

Dragon Data Ltd.

DRAGON 64 SUPPLEMENT

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of the publisher.

This book is sold subject to the condition that it shall not by way of trade or otherwise be lent, sold, hired out, or otherwise circulated without the publisher's prior consent in any form of binding or cover other than that in which it is published and without a similar condition being imposed on the subsequent purchaser.

DRAGON 64 SUPPLEMENT

© 1983 DRAGON Data Limited

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopying, recording, or otherwise; without the prior permission of the publisher.

This book is sold subject to the condition that it shall not by way of trade or otherwise be lent, resold, hired out, or otherwise circulated without the publisher's prior consent in any form of binding or cover other than that in which it is published and without a similar condition being imposed on the subsequent purchaser.

CONTENTS

Using the Extra Ram	3
Using the RS232 Interface	4
Using a Serial Printer	5
Using the RS232 Interface from BASIC.....	6
The Keyboard Auto-Repeat Facility	6
BASIC Differences Between the Dragon 32 and Dragon 64	7
USR Calls.....	7
MEM and VARPTR Calls	7
Dragon 64 Memory Map in 64K Mode	7
Pin-out of Dragon 64 RS232 Connector.....	8

DRAGON 64 Supplement

The Dragon 64 has been designed to ensure upward compatibility with the Dragon 32 and yet provide a machine with enhanced facilities. These extra facilities are:

1. An additional 32K of RAM.
2. An RS232 (serial) interface.
3. Auto-repeating keys.

As the Dragon 64 is virtually identical to the Dragon 32 in most other respects this supplement shall describe only those extra features.

1. Using the Extra RAM

When first switched on the Dragon 64 is configured like a Dragon 32, so that existing software, both tape and cartridge based, may be used as before. The extra 32K of RAM can be 'switched' into the machine by invoking a 'bootstrap' routine which enables the extra RAM and copies the BASIC interpreter into the top of the 64K RAM address space. This 64K mode bootstrap is invoked by typing:

EXEC

if no other EXEC's have been used, or by:

EXEC 48000

if a previous EXEC address needs to be over-ridden.

The 64K mode can be distinguished from the 32K mode by the fact that the cursor flashes blue rather than black.

The extra 32K of RAM overlays the normal BASIC and cartridge ROM addresses, which means that cartridge software cannot be used in the 64K mode. However, tape-based software, both BASIC and machine code, can make use of the extra RAM available. Because the BASIC interpreter is RAM resident in this mode, and occupies the top of RAM, 48K remains free for system and user use with the normal amount of RAM available to the BASIC programmer being 41241 bytes although this can, of course, be increased by an appropriate PCLEAR statement. If the BASIC interpreter is not required, for example, when running a machine code only program, the full 64K RAM space is available.

The memory map of the Dragon 64 in 64K mode is shown at the end of this supplement.

2. Using the RS232 Interface

An RS232 serial interface is provided with the Dragon 64 and can be used in both the 32K mode and the 64K Mode. This interface is used by the following extra BASIC commands:

DLOAD "filename", <baud rate select>

and

DLOADM "filename", <baud rate select>, <load offset>

DLOAD and DLOADM download ASCII format BASIC programs and machine code programs, respectively, from a host computer. Like their cassette equivalents, CLOAD and CLOADM, the parameters to these commands are optional.

The <baud rate select> value, as its name suggests, is used to select the inter-computer communication baud rate. The permissible values for this parameter are given below.

baud rate select value	resultant baud rate
0	110
1	300
2	600
3	1200
4	2400
5	4800
6	9600

If this parameter is omitted the last stated value is used and if no previous value has been stated then the rate defaults to 1200 baud.

The baud rate of the RS232 interface may be altered by an appropriate POKE statement in BASIC. For example:

POKE &HFF07, (PEEK(&HFF07) AND &HF0) OR B

where variable B holds a value which specifies one of the baud rates supported by the device.

