

Provel C5L Carver User's Guide

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Introduction

The Provel C5L is a fully automated 3 axis CNC servo carving machine designed to quickly and accurately produce models for socket forming. The C5L is constructed of stainless steel and features a 4 line LCD for machine status, a 9 key control panel for user inputs, a serial I/O port, automatic calibration, and an illuminated carving area. Foam blanks up to 22 inches in diameter and 36 inches in length can be carved, including AFO blanks. The C5L serial port receives carving files from Provel Carve software for carving. The C5L monitors door position, cutter position, servo motor load, and drive speed. Cutter operation can only occur when the door is closed.

Software

The Provel C5L Carver is compatible with any software that supports the AOP file format. Use the included Provel Carve software for sending files to the carver and specifying carve parameters. Use AOP Viewer (a free download) for viewing and analyzing shape files from the Provel D2 Digitizer or any other AOP file source. The C5L, Provel Carve, and AOP Viewer can be used with any AOP compatible software.

Precautions

Never remove access panels or attempt to service the carver without disconnecting electrical power. Read the entire user's guide carefully before using the carver.

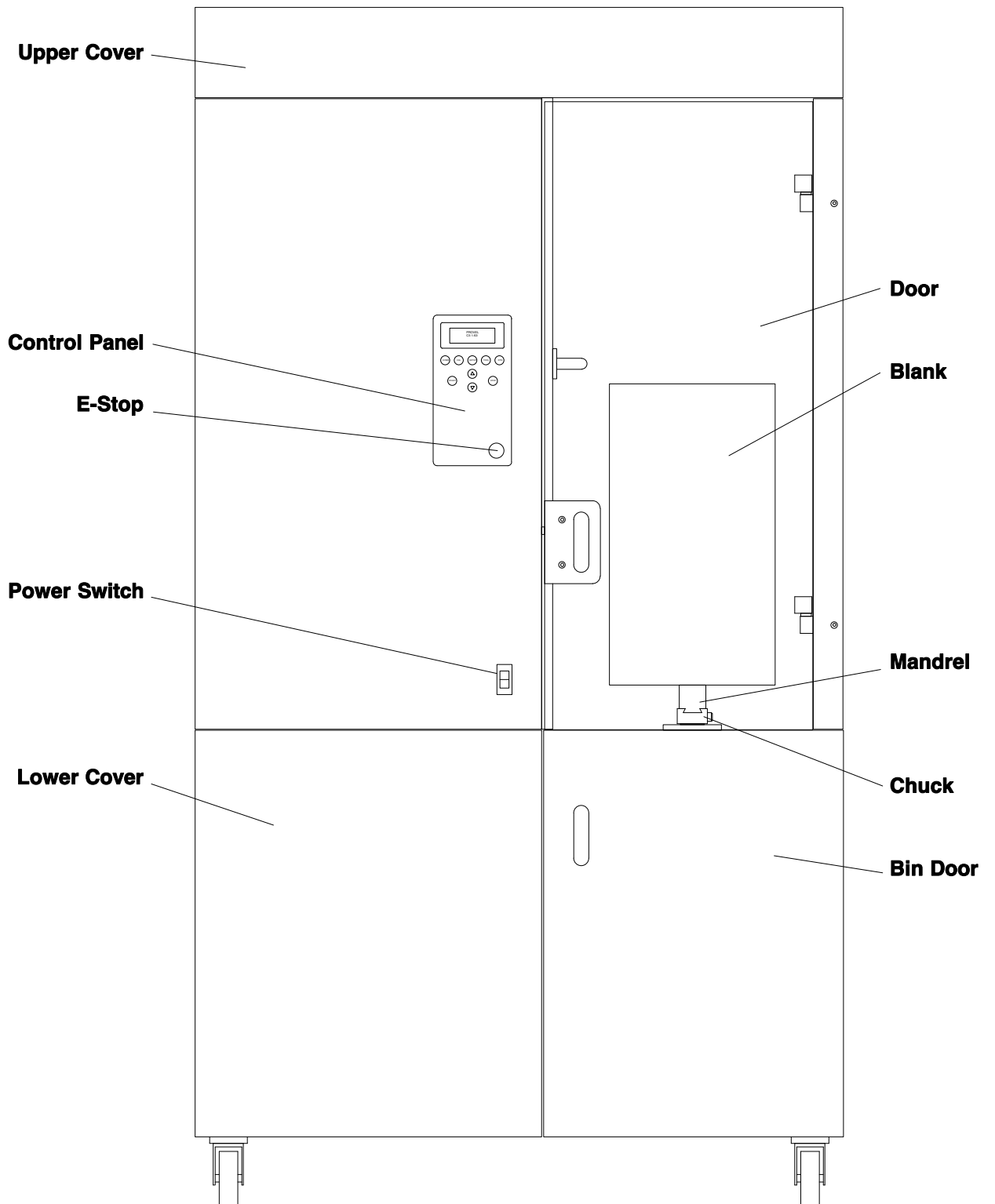
Cleaning

