

# Pro-Tools

MADE IN THE U.S.A.

## HB-302 BENDER INSTRUCTION SET



**PRO-TOOLS**  
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**[www.pro-tools.com](http://www.pro-tools.com)**

# HB-302 BENDER INSTRUCTION SET

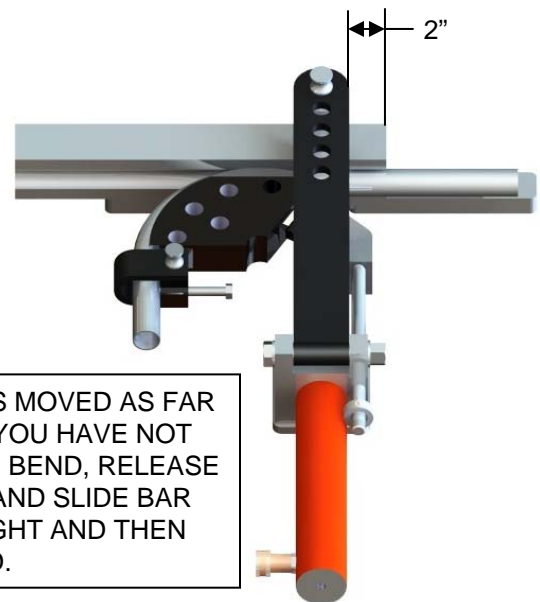
**DANGER**  
**PLEASE READ**



**NEVER DO THIS!!!**

NEVER START BEND WITH THE TUBE TOO SHORT. TUBE MUST ALWAYS EXTEND TO END OF ALUMINUM BAR OR PAST.

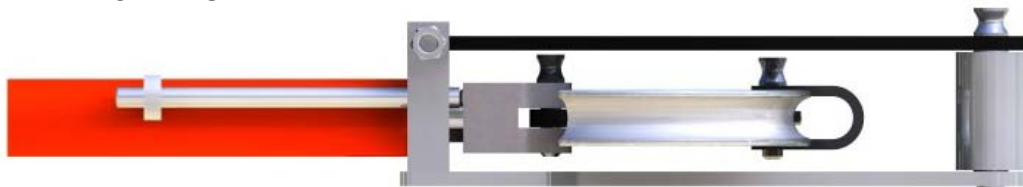
WHEN BENDING NEVER LET ALUMINUM BAR GO ANY FARTHER THAN SHOWN BELOW.



2"

IF YOUR BAR HAS MOVED AS FAR AS SHOWN AND YOU HAVE NOT COMPLETED THE BEND, RELEASE THE PRESSURE AND SLIDE BAR BACK TO THE RIGHT AND THEN FINISH THE BEND.

**DANGER**  
THIS BENDER OPERATES UNDER 15 TONS OF PRESSURE. PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY!

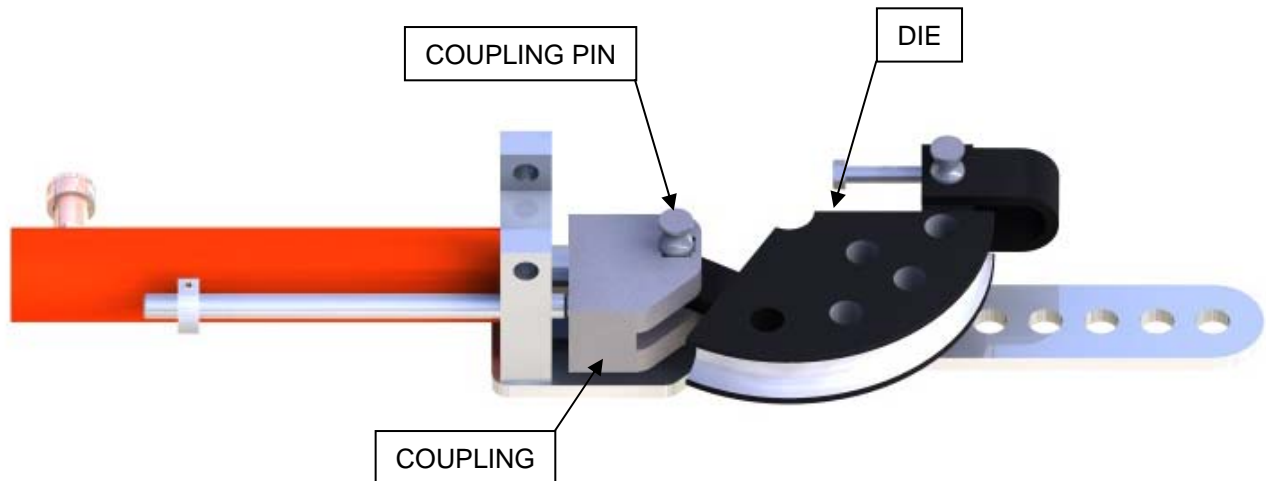


ALWAYS BE SURE THAT THE PIN PROTRUDES THROUGH LOWER PLATE, AS SHOWN.

