AccurPress

USER MANUAL

EDITION 5, REVISION 1
FEBRUARY 2008

ACCURPRESS

User Manual

Printed in Canada

NOTICE TO EMPLOYERS AND OWNERS

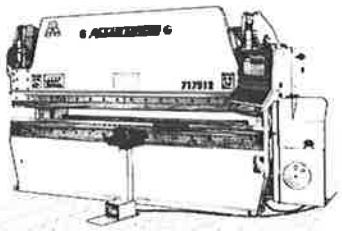
This User Manual will provide you with information and instruction on how to operate, install, and service your press brake. The manual is also an effort to promote and advance the extremely important requirements of press brake safety in your workplace.

As an employer/owner, you have managerial authority to direct and control the acts of your employees and you have definite legal responsibilities with regard to their safety. You also have the sole control over the "point of operation" (see Section 3 for definition) of every metal-forming system in your plant. You have the responsibility to provide and monitor this safeguarding. All a press brake manufacturer can do is to convey the knowledge of instructions, requirements, and specifications relating to press brake safety and point of operation safeguarding. You have the legal and moral responsibility to abide by and implement these instructions, requirements, and specifications. If you fail to do so, serious injury may occur to your employees.

A press brake manufacturer has no control over your day to day operations. That is why legal responsibility for point of operation safeguarding under Federal and State/Provincial Regulations and the various standards clearly rests with you, as the employer. Failure on your part to meet point of operation safeguarding requirements, to properly monitor their use, to implement and supervise a point of operation safety program, and to service and maintain your machines could expose you to a substantial liability for worker injuries.

Your employees should never have any part of their body in the point of operation of any metal-forming equipment at any time while the machine is energized or moving.

Warning signs are provided and attached to all Accurpress machines in conspicuous places at eye level. Additional labels are available from your Accurpress representative. This manual and the supplemental Accurpress/Accurshear Safety Manual should be carefully read and understood before operating your press brake. A copy of the Safety Manual is available from your Accurpress representative. Once again, you are responsible for point of operation guarding, not the manufacturer of the machine. We hope the information in this manual will be a help to you in safely operating and caring for your press brake.



ACCURPRESS

QUICK REFERENCE

This procedure can be used for the initial start-up of the machine before the dies are installed, and as a basic quick reference for subsequent operation with dies.

Before the dies are installed, become familiar with all mechanical and electrical controls by cycling the press ram using the different functions of the machine. Regardless of whether or not tooling has been installed, safety should always be a priority when working with the press brake.

⚠ WARNING

NEVER OPERATE THIS MACHINE WITHOUT FIRST READING AND UNDERSTANDING BOTH THE OPERATION MANUAL AND SAFETY MANUAL.

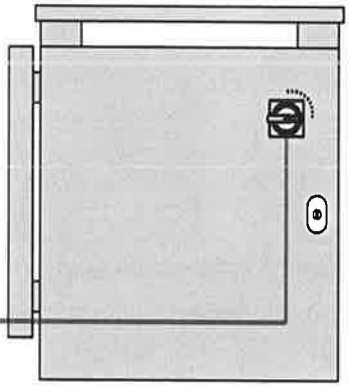
KEEP YOUR HANDS, FINGERS, AND ALL PARTS OF YOUR BODY FROM BETWEEN THE DIES OR POINT OF OPERATION WHEN THE MACHINE IS ENERGIZED OR THE MOTOR IS RUNNING.

NEVER START OR OPERATE THIS MACHINE WITHOUT ADEQUATE POINT OF OPERATION GUARDING.

1 STARTING UP THE PRESS BRAKE

STEP 1
Perform a safety inspection of the work area and equipment. Ensure that all safety hazards have been eliminated before proceeding.

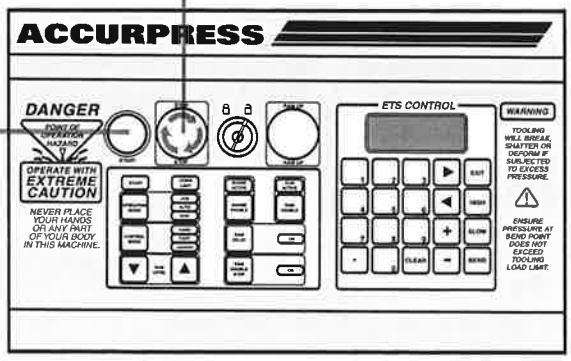
STEP 2:
Turn main disconnect switch to the **ON** position.
⇨ Enables power to the system.



MAIN ELECTRICAL CABINET

STEP 3:
Rotate **STOP** button 1/4 turn clockwise to release.

STEP 4:
Press **START** button.
⇨ Starts the hydraulic motor.



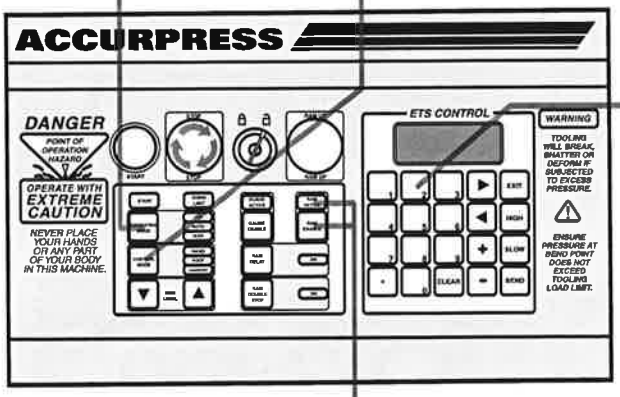
CONTROL STATION PANEL

2 CALIBRATING THE RAM

STEP 1:
Press **OPERATING MODE** key to select **AUTO** mode.

STEP 2:
Press **CONTROL MODE** key to select **HAND** mode.

STEP 3:
From main menu press [2] on keypad to access "Calibrate Ram" screen.



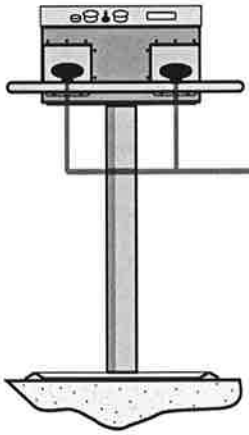
CONTROL STATION PANEL

MAIN MENU

STEP 4:
Ensure ram is clear of obstructions.

STEP 5:
Press **RAM ENABLE** key.
⇨ **RAM ACTIVE** light comes on.

STEP 6:
If not at top of stroke, depress and release palm pushbuttons.



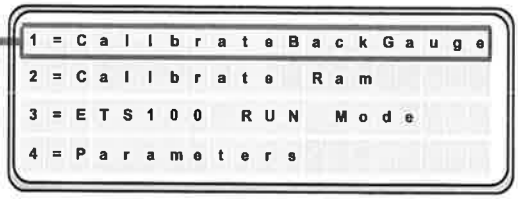
STEP 7:
Depress palm pushbuttons, then release when ram stops.
⇨ Calibration is complete.

STEP 8:
Press **EXIT** on keypad to return to main menu.

3 CALIBRATING THE BACKGAUGE
(IF EQUIPPED)

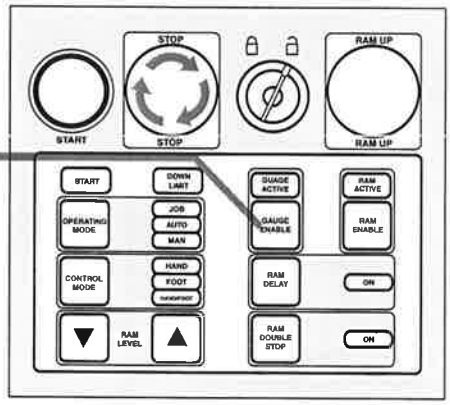
STEP 1:
Ensure backgauge is clear of obstructions.

STEP 2:
From main menu press [1] on keypad to access "Calibrate BackGauge" screen



MAIN MENU

STEP 3:
Press **GAUGE ENABLE** key.
⇨ The backgauge automatically travels to the rear limit (home), then forward to the predetermined position.



CONTROL STATION FUNCTIONS

NOTE:
For finger calibration refer to Accurpress Operation Manual.

STEP 4:
Press **EXIT** on keypad to return to main menu.

4 PROGRAMMING A RAM CYCLE

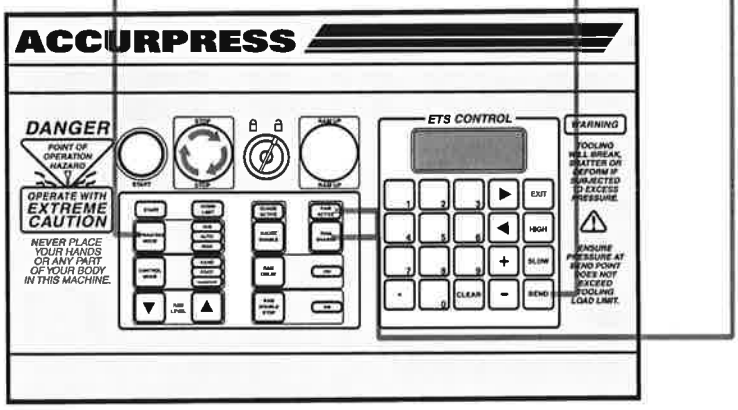
STEP 1:
From main menu press [3] on keypad to access "RUN Mode" screen.

MAIN MENU

STEP 2:
Press **OPERATING MODE** key to select **JOG** mode.

STEP 3:
Press **BEND** key and enter "10.000".

STEP 4:
Press **RAM ENABLE** key.
⇨ **RAM ACTIVE** light comes on.



CONTROL STATION PANEL

STEP 5:
Depress palm pushbuttons to jog ram down to position desired for top of stroke.

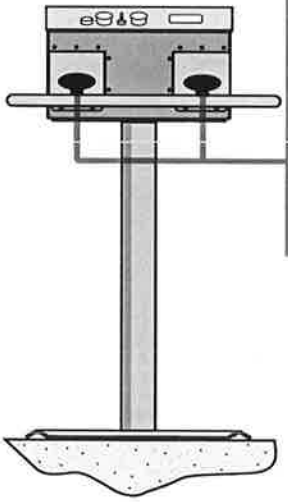
STEP 6:
Press and hold **HIGH** for 3 seconds to capture current position as cycle high position.

STEP 7:
Depress palm pushbuttons to jog ram down to position desired for speed change point.

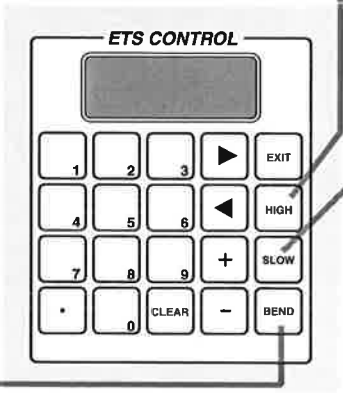
STEP 8:
Press and hold **SLOW** for 3 seconds to capture current position as cycle slow position.

STEP 9:
Depress palm pushbuttons to jog ram down to position desired for program bend point.

STEP 10:
Press and hold **BEND** for 3 seconds to capture current position as bottom position.

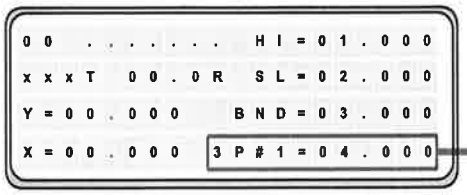


CONTROL STATION



ETS CONTROL KEYPAD

5 PROGRAMMING BACKGAUGE STEPS
(IF EQUIPPED)



RUN MODE SCREEN

STEP 1:
In Run Mode screen, use arrow keys on keypad to move cursor to backgauge step data fields.

STEP 2:
Using keypad, enter total steps desired.

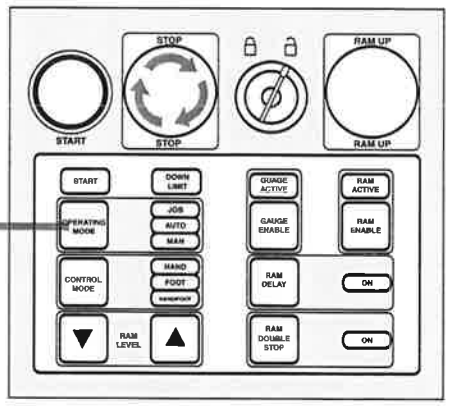
STEP 3:
Enter current step number.

STEP 4:
Enter desired backgauge position for current step.
⇨ Value is distance from center of die.

BACKGAUGE STEP DATA FIELDS

STEP 5:
Repeat Step 3 and Step 4 for all desired program steps.

6 EXECUTING A PROGRAM

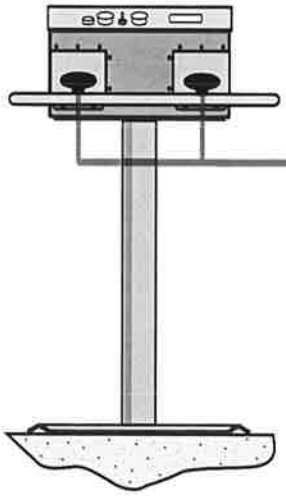


CONTROL STATION FUNCTIONS

STEP 1:
Press **OPERATING MODE** key to select **AUTO** mode.

STEP 2:
Ensure Run Mode screen is displayed.

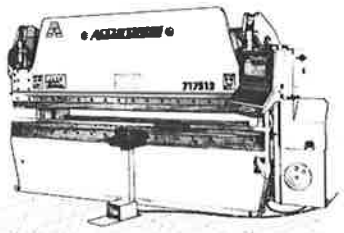
STEP 3:
if not at top of stroke, depress and release palm pushbuttons.



CONTROL STATION

STEP 4:
Depress and hold palm pushbuttons until bend is complete.

STEP 5:
Repeat Step 4 to run each remaining cycle in program.



1 ACCURPRESS GENERAL DESCRIPTION

1.1 Accurpress Description

The ACCURPRESS press brake tonnage is generated hydramechanically. Two hydraulic cylinders supply the force, which is synchronized and transferred to the press ram by mechanical linkages.

The hydraulic system allows the press ram to:

- Approach the workpiece rapidly
- Press the workpiece at a slow speed
- Retract at high speed

The hydraulic system is protected by a high pressure relief valve. This safeguard prevents the hydraulic components and the press brake frame from overloading when forming beyond capacity is attempted.

A torque limiting system is built into the torque tube assembly (for 100 ton models and up), preventing the press brake frame from being overstressed during off center bending.

Each press brake is equipped with:

- Powered press ram to bed parallelism adjustment
- Hand and foot control modes
- Hand to foot transfer mode
- Press ram double stop control
- Electronic press ram positioning control
- Press ram tonnage control
- Adjustable bending speed control

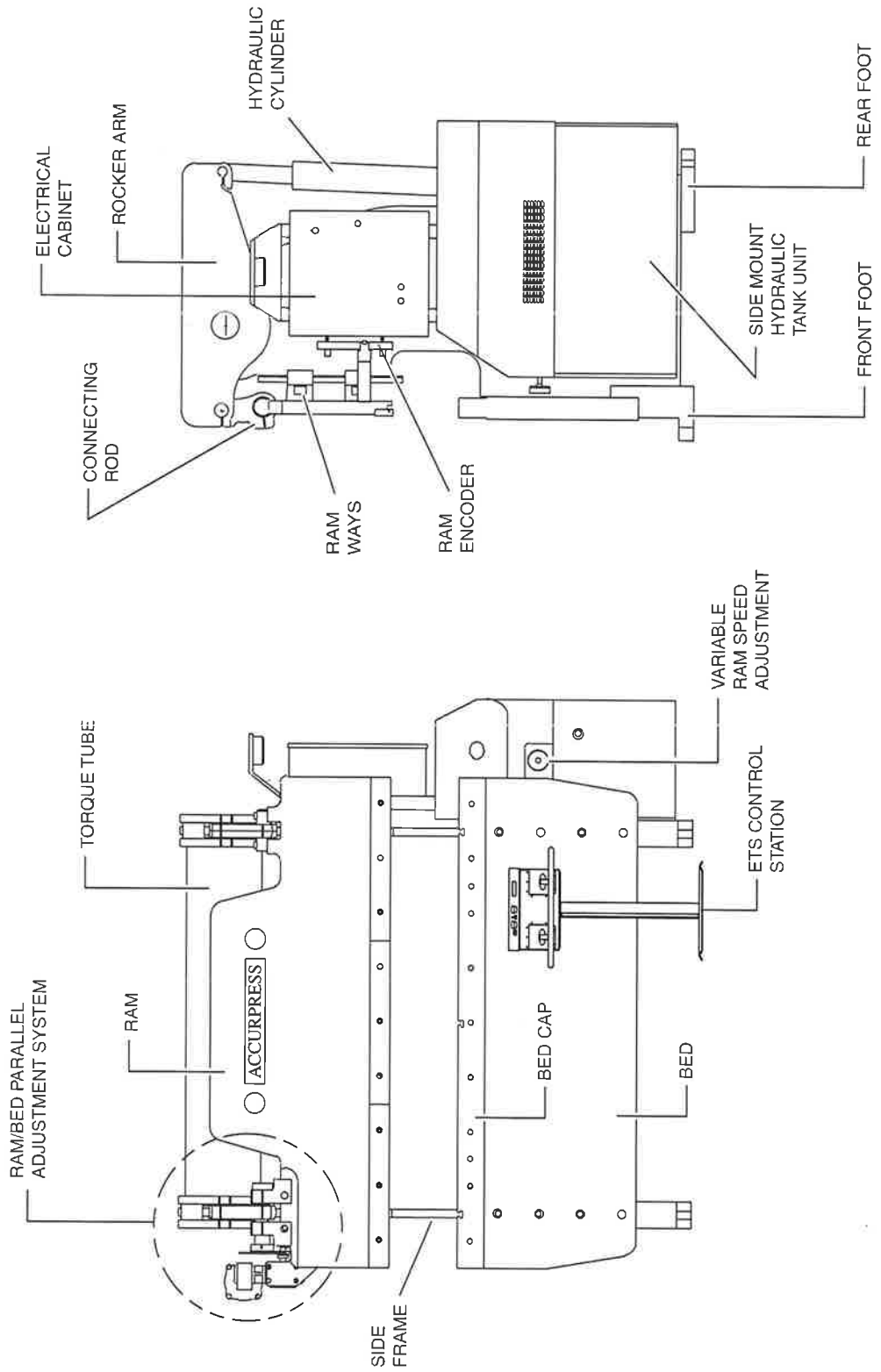


Figure 1.1-1: Press Brake General Description (60 to 130 ton models)

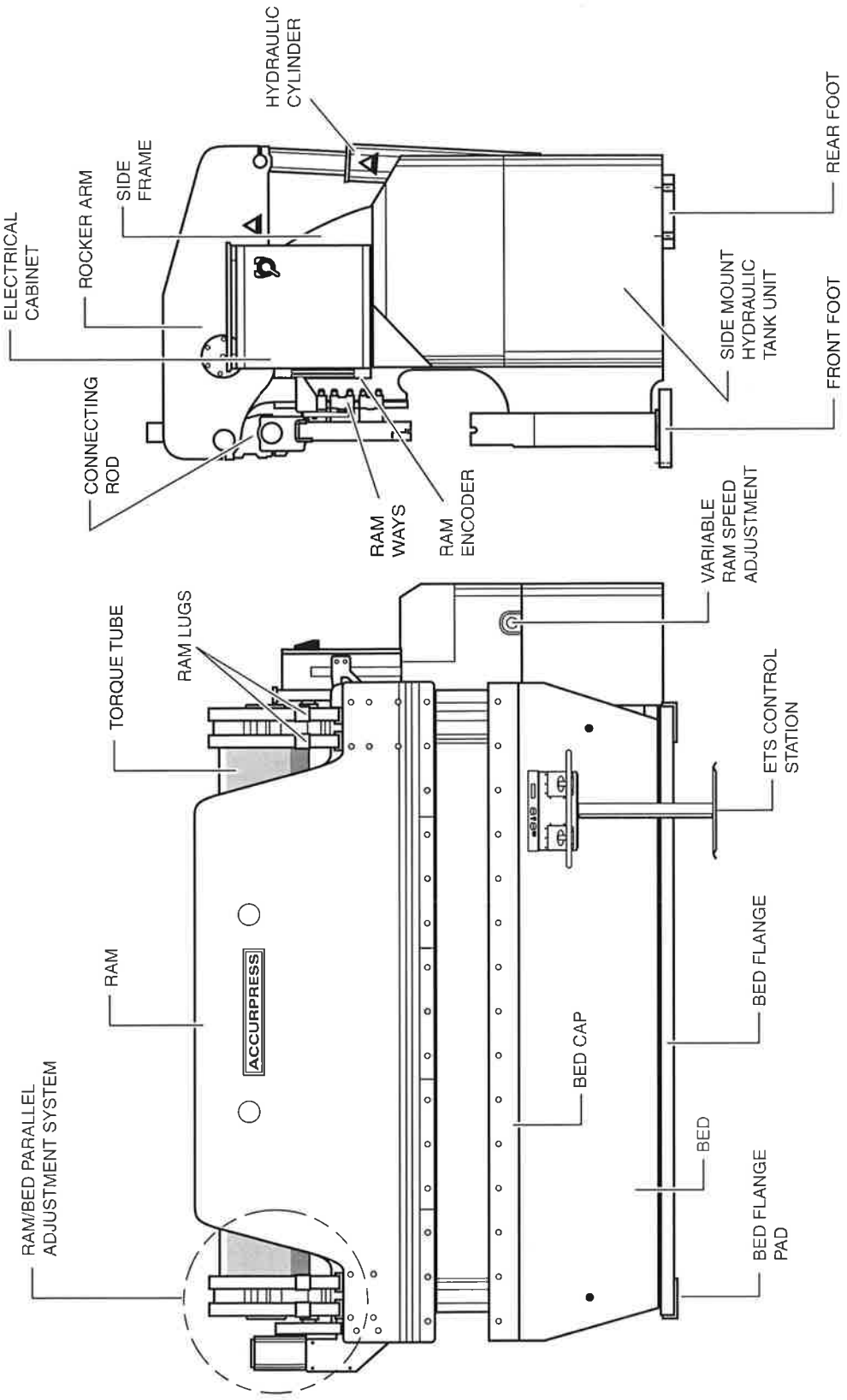


Figure 1.1-2: Press Brake General Description (175 ton models and up)

1.2 Backgauge Description

The following backgauge configurations are available for each Accurpress press brake:

1) Standard backgauge
   - With manual or power X-axis (horizontal) and R-axis (vertical) control.

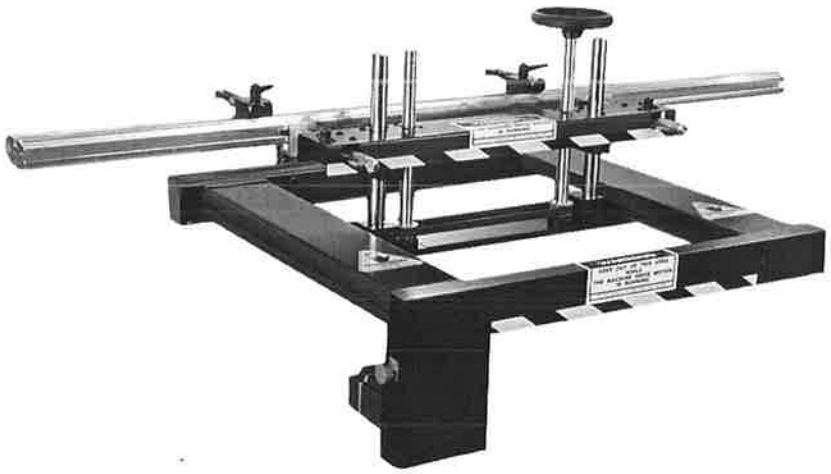


Figure 1.2-1: Standard Backgauge

2) Heavy duty premium backgauge
   - With power X-axis (horizontal) and manual or power R-axis (vertical) control.
   - With manual or power Z-axes (finger) control.

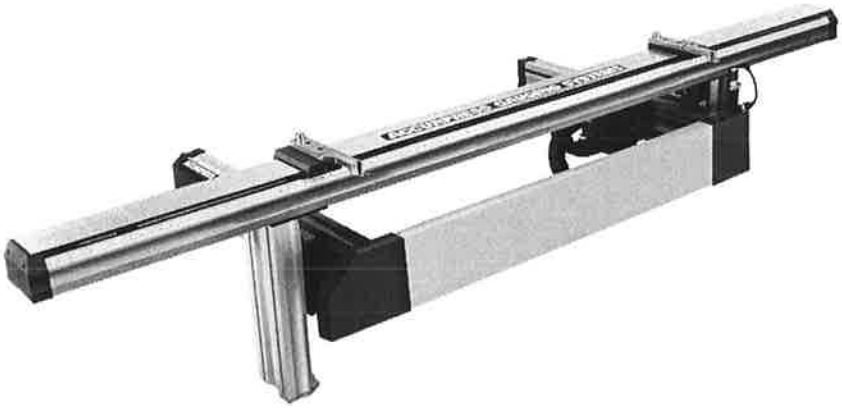


Figure 1.2-2: Premium Backgauge

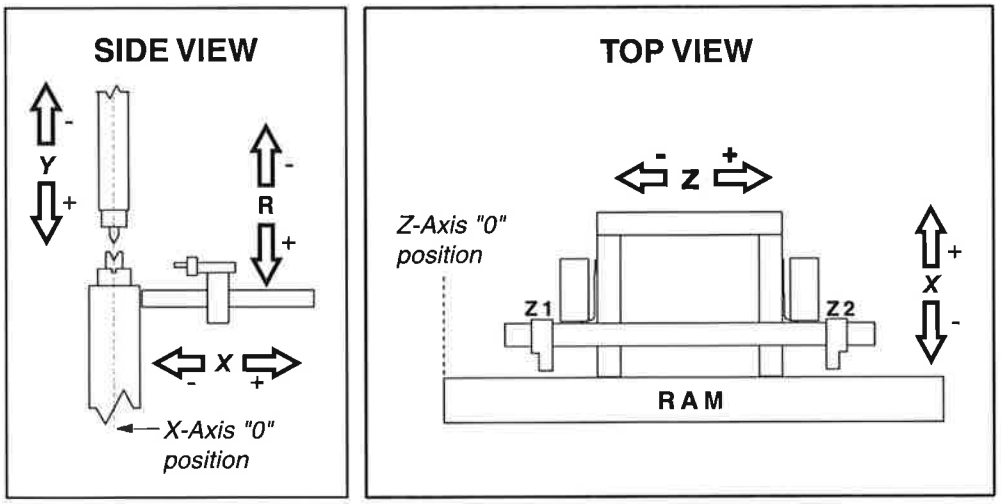


Figure 1.2-3: Ram and Backgauge Directions of Motion

1.3 Automatic Sheet Follower (Optional)

The Accurpress Automatic Sheet Follower (SF) is an optional material handling system used to automatically support and follow the sheet throughout the bending process. This is particularly useful in a single-operator situation, and when heavy, bulky, or long-flanged material bending applications exist.

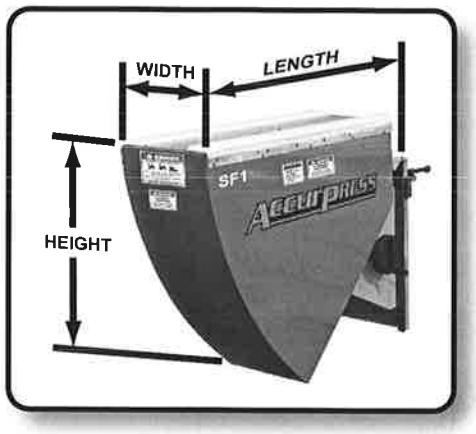
The SF is mounted to the front of the press brake and is easily positioned left to right via a linear bearing and rail along the length of the bed. Manual SF adjustments can be made in both the vertical and horizontal planes to provide the necessary mobility for various V-die openings and heights. For safety and convenience, the rail is extended beyond the bed length, normally on the left-hand side, to permit parking of the SF beyond the end of the bed.

The SF is fully integrated to the ETS 3000 Control and is operational in all job modes. The SF is represented by either one axis or two independent axes in the ETS 3000 program when the press brake is equipped with one or two SF Tables, respectively. Refer to the ETS 3000 User Manual for details.

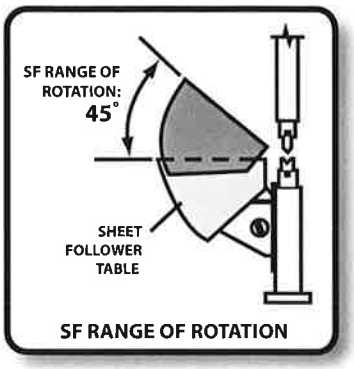
1.3.1 Technical Specifications

SF UNIT DIMENSIONS AND WEIGHT *	
Length	43"
Width	18"
Height	38"
Weight	600 lbs

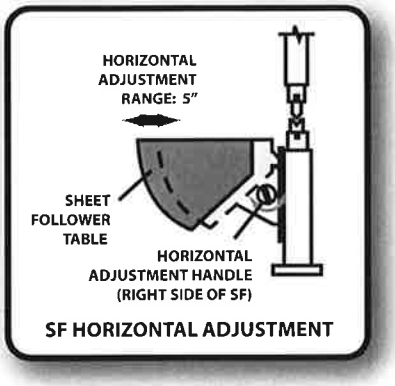
* Unit dimensions and weight are approximate.
** Specifications are subject to change without notice.



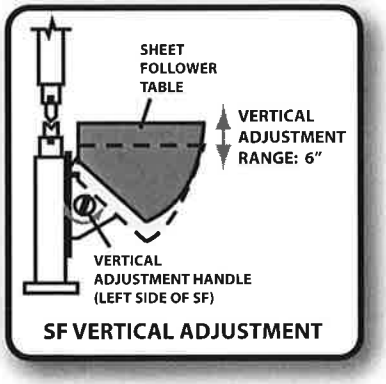
SHEET FOLLOWER RANGES OF MOTION AND ADJUSTMENTS	
Table Rotation	45°
Vertical Height Adjustment	6"
Horizontal Height Adjustment	5"



SF RANGE OF ROTATION



SF HORIZONTAL ADJUSTMENT



SF VERTICAL ADJUSTMENT

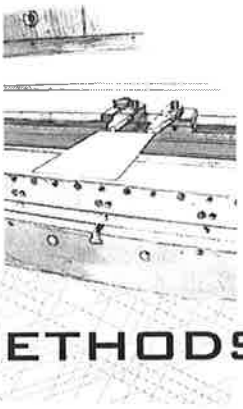
SF PERFORMANCE SPECIFICATIONS *	
Direct Lifting Capacity	500 lbs
Maximum Angular Velocity **	52.9 deg/s (1.85 rad/s)

The minimum recommended tool V-die opening is 1.2" when forming material with the SF. The SF operates at its maximum angular velocity when a V-die opening of 1.2" or less is used.

⚠ CAUTION

Be very cautious when forming material using tooling with small V-die openings. The ram bend speed, and thus the SF up-acting speed, will increase dramatically as the V-die opening decreases!

If a V-die opening less than 1.2" is used, the SF will not keep up with the ram bend speed. In this case, reduce the ram bend speed.



2 ACCURPRESS FORMING THEORY AND METHODS

Plate and sheet metal press brake forming involves many variables that affect the quality and accuracy of the final formed part. Understanding the terms and principles will help the press brake operator to achieve high quality in the formed parts and optimize productivity.

2.1 Glossary of Terms

2.1.1 Press Braking

Press braking is the mechanical process of deforming sheet material supported over a female ("V" shape) die by applying force through the punch.

Permanent deformation of the sheet part occurs along the line of contact when the force exceeds the yield strength of the material.

There are two methods for generating the force required to bend the sheet material:

- The most common method is by a flywheel and eccentric crank moving a sliding beam (ram). This is commonly referred to as a mechanical press brake.
- The preferred method is by hydraulic or hydramechanical force at the press brake ram. Hydraulic cylinders, attached to the press ram directly or by linkage, convert the energy from pressurized hydraulic oil to mechanical force.

2.1.2 Air Bending

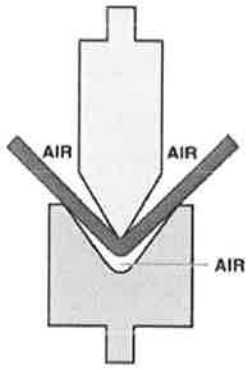


Figure 2.1-1: Air Bending

With air bending, the sheet is deformed in a three point contact between the punch and rounded shoulders of the die. The sheet material does not make contact with the sides of the die or the punch.

NOTICE

When the applied force is released, a partial springback occurs, due to the elastic properties of the material.

Typical air bending dies are configured with an included angle of 85 degrees so that the part can be over bent, with resulting springback to the desired 90 degrees.

With air bending, the operator can form parts with different bend angles using the same die set for a given material thickness. This is achieved by controlling the punch penetration into the work piece over the die.

Acute dies with an included angle of 60 degrees can be used to air bend sheet metal gauge parts for included angles greater than 60 degrees. The angle of the formed part is determined by the depth of the punch penetration into the die.

Tonnage requirements for air bending are typically published for mild steel of specified tensile strength, material thickness and die opening configuration. See Figure 2.2-1.

2.1.3 Bottom Bending

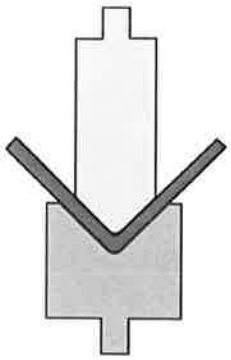


Figure 2.1-2: Bottom Bending

With bottom bending, the punch applies sufficient tonnage so that the sheet material conforms to the geometry of the die set. With this method the formed part should experience little or no springback.

The die included angle is normally 90 degrees.

Typical tonnage requirements for bottom bending are up to four times greater than for air bending.

Although variances in the formed part angle are lessened with bottom bending, the die set is limited to a single angle part forming operation.

2.1.4 Coining

With coining, the punch applies sufficient tonnage so that the sheet material conforms to the geometry of the die set and experiences a slight degree of thinning at the point of contact. With this method the formed part should experience no springback.

The die included angle is normally 90 degrees.

Typical tonnage requirements for coining are four to eight times greater than for air bending - a disadvantage due to costs associated with higher capacity press brakes and maintenance of equipment and tooling.

Although variances in the formed part angle are lessened with coining, the die set is limited to a single angle part forming operation.

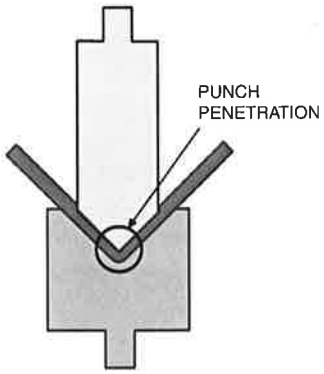


Figure 2.1-3: Coining

2.2 Air Bending Principles

2.2.1 Tonnage Requirements

Air bending is the preferred method of forming sheet material with a punch and die combination. Lower forming tonnage allows press brakes of lower capacity to manufacture the formed parts.

Figure 2.2-1 details the relationship between material thickness and die opening for a specified material tensile strength of 60,000 PSI. Note that as the tensile strength of most mild steels in North America exceed 60,000 PSI, higher tonnage values may be required.

2.2.2 Die to Material Thickness Ratios

Standard industry practice for sizing the die opening is: eight times material thickness when less than 1/2", ten times material thickness when 1/2" and greater.

For material in a heat treated condition, some material data sheets may specify larger die openings to prevent the formed shape from cracking.

For gauge sheet material and light plate, the punch radius is typically equal to the material thickness. For heavy plate, the punch radius is normally one and a half to three times the material thickness, depending on the properties of the plate being formed.

FORCE TO AIR BEND MILD STEEL (60,000 PSI)

F = U.S. tons/lineal ft. of workpiece All Dimensions in Inches

t	v	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	v
	f	3/16	9/32	11/32	7/16	9/16	11/16	7/8	1 1/8	1 3/8	1 3/4	2 3/16	2 13/16	3 1/2	4 1/2	5 1/2	6 7/8	f
ga.	r / in.	1/32	1/16	5/64	7/64	9/64	5/32	13/64	1/4	5/16	13/32	33/64	5/8	3/4	1 1/32	1 5/16	1 5/8	ga.
20	0.036	3.1	1.75	1.2														20
18	0.048	5.4	3.1	2.1	1.55	1.3												18
16	0.060	9.6	5.5	3.8	2.8	2.2	1.45											16
14	0.075		9.3	6.4	4.7	3.8	2.5	1.85										14
12	0.105		20.5	14.0	10.4	8.1	5.6	4.1	3.2	2.2								12
11	0.120			18.5	13.9	10.9	7.4	5.6	4.3	2.9	2.15							11
10	0.135			25.2	17.2	14.5	9.9	7.3	5.7	3.8	2.85	2.23						10
3/16	0.188				34.8	27.6	19.1	13.9	11.0	7.5	5.6	4.3						3/16
1/4	0.250					58.0	39.5	29.0	22.8	15.5	11.4	8.9	6.1	4.5				1/4
5/16	0.313						69.5	51.0	40.0	27.0	20.0	15.6	10.5	7.8	6.1			5/16
3/8	0.375							75.0	59.0	40.0	29.5	23.4	15.8	11.7	9.2	6.2	4.6	3/8
7/16	0.438							115.0	90.0	61.0	45.5	35.2	24.0	17.8	13.9	9.4	6.9	7/16
1/2	0.500									85.0	62.0	44.3	33.0	24.5	19.1	13.0	9.8	1/2
5/8	0.625											86.0	58.0	43.0	34.0	23.2	17.5	5/8
3/4	0.750												91.0	67.0	53.0	36.4	26.7	3/4
7/8	0.875												136.0	101.0	79.0	54.0	40.0	7/8
1	1.000													146.0	115.0	68.0	58.0	1

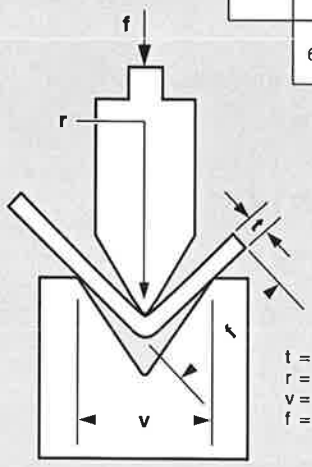
F VALUES

FOR STEEL OF DIFFERENT TENSILE STRENGTHS, F VALUE DIFFERS IN PROPORTION TO STRENGTH RATIO.

INSIDE RADIUS r, FOR MILD STEEL, IS ABOUT 5/32 OF FEMALE = DIE OPENING v FOR ANY t.

BORDERED f VALUES ARE FOR v = 8t, COMMON FOR AVERAGE 90 DEGREE BENDING.

IF t IS 1/2 IN. OR MORE USE v = 10t.



t = WORKPIECE THICKNESS
r = INSIDE RADIUS OF FORMED PART
v = VEE-DIE OPENING
f = MINIMUM FLANGE

Figure 2.2-1: Tonnage Chart

Note:

The above chart illustrates the appropriate tonnage values to air bend mild steel with 60,000 PSI tensile properties. It must be noted that most North American steel mills are producing harder metals with typical mechanical properties of 44,000 PSI yield and up to 80,000 PSI tensile strengths. The tonnage values required to form these metals are substantially higher and must be taken into consideration in the selection of a press brake.

2.3 Press Brake Tooling

2.3.1 General Purpose

General purpose tooling is manufactured from pre-hardened tool steel with a Rockwell hardness range of Rc 28-30.

Tooling usually covers the full length of the press brake bed, with nominal tolerances on size and straightness depending on the tooling manufacturer.

General purpose tooling that is sectionalized must be match marked since the individual sections may not be interchangeable, due to variance in dimensional manufacturing tolerances.

2.3.2 General Purpose Flame Hardened

Several press brake tooling manufacturers offer flame hardened tooling for better wear resistance at the die shoulders and punch tip radius.

This tooling can be less accurate in straightness, due to the heat treating process and subsequent mechanical straightening.

2.3.3 General Purpose Four Way Dies

The four way die has four different female "V" openings, each of which is accessed by rotating the die. Refer to Figure 2.3-1.

The disadvantage of this configuration is that the minimum flange of a part to be formed cannot be smaller than the width of the four way die.

Although the female opening change is simple, the die and die holder should be centered with the punch for each rotation, to ensure optimum press brake forming performance.

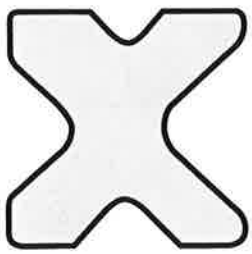


Figure 2.3-1: Four Way Die

2.3.4 Adjustable Dies

Adjustable dies provide a range of openings - in 1/2" increments from a minimum of 1" to a maximum of 8", 10" or 12". An opening is set by moving keyed adjustable risers to a keyway position of the interlocking base plate. Refer to Figure 2.3-2.

This type of die is useful for forming a greater range of material thicknesses. It is especially favorable because the wider openings allow forming of thicker plate.

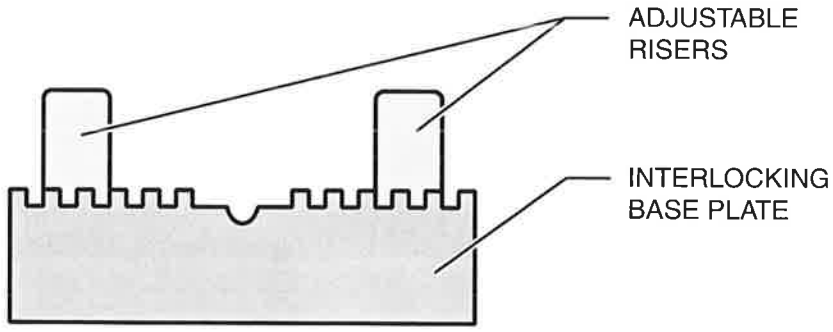


Figure 2.3-2: Adjustable Die

2.3.5 Punches

A variety of punches are available for different forming techniques. Consult tooling documentation for information on specific applications.

Figure 2.3-3: Punch

2.3.6 Precision Ground and Hardened Dies

Precision ground and hardened tooling is manufactured in sections to close dimensional tolerances to allow interchanging and direct replacement.

Precision tooling is geometrically defined with specified die height, die opening and shoulder radius, punch radius and load rating-all of which can be catalogued to a press brake CNC gauging system tool library. Defining the geometric tooling parameters in a CNC environment enhances press brake productivity because it reduces the number of trial bends and sample parts required for setting up the job.

2.4 Press Brake Die Holders

2.4.1 Standard Die Holder

The standard die holder serves as a filler block between the press brake bed and the press ram to ensure die closure within the full stroke of the press brake. In most instances, the tooling alone will not fill the shut height. Refer to Figure 2.4-1.

The die holder also serves as a working surface to minimize wear to the press brake bed during die changes.

The die holder permits the die set to be lifted for localized shimming to accommodate formed part angle variances. These variances are due to irregularities in general purpose dies and to wear, usually associated with continuous press braking in the same area.

Die holders may be restrained from movement or are mechanically adjusted on the press brake bed by a tang and set screws, T-bolt fasteners or die adjuster blocks.

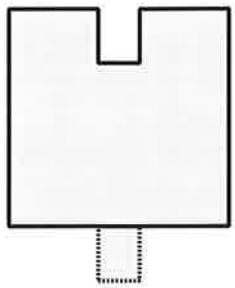


Figure 2.4-1: Standard Die Holder

2.4.2 Four Way Die Holder

The four way die holder is a channel that retains and centers a four way die with the punch during forming. Refer to Figure 2.4-2.

The four way die holder is similar to the standard die holder in terms of function and attachment to the press brake.

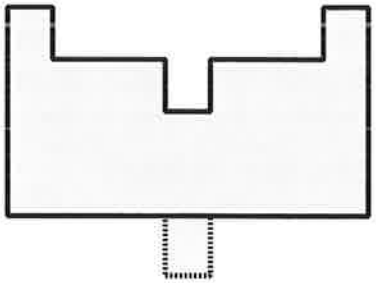


Figure 2.4-2: Four Way Die Holder

2.4.3 Crownable Die Holder

Several tooling manufacturers offer crownable die holders with:

- single adjustment for proportional die holder crowning over the full length, or
- individual adjustment points along the length of the die holder.

An advantage of the crownable die holder is that the operator can make die set adjustments without the traditional die holder shimming procedures.

The attachment and dimensional stack height for the press brake shut height are similar to the standard die holder.

2.5 Bend Allowance and Flat Panel Development

2.5.1 Bend Allowance

Bend allowance is the arc length along the neutral axis in the bend region. The neutral axis is the region where the material experiences no compression or elongation after forming.

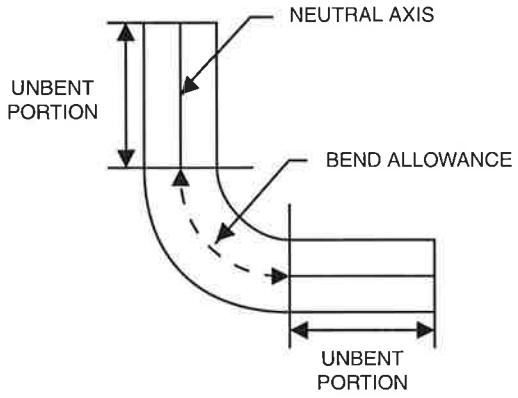


Figure 2.4-3: Bend Allowance

Bend allowance is dependent on the inside formed radius. The lower V die opening determines the inside radius (I.R.) of a formed part. The inside radius for mild steel is 5/32 x lower V die opening (W) when the punch radius is less than 5/32 x W.

Formulas for calculating the bend allowance are as follows:

If I.R.< Material Thickness (t)
Bend Allowance = (3.1416/180) x (I.R. + t/3) x A

If I.R.> 2 x Material Thickness (t)
Bend Allowance = (3.1416/180) x (I.R. + t/2) x A

Where A= (180 - Bend Included Angle)

If the inside radius is equal to t or 2t, or between t and 2t, the bend allowance is calculated by interpolating the bend allowance values from the two formulas mentioned above.

2.5.2 Flat Panel Development

Formed parts with different angles and multiple bends require a flat panel development calculation. The typical approach is to calculate the length along the neutral axis of the formed part.

Computerized flat panel development programs that create the flat panel size from the formed part CAD drawing are commercially available. With the flat panel development program, press brake production can be optimized by "off the floor" programming of many of the press brake CNC gauging systems.

2.6 Press Brake Forming Practice

2.6.1 Press Brake Condition

Accuracy and repeatability of formed parts are dependent on the press brake structural condition, the ram and bed die mounting surface condition, and the operating controls.

Die mounting surfaces of press brakes that have operated under heavy forming loads, particularly with bottom bending or coining, will require remachining to recover the load bearing integrity and positive crown.

2.6.2 Tooling Selection

Tooling is a key factor in determining the quality of the formed parts. Selecting the press brake die in accordance with accepted die opening and punch radius practices will generally result in parts formed to the required geometry.

A die opening that is too small requires greater press brake tonnage, which could result in cracking of the formed part.

A die opening that is too large can result in incorrect definition of the formed part, particularly with dies that have 80 - 85 degree included angle.

2.6.3 Tooling Installation

Press brake tooling installation and alignment will affect the repeat part definition.

Install and visually align the die holder and lower die to the punch. (Visual alignment is adequate for many general die set ups.)

A more exact alignment procedure is to equalize the clearance between the angled sides of the punch and the sides of the die, using feeler gauges. This is recommended for die set ups where formed part accuracy is a process requirement.

2.6.4 Tooling Condition

Press brake tooling should be maintained in good condition and stored in a tool rack when not in use.

Any clearance between the press bed, die holder and die, due to worn/damaged surfaces or bent tooling, can cause the die assembly to flex under load. This will result in variances in the formed parts.

Tooling should be straightened so that the assembly lies flat on the press bed with no air gap between the press bed and die holder or the die holder and die.

Check for clearances with a feeler gauge between each component along the length of the press bed.

In localized areas that exhibit gaps due to flexure of the die set, shimming is recommended to correct the condition.

Continuous production of small parts in a localized area of the die set will cause non-uniform wear. Formed full length parts may eventually exhibit an inconsistent bend due to this wear. To correct the situation, either shim under the die holder in the area or remachine the die.

Frequently inspect the dies and have them remachined to correct for wear or damage before repeatability, accuracy and productivity are affected.

2.6.5 Material Specification

Material specification is the most overlooked variable that affects the definition and repeatability of the formed part.

Material specifications for any grade of material vary constantly. Typically, lower grade materials have undefined physical and chemical properties, and in the case of steel may be known as "mild steel." Variations in physical properties, thickness and hardness within a material batch will affect the consistency of the bend angle-from end to end and from part to part.

Ideally, material for a production job should have Mill Certificates to identify that it is from one batch and is consistent in all other regards.

Prior to forming, part blanks should be sheared, punched or plasma cut with the batch material grain oriented in a consistent direction.

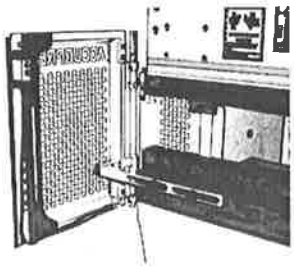
2.6.6 Qualified Press Brake Operator

Most new press brakes are equipped with CNC controls. However, the quality of the formed parts and the overall productivity of the press brake will be further enhanced by a well trained and qualified press brake operator, who understands the principles of press braking, die selection, die set up, and part blank material properties.

With traditional press brake controls, setting up a job relied on teach mode or trial bend procedures. The operator learned the setting of the press ram bend position for a particular material thickness and die set, using mechanical indicators. The operator would then offset the press ram bend position for subsequent jobs, to account for variability of material properties and for die wear.

A skilled operator continually monitors the formed parts and offsets the press ram and backgauge positions, to ensure that tolerances are maintained.

A training program to update operators on press brake safety, changes in material specifications, press brake technology and current manufacturing plant production layout will upgrade personal skill levels. A training program will also promote continuity of knowledge transfer to new workers.



3 ACCURPRESS SAFETY RECOMMENDATIONS

Press brake operations and applications can be performed safely and efficiently if proper tooling, point of operation guarding, work support fixtures, supervision and training are made top priority in your operation.

Study and follow the practices, procedures and standards discussed in this section of the manual. In addition, a separate Accurpress safety manual is available from your Accurpress representative, and should be carefully read and understood before operating the press brake.

NOTICE

It is the responsibility of the Owner/Employer and Operator/Helper to read this ACCURPRESS User Manual prior to start-up, in order to familiarize themselves with the press brake and its operational controls.

The Owner/Employer and Operator/Helper must read and understand the use, maintenance, and safeguarding requirements of the American National Standard for Power Press Brakes, ANSI B11.3-1982 or later revision, available from:

American National Standards Institute
1430 Broadway
New York, NY 10018
1-212-642-4900

The terms "point of operation" and "die area" refer to the space between the bed and the ram where the work (forming, shearing, punching) is being performed.

GOLDEN RULE

Keep your hands, fingers, and all parts of your body from between the dies or point of operation when the machine is energized or the motor is running ...unless the motor is locked off and the ram is blocked and secured.

3.1 Safeguarding

⚠ WARNING

Never start or operate this machine without adequate point of operation guarding.

NEVER operate an ACCURPRESS press brake without proper tooling and safeguarding at the point of operation which will protect you from bodily injury.

DO NOT remove Safety/Warning decals from the ACCURPRESS press brake.

The Owner/Employer is responsible for evaluating the hazards of every operation performed on an ACCURPRESS press brake and for providing safeguarding to protect all areas of entry to the point of operation.

The Owner/Employer is responsible for point of operation safeguarding installation, maintenance and usage by operators/helpers. Refer to Section 3.5.

3.2 Operation

NEVER operate this press until you understand that this press is dangerous and if you place your hands or any other part of your body in this press it could result in the loss of fingers, limbs or life.

The Owner/Employer is responsible for the training of operators/helpers prior to operating an ACCURPRESS press brake, and for ensuring that safety practices are observed at all times.

3.2.1 Point of Operation

NEVER place your hands or any part of your body within the point of operation.

3.2.2 Safeguarding

ALWAYS ensure that point of operation safeguarding is in place for every press braking operation being performed.

3.2.3 Operator Controls

Use the HAND control mode whenever possible. This is the safest way to activate downward ram travel. HAND/FOOT operation is the second choice for safety considerations. The FOOT control mode should be given last consideration for overall safe operation.

NOTE: In all cases it is strongly recommended that a support fixture be used to hold work whenever the ram is activated.

3.2.3.1 Footswitch Safety

The footswitch is equipped with a treadle cover and a treadle latch. These two mechanisms assist in preventing unintentional activation. The footswitch should never be altered or modified in any way, or removed and replaced by any other type of footswitch. The footswitch must be used in conjunction with adequate point of operation guarding selected for the particular operation being performed.

⚠ CAUTION

Use the footswitch only when the die is within 0.25" (6.4mm) of the material to be formed or when a safety curtain is used.

3.2.4 Multiple Operator Controls

If a press braking operation requires more than one operator, press ram motion controls must be provided for each operator.

3.2.5 Operator/Helper Awareness

NEVER become casual about a press braking operation. Always concentrate on the job at hand.

3.2.6 Operator/Helper Clothing

ALWAYS wear appropriate clothing. Loose clothes could become caught in the machine works.

3.2.7 Operator/Helper Positioning

ALWAYS position yourself to avoid being struck by the work piece during forming or when the press ram retracts.

ALWAYS watch for pinch points. The work piece often makes contact with the press ram and press bed.

3.2.8 Safety Hand Tools

ALWAYS use hand tools for feeding small parts or retrieving parts and/or material from the point of operation. Never position your hands near the die area!

3.2.9 Tool and Accessory Storage

NEVER hang tools from the press ram. They may cause injury if knocked off the press ram while an operation is being performed.

3.2.10 Die Area

ALWAYS keep the die area free of loose material and tools.

3.2.11 Work Area

ALWAYS ensure that all persons and tools are clear of the press brake before it is cycled, especially if multiple operators/helpers are present.

ALWAYS keep the operator's/helper's work area floor space clear of obstacles.

3.2.12 Unattended Press Brake

ALWAYS turn the main power OFF and either position the press ram at the bottom of the stroke or on blocks if the press brake is to be left unattended.

3.2.13 Test Intervals for Press Brake Control Functions

ALWAYS test press brake control and safeguarding functions:

- At the start of each press brake operator's/helper's workshift
- After each rest break or production interruption
- After changing operators/helpers
- After changing part size or procedure
- After changing tooling, dies, or die holders
- After changing point of operation safeguarding
- After having service or regular maintenance
- After adjusting press ram controls, press ram/bed parallel controls, press ram tonnage control, or safety light curtain alignment
- After any instance of an automatic main motor shut down
- After a programming change on any ACCURPRESS press brake equipped with CNC controls

3.3 Removal and Installation of Dies

3.3.1 Main Power Supply

⚠ DANGER

CRUSH AND SEVER HAZARD

ALWAYS follow your company's machine specific lockout/tagout procedure before changing dies on this press brake.

These steps must be followed BEFORE removing or installing dies or die holders:

- The ram must be retracted, on up stroke only, with sufficient clearance to allow for tooling to be removed or installed.
- Turn the main press brake power OFF at the control panel.
- Each employee working on die change is to apply their lock to the disconnect switch.
- Install a suitable ram block or ensure that the ram is secured against accidental movement.

3.3.2 Die Handling

Dies and die holders can be heavy and awkward to lift by hand.

ALWAYS lift lightweight dies (<10 kg or <22 lbs) using proper lifting and carrying techniques. It is recommended that all dies be transported on a die truck or cart to avoid injury to operators and to protect the dies from accidental damage.

Proper lifting equipment and practices must be appropriate for the weight involved. Any dies over 22.7 kg (50 pounds) should be handled by a hoist.

When lifting dies, fiber slings should be used to prevent damage to die surfaces. Ensure the die or die holder is well balanced within the fiber slings.

CAUTION

Falling Die Hazard

Serious bodily injury or death could occur if you are underneath a falling die.

NEVER place any part of your body underneath the dies when being lifted by hoists.

ALWAYS inspect your hoist and slings prior to use. Follow manufacturer's instructions on care and use of hoist.

ALWAYS use only the proper size bolts and/or lifting eyes that are load-rated for the die weight when hoisting.

ALWAYS use only approved and inspected rope slings for lifting dies.

3.3.3 Aligning Dies

Dies and die holders must be aligned when the control is in HAND mode. This ensures the operator's hands are away from the point of operation.

Refer to Section 6.2 for the die installation procedure.

3.3.4 Die Fastening

All dies must be securely fastened to the press brake, using the appropriate type of fasteners, to prevent injury to personnel or damage to the press brake and its tooling.

3.3.5 Die Removal

DO NOT simply unfasten the die clamping screws for removal. Prior to die removal, the ram should be lowered so that the tip of the punch is inside the "V" opening of the die. This will help ensure that the punch does not fall forward onto the operator/helper.

Refer to Section 6.2.3 for the die removal procedure.

3.3.6 Operator/Helper Personal Safety

⚠ DANGER

SERIOUS BODILY INJURY HAZARDS

Failure to follow and understand press brake safety procedures may result in serious injury or death!

NEVER place your hands or any other part of your body in the die area.

DO NOT position any part of your body where it might be struck, crushed, or severed by part movement.

ALWAYS ensure that safeguards and/or safety devices are used, installed and maintained in accordance to the manufacturer's instructions.

3.4 Press Brake Maintenance

3.4.1 Maintenance Personnel

The Owner/Employer is responsible for the correct training of maintenance personnel and their helpers prior to their operating an ACCURPRESS press brake, and for ensuring that safety practices are observed at all times.

It is the responsibility of the Owner/Employer to ensure that only trained personnel inspect, provide maintenance for, and operate the ACCURPRESS press brake.

3.4.2 Press Ram Blocking

ALWAYS ensure that the press ram is at the bottom of its stroke or on appropriate blocks to secure the ram from moving **BEFORE** any service or maintenance is attempted.

3.4.3 Main Power Lockout

DANGER

Failure to follow Lockout/Tagout Procedures and Electrical Safe Work Practices may result in serious bodily injury or death!

- **NEVER** service the **ACCURPRESS** press brake without first turning off the main power and ensuring the disconnect switch is locked out and the ram is blocked.
- Only trained and authorized personnel are allowed to perform lockout/tagout on this press brake.
- Ensure that lockout and electrical safe work practices and procedures are followed during press brake setup and maintenance.

3.5 OSHA

In recent years, both government and industry organizations have made a concerted effort towards creating a safe and healthy workplace. In the USA, legislation has been passed at the federal and state levels to protect the health and safety of its citizens. Federally, the Occupational and Safety Health Act (OSHA) was enacted by Congress and is applicable to all private employers who are involved in interstate commerce.

To facilitate compliance with OSHA legislation, the Secretary of Labor has been granted the authority to order work site inspections and, if necessary, issue citations for non-compliance. The requirements for press brakes are located under Standards for General Industry Subpart O - Machinery and Machine Guarding.

This section mandates the installation of machine guards by the owner/operator of the machine that will prevent an operator or other employees from having any part of the body in the danger zone, or point of operation, during the operating cycle of the machine. A manufacturer is not responsible for point of operation guarding. It is the employer's responsibility after it has created the point of operation.

Recently, the Occupational Safety and Health Administration (the federal department responsible for monitoring and enforcing of OSHA legislation) implemented a National Emphasis Program on Mechanical Power Presses. This program is designed to help ensure optimum worker protection by focusing not only on an employer's efforts to adopt protection measures, but also on their efforts to eliminate or reduce hazards in the workplace.

And, on February 14, 1997, the department issued Compliance Directive CPL 2-1.25 "Guidelines for Point of Operation Guarding of Power Press Brakes." The directive is reprinted in Section 3.5.1, and helps to clarify several important issues—including the difference between production work and custom work, and what is a safe distance. Contact OSHA for further information and for updates on this directive.

3.5.1 OSHA Compliance Directive for Point of Operation Guarding

OSHA Instruction CPL 2-1.25
Feb. 14,1997
Directorate of Compliance Programs
Guidelines for Point of Operation Guarding of Power Press Brakes

A. Purpose and Summary. This instruction provides guidelines for compliance officers who determine compliance with the guarding requirements for power press brakes. When guarding by barriers or physical devices is infeasible, guarding by "safe distance" is permitted if the employer meets conditions outlined below.

B. Scope. This instruction applies OSHA-wide.

C. Action. Regional Administrators and Area Directors shall ensure that CSHOs performing inspections at workplaces where power press brakes are used are aware of these guidelines and that they follow them when appropriate.

D. Discussion. OSHA's machinery and machine guarding regulations (29 CFR 1910 Subpart O) require one or more guarding methods to protect (operating, minor servicing and other nearby) employees from exposure to hazardous machine energy. These methods include guarding by physical barrier(s), by physical device(s), and by maintaining safe distance(s).

1. To protect employees who are not operating or performing minor servicing from exposure to hazardous machine energy, an employer must provide power press brake guarding by physical barrier(s) or by restricting access to power press brakes.

2. A power press brake must not be "energized" (as defined under paragraph 1910.147(b)) when the point of operation is not guarded by one or more physical barriers or physical devices unless: (1) under the operating control of a trained operator (see paragraph FI), (2) the operating control of an employee authorized to perform minor servicing which complies with the note following paragraph 1910.147(a)(2)(ii)(B), or as provided under the servicing and maintenance testing and positioning requirements of paragraph 1910.147(f).

3. Employees performing minor servicing on machine(s) or equipment during normal production operations must be protected from exposure to hazardous energy by physical barrier guards and when such guarding is not feasible, by alternative measures which otherwise provide effective protection. When machine(s) or equipment are not in normal production operations, servicing and maintenance must be performed under the control (lockout/tagout) of hazardous energy requirements of paragraph 1910.147 or paragraph 1910.333(b).

4. During normal production operations, the power press brake operator(s) must be protected to the extent feasible by physical barrier(s) or physical device(s) from exposure to hazardous energy sources not at the point of operation and elsewhere on the power press brake.

5. Because of constraints imposed by certain manufacturing or fabricating processes, safeguarding by maintaining a safe distance from the point of operation may be acceptable but only when safeguarding by physical barrier or physical devices is not feasible. "Safe distance" means the clearance between an employee (typically his or her fingers holding and supporting a piece part) and the power press brake point of operation.

6. Safeguarding by maintaining a "safe distance" is acceptable if:

a. The employer demonstrates that physical barriers and physical devices are not feasible to guard the power press brake point of operation. Physical devices typically include: two hand controls, holdouts or restraints and presence sensors.

b. The employer demonstrates that power press brake point of operation guarding by maintaining a safe distance is limited to one-time only fabrication of made-to-order or custom-made piece parts. Small quantity runs, typically performed in job shop or model shop establishments may be affected by this provision; high volume piece part rates of production will not. A "small quantity run" means fabrication of more than one of the same piece parts over a continuous timeframe of no more than four hours per month.

NOTE: Special feasibility guidelines for small quantity runs: When physical guards and physical devices are not feasible for small quantity runs as defined above, safeguarding by maintaining a safe distance as described in this directive is an alternative to power press brake replacement or major renovation which otherwise could provide employee protection.

c. The employer has a safety program which includes safe work procedures, training, and supervision to ensure that work is performed using "safe distance" alternative measures.

d. The employer has a workplace history of operating power press brakes safely by maintaining a safe distance from the point of operation. Such a history is characterized by absence of injuries related to failure to maintain a safe distance. Workplace history will be evaluated by Compliance Safety and Health Officer review of employer records and interviews or observations of employees.

7. Safeguarding of power press brakes is covered by American National Standards Institute standard ANSI B11.3-1982. OSHA recognizes this ANSI standard as the national consensus standard covering power press brakes guarding. Paragraph 6.1.4.3 of the ANSI B11.3-1982 standard specifically addresses safeguarding by maintaining employee(s) at a safe distance when a power press brake is being operated. By specific notation in paragraph 6.1.4.3, "[a] dimension value has not been assigned to the minimum safe distance." For the purpose of maintaining a "safe distance" as discussed in this instruction, the operating employee and helping employee(s) must not approach closer than necessary and in no case, closer than 4 inches (10.16 centimeters) to the power press brake point of operation. The minimum safe distance of 4 inches (10.16 cm) shall be measured from the exterior point of contact of the power press brake die closest to an employee.

E. "Safe Distance" Safeguarding Program. An employer who adopts "safe distance" protection must have (and be prepared to demonstrate to OSHA) an effective program. An employer can meet this obligation by establishing and having employees follow an effective program which includes exposure prevention procedures and training and enforcement of these procedures as delineated in paragraphs F through J below.

F. Exposure Prevention Procedures. A "safe distance" exposure prevention procedure must be developed and documented by the employer and utilized by employee(s). The exposure prevention procedure must include provisions for maintaining a minimum safe distance as discussed in paragraph D.7. above.

G. Training. Employees must be trained to follow the aforementioned exposure prevention procedure(s) before operating a power press brake covered under the procedures.

1. Training Content. Employee training must include at least the following:

a. The need for a safety oriented working relationship between the power press brake operator and when required, his or her helper.

b. The function and purpose of operating controls: operating mode controls; die space height adjustment positions: and other brake controls.

c. The hazards of placing any parts of the body within the point of operation.

d. The hazards and potential exposure related to each specific piece part bending operation particularly with respect to the piece part itself (for example, whipping) and to tooling (including loading and unloading).

e. The function and purpose of hand-feeding tools.

f. The dangers of unsafe work practices, inattention, horseplay, and misuse of equipment.

g. The necessity and importance of reporting immediately to the supervisor any condition concerning the power press brake and its operation that may affect the safety of an employee.

2. Effectiveness of Training. The employer must ensure that after training, employees perform applicable exposure prevention procedures proficiently. Power press brake operators and helpers must also comply with the safe operating instructions and recommendations of the power press brake manufacturer or industry-recognized safe working practices for power press brakes. [Successful completion of apprenticeship training may be referenced to demonstrate this latter element of employee proficiency.]

H. Retraining. Retraining must be conducted whenever a periodic inspection (see paragraph J below) reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in an employee's knowledge or use of exposure prevention procedure(s) or other work practices required to operate a power press brake safely. This retraining must introduce new or revised control methods and procedures, as necessary, and must reestablish employee proficiency to operate the power press brake safely.

I. Supervision. The employer must ensure, through effective supervision, that power press brakes are operated only by trained employees and must enforce the work practices on which power press brake operator training is based. This supervision must include periodic inspections as delineated in paragraph J below. Any deviations or inadequacies in the exposure prevention procedures or work practices must be corrected promptly. Employer measures must include retraining and other appropriate corrective action.

J. Periodic Inspection. An employer must conduct a periodic inspection of the "safe distance" exposure prevention procedure at least annually to ensure that this procedure and other provisions in this instruction are being followed. This periodic inspection must be performed by a trained person, that is, an inspector, other than the person(s) using the "safe distance" exposure prevention procedure. The periodic inspection must be designed to identify any deviations or inadequacies. The periodic inspection must include a joint review by an inspector and each trained employee of that employee's responsibility under the exposure prevention procedure. The employer must ensure that the periodic inspections have been performed. Normally, the employer must be able to identify the power press brake on which the exposure prevention procedure was being utilized, the date of the inspection, the employee(s) included in the inspection, and the person performing the inspection.

K. Enforcement. Whether or not safeguarding is provided by maintaining a safe distance, an employer shall be cited for violation of paragraph 1910.212(a)(3) (ii) when a physical barrier or a physical device is feasible (except as otherwise allowed under paragraph D.6.b above) but not used to protect employees from the point of operation of a power press brake. When physical guards and physical devices are not feasible and safeguarding by maintaining a safe distance is not provided as discussed in paragraph D.7. of this instruction, an employer shall be cited far violation of Section 5(a)(1), "The General Duty Clause," of the Occupational Safety and Health (OSH) Act.

L. Contact for further information. Questions regarding this instruction shall be directed to the Directorate of Compliance Programs and to the attention of Mr. Ronald J. Davies, (202) 219-8031, extension 110, in the Office of Safety Compliance Assistance.

M. Power Press Brake Injuries. Compliance Safety and Health Officers who discover instances in which power press brake-related injuries have occurred, are requested to find out the circumstances of the incident and report briefly to the Office of Safety Compliance Assistance, attention Mr. Ronald J. Davies. Please provide (to the extent feasible) the following incident information: the name and type of establishment, address and type of accident site, date of the incident, type of work being performed, make and model of the power press brake and a description of the safeguarding being used in the workplace at the time of the incident.

3.6 ANSI

American National Standards Institute (ANSI) is a national, nonprofit organization made up of a variety of private and public sector members. The principle function of ANSI is to establish industry-wide standards that are put in place through a process of consensus among qualified participants.

The ANSI standards dealing with power equipment are very similar to OSHA legislation, and are often identical in wording. ANSI offers its members a wide variety of services, including access to a library of information related to safety standards. ANSI press brake standards are reprinted in Section 3.6.1. Contact ANSI for further information and for updates on this standard.

3.6.1 ANSI Press Brake Standards

5. Care

5.1 Responsibility

5.1.1 Instructions

5.1.1 **Manufacturer.** It shall be the responsibility of the manufacturer to furnish instructions with any new power press brake to establish guidelines for the care of the power press brake.

5.1.1.2 **Modification.** It shall be the responsibility of any person modifying a power press brake to furnish instructions with the modification to establish new or changed guidelines for the care of the power press brake so modified.

5.1.2 **Installation.** It shall be the responsibility of the person(s) installing a power press brake to use procedures that will allow for a safe installation, and that will inhibit injury to employees and damage to the machine and its components.

5.1.3 **Training of Maintenance Personnel.** It shall be the responsibility of the employer to ensure the initial and continuing competence of personnel caring for, inspecting, and maintaining power press brakes in accordance with available instructions from the original manufacturers or subsequent modifiers and/or by his own written instructions.

5.1.4 **Inspection and Maintenance Records.** It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power press brakes to ensure that all of their parts, auxiliary equipment, and safeguards are in safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed as required for normal business operations.

5.1.4.1 **Preinspection Shutdown Procedure.** It shall be the responsibility of the employer to establish and follow a safe procedure before allowing a power press brake to be inspected or maintained. Following the inspection or maintenance, the machine must be restored to the predetermined operating condition.

5.1.5 **Clutch and Brake Adjustment.** Maintenance of the clutch and brake adjustment is necessary to avoid ram drift. Proper adjustment will allow the operator to exercise complete control over the motion of the ram. A small degree of overlapping of engagement of clutch and disengagement of the brake is generally necessary to accomplish this.

5.1.6 **Work-Area Clearance.** It shall be the responsibility of the employer to provide an adequate work area around power press brakes to permit safe maintenance practices.

6. Use

This section sets forth requirements for personnel safety in the use of power press brakes. Use is considered to mean the tooling installed, the material-position gages adjusted, proper die-height adjustment for piece-part operation, and the loading, operating, and unloading of piece-part components which are typically performed utilizing power press brakes.

The breakdown of responsibilities as described in this section is not to be interpreted as individual job descriptions as it is not unusual for one individual to be assigned to more than one of these responsibilities.

6.1 Employer Responsibility

6.1.1 **Safety Standard Compliance.** It shall be the responsibility of the employer, whether or not the employer is the owner, to ensure that the power press brake is in compliance with 1.3 prior to its use, and to provide safe tooling, safeguarding, and safe operating conditions for his employees.

6.1.2 **Training Responsibility.** It shall be the responsibility of the employer to exercise care in the selection of employees, to train employees in the care, setup, and use of power press brakes in individual piece-part bending operations. Periodic retraining is required for all operating personnel. Training should include but not be limited to the following specific instructions:

(1) The hazards of placing any body member within the point of operation to prevent serious bodily injury.

(2) The function and purpose of:

(a) Operating controls,

(b) Operating mode controls,

(c) Die-space height adjustment provisions, and

(d) Any other power press brake controls provided.

(3) The hazards and dangers which are related to each specific piece-part bending operation. A piece-part bending system is an orderly arrangement of components that act to perform a specific task to a given piece part. They are as follows:

(a) The specific piece part (see 6.1.4.3),

(b) The tooling designed or determined to perform the required piece-part bend or function,

(c) The power press brake to be utilized along with its operating control stations,

(d) The power press brake operator's function for loading, operating, and unloading the piece part, and

(e) Finally, the safeguarding means itself, which is the last but most important component necessary within the piece-part bending system.

(4) The dangers of unsafe work practices, inattention, horseplay and misuse of equipment.

(5) The function and purpose of safeguarding provisions for every job or piece-part operation.

(6) The function and purpose of hand-feeding tools.

(7) The necessity and importance of immediately reporting to the proper supervisor or authority any condition concerning the power press brake or piece-part operation that may affect the safety of an employee.

6.1.2.1 **Training Records.** A record of the material covered in the training and the date of the training should be maintained.

6.1.3 **Enforcement Responsibility.** It shall be the responsibility of the employer to establish, monitor, and enforce appropriate rules for safe operation of the power press brake operating procedures; for example,

(1) To recognize if an operator hazard exists on any particular piece-part operation or tooling and to take appropriate corrective action.