B	Baud Rate
1	50
2	75
3	110
4	135
5	150
6	300
7	600
8	1200
9	1800
10	2400
11	3600
12	4800
13	7200
14	9600
15	19200

The serial data is transmitted and received as 1 start bit, 8 data bits, 2 stop bits and no parity bit, so devices connected to his interface, such as serial printers, should conform to this specification.

2.1 Using a Serial Printer

The RS232 interface can also be used as the standard printer interface instead of the normal Centronics (parallel) interface. To select the serial option the following statement can be used:

```
POKE &H3FF,1
```

and to select the parallel option (default)

```
POKE &H3FF,0
```

In addition to the printer select byte, there are two other bytes (&H3FD and &H3FE) which specify a 16 bit end-of-line delay period since some printers require this. The time delay period is in increments of 10 milliseconds. Thus:

```
POKE &H3FE,50
```

will provide a delay of half a second.

Once the serial printer option has been selected, the BASIC commands LLIST and PRINT#-2 will output characters via the RS232 interface rather than via the Centronics interface.

2.2 Using the RS232 Interface from BASIC.

It is possible to manipulate the RS232 interface directly from BASIC by PEEKing and POKEing appropriate registers in the device.

E.g. The following program allows you to transmit characters:

```
100 REM WAIT UNTIL TX DATA REGISTER IS EMPTY
110 IF (PEEK(&HFF05) AND 16) =0 THEN 110
120 REM SEND CHARACTER GOT FROM KEYBOARD
130 CH$=INKEY$:IF CH$=" " THEN 130
140 PRINT CH$;:REM ECHO CHARACTER
150 POKE &HFF04,ASC(CH$)
160 GOTO 110:REM REPEAT
```

By using a similar technique to receive characters, communication is possible between two DRAGON 64's

```
200 REM SEND DTR LOW AND ENABLE RECEIVER
210 POKE &HFF06,PEEK(&HFF06) OR 1
220 REM NOW WAIT UNTIL RX DATA REGISTER IS FULL
230 IF (PEEK(&HFF05) AND 8)=0 THEN 230
240 REM RETURN DTR HIGH AND DISABLE RECEIVER
250 POKE &HFF06,PEEK(&HFF06) AND &HFE
260 REM NOW ACCEPT THE CHARACTER
270 CH$=CHR$(PEEK(&HFF04))
280 REM AND PRINT IT
290 PRINT CH$;
300 GOTO 210:REM REPEAT
```

Typical RS232 Connection

DRAGON 1

1. GND
2. RX DATA
4. DTR
5. CTS
6. TX DATA

DRAGON 2

1. GND
6. TX DATA
5. CTS
4. DTR
2. RX-DATA

The +12V and -12V lines, on pins 3 and 7 respectively, give standard RS232 voltage levels and can be used, for example, to keep CTS low rather than connecting it to DTR.

The pin-out of the RS232 is included at the end of this supplement.

3. The Keyboard Auto-Repeat Facility

To avoid incompatibility with existing Dragon 32 software the keyboard auto-repeat facility is only provided as standard in the 64K mode. However, it is possible to incorporate this facility into the 32K mode in the following way:

```
POKE &HFF03,(PEEK(&HFF03)AND&HFE)
POKE &H10D,&HBF
POKE &H10E,&H20
POKE &HFF03,(PEEK(&HFF03)OR1)
```

The timing reference for the repeat rate is derived from the mains cycle frequency (50Hz) and a memory location in RAM (&H11F) contains the inter-repeat delay value. This location contains a default value of 5 which gives an auto-repeat of 10 characters per second. This same value is also used to control the delay before starting the repeat but, in this case, its value is multiplied by a factor of 8 giving a default delay of 0.8 seconds before auto-repeat starts.

4. BASIC Differences Between the Dragon 32 and Dragon 64

The most important differences between these two machines have already been described in the previous sections of this supplement. However, there are a few amendments to the BASIC and these are described below:

4.1 USR Calls

In the Dragon 32 all USR calls defaulted to USR0. In the Dragon 64 USR calls are treated correctly in both the 32K mode and the 64K mode.

