Building A Hand Crank Coil Tester *(It ain't Rocket Science)*

By Gary Tillstrom

Setting coils for the model T is most accurately accomplished on a Ford type coil tester. Other than with possibly the use of an O scope, the magneto type coil tester is the only instrument that will accurately accomplish this as it allows one to visually verify that the cushion spring tension is set correctly allowing only one spark for each magnet pass. I have built and used in the past the buzz box type of tester with good results but I always just really wanted a hand-cranked unit. Four coils set in this manner will actually smooth out your already smooth engine.

My annual swap meet budget would never allow me to support my addiction for both filthy dirty worn out T parts **and** my want for a coil tester so I was faced with building one from scratch. Of course I would be using "filthy, dirty, worn out T parts" to build the thing. If you have always wanted one of these units or if your local chapter has decided the time has come for the membership to tackle such a project as a group thing, read on.

This Coil Tester was made from junk T parts and off the shelf parts from an industrial supply store. The cost including meter, stand and a new field coil was less than $300.

As a club project, this can go together very fast. Try to assign the work to various members and be sure to put a deadline on it. I believe each item could easily be completed within one month. If you're like me, that equates to 29 days of procrastination and one day to complete you're assigned task. Setting deadlines will ensure timely completion as nobody wants to be "the hold up". You will need the following task accomplished:

- **Flywheel with magnets** (preferably non starter type) – This needs to be taken apart, cleaned, magnets checked for cracks and recharged. When I knew I wanted to build one of these the first thing I did was find an old flywheel with the magnets on it. I removed the magnets, knocked out the triple gear pins and cleaned up the flywheel, magnets and attaching hardware. The brass screws can and should be replaced, as they are only about $8 a set. When you have the magnets off, check them closely for cracks. I recharged my magnets before reassembling the flywheel. Make sure they are all the same height (shim the low ones to bring them up).

- **Field Coil** – These things are cheap enough that you might as well pony up for a rewound unit unless someone in the club knows how to rewind one. Using a fresh unit also assures the tester will work without a flaw. Rewinding the field coil is actually very easy. I say it's easy because I boxed mine up and sent it off to Wally Szumowski. About a week later I had a fresh one. You might have an old one that your planning on using but for $140 this is money well spent. Now, wasn't that easy?

- **Coil Holder and Handle for the crank** – I made my coil holder from Baltic Birch plywood but any kind of stable wood will work. For the front face, plywood is probably not the best choice as the spark can track between plies. Far be it from me to try and tell anyone how to do wood work. I usually end up with splinters just from walking past trees! My coil holder is cobbled together in the usual eighth grade woodshop fashion *(my apologies to any eight graders who actually have talent for this sort of thing)*. I will offer this; build your unit so it will accept the largest coil you can find. If you build it with too snug of a fit on a small coil it won't fit some of the larger coils and you'll be unpopular with your fellow club members. A couple of years ago I built a buzz box tester and the newer plastic coils just wouldn't fit. I told myself, "that's ok, the plastic ones are junk anyhow". Careful planning will eliminate the need to make such excuses later.

  For the handle itself, I turned one from a model TT spoke. Actually, I didn't use a pattern as I just made the handle comfortable for my grip. The "coilbox" and the handle were both given three coats of spar varnish and a final coat of wax.

- **Frame Unit** – The best bet here is find a fabrication shop that will sell you the pieces you need cut to size. When I built mine all the parts were square and cleanly cut on a shear. This cost me $50 but was well worth it. You will need a drill press and be able to weld. Rather than ramble on with details to make this I'll let you refer to the drawing. You will need access to the flywheel and a field coil along with the bearings to ensure all is where it needs to be prior to welding the thing together.

- **Hand Crank** – You are going to need a 15/16th shaft collar and some ¼ by 1-inch strap. You will also need some 5/16th rod (an old intake or exhaust valve stem will work perfect). Whoever gets this assignment will need to be able to run a metal lathe and weld. The strap serves as the crank arm. The 5/16th rod is drilled to accept a 1/8th piece of welding rod. The welding rod serves as the spark pointer and is retained in the tube by a small setscrew.

  I drilled a 5/16 counter bore in the shaft collar and pressed the pointer holder in place. I then welded the pointer holder and the strap to the shaft collar. You will then need to heat and bend the crank arm as needed to clear the brake drum. Finally, drill and tap the crank arm to accept a 5/16-carriage bolt. The bolt shall be locked from the backside with a hex nut. This will allow the handle to turn free.

