

DCB Trouble Shooting Guide

Clamps & DrawBar

Clamps & Draw Bar:

Information:

The Clamp system of the DCB Bender utilizes 2 hydraulic cylinders for the Clamps and one Cylinder for the Draw Bar. The Clamps are plumbed in a Y configuration. Timing of the clamps is done via Flow Controls mounted on the exhaust side of the Cylinders to regulate forward clamping. The Flow & Pressure of the hydraulic pump regulate speed of the clamps. Clamp On/Off duration is controlled by Software Parameters. The Clamps & Drawbar Solenoid valves are Dual ended and run from 24 vdc. Hydraulic Pressure should be 1000-PSI. Max.

To Test the Clamp System:

- 1) Release Estop , Start Pump , Switch to Manual Mode
- 2) Actuate the Clamp FWD/REV buttons on the Screen
- 3) FWD ...Clamps should move FWD and Drawbar should go down.
- 4) Rev ...Clamps should reverse and Drawbar should go up.

If Clamp system passes this test the electronics are fine, the source of the problem is in the software parameters.

Problem	Possible Cause	Solution	Series
Clamps or Draw Bar not working	Control Panel button stuck to one side or push button contact broken	R&R Clamp Switch and or Contact Block	All
Clamps or Draw Bar Erratic Operation or Sticking in one direction. <i>This is the most common problem found on the Bender, due to faulty relays on Models up to Series 20014</i>	Clamps and(or) Drawbar Relay(s) are Malfunctioning	Replace Relay CR4 or 7 for Fwd Errors CR5 or 8 for Rev	2001-14
	Solid State Relay is Malfunctioning	Replace Relay SSR2 or 3 for Fwd Errors. Or SSR6 or 7 for Rev Errors	2015-Up

Clamp not staying Clamped for duration of Cycle	Clamp Delay Timer interval is to short	Set Parameter Clamp Delay = 700	All
Auto or Semi”			
Clamps not indexing forward evenly	Hyd. Pressure to low	Set Hyd. Pressure to 1000 PSI.	All
	Clamps Flow Controls out of adjustment	Cycle Clamps Manually and set Flow Controls	All
Bend Arm Returning prematurely	Return button is Stuck Dc	Replace Return Button	All
Bend Arm Returning prematurely	Un/Clamp Delay set to lo	Set clamp delay to 700	All

StopTable

Stop Table

Information:

This system is comprised of the Servo controller Dac (Digital to Analog) signal to the AMC servo amp Pins 4&5. This Signal is amplified and sent to the Rail Brushless ServoMotor. The servomotor has an Encoder that sends Position & Velocity Data to the Motion Control System.

- ✓ There is a **Status Led** on the AMC Servo Amp inside the Main Electrical Enclosure.
- ✓ Green = ok
- ✓ Red = Error.

This led must be Green for the Stop Table to function.

Emergency Stop must be up and the Pump must be on, for the Servo Amp to Enable (**See Electrical Print**)

Problem	Possible Cause	Solution	Series
Stop oscillation	Rail Gains not loaded properly on software initialization	Check gains in parameters against Setting in the Data sheet for changes and reset to default settings. Restart Software	All
Homing Inconsistency	Homing Proximity Switch Malfunction or wear	Touch Prox. Sw. with a piece of metal... red led should light on Prox. Switch if not Replace	All
	Loose Belt on Rail	Tighten Belt	All

	Check Clearance between Prox and Slide Cog.	Set to .050 clearance Max.	All
Mis-Positioning	Key-way of Drive belt Pulley damaged	Replace Drive Belt Pulley Shaft & Key & Bearings	All
	Slide Lock timer set to short	Check Parameters Sheet and set to Default Settings	All
	Rail PPU (Pulses Per Unit) Parameter Incorrect	Check Parameters Sheet Section Axis PPU ” and set Parameter 0 PPU ” to Default Settings	
	Table Is Severely Bent or Mis-Aligned	Sight down the length of the Rail and check for Straitness and correct using support brackets	All
	Check Rail Gain Parameters	Check gains in parameters against Setting in the Data sheet for changes and reset to default settings	
	Check Servo Amp Setting for Changes	Check Parameters Sheet and set AMC Amp Pot Settings on amplifier with voltmeter	All
Rail Slide (Stop) not functioning	Contact Relay Malfunction	Check Relay CR-6 ... CR6 should light when on using the manual mode Slide In/Out buttons on the Screen	2000-14
	Solid State Relay Malfunction	Check Solid State Relay SSR-5 should light when on using the manual mode Slide In/Out buttons on the Screen	2015-up
	Check Software option Slide off ” is not checked	Un-Check Disable Slide” in the Bender Software options	All
	Air slide Is Damaged or Dirty or needs lubrication	Disconnect Air lines from Cylinder and Manually actuate slide by hand to check. The slide must move freely	All

with no binding.

