SGB Series

Gravimetric Batch Blenders

With Mitsubishi Controller

(Standard & CE Models)

Operation, Installation and Service Manual

Sterling
2900 S. 160th Street
New Berlin, WI 53151
Tel: [262] 641-8600
Fax: [262] 641-8653
www.sterlco.com

CE

Part No. A0567659

Bulletin No. SM1-605M
4/13/03

	Model #	**Serial #**
Write down your Blender	_____	_____
serial numbers here	_____	_____
for future reference	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

Sterling is committed to a continuing program of product improvement.
Specifications, appearance, and dimensions described in this manual
are subject to change without notice.

Revision: NEW
Part No. A0567659 Bulletin No. SM1-605M

Table of Contents

Table of Contents

Safety Considerations

Sterling equipment is designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- ☑ Follow all **SAFETY CODES**.
- ☑ Wear **SAFETY GLASSES** and **WORK GLOVES**.
- ☑ Disconnect and/or lock out power before servicing or maintaining the blender.
- ☑ Use care when **LOADING**, **UNLOADING**, **RIGGING**, or **MOVING** this equipment.
- ☑ Operate this equipment within design specifications.
- ☑ **UNPLUG OR OPEN**, **TAG**, and **LOCK ALL DISCONNECT DEVICES** before working on equipment. You should remove the fuses and carry them with you.
- ☑ **GROUND** your equipment properly before applying power.
- ☑ Use extreme caution when working with your equipment. Keep body parts, tools, clothing, and debris away from vacuum inlets and moving parts.
- ☑ Do not jump or bypass any electrical safety components.
- ☑ Do not restore power until you remove all tools, test equipment, etc., and the blender and related equipment are fully reassembled.
- ☑ Only **PROPERLY TRAINED** personnel familiar with the information in this manual should work on this equipment.

Sterling

“SGB-E” Series Blenders

This blender is manufactured by ACS, Inc. at the ACS-Wood Dale facility:

ACS, Inc.
801 AEC Drive
Wood Dale, IL 60191

Phone: 630.595.1060
Fax: 630.595.6641

The equipment is distributed in Europe by our European facility:

ACS-EUROPE
Daniels Industrial Estate
BATH ROAD
Stroud, Gloucestershire, England
GL5 3TJ

Phone: (44) 1453 768980
Fax: (44) 1453 768990

Annex B Information

The following design information is provided for your reference:

1. No modifications are allowed to this equipment that could alter the CE compliance
2. Ambient temperature: 40 degrees Celsius – Maximum (104 degrees Fahrenheit)
3. Humidity range: 50% relative humidity
4. Altitude: Sea level
5. Environment: Clean, dust-free and non-explosive
6. Radiation: None
7. Vibration: Minimal, i.e. machine mounting
8. Special installation requirements: Clean, dry compressed air 1 cfm @ 60 psi (1.7 m^3/hr @ 4.14 bar)
9. Allowable voltage fluctuation: +/- 10%
10. Allowable frequency fluctuation: Continuous +/- 1%
    Intermittent +/- 2%
11. Nominal supply voltage: 120/1/60 or 220/1/50/60 (Verify on serial number tag)
12. Earth ground type: TN (system has one point directly earthed through a protective conductor)
13. Power supply should include a neutral power connection.
14. Over-current protection is supplied in the blender, but additional protection should be supplied by the user.
15. The plug on the power cord serves as the electrical disconnect device.
16. Unit is not equipped with three-phase motors.
17. N/A
18. Blender is not equipped with local lighting.
19. Functional identification
20. Blender is equipped with a CE mark
21. Blender is supplied with an operating manual in the language of the destination country.
22. Cable support may be required for power cord, depending on final installation.
23. No one is required to be in the interior of the electrical enclosure during the normal operation of the unit. Only skilled electricians should be inside the enclosure for maintenance.
24. Doors can be opened with a screwdriver, but no keys are required.
25. Two-hand control is not required or provided.
26. All blenders should be moved around and set in a place with a lift truck or equivalent.
27. There are no frequent repetitive cycles that require manual control—repetitive functions are automatic while the blender is operating.
28. An inspection report detailing the functional test is included with the blender.
29. The machine is not equipped with cableless controls.
30. Color-coded (harmonized) power cord is sufficient for proper installation.

1 General Information

1-1 Introduction

We are pleased to supply Sterling auxiliary equipment for your facility. We manufacture a complete line of auxiliary equipment to satisfy all of your material handling, process cooling, scrap reclaim, size reduction, and automation requirements. Please feel free to contact your sales representative or our office if you have any questions.

1-2 Equipment Function

All SGB blenders are designed to blend plastic pellets and regrind, and supply the blended material to the processing machine. Standard equipment is not designed to blend powder or any other materials.

1-3 Accessories

Sterling offers a variety of standard options for blenders including floor stands, RAM feeders, loading equipment, etc. All accessories are designed and manufactured by Sterling to ensure proper results for your application.

1-4 Customer Service

The intent of this manual is to familiarize the operator and maintenance personnel with this equipment and help your organization get the maximum service from your equipment. If you have any questions regarding installation, service, repair, custom equipment, or applications, please do not hesitate to contact us for the information required. Prices for additional equipment, accessories, or repair parts will be furnished promptly upon request.

NOTICE: If you desire to use a blender for an application other than that for which it was purchased, please contact your sales representative or our factory to verify compatibility of the equipment with the new process. Misapplication of the equipment could result in injury to the operator or damage to the equipment.

1-5 Necessary Documents

The documents listed below are necessary for proper installation, operation and maintenance of SGB Series Gravimetric Batch Blenders. You can obtain additional copies from the Service Department at Sterling or ACS Europe.

Make sure that appropriate personnel get familiar with these documents:

- This Operation, Installation, and Service manual
- Electrical schematic and connection diagrams
- Pneumatic circuit drawing
- Electric motor and controller information sheets (if equipped)
- Operation and Installation manuals for supplied options and accessories

1-6 System Capabilities

Blending systems are as varied as the applications that they service. This equipment is intended to blend the materials(s) specified at the time of purchase at specific rates.

1-7 Equipment Covered by this Manual

SGB Blenders

- SGB-450
- SGB-900
- SGB-2500
- SGB-4000
- SGB-5000

1-8 “SGB” Series Weigh Blender Mechanical Features

SGB Slide Gate Blender

- Efficient Opti-Mixer® and “HC” mixer designs promote homogeneity
- Exclusive diamond design slide gate metering assemblies meter a large range for free flowing pellet materials
- Slide gate stroke limiting restrictors provided for accurate metering of minor ingredients
- Electro-polished 304 SS stainless steel weighing and blending components
- Precision 1/10% span accurate cantilever load cell weighing system
- Removable stainless steel weigh hopper
- Removable stainless steel mixer agitator and mixer wrap (Opti-Mixer® only)
- Mild steel material supply hoppers with clean-out doors and material drains
- Compressed air hose with nozzle for clean-out
- Safety-interlocked system shuts off compressed air and electricity if mixer is opened

1-9 “SGB” Series Weigh Blender with *Mitsubishi Touch-Screen Control* Features

- LCD touch-screen interface display operator control panel with 8’ cable
- Target vs. actual set point verification
- Inventory accumulation for all ingredients
- Audible and visual alarms
- Auxiliary alarm contact
- 50 recipe storage book
- *Three (3) types of recipe entry procedures available:*
    - ✓ **Quick Set** (up to 6-component) recipe entry. Color and additives are metered as a percentage of the virgin material.
    - ✓ **Percentage mode** recipe entry. Ingredients are metered as a percentage of the overall batch.
    - ✓ **Parts mode** recipe entry (i.e. 500:1) Ingredients are metered as a ratio to each other within the batch
- Full control diagnostics
- RS-422 communications ports

1-10 SGB (-E) Series Specifications

SGB Series Specifications	SGB-450	SGB-900	SGB-2500	SGB-4000	SGB-5000	
Number of materials blended	4	2 to 6				2 to 5
Slide gate (adjustable, in (mm)) square	2 (50)		2.5 (63)	3 (76)		4 (101)
Supply hopper capacity, ft³ (l)	0.75 (21)	1 (28)	1.5 (42)	2 (56)		
Weigh hopper capacity ft³ (l)	0.12 (3.4)	0.4 (11)	0.65 (18)	1.4 (39)		
Typical batch size, lbs. (kg)	3 (1.3)	8 (3.6)	15 (6.8)	35 (16)		
Mixer capacity, lbs. (kg)	6 (2.7)	20 (9)	30 (13.6)	75 (34)		
Mixer motor size, HP (kW)	1/6 (.12)		1/2 (.37)			
Mixer speed, rpm	30	16	22			
Load cell capacity (2 per blender)	2 kg ea.	5 kg ea.	10 kg ea.	20 kg ea.		
Blended material discharge opening, in (mm)	3 (76)		4 (101)			
Maximum blending rate (approx.), lbs/hr (kg/hr) ①	350 (159)	700 (318)	1500(680)	3500 (1590)	4000 (1820)	5000 (2270)
Weight of machine (approx.), lbs (kg)	145 (66)	200 (91)	400 (185)	600 (275)		
Shipping weight (approx.), lbs (kg)	200 (91)	400 (185)	600 (275)	850 (390)		

① Based on 78% virgin, 20% regrind and 2% Color.

Note: SGB features and specifications are subject to change without notice.

1-11 Model SGB Blender System Component Description

This section describes the various components of the blending system. The SGB blending system is made up of the following components:

1-11-1 Material Supply Hoppers

1-11-2 Slide Gate Metering Assemblies

1-11-3 Weigh Hopper

1-11-4 Weigh Hopper Dump Valve

1-11-5 Mix Chamber

1-11-6 Operator Control Panel

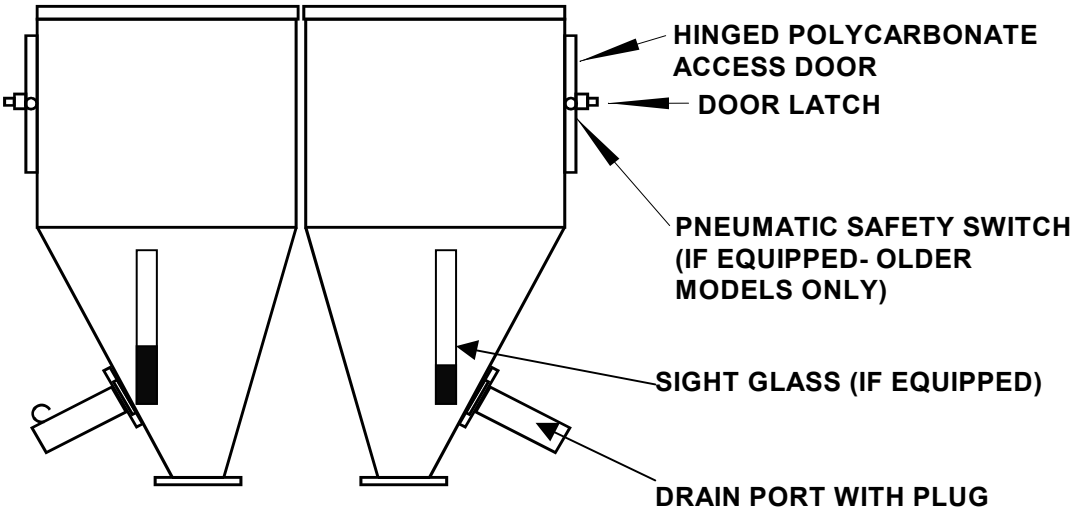
SGB

1-11-1 Material Supply Hoppers

The material supply hoppers are located on top of the blender frame. These hoppers store a supply of material for the individual metering devices. They are sized based on the total throughput of the blender.

The SGB blending system does not include any level indication devices on the unit. Optional low-level sensors are available. The blender controller will alarm if it runs out of material while trying to make a batch, but low-level sensors will alert floor personnel to the problem sooner.

Each hopper is equipped with a sight glass and/or access door.



Typical Material Supply Hoppers

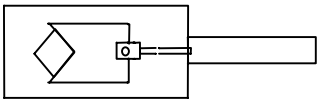
1-11-2 Slide Gate Metering Assemblies

Air operated slide gates are provided to meter the majority of pellet ingredients on the SGB blender.

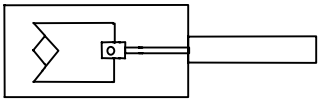
Important! **The metering range assumes ⅛" diameter free-flowing plastic pellets weighing approximately 35 lbs./cu. ft. This is meant to be an approximate sizing recommendation and can vary with different bulk density resins, pellet configuration, etc.**

A stroke limiter (included) can be installed on the metering gates to limit their travel. This device decreases the stroke of the gate and reduces the metering orifice of the valve. The unique diamond gate provides a square opening at any stroke length, providing more consistent flow from smaller valve openings than conventional slide gates. This stroke limiter may be necessary to accurately meter low percentage ingredients.

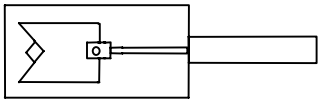
The air cylinders operating the slide gate are rugged, stainless steel cylinders designed for industrial use.



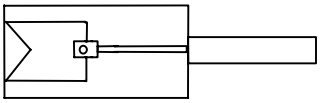
DIAMOND GATE OPEN



DIAMOND GATE 1/2 CLOSED



DIAMOND GATE 3/4 CLOSED



DIAMOND GATE CLOSED

The unique Sterling diamond gate provides a constant aspect opening that remains square regardless of the stroke length of the cylinder. This design provides a wider cross sectional opening when approaching a closed position, and provides better flow of plastic pellets out of the opening.

WARNING!

Slide gates create a pinch-point hazard.

Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning any blender, including all SGB Series models. Failure to do so may result in serious injury.

Each of the diamond gate air cylinders is actuated by a solenoid valve, which are controlled by the blender.

When the solenoid valve is energized, it opens the metering valve cylinder. When the solenoid valve is de-energized, it closes the metering valve cylinder.

If the power is interrupted to the blender, the metering valves will return to the closed position, to prevent material from over-filling the weigh hopper/mix chamber.

Important! **If the blender is in metering mode with one of the slide gates open, *do not open the front door of the blender!***

The safety switch shuts off the air supply to the blender. An open feeder slide gate stays open, and *an overflow of the weigh hopper can occur!*

1-11-3 Weigh Hopper

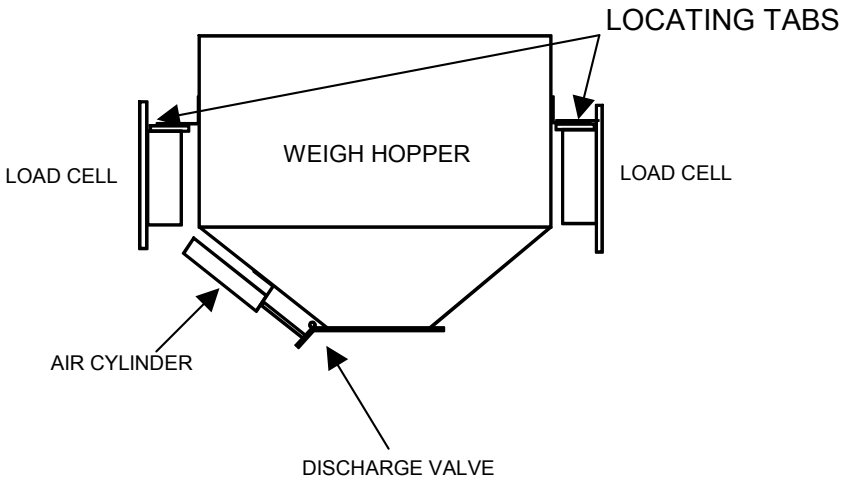
The weigh hopper on the SGB blender is used to weigh each batch of material, and includes an air-operated discharge valve. After the batch is weighed and the level sensor in the lower mix section is uncovered, the valve will open and discharge the batch into the mixer with the existing blended material. The discharge valve is also provided with a quick disconnect so the weigh hopper can be removed for cleaning.

On an SGB blender, the weigh hopper rests on each side on a precision cantilever load cell. To remove the weigh hopper, lift the hopper from the bottom, hold the discharge valve closed, and slide it out once clear of the locating tab on the bracket above the load cell.

Once the hopper has been cleaned, reposition it onto the load cell brackets, using care not to damage the load cells. Position the hopper as close to the center position between the load cells as possible.

Important! **Use care when replacing the weigh hopper, since the load cells are delicate weighing instruments and can be easily damaged. Do not use force to push in the weigh hopper. If it is positioned properly, it will slide in very easily.**

Load cells, if damaged, will have to be sent back to the manufacturer for testing and evaluation.



1-11-4 Weigh Hopper Discharge Valve

The weigh hopper discharge valve holds the material until it is dumped into the mixing section. The cylinder is actuated by a solenoid in the valve stack on the rear of the blender.

In looking at the pneumatic circuit, you can see that the air regulator controls the flow of air to the valve stack. When the weigh hopper discharge cylinder solenoid valve is not electrically energized, it will provide air pressure to the air cylinder and hold the shaft in an extended position, holding the dump valve closed.

When the air cylinder is actuated, the air pressure to the dump valve will be removed, causing it to open.

The air cylinder on the weigh hopper includes a spring return to allow the cylinder to retract in the absence of air pressure on the cylinder. This will cause the dump valve to open.

CAUTION! **The pneumatic system used on the SGB, like all pneumatic systems, is highly sensitive to oily, dirty, wet or contaminated air. If oil, dirt, water, or any other air-borne contaminates enter the system, the components could be damaged and injury to the operator could result.** ***A proper air supply must be supplied to the blender***.

When the safety circuit is disabled, the air pressure to the cylinder will drop off by shutting off all the air supply to the valve stack with the pilot operated master air valve. This will also cause the weigh hopper discharge door to open.

1-11-5 Mix Chamber

All of the Sterling batch blenders are equipped with an integral mix chamber. The mix chamber holds multiple batches of material so any variations in a batch are averaged over time.

1-11-5-1 Opti-Mixer™

The Opti-mixer™ is designed to provide bi-directional mixing action and can be easily taken apart for cleaning. This design is standard on all SGB blenders.

1-11-5-2 "HC" Mixer

The "HC" Mixer features an open wheel design and is best used for multiple regrind materials and rigid pellets. It is optional on all SGB models.

WARNING!

Never reach into the mix section of the blender without disconnecting the power or air supply.
Serious injury can result from getting your hand caught in the rotating mixer!

1-11-6 Operator Control Panel

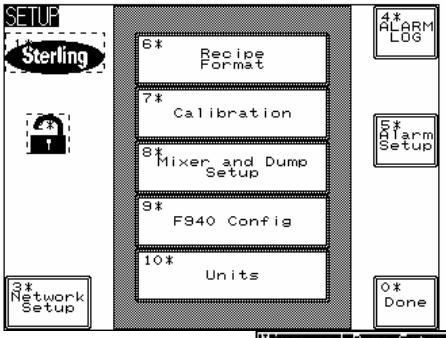
The operator control panel includes a 8 foot (2.4 m) cable and can be remote mounted (not recommended) adjacent to the blender. The panel can be unplugged and removed if necessary.

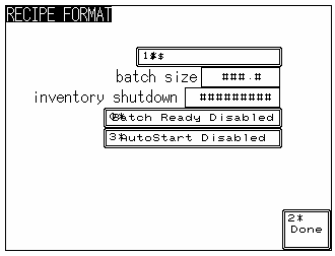
The controller includes an embedded computer. This design provides excellent blender performance along with an easily replaceable control panel in the unlikely failure of any computer or electronic part.

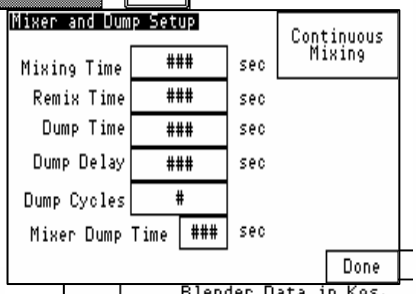
The display menu format is very simple. After installation and setup, simply enter in the recipe and start the blender.

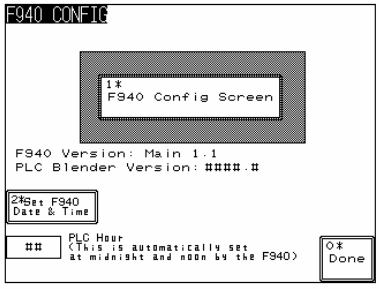
If it is desired to have a local display and control of the blender closer to a remote operator station, an optional RS422 remote control panel (RCP) is available.

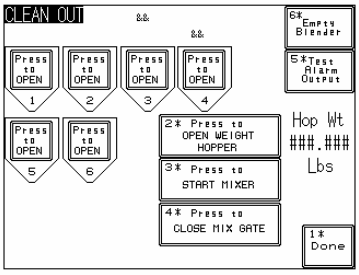
Typical Setup Screens

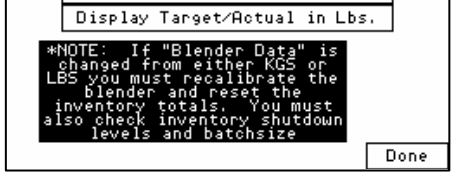


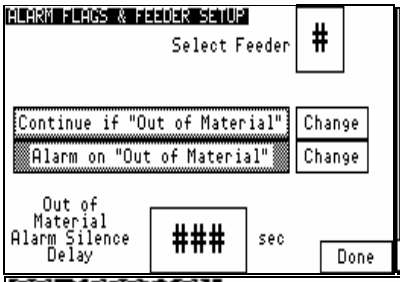


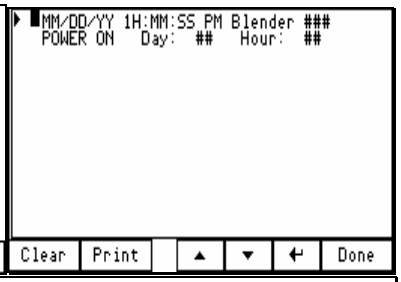


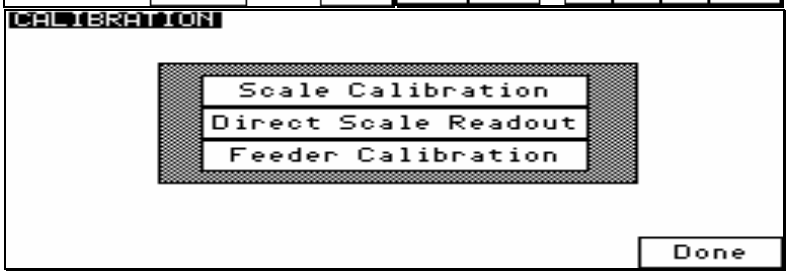


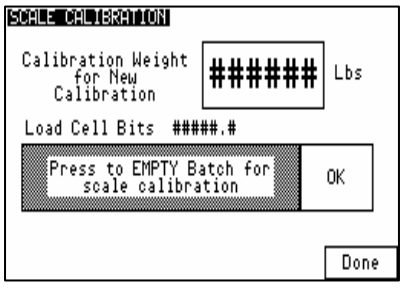


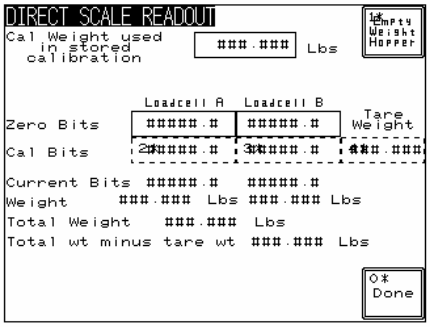


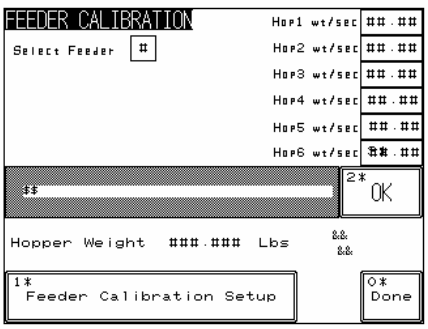




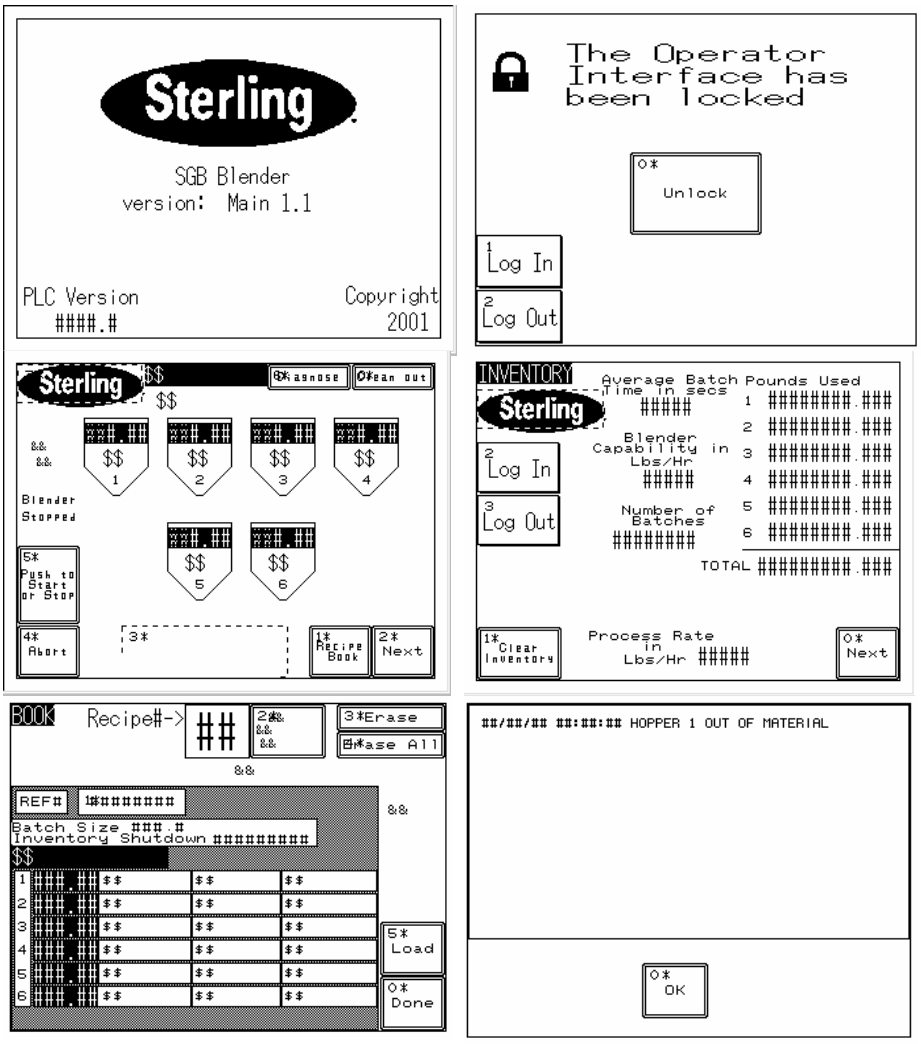








Typical Operator Screens



Note: The touch-screen panel display on your unit may be slightly different than shown.

