

Tracer AV

Aviation Baggage Instrumentation

Installation Manual



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Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
C	December 4, 2023	Revision history established; Updated replacement part numbers

Table i. Revision Letter History



Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at www.ricelake.com/training or obtained by calling 715-234-9171 and asking for the training department.

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1.0 Introduction

This manual is intended for use by service technicians responsible for installing and servicing Tracer AV aviation baggage instrumentation. This manual applies to units using Version 1.14 of the Tracer AV software.

Configuration and calibration of the Tracer AV can be accomplished using the 2-button keypad or the EDP command set. See [Section 3.1 on page 18](#) for information about configuration methods.



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Warranty information is available at www.ricelake.com/warranties

Safety Definitions:



DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.



WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.

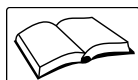


CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.



IMPORTANT: Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

General Safety



Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.



WARNING

Failure to heed could result in serious injury or death.

Ensure the power cord is disconnected from power source prior to opening the unit.

Do not operate without the enclosure completely assembled.

Do not make alterations or modifications to the unit.

1.1 Overview

The Tracer AV is a single-channel digital weight indicator comprised of three components:

- The Tracer AV houses the AC power supply and CPU board. There are external DB-9 connectors for a PC connection, two remote display connections, two remote keypad connections, and a load cell connection (See [Figure 2-3 on page 11](#)).
- RD-1 remote display, an .8", six-digit, seven-segment LED display or RD-2 remote display, an .8", six-digit, seven-segment LCD display.
- The RK-1 keypad (See [Figure 1-1 on page 8](#)) has two keys which are used to zero the scale and to toggle between a primary and secondary unit of measure in the normal mode of operation. These keys have a secondary function for the setup mode.

The Tracer AV features include:

- Four-wire load cell connections; remote sense connections are not provided
- The electronic data processing (EDP) port is full duplex; RS-232 communications at up to 38400 bps. The EDP port is accessed through the COMM connection
- The serial port connects to the remote displays. The output is RS-232 and will drive two remote displays
- Digital inputs are defaulted for RK-1 functionality
- Setpoints values will cause the display to flash when a specified weight value is exceeded
- Available for 115 VAC and 230 VAC

1.2 Operating Modes

The Tracer AV has three modes of operation.

Normal (Primary) mode

Normal mode is the default mode of the Tracer AV. The indicator displays gross or net weights as required, using the LCD/LED annunciators described in [Section 1.4 on page 9](#) to indicate scale status and the type of weight value displayed. Once configuration is complete and a legal seal is affixed, this is the primary mode in which the Tracer AV can operate.

Setup mode

Most of the procedures described in this manual require the Tracer AV to be in setup mode, including configuration and calibration.

To enter setup mode, remove the setup switch access screw on the Tracer AV (See [Figure 2-3 on page 11](#)). Once the screw is removed, use a small screwdriver or pen tip to press the setup switch. The display changes to show the word **DEFCAL**.

Test mode

Test mode provides a number of diagnostic functions for the Tracer AV. Like setup mode, test mode is entered using the setup switch. See [Section 6.7 on page 44](#) for more information.



NOTE: Test mode is intended for factory use only.

1.3 Display and Keypad

[Figure 1-1](#) shows the Tracer AV LCD display with annunciators and keypad. In setup mode, the keys are used to navigate through menus, select digits within numeric values and increment/decrement values. See [Section 3.1.2 on page 18](#) for information about using the front panel keys in setup mode.



Figure 1-1. RD-1 Front Panel, Showing LCD Annunciators



Figure 1-2. RK-1 2-Button Keypad

1.4 LCD/LED Annunciators

The Tracer AV display uses a set of six LCD/LED annunciators to provide additional information about the value being displayed:

- **Gross** and **Net** annunciators are lit to show whether the displayed weight is a gross or net weight.
- **Center of Zero** ($\rightarrow 0 \leftarrow$): Gross weight is within 0.25 graduations of zero. This annunciator lights when the scale is zeroed.
- **Standstill** ($\triangle \triangle$): Scale is at standstill or within the specified motion band. Some operations, including tare function, can only be done when the standstill symbol is shown.
- **lb** and **kg** annunciators indicate the units associated with the displayed value: lb = pounds, kg = kilograms.

1.5 Tracer AV Operations

Basic Tracer AV operations are summarized below.

1.5.1 Toggle Units

Press the **Units** key to switch between primary and secondary units. The appropriate unit's LCD/LED is lit.

1.5.2 Zero Scale

1. In gross mode, remove all weight from the scale and wait for the standstill annunciator ($\triangle \triangle$).
2. Press the **Zero** key. The center of zero ($\rightarrow 0 \leftarrow$) annunciator lights to indicate the scale is zeroed.

2.0 Installation

This section describes the connections between the DB-9 plugs and the CPU board. This section also includes assembly drawings, connection tables and parts lists for the service technician.



WARNING: Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the Tracer AV enclosure.

This unit uses line fusing which could create an electric shock hazard. Procedures requiring work inside the Tracer AV enclosure must be performed by qualified service personnel only.

The supply cord serves as the main power disconnect for the Tracer AV. The power outlet must be installed near the unit and be easily accessible.

2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the Tracer AV to ensure all components are included and undamaged. The shipping carton should contain the Tracer AV enclosure, remote display, remote keypad, this manual, two cables and a power cord. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

2.2 Enclosure Security/Disassembly

After an NTEP inspector has examined the unit, he/she will install security cables pictured in [Figure 2-1](#) and [Figure 2-2](#) on [page 11](#). These cables prevent the Tracer AV from being tampered with by an unauthorized individual. If these cables are removed, NTEP certification will become void.

If the Tracer AV enclosure must be opened by an authorized technician, ensure power is disconnected, then place it on an anti-static work mat. Cut tamper-proof cables, remove screws and remove the enclosure's top cover. An NTEP inspector will have to examine the unit and attach new security cables.



Figure 2-1. Tracer AV (front) Security Cables Installed After NTEP Certification



Figure 2-2. Tracer AV (back) Security Cables Installed After NTEP Certification

2.3 Cable Connections

The Tracer AV provides several cable connections: one for the power cord, one to accommodate the load cell, communications, remote displays, and keypads. Figure 2-3 shows the assignments for the Tracer AV connections. Details on pin assignments are shown in Table 2-1 on page 9 through Table 2-5 on page 10.

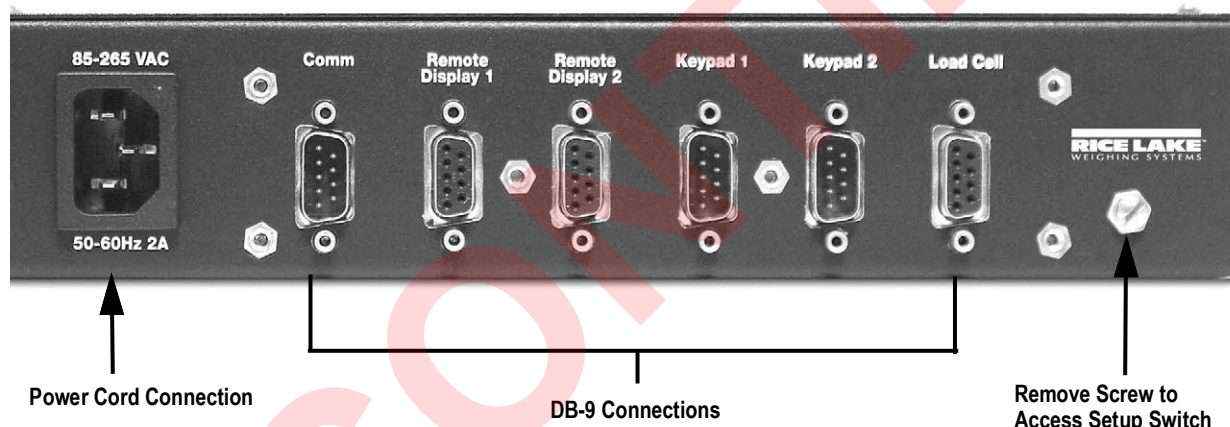


Figure 2-3. Tracer AV Power Cord Connection, DB-9 Connections and Setup Switch Access Screw

2.3.1 Illustrations

The following illustrations show the Tracer AV CPU board, system configuration, remote display cutout and remote display drawing.

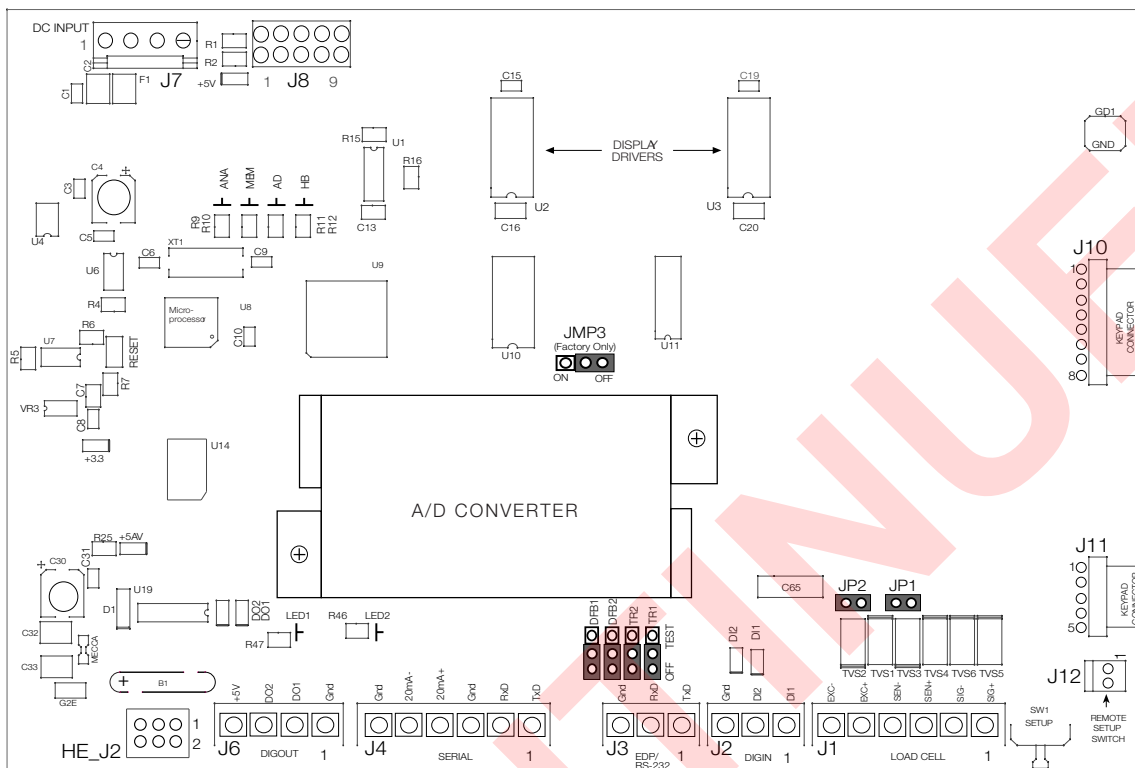


Figure 2-4. Tracer AV CPU Board

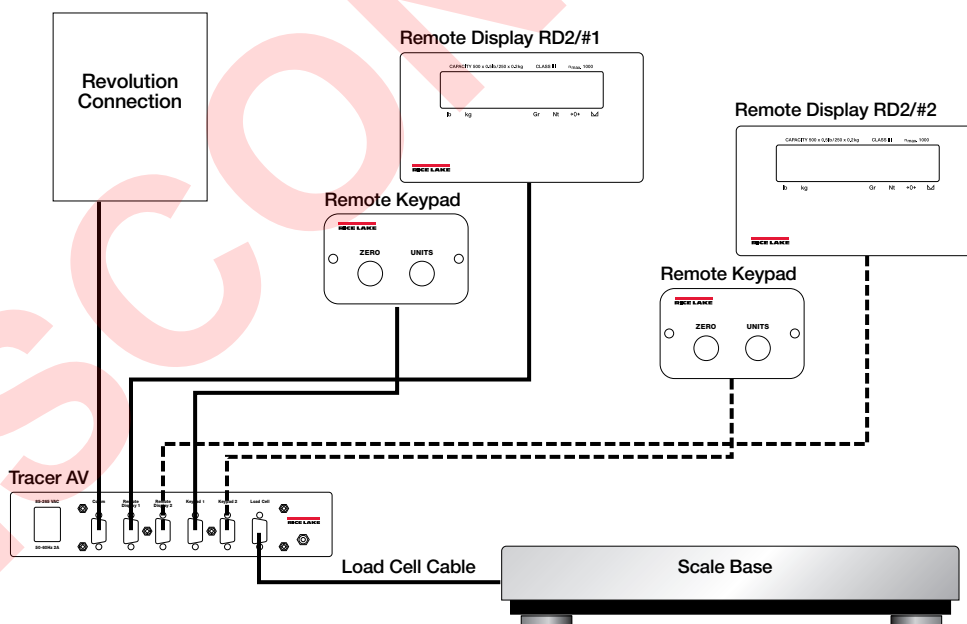


Figure 2-5. System Configuration

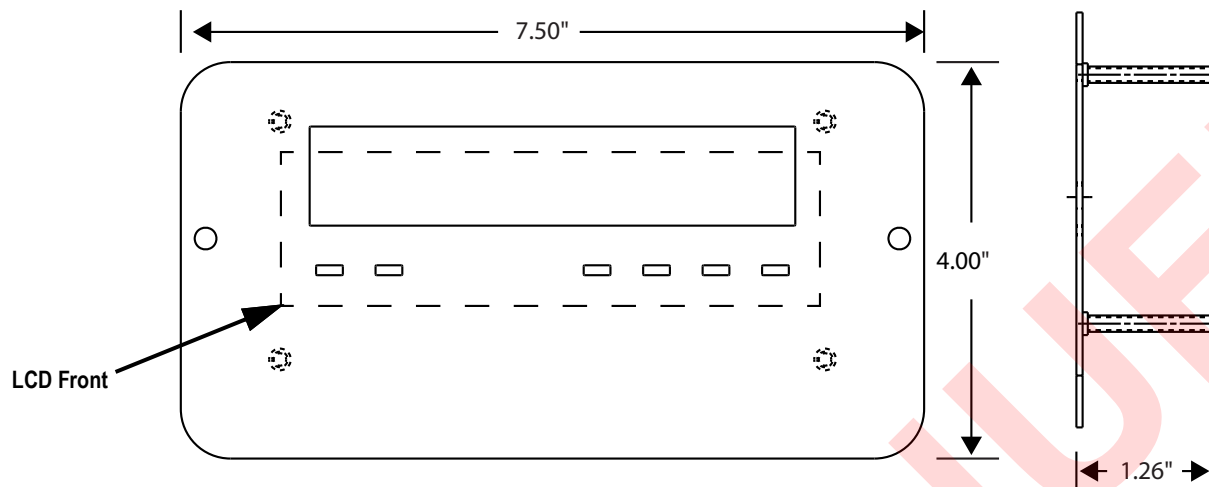


Figure 2-6. Panel Mount Housing Enclosure



NOTE: Dashed line represents RD-2 display location (LCD). Solid line represents RD-1 display location (LED).

