

Pro-Tools

MADE IN THE U.S.A.

MB-105 BENDER INSTRUCTION SET



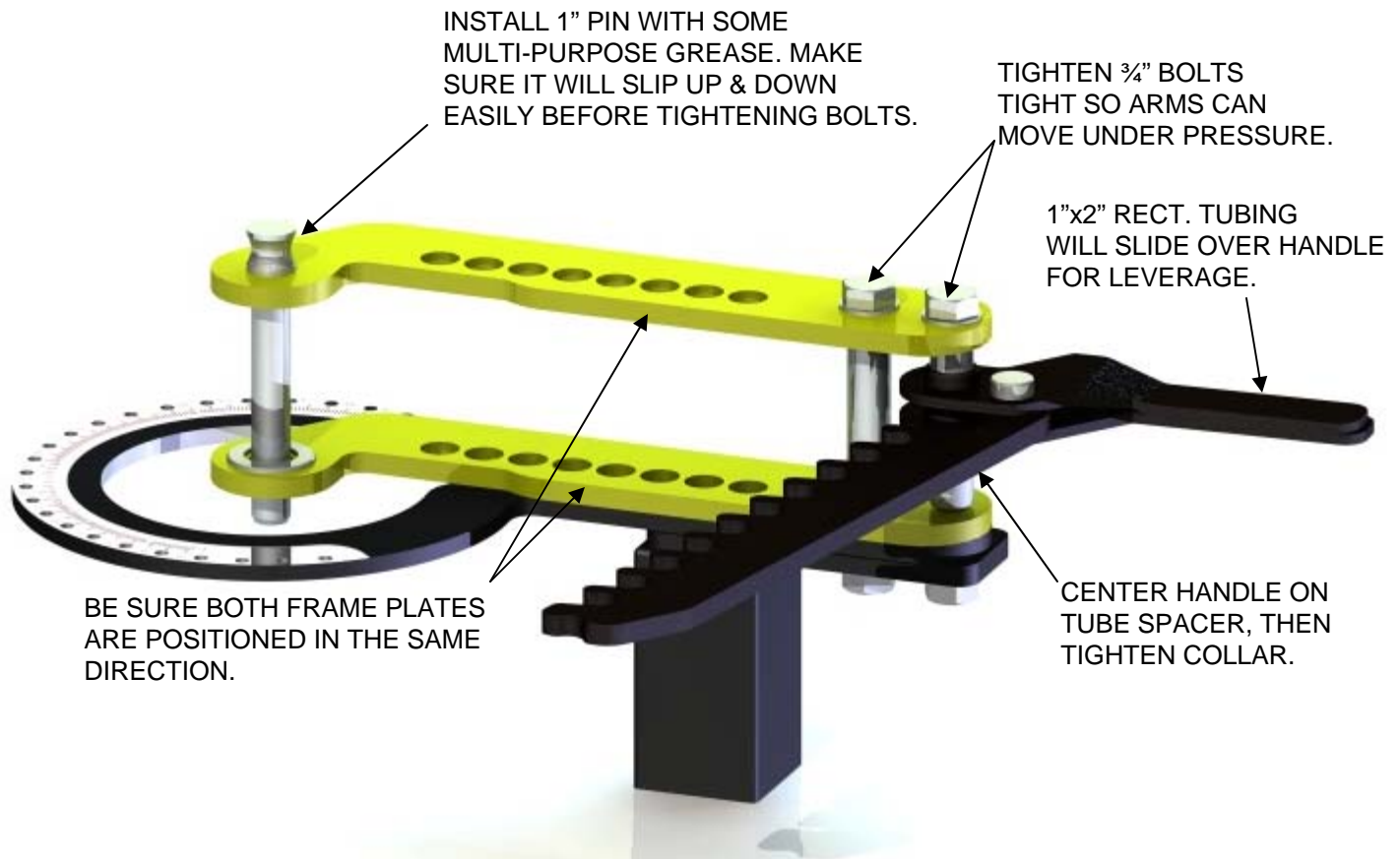
PRO-TOOLS

7616 INDUSTRIAL LANE TAMPA, FLORIDA 33637-6715

813-986-9000 PHONE 813-985-6588 FAX

ASSEMBLY INSTRUCTIONS

IN THE FOLLOWING INSTRUCTIONS WE WILL EXPLAIN THE ASSEMBLY OF THE BENDER. PLEASE READ EVERYTHING, BECAUSE SOME OF THE ITEMS ARE VERY IMPORTANT AND WILL SAVE YOU TIME LATER ON. THE BENDER IS DESIGNED TO BOLT TO A BENCH OR STAND. WE RECOMMEND INSTALLING IT ON A STAND. IT MAKES IT A GREAT DEAL EASIER TO WORK AROUND WITHOUT HAVING ANY OBSTACLES.



IMPORTANT

FRAME PLATES MUST BE ALIGNED PROPERLY TO ALLOW 1" PIN TO SLIP UP & DOWN FREELY.

IMPORTANT

$\frac{3}{4}$ " BOLTS MUST BE VERY TIGHT TO PREVENT ARMS FROM MOVING UNDER PRESSURE.