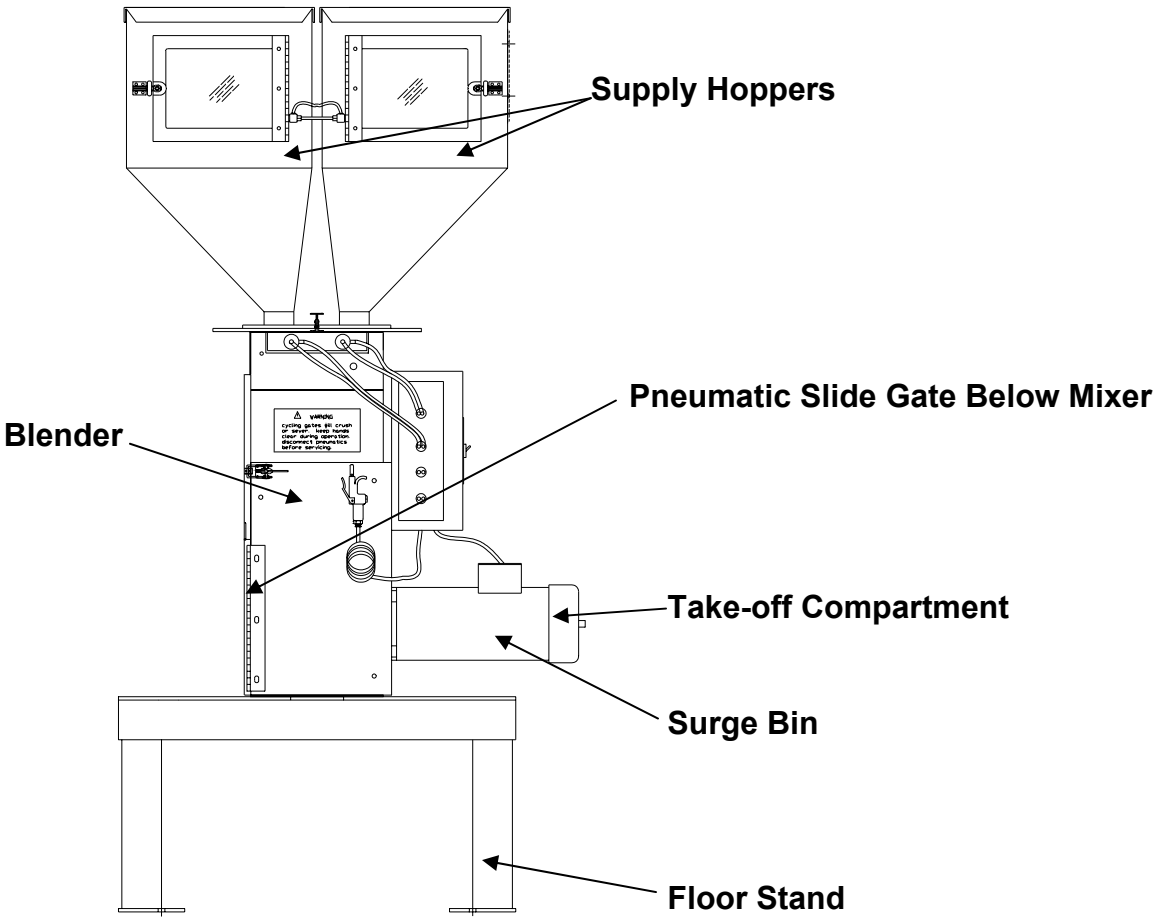
1-12 Pneumatic Slide Gate Below Mixer (Optional)

The SGB blending system can be equipped with an optional pneumatic slide gate below the mixing chamber. The gate is used in applications when the blender is mounted above a large hopper, or for gaylord filling, etc. This gate holds the material in the mixing section, to ensure that it is properly mixed. Control of the mixer function is described below, and is determined by the position of the "knife gate switch" located on the side of the back control panel.

Mixer Slide Gate Switch Positions

AUTO	Slide gate functions are automatically controlled by the blender controller
OPEN	Slide gate open all the time
CLOSE	Slide gate closed all the time

TYPICAL CENTRAL BLENDER LAYOUT



Safety *2*

2-1 Work Rules

Install, operate, and maintain this equipment according to applicable work and safety codes for your location. This includes OSHA, CE, NEC, CSA, SPI, and many other local, national, and international regulations. Obey these specific work rules:

☑ Read and follow the instructions in this manual before installing, operating, or maintaining any equipment. Additional copies are available from Sterling.

☑ Only qualified persons should work on, or with, this equipment.

☑ Work only with approved tools and devices.

☑ Disconnect and lock out power while working on this equipment.

2-2 Tools and Equipment Needed

You'll need the following:

- Hand tools
- Fork lift or overhead lift
- Wire, conduit, and fittings for wiring runs (if receptacle is not already in place)
- Mounting bolts with nuts and washers
- Compressed air tubing and fittings

2-3 Mechanical Installation

Blenders may be mounted on the machine, a stand, or a mezzanine. Be sure it is securely attached and additional bracing is used if necessary. The sections on the following pages explain general installation rules.

Read manual thoroughly before installing blender.

Use approved safety straps or chains to lift the blender at the marked lifting points.

2-4 Safety Considerations

The terms **NOTICE, CAUTION, WARNING,** and **DANGER** have specific meanings in this manual. ***See Section 11 for a complete list of specific safety warning information.***

A **NOTICE** is used to indicate a statement of company policy directly or indirectly related to the safety of personnel or protection of property.

A **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

A **WARNING** indicates a potentially hazardous situation which, if not avoided could result in death or serious injury.

A **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This word will be limited to the most serious situation(s).

The term **IMPORTANT** emphasizes areas where equipment damage could result, or provides additional information to make a step or procedure easier to understand. Disregarding information marked **IMPORTANT** would not be likely to cause personal injury.

REPORTING A SAFETY DEFECT

NOTE: If you believe that your equipment has a defect which could cause injury, you should immediately discontinue its use and inform Sterling, at our address listed in this manual.

The principle factors which can result in injury are:

1. Failure to follow proper operating and clean-out procedures, i.e. lockout/tagout.
2. Failure to maintain a clean and safe working environment.

2-5 General Responsibility

NO MATTER WHO YOU ARE…

Safety is important. Owners, operators, and maintenance personnel must realize that every day, safety is a vital aspect of their jobs.

If your main concern is loss of productivity, remember this: **Production is always affected in a negative way following an accident.** The following are some of the reasons, which can affect your production:

- **Loss of a skilled operator (temporarily or permanently)**
- **Breakdown of shop morale**
- **Costly damage to equipment**
- **Down-time**

An effective safety program is responsible and economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be

continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

2-6 Operator Responsibility

The operator's responsibility does not end with efficient production. The operator usually has the most daily contact with the blender and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

ONLY YOU can make safety work for you by constantly thinking about what is safe and what is not. It is often the "just once" that an operator reaches into a blender to remove material and it results in serious injury.

Learn and always use safe operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor or appropriate person.

REMEMBER:

- **NEVER** place your hands or any part of your body in any dangerous location.
- **NEVER** operate, service, or adjust the blender without appropriate training and first reading and understanding this manual.
- **NEVER** try to pull material out of the blender with your hands while it is running!
- Before you start the blender check the following:
    - Remove all tools from the blender;
    - Be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the metering or mixing area;
- If your blender has been inoperative or unattended, check all settings

before starting the unit.

- At the beginning of your shift and after breaks, verify that the controls and other auxiliary equipment are functioning properly.

- Keep all safety guards in place and in good repair. **NEVER** attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.

- When changing control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Locking selector switches should only be adjusted by authorized personnel and the keys removed after setting.

- Report the following occurrences **IMMEDIATELY:**
    - unsafe operation or condition
    - unusual blender action
    - leakage
    - improper maintenance
- **NEVER** stand or sit where you could slip or stumble into the blender while working on it.

- **DO NOT** wear loose clothing or jewelry, which can be caught while working on a blender. In addition, cover or tie back long hair.

- Clean the blender and surrounding area **DAILY**, and inspect the machine for loose, missing or broken parts.

- Shut off power to the blender when it is not in use. Turn the switch to the **OFF** position, or unplug it from the power source.

2-7 Maintenance Responsibility

Safety is essential to the good health of both operator and machine. If you are a maintenance worker, you must make safety a priority in order to effectively repair and maintain equipment.

BEFORE REMOVING, ADJUSTING, OR REPLACING PARTS ON A MACHINE, REMEMBER TO DO THE FOLLOWING:

- **BLEED** all air pressure from system components (refer to the Maintenance Section of this manual.)

- **TURN OFF** all air and electric supplies and all accessory equipment at the machine.

- **DISCONNECT AND LOCK OUT** electrical and pneumatic power, and attach warning tags to the disconnect switch and air shutoff valve.

When you need to perform maintenance or repair work on a blender above floor level, use a solid platform or a hydraulic elevator. If there is a permanently installed catwalk on your blender, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on blenders, machines, or work from ladders.

If you need to repair a large component, use appropriate handling equipment. Before you use handling equipment (portable “A” frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts of electrical apparatus, electrical component enclosures, and the blender frame are correctly connected to earth ground with an electrical conductor that complies with current codes. Install in accordance with national and local codes, which apply.

When you have completed the repair or maintenance procedure, check your work, remove your tools, rigging, and handling equipment.

Do not restore power to the blender until all persons are clear of the area. Start and run the blender until you are sure all parts are functioning correctly.

BEFORE you turn the blender over to the operator for production, verify all guards and safety devices are in place and functioning properly.

2-8 Safety

2-8-1 Description and Objectives

This section includes information on safety devices and procedures that are inherent to the SGB blending system. This manual is not intended to supersede or alter safety standards established by the user of this equipment. Instead, the material contained in this section is recommended to supplement these procedures in order to provide a safer working environment.

At the completion of this section, the operator and maintenance personnel will be able to:

- ***Identify and locate specific safety devices.***
- ***Understand the proper use of the safety devices provided.***
- ***Describe the function of the safety devices.***

2-8-2 Safety Circuit Standards

Safety circuits used in industrial systems protect the operator and maintenance personnel from dangerous energy. They also provide a means of locking out or isolating the energy for servicing equipment.

Various agencies have contributed to the establishment of safety standards that apply to the design and the manufacture of automated equipment. The Occupational Safety and Health Administration (OSHA) and the Joint Industrial Council (JIC) are just a few of the organizations that have joined with the plastics industry to develop safety standards.

Every effort has been made to incorporate these standards into the design of the SGB blending system; however, it is the responsibility of the personnel operating and maintaining the equipment to familiarize themselves with the safety procedures and the proper use of any safety devices.

2-8-3 Fail Safe Operation

If a safety device or circuit should fail, the design must be such that the failure causes a “Safe” condition. As an example, a safety switch must be a normally open switch. The switch must be held closed with the device it is to protect. If the switch fails, it will go to the open condition, tripping out the safety circuit.

At no time should the safety device fail and allow the operation to continue. For example, if a safety switch is guarding a motor, and the safety switch fails, the motor should not be able to run.

2-8-4 Safety Device Lock-Outs

Some safety devices disconnect electrical energy from a circuit. The safety devices that are utilized on Sterling SGB models are primarily concerned with the pneumatics and electrical power disconnection, and the disabling of moving parts that may need to be accessed during the

normal operation of the machine.

Some of the safety devices utilize a manual activator. This is the method of initiating the safety lock out. This may be in the form of a plug, disconnect plug, lever or a handle. Within this lockable handle, there may be a location for a padlock. Personnel servicing the equipment should place a padlock in the lockout handle.

WARNING! **Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning any Blend and Reclaim blender, including all SGB units. Failure to do so may result in serious injury.**

At no time must *anyone* remove the lockout or reconnect the twist plug, other than the person who installed the lockout or who unplugged the twist plug.

2-8-5 Lock-Outs, Plugs, and Other Safety Devices

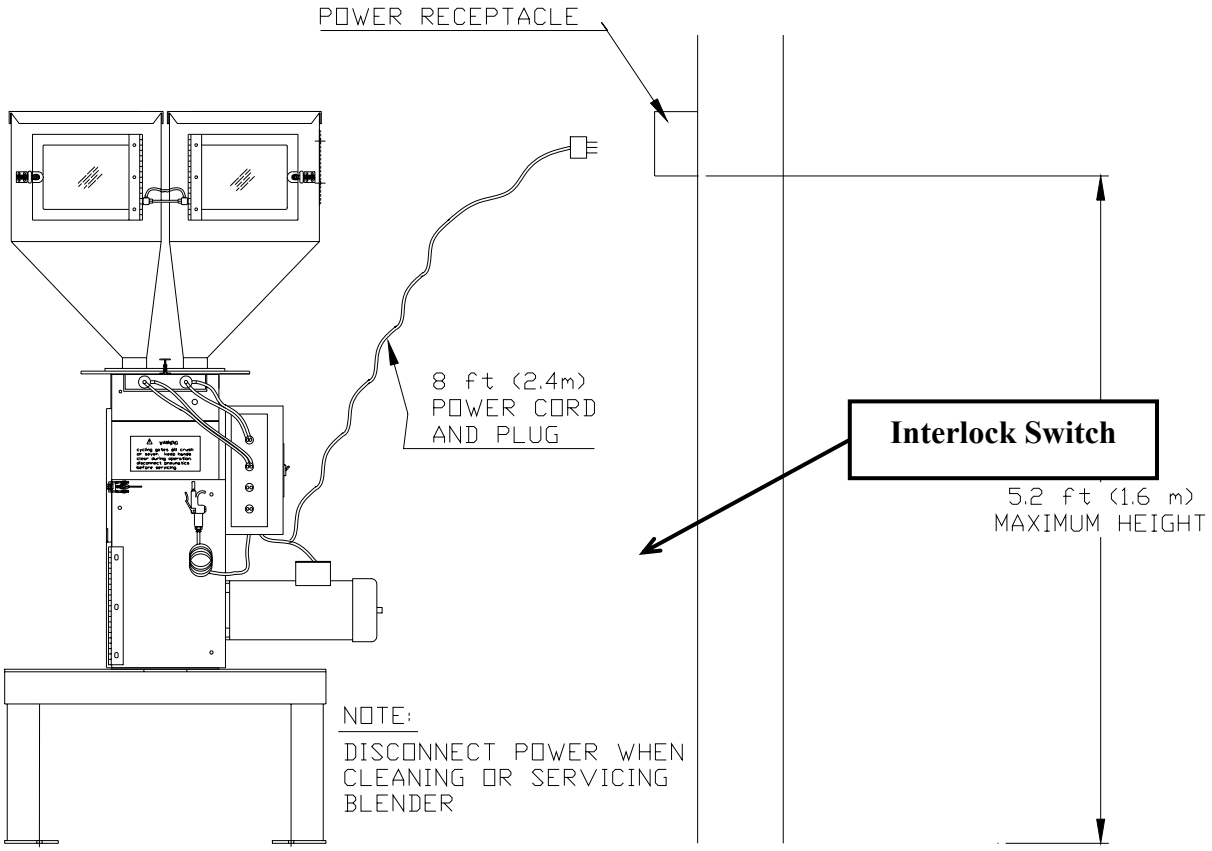
The SGB blending system utilizes several types of safety devices.

The Line Cord Plug

This line cord plug allows the operator or maintenance personnel to unplug the blending system from its power source and tag it out. This plug may be tagged with any number of approved electrical lockout tags. These tags are available at most electrical supply stores.

WARNING!

Disconnect both of these items to ensure optimum maintenance personnel safety when cleaning or servicing this equipment.



Electrical Disconnect Plug

2-9 Electric Safety Interlock Switch (All Models)

A unique electric safety switch is used to shut off power to the blender any time the mixer door is opened. **Do not tamper or alter with this switch in any way.**

Electrical safety interlock switch
(Located on mixer door)

WARNING! **Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning any product, including all SGB Series blending systems. Failure to do so may result in serious injury or death.**

3 Shipping Information

3-1 Unpacking and Inspection

You should inspect your Sterling batch blender components for possible shipping damage. If the container and packing materials are in re-usable condition, save them for reshipment if necessary.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc. In case of breakage, damage, shortage, or incorrect shipment, refer to the following sections.

3-2 In the Event of Shipping Damages

Important!

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment. The Carrier then assumes full responsibility of the shipment.

- ☑ Notify the transportation company's local agent if you discover damage.
- ☑ Hold the damaged goods and packing material for the examining agent's inspection. **Do not return any goods to Sterling before the transportation company inspection and authorization**.
- ☑ File a claim against the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.
- ☑ Advise Sterling regarding your wish for replacement and to obtain an RMA (return material authorization) number.

Parcel Post Shipment

- ☑ Notify Sterling at once in writing, giving details of the loss or damage. This information is required for filing a claim with our insurance company.
- ☑ Hold the damaged goods with the container and packing materials for possible inspection by postal authorities.

United Parcel Service Shipment

- ☑ Contact your local UPS office regarding damage and insurance claims.
- ☑ Retain the container and packing.
- ☑ Notify Sterling at once.

3-3 If the Shipment is Not Complete

Check the packing list. The apparent shortage may be intentional. Back-ordered items are noted on the packing list. You should have:

- ☑ Sterling SGB gravimetric batch blender components
- ☑ Bill of lading
- ☑ Packing list
- ☑ Operating and Installation packet
- ☑ Electrical schematic and panel layout drawings
- ☑ Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking. Determine that the item was not inadvertently taken from the area before you checked in the shipment. Notify Sterling immediately of the shortage.

3-4 If the Shipment is Not Correct

If the shipment is not what you ordered, **contact Sterling immediately**. For shipments in the United States and Canada, call 1 (800) 233-4819; for all other countries, call our international desk at 001 (630) 475-7491. Include the order number and item. *Hold the items until you receive shipping instructions*.

3-5 Returns

Important!

Do not return any damaged or incorrect items until you receive shipping instructions from Sterling.

- Notes -

Installation & Setup 4

4-1 Chapter Description and Objectives

It is the intent of this chapter to familiarize the reader with the proper site requirements and installation procedures of the SGB blending system. The information in this chapter is NOT meant to replace or supersede an established local or company implemented procedures. It is meant to enhance them.

4-2 Site Requirements

This section describes site requirements in detail. These requirements are broken down into mechanical mounting, electrical connections and pneumatic connections. Since the SGB is available in several different mounting arrangements, it is necessary for the reader to become familiar with the different arrangements.

4-2-1 Mounting Configuration

The SGB System is available in (3) three basic mounting arrangements. They are:

- ***Machine Mount***
- ***Mezzanine Mount***
- ***Floor Mount***

4-2-1-1 Machine Mount

In a machine mounting application of the SGB unit, there are a few items to review ***before*** placement and mounting of the blending system begins.

First, verify the machine flange dimensions match the SGB flange (if the optional pre-drilled holes were ordered). The SGB can also be equipped with an optional cast throat section with a drain port. This will bolt under the bottom plate of the blender.

Verify that the machine throat is physically capable of supporting the SGB blending system with a full load of material and vacuum loading equipment installed.

Important! **While in operation, the SGB applies horizontal and vertical pressures to the mounting flange. If there is a question as to the mechanical stability of a mounting flange, contact Sterling's Engineering department.**

Verify all clearances on the top and beside the processing machine. This is to insure that all motors, hoppers, control panels, etc. have adequate room for proper operation and servicing.

Refer to the assembly drawing with the unit for actual height and width dimensions.

Note: **Allow at least 36" clearance around blender to provide adequate room for cleaning, servicing, etc.**

Using proper lifting equipment, lift the blender, using the lifting lugs attached to the top plate of the blender. These lifting lugs can also be used to fasten horizontal or angled braces to the blender if more stability is needed.

Take care to insure proper orientation with adequate access to operator controls, mix chamber, and metering units.

Important!

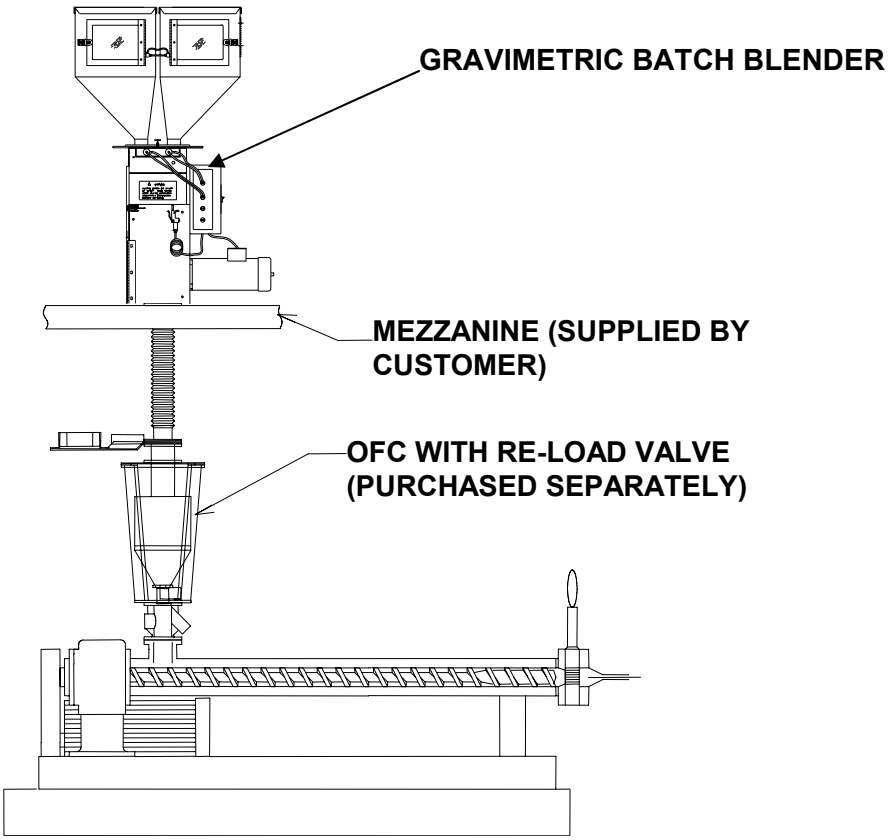
Never weld on the blender, support stand, machine or mezzanine without first removing the control panel and verifying that the blender is properly grounded.

4-2-1-2 Mezzanine Mount

In a mezzanine mount application, review the following items before installation begins. First, verify the SGB mounting locations match the mezzanine supports. Verify that the mezzanine is capable of supporting the blender with a full load of material and vacuum loading equipment installed.

Important! **While in operation, the SGB applies horizontal and vertical pressures to the mounting flange. If there is a question as to the mechanical stability of a mounting flange, contact Sterling's Mechanical Engineering department.**

Ensure that the gravity feed tube is installed in a vertical position, so that the materials will gravity flow to the extruder hopper. Use aluminum tubing or smooth wall flex hose.



If possible, use rigid tubing. Some flex hose will tend to sag and generate static that could cause de-mixing between the blender and the extruder.

Make sure that adequate space is around the blender (36" recommended) to allow proper cleaning, servicing, etc.

4-2-1-3 Floor Mount (Central Blender)

In a floor mounting application, ensure adequate clearance for all blender operations and maintenance. The operator and maintenance personnel must have access to parts of the blender. If necessary, it is the customer's responsibility to provide adequate, safe work platforms around the blender to meet state and local safety codes. Using proper lifting equipment, lift the SGB in place.

