TEXAS INSTRUMENTS
Calculator Products Division

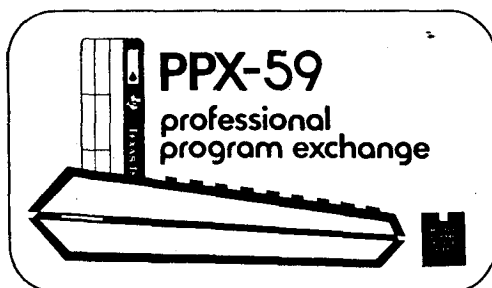
Submission Abstract

| | | |
|---|--|--|
| Program Title HEXAPAWN | | Rev. A |
| Abstract of Program Game is played on a 3X3 board against the calculator, each player having 3 chess pawns. Object is to reach opponent's side of the board, capture all of opponent's pieces, or block all legal moves. Differs from PPX #918049B considerably in that: calculator's moves are entirely random initially, calculator determines why it lost by its own logic and consequently learns by its mistakes, game is completely protected from illegal moves. The calculator soon becomes unbeatable. Keeps score; indicates wins and illegal moves. | | |
| User Benefits: Entertainment. Also demonstrates how the calculator can learn by its mistakes entirely on its own logic with no active learning input by the user other than winning a game. | | |
| Category Number 91 | Required Master Library #15 ProgsOr Leisure Library #15 | Prog. Steps 555 |
| | | PC-100A Needed <input checked="" type="checkbox"/> Library Module ID ML or LE |
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Program Description

| | | | |
|----------------|----------|------|---|
| Program Title: | HEXAPAWN | Rev. | A |
|----------------|----------|------|---|

Method, Equations, Sketches, Limitations, References, Error Recovery:

METHOD: Handling user's moves:

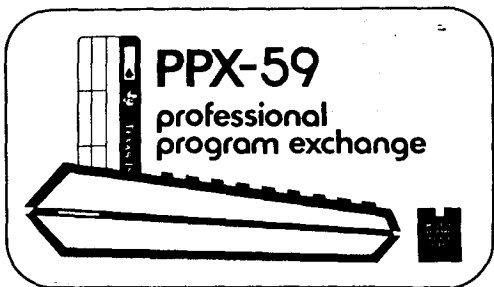
The player designates his move by entering the board location his piece is on and the location he wishes to move that piece into. The calculator makes sure it is a legal move: the user has a piece on the given location, no piece occupies the location he is moving into unless it is an attack move in which case the opponent's piece must occupy the position. User is informed of an illegal move and can enter a new move. A legal move is then executed and the game board adjusted, removing any captured piece. It is now the calculator's turn.

Handling calculator's moves:

The calculator randomly chooses which of his pieces he wishes to move, the type of move is then randomly selected: straight ahead, attack left, or attack right. The legality of the move is checked, if illegal a new type of move is selected for the same piece, until all moves for that piece are checked then a new piece may be selected. If the move is legal it is executed and the resulting board is checked against the memory it has accumulated of the resulting board configurations of moves that resulted in the opponent winning. If a match is found this move is put in a sub memory where it may be recalled if another move cannot be found. This condition can occur when the calculator has mistakenly thought a certain move to be a bad move when in actuality it was the move prior to that that resulted in a loss for the calculator. This condition is most easily visualized by playing the game to not win until the last possible moment. If this should occur (which it does) the calculator makes the losing move but replaces in its place in the memory the board configuration before the opponent's last move, which is the move that actually caused the calculator to lose. This replacement of board configurations in the calculator's memory saves memory space and decreases the searching time when checking a move against the memory. If a move is found to match a losing move in the memory, a new move is selected for the same piece, if all moves for that piece are exhausted then a new piece is selected and the same procedure repeated. If no move at all can be found then the user wins, then the calculator indicates this and adjusts the score.

After each player's move the calculator checks for a win. It checks for a win by reaching the end of the board,

X See Continuation Sheet



TEXAS INSTRUMENTS Calculator Products Division

Continuation Sheet

Continued From: ☒ Program Description ☐ User Instructions ☐ Stmt. of Example

Program Title:

HEXAPAWN

Rev.

A

by eliminating all of the opponent's pieces, and by blocking all legal moves for the opponent.

How to play HEXAPAWN:

Follow the User Instructions for entering the seed and library module number you are using.

| | | |
|---|---|---|
| 9 | 8 | 7 |
| 6 | 5 | 4 |
| 3 | 2 | 1 |

FIG. 1

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|

FIG. 2

| | | |
|---|---|---|
| 2 | 2 | 2 |
| 0 | 0 | 0 |
| 1 | 1 | 1 |

FIG. 3

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|

FIG. 4

The 3X3 game board is shown in Figure 1; figure 2 shows how the board is shown in the calculator display. The numbers are the board positions by which moves are designated. Figure 3 shows the initial game board with the pawns in place; figure 4 shows how this is shown in the display. The 2's are the calculator's pieces, the 1's represent the user's pieces.

