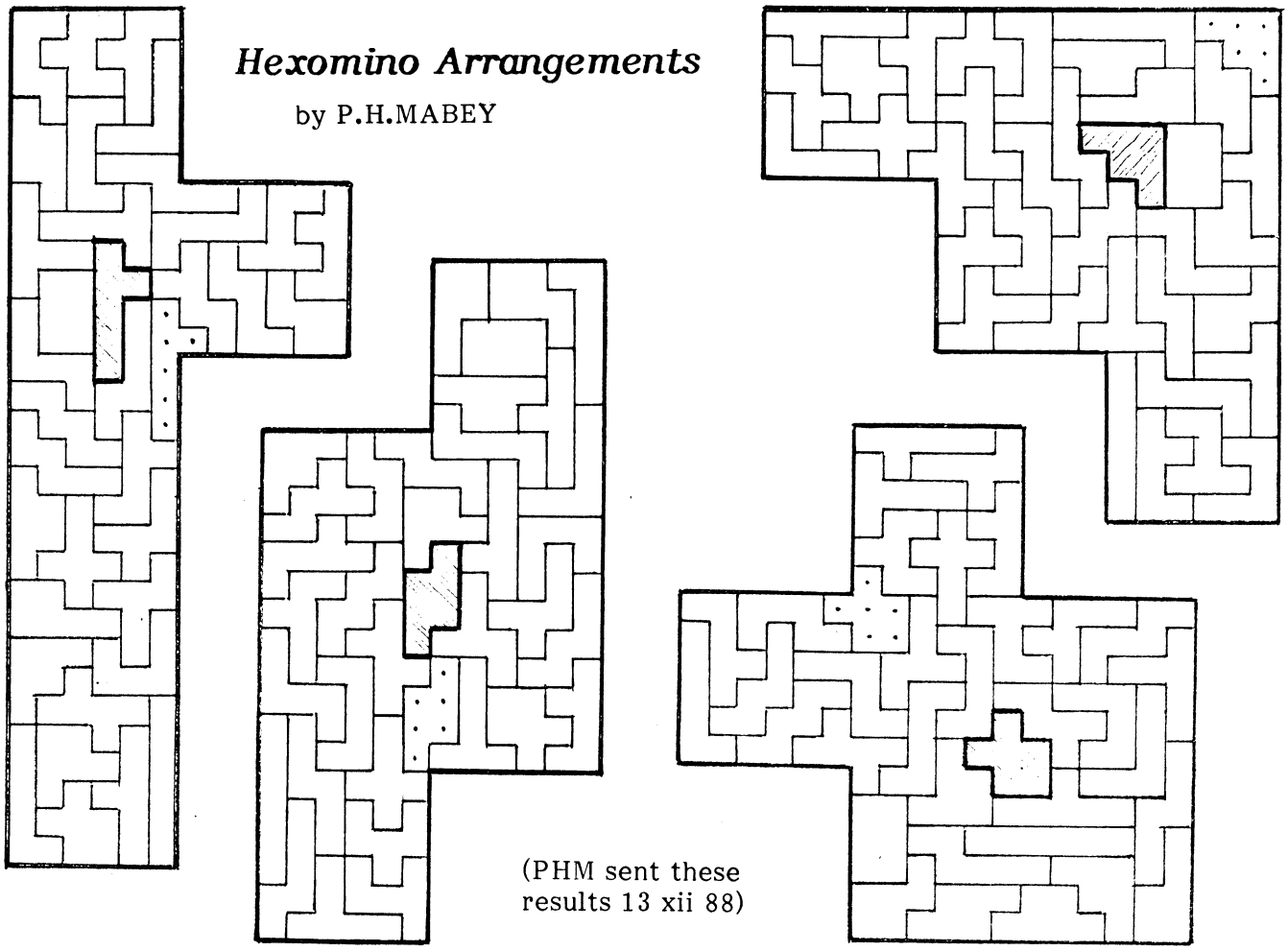
THE GAMES AND PUZZLES JOURNAL

ISSN 0267-369X
Incorporating CHESSICS
Issue 10 (March-April)
1989 © Copyright
Editor and Publisher:
G.P.JELLISS, 99 Bohemia Road
St Leonards on Sea, TN37 6RJ
Subscription £6 ($12) per year.
For airmail add £4 ($8)

Actual date of publication of this issue: 14 August 1989.

Hexomino Arrangements

by P.H.MABEY



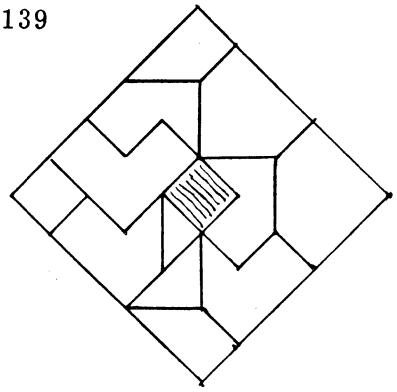
(PHM sent these results 13 xii 88)

The 35 hexominoes contain 35x6 = 210 squares in all. A sixfold replica of a hexomino contains 6x6x6 = 216 squares. Thus we can make a sixfold replica of a hexomino from the 35 pieces if we leave six squares uncovered. In these four examples by P.H.MABEY the uncovered squares form a hole of the same shape and orientation as the whole, and placed approximately (in one case exactly) centrally. Eleven cases are theoretically possible in all - in the shapes of those hexominoes of colour difference 2 (since there is an odd number of these the 35 hexominoes cannot cover any area that has a colour difference 0).

Contents

Solutions to Problems

on pages 123 and 139 of the last issue:



```
  TWO
  SIX×
 TWELVE

  345
  986
340170

  218
  965
210370

  165
  972
160380
```

ZERO	4206
SEI	827
SETTE	82112
OTTO	6116
NOVE	9652
TRENTA	102913

Puzzle Party

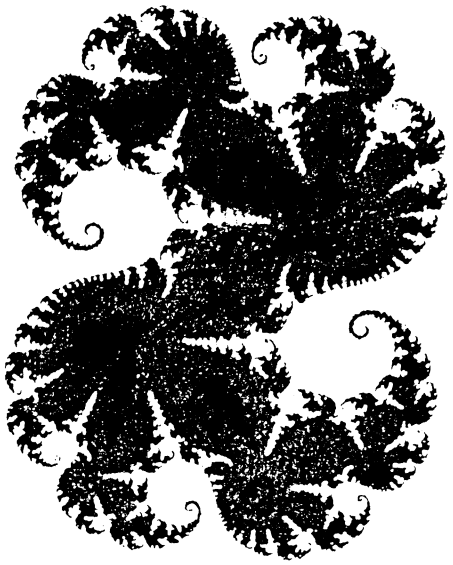
The 10th 'International Puzzle Party' will be held on 27th August 1989 at the Ramada Inn, London SW6, 10am-5pm. Entry is by invitation only. Full details from L.E.Hordern, Cane End House, Cane End, Reading RG4 9HH. Attendees are asked to supply a puzzle or souvenir for other collectors - about 30 will attend. The party is to further the exchange and trade of (mechanical) puzzles and info.

Eddington's Cricket Problem

Two correspondents have answered my query on this (p138), Tom Marlow and Chris Tylor. The question was set by Sir Arthur Eddington in Caliban's column in The New Statesman in 1938, and is quoted in Fred Hoyle's The Nature of the Universe (Blackwell, 1950, p22), which was no doubt where I saw it first. I will quote it if I can obtain copyright permission. 'Caliban' was a pseudonym of Hubert Phillips who has published a number of collections of his own puzzles, and was a crossword compiler and international bridge player as well as associated with the enigmatic 'Round Britain Quiz' on radio.

Fractals

A brief outline of 'Fractals' is given in the 25th Anniversary issue of the IMA Bulletin in the Presidential Address by Prof. R.F.Churchhouse on Mathematics and Computers. I shall attempt to reproduce one of the Figures here:



Julia set associated with the point

$0{\cdot}27334 + 0{\cdot}00742i$

Tom Marlow mentions Recreational & Educational Computing Newsletter, from Dr M.W.Ecker, 129 Carol Drive, Clarks Summit, PA18411, U.S.A. ($34). Dr Tylor mentions another US newsletter, Amygdala on the subject, and an article in the Computer Recreations column in Scientific American, 1987, pp118-122. Mr Marlow comments that fractals really need colour to do them justice. Perhaps when G&PJ moves on to colour printing ... Unlikely unless there are great technical advances in photocopying technology!

Publication Delays

Because this issue is still way behind schedule I have started to date some of the articles, some of which have been in my files over six months. Issues 11 and 12 should follow in quick succession to get back on time.

The Ring Issue 42 of this zine, edited by Andy Murby, 12 Townsend Lane, Donington-Le-Heath, Coalville, Leicestershire, LE6 2GF, contains the rules of Squadron, a highly elaborate three-dimensional version of Sopwith (brought to my notice by Alan Parr). It involves flying at three different levels (cf. G&PJ, p.72) also different types of aircraft, and bombing and rconnaissance missions, and is not just a free-for-all dogfight.

LEAPFROG By G.P.JELLISS

Notes on the game described in issue 7, page 99.

