

OPEN-FILE REPORT 83-7

PROGRAMMABLE CALCULATOR SOLUTIONS
FOR
QUARTER-QUARTER-QUARTER
AND
LATITUDE-LONGITUDE DETERMINATIONS

by

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Colorado Geological Survey
Department of Natural Resources
Denver, Colorado 80203
1983

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TITLE: QUARTER-QUARTER-QUARTER DETERMINATIONS

ABSTRACT:

The program displays the quarter-quarter-quarter breakdown of a point in a section defined in feet from either the north or south line and east or west line. Use of the program speeds quarter-quarter-quarter determinations and reduces errors. Points located on a quarterline are denoted with an asterisk. An ideal section shape is assumed.

Program Lines: 145
Bytes: 283
Accessories: None

PROGRAM DESCRIPTION I

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Program Title QUARTER-QUARTER-QUARTER DETERMINATIONS

Contributor's Name Peter Rushworth

Address Colorado Geological Survey 1313 Sherman St. Room 715

City Denver State/Country Colo Zip Code 80203

Program Description, Equations, Variables

Program uses flag logic to determine if a point is located in either the
north or south and east or west portion of each of three quarters of a
section. The general formula used to develop the alpha display is:

Flag set N or W

<u>or</u>	<u>=</u>	<u>INT</u>	<u>distance from section line</u>	<u>MOD 2</u>
<u>Flag clear S or E</u>			<u>660 for quarter 1</u>	
			<u>1320 for quarter 2</u>	
			<u>2640 for quarter 3</u>	

Necessary Accessories None

Operating Limits and Warnings Assumes ideal section boundaries and shape. Use with
printer in NORMAl mode.

Reference(s) _____

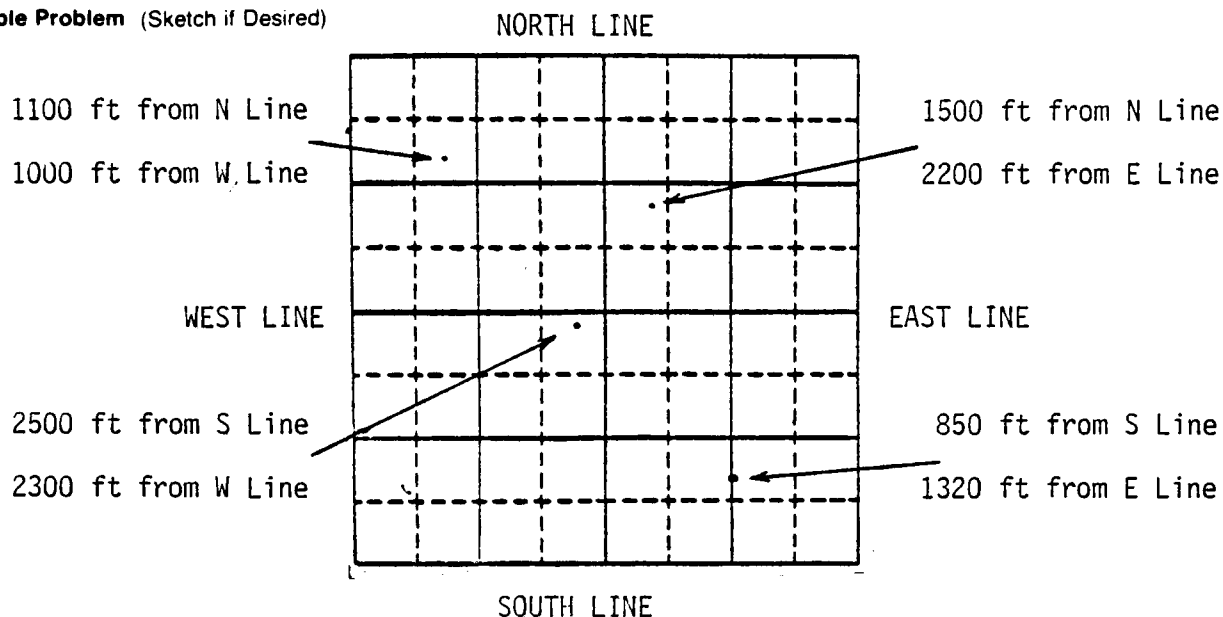
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PROGRAM DESCRIPTION II

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Sample Problem (Sketch if Desired)



SOLUTION:

