NATIONAL

Sheet Metal Machines, Inc.

# INSTRUCTIONS MANUAL

## HYDRAULIC SHEARS

*ALL MODELS*

MADE IN U.S.A.

NATIONAL
SHEET METAL MACHINES, INC.
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931

# >>>SAFETY<<<

WARNING;;; DO **NOT** operate this machine **WITHOUT** manufacturers Holddown Assembly or an APPROVED Finger Guard installed...

WARNING;;; DO **NOT** operate or store this machine in Damp or Wet conditions...

WARNING;;; This machine **MUST** be wired to central power source by Qualified Electrician using materials and methods prescribed by Local Electrical codes...

**NEVER** place any part of your body under the blade area...

**NEVER** allow anyone to support material being cut from the rear position of the machine...

**NEVER** operate this machine with the front and/or back panels removed...

Do **NOT** stack material to be cut , design is for single layer only...

Keep floors dry and free of clutter, maintain good footing, and do not "overreach"...

Do **NOT** use machine as a work table, material may slip into cutting path and cause serious damage and injury...

**ALWAYS** UNPLUG this machine before performing any type maintenance...

**ALWAYS** operate this machine from the front area...

Always lay material FLAT on table, do not support material as clamping may result in serious injury...

Always keep children, pets, and visitors at a SAFE distance from this machine when operating...

Feed material from the **FRONT** only...

Never FORCE the machine to cut, check Trouble Shooting Guide and Design Standards if problems arise...

Wear clothing that will **NOT** become caught on material. **NEVER** wear neckties, long jewelry around the neck or on an arm, loose garments, or accessories of any type...

Check machine before every use for Damage or loose material between blades...

Follow Preventative Maintenance Guide **DAILY** ...

Turn this machine **OFF** before leaving the work area...

## ALWAYS WEAR SAFETY GLASSES or ANY APPROVED EYE PROTECTION DEVICES WHEN OPERATING THIS MACHINE.

## KEEP FINGERS CLEAR OF THE BLADE AREA and the HOLDDOWN...

## Safety Saves and Safety Pays

# DESIGN STANDARDS

This machine is designed and manufactured to SAFELY cut "MILD STEEL" by GAUGE and Tolerances outlined below.

DO **NOT** cut materials that are not within the specified tolerances of this machine...**SERIOUS DAMAGE and/or INJURY MAY OCCUR...**

| Model | Carbon Composition (Max. %) | Thickness Tolerance | Tensile Strength | Yield Strength (ksi) | Rockwell Hardness (ksi) |
|---|---|---|---|---|---|
| 16 ga. | 20-25% | .053-.067 | 50 | 30 | B65 |
| 12 ga. | 20-25% | .097-.113 | 50 | 30 | B65 |
| 10 ga. | 20-25% | .126-.142 | 50 | 30 | B65 |
| 1/4" | 20-25% | .220-.270 | 50 | 30 | B65 |

*****Maximum Tolerances are "Built Into" above stated figures*****

Thickness of material must be ADJUSTED accordingly to compensate for HIGHER TENSILE and/or HIGHER ROCKWELL.

*Aluminums, Stainless, Galvanized,* and *ALL Alloys* **MUST fall within the above standards** to accomplish a SAFE and SATISFACTORY CUT...