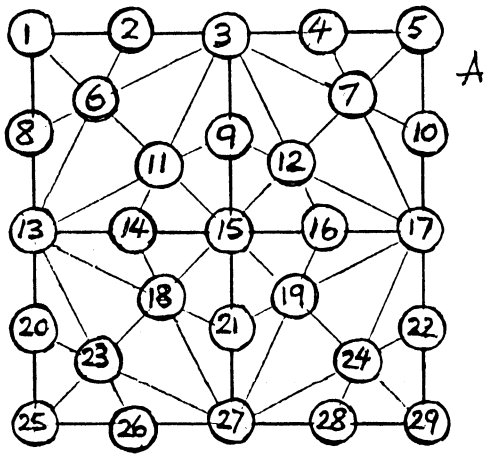
The rules of Leapfrog are designed to be as unrestrictive as possible - but in fact there are quite severe limits on what can be done in one turn because of the tagging and non-return conditions and the limited number of pieces. Beginners may prefer to start with a simpler variant in which only one piece is allowed to move in one go - i.e. there is no tagging. As with all my games, readers are welcome to try out any variants or improvements they can think of - I make no claim that I have optimised all the rules.

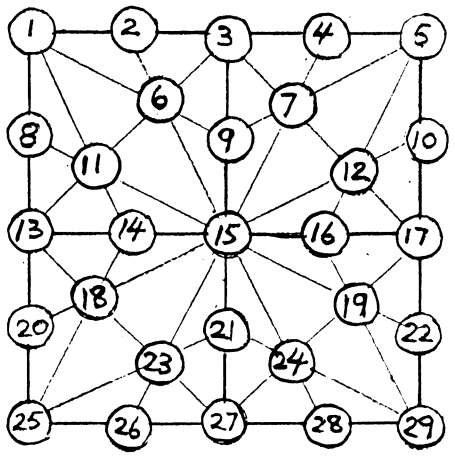
A notation for the cells of the Leapfrog board is to regard it as basically a 9x9 board, and to letter the files a-i and number the ranks 1-9 as usual, then note that 16 of the cells are split to form two cells. Instead of one cell b2 we have b2 and b2' - the dash always indicating the higher of the two cells. Using this notation, the position shown on page 99 is reached by the following series of moves: c7-e7 (tags d7), d7-c9 (tags d8), d8-e9-g9-g7-g5-g3 (displaces g3-i3) -g1-h3 (h3-g5) -g5 (g5-e5) -e6-c5-d7 (tags d6'), d6'-b4-a5-a3-c3-e3-g4 (g4-e3) -g2 (g2-g4). Or something like that - I forgot to keep a record.

LEAPFROG SOLITAIRE

By Leonard J. GORDON

In issue 7 of Games and Puzzles Journal, Sept-Oct 1988, G.P.Jelliss describes a game called "Leapfrog". Frog pawns move by leaping over others. GPJ points out that on ordinary boards this type of movement results in pieces being confined to certain cells. He remedies this by devising a special board. We can and do play solitaire on just about any game board. Pegs are confined to certain sets of holes in every solitaire I have ever tried. Let's see what solitaire is like on a "Leapfrog" board. The full size board is too big for a practical puzzle, so here is an essential element. Jump along lines only. [Diagram A below]. It took me a while to get mentally adjusted to the board. Len Gordon (12 ii 1989)





There is another way of extracting an element from the "Leapfrog" board [Diagram B inserted above]. For the left scheme I found a solution in 10. John Harris improved it by one: 17-15, 14-16, 5-17-15, 3-10, 27-16-14-27-15-3-14, 25-18, 29-19, 1-11, 13 loops perimeter then continues 13-9-17-21-13-15. (center-center). Here are a couple of solutions to the right scheme. These have not been reviewed by my cohorts, so they might be improved.

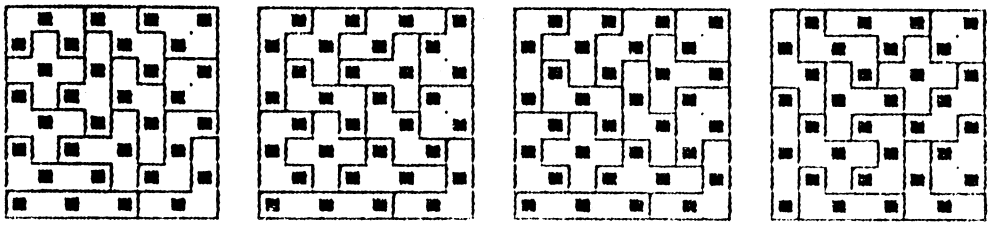
1) 17-15, 14-16, 5-17-15-10, 3-15, 18-12, 27-18, 8-15, 29-17-5-16-29-27-19-11, 1-3-5-9-1-14, 13-23, 25-27-15-13-25-21 (11 moves)
2) 17-15, 14-16, 5-17-15-10, 20-15, 27-18-12, 8-15, 29-17-5-16-29-27-19-11, 3-15, 1-3-5-9-1-14-16, 25-27-15, 16-14, 13-15 (12 moves center-center)

Len Gordon (9 iii 1989)

BROKEN CHESSBOARDS WITH UNIQUE SOLUTIONS

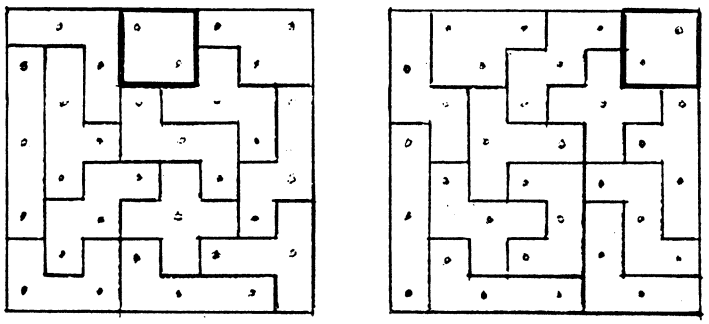
By Leonard J. GORDON

Dudeney's Broken Chessboard puzzle [mentioned in the review of Slocum's Compendium, p128 of the last issue] has four solutions. They were all found by John W. Harris some years ago, as follows. It's a fun game [LJG says!] to present the first three solutions and ask for the fourth - the one in which the X and U do not join.

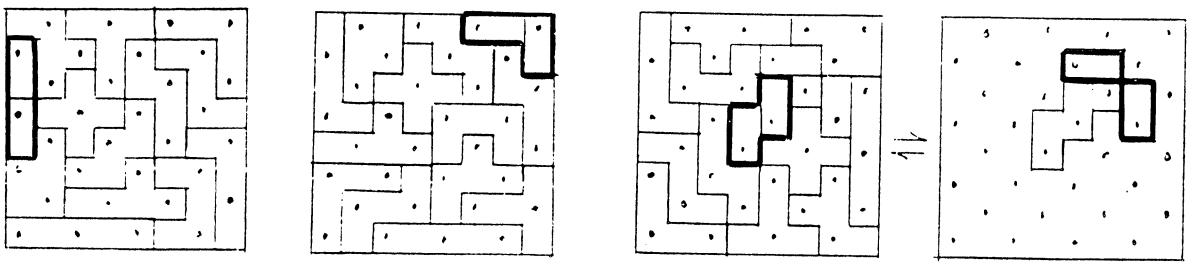


Someone recently asked me why Dudeney's puzzle had four solutions - "Couldn't he devise one with a unique solution?". The answer is obvious. Dudeney was a mathematician, not a drudge. The point of his puzzle was to show that there are 12 shapes which can be made from 5 unit squares each, and that with an added 4 unit piece (he chose a 2x2 square) they can form an 8x8 square. Add colouring and we have a chessboard. It would be fortuitous if a unique solution resulted. Checking for uniqueness by hand is most laborious.

Today, we all have computers [except the editor] and the game changes. Finding chequered colourings for the 13 pieces so that the set has a unique solution to 8x8 is right up the machines alley. Here are two Dudeney type puzzles with unique solutions. Neither allows X to be mated with U - I deliberately chose this incompatibility.



While thinking about making the 2x2 square by joining two 1x2 pieces, it occurred to me to ask what happens if we specify that the two halves must be touching along one edge. This allows making 'L', 'I' or 'S' shaped pieces. Here is one set of pieces that has unique solutions for all three of these cases - and also for the 'pseudo-tetromino' case where the 1x2s meet at a corner - as indicated by the fourth diagram.

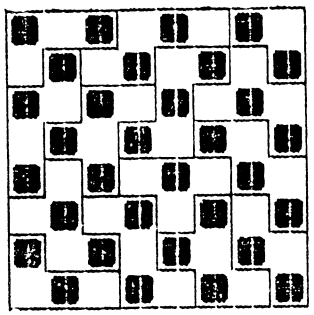


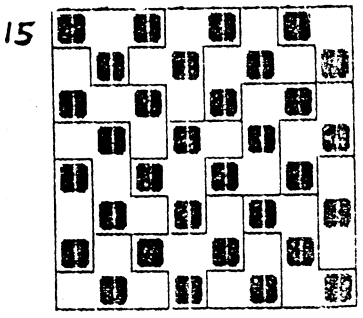
[It is interesting that the 'S' piece is internal to the pattern - it is probably too much to ask for a unique solution with the 2x2 internal. This leaves just the 'T' piece case to solve. GPJ]

Slocum's Compendium describes a 14-piece puzzle patented in 1892 (14.10 in his collection - 14.7 and 14.11 are identical to it except for colour or piece reversals). The original name was "The Checquers Puzzle - Beats the World" but it is now better known as "The Bug House Puzzle". A 1927 manufacturer claimed 78 solutions for it - this was quite a good estimate - the computer finds 84 [LJG has provided a print-out of them]. I was hoping to use this exercise to discover if people tended to find certain types of solutions while the computer found the 'counter-intuitive' ones, but there are not enough people solutions to draw any conclusions. Puzzle 14.4 in the Compendium is the same as the above, except for a conversion of two pieces to two others so as to make a symmetrical set. The 'inventor' of 14.4 probably thought he was making an improvement. I guess that the original inventor ('Professor' HOFFMANN) deliberately factored out symmetry because it made the puzzle too easy. People are funny.

