HAWK™

Terminal
Technical Manual

CUSTOMER FEEDBACK

If you have a problem with this product, or just a suggestion on how we can serve you better, please fill out this form and send it to us. Your feedback will help us to improve product performance, quality and service. If you are in the United States, you can mail this postpaid form to the address on the reverse, or fax it to (614) 438-4355. If you are outside the United States, please apply the appropriate amount of postage before mailing. You may also fax it the number above.

Your Name:	Date:	
Organization Name:	METTLER TOLEDO Order Number	
Address:	Part / Product Name:	
	Part / Model Number:	
	Serial Number:	
Phone Number: ( ) Fax Number: ( )	Company Name of Installation:	
E-mail Address:	Contact Name:	
	Phone Number:	

How well did this product meet your expectations in its intended use?		Comments:
	Met and exceeded my needs	
	Met all needs	
	Met most needs	
	Met some needs	
	Did not meet my needs	

PROBLEM:

UNACCEPTABLE DELIVERY:	OUT OF BOX ERROR:	
Shipped late	Wrong item	Wrong documentation
Shipped early	Wrong part	Missing documentation
Shipped to incorrect location	Missing equipment	Incorrectly calibrated
Other (Please Specify)	Equipment failure	Other (Please specify)

Comments:

DO NOT WRITE IN SPACE BELOW; FOR METTLER TOLEDO USE ONLY

	Retail		Light Industrial		Heavy Industrial		Systems

RESPONSE: Include Root Cause Analysis and Corrective Action Taken.

FOLD THIS FLAP FIRST

BUSINESS REPLY MAIL

FIRST CLASS   PERMIT NO. 414   COLUMBUS, OH

POSTAGE WILL BE PAID BY ADDRESSEE

Mettler-Toledo, Inc.
Quality Manager - MTWI
1150 Dearborn Drive
Worthington, Ohio 43085
USA
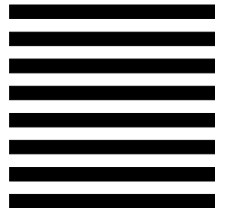
Please seal with tape.

INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by contacting:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240
(US and Canada) 614- 438-4511
(All Others) 614-438-4888

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This manual correctly describes the operation and functionality of the HAWK terminal containing software version 125362 Sr 2.00. The software version is displayed during the power-up sequence.

PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

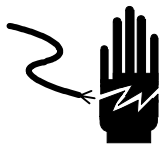FOLLOW these instructions carefully.

SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL METTLER TOLEDO for parts, information, and service.

Note: If the unit has been stored or transported in below freezing temperatures, allow the unit to warm up to room temperature before turning on AC power.

⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

⚠ WARNING

FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

⚠ CAUTION

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

CONTENTS

1 Introduction

The HAWK terminal offers all the features needed to meet the real world requirements of manufacturing, agricultural, packaging, and general weighing applications. Rugged, reliable, and easy-to-use, it can be used with a variety of scale bases and in a variety of applications in general purpose industrial and commercial environments. For the best performance, however, **it should not be used in environments requiring washdown, immersion in liquids, exposure to splashing liquids, or exposure to corrosive chemicals.**

This manual provides essential information for assembling, programming, and maintaining the HAWK terminal. Please review this material carefully. You should also consult the technical manual for the scale base being used with the terminal.

If you encounter problems not covered in the manual, please return the **Publication Evaluation Report** found in the back of this manual. Should you need further assistance, please contact your authorized METTLER TOLEDO representative.

Specifications
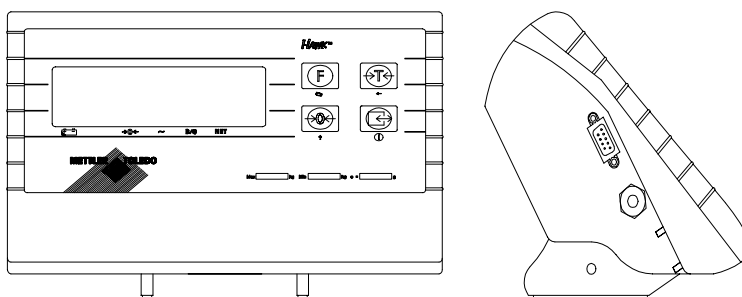
Figure 1-1

HAWK Terminal Specifications	
Displayed Resolution	Up to 10,000d
Physical Dimensions (W x D x H)	260 mm x 160 mm x 145 mm 10.2 in x 6.2 in x 5.6 in
Construction	ABS plastic
Power	10.2 VDC / 0.15 A (AC transformer included) or six "D" cells
Battery Life	Up to 500 hrs with six 'D Cell' batteries powering one 350 ohm load cell
Environment	General purpose, dry.
Display	Six-digit, 25 mm / 1 in tall, high contrast, LCD
Scale Type	Analog: Suitable for 2mV/V and 3mV/V load cells Can power up to four 350 ohm load cells
Keypad	4 color-coded, tactile-feel keys ZERO, TARE, FUNCTION, and PRINT
Approvals	UL Listed Canada Weights and Measures AM-5318 US Weights and Measures CoC #99-054
Operating Temperature	-10°C to 40°C (14°F to 104°F) with 10 to 95% relative humidity, non-condensing
Storage Temperature	-20°C to 60°C (-4°F to 140°F) with 10 to 95% relative humidity, non-condensing
Data Output	ASCII via RS-232 standard
Weighing Units	Pounds, kilograms and grams

Table 1-1

2   Load Cell and Serial Port Connections

Load Cell Wiring

Load Cell Terminal Strip Signal Names for HAWK Terminal

| +EXC | +SEN | +SIG | Shield | -SIG | -SEN | -EXC |
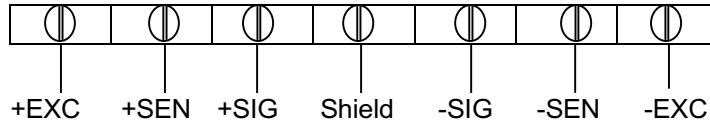
Figure 2-1

Standard METTLER TOLEDO Light Capacity 6-wire Load Cell Color Code

| White | Yellow | Green | Orange | Black | Red | Blue |
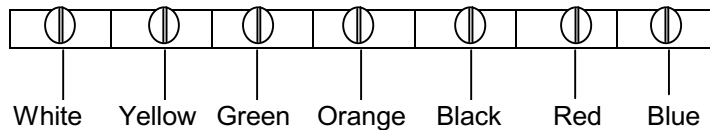
Figure 2-2

Note that jumpers JUMP 1 and JUMP 2 (Figure 2-5) on the Controller PCB are <u>NOT</u> shorting the pins in this configuration.

