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MODCOMP MAX IV SYSTEM PROCESSORS REFERENCE GUIDE

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MODCOMP MAX IV SYSTEM PROCESSORS

USERS REFERENCE GUIDE

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Abstract

A user almost always faces a big problem when having to learn to use a new computer system. The information necessary to use the system is often scattered throughout many different manuals. The user also faces the problem of extracting the information really needed from each manual. Very few computer vendors supply a single 'Users Guide' or even a manual to help the new user locate the necessary manuals. Modcomp is no exception to this. Modcomp MAX IV requires that the user be familiar with the system file usage which adds to the problem. At General Atomics there is an ever increasing need for new users to learn how to use the Modcomp computers. This paper was written to provide a condensed 'Users Reference Guide' for Modcomp computer users. This manual should be of value not only to new users but any users that are not Modcomp computer systems experts.

This 'Users Reference Guide' is intended to provide the basic information for the use of the various Modcomp System Processors necessary to, create, compile, link-edit, and catalog a program. Only the information necessary to provide the user with a basic understanding of the Systems Processors is included. This document provides enough information for the majority of programmers to use the Modcomp computers without having to refer to any other manuals. A lot of emphasis has been placed on the file description and usage for each of the System Processors. This allows the user to understand how Modcomp MAX IV does things rather than just learning the system commands.

Introduction

This manual consists of many parts describing the various System Processors. A detailed description of each System Processor is provided in the appropriate Modcomp Manual, which will be listed after each section. This document consists of the following parts:

- File Description and Use - Describes the files used by the System Processors and how they are used
- Job Control - Command Line Interpreter
- Job Control Sequence - This part describes the overall procedure to, create, compile, link-edit, and catalog a program.
- Source Editor - Describes the use of the Source Editor (SED) System Processor
- Compiler Processor - Describes the use of the Ratfor and FORTRAN compiler System Processor
- Assembler - Describes the use of the Assembler System Processor
- Link-Editor - Describes the use of the Link-Editor System Processor
- Cataloger Processor - Describes the use of the Task Overlay Cataloger System Processor
- Multiuser System Job Control - Describes the Neutral Beam Multiuser system and some of the Procedures available.

File Description and Use

Job control and the System Processors use several different files for the input and output operations performed by each. The files are logical names and are not necessarily disk files. Some of the files may be thought of as data streams rather than particular devices. Others are typically logical disk file names. The important thing to remember is that the files are logical file names. The following is a description of the basic file names used:

- SI - Source Intput file. This is actually an input source data stream that may be assigned to any device to input source data from. It is used by the System Processors that use source data as input.
- SO - Source Output file. This is actually an output source data stream that may be assigned to any device to output source data to. It is used by the System Processors that output source data.
- BI - Binary Intput file. This is actually an input binary data stream that may be assigned to any device to input binary data from. It is used by the System Processors that use binary data as input.
- BO - Binary Output file. This is actually an output binary data stream that may be assigned to any device to output binary data to. It is used by the System Processors that output binary data.
- CI - Command Intput file. This is the command input file stream that may be assigned to any device to input Job Control commands or directives for the System Processors.
- CO - Computer to Operator file. This is the output file stream that may be assigned to any device used by Job Control and the System Processors, to output operator and error messages.
- LO - Listing Output file. This is the listing output file stream that may be assigned to any device, used by the Systems Processors for listing output data.
- SC - Scratch file. This is the scratch file that is used by some of the System Processors (i.e. M4E) for intermediate file operations. It may be assigned to disk (typical) or to magnetic tape.
- USL - User Source Library file. This is the logical file name that is assigned to the file that contains the users source data. It is typically assigned to a disk file, but could be assigned to a magnetic tape drive.
- JC - Job Control file. This is the logical file name that is assigned to the file that contains the global Job Control procedures. It is typically assigned to a disk file, but could be assigned elsewhere.
- UJC - User Job Control file. This is the logical file name that is assigned to the file that contains the user Job Control procedures. It is typically assigned to a disk file, but could be assigned elsewhere.
- WRK - Random WoRK file. This is the logical file name that is assigned to the random work disk file used by the source editor. Must be a disk file.
- UL - User Library file. This is the logical file name that is assigned to the file that contains the users subroutine library in binary object code format.

- **TM** - **Temporary Load Module file.** This is the file that contains the users executable load modules. This is where the program is cataloged as a load module.
- **NO** - **NO is actually a null file.** A logical file may be assigned to NO when no input or output is to be performed from/to the logical file. I.E. ASS SI NO, ASS LO NO.

