YEAR	B ORIG DEMAND + CAP	C ORIG INVEST-MENT + INV	D NEW DEMAND + CAP	E NEW INVEST-MENT + INV	F CHNGE IN DEMND + CAP	G CHNGE IN INVST-MENT + INV	H PW CHNGE IN DEMND + CAP	I PW CHNGE IN INVST-MENT + INV	J MID YR	K MID YR CUM MONTH	L MONTH-LY INTRST FRACT @ 24%	M CUM PW CHNGE IN DEMND + CAP	N CUM PW CHNGE IN INVST-MENT + INV	O (CUM PW CHG IN INVEST / CUM PW CHG IN DEMAND) + (INV / CAP)
	FIG 4	FIG 4	FIG 4	FIG 4	(D-B)+ CAP	(E-C)+ INV	F / (1+L)^K + CAP	G / (1+L)^K + INV	HALF YEAR POINT	J + 12	24% / (100+ 12)	CUM SUM OF H	CUM SUM OF I	(N / M) + (INV / CAP)
1	0.50	1	0.75	1	0.25		0.22199	0	0.5	6	0.02	0.2219	0	0.0000000000
2	1.00	1	1.50	2	0.50	1.00	0.35007	0.70015	1.5	18	0.02	0.5720	0.7001	1.2238996535
3	1.50	2	2.00	2	0.50		0.27603	0	2.5	30	0.02	0.8481	0.7001	0.8255545208
4	2.00	2	2.50	3	0.50	1.00	0.21765	0.43530	3.5	42	0.02	1.0657	1.1354	1.0654025849
5	2.50	3	3.00	3	0.50		0.17161	0	4.5	54	0.02	1.2373	1.1354	0.9176373180
6	3.00	3	3.50	4	0.50	1.00	0.13531	0.27063	5.5	66	0.02	1.3726	1.4061	1.0243355088
7	3.50	4	4.00	4	0.50		0.10669	0	6.5	78	0.02	1.4793	1.4061	0.9504575465
8	4.00	4	4.50	5	0.50	1.00	0.08412	0.16825	7.5	90	0.02	1.5635	1.5743	1.0069317009
9	4.50	5	5.00	5	0.50		0.06633	0	8.5	102	0.02	1.6298	1.5743	0.9659483836
10	5.00	5	5.50	6	0.50	1.00	0.05230	0.10461	9.5	114	0.02	1.6821	1.6789	0.9981020123
11	5.50	6	6.00	6	0.50		0.04124	0	10.5	126	0.02	1.7234	1.6789	0.9742164952
12	6.00	6	6.50	7	0.50	1.00	0.03251	0.06503	11.5	138	0.02	1.7559	1.7440	0.9932139253
13	6.50	7	7.00	7	0.50		0.02564	0	12.5	150	0.02	1.7815	1.7440	0.9789189367
14	7.00	7	7.50	8	0.50	1.00	0.02021	0.04043	13.5	162	0.02	1.8017	1.7844	0.9903766601
15	7.50	8	8.00	8	0.50		0.01594	0	14.5	174	0.02	1.8177	1.7844	0.9816908408
16	8.00	8	8.50	9	0.50	1.00	0.01257	0.02514	15.5	186	0.02	1.8303	1.8095	0.9886843486
17	8.50	9	9.00	9	0.50		0.00991	0	16.5	198	0.02	1.8402	1.8095	0.9833592755
18	9.00	9	9.50	10	0.50	1.00	0.00781	0.01563	17.5	210	0.02	1.8480	1.8252	0.9876585273
19	9.50	10	10.00	10	0.50		0.00616	0	18.5	222	0.02	1.8541	1.8252	0.9843761809
20	10.00	10	10.50	11	0.50	1.00	0.00485	0.00971	19.5	234	0.02	1.8590	1.8349	0.9870306144
21	10.50	11	11.00	11	0.50		0.00383	0	20.5	246	0.02	1.8628	1.8349	0.9850007200
22	11.00	11	11.50	12	0.50	1.00	0.00302	0.00604	21.5	258	0.02	1.8659	1.8409	0.9866439669
23	11.50	12	12.00	12	0.50		0.00238	0	22.5	270	0.02	1.8682	1.8409	0.9853860804
24	12.00	12	12.50	13	0.50	1.00	0.00187	0.00375	23.5	282	0.02	1.8701	1.8447	0.9864050081
25	12.50	13	13.00	13	0.50		0.00148	0	24.5	294	0.02	1.8716	1.8447	0.9856245457
26	13.00	13	13.50	14	0.50	1.00	0.00116	0.00233	25.5	306	0.02	1.8728	1.8470	0.9862569904
27	13.50	14	14.00	14	0.50		0.00092	0	26.5	318	0.02	1.8737	1.8470	0.9857723736
28	14.00	14	14.50	15	0.50	1.00	0.00072	0.00145	27.5	330	0.02	1.8744	1.8485	0.9861651754
29	14.50	15	15.00	15	0.50		0.00057	0	28.5	342	0.02	1.8750	1.8485	0.9858641154
30	15.00	15	15.50	16	0.50	1.00	0.00045	0.00090	29.5	354	0.02	1.8754	1.8494	0.9861081734
31	15.50	16	16.00	16	0.50		0.00035	0	30.5	366	0.02	1.8758	1.8494	0.9859210893
32	16.00	16	16.50	17	0.50	1.00	0.00028	0.00056	31.5	378	0.02	1.8761	1.8499	0.9860727653
33	16.50	17	17.00	17	0.50		0.00022	0	32.5	390	0.02	1.8763	1.8499	0.9859564864
34	17.00	17	17.50	18	0.50	1.00	0.00017	0.00034	33.5	402	0.02	1.8765	1.8503	0.9860507635
35	17.50	18	18.00	18	0.50		0.00013	0	34.5	414	0.02	1.8766	1.8503	0.9859784840
36	18.00	18	18.50	19	0.50	1.00	0.00010	0.00021	35.5	426	0.02	1.8767	1.8505	0.9860370892