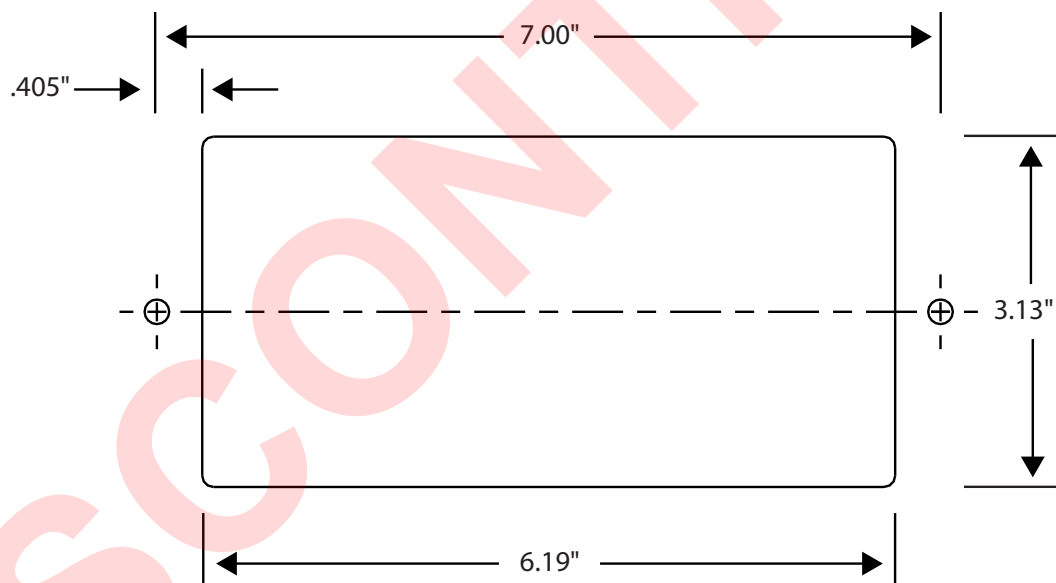


Figure 2-7. Remote Display Cutout for Panel Mount

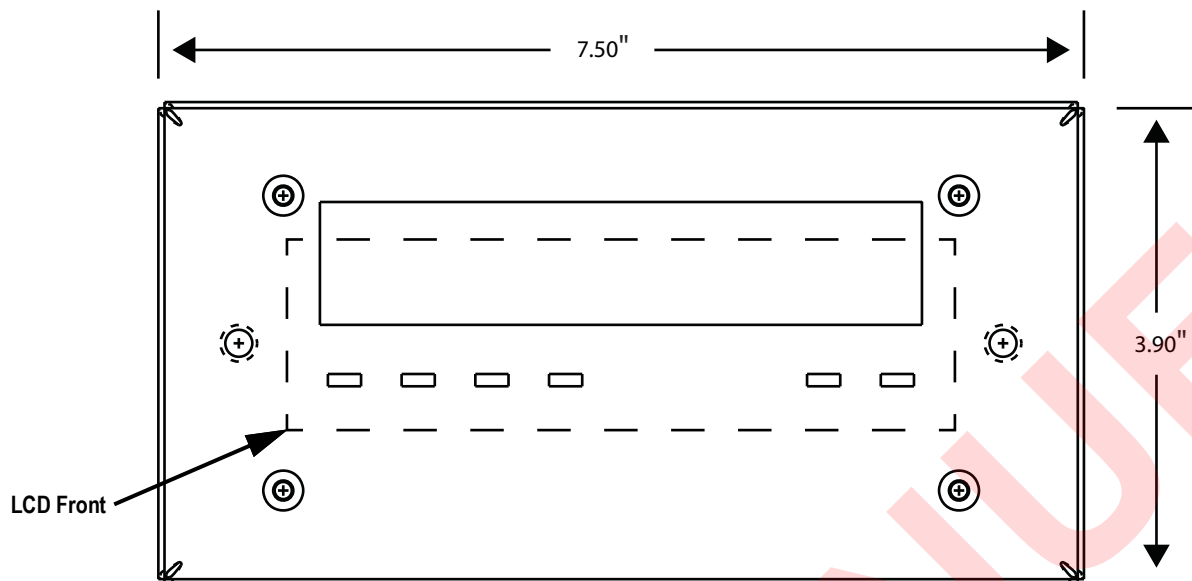


Figure 2-8. External Mount Housing Enclosure



NOTE: Dashed line represents RD-2 display location (LCD) for **External Mounted Enclosure**. Solid line represents RD-1 display location.

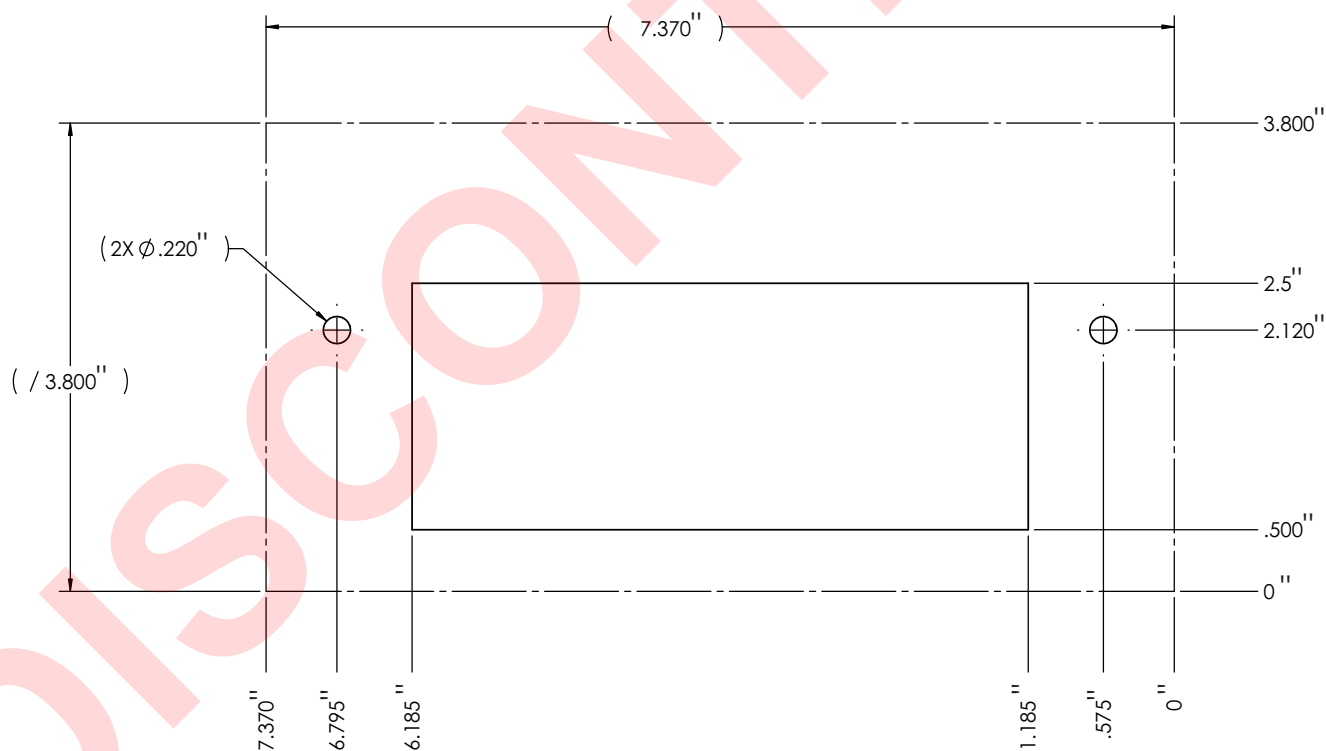


Figure 2-9. Remote Display Cutout for External Mount

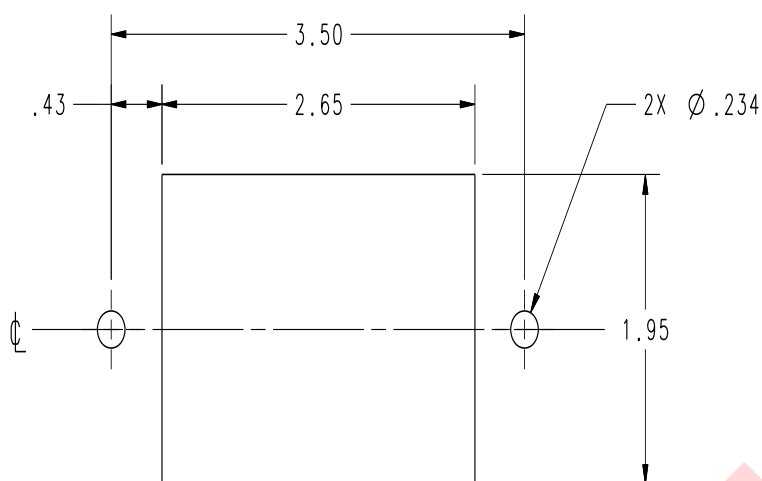


Figure 2-10. Switch Panel Cutout

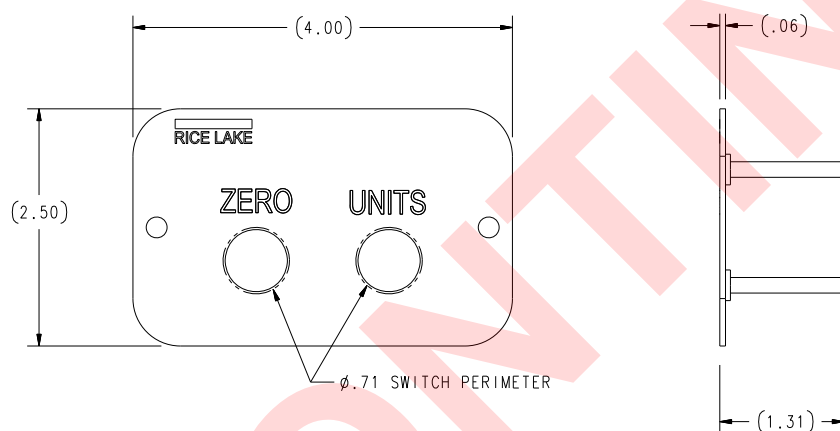


Figure 2-11. Switch Panel Drawing

2.3.2 Load Cells

The load cell cable is connected to the socketed DB-9 marked load cell. This DB-9 is connected to the CPU board on J1; see the table below for the pin assignments. The DB-9 is for four-wire installations, so leave sense jumper JP1 and JP2 on.

DB-9	J1 Pins	Function	Pad Number
Pin 3	2	-Sig	P 13
Pin 4	5	+Exc	P 12
Pin 5	--	Shield	--
Pin 6	6	-Exc	P 11
Pin 7	1	+Sig	P 14

Table 2-1. J1 Load Cell



NOTE: The DB-9 is factory pinned for four-wire connections. Leave sense jumpers JP1 and JP2 on.

2.3.3 Serial Communications

The pinned DB-9 connector marked as COMM is connected to EDP port J3. It is bi-directional communication to be used for a PC connection.

There are two socketed DB-9 connectors for remote displays which are connected to the serial port J4. The remote display's DC power and communications are run in the same three-conductor cable. The serial port data is transmitted on the 20 mA pins to the remote displays.