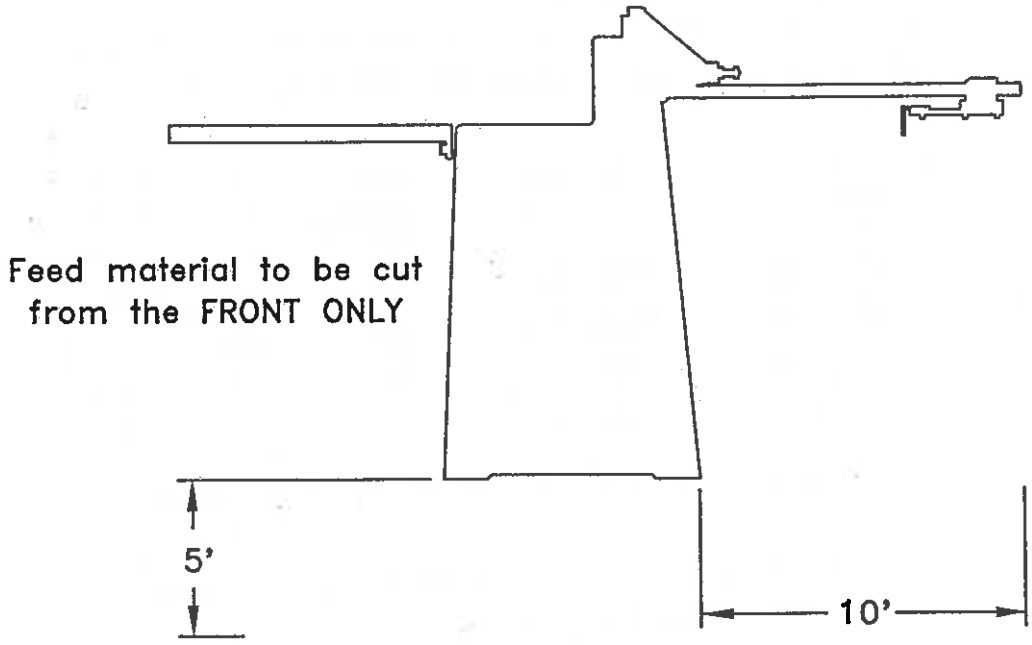
## DO NOT CUT MATERIALS NOT DESIGNED FOR THIS MACHINE....EXTREME and/or COSTLY DAMAGE and/or SERIOUS INJURY MAY OCCUR...

## *****NOTICE*****

**This machine has been Factory Tested to CAPACITY of MILD STEEL**
**DO NOT EXCEED MAXIMUM RATED CAPACITIES AS SHOWN ABOVE**

# SAFE ZONE

## (Working Areas)




1. Allow a minimum five **(5)** feet of open area, free of materials, and machinery on **BOTH** sides (Left & Right) of machine.

2. Allow a minimum ten **(10)** feet of open area, free of obstructions, etc. in **REAR** of machine.

3. Do **NOT** operate machine when People or Obstructions are within SAFE ZONE. Serious injury may occur.

4. Do **NOT** stack, store or place material, machinery, or any other obstructions in **FRONT** of machine that might cause tripping or in any way present a HAZARD to operators and/or helpers.

## KEEP WORK AREA AND SAFE ZONES CLEAN

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# ADJUSTING PROCEDURES

## GIB SLIDES

1. Loosen Lock Nuts on all Square Head bolts **(#35** or **#89)** on BOTH legs **(#2** or **#2 & #3).**

2. Tighten two (2) bolts randomly on each leg **(#2** or **#2 & #3). (DO NOT OVERTIGHTEN)**

3. "BUMP" tighten the remaining bolts to just beyond Finger Tight.

4. Loosen two (2) bolts previously tightened in #2 above and repeat "BUMP" tighten procedure on all bolts. Insure that **ALL** bolts feel equal in pressure to allow a smooth travel of the Cutterhead **(#3** or **#4).**

5. Exercise Machine listening for any indication of excessive movement and/or "drying" of slide areas.

6. Tighten Lock Nuts on Square Head Bolts **(#35** or **#89)** on both legs **(#2** or **#2 & #3).**

## CUTTERHEAD/BLADE ANGLE

1. Lower Cutterhead **(#3** or **#4)** to extreme Bottom and turn machine OFF.

2. Visually check to insure that UPPER Blade **(#6** or **#10)** passes LOWER Blade **(#16** or **#10)** sufficiently to accomplish FULL Table **(#1)** Width Cut.

If #2 above is satisfactory, no further Cutterhead **(#3** or **#4)** Adjustments are necessary...Correction procedures follow if Full Width Cut or Cutterhead **(#3** or **#4)** Clearance is not adequate.

3. Loosen Lock Nuts on Pull Rod Assemblies **(#18** or **#33).**

4. Adjust "LOW END" *(Right Side Facing)* Blade **(#6 & #16** or **#10)** clearance to the prescribed Height: **36" & 52"...*1/4"*** **48"...*1/2"***
**72"...*9/16"*** **120"...*5/8"***

5. Raise or Lower "HIGH END" until there is a **MINIMUM .003"** clearance between Cutterhead **(#3** or **#4)** and Leg **(#2** or **#2 & #3)** at Gib Slide area on either side of machine as viewed from the rear. *(Adjustments are made by turning the Pull Rod (#18 or #33) **CW** or **CCW** as necessary)*

6. Test run machine, checking for smooth operation/travel and no apparent "DRYING" of slide areas or Gibs **(#34** or **#25).** Insure that TOTAL Width cutting capability is obtained. *(Top Blade (#6 or #10) Passes Lower Blade (#16 or #10))*