All logical files have a current assignment and a default assignment. The current and default assignments are made when a user first signs onto the system. The assignments may be subsequently changed by executing the assign (ASS) or default (DEF) Job Control commands. The default (DEF) command does not change the current assignment until the set defaults (JOB) command is issued, or the logical file is assigned to itself. Each logical file also has a file position index that is a pointer for the logical file to the assigned device. The list of logical file current assignments, default assignments, and file-position indices, for the Multiuser system at time of sign-on (Signed on to Y "SYY", on BAT002) are as follows:

LOGICAL FILE NAME	CURRENT DEVICE ASSIGNMENT	FILE POSITION INDEX	DEFAULT DEVICE ASSIGNMENT	CURRENT FILE-TO-FILE ASSIGNMENT	DEFAULT FILE-TO-FILE ASSIGNMENT
SI	AI2	0	AI2		
SO	2SB	0	2SB	SCB	SCB
BI	2SA	0	2SA	SCA	SCA
BO	2SA	0	2SA	SCA	SCA
CI	AI2	4	AI2		
CO	A2	3	A2		
LO	A2	0	A2		
USL	YSL	0	YSL		
JC	AJC	0	AJC		
UJC	YSL	0	YSL	USL	USL
WRK	YWK	0	YWK		
UL	YLB	0	YLB		
TM	YTM	0	YTM		

The commands to assign and manipulate files are described in the following section on Job Control.

Job Control

Job Control is Modcomp's command line interpreter. It provides the interface between the user and the system by allowing the user to input commands that are interpreted by Job Control. The commands are input from whatever device CI is assigned to. Job Control commands can be written as sequence of commands that run as a Job Control Procedure. Global Job Control procedures are executed from the file that JC is assigned to. User Job Control procedures are executed from the file that UJC is assigned to. User Job Control procedures are normally executed before global procedures. Job Control uses \$ as the prompt character. It must be present at the beginning of each Job Control directive. The following is a description of the logical files used by Job Control, and some of the basic directives.

The principal logical files used by Job Control are:

- Command Input - Job Control directives are read from this logical file.
- Computer to Operator - Messages to the operator's attention are written to this file.
- Listing Output - Directives are written to this file.

Other logical files used by Job Control are:

- UJM, JM - These logical files are used to store custom-written Job Control directives.
- UJC, JC - These logical files are used to store Job Control procedures.
- JW - This logical file is used as a work area by Job Control when performing procedures.
- UBM - This logical file, if it exists, is searched on the \$EXE commands prior to searching the the default logical file. UBM is only searched if the logical file is defaulted and UBM exists.

Some basic Job Control directives are:

- **\$ASSign** - Changes current assignment of a logical file name to a physical device name or another logical file.
 - I.E. **\$ASS SI YSL** - Changes current assignment of Source Input file to physical file name YSL.
 - \$ASS SI USL** - Changes current assignment of Source Input file to wherever logical file USL is assigned.
- **\$DEFault** - Changes default assignment of a logical file name to a physical device name or another logical file.
 - I.E. **\$DEF SI YSL** - Changes default assignment of Source Input file to physical file name YSL.
 - \$DEF BI BO** - Changes default assignment of Binary Input file to wherever logical file BO is assigned.
- **\$REWInd** - Rewinds the logical file to beginning of file. Resets the File-Position-Index = 0.
 - I.E. **\$REW BI** - Positions the logical Binary Input file to beginning of the file that BI is assigned to.
- **\$JOB** - Sets the current assignments of all the logical files to their default assignments and rewinds all of the logical files (File-Position-Index = 0).
 - I.E. **\$JOB**
- **\$WEQfile** - Writes an end of file (\$\$) to wherever the logical file name is assigned.
 - I.E. **\$WEQ BO** - Writes an end of file (\$\$) to wherever logical file name BO is assigned.
- **\$POSITION** - Positions to a modulename (1 to 8 bytes) that was cataloged by the Source Editor, on a directorized file on disk or magnetic tape.
 - I.E. **\$POS ABC** - Positions logical file SI to modulename ABC on the directorized file that SI is assigned to. Note: You may specify some other logical file other than SI in optional parameter 2. SI is the default if parameter 2 is not specified.

The above Job Control directives are the basic directives that are commonly used. For a detailed description of the Job Control directives, and how to write Job Control procedures, refer to the manual:

MAX IV/32 Programmer's Reference Manual, Nonresident Job Control and Batch Facilities

Job Control Sequence

The following is the overall sequence of events to, create, compile, assemble, link-edit, and catalog a RATFOR (FORTRAN) program.

