American Hoist & Derrick Company St. Paul, Minnesota

the Crosby group
National Swage Company

P.O. DRAWER 906
JACKSONVILLE, ARKANSAS 72076

TELEPHONE 501 / 982-3112 TELEX 53-6461

NATIONAL SWAGING SYSTEMS

This Manual is provided to give Installations, Operational, and Service Information relating to your Swaging Press.

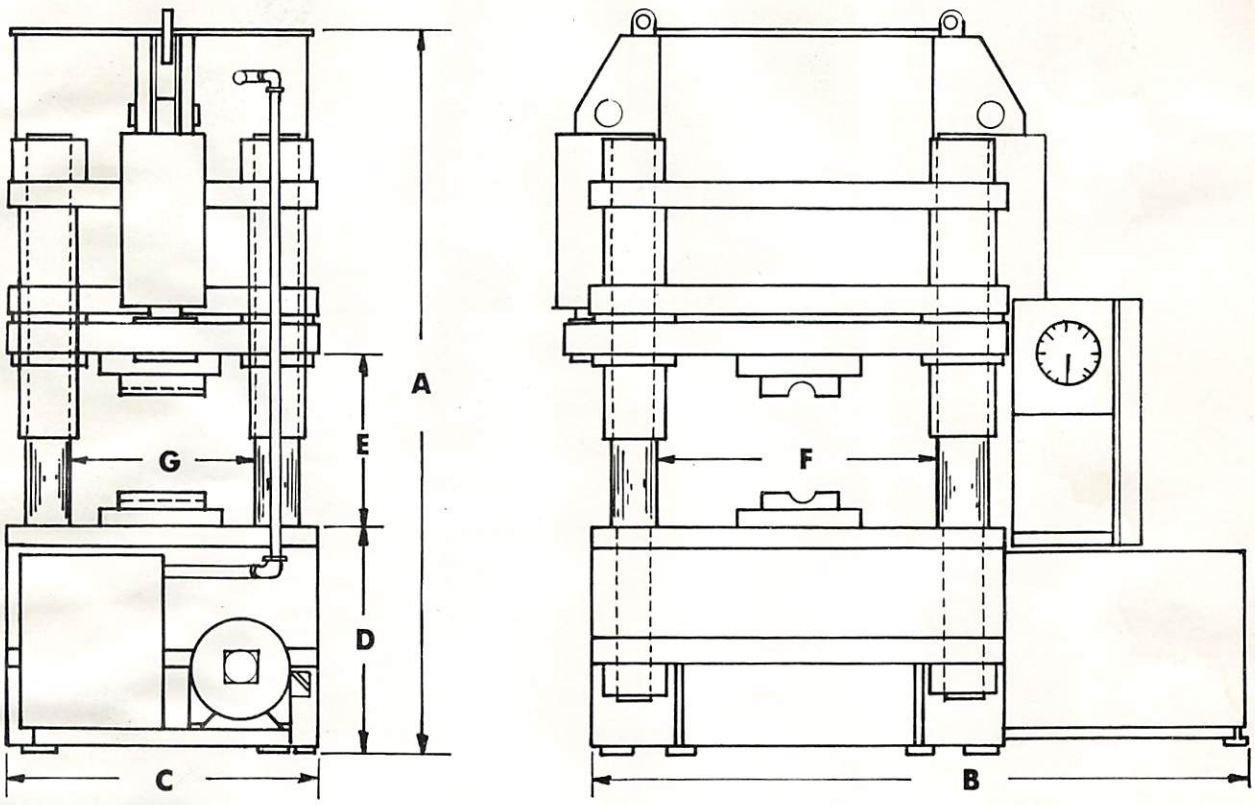
For additional information and the ordering of replacement parts and components contact:

NATIONAL SWAGE COMPANY

P.O. BOX 906

JACKSONVILLE, ARKANSAS 72076

AC-501-982-3112



SPECIFICATIONS FOR 3000 TON PRESS

Dim.	Description	
A	Overall Height	131.50
B	Overall Width	119.50
C	Overall Front to Back	52.00
D	Min. Height Floor to Platen	38.50
E	Max. Daylight between Platens	27.62
F	Width between Columns	48.00
G	Front to Back between Columns	28.00
	Approx. Weight — Press	56,000
	Max. Stroke of Ram	13.5
	HP Pump Motor (220/440 — 3 PH 60 Cy.)	45

NOTE: All dimensions shown in inches and weight in pounds.

SWAGING CAPACITY

Swage Sockets	Standard Sleeves	Heavy Duty Sleeves	Duplex Steel Sleeves	Alum. Duplex Sleeves
3*	4*	1-⅛ *	1*	1½ *

(*) Largest size fitting available.