7. Tighten Lock Nuts on Pull Rod Assemblies **(#18** or **#33).**

## BLADE GAP SETTINGS

**(CUTTING EDGE SPACE)**

1. Lower Cutterhead **(#3** or **#4)** to Extreme Bottom and turn machine OFF.

2. Press and HOLD **"STOP"** button **(#52** or **#84)** and **"START"** button **(#52** or **#84)** simultaneously.

3. Quickly release **"STOP"** button **(#52** or **#84)** and depress and HOLD again. This releases all "upward" pressure on the table.

4. Loosen ALL Leg Bolts **(#46** or **#92)** gently. Insure that table **(#1)** rests on all pads on legs **(#2** or **#2 & #3)** as viewed from underside of machine. **Shim from Floor as necessary. NH120 Series** see #4a on pg. 31.

5. Loosen Socket Set Screws **(#21** or **#90)** on both legs. Loosen Hex Bolts **(#22** or **#91)** on both legs.

6. Tighten SSS **(#21** or **#90)** on "Low End" leg **(#2** or **#2 & #3)** until Blades **(#6 & #16** or **#10)** Touch then "Back Off" approximately **.005"** with Hex Bolt **(#22** or **#91).** Repeat this procedure on "High End".

7. Check "CENTER" for Parallel alignment. If "BOW" is evident adjust Cutterhead Nut **(#36** or **#74)** to align Blades **(#6 & #16** or **#10).**

8. Adjust "High End" to specified Gap. Tighten Leg Bolts **(#46** or **#92).**

9. As in #3 above, "BUMP" Cutterhead **(#3** or **#4)** up until approximately 4-6 inches of blades **(#6 & #16** or **#10)** have not passed. *(**Do Not** Allow Cutterhead (#3 or #4) to Advance Up to STOP Position)*

10. Repeat Step #8 for "Low End".

11. Press and HOLD Foot Switch **(#85** or **#116)** and repeat step #2 and #3 until Cutterhead **(#3** or **#4)** is Down approximately 1/2 the total travel distance.

12. Adjust the CENTER to the specified Gap with Nut **(#36** or **#74).**

13. Repeat Step #11 until Cutterhead **(#3** or **#4)** is in Bottom position. Check "High End" clearance.

14. As described, "BUMP" Cutterhead **(#3** or **#4)** up and check "Low End".

15. Torque Leg Bolts **(#46** or **#92)** approximately 120 pd @ 3 ft. bar end.

16. Test run checking for blade clearance end to end.

17. If Holddown assembly **(#4** or **#38)** has been removed; Replace, Adjust, and Test Cut material.

## Blade Gap Settings

| 36" & 52" Shears | 48" Shears | 72" Shears | 120" Shears |
|---|---|---|---|
| **.003"** | **.006"** | **.006"** | **.006"** |

# HYDRAULIC PRESSURE

1. Install Fluid Gauge into Port below Pressure Relief Valve **(#57** or **#19)** on Subplate Assembly **(#56** or **#18).**

2. Relax Limit Switch Arm **(#47** or **#80)** on Limit Switch **(#49** or **#81).**

3. Loosen Lock Nut on Pressure Relief Valve **(#57 or #19)**.

4. Turn machine ON and quickly adjust Pressure Relief Valve **(#57** or **#19)** to prescribed setting. Turn machine OFF.

5. Tighten Lock Nut and reset Limit Switch Arm **(#47** or **#80)**. Cutterhead **(#3** or **#4)** should travel to extreme TOP position MINUS approximately **.009"**. Exercise machine and listen for distinct differences in sound as machine stops at TOP. *(Indicates Pressure By-Pass)* Readjust Limit Switch **(#49** or **#81)** as necessary to obtain proper cut off.

**HYDRAULIC PRESSURE SETTINGS**

**NH5216**...450PSI
**NH4825**...1050PSI
**NH3612**...500PSI
**NH7225**...1200PSI
**NH5212**...500PSI
**NH10187**...1700PSI
**NH5210**...550PSI

# HOLDDOWN PRESSURE or TENSION

## 36 and 52 Inch Models

1. To adjust clearance between Holddown Assembly **(#4)** and Table **(#1)**, loosen lock nuts and rotate Square Head Bolts **(#12)**. Factory set at **1/4"** clearance.

