

PROCEDURE MANUAL I  
for the  
Subscribers Survey and Collection of Trunk Traffic Data  
Quality of Telephone Service

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by

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## Introduction

The purpose of this manual is to provide a general guide for data collection during the first phase of the inspection of an area.

### Initial Steps

1. As soon as a general plan is decided, a letter to the telephone company should be submitted. The letter may include the following requirements:
  - a. Telephone directory of the area.
  - b. Exchange data: List of all exchanges in the area, their prefix phone numbers, locations, number of residential and business subscribers, type of equipment (S x S, #5, X BAR, etc.) and whether the exchange is always attended by company's employee.
  - c. Company's offices data: Locations of maintenance centers, business office and toll center.
  - d. Interoffice trunking arrangement: List of all interoffice trunking connections . (See Exhibit A).
2. When the data from the telephone company is available, it will be prepared for input to a computer program using standard computer coding forms and placing the data in the columns specified in programs I and III given in the Computer Program Specification document (also in the Appendix of this manual). For subscriber surveys a sample size of 250 is recommended and should be input for Program I.
3. A special PIC report should be requested from the PIC. This report should be provided to the supervisor.

## Procedure for Subscribers' Survey

### Conducting the Interview

The questionnaire (See Exhibit B) was carefully structured and worded to obtain cooperation of subscribers and consistency in the interviewing procedure. Read the introduction and the questions exactly as

written (only the capital letters). If clarification is required, try to stay close to the given text. You should sound helpful but formal, to avoid long and uncontributing conversations. Avoid leading the subscriber to any specific answer, either by giving examples or by the tone of your voice. If a subscriber's answer is not clear, clarify it with him before classifying the answer. Survey results will be recorded on a computer generated form (See Exhibit C) according to a section given below. Also, a random sample of subscribers will be selected according to the instructions and random numbers on the computer form and the steps in the following paragraph.

#### Obtaining C.O.'s Sample of Subscribers:

1. The number of residential and business subscribers that should be included in the survey (the stratified sample) is given in the instructions on the computer form.
2. Arbitrarily select a random number and eliminate it from further use. A random number consists of page number-column number-line number. This points a scale mark in the telephone directory, below which you should select the first number that has any of this C.O.'s prefixes. Notice whether this is a residential or business subscriber. If you still have to make a call to this type of subscriber, place a small mark next to the number and dial it immediately. If you have already marked the number and made a successful call to this subscriber, don't dial again, but copy the record of this first interview again, and proceed with the next random number.

#### Recording Non-Responses

1. Dial the number. Classify and mark non-responses in the table according to the following definitions:
  - a. No answer after the phone rings a reasonable number of times (approximately 2 minutes).
  - b. All trunk busy: You get a fast busy signal.
  - c. Problems on line: You cannot complete an interview due to technical problems, such as those mentioned in the questionnaire (question 1 codes 1, 2, 5, 6, 7, 8).
  - d. Not in service, disconnected: Information given on intercept record.

- e. Refused: Subscriber refuses to cooperate and interview cannot be completed.
  - f. Busy (after two attempts): If you get a busy line, record the phone number and dial it again after awhile. If it is busy again count it as "busy."
  - g. Others: Includes all other reasons for not completing an interview, such as getting a child or babysitter on the phone, non-English speakers, etc.
2. After the required number of interviews are completed, count the number of marks of each item of non-response and write it in the "total" column.

#### Recording the Answers

1. Record the phone number, the hour of the interview and the answers on a line that starts with the letter associated with the subscriber's type (R - resident, B - business).
2. In questions 1 and 2, classify the customer's response and circle the appropriate code. You may circle more than one. If code 13 in question 1 and/or code 8 in question 2 are circled, you should write an explanation in the remarks' column. In cases of no problem, don't mark anything.
3. In question 3, circle:
  - VG - "very good" rating
  - G - "good" rating
  - F - "fair" rating
  - P - "poor" rating.
4. In question 4 and 5, write the code number associated with the subscriber's answer.
5. In question 6, if additional information seems important to make further investigation, you may record it on an extra paper.
6. During the interview, notice the quality of transmission. Record your rating after the interview is finished in "quality" column, circling the appropriate letters:
  - G - good transmission
  - N - noisy line
  - XT - cross talk during the interview
  - W - weak transmission.

### Subscribers' Complaints

In case the subscriber has a basis to make an official complaint to the PUCO, he should be addressed to PIC (give the appropriate number). His interview should be recorded as usual. Follow-up action on the complaint may occur at the discretion of Customer Services personnel, and/or Compliance Division management personnel regardless whether it is ever called in to PIC by the subscriber.