# HB-302 BENDER DIE INSTALLATION

## STEP 1

INSTALL DIE IN COUPLING AND INSERT PIN THROUGH BOTH. (NOTE) THIS IS THE ONLY PIVOT AND ALL OF THE FORCE IS EXERTED THERE. THIS POINT MUST BE WELL LUBRICATED AT ALL TIMES. BE SURE TO THOROUGHLY GREASE PIN & CONNECTION. WE RECOMMEND "ALL PURPOSE WHEEL BEARING GREASE".

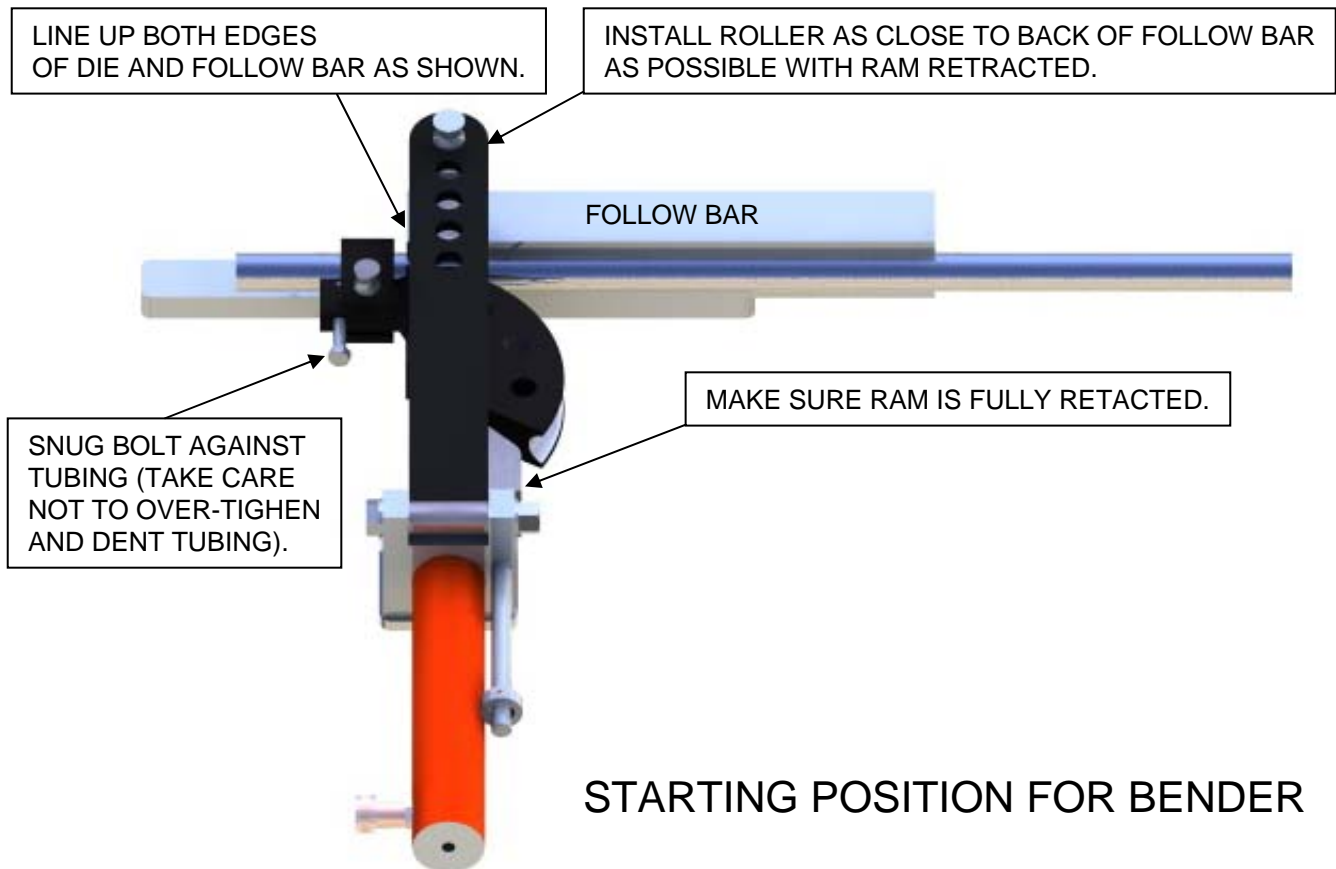


**INSTALL DIE AS SHOWN ABOVE**

PLEASE NOTE: THIS ILLUSTRATION IS FOR DIRECTION PURPOSES AND MAY NOT BE EXACTLY LIKE THE ACTUAL BENDER.

