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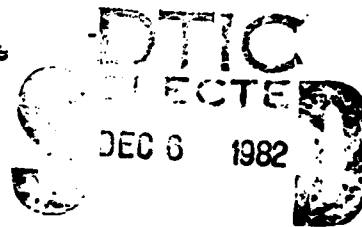
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Aerodynamics Technical Memorandum 342

ADDITIONAL OS8 UTILITY PROGRAMS WITH CCL CALLING SEQUENCE

G.F. FORSYTH

Approved for Public Release



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DEPARTMENT OF DEFENCE SUPPORT
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Aerodynamics Technical Memorandum 342

ADDITIONAL OS8 UTILITY PROGRAMS WITH CCL CALLING SEQUENCE

by

G.F. FORSYTH

SUMMARY

A system for labelling the directories of magnetic media (rigid discs, floppy discs, cassettes and tapes) in a machine readable fashion, a go-nogo quick machine test program and two new versions of a text printing program are presented. Also presented is a method of calling these utility programs using the commands PRINT and ZERO. Two versions of the text printing program allow either a raster-scan plotter or a conventional printer to be used. The plotter version allows the font to be modified and figures to be included in the test. It also includes Greek characters, mathematical symbols and shifted text.



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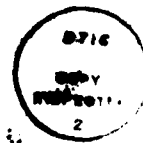
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1 INTRODUCTION.

The ARL Transonic Wind Tunnel Dynamic Derivatives Control and Data Acquisition Equipment consists of a minicomputer (DEC 8A800), a graphics terminal (DEC VT55), a programmable data system and an electrostatic printer/plotter (VERSATEC D800A). Data and programs are stored on IBM standard (3740) flexible discs.

The system is usually run under OSB Version 3D software (1), but certain user utility* programs are used as well. These user programs are usually available from the Digital Equipment Computer Users Society (DECUS) and include the programs to be described here. These are:- (i) LPTSPL which adds concise calls for PRINTR and LABEL (both also described here) and for RUNOFF(2); (ii) LABEL which adds labels to magnetic media in a form that the DECUS version of the directory program DIRECT(3) can read; (iii) PRINTR which is in two versions to suit either an electrostatic plotter (or printer/plotter) or a conventional printer; and (iv) QIKTST which runs a brief selection of processor and memory diagnostic routines to test the basic system. The two versions of PRINTR are numbered 3A and 4A and are distinctly different. Version 2A of the PRINTR program(4,5), which was dated 31-AUG-79, is presently available from the Digital Equipment Computer Users Society (DECUS) as DECUS 8-915. The changes relating to these versions will be given in separate sections of this publication.

Unless indicated otherwise, the character codes used conform to the standard of the American Standard Code for Information Interchange (ASCII).

2 PRINT COMMAND.

The Concise Control Language CCL of OSB(1) includes a call PRINT which looks for a user program LPTSPL. This may be any program which can be started by chaining. Several alternative programs available from DECUS usually spool line printer output, putting page headers and dates on the output. This version is different in that it provides a simple way of setting various options. The program then chains to either PRINTR, RUNOFF or LABEL depending on the options entered. Assuming that this version of LPTSPL.SV is present on the system device the form of the call is:-

PRINT DEV:FILE.EX/(OPTIONS) TERM

* In this context a utility program may be thought of as a useful program which is used intact to perform some repetitive function in much the same way as handy subroutines are kept for adding to programs as and where needed.

Any number of options may be entered, each either preceded by a slash or included in brackets. A full list of the options is given in Table 1. The Z option runs LABEL (itself with a Z option and including a Y option if required) and no file or extension may be entered in this case. This option also does not check the terminating character. For all other options, the command line may terminate with either a carriage return or an escape character, resulting in a return to monitor or the called program respectively. The R option runs RUNOFF; all other options run PRINTR.

