

SEL 810A BASIC COMPILER DEMO and associated GAMES

BLACK JACK, MAGIC SQUARES, LUNAR LANDER

The following are games that ran on the SEL 810A computer. By the attached documentation, the games were demonstration software for a BASIC COMPILER program for the SEL 810B computer from Wallace Ohran & Sons of Provo, Utah they provided October 20, 1972.

The software was written to run on a SEL 810B. It was found that the instruction set for the 810A did not have an "OVS" (Overflow Set) instruction. In order to get the compiler to run on an 810A, the program needed five (5) memory locations modified after it was loaded in to memory. The attached documentation lists the locations to be modified.

I recall playing the Lunar Lander game in the mid 1970's. It was necessary to modify the 5 memory locations to run on the SEL810A. The object was to land the LEM (Lunar Excursion Module) on the surface of the moon without crashing. The player would input a percent of fuel to be burned (0 - 100%) every 10 seconds. The computer would calculate the remaining fuel, altitude, speed, and velocity. The object was to contact the lunar surface at less than 10 MPH. A couple of sample printouts are in the attached documentation.

SEL810A BASIC Games:

BASIC Compiler(demo version)

Black Jack

Magic Squares

Lunar Lander

The loading procedure is detailed in the attached documentation. The following is an outline.

Bootstrap the machine

Load the 16K load/ dump program with the bootstrap.

Load the BASIC Compiler into the reader (absolute tape) and
start the absolute loader (PC=037673 for 16K loader).

Modify the 5 address locations in memory.

<u>Octal Location</u>	<u>Octal contents</u>
'2326	'120770
'2364	'120770
'771	'050160
'772	'050160
'773	'112770

Master Clear; Press Start/Stop Twice to start the COMPILER. The TTY should print READY.

Load the "GAME TAPE" in the paper tape reader.

Type "TAPE". (The tape should read and the TTY should respond with "READY")

Type "RUN" to start the "GAME" program running.

Ron Price

Cortland, NE.

January 4, 2020

Wallace Ohran & Sons

179 West 4750 North
PROVO, UTAH 84601
(801) 225 - 6789

October 20, 1972

Dear SEL 810 user,

Wallace Ohran and Sons, Inc. have a program to sell--BASIC for the SEL 810 series computer. Enclosed is a copy for your inspection, with instructions for adapting the program to your particular system.

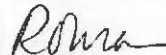
Let me tell you about SEL 810 BASIC. It exceeds Dartmouth BASIC specifications. It uses only 6K of core. It's clean; it's been in use for over a year. It's flexible--easily linked to plotters, tubes, graphic displays, TV screens, D/A, A/D, etc. It's easy to use: interactive program development, on-line editing, and interpretive execution.

Incidentally, the enclosed tape has no syntax processor and therefore, will run only the special-format demonstration programs provided; it cannot accept programs in ASCII source. For \$1500, well worth it to leave the headaches of FORTRAN behind, we will send you a complete version of SEL 810 BASIC including syntax processor, which will accept BASIC programs in source.

I hope you will enjoy the demonstration program. The enclosed tapes are yours without restriction or liability. This approach lets you see what you will be getting. If nothing more, your SEL is now a good blackjack dealer.

I look forward to hearing from you soon.

Sincerely,



Richard Ohran
Marketing

RO:np
Enclosures

Wallace Ohran & Sons

179 West 4750 North
PROVO, UTAH 84601
(801) 225 - 6789

November 6, 1972

Dear SEL 810A User:

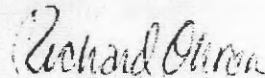
A week or so ago you were mailed a copy of the Basic Interpretive Compiler for the SEL 810 series computers. The compiler was developed on a SEL 810B computer, utilizing instructions common to the whole 810 series.

It has since been discovered that the version of Basic which you received will not work because OVS (overflow set) command is not available on the 810A series. The following core patch will rectify the situation:

<u>Octal location</u>	<u>Octal contents</u>
'2326	'120770
'2364	'120770
'771	'050160
'772	'050160
'773	'112770

This should cure any problems you might have had using the compiler. If any further problems arise, please contact me at the above address or telephone 801-374-1211, ext. 3812.

