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DECUS NO.	8-275
TITLE	GRADE COMPILER
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DATE	June 6, 1970
SOURCE LANGUAGE	PAL III

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DECEMBER

1941



GRADE COMPILER

DECUS Program Library Write-up

DECUS No. 8-275

ABSTRACT

The "Grade Compiler" is designed to handle the individual grades of a class of students. It performs the functions of calculating individual averages from typed-in data, storing the final averages and the two-letter code names, typing in alphabetical or rank order all the code names and their corresponding averages, making individual deletions, typing individual averages on demand, calculating the class average, and deleting all the stored data. It will handle up to two hundred and seventy code names and averages in a basic 4K PDP-8 system.

INSTRUCTIONS

Loading and Starting

Load the program with the BIN (binary) loader (DEC-08-LBAA-PM). Start it at location 0200.

The Command Mode

The program has two modes of operation: the command mode and the operating mode. In the command mode, the computer types an asterisk at the left margin, then waits for the operator to type a command character (see the table below). The command character specifies which function the program should perform when it enters operating mode. Once the operator types a command character, the program enters the operating mode, and performs the function specified.

If the operator types an illegal command character (one not in the table), the computer will type a question mark, a carriage return, and a new asterisk. It will then wait for a new command character.

Normally the computer returns to the command mode when it has completed the function. However, in a few cases, the operator must type "Control/C" (hold down the control key on the teletype while typing a "C") to return to the command mode. This should be done when the computer types a colon, then waits for input.

Example: (Throughout this manual computer typeout will be underscored)

* X?

* C

NAME: (At this time, the operator typed a "Control/C" to return to command mode)

*

<u>Command Letter</u>	<u>Name of Function</u>	<u>Action Performed</u>
C	<u>C</u> alculate	Calculates individual averages
L	<u>L</u> ist	Lists code names and averages in alphabetical order
R	<u>R</u> ank	Lists code names and averages in rank order
A	<u>A</u> verage	Computes class average
S	<u>S</u> ingle delete	Deletes individual code names and averages from memory
W	<u>W</u> rite	Types out individual averages
D	<u>D</u> elete	Deletes all stored data

COMMAND CHARACTERS AND CORRESPONDING FUNCTIONS

The Operating Mode

The computer enters the operating mode after the operator specifies which function he wants performed by typing a command character. In this mode it performs the individual functions. The operator can order the computer to return to the command mode by typing a "Control/C" after the computer has typed a colon.

Note: The program types a colon, then stops typing, to indicate it needs some information before it can proceed.

The Calculate Function (C)

This function accepts data from the operator, computes individual averages, and stores the code names and final averages.

The computer first types "NAME:", then waits for the operator to type a two character code name. This code name must conform to these rules:

- a) The code name must be a two character name (i.e. not one character and a space).
- b) The first character must be a letter (A-Z).
- c) The second character may be either a letter (A-Z), or a number (0-9). It must not be any other character.
- d) The code name needs no space after it; this is provided by the program.
- e) If one of these rules is broken, the computer will type a question mark, a carriage return, another colon, and will wait for the operator to try again.

This code name is used in the LIST and RANK functions.

The program will then type "OK" if the code name has not been used before. It will type "REDEFINITION" if it has been previously used. This is intended as a warning to the operator that he may have mistyped the code name.

The computer then types "COURSES:" and waits for the operator to type the number of courses.

The program then types "F:." The operator should then type in the numerical grade of the student's first full-credit course. The program will continue asking "F:." When the operator has inputted all the full-credit course grades, he should type an "X."

Note: If the student's courses are all full-credit courses, the operator should type "X" the first time the program asks "F:."

The computer then types "H:" and waits for the operator to type the grade of the student's first half-credit course. The computer will continue asking for half-credit course grades until it has asked for grades for all the courses.

The computer will then type "WEIGHTING:." At this point the operator should type the amount of weighting he wishes to add to the running total. (This may be zero.)

The computer will then compute the student's average, will type it, store it in its file, and will return to the beginning of the cycle to ask "NAME:," again. (The operator must type "Control/C" to return to command mode.)

All numerical inputs must follow these rules:

- a) All leading spaces, letters, and punctuation marks will be printed, but will otherwise be ignored.
- b) The typed in number may have any number of digits, it may be a decimal number, and it may be negative (shown by a preceding minus sign). Fractions must be typed as decimal numbers (e.g. "1/2" must be typed as ".5").
- c) The number must be terminated by a space, carriage return, letter, or punctuation mark, but not by a digit, an "E", or a period.

This terminating character will be printed. (Spaces and carriage returns are recommended. Carriage returns should be used when nearing the ends of lines to avoid the pileup of subsequent letters at the righthand margin.)

- d) Mistakes in typing numerical data may be corrected by striking the "RUBOUT" key -- this is printed as a backslash. This action will erase the entire number from memory, and will allow the operator to try again.

EXAMPLES OF LEGAL NUMBERS:

0 8.01 -100.9976 13 ABC\$8A +2.5

EXAMPLE OF AN ILLEGAL NUMBER:

10E

The following formula is used when computing individual averages:

- a) Full-credit courses are given extra credit by doubling them, adding this to the running total, then adding "one" to the total of courses. (i.e. full-credit courses are treated as though they are two courses.)
- b) Grades of half-credit courses are simply added to the running total.
- c) The weighting is added to the running total, then the total is divided by the number of courses. The result is corrected to the third decimal place.