MARGINAL COST = SUM OF THE PRESENT WORTH OF INVESTMENT CHANGES / SUM OF THE PRESENT WORTH OF DEMAND CHANGES

= INV / CAP * column O

INV / CAP * (APPROX 1.01) = CAPACITY COST

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FIGURE 4D (AT A 24 % DISCOUNT RATE)

Added Demand Not Constant

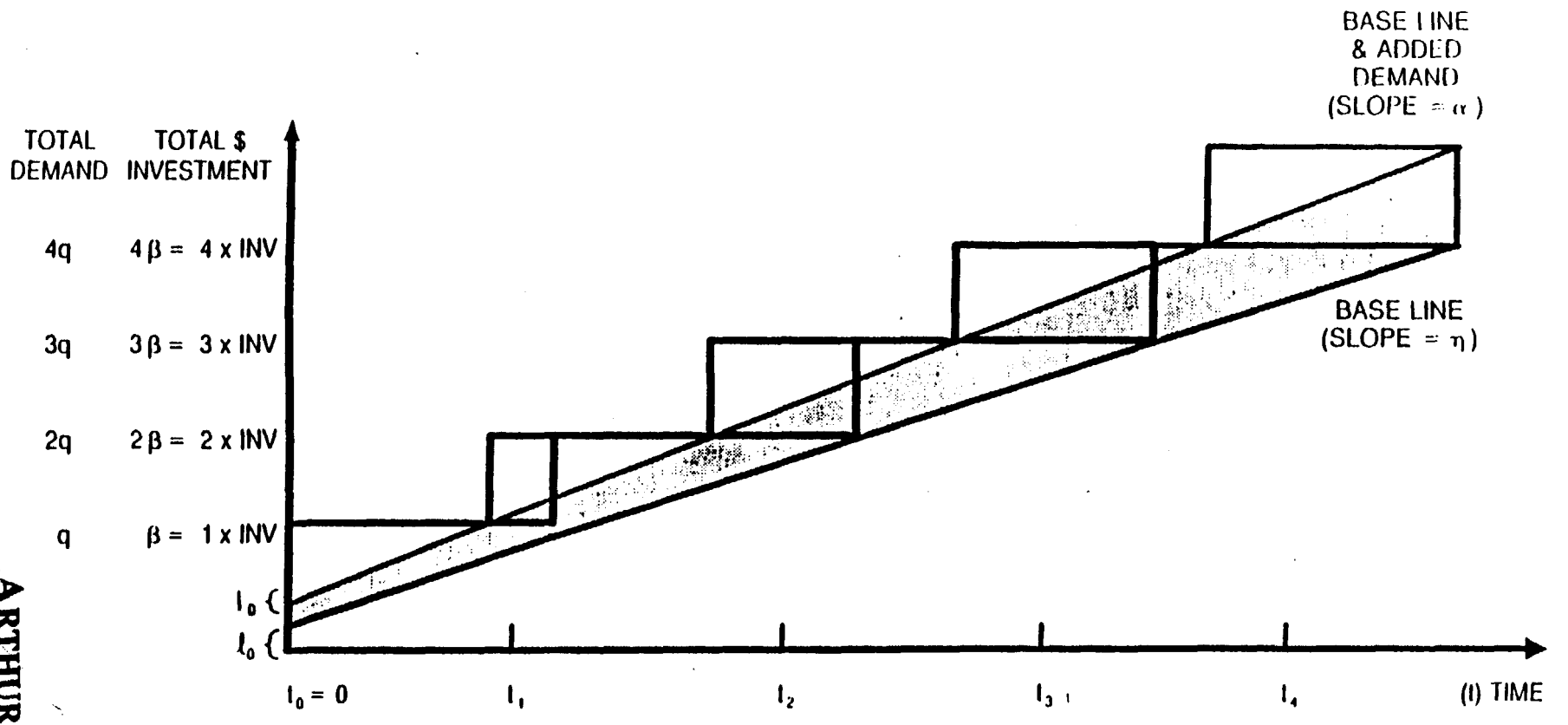

FIGURE 5

LCC90 BVS823.006

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U.S. West Communications, SCM Group, April 1989

