

8.11 TOOLING MAINTENANCE

The following sections deal with the maintenance and repair of tooling.

8.11.1 TOOLING SELECTION

The Model-83 press must be equipped with accurate and high-quality tooling in order to maintain a high degree of accurate punching. Spartanics has considerable experience in providing its customers with high-quality tooling. We supply most of our customers with tooling and we recommend that you allow us to do the

same for you. If, the Punch And Die Index in Chapter 12 of this manual. Spartanics or your service representative in order to get the proper tooling specifications or choose the tooling specifications from the Punch And Die Index in Chapter 12 of this manual.

The Model-83 press features the following punch size ranges:

Punch Size Range -- Circular Tooling

Maximum Diameter

For most applications, .375" (9.52mm).

Minimum Diameter

For most applications, 80% of material thickness.

Punch Size Range -- Noncircular Tooling

Maximum Diameter

For most applications, noncircular punches must be of a shape and size which allows them to fit into a .250" (6.35mm) dia. circular hole.

Minimum Diameter

Determined by material type and thickness.

Additional Information

If you want Spartanics or your service representative to provide you with tooling, please be prepared to give the following information:

1. Hole Size
2. Type of Material to be Punched
3. Thickness of Material to be Punched

NOTE: In some cases, Spartanics will need a sample of your material to determine what tooling is best for you.

8.11.2 TOOLING REPLACEMENT

There are two different methods for replacing the tooling. Method #1 only involves changing or sharpening the punch and die. Method #2 involves changing the punch, die, ejector pin, and

stripper rods (if the rods are broken). Use following Table 8.11 A as a guide on which method you should use for servicing your press's tooling:

USE METHOD #1 IF:	USE METHOD #2 IF:
<ol style="list-style-type: none"> 1. You are sharpening a worn punch and die. 2. You are replacing a worn-out punch and die with a punch and die of the same size. 3. The new punch's diameter is in a size range that is compatible with the ejector pin presently installed on the press. See Table 8.11 B for compatibility listings. The ejector pin is the pin that goes through the center of the punch. 	<ol style="list-style-type: none"> 1. The new punch's diameter is not in a size range that is compatible with the ejector pin presently installed on the press See Table 8.11 B for compatibility listings. The ejector pin is the pin that goes through the center of the punch. 2. The ejector pin is broken. 3. The stripper rods are broken.

Table 8.11 A

PUNCH/EJECTOR PIN COMPATIBILITY TABLE

Punch Diameter	Ejector Pin Diameter
Less than .075" (1.90mm)	None
.075" (1.90mm) to .120" (3.05mm)	.028" (.71mm)
.121" (3.07mm) to .375" (9.52mm)	.058" (1.47mm)

Table 8.11 B

8.11.2 TOOLING REPLACEMENT**METHOD #1**

Replace the tooling as follows:

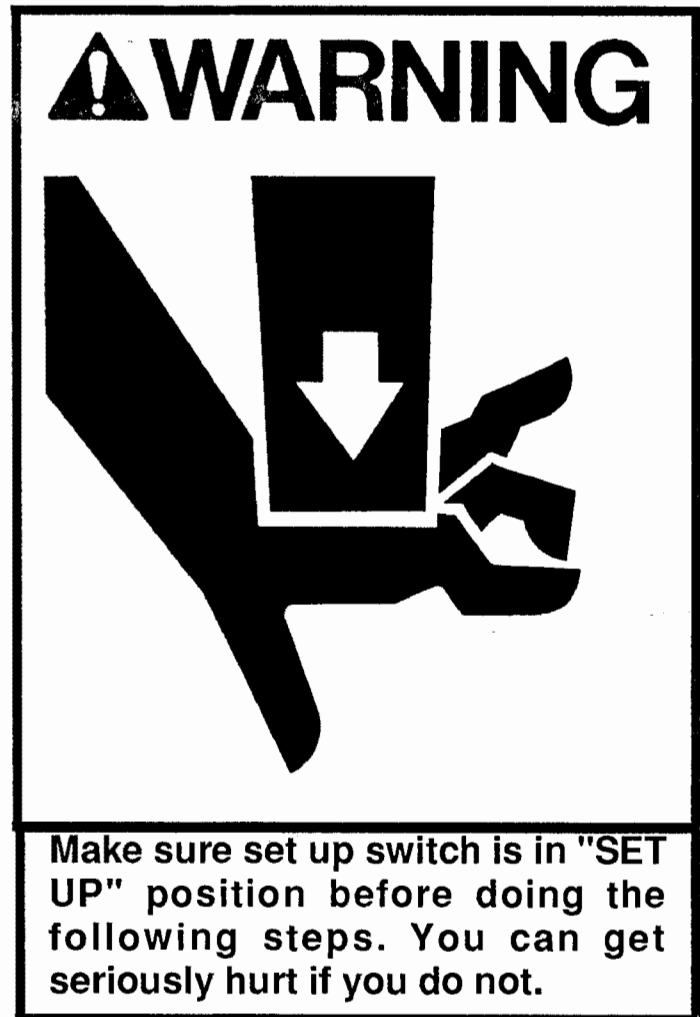
Tools Needed:

- Set of S.A.E. hex wrenches (Allen wrenches)
- crank tool #83-0010 (see Section 11.3)
- die tool #38-134 (see Section 11.3)
- machinist's tool (see Chapter 15)
- medium flat-tip screwdriver
- needle-nose pliers

Note

Use the Illustrated Parts List in Chapter 11 of this manual as an aid in replacing the punch and die. When you see something like "Remove hold-down guard (451, Fig. 13)" in the following procedure, the number (451) refers to a picture of the hold-down guard (and how the guard is attached to the press) in Figure 13 of the Illustrated Parts List.

1. If press is equipped with converter, loosen converter arm set screw (702, Fig. 21) with 3/32" hex wrench and remove converter arm (703).
2. Remove hold-down guard screws (450, Fig. 13) with 5/32" hex wrench.
3. Remove hold-down guard (451) from press. Leave hold-down covers (448) and (449) attached to hold-down guard.
4. Turn ram guard fasteners (111, Fig. 1) 1/4 turn counterclockwise (until they pop up) with screwdriver.
5. Remove ram guard (112).
6. Turn set up switch to "SET UP" position.
7. Press "ON" button on control panel.
8. Pop up crankshaft cover button by pulling on button with needle-nose pliers. The cover should flip up after the button is pulled. See Figure 8.11 A.
9. Put crank tool over end of crankshaft. See Figure 8.11 A.
10. Turn crankshaft until stripper is just below guide assembly. See Figure 8.11 B.
11. Pull stripper retaining spring off of stripper with machinist's tool (See Figure 8.11 B). Stripper will drop off of punch. If press is equipped with a urethane stripper instead of a metal one, pull it off of punch.
12. Turn crankshaft a little so that the punch raises about 1" (25mm). See Figure 8.11 B.



