APPENDIX A

AN/TTC-39A(V)1

This appendix is comprised of three annexes: Annex A (AN/TTC-39 Series Switch Features), Annex B (Technical and Functional Descriptions), and Annex C (Planning AN/TTC-39A(V)1 Switch Employment).

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ANNEX A TO APPENDIX A

AN/TTC-39 SERIES SWITCH FEATURES

1. General. AN/TTC-39 series CSs have a number of features and provide services of interest to the planner-engineer. In general, services are allocated to individual subscribers by assigning different classmarks in the database. The following paragraphs describe the features and the subscriber actions to use them. Where differences exist between the variants, they are noted. See also Chapter II, Section D, Subsection 2 for a discussion of the flood search related switch features which also apply to the AN/TTC-39D.

2. Precedence and Preemption

a. A CS can process five precedence levels, as indicated below in ascending order:

(1) Routine (R).

(2) Priority (P).

(3) Immediate (I).

(4) Flash (F).

(5) Flash Override (FO).

b. The maximum precedence level authorized to a terminal is assigned by a classmark. The precedence indicator (P, I, F, or FO) is dialed first in any dialing sequence. If no precedence is dialed, the call is processed as routine. Calls may be initiated by a subscriber at a precedence level lower than the maximum authorized. Once a call is established, the precedence level assigned by the originator is maintained no matter what level is authorized to other participants in the call. Subscribers attempting to use precedence levels higher than those authorized have the call processed at their maximum authorized level and are notified by recorded announcement that they have committed a precedence violation.

c. Preemption is employed to ensure that higher priority calls are given preference over lower priority calls. Loops, trunks, and common equipment (with the exception of senders and receivers) are preemptable. A call cannot preempt a line, trunk, or common equipment in the

switch that is handling a call of equal or higher precedence. (The call-service attendant can provide precedence service for subscribers on a per-call basis; this action does not alter the subscriber's maximum authorized precedence.) Each subscriber's precedence classmark is assigned on the ATS worksheet.

3. Local Calls. Local calls are made by dialing seven digits (PRSL GXX or NNX GXXX), where PR = 72-99, SL = 00-99, G = 1-8, X = 0-9, and N = 1-9.

4. Abbreviated Dialing. When the switch uses the 4/3 numbering plan (PRSL GXX), abbreviated dialing is automatically invoked. A subscriber needs only to dial the 3-digit GXX to reach any other local subscriber. When abbreviated dialing is used, no local subscriber telephone number begins with 9. The digit 9 is used as an escape code to access switches other than the local switch. Abbreviated dialing is invoked by a database entry when the switch uses the 3/4 numbering plan (NNX GXXX). When invoked, a local subscriber needs only to dial the last four digits of any other local subscriber (GXXX), but needs to dial the escape code (9) to call outside the local NNX switch code. The AN/TTC-39D does not use abbreviated dialing.

5. Long Distance Calls. If the distant subscriber has a different area code (MYX) or national code, those codes must also be dialed. The form for typical subscribers in a tactical network is 9+PRSL+GXX/NNX+GXXX, 9+MYX+PRSL+GXX/NNX+GXXX, or 9+9YX+MYX+NNXX+GXX.

6. DSN Calls. DSN calls are made by dialing 9+MYX+NNX+XXXX, where M = 2-8; Y = 0 or 1; X = 0-9; and N = 2-9. All DSN calls require a 10-digit address. The switch uses the area code to identify the call as DSN. See Chapter III for information on assigning area codes.

7. Compressed Dialing. Compressed dialing allows subscribers to dial a 2-digit number plus C to reach a called party. The 2-digit number is translated to the actual address by a table look-up. The called party may be a subscriber off the same switch or a subscriber off a remote switch. Two categories of compressed dialing exist: common-pool and individual. A terminal may be assigned to only one category.

a. Common-Pool Compressed Dialing. Each of five common-pool compressed dial lists may contain up to 80 compressed dial codes. Subscribers may be authorized access by classmark to one of the five common-pool directories. A subscriber authorized access to a list has access to all codes within that list and does not have access to any of the other four lists. The lists are numbered 1 to 5. The compressed dial numbers that may be used within each list are 20 to 99. The classmark for common-pool dialing is assigned on ATS worksheets. Compressed dial numbers are assigned on the ACP worksheet.

b. Individual Compressed Dialing. The individual compressed dial list may contain up to 80 compressed dial numbers (20 to 99) and may be subdivided into 8 subsets. Subsets are equivalent to the "list number" for common-pool compressed dialing. They are numbered 1 through 8. A compressed dial number may be a member of one subset, all eight subsets, or any number in between. Subscribers given access to individual compressed dialing features are further classmarked for access to a specific subset of the list. Subscribers, therefore, are given access to only one or a few compressed dial numbers, based on the subset assigned. Example entries on the form are shown below in Table A-1. Subscribers classmarked for subset 1 have access to 8172130 and 8172133 only; those classmarked for subset 2 can access all 6 numbers. The classmark for individual compressed dialing is assigned on the ATS worksheet. The compressed dial numbers and the subsets to which they belong are assigned on the AIC worksheet.

Table A-1. Example Compressed Dial List Entries

Compressed Dial Number	Directory Number	Subsets
20	8172130	1, 2
21	8172131	2
22	8172132	2
23	8172133	1, 2
24	8172134	2
25	8172135	2

8. Fixed-Directory Service. Fixed-directory service is a feature whereby roving subscribers and roving units are

given a fixed number. This constant fixed 7-digit number is used regardless of the subscriber or unit location within a given area code. The CS program uses this number, accesses a directory translator table, and translates the fixed-directory number to a switch code or subscriber number. When fixed-directory routing is used, the planner-engineer must ensure that the fixed-directory translation table is updated each time a roving unit or subscriber moves.

a. There are two fixed-directory lists. The fixed-directory subscriber list (FDSL) is used for locating roving subscribers and the fixed-directory unit list (FDUL) is used to locate roving units. (The FDSL is used by the AN/TTC-39D only to route calls to subscribers' extra switch, non-MSE switches.) The fixed-directory number has the form 99PXJXZ, where P = 7, 8, 9; X = 0-9; J = 7, 8, 9; and Z = 0, 1, 2, 3. This set of numbers allows for 3,600 combinations. The FDUL has the form 99XXIXX, where X = 0-9 and I = 0-6. (The AN/TTC-39D does not use the FDUL.) The first two digits after the 99 are used to index switch codes. The last three digits must match the called party's actual number at the switch indicated by the switch code. One hundred switch codes are allowed. Fixed-directory lists are entered into the database translation tables using the AFD routing worksheet.

b. Fixed-directory calls are accessed by a subscriber that dials the escape code (9), then 99-PXJXZ or 99-XXIXX. The switch software checks the third digit after the 99. If it is in the range 0 to 6, it then goes to the FDUL list. If in the range 7 to 9, the FDSL list is accessed. In either case, using the appropriate list, the switch translates the fixed-directory number to a 7-digit number of the form PRSL-IXX or NNX-XIXX. The switch then acts as if the translated number is the one that had in fact been dialed, with one exception. If the 7-digit number is not local to the switch, the software makes one further check. It checks the F or S information stored with the translated number. An F causes the switch to send the translated number. In either case, the switch selects the route, based on the translated number switch code (PRSL or NNX). Planner-engineers should be aware of the following:

(1) Option "F" in subparagraph 8b above is not used.

(2) Fixed-directory calls are translated to numbers containing seven digits; therefore, they are restricted to a

single area code. Using fixed-directory service over area code boundaries becomes a special case. To access a fixed-directory number in another area code, the following dialing sequence must be used: 9+MYX+99+PXJXZ or 9+MYX+99+XXIXX. The MYX is the area code within whose boundary the FDUL or FDSL resides, and the PXJXZ or XXIXX is the fixed-directory number from that area code. The originating switch routes the call using the area code. A switch in the called area code then translates the number.

(3) Dialing access to subscribers by using the FDUL feature is restricted to subscribers whose 3-digit directory number is of the form IXX, with I = 1-6. Subscribers with directory numbers outside these boundaries may be reached by using operator assistance at the roving unit location (dialing 0XX).

9. Conferencing. The AN/TTC-39 series is equipped with four five-party conference bridges and accommodates progressive and preprogrammed conferences. A progressive conference is one in which the originator calls other subscribers in sequence, waiting and verifying the connection before calling the next subscriber. A preprogrammed conference, on the other hand, is established under processor control from a previously determined subscriber list. The originator merely enters the proper code, and the switch processor determines the conferee's addresses. The switch processor then performs a table look-up and connects each listed party to the conference bridge. For a discussion of the effect of secure conference calls and LKG availability, see Chapter IV, paragraph 9. The switch processor establishes conferences among more than five subscribers by using more than one conference bridge. The maximum conference size varies by the number of conference bridges available and, therefore, by the size of the switch.

a. A party may be a local subscriber, a subscriber off a remote-switch, or a preprogrammed conference off a remote switch. Each conference bridge can handle secure or nonsecure conferences independent of any other conference call in process. In all cases, however, only plain text (PT) voice is present on the bridge. The conference originator is allowed to add one or more conferees, even while the conference is in traffic, depending on the availability of conference bridge ports or additional conference bridges. The capacity of interconnected conference bridges is shown in Table A-2:

Table A-2. Conference Bridge Capacities

Number of Interconnected Conference Bridges	Conference Size Maximum (Parties)
1	5
2	8
3	11
4	14
5	17
6	20

1/ AN/TTC-39 series limit.

b. The planner-engineer should note that progressive conferences and preprogrammed conferences are mutually exclusive classmarks. Subscribers can have only one capability. If a subscriber is classmarked for preprogrammed conference only, then that phone can be used only for preprogrammed conference calls.

(1) Progressive Conference. The classmark to allow a subscriber to initiate a progressive conference call is assigned on the ATS worksheet. (The progressive conference initiator must be classmarked for that privilege in the database. Other members of a progressive conference need not be so classmarked.) To establish a progressive conference, a subscriber calls each conferee in sequence. The dialing sequence for a progressive conference consists of the precedence indicator P, if desired, then the conference indicator C, followed by the designated address of the first conferee. This designator may be the full subscriber address or an abbreviated dial code. After the first conferee answers, the originator calls the next conferee by again entering C and the appropriate address. Calls to conferees who cannot be reached are terminated by the originator dialing C for release during the call set-up phase. This process is repeated until all desired conferees who can be reached are connected to the conference. The dialing sequence for a progressive conference call is:

(P) + C + Address (1st Call)

C + Address (All Other Calls)

(2) Preprogrammed Conference. A subscriber is assigned as a member of a preprogrammed conference on the APC worksheet. The subscribers who can initiate each preprogrammed conference are also identified on this worksheet. If a subscriber is limited to only preprogrammed conferences, a corresponding classmark is entered on the ATS worksheet. In a preprogrammed conference the addresses of a predetermined list of conferees is stored at the AN/TTC-39A(V)1. Dialing a special code causes the switch to automatically call each of the intended conference members in turn. The signaling sequence for this type of conference consists of the desired precedence indicator, then 6C, followed by the two-digit conference indicator of the form NX, where N = 2-9 and X = 0-9. A conference call is terminated when the originator goes on-hook or is preempted and goes on-hook. For those cases, the appropriate tone, conference disconnect, and preempt are applied to the bridge port that was released.

10. Commercial Network Access. This feature allows subscribers to access the commercial network. The classmark is assigned on the ATS worksheet. The network is accessed by the subscriber who dials a feature code and the end-of-dial code, in this case 5C. The switch connects the subscriber to the commercial office over a nonbusy trunk. For a dc closure trunk, the commercial office returns a dial tone, and the subscriber may dial up to a 13-digit commercial subscriber number. With a dc closure trunk, incoming calls from a commercial central office are intercepted at the call-service position. An E&M trunk has no operator intercept on indial or outdial.

11. Direct Access Service (DAS). DAS simulates a point-to-point, sole-user circuit in one direction. When a calling DAS subscriber goes off-hook, the switch automatically connects to the called subscriber. The connection is made at the precedence designated in the called number field. This precedence can equal but not exceed the precedence level authorized to the calling subscriber. Subscribers who initiate calls when they go off-hook are called DAS subscribers. A DAS or a non-DAS subscriber may receive the call. For DAS-to-DAS subscribers, one member should be set to a lower precedence than the other to prevent a glare condition if both go

off-hook simultaneously. The called party may be a local subscriber or a remote subscriber off an automatic switch. An AN/TTC-39 series subscriber classmarked as a DAS subscriber can initiate only DAS outgoing calls and receive only DAS incoming calls. An AN/TTC-39 series switch non-DAS subscriber (one who cannot initiate DAS calls) can receive both DAS and non-DAS calls.

a. Incoming DAS calls over trunks to an AN/TTC-39 series switch must be accompanied by a DAS traveling classmark. The AN/TTC-39 series switch generates this classmark. Therefore, incoming DAS calls to an AN/TTC-39 series subscriber must originate at another AN/TTC-39 series switch, and pass only through a switch or switches capable of transferring the DAS traveling classmark. There is no such restriction for outgoing DAS calls to other automatic switches.

b. The AN/TTC-39 series switch is capable of providing DAS for up to 60 subscribers. A DAS subscriber cannot be involved in a conference call. The DAS number called is entered into the database using the ATS worksheet.

12. Call Transfer. The CS permits the call service attendant or a subscriber classmarked for this service to transfer incoming calls to another instrument. Authorization for a subscriber to have this privilege is granted on the ATS worksheet. Although any number of subscribers can be granted this privilege, there are several restrictions:

a. Processor memory allocation is such that only 40 phones can simultaneously transfer calls.

b. A call can be transferred only once. For example, a call to phone A, which is in a transfer state to phone B, which is also in a transfer state to phone C, will ring phone B. The additional transfer to phone C is prevented.

c. The telephone instrument from which calls are being transferred must be capable of dialing 2C. (Phones such as those using dial-pulse and 20-Hz ringdown cannot use this feature.)

d. Members of line-hunting groups cannot transfer calls.

e. Data subscribers cannot transfer calls.

f. The subscriber activates this feature by dialing the call transfer access code (2C), then the directory number of the phone to which the calls are transferred. Success is indicated when the subscriber receives a call transfer dial tone (1,050 Hz). The phone can be another local subscriber or a remote subscriber. While in the call-transfer mode, only incoming calls are affected, and the phone may still be used for outgoing calls. In this case, the user receives call transfer dial tone, rather than normal dial tone (425 Hz). To cancel a call-transfer action, subscribers must again dial the 2C access code and then enter their telephone numbers. This feature is also available to the call-service position directory number; however, dial 0 calls are not affected. The call-service attendant cannot extend call-transfer privileges to a subscriber using the CSP equipment.

g. When calls are transferred, the classmarks and profile of the instrument to which a call is transferred are used to determine the completion mode of the call, not the characteristics of the transferring subscriber.

13. Transmission Media Selection. Subscribers can restrict the transmission medium to all analog or all digital by dialing special codes before the address digits.

a. Analog Transmission Required. If required, to request all-analog transmission, the subscriber dials 3C before the address digits. This prefix can be used only by analog terminals off an AN/TTC-39 series CS. It ensures an analog end-to-end connection. (The prefix might be used when transmission of quasi-analog signals is intended, or when degradation from multiple analog-to-digital conversions may occur.)

b. Digital Transmission Required. To request all-digital transmission, a subscriber dials 7C before the address digits. The prefix can be used only by digital subscribers (DSVT or DNVT) off an AN/TTC-39 series CS. It ensures a digital end-to-end connection. (This capability might be used to transmit digital data from a digital facsimile.)

14. Subscriber Security Preference. DSVT subscribers may request security for their calls or request end-to-end encryption.

a. Security Required. DSVT subscribers request security by dialing the prefix 1C before the address digits. In this case the call is not completed if the path includes a nonsecure portion. The path could include approved loops or trunks.

b. End-to-End Encryption Required. To request end-to-end encryption, a DSVT subscriber dials the prefix 4C before the address digits. This ensures that the entire path is encrypted, and that the path includes no approved loops or trunks. (This preference must be used if a compartmented S variable is to be utilized, and the DSVT isn't already classmarked for end-to-end encryption in the ATS screen.)

15. Subscriber Security Classmarks. There are four subscriber classmarks: security required, security preferred, nonsecure, and end-to-end.

a. Security Required. This classmark can be applied to any instrument. It requires that all calls to and from that instrument be secure. A nonsecure subscriber cannot place a call to a subscriber classmarked "security required." (For a DSVT-initiated call, this classmark does not guarantee a digital path or end-to-end encryption; the call could be routed over an approved loop and/or terminate at an approved loop.) The use of this classmark for an instrument other than a DSVT creates an approved loop. See paragraph 8, Chapter IV for a discussion of approved loops.

b. Security Preferred (SP). This classmark can be applied only to the DSVT (DSVT and DNVT in the TTC-39D). It causes the CS to attempt to complete the call as a secure call. Use of this classmark does not guarantee a digital path and does not guarantee that the call will be secure. If a call is completed as nonsecure, the SP subscriber will receive non-secure warning tone (NSWT) and the NSW light on the DSVT will flash to indicate the condition.

c. Nonsecure. This classmark can be applied to any instrument except the DSVT.

d. End-to-End. This classmark can be applied only to a DSVT. This classmark permits calls only to another DSVT.

16. Automatic Line-Hunting Group

a. This feature assembles up to five subscribers into an automatic line-hunting group. When a group member's address is dialed, the switch attempts to contact the desired party. If the called party is busy, the switch attempts the next listed member. Each member is sequentially attempted until one is successfully contacted, at which point the search ends. For Routine precedence calls, only one cycle through the group is made. If the call is at a precedence level higher than Routine, and all the members are found busy, the search is started again at Priority level. The cycle is repeated until contact is made or until contact with all members has been attempted at a precedence level one below the precedence at which the call was placed. Should all the lines be busy at an equal or higher priority, a busy tone is sent to the originator. The switch has the capacity for 32 automatic line-hunting groups of 2 to 5 members each. Subscribers classmarked for line-hunting should not also be classmarked for call transfer.

b. If the planner or engineer has a preference for the order in which the numbers are attempted, the switch supervisor may initially classmark all members of the line-hunting group with a zero. The switch supervisor later goes back and modifies the entry with the line-hunting group number. The modification is then done in the order in which the numbers are to be tried. The line-hunting group feature is assigned on the ATS worksheet.

17. Zone Restriction

a. This feature can restrict any terminal, on a terminal-by-terminal basis, from completing calls to designated destinations. The terminal may be a loop or a TGC. The feature is implemented through the use of eight tables, with each table designated as either permissive or restrictive. A permissive table is one in which the terminal is allowed to call only the codes listed. A restrictive table restricts a terminal from calling the codes listed. (The terminal may call any other code.) Of the 8 tables, 2 may have up to 101 entries; the remaining 6 may contain no more than 33 entries.

b. An important application of zone restriction concerns the use of DSN trunks. Calls can be routed from other switches and area codes to the local switch and tie up local DSN trunks. The local switch (with permission from

the planners) can zone restrict switches from interfacing to the DSN trunks. This is a network management issue and requires coordination with the JCCC. (See Chapter III, CJCSM 6231.01 for a discussion of the JCCC.)

18. Call Inhibit. This feature is similar to zone restriction except that it is not selectable on a terminal-by-terminal basis, but applies to all terminals of the switch. When implemented, the switch maintains a list of area (NYX) and switch (PRS) codes into which all calls are prohibited. Up to 20 area code tables are allowed, with as many as 50 selected switch codes per area code. For systems using the 3/4 numbering plan, NNX can be substituted for PRS. This feature is entered into the database by using the ACI worksheet. The AN/TTC-39D does not use the call inhibit feature.

19. TGC Traffic Limitations. The AN/TTC-39 series CS has two methods of controlling outgoing access to trunk groups. With the first method, a maximum precedence level is assigned to a TGC as a whole. Outgoing calls at a higher precedence than the established maximum are not allowed on the TGC. The second method also restricts calls on the basis of precedence. For each level of precedence, a number is assigned that establishes the maximum number of calls that may be placed at that precedence and below at any one time. This method can be used by both switches. Only one method of trunk-access control can be applied to a single TGC at one time. Both means of limiting trunk-group access are described in the following subparagraphs.

a. Assigning a Maximum Level of Precedence to the TGC. This feature is straightforward. Calls placed at a precedence higher than what is assigned to the trunk cluster are not routed over that TGC. This classmark is assigned to PBX and DIBTS TGCs on the ATG worksheet.

b. TGC Traffic Limitations. This feature allows the number of outgoing calls over a TGC to be limited at each precedence level, except for FO. FO calls are not subject to any such limitations. This feature is normally used only in a strategic network to ensure that a certain percentage of the trunks can be kept available for incoming calls. It is assigned using the ATG worksheet.

(1) Implementation is through a database entry whereby a table is created with an entry for each of the precedence levels: F, I, P, and R. The entry by each precedence is the total number of outgoing calls allowed at that precedence or below over the TGC. The entry associated with F must be greater than or equal to that which is associated with I, which must be greater than or equal to that which is associated with P, which in turn must be greater than or equal to that which is associated with R.

(2) Table A-3 illustrates possible database entries for four TGCs, A through D. For these entries, TGC A has no limitations; TGC B allows higher precedence and a progressively larger number of trunks; TGC C allows no outgoing calls at R or P; and TGC D allows only 10 outgoing calls at any precedence (except FO). Table A-4 shows an example of traffic through the TGC B in Table A-3. For the case of TGC B, the next attempted outgoing call at a precedence of Routine encounters an all-trunks-busy condition. The next outgoing call attempted at Priority or higher is allowed preemption, and one of the three Routine calls in progress is preempted.

20. Traffic Load Control (TLC). The TLC feature allows traffic to be limited during peak busy periods. Two types of TLC exist: trunk restriction and switch access restriction. Each type has two levels of implementation based on user importance. All subscribers are assigned to a group associated with a particular type and level of restriction. (A user may also be assigned to a class with no restriction.) The TLC classmarks are shown in Table A-5, listed in decreasing level of user importance.

Table A-3. Example TGC Traffic Limitation Table

	TGC			
	A	B	C	D
Total Trunks	30	30	30	30
F	30	25	30	10
I	30	20	30	10
P	30	15	0	10
R	30	10	0	10

Table A-4. Example Traffic Limitation for TGC B

	TGC B	
	Outgoing Calls Allowed	Active Outgoing Calls
F	25	7
I	20	3
P	15	12
R	10	3

Table A-5. TLC Classmarks and Restrictions

Subscriber Classmark	Type of User	Type of Restriction
Level 1	Most essential	No restriction
Level 2	More essential	Trunk restriction
Level 3	Essential	Trunk restriction
Level 4	Less essential	Switch access restriction
Level 5	Least essential	Switch access restriction

a. The switch automatically implements TLC when preset thresholds are exceeded during a measured period of time. The switch supervisor also may manually implement this feature. Trunk restriction, levels 2 and 3, may be implemented independently from switch access restriction, levels 4 and 5. Trunk restriction and switch access restriction are automatically removed at the end of the time period during which the appropriate traffic level has fallen below and stayed below the preset threshold. At all times, the switch supervisor can remove or change the TLC level.

(1) Trunk restriction is automatically applied when the cumulative number of outgoing calls offered to all trunk groups exceeds the preset thresholds. When it is applied, level 3 is implemented first and includes only those subscribers classmarked for level 3. If additional trunk restriction is required, level 2 is implemented and includes

those subscribers classmarked for level 2, as well as those classmarked for level 3.

(2) Switch access restriction is automatically applied when the cumulative number of calls originated by subscribers exceeds preset thresholds. When it is applied, level 5 is implemented first and includes only those subscribers classmarked for level 5. If additional switch access restriction is required, level 4 is implemented and includes those subscribers classmarked for level 4, as well as those classmarked for level 5.

b. Threshold levels and time periods are set in the database. The time period is variable from a 1-minute to 15-minute interval in 1-minute increments. The thresholds for levels 2 through 5 are adjustable from 0 to 2,047 calls during whatever time period has been specified. The only restriction on the number of calls established as a threshold is that the values established for levels 3 and 5 not exceed threshold values established for levels 2 and 4, respectively. TLC classmarks are assigned to subscribers on the ATS worksheet. Thresholds for TLC are assigned on the ATH worksheet.