Yours truly,



Richard Ohran

RO/df

USING THE SEL 810 BASIC COMPILER (DEMONSTRATION VERSION)

REQUIRED CONFIGURATION* SEL 810B OR 810A COMPUTER WITH HARDWARE MULTIPLY AND DIVIDE, 8K OF CORE, STANDARD SEL I/O WRITER (UNIT 1).

OPTIONAL* HIGH SPEED PAPER TAPE READER, HIGH SPEED PAPER TAPE PUNCH.

NON-STANDARD I/O DEVICES* NON-STANDARD I/O DEVICES MAY BE ADAPTED TO THIS COMPILER BY PATCHING APPROPRIATE I/O COMMANDS USING THE I/O LISTING PROVIDED. SPECIAL HELP WILL BE GIVEN UPON REQUEST.

LOADING THE DEMONSTRATION COMPILER* USE THE STANDARD SEL RELOCATABLE LOAD/DUMP PACKAGE, TAPE #30001D. THE COMPILER IS IN ABSOLUTE FORMAT AND MAY BE LOADED BY STARTING THE COMPUTER WITH "17672 IN THE PROGRAM COUNTER. THE EXACT LOCATION MAY VARY FROM MACHINE TO MACHINE DEPENDING ON THE AMOUNT OF CORE.

INITIATING THE COMPILER* PRESS MASTER CLEAR; PRESS START TWICE. THE COMPUTER SHOULD TYPE "READY" ON THE TELETYPE. LOCATION 1 HAS A JUMP INSTRUCTION TO THE START OF THE COMPILER.

LOADING A DEMONSTRATION PROGRAM* PLACE ONE OF THE DEMONSTRATION PROGRAMS IN THE READER. WITH THE TAPE IN PLACE, TYPE EITHER "RTAPE" IF THE PHOTO READER IS BEING USED, OR "TAPE" IF THE ASR-33 READER IS USED. WHEN THE CARRIAGE RETURN IS TYPED, THE READER SHOULD COMMENCE READING THE PROGRAM. IF THE READER INPUTS THE WHOLE TAPE CORRECTLY, THE COMPUTER WILL TYPE OUT "READY". OTHERWISE, IT WILL TYPE OUT A "CK" AND HALT. IF THIS HAPPENS AND YOU WISH TO ATTEMPT TO READ AGAIN, REPOSITION THE TAPE TO THE BEGINNING AND PRESS "START".

RUNNING THE PROGRAM* TYPE "RUN" FOLLOWED BY A CARRIAGE RETURN.

LISTING THE PROGRAM* TYPE "LIST" FOLLOWED BY A CARRIAGE RETURN FOR A LISTING OUTPUT ON THE TELETYPE. TYPE "PLIST" FOR A PUNCHED TAPE OUTPUT ON THE HIGH SPEED PUNCH.

DELETING LINES FROM A PROGRAM* TYPE A STATEMENT NUMBER FOLLOWED BY A CARRIAGE RETURN TO DELETE THE LINE.

INTERRUPTING THE EXECUTION OF A PROGRAM* TYPE A "CONTROL A" FOLLOWED BY A CARRIAGE RETURN.

EDITING FEATURES* A "BACK ARROW" DELETES THE PREVIOUS CHARACTER FROM THE INPUT BUFFER. AN "ALTERNATE MODE" DELETES THE WHOLE LINE. LINEFEEDS ARE IGNORED. A CARRIAGE RETURN COMPLETES THE LINE AND SIGNALS THAT THE COMPILER MAY PROCESS THE INPUT.

BASIC FOR THE SEL 810B

"BASIC" IS A HIGH LEVEL LANGUAGE WHICH ALLOWS THE USER TO QUICKLY SOLVE MATHEMATICAL PROBLEMS OF RELATIVELY LARGE COMPLEXITY WITHOUT THE SUBSTANTIAL PROGRAMMING EFFORT WHICH MIGHT BE REQUIRED TO DO THE SAME PROBLEM IN FORTRAN. THE COMPILER IS INTERACTIVE AND ALLOWS THE CORRECTION AND EDITING FUNCTIONS TO BE PERFORMED AT THE TERMINAL. THE CURRENT SYSTEM IS "SINGLE USER" AND TYPICALLY USES THE SYSTEM I/O WRITER FOR COMMUNICATIONS WITH THE PROGRAMMER. THERE ARE ALSO PROVISIONS IN THE COMPILER TO DRIVE OTHER I/O DEVICES.