8.11.2 TOOLING REPLACEMENT

METHOD #1

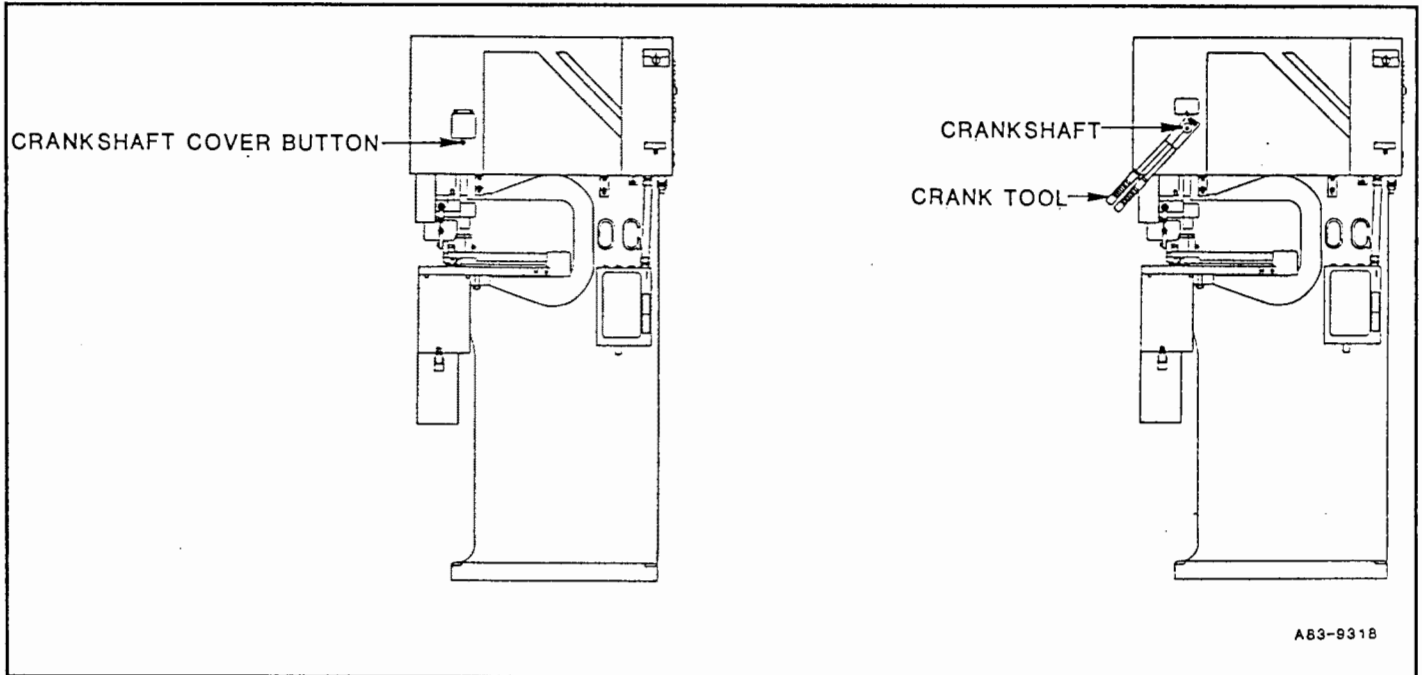


Figure 8.11 A

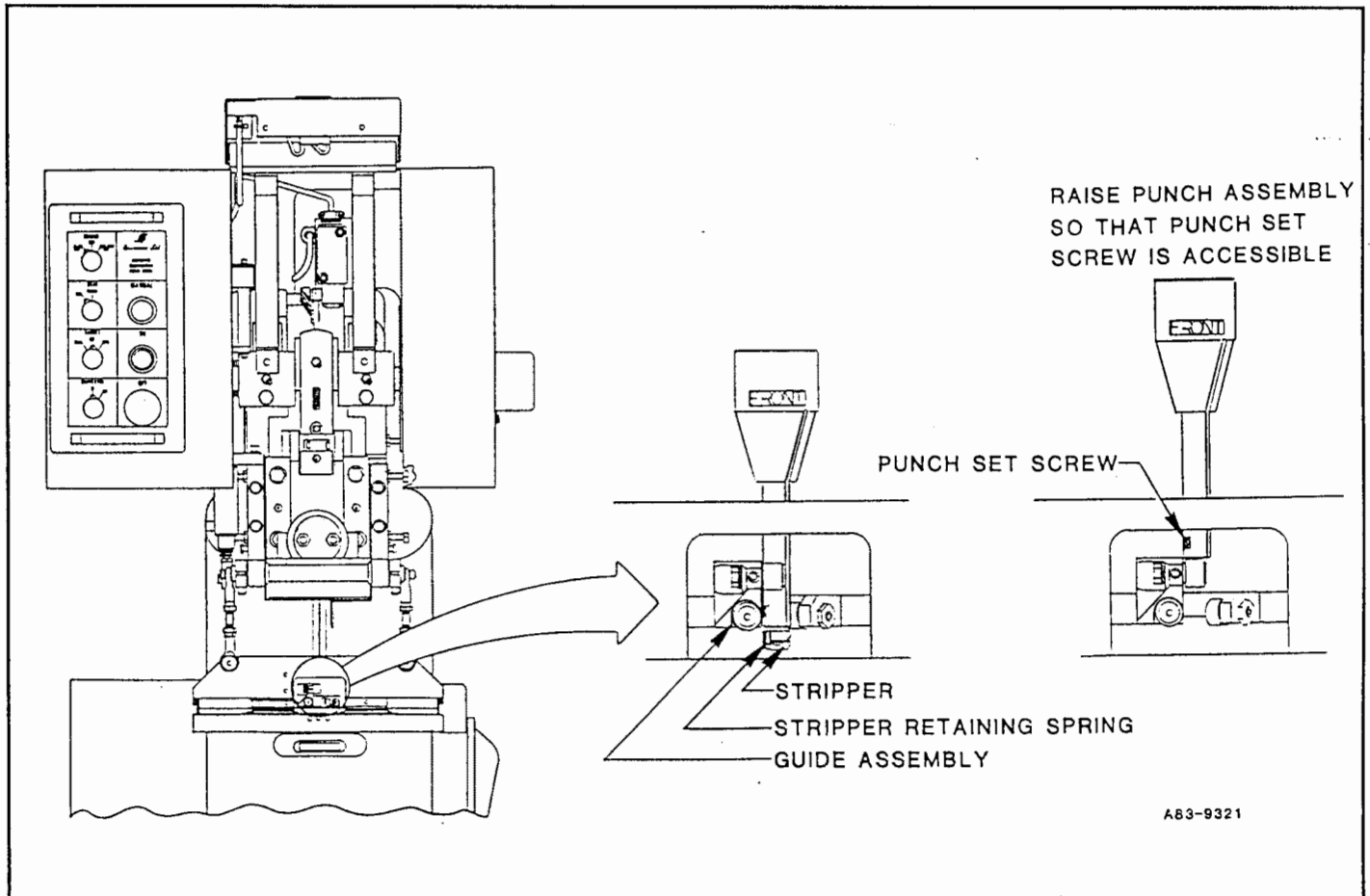


Figure 8.11 B

8.11.2 TOOLING REPLACEMENT**METHOD #1**

13. Loosen punch set screw a few turns with 5/64" hex wrench. Punch should fall out of its holder. If punch does not fall out, pull it out with needle-nose pliers (see Figure 8.11 B).
14. Sharpen punch according to Section 8.11.3 or, if punch is worn out, go to step 15.
15. Place new or sharpened punch into position and secure in place by tightening punch set screw. Make sure that punch is all the way up into punch holder.
16. Turn crankshaft until punch assembly is in its highest position.
17. Loosen die set screw a few turns with 1/8" hex wrench. See Figure 8.11 C.
18. Lift die out of bolster plate with die tool as shown in Figure 8.11 D.
19. Sharpen die according to Section 8.11.3. If die is worn out, go to step 20.
20. Place new or sharpened die into position with die tool. Make sure that die is seated all the way into bolster plate. Flat part on the side of die must face front of the press. Top of die has to be slightly above the bolster plate (between .007" and .010" [.18mm and .25mm]). Shims may be placed under die to raise the die up. Dies that have been sharpened often need shims to be placed under them.
21. Tighten die set screw.

CAUTION

Do not run press until tooling has been checked and properly aligned. The press may be seriously damaged if you run it before checking the tooling alignment.

22. Check tooling alignment according to Section 8.11.4.

METHOD #2

Replace the tooling as follows:

NOTE

Disregard steps 12-13, 17-24, and 29-31 if you are only changing the stripper rods.

Tools Needed:

- Set of S.A.E. hex (Allen) wrenches)
- 11/16" open-end wrench
- 6" (150 mm) scale
- crank tool #83-0010 (see Section 11.3)
- die tool #38-134 (see Section 11.3)
- machinist's tool (see Chapter 15)
- medium flat-tip screwdriver
- needle-nose pliers



1. Remove the sensing heads according to Section 8.9.1. Place sensing heads on hold-down frame.

8.11.2 TOOLING REPLACEMENT

METHOD #2

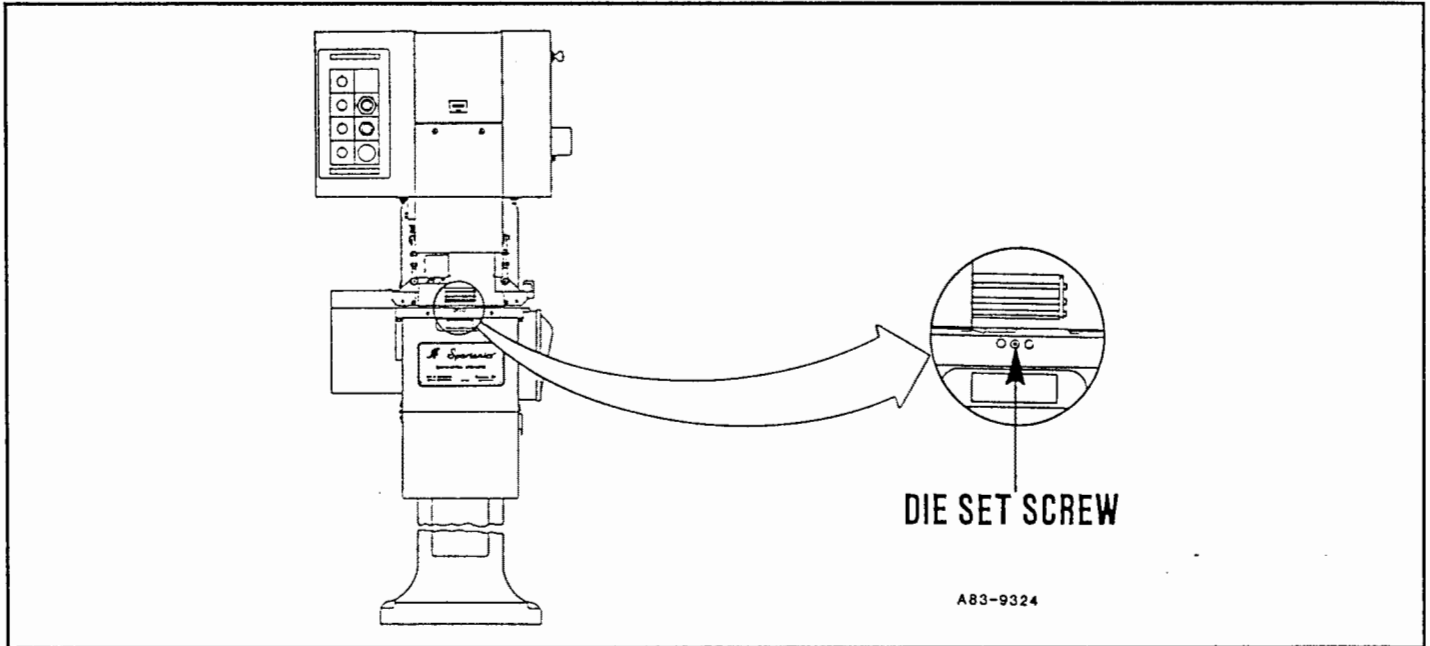


Figure 8.11 C

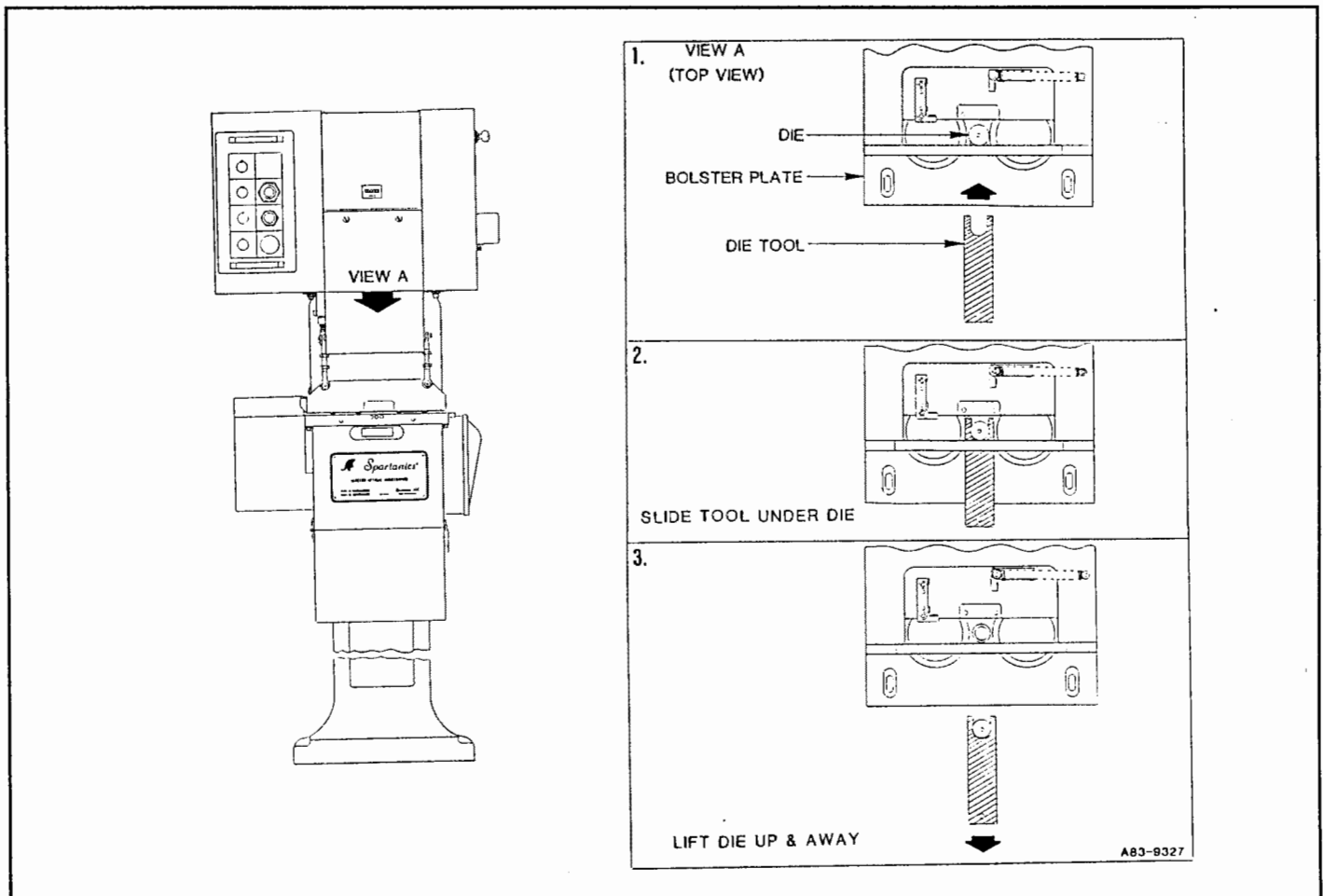


Figure 8.11 D

8.11.2 TOOLING REPLACEMENT**METHOD #2****Note**

Use the Illustrated Parts List in Chapter 11 of this manual as an aid in replacing the punch and die. When you see something like "Remove hold-down guard (451, Fig. 13)" in the following procedure, the number (451) refers to a picture of the hold-down guard (and how the guard is attached to the press) in Figure 13 of the Illustrated Parts List.

