
API / Pacific Scientific Intelligent Servo ASCII Protocol

Application Note

This document describes how to configure a Paradigm operator interface terminal to allow communications with an API / Pacific Scientific Intelligent Servo ASCII Protocol device. The communications protocol supports access to pertinent parameters. Please read this document carefully before attempting to configure communications with these devices.

Introduction

The EDICT-97 configuration software has been designed to allow the user to enter commands and transfer data in a manner that should be familiar to the user of an API / Pacific Scientific Intelligent Servo ASCII Protocol device.

Accessing Data

The driver described here supports the parameters in the table below.

Identifier	Description	Access
#=	Immediate Mode Status	Command
#0	Immediate Mode OFF	Command
#1	Immediate Mode ON	Command
#A	Set Acceleration	Command w/Parameter
#M	Absolute Move	Command w/Parameter
#MTPOS	Move from current position	Command w/Parameter
#OC	Clear Output	Command w/Parameter
#OS	Set Output	Command w/Parameter
#R	Set TPOS to 0	Command
#Z	Set FPOS, TPOS & PERR to 0	Command
/A	Calibrate Analog Inputs	Command
/F	Reset Drive	Command
/Q	Drive Status (use last 4 bits=EFRM)	Command
/R	Run Active Program	Command
/S	Stop Active Program	Command
ACC	Acceleration (.001RPM/Sec)	Read / Write
ADC1	Analog Input 1 (Volts)	Read
ADC2	Analog Input 2 (Volts)	Read
ADC3	Analog Input 3 (Volts)	Read
ADC4	Analog Input 4 (Volts)	Read
BSPD	Base Speed (RPM)	Read / Write
BUSU	Bus Undervoltage Setpoint (VDC)	Read / Write
CAL1	Offset for Analog Input 1 (Volts)	Read / Write
CAL2	Offset for Analog Input 2 (Volts)	Read / Write
CAL3	Offset for Analog Input 3 (Volts)	Read / Write
CAL4	Offset for Analog Input 4 (Volts)	Read / Write
CDLY	Commutation Delay	Read
CM	Command Mode	Read / Write
COFF	Commutation Offset (degrees)	Read / Write
COT	Check Motor OT Input	Read / Write
CPOS	CAM Position (Revolutions)	Read
CTMP	Drive Temperature (degrees C)	Read
DCC	Current Command (Amps)	Read / Write
DCM	Command Source (Analog/Digital)	Read / Write
DCV	Command Velocity (RPM)	Read / Write
DEC	Deceleration, analog vel. mode (.001RPM/Sec)	Read / Write

Identifier	Description	Access
DM	Drive Mode (anal=0 & DCC/DCV=1)	Read / Write
EM	Enable Source	Read / Write
EPPR	Feedback Encoder (pulses/rev)	Read / Write
FBF	Feedback Filter-velocity (Hz)	Read / Write
FBS	Feedback Sign and Scale	Read / Write
FEED	Motor Feedback device type	Read / Write
FINV	Invert Feedback Direction	Read / Write
FLT	Fault Code	Read
FPOS	Feedback Position (Revolutions)	Read / Write
FSTV	Full Step Velocity (RPM)	Read / Write
FSV	Velocity @ 10V Analog Cmd (RPM)	Read / Write
HED	Status of HED Inputs	Read
HINV	Invert Hall (HED) Direction	Read / Write
HSIF	High Speed Input Filter (Hz)	Read / Write
IBO	Current loop offset	Read / Write
ICO	Current loop offset	Read / Write
IFBK	Composite Output current, I servo	Read
IKI	Current Loop Integral Gain (ohms/sec)	Read / Write
IKID	Velocity Loop D-axis gain	Read / Write
IKIQ	Velocity Loop Q-axis gain	Read / Write
IKPD	Current Loop D-axis gain	Read
IKPQ	Current Loop Q-axis gain	Read
IMAX	Maximum Allowed Current	Read / Write
IN	Active input bits	Read
IN0	Force input bits # off	Read / Write
IN1	Force input bits # on	Read / Write
INER	Motor Inertia (kg-m ²)	Read / Write
INX	Bit representation of Extended Inputs	Read
INX0	Force Extended Input bits # off	Read / Write
INX1	Force Extended Input bits # on	Read / Write
IOCW	I/O Configuration word	Read / Write
IPK	Max. I @ moment, I _{2t} (.01A)	Read
IRA	Current ref in Amps (Model Dependent)	Read / Write
IRMS	Foldback RMS Current Limit (.01A)	Read / Write
JOGS	Jog Speed (RPM)	Read / Write
KF	Velocity Feedforward gain	Read / Write
KI	Velocity Integral gain (Nm/RPM/sec)	Read / Write
KP	Velocity Proportional gain (Nm/RPM)	Read / Write
KT	Motor Torque Constant (Nm/Amp)	Read / Write
MARK	Marked Position (Revolutions)	Read
MAST	Master Encoder Counts	Read
MBR	Macro being run	Read / Write
MCG	Midband Compensation gain	Read / Write
MCSV	Midband Compensation Start Velocity	Read / Write
MDEL	Master Displacement	Read
MFLX	Minimum Flux at Top Speed (Weber)	Read / Write

