Title:

SERIAL PRINTER DRIVER

Description

Abstract:

      Description of the RC3600 MUS driver for the RC3637,
      RC3638, RC3639 and RC3640 serial printers.

CONTENTS

1. GENERAL. 1.

This driver can be used as a standard driver for the serial prin-
ters RC3637, RC3638, RC3639 and RC3640.

These printers are slightly different in their standard character
sets, in the handling of special control characters and in the
VFU-tape formats. These differences are described in the appen-
dixes.

If too many characters are printed on a line the RC3640 will au-
tomatically insert a line feed when the right margin is reached
before the rest of the line is printed. The other types of serial
printers will insert a carriage return, i.e. the rest of the line
is over-printed at the beginning of the same line.

The driver accepts control and output messages. Input messages
are treated as control messages.

It can be used in two modes, unformatted and formatted print. In
unformatted mode a few special characters control the VFU (Ver-
tical Format Unit) in contrary to formatted mode where more detai-
led control of paper spacing can be obtained.

1.1 Programming. 1.1

If file descriptors are used in the communication with the driver
the kind must be blocked if mode 7 is used.

This ensure that the whole line is output again after repetition
of a message. In mode = 3 the kind must be characteroriented, as
only non-processed characters are output after repetition.

2.   CONTROL.   2.

Reservation, conversion, position and disconnect messages are
accepted.

2.1   Reservation.   2.1

If bit 13 is set in mess0 and mess1<>0 the sender of the message
is inserted as reserver of the device. If mess1 = 0 the driver
is released enabling other processes to reserve the driver. If
a break occurs, except for a break caused by a power failure,
the driver will be released too.

In MUSIL the reservation/release is done with the procedure calls
OPEN/CLOSE(TRUE), TRUE<>0.

2.2   Conversion.   2.2

If bit 12 is set in mess0 the mess2 is taken as the byte address
of the conversion table.

If the table address is zero and the process descripter word stan-
dard-table is non-zero, this address is taken as the conversion
table address. This standard table can be set by the DOMUS utility
program STACO.

In MUSIL an OPEN will transfer the conversion table address.

If a conversion table is specified the characters to be output are

conv-char:= byte(conv-table + char).

The character value 26 (after conversion) is skipped and 255 is
printed as a space.

2.3   Position.   2.3

The position command (1B10 set) has only effect if output mode is
7. Then mess2 of the control message defines the new margin, i.e.
the number of spaces to be output in front of each printline.

The MUSIL call SETPOSITION (FILE, MARGIN, NOTUSED) will generate
the message.

2.4   Disconnect.   2.4

A control message with the disconnect bit (bit 9) set will reset
the margin to zero.

In MUSIL the message is generated by CLOSE(TRUE), TRUE<>0.

3.   OUTPUT.   3.

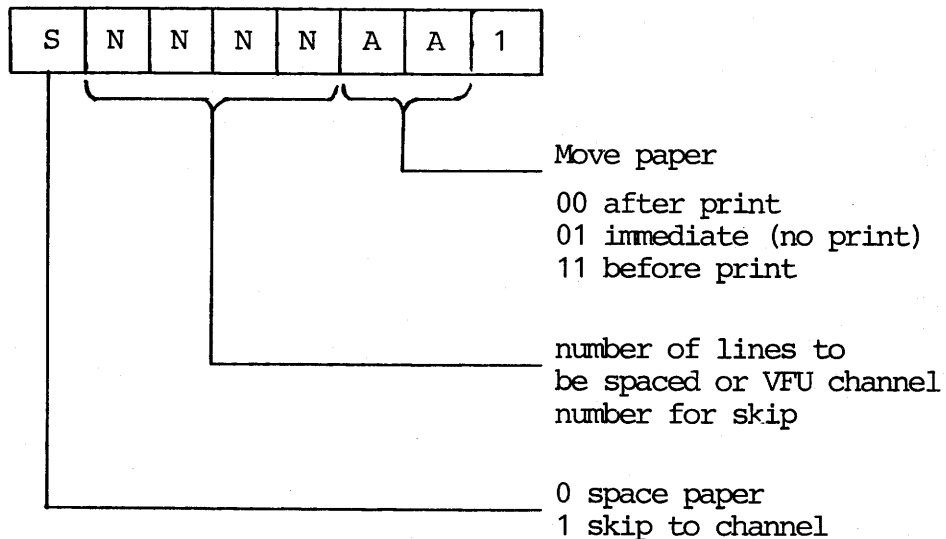Two modes exist:

3:    Unformatted printing.
      The converted characters are output to the line printer.
      The character 26 is skipped and 255 is printed as a space.
      The character-set and the action on special control characters
      for each printer type is described in appendix A.

7:    The first byte of an output message is interpreted as a car-
      riage control word. No conversion is performed on this byte.

      The standard RC3600 interpretation is used:


```
+---+---+---+---+---+---+---+---+
| S | N | N | N | N | A | A | 1 |
+---+---+---+---+---+---+---+---+
```

Move paper

00 after print
01 immediate (no print)
11 before print

number of lines to
be spaced or VFU channel
number for skip

0 space paper
1 skip to channel

      Use of special control characters are not recommended.

If the carriage control word indicates a skip to channel 1, a form
feed will be executed. If a skip to channel 2 to 12 is indicated
a vertical tabulation will be executed, i.e. the paper will be
moved to the next hole in channel 5 of the VFU-tape.

The VFU-tape for the different printer types are described in
appendix B.

4.   STATUS.   4.

1b0:   Disconnected. The printer is not connected to the CPU.
A powerfail has occured and data can be lost.

1b1:   Offline. The printer has gone offline due to errors or has
been set offline by the operator. The message must be re-
peated.

1b6:   The driver is reserved or an illegal carriage control word
is found (program error).

1b9:   Printer not ready. The message must be repeated.

1b10:   Parity error. A CCW contains a zero bit in the least sig-
nificant position (program error).

1b11:   End of paper, less than 1.5 forms left. The status can be
ignored until returned with either 1b1 or 1b9 in which
case the last line on the last form has been printed, and
the message must be repeated.

The status is hard, i.e. following transput messages are
rejected with the not processed status, and the driver
must be cleared by a control message.

1b14:   Timeout. Either hardware error or a skip to a non existing
channel has been performed (paper run away).

APPENDIX A - CHARACTER SETS.

The standard character sets for the printers are slightly diffe-
rent, especially in the use of control characters.

The standard character set for RC3640 is an extended set of 183
printable characters, while the other types of serial printers as
a standard contain a character set of 63 printable characters.

Note: Character values not mentioned in the tables for a printer
      should never be used, as the result may be unpredictable.

A1   RC3637

Control characters:

Desig-nation	Dec. value	Description
LF	10	Line Feed. Feeds the paper one line.
VT	11	Vertical Tabulation. Feeds the paper to a stop preset by the VFU-tape.
FF	12	Form Feed. Feeds the paper to the top of the next form as preset by the VFU-tape.
CR	13	Carriage Return. The carriage returns to the left margin.
EC	14	Elongated Characters. All printable characters on the whole line (incl. space) will have the double width. Special feature, which is not a standard on RC3637.
DEL	127	This character is skipped.

Character Set - RC3637

value	32	48	64	80
column / row	0	1	2	3
0	SP *	0	@	P
1	!	1	A	Q
2	"	2	B	R
3	#	3	C	S
4	$	4	D	T
5	%	5	E	U
6	&	6	F	V
7	'	7	G	W
8	(	8	H	X
9	)	9	I	Y
10	*	:	J	Z
11	+	;	K	Æ**
12	,	<	L	Ø**
13	-	=	M	Å**
14	.	>	N	^
15	/	?	O	—

* SP=space

** [,\,] is avaialable instead of Æ, Ø, Å.

A2 RC3638 and RC3639.

