4.11.2 Chart Controls

The CHART pushbutton switches function as follows:

SPILL - this latching switch allows the chart to free-run over the front of the platen, although the chart may still be operated in either direction by the chart control unit. Depressing this switch de-energizes the tensioning motor on the chart take-up roller. A small weight should be attached to the free end of the paper to offset the torque of the supply roller tensioning motor.

NOTE: When the SPILL switch is latched, the fast forward and fast reverse switches are inoperable.

Fast Forward/Fast Reverse - these are non-latching switches that enable the chart to be moved independently of any other control, except SPILL, in the directions indicated by the arrowhead legends. Each switch applies full voltage to a related tensioning motor, de-energizes the opposing tensioning motor, and disables the chart stepper motor clutch.

CLUTCH/SERVO - these latching switches are associated with the optional chart servo drive control. The CLUTCH switch energizes the servo control clutch which connects the servomotor to the chart drive. The SERVO switch connects the servo amplifier to the servomotor.

TIME - this latching switch energizes the chart stepper motor clutch. Depressing this switch allows chart control by the chart drive unit in any of the operating modes.

5.0 INSTALLATION AND PREPARATION FOR USE

5.1 INITIAL INSTALLATION

The design of the 1125 testing instrument allows a flexibility in installation layout. The equipment units - loading frame and console - may be positioned side by side or angled for operating efficiency. The floor areas, where the units are to be installed, must have the structural strength required to support the equipment (reference specifications, section 2).

5.1.1 Leveling of Loading Frame

After the 1125 instrument is mounted in its operating position, level the loading frame with the four adjustable pads on the base. Tools required are 5/8-inch and 15/16-inch open end wrenches and a bubble level. Use the plate between the columns of the frame as an indicating surface for the level.

5.1.2 Interconnection of Units

The cabling essential for interconnecting the two units of the 1125 instrument is shown in figure 5-1. Not shown is other cabling supplied for optional accessories that may be included with the original equipment.

NOTE: It is recommended that a clear space of at least 3 feet be left behind the instrument to provide service access and to avoid damaging the interconnecting cables.

Install the cabling as follows:

a. Fasten signal cable (A379-85) to SIGNAL connectors on console outlet panel and loading frame connector panel.

b. Plug power cable (A379-66) into INTERCONN POWER receptacles on console outlet panel.

c. Plug load cell cable male connector into receptacle located on rear of console about midway on left-hand side. Mount other end of cable in retainer clip on loading frame column. Leave slack in cable to reach any of three possible operational positions of load cell, as shown in figure 5-1.

Accessory cabling is accomplished at the loading frame connector panel as required. All accessory cable connectors are clearly marked, and additional instructions are provided in this manual or with the units.

5.1.3 Main Power Connection

Ensure that the instrument main power switch is off. Connect the power cable (16-2-9) to the INPUT POWER receptacle on the console outlet panel; then to a power source of 120 volts, 50/60 Hz, single phase with a 20-ampere rating.

CAUTION

Do not connect any power source other than 110-130 VAC, 50 or 60 Hz to the instrument.

A separate external transformer (an optional accessory) is supplied with the 1125 instrument for specific power sources of 100, 230, or 440 VAC, 50 or 60 Hz, single phase.

5.2 PREPARING THE RECORDER FOR USE

The chart recorder can be opened in two directions for access to all components. The back swings up to expose the pen drive mech-

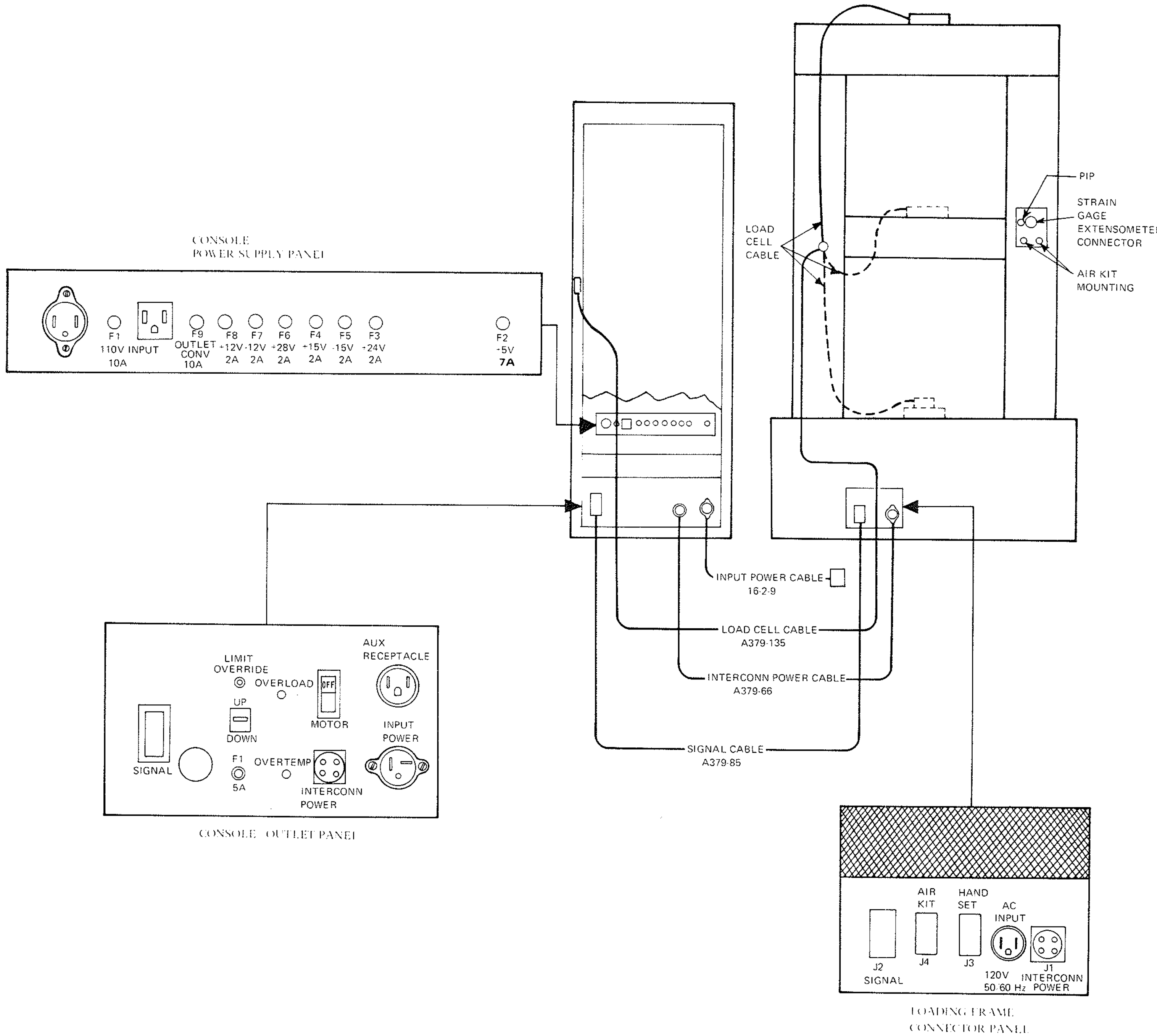


Figure 5-1. Model 1125 Installation (Rear View)

anism, or the front swings up to expose the chart drive mechanism and to load the chart paper. When opened from the front, two interlock switches disable the chart drive motor and chart tensioning motors.

NOTE: The recorder should always contain properly installed chart paper whenever the instrument console is energized; otherwise, the chart tensioning motors will free-run.

5.2.1 Loading Chart Paper

Chart paper is available from Instron, in 10-roll cartons, under part number 3710-022 (English scale) or 3710-016 (metric scale). To install a roll of chart paper, proceed as follows:

a. Open recorder by lifting front edge of platen up until support arm is locked in position (figure 5-2).

b. To remove a used chart roll, release take-up roller by pressing its right-hand flange against spring. Reinstall roller after removing chart paper.

c. Fold free end of new chart to a point. Insert chart roll between supply roller flanges so that printed side is up (figure 5-3a).

d. Ensure that reciprocating roller assembly is beneath drive roller by moving positioning stud to left side of slot.

NOTE: Positioning stud should move freely - do not use force.

e. Thread chart end behind guide roller, between reciprocating rollers, and over drive roller until end appears above platen.

f. Feed chart end under transparent guide and across platen, until paper extends at least 20 inches (500 mm) beyond edge of platen (figure 5-3b). Ensure that slotted paper edges fit over sprockets on drive roller.

g. Set reciprocating roller assembly under supply roller by moving positioning stud to right side of slot (figure 5-3c). Do not use undue force on stud. Allow paper to go back across platen while maintaining slight tension on folded end.

h. Feed end of paper over front idler roller, between reciprocating rollers, and over front guide roller.

i. Insert folded paper end in slot of take-up roller. Wind slack paper squarely on to roller (figure 5-3d).

j. Center positioning stud in slot to set the reciprocating roller assembly midway between take-up and supply rollers.

k. Lift end of recorder platen until support arm is unlocked and lower recorder into operating position.

5.2.2 Installing a Recorder Pen

The recorder may contain, as an option, from one to three pens. Each ball point pen mount and its cartridge ink is color-coded for ease of identification. A 3-pen mounting arrangement is shown in figure 5-4 and listed below, with the numbering system referenced to the PEN controls. The Instron replacement part number for each ball point cartridge type is also indicated.

PEN NO.	POSITION	COLOR	INSTRON PART NO.
1	back	red	53-1-2
2	center	blue	53-1-4
3	front	black	53-1-3