# HB-302 BENDER DIE INSTALLATION

## STEP 2



# HB-302 BENDER

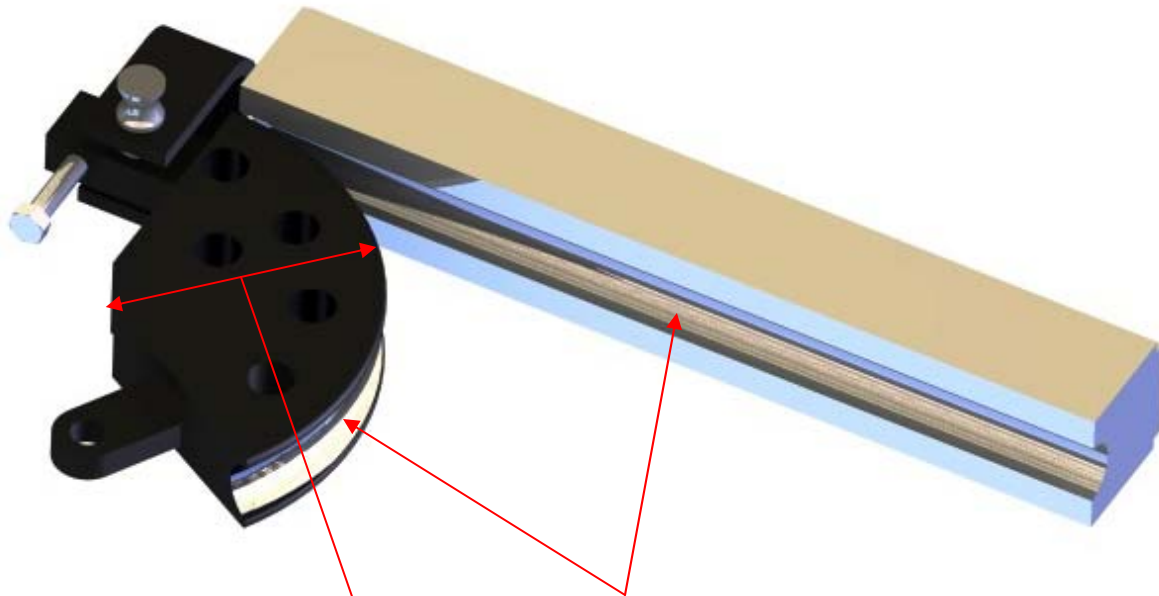
## HELPFUL INFORMATION

**NOTE:**

TO CALCULATE LENGTH OF TUBING USED IN A BEND,  
MULTIPLY RADIUS OF BEND x 6.28 x DEGREE OF BEND,  
THEN DIVIDE BY 360.

**EXAMPLE:**

8 INCH RADIUS, 90 DEGREE BEND WOULD BE:  
 $8 \times 6.28 \times 90/360 = 12.56$



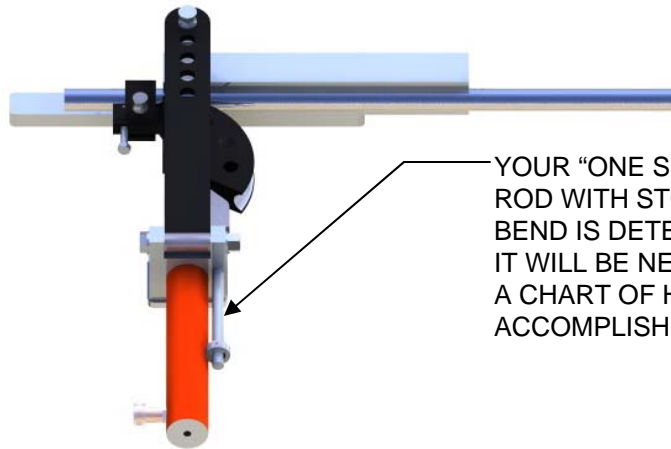
TO MEASURE RADIUS:  
START AT IMAGINARY CENTER OF CUTOUT,  
MEASURE TO EDGE OF DIE.

ABSOLUTELY NO GREASE IN RADIUS. AT  
ALL TIMES TUBING, DIE RADIUS AND BAR  
RADIUS MUST BE CLEAN AND GREASE FREE.

NOTE: ALL ROUND TUBE RADIUS  
MEASUREMENTS ARE "CENTER LINE RADIUS".

# HB-302 BENDER

## MEASURING DEGREE OF BEND



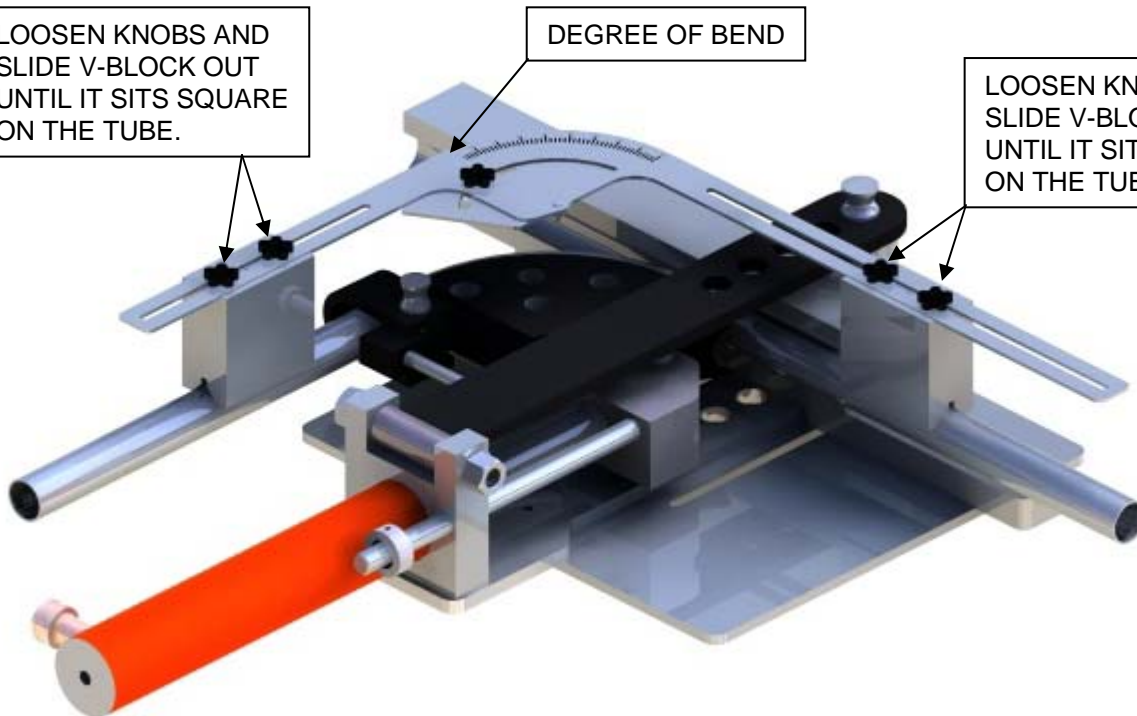
YOUR "ONE SHOT" BENDER IS EQUIPPED WITH A TRAVEL ROD WITH STOP. ON THIS TYPE OF BENDER, DEGREE OF BEND IS DETERMINED BY INCHES OF TRAVEL ON THE ROD. IT WILL BE NECESSARY TO "DEGREE" EACH DIE AND MAKE A CHART OF HOW MUCH TRAVEL IS NECESSARY TO ACCOMPLISH YOUR BEND.

