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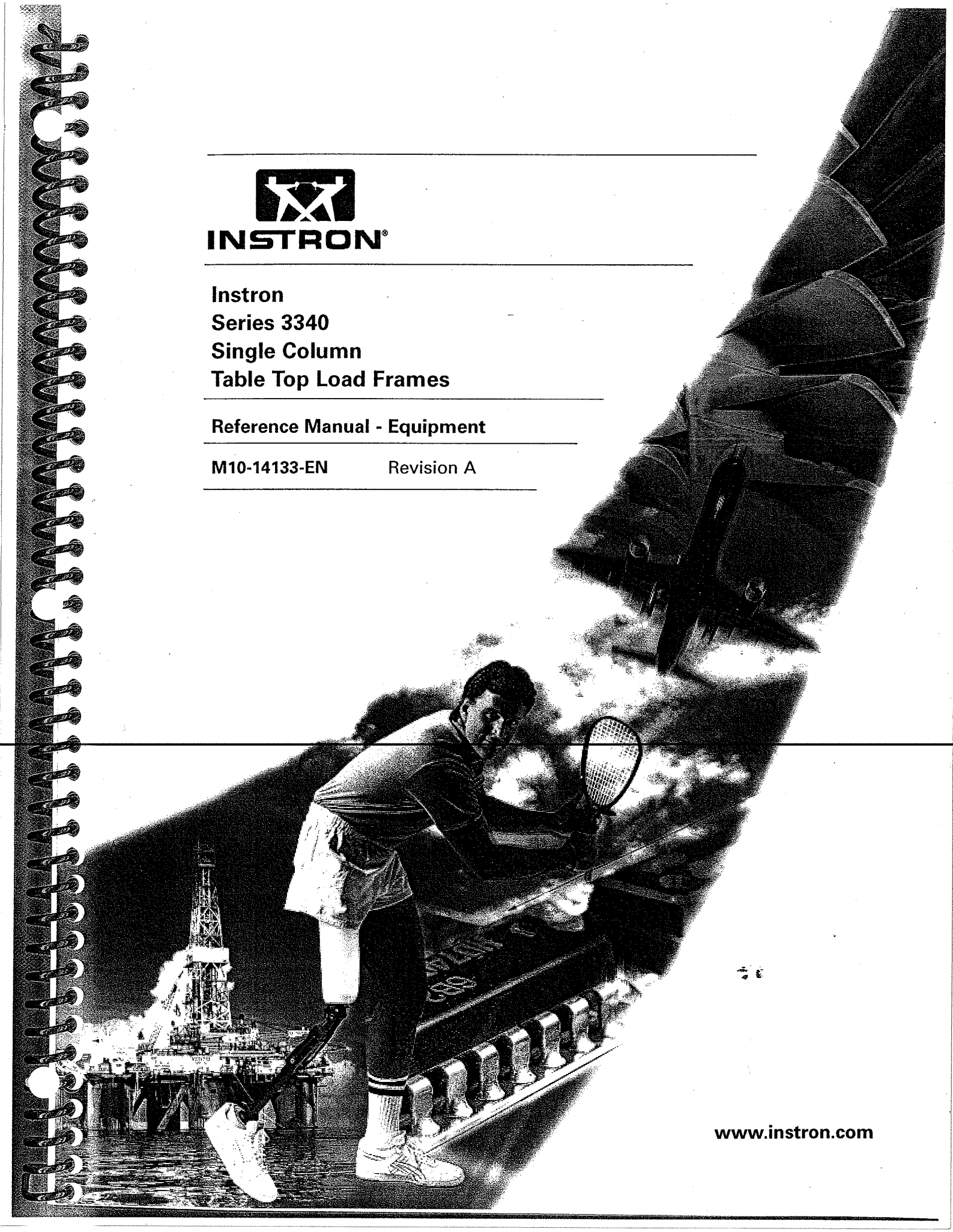
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INSTRON®

Instron
Series 3340
Single Column
Table Top Load Frames

Reference Manual - Equipment

M10-14133-EN Revision A

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Where applicable, this equipment is designed to comply with International Electromagnetic Compatibility (EMC) standards.

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General Safety Precautions



Materials testing systems are potentially hazardous.

Materials testing involves inherent hazards from high forces, rapid motions, and stored energy. You must be aware of all moving and operating components that are potentially hazardous, particularly the actuator in a servohydraulic testing system or the moving crosshead in an electromechanical testing system.

Carefully read all relevant manuals and observe all Warnings and Cautions. The term Warning is used where a hazard may lead to injury or death. The term Caution is used where a hazard may lead to damage to equipment or to loss of data.

Instron products, to the best of its knowledge, comply with various national and international safety standards, in as much as they apply to materials and structural testing. Our products are designed to the Instron Safety Standard (ICP-CS503), which is available on request. This standard is derived from various national and international standards including IEC61010-1. We certify that our products comply with all relevant EU directives (CE mark).

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At your request, we will gladly provide advice and quotations for additional safety devices such as protective shielding, warning signs or methods of restricting access to the equipment.

The following pages detail various general warnings that you must heed at all times while using materials testing equipment. You will find more specific Warnings and Cautions in the text whenever a potential hazard exists.

Your best safety precautions are to gain a thorough understanding of the equipment by reading your instruction manuals and to always use good judgement.

It is our strong recommendation that you should carry out your own product safety risk assessment.

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Warnings



Hazard - Press the Emergency Stop button whenever you consider that an unsafe condition exists.

The Emergency Stop button removes hydraulic power or electrical drive from the testing system and brings the hazardous elements of the system to a stop as quickly as possible. It does not isolate the system from electrical power, other means are provided to disconnect the electrical supply. Whenever you consider that safety may be compromised, stop the test using the Emergency Stop button. Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.



Flying Debris Hazard - Make sure that test specimens are installed correctly in grips or fixtures in order to eliminate stresses that can cause breakage of grip jaws or fixture components.

Incorrect installation of test specimens creates stresses in grip jaws or fixture components that can result in breakage of these components. The high energies involved can cause the broken parts to be projected forcefully some distance from the test area. Make sure that specimens are installed in the center of grip jaws and inserted at least two-thirds of the length of the jaws. Use any centering and alignment devices provided.



Hazard - Protect electrical cables from damage and inadvertent disconnection.

The loss of controlling and feedback signals that can result from a disconnected or damaged cable causes an open loop condition that may drive the actuator or crosshead rapidly to its extremes of motion. Protect all electrical cables, particularly transducer cables, from damage. Never route cables across the floor without protection, nor suspend cables overhead under excessive strain. Use padding to avoid chafing where cables are routed around corners or through wall openings.



Crush Hazard - Take care when installing or removing a specimen, assembly, structure, or load string component.

Installation or removal of a specimen, assembly, structure, or load string component involves working inside the hazard area between the grips or fixtures. When working in this area, ensure that other personnel cannot operate any of the system controls. Keep clear of the jaws of a grip or fixture at all times. Keep clear of the hazard area between the grips or fixtures during actuator or crosshead movement. Ensure that all actuator or crosshead movements necessary for installation or removal are slow and, where possible, at a low force setting.

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Warnings



Hazard - Set the appropriate limits before performing loop tuning or running waveforms or tests.

Operational limits are included within your testing system to suspend motion or shut off the system when upper and/or lower bounds of actuator or crosshead travel, or force or strain, are reached during testing. Correct setting of operational limits by the operator, prior to testing, will reduce the risk of damage to test article and system and associated hazard to the operator.



Electrical Hazard - Disconnect the electrical power supply before removing the covers to electrical equipment.

Disconnect equipment from the electrical power supply before removing any electrical safety covers or replacing fuses. Do not reconnect the power source while the covers are removed. Refit covers as soon as possible.



Rotating Machinery Hazard - Disconnect power supplies before removing the covers to rotating machinery.

Disconnect equipment from all power supplies before removing any cover which gives access to rotating machinery. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.





Explosion Hazard - Wear eye protection and use protective shields or screens whenever any possibility exists of a hazard from the failure of a specimen, assembly or structure under test.

Wear eye protection and use protective shields or screens whenever a risk of injury to operators and observers exists from the failure of a test specimen, assembly or structure, particularly where explosive disintegration may occur. Due to the wide range of specimen materials, assemblies or structures that may be tested, any hazard resulting from the failure of a test specimen, assembly or structure is entirely the responsibility of the owner and the user of the equipment.

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Warnings



Hazard - Ensure components of the load string are correctly pre-loaded to minimize the risk of fatigue failure.

Dynamic systems, especially where load reversals through zero are occurring, are at risk of fatigue cracks developing if components of the load string are not correctly pre-loaded to one another. Apply the specified torque to all load string fasteners and the correct setting to wedge washers or spiral washers. Visually inspect highly stressed components such as grips and threaded adapters prior to every fatigue test for signs of wear or fatigue damage.

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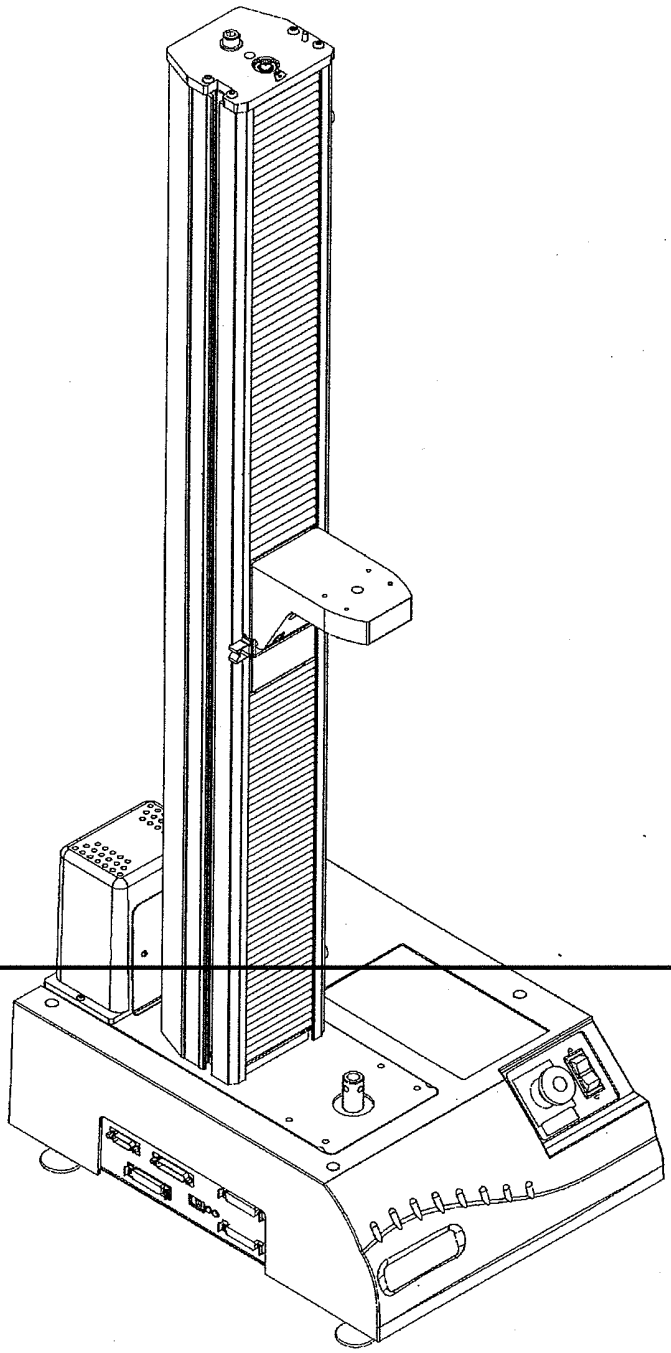
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Series 3340 Single Column Load Frame

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Chapter 1
Introduction

Outline

This chapter describes the Instron 3340 single column table top load frames and its associated components.

- Purpose 1-2
- Description 1-4
- Components and Assemblies 1-7
- System Safety and Information Labeling 1-17
- Calibration and Verification 1-21

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Purpose

The Instron Series 3340 electromechanical test instruments can test a wide range of materials in tension or compression. The five load frames described in this manual can be placed on a table top or work bench for use at a convenient working height.

The load frame is designed to secure a test specimen between the rigid frame base and the moving crosshead. The drive system moves the crosshead up to apply a tensile load on a specimen, or down to apply a compressive load on the specimen.

The applied load is measured by a load transducer (load cell) mounted between the specimen and the crosshead. The load cell converts forces into an electrical signal that the control system measures and displays. Load cells are interchangeable with others of different capacities to provide a range of load measurement capabilities.

Instron's proprietary software program controls the testing system. Setting test parameters and operating the system are done through the software program. Detailed information on operating the system through the software is provided in the online help included with the software.

About this Manual

This manual provides a basic understanding of the 3340 single column, table model test system and its principles of operation. The manual contains information on:

- Component and control descriptions
- Load frame specifications
- Installation procedures
- Functional and operational details
- Maintenance procedures
- Ancillary parts information and optional accessories

This manual is intended for the system operator.

Other Manuals

Refer to the documentation accompanying your software system for information regarding the use of your software. Software documentation includes online help. Accessories such as printers, grips and extensometers also come with separate instruction manuals.

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Product Support

Instron provides several information tools with its systems, including manuals and online help systems, that can answer many of the questions you may have. It is recommended that you review the manuals sent with the system you purchased, or check the software's online help system, for possible solutions to your questions.

You can also check the Frequently Asked Questions (FAQs) page on Instron's web site for additional information. If you need more information, you can submit your question by completing a Service Support form on the web site. Both the FAQs section and Request Service section are located under the Services on the Home page.

If you cannot find answers in these sources, contact Instron's Service department directly:

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Description

Basic Functions

The basic operation of the 3340 testing instrument involves:

- Proper load cell selection.
- Mounting the cell in the moving crosshead on the load frame.
- Attaching grips and fixtures.
- Setting the test parameters at the computer.
- Installing the specimen.
- Applying a load.
- Measuring the results of the test.

The specimen is secured by grips for tension testing, or table-mounted on a platen for compression testing. Special fixturing is available for applications, such as flexure and peel testing. If strain measurement is required, an optional strain gauge extensometer is attached to the specimen. Specialized, non-contacting extensometers can also be used with specimens that are unable to support a contacting extensometer.

Structural Design

This manual describes the 3342, 3343, 3344, 3345, and the 3345 Extra Height single column, table top load frames.

The load frames consist of a load frame table, a drive motor, a guide column and a vertical ballscrew. A moving crosshead mounts on the column and ballscrew. A load cell attaches to the crosshead. A drive assembly links the motor to the lower end of the ballscrew. The rotation of the drive motor transmits to the ballscrew and moves the crosshead up or down the column.

When you secure a specimen in the grips or fixturing, the crosshead applies a tensile or compressive force to the specimen. The load cell converts the forces into an electrical signal that the control system measures and displays.

Collapsible ballscrew blinds protect the ballscrew from dust and test debris. The blinds attach to the crosshead with velcro strips above and below the crosshead. A column cover encloses the ballscrew and provides additional support to the frame. On the side of the column cover there is a T-slot for mounting optional accessories.

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A travel limit rod with adjustable limit stops extends through the T-slot on the right side of the column cover. Set the upper and lower limit stops before starting a test. If the actuator arm on the crosshead contacts either limit stop, the limit switch activates and the crosshead stops.

A fixed top plate is located at the top of the column cover. The top plate is the ballscrew upper bearing carrier.

The entire assembly is installed on a base that contains the mechanical drive train for the ballscrew, a printed circuit card cage, and the power supply.

An emergency stop button is located on the front of the frame base, and is a large, round, red button. When activated, it stops the test immediately.

Crosshead Drive - Mechanical

The mechanical drive train for the moving crosshead is located within the support base. A ballscrew (inside the column) mounts into lubricated bearings on a rigid base beam inside the frame base. A d.c. servo motor connects and drives the ballscrew via a pulley system.

An encoder, mounted on the drive motor, provides crosshead position information to the computer. Refer to "Crosshead Position Control" on page 1-5 for additional information.

Crosshead Position Control

The system operates on a closed loop servo-control circuit. Crosshead speed and direction are determined by pre-set parameters at the computer. When the test begins, the controller generates a start signal that commands the crosshead to move in accordance with the pre-set parameters.

An incremental optical encoder is mounted on the shaft of the main drive motor and closes the control loop for the crosshead drive motor. The encoder is a rotational measurement device that provides feedback information using timing pulses. These pulses indicate the direction and angle of motor shaft rotation. The motor shaft rotation is proportional to crosshead displacement. The computer subtracts the encoder signal from the command signal and expresses the difference as an error signal. The motor drives the crosshead at the preset speed to minimize the error signal.

The error signal is applied to the servo power amplifier in the load frame. This unit is a self-contained, pulse-width modulated device that controls the speed and direction of the drive motor. The amplitude of the error signal determines the speed of the crosshead and the polarity determines the direction.

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Computer Communications

Inside the frame base there is a frame interface board that provides signal interfacing between the controller and the frame components. An integrated circuit chip on this board contains a unique digital code for each frame type and lets the computer recognize the frame. This identification enables the correct electronic setting for the system load limits and the automatic calibration values in the control program.

The computer contains a digilink board that enables the computer to communicate with the load frame. If your computer does not contain the digilink board, then your computer cannot operate the load frame. Communication occurs through the controller inside the load frame base. The controller receives messages from the computer and sends the message to the load frame to perform the required operation. While testing, the controller receives data from the load cell and sends the data back to the computer.

System Power and Electrical Connections

Main power to a Series 3340 load frame is applied through a separate cord set that attaches to the line input connector on the back of the frame. Voltages on the line input connector accommodate power source voltages from 100 to 240 V a.c.

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Components and Assemblies

Main Components

The main components of the Series 3340 load frame are shown in either Figure 1-1 or Figure 1-2 and are briefly described in this section.

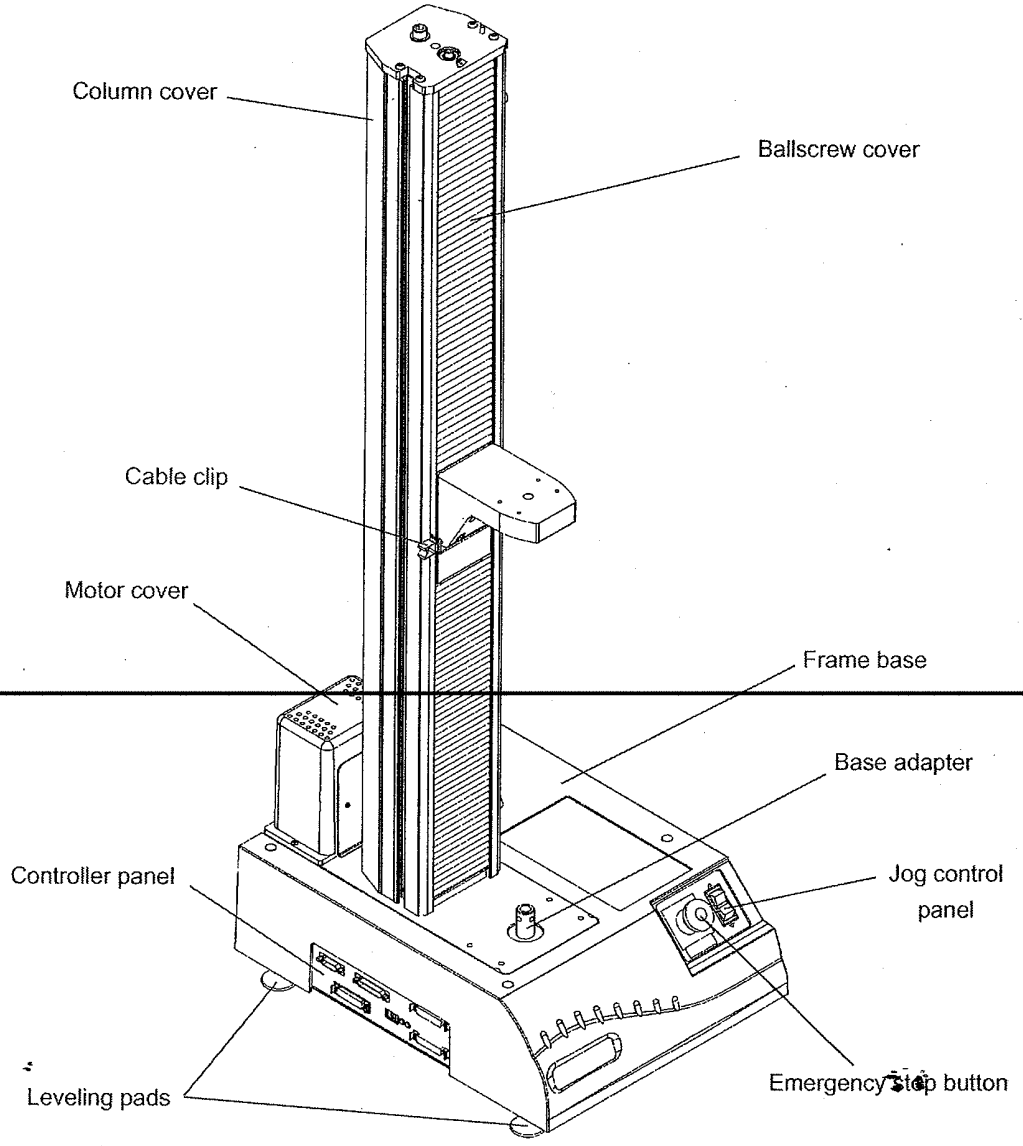


Figure 1-1. Load Frame Components - Front View

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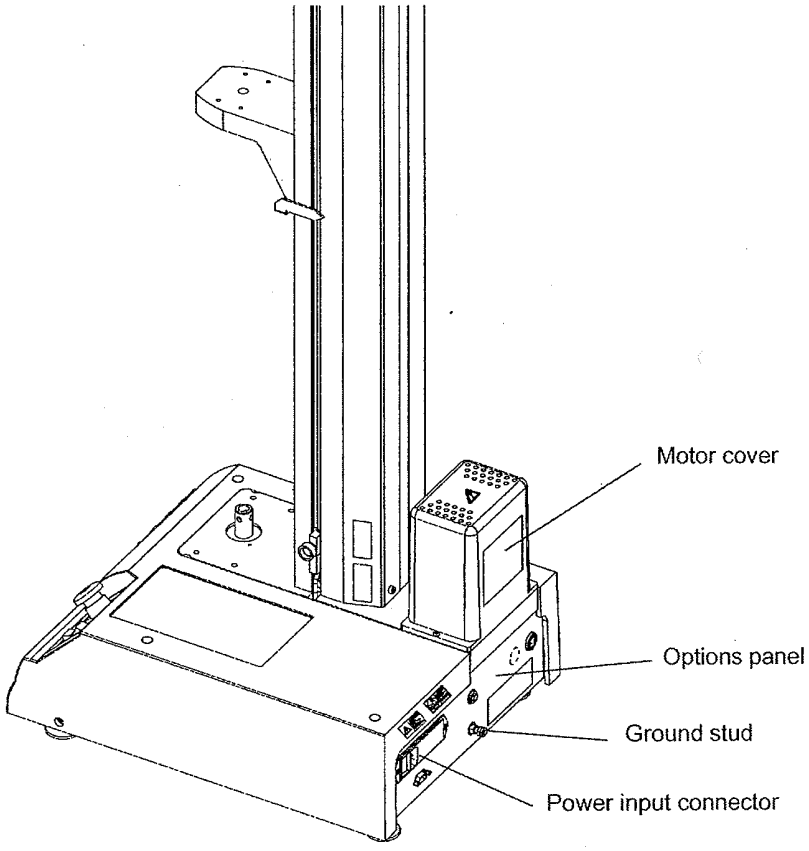


Figure 1-2. Load Frame Components - Rear View

Frame Base	The base of the frame contains the electrical components that power the frame and the controller panel that controls communications.
Motor Cover	Covers the motor that powers the ballscrews and moves the crosshead.
Base Adapter	Enables a specimen, grip, or fixture to be connected to the base of the load frame.
Emergency Stop Button	The Emergency Stop button is a round, red button on the front of the frame base. When you press this button, the system shuts off immediately. Refer to "Emergency Stop Button" on page 5-9 for additional details on this safety feature.

