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TI Programmable 58/59

Aviation

Quick Reference Guide

CONTENTS

CALCULATING NOTES

Low Battery Indication

If the display flashes erratically, fades out, gives incorrect results or is inconsistent in any way, recharge the battery. Calculator operation can be resumed after several minutes of recharging.

Algebraic Hierarchy

Operations and functions are performed automatically in following order.

1. Math Functions (x^2, cos, etc.)
2. Exponentiation (y^x) and Roots ($\sqrt[x]{y}$)
3. Multiplication, Division
4. Addition, Subtraction
5. Equals

Order applies to each set of parentheses. You can use up to 8 pending operations and 9 open parentheses, except where noted.

Flashing Display

A display flashing off and on indicates that an invalid key sequence has taken place or that the limits of the display have been exceeded. See Appendix B in *Personal Programming* for possible causes.

CONVERSIONS

Angle Formats

2nd D.MS — DEGREES, MINUTES, SECONDS TO DECIMAL DEGREES — Converts an angle measured in degrees, minutes and seconds to its decimal degrees equivalent. INV 2nd D.MS reverses this conversion. Also used for time conversions. **Operates on display value only.** Submit 2 digits each for minutes and seconds. Entry and display format is DD.MMSSsss where DD is degrees, MM is minutes, SS is whole seconds and sss is fractional seconds.

Polar to Rectangular

R x:t Θ 2nd P→R → y; x:t → x

Rectangular to Polar

x x:t y INV 2nd P→R → Θ; x:t R

Only 4 pending operations are available for other uses when using D.MS or Polar/Rectangular conversions.

Angular Conversions

FROM \ TO	Degrees	Radians	Grads
Degrees		$\times \frac{\pi}{180}$	$\div 0.9$
Radians	$\times \frac{180}{\pi}$		$\times \frac{200}{\pi}$
Grads	$\times 0.9$	$\times \frac{\pi}{200}$	

STATISTICS

Initialize: 2nd Prgm 1 SBR CLR
Data Entry: x_i x:t y_i 2nd Σ+
Data Entry Removal: x_i x:t y_i INV 2nd Σ+
Trendline Data Entry: x_1 x:t, y_1 2nd Σ+, y_2 2nd Σ+, etc.
Trendline Point Removal: x:t − 1 = x:t y_i INV 2nd Σ+

Calculations	Key Sequence
Mean of y-array	2nd $\bar{x}$
then x-array	x:t
Standard Deviation	
(N − 1 Weighting) of y-array	INV 2nd $\bar{x}$
then x-array	x:t
(N Weighting) of y-array	INV 2nd Op 11 $\sqrt{x}$
then x-array	x:t $\sqrt{x}$
Variance	
(N Weighting) of y-array	2nd Op 11
then x-array	x:t
(N − 1 Weighting) of y-array	2nd $\bar{x}$ x^2
then x-array	x:t x^2
Y-Intercept	2nd Op 12
Slope after y-intercept	x:t
Correlation Coefficient	2nd Op 13
y' for new x	2nd Op 14
x' for new y	2nd Op 15

SPECIAL CONTROL OPERATIONS

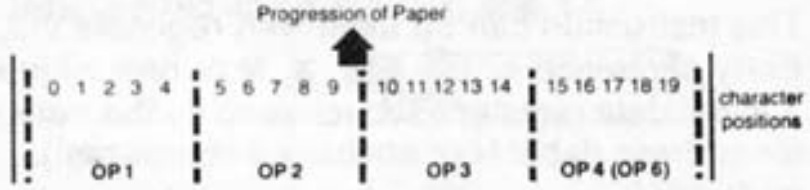
Each special control operation is called by pressing [2nd] [Op] **nn** where **nn** is the 2-digit code assigned to each operation (short form addressing can be used here). These operations use up to 4 pending operations and 1 subroutine level.

Code nn	Function
00*	Initialize print register.
01*	Alphanumerics for far left quarter of print column.
02*	Alphanumerics for inside left quarter of print column.
03*	Alphanumerics for inside right quarter of print column.
04*	Alphanumerics for far right quarter of print column.
05*	Print the contents of the print register.
06*	Print last 4 characters of OP 04 with current display.
07*	Plot ÷ in column 0-19 as specified by the display.
08*	List the labels currently used in program memory.
09	Bring specified library program into program memory.
10	Apply signum function to display register value.
11	Calculate variances.
12	Calculate slope and intercept.
13	Calculate correlation coefficient.
14	Calculate new y prime (y') for an x in the display.
15	Calculate new x prime (x') for a y in the display.
16	Display current partition of memory storage area.
17	Repartition memory storage area.
18	If no error condition exists in a program, set flag 7.
19	If an error condition exists in a program, set flag 7.
20-29	Increment a data register 0-9 by 1.
30-39	Decrement a data register 0-9 by 1.

*Designed specifically for use with optional PC-100A Print Cradle

ALPHANUMERIC PRINT CODES

The first seven control operations allow you to create and print out alphanumeric messages. Twenty characters can be printed on each line. They are assembled and stored in groups of 5 characters at a time as shown below.



Each printed character is represented by a two-digit, row-column address code according to the following table:

	0	1	2	3	4	5	6	7
0		0	1	2	3	4	5	6
1	7	8	9	A	B	C	D	E
2	-	F	G	H	I	J	K	L
3	M	N	O	P	Q	R	S	T
4	.	U	V	W	X	Y	Z	+
5	×	*	(	)	e	(	)	,
6	↑	%	;	/	=	"	×	Σ
7	≥	?	÷	∅	Π	^	Π	Σ

For instance, A is code 13 and + is code 47

PROGRAMMING NOTES

Labels

Any key on the keyboard can be used as a label except [2nd], [LRN], [Ins], [Del], [SST], [BST], [Ind] and the numbers 0-9.

DSZ

This instruction can be used with registers 0-9. Entry sequence is [2nd] [DSZ] **X, N** or **nnn** where X is the data register used followed by the transfer address (label N or absolute address nnn).

Flags

Ten flags are available (0-9). Entry sequence for setting, resetting or testing flags is the flag instruction, flag number, then transfer address (testing only).

