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REP 3/78

ENGINEERING PRODUCT SPECIFICATION

CENTRONICS 350 DOT

MATRIX PRINTER CUT FORMS/ENVELOPE FEEDER

Spec. No.: 80002173-9001

Date: May 8, 1984

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1.0 GENERAL DESCRIPTION

The dual sheet/envelope feeder described in this specification is designed to be an add-on triple cartridge cut sheet/envelope feeder for the Model 350 Series printer. The device is field/factory installable. The design is such as to allow easy removal and re-installation. No special tools, special training or adjustments are required for installation. Minor reconfiguration may be required of field mechanisms. Cartridges are inserted in any or all of three slots in the feeder body. Each cartridge contains a mechanical selector. The selector and pick mechanism are part of the cartridge. Rotary motion, picked off the printer feed roll shaft gear, drives the feeder which drives the selector.

The mechanical selectors can be addressed by the printer line feed stepping motor. A unique combination of line feed rotations and counter rotations select the appropriate cartridge.

Paper is fed into the printer and positioned against the feed rollers. At that position, 350 printer paper feed rollers position the paper for printing, maintaining all responsibility for paper control. When printing is finished, the printer paper feed rollers eject the paper thru the feeder discharge rollers into an output tray in the front part of the printer.

2.0 REFERENCE DOCUMENTS

2.1 CENTRONICS INTERNAL DOCUMENTS

- A. Centronics Engineering Standard #001
- B. Centronics Engineering Standard #011
- C. Centronics Engineering Standard #014
- D. Centronics Engineering Specification #80002149-9001 Rev C

2.2 EXTERNAL DOCUMENTS

- A. UL114
- B. CSA 22.2
- C. VDE 0871, 0730
- D. ANSI D 3290-76

3.0 DETAILED SPECIFICATION

The feeder consists of a base configuration and add-on optional features. The base configuration is a feeder body and one fixed width cut sheet cartridge. The fixed width sheet cartridge can handle sheets either 21 cm or 8.5 inches wide and 6 inches to 14 inches long depending on which cartridge insert is selected. Paper weights 16# thru 24# may be handled by the fixed width paper cartridge. Cartridge inserts are removable, separate assemblies.

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The optional add-ons/substitutes are:

- A. Additional Fixed Width Cut Sheet Cartridge - The feeder may contain one, two or three cut sheet cartridges, the third cartridge being mutually exclusive with the envelope cartridge.
- B. One Envelope Cartridge - When an envelope cartridge is used, it must be inserted in the front-most slot in the feeder and precludes the use of a cut sheet cartridge in that slot. The standard envelope cartridge can handle both #9 and #10 envelopes.
- C. Width Adjustable Cut Sheet Cartridge - These are direct substitutes for the fixed width sheet cartridge. The feeder may contain one, two or three variable width sheet cartridges, the third cartridge being mutual exclusive with the envelope cartridge.

Width adjustable sheet cartridges and fixed width sheet cartridge may be intermixed.

An output tray is provided to store forms after printing. Paper egress is to the front of the printer.

3.1 FEEDER BODY

The feeder body includes the cover system, a structural means for mounting cartridge guides, gear train, paper path baffling and feed rollers for front paper egress and means for attachment to the printer.

3.1.1 Cover System

Material will be flame retardant and UL/CSA approved. Centronics will specify color and provide color and texture chips.

3.1.2 Gear Train

The gear train is mounted to the right side of the feeder body and contains gearing necessary to transmit rotary motion from the printer paper feed roller gear to the various paper cartridges. Gears to be metric.

3.1.3 Baffling

Baffling to provide paper paths from cartridge to printer paper rollers and from paper rollers to stacker trays. Baffling to be metal. An electrically conductive path to be provided from the baffling to the printer main frame for dissipation to static build-up.

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3.2 CARTRIDGES

There are two basic cartridges used in the feeder -- a sheet cartridge holding cut sheets and an envelope cartridge for holding #9 and #10 envelopes. The cartridges are comprised of a body, removable insert, a back plate, a means for providing constant pressure to the paper stack, a feed roll shaft with feed rollers, a mechanical selector for selecting the cartridge and a means for coupling the gear train to the input shaft in the cartridge.

When a sheet cartridge has been selected by the proper rotations and counter-rotations, the input shaft is coupled to the feed-roll shaft through the mechanical selector. The feed rollers are driven in a clockwise rotation as viewed from the input shaft end. The cut sheet in contact with the feed rollers is fed downward, over a pair of corner separators, to the paper path. The second sheet is restrained by the corner separators.

When not being driven, the feed rollers are free-wheeling.

If the envelope cartridge is selected, the selector connects the input shaft to the feed roll shaft. The feed roll shaft is driven in a clockwise direction and the envelope in contact with the feed rolls is fed through a baffle unique to envelopes. When not being driven, the feed rollers are free-wheeling.

The sheet cartridges are generally loaded with the sheets face up, top up, from the front of the cartridge.

