WEIGH SYSTEM TECHNOLOGY

BLH

DXp-40
"Expert" Weight Transmitter
Operator's Manual

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SECTION 1. General Information

1.1 Introduction

1.1.1 General Description

The DXp-40 transmitter (Figure 1-1) is a microprocessor based device designed to convert the mV/V signal from up to four individual strain gage type force transducers (load cells) into a digital signal representing force, weight, or percent of span measurement units. Individually regulated, fault protected 10 VDC excitation is supplied to each transducer. Units operate at either 115 or 230 VAC. Standard DXp-40 transmitters are housed in NEMA 4 enclosures. NEMA 4X or explosion-proof enclosures are available as options. The digital RS-485 serial output port is configured for various baud rate and protocol selections using a series of DIP switches. Entry of calibration data, diagnostic parameters, and filter selections is accomplished using a series of pushbutton switches. Figure 1-2 presents an overall flow diagram for establishing the calibration and system operating parameters which will be discussed in the following chapters. An internal multi-line LCD display is provided for viewing the setup sequence, diagnostic information, and live operation.

Instrument features include an RS 485 serial port with BLH Digi-System network or a simplex output protocol, four ND converter channels, 10 volt excitation per channel, digital filter, and a NEMA 4 mild steel, painted enclosure. Standard instruments are designed to meet Class I, II, Division 2, Group A-G hazardous location requirements.

1.1.2 On-Line Diagnostics

Weigh system diagnostics can be communicated from the DXp-40 serial port to a host computer. This real time information regarding system performance enables the host process computer to notify an operator and/or re-configure the system to go into degraded mode operation.

1.1.3 Dynamic Digital Filter

The dynamic digital filter uses statistical characterization of process noise to derive optimum filtering settings. Once the noise is characterized, the operator selects the combination of averaging and filter cutoff bands needed to maintain both display stability and fast response time for better set point control.

1.1.4 Digital Calibration

Digital calibration uses a factory calibration curve embedded in firmware to establish a reference between weight (force) and mV/V. This allows an operator to set-up and calibrate a weigh system without the need for deadweights or other time consuming calibration methods. For systems with mechanical interactions, this calibration method can be modified to correct for system non-linearities

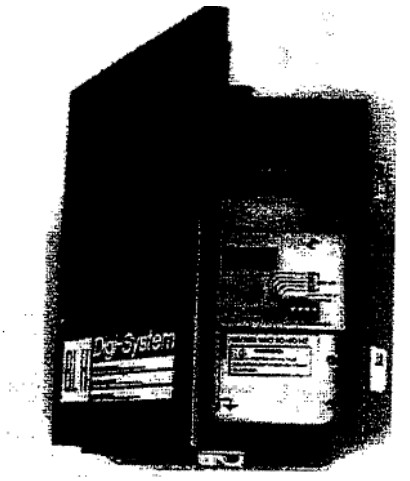

Figure 1-1. DXp-40 Weight Transmitter

1.2 OPTIONS

1.2.1 Mounting Options

For corrosive, hose down, or sanitary environments, a NEMA 4X stainless steel enclosure is available. An explosion proof enclosure is available for Class I, II, Division 1, Group B-G locations. Note: BLH 406 or 408 Intrinsic Safety Barriers must be specified for weigh systems located in a Division area.

1.2.2 Display Window

To allow viewing of the internal multi-line display at all times, units may be ordered with a front door panel polycarbonate window. Window units also have a brighter vacuum fluorescent type display panel for even greater visibility. See paragraph 1.3 for display specifications and Figure 2-1 for outline dimensions.

1.2.3 Terminal Computer Interface

The terminal/computer interface option provides a simple mnemonic half-duplex ASCII communications protocol via a built-in macro language consisting of 1 to 3 character command strings (reference Table 7-3). This powerful feature allows direct keyboard control (using easily remembered commands) of DXp-40 operation and recall of weight values (gross, net, tare, zero, balance, etc.)

Easily learned macro language syntax greatly simplifies the writing of a host computer communication interface (customer supplied).

1.2.4 MODBUS RTU Protocol

MODBUS is often recognized as an industry standard method of digital communication protocol between a master or host computer and a slave device. This protocol was originally developed by Modicon to communicate discrete and analog information —between PLCs. As implemented in the DXp-40, this protocol efficiently communicates weight and diagnostics information to a MODBUS driver equipped host.

1.2.5 Allen-Bradley Remote I/O Network Interface

The Allen-Bradley Remote I/O interface is a communication link that supports remote, time critical I/O control communications between a master processor and a remote 110 slave. It is typically used to transfer 1/0 bit images between the master and slave.

The DXp-40 represents a quarter (1/4) Rack of discrete I/O with 32 bits of input and output image files to the scanning PLC. All weight data and status information uses discrete reads and writes to communicate scale information to the PLC in the shortest time possible. Discrete transfers also are used to upload and download non-time critical information such as calibration and lower priority diagnostic data.

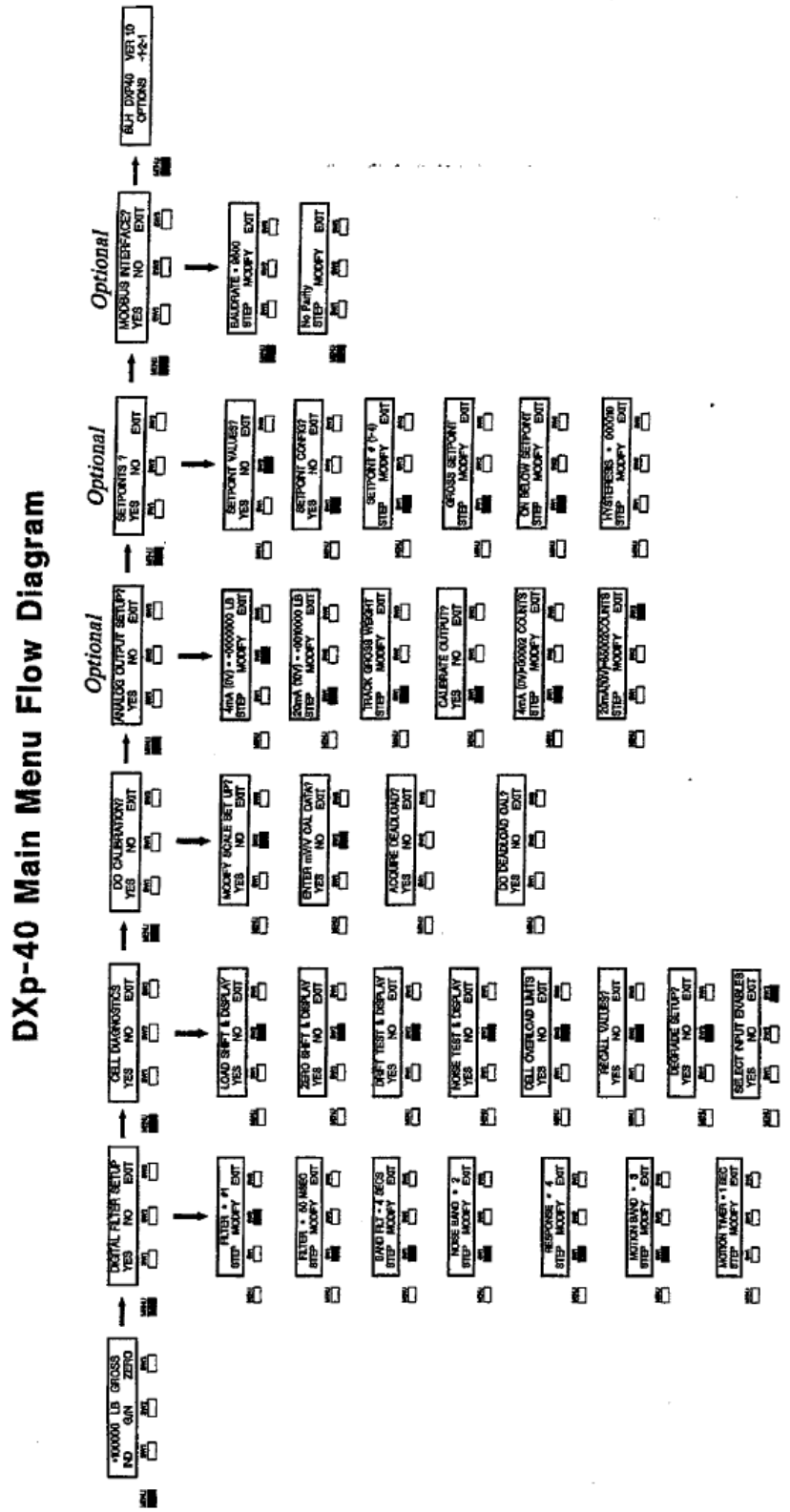

Figure 1-1. DXp-40 Calibration and Configuration.

1.3 DXp-40 Specifications

Performance

Internal Resolution	4,194,304 total counts
Max. Display Resolution	3,000,000 total counts
Max. Resolution Per Channel	750,000 counts
Conversion Speed	50 msec (20 updates/sec)
Sensitivity (Noise)	0.0011% full scale (max ±16 counts w/o filter)
Full Scale Range	35 mV/channel
Dead Load Range	100%
Input Impedance	10 M-ohms, min. per channel
Load Cell Excitation	10 V 2 x 350 ohm load cells, 65 mA/channel max
Remote Sense	user configurable on each channel
Linearity	± 0.0015% of full scale
Calibration Repeatability	0.3 µV per count
Software Filter (Std.)	50 to 6400 msec
Dynamic Digital Filter (Opt.)	multi-variable up to 64 seconds

Temperature Coefficient

Span/Zero	± 2ppm/°C
Step Response	one conversion
Common Mode Rej.	100 db @ 60 Hz
Normal Mode Rej.	100 db above 35Hz

Environment

Operating Temperature	-10 to 55°C (12 to 131°F)
Storage Temperature	—20 to 85°C (-4 to 185°F)
Humidity	5 to 90% rh, non-condensing
Voltage	117/230 ± 15% 50/60 Hz
Power	12 watts max
Parameter Storage	EEPROM
EMI/RFI	shielded from typical industrial interference

Enclosure

Dimensions	see outline dimensions - Figure 2-1

Internal Display/Operator Interface

High-Contrast LCD or Optional Vacuum Fluorescent	2 columns of 20 characters each
Interface	4 'soft buttons'

Isolated Analog Output

Type	16 bit digital to analog
Voltage	0-10V (25k ohm min load)
Current	4-20 mA (600 ohm max load)

Relay Outputs (optional)

Closed Contact or Solid State	28V ac/dc @ 0.4 amps (max.) 110/220 Vac @1.0 amp

Digital Inputs (optional)

12-24 Vdc Input or TTL Open Collector

Logic '0' (Low)	less than 5.0 Vdc, sink 3 mA (min)
Logic '1' (High)	10 to 28 Vdc

Mechanical Relay

Relay '0'	closed (one side = digital common, the other side = input)
Relay '1'	open (input internally pulled up)

BLH Digi-System Network

Type	RS-485 half duplex (multi-drop)
Baud	9.6K, 28.8K, and 56.7k
Data Format	proprietary

Standard Simplex Data Output (Transmit Only)

Type	RS-485 simplex
Baud	1200 or 9600
Data Format (Selectable)	
ASCII	7 data bits even parity stop bit

Terminal/Computer Interface

Interface Type	RS-485 half duplex
Baud	1200 or 9600
Protocol	duplex command/response format
ASCII	7 data bits even parity stop bit

Special Protocol (optional)

Modbus	RTU protocol - slave

Special Interface (optional)

Allen Bradley Remote I/O	represents 1/4 rack of discrete data also supports block transfer

Weight

NEMA 4/4X	approx. 12.0 lb

1.4 DXp-40 Ordering Information

DXp-40 [M] – [C] – [P] – [S] – [O]

[M] Mounting

(1)	NEMA 4 painted - standard
(2)	NEMA 4X stainless steel
(3)	NEMA 7 & 9 EX Enclosures for Class I, II, DIV. 1, 2, Grp. B - G
(5)	#2 with Polycarbonate Window and integral VFD display
(8)	#1 & FM/CSA approval (Class I II III, Div 2, Group ABCD FG)
(9)	#2 & FM/CSA approval (Class I II III, Div 2, Group ABCD FG)
(11)	#9 with Polycarbonate Window and integral VFD display

[C] Communication

(1)	RS 485 Network
(2)	#1 and Terminal/Computer Interface, ASCII protocol
(4)	Allen Bradley Remote I/O (Note: RS-485 Deleted)
(5)	#1 and MODBUS™ RTU (may require RS-485 to RS-232 serial conversion)

[P]Process Output

(1)	None
(2)	0-10V/4-20 mA Analog (includes switchable filter) & 4 Inputs/Outputs With Dry Contact Relays (not available with FM approval)
(3)	0-10V/4-20 mA Analog (includes switchable filter) & 4 Inputs/Outputs With Solid State Relays

[S]Software

(7)	Standard Includes: Keypad Calibration Dynamic Digital Filtering On-Line Diagnostics Degrade Mode Software

[O]Calibration

(1)	Default Calibration

Accessories

Conduit Fitting Kit (6 connectors) P/N 465231
Cable Fitting Kit (6 connectors) P/N 465232

1.5 WARRANTY POLICY

BLH warrants the products covered hereby to be free from defects in material and workmanship. BLH's liability under this guarantee shall be limited to repairing or furnishing parts to replace, f.o.b. point- of manufacture, any parts which, within three (3) years from date of shipment of said product(s) from BLH's plant, fail be-cause of defective workmanship or material performed or furnished by BLH. As a condition hereof, such defects must be brought to BLH's attention for verification when first discovered, and the material or parts alleged to be defective shall be returned to BLH if requested. BLH shall not be liable for transportation or installation charges, for expenses of Buyer for repairs or replacements or for any damages from delay or

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1.6 FIELD ENGINEERING

Improper DXp-40 installation or usage may result in system damage. Please follow instructions carefully. BLH will not accept any liability for faulty installation and/or misuse of this product. Authorized BLH Field Service Engineers are available around the world to install DXp-40 transmitters and/or train factory personnel to do so. The field service department at BLH is the most important tool to assure the best performance from your application. Field service phone numbers are listed below.

Call (Factory Number)
(781) 298-2200
Ask for Field Service

In Canada, Call
(416) 251-2554
or
(800) 567-6098 Toll Free

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SECTION 2. Installation

2.1 INTRODUCTION

2.1.1 General

The DXp-40 is designed to be installed within the length of the load cell(s) cable which is normally 35 ft or less. Standard NEMA 4 or optional NEMA 4X en-closures are suitable for outdoor or washdown type environments. Both enclosures are provided with pre-punched holes for installing conduit or cable fittings and holes for mounting to a bracket or wall.

2.2 MOUNTING

The NEMA 4 and NEMA 4X enclosures are equipped with four pre-punched holes for mounting to a wall or bracket. A U-bolt can be used for mounting to a pipe support. The instrument should be installed in a vibration-free location within the normal length of the load cell cables. If conduit is used, drains should be provided to reduce the possibility of condensate entering the enclosure. Outline dimensions for the standard DXp-40 transmitter are presented in Figure 2-1.

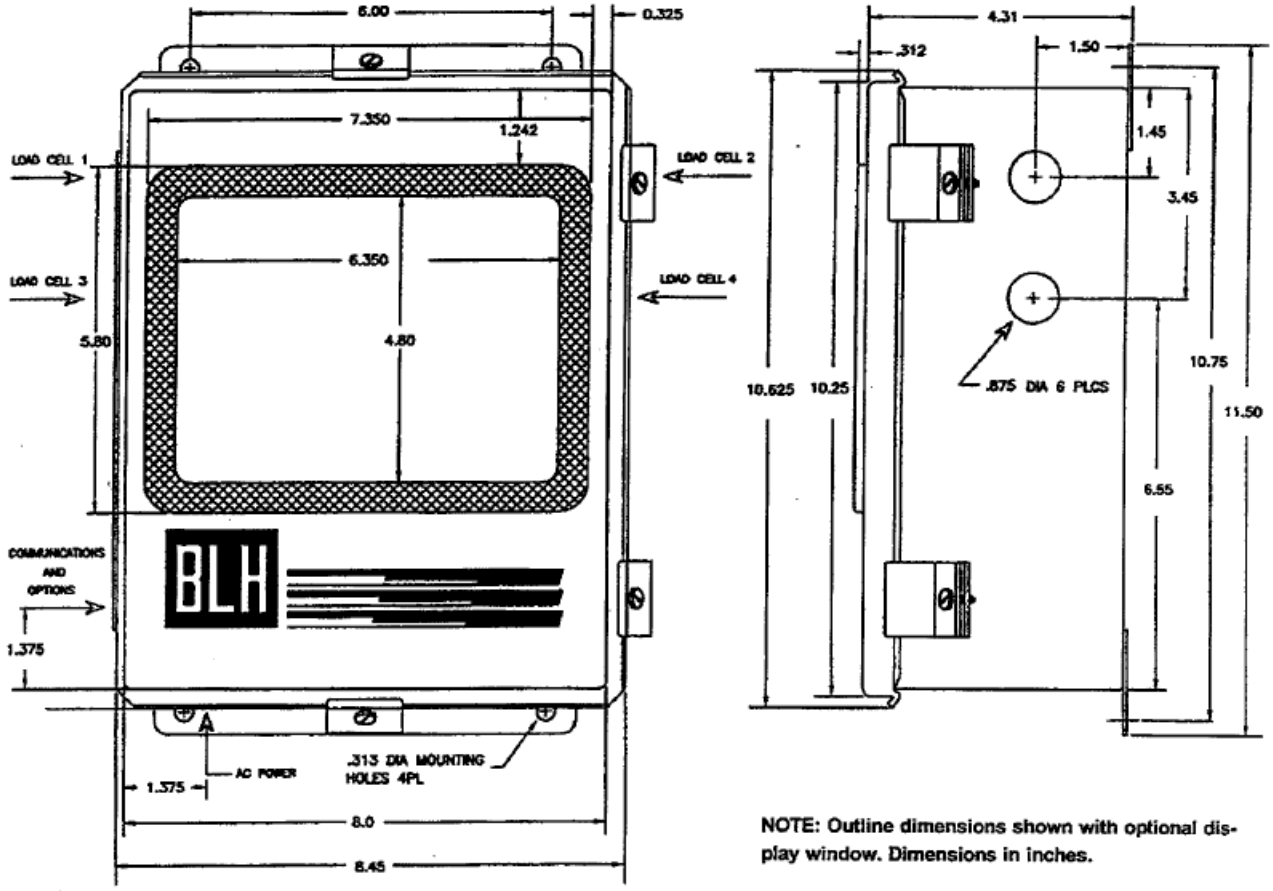


Figure 2-1. DXp-40 Outline Dimensions.

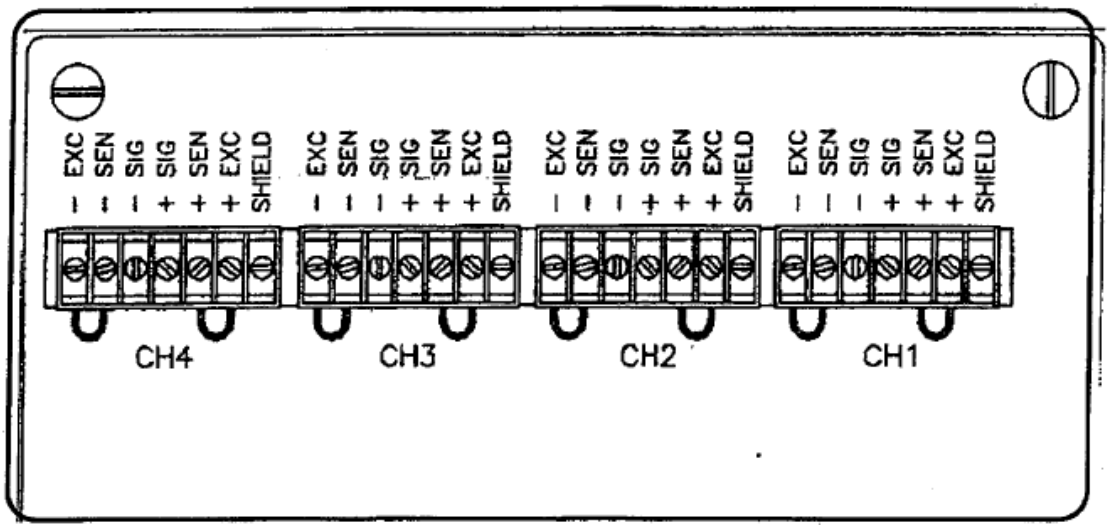


Figure 2-2. Load Cell Connections.

2.3 ELECTRICAL

2.3.1 Transducer Inputs

Up to four load cells, one per channel can be connected to the DXp-40. Connect individual load cells directly to the circuit board connectors as shown in Figure 2-2. Excitation and signal connection locations are clearly marked according to function and standard color code. When remote sensing is not used (most cases), connect -SENSE to -EXCITATION and +SENSE to +EXCITATION. Note: If tension load cells are used, signal leads (red/white) must be reversed.

If a deadweight or substitution method of calibration is being used, the load cell cable can be shortened as required. The leads should be re-tinned before the final connection is made.

NOTE: When tension or universal type load cells are used, it may be necessary to reverse the polarity of the signal leads to obtain a positive signal input to the DXp.

NOTE: All system load cells must be connected during power-up in order to turn on all A/D channel inputs.

2.3.2 Serial Communication

A terminal connector is provided for RS-485 wire connections (Figure 2-3). Multiple DXp transmitters, networked together, are wired in a parallel configuration with a termination jumper installed on the last instrument. A pair of twisted wires (20-24 gauge, Belden #9501) is all that is required for interconnection. Communication lines should not be run near ac voltage power lines.

2.3.3 Mains (AC) Power (Figure 2-4)

A screw terminal is provided for permanent transmitter power connection. All units are shipped from the factory configured for 115 VAC operation. To select 230 VAC operation, change SW1 on the base or 'mother' board (see Figure 2-4) to the 230V setting. The unit will operate within specification at 50 or 60 Hz. Before connecting power to the unit, verify that the proper power selection has been made. The two position terminal block is equipped with a clear plastic cover to prevent operator injury. Cable can be either solid or stranded 12 or 14 gage with a ground conductor.

The transmitter is protected with a 1/4 amp slow blow fuse, located adjacent to the mains terminal block. If the fuse opens, replace it with the same type and current rating.

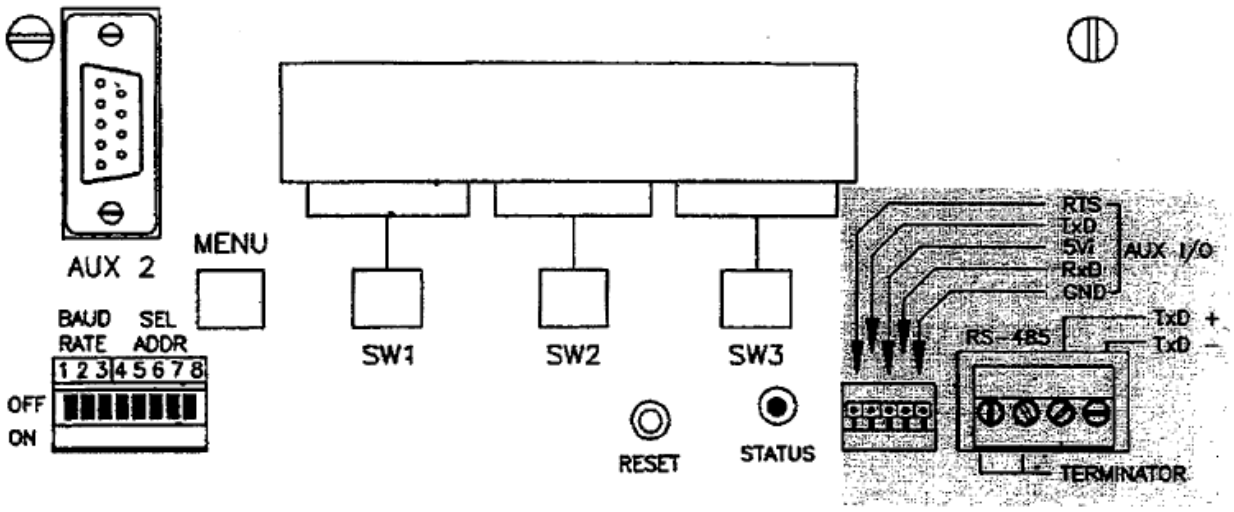


Figure 2-3. Serial Output Connections (Shaded).

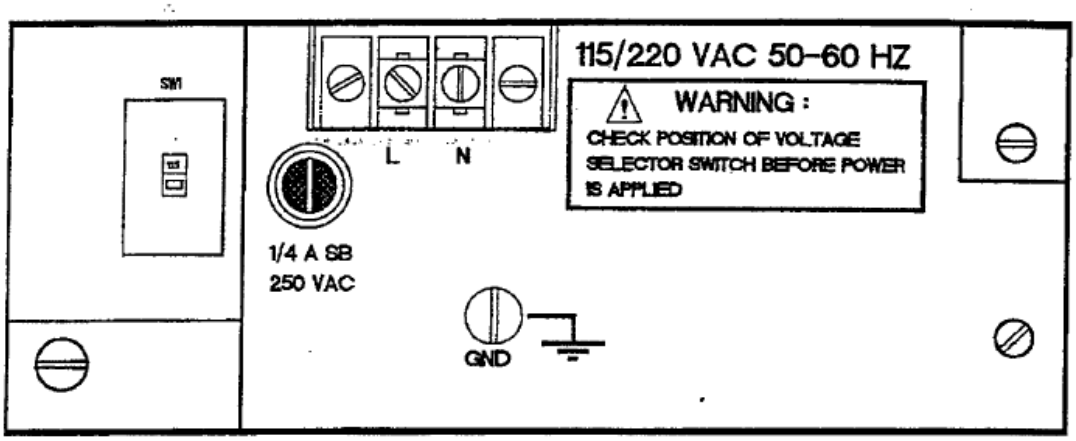


Figure 2-4. AC Power Connections and Fuse.

