INSTRUCTIONS- PARTS LIST

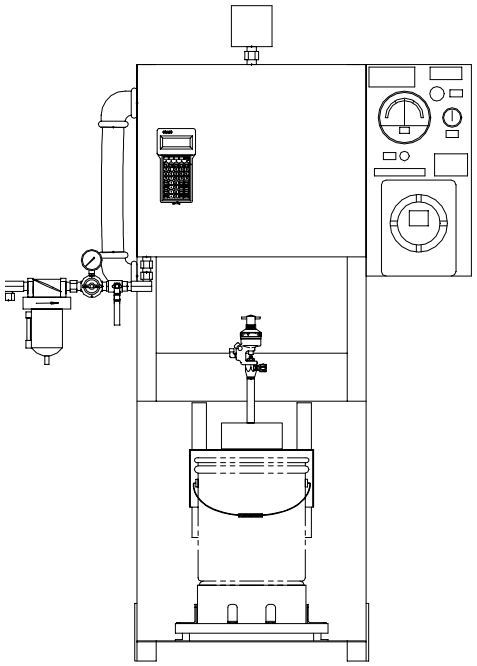
684-036
Rev. B

This manual contains important warnings and information.
READ AND KEEP FOR REFERENCE.

BATCH DISPENSE SYSTEM
Proportioning Controller

Model 965-775 through 965-779, Series A, Controllers

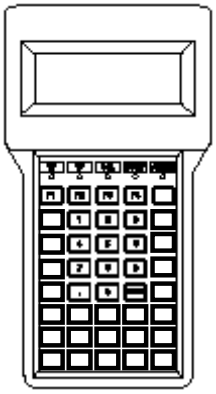
+5 Volts, 1.4 Amps; +12 Volts, 0.7 Amps; –12 Volts, 0.002 Amps



The controller is designed for use in Class 1, Division 1, Group C & D hazardous locations as defined in article 500 of the National Electrical Code (USA). Follow all instructions contained in this manual as well as in the X-Purge manual provided.

See page 2 for the Table of Contents.

Part Number 552-077 Blue Pendent
The Blue pendent is intrinsically safe for use in Hazardous Areas.



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Graco Inc. is registered to I.S. EN ISO 9001

Table of Contents

Symbols

Warning Symbol

WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol

CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire or explosion and serious injury.

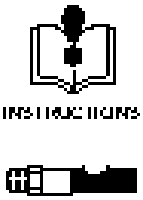
- The Batch Dispense Controller must only be installed and serviced by a qualified electrician.
- Ground the equipment and dispense only into grounded, conductive containers. See Ground the System on page 9.
- The Batch Dispense equipment may be safely installed in a Class 1, Division 1, Group C & D environment provided that all the instructions are followed.
- Provide fresh air ventilation to avoid the buildup of flammable vapors from solvent or the fluid being dispensed.
- Extinguish all the open flames or pilot lights in the dispense area.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- Do not smoke in the dispense area.
- Do not operate a gasoline engine in the dispense area.
- If there is any static sparking while using the equipment, stop dispensing immediately. Identify and correct the problem.
- Keep liquids away from the electrical components
- Disconnect electrical power at the main switch before servicing the equipment.
- The battery inside the Batch Dispense Controller may explode if mishandled, which could cause serious injury and property damage. Do not recharge or disassemble the battery. Do not expose the battery to fire or heat. The battery is intended for use at normal temperatures, where high temperature cycles are not expected to exceed 212 ° F (100 °C)

INJECTION HAZARD

Stream from the dispense valves, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Splashing fluid in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. Get immediate medical attention.
- Do not point the dispense valve at anyone or at any part of the body.
- Do not put hand or fingers over the valve tip.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Follow the Pressure Relief Procedure on page 13 whenever you are instructed to relieve pressure; stop spraying; clean, check, or service the equipment; or install or clean the valve tip.
- Tighten all the fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.

WARNING



EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call Graco Technical Assistance at 1-800-543-0339
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. See the instruction manuals of the individual Batch Dispense System components for their maximum working pressures.
- Route the hoses away from the traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below –40°F (–40°C).
- Do not use the hoses to pull the equipment.
- Do not move pressurized equipment.
- Use fluids or solvents that are compatible with the equipment wetted parts. See the Technical Data section of all the equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.

TOXIC FLUID HAZARD

Hazardous fluids or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled.

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer's warnings.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Wear the appropriate protective clothing, gloves, eyewear, and respirator.

HOW THE BATCH DISPENSE SYSTEM WORKS

Usage

The standard Graco Batch Dispense System (BDS) can proportion most two, three or more component epoxy or polyurethane paints, solvents, inks and a variety of other materials. Depending on the model selected, up to (20) different fluids (components) can be dispensed automatically, and another (12) materials (liquids, powders, etc.) can be added manually. The BDS is not for use with “quick-setting” paints (those with a pot life of less than 15 minutes). For information on handling quick-setting paints, contact your Graco representative or Graco Technical Assistance (see the back page).

Fluid Supply

The system can be set up to dispense components supplied from pressure tanks or feed pumps. The materials can be transferred from their original containers or from central paint recirculating lines. Each component material is supplied separately to the BDS unit. The standard BDS is designed to accurately dispense batches of 0.6 quarts to 5 gallons, at average maximum flow rates of 1 GPM.

Operating Cycle

To begin operation, the operator selects the dispense option on the pendant and chooses the desired recipe from the list of those available. The operator will then enter the desired total batch volume or weight. The operator may also be prompted to enter up to three pieces of dispense data such as a job number or operator ID number. Finally the operator is prompted to place a container on the dispense platform, with a keystroke initiating the dispense cycle.

The BDS will internally convert all desired volumes into weight using the Specific Gravity factors loaded during system set-up. The BDS then calculates the weight of each component required to satisfy both the recipe requirements and the total batch size requested.

The BDS then begins dispensing the first component of the recipe. The valve corresponding to the desired material is opened and the fluid flow is ramped up to maximum. As the target weight for the component approaches, the flow rate is ramped back down to provide greater precision. Finally, fluid flow is stopped altogether. The BDS may enter a “Drop” mode where the dispense valve is opened and closed very quickly, delivering a drop of material at a time until the final desired target weight is achieved. Each successive component is then dispensed one after another until the batch is complete.

Once the batch is complete, the operator will typically remove the container from the platform and agitate the material either manually or with a power mixer. The actual dispense data for this batch may then be displayed on the pendant or immediately printed on paper or labels using an optional printer. The dispense data is also stored electronically (for up to 1000 dispenses) for later retrieval via an optional PC link.

System Tuning

The actual volume of fluid dispensed in each batch can vary slightly from the calculated targets. However, the controller monitors this variance and reports an error if the desired tolerance has not been maintained. In order to minimize this variance, the controllers ramp-up, ramp-down and drop mode functions must be tuned for each particular fluid and its delivery system. In order to simplify tuning, an auto-tuning function is built into the systems control and software. During initial set-up, the tuning function will dispense each material a number of times at varying flow rates in order to build a knowledge of system responsiveness. The software then assigns the calculated tuning parameters to the individual material.

INSTALLATION

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD Installing and servicing this equipment requires access to parts which could cause a serious injury if the work is not performed properly.

- Do not install or service this equipment or perform any of the following installation and adjustment procedures unless you are trained and qualified.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

WARNING

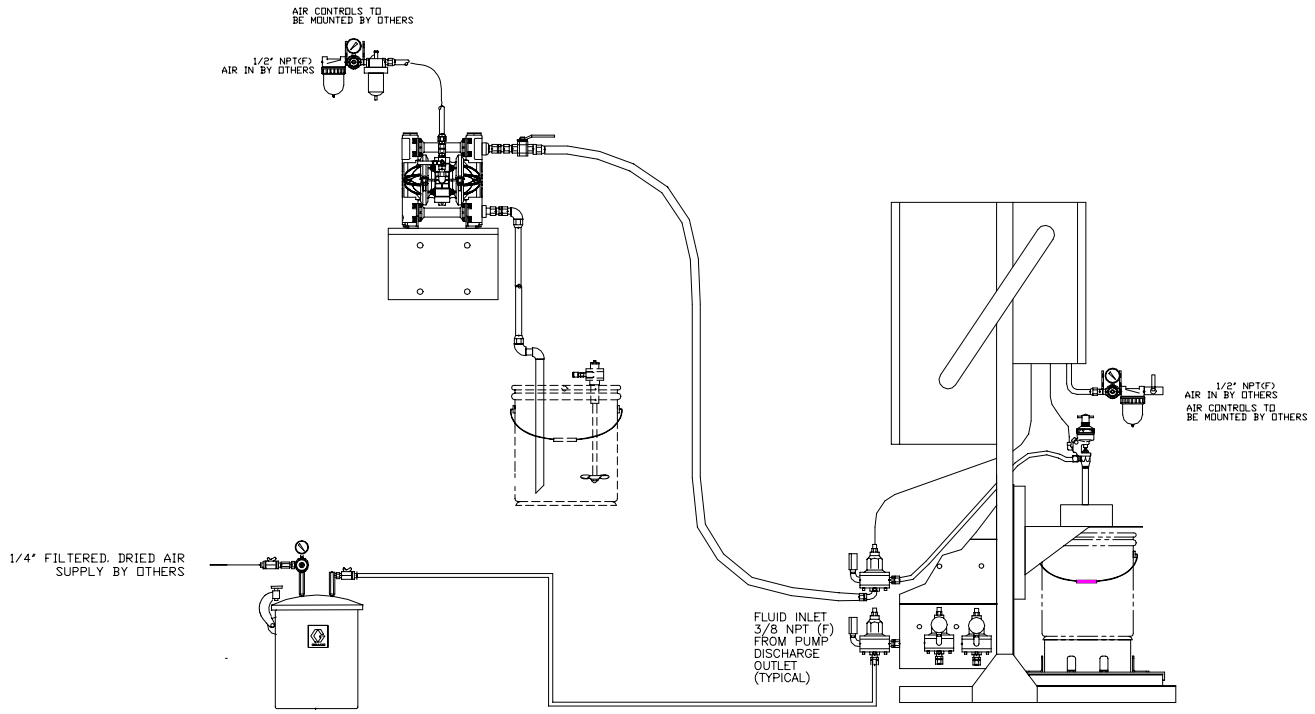
FLAMMABLE OR TOXIC VAPOR HAZARD

Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors. Do not operate the dispense station unless ventilation fans are operating. Follow all national, state, and local codes regarding air exhaust velocity requirements.

- Have the Batch Dispense system binder (a collection of manuals and diagrams in a three-ring binder, supplied by Graco) available during installation.
- Reference numbers and letters in parentheses in this manual's text refer to the numbers and letters in the illustrations.
- Be sure all accessories are adequately sized and pressure rated to meet the system's requirements.
- Connect the fluid and air supply lines as instructed in the system drawing and controller drawing.

The Typical Installation shown in Fig. 1 is only a guide-line for selecting and installing system components and accessories, and is not an actual system design. Follow the installation schematic in the system binder provided by Graco or contact your Graco representative or Graco Technical Assistance (see back page) for assistance.

NOTE:



SYSTEM LAYOUT DRAWING
FIGURE 1

Fluid Supply

The following installation and operation instructions generally presume a standard system, using pressure tanks to supply the paint components and solvent. The Optional Fluid Supplies listed below are two possible variations and their effect on the instructions.

Optional Fluid Supplies-
NOTE: The fluid supply must be free of pressure spikes, which are commonly caused by a pump stroke changeover. If necessary, install pressure regulators or a surge tank on the fluid supply outlets (which will also reduce the fluid supply pressure). Contact Graco for information on fluid pressure regulators.

Instead of pressure tanks, the Batch Dispense can be supplied by pail or drum pumps. If there are central paint recirculating lines, the Batch Dispense can be connected to them instead of to pressure tanks. An air piloted, fluid pressure regulator is required on each supply line at the input to the Batch Dispense Station. Other than references to the pressure tanks, operation is the same as described in this manual. For maintenance and safety, you must install a ball valve between each supply line and the Batch Dispense Station.

Location

WARNING

FIRE AND EXPLOSION HAZARD The standard Batch Dispense System is designed for use in Class 1, Division 1, Class C&D hazardous locations as defined in Article 500 of the National Electrical Code (USA).

NOTE: Special systems are available for use in non-hazardous locations. Contact your Graco representative.

The Batch Dispense System must be anchored to a poured concrete surface located in a vibration free area. For example, the Batch Dispense system should be located away from punch presses, heavy fork lift traffic, rail lines and other devices which produce significant, low frequency, mechanical vibrations. The vibrations from these items could cause performance problems. The Batch Dispense System's frame should be bolted in all four corners with a minimum of 3/8" diameter bolts.

The Batch Dispense System's weighing platform must also be shielded from direct air streams perpendicular to the weighing surface. Changes in direct air flow against the weighing platform could result in weight discrepancies.

The location of the Batch Dispense System should also be selected to minimize material handling. If there will be multiple users, a central location that meets the above requirements would be ideal.

Once the batch dispense system is anchored in it's final position, the weighing platform should be leveled by adjusting the four feet on the base of the platform. Be sure that the platform is stable and does not "rock" after leveling.

Connect the Electrical Supply

Connect the Batch Dispense System's X-Purge control (located in an explosion proof enclosure) to a 110 VAC grounded electrical supply, with an approved disconnect and explosion proof conduit and fittings as required by local electrical codes. See figure 2. Follow the installation drawings in the system binder provided by Graco.

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD To reduce the risk of fire, explosion, or electric shock:

- The Batch Dispense system must be electrically connected using approved explosion proof conduit and fittings.
- A qualified electrician must complete all wiring connections.
- Refer to local code for the explosion proof power supply requirements in your area.
- Also read and follow the warnings on page 4.

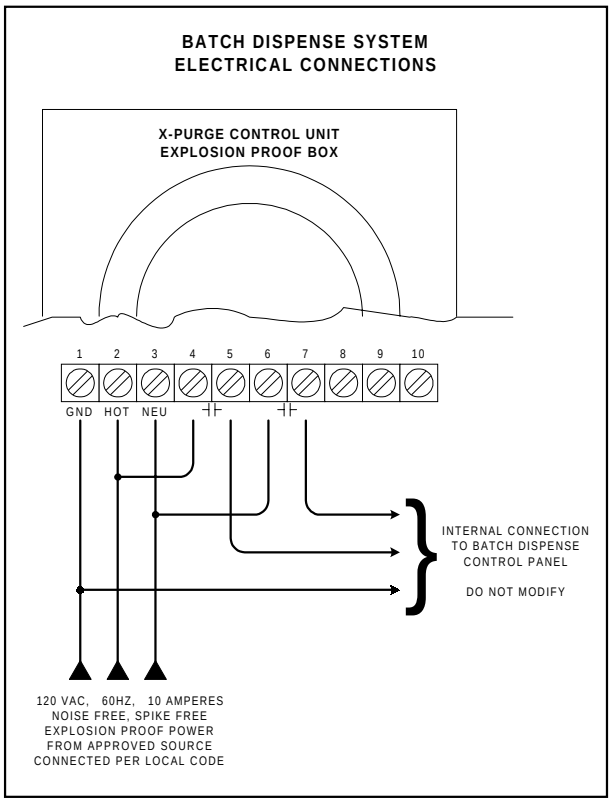


Figure 2

Ground the System (see figure 3)

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD To reduce the risk of fire, explosion, or electric shock:

- The Batch Dispense system must be electrically connected to a true earth ground; the ground in the electrical system is not sufficient.
- All wires used for grounding must be 10 gauge minimum.
- A qualified electrician must complete all grounding and wiring connections and check the resistance as instructed.
- Refer to your local code for the requirements for a “true earth ground” in your area.
- Also read and follow the warnings on page 4.

Ground the Batch Dispense system as instructed here and in the individual component manuals. A ground wire and clamp, part no. 222–011, are available from Graco.

Controller -
Connect the controller’s green-yellow ground terminal block to the NEMA enclosure’s grounding lug. Connect a ground wire from the enclosure to a true earth ground.

Solenoid Enclosure -
Connect a ground wire from the solenoid enclosure’s grounding lug to the same point as the controllers ground wire.

Batch Dispense Valve Manifold -
The mounting surface for the Batch Dispense valve manifold must also be electrically connected to a true earth ground point to dissipate static electricity generated as fluid is dispensed.

Feed Pumps or Pressure Pots -
Use a ground wire and clamp to electrically connect each of the supply pumps or pots to a true earth ground. See your separate pump or pressure pot manual.

Air and Fluid Hoses -
Use grounded hoses only for supply lines.

Fluid Supply Container -
Ground the container according to your local code.

All Containers Filled When Dispensing -
Use only metal pails or containers, which are conductive, placed on the grounded scale surface. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.

Maintain Grounding Continuity When Purging Or Relieving Pressure

Check the Resistance

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD To reduce the risk of fire, explosion, or electric shock the resistance between the Batch Dispense components and true earth ground must be less than 25 ohms.

