# Installing Strain Gain Transducers

## INTRODUCTION

Installing a HELM load monitor or a load measurement system can be divided into four basic segments:

1.) Selecting the sensor mounting locations.
2.) Installing the STRAIN GAIN load sensors and instrument.
3.) Inter-connecting the sensors to the instrument.
4.) Calibrating the press and making final instrument-adjustments.

Generally, HELM is requested to supervise the customer's personnel for steps 1,2 and 3. We almost always do the calibration. Special equipment and training is required for the calibration and adjustment (step #4). This article is provided for those customers who are confident they can perform the first three steps without our direct supervision. Part of this article explains the role of the customer in the final calibration procedure.

## SELECTING THE SENSOR LOCATION

### *Basic Principles of Measuring Press Loads*

As a press forms a product, the press structure is strained. The tie-rods and columns of a straightside press will stretch. The frame of a Gap-Frame or O.B.I. press will open up. The amount of strain on the press is directly related to the work that is done... the "load" on the press structure.

Strain-sensing "transducers" are mounted to strategic high-stress areas of the press frame. Signals from these sensors are routed to the instrument for processing. The instrument will display the strain in "tons-of-force" or in "percentage-of press capacity". Adjustable alarm levels are provided in the instrument so the customer may select what he considers an off-tolerance or overload condition.

Some areas of the press structure are highly stressed and provide excellent representative load-signals. Other areas are lightly stressed and only poor and non-linear signals are available. Only a few years ago, picking a good sensor location was only done by specially trained people. HELM development has produced highly sophisticated sensitive instruments with extreme stability. Sensor locations that were useless only a few years ago are now perfectly satisfactory for use with our systems.

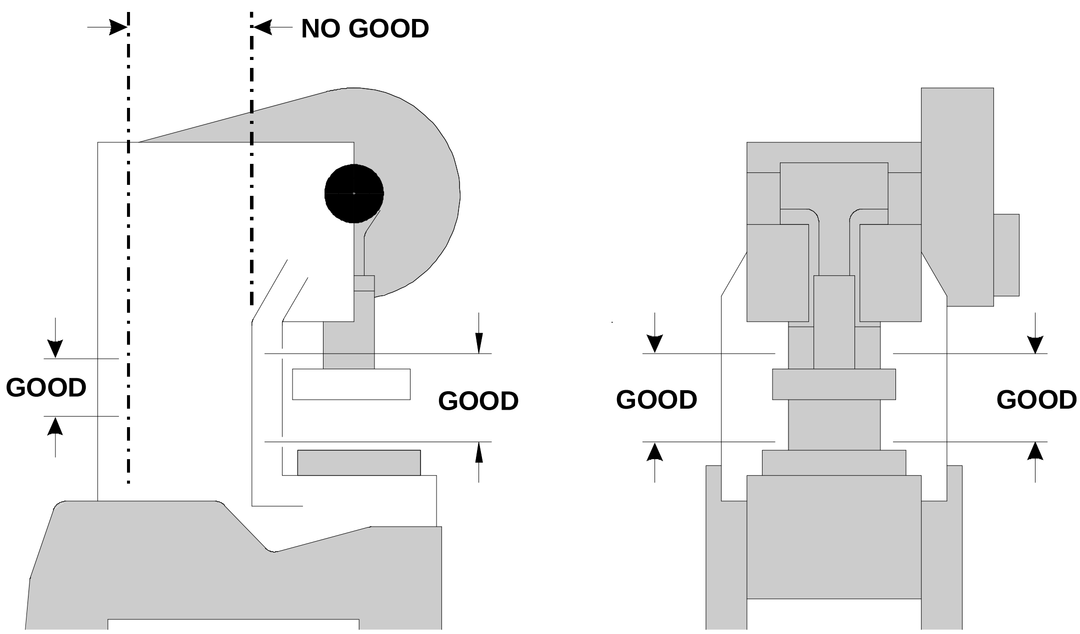
With our modern systems, and using reasonable care, it is now practical for a customer to pick sensor locations on common presses. True, such machines as under-drives, multi-column presses and special "exotic" presses still need professional study. In special cases, simply contact us and we will tell you the best location for your sensor.

# Installing Strain Gain Transducers

## Selecting a Sensor Location... ”C” Frame Presses

A Gap-Frame or O.B.I. press ”opens” up when it does work. This puts the throat area in tension and the rear of the web of the press in compression. Figures 1 & 9 show typical sensor- mounting locations on an O.B.I. press. Locations would be similar for a typical Gap-Frame press. Pick a location where the sensor will not be damaged by stock movement through the press, passing vehicles, changing tooling, etc.

We have found the load signals from the throat of the press to be the most dependable. The only time the rear of the press would be most desirable is when the throat area is obstructed with tooling. If the press has reinforcing tie-rods, the rear of the press cannot be used.




- Fig. 1 -

The best location would be in the throat area marked in gray. The manufacturer has generally ”beefed up” this area because of the high stresses. Avoid putting the sensor near a corner or a change-in-section. That area could provide a non-linear signal. If at all possible, stay in the center of the ”O.K.” zone (of figure 1). This area provides a good, dependable ”TENSION” sig- nal.

The second best location would be as near as possible to the rear edge of the upright web. Some types of presses have relatively thin webs. This causes them to bow in or out when the press is loaded. The load signal will be distorted if such bowing is significant or excessive. Sensors at the rear of the press will provide a usable ”COMPRESSION” signal.

The area marked ”no good” must be avoided. Also, avoid putting sensors near the gibs. Signals near the gib area may vary from somewhat non-linear to extremely weak. Try to mount the sensors at the same height on the press. For example; if you put the left sensor at the left edge of the throat, 4 inches above the bed, mount the right sensor on the right edge of the throat, 4 inches above the bed.

# Installing Strain Gain Transducers

O.B.I. presses with tie-rods must have the sensors mounted in the throat area. The signal at the rear of the press will generally be erratic. The tie-rods must be tight.

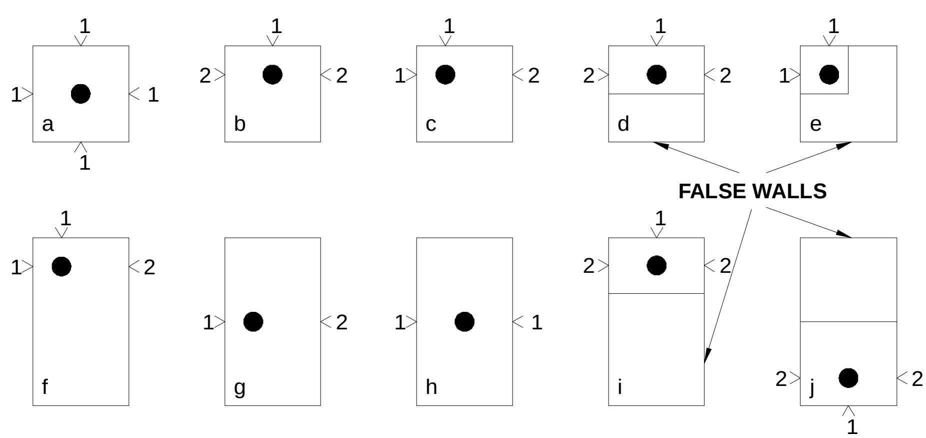
*Selecting a Sensor Location . Straightside Presses*

The tie-rods of a straightside press will stretch when the press is loaded. This obviously allows the compressed columns to stretch. Although the tie-rods themselves provide excellent load signals, mounting sensors to the tie rods is not normally practical. The columns provide excel- lent load signals if care is used in picking a high-stress location.

