MSI6260

TRANS-WEIGH
CRANE SCALES

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User Guide

Quality Industrial Weighing and Force Measurement Equipment

Measurement Systems International

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FCC COMPLIANCE STATEMENT FOR USERS IN THE UNITED STATES

This equipment generates and uses radio frequency energy and if not installed and used properly in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient the receiving antenna;
2. Relocate the computing device with respect to the receiver;
3. Move the computing device away from the receiver;
4. Plug the computing device into a different outlet so the computing device and the receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems" (Stock No. 004-000-00345-4)
This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

WARNING: Replacement of antennas with units other than identical part number antennas supplied by the original equipment manufacturer may violate the FCC emissions limit under which this equipment is certified, thereby causing harmful interference to other equipment. Furthermore, modification of these antennas or replacement by another type may restrict the useful transmission range of this equipment or cause equipment malfunction.

CONFIGURATION LOG - INDICATOR UNIT

Capacity _____ by _____ ❑ LB ❑ KG
Model No. _____
Serial No. _____
Program No. _____

Power: ❑ 120 VAC 50/60 Hz ❑ 240 VAC 50/60 Hz
❑ 12 VDC ❑ Other_____

Regulatory : ❑ Industrial ❑ Canada
❑ NIST HB 44 ❑ OIML
❑ Other _____

System Frequency:_____

Current Loop Output: ❑ Active ❑ Passive

Current Loop Mode: ❑ Print-on-Demand ❑ Continuous

Current Loop Baud Rate: ❑ 1200 baud ❑ 4800 baud
❑ _____

RS232C Output
Baud Rate: ❑ 1200 baud ❑ 4800 baud
❑ _____

RS232C Output Mode: ❑ Print-on-Demand ❑ Continuous

Switch Settings (closed switches are circled)
S2: 1 2 3 4 5 6 7 8
S3: 1 2 3 4 5 6 7 8

Configuration Jumpers (jumpered positions are circled)
J14: 1 2 3 4 5 6 7 8

CONFIGURATION LOG - CRANE UNIT

Capacity _____ by _____ ❑ LB ❑ KG
Model No. _____
Serial No. _____
Program No. _____
Cal Number _____
Access Code _____
RF Tuning Number _____

Special Options

❑ Remote control
❑ Dual load cell
❑ Presettable Tare
❑ _____
❑ _____

HOW TO USE THIS MANUAL

The TRANS-WEIGH is a sophisticated electronic crane weighing system. By employing an advanced radio signaling system, the TRANS-WEIGH brings the indicator to the operator, and eliminates the need for long, easily damaged cables between the load cell and indicator.

The TRANS-WEIGH system is designed for ease of use and installation. If questions or problems arise during any phase of installation or operation contact your scale distributor or MSI Customer Service at: 206/433-0199, 7AM to 4PM Pacific Time.
This User Guide contains four sections:

1. The `Installation Guide` provides detailed instructions on the assembly and installation of the two main parts of the TRANS-WEIGH system: the Crane Unit and the Indicator Unit. An installation check-out procedure is also provided.

2. The `Operator's Guide` has complete instructions for using the TRANS-WEIGH system. The guide can be used as a reference manual or a self-instruction workbook.

3. The `Technical Guide` details the specifications and set up for the system. In addition, two calibration procedures (a recommended and an emergency) are provided.

4. The `Options Section` contains the separate addenda for any options that have been ordered with the TRANS-WEIGH system.

INSTALLATION GUIDE INTRODUCTION

This section of the Installation and Operation Manual will detail the complete installation and checkout of the standard TRANS-WEIGH system. Options that may be used with the system are not covered in this section of the manual, but are placed in the Options section when ordered.

The installation consists of the following steps:

1. Unpack the TRANS-WEIGH cartons, and inspect the contents.
2. Assemble the crane unit.
3. Select a site for the indicator unit.
4. Install the indicator unit.
5. Test the crane unit and indicator unit together.

The chapters in this Installation Guide are arranged in the order in which the installation is done.

The TRANS-WEIGH system is designed for ease of use and installation, but if questions or problems arise during any phase of installation or operation contact your scale dealer or MSI Customer Service at 206/433-0199, 7AM to 4PM Pacific Time.

UNPACKING AND INSPECTION

The TRANS-WEIGH system is shipped in two cartons. One carton will contain the Crane Unit and the other will contain the Indicator Unit. Use the list below to verify that all necessary accessories have been included:

A. Crane Unit Carton Contents (Figure 2.1)

1. 1 ea. crane unit with attached antennas
2. 1 ea. battery
3. 1 ea. battery charger

B. Indicator Unit Carton Contents (Figure 2.2)

4. 1 ea. indicator unit
5. 1 ea. receiving antenna
6. 1 ea. remote antenna mount

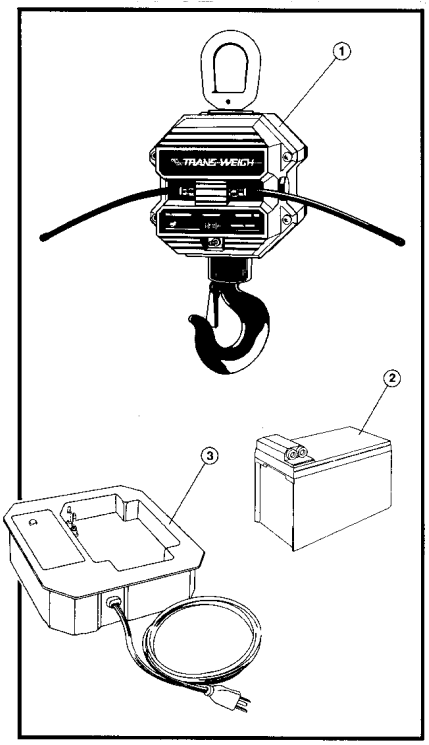


Figure 2.1
Crane Unit Carton Contents

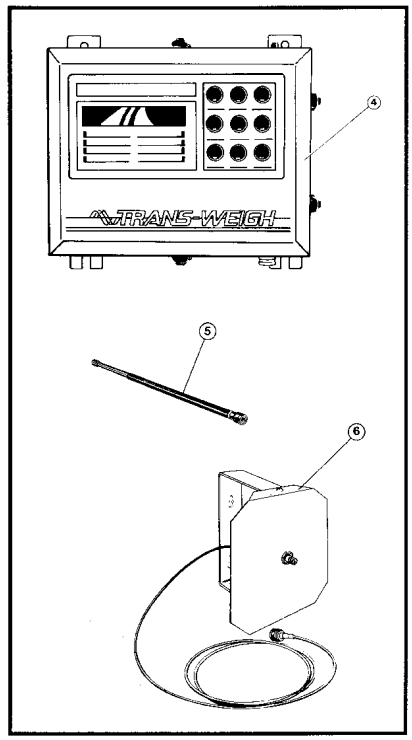


Figure 2.2
Indicator Unit Carton Contents

All items should be in good condition. If any items were damaged in shipment, contact the shipper immediately. If any items are missing, contact your scale dealer or the factory.

ASSEMBLY AND INSTALLATION

The TRANS-WEIGH system will be assembled and installed in two parts. The Crane Unit is assembled first, followed by the Indicator Unit installation.

Before you begin:
If options have been ordered with this TRANS-WEIGH system, check the Options Addenda before beginning. Some options require extra installation steps during the Crane Unit or Indicator Unit assembly and installation.

Because the TRANS-WEIGH system contains a radio transmitter/receiver pair, the instructions should be followed carefully for assembly and installation. This will prevent annoying radio frequency interference (RFI) either being generated by the system, or hampering the effective operation of the system.
Where the procedure designates a part by number, the number refers to the drawings in Figure 2.1 and 2.2, unless otherwise stated.

Crane Unit Assembly

1. Hang the Crane Unit (1) at arm level, or position the unit with the Battery Access door facing up. Use care not to set the unit on the antennas.
2. Unlatch the safety latches on both sides of the battery access door of the Crane Unit and open the door.
3. Take the battery (2) and align its red and black connectors on the two plugs inside the battery compartment, then push down to seat battery.
4. Close the battery access door, and secure the latches.

WARNING: Ensure the safety-snap latches are locked in place to prevent the door from accidentally opening, allowing the battery to fall out.

This completes the assembly procedure for the Crane Unit. Set it aside until completion of the Indicator Unit installation.

Indicator Unit Installation

Selecting a Site

The Indicator Unit installation requires some planning before the actual installation work. Keep the following in mind when selecting a site for the Indicator Unit:

1. The Indicator Unit requires at least 4 inches clearance around the top, bottom and sides of the enclosure.
2. The Indicator Unit should not be in a location where the operating temperature is above 140˚F (60˚C), or below 5˚F (-15˚C).
3. Avoid locating the Indicator Unit in direct sunlight. This prevents overheating the unit, and maintains readability of the display.
4. Although the standard Indicator Unit comes equipped with a power cord, **THE USE OF ELECTRICAL CONDUIT IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) IS STRONGLY RECOMMENDED.**
   In addition to providing an electrically safe installation, using conduit gives an extra measure of radio frequency interference (RFI) protection.
5. The Indicator Unit is actually a data processing system. Like any computer used in an industrial environment, it should have a dedicated power feed to the breaker panel. It should not be connected to the same feed

lines as equipment such as motors, presses, welders and ovens. (Any equipment containing motors, solenoids, contactors, relays or sparking contacts can cause interference which may affect the operation of the TRANS-WEIGH system. Since such equipment is found in the vicinity of most installations, all measures which isolate the TRANS-WEIGH Indicator Unit from such interference are prudent).

6. The antenna and mount (5 and 6) are supplied with an attached cable, and therefore must be located within 10 feet of the Indicator Unit. The antenna will also require a horizontal clearance of about 4 feet. The antenna should always be located where there is a clear line-of-sight path between it and the Crane Hook Unit. Objects such as partitions, equipment, vehicles, people etc., which are allowed to block this path at any time may disrupt the radio data link between the Crane Unit and the Indicator Unit. In general, the higher the antenna above ground, the more reliable the signal transmission.
7. The Crane Unit and Indicator Unit should be within 300 feet of each other. This distance may vary either way depending upon building structure, antenna height above ground, objects in the transmission path, local interference sources, etc.
8. If external equipment, such as a printer is to be connected to the current-loop output, the wiring to the external equipment must not be in the same conduit as the AC power. Check the Configuration Log for the correct current-loop or RS232 configuration to match the external equipment. If changes have to be made, refer to the System Set-Up section of the User Guide, contact your scale dealer or the factory.

Mounting the Indicator Unit

1. The dimensions of the mounting holes for the Indicator Unit are shown in Figure 2.3.
2. The Indicator Unit weighs about 14 pounds. Select the 4 stainless steel mounting bolts accordingly (up to 3/8" diameter can be used).
3. Mount the Indicator Unit at the selected location.
4. If the Indicator Unit is to be used with the factory installed AC power cord, plug it into the selected outlet, and skip to Step 15. In addition, if the Indicator Unit is used with the power cord and the current-loop output accomplish steps 6, 11, 12 and 13.
5. If the Indicator Unit is to be installed with conduit, the power cord and compression fitting will have to be removed. Release the latches holding the Indicator Unit front door .
6. Use a 5/16" nutdriver to remove the three locknuts along the top of the power supply cover and the two lock nuts along the bottom flange of the cover (see Figure 2.4) Lift the cover out of the enclosure.

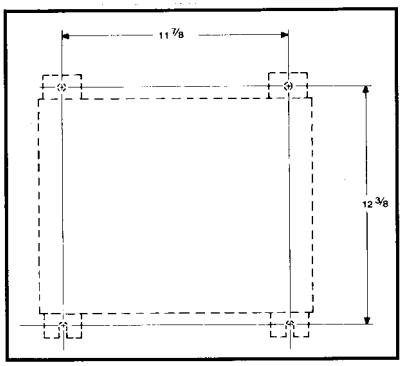


Figure 2.3
Indicator Unit Mounting Dimensions

7. Use a 3/16" flat-blade screwdriver to disconnect the power cord from the AC line terminal block.
8. Remove the locknut holding the power cord compression fitting to the enclosure, and remove cord and fitting (a pair of adjustable pliers may be necessary).
9. Install the conduit fitting to the enclosure and run the conduit to the fitting.
10. Pull the AC feed wires to the Indicator Unit. Strip and terminate the wires and connect them to the AC line terminal block shown in Figure 2.4.

WARNING: Be sure to observe the correct connections for line, neutral and ground. check the line voltage select switch terminal block at this time to verify the correct line voltage has been selected.

11. If the current-loop or RS232 output are not going to be used, skip to step 13. Otherwise, remove the hole plug to the left of the AC power fitting. Install the conduit or a suitable connector in the hole.
12. Run the wires for the current loop output from the conduit or connector to the terminal block labeled “20 mA CURENT/LOOP / DIGITAL I/O”. The current output (positive) terminal is labeled “TX+” and the current return (negative) terminal is labeled “TX-”.
13. Replace the power supply cover and nuts.
14. Close the front door of the Indicator Unit, and snap the latches down.
15. Attach the antenna mount (6) to the selected surface with the U-bracket in the vertical position (See Figure 2.4). Fasteners up to #12 in size may be used.
16. Connect the plug end of the antenna mounting bracket cable to the

antenna receptacle on the top of the Indicator Unit as shown in Figure 2.4. Turn the threaded barrel on the plug clockwise until tight.

17. Attach the antenna (5) to the antenna mount (6), tightening as in step 16 above.
18. Secure the antenna mount cable as necessary.
19. Adjust the antenna mount angle so the antenna is approximately perpendicular to the path between the Crane Unit and the Indicator Antenna. However, the tip of the antenna should not be closer than 12 inches to metallic or otherwise conductive materials such as the wall to which the antenna mount is attached. (If the Crane Unit does not have a fixed location, adjust the antenna angle for the path occurring when the Crane Unit is at the greatest distance from the Indicator Unit antenna.)

