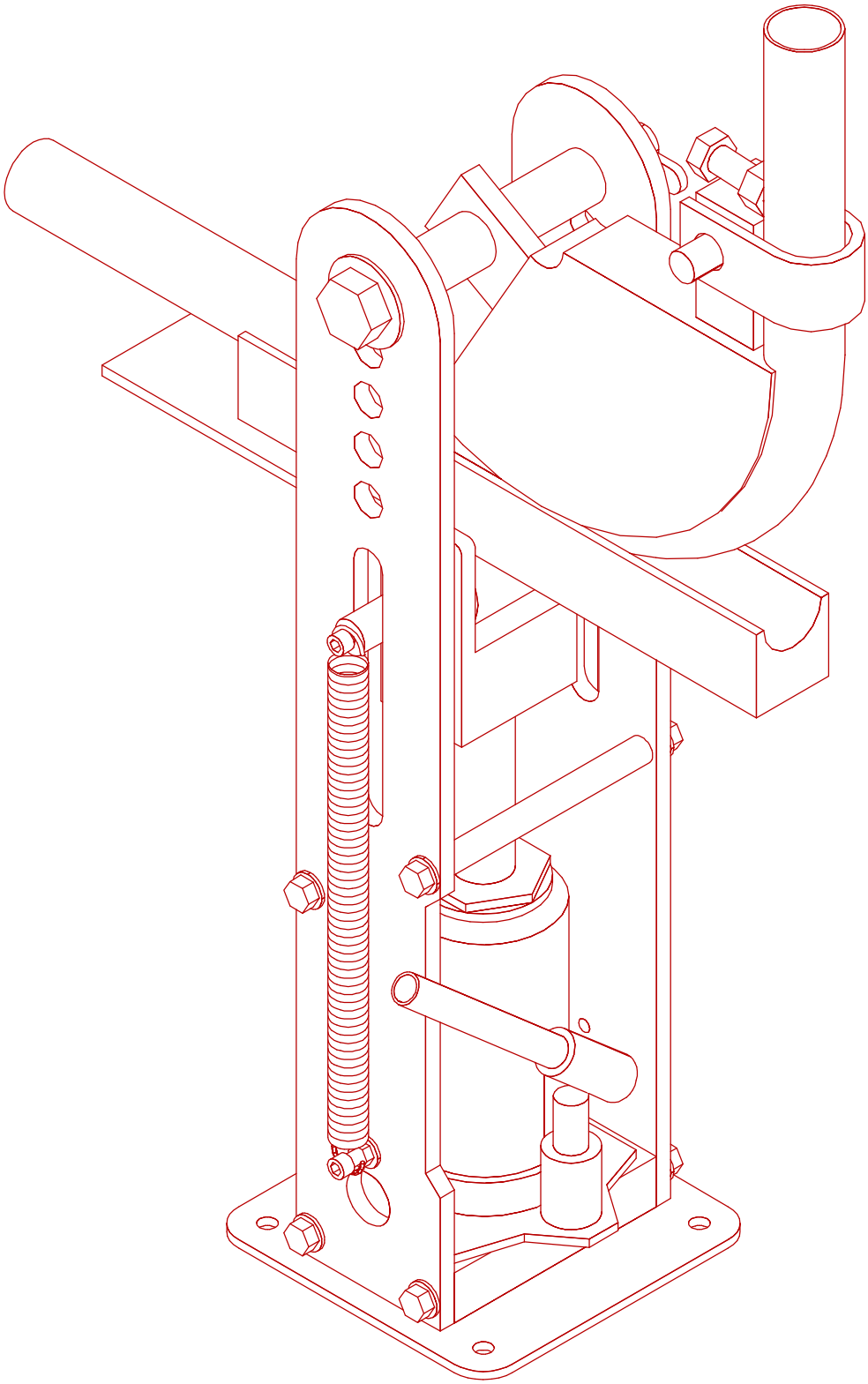
HMP-200 HYDRAULIC BENDER (HAND PUMP MODEL)
ASSEMBLY & BENDING INSTRUCTIONS



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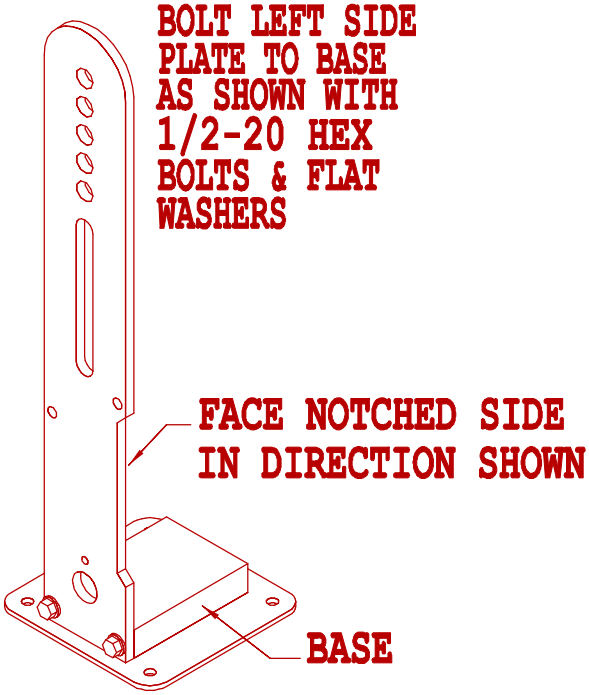
STEP BY STEP ASSEMBLY INSTRUCTIONS

