SECTION X

OPTIONAL QUICKDRAW ™ RPM CHANGER

The QUICKDRAW™ RPM Changer is an option for the ATC. The unit is used to control the spindle speed of a milling machine with a variable speed head; both manually and automatically.

Spindle RPM may be changed in steps over the full range of the variable speed selector dial. The RPM changer has four functions: RPM-UP, RPM-DOWN, RPM-RESET and RPM-HOME. Home means to stop on the lowest limit of the speed selector.

NOTE: The ATC power switch must be on and the spindle drive motor must be running in order for the RPM changer to operate.

The unit is supplied with the following:

a) A gear motor with related mounting hardware.

b) A cable assembly consisting of two limit switch assemblies; one limit switch assembly for the detection of the RPM low and high limits and the other for the RPM Reset signal.

c) A variable speed indicator dial assembly which replaces the standard dial assembly of the milling head. It is used for detection of the RPM increments.

When the RPM changer is ordered with the ATC, the operator control station will include the RPM-UP and DOWN Pushbuttons Refer to drawing (ATC-1) of the operator control station in the appendix.

RPM changers are available for different types of milling machines. Consult Summit/Dana Industrial Sales Department for details.

INSTALLATION

1. PRELIMINARY WORK

The spindle motor ON and OFF external interlock as discussed in Section III of the ATC must be installed in order for the RPM changer to function.

Complete the installation of the ATC and check that the ATC functions properly.

Before beginning this installation, REMOVE ALL INCOMING POWER TO THE ATC.

FIGURE (10.1) shows a typical RPM mounting layout. Use only for reference as each RPM changer assembly will have its own mounting drawing.

2. MECHANICAL INSTALLATION

The installation of this unit involves the following steps:

1. The manual crank on the variable speed selector is removed along with the indicator dial.

2. The new indicator dial is fitted in place of the old one and the motor coupler is placed on the shaft.

3. The gear motor mount bracket is mounted on the head per the mounting layout.

4. The gear motor is mounted to the bracket and the motor shaft is attached to the coupling.

5. The RPM Reset Limit switch unit is mounted so the switch roller is tangential to the indicator dial at the diameter that is relieved to expose the cap screws or small notches.

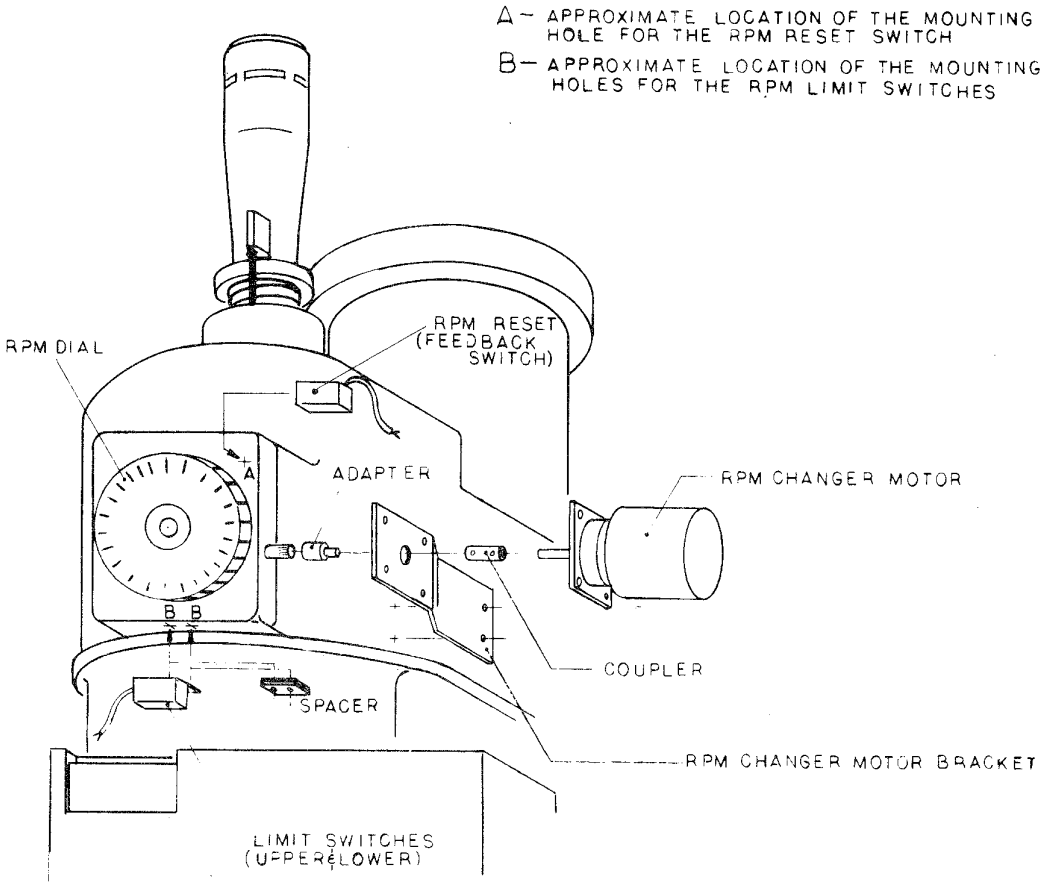
6. The RPM upper and lower limit switch assembly is mounted such that the switch rollers are tangent to the indicator dial at the flanges of the dial, on either side of the relieved portion. Adjust the switches such that they are both actuated.

