



Spartanics[®]

WL-3

**Automatic Registration Shear
Operations and Maintenance
Illustrated Parts List
Electronic Schematics**

100-9000

Second revision October 22, 1990

Re-compiled August, 2000

WL-3 Shear
Operation &
Maintenance
Section

SPARTANICS

The information furnished herein is believed to be accurate and reliable. However, no responsibility is assumed by Spartanics for damages incurred directly or indirectly from errors, omissions or discrepancies between the product and this manual.

In order to show equipment detail, this manual may show equipment with guards or covers removed. In normal use, equipment must never be operated with guards or covers removed or modified, and safety mechanisms must never be defeated!

Spartanics Ltd. reserves the right to change specifications at any time without notice.

For information not contained in this manual, contact Spartanics Technical Services Department for assistance.

Spartanics is a registered trademark of Spartanics Ltd. Rolling Meadows, Illinois.

Table of Contents

	<u>PAGE</u>	
Backgage.....	8	
- Bar.....	34	
- Electrical Square.....	31	
- Mechanical Square.....	31	
- Memory System.....	35	
- Servo System.....	35	
- Switch, Check out Procedure.....	32	
- Switch, Setting Procedure.....	33	
Blade Switch.....	41	
Controls, Explanation of.....	3	
Conversion Table (English-Metric).....	56	
Exploiting the WL-2/WL-3.....	20	
Dial Setting.....	38	
Follow-Up Potentiometer.....	38	
Gage Lights.....	38	
Guide Tube.....	7, 40	
Head Cover - Removal.....	28	
- Replacement.....	28	
Head - Removal.....	29	
- Replacement.....	30	
Helpful Hints.....	22	
Hold Down.....	47, 48	
Installation Instructions.....	1	
Maintenance.....	43	
Maintenance Check List.....	55	
Operating Instructions.....	17, 18	
Options - Auxiliary Hold Downs.....	16	
- Continuous Sequencer.....	9	
- Edge Scan Feature.....	14	
- Frontgage.....	10	
- Operation of Frontgage.....	11	
- Heavy Duty Offset Hold Down.....	13	
- Offset Feature.....	14	
- Third Sensor.....	15	
- 36" Capacity Add-On Feature.....	16	
- Three Sensor Capability.....	16	
Overload Heaters.....	41	
Plug-In Package Functions.....	37	
Power Supply.....	36	
Prism.....	46, 49, 50	
Relays.....	36	
Sensor Heads.....	6	
Servo Motors.....	39	
Shear Blade Cleaning.....	45	
Shear Line Specifications.....	24	
Shear Logic System.....	35	
Shearing Spins.....	27	
Stacker Belt.....	47	
Stacker Motor.....	42, 46	
Trouble Shooting Check List - Electrical.....	52	
- Mechanical.....	51	
Trouble Shooting Guide.....	43	

INSTALLATION INSTRUCTIONS

To put the WL-2/WL-3 Automatic Registration Shear into service, it is only necessary to perform the following:

1. After uncrating, inspect for visual damage.

DO NOT APPLY AC POWER

2. Remove auxiliary edge guides. These are 14 inch long metal strips bolted to the top of the shear bed.
- * 3. Turn Offset Crank to move guide tube away from shear blade.
- * 4. Remove auxiliary finger guard. This is a metal strip 39 inches long. It is located between the guide tube and shear blade, close to the blade. This hangs on pins on the back of the offset blocks. Do not loosen or remove any nuts or bolts, just lift straight up.
- * 5. Turn Offset Crank to move guide tube to zero position, closest to shear blade.
6. Check blade clearance. Manually lower the ram by inserting a metal rod in the brake and turning clockwise.

NOTE: DO NOT HAVE POWER CONNECTED!

Using a feeler gauge, check clearance between top and bottom blades. This should be .0015 inch at the ends and .001 inch through the center.

The bottom blade position is adjusted by turning the "Bed Adjust Bolts". Adjustment of the bottom blade should be adequate. If the top blade requires adjustment, this is accomplished from the rear of the shear by adjusting the nut positions on the 5 bolts running horizontally from the front of the ram into the ram stiffener.

NOTE: When blade clearance is correct, REMOVE metal rod. Apply AC power and actuate start button. The shear should run in the direction as indicated by the arrow on the fly-wheel cover (counter-clockwise). Ram will then complete cycle into its rest position. Turn off shear and remove power.

- * This applies only to Shears with OFFSET FEATURE.