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Jog Control Panel

The jog control panel lets you move the crosshead up and down as required for positioning the crosshead or moving the crosshead away from a limit stop. On the jog control panel, there are two indicator lights:

- **POWER** - When this light illuminates, the machine is on and receiving electrical power.
- **TEST IN PROGRESS** - When this light illuminates, the crosshead is moving, even when you are using the jog controls to move the crosshead.

For additional information, refer to "Using the Jog Control Panel" on page 5-3.

Motor Cover

Covers the motor that powers the ballscrews and moves the crosshead.

Leveling Pads

Four adjustable pads are used to level the load frame during installation. They are located at each corner of the frame base.

Controller

The controller contains the 3300 control electronics and system communications. It provides connectors that receive cables from the load cell (or extensometer) and the computer. Refer to "Controller Panel" on page 1-16 for more detailed information.

Power Input Connector

Connects the load frame to the electrical power supply, holds the power fuse, and controls the voltage setting. The voltage setting can be changed if necessary. Refer to "Setting the Input Voltage" on page 3-8.

Ground Stud

Located on the back of the frame base. Use the ground stud to ground the frame if the electrical power plug is not properly grounded.

Cable Clips

Secures various cables so they do not interfere with testing.

Options Panel

The options panel is located on the back of the frame base and provides connections for compatible accessories. Optional connections include:

- Pip jack
- 12 VAC 2A rated outlet for optional light accessory
- 10 pin D connector for optional air kit when fitted with automatic pneumatic grips.
- Interlock capability that enables an emergency stop feature when a protective door or guard, fitted on a frame, is opened.

Refer to "Connecting Optional Accessories" on page 3-16 for additional information.

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Column and Crosshead Components

Refer to Figure 1-3 to identify the components described in this section.

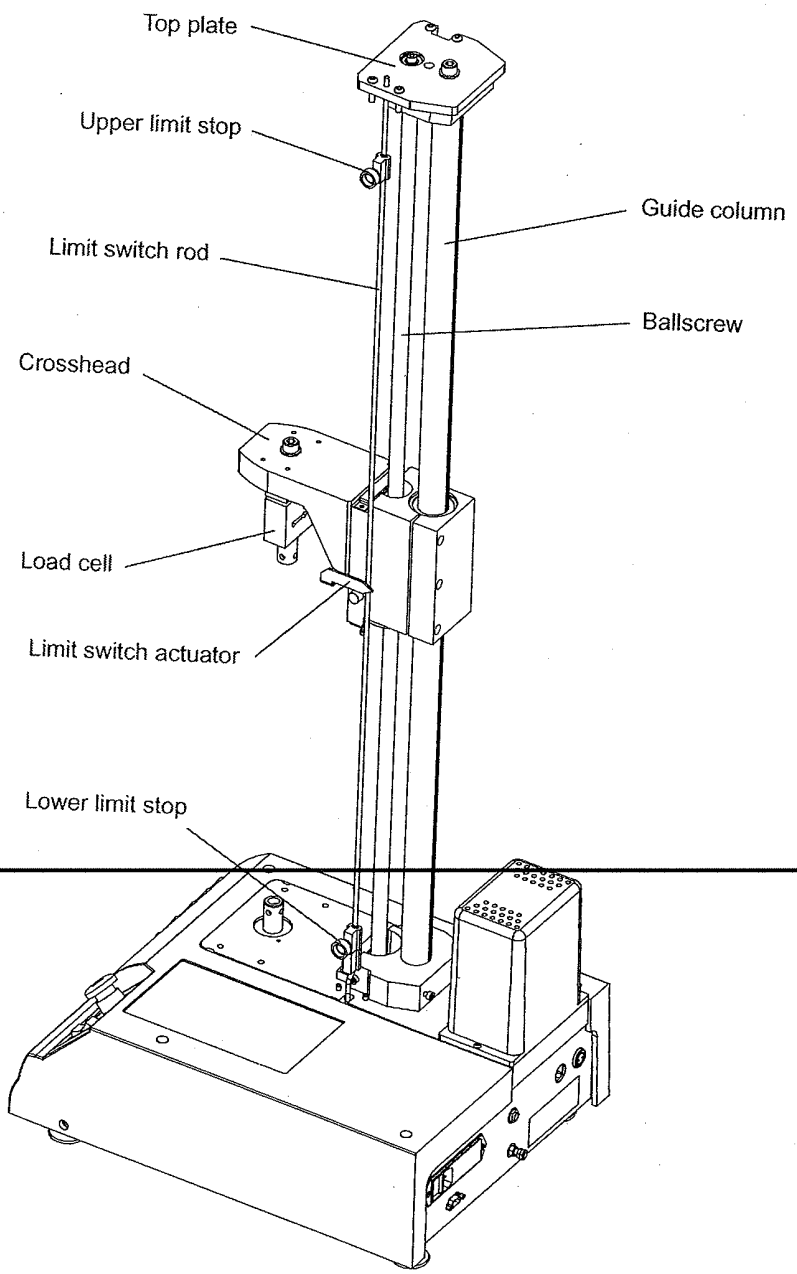


Figure 1-3. Column and Crosshead Components - 3342, 3343, & 3344 Models

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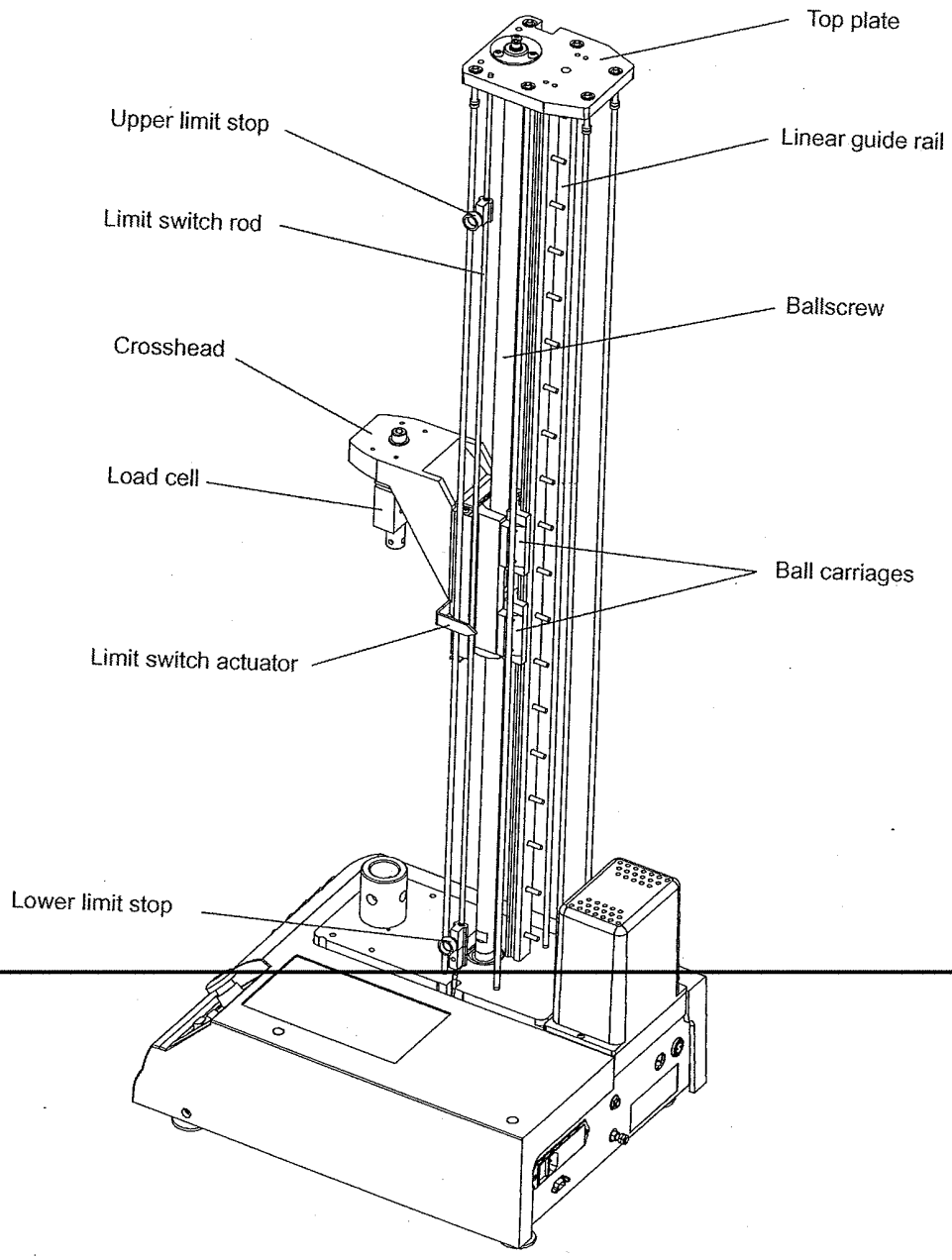


Figure 1-4. Column and Crosshead Components - 3345 & 3345 Extra Height

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Column Cover	An extruded aluminum cover that encloses both the ballscrew and the guide column. Vertical grooves (T-slots) on the left side of the cover is used to mount testing accessories. See Figure 1-1 on page 1-7.
Ballscrew Cover	Protective multi-fold curtains that mount inside the column cover and shield the ballscrew from dust and debris. See Figure 1-1 on page 1-7.
Crosshead	The moving structure on the load frame that applies a load to the test specimen at commanded speeds.
Limit Switch Actuator	A plate on the moving crosshead that contacts either the upper or lower limit stop and activates the stopping mechanism that prevents crosshead over-travel.
Upper and Lower Limit Stops	Limit stops are located on the right side of the column and connect to the limit switch rod. These stops are adjustable and should be positioned just beyond the test parameters to prevent crosshead over-travel. When the limit switch actuator contacts a limit stop, the stop moves the limit switch rod which then activates the limit switches located within the frame base. When a limit switch is activated, the crosshead stops immediately. To set the limit stops, refer to "Setting Crosshead Travel Limits" on page 5-5.
Limit Switch Rod	The limit switch rod runs through a T-slot inside the column cover into the frame base. The limit switch rod connects the upper and lower limit stops to the limit switches, which stops the crosshead when activated.
Travel Limit Switches	Not shown - Travel limit switches are located inside the frame base, directly under the Emergency Stop button. There are first and second level limit switches that stop the moving crosshead. When a first level limit switch is activated, the crosshead stops. A status message appears on the computer. To restore operation, use the jog controls on the jog control panel to drive the crosshead away from the limit stop. Refer to "Moving Off a Crosshead Limit" on page 5-7 for details. The second level switch is a fail-safe device if the first level switch malfunctions. When a second level switch is activated, it disables the drive motor relay and the crosshead stops. A status message appears on the computer indicating this condition. Determine what caused this condition and take the necessary actions to correct the problem. You need to reset the frame to continue testing. Refer to "Moving Off a Crosshead Limit" on page 5-7 for information on resetting the system.

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Measurement Scale	A graduated marker strip is located on the right side of the column cover. Use this strip to determine the approximate position of the moving crosshead. The limit switch actuator arm acts as a pointer.
Top Plate	A non-load bearing plate that provides bearing support for the ballscrews and rigidity to the frame structure.
Guide Column	3342, 3343, 3344 models - A cylindrical bar extending from the base plate to the fixed top plate. The guide column provides a rigid contact surface for maintaining crosshead guidance and a close alignment tolerance during heavy loading. 3345, 3345 Extra Height models - A linear guide rail (rectangular section) with two recirculating ball carriages. The rail mounts to the column extrusion that is fully structural. All guidance is from the rail.
Ballscrew	A threaded rod, inside the column cover, is supported by pre-loaded angular contact bearings that turn at set speeds to move the crosshead.
Ballscrew Ballnuts	Not shown - Ballscrew ballnuts are mounted in the crosshead where the ballscrew intersects the crosshead. The ballnuts contain the recirculating balls that let the ballscrew impart vertical motion to the crosshead. See Figure 6-1 on page 6-6 for location.
Load Cell	Load cells are precision force measurement transducers. They are typically mounted to the crosshead. Refer to "Load Cells" on page 4-2 for additional information.

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Electrical and Mechanical Components

Refer to Figure 1-5 on page 1-14 to identify the components described in this section.

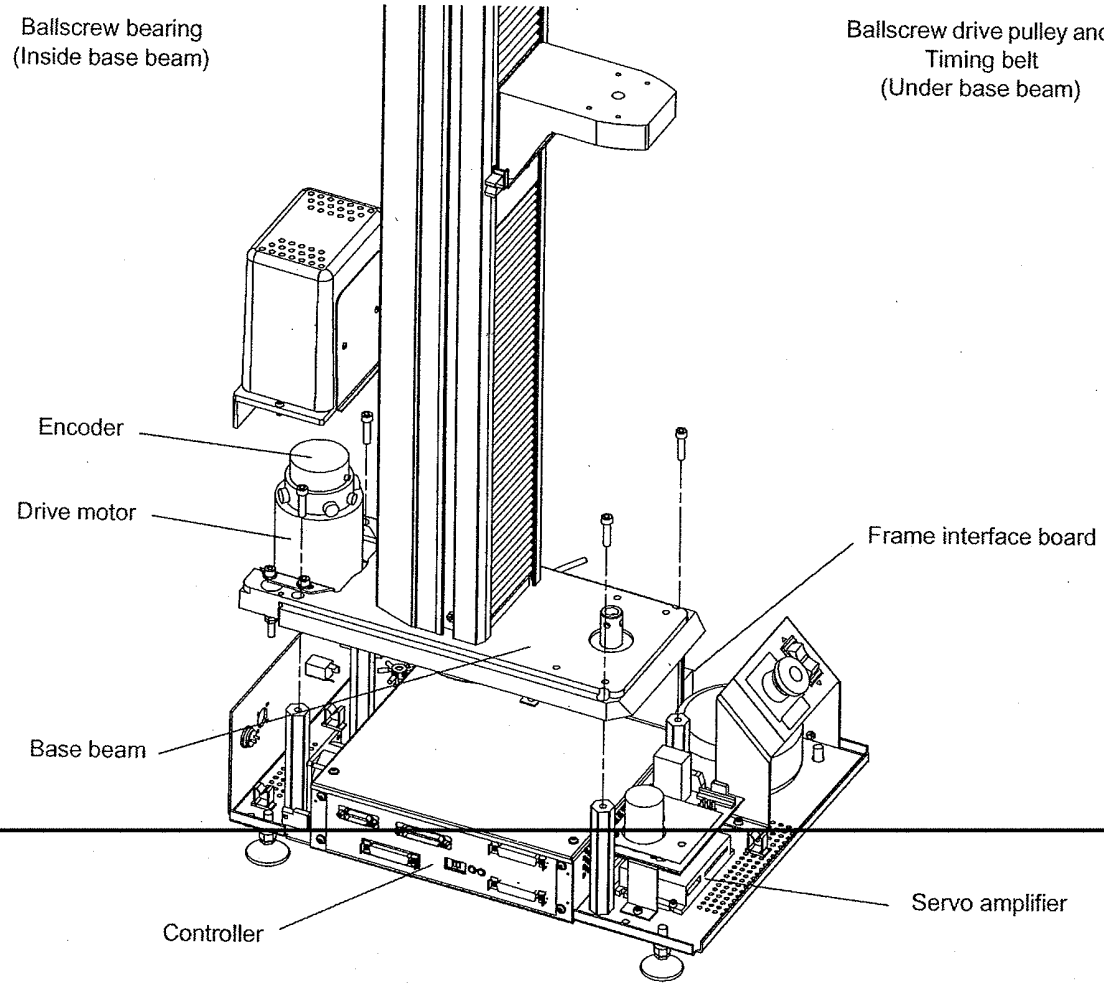


Figure 1-5. Load Frame with Covers Removed

Servo Amplifier — Provides dc power to the crosshead drive motor.

DC Power Supply — Not shown - This unit supplies d.c. power for the printed circuit boards located inside the controller. It is located in the rear right corner of the base, near the power input connector on the back panel.

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Encoder	This device is attached to the top of the drive motor. It is driven by the motor shaft and generates an output proportional to the revolutions of the motor shaft. The output is a proportional measurement of the moving crosshead displacement. It is used as feedback to maintain the pre-set speed of the crosshead and to indicate extension of the specimen during a test.
Drive Motor	An electric d.c. servomotor that provides the main drive power to the ballscrew and moving crosshead.
Timing Belt	The timing belt connects the drive motor to the ballscrew drive pulley.
Ballscrew Drive Pulley	This pulley connects to the ballscrews and completes the drive train from the motor.
Ballscrew Bearings	The lower bearing carrier for the ballscrews. They are located inside the base beam at the base of the ballscrew.
Frame Interface Board	A printed circuit board that provides the interface between the controller and the load frame components.

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Controller Panel

Refer to Figure 1-6 on page 1-16 to identify the components described below.

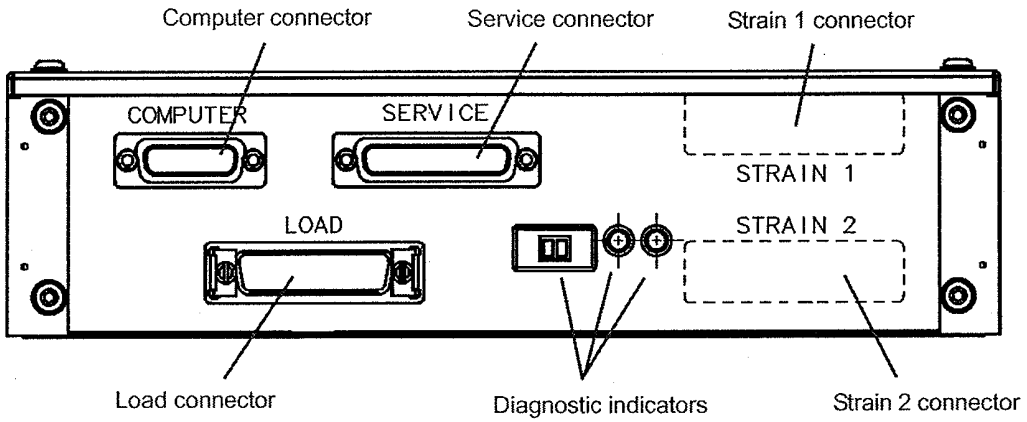


Figure 1-6. Controller Panel

Load Connector	The **LOAD** connector receives the load cell cable which carries signals between the load cell and the controller.
Computer Connector	The **COMPUTER** connector receives the computer cable that enables communications between the computer and the controller.
Strain 1 Connector	The 3340 frames provide an option to measure strain. If your frame is enabled to measure strain, connect the extensometer to the **STRAIN 1** connector. Always use **STRAIN 1** as the primary connection for strain.
Strain 2 Connector	**STRAIN 2** is another available option on the 3340 frames. Use **STRAIN 2** to connect a second extensometer or other strain device to the system.
Service Connector	The **SERVICE** connector is used only by Instron's field service engineers for diagnostic purposes. No equipment should ever be connected via the **SERVICE** connector.
Diagnostic Indicators	Diagnostic indicators facilitate the field service engineer in servicing and diagnosing possible hardware problems.