WARNING: Antenna must be used or damage to the unit will result!

The installation is now complete. Check the wiring before proceeding to the System Checkout.

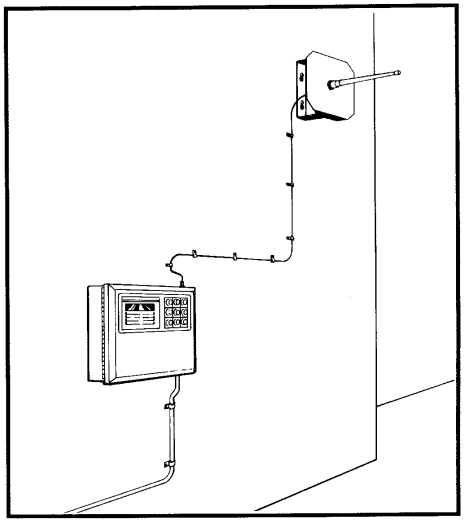


Figure 2.4
Indicator Unit Antenna Mounting

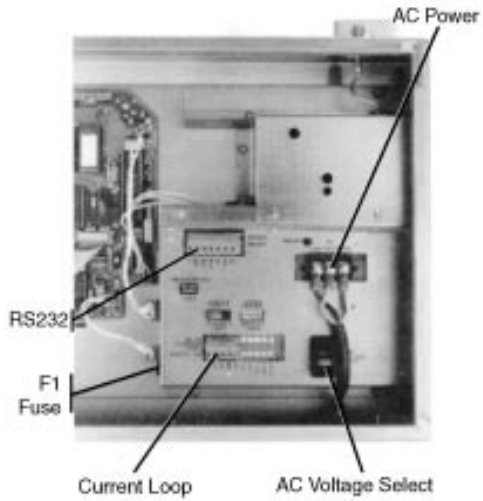


Figure 2.5
Indicator Unit Power Connections

SYSTEM CHECKOUT

The TRANS-WEIGH system is shipped from the factory with all switches and configuration jumpers set to order. Unless some modification must be made, no other setup procedures are necessary.

The system checkout will first verify the operation of the Indicator unit, then the Crane Unit. This checkout will make use of the power-up sequences that are part of the normal operation of the Indicator Unit and the Crane Unit.

The system is shipped weight-calibrated for Seattle, Washington U.S.A. When the system is used in a different locale it may require re-calibration. When possible, test weights up to 100% of capacity should be used to verify the calibration. If the TRANS-WEIGH system is used in a "legal for trade" application it will require certification from the proper Weights and Measures authority in your locality. For more information refer to Calibration Verification in the Operator's Guide.

Once the TRANS-WEIGH system is installed, the Indicator and Crane Unit checkouts are performed:

1. Locate the Crane Unit at the maximum distance that will be encountered in normal use. The Crane Unit should be OFF.

2. If not already done, turn on the AC circuit power to the Indicator Unit. The Indicator Unit will begin its power-up sequence which occurs in the following order:
   a. Error codes, such as "Err 3", will appear only if the system failed any of the self tests. If this message appears, depress the ON/OFF switch on the Indicator Unit, and go to the System Checkout Help section.
   b. A Display Test turns on all display digits, decimal points and indicator lights for two seconds. This verifies all lamps are working. If some of the digit segments, points or indicators are not on, or if the display does not light, go to the System Checkout Help section.
   c. The display blanks for about 2 seconds to verify that no lamp or numeric display segment is "locked" on.
   d. The Indicator program number is displayed. For example, the display may show something like "P-01.23". The Program Number will appear for about 2 seconds.
   e. The Indicator will end the power-up sequence. If the Crane Unit is off, there should be marching hyphens, "- - " moving across the display. If the Indicator Unit is in the calibration mode the Cal On message will briefly appear on the display. Refer to the Technical Guide to turn off the cal mode switch (position 8 of S2) in the Indicator Unit.
3. On the crane unit, press the momentary switch to the ON position and hold it for a long second. The Crane Unit will begin its own power-up sequence:
   a. The crane program number is displayed. In contrast to the indicator program number, it will show something like "PC-02.34" (note the PC prefix).
   b. The weight zeroed off and stored in the indicator unit will be displayed briefly.
   c. The Cal Number will appear. This is used to verify scale calibration by comparing it with the Cal Number stamped on the nameplate on the Crane Unit. A detailed discussion of the cal number is in the Calibration Verification chapter in the Operator's Guide.
4. The weight will be displayed. If there is an error, or the Crane Unit is overloaded, the overrange message "- EEEEE-" will appear.
5. If external equipment such as a printer is connected to the current-loop output, the output can be tested now. If the current-loop is in the "print-on-demand" mode (See Configuration Log) the weight information is printed when the print button is depressed. If the configuration is for the "continuous mode", the weight information is sent regardless of operator action. In either case the weight information is not sent if the scale is in motion. When the system checkout is complete, the TRANS-WEIGH is ready for normal use.

SYSTEM CHECKOUT HELP

If any of the steps in the system checkout fail, the problem can usually be traced to simple causes. Once suspected causes are corrected, repeat the entire checkout procedure. Use the following guide to help locate some of the more typical problems. If problems persist, contact your scale dealer or the factory for assistance.

The display does not light, or some of the digit segments do not turn on and off properly.
Open the door of the indicator unit and look at the AC power lamp. If it is not lighted, check the AC power system to the AC line terminal block for correct wiring, circuit breakers turned off, etc.
If there is AC power to the indicator unit, check the ribbon cables between the main circuit board, display circuit board, and the switch board. The connectors should be plugged firmly in place on all circuit boards.

There is an error message on the display.
If the message is "Err 3", turn off the Indicator Unit and close the CAL MODE switch in the Indicator Unit (position 8 of S2...refer to the Technical Guide for the location of S2). Turn the Indicator Unit on again. If the error message does not appear this time, proceed with the system checkout then push the ON/OFF button on the Indicator Unit to OFF. Open the CAL MODE switch and try the system checkout again. If the error message returns, read the next paragraph. Error messages usually indicate a fatal problem in the microcomputer circuit of the Indicator Unit, which will require dealer or factory service.

The weight reading at the end of the system checkout displays the wrong "count-by" increment.
When the CAL MODE switch in the Indicator Unit is closed, the highest resolution count-by is displayed regardless of the count-by setup. Check the CAL MODE switch (Position 8 of S2—refer to the Technical Guide for switch location) to make sure it is open. If the CAL MODE switch is open, check the settings of the capacity switch S3 against the Capacity Switch Setting Table in the Technical Guide for your system capacity and count-by.

The Crane Unit switch is ON, but the marching hyphens remain on the display.
a. Make sure the Indicator Unit antenna is mounted correctly, as described in the Assembly and Installation Section of this guide. Double-check the Crane Unit antennas, Indicator Unit antenna and antenna cable connector to make sure they are firmly in place.
b. Move the Crane Unit closer to the Indicator Unit. If the marching hyphens

disappear, the Crane Unit was out of range.

c. Unscrew the calibration port cover on the crane unit, look inside, and identify:

   The calibration push button switch, the calibration potentiometer that can be turned with a small, flat-head screwdriver, and the 7 segment calibration display.

   If the decimal point on the 7 segment calibration display is not flashing, the crane unit is not powered up. Go back to step 3 of System Checkout.

   If this decimal point is flashing, see the section of this guide entitled "TUNING THE RADIO."

d. If the marching hyphens remain on, remove the Crane Unit battery and recharge it (refer to the CHANGING AND CHARGING BATTERY section of this manual). Also refer to the Troubleshooting Guide section in this manual.

The printer (or other device) connected to the current-loop output fails to print, indicates an error, or prints nonsense.

Check the current-loop or RS232 specifications of the external equipment. Some important things to check are the baud rate (the speed at which the weight information is sent), number of data bits, parity (even, odd, or none) and the number of stop bits. Refer to the current-loop and RS232 specifications in the Options Sections of this manual.

OPERATOR'S GUIDE INTRODUCTION

This Operator's Guide details all functions and operations available on the standard TRANS-WEIGH system.
The Operator's Guide can be used as a self teaching workbook or a reference.

Using as a workbook

1. If you are using the TRANS-WEIGH system for the first time, it is suggested that you read the System Description in the Technical Guide.
2. Read the Operator Functions section to become familiar with the operations available on the TRANS-WEIGH system.
3. Read the Indicator Unit Front Panel section to locate the switches and annunciator lamps to learn what each does.
4. Read Turning System ON and OFF to understand what information is displayed by the TRANS-WEIGH system when it is first turned on, and how this information is used.
5. Use a sample weight to practice the operations described on pages 21 through 25.

Using as a reference manual

1. Look up the desired operation in Operator Functions section on page 17.
2. If an unfamiliar message or number appears on the display, go to the Special Display Messages section on page 26 for a list on displays and messages that may occur infrequently.

OPERATOR FUNCTIONS

The TRANS-WEIGH provides a wide variety of features and functions. This section will summarize those features, each of which is described in detail in the following sections.

The TRANS-WEIGH operates in two modes :

1. **GROSS:** All weighings displayed are in terms of the Gross, actual weight hanging on the scale.
2. **NET:** All weighings displayed are in terms of the NET difference between the gross weight and the tare weight. This compensates for such items as pallets, hooks, chains, and such. The "Net" mode allows the operator to measure the material weight only with the container, while other extraneous weights are automatically subtracted or "tared out" by the scale.

In the two modes of operation, the functions available for operator control are:

1. **ON/OFF CONTROL** performs system test and displays calibration information and system error messages. (Power function)
2. **SETTING ZERO** to compensate for small weight variations (less than 2%- 4% of capacity) such as hook, shackle and slings.
3. **ENTERING TARE** to put the scale into the "Net" mode so that container, pallet and heavier rigging weights are not displayed.
4. **DISPLAYING TARE** for the operator to check the current tare weight.
5. **CLEARING TARE** to remove the tare weight and put the scale into the "Gross" mode.
6. **TOTALIZING** to keep a running sum, or accumulation of several weighings.
7. **DISPLAYING TOTAL** for the operator to check the accumulated sum of weighings at any time.
8. **CLEARING TOTAL** to erase the current accumulated sum.
9. **PRINTING** of the TOTAL, TARE or CURRENT WEIGHT (Gross or Net).

INDICATOR UNIT FRONT PANEL

The front panel of the Indicator Unit has all the functions and controls necessary for operation of the TRANS-WEIGH system (with the exception of the Crane Unit ON/OFF switch.)

The three major parts of the Indicator Unit are illustrated in Figure 3.1. The switches control all major operator selected functions. The display shows the current weight, tare or total and special messages durring operation. The indicator lamp shows status of the system functions. A description of each switch and indicator begins below. A more detailed description of each switch and function follows.

Indicator Unit Switches

1. **ON/OFF** Turns the Indicator Unit on or off.
2. **ZERO** Sets the currently displayed gross weight to zero only if the weight on the hook is within the zero range determined by the regulatory configuration defined in the Technical Guide.
3. **PRINT** Initiates the printer output when the output is connected to external equipment.
4. **TARE** Sets the currently displayed weight to zero. Used to enter the tare when weight to be tared out is on the hook, placing the scale in the "Net" mode.
5. **DISPLAY TARE** Displays the current tare weight.
6. **CLEAR TARE** Removes the stored tare weight, placing system in "Gross" mode.

7. **TOTAL** Adds currently displayed weight to the weight accumulator.
8. **DISPLAY TOTAL** Displays the current sum in the weight accumulator.
9. **CLEAR TOTAL** Clears the weight accumulator to zero.

Indicator Lamps

10. **MOTION** Indicates when motion of the load on the Crane Unit is detected.
11. **ZERO CENTER** Indicates current weight is at "center of zero". Zero Center occurs when the weight is within 1/4 of a scale count of real zero.
12. **AUTO ZERO** Indicates the auto zero function is active. Auto zero occurs when, over a period of time, the small gross current weight changes (due to small weight changes and scale drift) are within a fractional count of real zero, and automatically subtracted. The range of auto zero is determined by the regulatory configuration defined in Table 4.5.
13. **LOW BATTERY** Indicates the Crane Unit battery voltage is low, requiring recharging. The scale will continue to operate for at least 1-1/2 hours.
14. **GROSS** Indicates the system is in the "Gross" weighing mode (no tare weight entered).
15. **NET** Indicates the system is in the "Net" weighing mode (the tare weight setting is subtracted from all displayed readings).
16. **TARE** Indicates the display is showing the tare weight.
17. **TOTAL** Indicates the display is showing the accumulated weight.

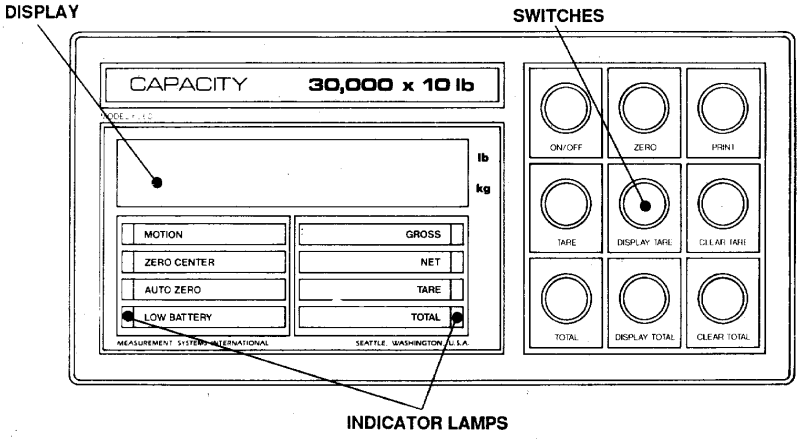


Figure 3.1
Indicator Unit Front Panel

TURNING SYSTEM ON AND OFF

The ON/OFF switch on the Indicator Unit is for the indicator only. The Crane Unit has a separate ON/OFF switch.