- **Spark Ring –** I used a small emergency brake drum (pre 26) for the spark ring. Chuck the drum in a metal lathe and polish the inside using various grades of paper until it is shiny and satin smooth. You will also be making an insulator block to insulate the spark ring from the frame. The ideal material for the insulator is available at Wal-Mart and is cleverly disguised as a small white plastic cutting board 3/8th thick over by the kitchen stuff. I used plywood when I built mine.
- **Misc. "Stuff"** – A sheet metal bracket will need to be fabricated to mount the meter in. Additionally, a dedicated stand should be built for the tester. If not, it will forever be in the way on your workbench. Harbor Freight sells a "universal tool stand" for $19 when it's on sale ($39 when it isn't).
- **Cover** – Head down to the fabric store and buy some genuine imitation leather (AKA vinyl). Sew a cover to fit over the tester and the base of the stand. This unit should be kept as clean as possible and the cover will help to a great extent. You could even add the clubs official logo to the cover. I use a custom fit "Glad" cover for mine; they come in a big box labeled "Lawn and Leaf".
- **Meter** – I bought a Simpson model 1357 square meter with a 3-½ inch face. The model number is followed with –3150, which identifies it as a 0-2 amp A/C panel meter. You may also find a 0-3 meter that could be used but keep in mind the ideal meter will have the desired 1.2-1.4 amp markings in the center one third of the meter. Look on ebay (I got mine for $17). When searching ebay, look up "panel meter, ammeter, amp meter, amp gauge, meter thingy, and electrical gauge". When folks list these things they call them everything possible.

Conclusion – I painted the major assemblies using Rustoleum 'hammered finish' paint, and the smaller parts gloss black, it makes it look like somebody with more talent actually built it. This will not be the easiest project you'll ever tackle but its by far the hardest either. Most model T people I know have the talent to build one. It would make a good club project as not everyone has a drill press, welder, wood lathe, metal lathe, etc. Have fun and always follow this last bit of advice, "Never ever touch the brake drum and start cranking"! ***Gary***

Parts Needed:

3/8 thick steel plate **8 X 12** Base

3/8 thick steel plate **7.5 X 10.5** Rear Plate

3/8 thick steel plate **3 X 5** Top Plate

Thick Walled Tubing **2 X 2 X 7**

¼ x 1 X 6 Inch Steel Strap

Simpson 1357 ammeter, 0-2 amps AC. Available from Instrument Meter Specialties of Glendale CA. 1-800-926-3837

1 Inch **Pillow Block Bearing**	P/N **4X726**
1 Inch **Flange Bearing**	P/N **1F546**
15/16ths **Shaft Collar**	P/N **3ZN91** (sold in a package of 3)

Available from Grainger's, look them up on the Web to find the nearest location to you and phone number

