

Provel D2 Digitizer User's Guide

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Introduction

The Provel d2 Digitizer is a fully automated prosthetic limb socket digitizer for capturing the internal shape of a residual limb cast. It can also be used to duplicate existing sockets. The d2 is constructed of stainless steel and features a high resolution direct drive encoder, one-button digitizing, fully automated measuring, landmark sensing, speed control, and data storage. Calibration is verified automatically for each digitizing cycle. Casts up to 14 inches in diameter and 20 inches in length can be digitized.

Software

The Provel d2 is compatible with any software that supports the Provel d1. Provel Digitize software (a free download at provel.us) is used to import and configure files from the digitizer. Use AOP Viewer (a free download at provel.us) for viewing and analyzing shape files from the d2 or any other AOP file source. The d2, Provel Digitize, and AOP Viewer can be used with any AOP compatible software.

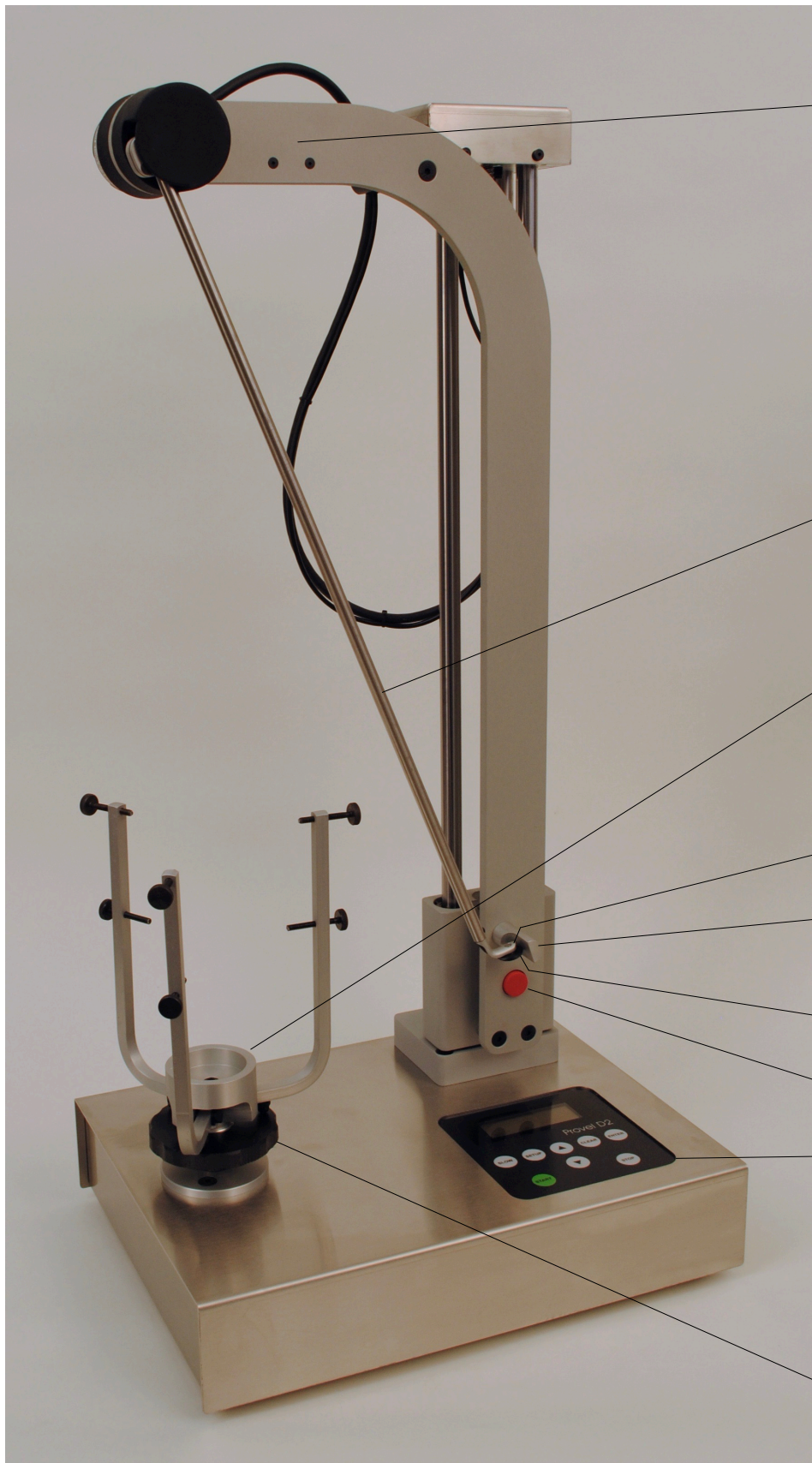
Precautions

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

Cleaning

Detergent based spray cleaners can be used to clean exterior surfaces. Do not use solvents or abrasive cleansers.

