SWITCHING SYSTEMS MANAGEMENT

NO. 4 ELECTRONIC SWITCHING SYSTEM

TRAFFIC SEPARATIONS

1. GENERAL

1.01 Traffic separations are a method of identifying items of traffic completed by the switching system. Each call which is successfully processed by the No. 4 Electronic Switching System (ESS) will fall into a traffic separations category.

1.02 When this section is reissued, this paragraph will contain the reason for reissue.

1.03 Traffic separations counts are accumulated primarily to provide data for Division of Revenues purposes. To implement the Division of Revenues procedures, investment and costs must be separated, based upon usage between interstate and intrastate operations. Further separation of the intrastate usage is required in some areas to satisfy state and local regulatory demands as well as to provide useful data for the operating telephone companies.

1.04 Categories may be related to geographic locality, trunk subgroup (TSG) ownership (Long Lines, associated company, or independent company), or type of traffic (message toll, centralized automatic message accounting, operator-handled, etc). Separations data are also used extensively for network management, machine administration, and various engineering functions.

2. TRAFFIC CLASSES

2.01 In order to provide the measure of traffic required, incoming and outgoing traffic is divided into classes. There are 32 classes of incoming separations and 64 classes of destination separations.

2.02 The separations classes are assigned by the machine administrator in conjunction with requirements from the Division of Revenues sources and the network manager. An incoming class (INSEP) is assigned to each one-way incoming and 2-way TSG. An outgoing class (DESEP) is assigned for each numbering plan area (NPA) or group of NPAs, for an NXX or group of NXXs, or for an NPA-NXX or group of NPA-NXXs. The machine administrator must provide a copy of current DESEP

assignments to the routing supervisor for use in code group assignments. The machine administrator must provide current copies of Form E-6352A and E-6352B to the network manager.

3. SEPARATION MATRICES

3.01 The No. 4 ESS contains two matrices which provide peg count and usage measurements for traffic separations. These matrices contain seizure and release peg counters which are scanned every 180 seconds. The seizure peg counter for a specific cell is incremented by one each time a call determined to be in that cell (separations category) reaches the waiting-for-answer state. The release peg counter is incremented by one each time a call in that cell terminates. Subtracting the release peg count from the seizure peg count provides the occupancy for that cell. From this the traffic measurements program calculates usage and outputs the results in CCS units.

3.02 The matrices are divided into 32 horizontal rows of INSEP classes and 64 vertical rows of DESEP classes. When a call is identified by incoming TSG, destination code, and domain, a count will be incremented where the two axes of the matrix cross. This arrangement provides 2048 categories (32 times 64). (See Fig. 1.)

3.03 DESEP 0 is not available for general assignment since this class is used for audit purposes. If an output, as discussed in Part 4, is requested for output measurement sets 0 through 31, an output will be provided. However, all entries will be zero.

3.04 INSEP 31 and DESEP 63 are generically assigned to system integrity test call TSGs and maintenance test access trunks. Although other TSGs and codes may be assigned to these classes if required, such assignments on a routine basis are not recommended.

3.05 With DESEP 0 unavailable for normal assignment, and INSEP 31 and DESEP 63 generically assigned to test classes, the matrix is effectively reduced to 1922 usable separations cells.

$$(31 \times 62 = 1922)$$

4. MEASUREMENT SUBCLASS AND OUTPUT MEASUREMENT SET

4.01 Measurement subclass 10 is the traffic separations and distribution measurement subclass. Output measurement sets (OMS) 0 through 2047 produce the 2048 INSEP/DESEP combinations which are available. To identify the output measurement set for a specific INSEP/DESEP combination the following formula is used:

$$(32 \times DESEP) + INSEP = OMS$$

Note: See Dial Facilities Management Practices, Division H, Section 9f(1), Traffic Measurements, for a description of the traffic measurement program.

5. NETWORK USAGE

5.01 By assigning various output measurement sets to a measurement report the machine administrator can obtain the counts and usage of those INSEP/DESEP combinations needed to satisfy traffic separations requirements. The traffic measurements program performs no summing of INSEP or DESEP classes other than the summing of the separations class usage counts to calculate one of the components of the total network usage counts. Measurement subclass 10 can be used to determine the amount of through-switched traffic. In order to accomplish this, it is necessary to assign INSEP and DESEP classes so that none of these classes represent both intertoll and toll-completing trunks. To obtain the quantity of through-switched traffic requires an off-line summation of the peg counts for each INSEP/DESEP combination which indicates that an incoming and outgoing intertoll trunk was used by a call. The INSEP class is specified in the trunk block translator and the DESEP class is specified in the code grouping translator. The first TSG in the routing data block determines whether the DESEP represents intertoll or toll-completing trunks.