DB-9	EDP Port		
COMM	J3	Function	Pad
Pin 2	1	EDP TxD	P 1
Pin 3	2	EDP RxD	P 2
Pin 5	3	EDP Gnd	P 3

Table 2-2. EDP Port/COM

DB-9	Serial Port	Digital Output		
Remote	J4	J6	Function	Pad
n/a	--	4	+5 VDC	P 4
n/a	4	--	20 mA+	P 5
n/a	5	--	20 mA-	P 6
Pin 1	--	--	+7.5 VDC	n/a
Pin 2	--	--	Gnd	n/a
Pin 9	--	--	TxD	n/a

Table 2-3. Serial Port/Remote Display

2.3.4 Digital I/O

Digital inputs can be set to provide several indicator functions, including all keypad functions. In the Tracer AV, these inputs are set to **Zero** and **Units** for the remote keypad. The inputs are active (on) with low voltage (0 VDC) and can be driven by TTL or 5V logic without additional hardware. LEDs on the CPU board light when digital inputs are active.

DB-9	Digital Input J2	J12	Function	Pad Number
Pin 4	--	1	Setup	P 10
Pin 5	3	--	Gnd	P 7
Pin 8	1	--	Dig In 1	P 9
Pin 9	2	--	Dig In 2	P 8

Table 2-4. Digital Input/Remote Keypad

Digital outputs are typically used to control relays that drive other equipment. In the Tracer AV, the setpoint value will cause the display to flash. Outputs are designed to sink not source, switching current. Each output is a normally open connector circuit, capable of sinking 250 mA when active. Digital outputs are wired to switch relays when the digital output is active (low, 0 VDC) with reference to 5 VDC supply. LEDs on the CPU board light when the digital outputs are active.

Port	Connector	Pin	Function
Digital Output	J6	1	Gnd
		2	DO 1
		3	DO 2
		4	+5V

Table 2-5. J6 Digital Outputs

2.4 Board Removal

If the Tracer AV CPU board must be removed, use the following procedure:



WARNING: Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the Tracer AV enclosure.

This unit uses line fusing which could create an electric shock hazard. Procedures requiring work inside the Tracer AV enclosure must be performed by qualified service personnel only.

The supply cord serves as the main power disconnect for the Tracer AV. The power outlet must be installed near the unit and be easily accessible.

1. Disconnect power to the Tracer AV.
2. Cut security cable (if installed) and remove screws.
3. Remove the top cover.
4. Disconnect power supply cable from connector J7 on the Tracer AV CPU board.
5. Unplug connectors J1 (load cell cable), J2 (digital inputs), J3 (EDP), J4 (serial), J6 (digital outputs), and J2 (display). See [Figure 2-4 on page 12](#) for connector locations.
6. Remove the five screws from the CPU board, then lift the board out of the enclosure.

To replace the CPU board, reverse the above procedure.

2.5 Replacement Parts

[Table 2-6](#) lists replacement parts for the Tracer AV.

Part No.	Description	Qty.
97880	Tracer AV Enclosure	
70599	6 Pos Screw Terminal - Pluggable 5 mm Center Screws	2
71125	3 Pos Screw Terminal - Pluggable 5 mm Center Screws	2
71126	4 Pos Screw Terminal - Pluggable 5 mm Center Screws	1
212841	Power Supply	1
87958	CPU Board Assembly	1
97881	Coverplate - 10" x 6" x 2"	1
97978	DB-9 PCB Assembly	1
93558	Remote Display, Panel Mount RD-1	
93213	Back Cover Enclosure	1
93215	Remote Display Lens	1
93559	Front Panel Assembly	1
93561	PCB Assembly	1
104872	Cable Assembly	1
166483	Remote Display, Panel Mount RD-2	
164384	Back Cover Enclosure	1
166485	Remote Display Lens	1
167183	Front Panel Assembly	1
163879	PCB Assembly	1
104872	Cable Assembly	1
97995	2-Button Keypad	
50749	DB-9 FEM to DB-9 Cable	1
71014	Piezo Switch SST SPSI	2
97877	Front Switch Panel	1
97878	Rear Switch Panel Cover	1
97977	PCB Assembly	1

Table 2-6. Replacement Parts

3.0 Configuration

To configure the Tracer AV, it must be placed in setup mode. Setup mode is initiated by pressing the setup switch on the Tracer AV (see [Figure 2-3 on page 11](#)).

When the Tracer AV is placed in setup mode, the word **CONFIG** is shown on the display. The **CONFIG** menu is the first of 7 main menus used to configure the Tracer AV. Detailed descriptions of these menus are given in [Section 3.2 on page 20](#). When configuration is complete, continue pressing the **▷ (Units)** key to exit setup mode.

3.1 Configuration Methods

The Tracer AV can be configured by using the **Zero** and **Units** keys to navigate through a series of configuration menus or by sending commands or configuration data to the EDP port. Configuration using the menus is described in [Section 3.1.2](#).

Configuration using the EDP port can be accomplished using either the EDP command set described in [Section 5.0 on page 33](#).

3.1.1 EDP Command Configuration

The EDP command set can be used to configure the Tracer AV using a personal computer, terminal, or remote keyboard. EDP command configuration sends commands to the Tracer AV EDP port. EDP commands can be sent using any external device capable of sending ASCII characters over a serial connection.

EDP commands duplicate the functions available using the Tracer AV front panel and provide some functions not otherwise available. EDP commands can be used to simulate pressing front panel keys, to configure the Tracer AV, or to dump lists of parameter settings. See [Section 5.0 on page 33](#) for more information about using the EDP command set.

3.1.2 Front Panel Configuration

The Tracer AV can be configured using a series of menus viewed on the RD-1 display when the Tracer AV is in setup mode. [Table 3-1](#) summarizes the functions of each of the main menus.

Menu		Menu Function
DEFCAL	Default Configuration	Select a 500 lb or 300 lb default configuration. Display and edit zero calibration a/d count value, test weight value and span calibration a/d count value can also be shown
CONFIG	Configuration	Configure grads, zero tracking, zero range, motion band, overload, tare function, sample rate, and digital filtering parameters
FORMAT	Format	Set format of primary and secondary units, display rate
CALIBR	Calibration	Calibrate Tracer AV. See Section 4.0 on page 30 for calibration procedures
SERIAL	Serial	Configure EDP serial port
PROGRM	Program	Set power-up mode, regulatory mode, and consecutive number values
SETPNT	Setpoint	Configure Setpoints and digital outputs
VERS	Version	Display installed software version number

Table 3-1. Tracer AV Menu Summary

Button	Function
Zero ▽	Move DOWN/ Increment Value
Units ▷	Move RIGHT/Next

Table 3-2. Button Functions in Setup Mode

The two-button numeric editor works as follows:

Press **Units** to navigate right. Press **Zero** to drop down or select from a list of values.

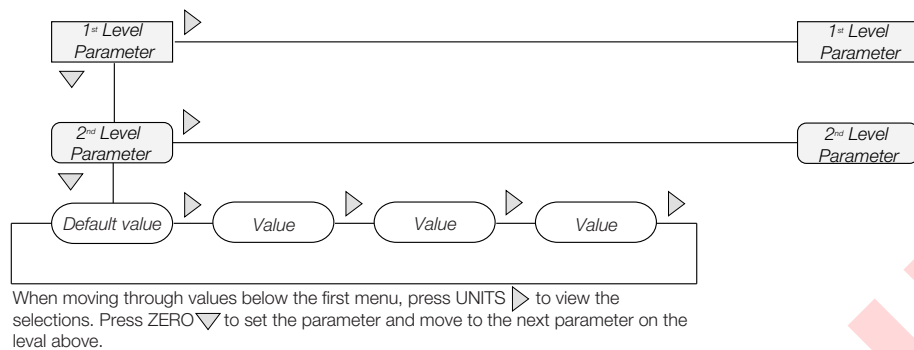


Figure 3-1. Setup Mode Menu Navigation

3.1.3 Setting Numeric Values For Parameters

1. Press **Zero** ▽ to immediately accept the current value and navigate to the next menu item.
2. Press **Units** ▷ to enter edit mode.
The leftmost digit will flash to indicate it can be altered.
3. Press **Zero** ▽ to increment to the desired value.
4. When the value is correct, press **Units** ▷ to move to the next digit.

3.1.4 Editing Integers

1. By pressing **Units** ▷, navigate all the way to the right (beyond all '-' characters until there are no segments flashing).

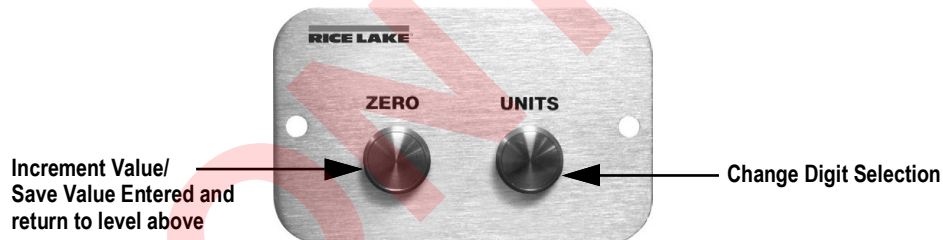


Figure 3-2. Editing Procedure for Numeric Values



NOTE: The '-' characters are placeholders for appending or removing digits at the end of numbers that exceed the six-digit display.

2. Press **Zero** ▽ to accept the modified value.

3.1.5 Editing Floating Point (Decimal Point Position)

1. By pressing **Units** ▷, navigate all the way to the right (beyond all '-' characters until there are no segments flashing).
2. Press **Zero** ▽ to initialize editing of decimal point position.
3. Press **Units** ▷ to move the decimal point to the desired position.
The decimal point will move forward one position with the **Units** ▷ button and wrap around until the **Zero** ▽ button is pressed to select the position.
4. When the decimal point is in the desired position, press **Zero** ▽.

3.2 Menu Structures and Parameter Descriptions

The following sections provide graphic representations of the Tracer AV menu structures. In the actual menu structure, the settings you choose under each parameter are arranged horizontally. To save page space, menu choices are shown in vertical columns. The factory default setting appears at the top of each column in bold type.

Most menu diagrams are accompanied by a table that describes all parameters and parameter values associated with that menu. Default parameter values are shown in bold type.

3.2.1 Default Calibration Menu

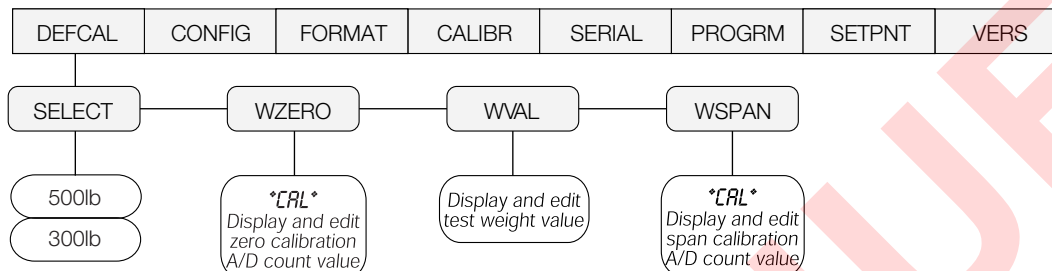


Figure 3-3. Default Calibration Menu

DEF CAL Menu		
Parameter	Choices	Description
SELECT	500 lb 300 lb	500 lb sets the scale to a primary of 500 lb x 1 lb and a secondary of 250 kg x .5 kg ; SP1 trip=50 lb; SP2=off; Dig Filter 1=8; Dig Filter 2=8; Dig Filter 3=8; Zero Tracking=3D 300lb sets the scale to a primary of 300 lb x 1 lb and a secondary of 150 kg x .5 kg SP1 trip=50 lb; SP2=off; Dig Filter 1=8; Dig Filter 2=8; Dig Filter 3=8; Zero Tracking = 3D
WZERO	—	Display and edit the zero calibration A/D count value Note: Do not adjust this value after WSPAN has been set!
WVAL	—	Display and edit the test weight value
WSPAN	—	Display and edit the span calibration A/D count value