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System Safety and Information Labeling

The 3340 load frames incorporate either the ISO or ANSI safety and information labels. ISO labels display pictogram labels with no text, whereas ANSI labels include descriptive text with the pictograms. Labels are located on the load frame as shown in Figure 1-7 on page 1-17, and inside the frame as shown in Figure 1-8 on page 1-18. Table 1-1 on page 1-18 explains the meanings of these labels.

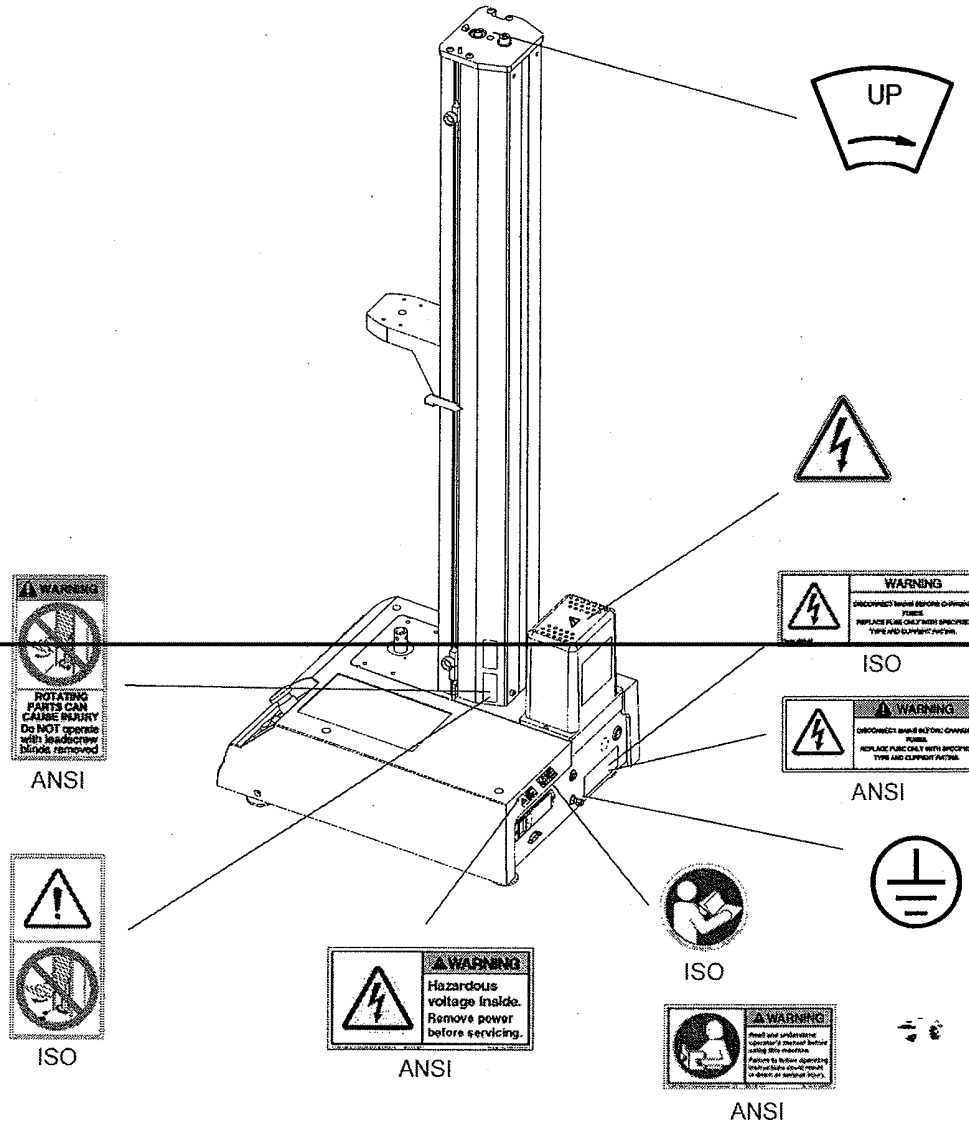


Figure 1-7. Safety and Information Labeling Locations

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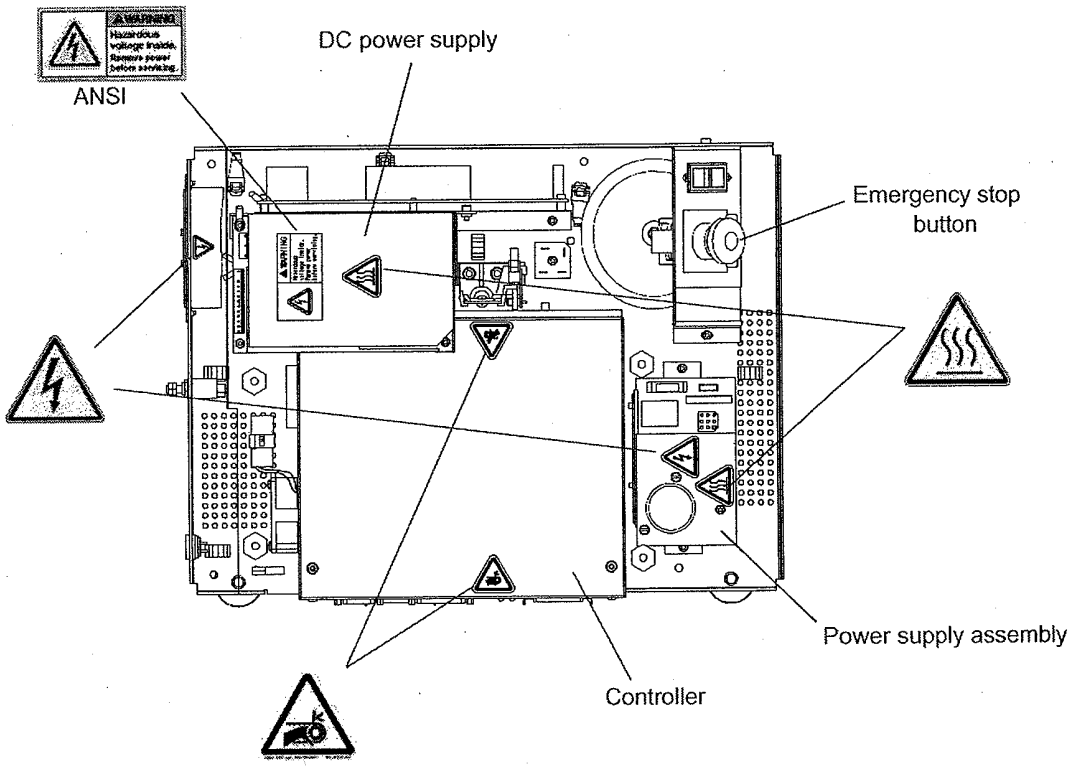
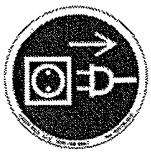


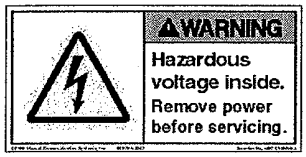
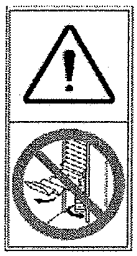
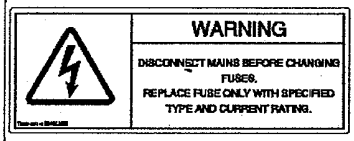
Figure 1-8. Labeling Inside the Frame Base

Table 1-1. Safety and Information Labeling Descriptions

Label	Meaning	Type	Purpose	Location
	Electrical hazard	ISO	Indicates that a hazard exists from high voltage or electrical current.	Frame - On top of the motor cover. Inside the frame base - On the DC power supply and on the power supply assembly.
	Disconnect Power Supply	ISO	Disconnect the power supply before servicing machine.	

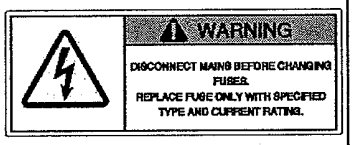
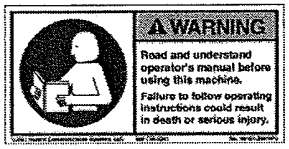
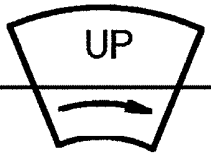
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Table 1-1. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Type	Purpose	Location
Electrical hazard 		ANSI	Indicates that an electrical hazard exists from high voltage or electrical current.	Frame - On the back panel. Inside the frame base - Top of the DC power supply.
	Belt entanglement hazard	ISO	Indicates that a hazard exists from the drive belt and pulley system.	Inside the frame base - Top of the controller.
	High temperature hazard	ISO	Indicates that a heat hazard exists. Stay clear of area when operating the machine.	Inside the frame base - On the power supply assembly and on the DC power supply.
	Rotating machinery hazard	ISO	Indicates that a rotating hazard exists. Do not operate with leadscrew (ballscrew) blinds removed. Keep clear of these areas (and tie back long hair) when machine is in use.	Frame - On the right side of the guide column cover just above the frame base.
	Rotating machinery hazard	ANSI	Indicates that a rotating hazard exists. Do not operate with leadscrew (ballscrew) blinds removed. Keep clear of these areas (and tie back long hair) when machine is in use.	Frame - On the right side of the guide column cover just above the frame base.
		ISO	Indicates an electrical hazard exists. Advises about disconnecting power mains before changing fuses and using only specified fuses.	Frame - On the back of the frame base.

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Table 1-1. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Type	Purpose	Location
		ANSI	Indicates an electrical hazard exists. Advises about disconnecting power mains before changing fuses and using only specified fuses.	Frame - On the back of the frame base.
	Ground stud	ISO	Indicates a ground stud.	Frame - On the back of the frame base.
	Read the manual	ISO	Read and understand the operator's manual before using the machine.	Frame - On the back of the frame base.
		ISO	Read and understand the operator's manual before using the machine.	Frame - On the back of the frame base.
		ISO	Crosshead Direction - Indicates the direction to turn the top of the ballscrew to manually move the crosshead upward. Use an 8 mm hex wrench to turn the ballscrew.	Frame - On the top plate.

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Calibration and Verification

Before shipment from the factory, this machine was calibrated according to system specifications, which in most cases exceeds ISO/EN or ASTM requirements. These standards recommend that verification of this calibration be repeated annually.

Service Agreements/Contracts

In many countries/territories Instron Service offers a variety of service agreements and contracts to cover such things as annual verification, maintenance, repair coverage, hotline support, etc. for your system. Contact your local Instron office for details on a service agreement/contract that best matches your needs. A listing of Instron offices can be found on the Instron web site at www.instron.com.

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Chapter 2
Specifications

Outline

This chapter describes the physical and electrical specifications for the Series 3340 testing systems.

- Specifications 2-2
- Dimensions and Weight 2-6

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Specifications

The specifications in this chapter apply to the 3342, 3343, 3344, 3345 standard height, and 3345 extra height load frames. Only the 3345 load frame is available in an optional configuration providing extra height for longer specimens. These are all single column, table-top load frames, designed for relatively low-force laboratory and quality control testing applications.

The Series 3340 load frames are available in a variety of colors including cobalt blue, teal green, scarlet red, and charcoal grey.

System Performance

Table 2-1. System Performance

Parameter	Specifications				
	3342	**3343**	**3344**	**3345**	**3345 Extra Height**
Testing Type	Tension, compression, and reverse stress. Frames are also capable of limited cyclic testing as outlined in "Cyclic Testing" on page 2-5. Standard configuration is below the moving crosshead.				
Basic Control Mode	Closed loop position control.				
Load Capacity kN kgf lbf	0.5 51 112	1 102 225	2 204 450	5 510 1125	5 510 1125
Maximum Speed mm/min in/min	1000 40	1000 40	1000 40	1000 40	1000 40
Minimum Speed mm/min in/min	0.05 0.002	0.05 0.002	0.05 0.002	0.05 0.002	0.05 0.002
Maximum Force @ Full Speed *	500 N (112 lbf)	1 kN (225 lbf)	2 kN (450 lbf)	5 kN (1125 lbf)	5 kN (1125 lbf)
Maximum Speed @ Full Load * mm/min in/min	1000 40	1000 40	1000 40	1000 40	1000 40
* Assumes an elastic specimen					

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Table 2-1. System Performance (Continued)

Parameter	Specifications				
	3342	3343	3344	3345	3345 Extra Height
Return Speed mm/min in/min	1500 60	1500 60	1500 60	1200 48	1200 48
Crosshead Speed Accuracy	± 0.2% at steady state and no load				
Position Accuracy	Under no load conditions, equal or less than ± 0.02 mm (0.0008 in) or ± 0.05% of displayed reading, whichever is greater.				
Position Repeatability	± 0.015 mm (0.0006 in)				
Load Weighing Accuracy	Load weighing system accuracy (at 25° C): ± 0.5% of reading down to 1/100th of capacity when using 2519 series load cells.				
Strain Measurement Accuracy	± 0.5% of reading down to 1/50 of full scale with ASTM E83 class B or ISO 9513 class 0.5 extensometer.				
Total Crosshead Travel	482 mm (19.0 in)	898 mm (35.4 in)	898 mm (35.4 in)	885 mm (34.8 in.)	1135 mm (44.7 in.)
Crosshead Position Control Resolution	0.156 µm	0.156 µm	0.208 µm	0.133 µm	0.133 µm
Acceleration Time, 0 to top speed	60 msec			70 ms	
Axial Stiffness	2 kN/mm (11,400 lb/in)	2 kN/mm (11,400 lb/in)	2 kN/mm (11,400 lb/in)	8.5 kN/mm (48,500 lb/in)	8.5 kN/mm (48,500 lb/in)
Emergency Stop Time	100 ms	100 ms	100 ms	100 ms	100 ms

Noise Levels

The maximum noise level for the Series 3340 load frames is less than 70 dB(A). Noise levels do not include noise from specimen breaks.

The noise level of the entire system depends on your particular system configuration. Refer to the documentation supplied with each component of your system to determine the maximum noise level of your entire configuration.

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Environmental Specifications

Table 2-2. Environmental Specifications

Parameter	Specifications				
	3342	3343	3344	3345	3345 Extra Height
Operating Temperature	+10°C to +38°C (+50°F to +100°F)				
Storage Temperature	-40°C to +66°C (-40°F to +150°F)				
Humidity	10% to 90% (non-condensing)				

Power Requirements

Table 2-3. System Power Requirements

Parameter	Specifications				
	3342	3343	3344	3345	3345 Extra Height
Maximum Power	170 VA	200 VA	240 VA	360 VA	360 VA
Voltage	100/120/220/240 VAC ±10%				
Frequency	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz

Non-Cyclic Testing Parameters

The 3340 Series load frames are primarily designed for unidirectional, or non-cyclic, tests. For constant loads (i.e. damper tests), the top speed must not exceed 50% of the maximum speed (refer to Table 2-1 on page 2-2) and the duty cycle must be 50%. Under these conditions, the time between tests must be equal to or exceed the test duration time. This allows time between tests for the motor and power amplifier to cool. For example, when a test lasts for 5 minutes you must wait 5 minutes or more before starting another test.

The 3340 Series load frames are also capable of limited cyclic testing, in which the frame constantly reverses direction. However, cyclic testing on these frames are limited as outlined in section "Cyclic Testing" on page 2-5.

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Cyclic Testing

Cyclic testing is defined as tests where the cycling limits are enabled and testing requires that the frame constantly reverses direction for 20 minutes or more. Cyclic testing on the 3340 load frames is limited by the heating of the power amplifier and motor. If the power amplifier is close to overheating, a thermal protection switch activates and automatically shuts down the amplifier.

The maximum frequency of cyclic testing is limited by two criteria:

- The fundamental dynamic control limit of the system (F_d)
  F_d max = 1 Hz (for any speed)
- The heating of the motor and power amplifier (F_h)

Cyclic tests are limited primarily by the frequency of high speed turnarounds where the motor experiences the peak accelerating current. The value of F_d must be de-rated for high speeds as follows:

F_h max = 0.08 (1000/S) Hz, where S = Speed (mm/min) for $S \geq 80$.

The above parameters assume testing an elastic specimen and an ambient temperature of 25° C (77° F). Higher ambient temperatures may further limit the performance of the amplifier.

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Dimensions and Weight

Load Frame Dimensions

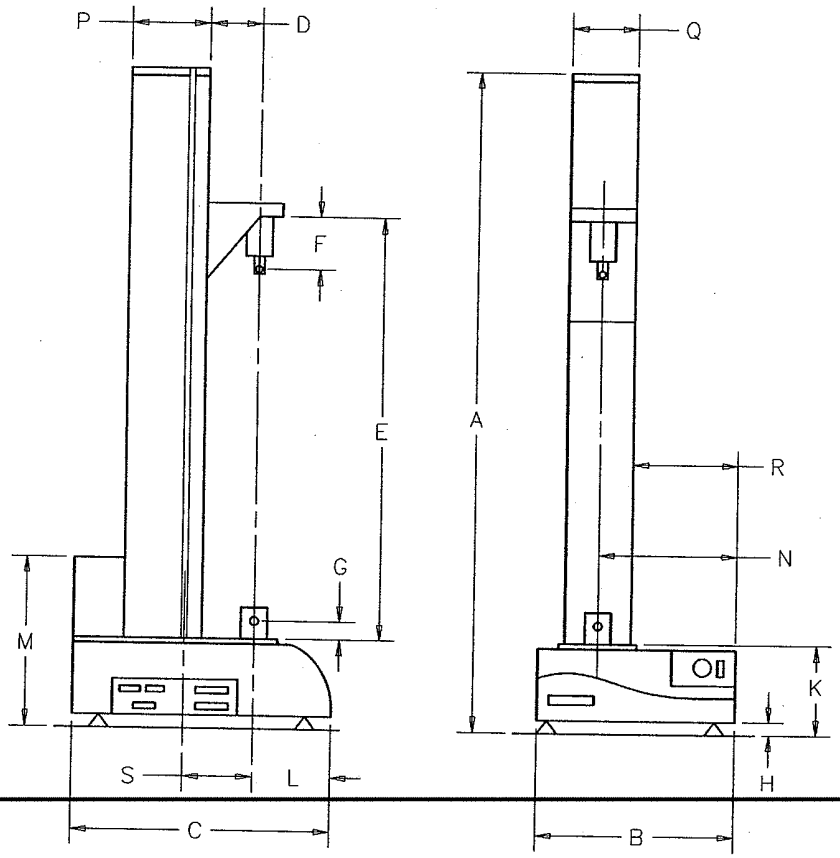


Figure 2-1. Load Frame Dimensions

Weight

Table 2-4. Weight Dimensions

Parameter	Specifications				
	3342	3343	3344	3345	3345 Extra Height
Weight (including typical loadcell)	38 kg (83 lb)	42.5 kg (94 lb)	42.5 kg (94 lb)	51 kg (112 lb)	57 kg (125 lb)

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All Other Dimensions

Table 2-5 shows the load frame dimensions for all single column table top models. See Figure 2-1 on page 2-6 to match the letter designation from Table 2-5.

