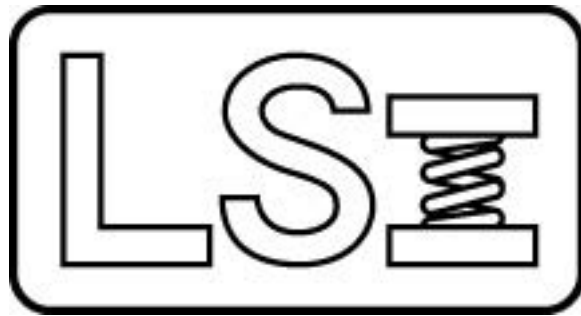


Larson Systems Inc.



ASSP User Manual Automatic Spring Sorting Package



ASSP with SFM (Super Force Meter) & ASSP with RoboSTAR

About This Manual

This manual could contain technical inaccuracies or typographical errors. Changes are periodically made to the information contained herein. These changes will be incorporated in new editions of the manual.

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1 INTRODUCTION

The Automated Spring Sorting Package (ASSP) manufactured by Larson Systems, Inc. (LSI) is a very flexible part testing and sorting system. It is designed for continuous production testing to evaluate and sort parts (springs) that are difficult to manufacture. Easily program a variety of tests tailored to accommodate requirement or part changes. Tests programmed may specify multiple presets, free length measurement, and multiple point testing for force @ length or length @ force, etc. Actual test data and statistical summary information can be sent to a printer or viewed on a PC via the RS232 printer port and USB or Ethernet connections.

An ASSP system can be purchased with either the SFM (Super Force Meter) or RoboSTAR as the testing component of the assembly. Change the indexer plate / escapement and retrieve a different test application when switching over to test a new part or spring type. In addition, the ASSP may be customized for feeder bowl exchanges to allow for quick transition. The testing component may also be operated independently from the ASSP sorting system if needed.

NOTE: Available features depend on the primary testing component and / or software package ordered.

1.1 Standard ASSP Features

- Flexible modular design used to accommodate specific testing and sorting needs
- Allows for automated (unattended) or manual (attended) testing and sorting
- Includes: Base, Indexer, and Control Electronics
- RS232 connection for printing capability or using UTM software on PC
- USB and Ethernet ports (connect to PC or printer)
- Resolution to 0.0005 inches
- Equipped with emergency shutdown feature
- Force overload stops
- 120V AC, 20 amp
- NIST traceable calibration

The following are priced separately from the tester itself, but are required in any standard testing, evaluating and sorting configuration:

- À la carte selection of a single load cell capacity
- À la carte selection of one indexer plate assembly
- À la carte selection of a 3 or 5 way sorter package
- On-site installation and training

1.1.1 SFM Configuration

- One Super Force Meter load station required

Optional:

- Free-length measuring head
- Additional SFM load station(s)
- Presetting station(s)
- Limit lights and full statistical analysis
- Test condition output option



SFM – Load Station Control Panel

- UTM – PC Universal Testing Manager Software

1.1.2 RoboSTAR Configuration

- RoboSTAR 1,000 lb drive, 9-inch stroke
- FLASH Basic Software Package
- Compression testing of force and length
- Touch screen controls with Windows 7
- Interchangeable load cell capability



Optional:

- FLASH software upgrade
- High resolution length scale to 0.0001 inches
- Additional load cell(s)
- Presetting station(s)
- High capacity 2,000 lb drive (240V AC – single phase)
- Sorter / Automation interface port

1.2 Optional Features and Equipment

- Vibratory feeder bowl with hopper (required for automated testing)
- Escapement assembly (required for automated testing)
- Additional Escapement fixtures and Indexer Plates
- Acrylic or padded sound barrier enclosure for vibratory bowl feeder
- Customized safety shield (recommended for manual testing)
- RS232 to parallel printer cable / adapter
- Inkjet printer (includes USB cable or RS232 cable / adapter)

2 GETTING STARTED

Unpack and set up the ASSP as much as possible prior to the onsite visit for installation and training. This will save much time when the LSI technician arrives. Make sure the proper access to a power supply, including pneumatics, is setup and ready to go even if connecting all the components has not been done as instructed in section 4.

2.1 Unpacking

Depending upon the configuration and size of ASSP ordered, the components may be shipped largely assembled in a single container or up to 4 cartons. Once the main container is opened, the packing list and this User Manual should be easily located. Please read the User Manual first. Use care when removing the ASSP components from shipping containers to avoid damage to the unit or any injury to self. The individual components are quite heavy and may require rigging equipment to lift and move during the unpacking process. If a location for the ASSP has not yet been determined, see section 4.1.

2.2 Items Shipped

Use the packing list to locate the items ordered and make sure all items listed were received. Notify LSI of any discrepancies. In general, items shipped may include:

- SFM (Super Force Meter) or RoboSTAR testing station with Base assembly
- Indexer Assembly, Indexer Plate Assembly and Spring Support Table

- 3 or 5-Way Sorter Package attached to Base, shipped with or without sorting bins
- Escapement Assembly, Escapement Chute and Vibratory Bowl Feeder
- Presetter Station or Additional Load Station (SFM)
- Sound Enclosure and / or Safety Shields
- Additional Indexer Plate(s), Load Cell(s), or Escapement Assembly
- Packing List with Calibration Report
- Parts List with attached drawings is normally shipped with the Main Assembly
- Other optional equipment ordered: Hopper, Elevator / Conveyor, Inkjet Printer, etc.

2.3 Using the Manual

Once Installation and Setup is complete, have the **ASSP Touch-Screen Control Center** display accessible when following along with this manual. Know how your ASSP is configured and keep in mind that some components may have individual control boxes along with their own User Manuals. Learn as much as possible about how the ASSP works before being trained on its use by an LSI authorized technician. The on-site installation and training service must be purchased with any ASSP system.

- Be sure to read through the User Manual before starting.
- The ASSP Control Center uses touch-screen technology.
- A button on the screen or keypad is identified in bold type, some inside brackets. Examples: Touch **RUN** when ready to start testing. Or, press **[ON / CLEAR]** to exit.

3 SAFETY AND USE GUIDELINES

3.1 Important Considerations

- **Compressed springs have stored potential energy proportional to the spring constant.** Use care and release this energy in a controlled manner to avoid injury.
- In an ASSP configuration, there are several pinch points that must be avoided to prevent injury. The system must be paused or turned off to clear parts or make adjustments in or around these areas.
- Use caution when adjusting the range of platform movement or stroke distance for the Load Stations; a change in PSI may be required to prevent damage to the load cell.
- Use protective eyewear when operating the ASSP system.
- Protective enclosures should be kept closed and secured during testing.
- Be sure the operating area is clean and dry.
- All parts to be tested should be free of oil and contaminants.
- Do not allow force to be applied greater than the tester is designed for.
- Follow all instructions and warnings associated with the use of the ASSP system.

3.2 Environmental and Protective Enclosures

3.2.1 Sound Enclosure

Depending on the type and size of parts being tested and the size and capacity of the equipment that makes up the ASSP purchased, noise is generated during production testing. There is a higher level of noise when testing larger springs and a lower noise level with smaller springs. A customized enclosure may contain much of the noise. A typical enclosure is 1/4-inch acrylic and reduces noise by approximately six decibels.

An encasement type of enclosure equipped with a noise-absorbing foam interior for greater sound absorption is available for larger vibratory bowl systems.

Either type of enclosure protects the equipment from contaminants and outside interference as well as providing a significant noise reduction benefit. Access to the equipment is maintained via removable panels including a hinged top fill door to easily load the hopper or bowl.



3.2.2 Safety Shields

Safety shield protection is an option offered by LSI. In a completely automated and unattended setup, this type of protection may not be required.

With steady traffic patterns around the testing area and a likelihood of using the ASSP for a hand-fed or manual application, installing an acrylic safety shield or shields around the presetting and test area is recommended. A passerby or operator could be injured if parts are ejected as load is applied.