Example of Calculate Function:

* C

NAME: ZA OK COURSES: 5 F: 3 F: 2.75 F: 2.5 F: X H: 2.5 H: 3

WEIGHTING: .1 AVERAGE=2.76

NAME: J8 OK COURSES: 6 F: 1.5 F: 2.5 F: 2.75 F: 2.5 F: X H: 3 H: 2.5

WEIGHTING: 0 AVERAGE=2.4

NAME: (User typed "Control/C")

*

The List Function (L)

This function types out in alphabetical order the code names in the memory and their corresponding averages. It numbers them as it goes, and automatically computes and prints the class average at the end. It returns to the command mode when it has finished.

Example:

* L

1. J8=2.40

2. ZA=2.76

AVERAGE=2.58

*

The Rank Function (R)

This function types out in rank order the code names and their corresponding averages, numbering them as it goes, automatically computing and typing the class average at the end, and returning to the command mode when it has finished.

Note: The program does not take into consideration cases in which two students have the same final average.

Example:

* R

1. ZA=2.76

2. J8=2.40

AVERAGE=2.58

The Average Function (A)

This function computes and types the class average, then returns to the command mode.

Example:

* A

AVERAGE=2.58

*

The Single Delete Function (S)

This function is used to delete individual code names from memory. The computer first types "NAME:;" the operator should then type in a two-character code name. The computer then eliminates this code name and the corresponding average from its file, and will ask "NAME:" again. The user must type "Control/C" to return to command mode.

If the code name is illegal or if it does not exist in its files, the computer will type a question mark, a carriage return, and a colon. The user may then try again.

Example:

* S

NAME: ZA (The computer deletes this code name from memory.)

NAME: QQ? (This code name did not exist in memory.)

: (User typed "Control/C.")

*

The Write Function (W)

This function types averages which correspond with code names inputted by the user. The computer

first types "NAME;" the operator then types a code name. The computer then types the average and asks "NAME:" again. The user must type "Control/C" to return to the command mode.

If the user types an illegal code name, or if it is not in memory, the computer will type a question mark, a carriage return, and another colon to allow the user to try again.

Example:

* W

NAME: J8=2.4

NAME: (The user typed "Control/C.")

*
—

The Delete Function (D)

This function deletes all information from the computer's file. It returns to the command mode upon completion.

Example:

* D

*
—

TECHNICAL INFORMATION

Minimum Hardware Required

A basic 4K PDP-8 family computer with teletype.

Other Programs Needed

Floating Point Package #2 (DEC-08-YQ2A-PB). The Floating Point Package should be loaded before the Grade Compiler.

Storage Requirement

The Grade Compiler uses locations 0000-1500; the Floating Point Package uses locations 5400-7577. The remaining locations are used to hold the files of code names and averages.

Each code name requires one word of memory space, and each average requires three words. In addition, one extra word per name is needed for the Rank and List functions. The Grade Compiler accommodates at least two hundred and seventy code names and averages.

Errors

The program can detect only those typographical errors which break the rules -- others are up to the user to detect.

Internal errors can only be detected by noticing abnormal output by the computer. On the PDP-8/S the "Parity Error" light will glow when some kinds of internal error occur.

BIBLIOGRAPHY

The following manuals, written by the Digital Equipment Corporation, will be helpful in loading and using this program:

Floating Point System Programming Manual (Digital 8-5-S).
Binary Loader Manual (DEC-08-LBAA-D).

*0000

0000	0000		
0001	0000		
0002	7777		
0003	1133	PREAD,	READ
0004	0671	PPRINT,	PRINT
0005	7400		7400
0006	7200		7200
0007	5600		5600

*0020

0020	0277	CQUEST,	0277
0021	0235	PCRLF,	CRLF
0022	0272	CCOLON,	0272
0023	0402	PINPUT,	INPUT
0024	0457	PSEARC,	SEARCH
0025	0240	CSPACE,	240

0026	0000		
0027	0000		
0030	0000	COURSE,	0; 0; 0
0031	0000		
0032	0000		
0033	0000	COUNTR,	0; 0; 0
0034	0000	TEST,	0
0035	1777	PTABL2,	1777
0036	1115	PWRITE,	WRITE
0037	0177		
0040	0000		
0041	0000		
0042	0000		
0043	0000		

/FLOATING POINT VARIABLES.

*62

0062	0003		3
0063	0000		
0064	0000		
0065	0000	TOTAL,	0; 0; 0
0066	0001		
0067	2000		
0070	0000	MINI,	1; 2000; 0
0071	0077	MASK,	0077
0072	0200	P0200,	0200
0073	0403	XINPUT,	INPUT+1
0074	0330	PXCHEC,	CHECKX
0075	0621	PCONTF,	CONTF
0076	7776	K0002,	7776
0077	0476	PCAL,	CALCUL
0100	0203	PC,	C
0101	0002	V,	2
0102	0777	MASK2,	777

/SET OUTPUT FIELD SIZE.

Ø1Ø3	Ø73Ø	PDECOD,	DECODE
Ø1Ø4	Ø713	PSHUFF,	SHUFFL
Ø1Ø5	ØØØØ	COMBIN,	Ø
Ø1Ø6	Ø271	NAME,	PNAME
Ø1Ø7	Ø275	CEQUAL,	275
Ø11Ø	37ØØ	K42ØØ,	37ØØ
Ø111	77ØØ	K77ØØ,	77ØØ
Ø112	2777	PLACE,	2777
Ø113	ØØØØ	FRUSTR,	Ø
Ø114	11Ø1		TAD V
Ø115	44Ø6		JMS I 6
Ø116	5513		JMP I FRUSTR
Ø117	Ø177		
Ø12Ø	Ø177		
Ø121	ØØØØ	HOLD,	Ø
Ø122	7766		
Ø123	2Ø3Ø		
Ø124	447Ø	CORREC,	7766; 2Ø3Ø; 447Ø
Ø125	Ø747	PMULT,	MULT
Ø126	14Ø2	PAV,	AV

	*2ØØØ		
2ØØØ	ØØØØ		Ø

/START OF PROGRAM.

