

Core Splitter User Guide

Core Splitter: User Guide

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Introduction

The Core Splitter is used to split whole round sections or rock pieces lengthwise into section halves. Two methods are available for splitting whole round sections:

1. For soft sediment in core liner a blade and wire system is used, and
2. For hard or lithified material a diamond blade rock saw is used.

This guide is intended as supplemental to proper training by experienced technical staff.

System Components and Configuration

The IODP Core Splitter system consists of the following general components (Figure 1).

- Splitting Tray, Trough and Table
- Carriage and Splitting Mechanisms
 - Wire and Hook Blades
 - Rock Saw a.k.a. "The Super Saw"
- Linear Actuator and Motor
- Control Panel and Control Unit



Figure 1. Core Splitter

Motion Control and Software

The splitting mechanisms are attached to the motion carriage and moved through the stationary core material. The motion of the carriage is controlled by the joystick and RP240 Operator Interface (Figure 2) to a digital servo motor controller with a custom program installed. The motor drives two linear actuators mounted underneath the splitting tray.

The motion control program was written with the Parker Motion Planner software and this software is also used to load the program into the digital servo controller. See Appendix B for detail on the procedures for interacting with the servo controller.



Figure 2. Joystick and RP240 Operator Interface mounted on Control Unit.

Operation

Getting Started

1. Supply power to the carriage and motion controller with the 110V isolation switch on the front of the Control Unit housing (Figure 3).

CAUTION: Before applying power, make sure that all obstructions have been removed. The saw is capable of crushing hands! As soon as power is applied the carriage will move automatically to the home switch (towards the drain end of the saw's basin).

1. When power is applied, the program in the motion controller will automatically reset and instruct the carriage to find its home position. If required, reset and home the carriage manually by following these steps.
2. Press Menu Recall on the Control Panel's Operator Interface (Figure 2).
3. The F1 key will give the user the option to select the program to run. Select the program called "MAIN" and press the ENTER key to run the program.
4. The Operator Interface will display the message, "Clear Core Splitter First and Then Press F1 to Zero." Once the F1 key is pressed the carriage will move backwards (towards the drain end of the saw's basin) to find its home or zero position.
5. Once the carriage finds its zero position, the joystick will be enabled. The Operator Interface will display the message, "Ready for Operations, Joy Stick Enabled."
6. Move the joystick forward and backwards to test the movement of the carriage.

Figure 3. 208V and 110V Isolation Switches



Main Power 110V. Turn on for power to carriage and motion control



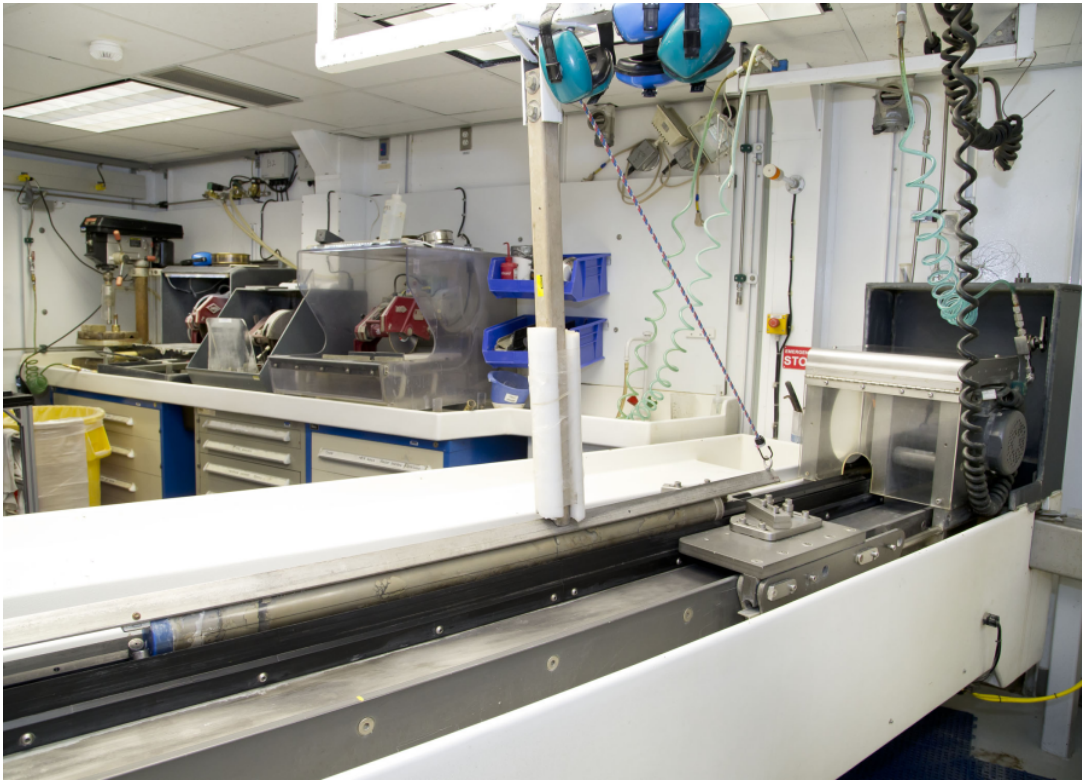
Turn on for power and water to Super Saw