STEP 1



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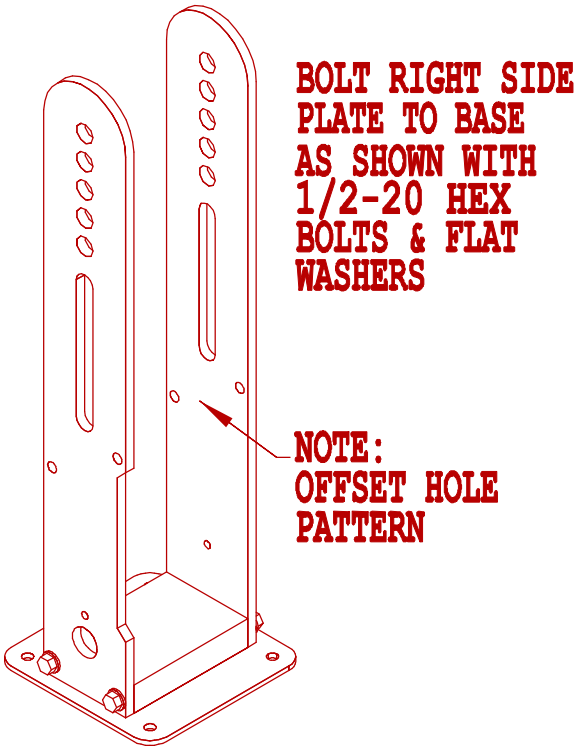
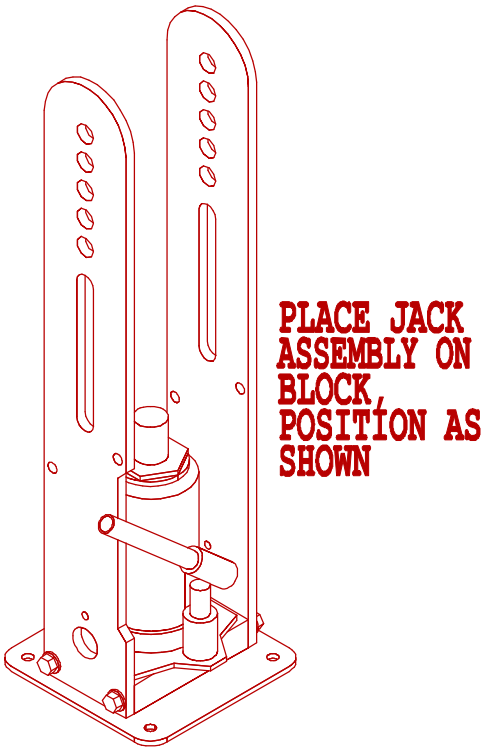
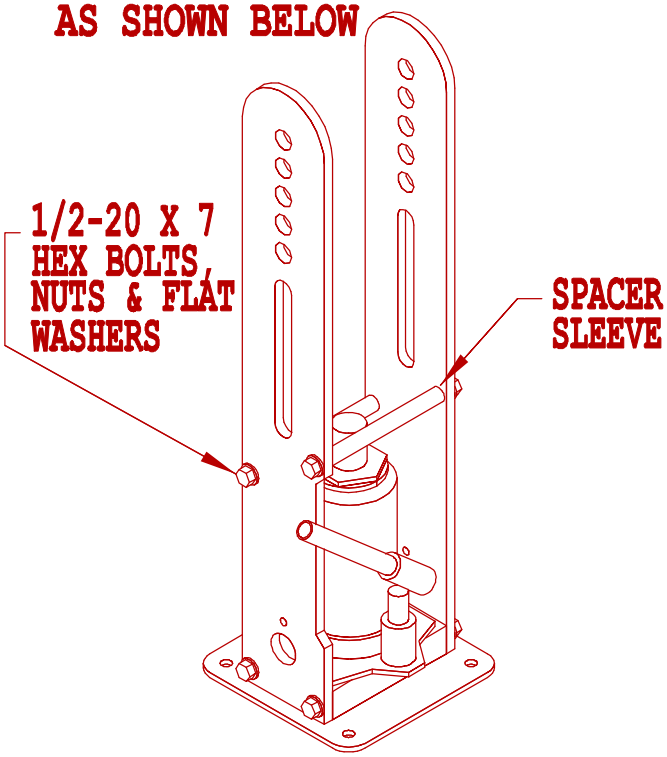


