In this newsletter we discuss the current BALMSETL implementation and how to run BALMSETL programs. We also mention a few features of the BALM system of interest to BALMSETL users.

The implementation is available on two permanent files:

BIA4293 - which contains the procedure definitions for the basic SETL operations; and

BIB4293 - which provides for the use of SETL operators in infix form.

Both files should be input using the EXECUTE procedure (details below). After "executing" BIA4293, one may write:

1) \( A = \text{MAKSET} (10,20,30); \ B = \text{WITHP}(A, 40); \ C = \text{ARB}(A); \) etc.

After "executing" BIB4293, one could write 1) as

\( A = \text{MAKSET} (10,20,30); \ B = A \text{ WITH } 40; \ C = \text{ARB} A; \) etc.

Note that the operator precedence established by BIB4293 is as follows (in decreasing order):

a) monadic operators giving boolean values from non-boolean arguments: ATOM, PAIR.

b) infix operators giving boolean values: EQ, LT, EL, etc.

c) monadic operators except as in a)

d) infix operators except as in b). Note that the functional application operators are in this group, so that

\( \text{G OF } X \ \text{LT } 1 \)

is interpreted as

\( \text{G OF } (X \ \text{LT } 1). \)
Operator precedences may be specified by users (for details, see Dave Shields).

Note the following limitations in the current implementation:

a) Function application is defined for only one argument; thus, \( G \ OF \ X \), or \( OFP(G,X) \) is legal, while \( G \ OF \ (X,Y) \) is not.

b) Character strings are available. The SETL string 'ABC' is written \( \langle ABC \rangle \); the null string " is \( \langle \rangle \). All character string operations except OCT are available. Bit strings are not available; for the present, use BALM octal constants;

c) No indication of error is given if an attempt is made to add UNDEF \( (\_\_\_\_) \) to a set; the value of \( S \) with UNDEF is \( S \).

d) Avoid operations which treat a set as an ordered pair, and vice versa. Note that if the BALM TL (CDR) is used instead of the BALMSETL TL (TLP), then TL MAKTUP(A,B) is \( (B) \), (the list containing B), and not B.

e) Assignments to arguments of a procedure (PROC) will be in effect only during the execution of the procedure. For this reason, the functions IS, FROM, and IN are not available. Note that after executing

\[
ISP = PROC(X,Y), \ X=\ Y \ END; \ A=10; \ B=20; \ C=30;
A=ISP(B,C);
\]

A will have the value 30; B will have value 20, (not 30) and C will have value 30. However, one may define IS as an infix function associating to the right, executing

\[
INFIX (=IS, 2002, 2003, =SETQ,)
\]

f) The implementation is very inefficient; don't worry about optimizing your BALMSETL programs.
BALMSETL USING \*INTERCOM

CR indicates "Return" Key.

LOGIN

TYPE VALID USER NAME-SHL1413         CR
TYPE VALID PASSWORD-                  CR
03/08/71 LOGGED IN AT 13:20:34.
COMMAND - CONNECT(INPUT,OUTPUT)      CR

COMMAND - EFL.60000.      CR
COMMAND - ATTACH(BIA,BIA4293)  CR
       ATTACH(BIA,BIA4293)
COMMAND - BALM,TTY.     CR
BALM 3.2 - 1JUN70
FREESPACE LENGTH 13424B
STACK LENGTH 3616B
BLOCKSPACE LENGTH 2752B

BIA = FILE(&BIA&); ERRS=FILE(&ERRS&); EXECUTE(BIA,ERRS);  CR

< BUGS IN HD, TL, EQL,FIRST, LAST FIXED >
< UOF, NEWAT, INCS ADDED 8 MARCH (D S) >
<IMPLEMENTATION ROUTINES INPUT>

U=MAKSET(10,20,30); V=MAKSET(10,30); PRINT(INCSP(U,V));  CR

TRUE     (V is subset of U)

EXIT();  CR
BALM DONE
COMMAND - LOGOUT.  CR
YOU NO LONGER OWN ANY PRIVATE FILES.
CP TIME 6.673
PP TIME 28.081
03/08/71 OFF AT 13:23:53.
Running BALMSETL programs under SCOPE (batch).

Here is a recommended deck for submitting running BALMSETL programs:

```plaintext
JOB1234,T30,CM60000. *your name *
ATTACH(BIA,BIA4293)
ATTACH(BIB,BIB4293)
BALM.
E-O-R
BIA = FILE(BIA#); EXECUTE(BIA,OUTPUT);
BIB = FILE(BIB#); EXECUTE(BIB,OUTPUT);
(insert program here)
EXIT(); (used to exit from BALM)
E-O-F
```

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**Codes For BALM Special Symbols**

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