Programmable TI 58/59 Specialty Pakettes

Production/Planning

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THE TI-59 PAKETTE STORY

Since the early days of handheld programmable calculators, Texas Instruments (TI) has been deeply involved in supplying not only calculators with exceptional power but also programs (software) to match. Many experts were put to work within their special fields of endeavor to design quality Software Libraries for TI calculator users. Among the Libraries produced by TI for the TI-59 are:

- Statistics
- Real Estate and Investment
- Surveying
- Navigation
- Farming
- Math/Utilities
- Aviation
- Leisure
- Business Decisions
- Securities Analysis
- Electrical Engineering
- RPN Simulator

Fully recognizing TI-59 users may require programs other than those included in TI-59 Libraries, a second program source was developed. This source, the Professional Program Exchange, gathers, compiles and redistributes programs **written by TI-59 users** who defined their own specific program needs and filled these needs by writing programs. These programs, now in Pakettes, add a new dimension to the software made available to TI-59 user. Combining some of the best TI originated programs with the most popular programs found in the Professional Program Exchange, Program Pakettes offer a true software value. Current TI Pakette offerings include:

- Securities
- Statistical Testing
- Civil Engineering
- Electronic Engineering
- Blackbody
- Oil/Gas/Energy
- Printer Utility
- Astrology
- Programming Aids
- 59 Fun
- 3-D Graphics
- Fluid Dynamics
- Mathematics
- Lab Chemistry
- Production Planning
- Marketing/Sales

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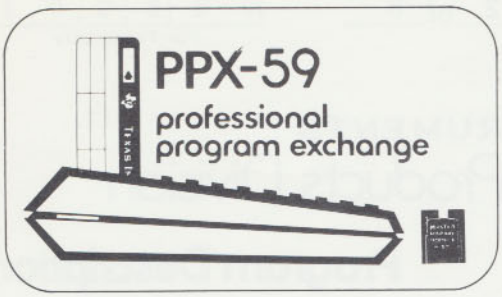

0,2 | 8,0,0,1
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TEXAS INSTRUMENTS
Calculator Products Division

Submission Abstract

Program Title	Rev.
PRODUCTION OUTPUT RATES	A

Abstract of Program

Given input of Pieces/Minute or Seconds/Cycle and units per cycle, Hours/Day, Days/Week, Weeks/Year, and a production efficiency factor, this program calculates production output as follows:

Units/Minute
" /Hour
" /Day
" /Week
" /Months
" /Year

In addition, this program permits individual inputs to be changed to quickly simulate the effect on production.

Original TI-59 Program By Alan B. Taplow, Lawrenceville, N. J.

User Benefits:

Saves time in making primary output calculations and saves considerable time in simulating production outputs from varying input conditions. Reduces calculation errors.

Category Number 02	Required Progs.	Prog. Steps 194	PC-100A Needed ☐ Library Module ID ☐

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Submission Checklist

- ☐ Recorded Magnetic Cards
- ☒ Submission Abstract
- ☒ Program Description
- ☒ User Instructions
- ☒ Sample Problem
- ☒ Listing
- ☐ _____
- ☐ _____

TEXAS INSTRUMENTS
Calculator Products Division

Program Description

Program Title:	Rev.
PRODUCTION OUTPUT RATES	A

Method, Equations, Sketches, Limitations, References, Error Recovery:

Input Factors:
- A = Seconds/Cycle
- B = Units/Cycle or Units/Minute
- C = Hours/Day
- D = Days/Week
- E = Efficiency Factor
- A' = Weeks/Year

Output Factors (Calculations)
- B' = Units/Minute
- C' = Units/Hour
- D' = Units/Day
- E' = Units/Week
- SBR CLR = Units/Month
- SBR 1/x = Units/Year

Calculations based upon the following equations

Units/Minute: There are two situations encountered in arriving at Units/Minute

1. Units/Minute already known thus Seconds/Cycle
   (A) Is not needed - for instance where a production line station is known to pass 12 pieces per minute. The program is designed to initialize by pressing R/S which enters "60" in data register 10 (LBL A). The key A is then by-passed and the known Units/Min. is entered directly in LBL B. The resulting calculation is:

$$B' = \frac{60}{60} \times B \times E$$

Since B' = 12 is really a "given" it is entered into B only to permit further calculations

$$= \frac{60}{60} \times 12 \times 1.0\ (100\%)$$

$$= 12$$

2. In many cases, seconds per cycle is significant - for instance when measuring the output of a molding machine which has a 15 second cycle & is running a 12 cavity mold at 100% efficiency. The resulting equation is

$$B' = \frac{60}{A} \times B \times E$$

$$= \frac{60}{15} \times 12 \times 1.0\ (100\%)$$

$$= 48$$

See Continuation Sheet

Continued From: ☒ Program Description ☐ User Instructions ☐ Stmt. of Example

Program Title:	Rev.
PRODUCTION OUTPUT RATES	A

Page 2, Continued

By entering 15 into A, the "60" already in data register 10 as a result of program initialization is replaced by 15.

Units/Hour

$$C' = \frac{60}{A} \times B \times 60 \times E$$

Units/Day

$$D' = \frac{60}{A} \times B \times 60 \times C \times E$$

Units/Week

$$E' = \frac{60}{A} \times B \times 60 \times C \times D \times E$$

Units/Month

$$\text{SBR CLR} = \frac{60}{A} \times B \times 60 \times C \times D \times 4.3333 \times E$$

Units/Year

$$\text{SBR 1/x} = \frac{60}{A} \times B \times 60 \times C \times D \times A' \times E$$

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User Instructions

Program Title
PRODUCTION OUTPUT RATES

	Calculate →			
WKS/YR	PCS/MIN	PCS/HR	PCS/DAY	PCS/WK
SEC/CY	UNIT/CY or UNIT/MIN	HRS/DAY	DAYS/WK	EFFICIENCY FACTOR

Partition (OP 17): 479.59*
Parentheses Levels: –
t Register: ☐
Angular Mode (if applicable): –
SBR Levels: –
Absolute Addresses: ☒
Library Module ID: –
*For TI-58 319.19
Disturbs Pending Operations: ☐

LABELS (Op 08)

INV	ln x	CE	CLR	x:t	x^2	
$\sqrt{x}$	1/x	STO	RCL	SUM	y^x	
EE	(	)	÷	GTO	×	
SBR	–	RST	+	R/S	•	
+/–	=	CLR	INV	log	CP	
tan	Pgm	P→R	sin	cos	CMs	
Exc	Prd	Ix I	Eng	Fix	Int	
Deg	Pause	x=t	Nop	Op	Rad	
Lbl	x≠t	Σ+	x̄	Grad	St flg	
If flg	D.MS	π	List	Write	Dsz	
Adv	Prt					

USER DEFINED KEYS

A	Seconds/Cycle PCS/Cycle or
B	PCS/Minute
C	Hours/Day
D	Days/Week
E	Efficiency Factor
A'	Weeks/Year
B'	PCS/Minute
C'	PCS/Hour
D'	PCS/Day
E'	PCS/Week

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS	OUTPUT/MODE (see legend below)
1	Initialize		RS	Display 60
2	Input	SEC/CYCLE (if applicable)	A	Displays number entered
3		PCS/CYCLE (or PCS/MIN if applicable)	B	" " "
4		HRS/DAY	C	" " "
5		DAYS/WK	D	" " "
6		EFFICIENCY in %	E	" " " in decimal
7		WKS/YR	A'	" " "
	Any or all can now be calculated			
8	PCS/MIN		B'	PCS/MIN
9	PCS/HR		C'	PCS/HR
10	PCS/DAY		D'	PCS/DAY
11	PCS/WEEK		E'	PCS/WK
12	PCS/MO		SBR CLR	PCS/MO
13	PCS/YR		SBR 1/x	PCS/YR
	FOR NEW SET OF DATA			
14			CM's RST RS	Display 60

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

DATA REGISTERS (INV List)

1 0	SECONDS/CYCLE
1 1	PCS/CYCLE
1 2	HOURS/DAY
1 3	DAYS/WEEK
1 4	EFFICIENCY FACTOR
1 5	WEEKS/YEAR
6	
7	
8	
9	
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

☐ See Contin on Sheet

0 2 | 8 0 0 1
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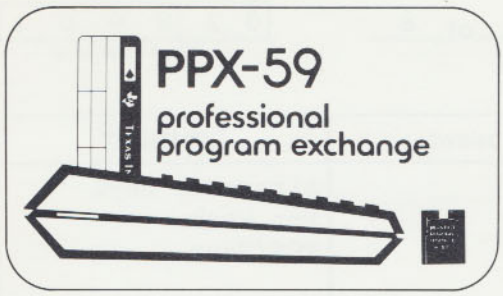

TEXAS INSTRUMENTS
Calculator Products Division

Sample Problem

Statement of Example

1. An injection molding machine cycles every 12 seconds. It is tooled with a 36 cavity mold and it operates 24 hours per day, 7 days per week, 48 weeks per year. Calculate its theoretical output assuming a 100% efficiency.