THE ILLUSTRATION BELOW SHOWS OUR PART #302DI DEGREE INDICATOR MOUNTED ON THE BENDER.

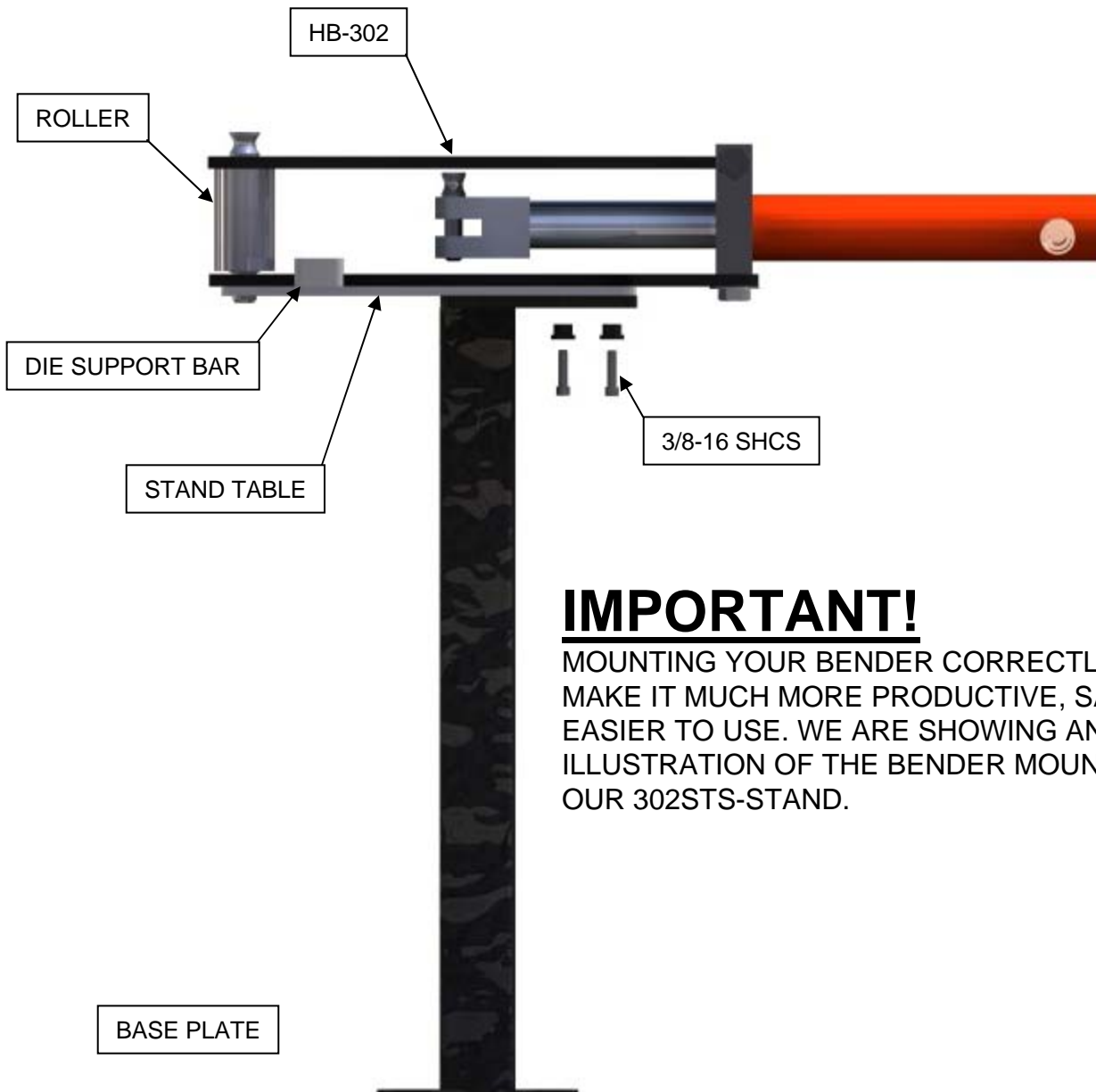
LOOSEN KNOBS AND SLIDE V-BLOCK OUT UNTIL IT SITS SQUARE ON THE TUBE.