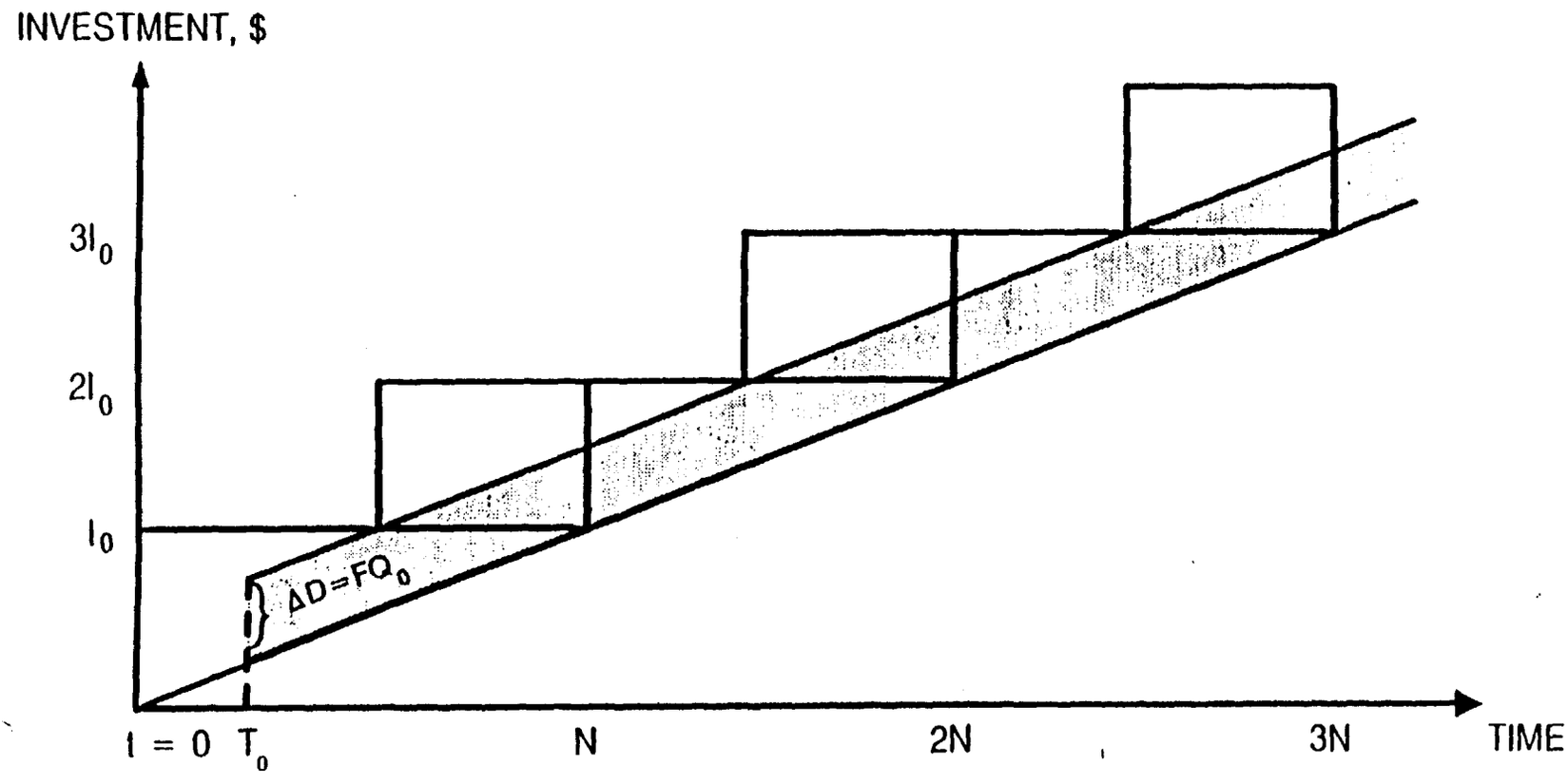

FIGURE 6