Table 2-5. Standard Load Frame Dimensions

Designation	Description	Dimension mm (inch)			
		3342	**3343/3344**	**3345**	**3345 Extra Height**
A	Overall height	900 (35.4)	1300 (51.2)	1358 (53.5)	1628 (64.1)
B	Overall width	382 (15.0)	382 (15.0)	382 (15.0)	382 (15.0)
C	Overall depth	500 (20.0)	500 (20.0)	500 (20.0)	500 (20.0)
D	Throat depth daylight	100 (4.0)	100 (4.0)	100 (4.0)	100 (4.0)
E	Vertical test daylight (From the base to the underside of the crosshead)	Max = 651 (25.6) Min = 169 (6.7)	Max = 1067 (42.0) Min = 169 (6.7)	Max = 1123 (44.2) Min = 238 (9.4)	Max = 1383 (54.4) Min = 248 (9.8)
F	Crosshead to load cell coupling pin	Dependent upon type of load cell and interface type used: 2519-101 (10 N) OO 77 (3.0) O 94 (3.7) 2519-102 (50 N) OO 77 (3.0) O 94 (3.7) 2519-103 (100 N) OO 77 (3.0) O 94 (3.7) 2519-104 (500 N) O 88.5 (3.5) 2519-105 (1 kN) O 88.5 (3.5) 2519-106 (2 kN) O 101.2 (4.0) 2519-107 (5 kN) O 101.2 (4.0)			
G	Base platen to coupling pin	Type O = 22 (.87) Type D = 35 (1.38)	Type O = 22 (.87) Type D = 35 (1.38)	Type O = 22 (.87) Type D = 35 (1.38)	Type O = 22 (.87) Type D = 35 (1.38)
H	Gap for feet	25 (1.0) nominal setting			
K	Platen height from table	164 (6.5)	164 (6.5)	173.5 (6.8)	173.5 (6.8)
L	Front of base to load axis	152 (6.0)	152 (6.0)	152 (6.0)	152 (6.0)
M	Motor cover height	328 (12.9)	328 (12.9)	328 (12.9)	328 (12.9)
N	Side of base to load axis	267 (10.5)	267 (10.5)	267 (10.5)	267 (10.5)

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Table 2-5. Standard Load Frame Dimensions (Continued)

Designation	Description	Dimension mm (inch)			
		3342	3343/3344	3345	3345 Extra Height
P	Column cover depth	113 (4.4)	113 (4.4)	150 (5.9)	150 (5.9)
Q	Column cover width	128 (5.0)	128 (5.0)	128 (5.0)	128 (5.0)
R	Surface width (Right side)	203 (8.0)	203 (8.0)	203 (8.0)	203 (8.0)
S	T slot center to load axis	133 (5.2)	133 (5.2)	133 (5.2)	133 (5.2)

Accessory Mounting Dimensions

You can attach numerous testing accessories and fixtures to the load frame for specialized tests. Instron manufactures many of these accessories. The following diagrams show standard manufacturer's mounting holes in the load frame base plate and the moving crosshead. Use these standard mounting holes to mount your accessories. Avoid tapping new holes that may weaken or otherwise compromise the integrity of the load frame.

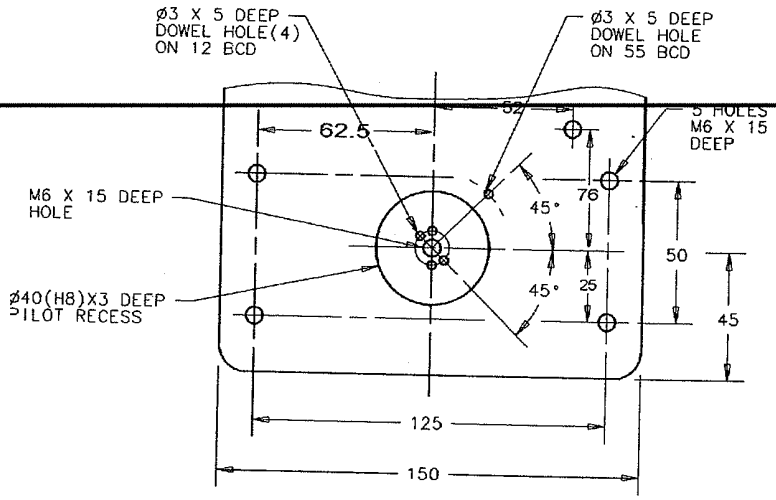


Figure 2-2. Base Plate Accessory Mounting Dimensions

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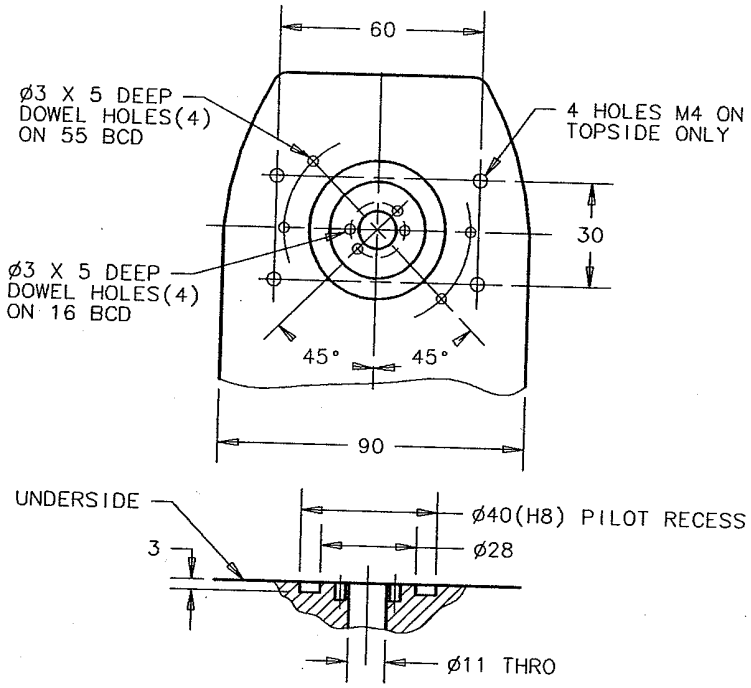


Figure 2-3. Crosshead Mounting Dimensions (Underside)

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Chapter 3
Installation

Outline

This chapter provides information on unpacking, moving, and installing your new Series 3340 testing system. Because the load frame is heavy, special moving and transporting techniques are required.

- Installation Guidelines 3-2
- Site Requirements 3-3
- Handling Single Column Frames 3-4
- Installation 3-7
- Connecting the System Components 3-13
- Connecting Optional Accessories 3-16

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Installation Guidelines

Customer's Responsibilities

Unless otherwise specified at the time of purchase, you must:

- Assume insurance and safety responsibilities.
- Arrange to off-load and unpack the equipment using qualified personnel.
- Transport the equipment to the test site. This includes special handling and rigging considerations.
- Prepare the test site. This includes physical, electrical and environmental considerations.

Instron's Responsibilities

An Instron service engineer or factory trained agent performs the procedures that make the test system operational. Do not attempt to complete the initial installation without the guidance of Instron service personnel.

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Site Requirements

Ensure that the following site requirements are met before you transport and unpack the system:

- The site floor and table are capable of supporting the weight of the load frame, and the system components. A table with leveling feet is preferred.
- The frame is not located against a wall or other object that interferes with air ventilation around the frame base. Proper air ventilation is required to dissipate the heat generated from the frame base.
- The site is free of vibration from other machinery.
- There is adequate clearance between the load frame and the site ceiling.
- The system is accessible for routine service. Allow approximately 1 meter (3 feet) of space on all sides of the frame.
- The electrical power source rating is within the voltage rating specified on the rear of the load frame. If it is not within the range, contact Instron Service or refer to the section, "Setting the Input Voltage" on page 3-8.
- The electrical power source is within 2.43 m (8 ft.) of the system.
- The test site meets the system's environmental specification. Refer to "Environmental Specifications" on page 2-4.

Refer to Chapter 2 for specific system specifications.

Preliminary Considerations

The Series 3340 testing system is designed for use on a table or workbench. Install the load frame in a semi-permanent location that can support the weight of the load frame. Refer to Chapter 2 for weight specifications.

Place the system components such as the computer, the controller and printer on a table beside the load frame, or on a roll-around cart. Be sure the table or cart provides a comfortable working height for the user and can support the weight of all the computer components.

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Handling Single Column Frames

The single column load frames are packed in a strong cardboard carton strapped to a wooden pallet. Accompanying components are also packed in cardboard cartons. These testing systems must be set up on a strong table or work bench at a convenient operating height and within easy reach of electrical power outlets.

Before You Begin

Before moving the load frame ensure that:

- ❑ You have reviewed the section "Site Requirements" on page 3-3. Verify that all conditions are met prior to transporting the test system.
- ❑ Your equipment operators have the appropriate licenses and have complied with your local safety standards (i.e. the appropriate training required by OSHA in the U.S.).
- ❑ At the final site location, there is adequate clearance between the ceiling and the top of the load frame.
- ❑ There are no loose accessories on the shipping skid.
- ❑ The frame and forklift can fit through all doorways, halls, elevators or stairs from the shipping dock to its final site location.
- ❑ You have adequate packaging materials to protect the load frame when moving or relocating it to another site. Contact Instron Professional Services to determine the appropriate packaging requirements for your model type.

Equipment

You need the following items:

- ❑ A forklift with a load rating that is double the load frame's gross weight.
- ❑ Sharp knife.
- ❑ Cutter for the steel strapping.
- ❑ Two individuals to lift the frame onto the table or a hoist to lift the frame using the eye bolt provided.

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Transporting and Unpacking

To unpack and position the load frame:

1. Use a forklift to carry the container to the testing area.

   Always follow the instructions provided with the shipping package. Contact Instron if you require any additional information. Refer to "Product Support" on page 1-3 for Instron's contact information.

2. Place the load frame carton near its final operating location.
3. Cut the strapping that secures the load frame carton to the wooden pallet.
4. Open the top of the load frame carton and remove the packing material.
5. Using a sharp knife, carefully cut down one corner of the carton and along the base, then fold the cut portion of the carton to one side.

Warning



Hazard - The load frame is heavy. Use two adults or a hoist using the eye bolt provided to lift the frame.

Caution

Do not put any strain on the Emergency Stop button, the limit stops, or the load frame grip adapters while lifting the load frame.

6. Either:

   a. Using two individuals, firmly grasp the load frame base, lift the frame out of the carton, and place it in its operating position on the table or workbench.

   or

   b. Lift the frame using a hoist on the eye bolt installed in the top plate. Ensure the hoist is rated for the weight of the frame as specified in Table 2-4 on page 2-6.

7. Use the packing list to inventory all the items. Some accessories may be in the container with the load frame or may be packaged separately.

   Do not open any of the packing boxes. The packing list will indicate the total number of boxes that are included in the shipment. Count the number of boxes

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you received to make sure you have the correct number of boxes. Do not open these boxes until the Instron service representative arrives to install your testing system. This ensures that no parts are lost prior to installation.

8. Retain all packing materials until the system is satisfactorily installed and all parts, assemblies and accessories have been located.

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Installation

Before placing the frame on the mounting surface (table or workbench) ensure that the surface is level. When placing the frame in its final location, do not tilt the frame more than 10° as shown in Figure 3-1.

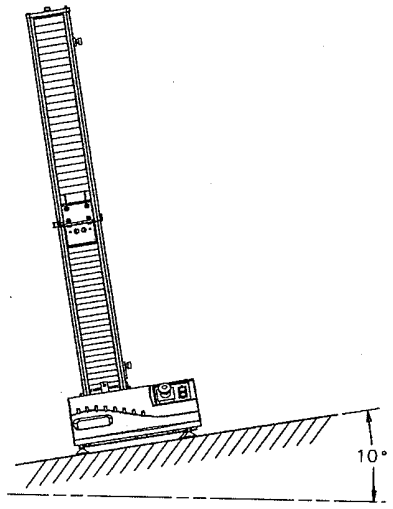


Figure 3-1. Tip Over Angle

Leveling the Load Frame

After setting the frame in the site location, level the load frame. This prevents the base from rocking and provides a level test surface for more accurate test results.

To level the frame base:

1. Place a bubble level on the frame base near the center of the space.
2. Adjust the four leveling pads, using a spanner wrench, until the frame is level in both the side-to-side and front-to-back directions. See Figure 3-2.

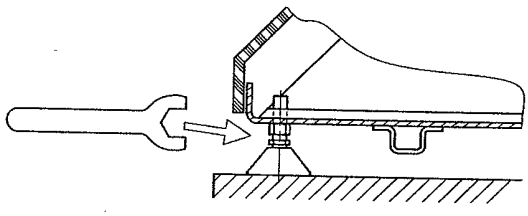


Figure 3-2. Leveling the Load Frame

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Connecting the Main Power Supply

The test system voltage is factory set according to the main power input voltage that is specified on your order. A 2.43 m (8 ft), 3-wire power cable for this voltage is also included. If your power source is not the voltage originally specified, follow the instructions described under "Setting the Input Voltage" on page 3-8 to change the voltage.

Caution

Use a 3-wire, grounded main power cable for the load frame. The load frame operates from a single phase, two-wire grounded power source that applies 240 volts rms or less between the supply conductors or between the ungrounded supply conductor and earth ground.

Note: *The connector on the power cable must be compatible with the power source. If you adapt the load frame for 220-240 Va.c. operation, and the power cable supplied with your system does not fit your power source outlet, add a male plug to the cable that is compatible with the outlet. Observe the following CEE wire color code for the cable:*

- *Brown - high (live)*
- *Light blue - low (neutral)*
- *Green & yellow - earth (ground)*

Setting the Input Voltage

The load frame voltage is factory set, according to the voltage that was specified at the time of purchase. However, you can alter the power input connector to accept line voltages from 100 Va.c. to 240 Va.c. (47 to 63 Hz). Refer to Table 3-1 on page 3-8.

The power input connector is located on the rear corner of the frame base. A white pin on the connector indicates the current voltage. If the voltage indicated does not match your power source, follow the instructions below to change the frame's voltage.

Table 3-1. Line Voltage Options

If Main Power Voltage is:	Set Frame Line Input Connector to:
100 Va.c. ± 10%	100 V
120 Va.c. ± 10%	120 V (standard)

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Table 3-1. Line Voltage Options (Continued)

If Main Power Voltage is:	Set Frame Line Input Connector to:
220 Va.c. ± 10%	220 V (see Note below)
240 Va.c. ± 10%	240 V

Note: *Some line voltage selector units may read 230 V (instead of 220 V) on the external face and on the internal card. These units are interchangeable and can be used as the 220 V selection.*

Warning



Electrical Hazard - Shut off the main power switch and disconnect the power cable to the frame before changing the power setting. There are dangerous voltage levels inside the fuse holder.

Equipment

You need the following tools:

- Small flat head screw driver or probe.
- Long nose pliers.

Setting the Line Voltage

To set the input power line voltage:

1. Ensure that the main power switch is set to Off (**O**) and the power cable to the frame is disconnected. Verify that the **POWER** indicator light on the jog control panel does not illuminate.
2. Inspect the line input connector. There are four holes in a vertical line at the right side of the connector, each corresponding to a different line voltage. A white plastic pin visible in one of the holes (see Figure 3-3) indicates the current voltage setting.
3. Insert a small flat-head screwdriver into the middle of the connector and pry out the fuse holder, as shown in Figure 3-4 on page 3-10.

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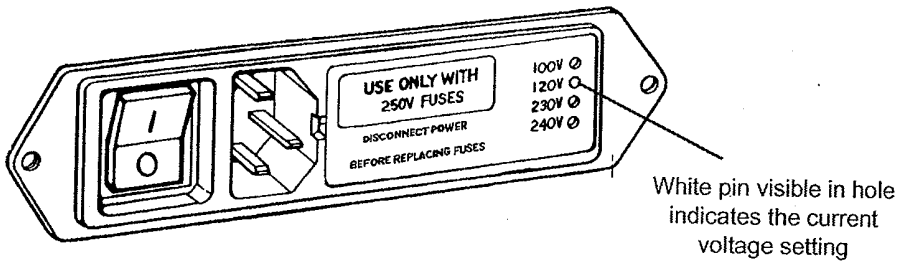


Figure 3-3. Input Line Voltage Adapter

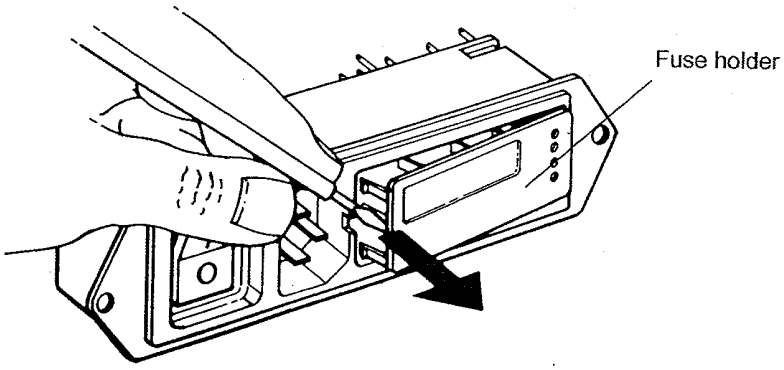


Figure 3-4. Prying Out Fuse Housing

4. Remove the fuse holder from the line input connector, as shown in Figure 3-5.

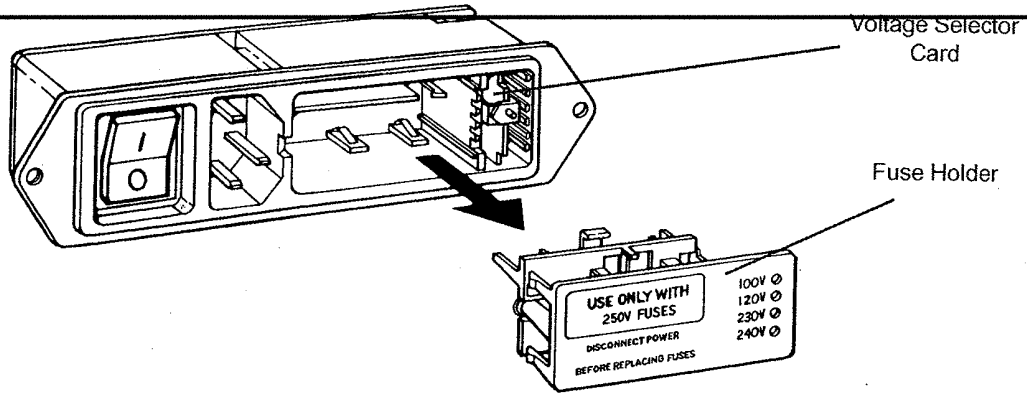


Figure 3-5. Removing the Fuse Holder

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5. Remove the voltage selector card using long nose pliers, as shown in Figure 3-6.

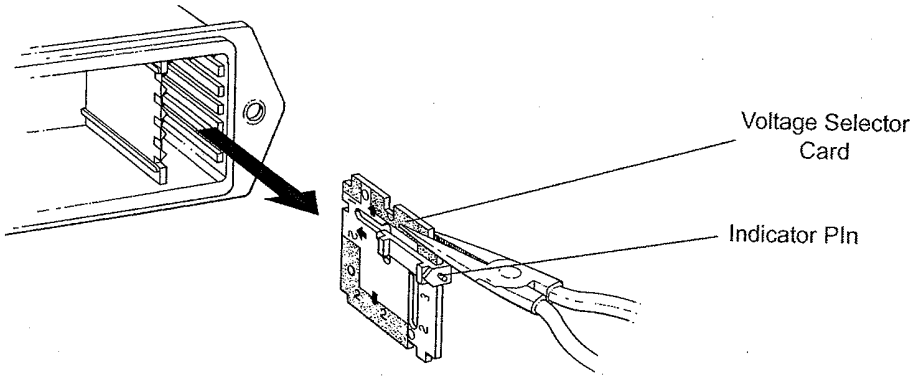


Figure 3-6. Removing the Voltage Selector Card

6. Position the voltage selector card so that the indicator pin points up, as shown in Figure 3-7.
7. Holding the pin in this position, rotate the card until the required voltage setting shows at the bottom of the card, as shown in Figure 3-7.

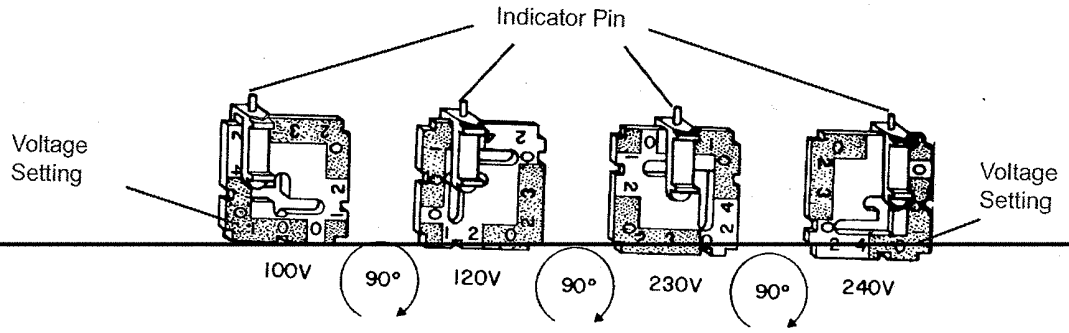


Figure 3-7. Selecting the Line Voltage Setting

8. Re-insert the card into the connector with the indicator pin pointing away from the connector. Ensure the card is fully seated.
9. If necessary, change the fuse in the holder (refer to Note below). Refer to "Fuse Replacement" on page 6-14 for replacing a fuse.

Note: *The fuse in the connector should be a 3.0 amp Slo Blo (Instron Part No. 27-2-40). Spare fuses are supplied with the system. Refer to "Ancillary Parts" on page 7-2.*

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10. Re-install the fuse housing into the connector. Ensure that the indicator pin now indicates the correct input voltage. See Figure 3-3 on page 3-10 for reference.

11. Re-connect the power cable to the main power source and turn on the system. Refer to "System Startup" on page 5-2 for instructions. Verify that the **POWER** indicator light on the jog control panel illuminates.

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Connecting the System Components

System connections are necessary to provide electrical power to the load frame and establish communication between the computer and load frame.

Warning

Electrical Hazard - Do not connect power cables when the power is on. Turn the power off to avoid hazardous voltages and component damage.