2. Calculate the machines output using an efficiency factor of 80%.

3. Calculate annual output only, assuming 80% efficiency and a 5 day work week.

☐ See Continuation Sheet

	ENTER	PRESS	OUTPUT/MODE (see legend below)	COMMENT
1		R/S	Display - 60	Initialize
	12	A	" 12	Seconds/Cycle
	36	B	" 36	PCS/Cycle
	24	C	" 24	Hours/Day
	7	D	" 7	Days/Week
	100	E	" 1.	Efficiency Factor
	48	A'	" 48	Weeks/Year
			Calculate	
		B'	" 180.00	PCS/Minute
		C'	" 10,800	PCS/Hour
		D'	" 259,200	PCS/Day
		E'	" 1,814,400	PCS/Week
		SBR CLR	" 7,862,340	PCS/Month
		SBR 1/x	" 87,091,200	PCS/Year
2	80	E	" 1	Alternate Efficiency Factor
		B'	144.00	PCS/Minute
		C'	8,640	PCS/Hour
		D'	207,360	PCS/Day
		E'	1,451,520	PCS/Week
		SBR CLR	6,289,872	PCS/Month
		SBR 1/x	69,672,960	PCS/Year

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

Over

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Sample Problem (cont'd)

0 2 | 8 0 0 1
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	ENTER	PRESS	OUTPUT/MODE (see legend below)	COMMENT
3	5	D	5	Alternate Days Per Week
		SBR 1/x	49,766,400	PCS/Year
	FOR NEXT PROBLEM			
		CM's		Clear Memories
		RST		Return to Start OP Program
		R/S	60	Initialize

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange

0 2 8 0 0 1
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LOC	CODE	KEY	COMMENTS
000	06	6	
001	00	0	
002	42	STO	
003	10	10	
004	91	R/S	
005	76	LBL	
006	11	A	
007	42	STO	
008	10	10	
009	91	R/S	
010	76	LBL	
011	12	B	
012	42	STO	
013	11	11	
014	91	R/S	
015	76	LBL	
016	13	C	
017	42	STO	
018	12	12	
019	91	R/S	
020	76	LBL	
021	14	D	
022	42	STO	
023	13	13	
024	91	R/S	
025	76	LBL	
026	15	E	
027	55	÷	
028	01	1	
029	00	0	
030	00	0	
031	95	=	
032	42	STO	
033	14	14	
034	91	R/S	
035	76	LBL	
036	16	A'	
037	42	STO	
038	15	15	
039	91	R/S	
040	76	LBL	
041	17	B'	
042	06	6	
043	00	0	
044	55	÷	
045	43	RCL	
046	10	10	
047	65	×	
048	43	RCL	
049	11	11	
050	65	×	
051	43	RCL	
052	14	14	
053	95	=	
054	58	FIX	
055	02	02	
056	95	=	
057	91	R/S	
058	76	LBL	
059	18	C'	
060	06	6	
061	00	0	
062	55	÷	
063	43	RCL	
064	10	10	
065	65	×	
066	43	RCL	
067	11	11	
068	65	×	
069	06	6	
070	00	0	
071	65	×	
072	43	RCL	
073	14	14	
074	95	=	
075	58	FIX	
076	00	00	
077	95	=	
078	91	R/S	
079	76	LBL	
080	19	D'	
081	06	6	
082	00	0	
083	55	÷	
084	43	RCL	
085	10	10	
086	65	×	
087	43	RCL	
088	11	11	
089	65	×	
090	06	6	
091	00	0	
092	65	×	
093	43	RCL	
094	12	12	
095	65	×	
096	43	RCL	
097	14	14	
098	95	=	
099	58	FIX	
100	00	00	
101	95	=	
102	91	R/S	
103	76	LBL	
104	10	E'	
105	06	6	
106	00	0	
107	55	÷	
108	43	RCL	
109	10	10	
110	65	×	
111	43	RCL	
112	11	11	
113	65	×	
114	06	6	
115	00	0	
116	65	×	
117	43	RCL	
118	12	12	
119	65	×	
120	43	RCL	
121	13	13	
122	65	×	
123	43	RCL	
124	14	14	
125	95	=	
126	58	FIX	
127	00	00	
128	95	=	
129	91	R/S	
130	76	LBL	
131	25	CLR	
132	06	6	
133	00	0	
134	55	÷	
135	43	RCL	
136	10	10	
137	65	×	
138	43	RCL	
139	11	11	
140	65	×	
141	06	6	
142	00	0	
143	65	×	
144	43	RCL	
145	12	12	
146	65	×	
147	43	RCL	
148	13	13	
149	65	×	
150	43	RCL	
151	14	14	
152	65	×	
153	04	4	
154	93	.	
155	03	3	
156	03	3	
157	03	3	
158	03	3	
159	95	=	
160	58	FIX	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

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0 2 8 0 0 1
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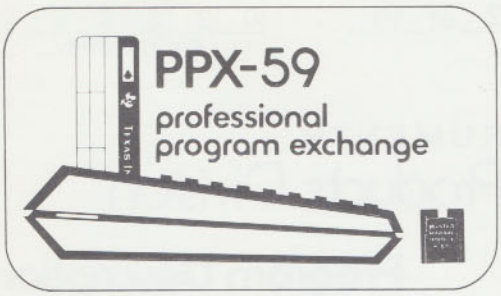
LOC	CODE	KEY	COMMENTS	LOC	CODE	KEY	COMMENTS	LOC	CODE	KEY	COMMENTS
161	00	00									
162	95	=									
163	91	R/S									
164	76	LBL									
165	35	1/X									
166	06	6									
167	00	0									
168	55	÷									
169	43	RCL									
170	10	10									
171	65	×									
172	43	RCL									
173	11	11									
174	65	×									
175	06	6									
176	00	0									
177	65	×									
178	43	RCL									
179	12	12									
180	65	×									
181	43	RCL									
182	13	13									
183	65	×									
184	43	RCL									
185	15	15									
186	65	×									
187	43	RCL									
188	14	14									
189	95	=									
190	58	FIX									
191	00	00									
192	95	=									
193	91	R/S									

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR



0 2 8 0 0 4
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TEXAS INSTRUMENTS
Calculator Products Division

Submission Abstract

Program Title	Rev.
I.E. TIME STUDY CALCULATIONS	A

Abstract of Program

This program will calculate an operation standard of minutes per part, parts per hour and parts per 8 hour shift. The data input is each elemental time reading, levelling factor, allowances and frequency.

Original TI-59 Program By A. B. Snaffer, Rahway, N.J.

User Benefits:

Saves time in calculating Production Standards from time study data.

Category Number 02	Required Progs. None	Prog. Steps 479	PC-100A Needed ☒ Library Module ID ☐

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TEXAS INSTRUMENTS
Calculator Products Division

Program Description

Program Title:	Rev.
I.E. TIME STUDY CALCULATIONS	A

Method, Equations, Sketches, Limitations, References, Error Recovery:

The data input to this program is the stop watch readings (snap-back) for each element taken from a time study.

With the factors for levelling, allowances and frequency the program will calculate the standard time by element. When all elements are inputted, the program will calculate the standard time per operation (sum of standard time per element) the production of parts per hour and parts per 8 hours.

Error Note: If an error is made when entering the time readings, a correction can be made by re-entering the time in error and pressing 2nd B . This will adjust both the summation of the time and the observation count.

☐ See Continuation Sheet

0 2 | 8 0 0 4
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User Instructions

Program Title
I.E. TIME STUDY CALCULATIONS

Ele.No.	Clear			Error
TIME	Level	Allow	Freq.	Std.

Partition (OP 17): 479.59
Parentheses Levels: 0
t Register ☐
Angular Mode (if applicable):
SBR Levels: 1
Absolute Addresses ☐
Library Module ID: N/A
Disturbs Pending Operations ☐

LABELS (Op 08)

INV	x	ln x	x	CE	x	CLR	x	x⇄t	x	x²	x
√x	x	1/x		STO		RCL		SUM		y^x	x
EE		(		)		÷		GTO		X	
SBR		−		RST		+		R/S		•	
+/−		=		CLR		INV		log		CP	x
tan	x	Pgm		P→R		sin	x	cos		CMs	
Exc		Prd		I≠I		Eng		Fix		Int	
Deg		Pause		x=t		Nop		Op		Rad	
Lbl		x≠t		Σ+		x̄		Grad		St flg	
If flg		D.MS		π		List		Write		Dsz	
Adv		Prt									

USER DEFINED KEYS

A Time
B Level Factor
C Allowance
D Frequency
E Operation Std.
A' Element No.
B' Clear Memory
C'
D'
E'

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS			OUTPUT/MODE (see legend below)
1	Enter Program Card Side 1 and 2					
2	Enter Element No.	Ele No.	2nd.	A		Element No.
3	Enter Element Time	Time		A		Element Time
4	Repeat Step 3 for each time.					
5	Enter Levelling Factor	Level		B		(Level Factor)
6	Enter Allowance Factor	Allow		C		(Level Factor)
7	Enter Frequency Factor	Freq		D		Sum Total Time *
						No. of Observations *
						Levelling Factors *
						Adjusted Time *
						Allowance Factor *
						Adjusted Time *
						Frequency Factor *
						Adjusted Time *
8	Repeat Steps 2 thru 7 for each Element.					

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
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DATA REGISTERS (INV List)

0₀ Count
0₁ Element No.
0₂ Sum Time
0₃ Time (last in)
0₄ Used (Ind.Trans)
0₅ Level Factor
0₆ Frequency
0₇ Avg. Time
0₈ Leveled Time
0₉ Allowance
1₀ Allowance Time
1₁ OP Std. Time
1₂ Pieces/Hr.
1₃ Pieces/8 Hr.
4
5
6
7
8
9

☐ See Continuation Sheet

Continued From: ☐ Program Description ☒ User Instructions ☐ Stmt. of Example

Program Title: I.E. TIME STUDY CALCULATIONS	Rev.

Step	Procedure	Enter	Press	Output
9	Calculate Operation Standards		E	Operation Standards* Min/Piece * Pieces/Hr. * (Pieces/8 Hr. Shift)*
10	Clear Memory to calculate another standard.		B'	
11	If Entry Error is made when entering Element time re-enter wrong time.	Time	E'	Neg (-) Time *

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Calculator Products Division

Sample Problem

Statement of Example Calculate the Production Standard for an operation with the following time study data.