7. Attach Stacker Basket and Stacker Basket Support Bracket. The stacker basket is the 30 inch long "L" shaped piece that was nailed to the wooden base. Remove top 2 nuts from Stacker Motor mounting, place 2 holes in Stacker Basket over these bolts and replace nuts.

Stacker Basket Support Bracket is the 26 inch long angle iron with 45 degree ends. This attaches to the Stacker Basket about at the top center hole and to the left shear leg, 12 inches from bottom, 9 inches from front.

8. Check Stacker Belt.

THE SHEAR IS NOW READY FOR OPERATION!

EXPLANATION OF CONTROLS

The WL-2/WL-3 Automatic Registration Shear was specifically designed for the precision shearing of printed sheet material such as nameplates, dials, printed circuits, etc. It operates by sensing the position of a reference line or edge. When the reference is incorrectly positioned, servo mechanisms reposition the backgage to move the material into the correct position before allowing the shear to trip.

To understand the operation of the WL-2/WL-3 Automatic Registration Shear, begin by examining the unit as follows:

CONTROL PANEL

- a) The switch marked "Lite-Dark" or "Lite-Edge-Dark" selects the proper polarity. For materials printed dark on a lite colored background or printed on a bright metal background, the line is "dark". For dark coated materials with light printing, the switch should be in the "lite" position. Ideal line width is about .020", with .004" to .050" generally acceptable. Lines in excess of 5/32" wide are infinitely wide to the sensor and the edge must be used. Lines between 1/16" and 5/32" wide should be avoided.

For shears with the Edge Scan Feature, the switch is placed in "Edge" whenever the reference is an edge.

- b) The switch marked "Auto-Scrap" controls the scrap door. In the scrap position, the door remains open and all materials drop through onto the floor. In the stack position, the scrap door is always closed and all material is channeled into the stacker. In the Auto position, the scrap door opens and closes automatically to discard scrap and stack strips.

Scrap Door Circuit Breaker is located on bottom side of starter panel, inside the Power Supply Cabinet.

- c) Extended Range Switch. This switch is not present on all shears. In the extended range position, scrap cuts can be corrected $\pm .050$ " and the stripping cuts corrected $\pm .030$ ". In the normal position all cuts, scrap and stripping, can only be corrected $\pm .030$ ". The correction capability range is measured at each end of the backgage. Material less than 15" wide may not correct the full amount. Material more than 15" wide may correct more than the specifications. In the wide scan position accuracy is decreased to $\pm .0045$ " with an increase in production rates.

- d) The repeat switch determines which cuts will be discarded and which will be saved (when Auto-Scrap switch is in Auto). When the switch is in position "1", all material is stacked. In "2", the scrap door is open for cut #1 and closed for cut #2. In "3" the scrap door is open for cuts #1 and #2 and closed for #3. In "4" the scrap door is open for cuts #1, #2 and #3 and then closed for cut #4.

The repeat switch also determines which cut is the last cut and, therefore, the cut that will be repeated.

In position #1 the backgagge will remain in the #1 position.

When in position #2, the shear will make one cut in position #1 and then automatically change to position #2. It will remain in position #2 for any number of cuts until the "Reset" button is actuated. When the "Reset" button is actuated, the backgagge returns to position #1.

With the Repeat switch in #3, we make one cut each in positions "1" and "2" and then remains in position #3 for any number of cuts until the "Reset" button is depressed and the backgagge repositions to position #1.

Position #4 operates just as "2" and "3", except for one additional single cut position.

- e) The Reset button is used to move the backgagge control position. With the Repeat Switch in "1" nothing happens when actuating the Reset Switch.

In position "2" the backgagge control position goes from 1 to 2 to 1 to 2 to 1 in single steps each time the Reset button is actuated.

In repeat position "3" the backgagge position control goes from 1 to 2 to 3 to 1 to 2 to 3 to 1 in single steps each time the Reset is actuated.

In repeat position "4" the backgagge position control goes from 1 to 2 to 3 to 4 to 1 to 2 to 3 to 4 to 1 in single steps each time the Reset is actuated.

A light rapid tap on the Reset Button may not allow the sequence to be completed and result in incorrect advances.

- f) The dial that has set the position of the backgage is indicated by the neon light, one above each light.

- g) The dials are direct readings in inches, tenths of inches and hundredths of inches. 1.11 indicates a backgage position of 1.11 inches from the edge of the shear blade. These readings are not extremely accurate as there is no requirement for accuracy here. These move the backgage into a coarse position to permit the sensors to observe only the reference line. The final accuracy is controlled by the sensors.