*Ø2ØØ

Ø2ØØ	73ØØ	CLA CLL	
Ø2Ø1	6Ø32	KCC	
Ø2Ø2	6Ø46	TLS	
Ø2Ø3	4235	C, JMS CRLF	/TYPE CR/LF.
Ø2Ø4	123Ø	TAD CAST	
Ø2Ø5	4436	JMS* I PWRITE	/TYPE ASTERISK.
Ø2Ø6	44Ø3	JMS I PREAD	/READ A CHARACTER.
Ø2Ø7	7Ø41	CIA	
Ø21Ø	3Ø34	DCA TEST	
Ø211	1243	TAD PTABLE	
Ø212	3Ø1Ø	DCA ØØ1Ø	
Ø213	141Ø	LOOK, TAD I ØØ1Ø	/GET NEXT WORD OF TABLE.
Ø214	745Ø	SNA	
Ø215	5232	JMP QUEST	
Ø216	1Ø34	TAD TEST	/COMPARE CHARACTERS.
Ø217	764Ø	SZA CLA	
Ø22Ø	5213	JMP LOOK	
Ø221	1Ø1Ø	TAD ØØ1Ø	
Ø222	1231	TAD GAP	
Ø223	3Ø34	DCA TEST	
Ø224	4235	JMS CRLF	
Ø225	1434	TAD I TEST	
Ø226	3Ø34	DCA TEST	
Ø227	5434	JMP I TEST	

Ø23Ø	Ø252	CAST,	Ø252	
Ø231	ØØ12	GAP,	12	
Ø232	1Ø2Ø	QUEST,	TAD CQUEST	/ERROR SIGNAL SUBROUTINE.
Ø233	4436		JMS I PWRITE	
Ø234	52Ø3		JMP C	
Ø235	ØØØØ	CRLF,	Ø	/CR/LF TYPE SUBROUTINE.
Ø236	1267		TAD CRETUR	
Ø237	4436		JMS I PWRITE	
Ø24Ø	127Ø		TAD CLFEED	
Ø241	4436		JMS I PWRITE	
Ø242	5635		JMP I CRLF	
Ø243	Ø243	PTABLE,	.	
Ø244	Ø3Ø4		Ø3Ø4	/LOOK-UP TABLE FOR COMMANDS.
Ø245	Ø3Ø3			
Ø246	Ø314			
Ø247	Ø323			
Ø25Ø	Ø327			
Ø251	Ø322			
Ø252	Ø3Ø1			
Ø253	ØØØØ			
Ø254	ØØØØ			
Ø255	ØØØØ		0303; Ø314; Ø323; Ø327; 322; 3Ø1; Ø; Ø; Ø	
Ø256	Ø742		DELETE	/ADDRESSES OF COMMAND ROUTINES.
Ø257	Ø476		CALCUL	
Ø26Ø	1ØØØ		ALPH	
Ø261	1331		SINGLE	
Ø262	1376		WRITEX	
Ø263	12ØØ		RANK	
Ø264	14Ø2		AV	
Ø265	ØØØØ			
Ø266	ØØØØ		Ø; Ø	
Ø267	Ø215	CRETUR,	Ø215	
Ø27Ø	Ø212	CLFEED,	Ø212	

/PAGE 2.

Ø271	Ø271	PNAME,	.	
Ø272	16Ø1			
Ø273	15Ø5			
Ø274	724Ø			
Ø275	ØØØØ		16Ø1; 15Ø5; 724Ø; Ø	
Ø276	Ø276	POK,	.	
Ø277	4Ø4Ø			
Ø3ØØ	1713			
Ø3Ø1	56ØØ		4Ø4Ø; 1713; 56ØØ	
Ø3Ø2	Ø3Ø2	PREUSE,	.	
Ø3Ø3	4Ø4Ø			
Ø3Ø4	22Ø5			
Ø3Ø5	Ø4Ø5			
Ø3Ø6	Ø611			
Ø3Ø7	1611			

Ø31Ø	2411		
Ø311	1716		
Ø312	ØØØØ		4Ø4Ø; 22Ø5; 4Ø5; 611; 1611; 2411; 1716; Ø
Ø313	Ø313	PCOURS,	.
Ø314	4Ø4Ø		
Ø315	Ø317		
Ø316	2522		
Ø317	23Ø5		
Ø32Ø	2372		
Ø321	ØØØØ		4Ø4Ø; 317; 2522; 23Ø5; 2372; Ø
Ø322	Ø322		
Ø323	4Ø1Ø		
Ø324	72ØØ	KS,	.; 4Ø1Ø; 72ØØ
Ø325	Ø325		
Ø326	4ØØ6		
Ø327	72ØØ	KD,	.; 4ØØ6; 72ØØ
Ø33Ø	ØØØØ	CHECKX,	Ø
Ø331	44Ø5		JMS I 5
Ø332	1Ø6Ø		TAD 6Ø
Ø333	764Ø		SZA CLA
Ø334	573Ø		JMP I CHECKX
Ø335	7Ø4Ø		CMA
Ø336	3Ø6Ø		DCA 6Ø
Ø337	5331		JMP CHECKX +1

