LO-LOSS
LIQUID CYLINDER FILLING SYSTEM

INSTALLATION AND OPERATING MANUAL

Manual Part Number 11510727
Rev A

SAFETY SUMMARY

Prior to installation or operation of the Lo-Loss liquid cylinder filling system, certain safety precautions should be reviewed. Strict compliance with these basic safety and handling practices is necessary when installing and using this equipment. We recommend that all of our customers emphasize safety and safe handling practices to all of their employees and customers. While every possible safety feature has been designed into the Lo-Loss and safe installation practices are anticipated, it is essential that the installer and user carefully read and fully understand all WARNINGS and CAUTIONS provided in this safety summary. Also, all applicable safety bulletins for oxygen and inert gases should be read and understood prior to installation and operation of the Lo-Loss.

WARNING

Excess accumulation of oxygen creates an oxygen-enriched atmosphere (defined by the Compressed Gas Association as an oxygen concentration above 23 percent). In an oxygen-enriched atmosphere, flammable items burn vigorously and could explode. Certain items considered non-combustible in air may burn rapidly in such an environment. Keep all organic materials and other flammable substances away from possible contact with oxygen; particularly oil, grease, kerosene, cloth, wood, paint, tar, coal, dust, and dirt which may contain oil or grease. DO NOT permit smoking or an open flame in any area where oxygen is stored, handled, or used. Failure to comply with this warning may result in severe personal injury.

WARNING

Nitrogen and argon vapors in air may dilute the concentration of oxygen necessary to support or sustain life. Exposure to such an oxygen deficient atmosphere can lead to unconsciousness and serious injury, including death.

WARNING

External valves and fittings can become extremely cold and may cause painful burns to personnel unless they are properly protected. Personnel must wear protective gloves and eye protection whenever removing parts or loosening fittings. Failure to do so may result in personal injury because of the extreme cold and high pressure.

WARNING

Accidental contact of liquid gases with skin or eyes may cause a freezing injury similar to a burn. Handle liquid so that it will not splash or spill. Protect your eyes and cover skin where the possibility of contact with liquid, cold pipes and cold equipment, or cold gas exists. Safety goggles or a face shield should be worn when operating this equipment. It is recommended that only clothing that can easily be removed be worn. It is also recommended that shirts having long sleeves be worn for arm protection. Cuffless trousers should be worn outside boots or over the shoes to shed spilled liquid.

WARNING

If clothing should be splashed with liquid oxygen or become otherwise saturated with the gas, air out clothing immediately, removing the clothing if possible. Such clothing will be highly flammable and easily ignited while concentrated oxygen remains, and should not be considered safe for at least 30 minutes.

CAUTION

Only use replacement equipment that is compatible with liquid oxygen and that has been cleaned for oxygen use. Do not use regulators, fittings, hoses, etc., which have been previously used in a compressed air environment. Similarly, do not use oxygen equipment for compressed air. Failure to comply with these instructions may result in serious damage to the Lo-Loss equipment.

CAUTION

Before locating oxygen equipment, become familiar with the National Fire Protection Association (NFPA) Standard No. 56F “Bulk Oxygen Systems at Customer Sites”, and with all local safety codes. The NFPA Standard covers general principles recommended for installing bulk oxygen systems on industrial and institutional consumer premises.

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STANDARD WARRANTY

Chart, Inc. warrants all Lo-Loss systems we manufacture to be free from defects in material and workmanship for **ONE YEAR** from the date of shipment, subject to the exclusions listed below and statements on the following pages.

If a warranty repair is required, the Lo-Loss system will be repaired at the nearest Chart Authorized Service Center.

Exclusions

A) We accept no liability for any warranty work performed or costs incurred by the customer, or others, without Chart Inc.'s express prior written approval

B) Chart Inc.'s obligations under this warranty is expressly limited to repair or replacement of any part or workmanship that Chart manufactured and found defective within **ONE YEAR** after date of shipment.

C) Chart Inc. is not liable for any other losses, damages, product losses, cost of delays, freight charges, or excess costs for repairs made outside the 48 contiguous United States, including incidental or consequential damages.

D) For warranty claims, please call Chart Inc.'s Customer Service at 800-400-4683.

INTRODUCTION

1.1 GENERAL

The Chart-MVE Lo-Loss filling system significantly reduces product losses associated with pressure-transfer liquid cylinder filling. Modular design allows manual or automatic operation with one or more liquid cylinders in argon, nitrogen or oxygen service.

1.2 THEORY OF OPERATION

Simply stated, the Lo-Loss system reduces product losses by controlling the pressure difference between the bulk tank and liquid cylinder. In a typical pressure-transfer operation (without Lo-Loss), the liquid cylinder is vented to atmosphere during the fill cycle. Figure 1 predicts fill losses in each service across a range of bulk tank pressures.

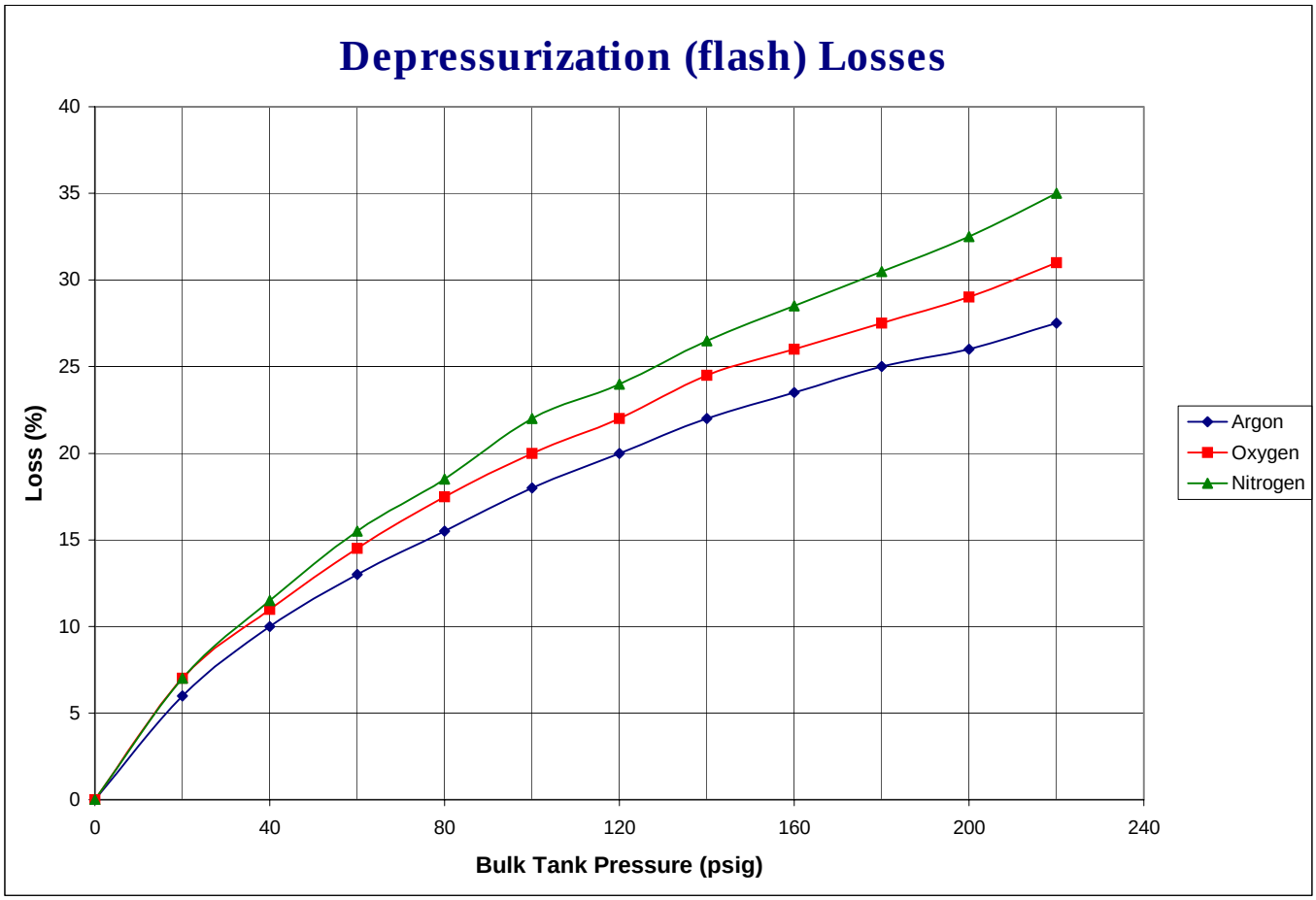


Figure 1. Depressurization (flash) Losses Versus Bulk Tank Pressure

For example, product losses of up to 20% will occur with a bulk tank pressure of 120 psig in argon service. This means that for every five liquid cylinders filled, one cylinder is lost to the atmosphere. In contrast, the Lo-Loss system will reduce flash losses to 4% - this represents a 75% reduction in product losses.

As the example illustrates, if the liquid cylinder is vented completely to atmosphere (0 psig), flash losses are considerable. The Lo-Loss system reduces flash losses by maintaining the liquid cylinder at a pressure 30 psig lower than the bulk tank. In the example above, Lo-Loss will maintain the liquid cylinder at 90 psig and reduce flash losses from 20% to 4% (see Figure 1).

The Lo-Loss system may marginally increase liquid cylinder fill times (up to 10% versus vent-to-atmosphere). However, fill times are highly dependent on piping layout and bulk tank conditions. Section 2 provides guidelines for optimizing piping layouts between bulk tank and liquid cylinder.

1.3 SYSTEM CONFIGURATION OPTIONS

<u>Automatic Option</u> (Figures 1 and 2) – Features an electrically actuated solenoid valve that is automatically opened and closed based on programmed input from the Fairbanks H90-5200A indicator box. The H90-5200A indicator has integral relays which can control up to 3 Lo-Loss base units. (1-argon, 1-nitrogen, and 1-oxygen) In order to prevent cross contamination, individual base units must be supplied by different liquid sources (bulk tanks), but the target liquid cylinders are weighed on the same scale system.

11482607 (Argon), 11378551 (N_2), 11378560 (O_2)
Automatic Units With Scale

These models include:

- Base unit
- Solenoid valve pre-wired for appropriate service (Argon, N_2 or O_2)
- 3'x3', 2500 lb floor scale
- H-90 5200A Digital weight indicator and automatic fill process controller
- Appropriate service kit (inert or O_2)

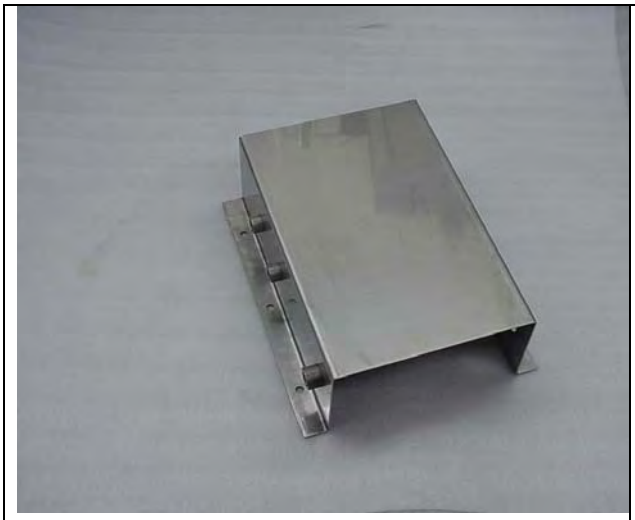
Figure 1

<u>Supplemental base units with the electric solenoid valve</u> (See the schematic diagram on page 12 for a schematic of a multiple automatic base unit plumbing configuration)

	
11482615 (Inert), 11482623 (O_2) *Automatic Units Without Scale* These models include: • Base unit • Solenoid valve • Appropriate service kit (inert or O_2) NOTE: DOES NOT INCLUDE SCALE OR CONTROLLER. INTENDED FOR ADD-ON TO EXISTING SCALE/CONTROLLER. ONE SCALE/CONTROLLER CAN HANDLE 3 SERVICES.	