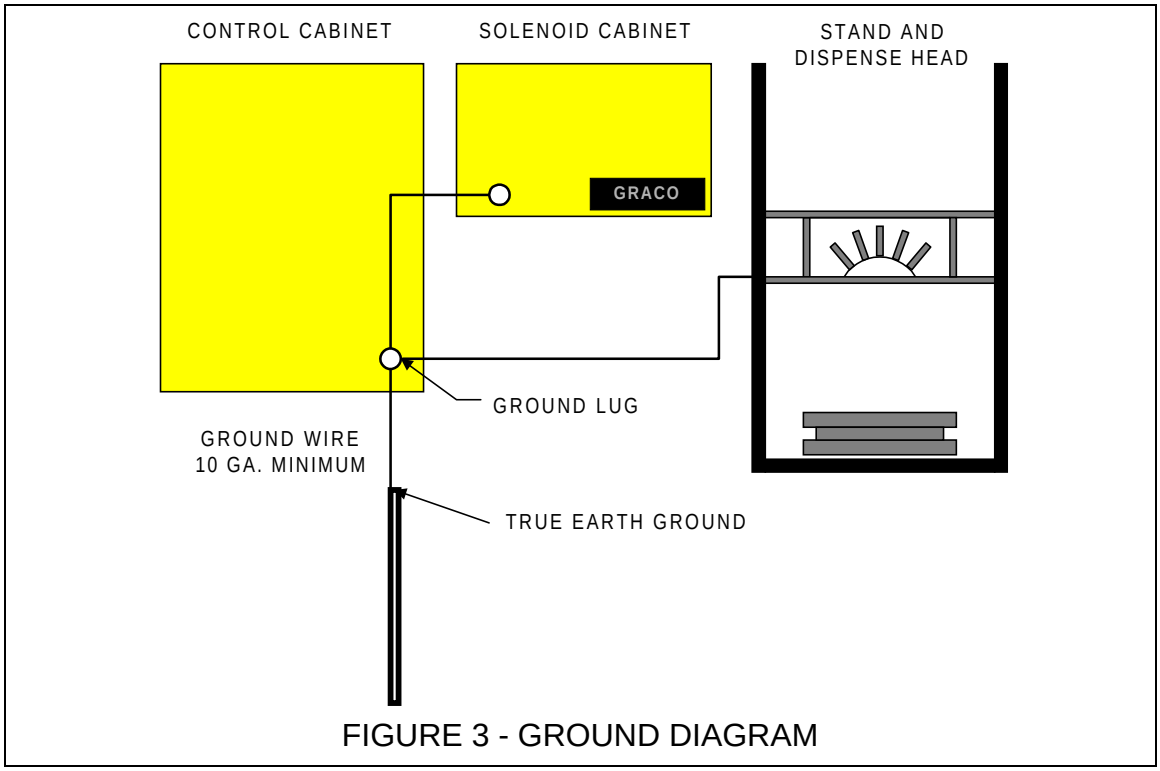


FIGURE 3 - GROUND DIAGRAM

Have a qualified electrician check the resistance between each Batch Dispense System component and the true earth ground. The resistance must be less than 25 ohms. If the resistance is greater than 25 ohms, a different ground site may be required. Do not operate the system until the problem is corrected.

Connect Other Wiring

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD To reduce the risk of fire, explosion, or electric shock:

- The Batch Dispense system must be electrically connected using approved explosion proof conduit and fittings.
- A qualified electrician must complete all wiring connections.
- Refer to local code for the explosion proof wiring requirements in your area.

The Pendant -
The pendant is pre-connected at the factory. DO NOT attempt to change the cable length. The pendent is connected to the controller through approved, intrinsically safe barrier blocks. If a failure of the pendant, pendant cable or the barrier blocks should occur, identify and correct the source of the problem first, and then replace the failed components ONLY with identical, approved components. Servicing should be performed ONLY by a qualified electrician.

The Weighing Platform -
The weighing platform is pre-connected at the factory. DO NOT attempt to change the cable length. The platform is connected to the controller through approved, intrinsically safe barrier blocks. If a failure of the platform, cable or the barrier blocks should occur, identify and correct the source of the problem first, and then replace the failed components ONLY with identical, approved components. Servicing should be performed ONLY by a qualified electrician.

Connect the PC interface cable -
The PC serial interface cable is terminated inside the controller cabinet with a nine pin “D” connector. Communication is type RS232. Any connections to the controller cabinet must be made ONLY through approved, explosion proof fittings and connectors and installed ONLY by a qualified electrician. Maximum cable length for RS232 is 50 feet. Additional components are available to extend the communication distance. Contact a Graco representative for details.

Connect Other Wiring (continued)

Connect the (optional) printer cable -
The (optional) printer cable is terminated inside the controller cabinet with a 25 pin “D” connector. Communication is standard parallel. Any connections to the controller cabinet must be made ONLY through approved, explosion proof fittings and connectors and installed ONLY by a qualified electrician. Maximum cable length for parallel communication is 25 feet. Additional components are available to extend the communication distance. Contact a Graco representative for details.

Other Installation Items

- Check all fluid and air connections for correctness and tightness.
- Follow the software start up procedures.
- If this is a new system, BE SURE TO PERFORM A SCALE CALIBRATION after the software has been set up. Shipping WILL affect scale calibration.

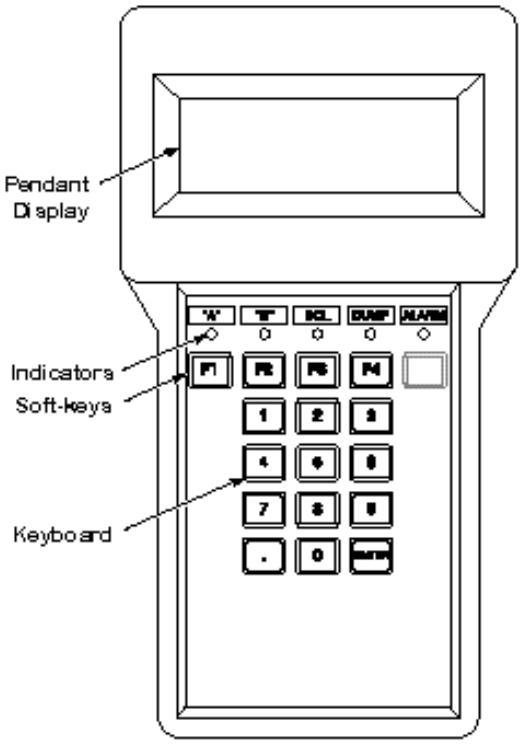


Fig. 4

OPERATOR CONTROLS AND INDICATORS

Aside from a power switch, there are no operator controls on the controller cabinet. Three remote devices provide operator interface; they are the Pendant, located on the Solenoid enclosure door, the X-Purge Electronic Control Unit, located in the explosion proof box next to the Solenoid enclosure, and the weighing platform.

Pendant

The pendant provides the operator interface for the function of the Batch Dispense System. (See Figure 4)

The pendant is a small display terminal with a 4 x 20 character display, five LED indicators (the small lights), and a keyboard for entering setup and operating parameters. The left four LED’s are essentially unused. The fifth LED blinks to indicate an alarm condition. The keyboard has both numeric and alphabetic characters. The alphabetic characters are split so that there are two letters per key. The upper letters on each key are accessed by pressing the SHIFT button (a red LED on the shift button will light up to indicate shift mode) and then pressing the desired key. Pressing the shift button again will turn off the shift light and allow access to the lower letters.

On the display screen are the functions that correspond to the five soft-keys, F1 through F5, and ENTER located in the lower right hand corner. If no word appears for a key, pressing that key will not affect the system. The operator can access all of the Setup, Statistics, and Dispense screens from the Operation Menu

- The blue pendant (part no. 552-077) is required for safe operation. Do not attempt to use any other display with this system.

- See pages 30 and 34 for the screen maps. See pages 19 to 29 for detailed information on the pendant display screens.

X-Purge Control Unit

The X-Purge Electronic Control Unit or ECU is located in the explosion proof box next to the Solenoid enclosure. ***A detailed explanation of the operation and trouble shooting of the ECU is provided in the X-Purge control manual in your system binder.***

In order to operate safely in an explosive environment, the Batch Dispense System employs a technique called X-Purging. The principal is simple, by providing a positive pressure of a safe gas (air) within the electrical cabinets, no explosive vapors can get into the cabinets. The ECU provides the control and monitoring of the purge process, which is why it is located inside an explosion proof enclosure. It is also the first point of power entry into the Batch Dispense System.
The ECU contains a number of lights, visible through the window, and a switch located on the side of the box (See Figure 5). During normal operation, the switch should be in the ON position and both the SAFE PRESSURE and POWER ON lights should be lit. If the ALARM ACTIVE and POWER OFF lights are lit, this is an indication that the X-Purge process has failed and power to the controller has been terminated.

There is also a pressure gauge located above the ECU. During normal operation the gauge should be in the green SAFE PRESSURE area.

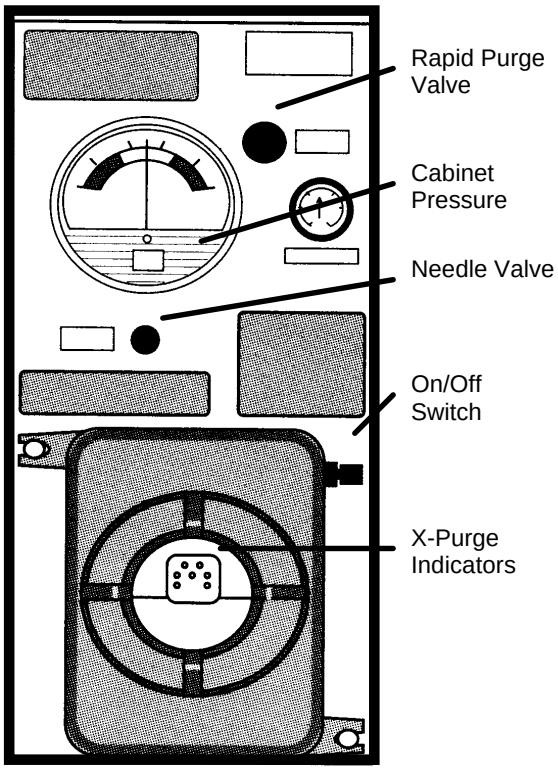


Fig. 5

Scale Platform

The scale platform is located at the base of the Batch Dispense Unit. It is typically mounted to a slide that can pulled in and out for easy positioning of five gallon pails. The platform surfaces are stainless steel for easy cleaning. There are no operator controls on the scale itself.

Be sure to position the container to be filled in the center of the weighing platform. Graco provides centering rings and other accessories to simplify this action.

OPERATION

Pressure Relief Procedure

WARNING

INJECTION HAZARD
The system pressure must be manually relieved to prevent the system from starting or dispensing accidentally. Fluid under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, or moving parts, follow the Pressure Relief Procedure whenever you:

- are instructed to relieve the pressure,
- stop dispensing,
- check or service any of the system equipment.

1. Return to the main operating screen. (see screen menu for operation)
2. Relieve fluid and air pressure at the component and solvent feed pumps or pressure pots, as explained in their separate instruction manuals.
3. Turn OFF all of the fluid supply ball valves.
4. Place an empty container on the weighing platform in dispense position.
5. Select F3 TOOLS
6. Select F1 MANUAL
7. Select the first dispense valve.
8. Press F1 and F3 respectively until they each read 60 or more.
9. Wait until all flow has stopped and then press F5. (Note: If flow does not stop in first 5 seconds, press F5 to stop and determine why fluid pressure from supply has not been turned off. Correct and return to step 5.)
10. Return to step 5 and repeat for EVERY VALVE IN LIST.
11. Turn off the bleed type main air supply valve.
12. If you suspect that a hose, regulator or valve nozzle has become clogged, or that the pressure has not been fully relieved after following the steps above, very slowly loosen the valve nozzle or hose coupling and relieve pressure gradually, then loosen completely. Then clear the nozzle or hose.

System Pressure

WARNING

COMPONENT RUPTURE HAZARD
Do not exceed the maximum working pressure of the lowest rated system component. See the instruction manuals of the individual system components for their maximum working pressures.

Initial Startup Sequence

WARNING

INJECTION HAZARD
To reduce the risk of serious injury, follow the Pressure Relief Procedure whenever you are instructed to relieve the pressure.

Have the system manual available during initial startup.

NOTE: The following instructions assume that the necessary set-up values, such as recipes, scale factors, valve parameters and system parameters have already been entered for the system. Review all the pendant screens and setup options on pages 24 to 29. If you need assistance in setting parameters, contact Technical Assistance at 1-800-543-0339.

1. The Batch Dispense System was tested with lightweight oil. To prevent contamination of your fluids, thoroughly purge the system with solvent as instructed in **System Purge**, page 18. Leave the solvent in the system.
2. Make sure all cabinet doors are closed and locked.
3. Apply air pressure to the Batch Dispense System and set the supply air regulator to 80 PSI minimum.
4. Apply electrical power to the Batch Dispense System through the main disconnect.
5. Set the switch on the X-Purge control box to the ON position.
6. Adjust the needle valve on the X-Purge control to read 0.25” water pressure, the middle of the green area.

7. Firmly pull out the Rapid Exchange Control Valve activator on the X-Purge control. The valve should latch in the OUT position. If it does not, refer to the separate X-Purge control manual in the system binder.
8. The X-Purge cycle will take approximately 5 minutes. When complete, the Rapid Exchange Control Valve activator on the X-Purge control will return to its normal position and the POWER ON light will come on.
9. Turn ON the Batch Dispense main power switch (located on the back cabinet door).
10. If this is the first time the system is being started up, some warning screens about missing files (config.dat, recipe.dat pump.dat) will be displayed on the Pendent. Press the ENTER button, located in the lower right hand corner, to continue.
11. On subsequent power ups, the screen on the pendant displays the Graco BDS banner and a warning message about pump circulation. Press the F1 key. A second screen will appear that precedes scale initiation. After the scale is successfully initiated, the Operation Menu will appear.

```
22:07          04/09/1996
      GRACO BDS 1000
F1=DISPENSE  STATS=F2
F3 = TOOLS     SETUP=F4
```

   See the screen above. Selecting any of the available options will take you into a series of additional screens, all of which can return you to the Operation Menu.
12. If this is the first time the system is being started, a number of set-up parameters must be established. Press F4 to enter SETUP mode.
13. A password prompt will appear. Press ENTER (There is no pre-loaded password).

```
GRACO BDS 1000
Enter Password
```

14. Proceed to select F4 SYSTEM, F3 VALVE and F1 RECIPE to load all of the necessary setup parameters. See “Software Setup” below and refer to screen maps for

```
          SETUP
F1=RECIPE
F3=VALVE        SYSTEM=F4
          F5=EXIT
```

   information on setting individual parameters. When complete, press F5 to return to main menu.

Dispensing Material

In normal usage, operators will dispense material from the Batch Dispense System by following the instructions listed below. For more detailed information, see the individual screen maps.

1. From the main operation menu, select F1, Dispense. You can then select whether to dispense a RECIPE=F1 (combination of materials in predetermined proportions) or a VALVE=F3 (single material in the amount you desire). In Either case, you will then be provided with an alphabetical list from which to choose the desired recipe or valve. The first item of the list is displayed on the pendent screen. Use the F1 key to step forward through the list, F4 to step backward through the list or F2 to jump forward by 10. You can also select the desired recipe or valve by typing in the first letter of the name, and then continuing to type in the name until the desired name appears on the screen (remember to use the SHIFT key for letters on the top half of a key).

2. Once the desired recipe or valve appears on the screen, press the ENTER key to select it (Note: SHIFT must be OFF to ENTER).

3. The pendent will then ask you for the amount of the recipe or valve that you want dispensed. For recipes, the amount that you desire is for the complete recipe. The Batch Dispense System will calculate the amount of each ingredient required to satisfy the recipe requirements AND the total amount requested. The pendent also displays the UNITS that it is working in. The four standard units are Pounds,

Quarts, Kilograms or Liters. The units can only be changed in the set-up screens (password required).

4. Enter the amount desired (in the units displayed) that you want to dispense by typing in the value using the numeric keys. You may use a decimal point in your request. If you make a mistake, use the DEL key to back up the cursor. When the value is correct, press ENTER.

   HINT: If you have accidentally selected the wrong recipe, enter 0 for the amount desired and then press ENTER. You will be returned to the main Dispense screen.

5. You may then be prompted to enter other pieces of information, as defined in the system set-up. Examples are Job Numbers, Operator ID numbers, Department Numbers, etc. Use the keypad to enter the information requested and then press the ENTER key.

6. The system will then repeat back the desired recipe and amount you have entered. It will also prompt you to place a container on the scale. Be sure that the container you choose is large enough to hold the volume requested and that it is large enough in diameter to catch the output of all of the valves. When the container is in place, press **F1 to start the dispense**. If the recipe or amount is wrong, press F5 to abort.

   HINT: You must use a container and not a pail liner. The system has a built in safety latch to ensure that you don't dispense onto an empty scale. The container must have enough tare weight to trip the internal safety latch.

7. When the dispense is complete, the pendent will say KIT 1 OF 1 DONE or OUT OF TOLERANCE. Press F3 to continue. You may now look at the dispense report by pressing F4. Use F1 and F2 to move up and down the report page. If the optional printer has been installed, the report can be printed by pressing F4 again. To exit the report, you must step up to the top of the report first, and then press F5.

