

MICROCHESS

Compiled by Kevin O'Connell

BELLE, BELLER, BELLEST

I find it hard to accept that Belle, the World Computer Chess Champion, is a micro. However, Belle's principal creator, Dr Ken Thompson of Bell Labs (and Unix fame), argued tenaciously that it might reasonably be considered to be so. This raises some important questions on which I would like to hear your views; for the purpose of a chess tournament, what is a micro? However, for the sake of argument and so that I can tell you something about the World Computer Champion in this column, let's accept Dr Thompson's argument.

Those who attended the recent conference on Advances in Computer Chess at Imperial College heard Dr Thompson talk about his chess machine. Since most of you were not present, here are some of the details which he revealed.

Belle is now in its (her?) third generation. The original Belle was a small piece of special hardware which was a good enough player to finish equal fourth in the World Computer Championship in Toronto in 1977. Finishing 1½ points behind the winner (Chess 4.6) in a four-round tournament seems to have acted as a spur to Dr Thompson.

The second incarnation of Belle followed about a year after the Toronto tournament and again took the form of special chess hardware (LSI/11, move generator, move evaluator and associated memory). This hardware, with 256k main memory and 1 Mbyte of 'associated memory' (used for storing a look-up table of about 100k chess positions) performed quite well and achieved a respectable rating of 1900 on the World Chess Federation scale.

It is, though, the third machine, which adds a PDP-11 and a 35 Mbyte Winchester (used principally for the openings book of 300k positions) to the special hardware, that has attained formidable strength and which won the World Championship in Linz last year. The rough chronology of its development during 1980 was: February - basic design; May - finalisation of design; June - construction; July - development; 20 July - the machine made its first half-move; at the beginning of August it played its first game, losing to the old Belle program; 6 August - it beat the old program convincingly; 8 August - first games played against a human opponent, winning two games of '30-30' (each player has 30 minutes' thinking time to make 30 moves) against a master strength player; late August - played its first tournament in preparation for Linz; September - program still being debugged and it played its second tournament since when the program has not changed significantly (erasing and blowing 256 PROMs is something of a deterrent to fixing even major bugs).

At the end of last September, Belle tied for first place in the World Computer Championship in Linz and then

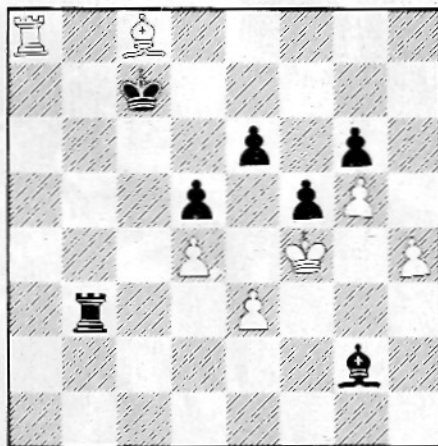
won the play-off match against 'Chaos'. Since then, Belle has had a series of considerable successes, including scoring 1½ out of 2 in 30-30 games against the internationally known US master Mike Valvo and taking second place in a human master tournament (albeit a very weak one). Belle's current rating on the world scale is 2140, but its performances in the last year have been running at about 2320 - and that is better than several of the world's 300 or so active International Masters.

That is an amazing achievement for a pure brute force program, even analysing 160,000 nodes per second. No less amazing is the following game played on 9 August last year, less than a week after the program started playing. The West German Grandmaster Helmut Pfleger (one of the 100 or so best players in the world) was given a simultaneous display against 26 opponents, apparently all humans, for German TV. It turned out, however, that one of the humans was relaying moves to and from a telephone line to Bell Labs in New Jersey.