Figure 2

<u>Manual Option</u> (Figures 3 and 4) – Designed for complete manual operation. When the appropriate fill weight is reached, as indicated on the Fairbanks 2300 digital indicator, the filling operation is terminated by manually closing the ball valve at the output of the Lo-Loss box. (Figure 3 and 4)



11378578 (Inert), 11378586 (O_2)
Manual Units With Scale

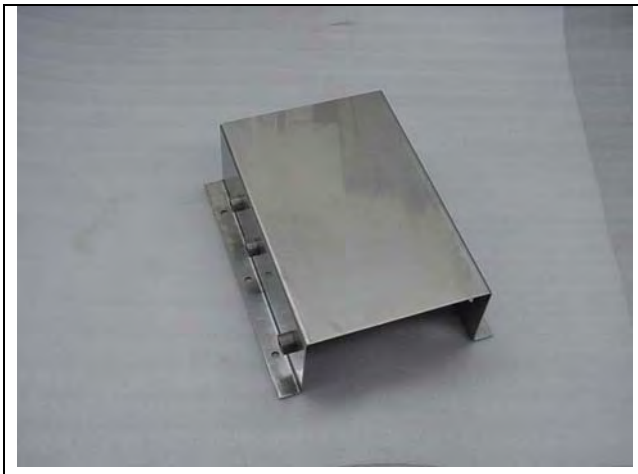
These models include:

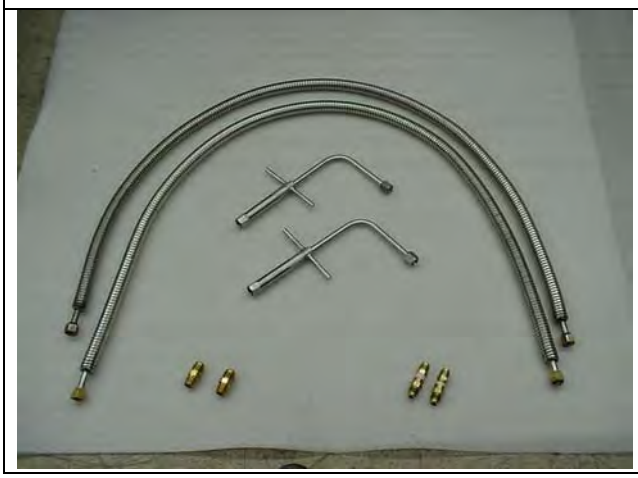
- Base unit
- Manual ball valve
- 3'x3', 2500 lb floor scale
- IND-HR2300 Digital weight indicator
- Appropriate service kit (inert or O_2)

NOTE: CONTRARY TO THE PHOTOGRAPH, THE BALL VALVE, LINE RELIEF AND FITTINGS ARE ASSEMBLED TO THE BASE UNIT.

Figure 3

Supplemental base units with the manual ball valve





11482631 (Inert), 11482640 (O_2)
Manual Units Without Scale

These models include:

- Base unit
- Manual ball valve
- Appropriate service kit (inert or O_2)

NOTE: CONTRARY TO THE PHOTOGRAPH, THE BALL VALVE, LINE RELIEF AND FITTINGS ARE ASSEMBLED TO THE BASE UNIT.

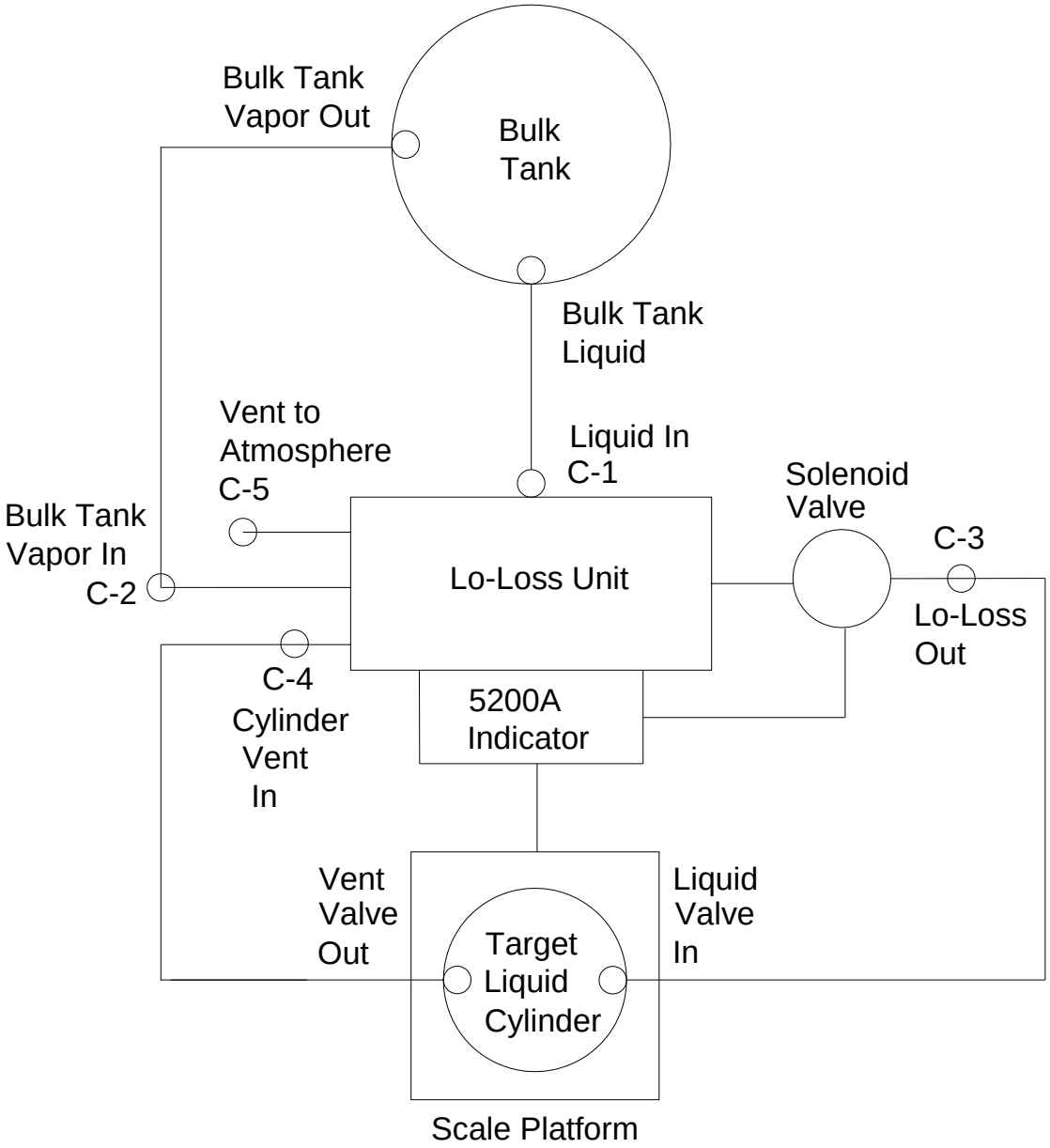
Figure 4

INSTALLATION

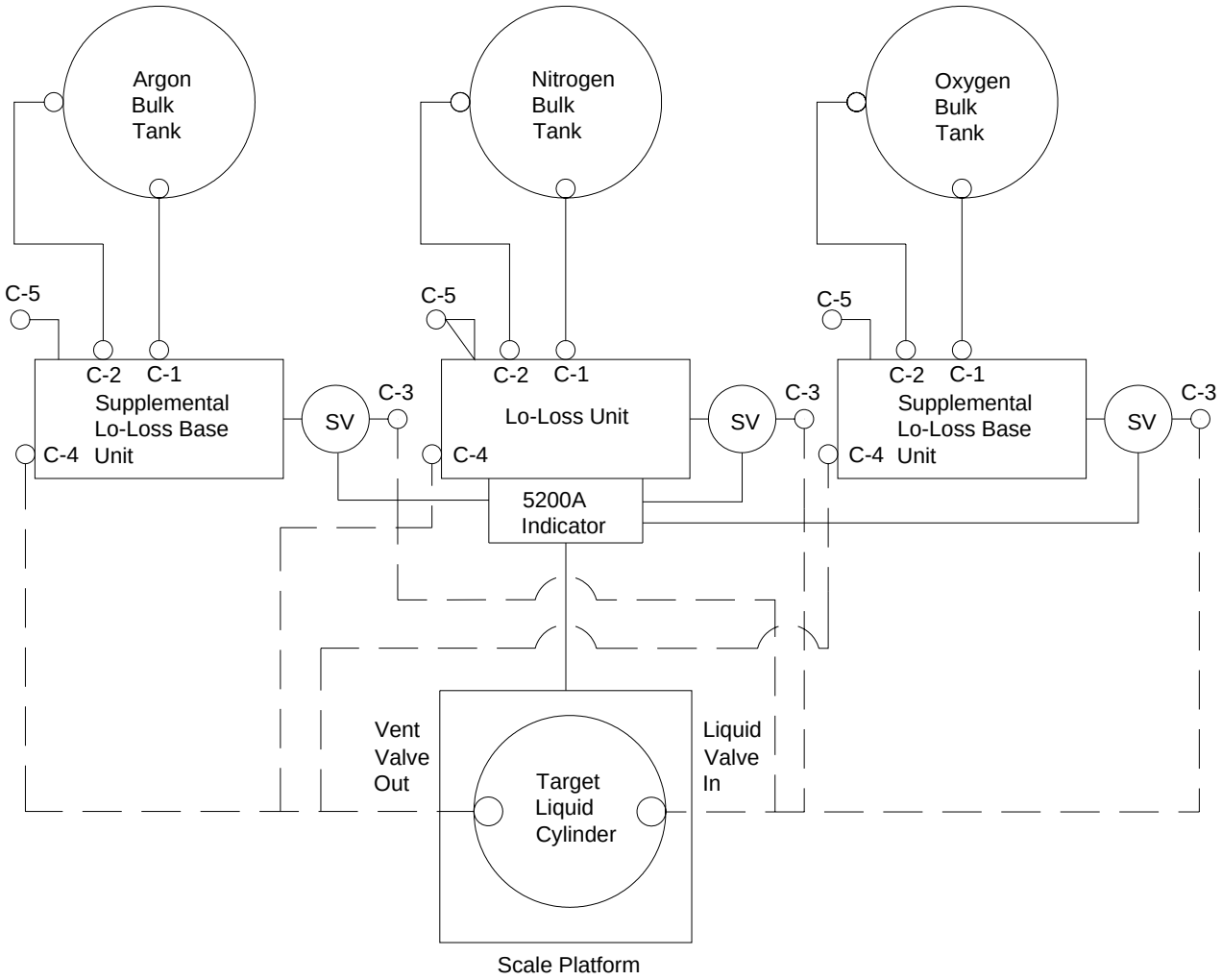
2.1 GENERAL

This section provides installation guidelines for mounting, connection and calibration of the Chart Lo-Loss liquid cylinder filling system. Each installation is different so typical mounting and plumbing considerations are provided. These are intended only as guidelines to insure a successful installation with reliable and trouble-free operation.