Element No.	#1 Time	#2 Time	#3 Time
	.34	.09	.18
	.37	.12	.15
	.37	.11	.17
	.36	.12	.19
	.34	.10	.17
Level Factor	.95	.95	.90
Allowance	1.15	1.15	1.15
Frequency	1	2	1

☐ See Continuation Sheet

ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
1	2nd A	Element No. 1	* *	Element No.
.34	A	0.340 Time	*	Element Time
.37	A	0.370 Time	*	Element Time
.37	A	0.370 Time	*	Element Time
.36	A	0.360 Time	*	Element Time
.34	A	0.340 Time	*	Element Time
.95	B	(0.95)		Level Factor
1.15	C	(1.15)		Allowance
1	D	1.780 Tot 5. Obs. 0.356 Avg.	* * *	Frequency
		.095 Levl.	*	
		0.338 Time 1.15 % Al.	* *	
		0.389 Time	*	
		1. Freq. 0.389 Time	* *	

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

☐ Over

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Sample Problem (cont'd)

0,2 | 8,0,0,4
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ENTER	PRESS	OUTPUT/MODE (see legend below)	COMMENT
2	2nd A[1]	Element No. 2 *	
.09	A	0.090 Time *	
.12	A	0.120 Time *	
.11	A	0.110 Time *	
.12	A	0.120 Time *	
.10	A	0.10 Time *	
.95	B	(0.95)	
1.15	C	(1.15)	
2	D	0.540 TOT *	
		5. Obs *	
		0.108 Avg *	
		0.95 Levl *	
		0.103 Time *	
		1.15 % Al. *	
		0.118 Time *	
		2 Freq *	
		0.059 Time *	
3	2nd A[1]	Element No. 3 *	
.18	A	0.180 Time *	
.15	A	0.150 Time *	
.17	A	0.170 Time *	
.19	A	0.190 Time *	
.17	A	0.170 Time *	
.90	B	(0.90)	
1.15	C	(1.15)	
1	D	0.860 Tot *	
		5. Obs *	
		0.172 Avg. *	
		0.90 Levl *	
		0.155 Time *	
		1.15 % Al	
		0.178 Time *	
		1 Freq *	
		0.178 Time *	

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange
Sample Problem (cont'd)

0 2 8 0 0 4
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ENTER	PRESS	OUTPUT/MODE (see legend below)	COMMENT
	E	Operation Standards *	
		0.626 M/P *	Min/Piece
		95.9 P/Hr. *	Pieces/Hr.
		767. P/Sh *	Pieces/8 Hr.

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange

0 2 8 0 0 4
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LOC	CODE	KEY	COMMENTS
000	76	LBL	
001	16	A'	
002	42	STO	
003	01	01	
004	71	SBR	
005	22	INV	
006	00	0	
007	42	STO	
008	02	02	
009	42	STO	
010	00	00	
011	98	ADV	
012	91	R/S	
013	76	LBL	
014	11	A	
015	42	STO	
016	03	03	
017	44	SUM	
018	02	02	
019	03	3	
020	42	STO	
021	04	04	
022	71	SBR	
023	23	LNX	
024	01	1	
025	44	SUM	
026	00	00	
027	91	R/S	
028	76	LBL	
029	23	LNX	
030	69	DP	
031	00	00	
032	03	3	
033	07	7	
034	02	2	
035	04	4	
036	03	3	
037	00	0	
038	01	1	
039	07	7	
040	69	DP	
041	04	04	
042	58	FIX	
043	03	03	
044	02	2	
045	73	RC*	
046	04	04	
047	69	DP	
048	06	06	
049	22	INV	
050	58	FIX	
051	92	RTN	
052	76	LBL	
053	12	B	
054	42	STO	
055	05	05	
056	91	R/S	
057	76	LBL	
058	13	C	
059	42	STO	
060	09	09	
061	91	R/S	
062	76	LBL	
063	14	D	
064	98	ADV	
065	42	STO	
066	06	06	
067	43	RCL	
068	02	02	
069	55	÷	
070	43	RCL	
071	00	00	
072	95	=	
073	42	STO	
074	07	07	
075	65	×	
076	43	RCL	
077	05	05	
078	95	=	
079	42	STO	
080	08	08	
081	65	×	
082	43	RCL	
083	09	09	
084	95	=	
085	42	STO	
086	10	10	
087	55	÷	
088	43	RCL	
089	06	06	
090	95	=	
091	44	SUM	
092	11	11	
093	42	STO	
094	14	14	
095	02	2	
096	42	STO	
097	04	04	
098	71	SBR	
099	24	CE	
100	98	ADV	
101	00	0	
102	42	STO	
103	04	04	
104	71	SBR	
105	29	CP	
106	07	7	
107	42	STO	
108	04	04	
109	71	SBR	
110	38	SIN	
111	98	ADV	
112	05	5	
113	42	STO	
114	04	04	
115	71	SBR	
116	39	COS	
117	00	0	
118	08	8	
119	42	STO	
120	04	04	
121	71	SBR	
122	23	LNX	
123	98	ADV	
124	09	9	
125	42	STO	
126	04	04	
127	71	SBR	
128	30	TAN	
129	01	1	
130	00	0	
131	42	STO	
132	04	04	
133	71	SBR	
134	23	LNX	
135	98	ADV	
136	06	6	
137	42	STO	
138	04	04	
139	71	SBR	
140	34	√X	
141	01	1	
142	04	4	
143	42	STO	
144	04	04	
145	71	SBR	
146	23	LNX	
147	98	ADV	
148	98	ADV	
149	98	ADV	
150	91	R/S	
151	76	LBL	
152	15	E	
153	69	DP	
154	00	00	
155	03	3	
156	02	2	
157	03	3	
158	03	3	
159	01	1	
160	07	7	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

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0 2 8 0 0 4
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LOC	CODE	KEY	COMMENTS
161	69	□P	
162	01	01	
163	03	3	
164	05	5	
165	01	1	
166	03	3	
167	03	3	
168	07	7	
169	02	2	
170	04	4	
171	03	3	
172	02	2	
173	69	□P	
174	02	02	
175	03	3	
176	01	1	
177	00	0	
178	00	0	
179	03	3	
180	06	6	
181	03	3	
182	07	7	
183	01	1	
184	03	3	
185	69	□P	
186	03	03	
187	03	3	
188	01	1	
189	01	1	
190	06	6	
191	01	1	
192	03	3	
193	03	3	
194	05	5	
195	01	1	
196	06	6	
197	69	□P	
198	04	04	
199	69	□P	
200	05	05	
201	98	ADV	
202	71	SBR	
203	32	X:T	
204	06	6	
205	00	0	
206	55	÷	
207	43	RCL	
208	11	11	
209	95	=	
210	42	STO□	
211	12	12	
212	71	SBR	
213	33	X^2	
214	65	×	
215	08	8	
216	95	=	
217	42	STO□	
218	13	13	
219	71	SBR	
220	45	Y^x	
221	98	ADV	
222	98	ADV	
223	98	ADV	
224	91	R/S	
225	76	LBL	
226	32	X:T	
227	69	□P	
228	00	00	
229	03	3	
230	00	0	
231	06	6	
232	03	3	
233	03	3	
234	03	3	
235	69	□P	
236	04	04	
237	43	RCL	
238	11	11	
239	58	FIX	
240	03	03	
241	69	□P	
242	06	06	
243	22	INV	
244	58	FIX	
245	92	RTN	
246	76	LBL	
247	33	X^2	
248	69	□P	
249	00	00	
250	03	3	
251	03	3	
252	06	6	
253	03	3	
254	02	2	
255	03	3	
256	03	3	
257	05	5	
258	69	□P	
259	04	04	
260	43	RCL	
261	12	12	
262	58	FIX	
263	01	01	
264	69	□P	
265	06	06	
266	22	INV	
267	58	FIX	
268	92	RTN	
269	76	LBL	
270	45	Y^x	
271	69	□P	
272	00	00	
273	03	3	
274	03	3	
275	06	6	
276	03	3	
277	03	3	
278	06	6	
279	02	2	
280	03	3	
281	69	□P	
282	04	04	
283	43	RCL	
284	13	13	
285	58	FIX	
286	00	00	
287	69	□P	
288	06	06	
289	92	RTN	
290	76	LBL	
291	22	INV	
292	69	□P	
293	00	00	
294	01	1	
295	07	7	
296	02	2	
297	07	7	
298	01	1	
299	07	7	
300	03	3	
301	00	0	
302	01	1	
303	07	7	
304	69	□P	
305	02	02	
306	03	3	
307	01	1	
308	03	3	
309	07	7	
310	00	0	
311	00	0	
312	03	3	
313	01	1	
314	03	3	
315	02	2	
316	69	□P	
317	03	03	
318	69	□P	
319	05	05	
320	58	FIX	
321	00	00	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

PPX-59 Professional Program Exchange

0,2 8,0 0,4
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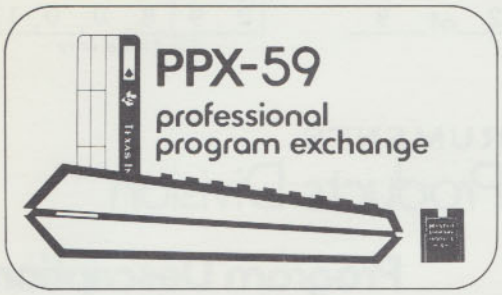
LOC	CODE	KEY	COMMENTS
322	43	RCL	
323	01	01	
324	99	PRT	
325	92	RTN	
326	76	LBL	
327	24	CE	
328	69	OP	
329	00	00	
330	03	3	
331	07	7	
332	03	3	
333	02	2	
334	03	3	
335	07	7	
336	69	OP	
337	04	04	
338	58	FIX	
339	03	03	
340	73	RC*	
341	04	04	
342	69	OP	
343	06	06	
344	22	INV	
345	58	FIX	
346	92	RTN	
347	76	LBL	
348	29	CP	
349	69	OP	
350	00	00	
351	03	3	
352	02	2	
353	01	1	
354	04	4	
355	03	3	
356	06	6	
357	69	OP	
358	04	04	
359	58	FIX	
360	00	00	
361	73	RC*	
362	04	04	
363	69	OP	
364	06	06	
365	22	INV	
366	58	FIX	
367	92	RTN	
368	76	LBL	
369	38	SIN	
370	69	OP	
371	00	00	
372	01	1	
373	03	3	
374	04	4	
375	02	2	
376	02	2	