FRONT VIEW OF FRAME ASSEMBLY

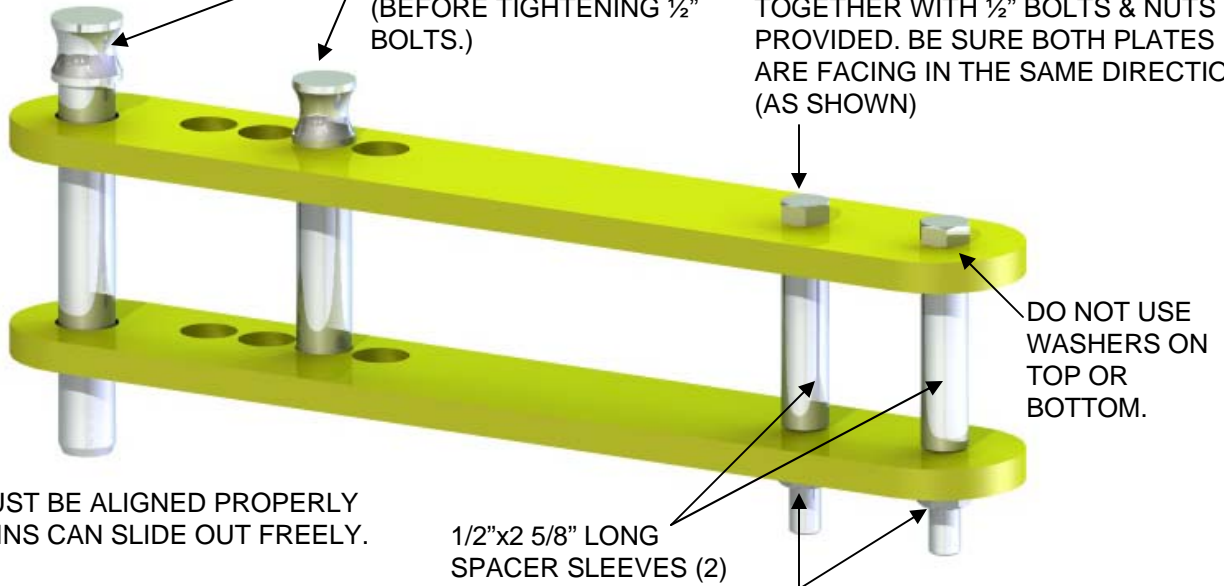
THIS IS THE FIRST STEP OF ASSEMBLY. WHEN COMPLETED MAKE SURE THIS PORTION OF YOUR BENDER IS ASSEMBLED AS SHOWN IN THE ABOVE ILLUSTRATION.

ASSEMBLY INSTRUCTIONS

REMOVE 1" PIN FROM FRAME ASSEMBLY AND INSERT THROUGH END HOLES (AS SHOWN)

INSERT 7/8" PIN AND 1" PIN FOR ALIGNMENT (BEFORE TIGHTENING 1/2" BOLTS.)

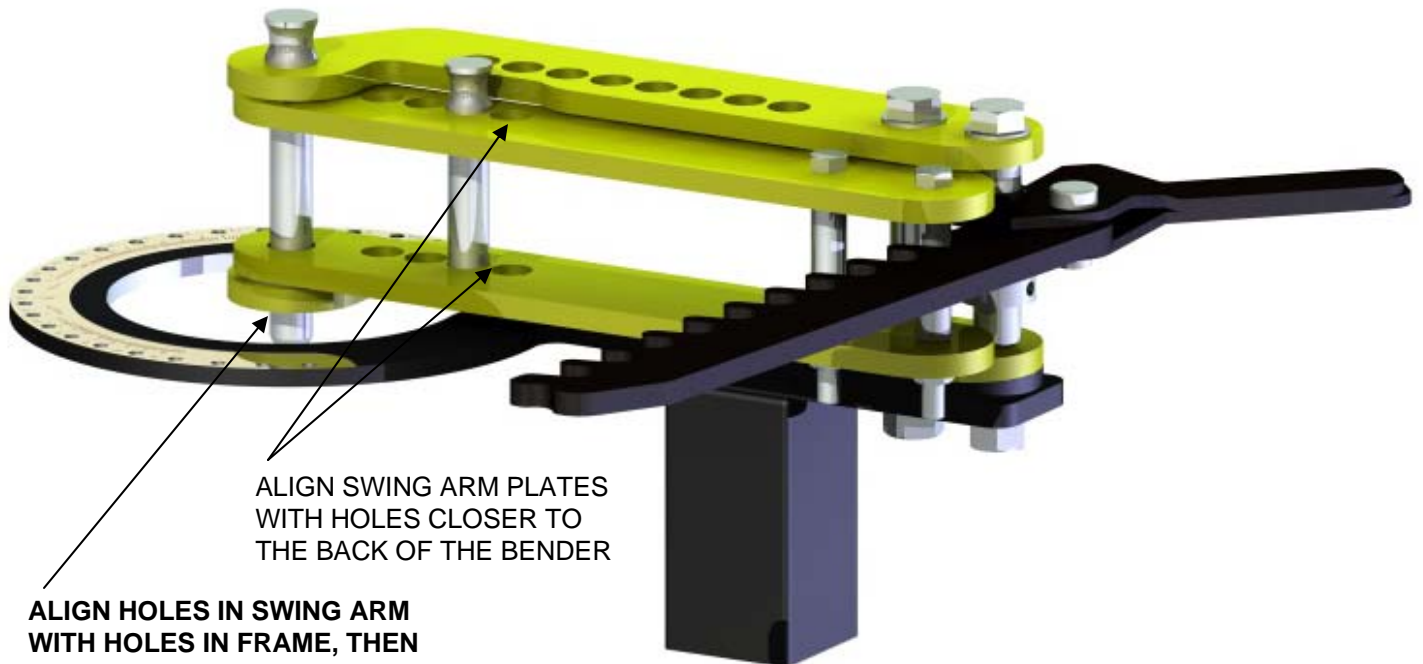
BOLT BOTH SWING ARM PLATES TOGETHER WITH 1/2" BOLTS & NUTS PROVIDED. BE SURE BOTH PLATES ARE FACING IN THE SAME DIRECTION (AS SHOWN)



NOTE:

PLATES MUST BE ALIGNED PROPERLY SO THAT PINS CAN SLIDE OUT FREELY.