Following are schematic diagrams which show the basic plumbing configurations for single and multiple service automatic Lo-Loss systems.



Single Service System

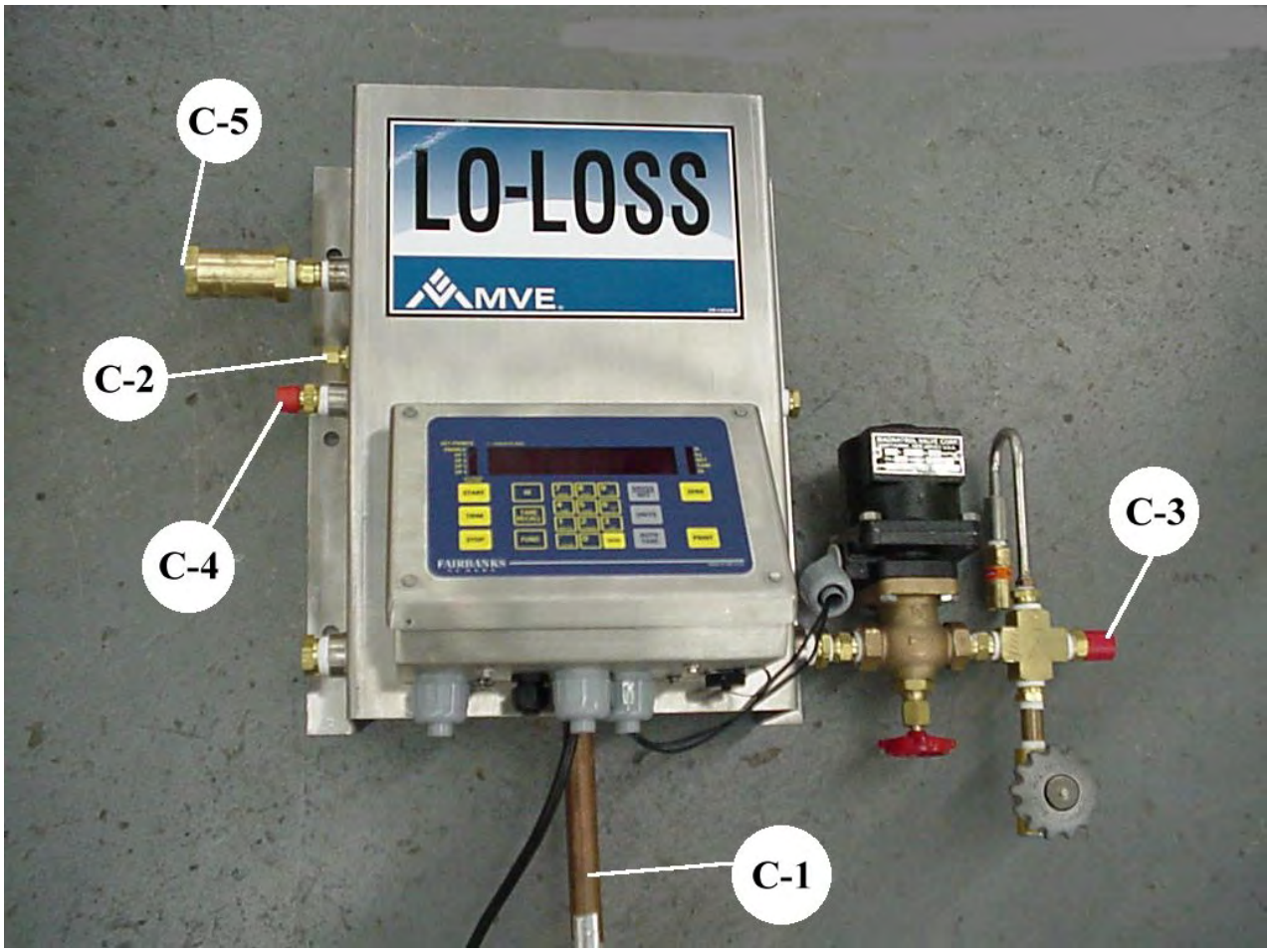


Multiple Service System

For the multiple service system, the operator uses the same scale system to fill one tank at a time from one of up to three separate liquid sources. (bulk tanks) The program in the 5200A indicator prompts the operator to select either AR, N2, or O2 services. The bulk tanks for each service must be hard plumbed to separate Lo-Loss base units to prevent cross contamination of the different cryogenic liquids. Even though the above diagrams show automatic Lo-Loss systems, the manual systems will be plumbed the same.

Where an unusual or difficult installation is anticipated or a deviation from the installation requirements is necessary, consult Chart for additional details or assistance. Do not proceed if you are unsure of the installation or are unfamiliar with the components required. Consult your local sales representative or call Chart Customer Service at 800-400-4683 for assistance.

2.2 PIPING CONNECTIONS



Lo-Loss Piping Connections

Tag Number	Description	Size	Material
C-1	Bulk Tank Liquid	7/8"OD Tube	Copper
C-2	Bulk Tank Vapor	1/4"OD Compression	Brass
C-3	Cylinder Liquid	1/2"ODT (Inert) or 5/8"ODT (O_2) 45D Flare	Brass
C-4	Cylinder Vent	1/2"ODT (Inert) or 5/8"ODT (O_2) 45D Flare	Brass
C-5	Vent to Atmosphere	1/2"FPT	Brass

C-1 Bulk Tank Liquid

A liquid line from the bulk tank (liquid withdrawal or auxiliary liquid) must be piped and attached to connection C-1 by silver brazing or a double-ferrule compression fitting union (Swagelok, Parker A-Lok, or equivalent). We recommend at least ¾" nominal copper or stainless steel tubing. The liquid

isolation valve at the bulk tank should be at least a ¾" fully-ported cryogenic ball valve or a 1" cryogenic globe valve. Ideally, the piping distance from the bulk tank to the Lo-Loss unit should be 20 feet or less. For distances between 20 and 30 feet, we highly recommend vacuum-insulated pipe and for distances over 30 feet, vacuum-insulated pipe is essential for liquid cylinder filling with Lo-Loss. The piping layout should be designed to minimize 90 degree bends. Where bends are required, we recommend using long-radius elbows to minimize pressure drop. Fewer 90 degree bends, larger diameter tubing (at least ¾" nominal), higher flow capacity valves (such as ball valves) and shorter piping runs (less than 20 feet) produce faster fill times and less wasted product.

C-2 Bulk Tank Vapor

The Lo-Loss uses the bulk tank pressure as a reference to control the liquid cylinder pressure during filling. Therefore, ¼"OD copper tube must be installed from a bulk tank vapor circuit to connection C-2 on Lo-Loss. A convenient place to connect at the bulk tank is the vapor phase line of the differential pressure gauge (contents gauge).

Bulk Tank Vapor Connection

C-3 Cylinder Liquid

Use a stainless steel transfer hose to connect C-3 to the liquid valve on the liquid cylinder. Use a hose with 1/2"ODT 45-degree flare (CGA 295) connections for inert services (nitrogen and argon) and 5/8"ODT 45-degree flare (CGA 440) connections for oxygen service.

C-4 Cylinder Vent

Use a stainless steel transfer hose to connect C-4 to the vent valve on the liquid cylinder. Use a hose with 1/2"ODT 45-degree flare (CGA 295) connections for inert services (nitrogen and argon) and 5/8"ODT 45-degree flare (CGA 440) connections for oxygen service.

C-5 Vent to Atmosphere

Connection C-5 is the outlet of a check valve that prevents moist air and water from entering the Lo-Loss regulator. The vent gas from the liquid cylinder will exit to the atmosphere through C-5. A pipe-away can be attached to exhaust the gas to a convenient location.

2.3 BULK TANK

The liquid line attachment to the bulk tank must be made at one of the liquid withdrawal points (pump feed, auxiliary liquid, etc). Make certain that the line selected pulls liquid off the bottom of the bulk tank (check the flow schematic diagram). Do **NOT** attach to the **GAS USE** circuit or any other bulk tank outlets. Silver braze all joints except pipe threads, compression fittings and unions. Do not use soft solder for any copper joints.

CAUTION

If any silver brazing is to be done on the piping of a liquid oxygen bulk tank it is recommended that all associated lines be purged with nitrogen gas prior to any brazing operation. Additionally it is recommended that the bulk tank be emptied and properly purged of oxygen.

2.4 BASE UNIT PHYSICAL INSTALLATION

Optional Stand – Part Number 11367289

The base unit (stainless steel piping cabinet) must be securely mounted to a wall or other suitable structure. Six ½" diameter holes are provided to facilitate mounting. If wall mounting is not possible, Chart offers an optional stand. The Chart part number is 11367289.

2.5 FLOOR SCALE PHYSICAL INSTALLATION

The Lo-Loss systems employ Fairbanks Aegis Basic floor scales (PLF-R3400 Series). This section contains excerpts from the Fairbanks installation manual for the Aegis Basic floor scales.

2.5.1 GRADE AND LOCATION SPECIFICATIONS

1. The floor should be relatively flat and firm.

2. The foot assembly can tolerate a 3° (or 3/16" over its diameter) departure from level.

3. The platform must be firmly supported on all four corners.

2.5.2 INSTALLATION OF PLATFORM

Standard installation of the platform consists of locating the platform, firming the platform and ramps if used, interfacing the platform to an instrument, and calibrating/adjusting the system.

2.5.2.1 Site Selection

The following points should be considered when selecting a location for the platform.

1. Locate the platform to allow convenient maneuvering of material around the platform.

2. The location should provide a solid base to support the platform, that is relatively level.

3. The floor must be able to support the platform plus the weight that will be placed on it.

CAUTION
Absolutely no arc welding operations are to be performed on or near this Scale while the Load Cells are in place and/or connected. All Load Cells must be disconnected and removed during welding.

2.5.2.2 Standard Installation

The platform is shipped fully assembled and wired. Remove the platform from the packing materials and place it in the location where it will be used. When lifting chains are used, they should be long enough so they form a 45° angle with the platform during the lifting operation.

1. Place the platform in position.

2. The platform should be made stable and level.

3. Place a 3-foot level on the platform. Adjust the feet so the platform is level in both directions. The foot can be adjusted with a wide blade screwdriver through the hole in the top of the platform.

