



SYSTEMS

ELECTRONICS GROUP

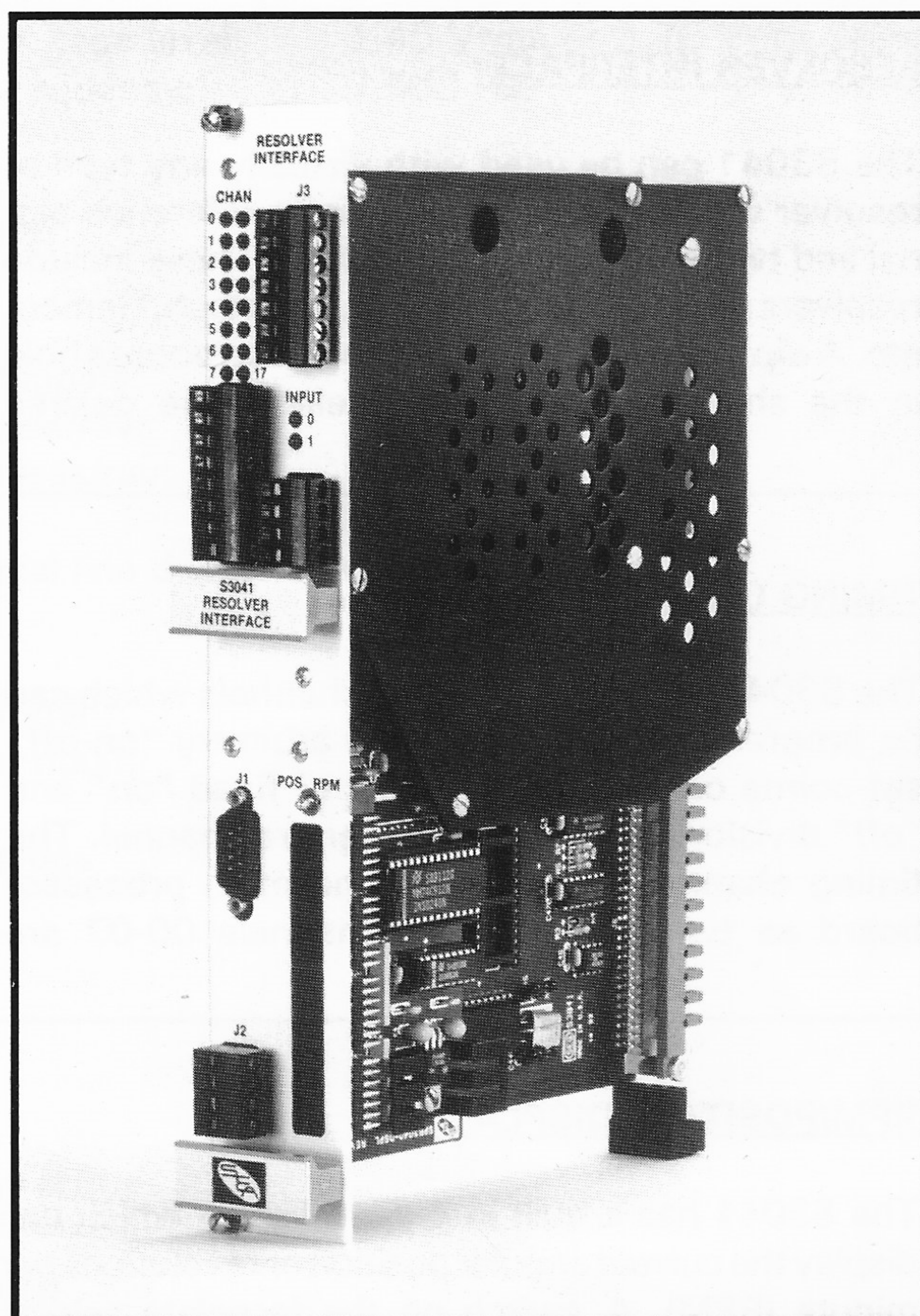
SYSTEMS S3000

INDUSTRIAL CONTROLLER

S3041: RESOLVER INTERFACE **(PROGRAMMABLE LIMIT SWITCH)**

FEATURES:

- o PROGRAMMABLE LIMIT SWITCH MODULE WITH 16 TIMING CHANNELS
- o INTERFACES WITH MACHINE MOUNTED RESOLVER
- o PROGRAMMABLE SCALE FACTOR (2 TO 512) AND OFFSET (0 TO ONE MINUS THE SCALE FACTOR)
- o MOTION OUTPUT WITH PROGRAMMABLE LOW AND HIGH SPEED THRESHOLDS
- o BRAKE WEAR COMPENSATION ALGORITHM FOR CONSISTENT STOPPING OF PRESSES
- o BUILT IN 4-DIGIT RPM/POSITION DISPLAY
- o CH00-03 AVAILABLE AS 15VDC TIMING SIGNAL OUTPUTS
- o DEDICATED 15VDC 128 AND 1024 PULSE PER REVOLUTION OUTPUTS
- o PROGRAMMED WITH PLSdev, DOS BASED SOFTWARE PACKAGE WHICH ALLOWS BOTH ON AND OFF-LINE TIMING CHANNEL PROGRAMMING AS WELL AS PLS CONFIGURATION
- o HIGH PERFORMANCE: RESOLVER TRACKING RATE OF 6,000 RPM WITH A CHANNEL UPDATE UNCERTAINTY OF LESS THAN ONE MICROSECOND



- o REMOVABLE FIELD WIRING CONNECTORS FOR ALL FIELD WIRING
- o STANDARD DOUBLE HEIGHT EUROCARD

GENERAL DESCRIPTION:

The S3041 Resolver Interface/PLS is a high speed programmable limit or cam switch which accepts angular position information in the form of resolver format signals and converts these to digital. The board contains 16 timing channels which can be programmed "on" and "off" at user defined position set-points. These timing channels are read by the main processor just like a basic input board (i.e. S3063). The first four timing channels (CH00-03) are also available as outputs which can be used to drive inputs on other I/O boards. Two additional

outputs with a fixed number of pulses per revolution (one at 128, the other at 1024) are available to drive digital tachometers, etc.

The scale factor of the S3041 is programmable from 2 to 512 divisions per revolution while the offset is programmable from 0 to one minus the scale factor. Other programmable features include a brake wear compensation algorithm for use with presses and a motion or speed output which activated is "on" and "off" at user defined low and high speeds. Program-

GENERAL DESCRIPTION (cont'd):

ming of the S3041 is implemented with PLSdev, a DOS based software package which allows the user to program the timing channels both on and off-line, set the S3041 configuration, upload and download programs to and from the S3041, etc.

High speed operation is attained with a resolver tracking rate greater than 6,000 RPM and a timing channel output update uncertainty of less than one microsecond to a change in angular position.

RESOLVER INTERFACE:

The S3041 can be used with virtually any type of resolver which incorporates a rotor reference signal and two stator feedback signals. These include resolvers manufactured by C&A, Autotech, Gemco, etc. A dip switch accessible through an access hole in the shield of the S3041 selects the desired

resolver reference voltage, either 1.45VRMS or 3.70VRMS. For Autotech and Gemco resolvers, the reference should be set at 1.45VRMS, for C&A at 3.70VRMS. For other resolvers, refer to the manufacturers specifications to determine which reference should be selected.

TIMING CHANNELS:

The S3041 contains 16 timing channels which can be programmed with up to 50 arbitrary "on-off" set-points or with a pulse train of fixed "on" and "off" divisions throughout the entire channel. The timing channels are read by the main processor board as two input bytes. Channels 00-07 are

mapped to the first input byte, channels 10-17 are mapped to the second input byte. The respective channel is read as a "1" when the channel is "on" and a "0" when it is "off". The status of each timing channel is indicated with individual LEDs on the faceplate of the S3041.

RPM/POSITION DISPLAY:

The S3041 has a built in 4-digit display which can display the current angular position or revolutions per minute (RPM). A switch on the faceplate selects

either position or RPM. The display is read with the least significant digit on the bottom of the display and the most significant digit at the top of the display.

BRAKE WEAR COMPENSATION:

The brake wear compensation algorithm can be used in conjunction with presses which incorporate a top dead center (TDC) or back dead center (BDC) stop feature. With these presses, a timing signal is used to declutch the press for TDC or BDC stops. However, as the brake wears, the press will no longer stop at TDC but will instead overshoot. When enabled, the brake wear algorithm of the S3041 will automatically adjust the TDC timing signal such that the press always stops at the desired stopping location regardless of brake wear.

The brake wear algorithm is implemented in CH00 and can be enabled or disabled by the user. When

disabled, CH00 functions as a standard timing channel. When enabled, the following parameters, set by the user, are used to implement the algorithm: Desired Stop Location, Allowed Error, CH00 Timing Width, and Compensation Window.

In addition to the above parameters, INPUT1 on the S3041 is used to enable the brake wear compensation. The adjustment of CH00 is performed when the press is stopped (RPM = 0) and INPUT1 is "high". If INPUT1 is "low" when the press is stopped, CH00 is not altered regardless of the stopping location. This allows the algorithm to be by-passed for inch and single modes as well as emergency stops.