MEMORY PARTITIONING

Memory area is partitioned in sets of 10 registers where each register can hold a data value or 8 program instructions. To check placement of current partition, press [2nd] [Op] **16.** To repartition, enter number of sets (N) of 10 data registers needed and press [2nd] [Op] **17.**

N	Program/Data TI-58	TI-59
N < 0 = N		
0	479/00	959/00
1	399/09	879/09
2	319/19	799/19
3	**239/29***	719/29
4	159/39	639/39
5	079/49	559/49
6	000/59	**479/59***
7	Flashing	399/69
8	Flashing	319/79
9	Flashing	239/89
10	Flashing	159/99
N > 10	Flashing	159/99

*Partition when calculator is turned on.

PROGRAM KEY CODES

Key Code	Key	Key Code	Key	Key Code	Key
00	0	39	cos	72*	STO Ind
↓	↓	40	Ind	73*	RCL Ind
09	9	42	STO	74*	SUM Ind
10	E'	43	RCL	75	−
11	A	44	SUM	76	Lbl
12	B	45	y^x	77	x≠t
13	C	47	CMs	78	Σ+
14	D	48	Exc	79	x̄
15	E	49	Prd	80	Grad
16	A'	50	x≥t	81	RST
17	B'	52	EE	83*	GTO Ind
18	C'	53	(	84*	Op Ind
19	D'	54	)	85	+
20	CLR	55	÷	86	St flg
22	INV	57	Eng	87	If flg
23	ln x	58	Fix	88	D.MS
24	CE	59	Int	89	π
25	CLR	60	Deg	90	List
27	INV	61	GTO	91	R/S
28	log	62*	Pgm Ind	92*	INV SBR
29	CP	63*	Exc Ind	93	.
30	tan	64*	Prd Ind	94	+/−
32	x:t	65	×	95	=
33	x²	66	Pause	96	Write
34	√x	67	x≠t	97	Dsz
35	1/x	68	Nop	98	Adv
36	Pgm	69	Op	99	Prt
37	P→R	70	Rad		
38	sin	71	SBR		

*Merged codes

RECORDING MAGNETIC CARDS (TI-59 Only)

Display When Write Pressed, Card Entered	Calculator Response
1, 2, 3, 4	Writes a card side with this number from the bank of this number (program and/or data) and records current partition on card.
−1, −2, −3, −4	Writes and protects card side with this number from the bank with this number. Also records current partition on card.
Any other number	Card is passed but not recorded. Rightmost two integer digits of display are flashed.

If the display is flashing any value when trying to read or record a card, the card is passed but not read or recorded and the rightmost two integers in the display are flashed.

The calculator should be in standard display format when reading or recording cards.

Only the integer portion of the display is recognized, i.e., 1.234 = 1.

READING MAGNETIC CARDS (TI-59 Only)

Display When Card Entered	Calculator Response
0	Reads information into bank number listed on card if current partition matches that on card. If partition incorrect, card is passed, but not read — display flashes card side passed.
1, 2, 3, 4	Expects card with this side number to be read — displays that side number. If another side is entered or if partition is incorrect, card is passed but not read — display flashes card side passed.
−1, −2, −3, −4	Forces side to be read into this bank number regardless of the partition or the number on the card. A protected program cannot be forced into any bank or alternate partition.
Any other number	Card is passed but not read — rightmost two integers in display flash.

LIBRARY USER INSTRUCTIONS

The remainder of this booklet contains the User Instructions for each program of the library.

REMOVING AND INSTALLING MODULES. The library module can easily be removed or replaced with another. It is a good idea to leave the module in place in the calculator except when replacing it with another module. Be sure to follow these instructions when you need to remove or replace a module.

CAUTION

Be sure to touch some metal object before handling a module to prevent possible damage by static electricity.

1. Turn the calculator OFF. Loading or unloading the module with the calculator ON may cause the keyboard or display to lock out. Also, shorting the contacts can damage the module or calculator.
2. Slide out the small panel covering the module compartment at the bottom of the back of the calculator.
3. Remove the module. You may turn the calculator over and let the module fall out into your hand.
4. Insert the module, notched end first with the labeled side up into the compartment. The module should slip into place effortlessly.
5. Replace the cover panel, securing the module against the contacts.

AVIATION LIBRARY DIAGNOSTIC — AV-01

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
	Diagnostic/Module Check			
1a	Select Program		[2nd] [Pgm] 01	
1b	Run Diagnostic		[SBR] [=]	6.[1]
	or			
1c	Library Module Check		[SBR] [2nd] [R/S]	6.[2]
	Initialize Linear Regression			
2a	Select Program		[2nd] [Pgm] 01	
2b	Initialize Linear Regression		[SBR] [CLR]	0.

NOTES:

1. This output is obtained if the calculator is operating properly.
2. The number 6. indicates the Aviation Library.
3. The Aviation Library programs are numbered 1 through 23. Program number 0 is the calculator's program memory.

FLIGHT PLAN WITH WIND — AV-02

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 02	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.0000[1]
4	Enter initial take-off time	ETD_t	[2nd] [E′]	ETD[7]
			[R/S]	tt (HH.MMSS) tF (gal or lbs)
	For each leg			
5	Enter magnetic variation (+W, −E)	Var	[2nd] [A′]	Var (deg)
6	Enter wind direction (true) in degrees	WD	[2nd] [B′]	WD (deg)
7	Enter wind velocity	WV	[2nd] [C′]	WV
8	Enter TAS and Burn (gal/hr or lbs/hr)[2] in that order[3]	TAS Burn	[2nd] [D′] [R/S]	TAS Burn
9	Enter true course	TC	[A]	TC (deg)
10	Enter distance of leg	Dist	[B]	Dist
11	Compute true heading and magnetic heading		[C]	TC (deg)[7]
			[R/S]	TH (deg) MH (deg)

12	Compute ground speed and estimated time enroute		[D] [R/S]	GS ETE (hrs)
13	Compute Fuel (for leg) and ETA		[E] [R/S]	Fuel (gal or lbs) ETA (hrs)
14	Enter estimated time of departure for next leg[5] and display total time and Fuel thus far	ETD[4]	[2nd] [E'] [R/S]	ETD[7] tt (HH.MMSS) tF (gal or lbs)
15	**For the next leg,** make appropriate changes in Steps 5-8[3] then go to Step 9 and continue.			

