

## 5-5. Shuttle Spring Force Adjustment (Figure 5-3)

### – CAUTION –

**Perform this procedure if there is excessive rattle under the cam cover. Uncorrected excessive rattle can lead to damaged cam and bearing surfaces. If this procedure does not correct the problem, set shuttle and counterweight preload per paragraph 5-6.**

1. Open front cover (1).
2. Loosen two screws (2).
3. Remove cam cover (3) and attached gasket (4).

*NOTE: If you find broken shims, check for and remove any fragments still wedged in spring area.*

4. Inspect area around shuttle spring (5) and counterweight spring (6) for shims that may have broken or come loose. Replace any loose or broken shims per steps 7 and 8 below.
5. Set POWER to ON. Press ON LINE switch so shuttle operates. Cycle ON LINE as necessary to keep shuttle moving or for continuous running use the method described in paragraph 5-3.
6. Apply heavy pressure to right side of counterweight (7) and check for rattle.
  - (a) If rattle decreases, install counterweight spring shim per step 8.
  - (b) If rattle does not change, apply pressure to shuttle. (On P300, push against antirotation arm; on P600, push against frame.) If rattle decreases, install shuttle spring shim per step 7. If rattle does not change, look for other problems, such as damaged shuttle bearings.
7. Install shuttle spring shim (0.01 in) as follows:

### – CAUTION –

**Procedures for gaining access to shim mounting area differ. See Figure 5-3.**

#### **ON UNITS WITHOUT SELF-ALIGNING CAM FOLLOWERS:**

- (a) Set POWER to OFF.
- (b) Pry spring (5) away from yoke (8) using screwdriver.
- (c) Insert shim (9) carefully, making sure that shim legs do not straddle any other shims, and press down until it is flush with yoke (8).

*NOTE: More than one shim may be required to obtain desired effect.*

## 5-5. Shuttle Spring Force Adjustment<sub>—continued</sub>

### ON UNITS WITH SELF ALIGNING CAM FOLLOWERS:

- (a) Set POWER to OFF.

#### – CAUTION –

**Use care when prying shuttle. Damage to shuttle parts is possible if prying tool slips or incorrect technique is used.**

- (b) Pry shuttle (10) away from cam surface so that the roller on yoke (8) moves away from cam (12). Use flat of screwdriver against bearing block and move handle in direction shown. Remove yoke (8).
- (c) Slowly and carefully return shuttle to normal (no tension) position.

