COMPUTER

CENTRE

BULLETIN

PASSWORD SECURITY

[WN-72]

The security of the University of Queensland system is based on the use of passwords, which a user must quote to be able to login and to gain full access to his files. If a user's password was discovered by another person, that person could use the owner's computer time and read and tamper with his files.

Previously, passwords were held in their original form in a protected disk file. Although access to this file was restricted to some Computer Centre personnel, the possibility of the file being illegally accessed existed.

To provide increased security for users, passwords are now kept on one of the accounting files, but in code. The code is a one way cypher (which alters the original password) designed so that although it is possible to code the password, it cannot be decoded.
A number of changes have been made to various systems programs to fit in with the new system. The PASSWORD and LOGIN programs encypher the passwords before comparing them with the master file.

The changes incorporated into the systems programs are invisible to the user, but should result in vastly improved security for files. One administrative change is necessary with the introduction of this system. The Centre can no longer tell a user his current password should he forget it. Instead, a user who forgets his password will have to make application for a new initial password to be entered on his project.

RELEASE OF NEW BATCH

[WN-71]

On Thursday 20 January 1972, a new version of the Batch Controlling Program (version 2D(64)-3) was implemented. Apart from providing additional control facilities, the main purpose of this release was to implement the Student Accounting facilities

described in the current version of the System User's Guide. (A seminar on the use of these facilities is to be given on 23 February 1972 at 10 a.m.).

In this version of Batch, some of the additional messages that were inserted by the previous version have been removed, so that there will be a greater similarity in the output from Batch and remote terminals. One additional message has been inserted at the top of the page. This includes the Batch version number (which was there before in a different form) and details of the input and output files used in the run. This information will assist Computer Centre staff in locating errors.

The release will also involve the concurrent updating of a number of other system programs, namely LOGIN, the Printer Symbiont and the Command Decoder. However, the changes in the routines will not be apparent to the user.

BMD PROGRAM ERRORS

[WN-71]

BMD02R (i.e. $BMD.R02) will not accept an output device other than the job output device. Columns 73-77 of the PROBLM card are accepted as the input filename and not columns 75-79 as given in the Newsletter WN-58. Users will be notified when this is corrected.

BMD04V (i.e. $BMD.V04) and possibly others will not accept more than 80 columns per input record even if it is from a file and not cards. The reason is that the input file is first copied to a temporary file in card image form; characters beyond the 80th being ignored. This restriction cannot easily be relaxed, so users should be aware of it.

By using the command

        DIRECTORY(FULL) $BMD

Any user may check the creation dates of the released BMD programs.

GE-225 PROGRAMS

[WN-73]

The following programs have been inserted or updated in the GE-225 program library.

C6-201   Pack subroutine   FORTRAN compatible

    This is a modification of the original version of Pack (C6-200) to permit use of the routine from within a FORTRAN program.

C6-203   Unpack subroutine   FORTRAN compatible

    Once again, this is a simple modification of the original version to provide for use within a FORTRAN program.

E2-201   MTIO   FORTRAN compatible

    A modification has been made to the original version of this program to give proper operation under all circumstances. The calling sequence for this version differs from that previously given and existing users would be required to modify their programs if they wish to take advantage of this version.

The Computer Centre wishes to thank Mr W. Leveritt of Ian Oliver and Associates for his work in modifying these three programs.

PDP-10 ASCII CODES

Sarah Barry

1.   INTRODUCTION

This article contains information about the PDP-10 codes and the various functions of the special control characters. It has been collected together in order to present a ready and convenient reference for the benefit of users.

2.   TELETYPE OPERATION

A Teletype is actually two independent devices, keyboard and printer, which can be operated simultaneously. The keyboard

resembles that of a standard typewriter. Codes for printable characters on the upper parts of the key tops are transmitted by using the shift key; most control codes require use of the control key.

The Teletype service routine is a full-duplex software routine, i.e. the two functions of 'typein' and 'typeout' are handled independently. The monitor examines each character it receives as input from a Teletype. According to the particular nature of the character and any switches that may or may not be set the exact response will differ. However, in most cases the monitor will echo something back to the printer, either the character input, or several characters. For example, 'A' would be echoed back simply as an 'A' but <cr> would be echoed back with a line feed appended, thus <cr><lf>. The monitor will examine the character input to see if special action is required. For example, ↑O is used simply to complement an existing switch; it is not used as data for a program and is not stored in the buffer. However, a printable character such as D has no significance as a control or special character and it would be stored in the Teletype input buffer for later use by a program.