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. Units (gal or lbs) must be consistent for correct tF.
3. To correct or change TAS or Burn, *both* must be reentered in the proper order.
4. Instruction **[2nd]** [**E'**] causes Fuel and ETE for leg to be added to cumulative totals (tt and tF). Therefore, do not perform this step until satisfied that the results are correct.

   If the incorrect value is inadvertently entered (**[2nd]** [**E'**]), the leg must be recomputed as follows:

ENTER	PRESS
ETE from previous leg	**[2nd] [D.MS] [STO] [1] [4]**
ETA from previous leg	**[2nd] [D.MS] [STO] [1] [6]**
tt from previous leg	**[2nd] [D.MS] [STO] [1] [2]**
tF from previous leg	**[STO] [1] [3]**

   Go to Step 11 and continue.

5. Note that the ETA is already in the display register. Thus, if the flight will continue uninterrupted, simply press **[2nd]** [**E'**]. To allow for layovers or time corrections, perform the needed calculations on the keyboard and continue (see Example).
6. Program leaves calculator in fix 4 mode.
7. Indicates ½ second pause in display.

FLIGHT PLAN AND VERIFICATION

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 03	
2	Select degree mode		[2nd] [Deg]	
	Time-Speed-Distance or Time-Fuel-Burn[2] Do 4 or 5 or 6			
3	Initialize		[SBR] [CLR]	0.0000[1]
4	a. Enter time b. Enter ground speed (or burn) c. Calculate distance (or fuel)	Δt GS (or Burn)	[B] [C] [D]	0.0000 0.0000 Dist (or Fuel)
5	a. Enter time b. Enter distance (or fuel) c. Calculate ground speed (or burn)	Δt Dist (or Fuel)	[B] [D] [C]	0.0000 0.0000 GS (or Burn)
6	a. Enter ground speed (or burn) b. Enter distance (or fuel) c. Calculate time (Each value is stored and need not be reentered unless it has changed.)	GS (or Burn) Dist (or Fuel)	[C] [D] [B]	0.0000 0.0000 Δt (HH.MMSS)
7	a. Display time (opt.) b. Display ground speed (opt.) c. Display distance (opt.) (in any order)		[B] [B] [C] [C] [D] [D]	Δt (HH.MMSS) GS Dist
	Flight Planning			
8	Initialize		[SBR] [CLR]	0.0000[1]
9	Enter take-off time[3]	ETD(HH.MMSS)	[A]	ETD (decimal hrs.)
10	Enter ground speed	GS	[C]	0.0000
11	Enter distance	Dist	[D]	0.0000
12	Calculate leg time		[B]	Δt (HH.MMSS)
13	Calculate ETA		[E]	ETA (HH.MMSS)
14	Calculate total distance and total time to checkpoint (For next leg, go to step 10)		[2nd] [E'] [R/S] [R/S]	ETA tD tt (HH.MMSS)
	Flight Verification			
15	Initialize		[SBR] [CLR]	0.0000[1]
16	Enter take-off time	ETD(HH.MMSS)	[A]	ETD (decimal hrs)
17	Enter anticipated ground speed	GS	[C]	0.0000
18	Enter distance	Dist	[D]	0.0000
19	Calculate ETA		[E]	ETA (HH.MMSS)
20	Enter actual time of arrival and calculate total distance and time flown	ATA (HH.MMSS)	[2nd] [E'] [R/S] [R/S]	ATA (HH.MMSS) tD tt (HH.MMSS)

21	Display actual leg time		[B] [B]	Δt
22	Display actual ground speed (For next leg, go to step 17)		[C] [C]	GS
	True Heading and Airspeed (Do 23 or 24 or 25)			
23	Enter ground speed	GS	[C]	0.0000
24	Perform Step 5			
25	Perform Steps 16, 18, 20			
26	Enter wind direction	WD	[2nd] [B′]	WD
27	Enter wind velocity	WV	[2nd] [C′]	WV
28	Enter true course and compute true heading and true airspeed	TC	[2nd] [D′] [R/S]	TH TAS

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. Replace GS with Burn and Dist with Fuel (see text).
3. Usually zero – this makes tt = the total elapsed time enroute. User may enter clock time (24 hr clock in HH.MMSS) if real-time ETA is desired for tt. Program will subtract 24 hrs if ETA is greater than 24 hrs. Note however, that program will yield incorrect results for leg times over 24 hrs.
4. Program leaves calculator in fix 4 mode.

LONG RANGE FLIGHT PLAN

STEP	PROCEDURE	ENTER	PRESS	PRINT
1	Select program		[2nd] [Pgm] 04	
2	Select degree mode		[2nd] [Deg]	
3	Initialize[1]		[SBR] [CLR]	0.0000
4	Enter coordinates in order:[2] Latitude (+N, −S)	L_n (DD.MMSS)	[A]	WP # L_n
	Longitude (+W, −E)	λ_n (DDD.MMSS)	[A]	λ_n
	(Repeat Step 4 for each waypoint beginning with the origin)[3]			
5	Enter GS (average for entire trip): (knots)	GS	[B]	GS
6	Enter Fuel aboard at takeoff: (gal or lbs)	Fuel abd	[C]	Fuel abd
7	Enter Burn (gal or lbs/hr)[4]	Burn	[D]	Burn
8	Enter departure time (GMT) and print Dist, ETE, ETA, EFR, EFL[5]	ETD (HH.MMSS)	[E]	ETD (HH.MMSS) Dist (n.mi) ETE ETA EFR EFL
	Do Steps 9-13 as required for each leg			
9	Enter new GS (knots)	GS	[B]	GS
10	Enter new Fuel aboard	Fuel abd	[C]	Fuel abd
11	Enter new Burn	Burn	[D]	Burn
12	Enter new ETD (GMT)	ETD (HH.MMSS)	[E]	ETD
13	Print Leg no., (L, λ) of end of leg, Dist, tot Dist, TC_i, ETE, ETA, EFR and EFL[6]		[2nd] [A′]	Leg number L_n λ_n Dist tot Dist TC_i ETE ETA EFR EFL

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. To correct an entry before [A] is pressed press [CE]. If [A] is pressed following an incorrect entry return to Step 3. If you already recorded your data on magnetic cards, read the cards and go to Step 8.

3. The number of waypoints that may be entered depends upon the number of data registers available for program use as shown below.

Number of Registers	Maximum Number of Waypoints
20	4
30	9
40	14
50	19
60	24
70*	29
80*	34
90*	39
100*	44

See your Owner's Manual for complete instructions on partitioning your calculator's storage area.