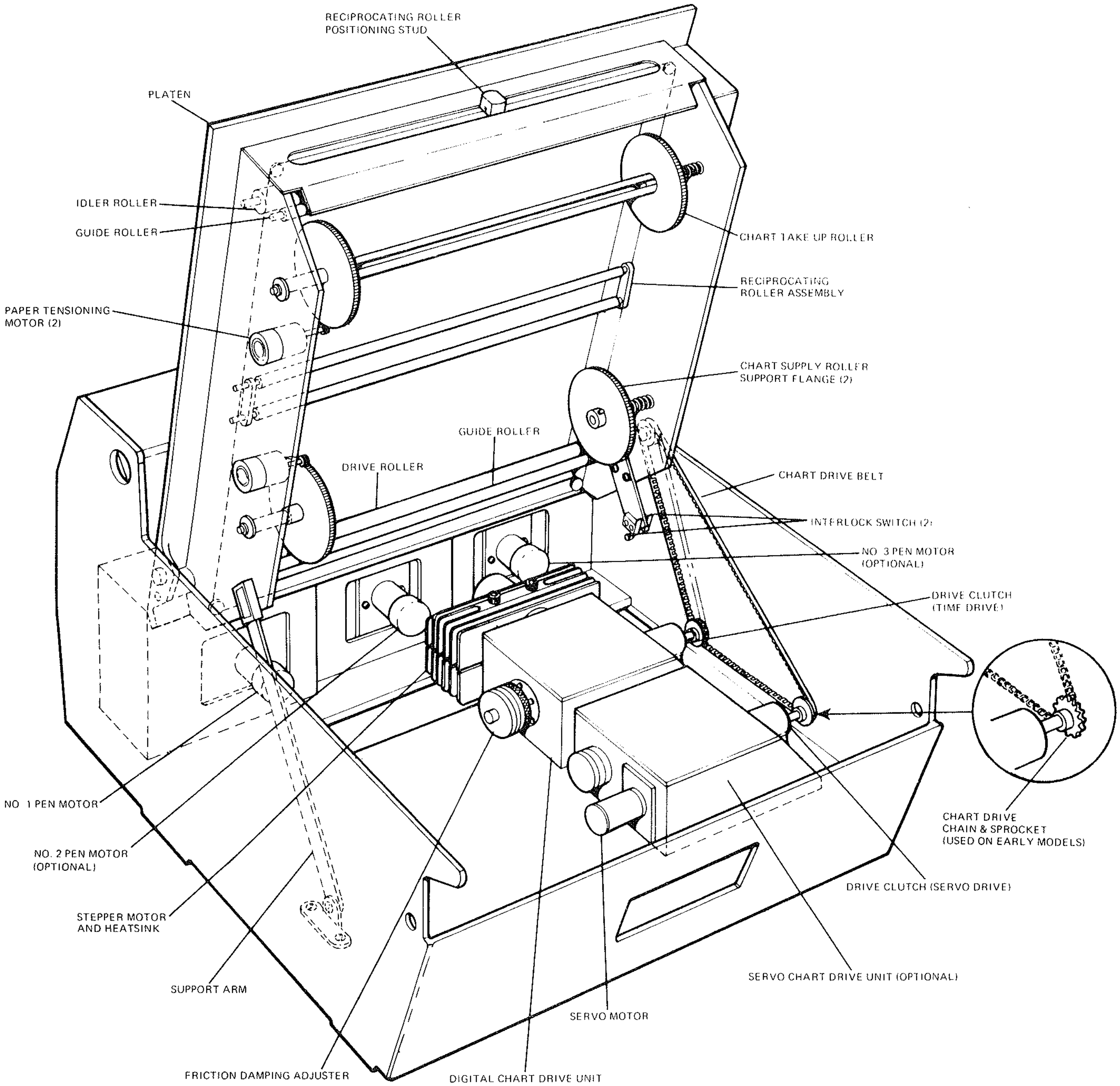
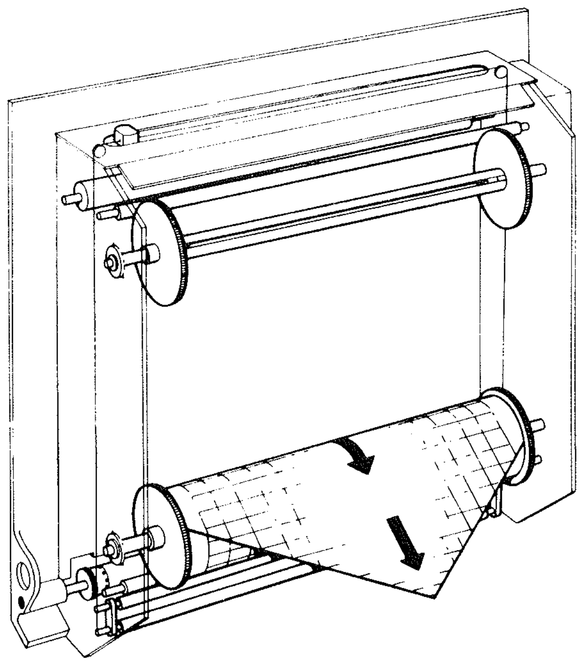
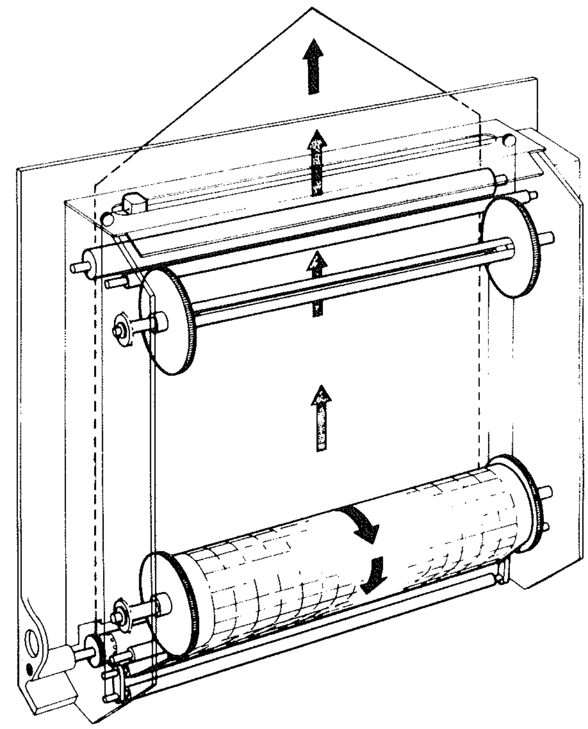


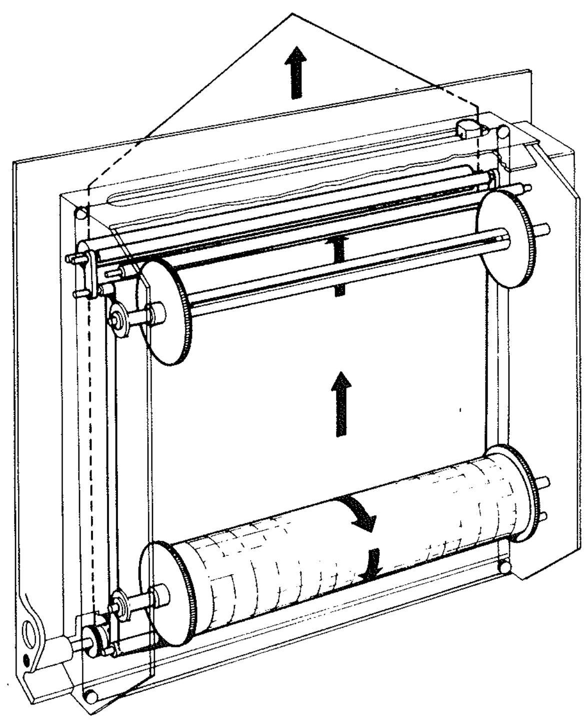
Figure 5-2. Recorder Assembly, Shown Open for Loading of Chart Paper



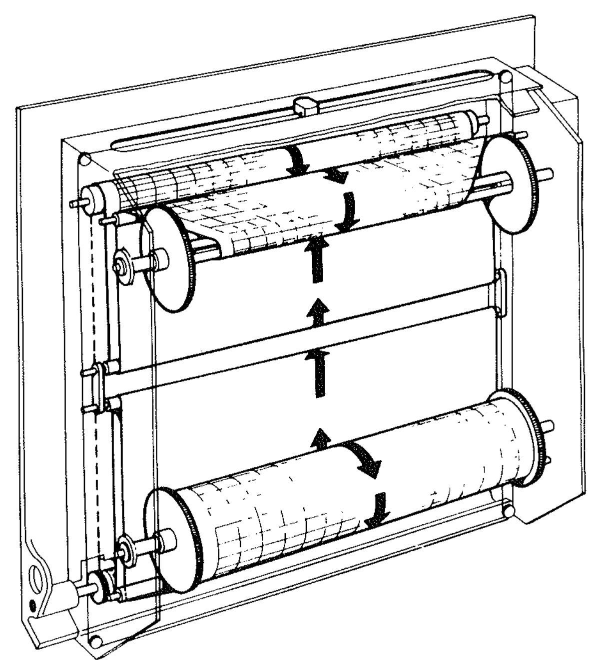
a. Install chart roll on supply roller flanges



b. Feed through reciprocating roller, and over drive roller and platen



c. Allow surplus paper to feed back while moving reciprocating roller up under take-up roller



d. Feed through reciprocating roller, over guide roller, and wind on take-up roller

Figure 5-3. Loading Recorder with Chart Paper

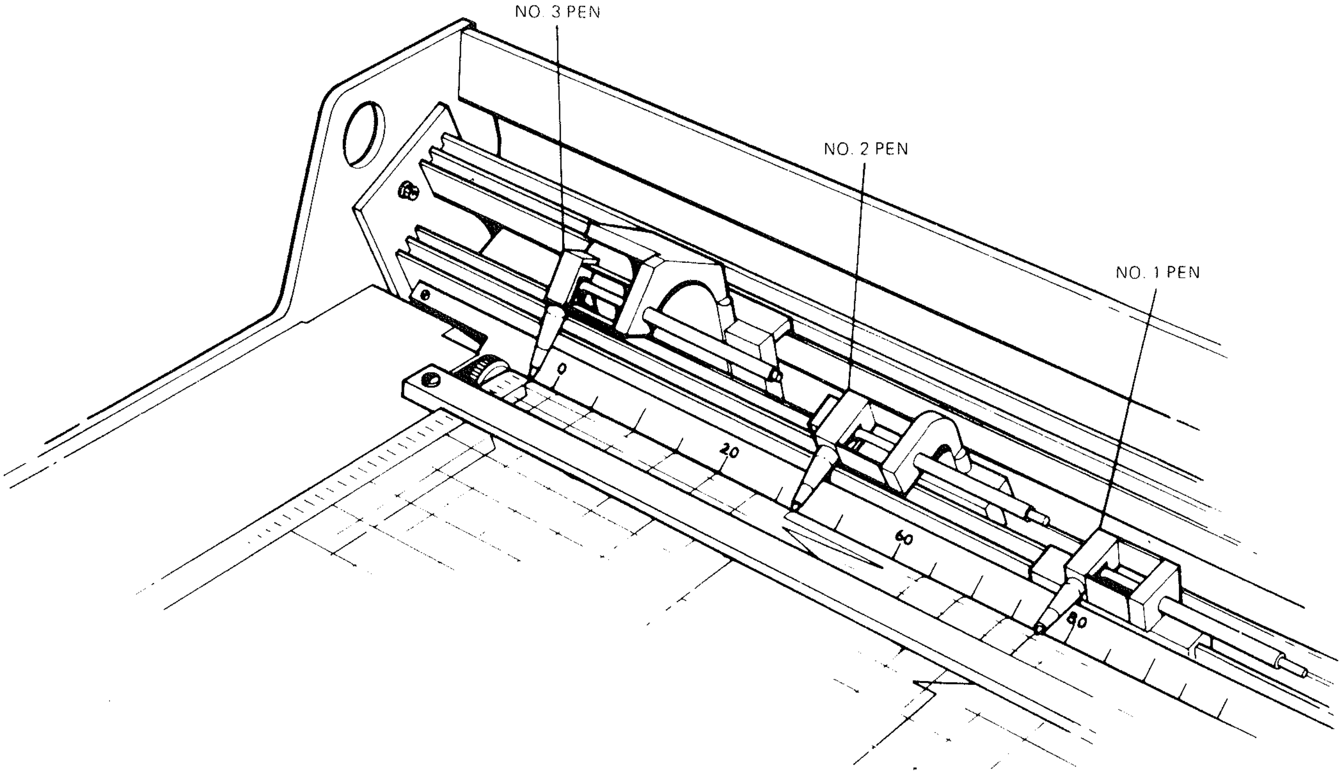


Figure 5-4. Recorder Pen Identification for an Optional 3-Pen Mount

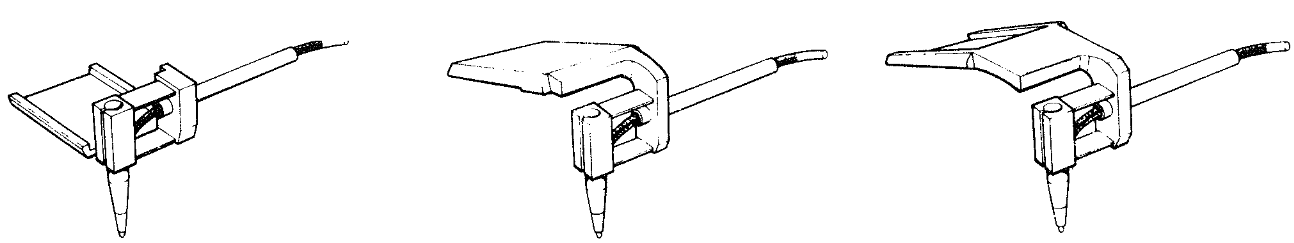
Three types of pen holders are used as shown in figure 5-5.

To change a recorder pen, proceed as follows:

a. Release pen hood by inserting a finger of each hand into hole on both sides of pen housing and pushing up on hood. Withdraw hood while tilting it slightly forward for clearance.

b. Remove pen holder by grasping it as shown in figure 5-6 and sliding unit up and out of carriage.

c. Withdraw pen mount and used pen from holder as shown in figure 5-7. Remove used pen from mount.