2.3.4 Auxiliary 110 Ports

The auxiliary I/O port connections are factory test ports and are not useful to an operator.

2.3.5 Optional Analog Output

With the analog option installed, a three position terminal connector is provided for 4-20 mA, 0-10 V, and common connections (Figure 2-5). As with serial communication, the wiring should be routed away from ac power lines and other sources of EMI. The current output is essentially immune to noise and can be transmitted long distances. The voltage output is susceptible to EMI/RFI and should be used only for short distances. Always use twisted pair, shielded cable.

2.3.6 Optional Remote Inputs

If the remote input option is installed, the gross/net, zero, tare, and filter functions can be activated using external push button switches or TTL signals. When using an external TTL device, 5 VDC must be supplied and the device TTL common connected to the DXp-40 common connector. Inputs are designated as digital (DIG) common and 1-4 (Figure 2-5) and function as defined in the following table:

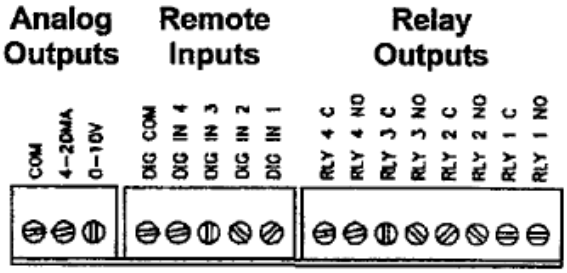
Input #	Open	Closed
DIG IN 1	Gross	Net
DIG IN 2	------	Zero
DIG IN 3	------	Tare
DIG IN 4	Filter 1	Filter 2

2.3.7 Optional Discrete Outputs

Units equipped with optional outputs have either four, dry contact, 28 volt (ac/dc) relays capable of handling 0.4 amps each or four, solid state, 117 VAC triac relays capable of handling 1 amp each. Customer ordering specifications (paragraph 1.4, topic `P') determine which type of relays are installed. Figure 2-5 shows the relay output wiring configuration. Paragraph 8.2 describes how the relays can be configured for different uses, depending upon the system application. Units are factory set in the normally open configuration.

NOTE: Discrete outputs are not available with mounting options 8 and 9 (see paragraph 1.4).

Figure 2-5. Optional I/O Connections



SECTION 3. Calibration

3.1 GENERAL

Calibration is the fourth step in the DXp-40 parameter entry menu (Figure 3-1). Setup and calibration is accomplished easily using the internal LCD display and its three switches.

Complete calibration is accomplished in two phases, scale setup and either millivolt per volt or deadload calibration as shown in Figure 3-2. Use the full calibration flow diagram insert on the following page for guidance throughout the calibration procedure.

3.2 SETUP PARAMETERS

Setup establishes scale operating parameters such as system capacity, decimal point location, display units (pounds, kilograms, tons), total number of load cells, and others. To enter or alter operating parameters, select YES for 'MODIFY SCALE SETUP?' in Figure 3-2 and proceed to Figure 3-3.

3.2.1 Calibration Type

DXp-40 transmitters offer two types of system calibration, digital or deadload. In the past, weigh systems could only be deadload calibrated by placing known quantities of dead weight upon the scale to establish voltage to weight equivalent points. In the DXp-40, however, since each load cell has its own ND converter with embedded mV/V calibration, calibration can be accomplished simply by entering known mV/V weight values from a load cell calibration sheet. Choose the calibration type to be performed.

3.2.2 Number of Load Cells

Enter the number of system load cells from 1 to 4.

3.2.3 Display Units

Designate the desired display unit type by entering LB (pounds), KG (kilograms), or TN (tons).

3.2.4 Decimal Point Location

Position the decimal point as desired for weight display and serial printouts.

3.2.5 Capacity

Enter the system total capacity value. A capacity of 10,000 will be 10.000, 100.00, 1000.0, or 10,000 relative to decimal point selection.

3.2.6 Count By

Define the count value of each display increment by selecting 1, 2, 5, 'or 10 (note that decimals apply).

3.2.7 Zero Band

• Choose a zero bandwidth (gross weight zero function) of 2%, 20%, or 100% of system capacity. If OFF is selected, the gross weight ZERO function is not avail-able.

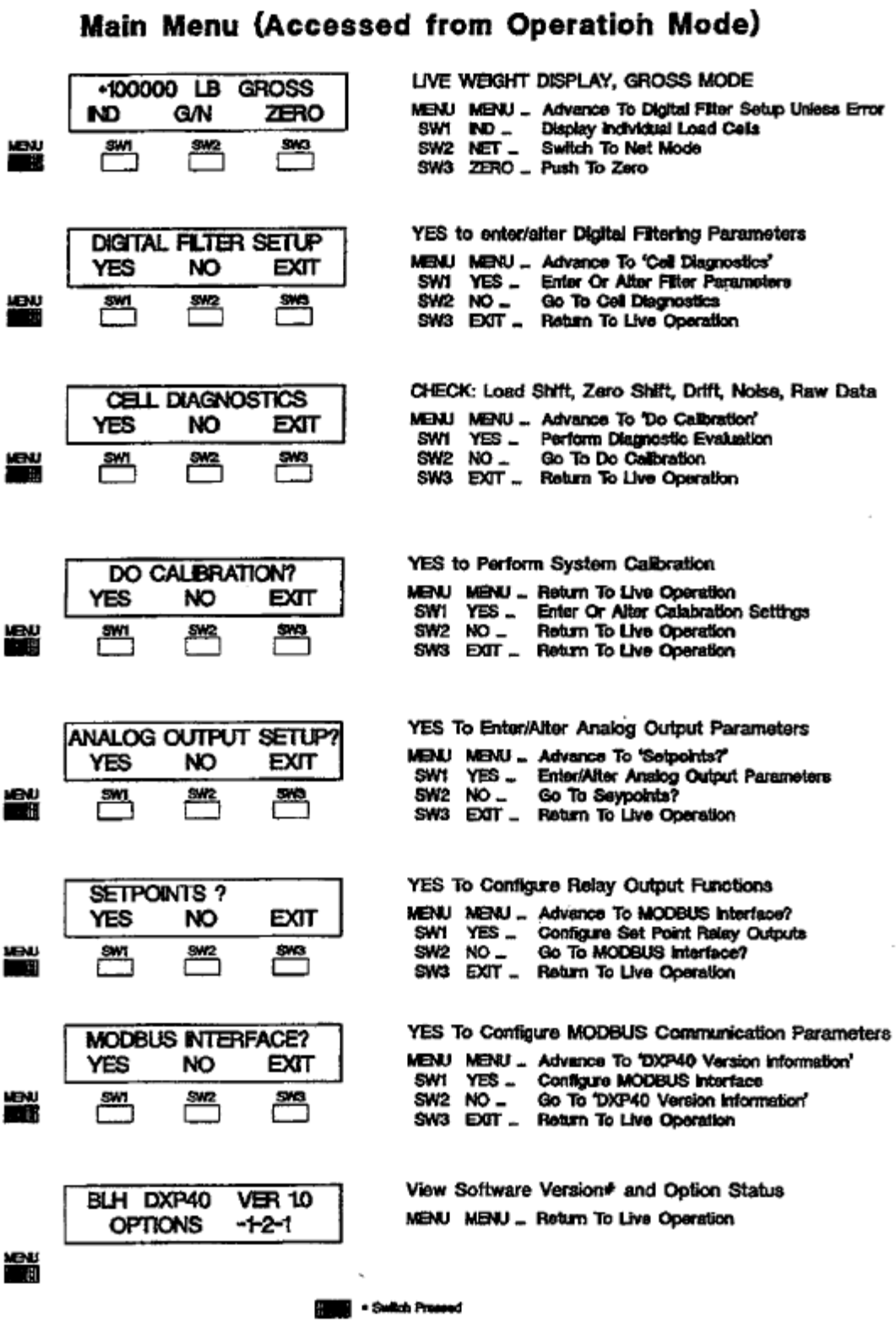


Figure 3-1. DXp-40 Main Menu Showing Calibration Display.

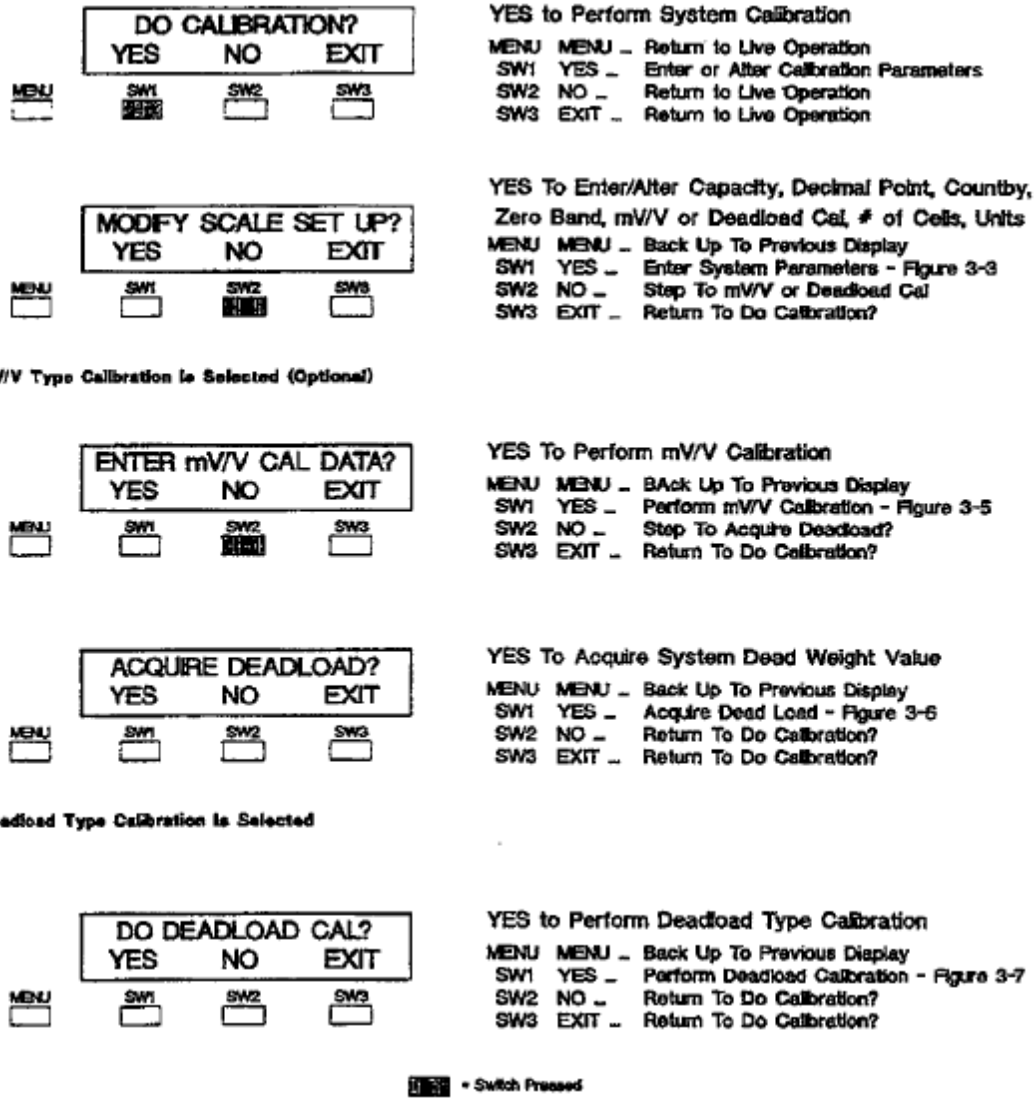
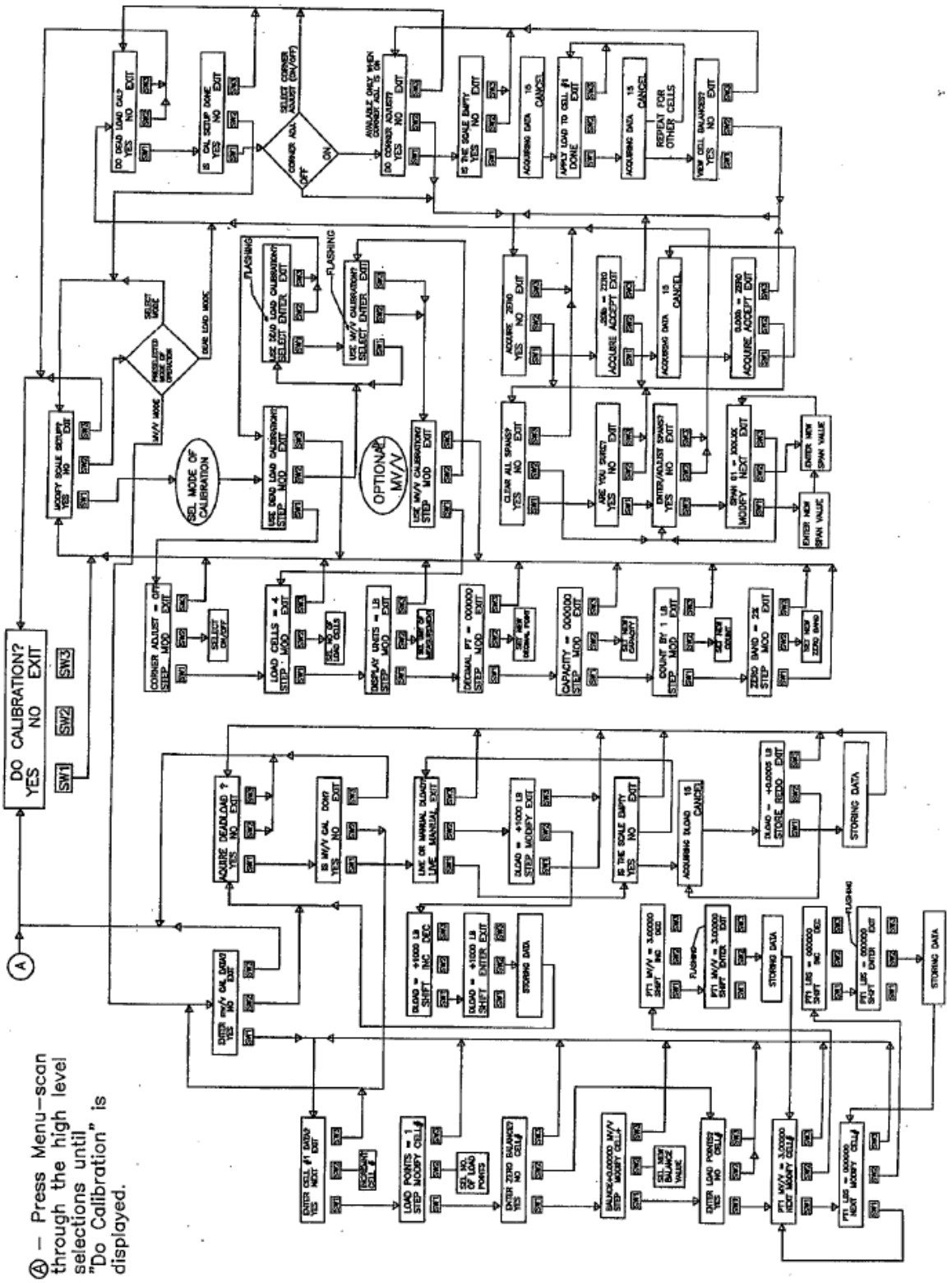
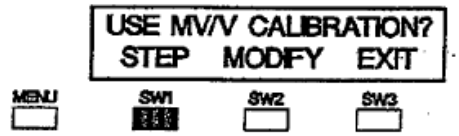


Figure 3-2. DXp-40 Calibration Menu.



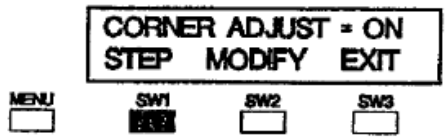
A – Press Menu–scan through the high level selections until "Do Calibration" is displayed.

Modify Scale Set Up



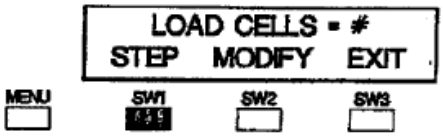
Select Calibration Type; mV/V or Deadload

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Corner Adjust
SW2 MODIFY_ Change Calibration Type Selection
SW3 EXIT _ Return To Modify Scale Setup?



Enable Or Disable Corner Adjust Feature

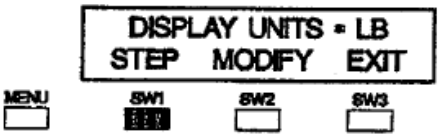
MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To # Of Load Cells
SW2 MODIFY_ Enable Or Disable (On/Off) Corner Adjust
SW3 EXIT _ Return To Modify Scale Setup?



Select Total Number of System Load Cells 1-4

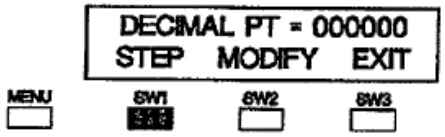
MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Display Units
SW2 MODIFY_ Change Number Of Load Cells
SW3 EXIT _ Return To Modify Scale Setup?

NOTE: MUST Start At Cell #1



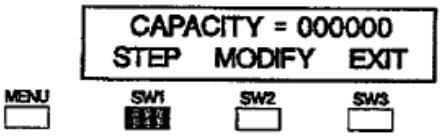
Choose Units Display Of LB, KG, TN, PVU

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Decimal Point
SW2 MODIFY_ Change Display Units
SW3 EXIT _ Return Modify Scale Setup?



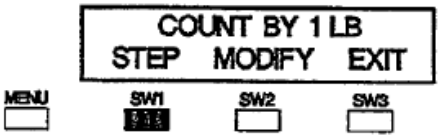
Select Decimal Point Location

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Capacity
SW2 MODIFY_ Add Decimal Point Or Change Location
SW3 EXIT _ Return To Modify Scale Setup?



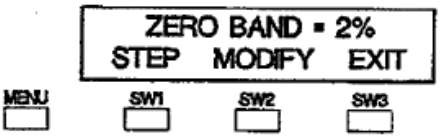
Enter Or Alter System Capacity Value

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Count By #
SW2 MODIFY_ Enter/Alter System Capacity Value
SW3 EXIT _ Return To Modify Scale Setup?



Choose Scale Graduations Of .1, .2, .5, 1.0, 2.0, 5.0, 10.0

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Step Forward To Zero Band
SW2 MODIFY_ Select New Count By Value
SW3 EXIT _ Return To Modify Scale Setup?



Select Zero Band Of 2%, 20%, 100%, OFF

MENU MENU _ Back Up To Previous Display
SW1 STEP _ Return To Modify Scale Setup?
SW2 MODIFY_ Select New Zero Band Percentage
SW3 EXIT _ Return To Modify Scale Setup?

3.3 DIGITAL CALIBRATION

3.3.1 Load Cell Calibration Data

Individual channels and embedded mV/V calibration-curves make it possible to calibrate a DXp-40 by simply entering mV/V equivalent force or weight values from a load cell calibration sheet (Figure 3-4). A cal sheet presents the load cell mV/V output reading for either 3 or 10 known weight values. The highest weight value recorded should match the rated capacity of the load cell. Note that there is also a 0 or no load mV/V output recorded. Each load cell must have its own cal sheet (match serial number on sheet to serial number on cell) in order to perform mV/V calibration. If cal sheets are not available, use deadload type calibration.

3.3.2 Entering mV/V Calibration Points

Following Figure 3-5 instructions, select a load cell and enter the zero balance (no load) mV/V value. After zero balance is established, enter the load point pound and load point mV/V value for each test point on the calibration certificate. Repeat this procedure for each load cell before advancing to 'Acquire Dead-load?' (next paragraph). Note that load cells are numbered according to their channel connection position (Figure 2-2).

3.3.3 Acquire Deadload

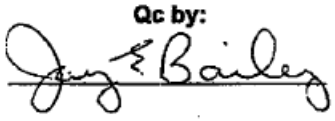
After all mV/V load points are entered, a scale zero reference must be acquired. Deadload zero determines the weight or signal output at which the scale/system is in no load condition. Addition of any ingredient weight will be referenced from this point to produce accurate live weight readings. Following Figure 3-6 instructions, acquire the deadload value by either entering a known weight value for all scale/sys-tem components (manual) or letting the DXp-40 read and store the no load signal (live). When all cal sheet span points are entered and deadload acquired, mV/V calibration is complete.

Calibration Chart

Customer:				**P.O :**	**F046999M0715**
Capacity	**10,000 lb**	**Type**	**C3P1**	**Serial No.**	**40243**
Mode	**Compression**	**Bridge**	**A**	**Test Report No.**	**C94-6000**
Indicator	**N.A.**	**Serial No.**	**N.A.**		
Date Of Calibration	**3/4/94**			**Temperature :**	**71 F**
Calibrated By:	**M. Houton**			**Humidity :**	**49 %**

Applied Load lbf	Response Run 1 mv/V	Response Run 2 mv/V	Response Run 3 mv/V
0	0.0000	0.0000	0.0000
1,000	0.2997	0.2999	0.2999
2,000	0.5997	0.5999	0.5998
3,000	0.8997	0.8998	0.8998
4,000	1.1998	1.1998	1.1998
5,000	1.5001	1.4998	1.4999
6,000	1.8002	1.8002	1.8002
7,000	2.1004	2.1004	2.1004
8,000	2.4007	2.4008	2.4008
9,000	2.7009	2.7009	2.7008
10,000	3.0012	3.0012	3.0012
5,000	1.5004	1.5003	1.5003
0	0.0000	0.0000	0.0000

Qc by:



Applied Load [lb]	Output Average mv/V	Ideal Output mv/V	Output Error mv/V	Output Error % FS	Hysteresis Error % FS
0	0.0000	0.0000	0.0000	.000%	
1,000	0.2998	0.3001	-0.0003	-.010%	
2,000	0.5998	0.6002	-0.0004	-.015%	
3,000	0.8998	0.9004	-0.0006	-.020%	
4,000	1.1998	1.2005	-0.0007	-.023%	
5,000	1.4999	1.5006	-0.0007	-.022%	
6,000	1.8002	1.8007	-0.0005	-.017%	
7,000	2.1004	2.1008	-0.0004	-.015%	
8,000	2.4008	2.4010	-0.0002	-.006%	
9,000	2.7009	2.7011	-0.0002	-.007%	
10,000	3.0012	3.0012	0.0000		
5,000	1.5003	1.5006	-0.0003	-.009%	.013%
0	0.0000	0.0000	0.0000	.000%	.000%

Figure 3-4. Typical Load Cell Calibration Sheet.