TABLE I

S-501 & S-502 Swage Sockets

Size	Die Size	Max. O.D. After Swaging
1/4"	.44	.46
5/16"	.69	.71
3/8"	.69	.71
7/16"	.88	.91
1/2"	.88	.91
9/16"	1.13	1.17
5/8"	1.13	1.17
3/4"	1.38	1.42
7/8"	1.50	1.55
1"	1.75	1.80
1-1/8"	2.00	2.05
1-1/4"	2.25	2.30
1-3/8"	2.50	2.56
1-1/2"	2.75	2.81
1-3/4"	3.00	3.06
2"	3.50	3.56

TABLE II

S-505 Standard Steel Sleeve

Size	Die Size	Max. O.D. After Swaging
1/4"	.50	.52
5/16"	.62	.64
3/8"	.73	.75
7/16"	.88	.91
1/2"	.98	1.01
9/16"	1.10	1.14
5/8"	1.20	1.24
3/4"	1.41	1.45
7/8"	1.63	1.68
1"	1.88	1.93
1-1/8"	2.08	2.13
1-1/4"	2.27	2.32
1-3/8"	2.46	2.52
1-1/2"	2.65	2.71
1-3/4"	3.04	3.10
2"	3.50	3.56
2-1/4"	4.06	4.12
2-1/2"	4.44	4.50
2-3/4"	4.64	4.70
3"	4.89	4.96
3-1/2"	5.70	5.77
4"	6.62	6.69

TABLE III

S-508 Heavy Duty Steel Sleeve

Size	Die Size	Max. O.D. After Swaging
3/8"	.75	.77
1/2"	1.00	1.03
5/8"	1.25	1.29
3/4"	1.50	1.54
7/8"	1.75	1.80
1"	2.00	2.05
1-1/8"	2.25	2.30

TABLE IV

S-506 Duplex Steel Sleeve

Size	Die Steel	Max. O.D. After Swaging
5/16"	.75	.77
3/8"	.75	.77
7/16"	1.00	1.03
1/2"	1.00	1.03
9/16"	1.25	1.29
5/8"	1.25	1.29
3/4"	1.50	1.54
7/8"	1.75	1.80
1"	2.00	2.05

3000 TON PRESS HYDRAULIC COMPONENTS

Item	Description
A.	Pump, Dynex PF4021-1594
B.	Directional Valve Denison A-3D03-35-B01-03-03-14B5-01D-28
C.	Sequence Valve, Snap Tite SAC 60-T-50-A
D.	Pilot Check Valve, Racine FB1-POLT-116N-10
E.	Hydraulic Cylinder, our Dwg. 6-5293
F.	Filter, Schroder KF3-2K25-M-Y2
G.	Check Valve, Republic 451-3/4"-S2-6
H.	Directional Valve, Denison A3D01-35-103-06-01-00A5-01A-28
I	Relief Valve, Racine 1351-3
J	Gauge, our Dwg. 4-5262
K	Gauge Cutout, Republic 691-3-1/4D2
L	Flow Control Valve, Color Flow
M	Gauge, our Dwg. 4-5261
N	P.O. Check Valve, Racine BC-F2-03
O.	Relief Valve, Denison R4V03-535-10-A1

SEQUENCE OF OPERATION

The system incorporates a high pressure axial piston pump "A" driven by an electric motor.

When the press is idle, Valve "B" is de-energized allowing the flow from Pump "A" to return to the tank at a 65 PSI drop. Therefore, minimum horse power is developed.

When Solenoid No. 1 is energized, oil flow is directed to Port "B" then through the internal check valve to the blind end of the return cylinders lowering the upper platen at a faster rate than when swaging. The pressure created in the pilot line to Valve "D", by the oil flowing out of the rod end of the return cylinders, opens Valve "D" allowing oil from the upper reservoir to free flow into the main ram. The pressure increase caused when the dies contact the work opens Valve "C" and closes Valve "D" allowing pump pressure to be applied to the main ram, as well as the return cylinders, for swaging. If Solenoid No. 1 is de-energized, the ram will stop and hold depending upon internal leakage of the hydraulic system.

To retract the ram, Solenoid No. 2 is energized, directing the flow from Pump "A" to Port "A", then to the rod end of the return cylinders. The pressure required to lift the platen is sufficient to open Valve "D" allowing the oil in the main cylinder to return to the upper reservoir and Valve "D" allowing the oil in the top of the return cylinders to return to tank.

Selecting the low range on the control panel energizes the solenoids on Valves "H". This limits the press to 1600 tons swaging force by means of relief Valve "I" which will cause the main relief to open at the pressure setting of Valve "I".

Check Valve "N" prevents drifting of presses upper platen by blocking rod end of side cylinders.