Pen Holder No. 1 | Pen Holder No. 2 | Pen Holder No. 3

Figure 5-5. Recorder Pen Holder Types

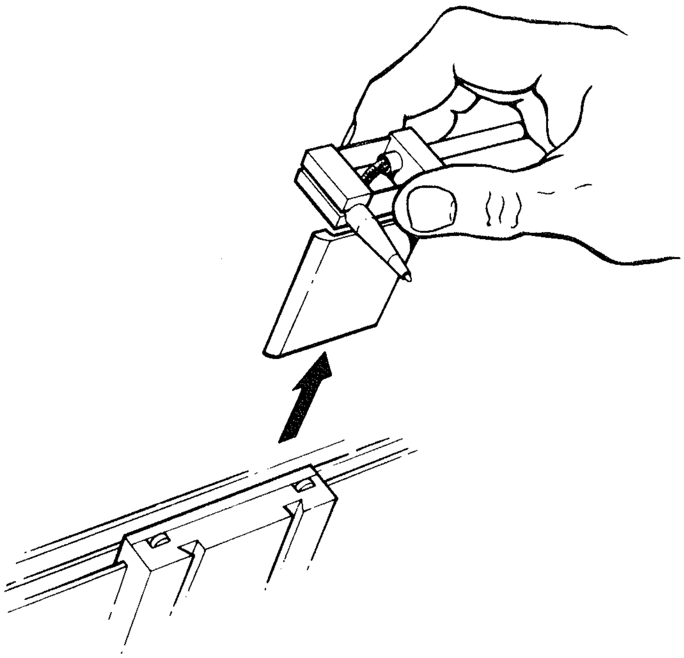


Figure 5-6. Removing Pen Holder from Carriage

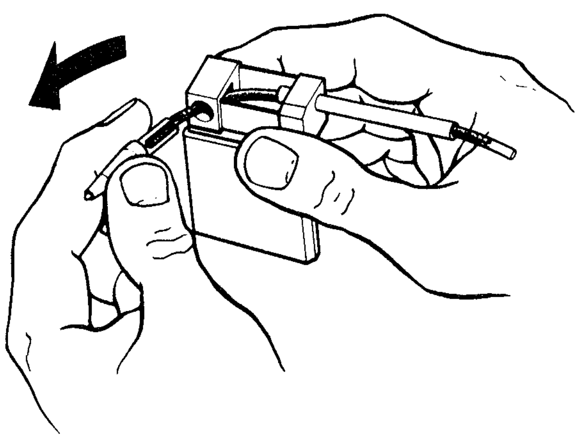


Figure 5-7. Removing Pen from Holder

d. Insert a new ball point pen cartridge into mount (figure 5-8). Color of ink should match color of mount.

e. Carefully insert pen reservoir into holder and form it, without kinking to fit into hole containing protective tubing. Remove tubing temporarily for ease of insertion. Press pen mount firmly into holder. Cut pen reservoir slightly shorter than protective tubing and install tubing.

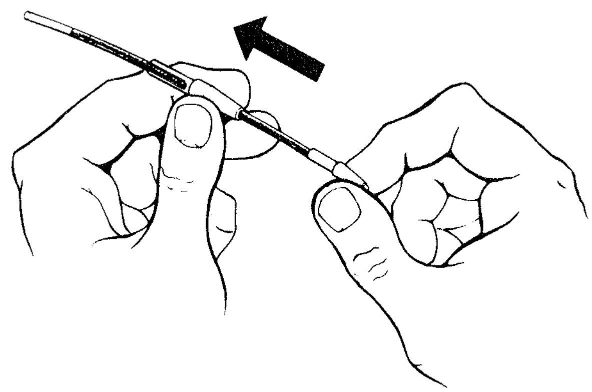


Figure 5-8. Inserting Pen in Mount

f. Slide pen holder assembly fully into carriage. Install hood, ensuring that clips engage pins at bottom.

NOTE: Recorder pen writing pressure is fixed and need not be adjusted. Run pen several times over chart paper until ink flows.

5.2.3 Pen Drive Mechanism Access

To open the recorder for access to pen drive assembly, proceed as follows:

a. With recorder in operating position, press lock buttons on both slides. Carefully pull unit out until "tip-out" panel, mounted above recorder, drops to a vertical position and lock buttons on slides just clear outer brackets.

CAUTION

Do not extend recorder beyond this point, as unit will drop out of slide retaining brackets.

b. Insert a finger into a lifting hole, on either side of pen carriage housing, and pull recorder assembly up to a vertical position.

c. To restore recorder to operating position: lower unit onto brackets, press slide lock buttons, lift "tip-out" panel and push unit in until slide buttons click into lock position.

5.3 SELECTING A LOAD CELL

A load cell of adequate capacity should be selected in accordance with the characteristics of the material to be tested and the following general guidelines:

a. The load cell capacity should be greater than the maximum testing loads anticipated.

b. If a choice is possible between two different cells because of their overlapping ranges:

(1) Select a higher-capacity load cell and use it on its lower load ranges whenever a minimum of deflection is desired.

(2) Select a lower-capacity load cell and use it on the higher load ranges whenever a maximum of long term balance or stability is desired.

Each load cell is supplied with the fixtures required for a standard application of the cell. Various optional devices for special cases are available from Instron.

NOTE: A compression overload carriage accessory is recommended for use with compression load cells of 1000 pounds (500 kg) capacity or less.

The load cell chart in paragraph 4.5 lists the cells, usable with the 1125 instrument, by application. Figure 5-9 is a listing of these cells, specifying for each cell: the usable full scale load ranges; the method of calibrating (mechanical or electrical); and the load cell amplifier FULL SCALE RANGE switch setting for calibrating purposes.

5.4 INSTALLING A TENSION LOAD CELL

Testing a specimen in tension may be done above or below the moving crosshead by mounting the load cell in the fixed or moving crosshead. Tension cells are supplied with a self-aligning coupling for connecting grips or other fixtures. A grip adapter, for base or crosshead, is supplied with the instrument on the baseplate between the columns.

Install a tension load cell as follows:

a. Lower load cell into hole position in center of fixed or moving crosshead (figure 5-10). Fit dowel holes in cell flange over dowels in crosshead.

b. Fasten load cell in place with bolts provided.

NOTE: The load cell can be left unbolted if the sample material does not recoil or release elastic energy when it ruptures. Leaving the cell loose also provides protection against accidental reverse-loading if the grips are forced together.

c. Attach self-aligning coupling to load cell spindle (figure 5-11). If testing is to be done above moving crosshead, remove grip adapter from baseplate and install in position on top of moving crosshead.

d. Insert load cell cable plug into connector. Ensure that load cell cable is secured out of testing area. Allow slack in cable if load cell is mounted in moving crosshead.

ENGLISH LOAD CELLS

Full Scale Range Switch Setting	0.1	0.2	0.5	1	2	5	10	20	50	100	200
Load Cell	**Full Scale Ranges**										
2511-103	0-0.1 lb	0-0.2 lb	0-0.5 lb	0-1 lb C	0-2 lb	0-5 lb	0-10 lb	0-20 lb	0-50 lb		
2511-105			0-0.5 lb	0-1 lb	0-2 lb	0-5 lb C	0-10 lb	0-20 lb	0-50 lb	0-100 lb	0-200 lb
2511-202	0-0.1 lb	0-0.2 lb	0-0.5 lb	0-1 lb C	0-2 lb	0-5 lb	0-10 lb	0-20 lb	0-50 lb		
2511-204			0-0.5 lb	0-1 lb	0-2 lb	0-5 lb C	0-10 lb	0-20 lb	0-50 lb	0-100 lb	0-200 lb
2511-301		0-2 lb	0-5 lb	0-10 lb	0-20 lb	0-50 lb	0-100 lb	0-200 lb	0-500 lb C	0-1000 lb	
2511-325	0-10 lb	0-20 lb	0-50 lb	0-100 lb	0-200 lb	0-500 lb	0-1000 lb	0-2000 lb C	0-5000 lb		
2511-303		0-20 lb	0-50 lb	0-100 lb	0-200 lb	0-500 lb	0-1000 lb	0-2000 lb	0-5000 lb C	0-10,000 lb	
2511-305			0-50 lb	0-100 lb	0-200 lb	0-500 lb	0-1000 lb	0-2000 lb	0-5000 lb	0-10,000 lb C	0-20,000 lb

METRIC LOAD CELLS

Full Scale Range Switch Setting	0.1	0.2	0.5	1	2	5	10	20	50	100	250
Load Cell	**Full Scale Ranges**										
2511-101	0-1 g	0-2 g	0-5 g	0-10 g C	0-20 g	0-50 g	0-100 g	0-200 g	0-500 g		
2511-102	0-10 g	0-20 g	0-50 g	0-100 g C	0-200 g	0-500 g	0-1 kg	0-2 kg			
2511-104	0-100 g	0-200 g	0-500 g	0-1 kg C	0-2 kg	0-5 kg	0-10 kg	0-20 kg	0-50 kg		
2511-106		0-200 g	0-500 g	0-1 kg	0-2 kg C	0-5 kg	0-10 kg	0-20 kg	0-50 kg	0-100 kg	
2511-201	0-10 g	0-20 g	0-50 g	0-100 g C	0-200 g	0-500 g	0-1 kg	0-2 kg			
2511-203	0-100 g	0-200 g	0-500 g	0-1 kg C	0-2 kg	0-5 kg	0-10 kg	0-20 kg	0-50 kg		
2511-205		0-200 g	0-500 g	0-1 kg	0-2 kg C	0-5 kg	0-10 kg	0-20 kg	0-50 kg	0-100 kg	
2511-302	0-1 kg	0-2 kg	0-5 kg	0-10 kg	0-20 kg	0-50 kg	0-100 kg	0-200 kg C	0-500 kg		
2511-326			0-5 kg	0-10 kg	0-20 kg	0-50 kg	0-100 kg	0-200 kg	0-500 kg	0-1000 kg C	0-2500 kg
2511-304	0-10 kg	0-20 kg	0-50 kg	0-100 kg	0-200 kg	0-500 kg	0-1000 kg	0-2000 kg C	0-5000 kg		
2511-306		0-20 kg	0-50 kg	0-100 kg	0-200 kg	0-500 kg	0-1000 kg	0-2000 kg	0-5000 kg C	0-10,000 kg	

Figure 5-9. Technical Data for Load Cells Usable with Model 1125 Instrument (See Notes) – Sheet 1 of 2

SI LOAD CELLS

Full Scale Range Switch Setting	0.1	0.2	0.5	1	2	5	10	20	50	100	250
Load Cell	Full Scale Ranges										
2511-109	0-0.01 N	0-0.02 N	0-0.05 N	0-0.1 N C	0-0.2 N	0-0.5 N	0-1 N	0-2 N	0-5 N		
2511-110	0-0.1 N	0-0.2 N	0-0.5 N	0-1 N C	0-2 N	0-5 N	0-10 N	0-20 N			
2511-111	0-1 N	0-2 N	0-5 N	0-10 N C	0-20 N	0-50 N	0-100 N	0-200 N	0-500 N		
2511-112		0-2 N	0-5 N	0-10 N	0-20 N C	0-50 N	0-100 N	0-200 N	0-500 N	0-1 kN	
2511-208	0-0.1 N	0-0.2 N	0-0.5 N	0-1 N C	0-2 N	0-5 N	0-10 N	0-20 N			
2511-209	0-1 N	0-2 N	0-5 N	0-10 N C	0-20 N	0-50 N	0-100 N	0-200 N	0-500 N		
2511-210		0-2 N	0-5 N	0-10 N	0-20 N C	0-50 N	0-100 N	0-200 N	0-500 N	0-1 kN	
2511-317	0-10 N	0-20 N	0-50 N	0-100 N	0-200 N	0-500 N	0-1 kN	0-2 kN C	0-5 kN		
2511-327			0-50 N	0-100 N	0-200 N	0-500 N	0-1 kN	0-2 kN	0-5 kN	0-10 kN C	0-25 kN
2511-318	0-100 N	0-200 N	0-500 N	0-1 kN	0-2 kN	0-5 kN	0-10 kN	0-20 kN C	0-50 kN		
2511-319		0-200 N	0-500 N	0-1 kN	0-2 kN	0-5 kN	0-10 kN	0-20 kN	0-50 kN C	0-100 kN	

NOTES:

1. Numbers shown in each row indicate load range available at each setting of FULL SCALE LOAD switch on load cell amplifier panel. For load cell in use, position outer dial of FULL SCALE LOAD switch so settings above unshaded section in figure appear in white background of dial. Settings shaded (orange) are most sensitive ranges of load cell. Settings shaded (grey/black) are not usable.

2. Only the 2511-300 series load cells are electrically calibrated; all others must be calibrated using precision weights.

3. A 'C' in one section of each row indicates FULL SCALE LOAD switch setting for calibrating that load cell.

Figure 5-9. Technical Data for Load Cells Usable with Model 1125 Instrument (See Notes) – Sheet 2 of 2

Figure 5-10. Installing a Tension Cell in the Moving Crosshead

5.5 INSTALLING A COMPRESSION LOAD CELL

Testing a specimen in compression is done below the moving crosshead, but the load cell may be mounted in two positions: in the moving crosshead (figure 12a); or on the baseplate between the loading frame columns (figure 5-12b).