LOC	CODE	KEY	COMMENTS
377	02	2	
378	69	OP	
379	04	04	
380	58	FIX	
381	03	03	
382	73	RC*	
383	04	04	
384	69	OP	
385	06	06	
386	22	INV	
387	58	FIX	
388	92	RTN	
389	76	LBL	
390	39	COS	
391	69	OP	
392	00	00	
393	02	2	
394	07	7	
395	01	1	
396	07	7	
397	04	4	
398	02	2	
399	02	2	
400	07	7	
401	69	OP	
402	04	04	
403	58	FIX	
404	02	02	
405	73	RC*	
406	04	04	
407	69	OP	
408	06	06	
409	22	INV	
410	58	FIX	
411	92	RTN	
412	76	LBL	
413	30	TAN	
414	69	OP	
415	00	00	
416	06	6	
417	01	1	
418	00	0	
419	00	0	
420	01	1	
421	03	3	
422	02	2	
423	07	7	
424	69	OP	
425	04	04	
426	58	FIX	
427	02	02	
428	73	RC*	
429	04	04	
430	69	OP	
431	06	06	

LOC	CODE	KEY	COMMENTS
432	22	INV	
433	58	FIX	
434	92	RTN	
435	76	LBL	
436	34	FX	
437	69	OP	
438	00	00	
439	00	0	
440	02	2	
441	01	1	
442	03	3	
443	05	5	
444	03	3	
445	04	4	
446	69	OP	
447	04	04	
448	58	FIX	
449	02	02	
450	73	RC*	
451	04	04	
452	69	OP	
453	06	06	
454	22	INV	
455	58	FIX	
456	92	RTN	
457	76	LBL	
458	17	B'	
459	47	CMS	
460	91	R/S	
461	76	LBL	
462	10	E'	
463	94	+/-	
464	42	STO	
465	03	03	
466	44	SUM	
467	02	02	
468	03	3	
469	42	STO	
470	04	04	
471	71	SBR	
472	23	LNX	
473	01	1	
474	22	INV	
475	44	SUM	
476	00	00	
477	91	R/S	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR



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TEXAS INSTRUMENTS
Calculator Products Division

Submission Abstract

Program Title	Rev.
COST/PRICE ESTIMATING	

Abstract of Program

Calculates the cost and sales price of a product (or lot) given various material and labor costs which go into making the product.

Original SR-52 Program by Richard E. Boehmler of Lomita, California.

User Benefits:

Significant time savings should be realized. This is especially true in cases where iterations of various rates occur.

Category Number 09	Required Progs.	Prog. Steps 301	PC-100A Needed ☐ Library Module ID ☐

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Signature _____ Date _____

Name Texas Instruments Tel. No. _____

Address _____

City _____ State _____ Zip _____

Submission Checklist

- ☐ Recorded Magnetic Cards
- ☒ Submission Abstract
- ☒ Program Description
- ☒ User Instructions
- ☒ Sample Problem
- ☒ Listing
- ☐ _____
- ☐ _____

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TEXAS INSTRUMENTS
Calculator Products Division

Program Description

Program Title: COST/PRICE ESTIMATING	Rev.

Method, Equations, Sketches, Limitations, References, Error Recovery:

This program calculates the sell price of a product(s) given various components of material and a material overhead rate; given the various components of labor and a labor overhead rate; other factors making up manufacturing cost, e.g., subcontract, etc. To the total manufacturing cost is added the General and Administrative cost (from the G&A rate); these two components make up the total cost. Adding the profit desired for the project the program calculates the sell price. Lastly, the program will compute the cost per unit on the sell price.

After entering the basic rates (A), the material components are entered (B), after which B' is pressed; the material total is printed and the material overhead is printed (and displayed).

Next, the various components of labor cost are entered (C) after which C' is pressed; the labor total is printed and the labor overhead is printed (and displayed).

Next, other factors which are included in manufacturing cost are entered (D), e.g., subcontract, travel, etc., after which D' is pressed; Manufacturing cost is printed, G&A is printed, and Total cost is printed (and displayed).

Next, E' is pressed and the profit is printed, sell price is printed (and displayed).

Finally, A' is pressed and the Sell price is again printed, the number of units considered is printed, and the cost per unit based on sell price is printed (and displayed).

☐ See Continuation Sheet

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PPX-59
professional program exchange

User Instructions

Program Title
COST/PRICE ESTIMATING

Un Cost	Mat+Ovhd	Lab+Ovh	Mfg+G&A	Sell Pr.
Rates	Mat'l	Labor	Other	Initial

Partition (OP 17): 319 , 79
Parentheses Levels: ____
Angular Mode (if applicable): ____
SBR Levels: ____
Library Module ID: ____
t Register ☒
Absolute Addresses ☐
Disturbs Pending Operations ☒

LABELS (Op 08)

INV	ln x	CE	CLR	x:t	x²
√x	1/x	STO	RCL	SUM	y^x
EE	(	)	÷	GTO	×
SBR	−	RST	+	R/S	•
+/−	=	CLR	INV	log	CP
tan	Pgm	P→R	sin	cos	GMs
Exc	Prd	Ix I	Eng	Fix	Int
Deg	Pause	x=t	Nop	Op	Rad
Lbl	x≠t	Σ+	x̄	Grad	St flg
If flg	D.MS	π	List	Write	Dsz
Adv	Prt				

USER DEFINED KEYS

A	Enter rates
B	Enter material
C	Enter labor
D	Enter other costs
E	Initialize
A'	Display un price
B'	Disp. Mat & Ovhd
C'	Disp. Lab & Ovhd
D'	Disp. Mfg Cost, G&A
E'	Disp. profit, Sell

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS	OUTPUT/MODE (see legend below)
1	Enter Program			
2	Initialize		E	0
3	Enter Rates	A_i	A	
	A_1 - Material Overhead			Material Ovhd*
	A_2 - Labor Overhead Rate			Labor Ovhd*
	A_3 - General & Admin Rate			G + A Rate*
	A_4 - Desired Profit Percent			Profit *
	A_5 - Number of Units Mfg			Nbr of Units*
4	Enter Material dollars	B_i	B	
	B_1 - Direct Material			Direct Mat'l*
	B_2 - Engineering Material			Eng. Mat'l*
	B_3 - Other Material			Other Mat'l*
5	Display (PRT) Mat'l tot., Ovhd		B' R/S	Mat'l tot* Mat'l Ovhd*
6	Enter Labor Dollars	C_i	C	
	C_1 - Engineering			Eng*
	C_2 - Quality Control			Qual. Control*
	C_3 - Machine Shop			Machine Shop*
	C_4 - Electronics Shop			Elect. Shop*
	C_5 - Manufacturing			Manuf.*
	C_6 - Production Control			Prod. Control*
	C_7 - Test			Test*

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

DATA REGISTERS (INV List)

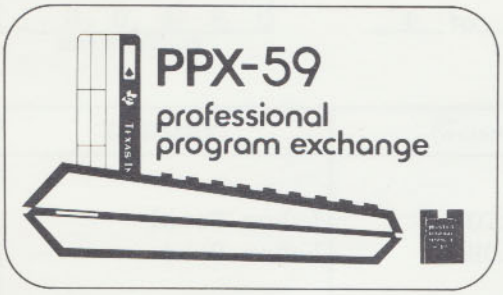
0	Counter
1	Counter (Alpha re
2	Mat'l Ovhd Rate
3	Labor Ovhd Rate
4	G&A Rate
5	Desired Profit
6	Nbr of Units
7	Mat'l Summary
8	Subcont., etc.
9	Labor Total
10	Total cost, sell
11	
12	
13	
14	
15	
16	
17	
18	
19	

☐ See Continuation Sheet

Continued From: ☐ Program Description ☒ User Instructions ☐ Stmt. of Example

Program Title: COST/PRICE ESTIMATING	Rev.

STEP	PROCEDURE	ENTER	PRESS	OUTPUT
7	Display (PRT) Labor Tot, Ovhd		C'	Labor Tot*
			R/S	Labor Ovhd*
8	Enter Subcontract, etc D_1 - Subcontract	D_i	D	Subcontract*
9	Display (PRT) Mfg Cost, G&A, Tot		D'	Mfg Cost*
			R/S	G&A*
			R/S	Total Cost*
10	Display (PRT) Profit, Sell Price		E'	Profit*
			R/S	Sell Price*
11	Display Unit Price		A'	Sell Price*
			R/S	Nbr Units*
			R/S	Unit Price*



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TEXAS INSTRUMENTS
Calculator Products Division

Sample Problem

Statement of Example

Company AA has requested that Company XYZ submit a cost proposal for the manufacture of a new product. In preparing the bid, Company XYZ will assume the following rates for work in the future: Material overhead - 5% of direct material cost; Labor overhead - 200% of Direct labor; General and Administrative - 20% of Manufacturing cost. For this project the company desires to use a 15% profit percentage. The number of units to be produced is 2500. Other data follows: Direct material - $12,000, Other material - $300, Engineering material - $1100. Labor costs are: Engineering - $5,000, Quality Control - $1,750, Machine Shop - $4,000, Electronics Shop - $3,500, Manufacturing - $25,000, Production control - $2,100, Test - $3,200, The sell price is to be determined.

