC control signal and is of little interest to the general user.

### ***Sample time***

is the time in milliseconds between acoustic bursts from the transducer. The default sample period is 50 milliseconds (preset 0). We recommend retaining this sample period in any setup. It gives sufficient time for any second echo to die, but not so long as to hinder response time.

### ***Active***

simply indicates whether or not the particular preset you've selected is the active one.

### ***Cone Diameter***

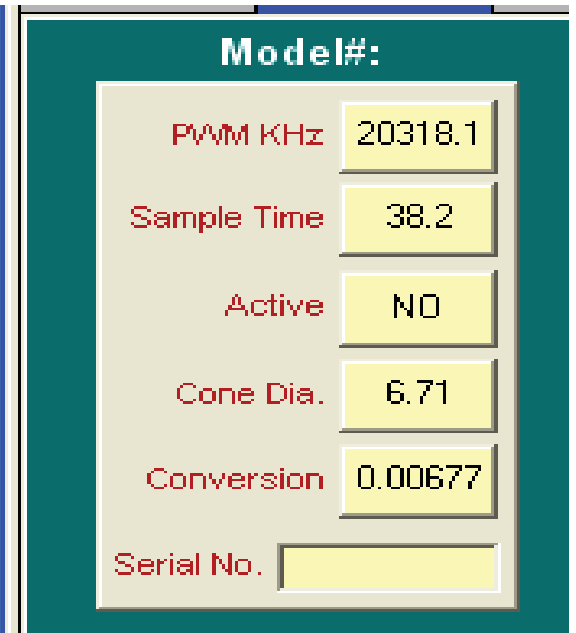
shows the beam's spot size at the far end of the range with the current set-up. It changes as you reconfigure the Base and Range parameters.

### ***Conversion***

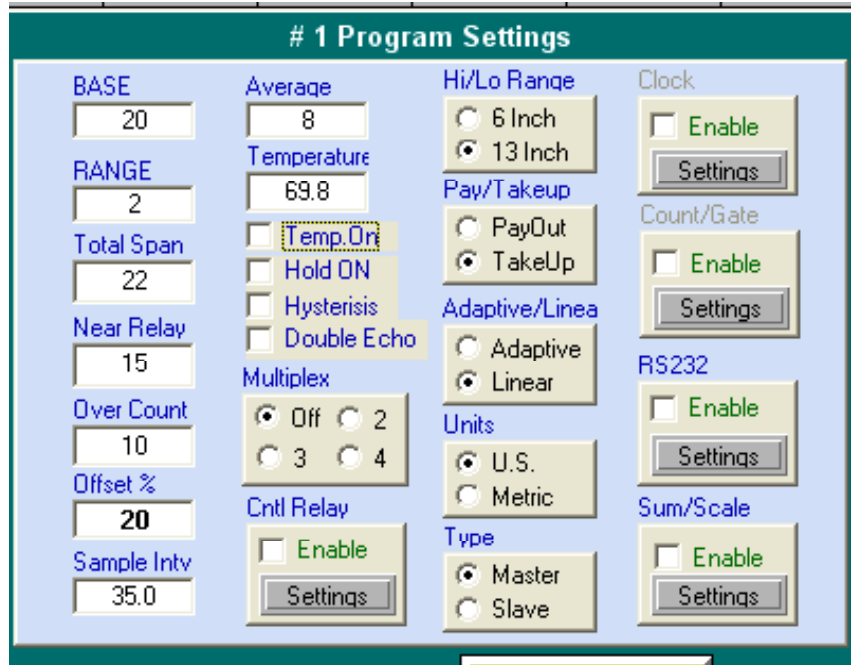
shows the scale factor used to calibrate the device. The default value relates a 'standard' speed of sound in 70° F. air to the processor clock speed to calculate target distance. The conversion value will be constant unless the control is fitted with the TS-50000AM temperature compensation module.

### ***Serial No.***

displays the unique Serial Number of the control.



The gray box to the right side of the window is the work space where you can enter control parameters.



### Base

sets the distance (default units are inches) from the transducer to the top of the control range. You can set this value to the nearest inch. A target moving between the Base and the transducer will cause no change in the control's output. The near relay or discrete output (CS-6100) will be OFF and the control indicator LED (on the nose of the CS-5000 series controls or on the board of the CS-6100) will stay red. Depending upon whether the control is in the payout (OUT) or Take-up (UP), the signal output will be either 10 VDC or 0VDC. The minimum Base distance is by default 13 inches. On CS-5000 series controls, minimum distance can be reduced to 6 inches by flipping switch 1 on the transducer range card. With the CS-6100 control, simply select the setting in the Hi/Lo Range box.