DEGREE OF BEND

LOOSEN KNOBS AND SLIDE V-BLOCK OUT UNTIL IT SITS SQUARE ON THE TUBE.



# HB-302 BENDER STAND INSTRUCTIONS

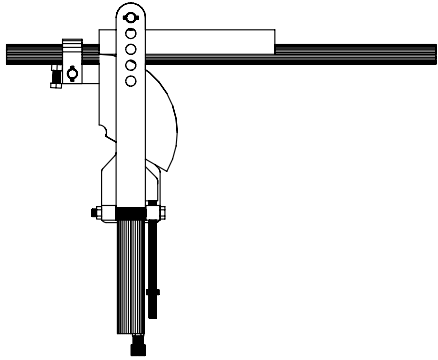


## **IMPORTANT!**

MOUNTING YOUR BENDER CORRECTLY WILL MAKE IT MUCH MORE PRODUCTIVE, SAFER, & EASIER TO USE. WE ARE SHOWING AN ILLUSTRATION OF THE BENDER MOUNTED ON OUR 302STS-STAND.

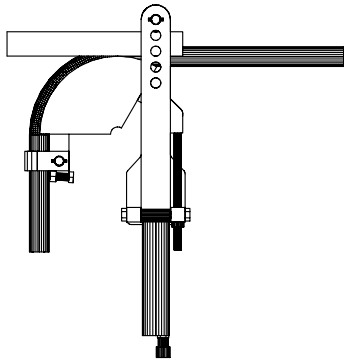
# HOW TO BEND A 180° WITH A "ONE SHOT"

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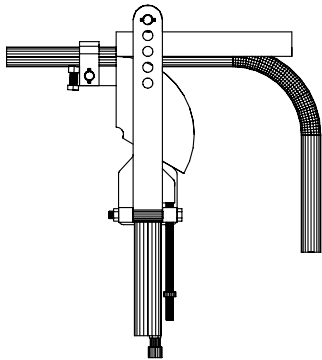
## STEP 1

PLACE TUBING IN STARTING POSITION .



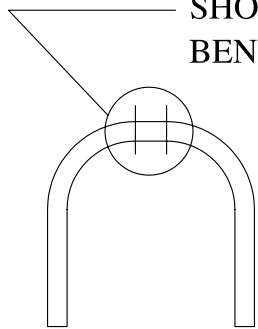
## STEP 2

CREATE FIRST 90° BEND.



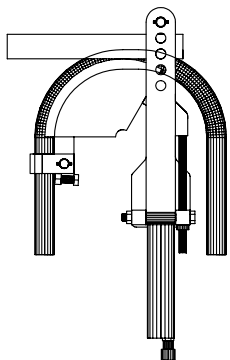
## STEP 3

REMOVE TUBING & INSERT AS SHOWN.  
(NOTE: ON THIS TYPE OF BENDER, IT WILL  
BE IMPOSSIBLE TO FORM A PERFECTLY  
ROUND 180° BEND. IT WILL REQUIRE A  
SHORT STRAIGHT SECTION BETWEEN  
BENDS.)

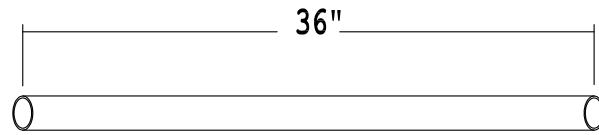


## STEP 4

COMPLETE BEND TO 180°.



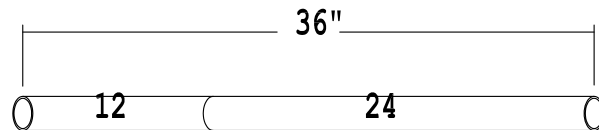
THE NEXT FEW PAGES WILL SHOW YOU HOW TO DO A TEST BEND AND HOW TO INTERPRET THE INFORMATION SO YOU WILL BE ABLE TO MAKE ACCURATE BENDS.



## 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.

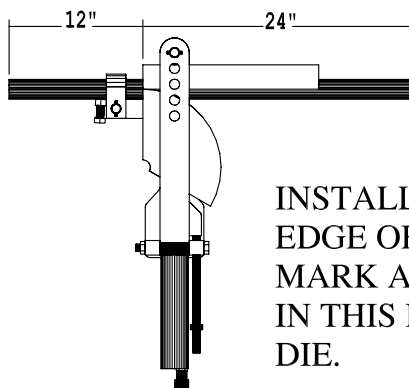
*NOTE: EACH SIZE OF TUBING BENDS AND STRETCHES AND USES A DIFFERENT AMOUNT OF TUBING IN THE BEND, SO IT WILL BE IMPORTANT TO LOG THE RESULTS FROM EACH TEST.*



## STEP 2

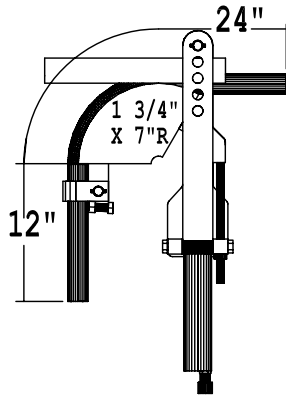
TAKE THE 36" PIECE OF TUBING & MEASURE FROM YOUR LEFT BACK TO YOUR RIGHT EXACTLY 12" & MARK THE TUBE. ALSO MARK THE TUBE 12 & 24 AS SHOWN SO THERE WILL BE NO MISTAKING WHICH END IS WHICH AFTER YOU MAKE THE BEND.

