9411E
UNCOUPLED or
COUPLED-IN-MOTION
RAILROAD SCALE CONTROLLER

SEQUENCE of OPERATION

Program SBM057C
Version 4.0 February 29, 1996

FOR INCLUSION
IN - KN585726

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SOFTWARE REVISION HISTORY

Rev. Designation and Date	Notes:
Revision A Released 11/93	1. The Software will now receive input from an AEI interface on serial port #3. 2. The Time and Date prompts can now be modified (translated) just as the other prompts. 3. The Digital I/O hardware test feature was fixed. 4. DIP Switch Sw1-1 was implemented as the "SETUP" switch to allow access to the protected setup parameters. 5. This version will "Log" changes made to the 14 sealable setup parameters that affect weighing accuracy. It will remember the last 120 changes. 6. The capacity of the car file was set at 650 records.
Revision B Released 03/94	1. The Host software was modified to correct a problem with the Set General Setup Information command. 2. The Host command Send English & Foreign Message #XXX was modified to allow the Host to read the message currently shown on the 19 character display. 3. The software was modified to correct an anomaly that caused an incorrect calculation of the Net Weight when an extremely large Gross Weight was associated with an even larger Tare Weight.
Revision C Released 03/96	1. Added dual AEI antenna capability. The system will indicate (in a status byte) when a car tag(s) is missing or a mismatch between the two tags on a car. 2. Added a setup option to change the default weighing display from Car Weight to AEI Car Id. 3. Added specialized calibration parameters for the first car behind the engine. 4. Changed the auxiliary port test function to decode the AEI tag data and shown it on the display. 5. CIMHOST software version PC137.200 will be required to operate correctly with this version of the 9411e software.

6. This manual was updated to reflect the above changes and other corrections.

OVERVIEW

The 9411E Coupled-In-Motion (CIM) Railroad Scale Controller is designed to calculate weights of railroad cars as they cross over a scale platform coupled or uncoupled in motion at speeds up to 5 MPH. Engine(s) may be located at the beginning, middle or end of a train. The train may approach the scale from either direction as the controls will sense each situation. The speed of each car weighed is used to qualify the data collected. Outputs are available for use by external speed indication devices, typically Red-Yellow-Green traffic lights. Configurable serial communication ports are available for interfacing to external printers or other devices. Basic Reports are available through the printer port. Messages shown on the 19 character display give the operator clear indication of system operation.

The complete 9411E C.I.M. System, normally, includes a Mettler-Toledo 7260 weighbridge (scale) with digital or analog load cells. Four wheel detectors mounted on or near the live section of the weighbridge sense when and what type of vehicles are entering the scale, as well as car speed. Performance of the non contact wheel detectors is dependent on several factors. These factors include: amplifier sensitivity setting, position of the detector on the rail, wheel flange size, car/engine design and speed of train. Under good conditions, the detector will operate reliably at speeds up to five miles per hour. Depending on specific site conditions, speed may be increased to a maximum of six miles per hour or reduced below five miles per hour to achieve the reliability desired. The scale is connected to a Mettler-Toledo Model 8142 or 8530 digital indicator. The scale indicator and the wheel detectors are interfaced to the Mettler-Toledo Model TSM300 microprocessor based single board computer.

The TSM300 microprocessor based single board computer provides the following system interfaces:

(1) Alpha / numeric keyboard, for setup configuration, and a local 19 character alpha/numeric prompting display.

(2) A Host device, with protocol selectable, via RS232 or RS422.

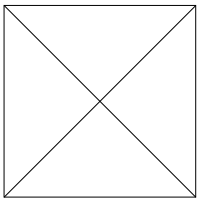
(3) An optional printer via 20 Ma. current loop or RS232, user selectable data transmission.

(4) An optional output only Auxiliary data device, via 20 mA. current loop or RS232, with user selectable data transmission.

(5) An optional input only interface to a RAIL Automatic Equipment Identification (AEI) device, via 20 mA. current loop or RS232.

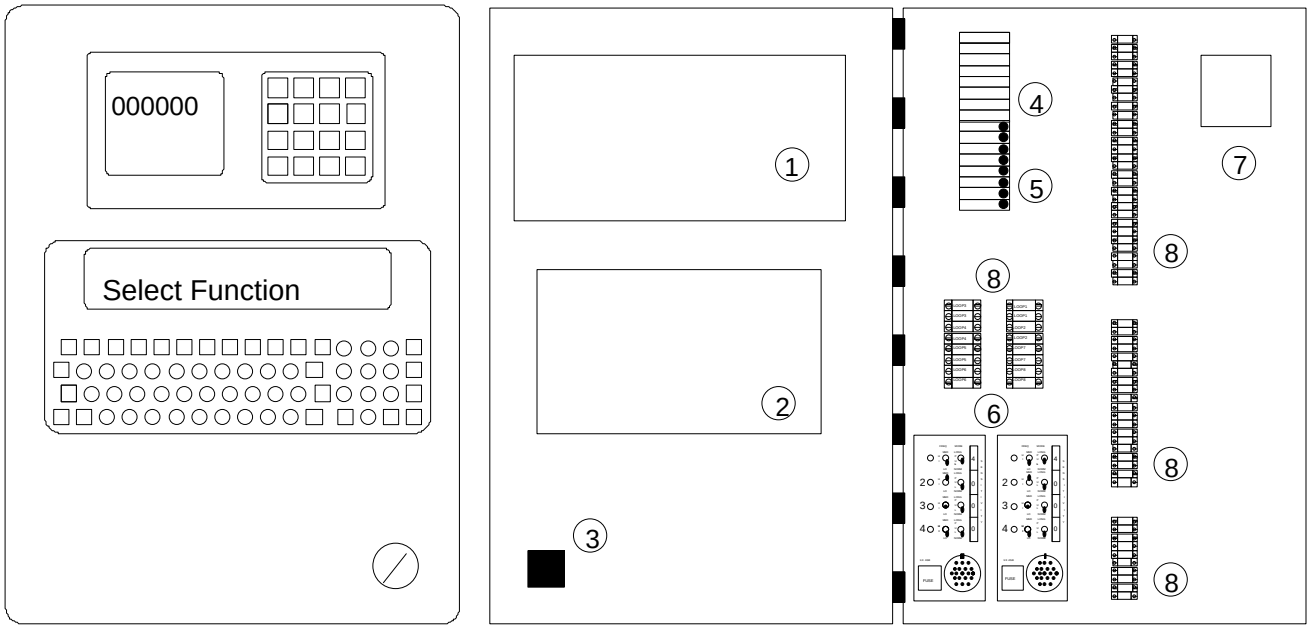
(6) Isolated 120 V.A.C. inputs and outputs.
(8) inputs are reserved for wheel detector inputs.
(4) outputs are reserved (3) for speed indication and (1) for a scale in use indication.

OVERVIEW (Continued)



OVERVIEW (Continued)

Model 9411E cabinet layout



Door (Front View) Door (Rear View) Inside View

1 Weight indicator
2 TSM 300 printed circuit board
3 On/Off switch
4 Electrical input modules
5 Electrical output modules (fused)
6 Non-contact wheel detector amplifiers (optional)
7 TSM 300 power supply
8 wire terminal blocks

OVERVIEW (Continued)

This document explains how to set up and operate the 9411E In Motion railroad scale controller.

Installation of hardware devices such as the scale, wheel detectors, lights, printers etc. are covered in other drawings and documentation.

- Calibrate the scale — Reference the scale documentation and scale weight indicator documentation. The scale weight indicator is mounted on the door of the 9411E. See appendix F of this manual for weight indicator parameters pertinent to the 9411E.

- US standard or metric — Make this selection on the TSM300 pcb in the 9411E - see "Power-up Sequence" of this manual and appendix G.

  If Standard US is configured the 9411E will load default values into the Car Type file and General Setup file setting it up for a typical US application.

The 9411E setup and operation are done using menus. Menu items are selected by function keys. The 9411E displays a single line of data, follow this Sequence of Operation manual for details as you setup and operate the 9411E.

The sequence of operation in this manual follows the order of the program logic. Each "Program Statement" in this sequence is actually a message or prompt for the display, and relates to a specific point in the program. Program operation is determined by your response to the prompts. By following the description of the "Program Statements" and responding to the prompts you "set up" and "operate" the system. The "program statements" refer to each other by unique numbers assigned to statements in the program. For example: if the system is at

"Program Statement" 8600 displaying the prompt [Printer Test? 0]

Respond with a YES answer "1" or a NO answer "0". If you select YES the program will go to "Program Statement" 8650 and send a test message to the printer. If you select NO the program will go to "Program Statement" 8700 and skip the test message to the printer. "Program Statements" are arranged in numerically ascending order in the manual.

OVERVIEW (Continued)

System setup is a process that needs to be done at installation. In the Setup Menu there are 6 sub menus for data entry.

SYSTEM SETUP

General setup: Data entered here includes: Site name, wheel detector distances, dynamic calibration factors, speed limits and password. The data entries start at program statement 7100.

The 16 calibration parameters are switch protected inside the 9411E controller. Calibration Parameters 9 thru 16 (averaging weights and weight offset) should be left at their default values until a coupled In-Motion test has been completed and calibration values determined. Static Grad size must match graduation size of scale indicator.

Slave mode. The 9411E front panel can be set to "slave" mode whereby all data entry for CARs is done via a host computer. Car data via the 9411E keyboard is disabled.

Speed limit indication. The three light output mode will operate a traditional Green/Yellow/Red traffic light. Green = speed OK, Yellow = speed marginally fast, Red = speed too fast. The single blinking light output mode operates 1 light, but has 3 functions; rapid blink (Once a second) = speed too fast: slow blink (Once every 2 seconds)= speed marginally fast: steady "on" = speed OK.

Car type setup: The 9411E matches up each vehicle (including engines) in the train with known vehicle types stored in the Car type file. If the 9411E processes a vehicle that does not match a known car type the weighing sequence will end.

This setup prompts you for specific information about cars. Enter cars you wish to be weighed and recorded first in the setup, followed by cars that are not to be weighed, such as engines.

You will be prompted for the spacing distances between axles and the "function" to perform for each axle.

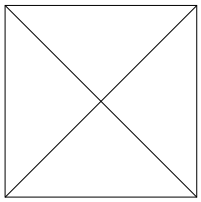
Functions are:

OVERVIEW (Continued)

W = weigh.	9411E will take a weighment when this axle actuates the weigh trigger wheel detector.
S = straddle	When this axle actuates the weigh trigger detector no weighment will be taken but the controller will wait for more axles before ending the car. The car is straddling the scale and the scale weight can be expected to go to zero.
E = End	When this axle actuates the weigh trigger no weighment will be taken and the controller will end the car.
N = Nothing	When this axle actuates the weigh trigger the controller takes no action other than to wait for the next axle of this car. This function is typically used on engines. It is because of functions like this that you enter engines and the like at the end of the car type file.
X = Weigh & Straddle	When this axle actuates the weigh trigger the controller will take a weighment and executes a straddle thereby waiting for the other end of the car.
Z = Weigh & End	When this axle actuates the weigh trigger the controller will take a weighment and end the car.

The following diagram is an example of function codes.

OVERVIEW (Continued)



OVERVIEW (Continued)

Printer setup: Interface setup for printer when connected to 9411E: Baud rate, data bits and parity.

This menu also provides a flexible printer output format for **IMMEDIATE WT PRINT** and **AUTO TRAIN REPORT** only. The format of the car type and train reports that are selected from the report menu are fixed. Immediate wt print and auto train report are enabled in the general setup.

Printer output string: The printer output has 3 different lines. 1 **header line** before the train, 1 **data line** for each car, and 1 **trailer line** which prints at the end of the train.

Header line: The header line contents is completely programmable as explained in statement 7550, 7560 - 7590. You can program one line of data using standard ASCII characters and control codes as shown in appendices C and D. Arrange the desired string contents, one character at a time, in the string locations as the system prompts you.

Printer Data Line: The data line can be a combination of variable car data as selected from the table found in statement 7550 and of literal characters selected form ASCII characters and codes as shown in appendices C and D. Since data fields are longer than 1 character be careful not overlap them.

Trailer line: Like the data line the trailer line can be a combination of variable data and literal characters. The variable data is limited to totals only, see statement 7550.

See appendix G. figure 5 for a "Setup Report" showing a sample string setup.

OVERVIEW (Continued)

Auxiliary setup: An output only port that transmits a single data line for each car as it is weighed. The total string length is a maximum of 120 characters. See statement 7550 for a table showing the available variable data codes. These codes can be combined with literals from appendices C and D, be careful not to overlap data. The auxiliary port has an optional Block check character which can be located anywhere within the string. The block check is calculated from a starting point, that you select in the string, up to the block check character (but does not include the block check character).

Host setup: Interface setup for bi-directional communication to a host computer.

Prompt translation: Display prompts may be customized or translated into different languages in this setup routine. Prompts and messages are more easily modified via the Host port but can be done via the 9411e keypad. An index of prompts and messages is located in the rear of this manual. While the index is arranged alphabetically the prompts are arranged chronologically in the 9411E. Each prompt and message is assigned a number in memory. Numbers for prompts are in the "message and display prompts" index in this manual.

OVERVIEW (Continued)

System Operation

After installation, setup, static scale calibration and dynamic calibration the In Motion railroad scale system can be operated. Following Menu items are used during operation

Weigh train: Weighs the train In Motion. The 9411E may be setup in 2 modes of operation: Attended mode where the operator selects "F1 -Weigh Train", or in an unattended mode where the 9411E is ready to weigh trains anytime they cross the scale.

Continue train: This function of the 9411E is for weighing a part of a train beginning somewhere in the middle and finishing at the end of the train.

Car data: This function of the 9411E is for entering car data for a specific train (IDs and tare weights) **after** the train is weighed.

Advance car data: This function of the 9411E is allows entry of one trains' car data (IDs and tare weights) **before** the train is weighed After the train has been weighed the advance car data can be **auto matched** with the train, and a train report generated with the car data included.

Print reports: This function not only provides for printing reports but also for clearing data out of memory.

Test mode: Diagnostic aids for testing and troubleshooting hardware and performance. As well as testing the hardware of the system this mode also has a graphic weight test for recording the weight of individual cars, which can aid troubleshooting.

Graphic Wt The graphic weight test will output characters to a 132 column printer. A full line of characters is printed for the maximum weight reading with lesser weights reduced. This automatic scaling of the weight provides greater resolution in the report. The weighments used for dynamic averaging are selected in General Setup.

- `*` characters represent weighments taken but not used in dynamic averaging.
- `!` characters represent weighments used in dynamic averaging.
- `--` characters represent when the weight trigger wheel detector was actuated.

OVERVIEW (Continued)

characters represent legitimate weight readings but too low to graph meaningfully.

OVERVIEW (Continued)

Dynamic calibration

Dynamic calibration is accomplished by running trains over the scale, evaluating the results and making adjustments if needed. If the dynamic weights differ significantly from the static weights look for mechanical causes first before making calibration adjustments. Mechanical causes could be things like defective wheels on particular cars, brakes stuck on cars, curves in the track, etc. Besides making calibration adjustments other things may be needed such as limiting train length if rail curve is the problem, lowering the speed limit if grade is a problem, etc.

A suggested Procedure

- Complete static calibration of the scale.
- Measure wheel spacings on cars and engines, enter values in Car Setup.
- Set the Averaging Wt and Offsets to default values in General Setup routine (this will enable you to directly interpret the results).
- Get as many loaded cars as required for the test, for this discussion lets use (10) cars.
- Static weigh each test car, uncoupled, and record the car weight along with the car identification number.
- Run graphic weight test (See Test Mode) on a typical car - set averaging window in general setup.
- Make up a train using only test cars.
- Make sure that the brakes are released on all cars.
- Enter the static weights and car IDs in the Advance Car Data file, in the order they will be weighed in the train.
- Zero the scale.
- Run train and generate a test report for pushing and pulling in each direction. That is 4 tests. Enter offset correction values in General Setup.
- Weigh the train as many times as required for the test, for this discussion let us weigh 3 times. Make sure that the engineer stays within the rated speed and does not back up during weighing. Record the TRAIN # for each train as assigned by the 9411E.
- Go to the Advance Car Data routine
    - Auto-Match car data with each train (since each train has the same cars).
- Go to Print Reports routine.
    - Select Print Test Report.
    - Select the trains tested to be included by entering their train numbers.
    - Select report format that you prefer.
        - Non US format reports errors in weight and % of error.
        - US format reports errors in weight and multiples of the maintenance tolerance of the static scale.

OVERVIEW (Continued)

- Examine the report and make adjustments if required, in the General Setup routine.

Acceptance testing and certification procedures may vary, test as required.

SPECIFICATIONS

Host Port - Allows and configuration of the port interface baud rate, bits per character and parity. Communication is RS232 or RS422.

Printer Port - Allows configuration of the port interface baud rate, data bits per character and parity. Formatting of the output string where each selected field (Sequence #, Train #, Date, Time, Sum, Weight and fixed characters) may be positioned in the output string by specification of the starting character position. Fixed characters may be utilized to format the output for printer control, multiple print lines, or multiple line feeds between prints. Output is 20 Ma. current loop or RS232.

Auxiliary Port - Allows configuration of the port interface baud rate, data bits per character and parity.

The receive side of the Auxiliary Port is used to connect to an Automatic Equipment Identification (AEI) device. The Owners Code and Car Number will be extracted from the Rail Car Tag Data and placed in the Car Number field as a car is being weighed. See Appendix L for further information.

A formatted output string can be transmitted where each selected field (Sequence #, Train #, Date, Time, Sum, Weight, fixed characters and block check character) may be positioned in the output string by specifying the starting character position. Output is 20 Ma. current loop or RS232.

SPECIFICATIONS (Continued)

Hardware Test Feature - The system provides for running seven diagnostic tests.

Display - writes a test pattern to the local display.

Keyboard - displays the key pressed.

Host - outputs a test string repeatedly and displays any displayable characters received (this allows a loop back test). The test output string is: **ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789**. For loop back testing, connect the Host output to the Host input.

Printer - outputs a test print line. The test output string is:
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 .

Inputs - displays on/off condition of inputs on the local display as **[INPUTS __3456__]** where the status of each of the 8 inputs are displayed. A standard unit only uses 4 of the 8 inputs (IP2, IP3, IP4, IP5). The other 4 inputs are used in pairs when the pre-scale speed detection option is used.

Outputs - Selectively turns on and off the 8 output bits. During the output test the status lights on the output opto isolator P.C. board can be observed to confirm that outputs are being energized.

> **Caution:** If external devices are connected during the output testing the devices will be energized.

Scale - Reads and displays the scale reading every second. An option for zeroing the scale is also provided.

SPECIFICATIONS (Continued)

I/O Interface - 120 V.A.C. Isolated inputs and outputs are provided to interface to other devices outside of the controller.

INPUTS :

There are four required inputs to the C.I.M. Controller for normal operation.

WHEEL DETECTORS, Loop Detector inputs or Electro-mechanical inputs. These four required inputs allow the controller to detect when a train is approaching the scale, its speed, position and vehicle types.

PRE-SCALE SPEED WHEEL DETECTORS, These optional wheel detectors are used in pairs to determine the speed of the approaching train. The controller will then use outputs to provide feedback to the engineer before the train reaches the scale.

OUTPUTS :

Four isolated 120 V.A.C. at 1 Amp. continuous, non-inductive, outputs are provided. Use of these outputs is optional.

SCALE IN USE, this output is normally OFF, when a train has been detected in the Weigh Trains mode this output will turn ON. When the entire train has been weighed or an error condition occurs to abort the weighing operation, the output will turn OFF.

OK SPEED, MARGINAL SPEED, FAST SPEED, these speed indication outputs are normally OFF, one of these outputs will turn ON to indicated the speed range of the train that is being weighed.

DATA FIELD DEFINITIONS

The available data fields are defined below. Each data field may be selected as optionally sent to the Printer port and the Auxiliary Port. All fields except the Net Weight, Net Tons and Total Weight fields are available to the Host port. The Total Weight fields are not available to the Auxiliary port.

	FIELD	Length	Type	Description
	Weight	6	Numeric	No decimal point is used. Error Codes will be sent in the **Weight Code** field. Leading zeros are transmitted as spaces (20H).
	Train Number	3	Numeric	Consecutive number (001 - 999).
	Sequence No.	3	Numeric	Consecutive number within a Train. Excluding cars which are NOT "Recorded", typically engine(s).
	Car ID	10	Alpha/Numeric	Car number and initials from Keyboard Entry or AEI antenna.
	Wt Code	1	Numeric	Indication of the speed class or Error Code when this car was weighed. See Appendix A.
	Speed	4	Numeric	Speed of this Car when it was weighed. In Miles per Hour or Kilometers per Hour (XX.X).
	Direction	1	Alpha	"A" for a train that entered at wheel detector #3. "B" for a train that entered at wheel detector #6.
*	**AEI Error Code**	1	Numeric	"0" Indicating both tags read ok. "1" - leading tag missing, "2" - trailing tag missing, "3" - both tags missing, "4" - both tags read **BUT** they do not match.
*	**Car Type**	1	Numeric	Indicating the type of vehicle that this car matched up to in the Car Type File. See Figure 6.
	Tare Weight	6	Numeric	No decimal point is used. Tare Weight from a keyboard entry.