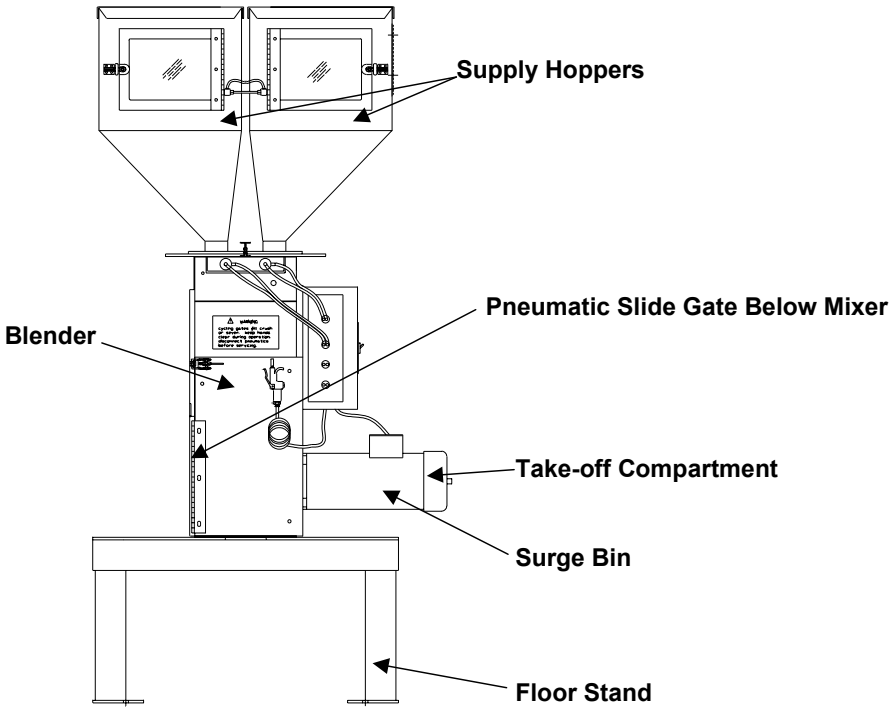
Important! **The blender must be securely fastened to the floor before operating.**

Sterling assumes *no* responsibility for any damages resulting from improper installation or improper handling during installation.

Make sure that the blender is **securely mounted to the floor** before installing loading equipment, loading with material and starting.

Make sure that the blender location is adequately away from high traffic aisles, and that fork trucks, etc. cannot damage the blender. Ensure that normal day-to-day operations will not place the blending system at risk of damage.

TYPICAL CENTRAL BLENDER LAYOUT



4-3 Installation Overview

This section will familiarize the reader with commonly used procedures for blender installation. After reading this chapter, the reader will be familiar with the installation requirements for all SGB blenders.

4-4 Mechanical Installation

The installation procedure should be used as a general guideline for the proper installation steps required to install the SGB blending system.

1. Remove crate from around blender.
2. Secure strap of proper lifting capacity to <u>both</u> lifting lugs.
3. Lift blender until strap is taut.
4. Remove bolts attaching bottom of blender to shipping skid.
5. Lift blender and position over machine throat or floor stand.
6. Set in position and secure by tightening four bolts.
7. Remove lifting strap.

<u>CAUTION!</u>

Blender Lifting Lugs
(1 on each side)

8. Mount the material conveying system receivers on the top of the blender supply hoppers.

9. Align the weigh hopper on the load cell brackets. Carefully adjust the load cell brackets to ensure that the weigh hopper is centered on the brackets without rocking. If for some reason the locating tabs do not align with the weigh hopper, they can easily be loosened and adjusted.

Important!

Use extreme care when tightening bolts on top of the load cells so you do not spring the load cells. The load cells are *extremely delicate and should be treated with care!*

10. Check the slide gate metering assemblies to ensure they are not damaged, and will slide back and forth freely. These are the most important items on the blender, besides the load cell and weigh hopper

assemblies.

4-5 Electrical Installation

The standard Sterling SGB blending system is designed to operate on 120/1/60 supply voltage (220/1/50 CE models are also available). The current requirements vary with the blender's size and throughput rating. For exact current requirements, check the blender serial number tag, located on the rear plate of the mixer section.

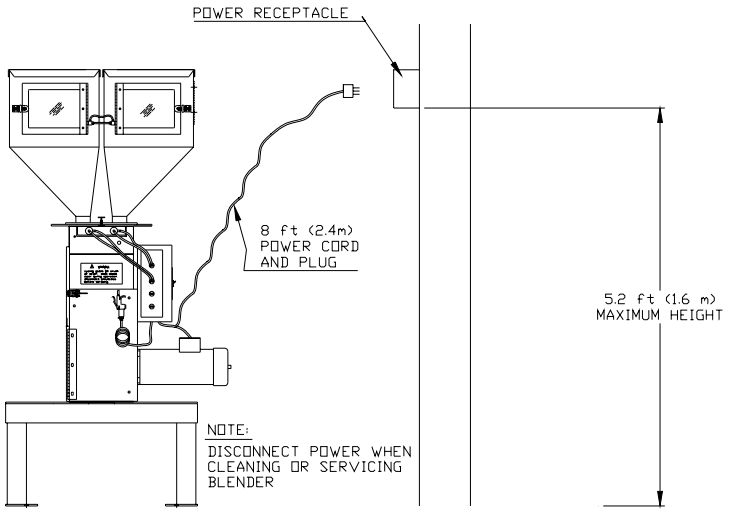
If a step down transformer was provided, it should never be used to power anything other than the blender. Loading equipment, etc. must be powered by another power source. As well as possibly overloading the transformer, the additional equipment may induce power line noise that may affect the operation of the blending system.

The transformer will be mounted and wired by the customer or your installer. If company or local codes require fusing or disconnects, these items must be supplied, wired, and mounted by the customer.

Each Sterling blending system MUST be connected to a separate source of power. Do not connect other electrical equipment, especially self-contained hopper loaders, on the same line as the blending system.

Ensure that the power entrance location on the blender panel remains unchanged. Make sure that the proper size wire and proper wire routing techniques are used when installing the supply wiring to the control panel. Care must be taken to ensure that the supply wiring does not interfere with the low voltage DC wiring.

The blender is equipped with a plug that functions as the disconnect device. The mating receptacle must be installed no higher than 5' feet (1.6 m) above the floor. Make sure your installation conforms to your regional electrical standards.



Power Receptacle Installation

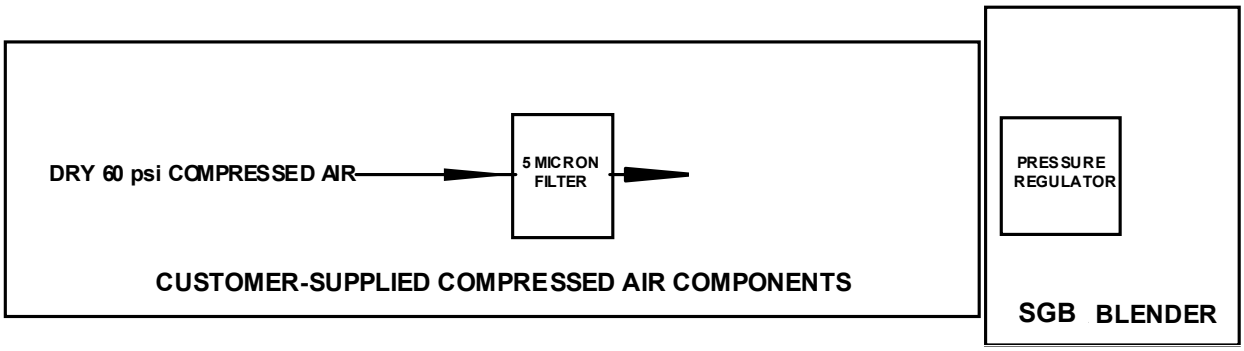
4-6 Pneumatic Installation

The SGB blending system uses plant-supplied compressed air to operate the metering and dump valves on the blender.

CLEAN AND DRY air must be supplied to the blender. The air supply should be filtered through a 5 micron air filter with a water separator. Oil should not be used unless air dryers are installed on the compressed air supply. In this situation, an oiler may be required on the blender to keep the air cylinder seals lubricated.

Important!

As this blender uses air for blender metering functions, it is very important to supply clean, dry air to the blender. Dirty or oily air can affect blender accuracy, result in poor performance and cause injury. Provide a 5-micron air filter on the air supply to the blender, and be sure excess oil is removed.



Sterling provides all pneumatic lines on the blender piped to a single ¼" NPT standard pipe thread fitting. The SGB blending system requires approximately 1 cfm (1.7 m³/hr) @ 60 psi (4.14 bar) maximum air pressure for proper operation.

The working pressure of the blender cylinders is not to exceed 60 psi (4.14 bar). This is adjustable by the regulator supplied on the rear panel of the blender. It is important to prevent fluctuation in the air pressure to the blender by not installing the unit on an airline. If this is the case, an accumulator tank with a check valve may have to be provided by the customer to ensure the blender a steady air supply.

CAUTION!

To prevent damage to the equipment, do not exceed 60 psi (4.14 bar) air pressure.
Always disconnect the compressed air supply when working on any part of the blender.

4-7 Blender Set-up

4-7-1 Description and Objectives

This section will discuss the mechanical setup and control system setup of the SGB blending system. After reading this section, you should be familiar with the mechanical setup and the electronic control setup of the

SGB blending system.

4-7-2 Weigh Hopper Installation

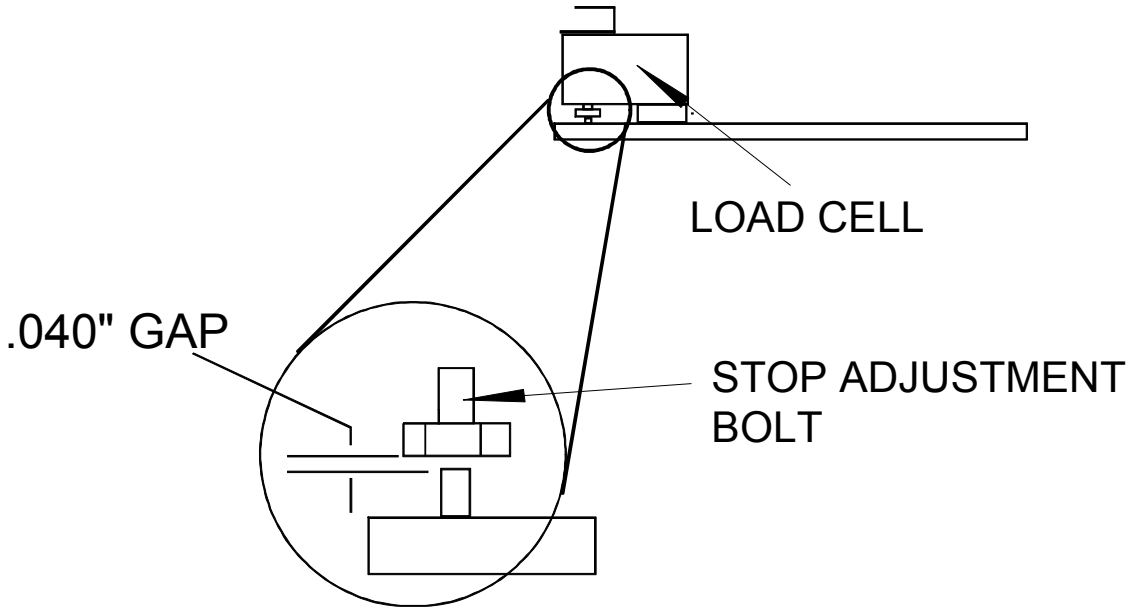
Remove the weigh hopper from the shipping box and install it in the blender on the load cell brackets. Connect the airline and close the mixer door, securing the latch.

4-7-3 Load Cell Adjustment

The mechanical setup of the SGB blending system involves the adjustment of the weigh hopper load cells (Please refer to the figure on the next page). This figure illustrates the proper adjustment of the load cell mechanical stop bolt. The setting for the positive stop is necessary to prevent the load cell from being “over-ranged” by excessive loading on the weigh hopper. The setting for the load cell stop is forty thousandths of an inch maximum (.040”). A feeler thickness gauge, with the weigh hopper empty, should be used to set this.

If a feeler gauge is not available, the weigh hopper should be filled with the material that is to be blended, and the stop adjusted so there is just a very small gap (a couple of sheets of notebook paper) between the load cell, and the blender base stop. This will allow the load cell to operate without mechanical restrictions and provide an overload safety. To adjust the stop, adjust the screw located on the bottom of the load cell. Adjust the screw up to increase the gap and down to decrease the gap.

Important! ***THE WEIGH HOPPER ASSEMBLY MUST HANG FREELY AND BE FREE FROM FRICTION, WITH NO MECHANICAL OBSTRUCTIONS OTHER THAN THE LOAD CELL ITSELF.***



Load Cell Mechanical Stop Adjustment

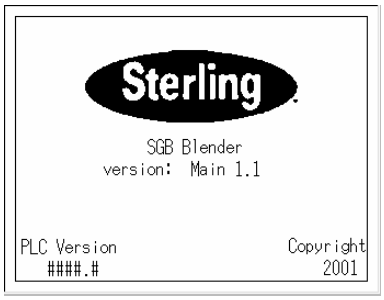
4-7-4 Final Setup

1. Connect the blender to the appropriate power source.
2. Connect the compressed air piping, ensuring that a 5-micron air filter is installed, along with the proper water trap, and lubrication unit, if required. Verify that 60 psi (4.14 bar) of clean, dry compressed air is supplied to the blender.

Important! Again, make sure that **proper air supply connections are made to the blender**, as dirty, contaminated, wet air can damage blender components ***and can quickly cause poor performance and accuracy!***

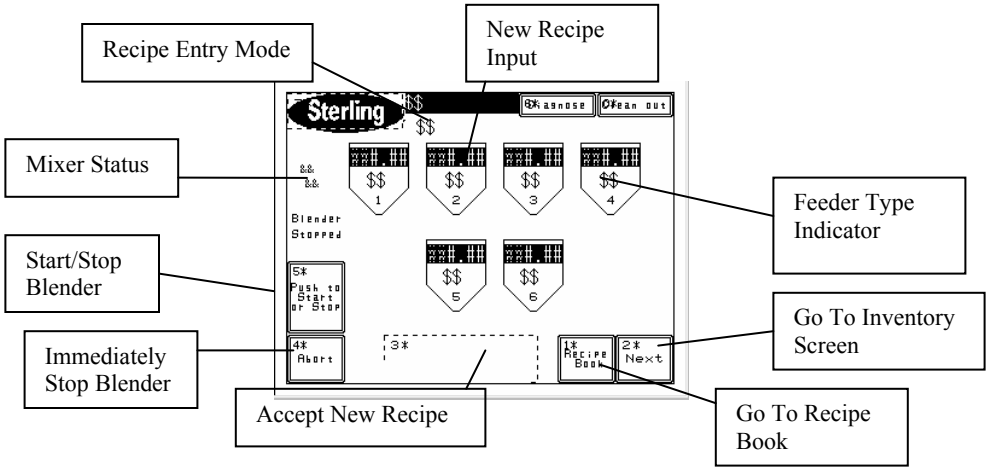
Make sure that the blender is supplied with clean, dry, 60 psi (4.14 bar) compressed air.

3. After powering up the blender the following screen will be shown:



This screen displays the software version of both the PLC and the F940. The Controller will stay on this screen for about 4 seconds, then enter the Recipe Screen (Next Screen in sequence). The software versions are also available on the F940 Configuration Screen.

4. The screen shown below allows the operator to control the blender. The blender can be started or stopped and the recipe values can be changed. Other data shown on this screen consists of the mixer status, recipe status, and feeder type data. The Recipe Screen should startup in the “Quick Set” mode. If so, enter a valid recipe.



If not, the blender can be reconfigured for Quick Set, Percent, or Parts by entering the Setup menu and pressing the Recipe Format key. Then select the mode following the key prompt on the screen.

To access the Setup Menu to change the Recipe Mode and other controller features, refer to the Appendix in Section 12 of this manual.

5. The operator can startup the blender by selecting the button that says, “Push to Start or Stop” (startup) on the left side of the Recipe Screen, depending on whether the blender is currently running or is stopped. Simply touch the button to either start or stop the blender. If the operator selects “Stop Blender” then the current batch in progress is first finished and then the blender will stop making new batches.

To immediately stop the blender, the operator can touch “Abort Current Batch.” This will cause the blender to stop making the current batch immediately. Obviously, if the blender is stopped in this method then the current batch will not be completed properly.

Operation *5*

5-1 SGB Blender Sequence of Operation

1. Blender is started by turning system on or material dropping below level switch in mix chamber.
2. Metering gates are opened to meter material into the weigh hopper in the programmed order.
3. Each component is weighed then the batch is dumped into the mix chamber (provided the mixer “High level” switch is not covered).
4. The material is mixed in the mix chamber and flows into the processing machine.
5. The optional slide gate below the mixer may control the flow of material to the molding machine or extruder.

5-2 Quick Start Procedure

1. Calibrate the weigh hopper before running the blender (This will improve inventory accuracy.).
2. Ensure that all ingredient supply hoppers to be used are filled with material. Virgin material should be loaded into hopper #1 and regrind into hopper #3.

   Note: Hopper #3 is equipped with an oversized square gate to assist in the feeding of the regrind material.

3. Enter the recipe menu on the LCD panel by turning on the Mitsubishi controller (It will automatically default to this screen), and enter the blend recipe desired following the steps listed below:

   - **Touch the box (labeled 1-6) that shows the value you want to change.**
   - **Enter in the new value (0 to 999.99) and hit the enter button (arrow).**
   - **After you have entered the new values for all hoppers (1-6), then push the “Accept New Recipe” button and the recipe will be entered.**

The blender monitors the operator’s entries and determines if the recipe entered is valid before allowing the operator to accept the new recipe. If there is an error (such as the recipe does not add up to 100% and the blender is in Percentage Mode) then a message is shown on the Recipe screen to alert the operator of the problem. The “Accept New Recipe” button is only shown if the recipe is valid and different from what is currently running on the blender.

Recipes can also be changed while the blender is running. The new accepted recipe is entered at the beginning of the next batch. This allows the operator to modify the new recipe without affecting the blender until they hit the “Accept New Recipe” button.

OR

4. The operator can load a previously stored recipe from the Recipe Book. The Recipe book also allows the operators to save the current running recipe. This can be done by performing the following steps:

   - **Touch the Recipe Book icon located on the Recipe Screen.**
   - **Select a stored recipe by changing the number next to “Recipe #”**
   - **Touch “Load” and then “Done” (This will take you back to the Recipe Screen.).**
   - **Touch “Accept New Recipe” to accept the loaded recipe into the blender.**

   To Save a running recipe to the Recipe Book:

   - **Go to the Recipe Book by touching the Recipe Book icon located on the Recipe Page.**
   - **Select a stored recipe by changing the number next to “Recipe #”.**
   - **Touch “Save Running Recipe” and then “Done”.**

5. Press “Push to Start or Stop” button to start blender.

5-3 Recipe Entry Formats

The Recipe Format screen allows the user to change many parameters concerning the way that the recipe is entered by the operator. It is accessed by touching the Sterling icon on either the Recipe screen or the Inventory Screen. The user must enter in the User Password to gain access (see User Password Setup for details.). The following Recipe Modes are described below:

5-3-1 “Quick Set”

(Most common in injection molding)

In this mode, hopper #1 is configured as virgin, hopper #3 is configured as regrind, and the others are configured as additives, i.e. color. The operator enters in the percentage of regrind and additives, and the virgin percentage is automatically calculated. The regrind percentage represents a percentage of the total batch, and the additives are based on a percentage of the virgin weight. This is useful because the percentage of regrind can be changed without affecting the ratio of color or additive to the virgin weight. Each percentage can be up to 100%, but not greater. The virgin percentage is automatically calculated by

the blender and the operator is not required to enter it.

The ingredient names selected will be displayed on the run mode display so the operator will know what material is being blended.

Important! **The #1 hopper ("NAT" - Virgin Material) recipe ingredient will not be shown on the recipe setup menu.**

ADD (Additive) designations will weigh the ingredient as a percentage of natural material only.

RGD (Regrind) designations will weigh the ingredient as a percentage of the total batch.

Virgin material must be loaded into hopper #1 and regrind into hopper #3.

5-3-2 "Percentage" Mode

(Most common in extrusion and blow molding)

Extrusion processing often requires recipes in percentage format, especially if regrind is not involved, i.e. blown or cast film.

In this mode, operators enter in values for each hopper up to 100%. The total of all the hoppers must equal 100%. If they don't, an error message appears on the Recipe screen and prevents the recipe from being accepted. All hoppers are a percentage of the total batch size.

Important!

All ingredients are weighed as a percentage of the total batch.

5-3-3 "Parts" Mode

(Often used in Compounding Applications)

The "Parts" recipe entry mode lets the operator enter in values based on a parts ratio rather than a percentage. Each entry can be up to 999.99 and the total of all hoppers does not have to be 100. After all values are entered, the total parts are calculated. The individual hopper target is then calculated based on each hopper's entered parts. These parts represent ratios of the total batch. For instance: Hop 1=300 parts, Hop 2=100 parts, Hop 3=10 parts, Hop 4=5 parts. This would mean that if the batch was divided into 415 parts, then Hop 1 would make up 300 of those parts, Hop 2 would make up 100, Hop 3 10 parts, and Hop 4 5 parts.

The preset part will be divided by the total of all parts, with each part representing the calculated weight for ratio control.

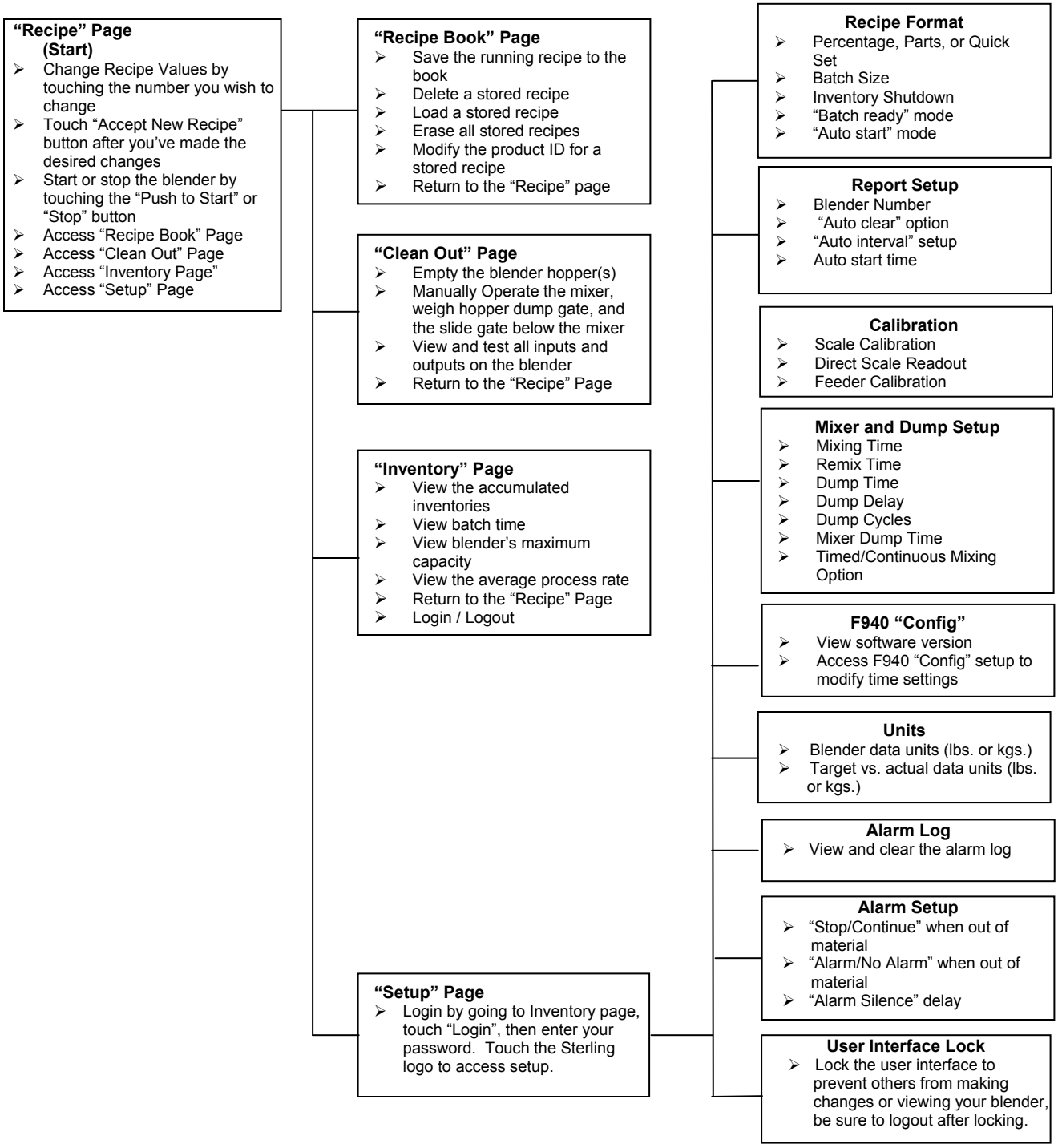
Example of a 5-component Blend in “Parts” Mode

Feeder Tag		Preset Part	Calculated Weight (Ratio Control)
Virgin	#1	7,200	7,200/10,000
Regrind	#2	2,000	2,000/10,000
Color	#3	500	500/10,000
Additive	#4	300	300/10,000
Total:		10,000	

5-3-4 Switching Modes

Recipe Modes can be switched while the blender is making a batch. At any time the operator can switch the recipe entry mode without affecting the current batch being made. The recipe mode is part of the “New Recipe” and is separate from the running recipe.