Erratic Stop Motion or Table Runaway

Information:

✓ **Axis Runaways are caused by 1 of 3 things**

1. Axis Dac (Digital to Analog) command lines are reversed or one line is broken or loose.
2. Encoder A/B signal lines are wired backwards
3. Total Encoder Failure

To Test Stop Table Encoder:

1. Turn Pump off, Press Estop Down, disconnect the main Air Line.
2. Loosen the 2 the Allen Bolts on the Rail Lock Air Cylinder, to release the Lock.
3. Physically move the slide by hand and observe the Rail Readout in the Software, it must count **Up** and **Down** when the axis is moved. If not the source of the Encoder Malfunction must be corrected.

Problem	Possible Cause	Solution	Series
No Motion & Servo Amp Lamp is Red	Servo Amp Fault ... when amp is OK a Green light is on of the AMC amp, Red if Amp is in Error from excessive current or wire is loose	Motor Phased incorrectly or Motor wires Damaged, or Rail Lock is Stuck on, cause an excessive load to the Motor/Amp Set	All
	Servo Amp to Motor Hall Phasing is incorrect. Hall wire is loose or broken.	There are 6 combinations of the 3 servo motor Hall wires. If replacing a motor it may be necessary to re phase the motor. Using a battery box (+/- 9v) and switching the 3 wires on the Servo Amp, till you can index the motor Fwd. Rev. smoothly ... the light on the amp must be green.	
No Motion & Servo Amp is Green and Rail is Holding in a fixed position	Rail Table Drive Belt is broken, Key is sheared in Motor to Rail Coupling shaft.	Repair Belt, Shaft Key, and or check Motor to Rail Coupling for Bolt Tightness	All
Runaway Axis	Encoder Failure	Replace Encoder or Inspect wiring and Connectors for	All

	defects	
Axis command wired backwards or Encoder AB Lines Wired backward or in correct	Switch command wires in pins 4 & 5 of the Servo Amp or AB airs of the Encoder	All

All

Rail Lock Unit

Information:

The Stop Table Locking Mechanism is comprised of a Pancake Type Air Cylinder. The locks function is to lock the table stop into position when at rest, and to keep the Stop from moving when an operator places the extrusion against it at the programmed stop position. It should lift (Unlock) before the Stop moves and Lock after the Stop has moved into position.

✓ **If Scratching is observed on the Stop Table Surface ... the lock is malfunctioning**

To check the lock:

1. Run 1 series of stops noting the area that the stop moves to for each move.
2. Place a piece of masking tape on the regions of the table where the lock should be engaged.
3. Run 1 Cycle Again observing the marks on the tape.
4. You should see only circles on the tape when you run another cycle.

5. If the tape is torn or scuffed in any way the stop is malfunctioning and must be repaired.

Problem	Possible Cause	Solution	Series
Rail Lock is making scratches on Rail Table	Rail Lock is Sticking	Check Air Lock Cyl. Shaft for Straightness	1-Up
Rail Slide Not locking in position @ End of Move	Air cylinder is damaged	Replace Air Cylinder for Air Lock.	
	Rail Lock Relay Malfunction	Check that light on Relay is on SSR-4 when lock is off	15-
		Check that light on Relay is on CR-10 when lock is off	11-15
		Check that light on	1-10

	Relay is on CR-7, when lock is off	
Rail Locking Pad is Worn	Repair or Replace wear pad	1-Up
Low Air Pressure	Check air Pressure Gage is @ 60 PSI.. Min.	1-Up
Air cylinder is defective	Test in manual mode for Cylinder Actuation	1-Up
Air lines are pinched	Check air line flow to lock cylinder	1-Up

Rail Slide Unit

Information:

The Slide (Stop) Mechanism is comprised of an Air Cylinder/Mechanical Slide and a Relay and is operated from 24vdc. The Rail Slides function is extend at the end of a move to provide a positive stop to place material against when at rest. It should Extend (Out) when the stop is in position and retract before the Stop moves to the next programmed position.

