NO. 2 ELECTRONIC SWITCHING SYSTEM (2-WIRE)
OPERATIONAL FEATURES
NETWORK CHANNEL TELETYPEWRITER

CONTENTS PAGE

FIGURE PAGE

TABLES

1. GENERAL

1.01 This section of the Dial Facilities Management Practices (DFMPs) deals with the description and operation of the teletypewriter, normally located in the network administrator's quarters, which uses the ***network channel*** to communicate with a particular No. 2 Electronic Switching System (ESS) central office.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 References herein to No. 2 ESS are also applicable to No. 2A ESS machines. Familiarity with the terminology, operation, and measurement features of the No. 2 ESS is desirable.

1.04 References will be made herein to the input manual (IM), output manual (OM), program for administrative traffic reports on line (PATROL), engineering and administrative data acquisition system (EADAS) and administrative messages such as dynamic service protection (DSP), toll network protection (TNP), and system overload (SOL). Appropriate documentation such as Traffic Facilities

Practices, Bell System Practices, Translation Guide TG-2H, and other sections of the Dial Facilities Management Practices will be used as additional reference materials.

2. DESCRIPTIONS

A. Teletypewriter

2.01 The No. 35 automatic send-receive (ASR) teletypewriter (TTY) is recommended for use with the No. 2 ESS dial central office. This type machine permits the preparation of a punched transmitter tape for the more frequently used and lengthy input messages associated with PATROL and the traffic work table (TWT).

2.02 The 35 ASR TTY contains a typing unit which may be friction-feed or sprocket-feed for continuous forms, a keyboard, a copyholder, and a chad box to collect the small paper discs (chad) which are punched out of the paper tape. A power switch, rather than the attendant control unit, is recommended; this power switch shall be placed in the ***on-line*** mode which permits the reception of hourly and exception reports from the No. 2 ESS machine. It is the responsibility of the network administrator to see that emergency power is available for the network channel TTY.

2.03 The No. 35 TTY operates at a maximum speed of 100 words per minute (WPM), and can be adjusted manually for either single or double line spacing.

2.04 Complete details on the operation of the TTY may be found in the pamphlet "How to Operate No. 35 Teletypewriters on Private Line Service" (999-400-908 LL, Issue C 5/72) published by the Long Lines Department of AT&T.

B. Teletypewriter Channels

2.05 A maximum of seven usable TTY channels (interfaced by eight control circuits) may be provided for a No. 2 ESS office. They are normally designated for use as follows:

CHANNEL NO.	DESIGNATED USE
1	Maintenance (local) Maintenance (remote)
2	Network administrator*
3	Service order (local or remote)
4	Local test desk (local or remote)
5	Trunk test (local or remote)
6, 7	Spare channels

*Formerly referred to as traffic (local or remote).

The maintenance channel has two control circuits (0 and 1) for duplication and reliability purposes. (See Bell System Practice 232-003-101.)

2.06 The exact number of channels to be furnished will be specified in the traffic order for inclusion on Engineering Questionnaire Forms E 8071 or E 8100. (There are two additional channels available for No. 2 ESS, but they are unassigned at this time.)

C. Types of Messages

2.07 Distinct message formats must be used on the individual channels. ***Only the TTYs associated with the maintenance channels have the ability to introduce all input messages into the No. 2 ESS machine.*** (The use of specific messages will be discussed in the portion of this section dealing with the input and output manuals.)

2.08 Various messages are used for administrative (A), maintenance (M), traffic (T), and utility (U) purposes as will be described later in this section.

2.09 This section of the DFMP will deal mainly with input/output messages and the capabilities of the network channel (network administrator's) TTY.

2.10 As of this writing, there are some input message-instructions which are not accepted over the network channels but will be with future issue and generic changes. In any event, these messages, to initiate dynamic service protection (DSP) and toll network protection (TNP), may be transmitted via the maintenance TTY, during the interim.

3. MESSAGE FORMATS

A. Input Messages

3.01 Every input message follows a fixed basic format regardless of which TTY channel is being utilized. The input messages must be in accordance with Input Manual, IM-2H200-01 which must be available to every No. 2 ESS network administrator. (In lieu of a complete manual, only those messages which are permitted from the network channel may be kept, also those pages referenced in Table A should be available to every No. 2 ESS network administrator.) Only specific messages are permitted from certain channels other than the maintenance channel. The maintenance channels have the ability to introduce all messages.

TABLE A

INPUT/OUTPUT TOPICAL INDEX*

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Abbreviated Dialing	Verify the abbreviated dialing list.	A VY SC/	C188	AR VY SC	Addendum 3
AMA	Specify days to switch recorders.	T WO AMS	C735	—	—
Call Store	All *stable* call store including traffic registers have been cleared by a complete *stable* initialization.	—	—	TI PR CLR	C894
Circuit Junctor(*)	To enter a change in call store the automatic junctor circuit and range extension tests on the Traffic Work Table (TWT). (*) Usually requested by the Maintenance channel.	T WT AJT	C739	—	—
Code Index	Verify the route index assigned to a code index.	A VY CRI	C163	AR VY CRI	C132
	Verify what code index is assigned to a 3- or 6-digit code.	A VY DIG	C169	AR VY DIG	C138
Concentrators	Assign to a usage list.	T CC CON	C715	—	—
Counter	Assign or remove PBX group.	A TC MLH	C128	—	—
	Assign or remove service circuits.	A TC SVC	C134	—	—
	Assign or remove trunk groups.	A TC TRK	C136	—	—
	Assign a peg counter to a line screening class.	A TC LSC	C126	—	—
	Assign a peg counter to a 3- or 6-digit code.	A TC PRC	C130	—	—
	Verify traffic printout schedule of multi-line hunt (MLH) group.	A TV MLH	C143	AR TV MLH	C116

* Based on IM-2H200, Issue 7, Addendum 1 and OM-2H200, Issue 7, Addendum 3.

