

TOSHIBA MJ-1015 MJ-1016 FINISHERS – LET'S "FINISH" THE COPY/PRINT JOB (part VIII)

By **VLADIMIR KAMENOV**

Here is the end of the series of articles about Toshiba MJ-1015 MJ-1016 finishers. In the 2009 February, March, April and May issues of RechargeEast Magazine you had chance to get acquainted with the operation principles and description of saddle stitch and punch units in these Toshiba copiers.

The previous articles were published in RechargeEast Magazine in October, November, December and January issues as well as in the issues for February, March and April. These issues are available upon request. Please forward your requests for past issues of the magazine to nikolai@rechargeast.com



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PART V: EXPLANATION OF UNIT OPERATION

A. PUNCH OPERATION

1. Outline

The puncher unit is located on the feed path between the host machine and the finisher, and successively punches holes when the paper stops temporarily. When the trailing edge of the paper reaches the puncher unit, the inlet roller of the finisher unit temporarily stops the paper and holes are punched on the trailing edge of the paper. The puncher unit consists of a die and hole puncher (punch blade).

The hole puncher is driven by the punch motor (M1P). The hole puncher is attached to the eccentric cam of the punch shaft, and rotary action of the punch shaft is converted to reciprocal motion to perform punching.

Punch motor (M1P) is a DC motor. The home position of the punch shaft is detected by punch home position sensor (PI3P). To stop the DC punch motor accurately at its home position, the punch motor clock sensor (PI2P) counts a predetermined number of clock pulses to stop the punch motor. A single punch operation is performed by rotating the punch shaft 180° from its home position.

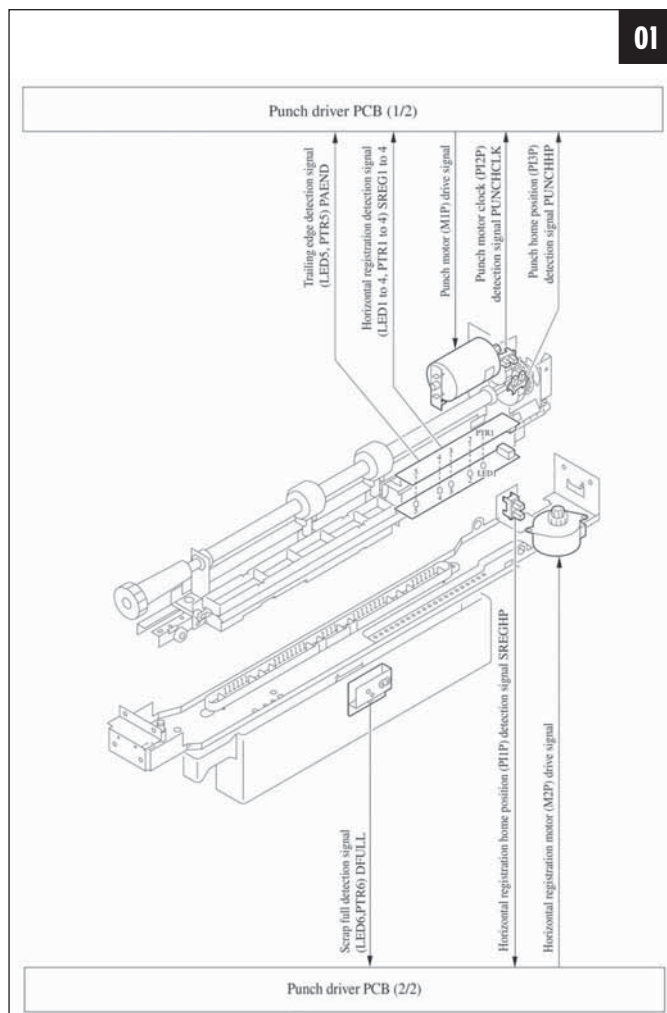
Five light sensors (photosensor PCB) are located at the upper side of the inlet paper feed path of the puncher unit and a set of five LEDs (LED PCB) are located at the lower side. These sensors and LEDs function as five sensors. The frontmost sensor (LED5, PTR5) are the trailing edge sensor and are used for detecting the trailing edge of the paper. The remaining sensors (LED1 to LED4, PTR1 to PTR4) are horizontal registration sensors, and are used for detecting the inner position of the paper for determining the hole punching position.