- ✓ The Bender software has a checkbox option to disable the Slide In-Out functions for special conditions

To Test the Slide:

1. **Lift Emergency Stop & Start Pump**
2. **Switch to Manual Mode**
3. **Click the Slide In/Out Buttons on the Manual Screen.**
4. **If the slide doesn't work check the following.**

Problem	Possible Cause	Solution	Series
Rail slide not sliding in or out	Disable Slide Option is checked in the software	Uncheck Disable slide in software	All
	Air cylinder is Damaged	Replace Air Cylinder	All
	Relay is Malfunctioning	Check Print for relay number. And observe LED when activated. If it's not on the relay is in Error and	All

	needs replaced	
Stop Table is not at the Programmed Position	See Stop Table Mis-Positioning section	All
Slide Unit is bent or binding	Disconnect Air lines from Air Cylinder & Check Slide Actuation and lube. If the slide unit slides freely then the Relay is in Error	All

Air System Settings

The air system requires a Minimum of 60 PSI. to operate properly.

And is set at the Regulator on the Side of the Bender.

StopTable Encoder

Information:

An Axis Runaway is caused by 1 of 3 things

4. Axis command lines are reversed or 1 line is Broken
5. Encoder A/B signal lines are wired backwards
6. Encoder Failure

✓ **Emergency Stop button must be up to operate**

To Test Stop Table Encoder:

1. Turn Pump off, Lift Estop & disconnect the Main Airline from the bender (This will disable the Rail Lock).
2. Slowly move the slide by hand and observe the Rail Readout in the Software, it must count **Up** and **Down** when the axis is moved.
3. If not the source of the malfunction must be corrected.

Problem

Encoder Not counting up or down

Possible Cause

Encoder is not plugged in properly

Solution

Check DB-9 Connector at Motor end of the Table & Check the Pins in the connector

Series

All

		aren't bent over or broken	
	Stop Table Belt is Broken	Repair or replace belt	All
	Encoder Ribbon cable in PC Console isn't fully Seated	Push connector down into socket	All
	Encoder is Defective	Replace Encoder	All
Encoder only counts in one Direction	Either the A or B lines of the encoder are loose or broken	Check DB-9 Connector at Motor end of the Table & Check the Pins in the connector aren't bent over or broken	All
Axis runaway	Encoder Feedback not phased properly	Check Color codes of the Schematic against the wiring in the DB-9 connector	All

Bend Arm

Bend Arm Errors

Information:

The Bend Arm is a Hydraulic Servo Unit. An Encoder closes the Control loop to the Motion controller.

The Hydraulic Servo Amp requires 24vdc from the machine power supply to operate. The Hydraulic Servo Amp is the Cream colored unit Made by Nachi" in the Main Enclosure. It has 4 control pots that *never need adjustment*.

Most problems associated with the Bend Arm will be Software Parameter Setting, Gains or Hydraulic Pressure.

Estop must be up and The pump turned on for the arm to function. There are 2 red LED's on the top right side of the Amp. The top LED should be on all the time, the 2nd LED (enabled) should be on when the pump is on and Estop is released up.

Problem

Possible Cause

Solution

Series

No Motion	Estop is Down or Pump not on	Lift Estop & Start Pump	All
	Servo controller card in PC is defective ... Lift lid on Console and check the Status LED (ACR2000) on Side-Top of Servo controller. This light must be Green. If Red the Motion controller is in Error.	Shut machine down and lift console cover and re-seat Servo Controller Card and or replace if found defective.	
	Internal Drive Chain Broken... usually due to increasing Hydraulic Pressure above 1000 PSI.	R&R Drive Chain and Reduce Hyd. Pressure to 1000 PSI.	All
	Defective 24v Power supply	Check DC Power supply voltage for 24vdc	All
Jerking in Jog Mode	Acceleration or Velocity parameter to High	Set to Default Settings from Data sheet in Electrical Enclosure Door	All
Jerking in all Modes	Bend Arm Encoder Belt is loose or Gains have been set to high. Acceleration or Velocity set to High	Check Encoder Belt on bottom of Arm. Reset Gains to Data Sheet Values (Default)	All
		Reset Acc Vel to Default Values on Data sheet	
Slow Arm Movement	Hyd. Pressure to Low. Bend Arm is Bound up or software Feedrate Override Slider is set low.	Set Pressure to 1000 PSI. on gauge. Inspect Arm chain Drive assembly and disconnect	All