For calls to PRINTR, there is a default input extension of .WJ and a default option of /3 which moves the output 3*4=12 spaces to the right. Note that there is no output file name; for RUNOFF the output is to DSK:FILE.WJ and the .WJ extension may not be used for input. RUNOFF calls use .RO as default input extension and /U as default option which selects the alternate system of underlining. Note that the /R option is also transferred to RUNOFF but that RUNOFF ignores this option.

Since the RUNOFF output is to disc and since PRINT includes the /3 option for PRINTR, it is never necessary to include an OVER option in the RUNOFF text. This means that RUNOFF output can always be read on a screen type terminal.

As an example of the use of the PRINT command, consider a text file FRED.RO which has been created by EDIT or TECO or some other editor. The calls to process the file with RUNOFF and then PRINTR are:-

```
PRINT FRED/R
PRINT FRED
```

This leaves a file FRED.WJ on the disc which can be read or edited. Any other options required can be simply included in the command lines. If a series of files FRED1 - FREDn are to be handled the escape termination may be used:-

```
PRINT FRED1$
#DSK:FRED2.WJ<DSK:FRED2.RO/U
ETC.
```

Note that the escape forces a return to the called program. RUNOFF in this case, without default options or input extensions or output devices, files or extensions. This is because the return is direct to the required program without going via LPTSPL which normally sets these default options. While included for completeness, it is not considered that the escape termination will be often used.

Similarly, the /Z option will not normally be used as the ZERO command performs the same task.

3 ZERO COMMAND.

The standard OS8 ZERO command runs PIP with a /Z option. PIP/Z causes any label which may be present in the directory area of the device to be deleted. A single location change to CCL is all that is necessary to change this to run LPTSPL with the same option. Table 2 identifies the location to be changed.

As noted in the previous section, LPTSPL with a /Z option chains to LABEL. The features of this program will be described in the next section, but operating examples will be given here for cases without and with a /Y option:-

ZERO DEV:

The first block of the device directory is cleared and the program then prompts:-

PLEASE TYPE (ESCAPE RETAINS PREVIOUS DATA)

MEDIA 4 LETTER CODE

VOLUME 0>4096

TEXT UP TO 128 CHARS; A BLANK LINE HALTS ENTRY

The user may now enter from the keyboard, the media code, volume number and text, finishing each item with a carriage return. If an escape is typed as the first character in a line, any previous data on the media for that line are retained. For volume, which is a decimal positive integer up to 4096, the escape may be anywhere on the line. If an escape is entered for the third line of text and previous text had a third line, that line is retained. If there were no such line, the command is ignored.

Input text may be written in upper or lower case and include any characters except those control characters used by the monitor e.g. FC. The media code however, must consist of 4 printing characters although space may be included. Since the volume number is stored as a 12-bit binary value only the numerals 0 to 9 may be used in that line.

Input continues until two consecutive carriage returns are entered. Only the first 128 characters in the text buffer are stored; any others are ignored.

For the case with a /Y option:-

ZERO DEV:/Y

the first block of the directory is reset and the system head from the system device written on the named device, producing a new system device. The prompt and text inputs are as before.

ZERO cannot be used with device SYS: as this produces the response:-

CAN NOT ZERO SYSTEM
USE PIP IF YOU MUST

However, use of the specific device name for SYS: is not prevented. Note also that the PIP /Z option is available still.

4 LABEL FEATURES.

As is evident from the previous section, LABEL performs the /Z option formerly done by PIP and then adds the label to the device directory. The label obtained can be read using the DECUS version of DIRECT(3), with a /H option. An example of a printout of such a directory follows:-

13-MAY-80

DSKY VOLUME— 400
YELLOW PUBLICATIONS FILES NUMBER 1

INIT .CM	1	07-FEB-80	DD6 .RO	76	29-APR-80
UTIL .WU	34	13-MAY-80	DDSUBM.RO	5	07-DEC-79
PRINTM.RO	50	29-APR-80	PUBS .LS	4	04-DEC-79
DDAR79.RO	5	12-JUL-79	UTIL .BK	26	13-MAY-80
DD4 .RO	70	29-APR-80	UTIL .RO	33	13-MAY-80
PRINTC.WU	4	29-AUG-79	PRINT .WU	64	29-APR-80
SRMOD.RO	19	15-APR-80	DD4 .WU	85	29-APR-80
HEADFM.WU	5	08-FEB-80			

