# EZ250 TEST STAND
## INSTRUCTION MANUAL
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I. INTRODUCTION
   A. Description and Features
      1. General Description
         The AccuForce® EZ250 Test Stand is a versatile, motorized test instrument designed to perform tension and compression tests up to 250 Lb. (110 Kg.).

      2. Programmable Parameters
         All of the following parameters can be easily programmed and edited on the EZ250’s large 4 line by 20 character display.
         Upper Limit
         Lower Limit
         Up Speed
         Down Speed
         Cycle Limits

      3. External Limit Control
         External limits allow the user to provide a digital signal to inform the test stand that a limit has been reached.

      4. Tension/Compression Mode
         This feature allows the user to program the test stand to perform a test and return to the upper limit or to perform a test and return to the lower limit.

      5. Auto Zero Mode
         This feature will automatically zero the Force gauge at the end of each cycle. It can be invoked by pressing the AUTO ZERO key.

      6. Non-Volatile Setup Memory
         The programmable parameters are stored in non-volatile memory as they are entered. The parameters stored include; Upper Limit, Lower Limit, Cycle Limit, Up Speed, Down Speed, Auto Zero mode, Tension or Compression mode, and Limit Transmit mode.

      7. Analog Output Port
         The EZ250 generates a ±1 VDC signal which corresponds to the displayed travel reading. This signal will be available on a separate analog output port.
         If available, the analog signal from the force gauge being used will also be passed through to the analog output port.
8. RS232 Interface
The EZ250 is equipped with a full duplex serial interface with DIP switch selectable BAUD rates, parity, data bits, and stop bits, verbosity and polarity. All keyboard and setup functions may be accessed via this port.

9. Safety Features
   a. Emergency Stop Switch
      The EZ250 is equipped with an Emergency Stop switch which will physically disconnect power from the motor in the case of an emergency.

   b. Upper and Lower Emergency Travel Switches
      These mechanical switches are independent of microprocessor control and can be adjusted to prevent the collision and/or destruction of gauges, fixtures, etc. in the event a limit is not detected.

   c. Lexan Safety Shield (optional)
      The optional Lexan Safety shield will prevent injury from flying particles that may occur during some types of testing.

   d. Power Entry Module
      This module provides 115/230 VAC switching with integral fusing. Fuses and voltage setting cannot be changed unless plug is removed.
10. Dimensions and Nomenclature

Dimensions and nomenclature for the EZ250 Test Stand are shown in Figure 1.

---

Figure 1  DIMENSIONS AND NOMENCLATURE
11. Gauge Compatibility
   a. AccuForce® III and IV (Version 2.0)
      AccuForce® III and AccuForce® IV gauges Version 2.0 and higher provide full
      functional use of the EZ250 Test Stand. The user may choose to display the Peak Tension,
      Peak Compression, or Present Force reading on the test stand display when these gauges are
      used.
   b. AccuForce® III and IV (previous to Version 2.0)
      When AccuForce® III and AccuForce® IV gauges previous to Version 2.0 are used with the
      EZ250 Test Stand, only the Present Force reading may be presented on the test stand display.
      "No gauge" will be displayed in the top left corner of the EZ250 display when
      Peak functions are used on these gauges.
   c. Other Gauges
      When gauges which do not support or are not compatible with the RS232 port on the EZ250
      are used, "No gauge" will be displayed in the upper left hand side of the display.

II. PREPARATION
   A. Lifting and Carrying
      The EZ250 Test Stand should be lifted by the four corners of its base plate. The majority of the weight
      is located over the left rear corner. Never lift the EZ250 Test Stand by the Safety Shield, Hood, or any of
      the accessories.
   B. Voltage Selection
      The EZ250 can be operated from a 115VAC or 230VAC voltage source. The voltage setting can be viewed
      through a window on the power entry module. The voltage setting can be changed as follows:
      1. Make certain the EZ250 is off and the power cord is not plugged into any power source.
      2. Unplug the power cord from the power entry module.
      3. Open the Access Panel to the power entry module. A screwdriver may be necessary to release the
         latch on the Access Panel.
      4. Remove the voltage selection tab from the power entry module.
      5. Rotate the voltage selection tab until the required voltage is shown and replace it.
      6. Remove fuses and replace with fuses rated for the voltage selected (see Fuses).
      7. Close the Access Panel on the power entry module and plug power cord back into the test stand.
C. Fuses
The power entry module on the EZ250 is designed to accept 5x20mm fuses. One set of two (630ma Slo-Blo) 5x20mm fuses are provided with the test stand. The fuses should be replaced as follows (refer to Figure 2):
1. Make certain the EZ250 is off and the power cord is not plugged into any power source.
2. Unplug the power cord from the power entry module.
3. Open the Access Panel to the power entry module. A screwdriver may be necessary to release the latch on the Access Panel.
4. Remove fuses and replace with properly rated fuses.
   a. 115VAC requires .630 Amp, 230V Slo-Blo fuses.
   b. 230VAC requires .630 Amp, 230V Slo-Blo fuses.
5. Close the Access Panel on the power entry module.
6. Plug power cord back into the power entry module.