		chain to check for free movement.	
Home Position Error	Encoder to Belt Drive Gear Set screw may be loose	Inspect Encoder Gear reduction box Belt and associated gear train	All
	Home offset in parameters has changed. Home Limit Switch is Loose or Arm Encoder Belt is loose.	Set Arm home offset to 0, home Arm and enter Offset Value of the distance to go to final home position. Re-home axis and check again.	All
Arm Jumping when Estop is depressed	Not turning the pump off first then Estop. If you just cut the power from the Hydraulic System using Estop before turning the pump off. It places the Servo arm in an uncontrolled state.	Turn pump off before depressing the Estop button. This relaxes any bi-directional pressure in the Arm Valve, which is causing the Jump.	All
Bend Arm Returning prematurely	Return button is Stuck Down	Replace Return Button	All
Bend Arm Returning prematurely	Un/Clamp Delay set to low	Set clamp delay to 700	All
Runaway Bend Arm Axis	Encoder Failure	Replace Encoder or Inspect wiring and Connectors for defects	
	Axis command wired backwards or Encoder AB Lines Wired backward or in correct	Switch command wires in pins 4 & 5 of the Servo Amp	All

or AB airs of
the Encoder

To Test the Bend Arm Encoder use the Following procedure:

- 1 ... Turn pump off & depress Estop
- 2 ... Loosen the Encoder housing bolts until tension is released on the Red Coated Link Belt and remove it from Encoder Gear box Assembly.
- 3 ... Lift Estop but **don't start the pump.**
- 4 Physically move the Encoder and observe the Arm Position readout in the Software.

**The readout must! Count up and Down when the encoder is rotated Fwd. and Rev.
If not the Encoder is malfunctioning ... Contact Minland Machine for assistance.**

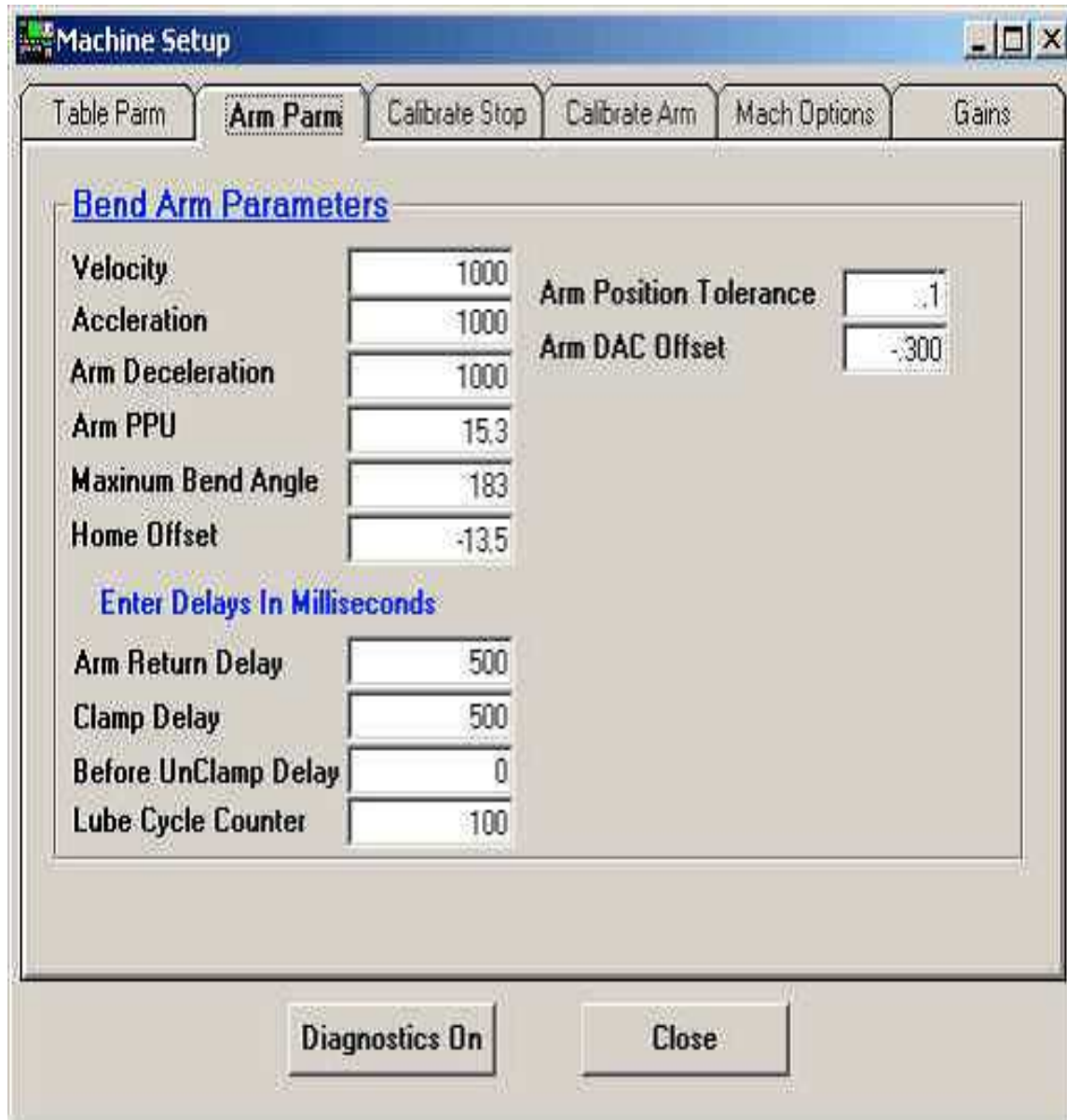
Important: after completing this test the "Home Offset" must be reset in the software. See To Set the Arm home Offset