Splitting with the Wire and Hook Blades for Soft Sediment

1. Supply power to the carriage with the 110V isolation switch on the side of the Control Unit housing (Figure 3).
2. Reset and home the carriage (see Getting Started section).
3. Mount the wire and blade splitting mechanism onto the carriage with the large pins with hook latches. Tighten the set screw on both sides of the carriage (Figure 4).
4. Install hook blades if necessary by first removing the large hex bolts that secure the blade housing to the plate (Figure 5). Separate the blade housing and install the blades. Before tightening the hex bolts on the blade housing, use a piece of core liner and adjust the width of the hook blades to cut the edges of the liner. Replace the hook blades as necessary.
5. Install the cutting wire as shown in Figure 5. Keep the wire fairly tight but note it will stretch over time. Replace the wire if it breaks or becomes too loose or deformed.

!worddav0eb194a30b64a259504b0ab71fc4f919.png|height=247,width=346!Wire Locks*Figure 5. Wire and Hook Blade***Figure 4: Installation of Wire and Hook Carriage** !worddav3aa9ac504308566cc6654f7ff071c9ba.png|height=240,width=346!Insert the 4 pins (2 on each side) and rotate to lock behind socket head screw.

1. Install the overhead clamp that secures the section in place (Figure 6).
2. Prepare and Load the Section (Figure 6).
 - Wipe excess moisture/mud off core liner
 - Load section onto the tray so that it is split from bottom to top along the splitting plane. Push the section up to the stop blocks. Sometimes the splitter may cut one side bigger than the other. If this is the case it is best cut the Working Half bigger for sampling purposes.
 - Engage the overhead clamp to secure the section in place. This will ensure the section does not buckle or deform.



CLAMPRELEASE

Figure 6. Soft Sediment Section Loaded for Wire and Blade Splitting

1. Use the Joystick to carefully engage the blades into the core liner. The wire should follow into the cut the blades made. Continue moving the blades and wire through the section.
2. When splitting is completed, disengage the clamp, remove the section to the splitting table to open, and return the carriage to the home position.
3. Clean off the tray and splitting mechanism to reduce contamination.

Splitting with the Super Saw for Hard Sediment and Rock

1. Mount the super saw splitting mechanism onto the carriage (Figure 7).
2. Return the carriage to the home position which is the starboard end of the track. Use the joystick or if necessary the menu options to home the carriage.
3. Prepare and Load the Section (Figure 7)
 - Load a section in a liner onto the tray so that it is split from bottom to top along the vertical splitting plane. Push the section up to the stop blocks.
 - For rock material that is not in a liner, the pieces can be placed directly onto the tray in any orientation that is convenient for splitting. Remember to have the bottom of the rock pieces marked. Orientation is utmost importance. There is no set length for what can or can not be split using the super saw but it is typically pieces that are too long to cut well on the tile saws.