* TI Programmable 59 only.

4. At this point you may record your data on magnetic cards if you own a TI Programmable 59. Press [INV] [2nd] [Fix] and then continue with the following:

To record bank 4 ($R_{00}-R_{29}$): enter 4 and feed in card
To record bank 3 ($R_{30}-R_{59}$): enter 3 and feed in card
To record bank 2 ($R_{60}-R_{89}$): enter 2 and feed in card
To record bank 1 ($R_{90}-R_{99}$): enter 1 and feed in card

See note 3 to determine which banks to record. Note that each bank must be recorded on a separate card side. (See your Owner's Manual for complete instructions.)

5. To change data entered in Steps 5-8 after [E] is pressed let n be the number of waypoints (including the origin) entered in Step 4. Now store 2n + 12 in R_{00} and enter any data you wish to change before performing Step 8 again.

6. While tedious it is possible to recalculate a leg in the detailed flight plan. Enter the following data calculated in Step 13 for the leg previous to the one you wish to recompute.

Enter	Press
EFL for the *previous* leg	[STO] 06
Previous leg number	[STO] 05
Previous ETA	[2nd] [D.MS] [STO] 04
Previous tot Dist	[STO] 01
[(Prev leg no. + 1)X2] + 12	[STO] 00

Now continue with Step 9.

ATMOSPHERE, SPEED, TEMPERATURE, AND ALTITUDE AV-05

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 05	
2	Initialize		[SBR] [CLR]	0.00
	Standard Atmosphere Quantities			
3	Enter PALT (ft)	PALT	[A]	PALT (ft)
4	Calculate T(°C)		[2nd] [B′]	T(°C)
5	Calculate a/a_0		[2nd] [C′]	a/a_0
6	Calculate P/P_0		[2nd] [D′]	P/P_0
7	Calculate ρ/ρ_0		[2nd] [E′]	ρ/ρ_0
8	For a new case, go to step 3			
	TAS, M, TAT, and DALT			
9	Enter PALT (ft)	PALT	[A]	PALT
10	Enter REC	REC	[2nd] [A′]	REC
11	Enter IT(°C)	IT	[B]	IT (°C)
12	Enter CAS (knots) Calculate TAS (knots) and M	CAS	[C] [R/S]	TAS (knots) M
13	Calculate TAT (°C)		[D]	TAT (°C)
14	Calculate DALT (ft)		[E]	DALT (ft)[1]
15	For a new case, make changes as needed in steps 9-12.			
	DALT for low airspeeds			
16	Enter PALT (ft)	PALT	[A]	PALT (ft)
17	Enter TAT (°C) (≈IT) and calculate DALT.	TAT	[E]	DALT (ft)[1]

NOTES:

1. The density altitude is a function of air density. It is the altitude at which a given air density *(ρ)* would be encountered under standard atmospheric conditions. It is *not* the true altitude.
2. Accuracy degenerates for mach numbers greater than 1.
3. The program leaves the calculator in fix 2 mode.

PREDICTING FREEZING LEVEL; LOWEST USABLE FLIGHT LEVEL AV-06

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 06	
2	Initialize		[SBR] [CLR]	0.
	Freezing Levels:			
3	Enter temperature If in °C If in °F	 T (°C) T (°F)	 [A] [2nd] [A']	 T (°C) T (°C)
4	Enter altitude (ft)	ALT	[B]	ALT (ft)
5	Calculate freezing levels (in any order)		[C] [D]	DFzL (ft) WFzL (ft)
6	For a new case, make changes as needed in Steps 3-4.			
	Lowest usable flight level:			
7	Enter altimeter setting (in Hg) and calculate LUFL	ASET	[E]	LUFL (ft)

NOTE: Both routines place calculator in fix 0 mode.

WIND COMPONENTS AND AVERAGE VECTOR

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 07	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.00[1]
	To calculate Tw and Cw			
4	Enter Var if applicable (see text)	Var	[2nd] [A']	Var
5	Enter wind direction	WD	[2nd] [B']	WD
6	Enter wind velocity	WV	[2nd] [C']	WV
7	Enter magnetic heading	MH	[2nd] [D']	MH
8	Calculate Tw		[A]	Tw (+ tail, – head)
9	Calculate Cw[2]		[B]	Cw (+ Lt, – Rt)
	To calculate an average vector do Step 3, then:			
10	Enter wind direction	WD	[2nd] [B']	WD
11	Enter wind velocity	WV	[2nd] [C']	WV
12	Enter distance	Dist	[2nd] [E']	Dist
13	To enter another wind vector, repeat Steps 10-12.			
14	Calculate WD_{av}		[D]	WD_{av} (deg)
15	Calculate WV_{av}[3]		[E]	WV_{av}

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. For another case, do Steps 4-7 as required for new values, then do Steps 8 and 9.
3. For a new case, do Step 3, then go to Step 10.
4. Program leaves calculator in fix 2 mode.

THE WIND TRIANGLE

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 08	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.00[1]
4	Enter magnetic variation[2]	Var (+W, −E)	[2nd] [A′]	Var
5	Enter magnetic heading	MH (deg)	[2nd] [D′]	MH
6	Enter true airspeed	TAS	[2nd] [E′]	TAS
	To calculate wind direction and velocity:			
7	Enter magnetic course	MC (deg)	[B]	MC
	(Do Steps 8-10 or Step 11)			
8	Enter leg distance	Dist	[D]	Dist
9	Enter time at start of leg	t_1 (HH.MMSS)	[E]	Ignore[3]
10	Enter time at end of leg[4]	t_2 (HH.MMSS)	[E]	GS
11	Enter ground speed	GS	[C]	GS
12	Calculate wind direction		[A] [2nd] [B′]	−1.00 WD (deg)
13	Calculate wind velocity		[A] [2nd] [C′]	−1.00 WV
	To calculate magnetic course and ground speed:			
14	Enter wind direction	WD (deg)	[2nd] [B′]	WD
15	Enter wind velocity	WV	[2nd] [C′]	WV
16	Calculate magnetic course		[A] [B]	−1.00 MC (deg)
17	Calculate ground speed		[A] [C]	−1.00 GS

NOTES:

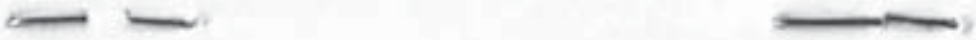
1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed — see Introduction.)
2. See text for proper usage.
3. Display shows Dist ÷ $(R_{11} - t_1)$.
4. To change t_1 or t_2, both must be reentered in proper order.
5. Program leaves calculator in fix 2 mode.