3.2.1 Capacities

The sheet cartridge has a capacity of approximately 150 sheets of 20# paper. The envelope cartridge has a capacity of approximately fifty (50) #9 or #10 envelopes - 24# paper. Cartridge capacities may vary slightly with type of paper used.

3.2.2 Sheet Cartridge

3.2.2.1 Sheet Cartridge Body

The sheet cartridge body is molded plastic. Material will be flame retardant and UL/CSA approved. Centronics will specify color and provide paint and texture chips.

3.2.2.2 Sheet Cartridge Back Plate

The back plate will be sheet metal. The back plate will be plated and will vary depending on paper size.

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3.2.2.3 Sheet Cartridge Insert

On fixed width cartridges, a cartridge insert is required which will accommodate one sheet width only. These inserts are to be made removable and interchangeable and will configure the cartridge for use with a specific sheet width. The standard inserts will be for 21 cm or 8.5 inch wide sheets. Inserts are right or left justifiable. Sheet weights of 16# thru 24# may be handled. Sheet weight of 16# is not recommended.

The sheet cartridge insert is molded plastic. Material will be flame retardant and UL/CSA approved. Centronics will specify color and provide paint and texture chips.

3.2.3 Envelope Cartridge

3.2.3.1 Envelope Cartridge Body

The envelope cartridge body is molded plastic. Material will be flame retardant and UL/CSA approved. Centronics will specify color and provide color and texture chips.

3.2.3.2 Envelope Cartridge Insert

The standard envelope cartridge insert is designed to accommodate both #9 and #10 diagonally cut flap folded envelopes and is to be adjustable. Envelopes are left justified only. Envelope weights of 24# only may be handled.

3.2.4 Sheet & Envelope Feed Roll Shaft

The feed roll shaft is .312 inch in diameter with a multiplicity of feed rollers attached. It is integrally mounted in the cartridge and coupled through a coupling means to the output of the mechanical selector. The feed rollers are suitable non-marking friction material.

3.2.5 Mechanical Selector

The mechanical selector is mounted in the cartridge side member and is physically positioned between the feed roll shaft and the gear train. It is designed such that when the selector drive gear is given a programmed sequence of rotations and counter rotations, the output and input are connected. At other times, the output is free-wheeling. The mechanical selector is a complete and replaceable subassembly consisting of a drive gear, input shaft, a mechanical selector and a coupling means to the feed roll shaft.

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3.3 SIZE

The cartridge bodies are approximately 14.25 inches wide by 8 inches long by 2.0 inches deep.

3.4 WEIGHT

The sheet cartridge weighs approximately 2.8 pounds. The envelope cartridge weighs approximately 2.7 pounds.

3.5 FORMS HANDLING

The feeder has the following capabilities and capacities:

3.5.1 Paper Specifications

- A. Cut Sheets - 16#-24# plain bond paper (16# not recommended). Paper flatness .030 inch/inch maximum. Total paper curl .125 inch maximum.
- B. Envelopes - #9 or #10, 24# business envelopes. Other envelopes may require a different cartridge or cartridge insert.

3.5.2 Paper Sizes

The feeder is capable of handling form sizes as follows:

- A. 5.83 in (148 mm) to 12 in wide
- B. 6 in to 14 in long

The basic sheet cartridge will handle fixed width forms 21 cm or 8.5 inches wide depending on the cartridge insert used. Variable width capability for forms from 5.83 in to 12 in wide will be provided on an optional basis.

3.5.3 Multi-Part Forms

3.5.3.1 Bottom Glued Forms

The standard sheet cartridge, while designed to feed single sheets, will feed certain types of bottom glued multi-part forms. Those forms that have a front sheet of 20# or 24# paper and whose total thickness is not more than .020 inches can generally be fed from the standard sheet cartridge. The user may experience reduced Mean Feeds Between Operator Correctable Faults.

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3.5.3.2 Top Glued Forms

The standard sheet cartridge, while designed to feed single sheets, will feed certain types of top glued multi-part forms. Those forms that have a front sheet of 20# or 24# paper and whose total thickness is not more than .020 inches can generally be fed from the standard forms cartridge. When feeding bottom glued forms, the cartridge insert is moved to register the form from the right side of the printer. Forms are inserted upside-down. Printing takes place from right to left. The user may experience reduced Mean Feeds Between Operator Correctable Faults.

3.5.3.3 Other Multi-Part Forms

Other multi-part forms not covered in Sections 3.5.3.1 and 3.5.3.2 may require specially designed cartridges.

3.6 HARDWARE CONSIDERATIONS

All hardware components used will be metric.

4.0 ENVIRONMENTAL CONDITIONS

The feeder will meet the requirements as specified for a "Class B" product in Centronics Engineering Standard #001. The only exception to this is the environmental limits for which "Mean Feeds Between Operator Correctable Faults" may be checked. These limits are 15.6°C to 32.2°C (60°F-90°F) and 30% to 85% Relative Humidity.