MOTION (SPEED) SIGNAL:

The motion signal is a user enabled feature which uses CH17. Two user programmable parameters are used in conjunction with the motion signal: low speed threshold and high speed threshold. When enabled as a motion signal, CH17 is "on" when the

speed (RPM) is between the low and high speed thresholds. When the speed is below the low speed threshold or above the high speed threshold, CH17 is "off". When disabled, CH17 functions as a standard timing channel.

PROGRAMMING:

Configuration and timing channel programming of the S3041 is performed with PLSdev, a DOS based programming software package which runs on any IBM PC or compatible. Connection of the PC to the S3041 is implemented with an RS-232 cable, no other hardware is required. PLSdev allows the user to perform the following:

- Configuration of the S3041 including:
 - Scale factor
 - Offset
 - Brake wear compensation enable/parameter programming
 - Motion output enable/parameter programming

- On and Off-line timing channel programming including:
 - arbitrary set-point programming
 - pulse train channel programming
 - timing channel fine tune
- Channel set-points download to S3041
- Channel set-points upload from S3041
- Configuration and Channel set-points print-outs
- S3041 Hardware Confidence test

MAIN PROCESSOR INTERFACE:

The timing channels of the S3041 are read as input bytes which are accessed by specifying the slot (00-14) and the byte (0 for channels 00-07, 1 for channels 10-17). The slot address is the left slot of the two slots the S3041 occupies. When the S3041 is specified in the system configuration of the main processor board, the timing channels are automatically read as part of the I/O update. The channels are mapped to two input variables (X) with the following format:

Input byte:	Xaab
Input bit:	Xaab.c

Where: X = input variable type (X)
aa = two digit left slot address (00-14)
b = channel group (0 = channels 00-07,
1 = channels 10-17)
c = channel address (0-7)

In addition to the timing channels that are read as inputs, the current position and RPM can also

be read from the S3041 during normal operation using the sfunc05 system function in the main processor board. The position and RPM is read as four consecutive bytes from the S3041 with the bytes mapped as follows:

byte1:	position (low byte)
byte2:	position (high byte)
byte3:	RPM (low byte)
byte4:	RPM (high byte)

The form of the sfunc05 as used in the main program of the main processor board should be:

sfunc05(slot,0,Byyy,4,Byyy);

where Byyy is the first byte of the four consecutive byte locations where the position and RPM will be stored in the main processor when the sfunc05 is performed. Refer to the appropriate main processor user's manual for more details on the use of sfunc05.

ERROR CODES:

The following is a list of error codes that may be displayed on the 4-digit display of the S3041 if an error is detected:

8807: Invalid scale factor (scale factor must be between 2 and 512).

8808: Invalid offset (offset must be between 0 and one minus the scale factor).

If an error occurs, re-download the PLS channel data file (which will also load the scale factor as set in the configuration file) and/or reset the offset within the range defined above.

INSTALLATION:

Prior to installing the S3041, the resolver select dip switches must be set for the resolver that the S3041 will interface to. For C&A resolvers, set both switches down on the side that reads "3.7 C&A". For Autotech and Gemco resolvers, set both switches down on the side that reads "1.45 RL100". For other resolvers, refer to the manufacturers data sheet for the appropriate reference voltage required. The dip switches are accessible through a hole in the S3041 shield.

The S3041 occupies two slots and may be installed in any I/O slot between 0 and 14. Install the S3041 by aligning the board with the card guides and sliding in until firmly seated. The board is held in the rack via captive screws located on the S3041 faceplate. To remove the S3041, loosen the captive screws and gently pull the board out of the rack using the handles located on the S3041 faceplate.

NOTE:When installing or removing the S3041, power to the S3000 rack must be off.

SPECIFICATIONS:

Location of S3041 in Rack:	Any I/O slot 0-14
Board Size:	
Length:	9.15"
Height:	6.30"
Width:	1.60"
Scale Factor:	2 to 512
Offset:	0 to scale factor - 1
Number of Timing Channels:	16
Maximum Number of set-points per channel:	
Arbitrary:	50
Pulse Train:	Scale factor / 2
Resolver-to-Digital Converter	
Resolution:	12 bits
Accuracy:	10 arc mins + 1LSB
Tracking Rate (R-to-D):	10,000 RPM
Tracking Rate (S3041):	6,000 RPM

SPECIFICATIONS (cont'd):

Signal Inputs (SIN and COS):

Input voltage (nominal):	2 Vrms
Input voltage (max):	8 volts
Input impedance (typ):	100K ohms

Reference Output:

Output voltage level:	1.45 Vrms or 3.70 Vrms selectable
Output frequency:	2,500 HZ

OUTPUT SECTION (timing signal and pulses/rev):

Number of Outputs:

Timing Signals:	4 (CH00-03)
128 pulses/rev:	1
1024 pulses/rev:	1

Output type:

Differential line driver (15VDC)