DATA FIELD DEFINITIONS (Continued)

Date	8	2 Formats	Date field (MM/DD/YY) or (DD/MM/YY) depending upon system setup.
Time	5	Alpha/Numeric	Character time field (HH:MM).
Net Weight	6	Numeric	No decimal point is used. The absolute value of the difference between **Weight** and **Tare Weight**.

DATA FIELD DEFINITIONS (Continued)

FIELD	Length	Type	Description
Net Tons	6	Numeric	**Net Weight** divided by the appropriate conversion factor (2000 for a Non Metric configuration, 1000 for a Metric system).
Total Gross Wt	6	Numeric	The Sum of the **Weight** fields of all cars in a train. This field is only available to the Printer port.
Total Net Wt	6	Numeric	The Sum of the **Net Weight** fields in a train. This field is only available to the Printer port.
Total Net Tons	6	Numeric	**Total Net Weight** divided by the appropriate conversion factor. This field is only available to the Printer port. See **Net Tons.**
Block Check Character -	1	Character	A single character that is computed as the Exclusive OR of all characters beginning at a specified starting character position and up to but not including the Block Check Character itself. See the Section on Host Interface Setup for specifying the starting character position for the Block Check Character. This field is only available to be sent out the Auxiliary Port.
Fixed Characters -	0-120	Character	Individual alpha-numeric or control character(s) that are specified to be sent, displayed, or printed in a character position within the string. Control characters will be specified in accordance with the key strokes specified in the Appendix labeled "Control and Special Character Entry". This will allow specification of start and/or termination characters or fixed characters needed to emulate an existing protocol or Host language requirement. Fixed characters are also useful for

formatting the output to printers to allow multiple line print or special printer control such as expanded or condensed printing.

POWER-UP SEQUENCE

Statements 01 through 99

The following section describes the controller power-up sequence as well as the status displays shown during this event. Upon applying power to the controller normal operation will begin at statement #10. Then a ROM checksum test is performed followed by a dynamic RAM read/write test. If either test fails, the controller will notify the operator through the display. A ROM failure will put the controller at statement #13a, a RAM failure will put the controller at statement #13b.

It should be noted that the controller is configured with a bank of DIP switches located on the main control printed circuit board. The setting of these switches determines the type of scale connected to the controller as well as other operational characteristics. A forced cold start may be done by; (1) removing power from the Controller, (2) turning SW1-8 on the TSM300 PCB **ON**, and (3) restoring power to the Controller. **WARNING:** A cold start will reset **ALL** parameters to factory setting and dynamic calibration offsets will be lost. Record **ALL** setup information before performing the cold start.

PROGRAM STATEMENT	**APPLICATION**
10	**[SBM057c 901242]** **----------** The display shows the version numbers for this particular 9411E program. These numbers should be made available to Mettler-Toledo Service if there is a problem with the controller. This message will be displayed for 2 seconds. If the dynamic RAM has been replaced or the RAM backup battery has failed then a cold start will automatically occur. In this case the controller will advance to statement #25. If DIP switch SW1-8 is **ON** (Request Cold Start) then the controller will advance to statement #15. The normal power up procedure will advance the controller to statement #50 after the data in the Car file has been sorted. In this case the message **[Sorting Car File !!]** will be displayed for a few seconds.

POWER-UP SEQUENCE (Continued)

PROGRAM STATEMENT	APPLICATION
13a	**[CPU Failure Prog XX]** **----------** The display shows the expected value of the checksum '**XX**'. Display of this message indicates the system EPROMS have failed. The EPROMS and-or CPU board must be replaced before proper system operation would be expected. Operation will halt at this statement and the controller cannot be operated. Contact Mettler-Toledo service.
13b	**[CPU Failure RAM R/W]** **----------** The display shows that the dynamic RAM failed the read/write test. Display of this message indicates a system hardware failure. Operation will halt at this statement and the controller cannot be operated. Contact Mettler-Toledo service.
15	**[Force Cold Start? 0]** **----------** The local display ask if a forced cold start is to be preformed. **WARNING:** A Cold start will remove **ALL** custom setups and data that is stored in the controller. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #35.
20	**[Are You Sure? 0]** **----------** **Final WARNING:** The local display asks if you are sure that a Cold Start is to be performed. Cold start will remove all custom setups and data that was stored. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #35.
25	**[Initializing Memory]** **----------** This message is displayed during the Cold Start procedure. The Car file is being cleared and all of

POWER-UP SEQUENCE (Continued)

PROGRAM STATEMENT	APPLICATION
	the System Setup parameters are being set to their default values. The system configuration DIP switches will now be evaluated. With DIP switch SW1-2 set to **OFF** the system will be configured as a Standard U.S. C.I.M. System (Generic US Vehicles and Engines operating on a 12'6" weighbridge). With DIP switch SW1-2 set **ON** the system configuration information will be cleared and left blank. The wheel detector spacings and vehicle wheel base information must be entered through the System Setup function. DIP switch SW1-3 determines the units of measurement used by the system. With DIP switch SW1-3 set to **ON** (METRIC) the system will use metric units of measurement (Centimeters for wheel spacings, wheel detector spacings and Kilometers per hour for speed units). With DIP switch SW1-3 set to **OFF** (American) the system will use inches for distances and Miles per Hour for speed measurements.
30	**[Cold Start Done]** **----------** All memory has been cleared and the system has been configured to its default setting. Press **<ENTER>** to advance the controller to the next statement.
35	**[Turn DIP Sw1-8 OFF!]** **----------** The display indicates the SW1-8 switch on the C.I.M. control PCB is **ON** and must be turned **OFF**. This is to prevent a cold start from occurring during the next power-up sequence. Turn the switch **OFF** to proceed to the next statement.

POWER-UP SEQUENCE (Continued)

PROGRAM STATEMENT	APPLICATION
50	**[Standard US. C.I.M.]** or **[Non-U.S. C.I.M. Scl]** The System configuration statement is displayed for 2 seconds, the controller then advances to the next statement. See Appendix G for further information on the DIP Switch settings.
60	**[Units:Inches & M/hr]** or **[Units: Cm & Km/hr]** The Units of Measurement (for Speed and Distance) configuration statement is displayed for 2 seconds, the controller then advances to statement #100. See Appendix G for further information on the DIP Switch settings.

POWER-UP SEQUENCE (Continued)

PROGRAM STATEMENT	APPLICATION
80	**[Date? MM-DD-YY]** OR **[Date? DD-MM-YY]** Enter the date month.day.year (US Format) or day.month.year (Non US Format) and press <ENTER> to advance to the next statement. Use a decimal point '.' as the field separator when entering data. See Appendix G for DIP Switch settings which allow US and Non-US system configuration. Press <UPARROW> to return to statement #50. Press <RESET> to return to statement #50.
90	**[Time? HH:MM:SS]** Enter the time (hours.minutes.seconds) and press <ENTER>. The controller will advance to the next statement. Enter the hour in 24 hour format and use a decimal point '.' as the separator between fields. Pressing <UPARROW> to return to the previous statement. Press <RESET> to return to statement #50.

SELECTING A FUNCTION

Statements 100 through 199

When power is applied to the controller, it will normally advance to this section without operator intervention. If the controller has been set up for **UNATTENDED MODE** then it will advance to statement #1000 **[Ready for Train XXX]** after the normal power-up sequence.

PROGRAM STATEMENT — **APPLICATION**

100 — **[Select Function] or [Mettler-Toledo 9411E]**

Press the proper function key to select one of the following modes. To check or modify the system time and date press <UPARROW>, the controller will return to statement #90. To check the controller configuration press <RESET>, the controller will return to statement #50.

FUNCTION KEY	OPERATION
F1	**WEIGH TRAIN** The program will advance to statement #1000.
F2	**CONTINUE TRAIN** The program will advance to statement #2000.
F3	**CAR DATA** The program will advance to statement #3000.
F4	**ADVANCE CAR DATA** The program will advance to statement #4000. See #4050 for Auto Matching Cars
F5	**PRINT REPORTS** The program will advance to statement #5000. See #5000 for the Train Report See #5100 for the Car File Report See #5200 for the Advance Car Data Report See #5300 for the Car Type Setup Report See #5400 for the System Setup Report See #5500 for the CIM Certification Report
F10	**SYSTEM SETUP** The program will advance to statement #7000. See #7100 for General Setup See #7300 for Car Type Setup See #7500 for Printer Setup See #7700 for Auxiliary Setup See #7800 for Host Setup

See #7900 for Prompt Translation

F11 **TEST MODE**
The program will advance to statement #8000.

F12 **DISABLE/ENABLE KEYBOARD**
The program will advance to statement #9000.

SELECTING A FUNCTION (Continued)

PROGRAM STATEMENT **APPLICATION**

NOTE: 1. If the system is setup in slave mode and the operator has requested one of the above functions that only operates in non-slave mode then, the controller will advance to statement #120.

120 **[Sorry,In Slave Mode]**

The message will be displayed for a few seconds. The function that was just requested is only available in stand alone (Non-Slave) mode. The controller will automatically return back to statement #100.

130 **[Keyboard Disabled !]**

The message will be displayed for a few seconds and then the controller will automatically return to statement #100. The keyboard is disabled. Use function key <F12> to enable the keyboard, a password may be required.

WEIGH TRAIN MODE <F1>

Statements 1000 through 1999

About This Section

The following section describes the sequence that the controller follows while a train is being weighed.

PROGRAM STATEMENT	APPLICATION
1000	**[Processing]** **----------** This message is displayed briefly while the controller is preparing to weigh a train.
1005	**[Ready for Train XXX]** **----------** The controller is ready to weigh a train and will assign it number XXX. When a train has been detected the **Scale In Use** output will be turned **ON**. The controller will then advance to statement #1020. If the scale weight is greater than the OFF ZERO TOLERANCE value (statement #7240) then the display will indicate so. If OFF ZERO FATAL (statement #7245) is set to YES then the controller will advance to statement #1015. An OFF ZERO TOLERANCE condition without OFF ZERO being FATAL will advance the controller to the next statement. To return to statement #100 (**Select Function**) press <RESET>.
1010	**[Scale OffZero XXXXX]** **----------** The display shows the current scale weight because it is greater than the Zero Tolerance value. If the scale weight goes below the tolerance value then the controller will return to statement #1005. When a train has been detected the controller will advance to statement #1020.
1015	**[OffZero FATAL XXXXX]** **----------** The display shows the current scale weight because it is greater than the Zero Tolerance value and the controller is configured **NOT** to weigh a train under

PROGRAM STATEMENT	APPLICATION

this condition. If the scale weight goes below the tolerance value then the controller will return to statement #1005. If a train approaches the wheel detectors it will not be weighed, the controller will remain at this statement.

1020 **[Approach Dir. X XXX]**

The display shows that a train has been detected as approaching from direction A or direction B. If the cars are being pulled across the scale then the display will remain in this format until the engines have past. After the first car has been weighed, the controller will advance to the next statement.

The operator can abort the weighing of this train by pressing the <RESET> key. The controller will advance to statement #1050a.

* **1030** **[NNN WWWWWW SS.S]** or **[NNN AEITAGDATA SS.S]**
---------- **----------**
(Display Format 1) (Display Format 2)

The display shows the sequence number of the previous car weighed (NNN), the weight of the last car recorded (WWWWWW) and current speed of the train (SS.S). Optionally the Car ID (AEITAGDATA) can be shown if an AEI device is connected to the 9411e. See statement 7740 for the details on this option.

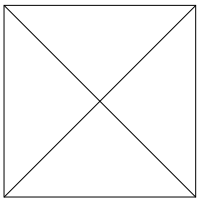


Diagram 1

WEIGH TRAIN MODE <F1> (Continued)

PROGRAM STATEMENT | **APPLICATION**

Pressing <F2> will change the display for this train from the default display format to the other format. The display will not change format until the next car has been weighed.

If three speed outputs have been selected (statement #7170) the OK SPEED output will be **ON** while the train speed is less than the marginal speed limit. The MARGINAL SPEED output will be **ON** while the train speed is greater than or equal to the marginal speed limit but less than the fast speed limit. The OVERSPEED output will be **ON** while the train speed greater than or equal to the over speed limit.

If one speed output has been selected (statement #7170) the speed indicator output will be turned **ON** once a train has been detected. This output will remain **ON** as long as the train is traveling at a speed less than the marginal speed limit. If the train is traveling at a speed greater than the marginal speed limit but less than the fast speed limit the output will be turned **ON** for one second then **OFF** for one second, repeatedly. If the train is traveling at a speed greater than the fast speed limit the output will be turned **ON** for .5 second then **OFF** for .5 second, repeatedly. The output will be turned **OFF** when an end of train condition is seen.

If an end of train condition is seen the controller will return to statement #1000 (**Ready for Train)** if the unattended mode has been selected, or to statement #100 (**Select Function**) if the attended mode. An end of train condition will occur if all cars in a train have gone across the scale (number of axles **IN** equals number

PROGRAM STATEMENT	APPLICATION
	of axles **OUT**) and no wheel detector activity has been seen for the timeout period. Once an end of train condition is detected a list of the car weights in the train will be printed (Figure 1) if Auto Train Report Print has been enabled. The controller will advance to statement #1050 under the following situations: 1. No wheel detector activity has been seen for the Timeout Period but the number of axles IN does not equal the number of axles OUT. 2. A error condition occurs. 3. The <RESET> key is pressed. Only the cars that have been completely weighed at the time <RESET> is pressed will be counted as part of the train.
1050	**[XXXXXXXXXXXXXXXXXX]** **----------** The display will show why the weighing process has stopped. See the following statements for the possible messages.

WEIGH TRAIN MODE <F1> (Continued)

PROGRAM STATEMENT	APPLICATION
1050a	**[* Operator Abort! *]** **----------** The Operator has pressed <RESET> while train was being weighed.
1050b	**[** Car File Full **]** **----------** The Car File is full. The remainder of the train has not been weighed. A maximum of 650 cars can be stored in the car file. (See statement #5030 to delete trains from the car file).
1050c	**[** End of Train! **]** **----------** An end of train condition has been seen.
1050d	**[** Train TimeOut **]** **----------** The number of axles **IN** does not equal number of axles **OUT**, and the train timeout period has expired.
1050e	**[Whl Detector Err(X)]** **----------** An illogical wheel detector sequence has been detected, or the controller cannot identify a valid car from the wheel detector sequence. The following 'X' illegal wheel detector sequences can occur: 3 - "**No-Match**" The vehicle passing over the scale generated a legitimate wheel detector sequence, but there was no entry in the Car Type file that would generate this sequence. The remedy for this is to measure the wheel base of the vehicle that caused the problem and enter its dimensions and actions in the Car Type file.

WEIGH TRAIN MODE <F1> (Continued)

PROGRAM STATEMENT	APPLICATION

4 - "**No Entry**" At the beginning of a train a failure has occurred with wheel detector #3 or #6 because wheel detector #4 or #5 was seen before wheel detectors #3 or #6. If the train was being weighed in direction 'A' then the problem is with wheel detector #3. If the train was being weighed in direction 'B' then the problem is with wheel detector #6. Example: A train is just approaching the scale, the first wheel detector sensed is #4 or #5, this is a problem.

5 - "**Too Many**" The system can keep track of 16 axles being on the scale (between #3 and #6) at the same time. More than 16 wheels have entered the scale without exiting.

6&7- "**Movement**" Wheel detector #3, #4, #5 or #6 is out of adjustment or the train has reversed direction during weighing.

8 - "**None Prior**" Wheel detector #3, #4, #5 or #6 is out of adjustment because no previous occurrence of this wheel was detected. Example: There are no axles on the scale. wheel detector #5 is sensed. The wheel was not first sensed by #3 and #4. This is a problem.

9 - "**Table Fault**" A RAM memory failure has occurred on the TSM300 microprocessor during a read operation of the Car Type File. Contact Mettler-Toledo service, we need to know if this has ever occurred.

If one of the above conditions occurs the system must wait for the rest of the train to cross the scale. **Once all wheel detectors have been open for the Timeout Period** (selected in Site File Setup) the controller will return to statement #1000 if unattended mode has been selected or to statement #100 (**Select Function**) if attended mode has been selected.

Press <RESET> to return the controller to statement #100.

CONTINUE TRAIN MODE <F2>

Statements 2000 through 2999

About This Section

The following section describes the proper sequence for starting to weigh cars in the middle of a train.

PROGRAM STATEMENT	APPLICATION
Note:	Prior to entering this mode the center body of a car must be positioned over the live section of the scale so that wheel detectors #3 and #6 are **NOT** activated and the scale indicator reads zero. In other words, the leading truck has already past the live section of the scale and the trailing truck of the car has not approached the scale.

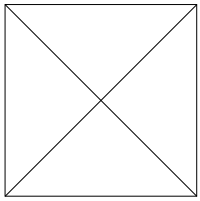


Diagram 2

CONTINUE TRAIN MODE <F2> (Continued)

PROGRAM STATEMENT	APPLICATION
2000	**[Continue Train XXX]** When the train starts to move, and wheel detector #3 or #6 is encountered, the **Scale In Use** output will be turned **ON** and the controller will advance to the next statement. To abort this process press <RESET>, the controller will return to statement #100 (**Select Function**).
2030	**[Approach Dir. X XXX]** The trailing truck of this first car will be ignored (**NOT** counted or weighed) and weighing will continue with the leading truck of the next car. Once this next car is weighed the controller will return to statement #1030.

ENTER CAR DATA <F3>

Statements 3000 through 3099

About This Section

The following section describes the operator interface which allows car numbers and tare weights to be entered to a train that has already been weighed. With tare weights in the car data, the Train Report will calculate car and train Net Weight and Net Tons. This section can also be used to enter static weights (in the tare weight field) during a CIM certification test. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

PROGRAM STATEMENT	APPLICATION
3000	**[Enter Train No. XXX]** **----------** Enter the train number of the cars that have been weighed. Press <ENTER> to advance to the next statement. Press <UPARROW> to back up to earlier train number.
3010	**[Car Sequence No.XXX]** **----------** Enter the sequence number of the first car in the train for which the ID number is to be entered. Press the <ENTER> key. The controller will advance to statement #3020 if the car is in the car file, or to the next statement if the car with this Train# / Sequence# can not be found in the car file.
3015	**[TTT/NNN Not Found !]** **----------** A car with sequence number NNN in train TTT was not found in the car file. Press any key to return to statement #3010.

ENTER CAR DATA <F3> (Continued)

PROGRAM STATEMENT	APPLICATION
3020	**[TTT/NNN XXXXXXXXXX]** **----------** NNN is the sequence number of the car in train XXX. The previously entered 10 character Id (XXXXXXXXXX) is displayed. Enter the new ID number for this car followed by <ENTER>, the controller will advance to statement #3030. To have the option of deleting this car press <F12>, the controller will advance to the next statement.
3022	**[Delete this Car? 0]** **----------** Press <1> (Yes) to deleted this car. The other cars from this train will not be disturbed. The controller will advance to the next statement. Press <0> (No) to leave this car in the car file. The controller will advance to statement #3030. <UPARROW> returns the controller to statement #3020.
3024	**[Are You Sure? 0]** **----------** Press <1> (Yes) to delete this car from this train. The controller will advance to the next statement. Press <0> (No) to leave this car in this train. The controller will advance to statement #3030.
3026	**[Sorting Car File !!]** **----------** This message will be displayed while the remaining cars in the car file are re-sorted by train number and car sequence number. The length of time that this message is displayed depends on how many cars still remain in the car file.

ENTER CAR DATA <F3> (Continued)

PROGRAM STATEMENT	APPLICATION
3028	**[* Car(s) Deleted! *]** **----------** The cars from the selected train have been deleted from the car file. The controller will return to statement #3020.
3030	**[TTT/NNN TarWtXXXXXX]** **----------** NNN is the sequence number of the car in train XXX. Any previously entered tare weight is displayed. Enter the tare weight for this car followed by <ENTER>. The controller will return to statement #3020, but the sequence # (NNN) will advance to the next car in the train. When there are no more cars in this train, the controller will advance to statement #3050.
3050	**[End of Train XXX]** **----------** There are no more cars for this train. Press any key to return to statement #3000.