The suggested order of turning the system on is:

1. Push the ON/OFF switch on the Indicator Unit. Wait for the Indicator Power-Up Sequence to be completed.
2. When the display shows the loss-of-signal message (with "- - " marching across the display), depress the Crane Unit ON/OFF switch ON and hold it for a long second. A Crane Power-Up Sequence will begin.

The preceding Power-Up sequence will verify that no other Crane Unit in the area is operating on the same frequency or with the same access code, and the Crane Unit is working (also indicated by Err 5).

To turn the system off, use the same sequence in the opposite order. This will confirm the Crane Unit is not inadvertently left on, wasting battery energy.

Indicator Unit Power-Up Sequence

When the Indicator Unit is turned on, it will display a Power-Up Sequence. The power-up sequence performs an Indicator Unit self-test, and shows the current program number used by the Indicator Unit computer. The normal order of the power-up sequence is :

1. Error codes will appear only if the system failed any of the self-tests. If a message such as “Err3” appears, the display will hold this number. Record this number to have ready if calling for service. An Error List is found at the end of the Operators Guide Section.

2. The Display Test turns on all display digits, decimal points, and all indicator lights. This test lasts about 2 seconds. It verifies that all lamps are working.

3. The display blanks for about 2 seconds to verify that no lamp or numeric display segment is locked on.

4. The Indicator Program Number is displayed. For example, the display may show something like “P-01.23”. Have this number ready whenever calling your dealer or factory customer service with questions or problems. The Program Number will appear for about 2 seconds.

5. If the Indicator Unit is in the calibration mode the CAL On message will

appear on the display. Otherwise the Indicator will end the power-up sequence and show the loss-of-signal message ("- - ").

Crane Unit Power-Up Sequence
When the Crane Unit is first turned on, another power-up sequence (similar to the one for the Indicator Unit) will start:

1. Crane Program Number is displayed. In contrast to the Indicator Program Number, it will show something like “PC-02.34” (note the PC prefix).
2. The weight zeroed off and stored in the indicator unit will be displayed briefly.
3. The Cal Number will appear. This number is used to verify scale calibration by comparing it with the cal number located on the calibration log label inside the battery compartment. A detailed discussion of the cal number is on page 28.
4. The weight will be displayed, or possibly an error or overrange message if there is a problem.

Operation after Power-Up Sequences
At the end of the Crane Unit Power-Up Sequence, the weight on the Crane Unit will be displayed. The back-up memory in the TRANS-WEIGH Indicator Unit will remember the mode the system was in the last time it was turned off. In addition, the unit will also remember the zero setting, tare setting and accumulated total.

SETTING DISPLAY TO ZERO

Description:
When the system is turned on with no weight on the hook, the system may still display a small weight reading. This residual reading may be automatically removed from all subsequent readings by ZEROING. When the scale is zeroed, the current weight reading is stored, and is subtracted from all readings that will follow. This value will be retained, even when the Indicator Unit is turned off until the system is zeroed again.

Rules of Use:
1. The system cannot be set to zero during motion (as indicated when the MOTION indicator is lighted).
2. The system will accept a zero setting if it is within the zero range of the system, usually 2 or 4% (See the Regulatory Configuration table in the Technical Guide).
3. The zero setting is stored by the back-up memory, which will restore it

the next time the system is turned on.

Procedure:

1. With a stable positive or negative reading on the display, push the ZERO button on the front panel.
2. The display will show zero to its set decimal place.
3. The ZERO CENTER indicator will light, followed by the AUTO ZERO indicator.
4. If a weight exceeding 1/4 count is placed on the scale, the ZERO CENTER light will go off. When the weight exceeds the auto-zero capture range, the AUTO ZERO and ZERO CENTER light will go off.

SETTING TARE WEIGHT (PLACING SYSTEM IN NET MODE)

Description:

While the ZERO operation works over a limited range, the TARE operation works over the entire capacity range. In addition, the current tare setting may also be displayed and printed.

Rules of Use:

1. The system will only tare positive readings.
2. The system will not tare during motion (indicated when the MOTION indicator is lighted).
3. The system will tare only when it is in the "Gross" mode (See page 23 about clearing the tare).
4. Setting or changing the tare has no effect on the zero.
5. Taring reduces the apparent overrange capacity of the scale by the amount of the tared weight since the overrange warning is triggered by exceeding the gross weight, not the net weight. The overrange weight, then, is the difference between the gross overrange and the tare weight. (See page 26 for a detailed example).
6. The tare weight is stored by the back-up memory, which will restore it the next time the system is turned on.

Procedure:

1. With no weight on the Crane Unit, zero the display if not already zeroed.
2. With the desired tare weight added to the Crane Unit, and a stable positive reading on the display, push the TARE button on the front panel. The display will show zero to its set decimal place. The NET indicator will light, and the GROSS indicator will go off.

DISPLAYING TARE SETTING

Description:
The current tare setting can be checked by using the TARE DISPLAY button.

Procedure:
1. Push the DISPLAY TARE button on the front panel.
2. The current tare weight will be displayed. In addition, the TARE indicator will light.
3. The tare weight will be displayed as long as DISPLAY TARE is depressed. When the button is released, the display will once again show the current weight, and the TARE indicator lamp will go off.

CLEARING THE TARE SETTING (PLACING SYSTEM IN GROSS MODE)

Description:
When the system is in the "Net" mode (the tare is set) it is possible to place it in the "Gross" mode by removing the tare setting.

Rules of Use:
1. The system can remove the tare even if the Crane Unit is in motion.
2. Removing the tare setting has no effect on the zero setting.

Procedure:
1. Push the CLEAR TARE button on the front panel.
2. When the CLEAR TARE button is depressed, the NET lamp will go off and the TARE lamp will light with zero displayed to show that the tare has been cleared. When the button is released, the TARE lamp will go off, the GROSS lamp will light and the gross weight will be displayed.

ACCUMULATING A TOTAL

Description:
A powerful feature of the TRANS-WEIGH system is the ability to accumulate weighings at the push of a button. The accumulator always uses the displayed weight, so gross and net readings can be added to the same total.

Rules of Use:
1. Weighings cannot be accumulated when there is motion (indicated when the MOTION indicator lamp is on).
2. Only positive weighings can be accumulated.

3. After a weighing is accumulated, the scale must return to 5% or less of its rated capacity before another weight can be added to the total. This assures that a weight on the scale will only be added to the total once.
4. The current total is saved by the back-up memory, which will restore it the next time the system is turned on.
5. If an attempt is made to add a weight to an accumulated total, and that weight would cause the sum to overflow the accumulator, an over-range will be displayed. The previous contents of the weight accumulator will remain intact.
6. Total weight up to 9,999,999 LB or KG may be accumulated. (If a decimal point is on, this is reduced to either 999,999.9 or 99,999.99).

Procedure:

1. With a stable positive weight reading on the display press the TOTAL button.
2. The display will show the total weight, and the TOTAL lamp will light for about 1 second after depressing the TOTAL button. This confirms entry of the current weight. The display will then blank briefly before restoring the current weight. If the display flashes "-EEEEE-" while the TOTAL lamp is on, the accumulator is full. See note below.
3. Remember to remove the weight before attempting another accumulation.

Note: If the display shows "-EEEEE-", the weight accumulator cannot accept the current reading, since it would overflow the accumulator. The following will remedy the situation:

A. Display the total (Page 24). Manually record the total.
B. Clear the total (Page 25).
C. Go back to Step 1 (Page 24) to add the current reading to the weight accumulator.
D. When the weights have been accumulated, display the new total, and manually add it to the old total recorded during step A.

DISPLAYING A TOTAL

Description:
Shows the current accumulated total of weighings.

Procedure:

1. Depress the DISPLAY TOTAL button on the front panel.
2. The current accumulated total will appear on the display.
3. The TOTAL indicator lamp will light.
4. The accumulated total will remain on until the DISPLAY TOTAL button

is released. The current weight reading will then appear on the display and the TOTAL indicator light will go off.

CLEARING THE TOTAL

Description:
Erases the current accumulated total.

Rules of Use:

1. The accumulator will clear only if DISPLAY TOTAL and CLEAR TOTAL are depressed in the order described. This prevents the accumulated total from being accidentally erased.

Procedure:

1. Depress the DISPLAY TOTAL button on the front panel.
2. The current accumulated total will appear on the display, and the TOTAL indicator will light.
3. While holding the DISPLAY TOTAL button down, press the CLEAR TOTAL button.
4. The TOTAL indicator will remain on, but the display will show zero indicating the total has been cleared.

PRINTING (CURRENT WEIGHT, TOTAL AND TARE)

Description:
Sends the current weight reading, tare setting, or current accumulated total to a device connected to the system printer output.

Rules of Use:

1. Scale must not be in motion (as indicated by the MOTION indicator) if the current weight is to be printed.
2. This operation functions only when external equipment is connected to one of the serial outputs, and the serial output setup parameters are correctly configured.

The following procedures will show an example in which a 10,000 pound system is in the “Net” mode, with a tare setting of 257 pounds, a gross weight of 5286 pounds and no accumulated total.

Procedure to Print Current Weight:

1. Push the PRINT button on the front panel.
2. Printed format will be:

NET 5029 LB (If the scale were in the "Gross" mode, "GROSS 5286 LB" would be printed instead).

Procedure to Print Total:

1. Push the DISPLAY TOTAL button, and hold it down. The current accumulated total will be displayed.
2. While holding the DISPLAY TOTAL button down, depress the PRINT button on the front panel.
3. The printed format will be:
   TOTAL 0 LB

Procedure to Print Tare:

1. Push the DISPLAY TARE button, and hold it down. The current tare setting will be displayed.
2. While holding the DISPLAY TARE button down, depress the PRINT button on the front panel.
3. The printed format will be:
   TARE 257 LB

SPECIAL DISPLAY MESSAGES

There are several display messages that may occasionally appear on the Indicator Unit display. The following is a list of these messages and their meanings.

Overrange ("-EEEEE-")

The overrange display occurs when the scale has been overloaded. Normally the overrange display will occur when the rated scale capacity has been exceeded by about 4% (See the Regulatory Configuration in the Technical Guide). This display will disappear when the overload is removed from the scale.

The overrange capacity is based on the gross weight capacity of the scale. When the system is in the “Net” mode the apparent overrange capacity is reduced by the tare weight. For example, consider a 10,000 LB scale which, in the gross mode, is set up to overrange at 105%, or 10,500 LB. If a tare weight of 1000 LB is entered, the scale will overrange when the net displayed weight reading shows 9,500 LB. This is because the actual gross weight on the scale is 1000 LB tare plus 9,500 LB gross for 10,500 LB.

The -EEEEE- display will also occur when the TOTAL button is depressed and the accumulator is full and cannot accept the current weight reading. See page 3.5 for corrective action.

Loss-of Signal ("- - ")
The loss-of-signal display (indicated by the marching hyphens "- - " across the display) occurs when the Indicator Unit is no longer receiving a signal from the Crane Unit. This will usually occur when the Crane Unit is turned off, or the battery in the Crane Unit is dead (did you forget to turn the Crane Unit off?) If the Crane Unit switch is ON, the battery may be discharged, and should be removed and recharged in the Battery Charger (See page 3.8).

The loss-of-signal display may also occur if the received signal is too weak. This may be due to poor Indicator Unit receiver antenna location or adjustment, intense interference, or too great a distance between the Crane Unit and the Indicator Unit. See the Troubleshooting Section in the Technical Guide for other possible reasons for loss-of-signal.

Error Messages ("Err")
Various error messages are displayed under certain conditions to aid the operator in problem diagnosis. The message begins with an "Err" and is followed by a number. Most errors are fatal. In other words, the system will not operate correctly without dealer or factory servicing. See the Error List on page 29.

Crane Unit Self-Shutoff ("CU OFF")
When the Crane Unit battery voltage has dropped below about 10.7 volts the Crane Unit will shut itself off. The last signal the Crane Unit will send will be the shutoff message CU OFF. Also, during normal operation, when the crane unit is manually powered down, it will send the shutoff message CU OFF.

Calibration Messages (CAL On/CAL OFF)
When the TRANS-WEIGH system is being calibrated, special conditions are set up. These conditions are for calibration only, and may adversely effect the normal weighing operations. If the Indicator Unit is in calibration setup mode on power-up, the CAL On message will appear briefly (Page 3.3). This message will also appear when the cal switch in the Indicator Unit is turned on. Whenever the cal switch is turned off, the CAL OFF message will briefly appear before normal weighing operations resume.

CHANGING AND CHARGING BATTERY

The Crane Unit is powered by a 12 volt rechargeable battery. When the LOW BATTERY lamp on the Indicator Unit starts to flash, about 1-1/2 hours of operation remain before the Crane Unit will shut itself off. The Crane Unit will not turn on again until it has a charged battery.

Removing the Battery

The battery is located in the rear compartment of the Crane Unit. The battery compartment door is secured by two safety snap-lock latches. To remove the battery disengage the latches, open the door and **PULL THE BATTERY STRAIGHT OUT.**

Charging the Battery

1. Plug the AC line cord of the MSI battery charger into the appropriate power source.
2. The red STATUS lamp on the charger will light to indicate the battery charger is functioning properly.
3. Insert the battery into the charger.
4. The STATUS lamp will go out (unless the battery is fully charged) to indicate the battery is charging.
5. When the STATUS lamp goes on again, the battery has reached 80% of full charge. This will require 8-12 hours for a fully discharged battery. The battery should be charged for another 4 hours to reach full capacity. A battery may be left connected to the charger continuously if desired.
6. The STATUS lamp may flash slowly on and off when the battery is fully charged and in the "trickle charge" mode.