[The above LG items are dated 1987].

The above described work on the "Bug House" puzzle proved useful in answering the editor's question on p128 of what is the maximum number of pieces, all different, that can form a dissected chessboard puzzle with a unique solution. After substituting the 4 different 5-cell 'F' pieces for the 2 'L' and 2 'Y' pieces in the "Bug House" puzzle, the computer found the unique 14-piece solution shown on the left below.



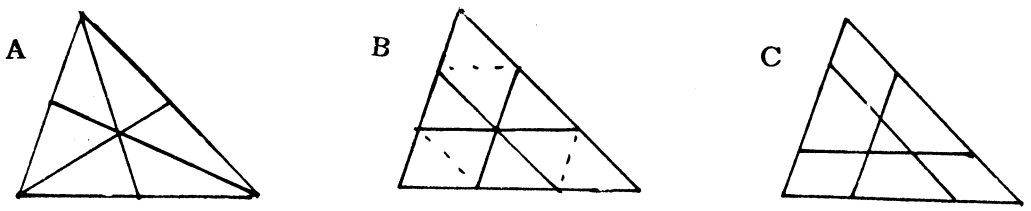


It took a bit of trial and error to find the 15-piece puzzle with unique solution shown on the right. There must be other 15-piece combinations, but even with a computer, finding them is time consuming. My program (compiled BASIC, IBM-PC) needs 10 to 20 minutes per puzzle. I doubt if there are any unique solution puzzles with 16 different pieces.

Len Gordon (May 1989)

HALF A CAKE By G.P.JELLISS

A line that passes through the centre of gravity of a shape (considered to be cut from a uniformly dense sheet of material) is called a "median". The medians through the vertices of a triangle are well known to divide it into two parts of equal area (**A**). The medians parallel to the sides however divide the triangle into parts whose areas



are in the ratio 4 to 5 (**B**). Thus three area bisectors are not necessarily concurrent. The median parallel to the base is of course at 1/3 of the height of the triangle. What is the exact position of the area bisector, parallel to a side, as a fraction of the height? (**C**).

If lines parallel to the sides of a triangle (as in **C**) cut it into six equal area parts, plus the central triangle, what is the ratio of the sides of the two triangles?

Solutions to Chess Problems - issue 8+9 (Nov 88 - Feb 89)

97. BORODATOV. (a) 1d6? 1f7 fe 2f8=Q [Rb/c4? e2 3f8=Q e1=S] Kxd4 3Qb4+ Kd3/Ke5 4Bf5/Qf4‡ 1...Kd6 2f8=Q+ Kc7 3Rb4 Kd6/fe 4Qb8/Bxf4‡ (b) 1Re3 Kc4 2e8=Q Kb5 3Qb8+ [Rb3+? Ka4] Kc4/Ka4 4Qb3/Ra3‡. But (a) has ‡3 by 1Rc4 fe 2Ke2 Kd6 3Bf4‡ and (b) has many duals.

98. BORODATOV. Retroplay: WS alternates between h2 and f1 while Black Knight retracts along the path: e1-g2-h4-g6-e7-c8-b6-a4-b2-d1-f2-h1. Then: 12Sf1-h2 (not retroopposition) Ph2-h1 =S 13d6-d7 (retrotempo) h3-h2 14Sh2-f1 h4-h3. So its Black to move: Sc2 mate.
The retraction sequence is not strictly unique - some shuttling back and forth by the Black Knight is possible unless the law on repetition has been tightened since my almost-forgotten playing days! [A.W.I., similarly S.P.] Perhaps 'last 14 moves in shortest game?' would be a better stipulation. S.P. describes the picture as an 'epicycloid' - I think the Black Knight traces out the garden path leading up to the White King's house.
The composers diagram has the title 'Kemping' the significance of which escapes me.
Retroanalysis: All the passed pawns indicate 8 captures of all missing pieces. The a and h Pawns could not have been captured on their files, so promoted

99. BORODATOV. The position is legal. 1b8=S (threat 2Qc8‡) Sxd7 2e8=S mate.
Solvers all ask, what is the point? S.P. thinks there must be a story behind it. Spoof retro.

100. WONG. 1Sf3 e5 2Sxe5 Qh4 3Sg6 Se7 4Sxh8 Sg6 5Sxg6 Be7 6Sxh4 Bf6 7Sf3 Ke7 8Sg1 Kd6. and 1Sc3 Sf6 2Sd5 Rg8 3Sxe7 Sd5 4Sxg8 Qf6 5Sxf6+ Ke7 6Sxd5+ Kd6 7Sc3 Be7 8Sb1 Bf6.
Pleasing and none the worse for being easy to solve. [S.P.] A gem, the first I have seen in twin form. [D.N.]

101. LINSS. 1Kd6 Rf6+ 2Kd5 e4‡ and 1Kd5 e4+ 2Kd6 Rf6‡ .
Reciprocal White and Black moves. Funny! [E.B.] and a miniature too [S.P.]
'First shall be last, and the last shall be first' [T.G.P.]

102. BOGDANOV & VLADIMIROV. 1Rcd5 Sg4+ 2Ke4 Rc4‡ and 1Rdd5 Se2 2Ke4 Re7‡
COOK: 1Kd6 Kf6 2Rd5 Rc6‡ [A.W.I., T.G.P., E.B.] Anticipatory self-pins [S.P.]

103. VLADIMIROV & OSHENEV. 1Sd6 Kh2 2Rc5 Se3‡ and 1Sc5 Kg1 2Rd6 Sf4‡
Symmetric play.

104. BAKCSI. 1Sb1 cb=S 2Sg3 Sa3 3OOO‡ and 1Kf1 cd 2Kg2 Ke2 3Sf4‡
Only S.P. found both parts. Two solvers found (a) but not (b), and two (b) but not (a)!

105. MIHALEK. (a) 1d2 f3(f4?) 2d1=B f4 3Bh5 Sf7 4Kg4 Sh6‡ (b) 1c2 f3 2c1=B Kf2 3Bg5 g4+ 4Kf4 Sg6‡ (c) 1d2+ Ke2(Kf1?) 2d1=B+ Kf1 3Bg4 Sf7 4Kf3 Sg5‡
Excellent triple theme-echo. [D.N.] (b)-(c) echo needs too many changes. [S.P.]

106. JELLISS. 1Ke3 Se3(Ka7) 2Kb7 Sf4 3Qh7(Kd3) Ke4 4Qe4(Ka8)‡ Dual 1Kf4 Sf4(Ka7) 2Se3 etc.
Cooks: 1Qd7/h3 Se3/f4 2Qh7(Kd3)+ Ke4(Ka8) 3Kb7 Sf4/e3 Qe4(Ka8)‡ [S.P.]
Change of axis of symmetry. Correction: move Qc2 WKd3, solution as intended.

107. MOCHALKIN. Add Black Pawn b2, then: 1Sd4 (threat Bf6‡) Ve6/Rb6/Kxd4 2Sc6/Rxf5/Bf6‡. (without Pb2 Black has 1...Rxb1, and No Solution). Try: 1Sf4? (threat Rxf5‡) Pao e6/Rb7/Kxf4 2Sg6/Bf6/Rxf5‡ but 1...Pao f6! (also 1Bxf5? d4!). Set: 1...Pao e6/Ve6/Ke6 2Bf6/Rxf5/Re7‡.
Better correction is Bb1-c2 [Corrections suggested by editor. Flaw found by A.W.I., T.G.P.]

108. MOCHALKIN. 1Qe6 c5/c3 2Bxb6/Sb3‡ Tries: 1Bxb6?/Sb3? c3/c5. 'Double Salazar' [A.M.]
Dual 1Qe6 c5 2Qxb6‡. Cooks: 1Ra3 2Sb3‡ or 1Sb3 2Ra3‡ [T.G.P.]

109. STEUDEL. (a) Captureless. 1d1=R Bh4 2Rd6 c8=Q‡ (b) Checkless. 1de=Q c8=R 2Qe8 Rc7‡

110. PRIBYLINEC. Upper: 1Ga6 Bc7+ 2Ka7+ Bb8‡ Lower: 1Rh1 Bxh4+ Kh2+ Be1‡
Cook: (b) 1Kh1 Rxh4 2g1=G Rxh3‡ [S.P., E.B.]

111. BARTEL. Set: 1...c8=NL 2NLh7+ g8=NL‡ Play: 1NLd7 g8=NL 2NLh7 c8=NL‡
A very interesting reversal of promotions with 5 units, employing no twinning but set play. Very fine. [S.P.] A new kind of mate with neutrals. [D.N.]

112. MOCHALKIN. 1Rd5+ Rc5 2Kc6 Kxd5‡ and 1Kb4 Rc4+ Rc5 Kxc5‡ (In the duplex play there is 1Rc4 Rc5 2Kd5 Kxc4‡ but also 1Rc8 etc Rd5+ 2Rc5 Kxc5‡).
Many cooks: S.P. finds 12: 1Kb4 Kc3/4 2Rb5 Rb1‡. 1Kb4/6 Rb1+/a1 2Kc5 Rb5/a5‡. 1Rh6/7/8 Kc4/5 2Rb6/7/8 Rb1‡. Likewise most other solvers.
Erich Bartel offers a pseudo-duplex setting of the idea (see problem **122**) and thinks it will be very hard to find a sound one not symmetrical. Other composers concur.