The Teletype remains in a Teletype-wait state unitl either of two things happens:

(a)   a break character is received (the most common case) or

(b)   the input buffer (72 characters long) is full all but 10 characters.

When one of these events occurs the job can then proceed to process the data.

Note that ↑Z is not the end of file character on the Teletype. It echoes back as ↑Z<cr><lf> and is a break character. It only becomes the end of file character because the software interprets it as such.

There are two different methods of tabbing on Teletype; by hardware or software. Most hardware features are advanced features and require bigger and more complicated machines for them to be incorporated. The model KSR 35 has a hardware tab feature while the model KSR 33 does not. Thus if ↑P switch is turned off for a KSR 33, the software will assume that the hardware tabs will be used; since there are no hardware tabs on a KSR 33 this would mean that ↑I etc would never be echoed. The software simulation of tab as a number of spaces is necessary for Teletypes like the KSR 33 that does not have these hardware features. In a similar fashion there is also software simulation for vertical tab and form feed.

The software simulation sends the required number of spaces or line feeds to the Teletype. Horizontal tab is simulated by enough blanks to space to the next tab stop, vertical tab by four line feeds, and form feed by eight line feeds. Hardware tabs etc sent to the Teletype consist of the particular ASCII character concerned plus a number of fill characters (these are ERASE — ASCII 177) which are necessary in order to allow time for the action to take place. Horizontal tab has two fill characters, vertical tab five, and form feed nine. These numbers of fill characters are at present fixed but are likely to be variable in the future.

Some form of terminal equipment allows for the full character set to be used. However, with the Teletype KSR 33 and 35 models, no lower case alphabetics are possible. The lower case keys are locked for transmission. However, with a KSR 37 Teletype lower case characters are permissible. They will be translated to upper case characters, and echoed as such, only if the ↑F switch is off.

3.   BATCH OPERATION

Batch is the program that controls the running of jobs processed through the card reader. On the system it is regarded as a single job operating under its own number. Each individual job is recognized and controlled by the Batch program and Batch alone recognizes when a new job starts. As far as the operating system is concerned each new job becomes a subjob or task of the main Batch job.

Most characters received by Batch are transmitted directly without alteration or further conversion. The two most important characters are 'SOH' and 'FS'. SOH is the first character of the Job Identification Card. When SOH is at the start of a record it is taken by Batch to indicate the start of a new job. FS is the file separator character on a File Separator Card. When FS is at the start of a record it is converted to the end of file character.

A command is only required when Batch is in monitor mode and is expecting a command. All Batch commands must be preceded by a period. When Batch is in monitor mode it attempts to find the next reasonable command. The next card is read; if it is a file separator it is skipped; if there is a period in column 1 then a command is assumed and submitted. If a semicolon is found in column 1 then the contents of the card are assumed to be comments and are listed only.

No control characters are sent to Batch except those necessary for paper spacing for the output device. Batch and the operating system use a special set of characters for communication purposes only.

4.   PDP-10 ASCII CODES

The following table outlines the full PDP-10 ASCII character set. In addition, the significance of a number of special control characters, and other relevant information is included.

Switches such as ↑B, ↑F, ↑P are likely to change sometime in the future but their description within this article explains their function as at present. In addition while the Teletypes are described as Model 33, 35 etc. some machines within the same model do not behave consistently and many of the statements in the following table must not be taken as gospel.