21. Traffic Metering. Traffic meters monitor traffic flow through the switch. The planner-engineer can obtain traffic metering reports for the following: up to 10 designated loops, up to 28 designated TGCs, calls to the operator position, and total traffic count through the switch. The reports interval can be 60, 120, 240, 480, or 720 minutes. To obtain the reports, the planner-engineer must indicate Yes on the Periodic Report Print column of the ASC worksheet. A description of the reports available in the AN/TTC-39A(V)4/D is found in the following paragraphs. There are slight differences with the AN/TTC-39A(V)1.

a. Switch Traffic Report (R1). The R1 report indicates processed calls, completed calls, incomplete calls, call attempts to the operator, and dial tone delay.

b. Node Pair Traffic Report (R2). This report shows originated and completed node pair calls.

c. Summary Report for TGCs (R3). The R3 report indicates incoming calls, calls processed over primary TGCs, offered calls over primary and alternate TGCs by precedence,

completed primary TGC calls, idle and preempted calls for primary and alternate TGCs, incomplete primary TGC calls, average trunks utilized, average number of total trunks defined, average number of out-of-service trunks, percentage of trunk utilization, percentage of processed primary TGC calls that are completed, and percentage of offered calls that are completed.

d. Precedence Reports for TGCs (R4). This report shows offered calls to the primary and alternate TGCs by precedence, completed TGC calls for primary and alternate TGCs by precedence, and percentage of offered calls that are completed.

e. Loop Traffic Report (R5). The R5 report indicates originated loop calls by precedence to loops and trunks.

f. DTG Bit Error Rate Report (R6). This report shows the BER by DTG and the reported DTG BER.

g. Traffic Metering Limitations. The planner-engineer should request reports only on loops and TGCs that are needed. Operator, total number of calls by precedence, individual trunk group status, DTG approximate error rate, and total traffic count reports all must be assigned the same reporting frequency. (The loop traffic report may have a different reporting frequency.) It takes approximately 20 minutes to print all reports if 28 TGCs and 10 loops have been designated.

22. Information Signals. The AN/TTC-39 series CS provides 12 information signals to subscribers, as follows:

a. Dial Tone. This is a 425-Hz tone.

b. Ring-back. This is a 425-Hz tone, which is on for 2 seconds and off for 4 seconds.

c. Line Busy. This is an On and Off 425-Hz tone. The same information signal is used for line busy, trunk busy, and lockout. (If a phone remains off-hook beyond one of the time-out periods, it enters a lockout state.)

d. Error Tone. Error tone is an alternating 425 Hz, 1050-Hz signal, 125 ms at each frequency. It signifies that the subscriber has dialed a number in an invalid sequence or has encountered an incompatible connection.

e. Preempt Tone. This is a 480/620-Hz tone pair that is on for 1.25 seconds. This tone informs subscribers that the call was preempted by one of higher precedence. If the subscriber is to receive a new call as a result of the preempt, the subscriber must hang up the handset and await receipt of a ring signal. If the purpose of the preempt was to provide service to another subscriber, the line busy signal would be heard.

f. Nonsecure Warning Tone. This is a 1,050-Hz tone that has a 100-ms duration at 6-second intervals. This signal is used only with the DSVT (DSVTs and DNVTs in the TTC-39D), and it indicates that the call in progress is nonsecure.

g. Standby for Conference Recorded Announcement. This is a short announcement to inform subscribers that they are being connected to a preprogrammed conference.

h. Conference Disconnect Tone. This is a 480/620-Hz tone pair with a 1-second duration. This tone informs subscribers that a conferee, other than the conference originator, has gone on-hook.

i. Call Transfer Dial Tone. This is a 1,050-Hz tone. This dial tone informs subscribers that the previously requested transfer of incoming calls is in effect. (Subscribers can still use the telephone for outgoing calls.)

j. Out-of-Service Recorded Announcement. This announcement informs subscribers that the called loop number is out of service, does not exist, or is unassigned.

k. Precedence Violation Recorded Announcement. This announcement informs the originating subscriber that they have attempted to place a call at a higher precedence than is authorized from that telephone. The call is processed at the maximum precedence authorized for that telephone.

l. Zone Restriction Recorded Announcement. This announcement informs the originating subscriber that they have attempted to call an area that cannot be called from that telephone. Either a zone restriction or call inhibit condition is in effect.

23. Processor Controlled Strapping (PCS). The PCS feature is used to configure DTGs, GMs, the transmission group

module, NCMDs, TDMMs, and TSBs. Strapping is assigned on the ADT worksheet.

24. Channel Reassignment Function (CRF). The CRF can reassign channels from an incoming DTG to channels in an outgoing DTG. It can also reassign a single, digital, sole-user type of channel to a channel in an outgoing DTG. The database allows up to 64 reassignments to be made. This feature accommodates multiplex signaling formats 1, 2, 3, and 4A. The ACR worksheet is used to implement the CRF.

ANNEX B TO APPENDIX A

AN/TTC-39A(V)1 TECHNICAL AND FUNCTIONAL DESCRIPTIONS

1. Introduction. The AN/TTC-39A(V)1 is a stored program-controlled circuit switch that serves analog and digital loops and trunks. It interfaces with TRI-TAC digital telephones and trunks and is backward compatible with existing tactical equipment. The switch is also interoperable with DSN and commercial central offices. The AN/TTC-39A(V)1 accommodates internal TRI-TAC COMSEC equipment that provides bulk encryption for selected group traffic and per-call security for both DSVT and approved loop calls. Security also can be provided for conference calls. In addition, the switch can act as a COMSEC parent switch for the AN/TTC-48A(V)2, and a home subnetwork of SB-3865 switchboards. The AN/TTC-39A(V)1 repackages the AN/TTC-39 digital switching matrices, increasing total line termination capacity of the switch to 744 loops and trunks, of which the great majority are digital multiplexed lines. In addition, a limited nodal control capability and a newer processor, the L-3212A, were added to the AN/TTC-39A. Each of the redundant L-3212A processors has 512k words of solid-state memory.

2. Switching Architecture. The AN/TTC-39A(V)1 is a hybrid circuit switch. It has one analog switching matrix, space division switching group (SDSG) and two digital matrices time division switching group modified (TDSGM). When a call involves both an SDSG and a TDSGM subscriber or trunk, the matrix paths are connected by 1 of the 36 intermatrix units (IMUs). Analog single-channel loops and trunks, as well as switch common equipment (senders, analog receivers, and IMUs), are connected to the SDSG. Digital single-channel and multiplexed loops and trunks are terminated on the TDSGMs, as are digital receivers, IMUs, trunk signaling buffers (TSBs), loop key generators (LKGs), and conference bridges. Call service positions (CSPs) may interface with either the SDSG or the TDSGMs.

3. SDSG. Common equipment and analog cable channels (quads) are wired to SDSG matrix ports. The 156 SDSG ports have addresses of the form A-BB-CC, where A is the SDSG frame number, BB is the SDSG group, and CC represents the channel on the SDSG group. Because the AN/TTC-39A(V)1 has only one SDSG frame, A is always 1. BB ranges from 01 to 13, and CC has a range of 01 to 12.

a. SDSG and TDSGM Addresses. External circuits (subscriber loops or trunks) interface with the analog side of the AN/TTC-39A(V)1 via field cables. Each of the switch's 8, 26-pair analog cables carries up to 12 traffic channels. Therefore, a maximum of 96 single-channel trunks or subscriber loops can terminate at the SDSG SEP. In addition, 60 matrix ports are reserved on the SDSG for internal common equipment and spares. When a planner-engineer uses the assign terminal service (ATS) and assign terminal type (ATT) worksheets to assign trunks, subscriber loops, and common equipment to the AN/TTC-39A(V)1 database, the SDSG or TDSGM address must be used. Quad numbers, nine-channel multiplex/ demultiplex (NCMD) channel numbers, and unit and port identifiers should not be used. Instead, the planner-engineer must identify the equipment's location on the switch by entering an SDSG or TDSGM address.

b. LTUs. The circuit path of each quad and piece of common equipment on the SDSG includes a line termination unit (LTU) wired to the matrix. LTUs are mounted on printed circuit boards (PCBs) and contain the necessary equipment to interface the circuit with the switching matrices. They respond to processor commands to make and break matrix connections. They also provide inlet-busy and outlet-busy status to the processor and perform path verification. Specific LTU characteristics are as follows:

(1) There are five LTUs that may be used to terminate analog loops, trunks, and common equipment on the SDSG. In addition to the LTUs, there are three types of special circuit adapters that may be used in the circuit paths of selected analog loops and trunks.

(2) The following is a list of the circuit cards and adapters that interface with the AN/TTC-39A(V)1's SDSG. The LTUs and special adapters are described in detail in Appendix D.

(a) Analog LTUs

NWLTU	Normal Wideband LTU
CBLTU	Common Battery LTU
AVLTU	Overseas DSN Telephone LTU
1600-Hz LTU	1600-Hz Ringdown LTU
20 Hz-LTU	20-Hz Ringdown LTU

(b) Special Adapters

SF	single frequency (2600 Hz) adapter
DCCLR	dc closure adapter
E&M	E&M 6-wire adapter

4. TDSGM. The digital side of the AN/TTC-39A(V)1 has two TDSGM frames, with 324 ports per frame. Each TDSGM is made up of TDMF cards. The time division matrix function (TDMF) is a single card consisting of one 64-channel time-division switching matrix (a time division memory module (TDMM)), six NCMDs, and a Switch MUX/DEMUX. TDMFs 1-6, 13, and 14 are on TDSGM frame 1; TDMFs 7-12 and 15 are on TDSGM 2. (TDMF 18 is a spare card that can be used with TDSGM 1.) NCMD circuitry on TDMFs 13-15 is bypassed, and the interfacing terminations are wired directly to TDMF ports. Therefore, there are 36 NCMDs active on each TDSGM (6 NCMDs per each of 6 TDMFs). The 36 NCMDs handle 324 channels, of which 322 may be used for external lines, and 2 are reserved for test terminals.

a. TDMF Usage. TDMFs 13-15 and 18 are used for internal common equipment, spares, and test channels. Remaining TDMFs terminate the external trunks and subscriber loops appearing at the TDSGM SEPs as field cables and multiplexed groups DTGs.

b. SDSG-TDSGM Comparison. The switching architecture of the two TDSGMs is much different from that of the SDSG. Although the various types of digital common equipment are wired directly to the switching matrices; external channels are not. DTG channels and, in all but a few instances, cable pairs carrying trunks and subscriber loops to the AN/TTC-39A(V)1 are connected to the matrix through NCMD equipment. With the exception of two channels per TDSG, frame and digital field-cable channels interface with the switching matrices via NCMDs and loop MUX/DEMUX equipment. Each TDSGM has two loop MUX/DEMUXes: LP-1 and LP-2. The assignments of external channels to the NCMDs are made, subject to the restrictions given below, at the planner's discretion. Therefore, although NCMD-to-TDSGM assignments are fixed, matrix assignments of trunks and subscriber loops are not.

c. TDSGM Addresses. Each TDSGM port has an address of the form DD-EE, where DD identifies the TDMM number, and EE is the port on the TDMM to which the terminal equipment has

been assigned. DD can range from 01 to 15, and EE can have a range of 00-63.

d. Assignment of External Channels to NCMDs. There is considerable flexibility in the assignment of external channels to NCMDs, but there are some restrictions. For example, field-cable channels normally are assigned, by convention, to the first eight NCMDs on each TDSGM. If a planner assigns a DTG to one of these NCMDs, the person entering the data into the switch will receive a ramification message on the operator's screen indicating that NCMDs 1-8 normally are assigned to the loop MUX/DEMUX. The operator can change the matrix assignments of the quads by assigning the cables to other NCMDs (or, more precisely, by using the ATS screen to assign the circuits to TDSGM addresses corresponding to other NCMD channels). However, because the loop MUX/DEMUX interfaces only with the first two TDMFs on each TDSGM frame, field cables may be assigned only to NCMDs 1-12. Field-cable channels cannot be assigned to NCMDs 13 through 36. Because there are more than enough NCMD channels available for the field-cable loops and trunks, this is not considered a limitation.

(1) Group-to-NCMD Assignments. With the exception of a few test terminals, all NCMD channels not used for field cables may be used for digital transmission group (DTG) channels. There are, however, restrictions governing the assignments of DTGs. For TDSGM frame 1, DTGs 9-15 must use NCMDs 1-18. DTGs 1-8 must use NCMDs 19-36. For TDSGM frame 2, DTGs 24-30 must use NCMDs 1-18. DTGs 16-23 must use NCMDs 19-36. The planner must be careful when entering ADT and ATS data for DTG and DTG channel assignments, respectively. When entering assign digital transmission group (ADT) data, the planner must be sure that a group's Start and End NCMDs are in the same subset of NCMDs. For example, if a group's Start NCMD were #15, then the End NCMD could not be greater than #18. Table A-6 provides a quick reference for the permissible DTG-to-NCMD assignments.

(2) DTG-to-NCMD Assignments. Each DTG is connected to one or more consecutive NCMDs. The first channel of the first NCMD assigned to the group is used for overhead purposes. The assignment of the group to the switch is done using the ADT database worksheet. Assignments of individual channels within a DTG are made using the ATS database worksheet. With the exception of 4 1/2-channel DTGs,

Table A-6. Permissible DTG-to-NCMD Assignments

DTG	NCMD	TDMF
1-8	19-24 25-30 31-36	4 5 6
9-15	1-6 7-12 13-18	1 2 3
16-23	19-24 25-30 31-36	10 11 12
24-30	1-6 7-12 13-18	7 8 9

two DTGs never share an NCMD. When the channel assignment of one DTG has been completed, the subsequent DTG is connected to the next free NCMD in the subset. This is required even if there are unused channels on the previous group's last NCMD.

(3) DTG-to-NCMD Assignment Data. The following paragraphs briefly describe the data that the switch processes to make DTG-to-NCMD assignments. Refer to Chapter V for more information about DTG-to-switch assignments.

(a) Start/End NCMDs. Start and End NCMD entries on the ADT worksheet tell the switch which NCMDs and matrix addresses must be used for the group. Selection of these NCMDs is based on the number of channels in the group and on the group's modularity.

(b) Group Modularity. For groups with 9-channel modularity (modulo 9), all 9 channels on each NCMD are used for termination of the groups' channels. For modulo 8 DTGs, only the first 8 channels of each NCMD are used for group terminations. Thus, 1 of every 9 TDMX terminations associated with an NCMD is not used. Therefore, modulo 9 is more efficient. Database entries for the group rate and the switch channel rate (assigned by the ASI worksheet) allow the switch to determine group modularity.

(c) Group Rate. The group rate entry on the ADT worksheet identifies the data rate of the group as a whole or the combined output rate of TGM subgroups. This input, in combination with the switch channel rate, tells the switch which NCMD channels are to be used for terminating the DTG's channels.

(d) Multiplex Signal Format (MSF)/Subgroup Rate. Another consideration when interfacing DTGs with the switch is the groups' MSFs. The MSF entry on the ADT worksheet tells the switch how to assign subgroup channels within a group. The AN/TTC-39A(V)1 accommodates MSFs 1, 2, 3A1, 3A2, 3A3, 3B, 3C, and 4. CJCSM 6231.04, Appendix B, provides descriptions of the various MSFs.

(4) DTG Assignment. The entries for group rate and Start and End NCMDs on the ADT worksheet provide enough information for the switch to assign the DTG channels to the NCMDs. Based on these entries, matrix assignments (TDSGM addresses) for individual channels within a group are made automatically. Switch supervisors must manually correlate group-to-NCMD assignments with the resultant matrix-address assignments. They then use the latter to assign DTG's loops or trunks to the switch at the ATS screen.

e. Digital Cards. As is the case with the SDSG, switch common equipment and single-channel loops and trunks on the digital side of the CS interface with the TDSGMs by means of LTUs. The following cards are used to interface loops, trunks, and common equipment with the TDSGM: diphase loop modem A (DLPMA) and group modem (GPMDM). Each card is discussed in Appendix D.

5. Connections and Patching of External Circuits. Single-channel subscriber loops and trunks are wired to junction boxes via 26-pair field cables. (Each field cable uses a separate J-box.) From the J-boxes, the circuits are carried via SM-D-811235 stub cables to the connectors on the switch shelter signal entry panel (SEP).

a. SDSG Connections and Patching. A maximum of 96 external analog terminations can appear on the SDSG. All of the terminations are single-channel circuits appearing on the SEP at the 26-pair field cables.

(1) Analog Field Cables

(a) The AN/TTC-39A(V)1 SDSG accommodates eight 12-channel analog field cables. These are terminated on connectors J1-J8 of the SDSG SEP, MP2. Circuits on SDSG cables 3 through 8 are hardwired from the SEP to the field-cable side of the SDSG patch panel. Normally, the field-cable side is through-connected to the network side of the SDSG patch panel. The network side, in turn, is hardwired to the LTUs. Card slots for the LTUs are wired to the analog switching matrix. The through connection from the field-cable to the network side of the SDSG patch panel may be interrupted by the insertion of a patch cord. Table A-7 provides the standard configuration for analog field cables 3 through 8.

(b) SDSG cables 1 and 2 are wired through two additional patch panels, the ALCG and the special-circuits patch panel. These patch panels are in the circuit path between the SEP and the SDSG patch panel. Cables 1 and 2 provide access to ALCG circuits and 24 special-circuit adapters. Table A-8 provides the standard configuration for analog field cables 1 and 2. Connections at the ALCG and special-circuits patch panels are normally through connections. Connections may be interrupted, however, by inserting patch cords in the proper jacks. Line-conditioning circuits are inserted into a line by connecting a patch cord (at the ALCG patch panel) from (a) both the field and network sides of a line, and (b) the appropriate input and output of an amplifier, attenuator, or equalizer. Connecting a patch cord from field to the network side of the special-circuits patch panel bypasses the adapter assigned to the channel. (This bypass must be done when the slot wired to the channel has no adapter.)

b. TDSGM Connections and Patching. The AN/TTC-39A(V)1 can have up to 648 external digital lines, most of which must be carried on multiplexed groups or DTGs. The switch can accommodate up to 144 single-channel external lines. All external circuits, MUXed and single-channel, interface with the switch via SEPs.

Table A-7. Standard Configuration of Analog Field Cables 3 Through 8

		Field-Cable Number					
	Pair	3		4		5	
Quad	RX TX	SDSG Slot	SDSG Address	SDSG Slot	SDSG Address	SDSG SLOT	SDSG Address
1	1 2	A1-05	1-12-02	A1-07	1-11-03	A1-09	1-10-04
2	3 4	A1-05	1-13-02	A1-07	1-12-03	A1-09	1-11-04
3	5 6	A2-05	1-01-03	A2-07	1-13-03	A2-09	1-12-04
4	7 8	A2-05	1-02-03	A2-07	1-01-04	A2-09	1-13-04
5	9 10	A3-05	1-03-03	A3-07	1-02-04	A3-09	1-01-05
6	11 12	A3-05	1-04-03	A3-07	1-03-04	A3-09	1-02-05
7	13 14	A1-06	1-05-03	A1-08	1-04-04	A1-10	1-03-05
8	15 16	A1-06	1-06-03	A1-08	1-05-04	A1-10	1-04-05
9	17 18	A2-06	1-07-03	A2-08	1-06-04	A2-10	1-05-05
10	19 20	A2-06	1-08-03	A2-08	1-07-04	A2-10	1-06-05
11	21 22	A3-06	1-09-03	A3-08	1-08-04	A3-10	1-07-05
12	23 24	A3-06	1-10-03	A3-08	1-09-04	A3-10	1-08-05

		Field-Cable Number					
	Pair	6		7		8	
Quad	RX TX	SDSG Slot	SDSG Address	SDSG Slot	SDSG Address	SDSG Slot	SDSG Address
1	1 2	A1-11	1-09-05	A1-13	1-08-06	A1-15	1-07-07
2	3 4	A1-11	1-10-05	A1-13	1-09-06	A1-15	1-08-07
3	5 6	A2-11	1-11-05	A2-13	1-10-06	A2-15	1-09-07
4	7 8	A2-11	1-12-05	A2-13	1-11-06	A2-15	1-10-07
5	9 10	A3-11	1-13-05	A3-13	1-12-06	A3-15	1-11-07
6	11 12	A3-11	1-01-06	A3-13	1-13-06	A3-15	1-12-07
7	13 14	A1-12	1-02-06	A1-14	1-01-07	A1-16	1-13-07
8	15 16	A1-12	1-03-06	A1-14	1-02-07	A1-16	1-01-08
9	17 18	A2-12	1-04-06	A2-14	1-03-07	A2-16	1-02-08
10	19 20	A2-12	1-05-06	A2-14	1-04-07	A2-16	1-03-08
11	21 22	A3-12	1-06-06	A3-14	1-05-07	A3-16	1-04-08
12	23 24	A3-12	1-07-06	A3-14	1-06-07	A3-16	1-05-08

Table A-8. Standard Configuration of Analog Field Cables 1 and 2

Field-Cable Number									
	Pair	1				2			
Quad	RX TX	SDSG Card Slot	SDSG Address	CEG Adapter Slot 1/	ADP NO.	SDSG Card Slot	SDSG Address	CEG Adapter Slot 1/	ADP No.
1 2	1 2 3 4	A1-01 A1-01	1-01-01 1-02-01	A1-03 A1-05 1/	1 2	A1-03 A1-03	1-13-01 1-01-02	A1-27 A1-29 1/	13 14
3 4	5 6 7 8	A2-01 A2-01	1-03-01 1-04-01	A1-07 A1-09	3 4	A2-03 A2-03	1-02-02 1-03-02	A1-31 A1-33	15 16
5 6	9 10 11 12	A3-01 A3-01	1-05-01 1-06-01	A1-11* A1-13	5 6	A3-03 A3-03	1-04-02 1-05-02	A1-35 1/ A1-37	17 18
7 8	13 14 15 16	A1-02 A1-02	1-07-01 1-08-01	A1-15 A1-17 1/	7 8	A1-04 A1-04	1-06-02 1-07-02	A1-39 A1-41 1/	19 20
9 10	17 18 19 20	A2-02 A2-02	1-09-01 1-10-01	A1-19 A1-21	9 10	A2-04 A2-04	1-08-02 1-09-02	A2-03 A2-05	21 22
11 12	21 22 23 24	A3-02 A3-02	1-11-01 1-12-01	A1-23 1/ A1-25	11 12	A3-04 A3-04	1-10-02 1-11-02	A2-07 1/ A2-09	23 24

1/ Adapter slots can hold SF and DCCLR cards. In addition, those slots marked by an asterisk can accommodate an E&M card. However, when that card is used, the adjacent slots must be left vacant.

(1) TDSGM SEP. Each of the two TDSGMs has a SEP. With the exception of a low-speed cable driver modem (LSCDM), groups and single-channel loops and trunks interfacing with TDSGM 1 use SEP MP1; circuits terminating on TDSGM 2 use MP4. Both TDSGM SEPs have 6 connectors (J1-J6) for digital field cables. The 144 digital single-channel loops and trunks interface with the switch via the 12 field cables. A maximum of 15 DTGs also are accommodated per TDSGM SEP. Fourteen of these use group modems, which are terminated in SEP connectors A1 through A14. The 15th group on each TDSGM frame, if used, must be an LSCDM. The two LSCDMs may be terminated in the last two connectors on the bottom righthand side of SEP MP4.

(2) Digital Field Cables. As noted above, the 12 digital field cables terminate on connectors J1 through J6 of MP1 and MP4. The circuits are hardwired from the SEPs to

the field-cable side of the TDSGM patch panels. The field-cable side normally is through-connected to the network (modem) side of the SEP's field-cable group. The network side of the circuit is wired to a DLPMA card. TDSGM nest card slots for the DLPMAs are, for the most part, wired to the loop MUX/DEMUXes. Matrix addresses for field-cable channels are determined by the positioning of the loop MUX/DEMUXes on the NCMDs. Normal-through connections from the field-cable to the network side of the TDSGM patch panels may be interrupted by the insertion of patch cords. Tables A-9 and A-10 provide the standard configurations for digital field cables.

6. Common Equipment. Some of the ports on both the analog and digital matrices are set aside for switch common equipment. For the AN/TTC-39A(V)1, common equipment assignments are on the STA program library tape (PLT). ATS or ATT worksheets may be used to modify AN/TTC-39A(V)1 common-equipment assignments. A brief description of each type of common equipment type is given below.

a. CSP, Terminal Type 96 and CSP TDSGM, Terminal Type 121. The AN/TTC-39A(V)1 CSP allows the switch call attendant to provide call-completion assistance, busy/no-answer verification, and directory and routing information. The operator also can report troubles, perform call splitting/holding, and establish secure calls and conferences. The switch can have up to one local and three external CSPs. The latter can be remoted up to 100 meters from the switch.

(1) CSP Bridge. The CSP has a three-party bridge that permits conversations among the call attendant and the calling and called parties. Consequently, the bridge has two matrix appearances, designated port 1 and port 2. These are connected via 4-wire analog loops through a J-box to the appropriate SEP. A third port on the bridge is connected to the attendant's headset.

(2) Voice Ports. The voice ports for the local CSP terminate on the TDSGM. It is possible, however, to change this assignment. Addresses for the two voice ports can be either on the SDSG or the TDSGM. The internal Type 96 (analog) CSP voice ports terminate on an SVLTU card; however, external analog CSPs use ac-strapped NWLTUs to interface with the SDSG. CSP voice ports connected to a TDSGM are terminated on continously variable slope delta (CVSD) cards. Regardless of the choice of matrix appearance

for the two voice ports, the CSP serves both digital and analog callers seeking call assistance.