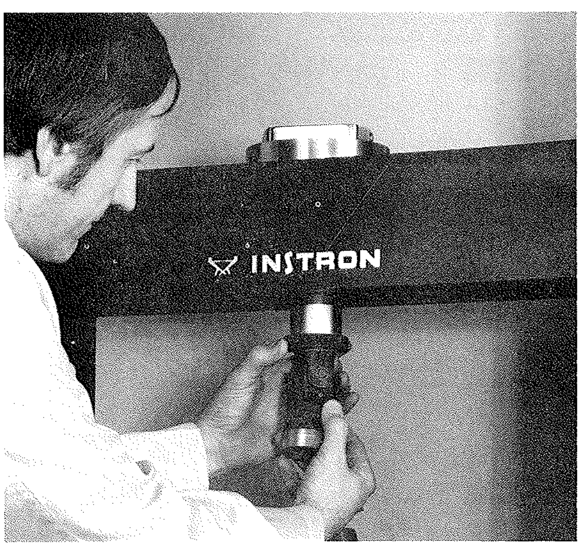


Figure 5-11. Attaching a Self-Aligning Coupling to a Tension Load Cell

Each compression cell is supplied with a table that attaches to the cell for supporting a test specimen; however, additional fixtures, available from Instron, are required to support the load cell and specimen depending on the testing method used.

Load cells of 1000 pounds (500 kg) or less require protection against accidental overload, and should be used with the compression overload carriage (figure 5-12c).

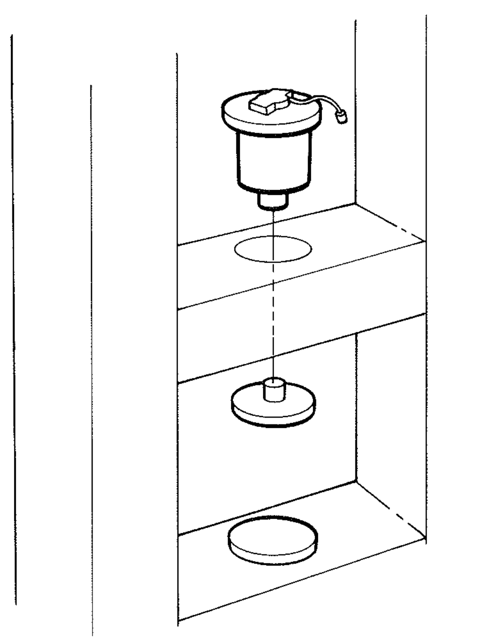


Figure 5-12a. Compression Load Cell Installation in Moving Crosshead

5.5.1 Compression Load Cell Installation in Moving Crosshead

NOTES: 1. When a compression load cell is mounted in the moving crosshead, specimen compression is limited by a minimum separation attainable (4 inches, approximately) between the moving crosshead and baseplate due to the leadscrew covers.

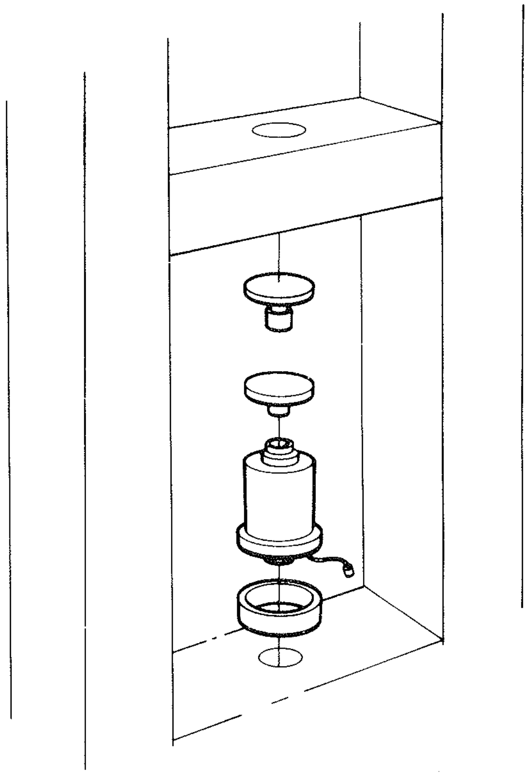


Figure 5-12b. Compression Load Cell Installation on Base of Loading Frame

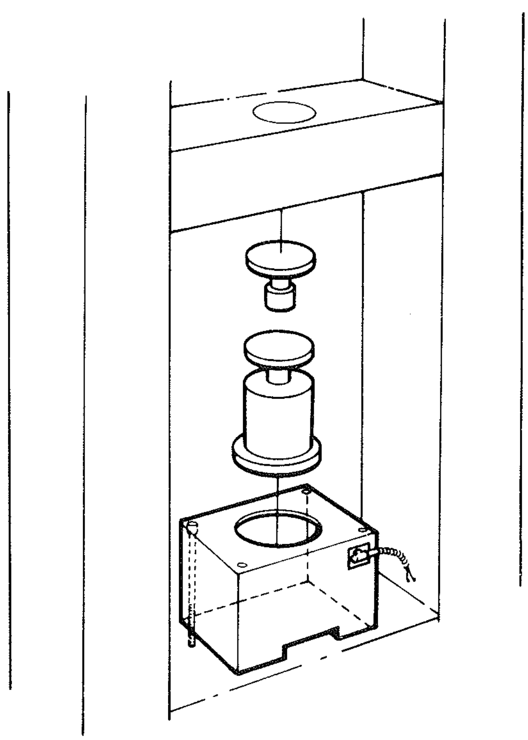


Figure 5-12c. Compression Load Cell Installation in Overload Carriage

2. The mechanical calibration of a compression load cell must be done prior to installation in the moving crosshead.

Install a compression load cell in the moving crosshead as follows:

a. Position load cell on its base and perform calibration procedure of paragraph 6.5.3.

b. Remove compression table and lower load cell into hole position in center of moving crosshead (reference figure 5-10). Fit dowel holes in cell flange over dowels in crosshead. Securely fasten cell in place with bolts provided.

c. Attach compression table to load cell spindle with spanner wrench provided.

d. Install compression cover plate (T379-57) supplied with testing instrument, in position on baseplate beneath load cell.

e. Insert load cell plug into load cell cable connector. Ensure that load cell cable is secured out of testing area.

5.5.2 Compression Load Cell Installation on Base of Loading Frame

Compression testing with the load cell mounted on the loading frame base (figure 5-13) requires several fixtures available as options, including: A support ring to mount on the baseplate for positioning and retaining the cell; and an anvil and anvil adapter to mount on underside of moving crosshead.

Install a compression load cell on base and mount fixtures as follows:

a. Position cover plate (T379-57)

provided in center of baseplate. Mount load cell support ring on cover plate. Fasten both plate and ring to baseplate using four 1/4-20 x 3 in. bolts provided.

b. Mount load cell on support ring with dowel holes in cell flange fitted over dowels in ring. Securely fasten cell with bolts provided.

c. Bolt anvil adapter to center position on underside of moving crosshead. Thread anvil firmly into adapter.

d. Insert load cell plug into load cell connector. Ensure that load cell cable is secured out of testing area.

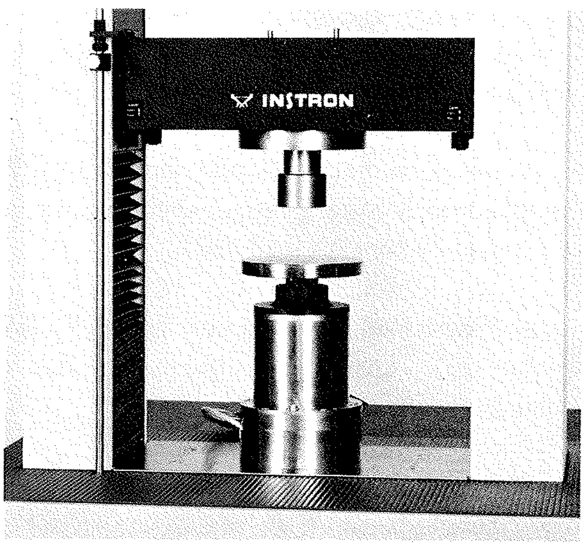


Figure 5-13. Compression Cell Installation on Base of Loading Frame

5.5.3 Compression Overload Carriage Installation

Load cells of 1000 pounds (500 kg) capacity or less require protection against accidental overload and should be used with the compression overload carriage (figure 5-14). This is a rigid box structure incorporating a spring-loaded cell carrier and automatic shut-off switch. The switch is set to actuate and stop the crosshead motion if the load should exceed approximately 1200 pounds.

The overload carriage may also be used with cells of more than 1000 pounds capacity. In this case, two bolts are screwed down to prevent actuation of the overload protective switches. These bolts, large socket-head cap screws, are located beneath the two circular plates on either side of the load cell position on the carriage.

NOTE: Ensure that the two bolts preventing actuation of the overload protection switches are removed from the carriage when testing with cells requiring overload protection.

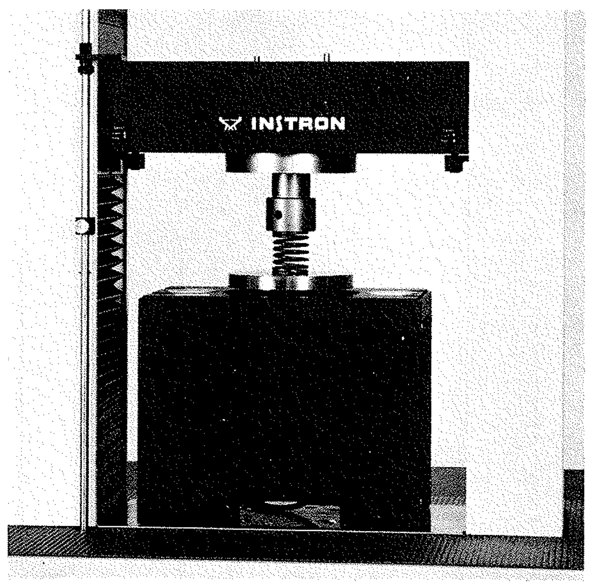


Figure 5-14. Compression Overload Carriage Installation (Typical)

Install overload carriage and compression load cell as follows:

a. Mount overload carriage on loading frame base with four ½-13 x 10-3/8-inch bolts provided.

b. Insert load cell into carriage and ensure that dowel pins seat in dowel holes. Bolt load cell securely in place.

c. Install and firmly hand-tighten compression table onto load cell.

d. Bolt anvil adapter to center position on underside of moving crosshead. Thread anvil firmly into adapter.

e. If overload carriage is to be used as a safety device, proceed as follows:

1. Remove two bolts from beneath circular plate on top of carriage.

2. Plug carriage control cable into socket provided on column of loading frame.

5.5.4 Installing a Reversible Tension-Compression Load Cell

The reversible load cells, when used for tension or compression testing, are installed in the same manner as the single mode cells, except calibration is performed electrically (reference paragraph 6.5.1). Couplings, compression tables, and adapters are included with these cells for either mode of testing – tension or compression. If the cell is to be mounted on the loading frame base, optional accessories – support ring, anvil, and anvil adapter – are required (reference paragraph 5.5.2).

NOTE: When mounting the 10,000-pound (5,000 kg, 50 kN) or 20,000-pound (10,000 kg, 100 kN) capacity load cells for tension or reverse stress testing, use the six 3/8-24 x 1-1/4 inch socket head cap screws. Tighten these high-strength screws to 120 in-lb of torque.

The load cell may be mounted above or below the moving crosshead for reverse stress testing. The adapters and fittings necessary generally are dependent upon the specimen/grip requirements, hence are not supplied with the cell. Consult an Instron Regional Office for assistance in meeting specific requirements.

6.0 OPERATION

6.1 TURN INSTRUMENT ON: WARM-UP PERIOD

NOTE: Prior to turning on the instrument for a warm-up period, turn off all accessories to avoid difficulty in setting up the basic system.

To power the 1125 instrument, set the main power circuit breaker on the front of the console to on. All units receive power when this switch is actuated, if interconnections were made in accordance with section 5 of this manual. (Ensure that the MOTOR circuit breaker, on the console outlet panel, is on.)