(2) To enforce strictly the use of safeguarding provisions provided for a particular piece-part operation.

(3) To enforce the use of mechanical feeds or appropriate hand-feeding tools when they are necessary and provided.

(4) To enforce the wearing of required personal protective equipment wherever it is needed.

(5) To determine and enforce the proper placement, handling, and flow of in-process piece-part materials so as to minimize the operator's distraction from the particular piece-part operation being performed.

6) To monitor and make certain that the power press brake and all items related to the piece-part operation are properly adjusted and are not being misused.

(7) To monitor and make certain that proper maintenance and care of the power press brake, tooling, and safeguarding is performed.

6.1.4 **Safeguarding the Point of Operation.** It shall be the responsibility of the employer, after selecting the tooling and specific type of power press brake for producing a piece part, to evaluate that operation before the piece part is worked (bent, etc) and to provide point-of-operation safeguarding according to the provisions of 6.1.4(1).

(1) **Safeguarding Provisions.** The employer shall provide safeguarding at the point of operation during the power press brake cycle by one or more of the following ways:

(a) A point-of-operation guard (see 6.1.4.1), or

(b) A point-of-operation device (see 6.1.4.2).

Exception: Only when 6.1.4(1) (a) and (b) cannot be used, a safe distance between the operator(s) fingers and the point of operation, while holding and supporting the piece-part, is acceptable (see 6.1.4.3 for specific requirements).

Auxiliary Safety Aids. Hand tools shall not be used in achieving safe distance. They can be used in conjunction with an approved point-of-operation guard or device as contained in 6.1.4(1).

(a) The employer shall provide and require the operator(s) to use hand tools when necessary for loading and unloading narrow (front-to-back) piece-part components to keep the operator(s) body members out of the point of operation.

(b) The employer is responsible for providing piece-part supporting devices or magnetic material-position gages to permit the operator to remove his hands from the piece part during the closing of the stroke when the safeguarding device requires the operator's hands to be removed from the piece part.

(c) The employer can attach a physical barrier to the power press brake which will prevent entry into an unused portion of a die or tooling and bending near the point of operation.

(d) When a hand bar is provided on a press brake, it should be mounted at a convenient height on the ram or press brake frame.

6.1.4.1 **Point-of-Operation Guards.** Every point-of-operation guard shall meet the following design, construction, application, and adjustment requirements:

(1) It shall prevent entry of hands or fingers into the point of operation by their reaching through, over, under, or around the guard.

(2) It shall, of itself, create no pinch point between itself and moving machine parts.

(3) Preventing the operator at all times from inadvertently reaching into the point of operation. (See 6.1.4.2.4 and 6.1.4.2.5.)

(4) It shall facilitate its own inspection.

(5) It shall offer maximum visibility of the point of operation, consistent with requirements (1) through (4).

6.1.4.2 **Point-of-Operation Devices.** A point-of-operation device shall protect the operator by means of one the following:

(1) Preventing or stopping normal stroke of the power press brake if an operator's hand(s) may be inadvertently placed into the point of operation. (See 6.1.4.2.1 and 6.1.4.2.2.)

(2) Mechanically removing the operator's hand(s) if in the point of operation as the dies close. (See 6.1.4.2.3.)

(3) Preventing the operator at all times from inadvertently reaching into the point of operation. (See 6.1.4.2.4 and 6.1.4.2.5.)

(4) Requiring application of both of the operator's hands to the machine operating controls during the die-closing portion of the power press brake stroke. (See 6.1.4.2.5 and 6.1.4.2.6.)

6.1.4.2.1 **Gate or Movable Barrier Device.** A gate or movable barrier device shall protect the operator as specified in 6.1.4.2(1) and shall enclose the point of operation before the press brake ram can be actuated. When used, this device shall be interlocked into the press brake control system to inhibit or stop activation of the press brake ram movement, unless the device is in its closed (protecting) position.

(1) The device shall not in itself create any hazard to the operator.

(2) The device shall not be used as a tripping mechanism.

(3) The device shall be designed for the highest order of reliability. It shall inhibit stroking of the power press brake in the event of a failure within the device.

6.1.4.2.2 **Presence-Sensing Point-of-Operation Device.** A presence-sensing point-of-operation device shall protect the operator as specified in 6.1.4.2(1) and shall be interlocked into the power press brake control circuit to inhibit or stop press brake ram activation if an operator's hand or other part of his body is detected in the sensing field of the device. The sensing field shall be located at a distance from the point of operation which ensures that the closing portion of the power press brake will completely stop prior to an operator reaching the point of operation after breaking the sensing field. The following requirements shall apply:

(1) The device shall not in itself create any hazard to the operator.

(2) The device shall not be used as a tripping mechanism.

(3) The device shall be designed for the highest order of reliability. It shall inhibit stroking of the power press brake in the event of a fault within the device, recognition of the presence of personnel within the sensing zone, and recognition of an erroneous signal.

(4) Failure of the sensing source, power supply, temperature variations, or other environmental factors shall not adversely affect the protection offered to the operator.

6.1.4.2.3 **Pullback Device.** A pullback device shall protect the operator as specified in 6.1.4.2(2) and shall include attachments for each of the operator's hands. Such attachments shall be connected to, and operated only by, the press brake ram or moving die, and shall be adjusted to inhibit the operator from reaching into the point of operation or to withdraw the operator's hands if they are in the point of operation as the dies close. A separate pullback device shall be provided for each operator, if more than one operator is required on a power press brake operation.

6.1.4.2.4 **Restraint Device.** A restraint device shall protect the operator as specified in 6.1.4.2(3) and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator, if more than one operator is required on a power press brake operation.

6.1.4.2.5 **Two-Handed Control Device.** A two-hand control device, when used, shall protect the operator as specified in 6.1.4.2(4). In a press brake operation requiring more than one operator, separate two hand controls shall be provided for each operator. The two-hand control device shall be located at a distance from the point of operation, which ensures that closing portion of dies or stroke will completely stop, prior to an operator reaching the point of operation after removing his hands from the hand controls. The device shall be designed for the highest order of reliability. It shall inhibit stroking of the power press brake in the event of a fault within the device.

6.1.4.2.6 **Hostage Operator Controls.** It shall be the responsibility of the employer to determine when hostage operator control stations are required and when one or more of the following types shall be allowed for use on a special-purpose power press brake.

(1) Two-Hand Maintained Controls (Full or partial Cycle). A two-hand maintained power press brake operator control station shall be installed to protect the operator during a full or partial cycle of the press brake ram by requiring application of both of the operator's hands to the operating control. Each hand control shall be protected against unintended actuation and arranged by separation so that the concurrent use of both hands is required to initiate the power press brake ram motion.

(2) Single Maintained Controls. A single maintained power press brake operator control station shall protect the operator by locating the single-cycle operating control station remotely away from the point of operation. The actuation of the operator's control will allow the power press brake ram to complete the closing portion of the cycle before the operator could inadvertently place any part of his body into the point of operation. All single maintained operator control stations shall be protected against unintended actuation.

(3) Additional Hostage Operator Controls. In a piece-part bending operation requiring more than one operator (helper), separate hostage controls shall be provided for each operator (helper).

6.1.4.3 **Point-of-Operation Safe Distance.** The employer's responsibility when using the minimum safe distance principle requires the following:

(1) The operator shall hold and support the material by the use of both hands on the near edge of the material. It is necessary for the press brake operator to side-support or hand-hold the piece part, his hand or any part of his body shall not be any closer than a minimum safe distance. The distance from the tips of the operator's fingers shall be at a minimum safe distance. The employer is then bound by the requirements of 6.1.4(1)

(2) The material-position gages shall be of sufficient height and size to prevent slipping of the material past the gages, which would allow the fingers to enter the point of operation.

(3) The operator shall be instructed to remove his foot from the foot pedal after each stroke and must operate the power press brake in a standing position.

6.1.4.4 **Auxiliary Safety Aids**

(1) The employer is responsible for providing piece-part supporting devices or magnetic material-position gages, to permit the operator to remove his hands from the piece part during the closing of the stroke when the safeguarding device requires the operator's hands to be removed from the piece part.

(2) Supporting devices shall be used behind the die, when necessary, to prevent the piece part from falling, thus eliminating the temptation to retrieve the piece part by reaching between the dies.

(3) The employer can attach a physical barrier to the power press brake which will prevent entry of any part of the body into an unused portion of a die or tooling, or being near the point of operation.

6.1.5 **Die Design, Construction, Procurement, and Modification.** It shall be the responsibility of the employer to institute general-and-special-purpose die design, construction, procurement, and modification policies and procedures that will eliminate the need for the operator to place his hands or fingers within the point of operation. The employer shall:

(1) Use general-and-special-purpose dies designed and constructed to eliminate hazards to operating personnel. Special-purpose dies shall be mounted on a bed or ram, or both, by using screw fastenings or clamps, or by the conventional die-clamping method.

(2) Furnish, and enforce the use of, a hand tool for the purpose of freeing or removing, or both, stuck work or scrap pieces from the die, to avoid requiring the operator to place his hands or fingers within the point of operation.

(3) Furnish, and enforce the use of, hand-feeding tools, when necessary, with manual feeding methods, to avoid requiring the operator to place his hands or fingers within the point of operation.

6.1.6 **Supervision of Stroking Control.** It shall be the responsibility of the employer to select the operating mode and the operating means (when more than one is available) which is to be utilized by the power press brake operator, in order to assure the safe performance of the piece-part operation.

(1) Direct foot-pedal control. When a direct foot-pedal control means is the only one provided, the operator shall be instructed to remove the foot pedal when it is not his intention to cycle the machine. When helpers are assigned to assist, refer to 6.7.

(2) Hydraulic, electrical, pneumatic controlled machines. When more than one mode is available (such as inch-single stroke or continuous) the selection of which is used is the supervisor's responsibility. When more than one operating means is provided (foot valve, foot switch, hand controls) it shall be the responsibility of the supervisor to determine if the operating means is safe to be used for the selected mode.

6.1.7 **Scrap Handling-Roll Feed.** The employer shall provide means for handling scrap from roll-feed or random-length stock operation. Roll-feed mechanisms and other auxiliary feed attachments incorporated for use in a piece-part bending system along with scrap cutters used in conjunction with scrap-handling systems shall be safeguarded in accordance with the requirements of 6.1.4 or in accordance with American National Safety Standard for Mechanical Power Transmission Apparatus, B15.1-1972, or latest revision thereof approved by ANSI.

6.1.8 **Unitized Tooling.** If unitized tooling is used, the opening between the top of the punch holder and the face of the ram or stocking pad shall be safeguarded in accordance with the requirements given in 6.1.4.

6.1.9 **Die Lubrication.** The employer shall provide brushes, swabs, lubricating rolls, or automatic or manual pressure guns, so that operators and die setters shall not be required to reach in the point of operation or other hazardous areas to lubricate material, punches, or dies.

6.1.10 **Die and Tooling Storage.** It shall be the responsibility of the employer to provide for safe storage of dies and tooling.

6.1.11 **Work Area.** The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another, with ample room for cleaning machines and for handling material, workpieces, and scrap. The work area shall be kept free from obstructions, grease, oil, and water, which may create a trip or fall hazard. The point-of-operation or die area shall be kept clear of all material or items other than the piece part being formed.

6.1.12 **Overloading.** The employer shall operate his power press brakes within the tonnage or bending capacity and attachment weight ratings specified by the manufacturer.

6.2 **Die Builder/Employer Responsibility.**

6.2.1 **Design and Construction of Special-Purpose Dies.** It shall be the responsibility of the die builder/employer to design and construct all special-purpose dies to eliminate the need for the operator to place his hands within the point of operation for loading or unloading the piece part.

6.2.1.1 **Strippers.** Spring, rubber, or stationary strippers, or an equivalent means, shall be provided on punching or piercing dies to inhibit material from riding up with the punch (except where a special mechanism is provided for scrap ejection).

6.2.1.2 **Guidepost Hazard.** The operator shall be protected from the hazard created by a guidepost (when it is located in the immediate vicinity of the operator) when the guidepost is separated from its bushing by more than ¼ inch, in accordance with the safeguarding requirements given in 6.1.4.1.

6.2.1.3 **Designation of Tonnage, Stroke, and Weight.** Special-purpose dies shall be:

(1) Designated for the tonnage stroke and shut-height requirements, or these characteristics recorded, if the records are readily available to the die setter.

(2) Designated to indicate upper die weight, when necessary for air counterbalance pressure adjustment.

6.3 **Supervisory Responsibility.** The employer shall provide adequate supervision to ensure that:

(1) The designated safeguarding means are installed, functional, and used;

(2) The designed work methods are used; and

(3) When necessary, the prescribed hand-feeding tools are used.

The employer may assign the responsibilities of this section to a responsible individual employee.

6.3.1 **Supervision of Personnel.** Supervisory personnel shall not allow employees to place their hands, fingers, or any part of their body within the point of operation. They are also responsible to ensure that die setters, leadmen, operators, helpers, etc, know and practice a safe method of performing a piece-part operation. Supervisory personnel are responsible for training new employees as well as employees newly assigned to their departments and to ensure that all employees follow safe operating practices, die-setting procedures, and the provisions of this standard. Supervisory personnel must control the selection of the operating mode and the keys obtained from the operator stroking control station, along with those obtained from the mode-selector stations, when keys are provided. Supervisory personnel may delegate some of these training responsibilities to die setters or leadmen when they have been trained and are qualified.

6.3.2 **Supervision of Work Area.** Supervisory personnel are responsible for the housekeeping, work in-process, storage, dies, piece-part material flow, and the equipment maintenance/repair reporting functions within their work area or department as it relates to the safe operation of power press brakes.

6.4 **Employee Responsibility.** Each employee shall comply with the safety rules and regulations established by the employer that are applicable to his own actions and conduct as it relates to the safe operation of power press brakes.

6.5 **Die-Setting Responsibility.** It shall be the responsibility of the person assigned to setting dies to select the proper tooling, install the tooling in the power press brake, properly adjust the tooling, adjust material-position gages, install point-of-operation safe-guarding, machine test the piece-part operation and machine function, and to:

(1) Make every attempt to protect the operator from the hazards of the point of operation.

(2) Advise all operating personnel of any particular care that must be exercised and procedures that must be followed to permit its safe use.

(3) Make die alignment adjustments only when the power press brake ram is at the bottom of its stroke, the press brake drive motor is turned off, and the fly wheel is completely stopped.

6.5.1 **Selection of Proper Dies.** Proper die selection is not limited only to considering a die that can perform the operation. A proper die is one that will perform the operation without exposing the operator to hazards.

6.5.2 **Die Installation.** It shall be the responsibility of the person assigned to die setting to follow safe procedures, established by the employer, for the installation of power press brake dies. Failure to follow safe procedures can cause accidents and injuries. The ram shall be brought to the bottom of the stroke before the power press brake motor and flywheel is stopped. Dies shall be securely clamped before the ram is placed in motion. To prevent operator exposure to hazard, the die setter shall, if necessary, install material supports, restrictive guards or devices, proper material stop gages, or magnetic material-position gages.

6.5.3 **Die Safeguarding.** The point operation shall be safeguarded in accordance with the requirements of 6.1.4.

6.5.4 **Die Removal.** It shall be the responsibility of the person assigned to die removal to follow safe procedures, established by the employer, in the removal of the power press brake dies. Failure to follow safe procedures can cause accidents and injury. The ram shall be brought to the bottom of the stroke before the power press brake motor and flywheel are stopped.

6.5.5 **Protection of Operator.** It shall be the responsibility of the individual(s) assigned, by the employer, to setting dies to protect the operator from the hazard at the point of operation by:

(1) Determining how the selected tooling can be used safely.

(2) Properly installing and adjusting the tooling.

6.6 **Press Brake Operator's Responsibility.** The employer shall assign responsibility to the power press brake operator, instructing him to have regard for his own safety, the safety of helpers assigned to him, and for the safety of others affected by his acts, and to follow written and oral safe procedures as specified by the employer and by Section 6. The press brake operator shall be responsible for reporting unsafe machine or tool conditions to his employer or supervisor.

6.6.1 **Pre-Operation Checks.** Before starting the production phase of a job, the following steps should be taken:

(1) Controls. Check all control switches to be certain they are set properly so that the power press brake will safely operate as intended. Make sure that all persons are clear, and test-operate the machine.

(2) Setup. Check to be sure that all setup work has been completed and that no loose tools or piece parts have been left between the dies or in the die space.

(3) Die Safeguarding. Check to be sure that the point-of-operation safeguarding meets the requirements of 6.1.4 and is operating properly.

(4) Hand-Feeding Tools. Check all hand-feeding tools to be sure they are suitable and in good operating condition.

(5) Material. Check the material furnished to be certain that it is the proper size, thickness and type.

6.6.2 **Operation of Press Brake.** It shall be the responsibility of the press brake operator, in fulfilling his responsibility in the operation of a power press brake, to comply with safe practices, as established by the employer, which includes keeping his body members out of the point of operation and other hazardous areas. It shall be the responsibility of the press brake operator to also observe the following points, except those which the employer has delegated to others:

(1) The power press brake and adjacent work area should be kept clean, orderly, and free of excessive accumulation of oil, grease, and material scrap.

(2) When point-of-operation safe distance is being used, the material-position gages shall be of sufficient height and size to prevent slipping of the material past the gages in order to avert fingers from entering into the point-of-operation area. If this cannot be accomplished, the press brake operator shall immediately report it to his supervisor.

(3) When using point-of-operation safe distance as the sole means of safeguarding, the press brake operator shall stand while operating the power press brake. If a platform is required, the employer shall provide a platform that is of safe and rigid construction in order to prevent the hazards of falling, slipping, or tripping.

(4) The press brake operator shall use proper work supports, mechanical assists, or helpers when loading or unloading large heavy piece parts or sheets of material. They shall observe proper handling and lifting motions.

(5) The press brake operator shall wear the personal protective equipment specified by the employer as required for the operation.

(6) The press brake operator shall reposition or position his hands after inserting the material into the die to prevent being struck by the piece part or caught between the piece part and any part of the press brake or its attachments.

(7) The press brake operator shall shut off the machine and immediately notify the supervisor when the press brake jams or sticks during the operating cycle.

(8) The press brake operator shall use the proper operating control and the safeguarding means provided to him by his employer for his safety and the safety of others.

(9) The press brake operator shall make certain that the appropriate work tables, material containers, die carts, etc, that are required to store and retain piece parts being processed shall neither interfere with his freedom, his access to the mechanical foot pedal or the operating controls, nor should they cause or prevent the movement of the treadle linkage mechanism.

(10) The press brake operator shall make the machine inoperable by the means provided to the press brake when he is not actively cycling the machine ram.

(11) Each press brake operator shall perform the piece-part bending operation of the power press brake in a safe manner, and shall study all piece-part bending operations to determine the safe practices necessary to inhibit injury to a helper, if one is assigned to a specific job.

6.7 **Press Brake Helper.** The employer shall establish and assign responsibilities to the press brake helper, who shall be protected from the hazards at the point of operation by safeguarding, as listed in 6.1.4. The helper shall have regard for his own safety, which includes keeping his body members out of the point of operation and other hazardous areas.

3.7 Safety Light Curtain (Optional)

Some press brakes may be equipped with a light curtain option. The light curtain (see Figure 3.7-2) is a presence-sensing device designed to ensure that personnel do not accidentally enter into the point of operation. Prior to using the light curtain for the first time, the muting point must be established.

⚠ WARNING

It is the responsibility of the Owner/Employer and Operator/Helper to read and fully understand the function and operation of the light curtain prior to startup. The Owner/Employer and Operator/Helper are responsible for the correct training on not only safe usage of the light curtain, but on it's limitations (inability to protect operator from flying objects, etc.). The performance and ability of this product to protect the operator depends not only on the correct installation and setup of the light curtain, but also the proper training of those involved. ANSI and OSHA regulations vary depending on your particular application and location, so make sure you understand what requirements you must meet.

3.7.1 Setting Up the Muting Point

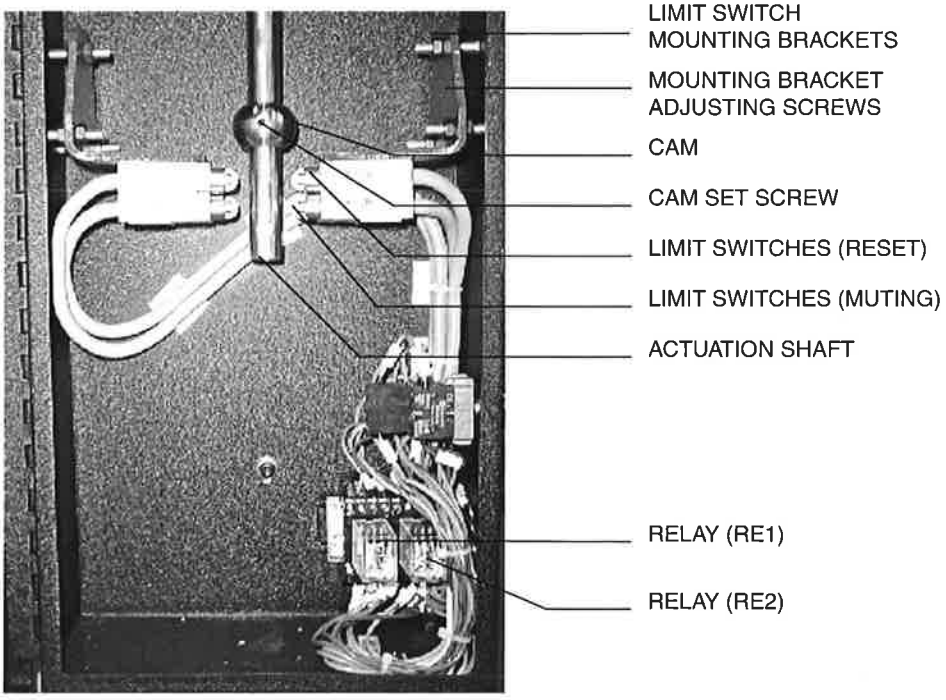


Figure 3.7-1: Inside the Light Curtain Muting Enclosure

1) Turn ON the mute enable keyswitch which is mounted to the light curtain guard.
2) Calibrate the ram.
3) Choose a job to run.
4) On the pedestal, set the Operating Mode to JOG, and turn the Double Stop ON.
5) Jog the ram down to the speed change point (the point where the ram slows down, just before the tool makes contact with the blank).
6) Loosen the cam set screw inside the light curtain muting enclosure. Slide the cam down along the actuation shaft until the lower pair of limit switches is fully depressed - this is the "muting position". The LED in each of the two relays, RE1 and RE2 (Refer to Figure 3.7-1), should illuminate simultaneously (within 0.3 seconds apart). If necessary, adjust the limit switch bracket adjusting screws until both LED's are simultaneously illuminated.

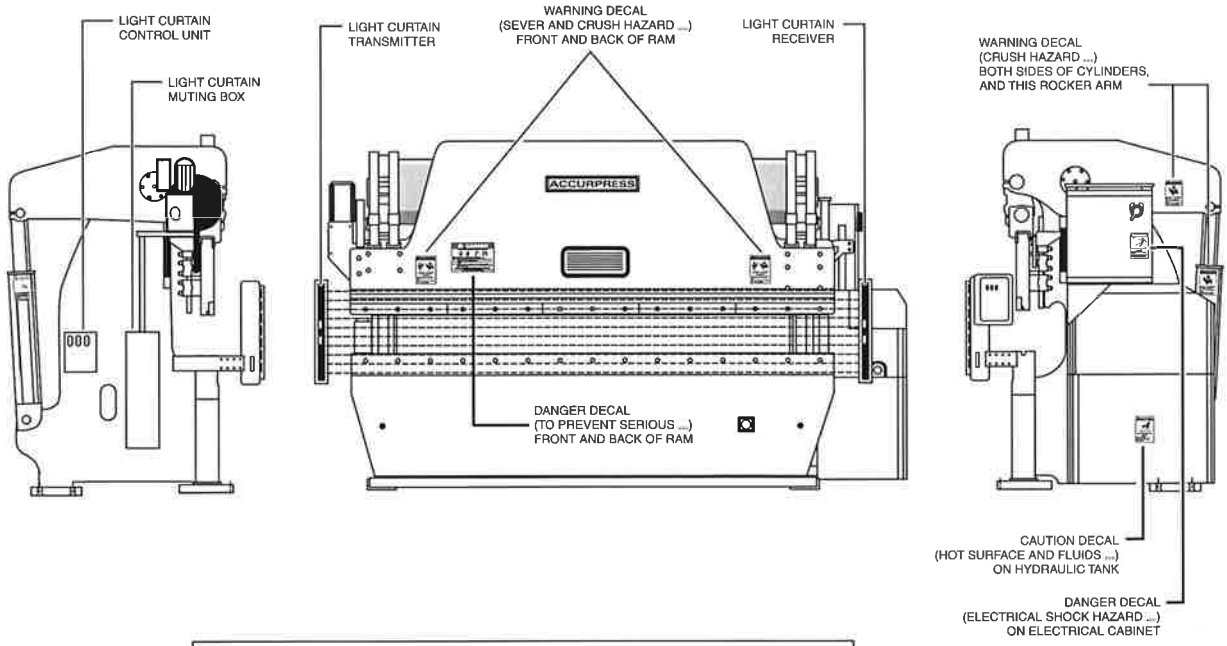
⚠ CAUTION

Never over-tighten the cam set screw.

7) At the "muting position," tighten the cam set screw.
8) Run the job again with the Double Stop ON. Verify that the mute indicator lamp comes on when the ram stops at the speed change point.

NOTICE

During the procedure, the light curtain may go into its fault condition if the limit switches are not activated simultaneously (0.3 seconds apart). To reset the light curtain, switch the pedestal's control mode to AUTO, then actuate the footswitch/palm pushbuttons. After the ram reaches the up-limit position and stops, turn the Run/Start keyswitch on the light curtain control box to Start, then release.



NOTE:

Decal located on torque tube:
WARNING, DO NOT LIFT MACHINE BY RAM ...

Decal mounted on back of ram:
WARNING, MACHINE IS FRONT HEAVY, RIG AND TRANSPORT ...

Decal mounted on backgauge:
WARNING, CRUSH HAZARD, NEVER PLACE ANY PART OF YOUR BODY IN THIS AREA ...

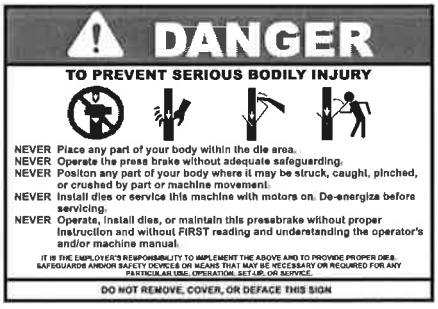


Figure 3.7-2: Light Curtain and Safety Decal Detail

3.8 LazerSafe Safeguarding System (Optional)

The LazerSafe LZS series is a safety device designed specifically for hydraulic or hydra-mechanical press brakes. This system senses a zone below the press brake punch tip using a flat laser beam that travels with the ram motion.

The key safety features of this safety device are monitoring the press brake ram bending speed to not exceed 10mm/second and press brake ram stopping distance to not exceed 8.5mm and allow press brake operator optimum access to the point of operation. Operating conditions that exceed these parameters will result in a stop command to the press brake requiring resetting of the LazerSafe safety device if the condition initiating the shut down is not corrected. The press brake will not operate until it complies.

Pressing speed is monitored continuously during the bending portion of the press brake cycle starting at the mute point.

Press brake ram stopping distance is measured on power up, and after every 30 hours of continuous operation and during press brake ram stoppage by the LazerSafe due to an object interrupting the laser beam.

The LazerSafe system allows operating modes that accommodate normal bending operations, bending parts with an up flange as well as a tray/box bending mode and a field muting mode.

Although LazerSafe systems are factory aligned and tested, each system must be field aligned at the time of the press brake installation for correct operation.

3.8.1 LazerSafe Preliminary Set up

The LazerSafe System must be temporarily disabled by a qualified field technician before any mechanical adjustments are performed.

⚠ WARNING

The LazerSafe bypass mode is provided for service technician set up only, and should not be used for production operation mode!

3.8.2 LazerSafe Alignment and Operation

The press brake must be installed to a good standard of machine level in order to properly square the LazerSafe to the press brake bed and ram. Ensure that both of the LazerSafe vertical brackets are mounted parallel to the press brake guide bars prior to carrying out the LazerSafe alignment procedure.

Refer to the "**LazerSafe LZS-003-HS Operation Manual - Dual Laser Version**" for the LazerSafe alignment procedure and operating instructions.

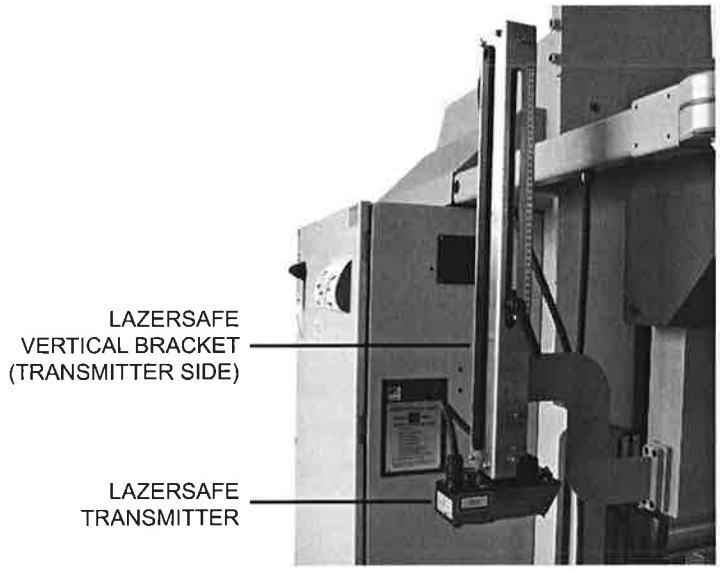


Figure 3.8-1: LazerSafe Transmitter Mounted to Vertical Bracket

3.9 Automatic Sheet Follower Safety (Optional Equipment)

3.9.1 Safety Recommendations

NEVER setup, operate, or maintain the Sheet Follower without proper instruction and without FIRST reading and understanding the press brake and ETS 3000 user manuals, and the Automatic Sheet Follower User's Guide.

To prevent serious bodily injury, NEVER position any part of your body where it may be struck, caught, pinched, or crushed by movement of the Sheet Follower or bend material. Be extra cautious when forming heavy or long-flanged materials.

The Sheet Follower is considered AUTOMATIC equipment. ALWAYS keep a safe distance from the Sheet Follower whether or not it is in motion. Advise the same to all persons nearby the operating vicinity.

NEVER place any object other than the bend material on top of the Sheet Follower table. Any object on the Sheet Follower table has the potential to become a flying projectile, posing a real danger for anyone in the vicinity.

NEVER overload the Sheet Follower table with material in excess of the Sheet Follower direct lifting capacity. An overload is unsafe and may damage the Sheet Follower.

NEVER place any part of your body, the pedestal, or any object underneath the Sheet Follower. This is a serious crush hazard.

NEVER position the Sheet Follower table directly underneath the ETS 3000 Control unless the Sheet Follower is immobilized in the parking area.

NEVER service the Sheet Follower unless the the press brake and Sheet Follower are de-energized.

It is recommended that when one or both (if equipped) Sheet Follower(s) are not in use, the unused Sheet Follower(s) should be parked for safety. See the ETS 3000 User Manual for the Sheet Follower parking procedure.

3.9.2 Sheet Follower Safety Decals

A number of factory-installed safety decals are attached to the Accurpress SF. The information provided on these safety decals is extremely important and should be carefully followed. The decals should never be removed, covered, or defaced. Ensure that all safety decals are on all SF's at all times. The safety decal details and placement locations are shown in *Figure 3.9-1* and *Figure 3.9-2*, respectively. Extra decals can be obtained through your Accurpress distributor, if needed.

1

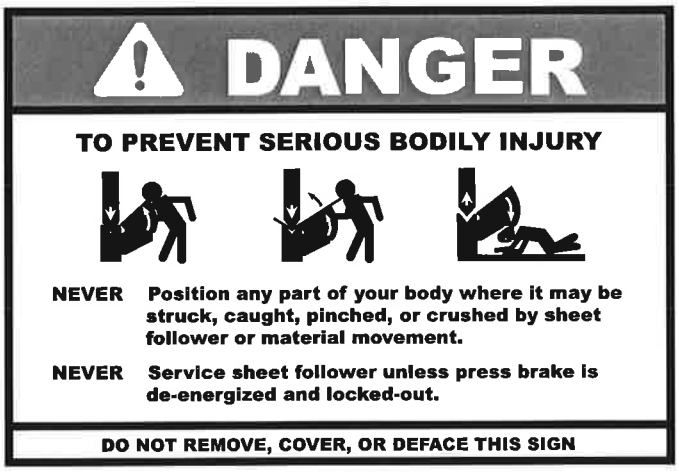


Figure 3.9-1a: Danger: "To Prevent Serious Bodily Injury" Safety Decal

2

Figure 3.9-1b: Warning: "Automatic Equipment" Safety Decal

Figure 3.9-1c: "Warning: Never Place Any Object" Safety Decal

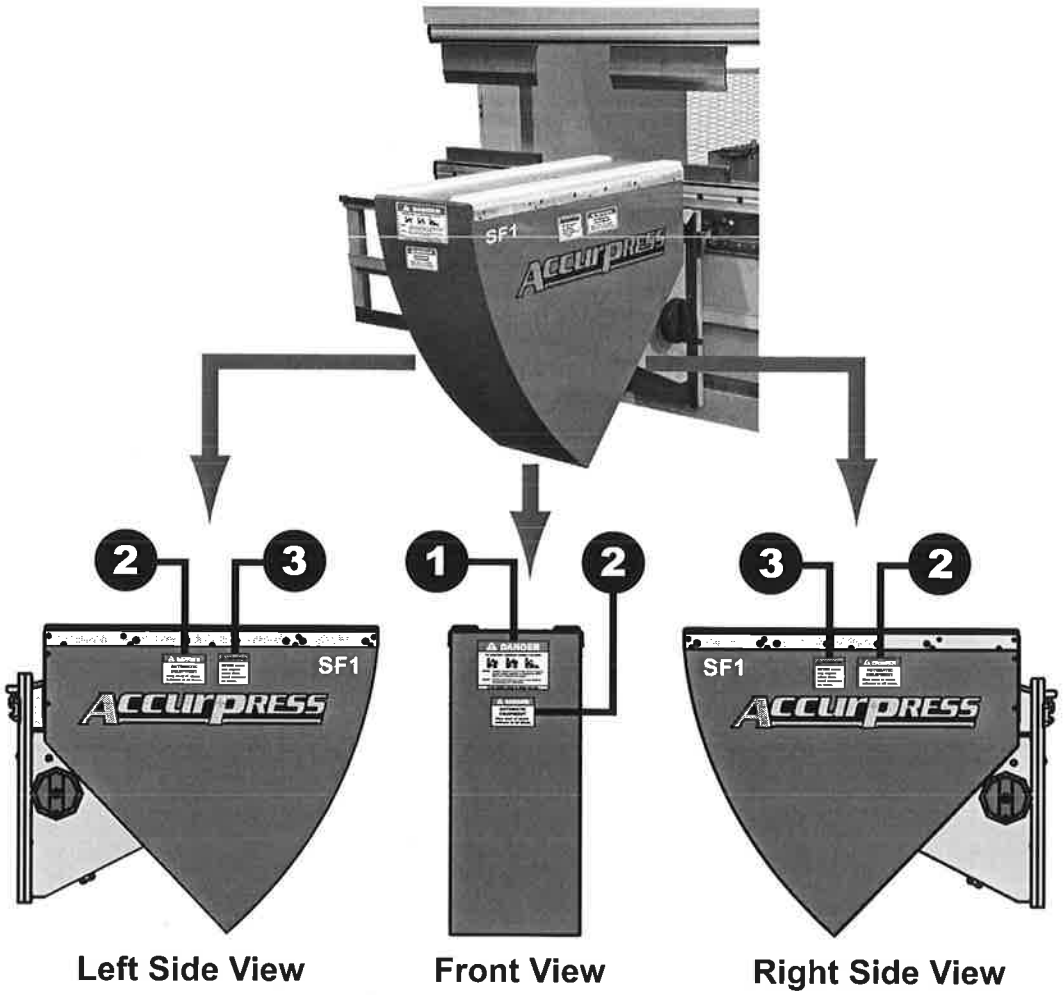
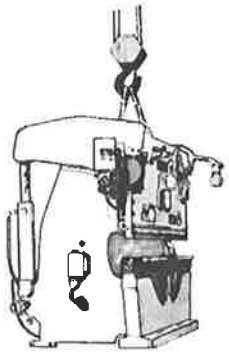


Figure 3.9-2: Sheet Follower Safety Decals Placement Locations



4 ACCURPRESS INSTALLATION

This section describes the general procedure for installing the press brake. For a more detailed description, refer to the Accurpress Installation Planner guide and video.

NOTICE

It is the responsibility of the Owner/Employer and Operator/Helper to read this ACCURPRESS User Manual prior to start-up, in order to familiarize themselves with the press brake and its operational controls.

The Owner/Employer and Operator/Helper must read and understand the use, maintenance, and safeguarding requirements of the American National Standard for Power Press Brakes, ANSI B11.3-1982 or later revision, available from:

American National Standards Institute
1430 Broadway
New York, NY 10018
1-212-642-4900

4.1 Inspection

Upon delivery, thoroughly inspect the press brake for shipping damage. All shipping damages should be reported to the carrier and the dealer immediately.

Note: All damage that occurs in transit is to be claimed against the carrier.

4.2 Lifting

Before attempting to lift the press brake be sure to remove the polyfilm wrapping.

Be aware of all lifting and warning decals before rigging the press brake for lifting. Refer to Figure 3.5-2 for safety decals locations.

There are two methods for lifting the press brake:

1. The press brake can be lifted using appropriately sized rigging equipment which may include a spreader bar with slings around the torque tube at the rocker arms, and skates.
2. A forklift truck of sufficient capacity can lift the press brake from the front, under the bed flange. The press brake is front heavy and should always be secured to the forklift mast when moving.

Refer to Figure 4.2-1 and Figure 4.2-2 for examples of possible lifting methods.

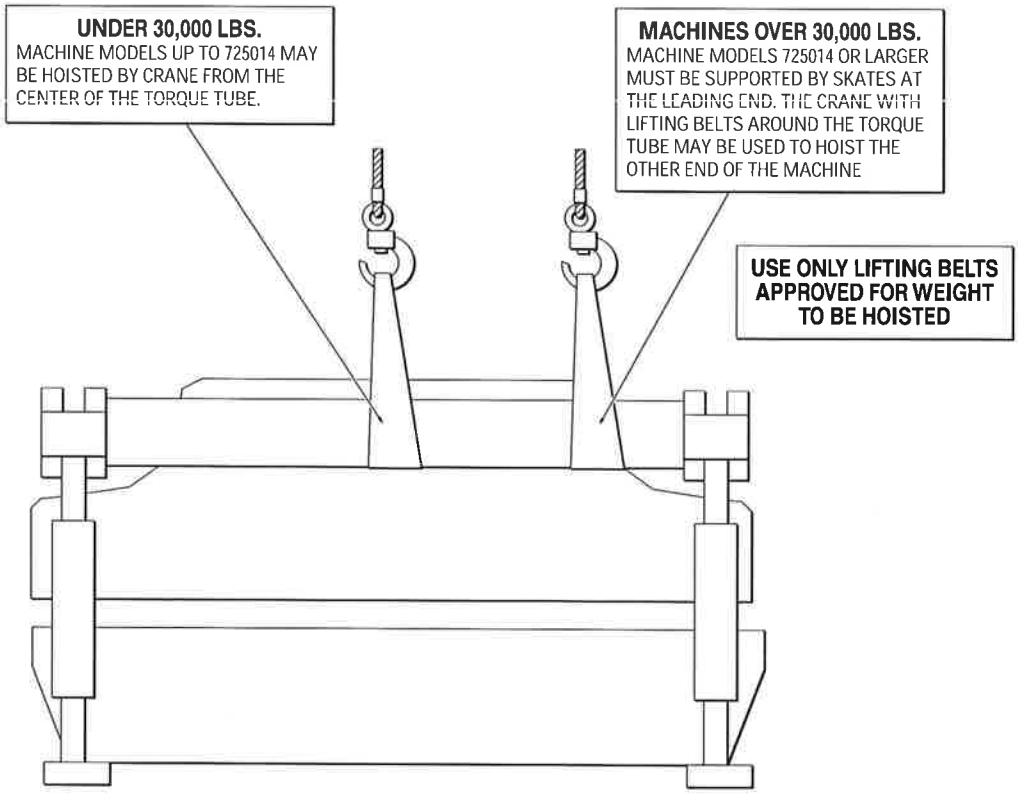


Figure 4.2-1: Press Brake Hoisting

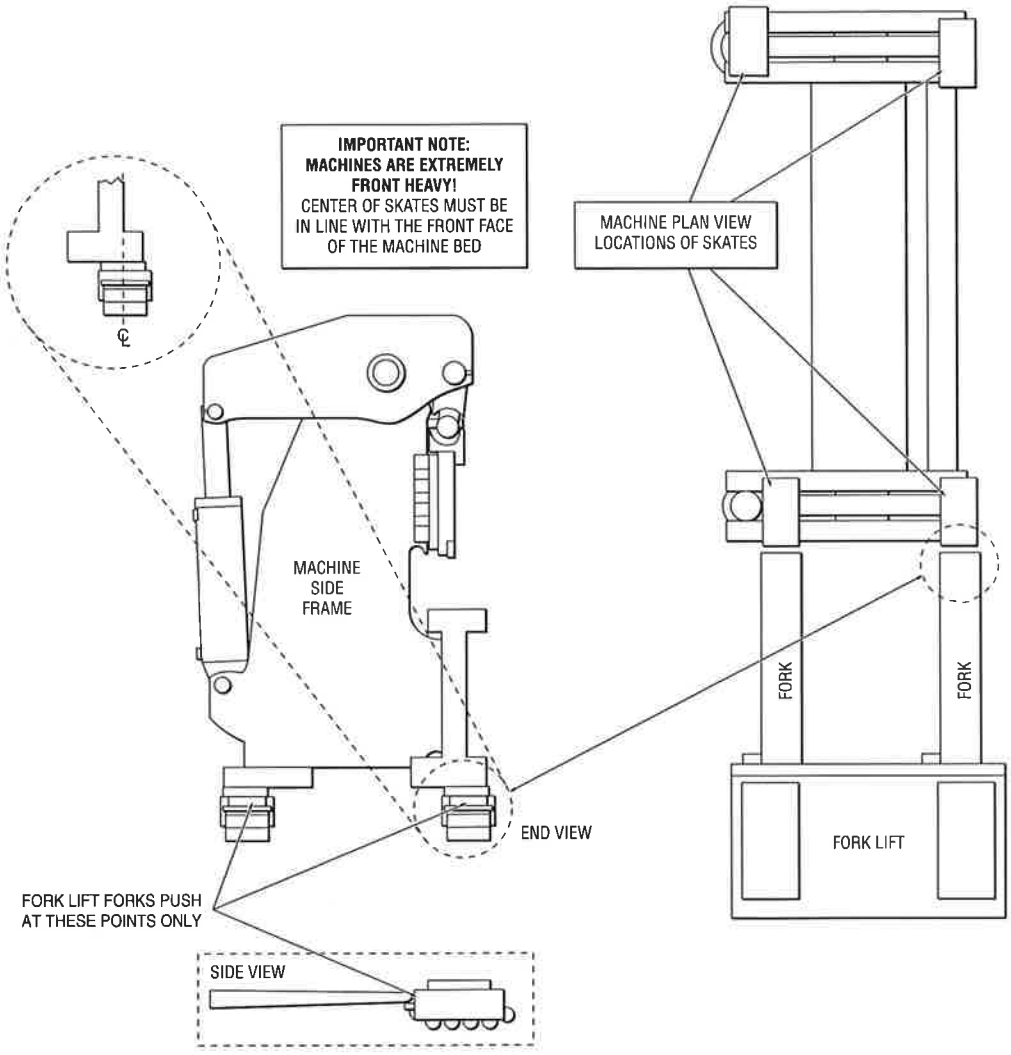


Figure 4.2-2: Moving the Press Brake with a Fork Lift and Skates

4.3 Placement

The ACCURPRESS press brake should be placed on a reasonably level concrete floor that can support its weight.

Before bolting or setting, the press brake should be leveled by shimming under the bed flange pads and the rear feet, as required.

It is suggested that suitable masonry anchors be used for fastening. The press brake base can be used as a template for anchoring point locations.

ACCURPRESS FOUNDATION DETAILS FOR 60, 100, 130, 175 TON PRESS BRAKES

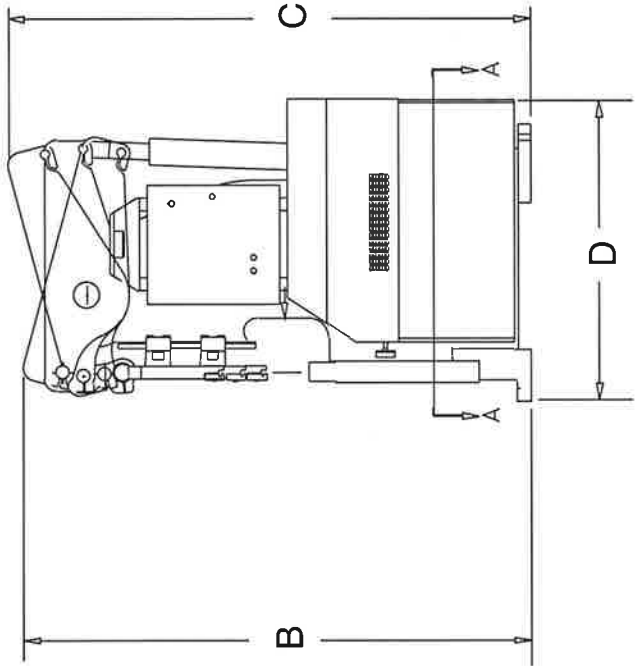
MODEL	DIMENSIONS (Inches)[7]						APPROX. WEIGHT (lbs)	ANCHOR BOLT DIA. SIZE (Inches)	# OF ANCHOR BOLTS REQ'D
	A	B	C	D (Approx.)	E (Approx.)	F			
7606	90.5	79.5	81.5	46.5	56	38.5	6,000	0.75	4
7608	114.5	79.5	81.5	46.5	80	38.5	8,000	0.75	4
76010	138.5	82.5	81.5	46.5	104	38.5	10,000	0.75	4
76012	162.5	86.2	81.5	46.5	128	38.5	12,000	0.75	4
71006	91.5	81.6	85.1	48.5	56	43.0	10,000	0.75	4
71008	115.5	81.6	85.1	48.5	80	43.0	12,000	0.75	4
710010	139.5	83.6	85.1	48.5	104	43.0	14,000	0.75	4
710012	163.5	86.6	85.1	48.5	128	43.0	16,000	0.75	4
71306	103.5	86.7	89.0	48.5	68	43.0	10,000	0.75	4
71308	115.5	86.7	89.0	48.5	80	43.0	13,000	0.75	4
713010	139.5	86.7	89.0	48.5	104	43.0	15,000	0.75	4
713012	163.5	89.7	89.0	48.5	128	43.0	17,000	0.75	4
713014	187.5	93.7	89.0	48.5	152	43.0	21,000	0.75	4
713020	259.5	116.0	98.3	54.0	224	43.0	40,000	0.75	4
71758	130.4	88.0	87.7	54.6	80	37.14	17,000	0.75	4
717510	154.4	90.0	87.7	54.6	104	37.14	21,000	0.75	4
717512	178.4	92.0	87.7	54.6	128	37.14	24,000	0.75	4
717514	202.4	94.8	87.7	56.0	152	37.14	28,000	0.75	4
717516	226.4	101.5	94.0	56.0	176	37.14	32,000	0.75	4

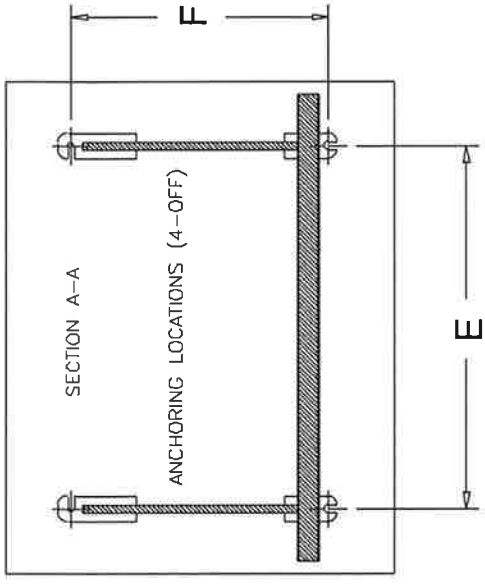
1. OVERALL LENGTH (DIMENSION A) REPRESENTS STANDARD HYDRAULICS WITH ELECTRICAL CABINET CLOSED.
2. DIMENSIONS MAY VARY WITH OPTIONS.
3. CUSTOMER'S DESIGNATED ENGINEER TO DESIGN FOUNDATION FOR LOCAL SITE CONDITIONS.
4. RECOMMENDED MINIMUM CONCRETE THICKNESS NO LESS THAN 6 INCHES AT 3,000 PSI STRENGTH.
5. IF REQUIRED, STEEL PLATE S AND STRUCTURALS TO BE A36 OR EQUIVALENT.
6. SIZE OF REINFORCING BARS AND ANCHORS TO BE SPECIFIED BY CUSTOMER'S ENGINEER.
7. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

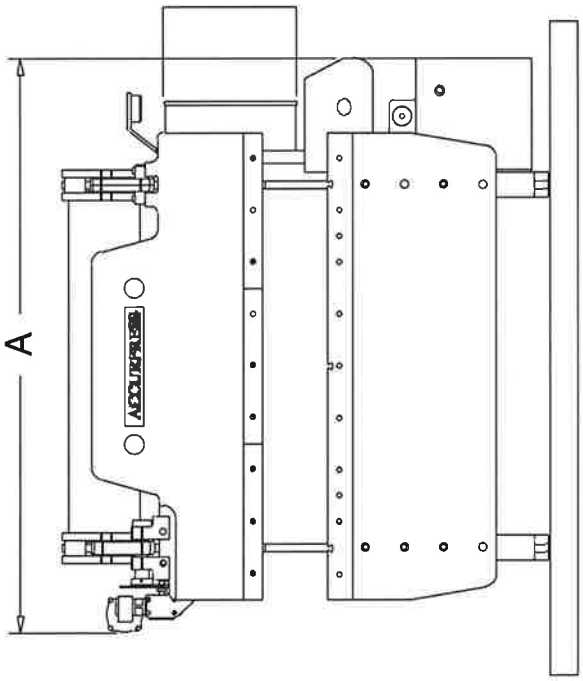
September 2006

ACCURPRESS FOUNDATION DETAILS

(MODELS 7606 TO 717516)







ACCURPRESS FOUNDATION DETAILS FOR 250, 320, 400, 500 TON PRESS BRAKES

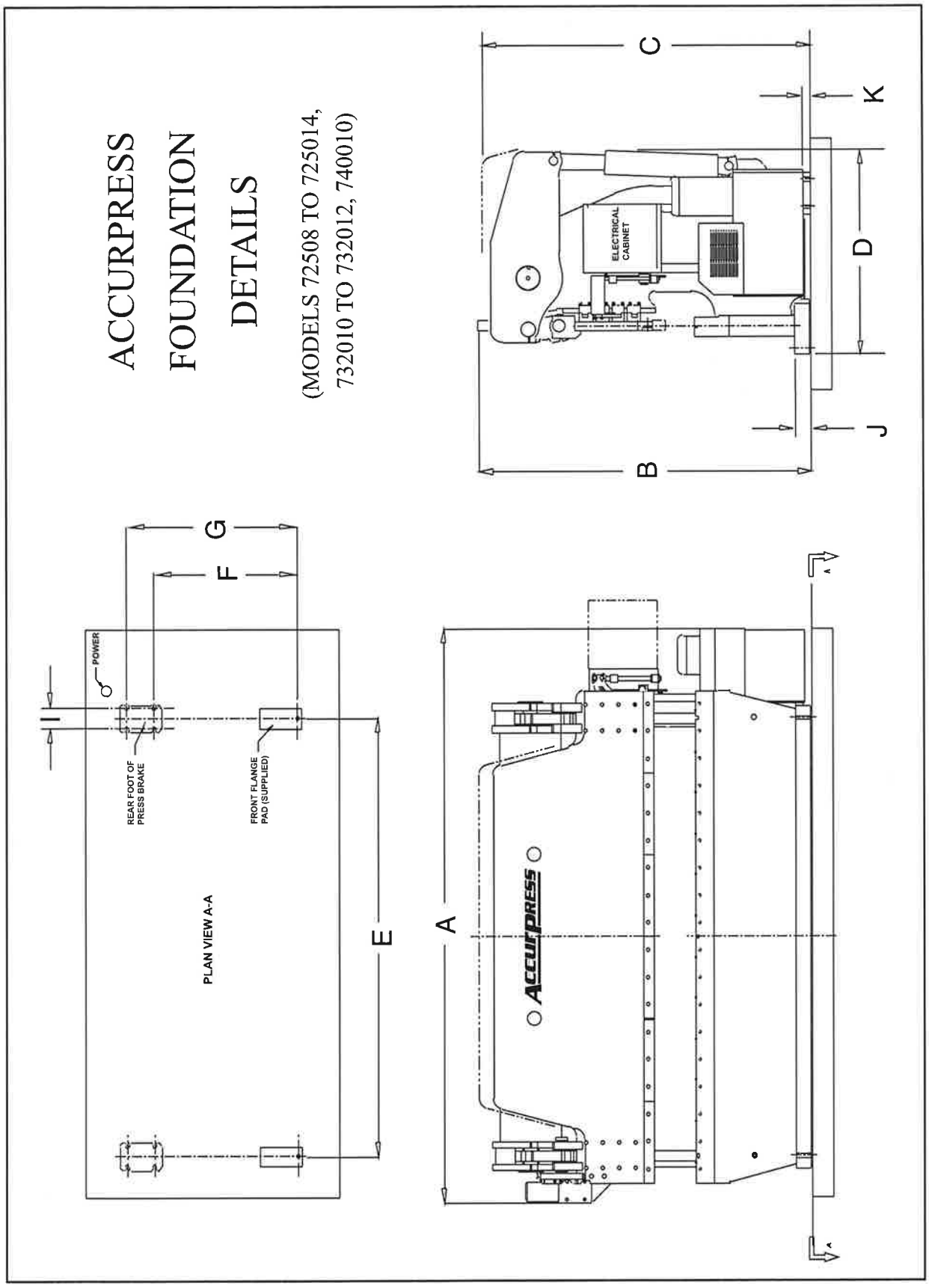
MODEL	DIMENSIONS (Inches)[6]											APPROX. WEIGHT (lbs)	ANCHOR BOLT DIA. SIZE (Inches)	# OF ANCHOR BOLTS REQ'D
	A[1]	B	C	D	E	F	G	H	I	J	K			
72508	130.6	95.0	95.2	59.2	80.00	41.47	49.47	-	6.00	4.5	2.0	21,000	0.75	10
725010	154.6	95.0	95.2	59.2	104.00	41.47	49.47	-	6.00	4.5	2.0	25,000	0.75	10
725012	178.6	96.5	95.2	59.2	128.00	41.47	49.47	-	6.00	4.5	2.0	29,000	0.75	10
725014	202.6	105.0	97.2	59.2	152.00	41.47	49.47	-	6.00	4.5	2.0	33,000	0.75	10
725016	226.6	113.0	99.2	59.2	176.00	33.47	41.47	49.47	8.00	6.5	4.0	40,000	0.75	14
732010	157.4	102.3	103.6	69.6	104.00	52.00	60.00	-	6.00	4.5	2.0	31,000	0.75	10
732012	181.4	104.3	104.8	69.6	128.00	52.00	60.00	-	6.00	4.5	2.0	36,000	0.75	10
732014	205.4	111.3	104.8	69.6	152.00	44.00	52.00	60.00	8.00	6.5	4.0	41,000	0.75	14
732016	229.4	115.0	106.8	69.6	176.00	44.00	52.00	60.00	8.00	6.5	4.0	47,000	0.75	14
740010	165.1	113.8	117.0	70.8	104.00	52.65	60.65	-	6.00	4.5	2.0	38,000	0.75	10
740012	189.1	113.8	117.0	70.8	128.00	44.65	52.65	60.65	8.00	6.5	4.0	43,000	0.75	14
740014	213.1	116.5	117.0	70.8	152.00	44.65	52.65	60.65	8.00	6.5	4.0	50,000	0.75	14
740016	237.1	119.8	117.0	70.8	176.00	44.65	52.65	60.65	8.00	6.5	4.0	60,000	0.75	14
750012	189.3	114.0	120.4	78.0	128.00	52.23	60.23	68.23	8.00	6.5	4.0	54,000	0.75	14
750014	213.3	117.0	120.4	78.0	152.00	52.23	60.23	68.23	8.00	6.5	4.0	58,000	0.75	14

1. OVERALL LENGTH (DIMENSION A) REPRESENTS STANDARD HYDRAULICS WITH ELECTRICAL CABINET CLOSED.
2. DIMENSIONS MAY VARY WITH OPTIONS.
3. CUSTOMER'S DESIGNATED ENGINEER TO DESIGN FOUNDATION FOR LOCAL SITE CONDITIONS.
4. RECOMMENDED MINIMUM CONCRETE THICKNESS NO LESS THAN 6 INCHES AT 3,000 PSI STRENGTH.
5. IF REQUIRED, STEEL PLATES AND STRUCTURALS TO BE A36 OR EQUIVALENT.
6. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

September 2006

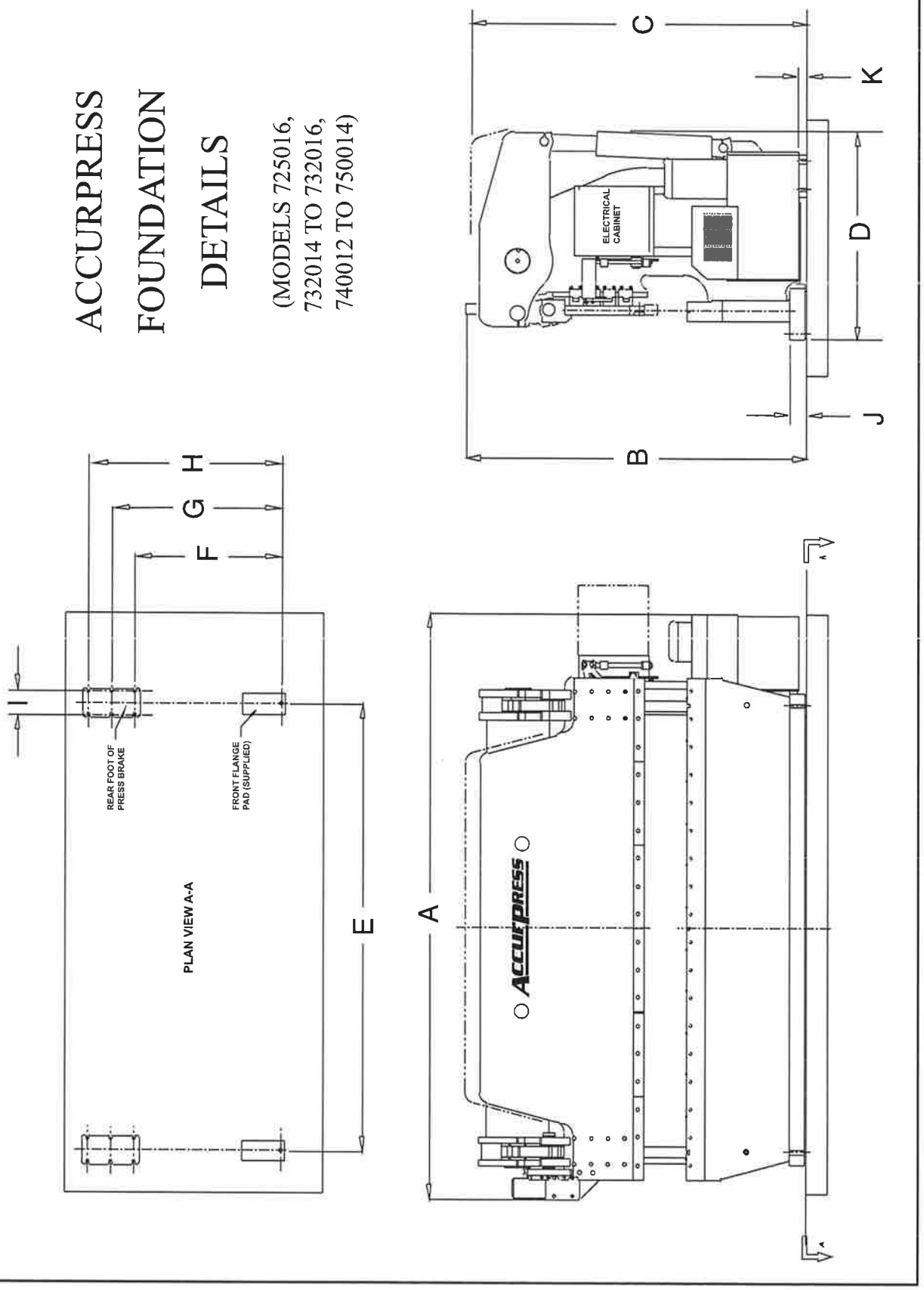
ACCURPRESS FOUNDATION DETAILS

(MODELS 72508 TO 725014, 732010 TO 732012, 740010)



ACCURPRESS FOUNDATION DETAILS

(MODELS 725016,
732014 TO 732016,
740012 TO 750014)



4.4 Preparation

4.4.1 Protective Rust Inhibitor Removal

All unpainted, machined surfaces are protected with rust inhibitor which must be removed with solvent and wiping cloths.

⚠ CAUTION

Always follow the personnel and environmental protection guidelines from the Material Safety Data Sheet (MSDS) for any chemical used and/or your company's environmental health and safety procedures.

If tooling is supplied with the press brake it must be removed, cleaned, and re-installed.

⚠ CAUTION

Before removing or installing any press brake tooling, the power must be locked off and the ram blocked using the appropriate devices.

4.4.2 Hydraulic System Oil

The ACCURPRESS press brake is normally shipped without hydraulic fluid.

Refer to Section 9.2 before filling the reservoir.

⚠ CAUTION

Read the MSDS for the hydraulic fluid before filling the oil reservoir.

If the press brake was shipped with fluid, be sure to remove the seal at the filler cap before starting the main motor.

4.5 Electrical Power Connection

DANGER

HAZARDOUS VOLTAGES

Failure to follow Lockout/Tagout Procedures and Electrical Safe Work Practices may result in serious injury or death!

- Only trained and qualified personnel are allowed to hook up this equipment to the electrical supply system. Install in accordance with all applicable electrical codes.
- Ensure that lockout and electrical safe work practices and procedures are followed during press installation.

Install the press brake electrical power connection following these steps:

1. Ensure that the site supply voltage corresponds to the voltage indicated on the press brake electrical nameplate.
2. To install wiring, punch a hole through the top of the electrical cabinet, above the main disconnect. The hole must be sized for the appropriate multiconductor and a strain relief.
3. First connect the ground wire (green or green with yellow stripe) to the back panel ground lug and securely tighten. Then, connect the supply wires to the main press disconnect device terminals and securely tighten.
4. Following your lockout/tagout procedure, remove the lock from the branch electrical supply circuit.
5. Ensure that the press disconnect switch is OFF before testing phase orientation. Using a phase indicator, check the phase sequence at the terminals just above the main disconnect device for correct motor rotation. The order of the phases must be: 1-2-3 (red-black-white).

6. Close the electrical cabinet door and fasten by turning the vault screw 1/4 rotation. Turn the main disconnect handle to the ON position.

> **⚠ CAUTION**
>
> **DO NOT** stand directly in front of the enclosure when turning the disconnect on, stand to the side opposite the enclosure hinge.

7. Prior to starting the main motor, check the hydraulic reservoir fluid level. Refer to Section 9.2.

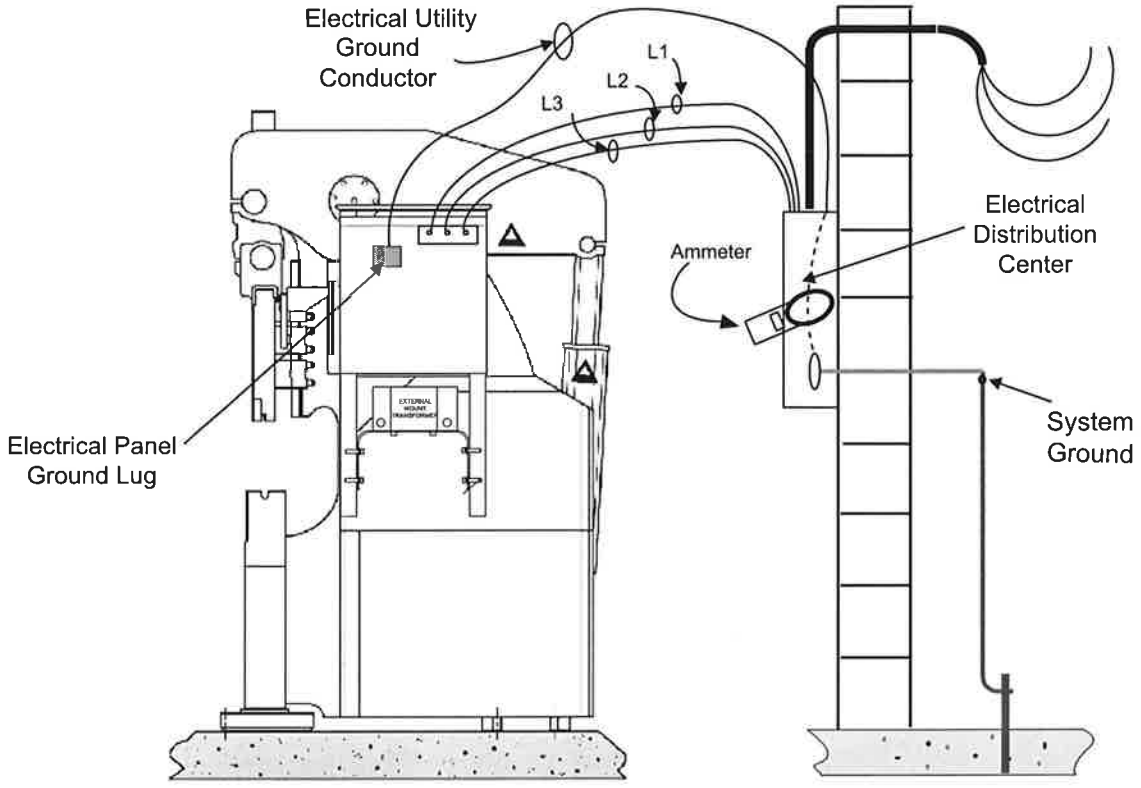


Figure 4.5-1: Press Brake Electrical Power Connection

4.6 Ground Connected Indicator Wiring

On some models, the press brake has a "push to test," ground connected, illuminating pushbutton on the door of the main electrical cabinet. This pushbutton must be wired to an external shop ground.

The single ground wire for connection can be located on the outside bottom surface of the main electrical cabinet. It is clearly labeled.

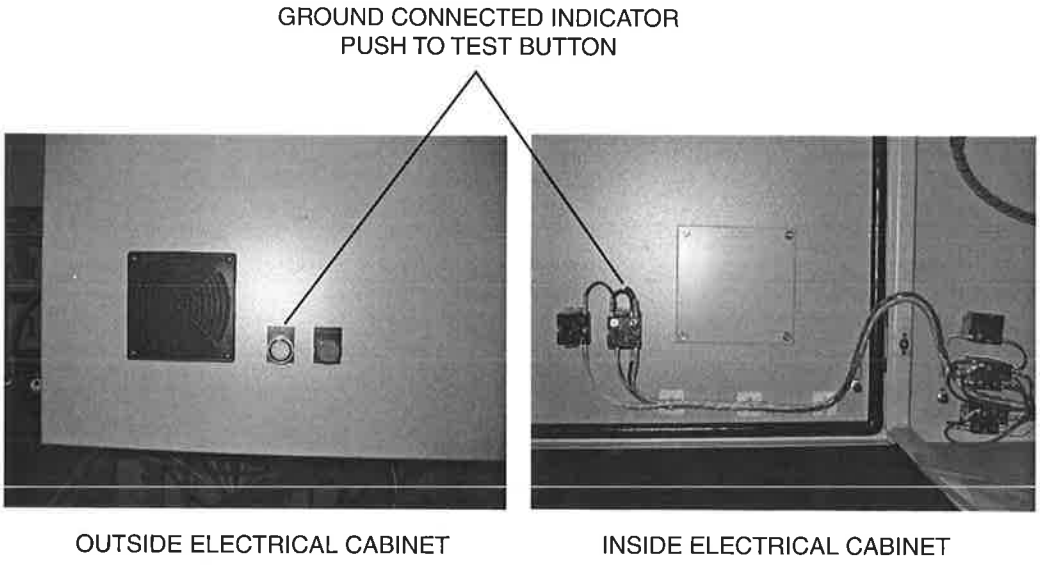


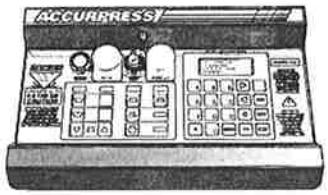
Figure 4.6-1: Ground Connected Indicator Test Button

4.7 Backgauge Finger Calibration

The backgauge fingers are calibrated at the factory and any subsequent calibration is only necessary in the event that they are forced out of position. If unsure of whether the fingers are aligned properly or not, refer to Section 8.2 or 8.3 for the appropriate calibration procedure.

4.8 Machine Startup Precautions

Prior to startup, the machine operator must inspect the workplace for safety hazards. The machine should be inspected for worn or broken parts, and to ensure that the point of operation guarding and safety devices are in place and in proper working order. All operational and activation controls used in conjunction with the selected point of operation guarding must be thoroughly tested.



5 ACCURPRESS

Description Of ETS Controls

The ETS control on the ACCURPRESS press brake is a dedicated programmable logic controller (PLC). It integrates the press ram (Y-axis) and backgauge (X-axis) into a single operating control.

The ETS allows the operator to:

- Input program data
- Select operating and control modes
- Directly control specific machine functions

The control station panel includes operating and control mode keys, functionality controls, a full numeric keypad and a four-line liquid crystal display (LCD). Refer to Figure 5-1.

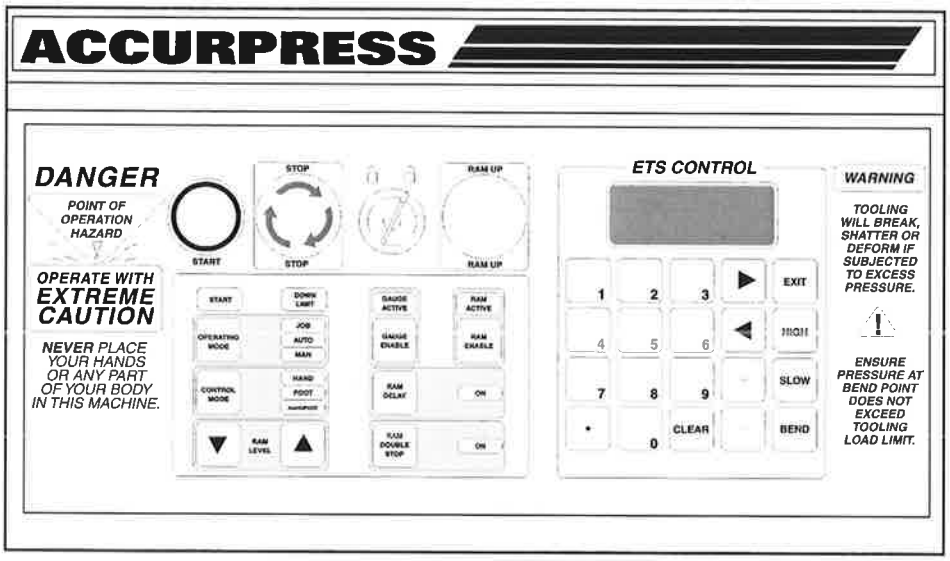
Available ETS Configurations

The basic ETS system is configured for up to 16 programs with one step per program to control the press ram. The backgauge is an option.