Table A-9. Standard Configuration of Digital Field Cables-TDSGM 1

		Field-Cable Number								
	Pair	1			2			3		
Quad	RX TX	TDSGM Slot	NCMD Chan	TDMX ADDR	TDSGM Slot	NCMD Chan	TDMX ADDR	TDSGM Slot	NCMD Chan	TDMX ADDR
1	1 2			01-07		2-4	01-20		3-7	01-32
2	3 4	A3-03	1-2	01-09	A3-07	2-5	01-21	A3-11	3-8	01-33
3	5 6		1-3	01-10		2-6	01-22		3-9	01-34
4	7 8		1-4	01-11		2-7	01-23		4-1	01-35
5	9 10	1/	1-5	01-12		2-8	01-24		4-2	01-36
6	11 12	A3-04	1-6	01-13	A3-08	2-9	01-25	A3-12	4-3	01-37
7	13 14		1-7	01-14		3-1	01-26		4-4	01-38
8	15 16		1-8	01-15		3-2	01-27		4-5	01-39
9	17 18		1-9	01-16		3-3	01-28		4-6	01-40
10	19 20	A3-05	2-1	01-17	A3-09	3-4	01-29	A3-13	4-7	01-41
11	21 22		2-2	01-18		3-5	01-30		4-8	01-42
12	23 24		2-3	01-19		3-6	01-31		4-9	01-43

		Field-Cable Number								
	Pair	4			5			6		
Quad	RX TX	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM SLOT	NCMD CH	TDMX ADDR
1	1 2		5-1	01-44		6-4	01-56		7-7	02-14
2	3 4	A3-15	5-2	01-45	A3-21	6-5	01-57	A3-25	7-8	02-15
3	5 6		5-3	01-46		6-6	01-58		7-9	02-16
4	7 8		5-4	01-47		6-7	01-59		8-1	02-17
5	9 10		5-5	01-48		6-8	01-60		8-2	02-18
6	11 12	A3-16	5-6	01-49	A3-22	6-9	01-61	A3-26	8-3	02-19
7	13 14		5-7	01-50		--	01-62		8-4	02-20
8	15 16		5-8	01-51		7-2	02-09		8-5	02-21
9	17 18		5-9	01-52		7-3	02-10		8-6	02-22
10	19 20	A3-17	6-1	01-53	A3-23	7-4	02-11	A3-27	8-7	02-23
11	21 22		6-2	01-54		7-5	02-12		8-8	02-24
12	23 24		6-3	01-55		7-6	02-13		8-9	02-25

1/ As delivered, the AN/TTC-39A(V)1 does not have a DLPMA in this slot, but has a CVSD card in Slot A202.

Table A-10. Standard Configuration of Digital Field Cables-TDSGM 2

		Field-Cable Number								
	Pair	1			2			3		
Quad	RX TX	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM Slot	NCMD CH	TDMX ADDR
1	1 2			07-07		2-4	07-20		3-7	07-32
2	3 4	A3-03	1-2	07-09	A3-07	2-5	07-21	A3-11	3-8	07-33
3	5 6		1-3	07-10		2-6	07-22		3-9	07-34
4	7 8		1-4	07-11		2-7	07-23		4-1	07-35
5	9 10	1/	1-5	07-12		2-8	07-24		4-2	07-36
6	11 12	A3-04	1-6	07-13	A3-08	2-9	07-25	A3-12	4-3	07-37
7	13 14		1-7	07-14		3-1	07-26		4-4	07-38
8	15 16		1-8	07-15		3-2	07-27		4-5	07-39
9	17 18		1-9	07-16		3-3	07-28		4-6	07-40
10	19 20	A3-05	2-1	07-17	A3-09	3-4	07-29	A3-13	4-7	07-41
11	21 22		2-2	07-18		3-5	07-30		4-8	07-42
12	23 24		2-3	07-19		3-6	07-31		4-9	07-43

		Field-Cable Number								
	Pair	4			5			6		
Quad	RX TX	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM Slot	NCMD CH	TDMX ADDR	TDSGM Slot	NCMD CH	TDMX ADDR
1	1 2		5-1	07-44		6-4	07-56		7-7	08-14
2	3 4	A3-15	5-2	07-45	A3-21	6-5	07-57	A3-25	7-8	08-15
3	5 6		5-3	07-46		6-6	07-58		7-9	08-16
4	7 8		5-4	07-47		6-7	07-59		8-1	08-17
5	9 10		5-5	07-48		6-8	07-60		8-2	08-18
6	11 12	A3-16	5-6	07-49	A3-22	6-9	07-61	A3-26	8-3	08-19
7	13 14		5-7	07-50		--	07-62		8-4	08-20
8	15 16		5-8	07-51		7-2	08-09		8-5	08-21
9	17 18		5-9	07-52		7-3	08-10		8-6	08-22
10	19 20	A3-17	6-1	07-53	A3-23	7-4	08-11	A3-27	8-7	08-23
11	21 22		6-2	07-54		7-5	08-12		8-8	08-24
12	23 24		6-3	07-55		7-6	08-13		8-9	08-25

1/ DLPMA (A304) must be removed if CVSD (A202 or A204) is installed.

(3) Signaling Port. In addition to the two voice ports, there is a signaling port in the CSP. A 4-wire circuit connects a CSP loop modem with a digital receiver in

the TDMX. This circuit is used for signaling and for controlling a CSP status and alarm panel.

(4) Call Queue. Subscribers reach the call attendant by dialing either 0 or the unique extension number associated with that attendant position. Calls are placed in a queue and receive a ring-back tone until an attendant answers. Ring-down lines, which lack a dial capability, are routed automatically to the queue. The queue accommodates 20 callers and is shared by the 4 CSPs.

b. IMU, Terminal Type 98. When a call involves both a digital and an analog loop or trunk, analog-to-digital and digital-to-analog conversions must be done. These are accomplished by the switch IMUs, which interface the SDSG with the TDSGMs. There are 36 IMUs in the AN/TTC-39A(V)1. Use the ATT worksheet to plan IMU data. (The switch IMU configuration normally need not be changed.)

c. RCU, Terminal Type 100. The switch has five rate changer units (RCUs). These are pooled to provide rate conversions for analog via DTG (AVDTG) subscribers connected through the TDMX with 16-kbps trunks or loops. AVDTG groups operate at a 32-kbps channel rate. A rate conversion must occur whenever an AVDTG subscriber is connected to a 16-kbps circuit. Each RCU has two CVSD units, one to convert the 32-kbps signal from and to analog, and the other to convert the 16-kbps signal from and to analog. The analog interfaces of the two RCU ports are connected. When necessary, the AVDTG subscriber is connected to the 32-kbps port, and the 16-kbps trunk or loop is connected to the 16-kbps port. The connection is maintained for the duration of the call.

d. Digital Trunk-Signaling Buffers, Terminal Type 117 and DIBTS Buffer, Terminal Type 110. The AN/TTC-39A(V)1 can have up to 30 TSBs. TSBs terminate the out-of-band, or common-channel, signaling used on TRI-TAC interswitch trunk groups. They are dedicated to TGCs that use common-channel signaling. DSBs accommodate the in-band signaling used with SB-3865 trunks. DSBs are pooled rather than dedicated. Any combination of TSB and DSB cards may be used to make up the 30 TSBs. Each card contains two buffers. Note that inter-switch trunk groups are those between the major TRI-TAC switches, namely, the AN/TTC-39 series, the AN/TTC-46, the AN/TTC-47, the AN/TTC-42, and the AN/TYC-39. Interswitch trunk groups are described as follows:

(1) The AN/TTC-39A(V)1 can accommodate analog interswitch trunks. Therefore, a pair of AN/TTC-39A(V)1s can be connected by analog Terminal Type 28 trunks. Like digital interswitch trunk groups, analog groups of this type use common-channel signaling (CCS). Consequently, TSBs are needed for both analog and digital common-channel signaling. Only two TSBs (buffers 3 and 4) will handle the analog interface. Each of these is wired to a Type-II modem, which converts the TSB output to a frequency shift keying (FSK) signal compatible with the analog medium. TSBs 3 and 4 must be manually patched.

(2) The switch supervisor uses the assign trunk group cluster ATG command to add trunk signaling buffers (TSBs) to interswitch TGCs. Any of the 30 TSBs may be assigned to a digital TGC, but **only** TSB 3 or 4 may be assigned to an analog TGC. In the latter case, do not assign the TSB to a TDMX address. Table A-11 lists the card slots containing the Type-II FSK modems and TSB cards. TSBs are installed in the TDSGM card nests, and Type-II cards are found in the SDSG nest. These modems are strapped in accordance with paragraphs 6-37 and 6-38 of TM 11-5805-747-12-3 (T.O. 31W2-2TTC39-91-3).

Table A-11. Modem and TSB Assignments for Analog Common-Channel Signaling

TSB Number	Common-Channel Signaling	Type II Modem Slots		TSB Location
		MOD21	MOD22	TDSGM Nest (Frame 1)
		SDSG Card Nest		
3	1	A6-33	A6-31	A5-35
4	2	A6-36	A6-34	A5-36

e. Analog Senders and Receivers. Senders and receivers are pooled common equipment, required for signaling with analog loops and trunks. A receiver collects the digits dialed by the terminal requesting service and relays them to the processor, which uses the information to establish a path through the switching matrices. Senders forward 25 different tones and 4 recorded announcements to the calling

and called loops and trunks during the call's signaling phase. Each receiver card multiplexes up to eight analog inputs from the service LTUs (SVLTU) in the SDSG card nest. (SVLTUs interface the receivers with the SDMX.) Dual tone multifrequency (DTMF) receivers used for analog via DTG (AVDTG) subscribers are assigned on a per-call basis to a channel on the CVSD A card.

(1) DTMF Receiver, Terminal Type 111. This equipment detects dialed digits from telephones with DTMF (two-out-of-eight voice-band) signaling. The receiver also detects the control tones, 570 and 2,600 Hz.

(2) MF Receiver, Terminal Type 112

(a) Multifrequency (MF) receivers detect digits and control tones from other switches. These digits and control tones are a combination of two-out-of-six voice-band tones.

(b) Assign the DTMF and MF receivers using ATS database worksheets. A DTMF/MF sender is usually paired with the receiver.

(3) DTMF Receiver on a TDSGM, Terminal Type 114. Five DTMF receivers are reserved for the AVDTG function. They detect the signaling of Type 1 analog telephones terminating on the TDSGMs as part of multiplexed loop groups. These receivers are installed with the other analog receivers in the CEG card nest. CVSD units located in the TDSGM card nest interface the DTMF receivers with the switching matrices.

(4) DTMF/MF Sender, Terminal Type 116. DTMF/MF senders provide processor-controlled signaling over analog subscriber lines and trunks. The 12 analog senders are pooled and located in the common equipment group (CEG) card nest. SVLTUs in the SDSG card nest provide the interface with the analog switching matrix. DTMF/MF senders are assigned to the switch by the ATS worksheet. The assignment is part of a sender-receiver pairing. (Each sender is paired on a matrix port with an analog receiver, either MF or DTMF.)

(5) Digital Receiver, Terminal Type 113. The AN/TTC-39A(V)1 can have up to 20 digital receivers. As soon as the digital scanner detects a request for service, the processor directs the digital signal generator to be

connected to the loop and furnish dial tone. Then a digital receiver is connected to the loop to detect the incoming digits as follows. For unencrypted service, the digital receiver is connected directly to the loop. For digital subscriber voice terminals (DSVT) calls, however, the digital receiver is connected to the plain-text inlet used in the call. Three line driver interface (LDI) cards interface digital receivers with the digital matrix. Use the ATS worksheet to assign the digital receivers to the circuit switch.

(6) Analog Conference Bridge Unit (CBU), Terminal Type 120). The AN/TTC-39A(V)1 has four 5-port conference bridges. These are terminated on two CBU cards. A pair of CVSD A cards is required to interface the analog CBUs with the TDSGM. CBUs support two types of conferencing, progressive and preprogrammed. A progressive conference is one in which the conference originator dials each of the intended conferees one after another, adding each of them in turn to the bridge. On the other hand, in a preprogrammed conference, the circuit switch attempts to connect a predetermined set of subscriber lines in a conference as soon as it receives the correct conference code from a properly classmarked subscriber. Neither progressive nor preprogrammed conferences are limited to five parties (the size of one conference bridge) because two or more bridges can be combined to form larger conferences. (Both types of conferences are explained in greater detail in Annex A, Appendix A.)

(7) LKG, Terminal Type 123. The AN/TTC-39A(V)1 has 32 KG-82 LKGs. These are pooled and are assigned on a per-call basis to provide channel encryption for DSVT, secure conference, and approved loop connections. LKGs are also used for key distribution. Because a DSVT can achieve end-to-end encryption with another DSVT, LKGs are needed only for the initial synchronization phase of DSVT-to-DSVT calls. For approved-loop and secure-conference connections, however, one or more LKGs will be tied up for the duration of the call. Therefore, planners must take this into account when assigning approved loop terminals. Similarly, to avoid any unnecessary use of LKGs, conferences involving DSVTs must be thought out carefully in advance. Use the ATT worksheet to assign the LKGs to the circuit switch.

7. Internal COMSEC. The AN/TTC-39A(V)1 is capable of serving as a COMSEC parent switch for directly connected subscribers and for a home subnetwork of SB-3865s or

AN/TTC-48s. The switch COMSEC racks accommodate 15 KG-94 TEDs and 32 pooled KG-82s (LKGs). TEDs provide bulk encryption for DTGs. DTGs 1-9 normally are through connected to TEDs 1-9 at the TDSG patch panel, and groups 16-21 normally are through connected to TEDs 10-15. It is possible, however, to interrupt these connections and dedicate the TEDs to other DTGs by means of manual patches at the TDSG patch panel. LKGs provide channel encryption for DSVTs and approved loops when a DSVT is involved. If an LKG is required full time for approved loops, then only 32 calls can be in progress at any time on the same switch. If two DSVTs are connected, the LKG is used only to initiate the per-call encryption. If one DSVT is in the connection, an LKG is required throughout the call. For approved loop calls with no DSVTs involved, two LKGs are required for the duration of the call if the subscribers are not both off the same parent AN/TTC-39A(V)1. (This is also true for other AN/TTC-39 series CSs.) No LKGs are required if no DSVTs are involved in the call. LKGs are also used for secure conferences. (Refer to Chapter IV for more information about secure conferences.)

8. Nodal Control. A limited nodal control capability is included in the AN/TTC-39A(V)1. It includes line conditioning for selected analog circuits, processor-controlled strapping for most TDSGM cards, digital and analog orderwires with the DTGs, a repeater mode for DTGs, and a CRF. These features are addressed below.

a. ALCG. The AN/TTC-39A(V)1 has 24 circuits for adjustable amplification (2-30 dB) and attenuation (0-23 dB) at the ALCG patch panel. These may be patched into the circuit paths of the quads on SDSG field cables 1 and 2. In addition, two equalizers can be patched into the circuits to correct amplitude and delay distortion.

b. Processor-Controlled Strapping (PCS). The NCMDs, group modems, transmission group module (TGM) cards, TDMMs, and TSBs in the AN/TTC-39A(V)1 are not strapped manually. Instead, the processor uses data entered via the database worksheets to configure the hardware automatically using PCS. PCS uses the ADT command to delete, add, and modify the configuration of DTGs and related equipment. Specific hardware configuration entries are covered in paragraphs 11, 23, and 26 of Annex C. These paragraphs cover the ADT, assign and display switch initialization (ASI), and ATG worksheets, respectively.

c. Engineering Orderwire (EOW). The orderwire control unit (OCU)-II in the circuit switch accommodates six AVOWs and 13 16 kbps digital voice orderwires (DVOWs). The orderwire signals are superimposed on the group traffic.

(1) Patching. Orderwire circuits may be patched manually at the EOW patch panel to any of the 30 DTGs. AVOWs can be used with any dipulse or diphase modem, including the LSCDMs, at any group rate (72 to 4,608 kbps). DVOWs can be patched to diphase groups or supergroups operating at rates at or above 256 kbps.

(2) Multiplexing and Encryption. Twelve DVOWs can be multiplexed in the OCU-II to form a dedicated 256-kbps diphase group. These signals are routed through a cable driver modem group buffer (CDMGB) to group modem 14 on TDSGM 1. A VINSON (KY-57) terminal provides encryption for any one of the DVOW channels. DOW channels are hardwired to the OCU-II from the first seven group modems of each TDSGM.

d. DTG Repeater Mode. The AN/TTC-39A(V)1 can act as a DTG repeater station. The switch routes, intact, the demodulated data from a group modem or LSCDM through a first-in first-out (FIFO) buffer and reclocks the data to a second group modem or LSCDM for retransmission. A manual patch must be done at the trunk encryption device (TED) patch panel. The group does not enter the switching matrices, and the channel reassignment function (discussed below) is not used.

e. Channel Reassignment Function (CRF). The CRF provides the capability to combine and decombine DTGs. Switch personnel can use the ACR command to move groups, channels, and subgroups to another DTG and thereby establish "sole-user" connections through the TDSGMs. Group and subgroup matrix assignments are determined by ADT command information entered for the groups.

(1) The supervisor reassigns channels using the ACR command, moving groups of channels from one digital data stream to another. Reassignments may be DTG-to-DTG, channel-to-channel, range-of-channels to range-of-channels, subgroup-to-subgroup, subgroup to range-of-channels, and range-of-channels to subgroup. Table A-12 shows the types of reassignments that may be made. The entries in the FROM column denote the group or subset of channels that will be reassigned to specific bit positions in an outgoing data

stream. The TO entries represent the channels to which the FROM group will be reassigned.

Table A-12. Valid Channel Reassignment Entries

From	To	Assignment
DTG Number and Subgroup Number	DTG Number and Subgroup Number	Subgroup to Subgroup
DTG Number and Subgroup Number	DTG Number, and Start Channel and End Channel	Subgroup to Range of Channels in a DTG 1/
DTG Number and Start Channel	DTG Number and Start Channel	Single Channel in a Group to Range of Channels in a Group
DTG Number Start Channel End Channel	DTG Number Subgroup Number	Range of Channels to Subgroup 2/
DTG Number, and Start Channel and End Channel	DTG Number, and Start Channel and End Channel	Range of Channels in a Group to Range of Channels in a Group 2/
TDMX Address	DTG Number and Start Channel	Single (Nongroup) Channel to Single (Group) Channel
TDMX Address	DTG Number, and Start Channel and End Channel	Single (Nongroup) Channel to Range of Channels (for Secondary Channels)

1/ The range of channels may constitute the entire "TO" group.
2/ Group-to-group assignments are entered in this way.

(2) Up to 64 reassignments may be entered at the assign channel reassignment (ACR) screen. No more than 64 reassignments can reside in the database at one time. Once 64 reassignments have been entered, additions and changes can be made to the set of reassignments only after one or more of the original reassignments has been deleted.

f. Intercom. The AN/TTC-39A(V)1 has two analog LS-147F intercoms for nonsecure voice communications with other shelters. Each intercom can interface with external locations in one of two ways. A direct access interface is provided at the TDSGM SEP (MP1), connector A16. The second interface must be patched from the intercom jacks to the field-cable jacks of either the TDSGM or the SDSG patch panels. The patching connects the intercom to the appropriate SEP.

g. Dial-Up Capability for External Switch Attendant. An external switch attendant with a terminal, or visual display terminal (VDT), can access the switch database via the circuit-switched network. The dial-up VDT can perform the same functions as the VDT internal to the switch. It can access the database entry commands and obtain traffic and switch status statistics. Remote access to the database, however, is restricted through the use of a password entered on the ASC worksheet. Separate visual display unit controllers (VDUC) are used for the internal supervisory position and the remote VDU terminal. Both terminals can access the database simultaneously; however, when the two terminals request simultaneous access to the same table or screen, contention is resolved by time-sharing.

9. AN/TTC-39A(V)1 Timing

a. Timing Overview. The switching and control equipment in the AN/TTC-39A(V)1 operates at preset frequencies and, therefore, requires clocking signals to maintain synchronization. In addition, all DTGs in a circuit switch must be in bit, frame, and signaling synchronization with each other. The timing and synchronization necessary for operation of the circuit switch are provided by switch timing circuits. These consist of a master timing generator (MTG), three local timing generators (LTGs), and an SDSG timing generator, all of which are redundant. (See CJCSM 6231.04, Chapter XXI for a detailed discussion of timing.)

(1) Each MTG is controlled by a crystal oscillator, which is phase-locked to a more accurate timing source. This source may be either external or internal to the switch. The method of deriving timing from an internal reference source is called the MASTER timing mode, while the SLAVE mode refers to the recovery of timing from an external reference. If both primary and secondary MTGs were to

detect a loss of recovered clock from the timing reference, the MTG controller would be capable of operating in a stand-alone mode.

(2) Normally, the rubidium atomic timing standard internal to the AN/TTC-39A(V)1 serves as the MTG's timing source. As a backup, the oscillators may be slaved to the timing of an external source (the external source should have a nuclear standard--such as another AN/TTC-39 series switch or CNCE). In the latter case, timing would be recovered from an incoming DTG. Only one DTG at a time can be used as an external reference source, and that DTG must be one of the following: group 1, 2, 16, or 17. The group with the lowest bit error rate (BER) should be selected.

(3) The timing mode is chosen using the MTG selector switches at the CEG patch panel. This occurs during initialization of the first DTG. When the internal timing standard is to be used as the reference for the MTG oscillators, set the Sync-Source switch on the MTG Selector panel to MA. When the MTGs are to be slaved to the timing recovered from an incoming group, set the Sync-Source switch to 1, 2, 3, or 4 (where the numbers correspond to DTGs 1, 2, 16, and 17, respectively). Then set the Group Rate Switch on the MTG selector panel to the rate of the selected DTG.

(4) In addition to the Group Rate and Sync-Source switches, there is a third switch on the MTG selector panel, the three-position LTG selector toggle switch. The LTG switch usually is kept in the central NORM position. The LTG A (primary LTG) and LTG B (backup LTG) positions are used to prevent disruption of the timing circuits when either the primary or backup distribution driver must be replaced. Distribution drivers provide the LTGs with the frequencies generated by the MTG oscillator assembly and the controller and synthesizer circuits. LTGs, in turn, provide the output clock frequencies required for switching and control.

(5) There are three redundant LTGs. One provides clocking for both analog and digital switching and control equipment. This LTG is in the CEG card nest. The other two LTGs, which are found in the TDSGM card nest, are used strictly for digital switching equipment. These are isolated one from another for the purpose of call security. One is designated as a RED LTG, the other as BLACK. The RED LTG provides a clock for unencrypted or nonsecure call processing. The BLACK LTG provides the clocking for secure

call processing. Switchover to the backup LTGs is automatic upon detection of a fault in the primary LTG. When the fault is repaired, switchover back to the primary LTG also is automatic.

b. AN/TTC-39A(V)1 Timing Subsystem. The redundant crystal oscillator has a stability of better than 1×10^{-9} per day over the specified operating-temperature range (-50° to +120° F). The stability of the atomic standard is $\pm 3 \times 10^{-11}$ per day. The rubidium clock's output frequencies are adjustable to within $\pm 1 \times 10^{-12}$ of the desired frequencies. The atomic standard has a rated accuracy of 1×10^{-11} per month and should be calibrated annually. The MTG receives a fault indication whenever the atomic clock fails to generate an accurate reference signal.

c. Circuit Switch Timing Flow

(1) Figure A-1 shows the timing flow when the AN/TTC-39A(V)1's MTG is operating in the MASTER timing mode. Two groups are shown, with group 1 going to switch 2, and DTG 2 destined for switch 3. (The distant timing source also could be a radio or a CNCE.) The MTG output, labeled T1, is used to time both the internal operation of the switch and all transmitted groups. The receive side of DTG 1 is shown with timing T2 from switch 2. T3 on the receive side of DTG 2 is the timing from switch 3. The incoming data in groups 1 and 2 are clocked into the switch's 512 bit (± 256) FIFO group buffers by T2 and T3 respectively, and are clocked out of the buffers by the internal T1. If the distant-end timing source is either an AN/TTC-39A(V)1 or a CNCE, then that source also should operate in the MASTER timing mode.