ASSP Control Panel
Emergency Stop



3.3 Using the Emergency Stop (E-Stop)

The red emergency stop button is located on the left side of the **ASSP Touch-Screen Control Center** and is **ONLY FOR EMERGENCY USE**. Frequent use to interrupt normal operation may result in damage to the tester or the FLASH Windows Operating System. When this button is pushed, all components controlled by the ASSP Control Center will shut down immediately. Remember to follow proper procedure to turn power off under normal conditions as instructed in section 6.

NOTE: An ASSP with RoboSTAR has a second **E-Stop** button on the **RoboSTAR Control Panel**, below the touch screen. Pushing this button stops the tester motor (drive) causing the tester's platform movement to stop immediately.



RoboSTAR Emergency Stop

The ASSP system itself will not recognize that the RoboSTAR E-Stop button was pushed and will continue to operate. Use the **ASSP Touch-Screen Control Center** to stop or pause the operation. The RoboSTAR may need to be re-initialized by touching **[Re-Initialize]** on the RoboSTAR Control Panel.

4 INSTALLATION AND SETUP

While this section covers general information, review the drawings provided showing the configuration of the particular ASSP ordered. The drawings and parts lists may have been sent out ahead of or included with the shipment. Contact LSI if unable to locate.

4.1 Selecting a Location

Note the dimensions of the fully assembled unit ordered and select a location with enough space to house the ASSP testing station. The location selected should be a dry, non-humid, non-condensing environment kept at room temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($68^{\circ}\text{F} \pm 9^{\circ}\text{F}$). The area should provide protection from debris or falling objects or anything that may damage components or interfere with its operation. The ASSP should be situated for accessibility to a printer, air compressor, and power supply.

4.2 Alignment

If there is more than one base supporting the equipment, they must be properly aligned so the attached panels or bars can be connected once leveled and at the proper height. Use the drawings provided to position components in relation to the bases for the configuration ordered.

4.3 Leveling and Height Adjustment

The base(s) of the ASSP also must be leveled and adjusted to the proper height before the components can be properly connected. These adjustments allow the components connections to match up and the ASSP to operate properly and produce accurate results. Smaller configurations may be mounted on a single base requiring the adjustment of only one base.

How to Level and Adjust Height:

Place a level on the tabletop area of the base and adjust the nut on each leveling foot making sure to put equal pressure on all pads for proper leveling and height adjustment.

4.4 Connecting the Components

Once the components are positioned according to the provided drawings, there are a few basic connections. The **main power input** is located at the bottom left corner on the back of the base. The Power Control Box Assembly is situated on the side of the base opposite the sorting components. The Power Control Box Assembly houses the Programmable Logic Control, or PLC, electrical system. Wiring from the ASSP Control Center runs to components through the PLC electrical system. The **pneumatic input and regulator** for air pressure is located on the side of the base below the Power Control Box Assembly.

5 ASSP COMPONENTS

The configuration of an ASSP system may be customized to include any of the components described in this section. The **Base**, **Indexer** and **Control Electronics** are standard for an ASSP system and operate with either the **SFM (Super Force Meter)** or **RoboSTAR** tester. The ASSP also requires a **Load Cell** and **Indexer Plate Assembly**. All other components are optional. Note the specific ASSP configuration ordered to identify which sections apply to your ASSP. A description of each component, what function it performs and other relevant information is given.

5.1 Base, Indexer, and Control Electronics

5.1.1 Base

The Base (Weldment Table) supports the ASSP testing and sorting system. It must be leveled before operating. If the ASSP is a large configuration, there may be more than one base unit supporting the system components. Each base should also be secured together at the proper height.

5.1.2 Indexer

5.1.2.1 Spring Support Table

The Spring Support Table is a rigid platform secured on top of the base and used to support the testing area. An escapement, spring sensor, presetting station(s) and / or load station(s) may all be attached to this fixture. In an SFM (Super Force Meter) configuration, the load cell(s) associated with the load station(s) are secured beneath the Spring Support Table.

5.1.2.2 Indexer Assembly

The Indexer Assembly consists of a gearbox and drive that are mounted on top of the base below the Spring Support Table. The drive runs through a cylinder housing on top of the gearbox and is positioned through the center of and level with the Spring Support Table. The Indexer Plate Assembly (section 5.5) attaches to the drive fixture and rotates on top of the Spring Support Table.

5.1.3 Control Electronics

5.1.3.1 ASSP Touch-Screen Control Center

The main control unit (ASSP Touch-Screen Control Center) is operated using an interactive touch screen. This unit controls the tester, indexer and sorter, etc. through the Power Control Box Assembly mounted on the side of the base.

5.1.3.2 Power Control Box Assembly

This Control Box houses the Programmable Logic Control (circuitry) of the ASSP, referred to as the PLC. The main power input plugs into the outside of this housing.

5.2 SFM – Super Force Meter

The Super Force Meter is a load station for measuring and evaluating a single load point on parts. This section describes items related to the Super Force Meter version of the ASSP. An SFM is equipped with operational limit lights that give out the test condition output – the SFM sends out the sorting signals to the ASSP.

5.2.1 Controls and Programming

The ASSP may be configured with more than one Super Force Meter control box. Each box is connected to its own load station mounted on the indexer, load cell underneath. While the ASSP Touch-Screen Control center operates the system, the SFM control box only interacts with the load station and its load cell. For operational information, refer to the User Manual for the Super Force Meter.

5.2.2 Free Length Measuring Head

Available for the purpose of obtaining a free length measurement of the parts being tested in the ASSP configuration, this setup consists of a Lynx gage with a capacitance probe positioned to measure a part's height as it passes by on the indexer plate.

5.3 RoboSTAR / STAR

The RoboSTAR and STAR testers are very similar. The RoboSTAR features a control panel that operates the testing unit remotely; the STAR's control panel is attached. Either model can be integrated with the ASSP. When the ASSP is equipped with the RoboSTAR or STAR tester, a true interchangeable load cell situation can be achieved and ease of programming, viewing statistics, and use of the sort feature makes the system very functional on a production floor. This section describes items related to the RoboSTAR version of the ASSP.

5.3.1 Controls and Programming

The RoboSTAR Control Panel operates only the RoboSTAR tester. This Control Panel is used to program and save specific testing sequences to be used within the ASSP system. The RoboSTAR may also be used as a stand-alone tester if needed. Consult LSI if using the RoboSTAR in this way is of interest.

Refer to the FLASH Series of Automatic Testers User Manual to learn about using the RoboSTAR Control Panel and the FLASH software package purchased with the ASSP. The FLASH manual is updated periodically for material software changes.

5.3.2 FLASH Software Packages

The Basic software package is standard on the ASSP – RoboSTAR. The Extra, Pro Spring, Pro Material, and Pro Ultimate are optional software packages. The RoboSTAR tester is programmed with one of these software packages as specified at purchase.

A Fatigue Testing software package may be purchased in addition to the software packages listed and is included with the Pro Ultimate package. Because the ASSP is primarily used as a sorting system, it is recommended that the RoboSTAR be equipped with the Pro Spring software package at a minimum to have the sorting feature enabled. See the FLASH Series User Manual for information on the other software packages available.

5.3.3 High-Resolution Length

The standard resolution is measured to 0.0005 inches. With the high-resolution option a glass length-scale is included that provides resolution measured to 0.0001 inches for the RoboSTAR testing station.

5.3.4 High Capacity 2,000 lb Drive

This is a Whisper drive available to accommodate a 2,000 lb load cell for testing.

5.3.5 Automation Interface Port

The automation interface port on the back of the RoboSTAR Control Panel housing allows the tester to interface with the main control system of the ASSP. Once a test is setup in Quick Launch and selected, the operation of the tester is controlled by the ASSP Control Center.

5.3.6 UTM (Universal Testing Manager) Software – RoboSTAR ASSP Setup Only

Get statistical and graphical results on demand using the UTM software. This software also allows the ASSP to keep testing while programming is done on a PC for alternate or additional testing using different requirements. There are many ways to use this software to obtain results useful to a particular application. Easily back up and save programs and results for future use.