White: Helmut Pfleger (rating 2525)
Black: Belle (rating 1900)

- | | |
|----------------|-------------|
| 1. d2-d4 | d7-d5 |
| 2. c2-c4 | c7-c6 |
| 3. c4xd5 | c6xd5 |
| 4. Nb1-c3 | Nb8-c6 |
| 5. Ng1-f3 | Ng8-f6 |
| 6. Bc1-f4 | Bc8-f5 |
| 7. e2-e3 | e7-e6 |
| 8. Bf1-b5 | Nf6-d7 |
| 9. O-O(Ke1-g1) | Bf8-e7 |
| 10. Qd1-e2 | Ra8-c8 |
| 11. Ra1-c1 | Bf5-g4 |
| 12. h2-h3 | Bg4-h5 |
| 13. g2-g4 | Bh5-g6 |
| 14. Nf3-e5 | Nd7xe5 |
| 15. Bf4xe5 | O-O(Ke8-g8) |
| 16. Be5-g3 | f7-f5 |
| 17. Bb5-d3 | Be7-d6 |
| 18. f2-f4 | Bd6-b4 |
| 19. g4-g5 | Qd8-e8 |
| 20. a2-a3 | Bg6-h5 |
| 21. Qe2-d2 | Bb4-a5 |
| 22. b2-b4 | Ba5-b6 |
| 23. Kg1-h2 | Rf8-f7 |
| 24. Nc3-b5 | Rf7-d7 |
| 25. a3-a4 | a7-a5 |
| 26. b4xa5 | Bb6xa5 |
| 27. Qd2-b2 | Ba5-b4 |
| 28. Bg3-e1 | Bb4xe1 |
| 29. Rf1xe1 | Qe8-d8 |
| 30. Qb2-a3 | Bh5-f3 |
| 31. Kh2-g3 | Bf3-h5 |
| 32. Rc1-c2 | Qd8-a5 |
| 33. Re1-c1 | Rc8-a8 |
| 34. Nb5-d6 | Qa5xa4 |
| 35. Qa3xa4 | Ra8xa4 |
| 36. Nd6xb7 | Rd7xb7 |
| 37. Rc2xc6 | Ra4-a3 |
| 38. Rc1-c3 | Ra3xc3 |
| 39. Rc6xc3 | h7-h6 |
| 40. h3-h4 | Kg8-f8 |
| 41. Bd3-a6 | Rb7-b6 |
| 42. Ba6-f1 | h6xg5 |

- | | |
|-------------|--------|
| 43. f4xg5 | g7-g6 |
| 44. Kg3-f4 | Kf8-e7 |
| 45. Kf4-e5 | Bh5-f3 |
| 46. Rc3-c7+ | Ke7-d8 |
| 47. Rc7-g7 | Bf3-h5 |
| 48. Rg7-a7 | Bh5-f3 |
| 49. Bf1-a6 | Bf3-g2 |
| 50. Ra7-a8+ | Kd8-c7 |
| 51. Ba6-c8 | Rb6-b3 |
| 52. Ke5-f4 | |



- | | |
|-------------|---------|
| 52. ... | e6-e5+ |
| 53. Kf4xe5 | Rb3xe3+ |
| 54. Ke5-f6 | f5-f4 |
| 55. Bc8-e6 | Kc7-b6 |
| 56. h4-h5 | g6xh5 |
| 57. g5-g6 | f4-f3 |
| 58. Be6xd5 | Bg2-h1 |
| 59. Ra8-a1 | f3-f2 |
| 60. Ra1-b1+ | Kb6-c7 |
| 61. Bd5xh1 | Re3-e1 |
| 62. Bh1-g2 | Re1xb1 |
| 63. g6-g7 | Rb1-g1 |
| 64. g7-g8Q | f2-f1Q+ |
| 65. Bg2xf1 | Rg1xg8 |
| 66. Bf1-h3 | Kc7-d6 |
| 67. d4-d5 | h5-h4 |
| 68. Bh3-e6 | Rg8-g3 |

White resigns.

Whether or not Belle should be counted as a micro, the micro chess machines are making great progress. One of the mini-micros that I am associated with, the Chess Champion Mk V, played a couple of games against the second-generation Belle during the computer conference, winning one and drawing one, which establishes that at about 1900, and the new Morphy machine from ACI is close behind - Danny Kopec, another speaker at the conference, assessed its rating at about 1850.