If the dials are difficult to move, check the dial locks at the base of the dial. Clockwise locks, counterclockwise unlocks.

Minimum dial setting is 0.15". The backgage must remain this far away from the blade to prevent contact with the sensor prisms.

- h) The amber light lights up when the shear is ready to fire.

- i) The sensing switch is marked as follows:

"Two Head": The position requires that the material be in position under both sensing heads, against the backgage, and properly positioned before the shear will fire.

"Right": This position requires that the material be placed under the right sensing head in order for the shear to fire.

"Center/Left": This position requires that the material be placed under the left sensing head in order for the shear to fire.

"Manual": When the switch is in this position, the shear will fire when the foot switch is pressed.

"Bumper": When the switch is in this position, the shear fires when the foot switch is pressed down and the material contacts the backgage. This will only happen when the shear is operating in station 1.

- j) The "Red Gage" lights are connected to the work switches on the backgage bar. The gage lights are ON when the work switches are not actuated. When material is pushed against the backgage switches, the gage lights go OFF.

If the gage lights flash ON and OFF, it is an indication that the material is beyond the correction range. The material contacting the work switch starts the correcting cycle.

When the backgage has not properly positioned the material and has reached the limit of its correction range, limit switches shut off the correcting action. This shut off action and material in contact with the work switch causes the backgage to oscillate at the end of correction range limit and shows as a blinking gage light. This action can occur on either side or both sides of the backgage simultaneously.

The red lights on top of the ram are in parallel with the Control Panel Gage lights. (On WL-2 Shears Only!)

- k) The Start and Stop switches are as marked.

SENSORS

- a) The Sensing heads are mounted on the guide tube and must be firmly tightened to the tube when the shear is in service. The thumb screw on the base of the sensor is to tighten the sensor to the tube. If the thumb screws are loose, the mechanical reference position of the sensors may not be correct and therefore the cut position may be incorrect.
- b) The dial on the lower right of the front of the sensor is marked 1 to 10. Each increment is about .0025". This is used to adjust the cut position on a line. If a .030" line is consistently being cut leaving .010" on one side and .020" on the other, moving this dial 2 divisions will subtract .005" from one side and add .005" to the other. This should balance the cut with .015" on each side.
- c) "IN" is defined as moving the material further under the blade.

- d) The switches on the sensors marked "Paint-Metal" select different light sources. The Paint position is used for paint on paint conditions and the Metal position is used for paint and metal combinations.
- e) The holes in the front of the sensors are viewing ports to look through the prism and see what the sensing element sees. The viewing port goes from front to back and from about 30 degrees above horizontal downward. With the shear "ON", the proper position for viewing through the viewing port can be determined by moving the head until the bright spot appears. In looking closer, without material, you will see the edge of the shear blade. With material under the sensor, you see the material.

THE REFERENCE LINE MUST APPEAR IN THE CENTER
OF THE VIEWING PORT

- f) The hole in the top of the sensor is the access to the prism retracting screw. The prism must be retracted when removing the sensor from the guide tube. The prism must be extended for operation. Observe this action by placing a piece of material with lines under the sensor and rotating the retractor screw.

GUIDE TUBE

- a) The guide tube is the mechanical reference point between the sensors and the blade edges. Moving this tube changes the relationship between the sensors and blade that was established during manufacture. This should not be removed from its mountings.
- b) Attached to the bottom 1/3 left side of the guide tube is a fixed finger guard. The finger guards attached to the right 2/3 of the tube are moveable to allow the operator to safely grip material within 3/8" of the shear blade. To extend the guards, merely push on the guard. To retract the guard, merely turn your hand, palm side up, and grip the ears of the guard from below and pull.

DO NOT REACH OVER THE TOP OF THE GUIDE TUBE!

- c) In the finger guard "extended" position, the sensors cannot be moved laterally past the guard.

BACKGAGE

- a) The backgage has 3 servo motors. The large center motor positions the backgage to the coarse position indicated on the Control Panel Dial with the illuminated neon light. The two smaller servo motors are the fine position drivers and act upon command from the signals generated by the sensors and processed in the electronics. Each of the smaller servos act independently of the other and move their associated end of the backgage in or out as directed by the sensors.
- b) The backgage bar has 3 work switches. The furthest right switch, closest to the control panel, is the "A" or "Right" switch. When this is actuated by the material it turns on the "A" or "Right" sensor. The two left switches are in parallel; actuating either or both of these will turn on the "B" or "Center/Left" sensor.
- c) The Gage Lites marked A & B or Right & Center/Left are connected to the associated A & B or Right & Center/Left Backgage Work Switches.
- d) The backgage limits are 0.15" minimum and 10.00" maximum.