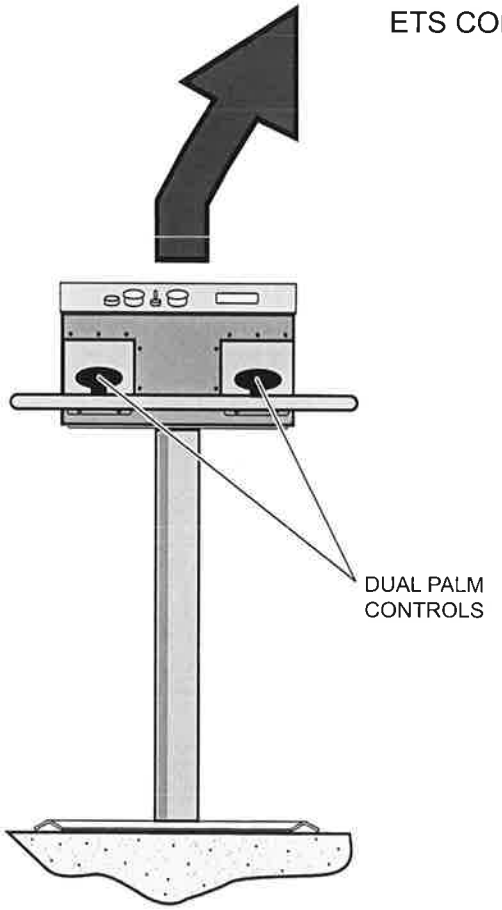
The ETS100 which includes the optional backgauge, is configured for up to 16 programs with one step per program for the press ram and five steps per program for the backgauge. The press ram tonnage is constant for each program but can vary between different programs.

The ETS200 is configured for up to 100 programs with nine steps per program for both the press ram and the backgauge. The press ram tonnage is constant for each program, but can vary between different programs.

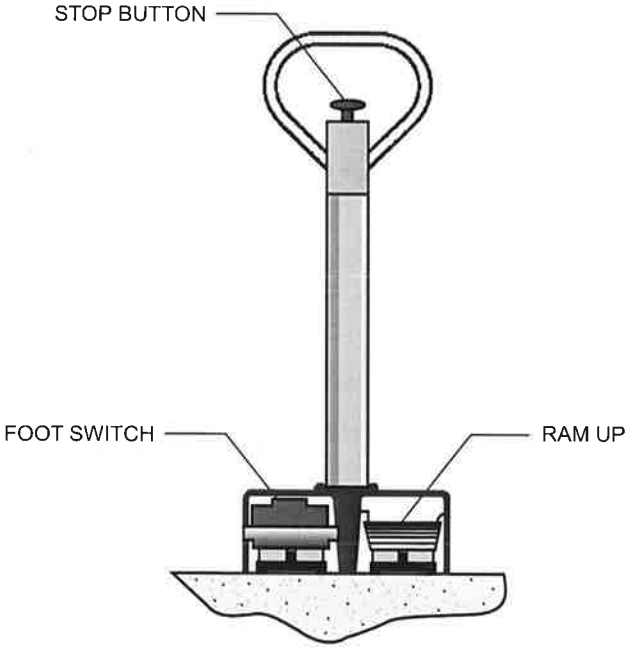
The ETS is compatible with numerous CNC gauging systems. The ACCURPRESS ETS2000, and ETS3000 gauging systems are recommended. When any of these options are interfaced, the ETS100/200 press ram and backgauge positioning controls are muted. All other press brake control functions are maintained.



ETS CONTROL STATION PANEL LAYOUT



ETS CONTROL STATION



FOOT SWITCH AND E-STOP PEDESTAL

Figure 5-1: ETS Control Station Foot Switch Pedestal Details

5.1 Controls

5.1.1 Stop

This red pushbutton stops the main motor. It disables the backgauge servo system on machines equipped with a backgauge.

Once pressed, this pushbutton stays down. To enable a restart, turn the pushbutton ¼ turn clockwise.

5.1.2 Start

This green pushbutton starts the main motor and enables the backgauge servo system. The stop button must be in the released position prior to pressing the start button.

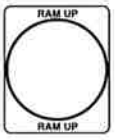
The START light goes on when the main hydraulic pump motor starts and stays on while the motor is running.

The START light will flash if the operator attempts to run a program while the hydraulics are off.

5.1.3 Edit

When this keylock selector switch is in the locked position, the current control station settings for the operating mode, control mode, ram delay, and ram double stop are locked in for the job run.

5.1.4 Ram Up



At any time, depressing this yellow pushbutton raises the press ram.

By holding down the RAM UP pushbutton, the operator can raise the press ram above the programmed limit, but the ram will stop at the factory-set upper limit switch.

5.1.5 Ram Enable

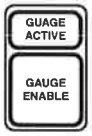
RAM ENABLE allows the operator to enable or disable press ram cycling.

RAM ENABLE is an on/off toggle.

The RAM ACTIVE light:

- comes on when RAM ENABLE is activated.
- flashes:
- if the operator tries to start press ram motion with the palm pushbuttons or footswitch without first toggling RAM ENABLE on.
- if the operator tries to start press ram motion without going into Program/Run mode.
- if the press ram is not calibrated first (Refer to Section 5.9).

5.1.6 Gauge Enable (systems with backgauge only)



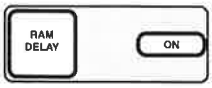
GAUGE ENABLE allows the operator to control the motion of the programmable backgauge.

GAUGE ENABLE is an on/off toggle.

The GAUGE ACTIVE light:

- stays on while the gauge is enabled.
- flashes in Run mode if the palm pushbuttons or footswitch are pressed when the backgauge is not at the programmed target position or has not been calibrated.
- switches off:
  - when the START button is pressed to start the main motor.
  - if a new backgauge target position is entered.

5.1.7 Ram Delay



In AUTO or MANUAL mode, RAM DELAY "ON" stops the press ram at the program bend point for the duration of the time set in the RmDly field of the parameters screen, before completing the cycle.

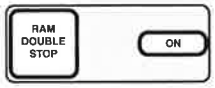
RAM DELAY is an ON/OFF toggle.

Refer to Section 5.6.2 to set the ram delay parameter.

The RAM DELAY "ON" light:

- comes on when the RAM DELAY key is pressed to enable ram delay.
- flashes during RAM DELAY execution.

5.1.8 Ram Double Stop



In HAND or FOOT mode, RAM DOUBLE STOP "ON" stops the press ram at the slow speed change point.

The palm pushbuttons or footswitch must be released and re-pressed to finish the cycle.

RAM DOUBLE STOP is an ON/OFF toggle.

The RAM DOUBLE STOP "ON" light:

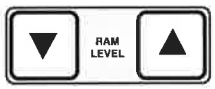
- comes on when the RAM DOUBLE STOP key is pressed to enable ram double stop.
- flashes when the press ram is at the slow speed change point.

5.1.9 Down Limit

The DOWN LIMIT light:

- comes on:
  - when the press ram reaches the program bend point.
  - when a program screen with a higher bend point than the current press ram Y-axis position is selected.
  - flashes when the press brake reaches the preset tonnage limit.

5.1.10 Ram Offset Level



The Ram Offset Level buttons control the offset of the left end of the press ram. This feature allows adjusting for die or material variances, to create equal angles at both ends.

▼ decreases the die space between the press ram and bed.

▲ increases the die space between the press ram and bed.

The press ram offset level indicator is located at the press brake eccentric shaft. Refer to Figures 5.1-1, 5.1-2, and 5.1-3.

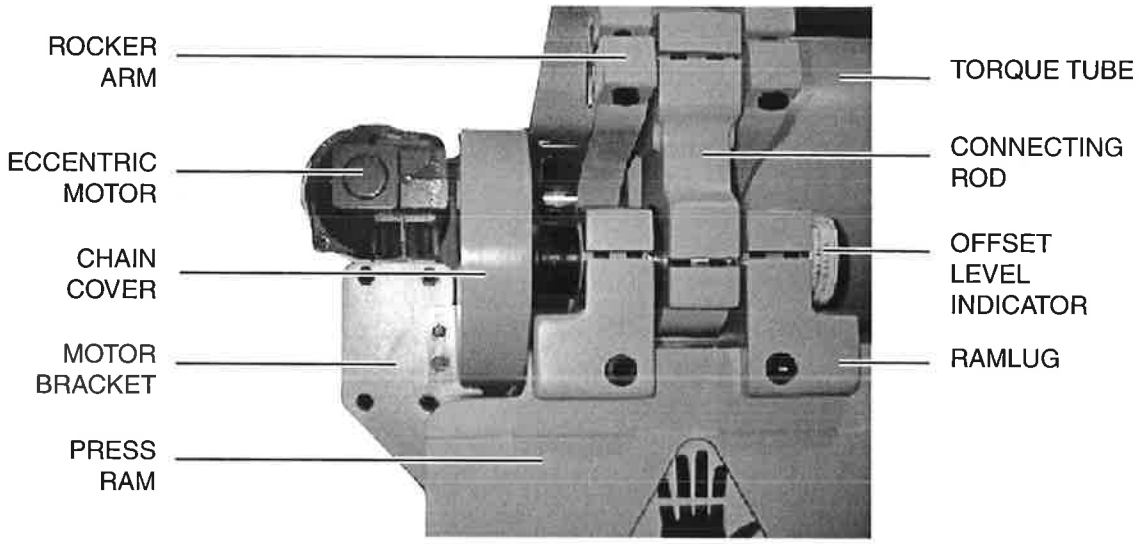


Figure 5.1-1: Ram Parallel Adjuster Assembly (Models up to 130 Ton)

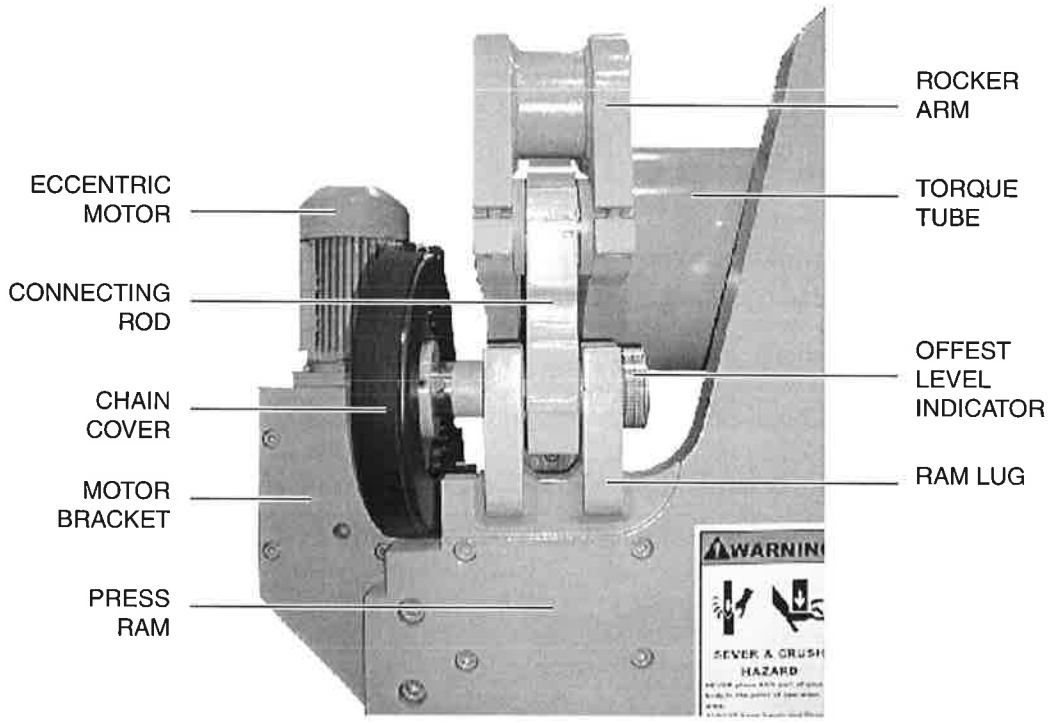


Figure 5.1-2: Ram Parallel Adjuster Assembly (Models 175 Ton and up)

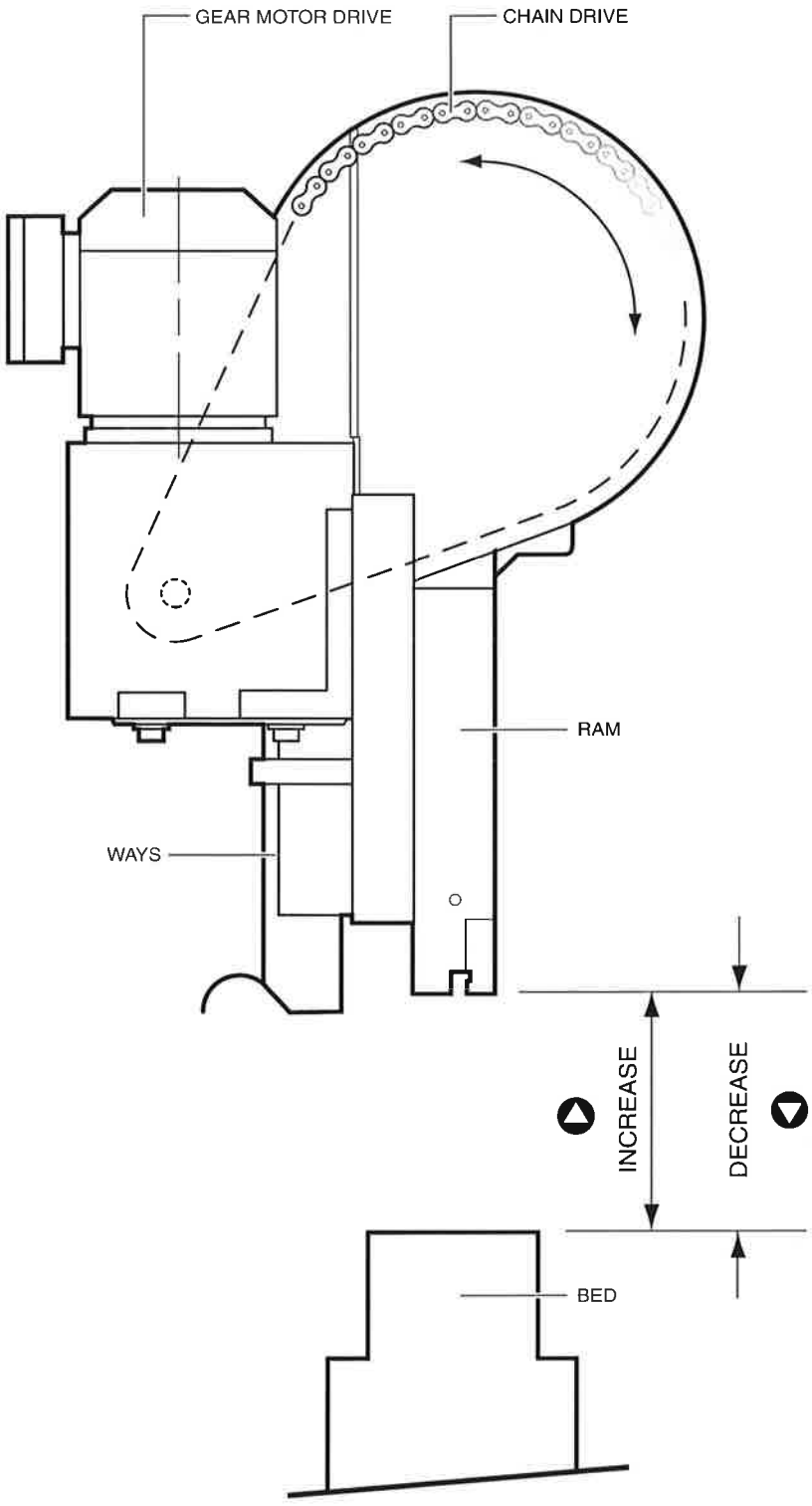


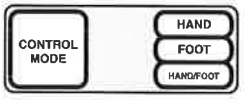
Figure 5.1-3: Ram Parallel Adjuster Operation - Side View (Models 175 Ton and up)

5.2 Modes

5.2.1 Control Modes

The ETS has three control modes:

- HAND
- FOOT
- HAND to FOOT TRANSFER



Each time the control mode key is depressed, the next control mode is selected and illuminated.

Press ram movement is dependent on the operating mode (Refer to Section 5.2.2) that is selected.

5.2.1.1 Hand

Start the cycle by pressing the two palm pushbuttons simultaneously.

The HAND mode light:

- flashes:
  - if the palm pushbuttons are not pressed at the same time.
  - if the operator tries to start the cycle by using the footswitch.
- continues to flash until the palm pushbuttons are pressed simultaneously.

The anti-tie down feature of this control mode ensures that the operator's hands stay clear of the point of operation (die area).

5.2.1.2 Foot

Start the cycle by pressing the footswitch.

The FOOT mode light:

- flashes if the operator tries to start the cycle by using the palm pushbuttons, and it continues to flash until the footswitch is pressed.

The footswitch has a mechanical gate and an anti-trip latch mechanism to prevent accidental activation.

5.2.1.3 Hand/Foot Transfer

Start the cycle by pressing the palm pushbuttons.

At the speed change point, complete the cycle by pressing the footswitch.

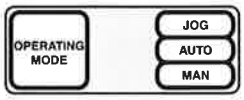
The HAND mode light flashes if the operator tries to begin the cycle by pressing the footswitch.

The FOOT mode light flashes at the speed change point if the operator continues to use the palm pushbuttons. It turns off once the palm pushbuttons are released.

5.2.2 Operating Modes

The ETS has three operating modes:

- JOG
- AUTO
- MANUAL



Each time the OPERATING MODE key is pressed, the next operating mode is selected and illuminated.

In all three modes, the press ram cycle begins when either the palm pushbuttons or footswitch are pressed, depending on the selected control mode.

5.2.2.1 Jog

In JOG, the press ram will stop in place:

- at any point in the cycle, if the palm pushbuttons or footswitch are released.
- once it reaches the program bend point (DOWN LIMIT light comes on) or the preset tonnage limit (DOWN LIMIT light flashes).

To raise the press ram:

- to the program high position, switch to AUTO or MANUAL, then press and release the palm pushbuttons or footswitch.
- to an unprogrammed position, press RAM UP and release when the press ram is at the desired position.

5.2.2.2 Auto

In AUTO, the press ram returns to the program high position:

- at any point in the cycle, if the palm pushbuttons or footswitch are released.
- after reaching the program bend point (DOWN LIMIT light comes on) or the preset tonnage limit (DOWN LIMIT light flashes).

To begin the next cycle, release and re-press the palm pushbuttons or footswitch.

5.2.2.3 Manual

In MANUAL, the press ram returns to the program high position:

- at any point in the cycle if the palm pushbuttons or footswitch are released.
- after it reaches the program bend point (DOWN LIMIT light comes on) or the preset tonnage limit (DOWN LIMIT light flashes) and the palm pushbuttons or footswitch are released.

5.3 Function Keys

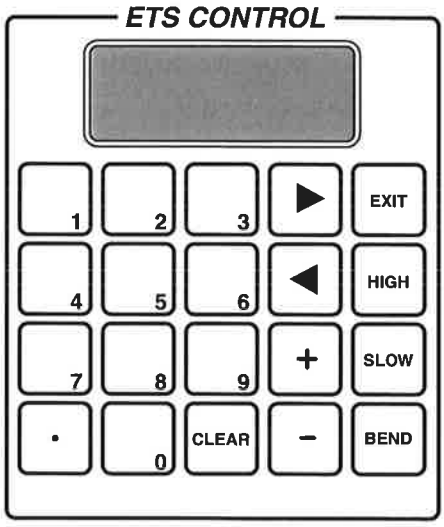
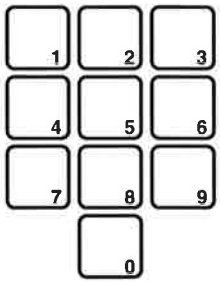


Figure 5.3-1: ETS Function Keys

The ETS includes a full numeric keypad and dedicated function keys for specific cursor movement and data input.



5.3.1 0 - 9

The 0 - 9 keys are used to enter:

- Menu selections
- Program numbers and names
- Y-axis positions
- X-axis positions (if equipped with backgauge option)
- Tonnage limit

5.3.2 Decimal (.)

The decimal key:

- provides the standard decimal place during a numeric data input.
- moves the cursor to the top left of the LCD display in the Program/Run screen.

5.3.3 CLEAR

The CLEAR key deletes the data field entry at the current cursor position.

5.3.4 EXIT

Generally, the EXIT key allows the operator to return to the main menu.

Occasions where the operator will exit to a screen other than the main menu are described in the applicable section.

5.3.5 Right and Left Arrows

The right and left arrow keys move the cursor to each data entry field.

5.3.6 Plus and Minus Keys

The [+] key increases and the [-] key decreases the display screen number by increments of:

1.000 - when the cursor is in the program number field
0.100 - when the cursor is in the program high position field (HI)
0.001 - when the cursor is in the program slow position field (SL)
0.001 - when the cursor is in the program bend position field (BND)
0.001 - when the cursor is in the (optional) backgauge target field

5.3.7 HIGH

The HIGH key is only active in Program/Run mode.

Pressing the HIGH key moves the cursor to the HI data input field.

Pressing and holding the HIGH key for three seconds will store the press ram's Y-axis position as the HI value in the current program.

5.3.8 SLOW

The SLOW key is only active in Program/Run mode.

Pressing the SLOW key moves the cursor to the SL data input field.

Pressing and holding the SLOW key for three seconds will store the press ram's Y-axis position as the SL value in the current program.

5.3.9 BEND

The BEND key is only active in Program/Run mode.

Pressing the BEND key moves the cursor to the BND data input field.

Pressing and holding the BEND key for three seconds will store the press ram's Y-axis position as the BND value in the current program.

5.4 Startup Screen

The Startup screen (below) is momentarily displayed after the main disconnect switch is turned ON:

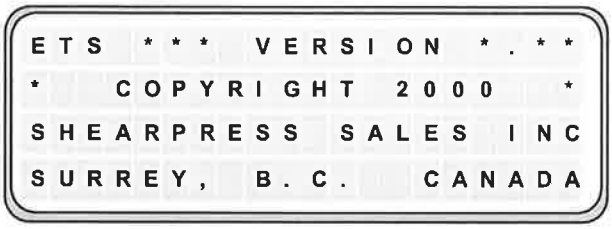


Figure 5.4-1: ETS Startup Screen

The ETS model number and version number should be recorded and stored in an accessible location so they are readily available when contacting the dealer or factory for assistance or service.

The Startup screen can be re-displayed by momentarily depressing the '0' key.

5.5 Main Menu

The main menu (below) is displayed immediately after the Startup screen. The numeric menu selections, and their associated descriptions, are the starting points for calibration and readily accessible operator inputs.

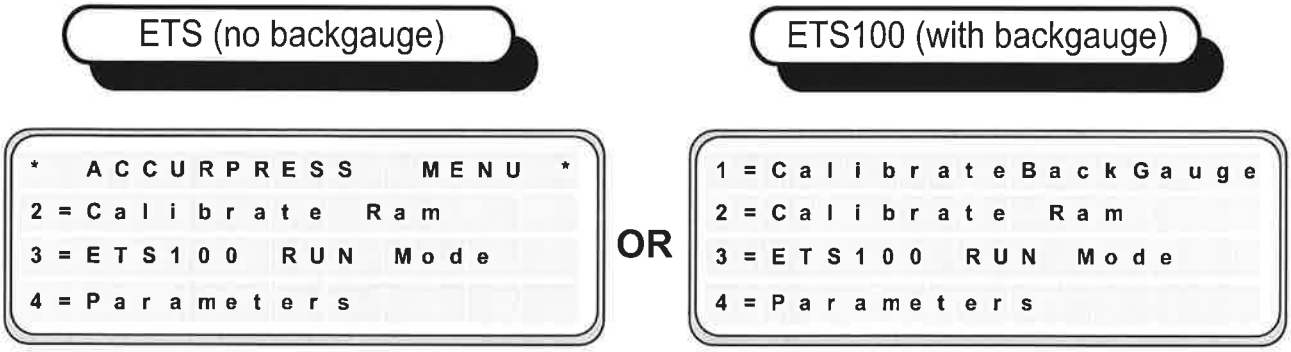


Figure 5.5-1: ETS (left) and ETS100 (right) Main Menu Screen

Selection #1-"Calibrate Backgauge" - only appears on the main menu display if the backgauge option is installed.

Selection #2-"Calibrate Ram" - is a standard feature and is always displayed in the main menu.

Selection #3-"Run Mode" - accesses the Program/Run screen.

Selection #4-"Parameters" - accesses the Operators Parameters screen.

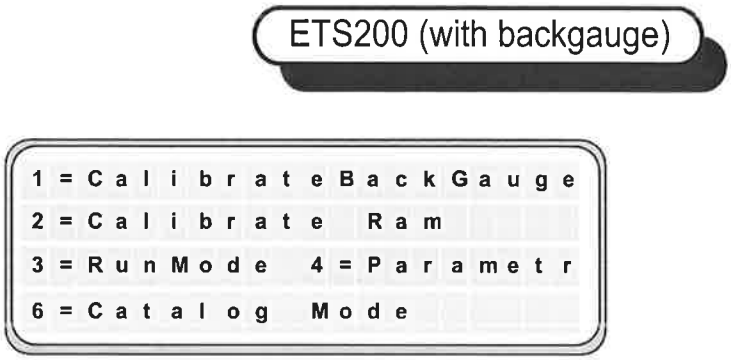


Figure 5.5-2: ETS200 Main Menu Screen

Selection #6 "Catalog Mode" is available only with the ETS200. It provides a list of all programs by name and number.

5.6 Operator Parameters

The Operator Parameters screen is accessed by selecting number "4" from the main menu: 4=Parameters for ETS / ETS100, or 4=Parametr for ETS200.

Input fields in the Parameters screen are either numeric values or ON/OFF toggles.

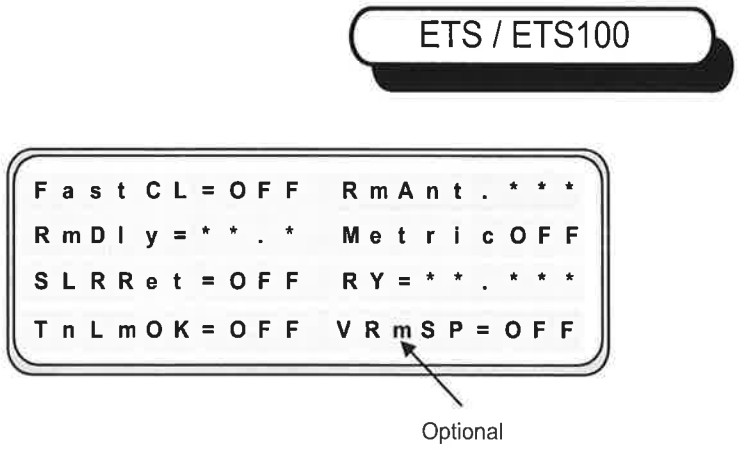


Figure 5.6-1: ETS / ETS100 Operator Parameters

Value changes to any of the fields in the ETS / ETS100 Parameters screen will occur globally-all Program/Run screens will be affected.

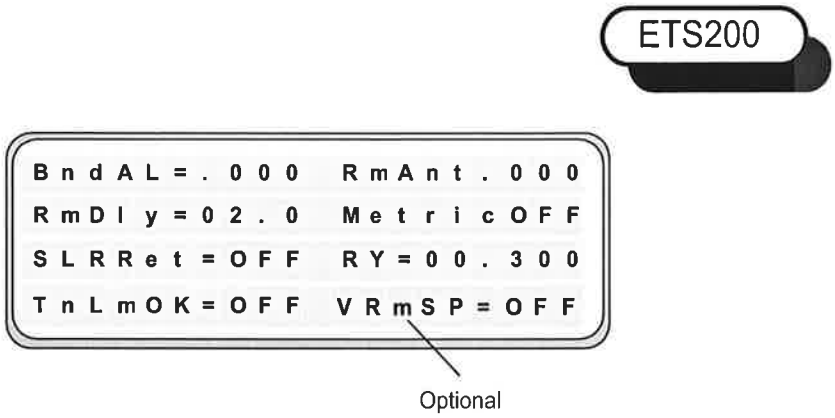


Figure 5.6-2: ETS200 Operator Parameters Screen

The "Bend Allowance" field (BndAl) in the ETS200 Parameters screen is not a global variable - a new value will be stored for each program. The operator must set the bend allowance immediately after exiting a program.

The following are descriptions of each parameter and its effect on the press ram or backgauge cycling characteristics.

5.6.1 FastCL (ETS100)

The fast calibration parameter is an ON/OFF toggle. When FastCL is ON, the most recent program screen is displayed automatically after X and/or Y axis calibration is complete.

5.6.2 RmDly

Ram delay is the programmed duration of time (in seconds) that the press ram will stop at the programmed bend position, in AUTO or MANUAL mode.

After completing the bend and stopping for the ram delay, the press ram retracts in slow speed until it reaches the speed change point, and then switches to normal speed to travel to the up-limit position.

To set the ram delay:

1. [◄] [►] will move the cursor to the "RmDly" data input field.
2. Press the CLEAR key. The setting will reset to "00.0".
3. Using the decimal and numeric keys, input the ram delay time to a maximum of 25.5 seconds.

5.6.3 SLRRet

The slow ram return setting is an ON/OFF toggle for slow press ram return.

If SLRRet is OFF, the press ram will raise from the programmed BEND point to the speed change point in normal speed. If ON, it will raise to this point in slow speed.

To set the slow retract ON or OFF:

1. ◄ ► will move the cursor to the "SLRRet" toggle field.
2. Press any numeric key to toggle between ON and OFF.

5.6.4 TnLmOK (systems with backgauge only)

The tonnage limit advance setting is an ON/OFF toggle for ram retraction, based on reaching a programmed tonnage limit instead of a programmed BEND position.

If TnLmOK is OFF, the press ram will stop at the programmed BEND position, then retract to the HIGH position.

If TnLmOK is ON, the press ram will stop at the programmed tonnage limit setting then retract HIGH position

To set the tonnage limit advance ON or OFF:

1. ◄ ► to move the cursor to the "TnLmOK" toggle field.
2. Depress any numeric key to toggle between ON and OFF.

5.6.5 RmAnt

The ETS control anticipates the press ram approaching the bend position, and compensates for any over-travel by sending a signal to stop prior to reaching this position. The ram anticipation factor is the Y-axis distance from the programmed bend position to the position where the ETS control actually sends the stop signal to the hydraulic valve.

An initial value is set by the ETS control at the time of press ram calibration, but this might require adjustment because the position of the press ram will change slightly as the hydraulic system reaches operating temperature.

To set the ram anticipation factor:

1. In Program/Run and MANUAL modes, cycle the press ram to a programmed bend position. When the press ram is at the bend position and the DOWN LIMIT light comes on, compare the actual Y-axis coordinate (Y value displayed) to the program bend position (BND value displayed). The difference is the offset distance.
2. EXIT from the Program/Run screen to the main menu, then select number 4 to enter the Parameters screen.
3. ◄ ► will move the cursor to the "RmAnt" data input field.
4. If the actual Y-axis coordinate is greater than the programmed bend position, increase the ram anticipation factor by the calculated offset distance.
   OR
   If the actual Y-axis coordinate is less than the programmed bend position, decrease the ram anticipation factor by the calculated offset distance.
5. Exit the Parameters screen, enter the Program/Run screen and execute the same program to verify the ram anticipation factor changes.

5.6.6 Metric

The metric setting is an ON/OFF toggle for working in either imperial or metric units of measure.

If metric is OFF, units of measure are in inches; if the setting is toggled ON, measures are in millimeters.

To set the units of measure:

1. ◄ ► will move the cursor to the "Metric" toggle field.
2. Press any numeric key to toggle between ON and OFF.

5.6.7 RY (systems with backgauge only)

The backgauge retract offset distance, RY, is the Y-axis distance from the press ram speed change point (SL value) to the pinch point where the press ram contacts the workpiece. At the pinch point in the press ram cycle, the backgauge will retract a distance of R (refer to Section 5.10.6.6) to prevent the fingers from restricting the movement of the workpiece during the forming process. When Fast Cycle is ON, the R value may not apply (see Section 5.8).

To determine the RY value, use JOG mode to move the ram to the desired position (the pinch point). Note the ram position on the Program/Run screen (see Figure 5.10-1, 5.10-2, or 5.10-3 for the location of the current Y-ram position field). Subtract the SL value (also located on the Program/Run screen), from the current ram position to determine the RY value.

To program the backgauge retract offset distance:

1. Use ◄ ► to move the cursor to the "RY" data input field.
2. Press the CLEAR key. The setting will reset to "00.000".
3. Using the decimal and numeric keys, input the backgauge retract offset distance.

5.6.8 VRmSP (Optional)

The variable ram speed setting is standard for the high speed Model 7320 and larger machines. Smaller machines do not allow disabling of the ram speed adjustment. This function is an ON/OFF toggle for enabling variable press ram speed on press brakes with fixed displacement hydraulic pumps.

If VRmSP is OFF, the press ram will travel at standard slow speed after the speed change point is reached.

Figure 5.6-3: Variable Ram Speed Control

If VRmSP is ON, the press ram will travel at an adjustable slow speed after the speed change point is reached.

The variable speed adjustment control is located on the front of the hydraulic tank. Refer to Figure 5.6-3.

To set the variable ram speed ON or OFF:

1. ◄ ► will move the cursor to the "VRmSP" toggle field.
2. Depress any numeric key to toggle between ON and OFF.

5.6.9 BndAL (ETS200)

The bend allowance is a backgauge offset distance used to compensate for the dimensional factor of material thickness. This value is added or subtracted from the flange dimension to determine the actual punch contact point on the piece part.

To associate a bend allowance with a program:

- Enter all values into the program.
- Save and Exit the program.
- Go into Parameters Screen and set the bend allowance. You may now save the program again and the latest entered bend allowance will also be saved as a part of this program.

5.7 Factory Parameters Screen

When the factory is called for assistance, service personnel may request that settings in the Factory Parameters screen be verified. The Factory Parameters screen (below) cannot be edited by the operator, and is only used in a troubleshooting situation.

To display the Factory Parameters screen from the main menu, select the "7" key.

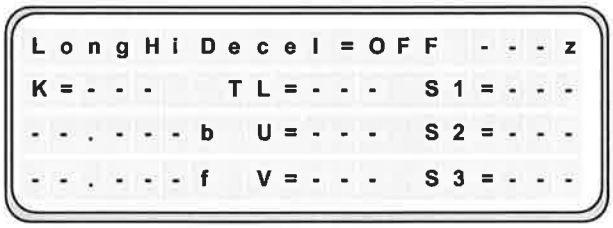


Figure 5.7-1: Factory Parameters Screen

To return to the main menu, press the EXIT key.

5.7.1 Temperature Compensation Parameters Screen

The Temperature Compensation Parameters screen displays the temperature compensation parameters. These parameters cannot be edited by the operator. The temperature compensation feature compensates for error in bending accuracy as the hydraulic fluid warms up.

To display the Temperature Compensation Parameters screen from the main menu, select the "9" key (see Figure 5.7-2).

To return to the main menu, press the EXIT key.

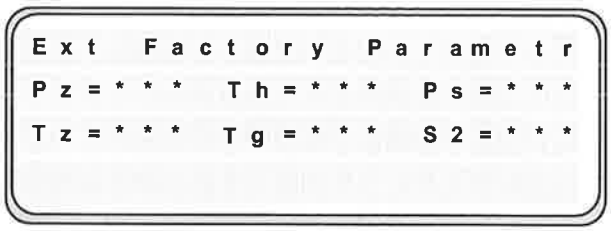


Figure 5.7-2: Temperature Compensation Parameters Screen

5.8 Backgauge Fast Cycle

The backgauge fast cycle feature allows the operator to run the press brake 25% - 30% faster than without it. It may be toggled ON/OFF by pressing the "5" key.

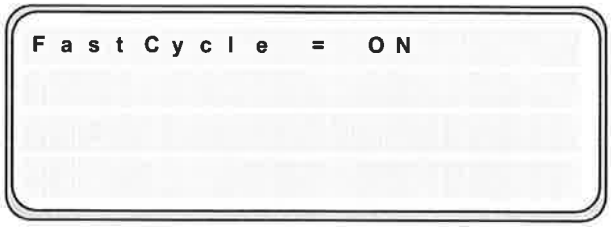


Figure 5.8-1: Backgauge Fast Cycle Screen

When Fast Cycle is ON, the moment that the backgauge starts moving to the next step depends on the relative direction of the next step:

- If the next step requires the backgauge to move away from the die, the backgauge motion to the next programmed position begins as soon as the ram reaches the pinch point (determined by the backgauge retract offset distance, RY, value in the operator parameters screen) of the current step.
- If the next step requires the backgauge to move towards the die, then once the ram reaches the pinch point (determined by RY value), the backgauge retracts back by a value of R (determined in the operator parameters screen). The backgauge moves to the next position once the ram returns to the up limit.

When Fast Cycle is OFF, once the ram reaches the pinch point, the backgauge retracts back by a value of R. The backgauge moves to the next position once the ram returns to the up limit.

5.9 Calibration Sequence

Both the press ram and the backgauge axis must be calibrated before any cycling is initiated.

The following is a description of the sequence of screens and procedures for calibrating the press ram and optional backgauge from an initial power startup, and for recalibrating during normal operation.

All possible screens and menu selections will be discussed in their order of occurrence.

5.9.1 Calibrate Press Ram (Y-axis)

Ensure that the system is running by verifying that the START light is on.

Select "2" from the main menu: 2 = Calibrate Ram. One of the following ETS press ram calibration status screens will appear:

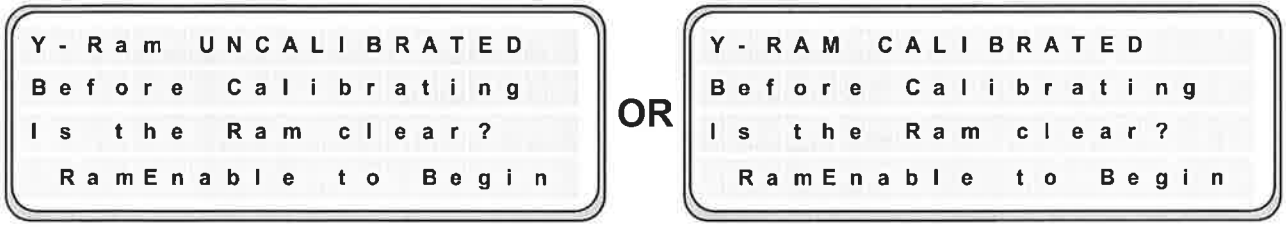


Figure 5.9-1: Ram Calibration Screens for Uncalibrated (Left) or Calibrated (Right) Ram

Before proceeding with calibration, make sure that the press ram is clear of any obstructions that could impede its travel during the calibration cycle.

After verifying that the press ram is clear, press the RAM ENABLE key and the following screen will prompt you to begin the calibration cycle.

Figure 5.9-2: Ram Calibration Cycle Prompt Screen

Set the operating mode to AUTO or MANUAL, and the control mode to either HAND or FOOT. Using the control mode selected, activate the ram. It will cycle to the top limit switch and stop. The calibration status will change to the "Top Y-Ram position" screen.

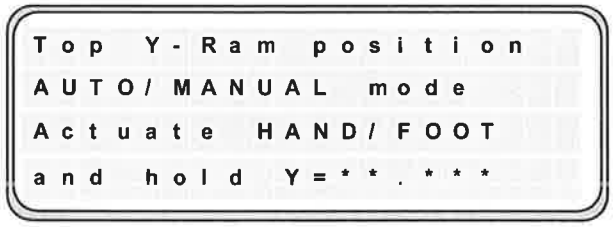


Figure 5.9-3: Ram Calibration Top Position Status Screen

Re-actuate the palm pushbuttons or footswitch until the press ram stops. Once it stops, release the palm pushbuttons or footswitch. The press ram has cycled down and returned up. This is necessary to determine the reference point and maintain the mechanical accuracy of the system. The reference point has a Y-axis coordinate near the zero position.

The press ram is now calibrated and the following screen appears:

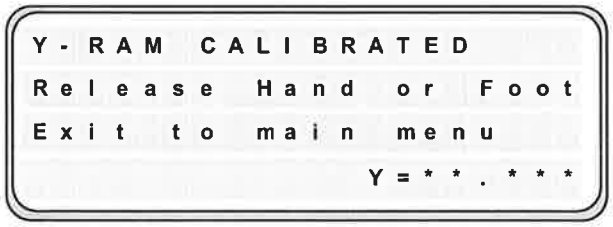


Figure 5.9-4: Completed Ram Calibration Status Screen

NOTICE

Whenever the Ram Calibration screen is accessed by pressing the "2" key in the main menu, the entire ram calibration sequence must be completed. Otherwise, the ram will beome uncalibrated.

5.9.2 Calibrate Backgauge (X-axis) (ETS100 / ETS200)

Ensure that the system is running by verifying that the START light is on.

Select "1" from the main menu: 1 = CalibrateBackGauge. One of the following Backgauge Calibration Status screens will appear:

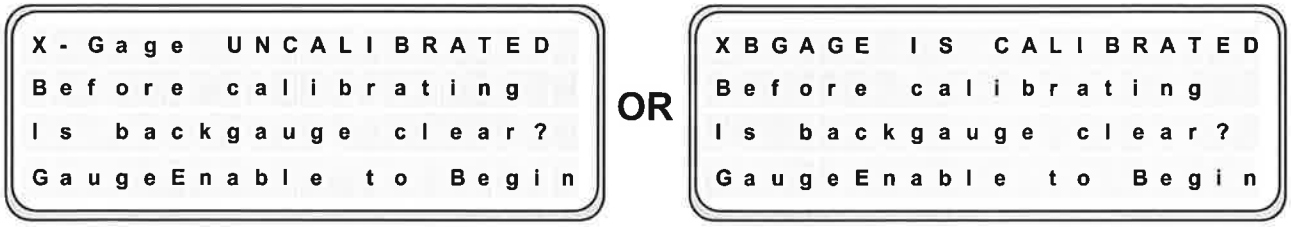


Figure 5.9-5: X-Axis Backgauge Calibration Screens for Uncalibrated (Left) or Calibrated (Right) Backgauge

Before proceeding with calibration, make sure that the backgauge is clear of any obstructions that could impede its travel during the calibration cycle.

After verifying that the backgauge is clear, press the GAUGE ENABLE key.

The following Calibration Status screen will appear:

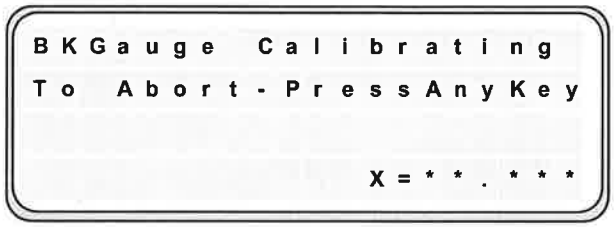


Figure 5.9-6: Backgauge Calibration Status Screen

If a key is pressed to abort the calibration cycle the main menu appears. At the same time the backgauge stops and either remains or reverts to an uncalibrated state.

While the "BKGauge Calibrating" Status screen is displayed, the backgauge automatically cycles back to the rear home position switch, and then forward to the predetermined "04.000" X-axis position. This is necessary to determine the home position and maintain the mechanical accuracy of the system. When the backgauge reaches this position, the following Calibration Status screen will appear (see Figure 5.9-7).

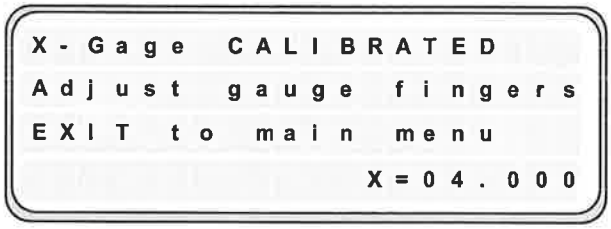


Figure 5.9-7: Completed Backgauge Calibration Screen

The above Calibration Status screen verifies that the automatic portion of the backgauge calibration cycle is complete.

The backgauge should be fully calibrated at this point unless the fingers or backstop bar have been forced out of position during operation. This is unlikely but should be checked periodically. Refer to Section 8.2 and Section 8.3 for verifying calibration and manually calibrating the backgauge.

NOTICE

Whenever the Backgauge Calibration screen is accessed by pressing the "1" key in the main menu, the entire backgauge calibration sequence must be completed. Otherwise, the backgauge will beome uncalibrated.

5.10 Program/Run Mode

NOTICE

Only after the entire Program/Run Mode section has been read and understood should an operator cycle the press ram. The operator should begin by testing the results of editing each data input field by cycling the press ram without any dies installed. This precaution will prevent any occurrence of an accidental tooling crash.

This section describes the procedures for programming the data entry fields.

The Program/Run screen (below) is accessed by selecting "3" in the main menu:

3 = ETS100 RUN Mode, or 3 = RunMode.

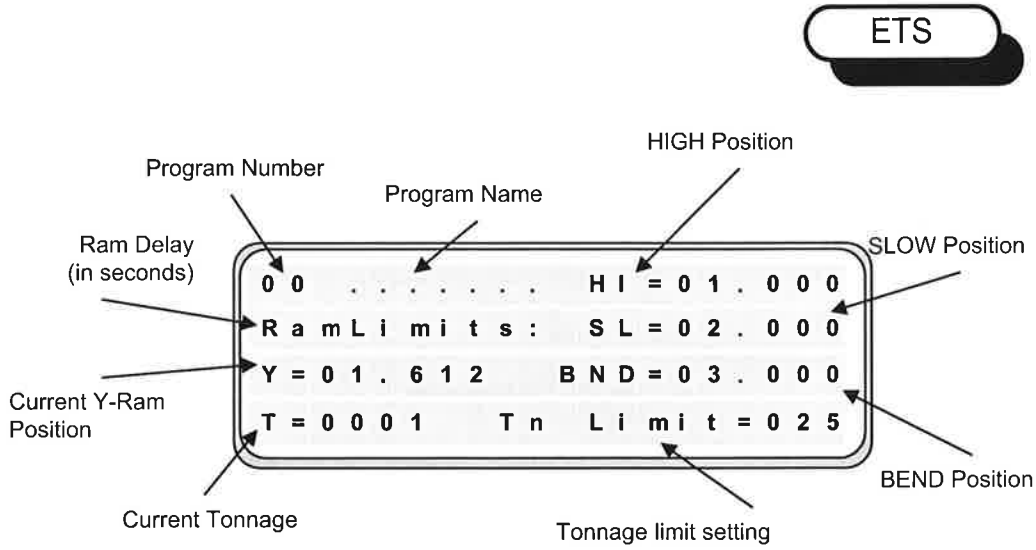


Figure 5.10-1: ETS Program/Run Screen

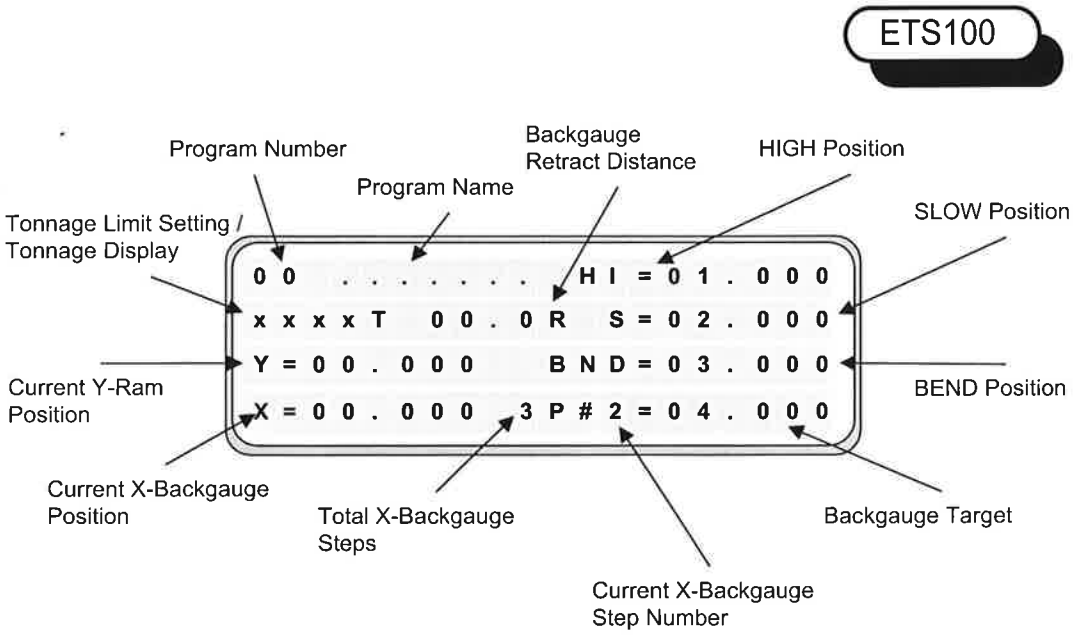


Figure 5.10-2: ETS100 Program/Run Screen

ETS200

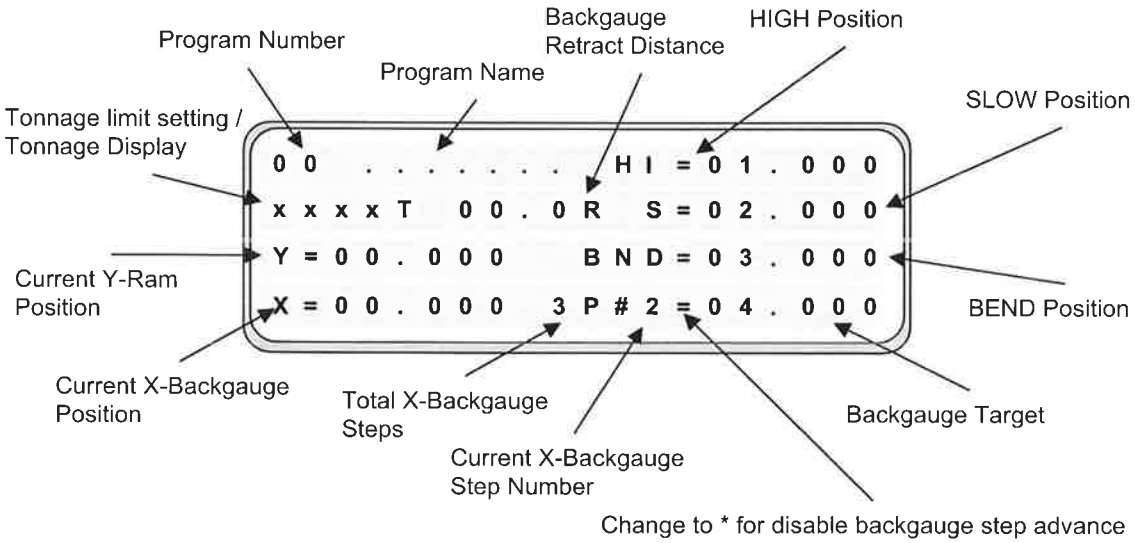


Figure 5.10-3: ETS200 Program/Run Screen

⚠ CAUTION

Only after the entire Program/Run Mode section has been read and understood should an operator cycle the press ram. The operator should begin by testing the results of editing each data input field by cycling the press ram without any dies installed. This precaution will prevent the occurrence of an accidental tooling crash.

5.10.1 Program Number

Each Program/Run screen has a pre-assigned program number.

When the cursor is in the program number field, the operator can change from one Program/Run screen to another using any of the following methods:

- Enter a program number using the numeric keys in a two digit format. Example - For program #1 enter 01.
- Go to the next program number using [+]. When the last program number is reached, press [+] to display program "00".
- Go to the previous program number using [-]. When program "00" is reached, press [-] to display the highest program number.

5.10.2 Program Name

The operator can assign a program name to each Program/Run screen by positioning the cursor in the program name field and pressing any numeric key to display the Program Name screen:

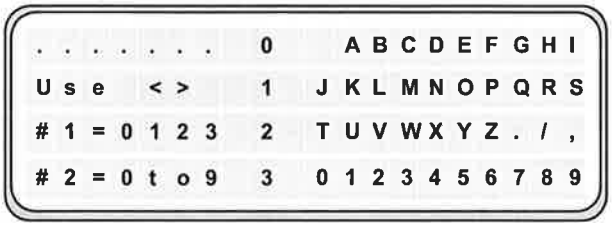


Figure 5.10-4: Program Name Screen

The Program Name screen is based on a grid of line and column numbers. The horizontal lines are numbered 0 to 3, and the vertical columns are numbered 0 to 9.

To name a program, begin by using the [◄][►] to ensure that the cursor is in the first position of the 7 character name field. Enter the number of the selected horizontal line, followed by the vertical row. For example, to select the letter R, enter the numerical coordinates 1 then 8. The R will appear in the first position of the program name field.

The following is a description of how to enter the name "RUN A,5" from the Program Name screen.

- [◄][►] to move to the first position in the 7-character name field.
- Refer to the chart below, entering first the line and then the column number to obtain the correct character.

Line		Column		Character
1	+	8	=	R
2	+	1	=	U
1	+	4	=	N
0	+	0	=	(space)
0	+	1	=	A
2	+	9	=	, (comma)
3	+	5	=	5

When the program naming is completed, press the EXIT key. The display will return to the Program/Run screen and the program name is automatically entered into the program name field. To save the program name, refer to Section 6.10.7.

The ETS200 includes a Catalog screen (below), which is accessed by selecting number 6 in the main menu: 6 = Catalog Mode.

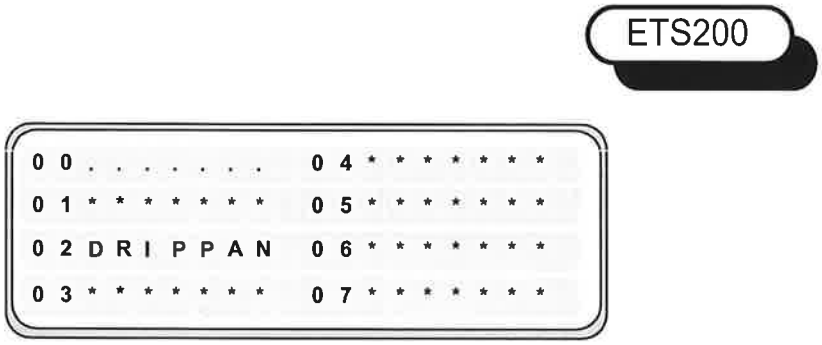


Figure 5.10-5: ETS200 Catalog Screen

The Catalog screen allows access to the 100 possible program names using the "+" and "-" keys.

* * * * * * * (asterisks) in the Program Name field indicate that the program is unused and/or has been erased. If this program is opened the default setting will be seen.

. . . . . (decimal points) in the Program Name field indicate that the program is in use but has not been assigned a title name.

Once the desired program has been located, enter its two digit number. This will activate Run mode for the program.

5.10.3 TnLimit

Each Program/Run screen has a data input field that enables the operator to control the press ram tonnage.

Decreasing output tonnage from the default maximum may be desired if bending over small or acute die openings.

To set the desired tonnage limit:

1. ◄ ► will move the cursor to the tonnage limit data input field.
2. Press the CLEAR key.
3. Using the numeric keys, input the desired maximum press ram tonnage.

5.10.4 HI, SL, BND Program Positions

Each Program/Run screen has three data input fields that enable the operator to control the press ram Y-axis positions during a cycle.

- HI - "high point" - the position at which the press ram begins and ends it's cycle.
- SL - "slow speed change point" - the position where the press ram changes speed.
- BND - "bend point" - the lowest position of the press ram cycle.

There are two options to input data into any of the three fields:

1. Numerical Entry Method:

   a) Press ◄ ► to move the cursor to the desired data input field, or,
   Press the HIGH, SLOW, or BEND key to go to the HI, SL, or BND field, respectively.

   b) Then, using the numeric keys, input the desired Y-axis position.

2. Capture Method:
   Jog the ram down to the desired position, then press the associated function key for three seconds to capture the press ram's current Y-axis position. This method will not work for capturing the HIGH position with the ETS200.

NOTE: Increasing the numeric values of these fields will move the press ram further below the respective Y-axis positions.

5.10.5 Current Y-Ram Position

The press ram's current Y-axis position is always displayed in the "Y=" field in the Program/Run screen.

5.10.6 Program Backgauge (X-axis)

This section applies only to machines that include the optional backgauge.

5.10.6.1 Current X-Backgauge Position

The backgauge's current X-axis position is always displayed in the "X=" field in the Program/Run screen.

5.10.6.2 Total Backgauge Steps

The ETS100 is configured for up to 16 programs with 1 step per program for the press ram and 5 steps per program for the backgauge.

The ETS200 is configured for up to 100 programs with 9 steps per program for both the press ram and the backgauge.

Each Program/Run screen has a data input field for the total number of backgauge steps desired.

To set the total number of backgauge steps:

1. ◄ ► will move the cursor to the "Total Backgauge Steps" data input field.
2. Using the numeric keys, input the desired number of steps.

5.10.6.3 Current Backgauge Step Number

Each Program/Run screen has a data input field for the current backgauge step number.

To set a backgauge step number:

1. ◄ ► to move the cursor to the "Current Backgauge Step Number" data input field.
2. Use the numeric keys to input the desired step number.

5.10.6.4 Enable/Disable Backgauge Step Advance

Each backgauge step can be toggled to enable or disable its automatic advance.

During a program run, when a backgauge step with disable advance is reached:

- the backgauge will remain in its last position,
- the GAUGE ACTIVE light will turn off, and
- the display will change to the disabled step number.

This feature is useful when it is necessary to extract a formed component from the rear of the press brake before the backgauge advances to the next position.

To enable or disable backgauge advance for a step number:

1. ◄ ► will move the "Current Backgauge Step Number" data input field.
2. Use the decimal key to toggle the field to the "=" or "*" character.
   "=" indicates that the backgauge position advance is enabled.
   "*" indicates that the backgauge position advance is disabled.

If backgauge advance is disabled for the current step, the backgauge can be re-enabled by pressing the GAUGE ENABLE key. The GAUGE ACTIVE light will turn on.

5.10.6.5 Backgauge Target Position

Each backgauge step number has a data input field for a target position.

To set a target position for a backgauge step number:

1. ◄ ► will move the cursor to the "Current Backgauge Step Number" data input field.
2. Use the numeric keys to input the desired step number.
3. ► will move the cursor to the "Backgauge Target" data input field.
4. Use the decimal key and the numeric keys to input the desired backgauge position.
5. Repeat the above procedure to set the target position for each desired step.

5.10.6.6 Backgauge Retract Distance

Each Program/Run screen has a data input field for the backgauge retract distance, R. This is the distance the backgauge will travel away from the part being formed so that the part does not hit the backgauge fingers during the forming operation.

The Y-axis position that triggers the backgauge is called the backgauge retract offset distance and is programmed in the RY data input field of the Parameters screen. Refer to Section 5.6.7.

To set the backgauge retract distance:

1. ◄ ► will move the cursor to the "Backgauge Retract Distance" data input field.
2. Using the decimal and numeric keys, input the desired distance.

During a cycle, the backgauge will retract this set distance when the press ram is at a programmed distance (RY) from the speed change point (SLOW position).

5.10.7 Saving a Program/Run Screen

Each Program/Run screen may be saved in memory for future recall.

A Program/Run screen may be saved at any time.

Some operators save a Program/Run screen only after all data input fields have been edited, while others choose to save after each data input.

To save a displayed Program/Run screen on the ETS100, press the EXIT key and follow the prompts on the Exit screen (see Figure 5.10-6).

ETS100

```
ETS100 Exit Screen
To Save Press #1
To Return Press #2
To Ignore Press Exit
```

Figure 5.10-6: ETS100 Exit Screen

The ETS200 Exit screen (Figure 5.10-7) includes the option of saving the program to a specified program number, as well as an "Erase Program" feature.

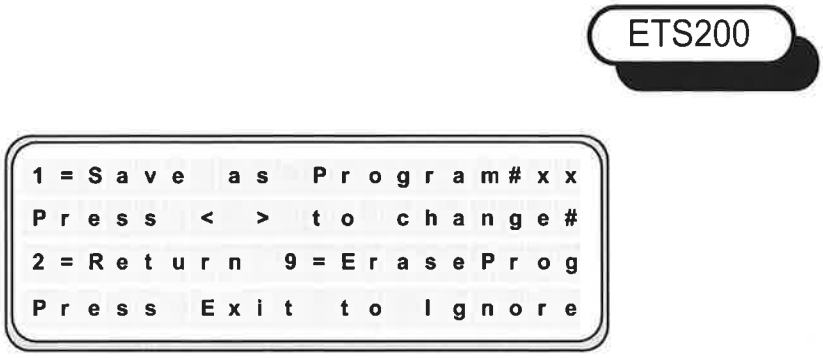


Figure 5.10-7: ETS200 Exit Screen

5.10.7.1 Saving a Program in ETS100

To save the current program, Press the "1" key.

To save the program to a new program number:

1. Press ◄ ► to move the cursor to the program number field.
2. Use the numeric keys to enter a new two digit program number.
3. Press ◄ ► again, to remove the cursor from the field.
4. Select "1" to store the program to its new number.

Note: Make sure that you do not overwrite an existing program.

For other features, follow the prompts on the screen.

5.10.7.1 Saving a Program in ETS200

An ETS200 program created the first time after initial installat ion start up will save all program steps by pressing the EXIT key followed by the "1" key. Subsequent edits require saving after each step edit, prior to running the step. This can be completed by two methods:

1. a) EXIT the current program, then press the "1" key.
   b) In the Main menu, press the "3" key to recall the last program run, and select the step to run.

2. The second method to save program edits is to index the step position field to the next step number, and then index back to the current step prior to running that step. This method is the more efficient way to prove and save the step edits to complete a multiple step program.

5.11 Third Party Mode

Third Party Mode allows compatible CNC gauging systems to be interfaced with the ETS control. The ETS2000 or ETS3000 control systems are recommended

When this option is interfaced, the ram and optional backgauge positioning controls on the ETS control are muted. All other ETS control functions are maintained.

For the electrical wiring information, refer to the Accurpress electrical schematic. Once the compatible CNC guaging system is detected, the ETS Third Party Mode screen will appear:

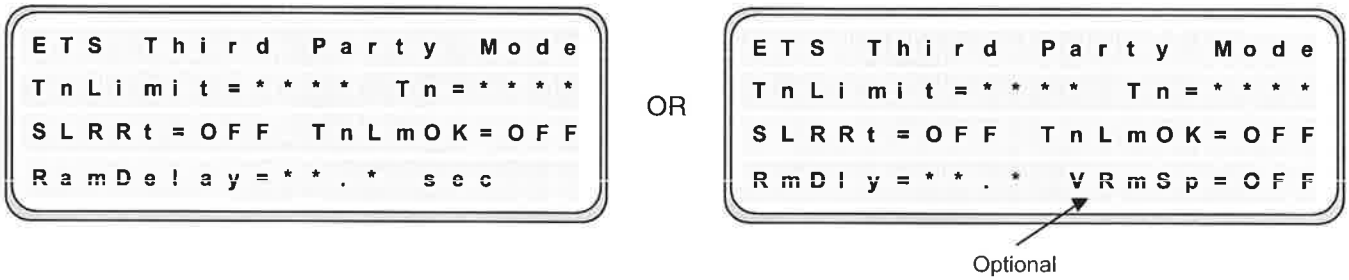


Figure 5.11-1: Third Party Mode Screen

5.11.1 TnLimit

The tonnage limit setting is a data input field to control the maximum press ram tonnage.

Decreasing output tonnage from the default maximum may be desired when bending over small or acute die openings.

To set the maximum desired tonnage:

1. ◄ ► will move the cursor to the "TnLimit" data input field.
2. Press the CLEAR key. The setting will reset to "00.000".
3. Using the numeric keys, input the desired maximum press ram tonnage.

5.11.2 SLRRet

The slow ram return setting is an ON/OFF toggle for slow press ram return.

If SLRRet is OFF, the press ram will raise from the programmed BEND to SLOW position in normal speed; if ON, it will raise in slow speed.

To set the slow retract ON or OFF:

1. ◄ ► will move the cursor to the "SLRRet" toggle field.
2. Depress any numeric key to toggle between ON and OFF.

5.11.3 RmDly

The ram delay setting is a duration of time (in seconds) that the press ram will stop at the programmed bend position, in AUTO or MANUAL mode, before raising.

To set the ram delay:

1. ◄ ► will move the cursor to the "RmDly" data input field.
2. Press the CLEAR key. The setting will reset to "00.0".
3. Using the decimal and numeric keys, input the ram delay time-to a maximum of 25.5 seconds.

5.10.4 Tn

The tonnage field displays a readout of the current press ram tonnage.

5.11.5 TnLmOK (systems with backgauge only)

The tonnage limit advance setting is an ON/OFF toggle for advancing the backgauge to the next target position at the completion of the press ram stroke, based on reaching a programmed tonnage limit, instead of a programmed BEND position.

If TnLmOK is OFF, the press ram will stop at the programmed BEND position and raise to the HIGH position, then the backgauge will move to the next position.

If TnLmOK is ON, the press ram will stop at the programmed tonnage limit setting and raise to the HIGH position, then the backgauge will move to the next position.

To set the tonnage limit advance ON or OFF:

1. ◄ ► will move the cursor to the "TnLmOK" toggle field.
2. Depress any numeric key to toggle between ON and OFF.

5.11.6 VRmSp (Optional)

The variable ram speed setting is an ON/OFF toggle for enabling or disabling variable press ram speed on press brakes with a fixed displacement hydraulic pump.

When the setting is OFF, the press ram will travel in standard slow speed after the speed change point is reached.

When the setting is ON, the press ram will travel in a slow speed that may be adjusted after the speed change point is reached.

To set the Variable Ram Speed ON or OFF:

1. ◄ ► will move the cursor to the "VRmSP" toggle field.
2. Depress any numeric key to toggle between ON and OFF.

Refer to section 8.1 for information of adjusting the variable ram speed control.

5.12 Help

To access on-screen information for any of the ETS controls shown, press the desired key for two seconds:

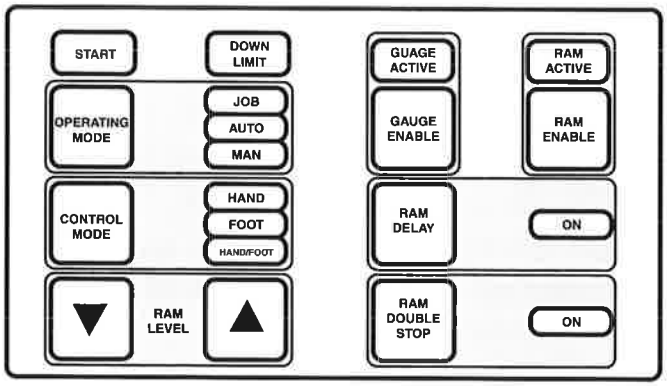


Figure 5.12-1: Control Station Function Keys

6 ACCURPRESS OPERATION

6.1 Pre-Startup

NOTICE

It is the responsibility of the Owner/Employer and Operator/Helper to read this ACCURPRESS User Manual prior to startup, in order to familiarize themselves with the press brake and its operational controls.

The Owner/Employer and Operator/Helper must read and understand the use, maintenance, and safeguarding requirements of the American National Standard for Power Press Brakes, ANSI B11.3-2002 or later revision, available from:

American National Standards Institute
1430 Broadway
New York, NY 10018
1-212-642-4900

Perform a safety inspection of the work area and equipment prior to starting up the press brake. Ensure that all safety hazards have been eliminated before turning on the press brake.

6.2 Tool Installation

6.2.1 Safety Procedures

Read Section 3.3.

6.2.2 Press Ram Positioning

Before turning the main power OFF, check that the distance between the press ram and bed is approximately 1/8" more than the sum of the punch and lower die assembly (die and optional lower die holder), when the punch is bottomed out in the die.

6.2.3 Punch Removal

DO NOT simply unfasten the die clamping screws for removal. This will help ensure that the punch does not fall forward onto the operator/helper.

To remove the punch:

1. Release the STOP button by rotating it 1/4 turn clockwise.
2. Push the green START pushbutton to start the main motor.
3. Set the control mode to HAND.
4. Set the operating mode to JOG. Lower the press brake ram until the tip of the punch is approximately 1/8" from the bottom of the "V" in the die.
5. Push the red STOP pushbutton to stop the main motor.
6. Lockout the main disconnect switch and secure the ram from movement.
7. Loosen the die clamping screws and slide the punch out at one end of the press brake.
   NOTE: If your Accurpress is equipped with the optional hydraulic Quick Clamp system, turn the keyswitch on the control box to ACTIVATE and hold it in this position. (The keyswitch is spring loaded to normally stay in the LOCK position.) Press the UNCLAMP button on the control and slide the punch out at one end of the press brake. Refer to Section 8.4.2 for illustrations of the Quick Clamp control.

6.2.4 Die Installation

After the main power has been turned OFF and locked out, lift the lower die holder and die, sliding them onto the bed from one end of the press brake. Center the lower die assembly on the press brake bed but do not fasten down.

6.2.5 Punch Installation

NOTICE

Punch tooling should be equipped with a safety tang. Punch tooling without a safety tang is held by the clamping force of the die clamp bar.

6.2.5.1 Mechanical Clamping System

To install a punch using the standard machanical clamping system:

1. Lift the punch and position it to slide into the groove of the press ram and the "V" of the die.
2. Once in place, tighten the die clamp bar socket head cap screws until the punch is secure.
3. Turn the main disconnect switch ON. Rotate the STOP button 1/4 turn clockwise to release. Press the start button. Turn the main power ON
4. Set the operating mode to JOG, then press and hold the SLOW key for 3 seconds, to ensure the press ram's travel is in slow bending speed.
5. If a tonnage control option is included, it should be turned ON and adjusted to a minimum setting before attempting to seat the punch.

⚠ CAUTION

Minimum tonnage is required to seat the punch. Excessive tonnage when seating the punch could damage the die, the ram, or the ram clamp bar. Care must be taken when installing dies with small and acute openings.

6. Lower the press ram until the 1/8" gap between the punch and die has been closed.
7. Torque to the die clamp fasteners to secure the punch in position.
8. To seat the punch in the ram groove, lower the press ram to adequate seating tonnage for the specific die set. The tonnage reading on the ETS control must not exceed the maximum rated load/foot or load/meter for the die set.
9. While maintaining the punch seating force, clamp the punch to the ram by torquing the die clamp bar socket head cap screws to a clamping torque that will ensure the punch is held securely to the ram. Due to the varying sizes and weights of punches, the required torque will vary. The maximum die clamp bolt torque must not exceed the seating torque for the given bolt size.

6.2.5.2 Hydraulic Clamping System (Optional)

To install the punch using the optional hydraulic Quick Clamp control (refer to Section 8.4.2 for a description and illustrations of this control):

1. Turn the keyswitch on the control box to ACTIVATE and hold it in this position.
2. Press the UNCLAMP control button.
3. Lift the punch, position and slide it into the groove of the press ram and the "V" of the die.
4. Set the operation mode to JOG.
5. Preset the ram pressure so that the tonnage does not exceed the maximum rated die pressure.
6. Turn the main power ON and lower the press ram until the 1/8" gap between the punch and die has been closed.
7. To seat the punch in the ram groove, lower the press ram until the preset pressure has been reached, as indicated on the pressure gauge.
8. While maintaining the preset seating force, clamp the punch to the ram by pushing the CLAMP button on Quick Clamp control box.

6.2.6 Tooling Centering

Centering the punch and die can be completed while the punch is being seated in the press ram.

Precise centering of the punch and die can be achieved using feeler gauges to check the punch-die shoulder gap while the punch is positioned near the die bottom.

Use the provided fasteners (set screws, T-bolts, and/or adjuster blocks) to center the die.

6.2.7 Die Fastening

The lower die assembly should be securely fastened to the press bed.

The die has a tang which fits into the groove on top of the lower die holder. Set screws are provided on the front and rear faces of the press bed for centering adjustments and fastening.

The lower die holder can be ordered either with or without a tang for fastening to the press bed. In either situation, provisions for fastening are included.

Adjustment and fastening of the lower die assembly are not considered complete until some sample bends have been created.

6.3 Press Brake Test Bends

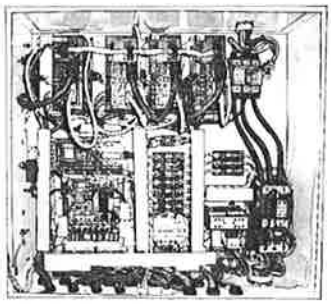
The operator will need to perform a number of trial bends and adjustments to achieve the required shape or angle.

The press ram position controls, press ram/bed parallel adjustment, and die shimming will affect the included angle of the formed part.

6.3.1 Performing a Test Bend

1. Set the operating mode to JOG.
2. Take two similar small flat test pieces and place one across each end of the die.
3. Using the palm pushbuttons or the footswitch, jog the press ram down to an adequate clearance position. Press the HIGH key for three seconds. This will set the high position for the cycle.

4. Jog the press ram down to where the punch is almost in contact with the part to be formed. At this point set the SLOW speed change position by pressing the SLOW key for three seconds.
5. Jog the press ram down so the punch forms the test pieces to approximately the desired angle.
6. Press and hold the BEND key for three seconds. This will set the press ram bend position for this angle.
7. Check the test bend pieces for equal angle forming at both ends of the press ram.
8. Press Ram/Bed Parallel Check
   - Take two similar small flat test pieces and position one across each end of the die.
   - Set the operation mode to MANUAL and bring the press ram down until the DOWN LIMIT light comes on. (The press ram should have changed into the slow speed mode just prior to contacting the test piece.)
   - Release the palm pushbuttons or footswitch to return the ram to its up-limit.
   - Measure the two formed test pieces. If the angles are not equal, the punch and die are not parallel. Reset the press ram parallel adjuster assembly (refer to Section 5.1.10) and continue making test bends until both pieces have the same angle.
9. Set Bend Point (Fine)
   - When identical pieces have been made, measure to ensure that they are at the desired angle. If the angle is too great, the press ram has not traveled down far enough. If too small, the press ram has traveled down too far.
10. Die Shimming
    - Full length consistency of formed parts may require shimming between the lower die holder and the press brake bed cap. This should compensate for deflections of the press ram and bed due to applied loads.



