AEROTECH

EC-2 MANUAL

SA/1401/EC/F/
R/BR-R/SM-O/PS/

REV. 2

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CHAPTER 1: GENERAL INFORMATION

This manual describes the general system operation. Detailed card description, interface information, adjustments, etc., will be found in the instruction manuals for the cards or individual modules.

CHAPTER 2: BASIC SL CARD A1

The 1401 Translator Board contains a fused 115/230V, 50/400 Hz power supply, sequencing logic to convert clock and direction commands to motor logic required, four RL output amplifiers, ie., the motor current is limited by the stepper motor resistance, and CW/CCW limit switch logic.

For stepping motors with less than 15 ohms per phase resistance, external resistors are needed in series with the white and black motor leads. The slew internal oscillator and the step latch on the 1401 board are not used in an SA system. A switch on the system rear panel selects full (2 phase on) or half-step mode, providing 1.8 degree or 0.9 degree per step with standard 200-step per revolution stepping motors.

SECTION 2-1 MAXIMUM RATINGS

	1401
Peak Output Voltage - - - - - - -	16 volts
Continuous Output Current - - - -	1 amp/phase
Operating Temperature - - - - - -	0 to 50 degrees C.
Storage Temperature - - - - - - -	-30 to +80 degrees C.
AC Line Voltage - - - - - - - - -	125VAC

SECTION 2-2 ELECTRICAL CHARACTERISTICS

Translator

Input Power	100-125VAC, 50-400 Hz or 200-250VAC

SECTION 2-3 ADJUSTMENTS

Test equipment required is a DC ammeter (5 amp capability) and an oscilloscope.

SECTION 2-4 TRANSLATOR

A. MOTOR CURRENT

Adjustment only required for Rm≤15 ohms on non-Aerotech stepping motors. Motor current is adjusted by inserting the correct motor series dropping resistor. When interfacing to a standard Aerotech 45 oz-in stepping motor, no adjustment is needed.

B. SUPPRESSION VOLTAGE

This adjustment has been made at the factory and should not require further adjustment.

C. HALF STEP AND FULL STEP MODES

The half-step mode or full step mode can be selected by a switch located on the Cabinet Rear Panel. This switch connects to J2 of the 1401 Translator and shorts or opens pin 13 to pin 6. In the half step mode, a .9 degree/step resolution is achieved when interfacing to a 200 step per revolution stepping motor. In the full step mode, a 1.8 degree/step resolution is achieved. The maximum speed of the system with the external rate adjust on the Cabinet Rear Panel full CW, is 500 steps/sec. in the half step mode and 250 steps/sec. in the full step mode.

SECTION 2-5 INSTALLATION

A. AC POWER INPUT

The 1401 Translator requires 30VA. A 50-400 Hz source may be used. Line voltage may vary +10%, -15%. AC power is connected to TB1-1 and TB1-2.

B. MOTOR

The motor windings should be connected to J1 per the schematic D620-1114.

C. OVERTRAVEL LIMIT SWITCHES

Translator stepping in a specific direction is inhibited when either J1-27 or J1-28 is taken to 0 volts. If both are connected to common, all stepping is inhibited.

D. 115/230 VAC OPERATION

The 1401 can be operated from 115 or 230V by installing appropriate jumpers. For 115V operation: transformer T1 jumper P to Q. Transformer T1 jumper R to S; remove Q to R.

For 230V operation, jumper R to Q. Remove P to Q and remove R to S. Refer to drawing D690-1084.

CHAPTER 3: INDEXER

Card A3, the Indexer, converts the input parallel word to serial data (clock and direction) for use by the 1401. Control lines on A3-J2 determine whether data from TW or remote input on J2 is to be input. SA systems have a model 20D indexer for absolute or incremental positioning; A3-J2 controls also allow selecting an external clock and direction command on A3-J4 for joystick control. Each clock pulse output by the indexer will cause the system to take a step thats size is equal to' the system resolution.

Card A4 contains the mechanical switches as well as the electronic switching to permit Local (manual) and Remote control from the Remote Input J2. The mechanical switches are S1 through S8 from left to right.