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Counter (Cont)	Verify service circuit group on traffic printout schedule.	A TV SVC	C149	AR TV SVC	C120
	Verify the peg counter assigned to a line screening class.	A TV LSC	C141	AR TV LSC	C115
	Verify the peg counter assigned to a 3- or 6-digit code.	A TV PRC	C145	AR TV PRC	C117
	Verify trunk group for traffic schedule and registers assigned to group.	A TV TRK	C151	AR TV TRK	C121
Customer Line	Assign to usage list.	T CC CLU	C713	—	—
Day	Verify type of day each day of the week is.	A VY DAY	C167	AR VY DAY	C136
Diagnose	Teletypewriter — A check of the complete input-output facilities of the traffic channel.	M TT SEN	C687	—	—
Error Messages	See last page of Table A.				
Hunt Group	Verify multi-line hunt group (MLHG) and/or member translations.	A VY MLH	C180	AR VY MLH	C150
Line	Assign a peg counter to a line screening class.	A TC LSC	C126	—	—
	Assign to usage list for traffic printout.	T CC CLU	C713	—	—
	Verify the peg counter assigned to line screening class.	A TV LSC	C141	AR TV LSC	C115
	Verify originating and terminating translations.	A VY L/	C177	AR VY L	C146

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Line Insulation Test (*)	Change time for item in call store on Traffic Work Table (TWT). (*) Usually requested by the Maintenance channel.	T WT LIT	C766	—	—
Line Load Control	Allow-deny system to invoke the dynamic service protection.	M SY DSP#	C610	MA SY DSP	C739
Miscellaneous	This message is the response message for the request to verify a given scanner row mask from the alarm monitor data table.	A VY: ALM:rr:	153	AR VY ALM	123
	This is the output message to verify all trunks associated with the given "carrier group" table.	A VY: CGA	159	AR VY CGA	128
	This is the response message from the message to find all telephone numbers for a given centrex group which have access to the indicated call pick up group.	A VY: CPU/	161	AR VY CPU	130
	This message is generated each time there is an initialization indicating what type of initialization has just taken place.			Ma SY CLR	729
	Time of day output message giving current time and day as known by the system.			MR TT aaa	846
MLH	Alter the translation data for Multi-Line Hunt Groups	A TC MLH A TV MLH A VY MLH	C128 C143 C180	— AR TV MLH AR VY MLH	— C116 C150

Message not allowed to Traffic Channel.

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
PBX	Alter the translation data for Multi-Line Hunt Groups.	A TC MLH A TV MLH A VY MLH	C128 C413 C180	— AR TV MLH AR VY MLH	— C116 C150
Peg Counter	Assign a peg counter to a line screening class.	A TC LSC	C126	—	—
	Assign a peg counter to a 3- or 6-digit code.	A TC PRC	C130	—	—
	Verify the peg counter assigned to a line screening class.	A TV LSC	C141	AR TV LSC	C115
	Verify the peg counter assigned to a 3- or 6-digit code.	A TV PRC	C145	AR TV PRC	C117
Plant Meas.	Change time in call store on the Traffic Work Table (TWT).	T WT PLT	C772	—	—
Print	C Schedule.	T PR C	C717	TX PR C TR PR C TI PR C	C888
	D Schedule.	T PR D	C719	TX PR D TR PR D TI PR D	C896
	H Schedule.	T PR H	C721	TX PR H TR PR H TI PR H	C898
	Q Schedule.	T PR Q	C727	TX PR Q TR PR Q TI PR Q	C911
	W Schedule.	T PR W	C731	TX PR W TR PR W TI PR W	C918

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Print (Cont)	LSM Schedule.	T PR LSM	C723	TX PR LSM TR PR LSM TI PR LSM	C904
	PLT Schedule.	T PR PLT	C725	—	—
	Traffic Work Table (TWT) Schedule.	T PR TWT	C729	TR PR TWT	C914
	WUL Schedule.	T PR WUL	C733	TR PR WUL	C921
Recent Change	Assign a peg counter to a 3- or 6-digit code.	A TC PRC	C130	—	—
Remove from Service	Traffic Teletypewriter	M TT RMV	C682	MR TT SI	C855
Route Index	Verify route index translation data.	A VY RI	C184 (L01) C186 (EF1)	AR VY RI	Addendum 3
	Verify the route index assigned to a code index.	A VY CRI	C163	AR VY CRI	C132
Service Circuits	Assign or remove to a printout schedule.	A TC SVC	C134	—	—
	Verify service circuit translation data.	A VY SVC	C198	AR VY SVC	Addendum 3
	Verify the printout schedule for a service circuit group.	A TV SVC	C149	AR TV SVC	C120
	Change in Traffic Work Table (TWT) for start of automatic service circuit tests.	T WT AST	C745	—	—
Simulated Trunk	Assign or remove a simulated trunk to a printout schedule.	A TC SIM	C132	—	—
	Verify the printout schedule for a simulated trunk group.	A TV SIM	C147	AR TV SIM	C118