A pawn may move: one space straight ahead towards the opponent's side of the board if the space is vacant (a '0' in that place); or attack on a forward diagonal, one space, if an opponent's piece is in that position. A pawn may never move backwards, the user's pawns will always move to a higher numbered position than what they are on. The object of the game is to get one pawn to the opponent's side of the board, capture all of the opponent's pawns, or block the opponent from making a legal move. A block for a win is shown in figure 5 below. All the user needs to do is move the pawn from position 1 to position 4 which results in the block shown in figure 6; it is now the calculator's turn but he has no legal move so the user wins.

| | | |
|---|---|---|
| 2 | 0 | 2 |
| 1 | 2 | 0 |
| 0 | 1 | 1 |

FIG. 5

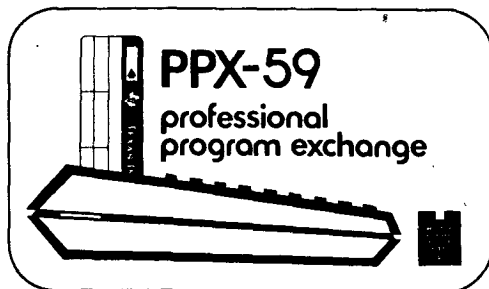
| | | |
|---|---|---|
| 2 | 0 | 2 |
| 1 | 2 | 1 |
| 0 | 1 | 0 |

FIG. 6

Keep in mind that when board positions to the left of the display are not occupied by a pawn the "0"s do not appear, this could make the game board harder to visualize in the display.

The calculator will not allow any illegal moves, it indicates wins by either opponent, keeps score, and learns entirely by itself with no direct help from the user. It eventually becomes unbeatable.

Also, be patient, it may take the calculator up to about 60 seconds to respond to certain moves.



User Instructions

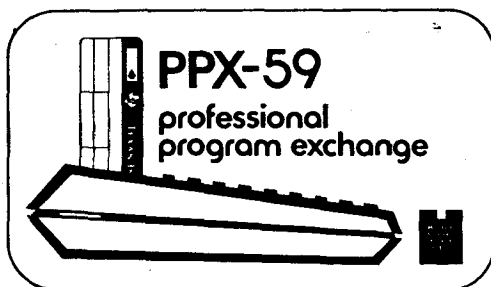
| | | | | | | | |
|--------------------------------------|--|-----------------|--|-------------------------------------|--|-------------------------------------|--|
| Program Title | | | | HEXAPAWN | | | |
| MOVE | | BOARD | | SCORE | | SEED/LIB NEW GAME | |
| Partition (OP 17) Parentheses Levels | | | | | | | |
| 559.49 | | 3 | | t Register | | <input checked="" type="checkbox"/> | |
| Angular Mode (if applicable) | | SBR Levels 3 | | Absolute Addresses | | <input checked="" type="checkbox"/> | |
| Library Module ID | | | | Disturbs Pending Operations | | | |
| LE or ML | | | | <input checked="" type="checkbox"/> | | | |

| USER DEFINED KEYS | |
|-------------------|--------------------|
| A | MOVE From/To |
| B | BOARD |
| C | SCORE player.TI59 |
| D | |
| E | NEW GAME |
| A' | |
| B' | |
| C' | |
| D' | |
| E' | SEED/MODULE NUMBER |

| DATA REGISTERS (INV) | |
|---|----------------------|
| 0 | used |
| 1 | used |
| 2 | used |
| 3 | used |
| *4 | 436 |
| *5 | 454 |
| *6 | 467 |
| 7 | used by ML |
| *8 | 21 initially |
| 9 | seed |
| 10 | used by LE |
| 11 | machine piece |
| 12 | board |
| 13 | locations |
| 14 | position moving from |
| 15 | position moving to |
| 16 | current board |
| 17 | player.piece counter |
| 18 | sub memory |
| 19 | 2nd to last board |
| 20 | last board |
| 21 | memory space |
| 42 | |
| *43 | 222000111 |
| *44 | 119 initially |
| 45 | used |
| 46 | sub memory move |
| 47 | Ind piece location |
| 48 | secondary move |
| 49 | score |
| *THOSE REGISTERS PRECEDED BY * MUST BE FILLED WITH THE CORRESPONDING NUMBER BEFORE RUNNING THE PROGRAM. RECORD ON A MAGNETIC CARD | |
| See Continuation Sheet IN BANK 4. | |