SECTION 3-1 FRONT PANEL SWITCH ASSEMBLY, CARD A4

SWITCH	NOMENCLATURE	FUNCTION
SI	Execute	Pushbutton causes the drive to execute the preset TW and direction data.
S2	Direction	Two position, OUT commands CW and IN commands CCW motor rotation.
S3	SLEW	Pushbutton causes the drive to run continuously at a speed determined by R26 on card A3. R26 is remoted on the rear panel. Maximum speed in half step is 500 Hz, and in full step is 250 Hz.
S4	RESET	Pushbutton clears all registers and the readout to zero.

SWITCH	NOMENCLATURE	FUNCTION
S5	X/Y	Two position, OUT sends commands from S1, S3, S4 and S7 to the X axis. On a 2-axis chassis, IN sends these commands to the Y axis. (Used only on 2 axis chassis.)
S6	LOCAL/REMOTE	Two position, OUT enables manual control of S1, S2, S3, S4 and S7 from front panel. IN disables these switches and enables the inputs at J2 (on Cabinet Rear Panel).
S7	SPARE	
S8	ABS/INC	OUT places the indexer in the Absolute mode. IN places the indexer in the Incremental mode.
S5 & S6	REMOTE EXT. CL.	When both pushbuttons are depressed, Ext. Command Clock input J2 pin 3 is active, but the local and remote parallel data is disabled.

CHAPTER 4: READ-OUT A8

The Aerotech Buffered Read-out is a five-digit (six-digit optional) plus sign LED read-out. Buffered outputs are available through a 16-pin DIP socket to the J3 connector on the rear panel. The Aerotech Buffered Read-out consists of two sections: the Counter Logic Board and the Display Card.

The Counter Logic Board contains the power section, control logic, counter and the output buffers.

The Display Card, which plugs into the Logic Board, contains the display LEDs, their drivers, and current limiting resistors. For further information, see the "Buffered Read-out D690-1086 Instruction Manual".

CHAPTER 5: REMOTE INPUT CONTROL, J2

The Remote I/O connector, J2, located on the Cabinet Rear Panel, provides the capability of controlling the positioning system from remote commands. All I/O is five volt logic, unless specified otherwise. Aerotech logic is CMOS; therefore, if TTL is used for Aerotech inputs, 2 to 3K pull-up resistors should be used on the TTL outputs. Drive current capability to Aerotech inputs must be limited to 10 mA to prevent damage to the CMOS logic in the event of a power failure to the Aerotech equipment. Aerotech outputs 26 or 29 will drive two TTL loads.