ENTER ADVANCE CAR DATA <F4>

Statements 4000 through 4099

About This Section

The following section describes the operator interface which allows the entry of car numbers and tare weights into the advance car data file. The advance car data can then be matched up with a train that will be weighed later. This section is also useful for entering Car numbers and Static weights of a test train during a coupled in-motion test report. To match advance car data up with a weighed train see statement #4000. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

PROGRAM STATEMENT	APPLICATION
4000	**[Car Sequence No.XXX]** **----------** Enter the starting sequence number (1 - 105) of the car that is to have an Id and/or a tare weight modified or entered. If a sequence number of zero 00 is entered, the controller will advance to statement #4100 **[Auto Match Cars?]**. <UPARROW> returns the controller to statement #100.
4010	**[Car Id # XXXXXXXXXX]** **----------** Any previously entered Car ID is displayed. Enter the ID of this car in the Advance Car Data file.
4020	**[Enter Tare WtXXXXXX]** **----------** Any previously entered Tare Weight is displayed. Enter the tare weight of this car in the Advance Car Data file. The controller will return to statement #4000 with the sequence # advanced to the next car.

ENTER ADVANCE CAR DATA <F4> (Continued)

PROGRAM STATEMENT	APPLICATION
4100	**[Auto Match Cars? 0]** **----------** Press <1> (Yes) to have the system auto match in-motion weights with tare weights according to car sequence numbers. This selection causes the system to automatically match weighed cars in the car file with their car Ids and tare weights from the advance car data file. The matching is done by car sequence number. The controller will advance to the next statement. Match is done on weighed trains only. <UPARROW> returns the controller to statement #4000.
4120	**[Enter Train No. XXX]** **----------** Enter the train number to be auto matched and press <ENTER>. If the train number is found in memory the controller will advance to statement #4150. If the train number entered is not found in memory the controller will advance to the next statement.
4140	**[Train Not Found]** **----------** Press <ENTER> to return the controller to the previous statement.

ENTER ADVANCE CAR DATA <F4> (Continued)

PROGRAM STATEMENT	APPLICATION
4150	**[Normal Sequence? 1]** **----------** Press <1> (Yes) to have the train selected in statement #4120 auto matched to the tare weights and car Ids in normal ascending sequence. If the train selected is to be auto matched in normal sequence, car sequence number 001 will be matched to the tare weight with sequence 01. Car sequence number 002 will be matched to the tare weight with sequence 02. If the train is to be auto matched in reverse sequence, the car sequence numbers will be auto matched in reverse order. For example if there are 20 tare weights stored in memory, car sequence number 001 will be matched to the tare weight with sequence 20. Car sequence number 002 will be matched to the tare weight with sequence 19 and so forth. Press <0> (No) to have the train auto matched to the tare weights in reverse sequence. <UPARROW> returns the controller to statement #4120.
4180	**[Processing]** **----------** The system is locating all of the cars in this train and updating the car Ids and tare weights with the information from the advance car data file. This task may take from 2 to 12 seconds. When it is completed the controller will return to statement #4100.

SYSTEM REPORTS <F5>

Statements 5000 through 5999

About This Section

The following section describes the operator interface which allows printout of the system reports and the deletion of trains from the car file. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

PROGRAM STATEMENT	APPLICATION
5000	**[Prt Train Report? 0]** **----------** Press <1> (Yes) to obtain a report of an individual train that was weighed. See Figure 2 for the format of the report. Press <0> (No) or <ENTER> to advance to statement #5100. <UPARROW> returns the controller to statement #100.
5010	**[Enter Train No. XXX]** **----------** Enter the 3 digit train number followed by the <ENTER> key. Only those cars that were weighed on this train will show up on the report. Net weight and net tons will be calculated for those cars that have tare weights.
5020	**[* Printing Report *]** **----------** This message will be displayed while the report is being printed. Upon completion the controller will advance to the next statement.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5030	**[Del Cars in Train?0]** **----------** Press <1> (Yes) to have all of the cars that belong to this train deleted from the car file. The cars from other trains that are still in the car file will not be disturbed. Press <0> (No) to leave the cars in the car file. The controller will advance to statement #5100. <UPARROW> returns the controller to statement #5010 to print another Train Report.
5040	**[Are You Sure? 0]** **----------** Press <1> (Yes) to delete all of the cars belonging to this train from the car file. Press <0> (No) to leave the cars from this train in the car file. The controller will advance to statement #5100.
5050	**[Processing]** **----------** This message will be displayed while this train of cars is being deleted from the car file. The length of time that this message is displayed depends on how many cars were in this train and where in the car file the train resided.
5060	**[Sorting Car File !!]** **----------** This message will be displayed while the remaining cars in the car file are re-sorted by train number and car sequence number. The length of time that this message is displayed depends on how many cars still remain in the car file.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5070	**[* Car(s) Deleted! *]** **----------** The cars from the selected train have been deleted from the car file. This message will be displayed for 2 seconds. The controller will then advance to the next statement.
5100	**[Print Car File? 0]** **----------** Press <1> (Yes) to obtain a printout of the entire car file as shown in Figure 3. Press <0> (No) or <ENTER> to advance to statement #5200. <UPARROW> returns the controller to statement #5000.
5110	**[* Printing Report *]** **----------** This message will be displayed while the report is being printed. Upon completion the controller will advance to the next statement. Pressing <RESET> while the report is printing will advance the controller to the next statement before completing the report.
5120	**[Clear Car File? 0]** **----------** Press <1> (Yes) to have **ALL** trains of cars deleted from the car file. The controller will advance to the next statement. Press <0> (No) to leave the cars in the car file. The controller will advance to statement #5200.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5130	**[Are You Sure? 0]** **----------** Press <1> (Yes) to have all cars deleted from the car file. The controller will advance to the next statement. Press <0> (No) to leave the cars in the car file. The controller will advance to statement #5200.
5140	**[Car File Cleared !!]** **----------** All cars in the car file have been deleted. This Statement will be displayed for 2 seconds. The controller will then advance to the next statement.
5200	**[Print AdvCar Data?0]** **----------** Press <1> (Yes) to obtain a printout of the Car Number and Tare Weights in the Advance Car Data file. The controller will advance to the next statement. Pressing <0> (No) or <ENTER> to advance to statement #5300. <UPARROW> returns the controller to statement #5100.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5210	**[* Printing Report *]** **----------** A report of all Car Ids and Tare Weights in the Advance Car Data file is printing (Figure 4). Upon completion the controller will advance to the next statement.
5220	**[Clear AdvCar Data?0]** **----------** Press <1> (Yes) to clear the advance car data file. The controller will advance to the next statement. Press <0> (No) to leave the car data in the file. The controller will advance to statement #5300.
5230	**[Are You Sure? 0]** **----------** Press <1> (Yes) to clear the advance car data file. The controller will advance to the next statement. Press <0> (No) to leave the car data in the file. The controller will advance to statement #5300.
5240	**[AdvCar Data Cleared]** **----------** All cars in the car file have been deleted. This Statement will be displayed for 2 seconds. The controller will then advance to the next statement.
5300	**[Print SetupReport?0]** **----------** Press <1> (Yes) to obtain a report containing all of the System Setup values. The controller will display the **[* Printing Report *]** message. See Figure 5 for an example of the report. Upon completion the controller will advance to the next statement. Pressing <0> (No) or <ENTER> will advance the controller to the next statement.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5400	**[Print Car Types? 0]** **----------** Press <1> (Yes) to obtain a report of the car types and wheel detector spacings. The controller will display the **[* Printing Report *]** message. See Figure 6 for an example of the report. Upon completion the controller will advance to the next statement. Press <0> (No) or <ENTER> to advance the controller to statement #100.
5500	**[Print Test Report?0]** **----------** Press <1> (Yes) to obtain a printout of the coupled in-motion test report. The Car Ids and Static weights that are needed in this report can be entered through the Enter Car Data function for the Advance Car Data function. See Figure 7 for an example of the report. The controller will advance to the next statement. Press <0> (No) to advance to statement #100 without printing the report.
5510	**[Enter Test Name]** **----------** Press <ENTER> to advance to the next statement.
5515	**[XXXXXXXXXXXXXXXXXX]** **----------** Enter the name for this test printout (i.e. Pulling 10 Cars 4 mph) and press <ENTER>.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5520	**[Print All Trains? 0]** **----------** Press the <1> (Yes) key if all of the trains in the car file are to be included in the Coupled In-Motion Test Report. This is typically used if the car file was empty before the start of the test and all of the test runs were good and are being used in the report. The controller will advance to statement #5540. Press <0> (No) or <ENTER> to select which of the trains in the car file are to be used in the report. The controller will advance to the next statement. <UPARROW> returns the controller to statement #5510.
5530	**[Enter Train No. XXX]** **----------** Enter the number of the train that is to be included in the report. After the <ENTER> key is pressed the controller will check to see if the train exists in the car file. If it does not, the controller will advance to the next statement. Otherwise the controller will return to this statement and prompt for another train to be added to the list. Typically 5 to 10 trains are used to generate enough data for the report. To complete the list of trains and start printing the report, enter a 0 for the train number, the controller will advance to statement #5540.
5535	**[Train Not Found]** **----------** Enter the number of the train that is to be included in the report. After the <ENTER> key is pressed the controller will return to statement #5530.
5540	**[US. Report Format?1]** **----------** Press <1> (Yes) to use the US format of the Coupled In Motion Test Report (See Figure 8). Press <0> (No) to use the NON US format of the report (See Figure 7). Press the <ENTER> key, the controller will advance to the next statement.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5545	**[* Printing Report *]** **----------** The Coupled In-motion Test Report is printed. Upon completion the controller will advance to the next statement. See Figure 8 for definitions of test data. **If you are testing a newly installed 9411E then: Please mail or FAX the final results of your Coupled-In-Motion Test Report to:** **Mettler-Toledo, Inc.** **9411E Product Manager** **60 Collegeview Road** **Westerville, Ohio 43081-1494** **FAX: (614) 841-5100**
5550	**[Repeat Report Prt?0]** **----------** Press <1> (Yes) to print another copy of the Coupled In-Motion test report, the controller will return to statement #5545. Typically a copy of the final report is given to the scale inspector, local service office and customer. Press <ENTER> to advance to the next statement. <UPARROW> returns the controller to statement #5510 to restart the test report procedure.
5555	**[Clear Test Cars? 0]** **----------** Press <1> (Yes) to delete all the test cars from the car file. The controller will advance to the next statement. Press <0> (No) to leave the test cars in the car file. The controller will leave the reports section and return to statement #100.

SYSTEM REPORTS <F5> (Continued)

PROGRAM STATEMENT	APPLICATION
5560	**[Are You Sure? 0]** **----------** Press <1> (Yes) to delete the test car data from the car file. The controller will advance to the next statement. Press <0> (No) to leave the test cars in the car file. The controller will return to statement #100.
5565	**[Processing]** **----------** This message is displayed while the test data is deleted from the car file.
5570	**[Sorting Car File !!]** **----------** This message will be displayed while the remaining car data is re-sorted by train no. and sequence number.
5570	**[* Car(s) Deleted! *]** **----------** All test cars used in this report and their associated data have been deleted from memory. This Statement will be displayed for 2 seconds. The controller will then return to statement #100.

SYSTEM SETUP <F10>

Statements 7000 through 7099

About This Section

This section allows the setup of the system parameters. These parameters are setup at installation and as required by the application. System Setup can be entered by pressing the <F10> key from **[Select Function]**. In this section, pressing <RESET> at any prompt will return the controller to [Select Function] and pressing <UPARROW> will return the controller to the previous statement.

PROGRAM STATEMENT	APPLICATION
7000	**[Supervisor PwXXXXXX]** Enter the supervisor password and then press <ENTER>. If a password has not been setup, this statement will be skipped and the controller will advance to the next statement. If no password is entered within 3 seconds the controller will return to statement #100.
7010	**[General Setup? 0]** Press <1> (Yes) to modify the general setup parameters. The controller will advance to statement #7100.
7030	**[Car Type Setup? 0]** Press <1> (Yes) to setup the car types. The controller will advance to statement #7300.
7050	**[Printer Setup? 0]** Press <1> (Yes) to setup the printer parameters. The controller will advance to statement #7500.
7070	**[Auxiliary Setup? 0]** Press <1> (Yes) to setup the auxiliary port parameters. The controller will advance to statement #7700.
7080	**[Host Port Setup? 0]** Press <1> (Yes) to setup the host port parameters. The controller will advance to statement #7800.

SYSTEM SETUP <F10> (Continued)

PROGRAM STATEMENT	APPLICATION
7090	**[Display Msg Setup?0]** **----------** Press <1> (Yes) to modify one or more of the display messages and prompts. The controller will advance to statement #7900. Press <0> (No) or <ENTER> to leave system setup and return the controller to statement #100.

GENERAL SETUP

Statements 7100 through 7299

About This Section

The following section describes the operator interface which allows setup of general parameters. Pressing <RESET> at any prompt in this section will return the controller to statement #7010 **[General Setup?]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

The cold start default settings are shown for each parameter.

PROGRAM STATEMENT	APPLICATION
7100	**[Change Password? 0]** **----------** Press <1> (Yes) to modify the supervisor password. The controller will advance to the next statement. Press <ENTER> or <0> (No) to advance the controller to statement #7110.
7105	**[Supervisor PwXXXXXX]** **----------** Enter the supervisor password. This password allows access to GENERAL SETUP and SYSTEM TEST. If no password is entered, the password will not be requested upon entry to SETUP or TEST. The password is a six (6) character field, characters may be alpha or numeric. Press <CLEAR> to clear the password and allow free access to GENERAL SETUP and SYSTEM TEST features. Press <ENTER> to complete the field entry and advance to the next statement.
7110	**[Enter Site Name]** **----------** Press <ENTER> to advance to the next statement. Press <UPARROW> to return to statement #7100.

GENERAL SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7115	**[XXXXXXXXXXXXXXXXXX]** **----------** Enter the name for this site (19 AlphaNumeric characters) and press <ENTER>. The site name is printed on the headers of some reports. Press <CLEAR> to clear the entry field. <UPARROW> returns the controller to statement #7100.
7120	**[Next Train # XXX]** Default - 001 **----------** Enter the number that will be assigned to the next train that is weighed and press <ENTER>. The train number is a 3 digit consecutive number assigned in order to weighed train. It will roll over from 999 to 001 automatically. <UPARROW> returns the controller to statement #7110.
7125	**[CarData SlaveMode?0]** Default - '0' No **----------** Press <1> (Yes) followed by <ENTER> to allow the Car File Data to be controlled be the Host Computer. Enabling this feature will disable Reports that contain Car File Data from being printed by the 9411E. This feature is necessary to keep conflicts from arising between an operator and the Host Computer. Press <0> (No) followed by <ENTER> to allow the Car File Data to remain in control of the operator (Not the Host Computer). Disabling this feature will only affect the Host Computer when it tries to request Car File Data from the 9411E.

GENERAL SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7130	**[ImmediateWt.Print?1]** Default - '1' Yes **----------** Press <1> (Yes) followed by <ENTER> to enable the immediate weight print feature. Enabling this feature will cause the car weights to be printed while the train is being weighed. Press <0> (No) followed by <ENTER> to disable the immediate weight print feature.
7140	**[Auto Train Report?0]** Default - '0' No **----------** Press <1> (Yes) followed by <ENTER> to enable the auto train report print feature. Enabling this feature will cause a list of all the car weights in the train to be printed at the completion of the train weighing, before returning to [SELECT FUNCTION] or [READY FOR TRAIN]. Press <0> (No) followed by <ENTER> to disable the auto train report print feature. The controller will advance to statement #7150.
7145	**[Auto Delete Train?0]** Default - '0' No **----------** Press <1> (Yes) followed by <ENTER> to enable this feature. When enabled, this feature will automatically delete the train from the car file after being printed by the Auto Train Report feature above. This feature will only work when the Auto Train Report feature is enabled. Press <0> (No) followed by <ENTER> to disable this feature. Press <ENTER> only to leave this feature enabled-disabled as before.
7150	**[Train TimeOut XXX]** Default - 60 Seconds **----------** Enter the number of seconds for the train timeout period and press <ENTER>. The train timeout period is used to automatically abort the weighing operation when a train stops on the scale for an extended period of time.

GENERAL SETUP (Continued)

PROGRAM STATEMENT		APPLICATION
*	7155	**[Sys.Reset Timer XXX]** Default - 10 Seconds **----------** Enter the number of seconds for the system reset timer and press <ENTER>. This value determines how long the wait is between end of one train and when the system is ready for the next train.
	7160	**[UnAttended Mode? 0]** Default - '0' No **----------** Press <1> (Yes) followed by <ENTER> to select the unattended mode of operation. If the system is set up for this mode, the 9411E will automatically return to '**Ready for Train**' when a train is finished weighing and optionally printed. Press <0> (No) followed by <ENTER> to select attended mode. In this mode, the 9411E will return to '**Select Function**' when a weighing operation is completed.
	7170	**[#of Speed Outputs X]** Default - 3 **----------** Press <1> (Yes) to select the one blinking light option for speed indication. Press <3> to select the traditional red, yellow, green light speed indication. Press <ENTER> to advance to the next statement.
	7180	**[Dist WD 1 to 2 XXXX]** US Default - 42 inches **----------** Enter the distance (in the linear measurement units for which the system is setup) between wheel detectors #1 and #2 and press <ENTER>. If the optional wheel detectors #1, #2, #7 and #8 are not connected enter zero (0). A maximum entry of 2250 linear units is allowed.

NOTE: The distance between wheel detectors #1 and #2 must be the same as the distance between wheel detectors #7 and #8.

GENERAL SETUP (Continued)

PROGRAM STATEMENT	APPLICATION

7185 **[Dist WD 3 to 4 XXXX]** US Default - 33 inches

Enter the distance (in the linear measurement units that the system is setup for) between wheel detectors #3 and #4 and press <ENTER>. A maximum entry of 2250 linear units is allowed.

NOTE: The distance between wheel detectors #3 and #4 must be the same as the distance between wheel detectors #5 and #6.

7190 **[Dist WD 4 to 5 XXXX]** US Default - 42 inches

Enter the distance (in the linear measurement units that the system is setup for) between wheel detectors #4 and #5 and press <ENTER>. A maximum entry of 2250 linear units is allowed.

If DIP Switch SW1-1 is **OFF** then the controller will advance to statement #7010. This will prevent the operator or a Host computer from modifying the ***Calibration Parameters***. With DIP Switch SW1-1 **ON** the controller will advance to the next statement. If the ***Calibration Parameters*** are modified by a Host Computer or an Operator then a log of the change will be made. See the report at the end of Figure 5 for some sample changes. The ***Calibration Parameters*** are numbered from 01 to 16 and shown in ***italics*** on the next pages. These numbers are also shown in the second section of the General Setup Report (See Figure 5).

GENERAL SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7200	**[Marginal Speed XX.X]** US Default - 4.0 mph **----------** ***Calibration Parameter 01*** Enter the marginal speed limit in the appropriate speed units and press <ENTER>.
7210	**[Fast Speed XX.X]** US Default - 5.0 mph **----------** ***Calibration Parameter 02*** Enter the too fast speed limit in the appropriate speed units and press <ENTER>.
7215	**[Over Speed Fatal? 0]** Default - '0' No **----------** ***Calibration Parameter 03*** Press <1> (Yes) followed by <ENTER> to enable this feature. When enabled, this feature will automatically block out the weight of any car that was weighed faster than the Fast Speed (See previous statement). The other data fields for this car will be printed and recorded in the car file but, the weight and weight code fields with be marked with error codes). Press <0> (No) followed by <ENTER> to disable this feature. The controller will advance to the next statement.
7220	**[Dynamic GradSizeXXX]** Default - 100 **----------** ***Calibration Parameter 04*** Enter the graduation size that the system is to be operated in (10, 20, 50, 100, etc.) and press <ENTER>. Since the controller will be averaging weights from the scale indicator, it needs to know what graduation size to round to.
7230	**[Static GradSize XXX]** Default - 20 **----------** ***Calibration Parameter 05*** Enter the static scale graduation size (for use in the Coupled In-Motion Test Report) and press <ENTER>. This value must match graduation size of the weight indicator.