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Speed Calling	Verify the list.	A VY SC/	C188	AR VY SC	Addendum 3
	Verify the CENTREX directory numbers sharing given speed calling list.	A VY SCL/	C191	AR VY SCL	Addendum 3
Status Information	Teletypewriter	M TT SI	C691	Mx TT SI	C855
Teletypewriter	Diagnose using sentence list.	M TT SEN	C687	—	—
	Diagnose the traffic channel.	M TT DGN	C675	Mx TT DGN	C849 C851
	Remove the traffic channel from service.	M TT RMV	C682	MR TT SI	C855
	Status information.	M TT SI	C691	Mx TT SI	C855
	Restore to service.	Mx TT RST	C684	—	—
Toll Network Protection	Invoke or remove	M SY TNP	C627	MR SY TNP	C803
Traffic Printout	Assign or remove MLH group.	A TC MLH	C128	—	—
	Assign or remove service circuit group.	A TC SVC	C134	—	—
	Assign or remove a CENTREX group.	A TC CTX	C124	—	—
	Assign or remove trunk group.	A TC TRK	C136	—	—
	Assign or remove a simulated trunk group.	A TC SIM	C132	—	—
	Verify the printout schedule for a MLH group.	A TV MLH	C143	AR TV MLH	C116

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Traffic Printout (Cont)	Verify the printout schedule for a service circuit group.	A TV SVC	C149	AR TV SVC	C120
	Verify the printout schedule for a trunk group.	A TV TRK	C151	AR TV TRK	C121
Traffic Schedule	Change data printed on schedules H or C.	T WO HCS	C737	—	—
	Output schedule C.	T PR C	C717	TX PR C	C888
	All stable call store including traffic registers have been cleared by a computer *stable* initialization.	—	—	TI PR CLR	C894
	Output schedule D.	T PR D	C719	TX PR D	C896
	Output schedule H.	T PR H	C721	TX PR H	C898
	Output schedule Q.	T PR Q	C727	TX PR Q	C911
	Output schedule W.	T PR W	C731	TX PR W	C918
	Output schedule LSM.	T PR LSM	C723	TX PR LSM	C904
	Output schedule PLT.	T PR PLT	C725	—	—
	Output schedule TWT.	T PR TWT	C729	TR PR TWT	C914
	Output schedule WUL.	T PR WUL	C733	TR PR WUL	C921
Traffic Work Table	Change when item is to be done C schedule.	T WT C	C751	—	—
	Change time for item in traffic work table AMA.	T WT AML	C742	—	—
	Change when item is to be done D schedule.	T WT D	C754	—	—
	Change time for item in traffic work table junctor circuit.	T WT AJT	C739	—	—

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Traffic Work Table (Cont)	Change when item is to be done H schedule.	T WT HA T WT HB T WT HC	C757 C760 C763	— — —	— — —
	Change time for item in Traffic Work Table line insulation test.	T WT LIT	C766	—	—
	Change when item is to be done Q schedule.	T WT TQ	C776	—	—
	Change when item is to be done W schedule.	T WT W	C781	—	—
	Change time for item in Traffic Work Table plant measurements.	T WT PLT	C772	—	—
	Change when item is to be done WKE schedule.	T WT WKE	C784	—	—
	Change time for item in Traffic Work Table service circuits.	T WT AST	C745	—	—
	Change time for item in Traffic Work Table trunks.	T WT ATT	C748	—	—
	Restore traffic work table.	T WT RST	C775	—	—
	Start weekly usage measurements.	T WT WKS	C787	—	—
	Update recent change as per call store.	T WT UPD	C779	TR WT UPD	C924
Trunk	Assign or remove to a printout schedule.	A TC TRK	C136	—	—
	Verify trunk translation data.	A VY TRK	C200	AR VY TRK	Addendum 3
	Verify the printout schedule for a trunk group.	A TV TRK	C151	AR TV TRK	C121

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Trunk (Cont)	Change time for item in traffic work table for trunk tests.	T WT ATT	C748	—	—
Usage List	Concentrators.	T CC CON	C715	—	—
	Customer line.	T CC CLU	C713	—	—
Verify	Abbreviated dialing list.	A VY SC/	C188	AR VY SC	Addendum 3
	CENTREX directory numbers sharing given speed calling list.	A VY SCL/	C191	AR VY SCL	Addendum 3
	Code index.	A VY CRI	C163	AR VY CRI	C132
	Code index is assigned to a 3- or 6-digit code.	A VY DIG	C169	AR VY DIG	C138
	Customer line usage counter.	T PR WUL	C733	TR PR WUL	C921
	Hunt group translation.	A VY MLH	C180	AR VY MLH	C150
	Line translation.	A VY L/	C177	AR VY L	C146
	Printout all items using the same billing number.	A VY BTN/	C157	AR VY BTN	C126
	Printout schedule for a PBX group.	A TV MLH	C143	AR TV MLH	C116
	Printout all items using the same message register.	A VY MSG/	C182	AR VY MSG	C153
	Route index translation data.	A VY RI	C184 (L01) C186 (EF1)	AR VY RI	Addendum 3
	Printout all items using the same sleeve lead.	A VY SLL/	C196	AR VY SLL	Addendum 3
	Service circuit translation data.	A VY SVC	C198	AR VY SVC	Addendum 3