Detergent based spray cleaners can be used to clean exterior surfaces. The acrylic door can be cleaned with a clean, soft cloth and a solution of detergent in water. Do not use solvents or abrasive cleansers.

Maintenance

Never remove any access panel without disconnecting power. The lead screws and guide shafts must be kept clean and well lubricated with WD 40 or a similar spray lubricant. **Never operate the carver with dry lead screws.** Do not allow lubricant to puddle on top of the ball screw bearings. Vacuum the bellows periodically to remove chips that can increase the stacked height of the bellows and restrict full travel. Clean exhaust filter and intake filter as needed using vacuum cleaner or simply rinsing in water. Filter must be dry before replacing. Plaster carving will require frequent filter cleaning to maintain air flow.

C5L Carver



Operation

Operation Summary

Turn power on. The carver will automatically home and calibrate if the door is closed.
Load blank, close door.
Configure file in Provel Carve.
Send file to carver.
Press start.
Remove pattern.

Manual Motion

Press UP or DOWN arrow to move cutter up or down. The carriage automatically stops at the end of travel limits. The carriage will not move unless the door is closed.

Carver Settings

Setup Mode allows selection of cutter speed, display backlight brightness, display contrast, baud rate, and radial offset.

Blank Loading

Blanks are available in several sizes. The smallest blank that will accommodate the model to be carved should be selected. Fully seat the blank on the mandrel before carving.