CALIBRATION VERIFICATION

The TRANS-WEIGH system is calibrated when it leaves the factory, but a quick check is provided to verify the calibration of the electronics prior to use.

While calibration verification is a quick and effective check, it does have the following limitations:

A. The check verifies the electronics operation, and the electrical portion of the load cell. That is, it is a reliable check for everything except the rare occasion of a mechanical failure of the load cell. Test weights are required to verify the proper mechanical operation of the load cell.

B. Calibration verification is not a substitute for a complete test-weight verification of the system (and in fact most Weights and Measures agencies recognize test-weight verification as the only acceptable calibration).

If the calibration verification fails, a complete calibration must be performed (refer to the Calibration Procedure in the Technical Guide).

Perform the following procedure for the verification:

1. Turn the system on (See Turning System On and Off Section). No weight should be applied to the hook.
2. Depress the ZERO button, and confirm the display shows zero.
3. Turn the Crane Unit off, and observe the CU OFF message.
4. Turn the Crane Unit on again, and record the cal number when it appears during the power-up sequence.
5. Compare the recorded cal number from step 4 above with the cal number recorded on the Cal Log in the Crane Unit battery compartment or on the serial tag. The system is in calibration if the two numbers agree within ±1 displayable increment.

ERROR LIST

The TRANS-WEIGH Indicator Unit goes through several "self-tests" when it is first turned on. The self-tests are conducted at the start of the Indicator Unit Power-Up Sequence (Page 20). If all self-tests pass, the power-up sequence continues normally. However, if any test fails the "Err " message appears on the display along with a number. The error message is also sent to the printer output. The following is a list of all the error numbers and their meaning. All of these errors indicate a failure in the unit that requires dealer or factory servicing.

Number	Meaning
1	**INTERNAL MEMORY FAILURE:** The memory in the microcomputer has failed.
2	**INTERNAL PROGRAM FAILURE:** The internally stored computer control program is not correct.
3	**LOSS OF BACKUP MEMORY DATA:** The back-up memory (for mode, tare setting, etc.) has failed to correctly retain all the information.
4xxx	**BACK-UP MEMORY FAILURE:** Memory fails to store data correctly. The three digits following the "4" are for servicing purposes.
5	**MISMATCHED ACCESS CODE:** Received access code from Crane Unit does not match the access code setting in the Indicator Unit.

TECHNICAL GUIDE - INTRODUCTION

The TRANS-WEIGH is a sophisticated electronic crane weighing system. By employing an advanced radio signaling system the TRANS-WEIGH brings the indicator to the operator, and eliminates the need for long, easily damaged cables linking the load cell and indicator.

This Technical Guide of the TRANS-WEIGH Installation and Operation Manual covers technical specifications, configuration information, calibration and troubleshooting.

The TRANS-WEIGH system is designed for ease of use, but if questions or problems arise during any phase of operation contact your scale dealer, or MSI Customer Service at 206/433-0199, 7AM to 4PM Pacific Time.

SYSTEM DESCRIPTION

The TRANS-WEIGH is a two part electronic weighing system. The system consists of a Crane Unit which houses the load cell, computer board, data link transmitter and battery. The Indicator Unit contains the data link receiver, a computer control board, operator controls, input/output interfaces and line operated power supply. Additional space is available in the Indicator Unit for special options.

When a weight is placed on the Crane Unit, the load cell mechanical movement is converted to an electrical signal. A computer in the Crane Unit changes the electrical signal to a series of digital impulses numerically representing the weight. These impulses are transmitted by the Crane Unit.

The Indicator Unit receives these digital impulses. The computer in the Indicator Unit performs the mathematical calculations with these numbers to make them understandable by the operator. The computer in the Indicator Unit also keeps track of the stored numbers (tare, zero, etc.), manages the front panel and controls external input and output from optional equipment.

TECHNICAL SPECIFICATIONS

System

Accuracy: ±0.1% of applied load; Meets Class IIIL, NIST Handbook 44

Internal Resolution:

32,768 internal counts

Response Time: 3 seconds to stable weight reading after weight change equal to scale capacity
Filter: 10 Hz, 4-pole analog filter plus digital filter
Display Refresh Rate: 2.5 readings/sec.
Warm-up time: None
Operating Temperature Range: 5˚ F to 140˚. F (-15˚ C to 60˚ C)
Storage Temperature Range: -40˚ F to 194˚ F (-40˚ to 90˚ C)
EMI Protection: Meets NIST Handbook 44 radiated susceptibility requirements. Watchdog restart. A/D converter synchronized to line frequency.
Telemetry Link Type: 49 MHz digitally encoded data link with error detection, unlicensed user operation under Part 15 of FCC Rules and Regulations.
Telemetry Link Range: 300 ft. (90 m) typical
Number of Simultaneously Operating Systems: Up to 4 within a 1000 ft. (600 m) radius.

Crane Unit

Enclosure: Rugged, impact-resistant cast aluminum, NEMA IV environmentally-sealed housing.
Power Source: 12 volt rechargeable lead acid battery, 50 hours operation between charges, 16 hour recharge period.
Switch Functions: ON/OFF
Capacity: 500 to 300,000 lbs., or 250 to 150,000 kg
Safe Overload: 200% of rated capacity
Ultimate Overload: 500 % of rated capacity

Indicator Unit

Enclosure: NEMA IV Environmentally sealed, stainless steel, wall mount housing.
Power Source: 115/230 VAC 50/60 Hz, internally selectable (+15% or 11-14 VDC (optional)
Switch Functions: ON/OFF, ZERO, PRINT, TARE, DISPLAY TARE, CLEAR TARE, TOTAL, DISPLAY TOTAL, and CLEAR TOTAL
Display: 0.8 in. high LED numeric display with status lamps for

MOTION, ZERO CENTER, AUTO- ZERO, LOW BATTERY, GROSS, NET, TARE and TOTAL

Auxiliary inputs/ outputs:

20 mA (passive or active) current loop output. 1 control signal input. 1 RS232C/RS423 output port (optional). 2 digital outputs (optional). 1 Additional control signal input (optional).

Weighing Functions

Pushbutton ZERO range:

+2% or +4% of applied load (internally selectable) depending upon Regulatory configuration.

Pushbutton TARE range:

100% of capacity overrange 104% of capacity or capacity plus 9 scale divisions (internally selectable) depending upon regulatory configuration.

Tare Recall: Displays TARE setting when DISPLAY TARE is pushed.

Totalizer: Accumulates and stores weight up to a total of 9,999,999 lbs/ kg (less if decimal point is on).

Print: Causes external printing device to print weight, tare or total.

Standard Options

- RS232C/RS423 serial output port
- Multiple operating frequencies
- 12 VDC external power source for indicator.
- Dual Load Cell input and summing
- Anti-EMI shielding (for locations with high intensity magnetic fields.)
- 12 VDC internal battery power for indicator

Special Options (available as special order only)

- 2 setpoint outputs for relays, etc.
- Power converters (external mount) for 24-250 VDC external power source.

SYSTEM SET-UP

This section lists the locations and functions of internal switches, jumpers and potentiometers. Generally these are set at the factory according to order requirements. They are provided here for reference for periodic recalibration or for reconfiguration if the customer's application changes.

Crane Unit Controls

The Crane Unit controls are accessed via a threaded plug as shown in Figure 4.1. Functions are as follows:

Pushbutton Switch
Momentary contact. Press and release. Used to access the Crane Unit menus. Used to accept user input.

3/4 Turn Potentiometer
Used to adjust all user inputs. Turning this has no effect until the user enters the menu structure by pressing the pushbutton switch.

7 Segment Display
The decimal point of this display is used to indicate a flashing "heartbeat" of the crane unit. Its normal rate is approximately 2.5 times per second. When it is off, it is between transmissions. The 7 segment display is used to provide feedback to the user. During normal operation, it is extinguished. During user interaction, it indicates the current action the user should take. Also, this display will flash error codes or warning conditions that exist in the crane unit's microcomputer.

Indicator Unit Switches and Jumpers
Refer to Table 4.4 for locations of internal switches and user configurable jumpers. Positions and functions are as follows:

Left Dip Switch (S2)
Positions 1-5
ACCESS CODE:
Set to match the Crane Unit.
Position 6
TEST MODE:
Normally open. For factory test only
Position 7
MOTION LOCK-OUT:
Normally open. Defeats motion lock-out when closed.
Position 8
CAL MODE:
Normally open. Activates CAL mode (used during calibration) when closed. In this mode, auto-zero is disabled, and count-by is set for maximum resolution. The zero and tare registers are cleared when the Indicator Unit is powered up.

Right Dip Switch (S3)
Position 1
SPARE:
Not used.

Position 2-5

CAPACITY SELECT:

Used to select scale capacity. See Table 4.4 for correct settings.

Position 6

UNITS SELECT:

Weight will be displayed in LB if open, KG if closed.

Position 7-8

COUNT-BY:

Sets minimum displayed increment for desired scale resolution. Recommended count-by settings are found in Table 4.4. However, if more or less resolution is desired, Table 4.1 can be used to determine the desired settings.

Configuration Jumpers J14 (To Right of S3)

Note: Position 1 is at bottom of J14. See Figure 4.2

Position 1

CURRENT LOOP MODE:

If closed, data is sent on pushing Print Button. If open, data is sent continuously.

Position 2

CURRENT LOOP BAUD RATE:

If closed, baud rate is 4800. If open, baud rate is 1200.

Position 3-4

RS232C MODE:

See Table 4.2.

Position 5

RS232C BAUD RATE:

If closed, baud rate is 4800. If open, baud rate is 1200.

Position 6-7

REGULATORY MODE:

See Table 4.3.

Position 8

TEST:

Normally open. For factory test only.

INDICATOR UNIT S3 POSITION		RESOLUTION (See Table 4.4 for recommended settings)
7	8	
CLOSED	CLOSED	Lowest resolution
CLOSED	OPEN	Next to lowest resolution
OPEN	CLOSED	Next to highest resolution
OPEN	OPEN	Highest resolution

Table 4.1 Resolution

WARNING: Increasing resolution more than one step beyond the resolution specified in Table 4.4 is not recommended since it may decrease the effectiveness of digital filtering and auto zero operations. Consult factory before increasing resolution.

INDICATOR UNIT		MODE
3	4	
CLOSED	CLOSED	Data sent on pushing PRINT button
CLOSED	OPEN	Data sent continuously without motion lockout
OPEN	CLOSED	Data sent on handshakes
OPEN	OPEN	Data sent continuously

Table 4.2 RS232 Mode

Note: The above table is for reference only. Consult the RS232 Options and Addendum for complete information.

INDICATOR UNIT		MODE
6	7	
CLOSED	CLOSED	Industrial
CLOSED	OPEN	NIST
OPEN	CLOSED	Canada
OPEN	OPEN	OIML

Table 4.3 Regulatory Mode

For more detailed explainations of the regulatory modes, refer to Regulatory Configurations section and Table 4.5.

Capacity	Resolution (Scale Divisions)	Indicator Unit Switch (S3) Position 1 2 3 4 5 6 7 8
500.0 X 0.1 LB	5000	0 0 0 0 0 0 0 1
250.00 X 0.05	5000	0 0 0 0 0 1 0 1
1,000.0 X .2 LB	5000	0 0 0 0 1 0 0 1
500.0 X .1 KG	5000	0 0 0 0 1 1 0 1
2,000.0 X 1 LB	2000	0 0 0 1 0 0 1 0
1,000.0 X 0.5 KG	2000	0 0 0 1 0 1 1 0
5,000 X 1 LB	5000	0 0 1 0 0 0 0 1
2,500.0 X 0.5 KG	5000	0 0 1 0 0 1 0 1
10,000 X 2 LB	5000	0 0 1 1 0 0 0 1
5,000 X 1 KG	5000	0 0 1 1 0 1 0 1
20,000 X 5 LB	4000	0 0 1 1 1 0 0 1
10,000 X 2 KG	5000	0 0 1 1 1 1 0 1
30,000 X 10 LB	3000	0 1 0 0 0 0 1 0
15,000 X 5 KG	3000	0 1 0 0 0 1 1 0
50,000 X 10 LB	5000	0 1 0 0 1 0 0 1
25,000 X 5 KG	5000	0 1 0 0 1 1 0 1
70,000 X 20 LB	3500	0 1 0 1 0 0 0 1
35,000 X 10 KG	3500	0 1 0 1 0 1 0 1
100,000 X 20 LG	5000	0 1 0 1 1 0 0 1
50,000 X 10 KG	5000	0 1 0 1 1 1 0 1
200,000 X 50 LB	4000	0 1 1 0 0 0 0 1
100,000 X 20 KG	5000	0 1 1 0 0 1 0 1
300,000 X 100 LB	3000	0 1 1 0 1 0 1 0
150,000 X 50 KG	3000	0 1 1 0 1 1 1 0

