ITR Engineering Data Sheet 201
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CARD RECORDER MECHANISMS

Card time recorders are used for registering on a card the time that employees enter and leave the factory. The card and the recorder may be so arranged that one card will cover any desired length of pay or cost period. Usually each employee makes four registrations each day. At some time between registrations, the card is moved either manually or automatically, depending on the type of machine employed, to such a position that the next registration will print in the proper space.

Each day's record appears on one line of the card, either vertically or horizontally. Each succeeding day's registration is printed on a different line from the preceding one. The spacing or moving of the card which permits this, may be done either manually or automatically.

When the complete day's record appears in the same vertical column, the machine is called a vertical lift or department store recorder. The latter name was acquired because of the recorders application to that line of industry where the arrival and departure of employees is irregular, particularly registering during the lunch period.

Any recorder may be equipped with a two color ribbon attachment which causes all registrations that do not conform to the regular working schedule to be printed in a different colored ink, the combination generally used being blue and red; blue for regular registrations and red for irregular registrations.

Power for driving the card recorder mechanism is either furnished by a clock movement which keeps the time and transmits it through a mechanical connection to the type wheels or from an electro-magnet which is energized by means of contacts in the master clock once each minute, thus stepping the type-wheels ahead one minute. In the latter case, the master clock is the time regulator.

Numbering Plan

This [product model or type] numbering plan embraces the use of a four figure number [e.g., 1106], each figure of which is used to designate the type or some feature of the mechanical structure of the recorder.

First figure	1 means Card Recorder.
	8 means Card Recorder (electric Drive, metal case).
	9 means Card Recorder (short case).

Second figure	0 means daily recorder. 1 means weekly recorder. 2 means two-weekly recorder. 3 means semi-monthly recorder. 4 means tri-monthly recorder. 5 means quadri-monthly recorder. 7 means monthly recorder.
Third figure	0 means hand column shift. 1 means automatic column shift.
Fourth figure	0 means hand abutment. 1 means automatic abutment. 5 means hand abutment -- 2 color. 6 means automatic abutment -- 2 color.

The Numbering of Vertical Lift Recorders.

First figure	same as above.
Second figure	6 means Vertical Lift Recorder.
Third figure	0 means 6 column, 6 changes. 1 means 6 column, 16 changes. 2 means 6 column, 22 changes. 3 means 7 column, 6 changes. 4 means 7 column, 16 changes. 5 means 7 column, 22 changes. 6 means 8 column, 6 changes. 7 means 8 column, 16 changes. 8 means 8 column, 22 changes.
Fourth figure	0 means non-automatic day to day. 1 means automatic day to day. 5 means non-automatic day to day, two color. 6 means automatic day to day, two color.

Recorders are now made to accommodate four different widths of cards viz., 2 11/16”, 3 ¼ ", or the standard tabulating cards, 3 13/32” which is the most widely used and 4 13/64” which is more adaptable for vertical lift recorders. The cards may be any convenient length and carry any desired information.

Information Needed Before Repairing Or Overhauling

As each customer maintains a certain schedule, it is necessary to note the following before disassembling.

First day of pay period, i.e., day or date shown by the indicator when printing on the top line of the card.
Exact time of abutment change.
Exact number and position of color change blocks.
Exact number and position of column change blocks.

Disassembling

Remove day indicator, A.M. and P.M. flag and color flag.

Remove screw from connecting link to the card receiver, drive out taper pins in the card receiver guide shaft and remove card receiver.

Remove pointer for column indicator.

Remove locator bar.

Remove screw in eccentric bushing for card receiver finder lever.

Remove screw from bottom of main plate and remove main plate assembly complete including upright lever and link, and finder lever and link.

Remove ribbon, ribbon shield and ribbon bracket.

Remove heavy operating spring.

Disconnect link for raising ribbon.

Remove ribbon feed pawl and bell hammer.

Remove the operating shaft complete including the printing, hammer, operating lever and tripping mechanism by loosening the bushing on the left end of the shaft.

Remove the column change mechanism by removing fork lever and driving out taper pins in front end of shaft. Disconnect the drop weight from the trip lever. The entire assembly can now be removed by taking out the two screws that hold it to the casting.