CONTINUOUS SEQUENCER - OPTIONAL FEATURE

On Shears equipped with the optional feature "Continuous Sequencer" the repeat switch is marked with a number 1 on the top position and 2, 3, 4 to the right side over the word NORMAL and 2, 3, 4 on the left side over the word RECYCLE.

With the switch in the number 1 position the Shear will not sequence out of the number 1 position.

On the "NORMAL" side with the switch in 2 or 3 or 4, the Shear will sequence from 1 to the switch position setting and then remain at the switch setting until the reset button is activated at which time the Shear returns to the number 1 position ready to begin the next sequence.

EXAMPLE 1: On a sheet requiring 2 scrap cuts and 5 stripping cuts the repeat switch would be set to normal 3. The Shear sequence would be one cut in position 1, one cut in position 2 and then repeat in position 3 until the reset button is activated at which time the Shear returns to position #1 ready to process the next sheet.

On the "RECYCLE" side the Shear makes a single cut per position and sequences to the next position until it reaches the switch setting and then automatically returns to the number 1 position without the operator activating the reset button.

EXAMPLE 2: On a job requiring 2 scrap cuts and no stripping cuts the repeat switch would be set at RECYCLE 2. The operator would cut the first scrap cut and the Shear would then automatically sequence to position 2 after the operator made the second cut the Shear would then automatically return to position 1 without activating the reset button.

EXAMPLE 3: If a sheet required 2 scrap cuts and only one stripping cut you would set the repeat switch to RECYCLE 3 and then make the 3 cuts, one in each position and after the third cut the Shear automatically returns to position 1 ready for the next sheet.

FRONTGAGE - OPTIONAL FEATURE

The basic WL-2/WL-3 Automatic Registration Shear operates by having photo-electric sensors observe reference marks. If the reference marks are correctly positioned to within $\pm .002$ " the shear will activate and cut the material. If the marks are not correctly positioned but are within $\pm .050$ " of the correct position the backgage will move the material into the correct position of $\pm .002$ " then initiate the cutting action.

To insure that the correct reference marks are being observed it is necessary that the material contact the backgage, electrical switches on the backgage must be activated by the material. This insures that the material is in contact with the backrail.

The backgage has a range from .15" to 10" and a correction capability of $\pm .050$ ".

The above conditions then have placed the following limitations on the basic WL-2 Automatic Registration Shear:

1. The minimum cut must be .15" or more.
2. The maximum cut must be 10" or less.
3. The material must contact the workswitches on the backgage, if the material droops below the backgage the shear will not operate.
4. The correction range is $\pm .050$ " therefore the reference marks must be with $\pm .050$ " repetitive accuracy, to the edge of the sheet. From end to end and sheet to sheet.
5. The material will be positioned by the backgage therefore material that is not rigid enough to activate the backgage switches or will bend when pushed by the backgage cannot be processed.
6. The backgage must be contacted and goes thru a sequence of different nominal positions as a sheet is processed. The backgage travel time averages 1-1/2 to 2 seconds per inch of travel. In sequencing from an average 1/2" scrap cut to a 7" stripping cut a 10 to 14 second time delay is experienced therefore most companies make all scrap cuts first then strip cut. This results in a double handling of the material.

The Frontgage feature has eliminated the above basic limitations. The Frontgage optional feature consists of a movable "false bed" that is easily installed on the shear bed of a shear with the frontgage option. The false bed is driven by the backgage and responds exactly as the backgage responds. The modification in the electronics allows you to bypass the workswitches on the backgage and to start the corrective action by activating the foot-switch.

OPERATING THE OPTIONAL FRONTGAGE FEATURE

The Gage switch located on the left side of the control panel is marked "BACK" in the upper position, "BOTH" in the center position and "FRONT" in the lower position.

With the switch in the "BACK" position the shear acts exactly as a standard shear, when the footswitch is activated without material in contact with the backgage nothing happens. When the material contacts the workswitches on the backgage the correcting sequence begins. With the switch in the "FRONT" position when the material contacts the backgage workswitches nothing happens BUT when you step on (activate) the footswitch the system begins its corrective action. With the backgage workswitches eliminated from the system it is possible to use the backgage bar as a mechanical positioning reference to bring the reference mark into the sensors field of view for the false bed to position the material. This is effective for use on material that would buckle by the action of the backgage pushing on the material. With the switch in the "BOTH" position the correcting sequence can be started by either stepping on the footswitch or by pushing the material against the backgage and activating the switches on the backgage.