7 ACCURPRESS ELECTRICAL EQUIPMENT

7.1 Disconnect Switch

A manually operated disconnect switch is installed on the door of the main electrical cabinet. This switch isolates the main power supply from the press brake. It also guards against entry to the cabinet while the switch is in the ON position.

The operator handle can be locked in the OFF position when the press brake is being serviced or while dies are being installed.

7.2 Ground Connected Test Pushbutton

The ground connected pushbutton is located on the outside of the main electrical cabinet. It should be illuminated at all times when the disconnect switch is on and power is supplied to the main electrical cabinet. When the pushbutton is depressed, it is actually being grounded, and it will remain illuminated if the ground connection is good. If the pushbutton turns off when it is depressed, the ground connection is faulty. If the pushbutton does not illuminate at any time, then replace the bulb.

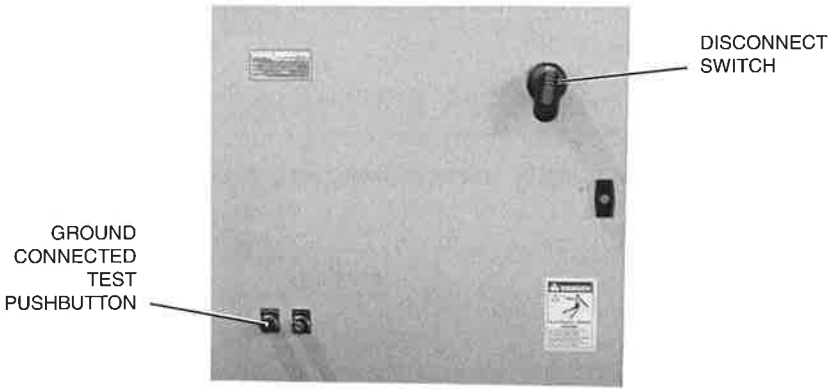


Figure 7.2-1: Main Electrical Cabinet

7.3 Electrical System Overload Protection

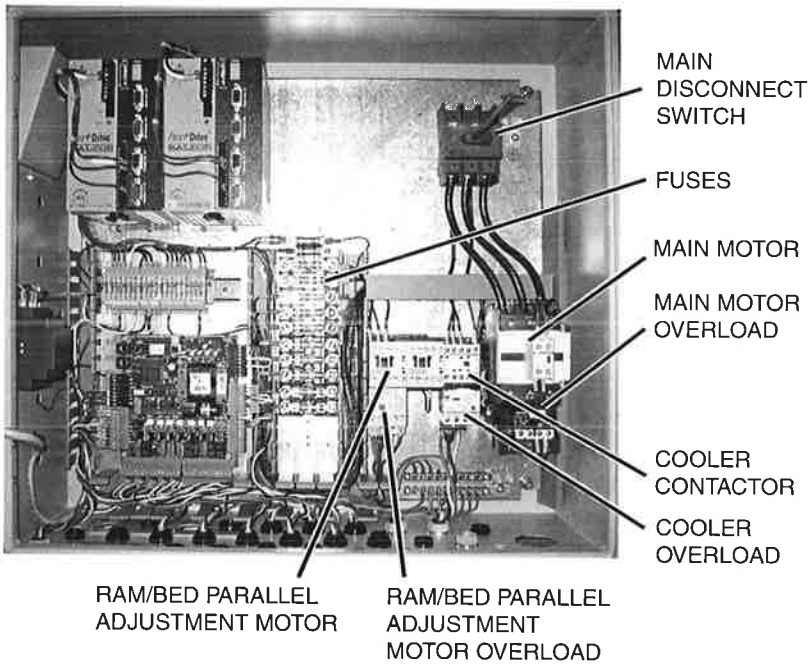


Figure 7.3-1: Typical Overload Protection in Electrical Cabinet

7.3.1 Fuses

The control power and auxiliary motors are protected by fuses in the event of an overload condition.

NOTE: If a fuse blows, the cause should be determined before the fuse is replaced and before attempting to restart a motor or actuate a control.

7.3.2 Motor Overload

The main motor, and the press ram/bed parallel adjust motor, are protected by thermal overloads. These devices are located in the main electrical cabinet.

NOTE: If a thermal overload trips, the cause should be determined before the thermal overload is reset and before attempting to restart a motor or actuate a control.

7.4 Limit Switches

Refer to Figure 7.4-1 and Figure 7.4-2.

These limit switches are factory preset and their position should not be adjusted. Any adjustments to this position may cause mechanical damage.

7.4.1 Press Ram Up Limit

The upper roller microswitch on the main electrical cabinet stops the press ram, at a factory preset position, from any further upstroke travel.

The press ram positioning control also uses this limit switch as a reference switch during Y-axis ram calibration.

7.4.2 Press Ram Down Limit

The lower roller microswitch on the main electrical cabinet stops the press ram, at a factory preset position, from any further downstroke travel in the event that a programmed Y-axis coordinate is greater than the maximum stroke of the press ram.

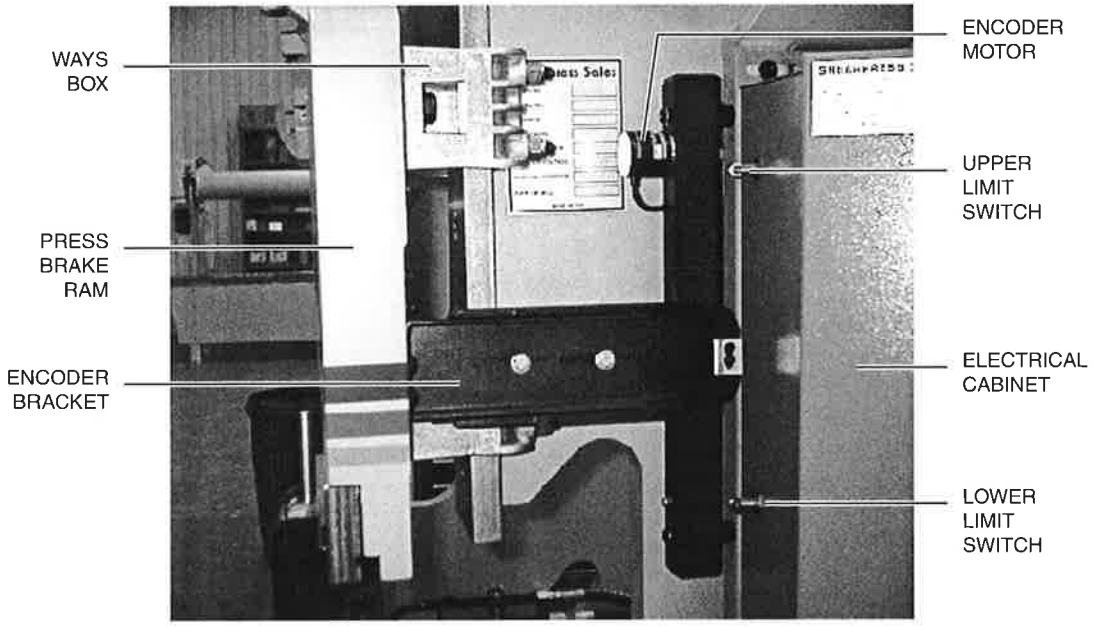


Figure 7.4-1: Ram Positioning Component Detail (Models up to 130 Ton)

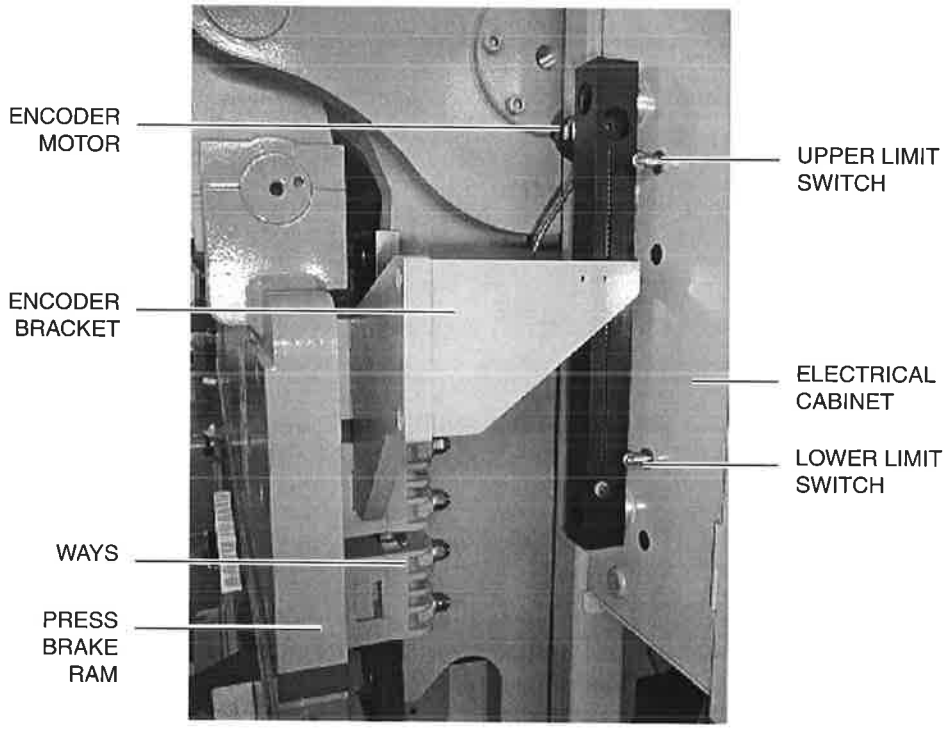
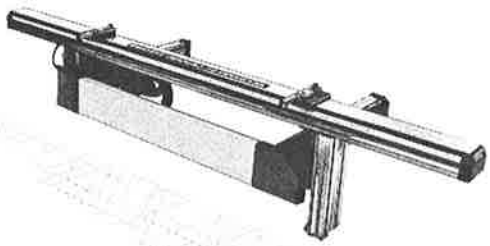


Figure 7.4-2: Ram Positioning Component Detail (Models 175 Ton and up)

7.4.3 Torsion Limit

A torque limiting system on most models prevents the press brake frame from being overstressed during off centre bending. Model 7175 and larger machines use a system built into the torque tube assembly, and Model 7100 and 7130 use a system built into the hydraulic system.



8 ACCURPRESS MECHANICAL EQUIPMENT

8.1 Ram Speed Adjustment

The ram speed can be adjusted manually using the Variable Ram Speed Adjustment Control. This rotary control hand dial is located on the front of the hydraulic tank.

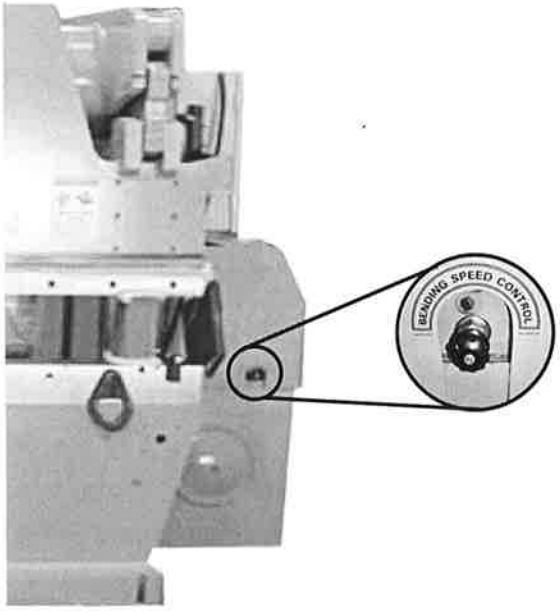


Figure 8.1-1: Variable Ram Speed Adjustment Control

The bending speed of the press brake can be adjusted from a maximum of 20 inches per minute to a minimum of 5 inches per minute. Clockwise rotation of the rotary control will reduce the ram bending speed; counterclockwise adjustment will increase the ram bending speed. The standard setting is 1.5 turns open.

For high speed model 7320 and larger machines only, the VRmSp parameter found in the Operator Parameters screen must be toggled ON first to enable the variable ram speed adjustment control (refer to Section 5.6.8). Otherwise, this adjustment control will not function.

8.2 Standard Backgauge Calibration

If the press brake is equipped with a backgauge, it must be mechanically calibrated to the center of the punch and die to assure system accuracy. The backgauge is fully calibrated when delivered and any subsequent mechanical calibration is only necessary in the unlikely event that the fingers or backstop bar are forced out of position. In addition to the mechanical calibrataion, the backgauge must be calibrated with the ETS software prior to running a program.

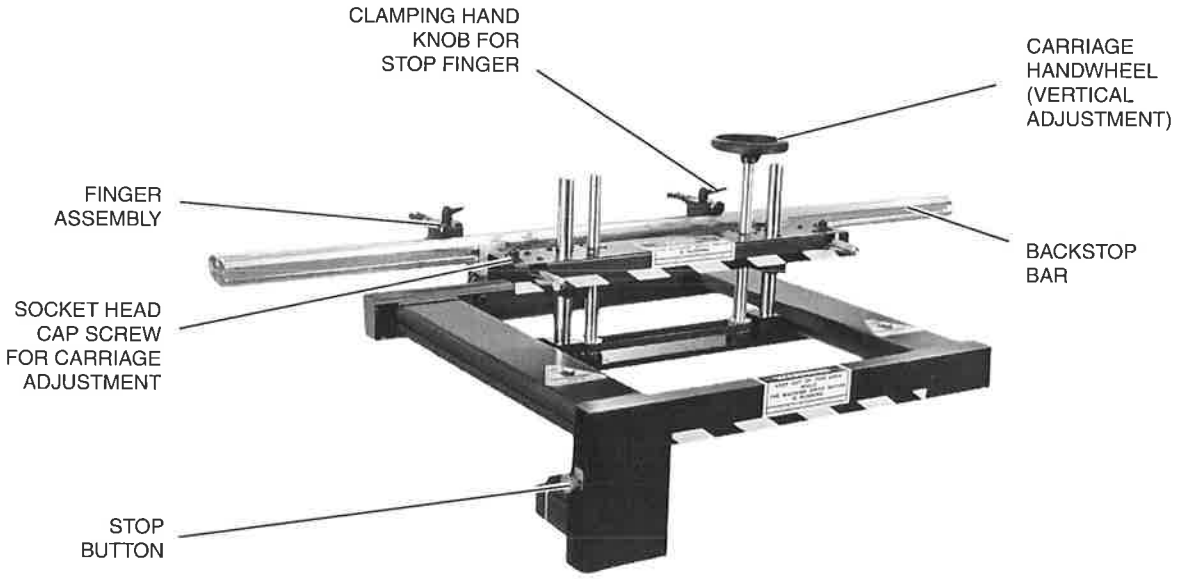


Figure 8.2-1: Standard Backgauge

Two calibration gauge bars are supplied with the backgauge. The calibration gauge bars are precision machined steel blocks with a toleranced dimension of 04.000" ± .001" from the "V" notch to their chamfered end. Each calibration gauge bar is rubber backed to prevent damage if excessive force is applied when positioning the punch in the calibration gauge bar's "V" notch.

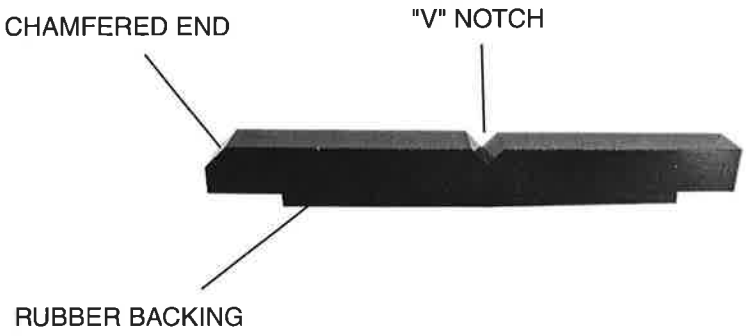


Figure 8.2-2: Calibration Gauge Bar

8.2.1 Checking Backstop Bar Alignment

The following procedure can be used to test the parallelism of the backstop bar with respect to the ram in the horizontal plane:

1. Mount a magnetic base dial indicator on one of the backgauge finger assemblies.
2. Bring the X axis to a position that will allow the dial indicator to reference the back surface of the ram from the finger.
3. Move the finger to one end of the backstop bar and adjust the dial to zero.
4. Move the finger to the other end of the gauge bar and watch the dial indicator. It should remain at zero.
5. If necessary, calibrate the backstop bar by first completing the finger calibration, then the backstop bar calibration (see Section 8.2.2 and Section 8.2.3).

NOTICE

Before initiating any of the following backgauge mechanical calibration procedures:

- the operator must be fully familiar with the press brake controls and program execution, and
- the punch and die must be installed and centered according to the procedures described in Section 8.3.

8.2.2 Finger Calibration

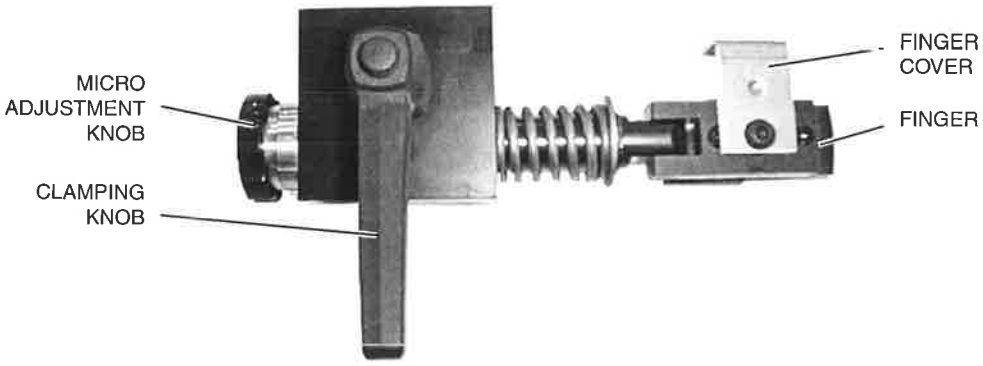


Figure 8.2-3: Standard Backgauge Finger Assembly

The backgauge fingers should be calibrated whenever they are out of parallel alignment with the tooling. If the backstop bar is knocked out of position, both the backstop bar and the fingers will need to be calibrated. It is good practice to re-calibrate the fingers each time the tooling is changed.

The following procedure will ensure that both fingers are the same distance from the backstop bar:

1. Set the operating mode to JOG and the control mode to HAND.
2. Either execute "CalibrateBackGauge" from the main menu, or program and then move the backgauge to the X=04.000" calibration position.
3. Place two calibration gauge bars across the die opening, several inches apart and near the center of the punch's length. Each bar must be placed so the rubber base is on the die and the chamfered end is towards the backgauge.

4. Using the palm pushbuttons, jog the press ram down until the punch seats into each calibration gauge bar "V" notch, with only enough applied force to slightly deform the rubber backing. Check that each calibration gauge bar is clamped securely, by manually trying to move each one.
5. Turn the backgauge carriage handwheel or program the backgauge to vertically adjust the carriage until the fingers are the same height as the calibration gauge bars. Mechanical adjustment to the backgauge occurs behind the press brake. Therefore, for safety reasons, the backgauge STOP pushbutton must be depressed and maintained in its locked position prior working in the backgauge area.
6. Unclamp and slide one backgauge finger to the end of one calibration gauge bar.
   - If the backgauge finger cannot be positioned directly behind the calibration gauge bar, turn the finger's micro adjustment knob clockwise to achieve clearance.
   - When the backgauge is located directly behind the calibration gauge bar, turn the finger's micro adjustment knob counterclockwise until the backgauge finger touches the calibration gauge bar.

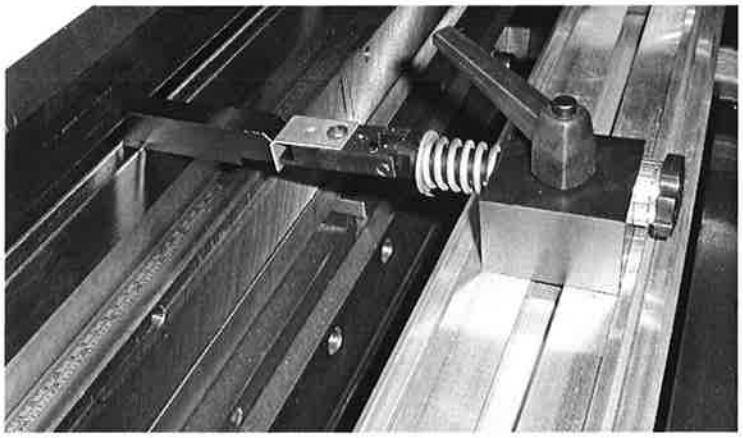


Figure 8.2-4: Standard Backgauge Finger Calibration

7. Unclamp and slide the second backgauge finger to the end of the second calibration gauge bar and adjust as described in step 6.
8. Adjust the micro adjustment knob on each finger so that the touch off contact pressure between the finger and gauge bar is the same for both fingers.
9. After the fingers have been calibrated, remove the calibration gauge bars, and re-enable the backgauge by rotating the backgauge stop button 1/4 turn clockwise.

8.2.3 Backstop Bar Calibration

If the backstop bar is out of alignment, the fingers must be calibrated first. Then the backstop bar can be calibrated to ensure it is parallel with the punch and die.

1. After both backgauge fingers have been initially calibrated and slid to each end of the backstop bar (refer to Section 8.2.2), unclamp the backstop bar from its horizontal chromed shafts.
   - To unclamp the backstop bar: locate both carriage socket head cap screws and loosen (with the supplied Allen key) just enough so that the backstop bar can be moved by hand.
2. During the backstop bar unclamping procedure, the backgauge carriage has likely moved from the X=04.000" calibration position. To move it back into position:
   i. Release the backgauge STOP pushbutton from the locked position, with a 1/4 clockwise turn.
   ii. Set the operating mode to AUTO or MANUAL.
   iii. Depress the palm pushbuttons to return the press ram to HIGH position.
   iv. Either execute "CalibrateBackGauge" from the main menu, or program the x-axis to the X=04.000" calibration position and press the GAUGE ENABLE key to move the backgauge to this position.
3. Set the operating mode back to JOG and depress the backgauge STOP pushbutton to its locked position.
4. Place BOTH calibration gauge bars across the die opening at either end of the press ram, each beside a backgauge finger. The calibration gauge bars must be placed with the rubber base on the die and the chamfered end towards the backgauge.

5. Using the palm pushbuttons, jog the press ram down until the punch seats into the calibration gauge bar "V" notches, with only enough applied force to slightly deform the rubber backing. Manually check that the calibration gauge bars are clamped securely.
6. Slide one backgauge finger to a position directly behind a calibration gauge bar.
   - If a backgauge finger cannot be positioned directly behind a calibration gauge bar, DO NOT turn the backgauge finger micro adjustment knobs. Instead, move the backstop bar by hand, until it is back far enough to gain clearance for backgauge finger positioning.
7. With the backstop bar still unclamped, move it forward until both backgauge fingers are in contact with the chamfered end of the calibration gauge bars.
8. Reclamp the backstop bar, while ensuring that each backgauge finger maintains contact with its calibration gauge bar. If contact was maintained, the backstop bar is now calibrated.
9. If no other mechanical adjustments are to be performed behind the press brake, the backgauge STOP pushbutton may now be released from its locked position, with a 1/4 clockwise turn.
10. Set the operating mode to MANUAL or AUTO and depress the palm pushbuttons to release the calibration gauge bars and return the press ram to the programmed HIGH position.

8.3 Premium Backgauge Calibration (Optional)

If the press brake is equipped with a backgauge, it must be mechanically calibrated to the center of the punch and die. The backgauge is fully calibrated when delivered and any subsequent calibration is only necessary in the unlikely event that the fingers or backstop bar are forced out of position. In addition to the mechanical calibrataion, the backgauge must be calibrated with the ETS software prior to running a program.

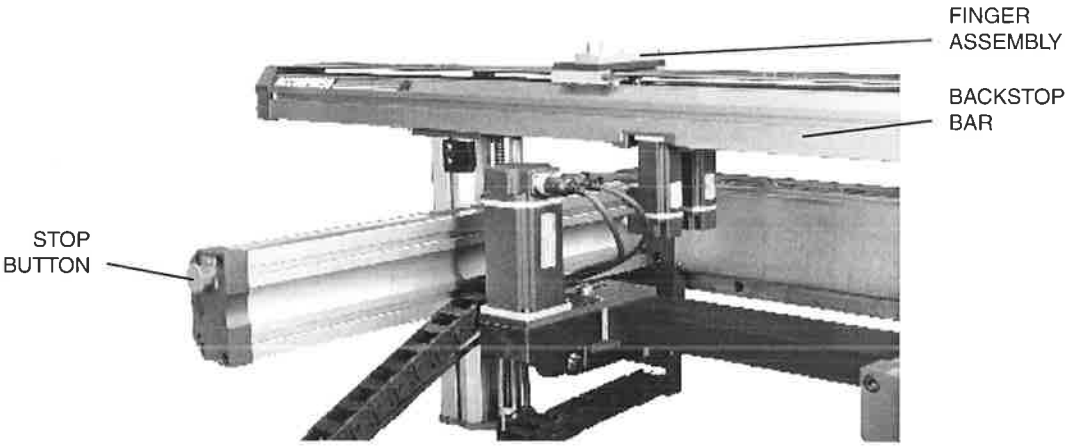


Figure 8.3-1: Premium Backgauge

If the fingers are out of alignment, only finger calibration is required. If unsure of whether the fingers are aligned properly or not, complete the finger calibration procedure. Refer to Section 8.3.3.

If the backstop bar is out of alignment, both the backstop bar and the fingers must be calibrated. Refer to Section 8.3.4. If unsure of whether the backstop bar is aligned properly or not, refer to Section 8.3.1 for verification.

8.3.1 Checking Backstop Bar Alignment

8.3.1.1 Vertical Plane

Refer to Figure 8.3-2.

The following procedure can be used to test the parallelism of the backstop bar with respect to the ram in the vertical plane:

1. Mount a magnetic base dial indicator on one of the backgauge fingers.
2. Bring the X and R axis to a position that will allow the dial indicator to reference the bottom surface of the ram from the finger.
3. Move the finger to one end of the backstop bar and adjust the dial to zero.
4. Move the finger to the other end of the gauge bar and watch the dial indicator. It should remain at zero.

5. Some crown is allowed, but the dial indicator should read zero at both ends. If necessary, calibrate the backstop bar by completing the procedure given in Section 8.3.4.1.

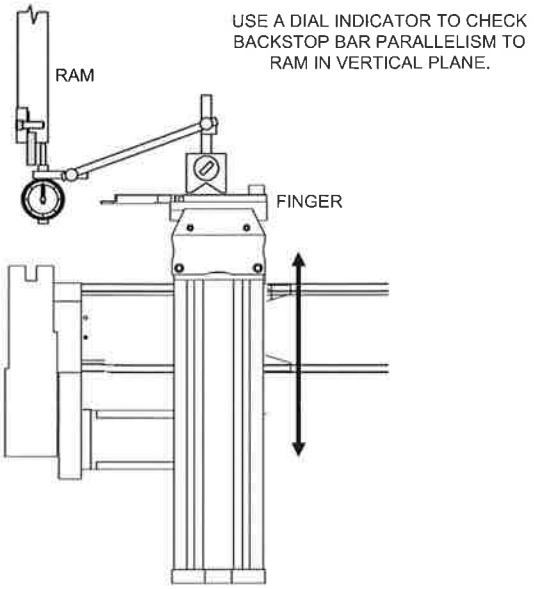


Figure 8.3-2: Checking the Backstop Bar Alignment in the Vertical Plane

8.3.1.2 Horizontal Plane

Refer to Figure 8.3-3.

The following procedure can be used to test the parallelism of the backstop bar with respect to the ram in the horizontal plane:

1. Mount a magnetic base dial indicator on one of the backgauge fingers.
2. Bring the X and R axis to a position that will allow the dial indicator to reference the back surface of the ram from the finger.
3. Move the finger to one end of the backstop bar and adjust the dial to zero.
4. Move the finger to the other end of the gauge bar and watch the dial indicator. It should remain at zero.
5. If necessary, calibrate the backstop bar by completing the procedure given in Section 8.3.4.2.

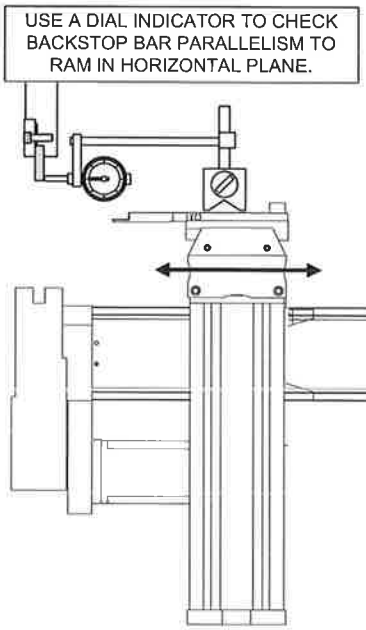


Figure 8.3-3: Checking the Backstop Bar Alignment in the Horizontal Plane

8.3.2 Backgauge Calibration Gauge Bars

Two calibration gauge bars are supplied with the backgauge.

Calibration gauge bars are precision machined steel blocks with a toleranced dimension of 04.000" ± .001" from the "V" notch to their chamfered end. Each calibration gauge bar is rubber backed to prevent damage if excessive force is applied when positioning the punch in the calibration gauge bar's "V" notch.

NOTICE

Before initiating any of the following backgauge mechanical calibration procedures:

- the operator must be fully familiar with the press brake controls and program execution, and
- the punch and die must have been installed and centered according to the procedures described in Section 8.3.

8.3.3 Finger Calibration

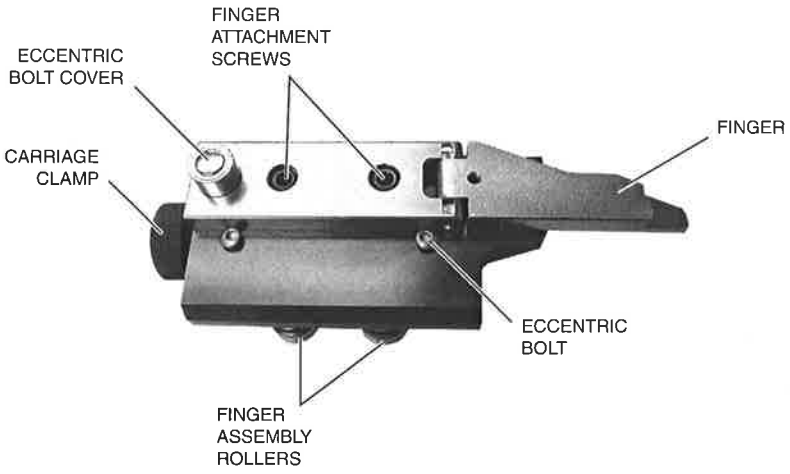


Figure 8.3-4: Premium Backgauge Finger Assembly

The backgauge fingers should be calibrated whenever they are out of parallel alignment with the tooling. If the backstop bar is knocked out of position, both the backstop bar and the fingers will need to be calibrated. It is good practice to re-calibrate the fingers each time the tooling is changed.

This procedure will ensure that both fingers are the same distance from the backstop bar:

1. Set the operating mode to JOG and the control mode to HAND.
2. Either execute "CalibrateBackGauge" from the main menu, or program and then move the backgauge to the X=04.000" calibration position.
3. Place two calibration gauge bars across the die opening, several inches apart and near the center of the punch's length. Each bar must be placed so the rubber base is on the die and the chamfered end is towards the backgauge.
4. Using the palm pushbuttons, jog the press ram down until the punch seats into each calibration gauge bar "V" notch, with only enough applied force to slightly deform the rubber backing. Check that the calibration gauge bar is clamped securely by manually trying to move it.

5. Adjust the carriage vertically until the fingers are the same height as the calibration gauge bars.
   Mechanical adjustment to the backgauge occurs behind the press brake. Therefore, for safety reasons, the backgauge STOP pushbutton must be depressed and maintained in its locked position prior working in the backgauge area.
   For machines with a Manual-R system, use the backgauge carriage handwheel.
   For machines with a Power-R system, program the proper position.
6. Move one backgauge finger to the end of one calibration gauge bar. On a Manual-Z system, loosen the carriage clamp and slide the finger. On a Power-Z system, program the proper position. Adjust the finger to the calibration position:
   - Using a 5/16" hex key, loosen the two socket head cap screws that attach the finger to the finger block.
   - Pry off the steel cap from the boss that encloses the eccentric bolt at the rear of the finger.
   - Using a 7/16" hex key, turn the eccentric bolt to adjust the finger firmly against the calibration block. Use slight hand pressure to keep the finger parallel to the finger block edge.
7. Move the second backgauge finger to the end of second calibration gauge bar and adjust as described in step 6
8. Adjust each finger so that the touch off contact pressure between the finger and gauge bars is the same for both fingers.
9. When adjustment is complete, replace the eccentric bolt cap and retighten the two screws.
10. Remove the calibration gauge bars, and re-enable the backgauge by rotating the backgauge stop button 1/4 turn clockwise.

8.3.4 Backstop Bar Calibration

8.3.4.1 Vertical Plane

To adjust the backstop bar in the vertical plane, begin by loosening the set screw on the R-axis top plate. Place a small cloth around the lowest point of the ball screw and apply vice-grip-pliers over the cloth, taking care not to grip or damage the ball screw. Loosen the cap screws on the R-axis bottom plate and rotate the ball screw to adjust the height. When the adjustment is complete, tighten the set screw and the cap screws. Remove the vice-grip-pliers and cloth.

8.3.4.2 Horizontal Plane

To adjust the backstop bar in the horizontal plane, loosen the T-nuts and rotate the T-bolts until parallelism with the ram is achieved.

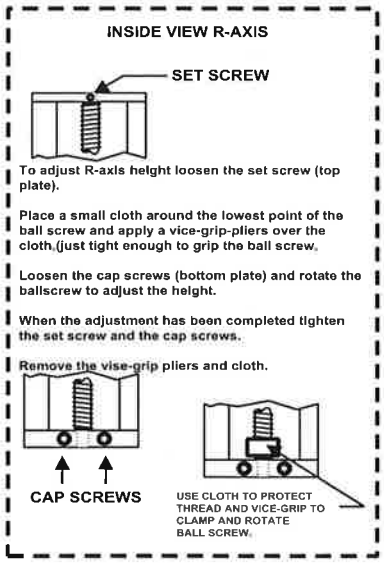


Figure 8.3-5: Backstop Bar R-Axis Adjustment

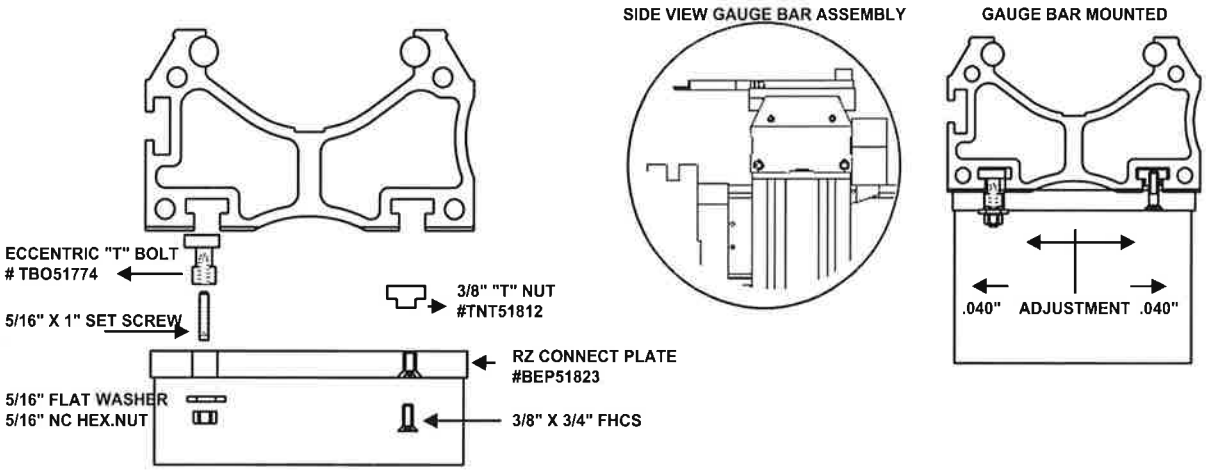


Figure 8.3-6: Backstop Bar Horizontal Adjustment

8.4 Description of Controls - Mechanical

8.4.1 Rear Operated Manual Backgauge (Optional)

To adjust the horizontal position of the backgauge stop bar, release the clamping hand knob on the carriage and rotate the adjacent hand knob. The clamping hand knob maintains the carriage position.

To adjust the vertical position of the backgauge stop bar, manipulate the knurled hand knobs on the threaded vertical support rods.

Backgauge fingers on the backstop bar are adjusted by unclamping them at their mount and sliding them forward or backward.

8.4.2 Hydraulic Quick Clamp Control (Optional)

The Accurpress Quick Clamp system is a hydraulically actuated rack and pinion die clamping system. It is designed to clamp the upper tooling to the ram with the press of a button instead of tightening and loosening each individual bolt on the die bars.

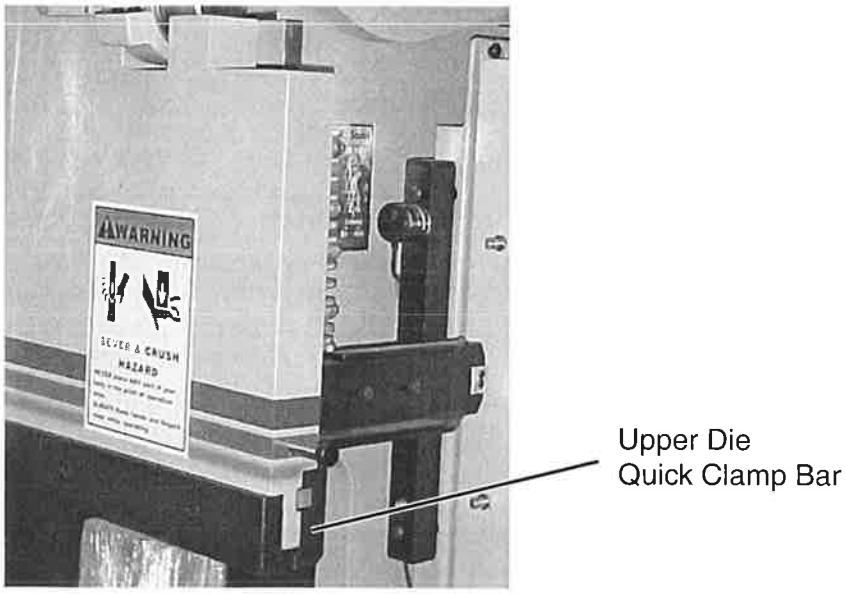


Figure 8.4-1: Power Quick Clamp System

The CLAMP and UNCLAMP control buttons are located on the Quick Clamp control panel (refer to Figure 8.4-2) on the outside of the main electrical cabinet. When the CLAMP button is pressed, the system clamps the punch to the ram. When the UNCLAMP button is pressed, the die clamp is released so that a punch may be installed or removed.

The ENABLE CLAMP / ENABLE UNCLAMP keyswitch on the Quick Clamp control panel is an override switch that enables either the CLAMP or UNCLAMP control button. When this keyswitch is in the ENABLE CLAMP position, the CLAMP control button is enabled and the UNCLAMP button is disabled. When the keyswitch is in the ENABLE UNCLAMP position, the UNCLAMP button is enabled and the CLAMP button is disabled.

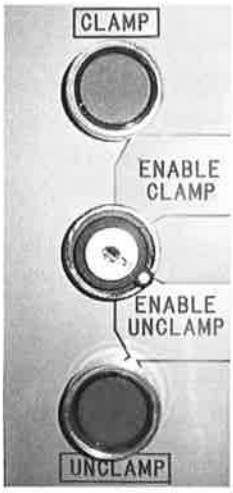


Figure 8.4-2: Quick Clamp Controls

8.5 Automatic Sheet Follower Adjustments (Optional Equipment)

For press brakes equipped with the Accurpress Automatic Sheet Follower (SF), each time the die tool is changed, the vertical and horizontal positions of the SF table must be adjusted to account for the different die height and V-die opening, respectively. See Sections 8.5.1 and 8.5.2.

When one or both (if equipped) SF tables are not being used, the unused SF table(s) should be parked for safety. To properly park the SF table, a procedure which consists of both software and hardware parking must be followed. For the software parking procedure, see the ETS 3000 User Manual. For the hardware parking procedure, see Section 8.5.3.

8.5.1 Sheet Follower Vertical Adjustment

Before using the SF, the operator must adjust the height of the SF so that the top of the SF table is level with the top of the die. This can be achieved by turning the vertical adjustment wheel on the left side of the SF table until the pointer on the SF Vertical Adjustment Indicator corresponds to the height of the die (see Figure 8.5-1).

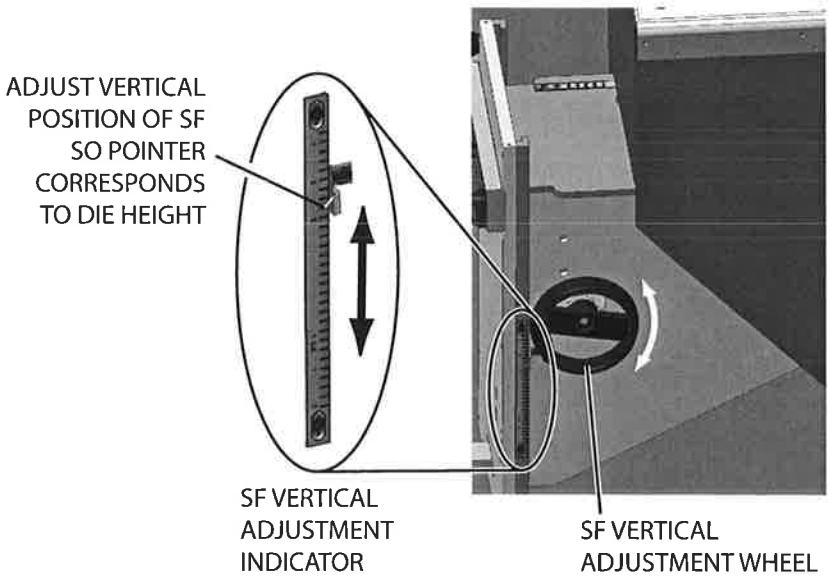


Figure 8.5-1: Leveling the Top of the SF Table to the Top of the Die Using the SF Vertical Adjustment Wheel and Indicator

If necessary, the vertical position of the SF can be adjusted or fine-tuned using the following procedure (refer to *Figure 8.5-2*):

1. Install the die to the press brake bed.
2. Ensure the SF is at the default initial position (180°).
3. Take a flat sheet of material and place one end on top of the die, and the other end on top of the SF table.
4. Turn the vertical adjustment wheel on the left side of the SF to adjust the height of the SF table so that the sheet material is horizontally level on contact with the top of the SF table.

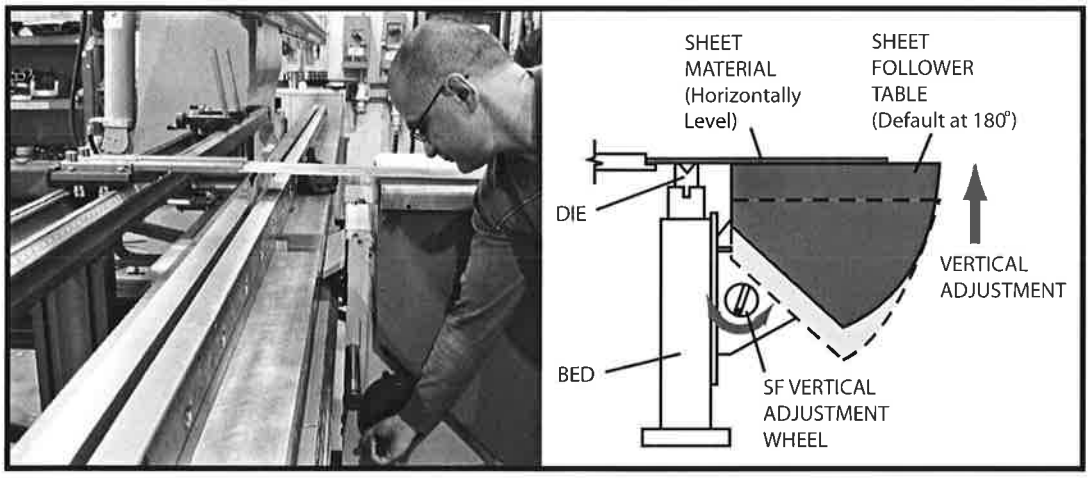


Figure 8.5-2: Fine-Tuning the Vertical Position of the SF

8.5.2 Sheet Follower Horizontal Adjustment

Before using the SF, the operator must adjust the horizontal distance of the SF table relative to the die tool for the specific V-die opening. Turn the horizontal adjustment wheel on the right side of the SF until the edge of the SF table is aligned to the mark corresponding to the V-die opening (see *Figure 8.5-3*).

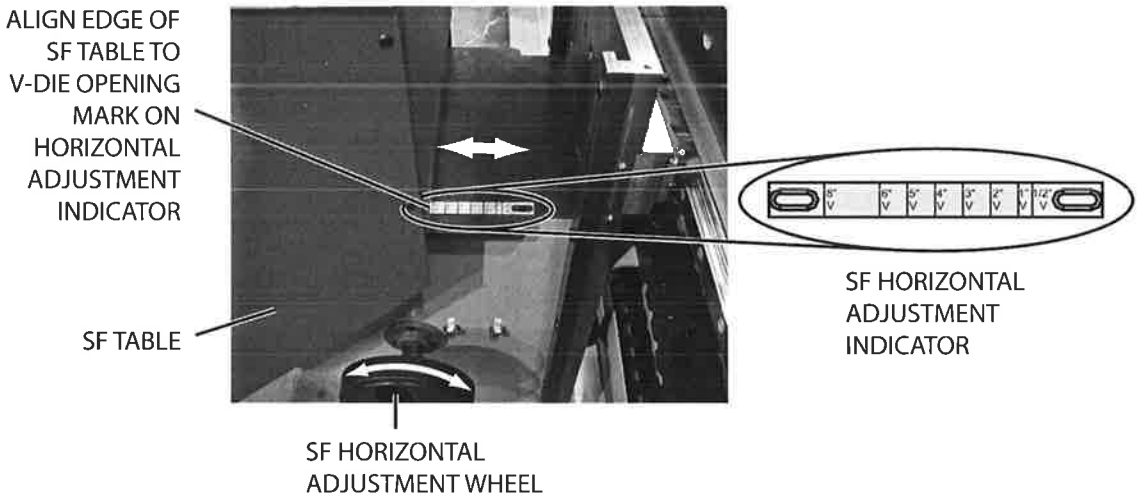


Figure 8.5-3: Adjusting the SF to the Horizontal Adjustment Indicator

If necessary, the horizontal position of the SF can be adjusted or fine-tuned using the following procedure (refer to *Figure 8.5-4*):

1. Turn the horizontal adjustment wheel on the right side of the SF to move the SF table as far away from the bed as it will go.
2. Set the press brake control station operating mode to Manual mode.
3. Bend a piece of material, and keep the ram at the bend point with the material still positioned between the punch and die.
4. Turn the horizontal adjustment wheel to adjust the horizontal distance of the SF table. For light gauge material, the SF table should just make contact with the material. For heavy gauge material, the SF table should be just in front of the material without touching it.

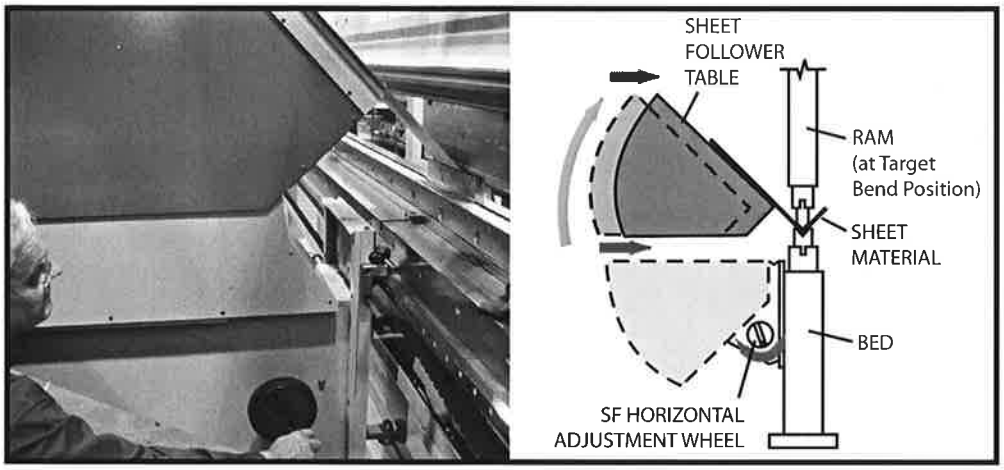


Figure 8.5-4: Fine-Tuning the Horizontal Position of the SF

8.5.3 Sheet Follower Hardware Parking

NOTICE

Hardware parking of the SF without software parking will not properly park the SF. If one SF table is moved into the parking area (hardware parked) but is not software parked, an attempt to run a job with the second SF table will result in an error message. Refer to the ETS 3000 User Manual for details.

A SF mounting rail is extended beyond the left end of the press brake bed to facilitate physical parking of the SF. Before moving the SF Table, release the safety brake handle at the top of the SF-to-bed mounting base. As each SF Table is fully moved inside the SF parking area, a corresponding limit switch is tripped to disable the SF drive.

The SF parking area has enough room for two SF Tables. When hardware parking one or two SF Tables, make sure each table is completely inside the the parking area to ensure that the corresponding limit switch is tripped. Secure each parked SF Table into position with the safety brake.

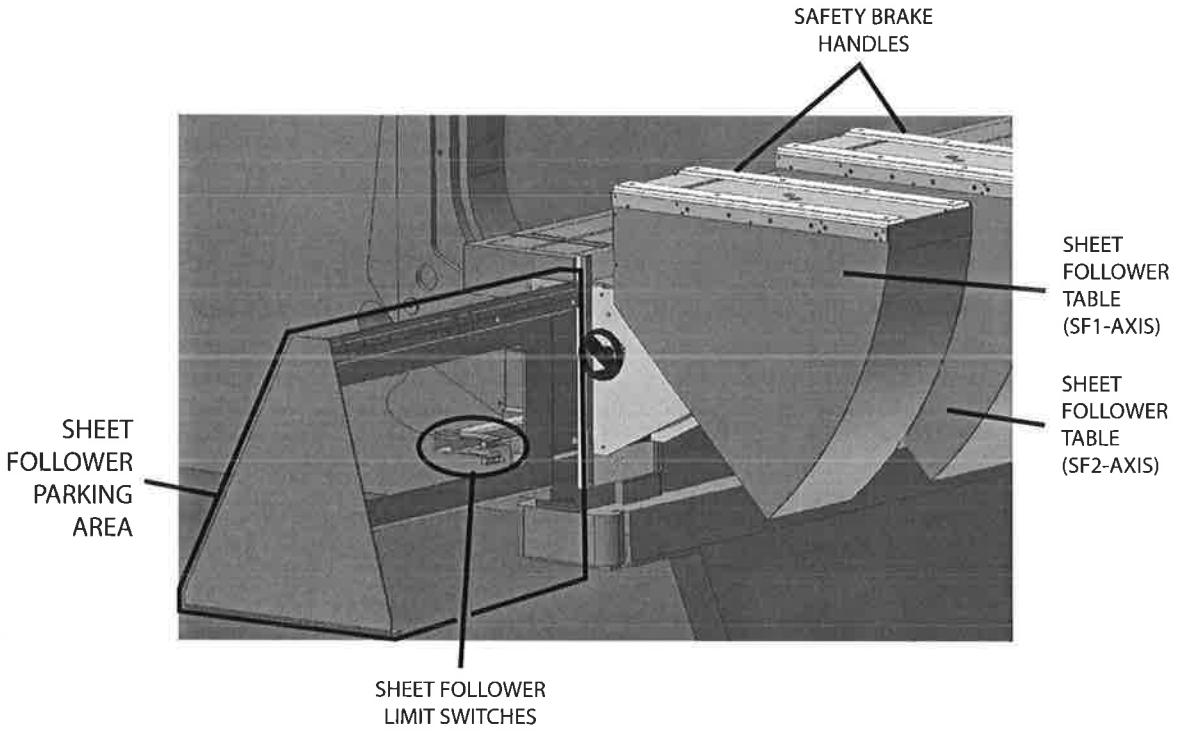


Figure 8.s5-5: Sheet Follower Parking Area

9 ACCURPRESS PREVENTIVE MAINTENANCE

Refer to Section 3, SAFETY prior to any servicing.

All personnel servicing any part of the press brake must follow safe work practices:

- Ensure that all other personnel are clear of the die area (point of operation) while the press brake is being serviced.
- Follow in-plant machine lockout procedures to prevent press brake operation during service or troubleshooting.
- Post equipment maintenance warning signs.
- Utilize proper personal protective equipment as required by regulatory requirements.

The Owner/Operator is responsible for establishing a maintenance schedule that is consistent with the number of hours the press brake is in operation and the number of duty cycles that are performed.

9.1 Mechanical System Lubrication

ACCURPRESS press brakes have a minimal number of lubrication points, as a result of maintenance-free bearing materials and bearings that are permanently lubricated and sealed.

Rotating members that do not have re-lubrication provisions do not require maintenance.

Other than the points of lubrication itemized below, do not apply lubricants to bearing surfaces where no provisions exist, as this may lessen the service life of the component.

NOTICE

It is the responsibility of the Owner/Employer to make sure that they obtain Material Safety Data Sheets (MSDS) for each lubricant used in the maintenance of the **ACCURPRESS**. The MSDS may be obtained from either the lubricant distributor or directly from the lubricant manufacturer. It is also the responsibility of the Owner/Employer to ensure that all used lubricants are recycled and/or disposed of in accordance with all applicable safety and environmental regulatory requirements.

9.1.1 Main Motor

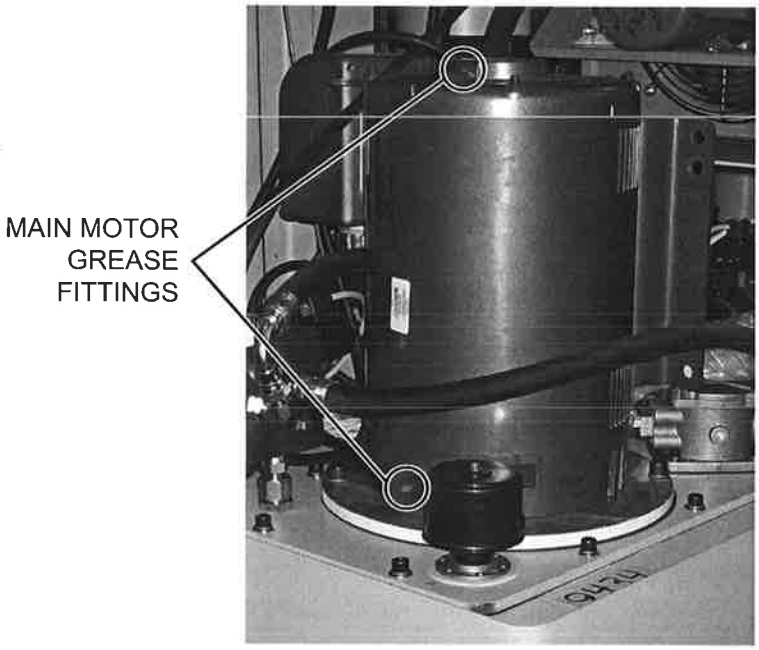


Figure 9.1-1: Main Motor Lubrication

Re-lube interval	Six months
Lubrication type	Grease
Lubricant brand	Shell Dolium
	Chevron SRI No. 2
	Texaco Premium RB
Procedure	Clean both grease nipples, fit grease

9.1.2 Backgauge Ballscrew (Optional)

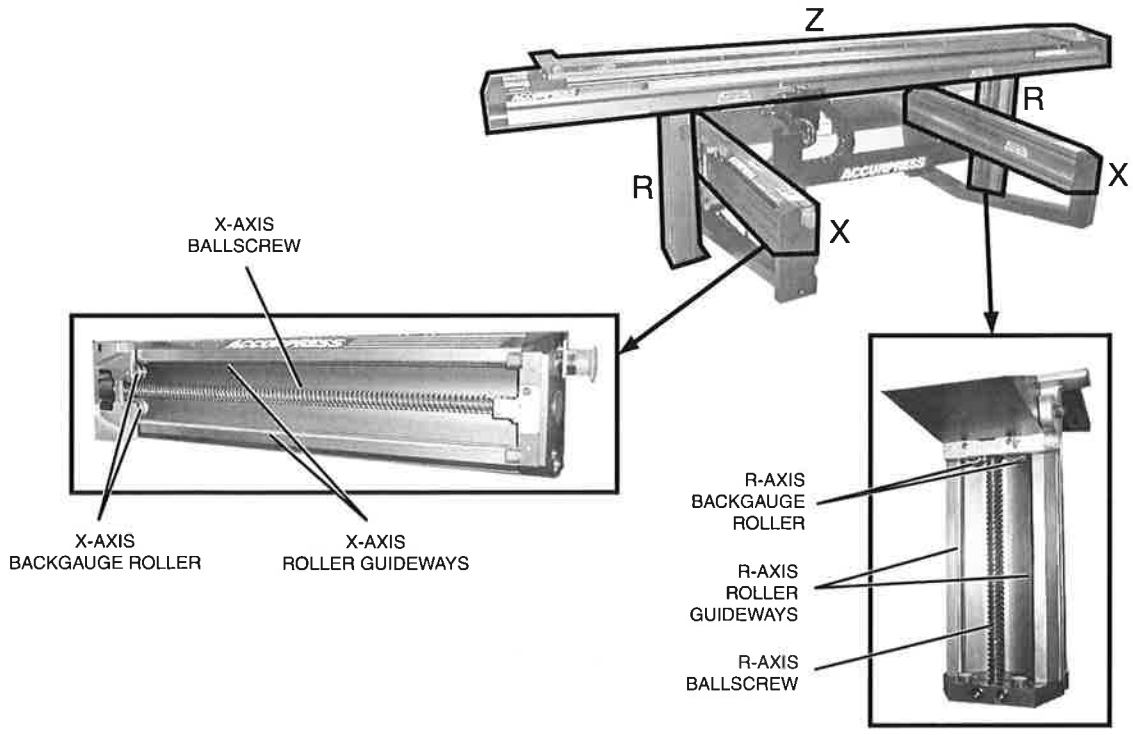


Figure 9.1-2: Cleaning and Lubricating the Premium Backgauge

Re-lube interval	Weekly
Lubrication type	10W oil / light weight grease
Procedure	Clean exposed surfaces of screw and apply a thin film of lubricant.

9.2 Hydraulic System

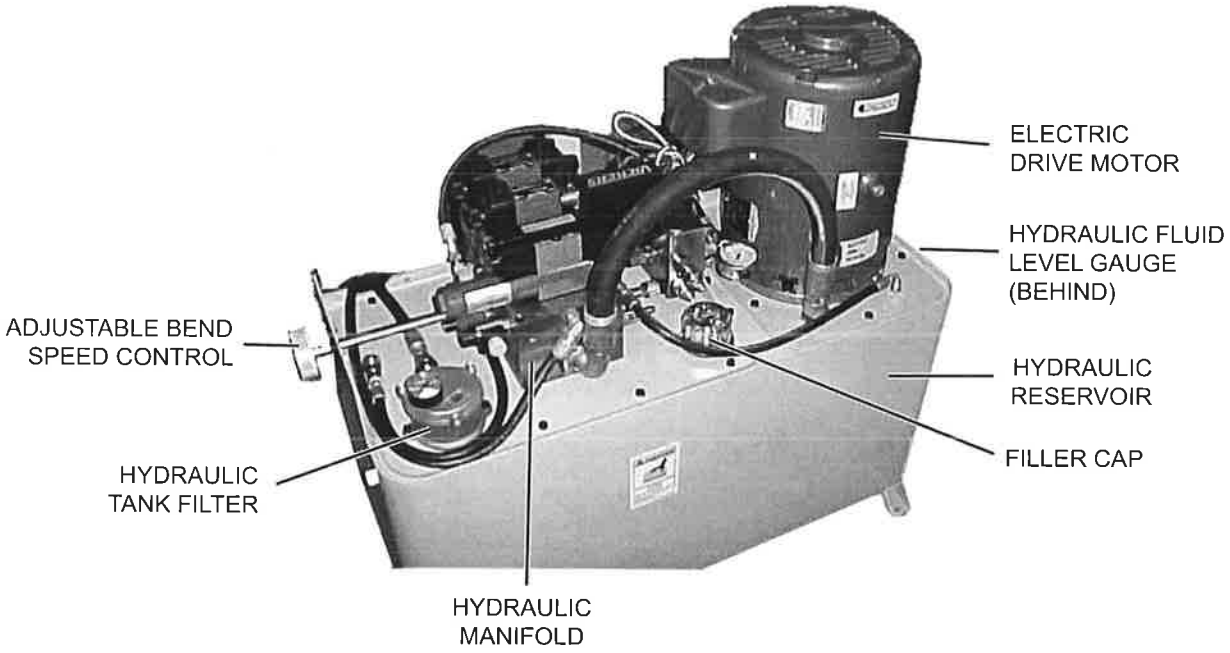


Figure 9.2-1: Hydraulic System (Models 60 Ton to 130 Ton)

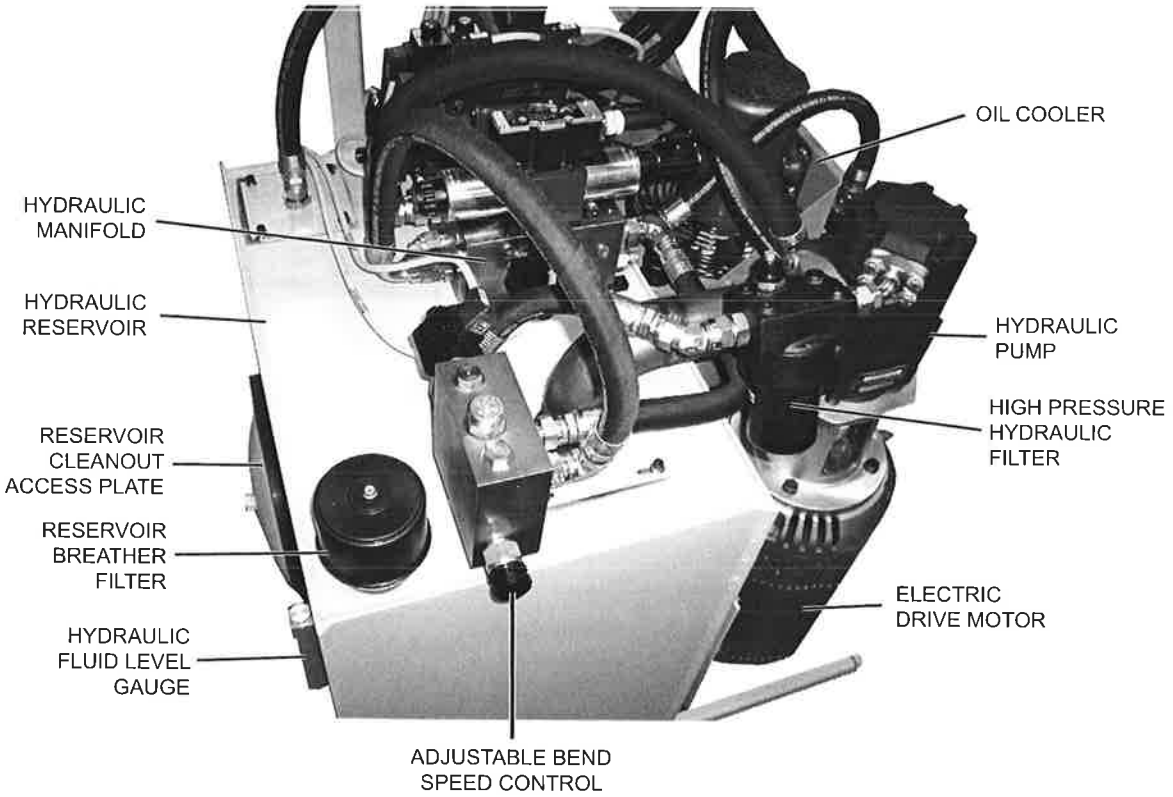


Figure 9.2-2: Hydraulic System (Models 175 Ton to Standard 320 Ton)

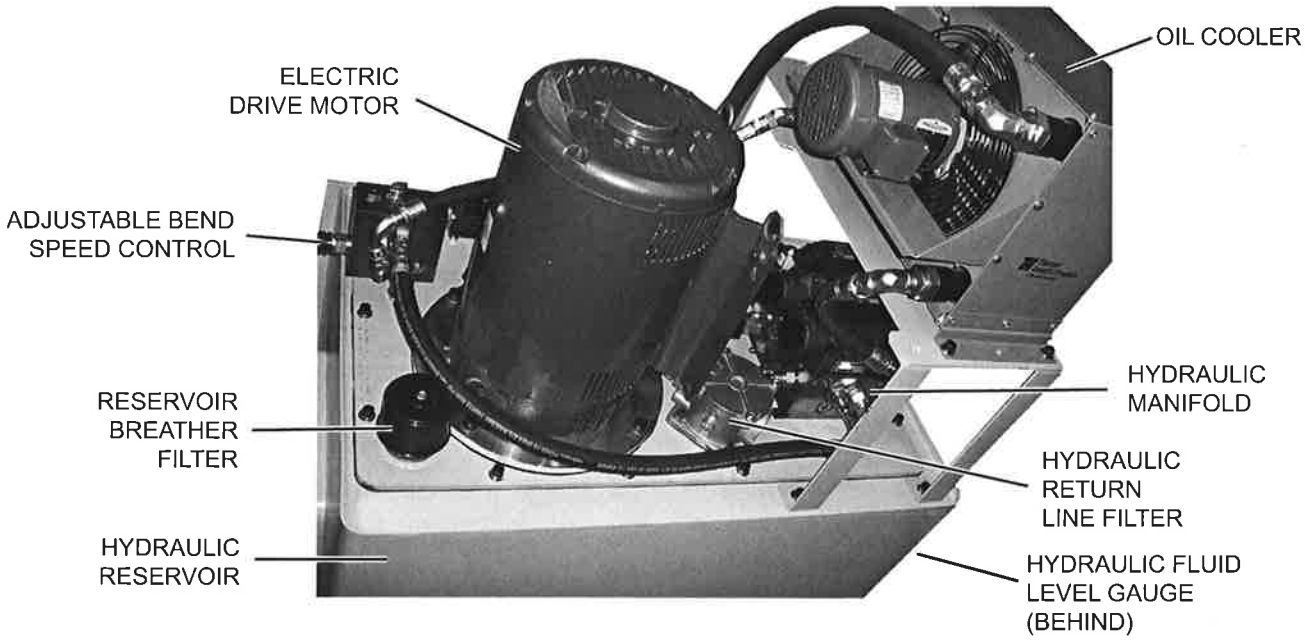


Figure 9.2-3: Hydraulic System (Models High Speed 320 Ton and Up)

NOTICE

It is advisable that the appropriate spill control products be readily available in the unlikely event of a spill or leak of hydraulic fluid. Follow your company's and/or Federal, State/Province and local regulatory requirements regarding spill response training, spill control procedures and equipment.

9.2.1 Hydraulic Fluid

9.2.1.1 Suggested Brands

Brands	
US Supplier	Texaco Rando HD Ashless 46
Canadian Supplier	Petro-Canada Harmony AW 46
Specification	
ISO grade	46

9.2.1.2 Equipment Requirements

To ensure a clean oil change, a portable filter/transfer unit should always be used when filling the hydraulic reservoir.

9.2.1.3 Fluid Level

Figure 9.2-4: Hydraulic Fluid Level Gauge

Remove the hydraulic reservoir shroud. Locate and remove the filler cap to access the reservoir. The filler cap also acts as a vent for the reservoir.

The fluid level gauge is also the housing for the thermometer, and is located behind the hydraulic tank. Fill the reservoir to a level that is approximately at the mid-point of the level gauge. Overfilling the reservoir could result in overflow when the press ram is raised.

After machine startup, and once the press ram has been raised, top up the hydraulic fluid level to the top of the level gauge.

If the press brake was shipped with fluid, be sure to remove the seal at the filler cap before starting the main motor.

9.2.1.4 Fluid Replacement

The frequency of hydraulic fluid replacement depends on the daily duty cycles and the operating environment. The suggested method for determining the fluid's condition is through hydraulic fluid analysis.

9.2.1.5 Draining the Reservoir

A portable filter/transfer unit is recommended for withdrawing the fluid out through the filler cap assembly. Oil absorption mats or cloths should be used to remove residual oil from the reservoir.

Accurpress Model Number	Electric Motor Horsepower (HP)	Reservoir Capacity in U.S. Gallons (Litres)
725	7.5	66 (250)
760	10	66 (250)
760 HS	15	66 (250)
7100	10	66 (250)
7100 HS	15	66 (250)
7130	15	66 (250)
7130 HS	20	66 (250)
7175	20	66 (250)
7175 HS	30	66 (250)
7250	20	66 (250)
7250 HS	30	66 (250)
7320	30	66 (250)
7320 HS	40	146 (553)
7400	40	146 (553)
7400 HS	50	146 (553)
7500	40	146 (553)
7500 HS	50	146 (553)
7600	50	146 (553)
7600HS	75	146 (553)
7750	60	146 (553)
7750HS	75	146 (553)
71000	60	146 (553)
71000HS	75	146 (553)

HS = High Speed Hydraulic Power Unit

Figure 9.2-5: Electric Motor Horsepower and Hydraulic Reservoir Capacities

9.2.2 Hydraulic Fluid Filtration

9.2.2.1 Return Filter

The return line filter should be replaced annually or at the same time the hydraulic fluid is replaced.

To replace the filter, loosen the four hex cap screws on the filter cover to access the filter element. Remove and replace the filter element, then reassemble the filter cover.

Depending on the duty cycles performed by the press brake, a hydraulic fluid analysis may be recommended to determine frequency of return line filter replacement.

9.3 Mechanical System Adjustments

9.3.1 Ways Box - Model 7250 and Smaller

Press ram free fall is a condition that may cause inconsistency in formed part geometry. If the press ram is free falling during the down cycle, it will hesitate slightly when the punch contacts the material to be formed.

If a free fall condition exists, check that all of the aluminum ways assembly nylock adjustment nuts are tightened to the proper torque as shown below.

Model Number	Torque (ft-lb.)
760 (except 12)	20
760 (12)	15
7100 (except 12)	20
7100 (12) - 7130	15
7250	30-35

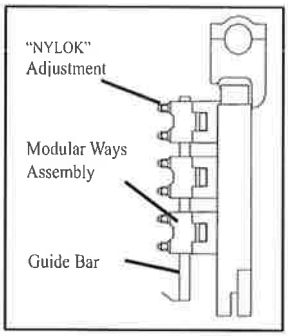


Figure 9.3-1: Ways Assembly Nylock Adjustment Nut Torque Values

Cycle the press ram and see if it is still free falling. If it is, increase the aluminum ways assembly nylock adjustment nut torque settings by 2 ft-lb. until the press ram is no longer free falling.

If the press ram is no longer free falling, check the ways assemblies for temperature gain due to excessive preload on the bearing ways.

The aluminum ways assemblies can feel warm to the touch after approximately 15 minutes of cycling. If they are too warm to touch after cycling for 15 minutes, release preload on the ways assembly nylock adjustment nuts by 1 ft-lb.

Repeat the above procedure until the optimum is achieved.

Refer to Figure 9.3-2 and 9.3-3.

9.3.2 Ways Box - Model 7320 and Larger

Press ram free fall is a condition that may cause inconsistency in formed part geometry. If the press ram is free falling during the down cycle, it will hesitate slightly when the punch contacts the material to be formed.

Individually loosen and slide 1 layer of .005" shim out from under each ways assembly clamping bar.

Retorque all ways assembly clamping bar fastening screws to 90 ft-lb. and cycle the ram for approximately 15 minutes.

If the press ram is still free falling after 15 minutes, repeat the above procedure until the optimum is achieved.

Check the ram ways assembly for temperature gain due to excessive preload. The bearing ways can feel warm to the touch after approximately 15 minutes of cycling. If the press ram ways assembly is too warm to touch after cycling for 15 minutes, replace one layer of .005" shim.

Refer to Figure 9.3-4.