| | | | | | | | | | |
|-----------|-----|-----|-----|-----|-----|-----|-----|---|---|
| FLAGS X 0 | X 1 | X 2 | X 3 | X 4 | X 5 | X 6 | X 7 | 8 | 9 |
|-----------|-----|-----|-----|-----|-----|-----|-----|---|---|

| STEP | PROCEDURE | ENTER | PRESS | OUTPUT/MODE (see legend below) |
|--|--|------------------|----------------------|---|
| 1 | Enter seed and library module number being used module number: 1 or 7 seed ≥ 0 | module # seed | x \geq t 2nd E' | 222000111. |
| 2 | Enter your move: position moving from, x \geq t, position moving into; 1 \leq location \leq 9 Repeat step 2 until game is won If an illegal move is attempted..... Simply repeat step 2 with a legal move If calculator wins If you win | from to | x \geq t A | 1. new board is displayed showing the result of your move and the calculator's move. .1111111111 is displayed -0.01 is displayed -1. is displayed |
| 3 | Begin a new game | | E | 222000111. |
| 4 | To display the current board | | B | current board is displayed |
| 5 | To display the score Steps 4 and 5 do not affect a game in progress at any time | | C | your score.calculator's score |
| Modes: n* — Printed only (n) — Displayed briefly (Pause) (n)* — Printed and displayed | | | | |



TEXAS INSTRUMENTS Calculator Products Division

Sample Problem

Statement of Example

A series of seven games will be played. The second game shows a case where the calculator assumes that a certain board configuration was the cause of his losing that game but actually it was the last board prior to this that caused him to lose. In the seventh game the calculator realizes this fact and substitutes the board that actually caused him to lose in place of the board that was originally assumed to have caused the loss. Check data register 22 after game 2 and then check it again after game seven, notice that it has changed and that the total number of registers used for calculator memory did not increase after game 7 because of the substitution. For this sample problem use the Master Library and a seed of 376.

☐ See Continuation Sheet

| ENTER | PRESS | OUTPUT/MODE (see legend below) | COMMENT |
|----------------------------|---|--|--|
| 1 376 | $x \geq t$ 2nd E' | 222000111. | Module No. 1 seed, initial game board |
| 1 4 3 5 4 7 | $x \geq t$ A $x \geq t$ A $x \geq t$ A B E | 202021110. 200021010. -1. 201020010 222000111. | THIS IS THE LOSING BOARD THAT IS PUT IN MEMORY REGISTER 21 user wins the winning board new game |
| 1 4 2 5 5 8 | $x \geq t$ A $x \geq t$ A $x \geq t$ A E | 22201110. 2212100. -1. 222000111. | PLACED IN MEMORY REGISTER 22 user wins new game |
| 1 4 2 5 | $x \geq t$ A $x \geq t$ A B C | 202002110. -0.01 202010102 2.01 | TI59 wins winning board score |

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

X Over

PPX-59 Professional Program Exchange Sample Problem (cont'd)

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| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

For TI use only

| ENTER | PRESS | OUTPUT/MODE (see legend below) | COMMENT |
|-------|-------|--------------------------------|--|
| | E | 222000111. | new game |
| 1 | x≥t | | |
| 4 | A | 202002110. | |
| 2 | x≥t | | |
| 5 | A | -0.01 | TI59 wins |
| | E | 222000111. | new game |
| 1 | x≥t | | |
| 4 | A | 22201110. | |
| 2 | x≥t | | |
| 5 | A | 20221100. | |
| 3 | x≥t | | |
| 5 | A | 212000. | PLACED IN MEMORY REGISTER 23 |
| 5 | x≥t | | |
| 8 | A | -1. | user wins |
| | E | 222000111. | new game |
| 1 | x≥t | | |
| 4 | A | 22201110. | |
| 2 | x≥t | | |
| 5 | A | 20221100. | PLACED IN MEMORY REGISTER 24 |
| 4 | x≥t | | |
| 7 | A | -1. | user wins |
| | E | 222000111. | new game |
| 1 | x≥t | | |
| 4 | A | 22201110. | THIS IS SUBSTITUED INTO MEMORY REGISTER 22 |
| 2 | x≥t | | |
| 5 | A | 2212100. | |
| 5 | x≥t | | |
| 8 | A | -1. | user wins |
| | B | 12202100. | winning board |
| | C | 5.02 | score |