To Set the Arm home Offset:

Switch to Manual Mode.

Open the Machine Parameters Screen and move the box to the side so you can still hit the Arm Jog and Home buttons.

1. Goto the Machine Parameters (**Arm Parameters**) and **Set the Home Offset to = 0.0**
2. Home the Arm with the offset set to 0 the arm will stop short of the hard stop.
The distance left between the Arm and the Hard Stop is the **Home offset** to enter and is in degrees.
3. The key is to creep up on the final offset value in small increments of -2 to -5 degrees.
4. The Arm should home against the cushion, but not slam when done. Typical Settings are -5 to -15 degrees and are always negative.



Bend Arm Encoder

Information:

- ✓ An Axis Runaway is caused by 1 of 3 things
 1. Axis command lines are reversed or 1 line is Broken
 2. Encoder A/B signal lines are wired backwards
 3. Total Encoder Failure

✓ **Emergency Stop button must be up to operate**

To Test the Bend Arm Encoder use the Following procedure:

- 1... Turn pump off & Lift Estop
- 2 ...Loosen the Encoder housing bolts until tension is released on the Red Coated Link Belt
And remove it on the Encoder Side of the Assembly.

3 ... Physically move the Gear and observe the Arm Position readout in the Software.
 The readout must! Count up and Down when the arm is moved Fwd. and Rev.
 If not the Encoder is malfunctioning ... proceed to the following section.

Problem	Possible Cause	Solution	Series
Encoder Not counting up or down	Encoder is not plugged in properly	Check the Circular Connector at the base of the swing Arm & Check the Pins in the connector aren't bent over or broken	All
	Bend Arm Chain inside Bender is Broken	Repair or replace chain inside top of Bender	All
	Encoder Ribbon cable in PC Console isn't fully Seated	Push connector down into socket	All
	Encoder is Defective	Replace Encoder	All
Encoder only counts in one Direction	A or B Lines are Blown in the Encoder	Replace Encoder	All
	Either the A or B lines of the encoder are loose or broken	Check the Circular Connector at the base of the swing Arm & Check the Pins in the connector aren't bent over or broken	All
Axis runaway	Encoder Feedback not phased properly	Check Color codes of the Schematic against the wiring in the Circular Connector	All

Air System

Lube System

Setting the Lube Pump

The Lube System is factory set and **should never need Adjustment**. The Bender is Automatically lubed every 100 Bends as defined in the **Lube Cycle Counter** in the **Bend Arm Parameters** .

The Bender is equipped with a Manual Lube Button on the Main Screen of the program. Emergency Stop must be up to function.

- ✓ The Lube system consists of the Lube Tank / Air solenoid / Plastic Lines and Special fittings at the end of the lines that keep the system pressurized.
- ✓ There is also a lube Tank Level Low signal that will tell you that the Lube Level is Low.

The will notify the user of this event.
- ✓ To Manually lube the system there is a button on the top right of the Software named **Lube**” that will manually give the Bender 1 shot of oil.
- ✓ **If the Lube lines are removed or the Lube System seal is broken it may be necessary to manually activate this button till the lube line are full and pressurized again.**
- ✓ If you suspect that the lube system is in error check the fittings at the end of the lines if any fitting is damaged it will create uneven pressure in the Lube System and some machine parts will be lubricated and others wont be lubed at all.
- ✓ **To Test the Lube System:**
 1. Lift Estop
 2. Switch to Manual Mode
 3. Click the Lube Button” on the screen... you should hear an Exhaust Sound from the Solenoid Valve next to the lube tank. If not either the Air supply is to low (below 60 PSI..) or the Air Solenoid Valve or the Lube Relay is defective. The Lube Relay Indicator in the Maine (Electrical Enclosure) LED should be Green when on and the System is 24vdc.