5.02 Traffic separation usage data are used to provide an estimate of total network usage. This is accomplished by using separation class usage in conjunction with service circuit and trunk maintenance network usage. An estimate of total network usage is outputted in usage measurement form at the master control center as a percentage of network capacity and on traffic schedules.

6. DIVISION OF REVENUES

6.01 Division of Revenues requirements will vary based on the geographic location of the switching machine and the area it serves. These requirements are provided in the Division of Revenues Practices. To obtain the local requirements of other operating companies, the machine administrator must contact the Division of Revenues supervisor for the specific company in question.

6.02 Existing procedures will apply to the No. 4 ESS locations in conjunction with their assigned Division of Revenues category. Division of Revenues (DR) Practices Section DR 13.10, Utilizing Computerized Message System (CMDS) Conversation Minutes and Monthly Separations Register Readings, will apply to those installations switching toll traffic only, DR category 3A. Section DR 14.10, Utilizing Measured Minutes and Monthly Separations Register Readings, will apply to those locations switching both toll and exchange traffic, DR category 2A. Certain types of test calls processed by the No. 4 ESS will score traffic separations registers. The Division of Revenues Practices will identify those test calls which must be included in the Division of Revenues count and those which must be excluded.

7. NETWORK MANAGEMENT

7.01 The machine administrator must consult the network manager before making INSEP and DESEP assignments. In order for the network management exception panel and cathode-ray tube system to function properly certain assignment guidelines must be followed. The network manager must be able to identify the traffic pattern of the office; that is, where traffiic is coming from and where it is destined. On the incoming side the network manager requires TSGs to be grouped into one of four categories, based on the point of origination. The four categories are:

(1) Foreign region

(2) Home region

(3) Subtending

(4) Home toll center area.

For example, all TSGs which originate at offices in regions other than the No. 4 ESS home region would fall into the first category (foreign).

7.02 For the outgoing side, all destination codes will be grouped into the same categories. For example, all codes which reside in offices subtending to the No. 4 ESS would fall into the third category (subtending).

7.03 To permit the grouping of TSGs and codes into the required categories, five traffic pattern index numbers are provided. The numbers represent the following:

0—No assignment

1—Foreign region

2—Home region

3—Subtending

4—Home toll center area

These traffic pattern index numbers are assigned to both INSEP and DESEP classes.

For example, all INSEP classes which contain TSGs which originate in a foreign region would be assigned a traffic pattern index of 1. All DESEP classes which contain codes which reside in a foreign region would also be assigned a traffic pattern index of 1. This would then indicate when traffic was originating in a foreign region, destined for a foreign region, using the No. 4 ESS as a via office.

7.04 The machine administrator must assign the INSEP and DESEP classes in a manner which breaks down the total office traffic in a sufficient means to permit grouping by traffic pattern index numbers to satisfy network management requirements.

7.05 Any changes made in INSEP or DESEP assignments must be coordinated with the network manager in order to keep the traffic pattern index assignments current. Initial traffic pattern index assignments will be made on ODA Form 409B. It is recommended that a copy of this form be retained by the machine administrator and the network manager as a record of traffic pattern index assignments.

7.06 Additional information on network management requirements is contained in Dial Facilities Management Practices, Division H, Section 9i, No. 4 ESS Network Management.

8. TRAFFIC DISTRIBUTION STUDIES

8.01 Point-to-point traffic distribution studies will be made at appropriate times to determine the distribution of the flow of traffic through an office. The data for this study are obtained by recording pertinent information (on magnetic tape) or from a sampling of the successfully handled calls processed by the office.

8.02 The traffic measurements program considers a successfully processed call to be one which has reached the waiting-for-answer state. After this point in the call processing sequence some data required by point-to-point studies are no longer available. For every *Nth* successfully processed call (*N* being some number indicating sample rate), this system will record the identity of the incoming trunk, outgoing trunk, call area, office codes, and traveling class mark (if used to indicate domain and/or routing treatment). The value of *N* will be based on real time and data volume considerations. Information obtained from the sampled calls will not be available for output on traffic schedules. This data will be processed off-line.

9. ASSIGNMENTS AND RECORDS

9.01 Assignment procedures are included in Dial Facilities Management Practices Division H, Section 9c, No. 4 ESS Assignment Practices. It will be necessary to provide special studies from time to time for various reasons and it is recommended that the machine administrator reserve a number of INSEP and DESEP classes for this purpose. From three to five INSEP/DESEP classes should be sufficient for most locations, but past experience may indicate that more spare classes are required. Records must be maintained by the machine administrator to identify INSEP and DESEP assignments. Form E-6352A, Traffic Separation Assignments INSEP, and Form E-6352B, Traffic Separation Assignments DESEP, are provided for this purpose. These forms are discussed in Dial Facilities Management Practices Division H, Section 9e, No. 4 ESS Machine Administration Records.

10. REPORTS AND SCHEDULES

10.01 Traffic separations data can be outputted on schedule 0 which is outputted onto magnetic tape or data link. There is presently no provision for downstream processing of traffic separations data; therefore the machine administrator must establish traffic measurement reports to provide information for Division of Revenues requirements. To accommodate Division of Revenues basic studies and monthly settlements, the data must reflect results for seven consecutive days. These measures will be summarized on a total-day basis and also for the total study period. The usage data provided should be summarized also; holding times and ratios should be calculated to provide reasonableness checks and tracking studies.

10.02 Due to the large volume of data, the traffic separations measurements require that two measurement reports be established (there is not sufficient time to output all of these measures on one report). It is recommended that one report be established containing one-half of the output measurement sets of measurement subclass 10. This report will be scheduled to print out at the designated time. A second report must be established containing the remaining output measurement sets of measurement subclass 10. This report will collect data over the same period of time as the first report. However, the second report must be designated to accumulate the data and output the measures 15 minutes after the first report. The information necessary for establishing these schedules can be found in the traffic measurement section of No. 4 ESS Translation Guide TG-4 and Dial Facilities Management Practices Division H, Section 9f(1), No. 4 ESS Traffic Measurements. Figure 2 illustrates the traffic separations output.

10.03 It is expected that a future enhancement to the system will provide a method for summing the separations measurements to reduce the volume of data to be outputted and to eliminate the massive clerical function of the Division of Revenues group. This section will be reissued to include information on this feature when it becomes available.

INCOMING TRUNK SUBGROUP ASSIGNMENTS

INSEP	INCOMING TRUNK ASSIGNMENTS		OUTGOING DESTINATION CODE ASSIGNMENTS – DESEP																			
			0 N.A.	1 FR-LL	2	3	4	5	6	7	8	9	10	11	12 ETC.	→	58	59 SPEC STUDY	60	61	62	63 TEST
0	FR – LL	0																				
1		1																				
2		2																				
3		3																				
4		4																				
5		5																				
6		6																				
7		7																				
8		8																				
9		9																				
10	FR – ACLDI	10																				
11	FR – LDS	11																				
12	HR – LL	12																				
13		13																				
14	HR – ACLDI	14																				
15		15																				
16	HR – LDS	16																				
19	SUB – LDS	19																				
23	TCA-MIXED TOLL	23																				
26	TCA LDS	26																				
27	TCA EXC	27																				
28	SPEC STUDY	28																				
29		29																				
30		30																				
31	TEST	31																				

Fig. 1—Typical No. 4 ESS Separations Matrix Assignments

MSC 10 TRAFFIC SEPARATIONS

OMS	DE	IN	SZRE	USAGE
0	0	0	0	0
1	0	1	0	0
2	0	2	0	0
3	0	3	0	0
4	0	4	0	0
5	0	5	0	0
6	0	6	0	0
7	0	7	0	0
8	0	8	0	0
9	0	9	0	0
32	1	0	0	0
33	1	1	0	0
34	1	2	0	0
35	1	3	0	0
36	1	4	0	0
37	1	5	0	0
38	1	6	0	0
39	1	7	0	0
2041	63	25	0	0
2042	63	26	0	0
2043	63	27	0	0
2044	63	28	0	0
2045	63	29	0	0
2046	63	30	0	0
2047	63	31	0	0

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Note: Data printed out in blocks of 32 lines. Two-line heading included as part of each data block.

Fig. 2—Traffic Separations Output