Identifier	Description	Access
MIND	Mutual Inductance (Henrys)	Read / Write
MMC	Master Modulo Constant	Read / Write
MPAI	Master pulses-Gear At In	Read
MPFI	Master pulses-Gear For In	Read
MPOL	Motor Pole count (pole)	Read / Write
MRSN	Motor Step Resolution (steps/rev)	Read / Write
MSP	Macro Step Pointer (Step Number)	Read
MVMS	Master Pulse per millisecond (Counts/ms)	Read
OFF	Inactive Input bits	Read
ON	Active Input bits	Read
ONE	System variable = 1	Read
OSPD	Overspeed Fault Setpoint (RPM)	Read / Write
OUT	Output Bits	Read
OUT0	Force output bits # off	Read / Write
OUT1	Force output bits # on	Read / Write
OUTON	Check Status of Outputs	Read
OUTX	Bit representation of Extended outputs	Read
OUTX0	Force Extended output bits # off	Read / Write
OUTX1	Force Extended output bits # on	Read / Write
PDD	Power Down Delay (seconds)	Read / Write
PERR	Position Error (Revolutions)	Read
PET	Position Error Tolerance (Revolutions)	Read / Write
PFLD	Percent Foldback Available	Read
PLSM	Floating point of Master Encoder Cts.	Read
PLSS	Floating point of Slave position	Read
PLSX	Floating point of Slave Modulo	Read
POS	Position in Feedback Counts (Counts)	Read
POSM	Motor Position (Revolutions)	Read
POSS	Position In (Steps)	Read
PPG	Position Proportional gain (1000/min)	Read / Write
PUD	Power Up Delay (msec)	Read / Write
QIN	Counts before Queue Ready	Read / Write
RCOS	Resolver cosine offset	Read / Write
REAL	Imaginary Axis Gain	Read / Write
RERR	End of program error code	Read
RFLX	Rated Flux at Base Speed (Weber)	Read / Write
RGNI	Regen Integration Increment	Read
RGNL	Limit on Integrated Regen	Read
RPOL	Feedback Resolver (pole)	Read / Write
RPS	Motor Speed in rev/sec	Read
RRES	Rotor Resistance (Ohms)	Read / Write
RSOS	Resolver sine offset factory	Read / Write
RUNA	Present Command acceleration	Read
RUNV	Present Command velocity	Read
SLAV	Slave Position	Read
SMC	Slave Modulo Constant	Read / Write

Identifier	Description	Access
SMOD	Slave Modulo	Read
SMRK	Slave Mark variable	Read
SPAI	Slave Pulses-Gear At In	Read
SPFI	Slave Pulses-Gear For In	Read
SPHZ	Slave Phase Adjust	Read
SPP	Standing Power Percentage (%)	Read / Write
SPPR	Gear Ratio Step Pulse Count (pulses/rev)	Read / Write
STEP	Program Step Number	Read
SWE	Software Enable(1)/Disable(0)	Read / Write
SWF	Stop Program on Fault	Read / Write
TBAS	Time Base	Read / Write
THC	Third Harmonic Compensation (%)	Read / Write
THET	Angular motor position (Counts)	Read
TIME	Time System Variable (secs)	Read
TMC	Master pulses received since last clear	Read
TPOS	Target Position (Revolutions)	Read
TR	Translation Ratio	Read / Write
TSC	Slave pulses generated since last clear	Read
UU	User Units (per Motor Rev)	Read / Write
VDC	Bus voltage present (VDC)	Read
VEL	Velocity of Feedback (RPM)	Read
VFF	VF Mode Frequency (Hz)	Read
VFI	VF Mode Current Command (Amps)	Read
WLIM	Wait for slave count input limit (Counts)	Read / Write
ZCHN	Z Channel Pulse	Read
ZERO	System variable = 0	Read
ZZ0	User Defined Variable	Read / Write
ZZ1	User Defined Variable	Read / Write
ZZ2	User Defined Variable	Read / Write
ZZ3	User Defined Variable	Read / Write
ZZ4	User Defined Variable	Read / Write
ZZ5	User Defined Variable	Read / Write
ZZ6	User Defined Variable	Read / Write
ZZ7	User Defined Variable	Read / Write
ZZ8	User Defined Variable	Read / Write
ZZ9	User Defined Variable	Read / Write

Knowledge of Unit Operation Is Assumed

In all cases, the simple principle of 'pass-through' is maintained: there is no attempt to validate a value in terms of the end use of the unit: both familiarity with the Drive functions and knowledge of system operation are assumed.

Communications

Communications with the device is via an RS-232 point to point link, or via RS-485. Default serial communications format is RS485, 9600 baud rate, 8 data bits, No parity, and 1 stop bit. The default Device Address is 1. Typical connection details are described in the tables below.

Typical RS232 Connections

Paradigm RS232 Port	Destination Device RS232 Port
Pin 1 (Tx)	Rx
Pin 2 (Rx)	Tx
Pin 3 (RTS)	
Pin 4 (CTS)	
Pin 5 (Comm.)	Gnd

In addition a link must be fitted between Pin 3 (RTS) and Pin 4 (CTS) on the Paradigm.

Typical RS485 Connections

Paradigm RS485 Port	Destination Device RS485 Port
Pin 6 (TxA) & Pin 8 (RxA)	+
Pin 7 (TxB) & Pin 9 (RxB)	-
Pin 10 (Comm.)	

In addition a 1k8 resistor must be fitted between Pin 9 (RxB) and Pin 10 (Comm.) on the Paradigm.