Figure 2 shows some typical locations of tie-rods within columns. The arrowheads show the first choice and second choice sensor-mounting location of each type of column. Note that the first choice is always the wall closest to the centerline of the tie-rod. Areas of the column away from the centerline of the tie-rod are perhaps distorting as the press is loaded. This can cause non-linear or weak signals.

Columns d, e, i and j of figure 2, have false walls. Any walls surrounding the gray areas will generally be useless for measurement purposes. The signals will be either very weak or non-existent. The false walls will, of course, be stressed. However, don't trust these walls for load measurement.

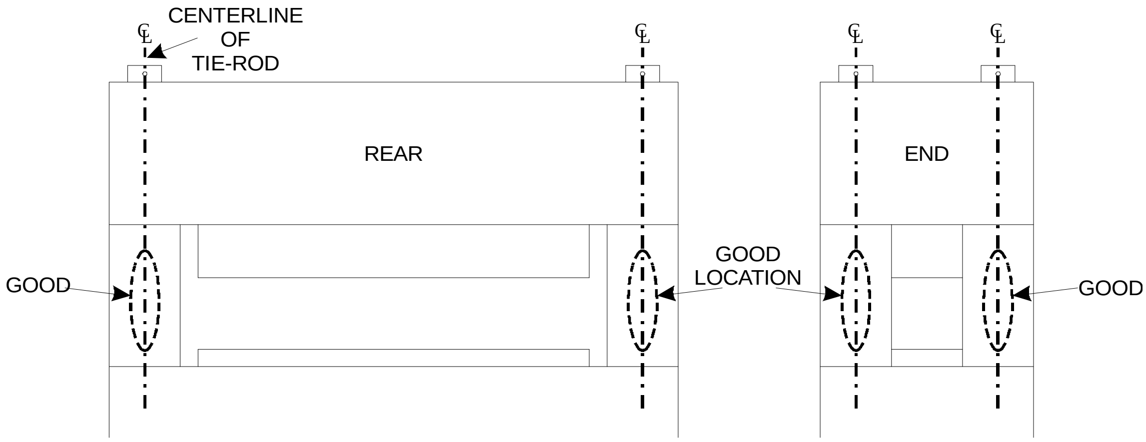
The columns a, b, c, f, g and h have some walls without arrows. There will be load signals there but they could be unpredictable. If you must use one of these walls, consult HELM first.




Tie-rods in columns . . . . Looking down inside columns
- Fig. 2 -

# Installing Strain Gain Transducers

Figure 3 shows the rear and end views of a basic straightside press with the tie-rods centered in the column and no false walls. Note that we have marked the "good" locations with an ellipse. We don't mean you may mount sensors anywhere inside the ellipse. You must stay on the centerline of the tie rod. However, the widest part of the ellipse represents the best mounting location. The narrower parts of the ellipse represent a poorer but still satisfactory location.




- Fig. 3 -

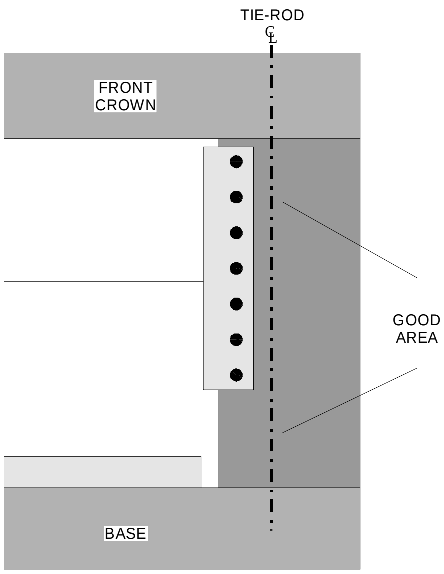
In some presses there are openings in the columns at the areas we show as "good" locations. In this case, mount on either side of the opening. Do not mount directly above or below the opening because the signal level there is not predictable. If you have doubts, call HELM.

Try to keep all the sensors at the same approximate height above the base of the column. Note that in figure 3 we show the vertical midpoint of the column as being good but the bottom of the column as being less desirable.

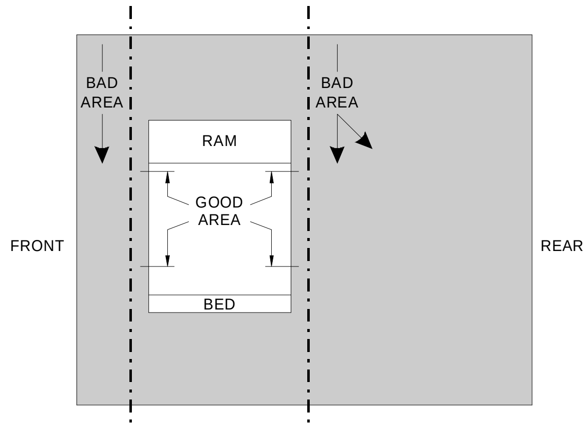
We say to position the sensors at the same height on the column. All this appears to be contradictory. However, compromise is perfectly acceptable. The result of the compromise will be a loss in signal. But, you should still have plenty of signal for accurate use of our instrument.

# Installing Strain Gain Transducers

Figure 5 shows typical mounting locations on a solid frame press. Be careful with this type of press. Load distribution is sometimes unusual. The most dependable mounting location is shown. The major problem will be locating the sensors in that area and still keeping them safe from damage. What is shown as ”bad” areas are generally unpredictable areas. If these ”bad” areas must be used either contact HELM or experiment.