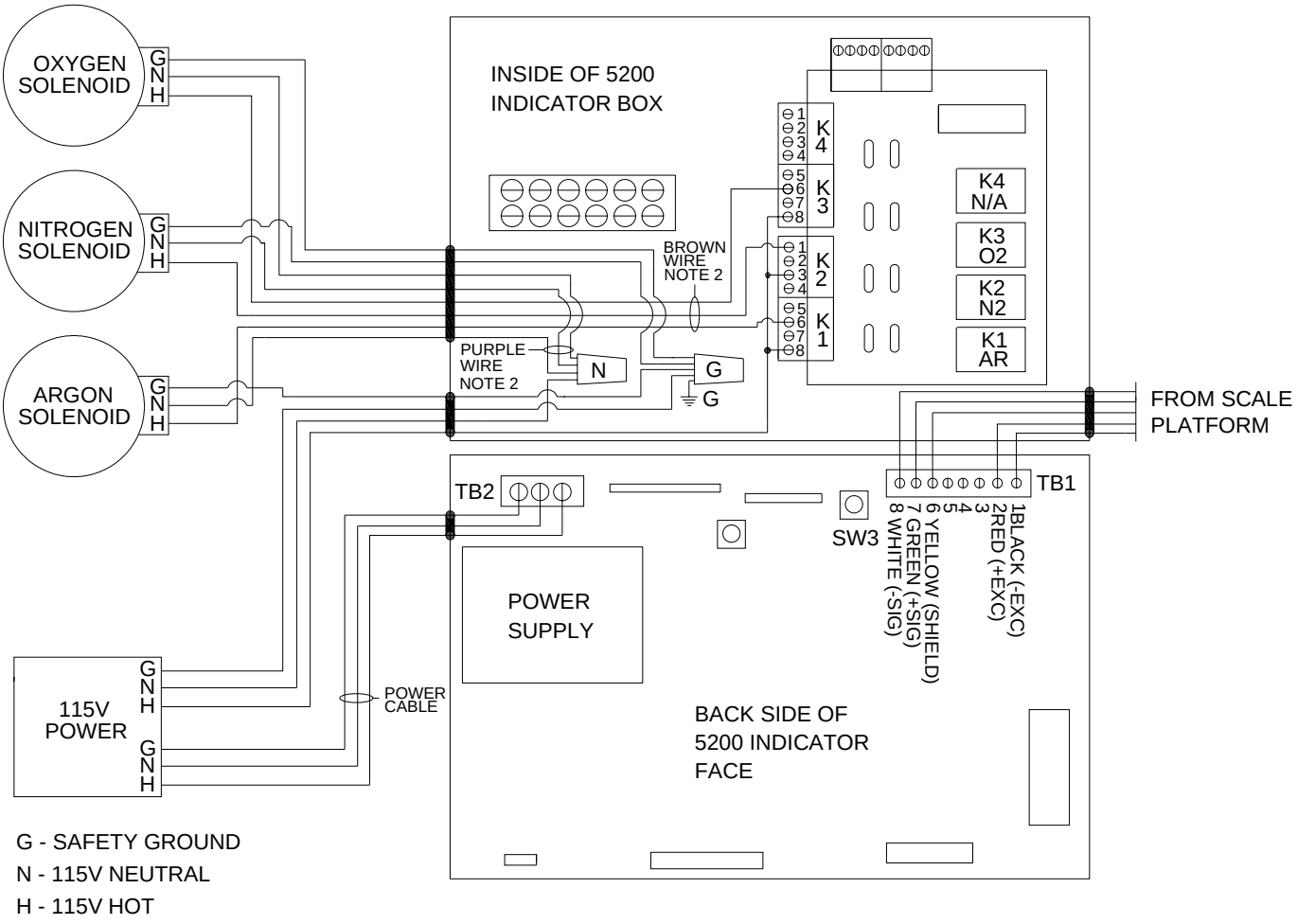
4. If ramps and/or bolt-down plates are part of the installation, they should be located and installed at this time. See Appendix B for accessory installation instructions.

AUTOMATIC SYSTEM

2.6 FAIRBANKS H90-5200A SCALE PLATFORM AND RELAY WIRING

Fairbanks H90-5200A CONTROLLER

AUTOMATIC LO-LOSS WIRING SCHEMATIC WITH THE FAIRBANKS H90-5200A LOAD CELL WIRING



AUTOMATIC LO-LOSS WIRING SCHEMATIC

NOTE 1: Do not splice into the 115V supply at TB2 on the indicator face to supply the hot and neutral leads to power the liquid solenoid(s). This can lead to erratic Lo-Loss behavior.

NOTE 2: Typically, the H90-5200A indicator is used to operate one Lo-Loss system. A brown wire (115V Hot) from the solenoid is connected at Chart to the appropriate relay bus depending on the specified liquid service. Loose purple (115V neutral) and green (safety ground) wires from the solenoid are coiled in the bottom of the indicator box and must be connected as indicated above by a qualified electrical technician.

NOTE 3: Though typically used for one service, there are 3 relays (K1, K2, and K3) in the H90-5200A indicator that can be used to operate up to 3 automatic Lo-Loss base units. However, they can only be used for the services specified. (1-Argon, 1-Nitrogen, and 1-Oxygen) It is extremely important that the solenoid services match the appropriate relays. To reiterate, argon must be wired into K1, nitrogen must be wired into K2 and oxygen must be wired into K3. Failure to follow these conventions will result in improper operation. Supplemental base units are supplied without the H90-5200A Fairbanks indicator, so the wiring from the solenoid valves is loose and must be connected as detailed in the wiring schematic above.

2.6.1 REMOVE THE FRONT COVER

WARNING: Before proceeding, remove power from the unit by unplugging the main power cord. All wiring must be done by a qualified electrical technician.

1. Loosen the (4) 7/16" hex head bolts. Gently lift the cover out and away from the indicator box.

2.6.2 RELAY WIRING TO THE SOLENOID VALVE(S)

1. The solenoid wiring must be completed by a qualified electrical technician as indicated in the wiring schematic above. Any questions can be directed to Chart Customer Service at 800-400-4683.

2.6.3 WIRE THE SCALE PLATFORM TO THE INDICATOR

The Fairbanks Aegis Basic floor scale is equipped with 25 feet of cable. Remove the cover plate on the scale platform and pull out enough cable to span the distance between the scale and the H90-5200A indicator.

1. Install the load cell cable in the bushing closest to terminal strip TB1 on the PC board and wire as follows:

TB1 Pin Number	Description	Wire Color (Fairbanks Aegis)
1	Minus (-) Excitation	Black
2	Plus (+) Excitation	Red
3	Plus (+) Sense	N/A
4	Minus (-) Sense	N/A
5		
6	Shield	Yellow
7	Plus (+) Signal	Green
8	Minus (-) Signal	White

Note: If standard load cell cable is over 25 feet long, then sense leads must be used. If sense leads are used, then cut the jumpers at JP6 and JP7 located next to TB1.

2.6.4 REPLACE THE FRONT COVER

1. The front cover must be removed for the calibration step. After the calibration is complete, replace the cover and install the hex head bolts. Tighten the bolts firmly, but do not over tighten.

2.7 FAIRBANKS H90-5200A ENTRY OF OPERATING PARAMETERS AND CALIBRATION

NOTE: Chart has released REV 1 and REV 2 versions of the H90-5200A indicator. After each calibration of the scale system and prior to returning to normal operation, the setpoint parameters must be either manually reentered (REV 1) or for the REV 2 units, the parameters are restored by pressing the "FUNC" key twice and then the "1" key. With the REV 2 units, the display will blank briefly then show "SEtPtS" and "rEStrd" to indicate that the parameters have been restored. If this does not occur when the REV 2 restoration protocol is entered, enter the REV 1

parameters as listed below. From that point forward, the parameters should be able to be restored by following the REV 2 restoration protocol listed above.

To restore the REV 1 parameters, reenter them manually as follows:

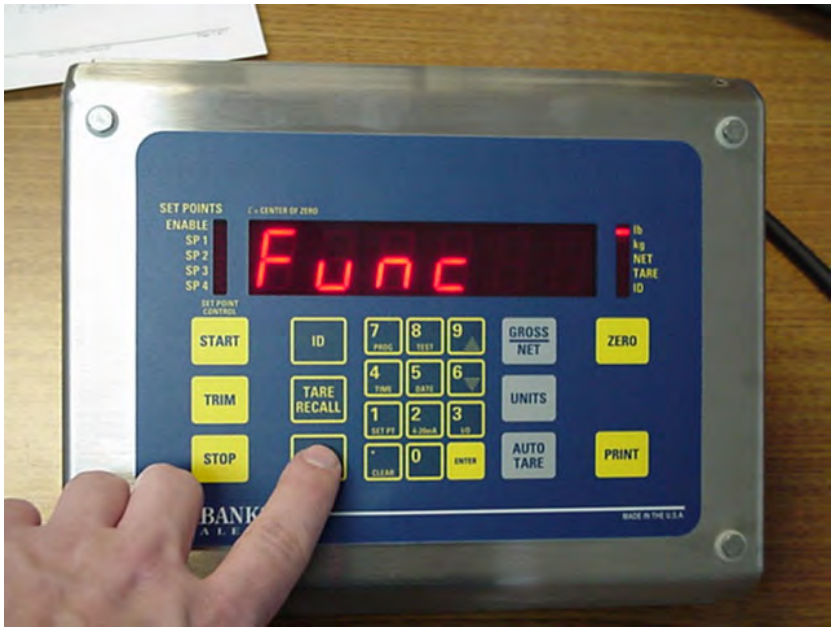
Press the function key on the indicator	
Press the #1 on the keyboard	**Display shows CAL SP**
Press the #7 on the keyboard	**Display shows SP AbA**
Press the ENTER key	**Display shows SP on 0**
Press the ENTER key	**Display shows n1 1**
Press the ENTER key	**Display shows dr 0**
Press the ENTER key	**Display shows Pr 0**
Press the ENTER key	**Display shows dc 0**
Press the ENTER key	**Display shows 2b 0**
Press the ENTER key	**Display shows SP1 off**
Press the ENTER key	**Display shows SPa2 0**
Press the ENTER key	**Display shows d1 0**
Press the ENTER key	**Display shows Print 0**
Press the ENTER key	**display clears to 0.00**

Prior to operation, the following steps must be taken to prepare the indicator for general use:

- **Configure the operating parameters (Interfacing the platform to the indicator)**
- **Perform the calibration (Assuring weighing system accuracy)**
- **Restore (REV 2) or reenter (REV 1) the setpoint parameters (Restoring the functions of the Lo-Loss system after calibration) See the NOTE above**

2.7.1 CONFIGURE THE OPERATING PARAMETERS

1. Enter the programming mode by pressing the *FUNC* key…



…followed by the *7* key.

The display will show the program number and revision level. This information should be recorded for reference. This is a non-programmable step. As detailed in the introduction to this section, there are currently 2 REV levels of the 5200 indicator. (REV 1 and 2)

2. Press the *ENTER* key…

The display will read “U” and one or more of the units indicator lights may be ON. The lighted indicator(s) show the current selection(s). Units of lb, kg, lb/kg or custom units can be selected, depending on the operators requirements.

3. Press the *ENTER* key…

The display will read “GS xxxx”, where the “xxxx” is the grad size. The grad size displayed is for the primary units selected. Grad sizes from 0.0001 to 50 can be selected. If an unacceptable grad size is selected, an error message “EIL” or “E1H” will be displayed. A grad size is unacceptable if the number of divisions for any weight unit is less than 100 or more than 10,000 (number of division = capacity/grad size). These error messages and inhibits will only be displayed when programming through the front panel. (ex. 2500 / 0.5 = 5000)

It is recommended to use a grad size of 0.5. To accomplish this, press the 9 key until “GS 0.5” is displayed on the screen.

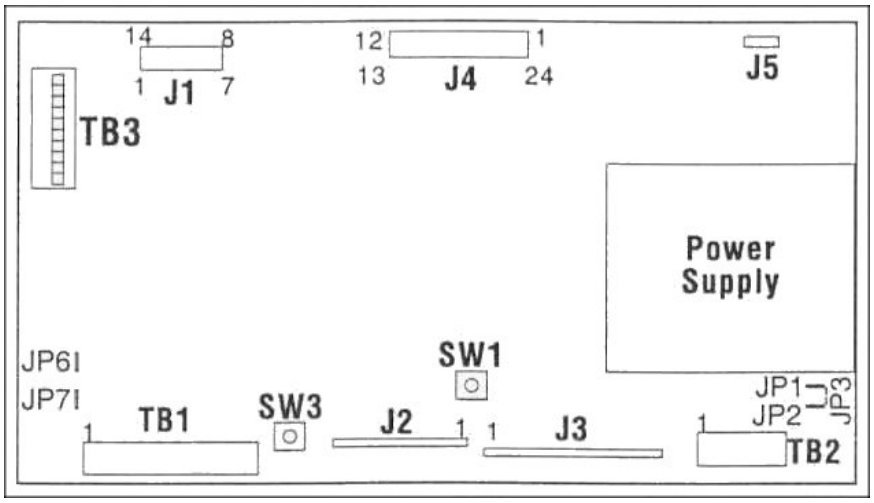
4. Press the *ENTER* key repeatedly until the main weight display returns. The factory default settings are acceptable for most applications. The following table summarizes the complete list of programming functions.