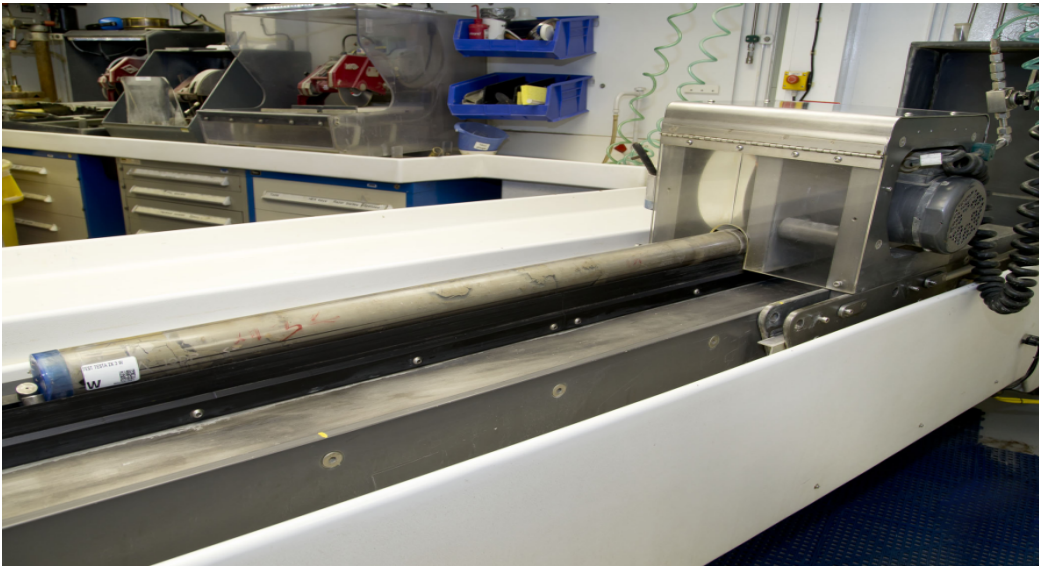


Figure 7. Hard Core Material within a Liner Loaded for the Super Saw

1. Before turning on the saw, ensure all personnel in the splitting room are wearing proper PPE and that both sets of doors are closed.
2. Supply power to the Super Saw with the 208V isolation switch on the side of the Control Unit housing (Figure 3). Open the water inlet valve if not open already. Water should start flowing through the nozzles inside the saw housing. Adjust the flow rate and direction of the water to give the cutting blade plenty of water.
3. Turn the saw on with the switch on the control panel. Using the joystick, slowly bring the saw to the material. The speed at which the carriage should move is dependent on the material. The button on the joystick can be engaged so that the carriage moves at a constant, slow speed. The operators may need to hold the section or rock in place so that it does not slip into the saw. Never allow hands or fingers to go into the saw housing.
4. When splitting is completed, turn off the saw on the control panel. An electric brake will stop the saw blade rapidly. Turn off the 208V isolation switch to stop the water flow. Pull the top of the section out of the saw and wash off the material before removing to the splitting table. Wash off the tray and return the carriage to the home position.

Troubleshooting

Carriage does not move with joystick operation	No power to the control unit	Turn 110V isolation switch to On. Home the carriage.
	Motor has reached its torque limit	Reset the controller and home the carriage
	Emergency Stop Button is Engaged	Disengage the Emergency Stop button. Reset the controller and home the carriage
	Digital Servo Controller has been corrupted or damaged.	Reload program into servo controller or replace with spare (see Appendix B)
	No obvious Cause	Get an ET and troubleshoot A hang crank or drill can be used on the gears to move the carriage.
Carriage only moves in one direction with joystick operation	Limit switch is stuck in engaged position	Disengage and lubricate the limit switch. Reset the controller and home the carriage
	A limit Switch cable is damaged and the circuit is open	Get an ET to examine the cables.
Super Saw does not turn on	No Power to Super Saw	Turn 208V isolation switch to On.
	The overcurrent protection switch is tripped.	Turn power off to the saw. Open the control cabinet and reset the overcurrent protection switch.
	Emergency Stop Button is Engaged	Disengage the Emergency Stop button.
Super Saw stops running while cutting core	Saw blade encounters too much friction and stops. The overcurrent protection switch is tripped to protect the motor.	Turn power off to the saw. Free the saw blade from the core material. Open the control cabinet and reset the overcurrent protection switch.

Changing the Blade

1. Open front Plexiglas cover and remove the 3 bolts on the Aluminum water trough that covers the top end of the blade.
 2. Remove the bolt and the metal plate holding the blade. Slide the Aluminum water trough away from the motor enough to remove the old blade. You may have to angle the blade in order to remove it from the saw housing.
 3. Remove metal insert (if present) on the center of the new blade and remount the blade and repeat steps 1 through 3 in reverse.
- NOTE! Make sure the blade is on in the correct direction. The arrow on the blade's label should match the direction the saw turns, clockwise if looking from the forward side of the splitting table.**

Counterbalance the turning mechanism in the frontScrews



Health, Safety, & Environment

Safety

- Keep extraneous items and body parts away from the moving splitting mechanism.
- The track system has well-marked emergency stop buttons to halt the system if needed.
- Do not stack anything on the track.
- Use hearing protection while operating the saw.
- Consult an Electronics Technician (ET) if any problems with the electronics or power are encountered or suspected.

- When working on the saw (changing blades etc.) always turn off the 208V power.

Pollution Prevention

- Minimize the release of plastic into the drain lines by ensuring the gratings over the drains are in place. Keep the sinks free of debris.
- No chemicals should be poured into the drains.

Waste Management

- Dispose of plastic and rock debris in the designated bins.

Scheduled Maintenance

Daily

- Spray down the core splitter and trough with water keeping it free of mud and debris. Spray the inside of the rock saw if in use, blade side only. Clear the drains of debris.

As Needed

- Spray silicone lubricant under the actuators when they get squeaky. Treat the black trays with Armor All.