- Fig. 4 -

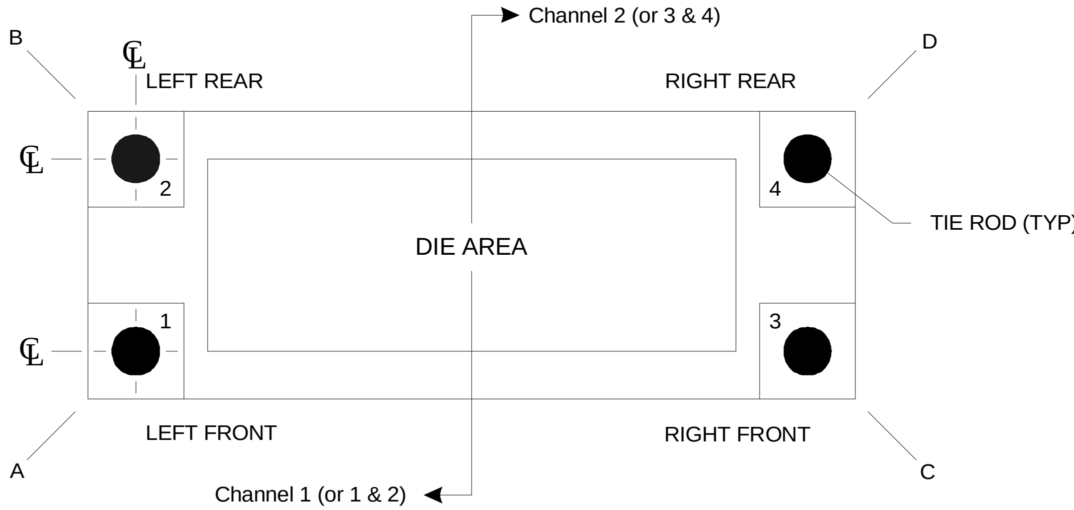



Solid-frame press . . . End view
- Fig. 5 -

Figure 6 shows some of the various ways people refer to the press columns. Some even call them northwest, south, east, etc. Some of our instruments refer to columns as 1, 2, 3 and 4. You will probably find ”left front”, ”right front”, etc. to be the least confusing.

A load monitor instrument has 2 or 4 ”channels”. A 2-channel instrument generally measures the left and right side of the press. Channels 1 and 2 of a 4-channel instrument measures the left side of the press. Channels 3 and 4 measure the right side. Some instruments are labeled LEFT and RIGHT. Some instruments are labeled LF, RF, LR, and RR.

# Installing Strain Gain Transducers




- Fig. 6 -

## MOUNTING THE STRAIN GAIN LOAD-SENSING TRANSDUCERS

A HELM load monitoring system is composed of: a portable or permanent-installation instru- ment with either one, two or four ”channels”; one STRAIN GAIN load sensing transducer for each instrument ”channel”; mounting and protective hardware for each STRAIN GAIN sensor. The sensors and hardware are available as installation kits. Each kit includes enough transducers, mounting hardware, and protective hardware for all the ”channels” of the system. This pamphlet explains what the various components are called, how they are used, and which kits are used for various instrument installations.

Instruments are grouped in two categories, portable instruments (such as the PORTA-PEAK) and permanent-installation systems (such as the LOADGARD series of instruments). PORTA-PEAK instruments are produced as two-channel or four-channel models. LOADGARD instruments are produced as one-channel, two-channel, or four- channel models.

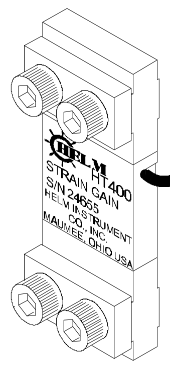
The main difference between a PORTA-PEAK installation kit and one for a LOADGARD is the covers of the protective shells. Sensor wires are connected directly to terminals inside a LOADGARD instrument. Sensor wires are connected to a PORTA-PEAK by means of a cable and a connector. Protective shells in a LOADGARD kit are provided with blank covers. Special flip-lid covers with a cable connector are provided for PORTA-PEAK installations.

If a PORTA-PEAK installation is being done it will be necessary to solder the sensor wires to the connector. Connector wiring is covered in figure 12.

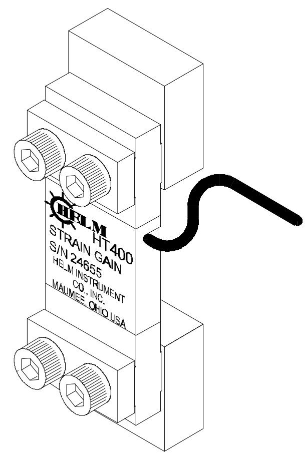
# Installing Strain Gain Transducers

## TWO TYPES OF MOUNTING KITS... WELD OR DRILL

There are two methods of mounting the load sensors to a machine... Direct mounting by means of holes drilled into the machine... Indirect mounting by using pre-drilled steel blocks (weld pads) welded to the machine. Therefore, kits will be referred to as either ”Weld-Pad” mounting or ”Drilled-Hole” mounting.



Transducers Bolted
Directly to the Press



Transducers Bolted to
Pre-Drilled & Tapped Weld Pads

*The Installation Kits*

There are a total of ten transducer/installation kits. Four kits are for the PORTA-PEAK instruments. Six kits are for permanent-installation systems such as LOADGARD. Here is how they are divided:

FOR PORTA-PEAK INSTRUMENTS:
Two-channel PORTA-PEAK, drilled-hole mounting ................................................ PK-2D
Two-channel PORTA-PEAK, weld-pad mounting .................................................... PK-2W
Four-channel PORTA-PEAK, drilled-hole mounting ................................................ PK-4D
Four-channel PORTA-PEAK, weld-pad mounting .................................................. PK-4W

FOR LOADGARD-TYPE SYSTEMS:
One-channel system, drilled-hole mounting ............................................................ L1-DB
One-channel system, weld-pad mounting ................................................................ L1-WB
Two-channel system, drilled-hole mounting ............................................................ L2-DB
Two-channel system, weld-pad mounting ................................................................ L2-WB
Four-channel system, drilled-hole mounting ............................................................ L4-BD
Four-channel system, weld-pad mounting ................................................................ L4-WB

# Installing Strain Gain Transducers

*Additional Installation Kits*

For larger straightside presses and where longer leads are required, the following kits may be ordered. Note, these kits are designed to be used with two, four, or eight channel permanently installed units, (LOADGARD/TREND LOADGARD) and come standard with weld hardware. Please specify drill hardware, if needed.

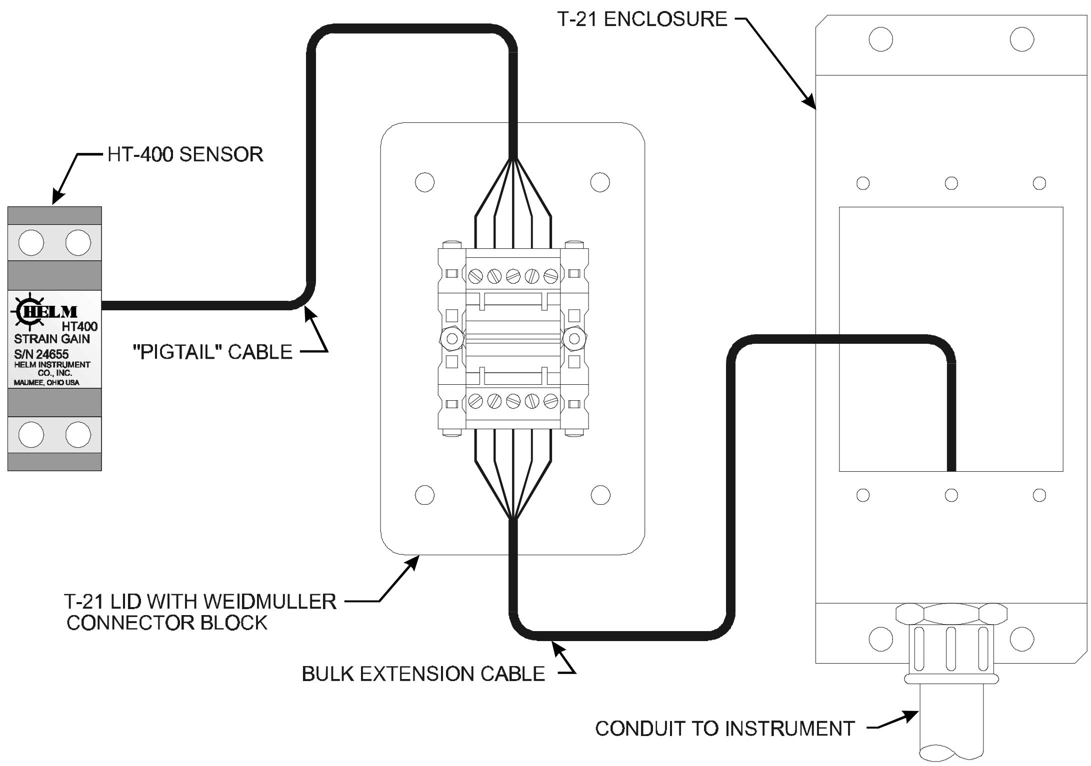
L4-WTS-350 kit includes: (4) sensors, (4) covers with terminal strips, (4) T-21 protection shells.
L4-WB and (1) 350 ft. roll of strain gain cable.