	*4ØØ		
Ø4ØØ	7477	C7477,	7477
Ø4Ø1	7746	C7746,	7746
Ø4Ø2	ØØØØ	INPUT,	Ø
Ø4Ø3	44Ø3		JMS I PREAD
Ø4Ø4	3Ø34		DCA TEST
Ø4Ø5	1Ø34		TAD TEST
Ø4Ø6	12ØØ		TAD C7477
Ø4Ø7	751Ø		SPA
Ø41Ø	525Ø		JMP ERROR
Ø411	12Ø1		TAD C7746
Ø412	77ØØ		SMA CLA
Ø413	525Ø		JMP ERROR
Ø414	1Ø34		TAD TEST
Ø415	ØØ71		AND MASK
Ø416	71Ø6		
Ø417	7ØØ6		
Ø42Ø	7ØØ6		CLL RTL; RTL; RTL
Ø421	31Ø5		DCA COMBIN
Ø422	44Ø3		JMS I PREAD
Ø423	3Ø34		DCA TEST
Ø424	1Ø34		TAD TEST
Ø425	12ØØ		TAD C7477
Ø426	751Ø		SPA
Ø427	5237		JMP NMTEST

/COMBINES INPUTTED LETTERS.

Ø43Ø	12Ø1		TAD C7746	
Ø431	77ØØ		SMA CLA	
Ø432	525Ø		JMP ERROR	
Ø433	1Ø34		TAD TEST	
Ø434	ØØ71		AND MASK	
Ø435	11Ø5		TAD COMBIN	
Ø436	56Ø2		JMP I INPUT	
Ø437	73ØØ	NMTEST,	CLA CLL	
Ø44Ø	1Ø34		TAD TEST	
Ø441	1246		TAD C752Ø	
Ø442	751Ø		SPA	
Ø443	525Ø		JMP ERROR	
Ø444	1247		TAD C7766	
Ø445	5231		JMP NMTEST-6	
Ø446	752Ø	C752Ø,	752Ø	
Ø447	7766	C7766,	7766	
Ø45Ø	73ØØ	ERROR,	CLA CLL	
Ø451	1Ø2Ø		TAD CQUEST	/ROUTINE FOR INDICATING ERROR.
Ø452	4436		JMS I PWRITE	
Ø453	4421		JMS I PCRLF	
Ø454	1Ø22		TAD CCOLON	
Ø455	4436		JMS I PWRITE	
Ø456	5473		JMP I XINPUT	
Ø457	ØØØØ	SEARCH,	Ø	/SEARCHES TABLE FOR SPECIFIED VARIABLE.
Ø46Ø	7Ø41		CIA	
Ø461	3113		DCA FRUSTR	
Ø462	1Ø35		TAD PTABL2	
Ø463	3Ø1Ø		DCA ØØ1Ø	
Ø464	141Ø		TAD I ØØ1Ø	
Ø465	745Ø		SNA	
Ø466	5657		JMP I SEARCH	
Ø467	1113		TAD FRUSTR	
Ø47Ø	765Ø		SNA CLA	
Ø471	5273		JMP .+2	
Ø472	5264		JMP SEARCH+5	
Ø473	1113		TAD FRUSTR	
Ø474	5657		JMP I SEARCH	
				/ROUTINE FOR ACCEPTING VALUES AND CALCULATING AVERAGES.
Ø475	Ø271	PPNAME,	PNAME	
Ø476	1675	CALCUL,	TAD I PPNAME	
Ø477	44Ø4		JMS I PPRINT	
Ø5ØØ	42Ø2		JMS I INPUT	
Ø5Ø1	3121	CON,	DCA HOLD	
Ø5Ø2	1121		TAD HOLD	
Ø5Ø3	4257		JMS SEARCH	/CHECK TO SEE IF NAME ALREADY USED.
Ø5Ø4	764Ø		SZA CLA	
Ø5Ø5	5313		JMP .+6	

Ø5Ø6	1716		TAD I PPOK	
Ø5Ø7	44Ø4		JMS I PPRINT	
Ø51Ø	1717		TAD I PPCOUR	
Ø511	44Ø4		JMS I PPRINT	
Ø512	5326		JMP CONT	
Ø513	172Ø		TAD I PPREUS	
Ø514	44Ø4		JMS I PPRINT	
Ø515	531Ø		JMP .-5	
Ø516	Ø276	PPOK,	POK	
Ø517	Ø313	PPCOUR,	PCOURS	
Ø52Ø	Ø3Ø2	PPREUS,	PREUSE	
Ø521	Ø325	PKD,	KD	
Ø522	ØØØ2			
Ø523	2ØØØ			
Ø524	ØØØØ	K2,	2; 2ØØØ; Ø	
Ø525	745Ø	MX,	-33Ø	
Ø526	4474	CONT,	JMS I PXCHEC	
Ø527	44Ø7		JMS I 7	/ENTER FLOATING POINT PACKAGE.
Ø53Ø	6Ø26		FPUT COURSE	/HOLD NUMBER OF COURSES.
Ø531	6Ø31		FPUT COUNTR	
Ø532	ØØØØ		FEXT	
Ø533	3Ø63			
Ø534	3Ø64			
Ø535	3Ø65		DCA TOTAL; DCA TOTAL +1; DCA TOTAL +2	
Ø536	1721	CONTD,	TAD I PKD	/THIS PART DOUBLES INPUTTED GRADES
Ø537	44Ø4		JMS I PPRINT	/'ONE' TO GRADE COUNTER TO PLACE MORE
Ø54Ø	44Ø5		JMS I 5	/WEIGHT ON FULL-CREDIT COURSES.
Ø541	1Ø57		TAD 57	
Ø542	1325		TAD MX	
Ø543	764Ø		SZA CLA	
Ø544	535Ø		JMP .+4	
Ø545	7Ø4Ø		CMA	
Ø546	3Ø6Ø		DCA 6Ø	
Ø547	5776		JMP I PCONTX	/IF AN "X" GO TO HALF-CREDIT COURSE
Ø55Ø	1Ø6Ø		TAD 6Ø	
Ø551	764Ø		SZA CLA	
Ø552	5356		JMP .+4	
Ø553	7Ø4Ø		CMA	
Ø554	3Ø6Ø		DCA 6Ø	
Ø555	534Ø		JMP CONTD +2	/IGNORE ILLEGAL PRECEDING CHARACTERS.
Ø556	44Ø7		JMS I 7	
Ø557	3322		FMPY K2	
Ø56Ø	1Ø63		FADD TOTAL	
Ø561	6Ø63		FPUT TOTAL	
Ø562	5Ø26		FGET COURSE	
Ø563	1Ø66		FADD MINI	
Ø564	6Ø26		FPUT COURSE	
Ø565	5Ø31		FGET COUNTR	
Ø566	2Ø66		FSUB MINI	