Control characters:

Desig- nation	Dec. value	Description
BELL	7	Emits a sound about two seconds long.
LF	10	Line Feed. Feeds the paper one line.
VT	11	Vertical Tabulation. Feeds the paper to a stop preset by the VFU-tape.
FF	12	Form Feed. Feeds the paper to the top of the next form as preset by the VFU-tape.
CR	13	Carriage Return. The carriage returns to the left margin.
EC	14	Elongated Characters. All printable characters on the whole line (incl. space) will have the double width.
DESEL	19	Select off. Sets the printer off-line.
DEL	127	This character clears the buffer.

Character Set - RC3638, RC3639

value	32	48	64	80
column / row	0	1	2	3
0	SP *	0	@	P
1	!	1	A	Q
2	"	2	B	R
3	#	3	C	S
4	$	4	D	T
5	%	5	E	U
6	&	6	F	V
7	'	7	G	W
8	(	8	H	X
9	)	9	I	Y
10	*	:	J	Z
11	+	;	K	Æ **
12	,	<	L	Ø **
13	-	=	M	Å **
14	.	>	N	^
15	/	?	O	—

* SP=space

** [,\,] is available instead of Æ, Ø, Å.

A3 RC3640

Control Characters:

Designation	Dec. value	Description
BELL	7	Emits a sound ½ second long.
HT	9	Horizontal Tabulation. Provides horizontal tabulation to pre-programmed tab. position (HTS). If tab is cleared (HTC) a space is printed.
LF	10	Line Feed. Feeds the paper one line.
VT	11	Vertical Tabulation. Feeds the paper to a stop preset by the VFU-tape.
FF	12	Form Feed. Feeds the paper to the top of the next form as preset by the VFU-tape.
CR	13	Carriage Return. The carriage returns to the left margin.
EC	14	Elongated Characters. All printable characters (incl. space) received after this control character will have the double width. Cancelled by LF, VT, FF, CR and NORM.
HTS	19	Horizontal Tab Set. Sets a tab stop at the current carriage position. Max. 8 are allowed.
HTC	20	Horizontal Tab Clear. Clears all horizontal tab stops.
CS	28	Colour Shift. After reception of this character the printer shifts to red print. Cancelled by LF, VT, FF, CR, and NORM.
UL	29	Underline. All printable characters (incl. space) received after this control character will be printed with an underline. Cancelled by LF, VT, FF, CR, and NORM.
NORM	31	Normal. Cancels EC, CS, and UL.
DEL	127	Delete. Dummy character. Skipped by the printer.

Character Set - RC3640.

value	32	48	64	80	96	112
column / row	0	1	2	3	4	5
0	SP *	0	ü	P	ä	p
1	!	1	A	Q	a	q
2	"	2	B	R	b	r
3	#	3	C	S	c	s
4	$	4	D	T	d	t
5	%	5	E	U	e	u
6	&	6	F	V	f	v
7	'	7	G	W	g	w
8	(	8	H	X	h	x
9	)	9	I	Y	i	y
10	*	:	J	Z	j	z
11	+	;	K	Æ	k	æ
12	,	<	L	Ø	l	ø
13	-	=	M	Å	m	å
14	.	>	N	^	n	ö
15	/	?	O	—	o	DEL

* SP=space

Values 32-127

value	160	176	192	208	224	240
column / row	0	1	2	3	4	5
0		0	@		á	ô
1	¨	1	Ä	△	ª	
2	¤	2	Á	◇	â	ù
3	§	3	Ã	◆	ã	
4	£	4	Ë	↑	à	ε
5	—	5	É	←	è	ż
6	´	6	Ç	—	é	°
7	`	7	Ñ	¢	ë	α
8	≤	8	Ö	ƒ	ε	β
9	≥	9	Õ	Æ	î	μ
10	o/oo	Ψ	Ü	±	ì	Ω
11	¥	∧	‡	[	i	{
12		∫	x	\	ñ	|
13		÷	¬	]	o	}
14		H	û	¨	õ	~
15		¿	IJ	ij	ò	SP*

(center vertical label: OCR – A)

* SP=space

Values 160–255

APPENDIX B, VFU TAPES.