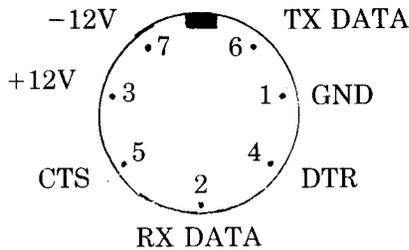
4.2 MEM and VARPTR calls

Because there is more than 32K of RAM available in the 64K mode the VARPTR and MEM functions have been altered so that they treat their 16-bit result as an unsigned number. This means that they don't return negative numbers for values in the range 32768 to 65535.

DRAGON 64 MEMORY MAP IN 64K MODE

Decimal Address	Contents	Hex Address
0-1023	System use	0-3FF
255	Direct Page RAM	0FF
1023	Extended Page RAM	3FF
1024-1535	Text Screen Memory	400-5FF
	Graphic Screen Memory	
1536-3071	Page 1	600-BFF
3072-4607	Page 2	C00-11FF
4608-6143	Page 3	1200-17FF
6144-7679	Page 4	1800-IDFF
7680-9215	Page 5	1E00-23FF
9216-10751	Page 6	2400-29FF
10752-12287	Page 7	2A00-2FFF
12288-13823	Page 8	3000-35FF
13824-49151	Program and Variable Storage	3600-BFFF
49152-65279	BASIC Interpreter	C000-FEFF
65280-65375	Input/Output	FF00-FF5F
65376-65503	SAM Control bits	FF60-FFDF
65504-65535	MPU vectors	FFE0-FFFF