Carving

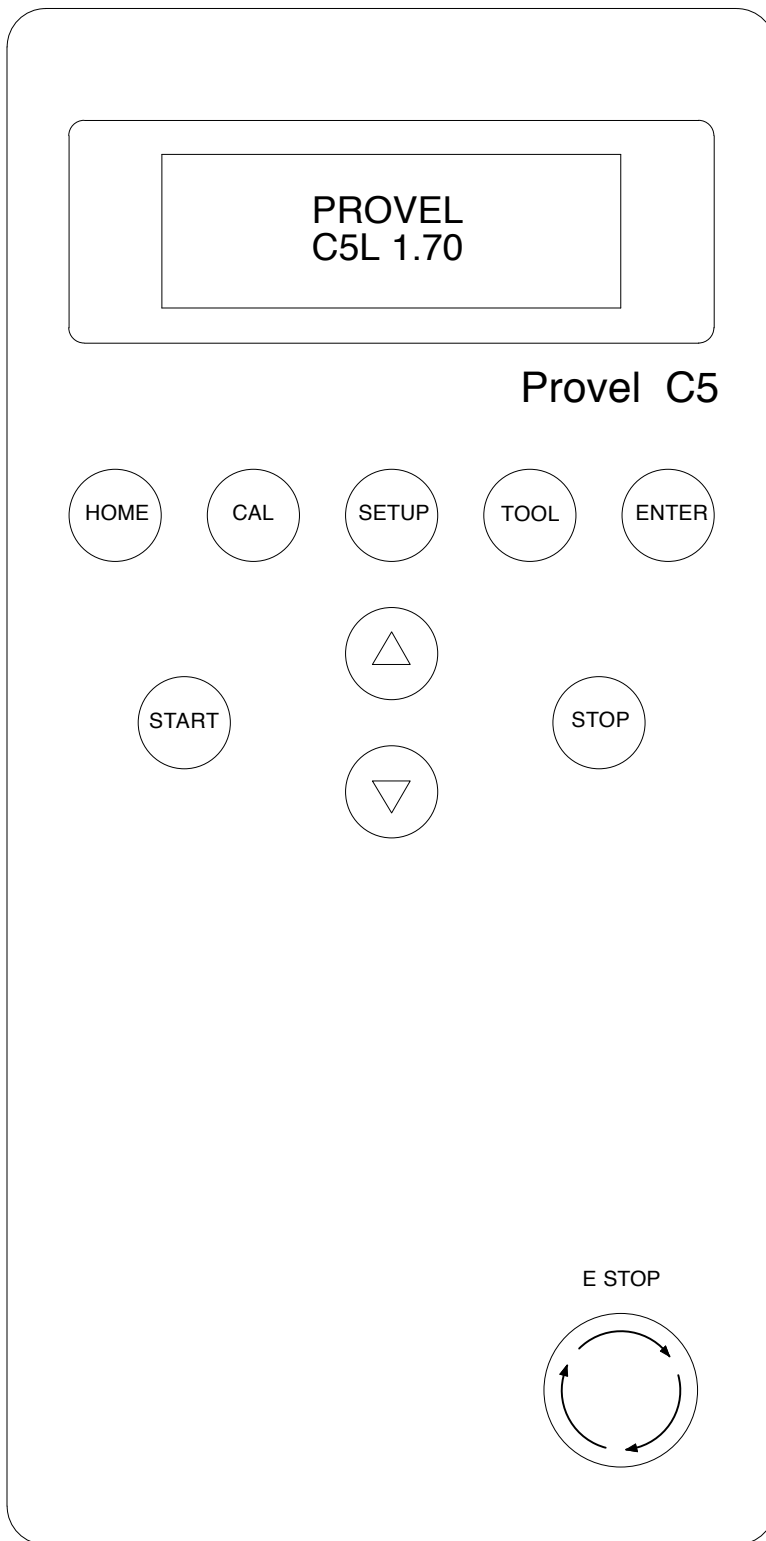
Select starting cutter position, carved height, and transition in Provel Carve. Press START to begin carving the loaded file. The cycle will not start if the door is open. The display will show file name and the axial position of the long axis from the top. Press STOP to pause carving and turn the spindle off. Press START to resume. Press HOME to exit carving. Pressing the E-STOP during automatic operation will cancel the carving cycle and require starting over.

Changing Cutters

If your carver is equipped with a full length flexible cover mandrel, always remove it before changing cutters. Press TOOL. Spindle will move to tool change position and wait. Loosen the set screws on the spindle and change the cutter. Make sure to tighten the set screws before closing the door. The C5 will automatically calibrate after the door is closed.

Body Jackets

Large diameter blanks have a proportionately higher surface speed than a smaller diameter blank for any given rotational speed. When carving body jackets select a slower speed in Provel Carve Preferences under the Body Jacket tab. Setting the Preferences speed control slider to 20% is a good starting point. Each blank type has its own speed selection preference, so selecting a slower Body Jacket speed will not affect the Socket speed preference.



Control Panel

HOME : Carriage home.

CAL : Calibrate cutter.

SETUP : Enter setup mode,
advance thru setup screens.

TOOL : Move spindle out for
cutter change.

RTN : Accept entry, next screen.

START : Start or resume carving
loaded file.

△ : Move cutter up.