Inventory and Statistical Data

The inventory and statistics screens are used to track the amount of each material and each recipe that has been used. The system keeps track of totals for each material and recipe for the current day and previous day, the current month and previous month and the current year and previous year. The system also keeps track of how much material is left in the various supply containers (at the VALVE) and in inventory (in STOCK) by subtracting its dispenses. In order for the machine to stay current, however, operators must tell the machine when they refill the supply containers or receive new shipments. The instructions below describe how to load this data, and how to obtain totals reports.

1. From the main operation menu, select F2 STATS, or statistics. When refilling the supply container with material from stock, select F1=VALVE. When receiving new shipments of material, select F3=STOCK.

2. Next, select the material you are moving by stepping through the list of those available using the F1 key to step forward and the F4 key to step back. When the desired material appears on the screen, press ENTER to select it.

3. Use the numeric keys to type in the amount of material being transferred. Note the units being displayed on the screen and make sure that you type in the correct value for those units. For example, 50 Gallons of paint is properly loaded as 200 Quarts. If operating in units of weight (Pounds or Kilograms) be sure to use the NET weight on the container. If you make a mistake, press the DEL key to move the cursor back. When the value is correct, press ENTER.

   HINT: You may occasionally need to correct the electronic inventory levels to account for manual removal of materials or losses due to maintenance. A negative value can manually be entered into the system to adjust the totals down.

4. The VALVE and STOCK values for this material are updated and displayed. If the values are incorrect, adjustment can only be made by following steps 1 through 3 above. Press F3 to continue.

5. A complete inventory report can be obtained by pressing F4 if the optional printer has been installed. A complete inventory report can also be obtained using the PC Link and related software.

6. Press F5 to return to the main STATS screen.

7. To examine usage history, Press F3. To examine usage by individual material (VALVE) press F3. To examine usage by RECIPE press F1.

8. Next, select the material or recipe by stepping through the list of those available using the F1 key to step forward and the F4 key to step back. When the desired material appears on the screen, press ENTER to select it.

9. Press F3 to step through usage by day, month or year. Press F3 again to return to the Usage Menu.

10. A complete usage report can be obtained by pressing F4 if the optional printer has been installed. A complete usage report can also be obtained using the PC Link and related software.

SOFTWARE SET UP

System Set Up

Follow the screen maps for System Set Up on pages 24-26. **Remember your password.** If you do forget your password, contact Graco Technical Assistance.

The user definable fields are a great way to customize tracking of material consumption. The user definable screens are used only for attaching data to the dispense records. They cannot be used to restrict access to individuals or materials.

Display units are available for both volume and weight in both metric and American units. All dispenses are done by weight. If volume units are selected, the system will automatically convert the DISPLAYED values to units of volume using the Specific Gravity of each material. Due to a software bug, you must press F5 instead of ENTER on this screen.

The maximum kit size value allows the user to establish the maximum amount that can be dispensed at one time. The system will, however, break up a large dispense into multiple small ones. If a maximum of 8 quarts (2 gallons) is loaded as the maximum kit size, and the operator requests 20 quarts of material, the system will dispense 2-1/2 “KITS”, stopping in between each one to allow the operator to put on an empty container.

The scale precision is related to the specific scale hardware chosen in the system. The software does not use this value to control how to measure weight. The software uses this value to determine how close it can get the actual weight to the target. The scale and controller communicate via RS232 communication and the scale tells the controller the actual weight, regardless of the scale precision setting.

Valve Set Up

Follow the screen maps for Valve Set Up on pages 26-28. When selecting valve names, try to use a common name that operators will recognize. The Valve ID number can then be used for a less obvious manufacturers ID number thus providing accuracy and familiarity.

Accuracy is one of the most important features of this system. Each material can be set up with its own accuracy tolerance window. A few guidelines to use when setting accuracy:

1. Accuracy and dispense speed work against each other. The tighter you make the accuracy window, the longer it will take to dispense a given amount of material. This is because the system must spend more time at lower flow rates and in the “Drop” mode where it dispense a drop of material at a time.

2. The accuracy is set in terms of percentage for practical reasons. The larger the dispense, the larger the accuracy window. In a recipe, accuracy is measured against the individual ingredient, not against the total batch.
3. The scale resolution will limit the accuracy capability of small dispenses. This is important to remember for recipes that have small components. The batch size may be large enough to accommodate the resolution of the scale but the smallest component of the recipe may not.

Enter the rest of the valve set up parameters based on your system requirements and referring to pages 26 to 28 as a guide.

Note: Material usage totals are internally associated with the valve number (1-20) and not with the valve name. If you frequently change the material type supplied by a given valve, your totals and dispense data may not correlate.

Recipe Set Up

Follow the screen maps for Recipe Set Up on page 29. When selecting recipe names, try to use a common name that operators will recognize. The recipe ID number can then be used for a less obvious product spec or code number thus providing accuracy and familiarity. Up to 1000 total recipes can be programmed and stored on board the control.

Many users begin the recipe name with a unique number (1-999). When the recipe list is automatically sorted, the recipes will come up in numeric order. The operator can now get to the desired recipe easily by just entering the recipe number.

Remember that recipes must be entered in proportions of WEIGHT and not volume. Contact your material supplier to get the correct weight ratio of your materials. As a temporary measure, you can calculate the weight ratio from the volume ratio by multiplying each of the volume parts by the specific gravity of the component.

Example-
You have a material that has a Volume Ratio of 3 parts resin to 1 part catalyst to 0.5 part of reducer, or 3 : 1 : 0.5.

From the MSDS sheets you find that:
The resin has a S.G. of 1.13
The catalyst has a S.G. of 1.02
The reducer has a S.G. of 0.88

Calculate the Weight Ratio:
Resin = 3 x 1.13 or 3.39 parts by weight
Catalyst = 1 x 1.02 or 1.02 parts by weight
Reducer = 0.5 x 0.88 or 0.44 parts by weight

The weight ratio is 3.39 : 1.02 : 0.44

A recipe can have a maximum of 16 lines. You can dispense the same material more than once in a given recipe, but it will be recorded as separate dispenses in the reports. There is also a timer function built in that will allow you to pause in a recipe to do intermediate mixing or to allow the materials to “sweat”. The timer is programmed in decimal minutes, so 30 seconds is properly entered as 0.5 minutes.

TOOLS

The TOOLS menu provides some manually controlled functions that are useful for set up, maintenance and trouble shooting. The TOOLS menu is the F3 option on the main operation menu.

Manual

The MANUAL=F1 option provides a way to manually activate individual valves and to manually set flow rate values. Make sure a container is under the dispense head any time you are using the manual functions. After pressing F1, select the material that you want to control by pressing F1 to step forward and F4 to step backward through the list of available valves. When the desired valve appears on the display, press ENTER to select it. NOTE: AS SOON AS THE ENTER KEY IS PRESSED, THE DISPENSE VALVE FOR THE SELECTED MATERIAL WILL OPEN UP. The display will show a Motor=XXX value and a Valve=XXX value. By pressing the F1 key, you will increase the flow rate signal and by pressing the F2 key you will decrease the flow rate signal. In order to close the dispense valve, press the F5 key and you will return to the TOOLS menu. (In some systems, the dispense valve also has a variable air pressure

signal to control the amount that the valve opens. The F3 and F4 keys control this signal.)

Calibrate

The calibrate function, F3 in the TOOLS menu, is used to zero the scale. The scale will occasionally drift in its zero point or the platform may accumulate dried coatings on its surface. The calibration will restore the zero point that is used for the safety latch (see Operation, Dispensing Material #6 on page 15).

Tune

The TUNE=F2 function is used during system set up to establish starting values for the Flow Offset and Drop Time variables. See the menu map on pages 26 and 28 for details. The tune function will perform a number of dispenses to experimentally establish conservative variable settings. These settings are optimized for accuracy and not speed. If faster dispensing is desired, some manual tuning may be required. The tune function will dispense the maximum batch size amount established in the SET UP as a part of its test function. If you use a clean container for the tune function, you can often return the material to the supply container after tuning is complete.

MANUAL FUNCTIONS

Over the life of the equipment you may be required to perform these functions.

Valve Purge

Valve Purging may be required for a number of reasons, such as changing materials, performing maintenance on a fluid component or for extended shut down. In order to do a Valve Purge, follow the instructions below:

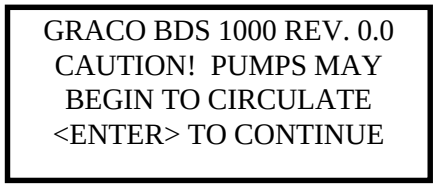
1. Identify the valve name and supply pump for the valve in question.
2. Remove excess material from the supply pump.
3. Safely shut down the supply pump following the instructions provided with the pump.
4. Place a adequate supply of flush solvent into the pump feed container.
5. Safely restore pressure to the supply pump.
6. From the pendent, select the F3=TOOLS menu and the F1=MANUAL option.
7. Place a large container under the dispense head.
8. Use F1 to find the valve name and press ENTER to select it.
9. Press F1 to increase the motor (flow rate) signal until a steady flow of flush solvent is being pumped through the valve. If the container gets full, press F5 to stop and return to step 7. Repeat until the flush solvent is running clear.
10. Press F5 to stop.

If loading a new material, repeat the above process substituting the new material for the flush solvent.

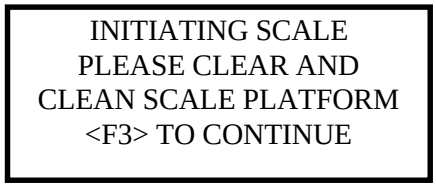
System Purge

For a System Purge, repeat the Valve Purge procedure described above for each of the material valves.

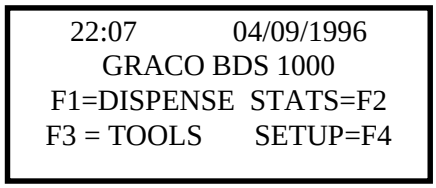
PENDENT SCREENS



This is the first screen that appears after a power up. It warns about the automatic circulate function that may cause a pump or regulator to automatically activate on a time schedule (without operator intervention). Press ENTER to go to the next startup screen.

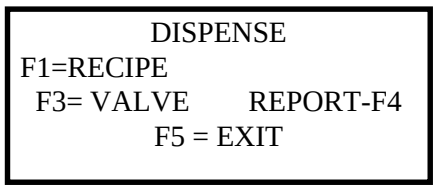


This is the second startup screen that initiates scale communication. Be sure that NOTHING is on the scale at this point. Be sure to clean off any spilled paint or fluids before continuing. Any problems with scale communication will show up here, with a screen that says “Error communicating with scale” (see troubleshooting). Press F3 to initiate scale and go to the main menu.

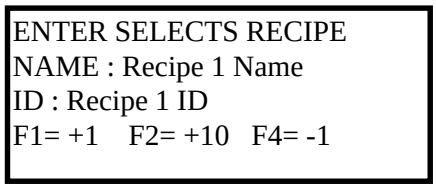


Main menu screen. All functions and examples start from this screen. This screen shows the four main menu options along with the current time (military time only) and date (American format MM/DD/YYYY)

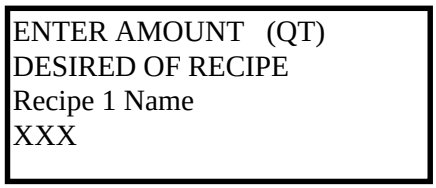
DISPENSE SCREENS



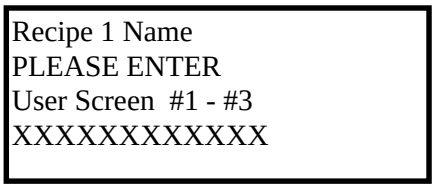
Dispense selection menu. Selecting F1 allows you to dispense a desired amount of a recipe combination of materials. Selecting F3 allows you to dispense a desired amount of a single material. Selecting F4 allows you to view and print (with optional printer) a report of the last batch dispensed. F5 takes you back to the main menu screen.



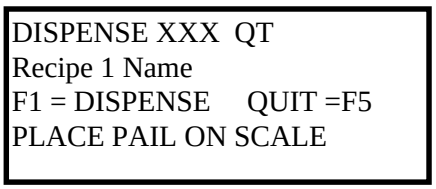
Select recipe screen. Allows the user to select the desired recipe from the list of all those available. The recipe’s name and ID number will appear as entered during the setup. The list is sorted alphanumerically by name. A recipe can be located by stepping through the list using the F1, F2 and F4 keys, or by pressing the first letter or number of the recipe desired using the pendent keypad. When the desired recipe appears, press the ENTER key to select it.



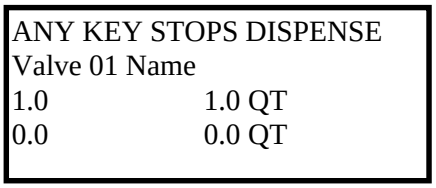
Enter the TOTAL amount of the recipe desired for this batch using the numeric keys. The pre-selected units of measure (QT, LT, LB, KG) will appear (this can only be changed in the setup). A decimal point can be used. Use the DEL or Delete key to correct any mis-keyed values. Press ENTER when desired amount appears correctly.



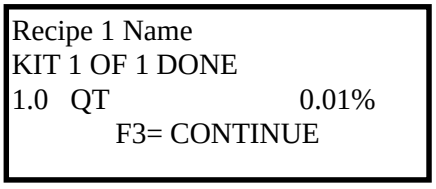
User Data Screen 1-3. Type in the data requested in the field using the keypad. A maximum of 12 characters can be entered. Press ENTER when complete. The data entered will appear on the printed and electronic dispense reports. The User Screens can only be modified in the Setup.



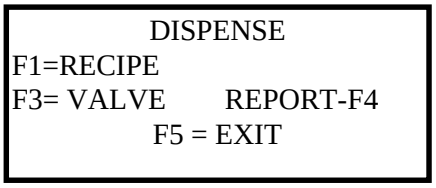
Dispense initiation screen. Place the desired batch container on the weighing platform. Make sure that the container is large enough to collect the batch size requested and that is big enough to fit under all of the dispense valves. If the desired recipe and amount do not appear correctly, you can abort the dispense by pressing F5. CAUTION, pressing F1 initiates the dispense and the first valve will open.



Dispense Screen. This screen appears while the dispense is being performed. In a recipe, each material is individually dispensed in sequence until the recipe is complete. The name of the valve currently dispensing appears on the screen. The left side of the screen shows the total batch size requested and the actual amount dispensed so far. The right side of the screen shows the required and actual amounts of this valve. PRESSING ANY KEY WILL STOP THE DISPENSE. Once stopped, the recipe can still be completed by selecting the continue option.

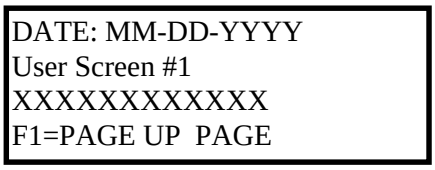


Recipe complete screen. Once the recipe has been successfully completed, this screen will appear. This screen shows the total amount dispensed and the batch deviation. F3 will return you to the dispense selection menu.

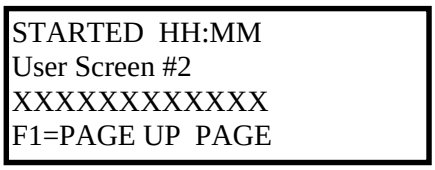


Dispense selection menu. See the previous page for details. If the REPORT Option is selected the screen below will appear.

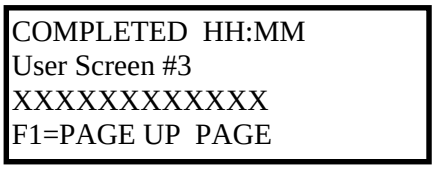
Report screen #1. The unique 9 digit report number of the last dispensed batch appears along with the banner. Pressing F4 will initiate a printed report on the parallel output port if a printer is attached. F5 will return you to the Dispense selection menu above. F1 allows you to page up and see report screen #2.



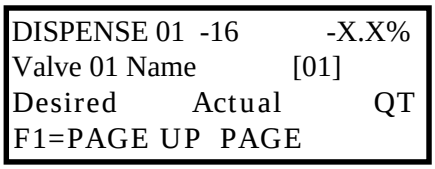
Report screen #2. The dispense date along with the first user screen information (if used) appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.



Report screen #3. The dispense start time along with the second user screen information (if used) appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.

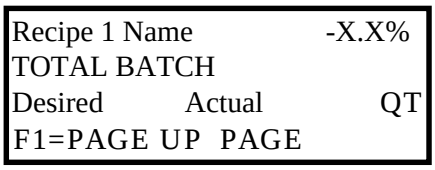


Report screen #4. The dispense finish time along with the third user screen information (if used) appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.



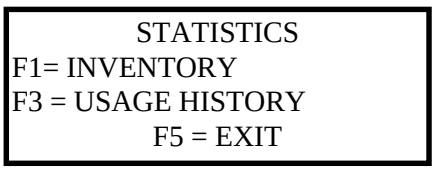
Report screen #5. The first dispense of the recipe along with the desired and actual dispense values appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.

Report screens #6-20. Each successive dispense of the recipe along with the desired and actual dispense values appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.