*Notes:*

A.) Longer or shorter rolls of cable are available ie: L4-WTS-250, 350, 450, 550, etc.

B.) The standard L4-DB or WB kits come with sensors that have 35 ft. lead or 140 ft. of cable L4-WB total.

L4-WTS KIT



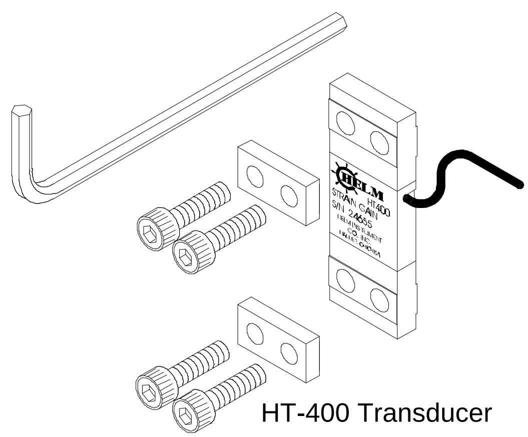
# Installing Strain Gain Transducers

*Items included in each Transducer/Installation kit:*

| | | | | | FIXTURES | | |
|---|---|---|---|---|---|---|---|
| KIT | SENSOR HT-400-35 | SHELL T-21 | COVER WS | COVER WRS | DRILL DF-400 | WELD WF-400 | PADS WP-400 |
| **PK-2D** | 2 | 2 | 1 | 1 | 1 | | |
| **PK-2W** | 2 | 2 | 1 | 1 | | 1 | 2 sets |
| **PK 4D** | 4 | 4 | 2 | 2 | 1 | | |
| **PK-4W** | 4 | 4 | 2 | 2 | | 1 | 4 sets |
| **L1-DB** | 1 | 1 | 1 | | 1 | | |
| **L I –WB** | 1 | 1 | 1 | | | 1 | 1 set |
| **L2-DB** | 2 | 2 | | | 1 | | |
| **L 2 –WB** | 2 | 2 | 2 | | | 1 | 2 sets |
| **L4-DB** | 4 | 4 | 4 | | 1 | | |
| **L 4 –WB** | 4 | 4 | 4 | | | 1 | 4 sets |

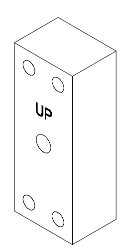
Each installation kit Includes an appropriate number of model HT-400-35 STRAIN GAIN load-sensing transducers. For example, there is one STRAIN GAIN sensor in the L1-DB kit, two sensors in the PK-2D kit, four sensors in the L4-WB kit and so on.

Each sensor is provided with two anti-torque washers, four mounting bolts, and a hex wrench to fit the bolts. Any STRAIN GAIN sensor ordered separately will also include the washers, bolts and wrench.

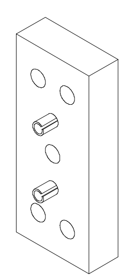


HT-400 Transducer

Each transducer/installation kit Includes either one welding fixture or one drilling fixture. The welding fixture is designated “WF-400”. The drilled- hole fixture (drill-guide) is designated ”DF-400”. This means either ”Weld Fixture for HT-400 series transducers” or ”Drill Fixture for HT-400 series transducers”.

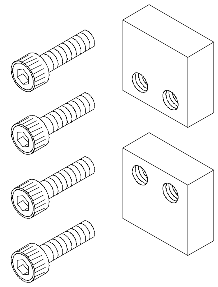


DF-400 Drill Fixture


WF-400 Weld Fixture

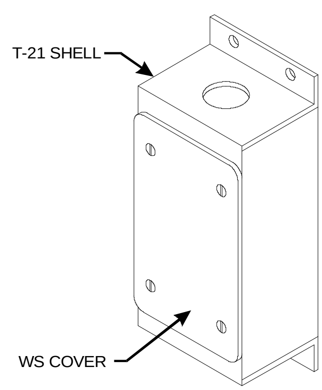
# Installing Strain Gain Transducers

If a welded-installation kit is selected there will be one set (2 pads) of WP- 400 weld pads and four mounting bolts included for each STRAIN GAIN sensor in the kit. The bolts are for temporarily mounting the weld pads to the weld fixture. They will not be used for mounting the sensor. WP-400 weld pad sets, with bolts, may be ordered separately.

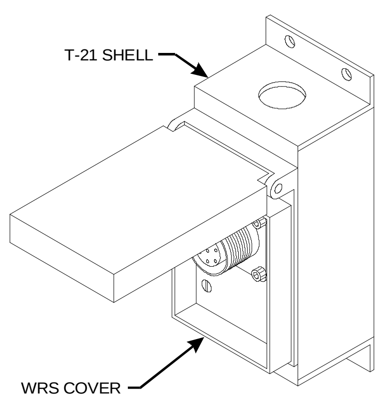


Each installation kit includes an appropriate number of protective shells to enclose the load sensor. The covers of the shells are either blank or contain a connector, depending on whether the installation is for a permanent LOADGARD type system or for PORTA-PEAK use.

