

**Hydraulic Wrap Around Bender**  
**Operating and Parts Manual**  
**MODEL # WTB-HRA/3**

Manufactured by:

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U.S. Patent 3,906,784  
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Rev 11/04

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Note: Equipment manuals and price sheets are available for download on our website: [WWW.TRIENG.COM](http://WWW.TRIENG.COM)

## Hydraulic Wrap Around Bender

This machine was designed and developed at Triangle Engineering Incorporated, West Hanover, MA USA. The primary function of the equipment is to bend a welded metal specimen into a 180 degree "U" shaped configuration, thereby subjecting the weld deposit to extreme tension.

After removal from a weld test coupon these straps or face, root, and side bend specimens are bent in the aforementioned shape very rapidly, with constant uniformity and consistent high quality. The full range of ferrous and nonferrous bend test requirements of A.S.M.E. Section IX and A.W.S. can be met with the adjustability of this device. The bend time cycle for a completed specimen, twenty to thirty seconds, is many times faster than known methods in use today. The unit is freestanding and does not require fastening at the floor line.

### Specifications:

Electrical Motor:	1 H.P., 115V, 1PH, 60HZ, 13A, 1725 RPM
Hydraulic Pump:	1500 P.S.I. 1-1/2 G.P.M.
System Pressure:	Factory set at 1050 P.S.I.
Hydraulic Oil Reservoir:	Capacity 5 gallons
Vise Jaws:	Heat treated AISI S7
Die Post:	Heat treated AISI 4140
Spur Gear: (24 Teeth)	Heat treated AISI 4140
Floor Space:	36" X 36" X 34" height
Weight:	380#

