

AD-A148 700

FLAD USER'S MANUAL: FLAD FILE CONTENTS(U) NAVAL
RESEARCH LAB WASHINGTON DC G P MUELLER 12 DEC 84
NRL-MR-5470

1/1

UNCLASSIFIED

F/G 9/2

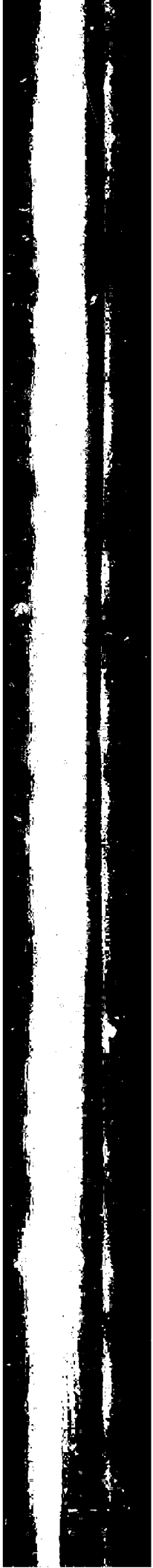
NL

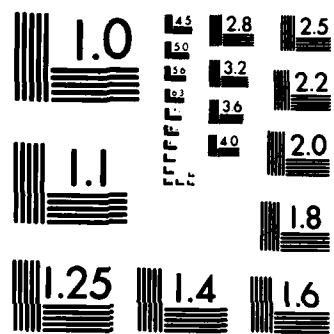


END

1/1

1/1





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

2

NRL Memorandum Report 5470

FLAD User's Manual: FLAD File Contents

G. P. MUELLER

*Radiation-Matter Interactions Branch
Condensed Matter and Radiation Sciences Division*

AD-A148 700

December 12, 1984

DTIC
ELECTE
DEC 18 1984
A B



DTIC FILE COPY

NAVAL RESEARCH LABORATORY
Washington, D.C.

Approved for public release; distribution unlimited.

84 12 07 006

AD-A148700

SECUR CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a SECURITY CLASSIFICATION AUTHORITY		3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited.	
2b DECLASSIFICATION / DOWNGRADING SCHEDULE			
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NRL Memorandum Report 5470		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Naval Research Laboratory	6b OFFICE SYMBOL (if applicable) Code 6650	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Washington, DC 20375-5000		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (if applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO. 62761N	PROJECT NO.
		TASK NO. 	WORK UNIT ACCESSION NO. DN780-081
11 TITLE (Include Security Classification) FLAD User's Manual: FLAD File Contents			
12. PERSONAL AUTHOR(S) Mueller, G.P.			
13a. TYPE OF REPORT Interim	13b. TIME COVERED FROM TO 	14. DATE OF REPORT (Year, Month, Day) 1984 December 12	15. PAGE COUNT 13
16 SUPPLEMENTARY NOTATION			
17 COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	Laser simulation FLAD	
	SUB-GROUP	CLAD	
19 ABSTRACT (Continue on reverse if necessary and identify by block number) > The Johns Hopkins University laser irradiation simulation code CLAD was converted to FORTRAN for use at NRL some years ago. The contractor, who renamed the code FLAD, left a series of tape files containing the new code. This report documents the location and contents of these files.			
20 DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL G. P. Mueller		22b. TELEPHONE (Include Area Code) (202) 767-2972	22c. OFFICE SYMBOL Code 6650

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

FLAD USER'S MANUAL: FLAD FILE CONTENTS

The computer code FLAD is designed to compute the effects of laser irradiations on the surfaces of materials. FLAD is a direct translation of the code CLAD, which was written and documented (Ne74) by R. W. Newman of The Johns Hopkins Applied Physics Laboratory. To indicate the applications of the code, the following is the abstract from Newman's report:

A Continuous Wave Laser Damage computer program (CLAD) has been developed to compute damage caused by a high power laser beam impinging on material surfaces. The program includes three-dimensional conduction, temperature dependent thermal properties, radiation relief, aerodynamic heating, laser radiation heating, heats of fusion and vaporization, chemical ablation, and material removal for flat and cylindrical bodies. The program uses finite difference techniques to compute mass loss and temperature histories of laser irradiated metals, ceramics, and ablatives. This report describes the computational methods contained in CLAD, along with some of the assumptions and limitations contained therein. The report is written as a user's manual and contains a description of the main program required to perform a CLAD analysis. Also included is a sample problem, the corresponding main program, and printed output, which will familiarize the user with an actual application of CLAD.

CLAD was written in the language PL/1. Under contract to NRL, SAI (Science Applications, Incorporated) (Sc--) converted the code to FORTRAN IV and made the modifications necessary for it to run on the TI ASC computer at NRL. Certain enhancements to the code were added by SAI; these enhancements are described in their report.