Digital Calibration

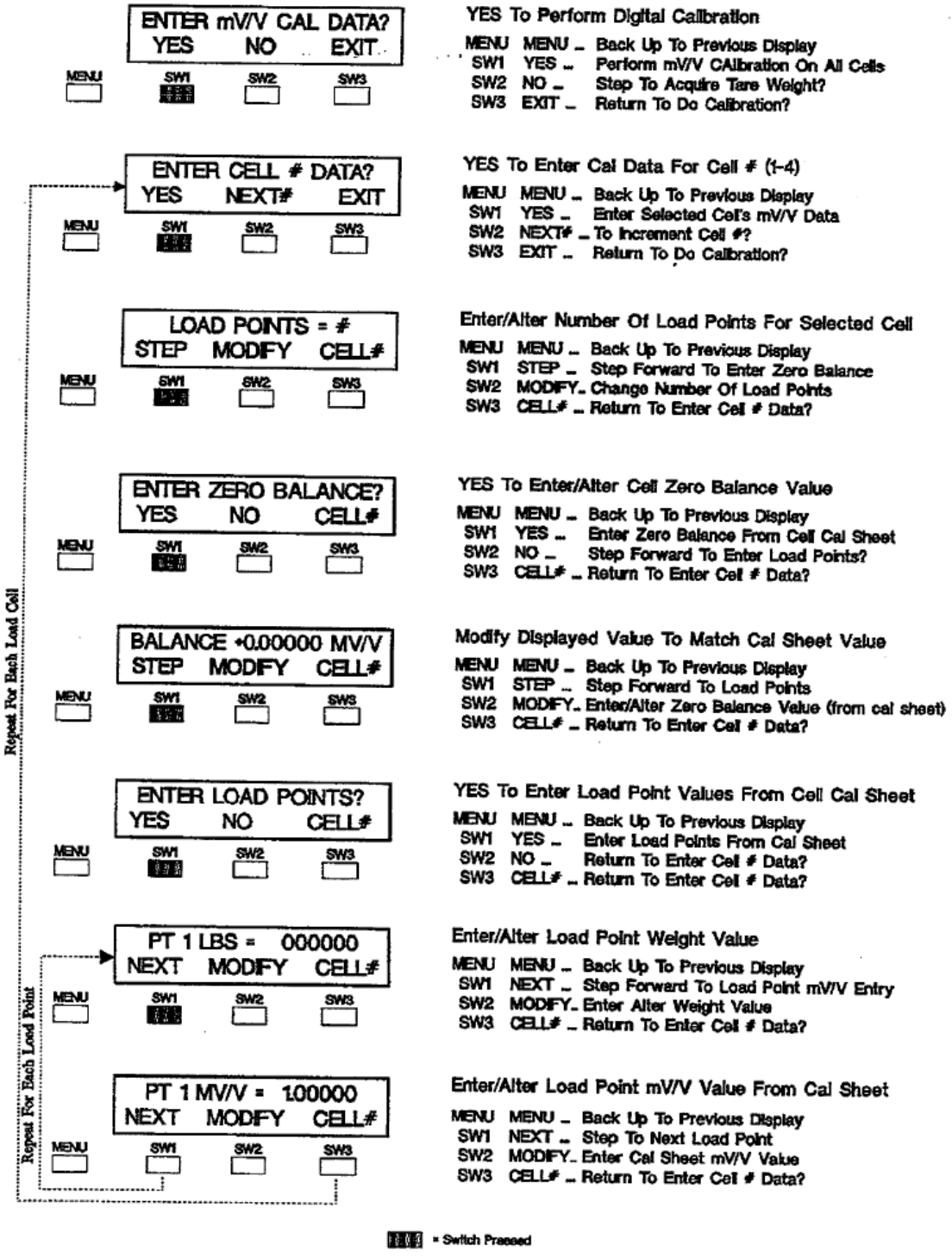
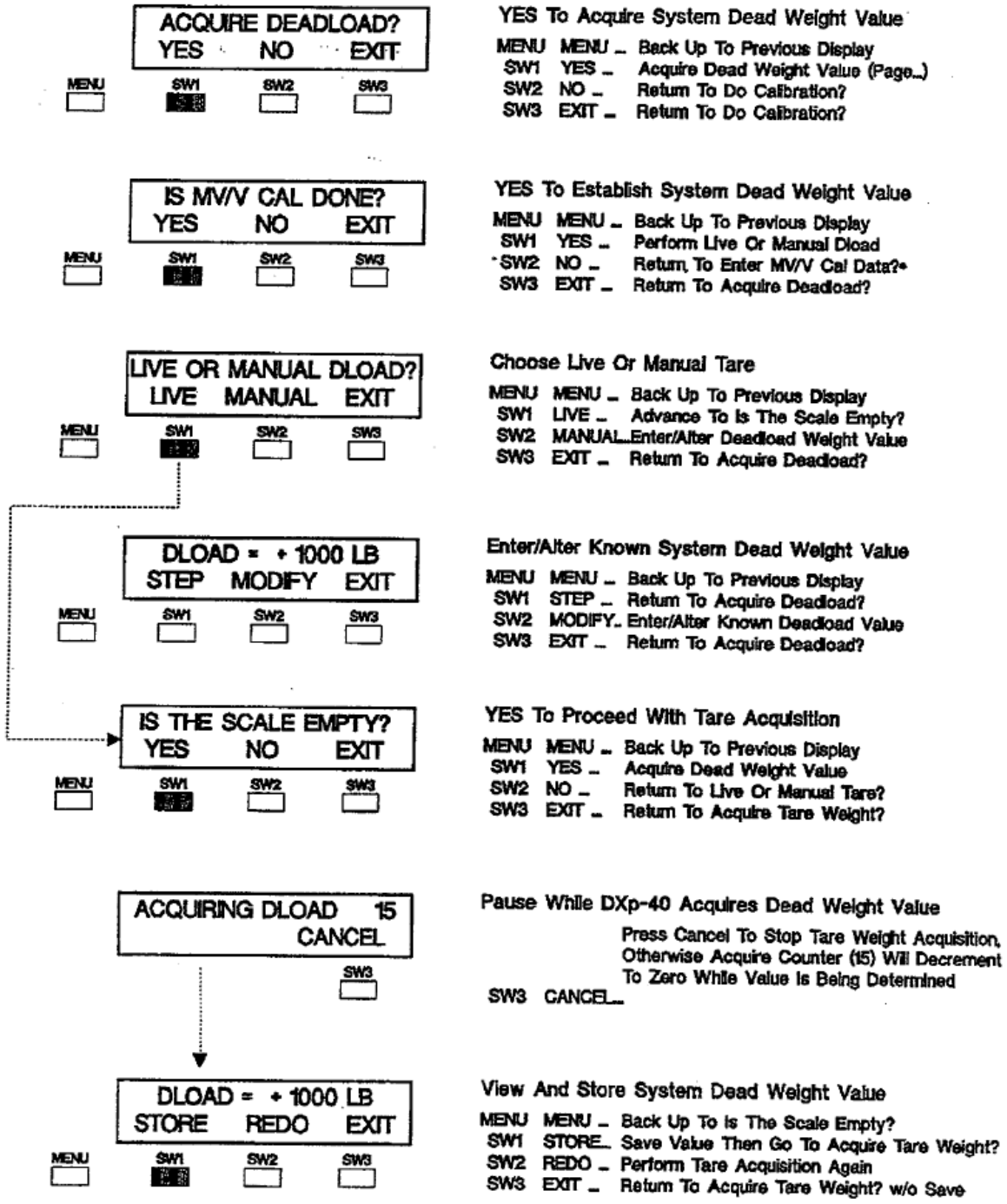


Figure 3-5. Millivolt per Volt Calibration Guide.

Acquire Deadload* (Establish Zero Weight Reference)



*** Digital Type Calibration Must Be Performed Before Attempting Tare**

Figure 3-6. Acquire Deadload (Used with mV/V Cal Only).

3.4 DEADLOAD TYPE CALIBRATION

Deadload calibration (Figure 3-7) uses known value 'true' weights to establish calibration span points. Often, only one true weight value is needed since water or other material can be substituted incrementally for that value.

3.4.1 Perform Corner Test (Sensitivity Adjust)

NOTE: Corner adjusting requires that dead weight equaling 15% (minimum) of scale capacity be loaded at each corner. Since applying/shifting this much dead weight is not practical for most tank based weigh systems, corner adjustment is usually performed only on platform scales.

NOTE: Corner testing is not required on systems using transducers with matched outputs or systems where the load distribution is not likely to change.

With multiple simultaneous ND conversion technology it is possible to 'balance' or corner adjust the system transducers. Corner adjustment ensures accurate weight readings even when the scale is loaded off center. Choose YES if corner adjustment is desired. Systems that do not experience load distribution changes typically do not require corner adjustment.

Corner testing optimizes scale performance by learning and compensating for the actual relationship between each transducer's output based upon varying load distribution. Perform corner testing by placing a known value weight on the scale/system directly above or as close as possible to each transducer as instructed in Figure 3-7. Position the weight above transducer #1 (channel 1) and acquire. Repeat the process for each subsequent transducer. After each transducer has 'felt' the weight, the DXp-40 will store the reaction pattern. This pattern becomes a reference for balancing live weight readings. Corner testing is ideal for systems/scales where ingredients may shift or loads move.

3.4.2 Acquire Zero

Acquire zero is the first step in deadload calibrating a weigh system. Acquire zero removes the weight value of system equipment (tank, platform, mixers, motors, etc.) and establishes a zero reference point. All live weight transactions will be referenced to this point. Remove any unessential equipment from the scale/system and follow instructions presented in Figure 3-7 (second page).

3.4.3 Span Point Entry

Once zero is established a span point (or points) must be entered to complete calibration (Figure 3-7 second page). The simplest form of deadload calibration consists of acquiring zero and entering one span point, preferably the full scale capacity value. To accommodate more sophisticated systems, the DXp-40 provides up to 10 span point entries. Weigh systems can be fully linearized, or tuned, by entering known live weight span points between zero and capacity. Enter span points from the lowest to the highest weight value; do not attempt to enter a point value lower than the previous entry. When deadloading to full capacity is impractical, the DXp-40 accurately interpolates all weight values between the last span point and capacity.

Deadload Type Calibration Flow Diagram

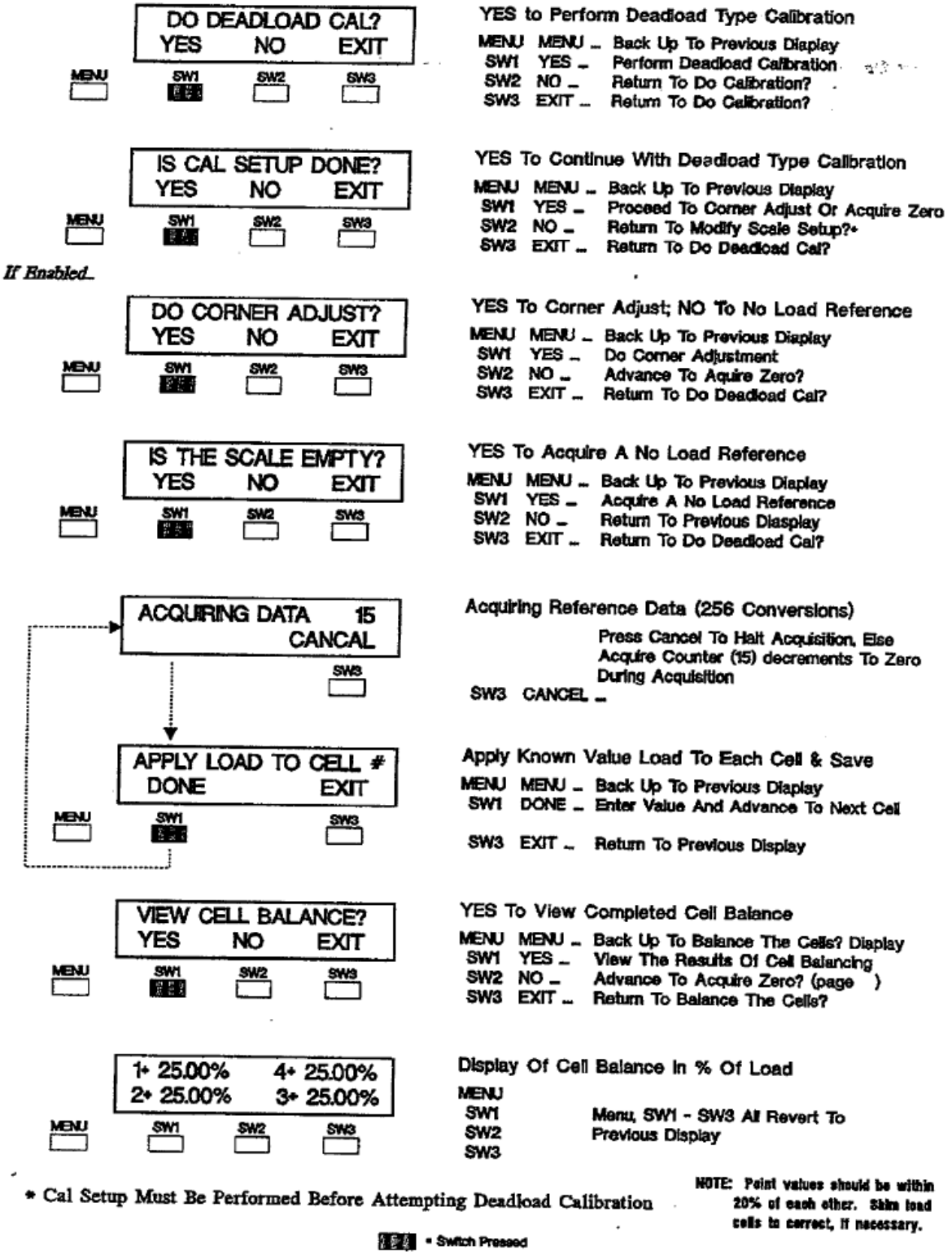


Figure 3-7. Deadload Calibration Entry Guide.

Deadload Type Calibration Flow Diagram (cont.)

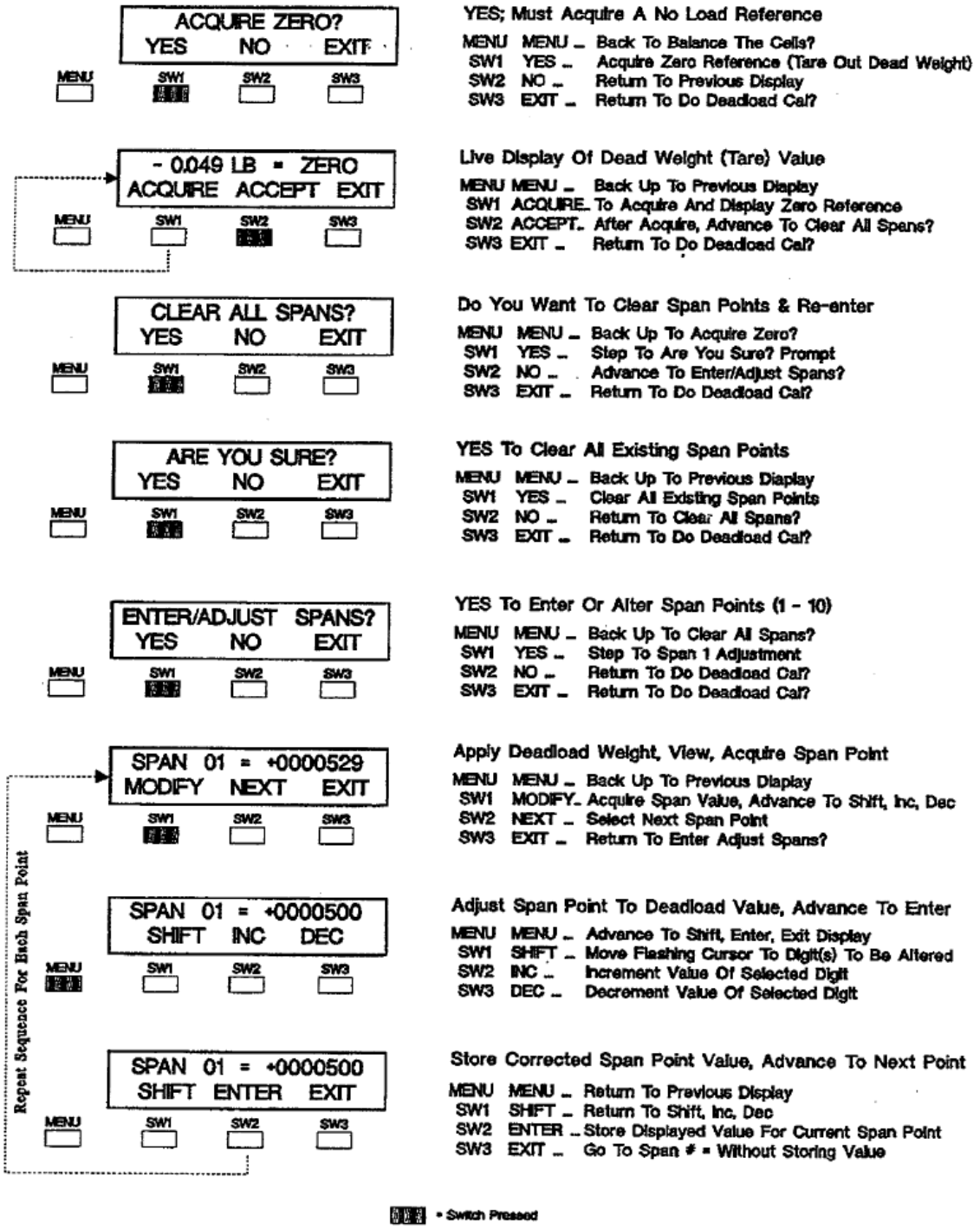


Figure 3-7. con't.

SECTION 4. Operation

4.1 GENERAL

DXp-40 transmitters power up in the gross weight weighing mode. If no system errors are detected, the internal LCD display will show the gross weight value as depicted in Figure 4-1 (the unshaded portion). Note: For initial system power up units are factory pre-calibrated with default values. Calibration (SECTION 3), however, should be performed before attempting system operation.

Figure 4-2 presents the display panel switch functions for the operating mode. Switch 2 toggles the operating mode from gross to net or net to gross. Switch 3 performs push to zero (gross mode) or tare (net mode). Use switch 1 to view individual load cell data. When the DXp-40 is connected to a host terminal, computer, or an LCp-40 network control device, gross, net, zero, and tare functions can be performed remotely.

4.2 GROSS WEIGHT WEIGHING

In the gross mode, all of the live weight of the system is transmitted: Live weight does not include the dead weight of a vessel or other mechanical equipment that is factored out during calibration.

4.3 ZERO OPERATION

A new zero can be acquired to compensate for changes in the dead load of the system due to heel build-up etc. Acquiring a new zero reference value does not affect the slope of the calibrator. The zero function in the DXp-40 can be configured for OFF, 2%, 20%, or 100% of system capacity (see Setup Parameters in SECTION VI Calibration). Zero may be acquired only if the system is not in motion and the zero band limit has not been exceeded (when ZERO is visible on the display).

4.4 NET WEIGHT WEIGHING

Net weight weighing is used when the operator wants to reset zero to compensate for the addition of live weight, or a container, before adding a specific amount of material. Tare is used to establish a zero reference in net mode.

4.5 TARE OPERATION

With the DXp-40 in net weighing mode, the tare operation resets the output to zero. Taring allows the operator to achieve a new zero reference before addition of each ingredient so that errors do not become cumulative.

4.6 VIEW INDIVIDUAL CELL DATA

Pressing switch 1 'IND' (Figure 4-2) allows the operator to view Individual load cell parameters in weight units, millivolts, or percent of total load. Note that live weight processing (including serial data transactions) continues during individual cell displays.

4.7 ERROR DETECTION AND CORRECTION

Should an error condition occur during system operation, a flashing capital 'E' will appear next to the weight/status information on the display (Figure 4-3). If the system is overloaded, (total or individual cell capacity exceeded) the word 'OVER' also will appear flashing beneath the flashing `E'. Errors other than overload fall into 4 categories; load shift, zero shift, cell drift, and cell noise errors. To evaluate and correct system errors, enter the diagnostic mode as shown in Figure 4-3 and proceed to SECTION V (Cell Diagnostics).

Main Menu (Accessed from Operation Mode)

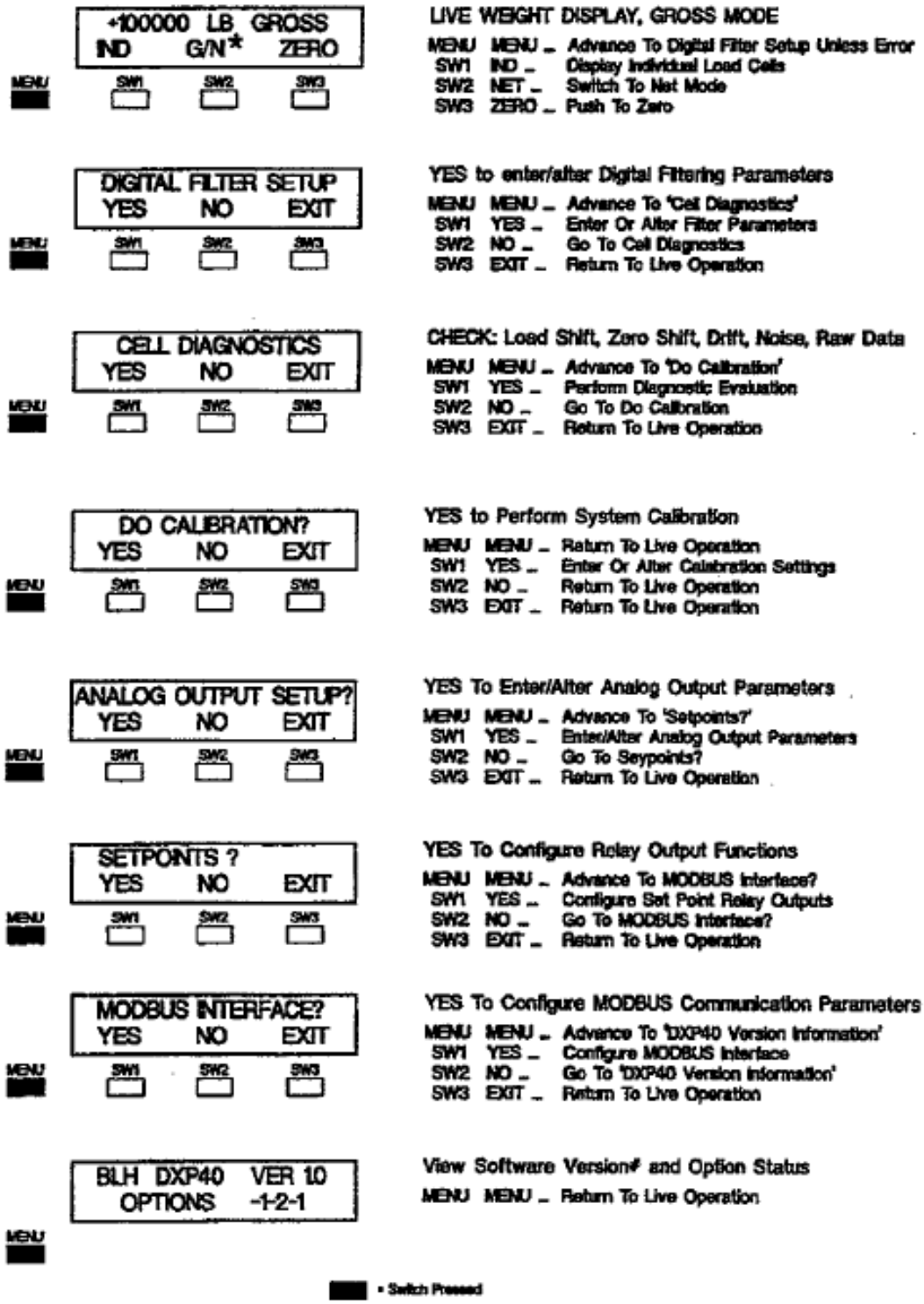
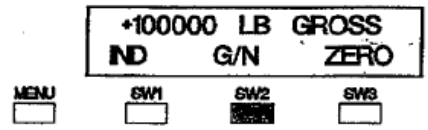


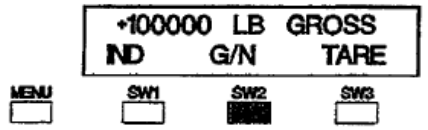
Figure 4-1. DXp-40 Main Menu - Power Up In Gross Mode

DXp-40 Operating Mode Switch Selections



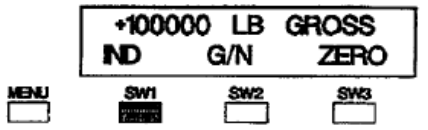
Live Weight Display, Gross Mode

MENU	MENU ..	Choose Main Menu - Figure 4-1
SW1	IND ..	Display Individual Load Cells
SW2	NET ..	Switch To Net Mode
SW3	ZERO ..	Push To Zero (no display if out of z band range; MOTION if in motion)



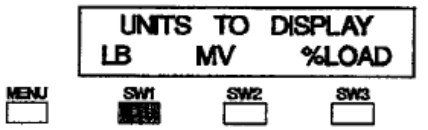
Live Weight Display, Net Mode

MENU	MENU ..	Choose Main Menu - Figure 4-1
SW1	IND ..	Display Individual Load Cells
SW2	GROSS ..	Switch To Gross Mode
SW3	TARE ..	Tare Net Weight (MOTION if in moti



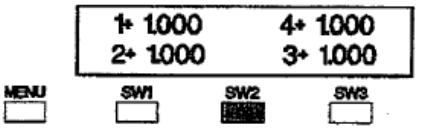
Look At Individual Cell Data

MENU	MENU ..	Choose Main Menu - Figure 4-1
SW1	IND ..	Display Individual Load Cells



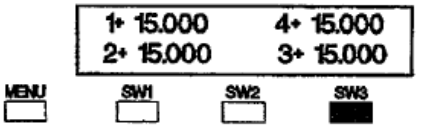
Select Load Cell Display Units

MENU	MENU ..	Go Back To Previous Display
SW1	LB ..	Display Weight Units
SW2	MV ..	Display Millivolt Signal
SW3	%LOAD ..	Display % Of Load Upon Cell



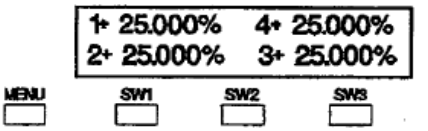
Individual Call Display In Weight Units

MENU	..	Units To Display
SW1	..	Exit
SW2	..	Millivolts
SW3	..	Show % Of Load



Individual Cell Display In Millivolts

MENU	..	Units to display
SW1	..	Units
SW2	..	Exit
SW3	..	Show % Of Load



Individual Cell Display In % Of Load

MENU	..	Units To Display
SW1	..	Units
SW2	..	Millivolts
SW3	..	Exit

= Switch Pressed

Figure 4-2. Switch Functions in the Operating Mode.