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**Caveat:** Use of the 6-inch minimum base relies on a shorter, less-intense acoustic burst. It is intended for applications that use a modest control range that must be close to the face of the transducer. The typical over-the-stock loop control set-up has a base distance in excess of 20 inches and the short-burst setting is unnecessary.

### Range

is the distance beyond the Base where the control will sense a moving target and create a 0-10 VDC signal. With a target in this zone, the indicator light is green. A typical loop-control setting for this parameter is 25 inches. That is, with a Base setting of 20 inches, the range would extend from 20 to 45 inches from the transducer. In looping-pit applications, range settings in excess of 80 inches are common.

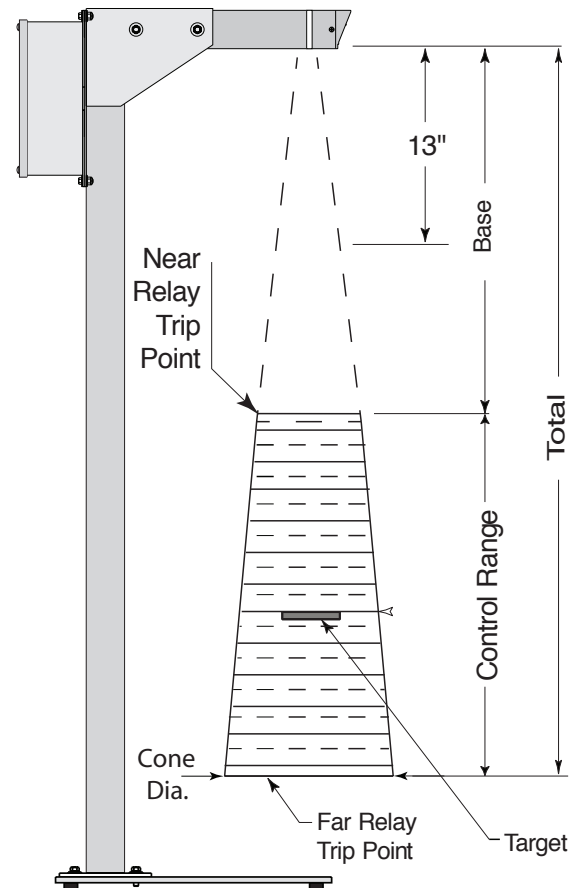
### Total Span

is simply the sum of the Base and Range parameters and is calculated automatically.

**Caveat:** Note that if you set the range here for preset 0 it will be overwritten by the DIP-switch range setting upon the first power cycle or system reset.

### Near Relay

offers a set-up option unavailable with manual set-up. It is frequently desirable to have the near relay – used to stop a press in case of tight loop – set some distance above the top of the control range. This setting avoids nuisance trips but retains tight-loop protection. The near relay may be set anywhere between 13 inches and Base distance.

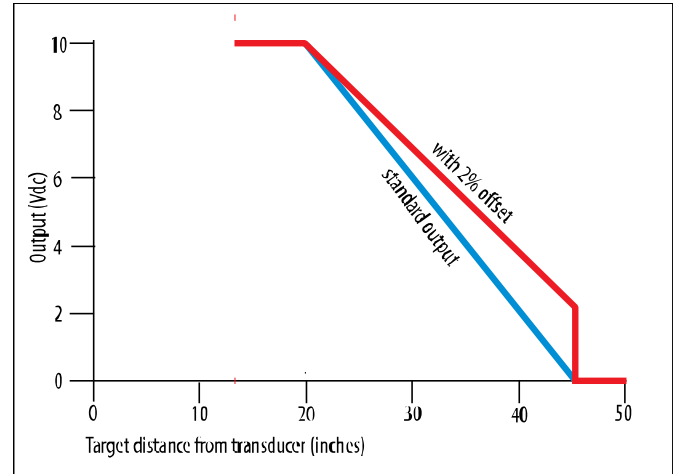


## Overcount

is the number of samples registered beyond Total Span required before the control drops out the FAR output or relay. 10 represents a good compromise between stability and speed of response.