5.4 Smart Interchangeable Load Cells

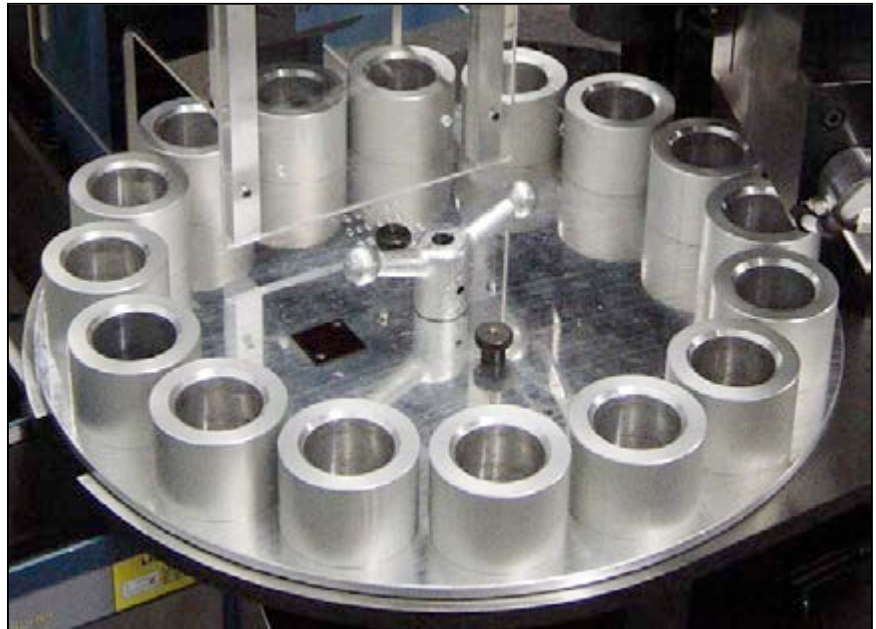
Both the SFM (Super Force Meter) and RoboSTAR testers feature interchangeable load cells. When operating within an ASSP system, the RoboSTAR load cell is more easily interchanged than the SFM. The SFM version may be customized to support multiple load stations to provide flexibility beyond a single load cell.

Load cells for the SFM (Super Force Meter) include 2, 11, 22, 66, 110, 200, and 500 lb capacities. Load cells for the RoboSTAR include 2, 11, 22, 66, 110, 200, 550, 1,000, and 2,000 lb capacities.

5.5 Indexer Plate Assembly

This component is a heavy-duty plate with slots custom sized for the parts to be tested and evaluated. When secured to the indexer assembly, the plate is electronically controlled and programmed to advance the slots incrementally through the presetting (if applicable) and testing stations, then finally to the sorting chute. This indexing system in a circular path may be loaded automatically from a vibrating feeder bowl and operate unattended or loaded manually, attended by an operator who loads and monitors the sorting operation.

Since an Indexer Plate is designed to handle parts similar in size, an additional plate or plates may be ordered to accommodate a part size change. To change out an Indexer Plate, first loosen the wing nut handle and remove. Lift the Indexer Plate using the lifting lugs and remove. Replace with a new indexer plate by aligning the pins on the Spring Support Table and secure with the wing nut handle. The Indexer Plate is designed to fit on the Spring Support Table in only one position.



When changing an Indexer Plate for a part size change, the Escapement (if an automated setup) will likely also need to be changed.

NOTE: When testing parts in bulk, the parts must be the same size and type. Indexer plates and escapements used for the same parts are engraved with a matching number for ease in determining that the correct plate and escapement are being used for the part. Using the incorrect indexer plate or escapement could result in damage to the load cell.

5.6 Presetting Stations

There are three capacities of preset stations available with the ASSP: 100, 250, and 500 lbs. A preset station is not required for the ASSP system. It is used in applications where the part is set, exercised, and then tested for sorting. A preset station can also be used as a counting device as it sets each part.

If a presetting station is ordered with the ASSP, it will be set up at the factory to operate as specified at purchase. If the presetter requirements change, the user will need to set the Presetter to operate as desired from the ASSP Control Center display under System Options > View Counters and Set Presets. If desired, this feature can be turned off and not used.

5.6.1 Setup and Adjustment

To adjust compressed spring length, remove the cover of the Presetter. The double lock nut setup on the threaded rod shown in the photo on the right can be moved up or down to set the length of stroke needed. Replace cover and tighten screws when done.



5.7 Length Zeroing & Testing Height Setup Procedure (ASSP with SFM Only)

The addition of length readings for the SFM (Super Force Meter) was designed as a set up aid and is not necessary for the normal usage of the ASSP. The actual positioning of the test platform is done with the use of a double lock nut. The addition of the length reading will give a more accurate set up.

There are two methods to zero the length: 1) plate-to-plate or 2) on a gage block. Both methods are covered in 5.7.1 and 5.7.2.



5.7.1 Zero Length Method 1: Plate-to-Plate



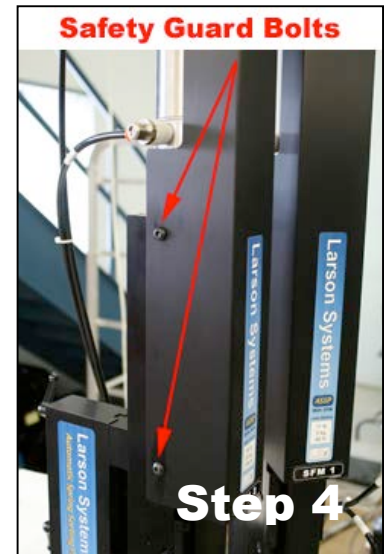
Length Zeroing Plate-to-Plate

1. On the SFM (Super Force Meter) control panel, reset the Length Offset. Use [OPTION], [F1] and [F2] buttons to access the Length Offset Setting and reset it to the value indicated on its calibration report. Press [ON/CLEAR] button to exit.



- a. Due to the nature of the length zeroing procedure, *THE LENGTH OFFSET WILL NOT BE ZERO*. A length offset is determined at calibration and is entered onto the calibration report. It will be unique for each load cell. For instance, an 11 lb load cell may have a value of -0.010" and a 66 lb load cell may have a value of -0.003". Enter this length offset value from the calibration report into its appropriate SFM control panel.
2. If the part to be tested requires the indexing plate to be in place, then install the appropriate indexing plate and home the Indexer. If not, remove the indexing plate.

- Position the testing platform to its initial testing position above the part by using the two quick release knobs (shown in the photo below) and raising or lowering the entire assembly as needed.