Standard METTLER TOLEDO Heavy Capacity 6-wire Load Cell Color Code

| Green | Brown | White | Yellow | Red | Blue | Black |
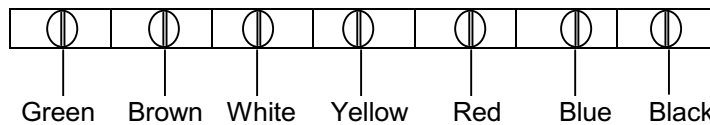
Figure 2-3

Note that jumpers JUMP 1 and JUMP 2 (Figure 2-5) on the Controller PCB are <u>NOT</u> shorting the pins in this configuration.

Standard 4-wire Load Cell Color Code

| Green | N.C. | White | Orange/ Yellow | Red | N.C. | Black |
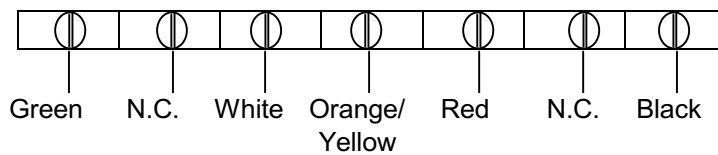
Figure 2-4

Note that jumpers JUMP 1 and JUMP 2 (Figure 2-5) on the Controller PCB <u>MUST BE</u> shorting the pins in this configuration.
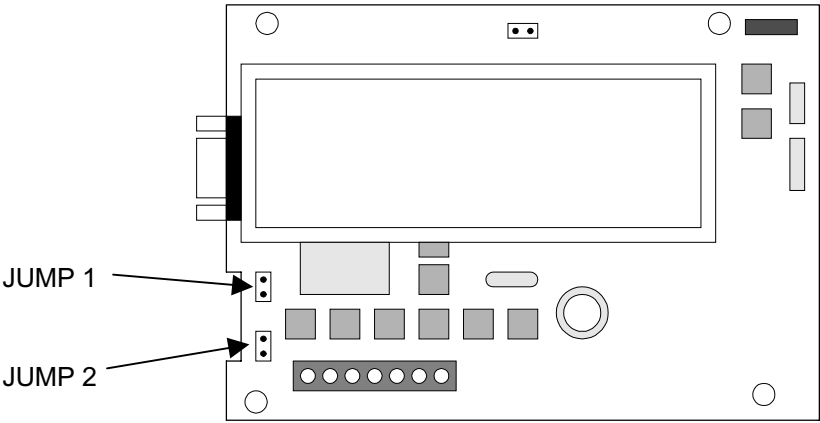
Figure 2-5

Serial Port Connections

NOTE: The bidirectional capability was added in version 2.0 software. Previous versions do not have this feature.

The HAWK terminal provides a bi-directional RS-232 port as standard. This port may be used to send data to or receive commands from a computer, printer, or other serial device. The following chart (Table 2-1) describes the pin configuration of the 9 pin D-Sub female connector on the side of the HAWK terminal. The maximum recommended cable length for RS-232 communications is 50 feet (15 meters).

Pin	Signal	Description
1		Not Connected
2	RxD	Receive Data
3	TxD	Transmit Data
4		Not Connected
5	Gnd	Logic Ground
6		Not Connected
7		Not Connected
8		Not Connected
9		Not Connected

Table 2-1

Table 2-2 shows the ASCII commands that may be used to communicate with the HAWK scale via the serial port. A more complete explanation is given in Appendix 3.
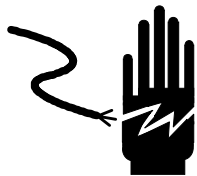
ASCII Command	Function Performed in the WILDCAT Scale
C	Clear Tare
T	Tare
P	Print
Z	Zero

Table 2-2

3   Programming and Calibration

Programming Mode

⚠ **WARNING**

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

The HAWK terminal contains various program blocks and sub-blocks which can be configured to determine how a scale will function. The programming mode of the HAWK terminal consists of main blocks (F1, F2, and F3), each containing programming sub-blocks (F1.1, F1.2, and so on). An overview of the programming mode is shown here.

F1 - Scale	F2 - Application	F3 - Serial I/F	Save
F1.1 Calibration Units	F2.1 Alternate Unit	F3.1 Baud Rate	Abort
GEO Code	F2.2 Auto Backlight	F3.2 Data Bits	Load Defaults
F1.2 Calibration	F2.3 Tare	F3.3 Stop Bits	
F1.3 Display X10	F2.4 PB Zero Range	F3.4 Parity	
F1.4 Programming Mode Access	F2.5 Auto Zero Maintenance	F3.5 Data Format	
	F2.6 Motion Sensitivity	F3.6 Checksum	
	F2.7 Filtering	F3.7 Gross Weight Legend	
	F2.8 Sleep Mode		
	F2.9 Power Up Zero Range		

Key Functions

Should you need to reconfigure the HAWK terminal, the following keys are used in the programming mode to configure the program blocks.

→0←	**ZERO**	Back up to the previous step.
→T←	**TARE**	Moves the data entry position one digit to the left.
F	**FUNCTION**	Increments the numeric data entry digit and/or allows the programmer to view the next display in a selection list.
	PRINT	Accepts/terminates a data entry.

Entering the Programming Mode

In order for you to access the program blocks which allow you to program the HAWK terminal, the CAL jumper must be in place shorting the two pins on the Controller PCB. Refer to Figure 3-1 for the CAL position.