0=OPEN **1=CLOSED**

Table 4.4
Capacity Switch Settings

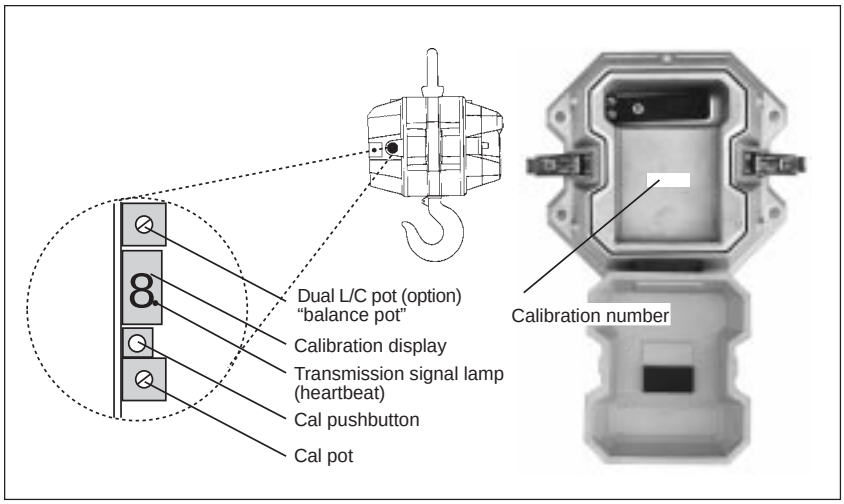


Figure 4.1
Crane Unit Switches and Adjustment

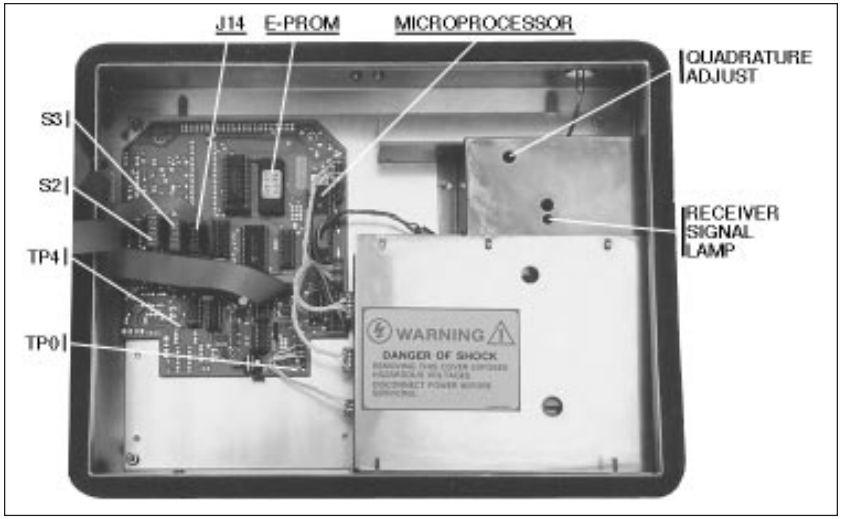


Figure 4.2
Indicator Unit Switches and Test Points

CALIBRATION PROCEDURE

With normal use the TRANS-WEIGH System should be recalibrated using test weights at regular intervals not to exceed 6 months, or whenever a load cell or Crane Unit computer circuit board is replaced. Use the following calibration procedure (see Table 4.8 “Crane Unit Menu Structure” for reference):

1. Exercise the load cell at least 5 times by lifting a test weight having a weight approximately equal to the system capacity.
2. Turn off Crane Unit and Indicator Unit.
3. Release four latches holding the Indicator Unit front door and open the door. Locate the CAL MODE dip switch (Position 8 of S2) (See Figure 4.2) and CLOSE it. (This defeats the auto-zero and filter and sets the count-by for maximum resolution. It also clears the zero and tare stored in the back-up memory so that true analog zero can be checked and adjusted.)
4. Close the door and turn the Indicator Unit on but DO NOT push the ZERO or TARE buttons at this time.
5. Remove the access plug on the Crane Unit and locate the 7 segment Calibration Display, the momentary Calibration Push Button, and the Calibration Potentiometer (see Figure 4.1).
6. Turn the Crane Unit on by pressing the the Power Switch on the Crane Unit’s external case and holding it on for a long second. The Indicator Unit will briefly display the Crane Unit’s Software Version, the amount of weight stored in the zero register, the calibration number, and then a normal output received from the Crane Unit. Simultaneously, the Crane Unit Calibration Display will display the Crane Unit’s Software Version and then extinguish. The decimal point will flash indicating that the crane unit is transmitting.
7. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the calibration Potentiometer (cal pot) until the number 2 is displayed.
8. Press the cal p/b and watch the cal display spell out ‘C’ ‘A’ ‘L’ (for calibration) and then begin flashing ‘A’ ‘n’ (where n is the current gain setting).
9. Use the cal pot to set the scale gain to A1, A2, A3 or A4. Press the cal pushbutton to accept the gain setting. The cal display will begin flashing ‘0.’
10. The flashing ‘0’ indicates that the user should remove any weight from the scale and leave only the dead load on the scale. The dead load (hook, shackle, etc) should be the same as that used during the normal use of the scale. Otherwise, the auto-zero may not function properly after calibration. When this is done and the motion lamp is extinguished on the

Indicator Unit, press the cal p/b.

11. After doing its internal zero calculation, the cal display will flash '0' 'C'. This indicates that the user can adjust the zero coarse reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read at or near zero. Press the cal p/b.
12. The cal display will flash '0' 'F'. This indicates that the user can adjust the zero fine reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read exactly zero. Press the cal p/b.
13. On the Indicator Unit, press the ZERO button.
14. The cal display will flash 'L'. The user should now lift test weights approximately equal to scale capacity. When this is done, press the cal p/b.
15. The cal display will flash 'L' 'C'. This indicates that the user can adjust the load coarse reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read at or near the value of the test weight. Press the cal p/b.
16. The cal display will flash 'L' 'F'. This indicates that the user can adjust the load fine reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read exactly the value of the test weight. Press the cal p/b.

NOTE If either step 14 or 15 does not allow enough cal pot range to correctly set the Indicator Unit, the user may need to change the Crane Units A/D gain setting. Exit out of calibration by either: (1) Repeatedly pressing the cal p/b until the cal display is extinguished, or (2) by cycling the power on the Crane Unit. Restart the calibration procedure and change the gain as needed up or down.

17. The cal display will flash 'U' which tells the user to unload the test weight from the scale. When this has been done and the motion lamp on the Indicator Unit has gone out, press the cal p/b.
18. After doing the calculation for the Calibration Number, the cal display will flash 'r'. This indicates that the Crane Unit is transmitting the Calibration Number to the Indicator Unit and that the user should copy down the number from the Indicator Unit display. This number is the new Calibration Number and it should be recorded in the Indicator Unit. Open cal switch in indicator, and turn the pot to 8 to exit.

ALTERNATIVE CALIBRATION PROCEDURE

If a Crane Unit computer board is replaced so that recalibration is required, but no test weights are immediately available, an approximate calibration can be performed using the CAL number stamped on the Crane Unit cal log in the battery compartment. This alternative method will work only if recent verifica-

tion has assured the accuracy of the CAL number or one recorded elsewhere. This procedure will not work if the load cell has been replaced and the CAL number of the new load cell is not known.

1. Follow steps 1-6 of the standard calibration procedure on page 39.
7. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the Calibration Potentiometer (cal pot) until the number 3 is displayed.
8. Press the cal p/b and watch the cal display spell out 'r' 'C' 'A' 'L' (for resistor calibration) and then begin flashing 'A' 'n' (where n is the current gain setting).
9. Follow steps 9-13 of the standard calibration procedure on page 39.
14. The cal display will flash 'r'. The user should press the cal p/b to allow the Crane Unit's A/D to calculate its current Calibration Number.
15. The cal display will flash 'r' 'C'. This indicates that the user can adjust the rCAL coarse reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read at or near the value of the previously recorded Calibration Number. Press the cal p/b.
16. The cal display will flash 'r' 'F'. This indicates that the user can adjust the rCAL fine reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read exactly the value of the the previously recorded Calibration Number. Press the cal p/b.

NOTE If either step 15 or 16 does not allow enough cal pot range to correctly set the Indicator Unit, the user will need to obtain accurate test weights and perform a complete calibration.

17. Open the CAL mode switch inside the Indicator Unit and latch the door closed.
18. With no test weights on the hook, push the ZERO button on the Indicator Unit.
19. Check calibration with test weights at 25%, 50%, 75%, and 100% of capacity. Repeat calibration if necessary until scale accuracy is within specification for intended use.
20. On the Crane Unit, replace the access plug.

SETTING THE ACCESS CODE

TRANS-WEIGH Systems shipped from the MSI factory will have both the Indicator Unit and the Crane Unit set to the same Access Code. This access code is embedded in every message sent from the Crane Unit and received by the Indicator Unit and allows more than one TRANS-WEIGH System to

operate on or near the same site. Whether the user decides to or is forced to change the Access Code, the only firm requirement is that both the Crane Unit and the Indicator Unit operate on the same one. To adjust the Access Code, follow the procedure outlined below:

1. Release four latches holding the Indicator Unit front door and open the door. Locate the dipswitch S2. See Figure 4.2 on Page 38. Choose an Access Code from Table 4.7 on Page 47 and set S2 as needed.
2. Remove the access plug on the Crane Unit and locate the 7 segment Calibration Display, the momentary Calibration Push Button, and the Calibration Potentiometer.
3. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the Calibration Potentiometer (cal pot) until the number 1 is displayed.
4. Press the cal p/b and watch the cal display spell out ‘A’ ‘C’ ‘C’ ‘E’ ‘S’ ‘S’ ‘C’ ‘o’ ‘d’ ‘E’ (for setting the Access Code) and then begin flashing a number from 0 to 31. This flashing number represents the Access Code currently being used by the Crane Unit.
5. At this point, the user can adjust the code up or down as needed with the pot. Match the code set in the Indicator Unit in step 1. When the user presses the cal p/b, if the code has been changed from it’s previous value, it will be loaded both into the Crane Unit’s transmitter code and also into EEPROM memory so that it can be recalled for future use.

NOTE An Err5 condition on the Indicator Unit confirms that the Access Code set in the Crane Unit does not match the one set in the Indicator Unit.

VIEWING THE CALIBRATION NUMBER

At any time the user may view the current Calibration Number produced by the TRANS-WEIGH Systems Crane Unit. Follow the procedure:

1. Remove the access plug on the Crane Unit and locate the 7 segment Calibration Display, the momentary Calibration Push Button, and the Calibration Potentiometer.
2. Remove any weight from and leave only the dead load on the scale. The dead load (hook, shackle, etc) should be the same as that used during normal use of the scale.
3. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the Calibration Potentiometer (cal pot) until the number 4 is displayed.
4. Press the cal p/b and watch the cal display continuously spell out ‘o’ ‘u’ ‘t’ ‘C’ ‘A’ ‘L’ (for output the Calibration Number). At this time, the number

displayed on the Indicator Unit is the currently calculated Calibration Number. Verify that it is reasonably close to the number recorded on the calibration log label inside the battery compartment. If it is not, the scale is in need of re-calibration.

5. Press and hold the cal p/b (may be 1 to 3 seconds) until the cal display is extinguished.

TUNING THE RADIO

On most TRANS-WEIGH Systems the Crane Unit's internal transmitter will be precisely tuned at the factory and should remain set as it is. When properly communicating, the Indicator Unit will display usable information. When not communicating, the Indicator Unit will display the marching hyphens. If a loss of communication makes it necessary to adjust the transmitter, follow the procedure outlined below:

1. Remove the access plug on the Crane Unit and locate the 7 segment Calibration Display, the momentary Calibration Push Button, and the Calibration Potentiometer.
2. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the Calibration Potentiometer (cal pot) until the number 6 is displayed.
3. Press the cal p/b and watch the cal display spell out 't' 'u' 'n' 'E' 'r' 'F' (for tune the radio frequency transmitter) and then begin flashing a number from 0 to 93. Each packet of data sent by the Crane Unit consists of numerous data pulses. This procedure will vary the length of time between each data pulse that is sent out and the number flashed is a factor of that time. The number displayed is most likely somewhere between 40 and 50 or somewhere between 80 and 90.
4. At this point, the user can adjust the time factor up or down as needed with the cal pot. There will be a window of several numbers that allow the Crane Unit to communicate with the Indicator Unit. The user should tune the transmitter such that the number on the cal display is in the middle of this window. For example, if the Crane Unit will communicate properly with the Indicator unit when this time factor is set from 41 - 49, then the user should set the time factor to 45.
5. When the user presses the cal p/b, if the time factor has been changed from it's previous value, it will be loaded both into the Crane Unit's transmitter code and also into EEPROM memory so that it can be recalled for future use.

CRANE UNIT WARNINGS/ERRORS

Warnings and Errors identified by the Crane Unit are displayed with a single digit code defined in Table 4.6 on Page 46. The code remains displayed as long as the conditions that caused it still exists. Cycling power on the Crane Unit will force these warnings/errors to be cleared, however if the conditions persist, the warning/error will reappear.

REGULATORY CONFIGURATIONS

The TRANS-WEIGH system can be set up for four different configurations of zero range, motion detect, zero capture and overrange capacity. The four configurations are based on those in widest use, and conform to the standards set forth by their respective agencies. (Note: The industrial configuration is not a standard, but is based on typical industrial use).

Table 4.5 lists the regulatory configurations and the specifications associated with each. The references following are those agency standards which the configurations are based.

ADJUSTING THE FILTER

To be effective in various operating environments, the TRANS-WEIGH Crane Unit is designed to allow a range of filtering options. Note that the weighing response time is directly related to the filter setting, and that lower settings provide the quickest TRANS-WEIGH Indicator Unit updates.

To set the filter:

1. Remove the access plug on the Crane Unit and locate the 7 segment Calibration Display, the momentary Calibration Push Button, and the Calibration Potentiometer.
2. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display (cal display) will show a number from 1 to 8. Turn the Calibration Potentiometer (cal pot) until the number 7 is displayed.
3. Press the cal p/b. The cal display will spell out ‘F’ ‘i’ ‘L’ ‘t’ ‘E’ ‘r’ and then begin flashing a two digit code indicating the current filter setting.
4. Use the cal pot to choose a new filter setting.
5. When the cal p/b is pressed, the new filter setting will take effect. The following filter settings are available:
   F1 No filtering. Used in radio noise and vibration free environments.