## Safety

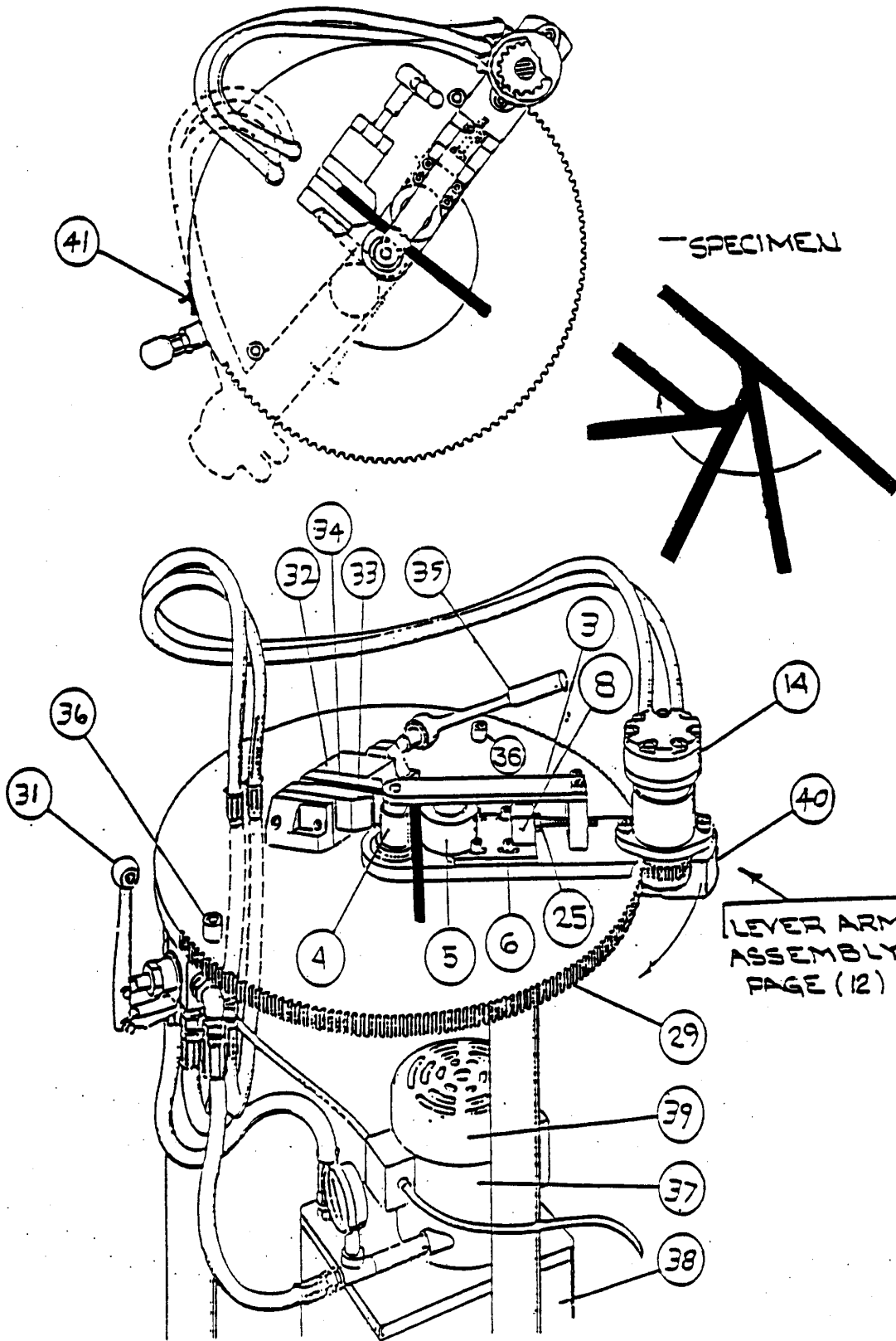
### Cleaning and Maintenance

Safety glasses must be worn at all times when operating this equipment. Keep your hands, tools or any foreign objects off the table and away from all moving parts during operation.

The WTB-HRA requires a minimum of maintenance, however, good housekeeping and a few routine checks will ensure years of uninterrupted service.

1. Wipe or brush clean the plate gear (#29) to remove any foreign material prior to activating the four way valve (#31). Scratches and small grooves may occur but will not affect the operation of the bender. Proper cleaning will reduce the scoring.
2. Weekly: Check the reservoir oil level and add DTE 25 non-foaming hydraulic fluid (or equal) if necessary. A rapid or consistent loss of fluid would indicate a possible hydraulic system leak.
3. Weekly: Add grease to pivot post fitting (#28) and pressure roll (fitting not shown). See drawing TB13A (Page 12), generally 1 to 2 pumps of a grease gun is sufficient.
4. The two limit stops (#36) are to prevent accidental over travel of the lever arm..stopping the arm prior to hitting these stops will prevent unnecessary jarring and scoring.
5. Periodically, check the die post to insure it is seated properly and tight.
6. Switch pump motor OFF when not in use. Prolonged operation in neutral position can cause heat build-up in the hydraulic system.

**Danger!!! Disconnect from the electrical power source and lockout prior to servicing this unit.**



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TITLE <b>WTB-HRA ILLUSTRATION</b>	DWG. NO. <b>A-0053-6</b>