D2 Digitizer



Mark Sensor
(on back)

Pendant Arm

Calibration Cup

Sensor Tip

Pendant Stop

Contact Wheel

Slide Release

Control Panel

Arm adjuster Ring

Digitizer Set-up

Connect Power

Connect the power cord to a grounded AC outlet. The d2 accommodates 86-264 VAC, 47-440 Hz.

Connect Computer

Connect the d2 to the computer using the serial cable. A USB adapter will be required for computers that do not have a serial port.

Pendant Slide

The pendant can be raised and lowered using the Slide Release Handle. Lift the handle to release the slide. Release the handle to engage the slide.

Set-up Mode

The d2 is ready to operate as delivered. It does, however, allow user adjustment of the parameters below in Set-up Mode. Press SETUP to enter and advance thru the Setup Menu. Use the up and down arrow keys to change the setting. Press ENTER to exit set-up mode.

Parameter	Default	Min	Max
Set Points/Rev	120	36	360
Reject Marks	>12°	OFF	360
Set Contrast	75%	7	100
Set Backlight	80%	0	100
Set Baud Rate	38400	4800	38400
Set Number of Files Limit	1	1	16
Set Cal Tolerance	.32 mm	.16	1.61
Set Motor Load Limit	100%	80	120
Set Max Acceleration	50%	10	90
Clear All Files	Press STOP and CLEAR		
Restore Defaults	Press STOP and CLEAR		

Software Set-up

Shapemaker 4.3

Choose "Calibrate Digitizer" from "Hardware/Utilities" menu. Enter a Calibration Piece Diameter of 50 mm.

Choose "Digitizer Set-up" from "Hardware/Utilities" menu. Confirm the following settings:

Digitizer Type: Provel

Arm Length: 618 mm

Slice Spacing: 5.08 mm

Points Per Slice: 120

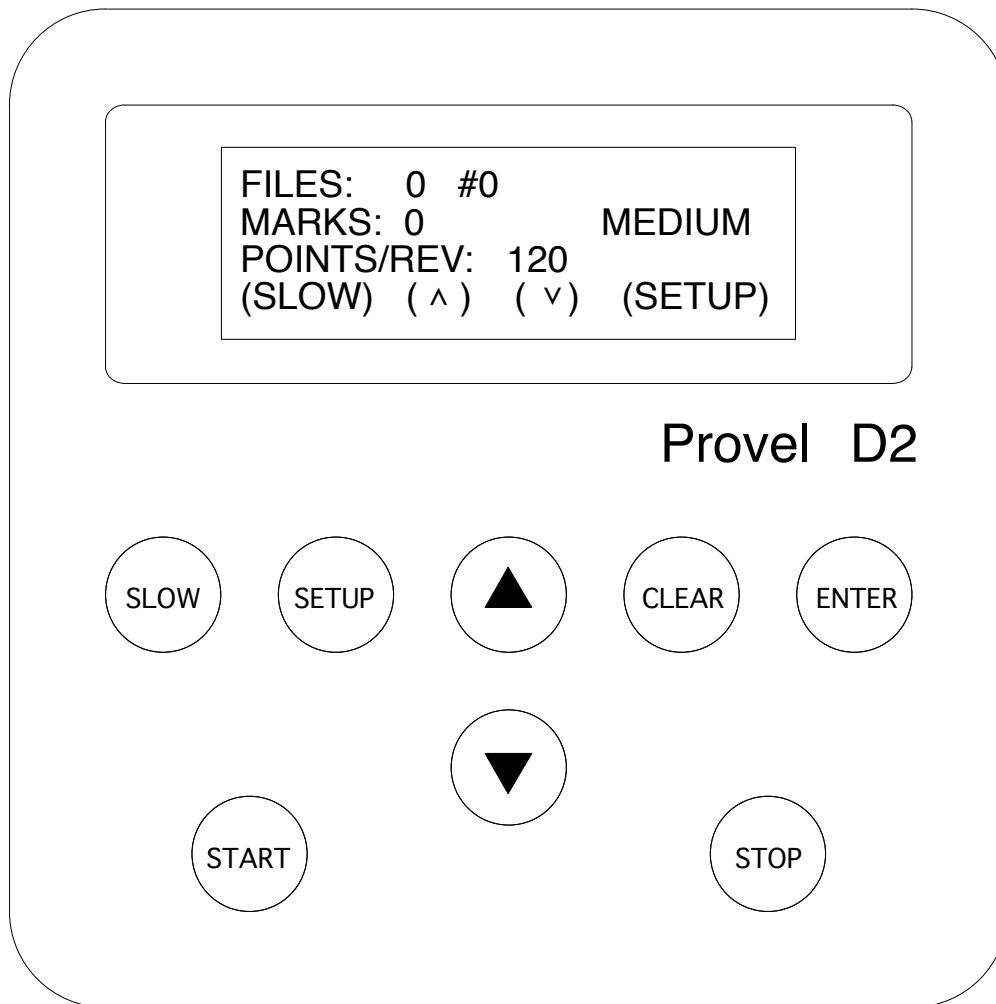
Baud Rate: 38400

Port: Com 1

Calibration

If the digitizer needs recalibration, the RECALIBRATE display will appear. To recalibrate, press START. The contact wheel must be on the stop. Press ENTER.