113. BARTEL. 1e1=Q 2Qxe7(Bf8) 3Qd8 for Qe8= and 1e1=R 2Rc1 3Rxc7 for Qc6= and 1e1=B 2Bc3 3Bh8 for Qg7= and 1e1=S 2Sc2 3Sa1 for Qc2=

114. VALOIS. 1d5 (all down one) 2Sd3 (all down one) 3Sc4 (all down one) 4OO‡
The stipulation (which I am afraid may prove to have less shelf-life than mousse) is far from clear: Do pieces drip off the board? or does the tub have a bottom, so that pieces get 'stacked' within its files? In the first case, what happens when both Kings drop off simultaneously? [S.P.] Intention...needs a rather artificial interpretation of the rule to mean that no further sinking takes place once any piece rests on the bottom (not quite my idea of mousse behaviour!) [A.W.I.] Chessic Mousse can behave anyhow its inventor chooses!

115. POISSON. 1-25Wxa7(Pa6) 52Wa6(Pa5) 79Wa5(Pa4) 106Wa4(Pa3) 133Wa3(Pa2) 160Wa2(Pa1) 187Wa1(Pb1) 188Wa2(not check from Pb1) 189Wb2(not check from Lb7) 190Wc2 191Wc1 192Wb1(Pc1) 219Wc1(Pd1) 220Wc2 222We2 223We1 224Wd1(Pe1) 229We1(Pf1) 256Wf1(Pg1) 283Wg1(Ph1) 284Wg2 285Wh2 286Wh1(Ph2) 313Wh2(Ph3) 340Wh3(Ph4) 341Wg3 342Wg4 343Wf4 345Wf6 347Wh6 348Wh5 349Wh4(Ph5) 376Wh5(Ph6) 377Wg5 378Wg6 379Wh6(Pg6) 380Wh5 383Wf6 384Wg6(Pf6) 389Wf6(Pe6) 391We5 392We6(Pe5) for Kd4 stalemate.
S.P. shortens this to 389 moves: As above, but 385Wh6 386Wh7 387Wh8 388Wg8 389Wf8 for f7=. A.W.I. finds the same, and also comments that if a P displaced to its promotion rank promotes, there is the much shorter solution: 25Wa7(Pa6) 28Wa8 for a7= [since Wa7(Pa8=Q/R/L+)]. Glad you advised against being deterred by length. A great long-ranger, supremely fairy. [D.N.]

116. JELLISS. Make f4 an ordinary Bishop then: 1a1=B+ Kf5 2a1-h8 a2-a4 3h8=R c4=R(unpin) 4Sg5 b1=R 5Se4 b1-g1+ 6Sg3+ Kf6 and now all 12 Black moves mate. [with B/Rf4 the 13th check by f4=R+ is answered by Rxf4]. Fortunately the flaw did not prevent solvers finding the intent.

Solver's Scores

Scores for problems 97-116: (Maximum possible 35): S.Pantazis & A.W.Ingleton 34, D.Nixon 25, E.Bartel 20, T.G.Pollard 19. H.Gruber also reported a couple of cooks.
The loss of our leading solver Ron Brain, who died in May, is a grievous blow - One regrets having neglected to keep up correspondence with him on chess problem matters. Four compositions by him appeared in Chessics, pages 43, 73, 75 and 129 - as one would expect he was very sound, and given more time could have become a leading composer.

Cooks, Comments & Corrections

Chessics 9, page 11, problem 310. E.ALBERT wrote to say that part 4 of this cooks by 1Rh8 Sf4 2Rh6 Se2 3Kg6 Gd2 4Kh5 Sf4‡. The composer, T.G.POLLARD corrects by shifting the Rg8 to g1, the solution then being 1Rh1 and then as above.

41. WONG. The cook claimed on p78 is invalid since after 1Bd2 Rc7 2Be3 Black has Rxc2+, or even 1Bd2 Rc7 2Be3 Rd7 3Bf4 Rd1+. So this problem will be considered in the 1989-90 award.

81. MOCHALKIN. Composer corrects as follows: Remove a6, Move a7-d7, e6-e2, e1-e3 and Add Black Bishop a4. Play 1Rg3 Pao/Vao e4 2Qg6(set Qh7)/Qg4‡ 1...Vxf4 2Sg3‡.

83. TAUBER. Paul Valois says this is a much clearer version of an idea first shown in S1199R in The Problemist, March 1988, by SEIDER & TAUBER - also mentioned by Stefanos Pantazis.

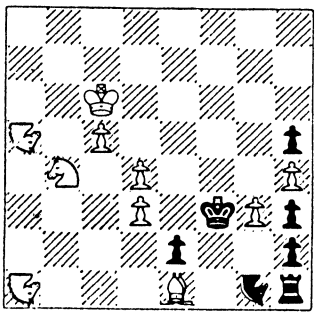
92. INGLETON. This first prize winner has now also been nominated 'Wenigsteiner' of the Year. The statement on p129 that the diagram position solves as in (b) overlooks the fact that it also has a mate with the BK on h8 (W plays Rd2, Gc1, Rd1, Rg1, Gh1) so the zero-position stipulation cannot be avoided. Erich Bartel sends for comparison the same theme with only three men: [BKd4, WRoyal Fers a2, W (0,5)+(0,6) Leaper b1, Helpstalemate in 4, by Elmar & Erich BARTEL, Schach Echo, June 1987. (b)a2-h4, (c)a2-c8, (d)a2-d8. Leading to stalemates with the BK in each of the four corners, the positions being exactly echoed - e.g. BKa1, RFb3, Lb7.]

92A. INGLETON. The composer of **92** comments: Readers may be interested ina similar setting which admits two well-behaved solutions with mates in different corners [using the same forces]: B:Ke4,Gb3; W:Rg3,Gf5. Helpmate in 5 (2 ways).

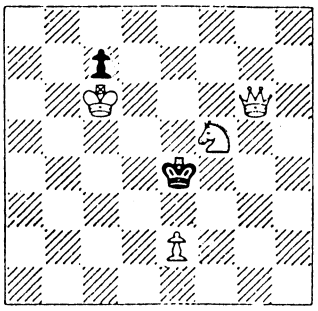
102. BOGDANOV & VLADIMIROV (see opposite). Composer correct by adding Black Pawn g7.

CAISSA'S KALEIDOSCOPE - Judge for 1989-90: Denis BLONDEL

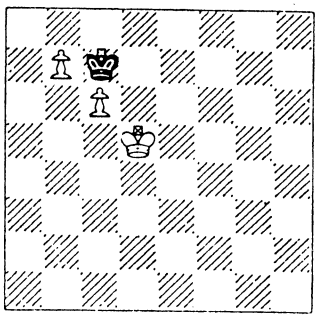
117. Hans GRUBER
Mate in 4
Nightriders



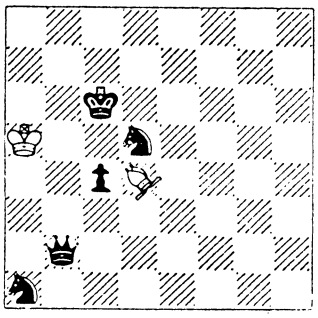
118. Kjell WIDLERT
Mate in 4
One-Way Chess



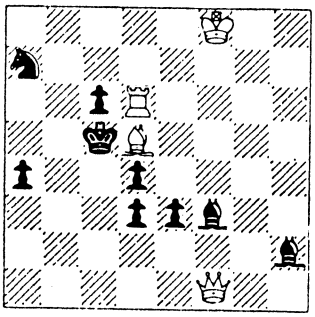
119. Th. STEUDEL
Mate in 3
Circe Chess



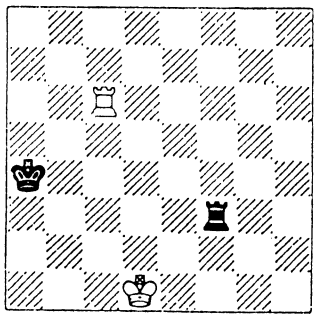
120. M. OLAUSSON
Maxi-Self‡2 (3 ways)
Mao+Bishop d4



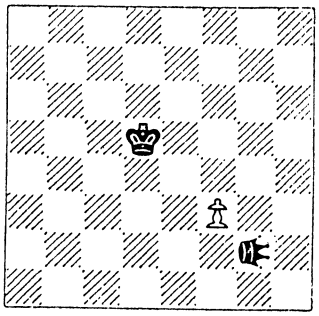
121. E.BOGDANOV & V.VLADIMIROV
Help‡2 (3 ways)



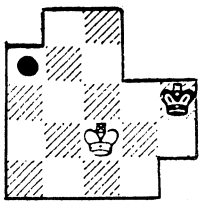
122. Erich BARTEL
Help‡2 (duplex)
Madrasi Rex Incl.



