

# Provel C7 Carver User's Guide

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ProvelCarve 2.0

## Introduction

The Provel C7 is a fully automated 3 axis CNC servo carving machine designed to quickly and accurately produce models for socket forming. The C7 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 C7 serial port receives carving files from Provel Carve software for carving. The C7 monitors door position, cutter position, servo motor load, and drive speed. Cutter operation can only occur when the door is closed.

## Software

The Provel C7 Carver is compatible with any software that supports AOP, OBJ, or STL file formats. 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.

## 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.

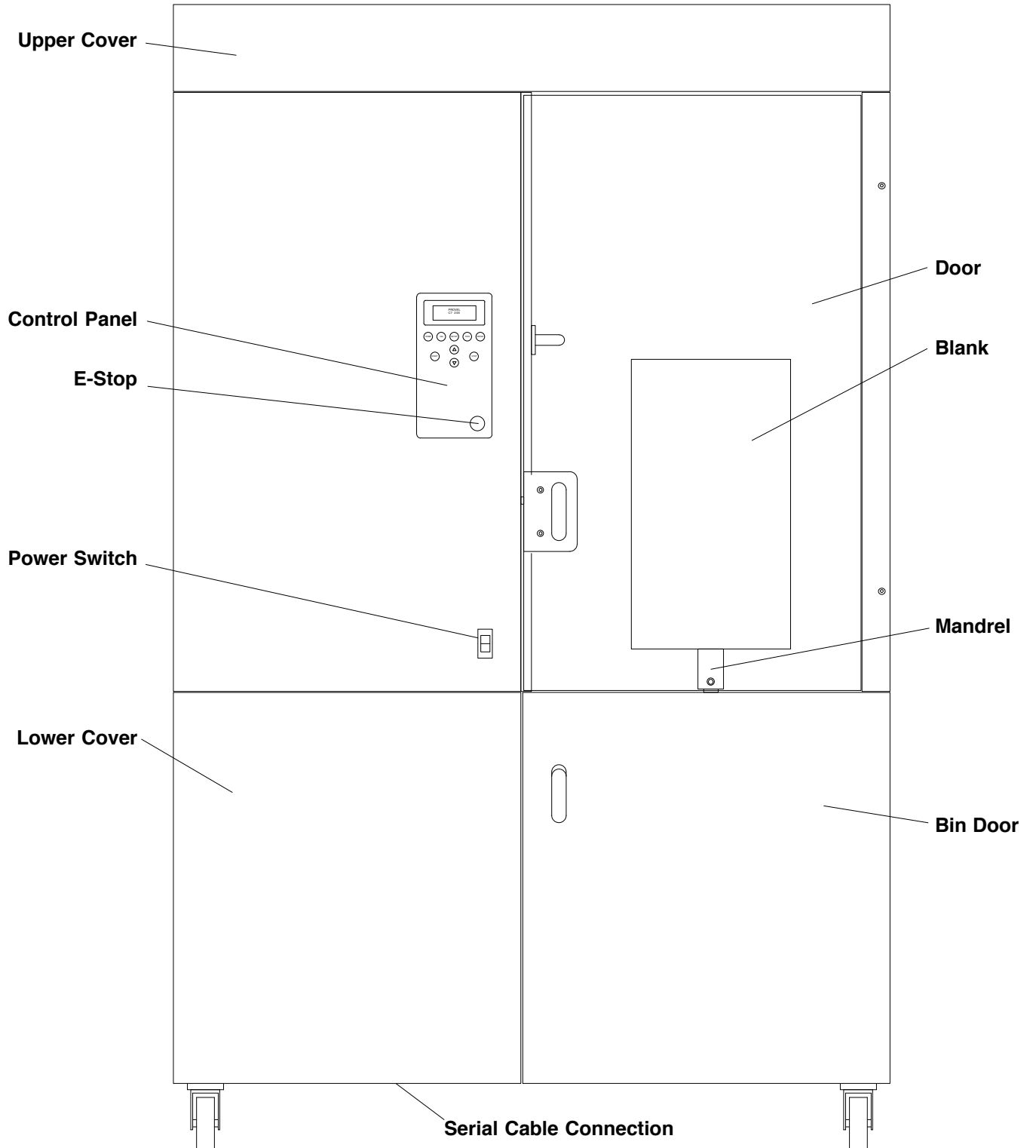
## Cleaning

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 ball screws and guide shafts must be kept clean and well lubricated. **Never operate the carver with dry ball screws.** Lubricate the ball screws with teflon based grease supplied. Guide shafts can be lubricated with WD 40. 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.

# C7 Carver



# Setup

## Uncrating

Once the shipment is unloaded, it will be necessary to stand the crate up. This will require several people. After the crate is standing, the front panel can be removed after removal of the circled screws. The carver can then be carefully rolled out of the crate taking care not to snag the power cord, and being careful to ease one caster wheel at a time over the edge of the crate to the floor to reduce impact.

## Power

The carver requires 120V power, and draws up to 10 amps. If connected to a 20 amp receptacle, there should not be additional loads on that circuit which require more than 10 amps.