☐ See Continuation Sheet

ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
	E	0		Initialize
.05	A	0.05*	MOHR	Mat'l Ovhd Rate
2	A	2.*	LOHR	Labor Ovhd Rate
.2	A	0.2*	ADMN	G & A Rate
.15	A	0.15*	PRFT	Profit
2500	A	2500.*	UNTS	Nbr Units
12,000	B	12000.00*	DMAT	Production Mat'l
1100	B	1100.00*	EMAT	Engineering Mat'l
300	B	300.00*	OTHR	Other Mat'l
	B'	13400.00 *	MTOT	Material Total
	R/S	670.00*	MOH	Material Ovhd
5000	C	5000.00 *	LABR	Engineering Labor
1750	C	1750.00 *	LABR	Quality Control
4000	C	4000.00 *	LABR	Machine Shop
3500	C	3500.00 *	LABR	Electronics Shop
25000	C	25000.00*	LABR	Manufacturing
2100	C	2100.00 *	LABR	Production Control
3200	C	3200.00 *	LABR	Test

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

☒ Over

PPX-59 Professional Program Exchange
Sample Problem (cont'd)

0 ,9 | 8 ,0 ,0 ,1
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ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
	C'	44550.00 *	LTOT	Labor Total
	R/S	89100.00 *	LOH	Labor Ovhd
125	D	125.00 *	OTHR	Subcontract
	D'	147845.00 *	MFGC	Mfg Cost
	R/S	29569.00*	ADMN	G & A
	R/S	177414.00*	COST	Total Cost
	E'	26612.10*	PRFT	Profit
	R/S	204026.10 *	SPRC	Sell Price
	A'	204026.10*	SPRC	Sell Price
	R/S	2500.*	UNTS	Nbr Units
	R/S	81.61*	UPRC	Unit Price

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange

0 9 | 8 0 0 1
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LOC	CODE	KEY	COMMENTS
000	76	LBL	
001	11	A	
002	72	ST*	
003	00	00	
004	32	X↕T	
005	22	INV	
006	58	FIX	
007	73	RC*	
008	01	01	
009	69	OP	
010	04	04	
011	69	OP	
012	21	21	
013	69	OP	
014	20	20	
015	32	X↕T	
016	69	OP	
017	06	06	
018	91	R/S	
019	76	LBL	
020	12	B	
021	44	SUM	
022	07	07	
023	32	X↕T	
024	22	INV	
025	58	FIX	
026	73	RC*	
027	01	01	
028	69	OP	
029	04	04	
030	69	OP	
031	21	21	
032	32	X↕T	
033	58	FIX	
034	02	02	
035	69	OP	
036	06	06	
037	91	R/S	
038	76	LBL	
039	17	B'	
040	98	ADV	
041	22	INV	
042	58	FIX	
043	43	RCL	
044	68	68	
045	69	OP	
046	04	04	
047	43	RCL	
048	07	07	
049	58	FIX	
050	02	02	
051	69	OP	
052	06	06	
053	91	R/S	
054	65	×	
055	43	RCL	
056	02	02	
057	95	=	
058	44	SUM	
059	07	07	
060	32	X↕T	
061	22	INV	
062	58	FIX	
063	43	RCL	
064	69	69	
065	69	OP	
066	04	04	
067	32	X↕T	
068	58	FIX	
069	02	02	
070	69	OP	
071	06	06	
072	98	ADV	
073	91	R/S	
074	76	LBL	
075	13	C	
076	44	SUM	
077	09	09	
078	32	X↕T	
079	22	INV	
080	58	FIX	
081	43	RCL	
082	70	70	
083	69	OP	
084	04	04	
085	32	X↕T	
086	58	FIX	
087	02	02	
088	69	OP	
089	06	06	
090	91	R/S	
091	76	LBL	
092	18	C'	
093	98	ADV	
094	22	INV	
095	58	FIX	
096	43	RCL	
097	71	71	
098	69	OP	
099	04	04	
100	43	RCL	
101	09	09	
102	58	FIX	
103	02	02	
104	69	OP	
105	06	06	
106	91	R/S	
107	65	×	
108	43	RCL	
109	03	03	
110	95	=	
111	44	SUM	
112	09	09	
113	32	X↕T	
114	22	INV	
115	58	FIX	
116	43	RCL	
117	72	72	
118	69	OP	
119	04	04	
120	32	X↕T	
121	58	FIX	
122	02	02	
123	69	OP	
124	06	06	
125	98	ADV	
126	91	R/S	
127	76	LBL	
128	14	D	
129	44	SUM	
130	08	08	
131	32	X↕T	
132	22	INV	
133	58	FIX	
134	43	RCL	
135	67	67	
136	69	OP	
137	04	04	
138	32	X↕T	
139	58	FIX	
140	02	02	
141	69	OP	
142	06	06	
143	91	R/S	
144	76	LBL	
145	19	D'	
146	98	ADV	
147	43	RCL	
148	07	07	
149	85	+	
150	43	RCL	
151	09	09	
152	85	+	
153	43	RCL	
154	08	08	
155	95	=	
156	42	STO	
157	10	10	
158	32	X↕T	
159	22	INV	
160	58	FIX	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

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0 9 8 0 0 1
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LOC	CODE	KEY	COMMENTS
161	43	RCL	
162	73	73	
163	69	□P	
164	04	04	
165	32	X↕T	
166	58	FIX	
167	02	02	
168	69	□P	
169	06	06	
170	91	R/S	
171	65	×	
172	43	RCL	
173	04	04	
174	95	=	
175	44	SUM	
176	10	10	
177	32	X↕T	
178	22	INV	
179	58	FIX	
180	43	RCL	
181	62	62	
182	69	□P	
183	04	04	
184	32	X↕T	
185	58	FIX	
186	02	02	
187	69	□P	
188	06	06	
189	91	R/S	
190	22	INV	
191	58	FIX	
192	43	RCL	
193	74	74	
194	69	□P	
195	04	04	
196	43	RCL	
197	10	10	
198	58	FIX	
199	02	02	
200	69	□P	
201	06	06	
202	91	R/S	
203	76	LBL	
204	10	E'	
205	98	ADV	
206	22	INV	
207	58	FIX	
208	43	RCL	
209	63	63	
210	69	□P	
211	04	04	
212	43	RCL	
213	10	10	
214	65	×	
215	43	RCL	

LOC	CODE	KEY	COMMENTS
216	05	05	
217	95	=	
218	58	FIX	
219	02	02	
220	69	□P	
221	06	06	
222	44	SUM	
223	10	10	
224	91	R/S	
225	43	RCL	
226	75	75	
227	22	INV	
228	58	FIX	
229	69	□P	
230	04	04	
231	43	RCL	
232	10	10	
233	58	FIX	
234	02	02	
235	69	□P	
236	06	06	
237	91	R/S	
238	76	LBL	
239	16	A'	
240	98	ADV	
241	22	INV	
242	58	FIX	
243	43	RCL	
244	75	75	
245	69	□P	
246	04	04	
247	43	RCL	
248	10	10	
249	58	FIX	
250	02	02	
251	69	□P	
252	06	06	
253	91	R/S	
254	22	INV	
255	58	FIX	
256	55	÷	
257	43	RCL	
258	64	64	
259	69	□P	
260	04	04	
261	43	RCL	
262	06	06	
263	69	□P	
264	06	06	
265	91	R/S	
266	95	=	
267	32	X↕T	
268	43	RCL	
269	76	76	
270	69	□P	

LOC	CODE	KEY	COMMENTS
271	04	04	
272	32	X↕T	
273	58	FIX	
274	02	02	
275	69	□P	
276	06	06	
277	91	R/S	
278	76	LBL	
279	15	E	
280	22	INV	
281	58	FIX	
282	22	INV	
283	57	ENG	
284	25	CLR	
285	06	6	
286	69	□P	
287	17	17	
288	47	CMS	
289	08	8	
290	69	□P	
291	17	17	
292	02	2	
293	42	STO□	
294	00	00	
295	06	6	
296	00	0	
297	42	STO□	
298	01	01	
299	25	CLR	
300	91	R/S	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

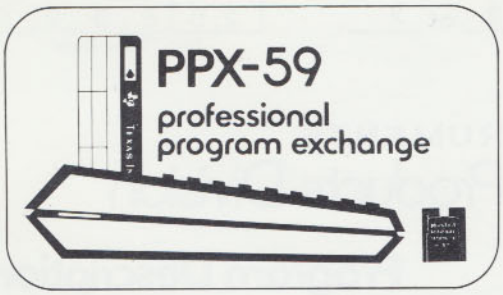
Continued From: ☐ Program Description ☐ User Instructions ☐ Stmt. of Example

Program Title: COST/PRICE ESTIMATING	Rev.

Out of learn mode, enter the following codes for alphanumerics and store in corresponding register. Be sure to be in 319.79 partition.

Alphanumeric	Reg.
30322335.	60
27322335.	61
13613031.	62
33352137.	63
41313736.	64
16301337.	65
17301337.	66
32372335.	67
30373237.	68
303223.	69
27131435.	70
27373237.	71
273223.	72
30212215.	73
1532367.	74
36333515.	75
41333515.	76

Alphanumerics on TI-59 only



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TEXAS INSTRUMENTS
Calculator Products Division

Submission Abstract

Program Title	Rev.
COST/VOLUME LEARNING CURVE	

Abstract of Program

This program is a mathematical model of a cost volume learning curve. The curve is described by the slope (.XX) and the coordinates of one point on the curve (Q_a, Cu_a). The slope of a cost/volume learning curve is the ratio of the cost of the Qth unit to that of the (Q/2)th unit.

Given a described learning curve, the costs of successive units of production are available in this program as are the sum costs and average costs of units produced between increasing cumulative volumes of production.

Alternatively, the program may be interrogated to determine the cumulative quantity of production required before reaching a certain cost per unit.

Original SR-52 Program by Rex Pensinger, Plano, Tx.

User Benefits:

Useful for Business Modeling and for forecasting manufacturing cost of products which follow or are expected to follow, a cost/volume learning curve.

