

UNIVERSITY OF SWAZILAND
MAIN EXAMINATION 2005/6

FACULTY OF SCIENCE

DEPARTMENT OF ELECTRONIC ENGINEERING

TITLE OF PAPER: TELECOMMUNICATIONS SYSTEMS,
OPTICAL AND MICROWAVE
TRANSMISSION

COURSE CODE: ECO530

TIME ALLOWED: THREE HOURS

INSTRUCTIONS:

- 1) There are FIVE questions in this paper. Answer QUESTION 1 plus any OTHER THREE questions.
 - 2) Each question carries 25 marks
 - 3) Marks for different sections are shown on the right hand margin.
-

***THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION
HAS BEEN GIVEN BY THE INVIGILATOR***

This question paper has 6 pages including this page and 10 pages of Erlang tables

QUESTION 1 (Compulsory)

- a. The UT-100 follows the basic architecture of a digital switch. Draw a block diagram of a generic digital switch and list the 8 basic functions expected from a digital switch. (10 marks)
- b. Show your understanding of switching by explaining the difference between the following:
- a. Analogue switch and a digital switch (1 mark)
 - b. Circuit switching and packet switching (1 mark)
 - c. A space switch and a time switch. (1 mark)
 - d. In addition, draw a diagram of a S-T-S switch. (1 mark)
- c. Draw a block diagram of the PIU in the UT-100 exchange and answer the following questions:
- a. How many PIU are in an M2 module?
 - b. Calculate the number of ports that a PIU can handle.
- (6 marks)
- d. A 10-MHz analogue signal is to be digitised for transmission over a digital link using advanced encoding techniques and 8 bits per sample European standard. What is the transmission rate? (5 marks)

QUESTION 2

- a. During the busy hour, 1200 calls were offered to a group of trunks & six calls were lost. The average call duration was 3 min. Find
- (i) Traffic offered
 - (ii) Traffic carried
 - (iii) GoS
 - (iv) Total duration of the periods of congestion
- (8 marks)
- b. A 4-node transmission ring is to be created to protect the 4 nodes. The traffic between node 1 & all other nodes warrants at least 4000 circuits and the traffic between all other nodes warrants less than 2000 circuits. Draw a diagram of your proposed ring and justify the capacities.
- (6 marks)
- c. Draw a cross-section of a twelve core optic fibre cable, single mode, 1310 nm. Label it and explain what losses are expected for a 60 km link.
- (4 marks)
- d. If the refractive indexes are given as $n_1 = 1.457$ and $n_2 = 1.343$, calculate and demonstrate the location of each angle:
- (i) Critical angle
 - (ii) The acceptance angle
 - (iii) The numerical aperture
- (7 marks)

QUESTION 3

- a. With the aid of a diagram, describe the ISDN reference model as prescribed in ITU-T Recommendations I.411 and I.430 by providing the configuration of ISDN user-network.
(9 marks)
- b. Give the structure of ITU No. 7 signalling which is compatible with ISDN and explain the function of each level.
(7 marks)
- c. Give two main reasons why channel associated signalling is not compatible with ISDN.
(4marks)
- d. Name and describe the functionality found within the three service categories of the ISDN network and give 2 examples in each category.
(5 marks)

QUESTION 4

- a. What are the terrestrial propagation models used in the design of line-of-sight systems. Which one is generally used and why?
(5 marks)
- b. If a transmitter has an output of 1 W, the feeder loss is assumed to be 3dB and the dish is 2.4 m operating at 3 GHz, what will be the EIRP?
(5 marks)
- c. A 70 km hop operating at 3 GHz is to be implemented using a microwave system. Assuming transmitter power of 1 watt and total feeder loss of 6dB, the required minimum received signal level is -70dBW with a fade margin of 10dB. What will be the total antenna gain for the link?
(9 marks)
- d. A satellite link is operating a QPSK modem to transmit a TDMA signal at 120Mb/s. The modem is within 2.5 dB of the theoretical QPSK modem. Due to other system impairments, an additional 1.6 dB degradation in performance exists. Determine the required E_b/N_0 and C/N if the theoretical $E_b/N_0=11.5\text{dB}$ (to maintain the required system performance)
(6 marks)

QUESTION 5

- (a) Give the general structure of a cellular public land mobile network (PLMN) as standardized by the ITU. And explain the function of each component. (10 marks)
- (b) Given that a cellular mobile network is based on the 7 cell cluster pattern (operating in the 900 MHz band), calculate:
- i The mean re-use distance ratio, (2 marks)
 - ii The carrier to interference ratio (C/I). (2 marks)
 - iii Explain why frequency reuse is implemented in cellular networks. (2 marks)
- (c) Given that a micro cell GSM 900 network is designed based on three RF carriers/cell, each cell is 500m^2 , and that each user generates 0.3 Erlangs. How many users per square kilometre may be served by the network:
- i Assuming a 0.002 grade of service
 - ii Assuming a 0.01 grade of service(Erlang B table is provided)
 - iii Explain the difference between (i) and (ii) in terms of number of circuits required. (9 marks)

=== END OF QUESTION PAPER, TRAFFIC CAPACITY TABLES FOLLOW ===

TRAFFIC CAPACITY TABLE Full Availability

(ERLANG B)