Display	Input	Function	Comments
		size 006	minimum size
	key in QQQ	xeq QQQ	enter program run program
N Line	1500	r/s	enter distance from N Line
E Line	2200	r/s	enter distance from E Line
NWSWNE		r/s	quarter-quarter-quarter
N Line	1100	r/s	enter distance from N Line
E Line		r/s	No E Line entry press r/s
W Line	1000	r/s	feet from W Line
SENWNW		r/s	quarter-quarter-quarter
N Line		r/s	no entry-r/s
S Line	850	r/s	feet from south line
E Line	1320	r/s	feet from east line
NESWSE*		r/s	"*" denotes point on quarterline
N Line		r/s	no entry r/s
S Line	2500	r/s	feet from south line
E Line		r/s	no entry r/s
W Line	2300	r/s	feet from west line
NENESW			REPEATS AS NECESSARY

USER INSTRUCTIONS

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				SIZE: (HP-41C) 006
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	size--minimum 006		size 006	
2	key in QQQ			
3	xeq QQQ			N Line
3a	enter north line go to 4 else 3b	n line	r/s	or
3b	if no entry r/s and enter south line	s line	r/s	S Line
4	enter east line distance go to 5 else 4a			E Line
		e line	r/s	or
4a	if distance from w line enter			W Line
		w line	r/s	
5	display quarter-quarter-quarter			NENENE
	an asterisk is appended to display			or *
	if point is located on a quarterline			SWSWSW
	Program returns to step 3a			

PROGRAM LISTING

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STEP/ LINE	KEY ENTRY	COMMENTS	STEP/ LINE	KEY ENTRY	COMMENTS
01	LBL "QQQ"		49	XEQ 13	
02	FS? 55	printer	50	X=0?	
03	PRBUF	flag	51	SF 08	
04	CF 21	test	52	RCL 00	
05	FS? 55		53	XEQ 12	
06	SF 21		54	X=0?	
07	SF 29		55	SF 09	
08	"N"		56	RCL 01	
09	ASTO 02	load	57	XEQ 12	
10	"S"	alpha	58	X=0?	
11	ASTO 03	data	59	SF 10	
12	"E"		60	CLA	
13	ASTO 04		61	FS? 05	
14	"W"		62	ARCL 02	accumulate
15	ASTO 05		63	FC? 05	alpha
16	XEQ 05		64	ARCL 03	display
17	LBL 10		65	FS? 06	according
18	0	prompt	66	ARCL 04	to
19	"N LINE"	for	67	FC? 06	flag
20	PROMPT	north line	68	ARCL 05	status
21	STO 00	if no entry	69	FS? 07	
22	X=0?	ask for	70	ARCL 02	
23	XEQ 01	south	71	FC? 07	
24	0		72	ARCL 03	
25	"E LINE"		73	FS? 08	
26	PROMPT	prompt for	74	ARCL 04	
27	STO 01	east line	75	FC? 08	
28	X=0?	if no entry	76	ARCL 05	
29	XEQ 02	ask for	77	FS? 09	
30	RCL 00	west	78	ARCL 02	
31	XEQ 04		79	FC? 09	
32	RCL 01		80	ARCL 03	
33	XEQ 04		81	FS? 10	
34	LBL 06		82	ARCL 04	
35	SF 12		83	FC? 10	
36	RCL 00		84	ARCL 05	
37	XEQ 14	flag test	85	FS? 00	if on
38	X=0?	sequence	86	"I*"	quarterline
39	SF 05	to	87	AVIEW	denote
40	RCL 01	develop	88	CF 12	by an
41	XEQ 14	alpha	89	STOP	asterisk
42	X=0?	display	90	XEQ 05	
43	SF 06		91	ADV	
44	RCL 00		92	GTO 10	
45	XEQ 13		93	LBL 14	
46	X=0?		94	660	quarterline
47	SF 07		95	XEQ 11	divisors
48	RCL 01		96	RTN	
			97	LBL 13	

PROGRAM LISTING

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STEP/ LINE	KEY ENTRY	COMMENTS	STEP/ LINE	KEY ENTRY	COMMENTS
98	1320				
99	XEQ 11	of a			
100	RTN	section			
101	◆LBL 12				
102	2640				
103	XEQ 11				
104	RTN				
105	◆LBL 11				
106	/				
107	INT				
108	2				
109	MOD				
110	RTN				
111	◆LBL 01				
112	"S LINE"				
113	PROMPT	south line			
114	5280	prompt			
115	X<>Y	converts			
116	-	relative			
117	STO 00	to north line			
118	RTN				
119	◆LBL 02				
120	"W LINE"				
121	PROMPT	west line			
122	5280	prompt converts			
123	X<>Y	relative			
124	-	to east line			
125	STO 01				
126	RTN				
127	◆LBL 04	tests for			
128	660	point on quarter			
129	/				
130	FRC				
131	X=0?				
132	SF 00				
133	FS? 00				
134	GT0 06				
135	RTN				
136	◆LBL 05	initialize			
137	CF 00	flags			
138	CF 05				
139	CF 06				
140	CF 07				
141	CF 08				
142	CF 09				
143	CF 10				
144	RTN				
145	END				

REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS		STATUS			
00	distance from north line	SIZE 006	TOT. REG.46	USER MODE	
01	distance from east line	ENG	FIX	SCI	ON OFF
		DEG	RAD	GRAD	
02	N	FLAGS			
03	S	#	INIT S/C	SET INDICATES	CLEAR INDICATES
04	E	00	c	point on line	-
05	W	05	c	south	north
		06	c	west	east
		07	c	south	north
		08	c	west	east
		09	c	north	south
		10	c	west	east
		12	s/c	doublewide	-
		21	s/c	printer enable	-
		29	s	digit grouping	-
		55	s/c	printer exist	-
		ASSIGNMENTS			
		FUNCTION	KEY	FUNCTION	KEY
		QQQ	any		

TITLE: LATITUDE-LONGITUDE DETERMINATIONS

ABSTRACT:

The program calculates the latitude and longitude of an unknown point on a map. Input are latitude-longitude dimensions and internal measurements in a dimensionless scale. Only two measurements are then required to define the latitude and longitude of any unknown point within the map boundary. Conversely, given latitude and longitude coordinates of an unlocated point the program computes and displays the plotting distances from the map boundary.

Program Lines: 141
Bytes: 310
Accessories: None

PROGRAM DESCRIPTION I

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Program Title LATITUDE-LONGITUDE DETERMINATIONS

Contributor's Name Peter Rushworth

Address Colorado Geological Survey 1313 Sherman Street Room 715

City Denver State/Country Colorado Zip Code 80203

Program Description, Equations, Variables

The program computes the coordinate location of an unknown point using a
distance ratio along both the north-south and east-west dimensions. The
general equation is:

Degrees of departure =
$$\frac{\text{Measured distance to point} * \text{Total degrees of departure}}{\text{Total measured map dimension}}$$

Degrees of departure are added to the base location which is the SE corner of
the map.

Necessary Accessories none

Operating Limits and Warnings For use only in the northern hemisphere. May be modified
for southern hemisphere use. Extreme latitudes may induce errors. ALWAYS TEST
PROGRAM AGAINST A KNOWN POINT. Use with printer in NORMAL mode.

Reference(s) _____

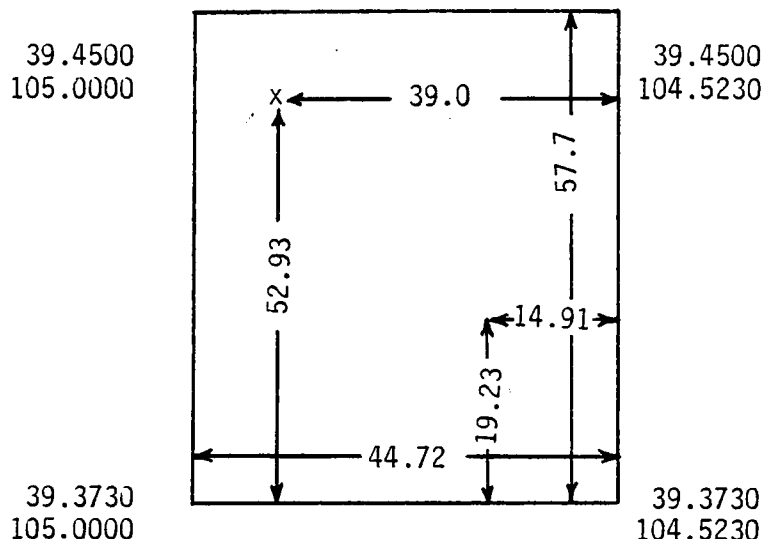
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PROGRAM DESCRIPTION II

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Sample Problem (Sketch if Desired)



- 1) Determine coordinates at point X
- 2) Locate the coordinates
Lat: 39.4000
Lon: 104.5500

SOLUTION:

Display	Input	Function	Comments
N Lat	39.4500	size 009	minimum size
S Lat	39.3730	xeq LALO	run program
E Lon	104.5230	r/s	enter north latitude
W Lon	105.0000	r/s	enter south latitude
N-S Dim	57.7	r/s	enter east longitude
E-W Dim	44.72	r/s	enter west longitude
Ready		A	measure between north and south
Pt Name	(if printer)	r/s	measure between east and west
Dim N to Pt	52.93	r/s	enter digit name of point
Dim W to Pt	39.	r/s	measure from baseline north
Lat: 39.4423		r/s	measure from baseline west
Lon: 104.5902		r/s	latitude of point
Dim N to Pt		r/s	longitude of point
Pt Name	(if printer)	E	repeats in mode
Lat	39.4000	r/s	to change to locating coordinate
Lon	104.5500	r/s	enter digit name of point
Plot 19.23 S to N		r/s	enter latitude of point
Plot 14.91 E to W		r/s	enter longitude of point
Lat		r/s	plot from south to north
		r/s	plot from east to west
			repeats in mode

NOTE: No r/s in output and point name is printed if printer connected

USER INSTRUCTIONS

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				SIZE: (HP-41C) 009
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	minimum size		size 009	
2	Enter LALO			
3	Execute LALO			N Lat
4	enter north latitude	north lat	r/s	S Lat
4a	enter south latitude	south lat	r/s	E Lon
4b	enter east longitude	east lon	r/s	W Lon
4c	enter west longitude	west lon	r/s	N-S Dim
4d	enter consistent measure btwn N-S	inches cm etc	r/s	E-W Dim
4e	enter consistent measure btwn E-W	inches cm etc	r/s	Ready
5	select Local Label A		A	
6	if printer xeq step 9 and rtn			Dim N to pt
6a	enter dimensions to point	inches cm etc	r/s	Dim W to pt
6b	point name printed if printer	inches cm etc	r/s	Pt Name-XX
6c	output-no r/s if printer			Lat: DDD.MMSS
6d			r/s	Lon: DDD.MMSS
6e	control returns to step 6		r/s	Dim N to Pt
7	Select local label E		E	
8	if printer xeq step 9 and rtn			Lat
8a	enter latitude of unlocated point	lat	r/s	Lon
8b	enter longitude of unlocated point	lon	r/s	Pt Name-XX
8c	output plot dimensions			Plot X.XX S to N
8d	no r/s if printer		r/s	Plot X.XX E to W
8e	control returns to step 8		r/s	Lat
9	printer present enter point name			Pt Name
9a	control returns to local label	point name	r/s	

PROGRAM LISTING

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STEP/ LINE	KEY ENTRY	COMMENTS	STEP/ LINE	KEY ENTRY	COMMENTS
01♦	LBL "LAL		46	*	compute ratio
0"		printer	47	RCL 03	
02	SF 27		48	/	add to baseline
03	FS? 55	flag	49	RCL 01	
04	PRBUF		50	+	
05	CF 21	test	51	HMS	
06	FS? 55		52	STO 07	
07	SF 21		53	"DIM W T	prompt for dimension west to point
08	DEG		0 PT"		
09	"N LAT"		54	PROMPT	
10	PROMPT	prompt	55	RCL 04	
11	HR	for	56	*	
12	"S LAT"	degree	57	RCL 02	
13	PROMPT	width	58	/	
14	HR	and	59	RCL 00	compute ratio
15	STO 01	store	60	+	
16	-	coordinates	61	HMS	add to baseline
17	STO 05	of southeast	62	STO 06	
18	"E LON"	map	63	FS? 55	if printer
19	PROMPT	point	64	XEQ 09	print name
20	HR		65	FIX 4	
21	STO 00		66	RCL 07	output
22	"W LON"		67	HR	coordinates
23	PROMPT		68	HMS	
24	HR		69	"LAT: "	
25	X<>Y		70	XEQ 05	
26	-		71	RCL 06	
27	STO 04		72	HR	
28	"N-S DIM	prompt	73	HMS	
29	PROMPT	for	74	"LON: "	
30	STO 03	measured	75	XEQ 05	
31	"E-W DIM	dimensions	76	ADV	
32	PROMPT		77	GTO A	
33	STO 02		78♦	LBL 05	output subroutine
34♦	LBL 14		79	ARCL X	
35	"READY"		80	AVIEW	
36	AVIEW	ready	81	FC? 55	
37	ADV		82	STOP	
38	STOP		83	RTN	
39	GTO 14		84♦	LBL 08	point name prompting and output
40♦	LBL A		85	"PT NAME	
41	FS? 55	if printer	86	PROMPT	
42	XEQ 08	ask	87	STO 08	
43	"DIM N T	for	88	RTN	
0 PT"		point name	89♦	LBL 09	
44	PROMPT		90	FIX 0	
45	RCL 05		91	CF 29	
			92	RCL 08	