## Homing

When the carver is turned on it will automatically home all 3 axes and then move to its parking position midway up the vertical axis with the radial axis retracted and the mandrel screw to the front on the chuck axis.

## Serial Connection

To send a file to the carver, it must be connected to the computer using the serial cable supplied. The carver connector is to the right of the left caster wheel near the front.

Caution anyone sweeping near the front of the carver to avoid hitting the connector with a broom.

If the computer does not have a 9 pin serial port, use the supplied Keyspan USB to serial converter. If using the Keyspan, install the required driver from the CD supplied with the Keyspan.

## ProvelCarve

Files are formatted and sent to the carver using ProvelCarve. Download and install ProvelCarve from the downloads page at [www.provel.us](http://www.provel.us).

# 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 display backlight brightness, display contrast, 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

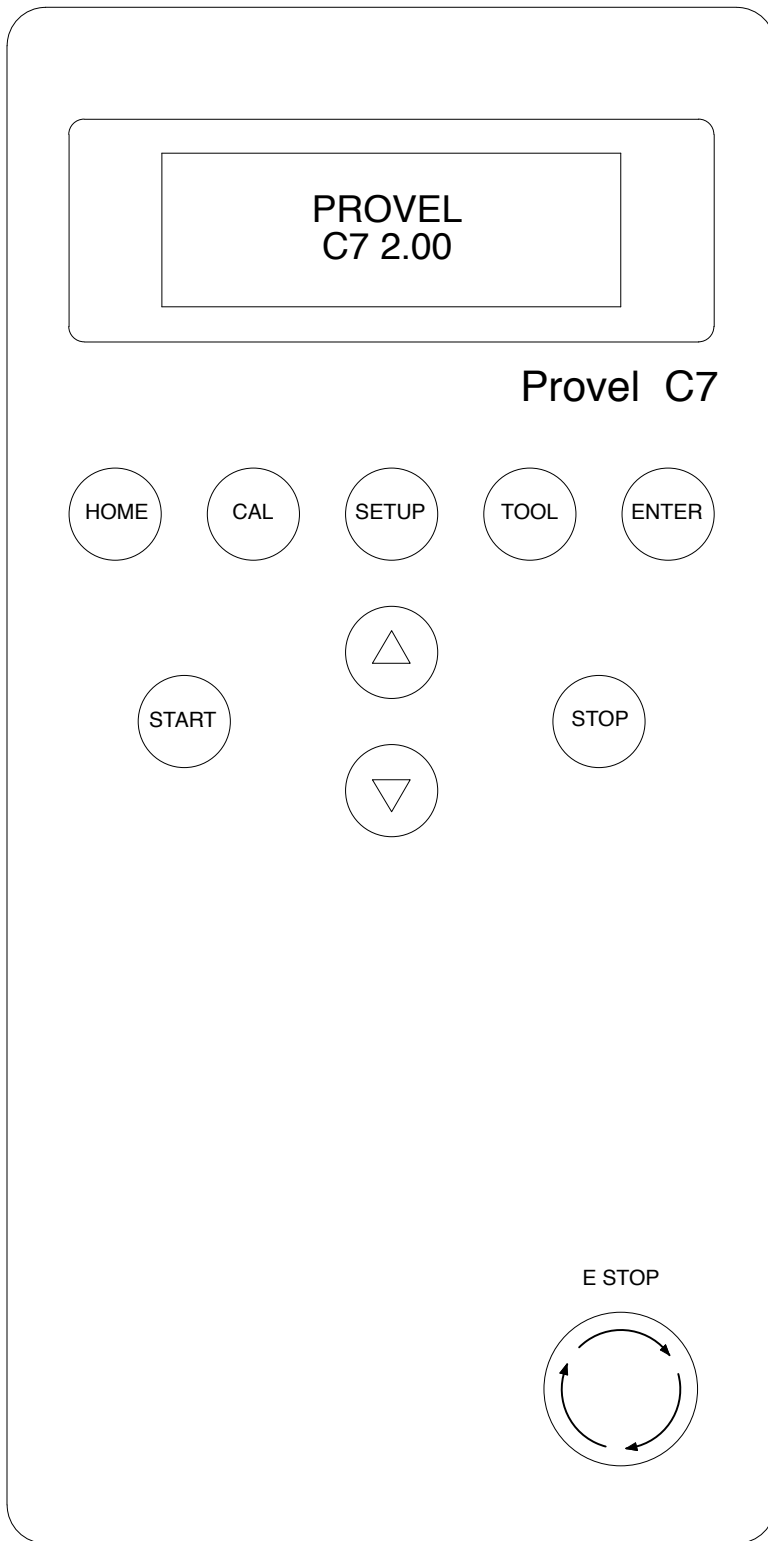
Press TOOL. Spindle will move to tool change position and wait. Loosen the set screws on the spindle and change the cutter. Make sure to tighten the set screws before closing the door. The C7 will automatically calibrate after the door is closed.

## 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.

## Clearing Files

Files are normally cleared from Provel Carve by sending a new file. To clear a file from the carver after carving, press ENTER. To clear a file from the carver before carving, press ENTER for 2 seconds.