SWING ARM ASSEMBLY



ALIGN HOLES IN SWING ARM WITH HOLES IN FRAME, THEN SLIDE PIN THROUGH HOLES. BE SURE TO POSITION SWING ARM WITH THE DRIVE PIN HOLES TOWARD THE INSIDE (AS SHOWN)

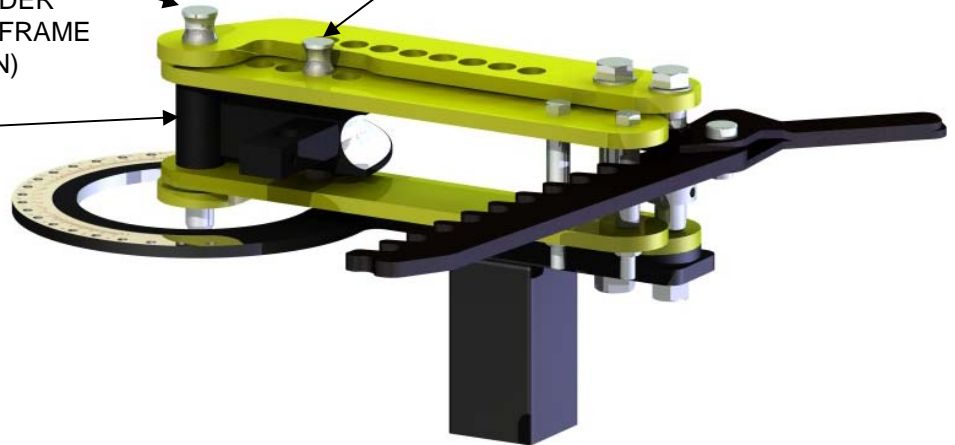
ASSEMBLY INSTRUCTIONS

MAIN DIE INSTALLATION

REMOVE 1" PIN, LUBRICATE PIN AND DIE SLEEVE, PLACE DIE IN BENDER FRAME THEN SLIDE PIN THROUGH FRAME AND DIE SLEEVE (AS SHOWN)

DIE SLEEVE

INSERT PIN THROUGH SWING ARM AND FIRST HOLE OF MAIN DIE.

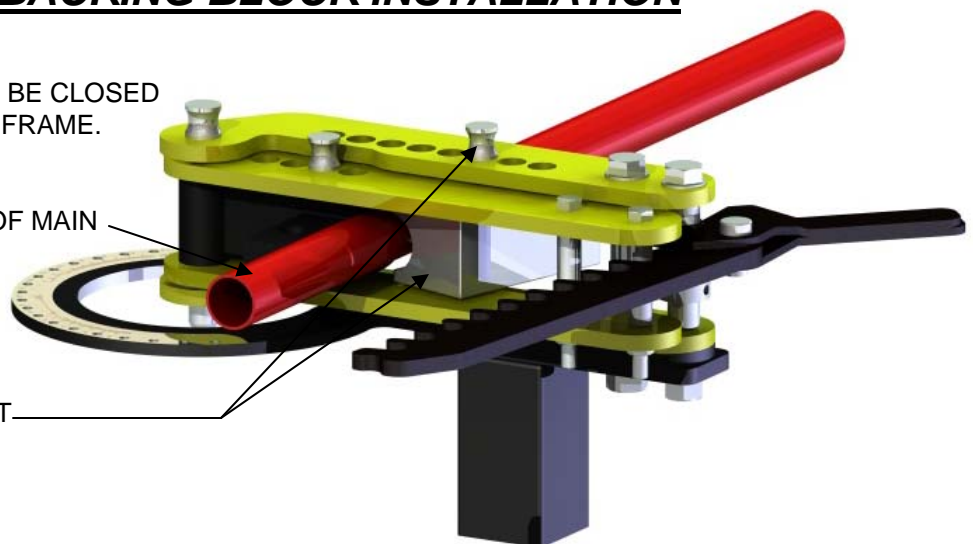


TUBE & BACKING BLOCK INSTALLATION

1. BENDER SWING ARMS MUST BE CLOSED POSITION AGAINST BENDER FRAME.

2. INSERT TUBE INTO RADIUS OF MAIN DIE.

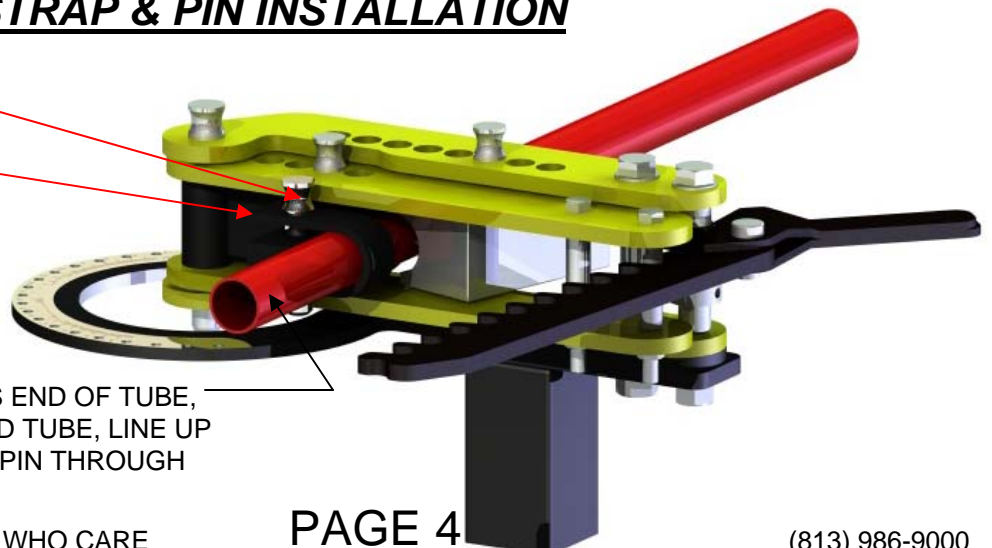
3. PUSH BACKING BLOCK AS TIGHTLY AS POSSIBLE AGAINST TUBE, THEN INSERT PIN THROUGH BENDER FRAME AND BLOCK.



STRAP & PIN INSTALLATION

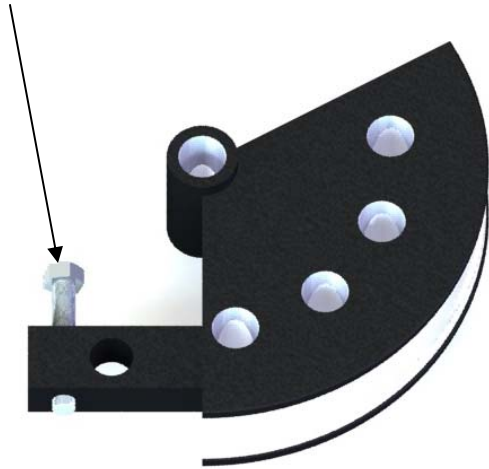
PIN
STRAP

PUSH FIRMLY ON THIS END OF TUBE, PLACE STRAP AROUND TUBE, LINE UP HOLES, THEN INSERT PIN THROUGH STRAP AND DIE TAB.