FOR USE WITH LOADGARD INSTRUMENTS




FOR USE WITH PORTA-PEAK INSTRUMENTS

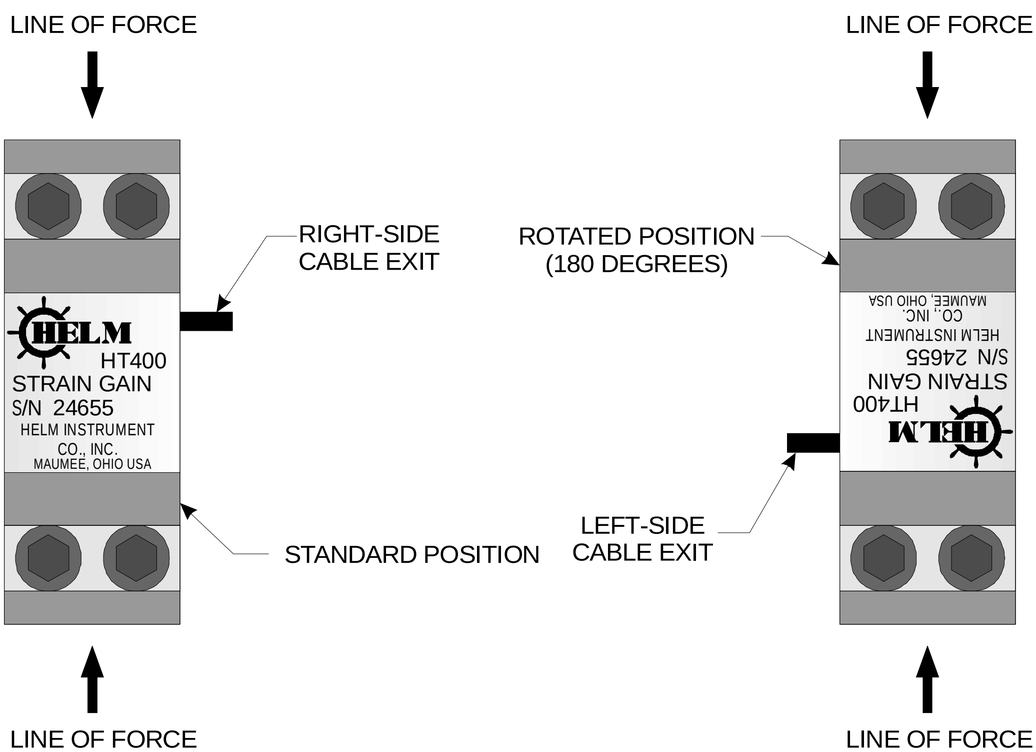


# Installing Strain Gain Transducers

**Basic Mounting Instructions for Helm Strain Gain Sensors**

1.) Align sensor with the line of force of machine component, as shown.
2.) Rotate sensor 180° to change cable exit orientation (optional).
3.) Mount sensor with nameplate facing out (away from mounting surface).
4.) See the following pages of this manual for more installation details.

**Typical Strain Gain Sensor Orientation**




*Drilled-Hole Mounting*

# Installing Strain Gain Transducers

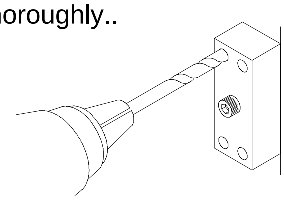
It is extremely important that the mounting surface of the machine be smooth, clean and very flat. There must be no burrs around the drilled holes. If the surface is not flat the sensor will be twisted when it is tightened. This will cause a shift in no-load zero balance. If this happens, the sensor will generally have a reduced working range or perhaps even be bent and damaged. It is also necessary that the sensor be aligned to the direction of force. In almost every case, this means the sensor be mounted vertically as shown in figure 9. Also, the sensor should always be mounted with the nameplate facing outward (away from the mounting surface). In the standard position, the sensor cable exits the right side of the sensor body. If a left-side cable exit is desired, for clearance or a uniform interconnect configuration for multiple sensors, then the sensor can be rotated 180° from top to bottom. This position puts the cable on the left-hand side of the body and the nameplate will appear upside-down. The sensor will function normally in this position (see page 11 for illustration). We do not recommend mounting the sensor with the nameplate facing in toward the mounting surface, as a decrease in output signal will result.

**1**

Grind mounting surface to have bare metal, smooth and flat. Hold sensor or drill guide to surface. It should not rock Scribe a vertical line to position the sensor properly.

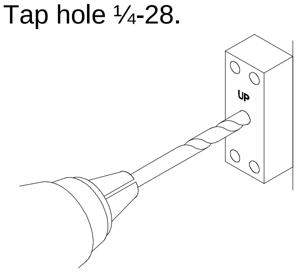
**2**

Using center hole in drill guide, bolt guide to press. Drill remaining holes about ¾ inch deep with #3 drill. Tap holes ¼-28. Remove guide, de-burr holes and clean thoroughly..



**3**

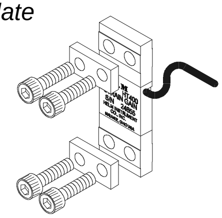
Hold drill guide to vertical line.
Drill center hole about ¾ inch deep with #3 drill. Tap hole ¼-28.



**4**

Using “anti-torque washers” as shown, bolt sensor to press structure. Tighten 4 bolts to about 175 in. lbs.

*Note the sensor nameplate Should always be facing out (away from surface).*



NOTE: If you have protective shells (T-21) for enclosing the sensor, see figure 10 and the accompanying text for special procedures.

## *Weld-Pad Mounting*

There are some simple cautions to observe when using the weld-pad method of sensor mounting.

- You must assure the fixture and pads are properly aligned with the direction of force. This will almost always be vertically as shown in figure 8 and figure 9.
- The pads must be held firmly against the machine surface and each pad must be tack-welded before finish-weld is done. If only one pad is tack-welded, the other pad will generally lift away from the surface. Unless both pads are firmly welded flat against the machine sur- face, the sensors may not provide proper load-sensing
- The finished weld should be tested by prying firmly with a screwdriver/between the fixture and machine surface. A poor weld will obviously let go.
- The weld-pads must remain firmly attached to the fixture until all welding is complete and the fixture is cool enough to be held in a bare hand.

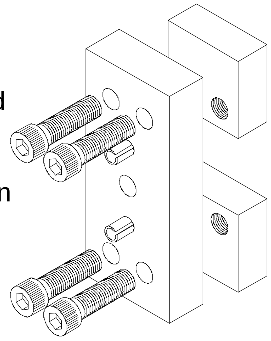
The weld-pads are made of 1018 mild steel. For welding to a cast iron machine we suggest N1-ROD-55 (INTERNATIONAL NICKEL CO.). Although a mounting hole is provided in the center of the fixture, most welders prefer to merely hold the fixture/pads firmly to the press with a gloved hand. In almost every case this works well.

***NOTE**: If you have protective shells (T-21) for enclosing the sensor, see figure 10 and the accompanying text for special procedures.*

# Installing Strain Gain Transducers

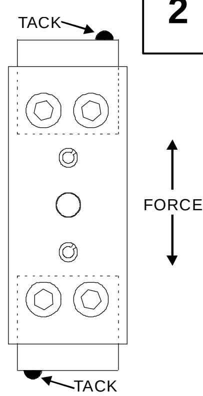
1

Assemble weld pads to fixture as shown. Grind and sand paint from mounting surfaces. Surface should be clean and reasonably flat.



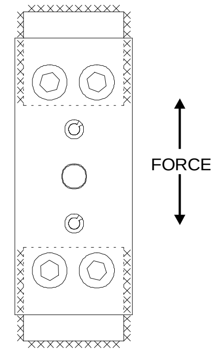
2

Align weld pads with direction of force (see Fig. 9). Hold pads firmly against mounting surface. Tack weld both pads to surface before finish welding is started.