Figure 2 POWER ENTRY MODULE
D. Mounting Gauges and Fixtures
The EZ250 test stand provides mounting kits for all AccuForce® IV gauges. Mounting kits for AccuForce® III gauges are optional.

1. AccuForce® IV (above 100 Lbs.)
   a. Mount gauge to bracket using two #8-32 X 1/2" socket head cap screws.
   b. Mount load cell to mounting plate using one 1/2-20 X 3/4" socket head cap screw.
   c. Store excess load cell cable below load cell mount and fasten load cell mount to test stand with four 1/4-20 X 3/4" socket head cap screws.

![Diagram of mounting setup]

**Figure 3** Mounting AccuForce IV (above 100 Lbs.)

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>AMETEK PART #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>#8-32 X 1/2&quot;</td>
<td>900-04-011</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>LOAD CELL MOUNT</td>
<td>E16-089</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1/2-20 X 3/4&quot;</td>
<td>02-90040</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1/4-20 X 3/4&quot;</td>
<td>01-90002</td>
</tr>
</tbody>
</table>
2. **AccuForce® IV (100 Lbs. and below)**
   a. Mount gauge to bracket using two #8-32 X 1/2" socket head cap screws.
   b. Mount load cell to mounting plate using one 900-04-010 socket head cap screw.
   c. Store excess load cell cable below load cell mount and fasten load cell mount to test stand with four 1/4-20 X 3/4" socket head cap screws.

![Diagram of AccuForce IV mounting](image)

**Figure 4** Mounting AccuForce IV (100 Lbs. and below)

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>AMETEK PART #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>#8-32 X 1/2&quot;</td>
<td>900-04-011</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>LOAD CELL MOUNT</td>
<td>E16-096</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>10-32 X 1/2&quot;</td>
<td>900-04-010</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1/4-20 X 3/4&quot;</td>
<td>01-90002</td>
</tr>
</tbody>
</table>
E. Cables and connections

1. Force Gauge Power Supply
   The EZ250 Test Stand provides a 12 volt, 150 milliamp power supply for the force gauge. The connection for this supply is located behind the force gauge mounting bracket. Connect the gauge power supply cord, provided with the test stand, to the gauge and test stand as shown in Figure 5.

2. Force Gauge I/O Cable
   The Gauge I/O Port provides the EZ250 Test Stand with serial data for the force readings as well as external limit information. The Force Gauge I/O Port is located behind the force gauge mounting bracket. Connect the Force Gauge I/O Cable to the gauge and test stand as shown in Figure 5. NOTE: Gauge should be set for 19200 BAUD.

3. Test Stand Power Cord
   The power entry module on the EZ250 is located on the back of the test stand. This module requires an IEC320 type power cord. Make certain the Power Entry Module is configured for the proper voltage before connecting the power cord.

Figure 5 CABLES AND CONNECTIONS FOR EZ250 TEST STAND
III. OPERATION
A. Gauge Setup
1. Turn on test stand power. This will eliminate the possibility of any gauge failure due to a low battery condition.
2. Make certain force gauge is configured for 19200 BAUD (see force gauge manual for details).
3. Make certain force gauge is set up for the desired units of measure.
4. Using the function keys on the force gauge, place the gauge in the desired display mode (Peak Tension, Peak Compression, or Present Reading). The selected gauge reading will be displayed on the LCD of the EZ250.

B. Force and Travel Readings
1. FORCE
The reading from the force gauge is displayed in the top left hand section of the display on the EZ250 (see Figure 6). If the force gauge is in the peak tension or peak compression mode, the peak tension or peak compression is shown on the EZ250 display. Typically, the gauge will transmit a special character such as T or C to indicate that it is in the peak tension or peak compression mode. If this character is transmitted, it will appear on the EZ250 display (see force gauge user's manual). The units of measure transmitted by the force gauge will also be displayed on the EZ250 display.

2. TRAVEL
The travel reading is displayed in the top right hand section of the display (see Figure 6). The travel reading may be set to zero at any carriage location by pressing the ZERO key. Travel in the up direction will mathematically increase the travel value while travel in the down direction will mathematically decrease it. Travel below zero will be displayed as a negative value.
C. SET and RESET Keys

The SET and RESET Keys are located on the Display Panel next to the corresponding setup parameter for Upper Limit, Lower Limit, Cycle Limit, Up Speed, Dn Speed, and Cycle (see Figure 6).