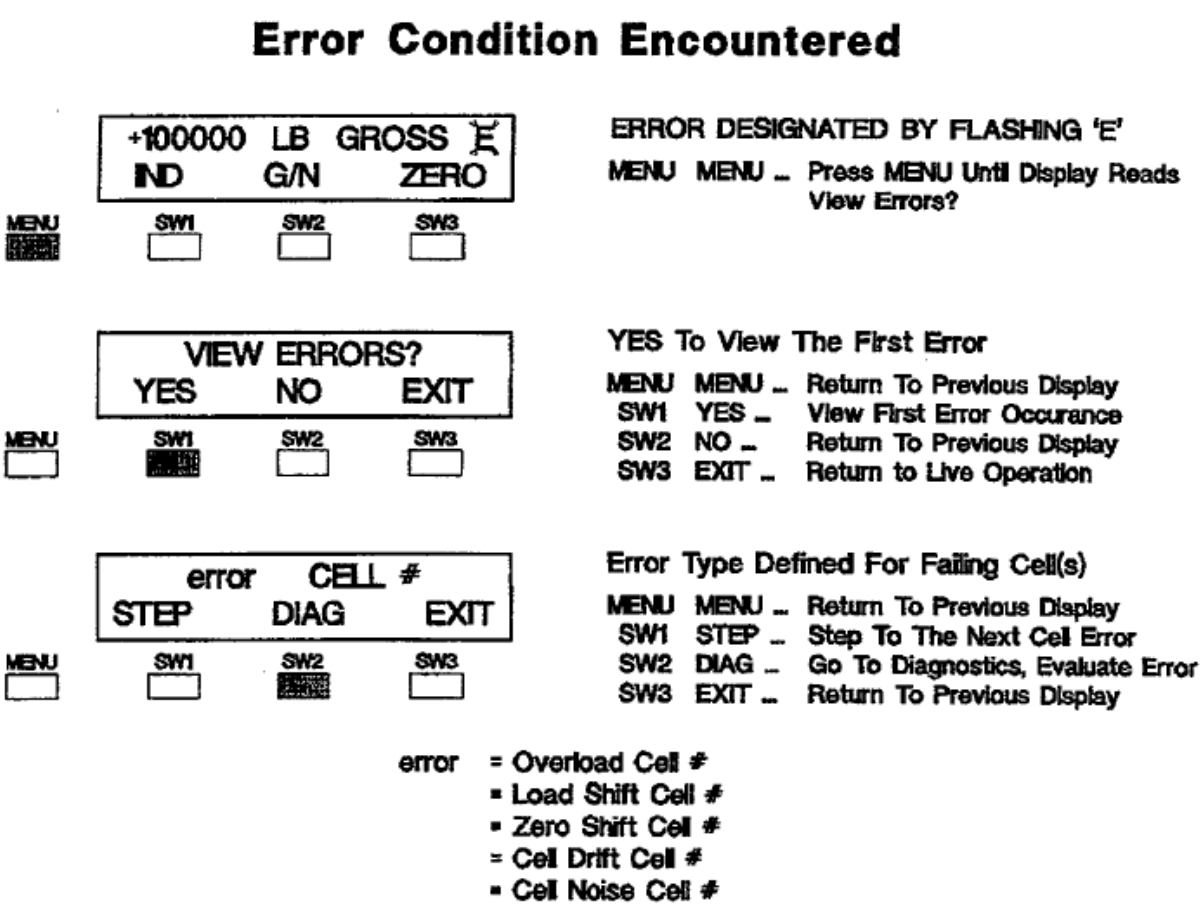


Figure 4-3. Error Detection & Correction Switch Selections.

SECTION 5. Dynamic Digital Filters

5.1 GENERAL

Digital filtering (including motion) constitutes the first set of parameter entries in the main menu (Figure 5-1, unshaded). Digital filtering combines moving averaging (fitter) with response and noise bands to eliminate vibration and agitation noise from dynamic process weighing systems. Filtering removes unwanted, mechanically induced fluctuations from the weight signal while maintaining rapid response to genuine live weight changes.

5.2 FILTER PARAMETERS

Each filter component has adjustable parameters (Figure 5-2) so that every weigh system can be 'tuned' to its own unique environment.

NOTE: Using diagnostic software, it is recommended that the statistically calculated noise characteristic parameters such as standard deviation, etc., be used as a basis for initial filter set-up.

5.3 DYNAMIC FILTER

Dynamic Digital Filter software is an advanced series of filtering algorithms for attenuating random weigh signal noise. Using the prefiltered signal from the standard filter, the Dynamic Filter applies a two step approach (Noise Band and Response Band) to adaptively reduce the noise components of the weigh signal without adversely affecting system dynamics (Figure 5-3).The resulting real time weigh signal provides stable weight information for high resolution indication and precise control over a broad spectrum of mechanical and electrical disturbances.

5.3.1 Band Filter

Band Filter is an exponential software filter which is applied only to signal fluctuations which fall within the Noise and Response band limits. The Band Filter is fully applied to signal fluctuations which fall within the Noise Band. For signal changes which fall outside the Noise Band but within the Response Band, proprietary statistical analysis algorithms are applied to the Band Filter resulting in progressively lower dampening proportional to time within the Response Band and direction of signal change. For signal changes which fall outside both Noise and Response bands, the Band Filter is canceled. This allows heavy dampening of system noise while maintaining quick response to changes in weight signals. The Band Filter length* is selectable at 0.5, 1, 2, 4, 8, 16, 32, and 64 seconds. The equivalent frequency attenuation is as follows:

Filter length (sec)	Frequency attenuation (Hz)
0.5	10
1	5
2	2.5
4	125
8	0.63
16	0.31
32	0.16
64	0.08

*Filter length is the time for an instant change to be fully reflected at the output.

5.3.2 Noise Band

Noise band is the + and - limit of the amplitude fluctuations in weigh signal due to external electrical or mechanical influences. For changes in signal amplitude equal to or less than the Noise Band limit, the Band Filter is fully applied for maximum dampening. In many applications, the standard deviation, determined by the Noise Test (paragraph 6.2.4), can be used to establish the value of the Noise Band. Under the Noise Teat menu, view the standard deviation without any filtering applied. For 68% attenuation (1 sigma filter), select the largest value and round it up to an enterable value for the Noise Band

For 99% attenuation (3 sigma filter), multiply the largest standard deviation value by 3 and round it up to an enterable value for the Noise Band. Noise Band amplitude selections are from 0 (off) to 250 display counts (display resolution).

Main Menu (Accessed from Operation Mode)

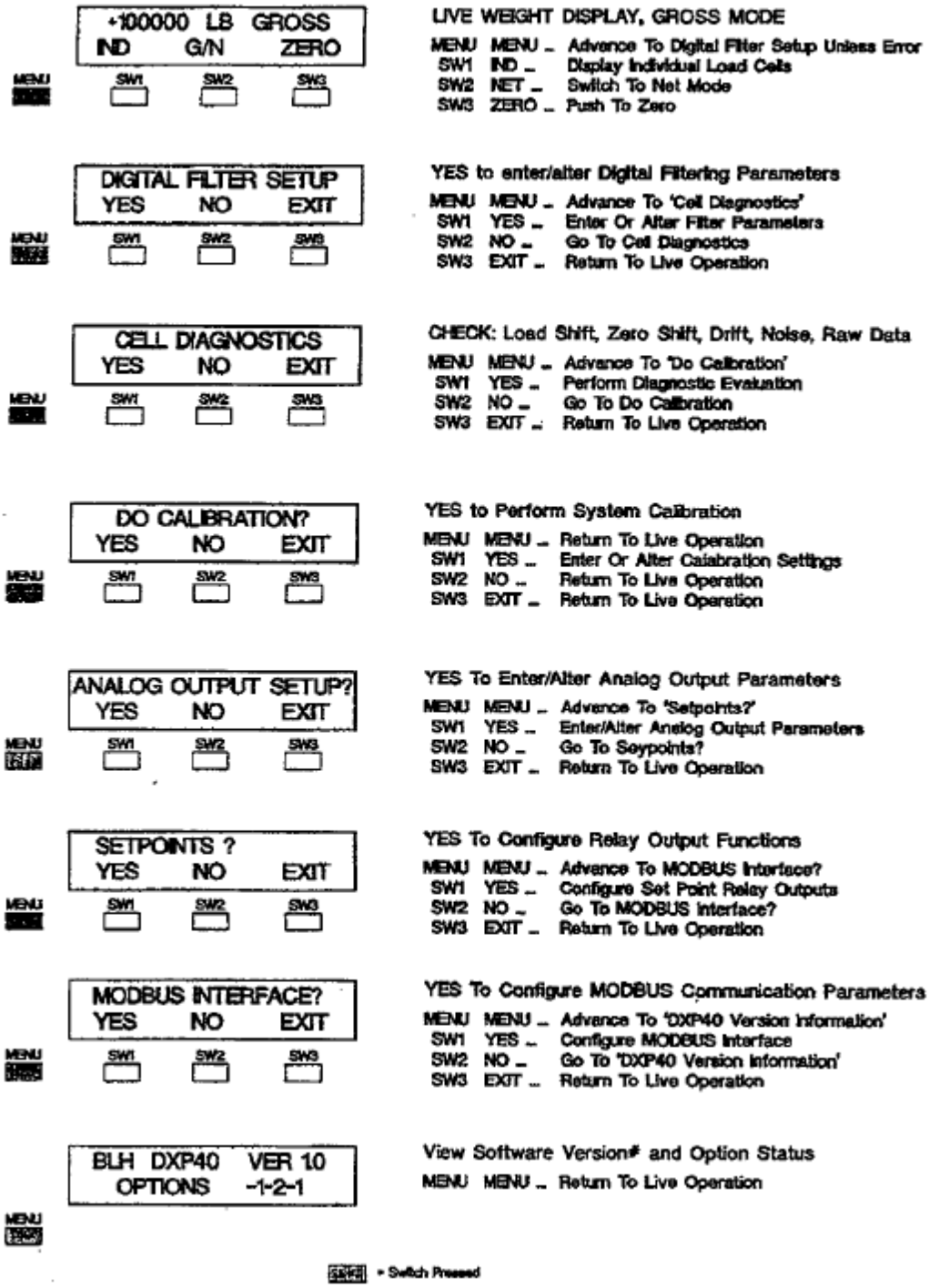


Figure 5-1. Main Menu Digital Filter Selection.

Digital Filtering Setup

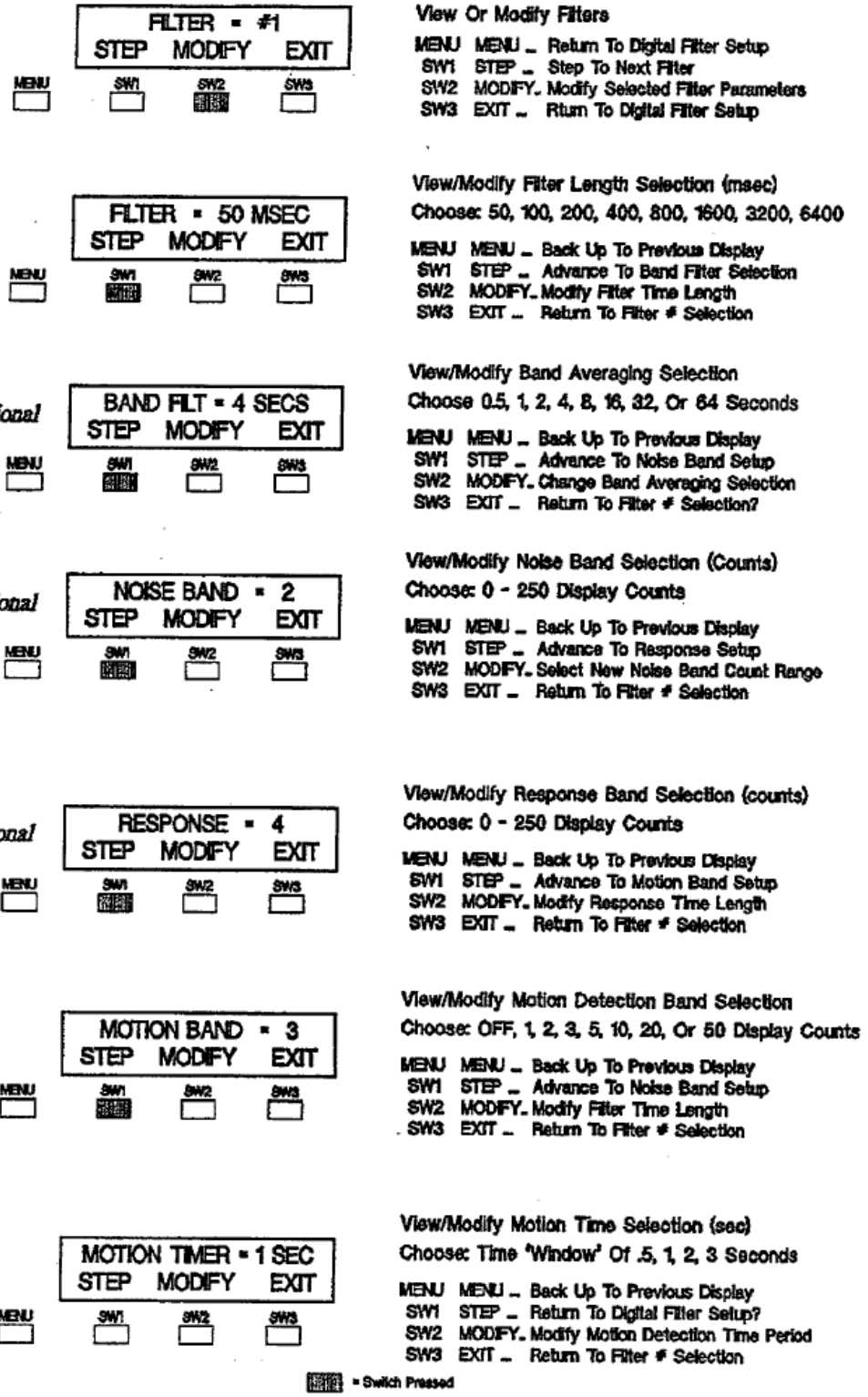


Figure 5-2. Digital Filter and Motion Setup.

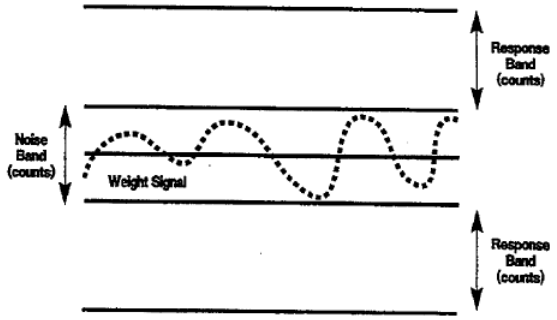


Figure 5-3. Graphical Operation Example.

5.3.3 Response Band

Response band is ne + and - limit in terms of the amplitude of changes in weight signal outside the Noise Band limit. Response allows quick response to small changes in weigh signals outside the Noise Band but within the Response Band. For changes in signal amplitude equal to or less than the Response Band limit, the Band Filter is applied with progressively lower dampening effect to allow responsive changes in weigh signal. Response Band amplitude selections are from 0 (off) to 250 display counts (display resolution). It is recommended that the Noise Band setting be multiplied by 1, 2, 3, or 4 to get the Response Band setting. With the vessel in a steady state, set the Noise Band according to the standard deviation value. With the Response Band set to zero any spikes that fall outside the Noise Band will cause the displayed or transmitted weight to jitter. Increase the Response Band setting until the jitter disappears.

The two bands work together to separate system noise from true change in weigh signal achieving higher accuracy and more dependable data for control purposes.

5.3.4 Default Parameters

All DXp-40 transmitters (even those without the dynamic filter) are shipped with these default parameters: band filter = 32 seconds, noise band = 1, and response band = 4.

5.4 MOTION DETECTION (Standard)

Motion detection parameters are -entered along with filtering parameters (Figure 5-2). Motion simply deter-mines when the system is active and when it is not. Tare and push to zero functions should not (and cannot if motion is selected) be implemented when the system is in motion. Motion can be configured for bandwidth of 1, 2, 3, 5, 10, 20, or 50 counts, or turned OFF. Once a band is selected, a time length (window) also must be established for the band. Motion must occur for the designated time interval before the system acknowledges an 'in motion' condition.

The motion timer is the time the system remains in an "in motion" condition after returning to a "not in motion" condition.

5.5 OPTIONAL SECOND FILTER

If the remote input option (paragraph 2.3.6) is installed, two sets of filtering parameters may be entered. Dual filters provide optimal control for systems with changing process dynamics. With the display reading 'DIGITAL FILTER SETUP?', press YES for filter 1, and press YES again for filter 2. Enter parameters for both filters as previously described. Filter selection is accomplished using remote digital input number 4. When input number 4 (DIG 4) is low (grounded), filter 2 is selected; high selects filter 1.

SECTION 6. On-Line Load Cell Diagnostics

6.1 GENERAL

The next step in the DXp-40 main menu is diagnostic error analysis and parameter entry (Figure 6-1). The unique quad A/D converter design makes it possible to diagnose system errors down to the exact load cell. Each load cell is continually checked for open circuit/wiring, zero shifts, drift, and overload. DXp-40 diagnostics also detect system malfunctions such as structure shifts, impact shock loads, and ingredient build up problems (heel checks).

Figure 6-2 provides an overall flow diagram for all diagnostic functions. Once an error is detected, the display shows a flashing 'E' while the serial output transmits the error code to the host computer. Also, a discrete relay output (optional) can be configured for error detection activation. Flow diagrams (Figure 6-3) show how to pinpoint the faulty cell(s) and change error condition parameters, if desired.

6.2 DIAGNOSTIC TESTS

Four of the five tests, load shift, zero shift, drift (when activated), and noise test, are evaluated and updated every 256 conversions (12 seconds). Overload is checked and updated every conversion (50 msec).

Flow diagrams (Figure 6-3) provided for each test show how to distinguish the cell/system fault and change parameters if desired.

Main Menu (Accessed from Operation Mode)

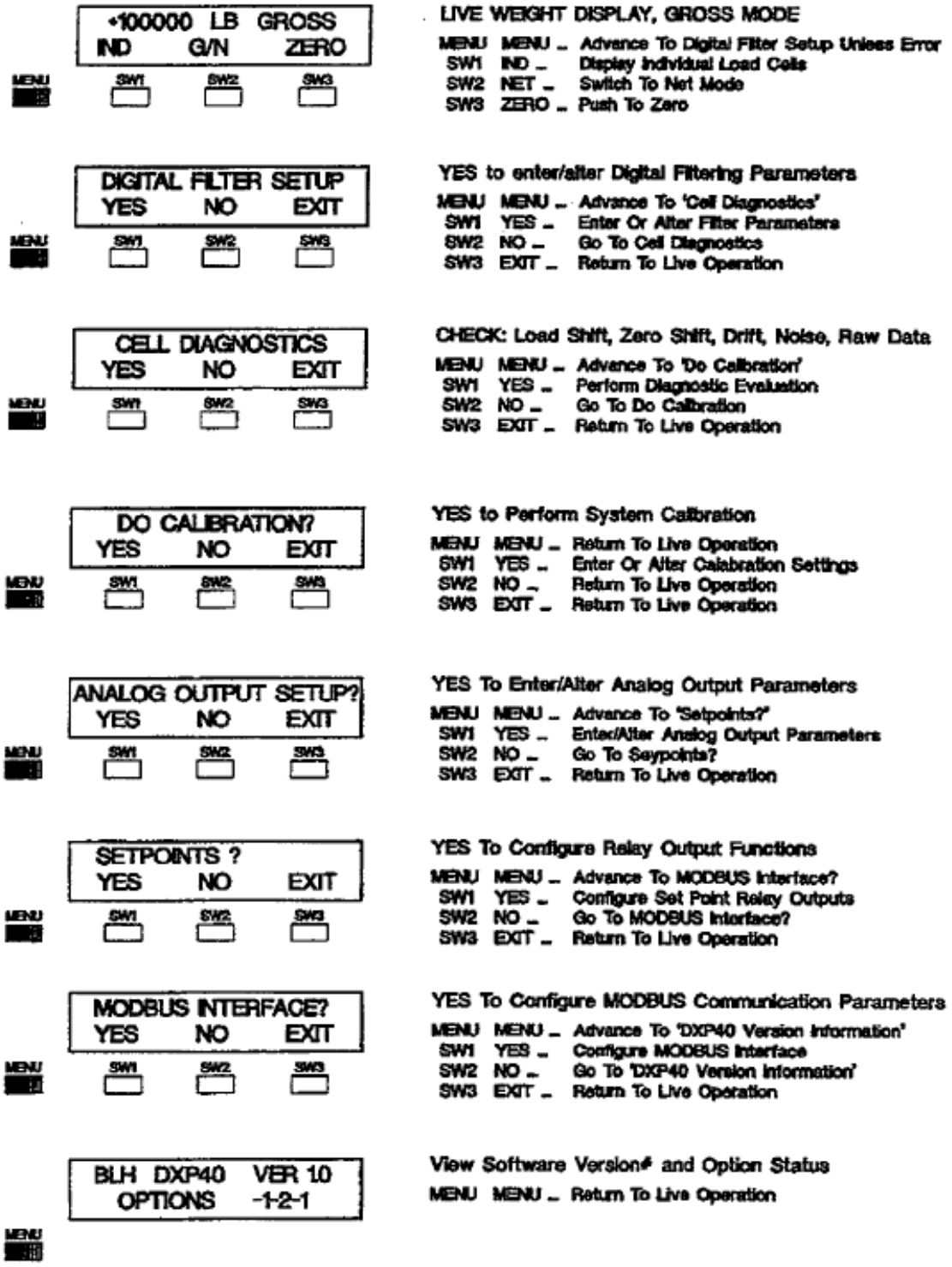


Figure 6-1. Diagnostic Error Evaluation Main Menu

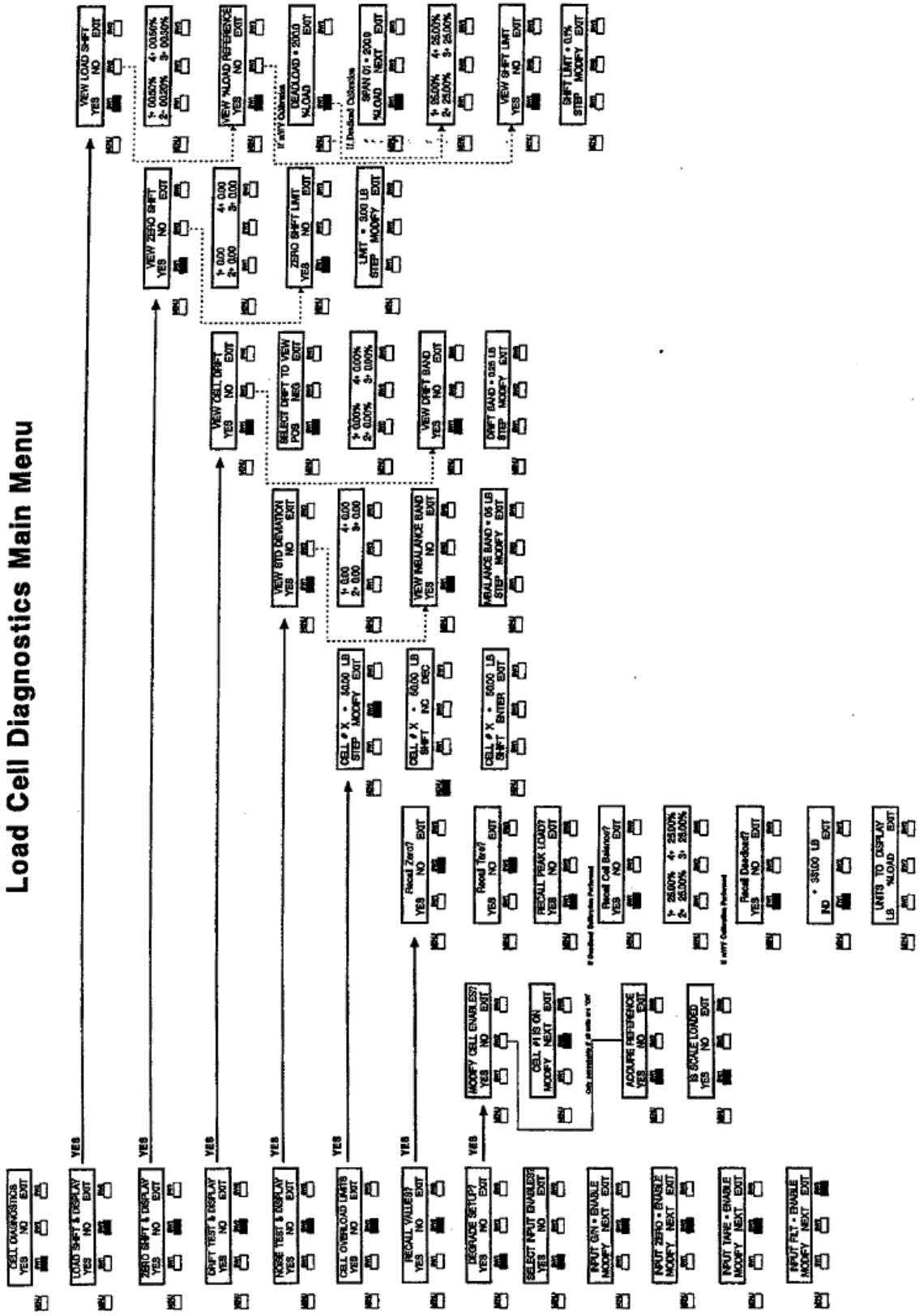


Figure 6-2. DXp-40 Diagnostic Routines.