No. of Trunks	Traffic Offered(Erlangs)at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
1	0.11	0.03	0.02	0.01	0.01	0.00	0.00	0.10	0.03	0.02	1
2	0.60	0.30	0.22	0.15	0.11	0.07	0.05	0.54	0.29	0.22	2
3	1.27	0.75	0.60	0.46	0.35	0.25	0.19	1.14	0.72	0.59	3
4	2.05	1.31	1.04	0.87	0.70	0.54	0.44	1.84	1.26	1.07	4
5	2.88	1.94	1.66	1.35	1.13	0.90	0.76	2.59	1.87	1.62	5
6	3.76	2.62	2.28	1.91	1.62	1.33	1.15	3.38	2.53	2.23	6
7	4.67	3.34	2.94	2.50	2.16	1.80	1.58	4.23	3.23	2.85	7
8	5.60	4.09	3.63	3.13	2.73	2.31	2.05	5.04	3.95	3.53	8
9	6.55	4.85	4.34	3.78	3.33	2.85	2.56	5.89	4.70	4.28	9
10	7.51	5.66	5.08	4.46	3.96	3.43	3.05	6.76	5.47	4.98	10
11	8.49	6.47	5.84	5.16	4.61	4.02	3.65	7.64	6.25	5.72	11
12	9.47	7.29	6.61	5.88	5.28	4.64	4.23	8.53	7.05	6.48	12
13	10.5	8.13	7.40	6.61	5.96	5.27	4.83	9.42	7.86	7.25	13
14	11.5	8.98	8.20	7.35	6.66	5.92	5.45	10.3	8.68	8.04	14
15	12.5	9.83	9.01	8.11	7.38	6.58	6.08	11.2	9.51	8.83	15
16	13.5	10.7	9.83	8.88	8.10	7.26	6.72	12.2	10.3	9.63	16
17	14.5	11.6	10.7	9.65	8.83	7.95	7.38	13.1	11.2	10.4	17
18	15.5	12.5	11.5	10.4	9.58	8.64	8.05	14.0	12.0	11.3	18
19	16.6	13.3	12.3	11.2	10.3	9.35	8.72	14.9	12.8	12.1	19
20	17.6	14.2	13.2	12.0	11.1	10.1	9.41	15.9	13.8	12.9	20
21	18.7	15.1	14.0	12.8	11.9	10.8	10.1	16.4	14.6	13.8	21
22	19.7	16.0	14.9	13.7	12.6	11.5	10.8	17.7	15.5	14.6	22
23	20.7	16.9	15.8	14.5	13.4	12.3	11.5	18.7	16.4	15.4	23
24	21.8	17.8	16.6	15.3	14.2	13.0	12.2	19.6	17.3	16.3	24
25	22.8	18.8	17.5	16.1	15.0	13.8	13.0	20.5	18.1	17.2	25
26	23.9	19.7	18.4	17.0	15.8	14.5	13.7	21.5	19.0	18.0	26
27	24.9	20.6	19.3	17.8	16.6	15.3	14.4	22.4	19.9	18.9	27
28	26.0	21.5	20.2	18.6	17.4	16.1	15.2	23.4	20.8	19.7	28
29	27.1	22.5	21.0	19.5	18.2	16.8	15.9	24.3	21.7	20.6	29
30	28.1	23.4	21.9	20.3	19.0	17.6	16.7	25.3	22.6	21.5	30
31	29.2	24.3	22.8	21.2	19.9	18.4	17.4	26.3	23.5	22.4	31
32	30.2	25.3	23.7	22.0	20.7	19.2	18.2	27.2	24.4	23.3	32
33	31.3	26.2	24.6	22.9	21.5	20.0	19.0	28.2	25.3	24.1	33
34	32.4	27.1	25.5	23.8	22.3	20.8	19.7	29.1	26.2	25.0	34
35	33.4	28.1	26.4	24.6	23.2	21.6	20.5	30.1	27.1	25.9	35
36	34.5	29.0	27.3	25.5	24.0	22.4	21.3	31.1	28.1	26.8	36
37	35.6	30.0	28.3	26.4	24.8	23.2	22.1	32.0	29.0	27.7	37
38	36.6	30.9	29.2	27.3	25.7	24.0	22.9	33.0	29.9	28.6	38
39	37.7	31.9	30.1	28.1	26.5	24.8	23.7	33.9	30.8	29.5	39
40	38.8	32.8	31.0	29.0	27.4	25.6	24.4	34.9	31.7	30.4	40
41	39.9	33.8	31.9	29.9	28.2	26.4	25.2	35.9	32.6	31.3	41
42	40.9	34.7	32.8	30.8	29.1	27.2	26.0	36.8	33.5	32.2	42
43	42.0	35.7	33.8	31.7	29.9	28.1	26.8	37.8	34.5	33.1	43
44	43.1	36.6	34.7	32.5	30.8	28.9	27.6	38.8	35.4	34.0	44
45	44.2	37.6	35.6	33.4	31.7	29.7	28.4	39.7	36.3	34.9	45
46	45.2	38.6	36.5	34.3	32.5	30.5	29.3	40.7	37.3	35.8	46
47	46.3	39.5	37.5	35.2	33.4	31.4	30.1	41.7	38.2	36.7	47
48	47.4	40.5	38.4	36.1	34.2	32.2	30.9	42.7	39.1	37.6	48
49	48.5	41.4	39.3	37.0	35.1	33.0	31.7	43.6	40.1	38.5	49
50	49.6	42.4	40.3	37.9	36.0	33.9	32.5	44.6	41.0	39.5	50
51	50.6	43.4	41.2	38.8	36.9	34.7	33.3	45.6	41.9	40.4	51
52	51.7	44.3	42.1	39.7	37.7	35.6	34.2	46.6	42.9	41.3	52
53	52.8	45.3	43.1	40.6	38.6	36.4	35.0	47.5	43.8	42.2	53
54	53.8	46.3	44.0	41.5	39.5	37.2	35.8	48.5	44.7	43.1	54
55	55.0	47.3	44.9	42.4	40.4	38.1	36.6	49.5	45.7	44.0	55

No. of Trunks	Traffic Offered (Trunks) at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
56	56.1	48.5	45.9	43.3	41.2	38.0	37.5	50.5	46.5	45.0	56
57	57.1	49.2	46.8	44.2	42.1	39.5	38.3	51.4	47.6	45.9	57
58	58.2	50.2	47.8	45.1	43.0	40.8	39.1	52.4	48.5	46.8	58
59	59.3	51.1	48.7	46.0	43.9	41.3	40.0	53.4	49.4	47.7	59
60	60.4	52.1	49.5	46.9	44.3	42.4	40.3	54.4	50.4	48.7	60
61	61.5	53.1	50.6	47.9	45.6	43.2	41.6	55.3	51.3	49.8	61
62	62.6	54.1	51.5	48.8	46.5	44.1	42.5	56.3	52.3	50.5	62
63	63.7	55.1	52.5	49.7	47.4	44.9	43.3	57.3	53.2	51.4	63
64	64.8	56.0	53.4	50.8	48.3	45.8	44.2	58.3	54.2	52.4	64
65	65.8	57.0	54.4	51.5	49.2	46.6	45.0	59.3	55.1	53.3	65
66	66.9	58.0	55.3	52.4	50.1	47.5	45.8	60.2	56.1	54.2	66
67	68.0	59.0	56.3	53.4	51.0	48.4	46.7	61.2	57.0	55.1	67
68	69.1	59.9	57.2	54.3	51.9	49.2	47.5	62.2	58.0	56.1	68
69	70.2	60.9	58.2	55.2	52.8	50.1	48.4	63.2	58.9	57.0	69
70	71.3	61.9	59.1	56.1	53.7	51.0	49.2	64.2	59.9	57.9	70
71	72.4	62.9	60.1	57.0	54.6	51.8	50.1	65.1	60.8	58.9	71
72	73.5	63.9	61.0	58.0	55.5	52.7	50.9	66.1	61.8	59.8	72
73	74.6	64.9	62.0	58.9	56.4	53.6	51.8	67.1	62.7	60.8	73
74	75.6	65.8	62.9	59.8	57.3	54.5	52.7	68.1	63.7	61.7	74
75	76.7	66.8	63.9	60.7	58.2	55.3	53.5	69.1	64.6	62.6	75
76	77.8	67.8	64.9	61.7	59.1	56.2	54.4	70.0	65.6	63.6	76
77	78.9	68.8	65.8	62.6	60.0	57.1	55.2	71.0	66.5	64.5	77
78	80.0	69.8	66.8	63.5	60.9	58.0	56.1	72.0	67.5	65.4	78
79	81.1	70.8	67.7	64.4	61.8	58.8	56.9	73.0	68.4	66.4	79
80	82.2	71.8	68.7	65.4	62.7	59.7	57.8	74.0	69.4	67.3	80
81	83.3	72.8	69.6	66.3	63.6	60.6	58.7	75.0	70.3	68.3	81
82	84.4	73.7	70.6	67.2	64.5	61.5	59.5	76.0	71.3	69.2	82
83	85.5	74.7	71.6	68.2	65.4	62.4	60.4	76.9	72.2	70.1	83
84	86.6	75.7	72.5	69.1	66.3	63.2	61.3	77.9	73.2	71.1	84
85	87.7	76.7	73.5	70.0	67.2	64.1	62.1	78.8	74.2	72.0	85
86	88.8	77.7	74.5	70.9	68.1	65.0	63.0	79.9	75.1	73.0	86
87	89.9	78.7	75.4	71.9	69.0	65.9	63.9	80.9	76.1	73.9	87
88	91.0	79.7	76.4	72.8	69.9	66.8	64.7	81.9	77.0	74.9	88
89	92.1	80.7	77.3	73.7	70.8	67.7	65.6	82.8	78.0	75.8	89
90	93.1	81.7	78.3	74.7	71.8	68.6	66.5	83.8	78.9	76.7	90
91	94.2	82.7	79.3	75.6	72.7	69.4	67.4	84.8	79.9	77.7	91
92	95.3	83.7	80.2	76.6	73.6	70.3	68.2	85.8	80.9	78.6	92
93	96.4	84.6	81.2	77.5	74.5	71.2	69.1	86.8	81.8	79.5	93
94	97.5	85.6	82.2	78.4	75.4	72.1	70.0	87.8	82.8	80.5	94
95	98.6	86.6	83.1	79.4	76.3	73.0	70.9	88.8	83.7	81.5	95
96	99.7	87.6	84.1	80.3	77.2	73.9	71.7	89.8	84.7	82.4	96
97	100.8	88.6	85.1	81.2	78.2	74.8	72.6	90.7	85.7	83.4	97
98	101.9	89.6	86.0	82.2	79.1	75.7	73.5	91.7	86.6	84.3	98
99	103.0	90.6	87.0	83.1	80.0	76.6	74.4	92.7	87.6	85.3	99
100	104.1	91.6	88.0	84.1	80.9	77.5	75.2	93.7	88.6	86.2	100
101	105.2	92.6	88.9	85.0	81.8	78.4	76.1	94.7	89.5	87.2	101
102	106.3	93.6	89.9	85.9	82.7	79.3	77.0	95.7	90.5	88.1	102
103	107.4	94.6	90.9	86.9	83.7	80.2	77.9	96.7	91.4	89.1	103
104	108.5	95.6	91.9	87.8	84.6	81.1	78.8	97.8	92.4	90.0	104
105	109.6	96.6	92.8	88.8	85.5	82.0	79.6	98.8	93.4	91.0	105
106	110.7	97.6	93.8	89.7	86.4	82.8	80.5	99.8	94.3	91.9	106
107	111.8	98.6	94.8	90.7	87.4	83.7	81.4	100.6	95.3	92.8	107
108	112.9	99.6	95.7	91.6	88.3	84.6	82.3	101.6	96.3	93.8	108
109	114.0	100.6	96.7	92.6	89.2	85.5	83.2	102.6	97.2	94.8	109
110	115.1	101.6	97.7	93.5	90.1	86.4	84.1	103.6	98.2	95.7	110