2. If press is equipped with a converter, loosen converter arm set screw (703, Fig. 21) with 3/32" hex wrench and remove converter arm (703).
3. Remove hold-down guard screws (450, Fig. 13) with 5/32" hex wrench.
4. Remove hold-down guard (450) from press. Leave hold-down covers (448) and (449) attached to hold-down guard.
5. Turn ram guard fasteners (111, Fig. 1) 1/4 turn counterclockwise (until they pop up) with screwdriver.
6. Remove ram guard (112).
7. Unscrew guide assembly bolts (470, Fig. 13) with 3/16" hex wrench.
8. Remove guide assembly (471).

CAUTION

Make sure that you hold onto punch holder when loosening shank clamp nuts. Otherwise, the punch holder may fall out of shank clamp and damage press.

9. While holding onto punch holder assembly (406, Fig. 11), loosen shank clamp nuts (403) with 11/16" open-end wrench and pull punch holder out of shank clamp.

10. Pull stripper retaining spring (425, Fig. 12) off of stripper (426) with machinist's tool. If punch is equipped with a urethane stripper instead of a metal one, pull it off of the punch assembly.
11. Pull stripper (426) off of punch assembly if still attached.
12. Loosen punch set screw (428) a few turns with 5/64" hex wrench.
13. Pull punch (430) out of punch holder (445).
14. Unscrew stripper spring set screw (431) with 3/8" hex wrench.
15. Turn punch holder (445) upside down and let stripper spring (433), spacers (435), and stripper rod assembly fall out of holder.
16. Inspect stripper rods (438) for damage. If stripper rods are OK, go to step 17. If stripper rods are damaged, replace them as follows:
 - a. Unscrew stripper rod screws (436) with 7/64" hex wrench.
 - b. Remove guide retaining block (437).
 - c. Remove stripper rods (438) from guide mounting block (441).
 - d. Pull O-rings (439) off of stripper rods (438).
 - e. Put O-rings on new stripper rods (439).
 - f. Put new stripper rods (438) in guide mounting block (441). Make sure that notches in end of stripper rods point away from center axis of mounting block as shown in Figure 8.11 E.
 - g. Put guide retaining block (437) on guide mounting block (441) and secure in place with stripper rod screws (436).

8.11.2 TOOLING REPLACEMENT

METHOD #2

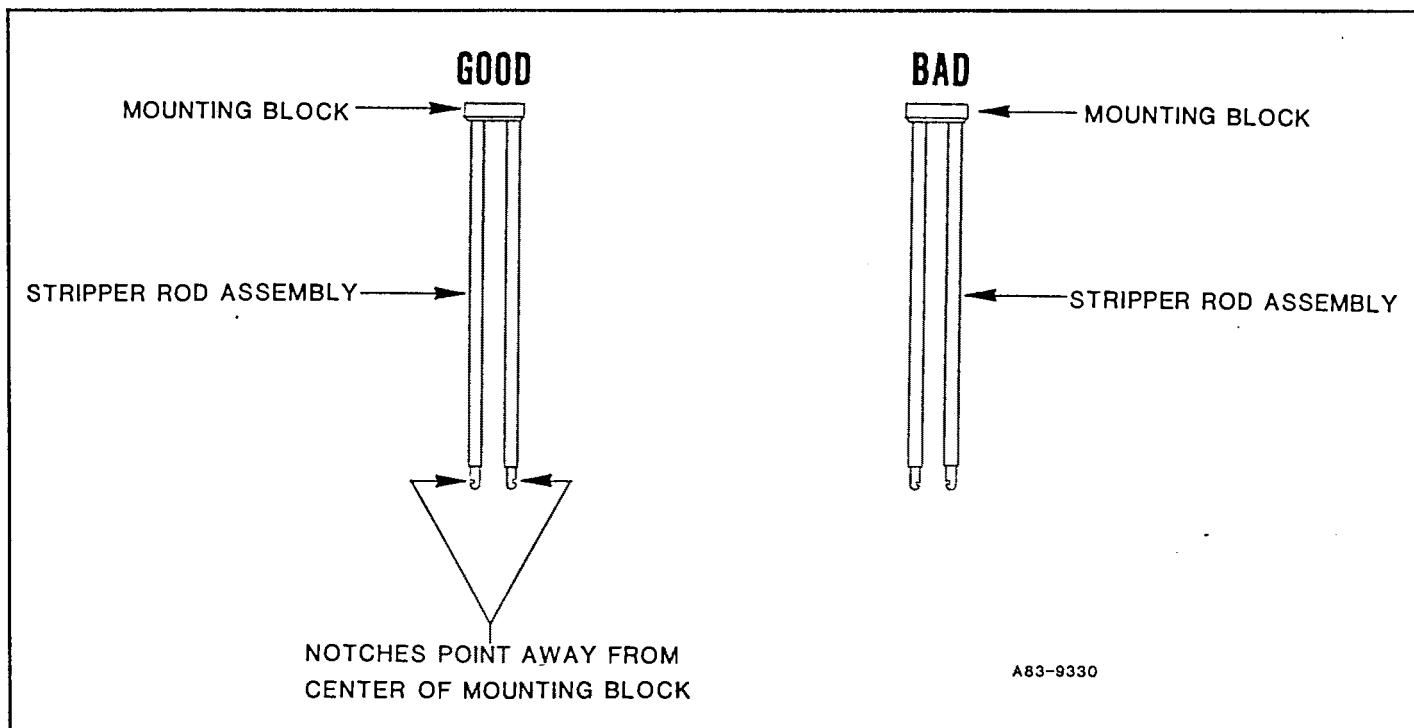


Figure 8.11 E

17. Unscrew ejector pin screw (442) with 3/32" hex wrench.
18. Turn punch holder (445) upside down and let ejector pin spring (443) and ejector pin (444) fall out of punch holder.
19. Place new ejector pin (444) into punch holder (445).
20. Place ejector pin spring (443) into punch holder (445). The button end of the spring goes towards the bottom of the punch holder.
21. Screw ejector pin screw (442) into punch holder (445).
22. Place new punch (430) into punch holder (445). Make sure that punch is all the way into punch holder.
23. Tighten punch set screw (428) with 5/64" hex wrench.
24. Measure the distance between the tip of the ejector pin and the the tip of the punch. The distance should be $3/32 \pm 1/64$ " ($2.4 \pm .4$ mm) as shown in Figure 8.11 F. If it is not, grind the tip of the ejector pin until it is.
25. Put the stripper rod assembly into the punch holder.
26. Put three spacers (435) into punch holder (445).
27. Put stripper spring (433) into punch holder (445).
28. Screw stripper spring set screw (431) into punch holder until the top of the screw is flush with the top of the holder. Then turn the screw 1/2 turn clockwise. After 1/2 turn, the top of the set screw will be about 1/16" (1.5mm) below the top of the punch holder.

8.11.2 TOOLING REPLACEMENT

METHOD #2

29. Place punch holder assembly (406, Fig. 11) all the way up into shank clamp (405) and rotate punch holder assembly until the word "FRONT" stamped on the holder faces the front of the press. Then tighten shank clamp nuts with 1 1/16" open-end wrench.

30. Place 6" (150mm) scale up to punch holder as shown in Figure 8.11 G. The edge of the scale must be parallel with the edge of the hold-down frame. If the scale is not parallel with the edge of the hold-down frame, loosen the shank clamp nuts and rotate the punch holder until the scale is parallel with the edge of the hold-down frame. Then tighten the shank clamp nuts.