(2) Figure A-2 shows the AN/TTC-39A(V)1 timing flow when timing is slaved to a digital group input. (This mode of timing should be used only when the rubidium standard is incapable of providing an accurate source.) T1 and T2 represent the incoming timing from two DTGs. In this example, the timing of the switch on the left is derived from recovered clock T1. T1 must be the most accurate of the timing recovered from DTGs 1, 2, 16, and 17. DTG 1 is the source for T1. The Sync Source switch on the MTG selector panel is set to 1, and the AN/TTC-39A(V)1 MTG is slaved to T1. The AN/TTC-39A(V)1 uses T1 to time both the internal operation of the switch and all transmitted groups. T2 represents the timing from DTG 5. Incoming data in DTG 1

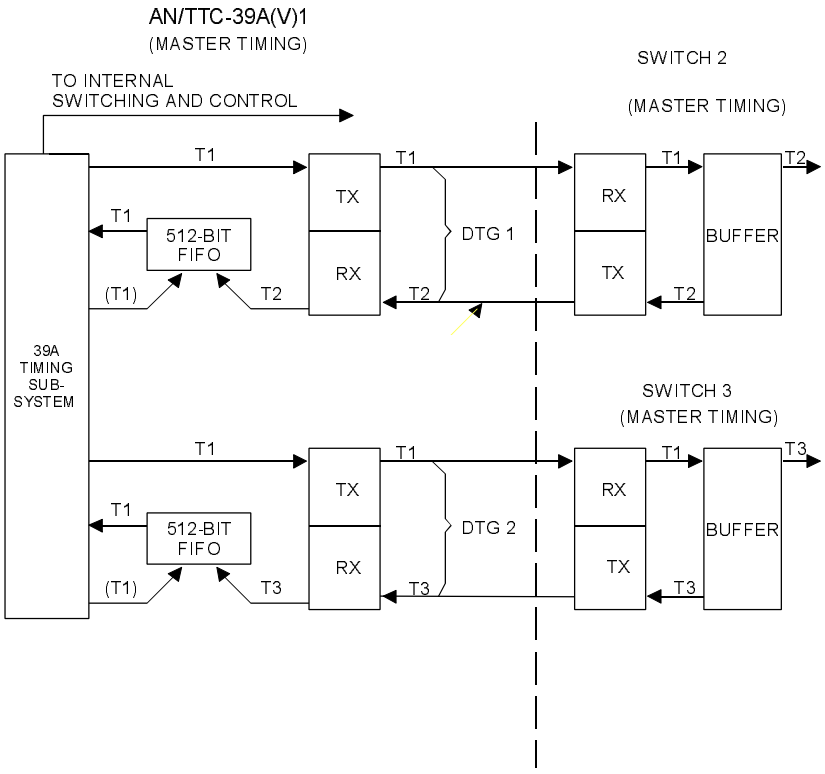

Figure A-1. AN/TTC-39A(V)1 Master Timing Mode

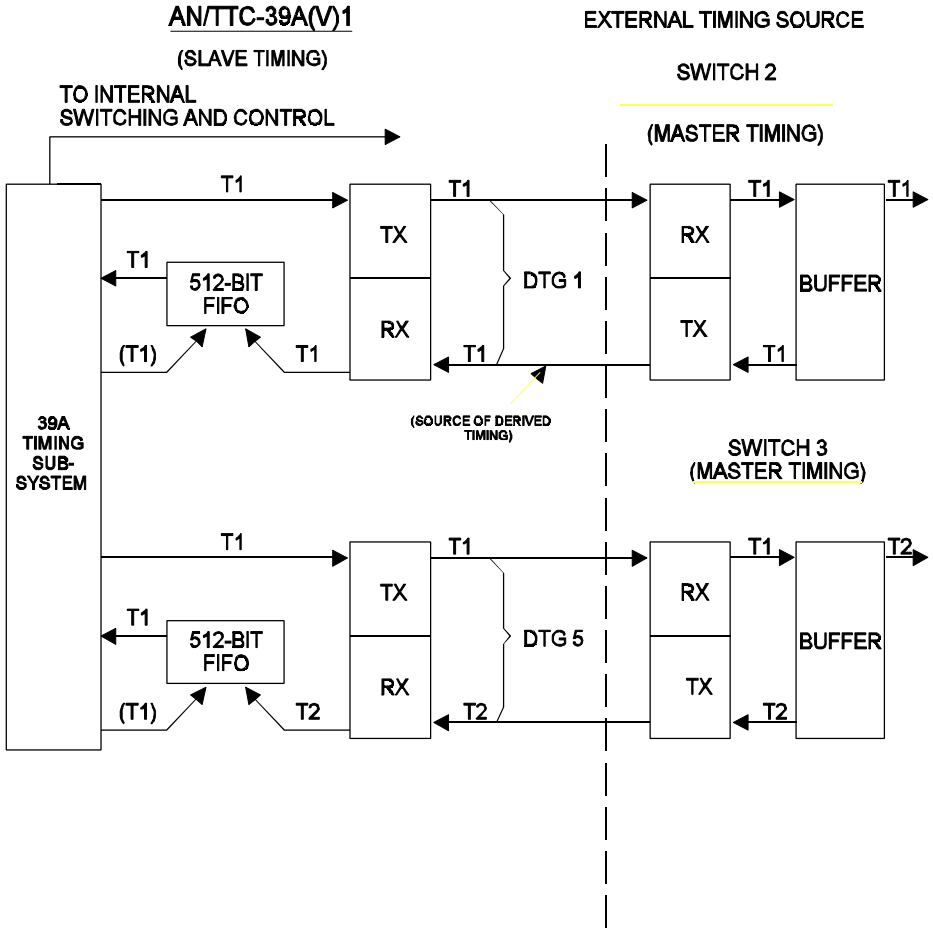

Figure A-2. AN/TTC-39A(V)1 Slave Timing Mode

is clocked into the 512 bit (±256) FIFO buffer by T1, and are clocked out of the buffer by the internal timing derived from T1. In a similar manner, data from group 5 are clocked into the second group's buffer by T2. They are clocked out of the buffer by T1.

10. Switch Termination Capacity

a. External Termination Capacity. The total termination capacity of the AN/TTC-39A(V)1 is 744 lines. Digital multiplexed loops and trunks constitute the greatest part of termination capacity. The AN/TTC-39A(V)1's digital termination capacity is 648 lines. Of these, 144 may be single-channel terminations. Table A-13 summarizes the switch's termination capacity.

b. Analog Terminations. The single SDSG in the switch accommodates a total of 96 analog loops and trunks, all of which are single-channel terminations. This number is a significant reduction from both the 300-line and 600-line versions of the AN/TTC-39A(V)1. However, additional analog lines can be accommodated through the switch's AVDTG capability. This feature is explained in the following paragraphs. Figures A-3 through A-6 provide further information on the AVDTG function.

(1) AVDTG. The AN/TTC-39A(V)1 can handle up to 60 additional analog loops (Type 1, local-battery, only) via digital multiplexed groups (LGMs, RLGMs, and RMCs). AAU cards must be installed in the external DGM equipment. The TD-1389 low rate multiplexers (LRMs) operating in the LGM-emulate mode and using CVSD cards may also be used for AVDTG subscribers. AAU cards provide the analog-to-digital and digital-to-analog conversions required for the termination of analog circuits on the TDMX. There are two circuits per card. When the AVDTG option is exercised, analog channels are substituted for digital loops on a two-for-two basis. The required channel rate for AVDTG subscribers is 32 kbps.

(2) Signaling and supervision tones from AVDTG cannot be detected in the digital mode. They must be converted from a digital to an analog signal before call processing can take place. Five pooled DTMF receivers and a maximum of 60 dedicated analog scanners are reserved for the AVDTG function. A half-connect is maintained at all times between each assigned AVDTG channel and its dedicated CVSD

Table A-13. AN/TTC-39A(V)1 Switch Termination Capacity

	SDMX	TDMX
External Terminations		
Single Channel		
Analog	96	0
Digital	0	144
Multiplexed		
Analog	0	60(max)
Digital	0	648
Total	96	648
Common Equipment		
DTGs (max)		30
LSCDMs (max)		2
TEDs		15
LKGs		32
IMUs		36
Analog Senders/Receivers	12	
DTMF Receivers		5
Digital Receivers		20
Aux Senders/Receivers	1	
Conference Ports		20
Call-Service Positions	3	3
Rate-Changer Units		10
Trunk Signaling Buffers:		30

unit analog scanner. The scanners continuously monitor the output of the CVSD units to detect requests for service (off-hook signals) from the AVDTG channels.

(3) After the switch has received the off-hook signal from the AVDTG telephone, it assigns one of the five pooled CVSD units and DTMF receivers to collect digits from the telephone. This connection remains in effect for the duration of the telephone's signaling phase.

(4) Both the number of AVDTG subscribers and their matrix assignments can vary. Therefore, the 60 CVSD units associated with the dedicated analog scanners must be assigned each time a new loop-group configuration is entered into the database. CVSD units may be assigned only for

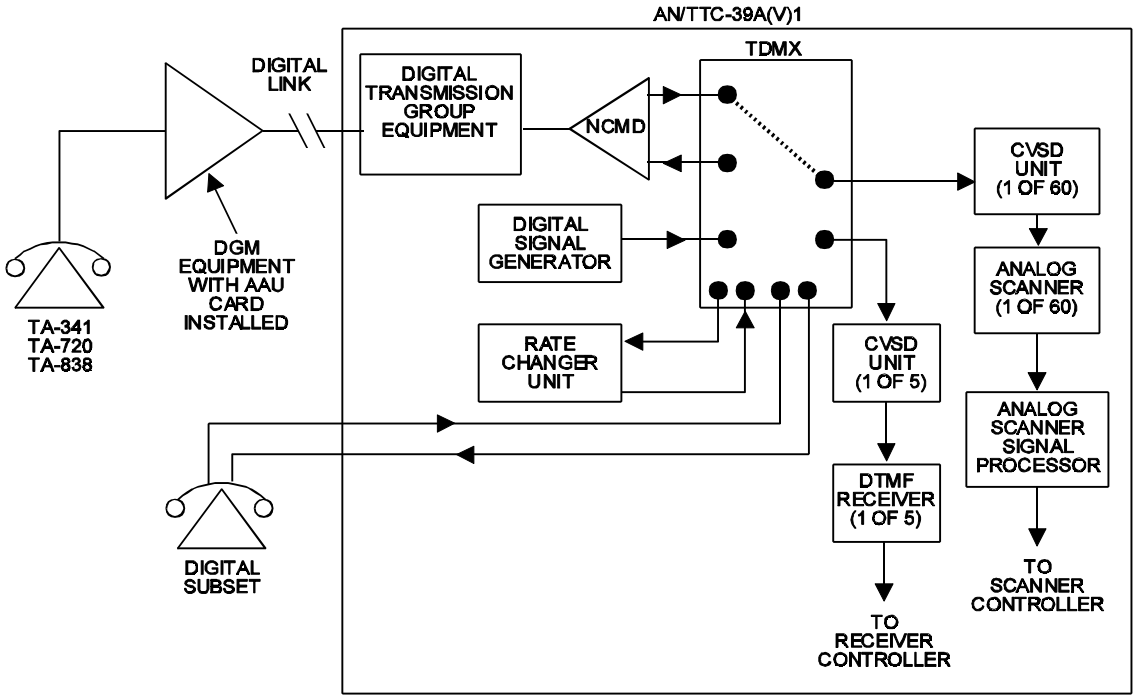

Figure A-3. Analog Via DTG, Static Phase

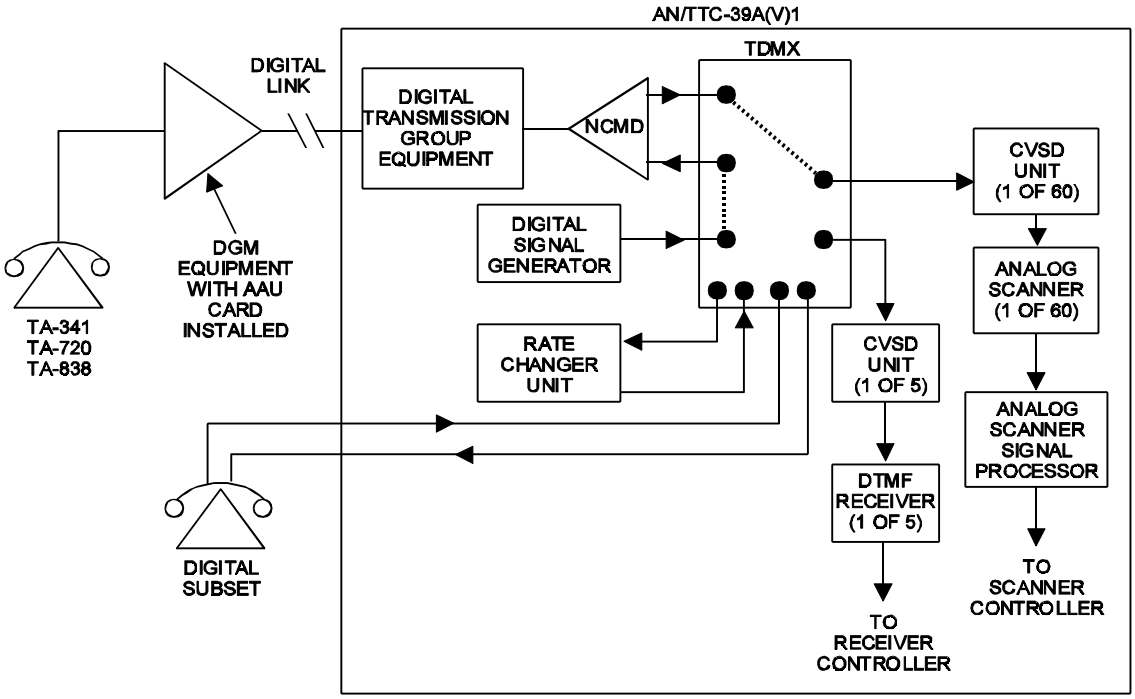

Figure A-4. Analog Via DTG, Supervisory Phase

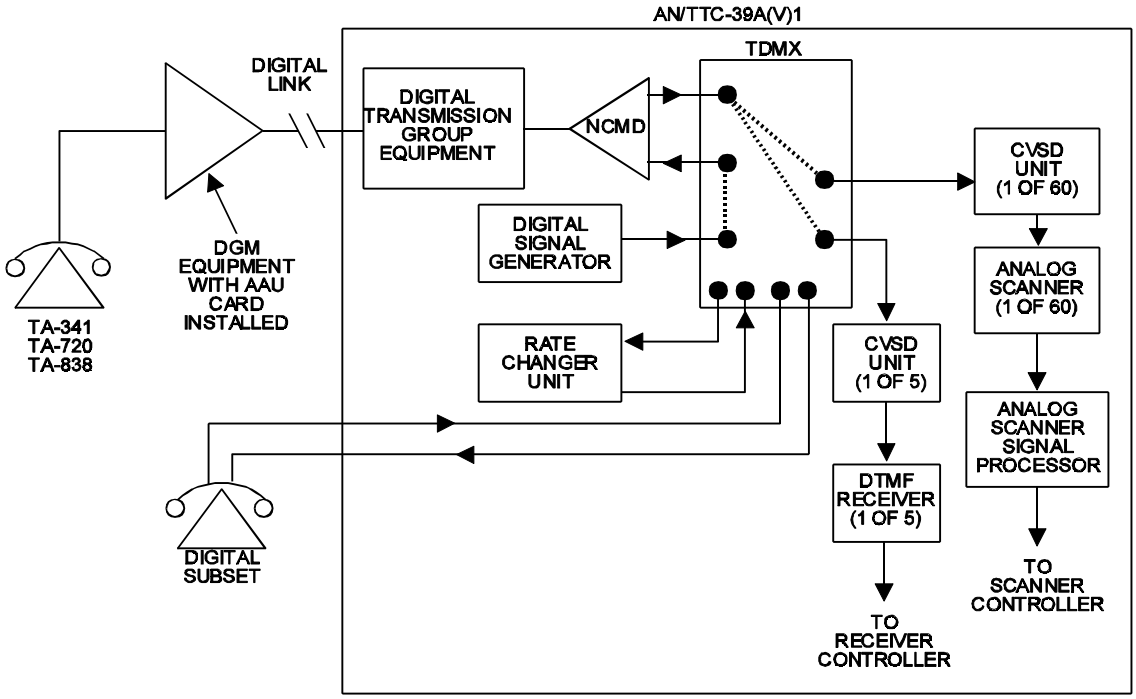

Figure A-5. Analog via DTG, Signaling Phase

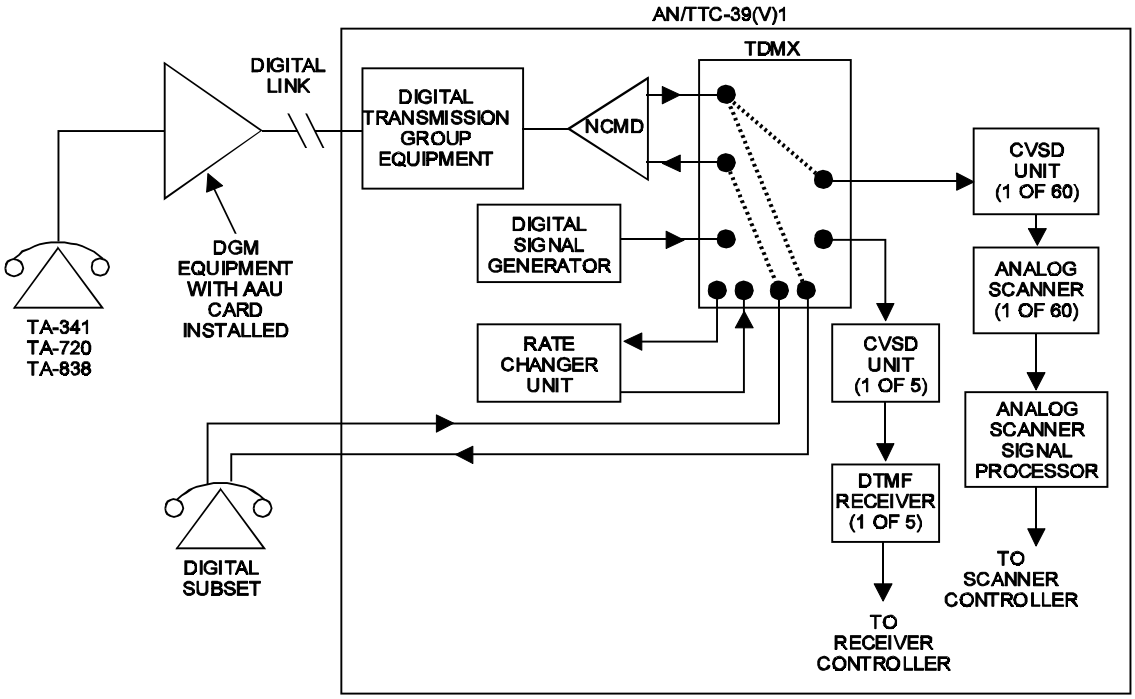

Figure A-6. Analog Via DTG, Traffic Phase

Type-1 TDMX lines, using the ATS worksheet (see Figures V-35 to V-36 in Chapter V). The 60 CVSD units are packaged in 7 CVSD A cards located in the TDSGM card nests. Thirty-six of the CVSD units are in frame 2.

(5) In addition to the analog signaling and supervision equipment reserved on the TDSGM, the AN/TTC-39A(V)1 provides five pooled RCUs for AVDTG subscribers. These are used for the duration of a call to provide bit-rate compatibility when a 32 kbps AVDTG subscriber is connected to a 16-kbps trunk. Each RCU consists of two CVSD units, one operating at 32 kbps and the other operating at 16 kbps. The analog interfaces of the two RCU ports are connected. Note that rate-changed AVDTG calls undergo an extra CVSD (and a D/A/D) conversion, which could impair the call's voice quality.

(6) Because this analog common equipment is located in the TDMX, IMUs are not needed for handling AVDTG signaling and supervision. However, an IMU is used each time an AVDTG subscriber is connected to an SDSG loop or trunk.

c. Digital-Termination Capacity. The AN/TTC-39A(V)1's two digital matrices terminate a total of 648 external digital lines. Of these, 144 can be single-channel terminations. The remainder are handled by the switch's 30 DTGs.

11. Switch Configuration

a. Common Equipment. The AN/TTC-39A(V)1 has one analog and two digital matrices. The common equipment for the switch is listed in multipage Table A-14.

Table A-14. Common Equipment, AN/TTC-39A(V)1

Intermatrix Units (IMU) - Terminal Type 98

Unit Number	SDSG Nest		SDSG Address	TDSGM Address
	Equipment	Card Slot		
1 2	IMLTU	A1-17	1-06-08 1-07-08	13-38 13-39
3 4	IMLTU	A2-17	1-08-08 1-09-08	13-40 13-41
5 6	IMLTU	A3-17	1-10-08 1-11-08	13-42 13-43
7 8	IMLTU	A1-18	1-12-08 1-13-08	13-44 13-45
9 10	IMLTU	A2-18	1-01-09 1-02-09	13-46 13-47
11 12	IMLTU	A3-18	1-03-09 1-04-09	13-48 13-49
13 14	IMLTU	A1-19	1-05-09 1-06-09	13-50 13-51
15 16	IMLTU	A2-19	1-07-09 1-08-09	13-52 13-53
17 18	IMLTU	A3-19	1-09-09 1-10-09	13-54 13-55
19 20	IMLTU	A1-20	1-11-09 1-12-09	13-56 13-57
21 22	IMLTU	A2-20	1-13-09 1-01-10	13-58 13-59
23 24	IMLTU	A3-20	1-02-10 1-03-10	13-60 13-61
25 26 27	IMLTU	A1-21	1-04-10 1-05-10 1-06-10	15-50 15-51 15-52
28 29 30	IMLTU	A2-21	1-07-10 1-08-10 1-09-10	15-53 15-54 15-55
31 32 33	IMLTU	A3-21	1-10-10 1-11-10 1-12-10	15-56 15-57 15-58
34 35 36	IMLTU	A4-37	1-13-10 1-01-11 1-02-11	15-59 15-60 15-61

Table A-14. (Cont'd)

Rate Changer Units (RCU) - Type 100

Unit Number	TDSGM-Nest Card Slot	TDSGM Address	
		Port 1	Port 2
1	CVSDA Card CVSD Unit No. 2 A3-37	14-40	14-45
2	A3-37	14-41	14-46
3	A3-37	14-42	14-47
4	A3-37	14-43	14-48
5	A3-37	14-44	14-49

DTMF Receivers - Terminal Type 111

Unit Number	CEG Nest		SDSG Nest		SDSG Address
	Card Type	Card Slot	Card Type	Card Slot	
3	DTMFB	A2-15	SVLTU	A2-22	1-06-11
4	DTMFB	A2-15	SVLTU	A3-22	1-10-11
5	DTMFB	A2-15	SVLTU	A1-23	1-02-12
11	DTMFB	A2-20	SVLTU	A2-22	1-07-11
12	DTMFB	A2-20	SVLTU	A4-39	1-12-11
13	DTMFB	A2-20	SVLTU	A1-23	1-03-12
17	DTMFB	A2-25	SVLTU	A3-22	1-09-11
18	DTMFB	A2-25	SVLTU	A4-39	1-13-11
19	DTMFB	A2-25	SVLTU	A1-23	1-04-12

Table A-14. (Cont'd)

MF Receivers - Terminal Type 112

Unit Number	CEG Nest		SDSG Nest		SDSG Address
	Equipment	Card Slot	Equipment	Card Slot	
25	MFRCB	A2-30	SVLTU	A2-22	1-08-11
26	MFRCB	A2-30	SVLTU	A3-22	1-11-11
27	MFRCB	A2-30	SVLTU	A4-39	1-01-12

DTMF/MF Senders - Terminal Type 116

Unit Number	CEG Nest		SDSG Nest		SDSG Address
	Equipment	Card Slot	Equipment	Card Slot	
5	SEND	A3-36	SVLTU	A2-22	1-06-11
6	SEND	A3-36	SVLTU	A2-22	1-07-11
7	SEND	A3-37	SVLTU	A2-22	1-08-11
8	SEND	A3-37	SVLTU	A3-22	1-09-11
9	SEND	A4-34	SVLTU	A3-22	1-10-11
10	SEND	A4-34	SVLTU	A3-22	1-11-11
11	SEND	A4-35	SVLTU	A4-39	1-12-11
12	SEND	A4-35	SVLTU	A4-39	1-13-11
13	SEND	A4-36	SVLTU	A4-39	1-01-12
14	SEND	A4-36	SVLTU	A1-23	1-02-12
15	SEND	A4-37	SVLTU	A1-23	1-03-12
16	SEND	A4-37	SVLTU	A1-23	1-04-12

Table A-14. (Cont'd)

Auxiliary Sender/Receivers- Terminal Type 115

Sender

Unit	CEG Nest		SDSG Nest		SDSG Address
	Card Type	Card Slot	Card Type	Card Slot	
AUX Send	AXSND	A3-38	SVLTU	A1-22	1-05-11

Receivers

Unit	CEG Nest		SDSG Nest		SDSG Address
	Card Type	Card Slot	Card Type	Card Slot	
Aux Rcv Card A	AXRCA	A2-33	SVLTU	A1-22	1-05-11
Aux Rcv Card B	AXRCB	A2-35	SVLTU	A1-22	1-05-11
Aux Rcv Card C	AXRCC	A2-37	SVLTU	A1-22	1-05-11
Aux Rcv Card D	ACRCD	A2-39	SVLTU	A1-22	1-05-11

Table A-14. (Cont'd)

Digital Receivers - Terminal Type 113

Unit Number	CEG-Nest Card Slot	LDI[1/]		TDSGM Address
		Number	Slot	
1[2/]	A5-25	7	A2-34	14-58
2[2/]	A5-25	7	A2-34	14-59
3	A5-25	7	A2-34	14-60
4	A5-26	7	A2-34	14-61
5	A5-26	7	A2-34	14-62
6	A5-26	7	A2-34	14-63
7	A5-27	9	A5-24	01-63
8	A5-27	9	A5-24	02-63
9	A5-27	9	A5-24	03-63
10	A5-28	9	A5-24	13-63
11	A5-28	9	A5-24	04-63
12	A5-28	9	A5-24	05-63
13	A5-29	9	A5-24	06-63
14	A5-29	18	A5-24 Frame 2	15-63
15	A5-29	18	A5-24 Frame 2	07-63
16	A5-30	18	A5-24 Frame 2	08-63
17	A5-30	18	A5-24 Frame 2	09-63
18	A5-30	18	A5-24 Frame 2	10-63
19	A5-31	18	A5-24 Frame 2	11-63
20	A5-31	18	A5-24 Frame 2	12-63

1/ Digital-receiver cards are in the CEG card nest. LDI cards are in the TDSGM nests. The three LDIs connect the receivers with the switch MUX/DEMUX.
2/ Digital receivers 1 and 2 are permanently assigned to the LCSP and RCSP 1 respectively. Digital receiver 21 is not used.