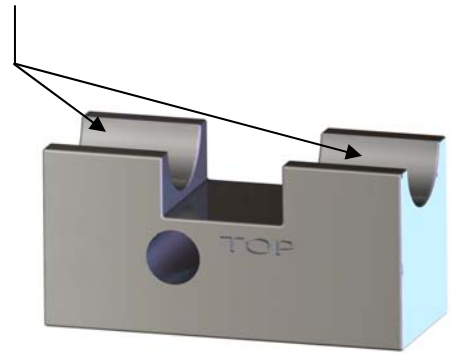
ASSEMBLY INSTRUCTIONS

TIGHTEN LOCKDOWN BOLT SO TUBE WILL NOT SLIP. BE CAREFUL NOT TO OVER-TIGHTEN & DAMAGE TUBE.



RADIUS OF MAIN DIE MUST BE CLEAN. ABSOLUTELY NO GREASE!

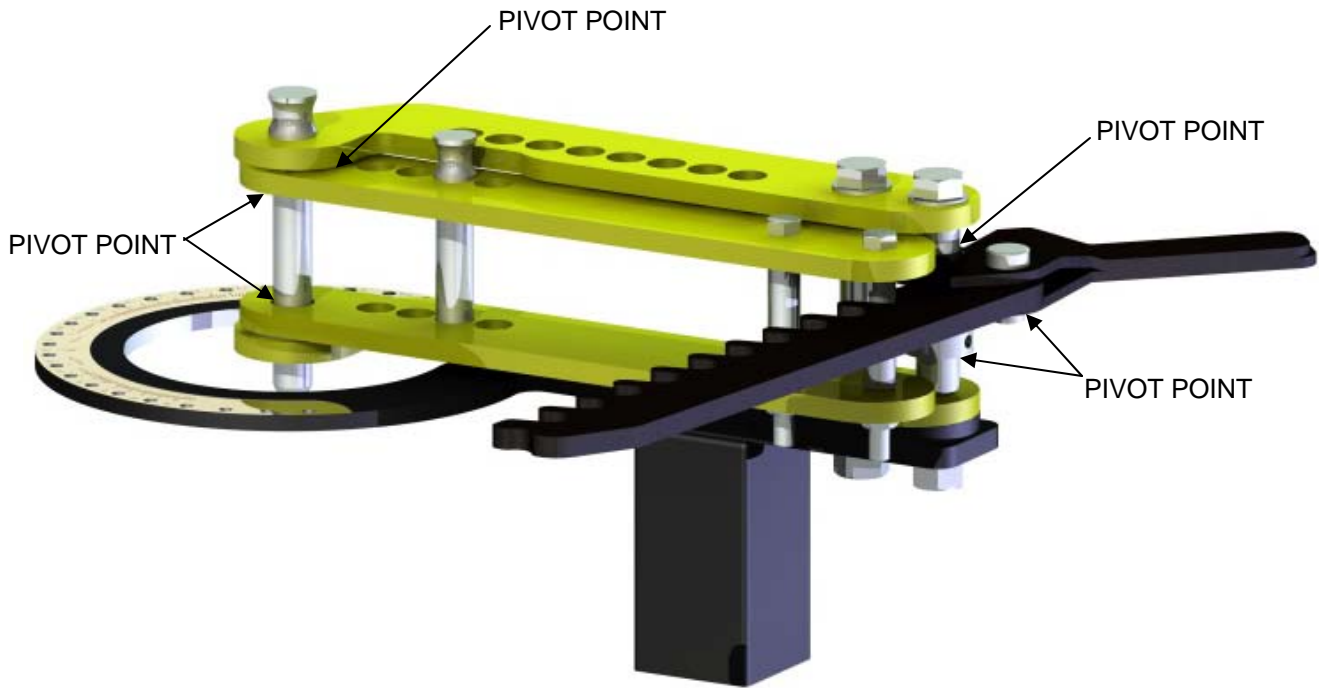
FOR A FRICTION-FREE BEND, ALWAYS LUBRICATE THE BACKING BLOCK. ALL PURPOSE WHEEL BEARING GREASE WORKS VERY WELL.



NOTE:

YOUR BACKING BLOCK HAS "TOP" STAMPED ON IT. THIS MUST ALWAYS FACE UP.

BACKING BLOCKS WILL VARY IN SHAPE & DESIGN. THE BLOCK SHOWN ABOVE IS JUST ONE EXAMPLE.



LUBRICATE ALL PIVOT POINTS TO PREVENT EXCESS WEAR AND TO INCREASE EASE OF BENDING.

BENDING INSTRUCTIONS

ENGAGE RATCHET AS SHOWN.
PULL HANDLE IN DIRECTION
OF ARROW.



FIG. A

CONTINUE TO WORK THE RATCHET
UNTIL YOU HAVE REACHED THE END,
AS SHOWN IN FIG. C.