Place contact wheel in calibration cup and press START. Return wheel to stop and press ENTER. Press ENTER again to exit calibration mode.



Control Panel

SLOW : Rotates work piece holder for positioning. Also selects slow speed while digitizing.

SETUP : Set points per rev, mark sensor, display, baud rate, file limit, calibration tolerance, and motor parameters.

CLEAR: Use to clear pending file, or with **STOP** to clear most recent file.

ENTER : Accept entry, return to home screen. Any time the arm returns home it will perform an enter function.

▲ : Increase digitizing speed, or change value in Setup.



▼ : Decrease digitizing speed, or change value in Setup.



START : Start digitizing. Also used to start calibration in recalibration mode.

STOP : Pause digitizing. Also used with **CLEAR** to clear files.

Operation

Establish Index

Turn power on. Move arm off stop to check calibration.

Mark Landmarks

Use a black felt pen to create a dense, black mark. The smallest mark the d2 will routinely sense is 1/4 inch (6 mm) in diameter. Large marks will appear in software as a cluster of marks. The D2 records a maximum of 36 landmarks.

Extend Top

To digitize the entire cast, it may be necessary to extend the cast with tape. Exposed tape adhesive on the inside of the cast should be covered with tape to prevent the contact wheel from sticking. Avoid creating sharp corners that could snag the contact wheel.

Fixture Cast

Place cast in the work piece holder and turn the adjuster ring to close the arms. Use the adjustment screws in the top of the arms as needed to center the cast. Make sure the cast will not contact the tip or the pendant arm at any point. Use the SLOW button to rotate the cast. Only the contact wheel should ride on the surface. Re-align the cast if necessary. Confirm the cast is stable before digitizing.

Digitize

Position the pendant in the bottom of the cast. Press START to begin digitizing. The display will count marks sensed. When the pendant clears the top of the cast, it will return to its home position and the digitizer will automatically stop. Do not catch the arm after it clears the cast, allow it to return to the stop without interference.

Speed Control

The digitizer will automatically adjust its speed to negotiate abrupt contours. SLOW may be pressed at any time. Use the UP and DOWN arrows to select speed range.

Pausing

Press STOP to pause. Press START to resume, or you may press ENTER to accept the file as is. Press CLEAR to delete the file.

File Transfer

File transfer is automatic in Provel Digitize. Provel Digitize will assign consecutive numbers to digitized files and add .aop as the file type. Files can be renamed as required. In Shapemaker, choose "Digitize" from the hardware menu. The file will be cleared from the digitizer memory as soon as it is successfully transferred.

Manual File Clearing

To clear the last file, press STOP and CLEAR.

To clear all files press SETUP, advance to CLEAR ALL FILES, press STOP and CLEAR.

Contact Wheels

The D2 is supplied with 20 and 25 mm contact wheels. The 20 mm wheel is fitted as delivered. If the contact wheel is changed, the new size should also be selected in Provel Digitize, Preferences/Digitizer.

Troubleshooting

Digitizer not communicating with computer

Check cable connection at the d2 and the computer. Confirm the correct port is selected in the computer. Make sure the baud rates match in the digitizer and computer. Cable length can also be a factor. Cable lengths up to 25 feet will normally work. Try selecting a slower baud rate.

Shape is wrong size in CAD software

Check CAD software to confirm Calibration Piece Diameter: 50 mm

Mark Sensor is not working

Make sure the fiber optic sensor tip is clean and the red sensor light is visible when digitizing.

Error Messages

STOPPED TOP LIMIT REACHED	Move slide down, press ENTER.
STOPPED MEMORY FULL	Transfer or delete files.
MEMORY CORRUPTED DEFAULTS LOADED	Set-up mode values have been reloaded with factory default values. Any user adjustable parameters that were changed from default values must be reset.
RECALIBRATE ERROR X.XX MM	Press START to begin calibration procedure.

Default Reset

Press SETUP, advance to To Restore Factory Defaults, press STOP and CLEAR.

Specifications

Size	31 x 43 x 92 cm (12 x 17 x 36 in)
Weight	16 kg (35 lbs)
Power	86-264 VAC, 47-440 Hz, .5A
Capacity	35 cm diameter x 50 cm (14 in diameter x 20 in)
Resolution	.16 mm Radial (.006 in)
Cable	9 pin d-sub
Interface	RS-232 serial
Memory	Stores multiple files
Controls	Enter, Clear, Setup, Start, Stop, Slow
Display	20 character x 4 line back lit LCD
Fuse	GMC-1

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Schematic