NOTICE

DO NOT APPLY LUBRICANTS to the ways box assembly.

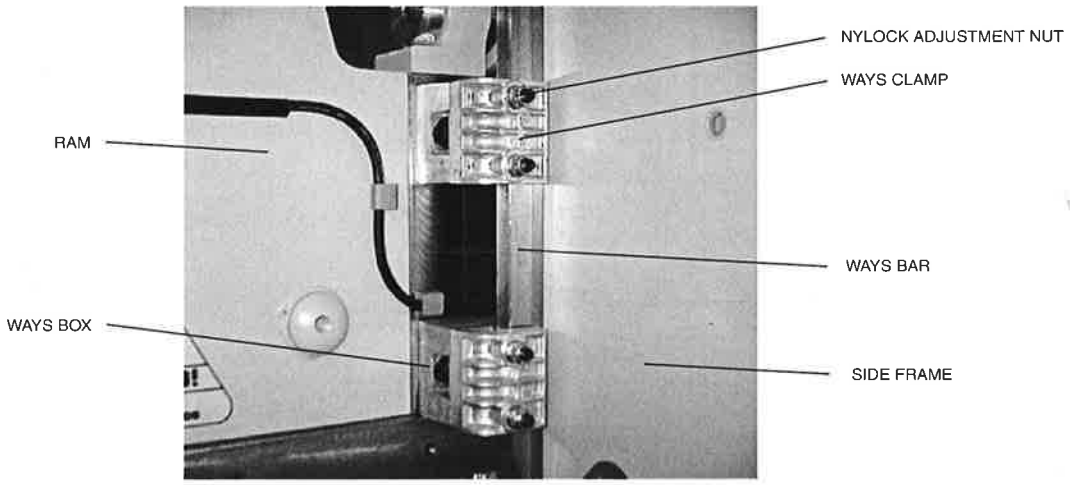
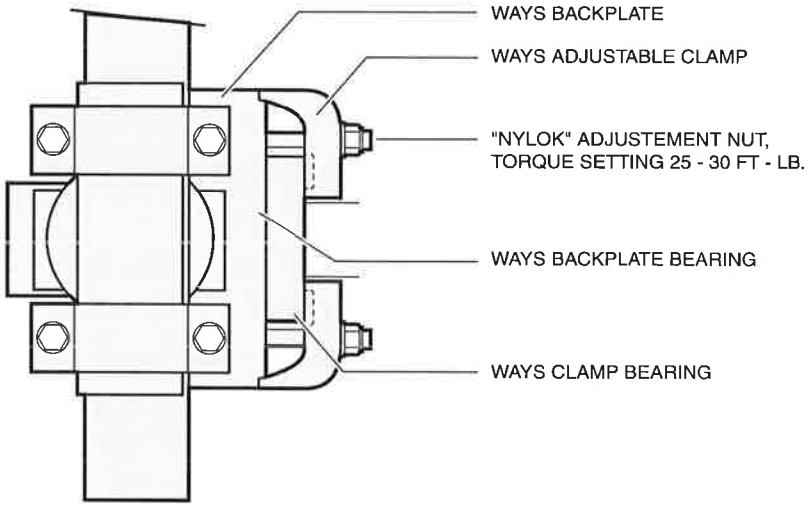


Figure 9.3-2: Ways Assembly - Models Smaller Than 100 Ton

WAYS – TOP VIEW



WAYS – SIDE VIEW

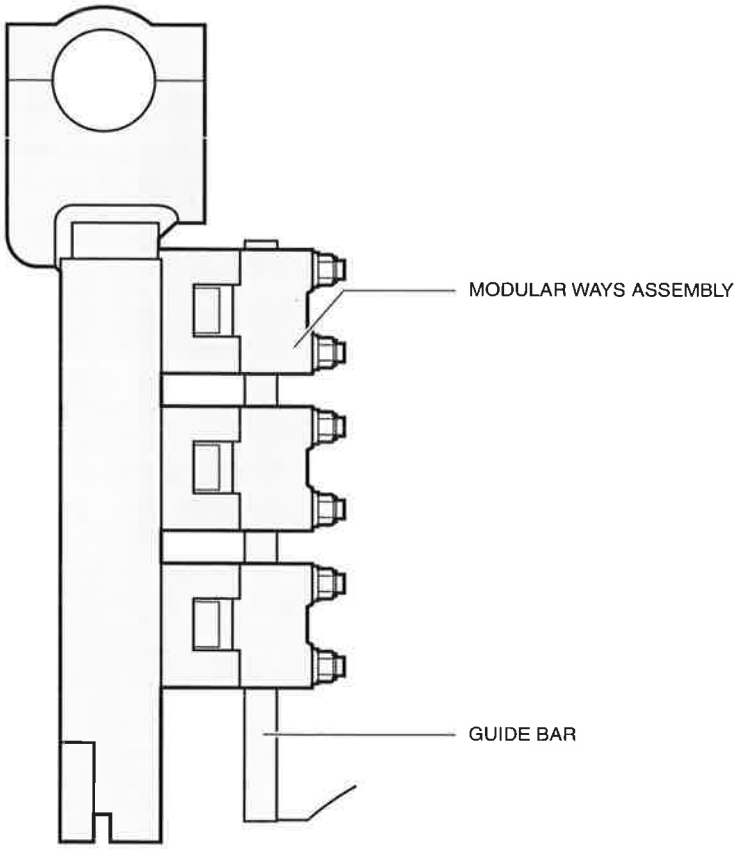


Figure 9.3-3: Ways Assembly - Models 100 Ton to 250 Ton

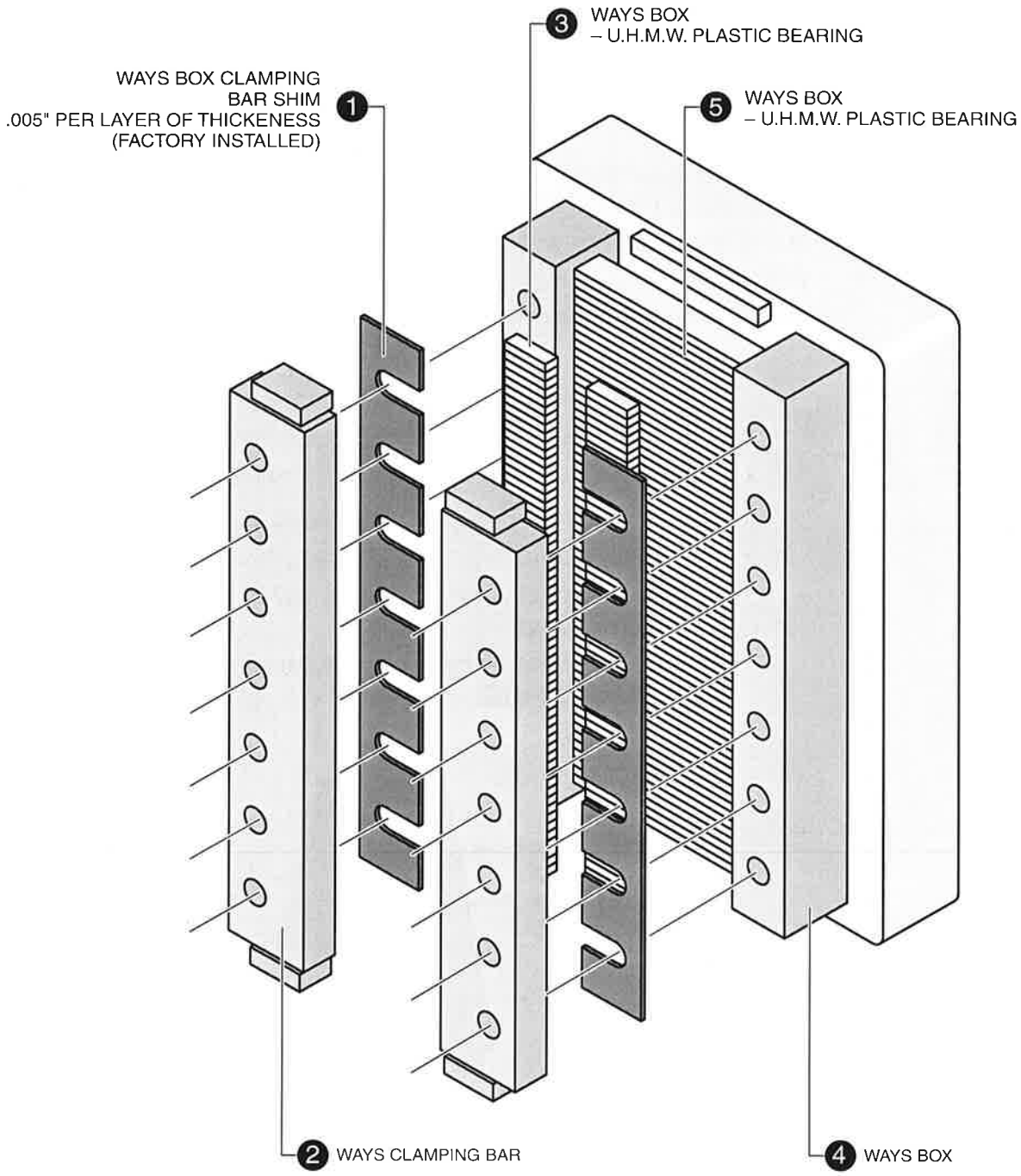


Figure 9.3-4: Ways Assembly - Models 320 Ton and Up

9.4 Sheet Follower Mechanical Lubrication

NOTICE

All personnel servicing the SF must follow safe work practices. Always follow de-energization procedures when servicing the SF.

The Owner/Operator is responsible for establishing a SF maintenance schedule that is consistent with the number of hours the SF is in operation and the number of duty cycles that are performed.

If equipped with the press brake, the Accurpress Automatic Sheet Follower (SF) should be routinely lubricated for optimal performance and minimal wear to the mechanical components.

Use the following procedure to lubricate the SF mechanical system:

1. Turn off power to the press brake to ensure the SF is disabled.
2. Remove the two cover mounting bolts from the top of the SF table.

Figure 9.4-1: Removing Cover Mounting Bolts from the Top of the SF Table

3. Insert the SF hook tool into the two top holes, and pull the top cover up and off.

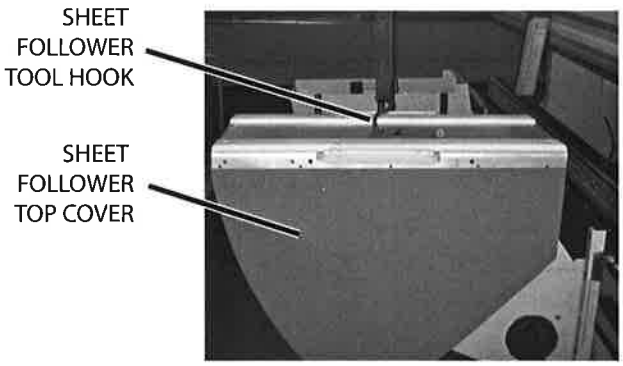


Figure 9.4-2: Using the SF Hook Tool to Remove the Top Cover

4. From the top of the SF, use vacuum and brush to remove debris off the mechanical moving parts, and the edges of the horizontal and vertical slide assemblies inside the SF. See *Figure 9.4-3*.

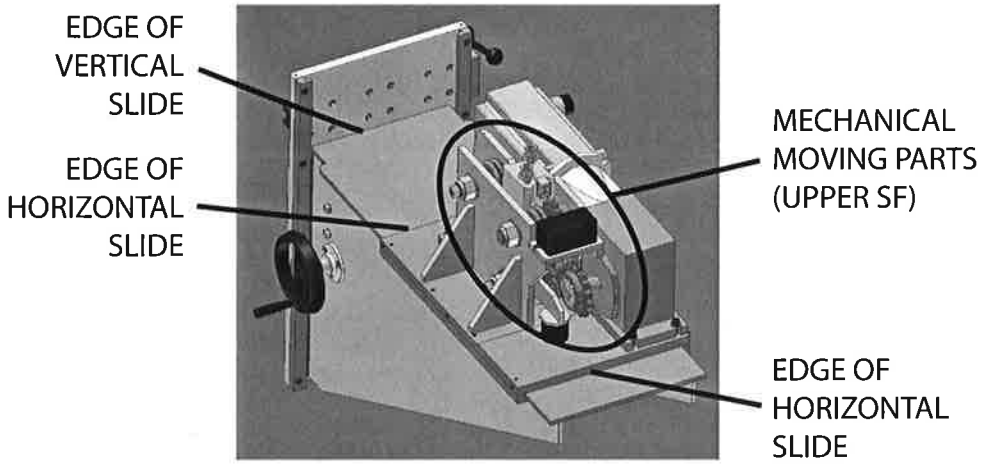


Figure 9.4-3: Removing Debris From the Mechanical Moving Parts, and the Horizontal and Vertical Slide Assemblies Inside the SF

Use a vacuum and brush to remove debris from the spaces in between the carriage mounts (see *Figure 9.4-4*).

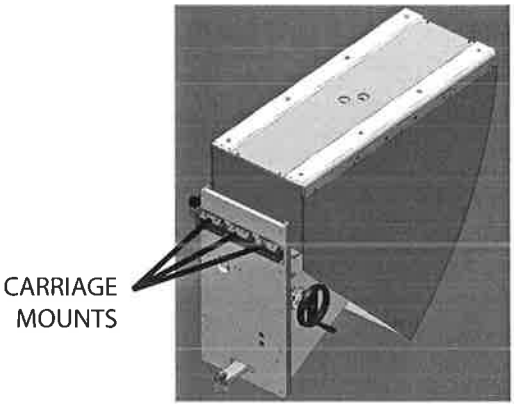


Figure 9.4-4: Removing Debris From the Carriage Mounts

5. Turn the horizontal adjustment wheel on the right side base of the SF to move the table as far away from the bed as it will go.

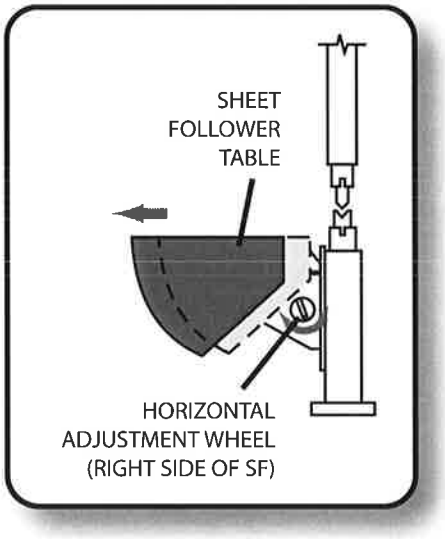


Figure 9.4-5: SF Table Horizontal Adjustment

6. Enable power to the press brake and startup the ETS 3000 Control.
7. In the Manual screen of the ETS 3000, rotate the SF to its highest position (90°).

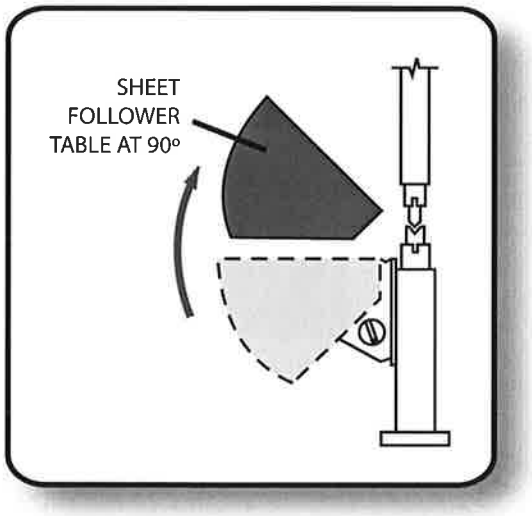
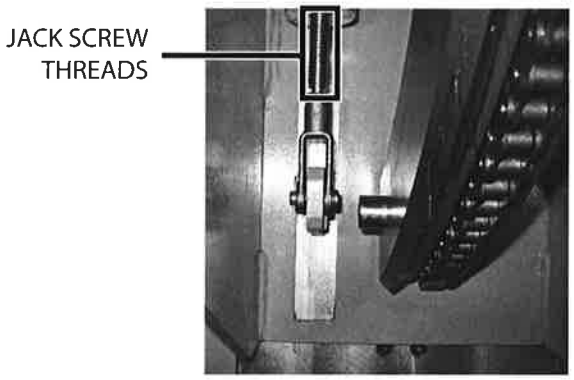


Figure 9.4-6: SF Table Rotated to Highest Position (90°)

8. Shut down the ETS 3000 Control and disable power to the press brake and SF.
9. Apply a liberal amount of multi-purpose grease along the threaded portion of the SF jack screw. This should be performed once every three to four months.



Jack Screw Lubrication Interval

Once Every 3-4 Months

Figure 9.4-7: Lubrication of the SF Jack Screw

10.Perform steps 11 to 14 together on a monthly basis.
11.Apply a liberal amount of multi-purpose grease to the chain.

Chain Lubrication Interval

Once Per Month

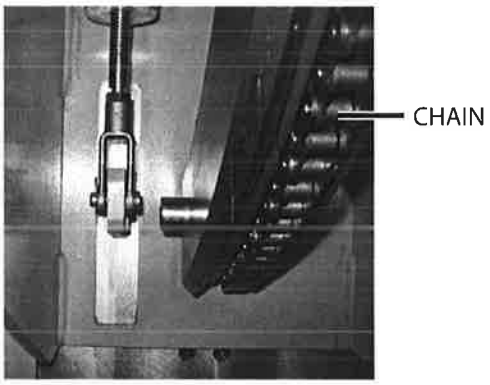


Figure 9.4-8: Lubrication of the Chain

12.Apply a liberal amount of multi-purpose grease to the v-shaped edges (front and rear) of the arc guide.

Arc Guide Lubrication Interval

Once Per Month

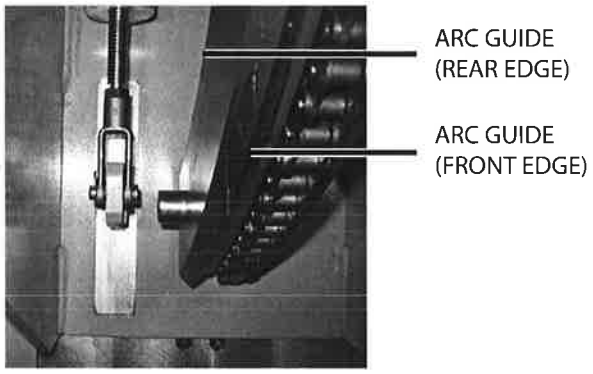
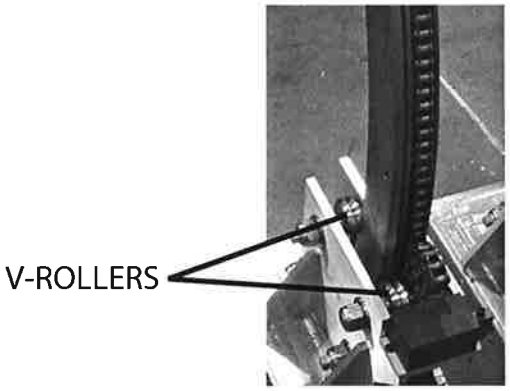


Figure 9.4-9: Lubrication of the Arc Guide Edges

13.Apply a liberal amount of multi-purpose grease to the four V-rollers (two front, two rear) at the base of the arc guide.

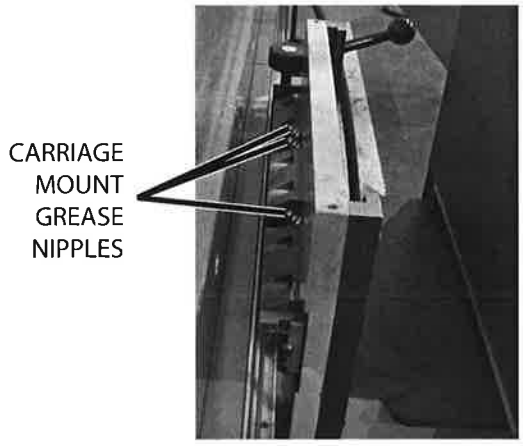


V-Rollers Lubrication Interval

Once Per Month

Figure 9.4-10: Lubrication of the Four V-Rollers

14. Using a grease gun, apply multi-purpose grease to the grease nipple of each of the three mounting carriages on the SF, located between the SF and press brake bed.



Carriage Mounts Lubrication Interval

Once Per Month

Figure 9.4-11: Lubrication of the Three Carriage Mounts

15. Enable power to the press brake and startup the ETS 3000 Control.
16. In the Calibration screen of the ETS 3000, calibrate the SF to move the SF table back to the horizontal position (180°).

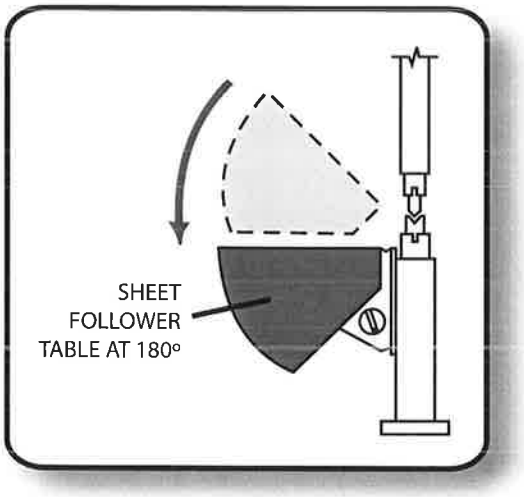


Figure 9.4-12: SF Table Rotated Back to Horizontal Position (180°)

17. Shut down the ETS 3000 Control and disable power to the press brake and SF.
18. Place the top cover back onto the SF.
19. Fasten the two cover mounting bolts to the top of the SF table.

10 ACCURPRESS TROUBLESHOOTING

Refer to Section 3, SAFETY prior to any servicing.

All personnel servicing any part of the press brake must follow safe work practices:

- Ensure that all other personnel are clear of the die area (point of operation) while the press brake is being serviced.
- Follow in-plant machine lockout procedures to prevent press brake operation during service or troubleshooting.
- Post equipment maintenance warning signs.
- Utilize proper personal protective equipment as required by regulatory requirements.

Service personnel may require basic diagnostic tools, such as an electrical multimeter for assessing electrical control problems and a pressure gauge for assessing hydraulic problems.

Service personnel using manual overrides on the hydraulic directional valves should proceed with extreme caution to prevent personal injury or damage to the dies, limit switches or hydraulic cylinders, due to overtravel.

Section 10.1 identifies typical malfunctions, their possible causes, and suggested solutions. Section 10.2 discusses instances of forming variance.

10.1 Press Brake Malfunctions

10.1.1 Hydraulic pump drive motor will not start.

Cause	Solution
Shop electrical supply disconnect switch is OFF.	Turn disconnect switch ON.
Press brake main disconnect switch is OFF.	Turn disconnect switch ON.
Emergency STOP pushbutton is pushed in.	Turn Emergency STOP pushbutton 1/4 clockwise to release, then push START pushbutton.
Control circuit fuse FU1 is blown.	Check for possible cause. Remedy cause and replace fuse.
Loose wire connections in control circuit wiring.	Check for electrical control wiring continuity using a multimeter and control schematic. Repair as required.

10.1.2 Hydraulic pump drive motor is running but press ram will not cycle.

Cause	Solution
Ram control is disabled. (RAM ACTIVE light is flashing.)	Toggle RAM ENABLE key.
Backgauge control is disabled.	Enable backgauge control.
Control setting is not the mode being used. (Hand or foot light is flashing.)	Change control mode to desired setting.
Neither calibration, run, nor third party control mode are selected.	Select calibration, run or third party control mode.
Ram (Y-axis) is uncalibrated.	Calibrate ram.
Backgauge (X-axis) is uncalibrated.	Calibrate backgauge.
Operational CNC systems interface is incompatible with existing electrical control.	Contact CNC system dealer/manufacturer.
ETS system parameter configuration is incorrect.	Consult factory service for procedures in re-setting system configuration.
Motor rotation is incorrect.	Check phase sequence at main supply voltage connection to disconnect switch. Ensure sequence is: 1-2-3 (red-black-white).
Loose connection/broken wire in operator control pedestal cable or defective electrical contact blocks.	Check for electrical continuity from operator control pedestal to the main electrical cabinet. Repair as appropriate.
Defective ram down overrun limit switch or loose/broken electrical connection.	Check for electrical continuity from the footswitch through to the DOWN solenoids. Repair as appropriate.
Hydraulic relief valve is stuck in OPEN position.	Try to cycle the press ram down using hydraulic valve manual override controls. If no ram motion occurs, remove relief valve cartridge and inspect the O-rings and sliding spools for defects or obstructions.

10.1.3 Press ram will cycle down in slow speed only.

Cause	Solution
Speed change position is not set correctly.	Optimum setting for speed change is at punch contact of part being formed.
High volume valve DOWN solenoid is defective.	Check electrical continuity to and at the solenoid. Repair as appropriate.

10.1.4 Ram hesitates / stops at speed change point or part contact point.

Cause	Solution
Press ram is free falling faster than the system can deliver oil to the hydraulic cylinders.	Check the press ram ways assembly. Refer to 9.3, "Mechanical System Adjustments".
High pressure relief valve is not maintaining preset relief pressure setting.	Remove the high pressure relief cartridge assembly from the manifold block and inspect the O-rings for damage. Check the center sliding spool to confirm valve functionality. Clean with solvent and compressed air to remove any foreign particles. Re-install and test valve.

10.1.5 Press ram will not return to the program up-limit.

Cause	Solution
Control mode is set to JOG.	Switch to AUTO or MAN mode, then activate footswitch or palm pushbuttons.
Loose connection/broken wire in operator control pedestal cable or defective electrical contact block.	Check for electrical continuity from the operator control pedestal through to the up solenoids. Repair as appropriate.
The ram up-limit switch is stuck or damaged in activated position.	Check limit switch mechanical functionality and electrical continuity. Repair as appropriate.

10.1.6 Press ram does not stop at bend point.

Cause	Solution
Hydraulic directional valve malfunction.	Manually activate the overrides to check pilot valve mechanical functionality. Make sure there is no obstruction of the pilot spool or the valve spool centering springs.

10.1.7 Ram stops and/or reverses before developing full tonnage or completing the bend.

Cause	Solution
Program bend point setting is incorrect.	Check program bend point to see if the press ram reaches the recorded position.
Tonnage control is set too low to complete the bend.	Check tonnage display and adjust for higher tonnage.
Excessive off center load is causing torsion safety limit switch activation.	Move part being formed closer to center on the press bed.
Slow speed change position setting is incorrect.	Optimum setting for speed change is at punch contact of part being formed.

10.1.8 Press tonnage display shows full tonnage but the press fails to complete the bend.

Cause	Solution
Part's material properties are incompatible with the press brake and die configuration.	Check material properties to confirm that the bend can be executed with the existing set-up. Increase die opening to reduce the press ram tonnage required to form the part. Decrease part length being formed to reduce the press tonnage required.

10.1.9 Backgauge will not advance to the next flange length step.

Cause	Solution
Incorrect programming of number of steps for the job.	Confirm backgauge program steps reflect the job requirement.
Backgauge position dimension per step is not programmed.	Verify or modify backgauge step program dimension.
STOP pushbutton is detented OFF.	Reset backgauge STOP pushbutton to ON (1/4 turn clockwise).

10.1.10 Hydraulic system is overheating.

Cause	Solution
The program up-limit setting is incorrectly adjusted and the ram up-limit switch is failing. This is allowing cylinders to fully retract, which relieves hydraulic flow over the system relief valve.	Check ram up-limit switch adjustment and functionality to stop ram up travel, and ETS HIGH set position.
Operator is continuously attempting to form parts over the capacity of the press brake.	Ensure the press brake speed change point is above the material to be formed and the tonnage indicator is registering within the rated tonnage.
Hydraulic system high pressure relief valve is relieving prematurely.	Remove the high pressure relief cartridge assembly from the manifold block and examine O-rings for damage. Push the center sliding spool to confirm valve functionality. Clean with solvent and compressed air to remove any foreign particles. Re-install then test valve.
High pressure pump cartridge is defective or worn, resulting in loss of flow and pressure.	Test the pump flow delivery and pressure at a hydraulic service center. If such facilities are not convenient, the high pressure cartridge "P2" can be removed and examined for mechanical damage and wear. Replace the cartridge or the complete pump, as required.
The coupling element between the electric motor and hydraulic pump is worn or disintegrated.	Inspect and replace as required.

10.1.11 Hydraulic pump is noisy.

Cause	Solution
Hydraulic fluid level is low.	Check fluid level when press ram is in up position. If required, add fluid until visible in sight gauge.
Pump inlet suction strainer is plugged or obstructed.	Check fluid condition. Replace hydraulic strainer, fluid and hydraulic filter as required.
Hydraulic inlet piping or connections are loose, causing pump to ingest air.	Check piping connections, O-ring at pump to inlet flange, and tighten inlet flange bolts.
Hydraulic pump shaft seal is defective, causing pump to ingest air.	Check shaft seal for wear or damage. Replace if required.

10.1.12 Operating modes will not toggle to next setting.

Cause	Solution
EDIT selector switch is set to LOCK.	Verify written job operating procedure and modify operating mode for compliance.

10.1.13 ETS or third party CNC gauging is inoperative / malfunctioning.

Cause	Solution
Incorrect CNC gauging interface.	Verify interface documentation and installation. Contact factory service to confirm press brake interface requirements.

10.2 Forming Variance

10.2.1 Unequal angle at each end of formed part.

Cause	Solution
Variance in metal thickness.	Check material thickness at both ends of the part. Offset the ram parallel to compensate for material thickness variance.
Variance in tooling height build-up at each end.	Offset the ram parallel to compensate for any tooling variance.

10.2.2 Inconsistency in formed parts.

Cause	Solution
Press ram, bed and tooling are coated with rust-proofing.	Remove die set, clean all parts with solvent, re-assemble and readjust.
Tooling does not lie flat on press bed cap.	Check clearance with feeler gauges. Shim between press bed and tooling, or mechanically straighten as required.
Tooling is worn.	Remachine forming surfaces of tooling. Utilize localized shimming practices to compensate for worn areas.

10.2.3 Each formed part exhibits a consistent angle from end to end, but there is inconsistency from part to part.

Cause	Solution
Press ram is free falling	Check press ram ways assembly adjustment.
High pressure directional control valve is defective or worn.	Disassemble and inspect for damaged or worn spools landings, spools, springs, or for contaminants.

10.2.4 Each formed part exhibits an inconsistent angle from end to end.

Cause	Solution
Rocker arm clamping screws are loose.	Locate and retorque.
Right ram lug clamping screws are loose.	Locate and retorque.
Left ram lug clamping screws are loose.	Locate and, if loose, consult factory service before retorquing.
Connecting rod clamping screws are loose.	Locate and, if loose, consult factory service before retorquing.
Connecting rod lower spherical bearing is worn or damaged.	Locate and, if loose, consult factory service before retorquing.

10.2.5 Under bending in the middle of the formed part.

Cause	Solution
Tooling is worn in the center due to continuous forming of small parts in one location.	Remachine forming surfaces of tooling. Utilize localized shimming practices to compensate for worn areas.
Press bed and ram are worn in the center due to continuous forming of small parts in one location.	Remachine forming surfaces of press bed and ram. Utilize localized shimming practices to compensate for worn areas.

10.3 ETS Messages

The software includes detailed messages to describe machine operation. One or more messages will be displayed to either explain an error or diagnose a problem.

10.3.1 Error Messages

If the palm pushbuttons or footswitch are activated and there is no motion for two seconds, error message(s) will be displayed. In this case the message(s) will explain the error. Each message has an associated number:

100 series - indicates problems are normally corrected by proper machine setup and operation.

900 series - indicates parts should be replaced, or the machine requires servicing.

The "Explanation/Solution" column gives the most common reasons and/or possible solutions for the message, starting with the most probable.

Number	Message	Explanation / Solution
099	ACR held on by NNN	The number NNN signifies why the Auto-Cycle-Relay remains on at the end of the cycle when the controls have been released. 1) Over 16 – two pedestal problem. 2) 12 thru 16 – both palm pushbuttons are sensed on 3) 8 thru 12 – right palm pushbutton is sensed on. 4) 4 thru 8 – left palm pushbutton is sensed on. 5) Under 2 – footswitch is sensed on.
901	Fuse F2 Blown	1) Random failure - replace fuse. 2) Chronic failure = normally indicates a failed solenoid valve.
102	Hydraulics Off	1) Check that the pedestal STOP button is released. 2) If '901' also, replace main PLC board fuse. 3) Check overloads on main contactor. 4) Check for power at J4, G9, G10, J8. 5) Hydraulics safety cutout must be on - check that there is no voltage at J6 when the start button is pushed. - if 120V at J6, problem with main PLC board. 6) If pump is running there is a PLC sensor fault, machine operation is not affected.
103	Ramup Activated	1) Ensure that RAM UP is not being pushed. 2) Check for power at G1 - if power present, suspect short in snake, pedestal wiring, or RAM UP switch. - if no power, there is a PLC main board problem.
104	Hand Required- Not Foot	1) Check that control mode is correct. 2) Pedestal problem: – fault in top contact of footswitch. – break in wiring to pedestal board P1-6. – pedestal board fault (R14).

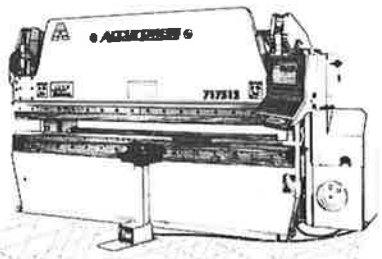
Number	Message	Explanation / Solution
105	Foot Required – Not Hand	1) Check that control mode is correct 2) Pedestal problem: – fault in contact of palm pushbutton. – break in wiring to pedestal board P1-3 or P1-4. – pedestal board fault (R7 or R8).
906	H/FtOn, NoAC Pwr	1) Footswitch not fully depressed. 2) Pedestal logic problem – change control modes and error message should change to 104 or 105, follow message instruction. 3) Check for obstruction under footswitch. 4) Check continuity from J4 to G3 with footswitch engaged. 5) Check continuity from J4 to G2 with palm pushbuttons engaged. 6) Check that hand/foot relay (RE2) is 12VDC. 7) Main PLC board has failed (not user replaceable).
107	Down Limit Open	Down limit microswitch is open.
108	Torque LimitOpen	Torque limit microswitch is open.
109	LightCurtainOpen	Light curtain has been activated.
110	3rd Party DnOpen	3rd party down limit is open.
111	Not Run-Calib Md	Need to switch to run mode or calibration mode.
112	Ram uncalibrated	Need to calibrate press ram (Y- axis).
113	Ram not enabled	Enable press ram by pressing the RAM ENABLE button.

Number	Message	Explanation / Solution
114	Xaxis off target	1) Wait for backgauge to reach programmed position. 2) Enable the backgauge by pressing the GAUGE ENABLE button. 3) Check for any obstruction of the backgauge. 4) Re-calibrate the backgauge X-axis.
115	Anti-tie-downErr	1) Operate palm pushbuttons simultaneously. 2) Check for switch or wiring error in pedestal.
116	DownLimit Reached	Ram has reached its target position and can go no further. This is not a fault.
117	TonLimit Reached	1) Check that tonnnage limit is set properly. 2) Check setting of K factor, or other parameters. 3) Tonnage sensor failure.
118	Retrip RDS/HFT	In either Ram Double-Stop mode or Hand-Foot transfer mode, the hand/foot switch was not released within 2 seconds at the slow speed change point.
119	Retrip ErrBitSet	Press ram will go up with next activation. Ram has stopped as a result of: 1) Switched out of JOG mode or changing modes. 2) Ram enabled when not at top of stroke. 3) HI point reduced when hydraulics are on. 4) Any other unauthorized motion.
120	Retrip ACRBit Set	Press ram is prevented from going up at the end of the stroke. Ram will go up with next activation.

10.3.2 Diagnostic Messages

If the palm pushbuttons or footswitch continue to be activated after a press ram cycle is completed, these messages will be displayed. They are used for diagnostic purposes and give the reason why the cycle was terminated.

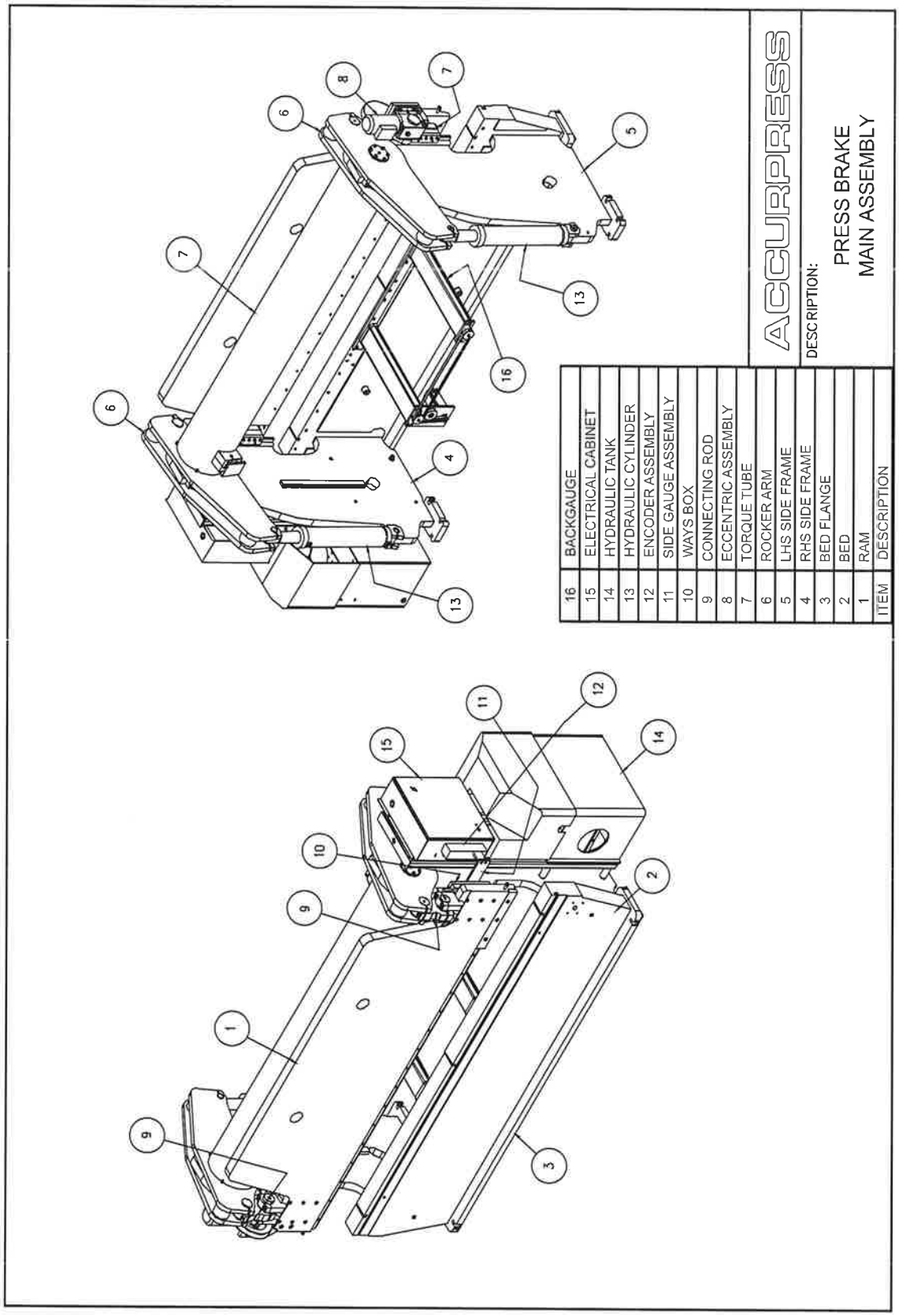
Number	Message	Solution
121	TonSensorProblem	1) Adjust zero on PLC board. 2) Check ton sensor input wires and connector. 3) Failed ton sensor.
122	Valid Bend Limit	Usually indicates desired operation.
123	Valid Ton Limit	Usually indicates desired operation.
124	Error Ton Cutout	Usually indicates ton limit set too low.
125	Ramup Sw Cutout	Occurs when Ram Up is activated before the bend limit has been reached. Usually this is the operator's intent.
126	Pedestal PwrLoss	Occurs if the hand/foot is de-activated before the ram has reached the bend limit. Usually this is the operator's intent.
127	X axis target loss	Retract must be programmed at least 0.300 from top of stroke.



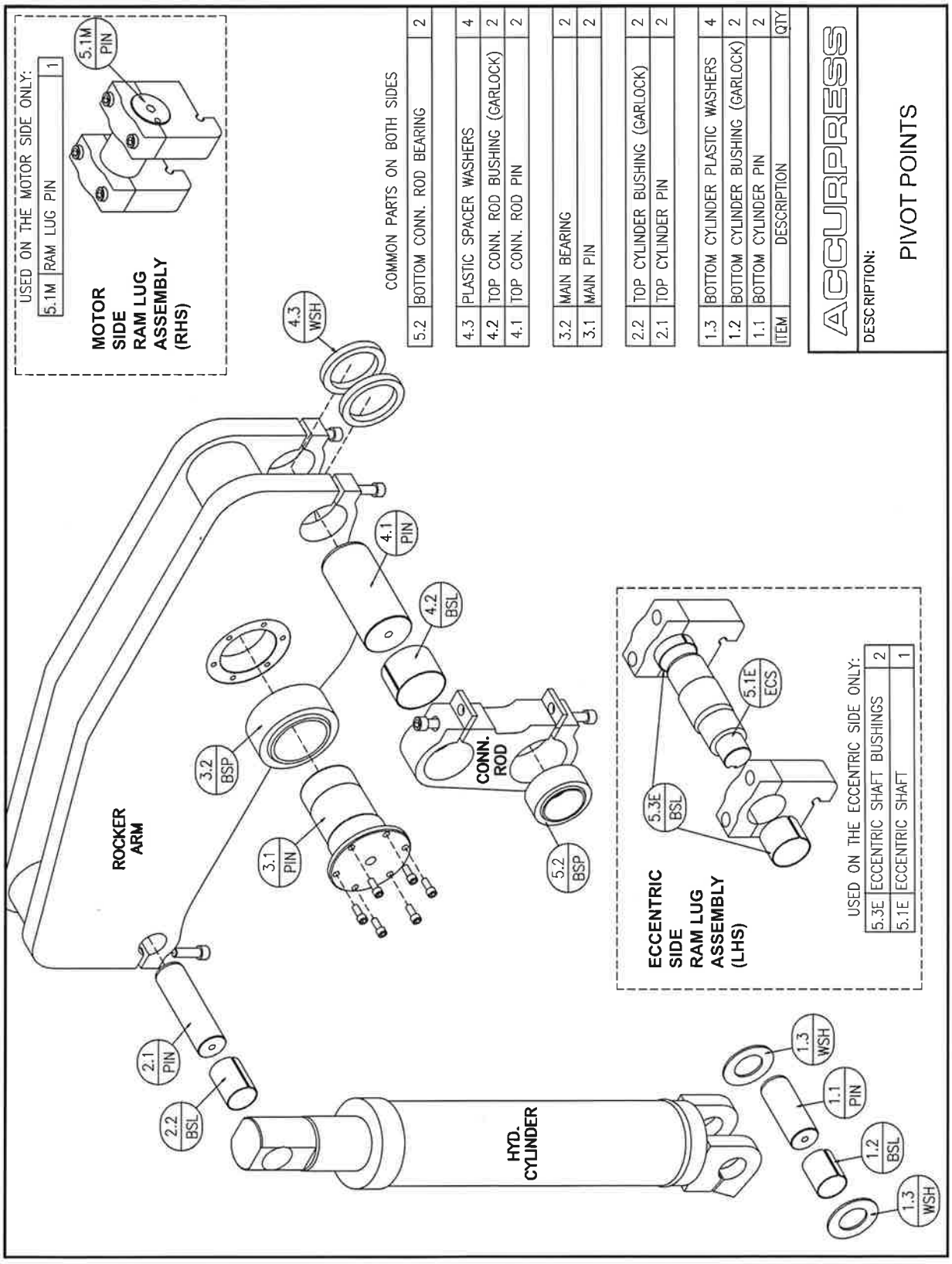
ACCURPRESS

APPENDIX A
PARTS & ASSEMBLIES

A.1 Press Brake Main Assembly



A.2 Pivot Points

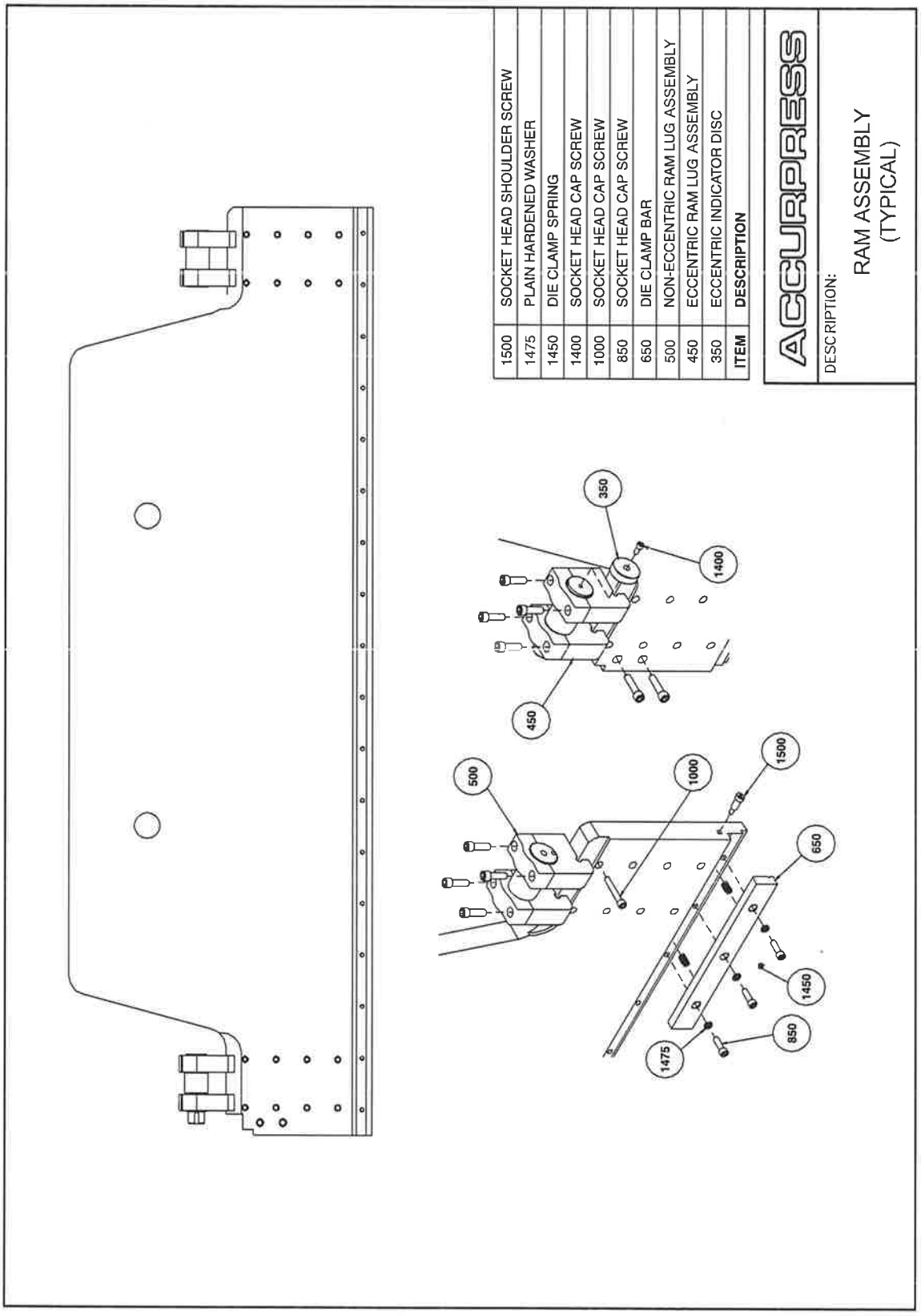


A.3 Ram Assembly

ITEM	DESCRIPTION
1500	SOCKET HEAD SHOULDER SCREW
1475	PLAIN HARDENED WASHER
1450	DIE CLAMP SPRING
1400	SOCKET HEAD CAP SCREW
1000	SOCKET HEAD CAP SCREW
850	SOCKET HEAD CAP SCREW
650	DIE CLAMP BAR
500	NON-ECCENTRIC RAM LUG ASSEMBLY
450	ECCENTRIC RAM LUG ASSEMBLY
350	ECCENTRIC INDICATOR DISC

ACCURPRESS

DESCRIPTION: RAM ASSEMBLY (TYPICAL)



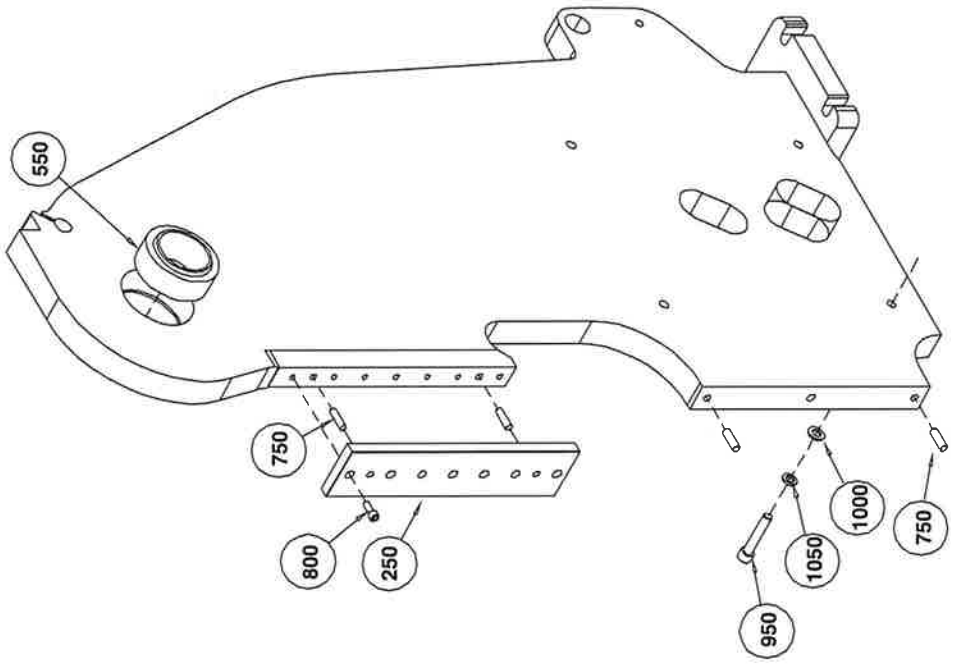
A.4 Side Frame Assembly

ITEM	DESCRIPTION
1050	LOCK WASHER
1000	FLAT WASHER
950	SOCKET HEAD CAP SCREW
800	SOCKET HEAD CAP SCREW
750	DOWEL PIN
550	SPHERICAL BEARING
250	GUIDE BAR

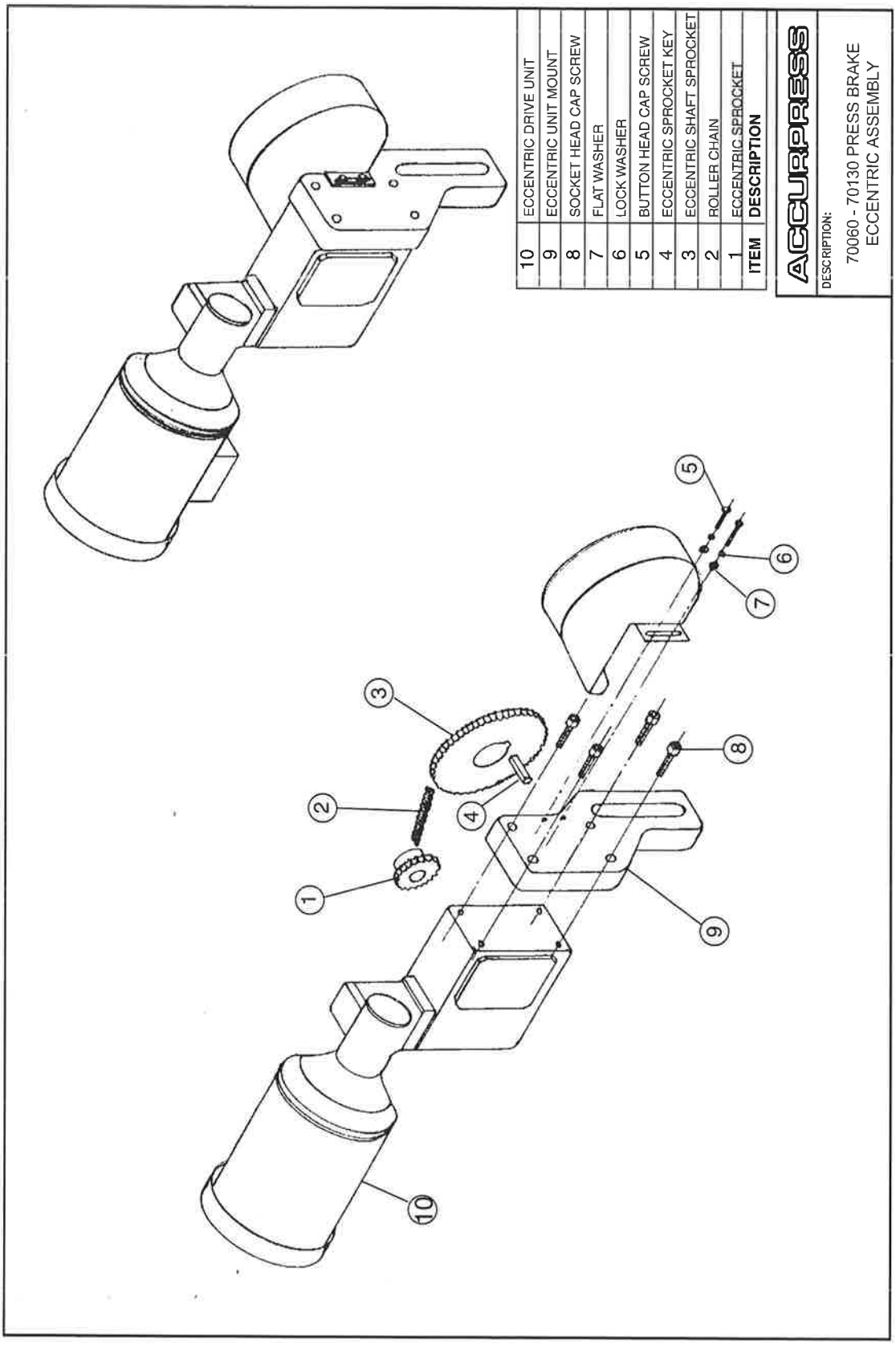
ACCURPRESS

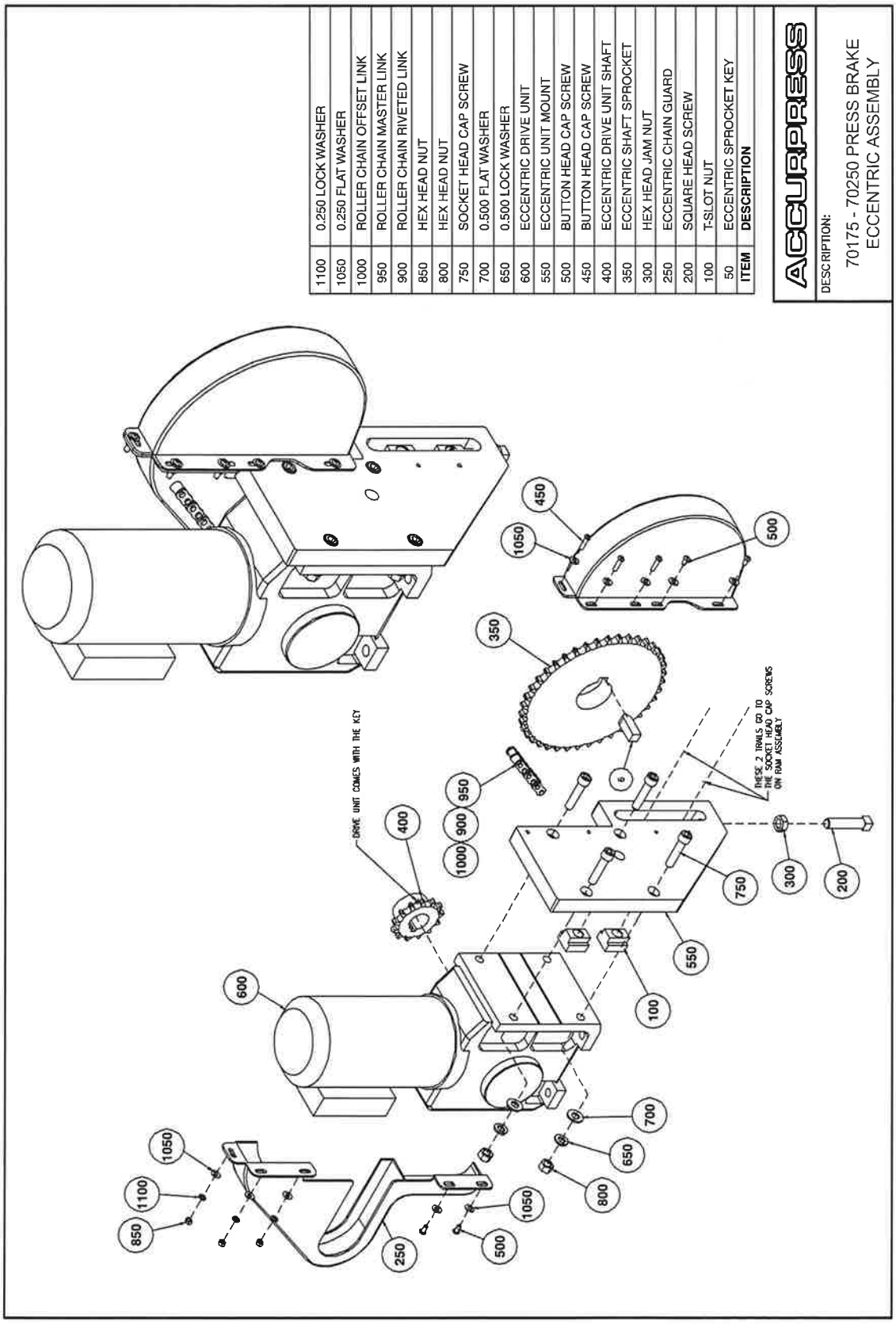
DESCRIPTION:

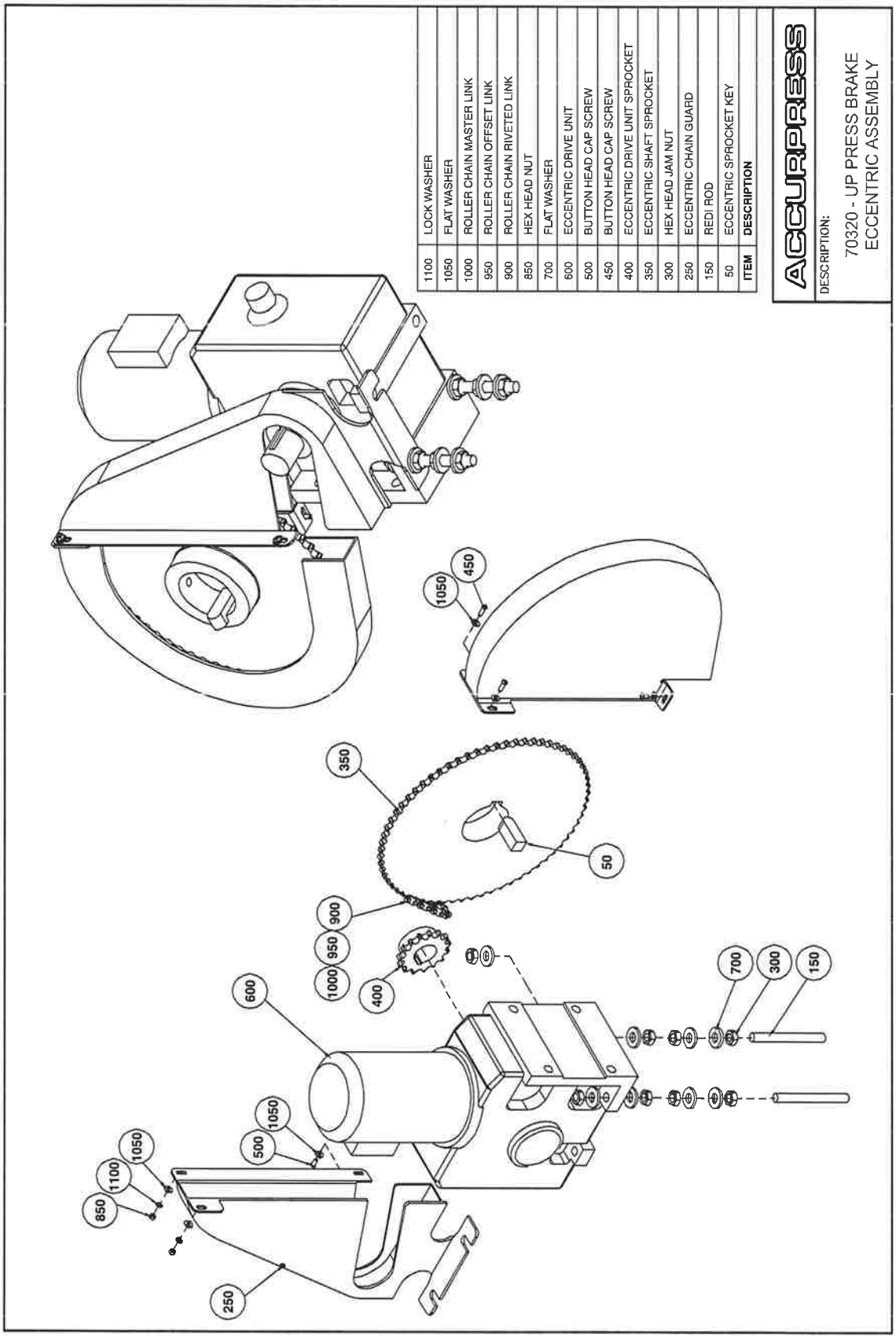
SIDE FRAME ASSEMBLY (RHS)



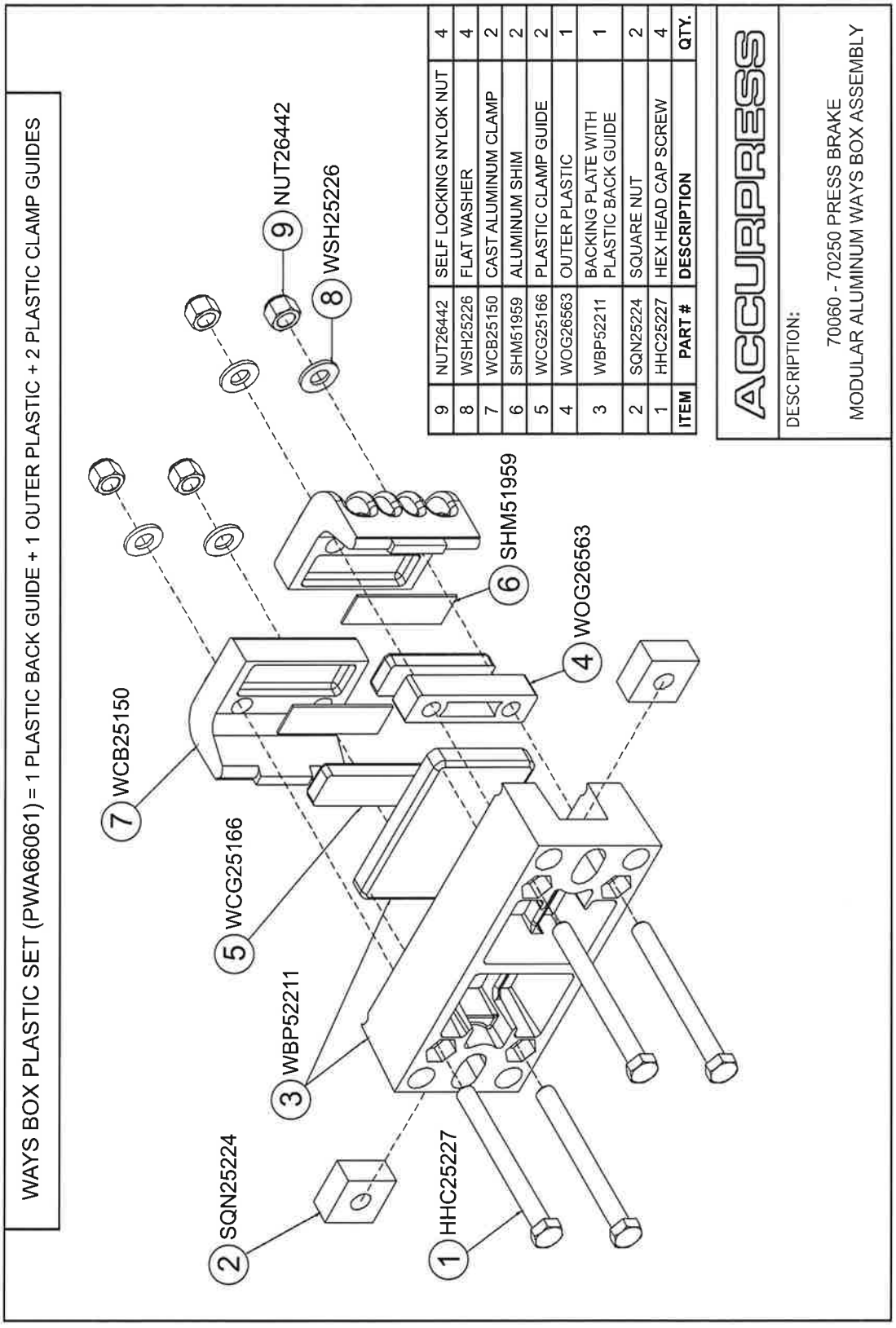
A.5 Eccentric Assembly




ACCURPRESS
DESCRIPTION:
70175 - 70250 PRESS BRAKE
ECCENTRIC ASSEMBLY
ITEM DESCRIPTION
1100 0.250 LOCK WASHER
1050 0.250 FLAT WASHER
1000 ROLLER CHAIN OFFSET LINK
950 ROLLER CHAIN MASTER LINK
900 ROLLER CHAIN RIVETED LINK
850 HEX HEAD NUT
800 HEX HEAD NUT
750 SOCKET HEAD CAP SCREW
700 0.500 FLAT WASHER
650 0.500 LOCK WASHER
600 ECCENTRIC DRIVE UNIT
550 ECCENTRIC UNIT MOUNT
500 BUTTON HEAD CAP SCREW
450 BUTTON HEAD CAP SCREW
400 ECCENTRIC DRIVE UNIT SHAFT
350 ECCENTRIC SHAFT SPROCKET
300 HEX HEAD JAM NUT
250 ECCENTRIC CHAIN GUARD
200 SQUARE HEAD SCREW
100 T-SLOT NUT
50 ECCENTRIC SPROCKET KEY
DRIVE UNIT COMES WITH THE KEY
THESE 2 TRAILS GO TO THE SOCKET HEAD CAP SCREWS ON RAM ASSEMBLY


ACCURPRESS
DESCRIPTION:
70320 - UP PRESS BRAKE
ECCENTRIC ASSEMBLY
ITEM DESCRIPTION
1100 LOCK WASHER
1050 FLAT WASHER
1000 ROLLER CHAIN MASTER LINK
950 ROLLER CHAIN OFFSET LINK
900 ROLLER CHAIN RIVETED LINK
850 HEX HEAD NUT
700 FLAT WASHER
600 ECCENTRIC DRIVE UNIT
500 BUTTON HEAD CAP SCREW
450 BUTTON HEAD CAP SCREW
400 ECCENTRIC DRIVE UNIT SPROCKET
350 ECCENTRIC SHAFT SPROCKET
300 HEX HEAD JAM NUT
250 ECCENTRIC CHAIN GUARD
150 REDI ROD
50 ECCENTRIC SPROCKET KEY

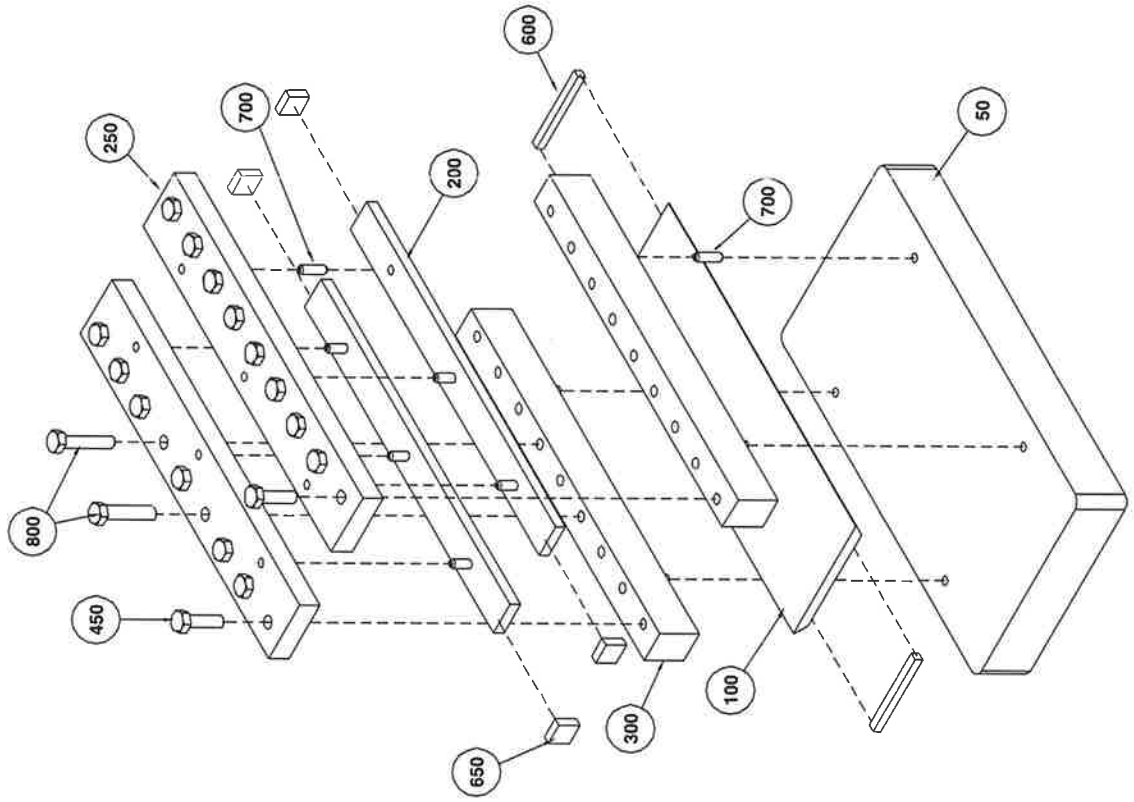
A.6 Ways Box Assembly



ITEM	DESCRIPTION
800	HEX HEAD CAP SCREW
700	SPRING PIN
650	WAYS BOX CLAMP KEEPER
600	WAYS BOX BACK KEEPER
450	HEX HEAD CAP SCREW
300	WAYS BOX SIDE BAR
250	WAYS BOX CLAMPING BAR
200	WAYS BOX CLAMP GUIDE
100	WAYS BOX BACK GUIDE
50	WAYS BOX BACK PLATE