GENERAL SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7240	**[Zero Tolerance XXXX]** Default - 100 **----------** ***Calibration Parameter 06*** Enter the zero tolerance value. When the controller is ready to weigh a train, a Zero Tolerance check will be performed. A message will be displayed and appropriate action taken if necessary.
7245	**[OffZero Tol.Fatal?0]** Default - '0' No **----------** ***Calibration Parameter 07*** Enter <1> (Yes) followed be <ENTER> if an OFF Zero Tolerance condition (while READY for TRAIN) is to prevent a train from being weighed.
7250	**[Weigh Wheel Dectr:X]** US Default - 6, else 5 **----------** ***Calibration Parameter 08*** Enter the number of the wheel detector that is the last one on the live section of the scale. This is usually #5 for an axle scale weighing system and #6 for a truck (2 axles per) weighing system.
7260	**[# Weights in Avg. X]** Default - 1 **----------** ***Calibration Parameter 09*** Enter the number of reading from the scale indicator (1 thru 9) that will be used for the average weight and press <ENTER>. NOTE: See Appendix B for a definition of the number of weighments.
7270	**[Start Average At X]** Default - 1 **----------** ***Calibration Parameter 10*** Enter the start averaging point (0 thru 9) and press <ENTER>. See Appendix B for a definition of the start averaging point.
*	**Note: When making an adjustment to the offset values, a good first value for the Offset values can be determined from summary section of the Couple-In-Motion Test Report. Use the AVERAGE ERROR (multiplied by -1) as an addition to the current offset value.**

GENERAL SETUP (Continued)

	PROGRAM STATEMENT	APPLICATION
	7280	**[Offset A Pushn XXXX]** Default - 0 **----------** ***Calibration Parameter 11*** Enter the zero offset for direction A - pushing and press <ENTER>. The offset can be positive or negative.
	7284	**[Offset B Pushn XXXX]** Default - 0 **----------** ***Calibration Parameter 12*** Enter the zero offset for direction B - pushing and press <ENTER>. The offset can be positive or negative.
	7288	**[Offset A Pulln XXXX]** Default - 0 **----------** ***Calibration Parameter 13*** Enter the zero offset for direction A - pulling and press <ENTER>. The offset can be positive or negative.
	7292	**[Offset B Pulln XXXX]** Default - 0 **----------** ***Calibration Parameter 14*** Enter the zero offset for direction B - pulling and press <ENTER>. The offset can be positive or negative.
*	7294	**[1stCar dA Pull XXXX]** Default - 0 **----------** **Calibration Parameter 15** Enter the first car offset for direction A - pulling and press <ENTER>. This is a special correction factor for the car just behind the engine(s). The offset can be positive or negative.
*	7296	**[1stCar dB Pull XXXX]** Default - 0 **----------** ***Calibration Parameter 16*** Enter the first car offset for direction B - pulling and press <ENTER>. This is a special correction factor for the car just behind the engine(s). The offset can be positive or negative. The controller will return to statement #7010.

CAR TYPE SETUP

Statements 7300 through 7399

About This Section

The following section describes the operator interface which allows setup of Car Type dimensions and actions that are required for identifying and weighing different types of vehicles. Most importantly the RECORDing of a vehicle distinguishes it from an Engine which is not typically counted, weighed, printed or RECORDed.

These parameters are setup only once at installation as required by the application. Pressing <RESET> at any prompt in this section will return the controller to statement #7010 **[General Setup?]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

PROGRAM STATEMENT	APPLICATION

IMPORTANT NOTES:

1) **A valid car description MUST have a straddle point, an 'S' (Straddle) or 'X' (Weigh-Straddle).**
2) **A valid car description MUST have an end of car point, an 'E' (End) or 'Z' (Weigh-End).**
3) **To delete a car enter zero for the length and 'N' (Nothing) for the action for all axles.**
4) **There should be no blank (deleted) car descriptions in-between valid cars.**

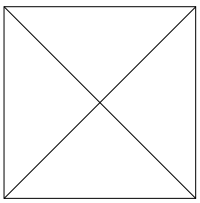


Diagram 3

CAR TYPE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION

7300 **[Car Type # XX]**

Enter the car type number (1 thru 15) and press <ENTER>.

<UPARROW> returns the controller to statement #100.

7310 **[Dist Axle 1 - 2 XXX]**

Enter the distance between this axle (1) and the next axle (2) and press <ENTER>. The units are centimeters for a Metric system otherwise, they are inches.

NOTE: If entering data for the last axle on the car enter zero (0) as the length since there is not another axle following this one.

7315 **[1: W-S-E-N-X-Z X]**

Enter what function the system will do when this axle hits the trigger point. The trigger point is the location of the last wheel detector on the scale. See Appendix B for further information. The controller will advance to statement #7320.

Press <**W**> followed by <ENTER> if the system is to perform a weigh function when this axle hits the trigger point.

Press <**S**> followed by <ENTER> if the car will now be straddling the scale when this axle hits the trigger point (i.e. in-between two trucks of the same car).

CAR TYPE SETUP (Continued)

PROGRAM STATEMENT | **APPLICATION**

Press <**N**> followed by <ENTER> nothing should be done when this axle hits the trigger point. Typically used on engines.

Press <**E**> followed by <ENTER> if this axle is the last axle of the car. The controller will advance to statement #7300.

Press <**X**> followed by <ENTER> if a combined weigh and straddle function is to be performed.

Press <**Z**> followed by <ENTER> if a combined weigh and end of car function is to be performed. The controller will advance to statement #7300.

NOTE: If <**E**> or <**Z**> is entered but the car does not have a straddle point, the following will be displayed.

7317 **[No Straddle Point]**

This system requires a straddle point in a car. You will not be allowed to leave this section until you enter a car with a straddle point, or delete the car by putting in zeros for all the distances and <**N**> for all **W-S-E-N-X-Z** Statements.

Press <ENTER> to return to statement #7315.

7320 **[Dist Axle 2 - 3 XXX]** (Refer to Statement #7310)

7325 **[2: W-S-E-N-X-Z X]** (Refer to Statement #7315)

7330 **[Dist Axle 3 - 4 XXX]** (Refer to Statement #7310)

7335 **[3: W-S-E-N-X-Z X]** (Refer to Statement #7315)

7340 **[Dist Axle 4 - 5 XXX]** (Refer to Statement #7310)

7345 **[4: W-S-E-N-X-Z X]** (Refer to Statement #7315)

7350 **[Dist Axle 5 - 6 XXX]** (Refer to Statement #7310)

7355 **[5: W-S-E-N-X-Z X]** (Refer to Statement #7315)

CAR TYPE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION	
7360	**[Dist Axle 6 - 7 XXX]**	(Refer to Statement #7310)
7365	**[6: W-S-E-N-X-Z X]**	(Refer to Statement #7315)
7370	**[Dist Axle 7 - 8 XXX]**	(Refer to Statement #7310)
7375	**[7: W-S-E-N-X-Z X]**	(Refer to Statement #7315)
7380	**[8: W-S-E-N-X-Z X]**	(Refer to Statement #7315)

7385 **[Record this Car? 0]**

Press <1> (Yes) followed by <ENTER> if this vehicle is to be recorded in the car file.

Press <0> (No) followed by <ENTER> if this vehicle is not to be recorded in the car file. The <0> (No) selection is typically used while describing an engine. If an Engine wheel base is similar to that of a Car (similar enough to create the same wheel detector pattern), the Engine will be recorded as a Car.

The controller will return to statement #7300 pointing to the next description in the Car Type File.

PRINTER INTERFACE SETUP

Statements 7500 through 7699

About This Section

The following section describes the operator interface which allows setup of the printer interface. Printer output is 20 mA. current loop or RS-232. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

The cold start default settings are shown for each parameter.

PROGRAM STATEMENT	APPLICATION
7500	**[Pntr Baud Rate XXXX]** Default - 300 baud **----------** Enter the baud rate for the printer port. Allowable settings are 300, 1200, 2400, 4800, or 9600. Press <ENTER> to complete the field entry and advance to the next statement. Press <UPARROW> to return to statement #7400.
7510	**[Pntr Data Bits X]** Default - 7 data bits **----------** Enter the number of data bits for the printer port. Allowable settings are 7 or 8. Press <ENTER> to complete the field entry and advance to the next statement.
7520	**[Pntr Parity (EON) X]** Default - 'E' even parity **----------** Enter the parity setting for the printer port. Allowable values are <E> for Even parity, <O> for Odd parity, or <N> for No parity. Press <ENTER> to complete the field entry and advance to the next statement.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7550	**[Trn Number Pos 012]** **----------** A 120 character string buffer is provided for the printer output transmission string. This output data string is **only** for immediate Weight Print and Auto Train Report, provided these features are selected in the General Setup. The **Car File Report** and **Train Report** generated in the print reports routine use a predetermined fixed format. Parameters within this string may be freely formatted. Each parameter to be included in the string is assigned a starting string position number. The starting position may be from 1 to 120, however, to avoid truncation, the starting position plus the parameter string length should not exceed 120. **A position value of 0 will cause the parameter not to be printed**. The following prompts allow entry of starting positions for each parameter. Values greater than the maximum starting position values will not be allowed. The transmission string will be initialized to spaces prior to loading, then un-occupied columns will be printed as spaces. The string length will be determined by the greatest ending string position set. **Parameter field Overlaps will not be checked.** See Figure 5 for a sample report with the default settings.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT | **APPLICATION**

7550 **[Trn Number Pos 012]** (Continued)

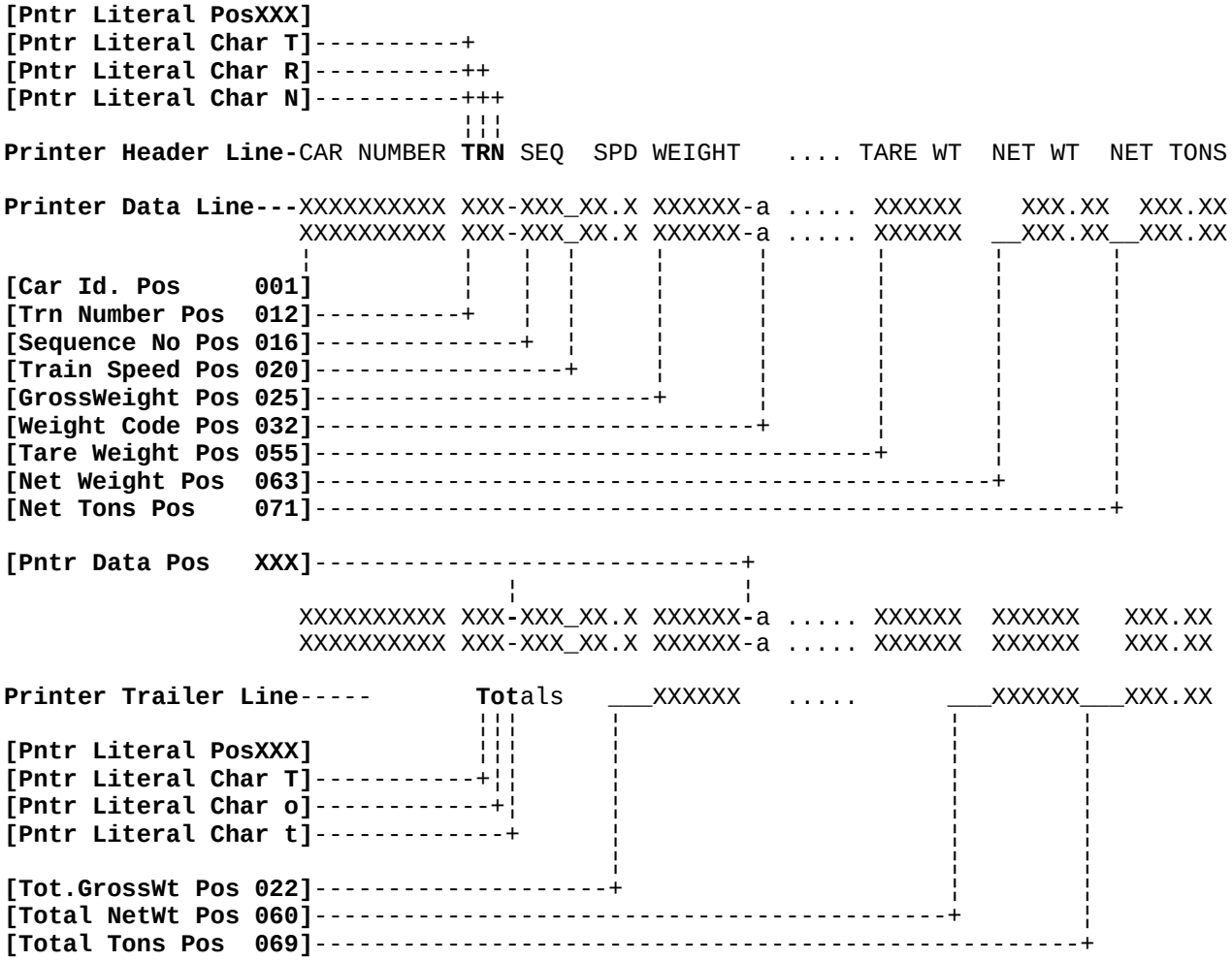
Prompt	Default Position	Field Length	Max Pos Set	Description
[Trn Number Pos 012]		3	118	Consecutive Train Number
[Sequence No Pos 016]		3	118	Sequence # within Train
[Car Type Pos 051]		2	119	Vehicle Type
[GrossWeight Pos 025]		6	115	Weight (No decimal pt)
[Weight Code Pos 032]		1	120	Weight Code (0 - 9).
[Weigh Time Pos 045]		5	116	Time (HH:MM).
[Weigh Date Pos 036]		8	113	Date (MM/DD/YY).
[Direction Pos 034]		1	120	Direction 'A' or 'B'.
[Car Id. Pos 001]		10	111	10 digit Car Number.
[Tare Weight Pos 055]		6	115	Tare Weight if Known.
[Train Speed Pos 020]		4	117	Train Speed XX.X
[Net Weight Pos 063]		6	115	Net Weight XXXXXX
[Net Tons Pos 071]		6	115	Net Tons XXX.XX
[Tot.GrossWt Pos 022]*		9	112	Total Gross Wt XXXXXXXXX
[Total NetWt Pos 060]*		9	112	Total Net Wt XXXXXX.XX
[Total Tons Pos 069]*		9	112	Total Net Tons XXXXXX.XX

*** Note:** These three total fields refer to positions on the Printer Trailer Line **NOT** the Printer Data Line.

Press <ENTER> to complete the field entry and advance to the next statement.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT **APPLICATION**



PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7560	**[Mod Pntr Hedr Lit?0]** **----------** The display asks if the printer header literal constants are to be changed. Literals are programmable characters from the ASCII charts in Appendixes C & D. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #7600.
7570	**[Clr Pntr Hedr Lit?0]** **----------** The display asks if the printer header literal constants are to be cleared. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #7580.
7575	**[Pntr Literals Clrd!]** **----------** The display indicates that all previously entered printer header literals have been cleared. After a few seconds the controller will advance to the next statement.
7580	**[Pntr Literal PosXXX]** **----------** Enter the position in the 120 character string of the character that will be modified or entered. Press <UPARROW> to return to statement #7570. Press <ENTER> to complete the field entry and advance to the next statement. When 0 is entered for the position then the controller will advance to statement #7600.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7590	**[Pntr Literal Char X]** **----------** Enter the desired literal, these are characters or codes that you may want to place in the car data line, to be inserted into the printer transmission string. See Appendix C for control and special character entry. Press <ENTER> to complete the field entry and return to statement #7580 with the literal position advanced to the next character. There is only one (1) limit on the number of literals that maybe entered, the Printer character string buffer is limited to 120 characters. Re-read controller statement #7550 to determine the maximum number of literals that maybe entered for your application.
7600	**[Mod Pntr Data Lit?0]** **----------** The display asks if the printer data literal constants are to be changed. Press <1> (Yes) or <ENTER> to advance to the next statement. Press <0> (No) to advance to statement #7640.
7610	**[Clr Pntr Data Lit?0]** **----------** The display asks if the printer data literal constants are to be cleared. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #7620.
7615	**[Pntr Literals Clrd!]** **----------** The display indicates that all previously entered printer data literals have been cleared. After a few seconds the controller will advance to the next statement.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7620	**[Pntr Literal PosXXX]** **----------** Enter the string position of the character that will be modified or entered. Press <UPARROW> to return to statement #7610. Press <ENTER> to complete the field entry and advance to the next statement. When 0 is entered for the position then the controller will advance to statement #7640.
7630	**[Pntr Literal Char X]** **----------** Enter the desired literal to be inserted into the printer transmission string. See Appendix C for control and special character entry. Press <ENTER> to complete the field entry and return to statement #7620 with the literal position advanced to the next character. There is only one (1) limit on the number of literals that maybe entered, the Printer character string buffer is limited to 120 characters. Re-read controller statement #7550 to determine the maximum number of literals that maybe entered for your application.
7640	**[Mod Pntr Trlr Lit?0]** **----------** The display asks if the printer trailer literal constants are to be changed. Press <1> (Yes) or <ENTER> to advance to the next statement. Press <0> (No) to advance to statement #100.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7650	**[Clr Pntr Trlr Lit?0]** **----------** The display asks if the printer trailer literal constants are to be cleared. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #7660.
7655	**[Pntr Literals Clrd!]** **----------** The display indicates that all previously entered printer trailer literals have been cleared. After a few seconds the controller will advance to the next statement.
7660	**[Pntr Literal PosXXX]** **----------** Enter the string position of the character that will be modified or entered. Press <UPARROW> to return to statement #7650. Press <ENTER> to complete the field entry and advance to the next statement. When 0 is entered for the position the controller will return to statement #100.

PRINTER INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7670	**[Pntr Literal Char X]** **----------** Enter the desired literal to be inserted into the printer transmission string. See Appendix C for control and special character entry. Press <ENTER> to complete the field entry and return to statement #7660 with the literal position advanced to the next character. There is only one (1) limit on the number of literals that maybe entered, the Printer character string buffer is limited to 120 characters. Re-read controller statement #7550 to determine the maximum number of literals that maybe entered for your application.

AUXILIARY INTERFACE SETUP

Statements 7700 through 7799

About This Section

The following section describes the operator interface which allows setup of the auxiliary port interface. Auxiliary output is 20 mA. current loop or RS-232. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

The cold start default settings are shown for each parameter.

	PROGRAM STATEMENT	APPLICATION
	7700	**[Aux. Baud Rate XXXX]** Default - 9600 baud **----------** Enter the baud rate for the auxiliary port. Allowable settings are 300, 1200, 2400, 4800, or 9600. Press <UPARROW> to return to statement #7500.
	7710	**[Aux. Data Bits X]** Default - 8 data bits **----------** Enter the number of data bits for the auxiliary port. Allowable settings are 7 or 8.
	7720	**[Aux. Parity (EON) X]** Default - 'N' no parity **----------** Enter the parity setting for the auxiliary port. Allowable values are <E> for Even parity, <O> for Odd parity, or <N> for No parity.
*	**7730**	**[No. AEI Antennas X]** Default - '0' no antennas **----------** Enter the number of AEI antennas mounted at the scale. Allowable settings are 0, 1, or 2.

AUXILIARY INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
* 7740	**[Display AEI CarId?X]** Default - '0' no **----------** Enter '0' for normal operation of the 19 character display. This will leave the display showing car weight during weighing. Enter '1' to change the default display to show AEI Car Id instead of weight during weighing. See section **X**.

AUXILIARY INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7750	**[Trn Number Pos 012]** **----------** A 120 character string buffer is provided for the auxiliary output transmission string. Parameters within this string may be freely formatted. Each parameter to be included in the string is assigned a starting string position number. The starting position may be from 1 to 120, however, to avoid truncation, the starting position plus the parameter string length should not exceed 120. **A position value of 0 will cause the parameter not to be transmitted**. The following prompts allow entry of starting positions for each parameter. Values greater than the maximum starting position values will not be allowed. The transmission string will be initialized to spaces prior to loading, then un-occupied columns will be transmitted as spaces. The string length will be determined by the greatest ending string position set. Parameter field overlaps will not be checked. A block check character may be sent by setting a block check character position other than 0. The block check is a single character that is computed as the Exclusive OR of all characters beginning at a specified starting character position and up to but not including the block check character itself. The block check begin prompt **[Blk Chk Bgn Pos 000]** will not appear if the block check character position is 0 **[Blk Chk Chr Pos 000]**.

AUXILIARY INTERFACE SETUP (Continued)

PROGRAM STATEMENT | **APPLICATION**

7750 **[Trn Number Pos 012]** (Continued)

Prompt	Default Position	Field Length	Max Pos Set	Description
[Trn Number Pos 012]		3	118	Consecutive Train Number
[Sequence No Pos 016]		3	118	Car Seq. # within Train
[Car Type Pos 051]		2	119	Vehicle Type
[GrossWeight Pos 025]		6	115	Weight (No decimal pt.)
[Weight Code Pos 032]		1	120	Weight Code 0,1 or 2.
[Weigh Time Pos 045]		5	116	Time (HH:MM).
[Weigh Date Pos 036]		8	113	Date (MM/DD/YY).
[Direction Pos 034]		1	120	Direction 'A' or 'B'.
[Car Id. Pos 001]		10	111	10 digit Car Number.
[Tare Weight Pos 055]		6	115	Tare Weight if Known.
[Train Speed Pos 020]		4	117	Train Speed XX.X
[Net Weight Pos 063]		6	115	Net Weight XXXXXX
[Net Tons Pos 071]		6	115	Net Tons XXX.XX
[Blk Chk Chr Pos 000]		1	120	Block check character
[Blk Chk Bgn Pos 000]		1	120	Begin block check

Press <ENTER> to complete the field entry and advance to the next statement.

