EMERSON EMC

PCM-18
WEB CONTROL APPLICATION MODULE OPERATORS MANUAL

P/N 400254-00 **REV: A3**
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SECTION 1
INTRODUCTION

1.1 OVERVIEW

This manual provides information for setup and programming of the PCM-18 module. It is important that the operator become familiar with manual P/N 400240-01 (PCX OPERATORS MANUAL). The PCX Operators Manual provides the background information needed to setup and program the basic FX Drive using PCX 6.X software.

EMC's Web Control Application module allows operator to achieve constant speed of a web when the take-up roll is center wound by an FX Drive, or modify the speed of a web to maintain loop position control of a dancer arm.

1.1.1 CENTER WIND OPERATION

Under normal center wind operation (motor speed constant), the web increases in speed as the take up roll increases in diameter. By applying Web software with an SCS-x encoder and a "Web Control PCM" the system monitors the SCS-x and varies the drive speed to maintain a constant web speed as measured by the SCS-x encoder.

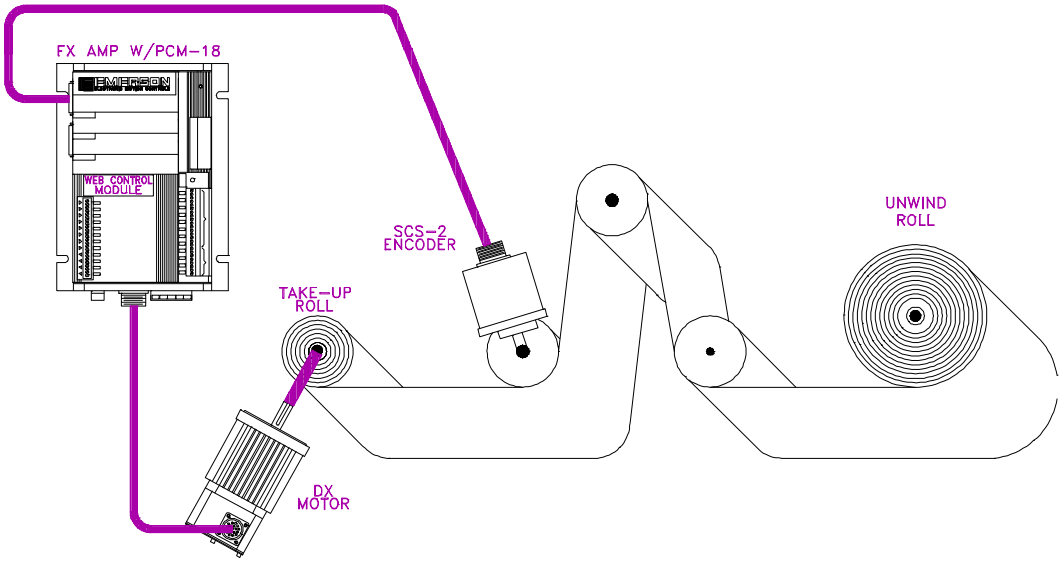


Figure 1 Center wind web system

The length of the index is determined by an SCS-x encoder rather than the motor. A feature in the Web software compares the motion of the motor with the motion of the encoder (see Figure 2). If the drive senses that the SCS-x encoder is not moving at all the system produces a center wind fault.

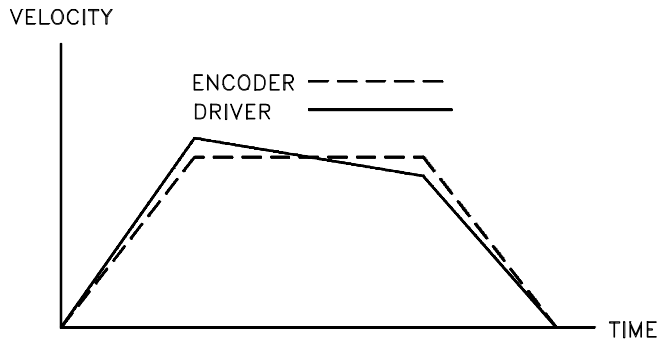


Figure 2 Motion control profiles using center wind drive

1.1.2 DANCER ARM OPERATION

The Web Control Software can also be programmed to maintain loop position control by monitoring an analog sensor that indicates the position of a dancer arm. A feature in the software uses the sensor input to determine when to modify the velocity of the web in order maintain proper dancer position. Loop position control can be used with the DX motor attached to a drive roller as shown in Figure 3.