5-4 SGB Series Control System Menu Structure



5-5 Blender Calibration

NOTE:** **It is not necessary to calibrate the weight scale on a brand new blender, although it is recommended that the calibration be checked periodically to ensure that the reported inventory totals are accurate. Remember that in most cases a bad calibration is worse than no calibration.

5-5-1 Standard Calibration on a blender equipped with an OptiMix style mixer (Recommended only if the calibration is out of spec)

1. Login by touching “login” from the Inventory Page and enter “5413”, then touch the Sterling logo to access setup.
2. Touch “Calibration” and then “Scale Calibration”.
3. Remove the weigh hopper, clean it out and press “OK”.
4. Verify that the calibration weight is not touching anything other than the load cell bracket.
5. Enter the number stamped on the calibration weight. Follow the on-screen instructions by touching “OK” and then follow the prompts.
6. The blender will evaluate the calibration and indicate if it is properly calibrated.
7. Press “Done” key three (3) times and you will return to the main menu.

5-5-2 Standard Calibration on a blender with an HC style mixer (Recommended only if calibration is out of spec)

1. Login by touching “login” from the Inventory Page and enter “5413”, then touch the Sterling logo to access setup.
2. Touch “Calibration” and then “Scale Calibration”.
3. Empty the hopper and press “OK”.
4. Place the test weight on the hopper and press “OK”.
5. The controller will communicate whether the calibration was successful.

5-5-3 Additional settings that usually do not have to be changed:

1. Login by touching “login” from the Inventory Page and enter “5413”, then touch the Sterling logo to access setup.

NOTE:** **If the controller is set to Continuous Mixing, then the blender will run continuously while the blender is operating. If it is set to “Timed Mixing” then the mixer will run for the “Mixing Time” setting when a batch is dumped into the mixer.

2. Touch the “Mixer and Dump Setup” key to enter the amount of

time the mixer will mix or the batch is dumped.

3. Enter a “Mixing Time” by pressing the number next to “sec”, this is the amount of time to run the mixer after a batch is dumped into the mixing chamber. Remember that if the mix time is too long you may get material separation.
4. Press the number next to “sec” on the “Remix Time” to set “Re-mix” off time. This allows the mixer to come on between batches if the blender cycle time is very slow, i.e. if you want the mixer to come on every minute, set this to 60 seconds. If you don’t want to use this function, set the time to “0”.
5. Press the number next to “sec” on the “Dump Time” to set your dump time (A value between “1” and “999” will need to be entered.). This feature is the amount of time required to empty the batch hopper. (Set the time so that all the material in the weigh hopper has a chance to be evacuated.)
6. Press the number next to “sec” on the “Dump Delay” line for the optional dump delay setting. This is the amount of time to start the mixer prior to dumping material into the mixing chamber. Set to “0” to disable this feature.
7. Press the number next to “Dump Cycles” to enter the number of times that material will be dumped from the weigh hopper. This allows the dump valve to open and shut repeatedly when the weigh hopper is empty to shake lose any sticking material. If this feature is set to “1” then the batch will dump normally.
8. Press the number next to “sec” on the “Mixer Dump Time” to enter the amount of time that the mixer will run while dumping material out of the knife gate below the mixer. This feature assists in cleaning out the mixer.
9. Press “Done” to return to the “Setup” screen.
10. Press “Alarm Setup” on the “Setup” screen to look at the “Alarm Flags & Feeder Setup screen.”
11. This screen allows you to change the way alarms on each feeder function. Enter the feeder you wish to configure by pressing the corresponding feeder number under “Select Feeder”. You can select “Stop if “Out of Material” which means if there is any kind of alarm on this feeder, the blender process will stop (i.e. The feeder supply hopper is out of material.) You can also set it to “Continue if “Out of Material.” This mode will alarm but let the blender continue to operate or you can set it to “No Alarm on Out of Material” mode. “No Alarm” mode does not set off any alarms. In addition, an “Out of Material Alarm Silence Delay” specifies the amount of time before an alarm will be set off.
12. Press “Done” to return to the “Setup” screen.

5-5-4 Verifying Calibration (Recommended on a periodic basis to ensure accuracy)

1. Login by touching “login” from the Inventory Page and enter “5413”, then touch the Sterling logo to access setup.
2. Touch “Calibration” and then “Direct Scale Readout”.
3. Remove the weigh hopper.
4. Locate the weight display for each of the two load cells, directly below “Current Bits.” Write down the displayed value.
5. Add the calibration weight to each load cell mounting bracket and write down the value displayed in “weight”, as in step 4.
6. Subtract the values recorded in step 4 from step 5. This is the measured weight. If the measured weight is within a 0.003 pounds of the weight stamped on the calibration weight, then you are within spec. If not, follow the steps above to calibrate the blender. (If your blender is frequently out of calibration, verify the operator is being cautious removing the weigh hopper for clean out.)
7. Press “Done” until you have reached the Recipe screen.
8. ***Anything in the Diagnostics Menu that is not covered here is in the Detailed Controller Setup Section***

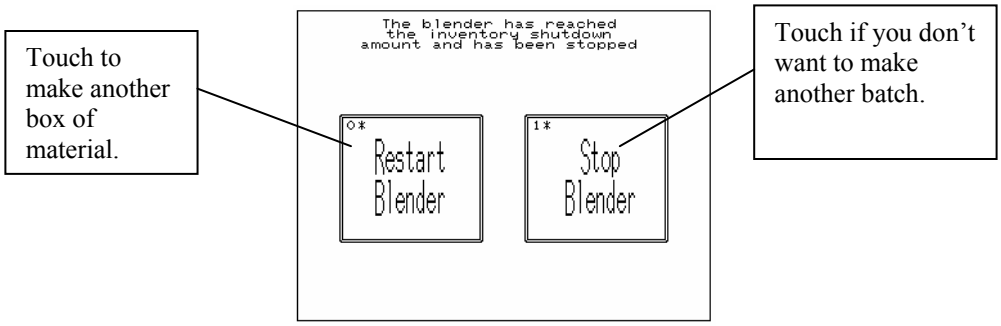
5-6 Controller Mode Setup

Setting up a recipe

1. Login by touching “login” from the Inventory Page and enter “5413”, then touch the Sterling Logo to access setup.
2. Press “Recipe Format” and toggle through the EZ, Percentage or Parts Modes.
3. While in the “Recipe Format” screen, the following areas will need to be configured:

Batch Size: This allows the operator to change the size of the batch to be made. A value will need to be entered between 0.5 to 199.9. This can also be changed while making a batch without affecting the current running batch. If the size is changed then you will need to touch “Accept New Recipe” on the Recipe screen before the change takes place. This feature allows stored recipes with different batch sizes to easily be loaded without the operator having to reconfigure the blender every time they want to load a stored recipe.

Inventory Shutdown: This feature allows the blender to make a certain amount of material at a time. If this feature is set to "0" then the feature will be disabled. If this option is used, the blender will make the set amount of material and will then shutdown and wait for the operator to restart the blender. This feature is useful when filling gaylord boxes. You no longer have to be troubled by a proximity switch that hangs in the box to sense when it is full. The following screen is shown when the blender reaches the Inventory Shutdown weight:



The Inventory Shutdown can also be configured while the blender is making a batch. If the Inventory Shutdown is changed, then you need to touch the "Accept New Recipe" on the Recipe Screen before the change happens. This allows the stored recipes with different Inventory Shutdown settings to easily be loaded without the operator having to reconfigure the blender every time they want to load a stored recipe.

Batch Ready Mode: This enables the blender to have a batch already made in the weigh hopper while the mixer is full. Enabling this feature dramatically increases the maximum achievable blender rate.

AutoStart Feature: By enabling this feature, the blender accurately finishes a batch that was interrupted by loss of blender power. This option starts the blender if it was running prior to power loss. It does not turn on the blender if it was previously stopped prior to power loss.

4. Press the "Done" key two (2) times until you return to the "Recipe" page.
5. When you are in the "Recipe" screen, touch the hopper box (1-6) that you want to change.
6. Enter in the new value (0-999.99) and hit the enter button (arrow)
7. After you have entered the values for all of the hoppers, then hit "Accept New Recipe" and the recipe will be entered.

Note: The blender monitors the operator's entries and determines if the recipe is valid before accepting the new recipe. If there is an error (such as the recipe does not add up to 100% and the blender is in Percentage Mode.) then a message is shown on the Recipe screen to alert the operator of the problem. The "Accept New Recipe" button is only shown if the recipe is valid and different from what is currently running on the blender.

Recipes can also be changed while the blender is running. The new accepted recipe is entered at the beginning of the next batch. This allows the operator to modify the new recipe without affecting the blender until they hit the "Accept New Recipe" button.

8. Recipe entry is complete.
9. To start the blender press "Push to Start or Stop" button.

Other questions regarding features are answered in the Detailed Control Setup Section

5-7 Color Change

The color change procedure is meant for use with the basic SGB Blender. This procedure assumes that the color component of the blend is in an additive ingredient hopper (#2, #4, #5, or #6).

Note: **The blender must be stopped to make color changes**. The processing machine can operate on virgin material only during this procedure with an optional quick color change bypass tube that can be installed to bypass the blender. Contact the factory for details.

1. Disable and clean any color loading equipment. Please refer to the loading equipment manual for any clean up recommendations.
2. Using the blender "Abort" or "Push to Start or Stop" key, put the blender in stop mode. After the cycle has completed, switch "OFF" the main power switch and unplug the blender power supply.
3. Open the upper mixer access door. This shuts off air to the blender circuit by deactivating the master air valve. Then unplug the quick disconnect from the air supply hose to the blender to further ensure that no air pressure is supplied to the blender.

WARNING!

- **Always unplug the main power cord.**

- **Always disconnect the air supply to the blender.**

...prior to performing any operations inside any access areas of

the blender where there are moving parts.

4. Remove the weigh hopper by unplugging the air line disconnect fitting, holding the dump valve closed, lifting the hopper to clear the load cell brackets, and gently pulling the weigh hopper out of the blender.

Important!

To reduce the chance for damage to delicate load cells, use care when lifting the weigh hopper off load cell locating tabs and when reinstalling the weigh hopper on load cell brackets.

5. If you want to catch the color, use a small plastic pail or chute to collect the material from the slide gate assembly. Reach up inside the blender to the color slide gate and push it open. At this point, there should be no air pressure on the blender, and the slide gate should move easily. Drain the color out in the bucket. Blend and Reclaim normally provides a JIT (Just in time) approach to the minor ingredients, so that a minimum amount of material is held in the blender so that color changes can be made easily.

6. If any other ingredients need to be changed for the next recipe, simply drain the larger hoppers with the drain tubes provided on the side of the hoppers. When the material level is below the drain tube, open the slide gate manually to dump the rest of the material. If you wish to speed the emptying process, material can be manually drained out of the slide gate assembly into a dump chute or bucket, while draining from the drain tube.
7. Using a vacuum cleaner or air hose, clean out all the hoppers that have been emptied. Always start at the uppermost part of the blender and work downward to prevent dust and pellets from falling into an already cleaned area.
8. Clean the weigh hopper and mixer assemblies on the blender using a vacuum cleaner. The mixer agitator is removable for cleaning if desired.
9. Reinstall any metering units that were removed from the blender during clean out.
10. Reinstall the weigh hopper using care to center the hopper on the load cells on the weigh hopper bracket.
11. Load the blender with new material.
12. Restart the unit with the new recipe.

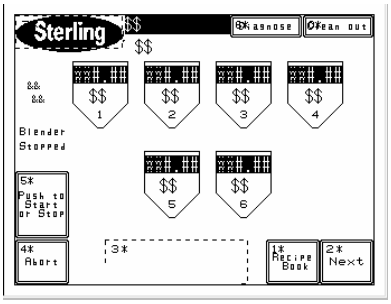
WARNING!

Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning any Sterling product, including all SGB Series blending systems. Failure to do so may result in serious injury or death.

5-8 Additional Operation Features

5-8-1 Display Description (LCD)

The SGB blending system utilizes a standardized menu format. Each screen was designed to be user-friendly and provide the operator with the necessary information to run the blender.



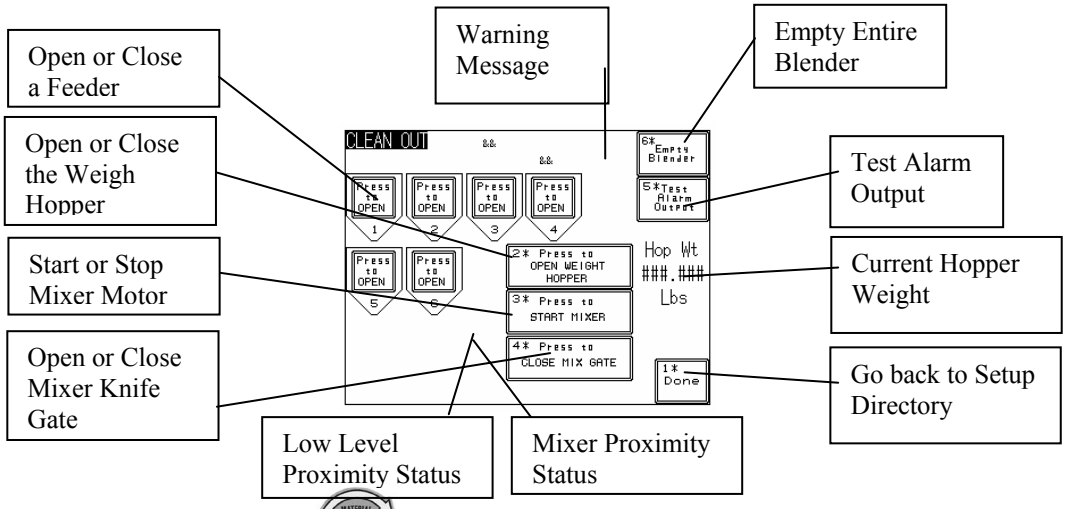
A typical menu is shown in the figure above. This display, which is defaulted to when the controller is turned on, provides the operator with the following information and options:

- The ability to change Recipe Values
- Accept a newly entered Recipe
- Start or Stop the blender
- Access to the Recipe Book
- Access to the Clean-out Screen
- Access to the Inventory Screen
- Access to the Controller Setup Screen

Please refer to the SGB menu structure in Section 5-4.

The menu tree shows the structure for a standard SGB blender.

When the unit is initially installed the Clean Out menu will be used. This screen is primarily used for trouble shooting the blender. All outputs can be controlled manually and all digital inputs from the proximity switches can be viewed. Pressing the “Clean Out” key when in the “Recipe” screen accesses this screen.

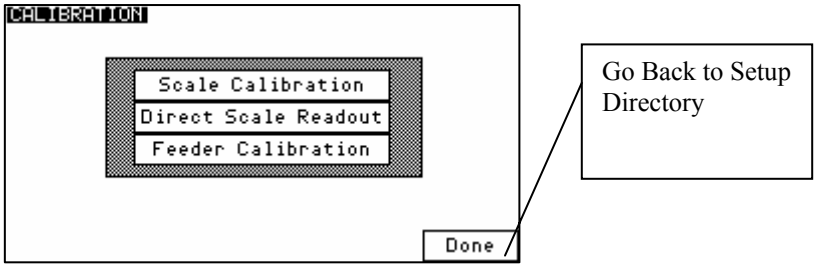


5-8-2 Weigh Hopper (Load Cell) Calibration on blenders equipped with an OptiMix mixer

Enter the Setup menu as described previously. **See Section 5-3 for menu tree.**

The factory pre-calibrates the weigh hopper on the SGB blenders.

Button #3 on the Setup Menu is “Calibration”. Press it to enter the screen (shown below) which will prompt you to enter the Calibration area. Press the button marked “Scale Calibration” to enter the scale calibration menu.



1.) Once in “Scale Calibration”, enter in the scale calibration weight value stamped on the side of the weight.

2.) The controller will prompt you to remove the weight hopper and press OK.

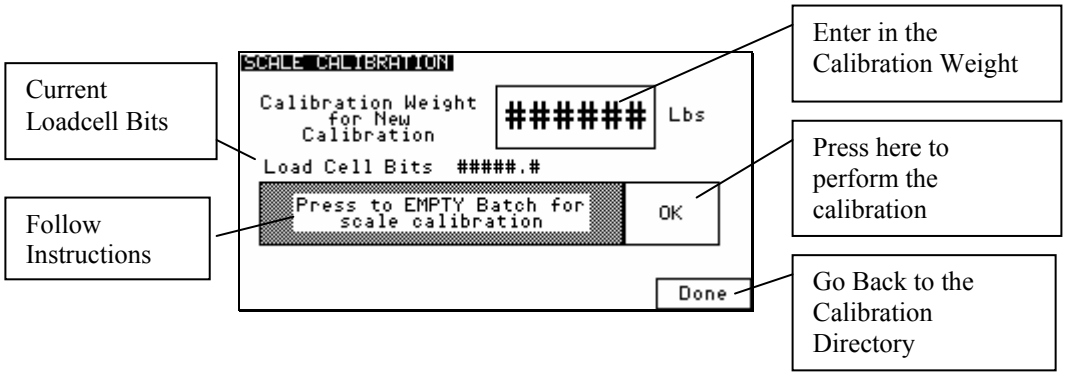
3.) After touching OK, the controller will display “PLEASE WAIT...”

4.) Next, the controller will ask you to hang the calibration weight on the right loadcell bracket (loadcell A) and press OK.

5.) The controller will ask you to hang the calibration weight on the left loadcell bracket (loadcell B) and press OK.

6.) Finally, the controller will ask you to replace the weigh hopper in the blender and press OK to complete the calibration.

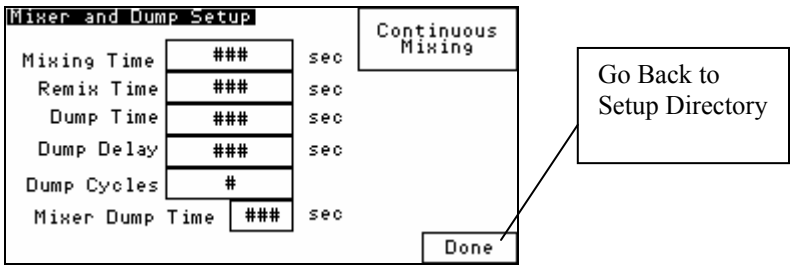
7.) The controller will verify that the calibration was done correctly by showing “**Calibration Successful.**”



5-8-3 Mix Timer

The mix timer is the amount of time that the mix motor will mix the material after it has entered the mixing section of the SGB blender. The timer has a range of 1 to 999 seconds.

To set the value of the mix timer, the user must gain access to the Setup Menu. After entering the Setup menu, the user must select “Mixer and Dump Setup.”



Selecting “Mixing Time” from the “Mixer and Dump Setup” menu will allow the operator to view the current time setting for the mix timer and to adjust it as needed.

The mix timer is set to a default time of 10 seconds. This time can be adjusted up or down depending on the amount of mixing needed for the materials being blended.

It is recommended that the mix time be held to the minimum, as segregation can occur from over-mixing if the material bulk density and pellet configuration varies with materials in the particular blend being processed.

5-8-4 Re-Mix Timer

In some applications, the SGB blender will require the use of the re-mix timer. Some materials tend to separate if they are mixed too long. This is possible when a processing machine is running at a rate significantly below the capacity of the blender.

With external vibration, the heavier pellets will tend to flow to the bottom of the mix chamber before the lighter material. This will occur even though the mixer is in a static mode. By re-mixing occasionally, this situation will be prevented.

The re-mix timer will start another mixing cycle if the blender has been idling long enough for the re-mix timer to time out. The re-mix timer may be set on the “Mixer and Dump Setup” screen from 1 to 999 seconds. Setting the re-mix timer to zero will disable this function.

If the re-mix timer is disabled, the controller will run only a single, timed

mix cycle after each dump of the weigh hopper.

To view and change the value of the re-mix timer, refer to the “Mixer and Dump Setup” menu. All current values for Mixing and Remixing Times will be shown on this screen. The re-mix timer default value is factory preset at zero.

5-8-5 Mixer Options

Press the “Timed/Continuous Mixing” key (In the top right hand corner) when in “Mixer and Dump Setup” screen to set the following options:

Timed Mixing Option This mode of operation turns the mixer on only during dumping and during the re-mix time set into the control to jog the mixer during high level mixer operation.

Continuous Mixing Option This mode of operation turns the mixer on after initial startup and will continue to run continuously, unless the remix time is set to jog the mixer during high level mixer operation. This option is used for sticky materials that tend to bridge and block off the mixer discharge to the processing machine.

5-8-6 Weigh Hopper Dump Time

The weigh hopper dump time is the amount of time the weigh hopper’s dump valve remains open to allow weighed material to exit the hopper and enter the mixer.

To view and change the current weigh hopper dump time settings, enter the Setup menu and select the “Mixer and Dump Setup” screen. Press the field next to “Dump Time” to set the operation of the Dump Valve.

The dump timer on the dump valve has a default time of eight (8) seconds. This time can be adjusted to optimize the blender cycle time.

The timer should be set to close the dump valve shortly after the material has totally dumped from the weigh hopper. This time can vary due to material flow characteristics, and the size of the batch that is programmed into the blender control. Experimentation with this setting can allow the operator to determine the best cycle for the material being weighed.

5-8-7 Weigh Hopper Dump Delay Time

The dump delay time is the amount of time from the end of metering the last ingredient until the start of the actual dump cycle. The start of the dump cycle is marked by the opening of the weigh hopper dump valve. This value has a range from 1 second to 999 seconds. To view and change the current dump delay time, enter the Setup Menu, select “Mixer

and Dump Setup" screen, and then select "Dump Delay".

The default time is factory set at zero seconds. This delay time is used to start the mixer prior to dumping the material from the weigh hopper into the mix chamber of the blender.

5-8-8 Weigh Hopper Dump Cycle

The dump cycle allows the weigh hopper dump valve to cycle, or open and close, a number of times prior to commencing with the next batch cycle. The setting allows from 1 to 9 dump cycles between batches (open and closed cycles).

The normal and default factory setting is 1, meaning the weigh hopper dump valve will open at the end of the weighed batch and close after the batch is discharged into the mixer.

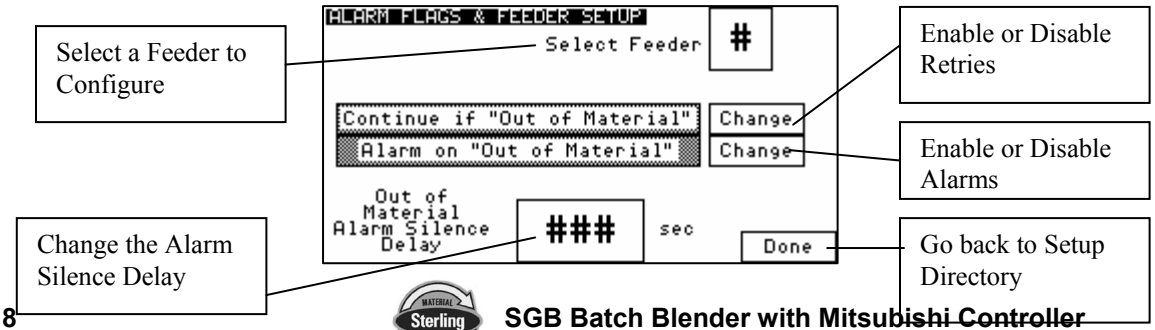
Setting the dump cycle to more than one cycle may be useful when blending high static, dusty material or those that have sticky tendencies. This will cycle the dump valve open and closed to allow any material that may cling to the dump valve.

To enter the dump cycle menu, first enter the Setup menu by pressing the "Sterling" icon from the main menu. Enter the password and press enter. Next, press the button marked "Mixer and Dump Setup". The display will show the "Mixer and Dump Setup" menu. Press the "Dump Cycle" key to enter a dump cycle value and press enter. Please refer to the menu structure tree shown on page 51.

5-8-9 Feeder Alarm Setup & Flags

This screen allows the operator to configure the alarm settings for each individual feeder. It can configure whether a feeder will retry during the metering of a batch, and enable or disable the "Out of Material" alarm for any feeder. If the alarm flag is set to "Stop", the blender will <u>not</u> continue. It stops on that component continuing to try and meter. The optional low level proximity switches have their own separate alarm. The alarm will sound, but <u>does not</u> stop the blender. To configure each hopper do the following:

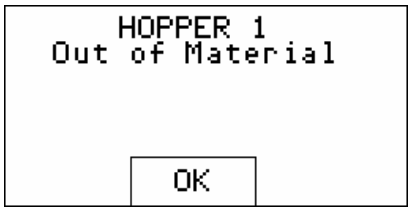
1.) Enter the Setup Menu.
2.) Once in the Setup menu, press "Alarm Setup." This will take you to the "Alarm Flags & Feeder Setup" screen.