Table A-14. (Cont'd)

DTMF Receivers for AVDTG - Terminal Type 114

Unit Number	TDSGM-Nest Card Assignment For CVSDAs		CEG-Nest Card Assignment For DTMF Rcvr		TDSGM Address
	Type	Slot	Type	Slot	
8	CVSD 9	A1-35	DTMFB	A2-15	14-22
15	CVSD 9	A1-35	DTMFB	A2-20	14-23
16	CVSD 9	A1-35	DTMFB	A2-20	14-24
23	CVSD 9	A1-35	DTMFB	A2-25	14-25
24	CVSD 9	A1-35	DTMFB	A2-25	14-26

Trunk Signaling Buffer (DSB/TSB)[1/] - Terminal Type 110/117

TDSGM			TDSGM		
Unit Number[2/]	Card Slot	Address	Unit Number	Card Slot	Address
1	A5-34	01-00	16[4/]	A5-34	07-00
2	A5-35	01-01	17	A5-35	07-01
3[3/]	A5-35	01-02	18	A5-35	07-02
4[3/]	A5-36	01-03	19	A5-36	07-03
5	A5-36	01-04	20	A5-36	07-04
6	A5-37	01-05	21	A5-37	07-05
7	A5-37	01-06	22	A5-37	07-06
8	A5-38	13-00	23	A5-38	15-00
9	A5-38	13-01	24	A5-38	15-01
10	A5-39	13-02	25	A5-39	15-02
11	A5-39	13-03	26	A5-39	15-03
12	A5-40	13-04	27	A5-40	15-04

Table A-14. (Cont'd)

TDSGM			TDSGM		
Unit Number	Card Slot	Address	Unit Number	Card Slot	Address
13	A5-40	13-05	28	A%-40	15-05
14	A5-41	13-06	29	A5-41	15-06
15	A5-41	13-07	30	A5-41	15-07

1/ In-band DSB cards and out-of-band TSB cards are interchangeable. With the exception of the cards in slot A5-34, each card accommodates two channels.
2/ Buffer cards 1-15 are installed in frame 1 of the TDSGM card nest; cards 16-30 are in frame 2.
3/ Hardwired to Type II modems in SDSG (can also be assigned to a DTG).
4/ TSB 16 presently not used.

Conference Bridges, TT-120

TDSGM	1					
CBU LOC	A2-39		A2-40		A2-39	
	CBU 1	CBU 2	CBU 3	CBU 4	CBU 5	CBU 6
Port 1	13-08	13-13	14-12	14-17	15-08	15-13
Port 2	13-09	13-14	14-13	14-18	15-09	15-14
Port 3	13-10	13-15	14-14	14-19	15-10	15-15
Port 4	13-11	13-16	14-15	14-20	15-11	15-16
Port 5	13-12	13-17	14-16	14-21	15-12	15-17

NOTE: CBUs 5 and 6 are available but the cards are not delivered in the baseline unit.

Table A-14. (Cont'd)

LKGs - Terminal Type - 123

Plain Text		Cipher Text
Unit Number	TDSGM Address	TDSGM Address
1 2	02-00 02-01	13-18 13-19
3 4	02-02 02-03	13-20 13-21
5 6	02-04 02-05	13-22 13-23
7 8	02-06 02-07	13-24 13-25
9 10	03-00 03-01	13-26 13-27
11 12	03-02 03-03	13-28 13-29
13 14	03-04 03-05	13-30 13-31
15 16	03-06 03-07	13-32 13-33
17 18	08-00 08-01	15-18 15-19
19 20	08-02 08-03	15-20 15-21
21 22	08-04 08-05	15-22 15-23
23 24	08-06 08-07	15-24 15-25
25 26	09-00 09-01	15-26 15-27
27 28	09-02 09-03	15-28 15-29

Table A-14. (Cont'd)

Plain Text		Cipher Text
Unit Number	TDSGM Address	TDSGM Address
29 30	09-04 09-05	15-30 15-31
31 32	09-06 09-07	15-32 15-33

b. LTU and Special Adapter Cards. The AN/TTC-39A(V)1 is delivered with the quantity of LTU and special adapter cards shown in Table A-15. The quantities shown do not include spares or RSP.

Table A-15. AN/TTC-39A(V)1 Printed Circuit Board Quantities

Printed Circuit Board	Code	Circuits per Board	Quantity Installed	Total
Normal Wide Band	NWLTU	2	32	64
Common Battery	CBLTU	2	9	18
DSN Telephone	AVLTU	2	1	2
1600-Hz Ringdown	16LTU	2	2	4
20-Hz Ringdown	20LTU	2	4	8
Intermatrix	IMLTU	3	16	48
dc Closure	DCCLR	1	4	4
2600-Hz SF	SF	1	4	4
E&M Signaling	E&M	2	2	4
Diphase Loop	DLPMA	4	38	162

ANNEX C TO APPENDIX A

PLANNING AN/TTC-39A(V)1 SWITCH EMPLOYMENT

PART A

SWITCH PLANNING

1. Switch Planning. The worksheets used in planning the use of an AN/TTC-39A(V)1 have been grouped into the following 11 categories. Each category is discussed briefly, including when each form should be used.

a. Common Equipment. Switch common equipment is assigned using the worksheets listed below. These worksheets establish in software the specific configuration of the switch hardware. Normally these worksheets are used only once, during the initial fielding of the switch. Once these data have been entered, a copy of these worksheets should be retained. The common equipment worksheets are as follows:

(1) Assign Terminal Service (ATS) Signaling Equipment Worksheet. This worksheet allows the operator to assign the signaling equipment.

(2) Assign Terminal Type (ATT), IMU Worksheet. The operator uses this worksheet to assign IMUs.

(3) ATT Conference Bridge Worksheet. The operator uses this worksheet to assign conference bridges.

(4) ATT, LKG Worksheet. The operator uses this worksheet to assign the LKGs.

(5) ATT, CVSD RCU Worksheet. The operator uses this worksheet to assign CVSD rate changers.

b. Switch Initialization. The switch operator uses the following worksheets to initialize the switch and assign classmarks. All worksheets must be completed.

(1) Assign Switch Initialization (ASI) Worksheet. This worksheet assigns a switch description (such as a number of TDSG matrices) but also assigns items such as the switch code.

(2) Assign Switch Classmarks (ASC) Worksheet. This worksheet assigns switch classmarks (that apply to the entire switch) associated with routing.

c. CSP. The CSP is assigned using the ATT CSP worksheet.

d. Analog Loops and Trunks. The ATS Analog Loop and Trunk worksheet assigns analog loops and trunks, if any are assigned. If compressed dial, preprogrammed conference, zone restriction, or traffic load control are to be used, see Subsection 2, paragraphs 18, 20, 28, and 31, respectively. Before assigning analog terminations, the planner-engineer should consider the following:

(1) Subscriber's Physical Location. Subscribers are served by 26-pair cable. Grouping by physical location minimizes the amount of cable and wire needed; however, the planner-engineer should consider the possibility of adding subscribers. (AN/TTC-39A(V)1 subscribers may also be served by a digital group and DGM equipment, using the AVDTG capability.)

(2) Requirement for Special Adapters. Certain types of subscriber loops and trunks require special adapters. These adapters can be installed only on field cables 1 and 2.

(3) Approved Loops. Subscribers must be trained on the security aspects of approved loops.

e. Digital Loops and Trunks. Three worksheets are used to assign loops and trunks to the digital side of the switch. If compressed dial, preprogrammed conference, zone restriction, or traffic load control are used, see paragraphs 9, 10, 28, and 31, respectively. Before the switch planners begin to assign digital terminations, they should evaluate the following items:

(1) Geographical Location of Local Digital Subscribers. Local subscribers may be served by either 26-pair cable or a digital group and digital group multiplex equipment. In either case, subscribers should be grouped by physical location to minimize the cable used. Additional subscribers also should be considered.

(2) Available Transmission Equipment. Transmission equipment dictates the data rates and the types of

modulation that can be used in digital groups. TDMX termination assignment and use of the digital GM depend upon the transmission equipment in use.

(3) Approved Loops. Subscribers must be trained in the security aspects of approved loops.

(4) Future Changes to Established DTGs. When assigning DTGs to NCMDs, future changes should be evaluated. Spare NCMDs should be placed where they are most likely to be used. For example, if the size of the digital group may increase from 9 to 18 channels, every effort should be made to keep as a spare the next NCMD in sequence. If this is not done, NCMD terminations in use must be moved to a location where two consecutive NCMDs are available.

(5) Digital Loops and Trunks. These are assigned using the worksheets listed below.

(a) ATS Digital Loop Trunk Worksheet. This worksheet assigns digital loops and trunks, if any are assigned.

(b) Assign Digital Transmission Group (ADT) Worksheet. This worksheet combines digital terminations into digital groups. It must be used if any digital groups (either trunks or local loops) are assigned.

(c) Assign Secondary Traffic Channels (AST) Worksheet. If DGM equipment is used in certain configurations, secondary traffic channels must be identified. This worksheet can be used for both switches.

f. Special Features. Certain worksheets are completed based on the special features assigned to subscribers. If the features are not assigned to any subscribers, these worksheets are not used. The worksheets are:

(1) Assign Preprogrammed Conference List (APC) Worksheet. This worksheet assigns subscribers to a preprogrammed conference group.

(2) ACP Worksheet. This worksheet assigns compressed dial numbers and their corresponding directory numbers to an ACP.

(3) Assign Individual Compressed Dial List (AIC) Worksheet. This worksheet assigns numbers to individual compressed dial lists.

(4) Assign Zone Restriction (AZR) Worksheet. This worksheet defines the permissive or restrictive zone lists. It would probably be used most often to restrict DSN access.

(5) Assign Alternate Parent (AAP) Worksheet. This worksheet defines the switch codes for the alternate and/or lateral COMSEC parent switches.

(6) Assign transfer List (AXL) Worksheet. This worksheet defines COMSEC identifiers to a home or lateral transfer list or deletes existing COMSEC identifiers.

g. Routing. Traffic routing is established for an AN/TTC-39A(V)1 using the worksheets listed below. Before any routing can occur, a routing diagram must be available. As a minimum, this diagram must show: the number and type (digital or analog) of trunks in each TGC, the PRSL of each switch, and area code boundaries (if any). The worksheets are:

(1) Assign Trunk Group Cluster (ATG) Worksheet. This worksheet assigns characteristics to TGCs. It is used any time a trunk is used.

(2) Assign NYX Routing (ANY) Worksheet. This worksheet assigns area codes. Because a home area code must be assigned, this worksheet will always be used.

(3) Assign PR (NN) Routing (APR) Worksheet. This worksheet defines NN (PR) (primary area) routing.

(4) Assign XX (SL) Routing (ASL) Worksheet. This worksheet defines XX (SL) (switch location) routing.

(5) Assign XXX Routing (AXX) Worksheet. This worksheet assigns XXX routing. It serves several purposes. One of the more common uses is to define an XXX code for routing to terminals such as converters and manual switches. When used in this manner, it conserves XX (SL) codes as the switch routes on the XXX. Because the AN/TTC-39A(V)1 routing table is limited to 50 SLs, this worksheet will normally be used.

(6) Assign Commercial Network Routing (ACN) Worksheet. This worksheet is used only when a TGC has been assigned as type C (commercial).

(7) Assign NNX Routing (ANN) Worksheet. This worksheet defines an NNX switch code. It can be used for both switches.

(8) Assign NNXX Routing (ANX) Worksheet. This worksheet is prepared at selected switches that use a 3/4 numbering plan. The worksheet provides routing to designated PBXs and provides for expanded switch operation.

(9) Assign Digit Editing (ADE) Worksheet. This worksheet edits telephone numbers to make them compatible with numbering plans in different networks or areas.

(10) Assign Alternate Area Routing (AAA) Worksheet. This worksheet is used when alternate paths exist to a distant PR (or NYX).

(11) Assign Fixed Directory Routing (AFD) Routing Worksheet. This worksheet is used to assign the current locations of fixed-directory subscribers and units.

h. COMSEC. The AVL Worksheet assigns storage locations to keys.

i. Switch Features. Three worksheets, as described below, are used to assign certain switch features:

(1) Assign Thresholds (ATH) Worksheet. This worksheet changes time-outs (such as interdigit and dial tone) and assigns the TLC thresholds. Normally it is not used unless TLC is implemented.

(2) Assign Traffic Metering (ATM) Worksheet. This worksheet assigns the interval between reports on loops and TGCs. This worksheet is not used unless periodic printouts have been requested on the ASC worksheet.

(3) Assign Frequency for Network Reporting (AFR) Worksheet. This worksheet changes the time intervals for certain network reports (such as, TGC/calls by precedence and TGC/calls preempted). This worksheet is used only to change the frequency of these reports.

j. EUB. Two worksheets, as discussed below, are used to configure the CS for EUB operation:

(1) Assign Essential User Bypass (AEU) Worksheet. This worksheet assigns up to 60 subscribers to another switch for emergency service.

(2) Assign Received Bypass List (ARB) Worksheet. This worksheet assigns subscribers to the switch for emergency service. Up to 60 subscribers from each of 2 other switches may be assigned.

k. Assign Channel Reassignment (ACR) Worksheet. This worksheet combines and decombines DTGs. From a planning standpoint, it should be completed only if the AN/TTC-39A(V)1 is to serve as a nodal control.

PART B

AN/TTC-39A(V)1 DATABASE

2. Introduction. This subsection contains worksheets for AN/TTC-39A(V)1 database entries. The planner-engineer provides these worksheets to the switch operator. An explanation of the data elements required and the accepted range of values is provided for each worksheet.

3. General. Subparagraphs 3a and 3b below contain the range of values for matrix addresses. Certain data elements are not entered in the database but are used by switch operators and maintainers to properly configure the switch hardware. These elements or worksheets containing these elements are annotated with an asterisk (*) in the title of the paragraph in which they are described. Worksheet titles correspond to the display menus upon which data elements are entered. The worksheets are described in alphabetical order by command and screen. Table A-16 is the data entry index for the AN/TTC-39A(V)1, with references to corresponding explanations for each worksheet.

a. SDMX Address Format. Each loop, trunk, or piece of common equipment associated with the SDMX is connected to a specific matrix terminal. This terminal is identified by a matrix address. The SDMX address is in the form X (SDSG frame = 1) - XX (SDMX group = 01 to 13) (SDMX terminal = 01-12).

Table A-16. Data Entry Index, AN/TTC-39A(V)1

Command		Paragraph	Figure
AAA	Assign Alternate Area Routing	4	A-7
AAP	Assign Alternate Parent	5	A-8
ACI	Assign Call Inhibit	6	A-9
ACN	Assign Commercial Network Routing	7	A-10
ACP	Assign Common Pool Compressed Dial List	8	A-11
ACR	Assign Channel Reassignment	9	A-12
ADE	Assign Digit Editing	10	A-13
ADT	Assign Digital Transmission Group	11	A-14
AEU	Assign Essential User Bypass	12	A-15
AFD	Assign Fixed Directory Routing	13	A-16
AFR	Assign Frequency for Network Reporting	14	A-17
AIC	Assign Individual Compressed Dial List	15	A-18
ANN	Assign NNX Routing	16	A-19
ANX	Assign NNXX Routing	17	A-20
ANY	Assign NYX Routing	18	A-21
APC	Assign Preprogrammed Conference List	19	A-22
APR	Assign PR (NN) Routing	20	A-23
ARB	Assign Received Bypass List	21	A-24
ASC	Assign Switch Classmarks	22	A-25
ASI	Assign Switch Initialization	23	A-25
ASL	Assign XX (SL) Routing	24	A-26
AST	Assign Secondary Traffic Channels	25	A-27
ATG	Assign Trunk Group Cluster	26	A-28
ATH	Assign Thresholds	27	A-29
ATM	Assign Traffic Metering	28	A-30
ATS	Assign Terminal Service (Analog Loop/Trunk)	29	A-31
ATS	Assign Terminal Service (Digital Loop/Trunk)	30	A-32
ATS	Assign Terminal Service (Signaling Equipment)	31	A-33
ATT	Assign Terminal Type (CSP)	32	A-34
ATT	Assign Terminal Type (Conference Bridge)	33	A-34
ATT	Assign Terminal Type (IMU)	34	A-35
ATT	Assign Terminal Type (LKG)	35	A-36
ATT	Assign Terminal Type (CVSD RCU)	36	A-37
AVL	Assign Variable Location	37	A-38
AXL	Assign Transfer List	38	A-39
AXX	Assign XXX Routing	39	A-40
AZR	Assign Zone Restriction	40	A-41

b. TDMX Address Format. Each loop, trunk, or piece of common equipment associated with the TDMX is connected to a specific matrix terminal. This terminal is identified by a matrix address. The TDMX address is in the form XX (TDMM in the SDSG = 01-15) - XX (TDMM terminal TDMM = 0063).

4. AAA. The worksheet for alternate area routing is shown in Figure A-7. Alternate area routing is used when multiple paths exist from the home switch to distant areas, either NYX or PR. The first-preferred and second-preferred route

may be specified for up to 10 NNX or PR codes in an NYX table, or SL codes in a PR table. Eight alternate area routing tables can be assigned. The following data elements are contained in the worksheets.

a. Alternate Area Code. Enter a 2- or 3-digit number (PR or NYX) to specify the alternate area to be routed to. Up to eight of these codes may be entered. The entry is based on network routing plans and must be compatible with the ANY and APR worksheets.

b. Switch Code. Enter the 2- or 3-digit numbers that identify the switches for routing to the area cited in subparagraph 5a above. The entries are in the format NNX or PR if the area code is NYX, or SL if the area code is PR. One switch code per area code is required. Up to 10 switch codes per area code may be entered. The entry must be based on network routing plans and must be compatible with the ANY, APR, and ASL worksheets.

c. First TGC/Second TGC. Enter a 1- to 3-digit number (1-127) to identify the first- and second-preferred routes to the switch code indicated. The first-preferred TGC is required; the second, optional. This entry is based on network routing tables. This entry must be compatible with entries on the ATG worksheet.

5. AAP. This worksheet (Figure A-8) is used to identify the switch codes for alternate and lateral COMSEC parent switches (APS/LCPS) and to designate whether or not keys are to be transferred.

a. Alternate Parent. Enter = NNX(X) = switch code of APS.

b. Lateral Parent. Enter = NNX (X) = switch code of LCPS.

c. Acting as Parent for Home Subnetwork. Enter Y = Yes or N = No.

d. Acting as Parent for Lateral Subnetwork. Enter Y = Yes or N = No.

Alternate Area Code	Switch Code NAC	1st TGC	2nd TGC	Alternate Area Code	Switch Code NAC	1st TGC	2nd TGC	Alternate Area Code	Switch Code NAC	1st TGC	2nd TGC

AAA Worksheet

AAA	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-7. AAA, Alternate Area Routing Worksheet

Switch Codes

_____ Alternate Parent

_____ Lateral Parent

Acting as Parent (Y = Yes, N= No)

_____ For Home Subnetwork

_____ For Lateral Subnetwork

Transfer (Blank = No, 1 = List, 2 = All, 3 = Stop

_____ Home Variable(s) to Alternate Parent

_____ Lateral Variable(s) to Lateral Parent

AAP Worksheet

AAP	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-8. AAP, Alternate Parent Worksheet

e. Transfer Home Keys to Alternate Parent. Enter Blank = No transfer, 1 = Home List from AXL worksheet, 2 = All Associated Home Keys, or 3 = Stop Home Transfer in Progress.

f. Transfer Lateral Keys to Lateral Parent. Enter Blank = No transfer, 1 = Lateral List from AXL Worksheet, 2 = All Associated Lateral keys, or 3 = Stop lateral transfer in Progress.

6. ACI. Data elements for call inhibit are entered on the worksheet shown in Figure A-9. Call inhibit, a switch capability, examines area and switch codes to screen calls and thus prevents subscribers from gaining access to restricted subnetworks. Any NYX area and selected NNX codes within that area may be specified, to which local subscribers and PBXs are not permitted access. All subscribers and PBXs are affected because the feature is not selectable on a terminal-by-terminal basis. (Call inhibit can also be applied to incoming calls on specific TGCs by using the ATG worksheet.) Up to 20 call-inhibit lists can be assigned with up to 50 NNX codes in each. The 50 NNX codes can be 50 individual NNX codes, 25 consecutive code groups, or a combination of code groups and individual codes. Entries must be compatible with the network numbering and routing plans. Data elements are described in the following paragraphs.

a. NYX Area Code. Enter a 3-digit number (NYX), where N = 2 to 9, Y = 0 or 1, and X = 0 to 9. This identifies the area containing NNX codes to which access is to be restricted. The area code must be compatible with the network numbering plan and routing plan.

b. Start NNX. Enter a 3-digit number (NNX), where N = 2 to 9 and X = 0 to 9, to specify the first NNX code (in numerical sequence) to which calls will be inhibited. If an individual NNX code is specified, it is entered here. For systems that use the 4/3 numbering plan, PRS can be substituted for NNX. However, using PRS can lead to unwanted results. This entry could inhibit calls to as many as 10 switches because any PRSL switch with a matching PRS would be inhibited.

c. End NNX. Enter a 3-digit number (NNX) to specify the last NNX code of a consecutively numbered group that began with the entry in subparagraph 6b above. If an

NYX Area Code	Start NNX	End NNX	E	NYX Area Code	Start NNX	End NNX	E	NYX Area Code	Start NNX	End NNX	E

ACI Worksheet

ACI	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE ___ OF ___

Figure A-9. ACI, Call Inhibit List Worksheet

individual NNX code is to be specified, leave this entry blank.

d. Eliminate. Enter E to eliminate entry from list.

7. ACN. Commercial network routing information is entered on the worksheet shown in Figure A-10. Up to six data elements are entered on the worksheet. The primary and alternate TGCs (up to five) are entered by TGC number in the range 1-127. These TGCs specify the routes used in accessing the commercial network. The primary TGC must be entered if commercial routing is specified. The alternate TGCs are optional entries based on the routing plan. The entries must be compatible with entries in the ATG and ATS trunk worksheets.

8. ACP. Figure A-11 is the worksheet used to assign the common-pool compressed dial lists. Compressed dialing permits selected subscribers to dial a 2-digit number plus C to reach another subscriber. Each of 5 common-pool compressed dial lists may contain up to 80 compressed dial codes. Subscribers authorized common-pool access are classmarked on the ATS worksheet according to which one of the five common-pool directories they can access. Subscribers authorized access to one directory will have access to all the codes within that directory, but are denied access to the other four common-pool directories. The directories (lists) are established on this worksheet. Data elements are described in the following paragraphs. (To establish individual compressed dial lists, see paragraph 13.)

a. List Number. Enter a single digit (1-5) to define the common-pool compressed dial list for which the codes are being established.

b. CDN. Enter a 2-digit number (20-99) to assign a compressed dial number. (This is the number subscribers dial to have the switch dial the directory number.) The same CDN may be contained in all 5 lists, as each list is independent.

c. Directory Number. Enter up to a 13-digit number (escape code is suppressed) to assign a directory number that corresponds to the CDN assigned in subparagraph 5b above. The switch outpulses this number when a subscriber dials the CDN. Because the lists are independent, the same directory

______ ______ ______ Primary TGC

______ ______ ______ Alternate 1

______ ______ ______ Alternate 2

______ ______ ______ Alternate 3

______ ______ ______ Alternate 4

______ ______ ______ Alternate 5

ACN Worksheet

ACN	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE ___ OF ___

Figure A-10. ACN, Commercial Network Routing Worksheet

List Numbers	Compressed Dial Number	Directory Number	List Numbers	Compressed Dial Numbers	Directory Number	List Numbers	Compressed Dial Numbers	Directory Number
	20			47			74	
	21			48			75	
	22			49			76	
	23			50			77	
	24			51			78	
	25			52			79	
	26			53			80	
	27			54			81	
	28			55			82	
	29			56			83	
	30			57			84	
	31			58			85	
	32			59			86	
	33			60			87	
	34			61			88	
	35-46			62-73			89-99	

ACP WORKSHEET

ACP	SW CODE	SW TYPE	SW LOCATION	DATE	REV 3	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-11. ACP, Common Pool Compressed Dial List Worksheet

number may appear in all five lists. It may have the same or a different associated CDN in each list.