Table 3-3. Default Calibration Parameters

3.2.2 Configuration Menu

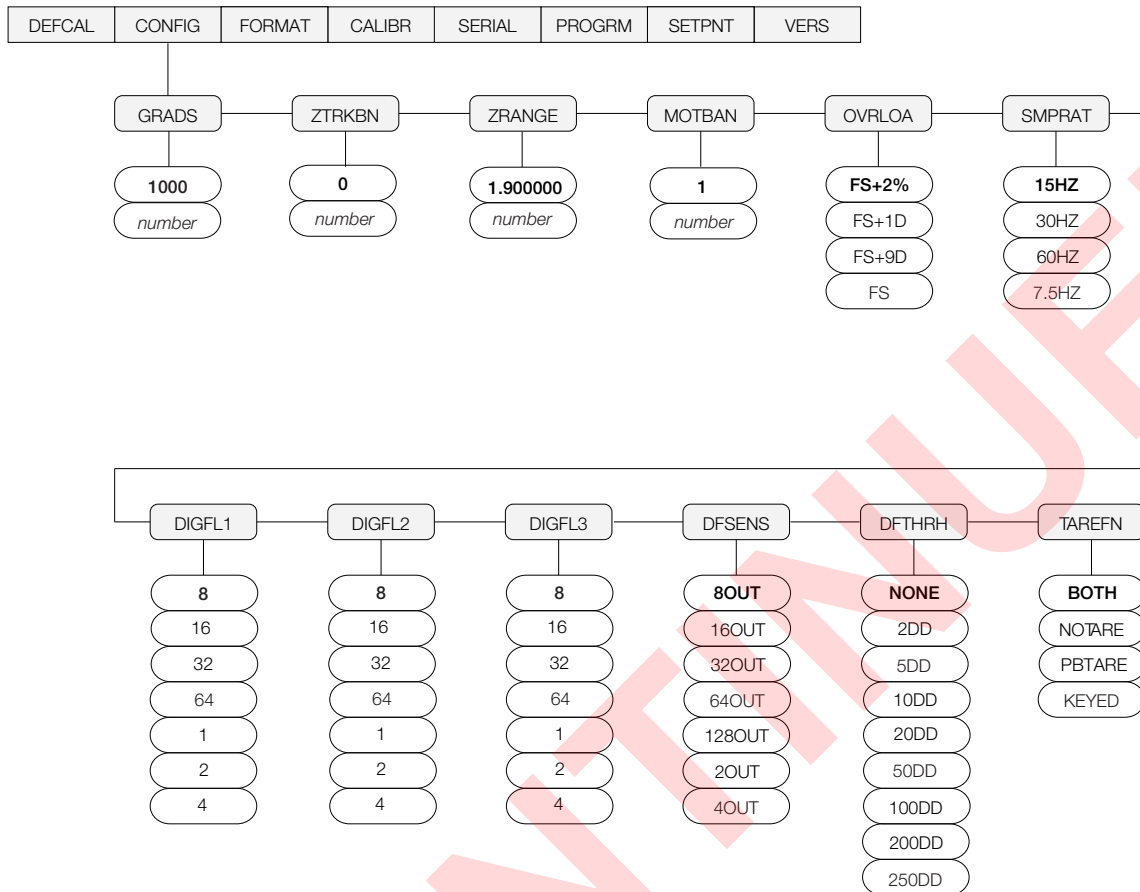


Figure 3-4. Configuration Menu

CONFIG Menu		
Parameter	Choices	Description
Level 2 submenus		
GRADS	1000 number	Graduations. Specifies the number of full scale graduations. The value entered must be in the range 1–100 000 and should be consistent with legal requirements and environmental limits on system resolution. To calculate GRADS, use the formula, GRADS = Capacity / Display Divisions . Display divisions for primary and secondary units are specified on the FORMAT menu.
ZTRKBN	0 number	Automatically zeros the scale when within the range specified, as long as the input is within the ZRANGE and scale is at standstill. Specify the zero tracking band in ± display divisions. Maximum legal value varies depending on local regulations. Note: For scales using linear calibration, do not set the zero tracking band to a value greater than that specified for the first linearization point.
ZRANGE	1.900000 number	Selects the range within which the scale can be zeroed. The 1.900000 default value is ± 1.9% around the calibrated zero point, for a total range of 3.8%. Indicator must be at standstill to zero the scale. Use the default value for legal-for-trade applications.

Table 3-4. Configuration Menu Parameters

CONFIG Menu		
Parameter	Choices	Description
MOTBAN	1 number	Sets the level, in display divisions, at which scale motion is detected. If motion is not detected for 1 second or more, the standstill symbol lights. Some operations, including print, tare, and zero, require the scale to be at standstill. Maximum legal value varies depending on local regulations. If this parameter is set to 0, the standstill annunciator will be set continuously on, and operations including zero, print, and tare will be performed regardless of scale motion. If 0 is selected, ZTRKBND must also be set to 0.
OVRLOA	FS+2% FS+1D FS+9D FS	Overload. Determines the point at which the display blanks and an out-of-range error message is displayed. Maximum legal value varies depending on local regulations.
SMPRAT	15HZ 30HZ 60HZ 7.5HZ	Sample rate. Selects measurement rate, in samples per second, of the analog-to-digital converter. Lower sample rate values provide greater signal noise immunity.
DIGFL1 DIGFL2 DIGFL3	8 16 32 64 1 2 4	Digital filtering. Selects the digital filtering rate used to reduce the effects of mechanical vibration from the immediate area of the scale. Choices indicate the number of A/D conversions that are averaged to obtain the displayed reading. A higher number gives a more accurate display by minimizing the effect of a few noisy readings, but slows down the settling rate of the indicator. See Section 6.6 on page 43 for more information on digital filtering.
DFSENS	8OUT 16OUT 32OUT 64OUT 128OUT 2OUT 4OUT	Digital filter cutout sensitivity. Specifies the number of consecutive readings that must fall outside the filter threshold (DFTHR parameter) before digital filtering is suspended. If NONE is selected, the filter is always enabled.
DFTHR	NONE 2DD 5DD 10DD 20DD 50DD 100DD 200DD 250DD	Digital filter cutout threshold. Specifies the filter threshold, in display divisions. When a specified number of consecutive scale readings (DFSENS parameter) fall outside of this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled.
TAREFN	BOTH NOTARE PBTARE KEYED	Tare function. Enables or disables push-button and keyed tares. Possible values are: BOTH: Both push-button and keyed tares are enabled NOTARE: No tare allowed (gross mode only) PBTARE: Push-button tares enabled KEYED: Keyed tare enabled

Table 3-4. Configuration Menu Parameters (Continued)

3.2.3 Format Menu

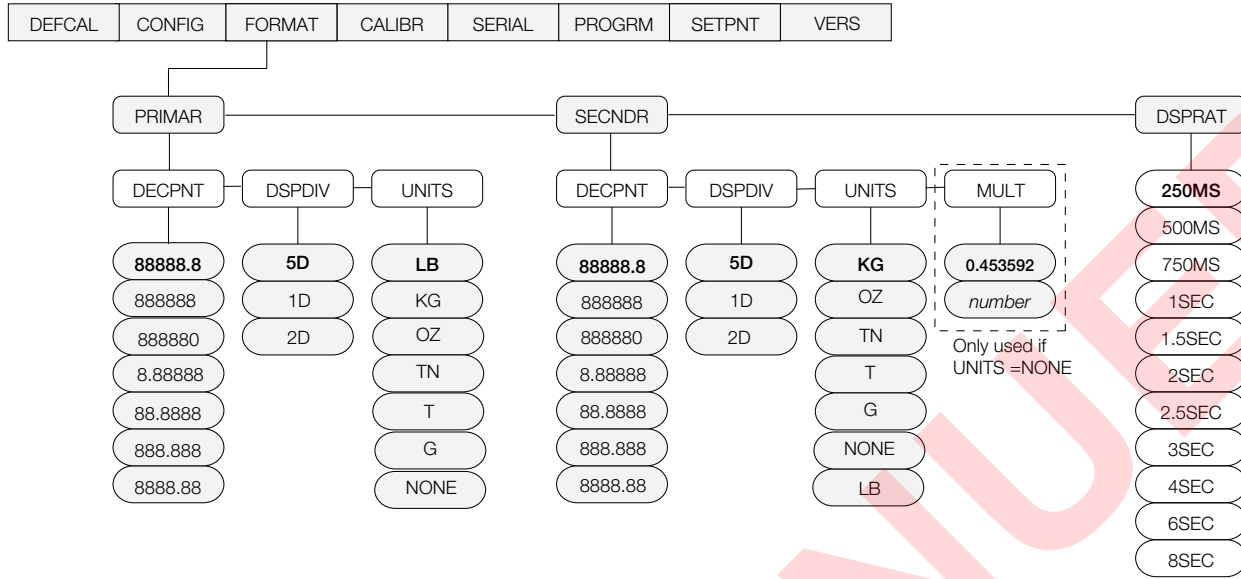


Figure 3-5. Format Menu

FORMAT Menu		
Parameter	Choices	Description
Level 2 submenus		
PRIMAR	DECPNT DSPDIV UNITS	Specifies the decimal position, display divisions, and units used for the primary units. See Level 3 submenu parameter descriptions
SECNDR	DECPNT DSPDIV UNITS MULT	Specifies the decimal position, display divisions, units, and conversion multiplier used for the secondary units. See Level 3 submenu parameter descriptions
DSPRAT	250MS 500MS 750MS 1SEC 1.5SEC 2SEC 2.5SEC 3SEC 4SEC 6SEC 8SEC	Display rate. Sets the update rate for displayed values. Values are in milliseconds (MS) or seconds (SEC)

Table 3-5. Format Menu Parameters

FORMAT Menu		
Parameter	Choices	Description
Level 3 submenus		
Primary Units (PRIMAR Parameter)		
DECPNT	88888.8 888888 888880 8.88888 88.8888 888.888 8888.88	Decimal point location. Specifies the location of the decimal point or dummy zeroes in the primary unit display. Value should be consistent with local legal requirements
DSPDIV	5D 1D 2D	Display divisions. Selects the minimum division size for the primary units displayed weight
UNITS	LB KG OZ TN T G NONE	Specifies primary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram Note: Indicators sold outside North America are configured with KG for both primary and secondary units.
Secondary Units (SECNDR Parameter)		
DECPNT	88888.8 888888 888880 8.88888 88.8888 888.888 8888.88	Decimal point location. Determines the location of the decimal point or dummy zeros in the secondary unit display
DSPDIV	5D 1D 2D	Display divisions. Selects the value of minimum division size of the displayed weight
UNITS	KG OZ TN T G NONE LB	Specifies secondary units for displayed and printed weight. Values are: KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram; LB=pound
MULT	0.453592 Enter other choices via keyboard	Multiplier. Specifies the conversion factor by which the primary units are multiplied to obtain the secondary units. The default is 0.453592, which is the conversion factor for changing pounds to kilograms. See Section 6.5 on page 42 for a list of multipliers. Note: Multipliers are pre-configured within the indicator. Manual entry is only necessary when NONE is selected under UNITS. To toggle between primary and secondary units, press the Units key.

Table 3-5. Format Menu Parameters (Continued)

3.2.4 Calibration Menu

See [Section 4.0 on page 30](#) for calibration procedures.

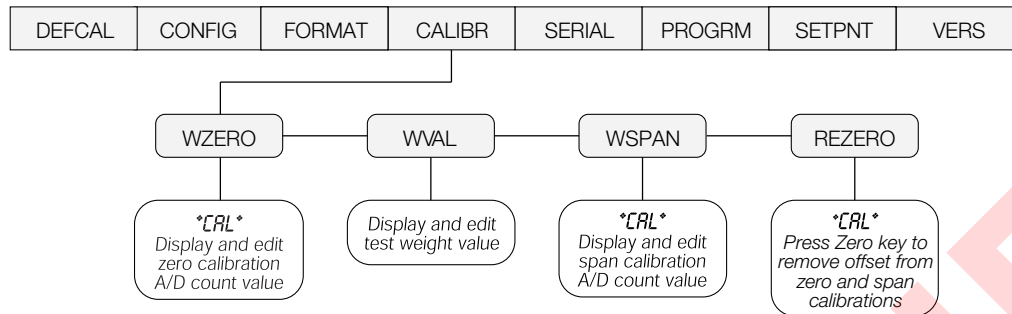


Figure 3-6. Calibration Menu

CALIBR Menu		
Parameter	Choices	Description
Level 2 submenus		
WZERO	—	Display and edit the zero calibration A/D count value Note: Do not adjust this value after WSPAN has been set!
WVAL	—	Display and edit the test weight value
WSPAN	—	Display and edit the span calibration A/D count value
REZERO	—	Press Zero ▽ to remove an offset value from the zero and span calibrations Use this parameter only after WZERO and WSPAN have been set. See Section 4.2 on page 31 for more information about using this parameter.

Table 3-6. Calibration Menu Parameters

3.2.5 Serial Menu

See [Section 6.3 on page 40](#) for information about the Tracer AV serial data format.