1. UPPER LIMIT

The SET UPPER LIMIT key allows the user to program the Upper Limit value shown on the display. During the RUN mode, the carriage will stop moving in the up direction when the travel value is equal to the Upper Limit value. The Upper Limit can be programmed as follows:

a. Press the SET key next to UPPER LIMIT.

b. Use the +/- key to change the polarity of the Upper Limit if desired.

c. Enter the desired Upper Limit Value using keys 0-9 on the keypad.

NOTE: Max. value for this parameter is ±20.000 in (±508.00mm). If a value outside of this range is entered, an error will occur (See INVALID ENTRY under Error Messages).

d. Press the SET key again to exit the SET mode.

2. LOWER LIMIT

The SET LOWER LIMIT key allows the user to program the Lower Limit value shown on the display. During the RUN mode, the carriage will stop moving in the down direction when the travel value is equal to the Lower Limit value. The Lower Limit can be programmed as follows:

a. Press the SET key next to LOWER LIMIT.

b. Use the +/- key to change the polarity of the Lower Limit if desired.

c. Enter the desired Lower Limit value using keys 0-9 on the keypad.

NOTE: Max. value for this parameter is ±20.000 in (±508.00mm). If a value outside of this range is entered, an error will occur (See INVALID ENTRY under Error Messages).

d. Press the SET key again to exit the SET mode.
3. **UP SPEED**
The SET UP SPEED key allows the user to program the Up Speed value shown on the display. This is the speed at which the carriage will move in the up direction. The Up Speed can be programmed as follows:

a. Press the SET key next to UP SPEED.
b. Enter the desired speed using keys 0-9 on the keypad or use the +/- key to toggle between the maximum and minimum speeds.

**NOTE:**
Max. value for this parameter is 20.00in/min (508.8mm/min). Minimum value for this parameter is 0.04in/min (001.0mm/min). If a value outside of this range is entered, an error will occur (See INVALID ENTRY underError Messages).

c. Press the SET key again to exit the SET mode.

4. **DN SPEED**
The SET DN SPEED key allows the user to program the Down Speed value shown on the display. This is the speed at which the carriage will move in the down direction. The Down Speed can be programmed as follows:

a. Press the SET key next to DN SPEED.
b. Enter the desired speed using keys 0-9 on the keypad or use the +/- key to toggle between the maximum and minimum speeds.

**NOTE:**
Max. value for this parameter is 20.00in/min (508.8mm/min). Minimum value for this parameter is 0.04in/min (1.0mm/min). If a value outside of this range is entered, an error will occur (See INVALID ENTRY under Error Messages).

c. Press the SET key again to exit the SET mode.

5. **CYCLE LIMIT**
The SET CYCLE LIMIT key allows the user to program the Cycle Limit value shown on the display. During the RUN mode, the carriage will cycle up and down between the Upper and Lower Limits until the Cycle Limit is equal to the Cycle count. The Cycle Limit should be set to zero for continuous cycling. The Cycle Limit can be programmed as follows:

a. Press the SET key next to CYCLE LIMIT.
b. Enter the desired number of cycles using keys 0-9 on the keypad.

**NOTE:**
Max. value for this parameter is 50000. If a value outside of this range is entered, an error will occur (See INVALID ENTRY under
Error Messages).
c. Press the SET key again to exit the SET mode.

6. CYCLE
The RESET CYCLE key allows the user to set the Cycle count to zero. The Cycle count is the number of times the carriage has performed the test stroke and returned to its original position. The count is incremented at the end of the test stroke before the carriage returns to its original position. The Cycle count can be reset by pressing the RESET key next to CYCLE.

D. Function Keys
1. UP and DOWN Keys
The UP and DOWN keys allow manual movement of the carriage. When either of these keys are pressed, the carriage will move in the up or down direction at the speed specified for that direction.

2. RUN/STOP Key
The RUN/STOP key allows the user to start and/or stop the automated testing (RUN mode) function of the EZ250. In the RUN mode, the carriage will cycle up and down between the Upper and Lower Limits until the Cycle count is equal to the Cycle Limit or until any other key is pressed. An LED on the RUN key will light up to indicate that an automated test is currently being performed.

3. AUTO ZERO Key
The AUTO ZERO key is used to engage and/or disengage the Auto Gauge Zero function on the EZ250. This function will automatically zero the force gauge before beginning a new cycle. An LED on the AUTO ZERO key will light up to indicate when this feature is activated.

4. ZERO TRAVEL Key
The ZERO TRAVEL key is used to set the indicated travel reading on the test stand display to zero. The travel may be zeroed at any carriage location.

