ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-132

METHOD FOR MEASURING PRINTER THROUGHPUT

December 1988

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BRIEF HISTORY

Upon request of the "European Printer Performance Test" Group (EPPT) ECMA decided in June 1987 to develop an ECMA Standard specifying a method for measuring the throughput of printing devices. Preliminary work by the EPPT Group was taken in account when preparing the ECMA Standard.

This ECMA Standard addresses only the quantitative aspect of throughput of printers. It takes into account performance aspects, i.e. the time required for printing a small number of pages, e.g. five pages, as well as the endurance aspects, i.e. continuous printing over one hour. For both types of test the figure of merit of the throughput is expressed in "printed pages per hour" which is considered more relevant than other units previously in use, e.g. characters per second or lines per minute.

The work was carried out in a special Working Group set up for this purpose. Close liaison and co-operation with the EPPT Group and with Committee AA19 of DIN was maintained.

Adopted as an ECMA Standard at the ECMA General Assembly of 15th Dec. 1988.

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1. SCOPE

This ECMA Standard specifies a method for measuring the throughput of printing devices. It specifies three different test patterns:

- a standard business letter in German,
- a spreadsheet with English words,
- a graphic pattern.

Depending on the test pattern the printer under test shall be submitted to one or two performance tests and one endurance test or only to a performance test.

These tests are intended to measure only the printer throughput and not to evaluate any other printer features such as character shaping, print compressions, network/controller performance, paper handling, colour etc. The method is relevant to all general purpose printer types (e.g. dot matrix, daisy wheel, ink jet, thermal transfer, laser printers) and to all configurations (e.g. tractor feed, cut sheet feed, 80-column and over 132-column print width etc.). It may not be the most suitable for comparing performance of high-speed printers.

2. FIELD OF APPLICATION

This method is intended for use by printer manufacturers and test houses so that a common form of test result presentation shall be obtained. It will enable also a user to make a quick and easy comparison of the printing throughput of different printers.

3. CONFORMANCE

Test results claimed to be in conformance with this Standard shall have been obtained according to the method of this Standard and presented as specified herein.

4. TEST DEFINITION

4.1 General

For each test the specified test pattern shall be printed a number of times on the device under test. A test shall be performed under the conditions specified in 5 below. The initial set up conditions for the printer shall be as described under each individual test. Once started a test shall be performed without interruption.

The performance tests are designed to enable measurement of the printer under typical user application print tasks.

The endurance tests are designed to show any effects of extended high duty print tasks on printing throughput, due to any limiting factors within the printer (for example: dot density limitations, temperature rises etc.)

For both types of test the throughput unit shall be "printed pages per hour" and shall be calculated by means of the formula:

$$\frac{\text{Number of printed pages x 3600 s/h}}{\text{Measured time in seconds}}$$

4.2 Performance Test

In the performance tests the test pattern shall be transmitted from the host system five times. The test time measurement shall start from the key depression on the host computer which initiates the transmission of data to the printer.

There is a measurable time delay between initiating the data transfer from the keyboard and the start of transmission of data to the printer. This can have a significant effect on the test result accuracy. The test operator shall ensure that for the computer system used the test start time delay does not effect the test time measurement by more than 1%

When the test is performed with cut sheet paper the test shall be started with no paper loaded (i.e. the first operation the printer must perform in the test is to load the first sheet).

The measurement of the time required by the test shall end when the fifth sheet has been ejected.

For a printer operating with continuous paper the test shall start with the paper loaded to the top of form position.

The measurement of the time required by the test shall end after execution of the form feed at the end of printing the fifth page.

The performance figures shall be recorded along with a reference to the virtual matrix used.

4.3 Endurance Test

In the endurance tests the test pattern shall be transmitted from the host system repeatedly.

The test time measurement shall start from the key depression on the host computer which initiates the transmission of data to the printer.

There is a measurable time delay between initiating the data transfer from the keyboard and the start of transmission of data to the printer. This can have a significant effect on the test result accuracy. The test operator shall ensure that for the computer system used the test start time delay does not effect the test time measurement by more than 1 %.

When the test is performed with cut sheet paper the test shall be started with no paper loaded (i.e. the first operation the printer must perform in the test is to load the first sheet).

For a printer operating with continuous paper the test shall start with the paper loaded to the top of form position.

The measurement of the time requested by the test shall end with the completion (ejection) of the first sheet after one hour has elapsed (one hour and n seconds) so that a whole number of pages shall be printed.

The one-hour test time shall include any time required to reload paper, change ribbon cassette or replenish ink/toner supplies. It is assumed that the test is commenced with new consumables.

The endurance figures shall be recorded along with a reference to the virtual matrix used.

5. TEST CONDITIONS

5.1 Test Environment

The test shall be performed in the following environment.

Temperature   18 °C to 25 °C
Relative humidity 30% to 70%

The printer, fully enclosed in its normal operating cover set, shall be acclimatized in the test environment in powered condition for at least one hour.

5.2 Voltage

The printer shall be connected to a voltage supply which remains within ± 10% of the nominal value of the mains voltage.

