RIDDLE OF THE SANDS

Not all games are about shooting aliens. Some, such as the program we present here, demand logical thinking. Trying to drive a truck across a desert is not easy when it can't carry enough fuel to get it all the way. Solving the problem requires a little experimentation or even another program!

Our game is set in a desert 1,000 kilometres wide. Every hundred kilometres or thereabouts is a staging post where fuel tanks may be stored. Back at base, you've as many petrol tanks as you could possibly need, each one large enough to fuel the truck from one stage to the next. The journey across the desert would be quite simple apart from one thing; the truck has room for a maximum of eight tanks at any one time. Therefore, to make it across the desert, you must build up supplies of fuel at various points on your route, driving back and forth between them.

Obviously, the first objective of the game is to make sure that you don't run out of petrol — it's a long walk back to base and the desert isn't a place for a pleasant stroll. Secondly, you must complete the journey travelling the shortest distance and using the fewest tanks possible. You should find this relatively easy to solve with the program set up for eight tanks.

However, we can alter the game to make the problem a little more mind-stretching. What happens, for example, if you can carry only four or six tanks at a time? To investigate these variations, you must alter the value of the variable M in line 60 and try the problem again. You should discover that you are using the same technique but that the intervals between your fuel dumps and the number of journeys made are altered. Can you devise an algorithm that is certain to see you safely

across the desert every time? Such an algorithm could be the basis for a program that *solves* this particular problem.

Our puzzle demonstrates an invaluable technique for solving problems in the development of a program. You must first experiment with the information given, try lots of worked examples and then, if all goes well, discover an emerging pattern. From this you can devise an algorithm and then come up with a program. If you want to develop our Desert Trucker game, you could add graphics and other refinements, introducing difficulties like needing to carry water as well as fuel.

Basic Flavours

This program is written in Microsoft BASIC, so should run unchanged on most machines with a 40 × 25 screen display. Spectrum owners must insert LET before all assignment statements.

CHR$(26): Replace by CLS on Spectrum, Oric-1, Atmos, Dragon and BBC; and by CHR$(147) on Commodore 64 and Vic-20.

MID$(STR$(A(1),2)): Replace by STR$(A(1)) on the Spectrum and any machine on which the command PRINT LEN(STR$(2)) produces the result 1.

THEN 1260 & THEN 1300: Change to THEN GOTO 1260 & THEN GOTO 1300 on the Spectrum.

```
10 REM **** Desert Truck
30 DIM A(10)
40 A(1)=80: REM Tanks at start
50 S=1:REM Truck's position
60 M=8: REM Max. tanks on truck
70 N=0: REM Total tanks used
100 REM Next turn
110 PRINT CHR$(26): REM Clear Screen
120 PRINT "STAGE:   1   2   3   4   5   6   7   8   9   10"
130 PRINT "TANKS: ";
140 FOR I=1 TO 10
145 A$=MID$(STR$(A(I)),2)
147 IF LEN(A$)<2 THEN LET A$=" "+A$:GOTO 147
150 PRINT A$;" ";:NEXT I:PRINT
160 X=9+(S-1)*3:PRINT TAB(X-1):T
"TRUCK":PRINT   TAB(X-1):T
175 IF S=10 THEN PRINT:PRINT : PRINT "Oh dear ...
180 IF T=0 AND A(S)=0 THEN PRINT "You did it!''":GOTO 1400
you d better start walking":GOTO 1400
190 PRINT:PRINT"Your options are :":PRINT
200 IF T>1 THEN PRINT "D Drop fuel tanks"
210 IF A(S)>0 THEN PRINT "P Pick up fuel tanks"
220 IF T>0 THEN PRINT "F Forwards one stage"
230 IF T>0 AND S>1 THEN PRINT "B Backwards one stage"
240 PRINT:PRINT "Which";:INPUT A$
250 IF T>1 AND (A$="D" OR A$="d" )THEN 1260
260 IF A(S)>0 AND (A$="P" OR A$="p") THEN 1300
270 IF T>0 AND (A$="F" OR A$="f") THEN S=S+1:T=T-1:N=N+1:GOTO 110
280 IF T>0 AND S>1 AND (A$="B" OR A$="b") THEN S=S-1:T=T-1:N=N+1:
GOTO 110
290 GOTO 110
1250 REM Drop tanks
1260 PRINT:INPUT "How many ";A
1270 IF A>T OR A<>INT(A) OR A<0 THEN PRINT:PRINT"Please try again
":GOTO 1260
1280 A(S)=A(S)+A:T=T-A:GOTO 110
1290 REM Pick up tanks
1300 PRINT:INPUT "How many ";A
1310 IF A>A(S) OR A<>INT(A) OR A<0 THEN PRINT:PRINT "Please
try again":GOTO 1300
1320 IF A+T>M THEN PRINT:PRINT"Sorry - only room for";M;"tanks on
board":GOTO 1300
1330 T=T+A:A(S)=A(S)-A
1380 GOTO 110
1390 REM End of game
1400 PRINT:PRINT "You used";N;"tanks of fuel, ";
1410 A=0:FOR I=2 TO 9:A=A+A(I):NEXT I
1420 PRINT "brought";A
1430 PRINT "with you and left";A;"in the desert."
1440 PRINT:PRINT"Type RUN to try again"
1450 END
```

ADRIAN MORGAN