Flow control Valve "L" in the return cylinder rod end line insures adequate pressure to pilot open the internal check in Valve "N" maintaining a resistance in order to get a smooth operation of Valve "N" in the down position.

SPECIAL MAINTENANCE PROCEDURES

Item Numbers

Item numbers shown refer to items on Drawing #6-9821 Parts List.

Replacement of Piston #45

In order to replace the piston #45, the cylinder #42 and packing gland #30 must first be raised from the machine. This is accomplished by removing dies and die holders. Raise upper platen fully. Block platen up. Loosen cap screws #15. Drain oil from upper reservoir. Fully lower upper platen. Remove return cylinder upper clevis pins #43. Remove the four upper nuts #44. Disconnect hydraulic lines and raise the cylinder until clear of the piston. Remove cap screws #15. Note there are two 1-8UNC tapped holes in the top of the piston that may be used as lifting points to move piston. Install packing gland #30 over piston before replacing cylinder. Before tightening cap screws #15, move platen up and down to allow piston to align itself in the packing gland.

Replacement of Guide Tube Bushing #68, Tie Rod #55, and Guide Tube #67

To replace guide tube bushings #68, tie rod #55 or guide tube #69, the individual tie rod must be removed. This may be done by blocking the upper platen in a mid-travel position. Loosen upper nut #44 and unscrew tie rod from lower nut #44. After fastening hoist to upper end of tie rod, collar halves #14 can be removed. Lift the rod out. Guide tube can now be removed by removing lock screw #47 and guide tube nut #48. Work with only one tie rod at a time.

Replacement of Chevron Style Packing #28

1. Remove dies and upper die holder.
2. Raise upper platen completely.
3. Drain all oil from reservoir.
4. Remove rod coupler #44.
5. Remove collars #37.
6. Lower upper platen about 6" and block packing gland and remove packing gland bolts #9.
7. Lower upper platen completely. Using hydraulic jack or fork truck.

8. Remove the packing #28.

9. Work the new parts into press. The lower gland #30 would be on the bottom, next would be the six Chevron vees and the thin hard packing ring. NOTE: THE TOP CHEVRON VEE IS THE ONLY ONE WITHOUT A FILLER STRIP IN THE CENTER OF IT. LUBRICATE ALL OF THE CHEVRON SEAL PARTS INDIVIDUALLY WITH HYDRAULIC OIL BEFORE INSTALLING.

10. Raise platen gland and piston into place.

11. Install packing gland cap screws #9. Tighten only enough to remove clearance between packing pieces. At this point there should be approximately .50 inch gap between the packing gland and the cylinder with new packing.

12. Install shims in the gap between the gland and the cylinder. Initial shim thickness is that of the gap obtained in step 13.

13. Tighten packing gland screws #27 evenly, alternating around the diameter, to 1100 ft. lbs.

14. Raise upper platen.

15. Install Rod Coupler #44.

16. Install Collars #37.

17. Refill with oil.

18. Lower and raise platen to allow the piston to center in the packing. Check clearance between the piston and packing gland to make sure piston is centered. If not centered loosen piston cap screws #15.

19. Tighten piston cap screws #15 to 1200 ft. lbs.

20. Install upper die holder and dies.

21. Adjust packing, when necessary, by reducing shim thickness in .03 inch increments.

NOTE: The piston may be held up using a 1" dia. eye bolt with 1-8 UNC threads screwed into the hole provided in the top of the piston. Access to this hole is provided as follows:

1. Drain upper reservoir with platen raised completely.

2. Remove nuts #35, top cover #40, cap screws #39, valve #37, and adapter assembly #38.

3. The eye bolt may now be threaded into the piston.

4. When using this method the 3/8 inch diameter pilot line does not need to be disconnected.

SWAGING

Cold swaging fittings onto wire rope is a severe process requiring considerable movement of the material as it is forced under great pressure to flow into the crevices between the wires and strands of the rope. During this reduction in the cross-section of the fitting, the material elongates down the rope; this action is met by great resistance at the interface of the fitting and die and the fitting and the rope. It is for these reasons that swaging cannot be done too rapidly and requires lubricant and dies in good repair.

Generally speaking, the swaging process has to be done in multiple pressings in order to eliminate excessive "flashing." The term "flashing" is used for the material that tends to be squeezed out or extruded into the area between the die faces. If excessive "flashing" has been created, it will have a tendency to be folded into the next pressing and will develop a definite and permanent mark in the material and possibly a crack.

To avoid this situation, the first pressing is done to some estimated gap opening between dies. The amount is dependent upon size of the fitting. The dies are then opened and the fitting rotated between 45° and 90° and pressed again bringing the dies closer together. This is repeated, each time bringing the dies closer together until the dies bottom out. The number of pressings is dependent upon the size fitting and the desired quality of the fitting after swaging.