5.3 Data Input

Data shall be sent to the printer at such a rate that the printer is never waiting for data to arrive and therefore producing a misleading (lower) throughput figure.

5.4 Test Sequence

Each test sequence shall be completed without stopping.

After each test sequence the printer shall be allowed to re-stabilise (cool down) to its normal powered up ambient state.

5.5 Print Paper

The paper used shall be:

- cut sheet weight: 80 g/m^2 ± 10 g/m^2,

- fanfold single ply weight: 70 g/m^2 ± 10 g/m^2,

- fanfold multiply: original plus two copies (type and weight of the paper/carbons according to the manufacturer's specification).

A printer configured for continuous paper (tractor, pin wheel or friction feed) shall preferably be loaded with 304,8 mm (12 inch) form length paper. If this is not possible any form length may be used but the test patterns can then be printed over more than one page. Any "skip over perforation" feature in the printer shall be disabled.

A printer configured for cut sheet paper shall be operated in automatic mode not in manual single sheet feed mode. A4 size paper shall be used and loaded in portrait mode.

The printer shall be tested with single-part paper and also with the maximum ply paper with which the printer will be used. This test shall only apply if the maximum ply has three parts (top sheet plus two copies, with or without carbon interleaves).

6. TEST RESULT PRESENTATION

Results recorded from the tests specified in 7-9 below shall be presented in the tabular format specified in Appendix A. The configuration used for the test shall be reported.

This presentation format should be used in all technical specifications, sales leaflets and information made available to printer users.

7. LETTER TEST

7.1 General

This test simulates a typical user application of printing a letter.

The test pattern for the letter test shall be the standard letter defined in German Standard DIN 32751. It has been selected because it is an existing, well defined standard already in use internationally.

7.2 Test Pattern

The printer shall be set up for 0,4 characters per mm (10 cpi) and 0,24 lines per mm (6 lines per inch, lpi) operation.

It is shown in Appendix B.

7.3 Test 1 - Performance

Set the printer to "Draft Quality" mode.

7.4 Test 2 - Performance

Set the printer to "Best Print Quality" mode.

7.5 Test 3 - Endurance

Set the printer to "Best Print Quality" mode.

8. SPREADSHEET TEST

8.1 General

This test simulates a typical user application of printing a spreadsheet.

The set up shall be for 0,24 lines per mm (6 lpi) and "Draft Quality " mode.

8.2 Test Pattern

The test pattern shall be the 132-column spreadsheet shown in Appendix C.

8.3 Test 1 - Performance

The printer shall be set up for 0,4 characters per mm (10 CPI). This test shall not be performed on printers having a print line length of less than 33,5 cm (13,2").

8.4 Test 2 - Performance

The print density mode shall be set to the compressed mode, normally 0,67 characters per mm (17 cpi). If this is not available then a compression in the range 0,65 characters per mm to 0,71 characters per mm (16,5 cpi to 18 cpi) shall be selected.

9. GRAPHICS TEST

9.1 General

The test pattern sent to the printer shall utilise graphics mode printing (e.g. vectors, bit map) and shall not use character mode printing (e.g. block graphic characters).

The dimensions defined are minimum dimensions. Any minor size deviations are permitted if they yield a larger but not a smaller image.

9.2 Test Pattern

The test pattern shall be that reproduced in Appendix D.

9.3 Test 1 - Performance

The minimum density to be tested is 2,63 H x 2,83 V dots per mm (60 H and 72 V dots per inch).

APPENDIX A

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PRESENTATION OF TEST RESULTS

Printer Type :

Configuration :

Designed for a print volume of ...... pages/month

Test Cases		Matrix Used	Cont. 1 Ply	Cont. Multiply	Cut Sheet
Letter-Performance	Draft				
5 Pages, 0,4 cpmm (10 cpi)	Best Quality				
Letter-Endurance 1 hour, 0,4 cpmm (10 cpi)	Best Quality				
Graphics, 5 pages Performance	Good Resolution				
Spreadsheet, 5 pages Performance 203,2 mm (8") Print Width	0,67 cpmm (17 cpi) Draft				
Spreadsheet, 5 pages Performance 355,3 mm (13,2") Print Width	0,4 cpmm (10 cpi) Draft				

- Results are given in printed pages per hour (pph).

- The matrix used is indicated by the number of horizontal and vertical dots (HxV) per mm (in).

- Results boxes may be left empty depending on the printer type.

- The 132-column spreadsheet (Appendix C) shall be printed on 80-column printers in compressed pitch (see 8.4).

APPENDIX B
LETTER TEST PATTERN

The standard letter reproduced overleaf is that of DIN 32751. The text of the letter starts with the word **Eilzustellung** and ends with the word **Mustervordrucke**. For convenience of the reader of this Standard and to indicate the relative positions of the different parts of the text there is a dotted line at the top and at the bottom of the page. These dotted lines are **not part of the text**.