No. of Trunks	Traffic Offered (Erlangs) at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
111	116.2	102.8	98.7	94.4	91.0	87.3	85.0	104.6	99.2	96.7	111
112	117.3	103.6	99.5	95.4	92.0	88.3	85.8	105.8	100.1	97.8	112
113	118.4	104.6	100.6	96.3	92.9	89.2	86.7	106.5	101.1	98.6	113
114	119.5	105.6	101.6	97.3	93.8	90.1	87.8	107.5	102.1	99.5	114
115	120.6	106.6	102.5	98.2	94.7	91.0	88.5	108.5	103.0	100.5	115
116	121.7	107.6	103.5	99.2	95.7	91.9	89.4	109.5	104.0	101.4	116
117	122.8	108.6	104.5	100.1	96.6	92.8	90.3	110.5	105.0	102.4	117
118	123.9	109.6	105.5	101.1	97.5	93.7	91.2	111.5	105.9	103.4	118
119	125.0	110.6	106.4	102.0	98.5	94.6	92.1	112.5	106.9	104.3	119
120	126.1	111.6	107.4	103.0	99.4	95.5	93.0	113.5	107.9	105.3	120
121	127.2	112.6	108.4	103.9	100.3	96.4	93.9	114.5	108.8	106.2	121
122	128.3	113.6	109.4	104.9	101.2	97.3	94.7	115.5	109.8	107.2	122
123	129.4	114.6	110.3	105.8	102.2	98.2	95.6	116.4	110.8	108.1	123
124	130.5	115.6	111.3	106.8	103.1	99.1	96.5	117.4	111.7	109.1	124
125	131.6	116.6	112.3	107.7	104.0	100.0	97.4	118.4	112.7	110.1	125
126	132.7	117.6	113.3	108.7	105.0	100.9	98.3	119.4	113.7	111.0	126
127	133.8	118.6	114.3	109.6	105.9	101.8	99.2	120.4	114.7	112.0	127
128	134.9	119.6	115.2	110.6	106.8	102.7	100.1	121.4	115.6	112.9	128
129	136.0	120.6	116.2	111.5	107.8	103.7	101.0	122.4	116.6	113.9	129
130	137.1	121.6	117.2	112.5	108.7	104.6	101.9	123.4	117.6	114.8	130
131	138.2	122.6	118.2	113.4	109.8	105.5	102.8	124.4	118.5	115.8	131
132	139.3	123.6	119.1	114.4	110.5	106.4	103.7	125.4	119.5	116.8	132
133	140.4	124.6	120.1	115.3	111.5	107.3	104.8	126.4	120.5	117.7	133
134	141.5	125.6	121.1	116.3	112.4	108.2	105.5	127.3	121.4	118.7	134
135	142.6	126.6	122.1	117.2	113.3	109.1	106.4	128.3	122.4	119.6	135
136	143.7	127.6	123.1	118.2	114.3	110.0	107.3	129.3	123.4	120.6	136
137	144.8	128.6	124.0	119.1	115.2	111.0	108.2	130.3	124.4	121.6	137
138	145.9	129.6	125.0	120.1	116.2	111.9	109.1	131.3	125.3	122.5	138
139	147.0	130.7	126.0	121.1	117.1	112.8	110.0	132.3	126.3	123.5	139
140	148.1	131.7	127.0	122.0	118.0	113.7	110.9	133.3	127.3	124.4	140
141	149.2	132.7	128.0	123.0	119.0	114.6	111.8	134.3	128.2	125.4	141
142	150.3	133.7	128.9	123.9	119.9	115.5	112.7	135.3	129.2	126.4	142
143	151.4	134.7	129.9	124.9	120.8	116.4	113.6	136.3	130.2	127.3	143
144	152.5	135.7	130.9	125.8	121.8	117.4	114.5	137.3	131.2	128.3	144
145	153.6	136.7	131.9	126.8	122.7	118.3	115.4	138.3	132.1	129.2	145
146	154.7	137.7	132.9	127.7	123.6	119.2	116.3	139.2	133.1	130.2	146
147	155.8	138.7	133.9	128.7	124.6	120.1	117.2	140.2	134.1	131.2	147
148	156.9	139.7	134.8	129.7	125.5	121.0	118.1	141.2	135.1	132.1	148
149	158.0	140.7	135.8	130.6	126.5	121.9	119.0	142.2	136.0	133.1	149
150	159.1	141.7	136.8	131.6	127.4	122.9	119.9	143.2	137.0	134.1	150
151	160.2	142.7	137.8	132.5	128.3	123.8	120.8	144.2	138.0	135.0	151
152	161.3	143.7	138.8	133.5	129.3	124.7	121.8	145.2	139.0	136.0	152
153	162.4	144.7	139.8	134.5	130.2	125.6	122.7	146.2	139.9	137.0	153
154	163.5	145.8	140.7	135.4	131.2	126.5	123.6	147.2	140.9	137.9	154
155	164.6	146.8	141.7	136.4	132.1	127.5	124.5	148.2	141.9	138.9	155
156	165.7	147.8	142.7	137.3	133.0	128.4	125.4	149.2	142.9	139.8	156
157	166.8	148.8	143.7	138.3	134.0	129.3	126.4	150.2	143.8	140.8	157
158	167.9	149.8	144.7	139.2	134.9	130.2	127.2	151.2	144.8	141.8	158
159	169.0	150.8	145.7	140.2	135.9	131.1	128.1	152.1	145.8	142.7	159
160	170.2	151.8	146.8	141.2	136.8	132.1	129.0	153.1	146.8	143.7	160
161	171.3	152.8	147.8	142.1	137.7	133.0	129.9	154.1	147.7	144.7	161
162	172.4	153.8	148.8	143.1	138.7	133.9	130.8	155.1	148.7	145.6	162
163	173.5	154.8	149.8	144.0	139.6	134.8	131.7	156.1	149.7	146.6	163
164	174.6	155.8	150.8	145.0	140.6	135.8	132.7	157.1	150.7	147.6	164
165	175.7	156.9	151.6	146.0	141.5	136.7	133.6	158.1	151.6	148.5	165