## Offset

is valuable in applications where high-inertia payout equipment can't accelerate to line speed fast enough. That is, the loop's depleted before the payout equipment gets up to speed. With offset, the drive motor gets a boost as soon as the stock rises into the control range. Enter Offset as a percentage of the full scale voltage. (For example, 20% would represent 2 VDC out of a total 0-10 VDC output). The graph compares standard loop control response to that with a 20% offset. With Offset, the output jumps from 0 VDC to 2 VDC when the target moves into the control zone.

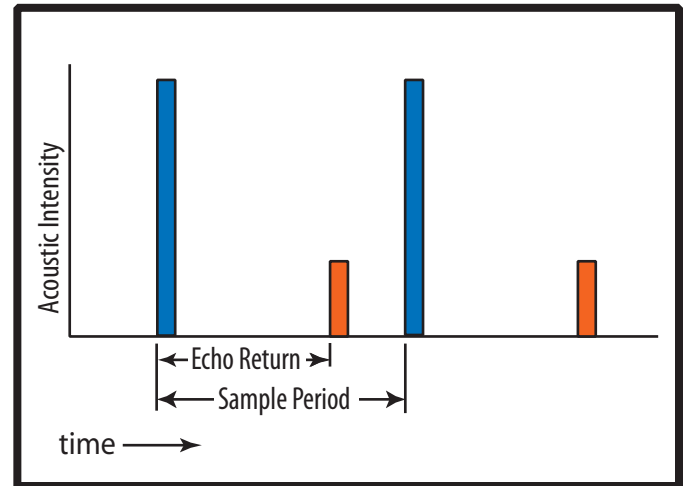


## Sample Interval

was described earlier. We strongly suggest setting the sample interval to 50 milliseconds. This is not the default in every preset, so you'll have to enter it!

## Average

sets number of running samples that the processor averages to compute the output signal. This number sets the integration time of the control: Sample Interval x Average. A small number gives the control a fast response, while a large number slows the response. The default value of 8, (400 msec integration at a sample interval of 50 msec) is a good compromise for most applications. You can reduce the averaging to as few as four if speed of response is critical. Be aware, however, that occasional measurement drop-outs, stock oscillations, and noise can make the final output noisy and unpredictable. Remember, most conventional drives have a much higher time constant than the Coiltek control. Changing this value will probably buy you little.



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## Temperature

will read out in this field if the TS-5000AM module is wired in and the Temp On box beneath it is checked. Otherwise, the field will assume the default value (70°F).

## Hold On

causes the loop control to hold the last non-zero value when there is an abrupt drop-off of the target. We created this feature to aid folks running either material with large voids or stock that swings wildly in and out of range. The feature is rarely used and we do not recommend its use. In preset 0, this value is read-only: the DIP-switch dictates its ON or OFF state.

## Hysteresis

puts a 5% 'cushion' around the discrete (CS-6100) or relay (CS-5000) Near and Far output actuation. This feature can avoid relay chatter about the cusps of the control range but its use is rarely necessary.

## **Double Echo**

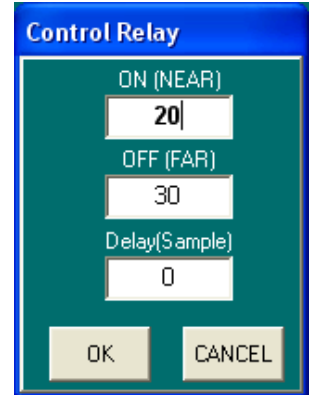
prompts the control to look for the second rather than the principal echo. This may be useful if there is a known obstruction in the ultrasonic beam path. Checking this field changes the CS-6100's behavior but it is hardwired in the CS-5000 series controls. Check the CS-5000 manual if you require double echo mode.

## **Multiplex**

This feature is inert. It has no programming function and will be eliminated in future upgrades.

## **Cntl Relay**

Is short for Control Relay – the third relay (or discrete output on the CS-6100). Click the box to activate it. Click on the Settings box to get the Control Relay set up window (above). You may set the relay to turn ON at a given distance from the transducer and OFF at another. The ON distance must be less than or equal to the OFF distance. This programmable hysteresis is handy for controlling equipment that is not variable speed (i.e. clutch drives, motor starters, etc.) Relay reaction time can also be delayed, if necessary. Delay is entered in number of samples so, in effect the delay time will be the Delay setting times the sample time.



Control Relay

ON (NEAR)  
20

OFF (FAR)  
30

Delay(Sample)  
0

OK CANCEL

## **Hi/Lo Range**

was discussed previously in the Base discussion. To reiterate: this setting is read-only for the CS-5100 series, but may be set as required for the CS-6100 series controls.