Command Sequence to, create or modify, compile, assemble, link-edit, and catalog a FORTRAN program

Create New Program "modulename" on USL

\$JOB	
\$ASS USL "User's Source File, i.e. YSL"	{ Optional. May be done before or after entering Source Editor }
\$EXE SED	{ Execute Source Editor }
ASS USL "User's Source File, i.e. YSL"	{ Optional. May be done before or after entering Source Editor }
OPT TWO,DAT	{ Set Options for 2 line, and Date }
CLE ALL	{ Clear old Tab settings }
SET TAB 8,25,36	{ Set Tab settings }
NOQ	{ No Quick. Display source lines }
ASS SI NO	{ Assign SI to NO Input }
RAN	{ Set Source Editor to random mode }
ADD 0	{ Start adding source records at line 1 }
 *** *** ***	 { Input: FORTRAN source records }
 .	 { Terminate ADD mode. Period in column 1 terminates ADD }
LIS	{ Optional. Lists source records to LO device }
CAT "modulename"	{ Catalog source on USL file as 1 to 8 character "modulename" }
EXI	{ Exit the Source Editor }
\$JOB	

Modify an existing Program "modulename" on USL

\$JOB	
\$ASS USL "User's Source File, i.e. YSL"	{ Optional. May be done before or after entering Source Editor }
\$ASS SI USL	{ May be done before or after entering Source Editor }
\$POS "modulename"	{ May be done before or after entering Source Editor }
\$EXE SED	{ Execute Source Editor }
ASS USL "User's Source File, i.e. YSL"	{ Optional. May be done before or after entering Source Editor }
ASS SI USL	{ May be done before or after entering Source Editor }
POS "modulename"	{ May be done before or after entering Source Editor }
OPT TWO,DAT	{ Set Options for 2 line, and Date }
CLE ALL	{ Clear old Tab settings }
SET TAB 8,25,36	{ Set Tab settings }
NOQ	{ No Quick. Display source lines }
RAN	{ Set Source Editor to random mode }
 Modify, Add, Delete, etc.	 { Modify FORTRAN source records }
 LIS	 { Optional. Lists source records to LO device }

Note: One of the following sequences of directives must be done to catalog the new source on file USL

(RECAT "modulename" or *)	{ ReCatalog source on USL file as 1 to 8 character "modulename" }
(REMOVE "modulename" CAT "modulename")	{ Remove old FORTRAN source "modulename" from USL. Catalog new FORTRAN source "modulename" on USL }

{ Note: Second method reduces file fragmentation }

(CAT "new modulename")	{ Catalog new FORTRAN source as "new modulename" }
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EXI \$JOB	{ Exit the Source Editor }
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Compile FORTRAN program "modulename" on USL

\$ASS USL "User's Source File, i.e. YSL"	{ Optional. }
\$ASS SI USL	{ Assign Source Input file to USL }
\$POS "modulename"	{ Position Source Input file (SI) to FORTRAN program }
\$EXE FR5,,NOLO,NOMAP,NOSC,\$23	{ Execute FORTRAN V compiler with the following options: NOLO - No listing output NOMAP - No map output NOSC - FORTRAN statements not output to SO file \$23 - Set integer, logicals, and reals to single precision }
\$WEO SO	{ Write end of file (\$\$) to Source Output file SO }

Assemble output from FORTRAN compiler (FR5) on Source Output file SO

\$ASS SI SO	{ Assign Source Input file SI to Source Output file SO }
\$REW SI	{ Rewind Source Input file to beginning of file }
\$EXE M5A,,NOLO,NOSC	{ Execute M5A Assembler with the following options: NOLO - No listing output NOSC - Source records not copied to scratch file SC }
\$WEO BO	{ Write end of file (\$\$) to Binary Output file BO }

Link-Edit program binary object module from M5A to required modules on users library file
UL

\$ASS BI BO	{ Assign Binary Input file BI to Binary Output file BO }
\$REW BI BO	{ Rewind Binary Input file BI and Binary Output file BO }
\$EXE M4E,,NOMAP	{ Execute M4E Link-Editor with NOMAP option }
EDIT	{ Perform link-edit }
WEO BO	{ Write end of file (\$\$) to Binary Output file BO }
EXI	{ Exit M4E Link-Editor }

Catalog binary object module from M4E as a load module on user load module file TM

\$ASS BI BO	{ Assign Binary Input file BI to Binary Output file BO }
\$REW BI BO	{ Rewind Binary Input file BI and Binary Output file BO }
\$EXE TOC	{ Execute Task Overlay Cataloger TOC }
FIL TM	{ Set load module file to file TM }
Input: Task/Overlay name, Resources, and Options	{ See section on Task Overlay Cataloger TOC }
CAT "program name"	{ Catalog program as executable load module with name "program name" }
EXI	{ Exit from Task Overlay Cataloger TOC }
\$JCB	

Source Editor (SED)

The Source Editor (SED) is a MAX IV program that creates and maintains user source programs or text on files. SED has two modes of operation, Sequential and Random. Sequential mode modifications to the input source must be in sequence, that is, records from the SI and CI files are read in succession. At the same time that changes are being made to source records, the records are sequentially written on the SO file. Modifications to the input source, in Random mode, are not necessarily in sequence. In this mode the source is held on the WRK file (random work file), and the modifications are performed to the WRK file. The user may specify random mode with the RANDOM directive. The following is a description of the files used by SED and some of the basic SED directives:

Resume of SED Directives

The following are the command categories:

- **Edit Instructions**
- **Listing of Source Files**
- **Edit Formatting and Control**
- **Directory Handling**
- **File Positioning**
- **Data Formatting**
- **Miscellaneous**

The following is a description of the commonly used SED Directives. Note: The parameter SLR means Source Line Reference.