No. of Trucks	Traffic Offered (Triangs) at Grade of Service of:-							Traffic Carried			No. of Trucks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
166	176.8	157.9	152.6	146.9	142.5	137.6	134.5	139.1	152.6	149.5	166
167	177.9	158.9	153.5	147.9	143.4	138.5	135.4	160.1	153.6	150.5	167
168	178.0	159.9	154.5	148.9	144.3	139.4	136.3	161.1	154.6	151.4	168
169	180.1	160.9	155.5	149.8	145.3	140.4	137.2	162.1	155.5	152.4	169
170	181.2	161.9	156.5	150.8	146.2	141.3	138.1	163.1	156.5	153.4	170
171	182.3	162.9	157.5	151.7	147.2	142.3	139.0	164.1	157.5	154.3	171
172	183.4	163.9	158.5	152.7	148.1	143.1	139.9	165.1	158.5	155.3	172
173	184.5	164.9	159.5	153.7	149.1	144.1	140.9	166.0	159.4	156.3	173
174	185.6	165.9	160.4	154.6	150.0	145.0	141.8	167.0	160.4	157.2	174
175	185.7	167.0	161.4	155.6	150.9	145.9	142.7	168.0	161.4	158.2	175
176	187.8	168.0	162.4	156.6	151.9	146.9	143.8	169.0	162.4	159.2	176
177	188.9	169.0	163.4	157.5	152.8	147.8	144.5	170.0	163.4	160.1	177
178	190.0	170.0	164.4	158.5	153.8	148.7	145.4	171.0	164.3	161.1	178
179	191.1	171.0	165.4	159.5	154.7	149.6	146.3	172.0	165.3	162.1	179
180	192.2	172.0	166.4	160.4	155.7	150.6	147.3	173.0	166.3	163.0	180
181	193.3	173.0	167.4	161.4	156.6	151.5	148.2	174.0	167.3	164.0	181
182	194.4	174.0	168.3	162.3	157.6	152.4	149.1	175.0	168.2	165.0	182
183	195.5	175.0	169.3	163.3	158.5	153.3	150.0	176.0	169.2	165.9	183
184	196.6	176.1	170.3	164.3	159.5	154.3	150.9	177.0	170.2	166.9	184
185	197.8	177.1	171.3	165.2	160.4	155.2	151.8	178.0	171.2	167.9	185
186	198.9	178.1	172.3	166.2	161.4	156.1	152.8	179.0	172.2	168.9	186
187	200.0	179.1	173.3	167.2	162.3	157.1	153.7	180.0	173.1	169.8	187
188	201.1	180.1	174.3	168.1	163.3	158.0	154.6	181.0	174.1	170.8	188
189	202.2	181.1	175.3	169.1	164.2	158.9	155.5	182.0	175.1	171.8	189
190	203.3	182.1	176.3	170.1	165.2	159.8	156.4	183.0	176.1	172.7	190
191	204.4	183.1	177.2	171.0	166.1	160.8	157.3	183.9	177.0	173.7	191
192	205.5	184.2	178.2	172.0	167.0	161.7	158.3	184.9	178.0	174.7	192
193	206.6	185.2	179.2	173.0	168.0	162.6	159.2	185.9	179.0	175.6	193
194	207.7	186.2	180.2	173.9	168.9	163.6	160.1	186.9	180.0	176.6	194
195	208.8	187.2	181.2	174.9	169.9	164.5	161.0	187.9	181.0	177.6	195
196	209.9	188.2	182.2	175.9	170.8	165.4	161.9	188.9	181.9	178.6	196
197	211.0	189.2	183.2	176.8	171.8	166.4	162.9	189.9	182.9	179.5	197
198	212.1	190.2	184.2	177.8	172.7	167.3	163.8	190.9	183.9	180.5	198
199	213.2	191.3	185.2	178.8	173.7	168.2	164.7	191.9	184.9	181.5	199
200	214.3	192.3	186.2	179.7	174.6	169.2	165.6	192.9	185.9	182.4	200
201	215.4	193.3	187.1	180.7	175.6	170.1	166.5	193.9	186.8	183.4	201
202	216.5	194.3	188.1	181.7	176.5	171.0	167.5	194.9	187.8	184.4	202
203	217.6	195.3	189.1	182.6	177.5	172.0	168.4	195.9	188.8	185.3	203
204	218.7	196.3	190.1	183.6	178.4	172.9	169.3	196.9	189.8	186.3	204
205	219.8	197.3	191.1	184.6	179.4	173.8	170.2	197.9	190.8	187.3	205
206	221.0	198.3	192.1	185.5	180.4	174.8	171.2	198.9	191.7	188.3	206
207	222.1	199.4	193.1	186.5	181.3	175.7	172.1	199.9	192.7	189.2	207
208	223.2	200.4	194.1	187.5	182.3	176.8	173.0	200.9	193.7	190.2	208
209	224.3	201.4	195.1	188.5	183.2	177.8	173.9	201.8	194.7	191.2	209
210	225.4	202.4	196.1	189.4	184.2	178.5	174.8	202.8	195.7	192.1	210
211	226.5	203.4	197.1	190.4	185.1	179.4	175.6	203.8	196.8	193.1	211
212	227.6	204.4	198.1	191.4	186.1	180.4	176.7	204.8	197.8	194.1	212
213	228.7	205.5	199.0	192.3	187.0	181.3	177.6	205.8	198.8	195.1	213
214	229.8	206.5	200.0	193.3	188.0	182.2	178.5	206.8	199.8	196.0	214
215	230.9	207.5	201.0	194.3	188.9	183.2	179.5	207.8	200.6	197.0	215
216	232.0	208.5	202.0	195.2	189.9	184.1	180.4	208.8	201.5	198.0	216
217	233.1	209.5	203.0	196.2	190.8	185.0	181.3	209.8	202.5	199.0	217
218	234.2	210.5	204.0	197.2	191.8	186.0	182.2	210.9	203.5	199.9	218
219	235.3	211.5	205.0	198.2	192.7	186.9	183.2	211.8	204.5	200.9	219
220	236.4	212.6	206.0	199.1	193.7	187.8	184.1	212.8	205.5	201.9	220