Code*	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
000	12-0-9-8-1	NUL	Null, tape feed	Ctrl-Shft-P	Ignored on input, suppressed on output.
001	12-9-1	SOH	Start of heading	Ctrl-A	Echoes as ↑A; passed to the program.
002	12-9-2	STX	Start of text	Ctrl-B	Turns echoing on and off by complementing the current setting. Normal setting is on.
003	12-9-3	ETX	End of text	Ctrl-C	The user's console is switched to monitor mode the next time input is requested by the program. Two successive ↑Cs cause the console to be immediately switched to monitor mode.
004	9-7	EOT	End of transmission	Ctrl-D	Passed to program. Not echoed.
005	0-9-8-5	ENQ	Enquiry	Ctrl-E	No special action.
006	0-9-8-6	ACK	Acknowledge	Ctrl-F	Turns translation of lower case letters to upper case on or off by complementing the current switch setting. Normal setting is off for translation. Used when lower case input is desired to programs. Not sent to program.
007	0-9-8-7	BEL	Bell	Ctrl-G	Bell, passed to program; a break character.
010	11-9-6	BS	Backspace	Ctrl-H	Backspace; acts as a rubout, unless either DDT mode or full character set mode is true, or the ↑F switch is on. In these cases, passed to program.
011	12-9-5	HT	Horizontal tab	Ctrl-I	Horizontal tab, passed to program. Echoed as spaces if ↑P switch is on. These spaces are not sent to the program.

* Code:
This is the internal representation of the character as a 7-bit octal value.

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
012	0-9-5	LF	Line feed	Ctrl-J	Line feed, a break character. No other special action.
013	12-9-8-3	VT	Vertical tab	Ctrl-K	Vertical tab, passed to program, echoes as four line feeds if ↑P switch is on. It is a break character. These line feeds are not passed to the program.
014	12-9-8-4	FF	Form feed	Ctrl-L	Form feed, passed to program. A break character. Echoes as eight line feeds if the ↑P switch is on. These line feeds are not passed to the program.
015	12-9-8-5	CR	Carriage return	Ctrl-M	Carriage return. If in paper-tape input mode, carriage return simply passed to the program; otherwise a line feed echo supplied and passed to the program as <cr><lf>. A break character due to the line feed.
016	12-9-8-6	SO	Shift out	Ctrl-N	No special action.
017	12-9-8-7	SI	Shift in	Ctrl-O	Complements output suppression bit allowing user to turn output on and off. Not passed to program. Echoed as ↑O followed by carriage return – line feed.
020	12-11-9-8-1	DLE	Data line escape	Ctrl-P	Not passed to program. When switch is off, <tab>, <vt>, <ff> are echoed normally, (by hardware). When switch is on, <tab> is converted to spaces, and <vt> and <ff> to line feeds to simulate the action indicated. The ↑P switch should be on for the KSR 33s.

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
021	11-9-1	DC1	Device control 1	Ctrl-Q	Starts the paper tape reader on an ASR terminal.
022	11-9-2	DC2	Device control 2	Ctrl-R	Starts the paper tape punch on an ASR.
023	11-9-3	DC3	Device control 3	Ctrl-S	Stops the paper tape reader.
024	9-8-4	DC4	Device control 4	Ctrl-T	Stops the paper tape punch.
025	9-8-5	NAK	Negative acknow-ledge	Ctrl-U	Deletes input line back to the last break character. Echoed as ↑U followed by carriage return – line feed.
026	9-2	SYN	Synchronous idle	Ctrl-V	No special action. In Batch it is converted to four tab characters to facilitate centring of heading messages.
027	0-9-6	ETB	End of transmission block	Ctrl-W	No special action.
030	11-9-8	CAN	Cancel	Ctrl-X	No special action.
031	11-9-8-1	EM	End of medium	Ctrl-Y	No special action.
032	9-8-7	SUB	Substitute	Ctrl-Z	A break character. Echoes as ↑Z followed by carriage return – line feed. By convention it is used as the end of file character for remote terminals.
033	0-9-7	ESC	Escape	Ctrl-Shft-K	Escape, it is translated to 175 (altmode) before being passed to the program.
034	11-9-8-4	FS	File separator	Ctrl-Shft-L	No special action. (Note that this does have special significance to Batch, where in the input stream it is replaced by ↑Z).
035	11-9-8-5	GS	Group separator	Ctrl-Shft-M	No special action.
036	11-9-8-6	RS	Record separator	Ctrl-Shft-N	No special action.