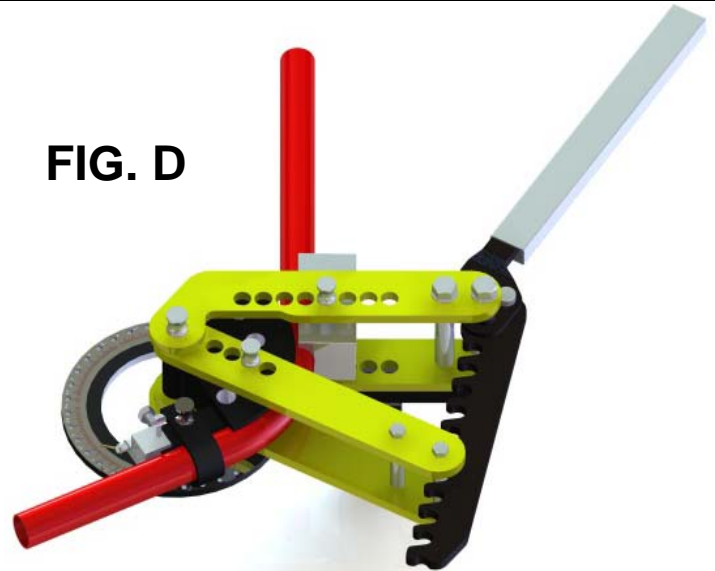


FIG. B



FIG. C

FIG. D



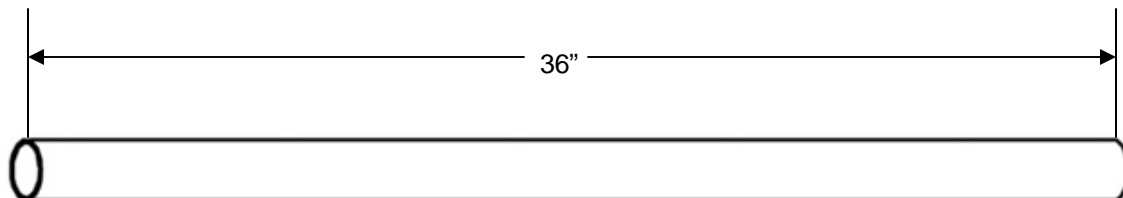
WHEN YOU HAVE BENT THE TUBING AS MUCH AS
THE FIRST POSITION WILL ALLOW, DISENGAGE THE
RATCHET & REMOVE THE 7/8" DRIVE PIN. ROTATE
THE SWING ARM COUNTER-CLOCKWISE UNTIL THE
DRIVE PIN CAN BE REINSTALLED THROUGH
ANOTHER HOLE IN THE BENDING DIE. BE CAREFUL
NOT TO MOVE THE TUBE. NOW REPEAT THE ABOVE
BENDING SEQUENCE UNTIL THE DESIRED DEGREE
OF BEND IS OBTAINED.

BENDING INSTRUCTIONS

IN THE NEXT FEW PAGES, WE ARE GOING 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 THEIR BENDER IS A MANDREL BENDER AND IT DOES NOT USE INSIDE MANDRELS, **BEWARE!!!** TRUE MANDREL BENDERS ARE EXTREMELY EXPENSIVE.

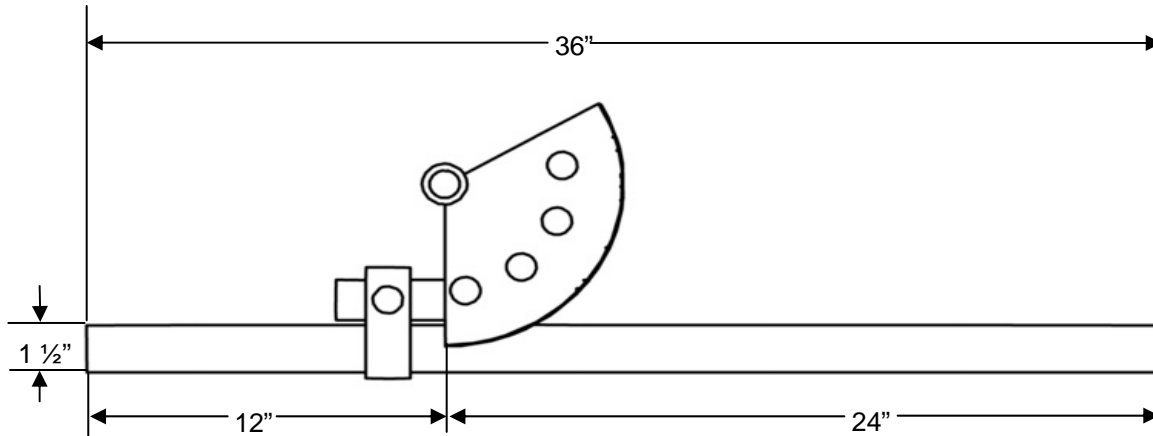


STEP1 THE TUBING FOR OUR TEST IS 1 1/2" x 36" LONG. ONLY ONE PIECE IS NECESSARY TO GIVE YOU ALL THE INFORMATION YOU WILL NEED TO MAKE ACCURATE BENDS. IT IS A GOOD IDEA TO KEEP A NOTEBOOK TO LOG YOUR INFORMATION ON THE TEST BEND. IT WILL BE NECESSARY TO RUN THE SAME TEST FOR EACH SIZE TUBING YOU PLAN TO BEND.

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

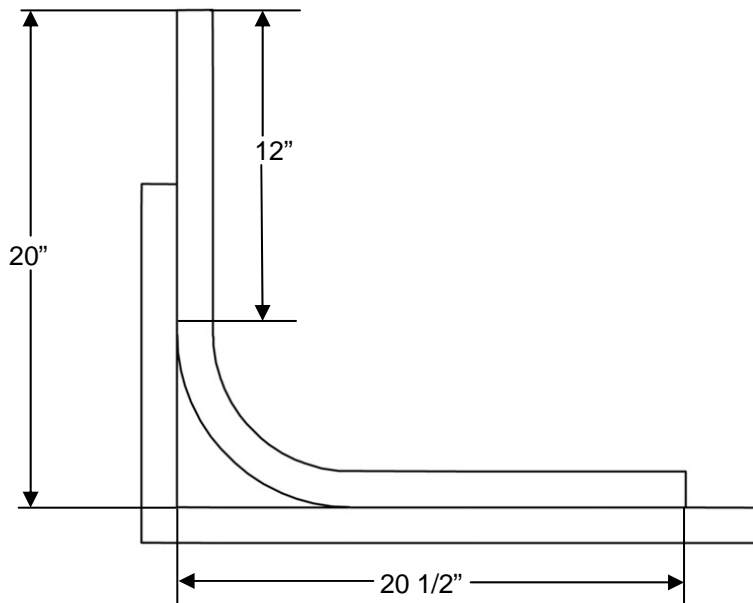
ALSO, ALWAYS KEEP ALL PINS AND ANY "METAL TO METAL" PARTS ON THE BENDER WELL LUBRICATED. THIS WILL GREATLY REDUCE THE AMOUNT OF FORCE NEEDED TO OPERATE THE RATCHET, AND WILL ALSO PREVENT UNNECESSARY WEAR.