Annually

- Remove the Servo motor and then unbolt, and lift one end (use a chain fall) to expose the under carriage. **Remember to block the lift so that it cannot fall while you perform maintenance.**
- Wash down and remove any sediment. **Don't wash dirt under the steel band that protects the internal mechanism.**
- Remove the end covers on the linear actuators and check if the motor belts need tightening.
- Examine the cable management system for abraded cables or other indications of wear.
- Remove the top covers of the linear actuators and check the ball screws to see if they need cleaning or additional lubrication.

Parts Information

Frame, Carriage, Tray and Housing

Vendor: A&A MachiningModel: Custom

Digital Servo Controller

Vendor: *Parker Automation* Model: Gemini GV6-U6ESpare: Available

Servo Motor

Vendor: Parker Automation

Model: MPP0923D1ENPSV

Spare: Available

Planetary Linear Gear Reducer

Vendor: BaysideModel: Spare:

Belt Driven Linear Actuators

Vendor: Parker AutomationModel: HPLA800 Dual Stage with 2300mm travel, Corrosion resistant, S03 Flange Configuration, 803-2534BSpare: Available
803-2534C

Operator Interface

Vendor: Parker CompumotorModel: RP240 Operator Interface for Servo Controller PLCSpares: Available

Joystick

Vendor: SureGripModel: JBDM-BL-06 with JM-P1-06-PS5 AssemblySpare: Available

Saw Motor

Vendor: Baldor RelianceIndustrial MotorsModel: MVM3559DSpare: Available

Electronic Motor Brake

Vendor: AmbitechModel: Short Stop SSU2G5SSpare: No

Motor Protector

Vendor: KlocknerMoellerModel: PKZMO-10 (PN XTPR010BC1)Spare: Available

Related Documentation and Links

Manuals and drawings are located in the JR1/IODP_Share/UBER SAW folder for reference.

Motion Planner software and servo controller program located on TAS Server

Parker Automation Gemini GV6 Hardware Installation Guide

Parker Automation Gemini Motor Reference Manual

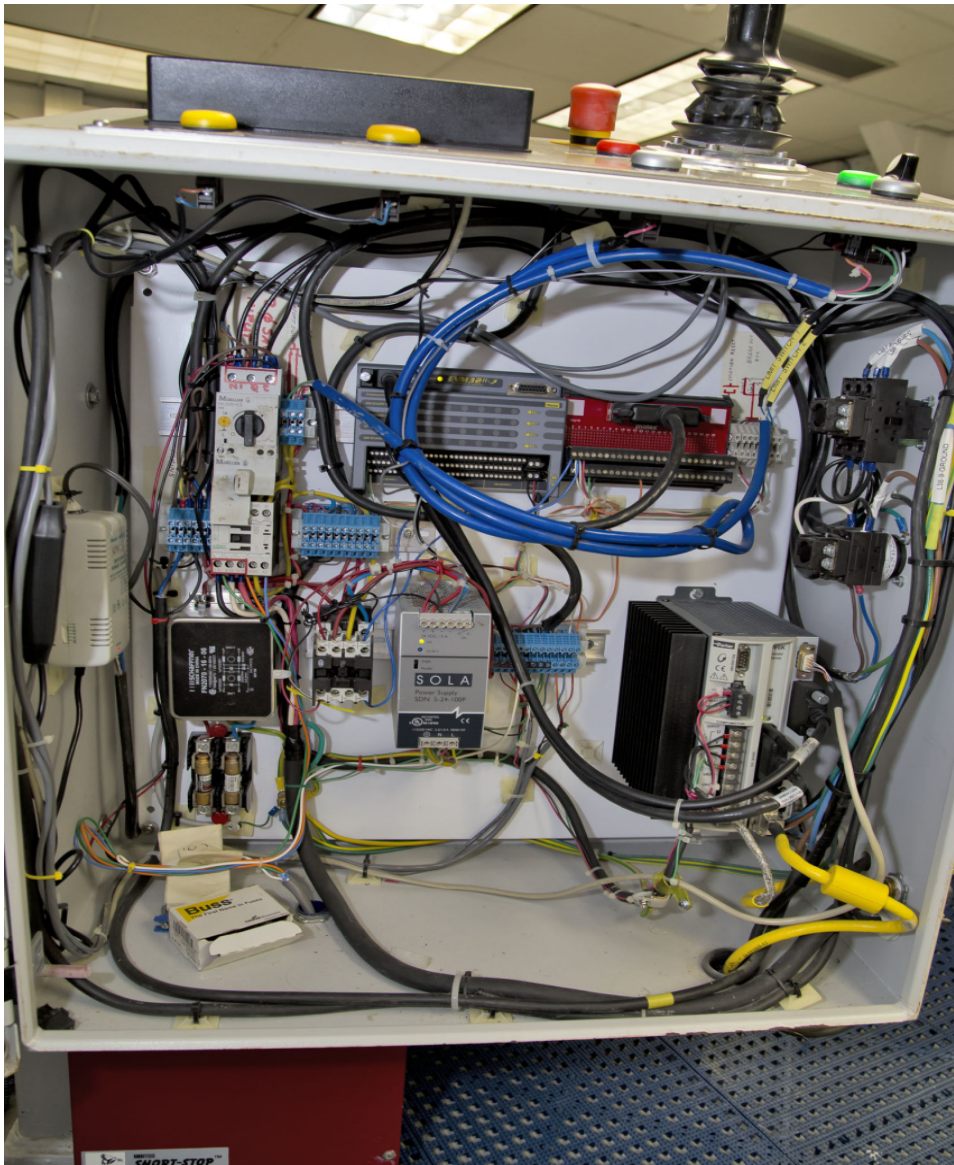
Parker Automation Gemini GV6K and GT6K Command Reference Guide