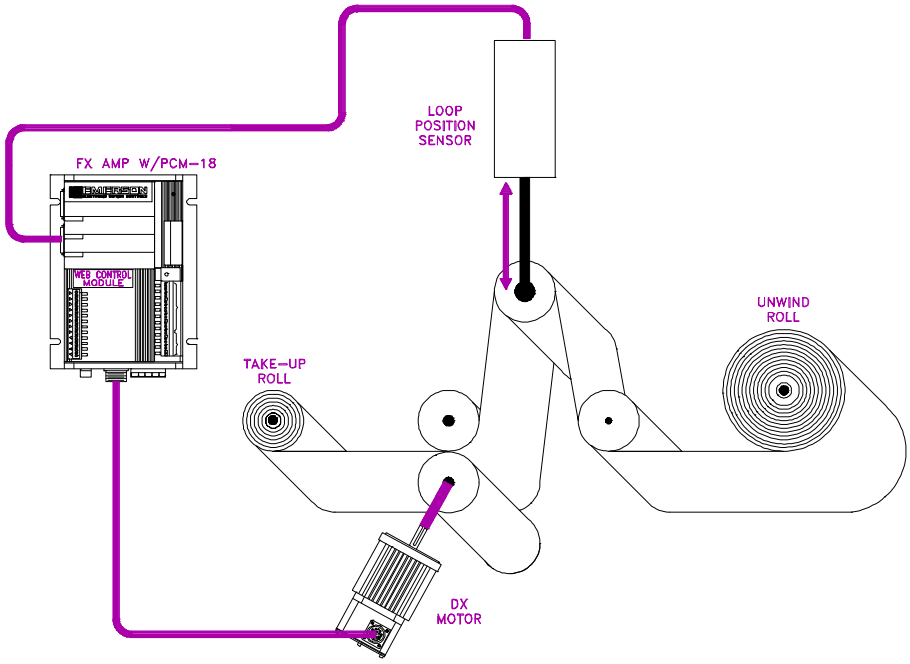
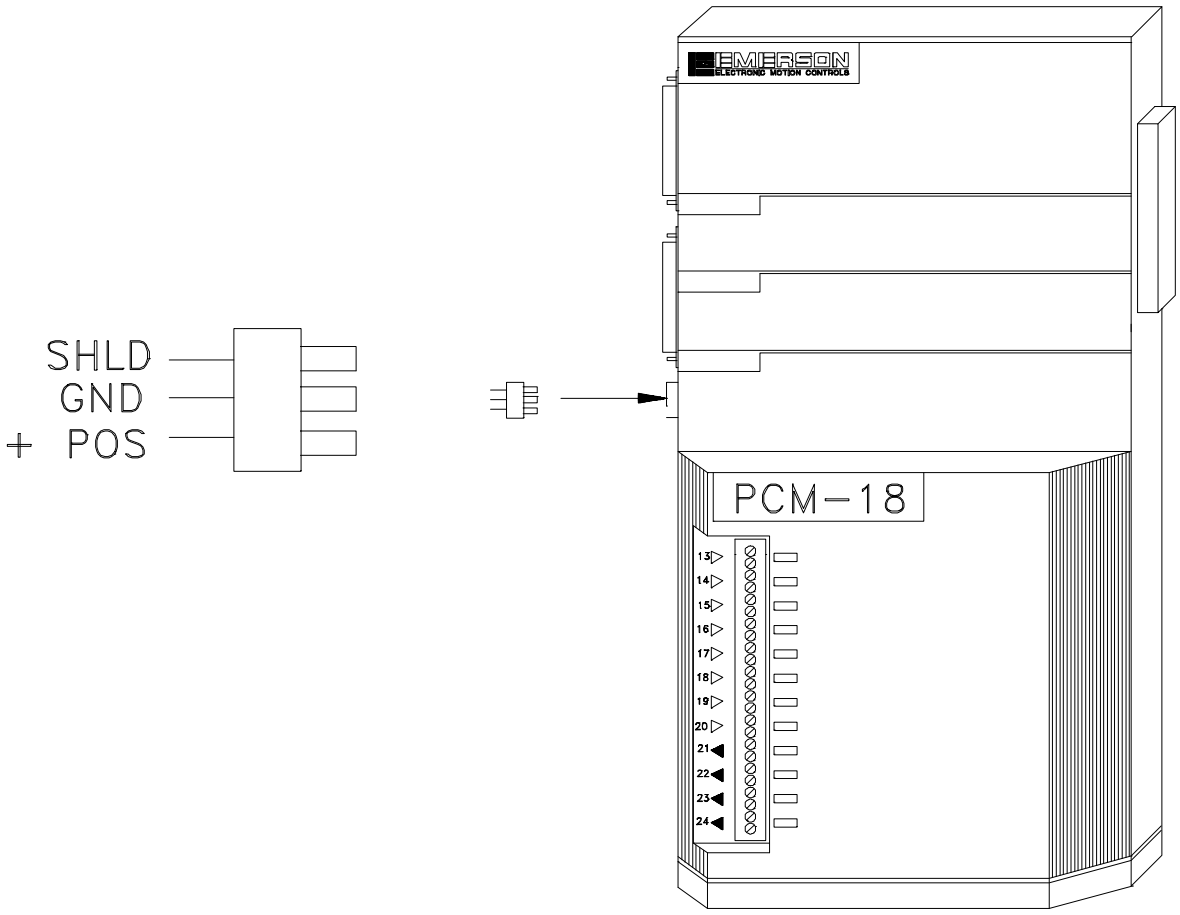