F2 Minimum filtering for low level noise areas. This is the factory default.
F3 Moderate filtering. Used in mid level noise areas.
F4 High filtering. Used where maximum filtering is required.

Parameter	Industrial	NIST	Canada	OIML
Overrange Limit	104% of C	104% of C	104% of C	C+9dZero
Range	+4% of C	+2% of C	+2% of C	+2% of C
Motion Band	+ 2d	+1d	+1d	+1d
Motion Delay	1.2 sec.	1.2 sec.	1.2 sec.	1.2 sec.
Auto Zero Capture Range	+1d	+1d	+.5d	+.5d
Auto Zero Aperture	+2% of C	+2% of C	+2% of C	+2% of C
Auto Zero Delay	1 sec.	1 sec.	1 sec.	1 sec.

C = full scale capacity
d = minimum displayed increment (count-by)

Table 4.5
Regulatory Configuration Specifications

REFERENCES TO STANDARDS

NIST: "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices", Handbook 44, United States Department of Commerce National Institute of Standards and Technology.

Canada: "Weights and Measures Specification SGM-1", Department of Consumer and Corporate Affairs Canada

OIML: "Metrological Regulations for Non-Automatic Weighing Machines", International Organization of Legal Metrology, OIML Secretariat-Rapporteurs, Federal Republic of Germany and France.

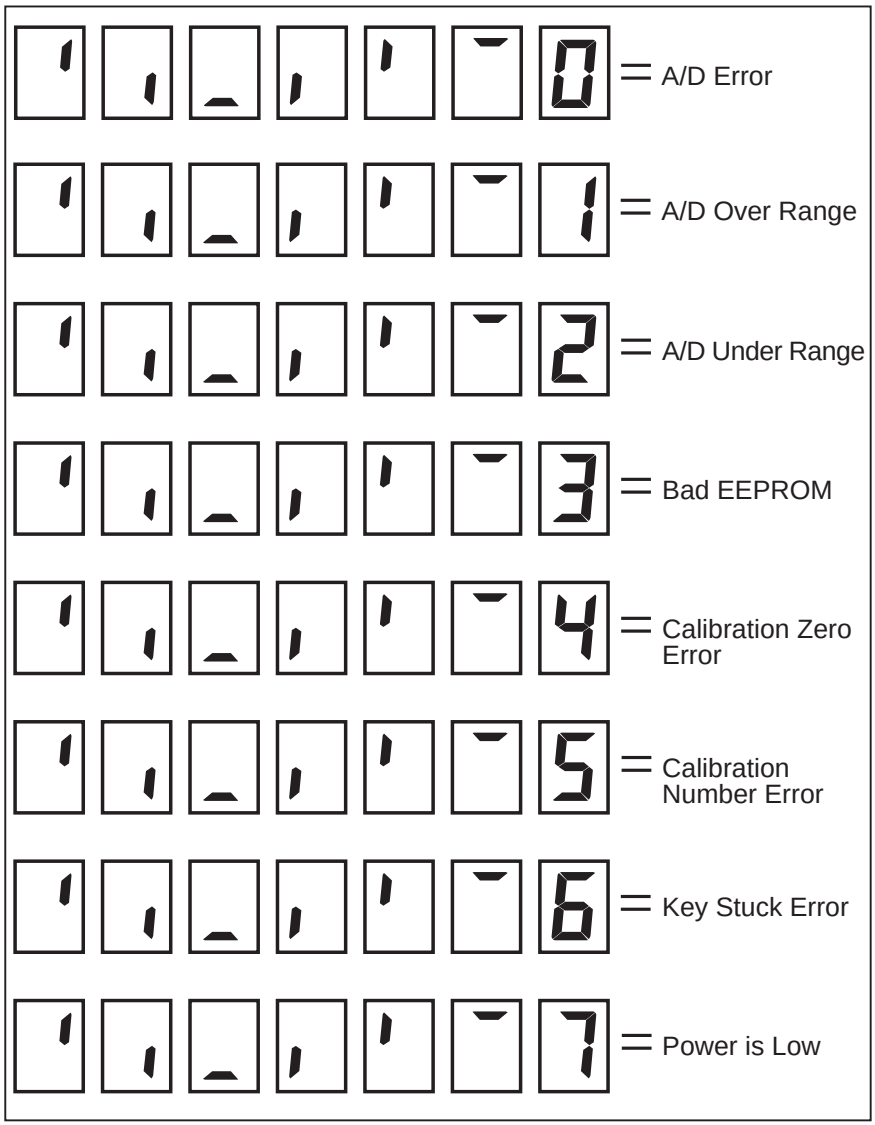


Table 4.6
Crane Unit Flashing Errors

Crane Unit Access Code	Indicator Unit Switch (S2) Position 1	2	3	4	5	6	7	8
00	0	0	0	0	0			
01	1	0	0	0	0			
02	0	1	0	0	0			
03	1	1	0	0	0			
04	0	0	1	0	0			
05	1	0	1	0	0			
06	0	1	1	0	0			
07	1	1	1	0	0			
08	0	0	0	1	0			
09	1	0	0	1	0			
10	0	1	0	1	0			
11	1	1	0	1	0			
12	0	0	1	1	0			
13	1	0	1	1	0			
14	0	1	1	1	0			
15	1	1	1	1	0			
16	0	0	0	0	1			
17	1	0	0	0	1			
18	0	1	0	0	1			
19	1	1	0	0	1			
20	0	0	1	0	1			
21	1	0	1	0	1			
22	0	1	1	0	1			
23	1	1	1	0	1			
24	0	0	0	1	1			
25	1	0	0	1	1			
26	0	1	0	1	1			
27	1	1	0	1	1			
28	0	0	1	1	1			
29	1	0	1	1	1			
30	0	1	1	1	1			
31	1	1	1	1	1			

0 = open, 1 = closed

Table 4.7
Setting Access Code

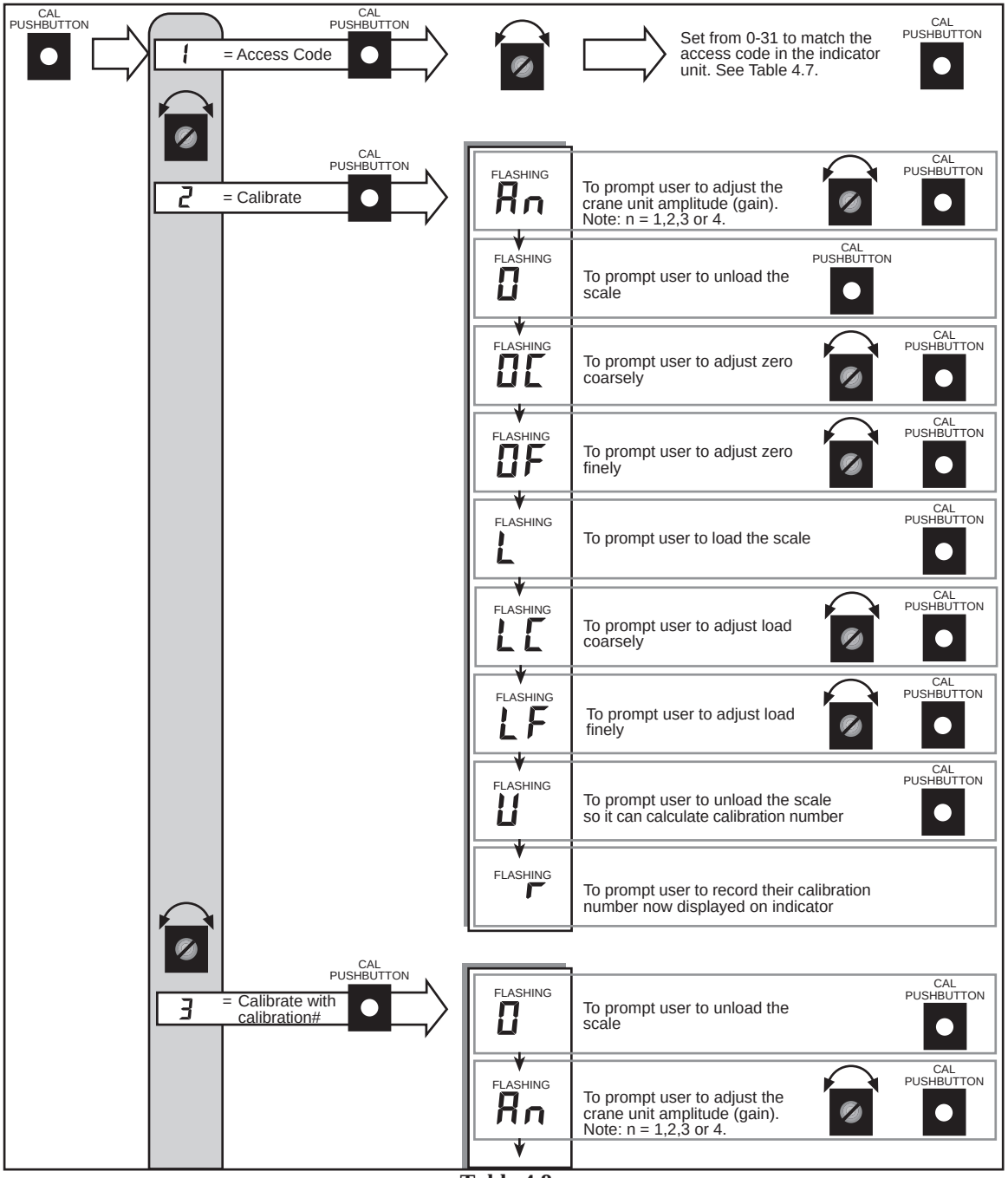


Table 4.8
Crane Unit Menu Structure

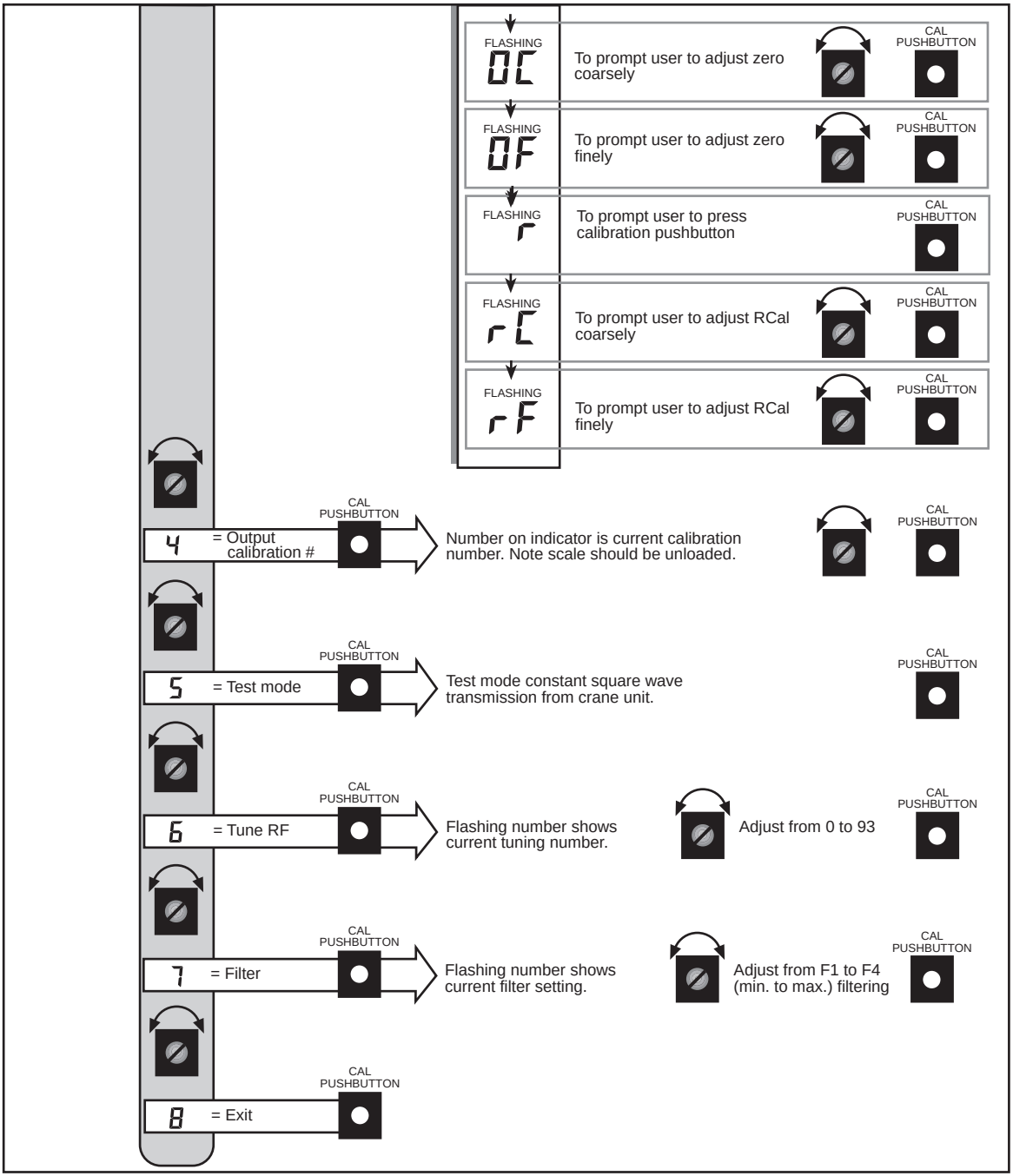


Table 4.8
Crane Unit Menu Structure (continued)

TROUBLESHOOTING GUIDE

This guide will help isolate and correct problems that may occur during the installation or use of the TRANS-WEIGH system.