0567	05031		FPUT COUNTR
0570	05000		FEXT
0571	1032		TAD COUNTR +1
0572	7640		SZA CLA
0573	5336		JMP CONTD
0574	5775		JMP I .+1
0575	0516		CC
0576	0501	PCONTX,	CONTX

/PAGE 3.

0500	0322	0500 PKS,	KS
0501	1600	CONTX,	TAD I PKS
0502	4404		JMS I PPRINT
0503	4474		JMS I PXCHEC
0504	4407		JMS I 7
0505	1003		FADD TOTAL
0506	6063		FPUT TOTAL
0507	5031		FGET COUNTR
0510	2066		FSUB MINI
0511	6031		FPUT COUNTR
0512	0000		FEXT
0513	1032		TAD COUNTR +1
0514	7640		SZA CLA
0515	5201		JMP CONTX
0516	1260	CC,	TAD PWT
0517	4404		JMS I PPRINT
0520	4474		JMS I PXCHEC
0521	4407	CONTF,	JMS I 7
0522	1063		FADD TOTAL
0523	4026		FDIV COURSE
0524	0000		FEXT
0525	1251		TAD PTOTAL
0526	4404		JMS I PPRINT
0527	1010		TAD I0
0530	3034		DCA TEST
0531	1434		TAD I TEST
0532	7640		SZA CLA
0533	5237		JMP .+4
0534	1121		TAD HOLD
0535	3434		DCA I TEST
0536	3410		DCA I I0
0537	1034		TAD TEST
0540	4525		JMS I PMULT
0541	3034		DCA TEST
0542	4407		JMS I 7
0543	6434		FPUT I TEST
0544	1122		FADD CORREC
0545	0000		FEXT

/ENTER FLOATING POINT PACKAGE.

/ENTER FLOATING POINT PACKAGE.

Ø646	4113		JMS FRUSTR	
Ø647	4421		JMS I PCRLF	
Ø65Ø	5477		JMP I PCAL	
Ø651	Ø651	PTOTAL,	.	
Ø652	4Ø4Ø			
Ø653	Ø126			
Ø654	Ø522			
Ø655	Ø1Ø7			
Ø656	Ø575			
Ø657	ØØØØ		4Ø4Ø; 126; 522; 1Ø7; 575; Ø	
Ø66Ø	Ø66Ø	PWT,	.	
Ø661	4Ø4Ø			
Ø662	27Ø5			
Ø663	11Ø7			
Ø664	1Ø24			
Ø665	1116			
Ø666	Ø772			
Ø667	ØØØØ		4Ø4Ø; 27Ø5; 11Ø7; 1Ø24; 1116; 772; Ø	
			/ROUTINE FOR PRINTING STRINGS OF CHARACTERS.	
Ø67Ø	ØØØØ	P,	Ø	
Ø671	ØØØØ	PRINT,	Ø	
Ø672	3Ø11		DCA 11	
Ø673	1411		TAD I 11	
Ø674	327Ø		DCA P	
Ø675	127Ø		TAD P	
Ø676	Ø111		AND K77ØØ	
Ø677	745Ø		SNA	
Ø7ØØ	5671		JMP I PRINT	
Ø7Ø1	7112			
Ø7Ø2	7Ø12			
Ø7Ø3	7Ø12		CLL RTR; RTR; RTR	
Ø7Ø4	45Ø3		JMS I PDECOD	
Ø7Ø5	127Ø		TAD P	
Ø7Ø6	ØØ71		AND MASK	
Ø7Ø7	745Ø		SNA	
Ø71Ø	5671		JMP I PRINT	
Ø711	45Ø3		JMS I PDECOD	
Ø712	5273		JMP PRINT +2	
Ø713	ØØØØ	SHUFFL,	Ø	/ROUTINE FOR TRANSFERRING DATA.
Ø714	1Ø35		TAD PTABL2	
Ø715	3Ø1Ø		DCA 1Ø	
Ø716	1112		TAD PLACE	
Ø717	3Ø11		DCA 11	
Ø72Ø	141Ø		TAD I 1Ø	
Ø721	745Ø		SNA	
Ø722	5713		JMP I SHUFFL	
Ø723	3411		DCA I 11	
Ø724	532Ø		JMP SHUFFL+5	