## STEP 3



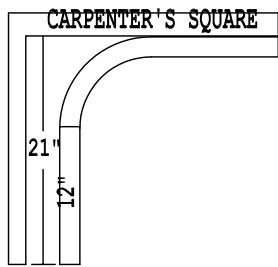
INSTALL THE TUBE IN THE BENDER AND POSITION THE EDGE OF THE DIE EXACTLY IN THE CENTER OF THE MARK AS SHOWN, THEN MAKE A 90° BEND. IN THIS EXAMPLE, WE ARE USING A 1 3/4" x 7" TUBIUNG DIE.

## STEP 4



(IMPORTANT) WITH YOUR TUBE BENT TO 90°, 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.

## STEP 5

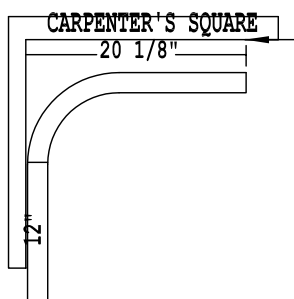


IT WILL BE NECESSARY TO CHECK YOUR BEND WITH A CARPENTER'S SQUARE TO VERIFY THAT YOUR 90° BEND IS ACCURATE.

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.

WE NOW HAVE A COMPLETED 90° BEND. USE YOUR CARPENTER'S SQUARE AS SHOWN IN STEP 5 TO TAKE YOUR FIRST MEASUREMENT. IN THIS TEST OUR 12\" SIDE IS NOW 21\".

## STEP 6

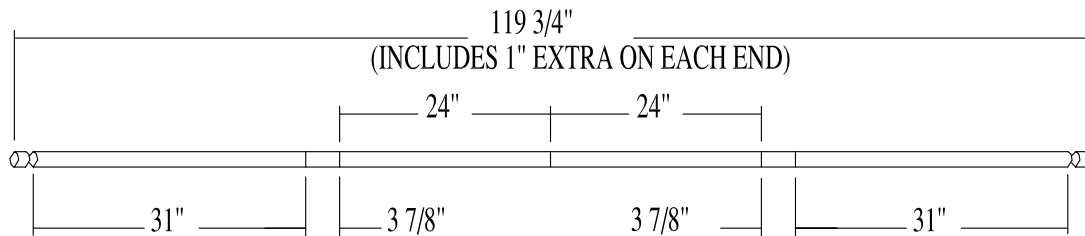


OUR SECOND MEASUREMENT AS SHOWN IN STEP 6 SHOWS THAT OUR 24\" SIDE IS NOW 20 1/8\".

WHAT THIS TEST HAS SHOWN US IS THAT WHEN INSTALLED IN THE BENDER USING 1 3/4\" x 7\" DIE SET, IT HAS SHORTENED UP THE TOP PART OF THE TUBE 3 7/8\" AND ADDED 9\" TO OUR DOWN LEG.

## 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.



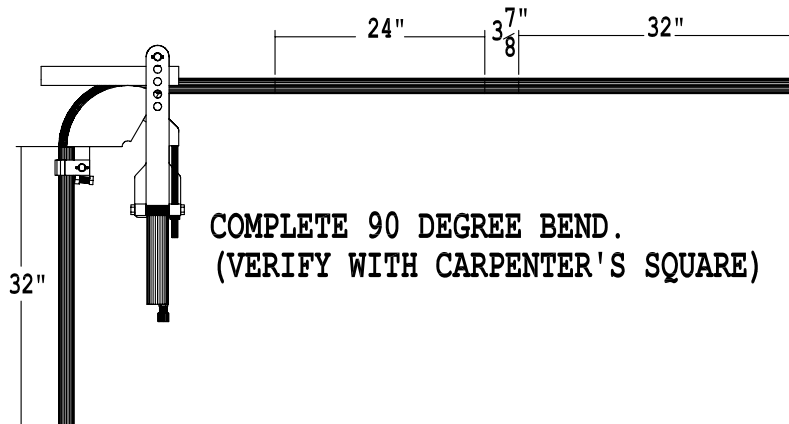
- A. DRAW A PICTURE OF A PIECE OF TUBING.
- B. WE KNOW WE WANT A WIDTH OF 48".
- C. MARK TUBE IN CENTER.
- D.  $1/2$  OF 48" IS 24". MEASURE FROM THE CENTER OF THE TUBE TO THE RIGHT 24" AND MARK THE TUBE. MEASURE FROM THE CENTER OF THE TUBE TO THE LEFT 24" AND MARK THE TUBE.
- E. ADD ON  $3 \frac{7}{8}"$  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 HAVE TO WELD A PIECE ON.