Edit Instructions

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>ADD</u> SLR	Adds source records after SLR. If SLR is null, then the current line is taken by default. Source records are added until ADD is terminated by a period in column 1.	ADD 20 A
<u>DEL</u> SLR-1 [SLR-2]	Deletes source records from SLR-1 to SLR-2. If SLR-2 is null then SLR-1 is deleted. If SLR-1 is null then the current line is taken by default. Note: C(urrent) may be used for SLR-1 or SLR-2 which uses the current line.	DEL 100 200 DEL C,200 DEL 1,C DEL
<u>REP</u> SLR-1 [SLR-2]	Replaces one or more source lines by one or more additional line . Identical to a DELETE followed by an ADD.	REP 100,200 REP C,300
<u>CHA</u> [(S1) (S2)] nO nL	Change character string S1 to character string S2 . nO are the number of occurrences of S1 on a source line. nL are the number of source lines to be changed. Any of the following characters: ' , " , : , , _ , . , / may be used as delimiters for S1 and S2. If S1 and S2 are null, then the S1 and S2 from the previous CHA command will be used.	CHA /ABC/XYZ/ 4 10 CHA :123:4567: 3 CHA CHA 4 100
<u>UND</u>	Undoes the last change made to the current line	U
<u>DUP</u> SLR-1 [SLR-2]	Inserts the source records from SLR-1 to SLR-2, after the current line. If SLR-1 is null then the current line is duplicated. Current line pointer is set to the last record inserted.	DUP 25 150 DUP 37 DUP
<u>MOV</u> SLR-1 [SLR-2]	Inserts the source records from SLR-1 to SLR-2, after the current line, and then deletes the source records from SLR-1 to SLR-2. Current line pointer is set to the last record inserted.	MOV 100 110 MOV 45
<u>MOD</u> SLR	Modify the source record at SLR. If SLR is null, then the current line is the default. The line to be modified is displayed on the CO file. The user may now overlay characters, delete characters, or insert characters. Deletion is done by typing _ under the characters to be deleted. Insertion is done by typing ^ before the character where insertion is to start. A space terminates insertion. An & is used to overlay characters with spaces or to insert spaces.	M 10 ABCDE (old line) X_ &^YZ XC YZE (new line)

Edit Instructions

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>GOTO</u> [-] SLR SLR (Integer value)	If SLR is a character string, then SED goes to the first line from the current line where the string is found. If SLR is an integer, then SED goes to the line number SLR. If [-] is specified then the search is backward from the current line pointer. If SLR is null, then SED uses the last GOTO or SKIP directive, and the search starts at the current line + 1. The character string delimiters are the same as the CHA directive. The user may specify the line number to go to by inputting just the SLR as an integer value.	GOTO "ABCD" GOT - /XYZ/ G 150 120 G :HELLO: G
<u>FOR</u> [Integer]	SED moves the current line pointer forward through the source module the specified number of lines. If the user does not specify a parameter, then SED assumes a value of 1.	FOR 20 F
<u>BAC</u> [Integer]	This directive is the same as FOR except the current line pointer is moved backwards.	BAC 10 B

Listing of Source Files

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>LIS</u> [Integer] [ALL]	LIS is used to obtain a listing of source programs on the LO file. In sequential mode, Integer is the number of programs to be listed from the SI file. If no parameter is specified, SED will list one program. In random mode, Integer specifies the number of lines to list from the WRK file. If no parameter is specified, SED will list the whole program from the WRK file. If the ALL parameter is specified, SED will list all of the programs in the USL directory.	LIST LIS LIS 3 LIS ALL
<u>SEA</u> (string) [Integer]	SEA causes SED to search for, and display on the CO file, source lines containing a specific character string specified by the parameter string. Integer specifies the number of lines to search from the current line pointer. If Integer is not specified, the entire module is searched. The current line pointer is not affected by the SEA directive.	SEA /ABC/ SEA :XYZ: 100
<u>PRI</u> Integer	The PRINT directive displays the specified number of lines, beginning with the current line, on the CO file. If no parameter is specified, the current line is displayed. The current line pointer is not affected by the PRI directive.	PRI 100 P 10 P
<u>TEX</u>	The TEX directive causes SED to perform all subsequent listings to the LO file in text format. Line numbers, headings, and titles will not be listed.	TEXT TEX
<u>SOU</u>	The SOU directive causes SED to perform all subsequent listings to the LO file in source format. Line numbers, headings, and titles will be listed. SOU is the default.	SOU
<u>LNA</u>	Causes SED to list only the source statements containing special keywords such as PROGRAM, TTL, etc. This directive affects subsequent LIST or COPY directives.	LNA
<u>LAL</u>	Causes SED to list all source statements when subsequent LIST or COPY directives are executed. LAL is the default.	LAL

