AN001

16-130742

Basic Installation Troubleshooting

Introduction

The purpose of this app-note is to guide you through the basic troubleshooting of Copley drives on an existing installation. This guide is intended to be used only as a reference.

Requirements

Laptop with Windows 7 (64 Bit). 32 Bit can only be used with older drives and CME V7.1
Laptop with Windows 10 (64 Bit)
Copley setup software CME V8.1 for 64-bit Windows computer
Copley setup software Legacy CME V7.1 for 32-bit Windows
CME\HELP\All documents\CME User Guide
Copley USB to Serial adapter (Part# SER-USB-RJ11) using Prolific Drivers
Digital Multi Meter (to measure AC/DC voltage supply, Motor ohms, and cable continuity

Troubleshooting Procedures

Please note that steady or flashing LED lights on Copley drive's "STATUS LED's" have a meaning which is explained below.

LED Drive Status and Actions	Condition	Action
No LED	No Power	Check DC power with DMM
Red/Blinking	Latching fault	Check ALL cables, including pins, shields, and grounds. Cycle DC Power to RESET the drive. For dual-axis drives, make sure the FEEDBACK cables are connected to the correct corresponding MOTOR connection.
Red/Solid	Transient fault condition	If AC powered drive, check AC Power. Drive will resume operation when the condition causing the fault is removed.
Green/Double-Blinking	STO circuit active, drive outputs are Safe-Torque-Off	Install STO Interlock or STO Jumper
Green/Slow-Blinking	Drive OK but NOT enabled	Will run when enabled
Green/Fast-Blinking	Positive or Negative limit switch active	Move in direction not inhibited by limit switch
Green/Solid	Drive OK and enabled	Will run in response to reference inputs or EtherCAT commands.

In the rare event that your Copley drive is not working properly, please try the following steps.

Before troubleshooting make sure that the drive is shut off and no live power is connected to the drive.

1. Make sure the drive is securely installed.
2. Make sure your 24VDC Power & AC Power (if AC Drive) are securely connected.
3. Make sure your MOTOR cable(s) are securely connected.
4. Make sure your FEEDBACK cable(s) and IO cable(s) (if used) are securely connected.

5. Make sure your communication to the drive is properly connected; could be serial to USB cable (Part# SER-USB-RJ11) or CAN cable and USB adapter (Part# CAN-USB-01).
6. Make sure the drive frame makes good contact with the metal frame of the machine.
7. Turn on DC power, then turn on AC power.

If the Copley drive continues to present a FAULT condition, please open CME and follow the next steps to try to isolate the source of the problem.

Saving Configuration Files

CME allows you to save to a computer the different data formats utilized by CME. In a standard installation, CME will save all files in the following location:

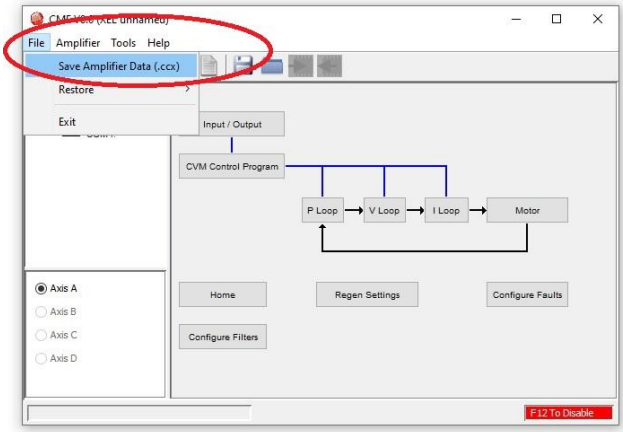
C:\Users\Public\Public Documents\Copley Motion\CME

The table below provides the different save options, the format file type, and a brief explanation of the function performed:

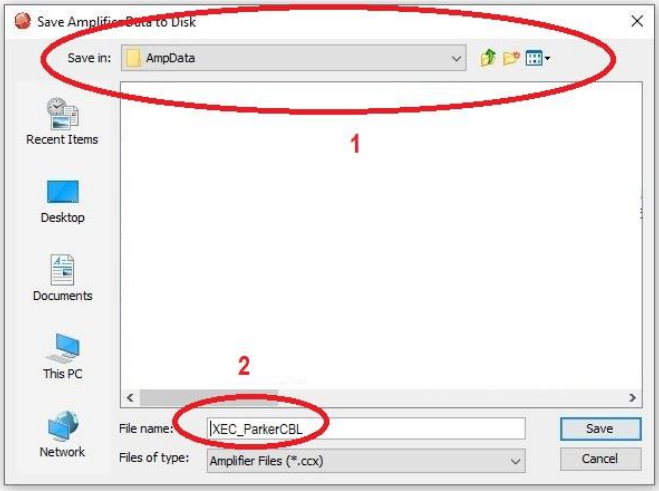
Option	File Type	Description
Save Amplifier Data	.ccx	Saves the parameters of the amplifier RAM to a file on disk.
Save a CVM Program	.ccp	Saves the current CVM control program to a file with a .ccp filename extension
Save a Gain Schedule	.ccg	The gain Scheduling allows the user to schedule gain adjustments based on changes to specific parameters.
Encoder Correction table	.cce	Saves a correction table (encoder correction) from the flash to a file with a .cce filename extension
Save a CAM table	.cct	Camming is an effective way to produce repetitive motion synchronized to an external device. A pre-defined cam-table of slave positions is typically cycled through by a master encoder connected to the drive. The drive performs a linear interpolation between points to minimize cam-table size.
Master using FOE (File over EtherCAT) or FOC (File over CANopen)	.ccd	A .ccd file contains all the driver files and EEPROM/FLASH.

Example: To save a .ccx file please follow the steps below:

1. Go to File → Save Amplifier Data (.ccx).



2. The window below will display.



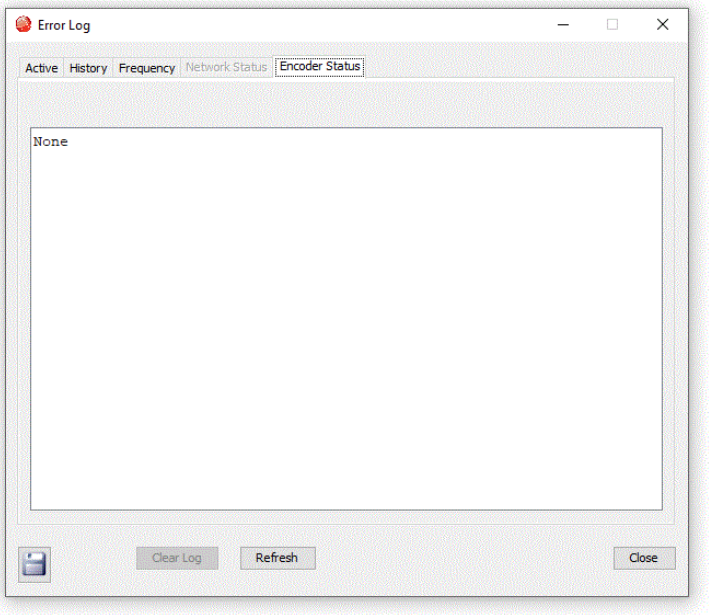
In the image above, the file "XEC_ParkerCBL" will be saved in the file AmpData:

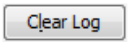
C:\Users\Public\Documents\Copley Motion\CME 2\AmpData

3. Click the Save button to save the file.

Viewing the Error Log

The image below shows a screen capture of the Error Log window. The following table provides a brief description of the different tabs and functions of the Error Log window.

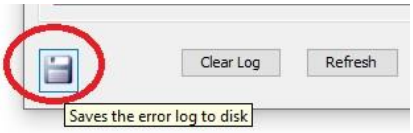


Tab	Contents
Active	Type and description of each active fault and warning. The contents of this tab are automatically refreshed as new events occur.
History	Type, description, and time of occurrence of each fault and warning since the log was last cleared. The contents of this tab are not refreshed automatically as new events occur. The contents are refreshed only when the tab is displayed or when Refresh is clicked.
Frequency	Type, description, and frequency of each fault and warning that has occurred since the log was last cleared. The contents are refreshed only when the tab is displayed or when Refresh is clicked.
Network Status	(Under CAN control only.) Status of CANopen network. Lists warnings and errors.
	Saves the contents of the History and Frequency tabs to a text file.
	Clears all History and Frequency entries in the drive.
	Updates the contents of the History or Frequency tabs.