3

Without removing fixture, weld outer sides of each pad. It is not necessary to weld inside edge of pad. Remove fixture.




4

Using "anti-torque washers" as shown, bolt sensor to press structure. Torque 4 bolts to about 175 in. lbs.

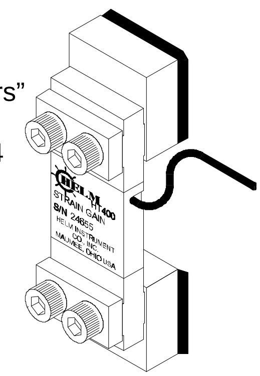
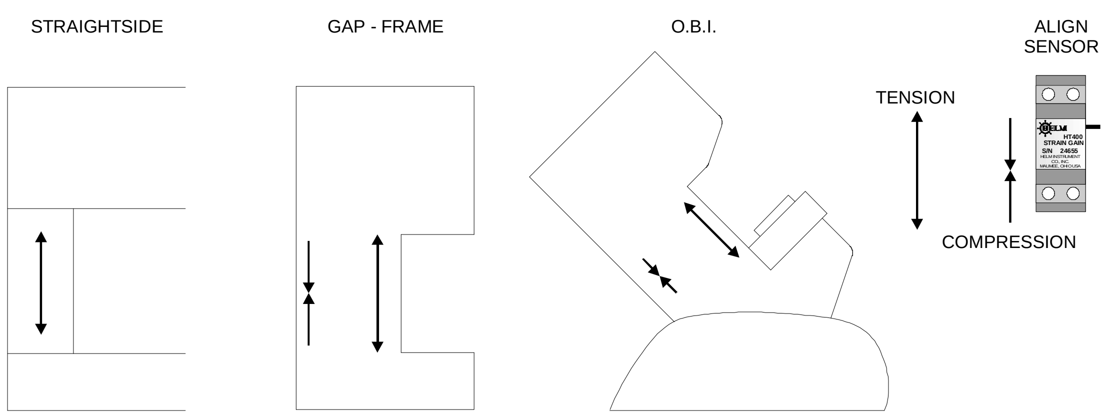


Figure 9 shows various presses with tension and compression symbols at recommended sensor-mounting locations. It is important to align the sensor with the direction of force. In the examples shown, this would mean with the two upper sensor mounting holes toward the top of the press and the two lower holes toward the bottom. This to most people would seem obvious. However, we have seen many cases where the installer mounted the sensors horizontally or on an angle.




- Fig 9 -

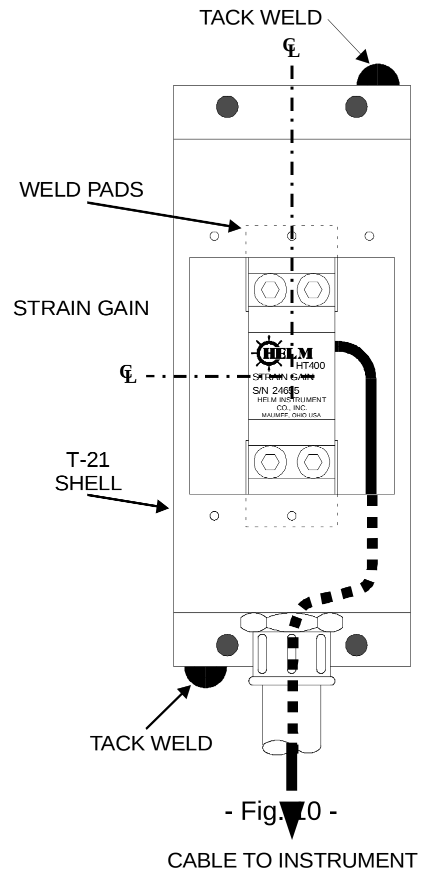
# Installing Strain Gain Transducers

*Mounting the Protective Shells (T-21)*

The T-21 protective shells may be mounted to the press either with the hardware provided or by tack welding them to the press. Refer to figure 10. Make certain the sensor is centered inside the shell. If it isn't, you could have trouble getting at the sensor-mounting bolts.

To protect the sensor, we suggest you do not have it on the press while you are mounting the shell. Make certain the sen- sor-mounting location is thoroughly cleaned after drilling and tapping the shell-mounting holes. If you are mounting the shell by welding it to the press, tack-weld only two corners (either top-right/bottom left or top-left/bottom right). It is not necessary to fully weld the top and bottom of the shell (you may want to remove the shell someday).

Use care when pulling the sensor cables through the conduit. The wires inside the cable are thin. Under normal circumstances they will not be damaged during pulling. However, unnecessary strain due to careless pulling may stretch or break one or more wires. This is a rare occurrence but we mention the possibility so you may guard against it.