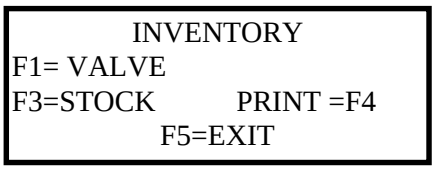


Last report screen. The total batch dispense along with the desired and actual dispense values appears here. You cannot exit the report from this screen. You must Page Up to report screen #1.

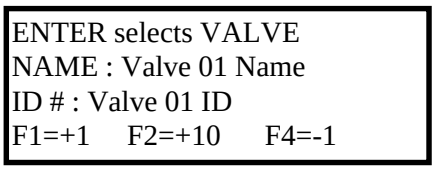
STATISTICS SCREENS



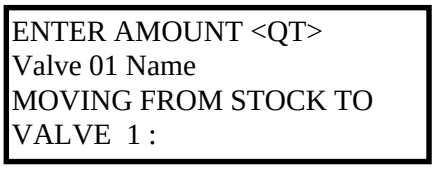
Statistics menu screen. F1 provides information and data entry about current inventory levels of each material. F3 provides information about how much of each material or recipe has been dispensed.



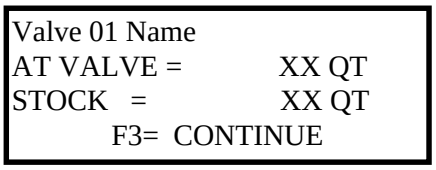
Inventory menu screen. F1 provides information and data entry about how much of each material is currently available for dispensing. F3 provides information and data entry about how much of each material is available in stock.



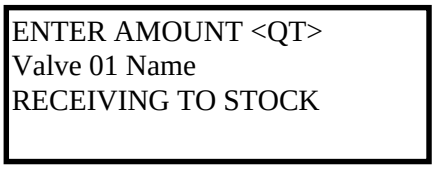
Valve selection screen. Select the valve that you would like to get information or enter data on by stepping to the correct valve using the F1, F2 or F4 keys. When the desired valve name appears, press enter.



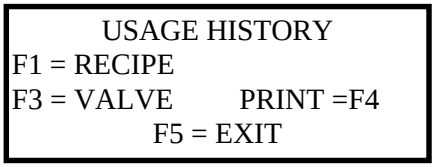
Inventory adjustment screen. Enter the amount (in the units shown) that you want to transfer from Stock to the supply pump, and then press enter. That amount will be added to the available supply amount and also be subtracted from the Stock amount. If there is no stock, then it will not be subtracted. A negative value can be entered to adjust inventory levels for material removed manually from the supply pump. To obtain information only, enter zero.



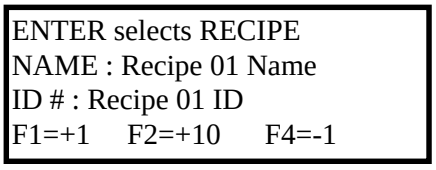
Inventory report screen. The adjusted values of material available for dispensing and in stock are displayed here. F3 will return you to the Inventory Menu.



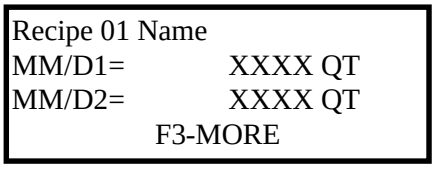
Inventory adjustment screen. Enter the amount (in the units shown) that you want to transfer into Stock from receiving, and then press enter. That amount will be added to the available Stock amount. A negative value can be entered to adjust inventory levels for material removed from Stock. To obtain information only, enter zero.



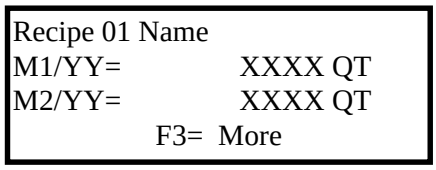
Usage History menu. F1 allows you to find out about total usage of a particular recipe. F3 allows you to find out about total usage of a particular material. F4 initiates a printed report if the printer board option is installed and a printer is plugged in and on-line.



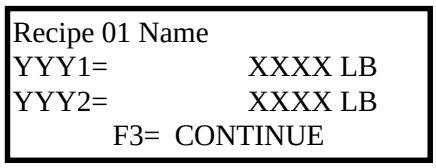
Select recipe screen. Select the recipe that you would like to get information on by stepping to the correct recipe using the F1, F2 or F4 keys. All recipes are stored in alpha-numeric order. Pressing the starting character of the desired recipe will allow you to jump to that portion of the list. When the desired recipe name appears, press enter.



Usage History Screen #1. Displays the total amount dispensed from this machine of the recipe shown for both yesterday and (so far) today. Information for specific days prior to yesterday is not available. F3 provides more information.

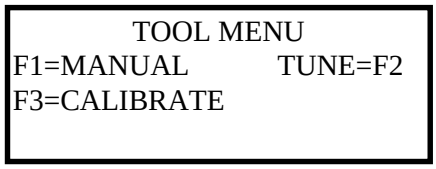


Usage History Screen #2. Displays the total amount dispensed from this machine of the recipe shown for both last month and (so far) this month. Information for specific months prior to last month is not available. F3 provides more information.

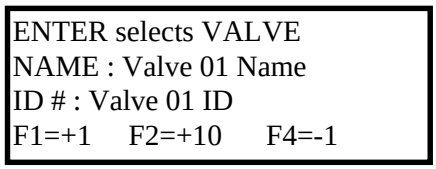


Usage History Screen #3. Displays the total amount dispensed from this machine of the recipe shown for both last year and (so far) this year. Information for specific years prior to last year is not available. F3 returns you to the usage history menu.

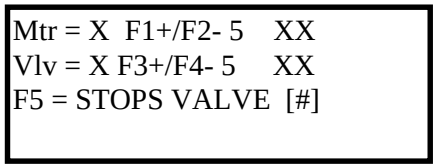
TOOLS SCREENS



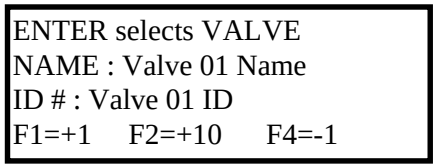
The tools menu allows you to select from three manually initiated functions. F1 allows you to turn specific valves and regulators on and off for maintenance, test or safety purposes. F2 is an auto tuning function that will generate default dispense parameters for individual materials. F3 is used for re-zeroing the scale.



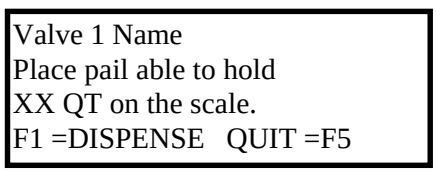
Valve selection screen. Select the valve that you would like to manually activate by stepping to the correct valve using the F1, F2 or F4 keys. When the desired valve name appears, press enter. **WARNING** The dispense valve selected will open IMMEDIATELY after pressing the enter key



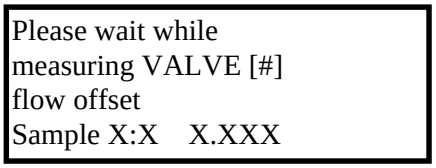
The manual mode screen. The Remote Regulator associated with the valve selected can be manually adjusted to increasing or decreasing pressure by using the F1 and F2 keys. The display shows the air pressure value (in PSI) sent to the remote regulator and the amount of increase/decrease with each step. Press F5 to close the valve and set the remote regulator air signal back to zero.



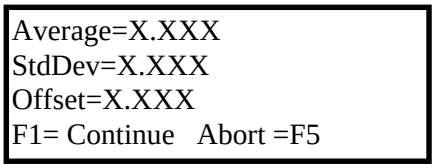
Valve selection screen. Select the valve that you would like to manually tune by stepping to the correct valve using the F1, F2 or F4 keys. When the desired valve name appears, press enter.



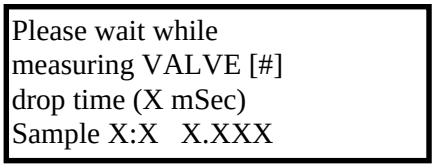
Tuning Start Screen. F1 will initiate the tuning process. The system will dispense the total amount displayed on the screen in a series of eight dispenses of varying size to determine the flow offset value.



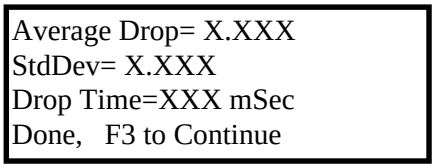
Offset Tuning In Process Screen. Pressing any key will terminate the dispense and abort the tuning process.



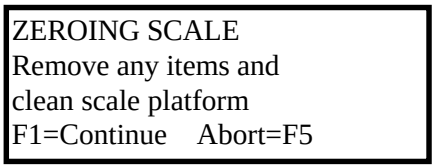
Offset Tuning Complete Screen. Pressing F1 will cause the calculated offset value to automatically be loaded into the offset parameter location in the set-up screens. It will also initiate the Drop Time tuning cycle.



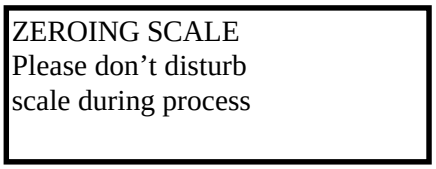
Drop Time Tuning In Process Screen. Pressing any key will terminate the dispense and abort the tuning process.



Drop Time Tuning Complete Screen. Pressing F3 will cause the calculated Drop Time value to automatically be loaded into the Drop Time parameter location in the set-up screens. It will also return you to the tools menu.



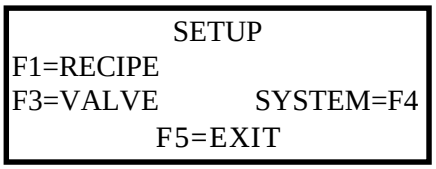
Zero Scale Initiation Screen. Resets the scale's zero point. Any increase in weight from this value is recognized as a tare weight. This is used to determine if a pail (or other container) is on the scale before initiating a dispense. If a centering ring is used, be sure it is in place before pressing F1 to continue.



This screen will appear while zeroing takes place (only a few seconds). When zeroing is complete, the display will return to the Tools Menu.

SETUP

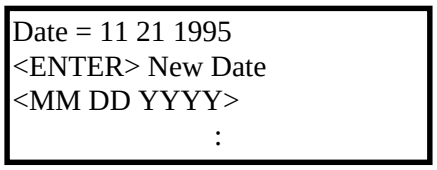
Password Screen. Enter the user selected password that was previously entered in the system setup screen and press the ENTER button. If this is a new system and the password has not yet been entered, just press the enter button.



Setup menu screen. In a new system, first enter the system parameters F4, then the valve parameters F3, and finally the recipe parameters F1.

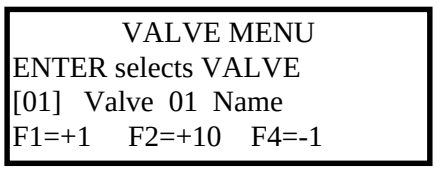
SYSTEM SETUP

CHANGE USER PASSWORD (<ENTER>=no change>)	Password Change Screen. All setup functions can be password protected. The system ships from Graco with no password loaded. When entering your password only the pound sign (#) will be displayed, after you have finished typing your new password you will be asked to retype it to verify that no mistakes were made.
CURRENT BANNER IS GRACO BDS 1000 (<ENTER>=no change>)	Banner Screen. This is the title displayed on the main screen and in any reports.
USER FIELD ONE IS User Field #1 (<ENTER>=no change>)	User field input screen. Type in the prompt you would like displayed during each dispense to collect application data, and then press enter. The information collected during the dispense will then be attached to both the printed and electronic reports. If this field is left blank, no prompt will appear during the dispense cycle. There is a maximum of three user input screens.
DISPLAY UNITS <ENTER>= LB F1= LB QT =F2 F3 = KG LT = F4	Display Units Screen. Sets what units of measure are used in all screens. Available choices are pounds (LB), kilograms (KG), quarts (QT), and liters (LT). **NOTE:** A software bug requires you to press F5 to continue past this screen.
MAXIMUM KIT SIZE ENTER LB's <ENTER>= XXX :	Maximum Dispense Screen. Limits the maximum kit size the control will allow to be dispensed. Use this to avoid overflowing your container or to limit the maximum weight that must be lifted.
SCALE PRECISION ENTER LB's <ENTER>= XXX :	Scale Precision Screen. Specifies the smallest weight that the scale can measure. Graco offers a variety of scales to match differing needs. The standard scale Part Number 551-388, has a maximum load of 50 lbs. (23 kg) and a precision of 0.001 lbs (0.002 kg).
MAXIMUM FLOW RATE CONTROL REGULATOR Enter PSI <ENTER>=100 :	Maximum Regulator Air Pressure Screen. This will usually be 100. Some unusual systems may have 120 PSI of air pressure that is used for powering the delivery pumps.
Time = 09 50 <ENTER> New Time <HH MM> :	Time enter screen. Enter the current time in the format shown and press enter. This running time is used for time stamps on dispense reports. Enter time in 24HR (Military) format.

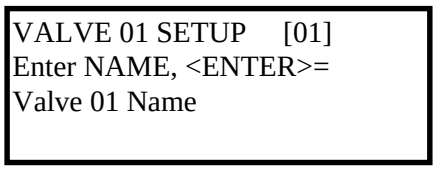


Date enter screen. Enter the current date in the format shown and press enter. This running date is used for date stamps on dispense reports.

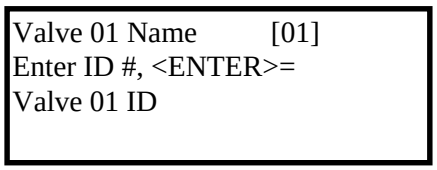
VALVE SETUP



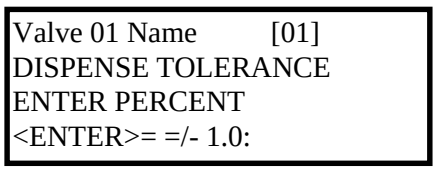
Valve selection screen. Select the valve that you would like to setup by stepping to the correct valve using the F1, F2 or F4 keys. When the desired valve name appears, press enter.



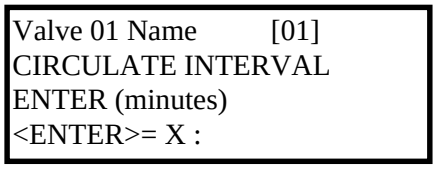
Valve Name. Defines what the valve will be referred to as by the control. Anytime the control requires selection of a valve this name will be used in the list of all available valves. You might use the name that the material dispensed by this valve is commonly referred to as. It may be 15 alphanumeric characters in length.



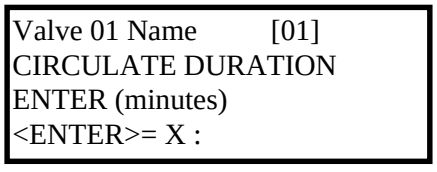
Valve ID #. Can be used to identify the valve by material stock number, etc. It may be 15 alphanumeric characters in length.



Dispense Accuracy. Sets the *percent* accuracy that is allowed for this material. A dispense that falls outside of this tolerance will cause an alarm and alert the operator to the condition. Maximum set point accuracy is +/- 0.5%. Remember that the smaller the dispense, the more difficult it becomes to hold accuracy. Be sure not to exceed the limitations of the scale.



Circulation Interval. Sets how often (in minutes) that the material at this pump will be circulated. Requires a special fluid delivery configuration. When circulation is called for, the maximum remote regulator air signal is applied for that valve. NOTES: 1) The circulation signal is pre-empted by dispense cycles. 2) Only one material can be in controlled circulation at any time.