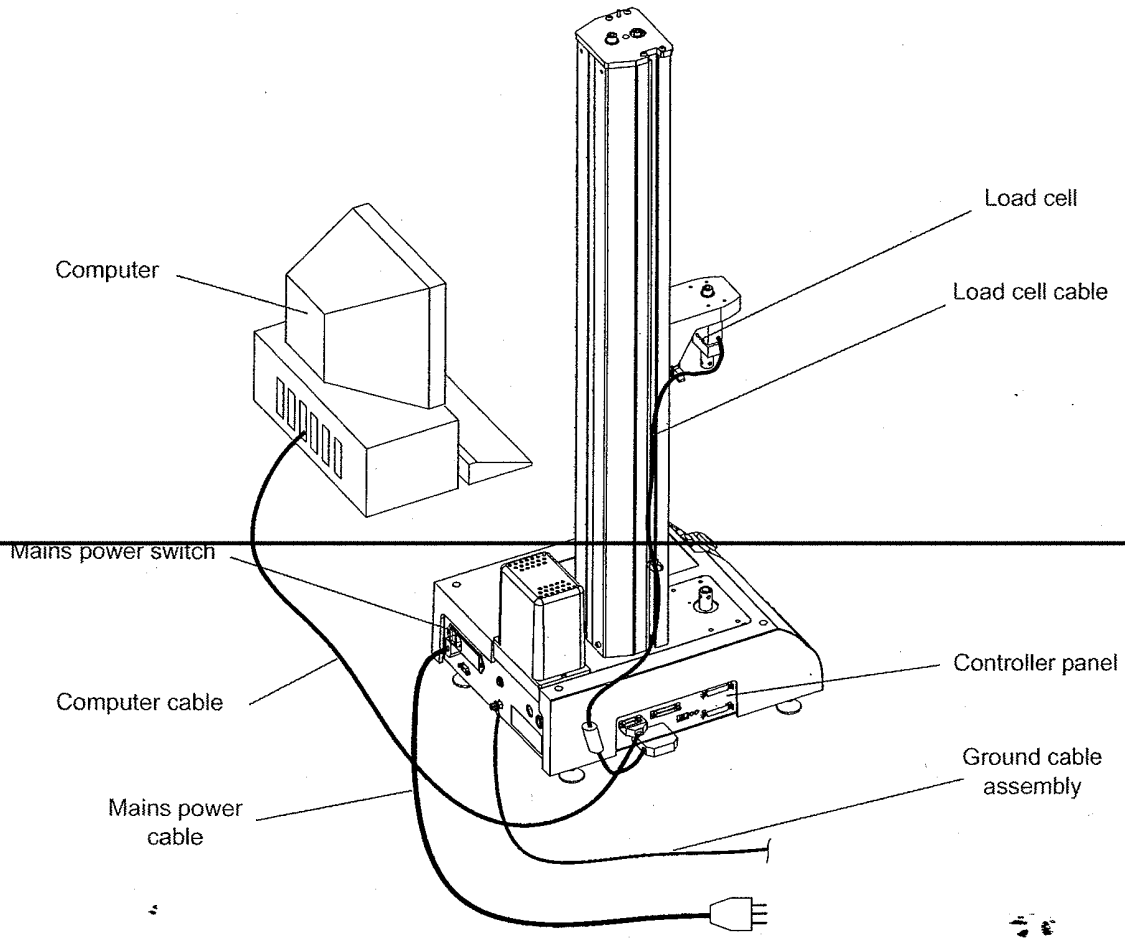


Figure 3-8. 3340 Installation Setup

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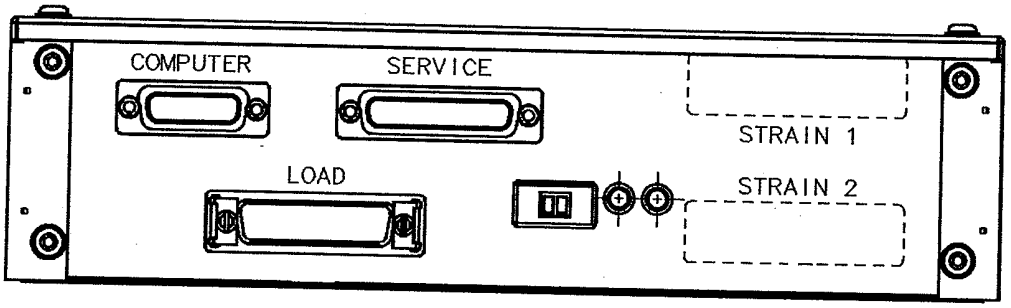


Figure 3-9. 3340 Controller Panel

To set up the Series 3340 table frame system:

1. Ensure that the main power switch is set to Off (**O**) and the mains power cable to the frame is disconnected. Verify that the **POWER** indicator light on the jog control panel does not illuminate.

2. Connect the computer interface cable (part #82-10-63) to the **COMPUTER** connector on the controller panel. See Figure 3-9 on page 3-14. The controller panel is located on the left side of the load frame base. Connect the other end of the cable to the system interface card on the back of the computer. Ensure that the connectors are fully engaged in their sockets and are clamped with the connector screws.

3. Connect the load cell cable to the **LOAD** connector on the controller panel, as shown in Figure 3-9 on page 3-14. Press the load cell cable into the cable clamps on the side of the crosshead.

   The 3340 frames provide an option to measure strain. If your frame is enabled to measure strain, you must connect the extensometer to the **STRAIN 1** connector. Always use **STRAIN 1** as the primary connection for strain. **STRAIN 2** is another available option on the 3340 frames. Use **STRAIN 2** to connect a second extensometer or other strain device to the system.

Note: *The connector labeled* **SERVICE** *is used only by Instron's field service engineers. No equipment should ever be connected via the* **SERVICE** *connector.*

4. Ensure that the voltage indicated on the power input connector is appropriate for the power being supplied to the load frame. Refer to "Connecting the Main Power Supply" on page 3-8. If it is not the appropriate voltage, refer to "Setting the Input Voltage" on page 3-8 to reset the load frame's voltage.

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5. If the main power cable is not a grounded cable, you must manually ground the frame using a separate ground cable. Attach the ground cable to the ground stud on the rear of the frame base, as shown in Figure 3-8 on page 3-13. Attach the other end of this cable to an earth ground connection.

6. Ensure that the computer and monitor are set to the appropriate line voltage. Check the switch on the back of the computer to verify the line voltage setting. If necessary, set the switch to the proper line voltage. Check the back of the monitor for a line voltage switch and ensure that it is properly set. If there is no switch on the monitor, then the monitor automatically sets itself.

7. Connect the main power cable for the load frame to the electrical power supply.

8. Connect the computer and monitor power cables to the electrical power supply.

   The system is now ready to be powered on. Refer to "System Startup" on page 5-2 for instructions. Verify that the **POWER** indicator light on the jog control panel illuminates.

Note: *If installation of an optional recorder, printer, or strain measuring accessory requires additional cabling, refer to the instruction manuals for these devices.*

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Connecting Optional Accessories

The Series 3340 load frames include connections for several accessories that enable you to customize testing to meet your needs. The options panel enables you to use optional accessories such as an airkit, light accessories and an interlock.

Figure 3-10 on page 3-16 displays the connections that are available on the back of the frame base. The accessories that can be connected to the 3340 frames include:

- Pip jack - Connect a remote pip marker cable and switch to the system.
- 12 VAC 2A rated outlet for optional light accessory
- 10 pin D connector for grip airkit (optional) - Enables you to apply a specified pre-tension to the specimen when using cord and yarn grips.
- Interlock capability (optional). This optional feature is provided when the frame is encased with a protective shield. The interlock prevents the system from working when the door is open.

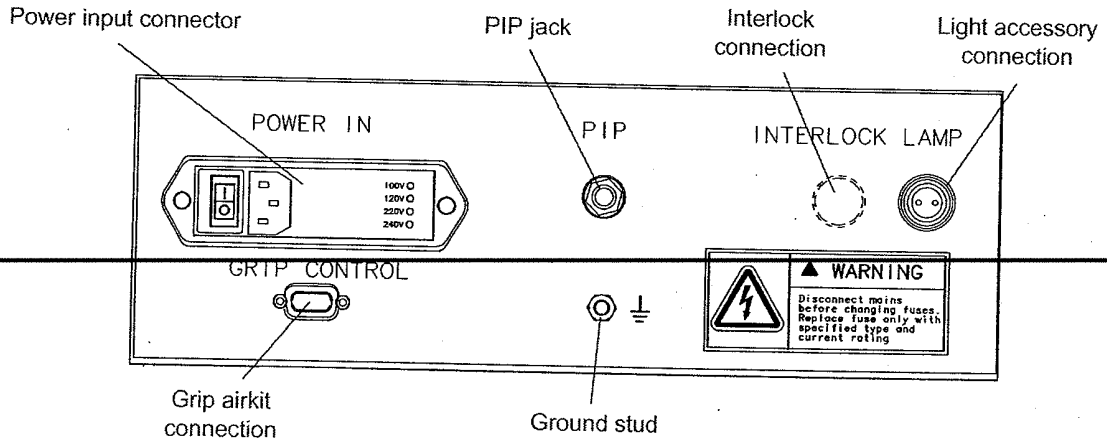


Figure 3-10. Accessory Connections

Note: *Figure 3-10 on page 3-16 displays all options on the Options panel. If the grip control or interlock options are not purchased with the system, these two connectors are not enabled and will have a black covering.*

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Chapter 4
Preparation for Use

Outline

This chapter describes how to prepare the test system for operation.

- Load Cells 4-2
- Adapters 4-5
- Selecting a Load Cell 4-8
- Installing a Load Cell 4-9
- Installing the Base Adapter 4-14
- Selecting Grips and Fixtures 4-16
- Installing Grips and Fixtures 4-18

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Load Cells

Note: *Load cells are precision instruments that are environmentally sensitive and require an extensive warm up period prior to use. Let your load cell warm up for a minimum of 15 minutes or longer before calibrating. This warm up period is necessary to let the load weighing components stabilize.*

General Characteristics

Load cells are precision force measurement transducers. They are typically mounted to the crosshead, but you can also mount them to the base platen by using specific fixtures. The active element in each load cell is a balanced wheatstone bridge. During a test, the signal conditioner on the load conditioner card applies excitation voltage to strain gauges that bond to internal load bearing structures of the cell. When you apply a load to the cell, the element deforms and unbalances the bridge. This reaction produces an electrical signal that is directly proportional to the deformation of the element. The signal is measured as the applied load.

Instron Series 2519 load cells are electrically calibrated and recommended for use on 3340 load frames. When you initiate calibration at the computer, a switched-in shunt resistor unbalances the bridge and causes the cell to generate a signal. The imbalance is equal to the required calibration load. Since the switching action is initiated at the computer, calibration is automatic.

Calibration of a load cell is a two-point function based on zero (no-load) and the calibration point. The calibration point, established for each cell during manufacture, occurs at approximately one-half the rated capacity of the cell.

Each load cell contains a special resistor with a resistance value unique to each type. This resistor enables a load cell to be automatically identified by the testing system.

Instron load cells are ruggedly made, but, as with any transducer, should be handled with care. Each cell is labeled with its rated capacity, and should only be used when testing within this rated capacity.

For additional information on selecting an appropriate load cell for your testing needs, refer to "Selecting a Load Cell" on page 4-8.

Load Cell Stability

There are two primary factors controlling the stability of load cells:

- change of balance point with temperature.

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- change of balance resulting from an application or change of load (creep).

Careful temperature compensation is made during manufacture so that all Instron load cells have a coefficient of less than 0.002% of full rated output per degree F. The balance shift due to temperature change becomes proportionately less at the higher end. Therefore, if you are running a very long test requiring maximum stability, use a cell where the loading is at the higher end of its range whenever a choice is possible.

The creep of a cell is a gradual, very small shift in a recorder reading after a high load has been quickly applied, or as a small shift in the balance point after a load has been quickly removed. For most cells, the creep coefficient is less than 0.05% of full rated output, although for a 500 gram cell this may be as high as 0.5% because of its more sensitive design.

The above discussion regarding stability refers only to the shift in balance point due to temperature or creep, its effect being to move the whole scale of a recorder up or down by the amount concerned. The calibration, or the scale sensitivity, of a cell is not affected by these variations and remains constant for all normal conditions.

Electrical Calibration

Calibrating a load cell electrically eliminates handling and applying precision dead weights to the cell for calibration purposes. This method is as accurate and stable as the dead weight method except that the mechanics of the cell are not checked. In addition to the stability consideration discussed in section "Load Cell Stability" on page 4-2, two other factors influence the operation of these cells: modulus compensating resistors and electrical calibration resistors.

Modulus compensation is provided to prevent temperature-induced modulus changes from affecting the calibration or sensitivity of the cell. While the magnitude of this effect is very small, the sensitivity of an electrically calibrated load cell must be exactly the same as that of the electrical calibration signal, and this agreement must exist under environmental conditions which may be different from those that existed in the laboratory at the time of calibration.

Each load cell contains a special calibration resistor so that when calibration is initiated, an electrical signal is produced which is equivalent to applying a precision dead weight to the cell. The accuracy of this comparison is better than 0.1% of the actual signal.

Load Cells Compatible with Series 3340 Frames

The Series 3340 load frames are designed for the Series 2519 load cells. The Series 2519 load cells have a rationalized output designed for accurate load

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measurement and precise load control. These cells are calibrated in S.I. units. However, you can select either U.S. Customary (English), metric, or S.I. units at the computer. The cells are interchangeable so that forces from 10 grams to the full capacity of the load frame can be accurately measured and recorded.

The Series 2519 load cells are designed for general tension and compression testing. Table 4-1 provides a sampling of 2519 load cells that are compatible with the 3340 frames. Each cell has a clevis pin attachment, optimized for its load range, that provides a quick connection for grips and fixtures. Refer to "Selecting a Load Cell" on page 4-8 and "Installing the 2519 Load Cell" on page 4-9 for information on selecting appropriate load cells and installing load cells.

You can also install a Series 2530 low profile load cell onto the Series 3340 frames. Refer to "Selecting a Load Cell" on page 4-8 and "Installing the 2530 Load Cell" on page 4-11 for information on selecting and installing 2530 load cells.

Table 4-1. Compatible Load Cells

Load Cell	Capacity	Interface Size
2519-101 *	10 N	OO O
2519-102 *	50 N	OO O
2519-103 *	100 N	OO O
2519-104	500 N	O
2519-105	1 kN	O
2519-106	2 kN	O
2519-107	5 kN	O

* These load cells come standard with a type OO to type O adapter.

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Adapters

Adapters enable you to connect grips (or fixtures) to load cells when the interfaces have different sizes. Adapters ensure a secure fit between the two interfaces and minimize slack in the load string.

Base Adapters

The 3340 load frames are supplied with two base adapters. Base adapters enable you to connect grips and fixtures to the base of the load frame. The standard adapter that comes with all 3340 models is the type O adapter. A type D adapter is also included as an ancillary part for all models. Refer to "Ancillary Parts" on page 7-2.

Coupling Adapters

Coupling adapters enable you to attach grips and fixtures of different sizes to the load cell and base adapter, thus providing more options for testing. These adapters are available in many types and sizes. The two primary types of adapters are:

1. Tension couplings, or self-aligning coupling adapters. This type provides a swivel connection and join pin-type interfaces. The swivel action allows the grip, or fixture, to self-align in the direction of the test load, thus minimizing any bending load on the specimen. Use self aligning adapters for tension testing only.
2. Rigid coupling adapters. This type joins pin type interfaces and uses checknuts to provide fixed connections. There is no swivel action with these adapters and they are not self aligning. Use rigid couplings for either tension or compression testing.

Within these two types of adapters there are different interface sizes available. Interface size is defined as the diameter of the shank, or male type interface, through which the clevis pin hole is drilled. When the load cell interface, or base adapter interface, differs from your grip interface, a coupling adapter creates a secure fitting between the two different interfaces.

Since coupling adapters connect two different interfaces sizes, between the load cell and the grip, they are identified by the two different sizes on each end. For example, if you have a type D load cell and a type O grip, the coupling you need must be a D to O coupling adapter. Refer to Table 4-3 on page 4-7 for examples of coupling adapters that are compatible with the 3340 load frames.

Note: *If your grip (or fixture) is the same size as your load cell, then an adapter is not required since the grip can connect securely with the load cell.*

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However, if you need the self-aligning feature that optimizes the load string alignment, you need to use appropriate tension couplings.

Table 4-2 shows the different interface sizes that are used for load cells, adapters, grips and fixtures. Although all the sizes shown in Table 4-2 can be used with the Series 3340 frames, it is recommended that either type D or type O be used with these frames.

Table 4-2. Interface Sizes

Interface Size	Dimensions
Type D *	1.25 inch connection with 0.5 inch clevis pin
Type O *	12 mm connection with 6 mm clevis pin
Type A	Hook
Type OO	6 mm connection with 2.6 mm clevis pin
Type B	0.5 inch connection with 3/16 inch clevis pin
Type C	5/8 inch connection with 0.25 inch clevis pin
Type 1	34 mm connection with 16 mm clevis pin
* These adapters are recommended for the 3340 load frames.	

Coupling adapters also vary on the maximum capacity they can sustain. When using couplings, ensure that the testing parameters fall within the coupling adapter's maximum capacity (as well as the load cell and load frame capacity).

Table 4-3 shows a sampling of coupling adapters that are compatible with the Series 3340 frames. These tables do not provide a complete listing of all adapters that are available for the Series 3340 frames.

Contact your regional Instron service office for assistance in determining the appropriate adapters to meet your testing requirements.

For additional information on selecting appropriate grips or fixtures for your testing needs, refer to "Selecting Grips and Fixtures" on page 4-16.

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Table 4-3. Coupling Adapters

Catalog No.	Coupling Type	Maximum Capacity	Interface Size
Note: Coupling types are listed from load cell, or base, towards the accessory. The lower case letter following "Type" indicates the gender of the coupling at that end.			
2501-348	Tension	2 kN 200 kgf 450 lbf	Type Om to Of
2501-109	Tension	50 N 5 kgf 11 lbf	Type Om to Bf
2501-094	Tension	10 kN 1000 kgf 2200 lbf	Type Om to Cf
2501-091	Tension	10 kN 1000 kgf 2200 lbf	Type Om to Df
2501-134	Rigid	100 N 10 kgf 22 lbf	Type Om to Bf
2501-133	Rigid	1 kN 100 kgf 225 lbf	Type Om to Cf
2501-093	Rigid	10 kN 1000 kgf 2200 lbf	Type Om to Df
2501-346	Rigid	5 kN 500 kgf 1120 lbf	Type Dm to Of
2501-119	Rigid	100 N 10 kgf 22 lbf	Type Dm to Bf
2501-120	Rigid	1 kN 100 kgf 225 lbf	Type Dm to Cf

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Selecting a Load Cell

Selecting a load cell is the first step in preparing for a tension or compression test. If the approximate tensile or compressive strength of the specimen is known, use these guidelines to choose a load cell:

- The test load must be greater than 1% of the load cell capacity. Measurements smaller than the Load Measurement Accuracy specifications shown in Table 2-1 on page 2-2 cannot be held to the stated accuracy specification.
- If a choice is possible between two different cells because of overlapping ranges:
  a. Select a higher-capacity load cell whenever a minimum of deflection is desired.
  b. Select a lower-capacity load cell whenever a maximum long term balance or stability is desired.

If the tensile strength is not known, refer to a Properties of Materials handbook to obtain an approximate strength. To calculate the tensile strength in force units for a specimen, multiply the tensile strength of the specimen by its cross-sectional area. For example:

$$\text{psi} \times \text{in}^2 = \text{lbf (pounds-force)}$$

$$\text{kg/m}^2 \times \text{m}^2 = \text{kgf (kilograms-force)}$$

$$\text{Pascals} \times \text{m}^2 = \text{newtons}$$

EXAMPLE:

Specimen:	Standard ASTM tensile geometry
Material:	Lexan
Tensile Strength:	5200 psi (from materials handbook)
Specimen area:	0.502 in. wide x 0.125 in. thick = 0.063 in^2
Tensile strength:	5200 psi x 0.063 in^2 = 328 lbf

In this example, the 5 kN (1000 lb, 500 kg) capacity load cell should be installed.

If you cannot determine an approximate value of tensile strength, use the highest capacity load cell rated for the load frame. Perform a preliminary test at a very slow speed to obtain the load range required. After performing the preliminary test, you can determine if a lower capacity load cell can provide better load resolution.

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Installing a Load Cell

Testing with a Series 3340 load frame is conducted below the moving crosshead. Series 2519 tension-compression load cells are typically installed to the underside of the crosshead. Refer to "Installing the 2519 Load Cell" on page 4-9. You can also install a Series 2530 low profile load cell to the underside of the crosshead. Refer to "Installing the 2530 Load Cell" on page 4-11.

Checklist

Check for the following conditions before you install the load cell:

- ❑ The frame's power switch is in the Off (**O**) position.
- ❑ The load cell installation drawings are available and you have all the parts that are required for the installation.
- ❑ Mounting screws are lubricated. Lubricating the mounting screws ensures that required pre-load factors can be obtained when testing.
- ❑ A torque wrench is available.
- ❑ All threads, bores and mating surfaces are clean and free of damage.
- ❑ There is adequate clearance between the bottom of the crosshead and the baseplate to install the load cell.
- ❑ The crosshead is stationary.