7760 **[Mod Aux. Literals?0]**

The display asks if the auxiliary literal constants are to be changed.

Press <1> (Yes) or <ENTER> to advance to the next statement.

Press <0> (No) to advance to statement #100.

AUXILIARY INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7770	**[Clr Aux. Literals?0]** **----------** The display asks if the auxiliary literal constants are to be cleared. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #7780.
7775	**[Aux. Literals Clrd!]** **----------** The display indicates that all previously entered auxiliary literals have been cleared. After a few seconds the controller will advance to the next statement.
7780	**[Aux. Literal PosXXX]** **----------** Enter the string position of the character that will be modified or entered. Press <UPARROW> to return to statement #7770. Press <ENTER> to complete the field entry and advance to the next statement. When 0 is entered for the position the controller will advance to statement #100.

AUXILIARY INTERFACE SETUP (Continued)

PROGRAM STATEMENT	APPLICATION
7790	**[Aux. Literal Char X]** **----------** Enter the desired literal to be inserted into the auxiliary transmission string. See Appendix C for control and special character entry. Press <ENTER> to complete the field entry and return to statement #7780 with the literal position advanced to the next character. There is only one (1) limit on the number of literals that maybe entered, the auxiliary character string buffer is limited to 120 characters. Re-read controller statement #7750 to determine the maximum number of literals that maybe entered for your application.

HOST INTERFACE SETUP

Statements 7800 through 7899

About This Section

The following section describes the operator interface which allows setup of the Host interface. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the previously executed statement.

PROGRAM STATEMENT	APPLICATION
7800	**[Host Baud Rate XXXX]** Default - 9600 baud **----------** Enter the baud rate for the Host port. Allowable settings are 300, 1200, 2400, 4800, 9600, or 19,200. **NOTE:** 19,200 is entered as 19.2 Press <ENTER> to complete the field entry and advance to the next statement. Press <UPARROW> to return to statement #100.
7810	**[Host Data Bits 8]** Default - 8 data bits **----------** Enter the number of data bits for the Host port. Allowable settings are 7 or 8. Mettler Toledo CIM Host program PC137 KN773485 requires 8 data bits. Press <ENTER> to complete the field entry and advance to the next statement.

HOST INTERFACE SETUP SEQUENCE (Continued)

PROGRAM STATEMENT	APPLICATION

7820 **[Host Parity (EON) N]** Default - 'N' no parity

Enter the parity setting for the Host port. Allowable values are <E> for Even parity, <O> for Odd parity, or <N> for No parity. Mettler Toledo CIM Host program PC137 KN773485 requires NO PARITY.

Press <ENTER> to complete the field entry and advance to the next statement.

7840 **[Host Comm Unit # 00]** Default - 00, Host Disabled

Leaving the Host Communication Unit number at 00 will disable the Host communication software in the 9411E. Enter the unit number that the Host device will poll this unit with. Press <ENTER> to complete the field entry. The controller will return to statement #100. **Note:** See statement #7125 to allow the Host device to have control of the car file data.

DISPLAY PROMPT / MESSAGE TRANSLATION

Statements 7900 through 7999

About This Section

The following section describes the operator interface which allows translation of the display prompts. The intention of this feature is to configure the controller in the native language of the end user or operator. This should provide for a more user friendly device. While these parameters are ***more easily modified through the Host port*** with the appropriate Host software, they can be translated via the keyboard. When translating a Prompt or Message that contains a data field **[Ready for Train XXX]**, remember that the controller will overwrite the data field (**XXX**) portion with the appropriate data.

PROGRAM STATEMENT	APPLICATION
7900	**[Mod Prompt/Msg# XXX]** **----------** Enter the Display Prompt/Message Number. There are approximately 175 different prompts in this version of the software. Press <UPARROW> decrease the prompt # by 1. Press <RESET> to return to statement #100.
7910	**[XXXXXXXXXXXXXXXXXX] Example: [Select Function]** **---------- ----------** The English (Initial Factory Setting) version of the prompt is displayed for a brief moment.

PROGRAM STATEMENT	APPLICATION
7920	**[XXXXXXXXXXXXXXXXXX] Example: [Selecionar Funcao]**

The current translation (Spanish, German, French, etc..) of this prompt is displayed for modification. Enter the updated translation using upper and lower case characters. Use <F12> to return the prompt to its original English value.

Press <ENTER> to complete the field entry return to statement #7900 with the prompt number advanced to the next message.

Press <UPARROW> to return to the previous statement and show the factory setting of the prompt.

Press <RESET> to return to statement #7900 without modifying the text.

TEST MODE <F11>

Statements 8000 through 8999

About This Section

The following section describes the operator interface which allows execution of the system test functions. The Test Mode may be entered by pressing the <F11> key. Pressing <RESET> at any prompt in this section will return the controller to statement #100 **[Select Function]**. In general throughout this section pressing <UPARROW> will return the controller to the statement that prompts the operator to run the previous test.

PROGRAM STATEMENT	APPLICATION
8000	**[Test Scale? 0]** **----------** The display asks if it is desired to test the scale. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8100. Press <UPARROW> to return to statement #100.
8050	**[Scale Weight XXXXXX]** **----------** The display of the scale weight is updated every second. Press <ENTER> to advance to the next statement. If a communication fault occurs between the TSM3000 and the scale indicator or if the data format is incorrect or garbled then the **[*** Scale Fault ***]** message will be displayed. If the scale indicator is over its rated capacity then the **[Scale Over Capacity]** message will be displayed.
8100	**[Zero Scale? 0]** **----------** The display asks if it is desired to ZERO the scale. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8200.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8150	**[Zeroing Scale]** **----------** A Zero 'Z' command is sent to the indicator through the serial communication line. The controller will return to statement #8050 to demonstrate that the scale has zeroed.
8200	**[Graphic WeightTst?0]** **----------** See Figure 9 for an example of the Graphic Weight Test Report. Report is designed in a 132 column format. This feature is used during startup of the system when problems occur with the accuracy of the weights. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8300.
8210	**[Enter Test Name]** **----------** Press <ENTER> to advance to the next statement.
8220	**[XXXXXXXXXXXXXXXXXX]** **----------** Enter the name for this run (i.e. SOUTH-PULLING) and press <ENTER>.
8240	**[Waiting for Train !]** **----------** The controller is ready for the start of the train. When a train is detected then the controller will advance to the next statement. <ENTER> to advance to statement #8280 and weigh car. <RESET> aborts the test and advances the controller to statement #8299.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8260	**[View Next Car? 1]** **----------** Press <1> (Yes) to have the system capture the weights of the next car that has been setup for 'WEIGH' or 'WEIGH-STRADDLE'. The Controller will advance to the next statement. <RESET> aborts the test and advances the controller to statement #8299.
8280	**[* Waiting For Car *]** **----------** Once a car has been weighed, the 9 weights prior to the trigger point and the 9 weights after the trigger point will be printed for each truck of the car (Figure 9). The window that has been selected under Site File Setup (number of weighments and start averaging point) is shown by exclamation marks (!). The average weight is the average of the window weights. Car weight is the summation of the average weight for each truck. See Appendix B for a description of the weighing procedure. Once the printout has been completed the controller will advance to the next statement. <RESET> aborts the wait for the car and advances the controller to the next statement.
8299	**[End Graphic Wt Test]** **----------** This message will be displayed for a brief moment and then the controller will advance to the next statement.
8300	**[Whl Detector Test?0]** **----------** This test will print the status of the wheel detectors (digital inputs). This feature is typically used during startup of the system if a problem exists in detecting cars. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8400.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8350	**[Wheel Detector Test]** **----------** This display is shown while the test is in progress. The wheel detector number and the time (ms.) of the leading edge of the signal are printed. Press <ENTER> to stop the test and advance to the next statement.
8400	**[Digital Inp. Test?0]** **----------** The display asks if it is desired as a test to display the status of the digital inputs. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8500.
8450	**[Inputs XXXXXXXX]** **----------** The current input status of all eight inputs is shown on the display. A number in the display represents an **ON** condition and a space in the field represents an **OFF** condition. The inputs are continuously read and updated. See Appendix I for more details on the input test display. Press <ENTER> to advance to the next statement.
8500	**[Test Outputs? 0]** **----------** The display asks if it is desired to test the digital outputs. Press <1> (Yes) to advance to the next statement. **CAUTION:** External devices will be energized if this test is performed. Press <0> (No) or <ENTER> to advance to statement #8600.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8550	**[Output Test _]** **----------** Press a numeric key from 1 to 8 to energized the associated output. The output will stay **ON** until another output is selected or the Output Test is exited. Press <ENTER> to advance to the next statement.
8600	**[Printer Test? 0]** **----------** The display asks if it is desired to run the printer test. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8700.
8650	**[Testing Printer]** **----------** A test string is sent to the printer. The controller then returns to the previous statement. The test output string is: **ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789<cr><lf>**.
8700	**[Host Test? 0]** **----------** The display asks if it is desired to run the Host test. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8800.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8750	**[Testing Host]** **----------** A test string is sent repeatedly to the Host. Any displayable characters received will be displayed (this allows a loop back test). The test output string is: **ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789<cr><lf>**. For loop back testing, connect the Host output to the Host input. The first 19 characters of the test output string will be shown on the display (**ABCDEFGHIJKLMNOPQRS**). Press <ENTER> to advance to the next statement.
8800	**[Aux. Port Test? 0]** **----------** The display asks if it is desired to run the auxiliary port test. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8900.
8850	**[Testing Aux. Port]** **----------**
*	The test string **ABCDEF...UVWXYZ0123456789<cr><lf>** is repeatedly sent out the auxiliary port. If the system is setup for zero AEI antennas than, any displayable characters received will be shown. With AEI setup set for one or two antennas than AEI Rail Tag Data can be displayed by passing tags infront of the antennas. Press <ENTER> to advance to the next statement. **Note:** For loop back testing, connect the Aux. output to the Aux. input. The first 19 characters of the test output string will be shown on the display.

TEST MODE <F11> (Continued)

PROGRAM STATEMENT	APPLICATION
8900	**[Keyboard Test? 0]** **----------** The display asks if it is desired to run the keyboard test. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to advance to statement #8950.
8925	**[Key Test XXX]** **----------** The display indicates the key that is pressed. Press <RESET> to advance to the next statement.
8950	**[Display Test? 0]** **----------** The display asks if it is desired to run the display test. Press <1> (Yes) to advance to the next statement. Press <0> (No) or <ENTER> to return to statement #100.
8975	**[**********]** **----------** A test pattern that illuminates all display pixels and cursors is written to the display. Press <ENTER> to return to statement #100.

DISABLE / ENABLE KEYBOARD <F12>

Statements 9000 through 9099

About This Section

The following section describes the operator interface which allows the keyboard to be disabled so that the unit cannot be tampered with while it is in unattended mode or to fully operate the unit from a host computer without any unexpected operator intervention.

PROGRAM STATEMENT	APPLICATION
9000	**[Supervisor PwXXXXXX]** **----------** Enter the supervisor password and then press <ENTER>. If a password has not been setup, this statement will be skipped and the controller will advance to the next statement. If no password is entered within 3 seconds the controller will return to statement #100. If the Keyboard has already been disabled then the controller will advance to statement #9200 to enable it. Otherwise the controller will advance to the next statement to disable the keyboard.
9100	**[Disable Keyboard? 0]** **----------** Press the 1 key to disable the function keys. The controller will return to statement #100 with the **[Mettler-Toledo 9411E]** prompt. <ENTER>, <UPARROW> or <RESET> returns the controller to statement #100 and leaves the keyboard enabled with the **[Select Function]** prompt displayed.
9200	**[Enable Keyboard? 0]** **----------** Press the 1 key to enable the function keys for operator interface, the controller will return to statement #100 with the **[Select Function]** prompt. <ENTER>, <UPARROW> or <RESET> returns the controller to statement #100 and leaves the keyboard disabled with the **[Mettler-Toledo 9411E]** prompt displayed.

APPENDICES
APPENDIX A - DEFINITION OF WEIGHT CODES / SPEED FLAGS

0 = Train was travelling at the OK speed.

1 = Train was travelling at the MARGINAL speed.

2 = Train was travelling at the TOO FAST speed.

3 = Car was detected and recorded but no trucks were weighed.

4 = Truck was not done being weighed when an END of CAR, STRADDLE, or WEIGH was seen for a new axle. This will occur if too many readings from the indicator have been selected to be read after the trigger point.

5 = Invalid scale mode. Indicator has been setup with a decimal point or the indicator is in net weight mode.

6 = Scale is over capacity.

7 = Indicator timeout. System did not receive any data from the indicator.

8 = Manual Entry.

9 = Car was travelling at the TOO FAST speed when the weight was taken and the System is set up for Over Speed Fatal.

APPENDIX B - DESCRIPTION OF WEIGHING AND TERMS

The In-motion railroad system averages a user selectable number of weighments in determining the weight of a truck. The starting point for averaging relative to the trigger point is also user selectable. The trigger point is when only one truck is completely on the scale and the wheel detector sequence indicates the first wheel of the truck is almost off of the scale.

The start averaging point is defined as the number of readings **before** the trigger point at which the system will start averaging. The number of weighments is the number of weight readings to be used for the average, starting at the start averaging point. These entries will generate a window of averaging before, around, or after the trigger point.

EXAMPLE 1:

Start averaging point equals **4**.
Number of weighments equals **5**.

```
:  :  :  :  :  *  *  *  *  !  *  :  :  :  :  :  :  :  :
9  8  7  6  5  4  3  2  1     1  2  3  4  5  6  7  8  9
Before                       Trigger                 After
```

! indicates the trigger point.
: indicates weighments stored in memory
***** indicates weighments that will be averaged

EXAMPLE 2:

Start averaging point equals **0**.
Number of weighments equals **3**.

```
:  :  :  :  :  :  :  :  :  !  *  *  *  :  :  :  :  :  :
9  8  7  6  5  4  3  2  1     1  2  3  4  5  6  7  8  9
Before                       Trigger                 After
```

! indicates the trigger point.
: indicates weighments stored in memory
***** indicates weighments that will be averaged

APPENDIX C - CONTROL AND SPECIAL CHARACTER ENTRY

When setting up string literals it is sometimes necessary to use control characters and other characters not available on the Controller keyboard. The following is a chart on how to enter control characters.

Note: The Controller's local display, will display ASCII Control Characters using the CTRL with a bar over the character entered. All other characters will be displayed as shown in the ASCII Control Character column.

ASCII CONTROL CHARACTER	HEX EQUIV.	ENTRY
SOH	01H	Press CTRL then A
STX	02H	Press CTRL then B
ETX	03H	Press CTRL then C
EOT	04H	Press CTRL then D
ENQ	05H	Press CTRL then E
ACK	06H	Press CTRL then F
BEL	07H	Press CTRL then G
BS	08H	Press CTRL then H
HT	09H	Press CTRL then I
LF	0AH	Press CTRL then J
VT	0BH	Press CTRL then K
FF	0CH	Press CTRL then L
CR	0DH	Press CTRL then M
SO	0EH	Press CTRL then N
SI	0FH	Press CTRL then O
DLE	10H	Press CTRL then P
DC1 (XOn)	11H	Press CTRL then Q
DC2	12H	Press CTRL then R
DC3 (XOff)	13H	Press CTRL then S
DC4	14H	Press CTRL then T
NAK	15H	Press CTRL then U
SYN	16H	Press CTRL then V
ETB	17H	Press CTRL then W
CAN	18H	Press CTRL then X
EM	19H	Press CTRL then Y
SUB	1AH	Press CTRL then Z
ESC	1BH	Press CTRL then [
FS	1CH	Press CTRL then \
GS	1DH	Press CTRL then]
RS	1EH	Press CTRL then ~
US	1FH	Press CTRL then ?
DEL	7FH	Press CTRL then _

APPENDIX C - CONTROL AND SPECIAL CHARACTER ENTRY (Continued)

Special characters are entered on the Controller keyboard by pressing SHIFT, ALT, or CTRL followed by a function key. The following is a chart of these special characters.

CHARACTER	HEX EQUIV.	ENTRY
* (asterisk)	2AH	Press SHIFT then F1
/ (slash)	2FH	Press SHIFT then F2
= (equal sign)	3DH	Press SHIFT then F3
<> (not equal)	n/a	Press SHIFT then F4
<= (less than or equal to)	n/a	Press SHIFT then F5
>= (greater than or equal to)	n/a	Press SHIFT then F6
! (exclamation mark)	21H	Press SHIFT then F7
" (double quotation mark)	22H	Press SHIFT then F8
# (number sign)	23H	Press SHIFT then F9
$ (dollar sign)	24H	Press SHIFT then F10
% (percent sign)	25H	Press SHIFT then F11
& (ampersand)	26H	Press SHIFT then F12
` (single quotation mark)	60H	Press ALT then F1
' (apostrophe)	27H	Press ALT then F2
^	5EH	Press ALT then F3
@ (at sign)	40H	Press ALT then F4
((opening parentheses)	28H	Press ALT then F5
) (closing parentheses)	29H	Press ALT then F6
[(opening bracket)	5BH	Press ALT then F7
\ (backslash)	5CH	Press ALT then F8
] (closing bracket)	5DH	Press ALT then F9
~	7EH	Press ALT then F10
? (question mark)	3FH	Press ALT then F11
_ (underscore)	5FH	Press ALT then F12
{	7BH	Press CTRL then F5
}	7DH	Press CTRL then F6
|	7CH	Press CTRL then ;

APPENDIX D - ASCII CONTROL CODE CHART

ASCII	DEC	OCTAL	HEX
NUL	0	000	00
SOH	1	001	01
STX	2	002	02
ETX	3	003	03
EOT	4	004	04
ENQ	5	005	05
ACK	6	006	06
BEL	7	007	07
BS	8	010	08
HT	9	011	09
LF	10	012	0A
VT	11	013	0B
FF	12	014	0C
CR	13	015	0D
SO	14	016	0E
SI	15	017	0F
DLE	16	020	10
DC1	17	021	11
DC2	18	022	12
DC3	19	023	13
DC4	20	024	14
NAK	21	025	15
SYN	22	026	16
ETB	23	027	17
CAN	24	030	18
EM	25	031	19
SUB	26	032	1A
ESC	27	033	1B
FS	28	034	1C
GS	29	035	1D
RS	30	036	1E
US	31	037	1F

ASCII	DEC	OCTAL	HEX
SP	32	040	20
!	33	041	21
"	34	042	22
#	35	043	23
$	36	044	24
%	37	045	25
&	38	046	26
'	39	047	27
(	40	050	28
)	41	051	29
*	42	052	2A
+	43	053	2B
,	44	054	2C
-	45	055	2D
.	46	056	2E
/	47	057	2F
0	48	060	30
1	49	061	31
2	50	062	32
3	51	063	33
4	52	064	34
5	53	065	35
6	54	066	36
7	55	067	37
8	56	070	38
9	57	071	39
:	58	072	3A
;	59	073	3B
<	60	074	3C
=	61	075	3D
>	62	076	3E
?	63	077	3F

ASCII	DEC	OCTAL	HEX
@	64	100	40
A	65	101	41
B	66	102	42
C	67	103	43
D	68	104	44
E	69	105	45
F	70	106	46
G	71	107	47
H	72	110	48
I	73	111	49
J	74	112	4A
K	75	113	4B
L	76	114	4C
M	77	115	4D
N	78	116	4E
O	79	117	4F
P	80	120	50
Q	81	121	51
R	82	122	52
S	83	123	53
T	84	124	54
U	85	125	55
V	86	126	56
W	87	127	57
X	88	130	58
Y	89	131	59
Z	90	132	5A
[	91	133	5B
\	92	134	5C
]	93	135	5D
^	94	136	5E

ASCII	DEC	OCTAL	HEX
`	96	140	60
a	97	141	61
b	98	142	62
c	99	143	63
d	100	144	64
e	101	145	65
f	102	146	66
g	103	147	67
h	104	150	68
i	105	151	69
j	106	152	6A
k	107	153	6B
l	108	154	6C
m	109	155	6D
n	110	156	6E
o	111	157	6F
p	112	160	70
q	113	161	71
r	114	162	72
s	115	163	73
t	116	164	74
u	117	165	75
v	118	166	76
w	119	167	77
x	120	170	78
y	121	171	79
z	122	172	7A
{	123	173	7B
|	124	174	7C
}	125	175	7D
~	126	176	7E

	_	95	137	5F		Del	127	177	7F

APPENDIX E - EXTERNAL WIRING INSTALLATION RECOMMENDATIONS

1. 120 VAC, 60 Hertz, isolated, regulated power source to be furnished by others. Mettler-Toledo recommends the use of a computer grade isolated transformer. The transformer shall be sized such that at least 50-70% of the VA rating will be drawn at minimum load.