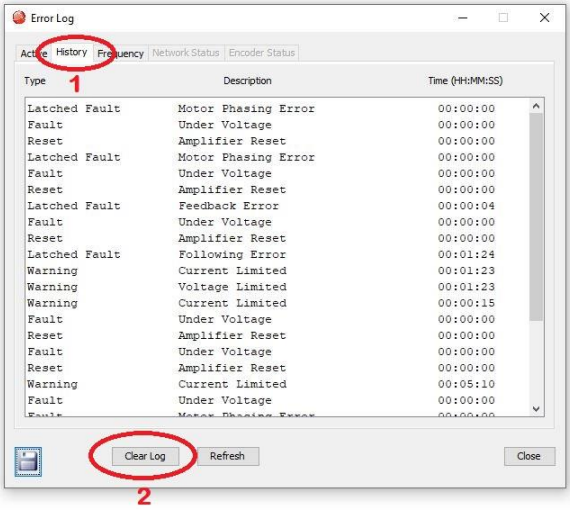
This section describes how to use the Error log window to view warnings and faults recorded to the Flash memory in the drive.

1. Select the error log icon on the CME menu:

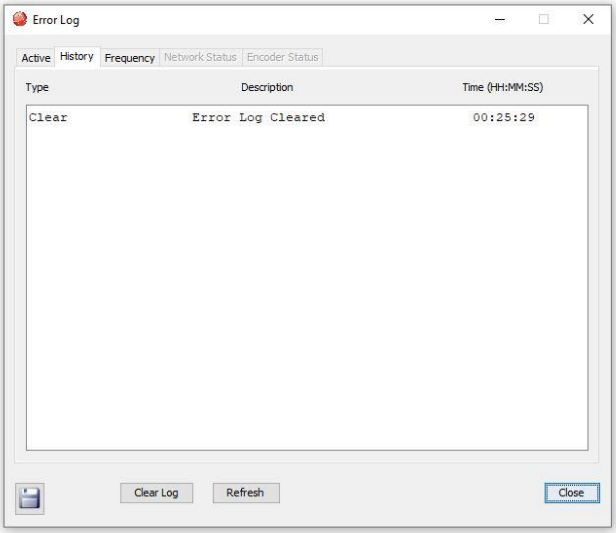
2. Once the Error Log window opens, select the icon on the bottom left corner "Save the error log to disk"



3. Save the error log using a descriptive name such as olderrorlog.txt. Once the error log is saved on the Logfiles folder, select the History tab (1) on the Error log screen and click Clear Log (2).



4. After you clear the log, it should look like the picture below.



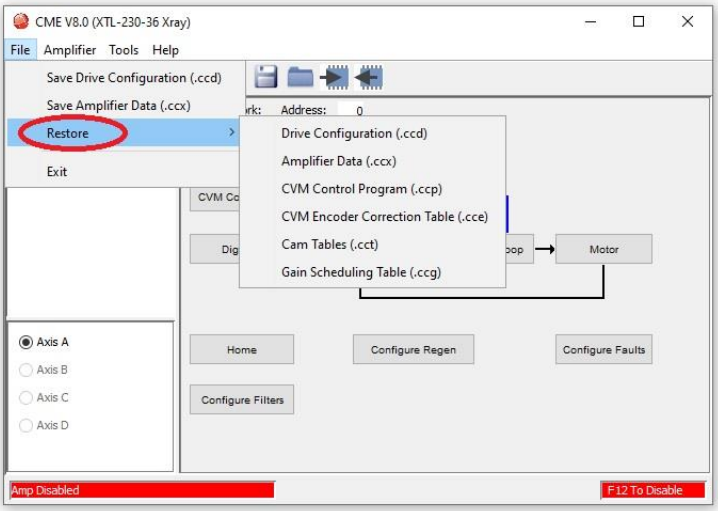
5. Make sure there are no active faults when clicking on the Active Tab (first tab next to History). Then, power cycle the drive.
6. Once the drive comes back, please check the Active Tab again to see if the issue returns. If the issue is back, then save the error log using a descriptive name such as newerrorlog.txt.