Appendix A: Exploded Diagram

To be continued....

Appendix B: Digital Servo Motor Controller

This section discusses details of the Parker Gemini GV6K-U6E digital servo motor controller (Figure B1) and the reprogramming or replacement procedure for the controller.



Parker Gemini GV6K-U6E
Figure B1: Inside of Control Unit highlighting the Parker Gemini GV6K-U6E digital servo motor controller

Configuration

The servo controller is designed to function with many different inputs and outputs. The IODP core splitter uses a Parker RP240 User Interface and a Joystick to interact with and control the servo controller. The servo controller sends commands to and receives feedback from the Parker Servo Motor. The core splitter also has limit switches and emergency stop buttons. The servo controller is loaded with a user defined program or code to coordinate all of these components. The program was developed with the Parker Motion Planner software and has these five components of code,

M AIN	It is the high level program that the other subroutines run under. When power is applied this is the program that is automatically run. It is responsible for calling the SETUP routine and reacting to input from the RP250 interface, Joy stick, limit switches and internal faults.
SE TUP	Responsible for initializing variables, setting up the RP250 display and finding Home.

RP 250	Receives and responds to user action on the panel. Sends messages to the LED display.
LS SET	Instructs the controller what to do if a limit switch is engaged.
CR ASH	Instructs the controller what to do if the current limit or other fault is triggered.

Setup

Refer to the *Parker Gemini GV6 Hardware Installation Guide* for instruction on how to connect to a servo controller and set up a new servo controller. A PC computer, preferably a laptop, will need to be set up and the Parker Motion Planner software installed. The Motion Planner software can be used to create new programs or view existing programs. The current version of the software should be located on the TAS server at TAS:\dml\software\tools\Parker but if not, the software can be downloaded from the Parker website. It will be easiest to use a computer with a RS-232 serial port or a USB to serial cable can be used provided that the necessary drivers are installed. The controller can also be connected to a computer using a peer to peer Ethernet cable but this method would need more assistance from a MCS.

Viewing the Program Code

The user does not need to be connected to a servo controller in order to view or edit a program. Open Motion Planner. Open the current version of the program located at TAS:\dml\software\tools\Parker\Uber Saw Program. The software will open an editor window that will allow the user to view the code (Figure B2). The master program has all five components of code built into it. To create, understand, evaluate, or edit a program, consult the *Parker Gemini GV6K and Gemini GT6K Programmer's Guide* and *Parker Gemini GV6K and Gemini GT6K Command Reference Guide*. Motion Planner also has On-line Help available.