31. Loosen die set screw a few turns with 1/8" hex wrench. See preceding Figure 8.11 C.

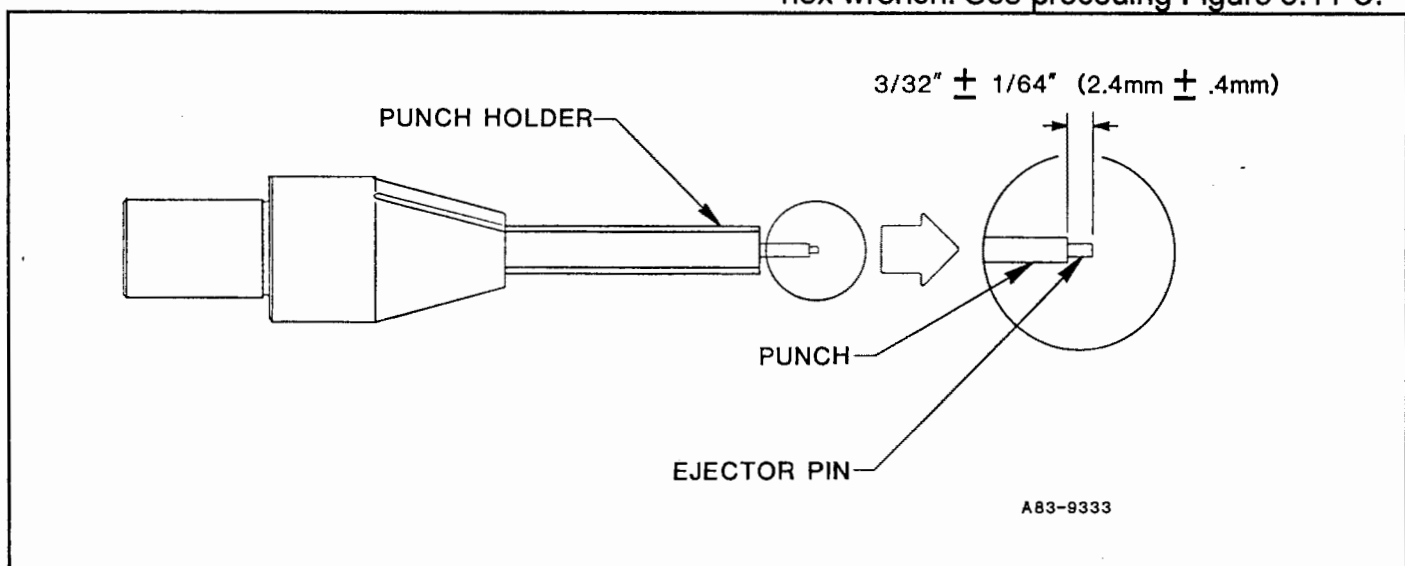


Figure 8.11 F

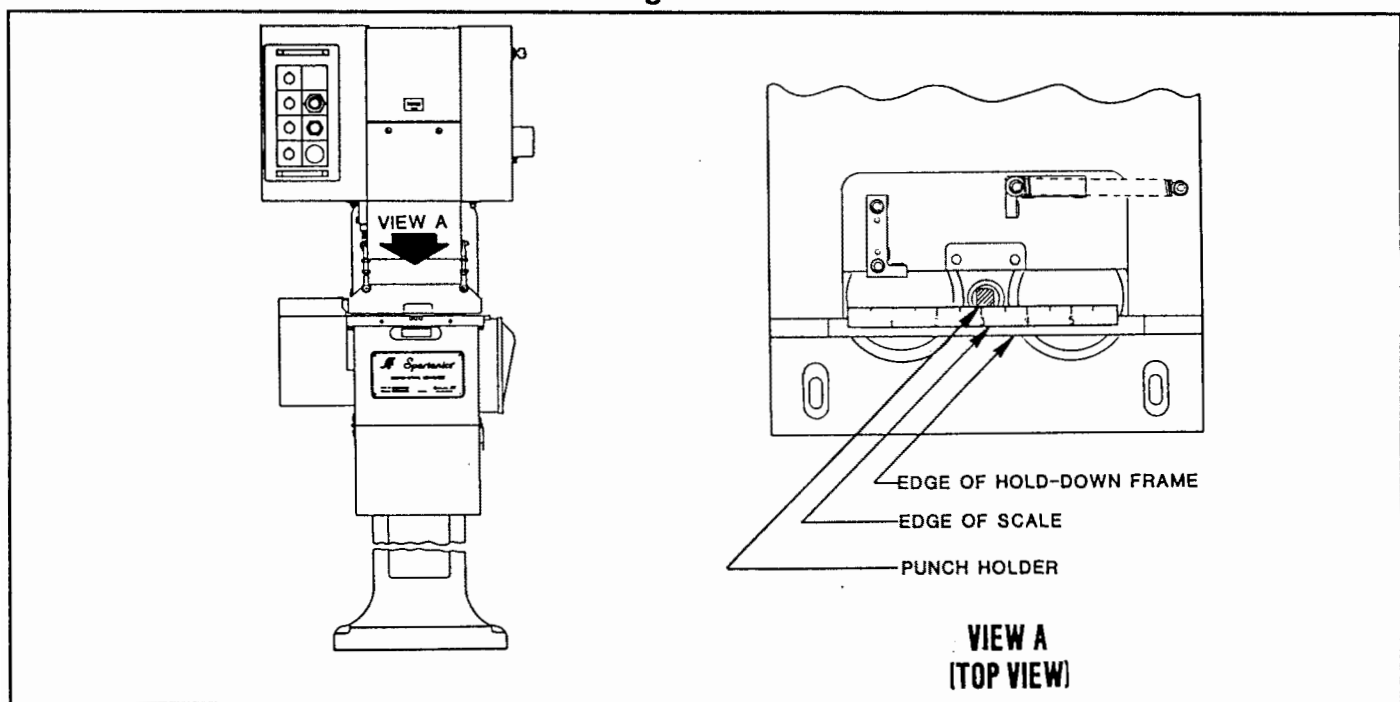


Figure 8.11 G

8.11.2 TOOLING REPLACEMENT

METHOD #2

32. Lift die out of bolster plate with die tool as shown in preceding Figure 8.11 D.

33. Place new die into position with die tool. Flat part on side of die must face the front of the press. Top of die has to be slightly above (between .003" [.08mm] and .009" [.24mm]) the bolster plate. Shims may be placed under die to raise die.

34. Tighten die set screw (see Figure 8.11 D).

CAUTION
Do not run press until tooling has been properly aligned or the press will be seriously damaged.

35. Align tooling according to Section 8.11.5.

8.11.3 SHARPENING TOOLING

The following specifications are for sharpening circular tooling. Contact Spartanics or your service representative for information on sharpening noncircular tooling.

Sharpen the tooling according to the following specifications:

DIE

Surface grind top surface of die until chips or rough edges are removed from die hole. If rough edges cannot be removed, replace die with new die. See Figure 8.11 H.

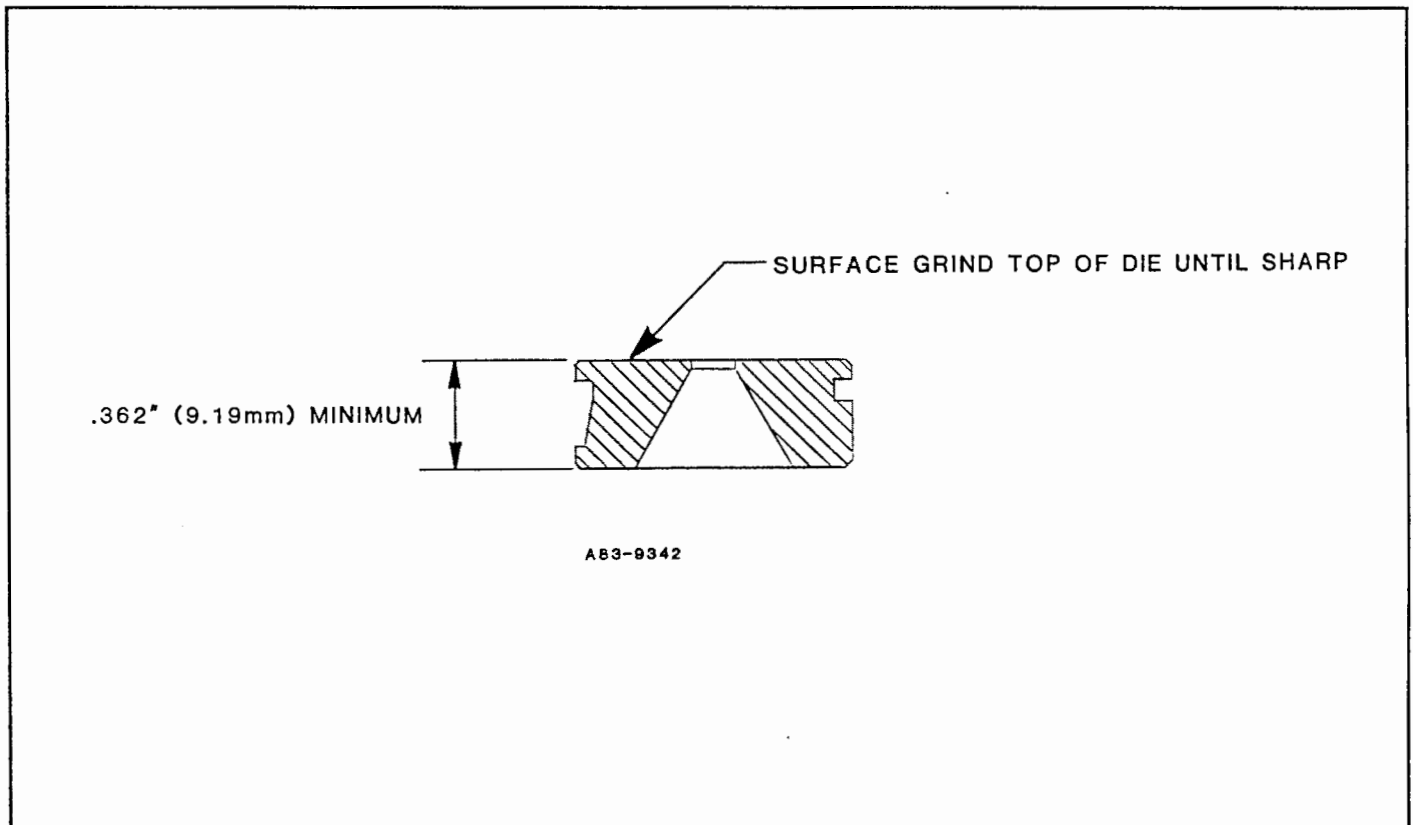


Figure 8.11 H

8.11.3 SHARPENING TOOLING

PUNCH

Surface grind tip of punch until chips or rough edges are removed. If rough edges cannot be removed, replace punch with new punch. See Figure 8.11 I.