Remove the color change mechanism by removing the two screws that hold it to the casting and disconnecting the link at the lower end.

Remove the drop weight assembly for abutment change by taking out pivot screw and disconnecting the card lift change rod.

Remove the vertical drive shaft.

Remove the tie plate, horizontal drive shaft and ribbon lifting mechanism.

Loosen lock nut and set screw on type wheel shaft, sliding shaft to the right. The minute, hour and day, or date wheels can now be removed. The A.M and P.M. cam is also on this shaft. In removing the type wheels always watch for spacing washers.

Remove transfer lever assembly and A.M. and P.M. cam wiper.

Remove lock levers.

Remove card lift cam and card lift lever.

Remove timing wheel.

Remove mitre or graduated gear.

Remove ribbon shift arms and reversing rod.

Remove minute wheel finder rod.

After the mechanism is dismantled, all parts should be inspected thoroughly for wear, breakage, etc.

Reassembly And Adjustment Of Mechanism

Install mitre or graduated gear and see that same spins freely on stud.

Install card lift cam, card lift lever and day indicator lift rod. Adjust bushings for a slight end shake in each shaft and see that the cam spins freely.

Install drop lever and weight for abutment change and adjust so that when at the end of its downward stroke, the feeding pawl will lock over the stud and not allow the cam to travel any farther. Adjust the retaining pawl for the card lift cam so that it drops into each tooth freely for the entire circumference of the ratchet.

Install ribbon feed shaft, reversing 1evers and spindles. Build up the spindles with spacers so that the spindle gear teeth and drive gear teeth mesh evenly. Adjust the thrust collars on the ribbon drive shaft so that the gear teeth mesh properly. The "V" retaining spring should now be adjusted so that the reversing levers have an equal throw on each side. It should be impossible to position the ribbon reversing levers on dead center.

Install type wheel lock levers, allowing slight end shake.

Install transfer levers and A.M. and P.M. cam wiper. Shaft for transfer levers should be tight and levers free.

Install the minute wheel finder rod, making sure that it works freely and has sufficient spring tension to center the minute wheel.

Install the timing wheel.

Install the tie plate, vertical and horizontal drive shafts. Adjust the eccentric bushing on the lower end of the vertical drive shaft for proper mesh of the worm with the mitre gear. On the later model machines, the vertical drive shaft is stationary, and the mitre gear adjustable. Adjust the eccentric bushing on the rear end of the horizontal drive shaft for proper mesh of its gear with the timing wheel. On the later model machines, the horizontal or timing shaft is not adjustable and the timing wheel is adjustable because of its eccentric bearing.