The 2nd European Microcomputer Chess Championship

Don't forget - the Second European Microcomputer Chess Championship
GOTO page 157

PROGRAMS

bers in three 8-bit bytes (12x2=8x3). Thus:

1. Store the wholly used byte of the first number.
 2. Store the wholly used byte of the second number.
 3. Assemble the two remaining 4-bit sections into one byte.
 4. Store the assembled byte.
- The process is reversed when

the stored data are later retrieved.

I am not familiar with Basic, so I cannot suggest any byte assembly/disassembly routines in that language, but the code in Figure 1 should run on a PET, or any other 6502 machine.
Derek Moody, Dorchester, Dorset

Code	Mnemonic	
AD	LDA	; To assemble two 4-bit remainders held in
YZ	YZ	; address WXYZ (any location)
WX	WX	; and address STUV into one byte,
29	AND	; and put the result into WXYZ.
0F	OF	
0A	ASL	; ie, if WXYZ contains 05
0A	ASL	; and STUV contains 0A
0A	ASL	; after running
0A	ASL	; WXYZ contains 5A
8D	STA	
YZ	YZ	
WX	WX	; This subroutine is relocatable, and
AD	LDA	; WXYZ and STUV may be anywhere in memory.
UV	UV	
ST	ST	
29	AND	
0F	OF	
18	CLC	
6D	ADC	
YZ	YZ	
WX	WX	
8D	STA	
YZ	YZ	
WX	WX	
60	RTS	; Return to calling routine.

Code	Mnemonic	
AD	LDA	; To disassemble the byte held in WXYZ and put the
YZ	YZ	; results into addresses WXYZ and STUV.
WX	WX	
AA	TAX	; ie, if WXYZ contains B6.
29	AND	; After running,
F0	F0	; WXYZ contains 0B
4A	LSR	; and STUV contains 06
4A	LSR	
4A	LSR	
4A	LSR	
8D	STA	
YZ	YZ	
WX	WX	
8A	TXA	
29	AND	
0F	OF	
8D	STA	
UV	UV	
ST	ST	
60	RTS	; Return.

MICROCHESS

Continued from page 68

will be held as part of the Fourth Personal Computer World Show at the Cunard Hotel, Hammersmith, London, 10-12 September.

The closing date for entries is 15 August 1981, although entries may be accepted after that date at the discretion of the organising committee.

SIXTY ZX81 or ZX80 PROGRAMS

60 1K program listings for only £4.95. Specify which. Includes many games, Home Finance, Utility, Maths, Chequebook and more. Also includes Hints'n'Tips.

BUSINESS OPPORTUNITY

Are you missing out on the greatest business opportunity this century? New computer career opportunities, full or part time, any area, little or no capital needed. Training avail. SAE details. Self teach prog course avail. SAE details.

SUSSEX SOFTWARE (DEPT PCW2), WALLSEND HOUSE, PEVENSEY BAY, SUSSEX.

DYNADRIIVE PERIPHERALS

Harbour Road
Troon KA10 6DU

We sell:

COMPUTER POWER SUPPLY UNITS — £69

+ 5v at 5 Amps — + 5v has logic shutdown capability and over voltage protection

- 5v at 1 Amp

+ 12v at 1 Amp

- 12v at 1 Amp

STANDARD 8 INCH FLOPPY DISCS — £2.75

£24.50 for 10

PHONE US AND LET US KNOW OF YOUR

PERIPHERAL REQUIREMENTS

Postage free on orders over £20.

Cheque with order, add V.A.T. at current rate.

SAME DAY DESPATCH

FURTHER PRODUCTS PENDING

Tel.: 0292-311800

Telex: 778978

MICROMART

LONDON COMPUTER CENTRE

Unique! Superbrain and WordStar Users! Upgrade your WordStar with the WordStar Patch plus

20 multi-coloured key tops.

By adding 20 multi-coloured dedicated function keys, you will upgrade your WordStar.