Display Reading	Operating Parameter
rEU 1 or 2	Program Number Display
U	Weight Units
GS 0.5	Grad Size
baL 2.0	Balance / Motion Band
AO 1.0	Auto Zero Tracking (AZT)
Aotd 1	Auto Zero Time Delay
OL 100	Zero Limit
AtArE 1	Auto Tare
tArE 1	Keyboard Tare
SEC 0.5 (REV 1 only)	Display Update Rate
FF 2	Digital Filter
id 0	Scale ID
td 12US	Time/Date Format
S.COde	Security Code
SL 0	Security Level
inhS 0	Inhibit Switch
rS 0	Remote Switch Enable

After *ENTER* is pressed for rS3 X, the display will return to the weigh mode.

2.7.2 CALIBRATION

1. Press the SW3 button twice. The button is located inside the front cover of the instrument on the PC board (see diagram below). **CAUTION: The indicator is energized during this step. Especially avoid the POWER SUPPLY section of the circuit board. SW3 is located in the low voltage section of the circuit board, but care must still be taken to avoid electrocution. Also take care not to push the front panel buttons when pressing SW3.**



Fairbanks H90-5200A PC Board Configuration

After the first press, the display will show the program number. After the second press, the display will show “CAL 0”.

Press “1” on the keypad…

and press the *ENTER* key once to enter the counts mode.

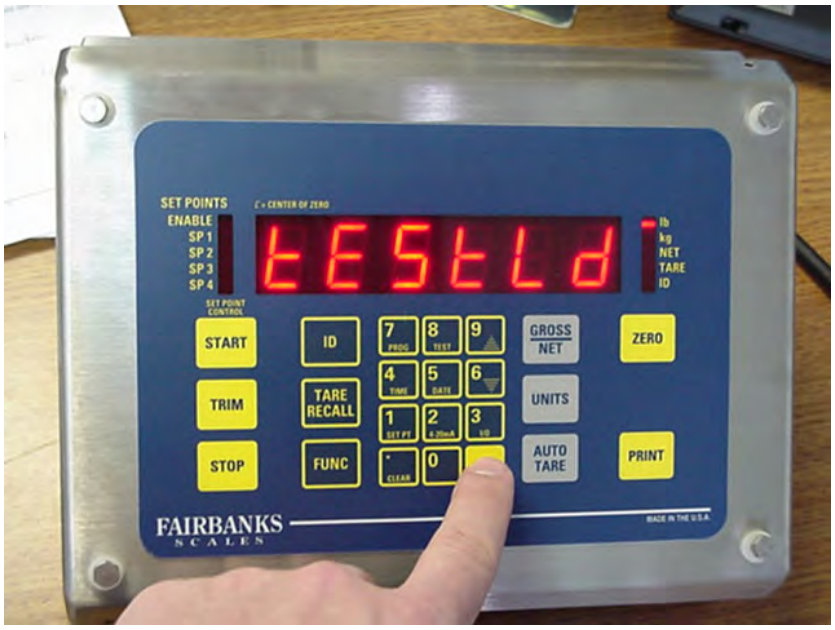
2. Remove all weight from the platform. When the display counts have stabilized, press the *ZERO* key to store the new zero value or press *ENTER* to retain the old zero reference.

Note: At any time during the calibration routine, up to the time the calibration weight is entered, the process may be aborted by pressing the GROSS/NET key repeatedly until the instrument returns to the weigh mode.

3. The display will show "0" (+/- 2) counts. If it does not, the instrument can repeatedly be re-zeroed by pressing the *ZERO* key.

4. Place a test weight on the platform. The recommended calibration weight is 500 lbs., but not less than 250 lbs. When the counts display is stable, press the *ENTER* key.

5. The display will flash "Enter" then "tEStLd" for calibration of the test load.



Enter the amount of test weight used in step 4, using the numeric keypad and press *ENTER*.

Note: The picture indicates a test load of 800. This is for demonstration purposes ONLY. YOU MUST ENTER THE ACTUAL CALIBRATION WEIGHT APPLIED TO THE PLATFORM IN STEP 4.

6. The display will flash “Enter” and then “CAP”, then show the currently programmed scale capacity. The Aegis Basic floor scales used with the Lo-Loss systems have a capacity of 2500 pounds. Enter 2500 as shown in the photo below.

7. If the calibration is successful, the display will show a number, preceded by a flashing "0". This number represents the zero calibration point. Record this number for future reference. Press the *ENTER* key to advance to the next step.

8. The display will show a number, preceded by a flashing "S". This number represents the span A/D counts. The span A/D counts represents the difference between the capacity A/D counts and the zero A/D counts.

9. Press the *ENTER* key to exit the calibration mode.

a. NOTE: If the calibration values are unacceptable, the display will show one of two error messages, "E2L" or "E2H". This usually indicates that an incorrect grad size has been selected or the platform has a problem. Press any key to restart the calibration procedure.

MANUAL SYSTEM

2.8 FAIRBANKS IND-HR2300 SCALE PLATFORM WIRING

Fairbanks IND-HR2300 (Manual) Indicator

2.8.1 REMOVE THE FRONT COVER

WARNING: **Before proceeding, remove power from the unit by unplugging the main power cord.**

1. Swivel the unit until the indicator screen and keyboard are facing down.

2. Remove the screws from the cover plate on the back of the unit with a phillips-head screwdriver.

3. The front portion (indicator and keyboard) will separate from the base unit.

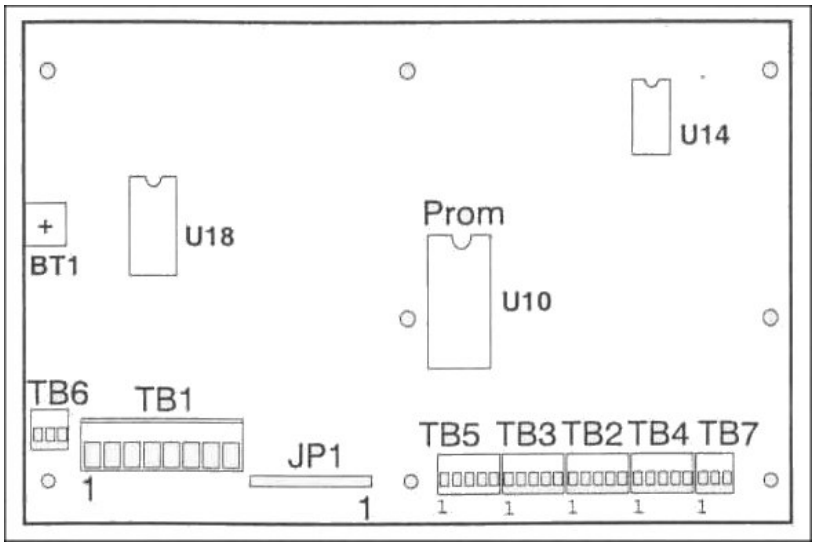
2.8.2 INSTALL THE SCALE PLATFORM CABLE

The Fairbanks Aegis Basic floor scale is equipped with 25 feet of cable. Remove the cover plate on the scale platform and pull out enough cable to span the distance between the scale and the IND-HR2300 indicator.

1. Install the load cell cable in the bushing closest to terminal strip TB1 on the PC board and wire as follows:

Terminal Number	Description	Wire Color (Fairbanks Aegis)
TB1-1	Minus (-) Excitation	Black
TB1-2	Plus (+) Excitation	Red
TB1-3	Plus (+) Sense	N/A
TB1-4	Minus (-) Sense	N/A
TB1-5	NC	N/A
TB1-6	Shield	Yellow
TB1-7	Plus (+) Signal	Green
TB1-8	Minus (-) Signal	White

Note: Sense leads MUST be jumpered if they are not used. Place a jumper from (+) sense to (+) excitation (TB1-3 to TB1-2) then a jumper from (-) sense to (-) excitation (TB1-4 to TB1-1). Use sense leads at any cable distance over 25 feet.



Fairbanks IND-HR2300 PC Board Configuration

2.8.3 REPLACE THE FRONT COVER

1. Reposition the front cover over the base unit.

2. Replace and tighten the mounting screws.

3. Power up the unit and proceed to Section 2.9 for scale calibration.

2.9 FAIRBANKS IND-HR2300 CALIBRATION

Prior to operation, the following steps must be taken to prepare the indicator for general use:

- **Establish a security code**
- **Configure the weighing parameters (Interfacing the platform to the indicator)**
- **Perform the calibration (Assuring weighing system accuracy)**

2.9.1 ESTABLISH A SECURITY CODE

There are two (2) security codes that MUST be set. To get a feel for the software flow of this instrument and set an "S Code", set the code then load a "canned" (factory defaults) menu. This accomplishes not only setting the code, but the "canned" menu clears the registers and loads a default program. This is much like an initialization in other instruments. This will familiarize the technician with the programming method(s) used in the IND-HR2300 instruments.

Here are some helpful hints:
- Pressing the *Gross/Net* key in programming mode will exit to the weigh mode
- Pressing *Scroll* moves through choices
- Pressing *Enter* selects the choice
- If you make a programming mistake, just exit, then go back in and try again.

Create a security code by following the steps in the table below.

Key Pressed	**Display Reading**
Pgr	InFo (main menu choice)
Scroll	io (main menu choice)
Scroll	CAnnEd
Enter	S CodE
Gross/Net	=
UnitS	= U
Scroll	= US
ID	= USI
Pgr	= USIC
4	= USIC4
Enter	NUPASS (meaning new password)
XXXXXX	Enter up to a six (6) digit service code

Enter	CLrPon (password needed after power-up)
Scroll	ClrFin (password needed upon menu re-entry) *preferred
Enter	S dAtE, then blank display
XXXXXX	Enter date in MMDDYY format
Enter	StorE
Enter	StorEd Adinit

This indicator should return to the weight display. Cycle power to the unit and proceed with configuration programming.

2.9.2 CONFIGURE THE WEIGHING PARAMETERS

Configure the weighing parameters by following the steps in the table below.