A warm-up period of 15 minutes minimum is recommended to assure load cell stability. This warm-up period is also necessary whenever a load cell is changed even though the instrument may have been operating for some time.

NOTE: Keep the recorder PEN pushbutton switch off when not calibrating or testing. If no load cell is installed or the instrument is not adjusted properly, the recorder pen will be driven off scale.

Perform the procedures for zeroing, balancing, and calibrating the load weighing system (paragraphs 6.2 through 6.5) after the warm-up period.

6.2 REFERENCE ZERO SETTING OF RECORDER PEN

Prior to recording, the pen should be set to a zero reference line. For most tension testing applications, the zero is usually the first line on the left side of the chart. Compression applications are usually referenced from the right side of the chart. The POLARITY switch, on the load cell amplifier panel, will reverse a full left or full right zero by changing the polarity of the load cell excitation voltage. A reference zero in the center of the chart is used when reverse stress testing.

Note that the recorder chart scale, located beneath the pen carriageway, is conveniently numbered for both 0-100 and 100-0 referencing. Also, the scale marks coincide with the English or metric units of the chart paper in use.

Depending on the load cell in use, set the reference zero in accordance with paragraph 6.2.1, 6.2.2, or 6.2.3.

6.2.1 Reference Zero Setting for a Single Mode Load Cell

For single mode tension or compression cells, set POLARITY switch to 1 for pen zero on left side of chart, and to 2 for zero on right side. Then perform the zeroing, balancing and calibrating procedures of paragraphs 6.3, 6.4, and 6.5.

6.2.2 Reference Zero Setting for a Tension-Compression Load Cell

The POLARITY switch allows left-to-right or right-to-left recording of load. This feature enables test charts to be plotted in standard engineering format.

a. Set POLARITY switch to 1 and set pen zero on left side of chart (paragraph 6.3). Balance and calibrate in accordance with paragraphs 6.4 and 6.5 respectively.

b. Refer to the following chart and set the

POLARITY switch as indicated to obtain the required reference zero position.

Test Type	Desired Recorder Pen Motion	Polarity Switch Position
Tension	L to R	1
Tension	R to L	2
Compression	L to R	2
Compression	R to L	1

c. Readjust zero and balance controls (paragraphs 6.3 and 6.4) whenever the POLARITY switch position is changed.

6.2.3 Reference Zero Setting for Reverse Stress Testing

When reverse stress testing, the recorder pen is usually zeroed at the middle of the chart. Two methods are given below for setting a center reference zero. For both methods, increasing tension is a pen deflection to the right and increasing compression is a pen deflection to the left.

a. This method allows the load range setting (inner knob) of the FULL SCALE LOAD switch to be changed to increase or decrease the pen sensitivity (lb/in, gm/cm, N/cm). Proceed as follows:

NOTE: Only 1/2 of any full scale range setting is available due to the centered pen position.

1. Set POLARITY switch to 1, and set pen zero on left side of chart (paragraph 6.3). Balance and calibrate in accordance with paragraphs 6.4 and 6.5, respectively.

2. Reset pen zero (paragraph 6.3) at middle graduation of chart.

b. This method allows a full left and right pen deflection, from a centered reference zero, using the maximum range of the load cell at a fixed sensitivity. For example, if a 20,000-pound range reversible load cell is used, a ± 20,000-pound equivalent (tension-compression) load signal is possible. Proceed as follows:

CAUTION

To avoid damaging the load cell, do not use the CENTER ZERO position of the FULL SCALE LOAD switch unless the recorder pen is to be zeroed at the center of the chart. In this switch position, the load cell amplifier gain is halved, requiring double the safe maximum output of the load cell for full scale pen deflection. An operator should be aware of the recorder pen sensitivity.

1. Set POLARITY switch to 1, and set pen zero on left side of chart (paragraph 6.3). Balance and calibrate in accordance with paragraphs 6.4 and 6.5, respectively.

2. Set FULL SCALE LOAD selector switch inner knob to CENTER ZERO position (fully clockwise).

3. Reset pen zero (paragraph 6.3) at middle graduation of chart.

6.3 ZEROING PROCEDURE

To adjust the ZERO control on the load cell amplifier panel, proceed as follows:

a. Depress and latch No. 1 PEN switch on recorder panel.

b. Unlock ZERO control by turning locking ring counterclockwise about 1/4-turn. Depress and hold ZERO pushbutton (figure

6-l). Adjust ZERO control to set No. 1 PEN at reference zero on chart.

c. Lock ZERO control and release ZERO pushbutton. Pen will move off zero if balancing procedure (paragraph 6.4) is required.

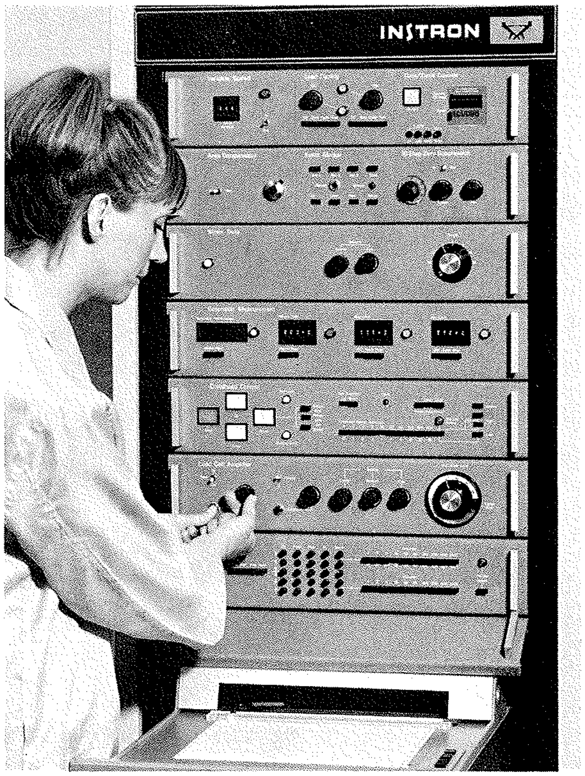


Figure 6-1. Zeroing the Load Weighing System

6.4 BALANCING PROCEDURE

6.4.1 Balancing Load Weighing System

This procedure electrically compensates for weights of fixtures attached to the load cell. The sensitivity of the BALANCE controls will vary with the setting of the FULL SCALE LOAD switch; hence, this switch should always be set to the lowest range (see procedure below) during the adjustment. There will be no shift in the balance when the selector is turned to higher full scale load ranges.

NOTE: If the FULL SCALE LOAD switch is subsequently set to the ultra-high sensitive ranges requiring the FILTER switch to be ON, a rebalancing will be necessary. Also if fixtures are added or removed, readjust the BALANCE controls.

To balance the load weighing system (figure 6-2), proceed as follows:

a. Set outer dial of FULL SCALE LOAD switch, in accordance with figure 5-9, for load cell in use. Turn inner knob to select lowest range in white sector of switch background.

b. If recorder pen is extremely unbalanced – fully left or right of chart scale – bring it onto chart scale by adjusting COARSE BALANCE control.

c. Unlock MEDIUM and FINE controls, and adjust to bring pen to reference zero. Lock BALANCE controls. Unlock and readjust FINE control if pen shifts away from zero setting.

NOTE: If the load cell cable has been altered or replaced, perform the quadrature adjustment procedure of paragraph 6.4.2.

6.4.2 Adjusting Quadrature Compensation

This procedure should be performed periodically to ensure that any quadrature component on the load signal is minimized to obtain optimum linear performance of the load weighing system (reference paragraph 4.6.7).

The quadrature compensating device is variable resistor, R3, mounted internally on the right-hand side of the load cell amplifier's motherboard. To check and adjust quadrature, proceed as follows:

a. Install load cell with coupling and load cell cable that will be used during regular testing procedures.

b. Zero and balance load weighing system (paragraphs 6.3 and 6.4.1).

Figure 6-2. Balancing the Load Weighing System

c. Set FULL SCALE LOAD switch to most sensitive range not requiring filtering, as in step a. of paragraph 6.4.1.

d. Set POLARITY switch, on load cell amplifier panel, to position used during regular testing procedures.

e. Slide load cell amplifier unit forward from console for internal access. Attach an oscilloscope to test points TP4 (high) and TP1 (low).

f. Observe an a.c. signal on oscilloscope. A nonsymmetrical waveform indicates presence of a quadrature component. Adjust R3 and FINE BALANCE control alternately until signal waveform is minimized and symmetrical.

6.5 CALIBRATION

The calibration procedure accurately calibrates the load weighing system against a precise load signal, and sets the system calibration for all ranges of the load cell in use. It is recommended that the calibration be checked on a regular basis -- at least once a day or whenever a load cell is changed.

A calibration procedure, performed after an instrument warm-up period, must be preceded by zero and balance procedures as described in paragraphs 6.3 and 6.4. Subsequent adjustments of the zero and balance controls do not affect the calibration of the instrument.

6.5.1 Calibration Procedure for Electrically Calibrated Load Cells

The calibration circuit of the electrically calibrated load cells (reference figure 5-9, note 2) is activated by depressing the CALIBRATION pushbutton on the load cell amplifier panel. This provides a load signal that simulates the installation of precision weights on the cell. In the case of tension - compression load cells, the calibration signal is always in the tension load direction. Therefore, the POLARITY switch must be set to 1 when calibrating.

To calibrate the load weighing system with an electrically calibrated load cell installed, proceed as follows:

a. Zero and balance load weighing system as described in paragraph 6.3 and 6.4.

b. Set FULL SCALE LOAD switch, on load cell amplifier panel, to calibration setting indicated in figure 5-9 for load cell in use.

c. Unlock CALIBRATION control. Depress and hold CALIBRATION pushbutton (figure 6-3). Adjust CALIBRATION control until recorder pen is set to full scale on chart. Lock CALIBRATION control. Release CALIBRATION pushbutton and note that pen returns to reference zero. Load weighing system is now calibrated for all ranges of load cell in use.

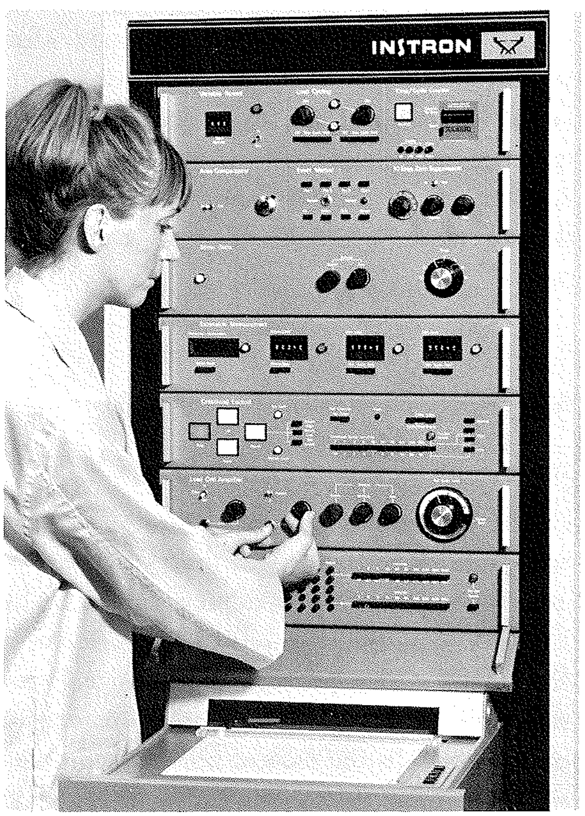


Figure 6-3. Calibrating the Load Weighing System

NOTE: The ZERO and BALANCE controls may be readjusted without affecting the system calibration. Rebalance the system if fixtures mounted on load cell are changed. Recalibrate the system if the load cell is changed.

6.5.2 Calibration Procedure for Mechanically Calibrating Load Cells in Tension

When using a non-electrically calibrated tension load cell, precision weights (figure 6-4) are attached to the cell to provide a reference load signal. A hangar strap is supplied with a weight set for calibrating tension cells.

To calibrate in tension using precision weights, proceed as follows:

a. Zero and balance load weighing system as described in paragraphs 6.3 and 6.4.

b. If using a 500-gram capacity load cell, calibration weight will hang directly from extension wire on cell. If using a 2000-gram cell, insert calibration weight hangar strap in upper grip, or weight will hook directly in grip. With all other mechanically calibrated cells, remove grip from load cell coupling; calibration weight will hang in its place.

c. Readjust BALANCE controls, as required, to return pen to reference zero and compensate for change due to added weight hangar or removed grips.

d. Refer to figure 5-9 and determine FULL SCALE LOAD switch setting for calibrating load cell in use. Calibration weight required is full scale load at this setting.

e. Set FULL SCALE LOAD switch, on load cell amplifier panel, to proper position.