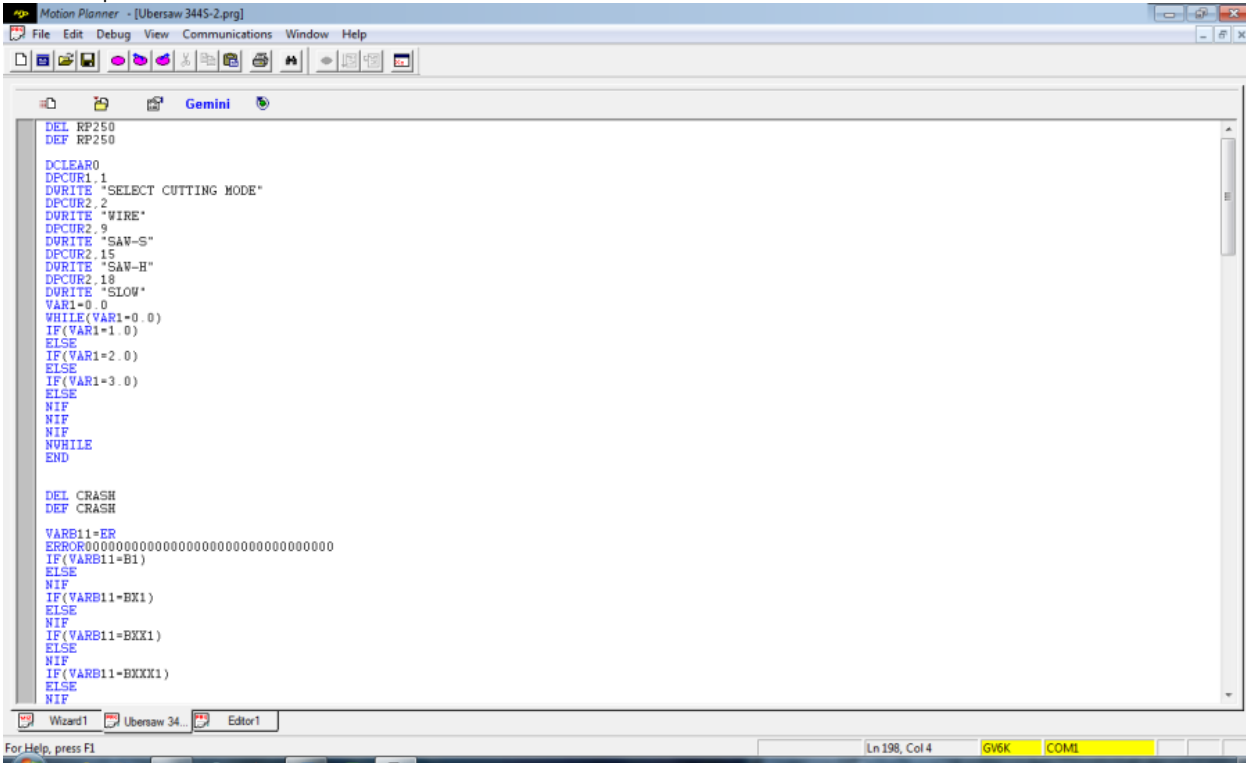


Figure B2: Viewing a program with Motion Planner.

Upload from Servo Controller

To view or download what programs are installed on a servo controller, connect the computer to the servo controller with RS-232 serial or Ethernet. Open Motion Planner and establish communication with the servo controller. Open a New Program Editor window. Click the "Upload Editor" button and select "Upload Program(s) from Drive" (Figure B3). The software should return a list of code that is loaded onto the controller (Figure B4). The controller that is installed on the Core Splitter should return a list with all five components of code listed above. The spare controller may or may not have the code already installed. The user can then select which program to view.

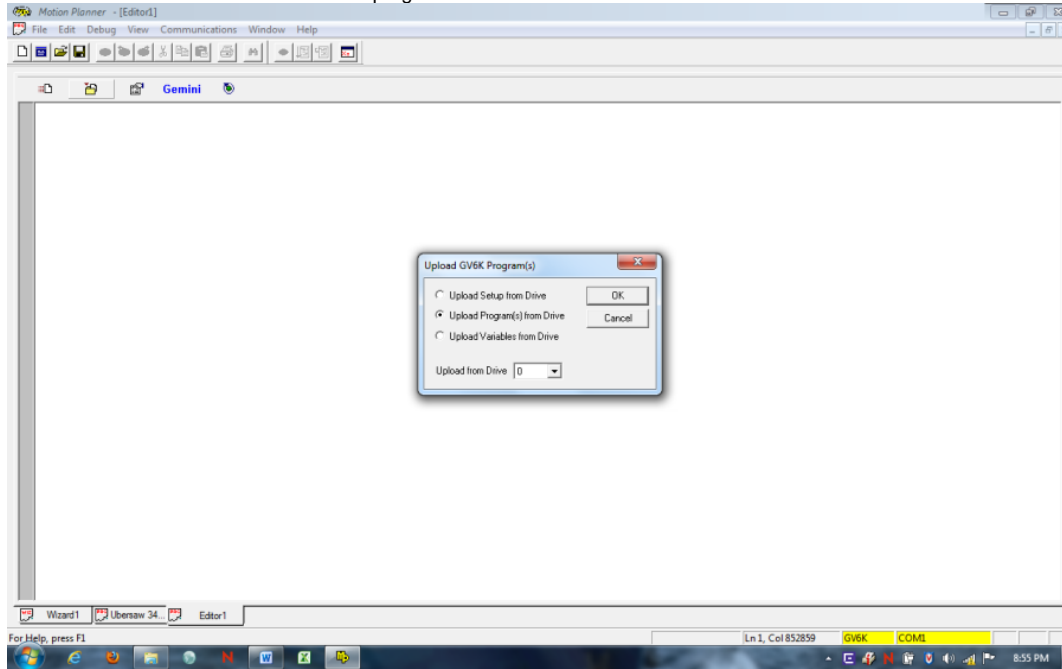


Figure B3: Uploading programs from a servo controller icon and dialog box.