In addition to the reports just cited, portions of the FLAD files on the ASC also describe the use or workings of the code. These portions are indicated in Appendix B.

While the conversion and testing seems to have been completed, no one seems to have used the converted code; nor, as of this date, does anyone in the laboratory seem familiar with its use. All that exists of the code, besides the two reports cited above, is a set of 23 files that are stored on tape in the ASC's catalog system.

In the process of determining the applicability of the code, it was necessary to review to contents of these 23 files. It seems worthwhile to

document the contents of the FLAD files so that other lab personnel will not have to go through the same process before they use it.

In Appendix A I document the location in the catalog system of the 23 FLAD files, along with a brief description of the contents of each file. In Appendix B I catalog the contents of all the files; each subroutine, data set, output file, and so forth is listed with an indication of which of the FLAD files that it appears in.

SAI created a procedure for using FLAD that I find awkward--it involves compiling a program named SIZER and linking it to the various FLAD subroutines for each use of the code. It seems simpler to me to rework this system so that all of the recompiling is not necessary.

I also recommend that any new user compile all of the subroutines for himself, rather than use the object modules that are stored in the FLAD files. In that way, he will be confident as to what version of each routine has been linked into the final object code.

REFERENCES

- (Ne74) R. W. Newman, "A User's Guide for the Continuous Wave Laser Damage Computer Program," (The Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Maryland), Report No. TG 1268.
- (Sc--) "FLAD User's Manual," (Science Applications, Incorporated, Arlington, Virginia), Report No. 164-416-063.

APPENDIX A: FLAD FILES ON THE ASC CATALOG SYSTEM

The FLAD files created or converted by Bjork are stored in the NRL TI ASC catalog. They are on tape and can all be reached using the pathname

ROOT=USERCAT/D64/B10/BJORC1

There are 23 files in the catalog, which I have named "A" through "W". Table A2 lists these 23 files by label, along with the appropriate pathname, version number and file organization. The nature of the contents of each file is indicated in the contents column. The DS files are all libraries. The symbols that are used in Table A2 are listed in Table A1.

TABLE A1
SYMBOLS USED IN TABLE A2

<u>SYMBOL</u>	<u>DESCRIPTION</u>
F	FORTRAN file.
o	Object file.
j	JSL file.
d	Data file.
P	Output file, sometimes with an attendant input file.
#	Descriptive file for the FLASTIC system, which is derived from CLAD.
∅	Descriptive file for one of the CLAD subroutines. The first four letters in the name of one of these "∅" files are a condensed version of the name of the subroutine it describes.

S DTIC
ELECTE
DEC 18 1984 **D**
B



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE A2
FLAD FILES ON THE NRL ASC CATALOG

<u>LABEL</u>	<u>NGDE</u>	<u>VERS</u>	<u>ORG</u>	<u>CONTENTS</u>	<u>COMMENTS</u>
A	/BJLIB	0	DS	F,d,#,z	Miscellaneous Files
B	/BJSafe	0	DS	F,d,#,z	Miscellaneous Files
C	/CLDATA	0	DS	d	Principal Data Sets
D	/CLDATA	1	DS	d	Copy, more or less, of D
E	/CLDJSL	0	DS	j	DO NOT USE
F	/CLDJSL	1	DS	j	DO NOT USE
G	/CLIB	0	DS	F	Principal FORTRAN file
H	/CLIB	1	DS	F	Copy, more or less, of G
I	/CLMAIN	0	PS	o	DO NOT USE
J	/CLOBJ	0	DS	o	DO NOT USE
K	/CLOBJ	1	DS	o	DO NOT USE
L	/CLOBJHE	0	DS	o	DO NOT USE
M	/CLOBJHE	1	DS	o	DO NOT USE
N	/FEMLIB	0	DS	F	Program SIZER
O	/MAINSR	0	PS	F	Program SIZER
P	/MAINSR	1	PS	F	Program SIZER
Q	/MELTERS	0	DS	F	Subroutine QFUSION
R	/NEWBJSAF	0	DS	d,j	Miscellaneous Files
S	/PLTFILES	0	DS	P	Three Output Files
T	/PRTFILES	0	DS	P	Three Output Files
U	/SPAWN	0	DS	o	DO NOT USE
V	/TC1AD10P	0	PS	P	Output File
W	/TC1AD10T	0	PS	P	Output File

APPENDIX B: CONTENTS OF THE FLAD FILES ON THE ASC CATALOG

Table B2 lists every element (subroutine, data set, object module, etc) that appears in the FLAD files, with an indication of which of the 23 FLAD files the element appears in. For the purposes of this table, the 23 files are broken down into four groups: FORTRAN files, data and job specification files, output files, and object and link editor files.