No. of Trunks	Traffic Offered (Erlangs) at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
221	237.5	213.6	207.0	200.1	194.6	188.8	183.0	213.8	208.5	202.8	221
222	238.6	214.6	208.0	201.1	195.6	189.7	183.9	214.8	207.4	203.8	222
223	239.8	215.6	209.0	202.0	196.5	190.6	186.9	215.8	208.4	204.8	223
224	240.9	216.6	210.0	203.0	197.5	191.6	187.8	216.8	209.4	205.8	224
225	242.0	217.6	211.0	204.0	198.5	192.5	188.7	217.8	210.4	206.7	225
226	243.1	218.7	212.0	204.9	199.4	193.5	189.6	218.8	211.4	207.7	226
227	244.2	219.7	212.9	205.9	200.4	194.4	190.6	219.8	212.4	208.7	227
228	245.3	220.7	213.9	206.9	201.3	195.3	191.5	220.8	213.3	209.7	228
229	246.4	221.7	214.9	207.9	202.3	196.3	192.4	221.7	214.3	210.6	229
230	247.5	222.7	215.9	208.8	203.2	197.2	193.3	222.7	215.2	211.6	230
231	248.6	223.7	216.9	209.8	204.2	198.1	194.3	223.7	216.3	212.6	231
232	249.7	224.7	217.9	210.8	205.1	199.1	195.2	224.7	217.3	213.6	232
233	250.8	225.8	218.9	211.8	206.1	200.0	196.1	225.7	218.2	214.5	233
234	251.9	226.8	219.9	212.7	207.1	201.0	197.1	226.7	219.2	215.5	234
235	253.0	227.8	220.9	213.7	208.0	201.9	198.0	227.7	220.2	216.5	235
236	254.1	228.8	221.9	214.7	209.0	202.8	198.9	228.7	221.2	217.5	236
237	255.2	229.8	222.9	215.6	209.9	203.8	199.8	229.7	222.2	218.4	237
238	256.3	230.8	223.9	216.6	210.9	204.7	200.8	230.7	223.2	219.4	238
239	257.5	231.9	224.9	217.6	211.8	205.7	201.7	231.7	224.1	220.4	239
240	258.6	232.9	225.9	218.6	212.8	206.6	202.6	232.7	225.1	221.4	240
241	259.7	233.9	226.9	219.5	213.7	207.5	203.6	233.7	226.1	222.3	241
242	260.8	234.9	227.9	220.5	214.7	208.5	204.5	234.7	227.1	223.3	242
243	261.9	235.9	228.9	221.5	215.7	209.4	205.4	235.7	228.1	224.3	243
244	263.0	236.9	229.9	222.5	216.6	210.4	206.3	236.7	229.1	225.3	244
245	264.1	238.0	230.8	223.4	217.6	211.3	207.3	237.7	230.0	226.2	245
246	265.2	239.0	231.8	224.4	218.5	212.2	208.2	238.7	231.0	227.2	246
247	266.3	240.0	232.8	225.4	219.5	213.2	209.1	239.7	232.0	228.2	247
248	267.4	241.0	233.8	226.3	220.4	214.1	210.1	240.7	233.0	229.2	248
249	268.5	242.0	234.8	227.3	221.4	215.1	211.0	241.7	234.0	230.1	249
250	269.6	243.1	235.8	228.3	222.4	216.0	211.9	242.7	235.0	231.1	250
251	270.7	244.1	236.8	229.3	223.3	216.9	212.9	243.7	235.9	232.1	251
252	271.8	245.1	237.8	230.2	224.3	217.9	213.8	244.7	236.9	233.1	252
253	272.9	246.1	238.8	231.2	225.2	218.8	214.7	245.6	237.9	234.0	253
254	274.0	247.1	239.8	232.2	226.2	219.8	215.6	246.6	238.9	235.0	254
255	275.2	248.1	240.8	233.2	227.2	220.7	216.6	247.6	239.9	236.0	255
256	276.3	249.2	241.8	234.1	228.1	221.7	217.5	248.6	240.9	237.0	256
257	277.4	250.2	242.8	235.1	229.1	222.6	218.4	249.6	241.8	237.9	257
258	278.5	251.2	243.8	236.1	230.0	223.5	219.4	250.6	242.8	238.9	258
259	279.6	252.2	244.8	237.1	231.0	224.5	220.3	251.6	243.8	239.9	259
260	280.7	253.2	245.8	238.0	232.0	225.4	221.2	252.6	244.8	240.9	260
261	281.8	254.2	246.8	239.0	232.9	226.4	222.2	253.6	245.8	241.8	261
262	282.9	255.3	247.8	240.0	233.9	227.3	223.1	254.6	246.8	242.8	262
263	284.0	256.3	248.8	241.0	234.8	228.2	224.0	255.6	247.8	243.8	263
264	285.1	257.3	249.8	241.9	235.8	229.2	225.0	256.6	248.7	244.8	264
265	286.2	258.3	250.8	242.9	236.7	230.1	225.9	257.6	249.7	245.8	265
266	287.3	259.3	251.8	243.9	237.7	231.1	226.8	258.6	250.7	246.7	266
267	288.4	260.4	252.8	244.9	238.7	232.0	227.8	259.6	251.7	247.7	267
268	289.5	261.4	253.8	245.9	239.6	233.0	228.7	260.6	252.7	248.7	268
269	290.7	262.4	254.8	246.8	240.6	233.9	229.6	261.6	253.7	249.7	269
270	291.8	263.4	255.8	247.8	241.5	234.9	230.6	262.6	254.8	250.8	270
271	292.9	264.4	256.8	248.8	242.5	235.8	231.5	263.6	255.8	251.8	271
272	294.0	265.5	257.8	249.8	243.5	236.7	232.4	264.6	256.8	252.8	272
273	295.1	266.5	258.7	250.7	244.4	237.7	233.4	265.6	257.8	253.8	273
274	296.2	267.5	259.7	251.7	245.4	238.6	234.3	266.6	258.8	254.8	274
275	297.3	268.5	260.7	252.7	246.4	239.6	235.2	267.6	259.8	255.8	275