5.0 RELIABILITY

5.1 FAILURE DEFINITION

A failure is a stoppage caused by the feeder, directly attributed to a faulty or worn part that requires replacement or adjustment.

An operator correctable fault is a stoppage caused by the feeder which, through operator intervention, can be corrected so that proper operation can be resumed. These include, but are not limited to, paper jams, misfeeds or multiple feeds.

5.2 PERFORMANCE

5.2.1 Mean Time Between Failures (MTBF)

Single Cartridge System - 5,000 Hours (design goal)
Dual Cartridge System - 3,200 Hours (design goal)
Three Cartridge System - 2,500 Hours (design goal)

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5.2.2 Mean Feeds Between Operator Correctable Faults (MFBOCF) - Cut Sheets

The mean feeds between operator correctable faults is 1,000.
The MFBOCF is based on the following assumptions:

- A. Two operator correctable fault per day due to feeder.
- B. Average of 35 characters/line.
- C. Average of 40 lines/page.
- D. Average last line of print is line 50.
- E. 20 line slew to get form to output stacker.
- F. Last two sheets of any cartridge excluded.
- G. Recommended sheet weights only (20-24#).

Time to print and space paper one line = $35/200 + .05 = .225$ seconds/line.

$.225$ seconds/line x 40 lines/page = 9 seconds/page

Time to print and space one line = .05 seconds

10 lines single space - $10 \times .05 = .5$ seconds

20 line slew to move form to output stacker at 8 inches/second

Time to slew = $20/(6 \times 8) = .417$ seconds

Allow 3 seconds to insert form

Therefore, $9 + .5 + .75 + 3 = 12.9$ seconds/page

$60/12.9$ pages/minute x 60 x 8 = 2,232 pages/8 hours

If 15% of the time is allowed for set-ups, paper reload, etc.,
then the number of sheets per 8 hour day = $2,232 \times .85 \div 2 = 950$.

Mean feeds between operator correctable faults is 1,000.

5.2.3 Mean Feeds Between Operator Correctable Faults (MFBOCF) - Envelopes

The mean feeds between operator correctable faults may vary considerably with envelope construction, weight, condition, environment and handling. For this reason, no mean feeds between operator correctable faults can be guaranteed. However, MFBOCF of 1/250 maximum is the established design goal.

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6.0 MOTOR TORQUE

The minimum torque that must be available at the printer feed roll shaft to drive a maximum configuration feeder is 17 ounce inches.

7.0 PRINTER CONSIDERATIONS

To properly sense the presence and/or absence of paper, it is required that a sensing means be mounted in the printer. It is recommended that a sensing means be placed approximately three (3) inches in from the right-most printing column and three (3) inches in from the left-most printing column. The sensing means will be mounted above the printer platen. If the two sensing means are monitored in a paper present in either/paper absent in both mode, paper widths from 4 inches to 12 inches, whether registered to the right or left side of the printer can be properly monitored.

8.0 MANUAL CUT SHEET INSERT

With the front cartridge removed, the operator may feed individual forms in a single step pre-empt mode.

9.0 CONTINUOUS FORMS

Adequate room to be provided to allow 14-7/8" wide continuous forms through the front egress.

10.0 MOUNTING CONSIDERATIONS

The sheet feeder body is to be mounted to the printer mechanism such that:

- A. The feeder body is hinged from the rear of the printer allowing it to be tilted back against a stop to allow clearing of paper jams, etc.
- B. The feeder body is positioned on the printer from the platen area when in the operating position.
- C. The left edge of inserted paper when left justified is to be a nominal distance of 3.726 inches from the inside face of the printer's left side frame member.
- D. The right edge of inserted paper when right justified is to be a nominal distance of 15.735 inches from the inside face of the printer's left side frame member.

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E. The left edge of inserted envelopes is to be a nominal distance of 4.726 inches from the inside face of the printer's left side frame member.

11.0 PRODUCT TRACEABILITY

The following assemblies must be serialized and marked with serial numbers unique to that assembly. Serial numbers must be indelible and to be placed in inconspicuous locations. Revision level of these assemblies must also be present.

- A. Feeder Body - Mark on side frame.
- B. Cassettes - Mark on base.
- C. Rear Egress Assembly - Mark on side frame.

12.0 PAPER REGISTRATION

Registration of paper inserted by the forms-envelope feeder is effected not only by the feeder, but primarily by the host printer. The forms-envelope feeder is designed for the following tolerances when used with a 350 Series Centronics printer.

Print Registration - Cut Sheet

| | |
|------------|------------------------------|
| Vertical | $\pm .035$ inches |
| Horizontal | $\pm .050$ inches |
| Skew | $\pm .004$ inch/inch maximum |

Print Registration - Envelopes

| | |
|------------|------------------------------|
| Vertical | $\pm .125$ inches |
| Horizontal | $\pm .050$ inches |
| Skew | $\pm .025$ inch/inch maximum |