Edit Formatting and Control

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>OPT</u> options	<p>This directive allows the user to set certain options within SED. Some of the options are :</p> <p>ONE - Each source record is displayed on one line. Line numbers are not displayed except for LIS.</p> <p>TWO - Each source record is displayed on two lines. Line numbers are always displayed.</p> <p>DAT - Saves date and time with a cataloged program.</p> <p>TAB - SED processes tabs when reading them from a SI file.</p> <p>NOT - Treats tabs as normal ASCII characters.</p> <p>QUI - Quick mode. SED does not display source lines accessed by the following directives: GOTO,SKIP, CHA, FOR or BAC.</p> <p>NOQ - NoQuick mode. SED displays the source lines accessed by the above directives.</p>	<p>OFT TWO,NOQ OPT DAT</p>
<u>RAN</u> [<u>RECOVERY</u>] [<u>EXIT</u>]	<p>The RAN directive places SED in random mode. SED copies the SI file to the WRK file. If RECOVERY is specified, SED recovers the last program placed on the WRK file in random mode. If EXIT is specified, SED immediately terminates random processing of the WRK file and enters sequential mode.</p>	<p>RAN RAN RECOVERY RAN REC RAN EXIT RAN EXI</p>
<u>XRN</u>	<p>Causes SED to terminate random processing of the WRK file and enter sequential mode.</p>	<p>XRN</p>
<u>INS</u> file	<p>The INSERT directive causes SED to read source statement additions or replacements from the specified file instead of from the CI file. It allows a user to insert source records from another file, either a scratch file or from a specified modulename on a USL file. Executing an ADD or REP directive after the INS directive will add the source records from the file specified in the "file" parameter until an EOF (\$\$) is encountered. Note: If file SI is used, it must be assigned back to its default after the insertion, or subsequent ADD or REP directives will continue to read the source records from the inserted file.</p>	<p>ASS SI SCB INS SI ADD {insert records from SCB file} ASS SI SI ----- ASS SI USL POS "modulename" INS SI ADD {insert records from "modulename"} ASS SI SI</p>

Directory Handling

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>CAT</u> name [Id]	The CAT directive causes SED to catalog a specified source module to the USL file named by the name parameter. The name parameter may be any valid program name that does not exceed 8 characters. In sequential mode, the source module is copied from the SI file. In random mode, the source module is copied from the WRK file, and SED then enters the sequential mode. The optional parameter "Id" may be used to record information when the program is saved. The "Id" parameter must be of the same format as "name" and it will override the DATE and PGM options.	CAT MYPROG CAT ABC BIGONE
<u>REC</u> name [Id] *	The REC directive is similar to the CAT directive, except it allows the user to catalog a source module with an existing name. If the * parameter is specified, then the source module is cataloged for the module located by the last POSITION directive.	REC MYPROG REC ABC BIGONE REC *
<u>REM</u> name	The REMOVE directive deletes the specified program "name" from the USL file directory.	REM MYPROG
<u>REN</u> name-1 name-2	The REN directive renames the program "name-1" to "name-2" on the USL file directory.	REN ABC XYZ REN OLD,NEW
<u>LDI</u>	LDI causes SED to list the USL file directory to the LO file.	

File Positioning

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>POS</u> name	POS positions the SI file to the start of the program specified by the name parameter, on the USL file. Note: Assign SI to the USL file before executing the POS directive.	POS ABC
<u>AVF</u> file [Integer]	AVF advances the file pointer to the number of file markers specified by the Integer parameter. If no Integer is specified, the file pointer is advanced to the next file mark.	AVF SI 3 AVF CI
<u>BKF</u> file [Integer]	BKF is the same as AVF except it moves the file pointer backwards.	BKF SI 2
<u>REW</u> file	REW rewinds the file specified in the file parameter to the beginning of the file.	REW SI

Data Formatting

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>COP</u> [Integer] [ALL] [NOR] [USL]	<p>The COP directive is used to copy source records to the SO file. In sequential mode, SED copies the source records from the SI file to the SO file. Integer specifies the number of records separated by file marks to copy. If Integer is not specified, one program will be copied. If the ALL parameter is specified, SED copies all of the modules in the SI file directory. If either SI or SO are assigned to magnetic tape, and the NOR parameter is present, then the tape will not be rewound prior to the copy. If the USL parameter is specified, SED first initializes the directory on the SO file with enough entries plus eight more, then SED performs a COP ALL.</p> <p>In random mode, SED copies the records from the WRK file to the SO file, and then SED returns to sequential mode.</p> <p>If the Integer parameter is specified in random mode, SED copies "Integer" source lines to the SO file, and SED remains in random mode.</p>	COP ALL NOR COP ALL COP USL COP COP 6