No. of Trunks	Traffic Offered (Kilograms) at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
276	293.4	269.3	261.7	253.7	247.3	240.5	236.2	263.3	260.6	256.3	276
277	299.3	270.3	262.7	254.6	248.3	241.5	237.1	269.6	261.5	257.5	277
278	303.8	271.6	263.7	255.8	249.2	242.4	238.0	270.8	262.3	258.3	278
279	301.7	272.6	264.7	256.8	250.2	243.4	239.0	271.6	263.3	259.4	279
280	302.3	273.6	265.7	257.6	251.2	244.3	239.9	272.5	264.3	260.4	280
281	303.9	274.6	266.7	258.5	252.1	245.2	240.9	273.5	265.5	261.4	281
282	305.0	275.6	267.7	259.5	253.1	246.3	241.8	274.5	266.5	262.4	282
283	306.2	276.7	268.7	260.5	254.0	247.1	242.7	275.5	267.5	263.4	283
284	307.3	277.7	269.7	261.5	255.0	248.1	243.7	276.5	268.4	264.3	284
285	308.4	278.7	270.7	262.5	256.0	249.0	244.6	277.5	269.4	265.3	285
286	309.5	279.7	271.7	263.4	256.9	250.0	245.5	278.5	270.4	266.3	286
287	310.6	280.7	272.7	264.4	257.9	250.9	246.5	279.5	271.4	267.3	287
288	311.7	281.8	273.7	265.4	258.9	251.9	247.4	280.5	272.4	268.2	288
289	312.8	282.8	274.7	266.4	259.8	252.8	248.3	281.5	273.4	269.2	289
290	313.9	283.8	275.7	267.3	260.8	253.8	249.3	282.5	274.4	270.2	290
291	315.0	284.8	276.7	268.3	251.7	254.7	250.3	283.5	275.3	271.2	291
292	316.1	285.8	277.7	269.3	252.7	255.7	251.1	284.5	276.3	272.2	292
293	317.2	286.9	278.7	270.3	263.7	256.6	252.1	285.5	277.3	273.1	293
294	318.3	287.9	279.7	271.3	264.6	257.6	253.0	285.5	278.3	274.1	294
295	319.4	288.9	280.7	272.2	265.6	258.5	254.0	287.5	279.3	275.1	295
296	320.6	289.9	281.7	273.2	266.6	259.4	254.9	288.5	280.3	276.1	296
297	321.7	290.9	282.7	274.2	267.5	260.4	255.8	289.5	281.3	277.1	297
298	322.8	292.0	283.7	275.2	268.5	261.3	256.8	290.5	282.2	278.0	298
299	323.9	293.0	284.7	276.1	269.4	262.3	257.7	291.5	283.2	279.0	299
300	325.0	294.0	285.7	277.1	270.4	263.2	258.6	292.5	284.2	280.0	300
301	326.1	295.0	286.7	278.1	271.4	264.2	259.6	293.5	285.2	281.0	301
302	327.2	296.0	287.7	279.1	272.3	265.1	260.5	294.5	286.2	282.0	302
303	328.3	297.1	288.7	280.1	273.3	266.1	261.5	295.5	287.2	282.9	303
304	329.4	298.1	289.7	281.0	274.3	267.0	262.4	296.5	288.2	283.9	304
305	330.5	299.1	290.7	282.0	275.2	268.0	263.3	297.5	289.1	284.9	305
306	331.6	300.1	291.7	283.0	276.2	268.9	264.3	298.5	290.1	285.9	306
307	332.7	301.1	292.7	284.0	277.2	269.9	265.2	299.5	291.1	286.8	307
308	333.8	302.2	293.7	285.0	278.1	270.8	266.2	300.5	292.1	287.8	308
309	335.0	303.2	294.7	285.9	279.1	271.8	267.1	301.5	293.1	288.8	309
310	336.1	304.2	295.7	286.9	280.0	272.7	268.0	302.5	294.1	289.8	310
311	337.2	305.2	296.7	287.9	281.0	273.7	269.0	303.5	295.1	290.8	311
312	338.3	306.2	297.7	288.9	282.0	274.8	269.9	304.4	296.1	291.7	312
313	339.4	307.3	298.7	289.9	282.9	275.8	270.9	305.4	297.0	292.7	313
314	340.5	308.3	299.7	290.8	283.9	276.8	271.8	306.4	298.0	293.7	314
315	341.6	309.3	300.7	291.8	284.9	277.8	272.7	307.4	299.0	294.7	315
316	342.7	310.3	301.7	292.8	285.8	278.4	273.7	308.4	300.0	295.7	316
317	343.8	311.4	302.7	293.8	286.8	279.4	274.6	309.4	301.0	296.6	317
318	344.9	312.4	303.7	294.8	287.8	280.3	275.6	310.4	302.0	297.6	318
319	346.0	313.4	304.7	295.7	288.7	281.3	276.5	311.4	303.0	298.6	319
320	347.1	314.4	305.7	296.7	289.7	282.2	277.4	312.4	303.9	299.6	320
321	348.2	315.4	306.7	297.7	290.7	283.2	278.4	313.4	304.9	300.6	321
322	349.4	316.5	307.7	298.7	291.6	284.1	279.3	314.4	305.9	301.6	322
323	350.5	317.5	308.7	299.7	292.6	285.1	280.3	315.4	306.9	302.5	323
324	351.6	318.5	309.7	300.6	293.6	286.0	281.2	315.4	307.9	303.5	324
325	352.7	319.5	310.7	301.6	294.5	287.0	282.1	317.4	308.9	304.5	325
326	353.8	320.5	311.7	302.6	295.5	287.9	283.1	318.4	309.9	305.5	326
327	354.9	321.6	312.7	303.6	296.5	288.9	284.0	319.4	310.9	306.5	327
328	356.0	322.6	313.7	304.6	297.4	289.8	285.0	320.4	311.8	307.4	328
329	357.1	323.6	314.7	305.6	298.4	290.8	285.9	321.4	312.8	308.4	329
330	358.2	324.6	315.7	306.5	299.4	291.7	286.8	322.4	313.8	309.4	330

No. of Trunks	Traffic Offered (Trunks) at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0533	.0200	.0100	.0050	.0020	.0010	.1000	.0533	.0200	
331	359.3	325.7	316.7	307.3	300.3	292.7	287.3	323.4	314.3	310.4	331
332	360.4	326.7	317.7	308.3	301.3	293.8	288.7	324.4	315.4	311.4	332
333	361.5	327.7	318.7	309.3	302.3	294.8	289.7	325.4	316.3	312.3	333
334	362.7	328.7	319.7	310.4	303.2	295.8	290.6	326.4	317.3	313.3	334
335	363.8	329.7	320.7	311.4	304.2	296.8	291.6	327.4	318.3	314.3	335
336	364.9	330.8	321.7	312.4	305.2	297.4	292.5	328.4	319.7	315.3	336
337	366.0	331.8	322.7	313.4	306.1	298.4	293.4	329.4	320.7	316.3	337
338	367.1	332.8	323.7	314.4	307.1	299.3	294.4	330.4	321.7	317.2	338
339	368.2	333.8	324.7	315.4	308.1	300.3	295.3	331.4	322.7	318.2	339
340	369.3	334.8	325.7	316.3	309.0	301.2	296.3	332.4	323.7	319.2	340
341	370.4	335.9	326.7	317.3	310.0	302.2	297.2	333.4	324.7	320.2	341
342	371.5	336.9	327.7	318.3	311.0	303.1	298.2	334.4	325.7	321.2	342
343	372.6	337.9	328.7	319.3	311.9	304.1	299.1	335.4	326.7	322.2	343
344	373.7	338.9	329.7	320.3	312.9	305.0	300.0	336.4	327.6	323.1	344
345	374.8	340.0	330.7	321.2	313.9	306.0	301.0	337.4	328.6	324.1	345
346	376.0	341.0	331.7	322.2	314.8	306.9	301.9	338.4	329.6	325.1	346
347	377.1	342.0	332.7	323.2	315.8	307.9	302.9	339.4	330.6	326.1	347
348	378.2	343.0	333.7	324.2	316.8	308.9	303.8	340.4	331.6	327.1	348
349	379.3	344.0	334.7	325.2	317.7	309.8	304.8	341.3	332.6	328.0	349
350	380.4	345.1	335.7	326.2	318.7	310.8	305.7	342.3	333.6	329.0	350
351	381.5	346.1	336.7	327.1	319.7	311.7	306.6	343.3	334.6	330.0	351
352	382.6	347.1	337.7	328.1	320.6	312.7	307.6	344.3	335.6	331.0	352
353	383.7	348.1	338.7	329.1	321.6	313.6	308.5	345.3	336.5	332.0	353
354	384.8	349.2	339.7	330.1	322.6	314.6	309.5	346.3	337.5	333.0	354
355	385.9	350.2	340.7	331.1	323.5	315.5	310.4	347.3	338.5	333.9	355
356	387.0	351.2	341.8	332.0	324.5	316.5	311.4	348.3	339.5	334.9	356
357	388.1	352.2	342.8	333.0	325.5	317.4	312.3	349.3	340.5	335.9	357
358	389.3	353.2	343.8	334.0	326.4	318.4	313.2	350.3	341.5	336.9	358
359	390.4	354.3	344.8	335.0	327.4	319.3	314.2	351.3	342.5	337.9	359
360	391.5	355.3	345.8	336.0	328.4	320.3	315.1	352.3	343.5	338.8	360
361	392.6	356.3	346.8	337.0	329.3	321.2	316.1	353.3	344.4	339.3	361
362	393.7	357.3	347.8	337.9	330.3	322.2	317.0	354.3	345.4	340.3	362
363	394.8	358.4	348.8	338.9	331.3	323.1	318.0	355.3	346.4	341.3	363
364	395.9	359.4	349.8	339.9	332.2	324.1	318.9	356.3	347.4	342.3	364
365	397.0	360.4	350.8	340.9	333.2	325.1	319.9	357.3	348.4	343.3	365
366	398.1	361.4	351.8	341.9	334.2	326.0	320.8	358.3	349.4	344.7	366
367	399.2	362.5	352.8	342.0	335.2	327.0	321.8	359.3	350.4	345.7	367
368	400.3	363.5	353.8	343.0	336.1	327.9	322.7	360.3	351.4	346.7	368
369	401.4	364.5	354.8	344.3	337.1	328.9	323.6	361.3	352.4	347.7	369
370	402.6	365.5	355.8	345.3	338.1	329.8	324.6	362.3	353.3	348.7	370
371	403.7	366.5	356.8	346.3	339.0	330.8	325.5	363.3	354.3	349.7	371
372	404.8	367.6	357.8	347.3	340.0	331.7	326.5	364.3	355.3	350.6	372
373	405.9	368.6	358.8	348.3	341.0	332.7	327.4	365.3	356.3	351.6	373
374	407.0	369.6	359.8	349.7	341.9	333.8	328.4	366.3	357.3	352.6	374
375	408.1	370.6	360.8	350.7	342.9	334.6	329.3	367.3	358.3	353.6	375
376	409.2	371.7	361.8	351.7	343.9	335.6	330.3	368.3	359.3	354.6	376
377	410.3	372.7	362.8	352.7	344.8	336.5	331.2	369.3	360.3	355.5	377
378	411.4	373.7	363.8	353.7	345.8	337.5	332.2	370.3	361.3	356.5	378
379	412.5	374.7	364.8	354.7	346.8	338.4	333.1	371.3	362.2	357.5	379
380	413.6	375.8	365.8	355.6	347.8	339.4	334.0	372.3	363.2	358.5	380
381	414.7	376.8	366.8	356.6	348.7	340.3	335.0	373.3	364.2	359.5	381
382	415.9	377.8	367.8	357.6	349.7	341.3	335.9	374.3	365.2	360.5	382
383	417.0	378.8	368.8	358.6	350.7	342.2	336.9	375.3	366.2	361.4	383
384	418.1	379.8	369.8	359.6	351.6	343.2	337.6	376.3	367.2	362.4	384
385	419.2	380.9	370.8	360.6	352.6	344.2	338.3	377.3	368.2	363.4	385