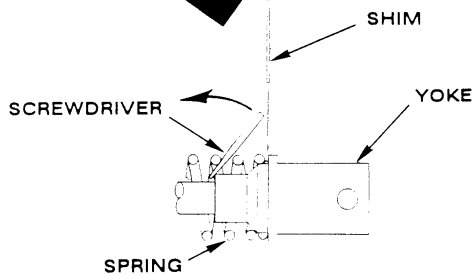
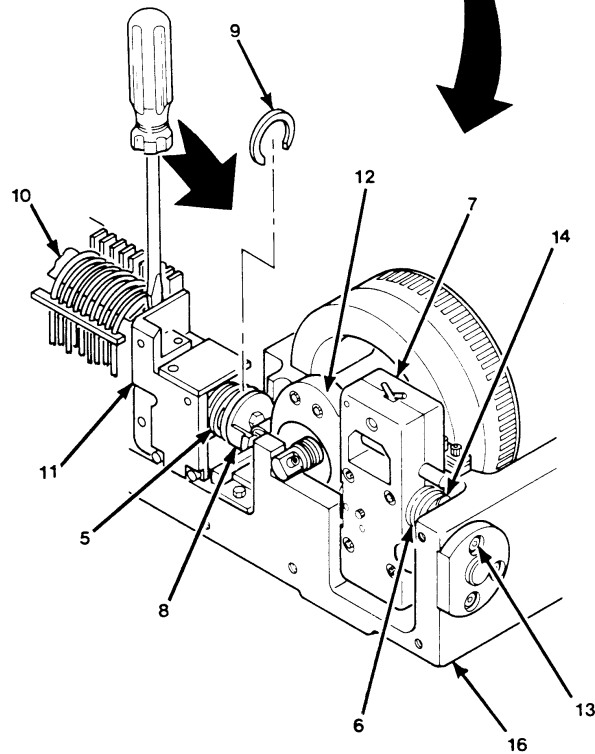
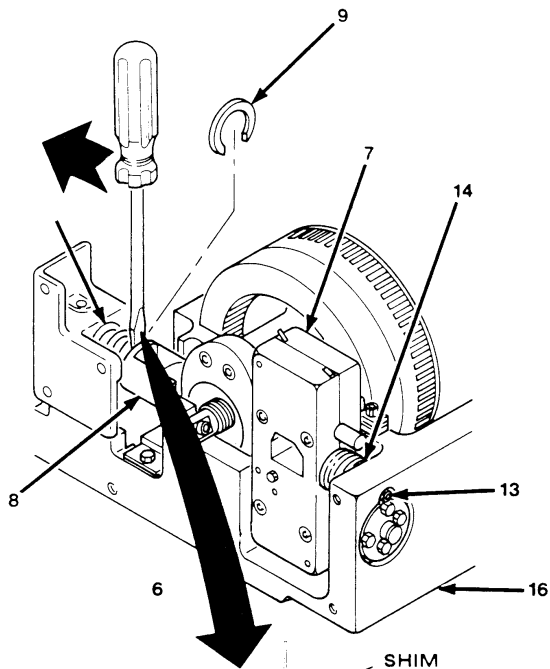
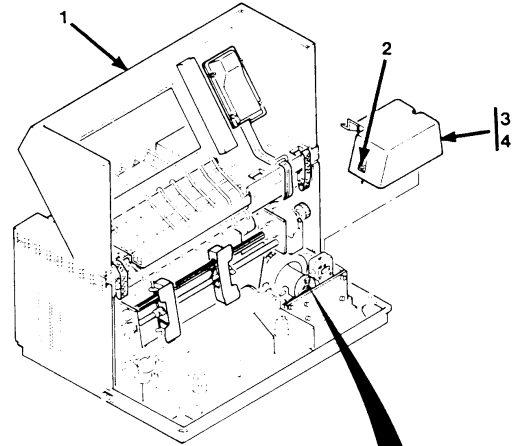
#### – CAUTION –

**Do not allow cam to move when yoke mounting pin is in contact with it. Damage to cam will result.**

- (d) Install shim (9). Pry shuttle spring (5) away from yoke socket to install shim. Repeat step (b) above to install yoke (8) and carefully release tension.
8. Install counterweight spring shim as follows:
    - (a) Loosen screw (13) about three turns.
    - (b) Press in on the screwdriver handle to force the loosened screw (13) to create space for shim (14). On P300, also displace the upper counterweight shaft if necessary to allow space for shims.

*NOTE: On P300 machines it is necessary to slip the counterweight upper shaft out of the way and then rotate the shim so that the shim tab does not interfere with the upper shaft when it is repositioned.*
    - (c) Install shim (14) between spring (6) and casting (16).
    - (d) Tighten screw (13).
  9. Install cam cover (3) and attached gasket (4).
  10. Tighten two screws (2).
  11. Close front cover (1).

1. FRONT COVER
2. SCREW (2)
3. CAM COVER
4. GASKET
5. SHUTTLE SPRING
6. COUNTERWEIGHT SPRING
7. COUNTERWEIGHT
8. YOKE
9. SHIM (P300: P/N 101565 P600: P/N 103422)
10. SHUTTLE
11. BEARING BLOCK
12. CAM
13. SCREW
14. SHIM (P/N 101564)
15. UPPER COUNTERWEIGHT SHAFT
16. CASTING



**-A-**  
**P300**

USE ALSO FOR P600 WITHOUT  
SELF-ALIGNING CAM FOLLOWERS.