## **Payout/Takeup**

This program box will set Program Presets 1 through 7 for either Payout or Takeup Mode. In Program Preset 0, Switch 1 of SW1 on the mainboard sets the Mode and this box is read-only.

In Payout mode, the output is 0V with the target at the Total Span distance and increases as it moves toward the Base distance. The slope is inverted in Takeup mode. The output is zero at the Base distance and increases as the target moves toward the Total Span distance. In most rewind operations, if stock is not present, it means that the material being rewound is spent and to stop the process. So the control output will drop to zero if the transducer does not "see" a target. A firmware program which holds a 10 V output beyond the control range is available if your process requires it.

## **Adaptive/Linear**

This parameter is read-only in program preset 0, settable in all others. The adaptive program is designed to compensate for radius changes in a depleting or building roll. The algorithm places the target in the center of the control range at all times. While this program works, it is computationally intensive, and works best with relatively slow processes. If you have high wrap ratios (O.D./I.D.), this option may help. Linear is the more typical setting. Like a conventional dancer arm, the output is proportional to target position within the control range.

## **Units**

US – All distance settings are in inches. Metric – All distance settings are in millimeters.

## **Type**

The control typically operates in stand-alone fashion with this switch in Master mode. If two or more controls operate within close proximity (6 feet or so) it may prove necessary to multiplex them to prevent 'crosstalk' interference. Multiplex wiring of the hardware is covered in the product manual. When multiplexing, each unit must be set to the Slave mode. This is read-only in program preset 0, but must be set in all other presets.

**Caveat:** Using the 2nd RS-232 port for data-streaming (see below) disables the control's multiplexing capability.

## Clock, Count/Gate

are in place for development work and are not available to the end-user.

## RS232

can open a second read-only serial port on Coiltek CS-5000 and CS-6100 series controls. The physical location of this port is the 20-pin header J5, pins 1 (GND), 2 (RX2), & 3 (TX2). Clicking Enable will open this port to provide a stream of ASCII data. You have the option of selecting Data Only or Serial Number & Data. Delay is in milliseconds. Select Baud rate of either 9600 (default) or 4800. Enabling this function disables the multiplexing option.

## Sum/Scale.

Selecting Enable and clicking the Settings button opens a new window (below).

This window opens two very powerful capabilities. Both allow the use of an external analog input. This input must be 0-5V and referenced to ground. It may be brought in on any of four available analog inputs. (Select Channels 0-3 on the screen). Corresponding inputs on J5 are A/D0 – pin 6, A/D1-pin 7, A/D2-pin 8, A/D3-pin9. Click the appropriate box for the analog input connected.

The two capabilities are:

### Sum Proportional.

With this button clicked, the control sums a voltage proportional to the calculated target position to the analog control voltage appearing at J5. Enter the percentage of the 0 – 10 volt position signal to add. (The maximum value is 50%.) If the external signal is proportional to line speed, the actual output signal will be a Proportional-Integral (or PI in control jargon). In a high-speed system, only a portion of the control signal will react to change in loop position. The response of the system is greatly improved. Yet, since the system continuously monitors loop position, it maintains long-term stability.

### Scale.

With this button clicked, the control multiplies the external analog input voltage by a value proportional to the calculated target position.