The punch motor, puncher unit and above sensors comprise the punch slide unit. This unit moves backwards and forwards according to the size of the paper. Backward and forward movement is driven by the horizontal registration motor (M2P). The home position of the punch slide unit is

detected by the horizontal registration home position sensor (PI1P). The horizontal registration motor (M2P) is a 2-phase stepping motor.

The punch motor and horizontal registration motor is driven by the punch driver PCB according to control signals from the finisher controller PCB.

Punch scraps caused by punching are stored in the punched scrap container. Scrap full detection is performed by a reflective sensor (LED6 and PTR6 on the scrap full detector PCB unit):



B. PUNCH OPERATION

The hole puncher is driven by the punch motor (M1P). The hole puncher home position is detected by the punch home position sensor (PI3P).

In all there are four types of puncher unit depending on the destination: 2-hole type (Puncher unit MJ-6002E), 2-/3-hole Dual Use (Puncher unit MJ-6002N), and two 4-hole types (Puncher unit MJ-6002F and Puncher unit MJ-6002S). With the 2-hole and 4-hole types, the hole puncher is moved reciprocally and punching is performed by the punch shaft rotating 180° from its home position. With the 2-/3-hole dual

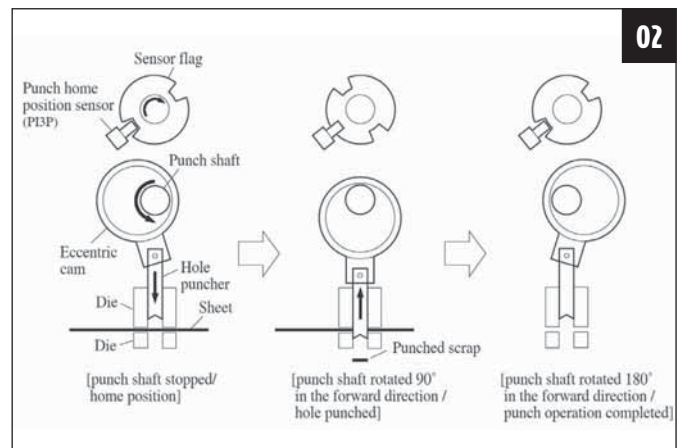
use type, too, the hole puncher is moved reciprocally and punching is performed by the punch shaft rotating 180° from its home position. However, half of the peripheral area of the punch shaft can be used as a 2-hole type while the other half can be as a 3 hole type. Whether the punch shaft is used as a 2-hole punch or a 3-hole punch depends on the instructions from the host machine.

1. 2-/4-hole Type

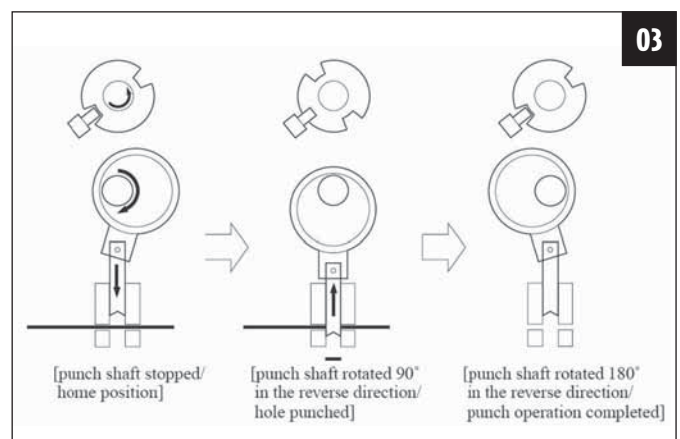
At the home position, the punch home position sensor is ON. Punching of the first sheet ends when the punch shaft has rotated in the forward direction 180°, and the state of the punch home position sensor has changed from OFF to ON. Punching of the second sheet ends when the punch shaft has rotated in the reverse direction 180°, and the state of the punch home position sensor has changed from OFF to ON.