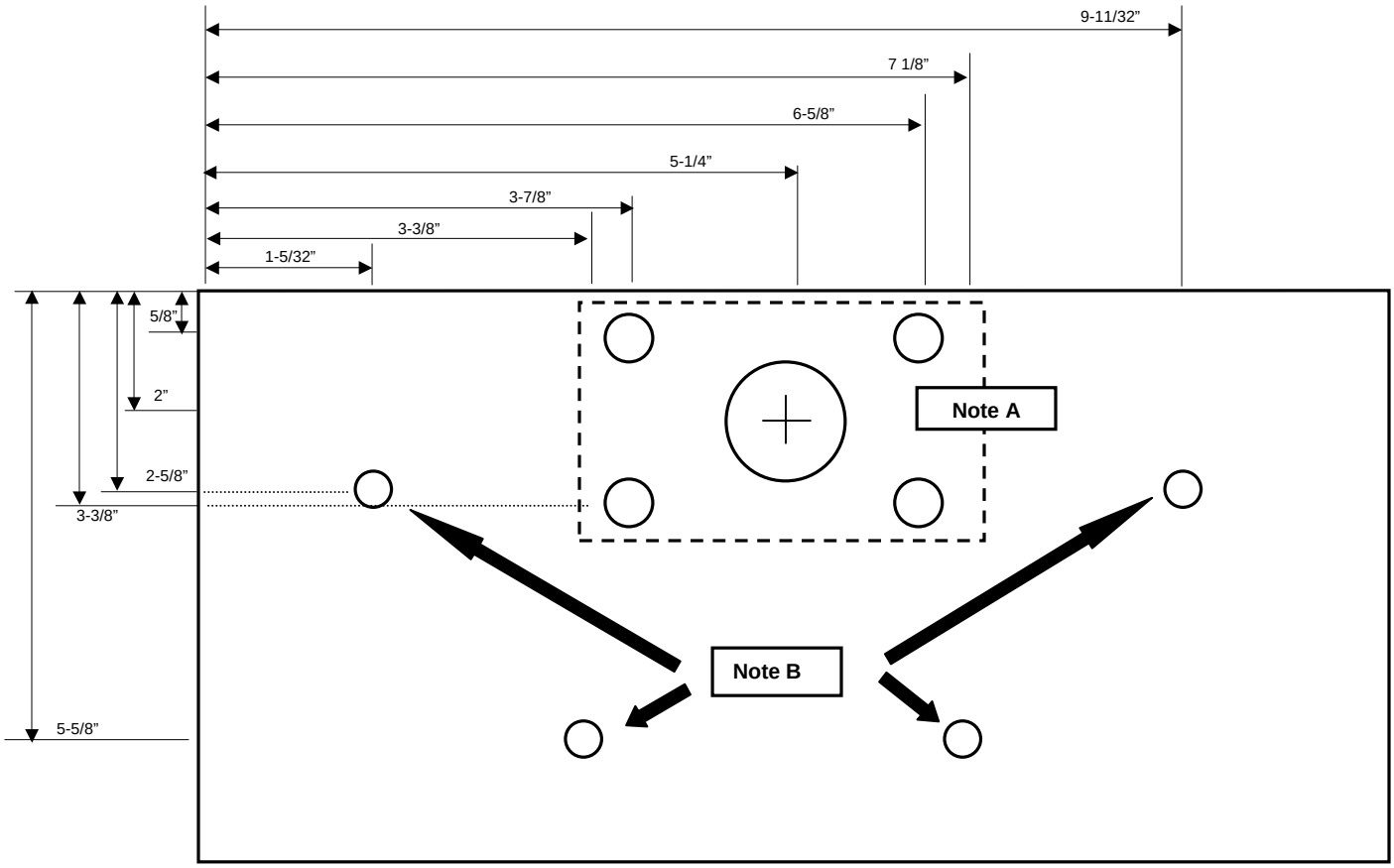
Rear Plate

Fabricate rear plate as shown using 3/8 steel plate having dimensions of 7 ½ inches by 10 ½ inches. Smooth all sharp edges with file. Deburr all holes after drilling.

NOTE A (denoted by heavy dashed line) Large hole in center of detail is made using a 1 1/16th by-metal hole saw. The four surrounding holes are to be drilled using a 25/64th drill bit and tapped to 7/16-20.

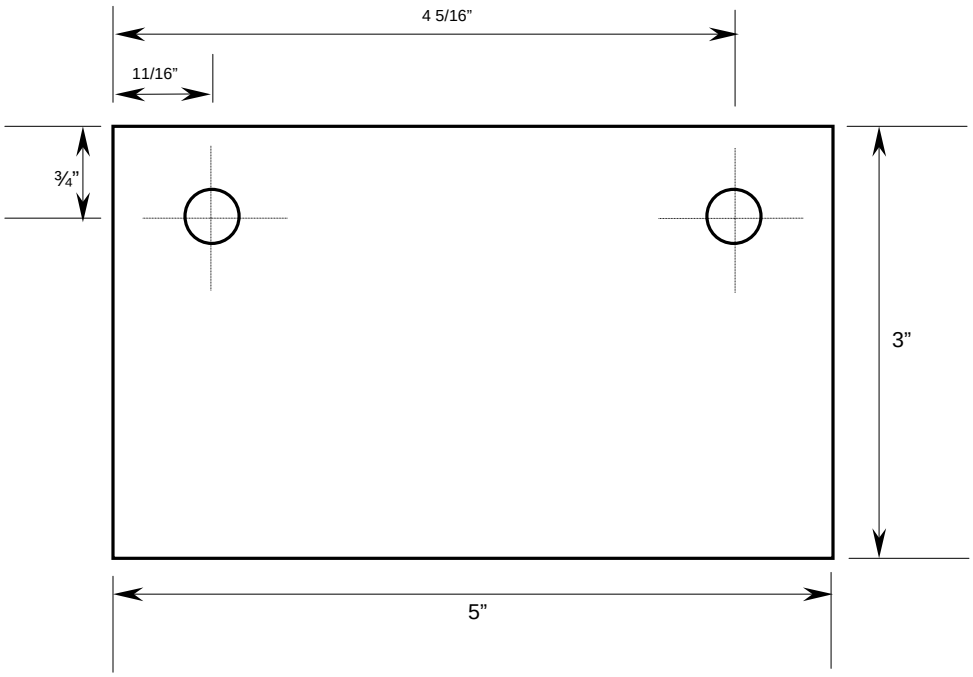
NOTE B Drill field coil mounting holes and tap for 3/8-24 bolts.