In case the issue persists, you can request technical assistance. Please send us the new and old .ccx file as well as the error log. You may ask for help here: www.copleycontrols.com/en/contact-us

Loading a Configuration File

In some cases, it will be necessary for you to load a "well known" configuration file. This file could be in a variety of formats; please see below:

1. Go to File → Restore and select the appropriate file format.

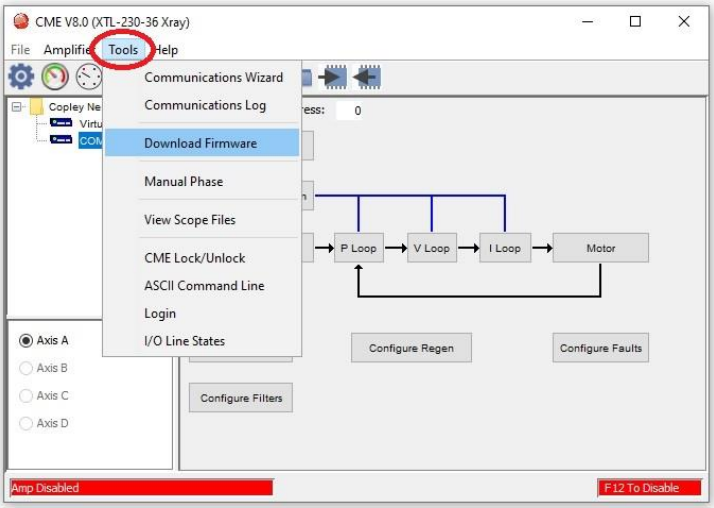


2. Navigate to the location of the config file on your computer.

Downloading Firmware

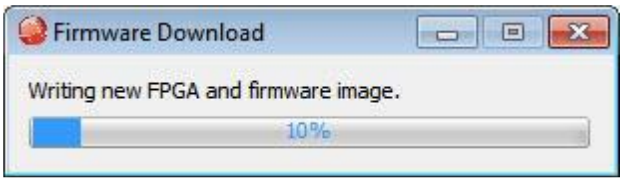
In some cases, you will need to load new firmware into the drive. CME makes this process effortless and simple.

1. On the CME menu select Tools →Download Firmware.



2. Navigate to the location of the firmware file in your computer.

WARNING: Do not power down or disconnect the amplifier during firmware download.



When the progress dialog closes, the firmware download is complete.

Boot Mode

Boot mode state is safe state which is usually triggered by an interruption on the communication with the drive while downloading firmware. See below on the procedures for getting the drive out of Boot Mode.

To get the drive out of Boot Mode, please use the following steps.

1. Connect the Copley USB to Serial adapter (Part# SER-USB-RJ11) to serial port on the drive.

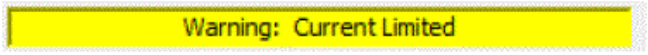
2. Connect basic power to the drive (+24v)

3. Open CME and select one of the communication ports under Copley Neighborhood, you should see the message below:

4. Select Yes and download the appropriate firmware, wait for the process to be done.

Faults and Warnings

The images below depict the way faults and warnings are displayed in CME. Faults will be displayed with a red background, while warnings will be displayed with a yellow background.



Please refer to list below to identify Status, Warnings and Faults and their recommended corrective action.

Bit	Event	Name	Description	Corrective Action
0	Fault	Short Circuit	Output to motor or regen measured is greater than twice peak	Check cable and motor or regen for short output to ground or output to output.
1	Fault	Drive over temp	Amp over temp drive protection.	Increase air flow, add heatsink kit, or reduce duty cycle.
2	Fault	Over voltage	DC bus above drive rating. Output shutdown	Check DC bus for pump up when stopping, add capacitance, or reduce deceleration rate.
3	Fault	Under voltage	DC bus below minimum	Check DC bus for drooping or collapsing, improve power source, or reduce acceleration.
4	Fault	Motor temp sensor	Motor temperature sensor open or closed	Check motor temperature confirm sensor circuit.
5	Fault	Feedback error	Problem with feedback circuits	Check Encoder Status for more details, check voltage levels, Confirm Encoder power regulated.
6	Fault	Phasing error	Problem with commutation or phasing	Check Halls states vs Encoder count. Test encoder for no drift. Do not hot swap. Check manual phasing.
7	Warning	Current	Current folds back to	Reduce duty cycle, remove