Circulation Duration. Sets how long (in minutes) that the pump is circulated. *For Example:* A Circulation Interval of 120 and a Circulation Duration of 5 will cause the pump to be circulated every two hours for 5 minutes.

```
Valve 01 Name        [01]
SPECIFIC GRAVITY

<ENTER>= X .XXX:
```

Specific Gravity. Enter the specific gravity of the material to be dispensed. This value is printed on the MSDS for every material. This value is used for the weight to volume calculations.

```
Valve 01 Name        [01]
MAXIMUM FLOW RATE
AIR SIGNAL  PSI
<ENTER>= X :
```

Maximum Flow Rate Air Signal. Sets the maximum air pressure supplied to the remote pressure regulator. The higher the value, the greater the flow rate potential will be. For thinner materials, a lower value may be desirable to reduce splashing of material. Be sure not to exceed the maximum air pressure rating of the regulator and also check that the maximum fluid pressure does not exceed the maximum rating of any components in the fluid system.

```
Valve 01 Name        [01]
MINIMUM FLOW RATE
AIR SIGNAL  PSI
<ENTER>= X :
```

Minimum Flow Rate Air Signal. Sets the minimum air pressure supplied to the fluid regulator. This should be set high enough to provide fairly smooth, continuous fluid delivery. This will also be the air pressure supplied during drop dispenses (see Valve Drop Time). Note that some regulators will not operate below 7 PSI and that some pumps will not operate below 25 PSI.

```
Valve 01 Name        [01]
MAXIMUM VALVE AIR
ENTER  PSI
<ENTER>= XXX:
```

Maximum Valve Air Pressure. Sets the maximum air pressure supplied to the dispense valve. corresponds to the full open position of the valve. This is typically set to 100 PSI.

```
Valve 01 Name        [01]
MINIMUM VALVE AIR
ENTER  PSI
<ENTER>= XXX:
```

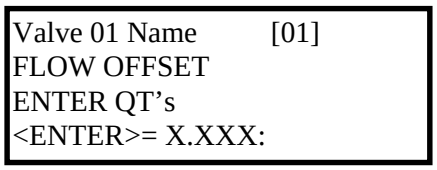
Minimum Valve Air Pressure**.** This is the smallest air pressure at which the valve needle leaves its seat. This is typically set at 60 PSI.

```
Valve 01 Name        [01]
VALVE AIR STEP
ENTER PSI
<ENTER>= XXX:
```

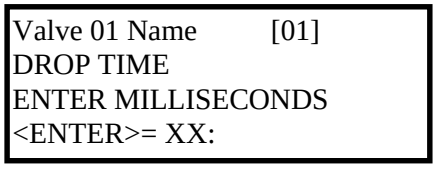
Valve Air Step. The valve (and flow rate) air pressure is incremented or decremented each pass through the control loop. This value should be between 1 and 5 psi. A lower value will provide a gentler ramp down of flow rate and a more accurate dispense. Use a higher value when speed of dispense is more important than accuracy.

```
Valve 01 Name        [01]
VALVE DROP AIR
ENTER PSI
<ENTER>= XXX:
```

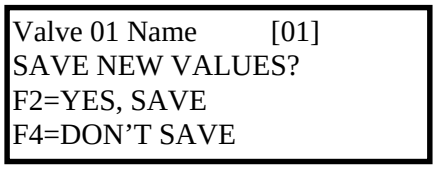
Valve Drop Air. This is the air pressure supplied to the valve during drop dispenses (see Valve Drop Time). This is typically set to 100 PSI.



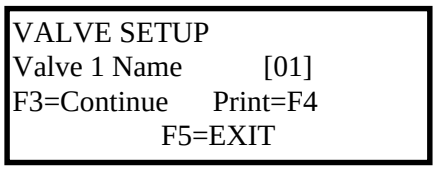
Flow Offset. This accounts for the time lag between the control reading measuring that the target has been reached and when the valve actually closes. The *Tune* function (in the *Tools* sub-menu) sets this value such that the flow will always stop before the target is reached. This value will be conservative and may be manually set to a lower value for fluids that are always dispensed in large volumes (where speed of dispense is important).



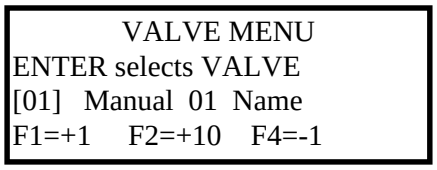
Valve Drop Time. The length of time (in milliseconds) that the valve receives an open signal during drop dispenses. Drop dispenses occur when very small dispenses are required. The *Tune* function (in the *Tools* sub-menu) sets the Drop Time value such that the resulting dispense is statistically equal to the resolution of the scale.



Save new values screen. At this point, NONE of the changes typed in during the current parameter change list have been applied or stored in memory. By pressing F2, update and storage will occur. If you press F4, all of the current changes will be lost. There is no way to step back through the parameter list or to recycle through the list. You must select F2 or F4.



Pressing F3 will allow you to change additional valve set-ups , F4 allows you to print out the current settings for this valve and F5 exits you from the valve setup menu and return you to the general setup menu.



Up to 12 manual ingredients may also be set up. Manual ingredients do not have all of the setup parameters identified above. As the name implies, manual ingredients are added manually. Manual ingredients are typically dry (powder) additives or very small additives. When manual additives come up in a recipe, the controller will stop the dispense and display the calculated amount of the manual ingredient required to complete the recipe. The display will also show the "real time" amount of the ingredient added. When finished, press F3 to continue and the desired and actual amounts of the manual addition will be included in the electronic reports.

RECIPE SETUP

```
ENTER selects RECIPE
NAME: Recipe 1 Name
ID #: Recipe 1 ID
F1=+1   F2=+10   F4=-1
```

Select the recipe that you would like to create or modify from the list of those available. Use F1 to step forward through the list, F10 to step backward or type in the name.

```
RECIPE SETUP
Enter NAME, <ENTER>=
Recipe 1 Name
```

Recipe Name. Defines what the recipe will be referred to as by the control. Anytime the control requires selection of a recipe, this name will be used in the list of all available recipes. It may be 15 alphanumeric characters in length and the list will be sorted alphanumerically. Many users choose to start the name with a number to aid in finding recipes quickly.

```
Recipe 1 Name
ENTER ID #, <ENTER>=
Recipe 1 ID
```

Recipe ID#. Can be used to identify the recipe by stock number. It also may be 15 alphanumeric characters in length.

```
Recipe 1 Name
DISPENSE #1 = XXXX
Not Selected
F1=NEXT              EDIT=F2
```

Dispense #1 *through* Dispense #16
This is where you set how much, in what order, of which valve will be dispensed in this recipe. You can use F1 to step through the list of sixteen available dispenses and F2 to select or edit the current dispense. When editing a dispense, you will first select what valve to dispense and then the number of parts by weight required of that valve.

```
          VALVE MENU
ENTER selects VALVE
ID:  Valve  01  ID
F1=+1    F2=+10    F4=-1
```

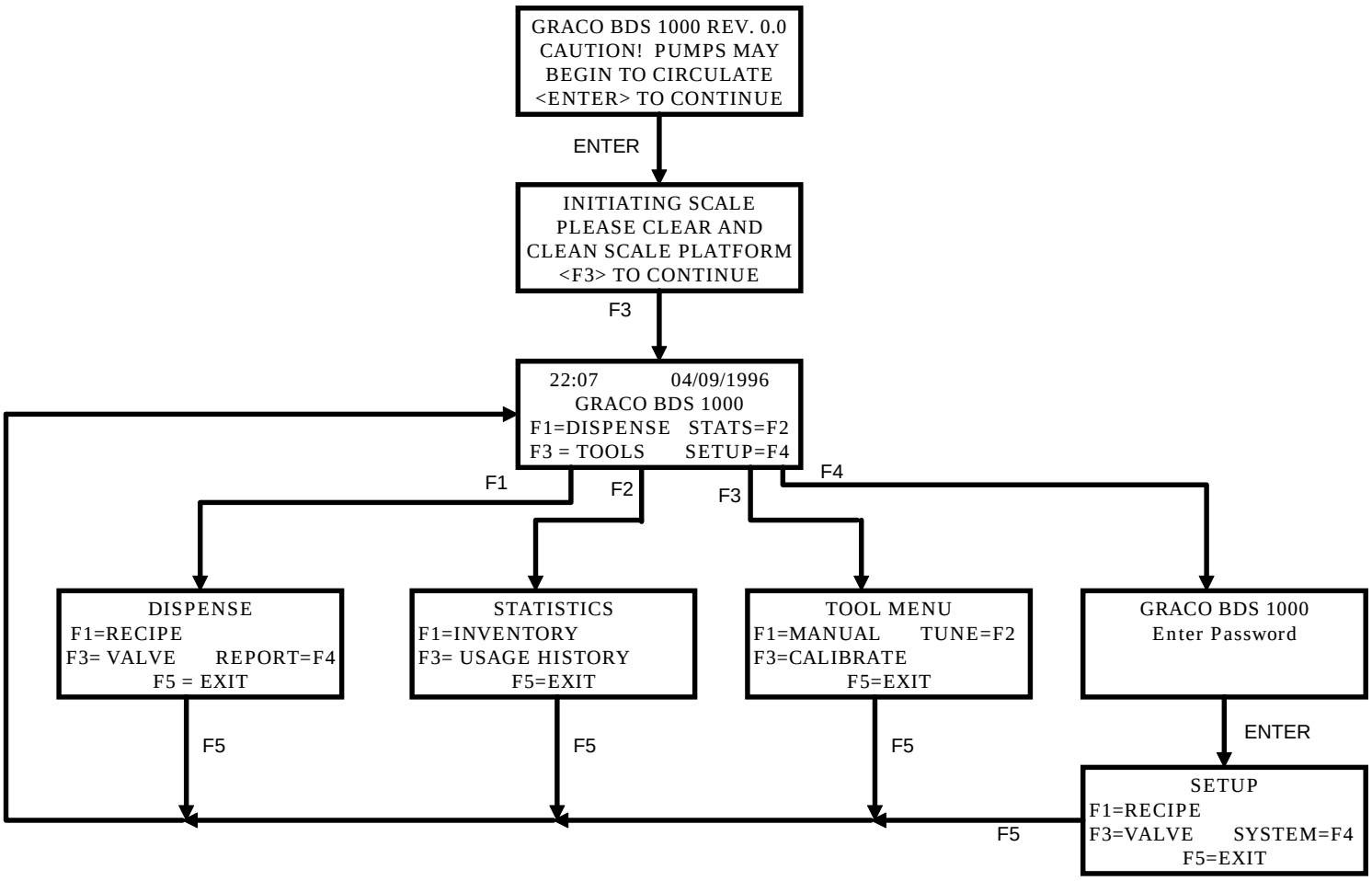
If this recipe requires a “sweat time” or mixing before all ingredients are added, a Pause/Mix selection can be made as one of the sixteen dispenses. This selection will show up as the last item in the list of pumps that comes up when editing a dispense. The Pause/Mix time is entered in minutes.

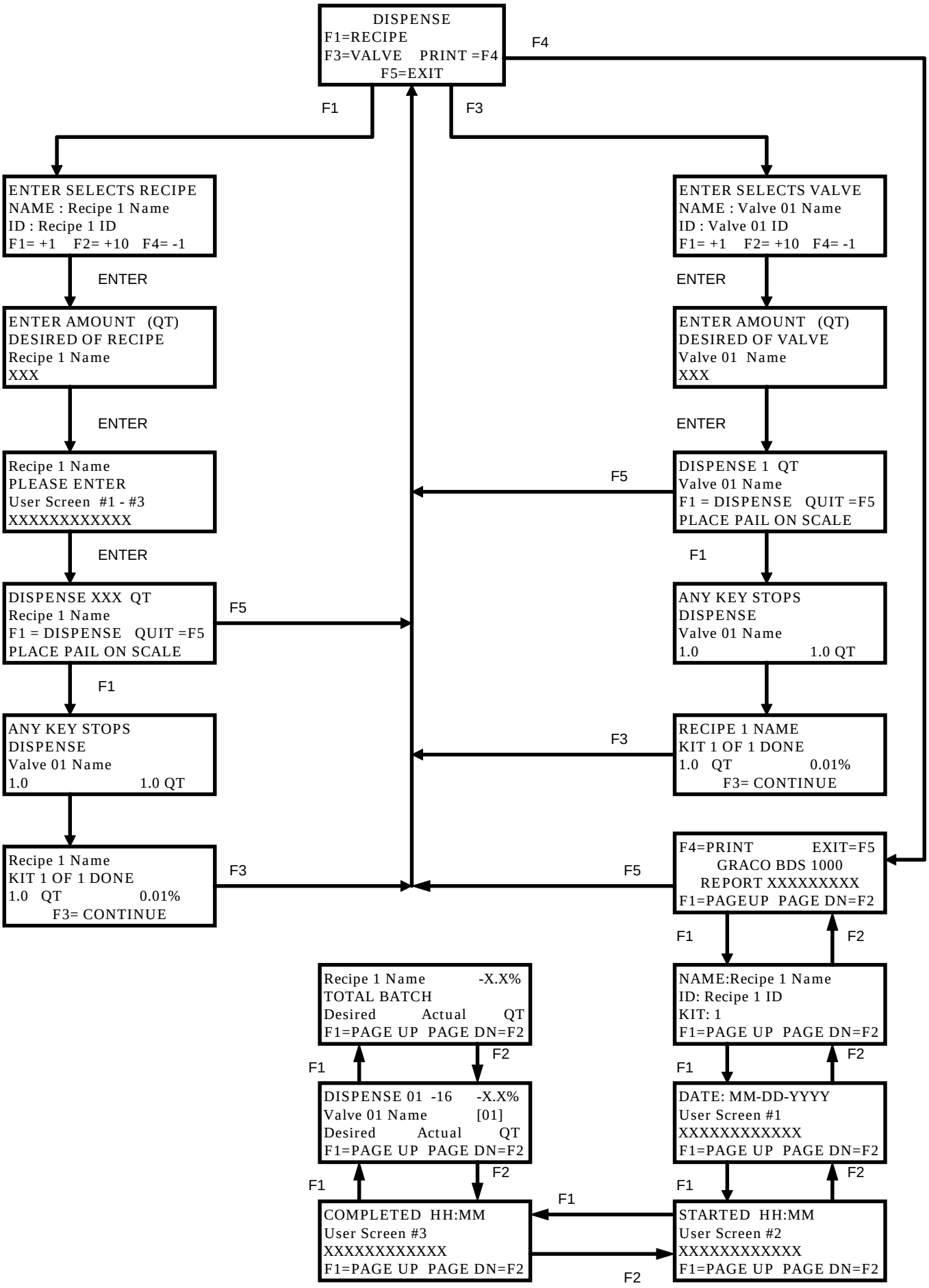
```
Recipe 1 Name
ENTER AMOUNT OF
Valve 01  Name
<ENTER>=X.XXX
```

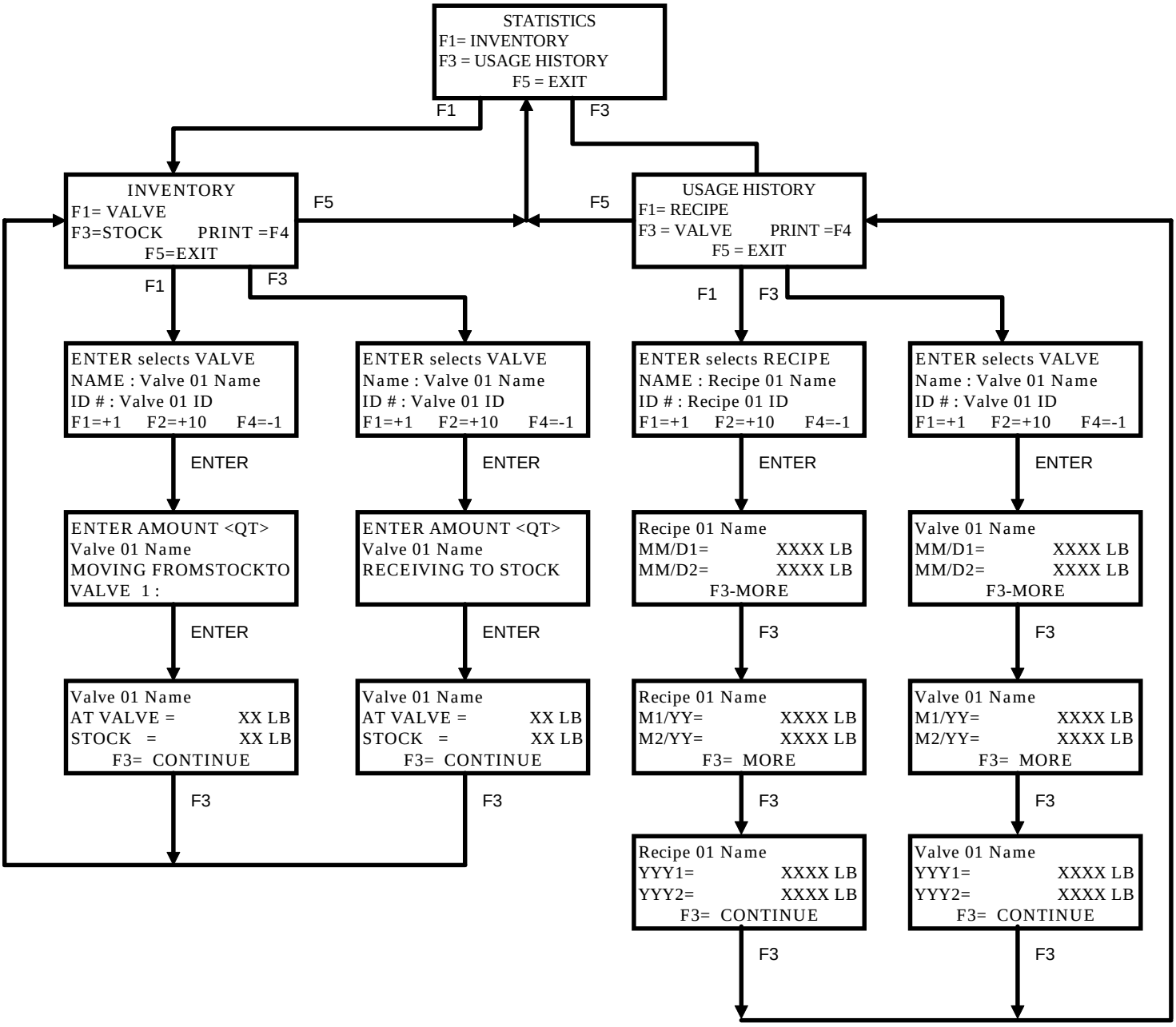
When you have finished editing the dispenses pressing **<Enter>** will exit you out of the dispense list without having to go through all sixteen dispenses.