To configure the program blocks, you must enter the programming mode by pressing and releasing the **PRINT** and **ZERO** keys simultaneously.
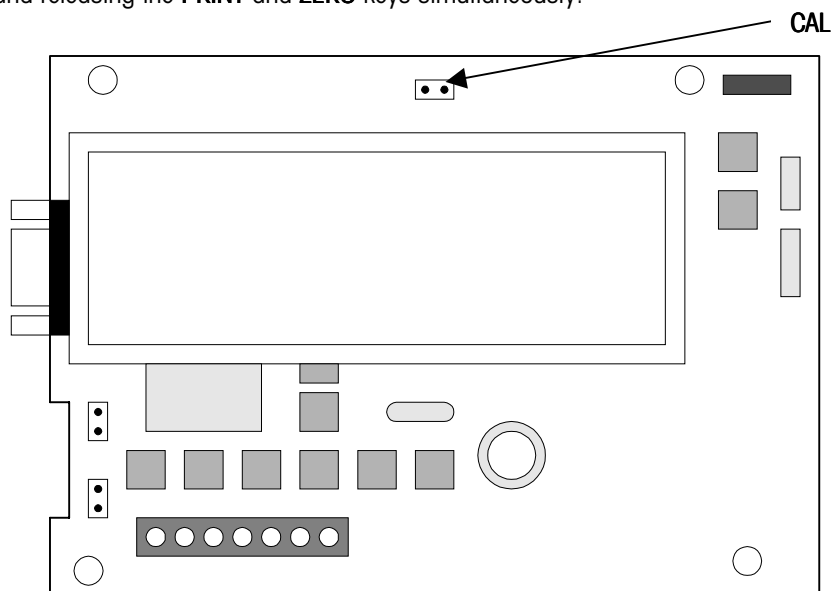
Figure 3-1

Entering and Configuring Program Blocks

Once the **[F1]** prompt is displayed, use the **PRINT** key to enter the block or the **FUNCTION** key to skip to the next block. The **ZERO** key is used to go back to the previous block.

Once **PRINT** is pressed, the HAWK terminal advances to the first parameter in the F1 program block. The display shows the sub-block number and the current value setting. Press **PRINT** to accept the value and advance to the next sub-block or press the **FUNCTION** key to toggle through the choices until the desired selection is displayed.

After the desired selection is displayed, press the **PRINT** key to accept the value. Continue this procedure throughout the setup routine until all required changes have been made.

Exiting the Programming Mode

At the end of all the program blocks, there is the SAVE program block. In this block, you can use the **FUNCTION** key to select SAVE, ABORT or DEFAULT. When the desired choice is displayed, press **PRINT**. The HAWK terminal exits the programming mode after the selection.

SAVE   The HAWK terminal will save all the changes you have made to the program blocks and then exit setup.

ABORT   All changes will be discarded and the original programming will remain.

DEFAULT   All blocks, except those steps denoted by * in Table 3-1 are reset to the factory defaults.

Sealing the Enclosure (Legal for Trade)

After calibration is complete, setup step F1.4 should be programmed as a "O" to eliminate accidental changes to the calibration values. After programming is complete, remove the setup jumper CAL (Figure 3-1) to prevent setup access. Close the enclosure, tightening all four screws on the rear cover. Install the two plastic plugs over the bottom screws and seal the enclosure as shown in Figure 3-2.
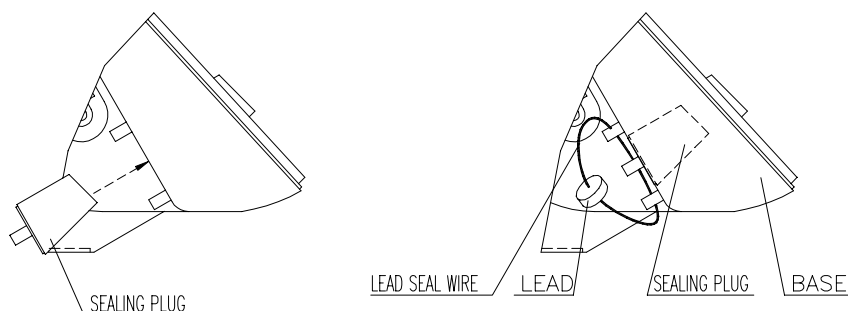
Figure 3-2

Factory Default Settings

The following is a list of the factory default setup parameters in the HAWK terminal.

STEP	DEFAULT	DESCRIPTION
F1.1	*	Calibration units – No default
GEO	*	Gravity adjust – No default
F1.2	0	Skip calibration
F1.3	0	Normal weight display
F1.4	0	Master Mode disable
F2.1	0	Alternative units = none (Unit Switch disable)
F2.2	0	Auto Backlight disable
F2.3	1	Tare enable
F2.4	1	Push button zero enabled, 2% range
F2.5	1	Auto zero maintenance enabled within 0.5d window
F2.6	1	Motion sensitivity +/- 1d
F2.7	0	No Filtering
F2.8	0	Sleep mode disable
F2.9	1	Auto zero capture at powerup range of +/- 2%
F3.1	9600	Serial output baud rate
F3.2	7	Data bits
F3.3	2	Stop bits
F3.4	2	Even parity
F3.5	2	Print format = single line gross-tare-net
F3.6	1	Checksum enable
F3.7	0	No printed legend for gross weight field

Table 3-1

*These steps are not reset during a Reset to Factory Defaults.

F1 Scale Block

This program block allows the user to set and calibrate the features that affect weighing performance.

[F1.2 2] CALIBRATION UNITS

Enter the value that corresponds to the type of test weights that will be used for calibration.

1 = lb

2 = kg

3 = g

[GEO 12] GRAVITY ADJUST

The terminal is calibrated with a GEO code of 12 at the factory. To adjust the factory calibration to your specific area, refer to Appendix 4 for your GEO code. Enter the new GEO code and the calibration will automatically be adjusted for your specific location.

[F1.2   0]   SCALE CALIBRATION

0 = Skip Calibration and proceed to F1.3

1 = Enter into the Calibration Sub-block.

[CAP.   ]   SCALE CAPACITY

"CAP" displays momentarily then current scale capacity is shown. This value is available for numeric entry editing. Press **FUNCTION** to clear the data before entering new data.

Table 3-2 shows all possible selections for capacity and increments.