9. ACR. This worksheet should be completed by the planner-engineer only if the switch is to be used as a nodal control; i.e., not collocated with an AN/TSQ-111 CNCE. As with the CNCE, the AN/TTC-39A(V)1 CRF can combine or decombine DTGs. Group and subgroup matrix assignments, such as DTG-to-DTG or subgroup-to-subgroup, are determined from the ADT worksheet. CRF data elements are entered from the ADT worksheet shown if Figure A-12. (See Table A-17 for a complete list of permissible reassignment combinations.)

Table A-17. Valid Combinations of From and To Entries

From	To	Assignment
DTG Number Subgroup Number	DTG Number Subgroup Number	Subgroup to Subgroup
DTG Number Subgroup Number	DTG Number Start Channel End Channel	Subgroup to Range of Channels in a DTG 1/
DTG Number Start Channel	DTG Number Start Channel	Single Channel in a Group to Single Channel in a Group
DTG Number Start Channel End Channel	DTG Number Start Channel End Channel	Range of Channels in a Group to Range of Channels in a Group 2/
DTG Number Start Channel End Channel	DTG Number Subgroup Number	Range of Channels to Subgroup 2/
TDMX Address	DTG Number Start Channel	Single (Nongroup) Channel to Single
TDMX Address	DTG Number Start Channel End Channel	Single (Nongroup) Channel to Range of Channels (for Secondary Channels)

1/ The range of channels may include the entire To group.
2/ Group-to-group assignments are entered this way.

Reassignment Number	From Data					To Data				
	DTG Number	Subgroup Number	Start Channel	End Channel	TDMX Address	DTG Number	Subgroup Number	Start Channel	End Channel	Remarks

ACR WORKSHEET

ACR	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-12. ACR, Channel-Reassignment Worksheet

a. Reassignment Number. Enter a 1- or 2-digit number to identify the number of the reassignment being made. The range for this entry is 1-64. Note that once 64 reassignments have been entered, additional reassignments cannot be made until 1 or more of the first 64 reassignments has been deleted.

b. From Data. These data elements describe the group from which channels are reassigned. The data must be consistent with the ADT worksheet.

(1) DTG Number. An entry should be made in this column if a group, subgroup, range of channels, or single channel from the DTG is being reassigned. Leave one entry blank if the channel being reassigned is a single, nongroup channel; i.e.,one entering the TDMX through the DLPMA. (See subparagraph 9b(5) below.) Enter the 1- or 2-digit number of the DTG containing the subgroup or range of channels to be reassigned. The range for this entry is 1-30.

(2) Subgroup Number. Make an entry in this column if an entire subgroup from the DTG identified in subparagraph 9b(1) above is to be reassigned; otherwise, leave it blank. Enter the 1-digit number identifying the subgroup to be reassigned. The range for this entry is 1-4. If an entry is made in this column, the start channel, end channel, and TDMX address columns must be left blank.

(3) Start Channel. Make an entry in this column if a range of channels or a single channel from the DTG identified in subparagraph 9b(1) above is to be reassigned; otherwise, leave it blank. Enter the 1- to 3-digit number identifying the single channel or the first primary traffic channel in a range of channels to be reassigned. The range for this entry is 1-144. If an entry is made in this column, the subgroup number and TDMX address columns must be left blank. If the reassignment consists of a single channel, no entry is required in the end channel column.

(4) End Channel. Make an entry in this column if a range of channels from the DTG identified in subparagraph 9b(1) above is to be reassigned; otherwise, leave it blank. Enter the 1- to 3-digit number identifying the last primary traffic channel in the range of channels to be reassigned. The range for this entry is 1-144. If an entry is made in this column, the subgroup number and TDMX address columns must be left blank.

(5) TDMX Address. Make an entry in this column if a single, nongroup channel is to be reassigned. Enter the 4-digit TDMX address of the channel to be reassigned. The entry must be in the form DD-EE. If any entry is made in this column, the DTG number, subgroup number, start channel, and end channel columns must be blank.

c. To Data. The data elements in this section describe the DTG to which channels are reassigned.

(1) DTG Number. An entry is always made in this column. Enter the 1- or 2-digit number identifying the DTG to which the channel or channels are being reassigned. The range for this entry is 1-30.

(2) Subgroup Number. Make an entry if the reassignment is made from subgroup-to-subgroup or from a range-of-channels to subgroup. Enter the 1-digit number identifying the subgroup to which the channels are being reassigned. The range for this entry is 1-4. If an entry is made in this column, leave the start channel and end channel columns blank.

(3) Start Channel. Make an entry in this column if the reassignment is made under one of the following conditions:

(a) From subgroup to range-of-channels in a DTG.

(b) From single-channel-(group) to single-channel-(group).

(c) From range-of-channels to range-of-channels.

(d) From single channel-(nongroup/TDMX) to single-channel-(group).

(e) From single channel-(nongroup/TDMX) to range-of-channels.

(f) Enter the 1- to 3-digit number identifying the single channel or the first primary traffic channel in a range to which another channel is reassigned. The range for this entry is 1-144. If an entry is made in this column, leave the subgroup number column blank. If the reassignment

consists of a single channel, no entry is required for the end channel column.

(4) End Channel. Make an entry in this column if the reassignment is being made under one of the following conditions:

(a) From subgroup to range-of-channels.

(b) From range-of-channels to range-of-channels.

(c) From single-channel-(nongroup/TDMX) to range-of-channels.

(d) Enter the 1- to 3-digit number identifying the last channel in a range to which another channel can be reassigned. The range for this entry is 1-144. If an entry is made in this column, leave the subgroup number column blank.

10. *ADE. Figure A-13 is the worksheet to assign digit editing. Digit editing is the process whereby a telephone number is modified by deleting, or deleting and substituting, digits to provide compatibility with other network numbering plans. Specific portions of the basic 10-digit address that the switch can edit are discussed in Chapter III. Data elements are described in the following paragraphs.

a. NYX, NNX, or NNXX Code. Enter a 3- or 4-digit number in the format NYX, NNX, or NNX, where N = 2 to 9, Y = 0 to 1, and X = 0 to 9, to specify which code is to be edited (deleted or prefixed). (In a tactical numbering scheme (NYX PRSL XXX) the codes that may be edited are NYX, PRS, or PRSL.)

b. Loop-around Equipment. Enter a single digit, which will assign loop-around equipment to perform mode conversions in conjunction with digit editing. The range for this entry is 0 to 5, where 0 = none, 1 = keychanger A, 2 = keychanger B, 3 = keychanger C, 4 = NBST regenerator, and 5 = data regenerator. This feature is not used in currently fielded switches; therefore, always enter 0 where 0 = None.

NYX, NNX, or NNXX Code	Loop-Around Equipment	Edit Type	Prefix Code	NYX, NNX, or NNXX Code	Loop-Around Equipment	Edit Type	Prefix Code

ADE WORKSHEET

ADE	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-13. ADE, Digit Editing Worksheet

c. Edit Type. Enter a single letter (D = Delete or P = Prefix) to specify the editing process to take place. D causes the entry in subparagraph 10a above to be deleted. P causes the code to be deleted. The digits remaining in the number are then prefixed by the code in subparagraph 10d below.

d. Prefix Code. If the edit type is P, enter the code to become a prefix (9NX, NYX, NXX, NX, or N). If the edit type is D, leave this entry blank.

11. ADT. The ADT worksheet, depicted in Figure A-14 and discussed in the following subparagraphs, must be used when planning DTGs for the AN/TTC-39A(V)1.

a. DTG Number. Enter a 1- or 2-digit number to specify the DTG for which data are being entered. The range for this entry is 1 to 30. DTGs 1 to 15 are assigned to TDSGM 1; DTGs 16 to 30 are assigned to TDSGM 1. DTGs 15 and 30 are used with the LSCDM.

b. Start NCMD. Enter the 1- or 2-digit number that specifies the first NCMD used to MUX/DEMUX channels of the DTG specified in subparagraph 11a, above. The range for this entry is 1 to 36. There are 36 NCMDs assigned to each TDSGM. Normally NCMDs 1 to 8 on each TDSGM are set aside for use with field cables. Thus, the start NCMD for DTG 1 (TDSGM 1) and DTG 16 (TDSGM 2) is NCMD 9. The start NCMD for the next DTG is usually the one immediately following the end NCMD of the preceding group. For example, if the end NCMD for DTG 1 is NCMD 3, normally the start NCMD for DTG 2 is NCMD 4. NCMDs must be assigned to DTGs in accordance with Table V-3. Leave blank the Start NCMD entry for the following conditions:

(1) When the DTG is in the repeater mode.

(2) When DTG 14 is used with the VOU.

c. End NCMD. Enter the 1- or 2-digit number that specifies the last NCMD used to MUX/DEMUX channels of the DTG identified in subparagraph 8a, above. The range for this entry is 1-36. The end NCMD is determined by the number of channels in the DTG and the DTG modularity (MOD 8 or 9). All NCMDs between the Start and End NCMDs are also assigned to the group. If only one NCMD is needed to accommodate the group, the End NCMD entry is the same as the Start NCMD entry. See Table A-18 for NCMD/DTG combinations. Leave

Data Entry	DTG Number										
	Start NCMD										
	End NCMD										
	TED										
	Sync Delay										
	Group Rate										
	MSF										
	Subgroup 1 Rate										
	Subgroup 2 Rate										
	Subgroup 3 Rate										
	Subgroup 4 Rate										
	In/Out of Service										
	Modulator Cable Length										
	Demodulator Cable Length										
	Modulation										
	DTG Repeater Mode										
	OCU-II Modem										
	Red Group Clock										
Planning Information	Number of Channels										
	Repeater In Use										

ADT Worksheet

ADT	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-14. ADT, Digital Transmission Group Worksheet

this column blank if either of the conditions identified in subparagraph 11b above is met.

NOTE: It is possible to assign two 4½ channel DTGs to a single NCMD, provided the groups are paired as depicted in Table A-19. When two 4½ channel DTGs are assigned to 1 NCMD, enter the same Start NCMD and End NCMD number for both DTGs.

d. TED. Enter a 1- or 2-digit number to identify the TED that will be used with the DTG. The range for this entry is 0-15, where 0 = None. Normally, TEDs 1-9 are used with DTGs 1-9, and TEDs 10-15 are used with DTGs 16-21. Always enter 0 under the following conditions:

(1) When the DTG is in the repeater mode.

(2) When the DTG is a 4½-channel group.

(3) When DTG 14 is used with OCU-II.

e. Sync Delay. The entries for this column are Y = Yes or N = No. Enter Y if the DTG is to be transmitted over a Tropo link; otherwise, enter N. Leave this column blank if any of the three conditions identified in subparagraph 11d above are met.

f. DTG Channel Rate. The entries for this column are 16 = 16 kbps or 32 = 32 kbps. The entry must be compatible with the switch rate (16 or 32 kbps) assigned on the ASI worksheet (paragraph 20, below). For example, if the switch rate is 32 kbps, then the DTG channel rate must also be 32 kbps. Leave this column blank for DTG 14 when it is used with OCU-II.

g. Group Rate. Enter the DTG group rate. This entry is based on the number of channels assigned to the DTG and the modularity of the DTG. The following are valid entries.

(1) MOD 8: 128, 256, 512, 1024, 1536, 2048, and 4096 kbps.

(2) MOD 9: 72, 144, 288, 576, 1152, 2304, and 4608 kbps.

Table A-18. NCMD/DTG Combination Table

DTG Number	NCMD Number
1-8	19-36
9-15	1-18
16-23	19-36
24-30	1-18

Table A-19. Allowable 4½-Channel DTG Pair

TDSGM	Allowable Pair	
	DTG A	DTG B
1	1	2
	3	4
	5	6
	7	8
	9	10
	11	12
	13	14
	15	
2	16	17
	18	19
	20	21
	22	23
	24	25
	26	27
	28	29
	30	

(3) The following restrictions must be considered when selecting the group rate:

(a) When DTG 14 is used with OCU-II, the entry must be 256 kbps.

(b) If the DTG is in the repeater mode, the 1,536-kbps rate cannot be used.

(c) Group rates above 2,048 kbps cannot be used for DTGs supporting LSCDMs.

(d) Dipulse groups are restricted to the following rates: 288, 576, 1,152, and 2,304 kbps.

h. MSF. Enter the DTG MSF. Valid entries are 1, 2, 3a1, 3a2, 3b, 3c, or 4. Leave this column blank for DTGs in the repeater mode, and for DTG 14 when used with OCU-II.

i. Subgroup (1-4) Rate. Make an entry in this column only if the DTG MSF is a type 3; otherwise, leave it blank. Also leave a blank for DTGs in the repeater mode, and for DTG 14 when used with OCU-II. Valid entries are:

(1) MOD 8: 0, 128, 256, 512, 1,024, and 2,048 kbps.

(2) MOD 9: 0, 144, 288, 567, 1,152, and 2,304 kbps.

j. In or Out of Service. Leave this column blank. This entry is based on current equipment status and is normally made after the switch becomes operational.

k. Modulator Cable Length. Enter a 1-digit number to specify the modulator cable length. The range for this entry is 0-4, where 0 = 0, 1 = 1/4, 2 = 1/2, 3 = 3/4, and 4 = 1 mile. For diphase DTGs always enter 4. For dipulse DTGs always enter 4 except when interfacing with a TD-206 repeater. In this case enter the actual cable length.

l. Demodulator Cable Length. Enter a 1-digit number to specify the demodulator cable length. The range for this entry is 0-4, where 0 = 0, 1 = 1/4, 2 = 1/3, 3 = 3/4, and 4 = 1 mile. For diphase groups, always enter 4, except when the DTG group rate is 4,096 or 4,608 kbps. For those group rates, the demodulator cable length must be less than or equal to 1/2 mile; enter 0, 1, or 2. For dipulse groups, enter 4 unless the modulator cable length is not 1 mile. In this case, the demodulator cable length must be equal to the modulator cable length; enter 0, 1, 2, or 3.

m. Modulation. Enter a 1-digit number to specify the type of DTG modulation. Enter 1 for diphase modulation.

Enter 2 for dipulse modulation. Note the following restrictions:

(1) Always enter 1 for DTG 14 when that group is used with OCU-II.

(2) If the entry is 2, the group rate is restricted to one of the following: 288, 576, 1,152, or 2,304 kbps.

n. DTG Repeater Mode. This entry specifies whether or not the DTG is in the repeater mode. Note that a DTG in repeater mode is not switched but is routed intact to an outgoing GM for retransmission. Any of the 30 DTGs available in the switch may be used in the repeater mode. The entries for this column are Y = yes or N = no. Always enter N for DTG 14 when it is used with OCU-II.

o. OCU-II Modem. This entry specifies whether the DTG will be used to transmit the 12 multiplexed DVOW channels from OCU-II to a control facility. The entries for this column are Y = Yes or N = No. The following restrictions apply:

(1) Y can be entered for DTG 14 only. Enter N for all other groups.

(2) For a Y entry, the DTG 14 group rate must be 256 kbps.

(3) For a Y entry, the modulation type must be diphase.

(4) For a Y entry, DTG 14 cannot be in the repeater mode.

p. RED-Group Clock. This entry specifies whether the DTG is associated with the RED-group or BLACK-group. The entries are Y = Yes or N = No. Enter N if a TED is assigned to the DTG. Enter N for DTG 14 when that group is used with OCU-II.

q. *Number of Channels. Enter the number of channels, including overhead channels, to be assigned to the DTG. This information is used by the planner-engineer to determine the number of NCMDs to be used with the DTG. It is not entered into the database.

r. *Repeater in Use. Enter Y if a repeater is in use on the DTG. Enter N if a repeater is not in use.

12. AEU. EUB automatically connects preselected digital subscribers to a distant AN/TTC-39 series CS for service if both processors of the local switch fail. To accomplish this assignment, both the switch being bypassed and the receiving switch need certain information. Use the AEU worksheet shown in Figure A-15 to enter the information required at the losing switch. The data elements are described in the following paragraphs.

a. *Subscriber. This element identifies the subscriber, by title or name, who is to receive EUB service. The subscriber element is used for reference only and is not entered into the database.

b. *Subscriber Number. Enter up to a 7- (normally a 3- or 4-) digit code to identify the user who is to receive EUB service. The subscriber number is used for reference only and is not entered into the database.

c. From or To. Enter a TDMX address entry in the format XX-XX. The From entry specifies the subscriber's current address and must be consistent with assignments made on the ATS loop terminal worksheet. The To entry specifies the route to be used to exit the switch enroute to the distant AN/TTC-39 series CS, and must be consistent with the assignment made on the ATS trunk worksheet. All EUB subscribers require their own dedicated trunk to use this service.

13. AFD. Figure A-16 is the worksheet used to record data elements required to create fixed-directory routing lists. Fixed-directory lists consist of FDSLs for locating roving subscribers, and FDULs for locating roving units. Subscribers or units on these lists retain the same directory number regardless of their location. The switch translates the fixed number into a route selection for their current location. Fixed-directory service is discussed in Chapter II. Data elements are described in the following paragraphs.

a. List Type. Enter a single letter (S = Subscriber or U = Unit) to identify the type of list to be entered. When completing worksheets for both types of lists, the planner-engineer should enter all subscribers on one worksheet, then all units on another, rather than mixing them.

Subscriber	Subscriber Number	Address		Subscriber	Subscriber Number	Address	
		From	To			From	To

AEU Worksheet

AEU	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF __

Figure A-15. AEU, Essential User Bypass Worksheet

List Type	Index Code	Directory Number	Signal FWD	List Type	Index Code	Directory Number	Signal FWD

AFD Worksheet

AFD	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-16. AFD, Fixed Directory Routing Worksheet

b. Index Code. Enter five digits to identify the subscriber or unit, respectively. This number is the fixed-directory telephone number of the subscriber or unit. FDSL entries are made in the format PXJXZ. FDUL entries are made in the format XX000. Value ranges for letters P, X, and J are as follows: P = 7 to 9; X = 0 to 9; and J = 7 to 9; and Z = 0 to 3. The complete FDUL dialed number is in the format 99XXIXX. The FDUL number's last three digits (IXX) are the same as the last three digits of the PRSLXXX directory number of the subscriber at the roving unit. The switch routes on the first XX in the XXIXX. The first XX code is translated by the switch to the roving unit's PRSL. The user must know the subscriber's IXX code to dial the subscriber directly, or the user must dial XX0 to receive operator assistance.

c. Directory Number. Enter a 7-digit number (PRSLXXX) to specify the roving subscriber's current directory number, or a 4-digit entry (NNXX or PRSL) to identify the roving unit. Normal routing occurs after translation to the directory number. The FDUL routes to the NNXX or PRSL code and uses the last three digits for routing to the subscriber. The last three digits of the PRSLXXX directory number must be the same as the last three digits of the XXIXX code dialed. This entry is based on the most current location of the roving subscriber or unit and the host unit's telephone directory.

d. Signal Forward. Enter a single letter (S = System Number, F = Fixed-Directory Number) to indicate which number will be forwarded to the next switch. F causes the fixed-directory number to be forwarded, and S causes the translated number to be forwarded. Use F if an AN/TTC-39 series CS is the next switch in the routing. Use S if the next switch is not an AN/TTC-39 series CS. If an F is used, the switch to which the call is routed must have a current, fixed-directory routing table in its database.

14. AFR. The worksheet in Figure A-17 is used to enter the frequency for network reporting for the operator report, total number of calls report, individual trunk group status report, calls preempted per trunk group report, DTG approximate-error-rate report, and total traffic count reports. One entry applies to all reports. Enter a 1- or 2-digit number as shown in Table A-20. Periodic printouts must be requested on the ASC worksheet. The TGC to be monitored must be identified on the ATM worksheet.

_____ _____ Frequency Adjustment

ID		TIME (MINUTES)	
48 = R3	Calls to Operator		
49 = R4	TGC Calls by Precedence	7 =	15
50 = R5	Individual Trunk Group Status	8 =	30
51 = R6	Calls Preempted per TGC(s)	9 =	60
74 = R27	Average Error Rate(s) per DTG(s)	12 =	240
92 = R44	Calls Offered	14 =	480
95 = R47	Calls Offered to Remote Switch(es)	16 =	1440

AFR	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-17. AFR, Frequency for Network Reporting Worksheet

Table A-20. Network Reporting Entries

Entry	Time Between Reports in Minutes
7	15
8	30
9	60
12	240
14	480
16	1,440

15. AIC. Use the worksheet in Figure A-18 to assign individual compressed dial lists. Compressed dialing permits selected subscribers to dial a 2-digit number plus C to reach another subscriber. The individual compressed dial list has up to 80 CDNs that belong to 8 subsets. Subscribers are classmarked for access to specific subsets of the list. They may be given access to only one or several entries in the list, based on the subset to which the CDN is assigned. A subscriber with access to this list cannot have access to any common-pool lists. Data elements are described in the following subparagraphs.

a. Compressed Dial Number. Enter a 2-digit number (20 to 99) assigning the CDN to be converted to a directory number. This number is arbitrary within the range specified.

b. Directory Number. Enter up to a 13-digit number to assign a directory number that corresponds to the compressed dial number assigned in subparagraph 15a, above.

c. Subsets. Enter up to eight individual digits to specify which of the eight subsets (1 to 8) contains the CDN. Each CDN may be a member of only one subset, all eight subsets, or any number of subsets in between. The term subset refers to a list of CDNs. The subscriber classmarked for individual compressed dial list subset number X can use only CDNs in list subset number X.

16. *ANN. The worksheet used to assign NNX (switch code) routing is shown in Figure A-19. (This worksheet is not used with a PRSL routing scheme.) Data elements are described in the following paragraphs.

CDN	Subscriber Directory Number	Subsets	CDN	Subscriber Directory Number	Subsets	CDN	Subscriber Directory Number	Subsets
20			46			72		
21			47			73		
22			48			74		
23			49			75		
24			50			76		
25			51			77		
26			52			78		
27			53			79		
28			54			80		
29			55			81		
30			56			82		
31			57			83		
32			58			84		
33			59			85		
34			60			86		
35			61			87		
36			62			88		
37-46			63-71			89		
						95		
						96-99		

AIC Worksheet

AIC	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-18. AIC, Individual Compressed Dial List Worksheet

a. NNX Code. To define the switch code (NNX) where the trunk will terminate, enter a 3-digit number in the format NNX, where N = 2 to 9 and X = 0 to 9. This entry is based on network routing plans.

b. Primary and Alternate TGCs. Enter the primary and alternate TGCs by TGC number. The allowable range is 1 to 127. These entries specify the routes to an NNX switch. A primary TGC must be entered for every foreign code. Alternate TGC entries are optional based on the network routing plan; up to five entries are permitted. This entry must be compatible with entries in the ATG and ATS trunk worksheets.

17. ANX. Data for routing on NNXX codes is entered on the worksheet shown in Figure A-20. An NNXX code may be assigned for switches using the 3/4 numbering plan to route to designated PBXs. NNXX routing cannot be assigned at switches that use a 4/3 numbering plan. Using this numbering technique, up to nine small switches (fewer than 100 lines) can share the same NNX code. (The digit 0 will route to the operator; therefore, only 1 to 9 can be used.) Routing can be assigned for up to 50 NNXX codes.

a. NNXX Code. Enter a 4-digit number NNXX (where N = 2 to 9 and X = 0 to 9) to identify the NNXX code at which the TGC will terminate. For expanded switch operation, the code becomes NNXG, where N = 2 to 9 and G = 2 to 8. The NNXX tables can handle 5 groups of 10 each (PBX only) and 1 group of 10, divided as follows:

(1) NNX0 = Operator at home code switch.

(2) NNX1 = Home code switch.

(3) NNX2 to NNX8 = Expanded node switches.

(4) A group consists of NNXX codes with the same NNX portion of the code. This entry is based on the network routing plan.

b. Primary or Alternate TGC. To reach the destination NNXX code, enter a 1- to 3-digit number (1 to 127) to specify the primary and up to five alternate TGCs. The primary TGC is a required entry for each NNXX code; however, alternate routes are optional. This element must be compatible with entries on the ATG worksheet and the network routing plan.