THE SEL 810B BASIC SYSTEM HAS ALL FEATURES OF THE STANDARD DARTMOUTH "BASIC" INCLUDING TRANSCENDENTAL AND MATRIX FUNCTIONS. THESE FEATURES ARE AS FOLLOWS*

STATEMENTS

LET	REM	INPUT	PRINT	GOTO	IF	DEF
FOR	NEXT	READ	DATA	RESTORE	WAIT	GOSUB
CALL	MAT	DIM	STOP	END		

FUNCTIONS

ABS	EXP	INT	LOG	RND	SQR	SIN
COS	TAN	ATN	TAB	SGN		

MATRIX OPERATIONS (USED WITH MAT STATEMENT)

ZER	CON	IDN	PRINT	READ	TRN	INV
+	*	*				

THE FLEXIBILITY OF "BASIC" IS GREATLY ENHANCED BY THE AVAILABILITY OF THE "CALL" FEATURE WHICH ACCOMPLISHES THE CONNECTION AND ARGUMENT TRANSFER TO ASSEMBLY LANGUAGE SUBROUTINES EXTERNAL TO THE COMPILER. THIS FEATURE HAS ALREADY BEEN USED EXTENSIVELY TO DRIVE A GRAPHICS DISPLAY TERMINAL AND A TELEVISION SCAN CONVERTER. IT HAS ALSO BEEN USED TO CONTROL A/D AND D/A CONVERTERS FOR REAL TIME WORK.

THE SEL 810B "BASIC" SYSTEM REQUIRES A MINIMUM OF 8K CORE MEMORY. THE SYSTEM ITSELF REQUIRES 6500 LOCATIONS LEAVING SOME 1500 LOCATIONS FOR PROGRAM STORAGE. SHOULD MORE PROGRAM STORAGE BE REQUIRED, AN ADDITIONAL 1000 MEMORY LOCATIONS CAN BE OBTAINED AT THE SACRIFICE OF THE MAT STATEMENT. THIS DOES NOT INHIBIT THE FUNCTION OF THE DIM AND SUBSCRIPT OPERATIONS. THE STORAGE IS USED QUITE EFFICIENTLY AS THE PROGRAM IS STORED IN AN ABBREVIATED FORM WHICH CAN MORE EASILY BE ANALYZED FOR INTERPRETIVE EXECUTION.

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FOR THE STAND ALONE ABSOLUTE VERSION OF THE COMPILER, I/O ROUTINES ARE ASSEMBLED AND LOADED SEPARATELY FROM THE MAIN BODY OF THE COMPILER. LINKAGE FROM THE COMPILER TO THE I/O OCCURS THROUGH DEDICATED LOCATIONS IN MAP ZERO. THE FOLLOWING IS A LIST OF THE SIGNIFICANT POINTERS IN MAP ZERO*

OCTAL LOCATION	SIGNIFICANCE
0	JUMP INSTRUCTION TO START BASIC (DOESN'T SCRATCH PROG.)
1	JUMP INSTRUCTION TO START BASIC (SCRATCHES OLD PROG.)
2	TELETYPE PRINTER ROUTINE POINTER
3	HIGH SPEED PUNCH ROUTINE ADDRESS
4	TELETYPE KEYBOARD ROUTINE ADDRESS
5	TELETYPE READER ROUTINE ADDRESS
6	HIGH SPEED READER ROUTINE ADDRESS
7	INTERRUPT ENABLE ROUTINE ADDRESS
10	PROGRAM EXECUTION HALT JUMP INSTRUCTION
11	LAST WORD OF AVAILABLE MEMORY
12	FIRST WORD OF AVAILABLE MEMORY
14	FIRST WORD OF USERS PROGRAM
15	LAST WORD OF USERS PROGRAM