2. Unless otherwise specified, all external wiring must be in steel conduit.

3. All external AC power and control lines must be in separate conduit from other external control and logic wiring.

4. All conduit shall enter the enclosure through insulated bushings.

5. Mettler-Toledo recommends all wires and/or cables be tagged for future identification.

6. Mettler-Toledo recommends two (2) spare wires be run in each conduit; maximum ten (10) wires - minimum two (2) wires. All spare wires entering the enclosure should be electrically terminated to the ground lug.

7. All electrical wiring to conform to appropriate national and local area electrical codes for this type of installation.

APPENDIX F - MODEL 8142 and MODEL 8530 INDICATOR SETUP

Both the Mettler-Toledo Model 8142 and Model 8530 indicators must be configured for Toledo Continuous Output format (with Checksum) at 4800 baud, 7 data bits with Even parity. The filtering setting must be set to zero (0) so that no filtering in the indicator affects the weighing, for the 8530 indicator set parameter 27 = 0, for the 8142 indicator set parameter 4.4 = 0. Finally the indicators must be configured to receive Ascii commands to Zero the scale.

rev 7/25/94 - added parameter code numbers

APPENDIX G - TSM-300 JUMPER AND DIP SWITCH SETTINGS

The below listed jumper and switch settings are for the TSM300 controller board (basic part number 13820100A). See the figure on the next page for the board layout.

W1 = OUT	W8 = IN
W2 = OUT	W9 = IN
W3 = Pins 2 to 3	W10 = Pins 2 to 3 - RAM Position
W4 = Pins 1 to 2	W11 = IN
W5 = Pins 1 to 2	W12 = IN
W6 = OUT	W13 = Pins 1 to 2, Pins 3 to 4
W7 = IN	W14 = Pins 1 to 2, Pins 3 to 4

The standard 9411E C.I.M. Controller uses DIP switches SW1-1, SW1-2, SW1-3 and SW1-8. When switch SW1-8 is **ON** at powerup a Cold Start will be forced on the RAM Memory of the controller.

Switch SW1-1 allows access to the Setup calibration parameters. See statements #7200 thru #7298. With SW1-1 **OFF**, the operator and Host computer will be prevented from modifying these values.

Switch SW1-2 determines if this is a standard US CIM application or not. With SW1-2 **OFF**, the generic US default settings will be configured into the Car Type file and the General Setup information at Cold Start. The US date format of MM/DD/YY will be used instead of the European format of DD/MM/YY. Also, as a standard US unit the decimal point "." will be used in numbers instead of the European standard of using a comma ",".

Switch SW1-3 determines the units of measure for the system. With SW1-3 **ON**, the unit is configured as a METRIC system and will report in centimeters and kilometers per hour. With it **OFF**, the unit is configured as a typical US system and will report in inches and miles per hour.

Standard U.S. System with 12'6" Scale	**Typical Non U.S. System Axle Weighing Scale**
SW1-1 = **OFF No Access**	SW1-1 = **OFF No Access**
2 = **OFF Std. US**	2 = **ON Non US**
3 = **OFF US Units**	3 = **ON Metric Units**
4 = OFF	4 = OFF
5 = OFF	5 = OFF
6 = OFF	6 = OFF
7 = OFF	7 = OFF
8 = **OFF No Cold Start**	8 = **OFF No Cold Start**

APPENDIX G - TSM-300 JUMPER AND DIP SWITCH SETTINGS (Continued)

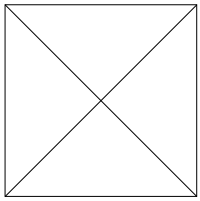


Figure 2.

APPENDIX H - COMMUNICATION STANDARDS

This section of the manual contains various items of interest when dealing with communication circuit types, signal identification, and data formats.

Communication Circuit Types

RS-232

- 50 feet maximum cable length. RS-232 has a medium amount of noise immunity. Long lengths of successful communications are highly dependent on the electrical environment. Performance of the RS-232 communication link can be improved by avoiding bundling the cables with other wiring and routing the cable away from devices which produce electrical noise.

RS-422

- 4000 feet maximum cable length. RS-422 has a medium amount of noise immunity. Long lengths of successful communications are highly dependent on the electrical environment. Performance of the RS-422 communication link can be improved by avoiding bundling the cables with other wiring and routing the cable away from devices which produce electrical noise.

20 Milliamp Current Loop

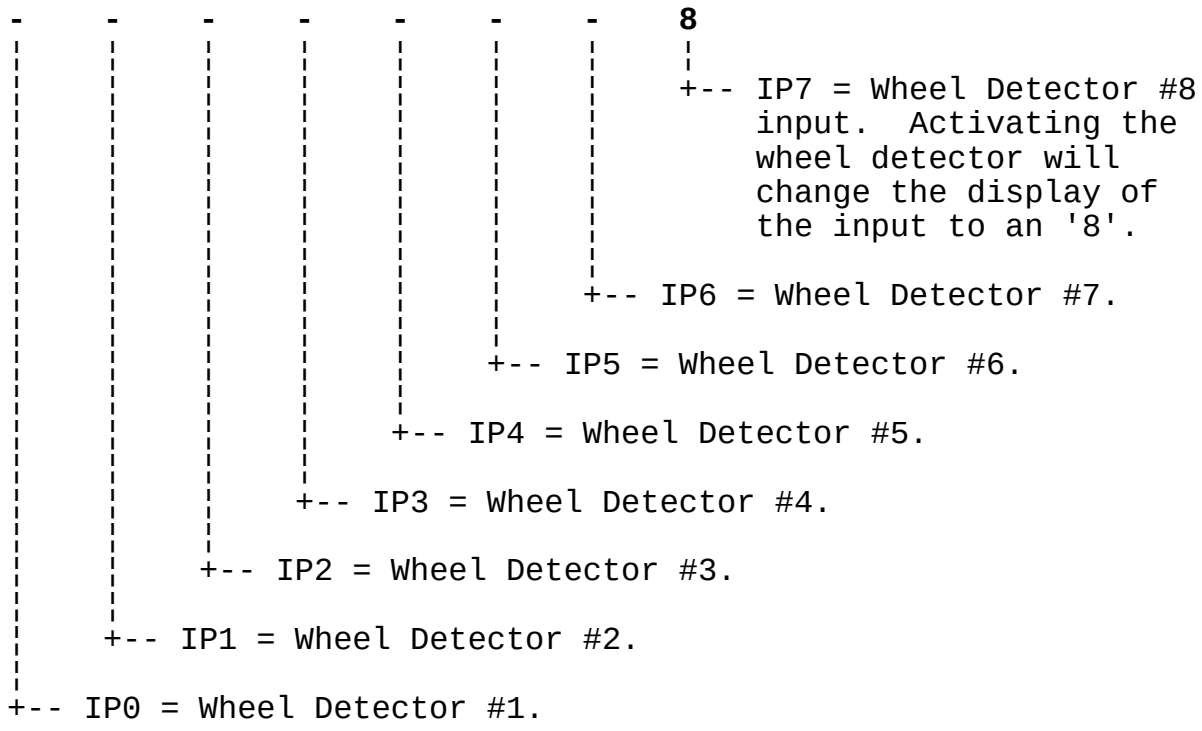
- 1000 feet maximum cable length, up to 1500 feet if routed in separate conduit. 20mA current loop offers good electrical noise immunity. Distance to 1500 feet are possible when the cable is placed in separate conduit.

APPENDIX I - DIGITAL INPUT TEST DISPLAY

During the input test mode eight characters will be displayed on the right side of the display. The values are either a space or a numeric digit, a numeric digit represents an **ON** condition of the input and a space represents an **OFF** condition of the input. The display order is from right to left, the right most digit represents input IP7, the left most digit represents input IP0.

INPUT TEST DISPLAY LAYOUT:

The following is a representation of what could be expected.



APPENDIX J - EXAMPLE AUXILIARY PORT SETUP

The following is an example for one model of video recorder. The 9411e transmits data out of the Auxiliary port to the video recorder. The recorder superimposes the data onto the video image. The recorder in the example requires an interface of 9600 Baud, 7 Data bits, Even parity. The recorder requires a Home command (Cntrl X) before text data and a carriage return (Cntrl M) line feed (Cntrl J) after text data. The user wants: Car sequence number, Gross weight and Speed information. The data string is:

Cntrl X
3 Character Sequence Number
3 Spaces
6 Character Gross Weight
3 Spaces
4 Character Speed Information
Cntrl M
Cntrl J

1. Press the <F10> key. The controller will proceed to statement #7000.

1a. At the **[General Setup? 0]** prompt, press the <0> key.

1b. At the **[Car Type Setup? 0]** prompt, press the <0> key.

1c. At the **[Printer Setup? 0]** prompt, press the <0> key.

1d. At the **[Auxiliary Setup? 0]** prompt, press the <1> key. The controller will proceed to statement #7700.

2. At the **[Aux. Baud Rate XXXX]** prompt, press the <9> key, then press the <6> key, then press the <0> key twice. Press the <ENTER> key.

3. At the **[Aux. Data Bits X]** prompt, press the <7> key. Press the <ENTER> key.

4. At the **[Aux. Parity (EON) X]** prompt, press the <E> key. Press the <ENTER> key.

5. At the **[TrnNumber Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

6. At the **[Sequence No Pos 000]** prompt, press the <2> key. Press the <ENTER> key.

7. At the **[Car Type Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

8. At the **[GrossWeight Pos 000]** prompt, press the <8> key. Press the <ENTER> key.

APPENDIX J - EXAMPLE AUXILIARY PORT SETUP (Continued)

9. At the **[Weight Code Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

10. At the **[Weigh Time Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

11. At the **[Weigh Date Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

12. At the **[Direction Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

13. At the **[Car Id. Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

14. At the **[Tare Weight Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

15. At the **[Train Speed Pos 000]** prompt, press the <1> key, press the <7> key. Press the <ENTER> key.

16. At the **[Net Weight Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

17. At the **[Net Tons Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

18. At the **[Blk Chk Chr Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

19 At the **[Blk Chk Bgn Pos 000]** prompt, press the <0> key. Press the <ENTER> key.

20. At the **[Mod Aux. Literals?0]** prompt, press the <1> key.

21. At the **[Clr Aux. Literals?0]** prompt, press the <0> key.

22. At the **[Aux. Literal Pos000]** prompt, press the <1> key. Press the <ENTER> key.

23. At the **[Aux. Literal Char X]** prompt, press the <CTRL> key, then press the <X> key. Press the <ENTER> key.

24. At the **[Aux. Literal Pos002]** prompt, press the <2> key, press the <1> key. Press the <ENTER> key.

25. At the **[Aux. Literal Char X]** prompt, press the <CTRL> key, then press the <M> key. Press the <ENTER> key.

26. At the **[Aux. Literal Pos022]** prompt, press the <ENTER> key.

27. At the **[Aux. Literal Char X]** prompt, press the <CTRL> key, then press the <J> key. Press the <ENTER> key.

28. At the **[Aux. Literal Pos023]** prompt, press the <0> key. Press the <ENTER> key. The controller will return to statement #100.

APPENDIX K - HOST COMMUNICATIONS

About this Section

The following describes the Bi-Directional Host Communications Protocol of the 9411E C.I.M. Controller. The Host Glossary defines some terms used. The Hardware Considerations section discusses the interfaces available. The Host Data Transmission section describes the communication commands briefly.

Mettler-Toledo can offer, to users and service personnel, a Host ToolBox program that is IBM personal computer compatible. The Host ToolBox performs most of the operations described in this section of the documentation, and offers many features that take advantage of the host computer. This program is used by Mettler-Toledo test personnel to assure the operation of the 9411E Host port at the factory.

APPENDIX K - HOST COMMUNICATIONS (Continued)

Host Glossary

<**Stx**>	**S**tart of **T**e**X**t character (02H).
<**Etx**>	**E**nd of **T**e**X**t character (03H).
<**Bcc**>	**B**lock **C**heck **C**haracter, the Exclusive OR of the lower 7 data bits of all characters in the message block, starting with the character after the <**Stx**>, up to and including the <**Etx**>.
<**Eot**>	**E**nd **O**f **T**ransmission Character (04H), sent by the host computer, breaks off the communication link.
<**Enq**>	**ENQ**uiry character (05H), when it is preceded by a 9411E <Unit Number> it establishes a communication link between the host computer and the associated 9411E.
<**Ack**>	**ACK**nowledge character (06H), character sent by the receiving device to inform the transmitting device that the message was received without error.
<**Nak**>	**N**egative **A**c**K**nowledgement character (15H), character sent by the receiving device to inform the transmitting device that an error was detected in the message received.
<Unit Number>	Specific Address of a 9411E (set by Host Port Setup) that the unit will respond to.
Alpha/Numeric	Field type definition indicating the characters can be numbers or any character A-Z.
Date Format	Field type definition indicating a format for date "mm/dd/yy"; where mm is the month, dd is the day, and yy is the year.
Numeric	Field type definition indicating that all of the character must be numbers.
Time Format	Field type definition indicating a format for time "hh:mm:ss"; where hh is the hour (24 hour format), mm is minutes, and ss is seconds.
Wt Format	Field type definition indicating that it is 6 numeric characters with NO decimal point.

APPENDIX K - HOST COMMUNICATIONS (Continued)

Hardware Considerations

The 9411E uses a multidrop protocol which supports up to 7 9411E's serviced by a single host computer. Two hardware standards are available to the designer, RS232 and RS422/485. See system drawings provided for connection details.

RS232 is a point-to-point connection between a host computer and one 9411E no greater that 50 feet away. RS232 has a medium amount of noise immunity, and successful communications is highly dependent on the electrical environment. Most often it is used in simple installations with one 9411E or to service individual 9411E's taken offline from a multidrop configuration.

RS422/485 supports a multidrop connection between a host computer and 9411E controllers. Distances as great as 4000 ft can be supported with a medium amount of noise immunity. Performance of the RS422/RS485 communication link can be improved by not bundling the cables with other wiring and routing the cable away from devices which produce electrical noise.

Notes:

The 9411E Host communications is a multi-drop protocol. This is true in all cases even if there is only one 9411E on the line. The multi-drop protocol requires that the host send the appropriate address to the 9411E before attempting any other communications. That is described in the manual and shown in one example as 05<ENQ> to talk to unit number 05. What the manual fails to make clear is that in order to get the attention of all units on a multi-drop line the host must send an <EOT> character before sending the address. Since an <EOT> could be a valid checksum in some cases, it is recommended that you send two <EOT> characters. That will guarantee that in all cases the 9411E will stop what it is doing on the host line and listen for its address before transmitting again.

There is also a timeout in the host communications that will reset the 9411E after several seconds of no communications. At that time you will have to send the <EOT><EOT>01<ENQ> again to talk to unit 01.

There are two areas of setup that must be configured properly in order for communications to occur. The host interface setup should have the baud rate, data bits, and parity set to agree with the host PC data port setup, and the unit number (also under host interface setup) must agree with the address sent by the host. Under general setup, the CarData SlaveMode must be set to 1 (program statement 7125).

added "notes" Dec 21, 1994

APPENDIX K - HOST COMMUNICATIONS (Continued)

Host Data Transmission

The 9411E supports a host interface based on the ANSI Standard X3.28. Up to 7 9411E's can be simultaneously connected to the host using the RS422 hardware interface. Drop addresses are the same as the Host Communications Unit Number as outlined in the Host Port Setup Section. The protocol requires a three-step procedure to exchange data. First, the host must send a logon query to the drop address of the selected 9411E which requires an acknowledgement to assure both ends of the link are ready to communicate. Second, a dialogue is initiated by the host to exchange data. Third, the host sends a logoff command to the selected 9411E so that it is free to talk to another.

Communication dialogues will take one of two forms, depending on whether data is moving to or from the 9411E. Both begin with a host transmission that includes a Start-of-Text character <**Stx**>, a block ID for synchronization and error recovery purposes, a two-character alphanumeric command, an ASCII string of data when appropriate, an End-of-Text character <**Etx**> and a block check character <**Bcc**>. In the simplest dialogue, where data is moving to the 9411E, an ASCII acknowledgement character is all that is required in response. The host is then free to send additional blocks of data in the same manner or to initiate the logoff. The second type of response involves sending data back to the host. In this case the 9411E sends data back to the host. The message block is structured with the same elements as the host used for its query. The block ID and the command characters are identical to those in the host's query. After the 9411E sends the message block it waits for the ASCII acknowledgement character from the host to assure receipt. The 9411E will then return control to the host by sending the ASCII acknowledgement character. The host may then initiate a new transfer or a logoff.

Examples of the dialogue:

Type I

```
   Host: 01<Enq>                                          (logon to drop address 01)
   9411: <Ack>                                                        (9411E ready)
   Host: <Stx>01<message><Etx><Bcc>          (send data starting with block ID 01)
9411: <Ack>
   Host: <Stx>02<message><Etx><Bcc>          (send additional data with block ID 02)
9411: <Ack>
   Host: <Eot>                                                          (logoff)
```

Type II

```
   Host: 01<Enq>                                          (logon to drop address 01)
   9411: <Ack>                                                        (9411E ready)
   Host: <Stx>01<message><Etx><Bcc>        (send request for data using block ID 01)
   9411: <Stx>01<message><Etx><Bcc>                    (send reply to block ID 01)
Host: <Ack>
   9411: <Ack>                                        (return flow control to host)
```

APPENDIX K - HOST COMMUNICATIONS (Continued)

Host Data Transmission (continued)

Host: <**Eot**> (logoff)

Note that all block IDs after a logon start at 01. These are ASCII decimal numbers. At 99 the block ID rolls over to 00, 01, 02, etc. The block check characters <**Bcc**> are computed as the 7-bit exclusive-OR checksum of all characters following the <**Stx**>, including the <**Etx**>.

Notes:

There are four timers used in the host communications. They are timers A, B, C, and D.

Timer A is a response timer that is kept by a sending unit waiting for a reply. It is started by the transmission of an <ETX> or <ENQ> and is stopped when a reply is received (<ACK>, <NAK>, or <STX>).

Timer B is the receive timer that is looking for an <ETX> character in a message transfer. It is started when an <STX> or <SOH> is received and stopped when an <ETX> is received. It the <ETX> character is missed, it will time out and tell the receiving unit to discard the data in the buffer and wait for retransmission.

Timer C is the gross timer. It is started when a connection is made to the network and is restarted each time a character is received from the host. It is stopped by a disconnect command. A timeout indicates that the network is no longer in service and that the 9411E should disconnect from the network.

The values of these timers depends on the baud rate selected for the host port. The values are listed below:

	TIMER VALUES ARE IN SECONDS		
BAUD RATE	TIMERA	TIMERB	TIMERC
300	7.80	4.00	7.80
1200	3.00	1.50	6.00
2400	2.00	1.00	4.00
4800	1.50	0.75	3.00
9600	1.00	0.50	2.00

added "notes" Dec 21, 1994

APPENDIX K - HOST COMMUNICATIONS (Continued)

Host Communication Error Codes

The following error codes may be sent by the 9411E in response to ***messages*** from the Host controller. The response ***message*** will be replaced by these.

E0 - Data Unavailable
The requested data is not available.

E1 - Unrecognized ***message***
The ***message*** issued is not a valid ***message***.

E2 - Improper Data Length
The data sent with the ***message*** was not of the expected length.

E3 - Invalid Data

E4 - In Use

E5 - Block ID mismatch
The block ID is not in sequence with the last one received.

E6 - Pointer out of range

E7 - Invalid Configuration

E8 - Data Table Full
The data requested to be added to a table could not be added due to the table being full.