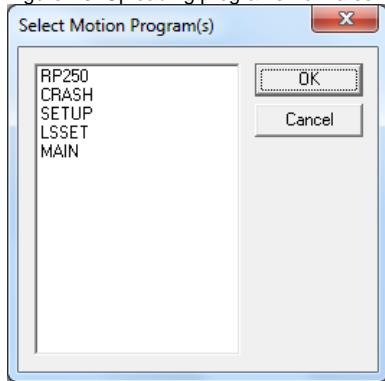
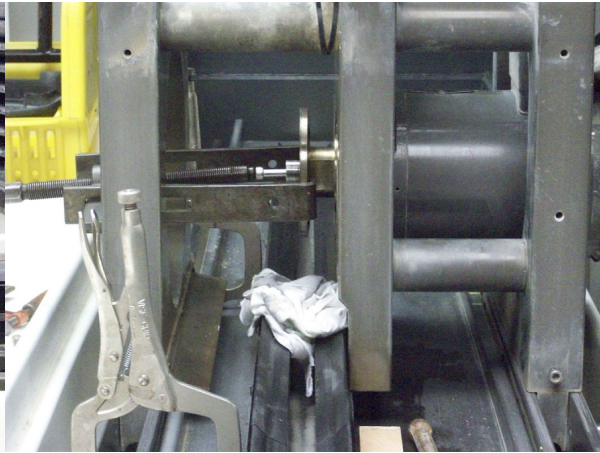
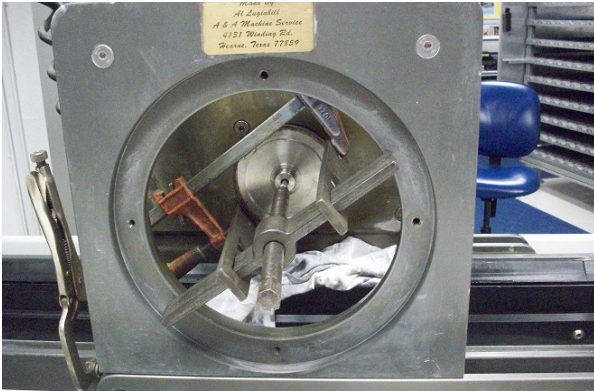
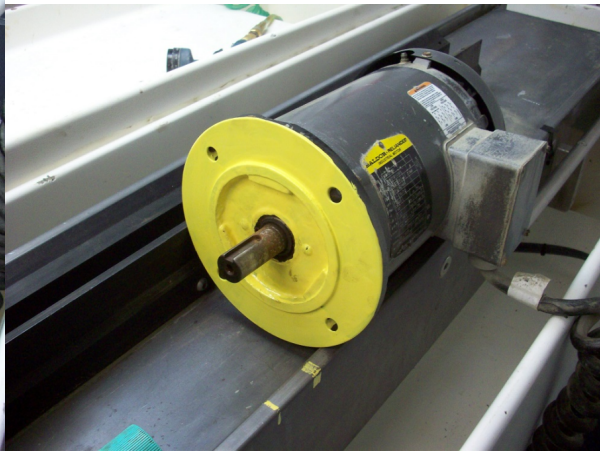


Figure B4: List of program code on the servo controller.

Download to Servo Controller



Removal of the blade flange from the saw motor.



Saw motor before and after refurbishment.



Left: Lifting of the saw housing off of the splitter with a chain hoist.
Right: Lifting of the port end of the splitter with a chain hoist.



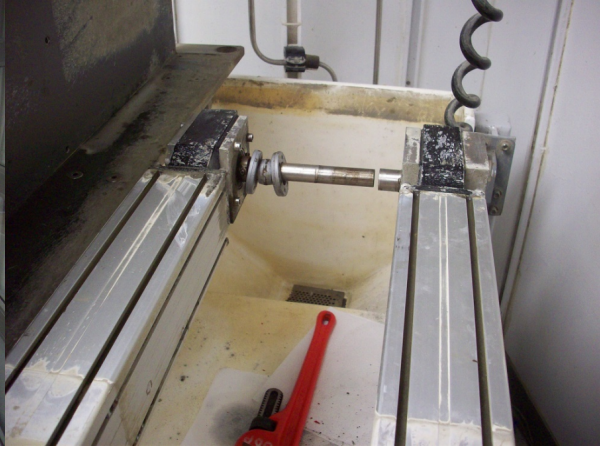
Left: Lifting of the port end of the splitter and blocking.
 Right: Lifting of the starboard end of the splitter.