15 FILES IN 481 BLOCKS - 178 FREE BLOCKS

Use of this feature reduces the number of allowable files on any one device since block 6 which was the last directory block is now a label or header block, reducing the maximum number of file entries from 248 to 200. Directories written by LABEL always have one (1) additional information word which is the default case for PIP. PIP may write directories with any number of additional information words. (The single additional information word in the default and LABEL cases is the date.)

The section on ZERO covered the use of the LABEL program with /Z and /Y options. The basic program without options may be used to write labels on existing devices without zeroing the directory, provided block 6 is still free. The procedure is:-

R LABEL
#DEV:

followed by the same prompt and responses as in the previous section. If this procedure is followed with more than 200 file entries

including empty files, the directory will not be valid.

For the media (floppy discs) in use in this installation, a simple code has been devised which is used in the label. The code involves using the media and volume entries to flag the type of media and the text to further identify it as per Table 3. It also appears to be good practice to list the available handlers on the label of system discs.

5 PRINTR VERSION 3.

The program PRINTR(4,5) provides a method of creating written text on an electrostatic plotter. It provides Greek and mathematical symbols, superscripts, two levels of subscripts, overstruck bars and dots, and inserted figures. A full description of version 2A of this program is given in Reference 5. The available font is listed in Table 4 and the control characters used are listed in Table 5.

This new version includes the support for the PRINT call from CCL, which required a new chain entry procedure and new options. The program may now be chained to with any options including escape and from 0 to 9 files. If the number of files is 0, the command decoder is called to enter a file name. The usable options are listed in Table 6. Any other option is ignored. The new options allow for multiple copies and text placement away from the left margin of the page.

The major change however is in the addition of new control characters. PRINTR obtains its extra output characters (e.g. Greek) and shifted text as well as figures by using control characters in the text file to be printed. (See Table 5). Two more characters have been allowed for future expansion (†D and †E) and †B has been added to allow font manipulation. The control B code allows the font for any character or overstrike to be modified at will, by inserting the string:-

†B, character to change, 12 characters representing the scans, return.

If an overstrike bar or dot is to be modified, the character is preceded by control H and only 4 scans are used:-

†B,†H,select character, 4 scan characters, return.

The scan characters represent the 7-bit scan pattern and may be themselves modified by the presence of control A, e.g. †AA represents a single scan of zero. The values used are given in Table 4. The most significant bit of the code is to the left and the scan is from top to bottom. As an example, the code for a space may become a shading character by the sequence:-

†Bspace†ASS†ASS†ASS†ASS†ASS

which may then be used:-



The original font can now be used only if this process is reversed.

!Bspace!AA!AA!AA!AA!AA!AA!AA!AA!AA!AA!AA

6 PRINTR VERSION 4.

Unlike the previous version of PRINTR, version 4 is not a development of version 2 but a special version to allow the CCL call PRINT to be used with conventional printers. It does not use the conventional printer handler and so allows any special features of the printer to be used. Control characters may be transferred directly to the printer from a text file using this program.

The number of run time options are much reduced relative to those for the plotter version. Options consist of /m for position and =n for copies and a default /G to force a new page after 70 lines. This latter feature may be set to any number of lines during assembly of the program.

This program is normally stored as PRINTF.SV to distinguish it from the plotter version.

7 QIKTST- A QUICK TEST

QIKTST is a simple diagnostic which provides a simple go-nogo test for PDP8 processors. It performs several processor tests and a memory check then returns if correct. Some errors produce message typeouts but others produce a halt condition.