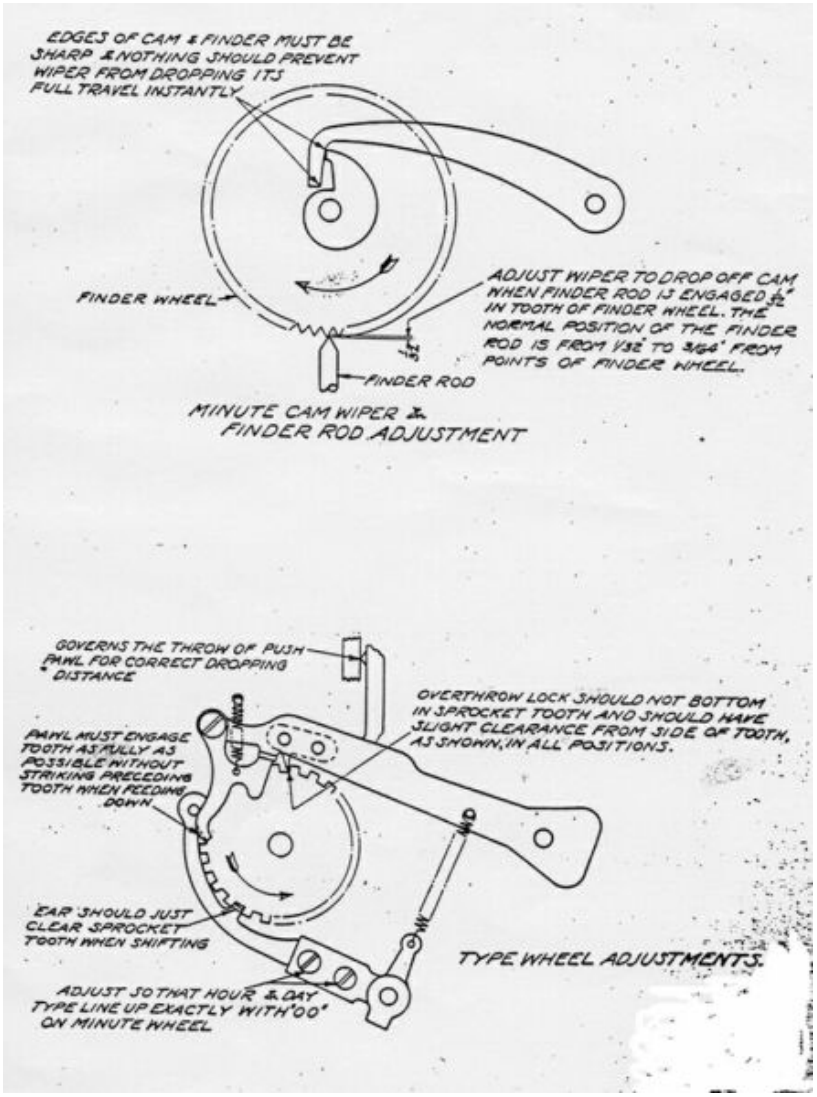
Install type wheels and adjust so that they spin freely on the shaft. Use spacing washers to get the proper mesh of the minute wheel gear with the spur gear on the vertical drive shaft. Never attempt to fit the type wheels until the tie plate is in position.

Type Wheel Adjustments

1. Adjust the upper finder rod bearing so that the center of the 00 is in the same horizontal plane as the center of the type wheel shaft.

2. Adjust the length of the lock levers until the hour and day, or date type, line up with the minutes.

3. Adjust the end of the minute wheel cam wiper so that when the finder rod enters the 00 tooth of the star wheel 1 /32" it will move the minute wheel sufficiently to let the cam wiper drop and change the hour. The 00 minute is positioned when the finder rod seats. This adjustment is very critical as it prevents printing the 59th minute after the hour has tripped or the 00 minute before the hour trips. Note: In making the above adjustment, make sure that the cam wiper drops clean and does not ride down the face of the cam.



4. Adjust both push pawls so that on their downward stroke, they just clear the tooth before the one they are going to take and enter the proper space with as deep a seat as possible.

5. Adjust the lock levers so that they will just clear the sprocket teeth when released by the down stroke of the push pawls.

6. Adjust the minute wheel cam wiper in relation to the hour transfer lever so that the hour push pawl will drop over the pin in the lock lever between the 52nd and 54th minute. Note:
After making this adjustment, check adjustment No. 3.

7. Adjust the position of the cam on the hour wheel so that the day push pawl drops over the pin in the lock lever at 10 P.M. and the A.M. and P.M. cam wiper rises and drops at the proper time.

8. Adjust the overthrow locks so that they enter the sprocket without hitting on either tooth or touching the bottom.

9. Adjust the stop for the transfer levers so that the push pawls, when at their extreme downward position, just clear the sprocket teeth.

If the type wheels are adjusted properly, the transfer levers will travel down slowly when the type wheels are retarded by hand. The lock levers should also drop in freely under the above test. The type wheels should be tested for the entire circumference of the sprocket. There should be a slight play in the type wheels at all times.

Timing The Recorder

1. Set the pointer on the mitre gear at 12:00 midnight.

2. Turn the minute wheel until it prints 00 and block the finder rod in the star wheel to hold in this position.

3. Turn the vertical drive shaft until the drop weight assembly for abutment change just drops from the ear of the mitre gear, then tighten set screw in spur gear, first meshing it properly with typewheel gear.