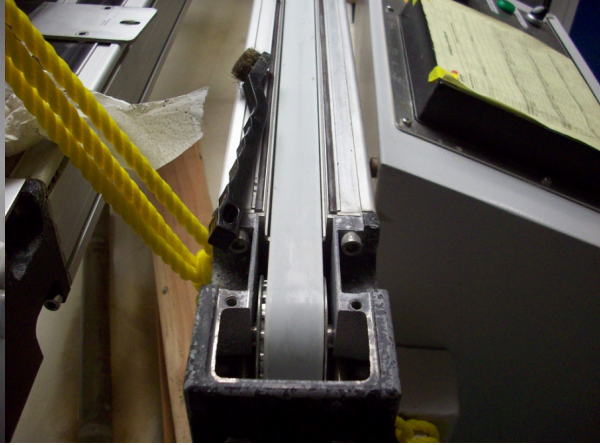
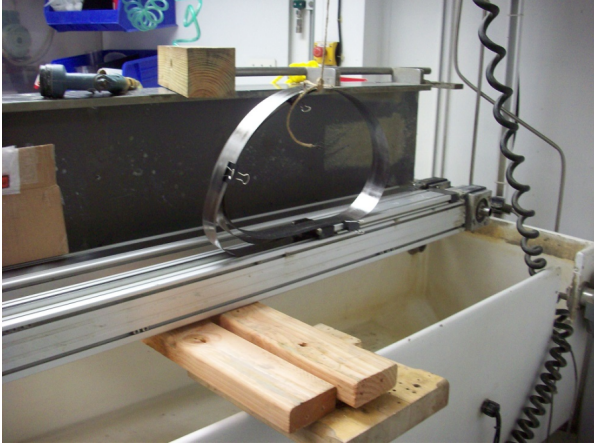
Left: Blocking of the starboard end of the splitter.
 Right: Removal of the side brackets of the splitting carriage.



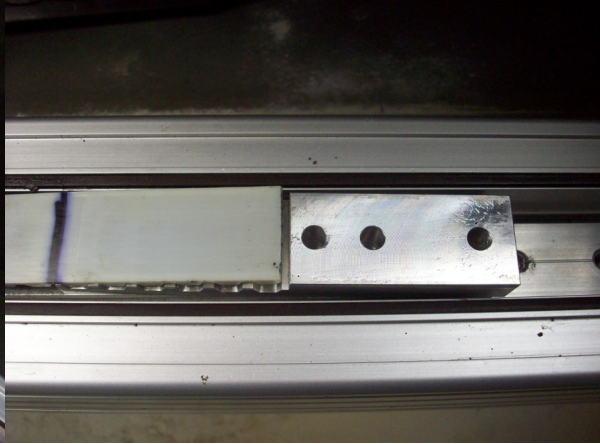
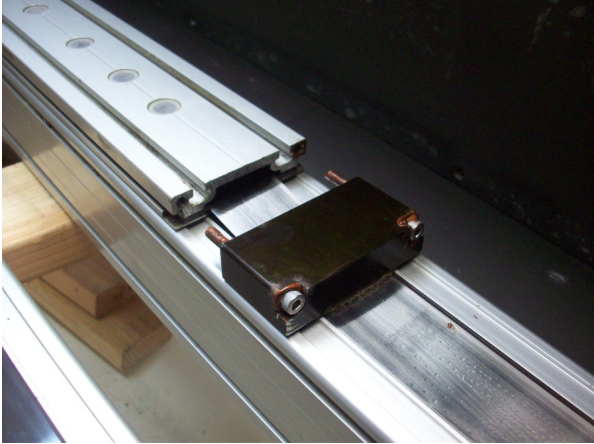
Left: Underside of the splitter showing linear actuators and travelling blocks for the splitting carriage.
 Right: Top of the linear actuators with the brackets that attach them to the splitter frame.



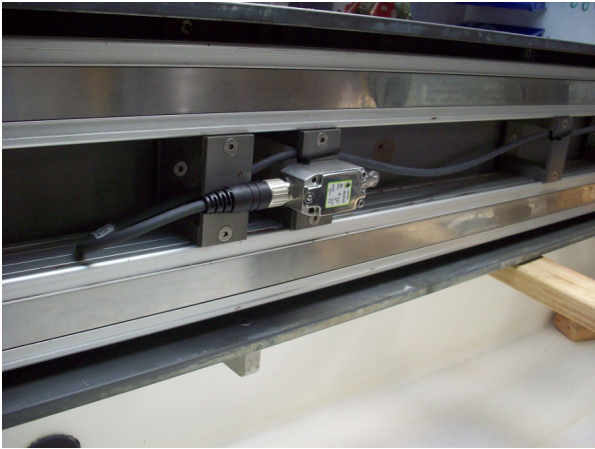
Left: Linear actuators with brackets removed.
Right: Motor shaft separated for cleaning and inspection.



Left: Removal of the protective cover of the actuator belt drive.
Right: Linear actuator belt.



Left: Linear actuator travelling block.
Right: Belt attachment to travelling block.



Left: Travelling block limit switch, one of two.

Right: