

Operator's Manual



McELROY

www.mcelroy.com



High Speed Tensile
with Impact Testing System

McSnapper®



PH014529-17-98

Thank You for purchasing this McElroy product

The McElroy McSnapper® is a tensile with impact testing machine designed specifically for polyolefin materials. It was developed to accurately test fusion joints. The McSnapper is designed to meet ASTM F2634 standard test method for laboratory testing of polyethylene (PE) butt fusion joints using tensile impact testing. The machine can be used in the development of new materials, quality assurance for existing materials, or in fusion compatibility to determine lot uniformity, strength and fusibility of pipe and fittings.



Warranty



LIMITED WARRANTY

McElroy Manufacturing, Inc. (McElroy) warrants all products manufactured, sold and repaired by it to be free from defects in materials and workmanship, its obligation under this warranty being limited to repairing or replacing at its factory and new products, within **5 years** after shipment, with the exception of purchased items (such as electronic devices, pumps, switches, etc.), in which case that manufacturer's warranty applies. Warranty applies when returned freight is prepaid and which, upon examination, shall disclose to have been defective. This warranty does not apply to any product or component which has been repaired or altered by anyone other than McElroy or has become damaged due to misuse, negligence or casualty, or has not been operated or maintained according to McElroy's printed instructions and warnings. This warranty is expressly in lieu of all other warranties expressed or implied. The remedies of the Buyer are the exclusive and sole remedies available and Buyer shall not be entitled to receive any incidental or consequential damages. Buyer waives the benefit of any rule that disclaimer of warranty shall be construed against McElroy and agrees that such disclaimers herein shall be construed liberally in favor of McElroy.

RETURN OF GOODS

Buyer agrees not to return goods for any reason except upon the written consent of McElroy obtained in advance of such return, which consent, if given, shall specify the terms and conditions and charges upon which any such return may be made. Materials returned to McElroy, for warranty work, repair, etc., **must have a Return Material Authorization (RMA) number**, and be so noted on the package at time of shipment. For assistance, inquiry shall be directed to:

McElroy Manufacturing, Inc.
P.O. Box 580550
833 North Fulton Street Tulsa, Oklahoma 74158-0550
PHONE: (918) 836-8611, FAX: (918) 831-9285.
EMAIL: fusion@McElroy.com

Note: Certain repairs, warranty work, and inquiries may be directed, at McElroy's discretion, to an authorized service center or distributor.

DISCLAIMER OF LIABILITY

McElroy accepts no responsibility of liability for fusion joints. Operation and maintenance of the product is the responsibility of others. We recommend qualified joining procedures be followed when using McElroy fusion equipment.

McElroy makes no other warranty of any kind whatever, express or implied; and all implied warranties of merchantability and fitness for a particular purpose which exceed the aforesaid obligation are hereby disclaimed by McElroy.

PRODUCT IMPROVEMENT

McElroy reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold machines and/or the accessories thereto.

INFORMATION DISCLOSED

No information of knowledge heretofore or hereafter disclosed to McElroy in the performance of or in connection with the terms hereof, shall be deemed to be confidential or proprietary, unless otherwise expressly agreed to in writing by McElroy and any such information or knowledge shall be free from restrictions, other than a claim for patent infringement, is part of the consideration hereof.

PROPRIETARY RIGHTS

All proprietary rights pertaining to the equipment or the components of the equipment to be delivered by McElroy hereunder, and all patent rights therein, arising prior to, or in the course of, or as a result of the design or fabrication of the said product, are exclusively the property of McElroy.

LAW APPLICABLE

All sales shall be governed by the Uniform Commercial Code of Oklahoma, U.S.A.

Register your product online to activate your warranty: www.McElroy.com/fusion

(Copy information listed on the machine nameplate here for your records).

Model No. _____

Serial No. _____

Date Received _____

Distributor _____



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Safety Alerts



This hazard alert sign appears in this manual. When you see this sign, carefully read what it says. **YOUR SAFETY IS AT STAKE.**

You will see the hazard alert sign with these words: **DANGER**, **WARNING**, and **CAUTION**.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

In this manual you should look for two other words: **NOTICE** and **IMPORTANT**.

NOTICE: can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

IMPORTANT: can help you do a better job or make your job easier in some way.

TX00030-12-1-92



WR00051-11-30-92

Read and Understand

Do not operate this equipment until you have carefully read, and understand all the sections of this manual, and all other equipment manuals that will be used with it.

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

Follow all applicable federal, state, local, and industry specific regulations.

McElroy Manufacturing, Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.



TX02946-4-15-09

WR00052-12-1-92



Safety



General Safety

Safety is important. Report anything unusual that you notice during set up or operation.

LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

SMELL odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

FEEL any changes in the way the equipment operates.

SEE problems with wiring and cables, hydraulic connections, or other equipment.

REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.



SAFE1ST12-22-92

TX00114-4-22-93

Wear Safety Equipment

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

Remove jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.



WRO0053-12-2-92

TX00032-4-7-93

Hydraulic Safety



Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury. Refer all servicing of hydraulic system to qualified personnel

NOTICE: Hydraulic system may be pressurized even when the machine is turned off. Before performing maintenance to the hydraulic system, bleed the system of any pressurized fluid. Refer to section "Maintenance Shutdown Procedure" for instructions on depressurizing the hydraulic system.

NOTICE: wear safety glasses, and keep face clear of area when performing maintenance on the hydraulic system to avoid spraying oil into eyes.



WRO0078-4-8-93

TX02921-4-13-09



Safety



Electrical Safety



WARNING Always ensure power cords are properly grounded. It is important to remember that you are working in a wet environment with electrical devices. Proper ground connections help to minimize the chances of an electric shock.

Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

NOTICE: Always connect units to the proper power source as listed on the unit, or in the owner's manual. On units with two power cords, plug each cord into separate power circuits. Do not plug into both outlets of one duplex receptacle.

NOTICE: Disconnect the machine from the power source before attempting any maintenance or adjustment.



WR00055-4-7-93



WR00025-11-30-92

TX02922-4-13-09

Crush Points



WARNING Hydraulically operated cylinder operates under pressure. Anything caught in the coupon retention clevis will be crushed. Keep arms, hands, fingers, and head out of the clevis and cylinder area. Use caution when "jogging" cylinder position for coupon installation



WR00012-12-4-92

TX00183-6-7-93



Overview



Overview of McSnapper®

The McSnapper operates using a hydraulic cylinder to provide the force and prescribed motion requirements. After the unloaded crosshead has traveled a short distance, allowing it time to come up to speed, it impacts the lower clevis assembly, applying an impact load to the sample and continuing to pull at a nearly constant velocity until the coupon has ruptured.

A linear transducer records the crosshead position throughout the duration of the test and a piezoelectric load cell mounted to the upper clevis measures the reaction forces transmitted through the sample.

The data acquired and inspection of the point of rupture in the coupon can indicate properties of the plastic or the efficiency of a method of joining.

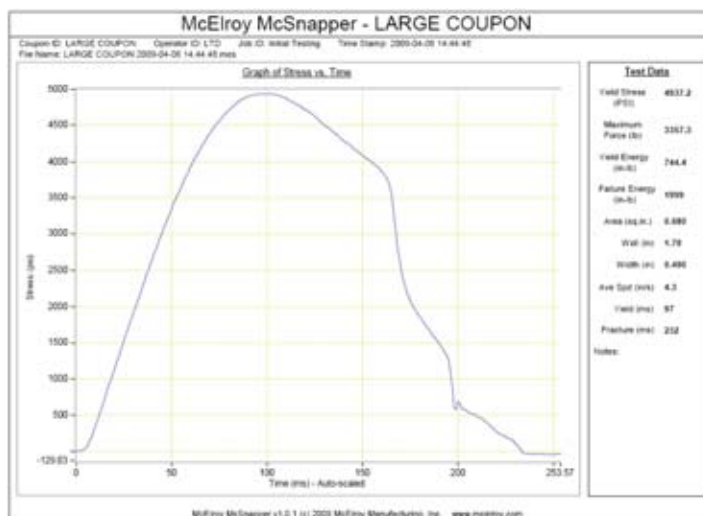
The quantitative data acquired during any individual test is stored by the software in an individual file which can be recalled as necessary. Individual or batch reports can be generated in the software to document the results of tensile-impact testing. These reports include charts of engineering stress, reaction force, work done, crosshead displacement and crosshead velocity in both time and displacement domains. These reports also include significant values such as coupon identification, yield stress, yield energy, failure energy, average test velocity, coupon dimensions, and test notes in a tabular format.

An example of a ductile rupture and a brittle rupture can be seen in examples 1 and 2

Example 1 is a report of a ductile rupture. The coupon obtained a yield stress level comparable to the parent material and evidenced good ductility prior to rupture.

Example 2 is a report of a brittle rupture. The coupon ruptured at a high stress level comparable to the parent material but evidenced little to no ductility prior to rupture.

It can be seen from these examples how the McSnapper provides a quantitative, scientific approach that serves as a versatile and valuable tool to aid in optimizing fusion quality.



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PH03831-4-9-09



Operation (Butt Fusion Testing)



About the Software

The software that acquires and analyzes the data from the McSnapper® written by McElroy Manufacturing, Inc.,. To operate this software, the operator should be familiar with the Microsoft Windows Environment. This manual assumes the user is familiar with the Windows environment.

TX02924-4-13-09

Test Capability

This machine can be used to test butt fusion coupons up to 2.6" thick. Coupons from 1/4" up to 2.6" thick can be tested with the standard McSnapper clevises. Coupons must be machined by a qualified machine shop.



PH03848-4-13-09

TX02925-4-13-09

Preparing Test Coupon

The test coupon is cut from a sample of pipe using the method selected by your organization. A detailed drawing of the coupon can be seen in the Appendix. It is important that the coupon matches the drawing specifications so that test data can be compared with other samples in a meaningful manner.



PH03849-4-13-09

TX03033-9-16-09

Turning System Power On

The McSnapper test unit is turned-on by pressing the green button labeled on and by turning surge protector on, opening CPU cover and pushing the CPU switch on. Once activated, the machine will go through its power-up sequence: the computer will boot up and the pump will run if the accumulator pressure is less than that required to conduct a test. Check the hydraulic system pressure gauge to assure that the necessary pressure is being achieved. The system pressure should be between 2400 - 3000 psi.

TX02926-4-13-09



PH03826-4-6-09



PH03850-4-13-09

Initiating Program

Log onto the McSnapper computer. There is a "McSnapper" shortcut icon on the desktop. Double click on this icon to start the program.

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PH03833-4-9-09

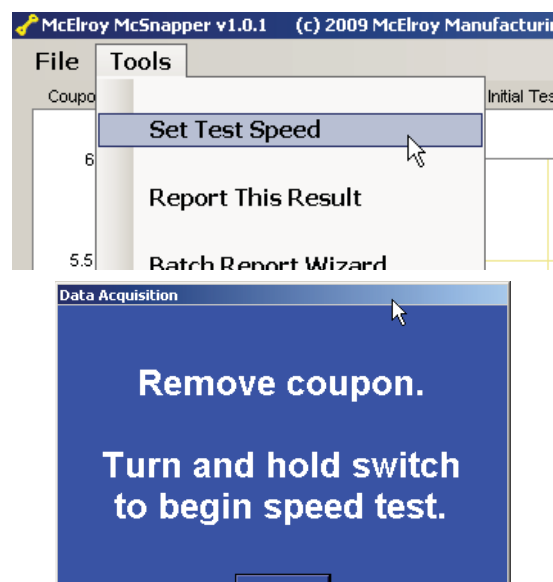
Setting Test Speed

A pressure compensated flow control valve is used to adjust the velocity. It is located in the test chamber with a placard. Before testing samples, use the following procedure to set the correct speed.

- 1) Open the test chamber and remove any sample held in the clevises.
- 2) Close the test chamber door.
- 3) Turn the cylinder switch to "HOME", to return the cylinder to starting position.
- 4) In the software, under the Tools drop down menu, select "Set Test Speed".
- 5) Turn the cylinder switch to "TEST" and hold until the cylinder is no longer in motion. Release the switch to its neutral position.
- 6) The software will display a graph of the crosshead velocity and the average speed.
- 7) If the average speed is lower than the required test speed, then turn the velocity control valve counter-clockwise to increase the speed. If the average speed is higher than the required test speed, then turn the velocity control valve clockwise to decrease the speed.



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PH03834-4-6-09

PH03835-4-6-09



Operation (Butt Fusion Testing)



Setting Test Speed (continued)

- 8) Repeat step 3 thru 7 until the average speed is within the testing requirements.

Once the average speed is set, the McSnapper is ready for testing.

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PH03827-4-6-09

Performing a Test

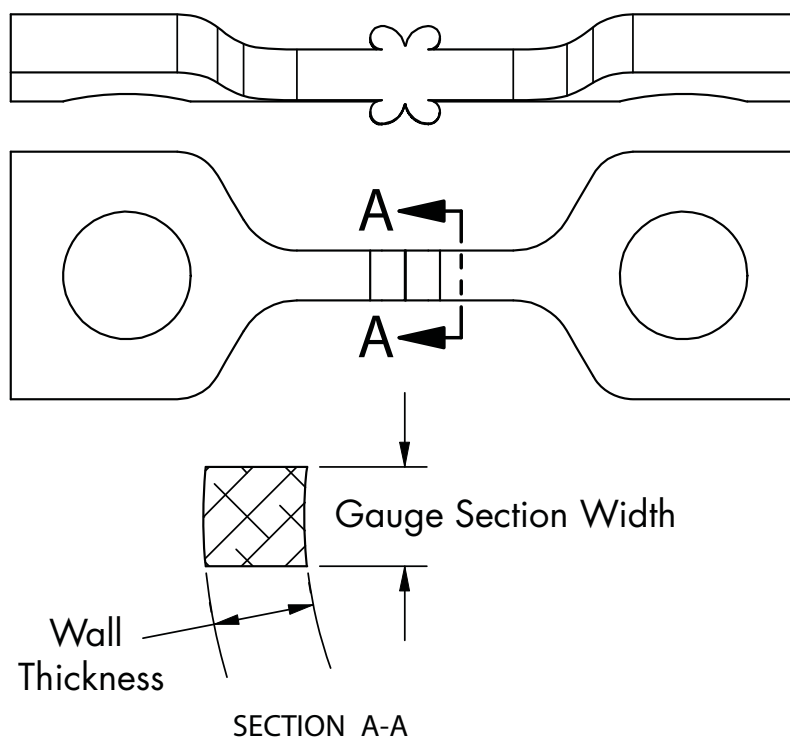
Under the file drop down menu, select "New Acquisition" or press the F5 key.

The software may prompt to set test speed if you have not done so already.

In the next dialog box, enter the data for the test and coupon. A file save location, coupon ID, wall thickness and gauge section width must be entered to proceed. Operator ID, job number and notes fields are optional.

Click "Proceed" to continue.

TX02930-4-13-09



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Installing Coupon

Rotate the clevises to adjust the distance between the holes, so that the test coupon can be inserted. Position the coupon in the retainer clevis so that the impact chamber shaft has a least 1/4" free travel. If there is not 1/4" free travel, adjust the clevises while maintaining sufficient thread engagement with both clevises and force sensor.

Once the coupon is positioned in the clevises, insert the detent pins into the clevises. The coupon must be centered in the clevises.



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PH03847-4-14-09

TX02931-4-13-09

Close the Door

Close the test area door. This door protects the operator from debris that may be generated during the test pull. The coupon door safety switch deactivates the "HOME" and "TEST" functions when the door is open (the jog mode is active when the door is open to allow the cylinder to be adjusted if necessary.)



PH03830-4-6-09

TX02932-4-13-09



Operation (Butt Fusion Testing)



Testing a Sample

To begin the pull, turn and hold the cylinder switch in the "TEST" position. This will destructively test the sample and start the data collection process. Hold the switch until the coupon has broken or the cylinder is no longer in motion.

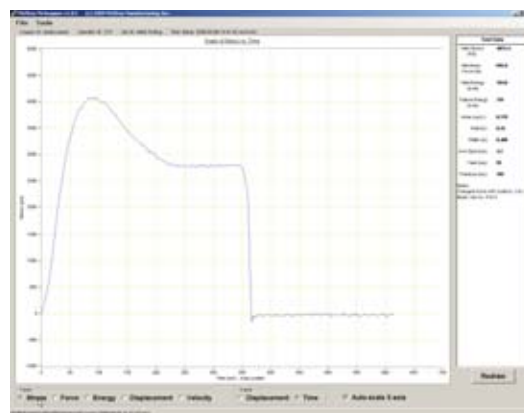
A file will automatically be saved in the location specified in the "New Acquisition" dialog box and the acquired test data will be displayed.



PH03829-4-6-09



PH03837-4-9-09



PH03838-4-9-09

TX02933-4-13-09

Remove Coupon

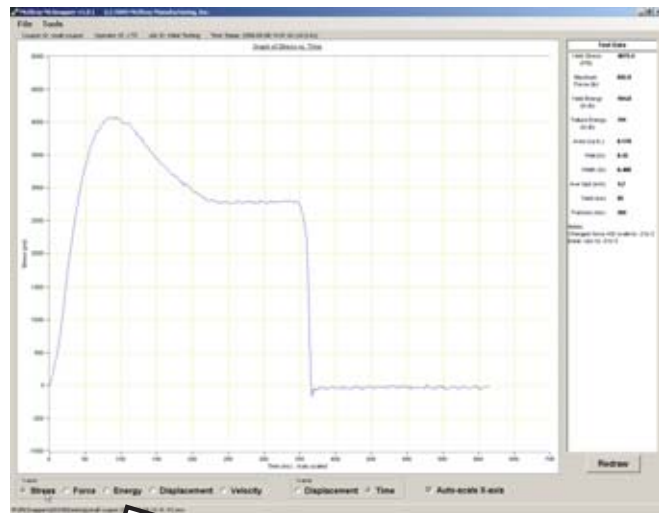
Open test chamber door. Remove detent pins on clevises to release coupon halves. Close the test chamber door and turn and hold the cylinder switch to "HOME" until the cylinder is no longer in motion.

TX02934-4-13-09

Analyzing Data

The display will be composed of a graph and a table of values consisting of...

Yield Stress
Maximum Force
Yield Energy
Failure Energy
Area
Wall Thickness
Width
Average Speed
Yield Time
Fracture Time



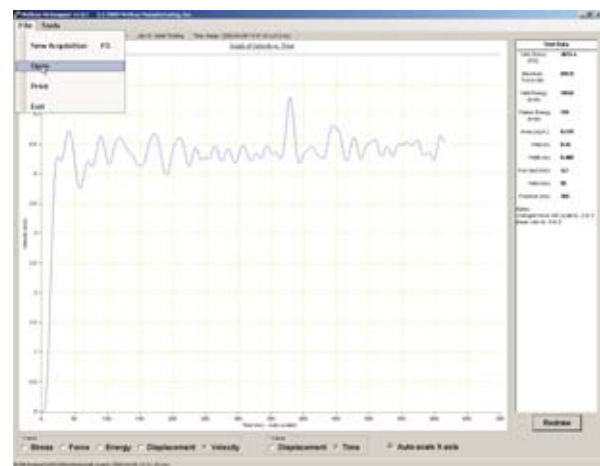
PH03838-4-9-09

The graph can be configured to plot stress, force, energy, crosshead displacement and crosshead velocity against crosshead displacement or time. These selections are made using the radio buttons below the graph.

TX02935-4-13-09

Opening a File

Under the File drop down menu, select "Open" and browse to the location of the file you want to open. Select the file you want to open and click "Open".



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TX02936-4-13-09



Working With Files



Printing Test Reports

A **test result** is a compilation of a table of significant values and a single, user configured graph for any individual test record.

A **test report** is a compilation of the table of significant values and all graphs for any individual test record.

A **batch report** is a compilation of multiple test reports and includes a summary of the significant values for all the test records included in the batch.

To print a single test result, use the radio buttons below the graph to select which graph to print. Under the File drop down menu, select "Print" and select the desired output printer. The result can be printed to a PDF file using the CutePDF printer driver or sent to a printer for a hard copy of the result.

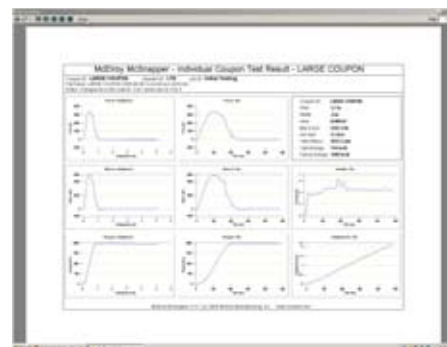
To print a complete test report, select "Report this Result" in the Tools drop down menu. A print preview of the report will be displayed. Click the Print icon and select the desired output printer. The report can be printed to a PDF file using the CutePDF printer driver or sent to a printer for a hard copy of the report.

To print batch report, select the "Batch Report Wizard" in the Tools drop down menu. In the dialog box, select the output location for the batch report summary file which contains all the significant test values from each test record in the batch. This file is a .csv format (comma separated values) and can be imported into a spreadsheet for analysis and/or formatting. Enter the report title. Click "Select Files..." to choose the test records to include in the batch using standard shortcut keys to select multiple files. Click "Open" and select the desired output printer. The batch report can be printed to a PDF file using the CutePDF printer driver or sent to a printer for a hard copy of the batch report.

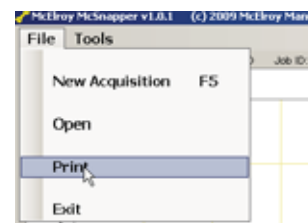
TX02937-4-13-09



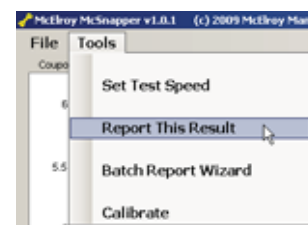
PH03844-4-9-09



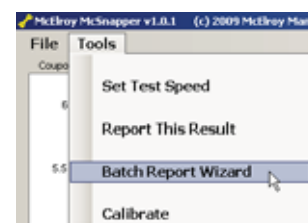
PH03843-4-9-09



PH03840-4-9-09



PH03841-4-9-09

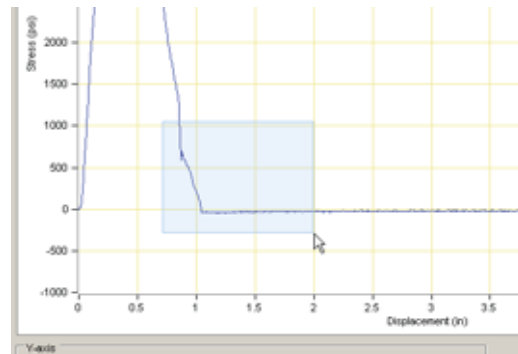


PH03842-4-9-09

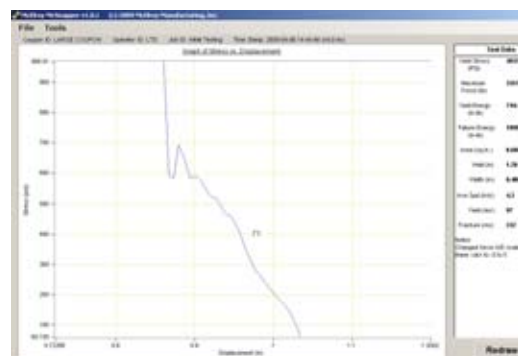
Graph View Controls

To change the view of the graphs in the program use the Mouse and modifier keys to perform move and zoom functions.

- 1) CTRL left click on the graph to pan around the graph.
- 2) CTRL right click and SHIFT right click undoes the last change to view.
- 3) SHIFT left click and drag zooms in on selection box.
- 4) Clicking the "Redraw" button resets the view to its initial settings.



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PH03846-4-9-09

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Maintenance



Preventative Maintenance

Follow the maintenance checklist and perform any maintenance required.