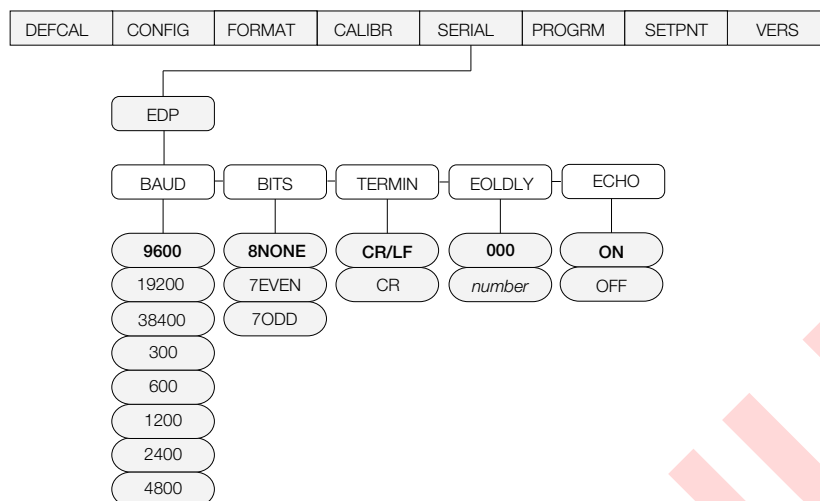


Figure 3-7. Serial Menu

SERIAL Menu		
Parameter	Choices	Description
Level 2 submenus		
EDP	BAUD BITS TERMIN EOLDLY ECHO	Specifies settings for baud rate, data bits, termination characters, end-of-line delay, and echo used by the EDP port
Level 3 Submenus		EDP Port and Printer Port
BAUD	9600 19200 38400 300 600 1200 2400 4800	Baud rate. Selects the transmission speed for the EDP port
BITS	8NONE 7EVEN 7ODD	Selects number of data bits and parity of data transmitted from the EDP port
TERMIN	CR/LF CR	Termination character. Selects termination character for data sent from the EDP port
EOLDLY	000 number	End-of-line delay. Sets the delay period, in 0.1-second intervals, from when a formatted line is terminated to the beginning of the next formatted serial output. Value specified must be in the range 0-255, in tenths of a second (10 = 1 second). Note: An EOL may be required for continuous transmission at slower baud rates to ensure the receiving buffer is empty before another string is transmitted
ECHO	ON OFF	This command enables or disables echoing of the serial commands sent to the indicator

Table 3-7. Serial Menu Parameters

3.2.6 Program Menu

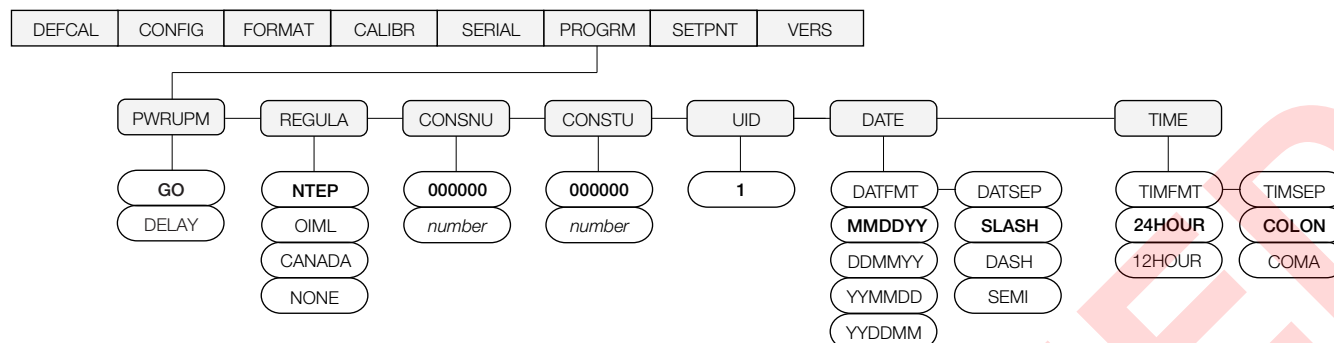


Figure 3-8. Program Menu

PROGRM Menu		
Parameter	Choices	Description
Level 2 submenus		
PWRUPM	GO DELAY	Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test. In DELAY mode, the indicator performs a power up display test, then enters a 30-second warm up period. If no motion is detected during the warm up period, the indicator becomes operational when the warm up period ends; if motion is detected, the delay timer is reset and the warm up period repeated.
REGULA	NTEP OIML CANADA NONE	Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site. OIML, NTEP, and CANADA modes allow a tare to be acquired at any weight greater than zero. NONE allows tares to be acquired at any weight value. OIML, NTEP, and CANADA modes allow a tare to be cleared only if the gross weight is at no load. NONE allows tares to be cleared at any weight value. NTEP and OIML modes allow a new tare to be acquired even if a tare is already present. In CANADA mode, the previous tare must be cleared before a new tare can be acquired. NONE, NTEP and CANADA modes allow the scale to be zeroed in either gross or net mode as long as the current weight is within the specified ZRANGE. In OIML mode, the scale must be in gross mode before it can be zeroed; pressing the ZERO key in net mode clears the tare.
UID	1	Specifies the unit identification number. Value specified can be any numeric value, up to six digits
DATE	DATFMT DATSEP	Allows selection of date format and date separator. See Level three parameter for descriptions
TIME	TIMFMT TIMSEP	Allows selection of time format and separator. See level three parameter for descriptions
CONSNU	000000 number	Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value is incremented following each print operation. The initial value of this parameter is set to the start up value specified on the CONSTU parameter. Changing either CONSTU or CONSNU immediately resets the consecutive number used for printing.
CONSTU	000000 number	Consecutive number start up value. Specifies the initial consecutive number (CONSNU) value used when the indicator is powered on
Level 3 submenus		
DATFMT	MMDDYY DDMMYY YYMMDD	Specifies the format used to display the date

Table 3-8. Program Menu Parameters

PROGRM Menu		
Parameter	Choices	Description
DATSEP	SLASH DASH SEMI	Specifies the date separator character
TIMFMT	24HOUR 12HOUR	Specifies the format used to display the time
TIMSEP	COLAN COMMA	Specifies the time separator character

Table 3-8. Program Menu Parameters (Continued)

3.2.7 Setpoint Menu

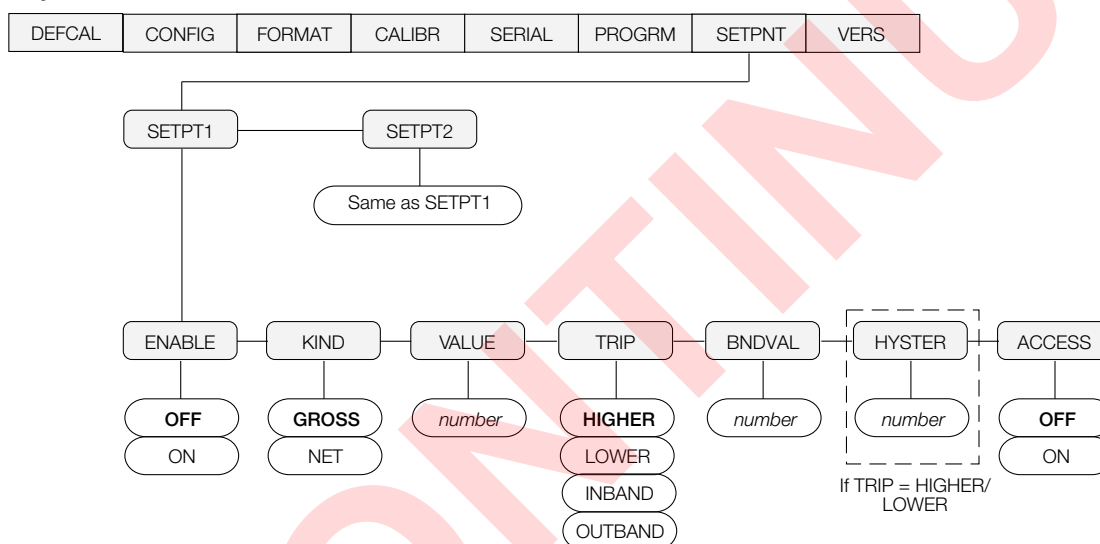


Figure 3-9. Setpoint Menu

SETPNT Menu		
Parameter	Choices	Description
Level 2 submenus		
SETPT1 SETPT2	ENABLE KIND VALUE TRIP BNDVAL	Specifies settings for setpoint enable, kind, weight value, trip, and band value used by the setpoint
Level 3 submenus		
ENABLE	OFF ON	Turns setpoint ON or OFF
KIND	GROSS NET	Specifies the setpoint kind and determines whether function is based on GROSS or NET weight. GROSS or NET setpoint kinds can be used
VALUE	number	Displays and edits the setpoint value

Table 3-9. Setpoint Menu Parameters

SETPNT Menu		
Parameter	Choices	Description
TRIP	HIGHER LOWER INBAND OUTBND	Trips the setpoint when the weight is higher or lower than the setpoint value, or is within or outside of the band value. LOWER means the output is active until you reach weight. If trip is HIGHER, the output is active when the setpoint is met or exceeded. INBAND means the output is active if the weight is within the band value. If trip is OUTBND, the output is active when the weight is outside of the band value.
BNDVAL	number	The band value for either INBAND or OUTBND trip setpoints. BNDVAL is ignored unless trip is set to INBAND or OUTBND
HYSTER	number	Specifies a band around the setpoint value that must be exceeded before the setpoint, once off, can trip on. If TRIP = HIGHER or LOWER
ACCESS	OFF ON	Front panel access to setpoints. Specify OFF if setpoints will not be used. ON enables operator to turn setpoints on/off, change value, or change BANDVAL via front panel entry during weigh mode

Table 3-9. Setpoint Menu Parameters (Continued)

3.2.8 Version Menu

The VERS menu is used to check the software version and reg version installed in the Tracer AV. You can also check the model.

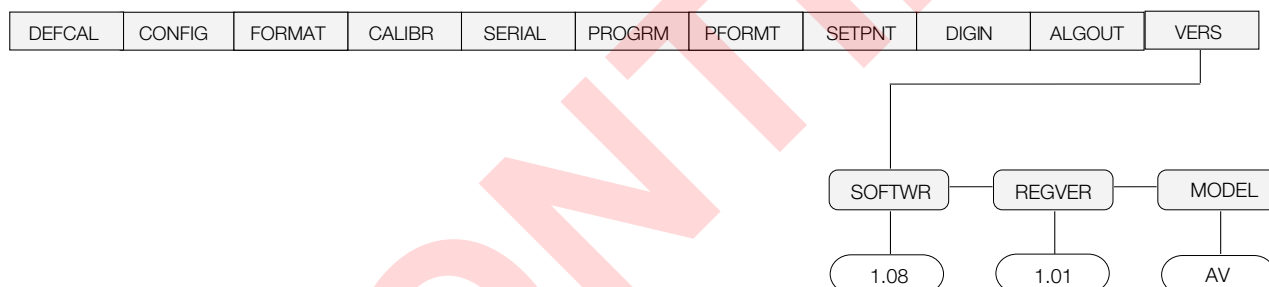


Figure 3-10. Version Menu

Menu	Choices	Description
Software	VX.XX.XX	Displays firmware version number
Regulation	LVR X.XX	Displays the Legally Relevant firmware version number
Model	AV	Displays the model

Table 3-10. Version Menu Parameters

4.0 Calibration

The Tracer AV can be calibrated using the **Zero** and **Units** keys or EDP commands. Both methods consist of the following steps:

- Zero calibration
- Entering the test weight value
- Span calibration
- Optional rezero calibration for test weights using hooks or other additional items.

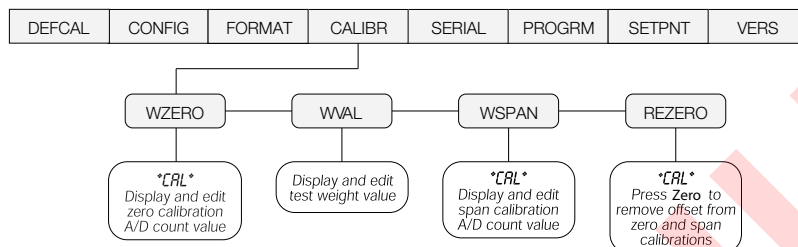


Figure 4-1. Calibration (CALIBR) Menu

The default calibration feature can also be used, which utilizes a more user-friendly procedure; however, not all options are available in default calibration.

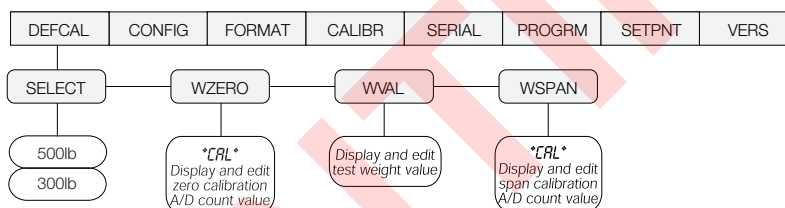


Figure 4-2. Default Calibration (DEFCAL) Menu

4.1 Default Calibration

If using a 500 lb or 300 lb scale, you can select it from the **DEFCAL** menu. This automatically uses the settings shown in [Table 4-1](#) for 500 lb or [Table 4-2](#) for 300 lb.

Primary	500 lb x 1 lb
Secondary	250 kg x .5 kg
SP1 Trip	50 lb
SP2	Off
Digital Filter	8,8,8
Zero Tracking	3D

Table 4-1. 500 lb Scale Settings

Primary	300 lb x 1 lb
Secondary	150 kg x .5 kg
SP1 Trip	50 lb
SP2	Off
Digital Filter	8,8,8
Zero Tracking	3D

Table 4-2. 300 lb Scale Settings

Do the following to calibrate the Tracer AV using the **Zero** and **Units** keys:

1. Place the Tracer AV into setup mode.
To enter setup mode, remove the setup switch access screw on the Tracer AV (See [Figure 2-3 on page 11](#)). Once the screw is removed, use a small screwdriver to press the setup switch. The display changes to show the word **DEFCAL**.
2. Remove all weight from the scale platform. If test weights require hooks or other items, place them on the scale.
3. Press **Zero** ▾ to go to **SELECT**.
4. Press **Units** ▷ to go to zero calibration (**WZERO**).
5. Press **Zero** ▾ to calibrate zero. The indicator displays ***CAL*** while calibration is in progress. When complete, the A/D count for the zero calibration is displayed. **DO NOT adjust this value after WSPAN has been set!** Press **Zero** ▾ again to save the zero calibration value and go to the next prompt (**WVAL**).
6. With **WVAL** displayed, press **Zero** ▾ to show the stored calibration weight. Use the procedure shown in [Figure 3-2 on page 19](#) to enter the actual value of the test weights to be used for the span calibration. Press **Zero** ▾ again to store the entered **WVAL** value and go to span calibration (**WSPAN**).
7. With **WSPAN** displayed, place test weights on the scale and press **Zero** ▾ to calibrate span. The indicator displays ***CAL*** while calibration is in progress. When complete, the A/D count for the span calibration is displayed. Press **Zero** ▾ again to store the span calibration value.