## Control Panel

HOME : Carriage home

CAL : Calibrate cutter

SETUP : Enter setup mode,  
advance thru setup screens

TOOL : Move spindle out for  
cutter change

ENTER : Accept entry, next screen

START : Start or resume carving  
loaded file

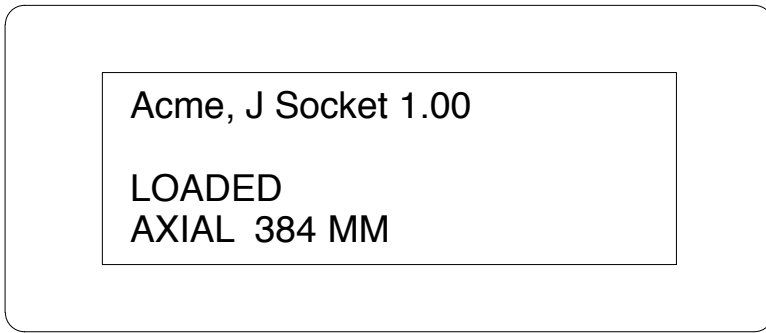
△ : Move cutter up

▽ : Move cutter down

STOP : Stop carver, spindle off

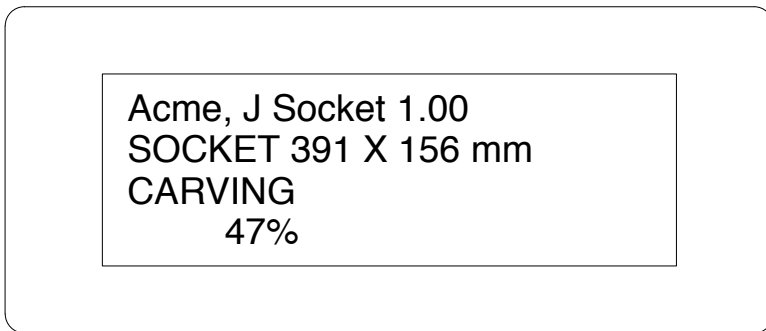
E STOP

E-STOP : Twist to release.



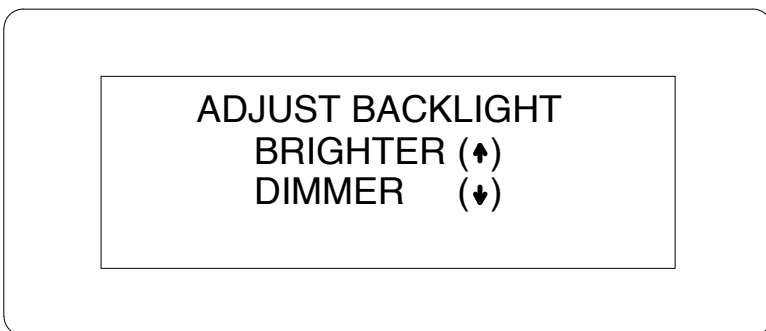
**File Loaded**

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



**Carving**

Carver will automatically return to home parking position when finished carving.



**Setup**

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

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

Parameter	Default	Min	Max
Adjust Contrast	70%	7	100
Adjust Backlight	75%	0	100
Select Baud Rate	38400	9600	38400
Radial Offset	0.0 mm	-10.0	10.0

## 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

DOOR OPEN Door must be closed for motion

SPINDLE DRIVE FAULT Cutter motor drive fault

LOGIC ERROR Program error

AMP ERROR Encoder feedback fault

POSITION ERROR Servo not moving to required position

ERROR ###, 0, 0 Chuck servo motion fault encoder count

ERROR 0, ###, 0 Short axis servo motion fault encoder count

ERROR 0, 0, ### Long axis servo motion fault encoder count

COMMAND ERROR Limit switch connection fault

FINDING HOME Indexing each axis

## Troubleshooting

### Unable to Load File

Confirm serial cable is connected at both ends. Confirm baud rates in ProvelCarve Preferences and C7 Setup on carver match. If USB to serial converter is used, drivers must be loaded on host computer. Cable lengths up to 50 feet will normally work.

### 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.

### Persistent Splash (startup) Screen

Motion controller (Galil) power fault or serial connection fault.

### Persistent Finding Home Screen

Possible chuck limit switch connection failure.



# Specifications

Overall Size	27 x 49.5 x 79 in (69 x 126 x 201 cm)
Weight	520 lbs (236 kg)
Power	115 VAC 10A, 60 Hz
Capacity	22 in diameter x 34 in (55 cm diameter x 86 cm)
Spindle Speed	3,000 RPM
Standard Cutters	18mm diameter ball nose, 8.5 & 11 in (22 & 28 cm)
Spindle Bore	16mm
Waste Bin	42 gallon (160 liter) 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	Short axis extend, Long axis bottom
Home Switches	Chuck, Short axis, Long axis
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

## Provel Inc

Cle Elum WA  
509.857.2009  
[www.provel.us](http://www.provel.us)

# C7 Schematic