## Hydraulic Wrap Around Bender

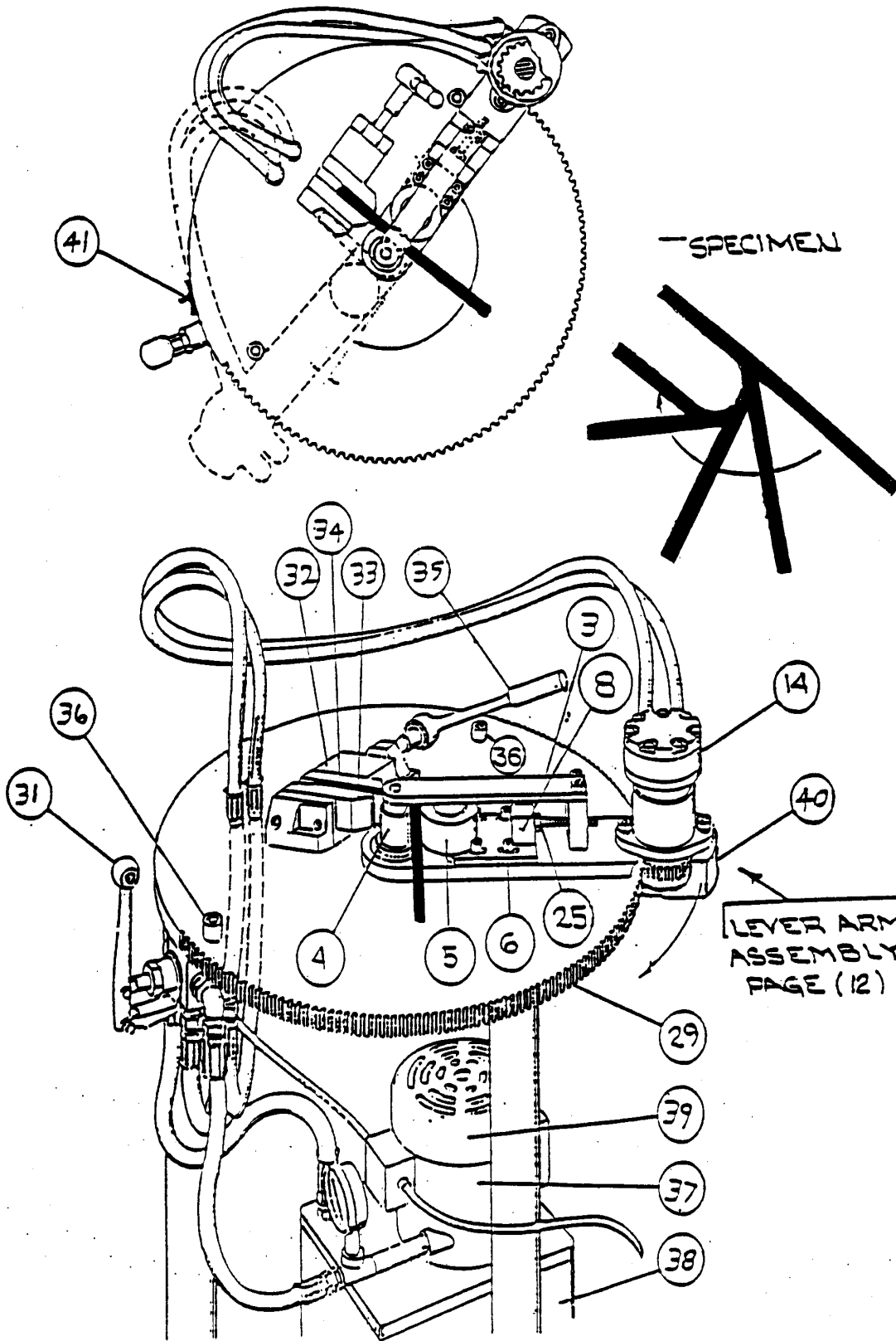
This tool should be connected to 120V-1PH 60HZ with circuit breaker capacity of 15 amperes. It is not necessary to bolt machine to the floor. Depending on the location and proximity to other personnel in the immediate area, **safety guards may be required** by the purchaser, at there option.


This weld test bender is equipped with an adjustable vise providing greater flexibility and ease of operation. With simple vise adjustment and proper die post, this unit is capable of bending specimens around die post diameters from 3/8" to 3-3/8" without the need of changing jaws and/or adding shims.

Your machine is factory set for bending around a 1-1/2" diameter die post.

### Set up and Operating Instructions For Various Bending Radii

1. Energize pumping system with switch (41). Press valve handle (31) forward, position lever arm against stop pin (36). Turn off pumping system (41).
2. Install proper die post [ Page 8 (API Page 9) ].
3. Install proper jaw [ Page 8 (API Page 9) ].
4. Loosen the two vise clamp knobs (not shown) located under the table (29).
5. Carefully, lift the vise (32) to disengage the rack tooth key then move the vise outbound to allow room for the die post.
6. Loosen the four bolts on the pressure roll assembly (8) and slide outboard.



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## Hydraulic Wrap Around Bender

7. Place the thicker end of the specimen into the vise using the 1-3/8" leveling cube to support outermost end of specimen while adjusting the opposite end in proximity to reference mark on fixed jaw. Hand tighten vise.
8. Lift the vise to disengage the rack tooth key and move it toward the die post. The specimen should be within .05" of the die post.
9. Ensure that the vise rack tooth key is properly engaged then tighten the two clamp knobs.
10. Using a 1" open end wrench #35H tighten vise with moderate pressure to secure specimen.
11. Adjust pressure roll slide plate inboard to make contact with the specimen, back off to allow 1/32" clearance and tighten four allen cap screws in holes closest to the die post to secure slide plate (8) to the lever arm.
12. Run back -up screw (25) up to contact rear surface of slide plate.
13. Energize pumping system with switch (41).
14. Unit is ready to commence 180° root bend. Pull on valve handle (31), lever arm will rotate clock wise wrapping specimen around the die post (4). Continue wrap around to complete 180°. Return lever arm to starting point, turn off pumping system (41), release vise pressure, open vise then remove the specimen.