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

TOPIC	MESSAGE FUNCTION	INPUT MESSAGE	IM-2H200 PAGE REFERENCE	OUTPUT MESSAGE	OM-2H200 PAGE REFERENCE
Verify (Cont)	Speed calling list.	A VY SC/	C188	AR VY SC	Addendum 3
	Trunk translation data.	A VY TRK	C200	AR VY TRK	Addendum 3
	Verify the peg counter assigned to line screening class.	A TV LSC	C141	AR TV LSC	C115
	Verify the peg counter assigned to a 3- or 6-digit code.	A TV PRC	C145	AR TV PRC	C117
	Verify the printout schedule for a service circuit group.	A TV SVC	C149	AR TV SVC	C120
	Verify the printout schedule for a trunk group.	A TV TRK	C151	AR TV TRK	C121
	Verify the printout schedule for a CENTREX group.	A TV CTX	C139	AR TV CTX	C113
	Work assignment for each day of the week.	A VY DAY	C167	AR VY DAY	C136
	Verify the printout schedule for a simulated trunk group.	A TV SIM	C147	AR TV SIM	C118
Weekly Usage	Change time for item in traffic work table.	T WT WKE	C784	—	—
	Start weekly usage measurements.	T WT WKS	C787	—	—

TABLE A (Cont)

INPUT/OUTPUT TOPICAL INDEX

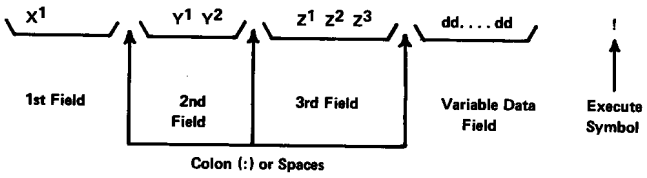
The following messages are error messages generated as response to input errors.

OUTPUT MESSAGE	PAGE REFERENCE	GENERIC
AR RC ERB	34	Extended feature
AR RC ERC	40	Extended feature
AR RC ERL	46	Extended feature
AR RC ERM	56	Extended feature
AR RC ERR	65	Local office
AR RC ERS	87	Extended feature

Other error messages used on the traffic teletypewriter channel.

AR VY ERR	142	The TN or TEN which was requested to be verified is in error due to a translation problem.
AR VY NOL	155	The TEN which was requested to be verified is for a non-line it could be a trunk, tone, or service circuit.

The format of input messages is as follows:



(a) ***First Field:*** The first, or ***X*** field, identifies the type of message. The types are as follows:

A—Administration

M—Maintenance

T—Traffic

U—Utility

Network channel ***X*** field entries (1st field) at this time are always single alpha characters, and may be ***A, M*** or ***T.***

(b) ***Second Field:*** The second, or ***Y*** field, indicates the unit or the program to which the message applies. This field usually consists of two alpha characters when the network channel is involved. Combinations of the first two fields and their meanings are as follows:

A TC—Administrative traffic change (change traffic measurement item)

A TV—Administrative traffic verification (verify traffic measurement item)

A VY—Administrative translation verify

M TT—Maintenance teletypewriter test

T CC—Traffic count change (change usage list)

T PR—Traffic print request (request for printout)

T WO—Traffic work option (change data on output)

T WT—Traffic work table (change).

(c) ***Third Field:*** The third, or ***Z*** field, identifies the type of action desired. The field may be one to three characters in length.

(d) ***Variable Fields:*** The remaining fields, dd....dd, are reserved for the variable input information that may be required. The content of this variable area is defined in the explanation of each message as shown in the Input Manual, IM-2H200-01. For example, an H Schedule input from the traffic work table would appear in the format: T WT:HA: day amhr pmhr qh! Where T WT:HA: are the X, Y, and Z fields and the remainder of the message is the variable fields.

(e) ***Execute Symbol:*** An exclamation point (!) is used as the last character of input messages in order to indicate that the message is complete so that the machine can act upon the input request.

(f) ***Single Versus Multiple Line Inputs:*** Most network channel input messages are single line entries. However, multiple line entries are required for some messages such as to verify a customer's originating or terminating translations. At the end of each line a slash (/) must be employed and the last line must contain the command ***END!.*** For example, (as described in the IM) the verification of the terminal equipment number associated with a particular directory number is arranged through the message:

A VY: L/

TN nnx abcd/

END!

Wherein nnx abcd is the customer's directory number; and directory number information associated with a particular terminal equipment number is obtained through the message:

A VY: L/

TEN nn gcsl/

PTY p/ (For party line)

END!

Wherein the TEN identity consists of the network number (nn), the concentrator group (g), the

concentrator (c), the switch and level (s1). The TEN values 00 0000, and nn 0070, nn 0470, nn 1070 and nn 1470 are not allowed.

3.02 For certain requests, the identity of an NNX, service or trunk group number, etc, may be required as a portion of the input message. These pieces of information will be contained in the variable field and are represented in IM-2H200-01 as aaa. The value of this field is reflected in decimals with the range confined to the parameter of the office. For example, A TC:MLH:010 1 b! would be used to assign MLH group 10 to a printout schedule. The variable b in this case connotes the schedule, ie, ***0*** as b places it on the H schedule, ***1,*** on the C schedule. For systems interfacing with EADAS, the C schedule must be used. The absence of the numeric before the execute (!) indicates the removal from ***either*** schedule.

3.03 For many input messages, certain values must be transmitted via the octal numbering system. The ESS 2400 Form, Traffic Work Table Assignment (Fig. 1) has been developed to employ octal values for days, hours of the days, the type schedule, etc. Full discussions of binary to octal conversion and completion of the ESS 2400 Form are contained in Translation Guide TG-2H, Division 10, Section 3 which must be available to every No. 2 ESS administrator. See 4.01 for using the network channel to input TWT messages.