Figure 3 Web system w/loop position control

1.1.3 LOOP CONTROL INPUT

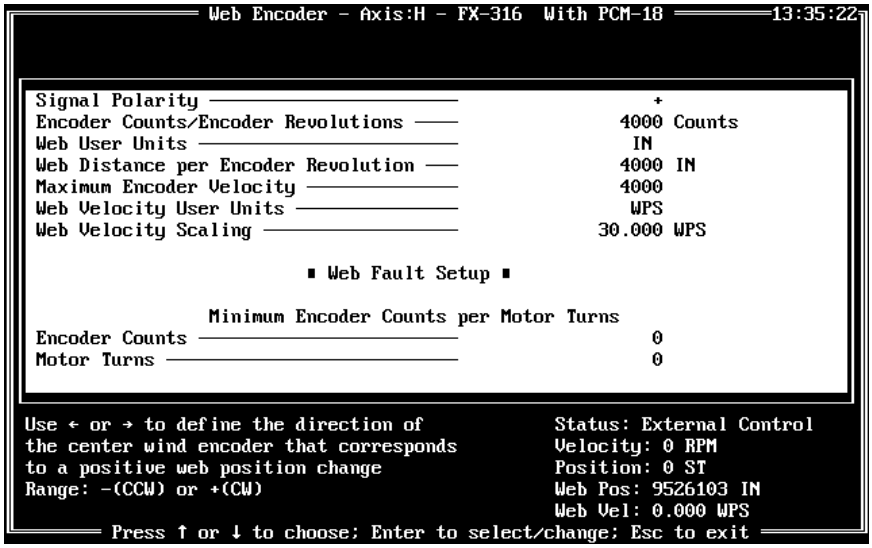
The loop control input is located on the side of the module below the encoder output connector. This input is a ±10 volt, 12 bit analog input used for web loop control. The zero velocity and maximum velocity voltages can be changed using serial commands. To set the zero velocity voltage, apply the desired voltage to the loop control input and type CN5 <ENTER>. To set the full scale velocity voltage, apply the desired voltage to the loop control input and type CF5 <ENTER>.



SECTION 2
SETUP AND PROGRAMMING

2.1 WEB ENCODER

When configuring your web system with a Web Control Module, the first step is to define the parameters in the Web Encoder screen.



2.1.1 WEB ENCODER SCREEN DEFINITIONS

Signal Polarity

This parameter defines the direction of the encoder that corresponds to a positive direction change. Clockwise is indicated with a (+), counterclockwise is indicated with a (-). Perspective is looking at the encoder shaft.

Encoder Counts/Encoder Revolutions

This parameter is used to define the encoder. For example if your web system is using an Emerson SCS-x 1000 line encoder you would enter 4000. This means there are 4000 encoder counts per encoder revolution.

Web User Units

This parameter allows the operator to enter up to three letters that represent the type of units to be associated with web distance.

Examples:

IN for Inches
MM for Millimeters
MTR for Meters

Web Distance per Encoder Revolution

This parameter sets the number of user units the web material would move if the encoder turned exactly one revolution. This allows the operator to setup all moves using distances that apply directly to the movement of the web material. It also displays all positional information in real units.

Maximum Encoder Velocity

This parameter sets the upper velocity limit the operator can specify (in RPM's) for Jogs, Homes and Indexes. This parameter is also used with web velocity scaling.