Reloading AcroBasic Programs

Downloading AcroBasic Programs

Appendix B:

AcroBasic Functions:

Information:

- ✓ The Bender Control System consists of 3 parts.
 1. The Main Program that the user sees.
 2. A PLC type program that resides in the Motion Controller itself in what is called Flash Memory and is Non-Volatile.
 3. A DLL file that handles all low level Motion Control Functions.

- ✓ It may happen that this Flash Memory program of Subroutines has been corrupted by a power surge, lightning and or incorrect Shut Down Procedure. Although this is rare it may be necessary to reload the Flash programs to the Motion controller. The Following instructions explain how to download the Programs.

✓ To Download the AcroBasic programs to the Flash:

1. Exit to Windows from the Bender Software and open AcroViewNT icon on the Screen.
2. Goto the command line at the bottom right of the screen and type the following commands. (Note: user may need to right click and select Echo On” if what you type doesn't show on the screen when typing).

Halt All**Flash Erase**

Select Open Project from the top left pull down menu, and select Default”, and answer Yes to download to card” and Gains. Clicks into the command line at the lower left of the screen and obtain a cursor. After programs have been downloaded, type the following commands followed by pressing Enter for each command

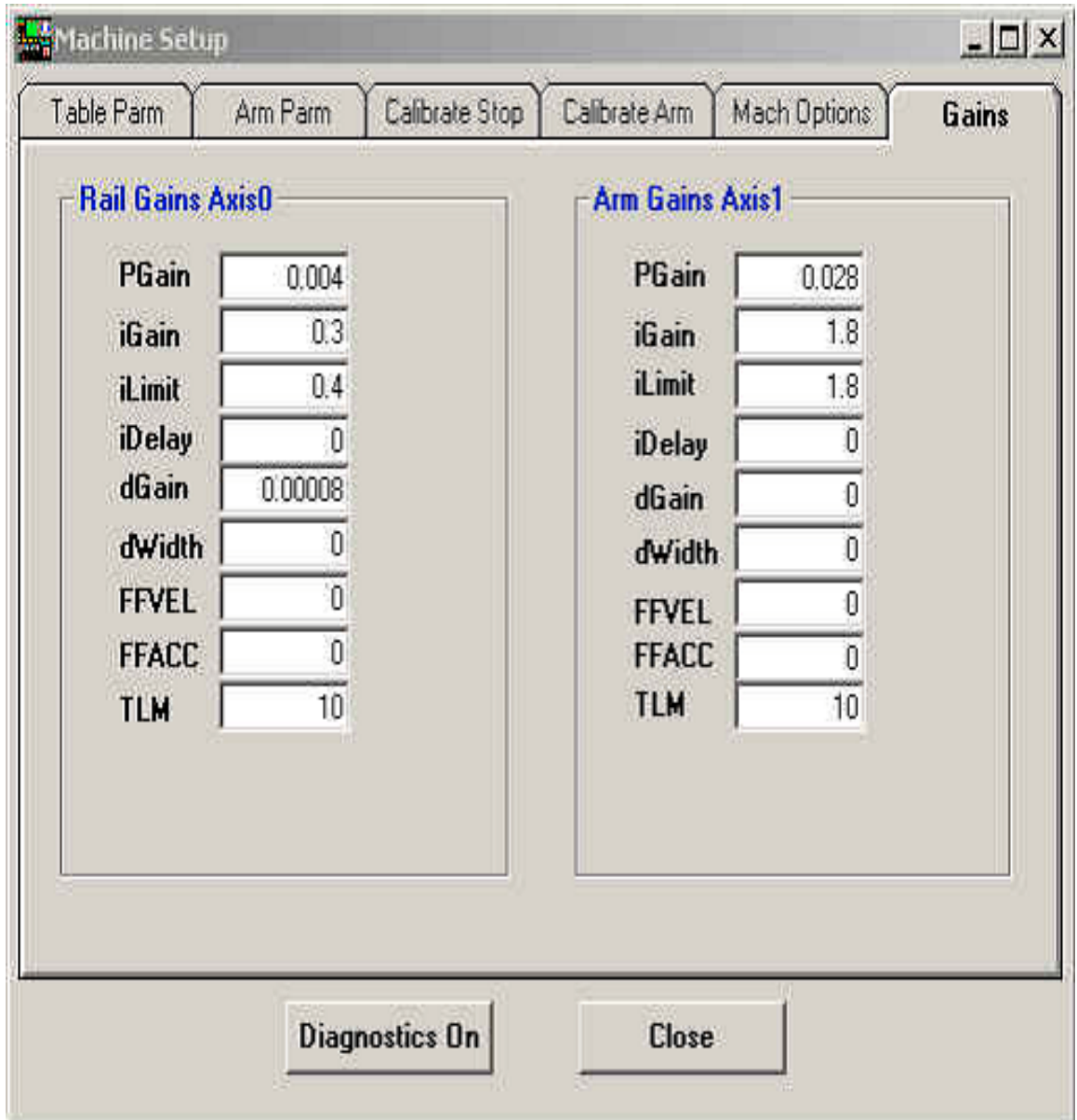
Flash Save**Esave****Esave All****Run all**