STEP 3



STEP 4

INSTALL SPACER SLEEVES AS SHOWN BELOW



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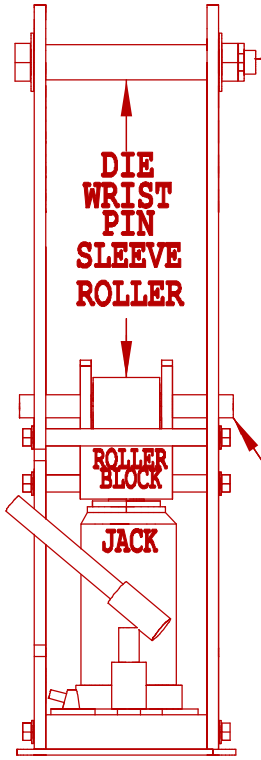
STEP BY STEP ASSEMBLY INSTRUCTIONS

STEP 5



1" BOLT, NUT AND WASHERS

A. SCREW THREADED ROD (IN TOP OF JACK) UP APPROXIMATELY 2 1/4"
B. PLACE ROLLER BLOCK ON TOP OF ROD.
C. INSERT 1" SHAFT THROUGH SIDE PLATES, ROLLER & BLOCK.
D. INSTALL DIE WRIST PIN SLEEVE, 1" BOLT, NUT & WASHERS.

1" SHAFT

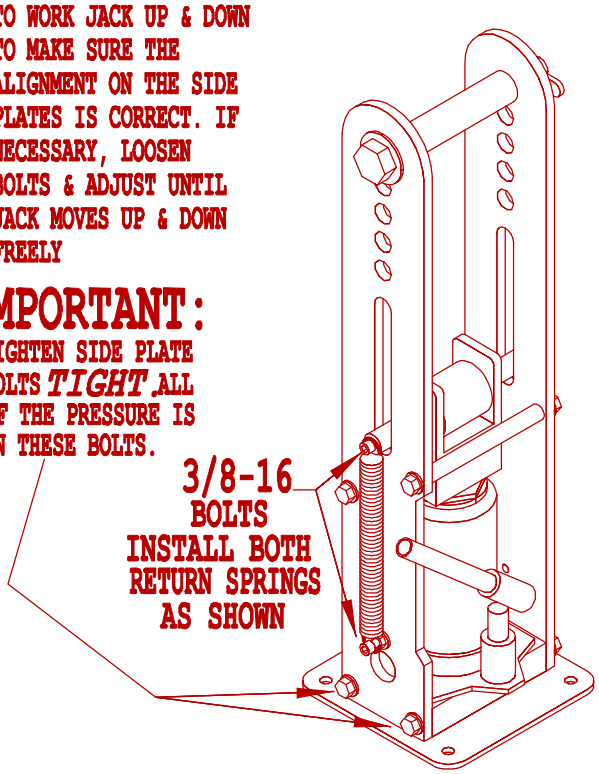
STEP 6

IT WILL BE NECESSARY TO WORK JACK UP & DOWN TO MAKE SURE THE ALIGNMENT ON THE SIDE PLATES IS CORRECT. IF NECESSARY, LOOSEN BOLTS & ADJUST UNTIL JACK MOVES UP & DOWN FREELY

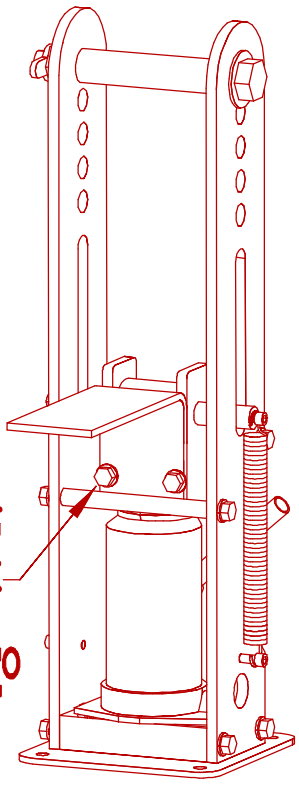
IMPORTANT:

TIGHTEN SIDE PLATE BOLTS *TIGHT*. ALL OF THE PRESSURE IS ON THESE BOLTS.