Installing the 2519 Load Cell

To install a Series 2519 load cell to the crosshead:

1. Ensure that the main power switch is set to Off (**O**) and the mains power cable to the frame is disconnected. Verify that the **POWER** indicator light on the jog control panel does not illuminate.
2. Connect the mounting screw and appropriate washer, as shown in Figure 4-1 on page 4-10.
3. Place the mounting screw assembly (from Step 2) into the top of the central bore of the crosshead.
4. Insert the anti-rotation pins (part #705K83) into the pin holes on the bottom of the crosshead.

Note: *There are four pin holes on the bottom of the crosshead that enable you to position the load cell either straight on or at a 45° angle. Refer to Figure 2-3 on page 2-9 for pin locations.*

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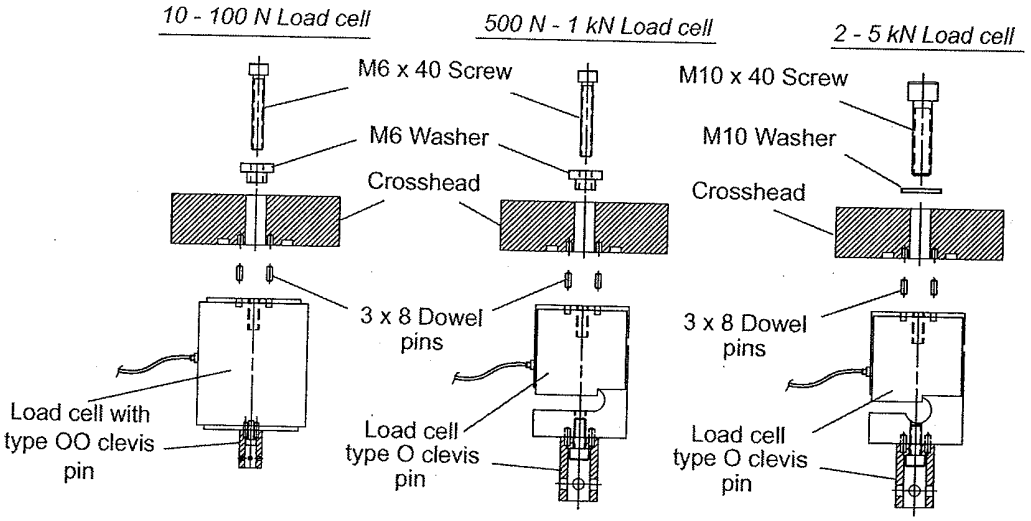


Figure 4-1. Installing 2519 Load Cells

5. Place the load cell against the bottom of the crosshead, ensuring that the anti-rotation pins fits securely in place against both the crosshead and load cell.
6. Tighten the mounting screw, by hand, so that it secures to the load cell underneath the crosshead.

Caution

Prevent the load frame from sliding by holding the crosshead with one hand while applying torque to the mounting screw.

7. Torque the mounting screw to the appropriate value indicated in Table 4-4 on page 4-11.
8. Connect the load cell cable into the **LOAD** connector on the controller panel.
9. Press the load cell cable into the adjustable clip on the side of the crosshead to prevent it from interfering with your test.
10. Re-connect the power cable to the main power source and turn on the system. Refer to "System Startup" on page 5-2 for instructions. Verify that the **POWER** indicator light on the jog control panel illuminates.

The load cell is now ready for testing.

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Table 4-4. Load Cell Mounting Information

Load Cell	Capacity	Mounting Screw [a]	Screw Torque Value [b]
2519-101	10 N	M6 x 40	7 Nm 0.71m.kg 5.16 ft.lb
2519-102	50 N	M6 x 40	7 Nm 0.71m.kg 5.16 ft.lb
2519-103	100 N	M6 x 40	7 Nm 0.71m.kg 5.16 ft.lb
2519-104	500 N	M6 x 40	7 Nm 0.71m.kg 5.16 ft.lb
2519-105	1 kN	M6 x 40	7 Nm 0.71m.kg 5.16 ft.lb
2519-106	2 kN	M10 x 40	25 Nm 2.55 m.kg 18.4 ft.lb
2519-107	5 kN	M10 x 40	25 Nm 2.55 m.kg 18.4 ft.lb

a. Mounting screws must be lubricated to ensure that required pre-load factors can be obtained when testing.

b. Use the torque value applicable to the smallest capacity of either the load cell or the frame. For example, if the load cell capacity is 1 kN and the frame's capacity is 5 kN, use the torque value applicable to 1 kN, the smaller capacity.

Installing the 2530 Load Cell

To install a Series 2530 low profile load cell into the crosshead:

1. Ensure that the main power switch is set to Off (**O**) and the mains power cable to the frame is disconnected. Verify that the **POWER** indicator light on the jog control panel does not illuminate.
2. Connect the mounting screw and washer as shown in Figure 4-2 on page 4-12.
3. Place the mounting screw assembly (from Step 2) into the top of the central bore of the crosshead.

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4. Insert the anti-rotation pin (part #705K83) into one of the pin holes on the bottom of the crosshead.

Note: *There are four pin holes on the bottom of the crosshead that enable you to position the load cell either straight on or at a 45° angle. Refer to Figure 2-3 on page 2-9 for pin locations.*

5. Place the locating ring (part #T1335-1048) into the top of the load cell that connects to the crosshead. See Figure 4-2 on page 4-12.

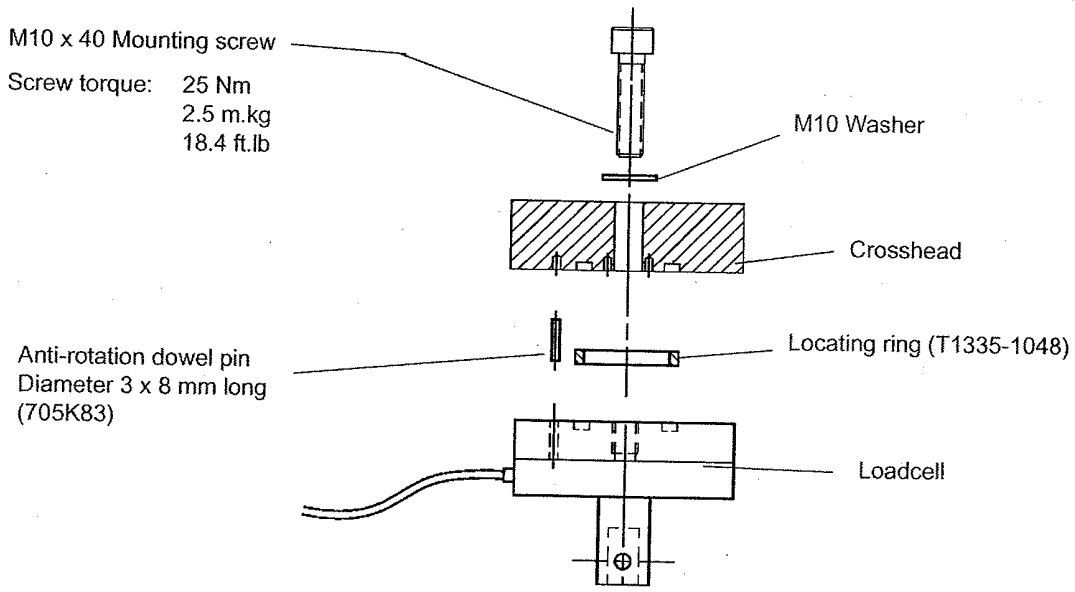


Figure 4-2. Installing 2530 Load Cells - Capacity up to 5 kN

6. Place the load cell against the bottom of the crosshead, ensuring that the anti-rotation pin and locating ring fit securely in place against both the crosshead and load cell.
7. Tighten the mounting screw, by hand, so that it secures to the load cell underneath the crosshead.

Caution

Prevent the load frame from sliding by holding the crosshead with one hand while applying torque to the mounting screw.

8. Torque the mounting screw to 25 Nm.
9. Connect the load cell cable into the **LOAD** connector on the controller panel.

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10. Press the load cell cable into the adjustable clip on the rear of the guide column to prevent it from interfering with your test.
11. Re-connect the power cable to the main power source and turn on the system. Refer to "System Startup" on page 5-2 for instructions. Verify that the **POWER** indicator light on the jog control panel illuminates.

The load cell is now ready for testing.

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Installing the Base Adapter

The base adapter on the 3340 frames can be removed, or re-oriented on an angle to match the position of the load cell. To change the orientation of the base adapter, you must remove the adapter and re-install it in the new position.

Removing the Base Adapter

To remove the base adapter:

1. Remove the spring that is located inside the adapter.
2. Insert the 5 mm hex key (refer to "Ancillary Parts" on page 7-2) into the base adapter, ensuring that it fits into the screw at the base of the adapter.
3. Using a torque wrench, turn the wrench counterclockwise to loosen and remove the screw inside the adapter.
4. Lift the base adapter away from the base beam.

Installing the Base Adapter

To install the base adapter:

1. Insert the adapter into the base beam, noting the orientation of the locating pin on the bottom of the adapter. The locating pin fits into any of the three locating pin holes on the base beam where the adapter is fitted.

   The adapter can be placed at 90°, or 60° to either side of 90°.

2. Insert the 5 mm hex key (refer to "Ancillary Parts" on page 7-2) inside the adapter, ensuring that it fits into the screw at the base of the adapter.
3. Using a torque wrench on the hex key, tighten the screw to the appropriate value indicated in Table 4-4 on page 4-11.
4. Remove the hex key and insert the compression spring.

You can now install a grip or fixture to the base adapter.

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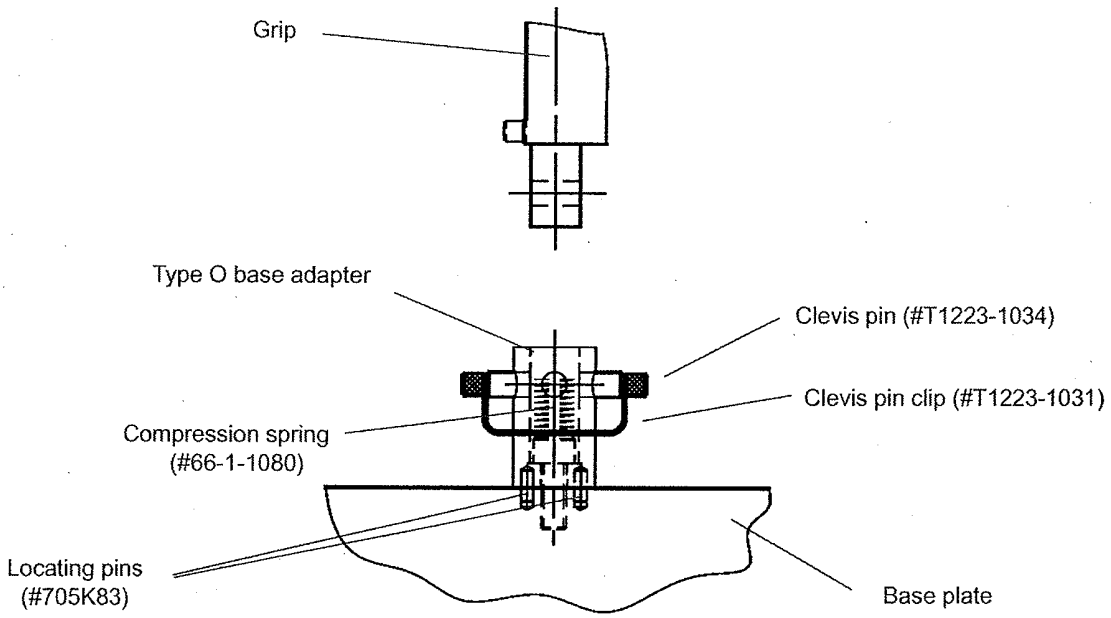


Figure 4-3. Installing or Removing the Type O Base Adapter

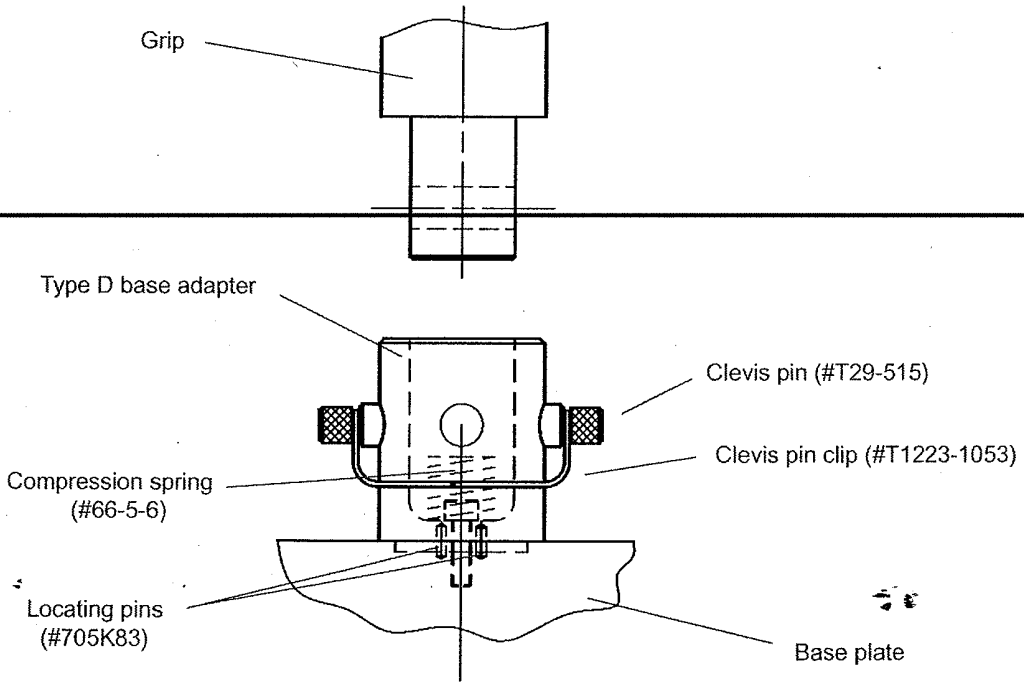


Figure 4-4. Installing or Removing the Type D Base Adapter

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Selecting Grips and Fixtures

Selecting grips depends on the material, geometry, and strength of the test specimen, with the tensile strength of the specimen being the primary consideration. Always ensure that the capacity of the grips is greater than the tensile or compressive strength of the specimen.

In tension testing, the test specimen is held securely in the jaws of upper and lower grips. In a standard configuration, the upper grip is attached to the load cell (which, in turn, is attached to the moving crosshead), and the lower grip is attached to the fixed base plate of the load frame.

In compression testing, the specimen is placed on a table (called a platen), and the load is applied by an anvil attached to the load cell. In this case, the diameter (or area) of the anvil is important, as well as its maximum loading capacity.

Table 4-5 on page 4-16 provides examples of common gripping techniques. You may have to experiment with several gripping techniques to eliminate specimen slippage in the grips. Screw-action and pneumatic-action grips use interchangeable jaw faces that are either serrated, flat, or rubber-coated. You can change these grip faces to determine the appropriate gripping method for your application.

Table 4-5. Examples of Gripping Techniques

Specimen Material	Specimen Geometry	Max. Break Load (lb)	Types of Grips and Faces
Paper	25 mm (1 in) wide	100	Screw-action or pneumatic-action with 25 x 50 mm flat faces
Plastic Films	25 mm (1 in) wide	100	Same as above. Also, line contact faces can be used
Rigid Plastics	25 mm wide x 12.5 mm thick (1 in wide x 0.5 in thick)	1000	Wedge-action or screw-action with serrated faces
Wire and Sheet Metal	0.5 to 1.5 mm diameter (0.002 to 0.060 in)	200	Screw-action or pneumatic-action with 25 x 50 mm flat or serrated faces

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Table 4-5. Examples of Gripping Techniques (Continued)

Specimen Material	Specimen Geometry	Max. Break Load (lb)	Types of Grips and Faces
Cord and Yarn	0.5 to 4.8 mm diameter (0.002 to 0.189 in)	350	Pneumatic cord and yarn grips
Fabrics	25 mm or 100 mm wide strip (1 in or 4 in)	1000	Screw-action or pneumatic-hydraulic action with flat faces

It is important that the rated loading capacity of the grips and fixtures exceed the expected load during a test, including a reasonable safety factor. Instron provides a wide variety of grips and compression fixtures to meet many testing needs. Contact your regional Instron sales and service office to discuss your specific requirements.

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Installing Grips and Fixtures

Most of Instron's standard grips and fixtures can be used with the 3340 frames, provided that they interface to the corporate mounting holes and can be adapted to the approved load cells by using appropriate adapters. The following sections provide general descriptions for installing grips and fixtures onto the 3340 load frames.

Installing Grips for Tension Testing

The standard method for mounting grips is to use a coupling adapter to attach the upper grip to the load cell, and using a base grip adapter to attach the lower grip to the base platen. Detailed instructions for installing the specific grips or fixtures you are using are provided in the installation drawings for those grips.

To install the upper grip:

1. Attach a coupling to the load cell with the retaining pin provided with the load cell.
2. Attach the retaining clip to the retaining pin provided with the coupling.
3. Attach the upper grip to the coupling using the pin provided with the coupling.
4. Attach the retaining clip to the retaining pin provided with the grip.

   This type of double-pin mounting allows the upper grip to be self-aligning.

To install the lower grip:

The base adapter supplied with a Series 3340 load frame includes a retaining pin and a compression (preload) spring. The spring supports the weight of the lower grip under compression, which prevents a discontinuity in the initial loading applied to a specimen. For best results, always ensure the spring is in place.

1. Insert the compression spring into the base adapter.
2. Push down to compress the spring inside the adapter (Figure 4-5 on page 4-19).
3. Insert the retaining pin to lock the grip or fixture to the base adapter.
4. Attach the retaining clip to the retaining pin as shown in Figure 4-5 on page 4-19.

Note: *The installation of Instron pneumatic grips requires additional procedures for mounting an Air Kit. Complete instructions are included with the kit.*

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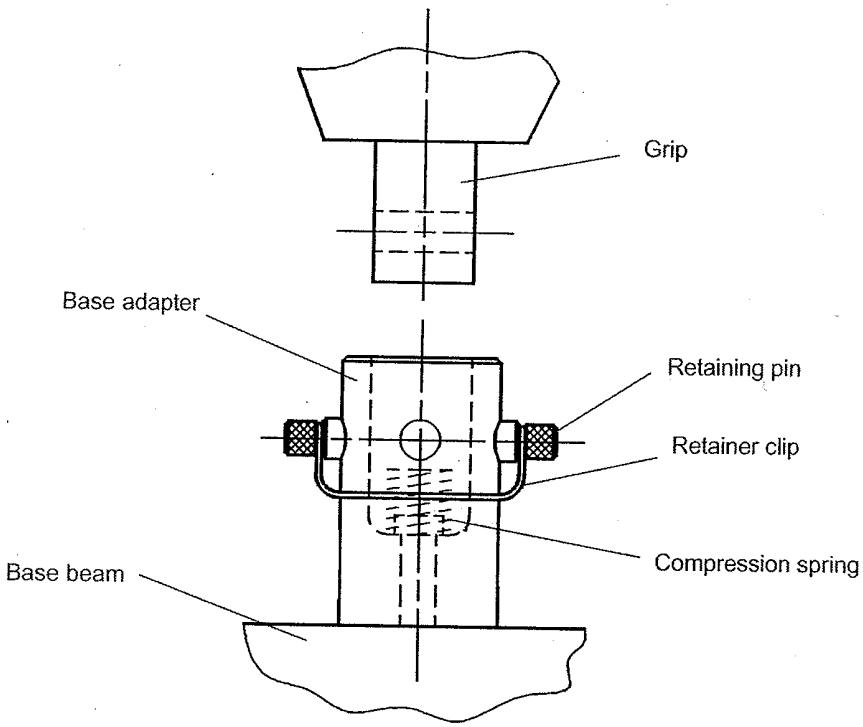


Figure 4-5. Installing Typical Grips

Installing Fixtures for Compression Testing

The optional compression anvils include a locknut and a bar wrench. Before installing an anvil on a load cell or on the base adapter, thread the locknut completely onto the anvil. Detailed instructions for installing specific grips or fixtures are provided in the installation drawings for those grips.

To install compression fixtures:

1. Install the anvil in the load cell coupling, or in the base adapter, using the retaining pin provided.
2. Turn the locknut firmly up against the coupling adapter to tighten the connection. This action removes any discontinuity in loading caused by a loose pin.

When removing the anvil after testing, use the bar wrench to loosen the locknut if it is jammed.

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Chapter 5
Operation

Outline

This chapter gives instructions on basic operation of the testing system.

- System Startup 5-2
- Using the Jog Control Panel. 5-3
- Setting Crosshead Travel Limits 5-5
- Starting a Test. 5-8
- Stopping a Test 5-9
- System Shutdown. 5-10

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System Startup

To turn on the system and prepare it for operation, perform the following steps:

1. Check that all cables are properly installed and securely connected.
2. Turn on the system by setting the main power switch on the back of the frame base to **I** (On). Ensure that the **POWER** indicator light on the jog control panel illuminates.
3. Power on all other system components (i.e. computer, recorder, and printer) using their own power switches.
4. Perform a system calibration, then allow a warm-up period of at least 15 minutes to assure system stability.