### Computer Processing

The completed forms of the subscriber survey will be input to a computer program.

## Trunk Data Collection Procedures

### Terminology

- Direct trunk: A trunk that has only one direct path between two offices with no intermediate points.
- Tandem trunk: A trunk that has only one path and has one or more place(s) called "tandem(s)" as intermediate points.
- Single link: A trunk between tandems or between tandem and final or initial central office (CO).
- High usage trunk system: A system that has more than one path to get through from origination to termination. The way of getting through this trunk is that whenever the trunk connected directly from origination to termination is overloaded, the overloaded amount of traffic is transferred to the 1<sup>st</sup> backup path and when the 1<sup>st</sup> backup path is overloaded, the overloaded amount of that traffic is also transferred to the 2<sup>nd</sup> backup path if there is a 2<sup>nd</sup> backup path, and so on. The backup paths usually are tandems.

### Introduction

Customer Service Personnel will secure the data to complete the form in Exhibit D which will be input to a computer program to analyze the trunk traffic data from each telephone company. Each company will have their data in their own format. For example, Ohio Bell has the most condensed traffic data stored on microfiche 658 & 668 which is shown in Fig. 1.

This section gives the procedures designed to be used to collect the traffic data by metropolitan areas in the state of Ohio. The traffic data will cover the whole range from each CO as an origination



point to all the other COs in the metropolitan area as termination points. Each tandem office will also serve as several originating and terminating points.

Exhibit D shows the format for one example office, the 22A CO as origination point to all the other COs in the Columbus Metro area.

Customer Service Personnel either visit each company to collect the data or ask them to send the necessary data, if feasible to do so, as in the case with Ohio Bell's microfiche.

#### Procedures

There are 6 columns to be filled in section A of Exhibit D and 7 columns to be filled in section B of Exhibit D.

1. The description of data required to complete section A columns are as follows:

- a. Connection: This column will be constructed from Trunking Arrangement data that shows which trunk is involved in that connection, i.e. Direct or Tandem or High Usage. If this is a tandem trunk, write down the name of the tandem in this column and if two tandem offices are involved, write down the two names sequentially with "/" marks between them. To complete the name of tandem offices, if necessary, consult some other company data. (e.g.) There is a tandem trunk from COL 22A to West Jef. 879 and the name of the tandem office is 2705T, so record "2705T" in the connection column next to the exchange name of W. Jef. 879.

If High Usage trunk is involved, write down the name of tandem in the first backup path. (e.g.) From 22A to NWRM 87A, there are two tandem offices corresponding to two backup paths. The name of tandem in 1<sup>st</sup> backup path is 1101T(IF) and the 2<sup>nd</sup> one is 1101T(AF). Then record "1101T(IF)" in this column.

- b. #CCS<sup>1</sup>: The most recent # of CCS which has been carried through the trunk from origination to termination. It is an integer.
- c. Trunk Size: The most recent # of circuits (trunks) in service connecting the origination and termination points. It is an integer.
- d. CCS Trans: The most recent # of CCS transferred when backup path is involved. It is an integer.
- e. % Block: The most recent percentage blocked when it is either Direct Trunk or Tandem trunk. If High Usage trunk is involved, only final backup path shows % blocked. It is a decimal fraction. When sufficient post data shows there is an apparent increasing or decreasing trend in % block, then record + (when it is increasing) or - (when it is decreasing) at the beginning of B. H. column.
- f. B. H.: Time consistent busy hour. Use all busy hour data immediately available from the current company record. The way of recording in this column is following. (e.g.) 10 x 4, 15 x 6, which means 4 data points are showing 10 o'clock as the busy hour and 6 data points are showing that 1500 military time or 3 o'clock in the afternoon as the busy hour. If several different busy hours are shown on one data summary, record the most recent and two other most frequently occurring.

Section B is used to show tandem offices as termination points. In reality calls do not terminate in tandem offices since they possess no subscribers, however, they do represent termination points for single trunk links for which data may be found in company records. They also represent origination points for single trunk links that terminate elsewhere. Their function is actually to serve as a relay point so that each origination is triggered by a termination. Thus every tandem office should

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<sup>1</sup>If only a tandem path connects two points the data will most likely be associated with each single trunk link. Therefore, the remaining columns of the form will not be completed in this case.

appear in section B for every CO originating point that connects to it and should also serve as an origination point at the top of a form of the type in exhibit C. The computer will present several forms for this purpose but the origination point will be left blank. This is because the exact tandem designation is not known when the form is printed but will become known as the data is collected.

- a. Termination: This column should be matched up with the ones in connection column of section A. Therefore, if one element in connection column in section A is recorded, then write down this element in the termination column of section B. If there are two elements in a box in case of Tandem trunk in connection column of section A, record only the 1<sup>st</sup> one in this column.
- b. Connection: If there is second backup path in High Usage trunk, write the tandem name of 2<sup>nd</sup> backup path in this column right after the 1<sup>st</sup> tandem name of backup path.
- c. #CCS, Trunk size, CCS Trans and % block is same as in section A.

It is important to recognize that the telephone companies will tend to have traffic study data associated with each single trunk link instead of being associated with a complete path between two offices. Since the PUCO A0227 is concerned with the performance along paths the connection column becomes very important in providing the necessary information to trace through all the data associated with a path by looking at it link by link. Therefore, the persons completing the form should clearly understand the purpose and use of the connection column so that when any situation occurs that is not clearly covered by the instructions, a special notation may be developed and used in the connection column to assist in tracing a complete path through its single links.

CURRENT TRUNKING ARRANGMENTS - Cont'd

EXHIBIT A

ORIGINATING OFFICE - TO -	23 ESS	25	26 SXS	26 ESS	27 SXS	27 ESS
3,0 ESS	D	27T	26 ESS	D	27 ESS	D
Wil. Group 83X	D	D	D	HU	27 ESS	D
in 837	-	-	-	-	-	-
rr 758	-	-	-	-	-	-
r 548	XBT	XBT	XBT	XBT	XBT	XBT
s 22	D	D	D	D	D	D
23 ESS	IAO	D	26 ESS	D	27 ESS	D
25	D	IAO	D	26SXS	D	27SXS
26 SXS	D	D	IAO	D	D	27SXS
26 ESS	D	D	D	IAO	27 ESS	D
27 SXS	D	D	D	26SXS	IAO	D
27 ESS	D	D	26 ESS	D	D	IAO
	D	D	D	26SXS	D	27SXS
	HU	D	D	D	D	HU
44	D	D	D	26SXS	D	27SXS
45	D	D	D	D	27 ESS	D
461	HU	D	D	HU	D	HU
462,6	HU	D	D	HU	D	HU
464,0,3,9 ESS	D	D	26 ESS	D	27 ESS	D
48 SXS	D	D	D	26SXS	D	27SXS
b 889 ESS	D	26T	26T	HU	27 ESS	D
47	D	D	D	D	D	HU
Cy 875,1	D	27T	26 ESS	D	D	D
877	27T	27T	27T	27T/26SXS	27T	27T/27SXS
76	27T	27T	27T	27T/26SXS	27T	27T/27SXS
6	-	-	-	-	-	-
c 65X	-	-	-	-	-	-
c 687 ESS	-	-	-	-	-	-
k 49	HU	D	D	HU	D	HU
d 852	-	-	-	-	-	-
1b 855	25T	25T	25T	25T/26SXS	25T	25T/27SXS
0 927	XBT	XBT	XBT	XBT	XBT	XBT
Cy 873	XBT	XBT	XBT	XBT	XBT	XBT
th 881	XBT	XBT	XBT	XBT	XBT	XBT
n 861,6,8	D	D	25T	HU	25T	HU
n 864	D	D	25T	HU	27 ESS	D
	-	-	-	-	-	-
462	-	-	-	-	-	-
olon 883	-	-	-	-	-	-
Vienna 468	-	-	-	-	-	-
by Gal 965	XBT	XBT	XBT	XBT	XBT	XBT
tv 882 & 891	D	26T	D	D	26T	HU
ef 879	27T	27T	27T	27T/26SXS	27T	27T/27SXS
th 83X & 846	D	26T	D	D	26T	HU
th 43X	HU	26T	26 ESS	D	26T	HU

CURRENT TRUNKING ARRANGMENTS - Cont'd

EXHIBIT A (CONT.)

IGINATING OFFICE - TO -

	23 ESS	25	26 SXS	26 ESS	27 SXS	27 ESS
t 3,0 ESS	D	27T	26 ESS	D	27 ESS	D
Wil. Group 83X	D	D	D	HU	27 ESS	D
Win 837	-	-	-	-	-	-
rr 758	-	-	-	-	-	-
e r 548	XBT	XBT	XBT	XBT	XBT	XBT
ls 22	D	D	D	D	D	D
23 ESS	IAO	D	26 ESS	D	27 ESS	D
25	D	IAO	D	26SXS	D	27SXS
26 SXS	D	D	IAO	D	D	27SXS
26 ESS	D	D	D	IAO	27 ESS	D
27 SXS	D	D	D	26SXS	IAO	D
27 ESS	D	D	26 ESS	D	D	IAO
	D	D	D	26SXS	D	27SXS
	HU	D	D	D	D	HU
44	D	D	D	26SXS	D	27SXS
45	D	D	D	D	27 ESS	D
461	HU	D	D	HU	D	HU
462,6	HU	D	D	HU	D	HU
464,0,3,9 ESS	D	D	26 ESS	D	27 ESS	D
48 SXS	D	D	D	26SXS	D	27SXS
889 ESS	D	26T	26T	HU	27 ESS	D
h 47	D	D	D	D	D	HU
Cy 875,1	D	27T	26 ESS	D	D	D
y 877	27T	27T	27T	27T/26SXS	27T	27T/27SXS
1 376	27T	27T	27T	27T/26SXS	27T	27T/27SXS
26	-	-	-	-	-	-
nc 65X	-	-	-	-	-	-
nc 687 ESS	-	-	-	-	-	-
ck 49	HU	D	D	HU	D	HU
id 852	-	-	-	-	-	-
Alb 855	25T	25T	25T	25T/26SXS	25T	25T/27SXS
t 0 927	XBT	XBT	XBT	XBT	XBT	XBT
Cy 873	XBT	XBT	XBT	XBT	XBT	XBT
th 881	XBT	XBT	XBT	XBT	XBT	XBT
yn 861,6,8	D	D	25T	HU	25T	HU
yn 864	D	D	25T	HU	27 ESS	D
	-	-	-	-	-	-
462	-	-	-	-	-	-
olon 883	-	-	-	-	-	-
Vienna 468	-	-	-	-	-	-
oy Gal 965	XBT	XBT	XBT	XBT	XBT	XBT
stv 882 & 891	D	26T	D	D	26T	HU
Def 879	27T	27T	27T	27T/26SXS	27T	27T/27SXS
th 83X & 846	D	26T	D	D	26T	HU
rt 43X	HU	26T	26 ESS	D	26T	HU

TELEPHONE PERFORMANCE QUESTIONNAIRE

Exhibit 3

Introduction: HELLO, I'M CALLING FOR THE PUBLIC UTILITIES COMMISSION OF OHIO. WE ARE CONDUCTING AN INSPECTION OF LOCAL TELEPHONE FACILITIES. OUR INVESTIGATION INLCUDES A CUSTOMER SURVEY AND AS PART OF THIS WE NEED SOME INFORMATION FROM YOU.

1. THE FIRST QUESTION INVOLVES THE OPERATION OF YOUR TELEPHONE. THIS PAST WEEK, HAVE YOU HAD PROBLEMS IN PLACING OR RECEIVING TELEPHONE CALLS? (Do not suggest an answer. Classify the customer's response according to the following categories and circle the appropriate codes. You may use more than one.)

Code	Categories
1.....	Cut off in the middle of a conversation
2.....	Late dial tone
3.....	Slow connections
4.....	Busy trunks (fast busy signal)
5.....	Noise on the line
6.....	Cross talk
7.....	Subscribers telephone equipment faulty
8.....	Dead line
9.....	Intercept
10.....	Wrong number
11.....	Does not get all incoming calls
12.....	Party line equipment problems
13.....	Other (Remarks)

2. HAVE YOU HAD ANY PROBLEMS WITH THE TELEPHONE COMPANY OR ITS SERVICES? (Instructions are the same as Quest. 1)

Code	Categories
1.....	Directories
2.....	Directory assistance
3.....	Repair service
4.....	Non payment disconnection
5.....	Billing
6.....	Regrades
7.....	New installation
8.....	Other (Remarks)

3. CONSIDERING ALL THIS, WOULD YOU RATE YOUR TELEPHONE AS VERY GOOD, GOOD, FAIR, OR POOR?
4. PLEASE ESTIMATE THE NUMBER OF LOCAL CALLS YOU MAKE IN A USUAL DAY. (Classify the response into the following ranges and record the corresponding code number.)

Code	Range on Number of Local Calls
0	NONE
1	1 TO 2 CALLS
2	3 TO 5 CALLS
3	6 TO 10 CALLS
4	11 TO 15 CALLS
5	MORE THAN 15 CALLS

5. AS A LAST BIT OF INFORMATION THAT WE NEED TO KNOW, PLEASE ESTIMATE THE NUMBER OF LONG DISTANCE CALLS YOU MAKE IN A USUAL WEEK. (Instructions are the same as Quest. 4)

Code	Range on Number of Toll Calls
0	NONE
1	1 TO 2 CALLS
2	3 TO 5 CALLS
3	6 TO 10 CALLS
4	11 TO 20 CALLS
5	21 TO 30 CALLS
6	31 TO 50 CALLS
7	MORE THAN 50 CALLS

6. IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD FOR OUR INFORMATION? (Record in remarks column, if any.)





APPENDIX A - SURVEY FORMS

PROGRAM I : Survey Forms

PURPOSE: To accept initial input data and compute required sample sizes for customer surveys in metropolitan areas. The information computed for each exchange or central office is to be printed on the data collection instrument.

INPUT:

	ITEM	SUGGESTED FIELD
Card 1:		
	Company name	1 - 20
	Metro area name	21 - 40
Telephone Book Information	First white page number	41 - 45 right justified
	Last white page number	46 - 50 right justified
	Number of columns/page	51 - 55 right justified
	Last scale number	56 - 60 right justified
	Sample size (S)	61 - 65 right justified
Cards 2 through n+1 (one for each exchange in the metropolitan area):		
	Alphanumeric code for the exchange	1 - 10
	Community name, if any	11 - 30
	Number of residential subscribers ( $x_i$ )	31 - 40 right justified
	Number of business subscribers ( $y_i$ )	41 - 50 right justified
	All relevant three digit prefix numbers separated by ",blank". This may be read as alpha data	51 - 80

NOTATION DESCRIPTION: In the above the following symbols were used: S,n, $x_i$ , $y_i$  which have the following meaning:

S = Numerical values of the total sample size taken in the metro area.

n = Number of exchanges in the metro area

$x_i$  = Number of residential subscribers served by the  $i^{\text{th}}$  exchange,  $i=1,\dots,n$

$y_i$  = Number of business subscribers served by the  $i^{\text{th}}$  exchange,  $i=1,\dots,n$

Further define the total population size to be P, then:

$$P = \sum_{i=1}^n (x_i + y_i).$$

Also define  $r_i$  to be the sample size of residential subscribers to be surveyed for the  $i^{\text{th}}$  exchange and  $b_i$  to be the sample size of business subscribers. Then since the surveys are stratified on exchanges and subscriber classification,

$$r_i = \text{INTEGER}[(S/P)*x_i + 0.5]$$

$$\text{and } b_i = \text{INTEGER}[(S/P)*y_i + 0.5]$$

where  $\text{INTEGER}[a]$  refers to the integer part of the number "a" in the brackets.

OUTPUT: Each page of output should be a form in the format of Exhibit A or should be printed onto a preprinted form in the format of Exhibit A. Each page will correspond to only one exchange and each exchange will correspond to at least one page of output. The information that will change from page to page of output is as follows:

- a) Heading - should include company name, metro area name, exchange code and name, and all prefixes used in the exchange.
- b) Residential and business sample sizes ( $r_i, b_i$ ) printed in the instructions.
- c) A list of 30 sets of random numbers. Each set printed in the following format:

XXXX-X-XXX

where the first four digits give a uniformly distributed (u.d.) random integer between the first white page number and the last white page number inclusive (both given on card 1). The single digit is a u.d. random integer between 1 and the number of columns/page inclusive (again found on card 1). The last three digits give a uniformly distributed integer between 0 and the last scale number inclusive (Card 1).

- d) The number of lines for recording subscriber responses should be computed as follows:  $r_i + b_i + \text{EXTRA}$  where EXTRA is either 2 or 20% of  $r_i + b_i$  which ever is largest. Given the total lines required, determine the number of pages required for the exchange where each

page contains all information so that it could stand alone.

- e) As each line is printed an "R" should be printed in the first column of the first  $r_i$  rows and a "B" printed in the first column of the next  $b_i$  rows with the first column of the last EXTRA rows left blank.

Notes: 1) Exhibit B shows the connection on the form with the above paragraph reference letters.

- 2) Exhibits A and B are Xerox reductions of the standard 11x15 computer printout page.

EXHIBIT A

OHIO BELL, INC. COLUMBUS METRO AREA UPPER ARLINGTON 481, 486, 488

ITEM	COUNT	TOTAL	REMARK
*NO ANSWER			
*ALL TRUNK BUSY			
*PROBLEMS ON LINE			
*NOT IN SERVICE, DISCONNECTED			
*REFUSED			
*BUSY (AFTER TWO ATTEMPTS)			
*OTHERS			

INSTRUCTIONS

\*1. YOU SHOULD COMPLETE XXX INTERVIEWS WITH RESIDENTIAL SUBSCRIBER AND XXX INTERVIEWS WITH BUSINESS SUBSCRIBERS.

\*2. SELECT THE FIRST NUMBER BELOW THE SCALE MARK THAT HAS ANY PREFIX LISTED ABOVE

RANDOM NUMBERS

A4

INTERVIEWER \_\_\_\_\_

DATE \_\_\_\_\_

PHONE NO	HOUR	1. EQUIP. PROB.	2. CO. PROB.	3. RATING	4. LOCAL	5. LD	6. REMARKS	QUALITY
R		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
R		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
R		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
B		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
B		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W
		1 2 3 4 5 6 7 8 9 10 11 12 13	1 2 3 4 5 6 7 8	VG G F P				G N X T W



Introduction: HELLO, I'M CALLING FOR THE PUBLIC UTILITIES COMMISSION OF OHIO. WE ARE CONDUCTING AN INSPECTION OF LOCAL TELEPHONE FACILITIES. OUR INVESTIGATION INCLUDES A CUSTOMER SURVEY AND AS PART OF THIS WE NEED SOME INFORMATION FROM YOU.

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8.....	Dead line
9.....	Intercept
10.....	Wrong number
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6	31 TO 50 CALLS
7	MORE THAN 50 CALLS

6. IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD FOR OUR INFORMATION? (Record in remarks column, if any.)

A6

APPENDIX B - TRUNKING FORMS

PROGRAM III: Trunking Forms

PURPOSE: To accept initial trunking arrangement data and to print it in a format that will aid the trunk traffic data collection procedure.

INPUT:

<u>ITEM</u>	<u>SUGGESTED FIELDS</u>
Card 1 (type 1):	
Company Name	1 - 20
Metro Area Name	21 - 40
Number of Exchanges (n)	41 - 45 right justified
Number of Tandem Offices and Double Tandem Combinations (m)	46 - 50 right justified
Card 2 through n+1 (type 2), each card will contain:	
Exchange code, usually consisting of an abbreviated community name and a prefix related numerical code and must be shortened to no more than eleven characters.	1 - 11 left justified
Sequentially assigned integer code, obtained by numbering exchanges from 1 to n. This will be referred to as an exchange's internal code to distinguish it from the alpha- numeric code given in columns 1-11	14 - 15 left justified

OUTPUT: Each page of output should be a form in the format of Exhibit C or should be printed onto a preprinted form in the format of Exhibit C. Each page will correspond to only one exchange and each exchange will have at least one page corresponding to it. The information printed onto the form that will change from page to page is as follows:

- a) Heading - This should include company name, metro area name, and one originating exchange code. Each exchange will be an originating exchange once per run.
- b) The form in Exhibit C is divided into two identical forms on the left and right halves of each page and two sections labeled A and B. Listed in the left hand "TERMINATION" column are approximately half of all exchanges given on cards of type 2 and listed in numerical order according to their internal codes. The remaining exchanges should be similarly listed in the right hand "TERMINATION" column. Enough extra blank's should be provided to equal about 20% of n (number of exchanges).
- c) For each originating exchange, section B for terminating tandem offices should also be provided. Enough blank spaces should be provided so that a total space of approximately  $3.33 * m$  will be available (counting left and right parts).
- d) For most metro areas in Ohio the terminating exchange section (section A) and the tandem office section (section B) will both fit one page of output for each originating exchange. For the Cleveland area, the terminating exchange area may fit one page and a separate page should be devoted to the tandem office section. Splitting within a section should be avoided if possible.
- e) Each tandem office should also serve as an originating point but since the tandem office designations are not known at the time their program is run, then  $4 * m$  additional forms, complete except for being left blank in the heading whose organization code would go, should be printed. A number of completely blank forms should also be provided.

- Notes:
1. Exhibit D shows the association between the elements of output and the above descriptive paragraphs. Both Exhibits C and D show typical exchange codes used by Ohio Bell in the Columbus area.
  2. Both Exhibits C and D are xerox reductions of the standard 11 x 15 computer printout page.