▽ : Move cutter down.

STOP : Stop carver, spindle off.

E-STOP : Twist to release.

Acme, J Socket

LOADED 3000 RPM
AXIAL XXX MM

File Loaded

Displays up to 20 character file name, carver status, and spindle speed. Axial is long axis position from top.

Acme, J Socket 1.00

CARVED 3000 RPM
AXIAL XXX MM

Finished Carving

Carver will automatically return to home parking position.

SELECT SPEED

5000 RPM (↑)
> 3000 RPM (↓)

Setup

Press SETUP to enter setup mode and advance thru setup screens: Cutter Speed, Display Backlight, Display Contrast, Baud Rate, Radial Offset.

Select Speed

Use Up, Down Arrow keys to make selection. Press RTN to exit.

SELECT SPEED
SELECT BAUD
SELECT CONTRAST
TEST MODE

Setup Mode

Select Tool: Specify cutter
Select Baud: Set baud rate
Select Contrast: Set display contrast
Test Mode: Enter Test Mode

0123456789ABCDEF
1 0000000000000000

Test Mode

Displays status of limit and home switches or other diagnostic information.

SERVO FAULT
POSITION ERROR

Fault

Displays servo, amp, motion processor, spindle motor controller, enclosure temperature faults.

Status Messages

****STOPPED****	Carver operation stopped due to fault.
E-STOP PRESSED	E-Stop must be released to proceed.
PRESS E-STOP	E-Stop must be pressed and released to clear fault.
STOP PRESSED	Stop must be released for carriage motion.
DOOR OPEN	Door must be closed for carriage motion.
SPINDLE DRIVE FAULT	Cutter motor drive fault.
LOGIC ERROR	Program error.
TIMEOUT	Carriage failed to reach target.
NO RESPONSE	Communication fault.
AMP ERROR	Servo Amplifier fault.
POSITION ERROR	Servo not moving to required position.
NNN, NNN, NNN	Error for Chuck, Short, and Long axes.
MOTOR OVER TEMP	Servo motor over temperature limit.
COMMAND ERROR	Motion processor error.

Troubleshooting

Unable to Load File

Check baud rate in Provel Carve and Carver Setup. They must match. Cable length can also be a factor. Cable lengths up to 25 feet will normally work. Try selecting a slower baud rate.

Carved Pattern Over or Undersize

Press SETUP. Repeat until Radial Offset displayed. Use Up, Down arrow keys to enter radial under or oversize in millimeters.

Will not Calibrate

Make sure the bellows are clean. Compacted chips in the folds will increase the folded height of the bellows and can prevent full travel of the long axis required for calibration.