Category Number 02	Required Progs.	Prog. Steps 267	PC-100A Needed ☐ Library Module ID ☐

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Signature _____ Date _____

Name Texas Instruments Tel. No. _____

Address _____

City _____ State _____ Zip _____

Submission Checklist

- ☐ Recorded Magnetic Cards
- ☒ Submission Abstract
- ☒ Program Description
- ☒ User Instructions
- ☒ Sample Problem
- ☒ Listing
- ☐ _____
- ☐ _____

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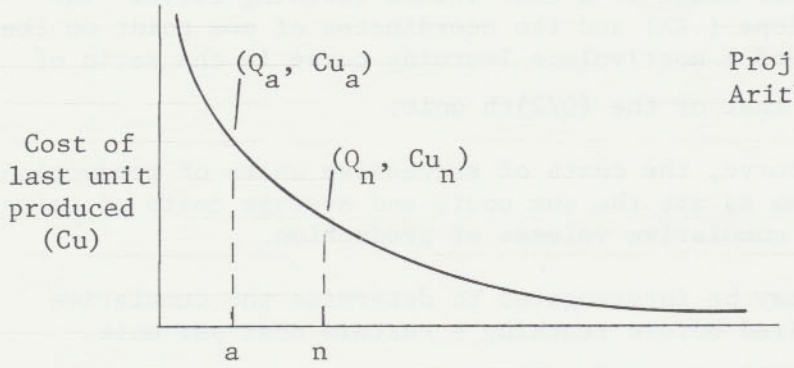
TEXAS INSTRUMENTS
Calculator Products Division

Program Description

Program Title:	Rev.
COST/VOLUME LEARNING CURVE	

Method, Equations, Sketches, Limitations, References, Error Recovery:



Projection on Arithmetic Paper

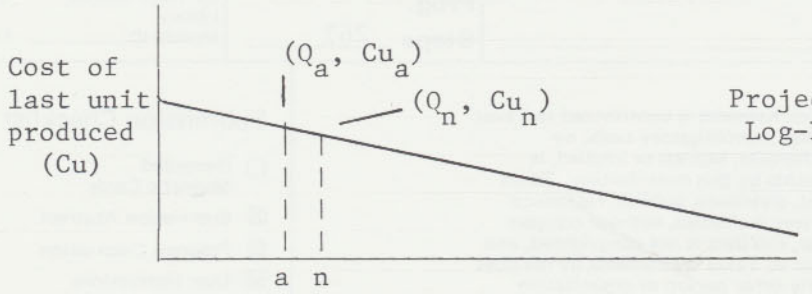
Cumulative Quantity of Units Produced (Q)

Given: Q_a, Cu_a

$$Cu_n = (e^{\ln Cu_a - F(\ln Q_a) + (F+1)(\ln Q_n)})(Q_n)^{-1}$$

where $F = \dfrac{\ln(XX)}{\ln 2}$

$$Q_n = e^{(\ln Cu_a - F(\ln Q_a) - \ln Cu_n)(-F)^{-1}}$$



Projection on Log-Log Paper

Cumulative Quantity of Units Produced (Q)

$(XX) = \dfrac{Cu_n}{Cu_a}$ when $Q_n = 2Q_a$ or learning curve slope

☒See Continuation Sheet

Continued From: ☒ Program Description ☐ User Instructions ☐ Stmt. of Example

Program Title: COST/VOLUME LEARNING CURVE	Rev.

Sum Cost = (Cu_n) (Q_n) / (F+1)

Avge. cost = Cu_n / (F+1)

ΔSum cost = Sum Cost @ Q_{n+1} - Sum Cost @ Q_n

Avge. cost/Δunit = ΔSum Cost/$(Q_{n+1}-Q_n)$

The required input data are: The slope (.XX), the coordinates of the given point (Q_a, Cu_a), and one of the coordinates of the undefined point (Q_n, Cu_n).

The output includes the following:

Q'_n (for each Cu_n given),

Cu'_n (for each Q_n given).

If cumulative quantities are known (or assumed), the following output is also available:

The cost of all units produced from the start of production through Q_n (sum cost).

The average cost of all units produced during this time. (Average cost/unit).

The sum cost of all units produced from Q_n through Q_{n+1}. (Δsum cost)

The average cost of all units produced from Q_n through Q_{n+1}. (Average cost/Δunit)

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User Instructions

Program Title
COST/VOLUME LEARNING CURVE

Cu'_n	Q'_n	Δ Cost	Slope	Avg. Cost
Cu_a	Q_a	Cu_n	Qn	Initialize

Partition (OP 17): 799 . 19 *
Parentheses Levels:
t Register: ☒
Angular Mode (if applicable):
SBR Levels: 1
Absolute Addresses: ☐
Library Module ID:
*For TI-58 319.19
Disturbs Pending Operations: ☒

LABELS (Op 08)

INV	ln x	CE	CLR	x:t	x^2
$\sqrt{x}$	1/x	STO	RCL	SUM	y^x
EE	(	)	÷	GTO	X
SBR	−	RST	+	R/S	•
+/−	=	CLR	INV	log	CP
tan	Pgm	P→R	sin	cos X	CMs
Exc	Prd	|x|	Eng	Fix	Int
Deg	Pause	x=t	Nop	Op	Rad
Lbl	x=t	Σ+	x̄	Grad	St flg
If flg	D.MS	π	List	Write	Dsz
Adv	Prt X				

USER DEFINED KEYS

A	Cu_a
B	Q_a
C	Cu_n known
D	Q_n known
E	Initialize
A'	Cu'_n unknown
B'	Q'_n unknown
C'	Δ sum cost
D'	.XX slope
E'	Avg. cost/Δ unit

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS			OUTPUT/MODE (see legend below)
1	Enter Program		2	*Op	17	799.19 (TI-59) 319.19 (TI-58)
2	Enter the slope (.XX)	.XX		D'		.XX
3	Enter coordinates of known (or assumed) point on the curve.					
	Cost of last unit	Cu_a		A		Cu_a
	Quantity (cumulative)	Q_a		B		Q_a
4	Enter the one known (or assumed) coordinate of the unknown point on the curve.					
	a. cost of the last unit	Cu_n		C		Cu_n
	or					
	b. quantity (cumulative)	Q_n		D		Q_n
5	Compute unknown coordinate					
	a. quantity (cumulative) (requires step 4.a)			B'		Q'_n
	b. cost of last unit (requires step 4.b)			A'		Cu'_n
	Repeat steps 4 and 5 for each n					
	NOTE: The following steps are applicable only for known (or assumed) cumulative quantities and must be preced ' by steps 4.b and 5.b.					

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

DATA REGISTERS (INV List)

0 0	Used
0 1	Cu_a
0 2	Q_a
0 3	Cu_n
0 4	Q_n
0 5	
0 6	Used
0 7	Δ Sum cost
0 8	Old sum cost
0 9	New sum cost
1 0	
1 1	.XX slope
1 2	
1 3	alphanumeric
1 4	storage
1 5	see page 9
1 6	
1 7	
1 8	
1 9	

☐ See Cont on Sheet

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User Instructions

Program Title
COST/VOLUME LEARNING CURVE

Cu'_n	Q'_n	Δ Cost	Slope	Avg. Cost
Cu_a	Q_a	Cu_n	Qn	Initialize

Partition (OP 17): 799 , 19*
Parentheses Levels:
Angular Mode (if applicable):
SBR Levels: 1
Library Module ID:
*For TI-58 319.19
t Register ☒
Absolute Addresses ☐
Disturbs Pending Operations ☒

LABELS (Op 08)

INV	ln x	CE	CLR	x⇄t	x²
√x	1/x	STO	RCL	SUM	y^x
EE	(	)	÷	GTO	X
SBR	−	RST	+	R/S	•
+/−	=	CLR	INV	log	CP
tan	Pgm	P→R	sin	cos X	CMs
Exc	Prd	Σx	Eng	Fix	Int
Deg	Pause	x=t	Nop	Op	Rad
Lbl	x≥t	Σ+	x̄	Grad	St flg
If flg	D.MS	π	List	Write	Dsz
Adv	Prt x				

USER DEFINED KEYS

A	Cu_a
B	Q_a
C	Cu_n known
D	Q_n known
E	Initialize
A'	Cu'_n unknown
B'	Q'_n unknown
C'	Δ sum cost
D'	.XX slope
E'	Avg. cost/Δ unit

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS		OUTPUT/MODE (see legend below)
6	Compute the sum cost of all units produced from start of production through Q_n			C'	Sum cost
7	Compute the average cost of all units produced from start through Q_n NOTE: steps 1 through 6 must be completed before proceeding through steps 8, 9 & 10 for the first time. In the following steps Q_{n+1} must exceed Q_n.			E'	Avg. Cost/unit
8	Initialize (retains Cu_a, Q_a, &Sum cost)			E	0.
9	Enter next known (assumed) cum. qty.	Q_{n+1}		D	Q_{n+1}
10	Calculate a. Cost of last unit @ Q_{n+1}			A'	Cu'_{n+1}
	b. Delta (Δ) sum cost of all units from Q_n through Q_{n+1}			C'	Δ sum cost
	c. Avge. cost/Δunit			E'	Avg. cost/Δunit
	d. New sum cost		RCL	09	New sum cost
	NOTE: a must precede b, b must precede c and a must precede d, otherwise omit unuseful steps.				
	REPEAT STEPS 8, 9 & 10 for EVERY n				

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

DATA REGISTERS (INV List)

0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

☐ See Continuation Sheet

TEXAS INSTRUMENTS
Calculator Products Division

Sample Problem

Statement of Example A better mousetrap has been designed and production started on 6-1-76. By 8-31-76, 5000 units were produced at a total cost $73,738.49. Assuming an 80% slope the 5000th unit is calculated to have cost $10. Production levels are planned at 30,000, 60,000, 90,000 and 150,000 for 1976 and the next three (3) years respectively. Find the following:

I. Expected cost/unit at the end of 1976 and each of the next three years (Cu_2, Cu_3, and Cu_4).

II. Total expected cost of units to be produced during each year '76, '77, '78, and '79.

III. Expected average cost/unit during each of these years.

☐ See Continuation Sheet

ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
.8	D'	.8 *	S	Slope
10	A	10. *	COST	Cu_a
5000	B	5000.*	EQTY	Q_a
30000	D	30000.*	EQTY	Q_1
	A'	5.616829622*	COST	Cu_1
	C'	248505.9289*	E CST	Sum cost (1976)
	E'	8.283530964*	AVG	Avg. cost/unit (1976)
90000	D	90000.*	EQTY	Q_2
	A'	3.943596876*	COST	Cu_2
	C'	274924.8697*	E CST	ΔSum cost (1977)
	E'	4.582081161*	AVG	Avg. cost/Δunit (1977)
	E	0.		
180000	D	180000.*	EQTY	Q_3
	A'	3.1548775*	COST	Cu_3
	C'	314058.4791*	E CST	ΔSum cost (1978)
	E'	3.489538657*	AVG	Avg.cost/Δunit (1978)
	E	0.		
330000	D	330000.*	EQTY	Q_4
	A'	2.595599532*	COST	Cu_4

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

☒ Over

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Sample Problem (cont'd)

2,0|8,0,2,6
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ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
	C'	425721.6579*	E CST	Δsum cost (1979)
	E'	2.838144386*	AVG	Avg.cost/Δunit (1979)

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

PPX-59 Professional Program Exchange

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LOC	CODE	KEY	COMMENTS
000	76	LBL	
001	39	COS	
002	53	(	
003	43	RCL	
004	11	11	
005	23	LNX	
006	55	÷	
007	02	2	
008	23	LNX	
009	54	)	
010	92	RTN	
011	76	LBL	
012	99	PRT	
013	22	INV	
014	58	FIX	
015	73	RC*	
016	00	00	
017	69	OP	
018	04	04	
019	32	X↕T	
020	69	OP	
021	06	06	
022	92	RTN	
023	76	LBL	
024	11	A	
025	42	STO	
026	01	01	
027	32	X↕T	
028	01	1	
029	03	3	
030	42	STO	
031	00	00	
032	71	SBR	
033	99	PRT	
034	91	R/S	
035	76	LBL	
036	12	B	
037	42	STO	
038	02	02	
039	32	X↕T	
040	01	1	
041	04	4	
042	42	STO	
043	00	00	
044	71	SBR	
045	99	PRT	
046	91	R/S	
047	76	LBL	
048	13	C	
049	98	ADV	
050	42	STO	
051	03	03	
052	32	X↕T	
053	01	1	
054	03	3	
055	42	STO	
056	00	00	
057	71	SBR	
058	99	PRT	
059	91	R/S	
060	76	LBL	
061	14	D	
062	98	ADV	
063	42	STO	
064	04	04	
065	32	X↕T	
066	01	1	
067	04	4	
068	42	STO	
069	00	00	
070	71	SBR	
071	99	PRT	
072	91	R/S	
073	76	LBL	
074	15	E	
075	43	RCL	
076	04	04	
077	42	STO	
078	06	06	
079	43	RCL	
080	09	09	
081	42	STO	
082	08	08	
083	00	0	
084	42	STO	
085	03	03	
086	42	STO	
087	04	04	
088	42	STO	
089	07	07	
090	91	R/S	
091	76	LBL	
092	16	A'	
093	53	(	
094	53	(	
095	53	(	
096	53	(	
097	43	RCL	
098	01	01	
099	23	LNX	
100	75	-	
101	53	(	
102	71	SBR	
103	39	COS	
104	65	×	
105	53	(	
106	43	RCL	
107	02	02	
108	23	LNX	
109	54	)	
110	54	)	
111	85	+	
112	53	(	
113	01	1	
114	85	+	
115	71	SBR	
116	39	COS	
117	54	)	
118	65	×	
119	53	(	
120	43	RCL	
121	04	04	
122	23	LNX	
123	54	)	
124	54	)	
125	22	INV	
126	23	LNX	
127	54	)	
128	54	)	
129	55	÷	
130	53	(	
131	71	SBR	
132	39	COS	
133	85	+	
134	01	1	
135	54	)	
136	54	)	
137	42	STO	
138	09	09	
139	65	×	
140	53	(	
141	71	SBR	
142	39	COS	
143	85	+	
144	01	1	
145	54	)	
146	55	÷	
147	43	RCL	
148	04	04	
149	95	=	
150	32	X↕T	
151	01	1	
152	03	3	
153	42	STO	
154	00	00	
155	71	SBR	
156	99	PRT	
157	91	R/S	
158	76	LBL	
159	17	B'	

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR

PPX-59 Professional Program Exchange

2 0 8 0 2 6
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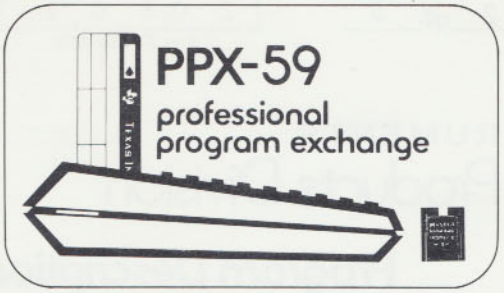
LOC	CODE	KEY	COMMENTS
160	53	(	
161	53	(	
162	53	(	
163	43	RCL	
164	01	01	
165	23	LNX	
166	75	-	
167	53	(	
168	71	SBR	
169	39	COS	
170	65	×	
171	53	(	
172	43	RCL	
173	02	02	
174	23	LNX	
175	54	)	
176	54	)	
177	54	)	
178	75	-	
179	53	(	
180	43	RCL	
181	03	03	
182	23	LNX	
183	54	)	
184	54	)	
185	55	÷	
186	53	(	
187	71	SBR	
188	39	COS	
189	94	+/-	
190	54	)	
191	54	)	
192	22	INV	
193	23	LNX	
194	95	=	
195	32	X↕T	
196	01	1	
197	04	4	
198	42	STO	
199	00	00	
200	71	SBR	
201	99	PRT	
202	91	R/S	
203	76	LBL	
204	18	C'	
205	53	(	
206	43	RCL	
207	09	09	
208	75	-	
209	43	RCL	
210	08	08	
211	54	)	
212	42	STO	
213	07	07	
214	95	=	
215	32	X↕T	
216	01	1	
217	05	5	
218	42	STO	
219	00	00	
220	71	SBR	
221	99	PRT	
222	91	R/S	
223	76	LBL	
224	19	D'	
225	42	STO	
226	11	11	
227	32	X↕T	
228	01	1	
229	02	2	
230	42	STO	
231	00	00	
232	71	SBR	
233	99	PRT	
234	91	R/S	
235	76	LBL	
236	10	E'	
237	43	RCL	
238	07	07	
239	55	÷	
240	53	(	
241	43	RCL	
242	04	04	
243	75	-	
244	43	RCL	
245	06	06	
246	54	)	
247	95	=	
248	32	X↕T	
249	01	1	
250	06	6	
251	42	STO	
252	00	00	
253	71	SBR	
254	99	PRT	
255	91	R/S	
256	76	LBL	
257	59	INT	
258	01	1	
259	69	OP	
260	17	17	
261	47	CMS	
262	02	2	
263	69	OP	
264	17	17	
265	25	CLR	
266	91	R/S	

LOC	CODE	KEY	COMMENTS
			Store the following alphanumeric codes in the appropriate registers.
		36.	12
		15323637.	13
		77343745.	14
		77153637.	15
		134222.	16

MERGED CODES

62 Pgm Ind	72 STO Ind	83 GTO Ind
63 Exc Ind	73 RCL Ind	84 Op Ind
64 Prd Ind	74 SUM Ind	92 INV SBR



2,0 8,0 2,7
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TEXAS INSTRUMENTS
Calculator Products Division

Submission Abstract

Program Title	Rev.
TIME/VOLUME LEARNING CURVE	

Abstract of Program

This program calculates the units of production that would be expected during sequential uniform periods of time assuming a specified rate of learning and given the quantity produced or to be produced during one specific period.

The rate of learning is the ratio of the time it takes to produce the nth unit to that of the n/2th unit. This ratio is commonly referred to as the "slope".

The uniform periods of time are represented by the equal areas under the attached curve separated by the vertical lines indicated the cumulative number of units produced.

Original SR-52 Program by Rex Pensinger, Plano, Tx.

User Benefits:

Useful for planning, scheduling, or goal setting for a production line which is expected to follow a learning curve of a certain rate (typically a rate of between 65% and 95%).

Category Number 02	Required Progs.	Prog. Steps 152	PC-100A Needed ☐ Library Module ID ☐

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Submission Checklist

- ☐ Recorded Magnetic Cards
- ☒ Submission Abstract
- ☒ Program Description
- ☒ User Instructions
- ☒ Sample Problem
- ☒ Listing
- ☐ _____
- ☐ _____

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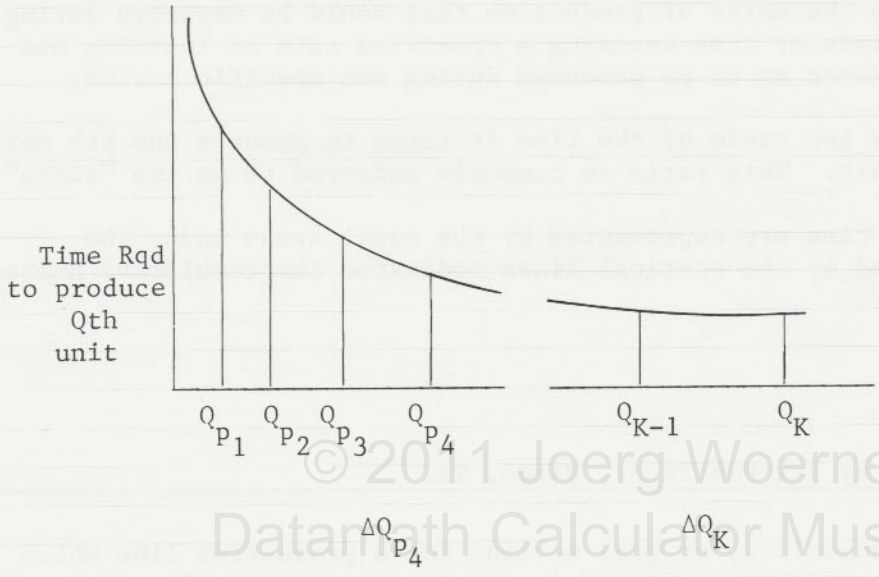
TEXAS INSTRUMENTS
Calculator Products Division

Program Description

Program Title:
TIME/VOLUME LEARNING CURVES

Rev.