Load Cell Diagnostics Main Menu

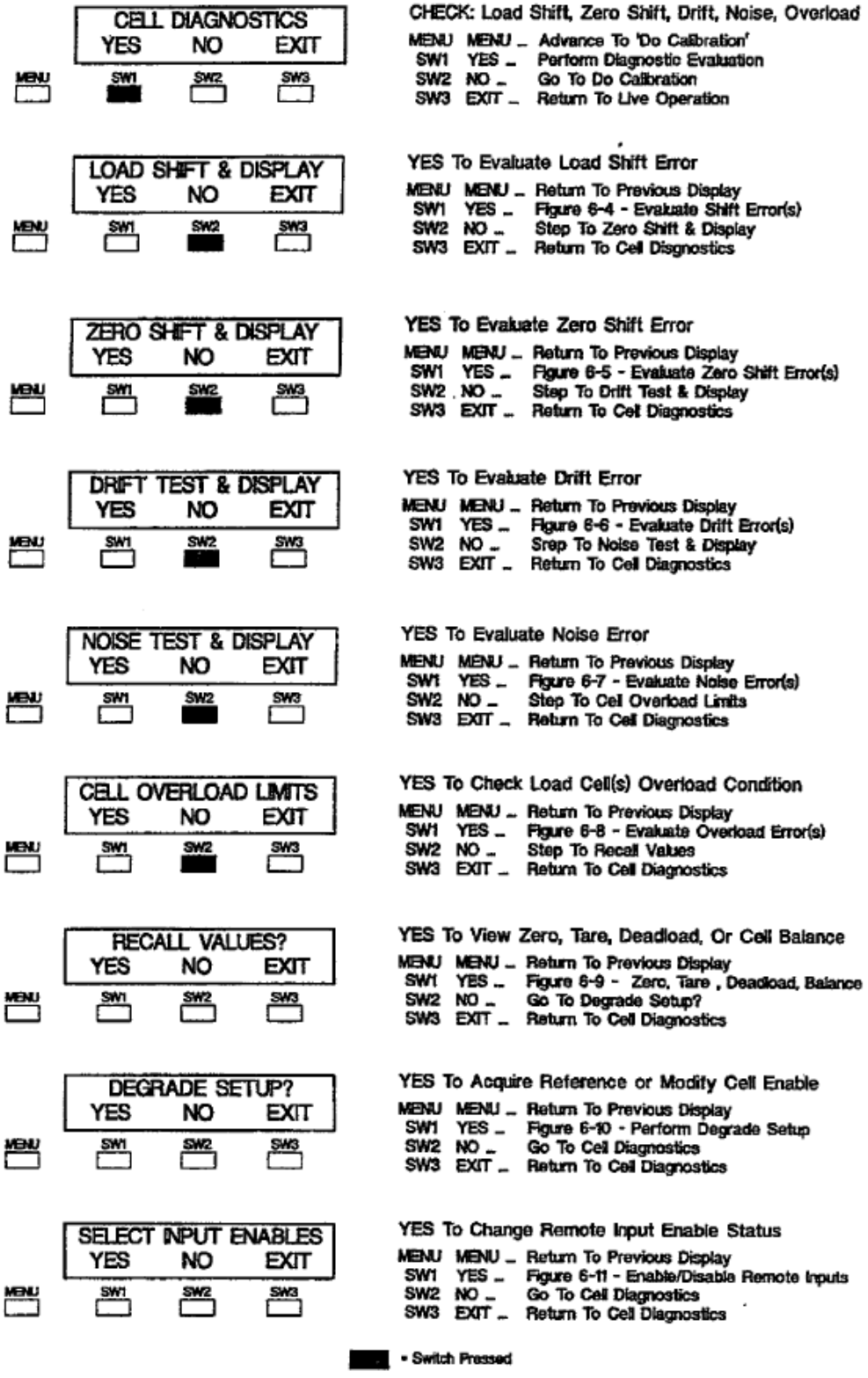


Figure 6-3. Diagnostic Error Evaluation Main Menu.

6.2.1 Load Shift

A load shift error indicates that system equipment or vessel contents have shifted so as to place a disproportional amount of weight on a single cell. This test does not apply to initial load alterations during installation and calibration. Load. shift - testing detects• significant load changes in an operational weigh system. Follow guidelines in Figure 6-4 to determine which cell(s) is experiencing the shift error.

Load shifts can be caused by many things, among a few are: heel build up on one side of a tank, support structure changes introducing more force from connected pipes or process equipment, excessive deflection of a support leg, or faulty signal from the load cell.

Check the system structure above that cell for evidence of weight shift. If physical evidence does not point to a structural or content error, see if the cell has failed any of the other diagnostic tests.

6.2.2 Zero Shift

Zero shift testing identifies a toad cell(s) that has shifted from its original calibration zero reference point. The diagnostic zero shift limit entry is DIFFER¬ENT from the 2%, 20%, 100%, or OFF calibration ZERO band entry. Zero' shift testing .is-applied, to - each load cell, whereas the zero band concerns only the total system weight. Follow the flow diagram in Figure 6-5 to view the zero shift value for each cell and/or alter the zero shift limit.

Zero shift test failures typically result in load cells that have been damaged by overloading or electrical leak-age. Either of these factors can cause a permanent shift in a cell's zero reference. If a cell fails the zero shift test, check to see if the overload peak has exceeded acceptable tolerance levels. Note that the zero shift test is performed only when the 'zero' function is activated.

6.2.3 Drift Test

The drift test detects a load cell output that is changing beyond acceptable tolerance levels. When the system stabilizes, after a period of weight activity, the processor waits one minute and then stores a reference value for each cell. Successive -values, averaged every 256 conversions, are compared to the stored value and checked for compliance with the drift band selection. Drift testing is abandoned when the system is active. Use Figure 6-6 to evaluate drift errors and/or change the drift band.

Long term load cell drift problems may be caused by electrical leakage or system structural problems. Since most systems usually experience inactive periods of 8 or more hours, this test is highly effective at catching long term drift problems. Long term drift testing provides 'early warning detection' for cells that may fail completely at a later date.

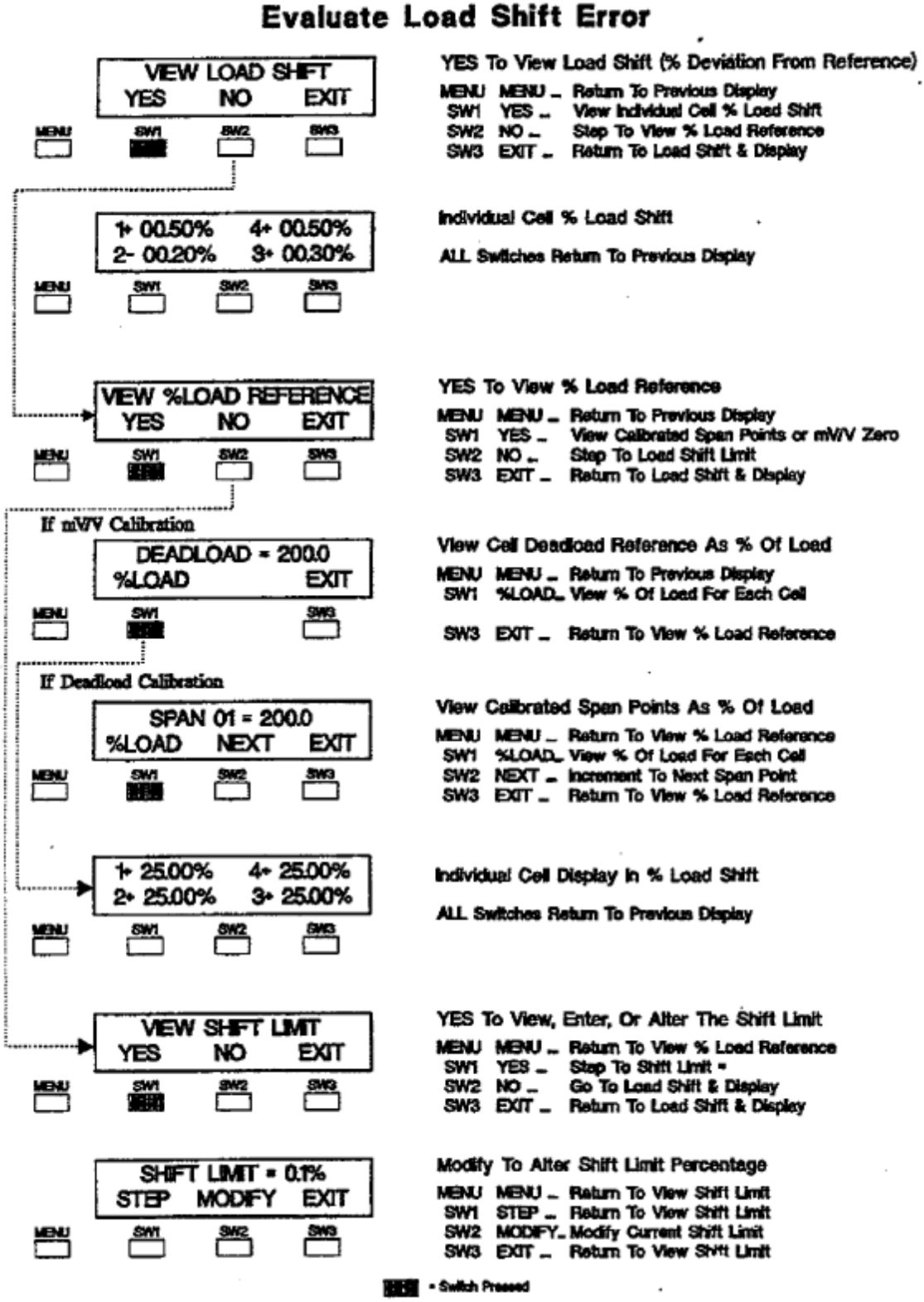


Figure 6-4. Load Shift Error Evaluation Instructions.

Evaluate Zero Shift Error

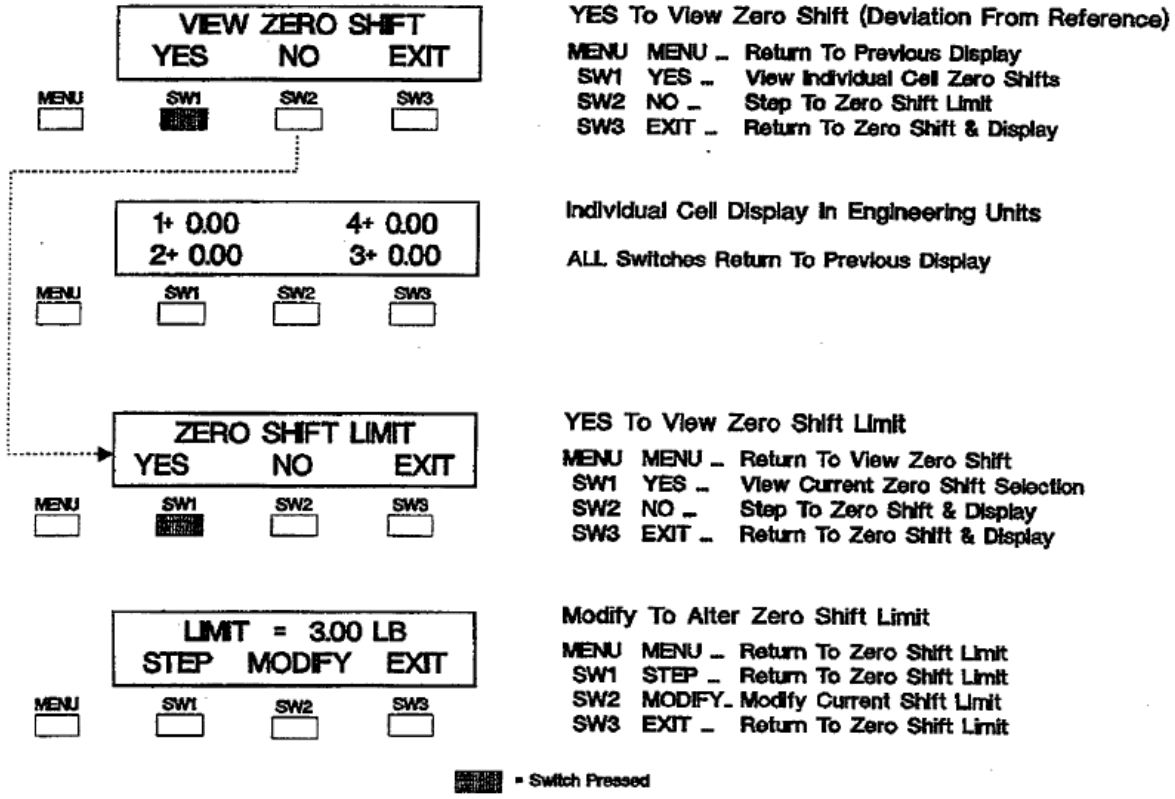


Figure 6-5. Zero Shift Error Evaluation Instructions.

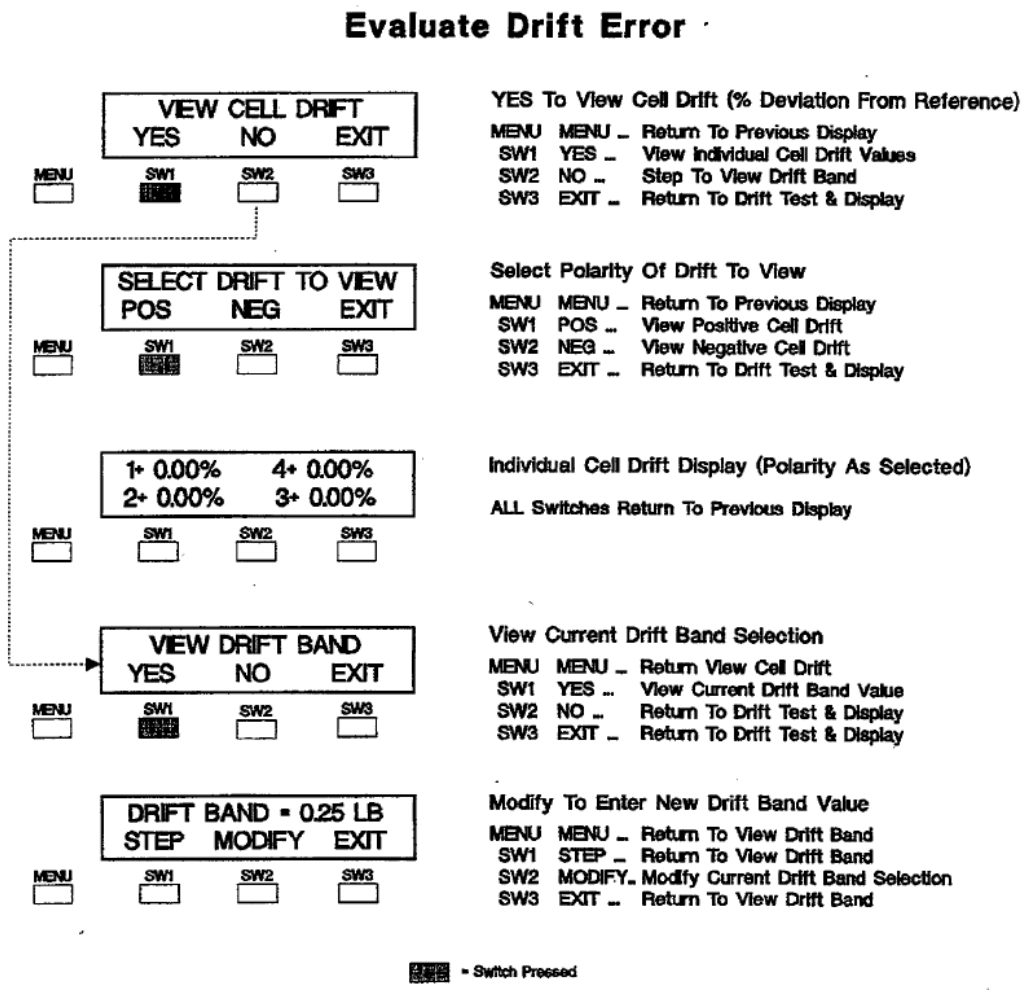


Figure 6-6. Drift Error Evaluation Instructions.

6.2.4 Noise Test

Noise testing identifies a load cell(s) that is experiencing unusual amounts of static state signal 'jitter'. The standard deviation for each cell output is computed every 256 AID conversions (12 seconds). The standard deviation values of all cells are -then compared to - one another. If the value of any one cell exceeds the values of all other cells by an amount greater than the imbalance band, an error is issued against that cell. Use Figure 6-7 to view the standard deviation for each cell and/or change the imbalance band Value.

Excessive noise may be introduced into a load cell through structural vibration or installation location (fork lift traffic, etc.). Another factor could be a loose or corroded load cell connection. If a load cell checks out 'good' for all other diagnostic tests but fails the noise test, carefully check the mounting location and electrical connections.

NOTE: Noise testing also provides a good way to set the OXp-40 filter. Try the following:

1). Turn the filter off (select 50 msec filter, Figure 5-2).

2). View the standard deviation for each load cell (during non-error condition).

3). Enter the highest value standard deviation as the noise band value.

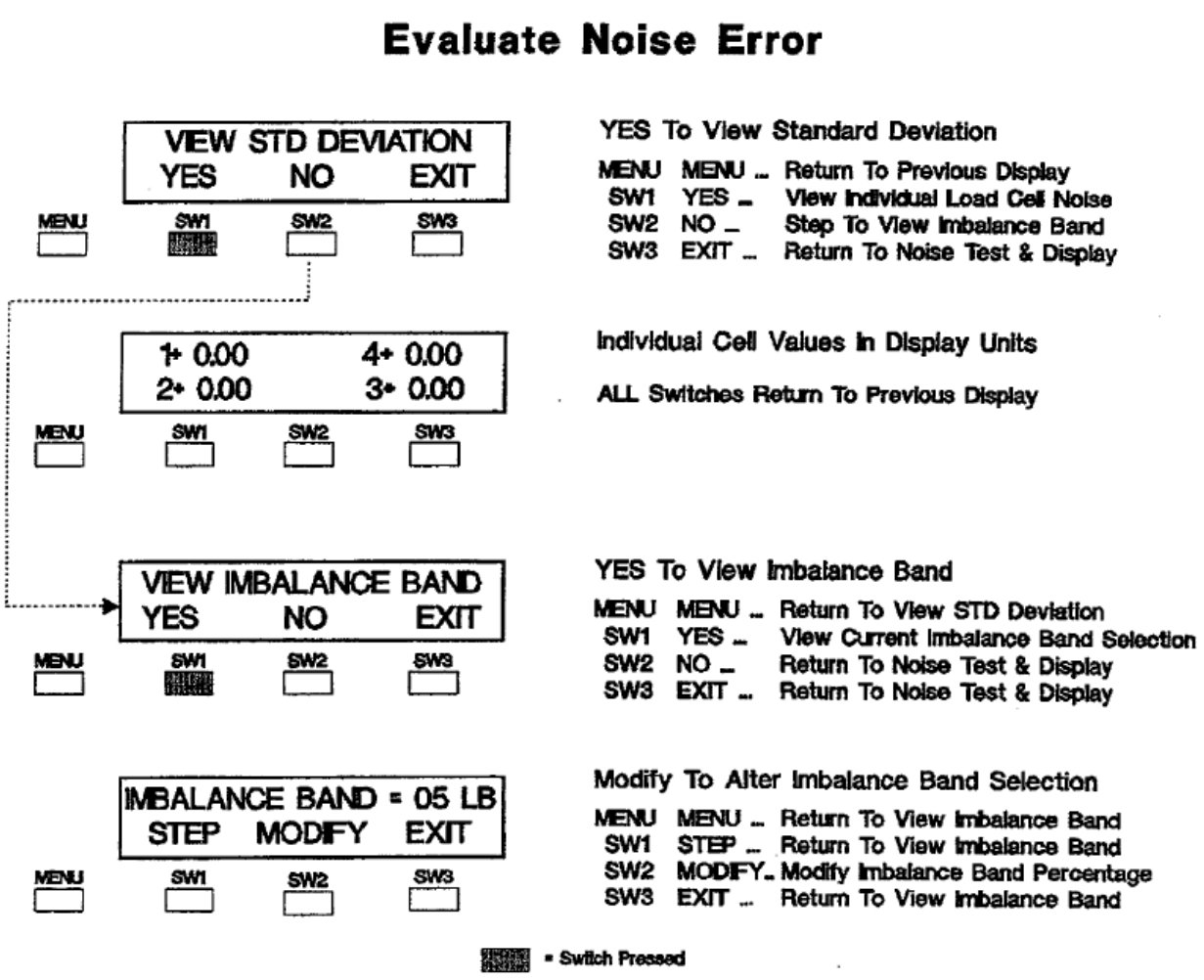


Figure 6-7. Noise Error Evaluation Instructions.

6.2.5 Overload

Since overload is critical to system safety and load cell integrity, it is checked every 50 msec. Cell overload limits are typically set at the cell's rated capacity. A running peak value for each cell is recorded and may be checked (or cleared) at any In older weigh systems, overload typically signaled a total system overload (system capacity exceeded).

The DXp-40, however, can alert an operator to a single cell overload, even though total weight does not exceed system capacity. Single cell overloads can be caused by heel buildup, shock loads (mixers/blenders, ingredient free fall force, etc.) and poor system design. Figure 6-8 provides a flow diagram for cell overload evaluation.

6.2.6 Recall Values

Recall values allows an operator to view the current TARE, ZERO, Balance, and Deadload values. Figure 6-9 shows how to recall any or all values.

Load Cell Overload Limit Selection

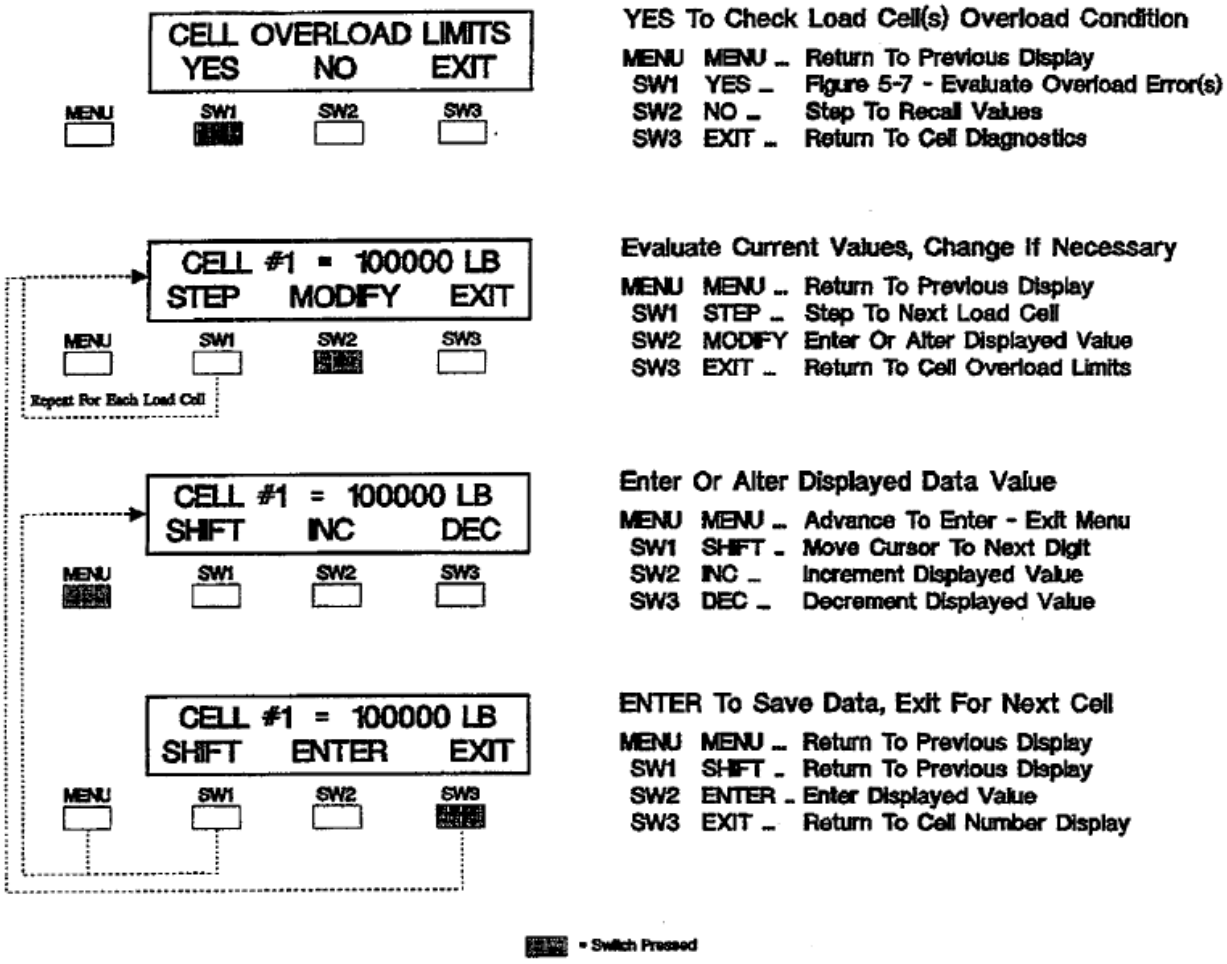


Figure 6-8. Overload Error Evaluation Instructions.

Recall Values (Zero, Tare, Balance or Deadload)

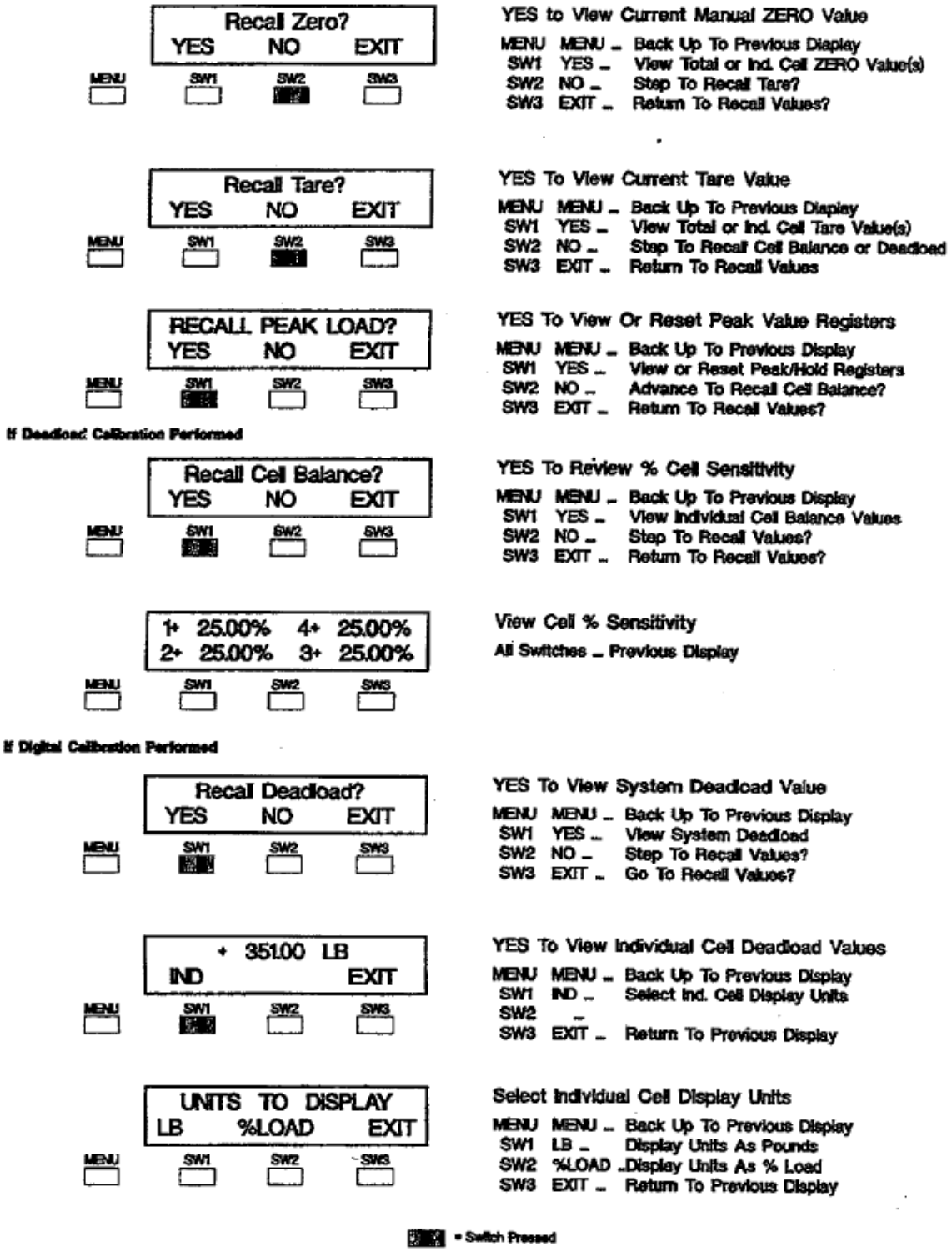


Figure 6-9. Recall Values Flow Diagram.