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange

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For TI use only

| LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS |
|-----|------|--------|---|-----|------|--------|---|-----|------|-----|----------|
| 000 | 76 | Lbl | ERROR INDICATOR ALSO PLACES 0 IN T REGISTER | 57 | 85 | + | SEED | 114 | 16 | A' | |
| 1 | 52 | EE | | 58 | 93 | . | | 115 | 01 | 1 | |
| 2 | 29 | CP | | 59 | 01 | 1 | | 116 | 22 | INV | |
| 3 | 09 | 9 | | 060 | 95 | = | | 117 | 67 | x=t | |
| 4 | 35 | 1/X | | 61 | 59 | Int | | 118 | 52 | EE | |
| 5 | 92 | INVSBR | | 62 | 32 | x=t | | 119 | 69 | Op | |
| 6 | 76 | Lbl | | 63 | 92 | INVSBR | | 120 | 20 | 20 | |
| 7 | 16 | A' | | 64 | 76 | Lbl | | 121 | 43 | RCL | |
| 8 | 43 | RCL | | 65 | 10 | E' | | 122 | 15 | 15 | |
| 9 | 16 | 16 | | 66 | 42 | STO | | 123 | 75 | - | |
| 010 | 55 | ÷ | ISOLATES A PAWN ON A GIVEN BOARD POSITION AND PLACES ITS VALUE IN T REGISTER | 67 | 09 | 09 | CHECKS MODULE BEING USED SO PROPER SUBROUTINE MAY BE CALLED | 124 | 43 | RCL | |
| 11 | 73 | RCLInd | | 68 | 07 | 7 | | 125 | 14 | 14 | |
| 12 | 00 | 00 | | 69 | 67 | x=t | | 126 | 95 | = | |
| 13 | 22 | INV | | 070 | 00 | 0 | | 127 | 32 | x=t | |
| 14 | 28 | log | | 71 | 75 | 75 | | 128 | 03 | 3 | |
| 15 | 95 | = | | 72 | 02 | 2 | | 129 | 67 | x=t | |
| 16 | 22 | INV | | 73 | 42 | STO | | 130 | 01 | 1 | |
| 17 | 59 | Int | | 74 | 44 | 44 | | 131 | 49 | 49 | |
| 18 | 65 | X | | 75 | 76 | Lbl | | 132 | 02 | 2 | |
| 19 | 01 | 1 | | 76 | 15 | E | | 133 | 67 | x=t | |
| 020 | 00 | 0 | EXECUTES A MOVE, FIRST IT REMOVES THE PAWN BEING MOVED FROM THE BOARD THEN REPLACES IT IN THE NEW POSITION | 77 | 43 | RCL | INITIALIZATION FOR A NEW GAME | 134 | 01 | 1 | |
| 21 | 95 | = | | 78 | 43 | 43 | | 135 | 55 | 55 | |
| 22 | 59 | Int | | 79 | 42 | STO | | 136 | 04 | 4 | |
| 23 | 32 | x=t | | 080 | 16 | 16 | | 137 | 22 | INV | |
| 24 | 92 | INVSBR | | 81 | 09 | 9 | | 138 | 67 | x=t | |
| 25 | 76 | Lbl | | 82 | 42 | STO | | 139 | 52 | EE | |