BENDING INSTRUCTIONS



STEP 2 TAKE THE 36" LONG PIECE OF TUBING AND MEASURE EXACTLY 12" FROM THE LEFT TO RIGHT. THEN MARK THE TUBE IN THE BENDER AND POSITION THE EDGE OF THE DIE EXACTLY IN THE CENTER OF THE MARK, AS SHOWN IN THE EXAMPLE. THEN MAKE A 90 DEGREE BEND. USE A CARPENTER'S SQUARE TO MAKE SURE YOU HAVE A PERFECT 90 DEGREE BEND. IF YOU OVERBEND, SIMPLY PLACE THE TUBE IN A VISE AND PULL IT BACK TO 90 DEGREES. IF IT IS NOT BENT ENOUGH, PUT THE TUBE BACK IN THE BENDER AND FINISH THE BEND. **IMPORTANT:** WITH YOUR TUBE BENT TO 90 DEGREES, BUT STILL IN THE BENDER, CHECK TO SEE IF THE EDGE OF THE DIE IS STILL LINED UP WITH YOUR MARK. IF IT IS, YOUR OK, 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 FOR YOU TO GET ACCURATE INFORMATION ON YOUR TEST.**

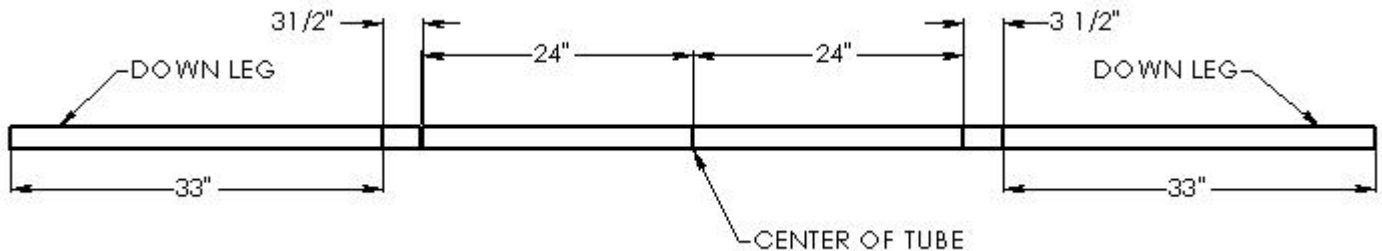
STEP 3 IN STEP 3 WE HAVE FINISHED THE BEND AND TAKEN A MEASUREMENT BY PLACING A CARPENTER'S SQUARE AGAINST THE BACK OF THE TUBING THEN RUNNING OUR RULER FROM THE SQUARE TO EACH END OF THE TUBING. IN THIS EXAMPLE WE ARE USING 1 1/2" TUBING AND A 6" RADIUS DIE. WE SEE THE SIDE WITH OUR 12" MARK IS NOT 20" LONG, AND THE 24" SIDE IS 20 1/2" LONG. WE HAVE GAINED 8" ON THE 12" SIDE AND LOST 3 1/2" ON THE 24" SIDE. IN THE NEXT FEW STEPS WE WILL SHOW YOU HOW TO APPLY THIS KNOWLEDGE TO YOUR PROJECT.



BENDING INSTRUCTIONS

STEP 4

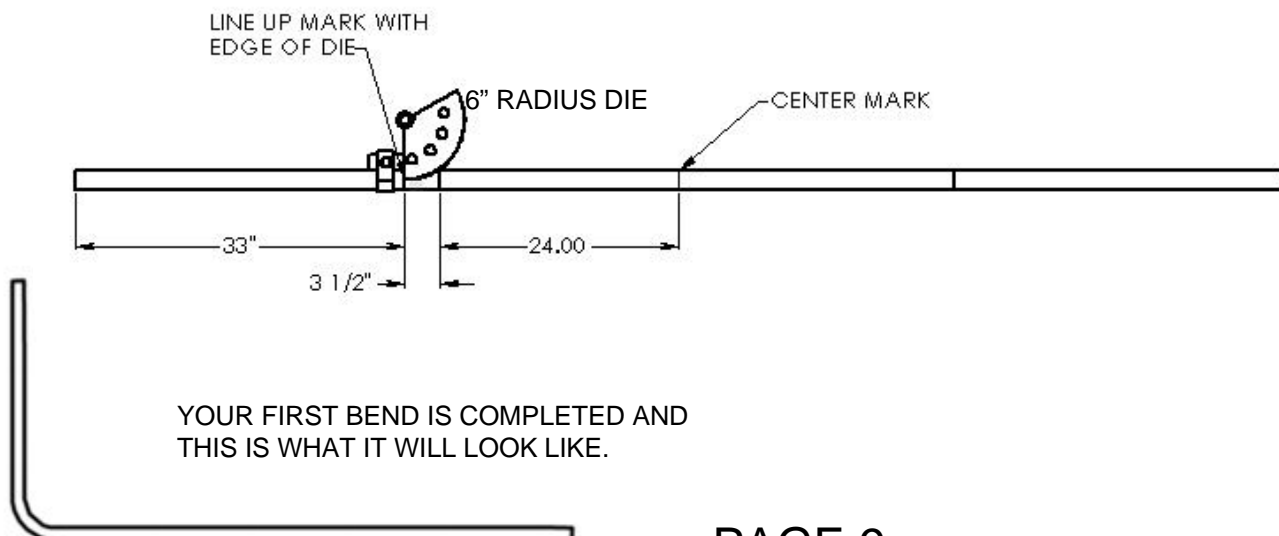
WE ARE NOW READY TO START A BENDING PROJECT. IN OUR EXAMPLE WE WILL FABRICATE THE MAIN HOOP FOR THE ROLLBAR ON A RACE CAR. WE USE THIS PROJECT BECAUSE IT IS A JOB REQUIRING MULTIPLE BENDS AND CLOSE TOLERANCES. WE ARE USING 1 1/2" TUBING, AND WE WANT A WIDTH OF 48" AND A HEIGHT OF 40" WHEN COMPLETED.