6.2.7 Degrade Mode Function

If a diagnostic test identifies one or more load cells in the system as providing faulty data, it is possible using degrade mode operation to eliminate the erroneous data from the cell(s) contributing to the system weight measurement. Since the DXp-40 measures each channel independently and digitally sums the weight information, degraded mode operation shuts off the actual measurement from the suspect channel(s) and uses a calculated digital substitute value, corrected for system balance and channel sensitivity. The resulting system performance will be reduced somewhat, but will still be compensated for load imbalance. This mode of operation makes it possible to continue weigh system operation with minimal interruption.

To activate degraded mode operation it is necessary to shut-off the suspect channel using the Cell Enable menu (Figure 6-10) accessed via the keypad. It is not possible to automatically activate this mode internally or remotely through the serial port.

Prior to degrade mode operation, a degrade mode reference must be established. This reference establishes individual cell characteristics for use in future degrade mode operation. To enter the reference point, perform the following:

[1] Calibrate the system and acquire a system deadload zero (mV/V calibration also must acquire deadload zero).

[2] Load system to at least 20% of full scale capacity.

[3] Proceed to the Degrade Setup Menu (Figure 6-10) and make sure all cells are 'On'.

[4] With a display of ACQUIRE REFERENCE choose YES to advance to IS SCALE LOADED. Choose YES again to enter reference value.

When degrade mode is operational, a capital 'D' will appear on the right side of the internal LCD weight display. A capital '13' also will be transmitted in the status portion of the terminal and continuous serial outputs.

If the Modbus option is present, status 1 (registers 40003, 40203, arid 40403) bit 11 and input 12 (function 02) will be set to a '1'.

NOTE: Degrade mode cannot be implemented remotely using the serial interface or digital inputs.

NOTE: For proper, degrade mode function, the scale center of gravity must remain the same.

NOTE: To enter a degrade mode reference point, all cells must be functional, turned 'On', and the system must be loaded to at least 20% of total capacity.

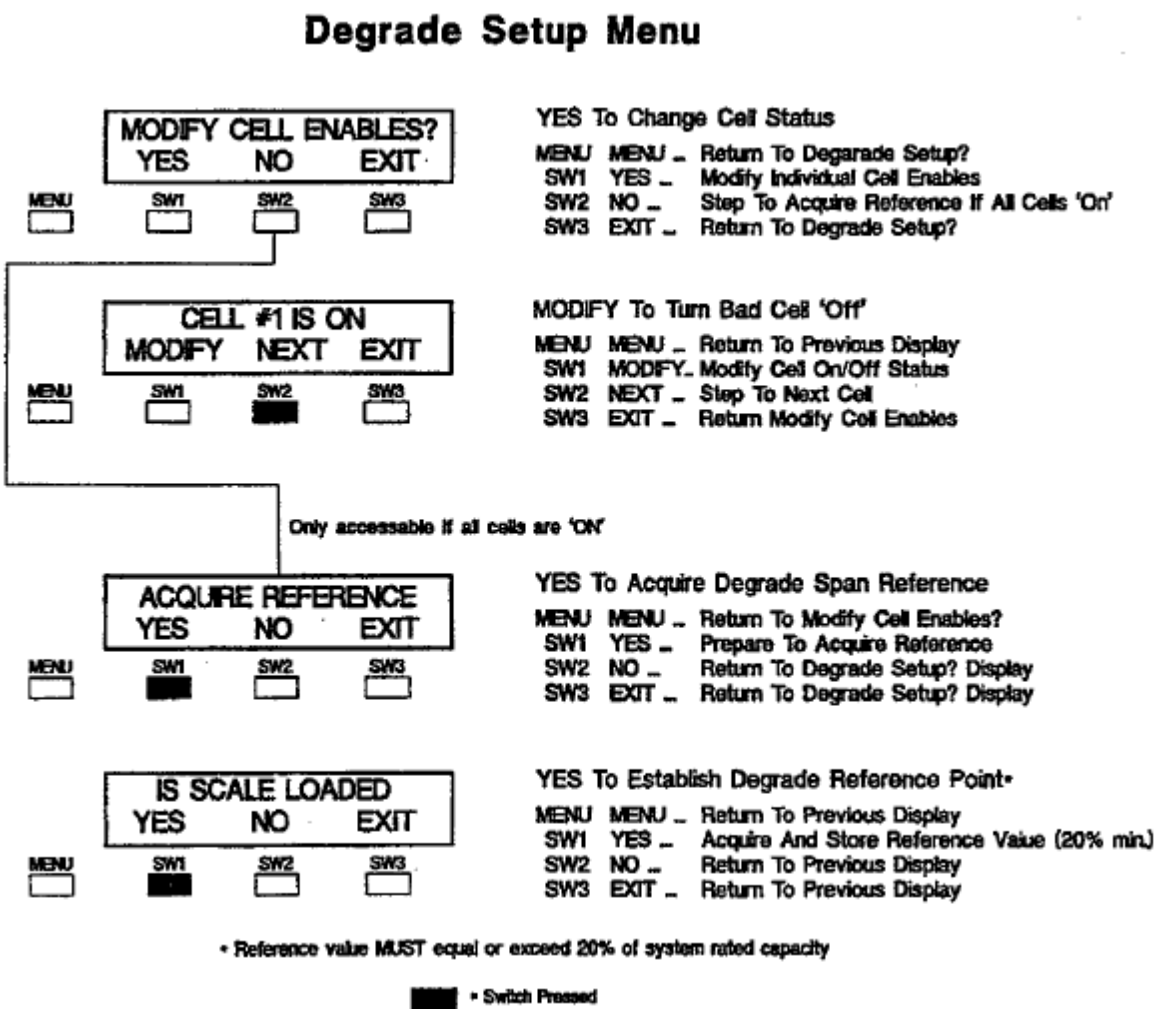


Figure 6-10. Degrade Mode Cell Selection and Reference.

6.2.8 Remote Input Enables (Optional)

Paragraph 8.3.1 defines the four remote inputs option-ally available with DXp-40 instruments. This section of diagnostic configuration determines whether or not individual remote inputs are enabled. Follow the flow diagram presented in Figure 641 to enable or disable each of the four inputs as desired.

NOTE: Enabling the remote G/N input effectively disables the internal DXp- 40 display and switch (SW2) function (see Figure 4-1). If internal G/N display and SW2 function is desired disable the G/N remote input.

NOTE: If the remote filter input is disabled, filter 2 parameters are not accessible {see Figure 6-11 explanation).

DXp-40 Remote Input Enable/Disable Selection

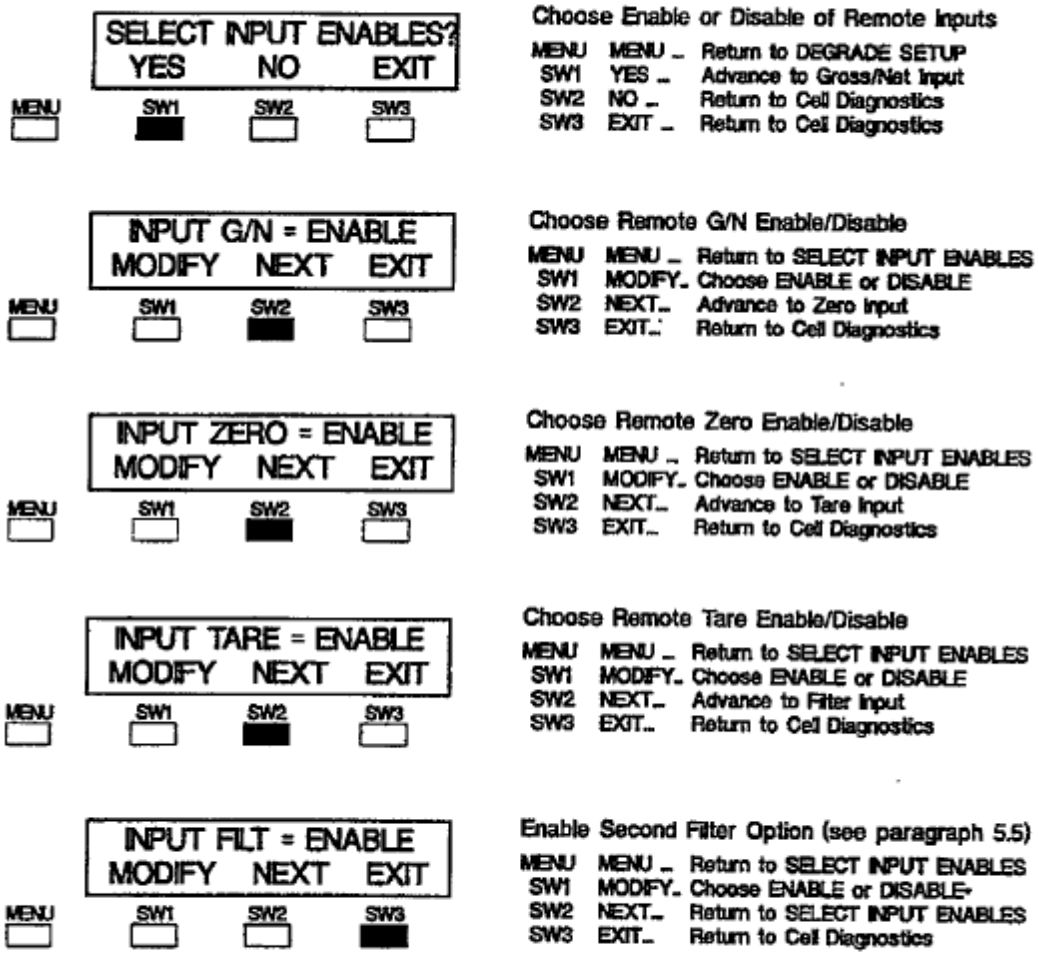


Figure 6-11. Input Enable Selection.

SECTION 7. Serial Communication

7.1 GENERAL

The DXp-40 is equipped with a variety of standard and optional serial output formats that are selected using a series of DIP switches (Figure 7-1). DIP switch positions 1, 2, and 3 (Table 7-1) allow four format choices; Digi-System Network, continuous output, terminal/computer interface, and MODBUS RTU. Allen-Bradley Remote I/O is available as an option, but requires different documentation (see page 7-9). All types of DXp interfacing will be discussed in the following paragraphs. Positions 4-7 designate transmitter address for applications requiring more than one DXp unit (Table 7-2). Switch position 8 is unused and should be left in the '0' (ON) position.

7.1.1 L.Cp-400 Digi System Network.

Up to 16 DXp-40 transmitters can be networked to the I_Cp-400 Network Controller. The half duplex format used to run the network is designed to provide remote operation of gross, net, tare, zero, and diagnostics, at high speed. This format is not intended for direct interface with a terminal or computer. The baud rate is selectable to accommodate systems with very long (low baud) or short (high baud) distances between DXp units.

7.1.2 Standard Simplex Output (Continuous Output).

The simplex output format is designed to transmit gross weight data (ASCII coded) to a remote terminal or computer. The accuracy of this point to point, digital communication interface is much greater than simple analog current or voltage approximates. Simplex outputs are transmitted in the format on page 7-2, top left-hand column.

Table 7-1. Serial Interface and Baud Rate Selections.

Switch Positions 1, 2, 3	Baud Rate	Interface
000	9600	Digi System Network
100	28800	Digi System Network
010	57600	Digi System Network
110	1200	Continuous Output
001	9600	Continuous Output
101	1200	Terminal Interface
011	9600	Terminal Interface
111		Modbus RTU

Table 7-2. DXp-40 Transmitter Address Selections

Switch Positions 4, 5, 6, 7	Address
0000	16
1000	1
0100	2
1100	3
0011	4
1010	5
0110	6
1110	7
0001	8
1001	9
0101	10
1101	11
0011	12
1011	13
0111	14
1111	15

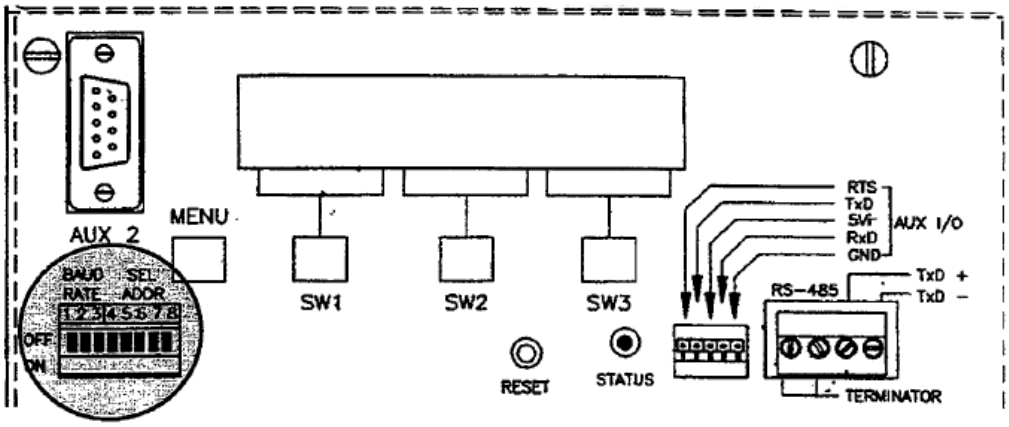


Figure 7-1. Serial Communication Parameter Selection Switch.

STX/ADR/POL/DATA/SP/UNITS/MODE/STATUS/CR/LF

Where:

STX=	1char. Start of Text (02H)
ADR=	DXp-40 unit address, 3 ASCII characters
POL=	Polarity sign; space for positive data, minus (-) for negative data
DATA=	7 char; six digits with decimal point or leading space, leading zeros = spaces
UNITS=	2 char; in demand mode 'LB' or 'KG' 1 char; in continuous mode 'L' or 'K'
MODE=	2 char; in demand mode. GR (gross), NT (net) TR (tare), or ZR (zero0) 1 char; in continuous mode, G (gross), N (net) T (tare), or Z (zero)
STATUS=	1char; M (motion), O (overload), or E (Error)
CR/LF=	2 char; carriage return, line feed (0DH/0AH)
SP=	1 char; ASCII space (20H)

Total bits per character = 1 start, 1 even parity, 7 data, and one stop.

7.1.3 Optional Computer/Terminal interface.

This half duplex (transmit and receive) format is de-signed for two way communication between a single DXp-40, or a network of DXp-40 units, and a computer/terminal. Protocol accommodates all operations such as gross, net, tare, zero, as well as remote filter 'selection. Use of this format requires customer developed device specific software to run the various network operations. Table 7-3 defines the terminal interface protocol.

Table 7-3. Computer/Terminal Interface Protocol.

Terminal Interface

ASCII Command	Description	Action	Response
'G'	GROSS	Switch to Gross mode	'01 0 LG' [adr/pol/data/sp/units/'G'/stat/CRLF]
'N'	Net	Switch to Net mode	'01 0 LN' [adr/pol/data/sp/units/'N'/stat/CRLF]
'T'	Tare	Switch to Net mode & Tare	'01 0 LN' [adr/pol/data/sp/units/'N'/stat/CRLF]
'Z'	Zero	Switch to gross mode and Zero	'01 0 LG' [adr/pol/data/sp/units/'G'/stat/CRLF]
'W'	Weight	Send Current Weight	'01 0 LG/N' [adr/pol/data/sp/units/mode/stat/CRLF]
'RT'	Recall Tare	Send Current Tare Value	'01 0 LT' [adr/pol/data/sp/units/'T'/stat/CRLF]
'RZ'	Recall Zero	Send Current Zero Value	'01 0 LZ' [adr/pol/data/sp/units/'Z'/stat/CRLF]
'QT'	Quad Tare	Send Individual Tare Values	'01 + 0 + 0 + 0 + 0 LT' [adr/pol/data/sp(for cells 1-4)/units/'T'/stat/CRLF]
'QZ'	Quad Zero	Send Individual Zero Values	'01 + 0 + 0 + 0 + 0 LZ' [adr/pol/data/sp(for cells 1-4)/units/'Z'/stat/CRLF]
'QG'	Quad Gross	Send Individual Gross Values	'01 + 0 + 0 + 0 + 0 LG' [adr/pol/data/sp(for cells 1-4)/units/'G'/stat/CRLF]
'QN'	Quad Net	Send Individual Net Values	'01 + 0 + 0 + 0 + 0 0 LN' [adr/pol/data/sp(for cells 1-4)/units/'N'/stat/CRLF]
'QV'	Quad mV/V	Send Individual mV/V Values	'01 + 0 + 0 + 0 + 0 0 MV' [adr/pol/data/sp(for cells 1-4)/units/'MV'/stat/CRLF]
'Q%'	Quad Percent	Send Individual %Load Values	'01 + 0 + 0 + 0 + 0 0 %L' [adr/pol/data/sp(for cells 1-4)/units/'%L'/stat/CRLF]

Table 7-3 con't. Computer/Terminal Interface Protocol.

ASCII Command	Description	Action	Response
'QB'	Quad Balance	Send Individual %Balance Values	'01 + 0 + 0 + 0 + 0 0 %B' [adr/pol/data/sp(for cells 1-4)/units/'%B'/stat/CRLF]
'D%'	Diag. % Load Shift	Send Current % Load Shift	'01 +0.00 +0.00 +0.00 +0.00 D%' [adr/pol/data/sp(for cells 1-4)/units/'D%'/stat/CRLF]
'DZ'	Diag. Zero Shift	Send Current Zero Shift	'01 + 0 + 0 + 0 + 0 0 DZ' [adr/pol/data/sp(for cells 1-4)/units/'DZ'/stat/CRLF]
'D+'	Diag. + Drift	Send Positive Cell Drift	'01 + 0 + 0 + 0 + 0 0 D+' [adr/pol/data/sp(for cells 1-4)/units/'D+'/stat/CRLF]
'D-'	Diag. - Drift	Send Negative Cell Drift	'01 - 0 + 0 + 0 + 0 0 D-' [adr/pol/data/sp(for cells 1-4)/units/'D-'/stat/CRLF]
'DN'	Diag. Noise Imbalance	Send Current Std. Dev. (adding 2 decimal places)	'01 + 0 + 0 + 0 + 0 0 Dn' [adr/pol/data/sp(for cells 1-4)/units/'DN'/stat/CRLF]
'DE'	Diag. Errors	Send Current Diagnostic Errors	'01 LZDNO LZDNO LZDNO LZDNO', CRLFw Error for cells 1 - 4 L = Load Shift Z = Zero Shift D = Cell Drift N = Noise Imbalance O = Overload _ = No Error
'SC'	Set Continuous	Send Constant Weight Data Transmission	[adr/pol/data/sp/units/mode/stat/CRLF]
'SD'	Set Demand	Weight Data Upon Request	
'SFxxxxxx'	Set Serial Format: where Xxxxxx 0= 6 digits data 1= 7 digits data xXxxxx 0= leading spaces 1= leading zeros xxXxxx 0= decimal point 1= no decimal point xxxXxx 0= units (L/K) 1= no units xxxxXx 0= mode (G/N) 1= no mode xxxxxX 0= status 1= no status	Changes To Serial Data Format	
'SLx'	Set Filter Length x=1: filter 50 ms x=2: filter 100 ms x=3: filter 200 ms x=4: filter 400 ms x=5: filter 800 ms x=6: filter 1600 ms x=7: filter 3200 ms x=8: filter 6400 ms	Enter or Alter Filter Length	
'SBxxx'	Set NoiseBand xxx= 000 to 250 display counts	Enter/Alter Noise Band	
'SRxxx'	Set Response Band xxx= 000 to 250 x 50 ms (0 to 12,500 ms max)	Enter/Alter Response Band	

Table 7-3 (cont.) Computer/Terminal Interface Protocol.

ASCII Command	Description	Action	Response
'SAx'	Set Band Filter: where x=1: 0.5 seconds x=2: 1 second x=3: 2 seconds x=4: 4 seconds x=5: 8 seconds x=6: 16 seconds x=7: 32 seconds x=8: 64 seconds	Set New Band Filter: notes 1 & 2	
'SSnx'/CR	Set Setpoint 'n' Value n=setpoint #, x=value (up to 7 ASCII chrs followed by CRLF)		
'RF'	Recall Serial Format		'01 RFxxxxxx'/CRLF
'RL'	Recall Filter Length		'01 RLx'/CRLF
'RB'	Recall Filter Band		'01 RBxxx'/CRLF
'RR'	Recall Filter Response		'01 RRxxx'/CRLF
'RA'	Recall Band Averaging		'01 RAx'/CRLF
'RSn'	Recall Setpoint # Value		'01 RSnxxxxxxx'/CRLF
'R0'	Recall Set Point Outputs(xxxx=setpts 4-1) x='0' if setpoint off x='1' if setpoint on		'01 R0xxxx'/CRLF
'Axx'	Address '01' - '16'	Enable Addressed FSk-40 To Communicate All Others, Disabled	

Note 1 Remote filter settings are not stored in EEPROM and will revert to EKPROM settings upon power down.

Note 2 Remote filter length is averaging applied to raw data before band or response is applied. Remote filter band has its own variable filter (band flit) which is applied to delta data that remains within the +/- band. Data remains within the band if the difference between the current data and the last averaged data is less than or equal to the band setting.

Remote filter response setting is added to the noise band setting. If the change in value from one conversion to the next exceeds the noise band and falls within the response band, the following takes place: the first time data falls within the response band, the full noise band filter is applied. It on subsequent conversions, the change in value still falls within the response band, the noise band filter is progressively reduced until it reaches a length of 50 msec, at which point the noise band filter is restarted at the current weight value.

When changing data is outside both the noise and response bands, the noise band filter is reset and restarted.

Abbreviations:

adr	address, 3 ASCII chars: first two are '01' - '16' followed by an ASCII space
pol	polarity: ASCII plus or minus sign
data	weight data: 7/8 characters, 6/7 digits w/decirnal point or leading space
sp	ACSCII space (20H)
units	one character: L=pounds, K=kilograms
mode	one character: G--gioss, N=net
stat	weigh status: M=motion, 0=overload, E=diagnostic error, space=normal
CRLF	carriage return line feed: two characters ODH OAR
' '	single quotes: ASCII character string

7.1.4 Optional MODBUS Protocol

This interface method is applicable to virtually any PLC or other process control computer with MODBUS communication capability. The interface provides weight and diagnostics information and allows for remote computer control of tare, zero, and .gross/net functions as well as the ability to download new calibration data and set point values. Information is transmitted in blocks of data thereby minimizing polling and response delays. The interface operates with the DXp-40 configured as the slave device and the host computer as the master. Table 7-4 presents a complete overview of register and bit allocations for each MODBUS format. Figure 7-2 (page 7-9) presents the interface baud rate and parity selections.

MODBUS Functions Supported:

02 Read Input Status
03 Read Holding Registers
06 Preset Single Register
16 (10 Hex) Preset Multiple Registers

DXP40 Data Formats Provided:

FORMAT #1: One 16 bit signed integer -32768 to 32767 for all weight data mV/V data is divided by 10

FORMAT #2: Two 16 bit signed integers for most weight data (the two integers must be added together to get -65536 to 65534) One 16 bit signed integer for diagnostic & %data One 16 bit signed integer for mV/V data (divided by 10)

FORMAT #3: Two 16 bit signed integers for all weight data (the high word, 1st integer, must be multiplied by 32768.0 then added to the low word, 2nd integer)

Table 7-4. MODBUS Register Allocations.