Increment Size	Scale Capacities (lb, kg or g)											
0.001	1	-	-	2	-	3	4	5	6	-	8	10
0.002	2	-	3	4	5	6	8	10	12	15	16	20
0.005	5	6	-	10	-	15	20	25	30	-	40	50
0.01	10	12	15	20	25	30	40	50	60	-	80	100
0.02	20	24	30	40	50	60	80	100	120	150	160	200
0.05	50	60	-	100	-	150	200	250	300	-	400	500
0.1	100	120	150	200	250	300	400	500	600	-	800	1000
0.2	200	240	300	400	500	600	800	1000	1200	1500	1600	2000
0.5	500	600	-	1000	-	1500	2000	2500	3000	-	4000	5000
1	1000	1200	1500	2000	2500	3000	4000	5000	6000	-	8000	10000
2	2000	2400	3000	4000	5000	6000	8000	10000	12000	15000	16000	20000
5	5000	6000	-	10000	-	15000	20000	25000	30000	-	40000	50000

Table 3-2

[Incr.   ]   INCREMENT SIZE

"Incr" displays momentarily then the current increment size is displayed for editing. Press the **FUNCTION** key to toggle through valid selections.

[E SCAL]   Empty scale platform and press **PRINT** to continue.

[15 CAL]   Delay while initial is set (display counts down). If motion sensitivity is not disabled and motion is detected at this step, the display will show [E   30]. Press **PRINT** and the display returns to the [E SCAL] prompt.

[Add Ld]   Place test weight on the scale platform. Press **PRINT**.

[0000'0']   Enter test weight value. No decimal point is permitted. Maximum test weight is 100% of full scale capacity. Minimum is 20% of full scale capacity.

[15 CAL]   Delay while span is set (display counts down). If motion is detected at this step then the display will show [E   30]. Press **PRINT** to return to the [Add Ld] prompt.

[CAL d]   "Calibration done" is displayed momentarily.

[F1.3   0]   EXPANDED DISPLAY

0 = Normal display mode

1 = Weight displayed in minor increments

[F1.4   0]   PROGRAMMING MODE ACCESS

If CAL jumper is installed on the Controller PCB, this step has no effect, and the programming is always accessible.

If CAL jumper is not installed on the Controller PCB:

0 = No access to view or change values in the programming mode.

1 = Programming blocks F2 and F3 may be accessed to change the parameters. Programming block F1 may only be viewed.

F2 Application Block

[F2.1   0]   ALTERNATE UNITS

Select the unit of measure desired as a secondary unit.

0 = No unit switching

1 = lb

2 = kg

If the calibration unit is "kg ", the available choice is only "lb".

If the calibration unit is "lb" or 'g', the choice is only 'kg'.

If unit switching is enabled, a quick press of the **FUNCTION** key will change the unit.

[F2.2   0]   AUTO BACKLIGHT

0 = Backlight can only be turned on manually by pressing the **FUNCTION** key.

1 = The backlight turns on during motion and stays on for 6 seconds after no-motion.

The manual on/off is always available. If unit switching is enabled, press and hold the **FUNCTION** key for 3 seconds to turn the back light on. If unit switching is disabled, a quick press of the **FUNCTION** key will turn the backlight on and off.

[F2.3   1]   TARE

0 = Tare disabled

1 = Tare enabled

[F2.4   1]   PUSHBUTTON ZERO RANGE

0 = Pushbutton zero disabled

1 = Enable pushbutton zero within +/- 2% of scale capacity

2 = Enable pushbutton zero within +/- 20% of scale capacity

[F2.5   1]   AUTOZERO MAINTENANCE

Auto Zero Maintenance (AZM) automatically compensates for small changes in zero resulting from material build-up or temperature changes. This sub-block lets you select the weight range (+/-) around gross zero within which the HAWK terminal will capture zero. If residual weight on the scale exceeds the weight range, the HAWK terminal will not capture zero. AZM is disabled in the net mode.

0 = No AZM

1 = AZM within 0.5d window

2 = AZM within 1d window

3 = AZM within 3d window

[F2.6   1]   MOTION SENSITIVITY SELECTION

The motion detection feature determines when a no-motion condition exists on the scale platform. The sensitivity level determines what is considered stable. Printing, pushbutton zero, and tare entry will wait for scale stability before carrying out the command.

0 = Motion detector disabled

1 = 1.0 d motion sensitivity

2 = 3.0 d motion sensitivity

[F2.7 0]   FILTER

This function will compensate for environmental disturbances such as vibration or air current.

0 = NONE

1 = LIGHT

2 = NORMAL

3 = HEAVY

[F2.8   0]   SLEEP MODE

0 = Disable

1 = Enable the sleep mode automatically after 5 minutes of stability.

[F2.9   1]   POWER-UP ZERO RANGE

0 = Auto zero capture at power-up disabled.

1 = Auto zero capture at power-up range of +/- 2%.

2 = Auto zero capture at power-up range of +/- 10%.

If Power-up Zero Capture is disabled, the HAWK terminal will display weight after power-up. Otherwise, if the weight is not in zero-capture range, display shows [E E E] or [-E-E-E], until weight is within the capture range.

F3 Interface Block

The following section will introduce the detail steps of configuring the RS232 output.

[F3.1   9600]   BAUD RATE

Select a baud rate from a list of 1200, 2400, 4800, or 9600 baud

[F3.2   7]   DATA BITS
7 = 7 data bits
8 = 8 data bits

[F3.3   2]   STOP BITS
1 = 1 stop bit
2 = 2 stop bits

[F3.4   2]   PARITY
0 = No parity
1 = Odd parity
2 = Even parity

[F3.5   2]   DATA OUTPUT FORMAT
0 = Toledo continuous with STX
1 = Demand, single line, displayed weight only
2 = Demand, single line, gross, tare, net
3 = Demand, three line gross, tare, net

[F3.6   1]   CHECKSUM (Only if F3.5 = 0)
0 = No checksum
1 = Checksum

[F3.7   0]   PRINTED GROSS WEIGHT LEGEND
0 = No Legend
1 = B (bruto)
2 = G (gross)

Exit Sub-Block

At the end of the programming mode, there are three choices for ways to exit. Use the FUNCTION key to move between the choices.

[SAVE]   Press **PRINT** to accept the changes in the program mode and exit programming.

[Abort]   Press **PRINT** to ignore any changes in the program mode and exit programming.

[dFAULT] Press **PRINT** to reset all program block parameters to factory default data and exit programming.

Parameters marked with an asterisk (*) in Table 3-1 will not be reset.