DEAD RECKONING

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 09	
2	Select degree mode		[2nd] [Deg]	
3	Initialize[1]		[SBR] [CLR]	0.0000
4	Enter time at start	t_S (HH.MMSS)	[2nd] [A′]	t_S (decimal)
5	Enter starting latitude (+N, −S)	L_S (DD.MMSS)	[B]	L_S (decimal)
6	Enter starting longitude (+W, −E)	λ_S (DDD.MMSS)	[2nd] [B′]	λ_S (decimal)
7	Enter true course	TC	[C]	TC
8	Enter ground speed	GS (knots)	[D]	GS
9	Enter time of dead reckoning position[2]	t_{DR} (HH.MMSS)	[2nd] [D′]	t_{DR} (decimal)
10	Compute latitude (+N, −S)		[E]	L_{DR} (DD.MMSS)
11	Compute longitude (+W, −E)[3,4]		[2nd] [E′]	λ_{DR} (DDD.MMSS)
12	$DR \rightarrow S$ (if required)[5]		[A]	0.0000

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. Steps 4-9 may be performed in any order.
3. Steps 10 and 11 may be performed in either order.



4. To compute a new position at a later time along the same course and speed, go to Step 9 and continue.
5. To use (L_{DR}, λ_{DR}) as the starting position for a new leg, do Step 12, then go to Step 7 and continue.
6. Program leaves calculator in fix 4 mode.

RHUMBLINE NAVIGATION

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 10	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.00[1]
4	Enter mag. variation (if needed)[2]	Var (deg)	[2nd] [A′]	Var
5	a. Enter latitude of start[3] b. Enter longitude of start[2]	L_s(DD.MMSS) λ_s(DDD.MMSS)	[B] [2nd] [B′]	L_s (deg) λ_s (deg)
6	a. Enter latitude of destination[3] b. Enter longitude of destination[2]	L_d(DD.MMSS) λ_d(DDD.MMSS)	[C] [2nd] [C′]	L_d (deg) λ_d (deg)
7	Calculate results		[2nd] [D′]	0.00
8	a. Display true course b. Display magnetic course (optional)		[D] [R/S]	TC (deg) MC (deg)
9	Display distance		[E]	Dist (n. mi.)
10	Display total distance[4]		[2nd] [E′]	tot Dist
11	For multiple legs, make (L_d, λ_d) the new (L_s, λ_s), then do Steps 4, 6–10.		[A]	0.00

NOTES:

1. Initialization selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. (+W, –E).
3. (+N, –S).
4. Steps 8-10 may be performed in any order.
5. Program leaves calculator in fix 2 mode.

GREAT CIRCLE FLYING

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 11	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.0000[1]
4	Enter starting latitude	L_s (+N, −S) (DD.MMSS)	[A]	L_s (deg)
5	Enter starting longitude	λ_s (+W, −E) (DDD.MMSS)	[2nd] [A′]	λ_s (deg)
6	Enter latitude of destination	L_d (+N, −S) (DD.MMSS)	[B]	L_d (deg)
7	Enter longitude of destination	λ_d (+W, −E) (DDD.MMSS)	[2nd] [B′]	λ_d (deg)
8	Compute Dist		[D]	Dist (n. mi.)
9	Compute TC_1		[2nd] [D′]	TC_1 (deg)
	To calculate coordinates of vertex, do Steps 10 and 11			
10	Compute longitude of vertex		[E]	λ_v (DDD.MMSS)[3]
11	Compute latitude of vertex		[C]	L_v (DD.MMSS)
	To compute latitude corresponding to an intermediate longitude, do Step 12			
12	Enter longitude (Repeat for each intermediate point)	λ_I (DDD.MMSS)	[C]	L_I (DD.MMSS)
13	For another case, go to Step 4			

NOTES:
1. Initializaiton selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. Program leaves calculator in fix 4 mode.
3. If $\lambda_v > 180$ use $\lambda_v - 360$.

LiNE OF SIGHT DISTANCE AND ALTITUDE; DME SPEED CORRECTION AV-12

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 12	
2	Select degree mode[1]		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.
	For all line-of-sight distance or altitude:			
4	Enter altitude of terrain (MSL)	Terr (ft)	[A]	Terr
5	Enter transmitter altitude (MSL)	Trans (ft)	[B]	Trans
	To calculate line-of-sight distance given ALT:			
6	Enter aircraft altitude (MSL)	ALT (ft)	[C]	ALT
7	Compute line-of-sight distance		[E] [D]	Dist (n. mi.)
	To calculate ALT given line-of-sight distance:			
8	Enter line-of-sight distance	Dist (n. mi.)	[D]	Dist
9	Compute minimum altitude required		[E] [C]	ALT (ft)
	To compute ground speed from DME speed reading:			
10	Enter magnetic course	MC (deg)	[2nd] [A′]	MC
11	Enter radial to (or from) the DME station	R_{DME} (deg)	[2nd] [B′]	R_{DME}
12	Enter DMEsp and calculate ground speed	DMEsp (knots)	[2nd] [C′]	GS (knots)
	To correct for aircraft altitude:			
13	Enter distance to DME station	$Dist_{DME}$ (n. mi.)	[2nd] [D′]	$Dist_{DME}$
14	Enter difference between aircraft and DME station altitude and compute corrected ground speed	Δh (ft)	[2nd] [E′]	GS′ (knots)

NOTES:
1. Step 2 is necessary if you have selected another angular mode since turning on your calculator.
2. Program places calculator in fix 0 mode.