Not to scale



Top Plate

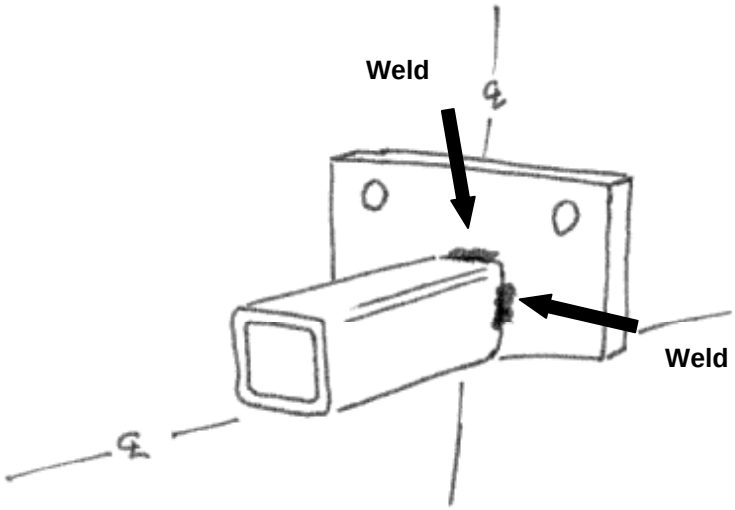
Fabricate top plate as shown using 3/8 steel plate having dimensions of 3 inches by 5 inches. Smooth all sharp edges with file. Deburr all holes after drilling. The holes shown should be drilled and tapped for 3/8-24 bolts.



Assembly Details

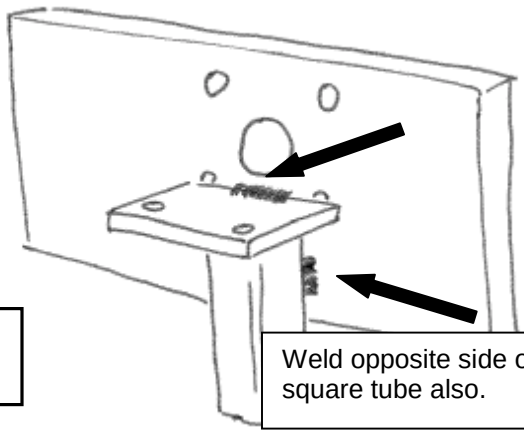
1. Center the top plate to the square tubing as shown. The back edge of the tube and the back edge of the top plate shall be flush. When welding the tube to the plate as shown, limit the length of the welds to no more than ¾ inch to control distortion.

   Do not weld the face that will be in contact with the rear plate! That will cause the field coil to be non-perpendicular with the shaft.



2. At this time attach the pillow block bearing to the top plate using 3/8 bolts. Attach the flange bearing to the rear plate using 7/16 bolts. The lower two 7/16 bolts must not extend out the back of the plate or they will interfere. Grind or add washers under the bolt heads to correct as required.

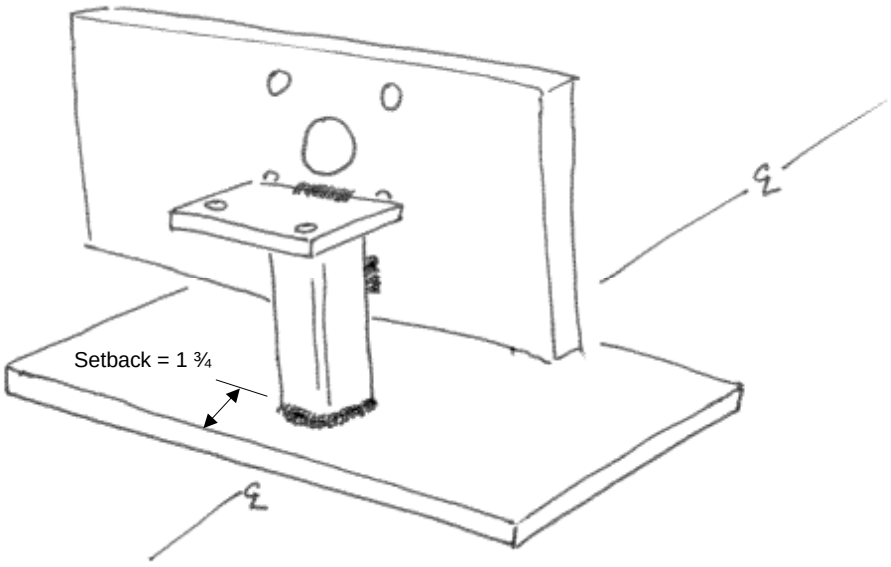
   Place a transmission main shaft (p/n 3331) through the flange bearing to aid in alignment/location. Now, take the top plate assembly and position the top plate and pillow block as shown. Limit length of welds to no more than ¾ inch in length to limit distortion.