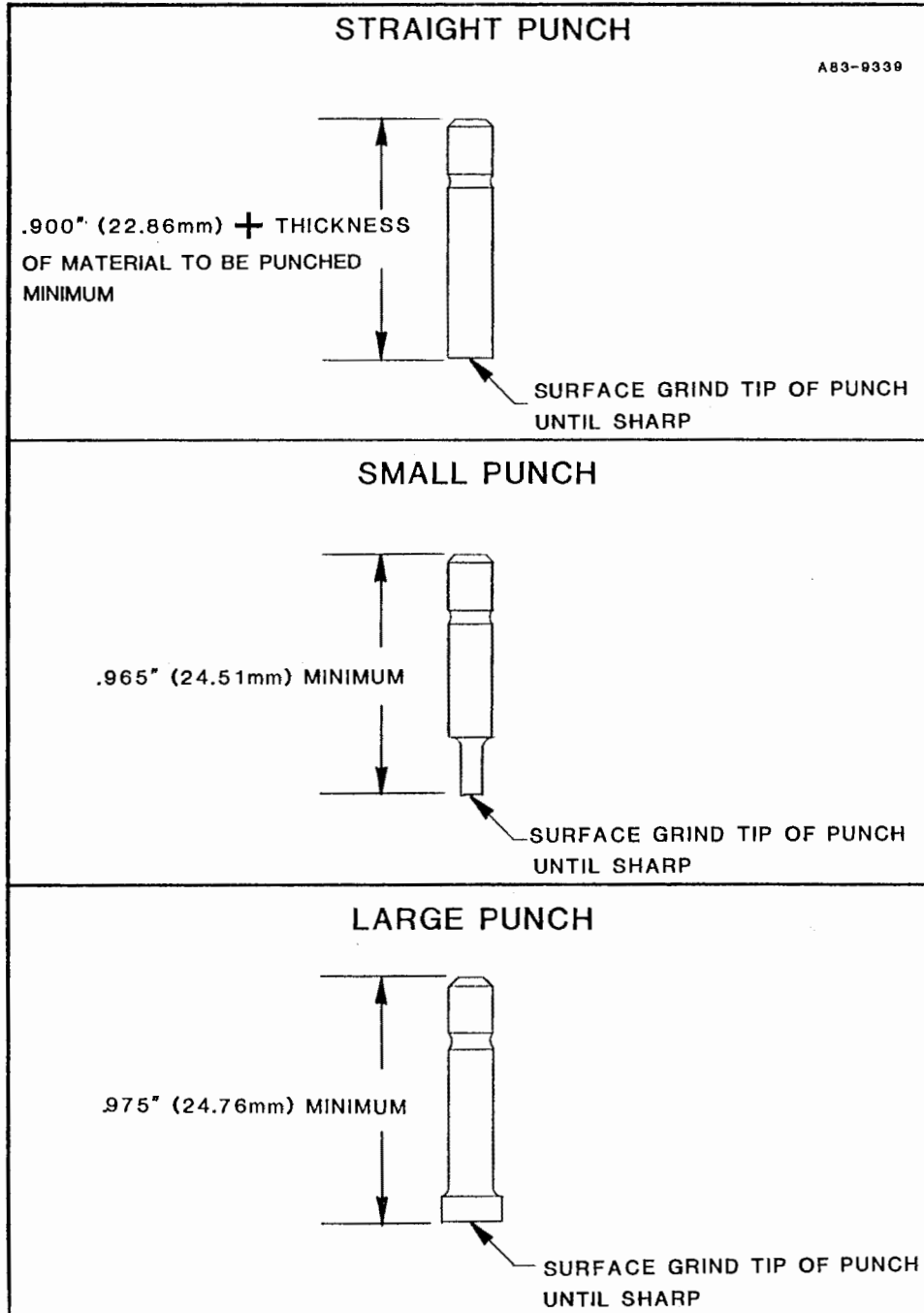


Figure 8.11 I

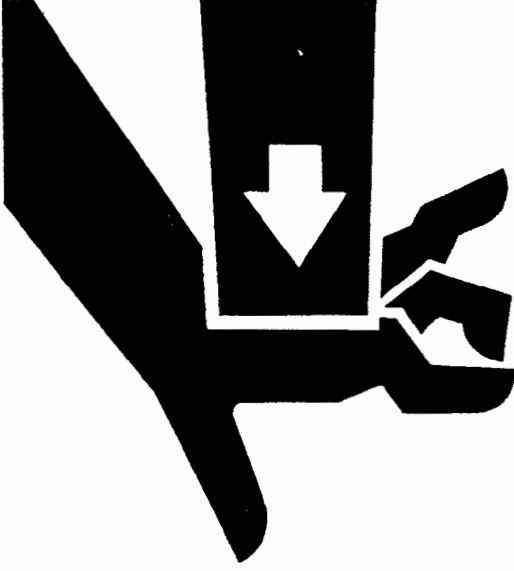
8.11.4 TOOLING ALIGNMENT CHECK

Check the tooling alignment as follows:

Tools Needed:

- 5/32" hex wrench (Allen wrench)
- 3/16" hex wrench (Allen wrench)
- crank tool (special tool #83-0010)
- dental-type inspection mirror
- needle-nose pliers

! WARNING



Turn press off before doing the following steps. You can get seriously hurt if you do not.

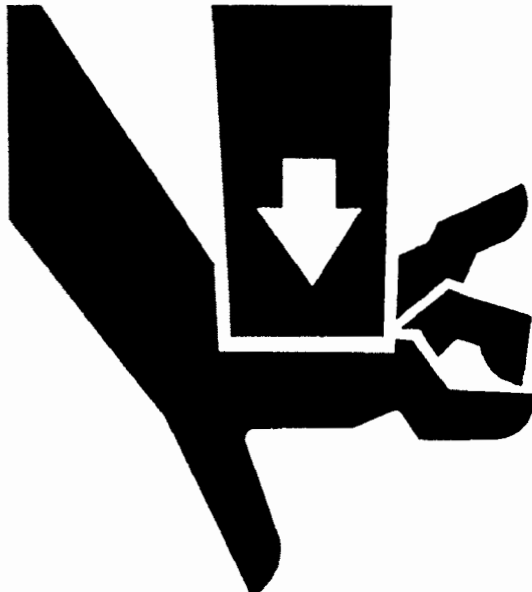
1. If installed, remove the sensing heads according to Section 8.9.1. Place the sensing heads on the back of the hold-down frame.

Note

Use the Illustrated Parts List in Chapter 11 of this manual as an aid in checking the tooling alignment. When you see something like "Remove hold-down guard (449, Fig. 13)" in the following procedure, the number (449) refers to a picture of the hold-down guard (and how the guard is attached to the press) in Figure 13 of the Illustrated Parts List.

2. If press is equipped with converter, loosen converter arm set screw (702, Fig. 21) with 3/32" hex wrench and remove converter arm (703) if not already done so.
3. If installed, remove hold-down guard screws (450, Fig. 13) with 5/32" hex wrench.
4. If installed, remove hold-down guard (451) from press. Leave hold-down covers (448) and (449) attached to hold-down guard.
5. If installed, remove ram guard (112, Fig. 1) by turning ram guard fasteners (111) 1/4 turn counterclockwise (until they pop up) with screwdriver.
6. Turn set up switch to "SET UP" position.

! WARNING



Make sure set up switch is in "SET UP" position before doing the following steps. You can get seriously hurt if you do not.

7. Press "ON" button on control panel.

8.11.4 TOOLING ALIGNMENT CHECK

8. Turn "TARGET" switch on control panel to "CLEAR" position. This will turn the light on underneath the die to ease the alignment of the tooling. If your press is not equipped with a light underneath the die, remove the slug bin (143, Fig. 1) and place a flashlight under the die when aligning the tooling. Also, if your press is equipped with a steel shield (272, Fig. 7) in the shield assembly (141, Fig.1), remove the assembly to let light shine through the die.
9. Pop up crankshaft cover button by pulling on button with needle-nose pliers. The cover should flip up after the button is pulled. See preceding Figure 8.11 A.
10. Put crank tool over end of crankshaft. See preceding Figure 8.11 A.
11. If installed, remove stripper according to steps 10-11 in Method #1 of Section 8.11.2.
12. Turn crankshaft until punch just starts to go through die.
13. After the punch goes through the die, there should be a uniform circle of light around the punch as shown in Figure 8.11 J. Use the inspection mirror to check for light on the back-side of the punch. If there is a uniform circle of light around the punch, go to step 14. If there is not a uniform circle of light, align the tooling according to steps 4-5 & 13-33 in Section 8.11.5.
14. Reattach the stripper and check punch clearance according to steps 37-39 in Section 8.11.5.
15. Turn the crankshaft until the punch is in its highest position.
16. Remove the crank tool from the crankshaft and close cover.
17. Press "OFF" button on control panel.
18. Reinstall the sensing heads according to Section 8.9.1.
19. Reattach the ram guard (112, Fig.1) and hold-down guard (451, Fig. 13).

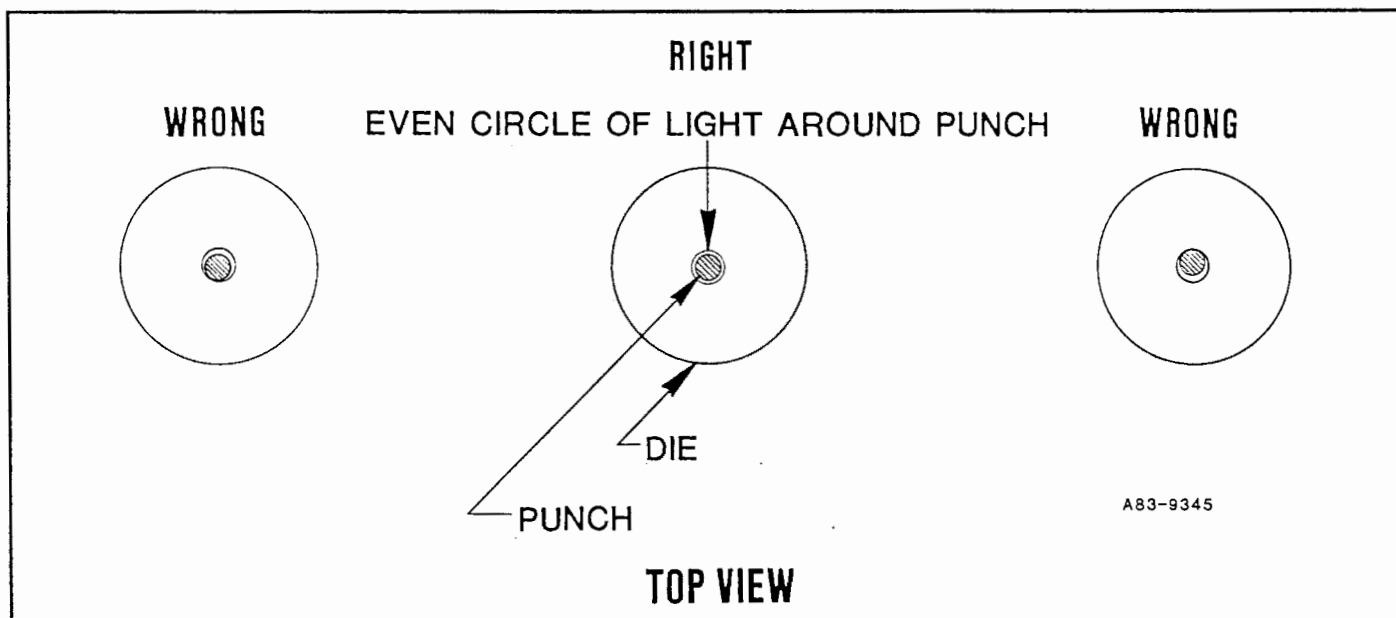


Figure 8.11 J

8.11.5 TOOLING ALIGNMENT

Align the tooling as follows:

Tools Needed:

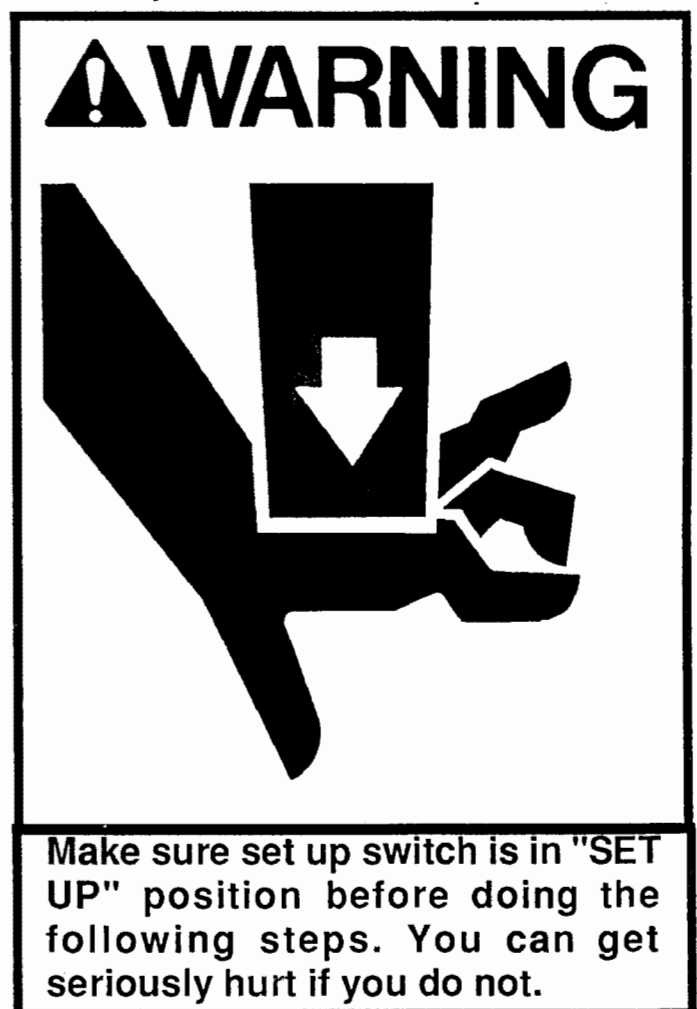
- > Set of S.A.E. hex (Allen) wrenches
- > 11/16" open-end wrench
- > 3/8" closed-end wrench
- > crank tool #83-0010 (see Section 11.3)
- > dental-type inspection mirror
- > die tool #38-134 (see Section 11.3)
- > medium adjustable-end wrench
- > medium flat-tip screwdriver
- > needle-nose pliers
- > rubber hammer

1. Loosen slug bin screws (142, Fig. 1) and slug bin (143).
2. Unscrew crank guard screws (122) with 3/16" hex wrench.
3. Flip hinged crank guard (133) up.
4. If installed, unscrew guide assembly bolts (470, Fig. 13) with 3/16" hex wrench.
5. Remove guide assembly (471).
6. Turn set up switch to "SET UP" position if not already done so.