3.) Select a feeder (1-6) by touching the “Select Feeder” box.
4.) The current settings for the hopper that you have chosen will now be shown on the screen.
5.) Make the necessary adjustments to the “Stop/Continue if “Out of Material,” Alarm/No Alarm on “Out of Material,” and Out of Material Alarm Silence Delay (0-60 seconds) settings.” Once the settings for these features have been set on the displayed feeder, select a new feeder to configure as desired.
6.) Press the “Done” key at the bottom to exit this screen.

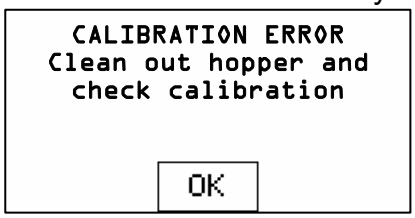
An alarm message will be shown if any alarm condition occurs. A message will pop up on the screen until the alarm condition is resolved. The operator can press “OK” on this pop-up to hide the screen temporarily, but if the alarm condition is still unresolved, then the message will reappear after a short delay. During an alarm condition, not only will a visual alarm show up on the screen but also an audible alarm will sound. The audible alarm will sound for 10 seconds and reappear every 30 seconds until the cause of the alarm is resolved. The following is a list of all alarm names and descriptions:

- **Hopper 1-6 Out of Material:** This alarm indicates that a hopper is out of material and signals the operator that they should check the resin system.

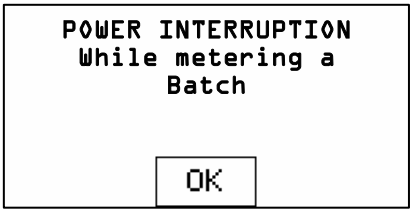


- **Max Hopper Weight Exceeded, check batch size:** This alarm indicates that the weight in the weigh hopper has exceeded the maximum allowed weight. This alarm can happen if the operator changes material density and does not perform a feeder calibration, but will usually be automatically fixed after the first batch. As long as this alarm doesn’t continue to reappear, then the operator should not be concerned. If the alarm continues to occur, then the operator should have maintenance check the blender.

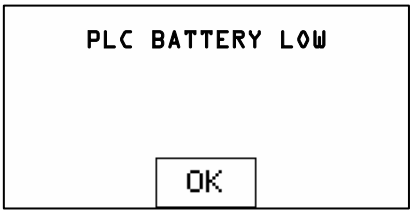
- **Calibration Error, Clean out hopper and check calibration:** This alarm indicates that the maximum empty weight for the weigh hopper has been exceeded. The blender will automatically tare up to 0.25 lbs of material, but if this weight is exceeded, then an alarm will appear. This alarm is most commonly caused by a build up of sticky material in the weigh hopper and can be corrected by simply cleaning out the weigh hopper. If this does not correct the problem, then the scale calibration should be checked by maintenance.



- **Power Interruption while metering a Batch:** This alarm indicates that the blender's power was turned off while the blender was making a batch. The batch accuracy is not effected as long as the blender is configured for "AutoStart." The blender will finish the last batch accurately even if the material was dumped into the mixer when the power was turned off.



- **PLC Battery Low:** PLC battery is low and may cause the blender to lose both the program and the blender configuration. Notify Maintenance immediately.



- **Inventory Cleared:** This is only logged in the Alarm Log and does not cause a pop-up message or audible alarm. Each time the inventory is cleared, the time and date are logged to the Alarm Log. An alarm will sound and a screen will pop up when Auto. Inventory Shutdown has been reached.

- **E-Stop Screen:** The blender is equipped with an E-stop switch that removes the power from all mechanical outputs. The E-Stop Screen appears along with an audible alarm whenever the E-Stop is activated. The operator can not access any screens until E-Stop is deactivated. The Panel View will then put the screen back to the display that the operator was on prior to hitting the E-Stop.

5-8-10 Additional Control Functions

The objective of this section is to familiarize the reader with the SGB blender recipe menus, run mode operation, run mode menus and displays. Upon the completion of this section, the reader will be familiar with the recipes and run mode displays that are available on one blender, including the recipe book and recipe storage facilities.

Topics covered in this section are:

- ***General Operation***
- ***Recipe Menu***

All personnel operating the SGB blending system should read this section of the manual ***before*** operating the blending system.

5-8-11 General Operation

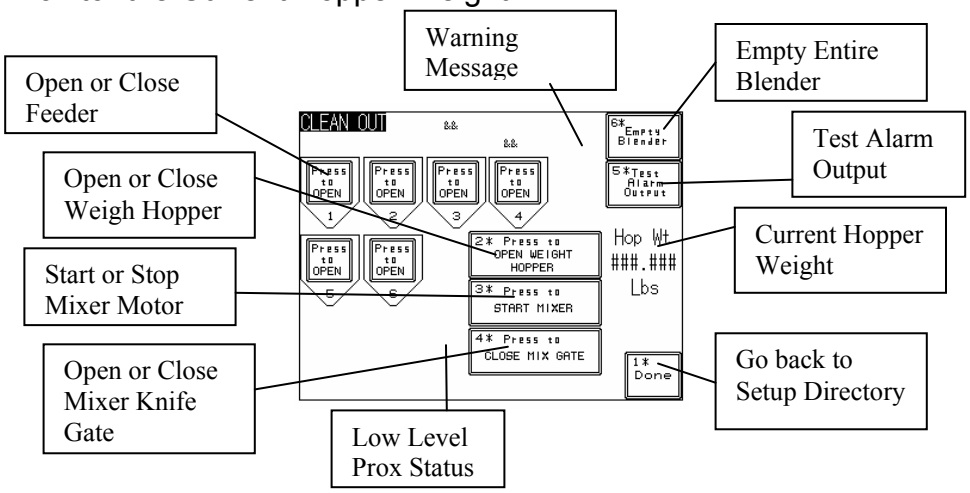
The general operation of the SGB blending system is as follows: Once the system is properly installed and set up, the system will be ready for operation. Please see the Installation and Setup chapter in this manual for further information.

Once the SGB system is powered on, the unit will display the recipe screen (the recipe format should be in “Quick Set” mode). Pressing the highlighted box next to the feeder number, the operator can enter a valid recipe or use a previously stored recipe from the recipe book.

5-8-12 Feeder Clean Out

Any feeder in the SGB blending system can be emptied and refilled with a different material. To do a feeder clean out, the operator has to press the “Clean Out” icon key from the recipe screen (the first screen that appears on power up).

This screen will allow you to Open or Close the Feeder, Weigh Hopper, Mixer Knife Gate, Empty the Entire Blender, Start or Stop the Mixer Motor, Test the Alarm Output, Find out the Mixer Proximity Status and monitor the Current Hopper Weight.



The dump valve opens as soon as the “Press to Open Feeder” key is pressed. This easy feeder clean out option also serves as a means for emptying a batch that is held in the weigh hopper if the “Press to Open Weigh Hopper” key is pressed when the blender is stopped. Touch the picture of the hopper you wish to open or close to select the feeder you desire to empty and close the dump valve. Touch the “Done” key to return to the recipe menu. After entering a recipe, the operator will restart the blending system, putting it back in normal operation.

Important!

Before starting SGB blending systems, each ingredient hopper in the current recipe *must contain material!* Virgin material must be loaded in hopper #1 and hopper #3 should only be used for regrind!!

Once the operator initiates the run mode of operation, the blending system controller will begin monitoring the mixer high-level switch. Nothing will happen until the mixer high-level switch is uncovered. This tells the controller that the mixing chamber is capable of holding another batch of material.

Once the mixer high-level switch is uncovered, and the weigh hopper has dumped, the system will meter the ingredients from the supply hoppers, through the metering units, into the weigh hopper. Each component will be metered individually to allow accurate weighing of the material.

Once the final ingredient specified in the recipe has been metered into the weigh hopper, the controller will take a final weight reading of the weigh hopper. This will start the “Dump Delay” timer. (See Section 5-8-9). Once the dump delay timer has timed out, the controller will activate the weigh hopper dump valve, initiating the weigh hopper dump cycle.

The open weigh hopper dump door will allow the material to drop into

the mixer section of the blender. If the dump delay is set, the mixer will start before the weigh hopper dump will open for the selected time.

The blender will sit at rest until the high-level sensor in the mixing chamber is uncovered to start another weigh cycle. (Unless the Re-Mix timer is set to a value other than 0 and times out to restart the mixer to run for another mix cycle.)

The level sensor is located on the back wall of the mixer chamber. If the sensor is covered with material, the indicator light on the back of the sensor will be lit.

Once this sensor is uncovered, the indicator lamp on the back of the level sensor will go out. This level sensor must be uncovered for approximately 1 - 2 seconds to indicate to the controller that there is room in the mixing section to accept a batch of material.

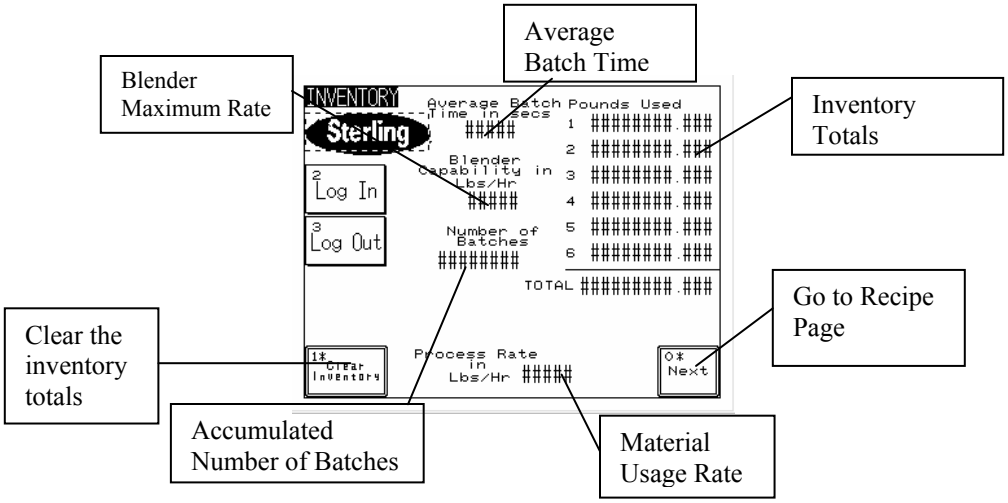
When the controller has determined that the mixer is ready for an additional batch of material, the controller will begin metering material into the weigh hopper assembly.

5-8-13 Standard Run Time Displays

While the blending system is in operation, there are a couple of displays available to the operator. These displays are selected simply by pressing the “NEXT” key when the unit is running. The default display shown when the blender is in run mode is the Recipe Screen.

The Recipe Screen indicates by feeder number, the amount of material metered into the weigh hopper assembly by that particular feeder. This display is updated after each component dispenses its specified amount. The ingredient weights (Unit Values) are in pounds, unless the metric display is selected.

Pressing the “NEXT” key when in the default recipe mode display will toggle to the next screen, which is the Inventory Display. *This can be done at any time, but if the blender is in a critical mode such as dumping, and updating inventory, etc., it may ignore the keystroke. Simply press the “NEXT” key again, the Inventory screen will be displayed.*



This display indicates the amount of material in pounds that has been used by each feeder of the recipe. It is important to note that the weights are rounded off to the closest pound. On minor ingredients, several cycles may have to occur to show an inventory number.

In addition to showing the amount of material that has been used for each feeder, this screen is also a summary display that shows the total inventory, the time for the last batch, and the average rate of the blender.

If the blender is run in “Percentage Mode” instead of “Quick Set” during operation, the “Percentage Mode” will use the blender inventory numbers shown on the Inventory screen to calculate the percentages for each ingredient. It is important to zero the inventories when a recipe is changed to have this screen accurately reflect the current percentages of the recipe in-process.

Note: **Blender inventories must be cleared when the current recipe is started to show accurate percentages for the current recipe.**

To clear inventories, press the “Clear Inventory” key on the “Inventory” screen.

5-8-14 Recipe Menu

Note: **Refer to the menu structure in section 5-4 for more information.**

The SGB System contains several operator friendly recipe menus. This section of the manual lists these recipe menus:

- Recipe Page (Start/Setup)

- Recipe Book Page
- Recipe Format

Upon Start Up, the blender controller will default to the “Recipe Menu” screen.

The “Recipe Book” screen can be accessed in the “Recipe Page” and is useful in storing and retrieving recipes.

The Recipe format option can be accessed in the Setup screen and is used to select one of three available formats: “Quick Set”, Percentage Mode or Parts Mode. (“Quick Set” is the default setting preset at the factory.) In addition, every feeder in the blending system does not need to have values entered (Percentage or Parts recipe formats), or a material type (REGRIND, NATURAL, or ADDITIVE) in “Quick Set” recipe format.

Recipe Format Menu:

- “Quick Set”, Percentage or Parts
- Batch Size
- Inventory Shutdown
- “Batch ready” mode
- “Auto start” mode

5-8-15 Current Recipe Menu

Throughout the menu structure, the top left corner of the display will list the name of the current screen that you are in. Each individual button will indicate instructions for keystrokes. In the Recipe Format menu shown on the previous page, pressing on the mode button displayed at the top of the screen will show the Current Recipe menu.

Note: ***The blender will always run the percentages shown in the Current Recipe menu display.***

5-8-16 “Quick Set” Menu

The “Quick Set” menu structure allows recipes to be entered and adjusted by touching the buttons on the panel face (for 1 to 6 components). This is convenient for use in the injection molding industry.

After an “Quick Set” is selected, the screen will display the label on the Recipe screen.

The first (component #1) material hopper on the blender is always designated “NAT” for natural (virgin) and cannot be changed. The other ingredient labels can be scrolled by pressing the hopper number. They

can be scrolled to read “NAT” (natural), “RGD” (regrind), or “ADD” (additive). The selected label will be displayed for the ingredient hopper with an arrow next to the abbreviation.

Component #3 is designed to handle regrind and most models come equipped with a larger, square gate to reduce the likelihood of bridging. If regrind is being used, it should always be run through component #3. If you don’t have regrind, another major ingredient can be run through component #3.

The ingredient labels (names) selected will be displayed on the recipe menu so the operators will know what material is being blended. The natural or virgin (component #1) ingredient will not be shown on the recipe menu.

If additive is designated, the weighed ingredient will be metered as a percentage of the natural or virgin.

If regrind is designated (component #3), the ingredient will be metered as a percentage of the total batch. It is assumed the regrind has been generated from pre-blended production, and already contains the same color and/or additives.

Please see next page for example calculations (setup).

Example calculations of a five (5) -component blend in “Quick Set”

Virgin (NAT): ???
Additive1 (ADD): 5.00% - of virgin component
Regrind (RGD): 30.00% - of total batch
Additive2 (ADD): 2.00% - of virgin component
Additive3 (ADD): 1.00% - of virgin component

Batch Size: 10.00 lbs.

Total available: 100.00%
Regrind: 30.00%

Balance: 70.00%

Virgin + Additive 1 + Additive 2 + Additive 3 = 70.00%

Virgin + (5% of virgin) + (2% of virgin) + (1% of virgin) = 70.00%

Virgin + (5/100 x virgin) + (2/100 x virgin) + (1/100 x virgin) = 70/100

100 virgin + 5 virgin + 2 virgin + 1 virgin = 70

108 virgin = 70

Virgin = 70/108 = 64.81%

Virgin = 64.81% of batch
Additive1 = 5% of 64.81% = 3.24% of batch (5% of virgin)
Regrind = 30% of batch
Additive2 = 2% of 64.81% = 1.30% of batch (2% of virgin)
Additive3 = 1% of 64.81% = 0.65% of batch (1% of virgin)

Virgin + Additive 1 + Additive 2 + Additive 3 + Regrind = 100% 64.81% + 3.24% + 1.30% + 0.65% + 30.00% = 100%

Typical Batch Size

SGB-450	3 lbs.
SGB-900	8 lbs.
SGB-2500/4000/5000	35 lbs.

5-8-17 Batch Size Menu

The SGB blending system is a gravimetric batching system. The blender will weigh a preprogrammed batch of material each cycle. This batch size is determined by the blender's weigh hopper size, the current recipe, and the bulk density of the ingredients.

Because the blending systems must handle a wide variety of materials, with varying bulk densities, the actual amount of weight of material the weigh hopper will hold can vary dramatically from application to application.

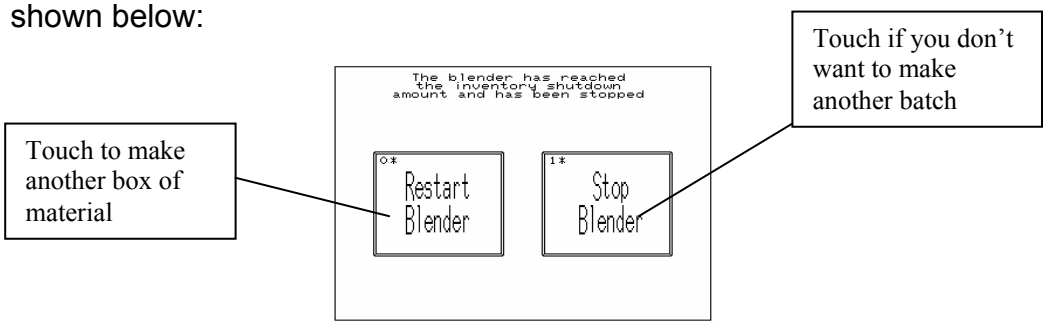
The weigh hopper size selected should be one that approaches the maximum capacity of the load cells without over-filling the weigh hopper. During the initial setup of each blender, the weigh hopper size setting should be checked to ensure that the weigh hopper is not overfilling due to a large percentage of light weight regrind, etc. The batch size will vary from model to model. The bulk density of the material being blended will also affect the batch size.

Important! ***If running a high percentage of lighter density regrind. Set the batch size so that the mixer does not overfill, preventing the weigh hopper from fully dumping when operating in "Batch Ready Mode".***

5-8-18 Inventory Shutdown

In many applications, the user of the SGB System produces large runs of blended material on the same recipe during production. An example may be a 40,000-lb. run of a certain specification plastic extrusion. Others may wish to fill a 1,000-lb. gaylord box in a central blending application. In either case, Sterling has provided a means to automatically stop the blending system when the blended material has reached a preset total blended weight. This is known as Inventory Shutdown.

When the Inventory Shutdown value is reached, the blender will finish the current batch of material. It will then stop and display to the operator that the inventory value has been reached. Additionally, it will flash an alarm and wait for operator attention. An example of this screen is shown below:



To enable this feature, simply enter a desired shutdown weight value (from 1 to 999999999) into the Inventory Shutdown display line of the Recipe Format screen, under the Setup menu.

This feature can be configured while the blender is making a batch. If the Inventory Shutdown is changed, then you will need to touch "Accept New Recipe" on the Recipe screen before the change can take place. This allows stored recipes with different Inventory Shutdown settings to easily be loaded without the operator having to reconfigure the blender every time they want to load a stored recipe.

To disable this feature, simply enter a zero (0) value.

5-8-19 Recipe Book (Storage) Menus

In many applications, it is favorable to hold several recipes in the memory of the blending system. The SGB has provided for this by incorporating Sterling's recipe book software.

The recipe book is capable of holding 50 different recipes. These may be stored and recalled by number. ***During this section of the manual, the operator may wish to revert to the Menu Tree Diagram on page 51 of this manual.***

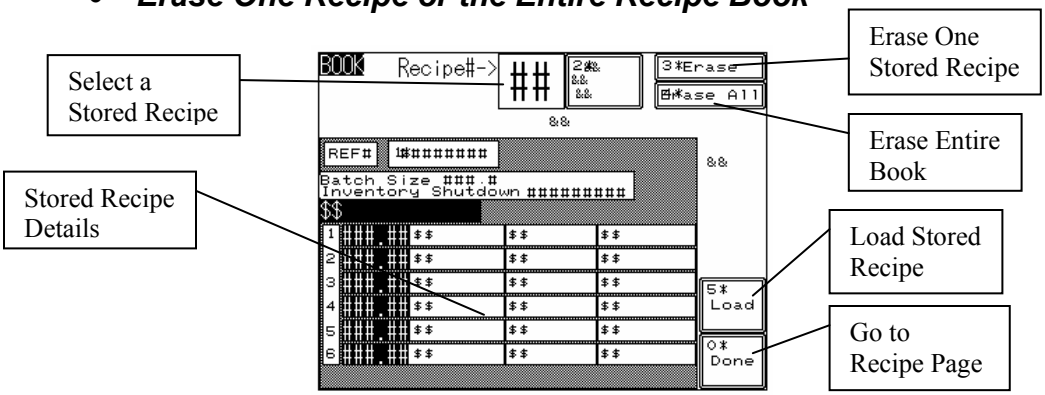
It is important to note that the recipe book only stores and recalls recipes. **The blender will operate on the current recipe only**, so a recipe must be recalled from the book to the current recipe for it to be active.

Each recipe stored in the recipe book may be displayed and/or modified. Only the current recipe will be blended.

Always verify that the Current Recipe is showing what you want to run, and that the correct recipe has been downloaded from the book.

The recipe book section contains the following Items:

- ***Save Running Recipe to the Book***
- ***Load a Stored Recipe from the Book***
- ***Display a Stored Recipe***
- ***Erase One Recipe or the Entire Recipe Book***



5-8-19-1 Save Running Recipe to the Book

The save current recipe to book function allows the operator to save the contents of the current recipe to the recipe book under a desired number.

Upon selecting this function, the operator will be prompted for a reference recipe number. This may be any number from 1 to 50.

The assigned recipe number will be used for all further references to this recipe until deleted. The operator should be familiar with the recipe numbers used. We suggest keeping a loose-leaf notebook with 50 tabbed pages as a reference to what is kept in the blender so this can be the standard for all blenders in the plant, etc. To save a running recipe to the Recipe Book perform the following steps:

1. Enter the Recipe Book by touching the Recipe Book icon located on the Recipe Screen.
2. Select a stored recipe by changing the number next to “Recipe #.”
3. Touch “Save Running Recipe” and then “Done”.

5-8-19-2 Load a Saved Recipe from the Book

The load from book function allows the operator to retrieve a previously stored recipe from the recipe book and install it into the current recipe menu. This will overwrite the current recipe, so make sure that it has been saved to the book before installing a new recipe in its place. To load a previously stored recipe from the Recipe Book:

1. Enter the Recipe Book by touching the Recipe Book icon located on the Recipe Screen.
2. Select a stored recipe by changing the number next to "Recipe #."
3. Touch "Load" and then "Done" (this takes you back to the Recipe Screen).
4. Touch "Accept New Recipe" to accept the loaded recipe into the blender.

Note: **If replacing the current recipe with one that is downloaded from the Recipe Book, *make sure that the previous recipe has been saved*, as it will be overwritten by the new downloaded recipe.**

5-8-19-3 Display Recipe Contents

The display recipe function is used to verify the contents of a recipe number before it is loaded from the recipe book. In order to view the desired recipe, the operator must enter the number which contains the recipe he wishes to view. Once a valid recipe number is entered, the display will indicate the contents of the stored recipe in percentages.

5-8-19-4 Erase Recipe or Entire Book

The Erase Recipe or Entire Book function is used to eliminate old or outdated recipes from the recipe book. If the operator only wants to delete one recipe, the configuration for that recipe should be currently displayed on the screen. The controller will only prompt the operator if they want to erase the entire book when that key is pressed. Once a recipe number is deleted, the contents of that recipe are lost. The recipe number may be used again in the future for new recipes.

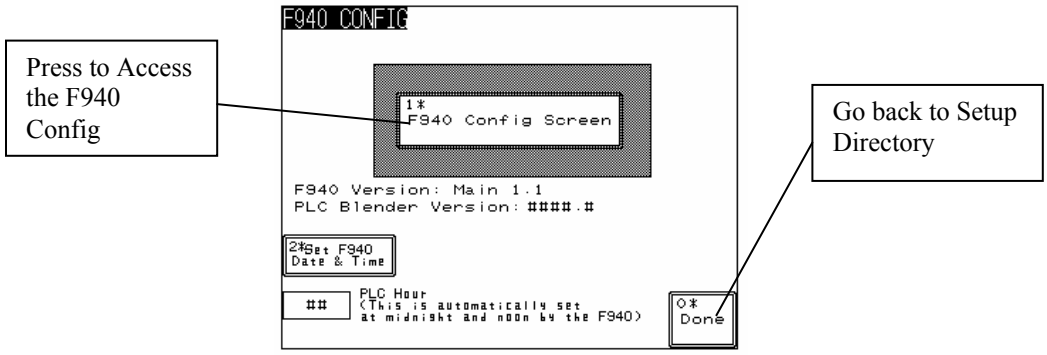
5-8-20 Controller Features

5-8-20-1 Display Time and Date

The display Time and Date item in the upper right corner of the “F940 Config” menu is used to verify the current time and date information.

5-8-20-2 Setting Date & Time

The Set Date & Time feature is located in the “Panel View Config” menu of the Setup Screen. This feature allows the operator to set the SGB’s internal time clock and date. The clock data must be entered in the traditional Hours, Minutes, and seconds. The date must be entered in Years, Months, and Days. All values in this screen can be entered by pressing on the related button and choosing the correct number.