Everytime the shear activates it is necessary to reactivate the correcting sequence.

In the "BACK" position this can only be accomplished by contacting the workswitches on the backgage bar. In the "FRONT" position the only way to activate the correcting sequence for each cut is to step on the footswitch. The footswitch must be activated for each cut and released after each cut.

In the "BOTH" position either the footswitch or the backgage bar workswitches can be used to initiate the correcting sequence. In this mode of operation if you use the footswitch and do not release the footswitch after the cut then you can reactivate the correcting sequence by activating the backgage bar switches. In this mode of operation you can:

1. On greatly out of square material you can eye spot the scrap cut to within $\pm .050$ ", apply hand pressure on the material to press it against the false bed and step on the footswitch. This will now position the material to within $\pm .002$ " and cut. With the backgage bar preset to the stripping dimension you can now continue to process the sheet without releasing the footswitch just press the material against the backgage workswitches.

2. On wide cuts most operators double handle each sheet as they do not wish to waste the time required for the backgage to travel from a narrow scrap cut to a wide stripping cut. They will scrap cut an entire job then strip cut the job.

With the frontgage you can eye spot the narrow scrap cut and with the backgage preset to the wide dimension after the scrap cut immediately press the material against the backgage.

OPERATING TECHNIQUE

The frontgage operates by positioning material with the false bed. If you apply pressure to the material outside of the area of the false bed the system cannot correctly position the material.

HEAVY DUTY OFFSET HOLD DOWN - OPTIONAL FEATURE

The standard WL-2/WL-3 Automatic Registration Shear hold downs are activated by a cam bar located on the shear ram. When the Offset Feature is being used the standard hold downs are moved away from the ram and the hold downs are not activated.

An additional hold down was developed to provide hold down pressure on the material when the Offset Feature is in use and the Offset setting is at least 2 inches. At Offset settings of less than 2 inches the hold down bar cannot be installed.

To install the Heavy Duty Offset Hold Down bar move the Offset bar out at least 2 inches with the shear turned OFF and the flywheel at rest. At the brake end of the ram drive shaft lower the ram until the blades have closed. Now install the hold down bar by bolting the four bolts (two at each end) and crank the ram up watching to see that the hold down dogs are contacted by the two tapered buttons on the ram.

As the ram is raised it will lift the hold down bar and compress the hold down springs.

If you cannot raise the ram by hand lower the ram to its bottom position, remove all tools from the brake and turn on the shear, the ram will lift itself and raise the hold down bar.

The Heavy Duty Offset Hold Down has about 500 pounds pressure and is very effective on difficult to shear materials. The bed to bottom of the Hold Down bar clearance is about .125 inch. Since the Hold Down bar is located next to the blade it provides a flattening action for wide, flexible material that tends to bow when the material droops over the blade.

OFFSET AND EDGE SCAN - OPTIONAL FEATURES

- OFFSET FEATURE - Allows the sensors to be moved up to 7-1/4" away from the shear blade so that a reference that is not located on the actual line of cut can be used.
- OFFSET EXTENDERS - This allows the use of a reference up to 12" removed from the actual cut line.
- EDGE SCAN FEATURE - Allows use of the edge of block printing or heavy line in the pattern as the reference point. Used with Offset Feature.

The Offset and Edge Scan optional features are extremely valuable when properly understood and used. The Offset Feature allows the use of a reference point that is not located on the cut line. The Edge Scan allows the use of a block area or wide line (over 5/32" wide) in the copy as a reference.

The Offset Feature moves the sensors on the guide tube away from the cutting line. This is moved by the crank on the left shear leg. The dials are direct reading in thousandths of an inch 0 to 100 and repeats. The scale on the left block is direct reading in inches and tenths of inches. Thus, if you desire to cut 1-3/8" (1.375) from the reference, you turn the crank watching the scale until you reach 1.3 inches and continue turning until the dial reads 75.

While this is a relatively simple adjustment, it does represent extra things to remember and can be a source of confusion to the beginner operator. If you can avoid using it for the first few days, this would be desirable.

Whenever there is an apparent sensing problem please retain a sample and forward to Spartanics. We are anxious to aid you in achieving maximum benefit in the shortest time and any samples of difficult materials can be of assistance.

CAUTION: When using Offset Feature or when guide tube is moved away from zero position (closest to blade), auxiliary finger guard must be in place in front of shear blades before turning on power.
NEVER PLACE FINGERS IN AREA OF BLADES!