Ø725	ØØ4Ø	MASK1,	4Ø	
Ø726	Ø1ØØ	LETTER,	1ØØ	
Ø727	Ø2ØØ	CHAR,	2ØØ	
Ø73Ø	ØØØØ	DECODE,	Ø	/DECODES PACKED CHARACTERS
Ø731	3113		DCA FRUSTR	
Ø732	1113		TAD FRUSTR	
Ø733	Ø325		AND MASK1	
Ø734	765Ø		SNA CLA	
Ø735	1326		TAD LETTER	
Ø736	1327		TAD CHAR	
Ø737	1113		TAD FRUSTR	
Ø74Ø	4436		JMS I PWRITE	
Ø741	573Ø		JMP I DECODE	
Ø742	1Ø35	DELETE,	TAD PTABL2	/CLEARS TABLE2.
Ø743	3Ø1Ø		DCA 1Ø	
Ø744	341Ø		DCA I 1Ø	
Ø745	55ØØ		JMP I PC	
Ø746	ØØØØ	M,	Ø	/ROUTINE FOR CALCULATING LOCATIONS OF VALUES.
Ø747	ØØØØ	MULT,	Ø	
Ø75Ø	Ø1Ø2		AND MASK2	
Ø751	3346		DCA M	
Ø752	1346			
Ø753	1346			
Ø754	1346		TAD M; TAD M; TAD M	
Ø755	111Ø		TAD K42ØØ	
Ø756	5747		JMP I MULT	
				/ROUTINE FOR PRINTING OUT IN ALPHABETICAL ORDER.
	*1ØØØ			
1ØØØ	45Ø4	ALPH,	JMS I PSHUFF	
1ØØ1	3411		DCA I 11	
1ØØ2	3Ø31			
1ØØ3	3Ø32			
1ØØ4	3Ø33		DCA COUNTR; DCA COUNTR +1; DCA COUNTR +2	
1ØØ5	1112	ALPH1,	TAD PLACE	
1ØØ6	3Ø12		DCA 12	
1ØØ7	1412		TAD I 12	
1Ø1Ø	745Ø		SNA	
1Ø11	5526		JMP I PAV	
1Ø12	3Ø34		DCA TEST	
1Ø13	1Ø12		TAD 12	
1Ø14	31Ø5		DCA COMBIN	
1Ø15	1Ø34		TAD TEST	
1Ø16	7Ø4Ø		CMA	
1Ø17	765Ø		SNA CLA	
1Ø2Ø	52Ø7		JMP ALPH1+2	

1021	1012		TAD 12
1022	3011		DCA 11
1023	1411	ALPH2,	TAD I 11
1024	7450		SNA
1025	5242		JMP ALPH3
1026	7040		CMA
1027	7450		SNA
1030	5223		JMP ALPH2
1031	7001		IAC
1032	1034		TAD TEST
1033	7710		SPA CLA
1034	5223		JMP ALPH2
1035	1011		TAD 11
1036	3105		DCA COMBIN
1037	1505		TAD I COMBIN
1040	3034		DCA TEST
1041	5223		JMP ALPH2
1042	7240	ALPH3,	CLA CMA
1043	3505		DCA I COMBIN
1044	4246		JMS ALPH4
1045	5205		JMP ALPH1
1046	0000	ALPH4,	Ø
1047	4407		JMS I 7
1050	5066		FGET MINI
1051	1031		FADD COUNTR
1052	6031		FPUT COUNTR
1053	0000		FEXT ← FADD CORREC
1054	4406		JMS I 6
1055	1310		TAD KP
1056	4404		JMS I PPRINT
1057	1034		TAD TEST
1060	0111		AND K7700
1061	7112		
1062	7012		
1063	7012		CLL RTR; RTR; RTR
1064	4503		JMS I PDECOD
1065	1034		TAD TEST
1066	0071		AND MASK
1067	4503		JMS I PDECOD
1070	1107		TAD CEQUAL
1071	4436		JMS I PWRITE
1072	1034		TAD TEST
1073	4424		JMS I PSEARC
1074	7650		SNA CLA
1075	7402		HLT
1076	1010		TAD 10
1077	4525		JMS I PMULT
1100	3034		DCA TEST
1101	4407		JMS I 7

/ENTER FLOATING POINT PACKAGE.

1102	5434		FGET I TEST	
1103	1122		FADD CORREC	
1104	0000		FEXT	
1105	4113		JMS FRUSTR	
1106	4421		JMS I PCRLF	/ROUTINE.
1107	5646		JMP I ALPH4	
1110	1110			
1111	5640			
1112	0000	KP,	.;5640; 0	

PAGE 4.

/TELETYPE KEYBOARD SERVICE ROUTINE.

1113	0000	W,	0	
1114	7525	MPLUS,	-253	
1115	0000	WRITE,	0	
1116	3313		DCA W	
1117	1313		TAD W	
1120	1314		TAD MPLUS	
1121	7650		SNA CLA	/DO NOT PRINT PLUS SIGNS.
1122	5712		JMP I WRITE	
1123	6041		TSF	
1124	5323		JMP .-1	
1125	1313		TAD W	
1126	6046		TLS	
1127	7300		CLA CLL	
1130	5715		JMP I WRITE	

/TELETYPE PRINTER SERVICE ROUTINE.

1131	7575	K,	7575	
1132	0000	PR,	0	
1133	0000	READ,	0	
1134	6031		KSF	
1135	5334		JMP .-1	
1136	6036		KRB	
1137	3332		DCA PR	
1140	1332		TAD PR	
1141	1331		TAD K	
1142	7650		SNA CLA	/CONTRO/C'S CAUSE RETURN TO COMMAND
1143	5472		JMP I P0200	
1144	1332		TAD PR	
1145	4315		JMS WRITE	
1146	1332		TAD PR	
1147	5733		JMP I READ	

/ROUTINE FOR PRINTING OUT IN NUMERICAL RANK ORDER.