The message typeouts are of the form:-

QIKTST ERROR n

where n is a number from 0 to 9 representing the machine operation being executed at the time the error is detected:-

- 0 ISZ;
- 1 CLA, SNA or SZL;
- 2 CMA, SZA or SKP;
- 3 JMP;
- 4 TAD;
- 5 MEMORY or DCA;
- 6 AUTOINDEX;
- 7 SNA or CLA;
- 8 JMS;
- 9 JMP.

Disc read errors produce either a monitor message or a halt. Full diagnostics should be run if QIKTST indicates an error.

Since QIKTST is run under OS8 it does not check memory above 7600 in any field. Variable KN in the program needs to be set to indicate how much memory should be found. (-1 for 8K, -2 for 12K, etc.) In the present version of QIKTST, this variable is stored at location 364. The program returns to monitor on exit and may be run by a System Initialise routine.

If the OS8 command:-

```
SET SYS INIT
```

has been previously executed and a file INIT.CM containing:-

```
R QIKTST (RETURN)
```

is on the DSK: device, then QIKTST will be run whenever the system is booted.

8 CONCLUSION.

PRINT and ZERO functions for OS8 and the component programs which create these functions have been described. The latter include LABEL, two versions of PRINTR and QIKTST. The programs are very useful additions to systems which include multiple discs or tapes and for systems without a letter quality printer. They will be distributed by the Digital Equipment Computer Users Society (DECUS).

REFERENCES

1. OS8 SYSTEM REFERENCE MANUAL. AA-H607A-TA
2. T.W.McIntyre, RUNOFF, V6. DECUS 8-880.
3. J. Van Zee, DIRECT: OS8 Directory Listing Program, Version 7B. DECUS 8-842, Nov. 78.
4. G.F.Forsyth, PRINTR, A Text and Graph Plotting System With Expanded Capabilities. DECUS 88-915, Dec. 79.
5. G.F.Forsyth, PRINTR, A Text and Graph Plotting System With Expanded Capabilities. AERO TM 1980.

TABLE 1.
OPTIONS FOR PRINT COMMAND.

=n	PRINTR outputs n (octal) copies of file.ex.
/m	PRINTR moves output 4m spaces to right, where m=0 to 9. 0 is included to allow suppression of the default /3 option.
/G	PRINTR inserts page feed if page Greater than 70 lines.
/R	RUNOFF called instead of PRINTR.
/R/A	RUNOFF assumes Autoparagraph.
/R/B	RUNOFF uses alternate Backspace.
/R/C	RUNOFF sets upper Case.
/R/D	RUNOFF looks for Down parameter.
/R/E	NOT YET IMPLEMENTED.
/R/F	RUNOFF does not Form pages.
/R/H	RUNOFF Holds line spacing on breaks.
/R/I	RUNOFF Inserts page and line numbers in left margin.
/R/J	RUNOFF Jumps (ignores) simulated form feeds.
/R/K	RUNOFF Kills error list in output.
/R/L	RUNOFF sets alternate page length (64 not 66).
/R/M	RUNOFF prints Multiple copies which is of little use in this context. Use =n option for extra printed copies.
/R/N	RUNOFF Notes errors on terminal.
/R/O	RUNOFF moves text Over on page.
/R/P	RUNOFF Pauses after each Page.
/R/Q	RUNOFF uses 55 not 137 for underline.
/R/S	RUNOFF Sets double Spacing.
/R/T	RUNOFF allows Tabs to be filled.
/R/U	RUNOFF Uses alternate Underline.(Default)

TABLE 1 continued.

- /RV** RUNOFF simulates form feeds.
- /RW** RUNOFF selects 60 as page Width not 70.
- /RX** RUNOFF sends only upper case.
- /R=n** RUNOFF uses n as an octal number to encode the Down, Over, Even and Multiple copy options. All these functions can be handled by PRINTR.
- /Z** LABEL Zeros the directory on the device named, then asks for a header for this device. The header consists of a 4-letter media code, a decimal volume number (under 4096) and up to 128 characters of text. Input is terminated by 2 consecutive carriage returns. Escape may be entered as the first character in any line to preserve existing data. See also ZERO command.
- /ZY** LABEL Zeros the directory as above but adds a system head from the system device. Neither Z option can be used on SYS:.