**-B-**  
**P600**

Figure 5-3. Shuttle Spring Force Adjustment

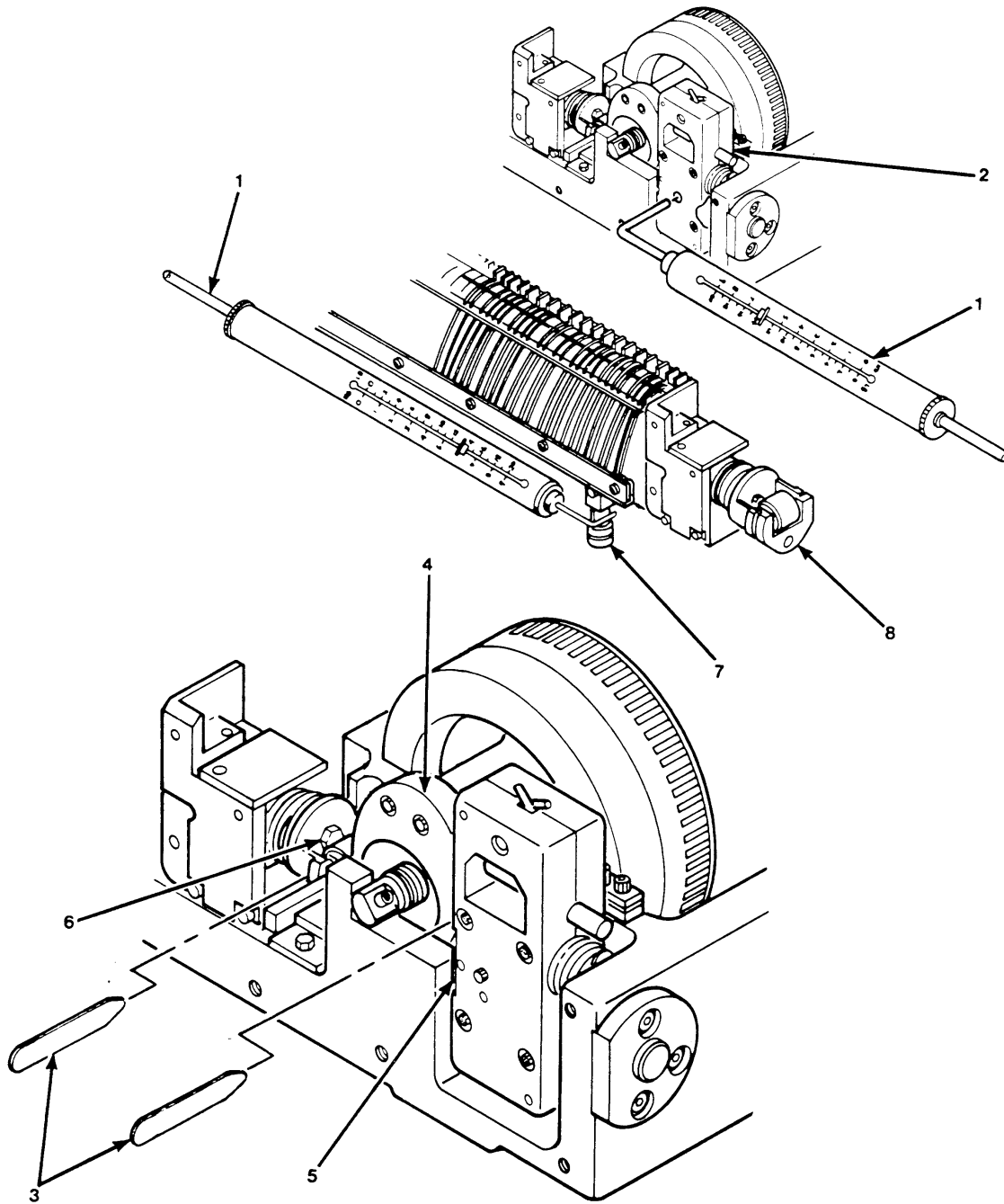
## **5–6. Setting Shuttle and Counterweight Preload (Figure 5–4)**