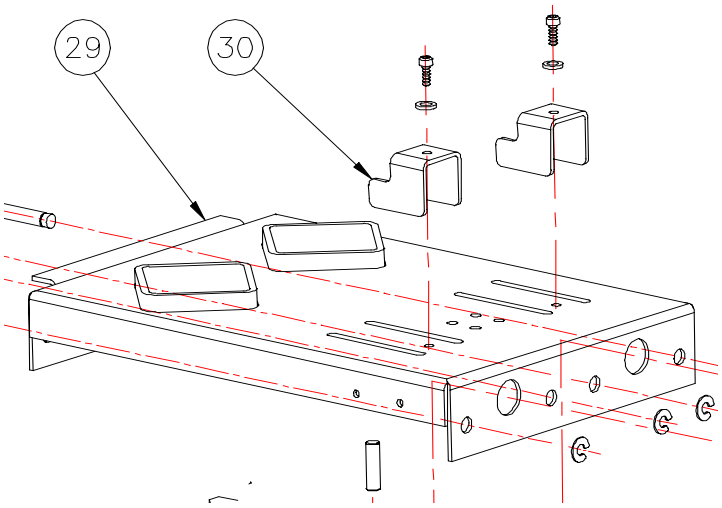
5-9 Stroke Limiters for Metering Gates

Stroke limiters are supplied on components 1 through 4 with all SGB blenders to allow standard metering gates to meter small amounts of low percentage additive materials.

Generally, the stroke limiter (Item 30) is not required on major ingredients (usually number 1 and 3) and should be removed. If they are left in place, throughput of the blender will be reduced.

To install the stroke limiter, drop it into the double slot on top of the gate assembly and secure it in place with the socket head screw that is provided. Be sure to use the lock washer to prevent the stroke limiter from coming loose.

Stroke Limiter



6-1 Work Rules

The installation, operation, and maintenance of this equipment must follow all applicable work and safety codes for the location where it is used. This may include, but is not limited to, OSHA, CSA, NEC, SPI, and other local, national, and international regulations. In addition, you must observe the following specific rules:

- ☑ Read and follow these instructions when installing, operating, and maintaining your equipment. If the instructions become damaged or unreadable, you can obtain additional copies from the Service Department at Sterling.
- ☑ Only qualified people may work on or with this equipment.
- ☑ Work only with approved tools and devices.
- ☑ Turn off and lock out the power switch when maintaining or servicing your blender system.
- ☑ Disconnect and lock out main power before servicing electrical equipment.

6-2 Maintaining Blenders

Sterling blenders need periodic maintenance to provide long dependable service. Check these elements regularly:

- Check functionality of safety circuit daily.
- Maintain proper air pressure and drain water from trap assembly on regulator – as required.
- Periodically lubricate slide gate rails.

WARNING!

Always remove plug and disconnect power before servicing blender.

Always read operating manual before operating or servicing blender.

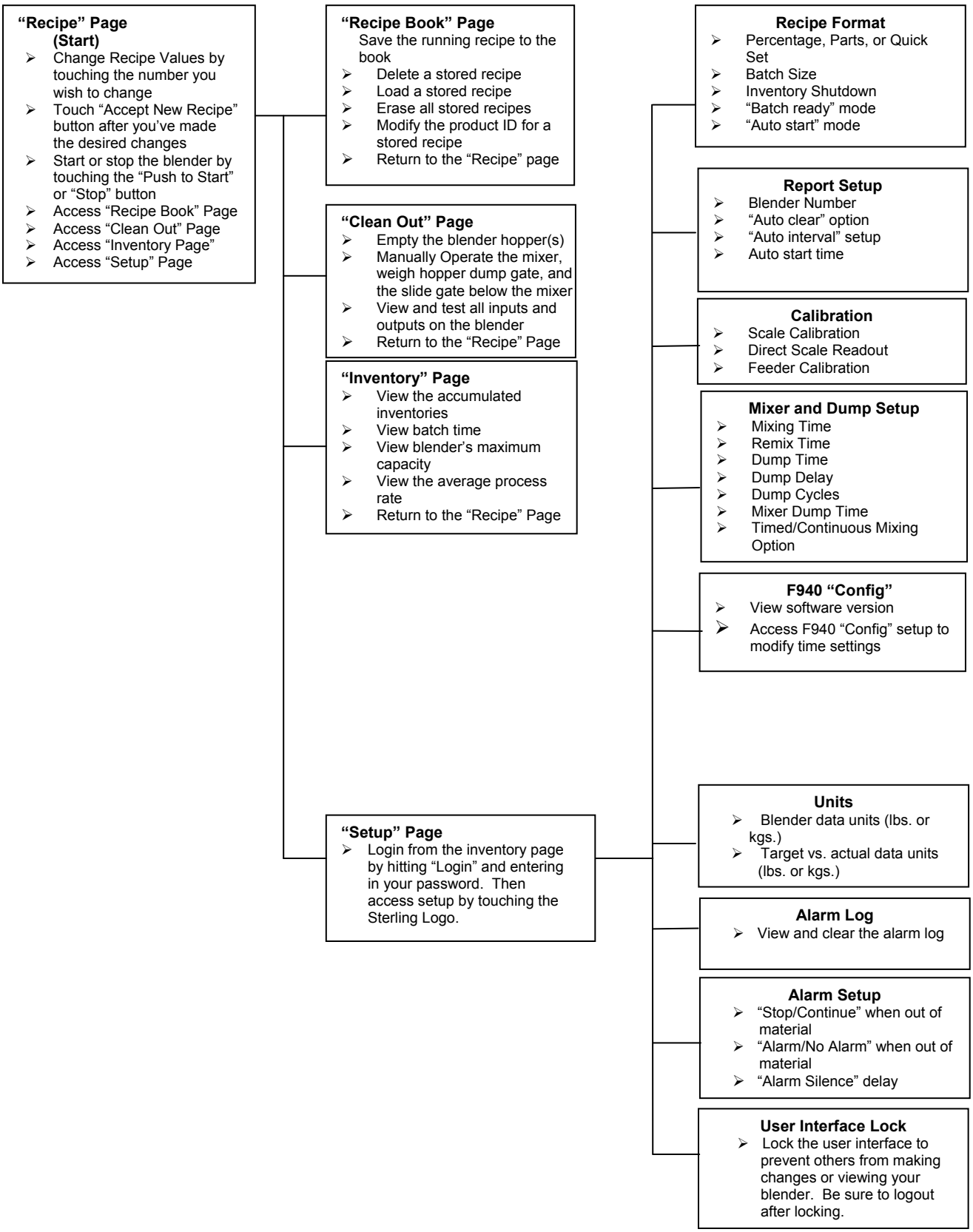
6-3 Controller Setup

This section describes the proper setup of the SGB blending system control parameters. These parameters are operator changeable; however, these items should only require setup during the initial installation. Only authorized personnel should change them. For security reasons, the menu that is used to access these parameters is password protected.

Many of the variables and setup parameters have been preset at the factory and do not need to be changed. However, this section of the manual will address all of the SGB setup parameters that were available at the time of printing. The purpose of this is to familiarize the reader with all the setup parameters and their usage.

A complete listing of all default values is provided at the end of this manual.

6-4 SGB Series Blender Menu Structure



6-5 Mechanical

The mechanical design of the blender is very simple and very little maintenance is required. The only moving parts are the metering gates, weigh hopper dump valve and mixer agitator. The following maintenance is suggested:

Daily

- Inspect blender for any loose parts-tighten them immediately.
- Verify quality of compressed air supply.
- Verify mixer door is properly latched.

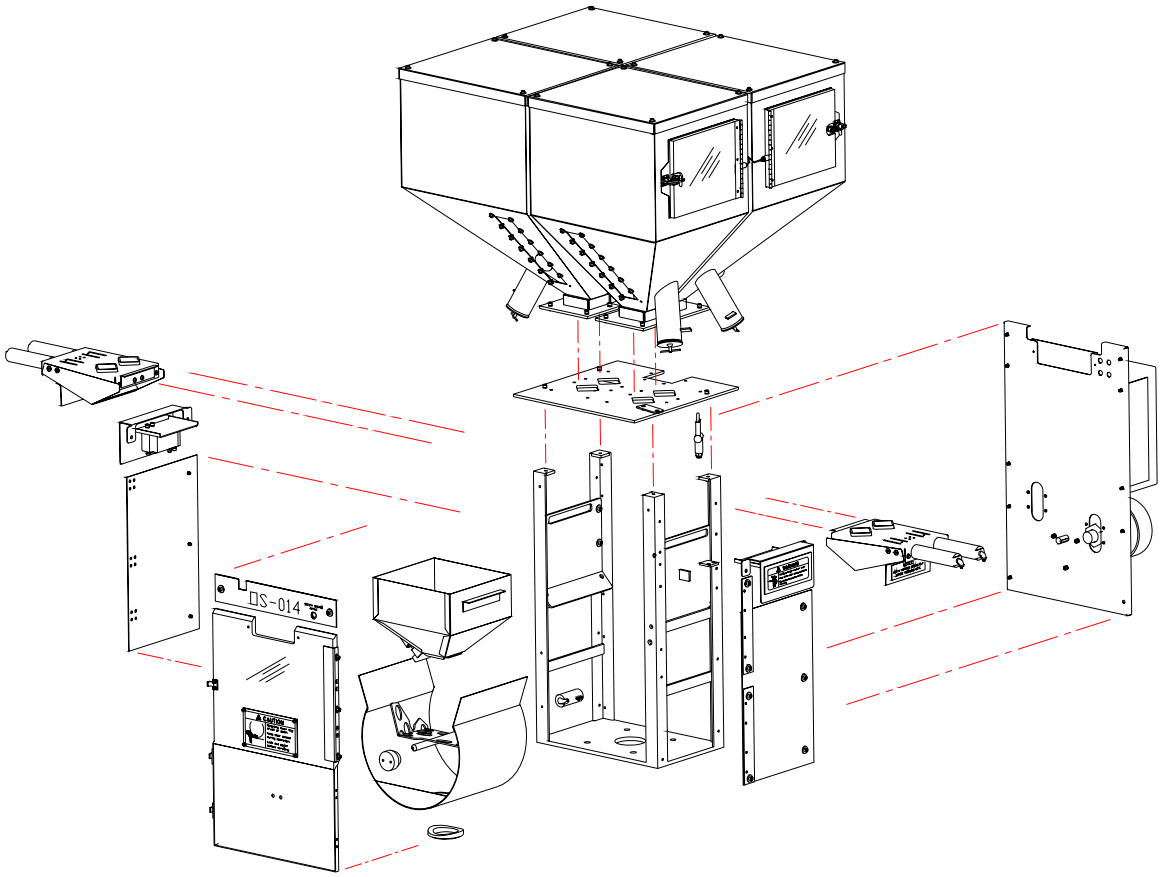
Weekly

- Inspect metering gates for proper operation.

Monthy

- Inspect air regulator and air safety circuits, if equipped.
- Recalibrate blender only if necessary.

Typical Model SGB Assembly Overview



6-6 Electrical

6-6-1 Description and Objectives

This section is designed to give the operator an overview of the electrical system that controls the SGB blending system. Since the SGB's control panel is a self-contained pluggable item, seldom will a maintenance person be required to enter the control panel. For purposes of understanding the system, it is advisable that the maintenance personnel be familiar with not only the internal workings of the control panel, but also with the input and output signals to the SGB unit.

This section includes the following:

- Internal components of the control panel
- Input signal to the control panel
- Output signals from the control panel

6-6-2 Internal Components of the Control Panel

Note: **See Section 12-2 for complete electrical schematics.**

This section describes the internal components of the SGB blending system control panel. It is not the intent of this section to completely familiarize the reader with the details on industrial control panel construction or standards, but simply to familiarize the reader with the major components inside the SGB control panel.

The customer must supply 120/1/50 or 60 (or 220/1/50 or 60) via wires L1 & L2 (N). Please insure that the earth ground connection is properly connected to an established earth ground.

"Power on" is indicated by a lighted on/off switch.

"Slide gate below mixer" switch controls position of optional slide gate.

"Safety Active" light displays status of safety interlock circuit. Audible alarm horn alerts operator to blender fault.

6-6-3 Input Signals to Programmable Controller

The SGB blending system has two main input signals that it uses from the blending process: the mix hopper high level signal and the weigh hopper load cells. This, of course, does not include the operator touchscreen input.

The mix hopper high level signal is generated by a proximity level sensor located in the right hand portion of the mixer chamber (viewing from the mixer door).

Load cells require +10 volts DC to operate. This is known as the load cell's excitation voltage.

6-6-4 Output Signals from Programmable Controller

The SGB blending system uses several output control signals to control the process. All of these are very similar in nature, the first of which is the mixer motor control.

The mixer motor is controlled by a PLC output.

The weigh hopper dump valve output functions similar to the mix motor output. Please refer back to the wiring diagram. The origin of the weigh hopper dump signal is a PLC output.

Each SGB blending system includes an auxiliary customer alarm output. This dry contact can be used to switch a remote alarm signal.

The customer alarm output is provided to actuate or energize a variety of alarm horns, buzzers, strobe lights, and beacons. These are normally provided by the customer, and care will have to be exercised not to exceed the maximum current draw (3 amp maximum). The contacts will close whenever the control detects a fault that will somehow inhibit the blending system from properly blending the material.

Note: **The customer alarm contact is open if the panel control power is turned off.**
This contact is for use with a customer supplied alarm device as described above.
The alarm contact has a maximum load of 3 amps.

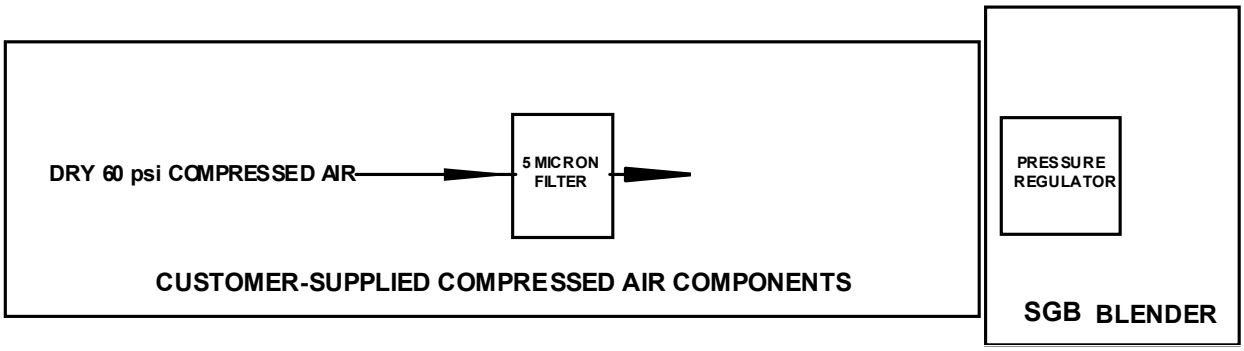
6-7 Pneumatic System Maintenance

The SGB blending system uses plant-supplied compressed air to operate the metering and dump valves on the blender.

It is the user's responsibility to provide CLEAN AND DRY air for the blender to be connected to. The air supply should be filtered through a 5 micron air filter and have a water separator installed. Oil should not be used unless air dryers are installed on the compressed air supply. In this case, an oiler may be required on the blender to keep the air cylinder seals lubricated.

Important!

As this blender uses air for blender metering functions, it is very important to supply clean, dry air to the blender. Dirty air can affect blender accuracy, result in poor performance and cause injury. *Provide a 5-micron air filter on the air supply to the blender and be sure excess oil is removed.*



Sterling provides all pneumatic lines on the blender piped to a single ¼" NPT standard pipe thread fitting. The SGB blending system requires approximately 1 cfm @ 60 psi (1.7 m³/hr @ 4.14 bar) air pressure for proper operation.

The working pressure of the blender cylinders is 60 psi. This is adjustable by the regulator supplied on the rear panel of the blender. (It is important that the air pressure to the blender is not fluctuating by installing the unit on an air line with other equipment using large volumes of air. If this is the case, an accumulator tank with a check valve may have to be provided by the customer to ensure the blender a steady air supply.)

WARNING!

Always disconnect the compressed air supply when working on any part of the blender.

7 Troubleshooting

7-1 Description and Objectives

This section provides basic troubleshooting procedures to common SGB blending system problems. Any problem encountered that is not listed should be discussed with an Sterling service technician.

Problem	Possible solution
Nothing happens when I push “Start Blender”	Check to make sure that air is hooked up and the regulator gauge reads at precisely 60 PSI.
	Check that the access door to the mixer is shut properly.
	Look on the Recipe Screen. If you see “Mixer Full”, then check the mixer. If the mixer is not full, then check that the mixer prox is adjusted properly (small screw on back).
“E-STOP has been Activated” is shown	Check the E-Stop located on the front of the blender panel.
“Interface has been Locked” is shown	Click “Unlock” and enter in your User Password.
I’ve forgotten my User Password	Contact Sterling’s Service Department.
POWER INTERRUPTION ALARM	Power was lost during a batch. Check your power source unless you intentionally killed the power during the batch.
PLC Battery Low	Change out the PLC battery with your spare
PLC Module Loaded	Check the input power. Verify that 110 volts (or 220 volts) are ±10%. This voltage must remain constant with all the motors starting and stopping. Insure that the blender is on a “clean” circuit that does not have other equipment on it. If the power is known to be intermittent and have problems, set up the unit to run in “AutoStart” mode. See the factory setup sheet at the end of this manual. In this mode, if a short power interruption occurs, the blender will automatically restart.
	Check the power supply. Make sure that it has +5 VDC output to the CPU board. Adjust to +5 VDC, ±0.1 volt.
	Check the display ribbon cable connection to the CPU board and the display. See the electrical chapter for more information.
	Check the contrast adjustment located on the display board.
	Check keyboard ribbon cable connections.
	Check the CPU board for “lockup”. To do so, reset the CPU board by cycling the power off and on at the motor control panel.

Problem	Possible solution
Weigh hopper occasionally overfills.	Check batch weight setting in the recipe menu. See the setup chapter for more information.
	Check the load cells and weigh hopper mounting for binding, etc.
	Check to see that a pellet has not lodged under a load cell.
	Check the ingredient supply hoppers to verify proper ventilation. If a vacuum receiver has a leaking flapper valve and the supply hopper is not vented, the blender computer can learn inaccurately and cause an overfill condition on the next few cycles.
	Check the load cell connections to the panel.
Material tends to separate in the mixing chamber.	Check the mix timer setting. This problem is normally due to over mixing. See the mix timer section in the setup chapter. Reduce the time until the problem is corrected.
	Check the mixer drive to ensure that the agitator is turning properly.
	Check the high level switch in the mixer to lower the level slightly.
Material sticks to the flapper of the weigh hopper and is not dumped.	Increase the Dump Cycles setting in Mixer and Dump Setup.
Too much material remains in the mixer.	Increase the Mixer Dump Time in Mixer and Dump Setup.
The material is not being mixed thoroughly.	Increase the Mixing Time in Mixer and Dump Setup. Actually if you over mix material, you can have the same problem. If you have the blender set for “Continuous Mixing” then change it to “Timed Mixing” and adjust the Mixing Time appropriately.
Recorded Inventory Totals don’t match what I’ve actually used	Check the blender’s scale calibration and verify that the batch hopper is not overfilling. If the hopper is overfilling, adjust your batch size. If this is correct, then you are probably not accounting for material scrap or other items in your process.
	Some error can be introduced by not weighing every batch. Check the Recipe Page.
Max Hopper Weight Exceeded Alarm continues to re-occur.	Stop the Blender and then Start it again. This causes the blender to perform an automatic feeder calibration. If this doesn’t fix it, then manually perform feeder calibrations and retest.
Blender occasionally dumps an incorrect batch.	The blender intermittently dumps a batch of material with one or more of the components incomplete.
	Check the recipe information; ensure that both the percentages and batch size are set properly.
	Check the status of the alarm flags & Feeder Setup to ensure that all of the feeders are set to Retry. In addition, if the blender is configured for timed batches then this can cause error.
	Check supply hopper ventilation to prevent problem associated with leaky vacuum receiver flappers.
Blender keeps dumping after mixer is full.	Check the mixer high-level switch sensitivity. When the sensor is covered by material, the indicator lamp on the back of the switch should be lit. To adjust the sensitivity, use the small adjustment screwdriver that was provided with the blender. The adjustment pot is located on the back of the sensor. Rotate clockwise to increase the sensitivity (less material in front of the switch to actuate it). Rotate counter clockwise to decrease the sensitivity (more material covering the switch).
	Check the mixer high-level sensor connection to the control panel.
Blender will not batch with empty mixer.	Check the mixer high-level switch sensitivity. Fines may have coated the level switch; it needs readjustment.
	Check the proximity switch connection.
	Make sure that the recipe is correct.
	Check batch size.

Problem	Possible solution
Mixer won't shut off and runs continuously.	Check the Mixer and Dump Setup to see if the mixer is configured for "Continuous Mixing". Set it to "Timed Mixing".
	Check the value of the mixer timer setting.
	Check the value of the dump delay timer.
	Check the mixer motor fuse. This is located in the control panel on the SSR for the mixer motor. If the unit has two (2) power inlets with a separate power inlet for the mix motor the overload fuse will be located in the rear junction box on the blender frame.
	Check the power source to the blender.
	Check the load cell in diagnostics under direct scale readout. Place a calibration weight on the weigh hopper; determine if the weight corresponds.
	Check the load cells to make sure that a pellet has not jammed under a load cell.
	Check the load cell connections to the control panel
	Check the power supply voltage and readjust as necessary as described earlier.
	Check the memory battery voltage on the CPU board. If the battery is dead, the blender "forgets" settings when the power is off. Replace it with a new battery. Order a spare CPU board; send the replaced one back to the factory to have a new battery holder and battery installed. If this is done in the field, ***the controller warranty will be voided***.
Out of Material Alarm is displayed, but there is material in the hopper.	Go to the Manual Control Page and check to see if "Hop Low" equals "1". If it does, then adjust the low-level prox until the value reads "0".
	Ensure that the material hopper is properly vented. If the vacuum receiver is leaky, then this will cause the problem. To test this, fill up the hopper and turn the loader off to prevent leaking. If this isn't the problem, then increase the "Out of Material Retry Limit" found under Feed Algorithm Options (see manual).
I'm not getting Out of Material Alarms	Check the Alarm Flags & Feeder Setup to see if the feeder is configured to give you an alarm.
Calibration Weight Exceeded	Clean out the hopper and retest. If this doesn't fix the problem, then perform a scale calibration. Also, check to sure that the Dump Time is not set extremely low. If all else fails, check the value set for the Max Empty Weight. This might need to be increased.
The feeder calibration values are moving too much.	First, check that the displayed actual dispensed weight is accurate. If this is OK, then check to see if the hopper is properly vented. To do this, fill hopper and turn off the loader and retest.
I can't calibrate the Scale without an error message.	This is caused by the difference in bits not being large enough. Using the Direct Scale Readout, examine current loadcell bits with and without the calibration weight. If the bits do not change significantly, then check for pellets jamming the loadcells and check the loadcell circuit. You might have a bad loadcell.
I can't calibrate the feeder without an error message.	Do other feeders calibrate correctly? Is the feeder I'm trying to calibrate a large gate? If these are true, then lower the Batch % for Feeder Cal setting under Feed Calibration Options. This can be observed by looking at the Hopper Weight display.
	None of the feeders calibrate? Check the Scale Calibration. If this is correct, then lower the Batch% for Feeder Cal setting under Feed Calibration Options for each feeder. This can be observed by looking at the Hopper Weight display.

Weigh hopper does not empty completely.	Check the dump time setting. It may be set too short. If this does not correct the problem, clean the weigh hopper and recheck the scale diagnostics readout. If not showing (0) zero when empty, re-calibrate the scale.
Problem	**Possible solution**
Blender does not make rate.	Verify application is not exceeding blender capacity. Verify additive percentage is not higher than designed, resulting in excessive dispense time. Verify all materials are feeding freely through the metering gates.
I have changed the recipe entry mode, batch size, inventory shutdown or feeder type and alarm flags, but the change hasn't taken place.	All of these settings are part of the current running recipe. This makes it easy for the operator to load a stored recipe without having to reconfigure all of these parameters for the new recipe. All you have to do is touch "Accept New Recipe" to load these values into the running recipe.
A feeder always puts too much material in the batch.	Check that the Gate Cycle Time is set correctly. If it is then lower the Initial % of Target to Meter. These are found under Feed Algorithm Options. Make small adjustments and retest.
A feeder is retrying more than 2-4 times.	Increase the Gate Cycle Time. This is found under Feed Algorithm Options. Make small adjustments and retest.
	Increase the Allowed Underfeed value under Feed Algorithm Options.
	Decrease the Retries before Double Gate Time.

Other service problems or questions can be answered by contacting the Sterling Service Department.

8 Blender Options

The following is a list of options, which your blender may have been equipped with:

Regrind Auger Metering (RAM)

Used for feeding difficult regrind materials.

Low Level Sensors

Detects material supply problems before blender runs out.

Remote Touch Screen Interface

Allows control of blender from a second location up to 50 feet (30 meters) away.

Mezzanine & Floor Stands

Supports blenders in mezzanine mount and freestanding applications.

Take-off Compartments

Allows material to be metered into a vacuum conveying system.

Slide Gate below Mixer

Ensures blend homogeneity.

CL-25 Pneumatic Loader for Additives

Compressed air loader to load low percentage additives into the blender.