Key Pressed	**Display Reading**	**Function**
Pgr	inFo	Start
Scroll	io	
Scroll	CannEd	
Scroll	ConFig	
Enter	S CodE	
XXXXXX	Enter S Code	
Enter	S dAtE	
XXXXXX	Enter date in MMDDYY format	
Enter	UnitS	Units
Enter	ActivE	
Scroll	Observe LED's and scroll to get desired units	
Enter	PU (if more than 1 unit selected)	
Scroll	Observe LED's and scroll to desired primary unit	
Enter	UnitS	
Scroll	d	Div
Enter	0.1	
Scroll	(0.0002 to 50) scroll until the display reads 0.5	
Enter	d	
Scroll	bAL	bAL
Enter	3.0	
Scroll	nonE, 0.5, 1.0, 3.0 scroll to desired bAL parameter	
Enter	bAL	
Scroll	A2t	Azt
Enter	3.0	
Scroll	nonE, 0.5, 1.0, 3.0 scroll to desired Azt parameter	
Enter	A2t	
Scroll	0.rangE	Ornge

Enter	100	
Scroll	nonE, 2 scroll to desired zero range	
Enter	0.rangE	
Scroll	tArE	tArE
Enter	both	
Scroll	nonE, Auto, tA, Ent, scroll to desired tare setting	
Enter	tArE	
Scroll	UpdAtE	UpdAtE
Enter	0.2	
Scroll	0.4, 0.6, 0.8 scroll to desired update rate	
Enter	UpdAtE	
Scroll	FiLtEr	Fltr
Enter	CEntEr	
Scroll	FASt, Slo, scroll to desired filtering	
Enter	FiLtEr	
Scroll	CAttLE	CAttLE
Enter	CatL 0 (1=yes, goes to Cb xxx, 0=no)	
Scroll	1	
Enter	Cb 5 (scroll to increase, ID key to decrease)	
Enter	CAttLE	
Scroll	SECUrE	SECUrE
Enter	FL 0 (Front Lock, 0=OFF, 1=ON)	
Scroll	1	
Enter	SECUrE	
Scroll	StorE (press Pgr to abort)	
Enter	StorEd	
	CAL	
Scroll	CALno0	
Scroll	Weight Display (done with ConFig)	

2.9.3 CALIBRATION

Calibration can be accomplished only after configuration has been completed. Be certain you have the proper amount of test weights available at the site. The 2300 series instruments will display an error code (LoSPAn) if weights used are not at least 12.5% of the programmed capacity. It will still complete calibration but use proper test loads to satisfy Weights and Measures and to get a steady, linear weight display. Be sure the scale platform is empty before proceeding.

Calibration can be accomplished by following the steps in the table below.

Key Pressed	**Display Reading**
Pgr	inFo
Scroll	io
Scroll	CannEd
Scroll	ConFig
Scroll	CAL
Enter	S CodE
XXXXXX	Enter S Code

Enter	S datE then blank
XXXXXX	Enter date in MMDDYY format
Enter	Adinit
	AdSPAn (A-D Span)
	Ad 0 (A-D Zero)
	Adinit
	SC CAP (scale capacity)
	1000.0 (capacity set in Canned Menu)
2500.0	Enter the scale capacity
Enter	Adinit (A-D Initialize)
	-then-
	XXXXXX (deadload counts, check that platform is UNLOADED)
Zero	Stby25
	Adinit
	Stby25
	Adinit
	Load (Add test weights)
XXXXXX	Enter test load on keypad
Enter	Stby25
	Adinit
	Stby25
	Adinit
	XXXXXX Weight Display (calibration is done)

There are two (2) possible error codes that may be displayed at the end of **CAL**. "**LoSPAn**" means that less than 12.5% of set capacity was used. Press *Enter* to continue.

"**Lo CPd**" means that the counts per division is low. Press *Enter* to continue or you may have to select a more appropriate division size and recalibrate. It is possible to get both error codes displayed, one after the other if you have both conditions.

OPERATION

3.1 GENERAL

This section provides procedures for proper connection of the Lo-Loss to liquid cylinders and the proper operation of the Lo-Loss controls for a filling operation. Separate procedures are provided for operation of the manual and automatic units. These procedures assume that the installation procedures in Chapter 2 have been successfully performed.

3.2 AUTOMATIC OPERATION

Automatic operation can be performed with the Aegis Basic floor scale and H90-5200A controller or equivalent scale/controller combination. The defining characteristic of automatic operation is that the user enters the fill parameters into the controller. The controller performs the entire fill process automatically. A solenoid valve opens automatically to start the fill process and closes automatically to

terminate the fill process. The following procedure should be utilized for automatic liquid cylinder filling.

1. Zero the scale (if necessary).

2. Place a liquid cylinder on the scale and note the weight shown on the indicator.

3. Connect the Lo-Loss liquid fill outlet to the liquid cylinder liquid line (blue handle valve) with a stainless steel transfer hose or suitable alternative. Connect the Lo-Loss vent inlet to the liquid cylinder vent outlet line (silver handle valve) with a stainless steel transfer hose or suitable alternative. Note the weight shown on the indicator with the hoses attached. Subtract the weight found in step (2) from this weight. This is the *hose weight*.

4. Make sure that the *PB* (Pressure Building) and *GAS USE* (both green handle valves) are closed. With the hoses securely tightened, open the *VENT VALVE* on the liquid cylinder. Allow the liquid cylinder pressure to drop below the bulk tank pressure. When venting stops, open the liquid cylinder *LIQUID* valve.

5. Press the *START* button on the **Lo-Loss** controller.

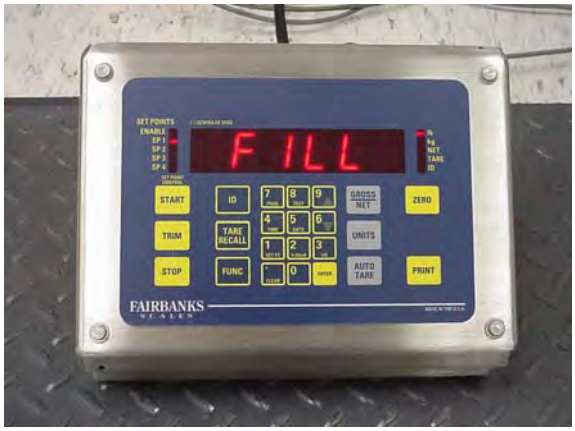
6. The digital readout on the controller will flash the following product codes in sequence:

Press 1, 2, or 3 on the keypad according to the following:

- For argon, press 1
- For nitrogen, press 2
- For oxygen, press 3

7. The digital readout on the controller will display “TARE”. Add the liquid cylinder *tare weight* stamped on the DOT data plate to the *hose weight* determined in step (3) above. Type this value on the keypad and press the *ENTER* button. **Note: The 300 value shown in the photo below is for demonstration only. The actual tare weight of the cylinder plus the hose weight MUST be entered.**

8. The digital readout on the controller will now display “FILL”. Type the product fill weight from an appropriate DOT fill weight table and press the *ENTER* button. At this point, the solenoid valve will open and allow product to flow into the liquid cylinder. The digital readout will display **net product weight** during the fill process. Also, the Lo-Loss system will maintain the liquid cylinder pressure at 30 psi *less* than the bulk tank. **Note: The 400 value shown in the photo below is for demonstration only. The actual DOT fill weight as specified in the operating manual MUST be entered.**



9. When the liquid cylinder has reached the full setpoint (tare weight plus product fill weight), the solenoid valve will close and terminate the fill. The Lo-Loss vent regulator will maintain the liquid cylinder pressure at 30 psi *less* than the bulk tank until the cylinder is removed from the scale.

10. When the fill cycle is complete, close the *VENT* and *LIQUID* valves on the liquid cylinder. Release pressure in the liquid fill hose by opening the *HOSE BLOWDOWN* valve. Disconnect and remove the transfer hoses.

11. Remove the liquid cylinder from the scale.

12. The Lo-Loss is ready to fill another liquid cylinder.

3.3 MANUAL OPERATION

Manual operation can be performed with the Aegis Basic floor scale and IND-HR2300 indicator or any scale/indicator combination. The defining characteristic of manual operation is that a valve must be manually opened and closed to facilitate liquid cylinder filling. The following procedure should be utilized for manual liquid cylinder filling.

1. Zero the scale (if necessary).

2. Place a liquid cylinder on the scale and note the weight shown on the indicator.

3. Connect the Lo-Loss liquid fill outlet to the liquid cylinder liquid line (blue handle valve) with a stainless steel transfer hose or suitable alternative. Connect the Lo-Loss vent inlet to the liquid cylinder vent outlet line (silver handle valve) with a stainless steel transfer hose or suitable alternative. Note the weight shown on the indicator with the hoses attached. Subtract the weight found in step (2) from this weight. This is the *hose weight*.

4. Make sure that the *PB* (Pressure Building) and *GAS USE* (both green handle valves) are closed. With the hoses securely tightened, open the *VENT VALVE* on the liquid cylinder. Allow the liquid cylinder pressure to drop below the bulk tank pressure. When venting stops, open the liquid cylinder *LIQUID* valve.

5. Open the *BALL VALVE* on the Lo-Loss system. Liquid will begin flowing from the bulk tank to the liquid cylinder.

6. Observe the weight on the scale indicator. Allow filling to continue until the weight equals the sum of the following three components:

    - Liquid cylinder tare weight (stamped on the DOT data plate)
    - Allowable DOT fill weight as specified in the liquid cylinder operating manual. This value is a function of the cylinder capacity and the relief valve setting
    - The hose weight determined in Step 3 above

7. When the weight reaches the proper fill weight as determined in Step 6, close the *BALL VALVE* on the Lo-Loss system.

8. Close the liquid cylinder *LIQUID* and *VENT* valves and open the *HOSE BLOWDOWN* valve on the Lo-Loss liquid fill line.

9. Disconnect and remove the transfer hoses from the *LIQUID* and *VENT* connections on the liquid cylinder.

10. Remove the liquid cylinder from the scale.

11. The Lo-Loss is ready to fill another liquid cylinder.

MAINTENANCE

4.1 GENERAL

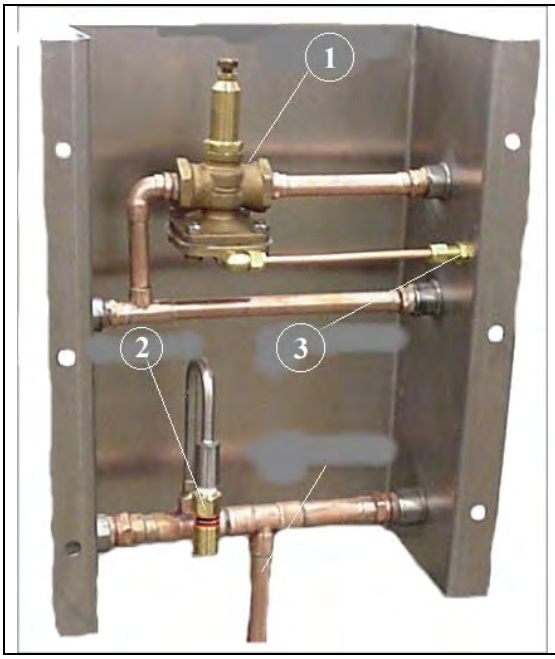
Maintenance of the Lo-Loss system is presented in this section and consists of routine checks and inspection, replacement of parts and adjustments.

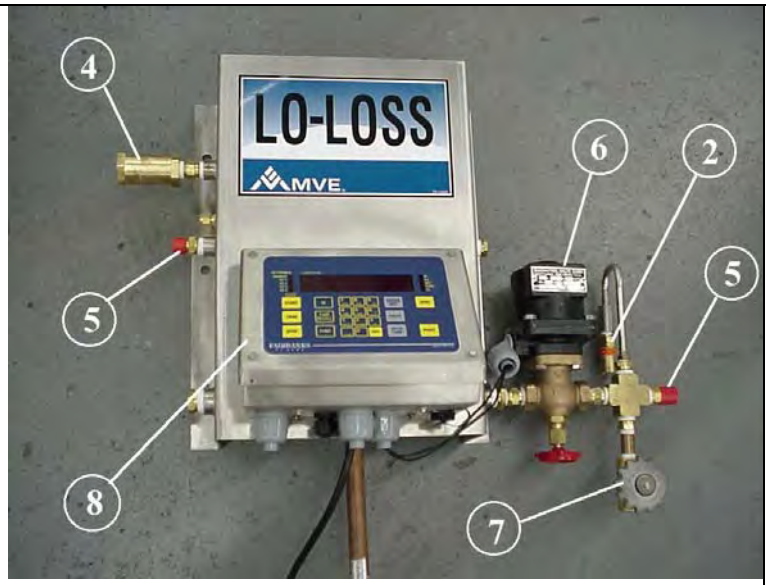
4.2 ROUTINE CHECKS AND INSPECTIONS

Check or inspect the following items on a regular basis:

- Check all threaded fittings for leaks and make any necessary repairs
- Check valve operation and valve packing; repair as necessary
- Check the condition of all fill and vent hoses. Ensure that there is no damage that could lead to a rupture.
- Clean all parts if there is excessive dirt or grease buildup.