Output Voltage:

Vout (on-min):	13.00 volts
Vout (on-max):	15.75 volts

Output Current (max):

50 milliamps

Short Circuit Protection:

No

DIGITAL INPUT SECTION:

Number of Inputs:

1 (INPUT1)

Input type:

Differential

Input Voltage:

Vin (on-min):	12 volts
Vin (on-max):	30 volts
Vin (off-max):	5 volts

Input Current (max):

10 milliamps at Vin = 30volts

Power Requirements (S3000 bus):

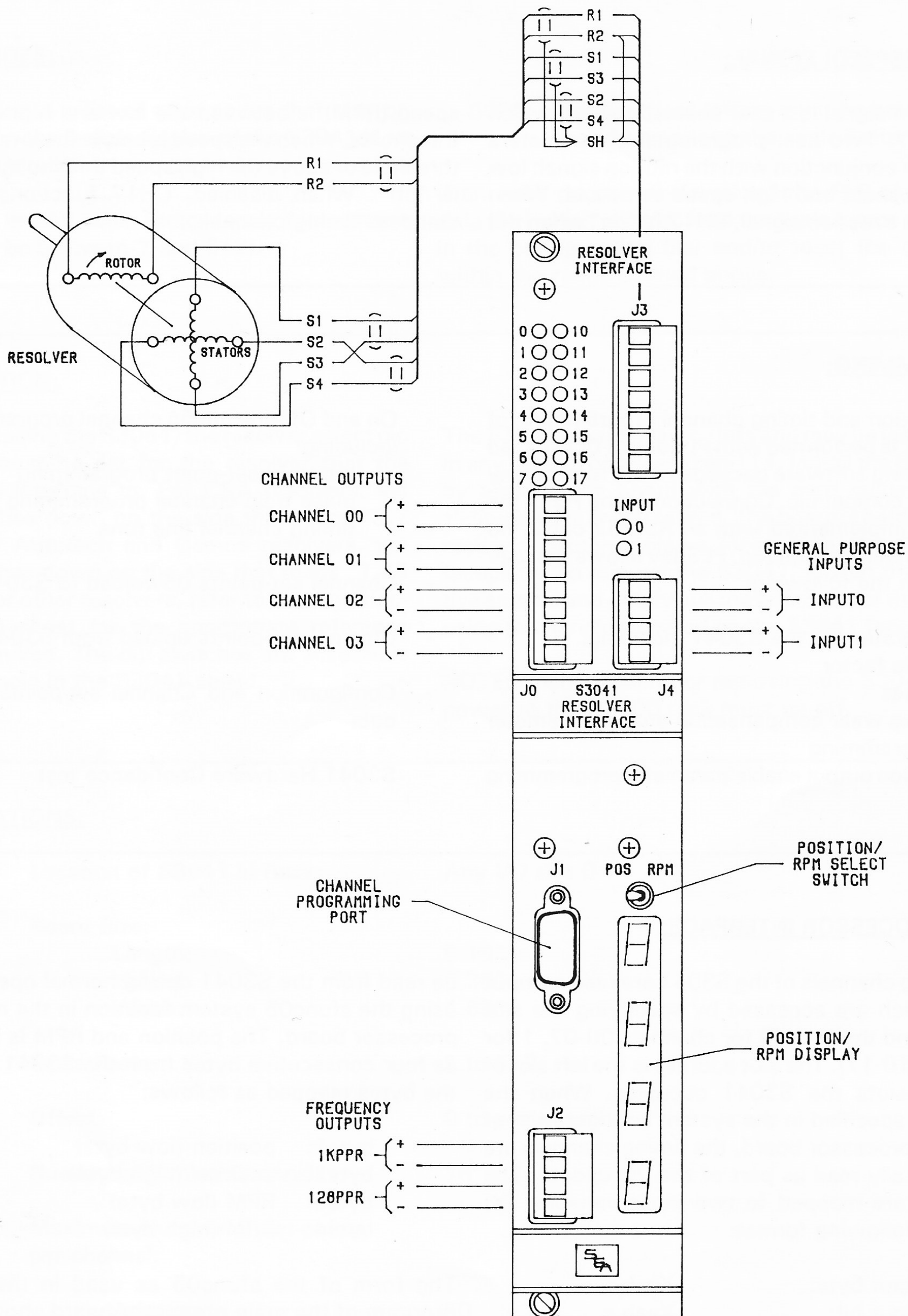
Icc(+ 5VDC max):	900 milliamps
Icc(+ 15VDC max):	100 milliamps
Icc(-15VDC max):	100 milliamps

Temperature Ranges:

Storage:	0 to 70 degrees C
Operating:	0 to 60 degrees C

Relative Humidity:

5 to 95% non-condensing



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