TABLE 2.

CCL CHANGE FOR LPTSPL AS ZERO CALL.

One entry in the CCL Table has to be altered so that LPTSPL is called instead of PIP. This may be done in several ways.

- SOURCE.** The source may be altered in the second last row of the table to change YPIP to YLPTSPL in the entry for XZER.
- FUTIL.** The core image file may be edited using FUTIL. The YPIP and YLPTSPL are the addresses of these filenames in field 0. In the version modified here (CCL Version 1F), these are stored at addresses 7211 and 7230 respectively. FUTIL may be used to change the entry in the table which in this case is in the 4th block location 115. For example, in the case where CCL.SV occupied blocks 103 to 124, location 106.115 was changed from 7211 to 7230.
- ODT.** The same change may be done using ODT on a core image of CCL. The location to be changed was 13115 from the same 7211 to 7230.

TABLE 3.
CODES FOR FLOPPY DISCS.

LABEL COLOUR	PROGRAM TYPE	MEDIA CODE	DISC FORMAT	VOLUME START	END
GREEN	DIAGNOSTICS	SYSG	RX01 SYSTEM	0	9
ORANGE	FORTRAN	SYSO	RX01 SYSTEM	10	19
		RXAO	RX01 FILES	100	199
		DSKO	BYTE FILES	100	199
ROWN	BASIC	SYSB	RX01 SYSTEM	20	29
		RXAB	RX01 FILES	200	299
		DSKB	BYTE FILES	200	299
GREEN	FOCAL, ETC.	SYSG	RX01 SYSTEM	30	39
		RXAG	RX01 FILES	300	399
		DSKG	BYTE FILES	300	399
YELLOW	PUBLICATIONS	SYSY	RX01 SYSTEM	40	49
		RXAY	RX01 FILES	400	499
		DSKY	BYTE FILES	400	499
AQUA	PROGRAMS	SYSA	RX01 SYSTEM	50	59
		DATA	DATA FILES	500	999
	UTILITIES	SYSA	RX01 COPIES	60	69
RED	DEC	DECR	ORIGINALS	70	79
	DECUS	USRR	RX01	80	100

TABLE 4.
 FONT OF PRINTR VERSION 3A
 CHARACTERS MARKED WITH * NOT AVAILABLE ON KEYBOARD
 CHARACTERS MAY BE PRODUCED BY CONTROL A FOLLOWED BY CHAR IN BRACKETS

VALUE	CHAR	VALUE	CHAR
0*	α(A)	100	Ø
1*	β(B)	101	Α
2*	γ(C)	102	Β
3*	δ(D)	103	Γ
4*	ε(E)	104	Δ
5*	ζ(F)	105	Ε
6*	η(G)	106	Φ
7*	θ(H)	107	Γ
10*	ι(I)	110	Η
11*	κ(J)	111	Ι
12*	λ(K)	112	Κ
13*	μ(L)	113	Λ
14*	ν(M)	114	Μ
15*	ξ(N)	115	Ν
16*	ο(O)	116	Ο
17*	π(P)	117	Π
20*	ρ(Q)	120	Ρ
21*	σ(R)	121	Σ
22*	τ(S)	122	Τ
23*	υ(T)	123	Υ
24*	φ(U)	124	Φ
25*	χ(V)	125	Χ
26*	ψ(W)	126	Ψ
27*	ω(X)	127	Ω
30*	Ω(Y)	130	Χ
31*	Γ(Z)	131	Υ
32*	→(L)	132	Ζ
33*	+(\)	133	[
34*	↑(J)	134	\
35*	+ (†)	135]
36*	Σ()	136*	°(† DELETE)
37*	≈(')	137	-
40	Space	140	.
41	!	141	α
42	"	142	β
43	‡	143	γ
44	\$	144	δ
45	%	145	ε
46	&	146	φ
47	'	147	θ

TABLE 4 continued.