E9 - Access Denied

APPENDIX K - HOST COMMUNICATIONS (Continued)

Host Communication Messages

The available ***messages*** fall into a control group, setup group or a data group as follows:

Control *Messages*	Possible Error Codes
C0 -- RESET SENT FROM HOST	E2, E4
C1 -- ENTER WEIGH TRAIN MODE	E2, E4
C2 -- ENTER CONTINUE TRAIN MODE	E2, E4
C3 -- SET GENERAL SETUP INFORMATION	E2, E3
C4 -- SEND GENERAL SETUP INFORMATION	E2
C5 -- (RESERVED FOR FUTURE DEFINITION)	E2
C6 -- (RESERVED FOR FUTURE DEFINITION)	E2
C7 -- FORCE CHARACTER INTO KEYBOARD LUN	E2
C8 -- SET CAR TYPE FILE RECORD	E2, E3
C9 -- SEND CAR TYPE FILE RECORD	E2
CF -- SEND PROGRAM VERSION NUMBER	E2
Setup *Messages*	
T0 -- SEND ENGLISH & FOREIGN PROMPT #XXX	E2, E3, E6
T1 -- SET NEW TRANSLATION OF PROMPT #XXX	E2, E3, E6
A0 -- SEND AUXILIARY PORT SETUP	E2
A1 -- SEND AUXILIARY DATA LITERAL	E2
A2 -- SET AUXILIARY DATA POSITIONS	E2, E3, E6
A3 -- SET AUXILIARY DATA LITERAL	E2
A4 -- SET AUXILIARY PORT SETUP	E3, E3
P0 -- SEND PRINTER PORT SETUP	E2
P1 -- SEND PRINTER DATA LITERAL	E2
P2 -- SET PRINTER DATA POSITIONS	E2, E3, E6
P3 -- SET PRINTER DATA LITERAL	E2
P4 -- SET PRINTER PORT SETUP	E2, E3
P5 -- SEND PRINTER HEADER LITERAL	E2
P6 -- SET PRINTER HEADER LITERAL	E2
P7 -- SEND PRINTER TRAILER LITERAL	E2
P8 -- SET PRINTER TRAILER LITERAL	E2, E3
Data *Messages*	
D0 -- SEND CAR FILE DATA RECORDS	E0, E2, E4
D1 -- SET ADVANCE CAR DATA RECORD	E2, E3
D2 -- SEND ADVANCE CAR DATA RECORD	E2

The format of the ***messages*** and their responses are as follows:

APPENDIX K - HOST COMMUNICATIONS (Continued)

Control Messages

C0 -- RESET SENT FROM HOST
Return to the Select Function prompt, abort weighing train.

Host: C0
9411E: <**Ack**>

C1 -- ENTER WEIGH TRAIN MODE

Host: C1
9411E: <**Ack**>

C2 -- ENTER CONTINUE TRAIN MODE

Host: C2
9411E: <**Ack**>

Control Messages (continued)

C3 -- SET GENERAL SETUP INFORMATION

* Host:

C3abbbbbbccccccccccccccccccdddefghiiizzzjkllll
mmmmnnnnppppqqqqrsssttttuuuuvwxy1111222233334444555
56666 where

a = keyboard disabled
bbbbbb = supervisor password
ccccccccccccccccccc = site name
ddd = next train number
e = **Protected** (Cannot be Changed be the Host)
f = immediate weight print
g = auto train report after weighing
h = delete train after auto train report
iii = train timeout
* zzz = system reset time
j = unattended mode
k = number of speed outputs (1 or 3)
llll = distance from wheel detector 1 to 2
mmmm = distance from wheel detector 3 to 4
nnnn = distance from wheel detector 4 to 5
pppp = marginal speed limit
qqqq = fast speed limit
r = over speed fatal
sss = dynamic graduation size
ttt = static graduation size
uuuu = zero tolerance
v = off zero tolerance fatal
w = weigh wheel detector (5 or 6)
x = number of weighments in average
y = averaging point
* 1111 = offset direction A pushing
* 2222 = offset direction B pushing
* 3333 = offset direction A pulling
* 4444 = offset direction B pulling
* 5555 = 1st car offset direction A (pulling)
* 6666 = 1st car offset direction B (pulling)

9411E: <**Ack**>

Control Messages (continued)

C4 -- SEND GENERAL SETUP INFORMATION
Send General Setup Information

Host: C4

* 9411E:
C4abbbbbbccccccccccccccccccdddefghiiizzzjkllll
mmmmnnnnppppqqqqrsssttttuuuuvwxy1111222233334444555
56666
where
a = keyboard disabled
bbbbbb = supervisor password
ccccccccccccccccccc = site name
ddd = next train number
e = car data slave mode
f = immediate weight print
g = auto train report after weighing
h = delete train after auto train report
iii = train timeout
* zzz = system reset time
j = unattended mode
k = number of speed outputs (1 or 3)
llll = distance from wheel detector 1 to 2
mmmm = distance from wheel detector 3 to 4
nnnn = distance from wheel detector 4 to 5
pppp = marginal speed limit
qqqq = fast speed limit
r = over speed fatal
sss = dynamic graduation size
ttt = static graduation size
uuuu = zero tolerance
v = off zero tolerance fatal
w = weigh wheel detector (5 or 6)
x = number of weighments in average
y = averaging point
* 1111 = offset direction A pushing
* 2222 = offset direction B pushing
* 3333 = offset direction A pulling
* 4444 = offset direction B pulling
* 5555 = 1st car offset direction A (pulling)
* 6666 = 1st car offset direction B (pulling)

Host: <**Ack**>

Control Messages (continued)

C7 -- FORCE CHARACTER INTO KEYBOARD BUFFER
Force Character into Keyboard Buffer

Host: C7x

where
x = character to be put into the keyboard buffer

9411E: <**Ack**>

C8 -- SET CAR TYPE RECORD
Set Car Type Record.

Host: C8xxaaabcccdeeefggghiiijkkklmmmnooopw

where
xx = record number in the car type file
aaa = distance between wheels 1 & 2
b = action code (**W,E,S,N,X,Z**) for wheel 1
ccc = distance between wheels 2 & 3
d = action code (**W,E,S,N,X,Z**) for wheel 2
eee = distance between wheels 3 & 4
f = action code (**W,E,S,N,X,Z**) for wheel 3
ggg = distance between wheels 4 & 5
h = action code (**W,E,S,N,X,Z**) for wheel 4
iii = distance between wheels 5 & 6
j = action code (**W,E,S,N,X,Z**) for wheel 5
kkk = distance between wheels 6 & 7
l = action code (**W,E,S,N,X,Z**) for wheel 6
mmm = distance between wheels 7 & 8
n = action code (**W,E,S,N,X,Z**) for wheel 7
ooo = distance between wheels 8 & 9 (000)
p = action code (**W,E,S,N,X,Z**) for wheel 8
w = record this car (0 or 1)

9411E: <**Ack**>

Control Messages (continued)

C9 -- SEND CAR TYPE RECORD
Send Car Type Record.

Host: C9xx

where
xx = record number in the car type file

9411E: C9xxaaabcccdeeefggghiiijkkklmmmnooopw

where
xx = record number in the car type file
aaa = distance between wheels 1 & 2
b = action code (**W,E,S,N,X,Z**) for wheel 1
ccc = distance between wheels 2 & 3
d = action code (**W,E,S,N,X,Z**) for wheel 2
eee = distance between wheels 3 & 4
f = action code (**W,E,S,N,X,Z**) for wheel 3
ggg = distance between wheels 4 & 5
h = action code (**W,E,S,N,X,Z**) for wheel 4
iii = distance between wheels 5 & 6
j = action code (**W,E,S,N,X,Z**) for wheel 5
kkk = distance between wheels 6 & 7
l = action code (**W,E,S,N,X,Z**) for wheel 6
mmm = distance between wheels 7 & 8
n = action code (**W,E,S,N,X,Z**) for wheel 7
ooo = distance between wheels 8 & 9 (000)
p = action code (**W,E,S,N,X,Z**) for wheel 8
w = record this car (0 or 1)

Host: <**Ack**>

CF -- SEND PROGRAM VERSION NUMBER
Send Program Version Number.

Host: CF

9411E: CFxxxxxxxxxxx

where
xxxxxxxxxxx = program version number (SBM057x)

Host: <**Ack**>

Setup Messages

T0 -- SEND ENGLISH & FOREIGN MESSAGE #XXX
Send English & Foreign Text of Message #XXX.

Host: T0nnn

9411E: T0nnneeeeeeeeeeeeeeeeeeetfffffffffffffffffft
where
nnn = display prompt number. If this value is received as 999, then the 9411e will send the information that is currently shown on the 19 character display.
eeeeeeeeeeeeeeeeeee = default english text of prompt
t = terminator ('|')
fffffffffffffffffff = current translation of prompt

T1 -- SET NEW TRANSLATION OF MESSAGE #XXX
Set New Translation of Message #XXX.

Host: T1nnnfffffffffffffffffft
where
nnn = display prompt number
fffffffffffffffffff = text of prompt
t = terminator ('|')

9411E: <**Ack**>

Setup Messages (continued)

A0 -- SEND AUXILIARY PORT SETUP
Send Auxiliary Port Setup

Host: A0

* 9411E: A0bbbbpntdwwwvvvzzzwwwjjjmmmyyydddiiitttsss
where
bbbb = baud rate (0300,1200,2400,4800 or 9600)
p = parity ('E'-even, 'O'-odd, 'N'-none)
n = number of stop bits ('1' or '2')
* t = no. of AEI antennas connected ('0','1' or '2')
* d = default display of AEI car Id information
www = train number position
vvv = sequence number position
zzz = car type position
www = weight position
jjj = weight code position
mmm = time position
yyy = date position
ddd = direction position
iii = car id position
ttt = tare weight position
sss = speed position
aaa = net weight position
bbb = net tons position

Host: <**Ack**>

A1 -- SEND AUXILIARY DATA LITERAL
Send Auxiliary Data Literal

Host: A1

9411E:
A1ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

Host: <**Ack**>

Setup Messages (continued)

A2 -- SET AUXILIARY DATA POSITIONS
Set Auxiliary Data Positions

Host: A2wwwvvvzzzwwwjjjmmmyyydddiiitttsss
where
www = train number position
vvv = sequence number position
zzz = car type position
www = weight position
jjj = weight code position
mmm = time position
yyy = date position
ddd = direction position
iii = car id position
ttt = tare weight position
sss = speed position
aaa = net weight position
bbb = net tons position

9411E: <**Ack**>

A3 -- SET AUXILIARY DATA LITERAL
Set Auxiliary Data Literal

Host:
A3tttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttt

9411E: <**Ack**>

A4 -- SET AUXILIARY PORT SETUP
Set Auxiliary Port Setup

* Host: A4bbbbpntd
where
bbbb = baud rate (0300,1200,2400,4800 or 9600)
p = parity ('E'-even, 'O'-odd, 'N'-none)
n = number of stop bits ('1' or '2')
* t = no. of AEI antennas connected ('0','1' or '2')
* d = default display of AEI car Id information

9411E: <**Ack**>

Setup Messages (continued)

P0 -- SEND PRINTER PORT SETUP
Send Printer Port Setup.

Host: P0

9411E:
P0bbbbpnwwwvvvzzzwwwjjjmmmyyyydddiiitttsssaaabbb
cccdddeee
where
bbbb = baud rate (0300,1200,2400,4800 or 9600)
p = parity ('E'-even, 'O'-odd, 'N'-none)
n = number of stop bits ('1' or '2')
www = train number position
vvv = sequence number position
zzz = car type position
www = weight position
jjj = weight code position
mmm = time position
yyy = date position
ddd = direction position
iii = car id position
ttt = tare weight position
sss = speed position
aaa = net weight position
bbb = net tons position
ccc = total gross weight position
ddd = total net weight position
eee = total net tons position

Host: <**Ack**>

P1 -- SEND PRINTER DATA LITERAL
Send Printer Data Literal.

Host: P1

9411E:
P1ttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttt

Host: <**Ack**>

APPENDIX K - HOST COMMUNICATIONS (Continued)

Setup Messages (continued)

P2 -- SET PRINTER DATA POSITIONS

Set Printer Data Positions.

Host: P2wwwvvvzzzwwwjjjmmmyyydddiiitttsss

where
www = train number position
vvv = sequence number position
zzz = car type position
www = weight position
jjj = weight code position
mmm = time position
yyy = date position
ddd = direction position
iii = car id position
ttt = tare weight position
sss = speed position
aaa = net weight position
bbb = net tons position
ccc = total gross weight position
ddd = total net weight position
eee = total net tons position

9411E: <**Ack**>

P3 -- SET PRINTER DATA LITERAL

Set Printer Data Literal.

Host:

P3ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

9411E: <**Ack**>

Setup Messages (continued)

P4 -- SET PRINTER PORT SETUP
Set Printer Port Setup.

Host: P4bbbbpn

where
bbbb = baud rate (0300,1200,2400,4800 or 9600)
p = parity ('E'-even, 'O'-odd, 'N'-none)
n = number of stop bits ('1' or '2')

9411E: <**Ack**>

P5 -- SEND PRINTER HEADER LITERAL

Host: P5

9411E:

P5ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

where ttt...ttt is the current 120 character printer header literal

Host: <**Ack**>

P6 -- SET PRINTER HEADER LITERAL

Host:

P6ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

where ttt...ttt is the new 120 character printer header literal

9411E: <**Ack**>

Setup Messages (continued)

P7 -- SEND PRINTER TRAILER LITERAL

Host: P7

9411E:

P7ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

where ttt...ttt is the current 120 character printer trailer literal

Host: <**Ack**>

P8 -- SET PRINTER TRAILER LITERAL

Host:

P8ttttttttttttttttttttttttttttttttttttttttttttt
tttttttttttttttttttttttttttttttttttttttttttttttttt
ttttttttttttttttttttttttt

where ttt.ttt is the new 120 character printer trailer literal

9411E: <**Ack**>

Data Messages

D0 -- SEND CAR FILE DATA RECORDS
Send Car File Data Records.

Host: D0

* 9411E: D0wwwvvvxzwwwwwwjhh:mmdd.mm.yydiiiiiiiiiitttttsssss

where:
www = train number
vvv = sequence number
* x = AEI tag status
* z = car type
wwwwww = car weight
j = weight code
hh:mm = time
dd.mm.yy (or mm/dd/yy) = date
d = direction ('A' or 'B')
iiiiiiiiii = car id
tttttt = tare weight
ssss = speed (xx.x)

Host: <**Ack**>

D1 -- SET ADVANCE CAR DATA RECORD
Set Advance Car Data Record.

Host: D1xxxiiiiiiiiiiwwwwww

where
xxx = record number in the advance car data file
iiiiiiiiii = car id
wwwwww = tare weight

9411E: <**Ack**>

APPENDIX K HOST COMMUNICATIONS (Continued)

D2 -- SEND ADVANCE CAR DATA RECORD
Send Advance Car Data Record.

Host: D2xxx

where
xxx = record number in the advance car data file

9411E: D2xxxiiiiiiiiiiwwwwww

where
xxx = record number in the advance car data file
iiiiiiiiii = car id
wwwwww = tare weight

Host: <**Ack**>

APPENDIX L - INTERFACING TO AEI EQUIPMENT

The System is designed to receive data from an AEI device into the receive side of the Auxiliary Port. The AEI unit must be configured with no handshaking protocol since it is only connected to the received side of the port.

The Antennas must be placed such that the Rail Car Tag Data of a given car is transmitted to the 9411E controller by the time that car has been entirely weighed.

The AEI unit must be configured to send **Tag Data Content Only** so that **NO** Time and Date, Sensor Input Report or Auxiliary information is sent to the 9411E controller. In the AEI unit command mode, use the #300 and #310 commands to transmit tag data with no appended information. The **Start of Message** character needs to be defined as the '#' character (Hex 23).

The 9411E controller is programmed to interpret only Equipment Tags that have the AAR Tag Type Codes. Only two of the six equipment group tag types will be decoded. These are the Rail Car formatted tag and the Locomotive formatted tag. From these two tag types the Owners Code and Car Number information will be extracted and placed into the 10 character Car Number field of the car data record e.g. (CSXT053476).

See your AEI device manual for precise setup and connectivity information.

The following strings can be sent into the Auxiliary Port of the 9411E controller to test the AEI software.

#F@Z^PLPHM!D **S**<cf><lf>
#F@Z^PLI\L1D **S**<cr><lf>
#F@Z^PLO,LQD **S**<cr><lf>
#FVJ+P!F:I1D ! S<cr><lf>
#F@Z^THQ0HAD **S**<cr><lf>
#FTB<@>2.JAD)T **S**<cr><lf>
#FTB<@J44J1D **S**<cr><lf>
#FATP5NZ.L!D **BNS**<cr><lf>
#FBD-P%Y(KAD ,D **S**<cr><lf>
#FP3<P(ABJ1D **S**<cr><lf>

Interfacing to the AMTECH AI1601 SmartPass™

When interfacing to a SmartPass™ unit, some setup is required.

The AMTECH SmartPass™ communication default is 9600 baud, 8 data bits, no parity. The 9411e AEI port also defaults to these same parameters. You should check the setup of the 9411E to verify that it matches the AEI unit. This is done through auxiliary port setup. The same port setting values apply to auxiliary output and AEI input, so these two ports can not have two *different* settings.

The 9411E will accept 20mA current loop or RS-232 from the AEI unit. The SmartPass™ supports RS-232 and RS-422. For RS-232, you will use the **black** wire (transmit) from the Red/Black pair, and the **yellow** wire (signal ground) from the Yellow/Black pair. Connect the black wire to terminal 3R in the 9411E, and the yellow wire to terminal 3G (as shown on the 9411E external wiring diagram KC470,555 for 120V units, or KC470,744 for 220V units).

The Red/Green wire pair from the SmartPass™ must be shorted together in order for the SmartPass™ unit to function. This is intended to be an “enable” input that turns the transmitter on and off. You may either hard wire this connection to enable the unit at all times or connect it to relay contacts (not supplied) that can be controlled by the 9411E “Scale In Use” output (consult the 9411E schematic wiring diagram KC470,556 for 120V units, or KC470,743 for 220V units).

You can change the SmartPass™ setup by connecting it to a “dumb terminal” or to a PC using a “terminal emulator” such as ProComm® or the Windows® terminal emulator. Consult the manual that comes with the SmartPass™ unit and/or your AMTECH distributor for help in setting up the SmartPass™.

The SmartPass™ unit **must** be set up for no time and date appended. This is command #300 (the factory default is to send the time and date along with the tag data).

Note: It is helpful to have two tags available for testing the SmartPass™ unit. Using the 9411E auxiliary port test mode, it is possible to see the translated tag data coming from the SmartPass™. Two tags are required, because the SmartPass™ will not send the same tag information twice. Alternating the two tags will allow the SmartPass™ to send the data for each tag as it is passed infront of the reader.

APPENDIX M - 9411E SPARE PARTS LIST

120 VAC model

Main PCB	TSM300	KT665040-057	
Power supply	TSM300	KA585922020	120 VAC model only
Fuse 3A slo blo	main fuse	09595700A	
Input Modules	24-120 VAC	13636300A	120 VAC model only
Output Module	24-280 VAC fused	13636700A	
Fuse 4A	output module	13637500A	
Non-Contact Wheel Detector		90185100A	
Non-Contact Wheel Detector Amplifier		KT665026AAN	
Mechanical Wheel Detector		KN711656020	
Operator Keyboard			
	keyboard gasket	13212800A	
	keyboard overlay	A13213000A	
	keyboard	13210000A	
	keyboard backup plate	13212100A	

Weight Indicator Keyboard		8142 analog	8530 digitol
	keyboard gasket	A12166400A	A12166400A
	keyboard overlay	11749500A	13160800A
	keyboard seal (RFI -Water)	12414600A	12414600A
	keyboard	B11748700A	B11748700A
	keyboard back plate	12166300A	12166300A

Main PCB	8530 digitol	A14085700A
Main PCB	8142 analog	E13200200A
Dual PCB	8142 analog	C12585400A

220 VAC model has same spare parts except

Power supply	TSM300 (220VAC)	KA585045020
Input Modules	180-240 VAC	13636400A
Non-Contact Wheel Det. Ampl. (220VAC)		KT665026AAU

rev 7/25/94 - edited and added part numbers

SAMPLE PRINTOUTS & REPORTS
FIGURE 1 - WEIGHED TRAIN LOG

```
CAR NUMBER TRN SEQ  SPD WEIGHT  DIR  DATE   TIME TYPE
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a B XX-XX-XX XX:XX XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX

            Totals      XXXXXX
```

FIGURE 2 - TRAIN REPORT

```
                TRAIN NET WEIGHT REPORT FOR site name
TIME:  XX:XX                                                 DATE:  XX-XX-XX
CAR NUMBER TRN SEQ  SPD WEIGHT  DIR  DATE   TIME TYPE TARE WT  NET WT  NET TONS
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX
XXXXXXXXXX XXX-XXX XX.X XXXXXX-a A XX-XX-XX XX:XX XX   XXXXXX  XXXXXX   XXX.XX

            Totals      ZZZZZZ                                 ZZZZZZ   ZZZ.ZZ
```

NOTE: The digit following the weight represents the weight code. See Appendix A for definitions of weight codes.