3/8-16 BOLTS INSTALL BOTH RETURN SPRINGS AS SHOWN



STEP 7

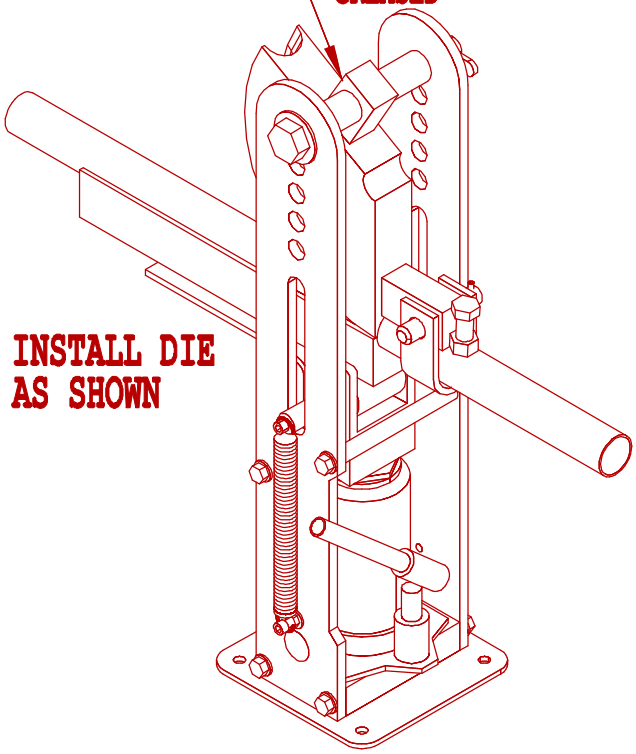


BOLT FOLLOW BAR SUPPORT BRACKET TO ROLLER BLOCK AS SHOWN

ADJUST HEIGHT TO MATCH HEIGHT OF ROLLER BLOCK

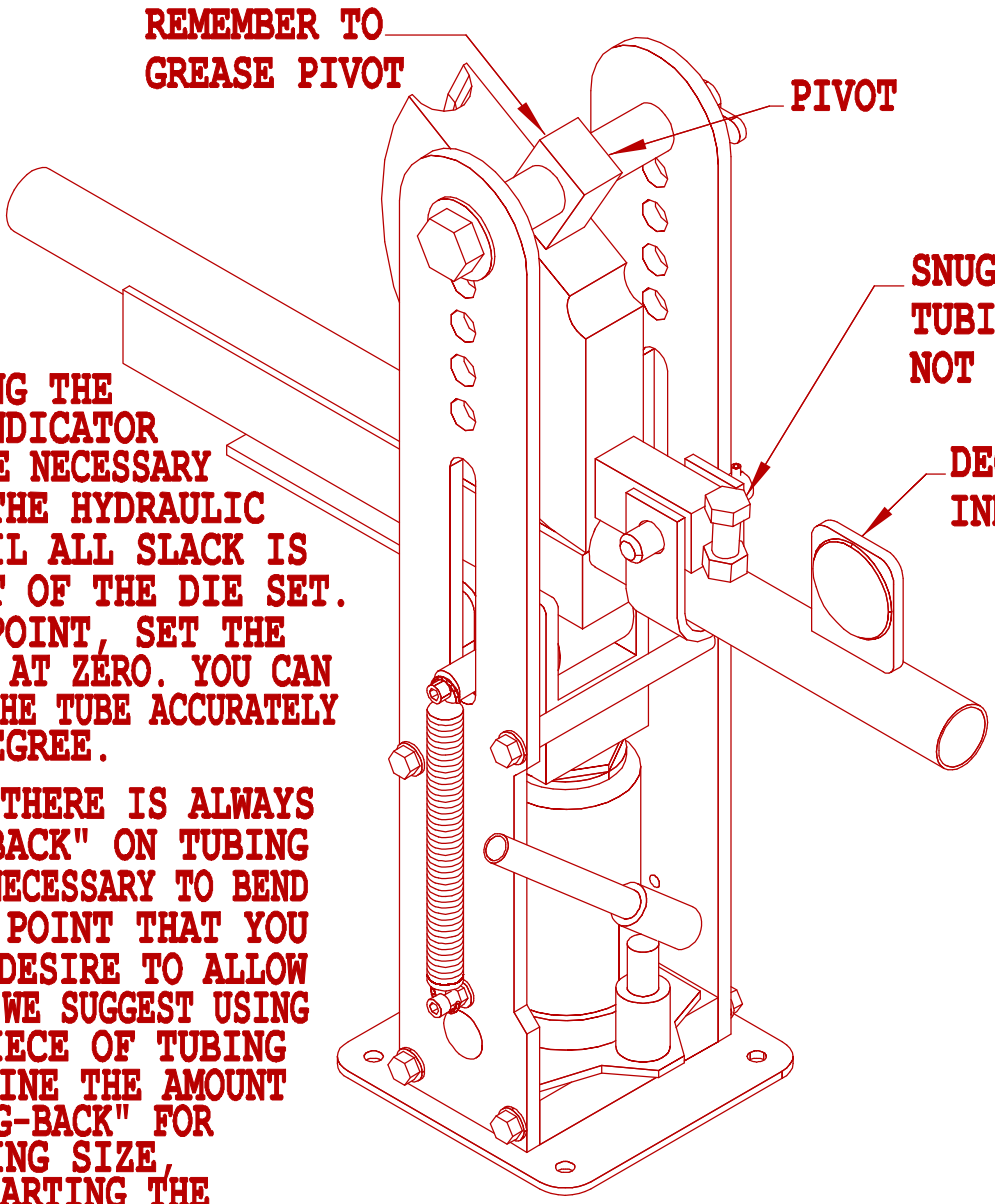
STEP 8

ALL METAL TO METAL SURFACES MUST BE GREASED



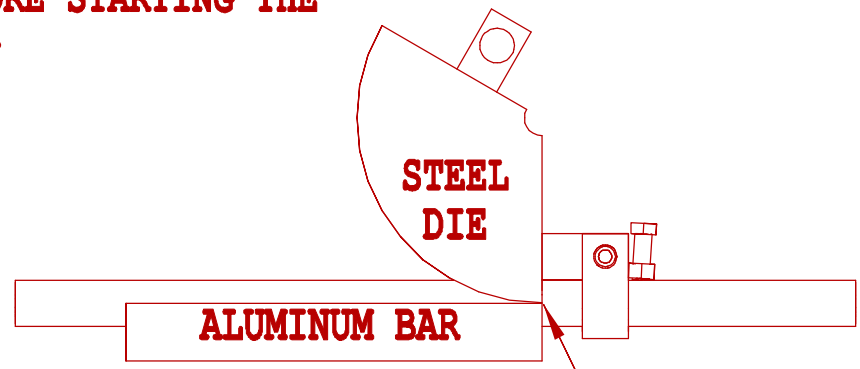
INSTALL DIE AS SHOWN

HMP-200 DIE INSTALLATION



WHEN USING THE DEGREE INDICATOR IT WILL BE NECESSARY TO JACK THE HYDRAULIC JACK UNTIL ALL SLACK IS TAKEN OUT OF THE DIE SET. AT THIS POINT, SET THE INDICATOR AT ZERO. YOU CAN NOW BEND THE TUBE ACCURATELY TO ANY DEGREE.

REMEMBER THERE IS ALWAYS "SPRING-BACK" ON TUBING SO IT IS NECESSARY TO BEND PAST THE POINT THAT YOU ACTUALLY DESIRE TO ALLOW FOR THIS. WE SUGGEST USING A TEST PIECE OF TUBING TO DETERMINE THE AMOUNT OF "SPRING-BACK" FOR EACH TUBING SIZE, BEFORE STARTING THE JOB.



THIS IS THE STARTING POSITION FOR THE DIE

LINE BAR & DIE UP EDGE TO EDGE

BENDING INSTRUCTIONS

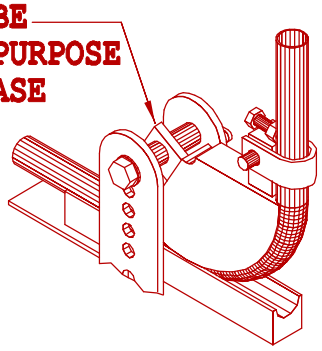
IN THE NEXT FEW PAGES, WE ARE GOING TO TRY TO EXPLAIN A FEW THINGS ABOUT BENDERS & GIVE SOME EXAMPLES & EXPLANATIONS ON MAKING BENDS.

