ACCU ELECTRIC MOTORS INC

USA: (888) 932-9183 CANADA: (905) 829-2505

- Over 100 years cumulative experience
- 24 hour rush turnaround / technical support service
- Established in 1993

The leading independent repairer of servo motors and drives in North America.

Visit us on the web:

www.servo-repair.com

www.servorepair.ca

www.ferrocontrol.com
www.sandvikrepair.com
www.accuelectric.com

Scroll down to view your document!

For 24/7 repair services :

USA: 1 (888) 932 - 9183
Canada: 1 (905) 829 -2505

Emergency After hours: 1 (416) 624 0386

Servicing USA and Canada

C H A P T E R ⑦

Maintenance & Troubleshooting

The information in this chapter will enable you to:

- Isolate and resolve system hardware and software problems

Troubleshooting

This section discusses methods to identify, isolate, and resolve problems that may occur in the use of your Compumotor Plus Drive.

Problem Isolation

When your system does not function properly (or as you expect it to operate), the first thing that you must do is identify and isolate the problem. When you accomplish this, you can effectively begin to resolve the problem.

The first step is to isolate each system component and ensure that each component functions properly when it is run independently. You may have to dismantle your system and put it back together piece by piece to detect the problem. If you have replacement or additional units available, you may want to use them to replace existing components in your system to help identify the source of the problem.

Try to determine if the problem is mechanical, electrical, or software-related. Can you repeat or re-create the problem? Do not attempt to make quick rationalizations about problems. Random events may appear to be related, but they are not necessarily contributing factors to your problem. You must carefully investigate and decipher the events that occur before the subsequent system problem.

You may be experiencing more than one problem. You must solve one problem at a time. Log (document) all testing and problem isolation procedures. You may need to review and consult these notes later. This will also prevent you from duplicating your testing efforts.

Once you have isolated the problem, take the necessary steps to resolve it. Refer to the problem solutions contained in this chapter. If your system's problem persist, contact Parker Compumotor's Applications Department.

Input/Output and Discrete Control Problems

This section describes how to solve problems relating to the use of the input and output lines on the Compumotor Plus.

Limits, Homing, Triggers & Sequence Selection

If you are having problems using the Trigger (**TR**), Home (**GH**), CW, CCW, or Sequence Select inputs, you must first check your wiring for proper installation. Use a multimeter to verify proper connection of the switches and inputs. If the hardware connections appear to be correctly made, use the Input Status (**IS**) command to monitor the state of each input manually and see if the Compumotor Plus recognizes the input change. You do this by changing the input state manually and issue the Input Status (**IS**) command. The **IS** command reports the hardware status of the Compumotor Plus inputs.

Remote Sequencing (BCD Inputs)

Start by checking your wiring as described in the section above for finding problems with limits, homing, triggers and sequence selection.

Ensure that your BCD input pattern is correct. Check *Chapter 6, Hardware Reference* for the Sequence Select Table. If it is not, the wrong sequence will be called. If you have a problem running a sequence from the remote input, try running the sequence using the **XR** command before attempting to run it using BCD input.

You may also put the indexer into Trace mode using the **XTR** command. You must have an RS-232C terminal or terminal emulator to use Trace mode. In Trace mode the indexer reports the current sequence and command being executed over the RS-232C port.

Motor Control Problems

The following section describes how to address problems with motor operation.

Motor Fails to Run at High Speeds

The motor may not produce enough force to move your load at the velocities you require. Check the speed/torque curve and make sure you are using the motor in the proper range.

Motor is Jerky or Weak

Check that there are no mechanical problems at the load causing a variable loading condition. Disconnect the motor from the load and run it without a load connected.

You can determine if the motor is developing its full holding torque by using a torque wrench on the shaft of the motor to measure the motor's torque capability.

Check to see if the resolver cable is connected properly. A damaged resolver cable may result in erratic motion.

Electrical Noise

For detailde information on reducing electrical noise in your system, refer to the current Compumotor catalog.

Diagnostic Codes

The following table lists all of the diagnostic codes which appear in the two digit status display on the front of the Compumotor Plus and that can be reported with the **RSE** command.

Error Code	Description	Possible Solutions
00	No Errors	
20	Actual position lags commanded position	Check for excessive load on the motor. Verify the maximum following error value is appropriate. Use the **CPE** command to set the following error maximum value. Allow for a larger following error if appropriate.
22	The maximum average current has been exceeded	Check the load to ensure the torque required is less than the torque available from the motor at the speed required. Verify that the average current setting is appropriate. Set the average current with the CCA command.
23	The drive enable input is inactive	This normally occurs when the driven enable plug is missing. ENABLE (Pin 4) should be grounded.
30	EEPROM Checksum error	The Compumotor Plus calculates a checksum on reset and when power is cycled. When the new checksum does not match the previously calculated checksum an Error 30 is issued. Error 30 occurs in the following situations: The drive is not properly configured for its motor. You can correct this problem by issuing a **CMTR** command using the code for the motor being used. When you change EPROMs integrated circuits. If memory is corrupted either during operation or when the Compumotor Plus is off. If the error occurs each time you power up your unit, consult Compumotor Application Engineering (800-358-9070).
61	Indexer incoming pulses (non-indexer version only)	The drive was receiving step pulses while powering up or after a reset. Ensure that step pulses are disabled during power up or reset. *This is a safety feature which prevents the motor from suddenly moving immediately following a reset or power failure if the motion controller continues to issue a position command.*
88	The microprocessor is not running	The drive may be faulty. Try replacing the drive. There may be excessive noise in the environment. Following the anti-electrical noise recommendations elsewhere in this chapter. Ensure the microprocessor has not fallen from its socket.