The printers are all equipped with Vertical Format Units (VFU).

B1 RC3637.

A 5- or 8-channel format tape is used, see fig. 1.

The VFU has two programs. Program 1 uses channels no. 1, 2 and 3 and Program II uses channels no 3, 4 and 5. The program to be used is selected manually by a switch on the paper transport.

The channels are defined as follows:

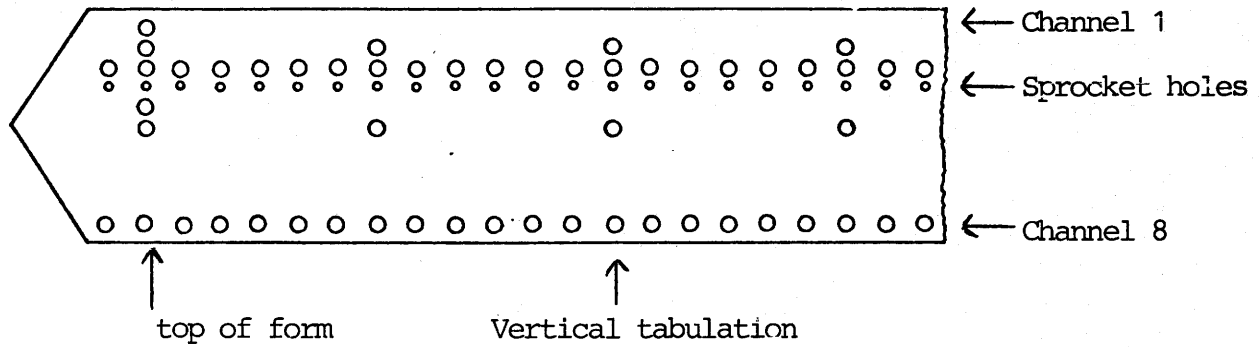| Channel no.	Usage.
1.	A hole indicates a begin of jump. This is a hardware forced jump, i.e. it implies an automatic jump to an end of jump hole. (Ch 2).
2.	A hole indicates an end of jump, either for a hardware forced jump, or for a jump started from software by a VT character.
1 and 2	A hole in both channels indicate top of form, i.e. a jump started by FF stops here.
3.	This channel is used for common line spacing. For normal line spacing the channel must always contain a hole. A "no hole" gives an extra line spacing.
4 and 5	Channel 4 corresponds to channel 1 and channel 5 corresponds to channel 2, but they are used when program II is selected.
6	Not used.
7	Not used.
8	If an 8-channel tape is used this channel must always contain a hole.

Fig. 1.

B2 RC3638 and RC3639.

An 8-channel format tape, with the sprocket holes located between channels 3 and 4, is used. (See fig. 1).

The channels are defined as follows:

Channel no.	Usage.
5	A hole indicates end of jump for a vertical tab. character.
7	A hole indicates top of form.
5 and 7	A hole in both channels indicates end of form. This implies an automatic jump to top of form. End of form and top of form must be seperated by at least one line.
1, 2, 3, 4, 6, 8,	Not used.

B3 RC3640.

An 8-channel format tape, with the sprocket holes located between channels 3 and 4, is used (See fig. 1).

The channels are defined as follows:

Channel no.	Usage.
4	A hole indicates a line feed.
5	A hole indicates vertical tabulation.
6	A hole indicates top of form.
7	A hole indicates end of form and implies an automatic jump to top of form. Top of form and end of form must be seperated. The end-of-form hole must be present if it should be possible to continue after end of paper without loss of data.
1, 2, 3, 8,	Not used.