POSITION AND NAVIGATION BY ONE VOR

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 13	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.0000[1]
4[2]	Enter magnetic variation (+W, −E)	Var (deg)	[2nd] [A′]	Var
5	Enter wind direction and velocity (in that order)[3]	WD (deg) WV	[2nd] [B′] [2nd] [B′]	Prev WD Prev WV
6[4]	Enter the radial and distance from the VOR to the destination (in that order)	Rvd (deg) Dvd	[2nd] [C′] [2nd] [C′]	Prev Rvd Prev Dvd
7	Enter magnetic heading	MH (deg)	[2nd] [D′]	MH
8	Enter true airspeed	TAS	[2nd] [E′]	TAS
9	Enter time of first radial reading[3]	t_1 (HH.MMSS)	[A]	t_1 (hours)
10	Enter radial from the VOR to the aircraft[3] (first reading)	Rad 1 (deg)	[B]	Rad 1
11	Enter time of second radial reading[3]	t_2 (HH.MMSS)	[A]	t_2 (hours)
12	Enter radial from the VOR to the aircraft[3] (second reading)	Rad 2 (deg)	[B]	Rad 2
13	Compute distance between VOR and aircraft at t_2		[C]	D_2
14a[4]	With D_2 in the display, press [D] to display magnetic course to destination. If D_2 is not in display, key it in and press [D]	D_2	[D]	MC (deg)
14b	Calculate distance to destination		[R/S]	Dist
14c	Calculate ground speed		[R/S]	GS
14d	Enter GS (if different from 14c) and calculate ETA	GS (optional)	[R/S]	ETA
15	For a new case where the old second reading is the new first reading, go to Step 11 and continue.			

NOTES:

1. Initialization uses [CMs] and selects degree mode. (Step 2 is seldom needed — see Introduction.)
2. If DME is available, then it may be used to measure the distance to the VOR. In this case, only Steps 11, 12, and 14 need be performed to obtain desired results.
3. To change either WD or WV, *both* must be reentered in that order. The same applies for the following data pairs: Rvd and Dvd, t_1 and t_2, Rad 1 and Rad 2.
4. If only D_2 is desired, Steps 6 and 14 may be omitted.
5. Program leaves calculator in fix 4 mode.

DME AREA NAVIGATION

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Load data using Load Module program or Flight Data card			
2	Select DME Area Nav program		[2nd] [Pgm] 14	
3	Initialize		[SBR] [CLR]	
4	Enter estimated ground speed[2]	GS	[2nd] [D′]	GS.0000
5	Enter time of DME reading[1]	t(HH.MMSS)	[A]	t (decimal hrs)
6a[3]	Enter VORTAC waypoint number	WP #	[2nd] [A′]	0.0000
6b	Enter radial from VORTAC	Rad	[2nd] [B′]	Radial
6c	Enter DME distance measured along above radial	DME	[2nd] [C′]	Distance
7[4]	Calculate distance to desired waypoint	WP #	[B]	Dist to WP
8	Calculate magnetic course to above waypoint		[D]	Mc (decimal degrees)
9[5]	Change distance (if needed)	± miles	[E]	Dist to ± miles
10	Calculate ETA to last distance displayed		[C]	ETA (HH.MMSS)
11a	Compute GS to waypoint in Step 7		[2nd] [E′]	GS[6]
11b	Enter calculated GS for use in additional ETA calculations if desired	GS	[2nd] [D′]	GS
12	For a new reading, perform Steps 5 and 6 and continue			

NOTES:

1. Use 24 hour clock. Program resets time at midnight. t of reading may be entered at any time before ETA is calculated.
2. Use units compatible with distance units (usually naut. miles and knots). GS may be entered at any time before ETA is calculated, and need not be reentered unless changed.
3. Steps 6a, b, and c should be performed in that order. All bearings should be entered in whole degrees.
4. Step 7 must be performed before 8, 9, or 10. MC is calculated to the last waypoint entered before pressing [B].
5. Enter a negative value if distance is desired to a point *closer* to you (along your flight path) than waypoint in Step 7. Enter a positive value otherwise.
6. Ignore this result on the first entry as it only initializes storage for subsequent entries. No valid GS estimate may be made with less than 2 observations made at different times. You may also ignore other GS calculations if they appear to be off.
7. Initialization selects degree mode.
8. Program leaves calculator in fix 4 mode.

AREA NAV—LOAD MODULE

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 15	
2	Initialize[1]		[SBR] [CLR]	0.
	For each waypoint, do Steps 3-6			
3	Enter number of waypoint to be entered	n	[A]	n.
4	Enter number of waypoint to be used as reference[2]	m	[B]	m.
5	Enter radial *from* m to n in degrees	Rad	[C]	Rad
6	Enter distance from m to n (For new waypoint, go to 3)	Dist	[D]	Dist
	To record waypoints on a magnetic card, do Steps 7-9			
7a	Record data registers $R_{00}-R_{29}$ on a magnetic card	4 Card (Bank 4)	[2nd] [Write]	4.
7b[4]	Record data registers $R_{30}-R_{59}$ on a magnetic card if needed[3]	3 Card (Bank 3)	[2nd] [Write]	3.
8	Label recorded card (see text). Initialize Load Module program for new network *or* go to VOR or DME Area Nav program			

NOTES:

1. Initialization uses [CMs] and selects degree mode.
2. Must be "0" or a waypoint already entered.
3. Step 7b is needed only if you are working with more than nine waypoints.
4. Registers $R_{60}-R_{89}$ (bank 2) and $R_{90}-R_{99}$ (bank 1) may be recorded similarly. See the preceding table to determine how many banks you need to record. (Note that each bank must be recorded on a separate card side.)

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Load data using Load Module program or Flight Data card			
2	Select VOR Area Nav program (A and B).		[2nd] [Pgm] 16	
3	Initialize		[SBR] [CLR]	
4	Enter estimated ground speed[2]	GS	[2nd] [D′]	GS.0000
5	Enter time of reading[1].	t (HH.MMSS)	[A]	t of reading (decimal hrs)
6a[3]	Enter waypoint number of first VOR.	n	[2nd] [A′]	0.0000
6b	Enter radial from first VOR.	Rad A	[2nd] [B′]	0.0000
7a[3]	Enter waypoint number of second VOR.	m	[2nd] [A′]	0.0000
7b	Enter radial from second VOR.	Rad B	[2nd] [C′]	0.0000
8[4]	Calculate distance to waypoint #W	W	[B]	Dist to #W
9	Calculate magnetic course to waypoint #W		[D]	MC (decimal degrees)
10[5]	Change distance (if needed)	± miles	[E]	Dist to ± miles
11	Calculate ETA to last distance displayed		[C]	ETA (HH.MMSS)
12a	Compute actual GS to waypoint in Step 7		[2nd] [E′]	GS
12b	Enter calculated GS for use in additional ETA calculations if desired	GS	[2nd] [D′]	GS
13	For a new reading, perform Steps 5, 6 and/or 7 as needed and continue.			