The New Program is now Stored into the Motion Cards Flash Memory.
Exit Acroview, and restart the Bender Software.

Software & Parameters

Gains

These are the Gains for the System amplifiers all benders from 2005 on use the same Gain Settings.



StopTable Parameters

Machine Setup

Table Parm Arm Parm Calibrate Stop Calibrate Arm Mach Options Gains

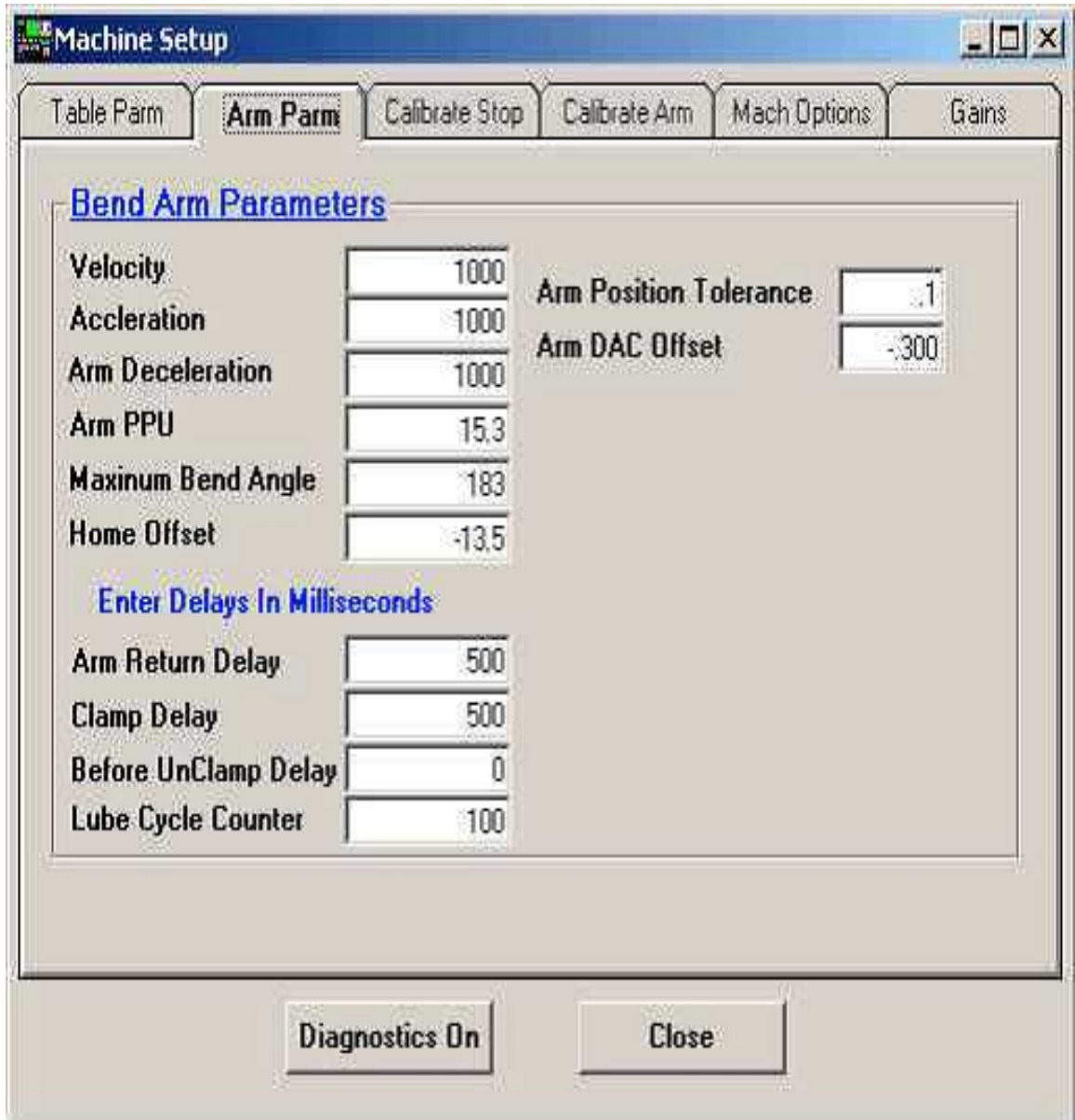
Stop Table Parameters

Max Velocity	500	New Program Defaults	
Max Acceleration	400	<input type="radio"/> Absolute	<input checked="" type="radio"/> Incremental
Rail Deceleration	300	<input checked="" type="radio"/> English <input type="radio"/> Metric	
Rail PPU	1410.96	Stop Position Tolerance	.002
Zero Offset	183.75	Home Offset	.100
Forward Limit	183		
Reverse Limit	-1		
Tooling Length	24		
Timer Interval	50		

Enter Delays In Milliseconds

Air Stop Delay	0
Air Slide Clamp Delay	300
Forward PB I/O Delay	0

Bend Arm Parameters



Parameters Data Sheet

Included with every bender from 2011 on inside the Main Electrical Enclosure Door is a Data sheet that contains all the Key Machine Parameters for Reference.

DCB10 Regression & Repeatability Certification

Machine Serial

20014

Machine Parameters As Tested

Number			
Date Tested	6/11/03		
Initials	DRB	[AxisPPU]	[MachineOptions]
VB Version	3.1.1	0PPU=1410.96	SerialNo=20014
Dll Version	2.0.0.0	1PPU=15.3	TimerInterval=50
MotherBoard (SOYO)	SY-7VMA-B	2PPU=0	MandrelOption=0
		3PPU=0	IdleTime=60
Machine Specifications		4PPU=0	Mandel=False
Operating System Win98se/NT4.0	Win98se	5PPU=0	drawBarFirst=True
TouchScreen Port USB/Serial	USB	6PPU=0	drawBarInJog=True