The following illustrates punching when two sheets are punched:

1) A hole is punched in the trailing edge of the first sheet



2) A hole is punched in the trailing edge of the second sheet:



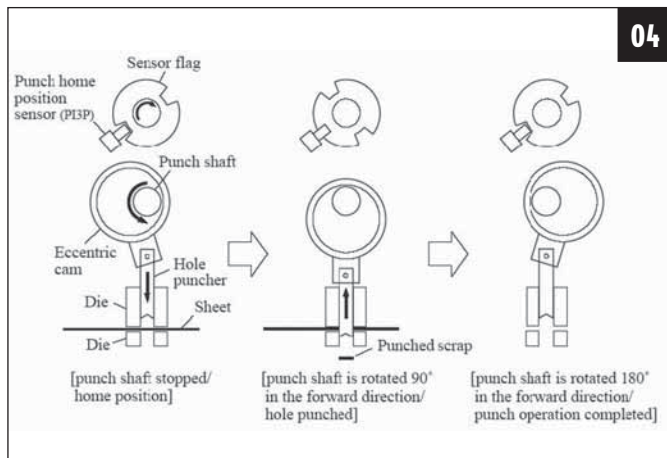
2. 2-/3-hole Dual Use Type

At the home position, the punch home position sensor is ON. To punch two holes, punching of the first sheet ends when the punch shaft half peripheral area has rotated in the forward

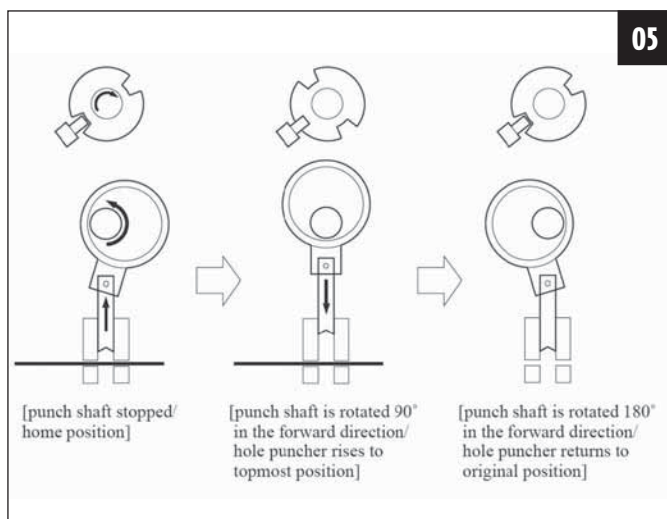
direction 180°, and the state of the punch home position sensor has changed from OFF to ON. At this time, the 3-hole puncher is moved reciprocally in the escape direction (hole puncher rise direction) on the remaining half peripheral area on the punch shaft. Punching of the second sheet ends when the punch shaft half peripheral area has rotated in the reverse direction 180°, and the state of the punch home position sensor has changed from OFF to ON. Also at this time, the 3-hole puncher is moved reciprocally in the escape direction (hole puncher rise direction) on the remaining half peripheral area on the punch shaft. To punch three holes, the 2-hole puncher is moved reciprocally in the escape direction (hole puncher rise direction).

The following illustrates punching when two sheets are punched with two holes:

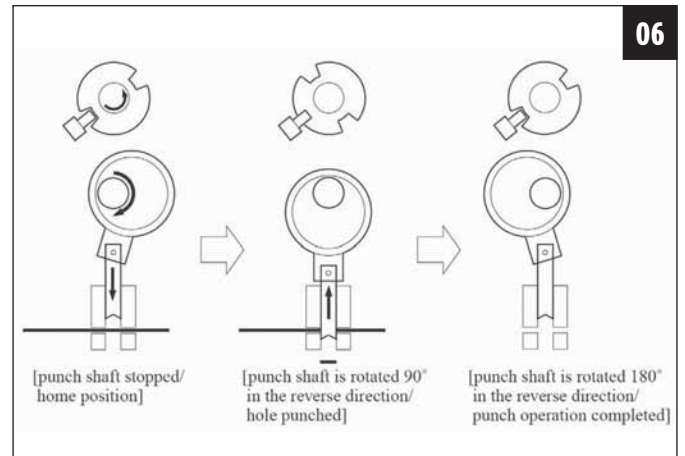
1) A hole is punched in the trailing edge of the first sheet