Web Velocity User Units

To make the display data meaningful, the user must set up a conversion between his units and the units that are used by the drive. The maximum velocity of the actuator is 3000 RPM. Since it is possible to use the Drive on a wide variety of applications, velocity units other than RPM's can be programmed. In order to set the velocity units correctly, they must be scaled against the maximum velocity. Consider the following applications.

APPLICATIONS	ENTER
3000 RPM = 600 INCHES PER MINUTE	600.0 IPM
3000 RPM = 360 DEGREES PER SECOND	180.00 DPS
3000 RPM = 34.525 FEET PER SECOND	34.525 FPS

Web Velocity Scaling

This parameter sets the web velocity to equate to max encoder velocity.

Example: Encoder Max Vel = 1500 RPM
Web Vel. User Units = FPM (Feet Per Min.)
one Encoder Rev = .5 ft
Web Vel Scaling = 750 FPM

Encoder Counts/Motor Revolutions

Web fault setup is used to define the number of counts the encoder must move for every motor revolution or a fault condition will occur. For example: If you entered 100 for encoder and 5 for motor revolutions and the encoder fails to move 100 counts within 5 motor revolutions a fault condition will occur.

2.1.2 LOOP POSITION CONTROL

The Loop Position Control screen parameters are used to maintain constant loop position in response to the position of the dancer arm. These parameters are active only when input function #51 is active (see inputs page 13).

If loop position control is to be used, then the loop control parameters must be set up. The parameters include the input voltage span, the deadband voltages, the loop limit voltages, and the maximum velocity trims. The effects of these parameters are illustrated in the following figure.