Switch Code	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	Switch Code	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5

ANN Worksheet

ANN	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-19. ANN, NNX Routing Worksheet

NNXX Code	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	NNXX Code	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5

ANX Worksheet

ANX	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-20. ANX, NNXX Routing Worksheet

18. ANY. Figure A-21 is the worksheet required to assign NYX (area code) routing. This worksheet defines the home and foreign area codes, and specifies primary and alternate routes to the foreign codes. Data elements are described in the following subparagraphs.

a. NYX Code. Enter a 3-digit number in the format NYX, where N = 2 to 9, Y = 0 to 1, and X = 0 to 9. Based on network routing plans, this entry defines the home area code and any foreign area code to which routing is being assigned. An entry for a home NYX code is required.

b. Home or Foreign. Enter a single letter (H = Home or F = Foreign) to indicate whether the NYX code is the home area or a foreign area. This entry is used to define home, and only one home entry is permitted at present. This entry is based on network routing plans.

c. NATO Designation. If the NYX code, above, is 9YX, enter S or T, where S = Routing to a NATO switch that uses a 6-digit area code (9YX-NYX) and T = Routing to a NATO switch that uses a 3-digit area code (9YX). If the NYX code is not 9YX, leave this entry blank.

d. Primary or Alternate TGC. Enter the primary and alternate TGCs by TGC number. The allowable range is 1 to 127. These entries specify the routes to foreign NYX areas. Enter a primary TGC for every foreign code, but not for the home code. Alternate TGC entries are optional, based on the network routing plan; up to five entries are permitted. This entry must be compatible with entries in the ATG and ATS trunk worksheets.

19. APC. Selected subscribers can be authorized to initiate preprogrammed conferences, both local and interswitch. When such a subscriber dials the appropriate group number, the switch automatically connects all group members through conference bridges. Data elements for assigning preprogrammed conference lists are entered on the worksheet shown in Figure A-22. Data elements are described in the following subparagraphs.

a. Group Number. Enter a 2-digit number (20 to 99) to identify the conference group being assigned. Each group may contain up to 14 members (4 conference bridges) or 20 members (6 conference bridges).

NYXCode	Home/Foreign	NATO Designation	PRITGC	ALT 1	ALT 2	ALT3	ALT 4	ALT 5

NYX Routing Worksheet

ANY	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-21. ANY, NYX Routing Worksheet

Preprogrammed Conference Group Number	Security Required	Member Directory Number	Initiate Classmark	Preprogrammed Conference Group Number	Security Required	Member Directory Number	Initiate Classmark

APC Worksheet

APC	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-22. APC, Preprogrammed Conference List Worksheet

b. Security Required. Enter a single letter (Y = Yes or N = No) to specify if security is required for the group being assigned. For security to be required, every member of the group must be able to talk in the secure mode. Each group member must have a DSVT (or have an approved loop).

c. Member Directory Numbers. Enter up to a 10-digit number to specify each conference group member's telephone number. Not all group members must be subscribers on the same switch. They may be foreign or may be roving subscribers. The directory number can also be a conference number at another switch in the form NYX-NNXX-CAA, where AA = the conference number at another switch.

d. Initiate Classmark. Enter a single letter (Y = Yes or N = No) to specify whether the member directory number associated with the conference may initiate a conference or not. At least one of the conference member directory numbers must be classmarked Y, but any number greater than one may receive this classmark.

20. APR. Use the worksheet in Figure A-23 to enter data that defines PR (primary area) routing. The data elements are described in the following subparagraphs.

a. PR (NN) Code. Enter a 2-digit number (72 to 79, 82 to 89, 92 to 98) to define the PR (primary area) code for which routing is being assigned. Note that PR is a subset of NN, where NN = 72 to 79. This entry is based on network routing plans.

b. Home or Foreign. Enter a single letter (H = Home or F = Foreign) to indicate whether the PR code is the home area or a foreign area. If the code is home, no more input is required and the home code has been defined. At present, only one home PR may be assigned. An entry is required for a home code if the switch uses the 4/3 numbering plan. This entry is based on network routing plans.

c. Primary and Alternate TGCs. Enter the primary and alternate TGCs by TGC number. The allowable range is 1 to 127. These entries specify the routes to a foreign PR code. Enter a primary TGC for every foreign code, but none for the home code. Alternate TGC entries are optional, based on the network routing plan; up to five are permitted. This entry must be compatible with entries in the ATG and ATS trunk worksheets.

NN Code	Home or Foreign	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	NN Code	Home or Foreign	PRI TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5

APR Worksheet

APR	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-23. APR, PR (NN) Routing Worksheet

21. ARB. Figure A-24 is the worksheet used to identify essential users. The worksheet is also used to enter data elements into the gaining switch's database. The data elements are described in the following subparagraphs.

a. Switch Code. Enter a 3- or 4-digit number (PRSL or NNX) to identify the code of the switch being bypassed.

b. Subscriber Number. Enter a 3- or 4-digit number (GXXX or GXX, where G = 1 to 8 and X = 0 to 9) to identify the subscriber receiving EUB service.

c. Matrix Location. Enter a code in the format DD-EE to identify the TDMX location, or in the format A-BB-CC to identify the SDMX location where the subscriber will be assigned. This location is selected from interswitch trunks connecting to the bypassed switch. For digital trunks, it is based on the To address on the EUB worksheet. For analog trunks, it is based on patching at the bypassing switch.

d. Terminal Type. Enter a 2-digit number (01 to 14) to identify the type of equipment on the received subscriber line. This entry is based on the ATS (loop) worksheet from the bypassed switch. Table A-21 lists the types of terminal equipment used for this element.

Table A-21. Terminal Type Entries

Type Number	Equipment Name
1	TA-341, TA-838, TA-720
3	DSVT, KY-90
6	Remote DSN Telephone (SF)
13	DNVT

e. Security. Enter a single letter (P = Preferred, R = Required, N = Nonsecure, E = End-to-End) to identify the subscriber's security requirements. This entry is based on the ATS (loop) worksheet (paragraphs 25 and 26) from the bypassed switch. Allowable entries are:

Switch Code	GXXX / GXX	Martix Location	Term Type	Security	Adapter Number	Switch Code	GXXX / GXX	Matrix Location	Term Type	Security	Adapter Number

ARB Worksheet

ARB	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-24. ARB, Received Bypass List Worksheet

(1) Analog subscribers: Enter N or R (approved loops).

(2) DNVT subscribers: Enter N.

(3) DSVT subscribers: Enter E, P, or R.

f. Adapter Number. Enter a 1- or 2-digit number (1 to 24) to assign an adapter to terminals that serve terminal type 6.

NOTE: This function is entered in memory but not as a command until directed by the organization responsible for the system's operation. Entry of this command reduces the switch assets available for use by local subscribers. Up to 2 lists of 60 subscribers per list is the maximum size of the ARB table. All new subscribers are classmarked as voice and data and Flash precedence. Further, alternations in classmarks may be made through the ATS command when the essential user function is used.

22. ASC. The ASC worksheet is used to assign classmarks that apply to the entire switch and may be changed without major impact. The ASC worksheet is shown in Figure A-25.

a. Alternate Routing. Enter a single letter (Y = Yes or N = No) to define whether the switch can perform alternate routing when it is acting as an intermediate switch (for tandem calls). The switch ignores this classmark for TGCs marked for spill forward.

b. Gateway Classmark. Enter a single letter (Y = Yes or N = No) to indicate whether this switch is acting as a direct entry into another system (DSN, commercial, NATO). If N is entered, this classmark prevents analog-to-digital, digital-to-analog, or both, conversions on tandem calls for non-spill-forward TGCs. This classmark is not checked.

c. NN Code for AN/TTC-30 Trunks. This code is not used.

ASI

— Switch Type 1 = 2 = AN/TTC-39A
— SDSG Matrix Size (0 - 1 + 39A)
— TSDG Matrix Size (1 - 2 = 39A)
— Single Shelter Switch (Y = Yes, N = No)
— — — Numbering Plan (3/4 or 4/3)
— — 16/32 kbps Switch

Time

— — — Day (1-365)
— — Hour (0-23)
— — Minute (0-59)
— Tenths of Minute (0-9)

For 3/4 Numbering Plan, also include

— Abbreviated Dial (Y = Yes, N = No)
— — — — Local Subscriber Code (NNXG)

ASI Worksheet

ASC

— Alternate Routing (Y = Yes, N = No)
— Gateway Classmark (Y = Yes, N = No)
— — NN Code for AN/TTC-30 Trunks
— Satellite Links (1-4)
— — — NATO Home Area (9YX)
— — — Switch Supervisor Loop Digits
— SSB Reset (Y = Yes, N = No; always displayed as N)
— TCCF Intercept (Y = Yes, N = No)
— — — TCCF Element ID
— TCCF Auto (Y = Yes, N = No)
— Periodic Report Print (Y = Yes, N = No)
— — — Password for Remote Access

ASC Worksheet

ASC/ ASI	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-25. ASC, Switch Classmarks and ASI, Switch Initialization Worksheet

d. Satellite Link Number. Enter a single-digit number (1 to 4) to indicate the maximum number of links allowed in a connection. The delay introduced by a satellite link can adversely affect some of the functions in establishing a connection between switches or between a switch and a subscriber. The switch can accommodate a given amount of delay; however, the number of tandem satellite links in a connection must be limited.

e. NATO Home Area. Enter a 3-digit number (900 to 919) to identify the NATO area code on which the switch is homed. If no NATO area is involved in the routing plan, leave this entry blank.

f. Switch Supervisor Loop Digits. Enter a 3- or 4-digit number (GXX or GXXX) to identify the directory number assigned to the switch supervisor. This number must be one assigned to a DSVT (terminal type 3) and is the instrument that rings when CSP operators depress the "Switch Supvsr" button on their consoles.

g. SSB Reset. Enter N. This feature is not implemented in the switch.

h. TCCF Intercept. Enter N. This feature is not implemented in the switch.

i. TCCF Element ID. Leave this column blank. It is not used at the present time.

j. TCCF Auto. Enter N. This feature is not implemented in the switch.

k. Periodic Report. Enter a single letter (Y = Yes or N = No) to indicate whether periodic reports should be printed on the local printer. Periodic reports and traffic metering reports for loops and trunks are printed only if this entry is Y.

l. Password for Remote Access. Leave this entry blank.

23. ASI. The ASI worksheet assigns initialization classmarks applicable to the entire switch. Use the ASI worksheet depicted in Figure A-25.

a. Switch Type. Enter a 1-digit number to identify the type of switch being initialized. Enter a 2.

b. SDSG Matrix Site. Enter a 1-digit number (0 to 4) to define the number of SDMXs that constitute the SDSG. Enter 1.

c. TDSG Matrix Size. Enter a single-digit number (1 to 4) to define the number of TDMXs that constitute the TDSG. Enter 2.

d. Single Shelter Switch. Enter a single letter (Y = Yes or N = No) to define the shelter configuration. Enter Y.

e. Numbering Plan. Enter a three-character and digit code (3/4 or 4/3) to define the numbering system to be used by the switch. The AN/TTC-39A(V)1 can use either a 3/4 plan (a 3-digit switch code and a 4-digit subscriber code in the format NNX-GXXX, where N = 2 to 9, X = 0 to 9), and G = 2-8, or a 4/3 plan (a 4-digit PRSL switch code and a 3-digit subscriber code in the format PR-SL-GXX, where PR = 72 to 99 and SL = 00 to 99).

f. 16- or 32-kbps Switch. Enter a 2-digit number (16 or 32) to define the voice digitization rate (16 or 32 kbps) that the switch will use.

g. Time. This element, a multientry code, defines the ASI command's time of entry. Enter Julian date 1-366), the hour (0 to 23), the minute (0 to 59), and tenths of a minute (0 to 9). This entry is made by the switch operator each time the switch is initially loaded.

h. Abbreviated Dial. If a 3/4 numbering plan is specified in subparagraph 23e above enter a single letter (Y = Yes or N = No) to define whether or not abbreviated dialing will be used. If a 4/3 numbering plan is specified, leave this entry blank. (When the switch is using a 4/3 numbering plan, abbreviated dialing is automatically invoked.)

i. Local Subscriber Code. If a 3/4 numbering plan is specified in subparagraph 23e above enter a local subscriber code in the format NNXG, where N = 2 to 9, X = 0 to 9, and G = 1 to 8. The NNX portion of the code is the switch code, and the G portion of the code indicates the first digit of all subscriber numbers served by the switch. If a 4/3 numbering plan is specified, leave this entry blank.

24. ASL. Data for routing on XX (SL) (switch location) codes are entered on the worksheet shown in Figure A-26. Only XX codes associated with the home NN can be assigned. To route to a switch in a different PR, use the APR worksheet. Assignments can be made only if the switch for which the database is being prepared is classmarked as a 4/3 switch.

a. XX (SL) Code. Enter a 2-digit number (00 to 99) to define the destination switch code or the switch code designated as home. This entry is based on the network routing plan.

b. Home or Foreign. Enter a single letter (H = Home or F = Foreign) to designate the switch classmark. Only one SL can be classmarked as home at present; all others are foreign. An entry for a home code is required if the switch uses the 4/3 numbering plan. This entry is based on the network routing plan.

25. AST. The worksheet shown in Figure A-27 assigns secondary traffic channels to the TDMX. Some input group combinations to the TGMs do not equal the combined output rate. In those cases, the lower rates are multiple-sampled, thereby creating redundant channels or secondary traffic channels. These channels must be identified to ensure accurate call completion. This condition should exist only when the high-speed side of a TGM is connected directly to the AN/TTC-39 series CS. (See CJCSM 6231.04 for more information.)

a. Primary and Alternate TGCs. Enter a 1- to 3-digit number (1 to 127) to specify the primary route to the SL code and up to five alternate routes. The alternate routes are optional entries. No entries are made for the SL

b. PTC. Enter a code in the format DD-EE, identifying the TDMX matrix location of the PTC against which the secondary channels will be identified.

c. STC. Enter a code in the format DD-EE, identifying STCs to be associated with the PTC. Either one or three STCs is assigned to a PTC, never two STCs. The terminal addresses of a PTC and all associated STCs must be within the range of a single DTG.

d. In/Out of Service. Enter I= In, or O= Out.

XX Code	Home or Foreign	Primary TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5

ASL Worksheet

ASL	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-26. ASL, XX (SL) Routing Worksheet

Terminal Address of PTC	Secondary Traffic Channel 1	Secondary Traffic Channel 2	Secondary Traffic Channel 3	In/Out Service	Terminal Address of PTC	Secondary Traffic Channel 1	Secondary Traffic Channel 2	Secondary Traffic Channel 3	In/Out Service

ATS Worksheet

AST	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-27. AST, Secondary Traffic Channels Worksheet

26. ATG. Use this worksheet to plan TGCs. The AN/TTC-39A(V)1 recognizes five categories of TGCs: interswitch (type I), PBX (type P), DIBTS (type D), commercial (type C), and other (type O). TGC characteristics are to some extent different from one cluster type to the next. Each of the first three TGC types requires a separate set of data entries. The worksheet has been divided into four sections to partition the data items by cluster type. Entries in the first section, found on the lefthand side of the worksheet, pertain to all types of TGCs. Each of the other three sections is dedicated to a particular cluster type; namely, interswitch, PBX, and DIBTS, respectively. Guidance for completing the ATG worksheet, shown in Figure A-28, is provided below.

a. Section 1 Entries. Complete all entries in this section when the cluster type is I, P, or D. Complete only the first two items for cluster types C and O.

(1) TGC Number. Enter a 1- to 3-digit number to identify the TGC. The range for this entry is 1 to 127. A unique number must be assigned to each TGC.

(2) Cluster Type. Enter a single letter, C, I, P, D, or O, to identify the type of TGC for which data are being entered. The TGC types are identified below.

(a) Type C. Commercial TGCs provide the interface between the AN/TTC-39 series CS and commercial networks.

(b) Type I. Interswitch TGCs connect the switch with an AN/TTC-39 series, AN/TTC-42 or NCS/LENS, and commercial networks. For interswitch, PBX, and DIBTS TGCs, continue to enter data in the remaining columns of the appropriate worksheet. Do not make any further entry in the commercial or other block.

(c) Type P. PBX TGCs connect the AN/TTC-39A(V)1 with attended switches acting as PBXs. An example of this type of switch is the SB-3614. The TGCs to switches that use operator assistance to reach the AN/TTC-39 series CS may also be classmarked as PBX TGCs if incoming call precedence or TLC is desired for those trunks.

(d) Type D. DIBTS TGCs connect the switch to switches using TRI-TAC DIBTS. These trunks connect the AN/TTC-39A(V)1 with an SB-3865 or SENS.

	TGC Number										
	Cluster Type										
	Spill Forward										
	Destination NYX										
	Zone Restriction										
	Access TGC										
	Traffic Limitations										
	F										
	I										
	P										
	R										
Interswitch	Keychanger										
	Glare										
	Message Switch TGC										
	Call Inhibit										
	TSB Number										

ATG Worksheet

ATG	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-28. ATG, Trunk Group Cluster Worksheet (AN/TTC-39A(V)1)

Interswitch (cont'd)	TSB Rate								
	Trunk Rate								
	Digital TSB TDMX Address								
	Primary Signaling Channel								
	Secondary Signaling Channel 1								
	Secondary Signaling Channel 2								
	Secondary Signaling Channel 3								
PBX	Number of Outgoing Digits								
	Maximum Precedence								
	PBX Switch Code NNXX								
	TLC Level								
DIBTS	Maximum Precedence								
	Traffic Control Level								
	Glare								
	Call Inhibit								
	Switch Code								
	Commercial Access								

Figure A-28. (Cont'd)

(e) Type O. Cluster types not covered in the subparagraphs above should be classmarked Other. For example, a TGC to DSN is marked O, as is a TGC to any switch using dial-pulse, DTMF, MF, or 20-Hz ringdown signaling. Examples of switches using these types of signaling are the SB-22, SB-86, SB-3082, or AN/TTC-22.

(3) Spill Forward. Enter Y = Yes or N = No to indicate whether or not the TGCs will operate in the spill-forward mode. When the AN/TTC-39A(V)1 receives a call on a TGC marked by the originating switch for spill-forward operation, it becomes the "acting-originating" switch and assumes routing control for the call. Spill forward should be assigned for TGCs that cross area code boundaries, provided the distant switch can operate in the spill-forward mode. A Y classmark also must be entered for DIBTS and MS TGCs.

(4) Destination NYX Code. Enter a 3-digit NYX area code for the area in which the TGC will terminate. The range for NYX is 200 to 919.

(5) Zone Restriction. Enter a 1-digit number to define the zone-restriction table that applies to this TGC. The range for this entry is 0 to 8. An entry of 1 to 8 indicates that calls may not be placed on that trunk group to telephone addresses contained in the table. (There are eight zone-restriction tables, and these are entered on the AZR worksheet.) An entry of 0 indicates that no restrictions apply.

(6) Access TGC. Enter Y = Yes or N = No to indicate whether or not the TGC provides the only routing to the destination NYX code entered above.

(7) Traffic Limit. Enter Y = Yes or N = No to indicate whether or not the number of trunks that can carry calls of a given precedence level will be restricted. If the entry here is Y, then proceed to the next four columns. Define the number of trunks that may be used to carry calls at each precedence level. Restrictions can be placed for all precedence levels except FO.

(8) Trunks Per Precedence Level. If the entry in the traffic limitations column was Y enter the number of trunks at each precedence level. The entry denotes the number of trunks that may carry calls at the indicated precedence level or higher. The number assigned for a given

level cannot exceed the number assigned to a higher precedence level.

b. Interswitch TGCs. This section contains guidelines for entering data about interswitch TGCs.

(1) Keychanger. Enter N for None.

(2) Glare. Enter a single letter (A = Accept or R = Reject) to indicate whether or not the switch will accept or reject a glare signal. Glare occurs when both ends of a trunk attempt to seize a trunk simultaneously. In this case, one of the switches must drop the trunk to avoid putting the trunk temporarily out of service. The other switch is then free to stay on the trunk and proceed with the call attempt. For the switch that stays on the trunk and ignores the glare condition, enter R; otherwise, enter A. (Only one end of the link should be classmarked R.) An R classmark must be entered for a message switch TGC.

(3) Message Switch TGC. Enter a single letter (Y = Yes or N = No) to indicate whether or not the TGC will terminate at a message switch. Only one AN/TYC-39 MS TGC may be assigned. If the entry here is Y, then the spill-forward classmark also must be Y, and the glare classmark must be R.

(4) Call Inhibit. Enter a single letter (Y = Yes or N = No) to indicate whether or not incoming calls will be restricted from the NNX switch codes in the call-inhibit tables.

(5) TSB Number. Enter a 1- or 2-digit number, identifying the TSB to be assigned to the TGC. Two types of TSBs exist: the in-band DSB and the common-channel or out-of-band, TSB. DSBs are pooled and used with DIBTS (SB-3865) trunk groups. They are entered on the ATS worksheet. TSBs provide the common-channel signaling required with interswitch trunk groups. Specifically, they encode, decode, store data, and format messages as required for signaling between TRI-TAC CSs and MSs. The range for the TSB Number entry is 1 to 30. (Any DSBs entered on the ATS worksheet for DIBTS TGCs are included in this number and must be taken into account.) When a group of analog interswitch (Type 28) trunks is being classmarked, the range is limited to TSBs 3 and 4, each of which is wired to a Type II modem.

(6) TSB Rate. An entry must be made here if an address is to be assigned in the TDMX Address of TSB column. Enter 16 or 32 kbps. The TSB rate may not exceed either the trunk rate (assigned in the next column) or the switch rate (assigned at the ASI worksheet). (See Table A-22.) Leave the box blank when classmarking a cluster of analog interswitch trunks.

(7) Trunk Rate. Make an entry here if an address is to be assigned in the TDMX Address of TSB column. Enter 16 or 32 to identify the rate at which the digital trunks in the TGC are to operate. The trunk rate cannot exceed the switch rate. (See Table A-22.)

Table A-22. Allowable TSB Rate Combinations

TSB Rate (kbps)	Trunk Rate (kbps)	Switch Rate (kbps)
32	32	32
16	16	16
16	32	32
16	16	32

(8) Digital TSB TDMX Address. Enter a TDMX address here only when the TSB is digital. The entry must be of the form XX-XX. The entry corresponds to the number of the TSB assigned to the group.

(9) Primary Signaling Channel. When the TSB is digital, the TDMX address of the group's primary signaling channel must be entered. Normally this channel is Channel 1 of the first NCMD assigned. The address must already have been assigned as part of a DTG.

(10) Secondary Signaling Channels. Several groups can be multiplexed to form a larger DTG. If the input rates of the subgroups do not make full use of the TGM's combined output rate, then the lower rates must be multiple-sampled. This creates secondary traffic and signaling channels. Secondary channels terminate on the NCMDs along with the primary channel. Therefore, they must be identified to the switch as secondary channels to ensure proper call

completion. One or three secondary signaling channels may be assigned here; otherwise, leave the boxes blank. (Do not assign just two secondary signaling channels.) These addresses must be in the same group as the primary signaling channel. Enter the TDMX address in the form XX-XX to identify the TDMX locations where secondary signaling channels will be assigned.

c. PBX TGCs. This section contains guidelines for entering data that are specific to PBX TGCs.

(1) Number of Outgoing Digits. Enter a 1- or 2-digit number, specifying the number of digits that will be sent to the distant switch. The range for this entry is 0 to 10. The entry must be compatible with the ADE worksheet and with the distant switch's numbering plan.

(2) Maximum Level of Precedence. Enter one or two letters to identify the highest precedence level that will be accepted from the distant PBX. Permissible entries are FO (Flash Override), F (Flash), I (Immediate), P (Priority), and R (Routine).

(3) Switch Code NNXX. Enter the 4-digit NNXX code, where N = 2 to 9 and X = 0 to 9, that identifies the PBX at the other end of the TGC. In a 4/3 numbering scheme, the NNXX is the PBX's PRSL code. Calls with a different dialed NNXX address and routed over this TGC will be intercepted by the telephone operator at the PBX. This prevents the caller from reaching an incorrect number when the PBX has no automatic tandeming capability.

(4) TLC Level. Enter a 1-digit number to identify the TLC level to be placed on the TGC during peak traffic periods. The range for this entry is 1 to 5, with 1 being the least restrictive (no restrictions) and 5 being the most restrictive (neither switch access nor trunk access is permitted). This classmark affects only outgoing traffic.

d. DIBTS TGCs. This section contains guidelines for entering data that pertain to DIBTS TGCs, which are used between AN/TTC-39 series CSs, SB-3865, and AN/TTC-48(V).

(1) Maximum Level of Precedence. See subparagraph 26c(2) above for this entry.

(2) Traffic-Control Level. See subparagraph 26c(4) above for this entry.

(3) Glare. See subparagraph 26b(2) above for this entry.

(4) Call Inhibit. See subparagraph 26c(4) above for this entry.

(5) Switch NNXX Code. Enter the 4-digit NNXX (PRSL) code of the destination unit-level switchboard.

(6) Commercial Access. Enter Y = Yes or N = No to indicate whether or not the TGC can be used for direct dialing into the commercial telephone network. If the entry is Y, then the TGC must be entered on the ACN worksheet as either a primary or an alternate route.