<u>VALUE</u>	<u>CHAR</u>	<u>VALUE</u>	<u>CHAR</u>
50	(150	h
51)	151	i
52	*	152	j
53	+	153	k
54	,	154	l
55	-	155	m
56	.	156	n
57	/	157	o
60	0	160	p
61	1	161	q
62	2	162	r
63	3	163	s
64	4	164	t
65	5	165	u
66	6	166	v
67	7	167	w
70	8	170	x
71	9	171	y
72	:	172	z
73	:	173	{
74	<	174*	f(=)
75	=	175*)(>)
76	>	176*	a(?)
77	?	177*	o(0)
		TWICE GIVES	oo

TABLE 5.
CONTROL CHARACTERS USED BY PRINTR VERSION 3A
TO BE INCLUDED IN INPUT TEXT FILE

†A	Subtracts 101 from the next character entered, to give the characters and values of Table 4.
†B	Modifies font using the next character as the character to be changed and the following character values as the font from top to bottom: †B, char, 12 values of scans as in Table 4. This also works for the overstrike font where the format is :- †B, †H, select character, 4 values.
†D	Reserved for select next font.
†E	Reserved for return to standard font.
†F	Enters figure mode. In this mode, the following pairs of characters are used as 12-bit data. Each character value as given in Table 4 is truncated to 6 bits (0-77 octal). The first pair of characters select a starting address on the line, indicate whether a second line of character pairs follows (only 120 characters per line) and select one of two modes of data presentation. In this first pair, bit 4000 is not used, bit 2000 indicates another line is to be read before printing and bit 1000 when set selects 12-bit format. In the 12-bit format, data are entered in order starting from the starting address set by the low order 9 bits of the first pair (address is byte). In the 8-bit mode, bit 4000 is reserved to indicate the next address, bits 2000, 1000 and 400 form a repeat code and the other 8 bits the output byte.
†H(BACKSPACE)	Indicates overstrike and underlines. For an underline, the next character must be minus or the underline code. All other characters are truncated to 4 bits to select one of eight overstrike codes and one of two vertical positions. The standard codes are BAR, DOT, 2 DOTS, BAR + 2 DOTS, HAT and a spare. Position 0 is high (upper case) and position 10 is low (some lower case characters).
†I	Tabs to next multiple of 8 positions from the margin, not from edge of paper. This is not affected by the OVER option.

TABLE 5 continued

↑J(LF)	Indicates end of line.
↑L	Feeds to a new page.
↑M(CR)	Ignored.
↑N	Half shift up. See next entry.
↑O	Half shift down. There are 4 shift levels. Line feed initially resets the pointer to the second level down, allowing one shift down and two shifts down from this position. Each shift is a quarter of the interline spacing of standard lines but the interline spacing of shifted lines is increased where necessary. Extra shift commands are ignored and shifts stay set until the end of the current line.
↑Z	End of file.

TABLE 6

OPTIONS IN PRINTR COMMANDS

(Used in command line to Command Decoder)

=n	Output n copies of all input files.
/m	Move all of output 4m spaces to the right, without disturbing relative tab positions, where m=0 to 9. The zero option allows the default /3 of the PRINT call to be suppressed.
/G	Inserts page feeds after every 70 (66) standard lines. This option should be used with care with shifted text, but is useful for paging unformatted output.

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16. Abstract A system for labelling the directories of magnetic media (rigid discs, floppy discs, cassettes and tapes) in a machine readable fashion, a go-nogo quick machine test program and two new versions of a text printing program are presented. Also presented is a method of calling these utility programs using the commands PRINT and ZERO. Two versions of the text printing program allow either a raster-scan plotter or a conventional printer to be used. The plotter version allows the font to be modified and figures to be included in the text. It also includes Greek characters, mathematical symbols and shifted text.			

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