NOTES:

1. Use 24 hour clock. Program resets time at midnight. t of reading may be entered at any time before ETA is calculated.
2. Use units compatible with distance units (usually naut. miles and knots). GS may be entered at any time before ETA is calculated, and need not be reentered unless changed.
3. Step 6a and b, and Step 7a and b must be performed in that order. Steps 6 and 7 may be performed in either order or separately (see example). All bearings should be entered in whole degrees.
4. Step 8 must be performed before Steps 9, 10, or 11. Magnetic course is calculated to the last waypoint number entered before [B] is pressed.
5. Enter a negative value if distance is desired to a point *closer* to you (along your flight path) than waypoint #W in Step 8. Enter a positive value otherwise.
6. Program leaves calculator in fix 4 mode.
7. Initialization selects degree mode.

COURSE CORRECTION

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 17	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.00[1]
4	Enter distance off course (+L, −R)[2]	DOC	[A]	DOC
5	Enter distance from start to destination	Dist	[B]	Dist
	Perform Step 6 OR 7			
6	Enter distance between start and checkpoint	DBSC	[C]	DBSC
7	Enter distance flown[2]	D_{fln}	[2nd] [C']	DBSC
	Perform Step 8 OR 9			
8	Enter intended course	MC_i (deg)	[D]	MC_i (deg)
9	Enter actual course	MC_{fln} (deg)	[2nd] [D']	MC_i (deg)
10	Calculate corrected course		[E]	$MC_{to\ fly}$ (deg)
11	Calculate distance remaining		[2nd] [E']	$D_{to\ go}$
12	For a new problem, go to Step 4			

NOTES:

1. Initialization uses [CMs] key and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. See text Remarks.
3. Program leaves calculator in fix 2 mode.

RATE OF CLIMB: TURN PERFORMANCE

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 18	
2	Select degree mode		[2nd] [Deg]	
3	Initialize		[SBR] [CLR]	0.0000[1,2]
	Rate of Climb			
4	Enter ΔALT in feet[5]	ΔALT	[2nd] [A′]	0.0000
5	Enter TAS in knots	TAS	[2nd] [B′]	0.0000
6	If Dist is known Calculate ROC[3,5]	Dist (n. miles)	[A] [B]	0.0000 ROC (ft/min)[5]
7	If ROC is known[5] Calculate Dist[4]	ROC (ft/min)	[B] [A]	0.0000 Dist (n. miles)
8	For a new case, go to Step 4			
	Turn Performance			
9	Enter TAS in knots	TAS	[2nd] [B′]	0.0000
10	Enter Bank ∠ in degrees	Bank ∠	[2nd] [C′]	0.0000
11	Enter Nstall in knots	Nstall	[2nd] [D′]	0.0000
12	To calculate G-force		[2nd] [E′]	G-force
13	To calculate Diam		[C]	Diam (n. miles)
14	To calculate t		[D]	t (HH.MMSS)
15	To calculate Stall		[E]	Stall (knots)
16	For a new case, make changes as needed in Steps 9–11 and calculate new values.			

NOTES:

1. Initialization use [CMs] and selects degree mode. (Step 2 is seldom needed – see Introduction.)
2. The program places the calculator in the fix 4 mode. To return to normal mode press [2nd] [fix] [9].
3. 0.0000 must be in the display before calculating ROC.
4. 0.0000 must be in the display before calculating Dist.
5. + if climb, – if descent.

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 19	0
2	Initialize		[SBR] [CLR]	0.00
3	Enter weight of item	Wt	[A]	Wt
	Do 4a OR 4b			
4a	Enter moment arm	Mmt arm	[B]	Mmt
4b	Enter moment	Mmt	[2nd] [B']	Mmt
5	To delete pair just entered (3 and 4)[1]		[2nd] [A']	0.00
6	Repeat Steps 3 and 4 for each data pair			
7	Compute total weight, total moment, and center of gravity (any order)		[C] [D] [E]	tot Wt tot Mmt C of G
8	To delete any pair: then, perform Steps 3 and 4 for deleted pair		[2nd] [E']	0.00
9	For a new case, go to Step 2			
10	To convert gallons of fuel to pounds of fuel	Gal (fuel)	[2nd] [C']	Lbs (fuel)
11	To convert pounds to kilograms	Lbs	[2nd] [D']	Kg

NOTES:

1. Step 5 causes the last pair to be deleted. If a mistake is made in Steps 3 and 4, do not perform Step 5 until both Steps 3 and 4 are completed.
2. Program leaves calculator in fix 2 mode.
3. Initialization uses [CMs] instruction.

CONSTANT CARD

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Initialize		[CLR] [2nd] [CMs]	0.
2	Enter Fuel 1 moment arm[1]	Mmt arm (in)	[STO] [0] [1]	
3	Enter Fuel 2 moment arm	Mmt arm (in)	[STO] [0] [2]	
4	Enter Bag 1 moment arm	Mmt arm (in)	[STO] [0] [3]	
5	Enter Bag 2 moment arm	Mmt arm (in)	[STO] [0] [4]	
6	Enter Fr Row moment arm	Mmt arm (in)	[STO] [0] [5]	
7	Enter Rr Row moment arm	Mmt arm (in)	[STO] [0] [6]	
8	Enter Mid Row moment arm	Mmt arm (in)	[STO] [0] [7]	
9	Enter Empty Moment	Empty Mmt (in-lbs)	[STO] [0] [8]	
10	Enter Empty Weight	Empty Wt (lbs)	[STO] [0] [9]	
	To Record Constant Card[2]			
11	Select floating point mode[3]		[INV] [2nd] [Fix]	
12	Record data on Constant Card	4 Feed in card	[2nd] [Write]	4.
13	Test card – turn calculator off, then on. Load card	Feed in card	[CLR]	0.
	Recall R_{01} through R_{09} and compare with appropriate figures			4.
	Example		[RCL] [0] [1]	Fuel 1 Mmt arm

NOTES:

1. Simply skip the step for any moment arm which is not applicable. But note that each register assignment *must* correspond to its proper moment arm (as shown in Steps 2-10) to yield correct results. Registers 01–09 *are not* available to the user even if that step is skipped.
2. TI Programmable 59 only.
3. A magnetic card may not be recorded when the calculator is in a fix decimal mode.