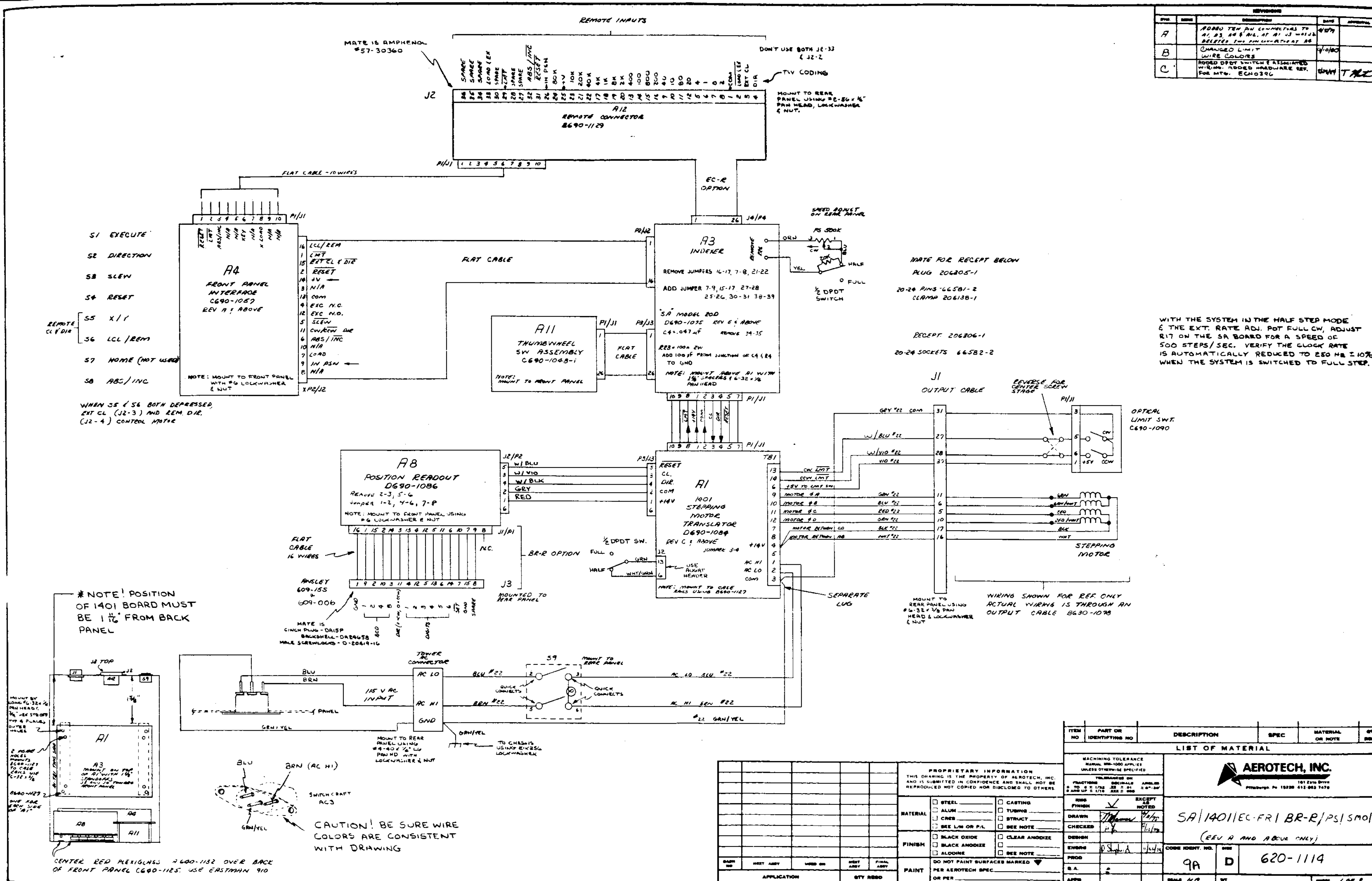
SECTION 5-1 J2 I/O

PIN	DESIGNATION	DESCRIPTION
7	Data 8	1 through 80K--Data Inputs, 5-digit BCD, positive true (5V on data input 10 commands the drive to take 10 steps upon "executing").
5	Data 4	"
8	Data 2	"
6	Data 1	"
11	Data 80	"
9	Data 40	"
12	Data 20	"
10	Data 10	"
15	Data 800	"
13	Data 400	"
16	Data 200	"
14	Data 100	"

PIN	DESIGNATION	DESCRIPTION
19	Data 8K	"
17	Data 4K	"
20	Data 2K	"
18	Data 1K	"
24	Data 80K	"
22	Data 40K	"
21	Data 20K	"
23	Data 10K	"
2	$\overline{\text{LOAD \& EX}}$	$\overline{\text{LOAD \& EX}}$ - $\overline{\text{Load \& Execute}}$. A negative pulse on this input loads and executes the above data commands. Pulse width is 10 us minimum (must remain low for this amount of time). Data and Direction must be on the line and settled before EX goes low, and can be removed 10us after EX goes high.
4	DIR	DIR - Direction. Input commanding the direction of travel: +5V commands CW and -0V commands CCW motor rotation. This is also the direction input used with the External Clock input to enable controlling the SL system via clock and direction commands.
26	IN PSN	IN PSN - In Position. This output goes high when the drive has completed the command. Low when the motor is positioning.

PIN	DESIGNATION	DESCRIPTION
25	+V	+V - Logic Supply. This output indicates the logic voltage used by the Indexer and that the Aerotech chassis has power applied.
3	EXT. CL.	EXT. CL. - External Clock. Clock command passed directly through the Indexer to the SL system. Active when in Remote, External Clock mode. Each transition from 0 to 5V causes the drive to take a single step.
1	COM	COM - Logic Common. All I/O is referenced to this output common.
27	NO CONNECTION	
28	NO CONNECTION	
29	$\overline{\text{LMT}}$	$\overline{\text{LMT}}$ - $\overline{\text{LIMIT}}$. This output goes low when either the CW or the CCW Limit is encountered and activated.
30	NO CONNECTION	
31	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ - $\overline{\text{RESET}}$. Zero volts on this input resets the system.
32	ABS/$\overline{\text{INC}}$	ABS/$\overline{\text{INC}}$ - Absolute/Incremental. High on this input selects the Absolute mode. 0 volts selects the Incremental mode.
33	LOAD & EX	LOAD & EX - Load and Execute. Same as pin 2, except a positive pulse on this input loads and executes the data commands.
34	NO CONNECTION	