Calibration

When the HAWK terminal is used in legal-for-trade commercial applications, it must be calibrated with certified test weights to the capacity and increment size shown on the data plate. The capacity and increment size is selectable in the programming mode in sub-block F1.2. Calibration is also completed in sub-block F1.2.
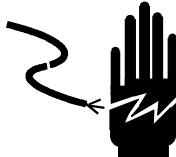
Gravity Adjustment

The HAWK terminal has built in compensation provisions to allow factory calibration with destination correction capabilities to compensate for variances on gravitational forces. If the HAWK terminal is subjected to a different gravitational force at its destination location, this can be compensated for electronically by adjusting the geo value. The geo value has 32 settings. The geo value for any world location can be found in the geo value table in Appendix 4 as long as the geographical coordinates and elevation above sea level are known. This value is programmed in the scale block when prompted for [GEO xx].

4   Maintenance and Troubleshooting

Cleaning

⚠ WARNING
ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

⚠ CAUTION
BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

Periodically clean the keyboard and cover with a soft clean cloth that has been dampened with a mild window type cleaner or detergent. DO NOT USE ANY TYPE OF INDUSTRIAL SOLVENT OR CHEMICALS. DO NOT SPRAY CLEANER DIRECTLY ONTO THE UNIT. DO NOT HOSE DOWN.

Troubleshooting

If you encounter operational difficulties, obtain as much information as possible regarding the problem. Failures and malfunctions often may be traced to simple causes such as loose connections, low battery power, or improper setup. Additional troubleshooting is best performed by substitution. A PCB or load cell believed to be defective may be checked by replacing the suspect part with known good part and then observing whether the problem is corrected.

Error Codes

The following table lists the error messages that may be displayed by the terminal.

Error Message	Description	Probable Action
E1	ROM error	Check Power Supply Voltages. Replace Controller PCB.
E2	Internal RAM error	Check Power Supply Voltages. Replace Controller PCB.
E7	EEPROM data incorrect.	Check Power Supply Voltages. Replace Controller Logic PCB.

Error Message	Description	Probable Action
E30	Scale in motion during calibration	Press **PRINT** to return to [E SCAL] or [ADD LD].
E32	Insufficient calibration test weight or insufficient signal from load cell	Press **PRINT,** then add additional test weight. Recalibrate using more test weight.
E34	Calibration Test Weight too large	Press **PRINT.** Use test weight less than 100% of scale capacity.
E E E	Scale not zeroed at power up	Auto Zero on power-up (F2.9) is enabled and the weight on the platform is greater than the programmed zero capture range. Zero the scale or remove the weight until zero is captured. Re-calibrate the scale.
-E E E	Scale not zeroed at power up.	Auto Zero on power-up (F2.9) is enabled and sufficient weight is NOT on the platform. Add weight until zero is captured. (Put platform on). Re-calibrate the scale.
I ` - - - - ` I	Overload indication.	Weight on scale exceeds calibrated capacity by more than 9d. Decrease load on scale.
I - - - - - I	Underload indication.	Weight on scale is below gross zero by more than 9d. Increase load on scale.

Table 4-1

Voltage Checks

AC Power Test

Using a Multi-meter, check the AC input power. Input power must be within -15% and +10% of the nominal AC line voltage.

Controller PCB Input Voltage Test

Confirm the AC adapter is outputting a voltage of at least 9 VDC. If the HAWK terminal has power and the Controller PCB does not function properly, replace the PCB.

Check Battery Voltage—(Units with Internal Battery Packs)

If the HAWK terminal does not respond when power is applied and the unit is turned on by pressing the **PRINT** key, for approximately 3 seconds the battery pack may be completely discharged. Install a new set of six "D" cells and retest.

RS232 Serial Output Test

Use the following test procedure to determine whether the RS232 serial port is operational.

- Remove power and disconnect the data cable from the HAWK terminal.
- Set the volt meter to read 20 volts DC.
- Connect the red lead to pin 3 of the HAWK terminal's serial port . Connect the black lead to pin 5.
- Apply power. The meter should read as follows:
- In Demand mode, the meter should read between -5 and -15 VDC with no fluctuation.
- To test the Demand output, press the **PRINT** key on the HAWK terminal. The display should fluctuate between -5 volts to +5 volts for the duration of the transmission, then become stable again. This indicates the terminal has transmitted data.
- In Continuous mode, the meter should fluctuate between -5 and +5 VDC continuously. The constant fluctuation on the meter display indicates the scale/terminal is transmitting information.

Parts Replacement and Adjustments

⚠ **WARNING**

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ **CAUTION**

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

Battery Replacement

The battery symbol at the lower left of the display is used to indicate low battery power. The cursor above the battery symbol will illuminate when there is approximately 15 minutes of operation remaining.
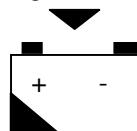
Figure 4-1

When the cursor is "on" above the battery symbol, change the batteries as soon as possible. To change the batteries:

1. Open the battery door on the rear of the HAWK terminal enclosure.
2. Carefully remove the six batteries.

3. Contact the manufacturer or seller of the batteries to find out how they should be recycled or recharged.

<div style="border:1px solid black">

⚠ CAUTION

THE HAWK TERMINAL CANNOT RECHARGE BATTERIES. IF RECHARGEABLE BATTERIES ARE USED, THEY MUST BE RECHARGED WITH A COMMERCIALLY AVAILABLE RECHARGER THEN REINSTALLED INTO THE TERMINAL.

</div>

4. Insert six new or recharged "D" size batteries as illustrated on the battery housing. This arrangement is shown below.

Top
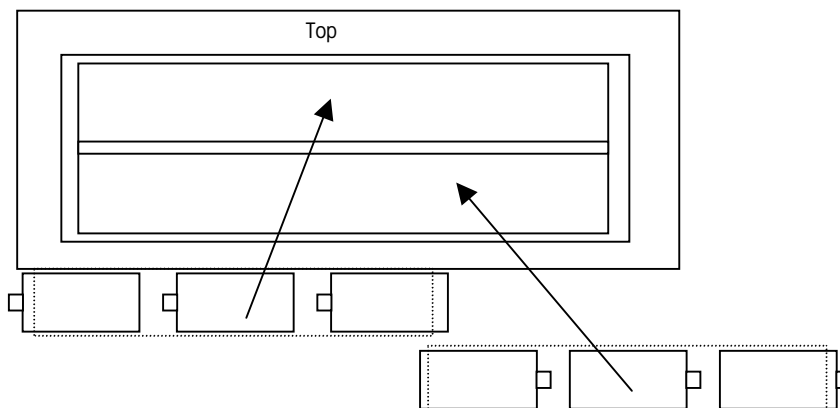
Figure 4-2: Shown With Rear Battery Panel Removed

5. Reinstall the rear cover over the batteries and press into place.
6. Test for proper operation.

The operating time for a new set of "D" size batteries depends on how the scale is used. Some estimates (without backlight) are shown below. Using the backlight feature reduces battery life.