Miscellaneous Instructions

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>MAC</u> name [LIST] [REMOVE]	<p>MAC defines a macro prototype. SED allows users to define their own SED custom directives as a macro consisting of a sequence of regular SED directives. When SED encounters the MAC directive, any subsequent SED directive from the CI file will be put into the macro stack until an ENDM (end of macro) directive is encountered. SED will execute user defined directives first, allowing the user to replace a standard SED directive. The name of the macro is specified by the name parameter. If LIS is specified, SED lists macro "name" on the CO file. If REM is specified, SED removes the macro "name" from the stack.</p> <p>If no parameter are specified, SED lists all of the currently defined macros to the CO file.</p>	MAC X OPT ONE P 20 F 20 OPT TWO ENDM
<u>ENDM</u>	Ends the macro definition.	See Above
<u>EXIT</u>	Exit from Source Editor SED.	EXI
<u>WEO</u> file	WEO directive writes an end-of-file mark (\$\$) to the specified file.	WEO SO

The Source Editor SED has many more directives than the ones described above. The above list of directives should be sufficient for most needs. For a more detailed description of the SED directives, refer to the following manual:

Programmer's Reference Manual MAX III/IV

Source Editor

Ratfor and FORTRAN Compilers

This section describes the file usage of the compilers and some of the FORTRAN compiler options. It is assumed that the user is familiar with the Ratfor and/or FORTRAN languages. If not, then the user should refer to the appropriate manuals.

Ratfor Compiler

The Ratfor compiler reads Ratfor source statements from the SI file, and converts them to equivalent FORTRAN statements that are written to the SO file. Compile errors are written to the LO file. The Ratfor compiler has no compile options.

FORTRAN Compiler

There are two FORTRAN compilers, FR4 and FR5. The FR4 compiler produces Modcomp IV assembly language instructions (M4A), and FR5 produces Modcomp V (Classic) assembly language instructions (M5A). We will use only the FR5 compiler. The FORTRAN compiler reads FORTRAN statements from the SI file, and translates them to equivalent sequences of assembly language instructions that are written to the SO file. Compile errors are written to the LO file. Some of the common compiler options are:

- LO** - If the LO option is on, the compiler lists the FORTRAN source and the diagnostic messages on the LO file. The default is LO.
- NOLO** - If the NOLO option is on, the compiler lists only the diagnostic messages to the LO file.
- MAP** - If the MAP option is on, the compiler lists the relevant symbol table information on the LO file for each program and subroutine compiled. The default is MAP.
- NOMAP** - If the NOMAP option is on, the symbol table information will not be listed.
- SC** - If the SC option is on, the compiler will write the FORTRAN statements as comments with the assembly language output to the SO file. The default is SC.
- NOSC** - If the NOSC option is on, the FORTRAN statements will not be written to the SO file.
- \$I2** - If the \$I2 option is on, all data explicitly or implicitly typed INTEGER will be typed INTEGER*2.
- \$L2** - If the \$L2 option is on, all data explicitly or implicitly typed LOGICAL will be typed LOGICAL*2.
- \$R6** - If the \$R6 option is on, all data explicitly or implicitly typed REAL will be typed REAL*6.

- \$R8 - If the \$R8 option is on, all data explicitly or implicitly typed REAL will be typed REAL*8.
- \$D6 - If the \$D6 option is on, all data explicitly or implicitly typed DOUBLE PRECISION will be typed REAL*6.
- \$23 - The \$23 option is equivalent to selecting the \$I2, \$L2, and \$D6 simultaneously.

The FR5 compiler is executed as follows:

\$EXE FR5, [OPT1], [OPT2], [OPTn] Where: OPT1, OPT2, OPTn are the selected options

The following describes the file usage for the Ratfor and FORTRAN compilers:

Refer to the following manuals for a detailed description of the compilers:

Ratfor Manual

Reference Manual MAX III/IV

FORTRAN

Assemblers

There are two assemblers, M4A and M5A. M4A assembles statements in Modcomp IV assembly language. M5A assembles statements in Modcomp V (Classic) assembly language. We will concern ourselves only with the M5A assembler, though the M4A assembler is used for assembling the SYSGEN. The assembler reads assembly language source statements from the SI file, assembles them, and produces binary object code written to the Binary Output file BO. An optional assembly listing and error messages are written to the LO file. It is assumed that the user is familiar with the Modcomp Assembly language, if not, then they should refer to the appropriate manuals. The following is a description of the assembler options and file usage.

Some of the common assembler options are:

- BO - If option BO is on, object records will be written to the BO file. The default is BO.
- NOBO - If option NOBO is on, object records will not be written to the BO file.
- LO - If option LO is on, an assembly listing will be written to the LO file. The default is LO.
- NOLO - If option NOLO is on, an assembly listing will not be written to the LO file.
- SC - If option SC is on, the source records are copied to the SC file on pass 1, and read from it on pass 2. Generally used if the SI file is assigned to a sequential access device. The default is SC.
- NOSC - If option NOSC is on, the source records are not copied to the SC file. If the source records are from a random access device, the NOSC option should be used for reasons of efficiency.
- \$PS - If option \$PS is on, the assembler symbol table will be listed on the LO file, each time an END card is encountered during pass 2.
- \$PT - If option \$PT is on, the assembler will list the information relating to symbol table size on the LO file.
- \$P1 - If option \$P1 is on, listed output will be produced on pass 1 as well as pass 2.
- \$WK - If option \$WK is on, the assembler will read the source records from the WRK file rather than the SI file. The WRK file must be in the Source Editor random mode format.
- \$OP - If option \$OP is on, the assembler will perform instruction optimization.