| 26 | 17 | B' | | 83 | 11 | 11 | | 140 | 43 | RCL | |
| 27 | 43 | RCL | | 84 | 08 | 8 | | 141 | 14 | 14 | |
| 28 | 16 | 16 | | 85 | 42 | STO | | 142 | 32 | x=t | |
| 29 | 75 | - | | 86 | 12 | 12 | | 143 | 03 | 3 | |
| 030 | 43 | RCL | DISPLAYS THE CURRENT BOARD | 87 | 07 | 7 | DISPLAYS THE SCORE | 144 | 67 | x=t | |
| 31 | 00 | 00 | | 88 | 42 | STO | | 145 | 52 | EE | |
| 32 | 65 | X | | 89 | 13 | 13 | | 146 | 61 | GTO | |
| 33 | 53 | (| | 090 | 03 | 3 | | 147 | 01 | 1 | |
| 34 | 43 | RCL | | 91 | 42 | STO | | 148 | 64 | 64 | |
| 35 | 14 | 14 | | 92 | 17 | 17 | | 149 | 16 | A' | |
| 36 | 75 | - | | 93 | 76 | Lbl | | 150 | 25 | CLR | |
| 37 | 01 | 1 | | 94 | 12 | B | | 151 | 67 | x=t | |
| 38 | 54 |) | | 95 | 43 | RCL | | 152 | 01 | 1 | |
| 39 | 22 | INV | | 96 | 16 | 16 | | 153 | 94 | 94 | |
| 040 | 28 | log | BEGIN HANDLING OF USER'S MOVE | 97 | 92 | INVSBR | BEGIN HANDLING OF USER'S MOVE | 154 | 81 | RST | |
| 41 | 85 | + | | 98 | 76 | Lbl | | 155 | 43 | RCL | |
| 42 | 53 | (| | 99 | 13 | C | | 156 | 14 | 14 | |
| 43 | 43 | RCL | | 100 | 43 | RCL | | 157 | 32 | x=t | |
| 44 | 00 | 00 | | 101 | 49 | 49 | | 158 | 01 | 1 | |
| 45 | 75 | - | | 102 | 92 | INVSBR | | 159 | 67 | x=t | |
| 46 | 32 | x=t | | 103 | 76 | Lbl | | 160 | 52 | EE | |
| 47 | 54 |) | | 104 | 11 | A | | 161 | 04 | 4 | |
| 48 | 65 | X | | 105 | 42 | STO | | 162 | 67 | x=t | |
| 49 | 53 | (| | 106 | 15 | 15 | | 163 | 52 | EE | |
| 050 | 43 | RCL | MERGED CODES | 107 | 32 | x=t | MERGED CODES | 164 | 03 | 3 | |
| 51 | 15 | 15 | | 108 | 42 | STO | | 165 | 42 | STO | |
| 52 | 75 | - | | 109 | 14 | 14 | | 166 | 00 | 00 | |
| 53 | 01 | 1 | | 110 | 01 | 1 | | | | | |
| 54 | 54 |) | | 111 | 04 | 4 | | | | | |
| 55 | 22 | INV | | 112 | 42 | STO | | | | | |
| 56 | 28 | log | | 113 | 00 | 00 | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| | | | | | | | | |
|----|-----|-----|----|-----|-----|----|-----|-----|
| 62 | Pgm | Ind | 72 | STO | Ind | 83 | GTO | Ind |
| 63 | Exc | Ind | 73 | RCL | Ind | 84 | Op | Ind |
| 64 | Ind | Ind | 74 | SUM | Ind | 92 | INV | SBR |

| LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS |
|-----|------|--------|--|-----|------|--------|-------------------------------|-----|------|--------|----------|
| 167 | 43 | RCL | | 224 | 61 | GTO | | 281 | 00 | 0 | |
| 168 | 15 | 15 | | 225 | 03 | 3 | | 282 | 03 | 3 | |
| 169 | 32 | x≥t | | 226 | 86 | 86 | | 283 | 91 | 91 | |
| 170 | 01 | 1 | | 227 | 43 | RCL | | 284 | 36 | Pgm | |
| 171 | 00 | 0 | | 228 | 19 | 19 | | 285 | 15 | 15 | |
| 172 | 44 | SUM | | 229 | 72 | STOInd | | 286 | 71 | SBR | |
| 173 | 00 | 00 | | 230 | 45 | 45 | | 287 | 40 | Ind | |
| 174 | 73 | RCLInd | | 231 | 61 | GTO | | 288 | 44 | 44 | |
| 175 | 00 | 00 | | 232 | 03 | 3 | | 289 | 65 | X | |
| 176 | 67 | x=t | | 233 | 86 | 86 | | 290 | 03 | 3 | |
| 177 | 01 | 1 | | 234 | 86 | St flg | BEGIN CALCULATOR'S MOVE | 291 | 85 | + | |
| 178 | 89 | 89 | | 235 | 01 | 1 | | 292 | 01 | 1 | |
| 179 | 01 | 1 | | 236 | 86 | St flg | | 293 | 95 | = | |
| 180 | 00 | 0 | | 237 | 02 | 2 | | 294 | 42 | STO | |
| 181 | 22 | INV | | 238 | 86 | St flg | | 295 | 47 | 47 | |
| 182 | 44 | SUM | | 239 | 03 | 3 | | 296 | 22 | INV | |
| 183 | 00 | 00 | | 240 | 86 | St flg | | 297 | 87 | If flg | |
| 184 | 97 | Dsz | | 241 | 07 | 7 | | 298 | 40 | Ind | |
| 185 | 00 | 0 | | 242 | 22 | INV | | 299 | 47 | 47 | |
| 186 | 01 | 1 | | 243 | 86 | St flg | | 300 | 02 | 2 | |
| 187 | 70 | 70 | | 244 | 00 | 0 | | 301 | 84 | 84 | |
| 188 | 81 | RST | | 245 | 01 | 1 | | 302 | 22 | INV | |
| 189 | 25 | CLR | | 246 | 05 | 5 | | 303 | 86 | St flg | |
| 190 | 72 | STOInd | | 247 | 42 | STO | | 304 | 40 | Ind | |
| 191 | 00 | 00 | | 248 | 00 | 00 | | 305 | 47 | 47 | |
| 192 | 02 | 2 | | 249 | 04 | 4 | | 306 | 01 | 1 | |
| 193 | 32 | x≥t | | 250 | 42 | STO | | 307 | 00 | 0 | |
| 194 | 01 | 1 | | 251 | 01 | 01 | | 308 | 44 | SUM | |
| 195 | 42 | STO | | 252 | 04 | 4 | | 309 | 47 | 47 | |
| 196 | 00 | 00 | | 253 | 42 | STO | | 310 | 73 | RCLInd | |
| 197 | 17 | B' | | 254 | 02 | 02 | | 311 | 47 | 47 | |
| 198 | 32 | x≥t | | 255 | 86 | St flg | | 312 | 29 | CP | |
| 199 | 42 | STO | | 256 | 04 | 4 | | 313 | 67 | x=t | |
| 200 | 16 | 16 | | 257 | 86 | St flg | | 314 | 02 | 2 | |
| 201 | 43 | RCL | | 258 | 05 | 5 | | 315 | 61 | 61 | |
| 202 | 15 | 15 | | 259 | 86 | St flg | | 316 | 42 | STO | |
| 203 | 32 | x≥t | | 260 | 06 | 6 | | 317 | 14 | 14 | |
| 204 | 06 | 6 | | 261 | 97 | Dsz | | 318 | 22 | INV | |
| 205 | 77 | x≥t | | 262 | 01 | 1 | | 319 | 97 | Dsz | |
| 206 | 02 | 2 | | 263 | 02 | 2 | | 320 | 02 | 2 | |
| 207 | 34 | 34 | | 264 | 80 | 80 | | 321 | 02 | 2 | |
| 208 | 43 | RCL | USER HAS WON A GAME | 265 | 87 | If flg | | 322 | 52 | 52 | |
| 209 | 20 | 20 | | 266 | 00 | 0 | | 323 | 36 | Pgm | |
| 210 | 32 | x≥t | | 267 | 03 | 3 | | 324 | 15 | 15 | |
| 211 | 71 | SBR | | 268 | 84 | 84 | | 325 | 71 | SBR | |
| 212 | 05 | 5 | | 269 | 87 | If flg | | 326 | 40 | Ind | |
| 213 | 10 | 10 | | 270 | 07 | 7 | | 327 | 44 | 44 | |
| 214 | 25 | CLR | PLACE LOSING BOARD PATTERN IN CALCULATOR MEMORY | 271 | 02 | 2 | | 328 | 65 | X | |
| 215 | 67 | x=t | | 272 | 08 | 08 | | 329 | 03 | 3 | |
| 216 | 02 | 2 | | 273 | 43 | RCL | | 330 | 85 | + | |
| 217 | 27 | 27 | | 274 | 46 | 46 | | 331 | 04 | 4 | |
| 218 | 43 | RCL | | 275 | 72 | STOInd | | 332 | 95 | = | |
| 219 | 20 | 20 | | 276 | 48 | 48 | | 333 | 42 | STO | |
| 220 | 72 | STOInd | | 277 | 61 | GTO | | | | | |
| 221 | 08 | 08 | | 278 | 03 | 3 | | | | | |
| 222 | 69 | Op | | 279 | 62 | 62 | | | | | |
| 223 | 28 | 28 | | 280 | 87 | If flg | | | | | |