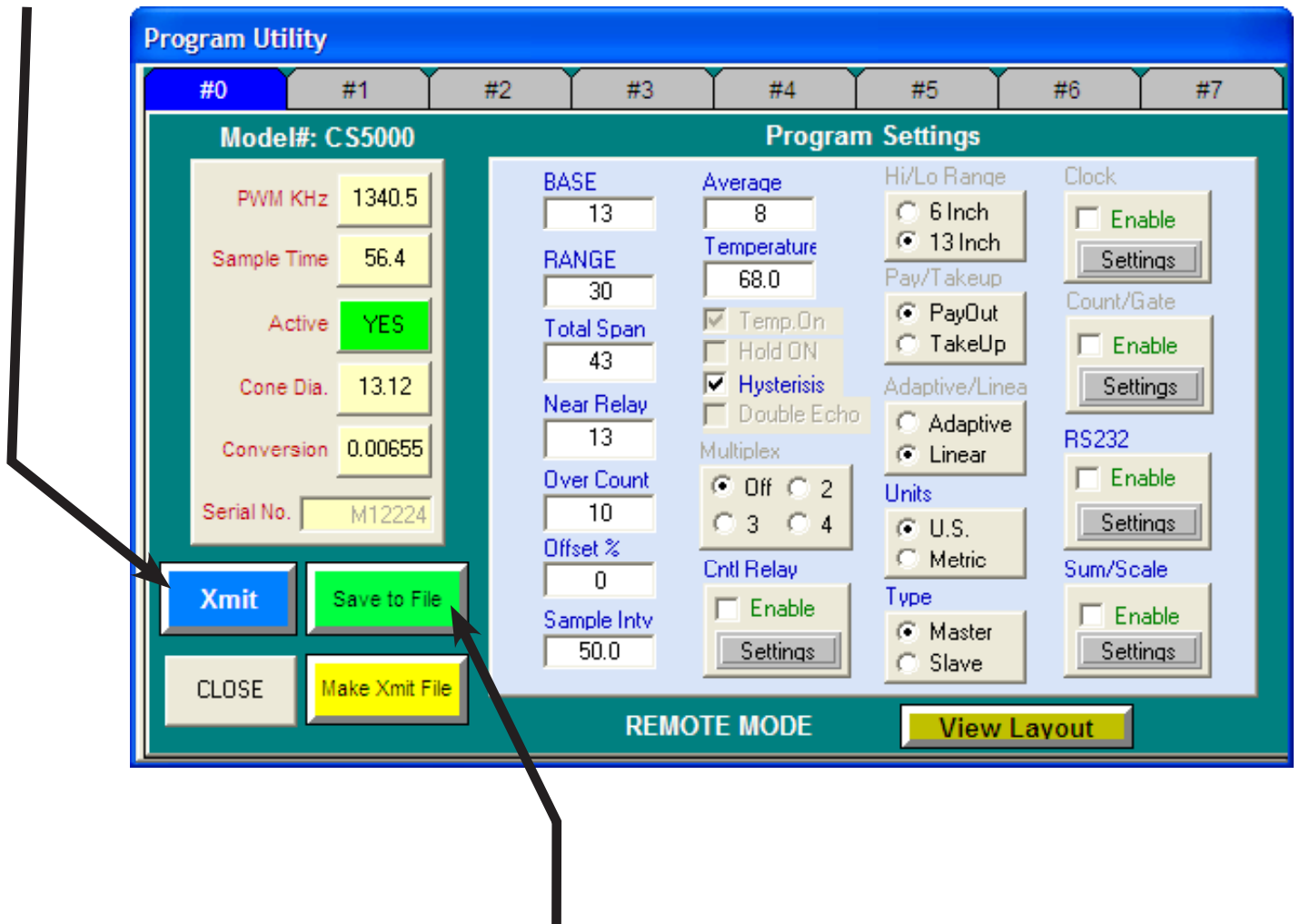
When payout or rewind equipment must operate over a wide range of speeds, the Scale function is useful. Using a potentiometer to provide the 0 – 5 volt external reference, its setting controls the gain of the Coiltek control. The Scale Value sets the multiplier at the control's maximum output. If a high-speed line is forced to operate slowly, the loop control has too much gain and payout equipment will behave in an ON-OFF manner. Reducing the gain, allows the line to operate in a stable, smooth manner. The Scale value can be set between 0.01 and 2.00. With the analog input limited to 5.0 volts, 2.0 is the upper limit (unity gain) because the control's maximum output is 10V.

The screenshot shows the 'Sum/Scale Dialog' window. At the top, the title is 'Sum/Scale Dialog'. Below the title, there is a 'Mode' section with three buttons: 'SUM Proportional' (which is selected), 'SUM Linear', and 'SCALE'. Below these buttons is a 'Percent Sensor' input field containing the value '30'. Underneath that is a 'Select A/D Inputs' section with four radio buttons: 'Channel 0' (selected), 'Channel 1', 'Channel 2', and 'Channel 3'. At the bottom of the dialog is a 'CLOSE' button.

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## Transmitting and Saving Programs

To save the program to the Preset value (selected in the tab at the top of the screen) click the Blue Xmit button at the lower left corner. This action stores that preset's parameters to the Coiltek control. Once transmission is complete the button turns green briefly then returns to blue. Each preset program that you set **must** be stored individually.



Once you've transmitted all the presets you need to set, you can save your work by clicking the green Save to File button. This action will save all modified presets into a file on your hard drive.