Note 1: Open vise jaw only enough to remove specimen. Excessive opening will collide vise jaw with pressure roll slide plate.

Note 2: Careful attention to the lever arm travel must be maintained when using small diameter die posts to prevent a collision with the vise. Some thin material bends may require additional bending by hand or vise to complete it's 180°.



# **Die Post and Jaw Installation**

## **Die Post Installation**

1. Remove the overarm (3).
2. Remove the existing die post by reaching under and to the center of the plate gear and loosen the clamping knob until it disengages from the die post. Lift the die post out from the top of the pivot post.
3. Aligning the pins, place the required die post into the pivot post. Reach under the plate gear and thread the clamp assembly into the die post; hand tight. Place the tool supplied with the pins down over the clamp knob to snug up or loosen clamp rod assembly.

Note: The clamp knob is attached to the pivot post to prevent misplacement.

## **Vise Jaw Installation**

Die post diameters less than 3/8" require a 1/2" stationary jaw TB33-500. Die post diameters 3/8" to 3-3/8" require a 3/4" stationary jaw TB33-750.

1. Remove the two socket head cap screws securing the stationary jaw TB33-xxx. Install the required jaw giving special attention to the length of the jaw bolts. They should be flush with the clamping surface of the jaw to prevent marking of the specimen. Fasten the jaw securely.

### **Die Posts Less Than 1/4" (Pie Segment)**

1. Remove the overarm (3) and existing die post (4).
2. Install the segment die post with the flat face of the segment parallel to the stationary vise jaw (33).
3. DO NOT replace overarm; proceed with general operating instructions.

### **Die Posts 1/4" to 2-1/16" Diameter**

1. Remove the overarm (3) and existing die post (4).
2. Install the required die post.
3. Install the overarm; proceed with general operating instructions.

### **Die Posts Over 2-1/16" to 3-3/8" Diameter**

1. Remove the overarm (3) and existing die post (4).
2. Install the 1-1/2" diameter die post.
3. Place the required die post sleeve over the 1-1/2" diameter die post.
4. Install the overarm; proceed with general operating instructions.

## Set Up For A.P.I. 1104 Code

1. Remove stationary jaw (33), movable jaw (34) and overarm (3).
2. Install the 1-1/2" diameter die post (4).
3. Position the 3-1/2" drop on die post over the 1-1/2" die post (4) with the auxiliary support pin down. The cut away section should be oriented to provide nesting with the A.P.I. stationary jaw (33-API).
4. Install the overarm (3).
5. Install the A.P.I. movable jaw (34-API).
6. Install the A.P.I. stationary jaw (33-API).
7. Position the vise jaw equalizing screw (located on the stationary jaw (33-API) to compensate for the bend thickness.
8. Proceed with the general operating instructions.

## Locating the Weld in the Center of the Bend

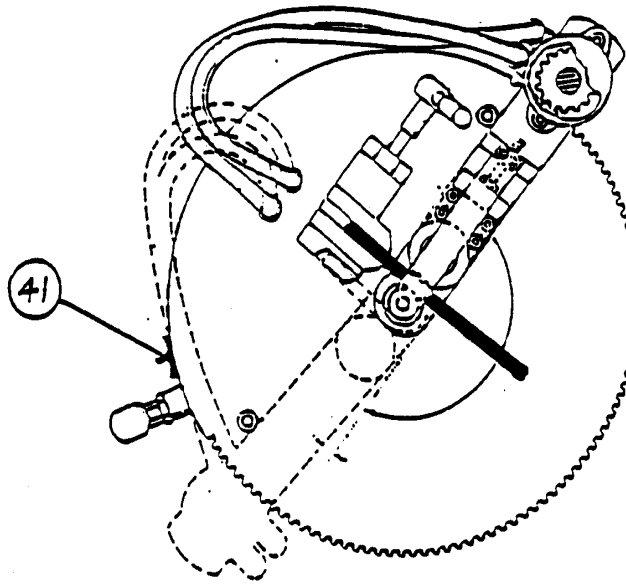
With a 3/8" thick bend using 1-1/2" diameter die post, measure from the centerline of the weld back 4" and place a reference mark. Align this mark with the witness mark on the stationary jaw.