4.3 REPLACEMENT OF PARTS





PARTS LIST				
Item	**Part Number**	**Qty**	**Spares***	**Description**
1	11081723	1		Regulator Differential Pressure – 30 psig (2.1 barg)
2	11074574	1	1	Pressure Relief Valve – ¼" MPT (350 psig / 24.1 barg)

3	11200585	1		Union Bulkhead Connector – ¼”ODT x ¼”ODT
4	11051090	1		Check Valve – ½” NPT
5	1110122	1	1	Male Connector – ½” ODT x ½” MPT (Argon or Nitrogen)
5	1110912	1	1	Male Connector – 5/8” ODT x ½” MPT (Oxygen)
6	10925509	1		Solenoid Valve – ½” NPT (Automatic Configuration)
6	11083219	1		Ball Valve – ½” NPT (Manual Configuration)
7	1713202	1		Globe Valve – 3/8” NPT
8	11083884	1		Scale Controller – Fairbanks Model H90-5200-A (Automatic)
N/A	11195149	1		Scale Indicator – Fairbanks Model IND-HR2300 (Manual)
N/A	11083884	1		Floor Scale – Fairbanks Aegis Basic
N/A	9713109	2		Transfer Hose – ½” ODT x ½” ODT (Argon or Nitrogen)
N/A	10903501	2		Fill Adapter – ½” ODT x ½” ODT (Argon or Nitrogen)
N/A	9713119	2		Transfer Hose – 5/8” ODT x 5/8” ODT (Oxygen)
N/A	10906498	2		Fill Adapter – 5/8” ODT x 5/8” ODT (Oxygen)
N/A	11520925	1	1	Regulator Repair Kit

*Recommended spare parts.

4.4 Adjustments

No adjustments should be necessary on the Lo-Loss system. Do not attempt to adjust the vent system regulator. This regulator is preset at the factory and is the main component that ensures proper performance of the Lo-Loss function. Call Chart customer service at 800-400-4683 if you suspect a regulator problem.

APPENDIX

A. SAFETY BULLETIN

Portions of the following information are extracted from Safety Bulletin SB-2 from the Compressed Gas Association, Inc (CGA). Additional information on nitrogen and argon and liquid cylinders is available in CGA Pamphlet P-9. Write to the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

From CGA Safety Bulletin

Cryogenic containers, stationary or portable, are from time-to-time subjected to assorted environmental conditions of an unforeseen nature. This safety bulletin is intended to call attention to the fact that whenever a cryogenic container is involved in any incident whereby the container or its safety devices are damaged, good safety practices must be followed. The same holds true whenever the integrity or function of a container is suspected of abnormal operation.

Good safety practices dictate that the contents of a damaged or suspect container be carefully emptied as soon as possible. Under no circumstances should a damaged container be left with product in it for an extended period of time. Further, a damaged or suspect container should not be refilled unless the unit has been repaired and recertified.

Incidents which require that such practices be followed include: highway accidents, immersion in water, exposure to extreme heat or fire, and exposure to most adverse weather conditions (earthquakes,

tornadoes, etc). As a rule of thumb, whenever a container is suspected of abnormal operation, or has sustained actual damage, good safety practices must be followed.

In the event of known or suspected container vacuum problems (even if an extraordinary circumstance such as those noted above has not occurred), do not continue to use the unit. Continued use of a cryogenic container that has a vacuum problem can lead to embrittlement and cracking. Further, if the cylinder is constructed with a carbon steel jacket, inordinate stress conditions caused by an inner liquid leak could possibly cause the carbon steel jacket to rupture.

Prior to reusing a damaged container, the unit must be retested, evaluated, and repaired as necessary. It is highly recommended that any damaged container be returned to Chart for repair and recertification.

The remainder of this safety bulletin addresses those adverse environments that may be encountered when a cryogenic container has been severely damaged. These are oxygen deficient atmospheres, oxygen enriched atmospheres and exposure to inert gases.

OXYGEN DEFICIENT ATMOSPHERES

The normal oxygen content of air is approximately 21%. Depletion of oxygen content in air, either by combustion or by displacement with inert gas, is a potential hazard and users should exercise suitable precautions.

One aspect of this possible hazard is the response of humans when exposed to an atmosphere containing only 8 to 12% oxygen. In this environment, unconsciousness can be immediate with virtually no warning.

When the oxygen content of air is reduced to about 15 or 16%, the flame or ordinary combustible materials, including those commonly used as fuel for heat or light, may be extinguished. Somewhat below this concentration, an individual breathing the air is mentally incapable of diagnosing the situation because the onset of symptoms such as sleepiness, fatigue, lassitude, loss of coordination, errors in judgement, and confusion can be masked by a state of “euphoria”, leaving the victim with a false sense of security and well being.

Human exposure to atmospheres containing 12% or less oxygen leads to rapid unconsciousness. Unconsciousness can occur so rapidly that the user is rendered essentially helpless. This can occur if the condition is reached by immediate change of environment, or through the gradual depletion of oxygen.

Most individuals working in or around oxygen deficient atmospheres rely on the “buddy system” for protection. Obviously, the “buddy” is equally susceptible to asphyxiation if he or she enters the area to assist an unconscious partner unless equipped with a portable air supply. Best protection is obtainable by equipping all individuals with a portable supply of respirable air. Life lines are acceptable only if the area is essentially free of obstructions and individuals can assist one another without constraint.

If oxygen deficient atmosphere is suspected or known to exist:

1. Use the “buddy system”. Use more than one “buddy” if necessary to move a fellow worker in an emergency.
2. Both the worker and the “buddy” should be equipped with self-contained or air line breathing equipment.

OXYGEN ENRICHED ATMOSPHERES

An oxygen-enriched atmosphere occurs whenever the normal oxygen content of air is allowed to rise above 23%. While oxygen is non-flammable, ignition of combustible materials can occur more readily in an oxygen-rich atmosphere than in air; and combustion proceeds at a faster rate although no more total heat is released.

It is important to locate an oxygen system in a well-ventilated location since oxygen-rich atmospheres may collect temporarily in confined areas during the functioning of a safety relief device or leakage from the system.

Oxygen system components, including but not limited to, containers, valves, valve seats, lubricants, fittings, gaskets and interconnecting equipment including hoses, shall have adequate compatibility with oxygen under the conditions of temperature and pressure to which the components may be exposed in the containment and use of oxygen. Easily ignitable materials shall be avoided unless they are parts of equipment or systems that are approved, listed or proved suitable by tests or by past experience.

Compatibility involves both combustibility and ease of ignition. Materials that burn in air may burn violently in pure oxygen at normal pressure and explosively in pressurized oxygen. In addition, many materials that do not burn in air may do so in pure oxygen, particularly when under pressure. Metals for containers and piping must be carefully selected, depending on service conditions. The various steels are acceptable for many applications but some service conditions may call for other materials (usually copper or its alloys) because of their greater resistance to ignition and lower rate of combustion.

Similarly, materials that can be ignited in air have lower ignition energies in oxygen. Many such materials may be ignited by friction at a valve seat or stem packing, or by adiabatic compression produced when oxygen at high pressure is rapidly introduced into a system initially at low pressure.

NITROGEN AND ARGON

Nitrogen and argon (inert gases) are simple asphyxiates. Neither gas will support or sustain life and can produce immediate hazardous conditions through the displacement of oxygen. Under high pressure, these gases may produce narcosis even though an adequate oxygen supply, sufficient for life, is present.

Nitrogen and argon vapors in air dilute the concentration of oxygen necessary to support or sustain life. Inhalation of high concentrations of these gases can cause anoxia, resulting in dizziness, nausea, vomiting, or unconsciousness and possibly death. Individuals should be prohibited from entering areas where the oxygen content is below 19% unless equipped with a self-contained breathing aparatus. Unconsciousness and death may occur with virtually no warning if the oxygen concentration is below approximately 8%. Contact with cold nitrogen or argon gas or liquid can cause cryogenic (extreme low temperature) burns and freeze body tissue.

Persons suffering from lack of oxygen should be immediately moved to areas with normal atmoshpheres. SELF CONTAINED BREATHING APPARATUS MAY BE REQUIRED TO PREVENT ASPHYXIATION OF RESCUE WORKERS. Assisted respiration and supplemental oxygen should be given if the victim is not breathing. If cryogenic liquid or cold boil-off gas contacts a worker's skin or eyes, the affected tissues should be promptly flooded or soaked with tepid water (105-115°F; 41-46°C). DO NOT USE HOT WATER. Cryogenic burns which result in blistering or deeper tissue freezing should be examined promptly by a physician.

Chart liquid cylinders are safely designed with the following features:

1. A vacuum maintenance system specifically designed to provide long life and all possible safety provisions.

2. Safety relief devices to protect the pressure vessel and vacuum casing, sized and selected in accordance with CGA S-1.1 standards to include a dual relief valve and rupture disk system to protect the pressure vessel and a reverse buckling rupture disc to protect the vacuum casing from over-pressure. While Chart equipment is designed and built to the most rigid standards, no piece of mechanical equipment can ever be 100% foolproof.

B. AEGIS BASIC FLOOR SCALE SPECIFICATIONS

B.1 PLATFORM SPECIFICATIONS

MODEL #	SIZE	CAPACITY
PLF-R3400-B	3’ X 3’	1,000 lb
PLF-R3400-C*	3’ X 3’	2,500 lb
PLF-R3400-D	4’ X 4’	2,500 lb
PLF-R3400-F	4’ X 4’	5,000 lb
PLF-R3400-I	4’ X 4’	10,000 lb
PLF-R3400-O	4’ X 5’	5,000 lb
PLF-R3400-P	4’ X 5’	10,000 lb
PLF-R3400-Q	4’ X 6’	5,000 lb
PLF-R3400-R	4’ X 6’	10,000 lb
PLF-R3400-G	5’ X 5’	5,000 lb
PLF-R3400-J	5’ X 5’	10,000 lb
PLF-R3400-H	5’ X 7’	5,000 lb
PLF-R3400-K	5’ X 7’	10,000 lb

* Standard model for Lo-Loss systems.

B.2 LOAD CELL SPECIFICATIONS

1. Load Cells: 350 ohm

2. Material: Mild Steel

3. Load cell output: 3 mV/V

4. Compensated temperature range: -10° C to 40° C

5. Safe operating temperature range: -40° C to 80° C

6. Safe overload range: 150% of rated capacity

B.3 ACCESSORIES

The accessories, ramps, bolt-down plates, bumper guards and pit frames are used in combinations in specific applications. The following configurations are to be followed:

1. Each ramp has the bolt-down plates as part of the ramp.

2. If two ramps are to be installed, no additional bolt-down plates are needed as there will be two bolt-down plates with each ramp.

3. If one ramp is installed, two additional bolt-down plates must be ordered and installed.

4. If no ramps are installed and bolt-down plates are needed, see the list in Subsection 2.4.4.2.3 for the correct accessory number.