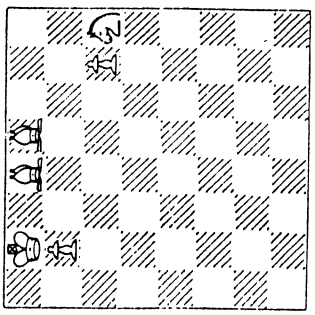
123. Hilmar EBERT
Help‡6 (b) g2-f1
Equihopper



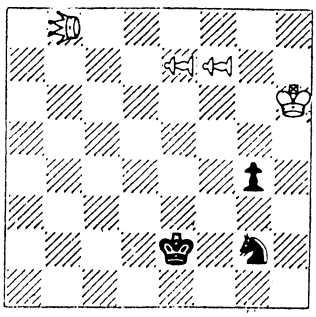
124. A.W.INGLETON
Helpmate in 7
Imitator a4



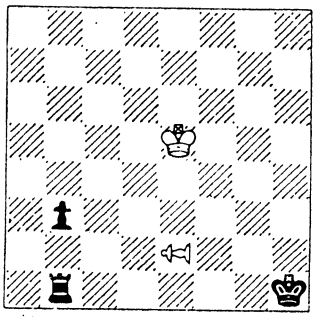
125. A.W.INGLETON
Helpmate in 5
Circe + Neutrals



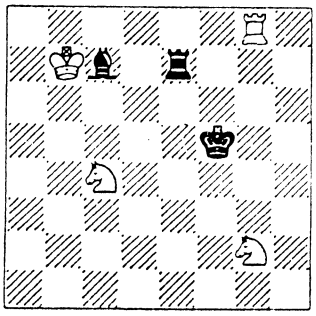
126. Erich BARTEL
H‡2 (2 ways). Circe
Malefique + Neutrals



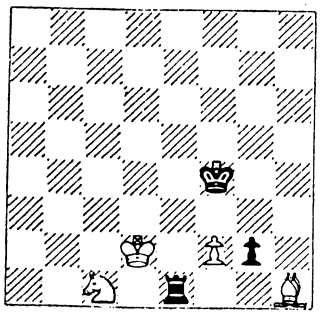
127. Kjell WIDLERT
Helpmate in 4
Neutral P e2



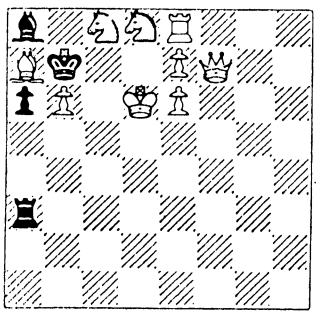
128. H. GRUBERT
Helpmate in 2
(b) c4-e8



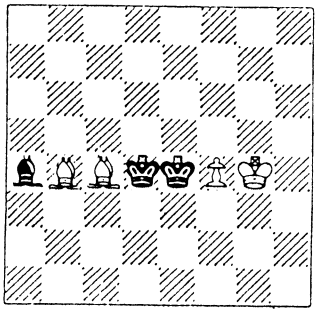
129. H. GRUBERT
Helpmate in 3
(b)f4-e5, (c)f2-e2 in (b)



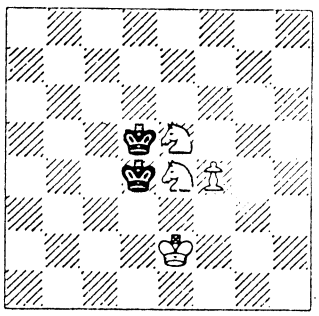
130. L.BORODATOV
‡(-1+1). (b)a3-c4
(c)a3-b8, (d)a3-e8.



131. E.HOLLADAY
H=2. (b)a4-h4
(c)f4-f5. Multirex.



132. E.HOLLADAY
H=2½ (2 ways)
Rex multiplex



Notes for Solvers

The Nightriders in **117** move along straight lines of Knight moves, in the same way that Rooks move along ranks and files, and Bishops move along diagonals. Thus Na1 guards c2, e3, g4 and Na5 guards c4, e3, g2, for example, while Ng1 is shut in by e2, f3, h3.

In One-Way Chess no piece may leave a square in the direction it entered it. In **118**, if Black's last move was Kf4-e4 then Qe6‡ (K cannot escape to f4) and if the last move was Ke5-e4 then Qg4‡, but K could have come from d4 or e3 after check by Sf5.

In Circe Chess (**119**) any captured piece reappears on its home square, if vacant. For problem purposes the home square of a Rook or Knight is taken to be the R or S square of the same colour as the capture square, and acaptured P in file x reappears at x2.

In **120** the Maximummer condition means Black is restricted to making only his longest possible legal moves (if he is in check this means the longest move that will stop the check). If there are several equally longest moves, any of them may be chosen. The condition applies only to the play - not to the hypothetical moves that stop the White King escaping from mate - the aim in a Self-mate being for White, who moves first, to compel Black to checkmate the White King. The piece at d4 is a Bishop with the added power of the Knight in Chinese Chess (which differs from the usual Knight only in its move being blockable by any piece on the Rook-wise adjacent square over which it passes - e.g. the moves d4-c6 and d4-e6 are blocked by Sd5, and d4-b5, d4-b3 by Pc4).

In a Helpmate in 2 Black moves first and helps White checkmate the Black King. All the help-moves of course have to be 'legal' - the BK does not voluntarily step into check. In a Duplex problem there are two solutions - one with Black moving first and White giving mate, and another with White moving first and Black giving mate.

The Madrasi Chess like pieces guarding each other are paralysed. Rex Inclusive means that the Madrasi rule applies also to the Kings. (See solution to **112**).

The Equihopper in **123** hops over any piece to the square, if any, the same distance beyond the hurdle as it is in front. Thus Eg2 can hop over f3 to e4. It cannot hop over d5 to a8 since the WPf3 blocks its path.

In **124** the board has got rather eaten away! The Imitator merely copies the moves of the other pieces in length and direction, it does not have any powers of its own. A move that cannot be imitated, e.g. because the Imitator is blocked by the edge of the board or by another piece, may not be made.

Neutrals (**125-127**) may be regarded as Black or White by the player whose turn it is to move. Neutrals can capture neutrals (one being regarded as White and the other as Black), and neutral Pawns promote to neutral pieces.

Circe Malefique means the captured pieces reappear on the opponent's home squares, thus the neutral Queen b8 (**126**) if captured by Black goes to d8, and if by White to d1.

In **130** the notation ‡(-1+1) means White retracts his last move and plays another move instead that gives checkmate.

Multirex and Rex Multiplex (**131** and **132**) mean the same, i.e. multiple Kings of one colour. Stalemate is required. There does not seem to be any logical problem in defining stalemate with multiple Kings, unlike the case of checkmate where at least three different interpretations are possible (see Chessics 4, 1977).

SOLUTIONS TO THIS ISSUE TO REACH ME BY 15th OCTOBER

Informal Tourney: I am most grateful to Denis BLONDEL for agreeing to act as Judge of the chess problems for 1989-90. We still need more composers to take an interest so that a full page of original problems can appear each time. Variant pieces and rules are our speciality in these pages - so not too many quasi-orthodox compositions please. Don't forget we also need two-movers with Nightriders for the special Dawson Centenary Tourney (sse p134).

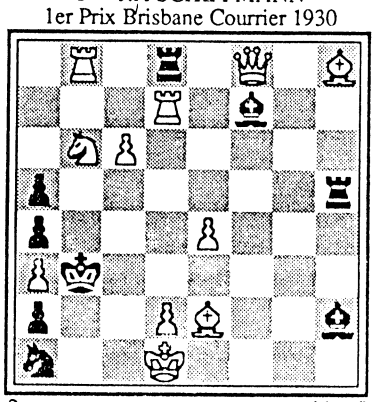
Retro-Opposition - and other retroanalytical chess problems by T.R.Dawson (edited by GPJ). This booklet, 24 pages, B5 (same size as this Journal) should be ready shortly after this issue is printed. It contains all 111 of T.R.Dawson's Retro-Opposition compositions, together with a selection of his other retros. It is based on a manuscript booklet in the BCPS Archives. Price £2.50 ($5) post free. *[Airmail - add 50p ($1)]*

REVIEWS - of Chess Problem Publications

Sprookjesschaak by Kurt Smulders (400 Belgian Francs, from the author at Dieseghemlei 122, B-2510 Mortsel, Belgium - Giro Account 000-1017816-92). This is a 142-page, A4 size, systematic 'Guide to Fairy Chess' in (I think) Dutch admixed with bits of French, German and English. It is essentially for reference rather than reading. I find the layout a bit confusing, this may be partly due to my minimal Dutch but is also inherent in the author's approach. For example, he begins with difficult subjects like special boards and boardedge related pieces (such as Actuated revolving centre, Eccentric knight, Reflecting nightrider) followed by questions of legality (Illegal clusters, Retroanalysis, Retractors) ending with Space chess - only then (pages 29 - 79) does he investigate Pieces and their powers. 144 diagrammed examples are given on pages 111 - 132, and there is a uselful 9-page index. I was pleased to find quite extensive extracts from Chessics, though the author has failed to understand the (0,0) Leaper is a Dummy and not a Zero (see Chessics 24, p86), and defines the Frog (pages 45 and 136) as Fers+Camel instead of Fers+Threeleaper - and spells my name endlessly with one s (which could be why this is a tetchy review). Any such collection must of course owe a lot to Anthony Dickins' Guide to Fairy Chess which showed the way (and is also much quoted), but this is of course more up-to-date and no Editor of a fairy chess column should be without a copy.

La Theorie des Effects by Pierre Bansac (A special issue of diagrammes, dated April-June 1989). This is a most important little book, published posthumously from papers that the author (otherwise known as General Charles Rinderknech, 1892-1978) left to the late Jean Bertin, and previously published (if I understand the French aright) only partially in L'Echiquier de Paris (1946-9) and Themes 64 (1978). How far the ideas originated with the author I am not clear, but the terminology he uses is certainly well established among chess problem analysts, and the exposition in this booklet is very clear - and there is more to follow in a later booklet I understand. 67 diagrams are analysed in detail in terms of the Theory of Effects, which is developed step by step at the same time. I have space here to give only one example of the approach.