WE ARE GOING TO TAKE YOU THROUGH A *STEP BY STEP* PROCEDURE SHOWING YOU HOW TO DETERMINE THE STARTING POINT OF YOUR BEND, HOW TO CALCULATE THE LENGTH OF TUBING YOU NEED TO START WITH, AND AS MANY WAYS AS POSSIBLE FOR YOU TO BE ABLE TO PRODUCE *PROFESSIONAL, ACCURATE BENDS.*

THE GENERAL RULE, AS FAR AS THE QUALITY OF THE BEND IS AS FOLLOWS: *THE THICKER THE WALL SIZE AND THE SMALLER THE DIAMETER OF THE TUBING BECOMES, THE BETTER THE BEND.* THIN WALL TUBING WILL FLATTEN SOMEWHAT ON ITS OUTER DIAMETER. THIS IS COMPLETELY NORMAL FOR ANY BENDER OTHER THAN A *TRUE MANDREL* BENDER. A MANDREL BENDER USES A STEEL BALL OR SIMILAR SHAPED DEVICE WITH AN OUTSIDE DIAMETER SLIGHTLY SMALLER THAN THE INSIDE DIAMETER OF THE TUBING BEING BENT. THIS HAS THE EFFECT OF THINNING THE WALL THICKNESS ON THE OUTSIDE OF THE TUBING, HOWEVER THE ROUNDNESS OF THE TUBING IS PRESERVED ALMOST PERFECTLY. EXHAUST HEADERS ARE BENT WITH*MANDREL* BENDERS. IF A COMPANY TELLS YOU THIER BENDER IS A MANDREL BENDER AND IT DOES NOT USE INSIDE MANDRELS, *BEWARE!!!* TRUE MANDREL BENDERS ARE EXTREMELY EXPENSIVE.

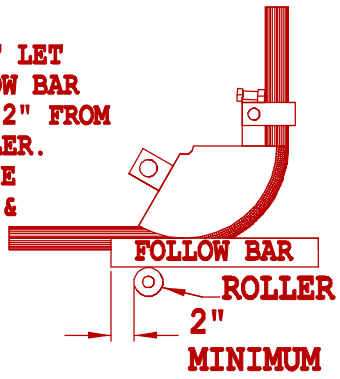
BEFORE WE START WITH THE BENDING CALCULATIONS WE ARE GOING TO LIST A FEW ITEMS OF IMPORTANCE.