4.2 Standard Calibration

Do the following to calibrate the Tracer AV using the **Zero** and **Units** keys:

1. Place the Tracer AV into setup mode.
To enter setup mode, remove the setup switch access screw on the Tracer AV (See [Figure 2-3 on page 11](#)). Once the screw is removed, use a small screwdriver or pen tip to press the setup switch. The display changes to show the word **DEFCAL**.
2. Remove all weight from the scale platform. If test weights require hooks or other items, place them on the scale for zero calibration.
3. Press **Units** ▷ until the display reads **CALIBR** (see [Figure 4-1 on page 30](#)). Press **Zero** ▾ to go to zero calibration (**WZERO**).
4. With **WZERO** displayed, press **Zero** ▾ to calibrate zero. The indicator displays ***CAL*** while calibration is in progress. When complete, the A/D count for the zero calibration is displayed. **DO NOT adjust this value after WSPAN has been set!** Press **Zero** ▾ again to save the zero calibration value and go to the next prompt (**WVAL**).
5. With **WVAL** displayed, press **Zero** ▾ to show the stored calibration weight. Use the procedure shown in [Figure 3-2 on page 19](#) to enter the actual value of the test weights to be used for the span calibration. Press **Zero** ▾ again to store the entered **WVAL** value and go to span calibration (**WSPAN**).
6. With **WSPAN** displayed, place test weights on the scale and press **Zero** ▾ to calibrate span. The indicator displays ***CAL*** while calibration is in progress. When complete, the A/D count for the span calibration is displayed. Press **Zero** ▾ again to store the span calibration value and go to the next prompt (**REZERO**).
7. The rezero function is used to remove a calibration offset when hooks or other items are used to hang the test weights.
 - If no other apparatus was used to hang the test weights during calibration, remove the test weights and press **Units** ▷ to return to the **CALIBR** menu.
 - If hooks or other items were used during calibration, remove these and the test weights from the scale. With all weight removed, press **Zero** ▾ to rezero the scale. This function adjusts the zero and span calibration values. The indicator displays ***CAL*** while the zero and span calibrations are adjusted. When complete, the adjusted A/D count for the zero calibration is displayed. Press **Zero** ▾ to save the value, then press **Units** ▷ to return to the **CALIBR** menu.
8. Press **Units** ▷ until the display reads **CONFIG**, and the display will exit the setup mode.

4.3 EDP Command Calibration

To calibrate the Tracer AV using EDP commands, the EDP port must be connected to a terminal or personal computer. See [Section 2.3.3 on page 16](#) for EDP port pin assignments; see [Section 5.0 on page 33](#) for more information about using EDP commands.

Once the Tracer AV is connected to the sending device, do the following:

1. Place the Tracer AV in setup mode (display reads **CONFIG**) and remove all weight from the scale platform. If your test weights require hooks or other items, place them on the scale for zero calibration.
2. Send the WZERO EDP command to calibrate zero. The indicator displays ***CAL*** while calibration is in progress.
3. Place test weights on the scale and use the WVAL command to enter the test weight value in the following format:
WVAL=nnnnnn<CR>
4. Send the WSPAN EDP command to calibrate span. The indicator displays ***CAL*** while calibration is in progress.
5. To remove an offset value, clear all weight from the scale, including hooks or other items used to hang test weights, then send the REZERO EDP command. The indicator displays ***CAL*** while the zero and span calibrations are adjusted.
6. Send the KUPARROW EDP command to exit setup mode.

4.4 More About Calibration

The following topics provide additional information about compensating for environmental factors ([Section 4.4.1](#)) and diagnostic information for determining expected zero and span coefficients.

4.4.1 Adjusting Final Calibration

Calibration may be affected by environmental factors including wind, vibration, and angular loading. For example, if the scale is calibrated with 1000 lb, a strain test may determine that at 2000 lb the calibration is 3 lb high. In this case, final calibration can be adjusted by tweaking WVAL to 998.5 lb. This adjustment provides a linear correction of 1.5 lb per 1000 lb.

To adjust the final calibration, return to the **WVAL** prompt and press **Zero** ▾ to show the test weight value. Press **Units** ▷ to adjust calibration up or down. Press **Zero** ▾ to save the value, then press **Units** ▷ to return to the CALIBR menu.

4.4.2 A/D Counts

[Table 4-3](#) lists the ideal A/D counts that result from input signals of 0–3.0 mV with zero deadload. Actual values will typically be higher than the values shown in [Table 4-3](#), but the ideal values can be used when calibrating the Tracer AV with no attached scale.

Input Signal (mV)	Raw A/D Counts
0.0 mV/V	167,840
0.5 mV/V	335,613
1.0 mV/V	503,377
1.5 mV/V	671,143
2.0 mV/V	838,908
2.5 mV/V	1,100,668
3.0 mV/V	1,174,446

Table 4-3. Ideal A/D Raw Counts



NOTE: When Raw A/D Count is displayed, the six most significant digits appear. Scroll left or right to see the full value.

5.0 EDP Commands

The Tracer AV can be controlled by a personal computer or remote keyboard connected to the EDP port. Control is provided by a set of EDP commands that can simulate front panel key press functions, display and change setup parameters, and perform reporting functions. The EDP port provides the capability to print configuration data or to save that data to an attached personal computer. This section describes the EDP command set and procedures for saving and transferring data using the EDP port.

5.1 The EDP Command Set

The EDP command set can be divided into five groups: key press commands, reporting commands, the RESETCONFIGURATION special function command, parameter setting commands and transmit weight data commands.

When the Tracer AV processes an EDP command, it responds with the message **OK**. The **OK** response verifies that the command was received and has been executed. If the command is unrecognized or cannot be executed, the indicator responds with **??**.

The following sections list the commands and command syntax used for each of these groups.

5.1.1 Key Press Commands

Key press EDP commands (Table 5-1) simulate pressing the keys on the 2-button keypad. Most commands can be used in both setup and weighing mode. Several of the commands serve as “pseudo” keys, providing functions that are not represented by a key on the front panel.

For example, to enter a 15-pound tare weight using EDP commands:

1. Type K1 and press **ENTER**.
2. Type K5 and press **ENTER**.
3. Type KTARE and press **ENTER**.
The display shifts to net mode when the tare is entered.

Command	Function
KZERO	In weighing mode, press the Zero key
KGROSSNET	In weighing mode, press the GROSS/NET key
KGROSS	Go to gross mode*
KNET	Go to net mode*
KTARE	Press the TARE key
KUNITS	In weighing mode, press the UNITS key
KPRIM	Go to primary units*
KSEC	Go to secondary units*
KLEFTARROW	In setup mode, move left in the menu
KRIGHTARROW	In setup mode, move right in the menu
KUPARROW	In setup mode, move up in the menu
KDOWNARROW	In setup mode, move down in the menu
KTIME	Press TIME/DATE key once*
KDATE	Press TIME/DATE key twice*
KDISPTARE	Press the DISPLAY TARE key*
KCLR	Press the CLEAR key*
K0	Press number 0 (zero)*
K1	Press number 1*
K2	Press number 2*
K3	Press number 3*
K4	Press number 4*
K5	Press number 5*
K6	Press number 6*
K7	Press number 7*

Table 5-1. EDP Key Press Commands

Command	Function
K8	Press number 8*
K9	Press number 9*
KDOT	Press the decimal point (.)*
KENTER	Press the ENTER key
* Pseudo keys	

Table 5-1. EDP Key Press Commands (Continued)

5.1.2 Reporting Commands

Reporting commands send specific information to the EDP port. These commands can be used in both setup mode and normal mode.

Command	Function
DUMPALL	List all parameter values
VERSION	Tracer AV software version
P	Write current displayed weight with units identifier. See Section 6.2 on page 39 for more information.
ZZ	Write current weight and annunciator status. See Section 6.2 on page 39 for more information.
S	Write one frame of stream format. See Table 5-11 on page 37 for information about the SX and EX commands.

Table 5-2. EDP Reporting Commands

5.1.3 The RESETCONFIGURATION Command

The RESETCONFIGURATION command can be used to restore all configuration parameters to their default values. Before issuing this command, the Tracer AV must be placed in test mode (press and hold setup switch for approximately three seconds to show TEST menu).

This command is equivalent to using the DEFLT function on the TEST menu. See [Section 6.7 on page 44](#) for more information about test mode and using the TEST menu.



NOTE: All load cell calibration settings are lost when the RESETCONFIGURATION command is run.

5.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter (Tables 5-3 through 5-10).

Current configuration parameter settings can be displayed in either setup mode or normal mode using the following syntax:

COMMAND<ENTER>

Most parameter values can be changed in setup mode only. Use the following command syntax when changing parameter values:

COMMAND=VALUE<ENTER>

where **value** is a number or a parameter value. Use no spaces before or after the equal (=) sign. If you type an incorrect command or value, the display reads??. Changes to the parameters are saved as they are entered but typically do not take effect until you exit setup mode.

For example, to set the motion band parameter to 5, type the following:

MOTBAND=5D<ENTER>

5.1.5 Soft Reset

The RS command will reset the Tracer AV without losing configuration and calibration. It does reset consecutive number.

Command	Description	Values
DEFCAL	Default Calibration	300 lb, 500 lb
GRADS	Graduations	1–100 000
ZTRKBN	Zero track band	OFF, 0.5D, 1D, 3D
ZRANGE	Zero range	1.9%, 100%
MOTBAND	Motion band	1D, 2D, 3D, 5D, 10D, 20D, OFF
OVRLOAD	Overload	FS+2%, FS+1D, FS+9D, FS
SMPRAT	Sample rate	15HZ, 30HZ, 60HZ, 7.5HZ
DIGFLTR1 DIGFLTR2 DIGFLTR3	Digital filtering	1, 2, 4, 8, 16, 32, 64
DFSNS	Digital filter cutout sensitivity	2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT
DFTHRH	Digital filter cutout threshold	NONE, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, 250DD
TAREFN	Tare function	BOTH, NOTARE, PBTARE, KEYED

Table 5-3. CONFIG EDP Commands

Command	Description	Values
PRI.DECPNT	Primary units decimal position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888, 888880
PRI.DSPDIV	Primary units display divisions	1D, 2D, 5D
PRI.UNITS	Primary units	LB, KG, OZ, TN, T, G, NONE
SEC.DECPNT	Secondary units decimal position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888, 888880
SEC.DSPDIV	Secondary units display divisions	1D, 2D, 5D
SEC.UNITS	Secondary units	LB, KG, OZ, TN, T, G, NONE
SEC.MULT	Secondary units multiplier	0.00000–9999.99
DSPRATE	Display rate	250MS, 500MS, 750MS, 1SEC, 1.5SEC, 2SEC, 2.5SEC, 3SEC, 4SEC, 6SEC, 8SEC

Table 5-4. FORMAT EDP Commands

Command	Description	Values
WZERO	Zero calibration	—
WVAL	Test weight value	test_weight_value
WSPAN	Span calibration	—
REZERO	Rezero	—
LC.CD	Set deadload coefficient	value
LC.CW	Set span coefficient	value

Table 5-5. CALIBR EDP Commands

Command	Description	Values
EDP.BAUD	EDP port baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
EDP.BITS	EDP port data bits/parity	8NONE, 7EVEN, 7ODD
EDP.TERMIN	EDP port termination character	CR/LF, CR
EDP.EOLDLY	EDP port end-of-line delay	0–255 (0.1-second intervals)
EDP.ECHO	EDP port echo	ON, OFF
STREAM	Streaming port	OFF, EDP, PRN
STRRTE	Stream rate	INDUST, LFT

Table 5-6. SERIAL EDP Commands

Command	Description	Values
PWRUPMD	Power up mode	GO, DELAY
REGULAT	Regulatory compliance	NTEP, OIML, CANADA, NONE
CONSNUM	Consecutive number	0-999 999
CONSTUP	Consecutive number start-up value	0-999 999
DATEFMT	Date format	MMDDYY, DDMMYY, YYMMDD, YYDDMM
DATESEP	Date separator	SLASH, DASH, SEMI
TIMEFMT	Time format	12HOUR, 24HOUR
TIMESEP	Time separator	COLON, COMMA

Table 5-7. PROGRM EDP Commands

Command		Description	Values
SP1	SP2		
SP1.ENABLE	SP2.ENABLE	Setpoint enable	OFF, ON
SP1.KIND	SP2.KIND	Setpoint kind	GROSS, NET
SP1.VALUE	SP2.VALUE	Setpoint value	number
SP1.TRIP	SP2.TRIP	Trip	Higher, Lower, Inband, Outbnd
SP1.BNDVAL	SP2.BNDVAL	Band value	number
SP1.HYSTER	SP2.HYSTER	Hysteresis	number
SP1.ACCESS	SP2.ACCESS	Setpoint access	OFF, ON

Table 5-8. SETPNTS EDP Commands

Command	Description	Values
DIGIN1 DIGIN2	Digital input function	OFF, ZERO, TARE, NT/GRS, UNITS, DSPTAR, PRINT, CLRCN, KBDLOC, HOLD, NEWID

Table 5-9. DIG IN EDP Commands

Command	Description	Values
SOURCE	Analog output source	GROSS, NET
OFFSET	Zero offset	0%, 20%
ERRACT	Error action	FULLSC, HOLD, ZEROSC
MIN	Minimum value tracked	0-999 999
MINNEG	Minimum negative	OFF, ON
MAX	Maximum value tracked	0-999 999
MAXNEG	Maximum negative	OFF, ON
TWZERO	Zero calibration	0-16 383
TWSPAN	Span calibration	0-16 383

Table 5-10. ALGOUT EDP Commands

5.1.6 Normal Mode Commands

The serial transmit weight data commands (see [Table 5-2 on page 34](#)) transmit data to the EDP port on demand. The SX and EX commands are valid only in normal operating mode; all other commands are valid in either setup or normal mode.