- 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 1/2" 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 WE KNOW THE BEND WILL ADD 8" TO THE LEG. IN THIS PROJECT WE WILL NEED 32" OF TUBING ON EACH END, BUT HAVE ADDED AN EXTRA INCH FOR A SAFTEY FACTOR. IT IS BETTER TO CUT A SMALL AMOUNT OFF THAN TO HAVE YOUR TUBE COME UP SHORT.

STEP 5

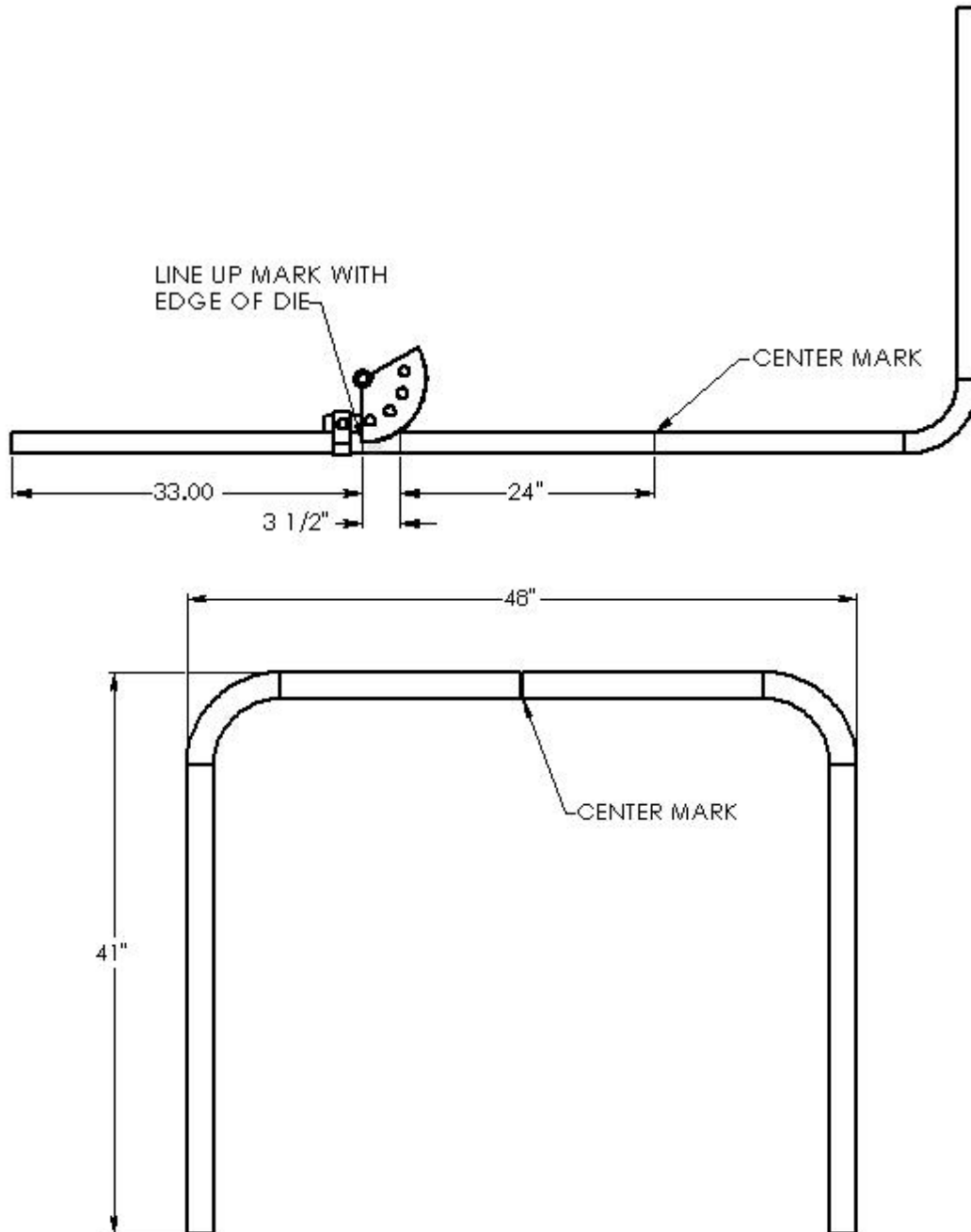
LINE UP TUBING IN BENDER AS SHOWN AND MAKE THE FIRST BEND.