No. of Trunks	Traffic Offered(Erlangs)at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0030	.0010	.1000	.0333	.0200	
385	420.3	381.9	371.8	361.5	353.8	345.1	339.7	378.3	369.2	364.4	386
387	421.4	382.9	372.8	362.5	354.5	346.1	340.7	379.3	370.2	365.4	387
388	422.5	383.9	373.8	363.5	355.5	347.0	341.6	380.3	371.2	366.4	388
389	423.6	385.0	374.8	364.5	356.5	348.0	342.8	381.3	372.1	367.3	389
390	424.7	386.0	375.8	365.5	357.5	348.9	343.5	382.3	373.1	368.3	390
391	425.8	387.0	376.9	366.5	358.4	349.9	344.5	383.3	374.1	369.3	391
392	426.9	388.0	377.9	367.5	359.4	350.8	345.4	384.2	375.1	370.3	392
393	428.1	389.1	378.9	368.4	360.4	351.8	346.4	385.2	376.1	371.3	393
394	429.2	390.1	379.9	369.4	361.3	352.8	347.3	386.2	377.1	372.3	394
395	430.3	391.1	380.9	370.4	362.3	353.7	348.3	387.2	378.1	373.2	395
396	431.4	392.1	381.9	371.4	363.3	354.7	349.2	388.2	379.1	374.2	396
397	432.5	393.1	382.9	372.4	364.2	355.6	350.2	389.2	380.1	375.2	397
398	433.6	394.2	383.9	373.4	365.2	356.6	351.1	390.2	381.0	376.2	398
399	434.7	395.2	384.9	374.3	366.2	357.5	352.0	391.2	382.0	377.2	399
400	435.8	396.2	385.9	375.3	367.2	358.5	353.0	392.2	383.0	378.2	400
401	436.9	397.2	386.9	376.3	368.1	359.5	353.9	393.2	384.0	379.2	401
402	438.0	398.3	387.9	377.3	369.1	360.4	354.9	394.2	385.0	380.1	402
403	439.1	399.3	388.9	378.3	370.1	361.4	355.8	395.2	386.0	381.1	403
404	440.2	400.3	389.9	379.3	371.0	362.3	356.8	396.2	387.0	382.1	404
405	441.4	401.3	390.9	380.3	372.0	363.3	357.7	397.2	388.0	383.1	405
406	442.5	402.4	391.9	381.2	373.0	364.2	358.7	398.2	389.0	384.1	406
407	443.6	403.4	392.9	382.2	374.0	365.2	359.6	399.2	390.0	385.1	407
408	444.7	404.4	393.9	383.2	374.9	366.2	360.8	400.2	390.9	386.0	408
409	445.8	405.4	394.9	384.2	375.9	367.1	361.5	401.2	391.9	387.0	409
410	446.9	406.5	395.9	385.2	376.9	368.1	362.5	402.2	392.9	388.0	410
411	448.0	407.5	396.9	386.2	377.8	369.0	363.4	403.2	393.9	389.0	411
412	449.1	408.5	397.9	387.2	378.8	370.0	364.4	404.2	394.9	390.0	412
413	450.2	409.5	398.9	388.1	379.8	370.9	365.3	405.2	395.9	391.0	413
414	451.3	410.6	399.9	389.1	380.8	371.9	366.3	406.2	396.9	391.9	414
415	452.4	411.6	400.9	390.1	381.7	372.9	367.2	407.2	397.9	392.9	415
416	453.6	412.6	402.0	391.1	382.7	373.8	368.2	408.2	398.9	393.9	416
417	454.7	413.6	403.0	392.1	383.7	374.8	369.1	409.2	399.9	394.9	417
418	455.8	414.7	404.0	393.1	384.6	375.7	370.1	410.2	400.8	395.9	418
419	456.9	415.7	405.0	394.1	385.6	376.7	371.0	411.2	401.8	396.9	419
420	458.0	416.7	406.0	395.0	386.6	377.7	372.0	412.2	402.8	397.9	420
421	459.1	417.7	407.0	396.0	387.6	378.6	372.9	413.2	403.8	398.8	421
422	460.2	418.7	408.0	397.0	388.5	379.6	373.9	414.2	404.8	399.8	422
423	461.3	419.8	409.0	398.0	389.5	380.5	374.8	415.2	405.8	400.8	423
424	462.4	420.8	410.0	399.0	390.5	381.5	375.8	416.2	406.8	401.8	424
425	463.5	421.8	411.0	400.0	391.5	382.4	376.7	417.2	407.8	402.8	425
426	464.6	422.8	412.0	401.0	392.4	383.4	377.7	418.2	408.8	403.8	426
427	465.8	423.9	413.0	401.9	393.4	384.4	378.6	419.2	409.8	404.7	427
428	466.9	424.9	414.0	402.9	394.4	385.3	379.6	420.2	410.7	405.7	428
429	468.0	425.9	415.0	403.9	395.3	386.3	380.5	421.2	411.7	406.7	429
430	469.1	426.9	416.0	404.9	396.3	387.2	381.5	422.2	412.7	407.7	430
431	470.2	428.0	417.0	405.9	397.3	388.2	382.4	423.2	413.7	408.7	431
432	471.3	429.0	418.0	406.9	398.3	389.2	383.4	424.2	414.7	409.7	432
433	472.4	430.0	419.0	407.9	399.2	390.1	384.3	425.2	415.7	410.7	433
434	473.5	431.0	420.0	408.8	400.2	391.1	385.3	426.2	416.7	411.6	434
435	474.6	432.1	421.0	409.8	401.2	392.0	386.2	427.2	417.7	412.6	435
436	475.7	433.1	422.1	410.8	402.2	393.0	387.2	428.2	418.7	413.6	436
437	476.8	434.1	423.1	411.8	403.1	394.0	388.1	429.2	419.7	414.6	437
438	478.0	435.1	424.1	412.8	404.1	394.9	389.1	430.2	420.7	415.6	438
439	479.1	436.2	425.1	413.8	405.1	395.9	390.0	431.2	421.6	416.6	439
440	480.2	437.2	426.1	414.8	406.0	396.8	391.0	432.2	422.6	417.6	440