Command	Description	Response Format
UID	Set unit ID	nnnnnnn
SD	Set date	MMDDYY, DDMMYY, YYMMDD (enter using DATEFMT specified)
ST	Set time	hhmm (enter using 24-hour format)
SX	Start EDP streaming	OK or ??
EX	Stop EDP streaming	OK or ??
RS	Reset system	—
XG	Transmit gross weight in displayed units	nnnnnn UU where nnnnnn is the weight value, UU is the units.
XN	Transmit net weight in displayed units	
XT	Transmit tare weight in displayed units	
XG2	Transmit gross weight in non-displayed units	
XN2	Transmit net weight in non-displayed units	
XT2	Transmit tare weight in non-displayed units	
XE	Query system error conditions	nnnnn nnnnn See Section 6.1.2 on page 38 for detailed information about the XE command response format.

Table 5-11. Normal Mode Commands

5.2 Saving and Transferring Data

Connecting a personal computer to the Tracer AV EDP port allows you to save configuration data to the PC or to download configuration data from the PC to a Tracer AV. The following sections describe the procedures for these save and transfer operations.

5.2.1 Saving Tracer AV Data to a Personal Computer

Configuration data can be saved to a personal computer connected to the EDP port. The PC must be running a communications program such as PROCOMPLUS®. See [Section 2.3.3 on page 16](#) for information about serial communications wiring and EDP port pin assignments.

When configuring the Tracer AV, ensure that the values set for the BAUD and BITS parameters on the SERIAL menu match the baud rate, bits, and parity settings configured for the serial port on the PC. Set the PRNDEST parameter to EDP.

To save all configuration data, place the Tracer AV in setup mode and send the DUMPALL EDP command. The Tracer AV responds by sending all configuration parameters to the PC as ASCII-formatted text.

5.2.2 Downloading Configuration Data from PC to Tracer AV

Configuration data saved on a PC or floppy disk can be downloaded from the PC to a Tracer AV. This procedure is useful when a number of Tracer AVs with similar configurations are set up or when a Tracer AV is replaced.

To download configuration data, connect the PC to the EDP port as described in [Section 5.2.1](#). Place the Tracer AV in setup mode and use the PC communications software to send the saved configuration data to the Tracer AV. When transfer is complete, calibrate the Tracer AV as described in [Section 4.0 on page 30](#).



NOTE: calibration settings are included in the configuration data downloaded to the Tracer AV. If the receiving Tracer AV is a direct replacement for another Tracer AV and the attached scale is not changed, recalibration is not required.

When downloading configurations that include changed serial communications settings, edit the data file to place the serial communications changes at the end of the file. Communication between the PC and Tracer AV will be lost once the Tracer AV receives settings for baud rate (BAUD parameter) or data bits and parity (BITS parameter) that do not match those configured for the PC.

6.0 Appendix

6.1 Error Messages

The Tracer AV provides a number of error messages. When an error occurs, the message is shown on the remote display. Error conditions can also be checked remotely by using the XE EDP command as described in [Section 6.1.2](#).

6.1.1 Displayed Error Messages

The Tracer AV provides a number of front panel error messages to assist in problem diagnosis. [Table 6-1](#) lists these messages and their meanings.

Error Message	Description	Solution
E A/D	A/D physical error	Contact Rice Lake Weighing Systems
EEEROM	EEPROM physical error	
EVIREE	Virgin EEPROM	Use TEST menu to perform DEFLT (restore defaults) procedure, then recalibrate load cells
EPCKSM	Parameter checksum error	A/D converter requires recalibration. Contact Rice Lake Weighing Systems
EACKSM	A/D calibration checksum error	
ELCKSM	Load cell calibration checksum error	Recalibrate load cells
EIDATA	Internal RAM checksum error	Contact Rice Lake Weighing Systems
E REF	A/D reference error	A/D converter requires recalibration. Contact Rice Lake Weighing Systems
ERROR	Internal program error	Check configuration. Run XE command (see Section 6.1.2) to determine error type Contact Rice Lake Weighing Systems if unable to clear error by cycling power or if error recurs
OVERFL	Overflow error	Weight value too large to be displayed
-----	Gross > overload limit	Gross value exceeds overload limit. Check configuration or signal input level. Overload can be caused by input signal > 45 mV or common mode voltage > 950 mV
_____	A/D underrange	A/D reading < -4 mV. Check scale for binding or damage
RNGERR	GRADS > 100,000 WVAL > 100,000	Only shows up in Configuration mode
EEPERR	EEPROM Error	Contact Rice Lake Weighing Systems

Table 6-1. Tracer AV Error Messages

6.1.2 Using the XE EDP Command

The XE EDP command can be used to remotely query the Tracer AV for the error conditions shown on the front panel. The XE command returns two 5-digit numbers in the format:

xxxxx yyyy

where **xxxxx** contains a decimal representation of any existing error conditions as described in [Table 6-2](#).

If more than one error condition exists, the number returned is the sum of the values representing the error conditions. For example, if the XE command returns the number 1040, this value represents the sum of an A/D reference error (1024) and an A/D calibration checksum error (16).

The second number returned (**yyyyy**) uses the same bit assignments as shown in [Table 6-2](#) to indicate whether the test for the error condition was run. For example, the value **yyyyy** = 50815 represents the decimal equivalent of the binary value 1100 0110 0111 1111. Using the bit assignments in [Table 6-2](#), this value indicates all tests were run.

Error Code	Description	Binary Value
0x0001	EEPROM Error	0000 0000 0000 0001
0x0002	Virgin EEPROM	0000 0000 0000 0010
0x0004	Config Parameter Checksum	0000 0000 0000 0100
0x0008	Load Cell Checksum	0000 0000 0000 1000
0x0010	A/D Calibration Checksum	0000 0000 0001 0000
0x0020	Print Formats Checksum	0000 0000 0010 0000

Table 6-2. XE EDP Commands

Error Code	Description	Binary Value
0x0040	XA Internal RAM Error	0000 0000 0100 0000
0x0080	External RAM Error	0000 0000 1000 0000
0x0100	Reserved	0000 0001 0000 0000
0x0200	ADC Physical Error	0000 0010 0000 0000
0x0400	ADC Reference	0000 0100 0000 0000
0x0800	Count Error	0000 1000 0000 0000
0x1000	Reserved	0001 0000 0000 0000
0x2000	Display Range	0010 0000 0000 0000
0x4000	ADC Range	0100 0000 0000 0000
0x8000	Gross Limit	1000 0000 0000 0000
0x10000 - 0x800000000		Reserved

Table 6-2. XE EDP Commands (Continued)

6.2 Status Messages

Two EDP commands, P and ZZ, can be used to provide status about the Tracer AV. These commands are described in the following sections.

6.2.1 Using the P EDP Command

The P EDP command returns the current displayed weight value to the EDP port, along with the units identifier. If the indicator is in an underrange or overload condition, the weight value is replaced with &&&&&& (overload) or :>>>> (underrange).

6.2.2 Using the ZZ EDP Command

The ZZ EDP command can be used to remotely query which annunciators are currently displayed. The ZZ command returns the currently displayed weight and a decimal number representing the LED annunciators currently lit. The format of the returned data is:

wwwwww uu zzz

where **wwwwww uu** is the current displayed weight and units, **zzz** is the annunciator status value (see Table 6-3). If more than one annunciator is lit, the second number returned is the sum of the values representing the active annunciators.

Example: If the annunciator status value returned on the ZZ command is 145, the gross, standstill, and lb annunciators are lit. 145 represents the sum of the values for the standstill annunciator (128), gross mode annunciator (16), and the lb/primary units annunciator (1).

Decimal Value	Annunciator
1	lb/primary units
2	kg/secondary units
16	Gross
32	Net
64	Center of zero
128	Standstill

Table 6-3. Status Codes Returned on the ZZ Command

6.3 Continuous Output (Stream) Format

Figure 6-1 shows the continuous output format sent from the Tracer AV Serial port to the Remote Display.



NOTE: In Setup mode, the text display message follows the following format: <100DM><Time M/S><Text!> or <100DMText!>

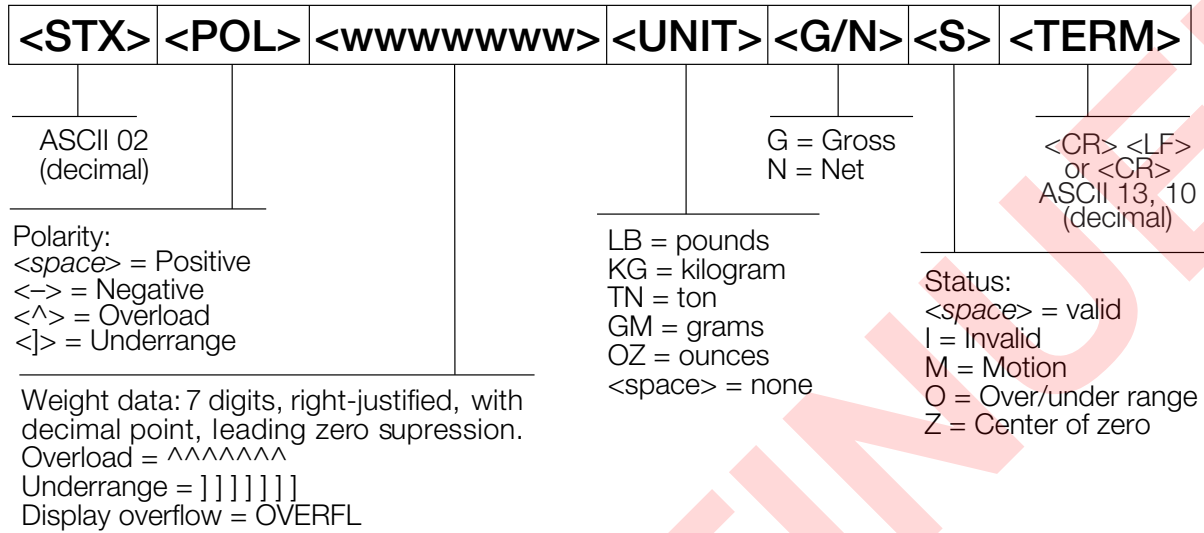


Figure 6-1. Continuous Output Data Format

6.4 Front Panel Display Characters

Figure 6-2 shows the 7-segment LED character set used to display alphanumeric characters on the Tracer AV front panel.

	-	9	E	Q
	.	:	F	R
	/	;	G	S
	0	<	H	T
%	1	=	I	U
&	2	>	J	V
,	3	?	K	W
(	4	@	L	X
)	5	A	M	Y
*	6	B	N	Z
+	7	C	O	[
,	8	D	P	\

Figure 6-2. <Prodfont>Tracer AV Display Characters

6.5 Conversion Factors for Secondary Units

The Tracer AV has the capability to mathematically convert a weight into many different types of units and instantly display those results with a press of the Units key.

Secondary units can be specified on the FORMAT menu using the SECNDR parameter, or by using EDP commands.



NOTE: Multipliers are preconfigured within the Tracer AV. Manual entry is only necessary when **NONE** is selected under **UNITS**. Long tons and grain units listed in [Table 6-4](#) cannot be directly specified as primary or secondary units. For these or other unlisted units of weight, specify **NONE** under **UNITS**.

Ensure that the secondary decimal point position is set appropriately for the scale capacity in the secondary units. If the converted value requires more digits than are available, the indicator will display an overflow message (**OVERFL**).

For example, if the primary units are short tons, secondary units are pounds, and the secondary decimal point is set to 8888.88, the indicator will overflow if 5 tons or more are applied to the scale. With 5 tons applied, and a conversion factor of 2000, the secondary unit's display needs five digits to the left of the decimal point to display the 10000 lb secondary units value.