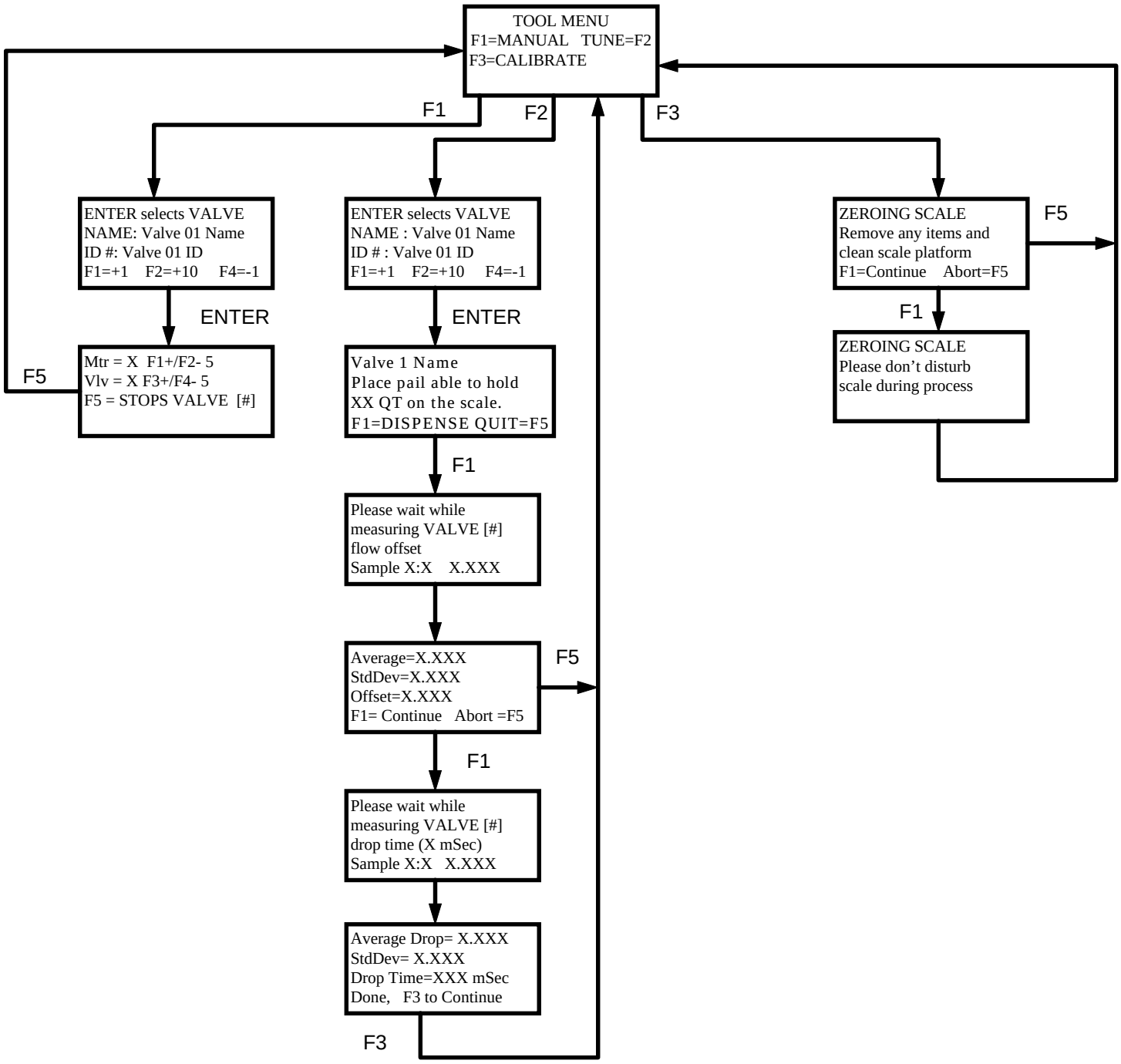
```
Recipe 1 Name
SAVE NEW VALUES?
F2=YES,  SAVE
F4=DON’T SAVE
```

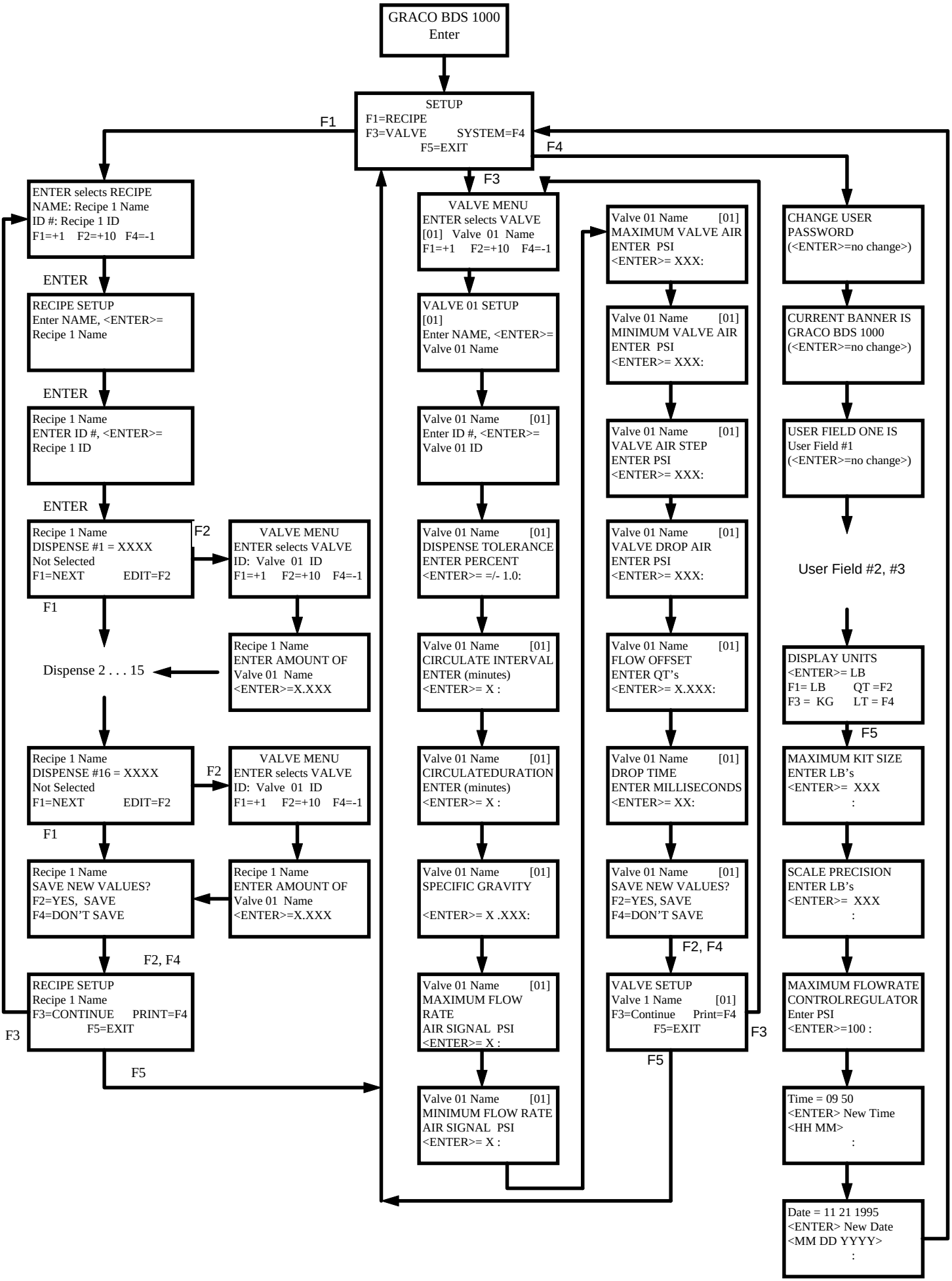
You are then asked to either save the new values entered, F2, or to abandon the changes, F4. If you think that you have made a mistake, press F4 and try going back in again.


GRACO BDS 1000 REV. 0.0
CAUTION! PUMPS MAY
BEGIN TO CIRCULATE
<ENTER> TO CONTINUE
ENTER
INITIATING SCALE
PLEASE CLEAR AND
CLEAN SCALE PLATFORM
<F3> TO CONTINUE
F3
22:07 04/09/1996
GRACO BDS 1000
F1=DISPENSE STATS=F2
F3 = TOOLS SETUP=F4
F1
F2
F3
F4
DISPENSE
F1=RECIPE
F3= VALVE REPORT=F4
F5 = EXIT
STATISTICS
F1=INVENTORY
F3= USAGE HISTORY
F5=EXIT
TOOL MENU
F1=MANUAL TUNE=F2
F3=CALIBRATE
F5=EXIT
GRACO BDS 1000
Enter Password
ENTER
SETUP
F1=RECIPE
F3=VALVE SYSTEM=F4
F5=EXIT
F5
F5
F5
F5


DISPENSE
F1=RECIPE
F3=VALVE PRINT =F4
F5=EXIT
F4
F1
F3
ENTER SELECTS RECIPE
NAME : Recipe 1 Name
ID : Recipe 1 ID
F1= +1 F2= +10 F4= -1
ENTER
ENTER AMOUNT (QT)
DESIRED OF RECIPE
Recipe 1 Name
XXX
ENTER
Recipe 1 Name
PLEASE ENTER
User Screen #1 - #3
XXXXXXXXXXXX
ENTER
DISPENSE XXX QT
Recipe 1 Name
F1 = DISPENSE QUIT =F5
PLACE PAIL ON SCALE
F5
F1
ANY KEY STOPS
DISPENSE
Valve 01 Name
1.0 1.0 QT
Recipe 1 Name
KIT 1 OF 1 DONE
1.0 QT 0.01%
F3= CONTINUE
F3
ENTER SELECTS VALVE
NAME : Valve 01 Name
ID : Valve 01 ID
F1= +1 F2= +10 F4= -1
ENTER
ENTER AMOUNT (QT)
DESIRED OF VALVE
Valve 01 Name
XXX
ENTER
DISPENSE 1 QT
Valve 01 Name
F1 = DISPENSE QUIT =F5
PLACE PAIL ON SCALE
F5
F1
ANY KEY STOPS
DISPENSE
Valve 01 Name
1.0 1.0 QT
RECIPE 1 NAME
KIT 1 OF 1 DONE
1.0 QT 0.01%
F3= CONTINUE
F3
F4=PRINT EXIT=F5
GRACO BDS 1000
REPORT XXXXXXXXX
F1=PAGEUP PAGE DN=F2
F5
F1
F2
Recipe 1 Name -X.X%
TOTAL BATCH
Desired Actual QT
F1=PAGE UP PAGE DN=F2
F1
F2
DISPENSE 01 -16 -X.X%
Valve 01 Name [01]
Desired Actual QT
F1=PAGE UP PAGE DN=F2
F1
F2
COMPLETED HH:MM
User Screen #3
XXXXXXXXXXXX
F1=PAGE UP PAGE DN=F2
F1
F2
NAME:Recipe 1 Name
ID: Recipe 1 ID
KIT: 1
F1=PAGE UP PAGE DN=F2
F1
F2
DATE: MM-DD-YYYY
User Screen #1
XXXXXXXXXXXX
F1=PAGE UP PAGE DN=F2
F1
F2
STARTED HH:MM
User Screen #2
XXXXXXXXXXXX
F1=PAGE UP PAGE DN=F2
F1
F2


STATISTICS
F1= INVENTORY
F3 = USAGE HISTORY
F5 = EXIT
F1
F3
INVENTORY
F1= VALVE
F3=STOCK PRINT =F4
F5=EXIT
F5
F5
USAGE HISTORY
F1= RECIPE
F3 = VALVE PRINT =F4
F5 = EXIT
F1
F3
F1
F3
ENTER selects VALVE
NAME : Valve 01 Name
ID # : Valve 01 ID
F1=+1 F2=+10 F4=-1
ENTER selects VALVE
Name : Valve 01 Name
ID # : Valve 01 ID
F1=+1 F2=+10 F4=-1
ENTER selects RECIPE
NAME : Recipe 01 Name
ID # : Recipe 01 ID
F1=+1 F2=+10 F4=-1
ENTER selects VALVE
Name : Valve 01 Name
ID # : Valve 01 ID
F1=+1 F2=+10 F4=-1
ENTER
ENTER
ENTER
ENTER
ENTER AMOUNT <QT>
Valve 01 Name
MOVING FROMSTOCKTO
VALVE 1 :
ENTER AMOUNT <QT>
Valve 01 Name
RECEIVING TO STOCK
Recipe 01 Name
MM/D1= XXXX LB
MM/D2= XXXX LB
F3-MORE
Valve 01 Name
MM/D1= XXXX LB
MM/D2= XXXX LB
F3-MORE
ENTER
ENTER
F3
F3
Valve 01 Name
AT VALVE = XX LB
STOCK = XX LB
F3= CONTINUE
Valve 01 Name
AT VALVE = XX LB
STOCK = XX LB
F3= CONTINUE
Recipe 01 Name
M1/YY= XXXX LB
M2/YY= XXXX LB
F3= MORE
Valve 01 Name
M1/YY= XXXX LB
M2/YY= XXXX LB
F3= MORE
F3
F3
F3
F3
Recipe 01 Name
YYY1= XXXX LB
YYY2= XXXX LB
F3= CONTINUE
Valve 01 Name
YYY1= XXXX LB
YYY2= XXXX LB
F3= CONTINUE
F3
F3


TOOL MENU
F1=MANUAL TUNE=F2
F3=CALIBRATE
F1
F2
F3
ENTER selects VALVE
NAME: Valve 01 Name
ID #: Valve 01 ID
F1=+1 F2=+10 F4=-1
ENTER
Mtr = X F1+/F2- 5
Vlv = X F3+/F4- 5
F5 = STOPS VALVE [#]
F5
ENTER selects VALVE
NAME : Valve 01 Name
ID # : Valve 01 ID
F1=+1 F2=+10 F4=-1
ENTER
Valve 1 Name
Place pail able to hold
XX QT on the scale.
F1=DISPENSE QUIT=F5
F1
Please wait while
measuring VALVE [#]
flow offset
Sample X:X X.XXX
Average=X.XXX
StdDev=X.XXX
Offset=X.XXX
F1= Continue Abort =F5
F5
F1
Please wait while
measuring VALVE [#]
drop time (X mSec)
Sample X:X X.XXX
Average Drop= X.XXX
StdDev= X.XXX
Drop Time=XXX mSec
Done, F3 to Continue
F3
ZEROING SCALE
Remove any items and
clean scale platform
F1=Continue Abort=F5
F5
F1
ZEROING SCALE
Please don't disturb
scale during process


GRACO BDS 1000
Enter
SETUP
F1=RECIPE
F3=VALVE SYSTEM=F4
F5=EXIT
F1
F3
F4
ENTER selects RECIPE
NAME: Recipe 1 Name
ID #: Recipe 1 ID
F1=+1 F2=+10 F4=-1
ENTER
RECIPE SETUP
Enter NAME, <ENTER>=
Recipe 1 Name
ENTER
Recipe 1 Name
ENTER ID #, <ENTER>=
Recipe 1 ID
ENTER
Recipe 1 Name
DISPENSE #1 = XXXX
Not Selected
F1=NEXT EDIT=F2
F2
VALVE MENU
ENTER selects VALVE
ID: Valve 01 ID
F1=+1 F2=+10 F4=-1
F1
Recipe 1 Name
ENTER AMOUNT OF
Valve 01 Name
<ENTER>=X.XXX
Dispense 2 . . . 15
Recipe 1 Name
DISPENSE #16 = XXXX
Not Selected
F1=NEXT EDIT=F2
F2
VALVE MENU
ENTER selects VALVE
ID: Valve 01 ID
F1=+1 F2=+10 F4=-1
F1
Recipe 1 Name
SAVE NEW VALUES?
F2=YES, SAVE
F4=DON'T SAVE
Recipe 1 Name
ENTER AMOUNT OF
Valve 01 Name
<ENTER>=X.XXX
F2, F4
RECIPE SETUP
Recipe 1 Name
F3=CONTINUE PRINT=F4
F5=EXIT
F3
F5
VALVE MENU
ENTER selects VALVE
[01] Valve 01 Name
F1=+1 F2=+10 F4=-1
VALVE 01 SETUP
[01]
Enter NAME, <ENTER>=
Valve 01 Name
Valve 01 Name [01]
Enter ID #, <ENTER>=
Valve 01 ID
Valve 01 Name [01]
DISPENSE TOLERANCE
ENTER PERCENT
<ENTER>= =/- 1.0:
Valve 01 Name [01]
CIRCULATE INTERVAL
ENTER (minutes)
<ENTER>= X :
Valve 01 Name [01]
CIRCULATEDURATION
ENTER (minutes)
<ENTER>= X :
Valve 01 Name [01]
SPECIFIC GRAVITY
<ENTER>= X .XXX:
Valve 01 Name [01]
MAXIMUM FLOW
RATE
AIR SIGNAL PSI
<ENTER>= X :
Valve 01 Name [01]
MINIMUM FLOW RATE
AIR SIGNAL PSI
<ENTER>= X :
Valve 01 Name [01]
MAXIMUM VALVE AIR
ENTER PSI
<ENTER>= XXX:
Valve 01 Name [01]
MINIMUM VALVE AIR
ENTER PSI
<ENTER>= XXX:
Valve 01 Name [01]
VALVE AIR STEP
ENTER PSI
<ENTER>= XXX:
Valve 01 Name [01]
VALVE DROP AIR
ENTER PSI
<ENTER>= XXX:
Valve 01 Name [01]
FLOW OFFSET
ENTER QT's
<ENTER>= X.XXX:
Valve 01 Name [01]
DROP TIME
ENTER MILLISECONDS
<ENTER>= XX:
Valve 01 Name [01]
SAVE NEW VALUES?
F2=YES, SAVE
F4=DON'T SAVE
F2, F4
VALVE SETUP
Valve 1 Name [01]
F3=Continue Print=F4
F5=EXIT
F3
F5
CHANGE USER
PASSWORD
(<ENTER>=no change>)
CURRENT BANNER IS
GRACO BDS 1000
(<ENTER>=no change>)
USER FIELD ONE IS
User Field #1
(<ENTER>=no change>)
User Field #2, #3
DISPLAY UNITS
<ENTER>= LB
F1= LB QT =F2
F3 = KG LT = F4
F5
MAXIMUM KIT SIZE
ENTER LB's
<ENTER>= XXX
:
SCALE PRECISION
ENTER LB's
<ENTER>= XXX
:
MAXIMUM FLOWRATE
CONTROLREGULATOR
Enter PSI
<ENTER>=100 :
Time = 09 50
<ENTER> New Time
<HH MM>
:
Date = 11 21 1995
<ENTER> New Date
<MM DD YYYY>
:

ERROR MESSAGES

GRACO BDS 1000 REV. 1.6 FILE MISSING RECIPE.DAT PRESS <ENTER> TO CREATE

This error message is displayed for new installations and when files are intentionally deleted. If this message appears unexpectedly, the memory has probably been erased due to battery back up failure or a voltage spike. Download your back up files through your PC link.