Note: *A fifteen minute warm-up period is also necessary whenever a load cell is changed, or after the initial connection of a strain gauge.*

5. Re-calibrate the system.
6. Open the testing software on your system computer.
7. Set testing parameters at the computer in accordance with your test program requirements. Refer to the online help system for details about the software and running a test.
8. Use the jog controls on the jog control panel to move the crosshead during test setup, or to facilitate specimen installation. The **TEST IN PROGRESS** indicator light on the jog control panel illuminates when you move the crosshead.

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Using the Jog Control Panel

The jog control panel lets you move the crosshead up and down as required for positioning the crosshead or moving the crosshead away from a limit stop. When using the jog controls, the crosshead can ramp from zero to full speed in about three (3) seconds. A Reduced Jog Speed feature is available in the software that reduces the top speed by a factor of 10. This Reduced Jog Speed feature allows finer position control and load adjustments.

Note: *Check the setting in the software (Normal or Reduced Jog Speed) before using the jog controls.*

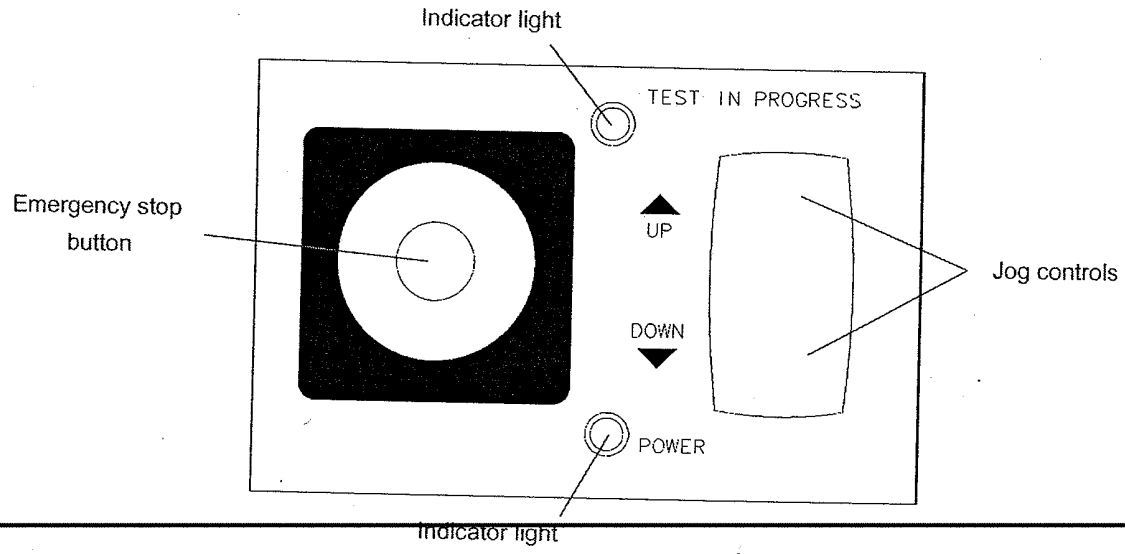


Figure 5-1. Jog Control Panel

The jog control panel is shown in Figure 5-1. The two actions you can perform with the jog control panel are:

JOG UP Press the **UP** arrow button to move the crosshead in tension (away from the base beam). Pressing the button increases the speed linearly, up to a maximum speed, until you release the button.

JOG DOWN Press the **DOWN** arrow button to move the crosshead in compression (toward the base beam). Pressing the button increases the speed linearly, up to a maximum speed, until you release the button.

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On the jog control panel, there are two indicator lights:

POWER	When this light illuminates, the machine is on and receiving electrical power.
TEST IN PROGRESS	When this light illuminates, the crosshead is moving, even when you are using the jog controls to move the crosshead.

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Setting Crosshead Travel Limits

Warning

Hazard - Always set the limit stops before starting a test. Failure to set the limit stops could cause injury from unexpected crosshead motion, and cause possible damage to test fixtures.

Note: *Set the crosshead limit stops after you establish the crosshead starting position, but before you start the test.*

The travel limit stops are two adjustable blocks mounted on the limit switch rod, which is located on the right side of the column cover, as shown in Figure 5-2 on page 5-6. Limit stops have thumbscrews that you tighten and release by hand, and you can move them to any position on the limit rod. These stops should be positioned just beyond the test parameters to prevent crosshead over-travel. When the crosshead reaches the maximum pre-set travel, the limit switch actuator contacts one of these stops. Contact between the actuator and the limit stop moves the limit switch rod and activates the limit switches located inside the frame base. This stops crosshead motion.

Note: *When setting limit stops, allow for an additional 3 mm of crosshead travel after the actuator activates a limit stop. There is a small delay time from the point when the actuator hits the limit stop and when the message relays to the limit switches located in the frame base.*

Procedure

To set the limit stops:

1. Ensure that the crosshead is stationary and that the test parameters are set. The **TEST IN PROGRESS** indicator light on the jog control panel should not illuminate.
2. Set the upper limit stop at a point just above the expected maximum crosshead travel in the upward direction when tension testing, or just above the test starting point when compression testing. Tighten the stop securely on the limit switch rod.

Note: *Use the vertical measurement strip on the right side of the column to find the approximate set point.*

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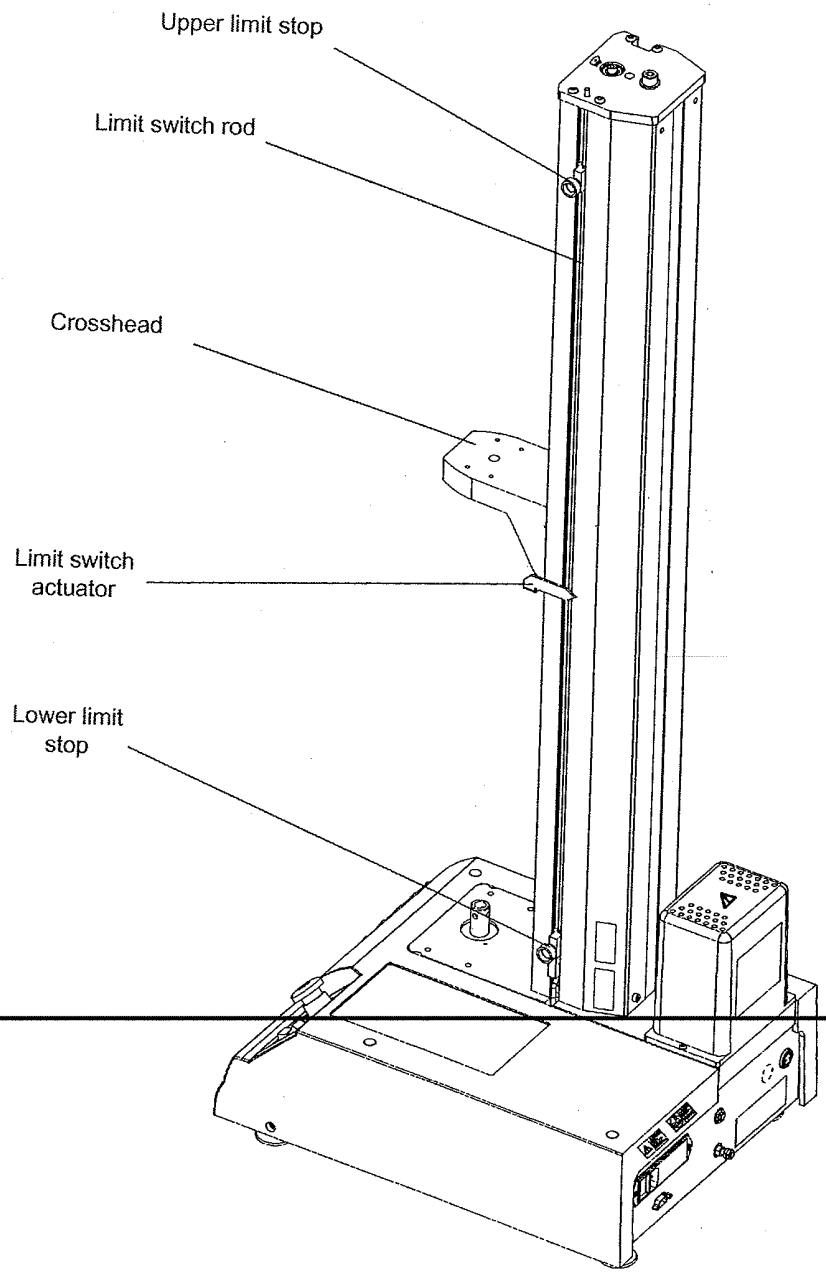


Figure 5-2. Load Frame Limit Stops

3. Set the lower limit stop at a point just below the starting position when tension testing, or just below the expected maximum crosshead travel in the downward direction when compression testing. Tighten the stop securely on the limit switch rod.

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Moving Off a Crosshead Limit

When the crosshead contacts either the upper or lower limit stop, the test stops. If this happens, use the jog buttons on the jog control panel to move the crosshead off the limit stop. Press the **DOWN** button on the jog control panel to move the crosshead off the upper limit stop. Press the **UP** button to move the crosshead off the lower limit stop. The **TEST IN PROGRESS** indicator light on the jog control panel illuminates when you move the crosshead.

There is also a second level switch, which acts as a fail-safe device if the first level switch (the limit stops) malfunctions. Activating a second-level limit switch disables the load frame drive so you cannot drive the crosshead away from the limit. This may indicate a problem with the load frame. Contact the Instron Service department for advice.

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Starting a Test

Warning



Hazard - Always set the limit stops before starting a test. Failure to set the limit stops could cause injury from unexpected crosshead motion, and cause possible damage to test fixtures.

Before You Begin

Before starting a materials test, ensure that the following conditions are met:

- All relevant procedures from the chapters titled "Installation" and "Preparation for Use" are completed.
- The appropriate channel (load or strain) is calibrated.
- The load cell, grips, and fixtures are appropriate for your test.
- Crosshead travel limits are set. Refer to section "Setting Crosshead Travel Limits" on page 5-5.
- You have reviewed the manuals for the control system and software, and are familiar with the online help system that accompanies the software.
- Know the specific procedures for setting up and running a test.

Procedure

To start a test:

1. Verify that the setup and test parameters are reasonable and correct for your test.
2. Ensure that travel limits are set.
3. Start a test from your computer software application. Refer to the online help for details.
4. Ensure that the **TEST IN PROGRESS** indicator light illuminates after you start the test.

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Stopping a Test

You can stop a test by using the hardware controls on the frame or settings in the software. The following sections describe the various ways to stop a test.

Emergency Stop Button

The Emergency Stop button is a large, round, red button located on the front of the load frame. Press this button to stop crosshead travel immediately when a condition develops that:

- Could affect the safety of persons operating the system.
- Could damage the specimen or the test fixtures.

Pressing the Emergency Stop button stops the system instantly and disables the frame's drive motor. The test cannot restart until the emergency button is reset and the frame is re-enabled.

Resetting the Emergency Stop Button

To reset the Emergency Stop button:

1. Determine the cause of the problem that led you to press the Emergency Stop button, and take the necessary action to fix the problem.
2. Turn the Emergency Stop button clockwise to release it. The button pops out.
3. From the software program, click the **FRAME ENABLE** button to re-enable the motor. Refer to the online help for details on enabling the frame.

Limit Stops

The test stops if the crosshead contacts the upper or lower limit stops. If this happens, move the crosshead away from the limit by pressing the **UP** or **DOWN** jog buttons on the jog control panel.

Software Controls

When the system encounters a pre-set limit or event that was set from the software, the test stops. The system performs the command that was set from the software. If the system is set to stop at a defined point, the crosshead stops at that point. If you set the system to return to gauge length, the crosshead stops at the pre-defined point and then returns to the original starting point of the test. Refer to the online help for further details.

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System Shutdown

Wait until the system completes all active tasks before shutting it off or disconnecting the electrical power. The system may be engaged in recalculations or printing tasks after the test is complete.

Shut off the power to the system before you:

- Perform any maintenance procedure on the load frame.
- Disconnect the main power cable.
- Move the load frame.
- Connect or install optional components or accessories.

To turn the system off:

1. Complete the test and remove the test specimen.
2. Ensure that the **TEST IN PROGRESS** indicator light on the jog control panel no longer illuminates.
3. Exit Instron's software program and turn off the computer using the normal shutdown procedure.
4. Switch the power to the Off (**O**) position on the rear right corner of the frame base. The **POWER** indicator light no longer illuminates.

System peripherals, such as the computer, recorders, and printers, must be shut off separately by their own power switches.

Standby Mode

The system also has a Standby mode that shuts off power to the entire system except the load cell and its conditioner card. This allows the load cell to remain warm while the system is not in actual use, and eliminates having to wait for the load cell to warm up when restarting the system.

The Standby feature is initiated automatically when the computer is turned off but the load frame remains on. To activate Standby mode:

1. Wait until the computer has finished its current tasks.
2. Exit Instron's software program. Exiting the program before shutting off the computer ensures that the program properly closes all open files before shutting down.
3. Turn off the computer using the normal shutdown procedure.

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4. Leave the load frame in the On (**I**) position to keep power flowing to the load cell.

5. Ensure that the **POWER** indicator light on the jog control panel continues to illuminate.

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Chapter 6
Maintenance

Outline

This chapter describes routine maintenance procedures and contains specific information for component replacement.

- Introduction to Maintenance 6-2
- Preventive Maintenance 6-3
- Access To Components 6-10
- Fuse Replacement 6-14
- Adjusting the Timing Belt 6-16
- Load Cells 6-17

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Introduction to Maintenance

General

The Series 3340 load frame is a precision electromechanical instrument that is designed to support a variety of test applications. These frames require minimal maintenance that can be performed with basic mechanical and electrical knowledge. Parts replacement, in some cases, however, should be done by skilled personnel.

Special Maintenance Recommendations

The load frame contains specialized components requiring replacement procedures and adjustments that Instron service engineers must perform. These critical items include the moving crosshead, ballscrew and drive pulleys.

If you need help with maintenance problems on these items, contact your regional Instron service office.

Daily Maintenance Checks

Before operating the system each day, ensure:

- ❑ All cable connections are tight and secure.
- ❑ All grips, fixtures and accessories are free of dirt, damage and deformation.
- ❑ The table supporting the load frame is level.
- ❑ Signal and power cables have adequate slack to prevent excessive strain on connectors.
- ❑ All cables are free of wear and chafing.
- ❑ Power is adequately supplied to the electronics.

Correct any problems before operating the test system.

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Preventive Maintenance

Preventive maintenance consists of periodic inspection, cleaning, and lubrication of the test system. The following sections provide guidelines for preventive maintenance.

Note: *Instron Service offers many preventive maintenance and calibration plans. Contact your regional Instron service office for information regarding these programs.*

Warnings



Electrical Hazard - Disconnect electrical power to the frame before opening or removing protective covers. Dangerous voltages and moving machinery are present. Unqualified personnel should not attempt repairs.



Rotating Machinery Hazard - Disconnect power supplies before removing the covers to rotating machinery.

Disconnect equipment from all power supplies before removing any cover which gives access to rotating machinery. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.

Inspection

Every six to twelve months, remove the covers from the base of the load frame and visually inspect interior components for obvious wear, misalignment, and adjustment. Check the following:

- ❑ Inspect the interior components for dirt and debris.
- ❑ Tighten all electrical connections.
- ❑ Operate the crosshead through the full range of motion. It should move smoothly with no unusual noise, or erratic motion. Refer to the Rotating Machinery Hazard warning above.

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Cleaning

It is recommended that the load frame be cleaned weekly, or more often if the machine is operating in a dusty or dirty environment.

Caution

Do not clean with solvents or abrasive cleaners. Some household or commercial cleaners can react with painted surfaces or panel markings.

Use low pressure air to blow dust. Do not direct the air stream directly at sensitive components.

To clean the load frame:

- Wipe exterior surfaces of the load frame with a moist cloth.
- Vacuum or blow dust off the components and printed circuit cards.

Lubricating the Ballnut

The ballscrew ballnut requires lubrication periodically. Grease is added to the ballscrew ballnut through a grease nipple. Where the grease nipple is located depends upon the specific model you purchased. On the 3342, 3343, and 3344 models, it is located inside the crosshead where the ballscrew intersects with the crosshead. See Figure 6-1 on page 6-6. On the 3345 and 3345 Extra Height models, it is located on the front of the crosshead. See Figure 6-2 on page 6-7. The top and bottom ballscrew bearings are sealed and should never need lubrication.

The ballscrew is self-lubricated during operation with grease contained in the ballscrew ballnut. As the crosshead moves up and down, a thin layer of grease spreads over the ballscrew as it passes through the ballscrew ballnut. However, the ballscrew ballnut must be maintained and greased in accordance with Table 6-1 on page 6-5.

Depending upon the environmental conditions, the guide column may also require lubrication using the same grease as for the ballscrew. Contact Instron's Service department for advice.

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Table 6-1. Load Frame Lubrication Requirements

Location	Recommended Lubricant	Interval	Instron Part Number
Ballnuts	Lithium based water resisting grease - NLGI Class 2 (DIN51825 class K2k LS2) Equivalents: Mobil: Mobilux® 2 BP: Energrease®LS2 Shell: Alvania® R2	1000 hours or 36 months of operating time *	105-1-1017 (Lubriplate 1200-2 in 14 oz. cans)

** Note:*

1. *Operating time is defined as time of crosshead movement, not the length of time the system has been powered on.*
2. *If the system is used more than 100 hours per month, inspect the lubricated area periodically and increase lubrication frequency as required.*
3. *Inspect the ballscrew and lubricate more frequently than the above recommendations if any of the following conditions exist:*
   - *There is high-load or high-speed testing.*
   - *There is long-term, continuous movement of the crosshead.*
   - *The system operates in a dirty environment.*
   - *There is high-load cycling tests.*

3342, 3343, and 3344 Models

To lubricate the ballscrew ballnut on the 3342, 3343, and 3344 models:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.
2. Remove the bottom ballscrew cover from the crosshead and slide it to the frame base. Refer to Figure 6-1 on page 6-6 to locate the grease nipple inside the column cover.
3. Use a grease gun to apply the grease into the grease nipple as shown in Figure 6-1 on page 6-6. It is not necessary to remove the guide column cover.
4. Fill the ballnut until grease oozes from the bottom of the ballnut. Wipe away the excess grease.
5. Re-attach the bottom ballscrew cover to the crosshead.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.

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7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease in the ballnut and coat the entire length of the ballscrew shaft.

8. Before you do any testing, perform the procedure "System Startup" on page 5-2.

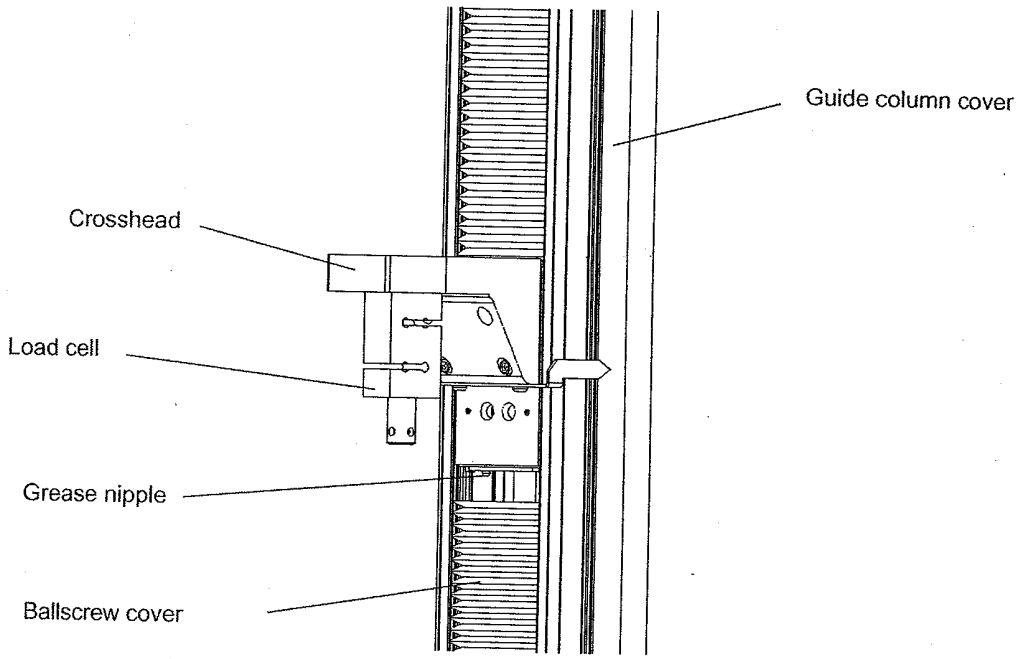


Figure 6-1. Lubricating the Ballnut on the 3342, 3343, and 3344 Models

3345 and 3345 Extra Height Models

To lubricate the ballscrew ballnut on the 3345 and 3345 Extra Height models:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.