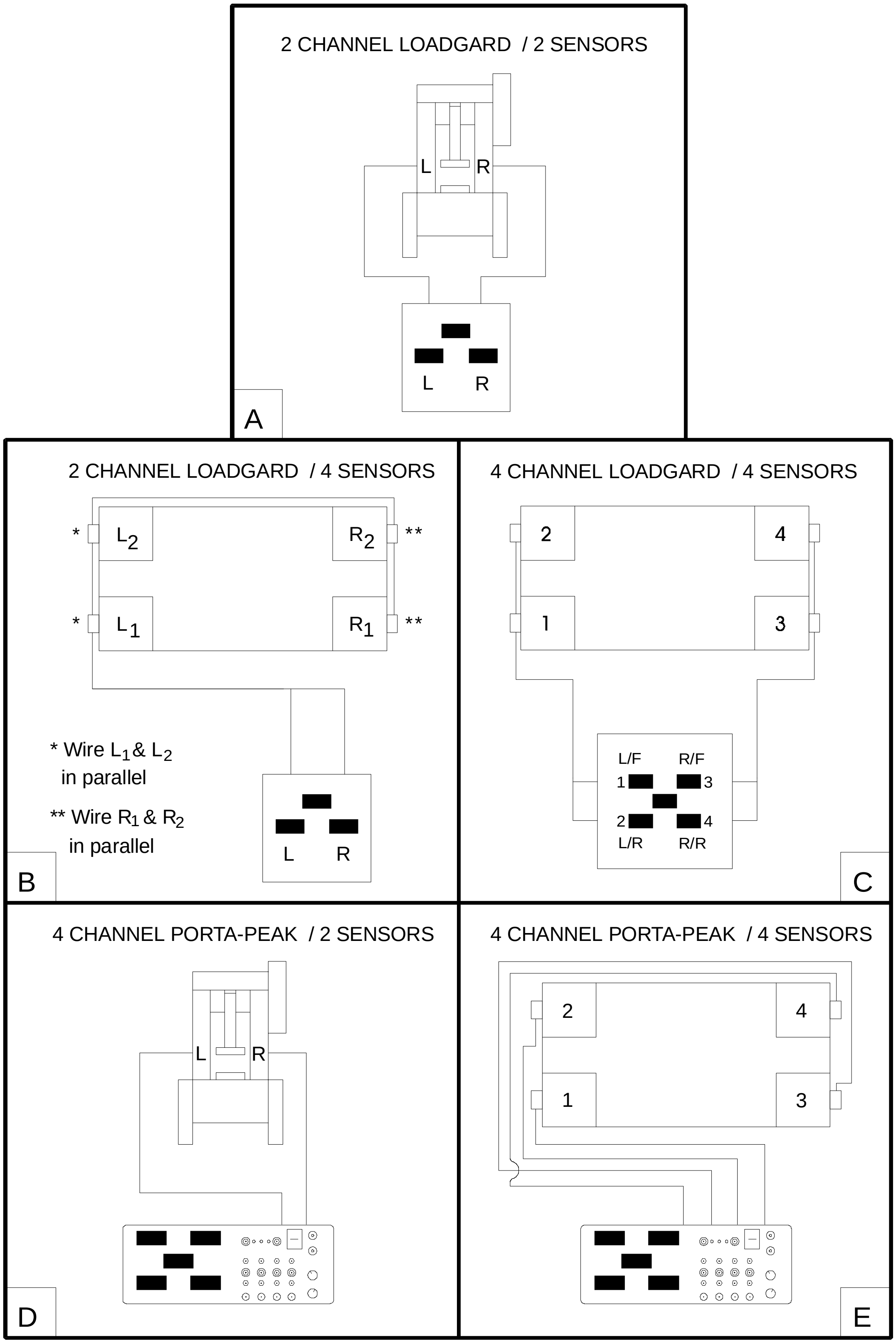

- Fig. 10 -

*Connecting the Sensor Cables to the Instrument*

Figure 11 shows some typical methods for cable routing. For best electrical shielding we sug- gest running the cables through metal conduit. However, some customers have used flexible tubing. Under no circumstances should sensor cables be put into conduit containing any other type of wires or cables... you cannot imagine the problems you will have if you disregard this rule.

The four LOADGARD installations (figure 11 A,B,C,D) should be used with "T-21" protective shells with "WS" blank covers. The load sensors will be "hard wired" directly to terminal strips within the instrument. The two PORTA-PEAK installation (figures 11 E,F) will also use "T-21" protective shells. Installation E uses one "WS" blank cover and one "WRS" cover with a con- nector. Installation F uses two "WS" blank covers plus two "WRS" covers with a connector in each cover. The connectors in the "WRS" covers must be wired as per the color code shown in figure 12.

# Installing Strain Gain Transducers




TYPICAL SENSORS CONNECTED TO VARIOUS INSTRUMENTS
- Fig. 11 -

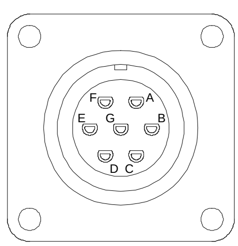
# Installing Strain Gain Transducers

Please note that the wiring diagram shows the rear of the connector, #1 sensor is on the right. Soldering small wires into a connector requires care and skill. Make certain there are no shorts or solder bridging between the terminals. It is good practice to place short pieces of plastic tubing (spaghetti) over the terminals. The wiring diagram shows the connections for sensors with a TENSION signal (see figure 9). For a COMPRESSION signal you should put both green wires to terminaI B and both black wires to terminal A. This will reverse the excitation to the strain gages inside the sensor. DO NOT change the white and red wires PLUS the red and black wires. To do so would put you right back where you started.

It is perfectly acceptable to coil up some excess sensor cable within the protective shell. Just don’t try to stuff the shell full. It is also perfectly acceptable to cut off unneeded excess cable. This will not affect the accuracy of the load measurements. It is not acceptable to splice the cable without instructions from HELM.

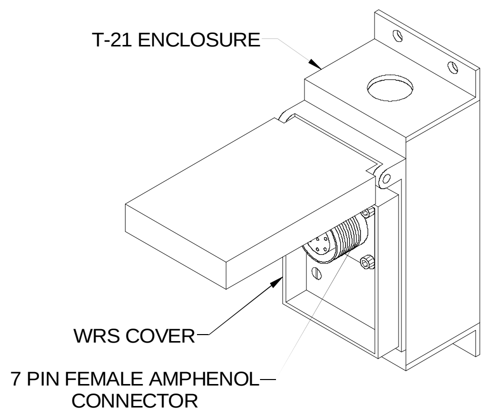
Proper terminations to LOADGARD type instruments will be covered fully in each instruction manual.

7 PIN FEMALE AMPHENOL CONNECTOR




BACK VIEW

| CONNECTOR CODE |
|---|
| PIN A - (+GAGE) |
| PIN B - (-GAGE) |
| PIN C - (+SIGNAL) |
| PIN D - (-SIGNAL) |
| PIN E - (OPEN) |
| PIN F - (OPEN) |
| PIN G - (SHIELD) |




- Fig. 12 -

**CALIBRATING THE PRESS AND INSTRUMENT**

Complete details of press calibration is beyond the scope of this article. Each instrument manual contains details for making the instrument adjustments. What we present here is a basic description of the calibration procedure and how the customer is involved in that calibration.

# Installing Strain Gain Transducers

To calibrate a system requires the use of specialized equipment. If you have such equipment, you have been trained how to use it. Therefore, you may ignore this section of the article.

## Basic Principles of Calibration

Assume you drilled two small holes in the upright of a press, exactly 2 inches apart, one directly above the other. As the press operates to form a part, the columns stretch and the holes move apart a few millionths of an inch. Assume 100 tons of load on the press caused the holes to move apart 100 millionths of an inch. In this exampIe 1 millionth of an inch stretch would equal 1 ton of load.

A two-inch long STRAIN GAlN load sensor wired to an instrument channel provides a very practical ”electronic micrometer”. As the column stretches, the sensor puts out a signal directly related to the amount of stretch. The instrument then translates the amount of stretch into tonnage. However, we must force the press to do a specific amount of work so we can adjust the instrument to precisely display that exact amount of work. In other words, we must adjust the signal ”gain” of the instrument.

Once we have made the precise “gain” adjustment, the load is removed from the press. An electronic simulated-load is then applied to the instrument. The instrument will then display a ”CAL” (calibration) number. The CAL number is recorded for use whenever the system is to be tested.

Once a press calibration is performed, you may change instruments or sensors and never need to re-calibrate unless you make a major physical change in the press structure.