PIN-OUT OF DRAGON 64 RS232 CONNECTOR



© Dragon Data Limited

Cleglen 83-4623

DRAGON 81 MEMORY MAP IN MSK MODE

Decimal Address	Contents	Hex Address
0-1023	Current user	0-3FF
256	Disc Filter Bank	0FF
1024	Page 0	3FF
1024-1535	Page 1	400-5FF
1536-2047	Page 2	600-8FF
2048-2559	Page 3	800-11FF
2560-3071	Page 4	1000-13FF
3072-3583	Page 5	1200-15FF
3584-4095	Page 6	1400-17FF
4096-4607	Page 7	1600-19FF
4608-5119	Page 8	1800-21FF
5120-5631	Page 9	2000-23FF
5632-6143	Page 10	2200-25FF
6144-6655	Page 11	2400-27FF
6656-7167	Page 12	2600-29FF
7168-7679	Page 13	2800-31FF
7680-8191	Page 14	3000-33FF
8192-8703	Page 15	3200-35FF
8704-9215	Page 16	3400-37FF
9216-9727	Page 17	3600-39FF
9728-10239	Page 18	3800-3BFF
10240-10751	Page 19	4000-43FF
10752-11263	Page 20	4200-45FF
11264-11775	Page 21	4400-47FF
11776-12287	Page 22	4600-49FF
12288-12800	Page 23	4800-4BFF
12800-13311	Page 24	4A00-4DFF
13312-13823	Page 25	4C00-4FFF
13824-14335	Page 26	4E00-51FF
14336-14847	Page 27	5000-53FF
14848-15359	Page 28	5200-55FF
15360-15871	Page 29	5400-57FF
15872-16383	Page 30	5600-59FF
16384-16895	Page 31	5800-5BFF
16896-17407	Page 32	5A00-5DFF
17408-17919	Page 33	5C00-5FFF
17920-18431	Page 34	5E00-61FF
18432-18943	Page 35	6000-63FF
18944-19455	Page 36	6200-65FF
19456-19967	Page 37	6400-67FF
19968-20479	Page 38	6600-69FF
20480-20991	Page 39	6800-6BFF
20992-21503	Page 40	6A00-6DFF
21504-22015	Page 41	6C00-6FFF
22016-22527	Page 42	6E00-71FF
22528-23039	Page 43	7000-73FF
23040-23551	Page 44	7200-75FF
23552-24063	Page 45	7400-77FF
24064-24575	Page 46	7600-79FF
24576-25087	Page 47	7800-7BFF
25088-25599	Page 48	7A00-7DFF
25600-26111	Page 49	7C00-7FFF
26112-26623	Page 50	7E00-81FF
26624-27135	Page 51	8000-83FF
27136-27647	Page 52	8200-85FF
27648-28159	Page 53	8400-87FF
28160-28671	Page 54	8600-89FF
28672-29183	Page 55	8800-8BFF
29184-29695	Page 56	8A00-8DFF
29696-30207	Page 57	8C00-8FFF
30208-30719	Page 58	8E00-91FF
30720-31231	Page 59	9000-93FF
31232-31743	Page 60	9200-95FF
31744-32255	Page 61	9400-97FF
32256-32767	Page 62	9600-99FF
32768-33279	Page 63	9800-9BFF
33280-33791	Page 64	9A00-9DFF
33792-34303	Page 65	9C00-9FFF
34304-34815	Page 66	9E00-A1FF
34816-35327	Page 67	9800-A3FF
35328-35839	Page 68	9A00-A5FF
35840-36351	Page 69	9C00-A7FF
36352-36863	Page 70	9E00-A9FF
36864-37375	Page 71	A000-ABFF
37376-37887	Page 72	A200-ADFF
37888-38399	Page 73	A400-A7FF
38400-38911	Page 74	A600-A9FF
38912-39423	Page 75	A800-ABFF
39424-39935	Page 76	AA00-ADFF
39936-40447	Page 77	AC00-AFFF
40448-40959	Page 78	AE00-B1FF
40960-41471	Page 79	B000-B3FF
41472-41983	Page 80	B200-B5FF
41984-42495	Page 81	B400-B7FF
42496-43007	Page 82	B600-B9FF
43008-43519	Page 83	B800-BBFF
43520-44031	Page 84	BA00-BDFF
44032-44543	Page 85	BC00-BFFF
44544-45055	Page 86	BE00-C1FF
45056-45567	Page 87	C000-C3FF
45568-46079	Page 88	C200-C5FF
46080-46591	Page 89	C400-C7FF
46592-47103	Page 90	C600-C9FF
47104-47615	Page 91	C800-CBFF
47616-48127	Page 92	CA00-CDFF
48128-48639	Page 93	CC00-CFFF
48640-49151	Page 94	CE00-D1FF
49152-49663	Page 95	D000-D3FF
49664-50175	Page 96	D200-D5FF
50176-50687	Page 97	D400-D7FF
50688-51199	Page 98	D600-D9FF
51200-51711	Page 99	D800-DBFF
51712-52223	Page 100	DA00-DDFF
52224-52735	Page 101	DC00-DEFF
52736-53247	Page 102	DE00-E1FF
53248-53759	Page 103	E000-E3FF
53760-54271	Page 104	E200-E5FF
54272-54783	Page 105	E400-E7FF
54784-55295	Page 106	E600-E9FF
55296-55807	Page 107	E800-EBFF
55808-56319	Page 108	EA00-EDFF
56320-56831	Page 109	EC00-EFFF
56832-57343	Page 110	EE00-F1FF
57344-57855	Page 111	F000-F3FF
57856-58367	Page 112	F200-F5FF
58368-58879	Page 113	F400-F7FF
58880-59391	Page 114	F600-F9FF
59392-59903	Page 115	F800-FBFF
59904-60415	Page 116	FA00-FDFF
60416-60927	Page 117	FC00-FFFF



Dragon Data Ltd.,
 Kenfig Industrial Estate,
 Margam,
 Port Talbot,
 West Glamorgan.
 SA13 2PE.

PIN-OUT OF DRAGON 81 RS232 CONNECTOR