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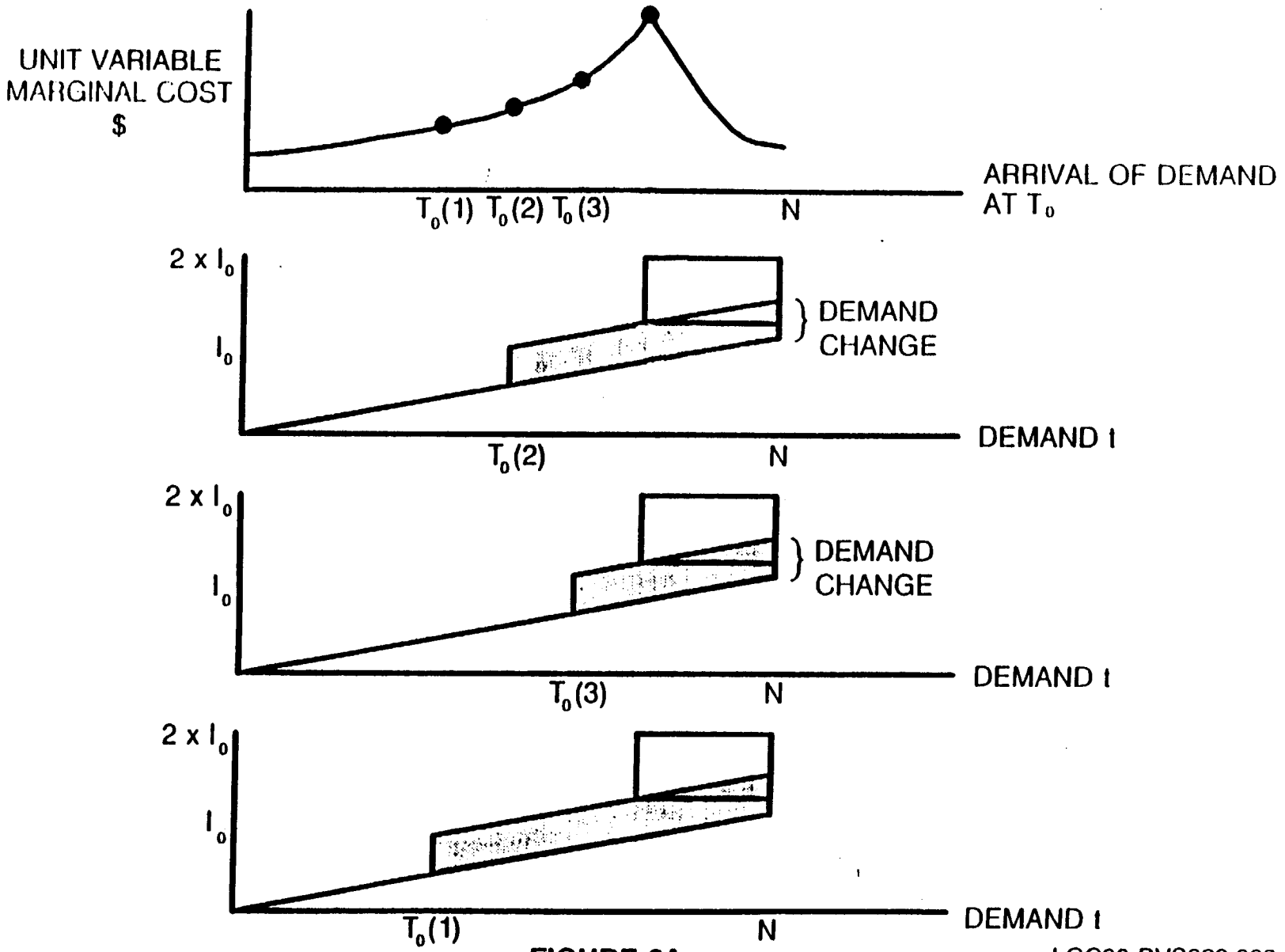