Number of Cells	Operation	Battery Life
1	Continuous Use	400 hrs (Approximately 17 days)
1	8 Hours per Day	500 hrs (Approximately 3 months)
4	Continuous Use	180 hrs (Approximately 1 week)
4	8 Hours per Day	250 hrs (Approximately 1.5 months)

Keyboard Replacement

1. Remove power by removing the six "D" size batteries from the rear battery compartment and/or disconnecting the AC power adapter.
2. Remove the four screws securing the front and back portions of the cover.
3. Disconnect the keyboard tail from the Controller PCB; discard the old front cover.
4. Connect the keyboard tail of the new front cover to J5 of the Controller PCB.
5. Secure the front cover to the back cover with the four screws.
6. Apply power then press and hold the **ON/OFF (PRINT)** key for 3 seconds.
7. Test the operation of the new keyboard.

Controller PCB Replacement

Use the following procedure to replace the PCB.

⚠ **WARNING**

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ **CAUTION**

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

1. Remove power by removing the six "D" size batteries from the rear battery compartment and/or disconnecting the AC power adapter.
2. Remove the four screws securing the front and back halves of the cover.
3. Disconnect the keyboard tail from the Controller PCB and set the front cover aside.
4. Disconnect the battery harness from the Controller PCB.
5. Disconnect the AC adapter harness from the Controller PCB.
6. Remove the two hex standoffs from the side of the enclosure that secures the serial output connector to the back cover of the HAWK terminal.
7. Remove the four screws that secure the Controller PCB to the back cover.
8. Using proper static electricity precautions, carefully remove the Controller PCB and place it in a protective static bag.
9. Install the new Controller PCB using the four screws removed in the previous step.
10. Install the two hex standoffs to the side of the enclosure that secure the serial output connector to the back cover of the HAWK terminal.
11. Reconnect the AC adapter and battery harnesses removed previously.
12. Connect the keyboard tail of the front cover to J5 of the Controller PCB.
13. Secure the front cover to the back cover with the four screws.
14. Apply power to the terminal. Press and hold the **ON/OFF (PRINT)** key for 3 seconds.
15. Reprogram, recalibrate and test the operation of the new Controller PCB.

Power-Up Sequence

The HAWK terminal goes through a series of self tests when it is turned on. These tests confirm normal internal operation. The power-up sequence is as follows.

While the display is checked by showing all numbers 0-9, a diagnostic self test is performed on the memory and microprocessor. An error message is displayed if any component fails the test. The program number **[125362]** is shown next, followed by the revision **[Sr. 2.00]**.

If everything tests okay, the HAWK terminal will show **[0.00]** on the display. The power-up sequence requires a few seconds to complete.

5   Parts List

HAWK Terminal
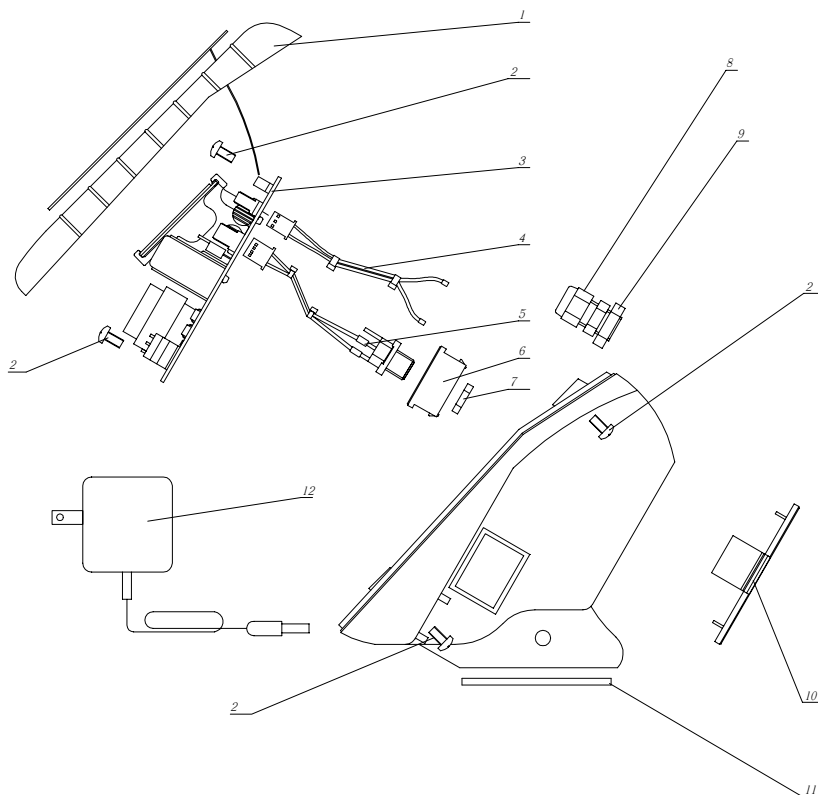
Item	P/N	Description	Quantity
1	127482OTC	Front Cover, Keyboard & Overlay Assembly	1
2	R0512000A	Screw, M4 x 6	8
3	127483OTC	Main PCB w/ Backlight	1
	127484OTC	Main PCB w/o Backlight	
4	124466OTC	Battery Harness	1
5	124467OTC	Power Supply Harness	1
6	124454OTC	Power Supply Plate	1
7	R0528800A	Nut, Power Supply	1
8	12901800A	Grip Bushing	1
9	14577900A	Grip Bushing Nut	1
10	124453OTC	Battery Cavity Cover Plate	1
11	124464OTC	Rubber Bar	2
12	124474OTC	Wall Adapter, 120 VAC, US Plug	1
	125967OTC	Wall Adapter, 220 VAC, US Plug	
	125969OTC	Wall Adapter, 230 VAC, EU Plug	

6   Appendices

Appendix 1: Demand Mode Output

Demand mode output occurs when a print request is received form the **PRINT** push button. The line format, baud rate, character length, and parity are selectable in the programming mode.