1 - J.A SCHIFFMANN
1er Prix Brisbane Courrier 1930



2≠ 11 + 9

The simplest 'effect' of a move is that a piece gains or loses control of or access to a particular square. The solution of the Schiffmann composition shown here is: 1Rd5 (threat Bc4‡) Be5/Re5/Bd6/Rd6 2Rb5/Cc8/Rd3/Sc4‡. This is the first example given. One effect of the key move is that the Black Bishop f7 loses control of square c4, thus allowing the threatened Bc4 mate. The effect of the defence Be5 is that the White Bishop h8 loses control of b2 so that Bc4 is no longer mate. The defence Re5 has the same effect. The other defences cut off the WQ control of a3. The defence Be5 also has the harmful effect that the Black Rook h5 loses control of b5, thus allowing Rb5 mate. The other defences lose h2 control of b8, d8 control of d3, and a2 control of b8 (again) plus d8 loss of control of b8.

This example only scratches the surface of 36 well-argued pages. The first 27 pages discuss the effects of moves, from simple to complex, and this is followed by a section headed 'L'Anti-Dual' which deals with such difficult subjects as dual avoidance and black correction.

Der Flug der Schwalbe by Wolfgang Dittmann is a 149-page, generously laid out, paperback book telling the story of the German chess problem fraternity whose symbol is a Swallow - which derives from the motto 'Eine Schwalbe' given to a famous problem by Johannes Kohtz and Carl Kockelkorn, which did 'make a summer' by inaugurating a new era of German chess composition. Only six problems are quoted, the bulk of the text being biographical of the leading lights of the Society, past and present.

The WCCT 3 brochure mentioned on p136 is available from Denis Blondel for 50 francs, or from R.C.McWilliam, 'Amizome' Moor Lane, Brighstone, Isle of Wight, PO30 4DL for £5.50.

CHESS & VARIANTS

Orthodox Chess

The World Chess Championship Candidates' semifinals, between Jonathan Speelman and Jan Timman and Anatoly Karpov and Artur Yusupov, will both be held at Sadler's Wells, London, beginning on 1st October (opening ceremony) and lasting up to three weeks. If the first eight games do not decide, two extra games will be played, and if the match is still even it will be decided by a series of quick-play games. The matches are sponsored by Pilkington glass. The winners will play each other (at a venue yet to be announced) for the right to meet the World Champion, Garry Kasparov. In what other game or sport is the World Champion so insulated from the rest of the contenders by the system? I'm sure Steve Davis would be very happy to see all the contenders for the Snooker title having to play each other in a knockout to meet him - instead of having to survive a series of matches of increasing severity to retain the title!

Playability of Variants

By Dr C.M.B.TYLOR

I have been sorting out various things for David Pritchard's projected Encyclopaedia of Chess Variants. This has led me to speculate about which of my own variants (Reactions and otherwise) might make playable games. I have realised that there are a number of quite different reasons why a variant might NOT make a playable game.

1. The normal game array has Kings in check (e.g. Auto-capture chess).

2. White has a forced win from the normal game array (e.g. Oppo-skip, Oppo-coexistence).

3. It is too easy to set up an impregnable defensive position (e.g. Auto-coexistence) or to stop the opponent building up an attack (e.g. All-in chess).

4. The special feature of the variant is optional, generally disadvantageous to use and rarely enforceable (e.g. Oppo-addition).

5. The rules for determining checks are so involved that it would be too easy to get into an illegal position without noticing (e.g. Tag chess).

No doubt there are various others, and also various reasons why a variant WOULD make a playable game.

Heterochess Olympics

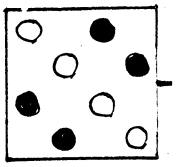
Patrick Donovan sends a couple of games from the Progressive Circe section:

White: Patrick Donovan, Black: Mario Simoncini. **1.** d3 **2.** e5 Qh4 **3.** Qd2 Nc3 e4 (not **3.** Bg5 Bxh4(d8) Bxd8?? **4.** Nf6 Ne4 Bc5 Bxf2‡) **4.** Bb4 Ke7 d5 d4 **5.** Nf3 Nxh4(d8) Nf3 Nxd4(d7) Be2 an interesting move this knight's tour. I don't know how good it is, but my opponent gave it!! in his reply [my opponents are never so helpful! - ed.] **6.** f5 Kf7 Qf6 Ne7 Rg8 Nbc6?? A weak reply. I suspect that it was worked out in a rush. **7.** Nd5 Nf4 Ng6 Bh5 Qxb4(f8) a3 Nh8‡ What really surprised me about Black's sixth was the number of different mates it allowed: e.g. **7.** N(c3)b5 Na3 Nc4 Qxb4(f8) Qb3 exf5 Nd6‡ **7.** h4 Rh3 Rg3 Rg6 Bh5 Nd5 Rxf6(d8)‡ **7.** f4 fxe5 exf6(d8) fxe7 exd8(Q) Qf4 Qxf5‡ **7.** Qh6 Bg5 Bxf6(d8) Bxg7 Ne6 Nxc7 Qf6‡. In my opponent's defence I guess it should be said that preventing an opponent who has 7 moves from mating you is no easy task. As I discovered in the following game:

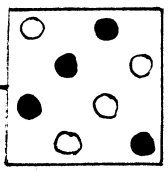
White Roberto Cassano, Black: Patrick Donovan **1.** e3 **2.** d5 Qd7 **3.** Bb5 Qf3 Ke2 (**3.** Bb5 Qf3 Ne2 is another try. The King is more difficult to mate when moved off its original square toward the centre of the board in many cases.) **4.** a6 axb5(f1) Nc6 Nf6 **5.** Qxf6(g8) Qxc6(b8) Qxb5(a7) d4 g4!! I looked at this position for many hours but couldn't find a saving line anywhere. [Just a couple of the lines I looked at: **6.** a6 axb5(d1) e5 exd4(d2) g5 Ke7 **7.** Kd3 Kxd4 Kc5 Qf3 ... Qxf7+ or: **6.** Nf6 Nxg4(g2) Nxf2 Nd1 e6 Qxb5+ **7.** Kxd1 (g8) Nc3 Nxd5(d7) e4 Bg5 h4 Nxc7‡.] Eventually I decided it was best to sacrifice the game for my sanity, and sent off a series without looking for the inevitable refutation. **6.** a6 axb5(d1) e6 Ke7 Nf6 Qd6 **7.** Nc3 Ne4 Nxf6(g8) g5 Qd3 Qxb5(a7) Qe8‡.

Chess Variants Society?

I have been trying to assess whether the current interest in variants is sufficient to support the formation of a 'Chess Variants Society' in the UK on the lines of the Italian AISE. It would organise UK Championships in the more popular variants like Progressive Chess. A volunteer for the post of Treasurer is the main lack - plus a few more potential members!

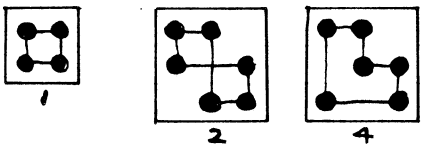


BISATINS By G.P.JELLISS

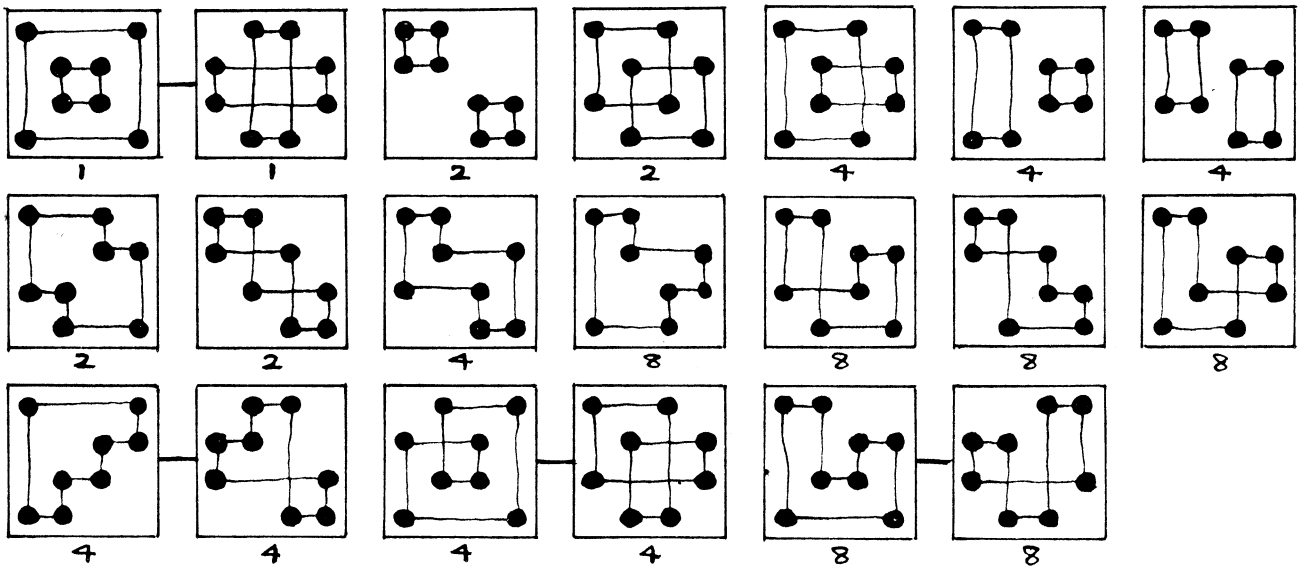


This article follows on from the one on 'Satin Squares' (pages 82-3 in issue 5+6) which dealt with binary arrays (i.e. arrays of black and white squares - or of 1s and 0s) with one black square in each rank and file. A bisatin of course has two black squares in each rank and file. Just as a satin can be regarded as a solution to the problem of placing as many chess Rooks on the board, none guarding or attacking another, so does a bisatin solve the problem of placing the maximum Paos on the board. (The Pao is the piece from Chinese Chess that moves like a Rook but captures by hopping over one man of any colour to any square beyond in the same rank or file. The name means Cannon.)