To locate the weld in the centerline of a bend specimen using die posts other than a 1-1/2" use the following to establish your reference mark.

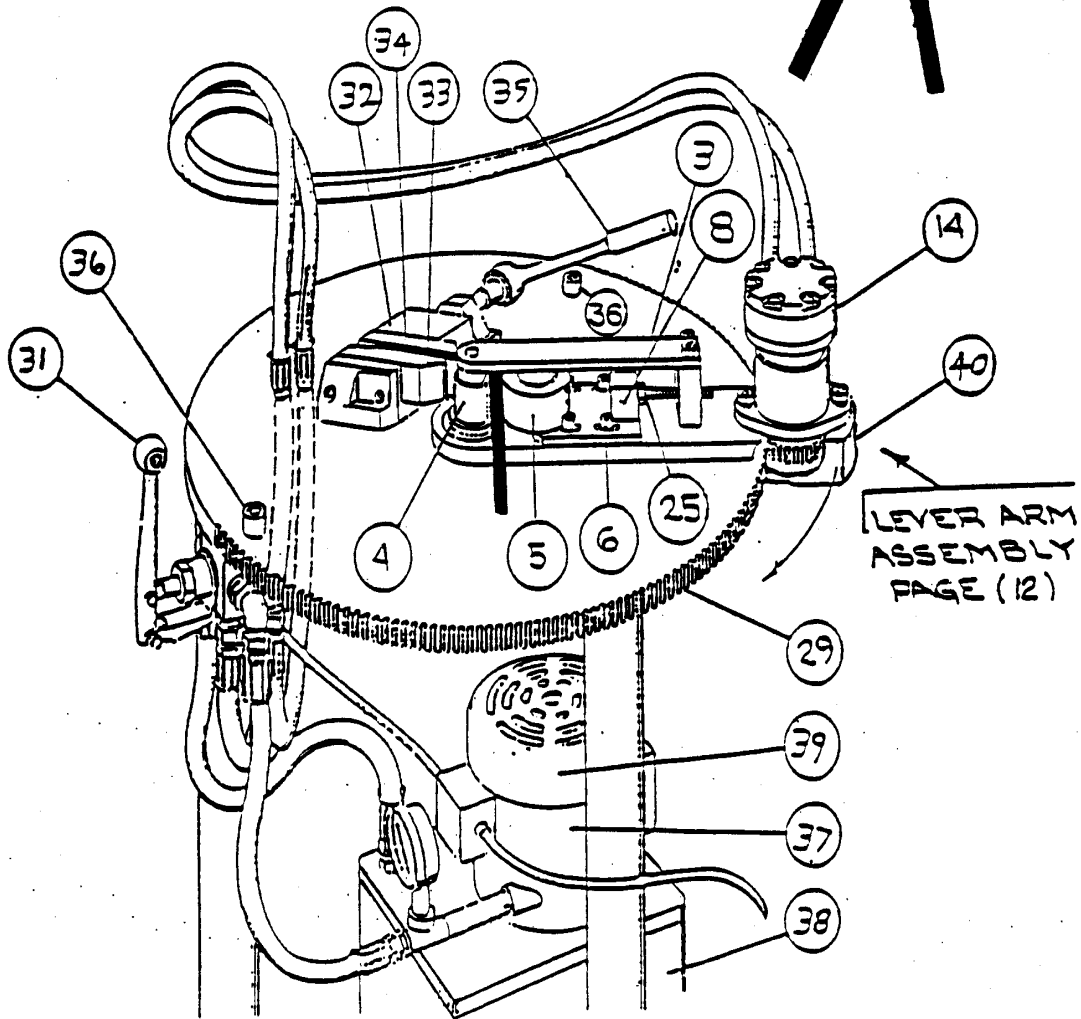
Die post diameter + specimen thickness x 3.14

4

then add 2.5"



SPECIMEN



LEVER ARM  
ASSEMBLY  
PAGE (12)



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TITLE

WTB-HRA ILLUSTRATION

DWG. NO.