FIGURE 6A

LCC90 BVS823.008

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Investment Model

Investment Primitives Or Building Blocks

Any Switch

- Getting started investment (per millisecond)
- Distr. processing investment (per millisecond)(non ISDN, ISDN)
- Line termination investment (non ISDN, ISDN)
  - Per line
  - Per CCS (orig., term.)
- Trunk termination investment
  - Per local CCS (out, in)
  - Per tandem CCS (out, in)
- Call type investment
  - Per originating call
  - Per terminating call
  - Per outgoing call
  - Per incoming call
  - Per T.T. or Digitone call (incr.)
- Special hardware investment (per CCS)
- Memory investment (per byte)
- SS7 octet investment (per octet)
- ISDN access packet investment (per PPS) by type
- ISDN data packet investment (per PPS) by type

FIGURE 7

LCC90 BVS823.010

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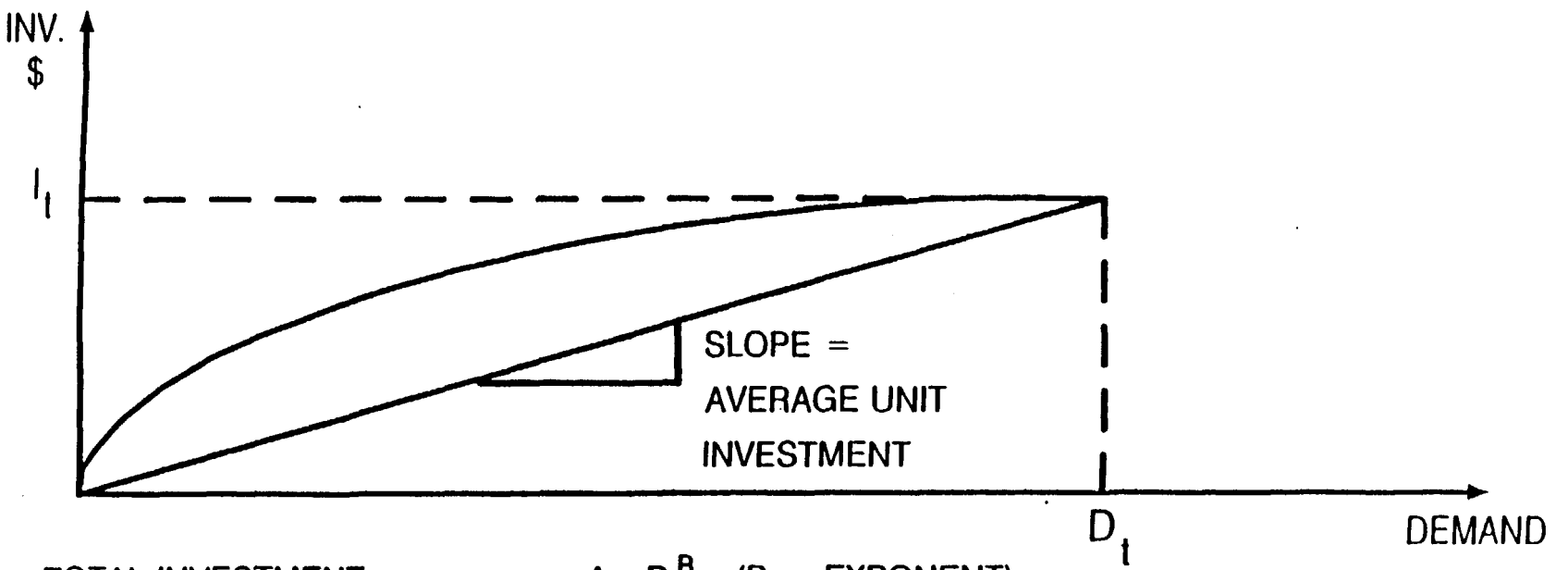
Rare, Non-Linear Function