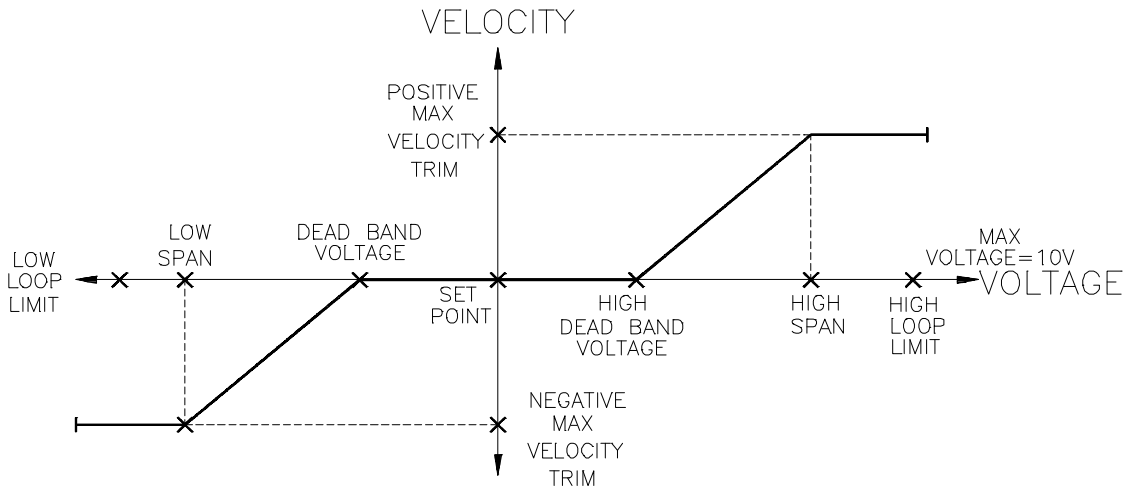


Figure 6 Velocity trim as a function of loop position control

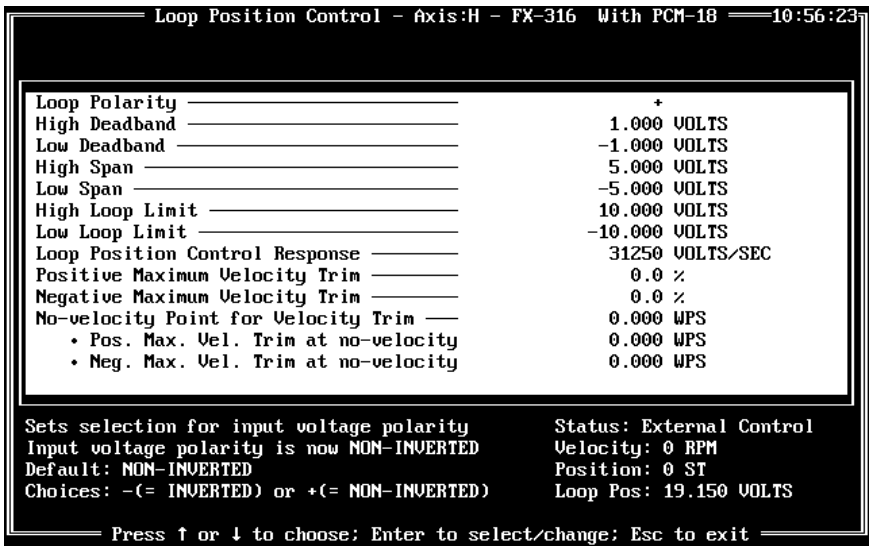


Figure 7 Loop Position Control

2.1.2.1 LOOP POSITION CONTROL SCREEN DEFINITIONS

Loop Polarity

Defines the polarity of the loop position analog input.

High Deadband

High Deadband is the upper voltage limit where no corrections will be made to the web velocity. For example; If the High Deadband is set to +1.00 Volts and the Low Deadband is set to -1.00 volts and the incoming voltage is .50 volts no correction will be made to the web velocity.

Low Deadband

Low Deadband is the lower voltage limit where no corrections will be made to the web velocity. For example; If the Low Deadband is set to -1.00 Volts and the High Deadband is set to +1.00 volts and the incoming voltage is .50 volts no correction will be made to the web velocity.

High Span

When the feedback voltage reaches the High Span value the web velocity will be increased by the value set in the "Positive Maximum Velocity Trim" parameter.

Low Span

When the feedback voltage reaches the Low Span value the web velocity will be decreased by the value set in the "Negative Maximum Velocity Trim" parameter.

High Loop Limit

When the voltage reaches the High Loop Limit output number 32 will go high (turn on).

Low Loop Limit

When the voltage reaches the Low Loop Limit output number 33 will go high (turn on).

Positive Maximum Velocity Trim

This value is the maximum amount that the Web Velocity will **increase** when the input feedback voltage reaches the High Span value. This parameter is used when actual velocity is greater than no-velocity point. This velocity is specified as a percentage of the current velocity.

Negative Maximum Velocity Trim

This value is the maximum amount that the Web Velocity will **decrease** when the input feedback voltage reaches the Low Span value. This parameter is used when actual velocity is greater than no-velocity point. This velocity is specified as a percentage of the current velocity.

No-Velocity Point For Velocity Trim

This parameter defines an absolute web velocity that is used to determine which velocity trim is used, percentage (described above) or absolute (described below).

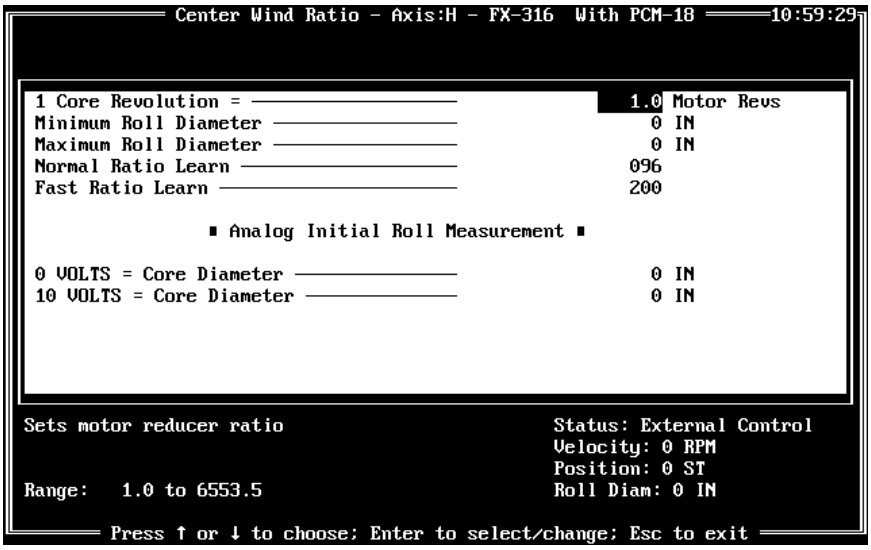
Positive Maximum Velocity Trim - no-velocity

This value is the maximum amount that the Web Velocity will **increase** when the input feedback voltage reaches the High Span value. This parameter is used when actual velocity is less than no-velocity point. This value is entered as an absolute web velocity.

Negative Maximum Velocity Trim - no-velocity

This value is the maximum amount that the Web Velocity will **decrease** when the input feedback voltage reaches the Low Span value. This parameter is used when actual velocity is less than no-velocity point. This value is entered as an absolute web velocity.