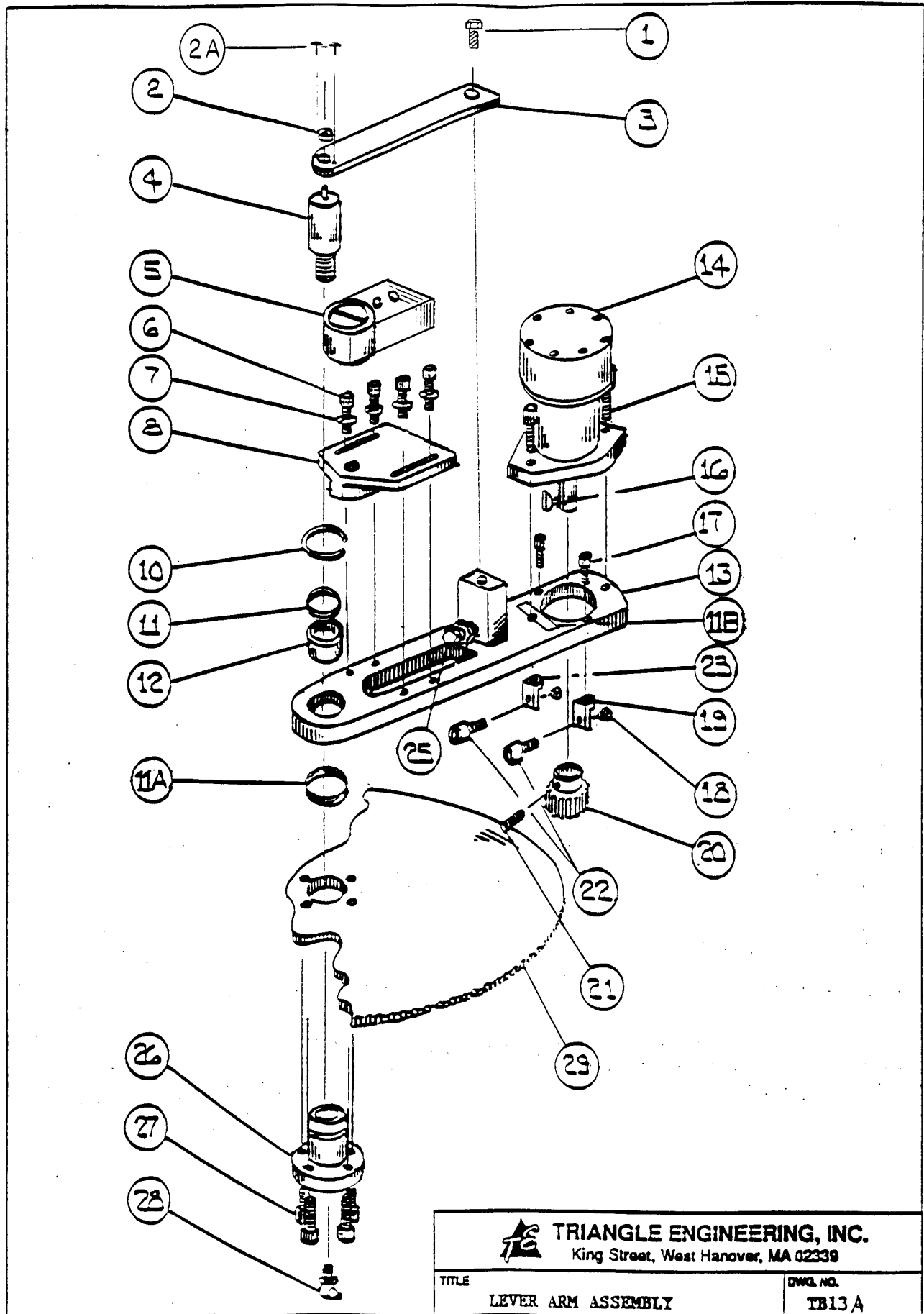
A-0053-6


## Parts List

### Dwg. A-0053-6A

<u>Detail Number</u>	<u>Part Number</u>	<u>Description</u>	<u>Quantity Req'd</u>
3	TBA03A	Over arm with bearing	1
4	TB04-XX/3	Die post	1
*	TB04/3	Die post clamp assembly	1
5	TBA05	Pressure roll	1
6	TBA06	Socket head cap screw	4
8	TBA08	Pressure roll adj. plate	1
14	TB14	Hydraulic motor	1
25	TB25	Hex head adj. screw	1
29	TBA29	Plate gear	1
31	TB31	Hydraulic valve	1
32	TBA32	Vise, complete less jaws	1
*	TBA32-1	Vise rack key (HT) 2 pc set	1
*	TBA32-2	Vise standard key	1
*	TBA32-3	Vise clamp knob	2
*	TBA32-4	Vise clamp bar	1
33	TB33-750	Stationary jaw 3/4" thick	1
33	TB33-500	Stationary jaw 1/2" thick	1
33	TB33-API	Stationary A.P.I. jaw	1
34	TB34-750	Movable jaw 3/4" thick	1
34	TB34-API	Movable A.P.I. jaw	1
35	TB35H	1" Open end wrench	1
36	TB36	Limit stop	2
37	TB37	Hydraulic pump	1
38	TB38	Hydraulic oil reservoir	1
39	TB39-60HZ	Electric motor	1
40	TB40	Guard	1
41	TB41	Off-on switch	1