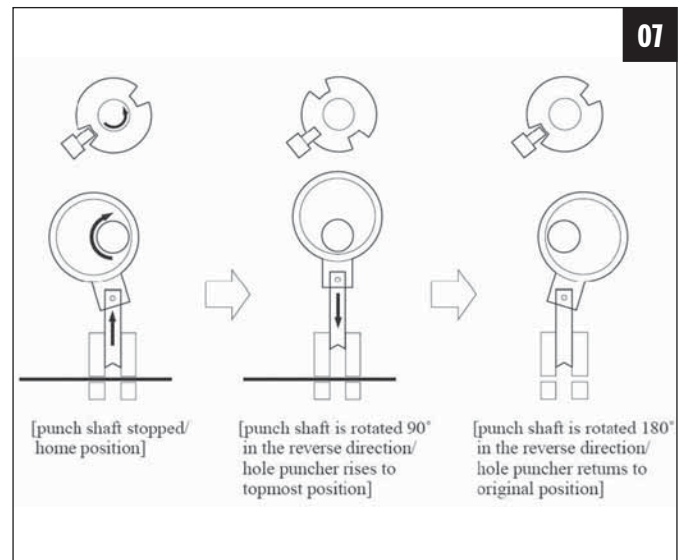
When two holes are punched, the 3-hole puncher is fed reciprocally in the escape direction (hole puncher rise direction) as shown below:



2) A hole is punched in the trailing edge of the second sheet:



When two holes are punched, the 3-hole puncher is fed reciprocally in the escape direction (hole puncher rise direction) as shown below:

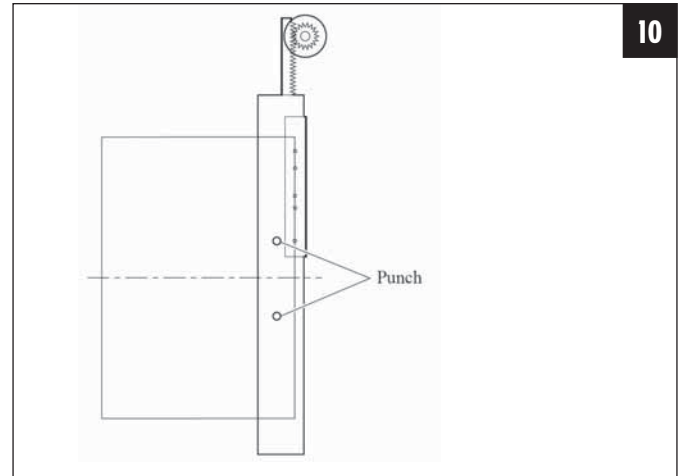
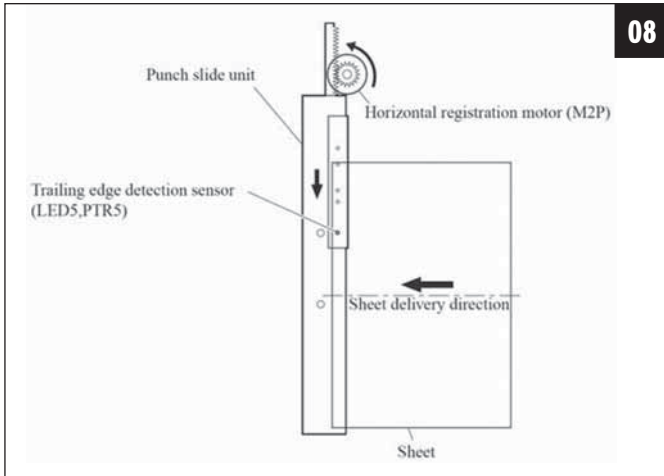