2. Remove the black cover on the front of the crosshead to expose the grease nipple. Refer to Figure 6-2 on page 6-7 to locate the grease nipple on the crosshead.

3. Use a grease gun to apply the grease into the grease nipple as shown in Figure 6-2 on page 6-7.

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4. Fill the ballnut until grease oozes from the bottom of the ballnut. Wipe away the excess grease.
5. Re-attach the black cover onto the grease nipple.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.
7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease in the ballnut and coat the entire length of the ballscrew shaft.
8. Before you do any testing, perform the procedure "System Startup" on page 5-2.

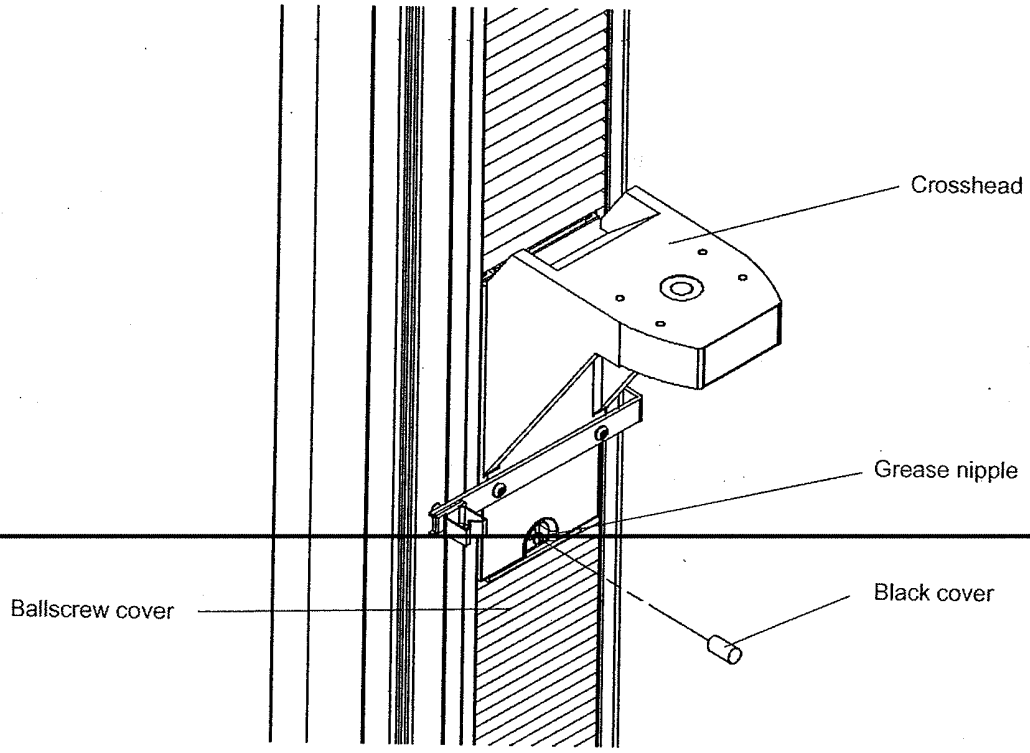


Figure 6-2. Lubricating the Ballnut on the 3345 and 3345 Extra Height Models

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Lubricating the Linear Guide

On the 3345 and 3345 Extra Height models, the linear guide column must also be lubricated periodically, in addition to the ballscrew ballnut. Refer to Table 6-1 on page 6-5 for an estimated lubrication schedule. There are two carriages that carry the crosshead along the linear guide column. These two carriages contain grease that lubricates the guide column as they travel along the guide column. Each carriage has its own grease nipple. One is located above the crosshead (behind the ballscrew cover) and the other is located below the crosshead.

To lubricate the linear guide column:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.
2. Remove the ballscrew covers from the crosshead and slide them away from the crosshead. Refer to Figure 6-3 on page 6-9 to locate the grease nipple on each carriage.
3. Use a grease gun to apply the grease into the grease nipple. It is not necessary to remove the guide column cover.
4. Fill each carriage until grease oozes from them. Wipe away the excess grease.
5. Re-attach the ballscrew covers to the crosshead.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.
7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease and coat the entire length of the linear guide column.
8. Before you do any testing, perform the procedure "System Startup" on page 5-2.

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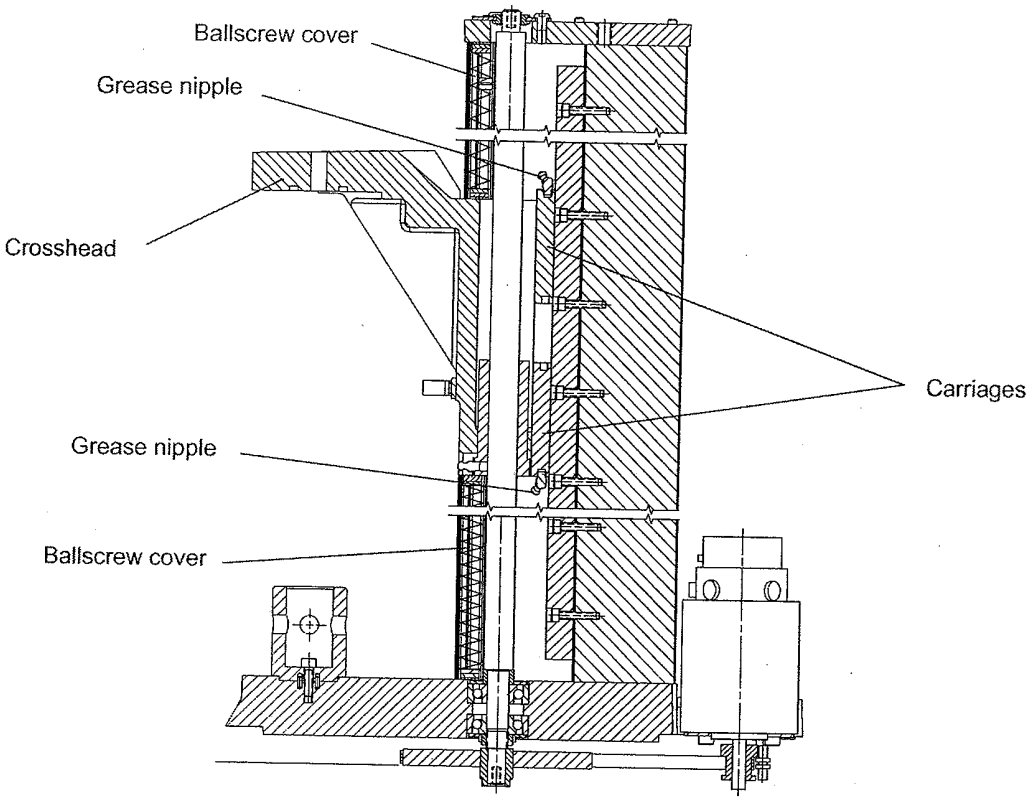


Figure 6-3. Lubricating the Linear Guide Carriages

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Access To Components

Access to the Ballscrew and Guide Column

The Series 3340 load frames operate with a circulating ball type ballscrew with sealed bearings at the top and bottom plates.

The ballscrew and guide column are protected from dirt and debris by a ballscrew cover resembling folded blinds. Velcro® fastener strips secure the ballscrew cover to the upper and lower surface of the crosshead. To access the ballscrew and guide column, pry the Velcro® apart and push the cover out of the way. Before resuming tests, restore the cover to its original position, and press the Velcro® into place.

Internal Access to the Load Frame Base

The base frame has a cover for the internal components of the frame, and a separate cover for the motor, as shown in Figure 6-4 on page 6-11. Should you need to inspect any internal components, follow the instructions below.

Warning



Electrical Hazard - Disconnect electrical power to the frame before opening or removing protective covers. Dangerous voltages and moving machinery are present. Re-install all covers before resuming operation. Unqualified personnel should not attempt repairs.



Rotating Machinery Hazard - Disconnect power supplies before removing the covers to rotating machinery.

Disconnect equipment from all power supplies before removing any cover which gives access to rotating machinery. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.

When removing covers:

- Remove only the covers in the area where you are working.
- Do not remove the column cover. Removing the column cover is not necessary nor recommended.

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- Do not raise the load frame or tip it over to access the interior parts.
- It is not necessary to remove the motor cover when removing the base frame cover.
- Re-attach all covers before turning on the system. Be sure to use all the fasteners that you removed.

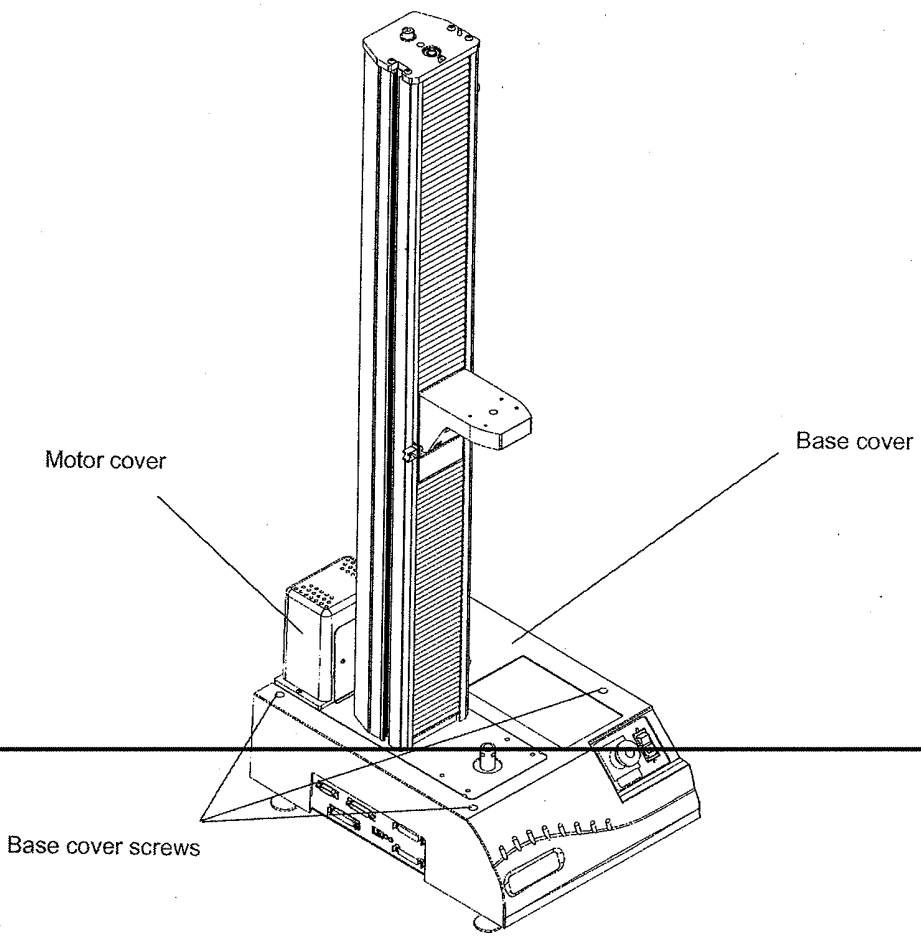


Figure 6-4. Load Frame Access Cover

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Removing the Base Cover

To remove the base cover:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.
2. Raise all accessories in the column T-slot half way up the column.
3. Use a 5 mm hex wrench to remove the four screws from each corner of the base cover. Keep the screws in a safe place so they do not get misplaced.
4. Lift and carefully remove the base cover.

Note: *The motor cover is separate from the base cover, so the motor cover remains in place when you remove the base cover.*

5. Proceed with the necessary inspections.

Refitting the Base Cover

Warning



Hazard - Test the Emergency Stop button immediately after replacing the covers, before you perform any testing.

After refitting any cover, perform a functional check of the Emergency Stop button to ensure the it operates correctly. Do not perform any testing until the Emergency Stop button has been tested and verified to be in working order.

To refit the base cover:

1. Position the cover around the column cover.
2. Lower the cover onto the frame base, taking care not to trap any cables between the casing and the base or the table.
3. Replace and tighten the four screws securing the cover to the frame base.
4. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.
5. Test the Emergency Stop function, the crosshead travel limit stops, and jog controls before you do any testing.
6. Before you do any testing, perform the procedure "System Startup" on page 5-2.

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Removing the Motor Cover

To remove the motor cover:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.
2. Use a 2.5 mm hex wrench to remove the two screws from each side of the motor cover. Keep the screws in a safe place so they do not get misplaced.
3. Lift and carefully remove the motor cover.

Note: *The motor cover is separate from the base cover, so the base cover remains in place when you remove the motor cover.*

4. Proceed with the necessary inspections.
5. Re-fit the motor cover and secure it with the two screws from Step 2.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.
7. Before you do any testing, perform the procedure "System Startup" on page 5-2.

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Fuse Replacement

The input power line fuses are the only fuses in the system that may need replacement. The power line is protected by a fuse located in the power line input connector on the right side of the frame base. Table 6-2 shows the proper fuse sizes for the Series 3340 load frames.

Warning



Electrical Hazard - Disconnect the main power to the load frame before removing the frame panel. Dangerous voltages within the base structure can cause personal injury.

Caution

Replace a fuse with the same type and size as the original. Installing the wrong fuse could damage the load frame electrical circuits.

Note: *All voltages for all frames use a 3.0 amp fuse as shown in Table 6-2.*

Table 6-2. Power Line Fuse

Symbol	Load Frame Models	Fuse Description	Instron Part Number
F1	3342, 3343, 3344, 3345	3.0A, 250 V Slo Blo	27-2-40

To replace the fuse:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the jog control panel does not illuminate.
2. Verify that the voltage selector is correct. Refer to "Setting the Input Voltage" on page 3-8 if you need to change the line voltage.
3. Insert a small flat-head screwdriver into the middle of the connector and pry out the fuse holder. Refer to "Setting the Input Voltage" on page 3-8 for more detailed instructions on locating and removing the fuse holder.
4. Remove the fuse holder from the line input connector.
5. Remove the fuse as shown in Figure 6-5 on page 6-15.

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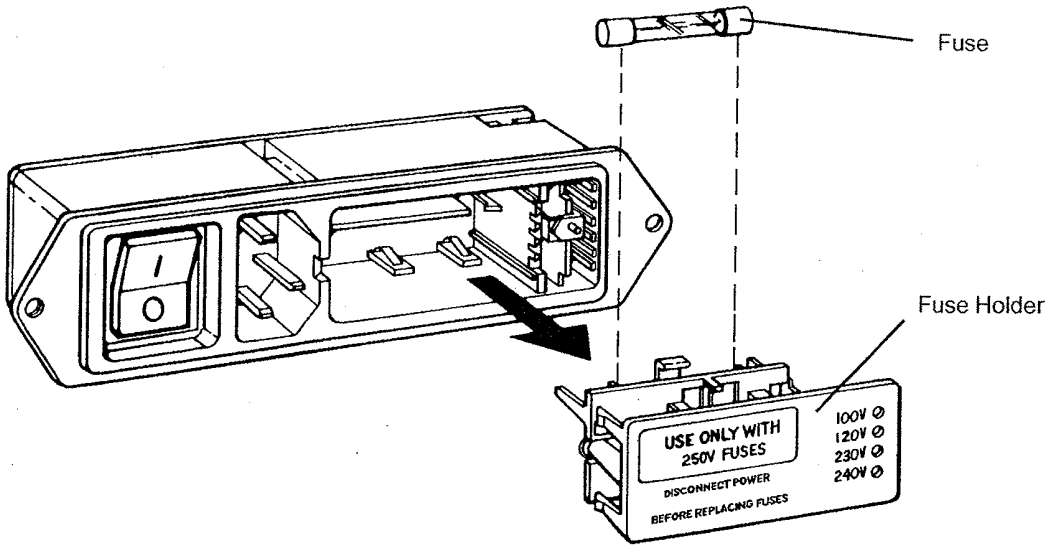


Figure 6-5. Removing the Fuse from the Fuse Housing

6. Install a new fuse in the holder and re-insert the fuse holder into the line input connector.

Note: *The fuse in the connector should be a 3.0 amp Slo Blo (Instron Part No. 27-2-40). Spare fuses are supplied with the system. Refer to "Ancillary Parts" on page 7-2.*

7. Verify that the voltage selection is correct (refer to "Setting the Input Voltage" on page 3-8).

8. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.

9. Before you do any testing, perform the procedure "System Startup" on page 5-2.

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Adjusting the Timing Belt

The crosshead drive system uses a timing belt. This belt requires little maintenance involving periodic inspection for excessive wear and tension adjustment, which should be done by an Instron service engineer.

Note: *The timing belt is designed to minimize stretch with normal use. The factory sets the belt tension during assembly. Further adjustment is not normally required.*

If you believe the timing belt needs adjustment, contact your local Instron service office for assistance.

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Load Cells

Troubleshooting Load Cells

Instron load cells, in general, are electrically calibrated, self-identifying and rationalized. Approximate resistances are given that can verify a possible broken gauge, or a faulty connector or cable.

If a strain gauge in a cell has been badly overstressed, but still maintains its electrical continuity, the cell may show a higher than normal amount of creep. If a gauge has become improperly bonded due to degradation in use, the cell may exhibit a combination of general instability in its balance point, together with a large amount of creep. Difficulties of this sort rarely appear as an instability in the calibration of the cell.

If a load cell has been overloaded, the load-sensitive member may be permanently deformed to the extent that the proper dimensional alignments inside the cell are no longer maintained. For example, if the position of the central spindle is changed, this can result in the balance point shifting abruptly as the cell is loaded or unloaded.

To check the load cell, substitute another cell to re-check the test results carefully. If your results differ significantly from the original test results, then the original load cell may be damaged. However, many of the symptoms described above can also arise from a faulty load sensor conditioner, recorder, or possibly a mechanical adjustment.

If you suspect that a cell may be damaged, contact your local Instron service office to arrange returning the load cell for analysis and possible repair.

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Chapter 7
Ancillary Parts & Accessories

Outline

This chapter describes the ancillary components that are included with the Series 3340 load frames, and optional accessories that can be purchased separately.

- Ancillary Parts 7-2
- Optional Accessories 7-4

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Ancillary Parts

The components listed in Table 7-1 are parts that are either required to complete the installation, or facilitate setting up load cells and accessories on the Series 3340 load frames. Keep these components in a safe place so they do not get misplaced. You may need them in the future.

Table 7-1. Ancillary Parts and Spare Parts List

Description	Part Number	Quantity	Purpose
Screw, M6 x 16	201V33	3	Installing load cells
Screw, M10 x 40	201V57	2	Installing load cells
Screw, M6 x 40	201V38	2	Installing load cells
Washer, M10	610J9	2	Installing load cells
Washer, M6	T604235	1	Installing load cells
Spring compression, LC029E-2	66-1-1080	2	O coupling
Spring compression, 0.85OD x 3/4 L	66-5-6	2	D coupling
Clevis pin clip, type O	T1223-1031	2	Installing grips and fixtures
Clevis pin, type O	T1223-1034	2	Installing grips and fixtures
Clevis pin clip, type D	T1223-1053	1	Installing grips and fixtures
Clevis pin, type D	T29-515	1	Installing grips and fixtures
Base adaptor, type D	T581-48	1	Installing grips and fixtures to the frame base
Accessories slot T-nut	T1697-1307	6	Installing accessories in the T-slot on the column cover, or installing mounting clips for cable routing
Adjustable cable clips	11-6-60	6	Secures cables to the T-slot on the column cover to ensure cables do not interfere with testing
Hex wrench key set, 1.5 to 10 mm, ball end	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Fuse, 3.0A Slo-Blo	27-2-40	2	Protection from electrical surges
Dowel pin, 3 x 8 mm	705K83	5	Orienting a Series 2519 load cell at different angles

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Table 7-1. Ancillary Parts and Spare Parts List (Continued)

Description	Part Number	Quantity	Purpose
Locating ring	T1335-1048	1	Fitting between load cell and crosshead
Cord set	Various **	1	Provides electrical connection from power source to the frame
Ground cable assembly	A712-213	1	Ground cable to ground the load frame if the mains power supply is not grounded
** The cord set included with the frame is determined by the selection made on the purchase order, or the country specified on the purchase order. If no selection is made, or country specified, then the cord set is based on the country to which the frame is shipped and is compatible with the electrical requirements for that country.			

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Optional Accessories

Table 7-2 summarizes the optional accessories that are compatible with the Series 3340 load frames. These items are not included with the load frame, but can be purchased separately.

Table 7-2. Optional Accessories and Fixtures

Part Number	Description
2501-232	Adapter, load cell on base (for 2530 load cells only)
2717-068	O-ring fixture *
2701-065	Pneumatic grip control (Airkit)
3119-402	Environmental chamber (Short)
3119-403	Environmental chamber (Long)
2310-516	Remote pip marker cable and switch
2603-080	Long travel extensometers
2630-100	Clip-on static type extensometers (specimen mounted)
2910-063	Test area light (adjustable, mounts to T-slot)
* Accessories are specific to the 3340 load frames.	

Most of Instron's standard grips and fixtures can be used with the 3340 frames, provided that they interface to the corporate mounting holes and can be adapted to the approved load cells by using appropriate adapters. However, do not use high capacity grips or fixtures that exceed 10 kN or more.

Contact your regional Instron service office to discuss which optional accessories meet your testing needs.

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