DXP40 READ ONLY REGISTERS (Function 03)

READ ONLY ITEM	FORMAT #1 ADR	#REG	FORMAT #2 ADR	#REG	FORMAT #3 ADR	#REG
1 - STATUS 3	40001	1	40201	1	40401	1
2 - STATUS 2	40002	1	40202	1	40402	1
3 - STATUS 1	40003	1	40203	1	40403	1
4 - GROSS	40004	1	40204	2	40404	2
5 - NET	40005	1	40206	2	40406	2
6 - GROSS CELL 1	40006	1	40208	2	40408	2
7 - GROSS CELL 2	40007	1	40210	2	40410	2
8 - GROSS CELL 3	40008	1	40212	2	40412	2
9 - GROSS CELL 4	40009	1	40214	2	40414	2
10 - NET CELL 1	40010	1	40216	2	40416	2
11 - NET CELL 2	40011	1	40218	2	40418	2
12 - NET CELL 3	40012	1	40220	2	40420	2
13 - NET CELL 4	40013	1	40222	2	40422	2
14 - MV/V/10 CELL 1	40014	1	40224	1	40424	2
15 - MV/V/10 CELL 2	40015	1	40225	1	40426	2
16 - MV/V/10 CELL 3	40016	1	40226	1	40428	2
17 - MV/V/10 CELL 4	40017	1	40227	1	40430	2
18 - % LOAD CELL 1	40018	1	40228	1	40432	1
19 - % LOAD CELL 2	40019	1	40229	1	40433	1
20 - % LOAD CELL 3	40020	1	40230	1	40434	1
21 - % LOAD CELL 4	40021	1	40231	1	40435	1
22 - PEAK TOTAL	40022	1	40232	2	40436	2
23 - PEAK CELL 1	40023	1	40234	2	40438	2
24 - PEAK CELL 2	40024	1	40236	2	40440	2
25 - PEAK CELL 3	40025	1	40238	2	40442	2
26 - PEAK CELL 4	40026	1	40240	2	40444	2
27 - TARE	40027	1	40242	2	40446	2
28 - TARE CELL 1	40028	1	40244	2	40448	2
29 - TARE CELL 2	40029	1	40245	2	40450	2
30 - TARE CELL 3	40030	1	40246	2	40452	2
31 - TARE CELL 4	40031	1	40250	2	40454	2
32 - ZERO	40032	1	40252	2	40456	2
33 - ZERO CELL 1	40033	1	40254	2	40458	2
34 - ZERO CELL 2	40034	1	40256	2	40460	2
35 - ZERO CELL 3	40035	1	40258	2	40462	2
36 - ZERO CELL 4	40036	1	40260	2	40464	2
37 - % SENSITIVITY CELL 1	40037	1	40262	1	40466	1
38 - % SENSITIVITY CELL 2	40038	1	40263	1	40467	1
39 - % SENSITIVITY CELL 3	40039	1	40264	1	40468	1
40 - % SENSITIVITY CELL 4	40040	1	40265	1	40469	1
41 - % LOAD SHIFT CELL 1	40041	1	40266	1	40470	1
42 - % LOAD SHIFT CELL 2	40042	1	40267	1	40471	1
43 - % LOAD SHIFT CELL 3	40043	1	40268	1	40472	1
44 - % LOAD SHIFT CELL 4	40044	1	40269	1	40473	1
45 - POS DRIFT CELL 1	40045	1	40270	1	40474	1
46 - POS DRIFT CELL 2	40046	1	40271	1	40475	1
47 - POS DRIFT CELL 3	40047	1	40272	1	40476	1
48 - POS DRIFT CELL 4	40048	1	40273	1	40477	1
49 - NEG DRIFT CELL 1	40049	1	40274	1	40478	1
50 - NEG DRIFT CELL 2	40050	1	40275	1	40479	1
51 - NEG DRIFT CELL 3	40051	1	40276	1	40480	1
52 - NEG DRIFT CELL 4	40052	1	40277	1	40481	1
53 - NOISE CELL 1	40053	1	40278	1	40482	1
54 - NOISE CELL 2	40054	1	40279	1	40483	1
55 - NOISE CELL 3	40055	1	40280	1	40484	1

Table 7-4 con't. MODBUS Register Allocations.

STATUS REGISTER DEFINITIONS (Function, 03)

STATUS 1 (GENERAL STATUS)

BIT 0 - ACTIVE FILTER, (0) = FILTER 1, (1) = FILTER 2
BIT 1 - MOTION
BIT 2 - UNABLE TO TARE/ZERO BECAUSE OF MOTION
BIT 3 - UNABLE TO ZERO BECAUSE OF LIMIT
BIT 4 - IN CAL
BIT 5 - DIAG ERROR
BIT 6 - LIMIT OVERLOAD
BIT 7 - A/D OVERLOAD
BIT 8 - LOST TARE
BIT 9 - ZERO
BIT 10 - POWERUP
BIT 11 - SPARE (0)
BIT 12 - SPARE (0)
BIT 13 - SPARE (0)
BIT 14 - SPARE (0)
BIT 15 - SPARE (0)

STATUS 2

BIT 0 - SETPOINT 1
BIT 1 - SETPOINT 2
BIT 2 - SETPOINT 3
BIT 3 - SETPOINT 4
BIT 4 - OVERLOAD LIMIT CELL 1
BIT 5 - OVERLOAD LIMIT CELL 2
BIT 6 - OVERLOAD LIMIT CELL 3
BIT 7 - OVERLOAD LIMIT CELL 4
BIT 8 - A/D UNDERLOAD CELL 1
BIT 9 - A/D OVERLOAD CELL 1
BIT 10 - A/D UNDERLOAD CELL 2
BIT 11 - A/D OVERLOAD CELL 2
BIT 12 - A/D UNDERLOAD CELL 3
BIT 13 - A/D OVERLOAD CELL 3
BIT 14 - A/D UNDERLOAD CELL 4
BIT 15 - A/D OVERLOAD CELL 4

STATUS 3 (DIAGNOSTIC ERRORS)

BIT 0 - LOAD SHIFT CELL 1
BIT 1 - LOAD SHIFT CELL 2
BIT 2 - LOAD SHIFT CELL 3
BIT 3 - LOAD SHIFT CELL 4
BIT 4 - ZERO SHIFT CELL 1
BIT 5 - ZERO SHIFT CELL 2
BIT 6 - ZERO SHIFT CELL 3
BIT 7 - ZERO SHIFT CELL 4
BIT 8 - DRIFT CELL 1
BIT 9 - DRIFT CELL 2
BIT 10 - DRIFT CELL 3
BIT 11 - DRIFT CELL 4
BIT 12 - NOISE CELL 1
BIT 13 - NOISE CELL 2
BIT 14 - NOISE CELL 3
BIT 15 - NOISE CELL 4

Table 7-4 con't. MODBUS Register Allocations.

DXp-40 Read/Write Registers (Functions 03, 06, 16)

Read/Write	Format #1 ADR	#REG	Format #2 ADR	#REG	Format #3 ADR	#REG
CommanD*	40101	1	40301	1	40501	1
SETPOINT 1	40102	1	40302	2	40502	2
SETPOINT 2	40103	1	40304	2	40504	2
SETPOINT 3	40104	1	40306	2	40506	2
SETPOINT 4	40105	1	40308	2	40508	2
FILTER 1 LENGTH	40106	1	40310	1	40510	1
FILTER 1 BAND	40107	1	40311	1	40511	1
FILTER 1 RESPONSE	40108	1	40312	1	40512	1
FILTER 1 BAND AVERAGE	40109	1	40313	1	40513	1
FILTER 1 MOTION	40110	1	40314	1	40514	1
FILTER 1 MOTION TIMER	40111	1	40315	1	40515	1
FILTER 2 LENGTH	40112	1	40316	1	40516	1
FILTER 2 BAND	40113	1	40317	1	40517	1
FILTER 2 RESPONSE	40114	1	40318	1	40518	1
FILTER 2 BAND AVERAGE	40115	1	40319	1	40519	1
FILTER 2 MOTION	40116	1	40320	1	40520	1
FILTER 2 MOTION TIMER	40117	1	40321	1	40521	1
DIAG SHIFT LIMIT	40118	1	40322	1	40522	1
DIAG ZERO SHIFT LIMIT	40119	1	40323	2	40523	2
DIAG DRIFT LIMIT	40120	1	40325	1	40525	1
DIAG NOISE LIMIT	40121	1	40326	1	40526	1
OVERLOAD CELL 1	40122	1	40327	2	40527	2
OVERLOAD CELL 2	40123	1	40329	2	40529	2
OVERLOAD CELL 3	40124	1	40331	2	40531	2
OVERLOAD CELL 4	40125	1	40333	2	40533	2

COMMAND
01 = TARE net weight
02 = ZERO gross weight

SETPOINT
any pos weight value

DIAG SHIFT LIMIT
0 - 99 (0% - 9.9%)

DIAG ZERO SHIFT LIMIT
any pos weight value

DIAG DRIFT LIMIT
0 - 99 counts

DIAG NOISE LIMIT
0 - 99 counts

FILTER LENGTH
00 = 50ms
01 = 100ms
02 = 200ms
03 = 400ms
04 = 800ms
05 = 1600ms
06 = 3200ms
07 = 6400ms

NOISE BAND
0 - 250 counts
ie. if counting
by 2 lbs:
02 = 4 lbs

RESPONSE BAND
0 - 250 counts

BAND FILTER
00 = 0.5 seconds
01 = 1 second
02 = 2 seconds
03 = 4 seconds
04 = 8 seconds
05 = 16 seconds
06 = 32 seconds
07 = 64 seconds

MOTION
00 = OFF
01 = 1 count
02 = 2 counts
03 = 3 counts
04 = 5 counts
05 = 10 counts
06 = 20 counts
07 = 50 counts

MOTION TIMER
00 = 1/2 SEC
01 = 1 SEC
02 = 2 SEC
03 = 3 SEC

OVERLOAD
any pos weight value

Note: counts refers to displayed counts. If the display is counting by 2 (x2 increments), then presetting a register to 9 would equal 18 lb/ph/etc.

Table 7-4 (cont.) Input Status Bit Designations.

INPUT STATUS DEFINITIONS (Function, 02)

INPUT 1 - ACTIVE FILTER, (0) = FILTER 1, (1) = FILTER 2
INPUT 2 - MOTION
INPUT 3 - UNABLE TO TARE/ZERO BECAUSE OF MOTION
INPUT 4 - UNABLE TO ZERO BECAUSE OF LIMIT
INPUT 5 - IN CAL
INPUT 6 - DIAG ERROR
INPUT 7 - LIMIT OVERLOAD
INPUT 8 - A/D OVERLOAD
INPUT 9 - LOST TARE
INPUT 10 - ZERO
INPUT 11 - POWERUP
INPUT 12 - SPARE
INPUT 13 - SPARE
INPUT 14 - SPARE
INPUT 15 - SPARE
INPUT 16 - SPARE

INPUT 17 - SETPOINT 1
INPUT 18 - SETPOINT 2
INPUT 19 - SETPOINT 3
INPUT 20 - SETPOINT 4
INPUT 21 - OVERLOAD LIMIT CELL 1
INPUT 22 - OVERLOAD LIMIT CELL 2
INPUT 23 - OVERLOAD LIMIT CELL 3
INPUT 24 - OVERLOAD LIMIT CELL 4
INPUT 24 - A/D UNDERLOAD CELL 1
INPUT 26 - A/D OVERLOAD CELL 1
INPUT 27 - A/D UNDERLOAD CELL 2
INPUT 28 - A/D OVERLOAD CELL 2
INPUT 29 - A/D UNDERLOAD CELL 3
INPUT 30 - A/D OVERLOAD CELL 3
INPUT 31 - A/D UNDERLOAD CELL 4
INPUT 32 - A/D OVERLOAD CELL 4

INPUT 33 - LOAD SHIFT CELL 1
INPUT 34 - LOAD SHIFT CELL 2
INPUT 35 - LOAD SHIFT CELL 3
INPUT 36 - LOAD SHIFT CELL 4
INPUT 37 - ZERO SHIFT CELL 1
INPUT 38 - ZERO SHIFT CELL 2
INPUT 39 - ZERO SHIFT CELL 3
INPUT 40 - ZERO SHIFT CELL 4
INPUT 41 - DRIFT CELL 1
INPUT 42 - DRIFT CELL 2
INPUT 43 - DRIFT CELL 3
INPUT 44 - DRIFT CELL 4
INPUT 45 - NOISE CELL 1
INPUT 46 - NOISE CELL 2
INPUT 47 - NOISE CELL 3
INPUT 48 - NOISE CELL 4

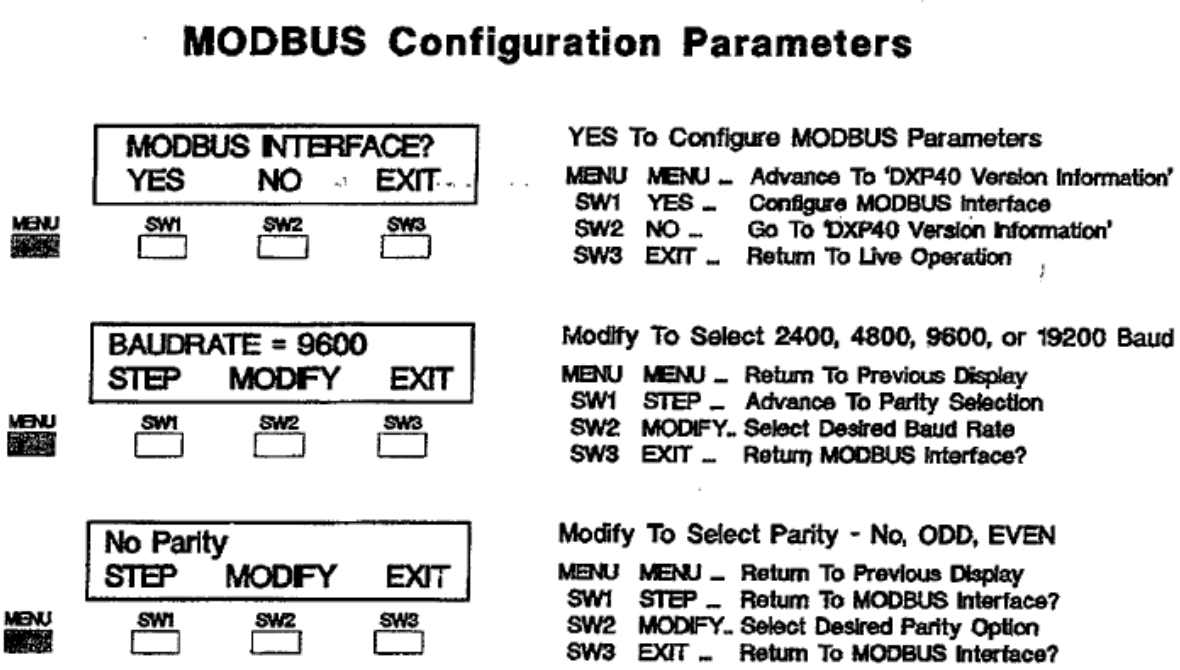


Figure 7-2. MODBUS Baud Rate and Parity Selections (accessed from main menu).

7.1.5 Optional Allen Bradley Remote 110

This interface option uses Allen Bradley components in the DXp-40 to establish a remote I/O network communication link to the PLC 5 series of programmable logic controllers. To the PLC, the DXp-40 represents 1/4 rack of discrete I/O with 32 bits of input and output image files.

All weight and status data uses discrete reads and writes to communicate scale information to the PLC in the shortest time possible. Non time critical information such as higher level diagnostics relies upon block transfers.

The complete details of this interface are covered in the BLH Allen-Bradley Remote I/O Interface Manual (TM014).

SECTION 8. Process Control

8.1 GENERAL.

The DXp-40 is available with optional analog outputs and discrete inputs and outputs that allow it to be used as a blind local controller supervised by a host computer (Figure 8-1).

This control strategy off-loads simple control actions to the DXp-40, thereby reducing processing overhead in the host. It also maximizes response time for more precise set point cutoffs resulting in less product variation.

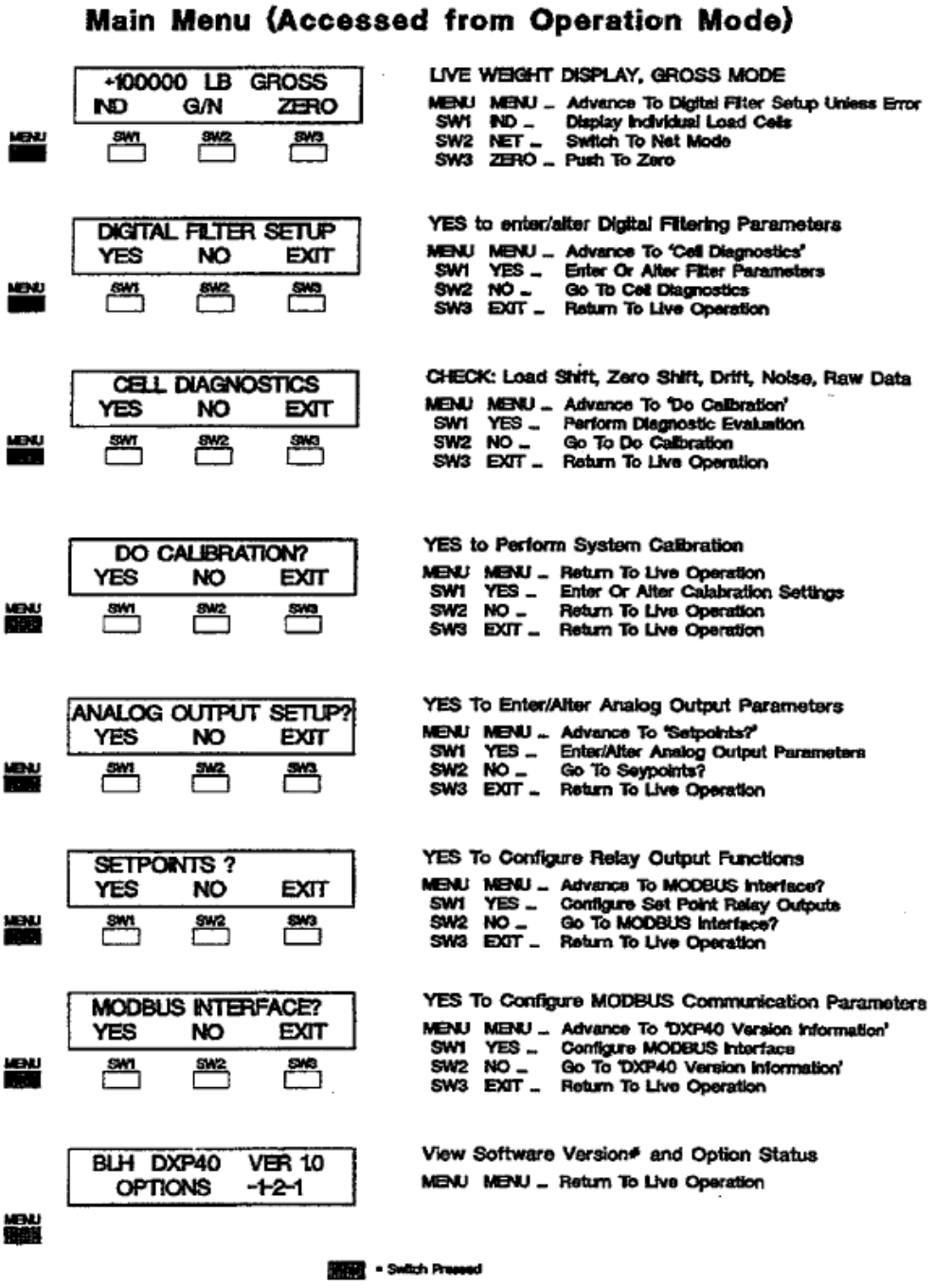


Figure 8-1. Analog and Set Point Selections in Main Menu.

8.2 OPTIONAL ANALOG OUTPUT

The DXp-40 is available with an optional 0-10 V and 4-20 mA analog output, representing either gross or net weight. This output is based upon a 16 bit digital to analog (D-A) conversion which represents up one part in 65536 of analog precision. The scaling of the output is accomplished after the DXp-40 is calibrated and can be ranged for any portion of the gross or net weight output curve.

Systems using the analog output for level control will typically configure the output to track gross weight (live product weight). Batch control systems that use weight as a variable to determine set point cutoffs can be configured to operate in the net weighing mode while using a discrete remote input to activate the tare function. Connect a current/volt meter to the appropriate analog output points (see Figure 2-5) and proceed with configuration as shown in Figure 8-2.

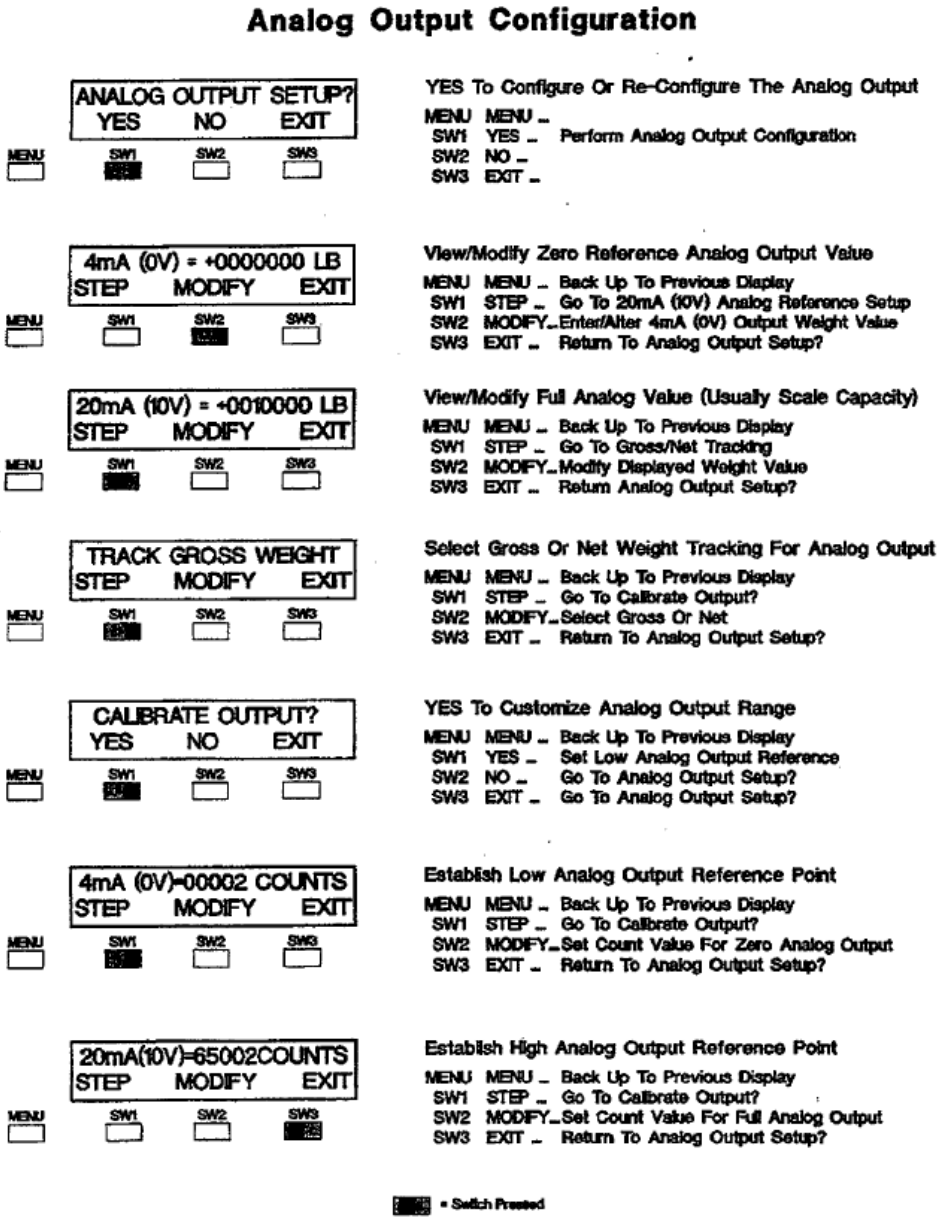


Figure 8-2. Analog Output Configuration Flow Diagram.

8.3 OPTIONAL DISCRETE INPUTS and OUTPUTS

8.3.1 Inputs

Remote initiation of zero, tare, gross/net, and a two position digital filter can be accomplished-using-the optional remote input connections (Figure 8-3). Remote inputs can be triggered by 12-24 VDC input signals (DIAG A - common output rating on many PLCs), open collector TTL devices (DIAG B), or other relays (DIAG C).

Open collector TTL and 12-24 VDC inputs are enabled in the logic low ('0') state. Logic low voltage is less than 5 VDC and current sinking capability must be no less than 3 mA. For a logic high ('V), the voltage range is 10 to 28 VDC. If TTL triggering is desired, open collector components MUST be used.

When using external relays, a closed relay equals '0' when one side of the relay is connected to digital common and the other side is connected to the input. A '1' is achieved by opening the relay.

PLC or DCS batch control systems can be configured to use these remote functions in combination with set point outputs to provide local ingredient add/discharge control Inputs function as shown in Figure 8-3.

NOTE: DXp-40 unit's ship with all remote inputs disabled. To enable any or all of the remote inputs, refer to paragraph 6.2.8 for instructions

8.3.2 Outputs

Four programmable contact relay outputs are available as set point or diagnostic alarm outputs. In the set point mode, each relay can be programmed to track gross or net operation and to have a deadband to eliminate relay chatter. In addition, the polarity, (normally open or normally closed 'position) 'of the relay is selectable using jumpers on the relay board (units are shipped in the normally open position). Also, the relay condition above or below set point, or operation and a polarity sensitive mode is selectable. Set point values can be entered via the keypad or remotely through the serial port.