Primary Unit	x Multiplier	Secondary Unit
grains	0.064799	grams
	0.002286	ounces
	0.000143	pounds
	0.000065	kilograms
ounces	437.500	grams
	28.3495	grams
	0.06250	pounds
	0.02835	kilograms
pounds	7000.00	grams
	453.592	grams
	16.0000	ounces
	0.453592	kilograms
	0.000500	short tons
	0.000446	long tons
	0.000453	metric tons
short tons	2000.00	pounds
	907.185	kilograms
	0.892857	long tons
	0.907185	metric tons

Primary Unit	x Multiplier	Secondary Unit
grams	15.4324	grains
	0.035274	ounces
	0.002205	pounds
	0.001000	kilograms
kilograms	15432.4	grains
	35.2740	ounces
	1000.00	grams
	2.20462	pounds
	0.001102	short tons
	0.000984	long tons
	0.001000	metric tons
metric tons	2204.62	pounds
	1000.00	kilograms
	1.10231	short tons
	0.984207	long tons
long tons	2240.00	pounds
	1016.05	kilograms
	1.12000	short tons
	1.01605	metric tons
NOTE: Multipliers in italics are preconfigured		

Table 6-4. Conversion Factors

6.6 Digital Filtering

The Tracer AV uses averaged digital filtering to reduce the effect of vibration on weight readings. Adjustable threshold and sensitivity functions allow quick settling by suspending filter averaging, allowing the weight reading to jump to the new value. Figure 6-3 shows the digital filter parameters on the CONFIG menu.

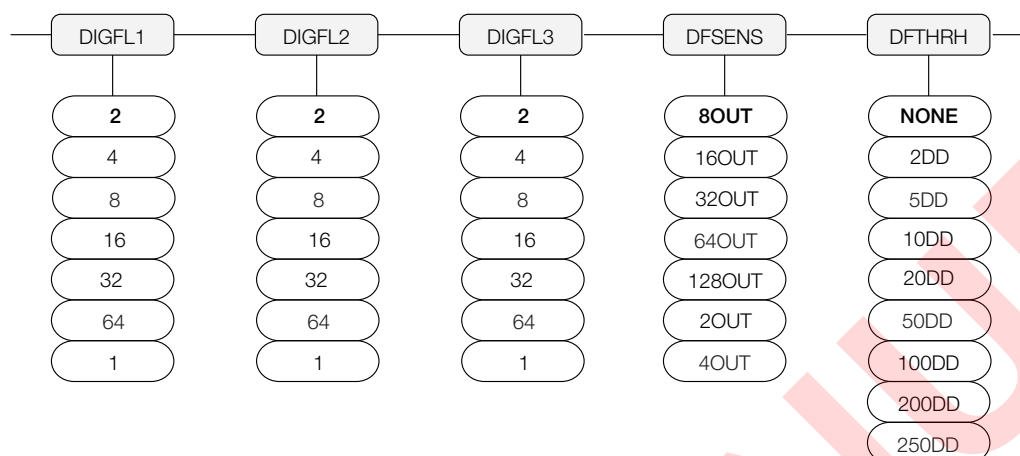


Figure 6-3. Digital Filtering Parameters on the Configuration (CONFIG) Menu

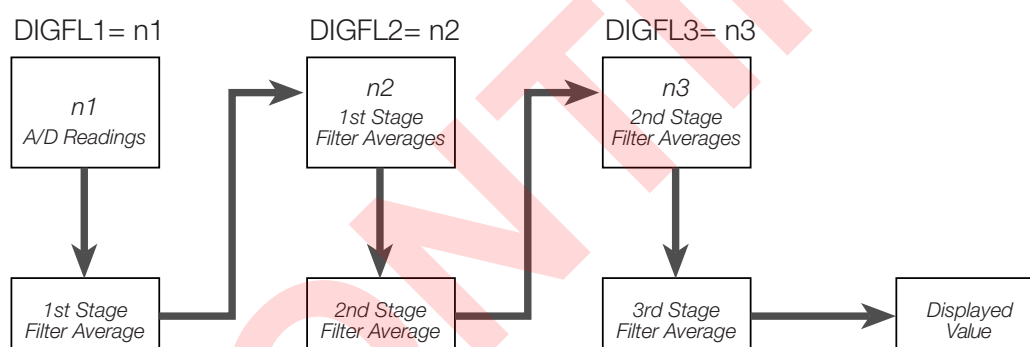


Figure 6-4. Flow Diagram for Tracer AV Digital Filters

6.6.1 DIGFLx Parameters

The first three digital filtering parameters, DIGFL1, DIGFL2, and DIGFL3, are configurable filter stages that control the effect of a single A/D reading on the displayed weight. The value assigned to each parameter sets the number of readings received from the preceding filter stage before averaging.

The overall filtering effect can be expressed by adding the values assigned to the three filter stages:

$$\text{DIGFL1} + \text{DIGFL2} + \text{DIGFL3}$$

For example, if the filters are configured as DIGFL1=4, DIGFL2=8, DIGFL3=8, the overall filtering effect is 20 (4 + 8 + 8). With this configuration, each A/D reading has a 1-in-20 effect on the displayed weight value. Setting the filters to 1 effectively disables digital filtering.

6.6.2 DFSENS and DFTHR Parameters

The three digital filters can be used by themselves to eliminate vibration effects, but heavy filtering also increases settling time. The DFSENS (digital filter sensitivity) and DFTHR (digital filter threshold) parameters can be used to temporarily override filter averaging and improve settling time:

- DFSENS specifies the number of consecutive scale readings that must fall outside the filter threshold (DFTHR) before digital filtering is suspended
- DFTHR sets a threshold value, in display divisions. When a specified number of consecutive scale readings (DFSENS) fall outside of this threshold, digital filtering is suspended. Set DFTHR to NONE to turn off the filter override

6.6.3 Setting the Digital Filter Parameters

Fine-tuning the digital filter parameters greatly improves Tracer AV performance in heavy-vibration environments. Use the following procedure to determine vibration effects on the scale and optimize the digital filtering configuration.

1. In setup mode, set all three digital filters (DIGFL1, DIGFL2, DIGFL3) to 1. Set DFTHR to NONE. Return the Tracer AV to normal mode.
2. Remove all weight from the scale, then watch the indicator display to determine the magnitude of vibration effects on the scale. Record the weight below which all but a few readings fall. This value is used to calculate the DFTHR parameter value in Step 4.

For example, if a heavy-capacity scale produces vibration-related readings of up to 50 lb, with occasional spikes to 75 lb, record 50 lb as the threshold weight value.

3. Place the Tracer AV in setup mode and set the digital filters (DIGFL x) to eliminate the vibration effects on the scale (Leave DFTHR set to NONE). Reconfigure as necessary to find the lowest effective values for the DIGFL x parameters.
4. With optimum values assigned to the DIGFL x parameters, calculate the DFTHR parameter value by converting the weight value recorded in Step 2 to display divisions:

$$\text{threshold_weight_value} / \text{DSPDIV}$$

In the example in Step 2, with a threshold weight value of 50 lb and a display division value of 5 lb: $50 / 5 \text{ lb} = 10 \text{ DD}$. DFTHR should be set to 10 DD for this example.

5. Finally, set the DFSENS parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) will cause more consecutive out-of-band readings, so DFSENS should be set higher to counter low frequency transients.

Reconfigure as necessary to find the lowest effective value for the DFSENS parameter.

6.7 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the Tracer AV, including:

- Display raw A/D count
- Reset configuration parameters to default values
- A/D internal calibration



NOTE: Test mode is intended for factory use only.

To enter test mode, press and hold the setup switch until the front panel display shows the word **TEST**. After about three seconds, the test mode display automatically shifts to the first test menu function, A/DTST.

Figure 6-5 shows the Test Menu structure; Table 6-5 summarizes the test menu functions.

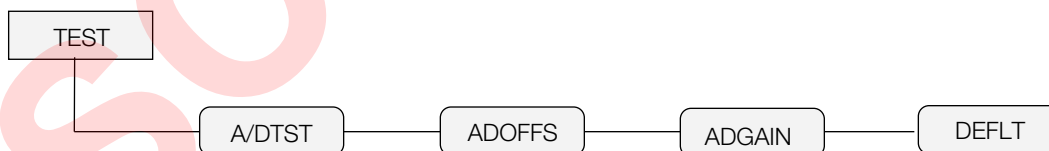


Figure 6-5. Test Mode Menu

TEST Menu	
Function	Description
A/DTST	Display A/D test Press and hold Enter key to display raw count from A/D converter.
DEFLT	Default parameters Press setup switch and Enter key at the same time to reset configuration and calibration parameters to factory default values. Load cells must be recalibrated before using the Tracer AV (see Section 4.0 on page 30).

Table 6-5. Test Mode Menu Functions

6.8 Regulatory Mode Functions

REGULAT Parameter Value	Weight on Scale	Tare in System	Front Panel Key Function	
			TARE	ZERO
NTEP	zero or negative	no	no action	ZERO
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	TARE	
CANADA	zero or negative	no	no action	TARE
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	no action	
OIML	zero or negative	no	no action	ZERO
		yes	CLEAR TARE	ZERO and CLEAR TARE
	positive	no	TARE	ZERO
		yes	TARE	ZERO and CLEAR TARE
NONE	zero or negative	no	TARE	ZERO
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	CLEAR TARE	

Table 6-6. TARE and ZERO Key Functions for REGULAT Parameter Settings

6.9 LED Functions

The following is a list of diagnostic LEDs for the Tracer AV. See [Figure 2-4 on page 12](#) for locations on the Tracer AV CPU board.

Serial Port Status

LED1 (EDP Port)Flashing red = TXD activity

Flashing green = RXD activity

On steady or off = No activity

LED2 (PRN Port)Flashing red = TXD activity

Flashing green = RXD activity

On steady or off = No activity

LED AD (ADC)Green = Active

Red = Fault

LED MEM (Memory Test)Green = Pass

Red = Fail

LED ANA Red = Not Implemented
(Analog Option Card)

Digital Input/Output Status

DO 1 (Digital Out 1)On when lit (active low)

DO 2 (Digital Out 2)On when lit (active low)

DI 1 (Digital In 1)On when lit (active low)

DI 2 (Digital In 2)On when lit (active low)

Power Supply

LED (+5AV)Excitation/ADC supply on

LED (+5V & +3.3V)Digital logic supply on

Operation Status

LEDHB (Microprocessor)Flashing green = Active

Red = Fault

6.10 Specifications

Power

Line Voltages	115 or 230 VAC
Frequency	50 or 60 Hz
Power Consumption	1.5 A at 115 VAC (8 W) 0.75 A at 230 VAC (8 W)
Fusing	2.5 A 5 x 20 mm fuse

Analog Specifications

Full Scale Input Signal	Up to 22.5 mV
Excitation Voltage	+5 V single sided 8 x 350 Ω or 16 x 700 Ω load cells
Sense Amplifier	Differential amplifier with 4- and 6-wire sensing
Analog Signal	
Input Range	-0.5 mV/V to +4.5 mV/V
Analog Signal	
Sensitivity	0.3 μ V/graduation minimum, 1.5 μ V/grad recommended
Input Impedance	200 M Ω , typical
Noise (ref to input)	0.3 μ V p-p with digital filters at 4-4-4
Internal Resolution	8,000,000 counts
Display Resolution	100 000 dd
Measurement Rate	Up to 60 measurements/sec
Input Sensitivity	10 nV per internal count
System Linearity	Within 0.01% of full scale
Zero Stability	150 nV/ $^{\circ}$ C, maximum
Span Stability	3.5 ppm/ $^{\circ}$ C, maximum
Calibration Method	Software, constants stored in EEPROM
Common Mode	
Voltage	-2.35 to +3.45 V, referred to ground
Rejection	130 dB minimum at 50 or 60 Hz
Normal Mode	
Rejection	90 dB minimum at 50 or 60 Hz
Input Overload	$\pm$ 12 V continuous, static discharge protected
RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass
Analog Output	Optional: fully isolated, voltage or current output, 14-bit resolution. Voltage output: 0 -10 VDC Load resistance: 1K Ω minimum Current output: 0-20/4-20 mA External loop resistance: 500 Ω maximum

Digital Specifications

Microcomputer	Phillips PXAG30K main processor at 19.6608 MHz
Digital Inputs	2 inputs, TTL or switch closure, active-low
Digital Outputs	2 outputs, 250 mA Max sink
Digital Filters	3 filters, software selectable

Serial Communications

EDP Port	Full duplex RS-232
Both Ports	38400, 19200, 9600, 4800, 2400, 1200, 600, 300 bps; 7 or 8 data bits; even, odd, or no parity

Operator Interface

Display RD-1	6-digit LED display. 7-segment, 0.8 in (44.5 mm) digits
RD-2	6-digit LCD display. 7-segment LCD/LED annunciators gross, net, center of zero, standstill, lb/primary units, kg/secondary units, count, tare
Keypad	2-button keypad

Environmental

Operating Temperature	-10 to +40 $^{\circ}$ C (legal); -10 to +50 $^{\circ}$ C (industrial)
Storage Temperature	-25 to +70 $^{\circ}$ C
Humidity	0-95% relative humidity

Enclosure

Enclosure Dimensions	10.5 inch x 12.5 inch x 6.4 inch 26.7 cm x 31.75 cm x 16.3 cm
Weight	7.8 lb. (3.54 Kg)
Rating/Material	UL Type 1

Approvals



NTEP

CoC Number 21-015
Accuracy Class III/IIIL nmax : 10 000



Measurement Canada

Approval AM-6168C
Accuracy Class III nmax : 10 000



UL Listed

File Number E505539

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