2.1.3 CENTER WIND RATIO



2.1. CENTER WIND RATIO SCREEN DEFINITIONS

1 Core Revolution = X.X Motor Revs

This parameter specifies the motor to roll reducer ratio (if one is used). Although this parameter is not required to be accurate for general web operation, it is required to be accurate for the roll diameter initialization and monitoring.

New Roll Diameter

This parameter specifies the source for the new roll diameter when the New Roll Diameter input is activated. The choices are analog or fixed. If fixed is selected then a prompt appears for the diameter to initialize to. If analog is chosen the diameter is measured using the analog input on the drive (see the Analog Initial Roll Measurement below).

Minimum Roll Diameter

This parameter defines the minimum roll diameter and is specified in web units. If the calculated roll diameter falls below this value the Roll Full/Empty output is activated.

Maximum Roll Diameter

This parameter defines the maximum roll diameter and is specified in web units. If the calculated roll diameter exceeds this value the Roll Full/Empty output is activated.

Normal Ratio Update Rate

This value, specified as a number of motor turns, determines how often the motor-to-web ratio is updated. This update rate determines how quickly the center wind system adapts to rapid changes in the web ratio (roll diameter).

Fast Ratio Update Rate

This value is used as an alternate rate from the above. It may be used to adapt to new roll diameters when initializing or during a roll changing application such as a flying splice. When the Fast Ratio Learn input is active this update rate is used.

Analog Initial Roll Measurement

The two parameters below are used to specify how the signals at the drive analog input are converted to roll diameter. For the specified voltage (0 or 10), enter the roll diameter which corresponds to the voltage input according to the sensor range and setup.

0 Volts = Core Diameter
10 Volts = Core Diameter

NOTE: that the CN4 (channel null) and CF4 (channel full scale) serial commands apply to the accuracy of this function.

2.1.4 JOG (WEB APPLICATIONS)

When the WEB JOG SELECT input is high (active), the jog motion profile is based on the movement of an SCS-x encoder on the web. When a jog is executed, the drive accelerates the motor at the programmed web acceleration rate until the programmed velocity of the web is achieved. Both the acceleration and velocity are measured by the encoder. The drive will maintain the set web velocity until the Web Jog input is released, at which time it will decelerate at the programmed web deceleration rate.

If the LOOP POSITION CONTROL input is high, then the speed will be modified in response to the position of the dancer in order to maintain constant loop position per the parameters in the Loop Position Control Setup screen.

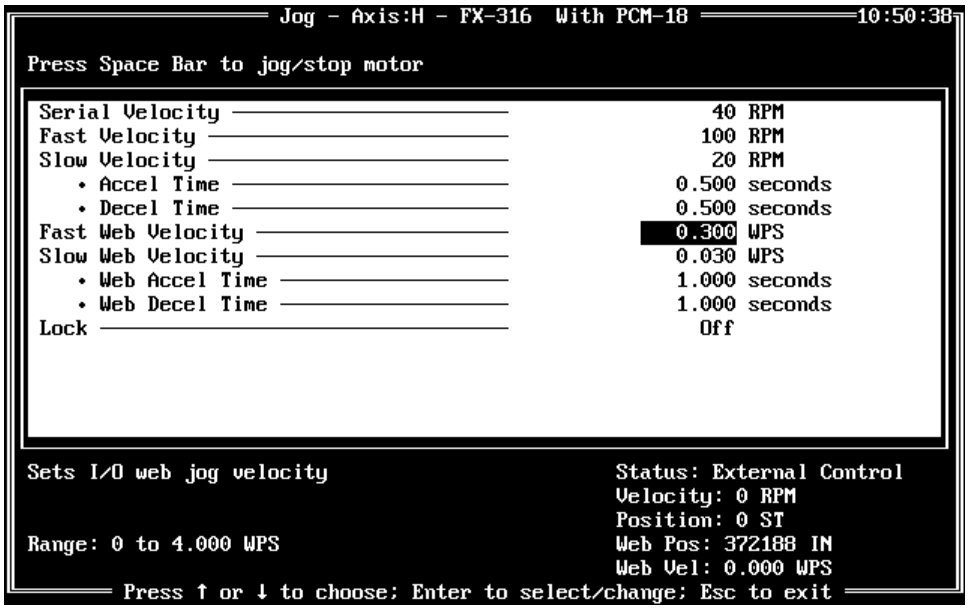


Figure 9 Jog Function

NOTE: All accel times are based from 0 to maximum velocity, <u>not programmed speed.</u> All decel Times are based from maximum velocity to 0, <u>not</u>

programmed speed.