Inspection Checklist

Action

Inspect for leaks.	Tighten any loose fittings or replace any leaking hoses or components.
Inspect wiring.	Repair or replace any damaged wiring or components.
Listen for audible changes in operation.	Diagnose source of noise. Consult McElroy if necessary.
Inspect for smooth travel of cylinders.	Check fluid level using Maintenance Shutdown Procedure. Cycle cylinders full stroke using the cylinder switch until cylinder travels smoothly.
Check for filter return pressure at 4" per second travel speed. Ensure filter gauge does not exceed 20 psi.	Replace filter if exceeds 20 psi.
Ensure bolts are tight.	Tighten any loose bolts
Force sensor cable is snug.	If loose, gently tighten cable until cable is snug. Do not over tighten.

TX02939-4-13-09

Routine Maintenance

- 1) Check accumulator pre-charge (Yearly).
- 2) Calibrate force sensor, signal conditioner and linear transducer (Yearly).
- 3) Check fluid level (Bi-Yearly) using the "Maintenance Shutdown Procedure" section of the manual.
- 4) Check hard disk for errors and defragment the hard disk (Bi-Yearly).

TX02940-4-13-09



Maintenance



Maintenance Shutdown Procedure

Procedure to depressurize the system and return the reservoir to maximum fluid level. (used to depressurize system for transport or maintenance and used to check fluid level)

This procedure accomplishes two things:

1. It empties the accumulator of all pressurized hydraulic fluid, removing the stored energy from the system
2. It retracts the cylinder fully, causing the reservoir to reach its highest level condition, suitable for checking fluid level.

Press '**OFF**' button and turn surge protector off.

Flip surge protector on and power up computer.

Press "**ON**" button to power up electronics and hydraulic system.

Close test cabinet door.

Turn cylinder switch to "**TEST**" and hold.

While holding switch to "**TEST**" press the "**UP**" cylinder jog button

This will dump all fluid to tank while preventing the prime mover from being powered.

Without releasing the "**TEST**" switch, release the "**UP**" cylinder jog button and press "**OFF**" button.

Release both controls.

Check pressure gauge and confirm it shows zero pressure in the system.

After performing this procedure, the fluid level can be checked. It should reach just to the upper groove on the dipstick. With the cylinder extended and accumulator charged, the hydraulic fluid level may not reach the dipstick.

NOTICE: Do not overfill. Fluid will leak through the tank breather.

TX02942-4-13-09



Specifications



Specifications

Power:	120 VAC, 60 Hz, single phase, 15 amp
Dimensions:	Height 68", Width 48", Depth 32"
System pressure:	Maintain 2400 - 3000 PSI
Accumulator precharge:	850 PSI
Return filter maximum pressure:	20 PSI
Cylinder maximum speed:	6 inches/second
Hydraulic fluid type:	Univis N 46 or equivalent
Filter type:	MED00051 10 micron absolute
Pressure relief valve:	Relief valve set at 3000 PSI
System pressure monitoring:	Gauge pressure range of 0-3000 PSI
Filter element monitoring:	Gauge measures pressure drop over the filter from 0-30 PSI
Maintenance lockout valve:	Manually positioned lockable ball valve
Cylinder position transducer:	9" travel and $5k \pm 20\%$ resistance, 0.1% linearity
Force Sensor	ICP piezoelectric, sensitivity 0.2mV/lbs $\pm 15\%$, 8k lbs tension, linearity $\leq 1\%$ full scale
Hydraulic Power Unit (HPU):	Self-contained unit 3/4 gallon capacity reservoir .06 cubic inch per revolution pump Check valve prevents reverse flow from accumulator Suction strainer internal to reservoir Electric motor (1 HP, 1740 RPM, 120 VAC) 3000 PSI relief valve.

Computer Hardware

17" Touchscreen LCD Monitor in protected Rackmount enclosure
Rack mounted industrial computer with CD/DVD-R Drive, two network ports, USB ports, sound card capable
Rackmount Keyboard with Integral Trackball Mouse
National Instruments USB-6009 14 Bit Data Acquisition Device

Computer Software

Windows XP Professional
McSnapper by McElroy Manufacturing, Inc.
National Instruments NI-DAQmx 8.9



1. ALL MACHINED SURFACES 125 RMS OR BETTER
2. ALL INTERNAL RADII R1/2
3. ALL EXTERNAL RADII R3/8



The leader by design.

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