If you start at any mark (i.e. black square or '1') in a bisatin, then move to the other mark in the same rank, then to the other mark in the same file as the second, then to the other mark in the rank of the third mark, and so on, you will eventually return to the first mark, having circuited all or some of the marks. A bisatin is thus equivalent to a Rook circuit or a set of superimposed Rook circuits, having one move in every rank and file.



These diagrams show all the geometrically different bisatins of sizes 2, 3 and 4. The number below each diagram shows its number of different orientations.



In the special case of 4x4 bisatins each line contains two white and two black marks, so reversing the colouring produces a complementary bisatin. In the diagrams above the four pairs of complements are linked. The other twelve are self-complementary.

The alternate marks in a bisatin of one circuit form two satins. Every bisatin can be expressed as a combination of two satins, uniquely when there is just one circuit, and in 2^{m-1} ways when there are m circuits, since after the first circuit has been split into two parts A and B, the two parts of each subsequent circuit can be assigned to A or B.

THEOREM: There are $(n!)^2/2n$ bisatins of one circuit of size nxn. Or, in terms of a recurrence relation, which may be more convenient to calculate: $A_n = n(n-1)A_{n-1}$, $A_2=1$.

Proof: Choose the positions of marks 1 and 2 in the top rank - there are $n(n-1)/2$ choices. Mark 3 may now be in anyof n-1 squares, and for mark 4 there are n-2 choices. Mark 5 may then be in any of n-2 positions, and so on. Thus the total of choices is given by the product: $\frac{1}{2}n(n-1).(n-1)(n-2)^2(n-3)^2\cdots 2^2 1^2$ which equals $(n!)^2/2n$.

THEOREM: A recurrence relation I have found for the total number B_n of bisatins of all types of size n is as follows (but does not seem to reduce to a simple formula):

$$B_n = n(n-1)B_{n-1} + \tfrac{1}{2}n(n-1)^2B_{n-2}, \text{ with } B_2 = 1 \text{ and } B_3 = 6.$$

Proof: The cases B_2 and B_3 are illustrated on the opposite page. Now for the general case of a bisatin nxn we can always start as for the above enumeration of bisatins of 1 circuit, identifying marks 1, 2 and 3. Now there are two cases. The square in the same file as mark 1 and the same rank as mark 3 is either occupied by a mark or is vacant. In the occupied case the marks 1,2,3,4 form a circuit. Deletion of the ranks and files in which this circuit lies gives a bisatin of side n-2. In the vacant case we can delete the top rank (containing marks 1 and 2) and the file containing marks 2 and 3, and insert a new mark in the vacant space in the file containing mark 1 and the rank containing mark 3, thus leaving bisatin of side n-1. By this process any bisatin can be reduced to a unique bisatin of smaller size. Reversing the process we can form from a bisatin of size n-2 a total of $\frac{1}{2}n(n-1)^2$ bisatins of size n by addition of a circuit of four marks, two in the new top rank - there being n-1 choices for the position of the other extra rank and $\frac{1}{2}n(n-1)$ ways to place the two new files in relation to the existing files. This gives the term $\frac{1}{2}n(n-1)^2B_{n-2}$ in the recurrence. The other term arises from expanding a bisatin of size n-1 to size n by choosing one of its marks to be deleted, 2(n-1) choices, and inserting an extra rank at the top and an extra file, n possible positions, to left or right of the chosen mark, giving 2n(n-1) choices in all. But we must divide by 2 since the extra file has to be to the right. (The number of right and left cases must be the same overall - though not in individual cases.) This gives the first term of the recurrence.

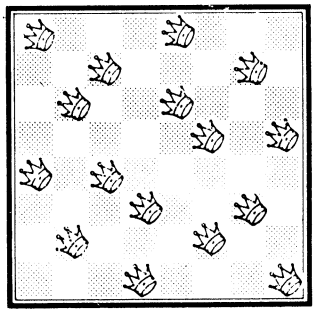
The following figures have been calculated using the above formulas:

Size	2	3	4	5	6	7	8
Number of bisatins	1	6	90	2040	67950	3110940	187530840
Number of bisatins of 1 circuit	1	6	72	1440	43200	1814400	101606400
Number of separable bisatins	0	0	18	600	24750	1296540	85924440

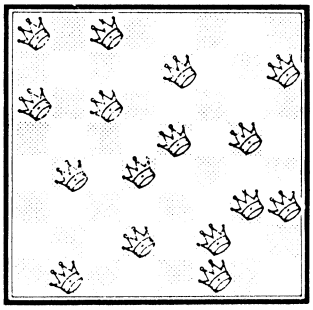
(the last line is just the difference of the previous two lines).

Since there are so many bisatins in the cases of size 5 upwards we need, for further recreational study, to apply further restrictions, such as to single-circuit types, symmetric patterns, or those with diagonal properties also. Here are two examples:

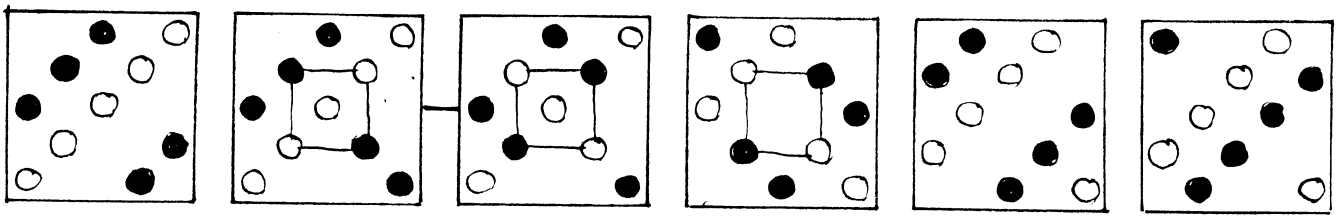
A. 16 Lions or Leos in mutual unguard. Quoted in Schach und Zahl (1978) as a Queen-placing problem. It is a symmetric bisatin of one circuit.



B. 16 Greater Lions or Leos (i.e. acting in any straight line of square centres). Given by Sam Loyd in his Puzzle Mag. January 1908, as a Queen-placing prob.

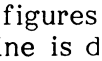


Another context in which bisatins arise is in the composition of a CHESS ACROSTIC (invented by N.A.Macleod - New Years Greeting Problem 1979-80) which has a problem in every rank and file of the diagram. Thus each rank and file contains two kings, one White and one Black. The White kings form one satin and the Black kings another. Together they form a bisatin. The following are all solutions 5x5: For the 4x4 case see above left.



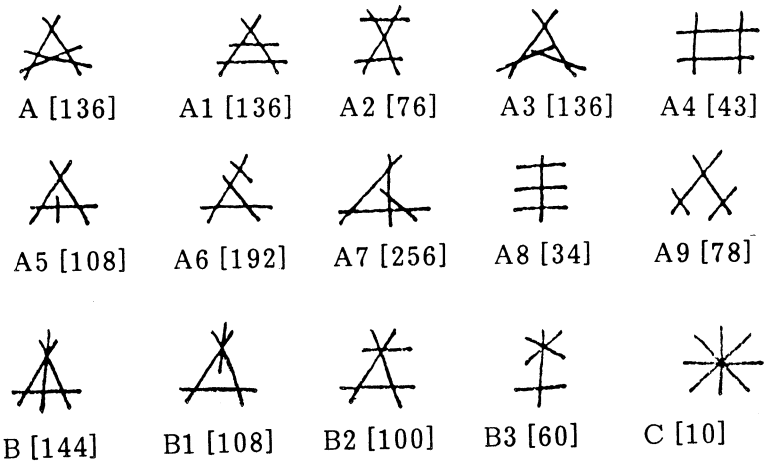
ALPHABETICAL TOPOLOGY

By John DAWES

I found the article on Alphabetical Topology interesting (page 144). The 3-line "runes" can be generated from the base figures  by suppressing 0 or more free ends, ensuring that no entire line is deleted, and discarding duplicates. I find 16, 6 and 13 from these three symbols respectively, making 35 in all. You missed two: 

I have made a similar analysis of the 4-line runes, as follows. I haven't drawn out all the individual runes yet - but if I do I'll send you a copy! They are derived from the 15 basic figures shown below by deleting from 0 to 8 of the free ends in all possible ways that do not delete an entire line segment, discarding duplicates. The numbers in brackets show how many different runes can be derived from each basic figure. The basic figures themselves are derived A, B and C, which show the 3 ways in which 4 lines can intersect in a plane, by systematically truncating the line segments.

John Dawes (1 v 1989)



Total number of 4-line runes = 1617.