### **a. Setting Preload Without Force Gauge**

1. Verify you have access to the necessary area. If not, perform steps 1 through 4 of paragraph 5–5.
2. Rotate flywheel approximately 1/8 turn and observe whether counterweight cam follower makes firm contact.
  - (a) If yes, go to step 3.
  - (b) If no, add shims per paragraph 5–5.
3. Gently rotate roller on left cam follower (6) while checking for rotation of cam (4).
4. Did cam (4) move?
  - (a) If yes, go to paragraph 5–5.
  - (b) If no, add shims per paragraph 5–5, step 7, until moving roller on cam follower (6) with finger causes rotation of cam (4). Add up to three more shims, as needed, to ensure firm contact of roller and cam.
5. Operate printer. Perform frequent stops and starts while checking for stalling. If stalling occurs, remove one shim and recheck.
6. Perform steps 9 through 11 of paragraph 5–5.

### **b. Setting Preload Using Force Gauge (Figure 5–4)**

1. Remove ribbon drive per paragraph 5–20a. Perform steps 1 through 6 of paragraph 5–17a to gain access to equipment to be adjusted.
2. Insert force gauge (1) in hole in counterweight (2).
3. Insert 0.003 inch flat feeler gauge (3) between cam (4) and right cam follower (counterweight) (5).
4. Gently pull force gauge (1) horizontally to right. Note force gauge indication when feeler gauge (3) pulls free.
  - (a) If indication is between 10 and 16 pounds, go to step 5.
  - (b) If indication is less than 10 pounds, install counterweight spring shim per paragraph 5–5, step 8, and repeat steps 2 through 4 above.
  - (c) If indication is greater than 16 pounds, remove a counterweight spring shim and repeat steps 2 through 4 above.
5. Insert 0.003 inch flat feeler gauge (3) between cam (4) and left cam follower (hammerbank) (6).
6. Hook force gauge (1) on antirotation arm (7).
7. Gently pull force gauge (1) horizontally to left. Note force gauge indication when feeler gauge (3) comes loose.
  - (a) If indication is between 10 and 16 pounds, go to step 8.
  - (b) If indication is less than 10 pounds, install shuttle spring shim per paragraph 5–5, step 7 and repeat steps 5 through 7 above.
  - (c) If indication is greater than 16 pounds, remove a shuttle spring shim and repeat steps 5 through 7 above.



- 1. FORCE GAUGE
- 2. COUNTERWEIGHT
- 3. FEELER GAUGE
- 4. CAM
- 5. RIGHT CAM FOLLOWER
- 6. LEFT CAM FOLLOWER
- 7. ANTIROTATION ARM
- 8. YOKE

Figure 5-4. Setting Shuttle and Counterweight Preload

## **5–6. Setting Shuttle and Counterweight Preload**—continued

### **b. Setting Preload Using Force Gauge**—continued

8. Prepare for power-up.
  - (a) Install paper and set Forms Thickness Lever to 6.
  - (b) Install shoulder screw per paragraph 5–27a.7.
  - (c) Partially install ribbon drive by performing steps 1 through 3 of paragraph 5–20b.
  - (d) Check MPU gap and adjust as necessary per paragraph 5–11. Do not adjust phasing.
  - (e) Connect power cord. Set POWER to ON.
9. Tip front edge of shuttle yoke (8) down (self-aligning followers only).
10. Cycle ON LINE until left cam follower (6) lines up with cam (4).
11. Tip front edge of shuttle yoke (8) up.
12. Cycle ON LINE until right cam follower (5) lines up with cam (4).
13. Check MPU phasing and adjust as necessary per paragraph 5–12.
14. Return to normal configuration by performing steps 7 through 13 of paragraph 5–27b and returning ribbon drive to operating position per paragraph 3–4c, steps 8 and 9.