No. of Trucks	Traffic Offered (Triangs) at Grade of Service of:-							Traffic Carried			No. of Trucks
	.1000	.0333	.0200	.0100	.0050	.0030	.0010	.1000	.0333	.0200	
441	481.3	438.2	427.1	415.8	407.0	397.3	391.9	433.2	423.8	418.3	441
442	452.4	439.3	428.1	416.7	408.0	398.7	392.9	434.2	424.8	419.3	442
443	483.5	440.3	429.1	417.7	409.0	399.7	393.8	435.1	425.5	420.3	443
444	484.6	441.3	430.1	418.7	409.9	400.7	394.8	436.1	426.8	421.3	444
445	485.7	442.3	431.1	419.7	410.9	401.8	396.7	437.1	427.8	422.3	445
446	486.8	443.3	432.1	420.7	411.9	402.6	398.7	438.1	428.8	423.3	446
447	487.9	444.4	433.1	421.7	412.9	403.5	397.8	439.1	429.8	424.4	447
448	489.0	445.4	434.1	422.7	413.8	404.5	398.8	440.1	430.8	425.4	448
449	490.2	446.4	435.1	423.6	414.8	405.5	399.5	441.1	431.8	426.4	449
450	491.3	447.4	436.1	424.6	415.8	406.4	400.3	442.1	432.8	427.4	450
451	492.4	448.5	437.1	425.6	416.8	407.4	401.4	443.1	433.8	428.4	451
452	493.5	449.5	438.1	426.8	417.7	408.3	402.4	444.1	434.8	429.4	452
453	494.6	450.5	439.1	427.8	418.7	409.3	403.3	445.1	435.8	430.4	453
454	495.7	451.5	440.1	428.8	419.7	410.3	404.3	446.1	436.8	431.3	454
455	496.8	452.6	441.2	429.8	420.6	411.2	405.3	447.1	437.8	432.3	455
456	497.9	453.8	442.2	430.6	421.6	412.2	406.2	448.1	438.8	433.3	456
457	499.0	454.8	443.2	431.5	422.8	413.1	407.2	449.1	439.8	434.3	457
458	500.1	455.8	444.2	432.5	423.6	414.1	408.1	450.1	440.8	435.3	458
459	501.2	456.7	445.2	433.5	424.5	415.1	409.1	451.1	441.8	436.3	459
460	502.4	457.7	446.2	434.5	425.5	416.0	410.0	452.1	442.8	437.3	460
461	503.5	458.7	447.2	435.5	426.5	417.0	411.0	453.1	443.8	438.2	461
462	504.6	459.7	448.2	436.5	427.5	418.0	411.9	454.1	444.8	439.2	462
463	505.7	460.8	449.2	437.5	428.4	418.9	412.9	455.1	445.8	440.2	463
464	506.8	461.8	450.2	438.5	429.4	419.9	413.8	456.1	446.8	441.2	464
465	507.9	462.8	451.2	439.4	430.4	420.8	414.8	457.1	447.8	442.2	465
466	509.0	463.8	452.2	440.4	431.4	421.8	415.7	458.1	448.8	443.2	466
467	510.1	464.9	453.2	441.4	432.3	422.8	416.7	459.1	449.8	444.2	467
468	511.2	465.9	454.2	442.4	433.3	423.7	417.8	460.1	450.8	445.1	468
469	512.3	466.9	455.2	443.4	434.3	424.7	418.8	461.1	451.8	446.1	469
470	513.4	467.9	456.2	444.4	435.3	425.6	419.8	462.1	452.8	447.1	470
471	514.6	469.0	457.2	445.4	436.2	426.6	420.8	463.1	453.8	448.1	471
472	515.7	470.0	458.3	446.4	437.2	427.6	421.4	464.1	454.8	449.1	472
473	516.8	471.0	459.2	447.3	438.2	428.5	422.4	465.1	455.8	450.1	473
474	517.9	472.0	460.3	448.3	439.2	429.5	423.4	466.1	456.8	451.1	474
475	519.0	473.1	461.3	449.3	440.1	430.4	424.3	467.1	457.8	452.0	475
476	520.1	474.1	462.3	450.3	441.1	431.4	425.3	468.1	458.8	453.0	476
477	521.2	475.1	463.3	451.3	442.1	432.4	426.2	469.1	459.8	454.0	477
478	522.3	476.1	464.3	452.3	443.1	433.3	427.2	470.1	460.8	455.0	478
479	523.4	477.2	465.3	453.3	444.0	434.3	428.1	471.1	461.8	456.0	479
480	524.5	478.2	466.3	454.3	445.0	435.3	429.1	472.1	462.8	457.0	480
481	525.7	479.2	467.3	455.3	446.0	436.2	430.0	473.1	463.8	458.0	481
482	526.8	480.3	468.3	456.2	447.0	437.2	431.0	474.1	464.8	459.0	482
483	527.9	481.3	469.3	457.2	447.9	438.1	431.9	475.1	465.8	459.9	483
484	529.0	482.3	470.3	458.2	448.9	439.1	432.9	476.1	466.8	460.9	484
485	530.1	483.3	471.3	459.2	449.9	440.1	433.8	477.1	467.8	461.9	485
486	531.2	484.4	472.3	460.2	450.9	441.0	434.8	478.1	468.8	462.9	486
487	532.3	485.4	473.4	461.2	451.8	442.0	435.8	479.1	469.8	463.9	487
488	533.4	486.4	474.4	462.2	452.8	443.0	436.7	480.1	470.8	464.9	488
489	534.5	487.4	475.4	463.2	453.8	443.9	437.7	481.1	471.8	465.9	489
490	535.6	488.5	476.4	464.1	454.8	444.9	438.8	482.1	472.8	466.8	490
491	536.7	489.5	477.4	465.1	455.7	445.8	439.8	483.1	473.8	467.8	491
492	537.9	490.5	478.4	466.1	456.7	446.8	440.8	484.1	474.8	468.8	492
493	539.0	491.5	479.4	467.1	457.7	447.8	441.8	485.1	475.8	469.8	493
494	540.1	492.6	480.4	468.1	458.7	448.7	442.4	486.1	476.8	470.8	494
495	541.2	493.6	481.4	469.1	459.8	449.7	443.4	487.1	477.8	471.8	495

No. of Trunks	Traffic Offered(Erlangs)at Grade of Service of:-							Traffic Carried			No. of Trunks
	.1000	.0333	.0200	.0100	.0050	.0020	.0010	.1000	.0333	.0200	
496	843.3	484.8	483.4	470.1	460.8	450.7	444.3	480.1	478.1	472.8	496
497	843.4	485.8	483.4	471.1	461.8	451.8	445.3	489.1	479.1	473.7	497
498	844.5	486.7	484.4	472.1	462.8	452.8	446.3	490.1	480.1	474.7	498
499	845.6	487.7	485.4	473.0	463.8	453.8	447.2	491.1	481.1	475.7	499
500	846.7	488.7	486.4	474.0	464.8	454.8	448.2	492.1	482.1	476.7	500

END