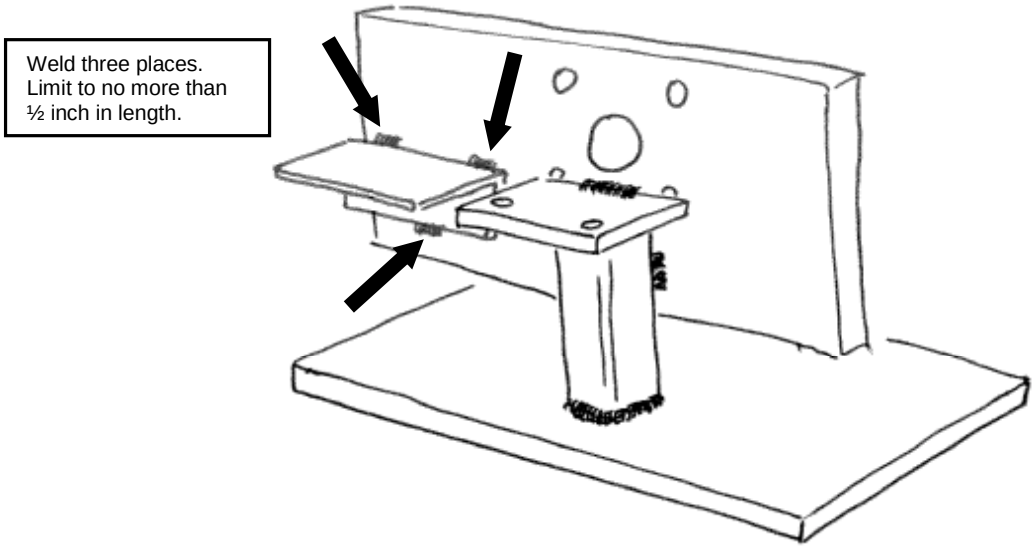
Bearings omitted from view for clarity (plus the fact that I can't draw!)

Weld opposite side of square tube also.

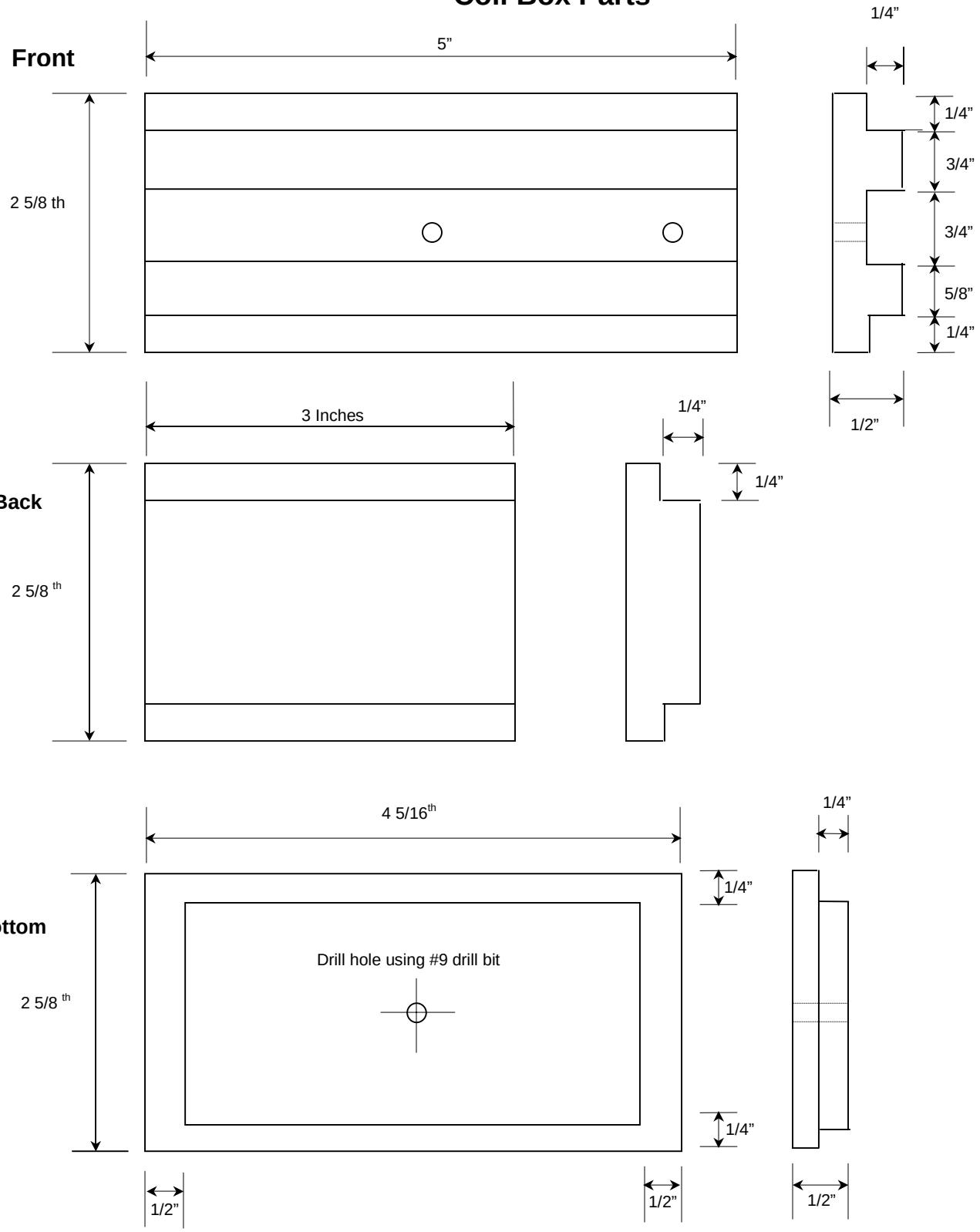
3. Position the welded up assembly onto the 8 X 12 inch base plate, centering left and right as shown. The front edge of the square tube should be set back 1 ¾ inches as shown. Weld around periphery as illustrated.