RS-232C Communication Problems

Use the following procedure to troubleshoot communication problems that you may have with the Compumotor Plus.

① Be sure the host computer's transmit (TX) wire is wired to the peripheral's receive (RX) connection, and the host computer's receive (RX) wire is wired to the peripheral's transmit (TX) connection. Switch the receive and transmit wires on either the host or peripheral if the problem persists.

② Confirm that the host and peripheral are configured for the same baud rate, 8 data bits, 1 stop bit, and no parity.

③ If you receive double characters, for instance typing A and receiving AA, the computer is set for half duplex mode. Change the terminal setup to full duplex mode.

④ To test the terminal or terminal emulation software and the RS-232C cable for proper three-wire communication, unhook the Compumotor Plus and enter a character. You should not see a character on the screen. If you do, your terminal is in half duplex mode. Connect the host's transmit and receive lines together and send another character. You should receive the echoed character. If not, consult the manufacturer of the host's serial interface for proper pin outs.

⑤ Use DC common or signal ground as a reference, not earth ground.

⑥ Cable lengths should not exceed 50 ft. unless you are using some form of line driver, optical coupler, or shield. As with any control signal, be sure to shield the cable-to-earth ground at one end only.

This section offers some helpful tips for debugging your programs or to understand why something may be happening in a way you do not expect. The Compumotor Plus has several tools that can be used to aide in the determination of problems in the system design. Those tools are listed below.

Command	Tool
DFS	Display servo status
DFX	Display indexer status
OS	Display homing/jog status
SS	Display set-up report
XDIR	Display programmed sequences
XSS	Sequence execution status
XST	Single step execution
XTR	Trace mode

DFS Servo Status

The **DFS** command reports the status of the servo control switches. The table below describes the function of each of the switches.

Bit	Function	Bit	Function
31	Reserved	15	Reserved
30	Reserved	14	Reserved
29	Reserved	13	Reserved
28	Reserved	12	Reserved
27	Reserved	11	Enable circuit — enabled=0, disabled=1
26	Reserved	10	Reserved
25	Reserved	9	Reserved
24	Reserved	8	Failed CRC check — no = 0, yes = 1
23	Reserved	7	Reserved
22	Reserved	6	Average current exceeded — no = 0, yes = 1
21	Reserved	5	Max position error exceeded —no = 0, yes = 1
20	Reserved	4	Reserved
19	Reserved	3	Driver internal error — no error=0, pwm hardware shutdown=1
18	Reserved	2	Reserved
17	Reserved	1	Overcurrent —no=0, yes (shutdown error)=1
16	Reserved	0	RS-232C CMD — on (ST0)=0, off (ST1)=1

DFX Command Report Back

The **DFX** command reports the Compumotor Plus indexer's current states and conditions. The information is described in the following table.

Bit	Function	Bit	Function
31	Reserved	15	U command waiting for continue no=0, yes=1
30	Reserved	14	Waiting for a trigger no=0, yes=1
29	Reserved	13	Home to resolver position no=0, yes=1
28	Reserved	12	Back up to home limit no=1, yes = 1
27	Reserved	11	High speed portion of home move not in progress=0, in progress=1
26	Reserved	10	Execute a sequence no=0, yes=1
25	Reserved	9	Waiting on a timer no=0, yes=1
24	Reserved	8	Hit a CCW limit no=0, yes=1
23	Homing to resolver position no=0, yes=1	7	Hit a CW limit no=0, yes=1
22	Hit a soft CW limit no=0, yes=1	6	PS command waiting for continue o=0, yes=1
21	Hit a soft CCW limit no=0, yes=1	5	Absolute move direction positive=0, negative=1
20	Registration move in progress no=0, yes=1	4	Positioning mode (incremental/absolute) MPI=0, MPA=1
19	Home limit not found=0,found=1	3	Mode (preset/continuous) MN=0, MC=1
18	Jog disable=0, enable=1	2	Commanded move direction positive=0, negative=1
17	Queued for RM mode no = 0, yes = 1	1	Preset move in progress not moving=0, moving=0
16	Run sequence on power-up no = 0, yes=1	0	Continuous move in progress not moving=0, moving=0

Homing and Jog Status

The **OS** command is used to report the status of homing, jog, and other setup functions. Below is a summary of the commands and their uses. Refer to the **OS** command in the *Chapter 5, Software Reference* for more information.