1. PIVOT POINT MUST BE LUBRICATED. (ALL PURPOSE WHEEL BEARING GREASE WORKS VERY WELL.)



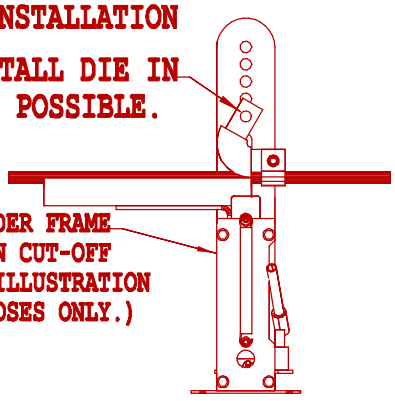
DANGER!

WHEN BENDING, DO NOT LET THE END OF THE FOLLOW BAR GET ANY CLOSER THAN 2" FROM THE EDGE OF THE ROLLER. IF NECESSARY, RELEASE THE TENSION ON JACK & SLIDE BAR BACK.

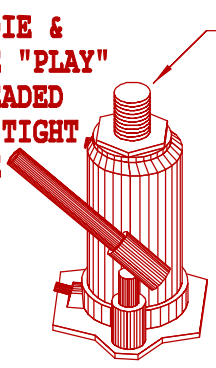


SMALL DIE INSTALLATION

ALLWAYS INSTALL DIE IN LOWEST HOLE POSSIBLE.

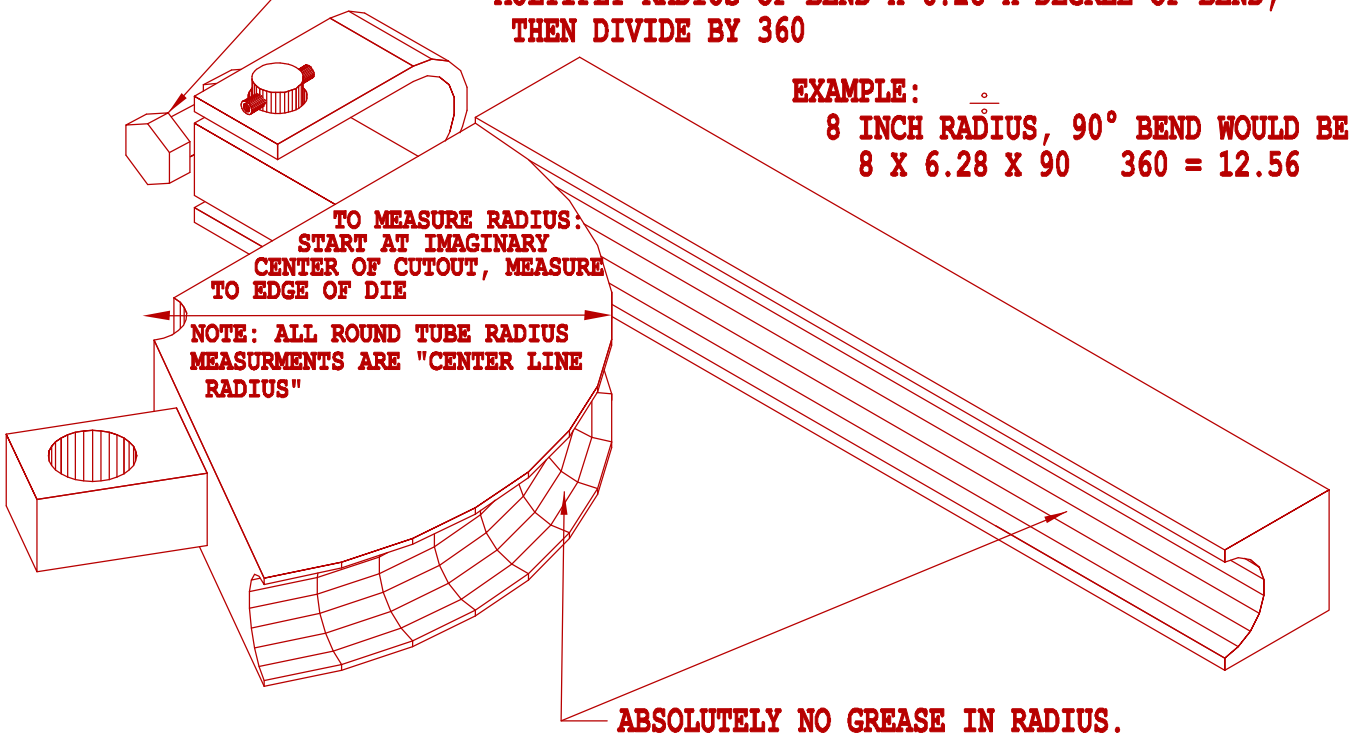


AFTER INSTALLING DIE & FOLLOW BAR, REMOVE "PLAY" BY UNSCREWING THREADED ROD IN JACK UNTIL TIGHT, NOT BY PUMPING THE JACK.