Spare Parts *9*

9-1 Spare Parts List

SGB Series Gravimetric Batch Blending Systems

✓ ***Please see Section 9-2 for parts identification and exploded views.***

Model SGB-450

Part No.	Description
53292	Air Cylinder (weigh hopper dump)
53272	2kg Load Cell
10220	Mixer Agitator (Opti-Mixer)
A0556548	Mixer High Level Sensor
35448	Slidegate Air Cylinder (3" stroke)
A0565882	Calex Module
A0569702	PLC
A0569708	SBG Graphics Panel
A0542200	1.5 Amp Fuse
A0542207	3.0 Amp Fuse
A0569106	Calibration Weight (~4 lbs.)

Model SGB-900

Part No.	Description
35450	Air Cylinder (weigh hopper dump)
61-1010E-5kg	5kg Load Cell
10207	Mixer Agitator (Opti-Mixer)
A0556548	Mixer High Level Sensor
35448	Slidegate Air Cylinder (3" stroke)
A0565882	Calex Module
A0569702	PLC
A0569708	SBG Graphics Panel
A0542200	1.5 Amp Fuse
A0542207	3.0 Amp Fuse
A0569107	Calibration Weight (~10 lbs.)

Model SGB-2500, SGB-4000 & SGB-5000

Part No.	Description
53243	Air Cylinder (weigh hopper dump)
A0564528	20kg Load Cell
10197	Mixer Agitator (Opti-Mixer)
A0556548	Mixer High Level Sensor
53266	Slidegate Air Cylinder (5" stroke) – SGB4000 only
35479	Slidegate Air Cylinder (6" stroke) – SGB5000 only 0801100

A0565882	Calex Module
A0569702	PLC
A0569708	SGB Graphics Panel
A0542200	1.5 Amp Fuse
A0542207	3.0 Amp Fuse
A0569108	Calibration Weight (~25 lbs.)

9-2 Model SGB Blender System Component Description

This section describes the various components of the blending system. The SGB blending system is made up of the following components:

- ***Ingredient Supply Hoppers***
- ***Ingredient Weigh Hopper***
- ***Ingredient Metering Slide Gate Assemblies***
- ***Rotary Mixer***
- ***Computer Control Panel***

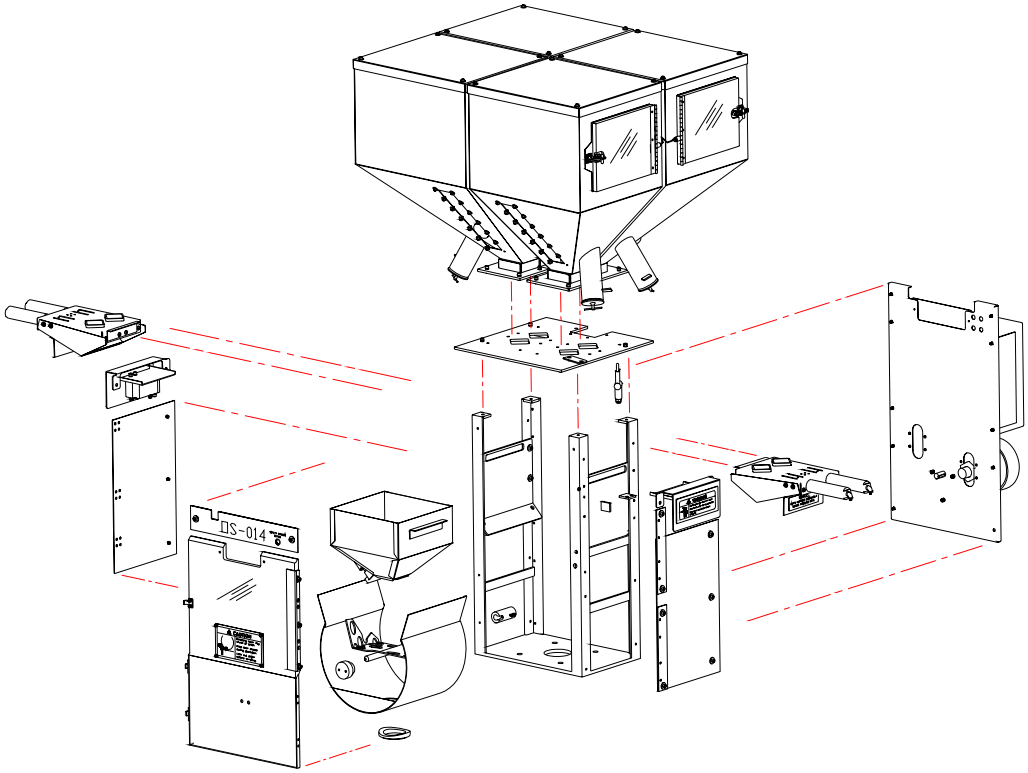
9-2-1 Overview

Component Identification and Location

This section will familiarize the reader with the components of the SGB blending system. After reading this section, the reader will be able to:

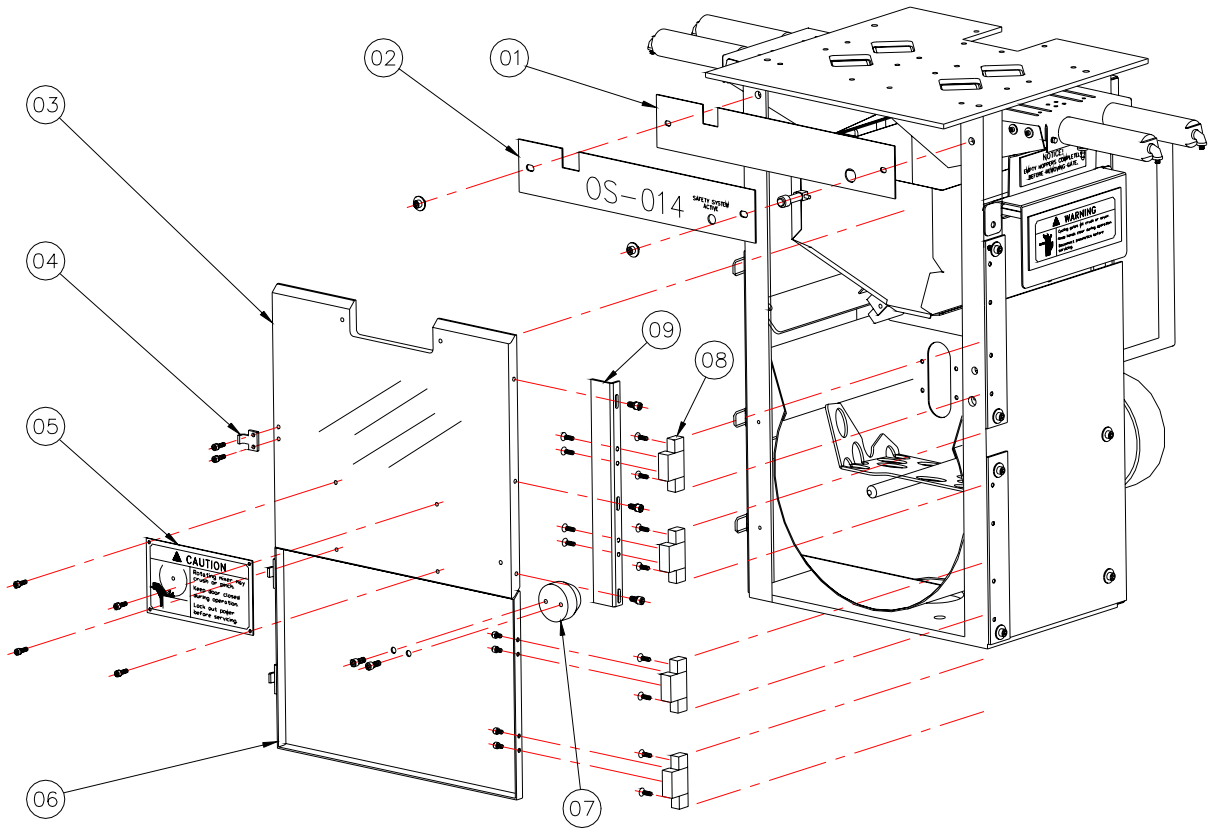
- ***Identify the individual common components of the SGB blending system***.

Typical Model SGB Assembly Overview



9-2-2 Typical Mixer Section (Front)

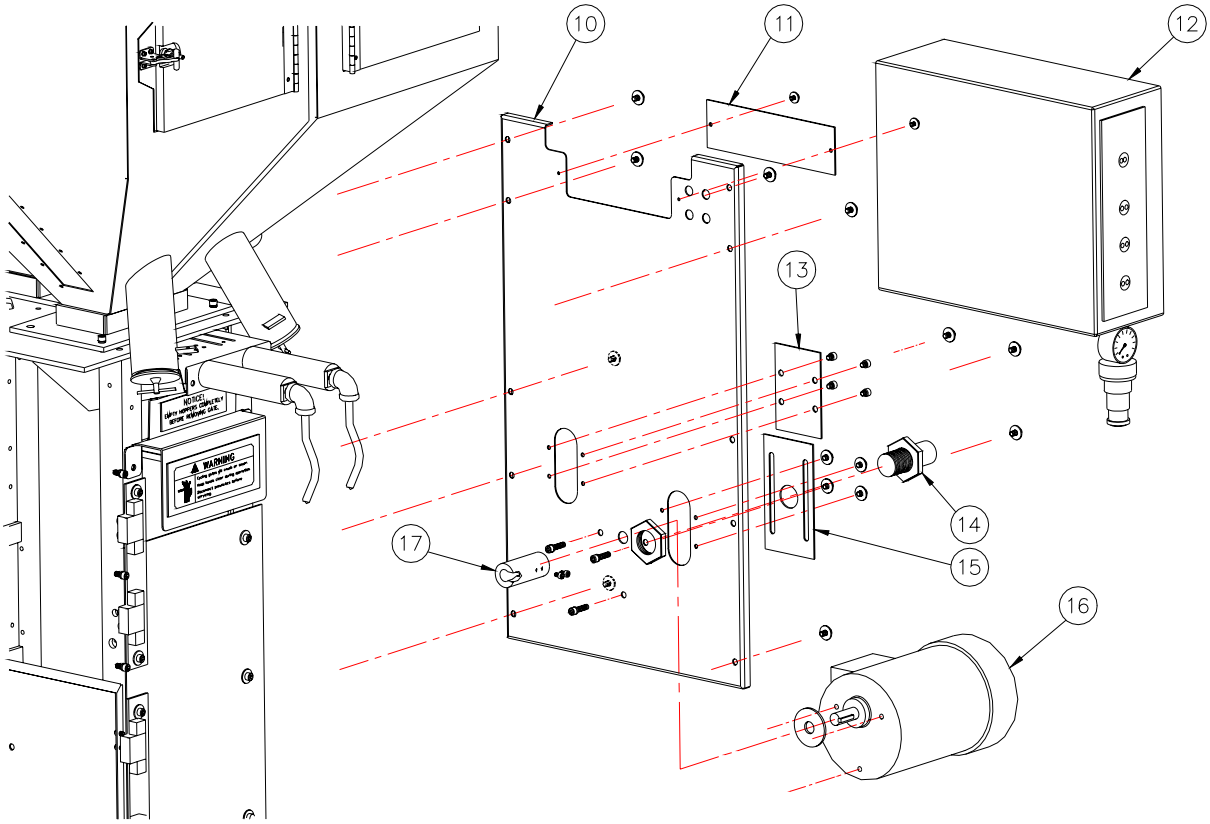
Typical Opti-Mixer™ - Front Assembly Detail



01	Nameplate and indicator mounting plate
02	Nameplate
03	Upper polycarbonate Opti-Mixer™ door
04	Door clamp
05	“Caution” label
06	Lower stainless steel Opti-Mixer™ door
07	Mixer agitator door bushing
08	Door hinge
09	Door hinge base

9-2-3 Typical Mixer Section (Rear)

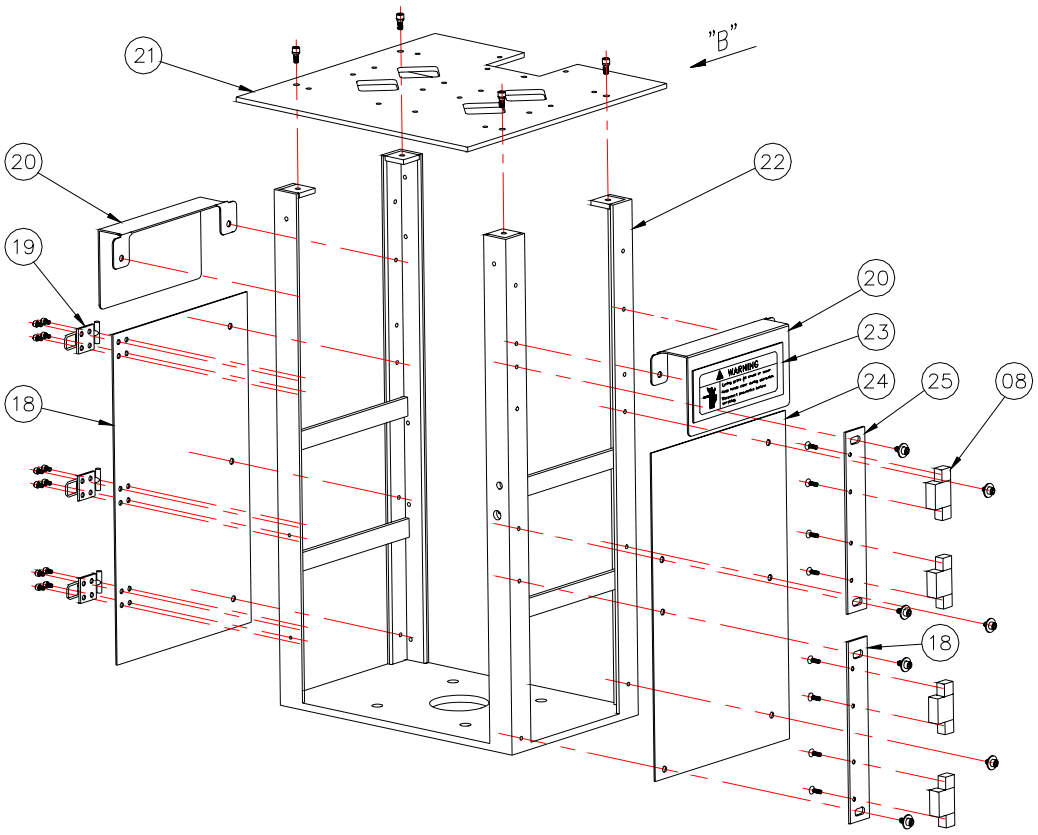
Typical Opti-Mixer™ - Rear Assembly Detail



10	Opti-Mixer™ back plate
11	Cover plate
12	Back control panel
13	Cover plate
14	Proximity sensor (Mixer “high” level)
15	Mixer proximity sensor mounting plate
16	Mixer gear motor
17	Mixer agitator shaft coupling

9-2-4 Typical Mixer Frame

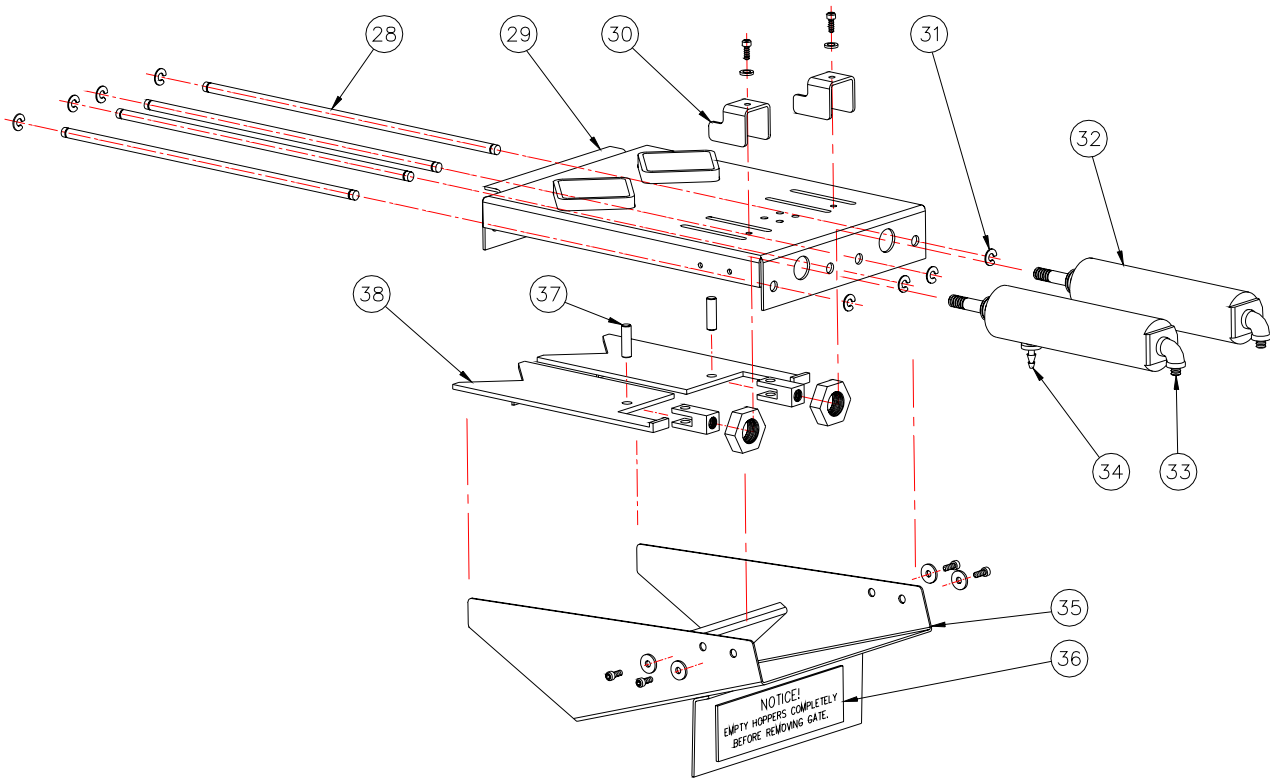
Typical Opti-Mixer™ Frame Assembly



18	Hinge mounting bracket
19	Mixer door clamp
20	Load cell cover
21	Opti-Mixer™ top plate
22	Opti-Mixer™ frame
23	Warning label
24	Opti-Mixer™ frame side panel
25	Hinge mounting bracket

9-2-5 Typical Gate Assembly

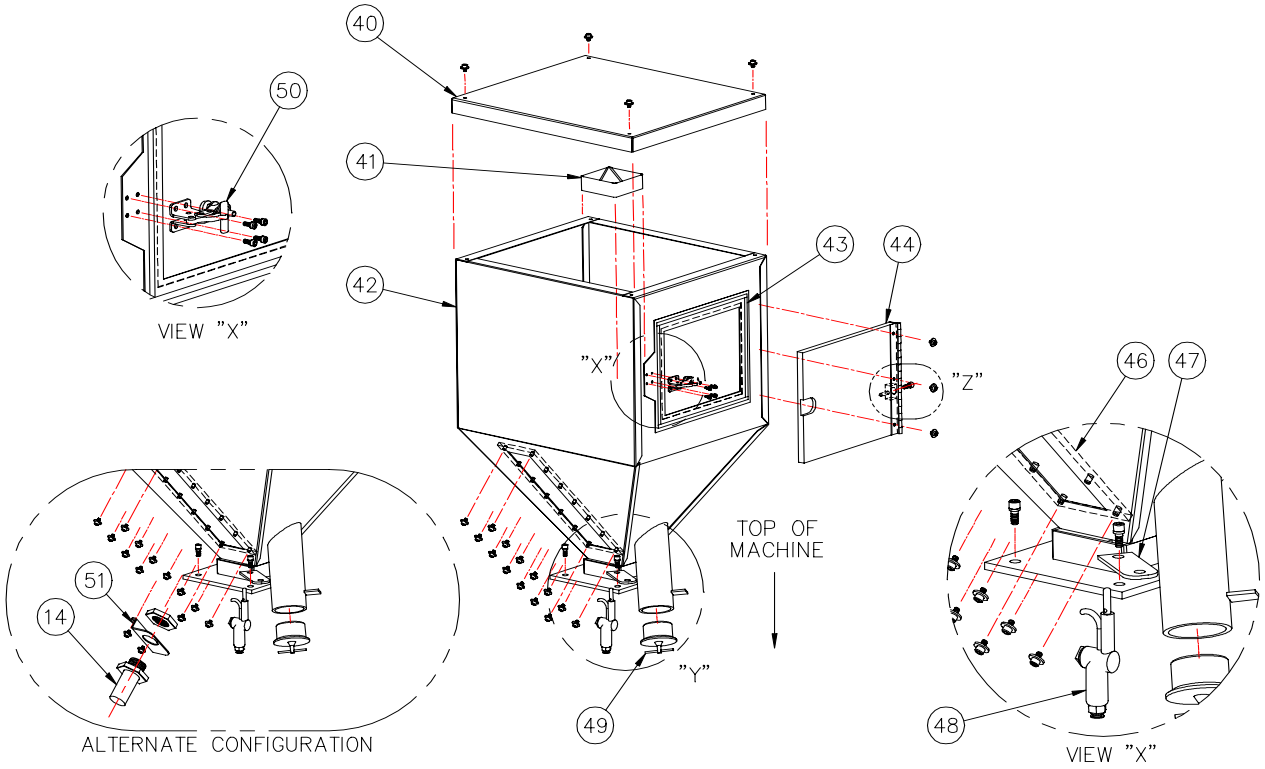
Typical SGB Series Diamond Gate Assembly Detail



28	Slide gate guide rod
29	Stainless steel gate assembly base
30	Slide gate stop (stroke-limiter)
31	Retaining clip
32	Slide gate air cylinder
33	Slide gate air cylinder pneumatic connector fitting
34	Slide gate air cylinder pneumatic barb fitting
35	Slide gate assembly material chute (deflector)
36	Notice (warning) label
37	Pin
38	Diamond v-gate (metering slide gate)

9-2-6 Typical Supply Hopper

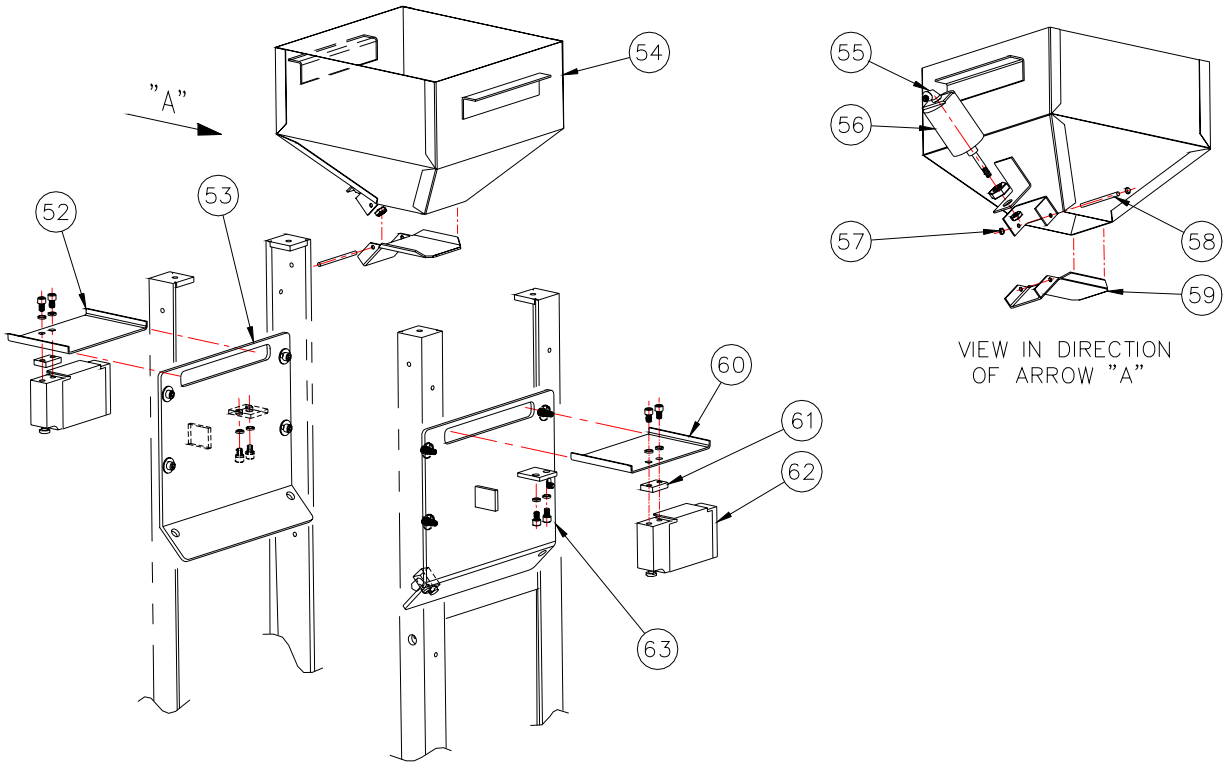
Typical SGB-450 Series Hopper Assembly Detail



40	Mild steel hopper cover
41	Hopper insert (square to diamond-polyurethane)
42	Mild steel hopper
43	Gasketing
44	Polycarbonate access door
45	N/A
46	Polycarbonate hopper sight glass
47	Blow-off tool holder
48	Blow-off tool
49	Drain plug
50	Cleanout door clamp
51	Optional low level proximity sensor mount

9-2-7 Typical Weigh Hopper

Typical Weigh Hopper & Load Cell Detail



52	Left weigh hopper bracket
53	Inside mixer plate
54	Weigh Hopper
55	Weigh hopper discharge air cylinder pneumatic connector
56	Weigh hopper discharge air cylinder
57	Weigh hopper discharge air cylinder mounting bracket
58	Weigh hopper discharge hinge pin (bolt)
59	Weigh hopper discharge flapper
60	Right weigh hopper bracket
61	Spacer
62	Load cell(s)
63	Load cell mounting plate

Technical Assistance

Parts Department

Call toll-free 7am–5pm CST [800] 783-7835 or call [262] 641-8600, Fax [262] 641-8653
The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

Service Department

Call toll-free 8am–5pm CST [800] 783-7835 or call [262] 641-8600
Emergencies after 5pm CST, call [847] 439-5655
We have a qualified service department ready to help. Service contracts are available for most products.