If this ECMA Standard is translated into another language, the text of this standard letter shall remain in German in order to ensure correlation between measurements made at different locations.

|--------|---------|---------|---------|---------|---------|--------|--------|

Eilzustellung

Norddeutsche Farbenwerke KG
Herrn Dr. Grauert
Große Elbstraße 64

2000 Hamburg 4

Org. III 5/37   H-A   4 34   22.04.75
7.04.75   Volkmann

Vordruckgestaltung für den allgemeinen Schrift-
verkehr, für das Bestell- und Rechnungswesen   E i l t

Sehr geehrter Herr Dr. Grauert,

Sie können das Schreiben der Briefe, Bestellungen, Rechnungen usw.
sowie das Bearbeiten des Schriftgutes rationalisieren, wenn die
Vordrucke Ihres Unternehmens den folgenden Normen entsprechen:

                DIN 676 Geschäftsbrief; Vordrucke A4
                DIN 677 -; Vordruch A5
                DIN 679 Geschäftspostkarte; Vordruck A6

                DIN 4991 Vordrucke im Lieferantenverkehr; Rechnung
                DIN 4992 -; Bestellung (Auftrag)
                DIN 4993 -; Bestellungsannahme (Auftragsbestätigung)
                DIN 4994 -; Lieferschein/Lieferanzeige
                DIN 4998 Entwurfsblätter für Vordrucke

Diese Normen enthalten alle Einzelheiten für den sinnvollen und
zweckmäßigen Aufdruck. Wenn dazu bei der Beschriftung genormter
Vordrucke DIN 5008 "Regeln für Maschinenschreiben" beachtet wird,
entstehen übersichtliche und werbewirksame Schriftstücke.

Die beigefügten 6 Mustervordrucke zeigen, daß das Beachten der
Normen die künstlerische und werbewirksame Gestaltung der Vor-
drucke nicht ausschließt.

Da wir uns auf die Herstellung genormter Vordrucke spezialisiert
haben, können wir besonders billig liefern. Eine Probebestellung
wird Sie und Ihre Geschäftsfreunde von den Vorteilen überzeugen.

Mit bester Empfehlung

NORAG
Druckerei und Verlagshaus KG

Hermann

Anlagen

    6 Mustervordrucke

|--------|---------|---------|---------|---------|---------|---------|--------|

APPENDIX C
SPREADSHEET TEST PATTERN

The spreadsheet test pattern is reproduced overleaf.

The text of the spreadsheet starts with the word **SPREADHSEET** and ends with the **bottom right-hand last line of twelve double underline characters.**

For the convenience of the reader of this Standard and to indicate the relative positions of the different parts of the layout there is a dotted line at the top and at the bottom of the page. These dotted lines **are not part of the text.**

If this ECMA Standard is translated into another language the seven English words and the abbreviated names of the months shall remain in English in order to ensure correlation between measurements made at different locations.

SPREADSHEET TEST
TYPICAL YEARLY CASH FLOW ACCOUNT

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jly.	Aug.	Sep.	Total
REVENUE													
Salary	12345	67890	12345	67090	12345	01234	56709	01234	56789	01234	50123	44567	901234567358
OUTGOING EXPENSES													
Property Rates	123	456	7890	1234	5670	9012	2123	4501	2345	6789	0123	4567	89012194670
Car Repayment	123	4567	8901	2345	6789	0123	4501	2345	6789	0123	4567	8901	23450543224
Food Purchases	1234	4567	9012	3456	7890	1234	5012	3456	7890	1234	5678	9012	34501659100
Personal Taxes	1234	4567	9012	3456	7890	1234	5012	3456	7890	1234	5678	9019	34501543224
Gas			012			012			012			012	0012210876
Electricity		123			123			123			123		1232486050
Insurance		900							123				8905432243
Car Repairs		234		567			895						1237358004
House Repairs				678			901						6781946780
Entertainment	55	22	33	45	65	75	85	95	05	16	25	32	4547934568
Pension Fund	909	129	349	569	539	695	691	696	914	149	051	493	41495807081
Sundry	566	766	866										9017483242
Accountancy	123	456					7890						72345041253
Telephone			234			403			055			550	12347413106
Travelling Expenses	455	295	395	095	059	359	451	251	929	051	590	959	52251291405
HOUSE EXPENDITURE													
House Repayments	051	011	921	4519	2519	5059	9299	9540	2040	8544	651	351	95125715432
House Insurance			3105		3105			0592			3512		38512795382
TOTAL OUTGOINGS	7358	1946	54322	6591	21007	34225	56789	01234	40123	44567	90123	45678	901234765502
NET BALANCE	1234	4567	901	2345	6709	0123	4501	2345	6789	01234	5678	9012	345240743358
BALANCE B/FWD	-1234	4567	9012	3456	70901	23450	12345	67090	12345	67890	12354	12345	-12345406010
BALANCE C/FWD	1234	4567	9017	23457	78907	12345	05570	45199	25199	52259	12549	25959	25159109152

APPENDIX D
GRAPHIC TEST PATTERN

The graphic test pattern is shown overleaf. The frame of 127 x 165,1 enclosing the four black rectangles **is part of the test pattern.**

It shall be printed at a distance of ten SPACE characters from the left-hand edge of the sheet at a character pitch of 0,4 characters per mm (10 cpi).

The dimensions indicated in mm **are not part of the test pattern.**