BENDING INSTRUCTIONS

HELPFUL INFORMATION



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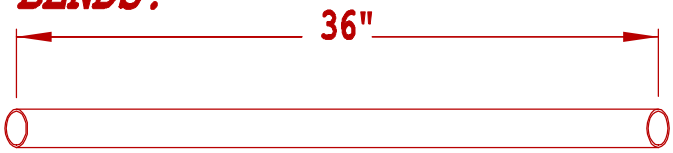
BENDING INSTRUCTIONS

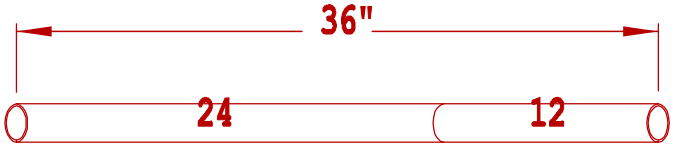
THE NEXT FEW PAGES WILL SHOW YOU HOW TO DO A TEST BEND AND HOW TO INTERPRET THE INFORMATION SO YOU WILL BE ABLE TO MAKE ACCURATE BENDS.

NOTE: FOR SAFETY'S SAKE WE STRONGLY RECOMMEND THAT YOU BOLT THE BENDER TO THE FLOOR OR WORKBENCH BEFORE STARTING ANY BENDS.



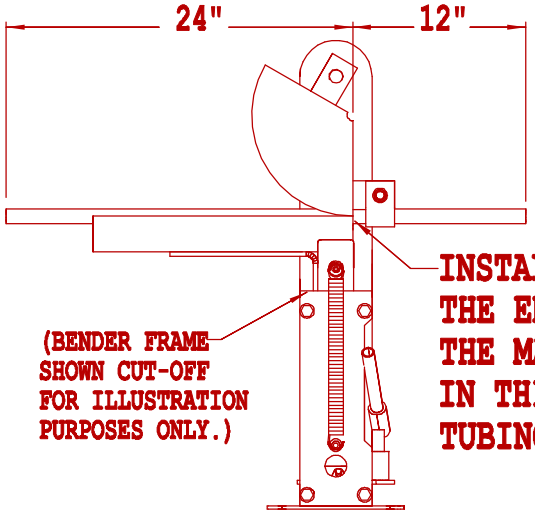
STEP 1 THE TUBING FOR OUR TEST IS 1 3/4" X 36" LONG. ONLY ONE PIECE IS NECESSARY TO GIVE YOU ALL THE INFORMATION YOU WILL NEED TO MAKE ACCURATE BENDS. IT IS A GOOD IDEA TO KEEP A NOTEBOOK TO LOG YOUR INFORMATION ON THE TEST BEND. IT WILL BE NECESSARY TO RUN THE SAME TEST FOR EACH SIZE TUBING YOU PLAN TO BEND.

NOTE: EACH SIZE OF TUBING BENDS AND STRETCHES AND USES A DIFFERENT AMOUNT OF TUBING IN THE BEND, SO IT WILL BE IMPORTANT TO LOG THE RESULTS FROM EACH TEST.



STEP 2 TAKE THE 36" PIECE OF TUBING & MEASURE FROM YOUR RIGHT BACK TO YOUR LEFT EXACTLY 12" & MARK THE TUBE. ALSO MARK THE TUBE 12 & 24 AS SHOWN SO THERE WILL BE NO MISTAKING WHICH END IS WHICH AFTER YOU MAKE THE BEND.

STEP 3



INSTALL THE TUBE IN THE BENDER AND POSITION THE EDGE OF THE DIE EXACTLY IN THE CENTER OF THE MARK AS SHOWN, THEN MAKE A 90° BEND. IN THIS EXAMPLE, WE ARE USING A 1 3/4"X 7" TUBING DIE.

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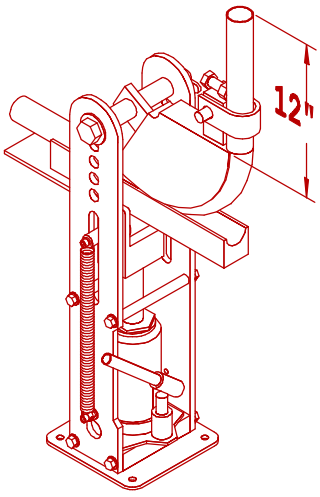
BENDING INSTRUCTIONS

STEP 4

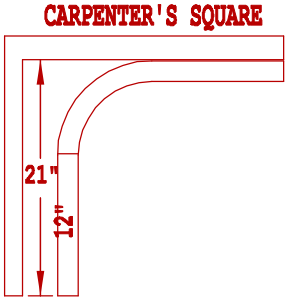


(IMPORTANT) WITH YOUR TUBE BENT TO 90 DEGREES, *BUT STILL IN THE BENDER,* CHECK TO SEE IF THE EDGE OF YOUR DIE IS STILL LINED UP WITH YOUR MARK. IF IT IS, YOU'RE O.K. IF NOT, IT WILL BE NECESSARY TO CUT ANOTHER PIECE OF TUBING AND REPEAT THE TEST. *THE MARK MUST BE LINED UP WITH THE DIE IN ORDER TO GET ACCURATE INFORMATION.*

IT WILL BE NECESSARY TO CHECK YOUR BEND WITH A CARPENTER'S SQUARE TO VERIFY THAT YOUR 90 DEGREE BEND IS ACCURATE.