To use this guide, follow these steps:

1. Find the symptom in the SYMPTOM column most like the problem encountered.

2. Refer to the POSSIBLE CAUSE column for suggested causes. The typical solutions for a cause are in the REMEDY column.

The list of possible causes is not exhaustive, but includes the most likely causes roughly in order of probability of occurance, beginning with the most likely cause.

The possible causes listed apply to installation problems, in-service problems and problems caused by incorrect reassembly during repair. Therefore not all causes listed apply to the solution at hand.

If a symptom that corresponds to the problem is not found in the list, or the cause remains uncertain, contact your scale dealer or MSI Customer Service at 206/433-0199, 7AM to 4PM Pacific Time.

Symptom	Possible Cause	Remedy
1. Indicator unit display does not light when ON/OFF button is pushed	A. Line voltage selector in wrong position	Set to correct position
If power lamp on power supply is off (Fig. 4.2):	B. Power to unit is off, misconnected, or wrong voltage (or wrong polarity for DC powered units)	Measure voltage between L and N or (+ and - on DC powered units)
	C. Internal Power Supply fuses F2 and/or F3 blown	De-energize power source, remove power supply and replace fuse(s)
If voltage between TP0 and TP4 on controller board (Fig. 4.2):	Fuse F1 on power supply board blown	Replace

DC power cable assembly defective	Reconnect, repair,or disconnected	Replace
Otherwise:	Faulty controller board Faulty power supply board Faulty display board	Replace Replace Replace
2. Annuciator lamp or numerical display segment malfunctioning as indicated by power up lamp test sequence	A. Faulty display board	Replace
3. Meaningless symbols appear on display or front panel switches function incorrectly or unit will not turn off	A. Controller board program lock-up B. Faulty indicator controller board	Switch off main power source then switch back on Replace
4. Indicator Unit turns off and on and normally shows a weight but does not respond to weight changes applied to the Crane Unit	A. Crane Unit not calibrated properly B. Faulty Crane Unit controller board	See Calibration Procedure Replace
5. Indicator displays over-range symbol ("-EEEEE-") with no load on Crane Unit.	A. Totalizing accumulator is full B. Load cell or load cell cable defective C. Load cell cable disconnected or misconnected D. Crane Unit not calibrated properly E. Faulty Crane Unit controller board	Clear accumulator (See Page 25) Repair/Replace Disconnect and reconnect in correct position See Calibration Procedure Replace
6. Scale cannot be rezeroed with ZERO button	A. Dead load on crane unit exceeds zero range limits (+2% of +4% of capacity)	Reduce dead load, or use TARE button to zero
7. Overrange below 100% of scale capacity	A. Tare or zero value entered	Zero and tare entry reduce effective scale capacity since overrange point is based on gross weight.

	B. Crane Unit not calibrated properly	See Calibration Procedure
9. Weight reading unstable	A. CAL MODE active (filter off) Indicator Unit controller board	Open CAL switch MODE switch on
	B. Too much resolution	Set count-by switches for recommended resolution (Table 4.4)
	C. Faulty or loose load cell cable or connector	Check, reseat connector, replace or repair
	D. Faulty Crane Unit controller board	Replace
	E. Filter set too low.	See Adjusting the Filter (page 44)
9A. Weight reading slow to update.	A. Filter set too high.	See Adjusting the Filter (page 44)
10.Weight reading or zero drifts slowly	A. CAL MODE active (AZM off)	Open CAL MODE switch on Indicator Unit controller board
	B. Resolution too great for proper AZM	Set count-by switches for recommended resolution (Table 4.4)
	C. Faulty or loose load cell cable or connector	Check, reseat connector, replace repair
	D. Faulty Crane Unit controller board	Replace
11.Large displayed weight error	A. Scale not zeroed or tared before weighing	See Operator's Guide
	B. LB/KG switch in wrong position	Set to correct position
	C. Crane Unit improperly calibrated	See Calibration Procedure

	D. Faulty Crane Unit controller board	Replace
	E. Faulty load cell	Replace
12.Large number on display with no weight applied	A. Tare value previously entered (if minus sign is on)	Normal operation. Clear Tare if desired. (See page 23)
	B. Crane Unit improperly calibrated	See Calibration Procedure
	C. Defective Crane Unit controller board	Replace
	D. Defective load cell	Replace
13.Marching hyphens appear on display even with Crane Unit less than 30 feet from Indicator Unit	A. Verify crane unit is on (red LED is blinking)	Turn on
	B. Crane Unit battery discharged	Replace / recharge
	C. Crane Unit and Indicator Unit access code switch settings are different	Obtain correct settings and correct code switch
	D. Receiver and transmitter frequencies are different	Replace board with correct frequency
	E. Crane Unit needs to be tuned.	See Tuning the Radio (Page 43).
13A.If the receiver activity lamp inside the indicator is pulsing regularly (about twice per second), crane unit is O.K. If not, go to (13B).	A. Receiver Quadrature may need readjustment	Locate the quadrature adjust access hole in Fig.4.2. Noting the original orientation of the screwdriver slot in the hole. Use a small screwdriver (3/32" or 1/8" blade) to turn the slot slowly in each direction from the original setting

		while watching the display, adjusting up to 45 deg. in ea. direction. When a weight reading appears on the display, move the crane unit away from indicator to distance of desired range. Next adjust the quadrature counterclockwise until hyphens appear again. Then slowly adjust clockwise until the weight appears again and mark the slot position. Repeat in the other direction and mark this slot position. Finally, readjust to set the slot position exactly between these two extreme positions for optimum performance.
	B. Faulty receiver board in Indicator Unit	Replace/Repair
	C. Faulty or misconnected receiver	Repair, Replace, Reconnect assembly
	D. Faulty Indicator Unit controller board	Replace/Repair board
13 B.Hold a portable FM radio next to a Crane Unit antenna and tune to about 99.7MHz. If pulsing is not heard, go to (13C) below.	A. Faulty receiver board in Indicator Unit	Replace
	B. Receiver antenna assembly faulty	Repair/Replace
	C. Receiver antenna cable assembly faulty	Repair/Replace

	D. Faulty controller board	Replace
13 C.Remove access port on side of Crane Unit and check whether decimal point on calibration display is flashing.	A. Faulty transmitter board in Crane Unit	Replace
	B. Faulty or misconnected cables connecting transmitter board to controller board or antennas.	Repair/Replace/ Reconnect
	C. Crane Unit transmitter not properly tuned.	See Tuning the Radio
	D. Crane Unit controller board faulty	If battery is fully charged, replace board
	E. Crane Unit controller board not getting power	Repair, replace faulty power connectors, wiring battery, or switch
14.Insufficient range (distance from Crane Unit to Indicator Unit.	A. Antennas damaged or antenna connectors are loose	Repair/Replace
	B. Antenna cables or internal cable assemblies damaged/loose connectors	Repair/Replace
	C. Receiver antenna misoriented	Check orientation and reorient as necessary (See Page 12)
	D. Line-of-sight between unit and receiver antenna blocked	Relocate receiver antenna
	E. Faulty receiver or transmitter board	Replace
15.Printer does not print when Print Button is pushed	A. Interface cable malfunction	Check for open or short with ohmmeter. Repair/ Replace
	B. Scale in motion	Wait until load has stabilized as indicated by motion lamp

	C. Malfunctioning power supply	Replace
	D. Indicator I/O or serial data cable assembly (connecting power supply to controller board) damaged or installed incorrectly	Test, repair, replace, check installation

15. Installation Problems

A. Baud rate or mode incorrect
B. Serial interface connections wrong or incomplete
C. Custom software required
D. Interface jumpers on power supply incorrectly setup

CURRENT LOOP SERIAL OUTPUT - OPTION

Scope

This specification describes the Current Loop Serial Output for the MSI-6260 Series TRANS-WEIGH scales. Only those details pertinent to the Current-Loop Serial Output are described in this document.

All specifications in this document are correct as of the date printed on the cover sheet of this document. The manufacturer reserves the right to change the specification without prior notice.

Function

Whenever the TRANS-WEIGH display is updated the display information can be transmitted through the Current-Loop Serial Output. The information will be transmitted continually, or upon request, depending upon the mode selection.

Electrical Conformance

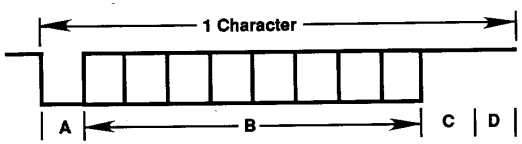
The Current Loop Output is always in one of two states: mark or space. Current flow (a closed loop) indicates the mark state. No current flow represents the space state. When no information is being sent to the external device, the current-loop is in the mark state.

The nominal current in the loop during the mark state is 20 mA. The nominal current during the space state is 0.mA.

The TRANS-WEIGH Current-Loop Output can be either active or passive. If the current loop output is active the TRANS-WEIGH is the source of current. If the current loop output is passive, the TRANS-WEIGH is not the current source, but does control the current loop state. In a current-loop system, only one device may be active in the loop, but there can be many passive devices.

Data Protocol

The Current-loop Output transmits serial ASCII characters. Each character consists of 11 bits. Each bit is at a mark (logic 1) or space (logic 0) level, as defined by the EIA specification. Each character consists of 11 bits in 4 bit fields A through D, defined as follows:



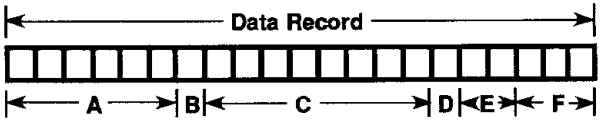
A: Start : 1 bit, always a space
B: Data : 8 bits, mark or space
C: Parity: 1 bit, unrecognized (always marked)
D: Stop: 1 bit always a mark

Data Transmission Rate

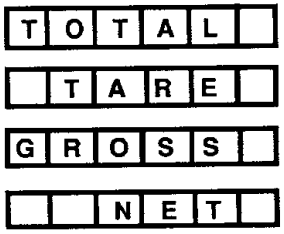
The Current-loop Output transmits at either 1200 baud (bits per second) or 4800 baud. The transmission rate is selected during installation.

Data Format

Each display reading that is transmitted through the Current-loop Output consists of 17 or 18 characters, called a data record. The characters in each data record are grouped into six fields A through F, defined as follows:



A. Type field: six characters describing the type of weight information being transmitted. The type field may be any one of the following (any blank position in the field is occupied by the space character):



B. First space field: one space character.

C. Reading field: seven or eight characters of "0" to "9", including a minus sign "-" and a decimal point "." if appropriate.
D. Second space field: one space character.
E. Units field: two characters, "LB" or "KG" as appropriate.
F. Trailing field: three characters consisting of an ASCII DC1, a carriage return and a line feed.

Mechanical

The Current-loop Output connection is made through a terminal block in the TRANS-WEIGH Indicator Unit.

Operation

The Current-loop Serial Output can be used in two modes of operation: continuous or print-on-request. The operator relevant operating instructions are detailed in the TRANS-WEIGH Installations and Operations section of this manual.

Continuous

In the continuous mode, the display reading is transmitted during every display update. The display reading will not be transmitted during scale motion. No operator interaction is required.

Print-On-Request

In the print-on-request mode, the display reading is transmitted whenever the front panel PRINT switch is depressed by the operator. The display reading will not be transmitted during scale motion.

Current-Loop Set-Up

The current-loop output baud rate is selected by position 2 of J14. The two standard baud rates are 1200 and 4800.

The active/passive current-loop output modes are selected by the TRANSMIT LOOP jumpers on the power supply. These may be accessed by removing the power supply cover at the lower right, inside the Indicator Unit.

Active output:	TA1, TA2, TA3, TA4 closed. TP1, TP2 open.
Passive output:	TA1, TA2, TA3, TA4 open. TP1, TP2 closed.

The current-loop output connection from the Indicator Unit to the external equipment is made at the 20 mA CURRENT LOOP / DIGITAL I/O terminal block.

Active output:	The current source is from the TX+ terminal and the return is at the TX- terminal.
Passive output:	The current enters at the TX+ terminal and leaves at the TX- terminal.

RS232C / RS423 SERIAL OUTPUT - OPTION

Scope

This specification describes the RS232C/RS423 Serial Output Option (B02) for the MSI-6260 Series TRANS-WEIGH scale. Only those details pertinent to the B02 option are described in this document.

All specifications in this document are correct as of the date printed on the front cover of this document. The manufacture reserves the right to change the specification without prior notice.

Definition

Function

Whenever the TRANS-WEIGH display is updated, the display information can be transmitted through the RS232C/RS423 serial output. The information will be transmitted continually, or upon request, depending upon the mode selection.

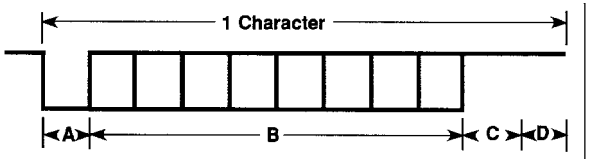
Electrical Conformance

The electrical characteristics of the serial output can be configured to conform to the Electronics Industries Association (EIA) specifications for RS232C or RS423. The electrical output specification setup is made during the installation.

Data Protocol

The serial output transmits serial ASCII characters. Each character consists of 10 bits. Each bit is at a mark (logic 1) or space (logic 0) level, as defined by the EIA specification.