I_t = TOTAL INVESTMENT = $A \times D_t^B$ (B → EXPONENT)

AVERAGE UNIT INVESTMENT = TOTAL INVESTMENT / D_t

$$= \frac{A \times D_t^B}{D_t}$$

MARGINAL INVESTMENT = DERIVATIVE OF TOTAL INVESTMENT

$$\frac{dI_t}{dD_t} = B \times A \times D_t^{B-1} = \frac{B \times A \times D_t^B}{D_t}$$

MARGINAL INVESTMENT = B x AVERAGE UNIT INVESTMENT

FIGURE 8

LCC90 BVS823.011

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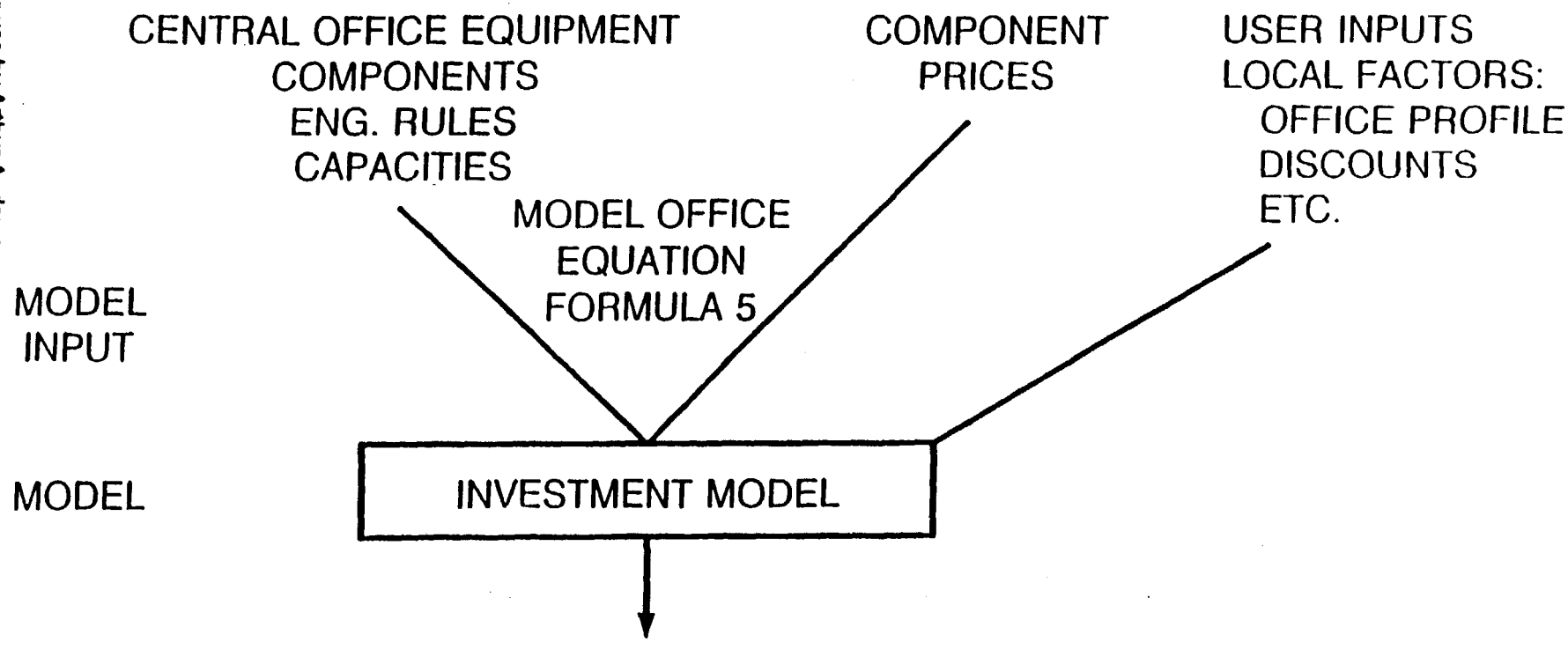
SCIS Input & Output