5. SEND Key
The SEND key allows the user to manually transmit the force reading, travel reading, and cycle count through the Test Stand I/O port (see Stand I/O Port for details). Data may be transmitted at any time.
6. **0 through 9 Keys**
   These keys are used in conjunction with all of the SET keys to enter numerical data.

7. **EXT LIMIT Key**
   The EXT LIMIT key is used in conjunction with the SET UPPER LIMIT and SET LOWER LIMIT keys. The EXTERNAL LIMIT feature allows the Upper or Lower Limit to be controlled by an outside signal such as a force gauge rather than a travel setting (see External Limit Control and APPENDIX B). To engage the External Limit feature, press the EXT LIMIT key instead of using the 0 - 9 keys to enter a limit.

8. **TENS/COMP Key**
   The TENS/COMP key is used to toggle between TENSION and COMPRESSION modes. Two LEDs on the TENS/COMP key indicate whether the test stand is in the TENSION or COMPRESSION mode. In the TENSION mode, the carriage will move up to the Upper Limit, increment the Cycle Count, and then return to the Lower Limit. In the COMPRESSION mode, the carriage will move down to the Lower Limit, increment the Cycle Count, and then return to the Upper Limit.

9. **in/mm Key**
   The in/mm key allows the user to select either inches or millimeters for the units of measure.

10. **+/- Key**
    This key is used in conjunction with the SET UPPER LIMIT and SET LOWER LIMIT keys to change the polarity of the selected limit. It is also used with the SET UP SPEED and SET DN SPEED keys to toggle between maximum speed and minimum speed.
Figure 6

E. Error Messages

No Gauge - Test Stand is unable to communicate with the force gauge. Make certain gauge is set for 19200 BAUD. And that the cable is properly installed.

ABORTED BY USER - RUN mode has been terminated by pressing any of the keys on the keyboard.

LOWER LIMIT ERROR - Present position of carriage is already at or below the position specified as the lower limit. Make certain the Lower Limit is properly entered, re-position the carriage or zero the travel.

UPPER LIMIT ERROR - Present position of carriage is already at or above the position specified as the upper limit. Make certain the Upper Limit is properly entered, re-position the carriage or zero the travel.
EXTERNAL LIMIT ERROR - One of the EXTERNAL LIMITS is already activated. Verify proper setting/operation of external device (ie. force gauge).

LOWER LIMIT SWITCH - Lower Emergency Over-travel switch is activated. Re-position the carriage. Check for setup errors or test stand malfunction.

UPPER LIMIT SWITCH - Upper Emergency Over-travel Switch is activated. Re-position the carriage. Check for setup errors or test stand malfunction.

INVALID ENTRY - If a number greater than the maximum value or less than the minimum value allowed for the Upper Limit, Lower Limit, Up Speed, Down Speed, or Cycle Limit is entered during the Setup, the EZ250 will beep to indicate an error. It will also automatically change the entered value to the maximum or minimum allowable value for that parameter and remain in the SET mode (cursor still flashing). At this point the user may enter a new value or press the SET key again to accept the default value.

F. Safety Features

1. Emergency Stop Switch
The Emergency Stop Switch is located at the top right hand side on the front of the test stand (See Figure 1). In the event of an emergency, pressing the Emergency Stop Switch will disconnect power from the motor. The switch will lock down when activated and illuminate to indicate that the motor is disengaged. Twist the Emergency Stop Switch clockwise to release it and resume normal operation.

2. Emergency Over-travel Switches
Before operating the EZ250 in the RUN mode, the Upper and Lower Emergency Over-travel Switches should be properly positioned. These switches are intended to prevent damage to gauge and fixtures in the event of a user or control system error.
When activated, the Upper and Lower Emergency Over-travel Switches will disable the motor in the up or down direction respectively. If the stand is operating in the RUN mode the test will be aborted. An error message will appear on the top line of the LCD indicating that either the upper or lower limit switch is activated.

The Emergency Over-travel switches will disable the test stand when the indicating line on the carriage travels past the pointer on either switch (see Figure 7).

**Figure 7** The motor will be disabled in one direction when the activation line becomes aligned with the pointer of either Over-travel switch.
G. RS-232 Interface

The Test Stand I/O Port is located on the right hand side of the EZ250 (see Figure 1). This port provides access to all necessary pins for serial communication as well as access to special function pins on the force gauge. The gauge reading, travel reading, and cycle count can be transmitted via the stand I/O Port by pressing the SEND key on the keypad. The EZ250 will also transmit these readings at the end of each stroke. This feature can be enabled and disabled by transmitting an ASCII character "E" to the Test Stand I/O port (see Special I/O functions).