Method, Equations, Sketches, Limitations, References, Error Recovery:



Q Cumulative Quantity of Units Produced

$$T_Q = T_1 \left(Q^{(G^{-1}-1)}\right)$$

$$\Delta Q_p = Q_K \left[\left(\frac{p}{K}\right)^G - \left(\frac{p-1}{K}\right)^G\right]$$

$$Q_K = \Delta Q_K \left[1 - \left(\frac{K-1}{K}\right)^G\right]^{-1}$$

where

$$G = \frac{1}{1 + \frac{LN.XX}{LN2}} \qquad .XX = \frac{T_{Q'}}{T_Q} \text{ when } Q' = 2Q$$

p is the integer representing one of the sequential uniform time periods

K is the integer representing the uniform time period for which ΔQ is known (ΔQ_K)

☐ See Continuation Sheet

2 0 8 0 2 7
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User Instructions

Program Title
TIME/VOLUME LEARNING CURVE

S	K	ΔQK	P	ΔQP
QK				INITIALIZE

Partition (OP 17): 159.99*
Parentheses Levels:
Angular Mode (if applicable):
SBR Levels: 1
Library Module ID: *For TI-58 159.39
t Register ☒
Absolute Addresses ☐
Disturbs Pending Operations ☒

LABELS (Op 08)

INV	ln x	CE	CLR	x:t	x²
√x	1/x	STO	RCL	SUM	y^x
EE	(	)	÷	GTO	×
SBR	−	RST	+	R/S	•
+/−	=	CLR	INV	log	CP
tan	Pgm	P→R	sin	cos	CMs
Exc	Prd	Ix I	Eng	Fix	Int
Deg	Pause	x=t	Nop	Op	Rad
Lbl	x≠t	Σ+	x̄	Grad	St flg
If flg	D.MS	π	List	Write	Dsz
Adv	Prt				

USER DEFINED KEYS

A	Slope
B	Known Period
C	Known Quantity
D	Time Period
E	Quantity in Period P
A'	Total thru Period
B'	
C'	Used
D'	Used
E'	Initialize

FLAGS	0	1	2	3	4	5	6	7	8	9

STEP	PROCEDURE	ENTER	PRESS			OUTPUT/MODE (see legend below)
1	Enter Program (TI-59)		10	*Op	17	159.99
	(TI-58)		4	*Op	17	159.39
2	Initialize			E'		0.
3	Enter slope (decimal fraction)	S		A		S*
4	Enter the sequential # of the period for which the quantity of units produced is known or assumed.	K		B		K*
5	Enter the known (assumed) period quantity of units produced.	ΔQ_k				ΔQK*
6	Compute expected qty. to be produced in any preceding or succeeding period. Enter period #. Repeat for all periods to be interrogated.	p		D		P*
				E		ΔQP*
7	Compute total expected qty. to be produced from start of production through known period K.			A'		QK*
	NOTE: At least one iteration of step 6 must precede step 7.					

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

DATA REGISTERS (INV List)

0	Used
1	ΔQK
2	K
3	QK
4	P
5	S
6	
7	alphanumeric
8	storage
9	See page 5
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

☐ See Continuation Sheet

2,0 | 8,0,2,7
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TEXAS INSTRUMENTS
Calculator Products Division

Sample Problem

Statement of Example

A new production line is being set up for a new widget recently designed. Pre-determined work measurement studies indicate that an average operator should be expected to assemble 500 widgets per week by his 12th week on the job, assuming an 85% learning curve.

Find the operator's expected output for each of the first 6 weeks on production as well as the total output for the first 12 weeks.

☐ See Continuation Sheet

ENTER	PRESS	OUTPUT/MODE (see legend below)		COMMENT
	E'			
.85	A	0.85*	S	Slope
12	B	12.*	K	Known Period
500	C	500.*	ΔQK	Known Quantity
1	D	1.*	P	1st Period
	E	181.1745717*	ΔQP	Expected Quantity
2	D	2.*	P	2nd Period
	E	266.8745529*	ΔQP	Expected Quantity
3	D	3.*	P	3rd Period
	E	312.8892658*	ΔQP	Expected Quantity
4	D	4.*	P	4th Period
	E	347.0979978*	ΔQP	Expected Quantity
5	D	5.*	P	5th Period
	E	374.9777432*	ΔQP	Expected Quantity
6	D	6.*	P	6th Period
	E	398.8050251*	ΔQP	Expected Quantity
	A'	4653.784567*	QK	12 Week Total

Modes: n* — Printed only (n) — Displayed Briefly (Pause)
(n)* — Printed and displayed

☐ Over

PPX-59 Professional Program Exchange

2 0	8 0 2 7

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LOC	CODE	KEY	COMMENTS
000	76	LBL	
001	11	A	
002	42	STO	
003	05	05	
004	32	X:T	
005	06	6	
006	42	STO	
007	00	00	
008	18	C'	
009	91	R/S	
010	76	LBL	
011	12	B	
012	42	STO	
013	02	02	
014	32	X:T	
015	07	7	
016	42	STO	
017	00	00	
018	18	C'	
019	91	R/S	
020	76	LBL	
021	13	C	
022	42	STO	
023	01	01	
024	32	X:T	
025	08	8	
026	42	STO	
027	00	00	
028	18	C'	
029	98	ADV	
030	98	ADV	
031	91	R/S	
032	76	LBL	
033	14	D	
034	42	STO	
035	04	04	
036	32	X:T	
037	09	9	
038	42	STO	
039	00	00	
040	18	C'	
041	91	R/S	
042	76	LBL	
043	15	E	
044	53	(	
045	43	RCL	
046	01	01	
047	65	×	
048	53	(	
049	01	1	
050	75	-	
051	53	(	
052	53	(	
053	43	RCL	
054	02	02	
055	75	-	
056	01	1	
057	54	)	
058	55	÷	
059	43	RCL	
060	02	02	
061	54	)	
062	45	Y×	
063	19	D'	
064	54	)	
065	35	1/X	
066	54	)	
067	42	STO	
068	03	03	
069	65	×	
070	53	(	
071	53	(	
072	43	RCL	
073	04	04	
074	55	÷	
075	43	RCL	
076	02	02	
077	54	)	
078	45	Y×	
079	19	D'	
080	75	-	
081	53	(	
082	53	(	
083	43	RCL	
084	04	04	
085	75	-	
086	01	1	
087	54	)	
088	55	÷	
089	43	RCL	
090	02	02	
091	54	)	
092	45	Y×	
093	19	D'	
094	54	)	
095	95	=	
096	32	X:T	
097	01	1	
098	00	0	
099	42	STO	
100	00	00	
101	18	C'	
102	98	ADV	
103	91	R/S	
104	76	LBL	
105	16	A'	
106	43	RCL	
107	03	03	
108	32	X:T	
109	01	1	
110	01	1	
111	42	STO	
112	00	00	
113	18	C'	
114	91	R/S	
115	76	LBL	
116	18	C'	
117	73	RC*	
118	00	00	
119	69	OP	
120	04	04	
121	32	X:T	
122	69	OP	
123	06	06	
124	92	RTN	
125	76	LBL	
126	19	D'	
127	53	(	
128	01	1	
129	55	÷	
130	53	(	
131	01	1	
132	85	+	
133	53	(	
134	43	RCL	
135	05	05	
136	23	LNX	
137	55	÷	
138	02	2	
139	23	LNX	
140	54	)	
141	54	)	
142	54	)	
143	92	RTN	
144	76	LBL	
145	10	E'	
146	22	INV	
147	58	FIX	
148	22	INV	
149	52	EE	
150	25	CLR	
151	91	R/S	

Store the following alphanumeric codes in the appropriate register.

36.	06
26.	07
753426.	08
33.	09
753433.	10
3426.	11

PRODUCTION PLANNING

- **PRODUCTION OUTPUT RATES**
  Given an output rate (pieces/minute **or** seconds/cycle) a production schedule, and an efficiency factor, this program calculates production output in units per minute, hour, day, week, month or year.
  TI-58 or 59.

- **I.E. TIME STUDY CALCULATORS**
  Calculates an operation time standard of minutes per part and output rates per hour, and eight hour shift. Inputs include: elemental time readings, leveling factors, allowances and frequency of observations.
  PC-100A/C required TI-59 only.

- **COST/PRICE ESTIMATING**
  Computes the cost and sales price of a product (or lot) given various material and labor costs.
  TI-59 only.

- **COST/VOLUME LEARNING CURVE**
  Given a described learning curve, the costs of successive units of production are determined, as are the sum and average costs of units produced between increasing cumulative volumes of production.
  TI-58 or 59.

- **TIME/VOLUME LEARNING CURVE**
  Calculates the units of production that would be expected during sequential uniform periods of time. Inputs are specified learning rate and the quantity to be produced.
  TI-58 or 59.

PREPROGRAMMED MAGNETIC CARDS ARE NOT INCLUDED.
(The program Code Lists must be keyed into blank magnetic cards.)

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