Each character consists of 10 bits in 4 bit fields A through D, defined as follows:



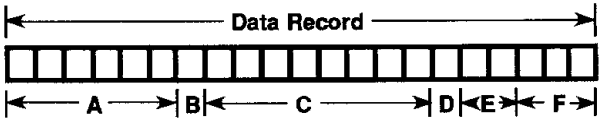
A: Start : 1 bit, always a space
B: Data : 7 bits, mark or space
C: Parity : 1 bit, always a mark
D: Stop : 1 bit, always a mark

Data Transmission Rate

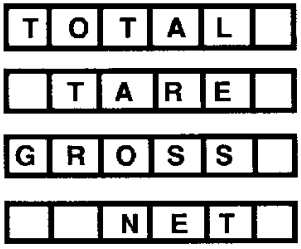
The serial output transmits at either 1200 baud (bits per second) or 4800 baud. The transmission rate is selected during installation.

Data Format

Each display reading that is transmitted through the serial output consists of 17 or 18 characters called a data record. The characters in each data record are grouped into six fields, A through F, defined as follows:



A: Type field: six characters describing the type of weight information being transmitted. The type field may be any one of the following (a blank position in the field is occupied by the space character):



B: First space field: one space character.
C: Reading field: seven or eight characters of "0" to "9", including a minus sign "-" and a decimal point "." if appropriate.
D: Second space field: one space character.
E: Units field: two characters, "LB" or "KG" as appropriate.

F: Trailing field: three characters consisting of an ASCII DCI, a carriage return and a line feed.

Operation

The TRANS-WEIGH serial output B02 can be used in four modes of operation: continuous, print-on-request, print-on-handshake, or continuous with motion override.

Continuous

In the continuous mode, the display reading is transmitted during every display update. The display reading will not be transmitted during scale motion. No operator interaction is required.

Print-On-Request

In the print-on-request mode, the display reading is transmitted whenever the front panel PRINT switch is depressed by the operator. The display reading will not be transmitted during scale motion.

Print-On-Handshake

In the print-on-handshake mode, the display reading is transmitted whenever the clear-to-send (CTS) line is asserted by the receiving equipment (printer, computer, etc.). The display reading will not be transmitted during scale motion.

Continuous With Motion Override

In the continuous with motion mode, the display reading is transmitted during every display update regardless of scale motion.

DUAL LOAD CELL CALIBRATION - OPTION

Note: This procedure requires that the master and slave units be connected at all times. Also, you must be able to hang weight individually on both the master and slave.

Calibration Procedure

With normal use, the TRANS-WEIGH System should be recalibrated using test weights at regular intervals not to exceed 6 months, or whenever a load cell or Crane Unit computer circuit board is replaced. Use the following calibration procedure:

1. Exercise the Master and Slave load cells at least 5 times by lifting a test weight that is approximately equal to system capacity.
2. Turn off Crane Unit and Indicator Unit.
3. Release four latches holding the Indicator Unit front door and open

the door. Locate the CAL MODE dip switch (Position 8 of S2) (See Figure 4.2) and CLOSE it. (This defeats the auto-zero and filter and sets the count-by for maximum resolution. It also clears the zero and tare stored in the backup memory so true analog zero can be checked and adjusted.)

4. Close the door and turn the Indicator Unit on but `Do Not` push the ZERO or TARE buttons at this time.
5. Remove the access plug on the Master Crane Unit and locate the seven-segment Calibration Display, the momentary Calibration Pushbutton, the Calibration Potentiometer, and the Balance Potentiometer.(See Figure 4.1).
6. Turn the Crane Unit on by pressing the Power Switch on the Crane Unit's external case and holding it on for a long second. The Indicator Unit will briefly display the Crane Unit's Software Version, the amount of weight stored in the zero register, the calibration number, and then a normal output received from the Crane Unit. Simultaneously, the Crane Unit Calibration Display will display the Crane Unit's Software Version and then extinguish. The decimal point will flash indicating that the crane unit is transmitting.
7. Hang a test weight from the master unit that is approximately equal to the maximum capacity of the master load cell and slave load cell individually. This weight should also be suitable to hang from the slave unit. Record the weight reading on the indicator unit.
8. Hang the same test weight from the slave unit. Adjust the Slave Adjust Potentiometer until the display shows the same as was recorded for the master unit.
9. Repeat steps 7 & 8 until no further adjustment is necessary. After the master and slave units have been balanced, DO NOT adjust the Slave Adjust Potentiometer any further.
10. Press and release the Calibration Push Button (press the cal p/b). The Calibration Display will show a number from 1 to 8. Turn the calibration Potentiometer until the number 2 is displayed.
11. Press the cal p/b and watch the cal display spell out 'C' 'A' 'L' (for calibration) and then begin flashing 'A' 'n' (where n is the current gain setting.)
12. Use the cal pot to set the scale gain to A1, A2, A3 or A4. Press the cal pushbutton to accept the gain setting. The cal display will begin flashing '0'.
13. The flashing '0' indicates that the user should remove any weight from the scale and leave only the dead load on the scale. The dead load (hook, shackle, etc) should be the same as that used during the normal use of the scale. Otherwise, the auto-zero may not function properly after calibration. When this is done and the motion lamp is

extinguished on the Indicator Unit, press the cal p/b.

14. After doing its internal zero calculation, the cal display will flash '0' 'C'. This indicates that the user can adjust the zero coarse reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read at or near zero. Press the cal p/b.

15. The cal display will flash '0' 'F'. This indicates that the user can adjust the zero fine reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read exactly zero. Press the cal p/b.

16. On the Indicator Unit, press the ZERO button.

17. The cal display will flash 'L'. The user should now lift test weights approximately equal to scale capacity. When this is done, press the cal p/b.

18. The cal display will flash 'L' 'C'. This indicates that the user can adjust the load coarse reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read at or near the value of the test weight. Press the cal p/b.

19. The cal display will flash 'L' 'F'. This indicates that the user can adjust the load fine reading on the Indicator Unit. Use the cal pot as needed to make the Indicator Unit read exactly the value of the test weight. Press the cal p/b.

NOTE If either step 14 or 15 does not allow enough cal pot range to correctly set the Indicator Unit, the user may need to change the Crane Units A/D gain setting. Exit out of calibration by either: (1) Repeatedly pressing the cal p/b until the cal display is extinguished, or (2) by cycling the power on the Crane Unit. Restart the calibration procedure and change the gain as needed up or down.

20. The cal display will flash 'U' which tells the user to unload the test weight from the scale. When this has been done and the motion lamp on the Indicator Unit has gone out, press the cal p/b.

21. After doing the calculation for the Calibration Number, the fcal display will flash 'r'. This indicates that the Crane Unit is transmitting the Calibration Number to the Indicator Unit and that the user should copy down the number from the Indicator Unit display. This number is the new Calibration Number and it should be recorded for future reference.

22. To exit from the calibration menu, turn the calibration Potentiometer until the number 8 is displayed on the Calibration Display. Then press the Calibration Push Button. The Calibration Display should return to the blinking decimal. The scale is now in normal weighing mode.

INDICATOR UNIT POWERED BY AN INTERNAL BATTERY - OPTION

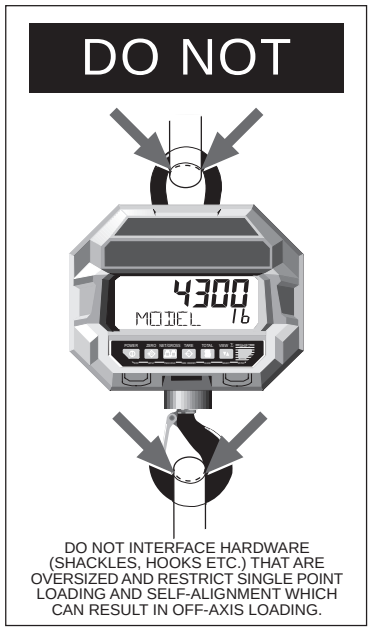
When the TRANS-WEIGH scale is supplied with an internal battery-powered Indicator Unit there are minor variations in operation not covered elsewhere is this manual. Briefly, the internal battery option differs from the standard models in that the AC or DC power supply is replaced by an internal rechargeable battery and charger.

This means that the serial data interfaces and RS232 are not available with the internal battery option since the interface circuitry is on the AC or DC power supply.

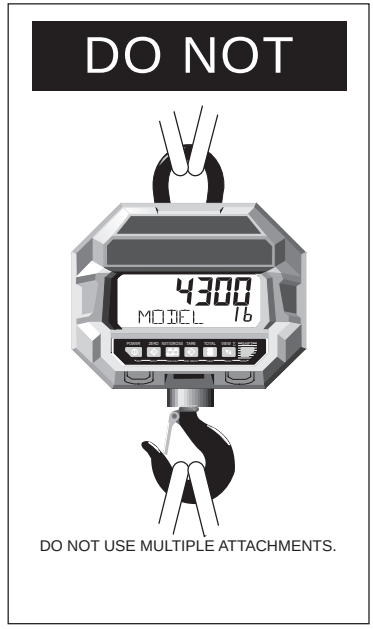
Operation differs as follows:

1. The Indicator display is turned off and on by the ON/OFF toggle switch rather than the ON/OFF push-button. The ON/OFF push-button remains functional, but only if the toggle switch is in the ON position.
2. If AC power is connected, the battery charger will continue to charge the battery whether the ON/OFF toggle switch is on or off. However, a discharged battery will charge much faster if the switch is off. A fully discharged battery will be recharged in about 16 hours if the switch is off or about 40 hours if the switch is on.
3. The CHARGE STATUS and LOW BATTERY indicator lamps next to the ON/OFF toggle switch give a valid indication only when the toggle switch is off. The LOW BATTERY lamp comes on when there is approximately one hour of battery-powered indicator operation remaining. When the battery becomes fully discharged the indicator display will automatically be turned off to protect the battery from deep-cycle discharge damage. To restart the indicator after automatic shutoff, it is normally necessary to turn off the toggle switch and connect AC power to recharge the battery. The internal battery will normally power the indicator for 12 to 20 hours between recharges. More frequent recharges (as often as every 8 hours of operation) can extend the useful life of the battery appreciably. The battery may be charged as often or as long as desired since the battery is immune to "memory" problems and the charger automatically protects the battery from overcharge. The CHARGE STATUS lamp will come on when the battery reaches approximately 90% of full recharge (assuming that the ON/OFF toggle switch is off).
4. An optional 20' DC power cable (MSI Part Number 40043-0240) is available to power the indicator from an external DC source if desired. This cable plugs into the same connector as the AC cable supplied as standard.

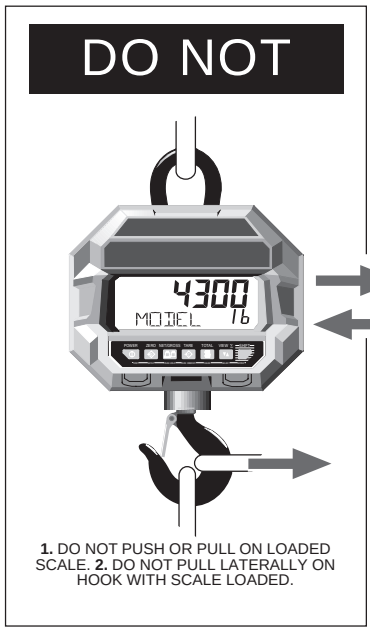
PROPER LOADING PROCEDURE



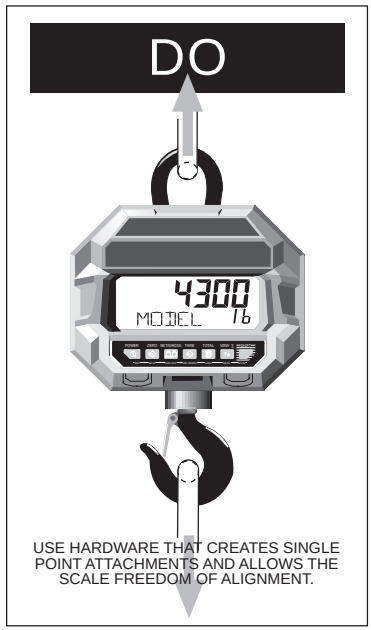
DO NOT INTERFACE HARDWARE (SHACKLES, HOOKS ETC.) THAT ARE OVERSIZED AND RESTRICT SINGLE POINT LOADING AND SELF-ALIGNMENT WHICH CAN RESULT IN OFF-AXIS LOADING.



DO NOT USE MULTIPLE ATTACHMENTS.



1. DO NOT PUSH OR PULL ON LOADED SCALE. **2.** DO NOT PULL LATERALLY ON HOOK WITH SCALE LOADED.



USE HARDWARE THAT CREATES SINGLE POINT ATTACHMENTS AND ALLOWS THE SCALE FREEDOM OF ALIGNMENT.

PUB.PLP-01-95

THE MSI LIMITED WARRANTY

MEASUREMENT SYSTEMS INTERNATIONAL, INC., WARRANTS load sensing elements and meters against defects in workmanship and materials for a period of one year from date of purchase and warrants electrical cables and batteries against the same defects for a period of ninety (90) days from date of purchase.

Any device which proves defective during the warranty period will be replaced or repaired at no charge; provided that the defective device is returned to the Company freight prepaid.

In no event shall the Company be liable for the cost of any repairs or alterations made by others except those repairs or alterations made with its specific written consent, nor shall the Company be liable for any damages or delays whether caused by defective workmanship, materials or otherwise.

The Company shall not be liable for any personal injury or property damage resulting from the handling, possession or use of the equipment by the customer.

The warranty set forth herein is exclusive and is expressly in lieu of all other warranties, express or implied, including without limitation any implied warranties of merchantability or fitness, or of any other obligations or liability on the part of the Company.

The liability of the Company under this warranty is limited solely to repairing or replacing its products during the warranty periods; and the final judgement and disposition of all claims will be made by MEASUREMENT SYSTEMS INTERNATIONAL, INC.

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