2.1.5 INDEXES (WEB APPLICATIONS)

Six types of indexes (Incremental, Absolute, Registration, Feed Sensor, Rotary CW, and Rotary CCW) can be programmed into the Drive. Descriptions of Index types are listed in the PCX 6.X. Operators Manual (P/N 400240-01).

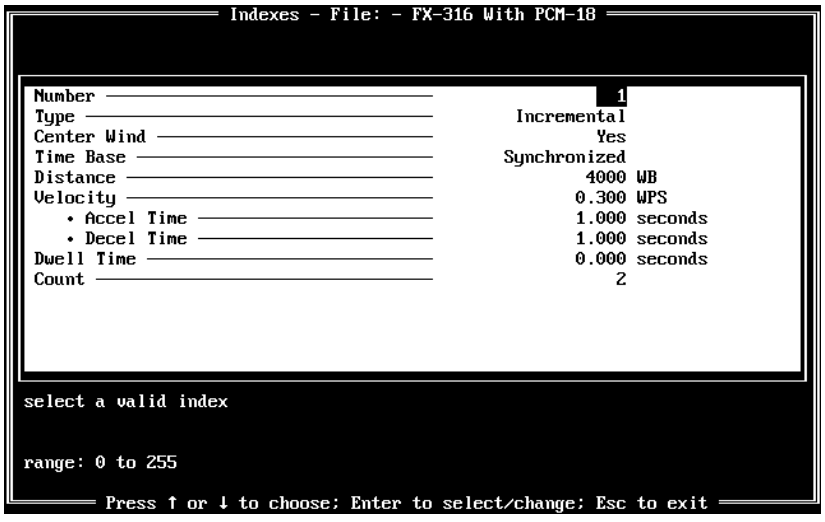
Index #0 is the "web learn index" When index 0 is initiated the drive performs a motion profile. The software than compares the movement of the drive with the movement of the encoder in order to determine the initial center wind ratio (the ratio of the web encoder movement to the motor movement).

If Center Wind is programmed "YES" in the Index screen, then when an index is executed the drive will accelerate at the programmed acceleration rate for the index selected until the programmed speed of the web (as measured by the SCS-x encoder) is achieved. The drive will maintain this programmed web speed by varying the speed of the motor through the duration of the index.

The index length will be determined by the amount of material moved as measured by the SCS-x encoder. As the index approaches the end of its programmed distance the motor will decelerate at its programmed deceleration rate and stop at the programmed index length (as measured by the SCS-x encoder).

If the LOOP POSITION CONTROL input is high, then when an index is executed the index acceleration, velocity and deceleration will be modified in response to the position of the dancer arm (per the parameters in the Loop Position Control Setup screen) in order to maintain constant loop position.

Note: If center wind is selected, the index type must be either <u>Incremental</u> or <u>Absolute.</u>



2.1.6 INPUT FUNCTIONS

Listed below are the input functions that pertain directly to web control applications. For a complete list of available input functions see "Input Functions" in the PCX 6.X Operators Manual.

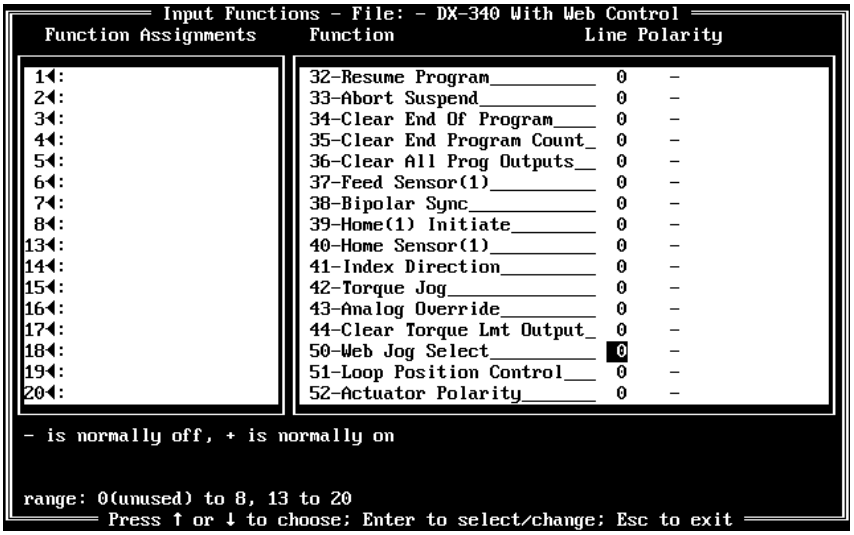


Figure 11 Input Functions

FUNCTION# **DESCRIPTION**

38 **EXTERNAL MODE OVERRIDE**

This input causes the external mode to override the current internal mode of operation. The external mode is specified in the Master Axis screen (formerly Bipolar Sync) and is limited to Bipolar Sync and Bipolar Web Sync for the PCM-18.