4. Turn the timing wheel at 12:00 midnight, holding the pointer near the outside circumference of the wheel, then tighten all set screws allowing the proper mesh of gears and end shake in the horizontal shaft.

Note: To change the time of the abutment, all that is necessary is to loosen the two screws in the mitre gear cam or single tail pawl and move the pointer to the time of the desired change. The usual custom is to have the abutment change between three and fifteen minutes past midnight.

Install the column change drop weight and ratchet assembly making sure that the cam wiper rides freely on its cam and does not hit on the push pawl or bushing for transfer lever shaft. The cam should be kept very smooth to prevent friction. Check the retaining pawl to see that it drops in freely for the entire circumference of the ratchet. All parts in this assembly must work. very freely. The spring that allows manually shifting the column in the reverse direction should have good tension.

Install the color change mechanism and adjust so that when the connecting link is lowered slowly, it will trip the color change. On the new style color change, the push pawl and lock lever adjustments are the same as for the type wheels. When the operating lever is depressed, there should be a slight play in the color change fork. On the old style machines, the proper rise of the ribbon is accomplished by adjusting the fork. On the new style machine, there is an adjustment provided on the ribbon raising lever. If the ribbon does not rise high enough, the record will be part red and part blue.

Install operating lever assembly complete and adjust bushing for a slight end shake in the shaft. Connect up link for raising ribbon, also feed pawl for ribbon, and hook up the heavy springs on the rocker arm and operating lever. Check printing hammer to see that it fits snugly in block. The rebound spring should have good tension. If the printing rubber is old or chipped, it should be replaced. When replacing, make sure that the shoulder fits snugly against the hammer before drilling and pinning.

If the hammer does not work snugly in its pivot, or the rebound spring is weak, a double impression is the result. A soft printing rubber will give a blurred impression.

Install main plate assembly complete. Connect up finder link to be adjusted later.

Install locator bar for card receiver and the column pointer.

Install the card receiver making sure it holds the ribbon shield in the proper position.

Install the A.M. and P.M. flag, day indicator and color flag. The day indicator should be installed so that the proper day is indicated. This is accomplished by the proper meshing of the gear into the rack.

Adjust the eccentric bushing on the finder lever link so that the finder will go into the card receiver aligner plate before the hammer trips. When properly adjusted, the finder lever will rest about even with the main plate. This keeps the finder in such a position that it cannot rub an the teeth of the locator bar.

Adjust the stop for the down stroke of the operating lever so that the finder lever will not bottom in the aligner plate.

Adjust the hammer so that when a card is inserted in any manner, it will not hit on the printing rubber and at the same time remember that the hammer must be kept as close to the card as possible. This adjustment is governed by the base of the hammer resting against the hammer block.

To adjust for the vertical registration on the card, it will be necessary to increase or decrease the height of the card lift lever on the card lift cam for that position.

Note: Raising the card lift lever, lowers the registration and vice versa.

The finder for card receiver, entering the proper notch in the locator bar should locate the card receiver at its approximate position. The card receiver and card is finally positioned by the finder entering the aligner plate. Check to see that in the first position, the finder does not hit on the upright lever or link. To adjust for lateral registration, move the aligner plate until the receiver and card is pulled into exact alignment. Adjust the position of the bumper springs on the card receiver guide shaft so that when the card receiver is in the first and last positions respectively, the springs will be free but with no play.

Adjust the lower bearing on the day indicator lift rod so that it will work freely and the day indicator will not creep. Assuming that the day indicator lines up correctly with the A.M. on the first day of the pay period and on each succeeding day gradually gets higher. This indicates that the lower bearing on the day indicator lift rod is out of position and must be moved until indicator is correct for all days.

To set a schedule on the timing wheel, insert blocks in such a position that the long side of the blocks will be toward the face of the pointer. Adjust the tripping lever and link so that the column change pawl drops over the ratchet tooth from two to four minutes before the pointer drops from the timing wheel blocks. This same condition holds true for the color change blocks and insures all the pawls being in readiness to operate at the time the change is desired. On the later model machines, the links to color and column change mechanisms are adjustable to get the above conditions while on the earlier model machines, the bearing to support the drop link is eccentric.