Demand mode output is prevented when the scale is "in motion" or when the weight is below 20d of gross weight or over capacity. When one of those situations occurs, the print request is ignored and is not stored. Zero must be captured at powerup before a demand mode output can occur. After one output, the HAWK terminal must see motion before it will send data again.

Weight Field Format

Displayed Weight Format (Gross or Net)

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	B	C R	L F
Note	C							D	E	D	B	F	H

Table 6-1: Gross Weight

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	N	C R	L F
Note	I							D	E	D	J	F	H

Table 6-2: Net Weight

Single Line – Gross, Tare, Net Weights

Single-line gross weight format is output if no tare weight has been taken.

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	B	S P	M S D	-	-	-	-	-	L S D	S P	Units
Note	C							D	E	D	B	D	K							D	E

Single Line – Gross, Tare, Net Weights (Continued)

Data	S P	T	S P	M S D	-	-	-	-	-	L S D	S P	Units	S P	N	C R	L F
Note	D	J	D	I							D	E	D	J	F	H

Table 6-3: Single Line – Gross, Tare, Net Weights

Multiple Line – Gross, Tare, Net Weights

If no tare weight has been taken, only the gross weight field is output.

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	B	C R	L F
Note	C							D	E	D	B	F	H

Table 6-4: Multiple Line – Gross Weight

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	T	C R	L F
Note	K							D	E	D	J	F	H

Table 6-5: Multiple Line – Tare Weight

Data	M S D	-	-	-	-	-	L S D	S P	Units	S P	N	C R	L F
Note	I							D	E	D	J	F	H

Table 6-6: Multiple Line – Net Weight

Demand Format Notes

B   Selectable gross weight legend. Selectable in the programming mode as a space, "B" for bruto or "G" for gross.

C   The gross weight data fields are padded with leading spaces to 7 digits.

D   ASCII Space <SP> character, hex value 20.

E   Weight units (lb, kg, g) as selected in setup and by the FUNCTION key.

F   ASCII Carriage Return <CR> character, hex value 0D.

G   Optional checksum character: Checksum is defined as the 2's complement of the seven low order bits of the binary sum of all characters preceding the checksum character, including the <STX> and <CR> characters. The checksum calculation for multiple lines of data includes the <LF> character from the previous line of data.

H   ASCII Line Feed <LF> character, hex value 0A.

I   The net weight field is right justified and padded with spaces to seven digits.
    A negative net weight is indicated by a minus character before the most significant digit of the weight value. For example, a weight of −55.00 is printed with one leading space (sp=space): sp-55.00.

J   Weight field descriptors. The "T" and "N" legends are printed (for net weight) after the tare and net weight fields to identify them.
    *The tare weight data field is padded with leading spaces to 7 digits.

Appendix 2: Continuous Mode Output

The continuous output format is output as the display is updated (approximately 7 times per second). The format is fixed except for baud rate, data bits, stop bits, parity, and the selectable checksum character. The continuous output mode provides compatibility with METTLER TOLEDO products that require real-time weight data (for example, Models 8624, 9323, 9325, and other accessories).

Continuous data output at a 1200 baud rate will slow the display update rate. Use 4800 baud or faster to maintain the maximum update rate.

The continuous output includes status bytes that indicate the operating conditions in the terminal.

Character	1	Status			Indicated Weight						Tare Weight							
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1
Data	STX	SWA	SWB	SWC	MSD	-	-	-	-	LSD	MSD	-	-	-	-	LSD	CR	CHK
Note	A	B			C						D						E	F

Table 6-8: Continuous Format Output

Continuous Format Notes

A ASCII Start of Text <STX> character, hex value 02.

B SWA, SWB, and SWC: Status Words A, B, and C. Refer to Tables 6-9, 6-10, and 6-11 for status bytes.

C Displayed weight: Six digits of displayed weight. No decimal point in field.

D Tare weight: Six digits of tare weight data. No decimal point in field.

E ASCII Carriage Return <CR> character, hex value 0D.

F Optional checksum character: Checksum is defined as the 2's complement of the seven low order bits of the binary sum of all characters preceding the checksum character, including the <STX> and <CR> characters.

Status Byte Definition

Bit Identification Table For Status Byte A			
	Dummy Zero or Decimal Position		
Bit	XXXX00	XXXXX0	XXXXXX	XXXXX.X
0	0	1	0	1
1	0	0	1	1
2	0	0	0	0
	Dummy Zero or Decimal Position		
	XXXX.XX	XXX.XXX	XX.XXXX	X.XXXXX
0	0	1	0	1
1	0	0	1	1
2	1	1	1	1
	Increment Size		
	X1	X2	X5
3	1	0	1
4	0	1	1
5	Always = 1		
6	Always = 0		

Table 6-9

Bit Identification Table For Status Byte B	
Bit	Function
0	Gross = 0, Net = 1
1	Sign, Positive = 0, Negative = 1
2	Out of Range = 1, In Range = 0
3	Motion = 1
4	lb = 0, kg = 1 (see also Byte C, bits 0, 1, 2)
5	Always = 1
6	Power-up Not Zeroed = 1

Table 6-10

Bit Identification Table For Status Byte C	
Bit	Function
0	lb or kg = 0, grams = 1
1	Always = 0
2	Always = 0
3	Print Request = 1
4	Expand Weight Display = 1
5	Always = 1
6	Always = 0

Table 6-11

Appendix 3: ASCII Input Commands

Beginning with software version 2.00, the HAWK terminal has the ability to receive certain ASCII characters via the serial port to perform simple keyboard functions. Previous versions of software did not have this capability. The software version can be viewed at power up.

The ASCII input commands will operate when the serial port is programmed for either demand output or continuous output. The input character format must be the same as the data output format selected in setup including baud rate, data bits, parity and stop bits. The remote commands are subject to the same restrictions as the keyboard equivalents. For instance, tare, zero and print commands will only operate if sent when there is no motion on the scale. When sending multiple commands, there must be a time delay of at least one-half second (500 milliseconds) between each remote ASCII command character.

These ASCII commands duplicate the front panel functions. Note that all characters are uppercase and no control characters such as <CR> (carriage return) or <LF> (line feed) need to be sent. If they are sent, they will be ignored. All ASCII characters other than the ones listed below will also be ignored.

The following commands are recognized by the HAWK terminal when the output mode is programmed as either demand mode or continuous output.