3.04 A request for time can be initiated on the network channel. The message is M TT:TIM! Only the maintenance channel may be used to ***change*** time.

3.05 When restoral procedures for the network channel (after an out-of-service condition has existed) are required, a message input of M TT:SEN a ! should be transmitted. The variable a is the control circuit number to which the network channel is assigned. Other input information is required to complete this test as is described in IM-2H200-01.

B. Output Messages

3.06 Every output message will follow a fixed basic format in accordance with Output Manual, OM-2H200-01, which must be available to every No. 2 ESS administrator. (In lieu of a complete manual only those messages which are output on the network channel may be kept, also, those pages referenced in Table A should be available to every No. 2 ESS network administrator.)

TRAFFIC WORK TABLE ASSIGNMENT

NO 2 ESS

ESS Unit OLD TOWN

Date 5/22/75

Binary to Octal Work Sheet

			Days							AM Hours												PM Hours												Qtr Hours			
Octal Data Word			d	a			y			a			m			h			r			p			m			h			r			q	h		
Day/Hours			Sat	Fri	Thu	Wed	Tues	Mon	Sun	11:00	10:00	9:00	8:00	7:00	6:00	5:00	4:00	3:00	2:00	1:00	Midnight	11:00	10:00	9:00	8:00	7:00	6:00	5:00	4:00	3:00	2:00	1:00	Noon	45	30	15	0
Position Weight			1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	4	2	1	1	4	2	1
SCHEDULE	PRINT CODE	TQ	0	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
			0		7			6			7			0			0			0			0			0			0			7		1		7	
		HA	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0
			0		4			2			3			0			0			0			0			0			3			0		0		4	
		HB	0	1	0	1	0	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	1	0	0	0
			0		5			3			0			0			0			0			0			1			0			0		1		0	
		HC																																			
		C	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0
			0		5			2			0			0			0			0			0			0			6			0		0		2	
		MQ																																			
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		W	0	1	0	0	0	0	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		4			0			0			0			0			0			0			0			2			0		0		1	
		PLT																																			
	START CODE	ATT																																			
		AST																																			
		AJT																																			
		AML																																			
		LIT																																			
		WKE	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
			0		7			6			4			0			0			0			0			0			0			0		0		4	
		WKS	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
			0		7			6			1			0			0			0			0			0			0			0		0		4	

INPUT: T WT: COD day amhr pmhr qh!

TO VERIFY: T PR: TWT!

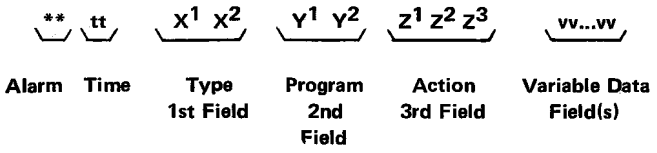
Printed in U.S.A.

Note: The standard format for inputting any of the above schedules is T WT:COD day amhr pmhr qh! For example, the HA and HB schedules would be respectively input as follows:

T WT:HA 042 3000 0030 04!
T WT:HB 053 3000 0100 10!

Fig. 1—Traffic Work Table Assignment Form

3.07 The basic output message is:



wherein ** represents major alarm. Other symbols in this alarm field are * indicating a minor alarm. The absence of asterisks indicates a no-alarm condition. The tt characters always consists of two digits indicating the total number of minutes since the last hourly message was printed. Hence, the determination of the time of the output message may be made by adding the value of tt to the hour and minutes in the previously recorded hourly printout.

3.08 The respective X, Y and Z fields represent the types of message, program, and action that has occurred, in a similar fashion to the input messages. The variable field (v) is the information portion of the message.

3.09 The X field consists of two alpha characters; the first representing administration (A), traffic (T) and maintenance (M). (See Table A for examples of messages for which the network administrator is responsible.) The second symbol in this field indicates why the output was generated, and is also represented by an alpha symbol as follows:

A—Action was taken; the system has taken an automatic action and a different configuration is being used

I—Information being provided due to an automatic trigger

R—Response to a message sent to the system with an acknowledgment of PF (print follows) by the No. 2 ESS machine.

3.10 For example,

12 AR TV MLH 122 1

means: this is the response (administrative) message for the message to verify what traffic printout schedule MLH group 122 is assigned, ie, the C schedule. (This is a no alarm message.)

4. USE OF NETWORK CHANNEL TTY

A. Traffic Work Table (TWT)

4.01 Data acquisition and the subsequent summarization and dissemination to other interested groups is an important job responsibility of the network administrator. Data acquisition in the No. 2 ESS, in some cases, is generically programmed and, in other cases, is programmed through translations. By using the TWT, the network administrator is able to control the collection and printout times of the traffic measurement schedules.

4.02 The TWT is the means used by the network administrator to instruct the No. 2 ESS to print accumulated data and in the case of the ***W*** schedule (load balance) the hours during which data will be collected.

4.03 The TWT can be constructed by the use of form ESS 2400, Traffic Work Table Assignment, (Fig. 1). This form is designed to place binary 1s in the appropriate day, am hours, pm hours, and quarter hours sections. By using the binary to octal conversion, which the form provides, the various octal input messages can be developed. See Fig. 1 for examples.

4.04 It is important to recognize that the upper portion of the ESS 2400 Form is exclusively the ***print code***—and will only control printing periods. The last two lines, WKE and WKS (week end and week start, respectively) are used by the network administrator in conjunction with the W schedule only (load balance, selected concentrator or selected subscriber line usage). This permits controlled daily hours to be included in one week's load balance study period.