PROGRAM LISTING

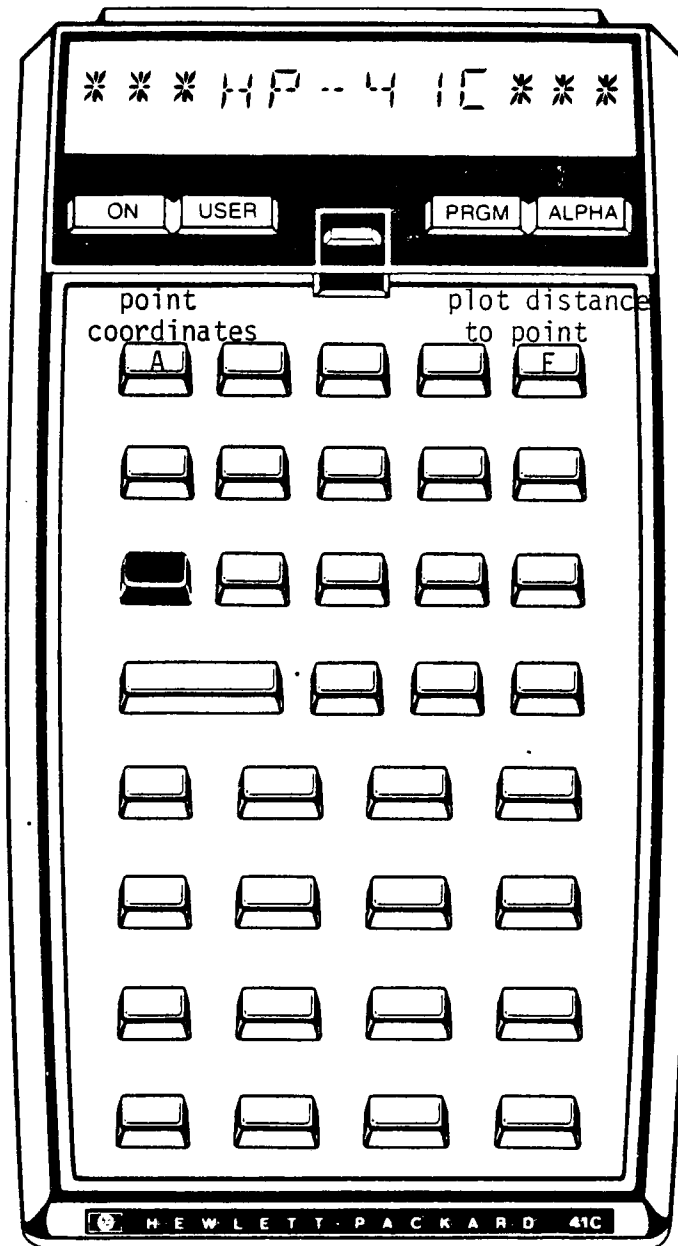
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STEP/ LINE	KEY ENTRY	COMMENTS	STEP/ LINE	KEY ENTRY	COMMENTS
93	-PT NAME				
-	"				
94	XEQ 05				
95	SF 29				
96	RTN				
97	LBL E	if printer			
98	FS? 55	ask for point			
99	XEQ 08	name			
100	"LAT"				
101	PROMPT	prompt			
102	HR	for			
103	RCL 01	coordinates			
104	-				
105	RCL 03				
106	*				
107	RCL 05	convert			
108	/	dimensions			
109	STO 07	for			
110	"LON"	plotting			
111	PROMPT				
112	HR				
113	RCL 00				
114	-				
115	RCL 02				
116	*				
117	RCL 04				
118	/				
119	STO 06				
120	FS? 55	if printer			
121	XEQ 09	print			
122	FIX 2	point name			
123	RCL 07				
124	"PLOT "	output			
125	ARCL X	plotting			
126	"F S TO	distances			
N"					
127	AVIEW				
128	FC? 55				
129	STOP				
130	CLA				
131	RCL 06				
132	"PLOT "				
133	ARCL X				
134	"F E TO				
W"					
135	AVIEW				
136	FC? 55				
137	STOP				
138	CLA				
139	ADV				
140	GTO E				
141	END				

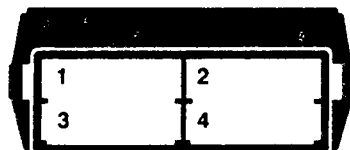
KEYBOARD CARD LABELING

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KEYBOARD



SYSTEM
CONFIGURATION



CARD

