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><><    TRICKS OF THE TRADE    ><><
><><><><    TUTORIAL #14  ><><><><
><><><><    MIKE WHITE      ><><><><
><><><><  COUNTY LINE #2  ><><><><
><><><><  R.D.#1 BOX 373  ><><><><
><><><><  WAKEMAN , OHIO  ><><><><
><><><><      44889        ><><><><
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MORE ON STRINGS

"RUNNING ALL AT ONCE" TO QUOTE MYSELF FROM LAST MONTH, MEANS THAT ALL FIVE MULTIPLE STRING METHODS CAN EXIST IN A PROGRAM AT THE SAME TIME! THE BOTTOM LINE IS THIS; FROM NOW ON, WE'LL BE DISCUSSING THE @(X) STRING AS AN EXAMPLE. BUT REMEMBER, THE METHODS DISCUSSED APPLY TO THE *(X), %(-X), %(+X), AND THE %(X) ARRAYS AS WELL AS @(X) (WITH 1 EXCEPTION). THEY CAN EVEN EXIST WITHIN EACH OTHER! THEY ARE COMPATIBLE! HOW? LET'S SEE:

THE MATH METHOD

SAY WE WISH TO KEEP 4 PLAYERS SCORES, DIFFICULTY LEVELS, AND NUMBER OF LIVES IN A GIVEN PROGRAM. "PLAYER UP" IS KEPT IN THE VARIABLE "P". USING THIS METHOD, WE VERY SIMPLY SAY: SCORE=@(P), DIFFICULTY=@(P+4), AND LIVES=@(P+8). THE @(X) STRING WILL LOOK LIKE THE FOLLOWING CHART:

PLAYER UP	SCORES	DIFFICULTY	LIVES
1	@(1)	@(5)	@(9)
2	@(2)	@(6)	@(10)
3	@(3)	@(7)	@(11)
4	@(4)	@(8)	@(12)

THE "+" KEY CAN EVEN BEGIN ANOTHER STRING STARTING AT @(13). THE "x" KEY CAN TAKE THE IDEA FARTHER, AS SEEN IN THIS LINE FROM **SNOOP CAMERA**! (OUR SCREEN DUMP PROGRAM):

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58 PRINT #1,0,;FOR X=VTO W;B=@(4x(X>R)+PX(X,Y)+Dx8+19);
FOR C=1TO K;TV=B-(N=1)x(B=771);IF N=2TV=B.(B,1)
```

THE COLOR CODE IS IN THE @(X) STRING. IF X>R WE ARE RIGHT OF THE &(9) BOUNDRY LINE. ALSO, "D=D+1" AS WE CROSS AN INTERRUPT COLOR CHANGE LINE. TO ALLOW FOR A FOUR COLOR SCREEN, WE MOVE 4 PLACES UP THE STRING WHEN WE CROSS &(9), AND 8 WHEN WE CROSS AN INTERRUPT. THE FIRST 26 @(X) ADDRESSES HOLDS THE INTERRUPT LINE SCREEN LOCATIONS. "D=1" WHEN THE "xPRINT " LOOP (OF WHICH LINE #58 IS PART OF) STARTS, THUS Dx8+19=27. THE PRINTER RECEIVES THE "TV=?" COMMANDS AT THE END OF LINE #58, WHICH SENDS DOT IMMAGE GRAPHICS DATA OUT, ONE BYTE AT A TIME! (SEE PG. 38,42, AND 43 OF VOL. 2 **NIAGARA BUG BULLETIN** TO REVIEW THE "BYTE" COMMAND IN EB). THIS COMBINES "THE MATH METHOD" WITH:

THE BIT-SPLIT METHOD

IN **MONKEY JUMP** (WAVEMAKERS) EACH PLAYER RESUMES THE SCREEN OF BANANAS HE WAS EATING, WITH EACH TURN! THE ROUTINES ARE:

```
14 H=1;FOR D=1TO M;H=Hx10;NEXT D;I=H÷10
16 D=1;FOR A=-30TO 33STEP 12;BOX 1,A-6,138,3,3
17 FOR B=-60TO 60STEP 20;C=@(D)÷H
18 BOX B,A,2,2,(RM>I-1);D=D+1;NEXT B;NEXT A
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THE @(X) STRING IS "DIGIT-SPLIT" TO HOLD ALL FOUR SCREENS OF BANANAS IN THE SPACE OF ONE STRING! IF @(1)=1111, ALL 4 PLAYERS WOULD GET THAT BANANA RESTORED ON THE NEXT TURN. IF @(1)=1010 ONLY THE 2ND AND 4TH PLAYER WOULD, AND IF @(1)=0 NO ONE WOULD. "M" HOLDS THE PLAYER UP, AND "H" AND "I" SEPARATE THE DIGITS. HOWEVER, <u>ALL NUMBERS IN A COMPUTER ARE BINARY</u>! SO, IF WE CAN DIVIDE BY 10 AND GET AWAY WITH IT, WHY NOT ANY NUMBER? <u>IT CAN BE DONE</u>!! BOWLING (FROM **NIAGARA BUGS CLUB TAPE**) CONTAINS THIS:

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260 @(V)=Sx100+Rx10+Q;IF Z=6PRINT " x ",
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THIS LINE PUTS NUMBERS BACK IN THE STRING AFTER A PLAYERS TURN ENDS. SINCE THE HIGHEST POSSIBLE SCORE IS 300, THE FIRST 3 DIGITS HOLD THE SCORE, AND THE OTHER TWO HOLD STRIKE AND SPARE INFORMATION TO FIGURE SCORING (ADDS TO THE NEXT FRAME ETC.). IN **U.F.O. ATTACK** IT'S MORE COMPLEX. THESE TWO SUBROUTINES KEEP THE FLYING SAUCER LOCATIONS AND SIZES IN THE SAME STRING SPACE:

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2 X=@(R)÷100;Y=(ABS(RM)÷5)x5-50;H=RM;RETURN
3 @(P)=Xx100+H+Y+50-2x(X<0)x(H+Y+50);RETURN
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"X" AND "Y" ARE SCREEN LOCATIONS AND "H" IS THE SAUCERS SIZE AS EXPLAINED IN THIS COLUMN TWO MONTHS BACK. "Y" INCREMENTS IN 5 PIXEL STEPS, SO THE NUMBERS BETWEEN THOSE STEPS HOLD OUR SAUCER SIZE. USING "ABS" TO RETRIEVE "Y" IN LINE #2 RESULTS IN GETTING ONLY POSITIVE NUMBERS, HENSEFORTH THE "-50". "÷5)x5" IN LINE #2 YIELDS UP A NEW "RM", SO "H=RM". IN LINE #3 THE 50 MUST BE ADDED BACK ON, AND ALLOWANCE MUST BE MADE FOR "X" TO GO NEGATIVE. IF "X" IS NEGATIVE "H" AND "Y" MUST BE SUBTRACTED INSTEAD OF BEING ADDED, OR "ABS" WILL GIVE THE WRONG NUMBERS, "-2x(X<0)x" RESULTS IN A SUBTRACTION (H+Y+50-2x(H+Y+50)=-H-Y-50 OR, X-2xX=-X).

IF YOU'RE USING "THE BIT-SPLIT METHOD" DON'T BE AFRAID TO DIVIDE BY 2,5,90,32767, OR WHATEVER! IN **PUT-PUT GOLF** (ON **NIAGARA BUGS CLUB TAPE**) YOU WILL FIND "X=@(U+4)÷90;Y=ABS(RM)-45" IN LINE #22. THIS SAVES A BYTE OF BASIC TEXT BY DIVIDING BY 90 INSTEAD OF 100, SINCE THE SCREEN IS LIMITED VERTICALLY FROM 43 TO -44. 8 DATA PIECES FROM 1 ADDRESS ARE POSSIBLE WITH A TRUE "BIT-SPLIT"!

ALL THE STRINGS DISCUSSED THIS MONTH HAVE A COMMON FEATURE, THEY'RE SYMMETRICAL (4 SCORES, 4 DIFFICULTIES, 4 LIVES, ETC.). WHAT IF THEY WERE DIFFERENT? NEXT MONTH! KEEP BUGGIN'!!!   ✳