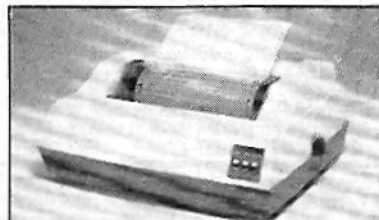
In CPM all keys as normal. Under WordStar numeric pad becomes dedicated functions. For your WordStar Patch plus 20 Multi-coloured Key Tops send £65

with order to:

**LONDON COMPUTER CENTRE
(MAIL ORDER DEPT TC1)
43 GRAFTON WAY, LONDON
W1P 5LA.**

SUPERCASE — will support your T.V. For UK 101/SUPERBOARD & others. Rigid 4 part metal case, back punched for DIN sockets, mains fuse & switch. Removable rear panel for easy mounting of own sockets etc. State computer type. PCB supported by rigid inclined plate.
£28.00 + £3 p.& p.

SUPER PRINTER — COMET 8300P by C. ITOH SAVE £160



Fast 125 cps Bi directional 80/132 Column continuously rated business printer. Uses ex-stock paper. £280 p.p. at cost.

SUPER INTERFACE — Gives SUPERBOARD/UK 101: 2-8 Bit output ports, 1-8 Bit input port 1-4 Bit input port, Tape motor relay. This will drive Centronics parallel interface with NO extra software, just plug in then one POKE and all PRINT statements can operate the printer.
£25.00 + 50p p.&p. built & tested.

SUPER VIDEO — 12" Hi. Resolution Monitor, 12 MHz. — Low distortion (2% max.) Open frame. Centre Res. — 900 lines. Corner Res. — 750 lines. Green screen/Antireflective coating £85.00 White screen P4 Phosphor £78.00

PRINTER KITS — Limited offer. 40/80 Column bi-Directional printer mechanism. Driver card with Centronics interface & case. Requires 24V & 5V power supply. Similar to above printers.
£180.00 + p.p. at cost.

Add 15% VAT to all orders. Ring or write for further details.
**Jayman Electro Devices Ltd,
15 Ash Grove, Springhead Oldham,
Lancs, OL4 4RD
Tel No. 061-652 1604**

MICROMART

VASTLY INCREASE YOUR MICRO'S CAPACITY WITH

CP/M FORTRAN-80 OVERLAYS

VERA is a simple root + segment overlay system. Supplied as 250 line 8080 assembler listing plus manual. £63 inc. vat from:

ENGINEERING COMPUTATIONS	3 Clissold Court, Green Lanes, London N4 2EZ	Enquiries 800 3362
--------------------------	--	--------------------

NASCOM SOFTWARE

We offer the following quality software for NASCOM systems:

NASPAS - a 12K PASCAL compiler which produces Z80 code directly i.e. no P-code. The compiler offers floating point and integer arithmetic, arrays, sets, strings and all major Pascal statements together with fully recursive functions and procedures with value and variable parameters. The object programs run very quickly. Price: £35.00

NASMON - A new monitor for NASCOMs. Occupies 4k and includes a sophisticated screen editor, a 'front panel' mode, blocked and buffered tape routines and powerful debugging commands. Price: £30.00 in EPROM

BAS12K - a 12K BASIC interpreter offering 11 digit precision arithmetic, PRINT USING, IF... THEN... ELSE and other advanced features. Price: £25.00

NASGEN - a fast 3K assembler generating a full symbol table and with many assembler directives and commands. Price: £15.00 on tape, £25.00 in EPROM.

NASNEM - a 2½K disassembler which interfaces to NASMON's front panel to produce single step disassembly. Optionally it produces labels and o/p may be directed to a text buffer suitable for NASGEN. Price: £10.00 on tape, £15.00 in EPROM.

All the above software runs under NASMON except NASPAS which can run under NASMON or NAS-SYS.

All prices are fully inclusive.

FREE: a free CHESS program with every order of NASMON.

Full details may be obtained from:

HISOFT 60 Hallam Moor, Liden, Swindon Wiltshire.

ZX80 Tolinka

Use your 16K ZX80 as a powerful chess recording machine.

This 7K programme features on screen:

- ♙ Double board so each player sees board from his point of view.
- ♙ Move indicator.
- ♙ Move number.
- ♙ Pieces on both boards moved simultaneously.
- ♙ Stores 20 games per C60 cassette.