2. To adjust Tension *(Clamping Pressure)* tighten or loosen NYLOC Nuts **(#48)** to desired position.

## 4-6-10 Foot Models

1. CLAMPING PRESSURE is regulated by total machine pressure setting, therefore, NO adjustments are necessary.

2. CLAMPING SPEED *(Downward Movement)*;
   a.) Remove Cap and loosen lock nut on Sequence Valve **(#101)** located in UPPER hydraulic system line coming from Subplate Assembly **(#18)**.
   b.) With machine in motion, rotate the Set Screw **CW/CCW** until desired Downward travel speed is obtained.
   c.) Tighten Lock Nut and replace Cap.

3. To adjust RELEASE SPEED *(Upward Movement)*, repeat steps a, b, and c above in Bottom Hydraulic System Line.

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# BLADE ROTATION

***National Sheet Metal Machines, Inc.*** **accepts no responsibility for any accident, injury, or damage caused by or resulting from improper or unsupervised Blade Rotation.**

**EXTREME CAUTION *MUST BE OBSERVED* as Blades are EXTREMELY SHARP and DELICATE.**

**Standard Blades on ALL *National* shears have four (4) available Cutting Edges**

1. Raise Cutterhead **(#3** or **#4)** to it's Upper Most Position and Turn Machine OFF. **DISCONNECT POWER from MAIN SOURCE.**

2. Lock Cutterhead **(#3** or **#4)** in position. It is recommended that a **2" x 4"**, etc. Brace be wedged under Cylinder Block **(#27** or **#28)** *(Left or Right Side)* to the floor.

3. Remove Holddown Assembly **(#4** or **#38)**. ***NH4825, NH7225, NH10187*** hydraulic lines **MUST be Removed and Plugged** to prevent fluid loss.

4. Remove Upper Blade **(#6** or **#10)**, clean and remove any burrs with emory stone, etc. Clean Blade Pad and flat file to remove burrs, etc.

5. Follow step 4 for Bottom Blade **(#16** or **#10)**.

6. ***1st Rotation***

Rotate Blades **(#6 & #16** or **#10)** *180 degrees* End to End *(Left to Right)*

**2nd Rotation**

Maintain same position as 1st Rotation above and LOWER Upper Blade **(#6** or **#10)** to Table **(#1)** and RAISE Table Blade **(#16** or **#10)** to Cutterhead **(#3** or **#4).**

**3rd Rotation**

Repeat as 1st Rotation.

7. Adjust Table Blade **(#16** or **#10)** LEVEL with Top of Table **(#1).** Lock Blade Bolts and Adjuster Nuts.

8. Raise Upper Blade **(#6** or **#10)** to rest on Bumper Pad as much as possible, Tighten Bolts.

9. Unlock Cutterhead **(#3** or **#4).** (Remove locking device as defined in #2 on previous page, if used.)

10. Adjust Blade Gap Setting. *(See pg.33)*

11. Replace Holddown Assembly **(#4** or **#38),** Adjust and test. *(See Holddown Pressure or Tension pg.35)*

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# PREVENTATIVE MAINTENANCE

1. Lubricate machine often. Lubrication Points are shown on Parts Lists. Recommend lubrication DAILY if in production...WEEKLY if for normal use.

2. Maintain Hydraulic Fluid Level as described in Recommended Lubricants. Recommend COMPLETE oil change after first 500 hours of operation and 2,000 hours thereafter.

3. Always keep blades clean. Wipe DAILY with light weight lubricant. Keep blades SHARP, rotate as often as necessary. Sharp blades reduce Stress on machine parts and helps to insure a long, trouble-free life for your machine.

# RECOMMENDED LUBRICANTS

## TANK

Fill tank with Medium Weight Hydraulic Fluid *(20-30 Wt. 220 SUS @ 100 )* to within two (2) inches from top. Recommend ***Mobil AW 46***, ***BP Energol HLPHD 46***, ***Chevron 68***, or Equivalent.

## CUTTERHEAD & HOLDDOWN ASSEMBLY

***Valvoline Multi-Purpose Lithium Grease PN:609*** or Equivalent

## TREADLE ASSEMBLY

(All Moving Parts and Pins)

***NAPA Dripless Oil***, ***3 in 1 Oil***, or Equivalent

## OIL FILTER REPLACEMENTS

***FRAM---P1653*** ***NAPA---1551***

***CROSS---****(Available thru Factory)*