ACCURPRESS

DESCRIPTION:
70320 - UP PRESS BRAKE
NON-ECCENTRIC WAYS BOX ASSEMBLY



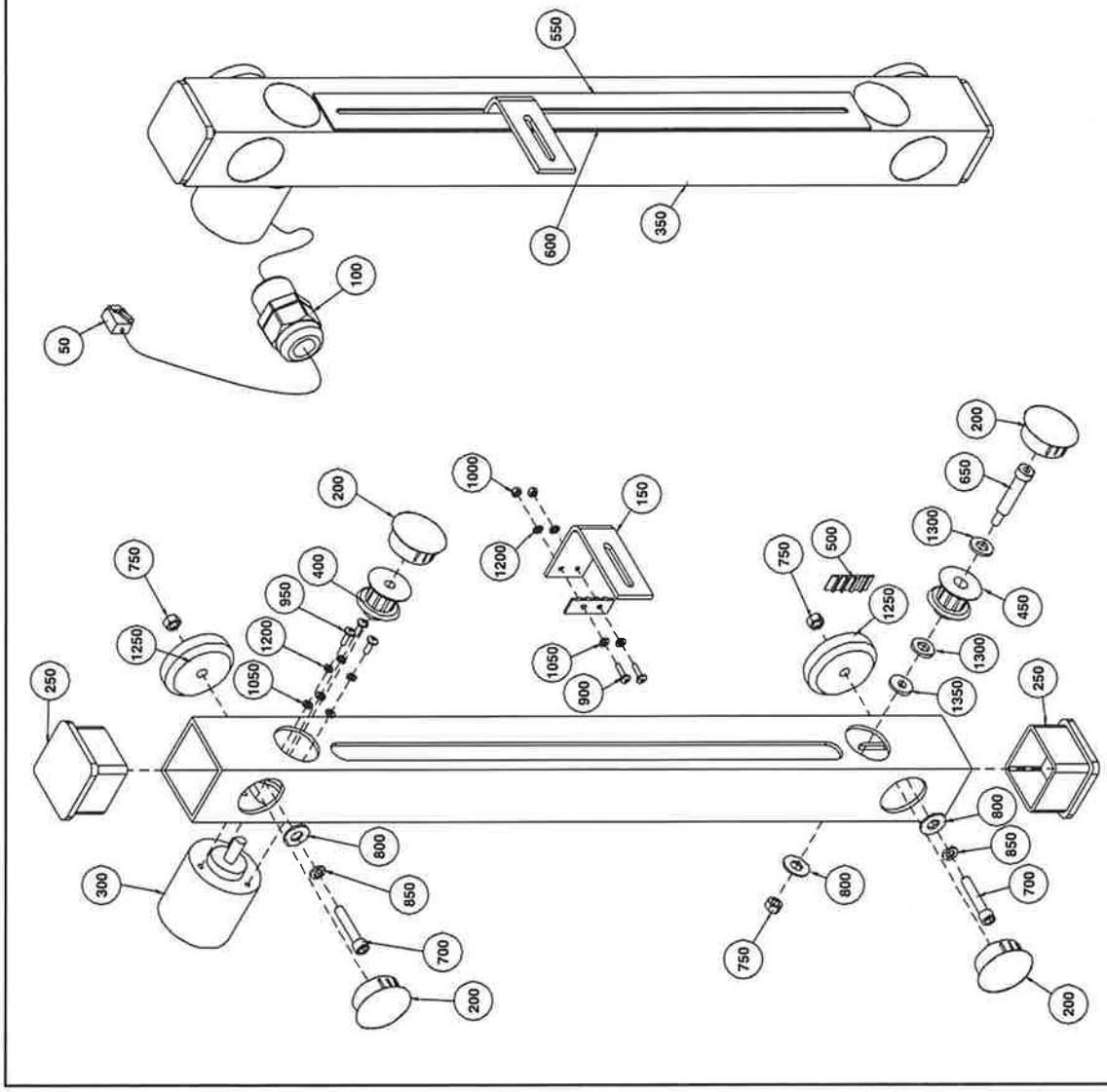
A.7 Encoder Assembly

70060-70250 PRESS BRAKE = 08" STROKE ASSEMBLY
70320-70500 PRESS BRAKE = 10" STROKE ASSEMBLY
70600-70750 PRESS BRAKE = 12" STROKE ASSEMBLY
71000-71500 PRESS BRAKE = 14" STROKE ASSEMBLY

ITEM	DESCRIPTION
1350	BOKERS FLAT WASHER
1300	NYLON "CORDS" WASHER
1250	STAND-OFF
1200	LOCK WASHER
1050	FLAT WASHER
1000	HEX HEAD NUT
950	PHILIPS PAN HEAD SCREW
900	PHILIPS PAN HEAD SCREW
850	LOCK WASHER
800	FLAT WASHER
750	HEX HEAD NUT
700	SOCKET HEAD CAP SCREW
650	SOCKET HEAD SHOULDER SCREW
600	LIP SEAL ADHESIVE
550	LIP SEAL
500	GEAR BELT
450	GEAR BELT PULLEY (DRIVEN)
400	GEAR BELT PULLEY (DRIVE)
350	ENCODER TUBE
300	ROTARY ENCOUDER
250	SQUARE END PLUG
200	DOME END PLUG
150	STANDARD ENCODER DRAG LINK
100	STRAIN RELIEF CONNECTOR
50	6 PINS PHONE CONNECTOR

ACCURPRESS

DESCRIPTION:
RAM ENCODER ASSEMBLY

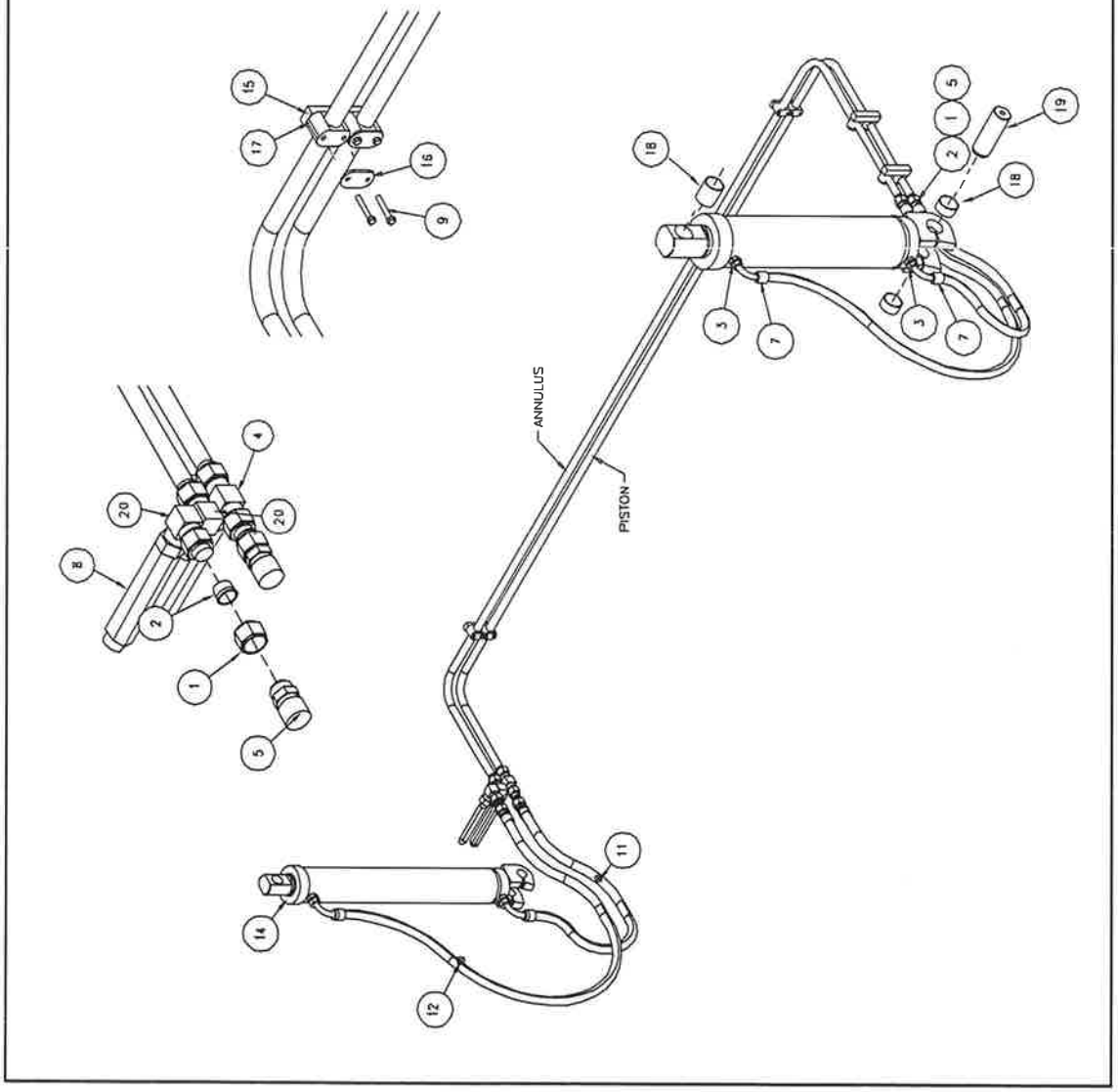


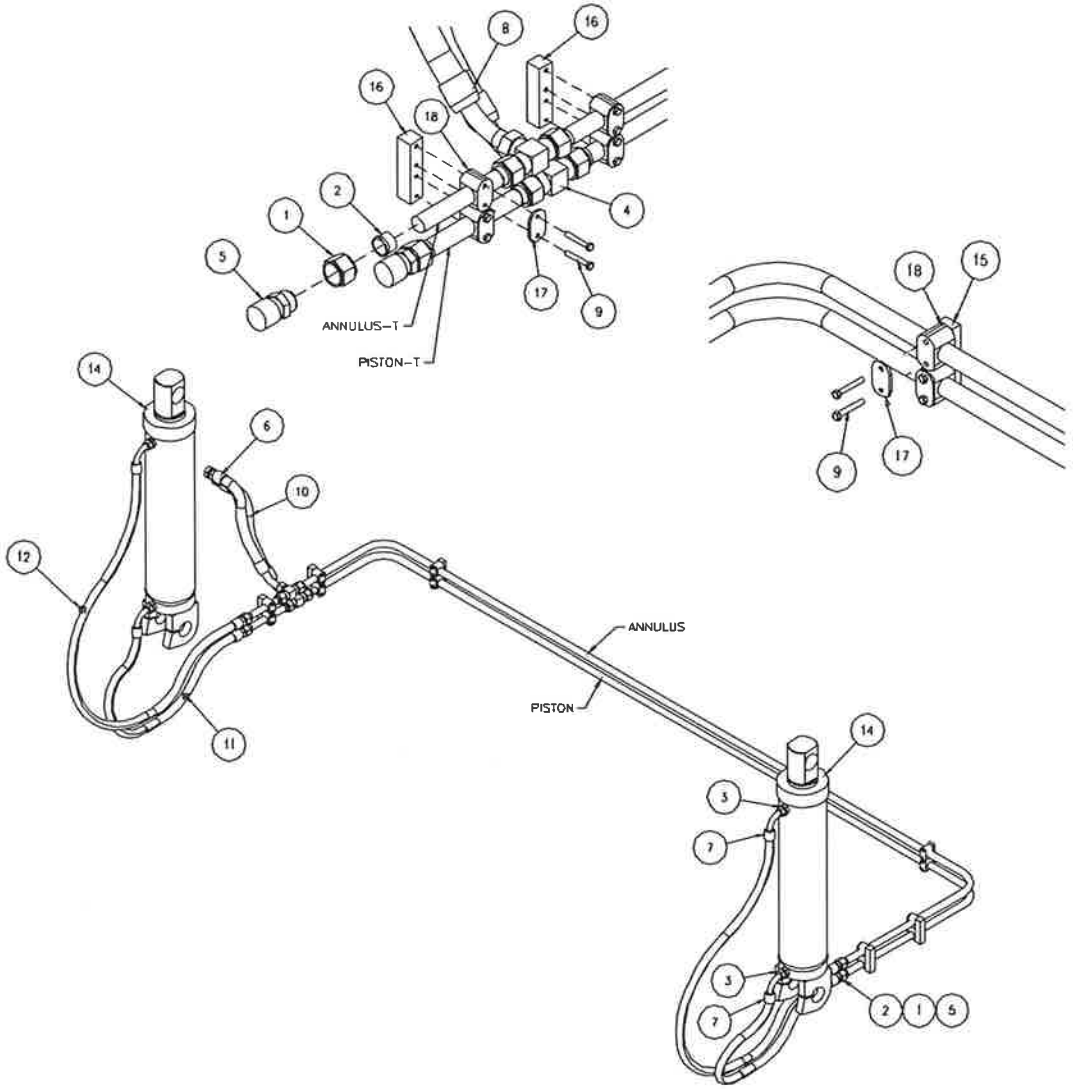
A.8 Hydraulic Transmission Assembly

ITEM	DESCRIPTION
20	FITTING, COMMON
19	BOTTOM CYLINDER PIN
18	BUSHING
17	TUBE CLAMP
16	TUBE CLAMP COVER
15	TUBE CLAMP BRACKET
14	CYLINDER
13	TUBE SET
12	HOSE, RAW MATERIAL
11	HOSE, RAW MATERIAL
10	HOSE, RAW MATERIAL
9	HEX HEAD CAP SCREW
8	FITTING, HYDRAULIC MANIFOLD
7	FITTING, HOSE END
6	FITTING, HOSE END
5	FITTING, HOSE END
4	FITTING, COMMON
3	FITTING, COMMON
2	FITTING, SLEEVE
1	FITTING, FLARED STYLE "B" NUT

ACCURPRESS

DESCRIPTION:
70060 - 70130 PRESS BRAKE
HYDRAULIC TRANSMISSION ASSEMBLY



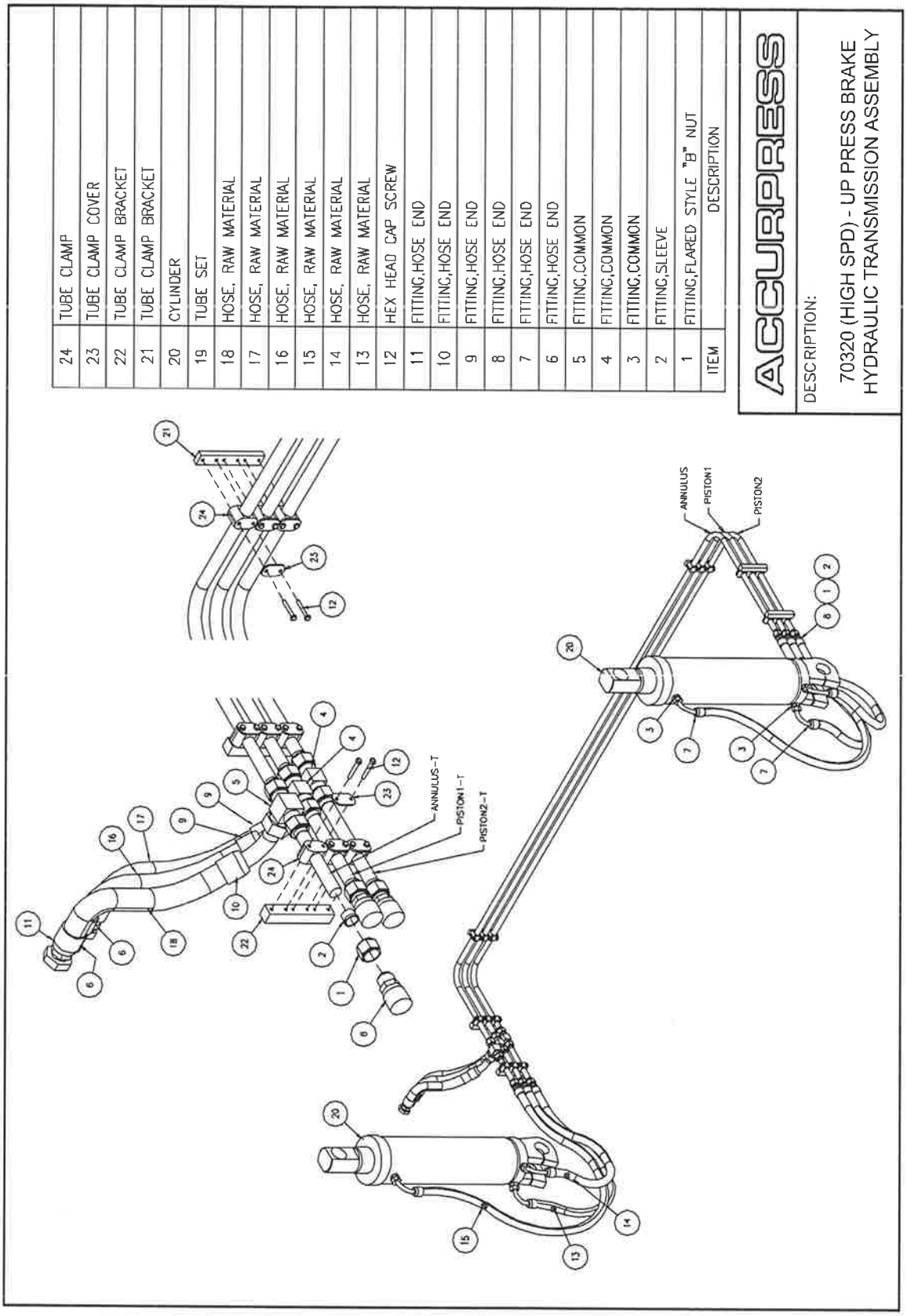


ITEM	DESCRIPTION
18	TUBE CLAMP
17	TUBE CLAMP COVER
16	TUBE CLAMP BRACKET
15	TUBE CLAMP BRACKET
14	CYLINDER
13	TUBE SET
12	HOSE, RAW MATERIAL
11	HOSE, RAW MATERIAL
10	HOSE, RAW MATERIAL
9	HEX HEAD CAP SCREW
8	FITTING,HOSE END
7	FITTING,HOSE END
6	FITTING,HOSE END
5	FITTING,HOSE END
4	FITTING,COMMON
3	FITTING,COMMON
2	FITTING,SLEEVE
1	FITTING,FLARED STYLE "B" NUT

ACCURPRESS

DESCRIPTION:

70175 - 70320 (STD) PRESS BRAKE
HYDRAULIC TRANSMISSION ASSEMBLY


ACCURPRESS
DESCRIPTION:
70320 (HIGH SPD) - UP PRESS BRAKE
HYDRAULIC TRANSMISSION ASSEMBLY
ITEM | DESCRIPTION
1 | FITTING,FLARED STYLE "B" NUT
2 | FITTING,SLEEVE
3 | FITTING,COMMON
4 | FITTING,COMMON
5 | FITTING,COMMON
6 | FITTING,HOSE END
7 | FITTING,HOSE END
8 | FITTING,HOSE END
9 | FITTING,HOSE END
10 | FITTING,HOSE END
11 | FITTING,HOSE END
12 | HEX HEAD CAP SCREW
13 | HOSE, RAW MATERIAL
14 | HOSE, RAW MATERIAL
15 | HOSE, RAW MATERIAL
16 | HOSE, RAW MATERIAL
17 | HOSE, RAW MATERIAL
18 | HOSE, RAW MATERIAL
19 | TUBE SET
20 | CYLINDER
21 | TUBE CLAMP BRACKET
22 | TUBE CLAMP BRACKET
23 | TUBE CLAMP COVER
24 | TUBE CLAMP
ANNULUS
PISTON1
PISTON2
ANNULUS-T
PISTON1-T
PISTON2-T

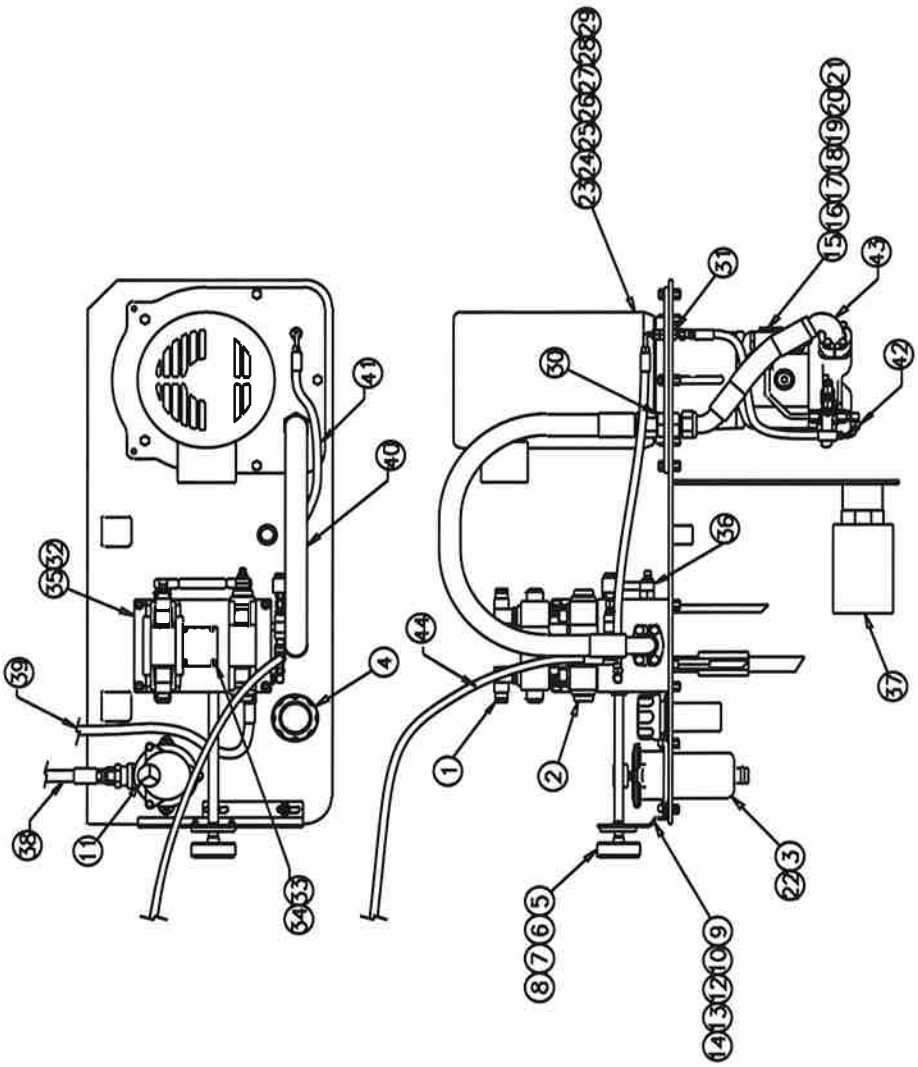
A.9 Hydraulic Tank Assembly

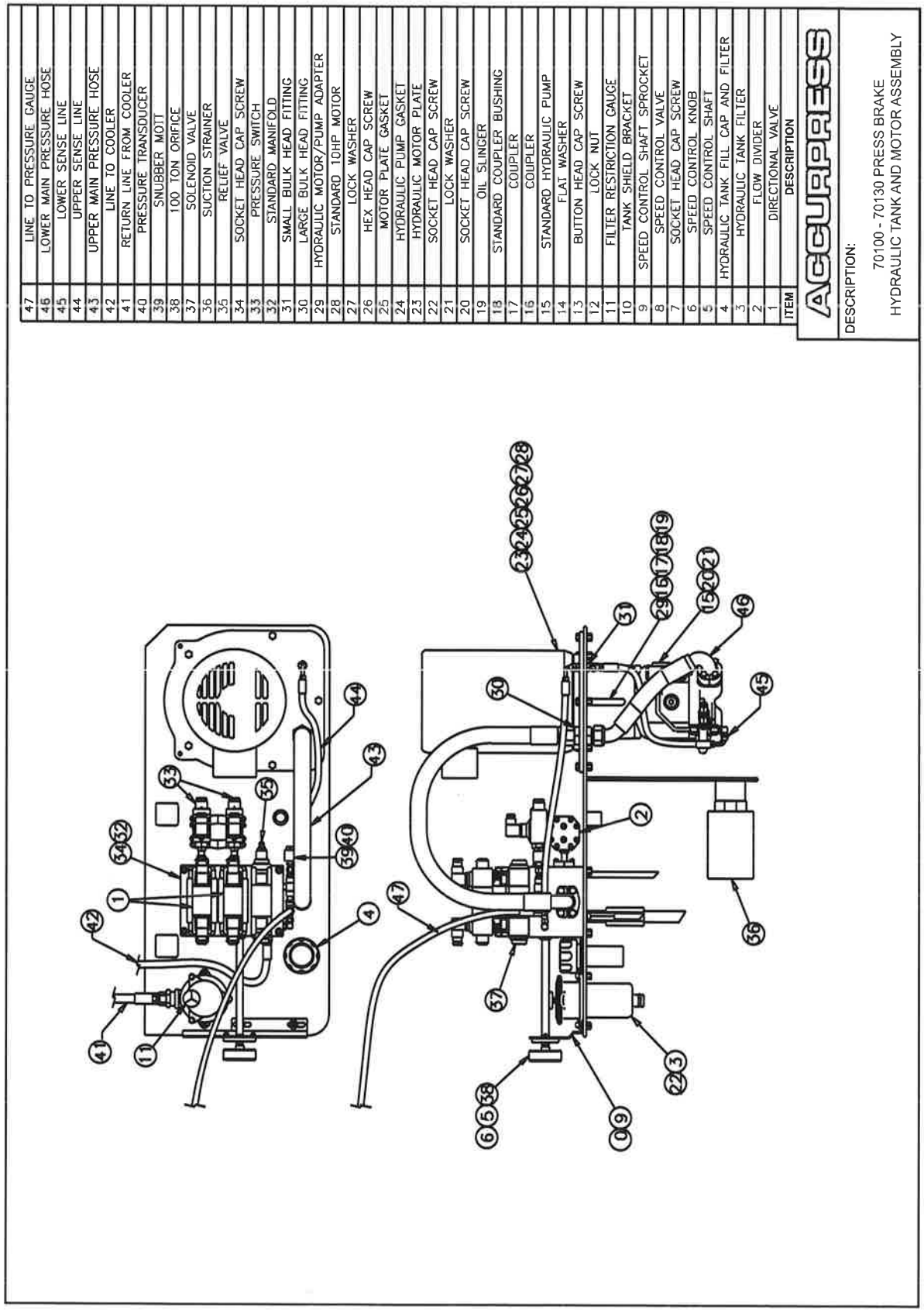
ITEM	DESCRIPTION
1	HIGH SPEED VALVE
2	SLOW SPEED VALVE
3	HYDRAULIC TANK FILTER
4	HYDRAULIC TANK FILL CAP AND FILTER
5	SPEED CONTROL SHAFT
6	SPEED CONTROL KNOB
7	SOCKET HEAD CAP SCREW
8	SPEED CONTROL VALVE
9	SPEED CONTROL SHAFT SPROCKET
10	TANK SHIELD BRACKET
11	FILTER RESTRICTION GAUGE
12	LOCK NUT
13	BUTTON HEAD CAP SCREW
14	FLAT WASHER
15	STANDARD HYDRAULIC PUMP
16	COUPLER
17	COUPLER
18	STANDARD COUPLER BUSHING
19	OIL SLINGER
20	SOCKET HEAD CAP SCREW
21	LOCK WASHER
22	SOCKET HEAD CAP SCREW
23	HYDRAULIC MOTOR PLATE
24	HYDRAULIC PUMP GASKET
25	MOTOR PLATE GASKET
26	HEX HEAD CAP SCREW
27	LOCK WASHER
28	STANDARD 10HP MOTOR
29	HYDRAULIC MOTOR/PUMP ADAPTER
30	LARGE BULK HEAD FITTING
31	SMALL BULK HEAD FITTING
32	STANDARD MANIFOLD
33	BLOCK OFF PLATE
34	SOCKET HEAD CAP SCREW
35	SOCKET HEAD CAP SCREW
36	NEEDLE VALVE
37	SUCTION STRAINER
38	RETURN LINE FROM COOLER
39	LINE TO COOLER
40	UPPER MAIN PRESSURE HOSE
41	UPPER SENSE LINE
42	LOWER SENSE LINE
43	LOWER MAIN PRESSURE LINE
44	LINE TO PRESSURE GAUGE

ACCURPRESS

DESCRIPTION:

70060 PRESS BRAKE
HYDRAULIC TANK AND MOTOR ASSEMBLY





ITEM	DESCRIPTION
47	LINE TO PRESSURE GAUGE
46	LOWER MAIN PRESSURE HOSE
45	LOWER SENSE LINE
44	UPPER SENSE LINE
43	UPPER MAIN PRESSURE HOSE
42	LINE TO COOLER
41	RETURN LINE FROM COOLER
40	PRESSURE TRANSDUCER
39	SNUBBER MOTT
38	100 TON ORIFICE
37	SOLENOID VALVE
36	SUCTION STRAINER
35	RELIEF VALVE
34	SOCKET HEAD CAP SCREW
33	PRESSURE SWITCH
32	STANDARD MANIFOLD
31	SMALL BULK HEAD FITTING
30	LARGE BULK HEAD FITTING
29	HYDRAULIC MOTOR/PUMP ADAPTER
28	STANDARD 10HP MOTOR
27	LOCK WASHER
26	HEX HEAD CAP SCREW
25	MOTOR PLATE GASKET
24	HYDRAULIC PUMP GASKET
23	HYDRAULIC MOTOR PLATE
22	SOCKET HEAD CAP SCREW
21	LOCK WASHER
20	SOCKET HEAD CAP SCREW
19	OIL SLINGER
18	STANDARD COUPLER BUSHING
17	COUPLER
16	COUPLER
15	STANDARD HYDRAULIC PUMP
14	FLAT WASHER
13	BUTTON HEAD CAP SCREW
12	LOCK NUT
11	FILTER RESTRICTION GAUGE
10	TANK SHIELD BRACKET
9	SPEED CONTROL SHAFT SPROCKET
8	SPEED CONTROL VALVE
7	SOCKET HEAD CAP SCREW
6	SPEED CONTROL KNOB
5	SPEED CONTROL SHAFT
4	HYDRAULIC TANK FILL CAP AND FILTER
3	HYDRAULIC TANK FILTER
2	FLOW DIVIDER
1	DIRECTIONAL VALVE

ACCURPRESS

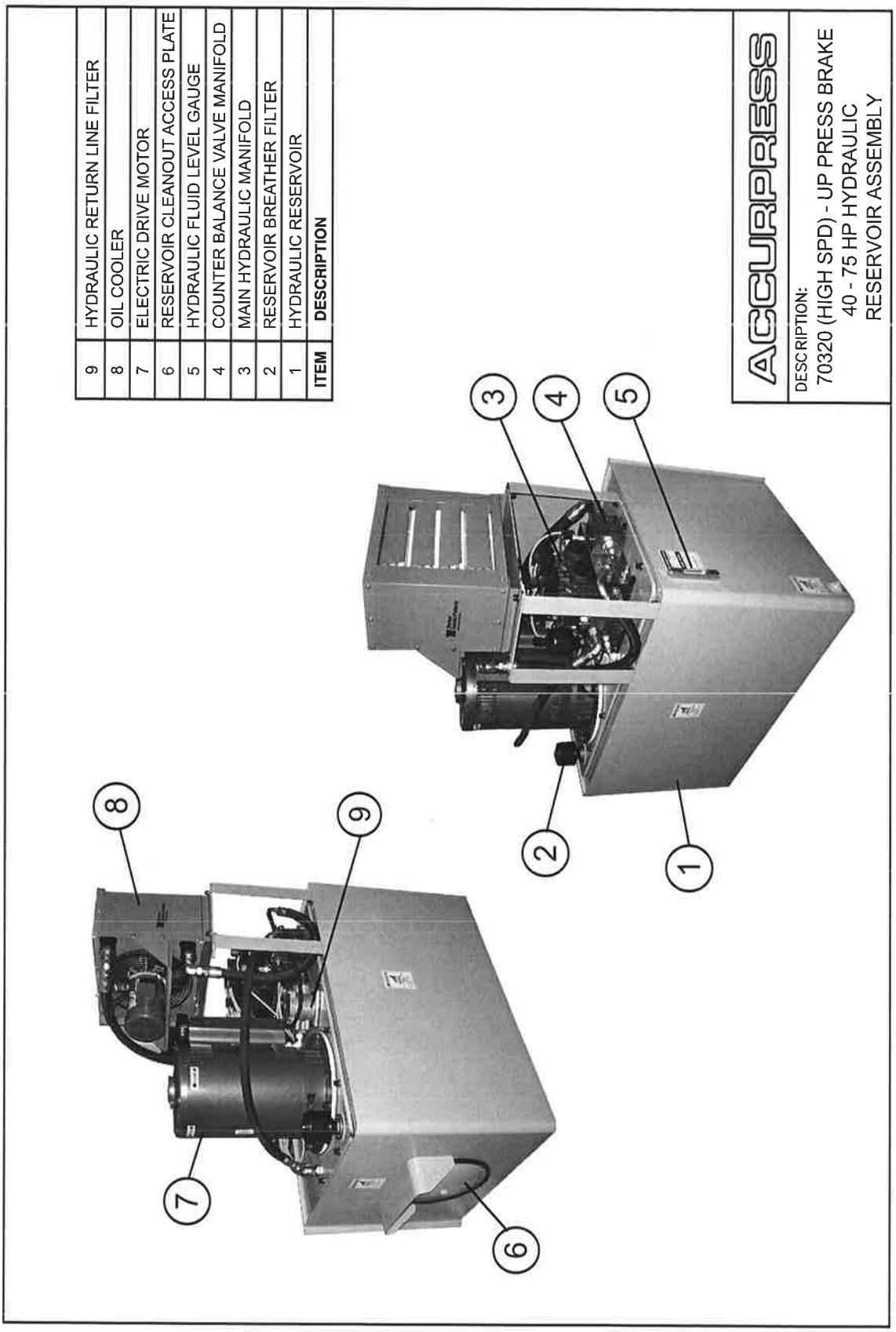
DESCRIPTION:

70100 - 70130 PRESS BRAKE
HYDRAULIC TANK AND MOTOR ASSEMBLY

ITEM	DESCRIPTION
10	20-30 HP STANDARD MANIFOLD
9	HYDRAULIC FLUID LEVEL GAUGE
8	RESERVOIR CLEANOUT ACCESS PLATE
7	RESERVOIR BREATHER FILTER
6	HYDRAULIC PUMP
5	ADJUSTABLE BEND SPEED CONTROL
4	HP HYDRAULIC FILTER
3	OIL COOLER
2	ELECTRIC DRIVE MOTOR
1	HYDRAULIC RESERVOIR

ACCURPRESS

DESCRIPTION:
70175 - 70320 (STD) PRESS BRAKE
20 - 30 HP HYDRAULIC
RESERVOIR ASSEMBLY


ITEM DESCRIPTION
9 HYDRAULIC RETURN LINE FILTER
8 OIL COOLER
7 ELECTRIC DRIVE MOTOR
6 RESERVOIR CLEANOUT ACCESS PLATE
5 HYDRAULIC FLUID LEVEL GAUGE
4 COUNTER BALANCE VALVE MANIFOLD
3 MAIN HYDRAULIC MANIFOLD
2 RESERVOIR BREATHER FILTER
1 HYDRAULIC RESERVOIR
ACCURPRESS
DESCRIPTION:
70320 (HIGH SPD) - UP PRESS BRAKE
40 - 75 HP HYDRAULIC
RESERVOIR ASSEMBLY

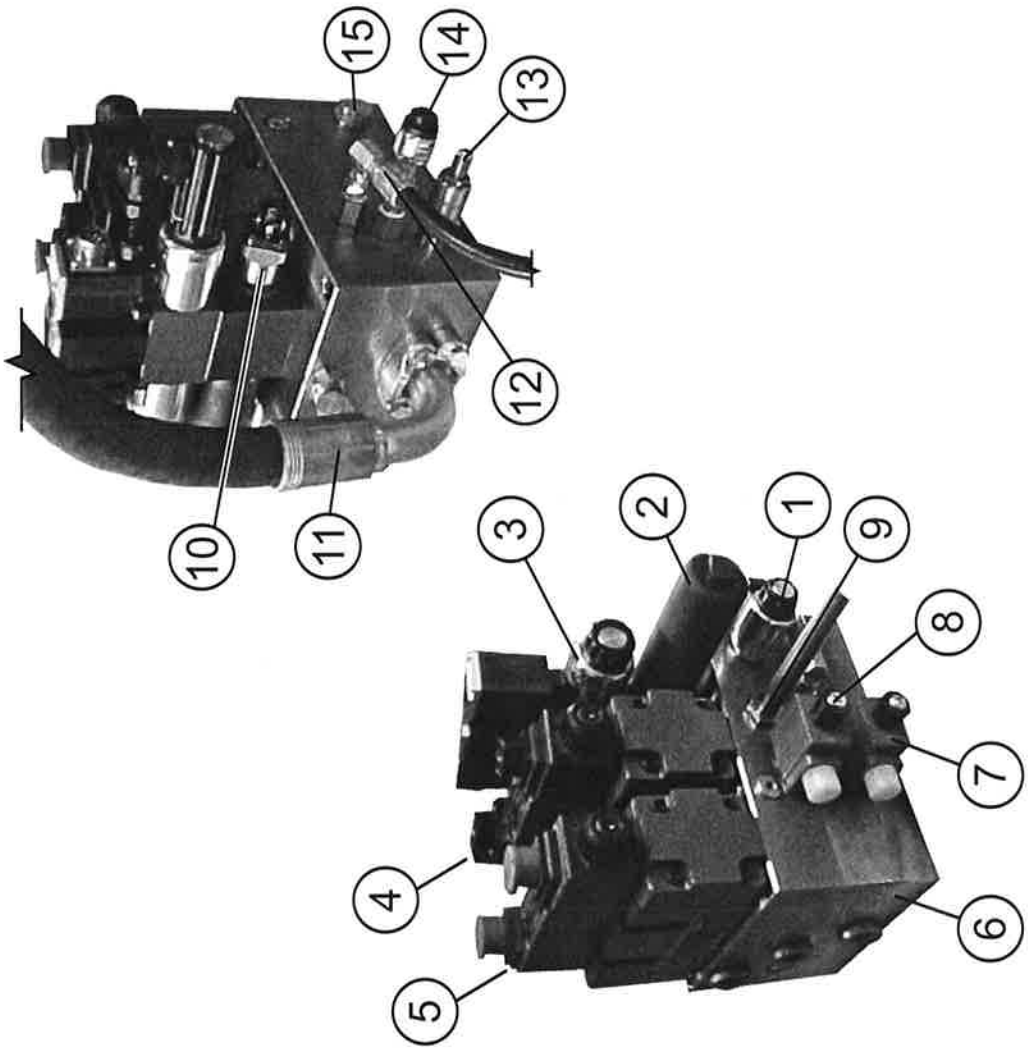
A.10 Main Hydraulic Manifold Assembly

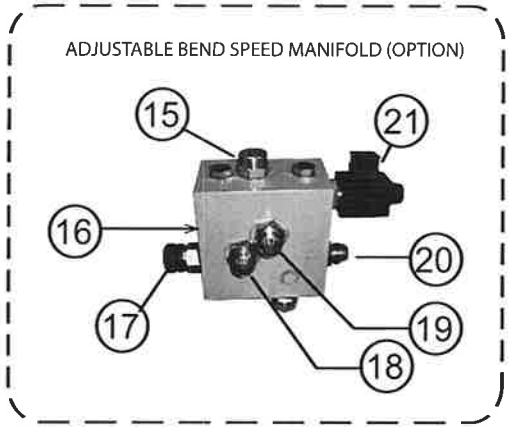
ITEM	DESCRIPTION
15	FLOW DIVIDER
14	PRESSURE TRANSDUCER
13	RELIEF VALVE
12	PUMP FEEDBACK
11	MAIN PRESSURE
10	PRESSURE FILTER RESTRICTION INDICATOR
9	SPEED CONTROL
8	COMPRESSION 2 VALVE
7	COMPRESSION 1 VALVE
6	10-15 HP MANIFOLD
5	HIGH VOLUME VALVE
4	HIGH VOLUME VALVE
3	HIGH PRESSURE PROPORTIONAL VALVE
2	HIGH PRESSURE FILTER
1	SAFETY VALVE

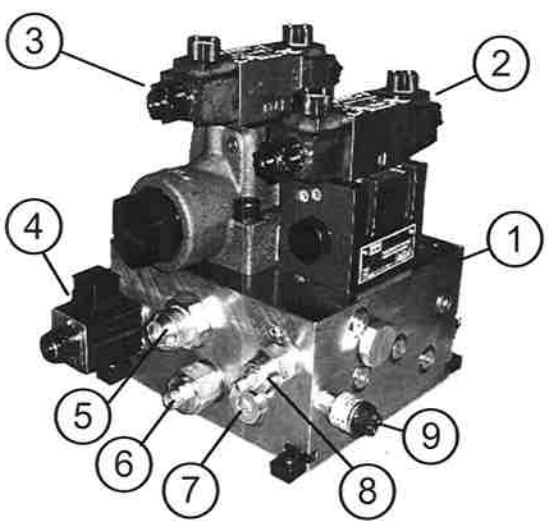
ACCURPRESS

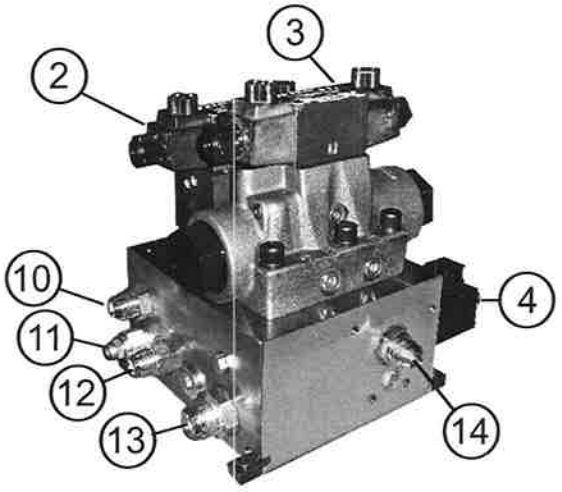
DESCRIPTION:

10 -15 HP ADVANTAGE
HYDRAULIC MANIFOLD







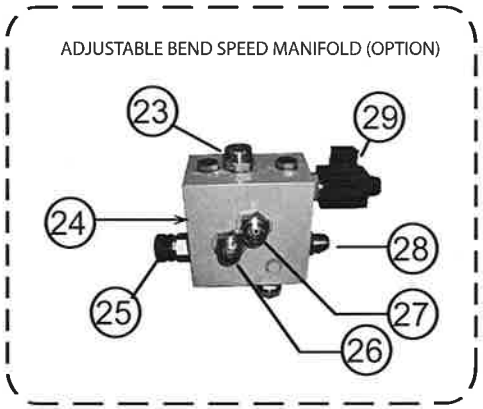


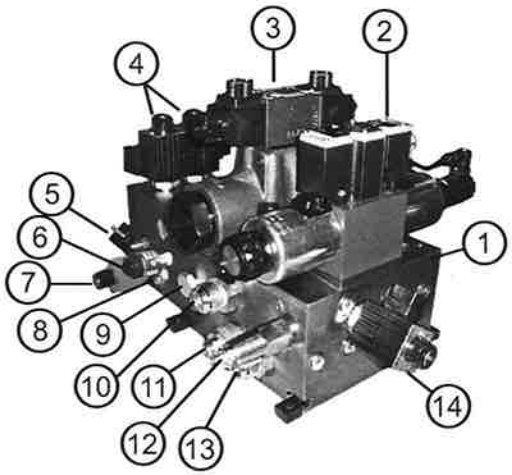
ITEM	DESCRIPTION
21	ENABLE SOLENOID
20	HP-IN
19	HP-OUT
18	DRAIN PORT
17	NEEDLE VALVE (FLOW CONTROL)
16	ADJUSTABLE BEND SPEED MANIFOLD
15	PRIORITY VALVE CARTRIDGE
14	PISTON PORT
13	ANNULUS PORT
12	COOLER PORT
11	COOLER RELIEF
10	HIGH PRESSURE IN
9	PRESSURE TRANSDUCER
8	HIGH PRESSURE RELIEF
7	ADJUSTABLE BEND SPEED DRAIN PORT
6	HIGH VOLUME RELIEF
5	HIGH VOLUME IN
4	DECOMPRESSION VALVE
3	HIGH VOLUME DIRECTIONAL VALVE
2	HIGH PRESSURE DIRECTIONAL VALVE
1	20-30 HP STANDARD MANIFOLD

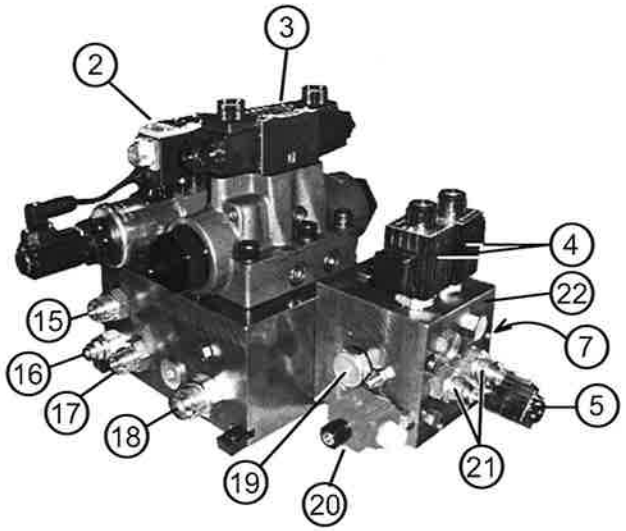
ACCURPRESS

DESCRIPTION:

20 -30 HP STANDARD
HYDRAULIC MANIFOLD



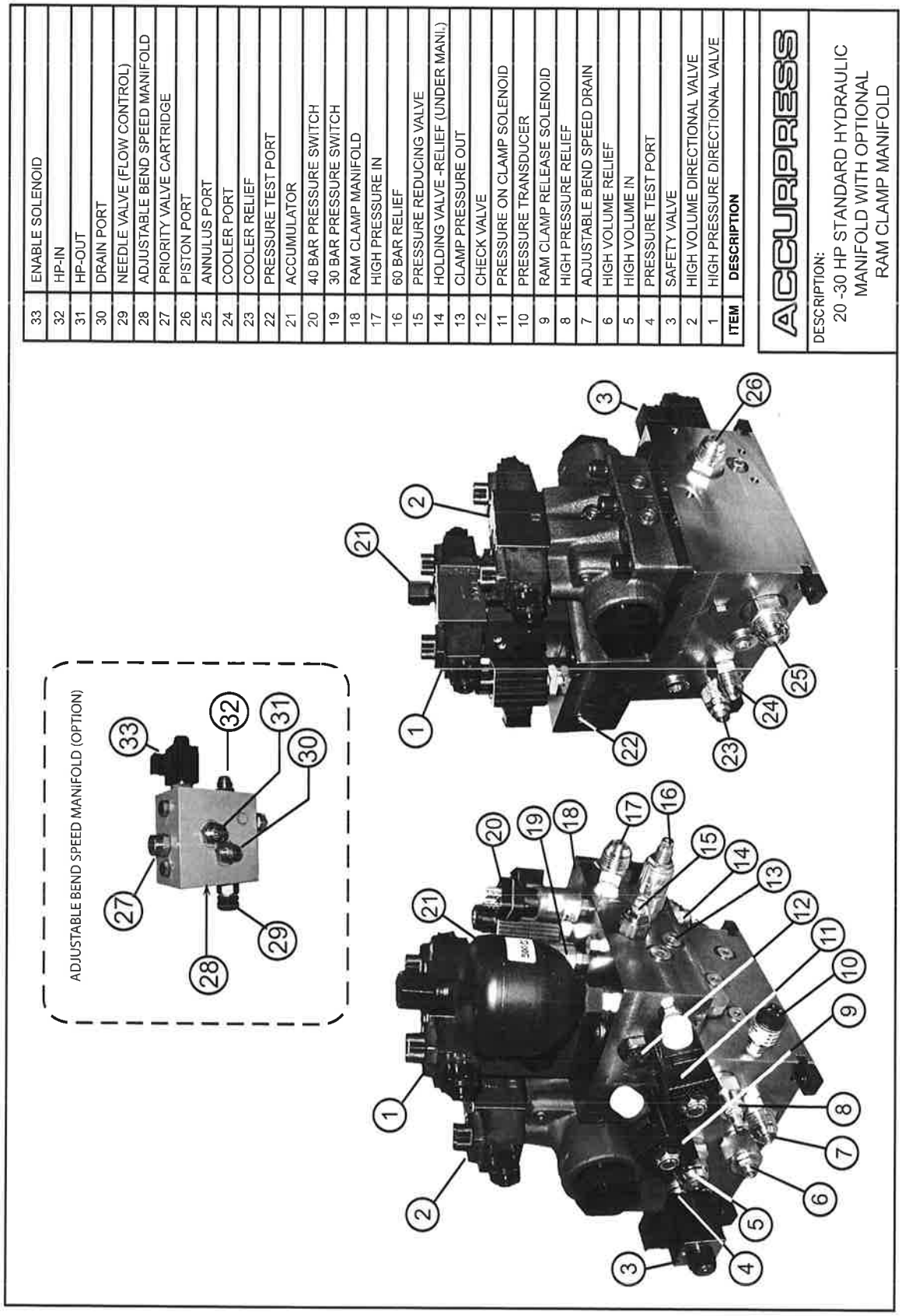




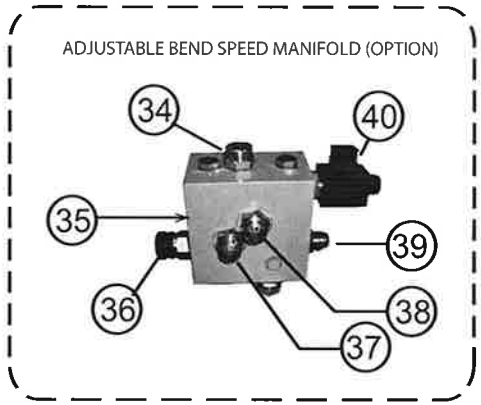
ITEM	DESCRIPTION
29	ENABLE SOLENOID
28	HP-IN
27	HP-OUT
26	DRAIN PORT
25	NEEDLE VALVE (FLOW CONTROL)
24	ADJUSTABLE BEND SPEED MANIFOLD
23	PRIORITY VALVE CARTRIDGE
22	DUAL RAM FEEDBACK MANIFOLD
21	PISTON PORTS
20	DRF PROPORTIONAL VALVE (SG. SIDE)
19	FLOW DIVIDER SPOOL CARTRIDGE
18	ANNULUS PORT
17	COOLER PORT
16	COOLER RELIEF
15	HIGH PRESSURE IN
14	SAFETY VALVE
13	HIGH PRESSURE IN
12	HIGH PRESSURE RELIEF
11	HIGH VOLUME RELIEF
10	HIGH VOLUME IN
9	PRESSURE TEST PORT
8	SHUTTLE VALVE
7	DRF PROPORTIONAL VALVE (ECC. SIDE)
6	PRESSURE TRANSDUCER
5	FLOW DIVIDER BALANCE VALVE
4	ISOLATION VALVES
3	HIGH VOLUME DIRECTIONAL VALVE
2	HIGH PRESSURE DIRECTIONAL VALVE
1	20-30 HP STANDARD MANIFOLD

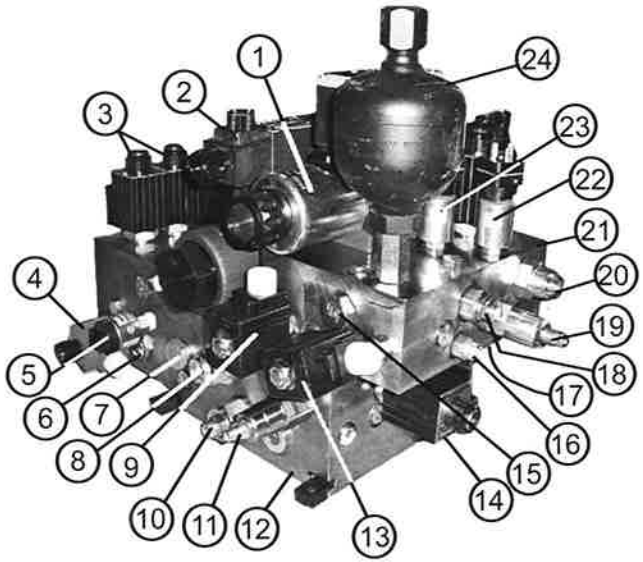
ACCURPRESS

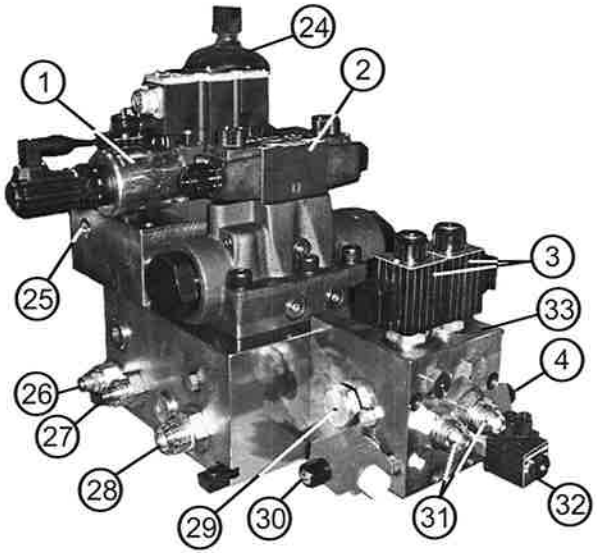
DESCRIPTION:
20 -30 HP STANDARD HYDRAULIC MANIFOLD WITH OPTIONAL ADVANTAGE (DRF) MANIFOLD



ITEM	DESCRIPTION
1	HIGH PRESSURE DIRECTIONAL VALVE
2	HIGH VOLUME DIRECTIONAL VALVE
3	SAFETY VALVE
4	PRESSURE TEST PORT
5	HIGH VOLUME IN
6	HIGH VOLUME RELIEF
7	ADJUSTABLE BEND SPEED DRAIN
8	HIGH PRESSURE RELIEF
9	RAM CLAMP RELEASE SOLENOID
10	PRESSURE TRANSDUCER
11	PRESSURE ON CLAMP SOLENOID
12	CHECK VALVE
13	CLAMP PRESSURE OUT
14	HOLDING VALVE -RELIEF (UNDER MANI.)
15	PRESSURE REDUCING VALVE
16	60 BAR RELIEF
17	HIGH PRESSURE IN
18	RAM CLAMP MANIFOLD
19	30 BAR PRESSURE SWITCH
20	40 BAR PRESSURE SWITCH
21	ACCUMULATOR
22	PRESSURE TEST PORT
23	COOLER RELIEF
24	COOLER PORT
25	ANNULUS PORT
26	PISTON PORT
27	PRIORITY VALVE CARTRIDGE
28	ADJUSTABLE BEND SPEED MANIFOLD
29	NEEDLE VALVE (FLOW CONTROL)
30	DRAIN PORT
31	HP-OUT
32	HP-IN
33	ENABLE SOLENOID



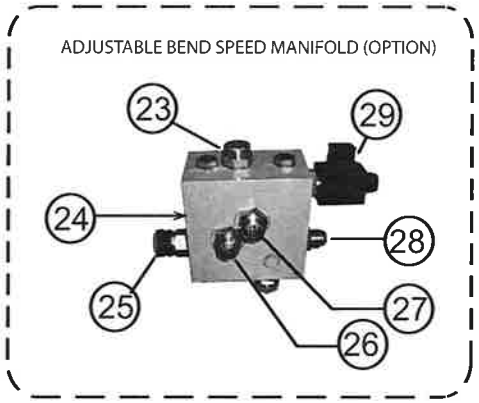


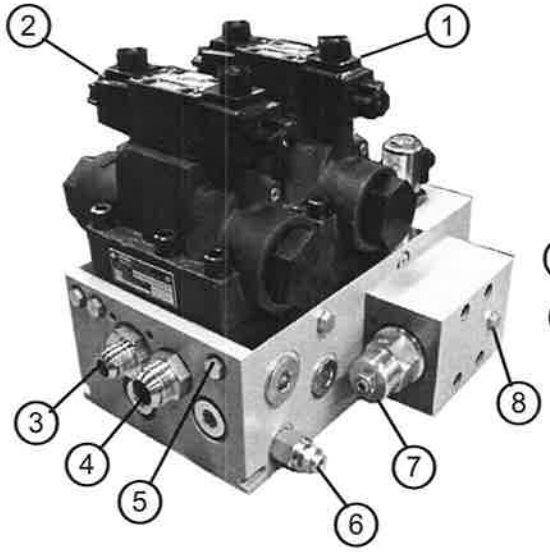


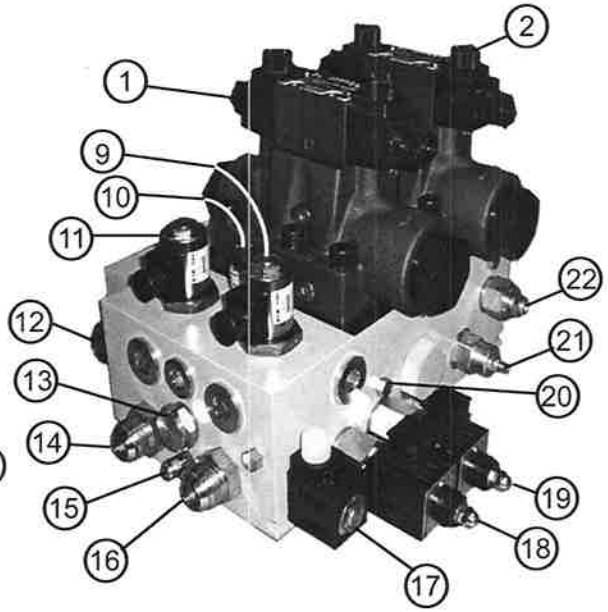
ITEM	DESCRIPTION
40	ENABLE SOLENOID
39	HP-IN
38	HP-OUT
37	DRAIN PORT
36	NEEDLE VALVE (FLOW CONTROL)
35	ADJUSTABLE BEND SPEED MANIFOLD
34	PRIORITY VALVE CARTRIDGE
33	DUAL RAM FEEDBACK MANIFOLD
32	FLOW DIVIDER BALANCE VALVE
31	PISTON PORTS
30	DRF-PROPORTIONAL VALVE (SG. SIDE)
29	FLOW DIVIDER SPOOL CARTRIDGE
28	ANNULUS PORT
27	COOLER PORT
26	COOLER RELIEF
25	PRESSURE TEST PORT
24	ACCUMULATOR
23	30 BAR PRESSURE SWITCH
22	40 BAR PRESSURE SWITCH
21	RAM CLAMP MANIFOLD
20	HIGH PRESSURE IN
19	60 BAR RELIEF
18	PRESSURE REDUCING VALVE
17	HOLDING VALVE - RELIEF (UNDER MANI.)
16	CLAMP PRESSURE OUT
15	CHECK VALVE
14	SAFETY VALVE
13	PRESSURE ON CLAMP SOLENOID
12	20-30 HP STANDARD MANIFOLD
11	HIGH PRESSURE RELIEF
10	HIGH VOLUME RELIEF
9	RAM CLAMP RELEASE SOLENOID
8	HIGH VOLUME IN
7	PRESSURE TEST PORT
6	SHUTTLE VALVE
5	PRESSURE TRANSDUCER
4	DRF PROPORTIONAL VALVE (ECC. SIDE)
3	ISOLATION VALVES
2	HIGH VOLUME DIRECTIONAL VALVE
1	HIGH PRESSURE DIRECTIONAL VALVE

ACCURPRESS

DESCRIPTION:
20 -30 HP STANDARD HYDRAULIC MANIFOLD WITH OPTIONAL RAM CLAMP AND DRF MANIFOLDS







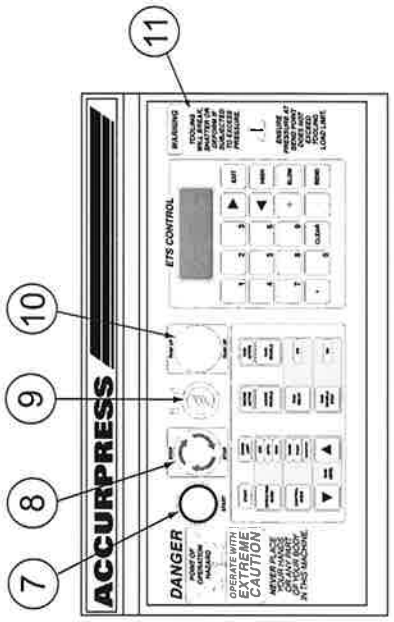
ITEM	DESCRIPTION
29	ENABLE SOLENOID
28	HP-IN
27	HP-OUT
26	DRAIN PORT
25	NEEDLE VALVE (FLOW CONTROL)
24	ADJUSTABLE BEND SPEED MANIFOLD
23	PRIORITY VALVE CARTRIDGE
22	HIGH PRESSURE RELIEF VALVE
21	HIGH VOLUME RELIEF VALVE
20	SIDE GAUGE TEST PORT
19	COMP. 2 VALVE (SIDE GAUGE CYLINDER)
18	COMP. 1 VALVE (ECCENTRIC CYLINDER)
17	BALANCE VALVE - COMP. 1, COMP. 2
16	ECCENTRIC PISTION PORT
15	ECCENTRIC END CYLINDER TEST PORT
14	SIDE GAUGE PISTON PORT
13	FLOW DIVIDER
12	ANNULUS PORT
11	SIDE GAUGE ISOLATION VALVE
10	TONNAGE TRANSDUCER
9	ECCENTRIC ISOLATION VALVE
8	COUNTER BALANCE TEST PORT
7	COUNTER BALANCE VALVE
6	COOLER RELIEF VALVE
5	HIGH PRESSURE TEST PORT
4	COOLER PORT
3	HIGH PRESSURE IN
2	HIGH PRESSURE DIRECTIONAL VALVE
1	HIGH VOLUME DIRECTIONAL VALVE

ACCURPRESS

DESCRIPTION:

40 - 75 HP STANDARD
HYDRAULIC MANIFOLD

A.11 Control Station and Pedestal Assemblies

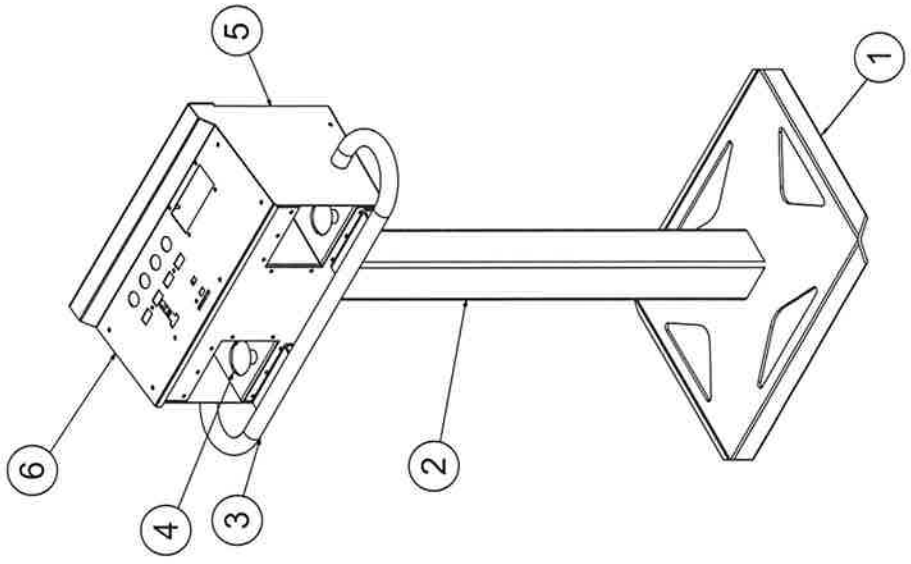


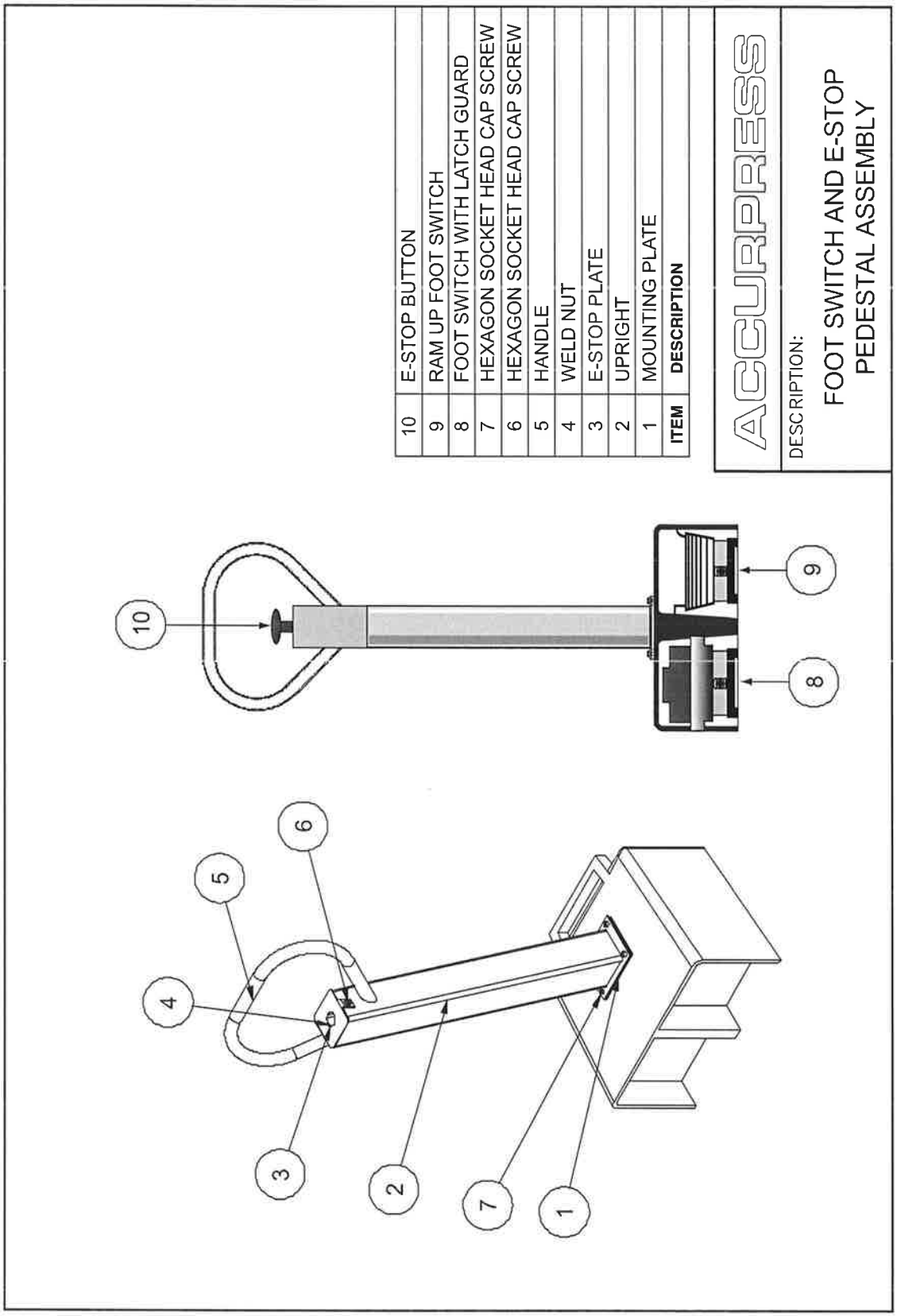
ITEM	DESCRIPTION
11	CONTROL STATION OVERLAY
10	RAM UP PUSHBUTTON
9	EDIT KEYLOCK SELECTOR SWITCH
8	STOP PUSHBUTTON
7	START PUSHBUTTON
6	CONTROL HEAD COVER
5	CONTROL HEAD BODY
4	PALM BUTTON
3	HANDLE ASSEMBLY
2	STAND
1	BASE

ACCURPRESS

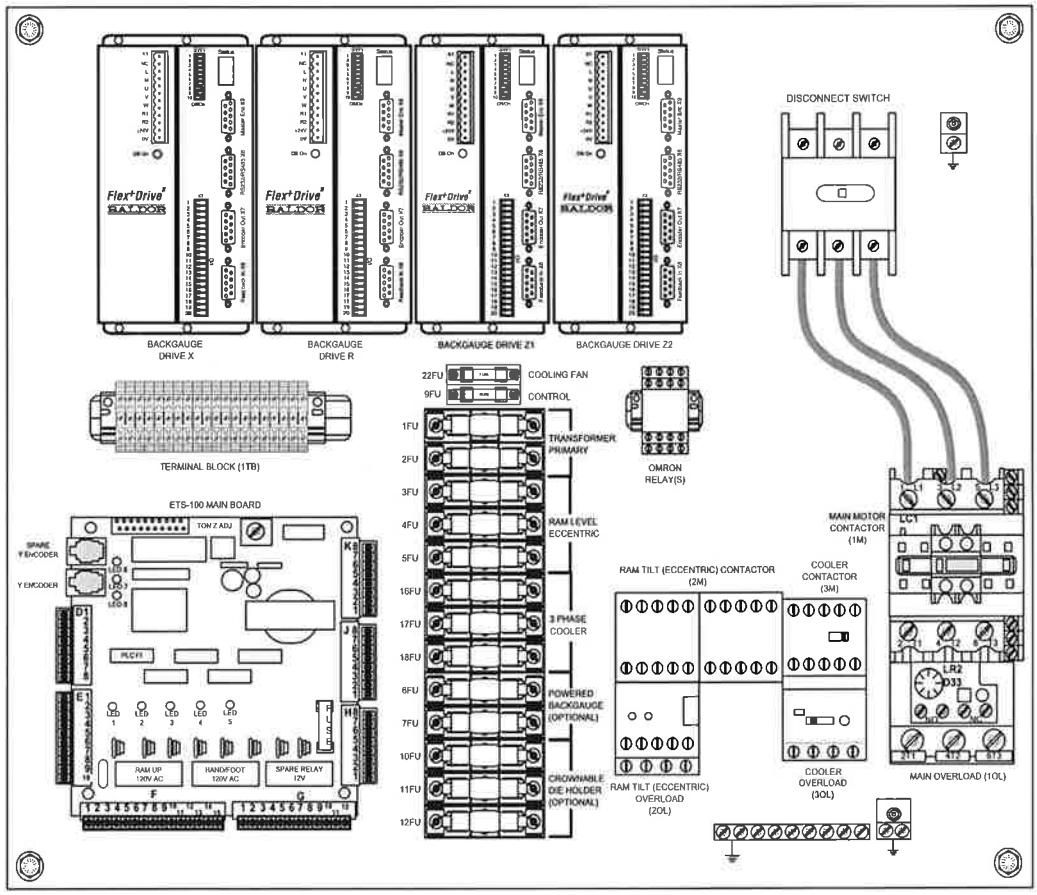
DESCRIPTION:

ETS CONTROL STATION




ACCURPRESS
DESCRIPTION:
FOOT SWITCH AND E-STOP PEDESTAL ASSEMBLY
ITEM DESCRIPTION
10 E-STOP BUTTON
9 RAM UP FOOT SWITCH
8 FOOT SWITCH WITH LATCH GUARD
7 HEXAGON SOCKET HEAD CAP SCREW
6 HEXAGON SOCKET HEAD CAP SCREW
5 HANDLE
4 WELD NUT
3 E-STOP PLATE
2 UPRIGHT
1 MOUNTING PLATE
10
9
8
6
5
4
3
2
7
1