The only exception to the above procedure is for S-603 and S-605 duplex aluminum sleeves. These are swaged in a single pressing and the excess material does form into "flashing." This "flashing" is then manually stripped from the fitting.

Large size S-501 and S-502 swage sockets should be swaged progressively. This is done by starting at the tapered end of the socket and inserting and pressing a portion of the socket shank. The shank is inserted further into the dies, without turning the socket, and pressed. This is repeated until the entire length is pressed. The socket is then withdrawn and rotated between 45° and 90° and the above procedure repeated. Using the previously described no-flashing technique, this procedure is reapeated until the socket is fully swaged.

SWAGING GUIDE

The quality achieved in cold swaging fittings onto wire rope is the result of the technique that is employed and the tooling that is used. Proper technique coupled with using swaging dies that are in good repair will produce a satisfactory swage termination.

A satisfactory swage termination is one that does the job for which it is intended and meets customer acceptance. This requires that it be swaged in proper dies to the correct after-swage dimension. It must be free of cracks or folds that could cause failure in service.

Swaging dies should be inspected periodically for excessive die wear. The dies should be free of any scores which may interfere with the cold flow of the metal or cause marking of the fitting being swaged. When scores appear in the cavities, they should be polished out. Dies showing excessive wear should be replaced.

The accompanying tables list the swaging die size and the maximum OD of the fitting after swaging. These are meant to serve as an inspection guide. The maximum OD after swaging takes into account die tolerance, die wear, and material spring-back.

DIES

The dies are made solely for the use of swage fittings on wire rope and any other use may result in severe damage to the dies.

The swaging operation results in a high degree of metal movement. The movement that occurs between the fitting and the dies will cause wear of the dies. Therefore, to prolong the life of the dies, it is important to keep the die cavities well oiled.

When scores appear in the cavities, they should be polished out to reduce the wear of the die and also to prevent marking of the fitting being swaged.

When using 7" wide dies in the press, the maximum tonnage to be used is 1500 tons.

WARNINGS

The main relief pressure is set at the factory at 5000 PSI and must not be exceeded.

The sequence pressure is set at 200 PSI above the pressure required to lower the platen before contact between the dies or the dies and the work inserted in the dies and must not be exceeded.

The press is not to be pressurized to the relief pressure in the downward direction without the dies in place.

Keep hands and limbs free of the press during press operation, especially noting the possible pinch point between dies and between column guide tubes and cylinder.

When changing dies, blocking should be inserted between upper and lower platens to lock out ram movement and power to press should be shut off.

The maximum tonnage to be used with the 7" wide dies is 1600 tons and must not be exceeded.

REQUIREMENTS FOR INSTALLATION OF 3000 TON SWAGING PRESS

The swaging press was adjusted and tested at the factory before shipment and placed in operating order, therefore, proper care in setting up the press will only require a minimum of installation time.

Foundation

The swaging press requires only a foundation capable of adequately supporting the total weight of the press. All operating forces generated during the swaging process are absorbed in the press and not transmitted to the foundation.

To achieve the maximum life of the cylinder packing, column bushings, etc., it is important to install and maintain the press in a level position.

Attach pumping unit to press and level using leveling screws at end of pumping unit platform.

Electrical Connection

The pumping unit is complete with all electrical components, so, it is only necessary to furnish a 240 volt or 480 volt, 60 cycle, three-phase line to the electrical box located on the control panel. If a main disconnect is required, this is to be customer furnished.

The pumping unit and control panel were wired at the factory, so, it will only be necessary to re-connect to the labeled terminals those wires disconnected for shipping and be connected to the proper voltage source by a qualified electrician. The press is wired for 240 VAC unless marked 480 VAC on the outside of the electrical box.

Full load power requirement is approximately 34 KW. The direction of motor rotation is optional.

CAUTION:

Do not start the pump motor until the hydraulic system has been filled with hydraulic oil.

Hydraulic System

The press and pumping unit have been shipped without hydraulic oil. The oil reservoir capacity of the 3000 ton press is 68 gallons. The oil reservoir capacity of the upper reservoir is 92 gallons. For presses to be operated in the 75° and 95° F ambient or room temperature range, select an oil that has a rating of 200 to 250 SSU @ 100° F. If the press is to be used in a different ambient temperature range, select an oil that is rated accordingly.

Shipping required the hydraulic lines between the pumping unit and press to be disconnected. These lines are color coded to simplify installation. Before reconnecting, check the ends of the lines and remove any burrs or sharp edges. Failure to do so may damage the o-ring seal inside the fittings. Apply a light coat of oil to the end of the tube before sliding into the fitting. Tighten nut one turn after turning hand tight.