Sales Department

Call [262] 641-8600 Monday–Friday, 8am–5pm CST
Our products are sold by a world-wide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

Contract Department

Call [262] 641-8600 Monday–Friday, 8am–5pm CST
Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

10-2 Returned Material Policy

10-2-1 Credit Returns

1. Prior to the return of any material **authorization** must be given by **Sterling.** A RMA number will be assigned for the equipment to be returned.
2. Reason for requesting the return must be given.
3. ALL returned material purchased from **Sterling** returned is subject to 15% ($75.00 minimum) restocking charge.
4. ALL returns are to be shipped prepaid.
5. The invoice number and date or purchase order number and date must be supplied.
6. No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

10-2-2 Warranty Returns

1. Prior to the return of any material, authorization must be given by **Sterling.** A RMA number will be assigned for the equipment to be returned.
2. Reason for requesting the return must be given.
3. All returns are to be shipped prepaid.
4. The invoice number and date or purchase order number and date must be supplied.
5. After inspecting the material, a replacement or credit will be given, at **Sterling's** discretion. If the item is found to be defective in materials or workmanship, and it was manufactured by **Sterling,** purchased components are covered under their specific warranty terms.

10-3 Warranty

Sterling warrants all equipment manufactured by it to be free from defects in workmanship and material when used under recommended conditions. The Company's obligation is limited to repair or replace FOB the factory any parts that are returned prepaid within one year of equipment shipment to the original purchaser, and which, in the Company's opinion, are defective. Any replacement part assumes the unused portion of this warranty.

This parts warranty does not cover any labor charges for replacement of parts, adjustment repairs, or any other work. This warranty does not apply to any equipment which, in the Company's opinion, has been subjected to misuse, negligence, or operation in excess of recommended limits, including freezing or which has been repaired or altered without the Company's express authorization. If the serial number has been defaced or removed from the component, the warranty on that component is void. Defective parts become the property of the warrantor and are to be returned.

The Company is not liable for any incidental, consequential, or special damages or expenses. The Company's obligation for parts not furnished as components of its manufactured equipment is limited to the warranty of the manufacturers of said parts.

Any sales, use, excise, or other tax incident to the replacement of parts under this warranty is the responsibility of the purchaser.

The company neither assumes nor authorizes any other persons to assume for it any liability in connection with the sale of its equipment not expressed in this warranty.

Many types of Sterling equipment carry an additional one-year service policy. Consult your Sterling sales representative for specific details.

11-1 SGB Blender Safety Tags

Pinch Point
Slide Gate

Read Operation and Installation Manual

Shear Point
Rotating Mixer

Earth Ground

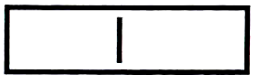
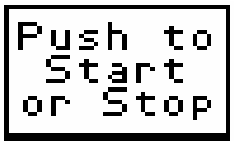
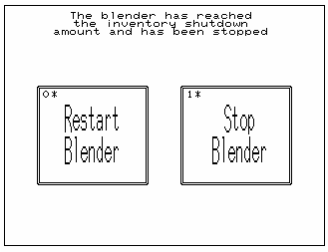
High Voltage
Inside Enclosure

Protected Earth Ground

Shear Hazard
Rotating Auger

Lifting Point

11-2 Pushbutton and Touchscreen Tags

Button	Function
 **Power On**	Turns power on to the blender controller. (Found on back of controller.)
 **Power Off**	Turns power off to the blender controller. (Found on back of controller.)
	Stops blender & re-starts controller.
	Press to move back one screen level in controller function.
	Move forward one screen level in controller function.
	Start (or stop) blender with current program parameters.
	Can erase current settings for one recipe or all recipes.
	Stops blender operation after current inventory shutdown (if used) is completed (This screen will be displayed.).

11-3 Blender Identification (Serial Number) Tag

(Located on back of mixing chamber)

CE

SGB Series Blender
Model Number SGB-900
Max Blend Capacity 318 KG/HR

220V **Serial Number 060701R**
1Ø **Date of Manufacture 06/2002**
4.5A
Over-current Protection Device (s) 4.5A Total
Frequency 50/60Hz
Compressed air supply 4.14 bar (60 psi)
Mixer Speed 16 RPM
Blender Mass 400 lbs/(180 KG)
Electrical Diagrams &
Pneumatic Diagram

5200 W. Clinton Ave Milwaukee, WI USA
(414) 354-0970

12 Appendix

Important! **Hidden, programmable features and hidden menu pages should not be made available to floor operators. These pages include the Service Supervisor Information addendum located in this section. Unauthorized changes to these factory settings by inexperienced operators may prevent the SGB unit from operating properly, and may void part or all of the warranty.**

12-1 Addendum Service Supervisor Information

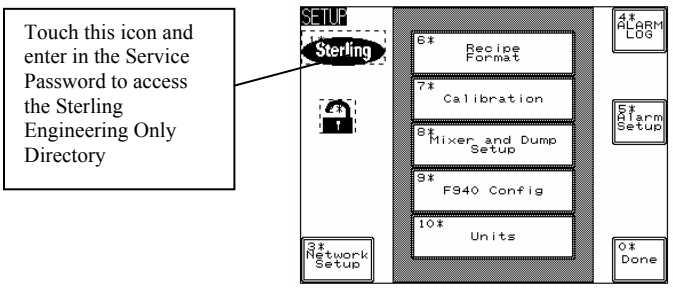
Note: Should not be used by untrained personnel – blender controller and/or program can be compromised!

12-1-1 Programmable Settings

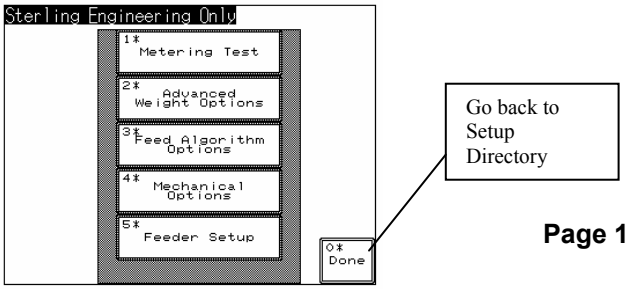
SGB

The SGB Series blender software program has been designed to allow some customizing to achieve certain desired operating parameters. The following is a listing of the selections that are “field” programmable, followed by the procedure for doing so.

This menu is accessed by pressing the Sterling icon when in the “Setup” Directory Screen menu.



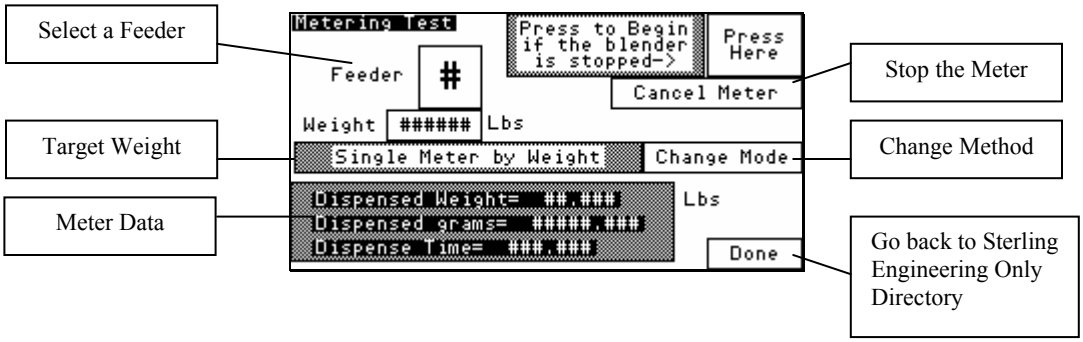
You must have logged in on the Inventory Page using the long password 3145348 to gain access to the “Sterling Engineering Only” screen. The screen similar to that shown below should be displayed and use the keystrokes described herein to change or toggle the parameters.



12-1-2 Factory Setup Menu

Available Selections

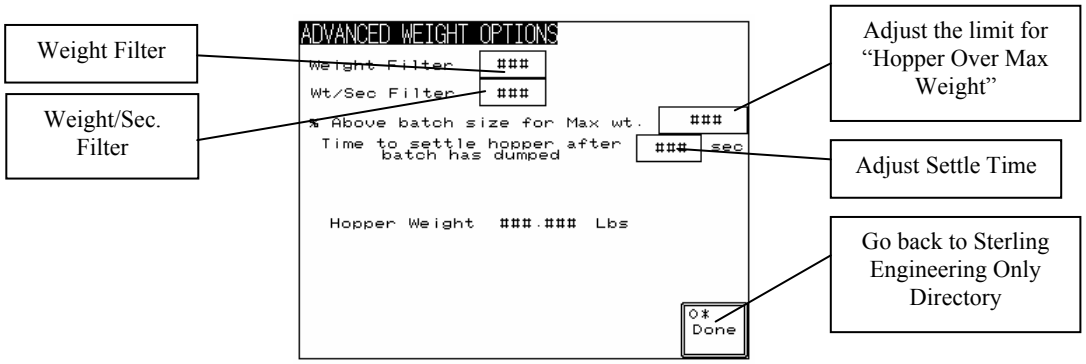
Metering Test Screen This screen is useful in both R & D and development purposes when testing the metering performance of each feeder. The user can perform a “Single Meter by Weight” to evaluate the mechanical standard deviation of the gate or auger. This test meters for the calculated time based off the target weight entered on this screen. The blender does not retry or adjust the time of the meter to reach the target, but instead always meters for the same amount of time as long as the target weight has not been changed. This allows you to open the gate for several feeds using the same amount of time. You can then record the Dispensed Grams and plot the standard deviation of the gate. The other purpose of this screen is to verify that the dispensed weight displayed is correct. You can perform a meter and then pull the weigh hopper to weigh the material on a gram scale. The value on the screen should match the measurement on the gram scale. If it does not, then either the weigh hopper is not balanced correctly or the scale calibration is not correct. Refer to the Troubleshooting Section of this manual for additional details.



Advanced Weight Options Screen This screen allows you to modify the weight filter, adjust the mechanical time to settle the weigh hopper after dumping, adjust the mechanical time to settle after a feeder has

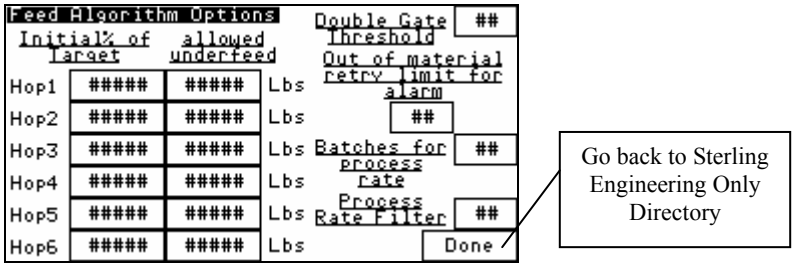
introduced material into the weigh hopper, adjust the Maximum Empty Weight of the hopper.

The weight filter is the specialized filter algorithm that smoothes erroneous load cell readings. The signal will be filtered more if this value is increased and less if decreased. This setting should not be modified except by the developer except under unusual circumstances.



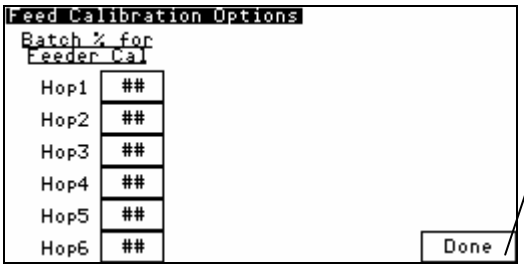
Feed Algorithm Options Screen

This screen allows the user to configure how the blender metering algorithm works. The user can adjust the Initial percentage of Target to Meter, the Allowed Underfeed value, the number of retries before Double Gate Time, the allowed Weight/Sec Drop, and the Out of Material retry limit.



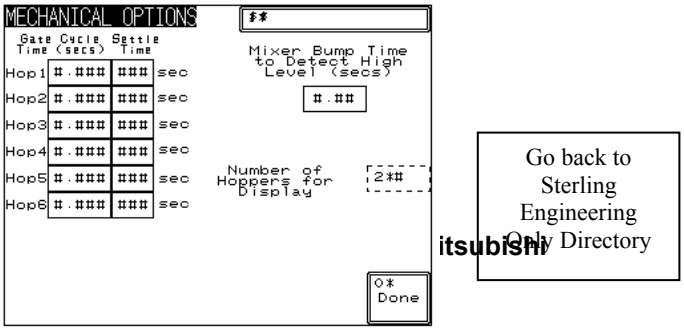
Feed Calibration Options Screen

This screen allows you to perform the feeder calibrations for each feeder (in weight per second). This is useful when the feed calibration is giving you an error message (most commonly caused by overfilling the hopper during the calibration). Select a feeder and then follow instructions. An error is shown if the current feeder calibration feed time was too short, the feed time was too long, or if the hopper weight exceeded 110% of the set batch weight. In the case that the feeder exceeded 110% (maximum hopper weight) due to a high rate hopper then the "Batch % for Feeder Cal" setting might be set too high. Consult Sterling if this problem arises. The current feeder calibration values are also shown on this page. ***It is not necessary to perform feeder calibrations. The blender will automatically learn these values during the batch.***



Mechanical Options Screen

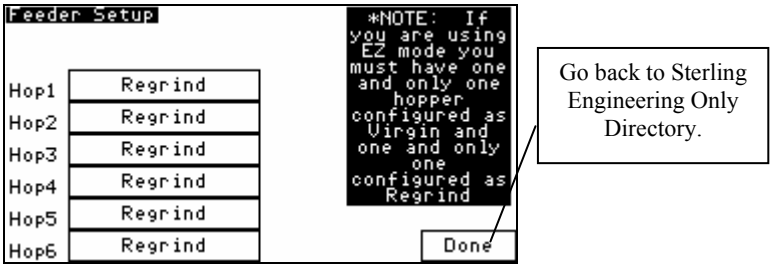
This screen allows the user to change the number of hoppers, the predetermined gate cycle time, and the mixer bump time for detecting high level. The gate cycle time has been measured and set at the factory, but might need to be adjusted if we change the mechanical design of the gate, solenoids, and air cylinders. This setting will vary depending on whether you are using a gate.



Feeder Setup

This screen allows you to modify the type of each feeder. In most cases, the user will want to keep regrind on hopper 3 because that blender has been specifically designed to handle the regrind. These settings should only be modified under special circumstances.

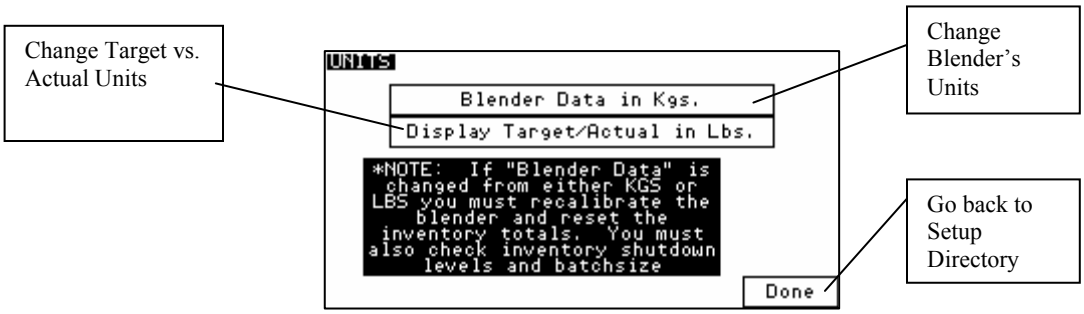
If the blender is configured in “Quick Set” then one hopper must be configured for Regrind and only one hopper must be configured for Virgin material. If this is incorrect, a message will be given on the Recipe Screen.



12-1-3 Customer Setup Menu

Units

This screen allows the user to change the blender’s unit of measurement. The entire blender can be configured in either Kgs. or Lbs., while the Target vs. Actual data can be configured for either regardless of the blender’s units.



Alarm Setup

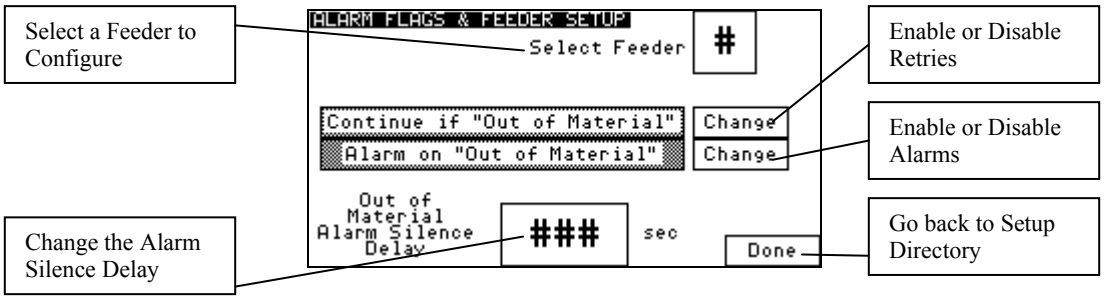
This screen allows the user to configure the feeder type for each feeder; configure whether a feeder will retry during the metering of a batch, and enable or disable the “Out of Material” alarm for any feeder. If a hopper is set to “Continue on Out of Material” then the blender will continue to meter the rest of the batch even if this hopper runs out of material. To configure each hopper, perform the following steps:

1. Select a feeder by touching the “Select Feeder”

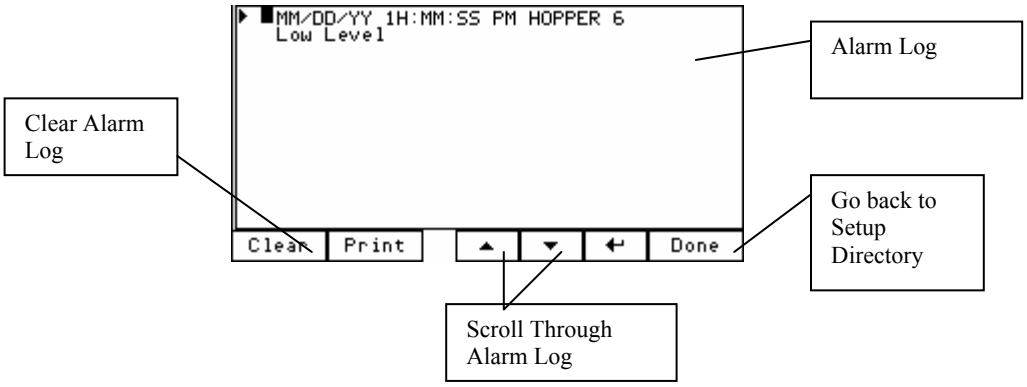
box.

2. **The current settings for that hopper will be shown.**

3. **Make the necessary adjustments and select a new feeder to configure if desired.**
4. **Hit "Done" to exit.**



Alarm Log This screen shows the last 100 stored alarms. The log can be viewed and cleared.



Programmable Features (continued)

After all selections are made:

- Keep pressing the "Done" key until the unit returns to the Recipe menu.

Important!

Programmable features should not be accessed by inexperienced operators or inexperienced plant personnel. Unauthorized changes may prevent the blender from operating properly and may void part or all of the warranty.

Call the Sterling Service Department for assistance or for further explanation of these or any other programmable features, which may or may not be shown in this manual.

Information included in this manual is subject to change without notice.

Remember: ***Blender controller default password is "5413"***

Service Notes

12-2 Passwords

User Password "5413"
Maintenance Password "3145348"

CAUTION! *Maintenance password should only be supplied to qualified personnel! The program can be compromised.*

12-3 Default Values (factory defaults shown):

SGB BLENDER CONFIGURATION PARAMETERS					
Model Number/Type	***SGB-450***	***SGB-900***	***SGB-2500***	***SGB-4000***	***SGB-5000***
RECIPE FORMAT					
Recipe Entry Mode	QUICK SET				
Batch Size	3.5	7	35		
Inventory Shutdown	0				
Batch Ready Mode	Enabled				
AutoStart Mode					
REPORT SETUP					
Blender Number	1				
SCALE CALIBRATION	PERFORM A SCALE CALIBRATION ON ALL MANUFACTURED UNITS				
DIRECT SCALE READOUT	LOG THESE VALUES AFTER THE SCALE CAL WITH THE ORDER INFORMATION				
FEEDER CALIBRATION					
Hop1 wt/sec	1		2	2	4
Hop2 wt/sec (WITH STROKE LIMITER)	0.25		0.5	0.5	
Hop3 wt/sec (WITH SQUARE GATE)	1		4		8
Hop4 wt/sec (WITH STROKE LIMITER)	0.25		0.5	0.5	
Hop5 wt/sec (WITH STROKE LIMITER)	0.25			0.25	
Hop6 wt/sec (WITH STROKE LIMITER)					
MIXER AND DUMP SETUP					
Mixing Time	4	6			
Remix Time	0				
Dump Time	4	6		5	

Dump Delay	0		
Dump Cycles	2	1	
Mixer Dump Time	4	6	5
Continuous/Timed Mixing	TIMED		
USER PASSWORD			
User Password	5413		
Maintenance Password	3145348		

SGB BLENDER CONFIGURATION PARAMETERS Cont'd.

Model Number/Type	***SGB-450***	***SGB-900***	***SGB-2500***	***SGB-4000***	***SGB-5000***
ALARM SETUP					
Hop1 Continue/Stop on Out of Material	STOP				
Hop2 Continue/Stop on Out of Material					
Hop3 Continue/Stop on Out of Material					
Hop4 Continue/Stop on Out of Material					
Hop5 Continue/Stop on Out of Material					
Hop6 Continue/Stop on Out of Material					
Hop1 Alarm/No Alarm on Out of Material	ALARM				
Hop2 Alarm/No Alarm on Out of Material					
Hop3 Alarm/No Alarm on Out of Material					
Hop4 Alarm/No Alarm on Out of Material					
Hop5 Alarm/No Alarm on Out of Material					
Hop6 Alarm/No Alarm on Out of Material					
ADVANCED WEIGHT OPTIONS					
Weight Filter	5				
Wt/Sec Filter	1				
% Above batch size for max weight	45				
Time to settle hopper after batch dumped	5				
FEED ALGORITHM OPTIONS					
Hop1 Initial % of Target	99	100			
Hop2 Initial % of Target	98		-	-	
Hop3 Initial % of Target	99	100			
Hop4 Initial % of Target	98				
Hop5 Initial % of Target	98	99			
Hop6 Initial % of Target					
Hop1 Allowed Underfeed	0.015	0.03			
Hop2 Allowed Underfeed	0.004	0.004			
Hop3 Allowed Underfeed	0.015	0.03			
Hop4 Allowed Underfeed	0.004	0.004			
Hop5 Allowed Underfeed		0.004			

Hop6 Allowed Underfeed		
Double Gate Threshold	5	
Out of Material Retry limit before alarm	10	
Batches for process rate		
Process Rate Filter	3	

SGB BLENDER CONFIGURATION PARAMETERS Cont'd.

Model Number/Type	*SGB-450*	*SGB-900*	*SGB-2500*	*SGB-4000*	*SGB-5000*
FEED CAL OPTIONS					
Hop1 Batch % for feeder cal	25				
Hop2 Batch % for feeder cal	10		25		
Hop3 Batch % for feeder cal	10				
Hop4 Batch % for feeder cal	10		25		
Hop5 Batch % for feeder cal	10				
Hop6 Batch % for feeder cal					
MECHANICAL OPTIONS					
Hop1 Gate Cycle Time	0.05		0.1	0.15	
Hop2 Gate Cycle Time	0.05			0.1	
Hop3 Gate Cycle Time	0.1		0.2	0.25	
Hop4 Gate Cycle Time	0.05			0.1	
Hop5 Gate Cycle Time					
Hop6 Gate Cycle Time					
Hop1 Settle Time	2		3		
Hop2 Settle Time					
Hop3 Settle Time					
Hop4 Settle Time					
Hop5 Settle Time	4		5		
Hop6 Settle Time					
Mixer Bump Time to Detect high level	0.25				
Number of Hoppers for display	SEE ORDER				
FEEDER SETUP					
Hop1 Feeder Type	VIRGIN				
Hop2 Feeder Type	ADDITIVE				
Hop3 Feeder Type	REGRIND				
Hop4 Feeder Type	ADDITIVE				
Hop5 Feeder Type					
Hop6 Feeder Type					

Service Notes

Service Notes