Command	Description
OSA	Go home to resolver position
OSB	Back-up to home switch
OSC	Define Active edge of Home switch 1=Active high signal
OSD	Not defined
OSE	Enable Jogging
OSF	Not defined
OSG	Define Final Home approach direction 1=CCW
OSH	Define Active edge of home switch to stop on 1=CCW
OSI	Save Sequence Scan Mode On Stop

Function Setup Reports

The **SS** command reports the state of the following setup switches.

Command	Description
SSA	RS232 Echo, 0 = on, 1 = off
SSB	TRIG1 clears pause, 0 = no, 1 = yes
SSC	Not defined
SSD	TRIG1 dedicated stop line, 0 = no, 1 = yes
SSE	Not defined
SSF	TRIG1 sequence strobe, 0 = no, 1 = yes
SSG	Clear/Save buffer on limit 0 = clear 1 = Save
SSH	Clear/Save buffer on stop 0 = clear 1 = Save
SSI	Enable/Disable Interactive Mode, 0 = enable, 1 = disable
SSJ	Enable/Disable Continuous scan mode, 0 = enable, 1 = disable
SSK	Enable registration mode, 0 = no, 1 = yes
SSL	Resume execution enable, 0 = no, 1 = yes

Sequence Directory

The Compumotor Plus has the ability to display the contents of all currently defined sequences at one time. You use the **XDIR** command to instruct the Compumotor Plus to do this. The display of sequences is useful to establish which sequences have been defined as desired. It also makes a compact reference list for storing or referring to your programs.

Sequence Status

The Compumotor Plus can report the status of any sequence. The report tells you if the sequence is defined, empty or bad. Refer to the **XSS** description in *Chapter 5, Software Reference*. The **XSS** command is useful for determining if a sequence is usable. You normally issue this command immediately after attempting a download to ensure the download was successful. You may also use the Sequence Directory (**XDIR**) command to verify the contents of sequences.

Single Stepping

It can be beneficial to execute a program one command at a time. You can do this in the Compumotor Plus by using the Single Step (**XST**) command . If you single step in conjunction with the Trace mode (described above) you have a powerful problem solving tool at your disposal.

Trace Mode

The Trace mode is used to display what is occurring as you execute your sequence. By running the Trace mode you can see what commands are being executed and if the program stops running you can see what command was last executed. The Trace mode along with the Interactive mode (**SSI**) will help you to find commands that the indexer may not recognize. The Trace mode is enabled and disabled using the **XTR** command. When enabled you will execute sequences as you normally would using the **XR** command. As the sequence is running the commands are displayed on the screen. **XTR1** enables the Trace mode, **XTRØ** disables it. See *Chapter 4, Application Design* for a more thorough explanation of the Trace mode.

General Status

You can report back the value set by most of the Compumotor Plus commands by typing the device address followed by the command and a delimiter (carriage return or a space bar). In this way, you can find out what values you have entered for different commands.

Common Problems

This section describes some common problems which can occur then using the Compumotor Plus and possible reasons for the problems.

Problem	Possible Error
A move is commanded but no motion occurs.	A limit may be enabled and active. Use the **LD** command to find out which limits are enabled and the **IS** command to find out which limits are active. The Compumotor Plus may be in Absolute mode and is already at the commanded absolute position. Use the **PR** command to get the absolute position. If you wish to move incrementally, issue the **MPI** command.
The Compumotor Plus appears to be ignoring commands.	If you defined a sequence and never issued an **XT** command, the Compumotor Plus still thinks you are defining a sequence. Issue an **XT** command at the end of the sequence to end sequence definition.
The motor move sluggishly?	When the motor is easy to turn by hand over one-eighth or one-quarter of a revolution, and it moves into position without overshooting, the motor may have its gains set too low. Try increasing the velocity gain until the motor is as stiff as necessary. Be sure to lower the gains if the motor begins to resonate.
The motor vibrates when it's supposed to be standing still?	When the motor vibrates, resonates or makes a buzzing noise when it is holding a fixed position the gains main be set too high. The vibrations are not always a problem. Very high performance systems exhibit this behavior in some cases. The vibration is a signal that increasing the gains further could cause the motor to become unstable (see above). You can lower the velocity or derivative gains to stop the vibration if required.
I set the motor resolution to the maximum and my positioning isn't any more accurate. Why?	The accuracy of the system is determined by the motor's natural resolution, among other factors (see above). The user resolution has little to do with positioning accuracy unless a very coarse resolution is chosen.
My throughput is lower than I need.	You can frequently improve throughput by optimizing the gains in the Compumotor Plus. Sometimes you can get an improvement in throughput by using a motor with more torque. However, larger motors have larger inertias, making the gain in throughput less than you might think.