The M5A assembler is executed as follows:

\$EXE M5A, [OPT1], [OPT2], [OPTn] Where: OPT1, OPT2, OPTn are the selected options

The following is a description of the file usage by the assembler:

Refer to the following manuals for a detailed description of the Modcomp Assembly Language and assemblers:

Reference Manual MAX III/IV
System Processors
Assemblers

Reference Manual
Modcomp Classic
Central Processor

Link-Editor

The MAX IV Link Editor M4E links the main programs binary object module, produced by the assembler, to any referenced external binary object modules. The external binary object modules may reside on Library files or have been assembled with the main program. The object modules produced by the assembler are read by M4E from the BI file. Any referenced external library object modules are read from the Library Files. The standard Library files are, the User Library file (UL), and the System Library file (LB). The M4E "LIBRARIES" directive may be used to specify additional library files to search, and the order in which they are searched. M4E is executed in two passes as follows:

- Pass 1 - The primary object module is read and a core-resident symbol table is constructed of all internal definitions, external references, and common allocation. All external references are then resolved from either the specified input file (BI), the optional User Library file (UL), the System Library file (LB), or from user specified libraries. The validity of all data is checked during this pass.

If there are any unsatisfied external references, a search of the libraries is performed. The internals of each module is checked against the list of unsatisfied externals until all the necessary modules are loaded. All modules loaded during this pass are saved on the scratch file (SC).

- Pass 2 - During the second pass, all references to external names are satisfied from the symbol table. The modules on file SC are read during this pass, and a self-contained load module is written on the Binary Output (BO) file.

M4E has several directives and options that control the link edit process. This document will describe only the common directives and options.

Directives

- The only directive that will be described is the mandatory "EDIT" directive. There are several other M4E directives that may be found in the reference manual. The "WEO" and "EXIT" directives are the same identical to the ones used in the other System Processors.

- EDIT - This directive is required to perform link editing of the object modules.

```
EDIT [ MAIN ] [, bi ]  
      [ pname ]
```

Where: "pname" is a program name to link edit

"bi" is a logical file name

If "MAIN" is entered, the first object module read from the "bi" file will be link edited

If no parameters are entered, then MAIN and the Binary Input (BI) file are the defaults

Examples:

```
EDIT myprog BI  
EDI abc,SI  
EDIT  
EDIT MAIN,SI  
EDI
```

The common M4E options are:

- LO - If option LO is on, the M4E directives will be written to the LO file. The default is LO.
- NOLO - If option NOLO is on, the M4E directives will not be written to LO.
- MAP - If option MAP is on, a Map listing of the symbol table will be written to the LO file. The default is MAP.
- NOMAP - If option NOMAP is on, a Map listing will not be written.

The M4E Link Editor is executed as follows:

\$EXE M4E, [OPT1], [OPT2], [OPTn] Where: OPT1, OPT2, OPTn are the selected options
 EDIT
 WEO BO
 EXI

The file usage is described as follows:

The Link Editor M4E has many more directives than the ones described above. For a more detailed description of the M4E directives, refer to the following manual:

Programmer's Reference Manual MAX IV

**System Processors
Link Editor**

Cataloger

The Task Overlay Cataloger (TOC) catalogs program object modules as executable object load modules on a load module file. TOC reads the program object module from the Binary Input (BI) file. The program object module may have been generated by the Link Editor (M4E), or read as another load module. TOC has many directives used in cataloging a program that define the environment in which the loaded program operates. TOC transparently allocates default values to a user not requiring any special resources. However, other users who require specific characteristics for a particular program, uses the TOC directives to specify default values explicitly. This document will describe only the very basic TOC directives. It is suggested that the user read the reference manual for a detailed description of the TOC directives.