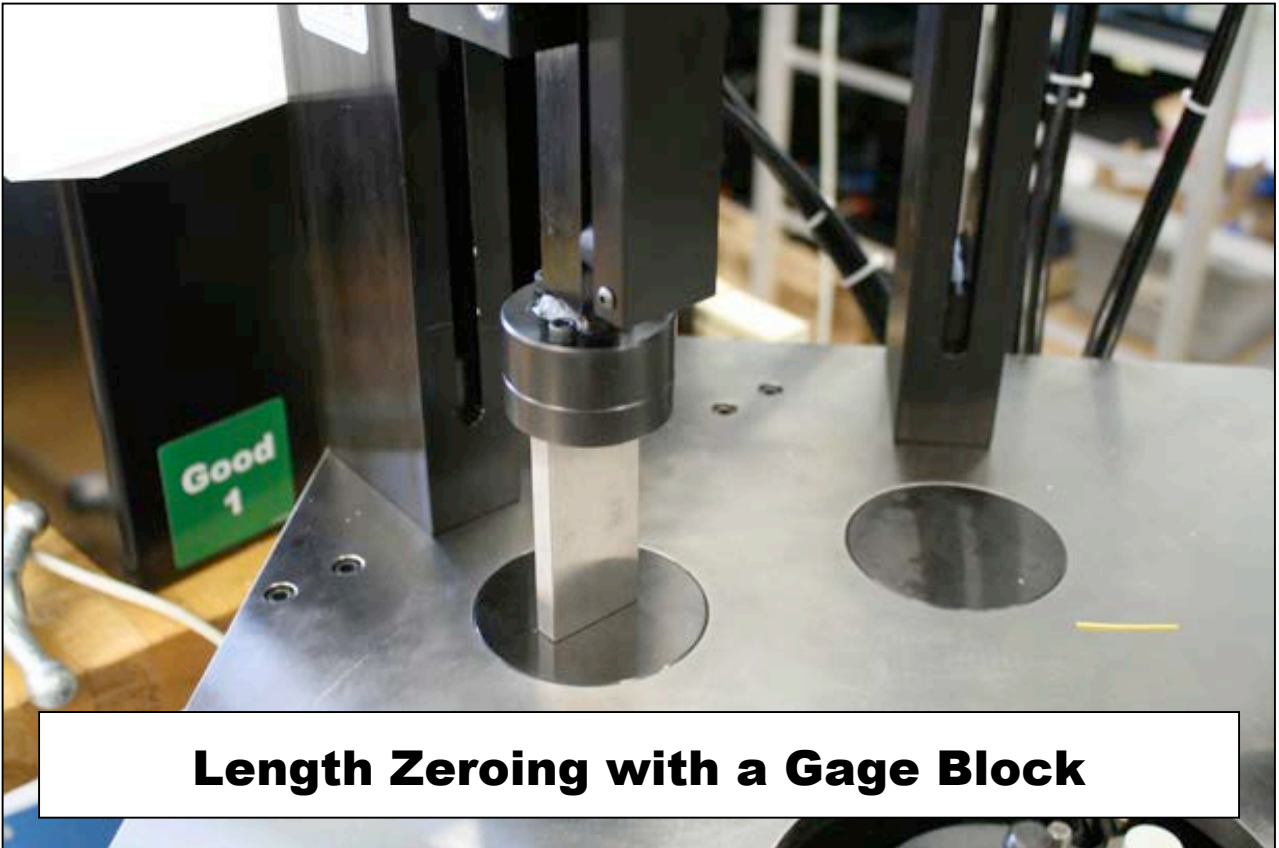
- Remove the safety guard covering the air cylinder by removing the 4 holding bolts, 2 on each side (shown in the above right photo).
- Loosen the double lock nut (shown in the photo on the right) and raise them enough so the testing platform can lower far enough to touch the load cell platform and push it into the overload stops.
- On the ASSP control panel (touch screen), navigate to the Main Menu. Press the following buttons to access the direct control to the air cylinders.



- PLC View
 - Direct Input View / Output Control
 - Page 2, Outputs 8 to 15
- Turn on both SFM 2 Loader (Output 12) and SFM 1 Loader (Output 13). The testing platform will be pushed down onto the load cells. The load cells will be overloaded and pressed onto the overload stops. *THIS IS NORMAL.*
 - Hit the **[Zero Length]** button on both SFM 1 and SFM 2.
 - Turn off both SFM 2 Loader (Output 12) and SFM 1 Loader (Output 13).
 - On the SFM loader to be set up, lower the double lock nuts into an approximate position for the travel necessary to test the part.
 - Place a part to be tested under the testing platform of the SFM being set up. This is necessary to accommodate for the deflection compensation of the load cell.
 - Turn on the output for the SFM loader being set up.
 - Set up the testing position desired using the bottom nut. Use the top nut to lock them both in place.
 - Turn off the SFM loader and turn it on again to recheck the testing position.
 - Make any adjustments to the double lock nut as necessary.

16. Turn off the SFM loader and repeat the process from Step 10 for the second loader, if necessary.
17. Replace the safety covers.
18. Using the navigation buttons, return to the Main Menu to begin normal operation.

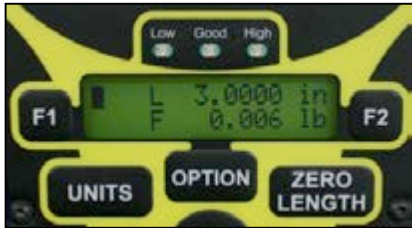
5.7.2 Zero Length Method 2: Gage Block



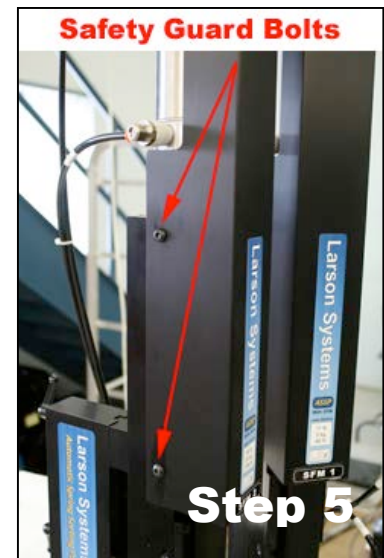
1. If the part to be tested requires the indexing plate to be in place, install the appropriate indexing plate and home the Indexer. If not, remove the indexing plate.
2. Position the testing platform to its initial testing position above the part by using the two quick release knobs and raising or lowering the entire assembly as needed.
3. Determine and place the necessary gage blocks on the load cell. They should stand tall enough to be between the initial testing position and the actual testing height.
4. On the SFM being set up, use the **[OPTION]**, **[F1]** and **[F2]** buttons to access and enter the Length Offset. Press the **[ON/CLEAR]** button to exit.
 - a. Due to the nature of the length zeroing procedure, the value entered will not be the amount of gage blocks. An additional length offset is necessary. This extra length offset is determined at calibration and is entered onto the



calibration report. This offset will be unique to each load cell. This value must be added to the amount of gage blocks used. For instance, if the value of the gage blocks is 3.00" and the offset for the 11 lb load cell is -0.010", then a value of 2.990" must be entered into the 11 lb SFM. If the offset for the 66 lb cell is -0.003", then a value of 2.997" must be entered into the 66 lb SFM.



5. Remove the safety cover above the air cylinder by removing the 4 holding bolts, 2 on each side (shown in the photo below left).

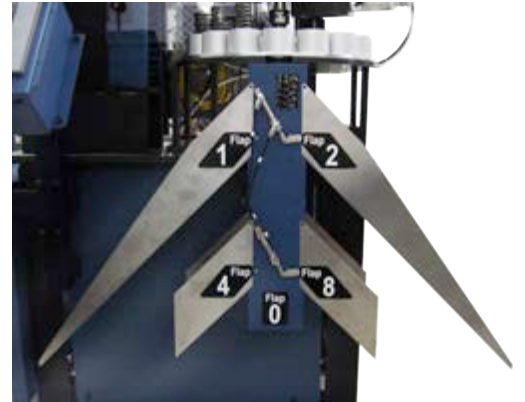


6. Loosen the double lock nut (shown in the photo above right) and raise them enough for the testing platform to lower far enough to reach the desired testing position.
7. On the ASSP control panel (touch screen), navigate to the Main Menu. Press the following buttons to access the direct control to the air cylinders:
 - a. **PLC View**
 - b. **Direct Input View / Output Control**
 - c. **Page 2, Outputs 8 to 15**
8. Turn on both SFM 2 Loader (Output 12) and SFM 1 Loader (Output 13). The testing platform will be pushed down onto the load cells. The load cells will be overloaded and pressed into the overload stops. *THIS IS NORMAL.*
9. Hit the **[Zero Length]** button on both SFM 1 and SFM 2.
10. Turn off both SFM 2 Loader (Output 12) and SFM Loader 1 (Output 13).
11. On the SFM loader to be set up, lower the double lock nuts to an appropriate position for the travel necessary to test the part.
12. Place a part to be tested under the testing platform of the SFM being set up. This is necessary to accommodate for the deflection compensation of the load cell.
13. Turn on the output for the SFM loader being set up.
14. Set the desired testing position using the bottom nut. Use the top nut to lock them both in place.
15. Turn off the SFM loader and turn it back on to recheck the testing position.
16. Make any adjustments to the double lock nut as necessary.

17. Turn off the SFM loader and repeat the process from step 11 for the second loader, if necessary.
18. Replace the safety covers.
19. Using the navigation buttons return to the Main Menu to begin normal operation.

5.8 Sorter Package

The sorting fixture is secured to the side of the base just below the indexing plate and indexer outlet slot. Choose from a three-way or five-way sorting device. A pneumatic or electrical hookup is required.