Attach required calibration weight to load cell.

f. Unlock CALIBRATION control. Do not depress CALIBRATION pushbutton. Adjust CALIBRATION control for full scale pen deflection on recorder chart. Lock the CALIBRATION control. Load weighing system is now calibrated for all ranges of load cell in use.

g. Remove calibration weights and weight hangar strap from load cell. Reinstall any fixtures necessary for mounting test specimen.

h. Readjust BALANCE controls, as required, to return pen to original reference zero.

NOTE: The ZERO and BALANCE controls may be readjusted without affecting the system calibration. Rebalance the system if fixtures mounted on load cell are changed. Recalibrate the system if load cell is changed.

6.5.3 Calibration Procedure for Mechanically Calibrating Load Cells in Compression

When using a non-electrically calibrated compression load cell, precision weights (figure 6-4) are mounted on the cell to provide a reference load signal.

To calibrate in compression using precision weights, proceed as follows:

a. Zero and balance load weighing system as described in paragraphs 6.3 and 6.4. Ensure that compression table to be used is mounted on load cell prior to balancing.

b. Refer to figure 5-9 and determine FULL SCALE LOAD switch setting for calibrating load cell in use. Calibration weight is full scale load at this setting.

c. Set FULL SCALE LOAD switch, on load cell amplifier panel, to proper position. Mount required calibration weight on compression table of load cell.

d. Unlock CALIBRATION control. Do not depress CALIBRATION pushbutton. Adjust CALIBRATION control for full scale pen deflection on recorder chart. Lock the CALIBRATION control and remove calibration weights. Load weighing system is now calibrated for all ranges of load cell in use.

NOTE: The ZERO and BALANCE controls may be readjusted without affecting the system calibration. Rebalance the system if fixtures mounted on load cell are changed. Recalibrate the system if load cell is changed.

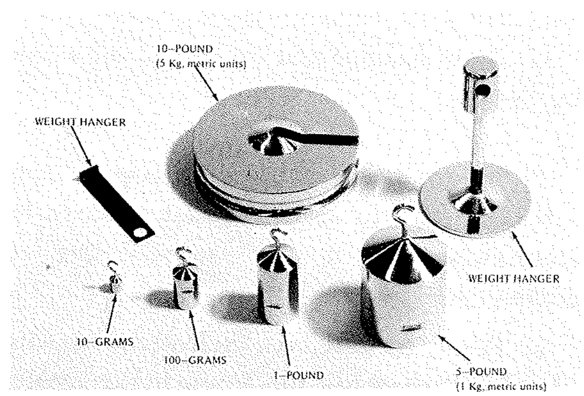


Figure 6-4. Calibration Weights

6.6 PRETEST SETUP PROCEDURES

6.6.1 Adjusting Crosshead Preload Nuts

(Applies to units below Serial No. 6590 only)

Preload nuts are mounted on the moving crosshead at both leadscrews. These nuts are tightened, prior to certain types of tests, while applying a tension preload between the moving crosshead and the loading frame base.

Tighten preload nuts when tension testing above the moving crosshead, compression testing below the moving crosshead, or reverse stress testing above or below the moving crosshead. Proceed as follows (reference paragraph 6.7.1 for setup procedure):

NOTE: Preload nuts must be loosened, when testing in modes other than those specified above, to avoid excessive wearing of the leadscrews. To loosen nuts, reapply the same tension preload to the moving crosshead as applied when nuts were tightened.

a. Mount a tension cell, with a load range equivalent to maximum expected tension/ compression loading, in moving crosshead.

b. Assemble grips to load cell and base adapter that will accept a rigid specimen.

c. Zero, balance and calibrate load weighing system.

d. Mount a rigid specimen in grips. Apply a tension load to specimen that exceeds, by approximately 10%, any expected tension/ compression loading.

e. Firmly hand-tighten preload nuts against crosshead, then use the 4½-inch bar wrench supplied with the model 1125 to fully tighten each nut.

f. Relieve tension loading, remove rigid specimen, and proceed with planned testing.

6.6.2 Establishing Gage Length

The gage length is the spacing between specimen contact faces of the upper and lower grips or fixtures at the start of a test, and establishes the initial length of a specimen. To ensure a uniformity in specimen length, this spacing must be the same for all similar tests. This requires that the moving crosshead return and stop at a preset limit, or gage length, at the conclusion of each test.

The choice of a suitable gage length depends upon the particular material under test. Factors to be considered are the available length of specimen material, and, in tension testing, the need to minimize strain error due to grip penetration.

6.6.3 Setting Limit Switches

To set the limits for gage length, proceed as follows:

a. Tighten crosshead preload nuts in accordance with paragraph 6.6.1, if required.

b. Loosen knurled screw that clamps each limit stop to limit switch rod. Slide stops beyond where approximate final set position will be.

c. On crosshead control unit, select and depress a crosshead speed pushbutton and a clutch pushbutton. Also depress a TEST DIRECTION pushbutton, either UP or DOWN. Move crosshead by pressing UP, DOWN and STOP control switches, as required, until desired gage length is obtained. Measure spacing between grip or fixture faces with a ruler or vernier caliper.

d. Make final adjustment of crosshead position with manual positioning knob, located beneath cover on right-hand column of loading frame. Clockwise rotation of knob causes upward movement of crosshead.

e. Gage length limit stop is upper stop, if tension testing above moving crosshead or compression testing below moving crosshead; or lower stop, if tension testing below moving crosshead. Set this gage length limit stop against limit actuating bracket on moving crosshead. Finger-tighten knurled clamping screw.

f. Make fine adjustment for setting gage length by turning large knurled nut on limit stop assembly, until limit switch is just actuated. This is indicated by related limit light on crosshead control panel being lit.

g. Set opposite limit stop at a point slightly beyond expected extension or compression of specimen.

6.6.4 Selecting Chart and Crosshead Speeds

NOTE: When operating the chart in the proportional mode, the chart speed/crosshead speed ratio is the same as that indicated beneath each A CHART SPEED switch only when the crosshead high speed clutch is energized (reference paragraph 4.10.2).

The testing (crosshead) speed is governed by the characteristics of the material to be tested and the desired test conditions. Usually, the testing rate is specified (1) as specimen strain in inches per inch per minute; (2) as % specimen extension or compression/minute; or (3) in terms of crosshead speed in inches/minute. When selecting a crosshead speed, the following should be considered:

1. Test material characteristics.

2. Total elongation or compression of specimen.

3. Maximum speed of recorder response.

The chart speed determines the length of the chart record for the test. A chart record of 5 to 15 inches is sufficient for most tests, but the chart record can be as long as desired. The test results appear on the recorder chart as a load-displacement curve (figure 6-5).

The chart time-drive axis indicates the displacement of the crosshead in a magnified (or reduced) form. The magnification ratio (M) is the ratio of the chart speed to the crosshead speed as follows:

$$\text{Magnification ratio} = \frac{\text{Chart Speed}}{\text{Crosshead Speed}}$$

The following example illustrates the selection of chart and crosshead speeds.

Given Data:

Material	Nylon Yarn
% extension/minute	100%
Expected ultimate extension	50%
Gage length	10 inches

Crosshead speed = (gage length) (% extension/minute)
= (10 inches) (100%/minute)
= 10 inches/minute

A 10-inch chart record is desired for the expected test duration of 1/2-minute (time expected to reach ultimate extension). Therefore, the chart should travel 20-inches in 1-minute, and a chart speed of 20 inches/minute is required. Then,

$$M = \frac{20 \text{ inches/minute}}{10 \text{ inches/minute}} = 2$$

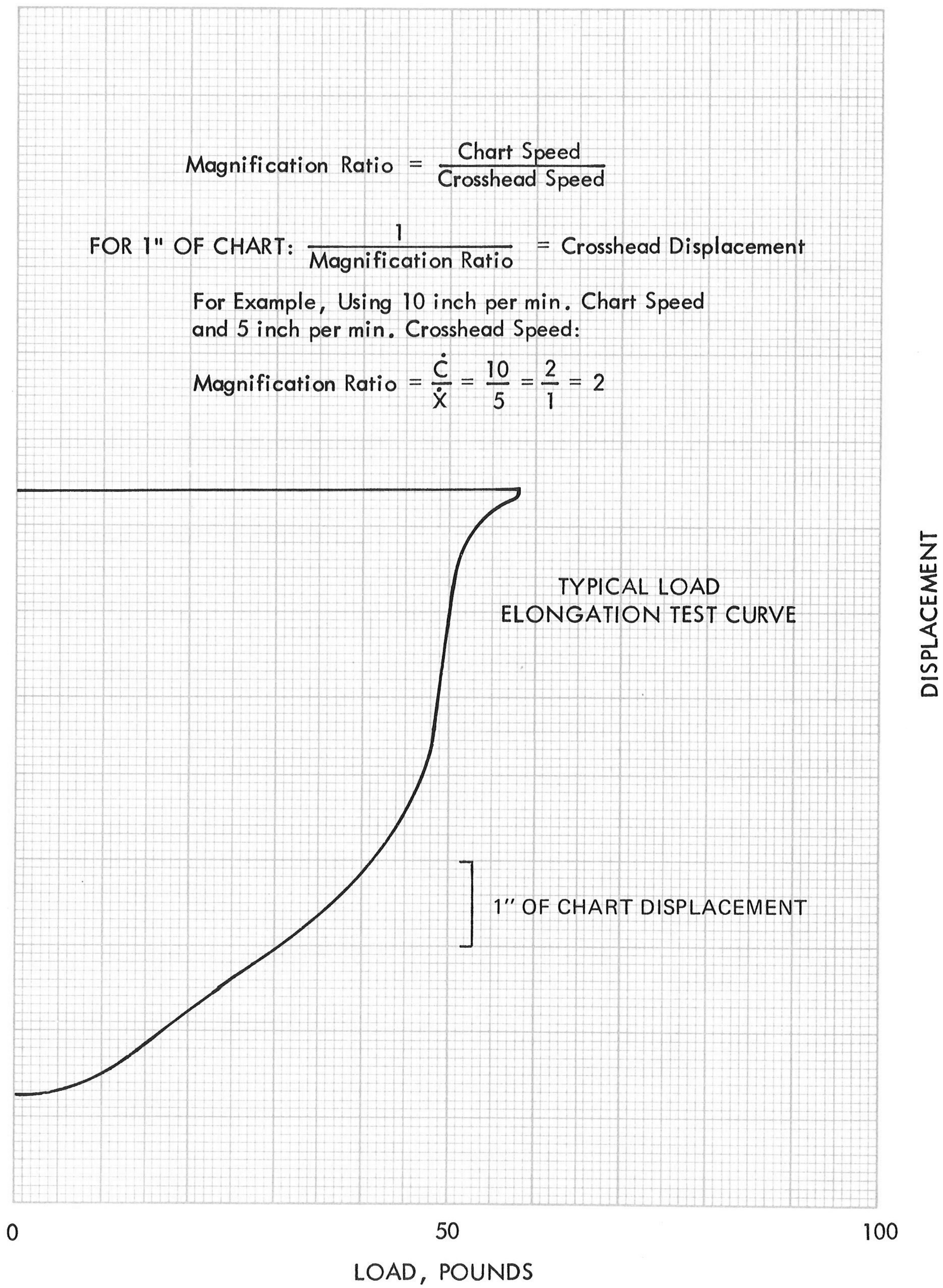


Figure 6-5. Typical Load-Displacement Chart Showing Magnification Ratio

Each inch of chart, along the time-drive axis, will indicate:

$$\frac{1}{M} = \frac{1}{2} = \text{Crosshead displacement (inches)}$$

To determine the percentage of total strain directly from the chart:

$$\text{Percentage strain} = \frac{\text{Chart displacement x 100}}{\text{M x Gage length}}$$

Using this method of indirectly measuring specimen strain is useful for many types of materials. However, it is not applicable when testing rigid materials at high loads without compensating for the machine deflection characteristics.

NOTE: The crosshead displacement approximately equals specimen strain, if the gage length equals the initial separation between the grips.