PIN	DESIGNATION	DESCRIPTION
35	NO CONNECTION	
36	NO CONNECTION	


REMOTE INPUTS
MATE IS AMPHENOL #57-30360
DON'T USE BOTH J2-33 & J2-2
TTL CODING
J2
A12
REMOTE CONNECTOR
B690-1129
MOUNT TO REAR PANEL USING #2-56 x 1/4" PAN HEAD, LOCKWASHER & NUT.
P1/J1
FLAT CABLE - 10 WIRES
EC-R OPTION
S1 EXECUTE
S2 DIRECTION
S3 SLEW
S4 RESET
S5 X/1
S6 LCL/REM
S7 HOME (NOT USED)
S8 ABS/INC
REMOTE CL & DIR
A4
FRONT PANEL INTERFACE
C690-1057
REV A & ABOVE
NOTE: MOUNT TO FRONT PANEL WITH #6 LOCKWASHER & NUT
XP2/J2
WHEN S5 & S6 BOTH DEPRESSED, EXT CL (J2-3) AND REM. DIR. (J2-4) CONTROL MOTOR
FLAT CABLE
A11
THUMBWHEEL SW ASSEMBLY
C690-1048-1
NOTE: MOUNT TO FRONT PANEL
A3
INDEXER
REMOVE JUMPERS 16-17, 7-8, 21-22
ADD JUMPER 7-9, 15-17, 27-28, 25-26, 30-31, 38-39
"SA" MODEL 200
D690-1075 REV E & ABOVE
SPEED ADJUST ON REAR PANEL
1/2 DPDT SWITCH
HALF
FULL
MATE FOR RECEPT BELOW
PLUG 206305-1
20-24 PINS 66581-2
CLAMP 206138-1
RECEPT 206306-1
20-24 SOCKETS 66582-2
WITH THE SYSTEM IN THE HALF STEP MODE & THE EXT. RATE ADJ. POT FULL CW, ADJUST R17 ON THE SA BOARD FOR A SPEED OF 500 STEPS/SEC. VERIFY THE CLOCK RATE IS AUTOMATICALLY REDUCED TO 250 Hz ± 10% WHEN THE SYSTEM IS SWITCHED TO FULL STEP.
J1
OUTPUT CABLE
REVERSE FOR CENTER SCREW STAGE
OPTICAL LIMIT SWT.
C690-1090
A8
POSITION READOUT
D690-1086
NOTE: MOUNT TO FRONT PANEL USING #6 LOCKWASHER & NUT
A1
1401 STEPPING MOTOR TRANSLATOR
D690-1084
REV C & ABOVE
1/2 DPDT SW.
STEPPING MOTOR
SEPARATE LUG
MOUNT TO REAR PANEL USING #6-32 x 1/8 PAN HEAD & LOCKWASHER & NUT
WIRING SHOWN FOR REF. ONLY ACTUAL WIRING IS THROUGH AN OUTPUT CABLE B630-1078
FLAT CABLE 16 WIRES
BR-R OPTION
J3
MOUNTED TO REAR PANEL
*NOTE! POSITION OF 1401 BOARD MUST BE 1 1/16" FROM BACK PANEL
115 V AC INPUT
TOWER AC CONNECTOR
S9
MOUNT TO REAR PANEL
QUICK CONNECTS
TO CHASSIS USING EIK25G LOCKWASHER
CAUTION! BE SURE WIRE COLORS ARE CONSISTENT WITH DRAWING
CENTER RED PLEXIGLASS A600-1132 OVER BACK OF FRONT PANEL C690-1125. USE EASTMAN 910
LIST OF MATERIAL
PROPRIETARY INFORMATION
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SA/1401/EC-FR/BR-R/PS/SMO1
(REV A AND ABOVE ONLY)
9A
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620-1114