5.9 Escapement Assembly

The escapement assembly consists of a tube or chute that runs from the vibratory feeding bowl to the escapement fixture that feeds parts to the index plate one by one. The escapement fixture contains two chambers that hold and sequentially drops each part into the aligned slot on the Indexer Plate. As the plate indexes forward, an empty slot is aligned with the escapement chamber and another part is released. Like an indexer plate, an escapement is custom sized to handle parts of similar size. If testing parts of a wide range in size, additional escapement fixtures can be ordered to accommodate a part size change and matched up with the correct indexer plate. See the note in section 5.5.

The tubes connected to the silver cylinders that extend off the right side of the escapement chambers facilitate pneumatic operation. The pneumatics can be automated or controlled manually via a shut-off valve for each chamber attached to the tubes.

5.10 Vibratory Bowl Feeder

A choice of two sizes of vibratory bowl feeders is offered with the SFM (Super Force Meter) and three are offered with the RoboSTAR. The bowl vibration facilitates the movement of the parts around the perimeter of the bowl towards the escapement chute assembly to deliver the parts one by one to the indexing plate for testing and sorting. Adjustment features may be added to use one bowl to quickly change over and handle different size parts.

SFM (Super Force Meter):

- 12-inch Vibratory Bowl Feeder with ½ Cubic Foot Hopper
- 18-inch Vibratory Bowl Feeder with 1 Cubic Foot Hopper

RoboSTAR:

- 12-inch Vibratory Bowl Feeder with ½ Cubic Foot Hopper
- 18-inch Vibratory Bowl Feeder with 1 Cubic Foot Hopper
- 30-inch Vibratory Bowl Feeder with 3-10 Cubic Foot Hopper

5.10.1 Control Panel and Bowl Feeder Settings

Instructions for using the control panel for the Bowl Feeder are found in a User Manual under separate cover. The control panel is programmed at the factory to operate within the guidelines requested at purchase. During operation the green on / off switch on the

Bowl control panel should be on. The switch will be illuminated when in the “on” position. The bowl is now ready to be told what to do from the ASSP Control Center.

5.10.2 Bowl Feeder Proximity Sensor

The vibratory bowl is equipped with a Proximity Sensor to monitor the level of parts remaining in the bowl. This sensor acts as a trigger to release more parts from the bulk hopper into the feeder bowl. A second sensor is mounted just outside the bowl beneath the Escapement cage where the springs pass to enter the Escapement chute. This sensor controls activation of the bowl as springs feed into the Escapement chute to the Indexer Plate.

5.11 Hopper

A hopper that allows bulk parts to drop into the vibratory bowl feeder is standard. Otherwise, a hopper may be ordered with a conveyor or elevator to move the parts to the bowl. The hopper is operated from its own control panel and is programmed at the factory to operate within the guidelines requested at purchase. During operation the green ON / OFF switch on the Hopper control panel should be on. The switch will be illuminated when in the “on” position. The hopper is now ready to be told what to do from the ASSP Control Center.

5.12 Elevator

An elevator may be added to a larger configuration (10 cubic foot hopper) to transport parts from the hopper to the feeder bowl. The elevator is operated from its own control panel and programmed at the factory to operate within the guidelines requested at purchase. A separate user manual for the elevator is provided.

General Information

The elevator has a safety feature that turns off the elevator if the drive encounters a fault. For example, if the conveyor becomes jammed and is unable to move, the elevator will turn off. This safety feature is active at power up. To reset the elevator back to normal operation, the toggle switch located on the right end of the middle row of buttons on the control panel must be manually flipped upward to the Start position. The switch then returns to the middle.

When the elevator is in normal operating mode the status indicator will blink yellow slowly.

6 THE ASSP TOUCH - SCREEN CONTROL CENTER

The Control Center display features an interactive touch-screen panel to operate the ASSP. The main settings that coordinate the components for production testing are controlled from here. It is important to first become familiar with the proper procedure for turning the system on or off.

6.1 Turn the System On / Off

The Startup Procedure is also covered in detail in section 7.1. Always begin startup with the **ASSP Touch-Screen Control Center**.

6.1.1 Turn On Procedure

1. Twist the red **Emergency Stop (E-Stop)** button on the left side of the **ASSP Touch-Screen Control Center** clockwise to release.
2. Press the blue **Power On** button below the **E-Stop** button until display lights up.
3. Touch the **Start** button.
4. Turn on Tester Power by touching **ON** and wait for the red indicator to turn green.
5. If using an ASSP with **RoboSTAR**, verify the red **E-Stop** button below the RoboSTAR touch screen display is in the "On" position (rotated and released).
6. Push and hold the blue **Power On** button to the right of the **E-Stop** until the display lights up. Wait for Windows to boot up and the FLASH software to load and display the **Manual Mode** screen. **NOTE:** A Windows Logon prompt can be activated to require a password entered to load Windows and the FLASH software. See section 3.4 for more information.
7. Remove the **Indexer Plate** from the indexer platform fixture.
8. Initialize your tester.
 - a. If using an ASSP with RoboSTAR, touch **Initialize Tester** on the **ASSP Touch-Screen Control Panel**. The indicator light will turn green when initialization is complete. Put the **Indexer Plate** back on the Indexer fixture.
 - b. If using an ASSP with SFM (Super Force Meter), zero the length and set up the testing height following the directions in section 5.7.
9. Touch **Indexer Power** to turn indexer on. Wait for the red indicator to turn green.
10. Touch **Home Indexer**. When the red indicator turns green the ASSP is ready.

6.1.2 Turn Off Procedure

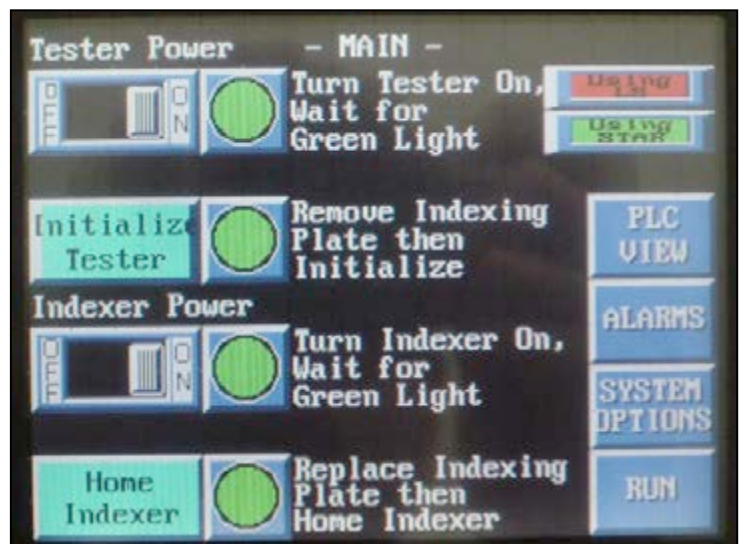
1. From the **RoboSTAR Control Panel** touch the red **[Shut Down]** button in the upper right of the display. This is the proper way to shut down the Windows operating system. A prompt will appear when complete.
2. Once Windows has successfully shut down it is safe to turn off the ASSP system from the **ASSP Control Center** using the red **Emergency Stop** button.

6.2 Main Menu at Startup

There are five menus: MAIN, PLC VIEW, ALARMS, SYSTEM OPTIONS, and RUN. From the Main menu, access the other menus by touching the corresponding button along the right side of the screen. To return to the Main menu, touch **Main** at the bottom right of the other menu screens.

6.2.1 Load Station or STAR

In the upper right, the operator should first choose the configuration of the ASSP. Select **Using LS** if ASSP is set up with an SFM for testing. Select **Using STAR** if the ASSP is set up with the RoboSTAR tester. The active selection will be green.



6.2.2 Tester Power

Touch **ON** under **Tester Power** to turn the tester on. Wait for the indicator light to change from red to green. When the indicator turns green it is safe to turn on the tester.

6.2.3 Initialize Tester

The indexing plate must be removed prior to initializing the tester. When ready, touch **Initialize Tester**.

6.2.4 Indexer Power

Touch **ON** under **Indexer Power** to turn the indexer on. The indicator light will change from red to green when power is turned on.

6.2.5 Home Indexer

Touch **Home Indexer** to return the indexer plate to its home position. This may take several seconds. The indicator light will change from red to green when the indexer has been homed.

6.3 PLC View Screen Selection

PLC refers to the Programmable Logic Controls used to coordinate the operation of the ASSP components. Touch the square indicator to the left of each item to access.