ERROR COMMUNICATING WITH SCALE. CHECK CABLE AND TRY AGAIN. F3 TO CONTINUE.

This error message appears when there is a breakdown in communication between the scale interface and the controller. Check the scale cables for damage. Scale vibration can also cause this error. The scale interface parameters may be have been modified due to error, damage or power spikes.

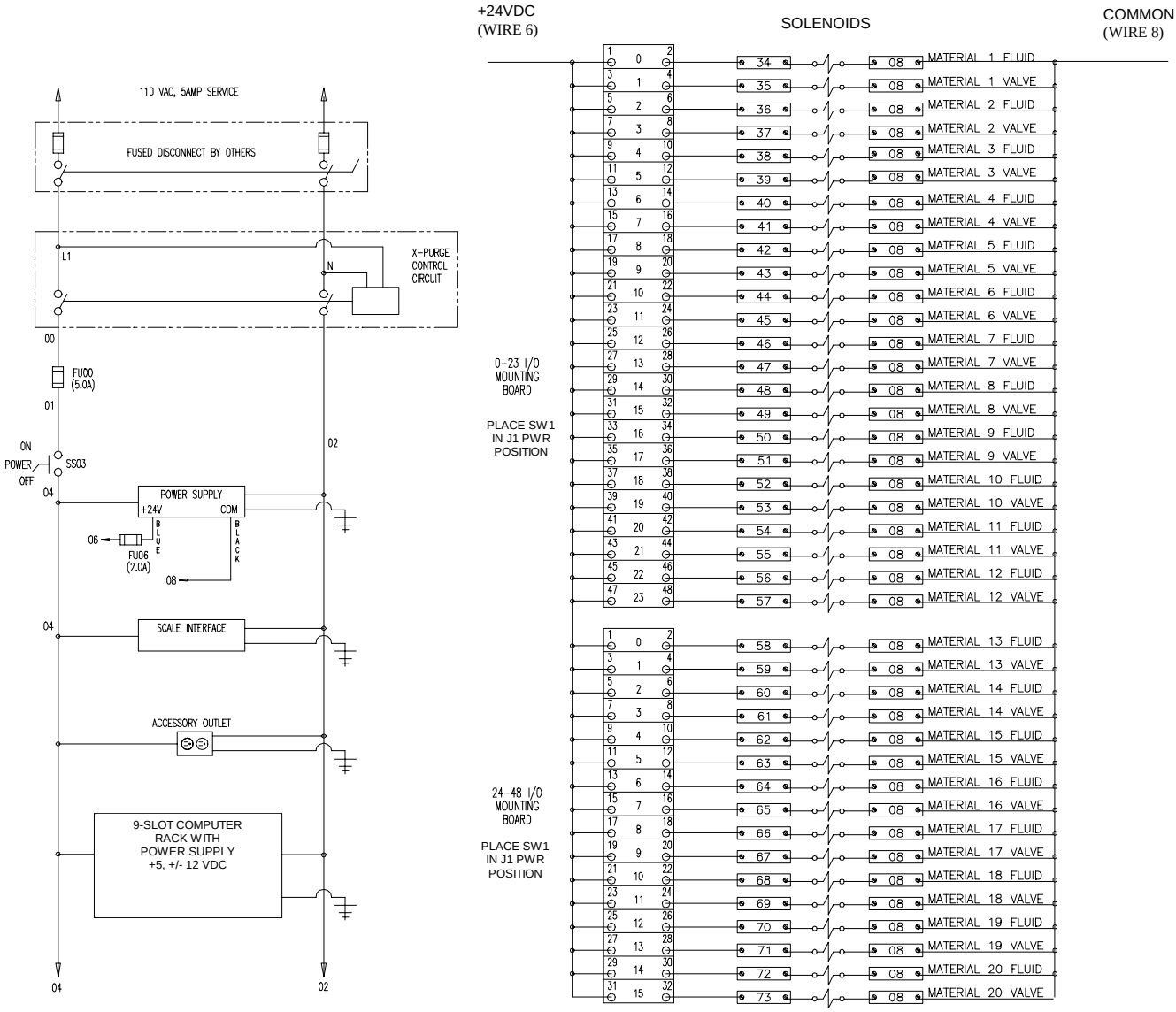
OUT OF TOLERANCE DISPENSING MATERIAL #XX F3 - CONTINUE

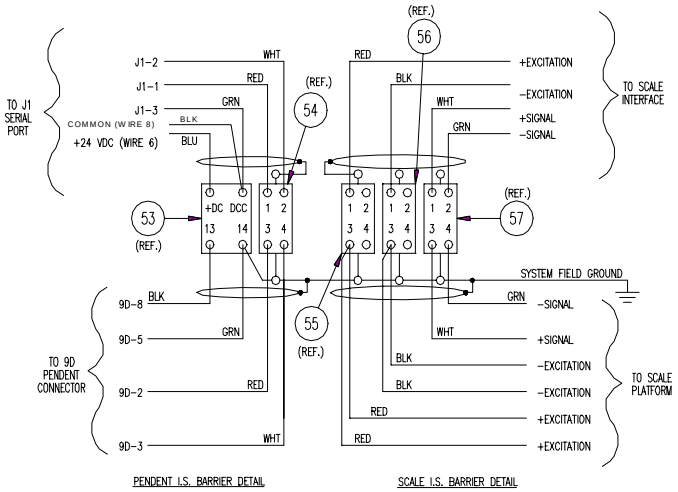
This error occurs when the programmed dispense tolerance could not be maintained. Possible causes are tuning problems, extraneous vibrations, valve or fluid regulator wear or regulator stuck open from dirt.

ERROR DISPENSING MATERIAL XX F3 - CONTINUE ABORT - F5

This error occurs when the material flow is insufficient due to valve or regulator failure, loss of air pressure, supply pump has run out of material, lines plugging or other component failure. This error can also occur if the container has overflowed.

Batch Dispense System Electrical Schematics

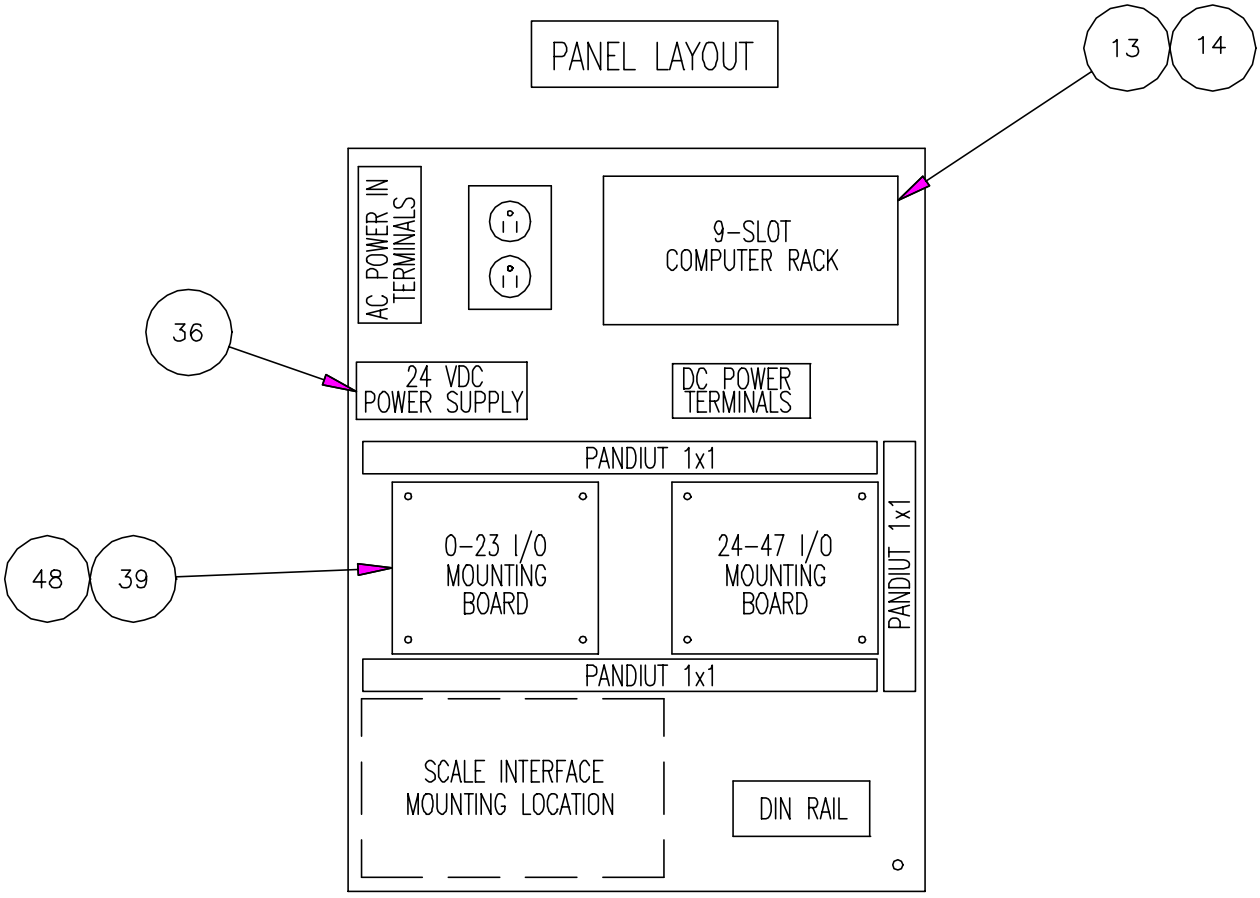




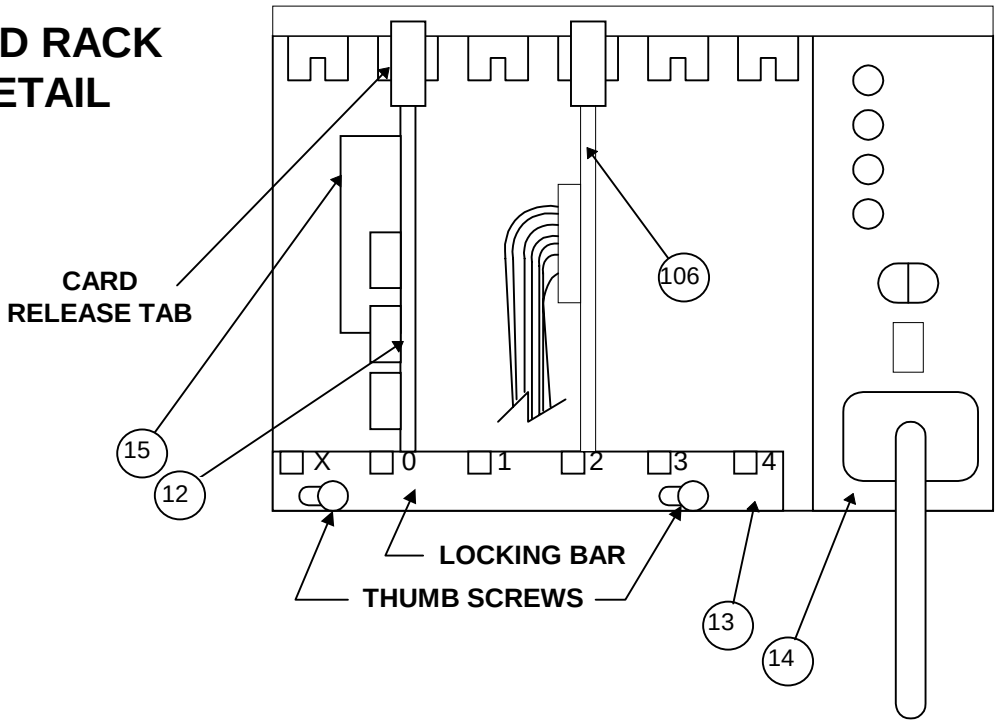
NOTE:
1. CONNECT I.S. GROUND POINTS TO SYSTEM FIELD GROUND (TRUE EARTH GROUND)

2. ADJUST SUPPLY TO +5.0 VDC BEFORE CONNECTING PENDENT

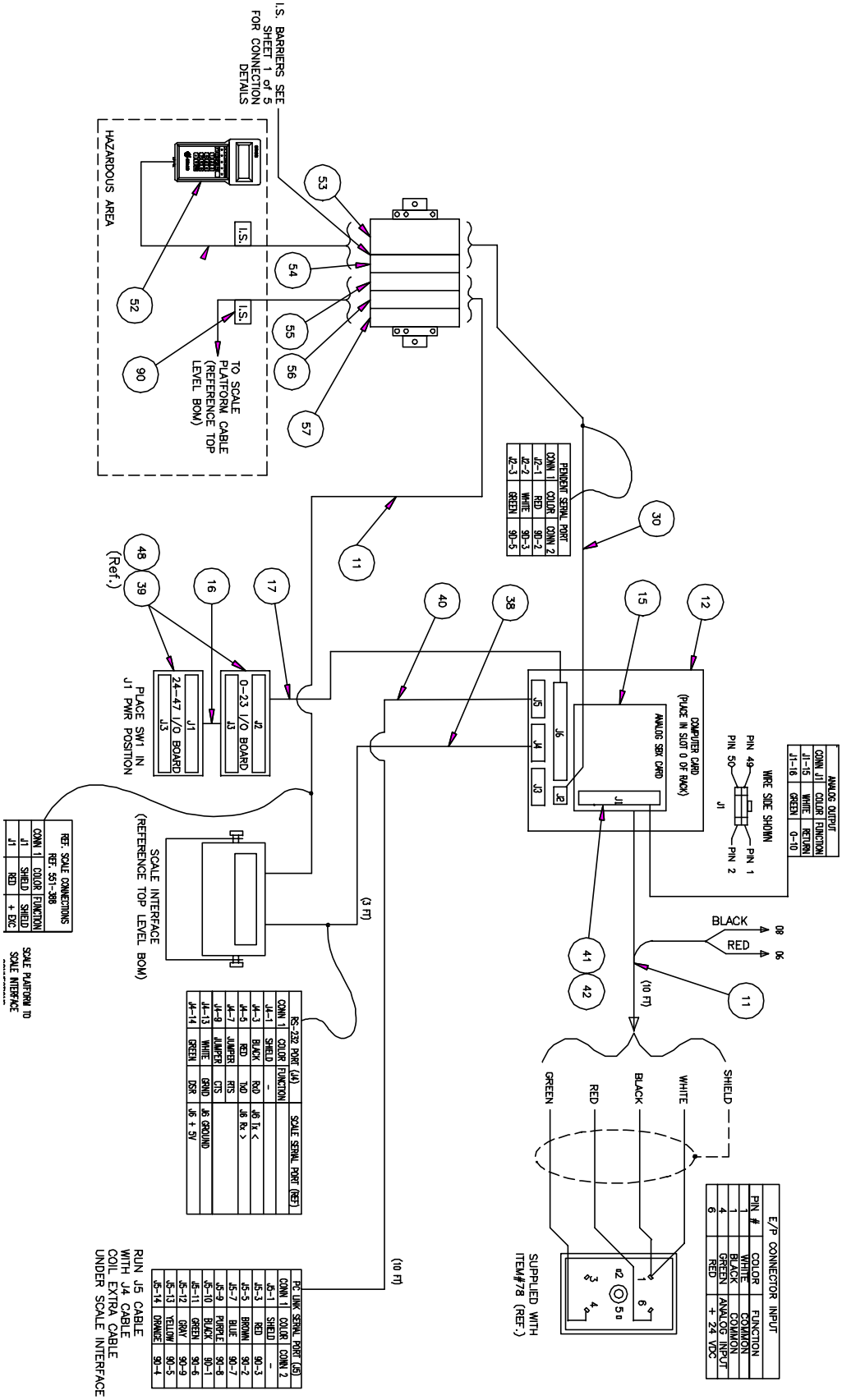
Batch Dispense System Electrical Schematics (continued)