A.12 Main Electrical Cabinet Back Panel Layout

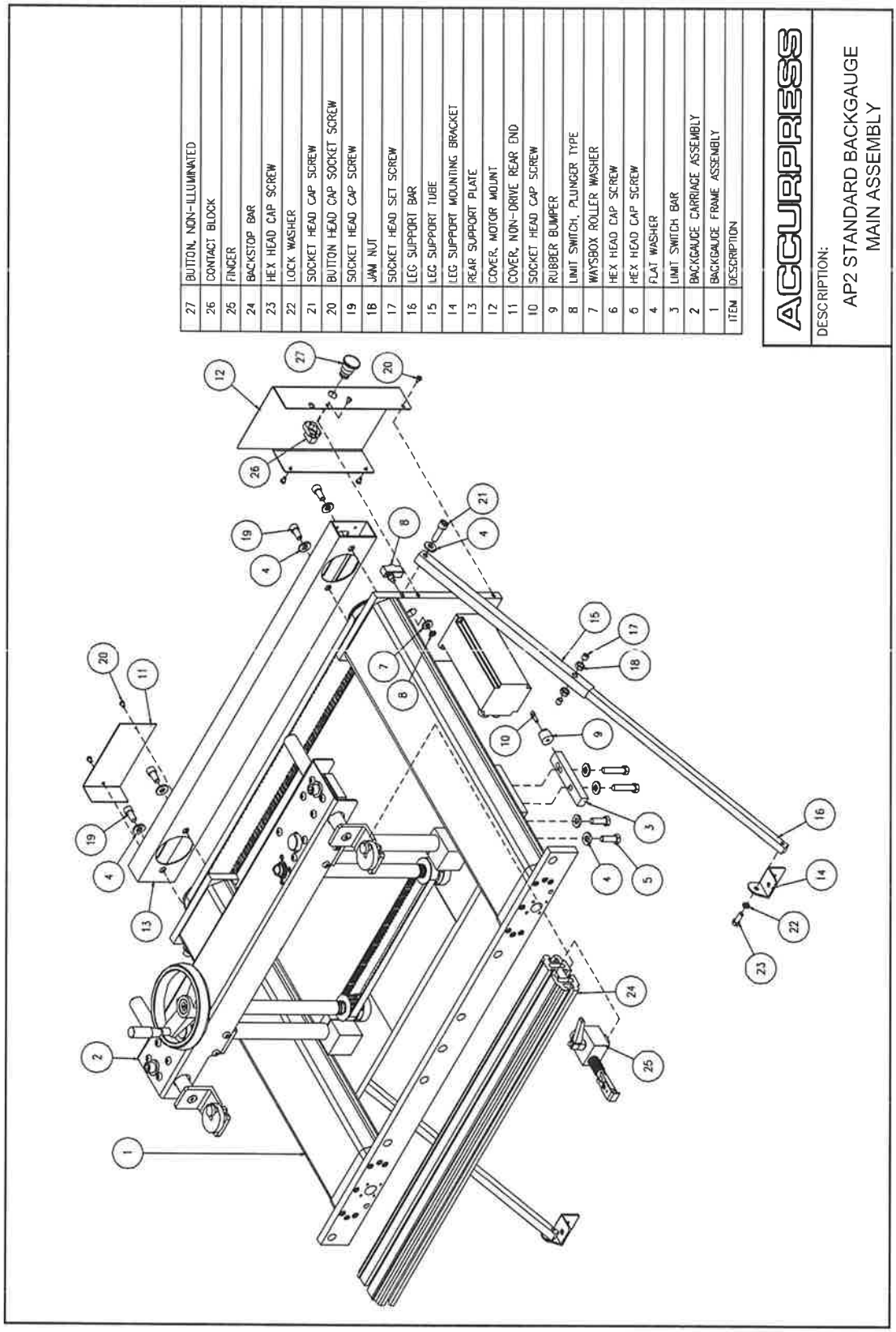


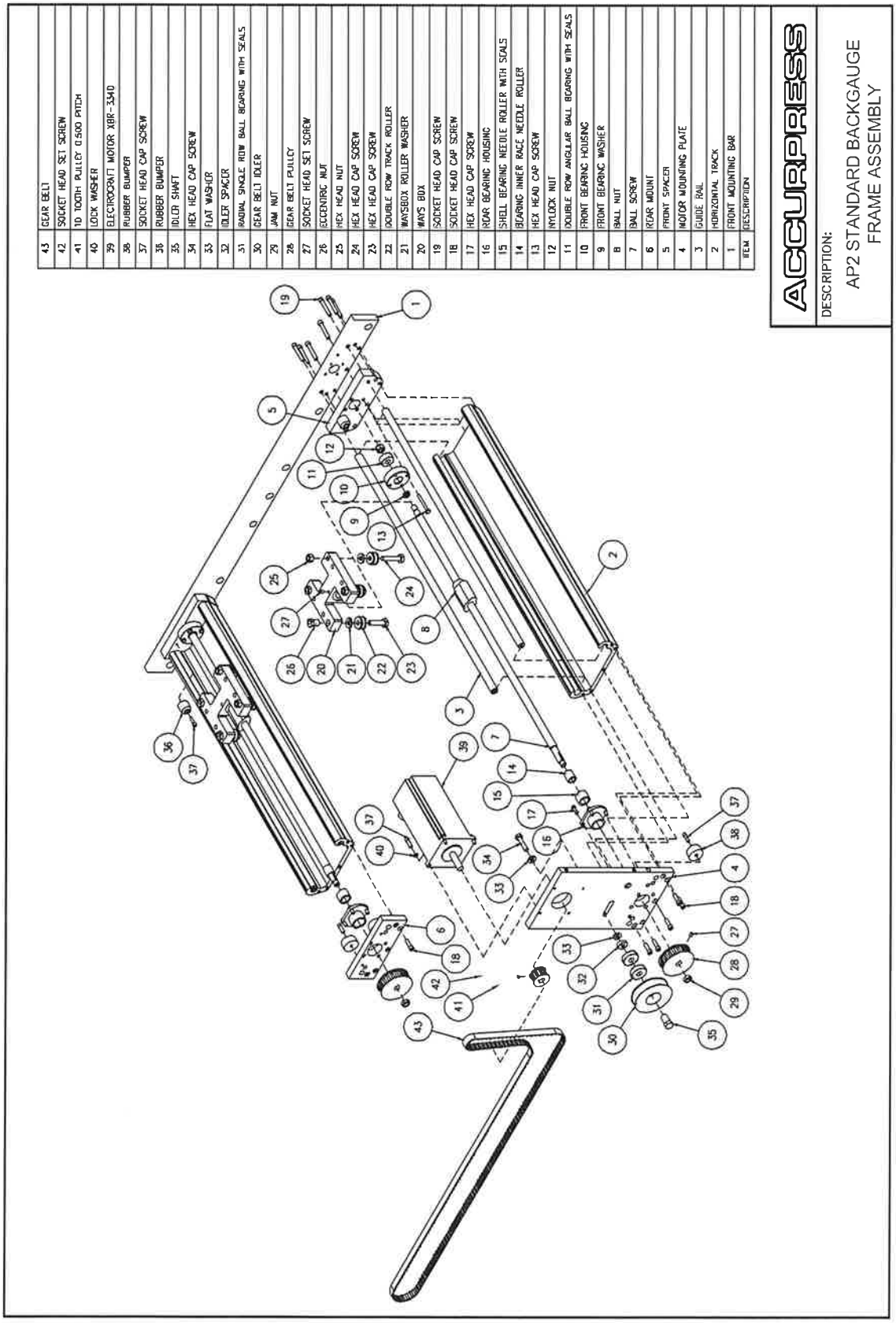
ACCURPRESS

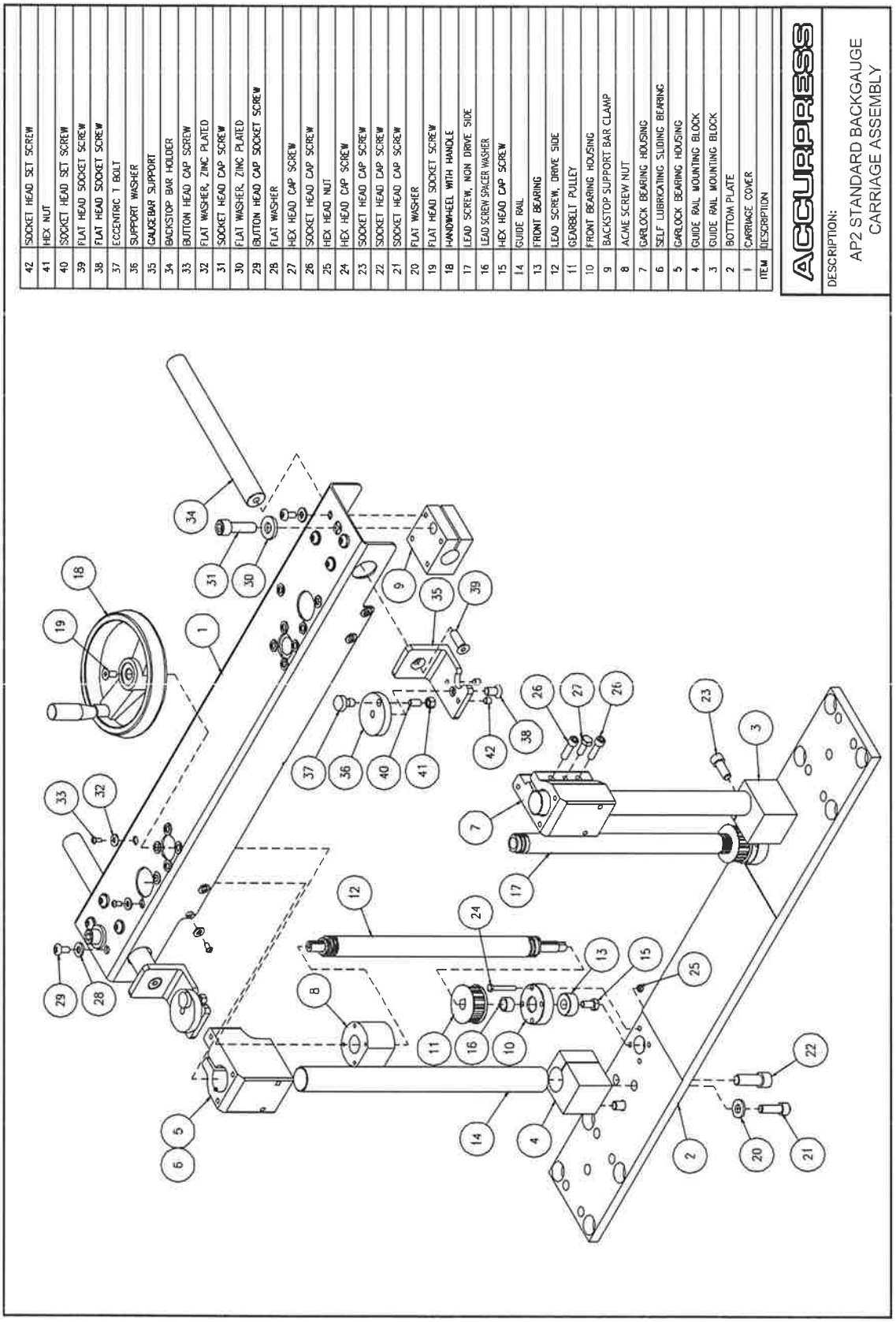
DESCRIPTION:

TYPICAL MAIN ELECTRICAL CABINET PANEL LAYOUT

A.13 Standard Backgauge Assembly



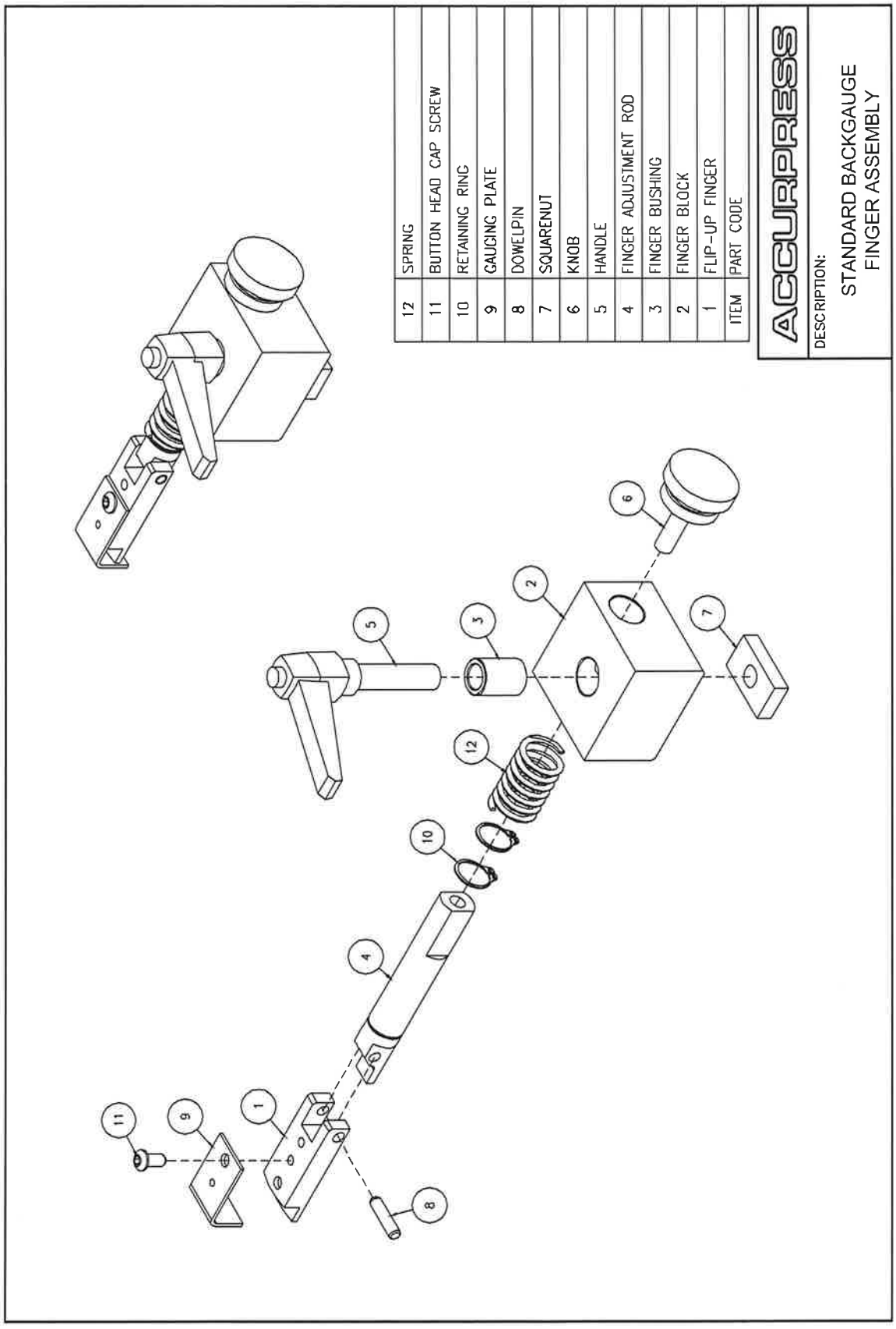

ITEM DESCRIPTION
1 FRONT MOUNTING BAR
2 HORIZONTAL TRACK
3 GUIDE RAIL
4 MOTOR MOUNTING PLATE
5 FRONT SPACER
6 REAR MOUNT
7 BALL SCREW
8 BALL NUT
9 FRONT BEARING WASHER
10 FRONT BEARING HOUSING
11 DOUBLE ROW ANGULAR BALL BEARING WITH SEALS
12 NYLOCK NUT
13 HEX HEAD CAP SCREW
14 BEARING INNER RACE NEEDLE ROLLER
15 SHELL BEARING NEEDLE ROLLER WITH SEALS
16 REAR BEARING HOUSING
17 HEX HEAD CAP SCREW
18 SOCKET HEAD CAP SCREW
19 WAYS BOX
20 DOUBLE ROW TRACK ROLLER
21 WAYSBOX ROLLER WASHER
22 HEX HEAD CAP SCREW
23 HEX HEAD CAP SCREW
24 HEX HEAD CAP SCREW
25 ECCENTRIC NUT
26 SOCKET HEAD SET SCREW
27 GEAR BELT PULLEY
28 JAM NUT
29 GEAR BELT IDLER
30 RADIAL SINGLE ROW BALL BEARING WITH SEALS
31 IDLER SPACER
32 FLAT WASHER
33 HEX HEAD CAP SCREW
34 IDLER SHAFT
35 RUBBER BUMPER
36 SOCKET HEAD CAP SCREW
37 RUBBER BUMPER
38 ELECTROCRAFT MOTOR XBR-3340
39 LOCK WASHER
40 10 TOOTH PULLEY 0.500 PITCH
41 SOCKET HEAD SET SCREW
42 GEAR BELT
43
ACCURPRESS
DESCRIPTION:
AP2 STANDARD BACKGAUGE
FRAME ASSEMBLY



ITEM	DESCRIPTION
1	CARRIAGE COVER
2	BOTTOM PLATE
3	GUIDE RAIL MOUNTING BLOCK
4	GUIDE RAIL MOUNTING BLOCK
5	GARLOCK BEARING HOUSING
6	SELF LUBRICATING SLIDING BEARING
7	GARLOCK BEARING HOUSING
8	ACME SCREW NUT
9	BACKSTOP SUPPORT BAR CLAMP
10	FRONT BEARING HOUSING
11	GEARBELT PULLEY
12	LEAD SCREW, DRIVE SIDE
13	FRONT BEARING
14	GUIDE RAIL
15	HEX HEAD CAP SCREW
16	LEAD SCREW SPACER WASHER
17	LEAD SCREW, NON DRIVE SIDE
18	HANDWHEEL WITH HANDLE
19	FLAT HEAD SOCKET SCREW
20	FLAT WASHER
21	SOCKET HEAD CAP SCREW
22	SOCKET HEAD CAP SCREW
23	SOCKET HEAD CAP SCREW
24	HEX HEAD CAP SCREW
25	HEX HEAD NUT
26	SOCKET HEAD CAP SCREW
27	HEX HEAD CAP SCREW
28	FLAT WASHER
29	BUTTON HEAD CAP SOCKET SCREW
30	FLAT WASHER, ZINC PLATED
31	SOCKET HEAD CAP SCREW
32	FLAT WASHER, ZINC PLATED
33	BUTTON HEAD CAP SCREW
34	BACKSTOP BAR HOLDER
35	GAUGEBAR SUPPORT
36	SUPPORT WASHER
37	ECCENTRIC T BOLT
38	FLAT HEAD SOCKET SCREW
39	FLAT HEAD SOCKET SCREW
40	SOCKET HEAD SET SCREW
41	HEX NUT
42	SOCKET HEAD SET SCREW

ACCURPRESS

DESCRIPTION:
AP2 STANDARD BACKGAUGE
CARRIAGE ASSEMBLY

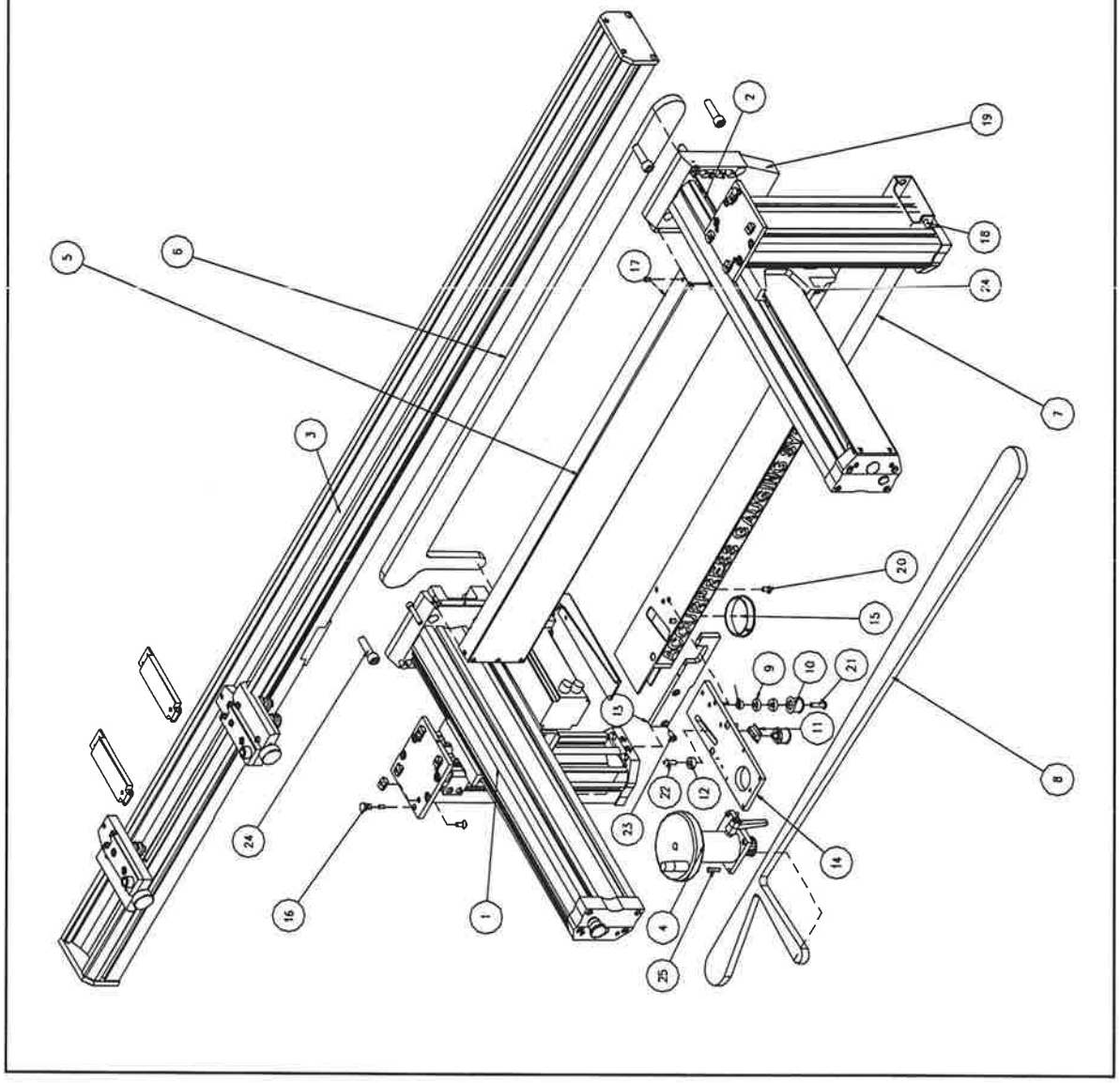

ACCURPRESS
DESCRIPTION:
STANDARD BACKGAUGE
FINGER ASSEMBLY
ITEM | PART CODE
1 | FLIP-UP FINGER
2 | FINGER BLOCK
3 | FINGER BUSHING
4 | FINGER ADJUSTMENT ROD
5 | HANDLE
6 | KNOB
7 | SQUARENUT
8 | DOWELPIN
9 | GAUGING PLATE
10 | RETAINING RING
11 | BUTTON HEAD CAP SCREW
12 | SPRING

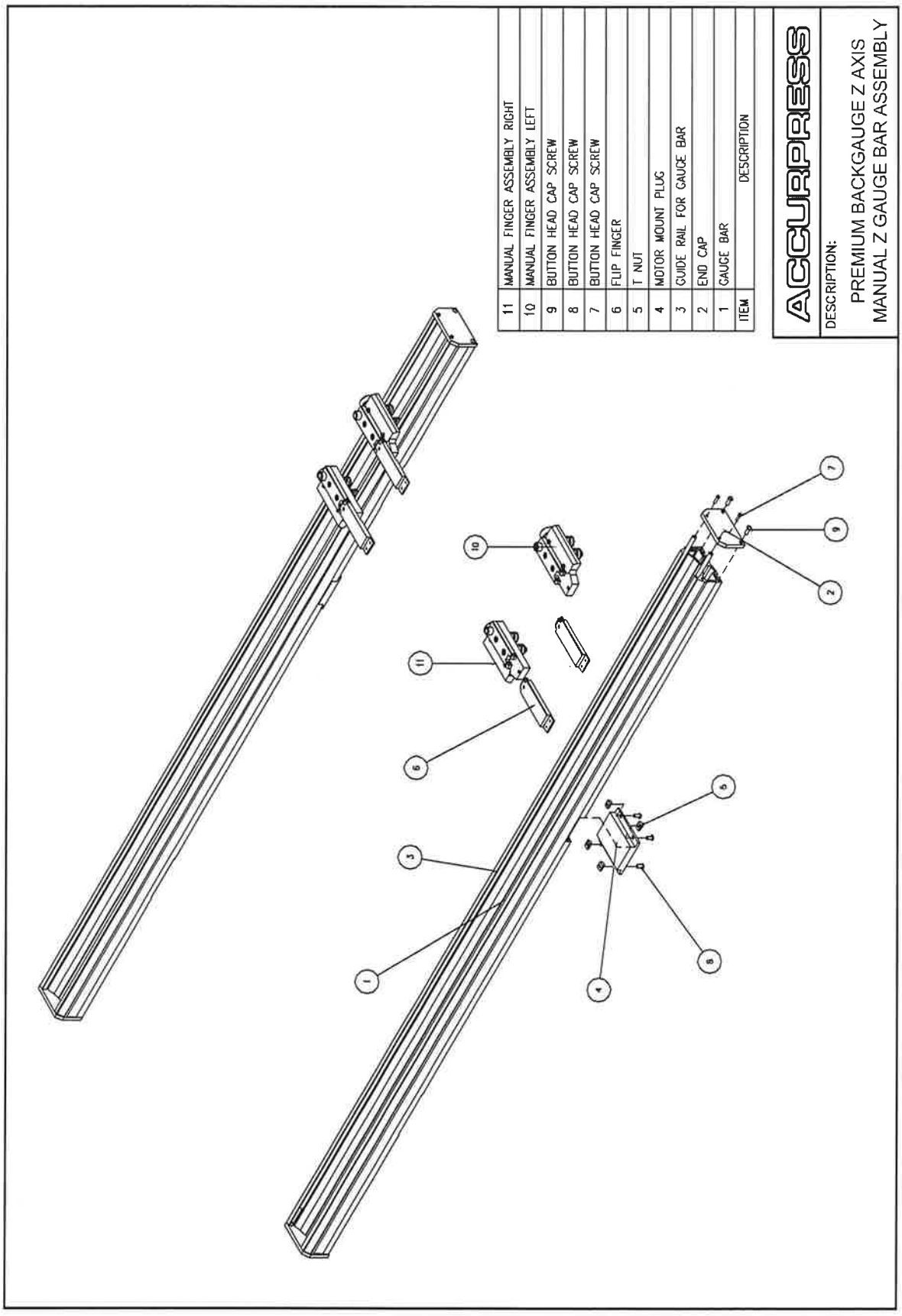
A.14 Premium Backgauge Assembly (Optional)

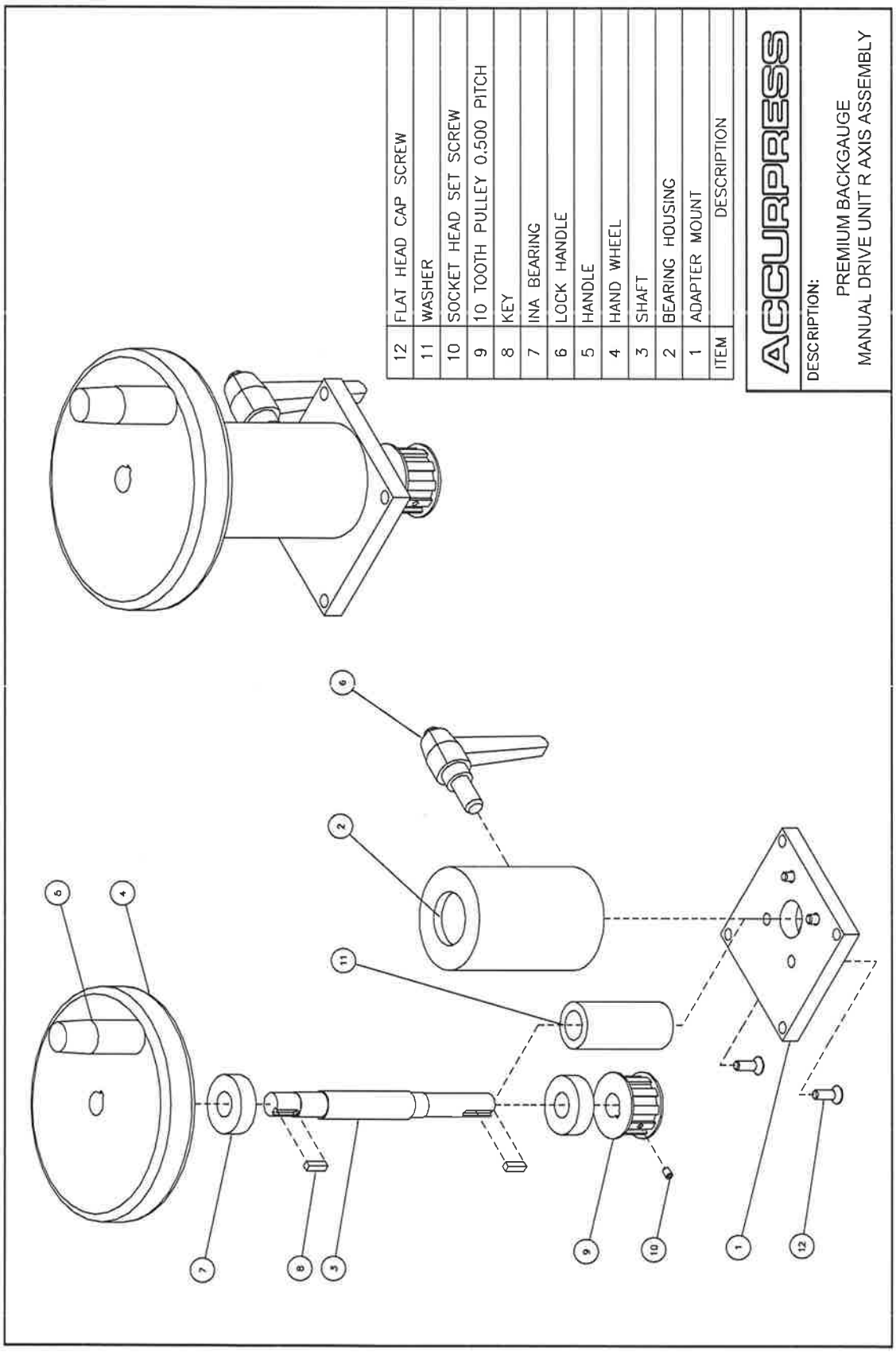
ITEM	DESCRIPTION
25	SOCKET HEAD CAP SCREW
24	HEX NUT
23	LOW HEAD SOCKET CAP SCREW
22	BUTTON HEAD CAP SCREW
21	BUTTON HEAD CAP SCREW
20	BUTTON HEAD CAP SCREW
19	SOCKET HEAD CAP SCREW
18	SOCKET HEAD CAP SCREW
17	BUTTON HEAD CAP SCREW
16	ECCENTRIC T BOLT
15	ACCESS COVER
14	MOTOR MOUNT
13	MOTOR MOUNT SUPPORT
12	WASHER FOR ADJUST IDLER
11	T NUT METRIC
10	IDLER PULLEY
9	BALL BEARING
8	TIMING BELT R AXIS
7	BELT COVER R AXIS
6	TIMING BELT X AXIS
5	BELT COVER X AXIS
4	MANUAL DRIVE UNIT R AXIS
3	MANUAL Z GAUGE BAR ASSEMBLY
2	X AND R AXIS NON MOTOR SIDE ASSEMBLY
1	X AND R AXIS MOTOR SIDE ASSEMBLY

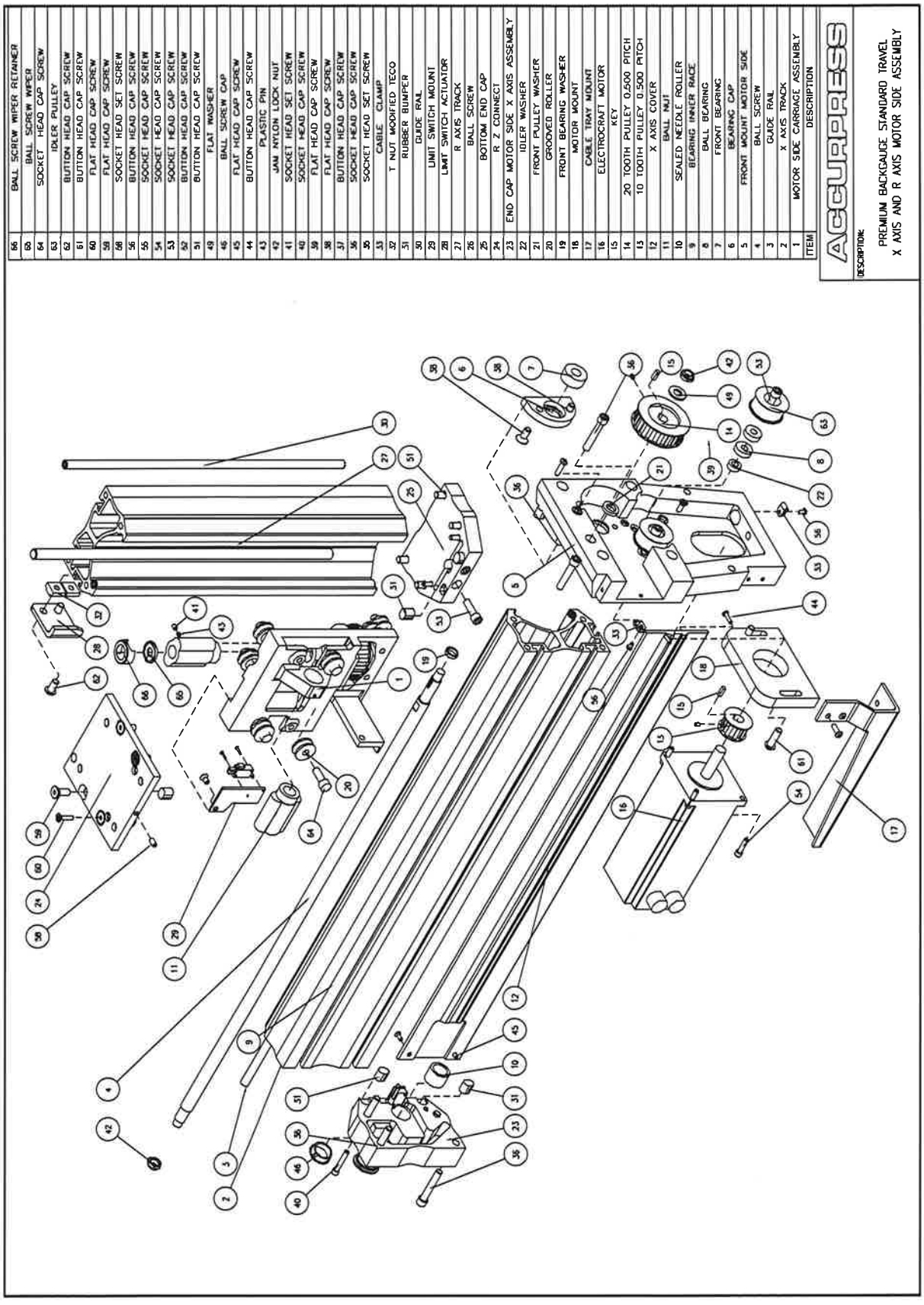
ACCURPRESS

DESCRIPTION:
PREMIUM BACKGAUGE
POWER X AND MANUAL R AND Z AXES
MAIN ASSEMBLY




ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE Z AXIS
MANUAL Z GAUGE BAR ASSEMBLY
ITEM DESCRIPTION
1 GAUGE BAR
2 END CAP
3 GUIDE RAIL FOR GAUGE BAR
4 MOTOR MOUNT PLUG
5 T NUT
6 FLIP FINGER
7 BUTTON HEAD CAP SCREW
8 BUTTON HEAD CAP SCREW
9 BUTTON HEAD CAP SCREW
10 MANUAL FINGER ASSEMBLY LEFT
11 MANUAL FINGER ASSEMBLY RIGHT


ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE
MANUAL DRIVE UNIT R AXIS ASSEMBLY
ITEM DESCRIPTION
12 FLAT HEAD CAP SCREW
11 WASHER
10 SOCKET HEAD SET SCREW
9 10 TOOTH PULLEY 0.500 PITCH
8 KEY
7 INA BEARING
6 LOCK HANDLE
5 HANDLE
4 HAND WHEEL
3 SHAFT
2 BEARING HOUSING
1 ADAPTER MOUNT

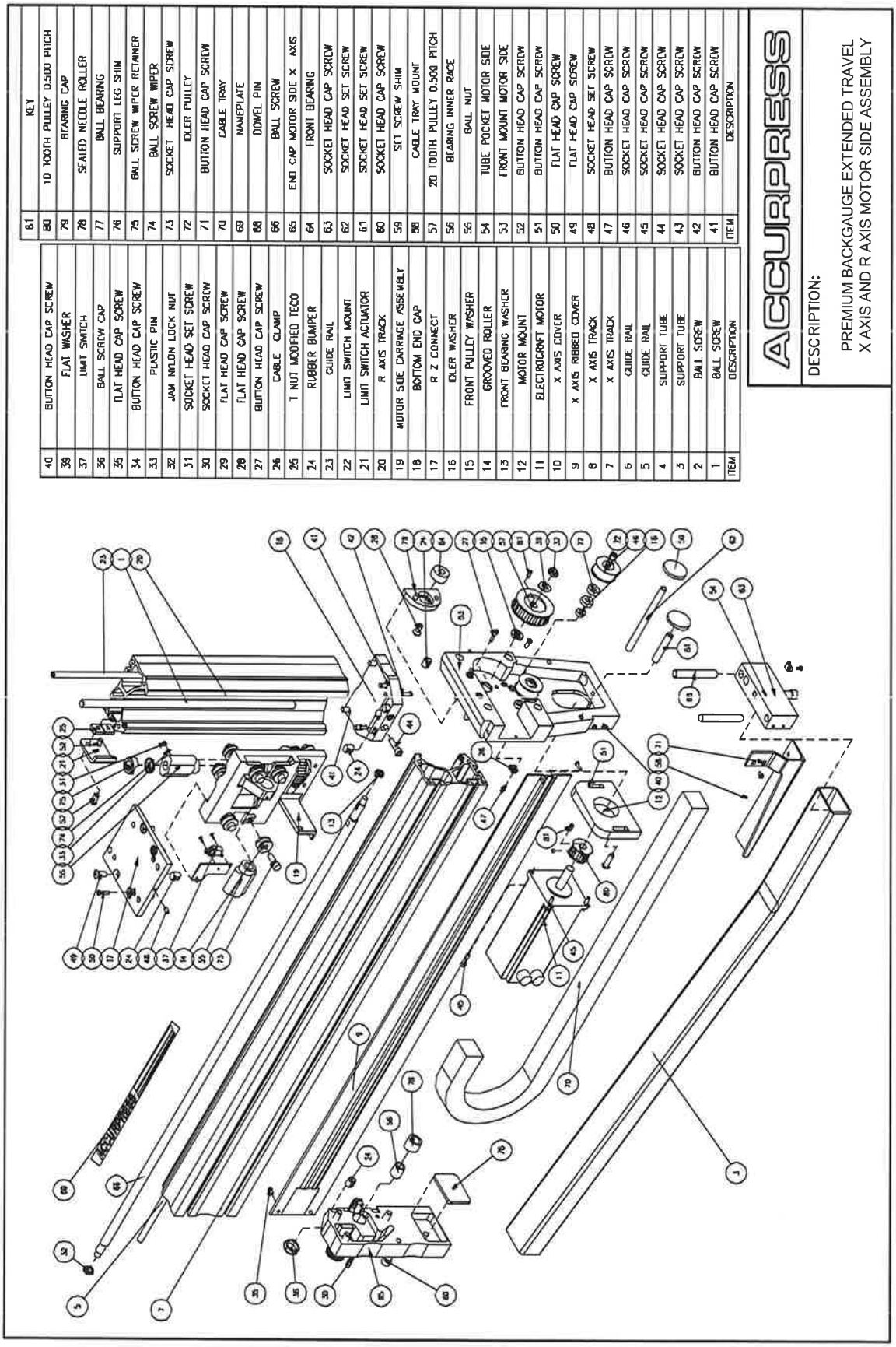


ITEM	DESCRIPTION
1	MOTOR SIDE CARRIAGE ASSEMBLY
2	X AXIS TRACK
3	GUIDE RAIL
4	BALL SCREW
5	FRONT MOUNT MOTOR SIDE
6	BEARING CAP
7	FRONT BEARING
8	BALL BEARING
9	BEARING INNER RACE
10	SEALED NEEDLE ROLLER
11	BALL NUT
12	X AXIS COVER
13	10 TOOTH PULLEY 0.500 PITCH
14	20 TOOTH PULLEY 0.500 PITCH
15	KEY
16	ELECTROCRAFT MOTOR
17	CABLE TRAY MOUNT
18	MOTOR MOUNT
19	FRONT BEARING WASHER
20	GROOVED ROLLER
21	FRONT PULLEY WASHER
22	IDLER WASHER
23	END CAP MOTOR SIDE X AXIS ASSEMBLY
24	R Z CONNECT
25	BOTTOM END CAP
26	BALL SCREW
27	R AXIS TRACK
28	LIMIT SWITCH ACTUATOR
29	LIMIT SWITCH MOUNT
30	GUIDE RAIL
31	RUBBER BUMPER
32	T NUT MODIFIED TECO
33	CABLE CLAMP
35	SOCKET HEAD SET SCREW
36	SOCKET HEAD CAP SCREW
37	BUTTON HEAD CAP SCREW
38	FLAT HEAD CAP SCREW
39	SOCKET HEAD SET SCREW
40	SOCKET HEAD CAP SCREW
41	JAM NYLON LOCK NUT
42	PLASTIC PIN
43	BUTTON HEAD CAP SCREW
44	FLAT HEAD CAP SCREW
45	SOCKET HEAD CAP SCREW
46	BALL SCREW CAP
49	FLAT WASHER
51	BUTTON HEAD CAP SCREW
52	BUTTON HEAD CAP SCREW
53	SOCKET HEAD CAP SCREW
54	SOCKET HEAD CAP SCREW
55	SOCKET HEAD CAP SCREW
56	BUTTON HEAD CAP SCREW
58	SOCKET HEAD SET SCREW
59	FLAT HEAD CAP SCREW
60	FLAT HEAD CAP SCREW
61	BUTTON HEAD CAP SCREW
62	BUTTON HEAD CAP SCREW
63	IDLER PULLEY
64	SOCKET HEAD CAP SCREW
65	BALL SCREW WIPER
66	BALL SCREW WIPER RETAINER

ACCURPRESS

DESCRIPTION:

PREMIUM BACKGAUGE STANDARD TRAVEL
X AXIS AND R AXIS MOTOR SIDE ASSEMBLY



ITEM	DESCRIPTION
40	BUTTON HEAD CAP SCREW
39	FLAT WASHER
37	LIMIT SWITCH
36	BALL SCREW CAP
35	FLAT HEAD CAP SCREW
34	BUTTON HEAD CAP SCREW
33	PLASTIC PIN
32	JAM NYLON LOCK NUT
31	SOCKET HEAD SET SCREW
30	SOCKET HEAD CAP SCREW
29	FLAT HEAD CAP SCREW
28	FLAT HEAD CAP SCREW
27	BUTTON HEAD CAP SCREW
26	CABLE CLAMP
25	T NUT MODIFIED TECO
24	RUBBER BUMPER
23	GUIDE RAIL
22	LIMIT SWITCH MOUNT
21	LIMIT SWITCH ACTUATOR
20	R AXIS TRACK
19	MOTOR SIDE CARRIAGE ASSEMBLY
18	BOTTOM END CAP
17	R Z CONNECT
16	IDLER WASHER
15	FRONT PULLEY WASHER
14	GROOVED ROLLER
13	FRONT BEARING WASHER
12	MOTOR MOUNT
11	ELECTROCRAFT MOTOR
10	X AXIS COVER
9	X AXIS RIBBED COVER
8	X AXIS TRACK
7	X AXIS TRACK
6	GUIDE RAIL
5	GUIDE RAIL
4	SUPPORT TUBE
3	SUPPORT TUBE
2	BALL SCREW
1	BALL SCREW

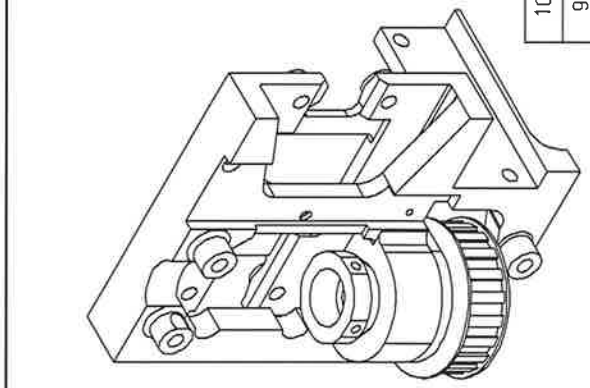
ITEM	DESCRIPTION
81	KEY
80	10 TOOTH PULLEY 0.500 PITCH
79	BEARING CAP
78	SEALED NEEDLE ROLLER
77	BALL BEARING
76	SUPPORT LEG SHIM
75	BALL SCREW WIPER RETAINER
74	BALL SCREW WIPER
73	SOCKET HEAD CAP SCREW
72	IDLER PULLEY
71	BUTTON HEAD CAP SCREW
70	CABLE TRAY
69	NAMEPLATE
68	DOWEL PIN
66	BALL SCREW
65	END CAP MOTOR SIDE X AXIS
64	FRONT BEARING
63	SOCKET HEAD CAP SCREW
62	SOCKET HEAD SET SCREW
61	SOCKET HEAD SET SCREW
60	SOCKET HEAD CAP SCREW
59	SET SCREW SHIM
58	CABLE TRAY MOUNT
57	20 TOOTH PULLEY 0.500 PITCH
56	BEARING INNER RACE
55	BALL NUT
54	TUBE POCKET MOTOR SIDE
53	FRONT MOUNT MOTOR SIDE
52	BUTTON HEAD CAP SCREW
51	BUTTON HEAD CAP SCREW
50	FLAT HEAD CAP SCREW
49	FLAT HEAD CAP SCREW
48	SOCKET HEAD SET SCREW
47	BUTTON HEAD CAP SCREW
46	SOCKET HEAD CAP SCREW
45	SOCKET HEAD CAP SCREW
44	SOCKET HEAD CAP SCREW
43	SOCKET HEAD CAP SCREW
42	BUTTON HEAD CAP SCREW
41	BUTTON HEAD CAP SCREW
ITEM	DESCRIPTION

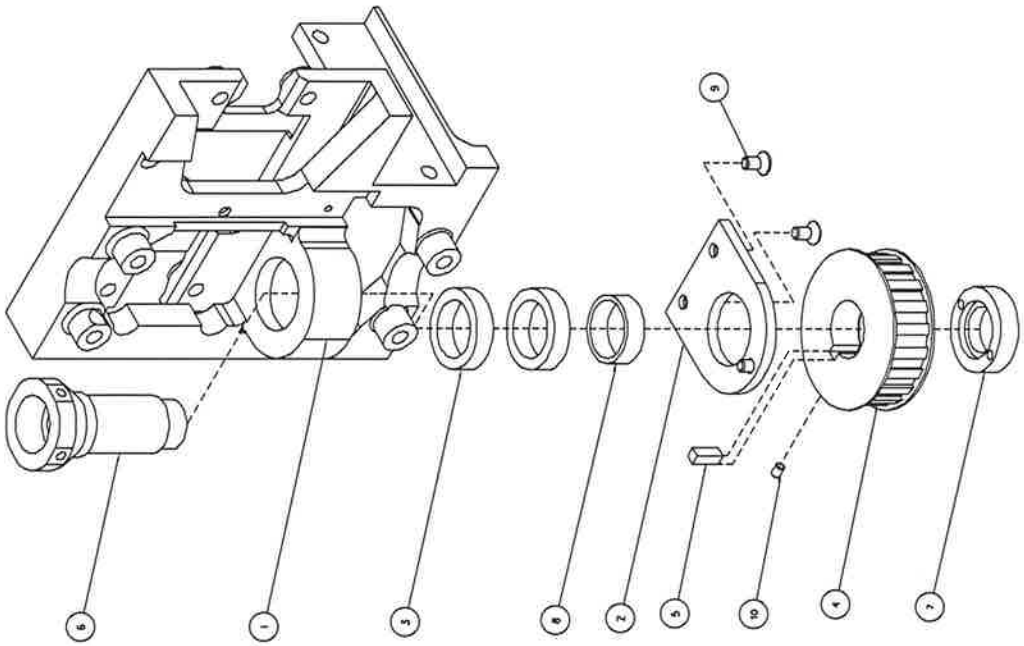
ITEM	DESCRIPTION
10	SOCKET HEAD SET SCREW
9	FLAT HEAD CAP SCREW
8	BEARING WASHER
7	PULLEY NUT
6	BALLNUT ADAPTER
5	KEY
4	20 TOOTH PULLEY
3	INA BEARING
2	BEARING CAP
1	RX CASTING MOTOR SIDE

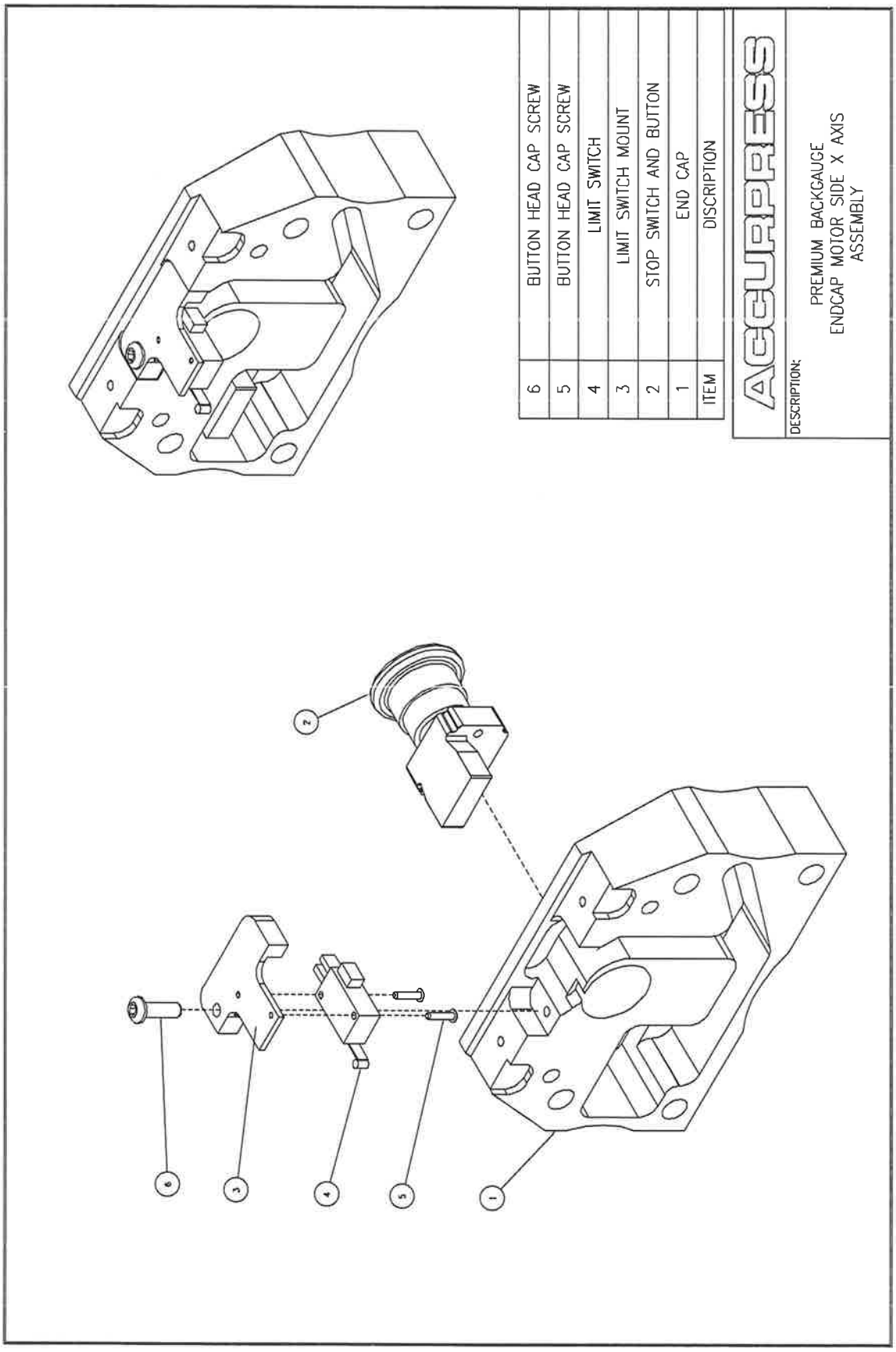
ACCURPRESS

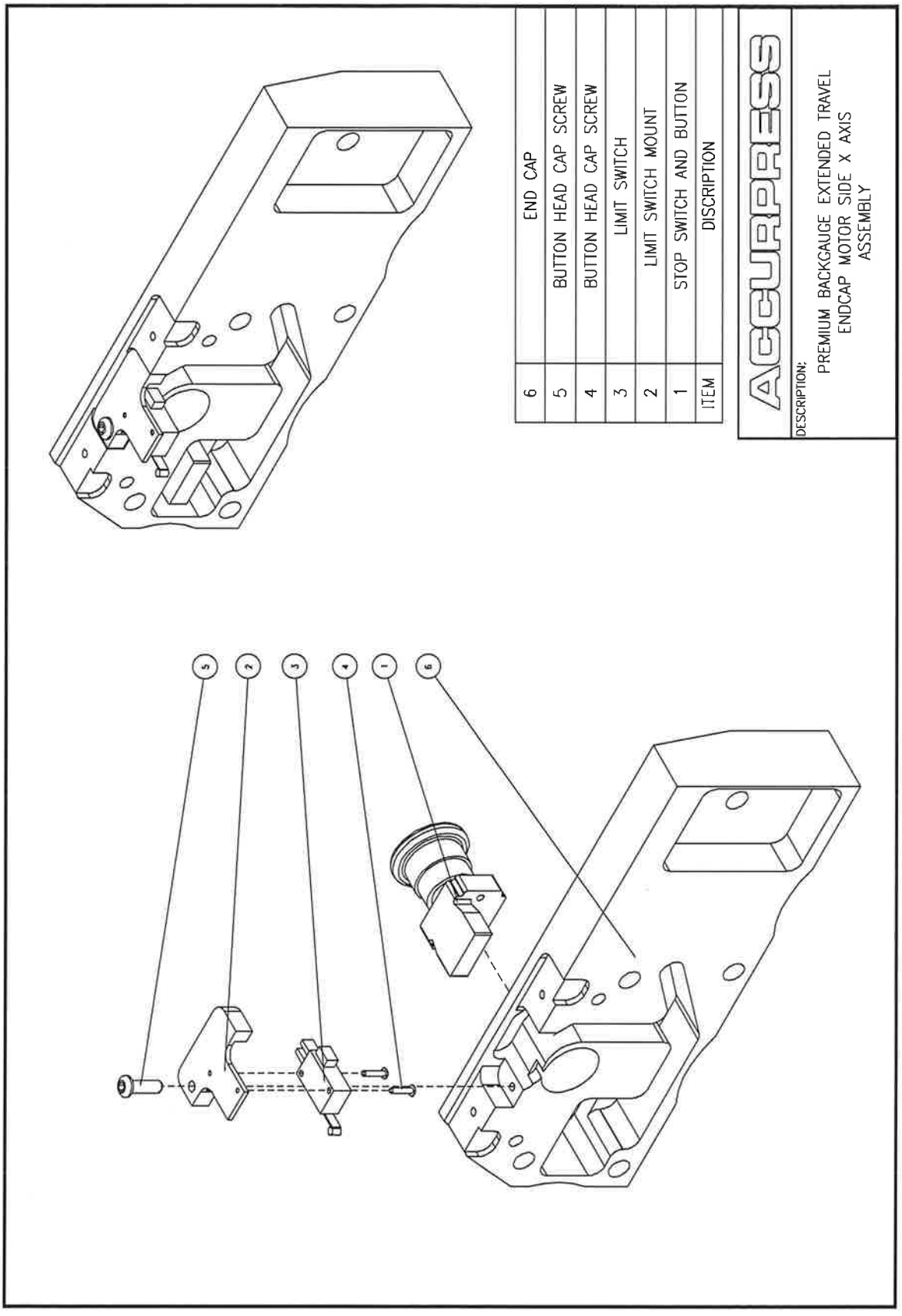
DESCRIPTION:

PREMIUM BACKGAUGE R AXIS
MOTOR SIDE CARRIAGE ASSEMBLY





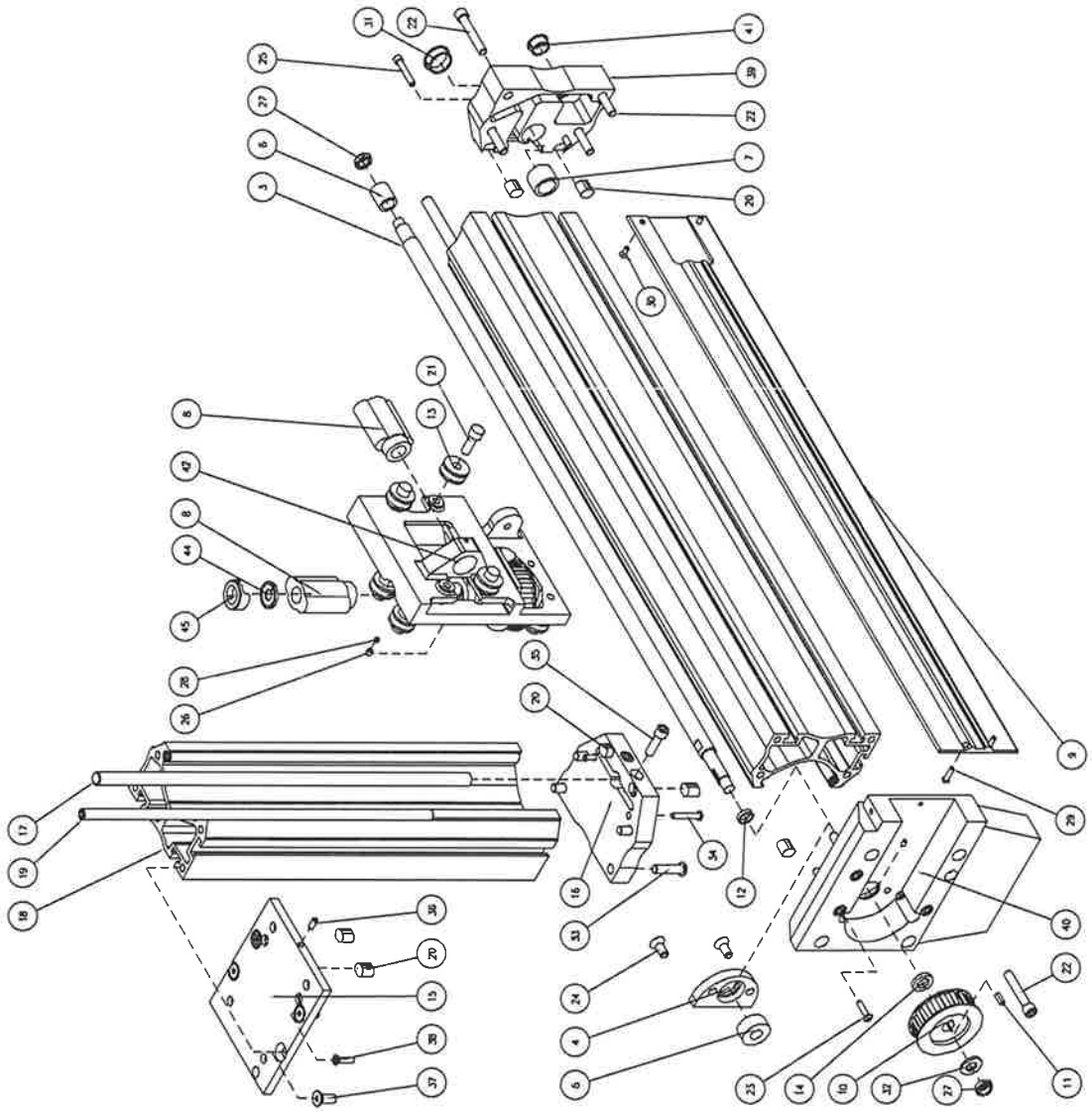

6 BUTTON HEAD CAP SCREW
5 BUTTON HEAD CAP SCREW
4 LIMIT SWITCH
3 LIMIT SWITCH MOUNT
2 STOP SWITCH AND BUTTON
1 END CAP
ITEM DISCRIPTION
ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE
ENDCAP MOTOR SIDE X AXIS
ASSEMBLY


ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE EXTENDED TRAVEL
ENDCAP MOTOR SIDE X AXIS
ASSEMBLY
ITEM
DISCRIPTION
6
END CAP
5
BUTTON HEAD CAP SCREW
4
BUTTON HEAD CAP SCREW
3
LIMIT SWITCH
2
LIMIT SWITCH MOUNT
1
STOP SWITCH AND BUTTON

ITEM	DESCRIPTION
45	BALL SCREW WIPER RETAINER
44	BALL SCREW WIPER
42	NON MOTOR SIDE CARRIAGE ASSEMBLY
41	BALL SCREW CAP
40	FRONT MOUNT NON MOTOR SIDE
39	END CAP
38	FLAT HEAD CAP SCREW
37	FLAT HEAD CAP SCREW
36	SOCKET HEAD SET SCREW
35	SOCKET HEAD CAP SCREW
34	BUTTON HEAD CAP SCREW
33	BUTTON HEAD CAP SCREW
32	0.500 FLAT WASHER
31	BALL SCREW CAP
30	FLAT HEAD CAP SCREW
29	BUTTON HEAD CAP SCREW
28	PLASTIC PIN
27	JAM NYLON LOCK NUT
26	SOCKET HEAD SET SCREW
25	SOCKET HEAD CAP SCREW
24	FLAT HEAD CAP SCREW
23	BUTTON HEAD CAP SCREW
22	SOCKET HEAD CAP SCREW
21	SOCKET HEAD CAP SCREW
20	RUBBER BUMPER
19	GUIDE RAIL
18	R AXIS TRACK
17	BALL SCREW
16	BOTTOM END CAP
15	R Z CONNECT
14	FRONT PULLEY WASHER
13	GROOVED ROLLER
12	FRONT BEARING WASHER
11	KEY
10	20 TOOTH PULLEY 0.500 PITCH
9	X AXIS COVER
8	BALL NUT
7	SEALED NEEDLE ROLLER BRG SCH
6	BEARING INNER RACE
5	FRONT BEARING
4	BEARING CAP
3	BALL SCREW
2	GUIDE RAIL
1	X AXIS TRACK

ACCURPRESS

DESCRIPTION:
PREMIUM BACKGAUGE STANDARD TRAVEL
X AXIS AND R AXIS NON MOTOR SIDE ASSEMBLY

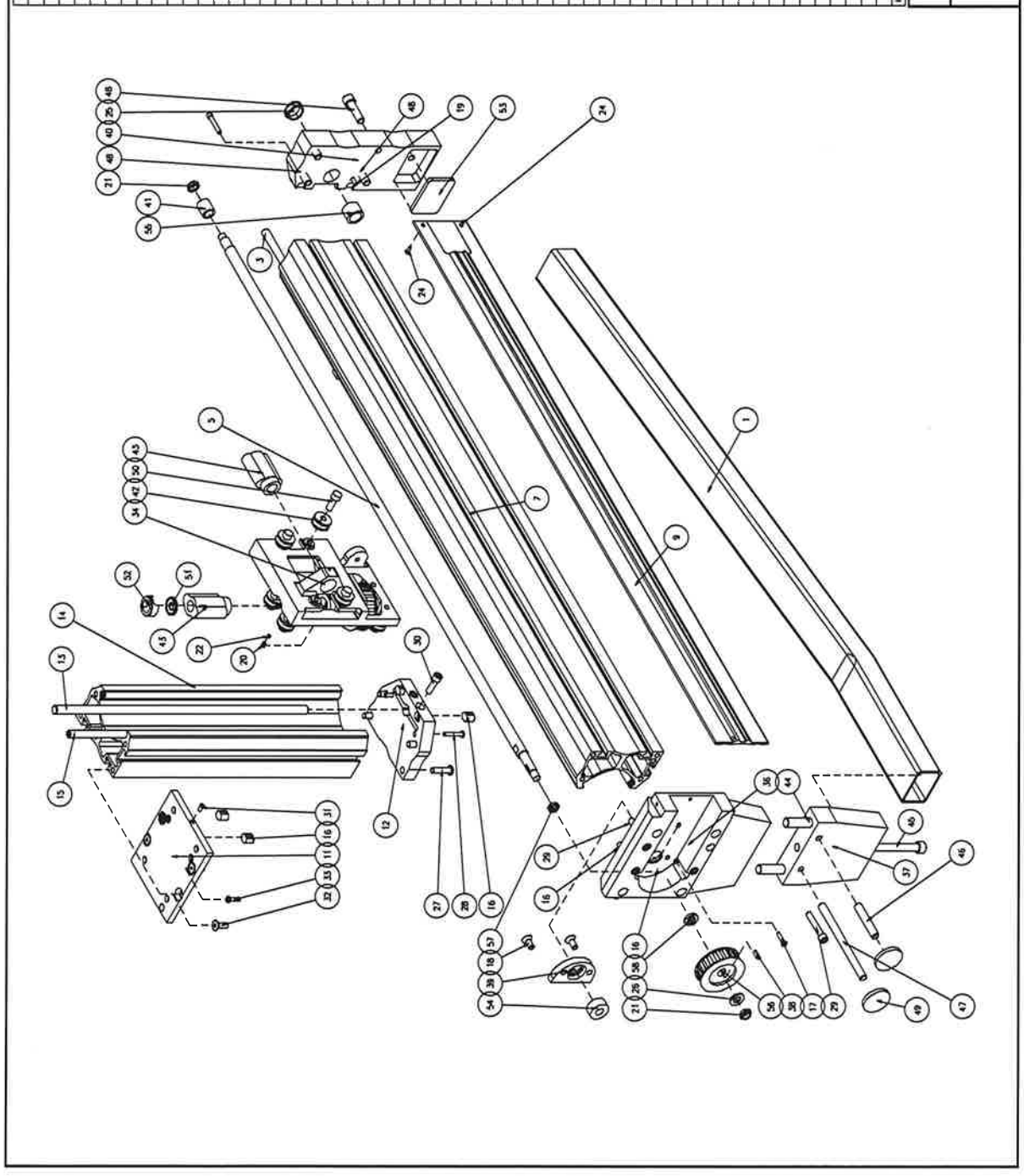


ITEM	DESCRIPTION
58	FRONT PULLEY WASHER
57	FRONT BEARING WASHER
56	20 TOOTH PULLEY 0.500 PITCH
55	SEALED NEEDLE ROLLER BRG SCH 1414 PP
54	FRONT BEARING
53	SUPPORT LEG SHIM
52	BALL SCREW WIPER RETAINER
51	BALL SCREW WIPER # R(37,38)-4 TYPE A
50	SOCKET HEAD CAP SCREW
49	SET SCREW SHIM
48	SOCKET HEAD CAP SCREW
47	SOCKET HEAD SET SCREW
46	SOCKET HEAD SET SCREW
45	SOCKET HEAD CAP SCREW
44	DOWEL PIN
43	BALL NUT
42	GROOVED ROLLER
41	BEARING INNER RACE P1D14-16
40	END CAP NON MOTOR SIDE
39	BEARING CAP
38	KEY
37	TUBE POCKET NON MOTOR SIDE
36	FRONT MOUNT NON MOTOR SIDE
34	NON MOTOR SIDE CARRIAGE ASSEMBLY
33	FLAT HEAD CAP SCREW
32	FLAT HEAD CAP SCREW
31	SOCKET HEAD SET SCREW
30	SOCKET HEAD CAP SCREW
29	SOCKET HEAD CAP SCREW
28	BUTTON HEAD CAP SCREW
27	BUTTON HEAD CAP SCREW
26	0.500 FLAT WASHER
25	BALL SCREW CAP
24	FLAT HEAD CAP SCREW
23	BUTTON HEAD CAP SCREW
22	PLASTIC PIN
21	JAM NYLON LOCK NUT
20	SOCKET HEAD SET SCREW
19	SOCKET HEAD CAP SCREW
18	FLAT HEAD CAP SCREW
17	BUTTON HEAD CAP SCREW
16	RUBBER BUMPER
15	GUIDE RAIL
14	R AXIS TRACK
13	BALL SCREW R37-1
12	BOTTOM END CAP
11	R Z CONNECT
10	X AXIS COVER
9	X AXIS RIBBED COVER
8	X AXIS TRACK
7	X AXIS TRACK 39.375 TRAVEL
6	BALL SCREW R37-1
5	BALL SCREW 39.375 TRAVEL
4	GUIDE RAIL
3	GUIDE RAIL
2	SUPPORT TUBE
1	SUPPORT TUBE

ACCURPRESS

DESCRIPTION:

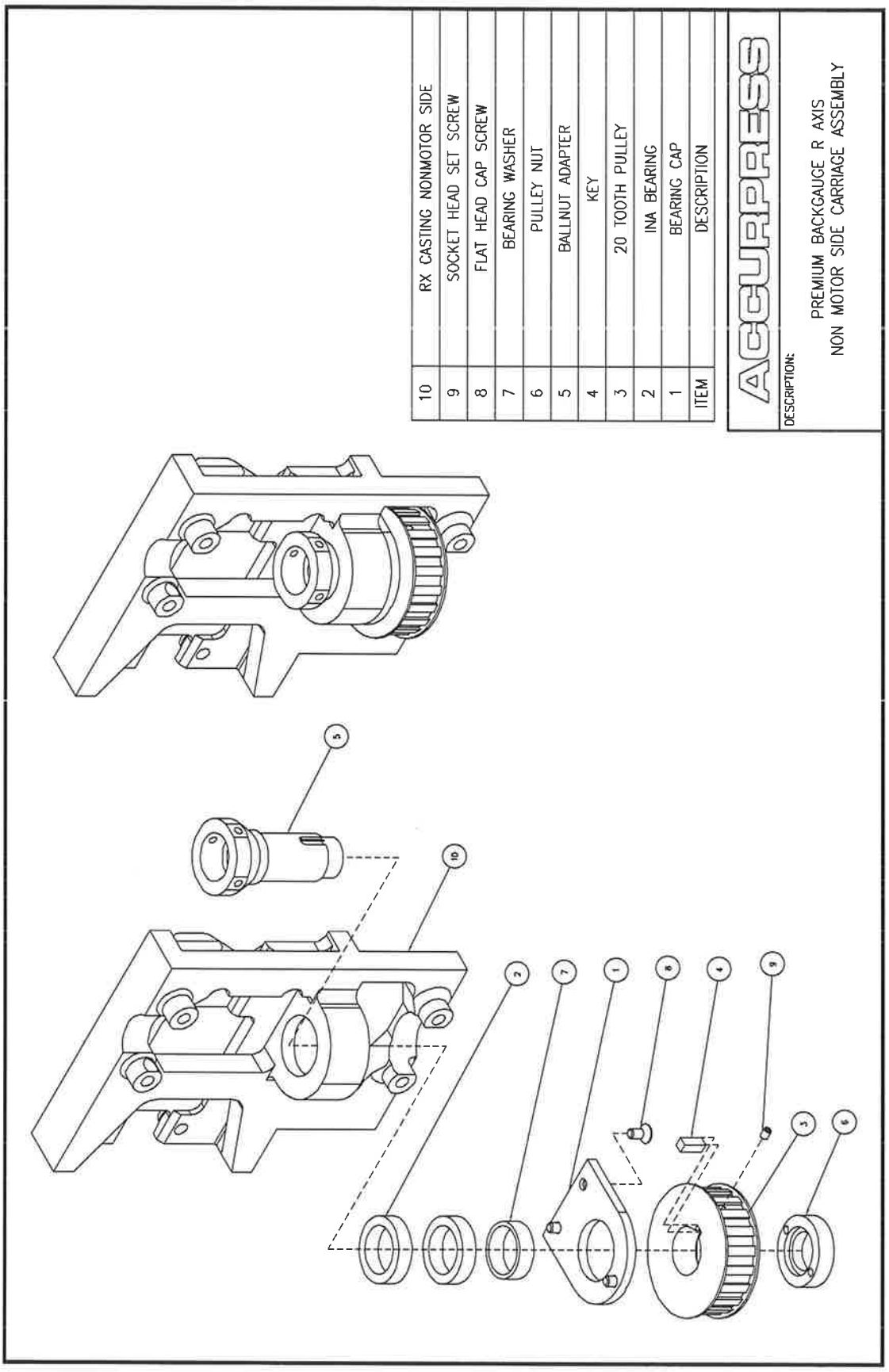
PREMIUM BACKGAUGE X AXIS EXTENDED TRAVEL
X AXIS AND R AXIS NON-MOTOR SIDE ASSEMBLY



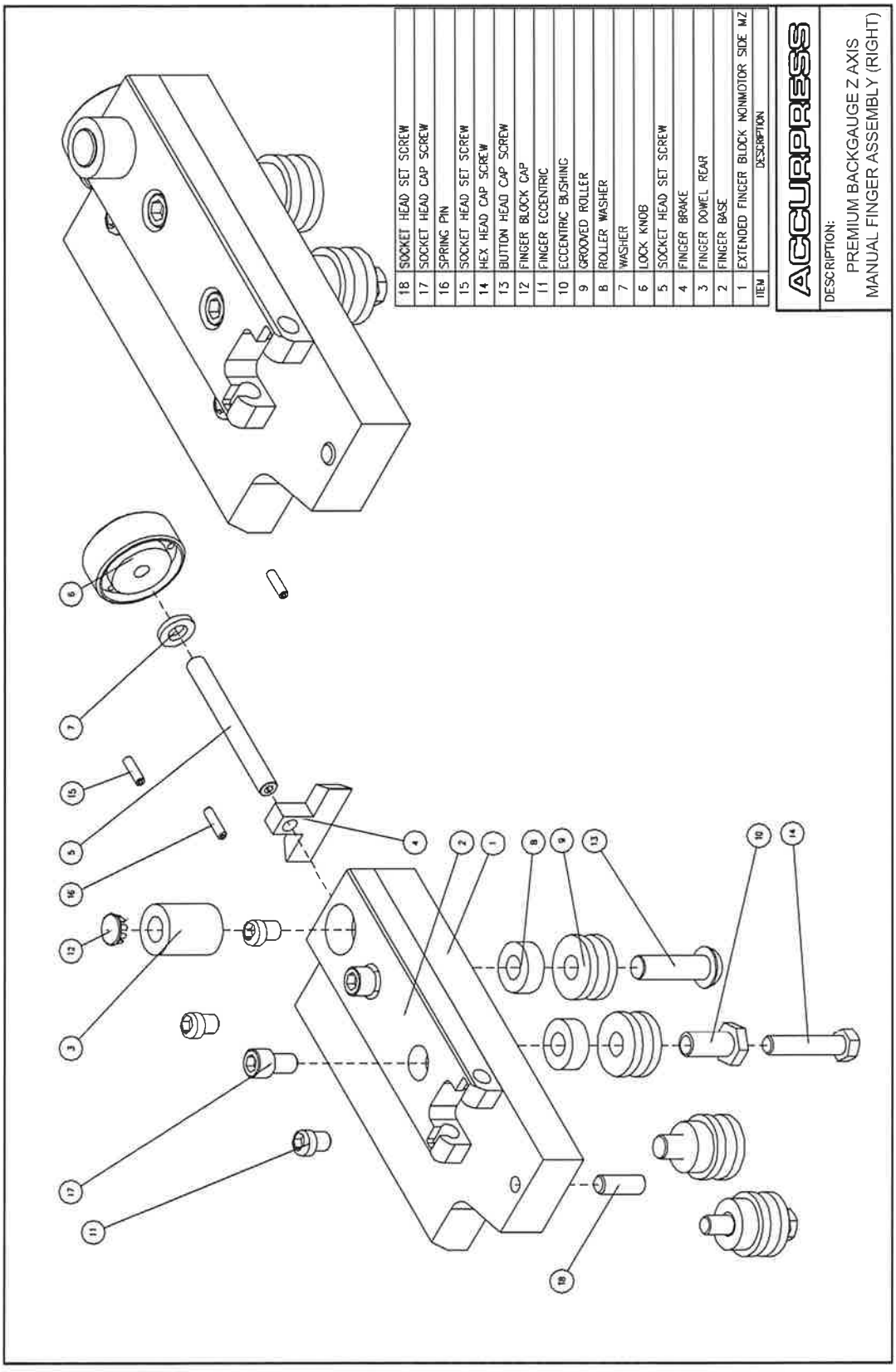
ITEM	DESCRIPTION
10	RX CASTING NONMOTOR SIDE
9	SOCKET HEAD SET SCREW
8	FLAT HEAD CAP SCREW
7	BEARING WASHER
6	PULLEY NUT
5	BALLNUT ADAPTER
4	KEY
3	20 TOOTH PULLEY
2	INA BEARING
1	BEARING CAP