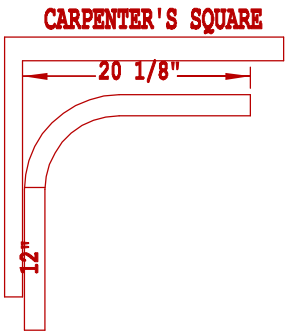
IF YOU OVER BEND, SIMPLY INSTALL THE TUBE IN A VISE AND YOU WILL BE ABLE TO PULL IT BACK VERY EASILY. IF IT IS NOT BENT ENOUGH, IT WILL BE NECESSARY TO RE-INSTALL THE TUBE IN THE BENDER TO FINISH THE BEND.

STEP 5



WE NOW HAVE A COMPLETED 90 DEGREE BEND. USE YOUR CARPENTER'S SQUARE AS SHOWN IN STEP 5 TO TAKE YOUR FIRST MEASURMENT. IN THIS TEST OUR 12 INCH SIDE IS NOW 21 INCHES.

STEP 6



OUR SECOND MEASUREMENT AS SHOWN IN STEP 6 SHOWS THAT OUR 24" SIDE IS NOW 20 1/8".

WHAT THIS TEST HAS SHOWN US IS THAT WHEN INSTALLED IN THE BENDER USING 1 3/4"X 7"R DIE SET, IT HAS SHORTENED UP THE 24" SIDE 3 7/8" AND ADDED 9" TO THE 12" SIDE.

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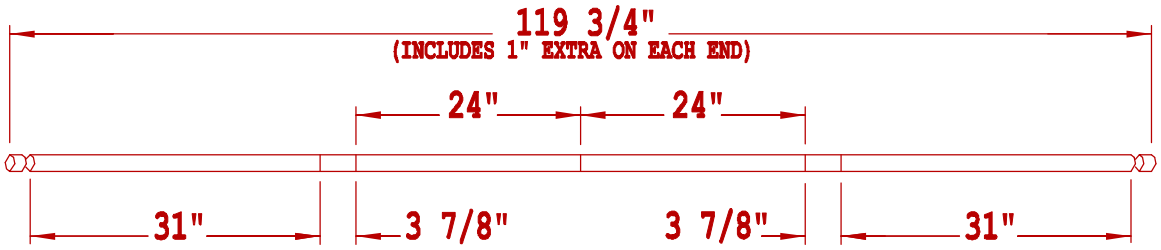
BENDING INSTRUCTIONS

STEP 7

WE ARE NOW READY TO START A BENDING PROJECT. IN OUR EXAMPLE WE WILL FABRICATE THE MAIN HOOP FOR THE ROLLBAR ON A RACE CAR. WE USE THIS PROJECT BECAUSE IT IS A JOB REQUIRING MULTIPLE BENDS AND CLOSE TOLERANCES. WE ARE USING 1 3/4" TUBING, AND WE WANT AN OVERALL WIDTH OF 48" AND AN OVERALL HEIGHT OF 40" WHEN COMPLETED.



A. DRAW A PICTURE OF A PIECE OF TUBING.

B. WE KNOW WE WANT A WIDTH OF 48".

C. MARK TUBE IN CENTER.

D. 1/2 OF 48" IS 24". MEASURE FROM THE CENTER OF THE TUBE TO THE RIGHT 24" AND MARK THE TUBE. MEASURE FROM THE CENTER OF THE TUBE TO THE LEFT 24" AND MARK THE TUBE.

E. ADD ON 3 7/8" ON EACH SIDE, BECAUSE WE KNOW THAT IT WILL SHORTEN UP THIS AMOUNT.

F. WE WANT A DOWN LEG OF 40" AND FROM OUR TEST BEND WE REALIZE IT WILL ADD 9". THEREFORE OUR FINAL DIMENSION WOULD BE 31" TO EACH SIDE.

G. *IMPORTANT!* IT IS MUCH BETTER FOR YOUR FINISHED ROLLBAR TO BE A LITTLE LONG ON THE DOWN LEGS THAN A LITTLE SHORT. FOR SAFETY'S SAKE, ADD 1" ADDITIONAL TO EACH END OF THE TUBE. THIS WILL CHANGE 31" FIGURE ON EACH END TO 32". IT IS MUCH EASIER TO CUT OFF A SMALL PIECE THAN TO HAVE TO WELD A PIECE ON.

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