*1200

1200	4504	RANK,	JMS I PSHUFF	
1201	3411		DCA I 11	
1202	3031			
1203	3032			

1204	3033		DCA COUNTR;	DCA COUNTR +1; DCA COUNTR +2
1205	1112	RANK1,	TAD PLACE	
1206	3012		DCA 12	
1207	1412		TAD I 12	
1210	7450		SNA	
1211	5526		JMP I PAV	
1212	3034		DCA TEST	
1213	1012		TAD 12	
1214	3105		DCA COMBIN	
1215	1034		TAD TEST	
1216	7040		CMA	
1217	7650		SNA CLA	
1220	5207		JMP RANK1+2	
1221	1012		TAD 12	
1222	3011		DCA 11	
1223	1034	RANK4,	TAD TEST	
1224	4424		JMS I PSEARC	
1225	7650		SNA CLA	
1226	7402		HLT	
1227	1010		TAD 10	
1230	4525		JMS I PMULT	
1231	3113		DCA FRUSTR	
1232	4407		JMS I 7	
1233	5513		FGET I FRUSTR	
1234	6063		FPUT TOTAL	
1235	0000		FEXT	
1236	7300	RANK2,	CLA CLL	
1237	1411		TAD I 11	
1240	7450		SNA	
1241	5270		JMP RANK3	
1242	7040		CMA	
1243	7450		SNA	
1244	5236		JMP RANK2	
1245	7040		CMA	
1246	4424		JMS I PSEARC	
1247	7650		SNA CLA	
1250	7402		HLT	
1251	1010		TAD 10	
1252	4525		JMS I PMULT	
1253	3113		DCA FRUSTR	
1254	4407		JMS I 7	
1255	5063		FGET TOTAL	
1256	2513		FSUB I FRUSTR	
1257	0000		FEXT	
1260	1045		TAD 45	
1261	7700		SMA CLA	
1262	5236		JMP RANK2	
1263	1011		TAD 11	
1264	3105		DCA COMBIN	
1265	1505		TAD I COMBIN	

1266	3034		DCA TEST
1267	5223		JMP RANK4
1270	7300	RANK3,	CLA CLL
1271	7040		CMA
1272	3505		DCA I COMBIN
1273	4675		JMS I PALPH4
1274	5205		JMP RANK1
1275	1046	PALPH4,	ALPH4

/PAGE 5.

/ROUTINE FOR PRINTING SINGLE ITEM.

1276	1506	WRITEX,	TAD I NAME	/ASK 'NAME:'.
1277	4404		JMS I PPRINT	
1300	4423		JMS I PINPUT	
1301	4424		JMS I PSEARC	
1302	7650		SNA CLA	
1303	4320		JMS ERR	
1304	1107		TAD CEQUAL	
1305	4436		JMS I PWRITE	
1306	1010		TAD 10	
1307	4525		JMS I PMULT	
1310	3034		DCA TEST	
1311	4407		JMS I 7	/ENTER FPP.
1312	5434		FGET I TEST	
1313	1122		FADD CORREC	
1314	0000		FEXT	
1315	4113		JMS FRUSTR	
1316	4421		JMS I PCRLF	
1317	5276		JMP WRITEX	/RECYCLE/
1320	0000	ERR,	0	
1321	1020		TAD CQUEST	
1322	4436		JMS I PWRITE	
1323	4421		JMS I PCRLF	
1324	1330		TAD M6	
1325	1320		TAD ERR	
1326	3320		DCA ERR	
1327	5720		JMP I ERR	
1330	7772	M6,	7772	

/ROUTINE FOR DELETING SINGLE ITEMS.

1331	1506	SINGLE,	TAD I NAME	/ASK 'NAME:'.
1332	4404		JMS I PPRINT	
1333	4423		JMS I PINPUT	
1334	4424		JMS I PSEARC	
1335	7650		SNA CLA	
1336	4320		JMS ERR	
1337	1010		TAD 10	
1340	3011		DCA 11	
1341	7040		CMA	

1342	1010	TAD 10
1343	3010	DCA 10
1344	1011	TAD 11
1345	7001	IAC
1346	4525	JMS 1 PMULT
1347	3105	DCA COMBIN
1350	1011	TAD 11
1351	4525	JMS 1 PMULT
1352	3026	DCA COURSE
1353	1411	TAD 111
1354	7440	SZA
1355	5361	JMP .+4
1356	3410	DCA 1 10
1357	4421	JMS 1 PCRLF
1360	5381	JMP SINGLE
1361	3410	DCA 1 10
1362	4407	JMS 17
1363	5505	FGET 1 COMBIN
1364	6926	FPUT 1 COURSE
1365	1000	FEXT
1366	5344	JMP SINGLE + 13

*1400

/ROUTINE FOR AVERAGING WHOLE CLASS.

1400	1442	PAV2,	AV2
1401	0651	PZ,	PTOTAL
1402	1035	AV,	TAD PTABL2
1403	3010		DCA 10
1404	1410		TAD 1 10
1405	7650		SNA CLA
1406	5500		JMP 1 PC
1407	1601		TAD 1 PZ
1410	4404		JMS 1 PPRINT
1411	1110		TAD K4200
1412	3105		DCA COMBIN
1413	3063		
1414	3064		
1415	3065		DCA TOTAL; DCA TOTAL +1, DCA TOTAL +2
1416	3026		
1417	3027		
1420	3030		DCA COURSE; DCA COURSE +1, DCA COURSE +2
1421	1035		TAD PTABL2
1422	3010		DCA 10
1423	1410	AV1,	TAD 1 10
1424	7650		SNA CLA
1425	5600		JMP 1 PAV2
1426	4407		JMS 17
1427	5505		FGET 1 COMBIN
1430	0063		FADD TOTAL
1431	6063		FPUT TOTAL
1432	5026		FGET COURSE

1433	1066		FADD MINI
1434	6026		FPUT COURSE
1435	0000		FEXT
1436	2105		
1437	2105		
1440	2105		ISZ COMBIN; ISZ COMBIN; ISZ COMBIN
1441	5651		JMP I PAV1
1442	4407	AV2,	JMS I 7
1443	5063		FGET TOTAL
1444	4026		FDIV COURSE
1445	1122		FADD CORREC
1446	0000		FEXT
1447	4113		JMS FRUSTR
1450	5500		JMP I PC
1451	1423	PAV1,	AV1

/ALTERATIONS TO FLOATING POINT PACKAGE.