# STEP 8



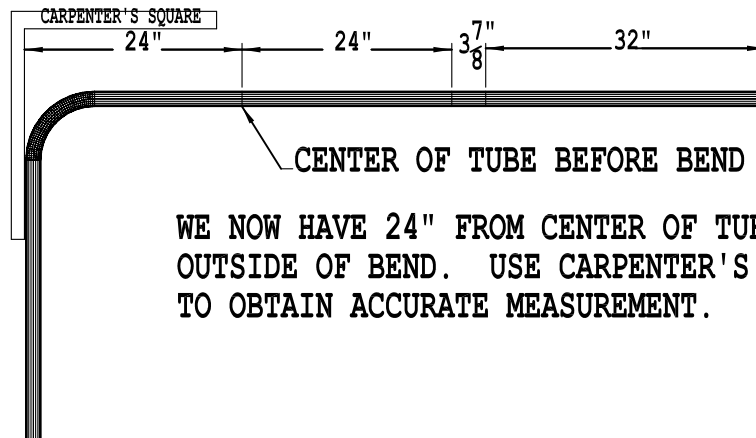
A.

INSTALL TUBING AS SHOWN.



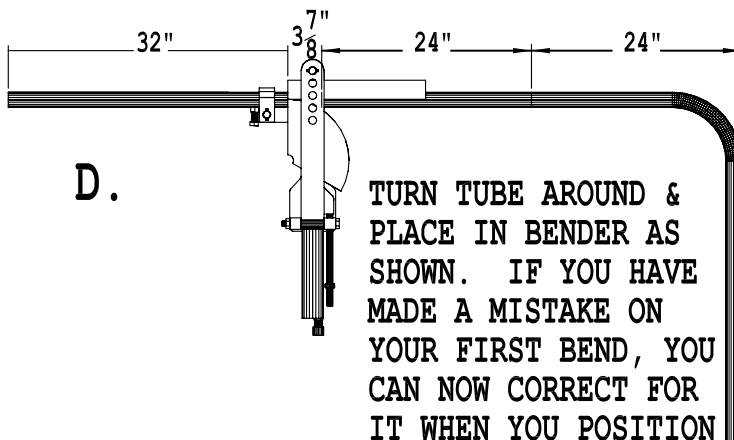
B.

COMPLETE 90 DEGREE BEND.  
(VERIFY WITH CARPENTER'S SQUARE)



C.

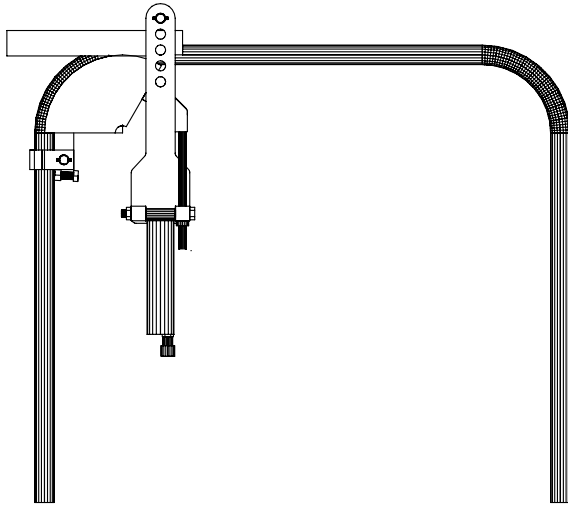
WE NOW HAVE 24" FROM CENTER OF TUBE TO  
OUTSIDE OF BEND. USE CARPENTER'S SQUARE  
TO OBTAIN ACCURATE MEASUREMENT.



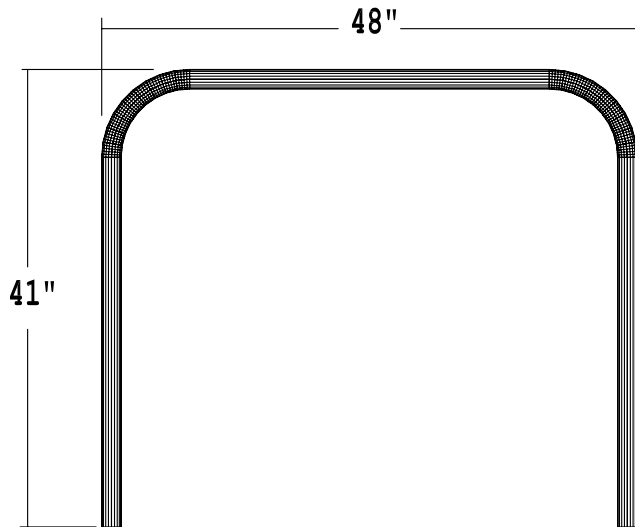
D.

TURN TUBE AROUND &  
PLACE IN BENDER AS  
SHOWN. IF YOU HAVE  
MADE A MISTAKE ON  
YOUR FIRST BEND, YOU  
CAN NOW CORRECT FOR  
IT WHEN YOU POSITION  
FOR THE LAST BEND.

# STEP 9



COMPLETE SECOND 90 DEGREE BEND .