BENDING INSTRUCTIONS

STEP 6

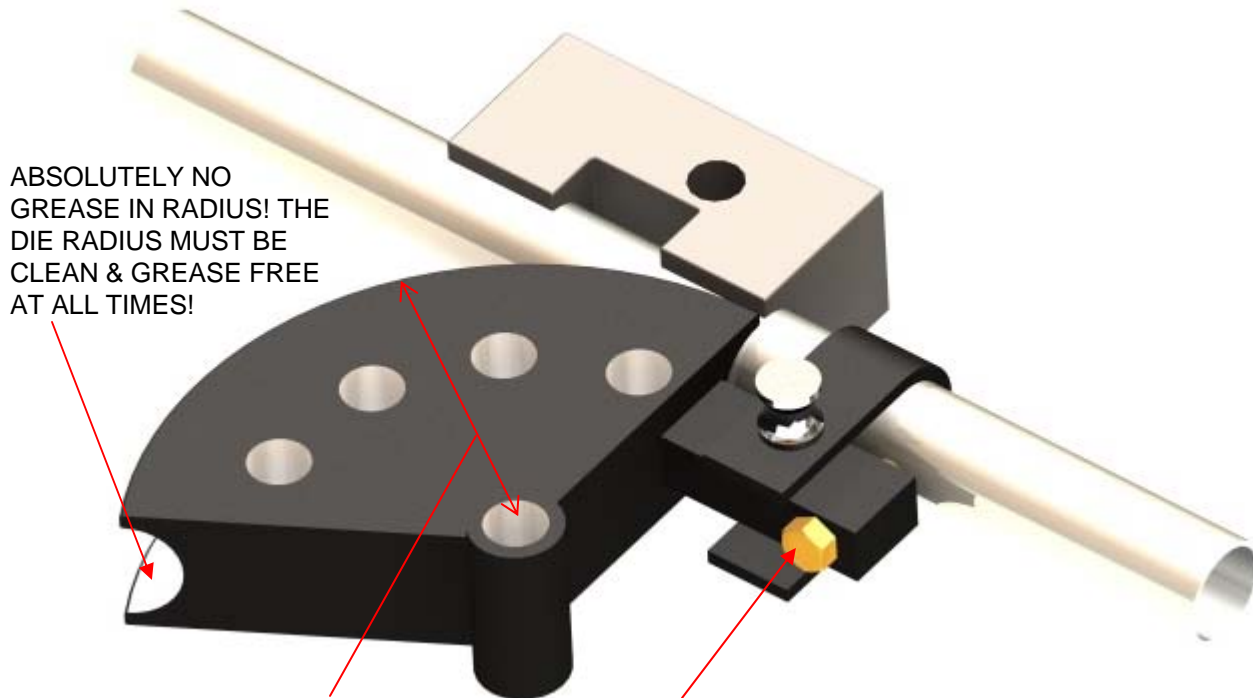
INSTALL TUBING IN BENDER AS SHOWN AND COMPLETE THE LAST BEND.



AT THIS POINT YOUR ROLLBAR IS COMPLETE, BUT WE WOULD LIKE TO OFFER A REMINDER. ALWAYS WORK ALL BENDS OFF THE CENTER MEASUREMENT BECAUSE DIFFERENT METALS STRETCH DIFFERENTLY & IF YOU MAKE A MISTAKE ON THE FIRST BEND YOU CAN MAKE AN ADJUSTMENT ON THE SECOND BEND TO CORRECT THE PROBLEM.

HELPFUL INFORMATION

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



ABSOLUTELY NO GREASE IN RADIUS! THE DIE RADIUS MUST BE CLEAN & GREASE FREE AT ALL TIMES!

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

TIGHTEN BOLT SO TUBE WILL NOT SLIP

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:

6 INCH RADIUS, 90 deg. BEND WOULD BE:
 $6 \times 6.28 \times 90 / 360 = 9.42$

IMPORTANT! LUBRICATING ALL PINS AND "METAL TO METAL" SURFACES WITH ALL PURPOSE BEARING GREASE WILL GREATLY REDUCE THE EFFORT NECESSARY TO OPERATE THE BENDER AND AT THE SAME TIME WILL GREATLY INCREASE THE OVERALL LIFE OF THE BENDER.

REMEMBER, GREASE IS OKAY EVERYWHERE EXCEPT IN THE RADIUS OF THE MAIN DIE.

THE MAIN DIE MUST REMAIN DRY AT ALL TIMES OR THE TUBING COULD SLIP AND KINK.

PLEASE NOTE:

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

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

EXTENSION BAR USES

SOME SMALL DIES ARE TOO SMALL TO DRILL DRIVE HOLES. IN THIS CASE THE OUTSIDE OF THE SWING ARM PUSHES AGAINST THE U-STRAP DRIVE PIN.



WITH SMALLER TUBE SIZES, THE RATCHET IS NOT NEEDED. FOR A QUICK BEND, SIMPLY INSERT THE HANDLE EXTENSION BETWEEN THE TWO BOLTS ON THE SWING ARM (AS SHOWN) AND PULL THE HANDLE AND SWING ARM AROUND TO CREATE THE DESIRED BEND.

TUBE RELEASE PROCEDURE



SOMETIMES AFTER COMPLETING THE BEND ON LARGE SIZE TUBING, THE DIE WILL NOT RELEASE THE TUBE. IF THIS HAPPENS, REVERSE THE HANDLE EXTENSION (AS SHOWN), THEN GIVE A HARD YANK IN THE OPPOSITE DIRECTION OF THE BEND.

MB-105 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: CAN THE BENDER BE CONVERTED TO HYDRAULIC?

A: YES, WE CARRY A HYDRAULIC CONVERSION KIT THAT USES EITHER AIR OR ELECTRIC.

Q: WHAT IS THE BIGGEST TUBE SIZE I CAN BEND?

A: WITH THE MB-105-HD BENDER THE MAXIMUM TUBE DIAMETER IS 2"O.D. THE MB-105 STANDARD CAN BEND A MAXIMUM DIAMETER OF 1.75" O.D.

Q: HOW MANY DEGREES CAN THIS UNIT BEND?

A: DEPENDING ON THE DIE YOU CAN CHOOSE FROM 120 DEGREE DIE FOR 90 DEGREE BENDS, OR YOU CAN CHOOSE THE 240 DEGREE DIE THAT WILL BEND 180 DEGREES.

Q: HOW DO I PREVENT THE TUBE FROM SCRATCHING OR MARRING?

A: TO LIMIT MARRING CONTACT OUR SALES DEPARTMENT FOR DELRIN BACKING BLOCKS. THESE ARE A MUST IF YOU PLAN ON BENDING STAINLESS STEEL OR HIGHLY POLISHED ALUMINUM.

Q: CAN I DO REPEAT BENDS WITH THE MB-105?

A: YES YOU CAN. WE CARRY A DEGREE RING (#MB-105 DS) WHICH COMES WITH A DEGREE STOP SO THAT YOU CAN GET RELIABLE CONSISTENT BENDS EVERY TIME.

Q: THE TUBE IS STUCK IN THE BENDER AFTER COMPLETING A BEND?

A: LOOK TO PAGE 12 OF THIS MANUAL FOR INSTRUCTIONS ON HOW TO REMEDY THIS.