FIGURE 3 - CAR FILE REPORT

CAR FILE REPORT FOR site name

TIME: XX:XX DATE: XX-XX-XX

CAR NUMBER	TRN SEQ	SPD	WEIGHT	DIR	DATE	TIME	TYPE	TARE WT	NET WT	NET TONS
XXXXXXXXXX	XXX-XXX	XX.X	XXXXXX-a	A	XX-XX-XX	XX:XX	XX	XXXXXX	XXXXXX	XXX.XX
XXXXXXXXXX	XXX-XXX	XX.X	XXXXXX-a	A	XX-XX-XX	XX:XX	XX	XXXXXX	XXXXXX	XXX.XX
YYYYYYYYYY	YYY-YYY	YY.Y	YYYYYY-a	B	YY-YY-YY	YY:YY	YY	YYYYYY	YYYYYY	YYY.YY
YYYYYYYYYY	YYY-YYY	YY.Y	YYYYYY-a	B	YY-YY-YY	YY:YY	YY	YYYYYY	YYYYYY	YYY.YY
YYYYYYYYYY	YYY-YYY	YY.Y	YYYYYY-a	B	YY-YY-YY	YY:YY	YY	YYYYYY	YYYYYY	YYY.YY

FIGURE 4 - ADVANCE CAR DATA REPORT

ADVANCE CAR DATA

DATE: XX-XX-XX TIME: HH:MM

SEQUENCE NO	CAR ID	WEIGHT
XX	XXXXXXXXXX	XXXXXX
XX	XXXXXXXXXX	XXXXXX
XX	XXXXXXXXXX	XXXXXX
XX	XXXXXXXXXX	XXXXXX
XX	XXXXXXXXXX	XXXXXX

		XXXXXXX

FIGURE 5 - SYSTEM SETUP REPORT

GENERAL PARAMETER SETUP

```
----------------------------------------
SITE NAME:           XXXXXXXXXXXXXXXXXX
NEXT TRAIN NUMBER                   001
CAR DATA SLAVE MODE                   0
IMMEDIATE WEIGHT PRINT                1
AUTO TRAIN REPORT                     0
AUTO DELETE TRAIN AFTER A.T.R.        0
TRAIN TIMEOUT (SECONDS)             030
SYSTEM RESET TIME                   010   *
UNATTENDED MODE                       0
NUMBER OF SPEED OUTPUTS               3
DIST. BETWEEN WHL DETECTORS 1 & 2   0000
DIST. BETWEEN WHL DETECTORS 3 & 4   0033
DIST. BETWEEN WHL DETECTORS 4 & 5   0042
DIST. BETWEEN WHL DETECTORS 5 & 6   0033
DIST. BETWEEN WHL DETECTORS 7 & 8   0000
```

SEALABLE PARAMETER SETUP

```
----------------------------------------
01 MARGINAL SPEED LIMIT             04.0
02 TOO FAST SPEED LIMIT             05.0
03 OVER SPEED FATAL                    1
04 DYNAMIC SCALE GRADUATION SIZE:    100
05 STATIC SCALE GRADUATION SIZE:     020
06 ZERO TOLERANCE VALUE             0200
07 OFF ZERO FATAL                      1
08 WEIGH WHL DETECTOR                  6
09 NUMBER OF WEIGHMENTS IN AVERAGE     1
10 START AVERAGE AT                    1
11 OFFSET A PUSHING                 0000   *
12 OFFSET B PUSHING                 0000   *
13 OFFSET A PULLING                 0000   *
14 OFFSET B PULLING                 0000   *
15 1ST CAR OFFSET A PULLING         0000   *
16 1ST CAR OFFSET B PULLING         0000   *
```

PRINTER PORT SETUP

```
----------------------------------------
BAUD RATE                           9600
CHARACTER DATA BITS                    7
CHARACTER PARITY                       E
TRAIN NUMBER POSITION                012
SEQUENCE NUMBER POSITION             016
CAR TYPE POSITION                    051
WEIGHT POSITION                      025
WEIGHT CODE POSITION                 032
TIME POSITION                        045
```

FIGURE 5 - SYSTEM SETUP REPORT (Continued)

```
DATE POSITION                          036
DIRECTION POSITION                     034
CAR ID POSITION                        001
TARE WEIGHT POSITION                   055
TRAIN SPEED POSITION                   020
NET WEIGHT POSITION                    063
NET TONS POSITION                      071
TOTAL GROSS WEIGHT POSITION            022
TOTAL NET WEIGHT POSITION              060
TOTAL NET TONS POSITION                069
----------------------------------------
LITERAL CHARACTER C   POSITION         001
LITERAL CHARACTER A   POSITION         002
LITERAL CHARACTER R   POSITION         003
.       .         .   .                ...
.       .         .   .                ...
.       .         .   .                ...
LITERAL CHARACTER 0DH POSITION         080        0DH = Carriage Return
LITERAL CHARACTER 0AH POSITION         081        0AH = Line Feed
----------------------------------------
LITERAL CHARACTER -   POSITION         004
LITERAL CHARACTER -   POSITION         018
LITERAL CHARACTER 0DH POSITION         080
LITERAL CHARACTER 0AH POSITION         081
----------------------------------------
LITERAL CHARACTER T   POSITION         012
LITERAL CHARACTER O   POSITION         013
LITERAL CHARACTER T   POSITION         014
LITERAL CHARACTER A   POSITION         015
LITERAL CHARACTER L   POSITION         016
LITERAL CHARACTER 0DH POSITION         080
LITERAL CHARACTER 0AH POSITION         081
```

AUXILIARY PORT SETUP

```
----------------------------------------
BAUD RATE                             9600
CHARACTER DATA BITS                      7
CHARACTER PARITY                         E
NO. AEI ANTENNAS                         2   *
DISPLAY AEI CAR ID                       0   *
TRAIN NUMBER POSITION                  000
CAR SEQUENCE POSITION                  000
CAR TYPE POSITION                      000
WEIGHT POSITION                        000
WEIGHT CODE POSITION                   000
TIME POSITION                          000
DATE POSITION                          000
DIRECTION POSITION                     000
CAR ID POSITION                        000
TARE WEIGHT POSITION                   000
```

FIGURE 5 - SYSTEM SETUP REPORT (Continued)

```
TRAIN SPEED POSITION                 000
NET WEIGHT POSITION                  000
NET TONS POSITION                    000
BLOCK CHECK CHARACTER POSITION       000
BLOCK CHECK BEGIN POSITION           000
---------------------------------------
LITERAL CHARACTER -   POSITION       004
LITERAL CHARACTER -   POSITION       018
LITERAL CHARACTER 0DH POSITION       080
LITERAL CHARACTER 0AH POSITION       081
```

FIGURE 5 - SYSTEM SETUP REPORT (Continued)

HOST POST SETUP

BAUD RATE	9600
CHARACTER DATA BITS	8
CHARACTER PARITY	N
COMM. UNIT NUMBER	01

SEALABLE PARAMETER CHANGES EVENT LOG

PARAMETER	OLD VALUE	DATE	TIME
01	04.0	09/01/93	08:00
02	05.0	09/01/93	08:00
03	0	09/01/93	08:00
04	100	09/01/93	08:00
05	020	09/01/93	08:00
06	0200	09/01/93	08:00
07	0	09/01/93	08:00
08	6	09/01/93	08:00
09	1	09/01/93	08:00
10	1	09/01/93	08:00
11	0000	09/01/93	08:00
12	0000	09/01/93	08:00
13	0000	09/01/93	08:00
14	0000	09/01/93	08:00
15	0000	03/01/96	08:00
16	0000	03/01/96	08:00

FIGURE 6 - CAR TYPE SETUP REPORT

CAR TYPE SETUP

TIME: 12:00 DATE: 02-25-94

TYPE	AXLE 1	AXLE 2	AXLE 3	AXLE 4	AXLE 5	AXLE 6	AXLE 7	AXLE 8	RECORD
01	070-W	300-S	070-W	000-E	000-N	000-N	000-N	000-N	1
02	096-N	300-S	096-N	000-E	000-N	000-N	000-N	000-N	0
03	110-N	300-S	110-N	000-E	000-N	000-N	000-N	000-N	0
04	081-N	081-N	300-S	081-N	081-N	000-E	000-N	000-N	0
05	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
06	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
07	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
08	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
09	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
10	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
11	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
12	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
13	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0
14	000-N	000-N	000-N	000-N	000-N	000-N	000-N	000-N	0

Note: Car Type 01 is the description of a typical US car. Most all Hopper Cars, Grain Cars, Coal Cars, Flat Cars, Gondola Cars, Box Cars and Pulpwood Cars will fit this description. The distance(s) at Axle 1 and Axle 3 are the wheel base dimensions of the trucks on the car. Typically there is only a few inches difference in the wheel base dimensions of two axle trucks. This minor difference is not noticable to the system. The distance at Axle 2 is known as the Straddle distance. This is affected by the overall length of the vehicle. The system cannot distinguish between any two cars (with similiar trucks) that have a Straddle distance that is greater than the length of the scale. This is why Car Type 01 covers 99% of all generic US cars.

Car Type 02 is the description of a short wheel based (81 inch trucks), 4 axle Engine that is not to be weighed.

Car Type 03 is the description of a generic 4 axle Engine with 96 inch truck, that is not to be weighed.

Car Type 04 is the description of a generic 6 axle Engine with 81 inch trucks.

FIGURE 7 - COUPLED IN MOTION TEST REPORT (NON U.S. FORMAT)

METTLER-TOLEDO MODEL 9411E C.I.M. SYSTEM
WEIGH COUPLED IN MOTION TEST REPORT

DATE: XX-XX-XX TIME: XX:XX SITE NAME: XXXXXXXXXXXXXXX
TEST NAME: XXXXXXXXXXXXXXX STATIC SCALE GRADUATION SIZE: 20

CAR NUMBER	TRN NO	SEQ NO	STATIC WEIGHT	DYNAMIC WEIGHT DIR	+/- ERROR	% ERROR	ERROR CLASS
CSXT384677	001	001	100000	98600-0 A	-1400	1.40	X
UP 654427	001	002	100000	99000-0 A	-1000	1.00	b
CR 764155	001	003	100000	99500-0 A	-500	.50	a
	001	004	100000	100200-0 A	200	.20	
	001	005	200000	201500-1 A	1500	.75	b
TOTALS:			600000	598800	-1200		

REPORT CONTAINS ALL CARS FROM TRAINS: XXX YYY ZZZ
LARGEST + ERROR: 0.750
LARGEST - ERROR: -.400
AVERAGE ERROR: -.390

CLASS				
	NUMBER OF CARS WITH ERROR	<= .2%	1	20.0%
a	NUMBER OF CARS	.2% < E <= .5%	1	20.0%
b	NUMBER OF CARS	.5% < E <= 1.0%	2	40.0%
X	NUMBER OF CARS	E > 1.0%	1	20.0%
	TOTAL NUMBER OF CARS IN TEST:		5	

FIGURE 8 - COUPLED IN MOTION TEST REPORT (U.S. FORMAT)

METTLER-TOLEDO MODEL 9411E C.I.M. SYSTEM
WEIGH COUPLED IN MOTION TEST REPORT

DATE: 01/16/96 TIME: 13:37 SITE NAME: Digitol RailMate
TEST NAME: Pull Direction A STATIC SCALE GRADUATION SIZE: 100

CAR NUMBER	TRN NO	SEQ NO	**STATIC WEIGHT**	**MAINT TOL (d)**	**DYNAMIC WEIGHT**	DIR	**+/- ERROR**	**MAINT MULT (E)**	**TOL ERROR CLASS**
NOKL008726	033	001	175300	4	176100-0	B	800	2.00	a
CCR 006034	033	002	191900	4	192400-0	B	500	1.25	a
BN 375715	033	003	167500	4	167600-0	B	100	0.25	
RBOX043333	033	004	173900	4	174200-0	B	300	0.75	
RBOX031011	033	005	164600	4	164700-0	B	100	0.25	
ATSF303892	033	006	254700	6	255100-0	B	400	0.67	
SWFX001638	033	007	262900	6	263200-0	B	300	0.50	
ATSF045811	033	008	221500	5	222000-0	B	500	1.00	
ATSF045727	033	009	233900	5	234200-0	B	300	0.60	
ATSF045834	033	010	237200	5	237100-0	B	-100	0.20	
NOKL008726	034	001	175300	4	175700-0	B	400	1.00	
CCR 006034	034	002	191900	4	192100-0	B	200	0.50	
BN 375715	034	003	167500	4	167500-0	B	0	0.00	
RBOX043333	034	004	173900	4	174100-0	B	200	0.50	
RBOX031011	034	005	164600	4	164600-0	B	0	0.00	
ATSF303892	034	006	254700	6	255000-0	B	300	0.50	
SWFX001638	034	007	262900	6	262800-0	B	-100	0.17	
ATSF045811	034	008	221500	5	221700-0	B	200	0.00	
ATSF045727	034	009	233900	5	234200-0	B	300	0.60	
ATSF045834	034	010	237200	5	237500-0	B	300	0.60	
NOKL008726	035	001	175300	4	175200-0	B	-100	0.25	
CCR 006034	035	002	191900	4	192100-0	B	200	0.50	
BN 375715	035	003	167500	4	167300-0	B	-200	0.50	
RBOX043333	035	004	173900	4	174000-0	B	100	0.25	
RBOX031011	035	005	164600	4	164500-0	B	-100	0.25	
ATSF303892	035	006	254700	6	254900-0	B	200	0.33	
SWFX001638	035	007	262900	6	263200-0	B	300	0.50	
ATSF045811	035	008	221500	5	221900-0	B	400	0.80	
ATSF045727	035	009	233900	5	234000-0	B	100	0.20	
ATSF045834	035	010	237200	5	237400-0	B	200	0.40	
TOTALS:			6250200	141	6256300		6500		

REPORT CONTAINS ALL CARS FROM TRAINS: 033 034 035
LARGEST + ERROR: 800
LARGEST - ERROR: -200
AVERAGE ERROR: 220
GROUP ERROR: 30
CLASS ----------

	NUMBER OF CARS WITH MAINT TOL MULT		E <= 1:	28	93.3%
a	NUMBER OF CARS	1 <	E <= 2:	2	6.7%
b	NUMBER OF CARS	2 <	E <= 3:	0	0.0%
X	NUMBER OF CARS		E > 3:	0	0.0%

TOTAL NUMBER OF CARS IN TEST: 30

EXPLANATION OF THE U.S. FORMAT COUPLED IN MOTION TEST REPORT

The format of this report was derived from Section T.N.3.6. IN-MOTION WEIGHING from the NBS Handbook 44. Section T.N.3.1. MAINTENANCE TOLERANCE VALUES which includes Table 6 for Class III-L scales was also used.

DEFINITIONS OF FIELD HEADINGS

STATIC SCALE GRADUATION SIZE:
This is the weight of the division (d) that was used to calibrate the scale.

STATIC WEIGHT:
This is a manually input weight that is assumed to be the weight of a test car weighed statically on the in-motion scale.

MAINT TOL (d):
This is the calculated maintenance tolerance for the static weight of the individual test car. The calculation is as follows:

1) $\frac{\textbf{STATIC WEIGHT}}{\textbf{STATIC SCALE GRADUATION SIZE}}$ = Number of divisions for the static test load

2) $\frac{\text{Number of divisions for the static test load}}{500\ *}$ = **MAINT TOL (d)**

* For each 500 divisions of scale load the maintenance tolerance is increased by 1 division.

DYNAMIC WEIGHT:
This is the weight of the test car arrived at by weighing in-motion using the in-motion division size.

+/- ERROR:
This value, in weight, is determined by the following calculation:

DYNAMIC WEIGHT - **STATIC WEIGHT** = **+/- ERROR**

MAINT TOL MULT (E):
This is the actual multiple of the Static Weight maintenance tolerance that is determined using the **+/- ERROR** in the following calculation:

1) $\frac{\text{Absolute Value of (}\textbf{+/-ERROR}\text{)}}{\textbf{STATIC SCALE GRADUATION SIZE}}$ = Divisions of Error

2) Divisions of Error

EXPLANATION OF THE U.S. FORMAT COUPLED IN MOTION TEST REPORT (Continued)

$$\frac{\text{MAINT TOL MULT (E)}}{\text{MAINT TOL (d)}} =$$

EXPLANATION OF THE U.S. FORMAT COUPLED IN MOTION TEST REPORT (Continued)

ERROR CLASS:
Once the **MAINT TOL MULT (E)** is determined it is grouped into one of four (4) classes. A code is placed under this heading for each car to indicate it's classification.

TOTALS:
All the totals are the sum of the data for each valid test car.

LARGEST + ERROR:
This is the largest positive weight error of all the valid test cars.

LARGEST - ERROR:
This is the largest negative weight error of all the valid test cars.

AVERAGE ERROR:
This is the average weight error for all the valid test cars.

GROUP ERROR:
This is a number that is calculated to help determine the test's compliance with Section T.N.3.6.1. of the HB44.

The figure is arrived at by the following calculation:

$$\frac{\text{TOTAL OF } \mathbf{+/-\ ERROR}}{\mathbf{STATIC\ SCALE\ GRADUATION\ SIZE}} = \mathbf{GROUP\ ERROR}$$

If the **GROUP ERROR** is greater than the TOTAL of the **MAINT TOL (d)**, it may not be in compliance with Section T.N.3.6.1. of the HB44.

CLASS:
This chart is to help in determining the test's compliance with Section T.N.3.6.2. of the HB44.

TOTAL NUMBER OF CARS IN TEST:
This is the number of cars that have both a valid **DYNAMIC WEIGHT** and **STATIC WEIGHT**.

EXPLANATION OF THE U.S. FORMAT COUPLED IN MOTION TEST REPORT (Continued)

Reference Sections of the NBS Handbook 44.

TABLE 6.- MAINTENANCE TOLERANCES
(All values in this table are in scale divisions)

Class	Test Load				
I	0 - 50,000	50,000 - 200,000	200,001 +		
II	0 - 5,000	5,001 - 20,000	20,001 +		
III	0 - 500	501 - 2,000	2,001 - 4,000	4,001 +	
IIII	0 - 50	51 - 200	201 - 400	401 +	
III L	0 - 500	501 - 1,000	(Add 1d for each additional 500d or fraction thereof)		
Tolerance	1	2	3	5	

T.N.3.6. IN-MOTION WEIGHING - Tolerances for a group of weighments appropriate to the application must satisfy the following conditions:

T.N.3.6.1 For any group of weighments, the error in the sum of the individual weights of the group must be within the sum of the maintenance static tolerances appropriate to the weights of the group; and

T.N.3.6.2 For any single weighment within a group, the weighment error shall not exceed:

Maintenance Percentage of Group	Static Tolerance Multiplier
65	1
30	2
5	3
0	4

FIGURE 9 - GRAPHIC WEIGHT TEST REPORT

```
     GRAPHIC WEIGHT TEST

     TEST NAME: SOUTH - PULLING     CAR SEQUENCE NUMBER:  12
       TIME: XX:XX     DATE: XX-XX-XX

9- 49340 ***************
8- 81900 ********************
7- 91920 *************************
6- 95320 ******************************
5- 97200 ***********************************
4- 98160 ****************************************
3- 98540 *********************************************
2- 98660 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1- 98640 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
T        ------------------------------------------------------
1- 98620 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
2- 98620 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
3- 98620 *********************************************
4- 98580 ****************************************
5- 61600 ***********************************
6- 54320 ******************************
7- 51540 *************************
8- 49940 ********************
9- 49100 ************

TRAIN SPEED -  3.0 MPH AVERAGE WEIGHT OF WINDOW - 98635

9- 49340 ******************
8- 81900 ********************
7- 91920 *************************
6- 95320 ******************************
5- 97200 ***********************************
4- 98160 ****************************************
3- 98540 *********************************************
2- 98660 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1- 98640 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
T        ------------------------------------------------------
1- 98620 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
2- 98620 !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
3- 98620 *********************************************
4- 98580 ****************************************
5- 61600 ***********************************
6- 54320 ******************************
7- 51540 *************************
8- 49940 ********************
9- 49100 ***************

TRAIN SPEED -  3.0 MPH AVERAGE WEIGHT OF WINDOW - 98635
```

TOTAL CAR WEIGHT - 197270 ADJUSTED CAR WEIGHT - 197270

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INDEX of DISPLAY PROMPTS (Continued)

INDEX of DISPLAY PROMPTS (Continued)

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[* Waiting For Car *]	59
[** Car File Full **]	160
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[********************]	
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(edited Message and Display Prompts Dec 21, 1994)