6.3.1 Internal Registers

This selection is only used in troubleshooting situations as advised by Larson Systems.

6.3.2 Direct Input View / Output Control

Touch this selection to view the inputs of the PLC and control the outputs manually.

6.3.3 Sorting Memory

Select **Sorting Memory** to view the sorting of the current parts being tested. Also, manually test, index, and operate the escapement here.

6.3.4 Pneumatic Devices

Touch **Pneumatic Devices** to access manual control of all pneumatic components.

6.4 Alarms

Touch **Alarms** from the Main menu to view the system alarms at anytime. All indicator lights should be blue during normal operation. When there is a problem during operation, the red fault light will flash on top of the center post and the display will automatically go to this screen. The indicator light next to the alarm that occurred will be red.



6.4.1 Preset Part Count Achieved

The presetting station can be set to count each part tested and trigger the alarm when the number of parts desired tested has been reached. To clear this alarm, go to the System Options screen on the ASSP Control Center display. Touch View Counters > Set Presets > Reset Counters / Clear Alarm in sequence. Once the alarm has been cleared, return to the RUN screen and resume normal operation.

6.4.2 UT Error

If the RoboSTAR or SFM tester encounters an error during testing the flashing fault light alarm will turn on. In this case, just moving the platform up using the jog bar in Manual Mode on the RoboSTAR Control Panel may clear this error. If this does not clear the error, consult the FLASH Series User Manual. If necessary, contact LSI. When the alarm has been cleared, return to the RUN screen from the ASSP Control Center display and resume normal operation.

6.4.3 Missing Spring Alarm

The Proximity Sensor next to the Escapement will trigger the fault light alarm if the number of missing springs allowed is reached. Either the springs or parts are not feeding properly or the feeder bowl is empty. To clear this error, correct the feeding problem or add more parts to the feeder. Once cleared, return to the RUN screen from the ASSP Control Center display and resume normal operation.

6.4.4 Indexing Drive Error

If excessive motor current is detected, and indexing drive error will occur. This is typically caused by a spring jammed in the indexer plate. To clear, go to the Main menu of the ASSP Control Center display and turn the Indexer Power off. Remove any springs jammed in the indexer plate. Once cleared, turn the Indexer Power back on and re-home the indexer. Resume normal operation.

6.4.5 Turn Off Light

Touch this indicator located on the ALARM screen of the ASSP Control Center display to turn off the red flashing light at the top of the center post after an alarm has occurred and subsequently cleared.

6.5 System Options

There are three menu pages for System Options. Touch the square indicator to the left of each item to access.

6.5.1 View Counters and Set Presets

Touch this selection to view how many parts have gone through each of the chutes of the sorter. Also, set the counter limits from this screen.

6.5.2 Vibratory Bowl Feeder

Touch to access adjustment to the mode of the bowl feeder during the test cycle.

6.5.3 Set Home Offset

Access the Home Offset screen by touching Set Home Offset. Adjust the home offset of the indexer here.

6.5.4 Missing Springs

Select Missing Springs to set the number of missing springs allowed before triggering an alarm.

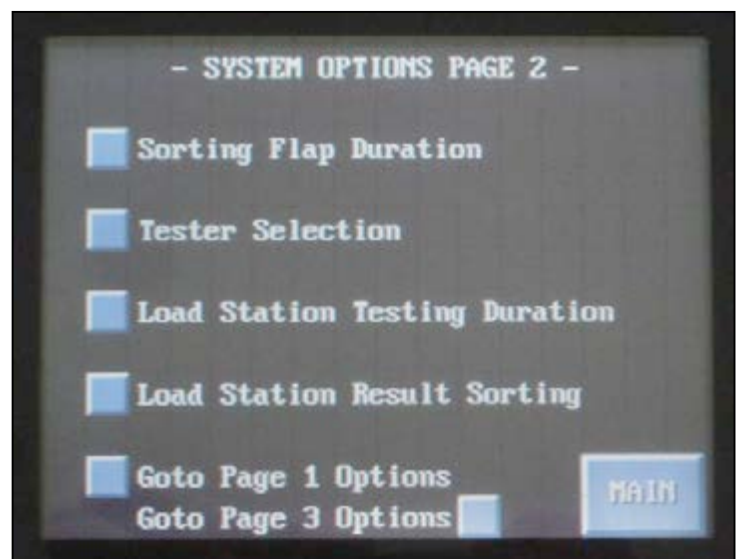
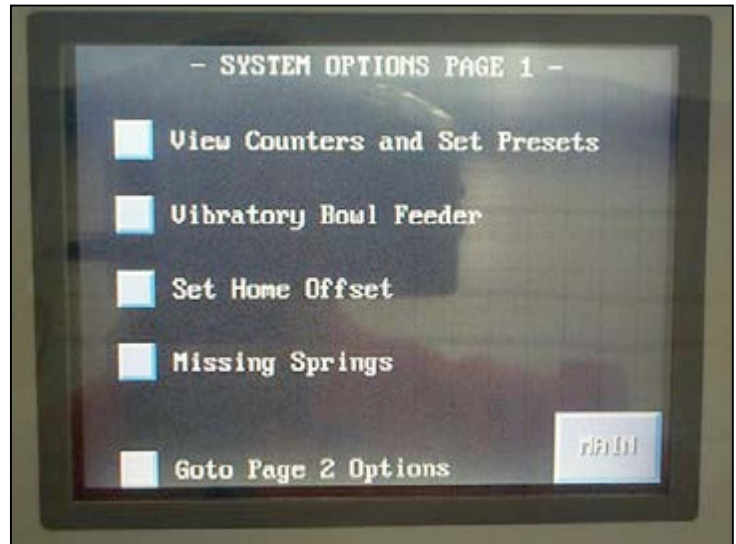
To access the next page of System Options: Touch **Go to Page 2 Options**

6.5.5 Sorting Flap Duration

Touch to access adjustment to the sorting flap duration. Enter how long a flap should stay open when tripped.

6.5.6 Tester Selection

Choose **Tester Selection** to identify the tester being used in the ASSP configuration. Touch **STAR** for a RoboSTAR tester or **LS** for Super Force Meter. If LS is selected, a screen appears to choose a combination of up to 3 Load Stations or other active units connected to the indexer.



6.5.7 Load Station Testing Duration

This selection activates the air cylinder for a Load Station in an SFM configuration. Set the desired time from activation to release of the platform during production testing. Screenshot below left.



6.5.8 Load Station Result Sorting

Set up sorting results for an SFM configuration from this selection. Conditional sorting for one, two, or three stations is allowed. See the above right screenshot

To access the next page of System Options: Touch **Goto Page 3 Options** or touch Return to the previous menu: Touch **Goto Page 1 Options**

6.5.9 Parts Per Plate

Choose to change or set the number of parts that may be positioned on the Indexer Plate at a time. The plates are able to hold 8, 16, or 32 parts.

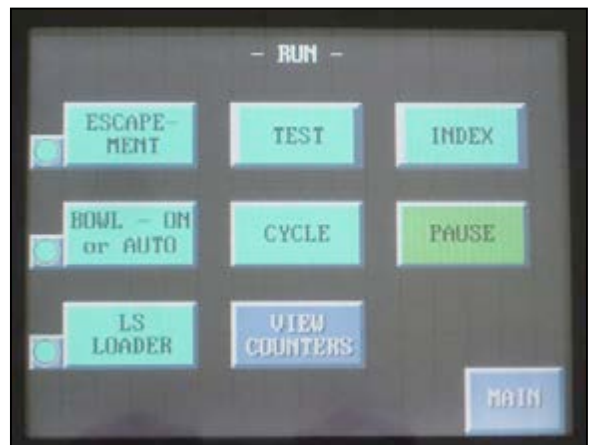
6.5.10 Screen Brightness

Adjust the brightness of the touch panel from this menu.



6.6 Run

This menu is normally displayed when production testing is in progress. The user is able to start the testing sequence, pause the operation, activate the indexer or escapement manually, and control the bowl feeder, etc. from this screen.