Digital Inputs		
INPUT #	OPEN (1)	CLOSED (0)
Input 1	Gross	Net
Input 2	- - -	Zero
Input 3	- - -	Tare
Input 4	Filter 1	Filter 2

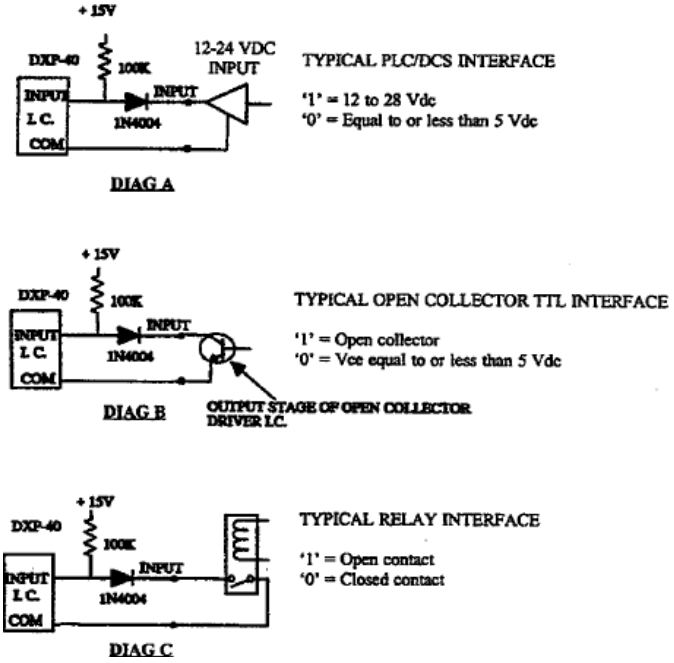
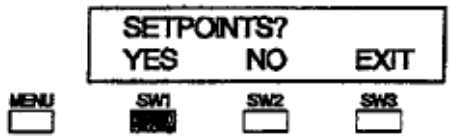


Figure 8-3. Digital Input Functions and Circuitry.

In addition to the use of relays for set point operation, the outputs can be configured to track any of the optional diagnostic functions. This provides a very simple method of communicating diagnostic alarms to a host computer or operator. Figure 8-4 provides instructions for relay configuration and Figure 8-5 (next 'page) shows how to enter actual set point values. Tables 8-1 and 8-2 (next page) show set point polarity and hysteresis capability.

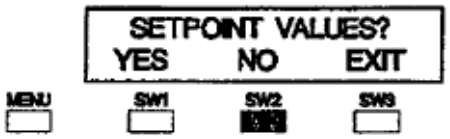
NOTE: NC/NO (normally dosed/normally open) selection not available with solid state relays

Setpoint Relay Output Configuration



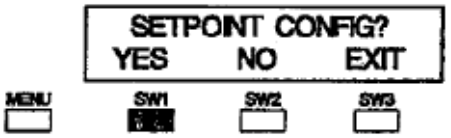
YES To Configure Or Re-Configure The Analog Output

MENU MENU ..
SW1 YES .. Perform Setpoint Output Configuration
SW2 NO ..
SW3 EXIT ..



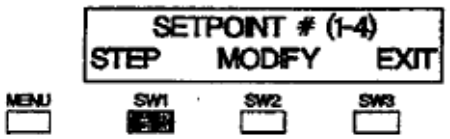
YES To Enter/Alter Actual Setpoint Values

MENU MENU .. Back Up To Previous Display
SW1 YES .. Go To Setpoint Entry Sub-Menu (Figure 8-5)
SW2 NO .. Advance To Setpoint Configuration
SW3 EXIT .. Return To Setpoints?



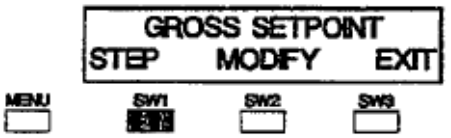
YES To Configure Setpoint Type, Polarity, and Hysteresis

MENU MENU .. Back Up To Previous Display
SW1 YES .. Begin Setpoint Configuration
SW2 NO .. Return To Setpoints?
SW3 EXIT .. Return To Setpoints?



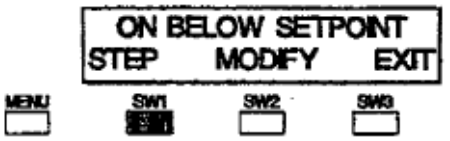
View/Modify Setpoint (1-4) Configuration

MENU MENU .. Back Up To Previous Display
SW1 STEP .. Select Next Setpoint
SW2 MODIFY.. Make Changes To Current Setpoint
SW3 EXIT .. Return To Previous Display



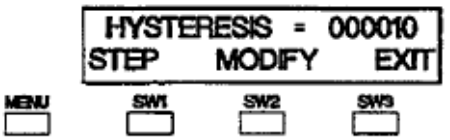
Select Setpoint 'Type' From Table 8-1 (Gross, Net, Alarm)

MENU MENU .. Back Up To Previous Display
SW1 STEP .. Go To Next Parameter Selection
SW2 MODIFY.. Change Setpoint Type
SW3 EXIT .. Return To Setpoint # (1-4)



Choose Relay 'On' Status (Above Or Below Setpoint)

MENU MENU .. Back Up To Previous Display
SW1 STEP .. Go To Next Parameter Selection
SW2 MODIFY.. Change Relay Energized ('On') Status
SW3 EXIT .. Return To Setpoint # (1-4)



Enter/Alter Setpoint Hysteresis Value

MENU MENU .. Back Up To Previous Display
SW1 STEP .. Go To Setpoint # (1-4)
SW2 MODIFY.. View Or Modify Current Hysteresis Value
SW3 EXIT .. Return To Setpoint # (1-4)

■ = Switch Pressed

Figure 8-4. Relay Output Configuration.

Setpoint Entry Sub-Menu

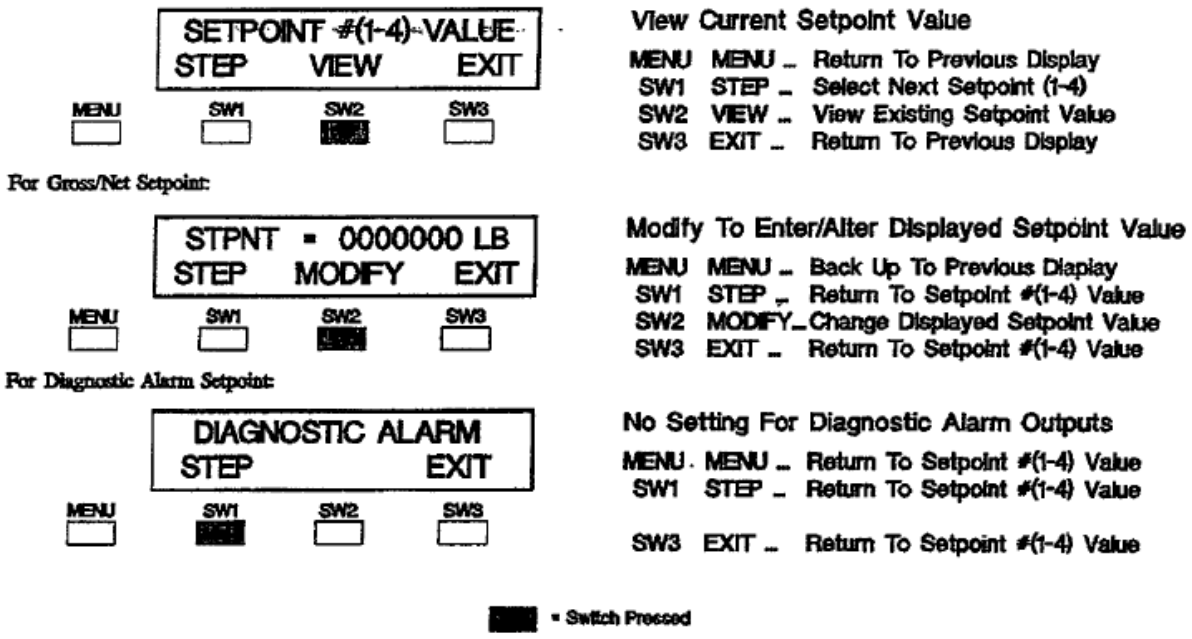


Figure 8-5. Set Point Value Entry Sub-Menu.

Table 8-1. Relay Output Selections and Parameters

Selectable Set Point Types And Respective Parameters		
Set Point Type	Programmable Parameters	
Gloss Set Point	On Below Or Above	Hysteresis
Net Set Point	Hysteresis	
Diagnostic Alarm		

Table 8-2. Relay Output Polarity Selections

Set Point Type	**Relay Energized**	**Hysteresis Active**
Gross On Below Set Point	Below Set Point	Below Set Point
Gross On Above Set	Above Set Point	Above Set Point
Net Set Point (ABS	Below Set Point	Below Set Point
Diagnostic Alarm	If Diagnostic Error	None

Appendix A – Part Numbers

Spare Parts

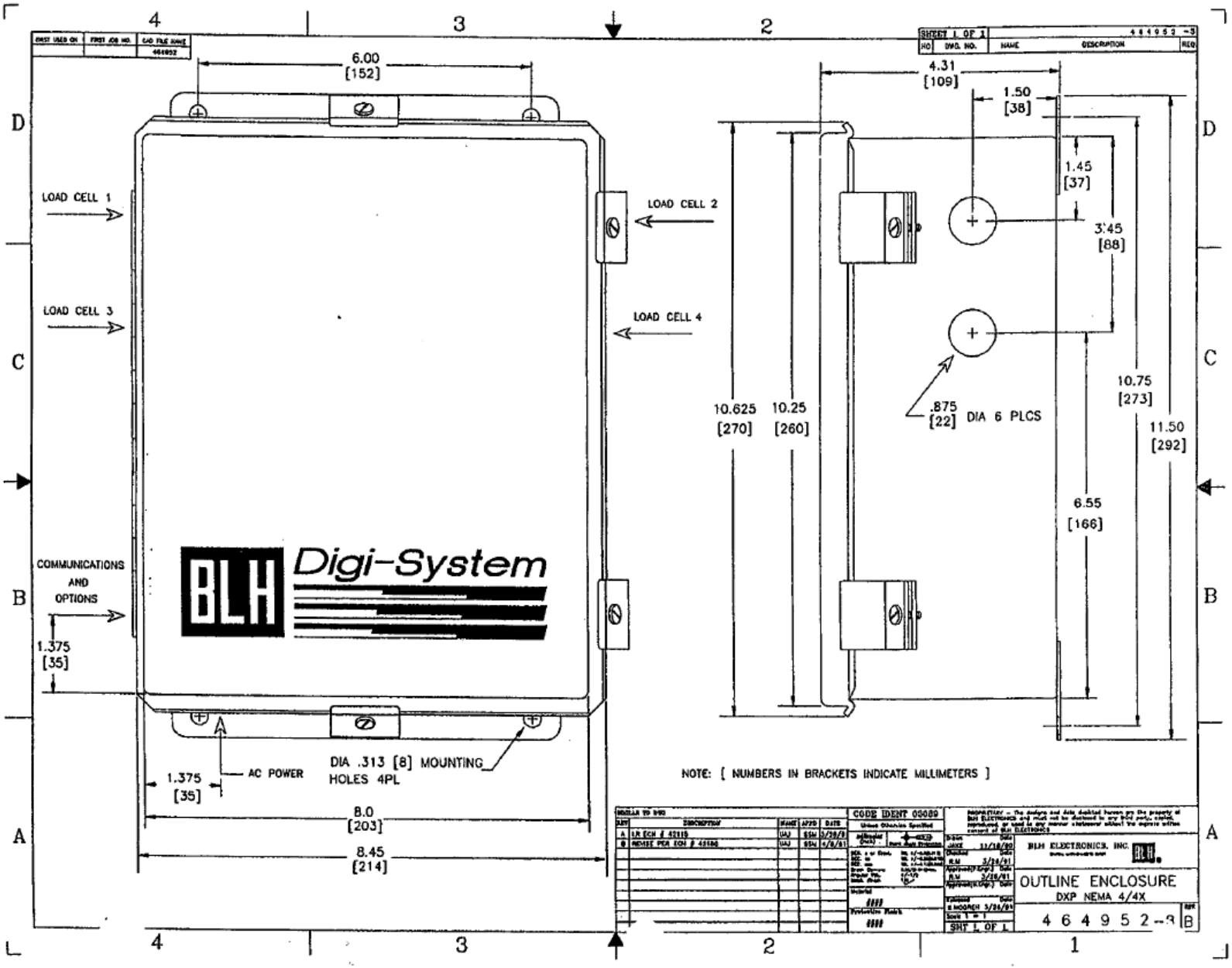
Power Supply/A-D Board	PN 465741-3
Display Board (standard LCD panel)	PN 466003-3
Standard CPU Board w/o EPROM	PN 466217-2
Programmed EPROM (specify code)	PN 466216-1
	(147697-8)
Load Cell Terminal Block Connector (7 pos)	PN 149005-8
RS-485 Terminal Block Connector (4 pos)	PN 148709-8
Analog and Relay I10 Board (Optional)	PN 466870-2
CPU Board with Allen-Bradley Remote I/O	PN 466805-2
	(w/o EPROM)

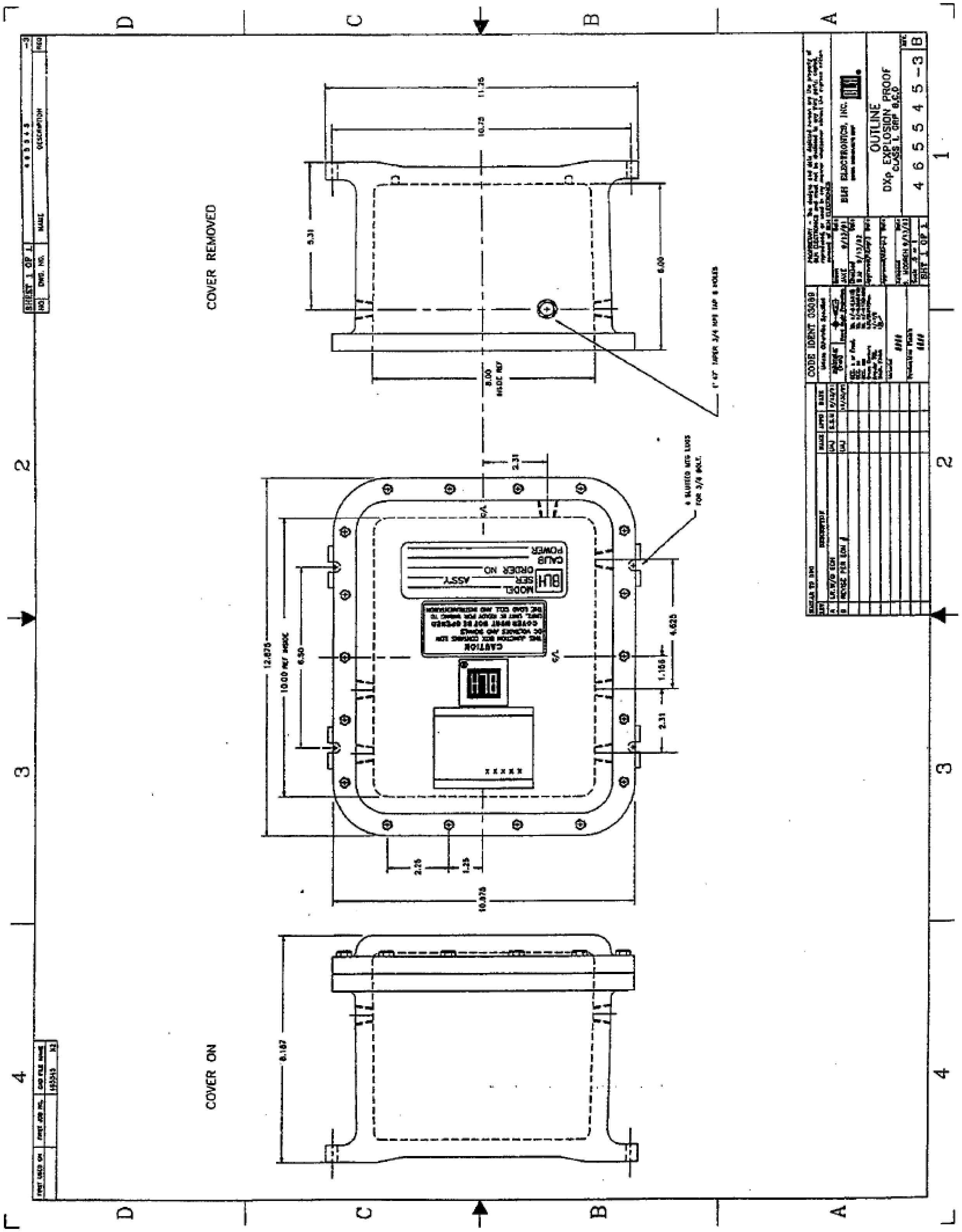
Documentation

Outline Drawing NEMA 4/4X	PN 464952-3
Outline Drawing Exp. Proof	PN 465545-3
Outline Uncased	PN 466211-3
Interconnect Wiring	PN 466181-3
Assembly Drawing	PN 466126-3
Operator's Manual	ITA 008

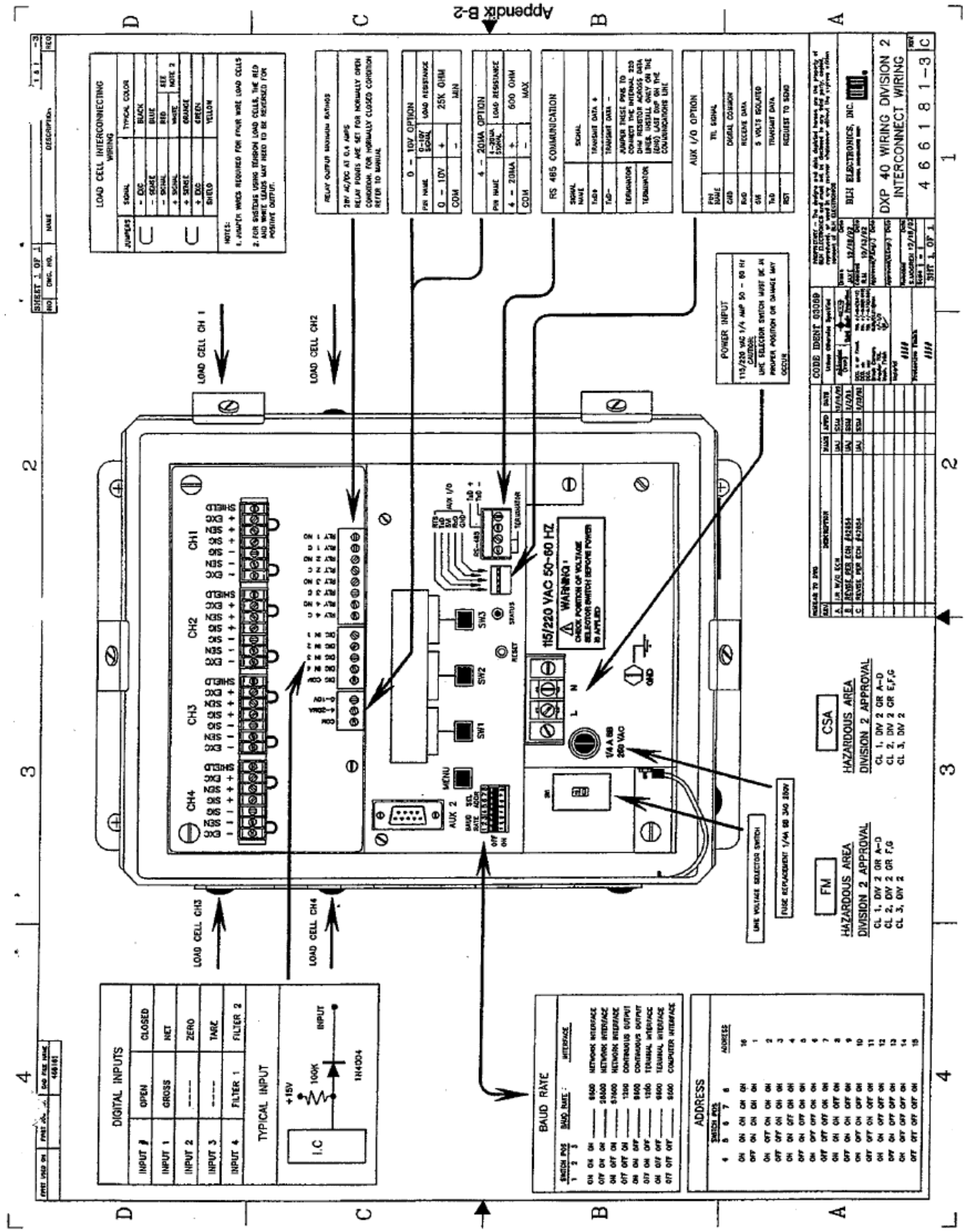
Accessories

625 Calibrator	PN 203797
Conduit Fitting Kt	PN 465231
Cable Fitting Kit	PN 465232


6.00
[152]
LOAD CELL 1
LOAD CELL 2
LOAD CELL 3
LOAD CELL 4
COMMUNICATIONS
AND
OPTIONS
1.375
[35]
AC POWER
DIA .313 [8] MOUNTING
HOLES 4PL
1.375
[35]
8.0
[203]
8.45
[214]
BLH Digi-System
4.31
[109]
1.50
[38]
1.45
[37]
3.45
[88]
10.625
[270]
10.25
[260]
.875
[22]
DIA 6 PLCS
10.75
[273]
11.50
[292]
6.55
[166]
NOTE: [NUMBERS IN BRACKETS INDICATE MILLIMETERS]
OUTLINE ENCLOSURE
DXP NEMA 4/4X
4 6 4 9 5 2 - 3
B


COVER REMOVED
COVER ON
OUTLINE
DXp EXPLOSION PROOF
CLASS I, GRP B,C,D
BLH ELECTRONICS, INC.
CODE IDENT 05089
4 6 5 5 4 5 -3
CAUTION
MODEL
SER
ORDER NO
ASS'Y
CALIB
POWER
11.25
10.75
5.31
6.00
8.00 INSIDE REF
12.875
10.00 REF INSIDE
6.50
4.625
1.156
2.31
2.25
1.25
10.875
8.187

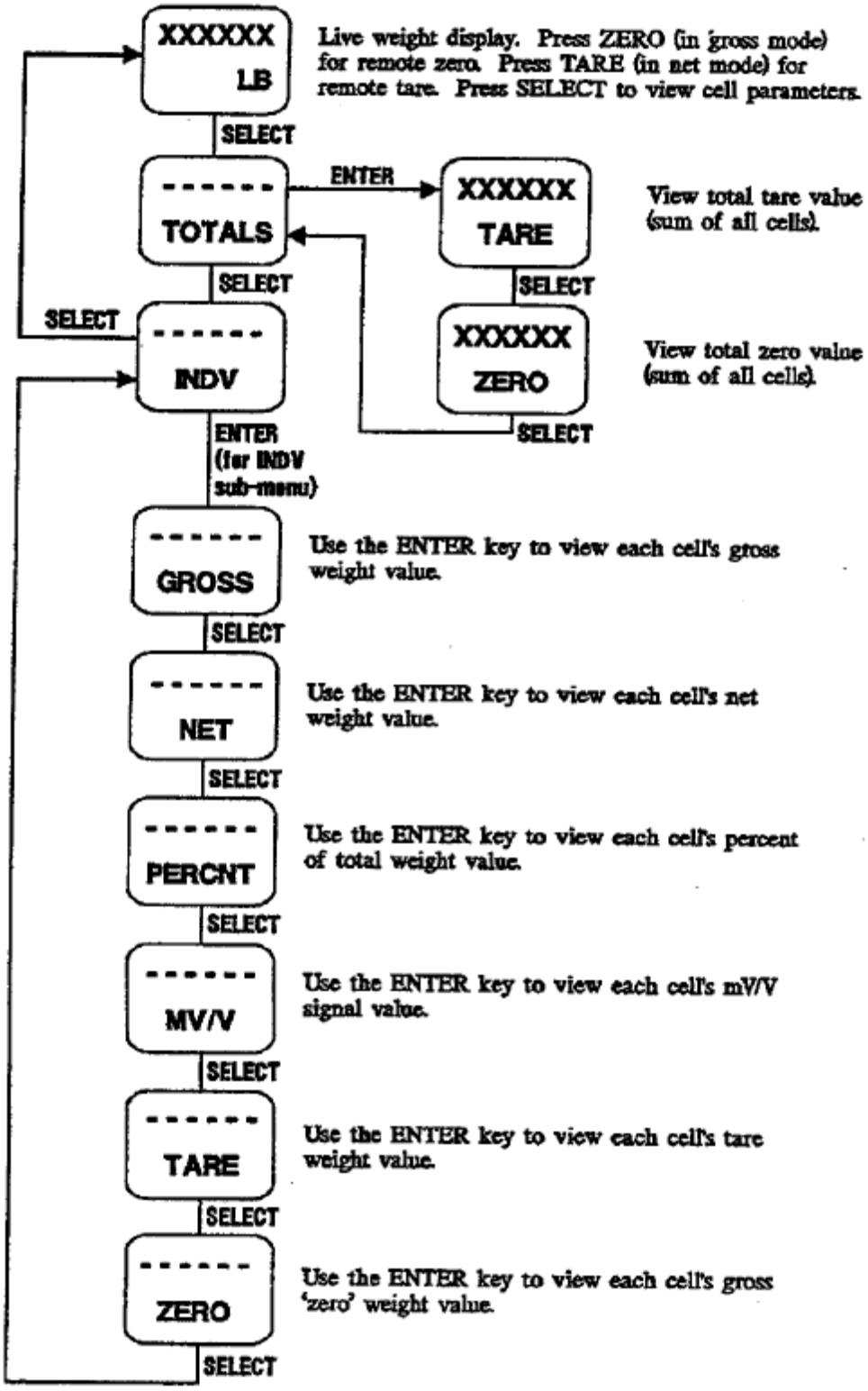
Appendix B. Outline and Wiring Diagrams



Appendix C. LCp-40 Series Remote Display

When connected to a BLH LCp-40 series (40, 41, or 42) network controller, DXp-40 weight values can be displayed remotely. In addition to remote display, ZERO and TARE functions can be implemented from the LCp instrument keypad. The following flow diagram defines DXp-40 functions available through an LCp-40 series controller.

LCp-40, 41, or 42 Remote Operation Flow Diagram



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