The following chart illustrates other examples of chart and crosshead speed selection:

Gage Length (Inches)	% extension per minute (Strain rate)	Crosshead speed (in/min)	Chart speed (in/min)	Crosshead displacement per inch of chart	Magnification Ratio
4	50%	2	5	0.4-inch	2.5
5	100%	5	5	1-inch	1
5	400%	20	10	2-inches	0.5

6.6.5 Extension Recording

A direct correspondence between the crosshead and recorder chart is possible when their motions are synchronized. For most testing applications, the time-drive motion of the chart provides an extension axis that gives an accurate measure of specimen extension as related to crosshead displacement. This close relationship is maintained by the low inherent deflection of the load cells and by the almost total elimination of backlash in the crosshead drive mechanism.

However, the chart need not be operated at the same speed as the crosshead. Also, the chart need not be stopped whenever the crosshead is stationary. The extension axis of the chart may be magnified or reduced, and may act as a time axis for the purpose of specimen relaxation and specimen recovery measurements.

For many applications, this method of extension recording affords the necessary accuracy, along with many other conveniences in operating technique. However, when testing rigid materials exhibiting low extension at high loads, such as metals, it is not recommended. The inherent deflections of the load cells and the machine and the slippage of the specimen from the grips may be sufficient to affect the accuracy of this method. Some errors can be compensated for by direct calibration of the machine deflection by running a "no-stretch" curve.

When testing these types of materials, it may be desirable to use extensometers, compressometers, or deflectometers attached directly to the specimen to measure strain.

6.7 TESTING PROCEDURES

The tensile properties of any material cannot be evaluated by a single test. However, by utilizing the various test techniques possible with the model 1125 instrument, on which the time base is strictly controlled, it is possible to isolate each mechanical property for detailed analysis.

The standard load-elongation test, conducted to specimen failure, can produce curves detailing features such as the elastic and flow regions, the extensibility of the material, and the ultimate tensile strength and rupture characteristics. By means of crosshead control and automatic cycling capability, the material behavior, such as relaxation, recovery, stress-conditioning, and hysteresis properties of many materials may be measured.

A number of typical load-elongation curves are presented in diagrammatic form in section 6.8 of this manual as examples. These demonstrate the instrument's performance and its application in testing a variety of different materials.

6.7.1 Load-Elongation Test

The following summary of steps required to perform a simple load-elongation test assumes that the testing instrument contains only the basic units. Also, that the operator is familiar with the preceding material in this manual.

To prepare the instrument for testing, perform the following steps:

a. Determine the crosshead and chart speeds required for the test conditions and specimen characteristics.

b. Install the required load cell and attach the load cell cable.

c. Switch on the instrument's main power and allow it to warm-up for a minimum of 15 minutes.

d. Zero, balance, and calibrate the load weighing system.

e. Place the FULL SCALE LOAD switch in the required position.

f. Install the required grips. Readjust the BALANCE controls as necessary to reset the pen to 0.

g. Adjust the gage length stop and opposite limit stop to the desired positions (reference paragraph 6.6.3).

To perform a simple load-elongation test to specimen rupture, proceed as follows:

a. Assuming testing is below the moving crosshead (figure 6-6) and the crosshead *preload nuts are properly set, position the crosshead at gage length and insert the specimen in the grips. Tighten the upper grip first. If this process applies a preload on the specimen, do not change the balance adjustment to compensate for it.

b. Depress the required crosshead speed, clutch and chart speed pushbuttons on their respective panels (figure 6-7).

c. On the crosshead control panel, depress the TEST DIRECTION UP pushbutton. Also, depress either the MAX LIMIT-STOP (sug-

* If required (see paragraph 6.6.1)

gested for rigid specimens) or MAX LIMIT-RETURN pushbutton.

NOTE

Prior to starting any test, always depress either the CYCLE pushbutton or one of the MAX LIMIT pushbuttons (STOP or RETURN) on the crosshead control unit.

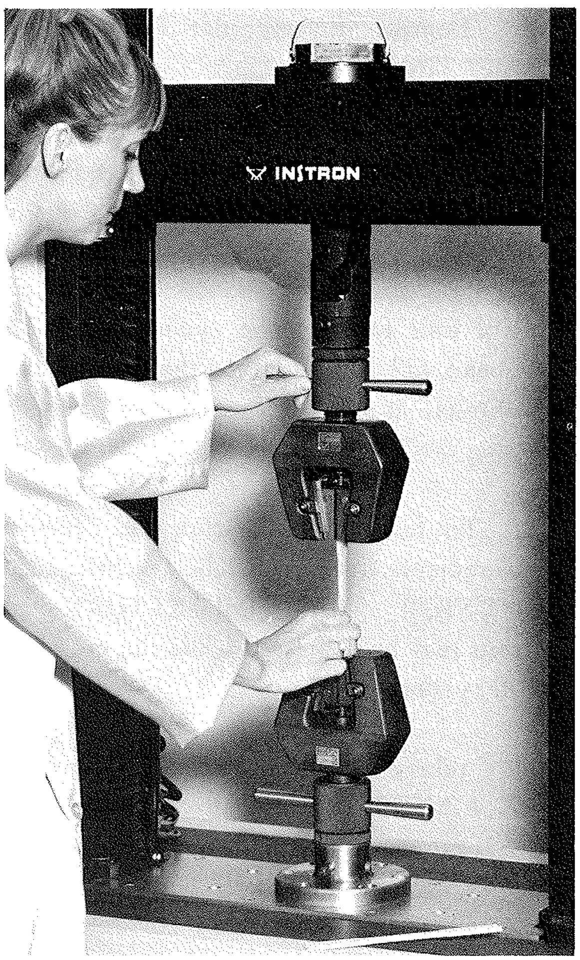


Figure 6-6. Installing a Specimen in Tester

d. Depress the recorder PEN and the CHART TIME pushbuttons.

e. To start a forward recorder chart motion, depress the pushbutton next to the "down" arrow legend on the chart drive control unit.

f. Push the UP button on the crosshead control unit to start the test (figure 6-8). The crosshead will move up until it reaches the upper limit stop. The specimen will presumably rupture. Depending upon the MAX LIMIT crosshead function switch depressed, the crosshead will either stop or return to gage length position.

g. To stop the pen and chart motions, release the PEN and CHART pushbuttons.

Figure 6-7. Selecting a Crosshead Speed

h. The crosshead may be stopped or reversed at the normal testing speed, by pressing the STOP button or the DOWN button, thus allowing manual control for any form of relaxation or cyclic test. Alternatively, the crosshead may be returned to gage length at a predetermined speed (reference paragraph 4.7.1) by pressing the RETURN button.

i. At the completion of the test, remove the specimen from the grips. With the crosshead in the gage length position, insert a new specimen.

6.7.2 Automatic Cycling Tests

To change from straight-forward tensile testing to automatic cycling tests involves programming crosshead motion between a minimum and a maximum extension limit.

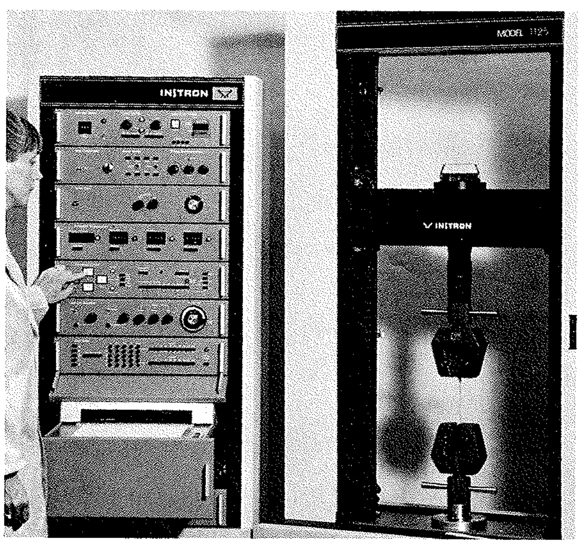


Figure 6-8. Starting a Load-Elongation Test

To perform extension cycling tests, proceed as follows:

a. Prepare the instrument for testing as in paragraph 6.7.1.

b. Assuming testing is below the moving crosshead, the gage length will be the lower cycling limit. Set the upper limit stop at the desired extension limit.

c. With the crosshead at the gage length limit, install the test specimen.

d. Depress the required crosshead speed, clutch and chart speed pushbuttons.

e. On the crosshead control panel, depress the TEST DIRECTION UP pushbutton. Also, depress the CYCLE crosshead function pushbutton.

f. Depress the recorder PEN and the CHART TIME pushbutton.

g. To start a forward recorder chart motion, depress the pushbutton next to the "down" arrow on the chart drive control unit.

h. Push the UP button on the crosshead control unit to start the cycling test. The crosshead will cycle between the preset extension limits. It may be stopped at any time by pressing the STOP button.

i. To facilitate relaxation and recovery measurements during a cyclic test, the MAX LIMIT-STOP or MAX LIMIT-RETURN pushbuttons may be depressed while the crosshead is still cycling.

For relaxation measurement, depress the MAX LIMIT-STOP pushbutton as the crosshead is moving up. The testing speed will not change, but the crosshead will stop at the upper limit position. This corresponds to maximum specimen load, and the decrease in load as the specimen relaxes may be recorded.

If, as the crosshead is moving down, the MAX LIMIT-STOP or MAX LIMIT-RETURN pushbutton is depressed, the crosshead will continue to move to the lower limit at normal testing speed and then stop. This corresponds, for this test, to minimum extension and load position and enables specimen recovery to be recorded.

6.8 SPECIAL TEST TECHNIQUES

Users of the Instron model 1125 instrument will probably develop individual test techniques connected with their particular application. However, some of the instrument's features are described below and demonstrate other operating techniques that are possible.

6.8.1 Measurement of Relaxation and Recovery

If a specimen is stretched a certain amount and the crosshead is stopped, usually the load will decay with time as the specimen relaxes. If the load on the specimen is reduced and the crosshead is stopped, the load will increase with time, indicating the specimen recovers from the previous stress condition.

This procedure can form the basis for a variety of analytical methods, ranging from simple measurement of the amount of load change with time to mathematical representation of the shape of the relaxation or recovery function.

6.8.2 Changing Load Ranges During a Test

The load range can be changed during a test. This technique can be used to expand the initial portion of a load-displacement

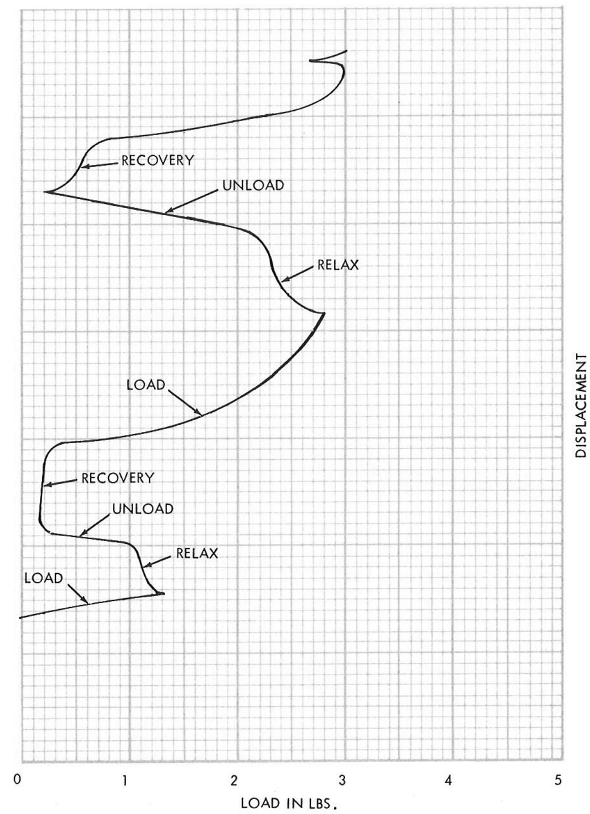


Figure 6-9a. Stress Relaxation - Recovery Composite Behavior Curve of a Rubber Specimen

chart for more detailed study. For example, a test can be started on the 1000-pound range of a 2511-303 cell and then subsequently changed to the 2000, 5000, or 10,000-pound range without recalibrating the system.

6.8.3 Zero Suppression

This operating technique enables an operator to expand selected increments of a test curve to full scale on the recorder chart. This magnifies variations in the loading curve for detailed study. The capability of the instrument to do this is limited by the range of the balance controls.