Send cheque/P.O. for £3.99 to receive Tolinka (cassette and listing), plus lists of other high quality software to:

Second Foundation

M.P. Biddell, 22 Bramber, Belgrave, Tamworth, Staffs B77 2LL.

Confirmation of acceptance or rejection of entries will be made known by 25 August 1981.

The full rules were published in the June 1980 PCW.

All queries regarding the competition shall be addressed to: Second European Microcomputer Chess Championship, *Personal Computer World*, 14 Rathbone Place, London W1P 1DE.

CALCULATOR CORNER

Continued from page 130

an analysis of the flow structure shows that the reverse sequence will execute faster, providing $p(A+B+2C) > 2A+D$.

The beauty of Figure 3(b) is that if we modify the steps INV DSZ, GOTO 0 by replacing them with INV DSZ, INV NOP, MRO, INV x = 0, then the loop GOTO 0/LBL 0 will be followed once only and the reverse sequence will be faster if:

$p(A+B+2C) > A$ as $p \rightarrow 1$ this will invariably hold.

Operation	Execution time in seconds 10,000 steps	Comments
INV NOP	27.0	
+	123.2	1 + + =
X	200.3	1 x x =
Min 0	89.2	1 Min 0
MR 0	64.0	
M+0	167.2	1 M+0
GSB	10.7	Read time 10,000 steps
GOTO	11.8	Read time 10,000 steps

Fig 4. Comparison of execution and read times.

TOM'S TANDY PROBES PRANGS

Continued from page 95

would be possible for the program to be made available to insurance companies, probably on a time-sharing system, so that he can keep control over changes and updates without getting into immense administration hassles. In this way, insurance clerks would be able to check claim forms as they come in. The system could easily be modified to talk

in terms of 'wet tarmac' instead of 'a coefficient of friction of 0.5', making things far more user-friendly.

And Tom knows that exactly the same principles could be applied to any sort of disaster, including shipping and aeroplanes. The potential to make a fortune there must be vast, but Tom's overriding concern is to have just enough money coming in so that he can continue his vital research into road safety. He tells me that when you've dug a few people out of crashes, all the fortunes in the world seem rather irrelevant.

SECRETS OF SYSTEMS ANALYSIS

Continued from page 83

be careful to store paper records properly and take copies of anything which might get lost; well, now you have to do this with your data files. You've probably forgotten by now that you had to learn how to look after paper with things written on it. Kids

know that by the time they get to school. You'll remember learning about how to file bits of paper, even if you did find it a bit of a bore. Looking after computerised data is actually easier, even though you can't see what's happened to the data by looking at the disk.

Next month

Next month will be the final installment, covering the monitoring of a system in operation and listing a whole lot of books that you might like to read.

BLUDNERS

Beat you to it this month - page 104. fourth paragraph: there are many hundreds of possible states in noughts and crosses but not during the course of a single game. And the Acorn Atom Maze program published in April: lines

248, 256, 266 contain characters which look like colons (:) should be inverse backslashes. Finally, last month's UK101 Zor, line 180, contains POKE L - 44,96, but the minus sign didn't reproduce clearly on some copies.

SOFTWARE

WE WRITE PROGRAMS TO FIT YOUR REQUIREMENTS
SPECIALISTS IN PET SOFTWARE



ARMBAM LTD
KILN LANE
LEIGH
TONBRIDGE
KENT TN11 8RT

HILDENBOROUGH 832130

NEW

TRS 80 MODEL III



The Model III has arrived in the U.K.

NEW FEATURES AVAILABLE

Upper and Lower Case characters (standard) Real Time Clock • 500 or 1500 baud Cassette • Parallel Printer Interface (standard) • Auto Repeat keys • Flashing Cursor • New Characters Greek, Japanese Kana • Numeric Keypad • 16 32 or 48k • Room for two D.D. Disc Drives & Interface • 12" VDU • All in stylish cabinet

16K £649 INCLUSIVE

Rat. Expenses Delivery 6 weeks



N.I.C.



Unit 7, 61 Broad Lane, London N15 4DJ
Daytime 01-808 0377 Evenings 07-889 9736