1. Keyboard Emulation Commands

All keyboard functions can be emulated via the RS-232 port through the following commands. All characters must be upper case.

<table>
<thead>
<tr>
<th>Keyboard Function</th>
<th>ASCII Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP</td>
<td>U</td>
</tr>
<tr>
<td>DOWN</td>
<td>D</td>
</tr>
<tr>
<td>RUN/STOP</td>
<td>S</td>
</tr>
<tr>
<td>SEND</td>
<td>Space Bar</td>
</tr>
<tr>
<td>ZERO TRAVEL</td>
<td>Z</td>
</tr>
<tr>
<td>AUTO GAUGE ZERO</td>
<td>A</td>
</tr>
<tr>
<td>SET Upper Limit</td>
<td>F</td>
</tr>
<tr>
<td>SET Lower Limit</td>
<td>B</td>
</tr>
<tr>
<td>SET Cycle Limit</td>
<td>L</td>
</tr>
<tr>
<td>SET Up Speed</td>
<td>P</td>
</tr>
<tr>
<td>SET DN Speed</td>
<td>N</td>
</tr>
<tr>
<td>RESET Cycle</td>
<td>R</td>
</tr>
<tr>
<td>TENS/COMP</td>
<td>T</td>
</tr>
<tr>
<td>in/mm</td>
<td>I</td>
</tr>
<tr>
<td>+/-</td>
<td>+</td>
</tr>
<tr>
<td>0 through 9</td>
<td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9</td>
</tr>
</tbody>
</table>

In order to provide maximum flexibility of this interface, data is not returned from the EZ250 after receiving any of the Keyboard I/O commands except for SEND.
2. Special I/O Commands
The serial interface also allows some special functions which cannot be performed from the keyboard. These functions are listed below and can be accessed through the following commands.

<table>
<thead>
<tr>
<th>Special Function</th>
<th>ASCII Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit Transmit On/Off</td>
<td>E</td>
</tr>
<tr>
<td>Transmit Force Reading</td>
<td>O</td>
</tr>
<tr>
<td>Transmit Travel Reading</td>
<td>V</td>
</tr>
<tr>
<td>Transmit Cycle Reading</td>
<td>C</td>
</tr>
<tr>
<td>Gauge Command</td>
<td>!</td>
</tr>
</tbody>
</table>

The character immediately following the Gauge Command will be transmitted directly to the gauge. The gauge response will be transmitted out the Test Stand I/O Port.

3. Setup Inquiry Commands
Because the Keyboard I/O commands do not return any data, it may be necessary at times to determine the status of each setup parameter. This can be accomplished by transmitting the following commands to the Test Stand I/O Port. All responses are transmitted as shown in the table below followed by CR LF.

<table>
<thead>
<tr>
<th>Setup Parameter</th>
<th>ASCII Command</th>
<th>Test Stand Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Limit</td>
<td>@F</td>
<td>* YXXXXXXXX</td>
</tr>
<tr>
<td>Lower Limit</td>
<td>@B</td>
<td>* YXXXXXXXX</td>
</tr>
<tr>
<td>UP Speed</td>
<td>@P</td>
<td>* XXXXX</td>
</tr>
<tr>
<td>DN Speed</td>
<td>@N</td>
<td>* XXXXX</td>
</tr>
<tr>
<td>Cycle Limit</td>
<td>@L</td>
<td>* XXXXX</td>
</tr>
<tr>
<td>Auto Zero Status</td>
<td>@A</td>
<td>AZ OFF or AZ ON</td>
</tr>
<tr>
<td>Units of Measure</td>
<td>@I</td>
<td>INCHES or</td>
</tr>
<tr>
<td>MILLIMETERS</td>
<td></td>
<td>TENSION or</td>
</tr>
<tr>
<td>Tension or Compression</td>
<td>.@T</td>
<td>XMIT ON or XMIT OFF</td>
</tr>
<tr>
<td>COMPRESSION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limit Transmit On or Off</td>
<td>@E</td>
<td></td>
</tr>
</tbody>
</table>

* y is the polarity, + for positive - for negative.
X is numerical data 0-9 including decimal point.
4. Output Data Format
There are three types of output data transmitted from the EZ250 Test Stand: test stand responses, gauge responses, and test stand data.

a. Test Stand Responses
Test Stand responses are transmitted in response to a Setup Inquiry Command. These responses are transmitted as shown in the table above and are followed by CR LF.

b. Gauge Responses
Gauge responses are a reproduction of the data sent from the gauge followed by CR LF.

c. Test Stand Data
Test stand data is transmitted in response to the SEND, Transmit Force, Transmit Travel, and Transmit Cycle commands. The format of this data is dependent upon the polarity and verbosity settings (see Appendix A). The EZ250 is delivered from the factory with the polarity and the verbosity turned on. The data format for each parameter is shown below.