Note

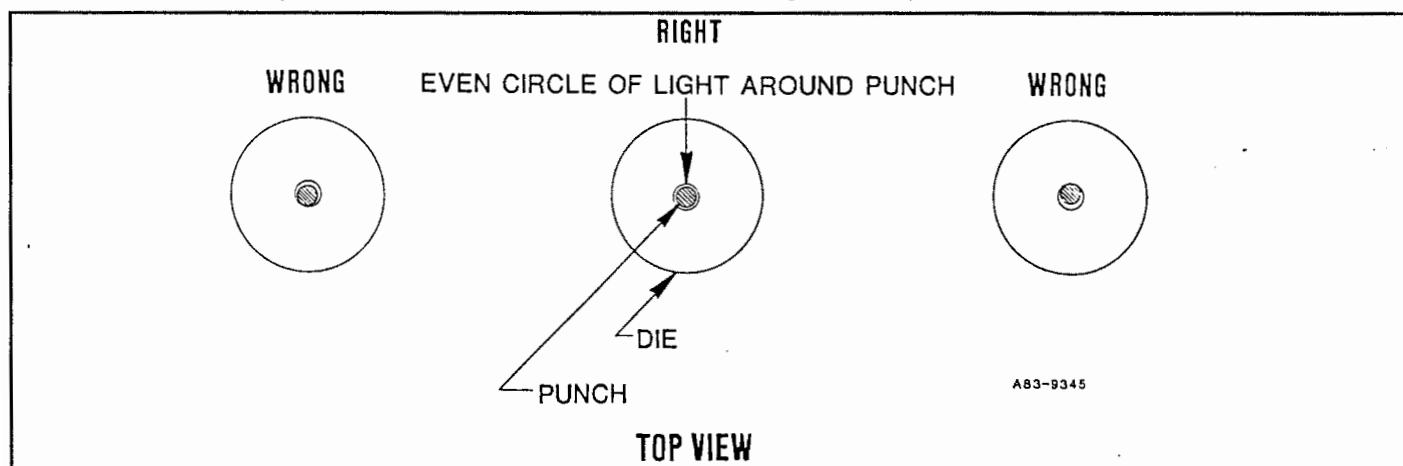
Use the Illustrated Parts List in Chapter 11 of this manual as an aid in aligning the tooling. When you see something like "Remove crank guard screws (122, Fig. 1)" in the following procedure, the number (122) refers to a picture of the of the crank guard screws (and how the screws are attached to the press) in Figure 1 of the Illustrated Parts List.



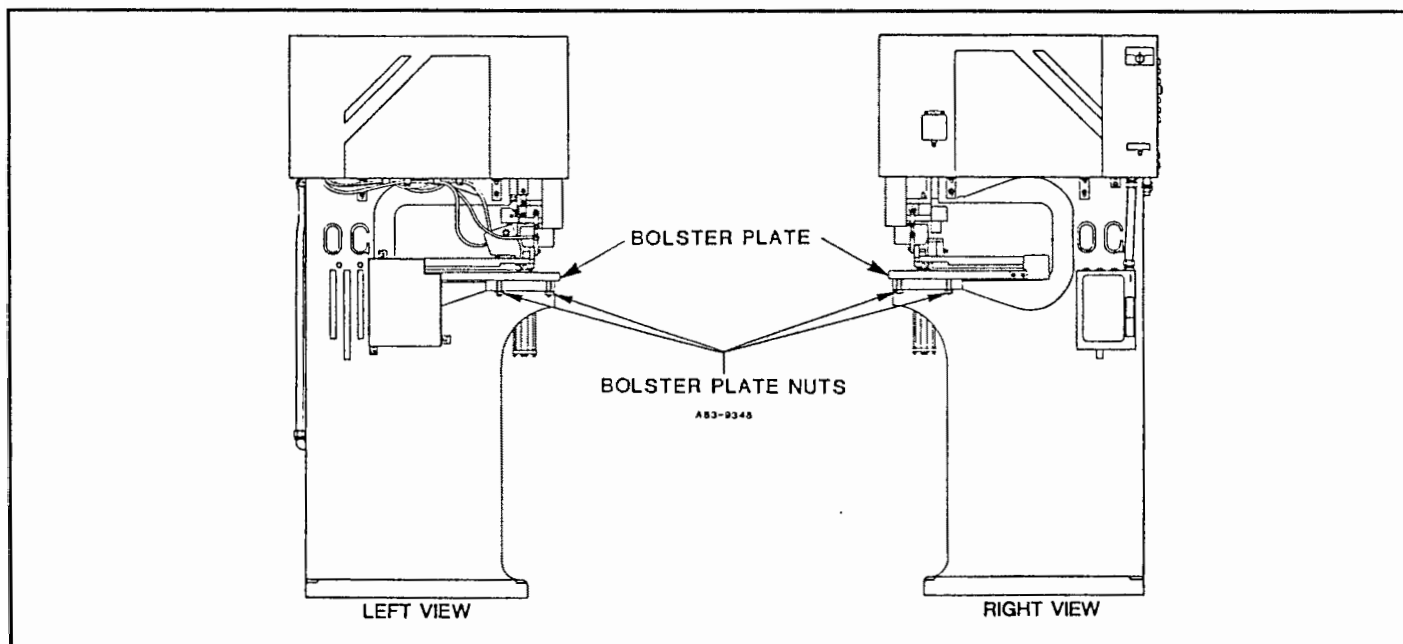
7. Press "ON" button on control panel.

8.11.5 TOOLING ALIGNMENT

8. Turn "TARGET" switch on control panel to "CLEAR" position if not already done so.
9. If not already done so, pop up crankshaft cover button by pulling on button with needle-nose pliers. The cover should flip up after the button is pulled. See Figure 8.11 A in Section 8.11.2.
10. Put crank tool over crankshaft if not already done so. See Figure 8.11 A in Section 8.11.2.
11. Turn crankshaft until punch just starts to go through die.
12. After punch goes through die, there should be a uniform circle of light around punch as shown in Figure 8.11 K. Use the inspection mirror to check for light on the backside of the punch. If there is a uniform circle of light around the punch, go to step 16. If there is not a uniform circle of light around the punch, go to step 13.

**Figure 8.11 K**

13. Loosen bolster plate nuts with 11/16" open-end wrench. See Figure 8.11 L.

**Figure 8.11 L**

8.11.5 TOOLING ALIGNMENT

14. Lightly tap bolster plate with rubber hammer until there is a uniform circle of light around the punch.

15. Tighten bolster plate nuts -- each nut a little bit at a time to keep the plate from moving and putting the punch out of alignment. If punch goes out of alignment when nuts are tightened, loosen nuts and realign bolster plate again.

16. Loosen bearing lock nuts on guide assembly with 3/8" closed-end wrench and then retighten nuts finger tight. See Figure 8.11 M.

17. Loosen set screws on guide assembly with 3/32" hex wrench. See Figure 8.11 M.

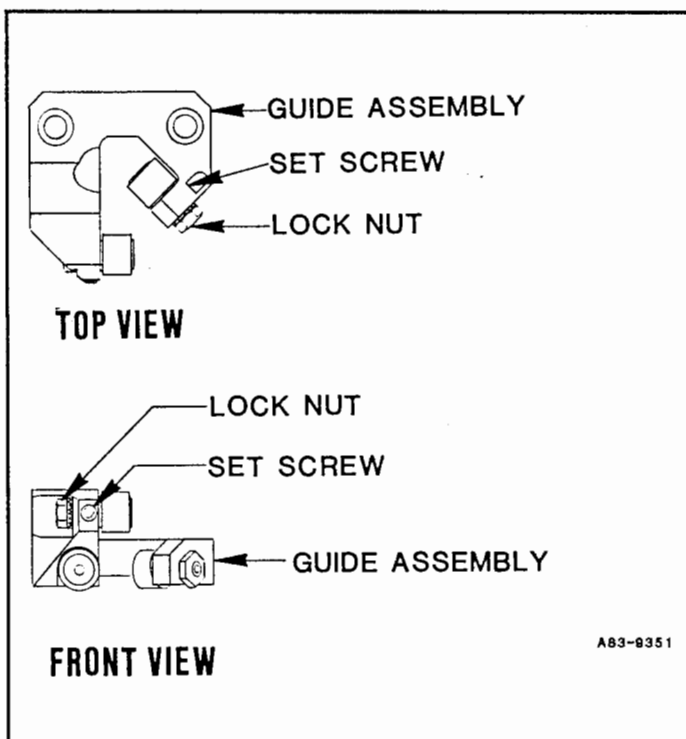


Figure 8.11 M

18. Raise punch by turning crankshaft with crank tool.

19. Put guide assembly (471, Fig. 13) into position on bolster plate (568).

20. Screw guide assembly mounting screws (470) into bolster plate but do not tighten screws yet.

21. Run punch down to its lowest position by turning crankshaft with crank tool.

22. Very gently move guide assembly to the right until the left bearing on the guide assembly just barely touches the side of the punch holder (see Figure 8.11 N). The bearing should have a little pressure on the punch holder but not enough pressure to alter the circle of light around the punch. When the bearing is against the punch holder, tighten the guide assembly mounting bolts (470) with 3/16" hex wrench.

23. Tighten the front bearing set screw until the front bearing just barely touches the front of the punch holder (see Figure 8.11 N). The bearing should have a little pressure on the front of the punch holder but not enough pressure to alter the circle of light around the punch. When the front bearing is against the punch, lightly tighten the bearing's lock nut with a 3/8" closed-end wrench.

24. Tighten the right rear bearing set screw with 3/32" hex wrench until the right rear bearing just barely touches the right rear corner of the punch holder (see Figure 8.11 O). Make sure that the set screw does not press against the bearing with so much pressure that the bearing ends up crooked as shown in Figure 8.11 O.