CALLING SEQUENCES FOR I/O ROUTINES USED BY BASIC

TELETYPE PRINTER, HIGH SPEED PUNCH

LAA	CNT	NUMBER OF CHARACTERS FOR OUTPUT
LBA	ADDR	ADDRESS OF OUTPUT BUFFER
SPB*	2	USE 3 FOR PUNCH

TTY KEYBOARD, TTY READER, HIGH SPEED READER

LAA	MAX	SIZE OF BUFFER IN CHARACTERS
LBA	ADDR	ADDRESS OF INPUT BUFFER
SPB*	4	5 FOR TTY READER, 6 FOR HIGH SPEED READER

UPON RETURN FROM THE INPUT ROUTINES THE B REGISTER WILL BE EXAMINED BY THE COMPILER FOR THE FOLLOWING ERROR CODES*

0	OK, NO ERRORS
1	LEADER OR TRAILER CHARACTER ENCOUNTERED
2	ESCAPE OR ALTERNATE MODE CODE DETECTED
3	INPUT BUFFER OVERFLOW

INTERRUPT ENABLING ROUTINES*

AN INDIRECT SUBROUTINE CALL IS MADE THROUGH LOCATION 7 BEFORE MAJOR COMMANDS ARE EXECUTED IN ORDER TO SET UP THE INTERRUPT ROUTINE FOR PROGRAM. INTERRUPT HALTS IF SUCH SHOULD OCCUR. UPON DETECTION OF AN INTERRUPT HALT THE INTERRUPT ROUTINE EXECUTES A NORMAL JUMP TO LOCATION 10 (OCTAL).

AN INSPECTION OF THE I/O LISTING PROVIDED WILL SHOW THAT THE ROUTINES HAVE BEEN WRITTEN IN A VERY STRAIGHT FORWARD MANNER THAT WILL ALLOW MODIFICATIONS TO BE MADE WITH EASE. INSTRUCTION CONSTRUCTION AS IS COMMONLY USED IN SOFTWARE PROVIDED BY SEL HAS NOT BEEN USED IN ORDER THAT THE USER MAY FREELY ADAPT THE I/O TO SUIT HIS PARTICULAR CONFIGURATION.

SEL 810-B BASIC ERROR CODES

- 1 INPUT EXCEEDS 71 CHARACTERS.
- 2 SYSTEM COMMAND NOT RECOGNIZED.
- 3 MISSING OR INCORRECT STATEMENT TYPE.
- 4 STATEMENT ENDS UNEXPECTEDLY.
- 5 EXPONENT OF NUMBER IS MISSING POWER.
- 6 "LET" STATEMENT HAS NO EQUAL SIGN.
- 7 MISSING OR INCORRECT FUNCTION IDENTIFIER IN "DEF" STATEMENT.
- 8 MISSING PARAMETER IN "DEF" STATEMENT.
- 9 MISSING ASSIGNMENT OPERATOR.
- 10 MISSING "THEN".
- 11 MISSING OR INCORRECT "FOR" VARIABLE .
- 12 MISSING "TO".
- 13 INCORRECT "STEP" IN "FOR" STATEMENT.
- 14 EXTERNAL ROUTINE FOR "CALL" STATEMENT DOES NOT EXIST.
- 15 INCORRECT NUMBER OF PARAMETERS IN "CALL" STATEMENT.
- 16 MISSING OR INCORRECT CONSTANT IN "DATA" STATEMENT.
- 17 MISSING OR INCORRECT VARIABLE IN "READ" STATEMENT.
- 18 NO CLOSING QUOTE FOR PRINT STRING.
- 19 MISSING PRINT DELIMITER OR BAD "PRINT" QUANTITY.
- 20 MISSING DELIMITER.
- 21 MISSING MULTIPLICATION OPERATOR.
- 22 MISSING LEFT PARENTHESIS.
- 23 MISSING RIGHT PARENTHESIS.
- 24 OPERAND NOT RECOGNIZED.
- 25 MISSING OR BAD INTEGER.
- 26 NON-BLANK CHARACTERS FOLLOWING STATEMENT'S LOGICAL END.
- 27 SYMBOL FOLLOWING MAT NOT RECOGNIZED.
- 28 ILLEGAL WORD FOLLOWS MAT.
- 29 IMPROPER MATRIX FUNCTION.
- 30 NO SUBSCRIPT WHERE EXPECTED.
- 31 MATRIX CANNOT BE INVERTED OR TRANSPOSED INTO SELF.
- 32 IMPROPER MATRIX OPERATOR.
- 33 MATRIX MAY NOT BE BOTH OPERAND AND RESULT OF MATRIX MULTIPLICATION.
- 34 DEFINED ARRAY MISSING SUBSCRIPT PART.
- 35 MISSING ARRAY IDENTIFIER.
- 36 DOUBLY DEFINED FUNCTION.
- 37 "FOR" STATEMENT HAS NO MATCHING "NEXT" STATEMENT.
- 38 "NEXT" STATEMENT HAS NO MATCHING "FOR" STATEMENT.
- 39 LAST STATEMENT IS NOT "END".
- 40 MISSING STATEMENT.
- 41 GOSUBS NESTED TEN DEEP.
- 42 ACCESSED OPERAND HAS UNDEFINED VALUE.
- 43 RETURN FOUND NO ADDRESS.
- 44 NON-INTEGGER POWER OF NEGATIVE NUMBER.
- 45 ZERO TO ZERO POWER.