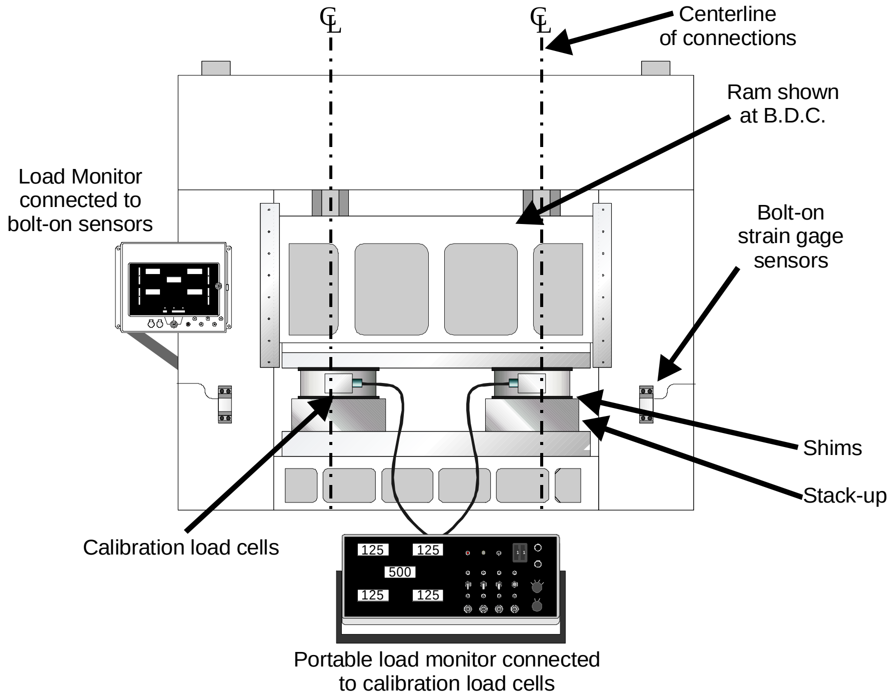
### *Calibration Procedure*

Special ”load cells” are used to measure a specific amount of impact made upon them by the press ram. (Think of these cells as high-capacity scales.) If the ram hits the cells with 100 tons of force, the press structure will stretch by a specific amount. That amount of stretch is detected by the STRAIN GAIN sensor. The instrument would then be adjusted to display 100 tons.

Obviously we use 100 tons only for illustration purposes. Generally the press is forced to do work equal to its maximum rated capacity. HELM is capable of providing full-capacity routine calibration on presses up to 8000 tons. (Under special conditions, presses with greater capacities may be calibrated to maximum limits.)

See figure 13 for typical instrument connections during caIibrations. As the ram impacts cells 1 *& 2,* for the force of the impact (load) is displayed on the PORTA- PEAK. The STRAIN GAIN sensors aIso detect the force of the impact and put a signal into the LOADGARD instrument. The LOADGARD is then adjusted to match the PORTA-PEAK display.

# Installing Strain Gain Transducers




- Fig. 13 -

1/8” tempered masonite shims, hard on both sides, are provided by HELM when we do the calibration. The stack-up is steel material and furnished by the customer. Note that the tooling has been removed from the press bed and slide. In rare cases, calibration can be done with tooling in the press, but don’t count on it.

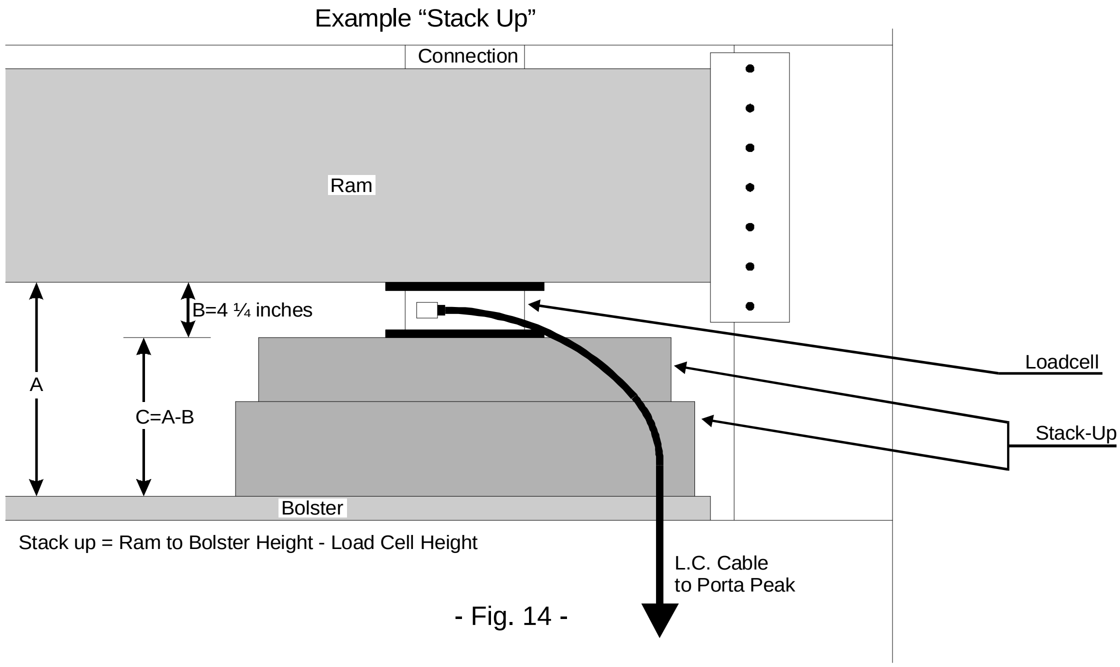
<u>Calculating Stack-Up Height and Material</u>

Having the proper stack-up material prepared in or near the press will greatly speed up calibration and decrease downtime. The following guidelines will help you determine the stack-up. Refer to figures 13 and 14.

- Use steel only. Solid steel die-risers, solid steel plates, or solid steel ”round stock” is fine. Don’t use I-beams, channels, etc. No aluminum, brass, etc.
- There must be one stack-up for each connection (pitman). One cell per pitman is generally used.
- The top and bottom stack-up surfaces should be reasonably parallel. Machining the stack-up to improve parallelism is not generally necessary. Reasonable non-parallelism will be leveled out by shim material.

For presses over 400 tons, load cells with a 1000 ton capacity will be used. They must set on a stack-up at least 10” wide and 10” front-to-back... 12” x 12” or larger would be better.

# Installing Strain Gain Transducers




- Fig. 14 -

- If height "C" (figure 14) exceeds about 4 ft. on presses over 400 tons, each stack up should be about 12" x 48".
- On presses with a maximum rated capacity under 400 tons, smaller cells will be used. They must set on a stack-up at least 3 1/2" wide and 3 1/2" front-to-back. Preferably, the stack up should be a bout 6" x 6" or more.
- If height "C" (figure 14) exceeds about 18", the stack-up must be at least 6" x 6".
- There must be one stack-up for each load cell or one stack-up long enough to position each cell directly under each pitman.

To calculate the height of each stack-up, refer to figure 14 and proceed as follows:

- Put the ram (slide) adjustment control to the center of its range.
- Run the ram (slide) to exactly bottom center (180 degrees).
- Measure the distance from the top of the bolster to the bottom surface of the ram (slide). This will be measurement "A".
- The load cell/shim height "B" is 4 1/4 inches for a 100 ton cell, 5 inches for a 250 ton cell, and 4 inches for a 1000 ton cell.
- Subtract the proper load cell height from measurement "A". This will give "C" the height of the stack-up.

Example... Height "A" is measured as 17 3/4. Load cell/soft-shim height "B" of 4 1/4". 17 3/4" minus 4 1/4" equals a required total stack-up of 13 1/2". You could use a 12" high stack-up if you have enough slide control. Keep in mind that slide control during calibration would be as important as if you were running parts in a die. Make certain that you choose a stack-up height that will allow both up and down slide control during calibration.