**Force**
The first character will be space, T, or C for present reading, peak tension or peak compression with AccuForce® gauges.

Character 2 will not be transmitted if polarity is off.

Characters 8 and 9 will not be transmitted if verbosity is off.

- Character 1: Space, T, or C
- Character 2: Space or - (gauge polarity)
- Character 3: Most significant digit
- Character 4: numerical or decimal
- Character 5: numerical or decimal
- Character 6: numerical or decimal
- Character 7: numerical or decimal
- Character 8: units of measure
- Character 9: units of measure
- Character 10: Carriage Return
- Character 11: Line Feed
Travel
Character 1 will not be transmitted if polarity is off.
Characters 8 and 9 will not be transmitted if verbosity is off.

Character 1: + or - (travel polarity)
Character 2: Most significant digit
Character 3: numerical
Character 4: numerical or decimal
Character 5: numerical or decimal
Character 6: numerical
Character 7: numerical
Character 8: units of measure
Character 9: units of measure
Character 10: Carriage Return
Character 11: Line Feed

Cycles
Character 1: Most significant digit
Character 2: numerical
Character 3: numerical
Character 4: numerical
Character 5: numerical
Character 6: Carriage Return
Character 7: Line Feed

H. Analog Output Port

1. Travel
The travel reading will be represented as an analog output voltage of ±1 VDC (± 2mV error) on the analog output port of the test stand. Positive 1 VDC will represent full scale in the up direction while negative 1 VDC represents full scale in the down direction.

2. Force
The analog output for the force reading is gauge dependant. If this signal is present it will be passed through to the analog output port on the test stand.

I. External Limit Control
Three pins are provided on the Gauge and Stand I/O Ports for external limit inputs. These pins are designated as Lower Limit Control, Upper Limit Control, and Ground (see the Gauge and Stand I/O Port sections of this manual). These signals will be disregarded unless EXTERNAL is selected for one or both of the limits. If EXTERNAL appears on the display for one of the limits and the corresponding limit input port is driven to a logic high, the stand will assume the limit has been reached.
IV. SPECIFICATIONS

A. Functional
   Capacity: 0-250 Lbs. (110 kg.)
   Speed Range: 0.04 - 20.00 in/min (1.0 - 508.0 mm/min)
   Cycle Limit Range: 0 - 50,000
   Maximum Stroke Length: 20.000 in. (508.00 mm)

B. General
   Power Requirement: 115VAC @ .630A or 230VAC @ .630A
                     (50 - 60 Hz.)
   Force Gauge: Mounting hardware for all AccuForce® IV
                Remote Load cells (preferred). Optional
                hardware available for AccuForce® III
                gauges.

C. Accuracy
   Speed: ±(0.065% RDG + 0.01 in/min)
          ±(0.065% RDG + 0.26 mm/min)
   Travel: ±(0.05% RDG + 0.0024 in)
          ±(0.05% RDG + 0.062 mm)
   Force:  Gauge Dependant

D. Resolution
   Speed: 0.01 in/min (0.1mm)
   Travel: 0.001 in. (0.01 mm.)
   Cycles: 1 cycle
   Force:  Gauge Dependent

E. Physical
   Dimensions (H X W X D): (41 X 15.75 X 24) inches
                           (1041.4 X 400.05 X 588) mm
   Weight: 175 Lbs. (79.4 kg).

F. Environmental
   Operating Temperature: +32 to +122 °F (+0 to +50 °C)
   Storage Temperature: -4 to +158 °F (-20 to +70 °C)
G. I/O Ports
1. Gauge I/O Port
   a. Pin Functions
      The connector used on the Gauge I/O Port is a 25 pin Male "D" connector the pin functions are listed below.

<table>
<thead>
<tr>
<th>PIN</th>
<th>SYMBOL</th>
<th>SIGNAL DESCRIPTION</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TX</td>
<td>Transmitted Data</td>
<td>Data to force gauge</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Received Data</td>
<td>Data from force gauge</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>Clear To Send</td>
<td>Indicates when gauge is ready to recv. data</td>
</tr>
<tr>
<td>7</td>
<td>SG</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>Upper Limit Control</td>
<td>See External Limit Control</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>Lower Limit Control</td>
<td>See External Limit Control</td>
</tr>
<tr>
<td>11</td>
<td>-</td>
<td>Analog Input from Gauge</td>
<td>Passed to Analog Output Port</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>Data Terminal Ready</td>
<td>Indicates when EZ250 is ready to recv. data</td>
</tr>
</tbody>
</table>

   b. General Specifications
      Interface Type: Full Duplex Serial
      Definition: DTE (Terminal)
      BAUD Rate: 19,200
      Parity: None
      Data Bits: 8
      Start Bits: 1
      Coding: ASCII
      Transmit Delimiter: CR LF
      Receive Delimiter: CR LF
      Transmit Sequence: LSB first (each character)
      Receive Sequence: LSB first (each character)
2. Stand I/O Port
   a. Pin Functions
      The connector used on the Stand I/O Port is a 25 pin Male "D" connector the pin functions are listed below.