WE NOW HAVE OUR ROLLBAR COMPLETED AND IT MEASURES 48" WIDE AND 41" HIGH. REMEMBER, EXTRA TUBING WAS FIGURED IN ON OUR DOWN LEGS ON PURPOSE AS A SAFETY FACTOR AND BECAUSE IT IS EASIER TO CUT A LITTLE OFF THAN TO HAVE TO ADD SOME ON.

## PLEASE NOTE:

WE HAVE VERY SIMPLE COMPUTER PROGRAMS AVAILABLE THAT WILL LAY YOUR JOB OUR FOR YOU, IF YOUR BENDING REQUIREMENTS BECOME TOO COMPLEX.

*WE APPRECIATE YOU PURCHASING A PRO BENDER AND BELIEVE IF YOU FOLLOW THE DIRECTIONS, WITH A LITTLE PRACTICE, YOU'LL BE PRODUCING PROFESSIONAL, ACCURATE BENDS EASILY.*

# HB-302 BENDER

## WARRANTY POLICY

ALL PRODUCTS **PRO-TOOLS** MANUFACTURES CARRY A ONE YEAR GUARANTEE AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP. (PRODUCTS THAT WE SELL BUT DO NOT MAKE ARE COVERED UNDER THAT MANUFACTURING WARRANTY PLAN). ANY TOOLS OR PARTS THAT FAIL ARE 100% COVERED UNDER THE WARRANTY AND WILL BE REPAIRED FREE OF CHARGE (EXCLUDING FRIEGHT CHARGES). MISUSE OR ABUSE IS NOT COVERED. SIMPLY CALL AND GET A WARRANTY AUTHORIZATION NUMBER AND IT WILL BE PROMPTLY AND CHEERFULLY TAKEN CARE OF.



### SAFETY WARNINGS



- ALWAYS READ AND UNDERSTAND DIRECTIONS THAT ARE INCLUDED WITH ALL PRO-TOOLS EQUIPMENT BEFORE OPERATING. IF DIRECTIONS ARE NOT INCLUDED, CALL PRO-TOOLS IMMEDIATELY.
- USE OF FABRICATION EQUIPMENT MAY PRESENT A PINCH OR CRUSH HAZZARD.
- ALWAYS OPERATE PRO-TOOLS EQUIPMENT WEARING SAFETY EQUIPMENT.
- ALWAYS USE THE CORRECT EQUIPMENT FOR THE PROJECT.
- NEVER USE PIPE BENDING DIES ON A TUBE OR TUBE DIES ON A PIPE.
- KNOW THE MATERIALS YOU ARE USING BEFORE BEGINNING FABRICATION.
- ALWAYS INSPECT EQUIPMENT PRIOR TO USE TO MAKE SURE IT IS IN GOOD WORKING ORDER. IF YOU ARE IN DOUBT, DO NOT USE AND CONTACT PRO-TOOLS.
- NEVER SUBSTITUTE COMPONENTS FROM OTHER EQUIPMENT. MAKE SURE COMPONENTS MATCH.
- NEVER EXCEED THE MANUFACTURER'S SPECIFICATIONS SET BY PRO-TOOLS.
- ALWAYS LUBRICATE METAL ON METAL PARTS!!!!**



## FAQ's

Q: HOW MUCH CAN THE HB-302 BEND A TUBE.

A: THE HMP-200 CAN ONLY GO TO 90 DEGREES.

Q: IS THE BENDER PORTABLE.

A: YES IT CAN BE MOUNTED ON OUR STANDS OR ON ANY ROLLING TABLE.

Q: WHAT IS THE MAXIMUM DIAMETER THIS BENDER WILL DO?

A: THIS BENDER WILL BEND UP TO 2" O.D. ROUND TUBE OR 1.5" SQ.

Q: HOW MANY DEGREES CAN I BEND?

A: YOU CAN BEND UP TO 110 DEGREES MAX. AFTER SPRING BACK.

Q: WHAT TYPE OF MATERIAL CAN I BEND?

A: YOU CAN BEND ALUMINUM, STAINLESS STEEL, DOM, 4130 CHROME MOLY TO NAME A FEW. CONTACT OUR SALES DEPARTMENT FOR SPECIFICS.

Q: CAN THIS BENDER USE OTHER PRO-TOOLS DIES?

A: NO IT CAN NOT. EACH BENDER IS DESIGNED TO USE ITS OWN DIES TO ENSURE THE POSSIBLE BEND.

Q: CAN I USE ELECTRIC INSTEAD OF AIR FOR THE HYDRAULICS.

A: YES YOU CAN CONVERT TO AN ELECTRIC PUMP IF YOU WISH.

Q: HOW DO I MAKE REPEAT BENDS WITH THIS BENDER?

A: THERE ARE TWO WAYS TO DO THIS. 1) CONTACT OUR SALES DEPARTMENT AND ORDER AN AIR CUTOFF SWITCH WHICH WILL ALLOW FOR CONSISTENT REPEAT BENDS. 2) MAKE THE BEND YOU WANT AND BEFORE RELEASING THE TUBE. MOVE THE COLLAR ON THE GUIDE BAR TO UNTIL IT IS NEXT TO THE BLOCK. THIS IS A VISUAL REFERENCE.