MERGED CODES

| | | | | | | | | |
|----|-----|-----|----|-----|-----|----|-----|-----|
| 62 | Pgm | Ind | 72 | STO | Ind | 83 | GTO | Ind |
| 63 | Exc | Ind | 73 | RCL | Ind | 84 | Op | Ind |
| 64 | Prd | Ind | 74 | SUM | Ind | 92 | INV | SBR |

| LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS |
|-----|------|--------|----------|-----|------|--------|----------|--|------|--------|----------|
| 334 | 45 | 45 | | 391 | 01 | 1 | | 448 | 05 | 5 | |
| 335 | 22 | INV | | 392 | 00 | 0 | | 449 | 53 | 53 | |
| 336 | 87 | If flg | | 393 | 44 | SUM | | 450 | 71 | SBR | |
| 337 | 40 | Ind | | 394 | 01 | 01 | | 451 | 05 | 5 | |
| 338 | 45 | 45 | | 395 | 73 | RCLInd | | 452 | 02 | 02 | |
| 339 | 03 | 3 | | 396 | 01 | 01 | | 453 | 92 | INVSBR | |
| 340 | 23 | 23 | | 397 | 29 | CP | | 454 | 32 | x≥t | |
| 341 | 22 | INV | | 398 | 67 | x=t | | 455 | 07 | 7 | |
| 342 | 86 | St flg | | 399 | 04 | 4 | | 456 | 67 | x=t | |
| 343 | 40 | Ind | | 400 | 28 | 28 | | 457 | 52 | EE | |
| 344 | 45 | 45 | | 401 | 42 | STO | | 458 | 04 | 4 | |
| 345 | 73 | RCLInd | | 402 | 14 | 14 | | 459 | 67 | x=t | |
| 346 | 45 | 45 | | 403 | 69 | Op | | 460 | 52 | EE | |
| 347 | 42 | STO | | 404 | 32 | 32 | | 461 | 32 | x≥t | |
| 348 | 45 | 45 | | 405 | 03 | 3 | | 462 | 75 | - | |
| 349 | 43 | RCL | | 406 | 44 | SUM | | 463 | 04 | 4 | |
| 350 | 14 | 14 | | 407 | 02 | 02 | | 464 | 61 | GTO | |
| 351 | 71 | SBR | | 408 | 73 | RCLInd | | 465 | 04 | 4 | |
| 352 | 40 | Ind | | 409 | 02 | 02 | | 466 | 77 | 77 | |
| 353 | 45 | 45 | | 410 | 42 | STO | | 467 | 32 | x≥t | |
| 354 | 25 | CLR | | 411 | 45 | 45 | | 468 | 09 | 9 | |
| 355 | 67 | x=t | | 412 | 73 | RCLInd | | 469 | 67 | x=t | |
| 356 | 03 | 3 | | 413 | 01 | 01 | | 470 | 52 | EE | |
| 357 | 18 | 18 | | 414 | 71 | SBR | | 471 | 06 | 6 | |
| 358 | 43 | RCL | | 415 | 40 | Ind | | 472 | 67 | x=t | |
| 359 | 15 | 15 | | 416 | 45 | 45 | | 473 | 52 | EE | |
| 360 | 72 | STOInd | | 417 | 01 | 1 | | 474 | 32 | x≥t | |
| 361 | 47 | 47 | | 418 | 67 | x=t | | 475 | 75 | - | |
| 362 | 32 | x≥t | | 419 | 12 | B | | 476 | 02 | 2 | |
| 363 | 43 | RCL | | 420 | 03 | 3 | | 477 | 95 | = | |
| 364 | 20 | 20 | | 421 | 22 | INV | | 478 | 42 | STO | |
| 365 | 42 | STO | | 422 | 44 | SUM | | 479 | 15 | 15 | |
| 366 | 19 | 19 | | 423 | 02 | 02 | | 480 | 16 | A' | |
| 367 | 43 | RCL | | 424 | 97 | Dsz | | 481 | 01 | 1 | |
| 368 | 18 | 18 | | 425 | 02 | 2 | | 482 | 22 | INV | |
| 369 | 42 | STO | | 426 | 04 | 4 | | 483 | 67 | x=t | |
| 370 | 16 | 16 | | 427 | 05 | 05 | | 484 | 52 | EE | |
| 371 | 42 | STO | | 428 | 01 | 1 | | 485 | 87 | If flg | |
| 372 | 20 | 20 | | 429 | 00 | 0 | | 486 | 00 | 0 | |
| 373 | 03 | 3 | | 430 | 22 | INV | | 487 | 05 | 5 | |
| 374 | 77 | x≥t | | 431 | 44 | SUM | | 488 | 01 | 01 | |
| 375 | 03 | 3 | | 432 | 01 | 01 | | 489 | 71 | SBR | |
| 376 | 84 | 84 | | 433 | 61 | GTO | | 490 | 05 | 5 | |
| 377 | 29 | CP | | 434 | 02 | 2 | | 491 | 02 | 02 | |
| 378 | 43 | RCL | | 435 | 52 | 52 | | 492 | 01 | 1 | |
| 379 | 17 | 17 | | 436 | 75 | - | | 493 | 22 | INV | |
| 380 | 22 | INV | | 437 | 03 | 3 | | 494 | 67 | x=t | |
| 381 | 67 | x=t | | 438 | 95 | = | | 495 | 05 | 5 | |
| 382 | 02 | 2 | | 439 | 42 | STO | | 496 | 01 | 01 | |
| 383 | 43 | 43 | | 440 | 15 | 15 | | 497 | 01 | 1 | |
| 384 | 93 | . | | 441 | 16 | A' | | 498 | 22 | INV | |
| 385 | 00 | 0 | | 442 | 25 | CLR | | 499 | 44 | SUM | |
| 386 | 01 | 1 | | 443 | 22 | INV | | 500 | 17 | 17 | |
| 387 | 44 | SUM | | 444 | 67 | x=t | | MERGED CODES 62 Pgm Ind 72 STO Ind 83 GTO Ind 63 Exc Ind 73 RCL Ind 84 Op Ind 64 Pro Ind 74 SUM Ind 92 INV SBR | | | |
| 388 | 49 | 49 | | 445 | 52 | EE | | | | | |
| 389 | 94 | +/- | | 446 | 87 | If flg | | | | | |
| 390 | 92 | INVSBR | | 447 | 00 | 0 | | | | | |
| | | | | | | | | | | | |