<table>
<thead>
<tr>
<th>PIN</th>
<th>SYMBOL</th>
<th>SIGNAL DESCRIPTION</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>RX</td>
<td>Received Data</td>
<td>Data to EZ250</td>
</tr>
<tr>
<td>3</td>
<td>TX</td>
<td>Transmitted Data</td>
<td>Data from EZ250</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>Clear To Send</td>
<td>Indicates when EZ250 is ready to recv. data</td>
</tr>
<tr>
<td>7</td>
<td>SG</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>Upper Limit Control</td>
<td>See External Limit Control</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>Lower Limit Control</td>
<td>See External Limit Control</td>
</tr>
<tr>
<td>11</td>
<td>-</td>
<td>Analog Output from Gauge</td>
<td>Passed from Analog Output Port</td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>Data Terminal Ready</td>
<td>Indicates when computer is ready to recv. data</td>
</tr>
</tbody>
</table>

b. General Specifications
   The Stand I/O Port on the EZ250 is configured as follows when delivered from the factory. However, BAUD rate, parity, data bits, stop bits, as well as other communications options are DIP switch selectable (see Appendix A).

   Interface Type: Full Duplex Serial
   Definition: DCE (Modem)
   BAUD Rate: 9,600
   Parity: None
   Data Bits: 8
   Stop Bits: 1
   Coding: ASCII
   Transmit Delimiter: CR LF
   Receive Delimiter: None
   Transmit Sequence: LSB first (each character)
   Receive Sequence: LSB first (each character)
APPENDIX A:
DIP Switch Settings for Stand I/O Port Configuration

- If necessary, the BAUD Rate, parity, data bits, stop bits, verbosity, and polarity can be configured on the EZ250 test stand as follows.

![DIP Switches Diagram](E96-139)

**Figure 8** DIP Switches for Stand I/O Port

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>PARAMETER</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,3</td>
<td>BAUD Rate</td>
<td>OFF OFF OFF = 300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON OFF OFF = 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF ON OFF = 1200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON ON OFF = 2400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF OFF ON = 4800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON OFF ON = 9600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF ON ON = 19200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON ON ON = 19200</td>
</tr>
<tr>
<td>4,5</td>
<td>Parity/Data Bits</td>
<td>OFF OFF = Even, 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF ON = Odd, 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON OFF = None, 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON ON = None, 8</td>
</tr>
<tr>
<td>6</td>
<td>Stop Bits</td>
<td>OFF = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON = 2</td>
</tr>
<tr>
<td>7</td>
<td>Polarity</td>
<td>OFF = NO</td>
</tr>
<tr>
<td></td>
<td>(transmit +/-)</td>
<td>ON = Yes</td>
</tr>
<tr>
<td>8</td>
<td>Verbosity</td>
<td>OFF = NO</td>
</tr>
<tr>
<td></td>
<td>(transmit units of measure)</td>
<td>ON = Yes</td>
</tr>
</tbody>
</table>
APPENDIX B:
Application Note - Force Limits

When an AccuForce®IV force gauge is used in conjunction with the EZ250 test stand, the EXT LIMIT feature on the EZ250 may be used along with the HIGH and LOW SET POINTS on the gauge to execute force limits. The following are step by step examples for setting up a tension test and a compression test using this feature.

- **TENSION TEST**
  - Definition - this test will pull a sample up until the force programmed in the force gauge is achieved. The carriage will then stop and return to the zero position. This cycle will be repeated until the Cycle Count is equal to the Cycle Limit.

  - Set Upper and Lower Emergency Over-travel Switches as described in this manual. This step is extremely important because if the test sample should break before reaching the preset force limit, the carriage will not stop moving in the up direction. This can cause damage to the test stand and/or fixtures.

  - Turn on EZ250 and force gauge.

  - If desired, set force gauge up to read peak tension (see force gauge user's manual).

  - Verify that force gauge readings are being displayed on the EZ250 LCD.

  - Set EZ250 up for Tension mode by pressing the TENS/COMP key. The LED next to TENS will light up when the EZ250 is in the Tension mode.

  - Place test specimen in fixtures and use the UP and DOWN keys to move the carriage to the desired start position.