8.11.5 TOOLING ALIGNMENT

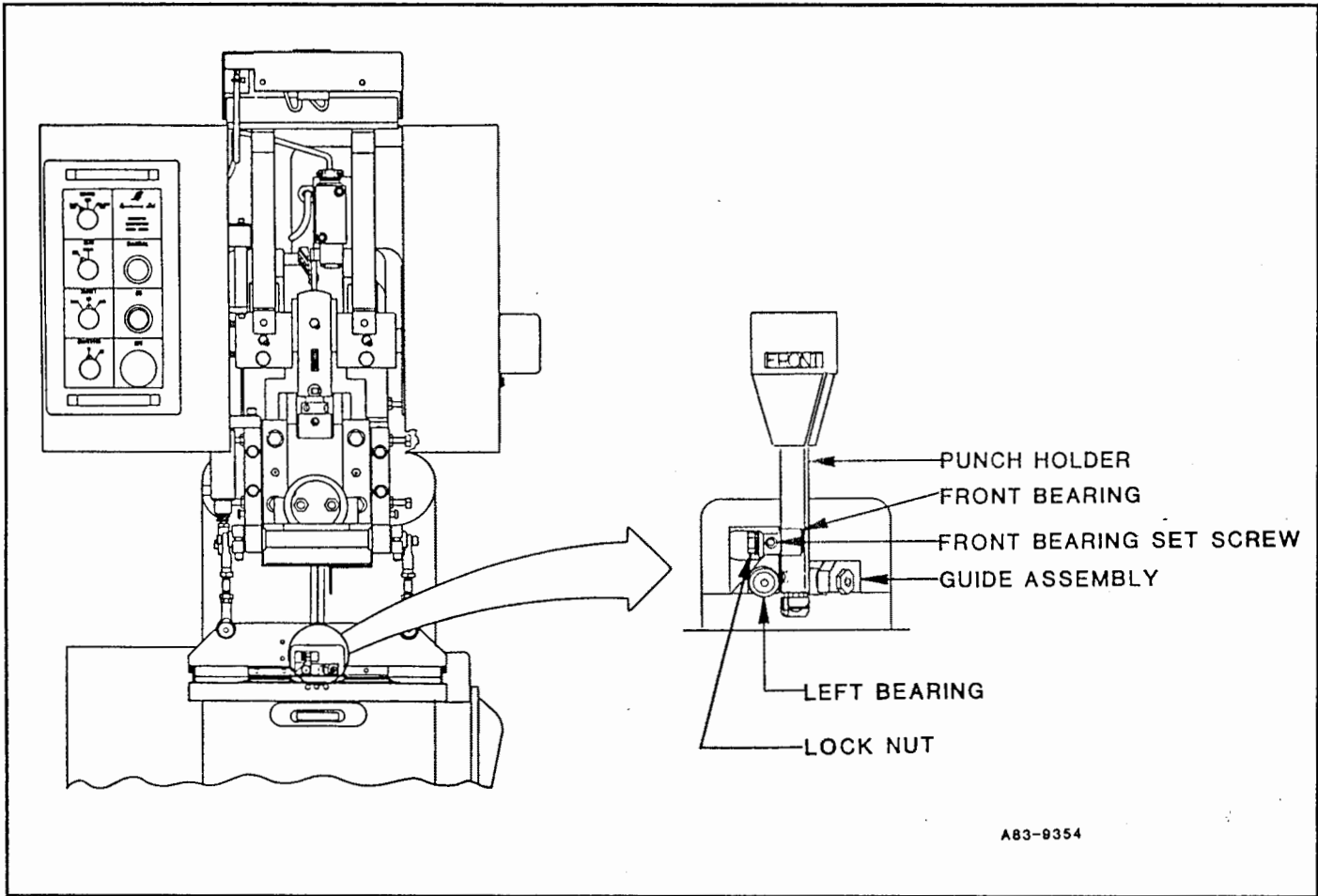


Figure 8.11 N

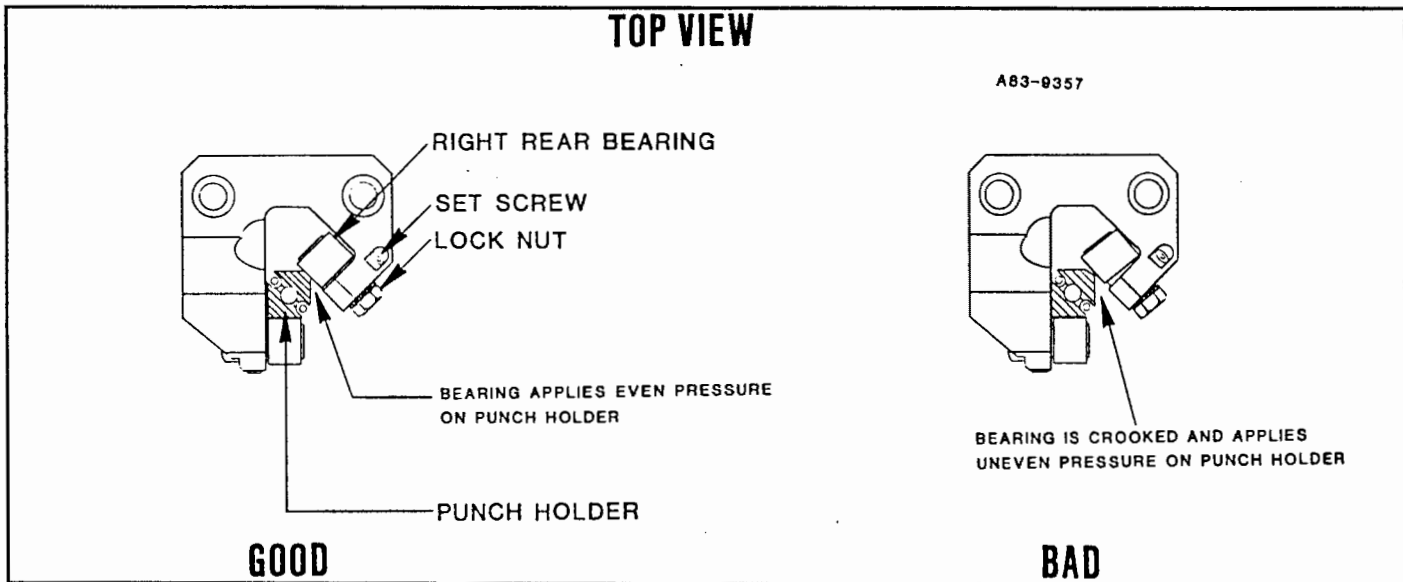


Figure 8.11 O

8.11.5 TOOLING ALIGNMENT

25. Lightly tighten the right rear bearing lock nut with a 3/8" closed-end wrench. If the circle of light around the punch begins to change as the nut is tightened, loosen the rear bearing set screw a little bit until the circle of light comes back to normal. It is OK for the circle of light to be a little bit off after the nut is tightened but the punch should not press against the side of the die after the nut is tightened (see Figure 8.11 P).
 26. Slightly loosen the guide assembly mounting screws (470) with hex wrench.
 27. Apply pressure to the guide assembly with your fingers until there is a uniform circle of light around the punch as shown in preceding Figure 8.11 K, then tighten the guide assembly mounting screws (tighten each screw a little bit at a time). If the circle of light around the punch begins to change as one mounting screw is tightened, tighten the other mounting screw until the circle of light comes back to normal. Use the inspection mirror to inspect the rear part of the circle of light behind the punch. It is very important that the circle of light be uniform all the way around the punch.
 28. Make sure punch is in its lowest position.
 29. Loosen the ram set screw with adjustable-end wrench (see Figure 8.11 Q).
 30. Insert end of 5/16" hex wrench (or 3/8" [9.5mm] dia. rod) into hole in ram adjusting screw (see Figure 8.11 Q).
 31. Turn ram adjusting screw until punch just begins to come out of die.
 32. Turn ram adjusting screw 1/4 turn in the opposite direction as turned in step 31 above. This will set the punch's penetrating depth to about .025" (.63mm). The punch depth should always be set between .020" (.50mm) and .030" (.76mm).
 33. Tighten ram set screw with adjustable-end wrench.
 34. Turn crankshaft until punch is about 1/2" (15mm) above die.
- CAUTION**

Never use an over stretched stripper retaining spring to hold a stripper in place. The stripper may come off and damage the press if it is overstretched.
35. Place stripper retaining spring (425, Fig. 12) on new stripper (426).
 36. Lift stripper up with hole end die tool and place stripper on end of punch holder. Stripper will snap into place. See Figure 8.11 R.
 37. Place two pieces of material to be punched under stripper as shown in Figure 8.11 S.
 38. Turn crankshaft until stripper presses down on material and then comes back up. If stripper stops the crankshaft when it presses down on material (the crankshaft cannot be turned through an entire punch cycle), either the punch penetration is too deep or the punch is too short. Check the punch penetration again according to steps 28-32. If the penetration is OK, a longer punch will have to be installed. If the crankshaft can be turned through an entire punch cycle, remove the material from under the stripper, and go to step 39.
 39. Turn crankshaft until punch is in its highest position and then remove crank tool.
 40. Close crankshaft cover.
 41. Remount sensing heads according to Section 8.9.1.
 42. If press is equipped with a converter, reattach converter arm (703, Fig. 21).