C. HORIZONTAL REGISTRATION OPERATION

Horizontal registration drive of the punch slide unit is performed by the horizontal registration motor (M2P). The home position of the punch slide unit is detected by the horizontal registration home position sensor (PI1P). The punch slide unit detects the trailing edge of the paper by the trailing edge sensor (LED5, PTR5) and horizontal registration sensors (LED1 to 4, PTR1 to 4) and is moved to the trailing edge position matched to the paper size.

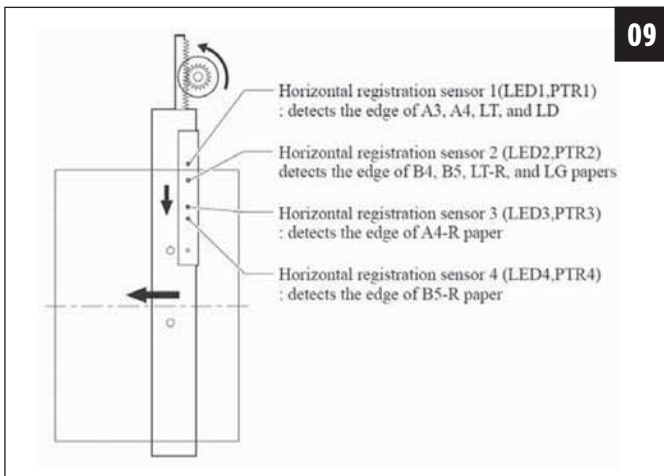
The following shows horizontal registration operation

1) When the leading edge of the paper from the host machine is detected by the trailing edge sensor (LED5, PTR5) on the puncher unit, the horizontal registration motor (M2P) starts to move the punch slide unit towards the front:

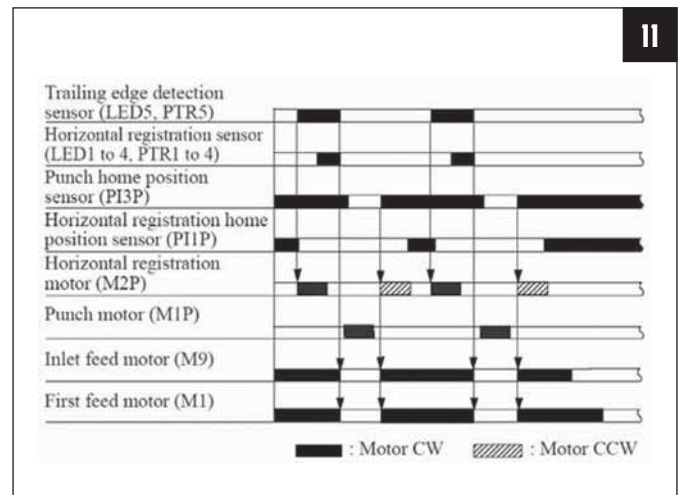


2) After the horizontal registration sensors (LED1 to 4, PTR1 to 4) detect the edge of the paper at its inner side in keeping with the paper size signals arriving from the host machine, the horizontal registration motor (M2P) drives the punch slide unit to a predetermined position further towards the front, and stops the unit at this position:

4) When punching ends, drive of the inlet feed motor (M9) and first feed motor (M1) on the finisher is started, the horizontal registration motor (M2P) is operated in the reverse direction, and the punch slide unit is returned to its home position where it comes to a stop.



5) Even if paper to be punched continues to arrive, the punch slide unit returns to its home position for each arriving sheet, and steps 1 to 4 are repeated:



3) When the trailing edge sensor (LED5, PTR5) detects the trailing edge of the paper, drive of the inlet feed motor (M9) and first feed motor (M1) on the finisher is stopped to stop paper feed. Next, the punch motor (M1P) is driven to punch holes in the paper:

The end.

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