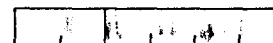
CHECK
FOR
WIN
BY
CALCULATOR
BY
BLOCKING
OPONENT

CALCULATOR'S
MOVE
TYPE
SUBROUTINES

INDICATE A
WIN BY EITHER
USER OR
CALCULATOR

PPX-59 Professional Program Exchange

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For TI use only

| LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS | LOC | CODE | KEY | COMMENTS |
|-----|------|--------|---------------------|-----|------|-----|----------|-----|------|-----|----------|
| 501 | 92 | INVSBR | | | | | | | | | |
| 502 | 02 | 2 | | | | | | | | | |
| 503 | 42 | STO | | | | | | | | | |
| 504 | 00 | 00 | | | | | | | | | |
| 505 | 17 | B' | | | | | | | | | |
| 506 | 01 | 1 | | | | | | | | | |
| 507 | 05 | 5 | | | | | | | | | |
| 508 | 42 | STO | | | | | | | | | |
| 509 | 00 | 00 | | | | | | | | | |
| 510 | 43 | RCL | | | | | | | | | |
| 511 | 08 | 08 | <i>CALCULATOR'S</i> | | | | | | | | |
| 512 | 42 | STO | <i>MEMORY</i> | | | | | | | | |
| 513 | 45 | 45 | <i>SUBSTITUTION</i> | | | | | | | | |
| 514 | 75 | - | | | | | | | | | |
| 515 | 02 | 2 | | | | | | | | | |
| 516 | 00 | 0 | | | | | | | | | |
| 517 | 95 | = | | | | | | | | | |
| 518 | 42 | STO | | | | | | | | | |
| 519 | 03 | 03 | | | | | | | | | |
| 520 | 22 | INV | | | | | | | | | |
| 521 | 97 | Dsz | | | | | | | | | |
| 522 | 03 | 3 | | | | | | | | | |
| 523 | 05 | 5 | | | | | | | | | |
| 524 | 50 | 50 | | | | | | | | | |
| 525 | 01 | 1 | | | | | | | | | |
| 526 | 22 | INV | | | | | | | | | |
| 527 | 44 | SUM | | | | | | | | | |
| 528 | 45 | 45 | | | | | | | | | |
| 529 | 73 | RCLInd | | | | | | | | | |
| 530 | 45 | 45 | | | | | | | | | |
| 531 | 22 | INV | | | | | | | | | |
| 532 | 67 | x=t | | | | | | | | | |
| 533 | 05 | 5 | | | | | | | | | |
| 534 | 20 | 20 | | | | | | | | | |
| 535 | 42 | STO | | | | | | | | | |
| 536 | 18 | 18 | | | | | | | | | |
| 537 | 43 | RCL | | | | | | | | | |
| 538 | 47 | 47 | | | | | | | | | |
| 539 | 42 | STO | | | | | | | | | |
| 540 | 48 | 48 | | | | | | | | | |
| 541 | 43 | RCL | | | | | | | | | |
| 542 | 15 | 15 | | | | | | | | | |
| 543 | 42 | STO | | | | | | | | | |
| 544 | 46 | 46 | | | | | | | | | |
| 545 | 22 | INV | | | | | | | | | |
| 546 | 86 | St flg | | | | | | | | | |
| 547 | 07 | 7 | | | | | | | | | |
| 548 | 29 | CP | | | | | | | | | |
| 549 | 92 | INVSBR | | | | | | | | | |
| 550 | 32 | x≥t | | | | | | | | | |
| 551 | 42 | STO | | | | | | | | | |
| 552 | 18 | 18 | | | | | | | | | |
| 553 | 01 | 1 | | | | | | | | | |
| 554 | 32 | x≥t | | | | | | | | | |
| 555 | 92 | INVSBR | | | | | | | | | |

MERGED CODES

| | | | | | | | | |
|----|-----|-----|----|-----|-----|----|-----|-----|
| 62 | Pgm | Ind | 72 | STO | Ind | 83 | GTO | Ind |
| 63 | Exc | Ind | 73 | RCL | Ind | 84 | Op | Ind |
| 64 | Prg | Ind | 74 | SUM | Ind | 92 | INV | SBR |