8.11.5 TOOLING ALIGNMENT

43. Flip hinged crank guard (133, Fig. 1) down and secure in place with crank guard bolts (123) and washers (124 & 125).

44. Reattach ram guard (112, Fig. 1), hold-down guard (451, Fig. 13), and vacuum cover (143, Fig. 1).

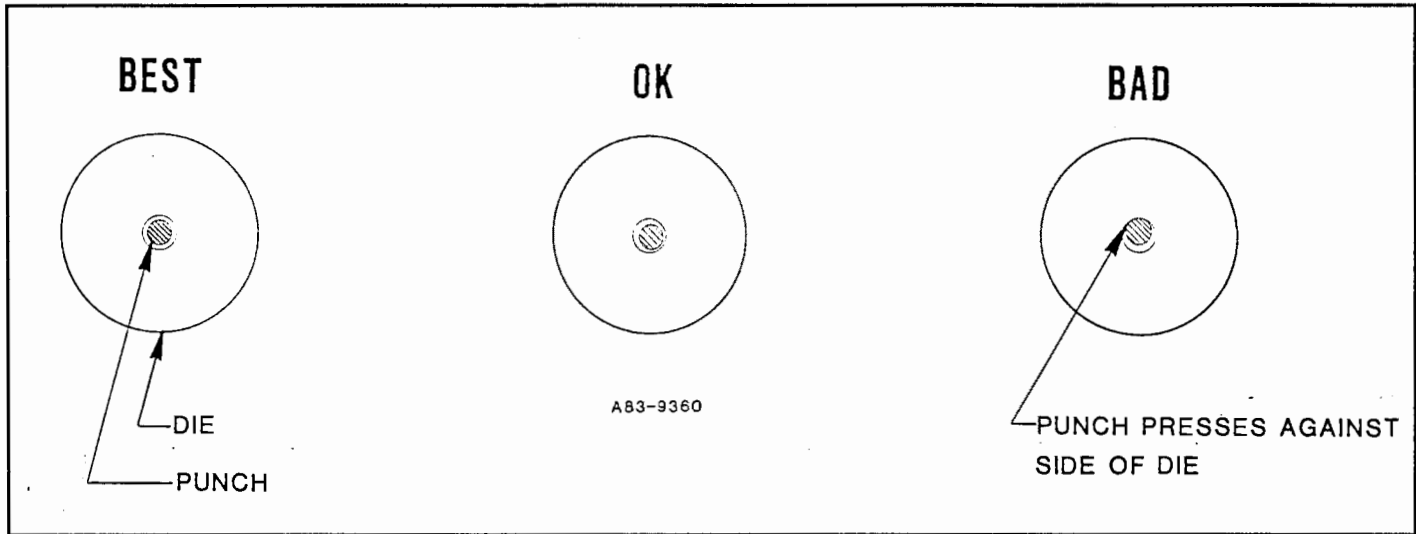


Figure 8.11 P

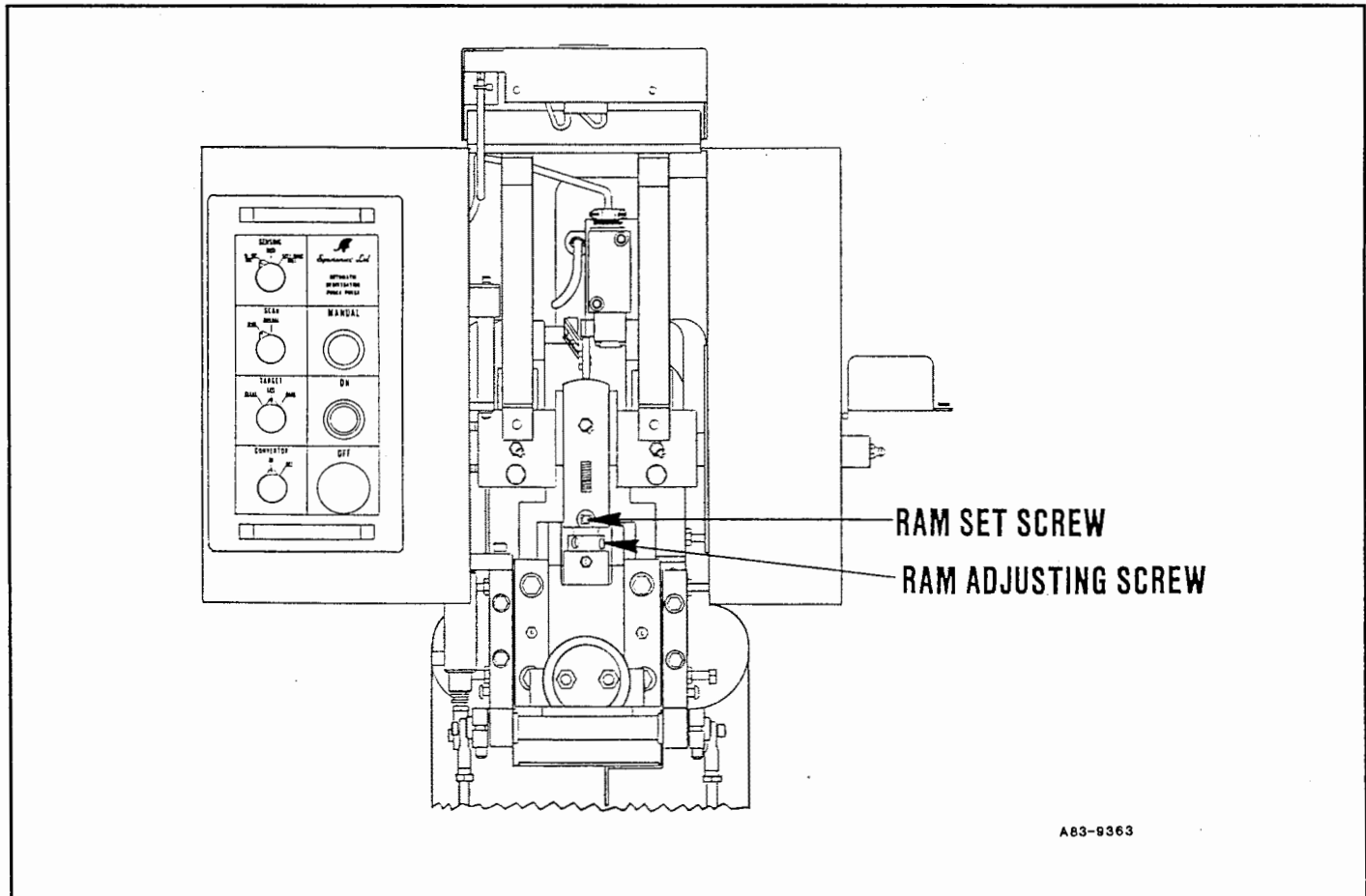


Figure 8.11 Q

8.11.5 TOOLING ALIGNMENT

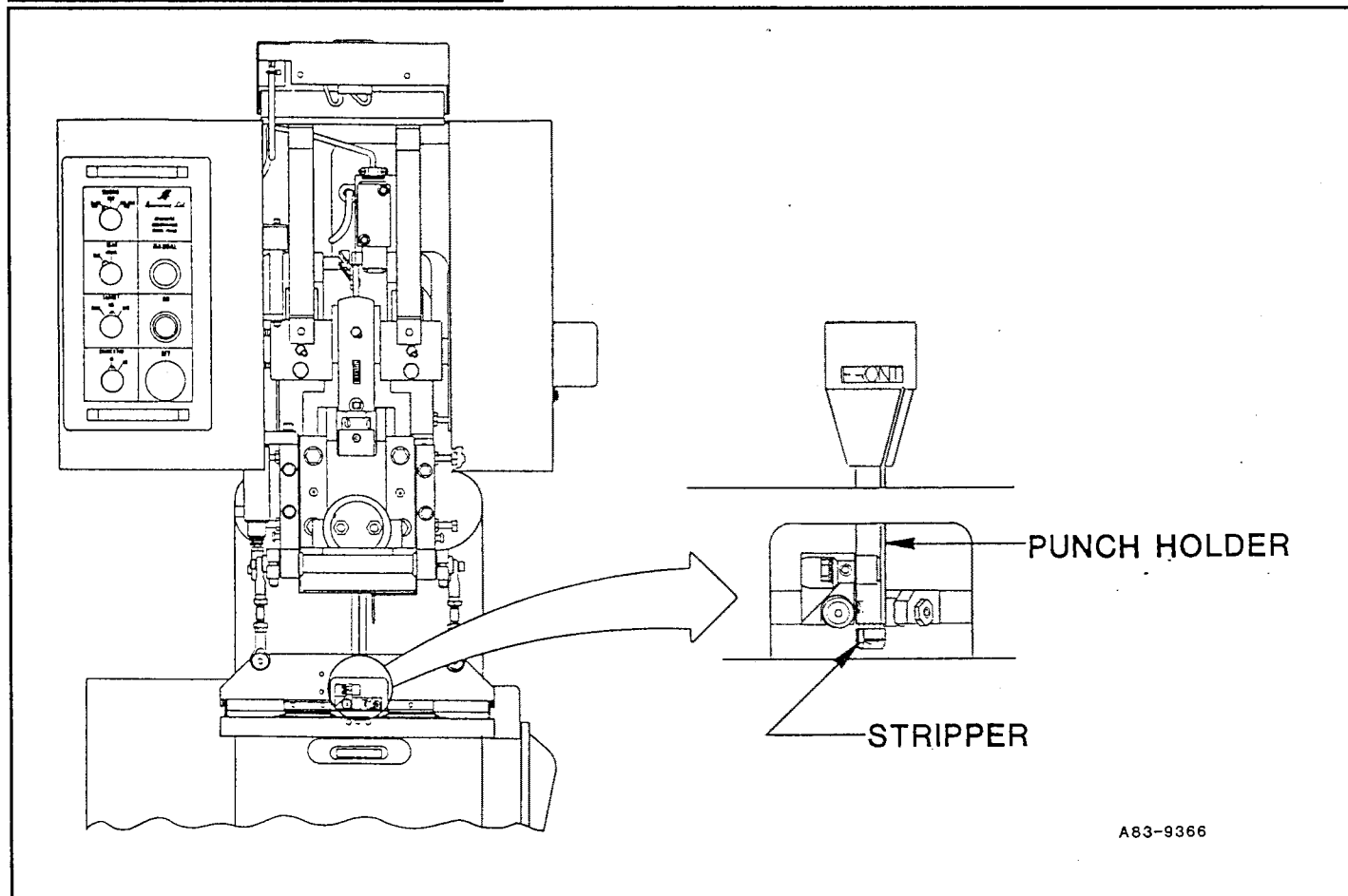


Figure 8.11 R

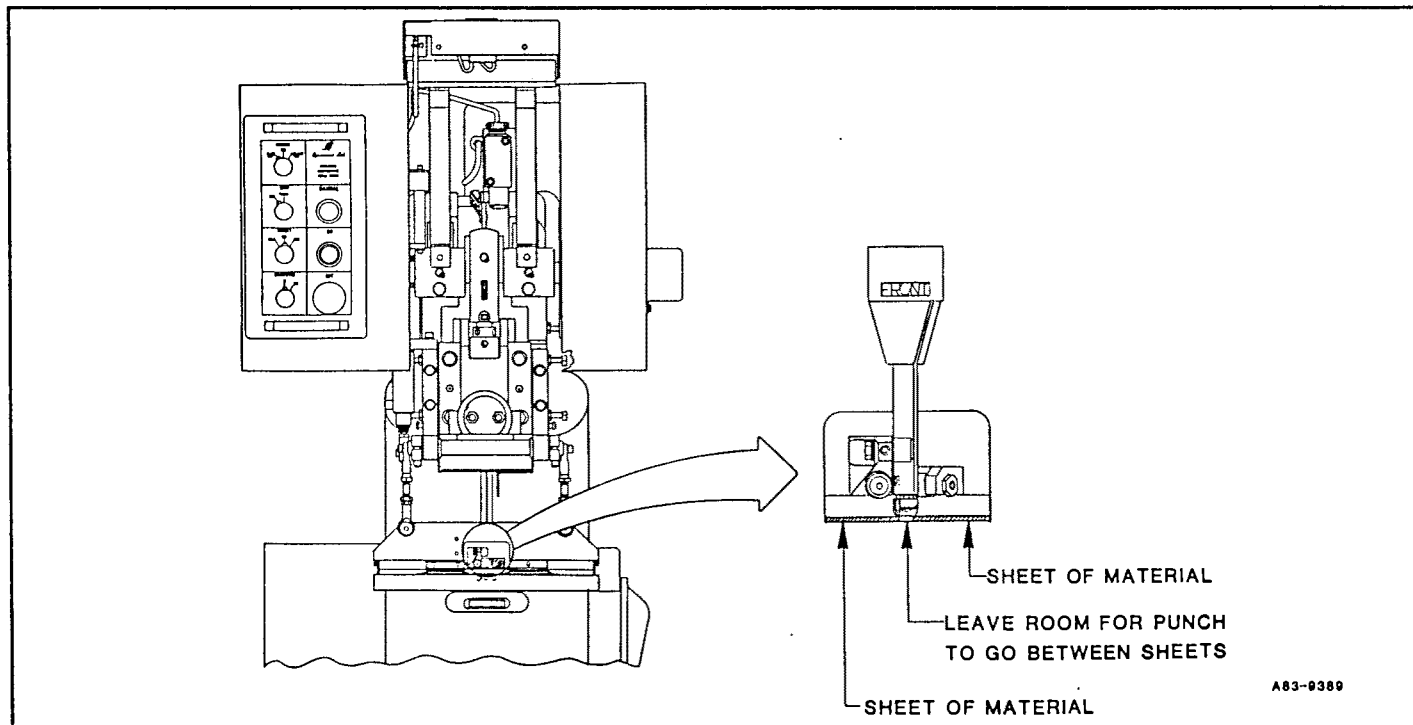


Figure 8.11 S