Common TOC directives

DIRECTIVE	DESCRIPTION	EXAMPLES
<u>TASK</u> [name] [pri] [lim]	The TASK directive declares that the next program to be cataloged is a task. The optional "name" parameter specifies the 1 to 6 character task name. Default is the actual program name. The optional "pri" parameter sets the tasks execution priority level (0-255). A default is specified by the task that schedules or activates the task. The optional parameter "lim" is the task influence limit (0 - 255), this task has over other tasks. The default is priority level.	TASK PROG1 100 10 TAS,,100 10 TAS
<u>OVER</u> [name]	The OVERLAY directive declares that the next program to be cataloged is an overlay. The optional parameter "name" is the same as for the TASK directive.	OVER PROG1 OVE
<u>FILE</u> filename	The FILE directive specifies the load-module logical file "filename" that will be used for subsequent directives.	FILE TM FIL YY
<u>CATALOG</u>	The CAT directive reads an object program from the BI file and catalogs it as a task or an overlay on the selected load module file, using all the accumulated or default resource information previously selected.	CAT
<u>SOU</u> name [file] [INIT]	The SOURCE directive generates a list of the resources to the LO file for the program "name". It optionally copies the source of the resources to a specified file "file", or initializes TOC's internal tables with the resources of the specified task or overlay.	SOU PROG SOU PROG, INIT SOU PROG SO
<u>LIST</u> [filename] [dir]	The LIST directive generates a report on the LO file of all programs in the current load-module file's directory. Optional parameter "filename" specifies the load-module file name. If this parameter is not specified, then TOC will list the load-module file specified by the last FILE directive. Optional parameter "dir" specifies that only the directory be listed with no validity checking. If this parameter is not specified, then TOC verifies the integrity of all the load-modules in the directory.	LIS LIS YY LIS TM DIR
<u>EXIT</u>	The EXIT directive exits TOC and returns the user to Job Control.	EXI

The Task/Overlay Cataloger (TOC) is executed as follows:

```
$EXE TOC
FIL YY
OVER program
CAT
EXI
```

TOC's file usage is described as follows:

TOC has many more directives than the ones described above. For a more detailed description of the TOC directives, refer to the following manual:

Programmer's Reference Manual MAX IV

Task/Overlay Cataloger

Multiluser System

The new Neutral Beam System software has a multiluser system to facilitate multibatch interactive processing on the Neutral Beam Systems. Each user must sign on to the system with a user password, which sets up the users operating environment. When the system is first booted up, the system sign on message will be displayed to all of the connected terminals. The sign on message will be displayed until, a user signs on to the system, or the screen saver blanks the screen. The procedure to sign on to the system is as follows:

- The user accesses the system, by a directly connected terminal, or by a terminal connected through the MICOM. This is the same as any of the other systems.
- The System Sign On message may or may not be displayed. The message will not be displayed if, signing on through a MICOM line that was not connected, or the screen saver has cleared the CRT. Whether the message is displayed or not, entering your password will sign you on to the system. Entering anything other than a legal password will result in, the system output an "INVALID PASSWORD" message, and the "System Sign On" message will be displayed.

Presently, there are specific user passwords as well as some general passwords. The system does not allow more than one user to sign on to the same area. The user signs off the system by typing the Job Control commands, "BYE" or "LO", which will cause the user to exit the system, and display the sign on message.

NOTE: Always sign off the system by typing "BYE" or "LO" when you are finished using the system. If using a terminal connected through the MICOM, enter "Break" after signing off.

Failure to sign off the system will, allow an unauthorized user to use your area, prevent other users from signing on to the system from the MICOM.

There are several Job Control procedures on the system to facilitate using the Systems Processors. There are general procedures for doing, source editing, compiling, assembling, link editing, etc. There are also specific procedures for, compiling, assembling, link editing, and cataloging specific programs. These procedures are in the format of "P.progname". At the present time, only the "SEdit" procedure will be described as we are in the process of redefining the other. They will be included in this document when they have been defined and implemented.

SEDIT [name] [USL file] [NEW]	<p>The optional parameter "name" specifies the name of the program to edit.</p> <p>If "NEW" is entered then it is assumed that a new module is being created. If the "name" parameter is null, SED performs a random recovery from the work (WRK) file.</p> <p>The optional parameter "USL file" specifies the name of the USL file. If this parameter is not entered, the USL file default assignment is used.</p>
--------------------------------------	---

X	- Displays 20 lines in OPT ONE format from the current line pointer and positions the line pointer forward 20 lines.
Z	- Positions the line pointer backward 20 lines and displays 20 lines in OPT ONE format from the new current line pointer.
XX	- Same as X except 10 lines are displayed in OPT TWO format.
ZZ	- Same as Z except 10 lines are displayed in OPT TWO format.
S	- Positions the line pointer backward 10 lines, displays 20 lines from the new current line pointer, repositions the line pointer forward 20 lines.

L	- Display the last line of the program.
PE	- Removes program name used in the SEDIT "name" parameter from the USL file directory, and catalogs the WRK file on the USL file with the same name. Exits from SED.
PSE	- Same as PE except it creates a backup of the program name with a colon in front of the name (i.e. :name). Exits from SED.
SV	- Same as PE except it does not exit from SED. The current line pointer stays where it was prior to executing the SV macro. This allows you to save your new program while you are working on it.
CAT	- This is the SED directive CAT for cataloging a program on the USL file. It must be used when the SEDIT parameter "name" is "NEW" (create new program). I.E. CAT "name".

Acknowledgements

28

- END -

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