Bit	Event	Name	Description	Corrective Action
		limited	protect the drive or motor	friction, Check motor Arms vs drive Ic Apk ratings. (1Arms = 1.414Apk).
8	Warning	Voltage limited	PWM output hits 95% duty cycle	Momentary voltage limit is okay however, if output speed is limited and waning is constant then increase dc bus or slow down.
9	Fault	Pos limit switch	Positive limit switch is active move aborts	If hold position at limit is selected, then motor will servo in position otherwise no current in direction of limit
10	Fault	Neg limit switch	Negative limit switch is active move aborts	If hold position at limit is selected, then motor will servo in position otherwise no current in direction of limit
11	Status	HW Enable inactive	Hardware Enable	Check IN1 for correct levels. Typically, IN1 input (SW input 0) is active low enable and stop settings are configured for controlled stop.
12	Status	SW Enable inactive	Software Enable	Check that master can move drive to op-state. If Copley mode is "Disabled" change to another mode.
13	Warning	Stopping	Trajectory aborted attempting to stop	Normal event when hardware disabled or master commands. Trajectory will abort when fault occurs so check faults for root cause.
14	Status	Brake activated	Brake FET is turned on	Check that brake is holding
15	Fault	PWM disabled	Drive PWM output H-bridge stage is OFF	Check for HW and SW enable or no faults
16	Status	Pos soft limit	Positive Software limit	Soft limits apply after

Bit	Event	Name	Description	Corrective Action
				homing. Move will stop using soft limit deceleration rate and hold on soft limit. Check soft limit deceleration rate.
17	Status	Neg soft limit	Negative Software limit	Soft limits apply after homing. Move will stop using soft limit deceleration rate and hold on soft limit. Check soft limit deceleration rate.
18	Fault	Tracking error	Following error limit exceeded	Some limit is preventing move. Check mechanical system and current limits. Reduce duty cycle.
19	Warning	Tracking warning	Following error above warning limit	Danger of following error. Some limit is affecting move. Check mechanical system and current limits. Reduce duty cycle.
20	Status	Resetting	Drive is presently being reset	Wait for reset to complete
21	Status	Position wrap	Position has wrapped	If wrap is set to some value count will start at 0 again at that value. Otherwise, if wrap is not set, the Position variable wraps at full scale range. This type of counting is called position wrapping or modulo count.
22	Fault	Drive Fault	Power-up diagnostic	Rest or power cycle the drive. Make sure power cabling and grounding is correct.
23	Warning	Velocity limit	velocity limited to configured value	Increase the velocity limit to 10% greater than rated or required speed
24	Warning	Acceleration limit	Acceleration limits command	Velocity mode only. If command exceeds limit the summing junction will only

Bit	Event	Name	Description	Corrective Action
				get limit.
25	Warning	Tracking Window	Following error is in tracking window	If Position Loop Error is outside of Position Tracking Error Limit, then position is not tracking, or move has not settled.
26	Status	Home switch active	Home switch input active	An input configured as home switch will capture position when activated. Normally for purposes of homing.
27	Status	In motion	Moving or not settled	Set if the trajectory generator is running a profile, or the Position Tracking Error Limit is outside the tracking window. Clear when settled into position.
28	Status	Velocity window	Velocity not tracking	Set if the absolute velocity error exceeds the velocity window value.
29	Warning	Phase not initialized	Algorithmic (No Halls) commutation run after enable	After enable algorithmic phasing will wiggle the motor to find phase. Confirm phase initialized and good before commanding move.
30	Fault	Command Input	Master command signal not present.	Master (CANopen or ECAT) not connected or not sending message in time configured by master. Turn off guard time if CANopen master not connected. If PWM command source check for command or allow 100% command.
31	Fault	Not defined		

Revision History

Date	Version	Revision
1/22/2021	Rev 00	Initial release
6/25/2021	Rev 01	Added Boot Mode section