  - Press the ZERO TRAVEL key to set the displayed travel to zero.

  - Press the SET UPPER LIMIT key on the EZ250 display panel.

  - Press the EXT LIMIT key and verify that EXTERNAL is displayed next to UPPER LIMIT on the EZ250. This will tell the EZ250 to monitor the Upper Limit Control pin.

  - Press the SET UPPER LIMIT key again to exit the SET UPPER LIMIT mode.
Set up the AccuForce® IV to control the Upper Limit Pin. As the carriage moves in the up direction it will be applying a tension force to the sample. Because tension forces are displayed as negative values on the force gauge, the mathematical value on the force gauge will be decreasing (becoming more negative) as force is applied. Therefore, the **LOW SET POINT** should be set for the desired force limit. See force gauge manual for details.

- Press the SET LOWER LIMIT key to begin programming the stop point in the down direction.

- Press the "0" key on the key pad repeatedly until the LOWER LIMIT reads zero.

- Press the SET LOWER LIMIT key again to exit the SET LOWER LIMIT mode.

- Press the SET UP SPEED key and use keys 0-9 on the key pad to enter the desired speed for the up direction.

- Press the SET UP SPEED key again to exit the SET UP SPEED mode.

- Press the SET DN SPEED key and use keys 0-9 on the key pad to enter the desired speed for the down direction.

- Press the SET DN SPEED key again to exit the SET DN SPEED mode.

- Press the SET CYCLE LIMIT key to begin programming the number of times the carriage should run up and down before ending the test.
  - For continuous cycling this parameter should be set to zero.
  - Otherwise, enter the desired number using keys 0-9 on the key pad.

- Press the SET CYCLE LIMIT key again to exit the SET CYCLE LIMIT mode.

- Press the RESET CYCLE key to set the CYCLE count back to zero.

- If desired, press the AUTO ZERO key to zero the gauge at the beginning of every cycle.

- The test is now set up. Verify that the gauge reading is zero and press the RUN key to begin the test.
**COMPRESSION TEST**

Definition - this test will push a sample down until the force programmed in the force gauge is achieved. The carriage will then stop and return to the zero position. This cycle will be repeated until the Cycle Count is equal to the Cycle Limit.

- Set Upper and Lower Emergency Over-travel Switches as described in this manual.
- Turn on EZ250 and force gauge.
- If desired, set force gauge up to read peak compression (see force gauge user's manual).
- Verify that force gauge readings are being displayed on the EZ250 LCD.
- Set EZ250 up for Compression mode by pressing the TENS/COMP key. The LED next to COMP will light up when the EZ250 is in the Compression mode.
- Place test specimen between the fixtures and use the UP and DOWN keys to move the carriage to the desired start position.
- Press the ZERO TRAVEL key to set the displayed travel to zero.
- Press the SET UPPER LIMIT key on the EZ250 display panel to begin programming the stop point in the up direction.
- Press the "0" key on the key pad repeatedly until the UPPER LIMIT is reads zero.
- Press the SET UPPER LIMIT key again to exit the SET UPPER LIMIT mode.
- Press the SET LOWER LIMIT key to begin programming the stop point in the down direction.
- Press the EXT LIMIT key. This will tell the EZ250 to monitor the Lower Limit Control pin.
- Verify that the word EXTERNAL is displayed next to LOWER LIMIT on the EZ250 and press the SET LOWER LIMIT key again to exit the SET LOWER LIMIT mode.
Set up the AccuForce® IV to control the Lower Limit Pin.

- As the carriage moves in the down direction it will be applying a compression force to the sample. Because compression forces are displayed as positive values on the force gauge, the mathematical value on the force gauge will be increasing (becoming more positive) as force is applied. Therefore, the HIGH SET POINT should be set for the desired force limit. See force gauge manual for details.

- Press the SET UP SPEED key and use keys 0-9 on the key pad to enter the desired speed for the up direction.

- Press the SET UP SPEED key again to exit the SET UP SPEED mode.

- Press the SET DN SPEED key and use keys 0-9 on the key pad to enter the desired speed for the down direction.

- Press the SET DN SPEED key again to exit the SET DN SPEED mode.

- Press the SET CYCLE LIMIT key to begin programming the number of times the carriage should run up and down during the test.
  - For continuous cycling this parameter should be set to zero.
  - Otherwise, enter the desired number using keys 0-9 on the key pad.

- Press the SET CYCLE LIMIT key again to exit the SET CYCLE LIMIT mode.

- Press the RESET CYCLE key to set the CYCLE count back to zero.

- If desired, press the AUTO ZERO key to zero the gauge at the beginning of every cycle.

- The test is now set up. Verify that the gauge reading is zero and press the RUN key to begin the test.