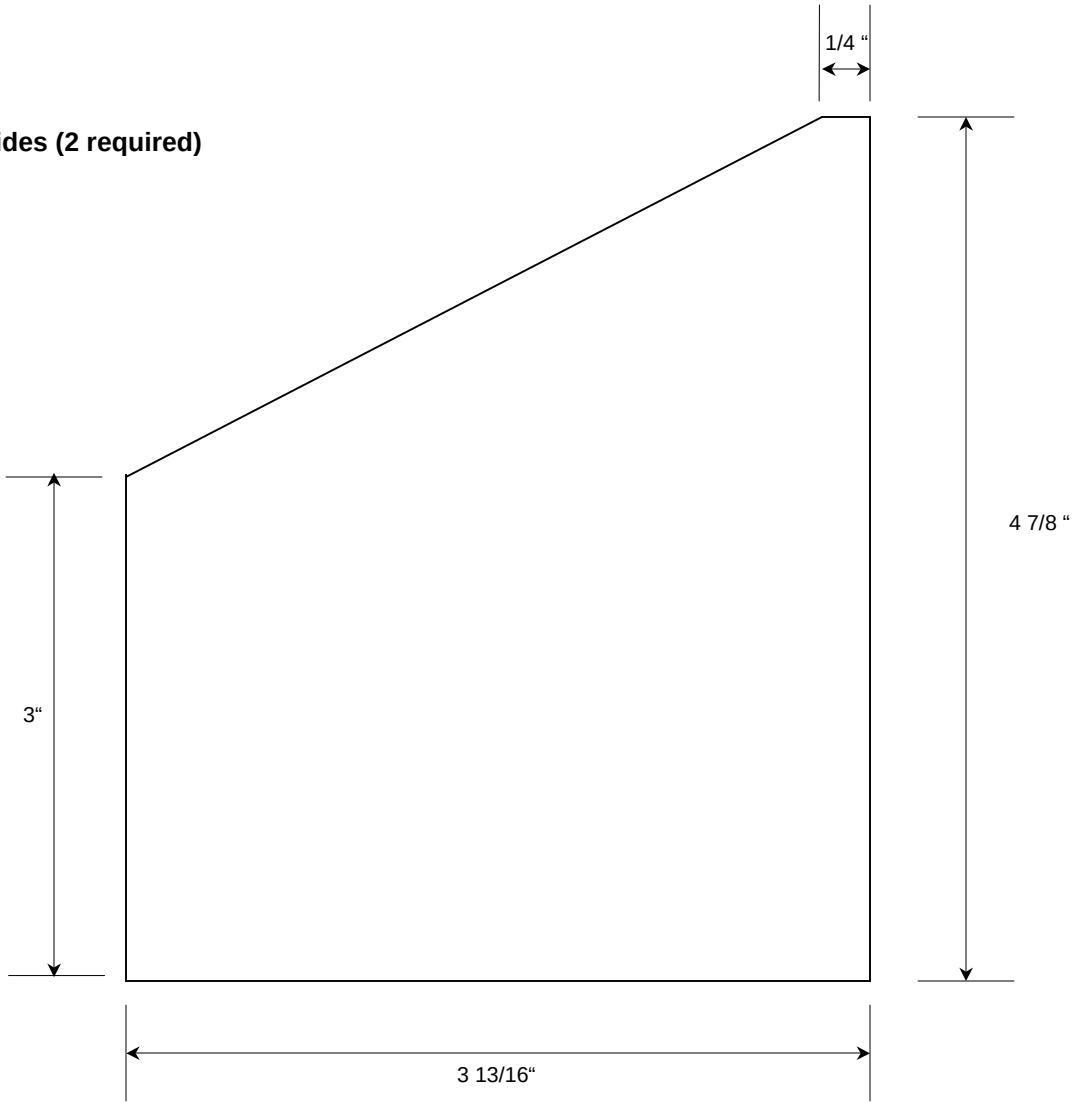
4. Add angle iron scrap as illustrated. This should be level across the top with the top plate. This item will be drilled later and the coil box added. Leave a gap between this scrap and the top plate as shown. Gap should be sufficient to allow wires to pass through, ¼ inch should be adequate.