Command	Function	Description
C	Clear	Clear tare value
T	Tare	Performs a pushbutton tare
P	Print	Transmit data or set print bit in continuous output
S	Print	Transmit data or set print bit in continuous output
Z	Zero	Zero the scale (if within range and no-motion)

Appendix 4: Geo Codes

Use the following Geo Codes if you relocate the HAWK to a location other than the original location where it was calibrated.

Northern and	Height above sea-level in meters										
southern latitude	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
in	Height above sea-level in feet										
degrees and minutes	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
0° 0′ —5° 46′	5	4	4	3	3	2	2	1	1	0	0
5° 46′ — 9° 52′	5	5	4	4	3	3	2	2	1	1	0
9° 52′ — 12° 44′	6	5	5	4	4	3	3	2	2	1	1
12° 44′ — 15° 6′	6	6	5	5	4	4	3	3	2	2	1
15° 6′ — 17° 10′	7	6	6	5	5	4	4	3	3	2	2
17° 10′ — 19° 2′	7	7	6	6	5	5	4	4	3	3	2
19° 2′ — 20° 45′	8	7	7	6	6	5	5	4	4	3	3
20° 45′ — 22° 22′	8	8	7	7	6	6	5	5	4	4	3
22° 22′ — 23° 54′	9	8	8	7	7	6	6	5	5	4	4
23° 54′ — 25° 21′	9	9	8	8	7	7	6	6	5	5	4
25° 21′ — 26° 45′	10	9	9	8	8	7	7	6	6	5	5
26° 45′ — 28° 6′	10	10	9	9	8	8	7	7	6	6	5
28° 6′ — 29° 25′	11	10	10	9	9	8	8	7	7	6	6
29° 25′ — 30° 41′	11	11	10	10	9	9	8	8	7	7	6
30° 41′ — 31° 56′	12	11	11	10	10	9	9	8	8	7	7
31° 56′ — 33° 9′	12	12	11	11	10	10	9	9	8	8	7
33° 9′ — 34° 21′	13	12	12	11	11	10	10	9	9	8	8
34° 21′ — 35° 31′	13	13	12	12	11	11	10	10	9	9	8
35° 31′ — 36° 41′	14	13	13	12	12	11	11	10	10	9	9
36° 41′ — 37° 50′	14	14	13	13	12	12	11	11	10	10	9
37° 50′ — 38° 58′	15	14	14	13	13	12	12	11	11	10	10
38° 58′ — 40° 5′	15	15	14	14	13	13	12	12	11	11	10
40° 5′ — 41° 12′	16	15	15	14	14	13	13	12	12	11	11
41° 12′ — 42° 19′	16	16	15	15	14	14	13	13	12	12	11
42° 19′ — 43° 26′	17	16	16	15	15	14	14	13	13	12	12
43° 26′ — 44° 32′	17	17	16	16	15	15	14	14	13	13	12
44° 32′ — 45° 38′	18	17	17	16	16	15	15	14	14	13	13
45° 38′ — 46° 45′	18	18	17	17	16	16	15	15	14	14	13
46° 45′ — 47° 51′	19	18	18	17	17	16	16	15	15	14	14
47° 51′ — 48° 58′	19	19	18	18	17	17	16	16	15	15	14
48° 58′ — 50° 6′	20	19	19	18	18	17	17	16	16	15	15
50° 6′ — 51° 13′	20	20	19	19	18	18	17	17	16	16	15
51° 13′ — 52° 22′	21	20	20	19	19	18	18	17	17	16	16
52° 22′ — 53° 31′	21	21	20	20	19	19	18	18	17	17	16
53° 31′ — 54° 41′	22	21	21	20	20	19	19	18	18	17	17
54° 41′ — 55° 52′	22	22	21	21	20	20	19	19	18	18	17
55° 52′ — 57° 4′	23	22	22	21	21	20	20	19	19	18	18
57° 4′ — 58° 17′	23	23	22	22	21	21	20	20	19	19	18
58° 17′ — 59° 32′	24	23	23	22	22	21	21	20	20	19	19

Northern and southern latitude in degrees and minutes	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
59° 32′ — 60° 49′	24	24	23	23	22	22	21	21	20	20	19
60° 49′ — 62° 9′	25	24	24	23	23	22	22	21	21	20	20
62° 9′ — 63° 30′	25	25	24	24	23	23	22	22	21	21	20
63° 30′ — 64° 55′	26	25	25	24	24	23	23	22	22	21	21
64° 55′ — 66° 24′	26	26	25	25	24	24	23	23	22	22	21
66° 24′ — 67° 57′	27	26	26	25	25	24	24	23	23	22	22
67° 57′ — 69° 35′	27	27	26	26	25	25	24	24	23	23	22
69° 35′ — 71° 21′	28	27	27	26	26	25	25	24	24	23	23
71° 21′ — 73° 16′	28	28	27	27	26	26	25	25	24	24	23
73° 16′ — 75° 24′	29	28	28	27	27	26	26	25	25	24	24
75° 24′ — 77° 52′	29	29	28	28	27	27	26	26	25	25	24
77° 52′ — 80° 56′	30	29	29	28	28	27	27	26	26	25	25
80° 56′ — 85° 45′	30	30	29	29	28	28	27	27	26	26	25
85° 45′ — 90° 00′	31	30	30	29	29	28	28	27	27	26	26

Publication Evaluation Report

If you find a problem with our documentation, please complete and fax this form to (614) 438-4355

Publication Name: METTLER TOLEDO HAWK Terminal Technical Manual

Publication Part Number: C15718200A   **Publication Date: 6/00**

PROBLEM(S) TYPE:	DESCRIBE PROBLEM(S):			INTERNAL USE ONLY
☐ **Technical Accuracy**	☐ Text	☐ Illustration		
☐ **Completeness** What information is missing?	☐ Procedure/step ☐ Example ☐ Explanation	☐ Illustration ☐ Guideline ☐ Other (please explain below)	☐ Definition ☐ Feature	☐ Info. in manual ☐ Info. not in manual
☐ **Clarity** What is not clear?				
☐ **Sequence** What is not in the right order?				
☐ **Other Comments** Use another sheet for additional comments.				

Your Name: _____   Location: _____

Phone Number: (_____)_____

Fax this completed form to Light Capacity Industrial Marketing at (614) 438-4355

C15718200A