- 46 TRIG FUNCTION ARGUMENT IS TOO LARGE.
- 47 ATTEMPTED SQUARE ROOT OF NEGATIVE ARGUMENT.
- 48 ATTEMPTED LOG OF NEGATIVE ARGUMENT.
- 49 ARRAY APPEARS WITH INCONSISTENT DIMENSI
- 50 ARRAY DOUBLY DIMENSIONED.
- 51 NUMBER OF DIMENSIONS NOT OBVIOUS.
- 52 ARRAY TOO LARGE.
- 53 SUBSCRIPT EXCEEDS BOUNDS.
- 54 DYNAMIC ARRAY EXCEEDS ALLOCATED STORAGE.
- 55 DIMENSIONS NOT COMPATIBLE.
- 56 MATRIX OPERAND CONTAINS UNDEFINED ELEMENT.
- 57 SINGULAR OR NEARLY SINGULAR MATRIX.
- 58 OUT OF STORAGE DURING SYNTAX PHASE.
- 59 OUT OF STORAGE FOR SYMBOL TABLE.
- 60 OUT OF STORAGE DURING ARRAY ALLOCATION.
- 61 OUT OF DATA.
- 62 OUT OF STORAGE DURING EXECUTION.

THE FOLLOWING ERRORS ARE WARNING ONLY, EXECUTION CONTINUES.

- 63 NUMERICAL OVERFLOW, RESULT TAKEN TO B + OR - INFINITY.
 - 64 NUMERICAL UNDERFLOW, RESULT TAKEN TO BE ZERO.
 - 65 LOG OF ZERO TAKEN TO BE - INFINITY.
 - 66 "EXP" OVERFLOWS, RESULT TAKEN TO BE + INFINITY.
 - 67 DIVISION BY ZERO, RESULT TAKEN TO BE + OR - INFINITY.
 - 68 ZERO RAISED TO NEGATIVE POWER, RESULT TAKEN TO BE + INFINITY.
-

READY

LOAD BASIC 37673
CHANGE 5 LOCATIONS

READY

PTAPE

READY

TAPE

READY

RUN

-THIS IS THE LUNAR APPROACH CONTROL COMPUTER

-GUIDANCE PLATFORM ALIGNMENT COMPLETED

-150 MILES OUT VELOCITY 3550 MILES/HOUR

-LUNAR ORBIT INSERTION BURN IN 200 SECONDS

***** PRIORITY RED ALERT*****

COMMAND MODULE MALFUNCTION----- OVERLOAD EXPLOSION IN 2 MIN

LEM UNDOCKING IN 1 MIN

LEM WILL BE UNDER MANUAL CONTROL

UPDATES EVERY 10 SECONDS

LEM WEIGHT=33680 LBS - 18415 LBS IS DESCENT STAGE FUEL

YOU CONTROL ENGINE OUTPUT POWER FROM 0%-100%

100% POWER = 52500 LBS

FUEL RATE AT 100% POWER=200 LBS/SEC

YOUR ONLY CHANCE IS TO LAND ON THE MOON

WITH AN IMPACT VELOCITY < 10 M P H.

STANDBY TO TAKE CONTROL

GOOD LUCK ----- YOU NEED IT !

TIME SEC	ALTITUDE MILES - FEET	VELOCITY MPH	FUEL LBS	% POWER
0	119 5278	3599.99	18415.	?70
10	110 1064	3383.07	17000.7	?50
20	100 4872	3230.41	15990.9	?20
30	91 4865	3186.34	15587.3	?