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
037	11-9-8-7	US	Unit separator	Ctrl-Shft-O	No special action.
040		SP	Space	space bar	Characters 040-137 are printing characters and have no special control significance.
041	12-8-7	!		! (Shft-1)	
042	8-7	"		" (Shft-2)	
043	8-3	#		# (Shft-3)	
044	11-8-3	$		$ (Shft-4)	
045	0-8-4	%		% (Shft-5)	
046	12	&		& (Shft-6)	
047	8-5	'	Accent acute	' (Shft-7)	
050	12-8-5	(		((Shft-8)	
051	11-8-5	)		) (Shft-9)	
052	11-8-4	*		* (Shft-:)	
053	12-8-6	+		+ (Shft-;)	
054	0-8-3	,		,	
055	11	-		-	
056	12-8-3	.		.	
057	0-1	/		/	
060	0	0		0	
061	1	1		1	
062	2	2		2	
063	3	3		3	

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
064	4	4		4	
065	5	5		5	
066	6	6		6	
067	7	7		7	
070	8	8		8	
071	9	9		9	
072	8-2	:		:	
073	11-8-6	;		;	
074	12-8-4	<		< (Shft-,)	
075	8-6	=		= (Shft--)	
076	0-8-6	>		> (Shft-.)	
077	0-8-7	?		? (Shft-/)	
100	8-4	@		@ (Shft-P)	
101	12-1	A		A	
102	12-2	B		B	
103	12-3	C		C	
104	12-4	D		D	
105	12-5	E		E	
106	12-6	F		F	
107	12-7	G		G	
110	12-8	H		H	
111	12-9	I		I	

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
112	11-1	J		J	
113	11-2	K		K	
114	11-3	L		L	
115	11-4	M		M	
116	11-5	N		N	
117	11-6	O		O	
120	11-7	P		P	
121	11-8	Q		Q	
122	11-9	R		R	
123	0-2	S		S	
124	0-3	T		T	
125	0-4	U		U	
126	0-5	V		V	
127	0-6	W		W	
130	0-7	X		X	
131	0-8	Y		Y	
132	0-9	Z		Z	
133	12-8-2	[		Shft-K	
134	0-8-2	\		Shft-L	
135	11-8-2	]		Shft-M	
136	11-8-7	↑		↑ (Shft-N)	
137	0-8-5	←		← (Shft-O)	

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
140	8-1	`	Accent grave		Characters 140-174 are lower case ASCII, translated to upper case unless ↑F switch is set. Echoes as upper case if translated to upper case.
141	12-0-1	a			
142	12-0-2	b			
143	12-0-3	c			
144	12-0-4	d			
145	12-0-5	e			
146	12-0-6	f			
147	12-0-7	g			
150	12-0-8	h			
151	12-0-9	i			
152	12-11-1	j			
153	12-11-2	k			
154	12-11-3	l			
155	12-11-4	m			
156	12-11-5	n			
157	12-11-6	o			
160	12-11-7	p			
161	12-11-8	q			
162	12-11-9	r			

Code	Card Punching (029 Code)	Std ASCII Char.	Standard ASCII Meaning	Teletype Punching KSR 33	Teletype Meaning
163	11-0-2	s			
164	11-0-3	t			
165	11-0-4	u			
166	11-0-5	v			
167	11-0-6	w			
170	11-0-7	x			
171	11-0-8	y			
172	11-0-9	z			
173	12-0	{			
174	12-11	|			
175	11-0	}			
176	11-0-1	~			
177	12-9-7	DEL	Delete, rubout	RUBOUT	Rubout character (a) completely ignored if in paper tape mode (b) break character, passed to program if either DDT mode or full character set mode is true (c) otherwise (ordinary case) causes a character to be deleted for each rubout typed. All the characters deleted are echoed between a single pair of backslashes. If no characters remain to be deleted, echoes as a carriage return - line feed.

5. 026 FORTRAN CHARACTERS

Users should note that some of the FORTRAN characters have an 026 card code punching that is different to the 029 card code. These characters are as follows:

Internal Code	Card Punching 029	Card Punching 026	Character
047	8-5	8-4	'
050	12-8-5	0-8-4	(
051	11-8-5	12-8-4	)
053	12-8-6	12	+
075	8-6	8-3	=

6. USASCII CODE AND IBM-029 CODE

Note also that the IBM model 029 keypunch has a 64 character set that does not agree completely with USASCII. The characters that are different are as follows:

USASCII	Card code	IBM 029
!	12-8-7	|
[	12-8-2	¢
\	0-8-2	no graphic assigned
]	11-8-2	!
↑	11-8-7	⌐
←	0-8-5	−

The IBM 029 key punches installed in the Computer Centre have their keytops engraved to reflect these differences.

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