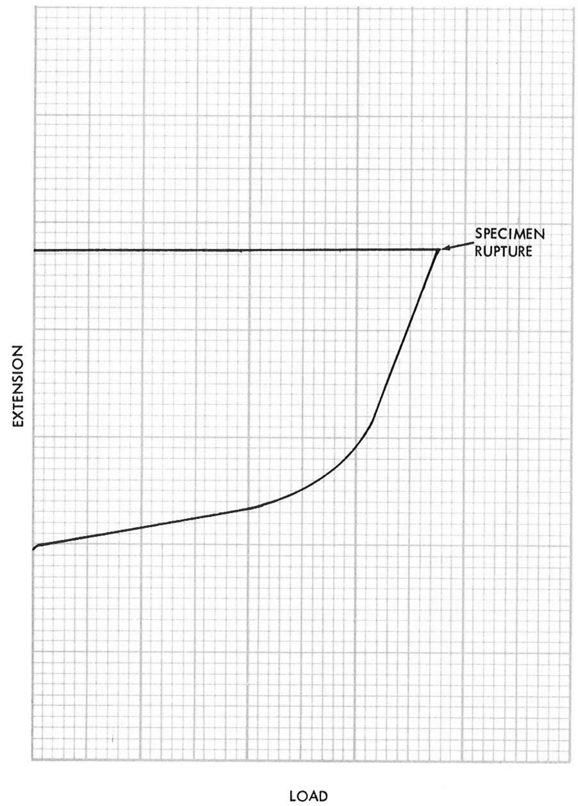


Figure 6-9b. Load-Extension curve of a non-Reinforced Plastic

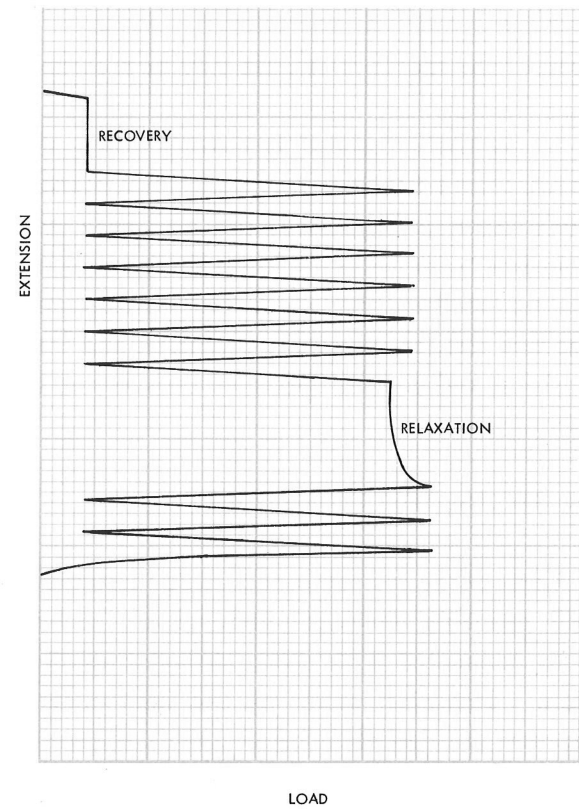


Figure 6-9c. Cyclic Response of a Rubber Specimen

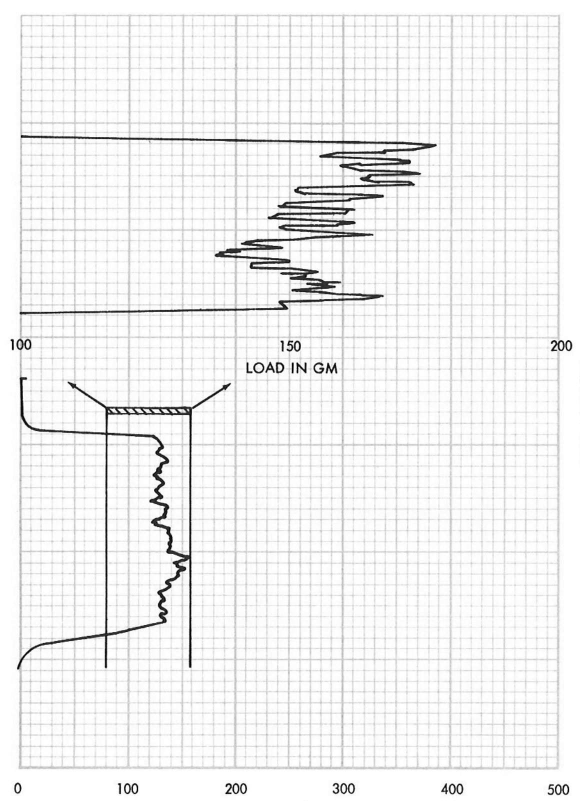


Figure 6-9d. Load-Displacement Curve, Using Zero Suppression to Expand Critical Portion

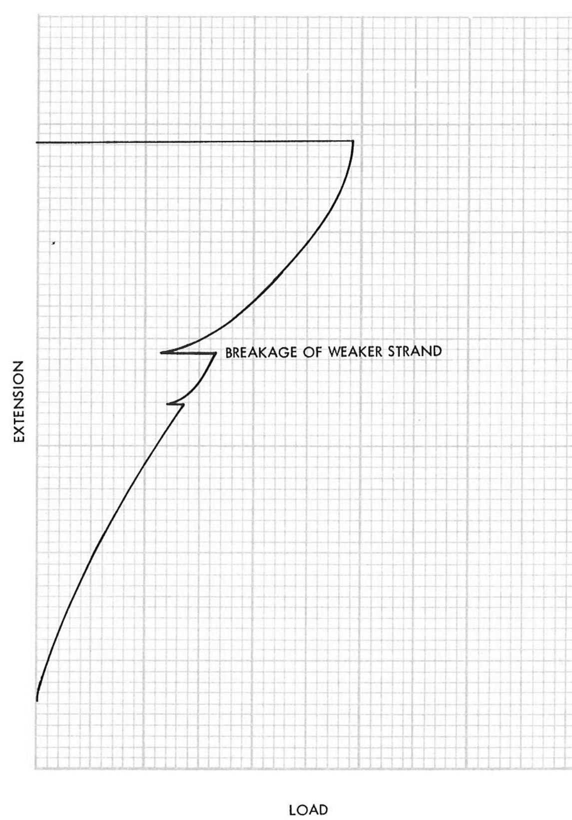


Figure 6-9e. Load-Extension Curve of Yarn Specimen, Indicating Failure of Individual Strands

The zero suppression technique operates by suppressing a portion of the loading curve from 0 to a selected load value. For example, it is possible to suppress the 0 to 300-pound portion of a loading curve, using the procedure outline below. Then, by selecting the 100-pound load range, the chart will indicate the 300 to 400-pound portion (i.e., a 100-pound increment) of the loading curve. The suppressed portion of the loading curve (zero to 300 pounds) will not be recorded.

To use the zero suppression technique, proceed as follows:

a. Install a load cell whose upper range will be greater than the maximum load expected. Zero, balance, and calibrate the load weighing system.

b. Set the FULL SCALE LOAD switch on a range which equals or exceeds the value of load to be suppressed.

c. Adjust the ZERO control to set the recorder pen to the load value that is to be suppressed.

d. Adjust the BALANCE controls to set the recorder pen back to 0. This introduces a negative unbalance which is equal to the load to be suppressed.

e. Adjust the ZERO control to set the recorder pen back to 0.

f. Set the FULL SCALE LOAD switch to the desired position. The recorder pen will be driven down-scale (beyond 0) until the test load reaches the load value which was suppressed. The recorder chart will indicate an increment of the loading curve which is equal to the load range selected.

6.8.4 Calibrating for non-Standard Load Ranges

For some tests it may be desirable to calibrate the load weighing system for a non-standard load range. The capability of the instrument to do this is limited by the range of the calibration control. For example, if a specimen material ruptures at 550 pounds a load scale of approximately 600 to 650 pounds would be desirable.

The following is an example of determining the calibration setting for a non-standard load range:

1. A full scale (f.s.) load range of 625 pounds is required. A 1000-pound capacity load cell is in use, and it has an electrical calibration signal of 500 pounds.

2. To determine where on the recorder chart to set the pen when calibrating the system:

$$\frac{\text{625 pounds f.s.}}{\text{10 major chart divisions}} = \text{62.5 pounds per division}$$

$$\frac{\text{500 pounds}}{\text{62.5 pounds per div.}} = \text{8 divisions}$$

3. Zero and balance the load weighing system. Place the FULL SCALE LOAD switch on 50.

4. Hold the load cell calibration pushbutton depressed, and adjust the CALIBRATION control to set the recorder pen to 8 major chart divisions. The load weighing system is now calibrated for 625 pounds full scale.

CAUTION

Do not overload the load cell.

5. When switching from the initially-calibrated load range, the new load range will be a proportion of the initially-calibrated range. For example, if the "50" FULL SCALE LOAD switch position was calibrated for 625 pounds, the load range for the "20" position can be determined as follows:

$$\frac{20}{50} = \frac{\text{X-Load}}{625}$$

X-Load = 250 pounds full scale, on the "20" position.

7.1 EVENT MARKER UNIT

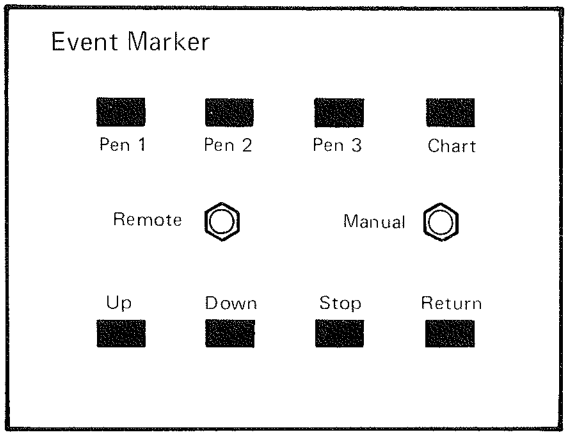


Figure 7-1. Event Marker Operating Controls

7.1.1 Description

The Event Marker control produces a small rapid deflection or "pip" of the recorder pen(s) or in the motion of the chart, either by depressing the MANUAL pushbutton or automatically. The resulting indicator mark on the chart serves as a convenient reference mark for several purposes. For example, the MANUAL pushbutton can be depressed to indicate various points of interest on the load-elongation curve. This unit can also be set to operate automatically when the crosshead starts up or down, stops, or reaches the preset "Return" position. The pip height is normally factory preset at 2% to 3% (figures 7-2 and 7-3), but may be adjusted (VR3 on servo amplifier circuit board).

7.1.2 Operation

a. Depress either PEN 1, 2, or 3, and/or CHART pushbutton(s), as desired. This determines which indicator will mark the desired point on the curve. To release a depressed pushbutton, simply push it in. It should snap out. Note that the chart marker functions only when an optional chart servo drive accessory has been installed on the recorder.

b. For automatic operation, depress UP, DOWN, STOP, and/or RETURN buttons, as desired. When the crosshead is operated in the UP, DOWN, STOP, or RETURN mode, a mark will be made on the chart.

c. For manual operation, depress MANUAL pushbutton when a mark is desired on the chart. Note that a pushbutton with an extension cord that plugs into the front panel is available for remote operation.

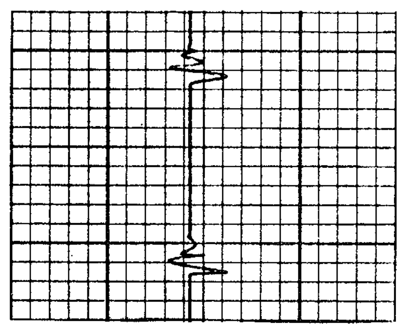


Figure 7-2. Pen Mark at 100 in/min Chart Speed

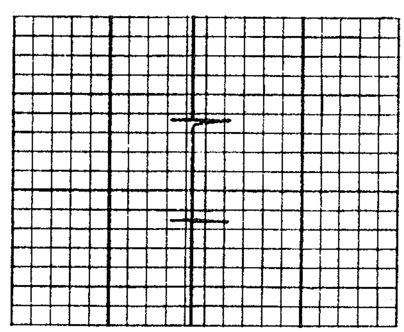


Figure 7-3. Pen Mark at 5 in/min Chart Speed