Table B1 lists all of the symbols that are used to describe the elements in Table B2.

TABLE B1
SYMBOLS USED IN TABLE B2

<u>SYMBOL</u>	<u>DESCRIPTION</u>
F	A FORTRAN routine.
*	All of the FORTRAN routines that seem to be part of the basic FLAD package (that is, that are linked together with SIZER) are indicated by an asterisk before their names in Table B2.
#	A partial description of the "FLASTIC" package, which is "CLAD" with the NRL modifications.
1	A data set of type 1: Program Size
2	A data set of type 2: Program Control and Target Geometries
3	A data set of type 3: Material Property
4	A data set of type 4: Time Dependent Auxillary Heating
5	A data set of type 5: Beam Description
ø	A description of one of the CLAD subroutines. The first four letters of this subroutine's name is a condensation of the name of the subroutine it describes.

TABLE B1 (Continued)
SYMBOLS USED IN TABLE B2

<u>SYMBOL</u>	<u>DESCRIPTION</u>
b	PIGTST is a non-FORTRAN program (perhaps PL/1). It appears in library "A" as an addition to subroutine "SIZER." The text of this program language starts in column 5, so CIFER treated it as a long continuation of "SIZER,"
i	A number of programs are called "MAIN" in these files because CIFER names any program that lacks a SUBROUTINE, PROGRAM or FUNCTION statement "MAIN". "B00083" and "SETUP" are two of these, and they are listed both under their own names and "MAIN". "SIZER" is probably another. There is no easy way to tell what an object program named "MAIN" actually is.
j	JSL file.
P	Output file--sometimes the corresponding input data is included.

TABLE B2
LOCATION OF VARIOUS FLAD ELEMENTS

FILE	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMODS						
	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U	
*ABTST1	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
AGGAS2	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
AL2024	.	3	.	.	.	.	.	.	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
AL2024T1	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
B00083 ⁱ	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*BEAM	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
*CAPCN3	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.
CAT06	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
CAT12	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
CIFEX	.	j	.	.	.	.	.	.	.	.	.	j	.	.	.	.	.	.	.	.	.	.	.	.
*COMCON	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.
*CON	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.	.
CONDOC	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CONVEC	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CONVRT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATA	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATARK	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATASZ	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATATM	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DIMEN	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
DOCTOR	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DONVRT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DUMP	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ERASE	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
FACTR%A	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FINALX	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*FIXUP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.
FLDXJSL	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
FLUXN	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE B2 (Continued)
LOCATION OF VARIOUS FLAD ELEMENTS

FILE	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMCDS					
	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
FORT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FRESNI	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
G4156E	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDR01	.	5	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDR02	.	5	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDTST	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*GRDZAP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.
HETGEN	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
HEVOL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
*HISTRY	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
LOADDATA	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
LOADJSL	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
MAIN	.	F	F	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.0
BOO083 ⁱ	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SETUP ⁱ	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MAINGEN	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
*MAINL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
MATMLT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NOZAP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA1	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA2	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA3	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA4	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA5	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA6	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PIGTST	b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*PLOTIT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
*POLATE	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
POURIT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.
*QDUMP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
*QFUSON	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.

TABLE B2 (Continued)
LOCATION OF VARIOUS FLAD ELEMENTS

FILE	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMODS							
	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U		
QFUSTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RADIAN	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANDRV	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANDU	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANSEQ	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RDRKTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RDTMTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*READRK	.	.	F	F	0	0	0	0
*READTM	.	4	F	F	4	4	0	0	0	0
RECMFPI	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
RECMPNXL	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
RSLMC	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
S304K038	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
S304R038	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*SET	.	.	F	F	0	0	0	0
SETUP ⁱ	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SETTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SHOOT	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.	.
*SIZER	1	1	.	.	.	F	F	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SPACER	.	.	.	.	.	.	.	.	.	.	.	h	h	.	.	.	.	.	.	.	.	.	.	.
SPECIF	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*STEP	.	.	F	F	0	0	0	0
STEPTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
STL304	.	3	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
STLCR	.	3	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*SURFER	.	.	F	F	0	0	.	.
TARG	F	2	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
TC1AD100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.	.
TC2AE100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.	.
TC3AE100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.	.
THRDTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE B2 (Continued)
LOCATION OF VARIOUS FLAD ELEMENTS

FILE	FORTRAN								DATA & JSL						OUTPUT				CMODS & LMODS				
	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
*THREED	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
THREEH	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
UCC	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
UNA	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USERPX	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
WALL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*WRITER	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	.
*ZAPNOD	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.
ZAPNTX	∅	∅	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
output	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.

END

FILMED

1-85

DTIC