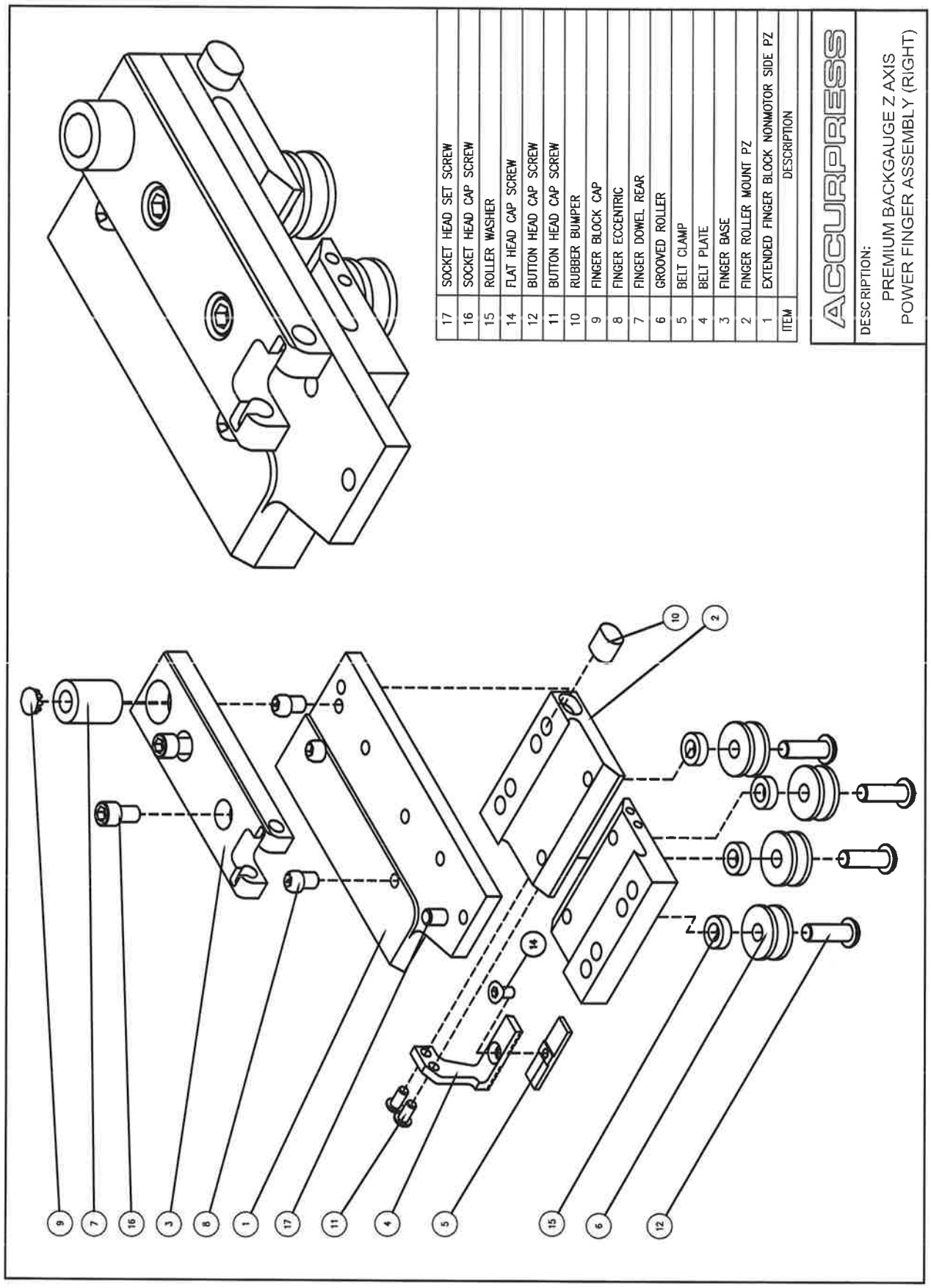
ACCURPRESS

DESCRIPTION:
PREMIUM BACKGAUGE R AXIS
NON MOTOR SIDE CARRIAGE ASSEMBLY



A.15 Premium Backgauge Finger Assembly (Optional)





ITEM	DESCRIPTION
17	SOCKET HEAD SET SCREW
16	SOCKET HEAD CAP SCREW
15	ROLLER WASHER
14	FLAT HEAD CAP SCREW
12	BUTTON HEAD CAP SCREW
11	BUTTON HEAD CAP SCREW
10	RUBBER BUMPER
9	FINGER BLOCK CAP
8	FINGER ECCENTRIC
7	FINGER DOWEL REAR
6	GROOVED ROLLER
5	BELT CLAMP
4	BELT PLATE
3	FINGER BASE
2	FINGER ROLLER MOUNT PZ
1	EXTENDED FINGER BLOCK NONMOTOR SIDE PZ

ACCURPRESS

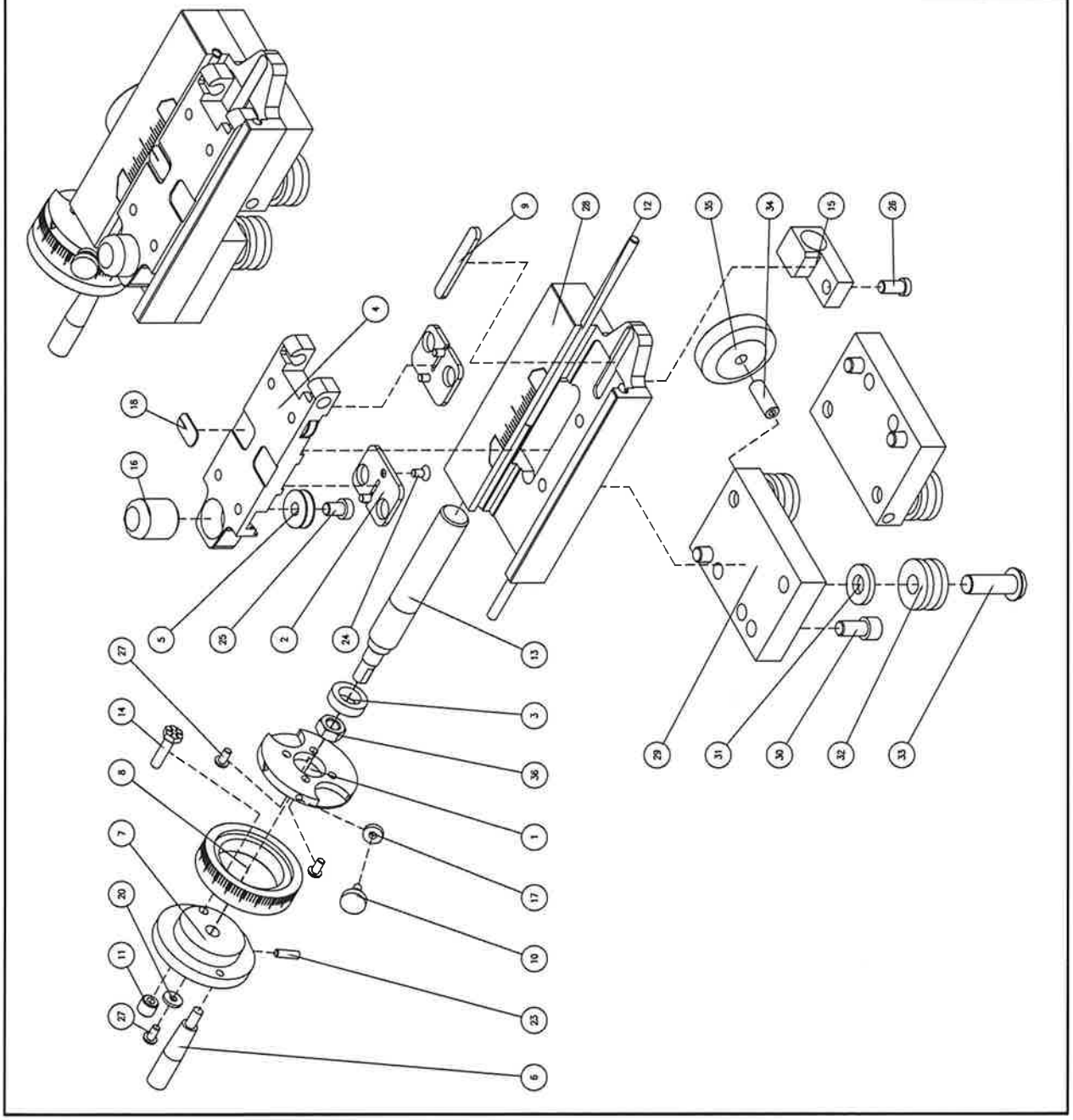
DESCRIPTION:
PREMIUM BACKGAUGE Z AXIS
POWER FINGER ASSEMBLY (RIGHT)

ITEM	DESCRIPTION
36	HEX NYLOCK JAM NUT
35	BRAKE KNOB
34	SOCKET HEAD SET SCREW
33	BUTTON HEAD CAP SCREW
32	GROOVED ROLLER
31	ROLLER WASHER
30	SOCKET HEAD CAP SCREW
29	MANUAL ROLLER MOUNT
28	X PRIME FINGER BLOCK RIGHT HAND
27	BUTTON HEAD CAP SOCKET SCREW
26	SOCKET HEAD CAP SCREW LOW HEAD
25	SOCKET HEAD CAP SCREW LOW HEAD
24	FLAT HEAD SOCKET SCREW
23	SOCKET HEAD SET SCREW
22	ONE BOX AND TWO FOAM INSERTS
21	3 PIECE LABEL SET
20	BOKERS FLAT WASHER
18	INDEX LABEL
17	THUMB SCREW WASHER # X316 SPU205
16	DOWEL PIN
15	LEAD SCREW NUT
14	LOCK PIN
13	LEAD SCREW
12	GUIDE RAIL WZ1/4
11	LOCK KNOB
10	THUMB LOCK KNOB #A9T41B8399116
9	SET SCREW SKID PLATE
8	INCREMENT HUB
7	HAND WHEEL
6	HANDLE #29011
5	GROOVED ROLLER
4	FINGER BASE
3	BEARING #3802 2RS
2	BEARING CAP FOR LR60/8
1	BEARING CAP FOR 3802 2RS

ACCURPRESS

DESCRIPTION:

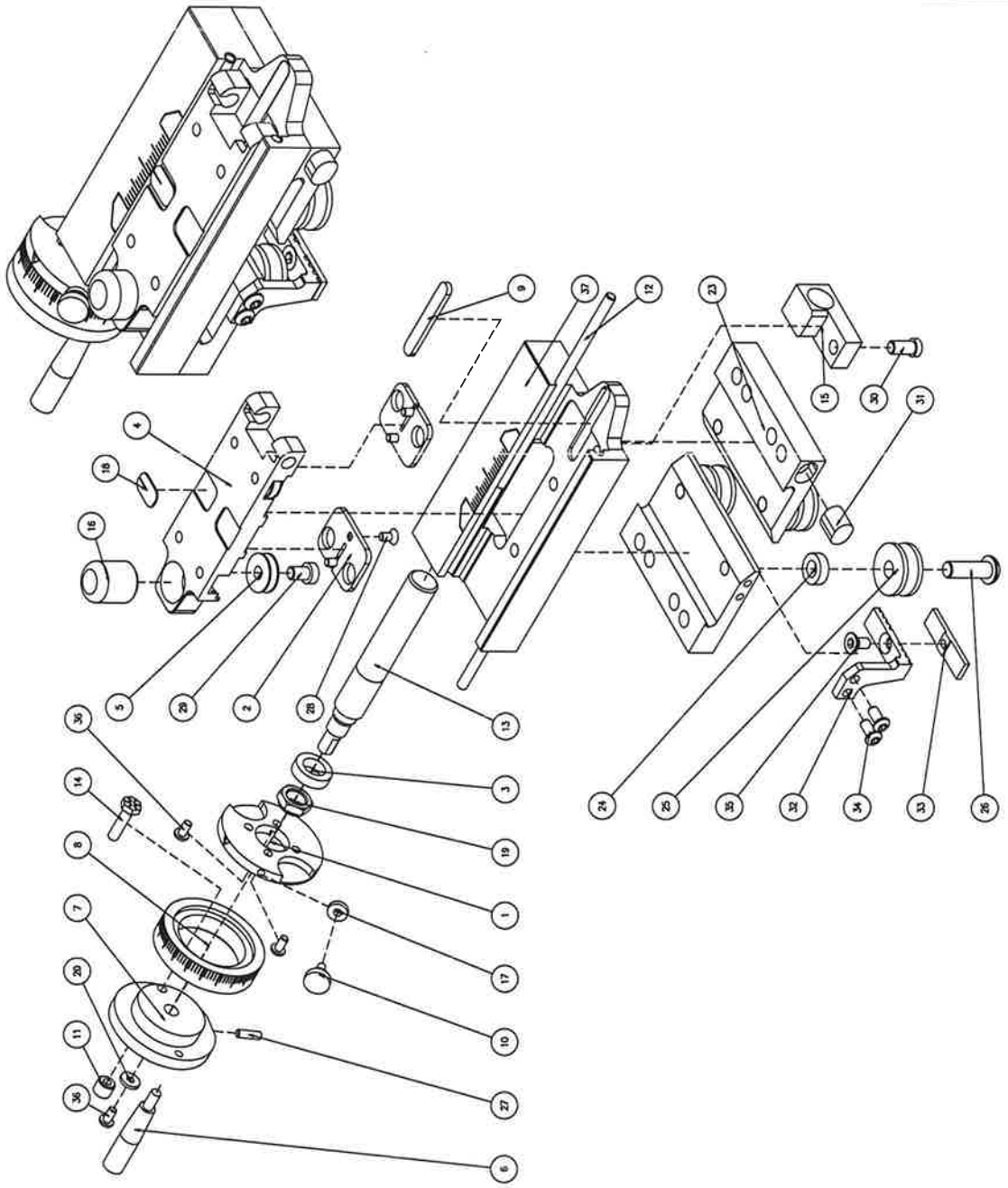
PREMIUM BACKGAUGE Z AXIS
MANUAL Z, MANUAL X PRIME
FINGER ASSEMBLY (LEFT)



ITEM	DESCRIPTION
37	X PRIME FINGER BLOCK RIGHT HAND
36	BUTTON HEAD CAP SOCKET SCREW
35	FLAT HEAD CAP SCREW
34	BUTTON HEAD CAP SCREW
33	BELT CLAMP
32	BELT PLATE
31	RUBBER BUMPER
30	SOCKET HEAD CAP SCREW LOW HEAD
29	SOCKET HEAD CAP SCREW LOW HEAD
28	FLAT HEAD SOCKET SCREW
27	SOCKET HEAD SET SCREW
26	BUTTON HEAD CAP SCREW
25	GROOVED ROLLER
24	ROLLER WASHER
23	FINGER ROLLER MOUNT PZ
22	ONE BOX AND TWO FOAM INSERTS
21	3 PIECE LABEL SET
20	BOKERS FLAT WASHER
19	JAM NYLON LOCK NUT
18	INDEX LABEL
17	THUMB SCREW WASHER # X316 SPU205
16	DOWEL PIN
15	LEAD SCREW NUT
14	LOCK PIN
13	LEAD SCREW
12	GUIDE RAIL WZ1/4
11	LOCK KNOB
10	THUMB LOCK KNOB #A9T41B8399116
9	SET SCREW SKID PLATE
8	INCREMENT HUB
7	HAND WHEEL
6	HANDLE #29011
5	GROOVED ROLLER
4	FINGER BASE
3	BEARING #3802 2RS
2	BEARING CAP FOR LR60/8
1	BEARING CAP FOR 3802 2RS

ACCURPRESS

DESCRIPTION:
PREMIUM BACKGAUGE Z AXIS
POWER Z, MANUAL X PRIME
FINGER ASSEMBLY (LEFT)

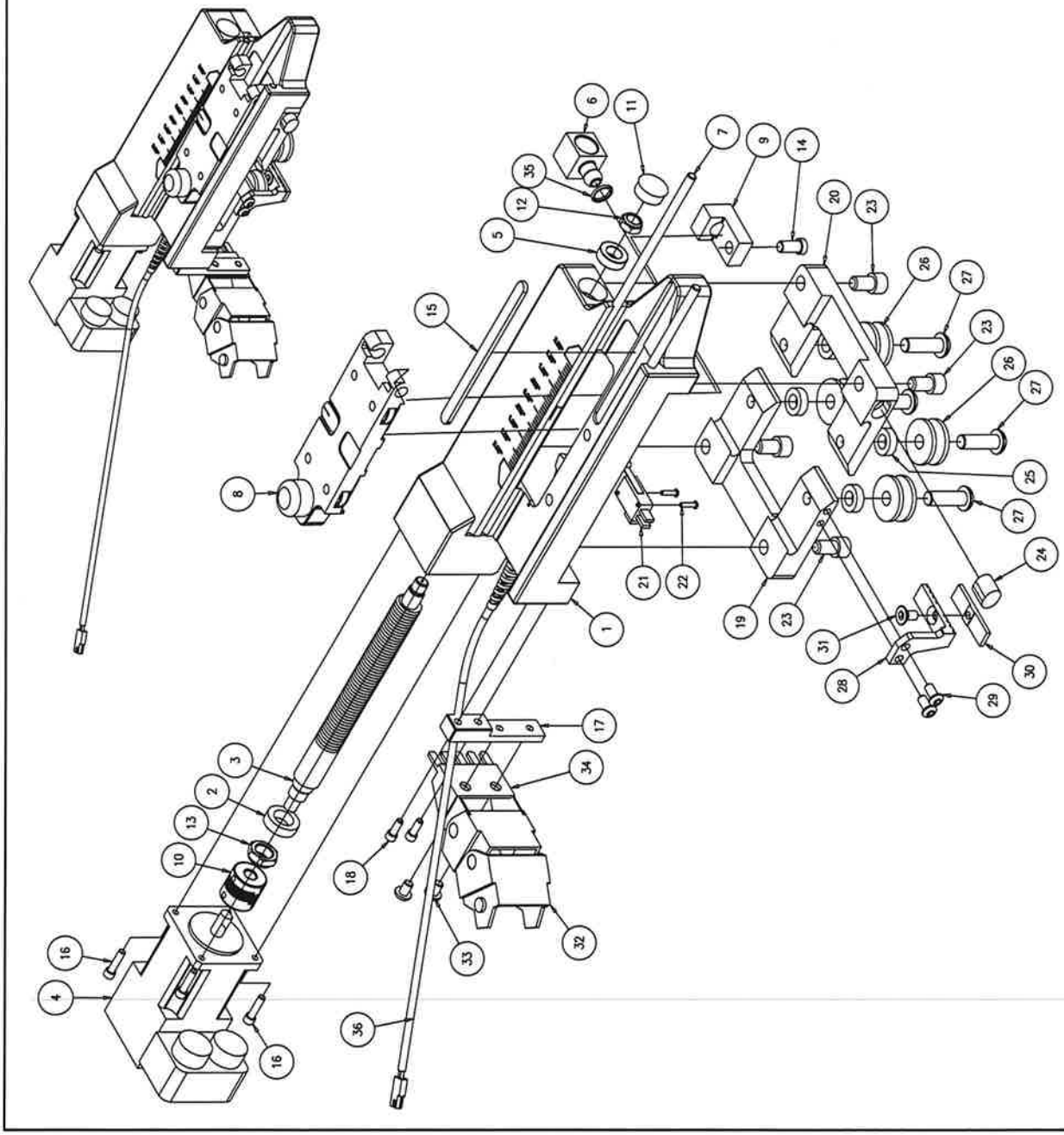


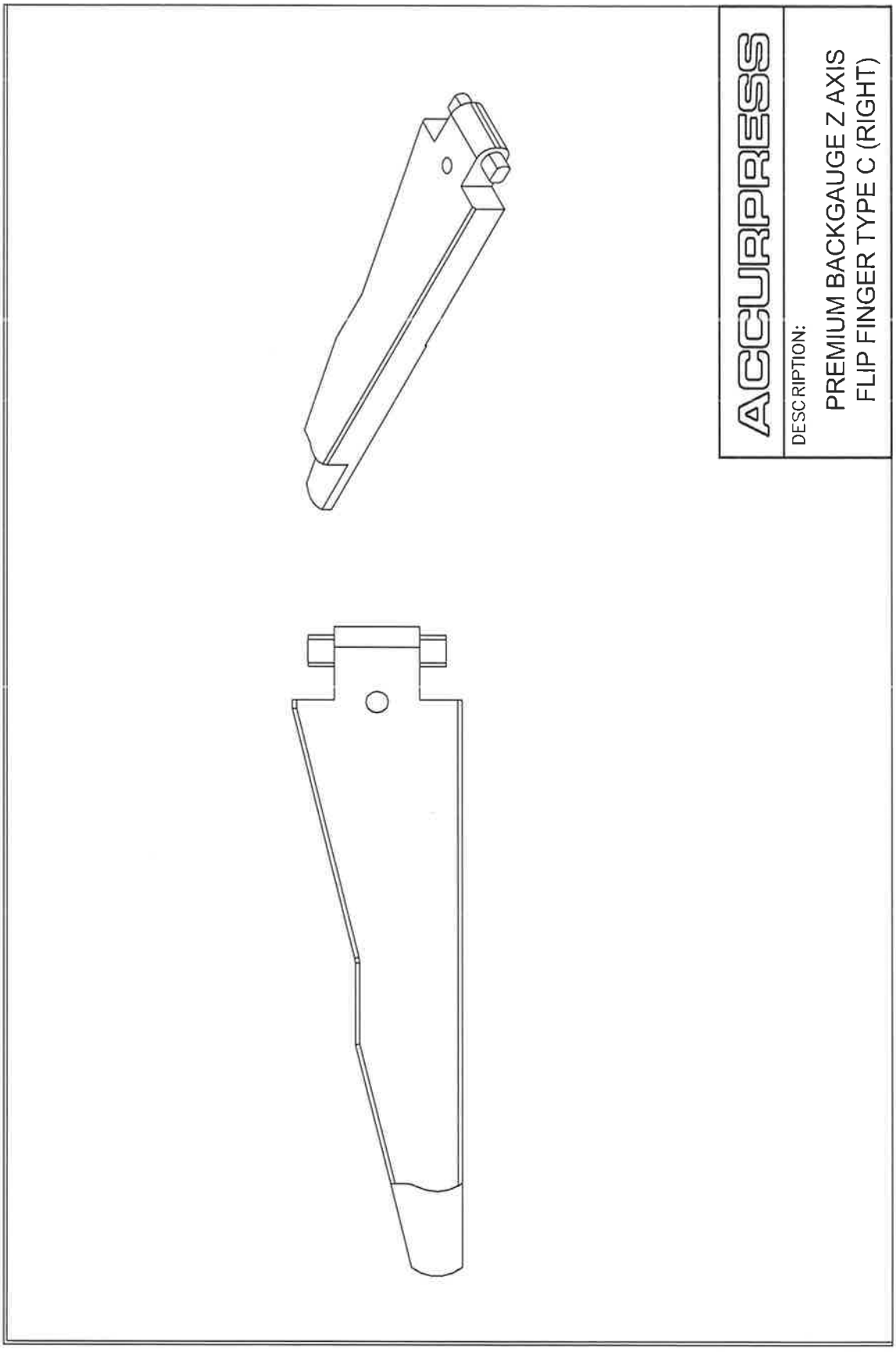
ITEM	DESCRIPTION
1	POWER X PRIME FINGER BLOCK, MACH
2	BEARING #3802 2RS
3	POWER XPRIME,LEAD SCREW,MACH
4	BRUSHLESS SERVO MOTOR
5	BEARING,BALL DBL ROW ANGULAR
6	LEAD SCREW NUT, MALE, MACHINE DETAIL
7	GUIDE RAIL WZ1/4
8	FLIP FINGER BASE
9	LEAD SCREW NUT, FEMALE, MACHINE DETAIL
10	HELICAL COUPLING,FLEX
11	DOME PLUG
12	NYLON LOCK NUT
13	JAM NYLON LOCK NUT
14	SOCKET HEAD CAP SCREW LOW HEAD
15	SET SCREW SKID PLATE
16	SOCKET HEAD CAP SCREW
17	CABLE TRAY BRACKET, MACH
18	SOCKET HEAD CAP SCREW
19	FINGER ROLLER MOUNT POWER Z, MACH
20	FINGER ROLLER MOUNT POWER Z, MACH
21	LIMIT SWITCH
22	BUTTON HEAD CAP SCREW
23	SOCKET HEAD CAP SCREW
24	RUBBER BUMPER
25	ROLLER WASHER
26	GROOVED ROLLER
27	BUTTON HEAD CAP SCREW
28	BELT PLATE
29	BUTTON HEAD CAP SCREW
30	BELT CLAMP
31	FLAT HEAD CAP SCREW
32	WIRE HARNESS TRACK
33	BUTTON HEAD CAP SOCKET SCREW
34	WIRE HARNESS BRACKET SET
35	O-RING
36	PWR XPRIME, LIMIT SWITCH CABLE

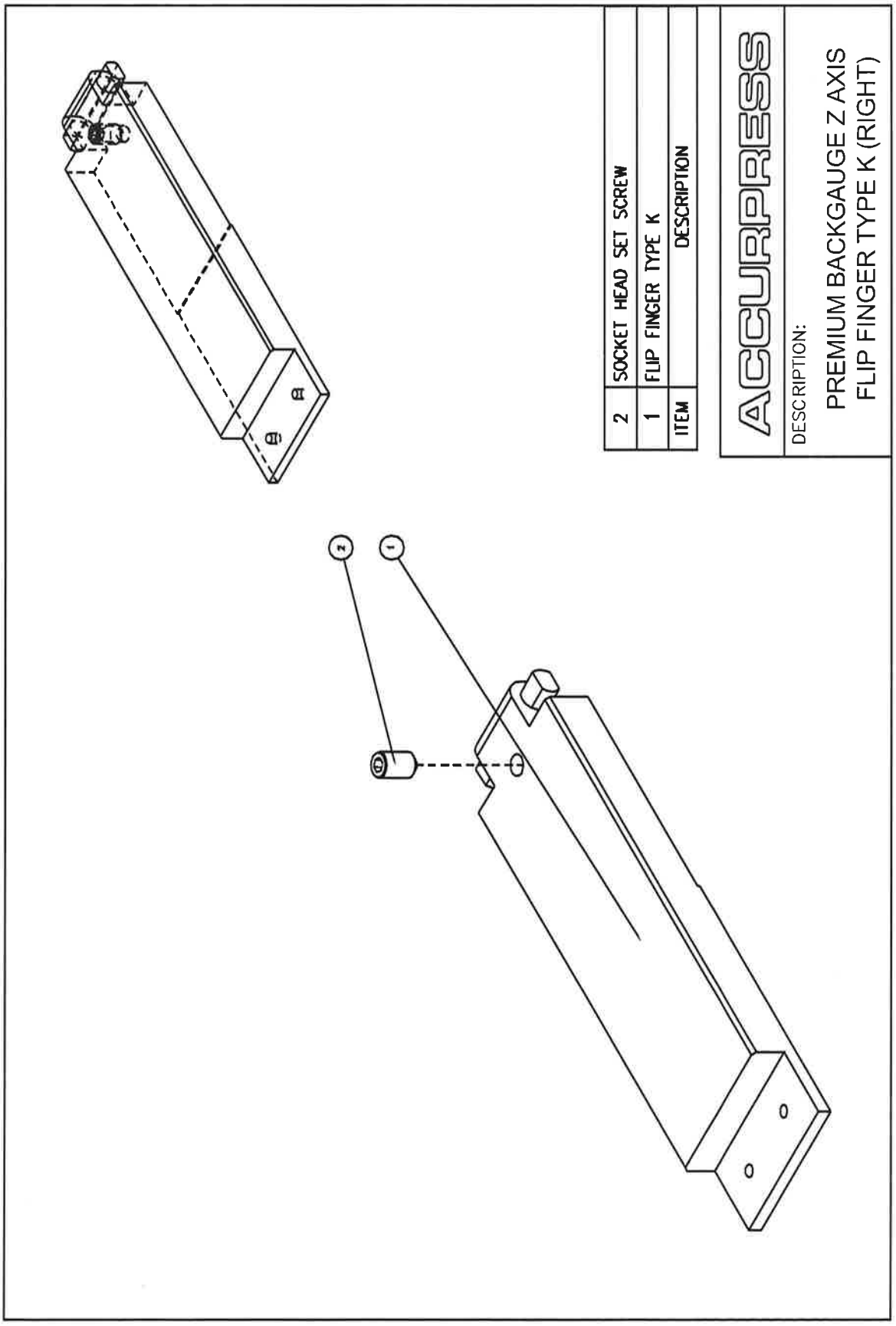
ACCURPRESS

DESCRIPTION:

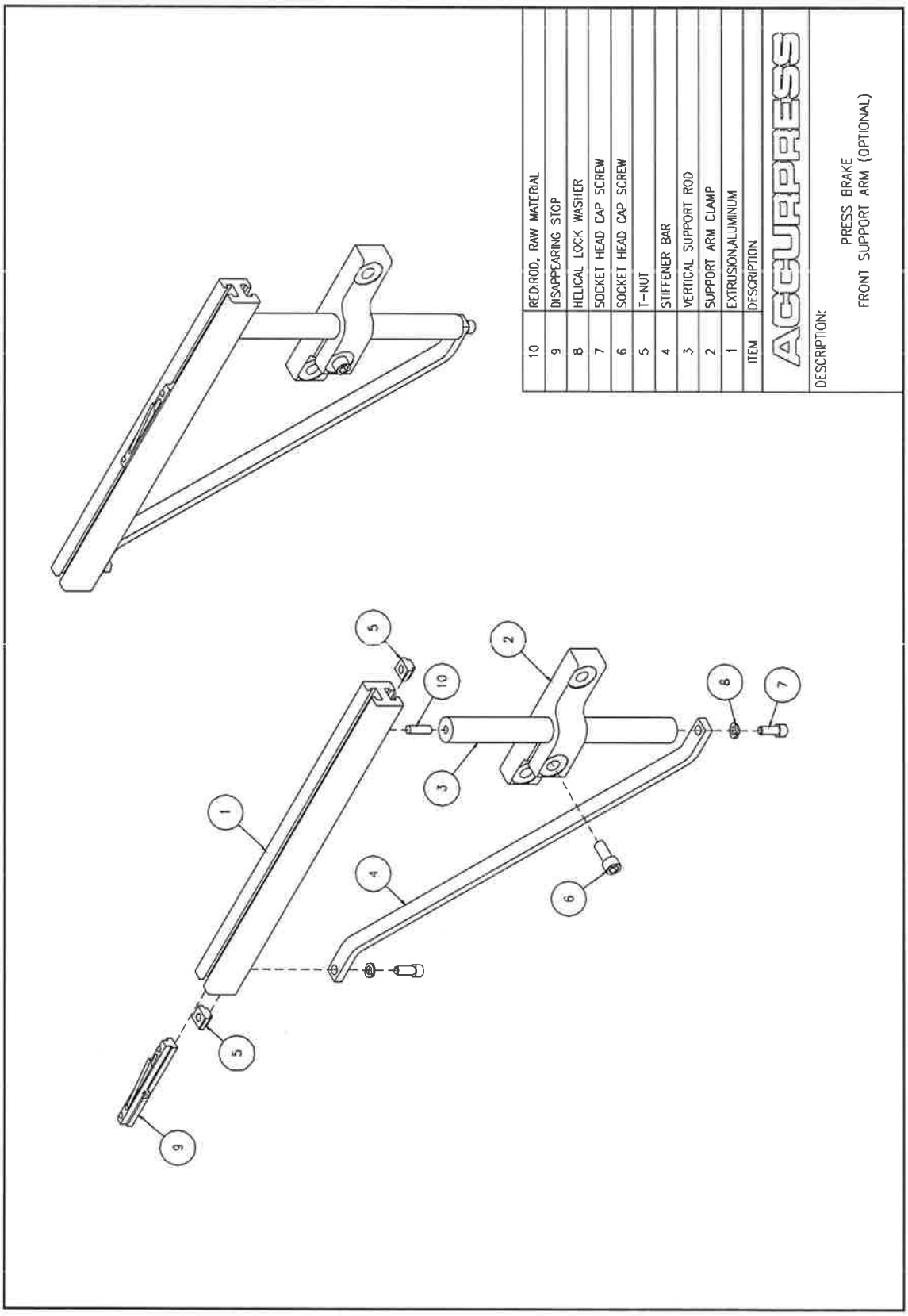
PREMIUM BACKGAUGE Z AXIS
POWER Z, POWER X PRIME
FINGER ASSEMBLY (MOTOR SIDE)




ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE Z AXIS
FLIP FINGER TYPE C (RIGHT)


ACCURPRESS
DESCRIPTION:
PREMIUM BACKGAUGE Z AXIS
FLIP FINGER TYPE K (RIGHT)
ITEM
DESCRIPTION
1
FLIP FINGER TYPE K
2
SOCKET HEAD SET SCREW

A.16 Support Arm Assembly (Optional)



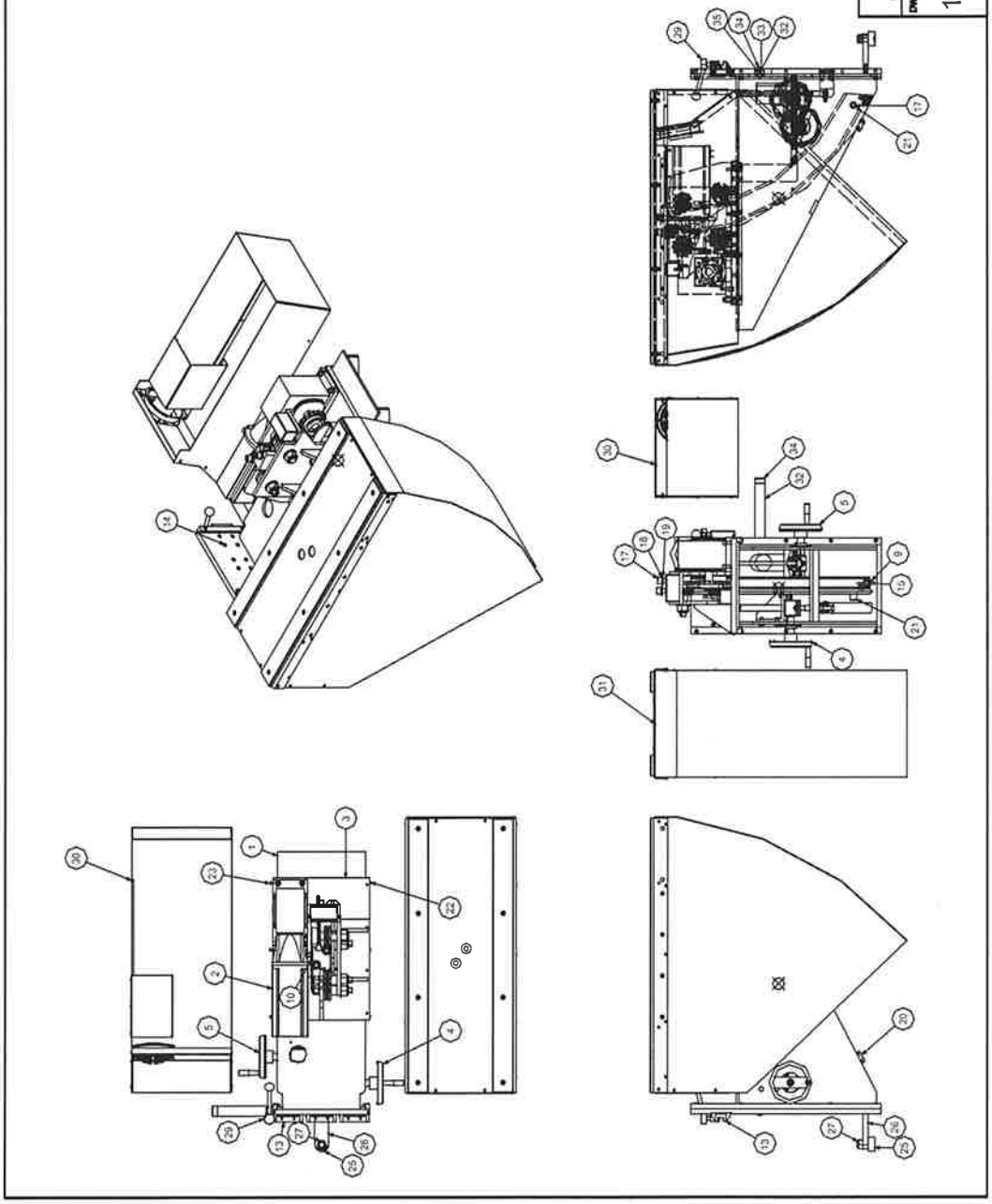
A.17 Automatic Sheet Follower (Optional)

ITEM	DESCRIPTION
1	MAIN SLIDE: ASSEMBLY
2	MOTOR/GEARBOX: ASSEMBLY
3	MOTOR CARRIAGE: ASSEMBLY
4	JACK ASSEMBLY
5	JACK ASSEMBLY
6	BASE
7	CLAMPING BAR
8	SEGMENT
9	CHAIN ANCHOR
10	LIMIT SWITCH TRIP
11	CLEVIS MOUNT
12	SCREW,SOCKET HEAD CAP
13	CARRIAGE
14	SCREW, SOCKET HEAD CAP
15	SCREW,SOCKET HEAD CAP
16	SCREW,FLAT HEAD SOCKET
17	SOCKET HEAD CAP SCREW
18	WASHER,LOCK
19	WASHER FLAT/ SAE
20	CHAIN, 60 PITCH,33 LINKS
21	PIN STOP
22	BUTTON HEAD CAP SCREW
23	BUTTON HEAD CAP SCREW
24	SCREW,SOCKET HEAD CAP
25	CAM FOLLOWR
26	CAM FOLLOWER SUPPORT
27	NYLOCK NUT
28	SCREW,SOCKET HEAD CAP
29	BRAKE ASSEMBLY
30	BOX
31	BACK COVER
32	BUMPER SHAFT
33	SET SCREW (SOCKET HEAD)
34	RUBBER BUMPER
35	SCREW,SOCKET HEAD CAP

ACCURPRESS

DWG #: 11.1

DESCRIPTION: AUTOMATIC SHEET FOLLOWER ASSEMBLY



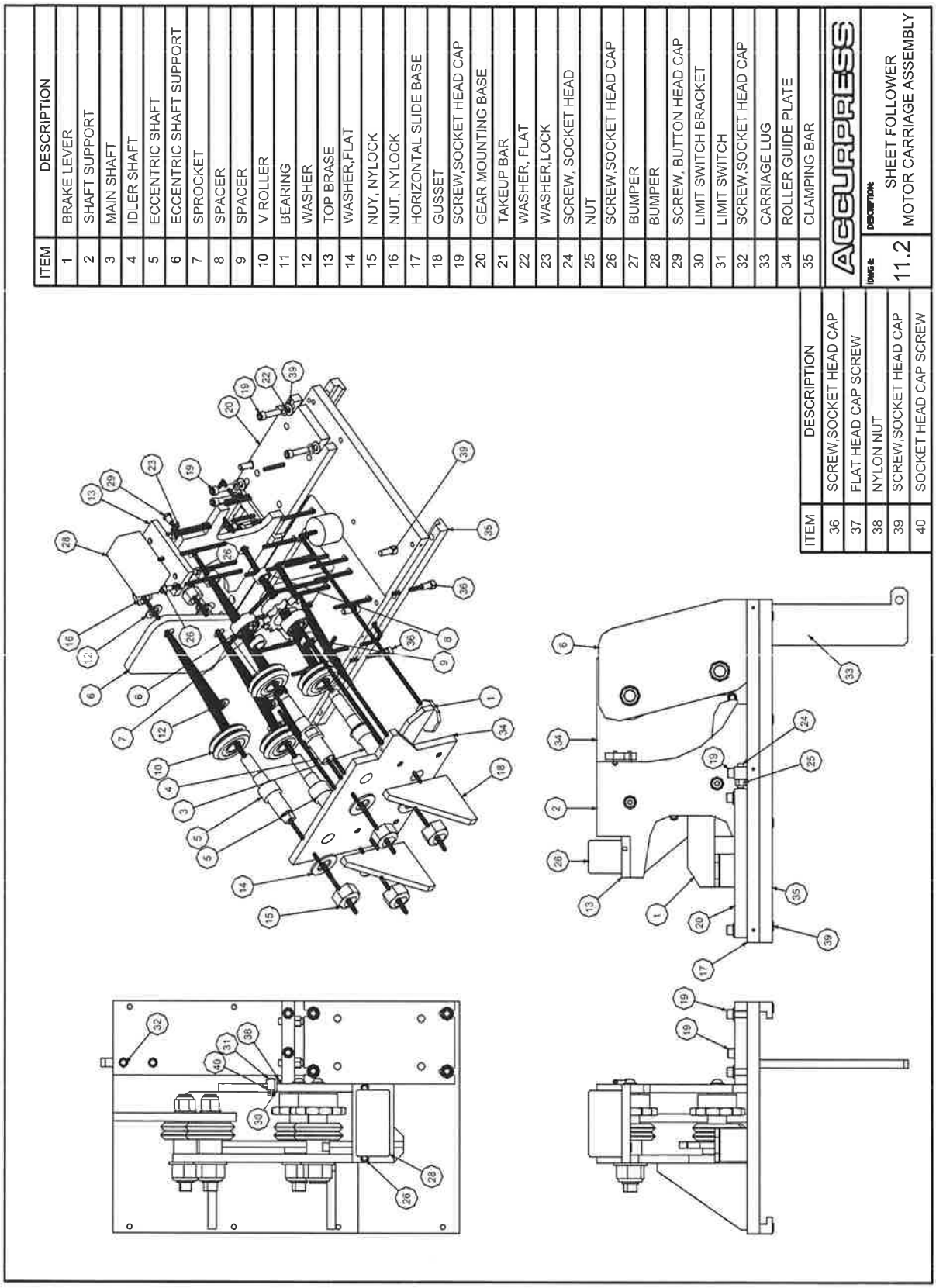
ITEM	DESCRIPTION
1	BRAKE LEVER
2	SHAFT SUPPORT
3	MAIN SHAFT
4	IDLER SHAFT
5	ECCENTRIC SHAFT
6	ECCENTRIC SHAFT SUPPORT
7	SPROCKET
8	SPACER
9	SPACER
10	V ROLLER
11	BEARING
12	WASHER
13	TOP BRASE
14	WASHER,FLAT
15	NUY, NYLOCK
16	NUT, NYLOCK
17	HORIZONTAL SLIDE BASE
18	GUSSET
19	SCREW,SOCKET HEAD CAP
20	GEAR MOUNTING BASE
21	TAKEUP BAR
22	WASHER, FLAT
23	WASHER,LOCK
24	SCREW, SOCKET HEAD
25	NUT
26	SCREW,SOCKET HEAD CAP
27	BUMPER
28	BUMPER
29	SCREW, BUTTON HEAD CAP
30	LIMIT SWITCH BRACKET
31	LIMIT SWITCH
32	SCREW,SOCKET HEAD CAP
33	CARRIAGE LUG
34	ROLLER GUIDE PLATE
35	CLAMPING BAR

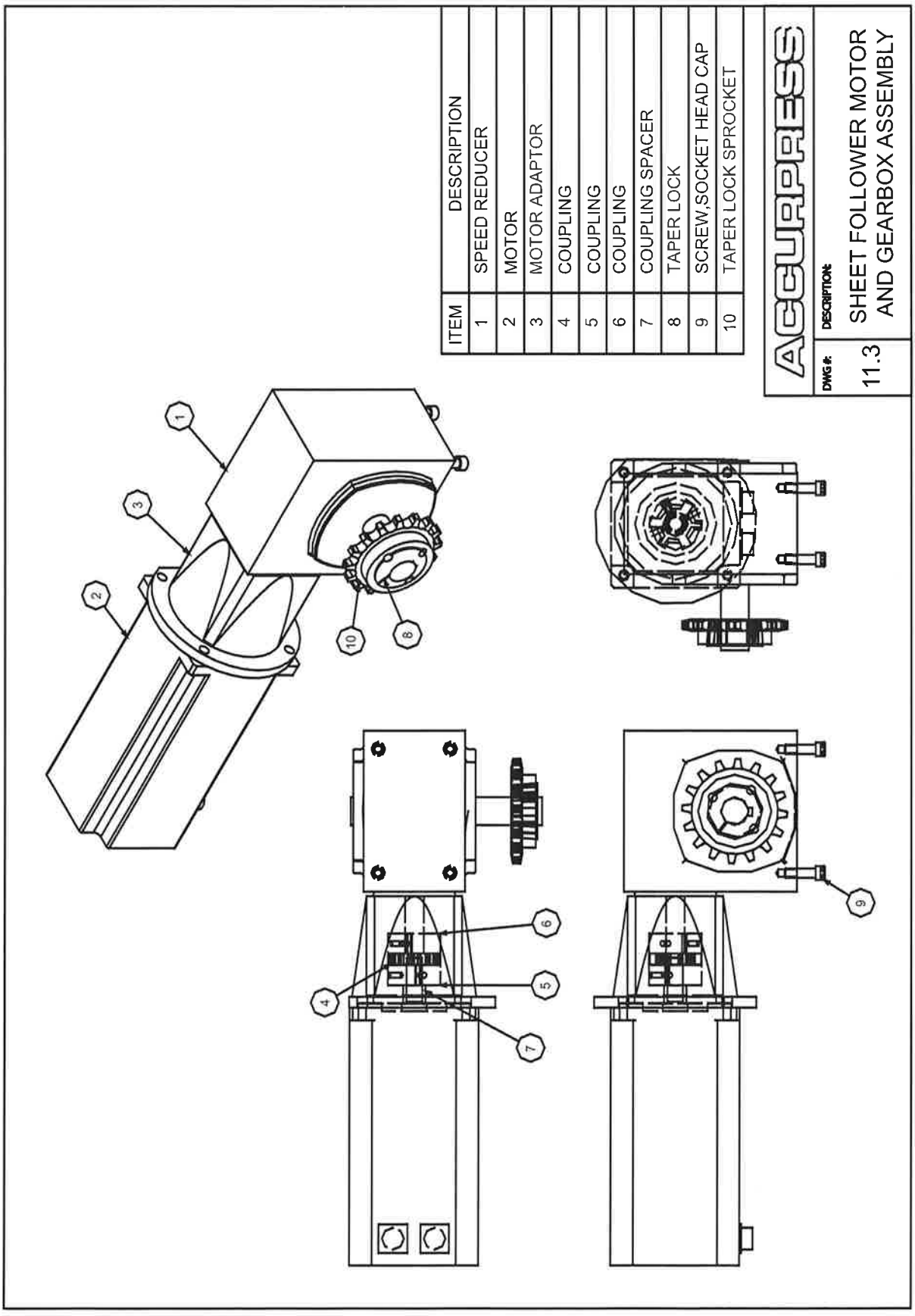
ITEM	DESCRIPTION
36	SCREW,SOCKET HEAD CAP
37	FLAT HEAD CAP SCREW
38	NYLON NUT
39	SCREW,SOCKET HEAD CAP
40	SOCKET HEAD CAP SCREW

ACCURPRESS

DWG #: 11.2

DESCRIPTION:
SHEET FOLLOWER
MOTOR CARRIAGE ASSEMBLY



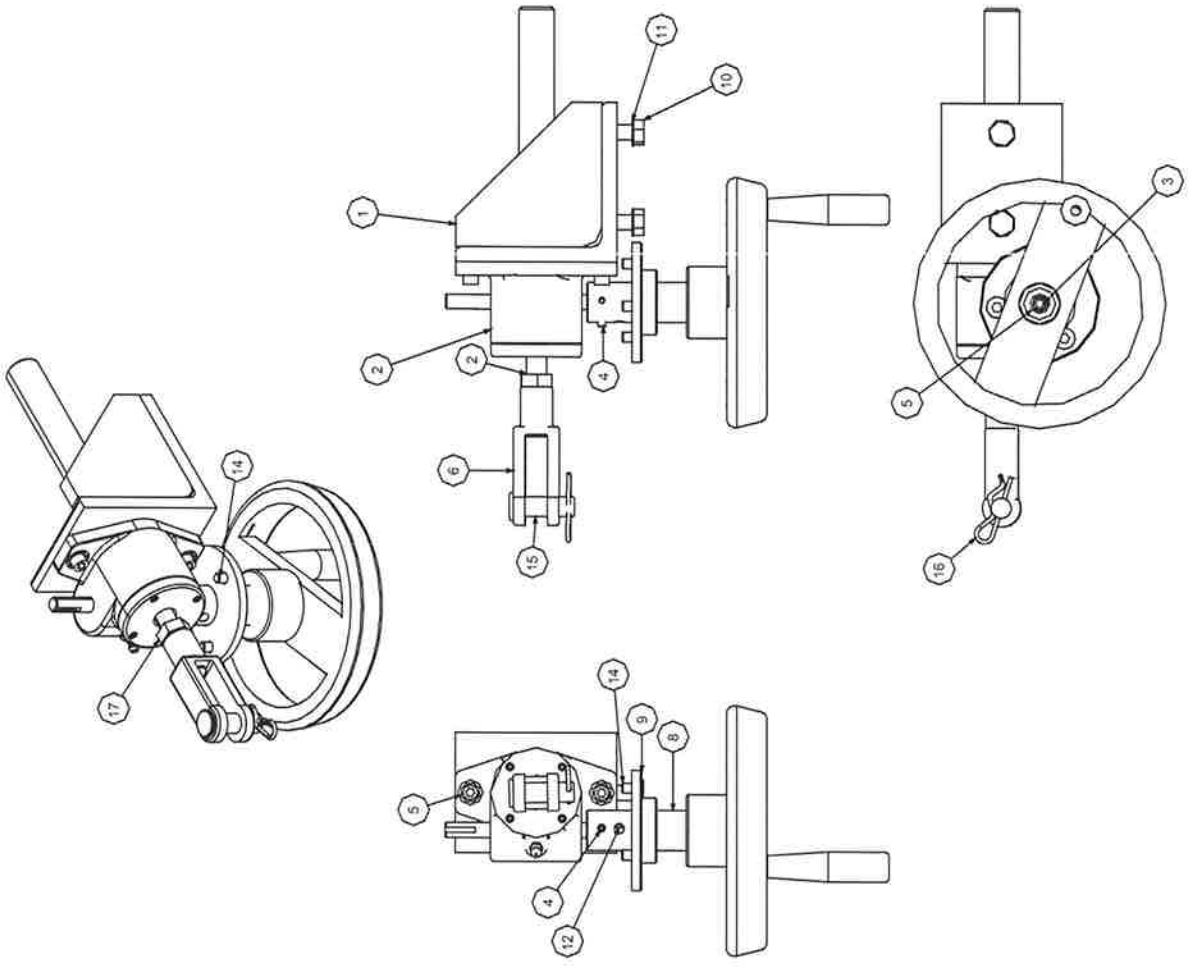

ITEM
DESCRIPTION
1 SPEED REDUCER
2 MOTOR
3 MOTOR ADAPTOR
4 COUPLING
5 COUPLING
6 COUPLING
7 COUPLING SPACER
8 TAPER LOCK
9 SCREW,SOCKET HEAD CAP
10 TAPER LOCK SPROCKET
ACCURPRESS
DWG #: 11.3
DESCRIPTION: SHEET FOLLOWER MOTOR AND GEARBOX ASSEMBLY

ITEM	DESCRIPTION
1	JACK SUPPORT
2	SCREW JACK
3	SCREW, SOCKET HEAD CAP
4	SCREW,SET (SOCKET HEAD)
5	WASHER,LOCK
6	CLEVIS YOKE
7	HANDWHEEL
8	HAND WHEEL EXT LONG
9	NYOIL FLANGE
10	HEX HEAD
11	WASHER,LOCK
12	KEY STEEL
13	FLAT WASHER
14	SCREW,FLAT HEAD SOCKET
15	CLEVIS PIN
16	HITCH PIN CLIP
17	JAM NUT
18	SCREW, SOCKET HEAD CAP

ACCURPRESS

DWG #: 11.4

DESCRIPTION: SHEET FOLLOWER HORIZONTAL JACK ASSEMBLY



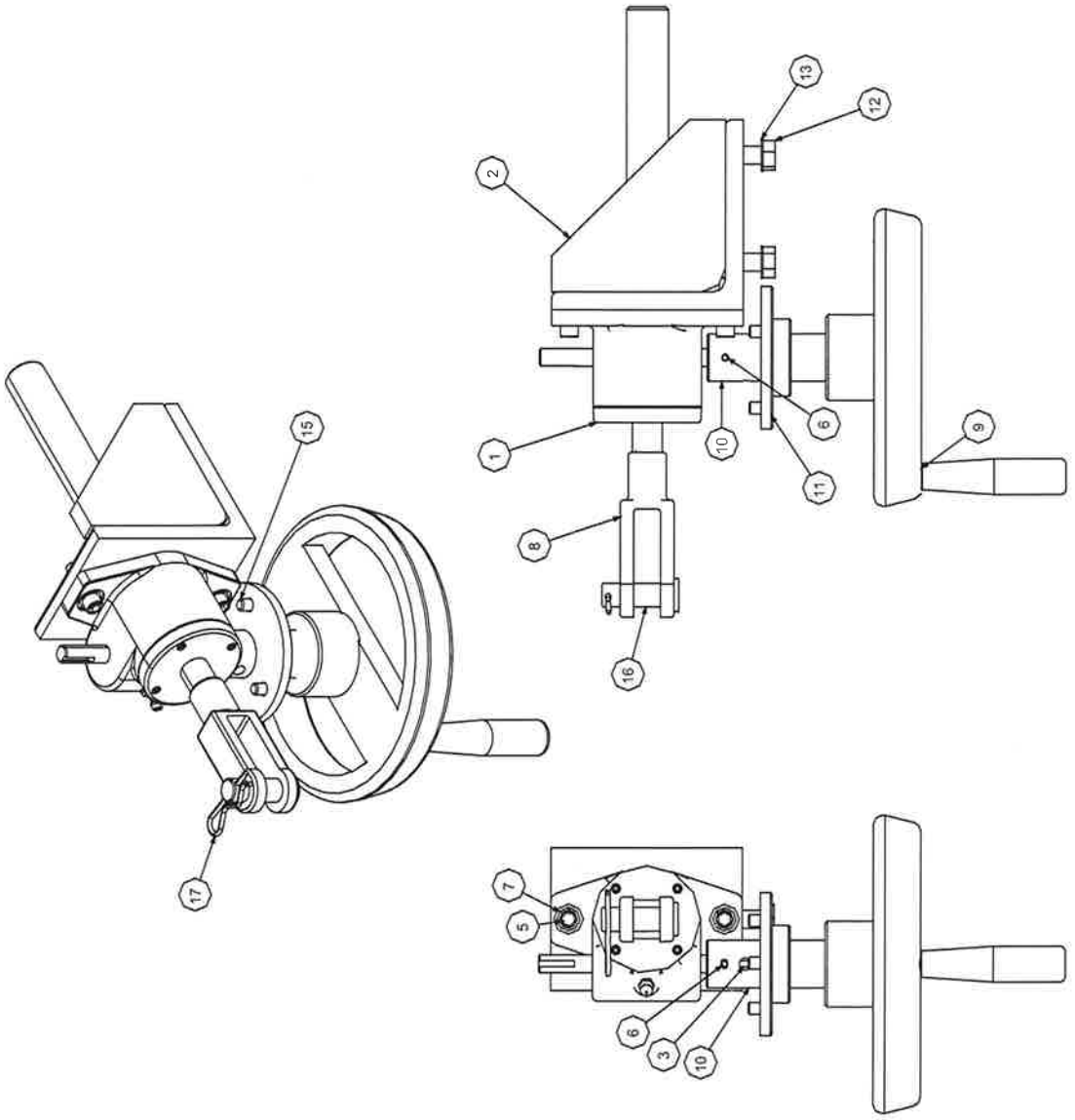
ITEM	DESCRIPTION
1	SCREW JACK
2	JACK SUPPORT
3	KEY STEEL
4	SCREW, SOCKET HEAD CAP
5	SCREW,SOCKET HEAD CAP
6	SCREW,SET (SOCKET HEAD)
7	WASHER,LOCK
8	CLEVIS YOKE
9	HANDWHEEL
10	HAND WHEEL EXT LONG
11	NYOIL FLANGE
12	HEX HEAD
13	WASHER,LOCK
14	FLAT WASHER
15	SCREW,FLAT HEAD SOCKET
16	CLEVIS PIN
17	HITCH PIN CLIP

ACCURPRESS

DWG #: 11.5

DESCRIPTION:

SHEET FOLLOWER
VERTICAL JACK ASSEMBLY

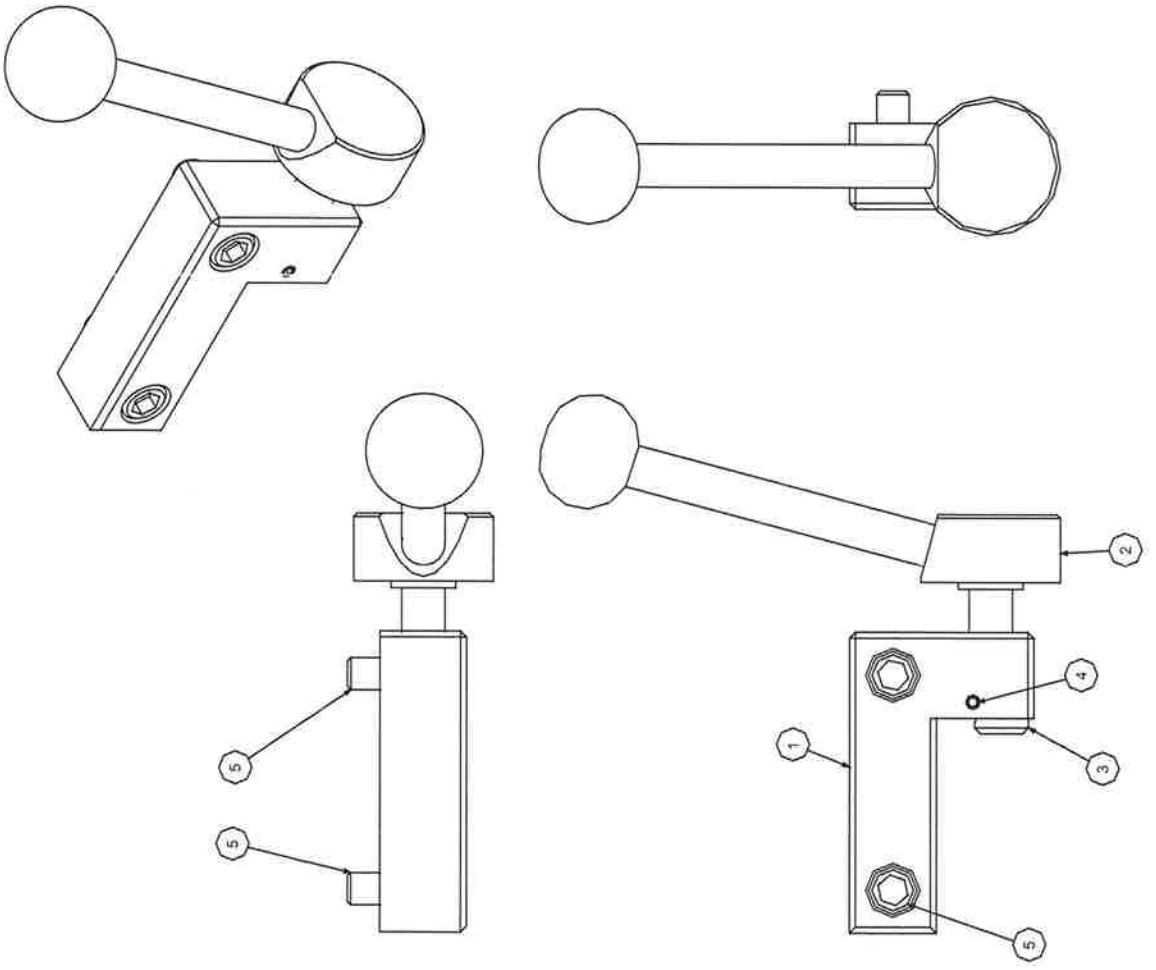


ITEM	DESCRIPTION
1	BRAKE
2	ADJ LOCKING HANDLE
3	BRAKE PAD
4	SCREW,SET (SOCKET HEAD)
5	SCREW,SOCKET HEAD CAP

ACCURPRESS

DWG #: 11.6

DESCRIPTION: SHEET FOLLOWER BRAKE ASSEMBLY

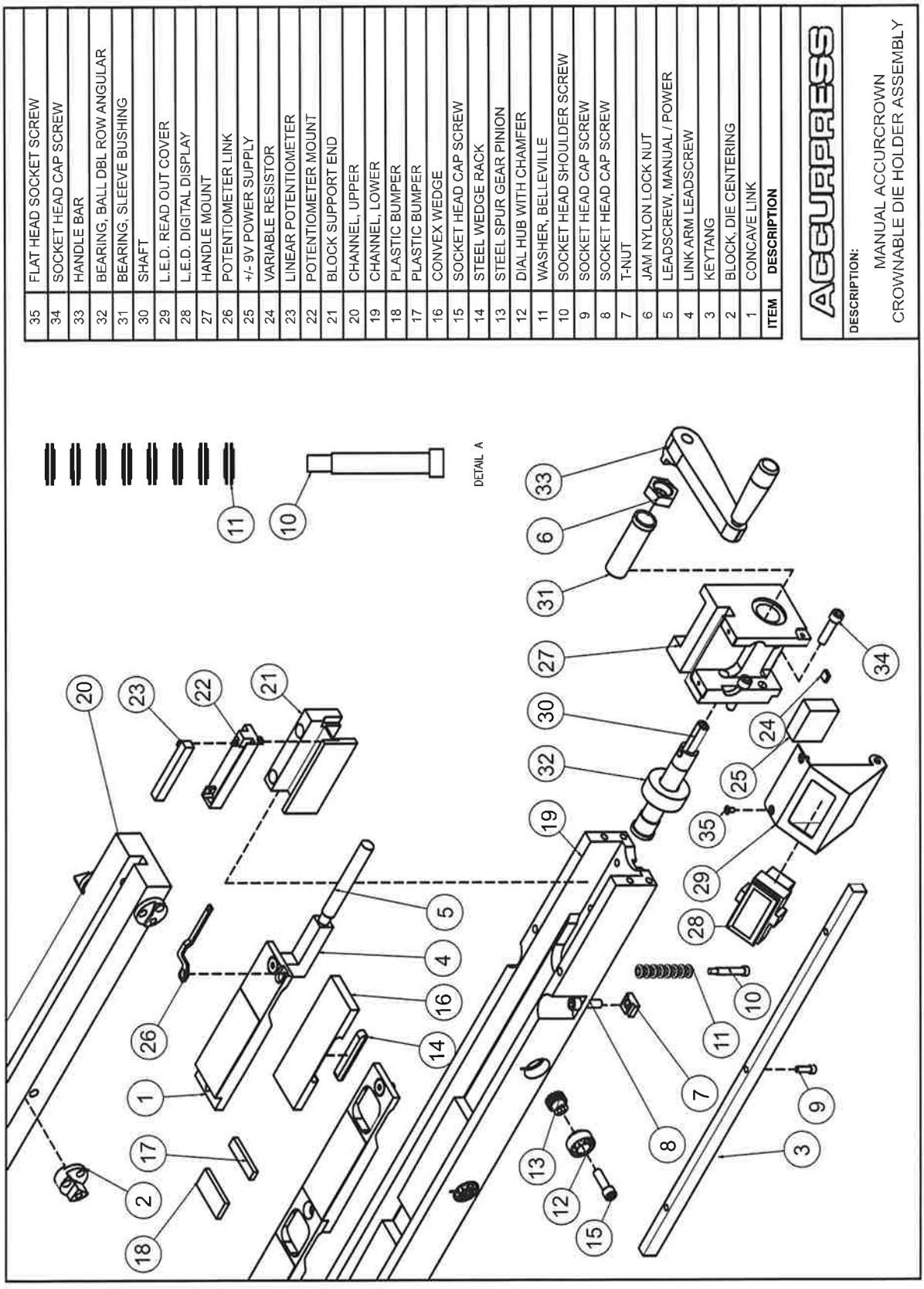


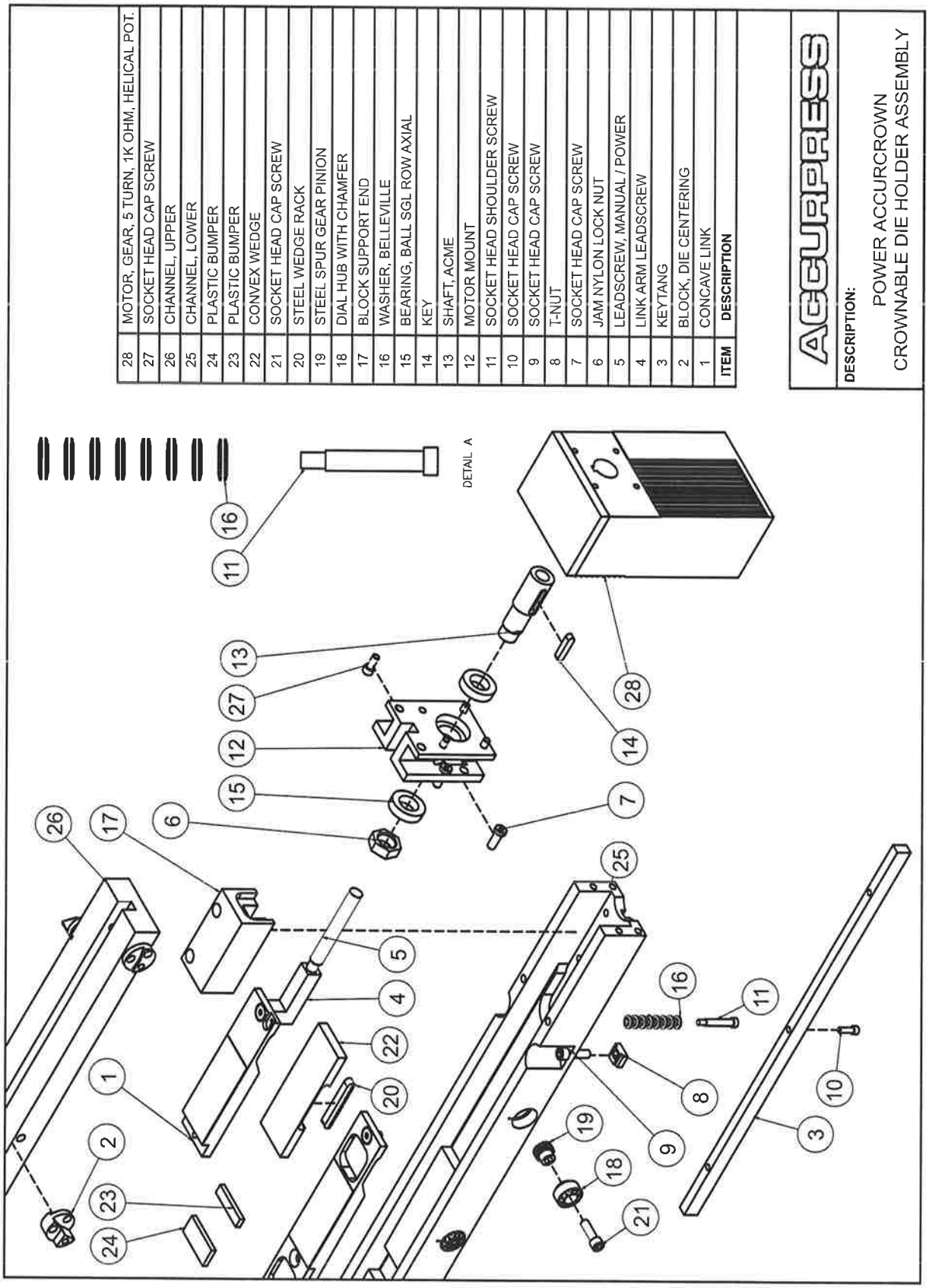
A.18 Accurcrown Crownable Die Holder (Optional)

ITEM	DESCRIPTION
35	FLAT HEAD SOCKET SCREW
34	SOCKET HEAD CAP SCREW
33	HANDLE BAR
32	BEARING, BALL DBL ROW ANGULAR
31	BEARING, SLEEVE BUSHING
30	SHAFT
29	L.E.D. READ OUT COVER
28	L.E.D. DIGITAL DISPLAY
27	HANDLE MOUNT
26	POTENTIOMETER LINK
25	+/- 9V POWER SUPPLY
24	VARIABLE RESISTOR
23	LINEAR POTENTIOMETER
22	POTENTIOMETER MOUNT
21	BLOCK SUPPORT END
20	CHANNEL, UPPER
19	CHANNEL, LOWER
18	PLASTIC BUMPER
17	PLASTIC BUMPER
16	CONVEX WEDGE
15	SOCKET HEAD CAP SCREW
14	STEEL WEDGE RACK
13	STEEL SPUR GEAR PINION
12	DIAL HUB WITH CHAMFER
11	WASHER, BELLEVILLE
10	SOCKET HEAD SHOULDER SCREW
9	SOCKET HEAD CAP SCREW
8	SOCKET HEAD CAP SCREW
7	T-NUT
6	JAM NYLON LOCK NUT
5	LEADSCREW, MANUAL / POWER
4	LINK ARM LEADSCREW
3	KEYTANG
2	BLOCK, DIE CENTERING
1	CONCAVE LINK

ACCURPRESS

DESCRIPTION:
MANUAL ACCURCROWN
CROWNABLE DIE HOLDER ASSEMBLY

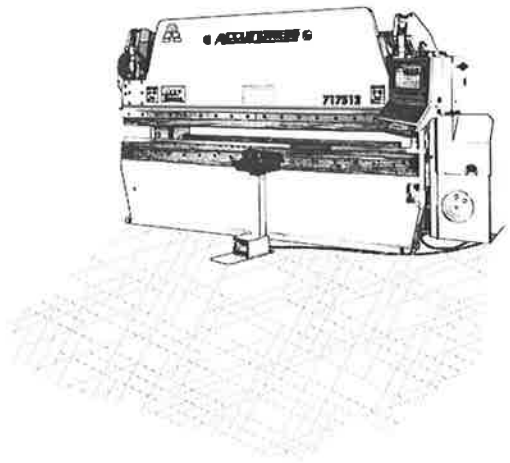




ITEM	DESCRIPTION
1	CONCAVE LINK
2	BLOCK, DIE CENTERING
3	KEYTANG
4	LINK ARM LEADSCREW
5	LEADSCREW, MANUAL / POWER
6	JAM NYLON LOCK NUT
7	SOCKET HEAD CAP SCREW
8	T-NUT
9	SOCKET HEAD CAP SCREW
10	SOCKET HEAD CAP SCREW
11	SOCKET HEAD SHOULDER SCREW
12	MOTOR MOUNT
13	SHAFT, ACME
14	KEY
15	BEARING, BALL SGL ROW AXIAL
16	WASHER, BELLEVILLE
17	BLOCK SUPPORT END
18	DIAL HUB WITH CHAMFER
19	STEEL SPUR GEAR PINION
20	STEEL WEDGE RACK
21	SOCKET HEAD CAP SCREW
22	CONVEX WEDGE
23	PLASTIC BUMPER
24	PLASTIC BUMPER
25	CHANNEL, LOWER
26	CHANNEL, UPPER
27	SOCKET HEAD CAP SCREW
28	MOTOR, GEAR, 5 TURN, 1K OHM, HELICAL POT.

ACCURPRESS

INDEX



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