4.05 Initially a tape should be made of the desired input messages in order to minimize errors and time on the channel. The desired TWT schedule tape should then be input and the data transferred to program store (it is only in recent change—call store—as a result of appropriate input messages). This program store transfer is accomplished with the message T WT UPD! (A central office update of recent change is necessary to make this message effective. See TG-2H, Division 10, Section 3.)

4.06 Should recent change clearing take place because of machine or other problems, the TWT can be recalled by the use of the message T WT RST! This will reinitiate the TWT as it is stored in program store. It will also be necessary to enter all changes made in the recent change area since the program store copy was last updated. The T WT UPD! input message should also be made after the changes have been entered so that program store can be updated as described in 4.05.

4.07 See DFMP, Division H, Section 10i for a complete description of the TWT.

4.08 The No. 2 ESS data accumulation is continuous data gathering. Data accumulators are continuously receiving new information and will continue to store such information until a specified time, established on the TWT, at which time a printout is requested. A scheduled printout is the only means of automatically resetting the data accumulators to zero. (Phase actions can also zero the accumulators.)

4.09 The TPR input messages (traffic print request) will not zero the accumulators, and will permit, for example, daily (cumulative total) inspection of the W schedule (load balance and concentrator or subscriber line usage). The W schedule is normally not printed until the end of a week's load balance study.

B. Network Channel Input Messages

4.10 ***General:*** Input messages for No. 2 ESS network channel are characterized by the following.

Input Messages

(a) All network channel input messages are indexed in Table A.

(b) A typical example of an input message is:

T PR TWT!

or

T PR:TWT!

which asks to print the traffic work table.

(c) Input fields are separated by spaces or colons as shown above. Colons are used to separate the action field from adjacent fields except when the action field is the last field. In this case, the execute character (!) is typed in place of the colon following the field. One or more extra spaces may be typed between fields, before the first character or before the execute character is typed. Time-out can be prevented by typing extra spaces before or after any field as explained in 4.13(f). Time-out can also be prevented at any time by typing a rub-out character in the input stream.

(d) An execute character must follow each line of an input message. One or more spaces may precede it. The standard execute character, the exclamation point (!), will be used on all single line messages. Where the input message is a multiline message (for example, see A VY:L/), the execute character is a slant (/), indicating more information will follow. The last line of the input message must use an end and an exclamation point (END!) to indicate the end of the message. The slant must never be used on a single line input message.

(e) An input message may be typed any time the TTY is not busy with an output message. After the first character is typed, a sharp sign (#) will be returned if the entire TTY buffer area is currently full. The typist should wait a few seconds and try again. If, after several tries, the area is still full, the priority of the input message can be increased ***"only if absolutely necessary."*** This action deletes one output message from the output buffer. The priority is increased by depressing the ***break*** key, typing a ***space,*** then following immediately with the desired input message.

(f) The preceding action will completely discard the remaining portion of the output message and put the TTY in the input state. Any output messages generated by this input will be put into the output buffer, if there is room, and will be typed after any output messages currently waiting for this TTY.

(g) If an error has been typed, or, for any other reason the input message should be abandoned, it may be done by typing the abandon character, the ampersand (&). This causes the input line to be erased and a line feed and

carriage return to be given. The current line may then be retyped correctly.

C. Network Channel Output Messages

4.11 ***General:*** Output messages applicable to the network channel may be divided into the following three categories:

(a) Acknowledgment of input messages

(b) Responses furnished to answer input messages

(c) No. 2 ESS generated condition reports.

4.12 ***Acknowledgment of Input Messages:*** Whenever an input message is completed, the system types out an acknowledgment indicating that the message has been received and what action has been taken. The acknowledgment is typed on the same line as the input message if a single-line message, and on the last line if a multiple-line message.

4.13 ***Error Messages:*** The following acknowledgment messages are returned directly by the TTY program when an internal error is detected. They are typed immediately following the execute character (!) or (/). In every case below, the ***entire*** message, even if multiple line, will be aborted, and the paper tape reader will ***not*** be turned back on if this message came from paper tape.

(a) ***?C***—The message appears to be a legal message, but it is not allowed from this channel. Recheck the message description in IM-2H200-01, Section C.

(b) ***?F***—A format error has occurred. The right kind of characters were not typed. Recheck the message format in IM-2H200-01, Section C.

(c) ***?I***—The first two fields of the message were not legal. Recheck the message index in IM-2H200-01, Section C.

(d) ***?O***—This channel is marked out-of-service. It must be restored to service before being used.

(e) ***?P***—A TTY parity error occurred during the input message. This message was not accepted by the system. Request TTY diagnostics on the channel being used.

(f) ***?T***—A time-out occurred while waiting for more input characters. This time-out is about 45 seconds. Time-out can be prevented by typing extra spaces before or after any field, or by typing a rub-out character in the input stream.

(g) ***?X***—The channel is in the paper tape mode, and the message does not contain the necessary paper tape control characters. The control characters ***X-OFF*** and ***ETX*** must be used to take the channel out of the current mode.

(h) ***??***—Either a system initialization of some degree occurred during the execution of this message (but not necessarily because of it) or the system has been forced into the digit mode (which could cause the loss of a character). The system cannot tell if the message is complete. The user must investigate and possibly repeat the message if not completed. The paper tape reader, when provided, will ***not*** be turned back on.

Caution: Do not blindly repeat any message without determining the reason for this response.

4.14 ***Input Responses:*** The following acknowledgments are returned by the program handling the particular input message typed.