		7PPU=0	ScannerOption=False
<i>Homing</i> Repeatability@10cycles	0.002		RequirePartNo=False
<i>Positioning</i> <i>Repeatability</i>	0.002	[SystemResolution]	
Swing Arm Deviation@90	0.2	0Resolution=0.000 714332648	[MachineMaint]
24vdc Power Supply Voltage	24.4	1Resolution=0.016 3940385	TotalPowerOnHours=58.7 1
24vdc Supply Model 4.6/6.4	4.4	2Resolution=0.000 063803	TotalPumpHours=0.5 1
Main AC Power Type 220/440	220	3Resolution=0.000 063803	TotalBendCycles=51 82

Hydraulic Pres@ Guage	1000	4Resolution=.0 002	FilterChangeInterval =10
Hyd Oil Temp Warmed up	90	5Resolution=.0002 4414	TotalFilterHours=0.5 1
Air Pressure @ Guage	60	6Resolution=.0 002	TotalStopTravel=33796.9 4
		7Resolution=.0 002	
		HandWheelPP R=100	[StopTableParamet ers]
			MaxAcc=150
		[Gains0] Rail	ZeroOffset=238.75
		PGAIN=.004	ForwardLimit=224
		IGAIN=.3	ReverseLimit=-1
		ILIMIT=.4	ToolLength=24
		IDELAY=0	DefaultPositionMode =0
		DGAIN=0.000 08	DefaultMetric=0
		DWIDTH=0	AirStopDelay=0
		FFVEL=0	SlideClampDelay=30 0
		FFACC=0	RetractBeforeClamp =0
		TLM=10	ForwardPBdelay=0
			PositionTolerance=.0 02
		[Gains1] Swing Arm	Decel=150
		PGAIN=0.028	MaxVel=200

IGAIN=1.8 StopHomeOffset=.10
0

ILIMIT=1.8

IDELAY=0

[SwingArmParameters]

DGAIN=0.000
1

MaxAcc=700

DWIDTH=0.00
1

MaxVel=700

FFVEL=0

MaxBendAngle=183

FFACC=0

ClampDelay=700

TLM=10

UnclampDelay=0

ArmReturnDelay=70
0

LubeCounter=100

HomeOffset=-6.0

**AMC Amp Pot
Settings**

Loop Gain = .6
ohms

swingArmFudge=0

Current Limit =
16.3 K

PositionTolerance=.1

Gain = 0 ohms

DeCel=250

Offset = 21.9K

armHomeOffset=-.7

ArmDacOffset=-.200