MODEL OUTPUT

- Basic switching investments (investment primitives see fig. 7)
- Feature investments (see fig. 11 & 12)

FOR SINGLE OFFICE OR WEIGHTED AVERAGE FOR MULTIPLE OFFICES SAME TECHNOLOGY

FIGURE 9

LCC90 BVS823.012

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INVESTMENT MODEL

ANY SWITCH

- GETTING STARTED INVESTMENT (PER MILLISECOND)
- DISTR. PROCESSING INVESTMENT (PER MILLISECOND)
- LINE TERMINATION INVESTMENT
  - PER LINE
  - PER CCS (ORIG. TERM.)
- CALL TYPE INVESTMENT
  - PER ORIGINATING CALL
  - PER OUTGOING CALL
  - PER TERMINATING CALL
  - PER INCOMING CALL
  - PER T.T. OR DIGITONE CALL (INCR.)
- TRUNK TERMINATION INVESTMENT
  - PER LOCAL CCS (OUT, IN)
  - PER TANDEM CCS (OUT, IN)
- SS7 OCTET INVESTMENT (PER OCTET)
- SPECIAL HARDWARE INVESTMENT
- MEMORY INVESTMENT

MODEL OFFICE

(INVESTMENT PRIMITIVES ABBREVIATED)

BELLCORE FORMULAS

USER INPUT

VENDOR TABLES

APPLICATION

TYPICAL FEATURE

OUTPUT SCREEN

SWITCHING COST INFORMATION SYSTEM
ANY SWITCH

RUN DATE STUDY NAME

FEATURE NO: 4 - THREE-WAY CALLING (3WC)

FEATURE RESOURCE INVESTMENT	E, F, & I INVESTMENT	PER POTS LINE
A. GETTING STARTED INVESTMENT		XX.XXXXX
B. CCS INVESTMENT		XX.XXXXX
C. CALL INVESTMENT		NOT APPLICABLE
D. MINIMUM LINE INVESTMENT		NOT APPLICABLE
E. FEATURE RELATED HARDWARE INVESTMENT		XX.XXXXX
1. 3/6 PORT CONFERENCE CIRCUIT CCS	XX.XXXXX	
F. MEMORY INVESTMENT		XX.XXXXX
1. PROGRAM STORE	XX.XXXXX	
2.	XX.XXXXX	
3.	XX.XXXXX	
TOTAL RESOURCE INVESTMENT		XX.XXXXX

LCC90 BVS823.013

FIGURE 10

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Input Screen

SWITCHING COST INFORMATION SYSTEM

ANY SWITCH

FEATURE NO: 4 - THREE-WAY CALLING (3WC)

BH THREE-WAY CALLS PER POTS LINE: H

BH HOLDING TIME, IN SECONDS, PER THREE-WAY CALL: H

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FIGURE 11

LCC90 BVS823.014

Output Screen

Switching Cost Information System
Any Switch

RUN DATE STUDY NAME

FEATURE NO: 4 - THREE-WAY CALLING (3WC)

FEATURE RESOURCE INVESTMENT		E, F, & I INVESTMENT PER POTS LINE
A. GETTING STARTED INVESTMENT		XX.XXXXX
B. CCS INVESTMENT		XX.XXXXX
C. CALL INVESTMENT		NOT APPLICABLE
D. MINIMUM LINE INVESTMENT		NOT APPLICABLE
E. FEATURE RELATED HARDWARE INVESTMENT		XX.XXXXX
1. 3/6 PORT CONFERENCE CIRCUIT CCS	XX.XXXXX	
F. MEMORY INVESTMENT		XX.XXXXX
1. PROGRAM STORE	XX.XXXXX	
2.	XX.XXXXX	
3.	XX.XXXXX	
TOTAL RESOURCE INVESTMENT		XX.XXXXX

FIGURE 12

LCC90 BVS823.015

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