SWITCHING SYSTEMS MANAGEMENT
NO. 1 ELECTRONIC SWITCHING SYSTEM
DATA ADMINISTRATION
WEEKLY MEASUREMENTS

CONTENTS PAGE

1. GENERAL

1.01 The network administrator is responsible for gathering the weekly traffic data and using it as a tool to balance the office load. This section describes the methods used to schedule, collect, and printout traffic data associated with the weekly (W) schedule.

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

1.03 The title for each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

1.04 The primary purpose of the W schedule is to provide hundred call seconds (CCS) usage data related to office line link network and trunk link network load distribution.

1.05 The weekly measurement schedule is a CCS usage accumulation of five groups of traffic items. The five items are as follows:

- Selected customer line usage
- Selected concentrator usage
- Office line concentrator usage
- Office trunk switch frame grid total usage
- Service link network input switch total usage.

1.06 The weekly printout contains the five different traffic items. However, their appearance on the printout is controlled by the following:

- Office line concentrator usage and office trunk switch frame grid total usage are standard and will always print.
- Selected customer line usage and selected concentrator usage must be assigned individually by input messages via the maintenance teletypewriter (TTY) before they will print.
- Service link network input switch total usage will only print if the network is equipped in the office.

1.07 The weekly measurement schedule can be varied to collect any number of hours per day for any number of days per week. Generally, this measurement period will cover two hours daily for the five business days of the week. Refer to Fig. 1 for a sample schedule.

1.08 The network administrator is responsible for:

- Determining the collection times and intervals for the W schedule.
- Validation and analysis of the data provided.
- Ultimate use of this data in the evaluation of network load balance.
- Determine the appropriate action to maintain an acceptable load balance.

1.09 A blank customer line usage assignment form has been attached to the back of this practice. It may be used as a master for reproduction purposes.

1.10 For additional information on traffic counts, traffic counters and methods to store, schedule, and printout data, refer to Dial Facilities Management Practices (DFMP), Division H, Section 6i(1), Data Administration, General Description.

1.11 For additional information on the network administration TTY, refer to DFMP, Division H, Section 6d(4), Teletypewriter.

1.12 Procedures for load balance and corrective action may be found in DFMP, Division H, Section 6, Load Balance.

1.13 W-schedule measurement data collection procedures:

(a) Update the traffic map in memory.

- Determine balance study period
- Prepare ESS Form 1402 W schedule
- Update the timetable matrix from the network administration TTY
- Set the TTY for tape and hardcopy if tape is required for mechanized processing of W schedule.

(b) Request subscriber line usage (SLU) data as required.

- Prepare the customer line usage assignment form. See Fig. 2 for typical entries.
- Forward the form to network maintenance for memory update.

(c) Process output.

- Collect TTY tapes and printouts
- Process tapes and printouts with manual or mechanized procedures.

2. CUSTOMER LINE SELECTED USAGE

2.01 This data is used by the network administrator for the following purposes:

(1) To analyze the load generated by specific subscribers

(2) To identify heavy or light usage subscribers

(3) To gather CCS/MS data on specific classes of service.

2.02 Customer line selected usage gives the network administrator the ability to measure CCS usage on selected individual customer lines. The line equipments selected for a study are assigned in translations and may be changed via recent change.

2.03 The number of lines that may be studied at one time depends on two factors: the number of program store (PS) words available to assign the lines and the number of call store (CS) registers available to accumulate the data. One PS word and one CS register must be available to study each line. To determine how many lines may be studied simultaneously, refer to the following items:

- Item 25 on ESS 1500A Form determines the number of lines in PS.
- Parameter set card NSL determines the number of CS registers.

Note: The maximum number is 128.

2.04 This count measures the originating plus terminating usage on a line by scanning the state of the line scan bit every 100 seconds.

ASSIGNMENT

2.05 To assign a specific customer line selected usage count, a recent change message is required from the maintenance TTY. The message identifies the line equipment number and an index reference number (000 through 127) which will determine the location of the measurement within the CUST. L SEL. printout.

2.06 Included with this practice is a form that may be used for selected line usage assignments. To use this form, enter the line equipment number next to the preprinted register number. The directory number may be entered in the remarks section. Refer to the customer line selected usage portion of Fig. 2 for typical entries. The highest index number (register) that can be assigned during the engineered period is equal to the number provided in the parameter.

2.07 Forward the form to the central office maintenance force. They will use the register index number and the line equipment number in the message to update the memory.

- In CTX-5 and lower generic programs, these assignments are not effective until a card write.
- In CTX-6, Issue 3 and higher programs, recent change hunt of these assignments will make them effective immediately.

2.08 An unassigned register (all zeroes) in the series indicates end of the study block. Therefore, no registers should be skipped and all unassigned registers must appear last.

PRINTOUT

2.09 The printout is typed in order of assignment. Refer to the line usage assignment form (Fig. 2) to identify the register number assignments.

2.10 The selective customer line usage counts are printed under the heading (30 CUST. L. SEL.). Refer to Fig. 3 for a sample printout.

3. CUSTOMER LINE TOTAL CONCENTRATOR USAGE

3.01 This count is useful when a problem concentrator has been identified as either excessively high or excessively low usage. It gives the network administrator the ability to measure the CCS usage on individual lines within a line concentrator. Thus the specific lines for which corrective action is needed can be identified.

3.02 All the lines in a concentrator will be measured at the same time.

3.03 The number of concentrators that may be studied at one time depends on two factors. The number of PS word blocks available to assign the concentrators and the number of CS register

blocks available to accumulate the data. Each block is equal to one concentrator regardless of the concentrator ratio. The PS and CS memory must be provided on a one to one relationship. A check may be made to determine how many concentrators may be studied simultaneously. The maximum number is eight.

- Item 24 on ESS 1500A Form determines the maximum number of concentrators in PS.

- Parameter set card SLC determines the number of concentrators in CS.

3.04 Originating plus terminating usage is included in this measurement. This usage is obtained by scanning the line bit of every subscriber line in a selected concentrator every 100 seconds.

ASSIGNMENT

3.05 To assign a concentrator usage count, a recent change message is required from the maintenance TTY. The message specifies line link network, frame, bay, and concentrator number and an index reference number (000 through 007). The index reference number will determine which block of registers is assigned to a given concentrator.

3.06 Included with this practice is a form that may be used for concentrator usage assignments. To use this form, enter the register number and concentrator number next to the preprinted index register number. Register numbers are assigned according to the type of line switch frame as follows:

INDEX REFERENCE NUMBER	REGISTER NUMBERS IN OFFICE WITH	
	2:1 LSFs	4:1 LSFs
000	000 to 031	000 to 063
001	032 to 063	064 to 127
002	064 to 095	128 to 191
003	096 to 127	192 to 255
004	128 to 159	256 to 319
005	160 to 191	320 to 383
006	192 to 223	384 to 447
007	224 to 255	448 to 511

3.07 For typical concentrator usage assignments, refer to the concentrator usage portion of Fig. 2.

3.08 Forward the line usage assignment form to the network maintenance force. They will use the index reference numbers and the concentrator numbers in the input message to update the memory.

PRINTOUT

3.09 The printout is typed in the order of assignment. Refer to the line usage assignment form (prepared for that study period) to identify the concentrator lines in the printout (see Fig. 2).

3.10 The concentrator usage counts are printed under the heading (31 CUST. L. TOT. USAGE). Refer to Fig. 3 for a sample printout.

4. LINE CONCENTRATOR USAGE

4.01 The office line concentrator usage count provides line link network load balance data per line concentrator. The concentrator is the line link network loading unit. Comparing the usage on individual concentrators enables the network administrator to evaluate how well the subscriber load is distributed across the line link network.

- It measures total originating plus terminating line A-link CCS usage of each concentrator.

- It includes usage due to A-links made busy for maintenance and reserved A-link usage.

4.02 The printout will appear in ascending order of network, frame, bay, and concentrator. (For instance: network 00, frame 0, bay 0, concentrator 0 is first; network 00, frame 0, bay 0, concentrator 1 is next, etc.)

4.03 It is possible that in an office with a fractional network, the line switch frame (LSF) numbering is nonconsecutive. However, registers are reserved for missing LSFs and will print out as all zeroes.

4.04 The office line concentrator usage counts are printed under the heading (32 L. CONC. USAGE). Refer to Fig. 3 for a sample printout.

5. TRUNK SWITCH FRAME GRID USAGE

5.01 The trunk switch frame grid usage count provides trunk link network load balance data per trunk grid. The grid is the trunk link network loading unit. Comparing the usage on individual grids enables the network administrator to evaluate how well the trunk load is distributed across the trunk link network.

- It measures total trunk A-link CCS usage of each grid.

- It includes usage due to A-links made busy for maintenance and reserved A-link usage.

5.02 The printout will appear in ascending order of network, frame and grid. (For instance: network 00, frame 0, grid 0 is first; network 00, frame 0, grid 1 is next, etc.)

5.03 The office trunk switch frame grid usage counts are printed under the heading (34 TSFG USAGE). Refer to Fig. 3 for a sample printout.

6. SERVICE LINK NETWORK INPUT SWITCH TOTAL USAGE

6.01 The service link network input switch total usage count provides service link network switch load balance data.

- It measures total usage of S-links by input switch.

- There are four S-links per input switch, 16 input switches per bay and two bays per service link frame.

6.02 The printout will be listed in ascending order of frame, bay, and input switch. (For instance: frame 0, bay 0, switch 00 is first; frame 0, bay 0, switch 01 is next; up to frame 0, bay 0, switch 15; followed by frame 0, bay 1, switch 00, etc.)

6.03 The service link network input switch total usage counts are printed under the heading (36 SLN. CONC. USAGE). Refer to Fig. 3 for a sample printout.

7. SELECTED VERSUS OFFICE CONCENTRATOR USAGE

7.01 Selected concentrator usage is a measurement of the time that the lines in each concentrator are busy, whether connected to an A-link or not.

7.02 Office line concentrator usage is a measurement of the time that the A-links in each concentrator in an office are busy.

7.03 Selected concentrator usage and office line concentrator usage measurements for the same concentrator will not always be equal during the same interval.

7.04 Reasons for not being equal include:

(a) A line on the high and wet list due to a permanent signal contributes to selected concentrator usage. There is no corresponding A-link, thus no contribution to office line concentrator usage.

(b) Two busy A-links, one connected and the other reserved, can be associated with one busy line while setting up a call. Under this condition a greater contribution is made to office line concentrator usage.

(c) A-links may be made maintenance busy, thus greatly inflating office line concentrator usage.

8. LOAD BALANCE DATA COLLECTION

8.01 The load balance data are collected using the office line concentrator total usage count.

This count provides line link network load balance data per line concentrator.

DATA COLLECTION FREQUENCY

8.02 Data must be collected and reported once a month for index purposes. It is recommended that data be collected more frequently for administrative purposes to maintain positive control over balance by using up-to-date information for assignment selections. This will become increasingly important when:

(a) The office is out of balance and the network administrator wants to analyze the results of specific corrective action procedures.

(b) The office is nearing the end of the job interval and/or is load limited; therefore, fine-tuned assignments are required to ensure objective service levels.

(c) The office is a new installation (at or greater than 30 percent of capacity) or a growth addition has just been completed, hence a new load balance data base is required. The more quickly the data are collected, the sooner the balance may be analyzed.

(d) The office has just completed an area cut and the network administrator wants to evaluate the effects of the applied loading techniques.

MISSING OR INCOMPLETE DATA

8.03 There are circumstances under which the data for the study week may be incomplete as a result of system reinitialization, lost or damaged tapes, etc. Refer to DFMP, Division H, Section 6g for information on how to deal with lost data.

DATA VALIDATION

8.04 The network administrator is responsible for the validation of load balance measurements. Presently there are only a few ways to validate the load balance data. These ways involve visual inspection as well as other methods to determine if the measurements are reasonable.

8.05 One method to determine inflated usage measurements is to schedule a single hour of W-schedule collection at a very idle period. Example: 3 to 4 am Sunday.

8.06 The printout obtained from this single hour should contain very low or zero usage.

8.07 High measurements may indicate A-links made busy and thus unavailable for subscriber traffic. This data causes a distortion of balance measurements, and may result in unnecessary action if not properly evaluated. If A-links were not found to be made busy, they may be false busy due to a trouble condition.

8.08 To reduce the possibility of inflated usage measurements, this procedure may be used on a regular basis. Example: Once a month.

8.09 Questionable data on selected lines or concentrators may indicate incorrect assignments. The assignments may be checked by verifying the translations using VFY-PSWD-. To do this, the network administrator must know the PS address of the translator. It may prove profitable to maintain a record of the PS addresses.

9. OTHER DATA COLLECTION CONSIDERATIONS

MECHANIZED DATA PROCESSING

9.01 A mechanized method has been developed to compute the load balance index and to provide administrative aids for assigning lines and achieving acceptable load balance. An interim mechanized load balance program has been incorporated into the Program for Administrative Traffic Reports On Line (PATROL) which will be in use until the introduction of the load balance system (LBS) as a part of the total network data system (TNDS).

9.02 The PATROL load balance program as an interim mechanization of the load balance index plan is an independent, stand-alone subsystem. The program computes the load balance office index, summarizes the load data by concentrator and line link network, and provides a guide for the assignment or removal of lines. The program maintains up to seven weeks of data and balance study files created from the W schedule.

9.03 Detailed information on the interim load balance program can be obtained from the PATROL lessons or through the operating telephone company PATROL coordinator. Refer to DFMP,

Division H, Section 6g for load balancing procedures and a description of the associated new interim PATROL load balance system.

9.04 The TNDS load balance system will provide a mechanized process to support the load balance procedures specified in DFMP, Divisions A and H.

(a) It will provide the following items:

- Compute the new load balance index
- Generate balance guide to assist in line assignment
- Produce balance reports showing current measurement and load correction required.

(b) As a part of the TNDS, the LBS will rely on the TNDS—Common Update and Traffic Data Administration Systems (TDAS). Operating telephone companies must have TDAS or its equivalent operational in order to implement this load balance system.

TRAFFIC MEASUREMENT SCHEDULE

9.05 The traffic measurement program consists of 23 routines. They are periodically executed according to the traffic map.

9.06 The traffic measurement schedule ESS Form 1402 is used to record the current state of the traffic map recorded in memory.

9.07 Routines that must be scheduled for the weekly measurements are as follows:

- Routine 09, Recycle
- Routine 10, Start Collect
- Routine 11, Stop Collect
- Routine 17, Print.

9.08 ***Routine 09, Recycle:*** This routine recycles all the accumulators associated with the weekly schedule. That is, it resets them to zero. This routine is normally set just prior to Routine 10 for the collection period.

9.09 ***Routine 10, Start Collect:*** This routine tells the program at what period of day to begin accumulating the weekly data.

9.10 ***Routine 11, Stop Collect:*** This routine tells the program at which period of the day to stop accumulating the weekly data.

9.11 ***Routine 17, Print "W":*** This routine tells the program when to print out the contents of the accumulators associated with the weekly schedule.

- Normally this routine is scheduled at the end of the week or study period.
- Scheduling printouts daily will give some protection against loss of data due to a zeroed traffic map after a phase 4 or higher emergency action. Each daily printout will consist of a cumulative total of all hours collected to and including the day on which the printout is requested, thus the weekly total will not be destroyed.
- This routine must not be scheduled at the same quarter as other print routines.

9.12 If a print routine is scheduled and the associated holding registers contain all zeros (no data), the printout will only show the identity line and one row of registers, registers 0000 through 0009 as all zeros. The entire schedule will not be printed out as zeros.

9.13 For typical entries of W-schedule routines on ESS Form 1402, refer to Fig. 1. An explanation of the entries are as follows.

- Reset the accumulators to zero on Monday at 5:15 pm (Routine 09).
- Collect all items assigned to W schedule on Monday, Tuesday, Wednesday, Thursday, and Friday during the periods of 6:30 to 8:30 pm (Routine 10 and 11).
- Print all items assigned to the W schedule on Friday at 8:45 pm (Routine 17).

9.14 Some additional scheduling considerations are as follows:

- If recycle and print are scheduled at the same time, recycle will occur first.

- Stop and start cannot be scheduled at the same time.

9.15 Refer to DFMP, Division H, Section 6i(1), General, for more details on traffic map scheduling.

OBTAINING WEEKLY DATA ON PAPER TAPE

9.16 The PATROL interim mechanized load balance program requires a paper tape input. To obtain weekly data on paper tape, the administration TTY must be placed in a tape mode prior to the execution of Routine 17 or an immediate request for the W-schedule.

9.17 Prior to CTX-7 generic program, the TTY tape mode may be set as follows:

- For both hard copy and paper tape, just before scheduled print time, depress the KT mode button.
- Depress the RLPT and RUBOUT keys to generate about 2 inches of header tape.
- After desired output is on tape, depress the K mode button to return TTY to the hard copy only mode.

9.18 The CTX-7 generic program has the ability to automatically turn on the tape for H or C schedules. This capability also requires certain TTY modifications. When the modifications are completed a new method of manually turning on the tape is required. The tape mode may be set as follows:

- Depress the KT mode button.
- Depress both the SHIFT and CTRL keys at the same time, and while holding them down, also depress the R key (tape) momentarily.

REQUESTING IMMEDIATE PRINTOUT

9.19 An immediate printout of the contents of the W-holding register is possible by typing the following message.

TC-WØRK-SET,02,17

9.20 It is important when requesting printouts that the typing does not overlap into a scheduled printout. This will cause the data to be mutilated.

10. CONCENTRATOR SWITCH USAGE DATA COLLECTION TECHNIQUE

10.01 Load balance procedures recommend balance by concentrator, switch, and in the case of 4:1 concentrators, quarter-switch. If a switch balance problem is suspected in a concentrator, in addition to analyzing class of service distribution, the following data collection technique may be used to determine switch and/or quarter-switch usage.

- Assign the concentrator to selected concentrator usage.
- Manually calculate the switch and quarter-switch usage by totaling the appropriate line equipment numbers (LENs) from the W-block printout.

10.02 For a switch calculation example, use the weekly printout data in Fig. 3. Selected concentrator usage is designated (31 CUST. L. TOTAL USAGE). The first 16 measurements from 00 to 15 represent the LENs of the first switch. Groups of four within measurements 00 to 15 represent the quarter-switch. Calculations are shown in Fig. 4.

10.03 The switch and quarter-switch engineering CCS for the 10 hours of usage data on the W-schedule can be calculated as follows:

- To determine concentrator CCS for 10 hours, multiply the hourly concentrator CCS by 10.
- To determine switch CCS, divide the concentrator CCS by the number of concentrator switches. The 2:1 concentrator has eight switches and the 4:1 concentrator has four switches.
- To determine quarter-switch CCS, divide the switch CCS by four.

Calculations of each of the above items are provided in the concentrator load capacity table (Fig. 5).

10.04 An analysis can be made to determine if the switch usage exceeds the engineering capacity.

- Assume this office has a 6:1 line junctor ratio. The data for this example is taken from Fig. 4 and 5.

QTR SW	10 HR CCS	10 HR ENG CCS	PERCENTAGE OF ENG CCS
First	118	101	118
Second	40	101	40
Third	146	101	146
Fourth	96	101	96
Total SW	400	403	100

- Total switch CCS is within limits. The third quarter-switch exceeds the limit by 46 percent.

- If a service problem is suspected, a line equipment transfer may be written to move a high usage line out of the third quarter of the switch.

ESS 1402 (05) TG-1A

TRAFFIC MEASUREMENT SCHEDULE

NO. 1/1A ESS 2-WIRE

(CTX-7, G1 AND LATER GENERIC PROGRAMS)

ESS UNIT _____ DATE _____

START DATE TIME	SCHEDULE	(ROUTINE) TC-TIME	DAYS							HOURS OF THE DAY																								QTR HOUR				REMARKS
			SUN.	MON	TUES.	WED	THURS	FRI	SAT	MIDNIGHT	1:00 A.M	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00 P.M	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	HOUR	1ST QTR	2ND QTR	3RD QTR	
START ALIT #		00	,							,																								,				
STOP AUTO TRUNK PROG. #		01	,							,																								,				
COLLECT	H(1)	02	,							,																								,				
COLLECT	H(2)	03	,							,																								,				
COLLECT	H(3)	04	,							,																								,				
COLLECT	C	05	,							,																								,				
		06	,							,																								,				
CONNECTED TRKS GRD *	H	07	,							,																								,				
CONNECTED TRKS GRD *	C	08	,							,																								,				
RECYCLE	W	09	,	0	1	0	0	0	0	0	,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	,	0	1	0	0	Load Balance
START COLLECT	W	10	,	0	1	1	1	1	1	0	,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	,	0	0	1	0	10 Hrs.
STOP COLLECT	W	11	,	0	1	1	1	1	1	0	,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	,	0	0	1	0	6:30 - 8:30
PRINT	D	12	,							,																								,				
PRINT *	H(1)	13	,							,																								,				
PRINT *	H(2)	14	,							,																								,				
PRINT *	H(3)	15	,							,																								,				
PRINT *	C	16	,							,																								,				
PRINT *	W	17	,	0	1	1	1	1	1	0	,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	,	0	0	0	1	
START AUTO TRUNK PROG #		18	,							,																								,				
TAPE PERFORATE *	H(1)	19	,							,																								,				
TAPE PERFORATE *	H(2)	20	,							,																								,				
TAPE PERFORATE *	H(3)	21	,							,																								,				
TAPE PERFORATE *	C	22	,							,																								,				

* DO NOT SCHEDULE FOR SAME QUARTER HOUR

PLANT DEPT ROUTINE

MESSAGE TO OBTAIN MATRIX PRINTOUT: TC-WORK-SET,03 13

Fig. 1—Traffic Measurement Schedule (1.07, 9.13)

H6I3-1 (3/76)

CUSTOMER LINE USAGE ASSIGNMENTS
NO.1 ESS
UNIT District CG-0
(ASSIGNED BY MTCE-TTY)

STUDY PERIOD
START 3-15-76
STOP 3-26-76

CUSTOMER LINE - SELECTED USAGE

REG. EQUIPPED = _____

REG	LEN	REMARKS	REG	LEN	REMARKS	REG	LEN	REMARKS
000	00-010-001	6-1321	050			100		
001	00-105-100	6-4056	051			101		
002	00-104-103	6-2107	052			102		
003	01-210-200	6-1099	053			103		
004	01-302-401	6-7432	054			104		
005	01-301-702	6-0819	055			105		
006	01-406-601	6-2020	056			106		
007	02-012-402	6-1402	057			107		
008	02-016-300	6-6000	058			108		
009	03-100-201	6-1011	059			109		
010			060			110		
011			061			111		
012			062			112		
013			063			113		
014			064			114		
015			065			115		
016			066			116		
017			067			117		
018			068			118		
019			069			119		
020			070			120		
021			071			121		
022			072			122		
023			073			123		
024			074			124		
025			075			125		
026			076			126		
027			077			127		
028			078					
029			079					
030			080					
031			081					
032			082					
033			083					
034			084					
035			085					
036			086					
037			087					
038			088					
039			089					
040			090					
041			091					
042			092					
043			093					
044			094					
045			095					
046			096					
047			097					
048			098					
049			099					

INDEX (REG.) EQUIPPED _____

CUSTOMER LINE - TOTAL CONCENTRATOR USAGE

INDEX	FRAME LLN-BAY CONC	REGISTER NUMBERS
001	01 - 012	000 - 031
002	02 - 103	032 - 063
003	00 - 204	064 - 095
004	-	-
005	-	-
006	-	-
007	-	-

2:1 = 32 REGISTERS/INDEX
4:1 = 64 REGISTERS/INDEX

PREPARED BY Sally Smith TEL. NO. 602-5531 ISSUE DATE 3-5-76

Fig. 2—Customer Line Usage Assignments—Typical Entries (1.13, 2.06, 2.09, 3.07, 3.09)

LINE NO.

MINUTES AFTER THE HOUR

TRAFFIC COUNT

OFFICE IDENTIFICATION FROM SET CARD TRAFD

```
   30 CUST. L. SEL. 000000
(0)
000098  000101  000084  000087  000095  000011  000000  000008  000014  000000
(1)
000121  000317  000005  000011  000032  000016  000013  000008  000012  000004

   31 CUST. L. TOT. USAGE 000000
(0)
000071  000000  000016  000031  000000  000000  000000  000040  000021  000000
(1)
000117  000008  000019  000030  000000  000047  000063  000009  000041  000019
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
(6)        ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
000119  000053  000009  000023  000043  000000  000000  000000  000000  000000

   32 L. CONC. USAGE 000000
(0)
002172  001973  001991  002004  002163  000721  000940  001119  002321  002001
(1)
003061  002121  001917  001710  002021  003114  002773  002129  001881  000991
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
(18)       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
002011  002317  001174  001916  001721  001998  002721  004007  003621  002212
(19)
000196  001973  000000  000000  000000  000000  000000  000000  000000  000000

   34 TSFG. USAGE 000000
(0)
000510  000432  000711  000329  000569  000411  000317  000921  000720  000641
(1)
000602  000617  000521  000419  000320  000479  000555  000714  001001  000918
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
(4)        ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
000671  000704  001089  000816  000421  000594  000723  000398  000921  000826
(5)
000712  000691  000674  000503  000491  000630  000000  000000  000000  000000

   36 SLN. CONC. USAGE 000000
(0)
000123  000456  000789  000987  000654  000321  000246  000813  000579  000000
(1)
000192  000837  000465  000001  000003  000002  000004  000006  000005  000007
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
   ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓       ↓
(4)
000008  000009  000011  000010  000013  000012  000014  000016  000018  000015
(5)
000017  000000  000000  000000  000000  000000  000000  000000  000000  000000

FINISH
        6/2  11:37
```

Fig. 3—Example of Weekly Output Message Format (2.10, 3.10, 4.04, 5.03, 6.03, 10.02)

DATA TAKEN FROM FIGURE 3 (31 CUST. L. TOT. USAGE)

MEASUREMENT NUMBER	DATA	
00	000071	
01	000000	
02	000016	
03	000031	
		TOTAL 118 CCS/FIRST QUARTER-SWITCH
04	000000	
05	000000	
06	000000	
07	000040	
		TOTAL 40 CCS/SECOND QUARTER-SWITCH
08	000021	
09	000000	
10	000117	
11	000008	
		TOTAL 146 CCS/THIRD QUARTER-SWITCH
12	000019	
13	000030	
14	000000	
15	000047	
		TOTAL 96 CCS/FOURTH QUARTER-SWITCH

TOTAL SWITCH 400 CCS
(ADDITION OF 4 QUARTER-SWITCHES)

Fig. 4—Calculation of Switch and Quarter-Switch Usage for a 4:1 Concentrator Office (10.02, 10.04)

CONCENTRATOR LOAD CAPACITIES

	MAXIMUM CCS				
	PER HOUR		PER 10 HOURS		
	LINE JUNCTOR RATIO	CCS PER CONCENTRATOR	CCS PER CONCENTRATOR	CCS PER SWITCH	CCS PER QUARTER-SWITCH
2:1 CONCENTRATION (HEAVY)	2:1	238	2380	298	—
	2.5:1	195	1950	244	—
	3:1	166	1660	208	—
	3.5:1	146	1460	183	—
	4:1	131	1310	164	—
4:1 CONCENTRATION (LIGHT)	4:1	230	2300	575	144
	5:1	189	1890	473	118
	6:1	161	1610	403	101
	7:1	141	1410	353	88
	8:1	127	1270	318	79

Fig. 5—Concentrator Load Capacities (10.03, 10.04)

H6I3-1 (3/76)

CUSTOMER LINE USAGE ASSIGNMENTS
NO.1 ESS
UNIT_____
(ASSIGNED BY MTCE-TTY)

STUDY PERIOD
START_____
STOP_____

CUSTOMER LINE - SELECTED USAGE

REG. EQUIPPED = _____

REG	LEN	REMARKS	REG	LEN	REMARKS	REG	LEN	REMARKS
000			050			100		
001			051			101		
002			052			102		
003			053			103		
004			054			104		
005			055			105		
006			056			106		
007			057			107		
008			058			108		
009			059			109		
010			060			110		
011			061			111		
012			062			112		
013			063			113		
014			064			114		
015			065			115		
016			066			116		
017			067			117		
018			068			118		
019			069			119		
020			070			120		
021			071			121		
022			072			122		
023			073			123		
024			074			124		
025			075			125		
026			076			126		
027			077			127		
028			078					
029			079					
030			080					
031			081					
032			082					
033			083					
034			084					
035			085					
036			086					
037			087					
038			088					
039			089					
040			090					
041			091					
042			092					
043			093					
044			094					
045			095					
046			096					
047			097					
048			098					
049			099					

INDEX (REG.) EQUIPPED _____

CUSTOMER LINE - TOTAL CONCENTRATOR USAGE

INDEX	FRAME LLN-BAY CONC	REGISTER NUMBERS
001	-	-
002	-	-
003	-	-
004	-	-
005	-	-
006	-	-
007	-	-

2:1 = 32 REGISTERS/INDEX
4:1 = 64 REGISTERS/INDEX

PREPARED BY_____ TEL. NO._____ ISSUE DATE _____