3. ELECTRICAL INSTALLATION

The interconnect cable for the RPM changer is brought out through the side of the control box station. The cable is approximately 6 feet long and has two molex connectors. One connector supplies

TYPICAL RPM MOUNTING LAYOUT

FIGURE 10.1



REFERENCE: BRIDGEPORT SERIES 1

the power to the gear motor and the other connector receives the signal inputs from the limit switch assemblies for RPM upper limit and lower limit and RPM reset.

1. Plug the gear motor connector into its mating connector and the limit switch assembly into its matching connector.

2. Place the ATC mode switch to MANUAL.

3. Apply incoming AC power to the ATC and place the power ON/OFF switch to (ON).

4. Start the spindle drive motor.

5. Momentarily press the RPM up pushbutton to see if the RPM of the spindle motor increases. If the speed increases, proceed to Step 7. However, if speed decreases the motor is wired backwards. Proceed to Step 6.

6. Reversing motor direction - Tool changers equipped with the RPM changer option should be shipped with an RPM motor that rotates in the proper direction for the mill to which it will be fitted. To reverse the motor direction, proceed as follows:

    a) Turn the ATC Power switch "OFF" and remove all incoming AC power to the tool changer.

    b) Disconnect the molex connector of the motor.

    c) Interchange Pins 2 and 3 of the 5 pin molex connector.

    d) Re-connect the motor molex connector, apply incoming power to the ATC and place the ATC Power switch "ON".

REFERENCE:
Motor connector for clockwise rotation during RPM up viewed from the shaft end.

Pin 1 - White
Pin 2 - Green
Pin 3 - Black

Motor connector for counterclockwise rotation.

Pin 1 - White
Pin 2 - Black
Pin 3 - Green

A pin extractor, part number 660-090 25, can be ordered from Summit/Dana to facilitate the removal of pins from the connector.

7. Momentarily press the RPM down pushbutton to see if the RPM of the spindle motor decreases.

The RPM changer will now control the RPM up or down. The next step is to set the upper and lower limits of RPM and finalize the installation.

4. SETTING THE RPM LIMITS

The RPM changer will not run in the "RPM UP" direction if the upper limit switch is actuated nor will it run in the "RPM DOWN" direction if the lower limit switch is actuated. The switches are supplied already wired and part of the mounting procedures described earlier.

To determine which limit switch is the down limit, loosen the bracket which holds the limit switches to the dial so that both switches are not actuated.

Actuate the two switches by hand and press and hold the RPM DOWN pushbutton. As you start down in RPM open the outer switch. The limit switch should stop the RPM down actuation. If it does not, then the inner switch should be tried.

Mark the switches so you know which is the up and down limit switch and re-install the switches on the machine so both are actuated.

1. Press the RPM down button to rotate the variable speed drive to its lowest RPM limit.

2. Mark the point at which the limit switch roller "lower" limit contacts the flange of the dial.

3. Press the RPM up button to rotate the variable speed drive to its highest RPM limit and mark the point at which the "upper" limit switch contacts the flange of the RPM dial in a manner similar to step 2.

4. Press the RPM down button to return the variable speed drive to a midrange RPM.

5. Shut the spindle drive motor off and remove the RPM dial from the mill and file or machine a small amount of material from the flange of the dial at the points marked in steps 2 and 3.

   The amount of material removed should be sufficient to allow the upper and lower limit switch rollers to (fall into) the upper or lower limit notches respectively and open the appropriate switch about .20 inches before the RPM limit of the indicator dial travel is reached.

5. M-FUNCTION INTERFACING

The RPM CHANGER is designed to interface to an external controller in the same fashion as previously discussed for the tool changer M-Function interface.

Please refer to the ATC section that begins with the M-Function cable and review the interface requirements. Keep in mind that SUMMIT/Dana Industrial has selected the M24, 25, and 26 commands to perform RPM UP, DOWN and HOME.

The ATC must be in the AUTO mode to execute the M-Function commands. MANUAL and LOCAL will not accept the commands.

6. PROGRAMMING THE RPM CHANGER IN AUTO

The RPM changer responds to three M-Function commands, but only when the spindle motor is running. The assigned are:

M24 - RPM UP
M25 - RPM DOWN
M26 - RPM HOME

1. Turn the ATC power on and select the AUTO mode. Program M3 - The spindle motor will run in the forward direction.

2. Program M26 - The spindle speed will decrease until you activate the RPM HOME limit switch and then hold at that RPM.

3. Program M24 - Spindle speed will increase until you actuates the RPM RESET limit switch.

4. Program M24 again - Spindle speed increases again until you actuate the RPM RESET limit switch. You may continue to program a M24 for each increasing RPM Step.

5. Program M25 - The spindle speed will decrease until you actuate the RPM RESET limit switch. This works the same way as programming the M24 but only decreasing the speed in RPM steps.

6. Program M26 - This will decrease the spindle speed down to the RPM home position.

7. Program M5 - The spindle will shut off.

It is advisable to program the RPM changer to home before the end of program M2 command is initiated so you always know where to start from in the next program.