(a) ***IP***—The message was received and is in process (being acted upon). A message may not follow. The request may still be rejected for validity reasons. If the message came from paper tape the reader will be turned back on.

(b) ***NG***—The message was not accepted (no good). The action or data fields were not accepted, or the present system state will not allow this message now. (Check the message description for allowable system states.) If the message came from paper tape, the reader-off character may not have preceded the execute (!), or slant (/), or abandon (&) character. If the message came from paper tape, the paper tape reader will ***not*** be turned on. The message must be retyped correctly from the beginning.

(c) ***OK***—The message was ***OK.*** It was accepted and the work requested has been accomplished. If the message came from paper tape, the paper tape reader will be turned back on.

(d) ***PF***—The message was received and is being acted upon. A printout will follow. If the message came from paper tape, the paper tape reader will be turned back on.

(e) ***RL***—The message should be repeated later. If the message came from paper tape, the tape reader will ***not*** be turned back on. This response may come for any of the following reasons.

(1) If an output was requested, the TTY waiting list may be full.

(2) The TTY program may have missed an input character due to a long scan time. All messages from paper tape are likely to obtain the same result at this time. Try only hand-typed messages if this response persists.

(3) Any reason given with the particular message.

(f) ***AR Type Output Message:*** This type message will be received in answer to a verify type input. The following items are provided with verification capability:

(1) Peg count register assigned to a line screening class

(2) Traffic schedule to which a MLH group is assigned

(3) Peg count register assigned to a 3- or 6-digit preroute code

(4) Traffic schedule to which a service circuit is assigned

(5) Traffic schedule to which a trunk group is assigned

(6) Route index assigned to a code index

(7) Day of the week in the No. 2 ESS memory

(8) Code index assigned to a 3- or 6-digit code

(9) Numbers or terminal equipment

(10) Multiline hunt groups

(11) Arrangement of a route index

(12) Speed calling

(13) Service circuits

(14) Trunks.

(g) One special AR type message will be received when an NG response is encountered. An NG response, as identified in 4.14(b), is generated by the No. 2 ESS when an input message is not accepted. Analysis of cause of failure of the input message is possible by using the contents of the special AR message. This message is:

AR RC ERR nnnnnn

The variable digits represented by ***n*** will permit selecting the appropriate six-digit error code from the OM-2H200. Subsequent action depends on the analysis of the six-digit error code.

4.15 The following describes the NG response and related AR RC ERx output messages caused by input errors.

(a) Some NG responses to network channel input messages will involve a related AR RC ERx message generated by the No. 2 ESS. Such messages will have an associated six-digit number. The NUMBER will be in the range:

LO-1 generic—163165-176523

EF-1 generic—265320-305535.

(b) Identify the cause of the NG message by locating the six-digit number of the AR RC ERx message in that portion of the output manual (OM-2H200). The OM-2H200 lists numerically all six-digit ***error codes*** applicable.

(c) ***Mx Type Output Message:*** Two messages fall under this type. Both relate to the status of the network channel TTY. (See OM-2H200-01.)

(d) ***TI and TR Type Output Message:*** These messages are always in response to T PR (traffic print request) input messages. They relate to the various traffic measurement schedules or to the TWT. (See OM-2H200-01.)

No. 2 ESS Generated Condition Reports

4.16 System conditions will be identified on the network channel TTY in an automatic manner. The system conditions identified in this manner are as follows:

DSP—Dynamic service protection

TNP—Toll network protection

SOL—System overload.

Such messages may appear separately, usually on a two-line message basis, as in the case of MA or MR output messages. (See OM-2H200.) These MA and MR output messages refer to system initialization levels (Ma SY CLR); to dynamic service protection (MA SY DSP); and to toll network protection (MR SY TNP NORMAL or ACTIVE).

(a) tt Ma SY CLR bbb ccc ddd eee

This message is generated each time there is an initialization (level 1 through 6). The variable b, c, d, and e positions identify the degree of level. These levels are referred to as maintenance recovery function (MRF). (See OM-2H200.)

(b) tt MA SY DSP

Dynamic service protection (the No. 2 ESS equivalent of line load control) action is being attempted by the No. 2 ESS. (See OM-2H200.)

(c) tt MR SY TNP—NORMAL bb-cc dddd-ee fff ggg

tt MR SY TNP—ACTIVE bb-cc dddd-ee fff ggg

The two messages above will appear when the status of toll network protection is changed by appropriate input messages. The ***normal*** message occurs when the MSY TNP OFF message is input. The ***active*** message will print whenever the M SY TNP ON message is input. (If no trunk groups are marked for TNP, any TNP inputs would have no impact on the system.) (See OM-2H200 and DFMP, Division H, Section 10d(3).)

4.17 Another means in which system conditions are transmitted to the network administrator is via the TWT scheduled printouts. The T PR input messages (traffic print requests) will cause the same inclusion of system condition mnemonics as the scheduled TI outputs. The outputs responding to a T PR input message will be TR output messages and listed under TI, TR, TX type output messages.

(a) tt TI PR CLR aaa bbb ccc day (time of day)

All ***stable*** call store, including traffic registers have been cleared by a complete ***STABLE INITIALIZATION.*** (See OM-2H200.)

(b) tt TX PR Q aaa bbb ccc day (time of day)

This message is ordinarily received when scheduled for specified quarter hours on the TWT. It may appear as an unsolicited, nonscheduled message when certain conditions exist in a clock quarter hour. These conditions are: *

- Number of dial tone speed tests is < or > 225
- Number of dial tone speed test failures are > 4
- Dynamic service protection (DSP) is active
- Toll network protection (TNP) is active
- A system overload (SOL) condition exists.