ENUMERATIONS

An 'enumeration' problem is not just a matter of calculating the total number of things of a given type, but also involves listing them or actually constructing them in a systematic manner that ensures that all are included and none omitted and none duplicated. Such a process - or 'algorithm' - may in some special cases provide a recurrence relation for calculation of successive totals - and in even more special cases may lead to a general formula for the total - the preceding article on 'bisatins' provides examples of these - but most cases are not of this helpful type. Here are a couple of generalised chess related enumerations to consider.

Riders on a Torus - by Stafanos PANTAZIS

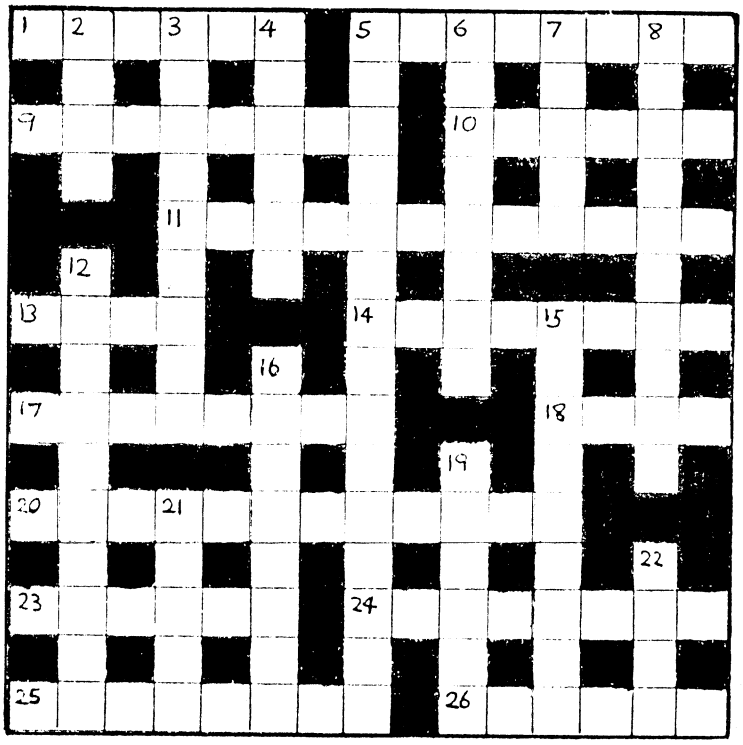
On a torus board a x b how many squares are observed by (a) Rook (b) Bishop (c) Queen (d) Nightrider (e) (m,n) rider, including the original square in each case, since all can go round the cylinder (via either edge - or in some cases both) and return to the start.

Knight Geodesics - by Dr C.M.B.TYLOR

The above item reminded me of some work Dr Tylor sent me [briefly mentioned in Chessics 18 (1984) page 30] and that he had originally studied in the 50's concerning the shortest routes by a Knight between two given points. We may present this problem in the form: How many ways can a Knight get from (0,0) to (m,n) in fewest moves?
(It is assumed that the board is large enough for all routes to be possible.)

CRYPTIC CROSSWORD - 8

by QUERCULUS



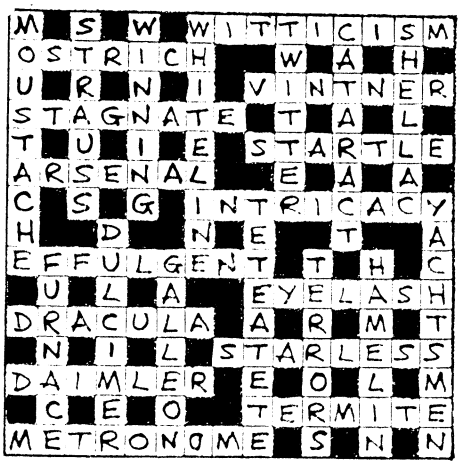
ACROSS

1. Far from fit for listed duties. (6)
5. Old time spoken form in countryside. (8)
9. Dart and rope for animal hunter. (8)
10. Elementary mud and air mixture. (6)
11. Franco's term on German soil shows him a marketeer? (12)
13. The southern mob are in a rut. (4)
14. Lighter made safe. (8)
17. Finished with drag after thorough examination. (8)
18. The way to begin the study of diseases. (4)
20. Loudly hosted unruly get-together. (12)
23. Sailor begins announcement of marriage in ship's hold. (6)
24. Incorporated the fourth stroke at an angle. (8)
25. Lend rich youngsters new form. (8)
26. Sign on for the silent service? (6)

DOWN

2. Land, sounding like one in pain. (4)
3. Litmus will show acid in rot. (9)
4. Object of worship in which buffet is held. (6)
5. Proposal never absent from the agenda? (9,6)
6. Clambers around in free-for-all. (8)
7. In school Denis describes former times. (6)
8. Games employ pieces in small amounts. (10)
12. Hundred adore pop record at small church gathering. (10)
15. Breathtaking play has nine characters. (9)
16. Lend a car for a year. (8)
19. Mind: a tipsy chef is having a fit about it. (6)
21. In magazine Wellington found on staircase. (5)
22. Creatures with perfect leg-joints? (4)

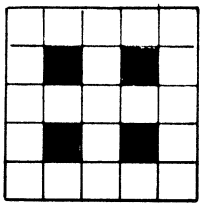
Crossword 7. SOLUTION



Shuffle-Link

2. SOLUTION

3. by GPJ

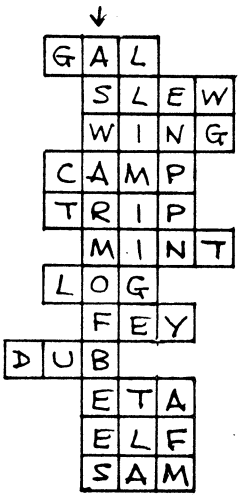


Shuffle round the letters of each of the six words listed below, to form six different words (anagrams). Then fit them into the grid, as in a normal crossword.

CHORE STROP THERE
TOURS WASTE WREST

Simply Strange

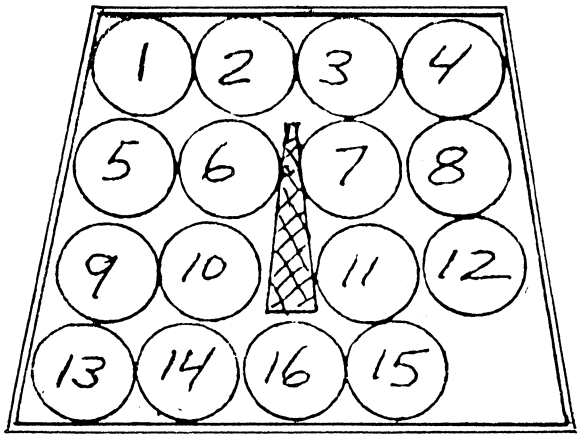
SOLUTION



THE 16-15 PUZZLE or TRAPEZELOYD

By Leonard J. GORDON

Here is a sliding block puzzle I just devised. Exchange blocks 15 and 16. I am sure you see the point of this puzzle. By introducing an odd loop, we make an odd number of exchanges possible. This is like the spider-fly game, where the spider must traverse the odd loop in order to get the move on the fly. I have had something like this in back of my



mind for years, but only now thought of a good execution. Your journal reawakened my interest in sliding puzzles. My solution takes 109 moves. ... The book writers wail that there is no good theory of sliding puzzles beyond the simple "count the inversions" rule. Maybe this will provide the theorists some meat. I am surprised that this hasn't been done before. Maybe it has, but I have never seen it. Len Gordon (27 xi 1988).

Here are two [new] solutions showing different approaches to one problem. The first solution I found took 109 moves. Later, I found the following which takes only 105. The first one took block 15 around the world. Here we take block 11 around to save 4:

12,8,4,3,7,11, 8,4,3,7,11, 3,4,12,15,16,14,10,6,2,11,
3,8,16,14,10,6,2,11, 1,5,9,2,11, 9,2,13,6,11, 9,2,5,1,3,7,4,
12,15,14,10,11, 6,13,9,2,3,7,8, 12,15,14,10,11,
6,2,3,7,8,12,16,11, 10,14,15,16, 12,8,7,3,2,6,10,14,15,16,
12,8,7,3,2,6,10,14,15,16, 12,8,7,3,2,6,10,14,15,16.

I sent the above to John Harris. He replied with an 87 move solution. He took block 16 around clockwise. My solutions took the 'spider' around counterclockwise. A minor improvement reduces his moves to 85. This is probably a minimum, but I offer no proof.

12,8,4,3,2, 6,10,9,13,14,16, 15,11,7,2,6,10,9,16, 14,13,5,9,16, 5,9,1,10,16,
5,14,15,11,12,8,4,3,6,16, 10,1,5,14,15, 11,12,7,2,16, 6,3,16, 2,7,12,11,15,
14,10,6,2,16, 4,7,12,11,15, 14,10,6,2,3,4,7,8,11,12,16, 7,8,11,12,16, 11,12.

I am not overly pleased that this puzzle has such a long solution, but 85 moves is not too bad. The closeness to the classic 15-1 puzzle is good, and the extra cell gets well faired in. The history of finding the above solutions is typical. Clearly, block 16 is the best one to take around the loop, but I failed to see that at first. I have hardly ever been able to find minimum move solutions to a difficult sliding block or solitaire puzzle on the first round. This is particularly true of puzzles I devised myself. However, I am fortunate to have correspondents who are good puzzle solvers. Once John Harris or my brother, Jerry Gordon, have improved my solutions, and I have in turn reviewed their results, we are fairly certain to have close to minimums. This puzzle is too difficult for computer confirmation.

Len Gordon (30 xii 1988)