6.6.1 Escapement

Touch **Escapement** to actuate indexing to include an escapement release with indexing movement. Displays in green when active, blue when inactive. See Section 6.6.3 –

Index for more information.

6.6.2 Test

When selected, only the test unit will operate. A test will be performed on the part aligned with the tester.

6.6.3 Index

Touch **Index** to increment the indexer by one when Escapement displays in blue (off). Indexer will increment and release a part from escapement when Escapement displays in green (on).

6.6.4 Bowl – On or Auto

Select to control the bowl feeder. When displayed in green the bowl will run constantly. In Auto the bowl will run during the test cycle only – Bowl On or Auto will display in blue.

6.6.5 Cycle

Touch **Cycle** to control the complete test cycle, including the tester, feeder, indexer and sorter.

6.6.6 Pause

Touch to **Pause** the testing cycle. Not used as a safety shut off. Pauses only after a cycle has been completed.

6.6.7 LS Loader

Touch to activate the air cylinder for the operation of the Load Station in an ASSP configured with the SFM tester.

6.6.8 View Counters

Touch to view the sort counter. From the menu preset counts may be set or reset for a particular testing sequence.

7 ASSP USER GUIDE

This section describes how to operate the ASSP once it has been properly set up. Startup always begins at the **ASSP Touch-Screen Control Center**. Do not turn on the SFM or RoboSTAR tester before turning on the ASSP system using the Touch-Screen Control Center display.

7.1 Startup Procedure

1. Release the red **Emergency Stop** button on the ASSP Touch-Screen Control Center by turning the knob to the right.
2. Press and release the blue **Power On** button. When the ASSP finishes its power up cycle, a splash screen will appear with the LSI logo and a **Start** button. Press the **Start** button on the touch screen to finish startup
3. Clear all parts from the indexing table.
4. Turn on the tester by taping on the Tester Power toggle switch. If a RoboSTAR tester is used, it will begin to power up and will take approximately 2.5 minutes to power up completely. If SFM's (Super Force Meters) are used, they will take about 45 seconds to power up.
5. Raise any safety shields around the indexing plate.
6. If a RoboSTAR tester is used, do the following:
 - a. Remove the indexing plate.
 - b. Press the **Initialize Tester** button after the tester has completely powered up.
 - c. When the tester finishes the initialization, replace the indexing plate.
7. On the ASSP touch screen, tap the **Indexer Power** toggle switch and wait for the green light to the left to turn on.
8. Tap the **Home Indexer** button. The indexer plate will rotate and find its home position.
9. If a RoboSTAR tester is used, load the appropriate test.
10. If SFM's are used, refer to section 5.7 to zero the length and set up the SFM loaders' testing heights.

7.2 Set Home Offset

Do not use this procedure unless it is needed per consultation with Larson Systems, as the ASSP is equipped with an automatic homing sensor. This procedure adjusts the position of the indexing plate so the parts fall correctly through the escapement and into the indexing plate. This also aligns the parts so they are centered either under the load cell for a RoboSTAR or centered directly on the load cell and loaders for SFM's (Super Force Meters).

From the Main menu of the ASSP Control Center touch **System Options**. Then, touch **Set Home Offset**. Load a few springs into the Escapement Chute and cycle it once by touching **ESCAPEMENT**. The first spring drops onto the Indexer Plate. Touch **ADVANCE** repeatedly until the spring falls into the slot on the Indexer Plate or until slot is accurately aligned at the drop point from the Escapement. Touch **INDEX** and then touch **ESCAPEMENT** once to drop another spring. Adjust by touching **ADVANCE** if needed. This process may be repeated to be sure the home offset is correctly set and the indexer plate is in alignment. When finished, touch **RE-HOME**. Touch **System Options** when finished to return to the previous menu.

7.3 Missing Spring Detector

The Missing Spring Detector is a proximity sensor between the Escapement and the test station. Do not adjust unless sensor is not sensing the spring or the spring is too tall to pass under the sensor. To set the height of the sensor put a spring under the sensor with the power on. Lower the sensor until the yellow light on the sensor comes on, sensing the spring. Secure sensor in place.

7.4 Sorting Parameters

Sorting parameters have been set at the factory according to specifications provided when ASSP was ordered. To change sorting parameters within the RoboSTAR configuration, refer to section 5.2.4 in the FLASH Series of Automatic Testers User Manual. This instructs how to set the test point conditions and which flap a condition is sorted to. To set the length of time a flap is open, see section 6.5.5 in the ASSP User Manual.

For an ASSP with SFM's (Super Force Meters) the sorting information is in the Sorting Setup in the System Options. Refer to section 6.5.7.

7.5 Programming a Test

The ASSP - RoboSTAR has tests programmed and saved for use with each part number. The tests were set up according to parameters provided. If additional tests are needed or testing requirements change, test sequences may be created or edited in Program Mode on the RoboSTAR Control Panel. See **Section 5.2 – Program Mode** in the FLASH Series User Manual. Test sequences programmed may be saved using **[File]** then set up under **[Quick Launch]** using the **[Add]** function.

7.6 Testing Procedure

Allow tester to warm up for at least five minutes before beginning a test sequence.

1. Follow the proper Startup Procedure (see section 7.1).
2. Load your parts into the indexer
 - a. By hand if no vibratory bowl or hopper are installed.
 - b. Into the vibratory bowl or hopper, if installed.
3. Navigate to the **Run** screen from the Main menu of the ASSP Control Center.
4. Press the **Index** button until the first part is in testing position.
5. Press the **Cycle** button on the **Run** screen to start the testing cycle.

7.7 Sending Data to a PC or Printer

7.7.1 SFM (Super Force Meter) Configuration

Data cannot be sent to a PC or printer from the SFM units.

7.7.2 RoboSTAR Configuration

Since the RoboSTAR is equipped with the FLASH software, a variety of statistical result formats may be sent to a printer. When the tester is in **Automatic Mode**, select the format from the top of the display just below the Main Menu bar and select **[Print Report]** from the bottom left of the display. Refer to Section 5.5 – Automatic Mode in the FLASH Series of Automatic Testers User Manual for more information.

Not only can you send results to a printer when operating a ASSP with RoboSTAR, you can also capture and send results to a computer using data capture software like Larson Systems' UTM (Universal Testing Management).

7.8 Spring / Part Changeover Procedure

Changing to a different size spring or part for testing does not require any major adjustments or changes to the ASSP. A changeover may only require retrieving and running a different test programmed for the new part number. This section describes how to determine the changes, if any, that are needed for a part changeover and how to perform such changes.

The Indexer Plate and Escapement assembly may need to be switched for a part change. Also, the spring Proximity Sensor located along the indexer may need to be raised or lowered. Parts from the previous tests remaining in the bowl will need to be removed to make way for the next part type being tested.

Use the following checkpoints to ensure a part changeover is done correctly:

1. Does the Indexer Plate and the Escapement Assembly need to be changed?
2. Is the Proximity Sensor at the correct height for the next part being tested?
3. Are there any springs remaining in the bowl, hopper, or elevator?
4. Will any adjustments need to be made to the Bowl for the part change?
5. Perform startup procedure if necessary.
6. Select the applicable test desired. Begin testing the next part.

7.8.1 Indexer Plate and Escapement Assembly

The two sets of indexer plates and escapement assemblies shipped can accommodate multiple parts, but the same part numbers should be tested together. The Cummins part numbers are stamped on the indexer plate and escapement to be used for that part. Match the part number to be tested to the correct indexer plate and escapement. If the correct plate and escapement are already in use on the ASSP, no change is necessary.

7.8.1.1 Changing the Indexer Plate and Escapement

Indexer:

1. Turn the T-handle in the center of the plate and remove.
2. Lift the plate off of the indexer platform.
3. Replace with the correct plate for testing the next part number.
4. Insert the T-handle and tighten.

Escapement:

1. Loosen the two adjustment handles on the back of the escapement.
2. Remove handles and then the escapement. (Escapement is heavy.)
3. Replace with the correct escapement for testing the next part number.
4. Insert the adjustment handles and tighten.

If the Indexer Plate and Escapement are changed, the ASSP will need to go through the [Startup Procedure – section 7.1](#) for initialization and homing before testing on the next part begins. Once all necessary changes have been made and the startup procedure is completed, the test for the current part may be retrieved and run.