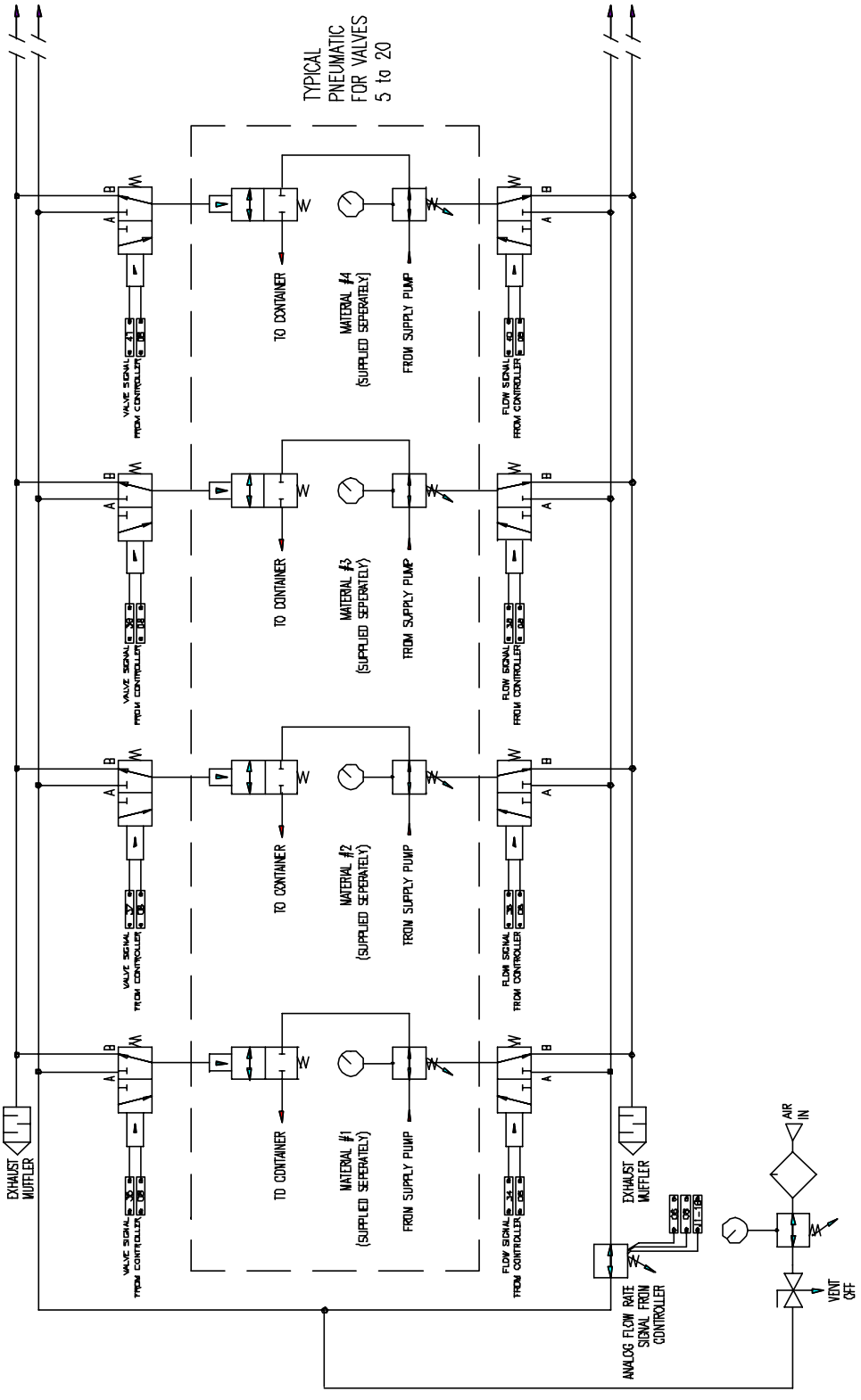
CARD RACK DETAIL



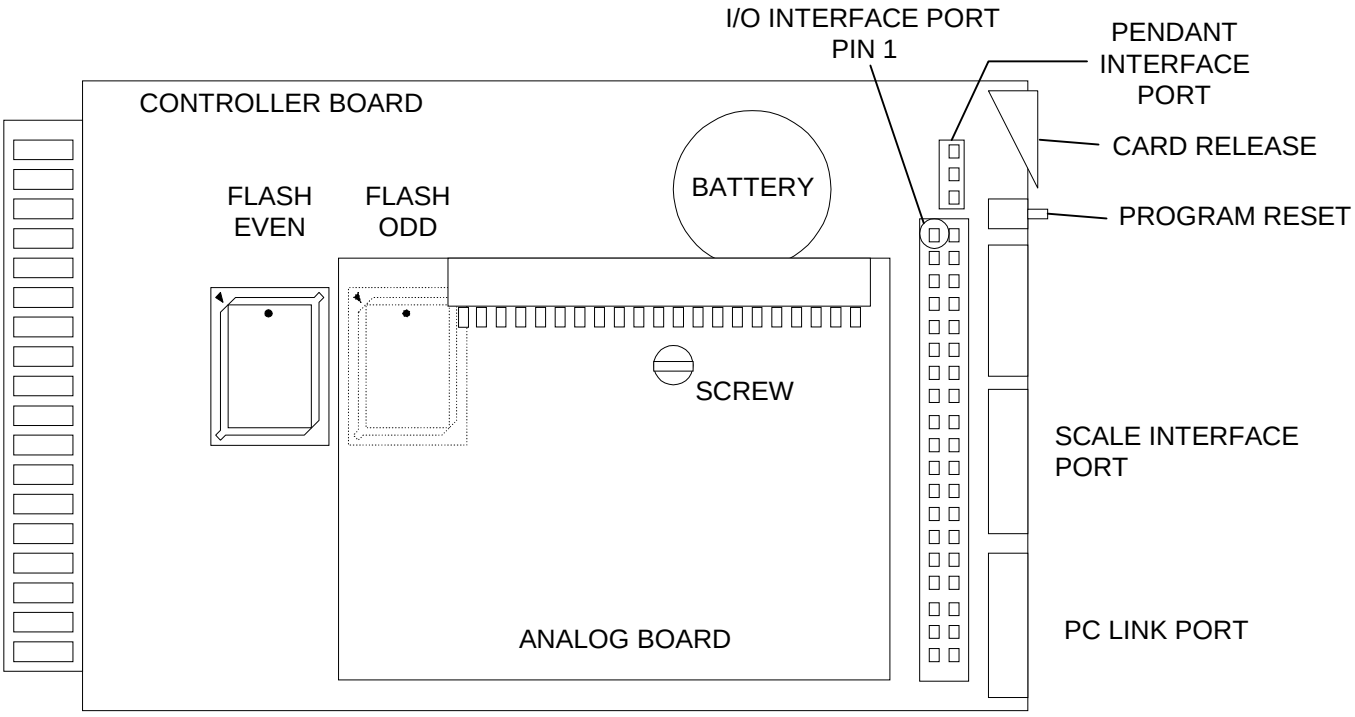
Batch Dispense System Electrical Schematics (continued)



Batch Dispense System Pneumatic Schematic



Controller Card Detail



Changing the Controller Card

1. Turn off the main power switch. Open the rear door of the controller and locate the card rack (Item #13) . See card rack detail on page 37.
2. Loosen the thumb screws and carefully slide the locking bar to the side.
3. Carefully remove the PC link Cable (Gray) and the Scale Interface Cable (Orange) from its socket.
4. The control card is a static sensitive device. It is recommended that you wear a grounded wrist strap (Graco part number 112-190) while removing or handling the card.
5. Lift the card release lever to unplug the card from the rack. Slide the card forward about 2".
6. Carefully unplug the Pendant interface cable from its socket. The wires are small and very fragile. DO NOT pull on the wires, pull on the plug.
7. Note the orientation of the large I/O interface cable (there is no alignment pin) and carefully unplug the cable from its socket.
8. Slide the card forward about half way out of the rack.
9. Carefully unplug the I/P Interface cable from its socket. The wires are small and very fragile. DO NOT pull on the wires, pull on the plug.
10. Slide the card completely out of the rack. The card is static sensitive. Store the card in a static discharge container.

Re-Installation

Re-installation is the reverse of removal, steps 10-1. When re-installing the I/O interface cable in step 7, be sure use the same orientation and verify that all the pins are lined up and properly inserted. In step 2, press the card into its socket until it snaps into place. Restore power following the initial start up sequence on page 13.

New Batch Dispense System Software

1. Record your system parameters from the pendant. Record your valve and recipe information either manually or using the PC Link software.
2. Power the system down.
3. Follow the instructions for changing the Controller Card (Item #12) found on page 40.
4. With the controller card removed from the rack, remove the Analog Board (Item #15) by first removing the retaining screw and then unplugging the Analog Board from the Controller Board (see Controller Board Detail on page 40).
5. Locate the two flash E-Prom sockets, Even and Odd. Using an IC extraction tool, remove the Flash E-Proms from their sockets.
6. Insert the new E-Proms into their sockets paying special attention to the even and odd designation and the orientation dots.
7. Replace the Analog Board. Make sure that the connector between the Analog Board and the Controller Board snaps into place. Re-install the screw.
8. Re-install the Controller Card following the instructions on page 40.
9. Power-Up the System following the Initial start-up sequence on page 13..
10. Re-Initiate the software as prompted by the pendent.
11. Manually re-install the system parameters recorded earlier. Reload valve and recipe data either manually or using the PC link software.

Batch Dispense System Controller

Part Number 965-775, 965-777, 965-779

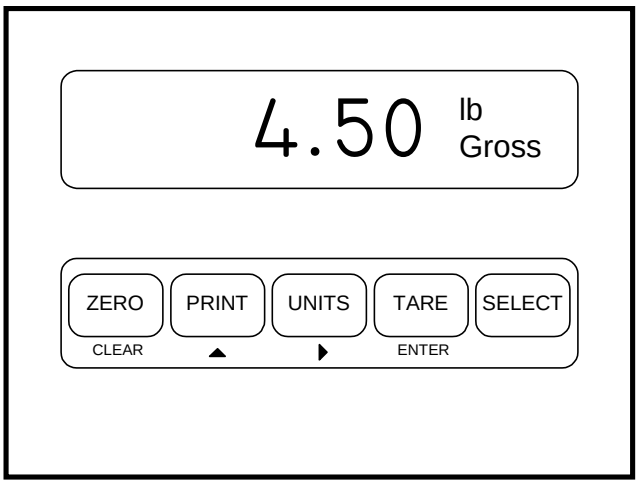
Ref.	Part No.	Description	Qty	Ref.	Part No.	Description	Qty
9	107578	Fuse 2.5 A, 250V	1	52	552077	Pendant, 40 Key IS	1
10	551507	Fuse 4 A, 250V	1	53	551433	Power Supply, 6VDC I.S.	1
11	111647	Cable, 4 Conductor	AR	54	551434	Barrier I.S. RS232	1
12	551944	Controller Board, BDS	1	55	551435	Barrier I.S. Load Cell +	1
13	551945	Controller Rack	1	56	551436	Barrier I.S. Load Cell -	1
14	551946	Controller Power Supply	1	57	551437	Barrier I.S. Load Cell Sig.	1
15	551947	Board, Analog	1	62	101180	Guage, Air Pressure 200	1
16	551948	Cable I/O	1	63	104267	Regualtor, Air 1/2”	1
17	551949	Cable I/O	1	65	106149	Filter Air 1/2”	1
24	222011	Grounding Clamp	1	66	107142	Valve, Air 1/2 MxF Bleeder	1
27	513313	Label, Warning Shock	1	76	514465	Kit Valve End Plate	2
30	570328	Cable, BDS Serial	1	77	514934	Valve Solenoid 4 Way 24V	8-40
32	570329	Cable, BDS Pendant	1	78	551309	Transducer 0-10VDC, 100#	1
36	514738	Power Supply 24VDC	1	105	111-664	3.6 V Battery	1
38	570330	Cable BDS Scale Interface	1	106	551626	Printer Board (Optional)	1
39	551288	Board 24 I/O	1/2				
40	570331	Cable PC Link (6’)	1				
48	112433	Relay, Output	8-40				

Calibrating
The Scale

WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD Calibrating the scale requires bypassing the explosion-proof safety controls.

- Do not perform any of the following procedures unless you are trained and qualified.
- Be sure that area is free of ALL flammable materials and volatile vapors prior to starting this procedure.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.



Calibration Procedure

1. Remove all flammable materials and volatile vapors from the area surrounding the machine.
2. Place the X-Purge On/Off switch (see figure 5 on page 12) into BYPASS mode.
3. With power still applied to the system, open the rear door of the controller cabinet. Use Caution and avoid contacting live wires within the cabinet.
4. Locate the scale interface (see panel layout Page 37). Note the display and the function keys.
5. Enter Calibration Mode by pressing [ZERO] + [SELECT] simultaneously and then pressing [ZERO], [PRINT], [UNITS], [TARE] immediately after.
6. "Quick Cal!" is displayed briefly followed by "New Zero?"
7. Press [ENTER]. The indicator will display (perhaps not precisely) the dead load on the scale.
8. Clean and clear the scale platform and press [ENTER]. Once you press [ENTER] a new zero is established.
9. "Adj'g Zero" will be displayed followed by "Keyin CalWT".
10. Place a calibrated weight on the scale platform that is between 40% and 80% of the scale's maximum load.
11. The display will show the measured value in decimal pounds. If the displayed value is not EXACTLY correct, you will need to key in the correct weight value in decimal pounds (following the instructions below) and then press [ENTER].
12. The indicator will perform the calibration, display the calibration weight and display the prompt "CAL OK?"
    A. If the displayed value is correct, press [ENTER]. The display will then prompt "SAVE CHANGES?". Press [ENTER] to save and then press [ENTER] to exit.
    B. If the displayed value is incorrect, press [CLEAR]. The display will then return to the "NO LOAD?" prompt.
13. Close and lock the cabinet doors. Place the X-Purge On/Off switch into OFF mode. Restart the system by following the "Initial Start -Up sequence on page 13.

Entering Numeric Values

In step #10 above, you may be required to key in the calibration weight. Since the display does not have a numerical keypad, you must follow these instructions for keying in numeric values.

Use the [▲] key to select the value of the digit (. or 0-9) and then use the [➢] key to move to the next digit to the right.

If you make an error, press [ZERO] to clear the entry and start again.

EXAMPLE:
To load the value 20.000

Press [▲] until a "2" appears
Press [➢] to move to the next digit
Press [▲] until a "0" appears
Press [➢] to move to the next digit
Press [▲] until a "." appears
Press [➢] to move to the next digit
Press [▲] until a "0" appears
Press [➢] to move to the next digit
Press [▲] until a "0" appears
Press [➢] to move to the next digit
Press [▲] until a "0" appears

Press [ENTER] to complete the entry

Accessories

Printer Board

- The printer board accessory allows a standard parallel printer to be used with the BDS to directly obtain reports or batch tickets.
- The Board can be inserted into any open slot in the card rack (see diagram on page 37) EXCEPT for the “X” slot.
- The board is connected to the printer via a ribbon cable (supplied with board) that has a 25-Pin Female “D” connector.
- The printer MUST BE LOCATED OUTSIDE THE HAZARDOUS AREA. Connections between the controller and the printer must be made using approved connectors and seal-offs per local electrical code.

Printer Kit

- Follow instructions supplied with printer kit, Form Number 308-818.

Panel Mount Display

- The panel mount display operates the same as the pendent display detailed in this manual. The position of the keys is different.
- The panel mount display has no back light due to intrinsic safety issues.
- The panel mount display has peel off, replaceable protective film. A 10-Pack is available under part number 114-312.
- The panel mount display enclosure should be mounted to a rigid surface. The Hoffman® Concept™ Series enclosure has many mounting accessories including pedestals and pivot brackets. These are available directly from Hoffman®.

RS-232 Range Extender

- The range extender allows the PC Link feature to be used over distances of up to 2-miles (instead of 100 ft for standard RS-232). Follow the instructions supplied with the range extender.
- Install one of the range extender units inside of the control cabinet. Plug the power cord into the accessory 110 VAC outlet and plug the 9-Pin PC-Link cable into the serial port using the adapter supplied with the range extender.
- Connect the other range extender port to your PC using an appropriate cable, and plug the power cord into a 110 VAC outlet.
- The two range extenders must be connected together using four wire 24 AWG shielded cable. The connection to the controller must be through an approved hazardous area connector or seal-off per local electrical code.

The Graco Warranty and Disclaimers

WARRANTY
Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months or two thousand hours of operation from time of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may includes the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS
The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including production liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

EQUIPMENT NOT COVERED BY GRACO WARRANTY
Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

Graco Phone Numbers

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you:
1-800-328-0211 Toll Free

FOR TECHNICAL ASSISTANCE, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

Sales Offices: Detroit, Los Angeles
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