\*Not shown

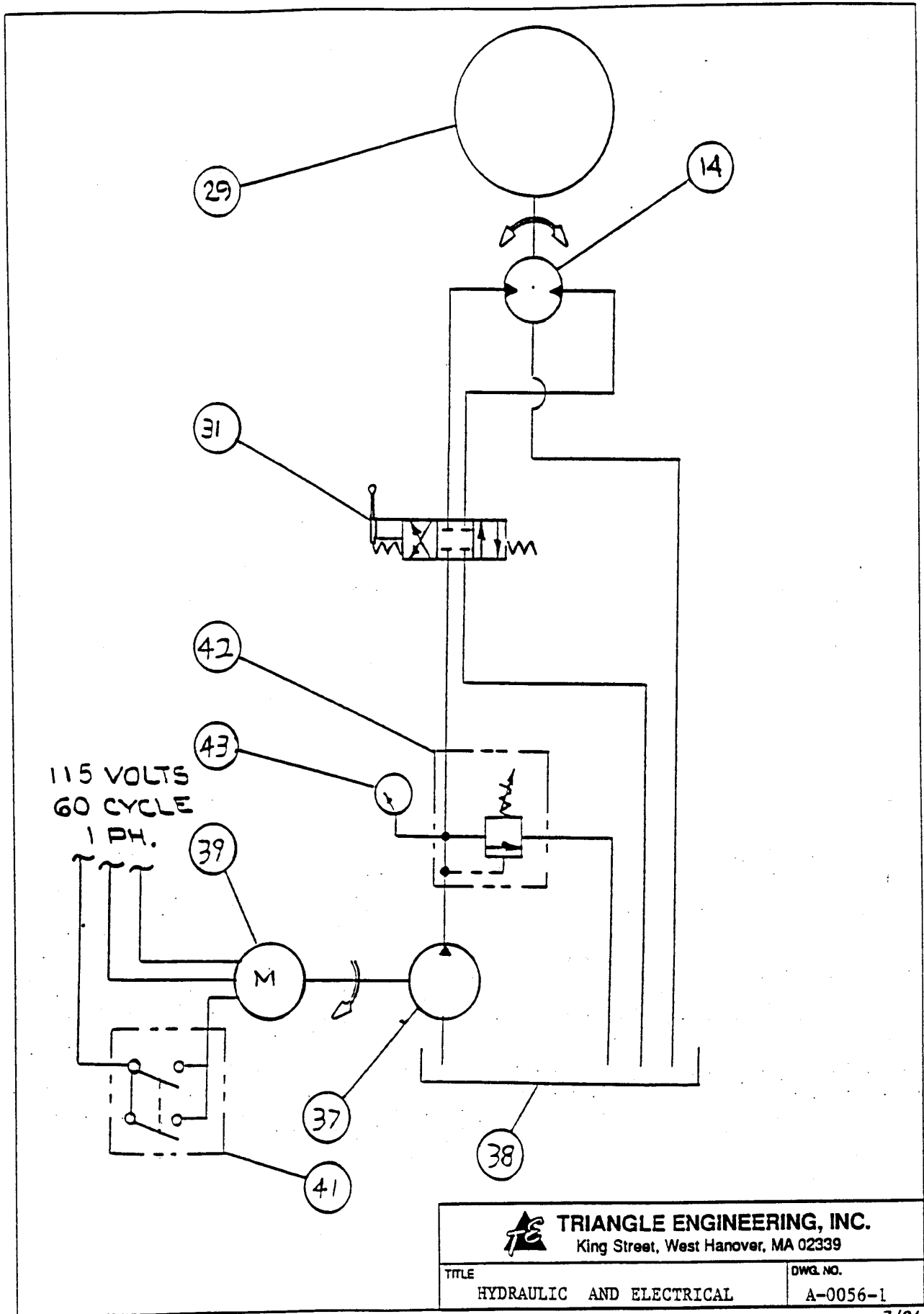



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TITLE <b>LEVER ARM ASSEMBLY</b>	DWG. NO. <b>TB13A</b>

# Parts List

## Dwg. TB13A

<u>Detail Number</u>	<u>Part Number</u>	<u>Description</u>	<u>Quantity Req'd</u>
1	TBA01	Socket head cap screw	1
2	TBA02	Bearing	1
2A	TBA02-1	Hex button head w/ spring washer	4
3	TBA03	Over arm	1
4	TB04XX/3	Die post (as req'd)	1
5	TBA05	Pressure roller	1
6	TBA06	Socket head cap screw	4
7	TBA07	Flat washer	4
8	TBA08	Pressure roll adj. plate	1
10	TB10	Retaining ring	1
11	TB11	Flat wear ring	1
11A	TB11A	Nylon washer	1
11B	TB11B	Nylon insert	1
12	TB12	Bronze bushing	1
13	TBA13	Lever arm	1
14	TB14	Hydraulic motor	1
15	TB15	Socket head cap screws 1-5/16 OAL	2
16	TB16	Woodruff key	1
17	TB17	Socket head cap screw	2
18	TB18	Hex nut -3/8-24	2
19	TB19	Cam follower post R.H.	1
20	TB20	Gear - 24 tooth	1
21	TB21	Socket head set screw (cup point)	2
22	TB22	Cam follower	2
23	TB23	Cam follower post L.H.	1
25	TB25	Hex head adjustment screw	1
26	TB26/3	Pivot post - flanged	1
27	TB27	Socket head cap screw	4
28	TB28	Alemite grease fitting	1
29	TBA29	Plate gear	1



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TITLE HYDRAULIC AND ELECTRICAL	DWG. NO. A-0056-1

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**Parts List**  
**A-0056-1A**

<u>Detail Number</u>	<u>Part Number</u>	<u>Description</u>	<u>Quantity Req'd</u>
14	TB14	Hydraulic motor	1
29	TBA29	Plate gear	1
31	TB31	Hydraulic valve	1
37	TB37	Hydraulic pump	1
38	TB38	Hydraulic oil reservoir	1
39	TB39-60HZ	Electric motor	1
41	TB41	Off-on switch	1
42	TB42	Pressure relief valve	1
43	TB43	Pressure gauge	1



**Model WTB-HRA**  
**Hydraulic Wrap Around Bender**

**Condition of Sale and Warranty**

Triangle Engineering, Inc. will guarantee the original equipment as advertised and purchased under terms of the initial contract, for a period of ninety days (90) following delivery at your location, not withstanding and provided that:

- A. The equipment has been operated and maintained without abuse and according to instructions and recommendations of Triangle Engineering, Inc.

This warranty covers the replacement of defective parts and/or components, if after pre-approval and final examination by Triangle Engineering, Inc. they are returned prepaid. In no event shall this warranty exceed the original purchase price for said defective parts.

This equipment is new and unique to the field of Destructive Testing and is protected under U.S. Patent No. 3,906,784.