5. No more than two ramps, located on opposite sides of the platform, may be installed.

6. Bumper guards are only used when bolt-down plates have been installed to secure the platform.

There are four groups of accessories designed for the PLF-R3400 series platforms: ramps, bumper guards, bolt-down plates and pit frames.

B.3.1 Ramp Accessories

Each ramp accessory consists of one ramp weldment and four anchor bolts. Ramps come in mild steel.

Accessory Number	Ramp Size	Platform Capacity (lb)
ACC-1706	3’	1,000 – 2,500
ACC-1707	4’	2,500 – 10,000
ACC-1709	5’	5,000 – 10,000

B.3.2 Bumper Guard Accessories

Bumper Guards are used when only one ramp is used with the platform or the platform needs to be protected from approaching traffic. The bumper guard bolts into the floor on the side of the platform opposite the ramp. Bumper Guards are made in mild steel and are supplied with anchor bolts.

Accessory Number	Bumper Guard Size	Platform Capacity (lb)
ACC-1717	3’	1,000 –2,500
ACC-1718	4’	2,500 – 10,000
ACC-1720	5’	2,500 – 10,000
ACC-1722	6’	2,500 – 10,000
ACC-1724	7’	5,000 – 10,000

B.3.3 Bolt-down Accessories

The bolt-down accessory consists of two packages. One consists of four bolt-down plates and eight anchor bolts. The other one consists of two bolt-down plates and four anchor bolts.

Accessory Number	Bolt Down Plates	Platform Capacity (lb)
ACC-1745	Set of Four	1,000 – 10,000
ACC-1746	Set of Two	1,000 – 10,000

B.3.4 Pit Frame Accessories

The pit frame accessory is designed for applications where the platform to be set into the floor. The pit frame is a one-piece welded unit. The pit frames are made in mild steel.

Accessory Number	Bumper Guard Size	Platform Capacity (lb)
ACC-1728	3’ X 3’	1,000 –2,500
ACC-1729	4’ X 4’	2,500 – 10,000
ACC-1730	4’ X 5’	2,500 – 10,000
ACC-1732	4’ X 6’	5,000 – 10,000
ACC-1734	5’ X 5’	5,000 – 10,000
ACC-1736	5’ X 7’	5,000 – 10,000

B.4 INSTALLATION OF ACCESSORIES

B.4.1 Installation of Ramps

One or two ramps may be installed on a platform. The ramp is shipped with the anchor bolt/foot locator tabs as part of the ramp. When only one ramp is used, it is recommended that a set of two bolt down plates be installed on the feet opposite the ramp to secure the platform.

B.4.2 One Ramp Installation

To install a single ramp with bolt down plates:

1. Place the platform in position where it will be located.

2. Lift the edge of the platform where the ramp is to located and slide the ramp under the edge of the platform.

3. Lower the platform onto the ramp, making sure the feet drop into the holes in the locating tabs. It may be necessary to loosen the load cell bolts and align the load cell so the foot fits into the hole. Re-tighten the bolts.

4. The edge of the locating tab will extend beyond the edge of the platform. Drill the holes for the four anchor bolts. The holes should be drilled with a 3/8” drill, 3.75 inches deep.

5. Install the four 3/8” anchor bolts.

6. Install the two bolt down plates on the side of the platform opposite the ramp.

7. Lift the corners of the platform at the ramp side and adjust the feet so that the top of the ramp and the top of the platform are flush. The platform must be stable on the floor.

B.4.3 Installation of Pit Frames

The Pit Frame Accessory is designed for use where the platform is to be set into the floor. In general, a hole is dug, the pit frame is installed, concrete is poured around the frame, and the platform is installed in the pit.

B.4.3.1 Pit Construction

1. Place the pit frame in the approximate position it will occupy on the floor.

2. Mark out the position of the hole to be dug. The hole MUST be a minimum of 8" larger than the pit frame on all sides. Should pit drainage be required, slope the pit floor, maintaining a level area at each corner.

3. The hole will have to be deep enough to accommodate the pit coping, plus the thickness of the pit floor.

4. Place two or more 2x4's across the pit frame. The 2x4's should be long enough to span the hole into which the frame will be placed.

5. With a loop of wire around the sides, secure the pit frame to the 2x4's. This wire will be cut away later.

6. Place the pit frame in the hole. The 2x4's should bridge the hole.

7. Level the pit frame by placing shims under the ends of the 2x4's. The pit frame should be level from end to end, as well as from side to side.

8. Install a section of ¾ inch conduit in the side section of the pit frame, using the hole provided.

NOTE The conduit must be installed through the hole provided. Align the pit frame and conduit with the desired scale location.

9. With the pit frame in place and secured, pour the concrete.

NOTE There must be a level area on the pit floor at each corner of the pit. This is where the platform feet will be set.

B.4.4 Platform Installation

When the concrete has cured to a strength greater than 3,500 psi, the platform can be installed.

1. Bring the cable from the indicator to the corner of the platform where the pit conduit is located.

2. Bring the instrument cable through the conduit in the side of the pit and out to the instrument location.

3. Place the platform into the pit. Make sure the feet fit into the stud pattern in each of the corners of the pit frame.

4. Adjust the feet so the platform is stable in the pit and flush with the pit edges. It will be necessary to lift the platform out of the pit to adjust the feet.

B.5 INTERFACE

The Junction Box, FAS-20 is located under the access panel on the top of the platform. Remove the phillips-head screw holding down the access panel.

The junction box is factory wired. There is 25 feet of 9-conductor cable with shield to go to the indicator, prewired into the box.

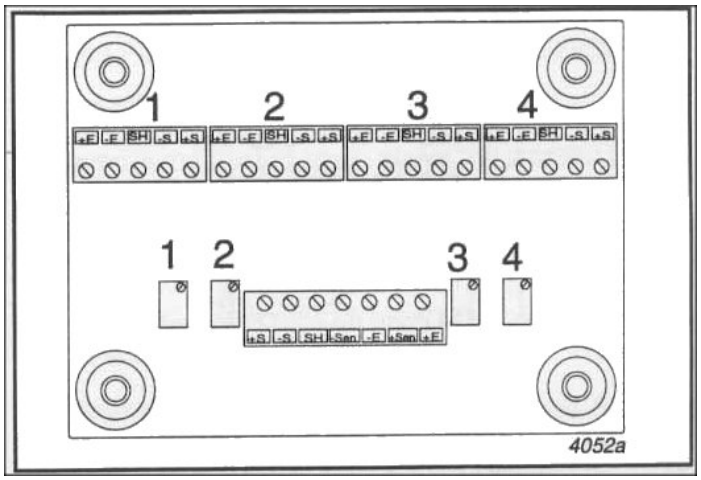
Cable may be shortened with no negative effects but splicing is not recommended.

The wiring code for the cables between the load cells and the junction box is as follows:

Load Cell Used in Mild Steel Scale	
Red	+ Excitation
Black	- Excitation
Green	+ Signal
White	- Signal
Yellow	Ground

B.6 INSTALLATION

B.6.1 Junction Box



JUNCTION BOX FAS-20 PC BOARD

The junction box has a 30 foot cable installed to connect the platform to the indicator. After the platform and the indicator have been connected, the balance network must be adjusted. This is done by adjusting the potentiometers located in the Junction Box. To adjust the network:

1. Turn all of the potentiometers clockwise up to 30 turns to the "zero" position. There is a "click" when the end is reached. Center the potentiometer by turning 15 turns counter-clockwise.

2. Place a test weight, equal to 25% of the platform capacity, on corner 1 and record the displayed weight.

3. Repeat step 2 on each of the corners.

4. Identify the corner that displays the lowest weight value. The other corners will be adjusted to this value by adjusting the appropriate potentiometer.

5. Place the test weight on the "second" lowest corner. Turn the potentiometer for that load cell counter-clockwise until the indicator reading matches the reading for the "lowest" load cell.

6. Repeat step 5 for each of the remaining two load cells.

7. Once all of the potentiometers have been adjusted, place the test weight on each of the corners to verify that they all display the same value.

B.7 SERVICE INFORMATION

B.7.1 Foot Replacement

Should one of the feet fail, it can be replaced. To replace a foot:

1. Lift the corner of the scale with the failed foot about 6 inches and secure with wooden blocks.

2. Unscrew the foot from the load cell through the hole in the top of the platform.

3. Install the new foot by screwing it into the load cell. There are no jam nuts involved.

4. Lower the platform to the floor and adjust the new foot so that the platform is level and stable.

B.7.2 Load Cell Replacement

Should one of the load cells fail, it can be replaced as follows:

1. Disconnect power to the indicator and platform.

2. Lift the corner of the scale with the failed load cell about 6 inches and secure with wooden blocks.

3. Remove the screw holding the junction box access cover in place and remove the access cover.

4. Remove the cover of the junction box.

5. Disconnect the cable from the failed load cell at the terminal block on the PC Board.

6. Loosen the appropriate gland nut for the load cell cable at the end of the junction box.

7. Slide the load cell cable out of the junction box. Tape a “fish wire” or other appropriate cable pulling material to the end of the cable.

8. From the underside of the platform, remove the two bolts holding the load cell in place, using a socket wrench.

9. GENTLY pull the old load cell cable out of the platform, being sure the “fish wire” attached to the junction box end slides freely through the channels.

10. Remove the foot from the old load cell and install it on the new load cell. See the foot replacement section of this manual for more information.

11. Using the fish line, GENTLY pull the new load cell cable back to the junction box.

12. Reinstall the two load cell bolts into the bottom of the platform. Torque the bolts to 90 ft-lb.

13. Lower the platform back onto the floor.

14. Dress the end of the load cell cable at the junction box. Feed the load cell cable through the gland in the end of the box.

15. Install the load cell wires in the appropriate connector on the PC Board. The wiring code is listed in Section 2.4.6.

16. Pull any excess cable out of the junction box and tighten the gland nut.

17. Level the scale following the instructions found in Section 2.4.4.1.2.

18. Re-power the indicator and calibrate the scale.

B.7.3 JUNCTION BOX PC BOARD REPLACEMENT

If the PC Board in the FAS-20 Junction Box fails, the whole box and PC Board are replaced with Part #92833.

1. Turn OFF power to the indicator.

2. Remove the access panel above the junction box.

3. Remove the junction box cover.

4. GENTLY lift the junction box out of the hole.

5. Loosen the gland nuts on each of the cables entering the box.

6. Remove the load cell and indicator wires from the connectors on the PC Board. IT IS RECOMMENDED THAT EACH CABLE BE TAGGED WITH THE CONNECTOR NAME.

7. Install the new box by bringing the appropriate cable through the appropriate gland and attaching the wires to the connectors.

8. Install the box cover and place it back in the hole.

9. Replace the access panel cover.

10. Turn on the indicator and check out the system. If it is necessary to adjust the potentiometers, follow the instructions in Section 2.4.7.1.

B.7.4 MOVING THE PLATFORM

When moving the platform, precautions should be taken to ensure the move is safe for both the operator and the platform.

1. On platforms with lifting handles, pull and twist the handles to the left to lock them in place.

2. The forks on the fork-lift should slide into the handles as far as possible.

3. There should be no weight on the platform when it is lifted and moved.

4. Care must be exercised when placing the scale on the floor after being lifted. The feet are free to move during transport. The scale should be placed on the floor slowly so the feet can move into position before full weight of the platform is placed on them.

5. The indicator and the connecting cables should be moved with the platform. Be sure the cables do not snag during the move.