7.8.2 Height of Proximity Sensor

If the next part being tested is too tall to pass under the sensor or too short to be detected, the height of the Proximity Sensor will need adjustment. See section 7.3.

8 TROUBLESHOOTING

Problems that may occur are described in this section with common workarounds or fixes. If at any time parts need to be cleared from or maintenance done on or near a pinch point area, the ASSP should be paused or turned off. Contact LSI with any questions or service needs.

8.1 The Tester is not Powering Up

8.1.1 Tester Power

Check all power connections and make sure tester power is on. This includes checking that the emergency stop button is positioned for Power On, not pushed in to Stop. See instruction for powering up the tester in section.

8.2 Escapement Assembly Not Feeding Parts to Indexing Plate

8.2.1 Check the Parts

Make sure parts are clean, free of foreign materials and are of the proper shape.

8.2.2 Possible Blockage and / or Alignment Problem

Determine if a blockage exists and where it is located. With the system turned off, carefully clear parts from that area. Then make sure the end of the escapement assembly is lined up with the next index plate slot.

8.3 Bowl Feeder Not Feeding Parts to Escapement Tube

8.3.1 Bowl Feeder Power and Feeder Control

Make sure the bowl feeder power is turned on and the feeder is operating. Check to see that the bowl feeder control is on the proper setting.

8.3.2 Check the Parts

Make sure parts are clean, free of foreign materials, and are the same shape and size.

8.4 Hopper Not Feeding Parts to Vibratory Bowl

8.4.1 Hopper or Elevator (Conveyor) Power is Turned Off

Make sure the power is turned on. The Bowl and Hopper each have a green ON / OFF switch on their individual control panels that illuminates when power is on. The Elevator has a toggle switch for Start / Stop. The Power indicator should be and the Status indicator should be.

8.4.2 Hopper is Empty

Parts should be at least one inch deep in the hopper in order to feed properly. If not, add more parts to the hopper. The hopper should automatically shut off whenever the

proper layer of parts has been fed to the bottom of the bowl. Part level is monitored via a photoelectric sensor.

8.5 Parts Not Sliding Down the Sorter Chute in Time

This would cause parts to be sorted incorrectly. The sorter chute may need to be cleared or the timing control needs to be adjusted.

8.5.1 Check Sorting Parameters

The sorting flap time open may need adjustment or the indexer is not set to drop the part in the correct sequence. See section.

8.6 Tester Displays an Error 4 Signal; Platform Crashes Down on Part at Startup

8.6.1 Incorrect Test Programmed

First check the programmed test sequence for errors and make any corrections.

8.6.2 Wrong Part Being Tested

In this case the test is correct, but the wrong part for the test is being fed to the testing area. Double check that the part intended is being delivered to the tester.

8.6.3 Reboot the System

It is possible that the system needs to reboot. Restart the tester and carefully follow the startup procedure.

9 CARE AND MAINTENANCE

9.1 Routine Maintenance

Routine maintenance includes cleaning of the feeder, indexer and sorting chutes. Grease and oil all indicated locations.

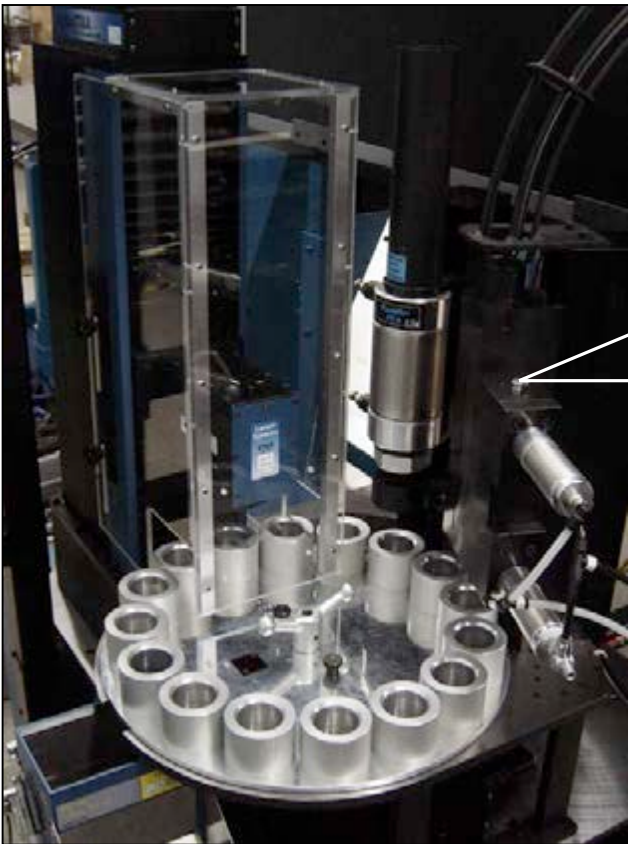
9.1.1 Air Cylinder Lubrication

Check oil reservoir on air cylinder lubricator daily. Fill the reservoir on the left with Mobil DTE Lite oil as needed. The reservoir should be approximately half full.

9.1.2 Escapement

The interchangeable escapement is equipped with an exterior oil cup. Fill daily with a couple drops of Mobil oil #2. See photos on the next page.



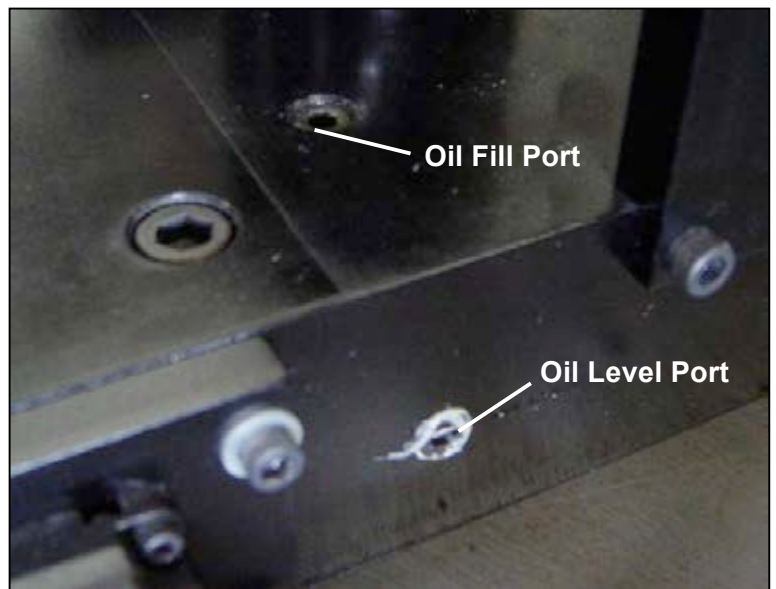


9.1.3 Indexer Bearing Grease

The Indexer's bearing housing, or gearbox, is found under the indexer platform. On the side of the cylinder between this housing and the indexer platform is an accessible grease point. Apply 2 pumps of all-purpose automotive grease every six months.

9.1.4 Indexer Gear Box Oil

Change the gearbox oil approximately every 2 years. This is done by first removing the Indexer platform from the base and then the gearbox assembly. Keep the gearbox level and locate the oil fill port on the top of the gearbox and the oil level port on the side. Open both ports. Carefully tip so oil flows out from the oil level port until drained. Lay gearbox in its normal position. Add Mobil #2 oil through the oil fill port on the top of unit until it starts to run out of the oil level port. Close both the fill and level ports. Secure the gearbox back onto the base and replace the Indexer platform over it.



9.2 Spare Parts

If requested, a list of recommended spare parts to have on hand can be provided with pricing for each item. The recommended spare parts are items that could be damaged or wear out over time. Having the parts immediately available reduces any down time for production testing.

9.3 Calibration

Annual calibration is recommended for the Super Force Meter tester and load cells. The tester and associated load cells may be shipped to LSI for this service or schedule an LSI technician to calibrate the equipment on-site.

A tester that is used heavily in volume production testing may need more frequent calibration. Generally, if the tester begins showing results outside of normal expectations, repair or calibration may be needed. Consult LSI for assistance.