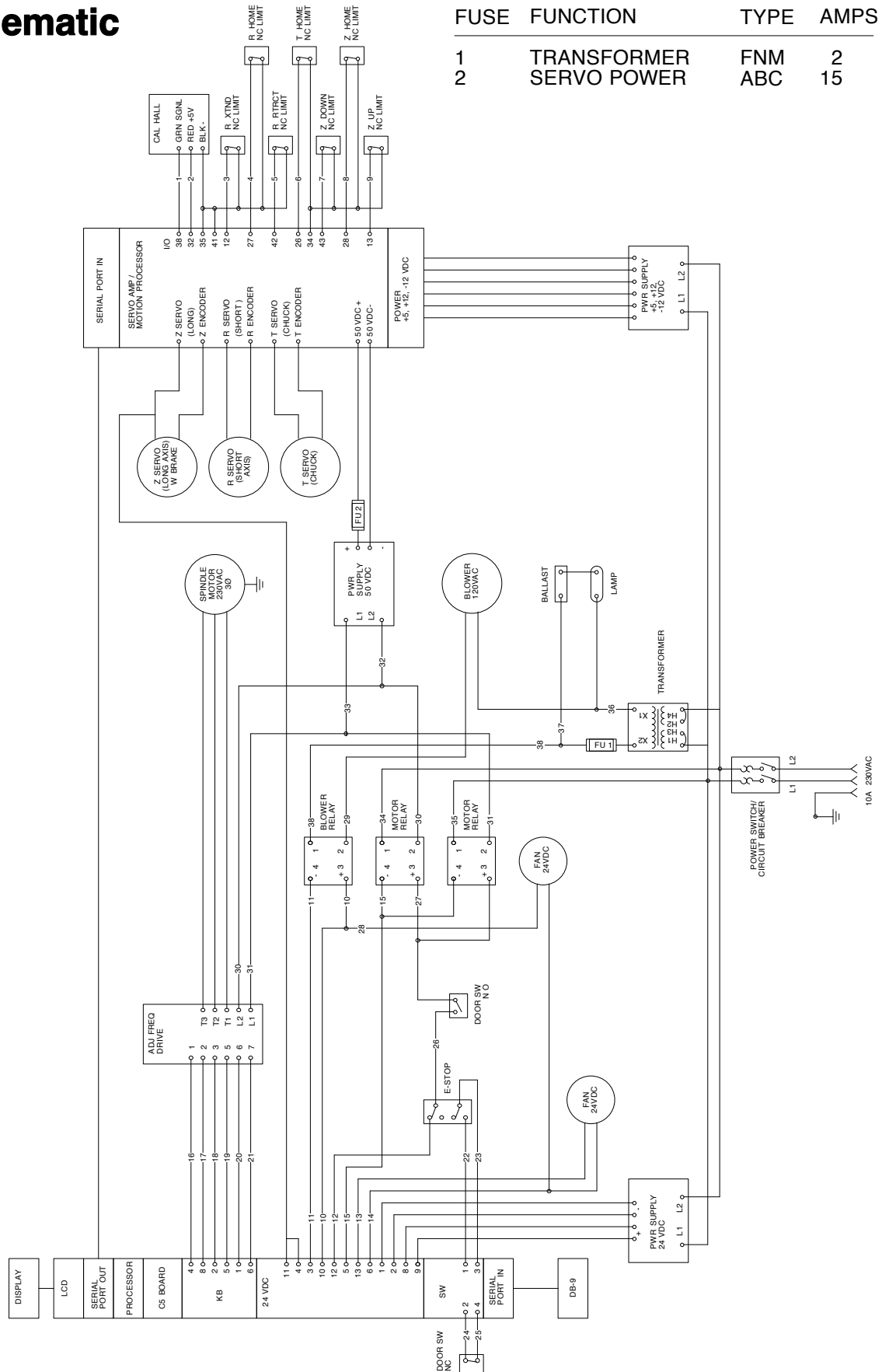
Specifications

Overall Size	70 x 128 x 202 cm (27.5 x 50.5 x 79.5 in)
Weight	232 kg (510 lbs)
Power	230 VAC 5A, 50/60 Hz
Capacity	55 cm diameter x 86 cm (22 in diameter x 34 in)
Spindle Speed	3,000 RPM
Standard Cutter	18mm diameter x 11" long, ball nose
Spindle Bore	16mm
Waste Bin	24 x 26 x 18", 48 gallon capacity
Cable	9 pin d-sub
Interface	RS-232 serial
Controls	Home, Calibrate, Setup, Tool, Return, Start, Up, Down, Stop
Display	20 character x 4 line back lit LCD
Limit Switches	2 Long Axis, 2 Short Axis
Home Switches	Long Axis, Short Axis, Chuck
Auto Calibration	Hall effect switch
Blower	Carving chamber exhaust
Fans	2, equipment chamber
Filters	2, carving chamber exhaust, equipment chamber inlet
Fuses	Servo Transformer: ABC 15A 250V Blower Transformer: FNM-2

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Schematic



FUSE	FUNCTION	TYPE	AMPS
1	TRANSFORMER	FNM	2
2	SERVO POWER	ABC	15