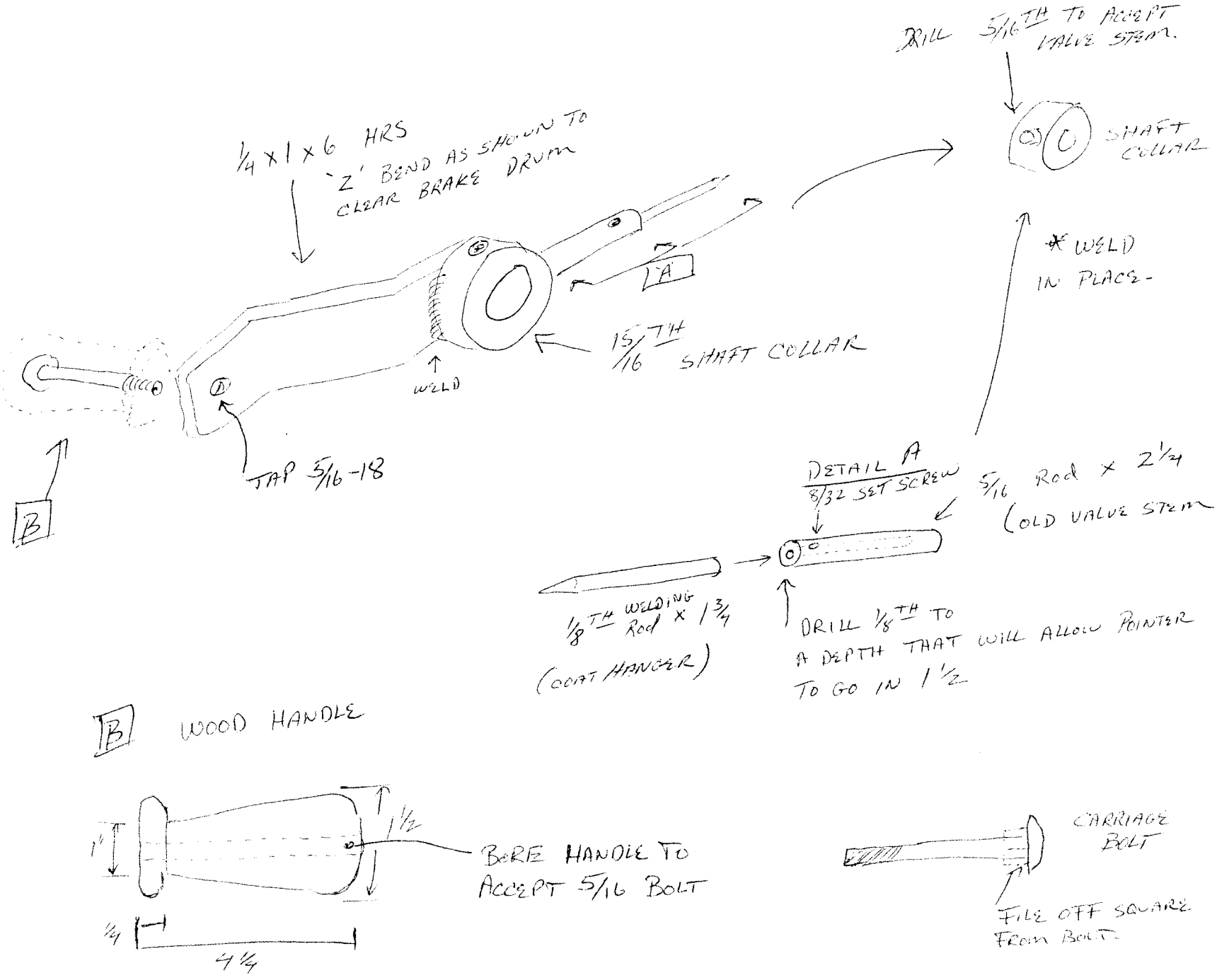
Coil Box Parts



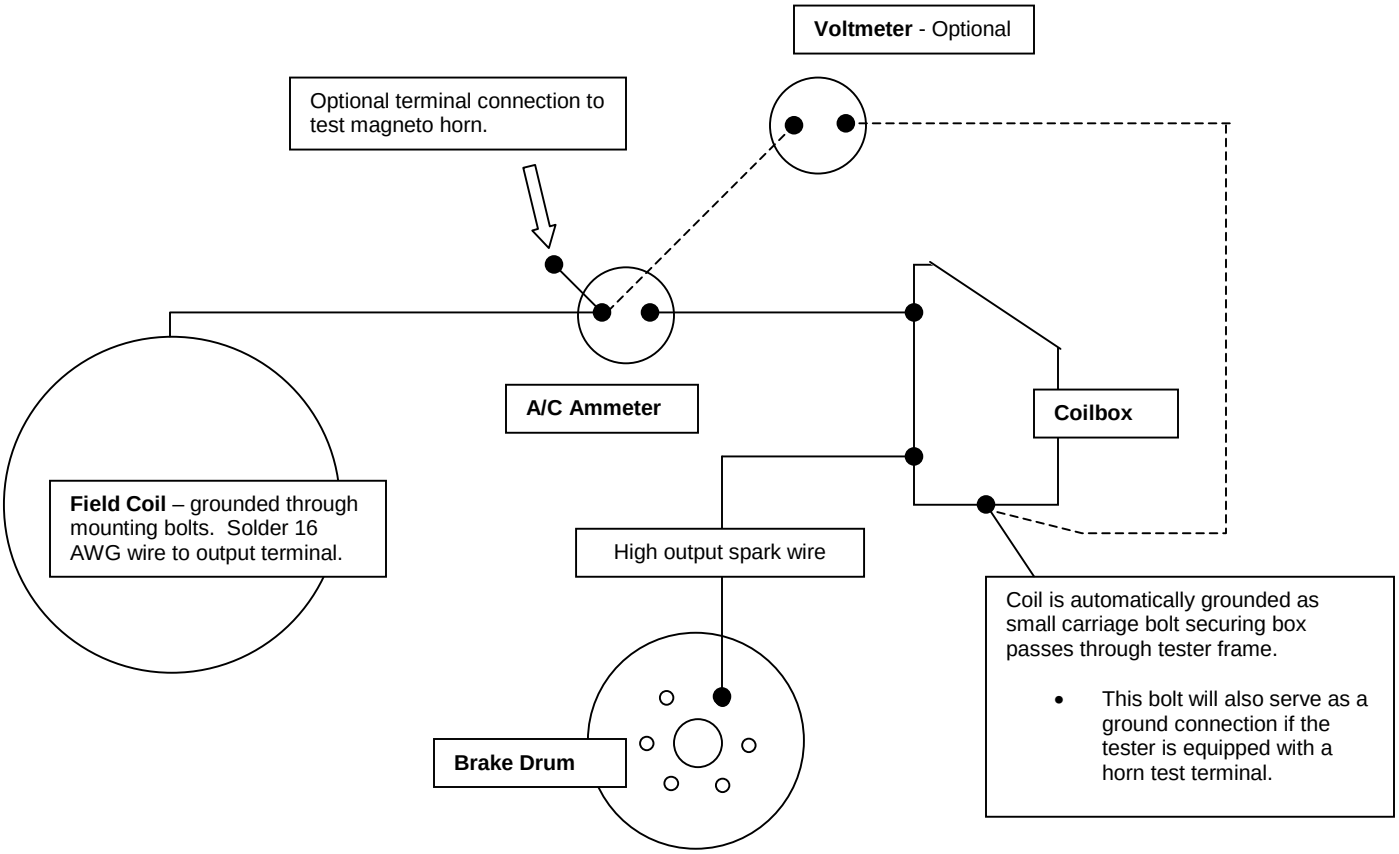
Sides (2 required)



All coil box parts should be made of a stable hardwood such as Maple or Cherry. Use Baltic Birch plywood as a last resort. Plywood has a tendency to arc between the plys. Assemble using wood glue and finish nails. Give coilbox three coats of spar varnish to finish.


1/4 x 1 x 6 HRS
'Z' BEND AS SHOWN TO CLEAR BRAKE DRUM
A
15/16 TH SHAFT COLLAR
WELD
TAP 5/16-18
B
DRILL 5/16 TH TO ACCEPT VALVE STEM.
SHAFT COLLAR
* WELD IN PLACE -
DETAIL A
8/32 SET SCREW
5/16 Rod x 2 1/4
(OLD VALVE STEM
1/8 TH WELDING Rod x 1 3/4
(COAT HANGER)
DRILL 1/8 TH TO A DEPTH THAT WILL ALLOW POINTER TO GO IN 1 1/2
B WOOD HANDLE
1"
1 1/2
BORE HANDLE TO ACCEPT 5/16 BOLT
1/4
4 1/4
CARRIAGE BOLT
FILE OFF SQUARE FROM BOLT.

Wiring Detail



Note: All ground symbols eliminated to simplify wiring of tester. The coil box and field coil are grounded through their respective mounting bolts.

It should be understood that the brake drum must be insulated from the frame. All hardware securing drum to insulator must be separated by at least ½ inch from all frame pieces. If not, spark will tend to jump from the offending hardware rather than across the pointer as intended. *(ask me how I know this)*

Photo’s of finished unit (Your’s will probably look better)

Notes:

The sketch for the coil holder shows a dado cut down off center on the front piece. The reason for its being off center is some of the contacts used in coil boxes are offset to the left and others are offset to the right. I forget what I had so you'll need to adjust the dimensions accordingly. You may actually be able to use the same dimension and just turn the part end for end.

When doing your final assembly the bearings called out have set screws to lock onto the shaft with. Position the flywheel/shaft assembly and space it before locking down. I had to shim my field coil behind the bolts as the plate warped a bit from welding.

I forgot to mention that Radio Shack sells rubber feet that I stuck onto the bottom of mine. You'll want to glue them on with JB weld as they won't stay put if you slide the thing.

Good luck and post a picture of your finished unit on the forum.