*7157

7157	5372		JMP RESTRT
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*7172

7172	7300	RESTRT,	CLA CLL	/ROUTINE FOR ECHOING RUBOUT WITH A
7173	1376		TAD BCKSLS	/BACK-SLASH.
7174	4436		JMS I PWRITE	
7175	5767		JMP I 7167	
7176	0334	BCKSLS,	334	

*7345

7345	4436		JMS I PWRITE	/ALTERATIONS TO ACCOMMODATE ION.
7346	5744		JMP I 7344	

*7144

7144	4403		JMS I PREAD
7145	7000		NOP
7146	7000		NOP
7147	3057		3057
7150	1057		1057
7151	7000		NOP
7152	7000		NOP

AC	0040
ALPH	1000
ALPH1	1005
ALPH2	1023
ALPH3	1042
ALPH4	1046
AV	1402
AV1	1423
AV2	1442
BCKSLS	7176
C	0203
CALCUL	0476
CAST	0230

CC	0616
COOLON	0022
CEQUAL	0107
CHAR	0727
CHECKX	0330
CLFEED	0270
COMBIN	0105
CON	0501
CONT	0526
CONTD	0536
CONTF	0621
CONTX	0601
CORREC	0122
COUNTR	0031
COURSE	0026
CQUEST	0020
CRETUR	0267
CRLF	0235
CSPACE	0025
C7477	0400
C7520	0446
C7746	0401
C7766	0477
DECODE	0730
DELETE	0742
ERR	1320
ERROR	0450

UA FGE	AT	1427
RUSTR	0113	
GAP	0231	
HOLD	0121	
INPUT	0402	
K	1131	
K0	0325	
KP	1110	
KS	0322	
K0002	0076	
K2	0522	
K4200	0110	
K7700	0111	
LETTER	0726	
LINK	0041	
LOOK	0213	
AI	0746	
MASK	0071	
MASK1	0725	
MASK2	0102	
MINI	0066	
MPLUS	1114	
MULT	0747	

MX	0525
M6	1330
NAME	0106
NMTEST	0437
P	0670
PALPH4	1275
PAV	0126
PAV1	1451
PAV2	1400
PC	0100
PCAL	0077
PCONTF	0075
PCONTX	0576
PCOURS	0313
PCRLF	0021
PDECOD	0103
PINPUT	0023
PKD	0521
PKS	0600
PLACE	0112
PMULT	0125
PNAME	0271
POINT1	0042
POINT2	0043
POINT3	0000
POINT4	0001
POK	0276
PPCOUR	0517
PPNAME	0475
PPOK	0516
PPREUS	0520
PPRINT	0004
PP1	0117
PP2	0120
PR	1132
PREAD	0003
PRETUR	0037
PREUSE	0302
PRINT	0671
PSEARC	0024
PSHUFF	0104
PTABLE	0243
PTABL2	0035
PTOTAL	0651
PWRITE	0036
PWT	0660
PXCHEC	0074
PZ	1401
P0200	0072

UA P1 AT 0117

UA P2 AT 0120

QUEST 0232
RANK 1200
RANK1 1205
RANK2 1236
RANK3 1270
RANK4 1223
READ 1133
RESTR 7172

UA RETURN AT 0037

SEARCH 0457
SHUFFL 0713
SINGLE 1331
SWITZ 0002
TEST 0034
TOTAL 0063
V 0101
W 1113
WRITE 1115
WRITEX 1276
XINPUT 0073

GOVERNOR DUMMER ACADEMY

JUN 03 1971

Byfield, Massachusetts 01922

FOUNDED IN 1763

VALLEAU WILKIE, JR.
Headmaster

June 3, 1971

DECUS Program Librarian
Digital Equipment Computer Users Society
146 Main Street
Maynard, Massachusetts 01754

Dear Sir:

Enclosed is a revised version of the Grade Compiler written by Mark Linehan (DECUS #8-275). The following corrections have been made:

1. During the writing of the program, it was noticed that the fixed point output controller in floating point package 2 (DEC-08-YQ2A-PB) did not round properly. To remedy this, Linehan added 0.005 (CORREC) and then typed numbers to two decimal places. This year it was discovered that the output controller sometimes gets ambitious and tries to round, which, in combination with Linehan's patch, causes a roundoff error. To correct this, I have set CORREC to 0, so that it has no effect, and have switched to using FPP 1 (DEC-08-YQ1A-PB) and a modified output controller (DECUS #8-44). Location 55 has been set to 0 to suppress the automatic return/line feed feature in this controller, since it was not in the old controller and the program types its own return/line feeds.

2. I don't know what the original idea was, but the weighting is now divided by ten and then added to the final average.

The output format has also been changed to four significant digits and three decimal places.

Sincerely yours, ..

Craig B. Laub

Craig B. Laub

:MFD

DECUS NOTE: New binary tape offered as of 11/12/71