*See OM-2H200 as well as TG2H, Division 10, Section 1.

(c) tt TX PR LSM aaa bbb ccc day (time of day)*

This message is a printout of the load-service measurements. The measurements contain data collected since the last clock quarter hour to the time of the printout. The message format is identical to a Q schedule printout. (See OM-2H200 and TG-2H, Division 10, Section 1.)

*The LSM output message can never be scheduled and will print only when transient call store records are cleared and reinitialized.

D. Input/Output Message Index

4.18 Table A contains an alphabetical listing by topic of input/output messages available on the network channel. The IM and OM page numbers shown refer to the Bell Telephone Laboratories documents IM-2H200-01, Issue 7 (through addendum 3) and OM-2H200-01, Issue 7 (through addendum 1). Table A is an example of how a network administrator may want to keep track of messages for which the administrator is responsible.

E. Program for Administrative Traffic Reports on Line (PATROL) and Capacity Determination (CADET)

4.19 The program for administrative traffic report on line (PATROL), as announced in AT&TCo, General Letter 74-04-148, is a time-shared computer program which processes H schedule data from paper tapes which were punched on the No. 2 ESS network administration TTY for the desired busy hours. Before processing begins, however, the tapes must be transmitted by the network administrator from another TTY via the direct distance dialing (DDD) network to the AT&TCo time-shared VM 370 computer. Administrative and engineering reports will be generated from the transmitted information.

(a) The PATROL program provides the following features:

(1) On-line access to large quantities of data

(2) Daily, weekly, monthly, high day and busy season reports

(3) Data validation and threshold exception flagging capability

(4) Control of data retention

(5) Automatic selection of high day data

(6) Conversational style of communication with the computer.

(b) The PATROL program summarizes an hour's data for all items from the H schedule. This data is primarily used for central office engineering (COE). All other schedules on the work table should be summarized at the telephone company location.

4.20 The PATROL is integrated into the AT&T Total Network Data System (TNDS). Further information on PATROL and its use with the No. 2 ESS machine can be found in DFMP, Division H, Section 10p.

4.21 There is also another program under development by AT&T for capacity determination (CADET). Further information on CADET will also be found in DFMP, Division H, Section 10p.

F. Engineering and Administration Data Acquisition System (EADAS)

4.22 The No. 2 ESS machine can be interfaced with the EADAS network. The EADAS has been developed to economically meet the total fundamental traffic data acquisition needs of the operating companies. These needs, should begin with the actual acquisition of the data and should continue through to the final output. This includes TDAS, and the individual downstream programs such as the Central Office Equipment Reports (COER), Load Balance System (LBS), Trunk Servicing System (TSS), Trunk Forecasting System (TFS), and any future programs that may be developed. The EADAS is an integral part of a Total Network Data System designed to satisfy requirements for the acquisition, analysis, and management of all types of traffic data. It is recommended that this system be considered for use with No. 2 ESS. Output from EADAS can reduce the network administrator's time in interfacing traffic measurements with PATROL. Transmitting data via paper tape by the network administrator to PATROL, is eliminated. The No. 2 ESS inputs data directly to the EADAS system. The EADAS then inputs this data into the traffic data administration system (TDAS) which in turn transmits the required data to PATROL. Further information on EADAS use may be obtained from DFMP, Division D, Section 4f. Other information can be obtained from Traffic Facilities Practice, Division B, Section 9-a and 9-b.

5. REFERENCES

5.01 Additional information on the No. 2 ESS network channel teletypewriter and associated functions can be found in the documents listed below.

1. No. 2 ESS Translation Guide, TG-2H, Division 10

2. Input Manual, IM-2H200-01
3. Output Manual, OM-2H200-01
4. BSP 232-003-101—TTY Facilities Description
5. BSP 232-003-301—TTY Operating Procedures
6. BSP 232-120-301—Traffic and Plant Measurements
7. DFMP, Division H, Section 10d(1)—Operational Features, Dynamic Service Protection
8. DFMP, Division H, Section 10d(2)—Operational Features, Toll Network Protection
9. DFMP, Division H, Section 4f—EADAS, Operating Network Administrator TTY
10. DFMP, Division H, Section 10i—Traffic Measurements
11. DFMP, Division D, Section 10p—Data Management
12. TFP, Division B, Section 9-a and 9-b—Load Measurement Facilities
13. TFP Division D, Section 12g(2)—Teletypewriters and Teletypewriter Arrangements
14. Long Lines Pamphlet 999-400-908 LL

TABLE B

ABBREVIATIONS AND ACRONYMS

ABBREVIATION	TITLE
ASR	Automatic Send-Receive
CADET	Capacity Determination
COE	Central Office Engineering
COER	Central Office Equipment Reports
DDD	Direct Distance Dialing
DFMP	Dial Facilities Management Practice
DSP	Dynamic Service Protection
EADAS	Engineering and Administrative Data Acquisition System
ESS	Electronic Switching System
IM	Input Manual
LBS	Load Balance System
MRF	Maintenance Recovery Function
OM	Output Manual
PATROL	Program for Administration Traffic Reports on Line
PF	Print Follows
SOL	System Overload
TDAS	Traffic Data Administration System
TNDS	Total Network Data System
TFS	Trunk Forecasting System
TNP	Toll Network Protection
TPR	Traffic Print Request
TSS	Trunk Servicing System
TTY	Teletypewriter
TWT	Traffic Work Table
WPM	Words per Minute