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Load Constant Card **OR**		[CLR] (feed card)	4.
2	Load data registers manually[3]			
3	Select program		[2nd] [Pgm] 20	
4	Initialize		[SBR] [CLR]	0.00
5	Enter Fuel 1 (gal)[2]	Fuel 1	[A]	Fuel 1
6	Enter Fuel 2 (gal)	Fuel 2	[2nd] [A′]	Fuel 2
7	Enter Bag 1 (lbs)	Bag 1	[B]	Bag 1
8	Enter Bag 2 (lbs)	Bag 2	[2nd] [B′]	Bag 2
9	Enter Fr Row (lbs)	Fr Row	[2nd] [C′]	Fr Row
10	Enter Rr Row (lbs)	Rr Row	[2nd] [D′]	Rr Row
11	Enter Mid Row (lbs)	Mid Row	[2nd] [E′]	Mid Row
12	Calculate tot Wt		[C]	tot Wt (lbs)
13	Calculate tot Mmt		[D]	tot Mmt (in-lbs)
14	Calculate C of G		[E]	C of G (in)
15	For a new case, do the steps (among Steps 5–11) to make desired changes, then go to Step 12.			

NOTES:

1. Do not attempt to enter any value which is not applicable to the aircraft described on the Constant Card. Note that program automatically converts gallons to pounds for Step 5 and 6. Do not enter pounds.
2. Program leaves calculator in fix 2 mode.
3. See the last set of User Instructions.

PILOT UNIT CONVERSIONS

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 21	
2	Initialize		[SBR] [CLR]	0.
3	Enter number to be converted (if not already in display)	nnn		nnn
	To convert units of length			
4	Press key corresponding to units of number in display		([A] – [E])	nnn
5	Press key corresponding to units desired		([A] – [E])	xxx
	To convert other units			
6	Press key corresponding to conversion desired, or [2nd] [E′] if the inverse of that key is desired	OR	([2nd] [A′] – [D′])	xxx
			[2nd] [E′]	
			([2nd] [A′] – [D′]	xxx
7	**For a new case, do Steps 3–5 OR 3 and 6**			

NOTE: To correct an entry or incorrect user defined key push, press [SBR] [CLR] and start over.

RNAV FLIGHT PLAN

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 22	
2	Initialize		[SBR] [CLR]	0.0000
	For each waypoint, do Steps 3a, b, and c			
3a	Enter number of waypoint to be entered[1,2]	WP #	[A]	WP #
3b	Enter latitude of waypoint (+N, –S)	L (DD.MMSS)	[B]	L (decimal)
3c	Enter longitude of waypoint (+W, –E)	λ (DDD.MMSS)	[C]	λ (decimal)
4a	Enter starting waypoint number	WP_s	[D]	WP_s
4b	Enter destination waypoint number	WP_d	[E]	WP_d
5a[3]	Calculate initial true course		[2nd] [A′]	TC (decimal)
5b	Calculate initial distance		[2nd] [B′]	Dist (n. mi.)
	Do Steps 6-10 for each intermediate waypoint			
6a[5]	Enter number of waypoint from which intermediate waypoint is to be defined	WP #	[D]	WP #

6b	Enter number of intermediate waypoint to be defined	WP #	[E]	WP =
7	Calculate and store coordinates of intermediate waypoint[4]	Leg Dist	[2nd] [C']	WP,
8[5]	Enter waypoint number of VORTAC to be moved to intermediate waypoint	WP =	[D]	WP =
9[5]	Enter magnetic variation of VORTAC to be moved to intermediate waypoint	Var (+W, −E)	[2nd] [D']	Var
10a	Compute Radial from VORTAC to intermediate waypoint		[2nd] [E']	Radial
10b	Compute DME distance from VORTAC to intermediate waypoint		[R/S]	DME Dist

NOTES: 1. The number of waypoints that may be entered depends upon the number of data registers available for program use as shown below.

Number of Registers	Maximum Number of Waypoints
20	3
30	8
40	13
50	18
60	23
70*	28
80*	33
90*	38
100*	43

See your Owner's Manual for complete instructions on partitioning your calculator's storage area.

2. Once you have entered this data you may record it on a magnetic card. If you have already recorded the data simply read the card to load the data registers. For 8 or fewer waypoints you need only record bank 4 of your calculator's storage area. For more than 8 points record banks 3 and 4; for more than 23, record 2, 3, and 4; and for more than 38 points, record all four banks. See your Owner's Manual for complete instructions on reading and recording magnetic cards (TI Programmable 59 only).
3. This step establishes an initial rhumbline course for setting up intermediate waypoints.
4. The coordinates are stored as indicated in Register Contents. The output is simply a reminder of the waypoint number. If you need to know these coordinates simply recall the appropriate data registers and press [INV] [2nd] [D.MS] to convert the latitude and longitude to the form DD.MMSSs.
5. This step may be omitted if the last value entered on this key was the same as the value you currently desire to enter.

*Indicates TI Programmable 59 only.

TIME ZONE CONVERSIONS

STEP	PROCEDURE	ENTER	PRESS	DISPLAY
1	Select program		[2nd] [Pgm] 23	
2	Initialize		[SBR] [CLR]	0.
3	Enter time first zone number[1]	Zone	[A]	0.
4	Enter date[1,2]	Date (MM.DD)	[B]	0.
5	Enter time[2]	t (HH.MMSS)	[C]	0.
6	Enter time increment[1,2]	Δt (HH.MMSS)	[D]	0.
7	(Optional) Display new time and date (same zone)		[E] [2nd] [E']	t (HH.MMSS) Date (MM.DD)
8	Enter new zone number[1]	Zone'	[A]	0.
9	Display time[1] and date (new zone)		[E] [2nd] [E']	t' (HH.MMSS) date' (MM.DD)
10	To convert results of Step 9 to a new time and/or zone, go to Step 6. For a new case, go to Step 3.			

NOTES:

1. See **Limitations** in test above.
2. t, Δt, and date must be entered as follows:
   t, Δt – HH.MMSS on 24-hour clock
   date – MM.DD (M-month, D-day)
3. Interpret 24:00:00 as 0:00:00 and add one day to date.