43 **INTERNAL MODE TIME BASE**

When this input is active any jog initiated by inputs is executed using the internal mode time base override. When this input is active any index, home, or program initiated by any means will be executed using the same time base. The external time base defaults to external encoder but may be changed to analog channel or internal. The override source is selected in the PCX Drive Parameters screen.

51 **LOOP POSITION CONTROL**

When this input is active the position of the loop is used to trim the velocity of the motor. When the loop position sensor is outside the deadband defined in the Loop Position Control setup

screen, then the commanded velocity of the motor is advanced or retarded.

52 **ACTUATOR POLARITY**

This input is used to invert the actuator polarity. When this input is active, positive initiation causes CCW rotation of the actuator.

53 **NEW ROLL DIAMETER**

This input is used to time the selection of a new feed roll diameter in order to use the appropriate web encoder/motor ratio. When this input becomes active, the new roll diameter is used to compute a new ratio. The new roll diameter is specified by the New Roll Default Diameter if fixed initial roll diameter is selected, or the New Roll Measured Diameter is used as measured at the drives analog input specified in the Center Wind Ratio screen.

54 **FAST RATIO LEARN**

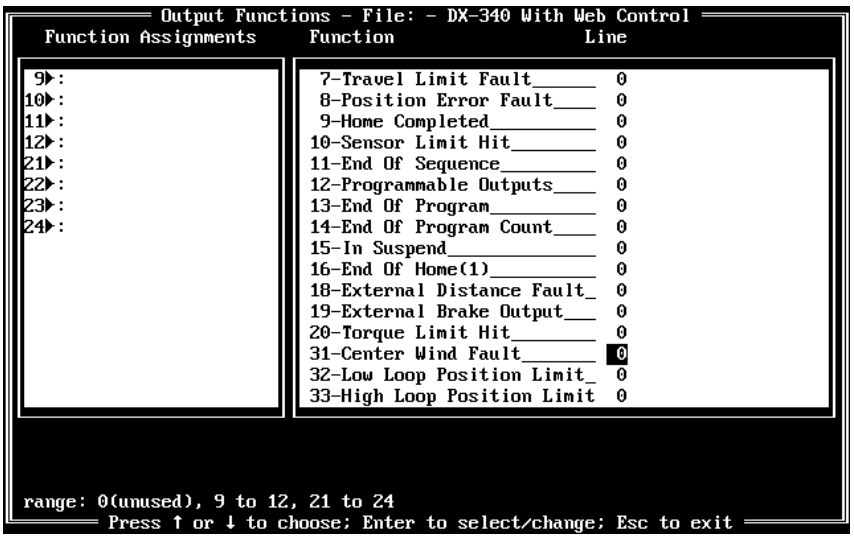
This input is used to select between the Normal Ratio Learn Rate and the Fast Ratio Learn Rate. An active input specifies the fast rate. These rates are specified in the Center Wind Ratio screen in PCX.

55 **WEB JOG SELECT**

This input initiates a *Web Jog*. When a Web Jog command is initiated the web will maintain a constant velocity while the motor velocity could very depending on the condition of the web.

2.1.7 OUTPUT FUNCTIONS

Listed below are the output functions that pertain directly to web control applications. For a complete list of available output functions see "Output Functions" in the PCX 6.X Operators Manual.



FUNCTION# **DESCRIPTION**

32 **HIGH LOOP POSITION LIMIT**

This output comes **ON** if the loop position sensor reaches the positive loop position limit as specified in the loop position control setup screen.

33 **LOW LOOP POSITION LIMIT**

This output comes **ON** if the loop position sensor reaches the negative loop position limit as specified in the loop position control setup screen.

34 **ROLL FULL/EMPTY**

This output become active when the specified max or min roll diameter is exceeded as calculated. The max and min diameters and relative data are specified in the PCX Ratio screen.

35 **CENTER WIND FAULT**

This output becomes active when a center wind fault occurs as defined by the web fault setup in the Web Encoder screen. Press the reset button or cycle power to clear.