27. ATH. Standard time-outs, limits, and other thresholds are in the PLT. If a threshold must be altered, the worksheet shown in Figure A-29 is completed. The following data elements are contained in the worksheet. Values in parentheses at the end of the data element title are the normal values contained in the PLT. A blank entry for the data element causes the switch to use the normal value.

a. Dial Tone Time-out (10 Seconds). The time limit after receipt of dial tone until the first dial is received is adjustable from 0 to 300 seconds. At the end of the time-out period, lockout occurs and continues until the subscriber goes on-hook. This standard should not be changed.

b. Next Digit Time-out (10 Seconds). The time limit between digits arriving from a subscriber is adjustable from 0 to 300 seconds. At the end of the time-out period, lockout occurs and continues until the subscriber goes on-hook. This standard should not be changed.

c. Release Time-out (10 Seconds). The time limits for (1) sending a line busy tone, trunk busy tone, error tone, OOS announcement, or idle codeword (to DSVT,DNVT); or (2) waiting for release are all the same and may be adjusted from 0 to 300 seconds. This standard should not be changed.

d. Ring or Ringback Time-out (180 Seconds). The time limit for ring or ringback to continue once a connection has been completed is adjustable from 0 to 300 seconds. At the conclusion of the time-out period the common-control equipment releases itself from the circuit and the call is lost. This limit should not be set for less than 60

	NORMAL ENTRY (Secs)	RANGE OF ENTRIES
--- Dial Tone Time-out	10	0-300
--- Next Digit Time-out	10	0-300
--- Release Time-out	10	0-300
--- Ring or Ringback Time-out	180	0-300
--- Lockout-State OOS Time-out	60	0-300
Precedence Violation Announcement Time-out	10	0-300
TLC Time-out	1 Min	1-15 min
TLC Threshold 2	2047	0-2047
TLC Threshold 3	2047	0-2047
TLC Threshold 4	2047	0-2047
TLC Threshold 5	2047	0-2047
Other Time-out Number	Para 3-7 ac, TM 11-5085-747-12	1-9
Other Time-out Value		
	Desired Value	0-300

ATH WORKSHEET

ATH	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-29. ATH, Thresholds Worksheet

seconds. The limit for how long lockout tone remains on the line following initiation of lockout is adjustable from 0 to 300 seconds. At the end of 60 seconds, the phone is marked OOS and remains so until a valid release is received.

e. Lockout-State OOS Time-out (60 Seconds). The time limit for how long lockout tone remains on the line following initiation of lockup is adjustable from 0 to 300 seconds. At the end of 60 seconds, the phone is marked OOS and remains so until a valid release is received.

f. Precedence Violation Announcement Time-out (10 Seconds). The time limit between the switch's recognizing a precedence violation and the sending of a precedence violation message is adjustable from 0 to 300 seconds. This should not be changed from the standard.

g. TLC Time-out (1 minute). The switch implements TLC automatically when preset thresholds are exceeded by the traffic load during a given period. This parameter establishes the length of the time period. The time period is variable between 1 and 15 minutes in 1-minute increments. TLCs are automatically removed at the end of the time period during which the traffic level has fallen below and stayed below the preset threshold. The load controls apply to both trunk restrictions (levels 2 and 3) and switch access restrictions (levels 4 and 5).

h. TLC Threshold 2 (2,047 calls). The switch automatically implements TLC on level 2 subscribers when the specified threshold is exceeded in the time period described in subparagraph 27g above. This level is adjustable from 0 to 2,047 calls.

i. TLC Threshold 3 (2,047 calls). The switch automatically implements TLC on level 3 subscribers when the specified threshold is exceeded in the time period of subparagraph 27g above. This level is adjustable from 0 to 2,047 calls and may not exceed the threshold 2 value.

j. TLC Threshold 4 (2,047 calls). The switch automatically implements switch access control on level 4 subscribers when the specified threshold is exceeded during the time period of subparagraph 27g above. This level is adjustable from 0 to 2,047 calls.

k. TLC Threshold 5 (2,047 calls). The switch automatically implements switch access control on level 5

subscribers when the specified threshold is exceeded during the time period of subparagraph 27g, above. This level is adjustable from 0 to 2,047 calls and may not exceed the threshold 4 value.

l. Other Time-out Numbers and Values. These elements apply to additional time-outs that may be entered from Table A-23.

28. ATM. The ATM worksheet shown in Figure A-30 allows the planner-engineer to specify which loops and TGCs are to be monitored for traffic reports as well as the frequency of the reports. See Chapter II for a discussion of the reports. The data elements on this worksheet are described in the following subparagraphs and Table A-23.

a. Modify. Enter the modified action: 1 = Loops, 2 = Destinations, 3 = TGCs and terminations, and 4 = All.

b. Report Interval. Enter a 4-digit number (0015, 0030, 0060, 0240, 0480, or 1440) to specify the time in minutes between reports. (This report interval applies to all loop and trunk reports.) If no entry is made, the switch defaults to the 1,440-minute interval.

c. Loop Numbers. Enter the matrix location (AA-BB-CC for analog or DD-EE for digital loops) to specify the loop to be monitored. Up to 10 loops can be entered. The addresses for analog and digital loops must correspond with those on the ATS worksheet.

d. TGC Numbers. Enter 1 to 127 to specify the TGC to be monitored. This is the number assigned in subparagraph 25a, above. A maximum of 28 TGCs can be entered.

29. ATS Analog Loop or Trunk. Figure A-31 is a dual-entry worksheet. Entries for loops are made using titles across the top of the worksheet. Entries for trunks use titles across the bottom of the worksheet. Each worksheet represents one 26-pair cable whose identity is entered on the bottom lefthand corner of the worksheet. Subparagraph 29a below explains the general information entries used for loops or trunks. These entries are for information only and are not entered into the database. Subparagraph 29b below explains the loop entries. Subparagraph 29c below explains the trunk entries.

_____ Modify			
_____ Report Interval (15, 30, 60, 240, 480, or 1,440 minutes)			
Loop Numbers	TGC Numbers	Loop Numbers	TGC Numbers

ATM Worksheet

ATM	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-30. ATM, Traffic Metering Worksheet

CCSD/ Circuit Number	Cable Pair	Office Designation	Equipment Type	LTU Type	LTU Strap	Technical Character	Card Location	Adapter Type Location	TerminalA ddress
	1&2								
	3&4								
	5&6								
	7&8								
	9&10								
	11&12								
	13&14								
	15&16								
	17&18								
	19-24								

ATS Worksheet

BOTTOM	NWLTU	TOP

CIRCUIT		CIRCUIT	
AC J11-J12,J8-J9	DC J13-J12,J10-J9	AC J5-J6,J2-J3	AC J7-J6,J4-J3
MP#____	SDSG CABLE		
J#	To		

ATS	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-31. ATS, Terminal Service Worksheet, Analog Loops and Trunks

Analog → Loops	DAS									
Cable Pair	Terminal Address	Terminal Type	Directory Number	Line Hunting Group	DAS Called Number	Traffic Load	Secure Call	Maximum Precedence	I/O Service	CVSD Unit Number
1&2										
3&4										
5&6										
7&8										
9&10										
11&12										
13&14										
15&16										
17&18										
19&20										
21&22										
23&24										
Analog → Trunks	Terminal Address	Terminal Type	TGC Number	Path Delay	TSS Number Master/Slave Type II Modem	Satellite Trunk	I/O Service	Trunk Number	16-kbps Trunk	MS Trunk

39 Trunk

Figure A-31. (Cont'd)

Cable Pair	Adapter Number	Progressive Conference	Call Transfer	Compressed Dial Class	Compressed Dial List	Zone Restriction	Preprogrammed Conference Only	Commercial Network Access
1&2								
3&4								
5&6								
7&8								
9&10								
11&12								
13&14								
15&16								
17&18								
19&20								
21&22								
23&24								
	MS Trunk Character	Transmission Type	Adapter Number	Echo Suppressor Number	Transmission Type	T Digit		
	39 Trunk (Continued)		NON 39					

Figure A-31. (Cont'd)

Table A-23. Other Time-outs

Time-Out Number	Time-Out	Normal Value (seconds)	Range (seconds)
1	Await start dial indication (wink start, release, or KP digit)	5	0-300
2	Send seize (await restart)	10	0-300
3	Send seize (await restart) (confirmation)	2	0-300
4	Await first or each successive digit	16	0-300
5	Send digit (wait for complement)	1	0-300
6	Send interdigit (wait for proceed or restart)	4	0-300
7	Send interdigit (wait for end of complement or last digit)	1	0-300
8	Send interdigit (wait for end of restart)	3	0-300
9	Wait for digit acknowledge	1	0-300

a. *General Information Entries. These entries provide the planner-engineer with general information.

(1) *CCSD Number. Normally this entry applies only to trunks. Enter the trunk CCSD number for which data is being entered.

(2) *Circuit Type. Enter L = Loop or T = Trunk.

(3) *Equipment Type. Enter the type of equipment that the loop or trunk terminates into at the distant end. Typical entries for loops are TA-954 and KY-68. Typical entries for trunks are AN/TTC-39A(V)1, AN/TTC-42, SB-3614, DSN, and Commercial.

(4) *LTU Type. Enter the type of LTU required to terminate the loop or trunk at the switch. Enter CBLTU, NWBLTU, 20LTU, 16LTU, or AVLTU.

(5) *Technical Characteristics. Enter 2W = 2-wire, 4W = 4-wire, or 6W = 6-wire.

(6) *Adapter Type. Enter the type of adapter, if required, to be used with the trunk or special circuit, such as a local or remote DSN terminal.

b. Loop Entries. Loop entries are required for analog loop subscribers terminating on the AN/TTC-39A(V)1 SDMX and for Type 1 AVDTG subscribers terminating on the AN/TTC-39 series switch TDMX. For loops, the data in the subparagraphs below are entered into the database. (If the subscriber is a DAS subscriber, only data through subparagraph 29b(10) below are required.)

(1) Terminal Address. Enter the matrix location in the format X-XX-XX for subscribers terminated on the SDSG. The entry identifies the address on the appropriate matrix where the terminal equipment is connected. For AVDTG subscribers, the address must be in the format DD-EE.

(2) Terminal Type. Enter a 1- or 2-digit number to identify the type of equipment being assigned to the terminal. Table A-24 lists the eight types of terminals.

Table A-24. Loop Terminal Type Entries

Type Number	Equipment Name
1	TA-341 (ac), TA-838 (ac), TA-720 (ac)
2	TA-341 (dc), TA-720 (ac)
5	Overseas DSN Telephone (dc)
6	Remote DSN Telephone (SF)
7	Common-Battery (Dial Pulse) TA-236
8	Common-Battery (DTMF) WECO 2500, TA-938
9	TA-312 (Common Battery)
12	20-Hz Ringdown

(3) Directory Number. Enter a 3- or 4-digit number, depending on whether the switch numbering plan is 4/3 or 3/4. Only the subscriber code (GXX or GXXX) portion of the number is entered here. This number is based on subscribers who are to receive service and are listed in the local telephone directory.

(4) Line Hunting Group. Enter a 1- or 2-digit number (0 to 32), which will assign the subscriber to a line-hunting group. If the subscriber is not a member of a group, enter O. If the subscriber is a member, enter the number of the group to which he belongs. (Five is the maximum number of members per group.)

(5) Direct Access Service, Called Number. Enter a 1- or 2-letter (FO, F, I, P) precedence code, a 2-digit special feature code, and a 1- to 13-digit directory number. The precedence and special feature codes are optional. Sixty subscribers can be assigned DAS. If the subscriber is not a direct access subscriber, leave the entry blank.

(6) TLC Level. Enter a 1-digit number (1 to 5) to specify the restrictions placed on the subscriber during peak busy loads. If no restriction is desired, enter 1.

(7) Secure Call Privilege. Enter a single letter (R = required, N = nonsecure) to specify the subscriber's security requirements.

(8) Maximum Precedence. Enter one or two letters (FO, F, I, P, or R) to identify the highest precedence the subscriber may impose on outgoing calls.

(9) In or Out of Service. Enter a single letter (I = In or O = Out) to specify whether the subscriber terminal is in service or out of service. The entry is based on switch equipment status reports.

(10) CVSD Unit Number. AN/TTC-39 series CSs support up to 60 AVDTG subscribers. Each subscriber has an analog scanner dedicated to it on the TDMX, and each requires a CVSD unit for connecting the terminal's digitized supervisory tones with the scanner. Enter a 1- or 2-digit number to identify the CVSD unit being assigned to an AVDTG subscriber.

(a) The range for this entry is 1 to 60.

(b) This column applies only to AN/TTC-39A(V)1 AVDTG subscribers. If the terminal being assigned is not for an AVDTG subscriber, leave this column blank. (An entry must be made if the terminal is Type 1, the address is of the form XX-XX, and the switch is an AN/TTC-39A(V)1.)

(11) Adapter Number. Enter a 1- or 2-digit number(1 to 24) to assign an adapter to terminals that serve equipment Type 6. If the terminal is not serving equipment Type 6, leave this entry blank. This assignment must be consistent with the field-cable-pair assignment. (See Chapter II, Table II-2.)

(12) Progressive Conference. Enter a single letter (Y = Yes or N = No) to specify if the subscriber has progressive conference-initiating privileges.

(13) Call Transfer. Enter a single letter (Y = Yes or N = No) to designate whether the subscriber has call-transfer privileges. Members of a line-hunting group are not allowed to use call transfer.

(14) Compressed-Dial Class. Enter a single letter (C = Common pool, I = Individual, or N = None) to specify whether the subscriber has compressed-dial privileges and, if so, what type. This entry must be compatible with ACP and AIC worksheets.

(15) Compressed-Dial List. If the compressed-dial class entry is C, enter a single digit (1-5) to identify the list of common-pool numbers available. If the compressed-dial class entry is I, enter a single digit (1-8) to identify the list of individual compressed-dial numbers. This entry must be compatible with ACP and AIG worksheets. If no lists are to be accessed, enter 0.

(16) Zone Restrictions. Enter a single digit (0-8) to specify the areas the subscriber may access. If there are no restrictions on the subscriber, enter 0. This entry must be compatible with the AZR worksheet.

(17) Preprogrammed Conference Only. Enter a single letter (Y = Yes or N = No) to specify if the subscriber is restricted to preprogrammed conferences only.

(18) Commercial Network Access. Enter a single letter (Y = Yes or N = No) to specify if the subscriber may dial directly into the commercial system. If the entry is

Y, then a commercial route must be available on the ACN worksheet.

c. Trunk Entries. For trunks, the data in the following subparagraphs must be entered in the database.

(1) Terminal Address. For analog trunks terminated on the SDMX, enter the matrix address in the format X-XX-XX.

(2) Terminal Type. Enter a 2-digit number from Table A-25.

(3) TGC Number. Enter a 1- to 3-digit number (1-127) to identify the TGC to which the trunk belongs. This entry must be compatible with the ATG worksheet and the network trunking plan.

(4) Path Delay. Enter a 1- or 2-digit number (0-40) to specify the milliseconds of expected delay during trunk connections when the transmission medium is LOS, tropo, or cable. Path delay is indicated on all outgoing trunks. The entry value is determined by the transmission equipment's technical characteristics. The normal entry is 0.

(5) *TSB Number (Master/Slave). This number is not entered into the switch database. For analog trunks connecting two AN/TTC-39A(V)1s, an analog TSB must be selected. One end is designated master and the other slave; only TSBs 3 and 4 may be used. Enter the TSB number and master or slave.

(6) Satellite Trunk. Enter a single letter (Y = Yes or N = No) to indicate whether or not the trunk will transit a satellite link.

(7) In or Out of Service. Enter a single letter (I = In or O = Out) to indicate if the terminal is in or out of service. The entry is based on current equipment status reports.

(8) Trunk Number. Enter a 1- to 3-digit number (1-255) to identify the trunk being assigned. This entry is determined from the network trunking plan. It is required only on trunks between AN/TTC-39 series CSs, and between AN/TTC-39 series CSs and AN/TYC-39s.

Table A-25. AN/TTC-39A(V)1 Trunk Terminal Types

Type Number	Equipment Name
25	AN/TTC-38 and AN/TTC-25 (Confirmation)
26	AN/TTC-38 (Tone Burst)
27	DIBTS
28	AN/TTC-39 Series and AN/TYC-39 (Analog Traffic Trunk)
29	AN/TTC-39 Series (Digital Traffic Trunk)
30	CV-1918/1919, C-2875, C-2907, SB-3082 (A2), and C-6709 Converters
31	SB-3614, 3-Digit PABX
32	AN/TTC-30
34	DSN PNID PBX Access Line
36	DSN Trunk (MF Nonconfirmation)
37	AN/TTC-28
38	AN/TTC-22 (SF)
39	NATO
40	Common-battery (Dial Pulse) AN/TTC-4/5/7/10/22
41	1600-Hz Ringdown SB-3082 (A3)
42	SB-3082 (A3), Automatic Outgoing, 1600-Hz RD Incoming
43	20-Hz Ringdown SB-22, -86, -3082, -3614
44	Commercial Office (dc Closure)
45	Commercial Office (SF, Dial Pulse)
46	Commercial Office (E&M, MF, Wink Start)
66	DSN PBX Trunk(MF 2/6 Nonconfirmation, Wink Start)
82	Commercial Office (E&M, Dial Pulse, Wink Start)
83	Commercial Office (E&M, Dial Pulse, Timed Start)

(9) 16-kbps Trunk. Enter Y = Yes if the trunk is a 16-kbps trunk; otherwise enter N = No. Normal entry is N for no.

(10) MS Trunk. Enter a single letter (Y = Yes or N = No) to indicate if the trunk terminates at an AN/TYC-39 MS. This entry must be compatible with the ATG worksheet and the network trunking path.

(11) MS Trunk Characteristics. Enter a 1- or 2-digit number to identify the trunk characteristics if the entry for subparagraph 29c(10) above was Y. For analog trunks, characteristics are identified by the numbers 1 to 15. Digital trunks are identified by the digit 0. If the trunk is not an MS trunk, leave the entry blank.

(12) Type Transmission. Enter a 2-letter code to identify the type of transmission used on the trunk.

(a) Two types of the transmissions exist: AN = analog nonsecure or AS = analog secure.

(b) Enter AN for all inter-AN/TTC-39 series CSs analog trunks and most other analog trunks. The exception is trunks to other CSs declared "approved" by the commander. For those cases, enter AS. If the trunk is between an AN/TTC-39 series CS or an AN/TYC-39, this completes the database entries.

(13) Adapter Number. Enter a 1- or 2-digit number (1-24) to identify which adapter is to be used on trunk types 33-39 and 44-83. This entry must be compatible with the ATS Loop Terminal Worksheet and the network trunking plan.

(14) Echo Suppressor Number. Enter a 1- to 3-digit number to assign a dedicated echo suppressor for certain trunk types. The range for this entry is 0-120, where 0 = none.

(15) Transmission Type. Enter a 2-letter code to identify the type of transmission used on the trunk.

(a) Two types of transmissions exist: AN = analog nonsecure or AS = analog secure.

(b) Enter AN for all inter-AN/TTC-39 series CS analog trunks and most other analog trunks. The exception

is for trunks to other switches that have been declared "approved" by the commander. For those cases, enter AS. (Normally Air Force trunks will not be identified as AS.)

30. ATS Digital Loops or Trunks. This worksheet is also a dual-entry worksheet. (See Figure A-32.) Entries for loops are made using the column titles across the top of the worksheet. For trunk entries, use the column titles at the bottom of the worksheet. A separate worksheet should be used for each 26-pair cable that contains digital loops. A separate worksheet also should be used for each digital loop group. Mixing different loop groups on the same worksheet is not recommended. Subparagraph 30a below explains the general entries. These entries are for information only and are not entered into the database. Subparagraph 30b below explains the loop entries, and subparagraph 30c explains the trunk entries.

a. General Information Entries. These entries provide the planner-engineer with general information. They are not entered into the switch database.

(1) *CCSD Number. This entry normally applies to trunks. Enter the trunk CCSD number for which data are being entered.

(2) *Type of Circuit. Enter L = Loop or T = Trunk.

(3) *Type of Equipment. Enter the type of equipment into which the loop or trunk terminates at the distant end. Typical entries for loops include DSVT, DNVT, and TA-1035. Typical entries for trunks include AN/TTC-39A(V)1, AN/TYC-39, AN/TTC-42, SB-3865, and MSE switches.

(4) *Type of LTU. Enter the type of LTU used to terminate the loop or trunk at the switch. Enter DLPMA.

(5) *LTU Strap. Enter Y = Yes if -56 V power is to be supplied to the loop; otherwise enter N = No.

(6) *NCMD Number. Enter the NCMD number on which the loop or trunk will be terminated, if TDMX entry is by loop group.

b. Loop Entries. The following subparagraphs describe the data elements for loops. These data elements must be entered into the switch database.

CCSD Circuit Number	Cable Pair	Office Designation	Circuit Type	Equipment Type	LTU Type	LTU Strap	NCMD Number Location
	1&2						
	3&4						
	5&6						
	7&8						
	9&10						
	11&12						
	13&14						
	15&16						
	17&18						
	19&20						
	21&22,23&24						

MP #	TDSG	Cable
	Loop Clock Location Strap	
	Red	Black
	J14-15 J16-17 J18-J19 J20-J21 J22-J23 J24-J25	J2-J3 J4-J5 J6-J7 J8-J9 J10-J11 J12-J13

A113
A126
A138
A213
A126

ATS Worksheet (Digital Loops or Trunks)

DLPMA (39A)
-56 V ON J2-J3
-56 V OFF J3-J4

ATS	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-32. ATS, Terminal Service Worksheet, Digital Loops or Trunks

Digital → Loops	DAS								
Cable Pair	Terminal Address	Type Terminal	Directory Number	Line-Hunting Group	DAS Called Number	Traffic Load	Secure Call	Maximum Precedence	I/O Service
1&2									
3&4									
5&6									
7&8									
9&10									
11&12									
13&14									
15&16									
17&18									
19&20									
21&22									
23&24									
Digital → Trunks	Terminal Address	Type of Terminal	TGC Number	Path Delay	Satellite Trunk	I/O Service	Trunk Number	16-kbps Trunk	MS Trunk

Figure A-32. (Cont'd)

Cable Pair	Terminal Character	16-kbps HDX	MS Comp	FAX	MS Type 2	Progressive Conference	Call Transfer	Comp Dial Class	Comp Dial List	Zone Restriction	Preprogram Conference Only	Commn Network Access
1&2												
3&4												
5&6												
7&8												
9&10												
11&12												
13&14												
15&16												
17&18												
19&20												
21&22												
23&24												
Digital → Trunks	MS Trunk Character	Trans Type										

Figure A-32. (Cont'd)

(1) Terminal Address. For subscribers on the TDSG, enter the matrix address in the format XX-XX. The entry identifies the address on the appropriate matrix to which the terminal equipment is connected.

(2) Type of Terminal. Enter a 1- or 2-digit number to identify the type of equipment being assigned to the terminal. Table A-26 lists the entries.

Table A-26. Digital Loop Entries

Type Number	Equipment
1	TA-341 (AC), TA-838 (AC), or TA-720 (AC), entering the TDMX through an AVDTG
3	DSVT or KY-90
13	DNVT

(3) Directory Number. Enter a 3- or 4-digit number, depending on whether the switch numbering plan is 4/3 or 3/4 as assigned in ASI. Only the subscriber code (GXX or GXXX) portion of the number is entered here.

(4) Line-Hunting Group. Enter a 1- or 2-digit number (0-32), which assigns the subscriber to a line-hunting group. If subscribers are not members of a group, enter 0. If members enter the number of the group in which they belong, five is the maximum number of members per group.

(5) DAS - Called Number. Enter the directory number of the subscriber to be called when the terminal is taken off-hook. This number can have up to 13 digits, plus the optional precedence code. Sixty lines are available for DAS. If the subscriber is not a direct access subscriber, leave the entry blank.

(6) TLC Level. Enter a 1-digit (1-5) number to specify the restrictions placed on the subscriber during peak busy loads. If no restriction is desired, enter 1.

(7) Secure-Call Privilege. Enter a single letter (R = Required, P = Preferred, N = Nonsecure, or

E = End-to-End) to indicate the subscriber's security requirements.

(8) Maximum Precedence. Enter a 1- or 2-letter code (FO, F, I, P, or R) to identify the highest precedence the subscriber may impose on outgoing calls.

(9) In or Out of Service. Enter a single letter (I = In or O = Out) to indicate whether the subscriber terminal is in service or out of service. The entry is based on switch equipment status reports. There are no additional database entries required for a DAS subscriber.

(10) Terminal Characteristic. Enter a single letter (D = Data only, V = Voice only, or M = Multimode (voice and data)) to indicate the terminal's transmission characteristics. This entry is based on subscriber requirements and must be consistent with the technical characteristics of the terminal type.

(11) 16-kbps HDPLX. Enter a single letter (Y = Yes or N = No) to make the terminal compatible with digital net radio interface equipment. When the KY-90 is employed in the "VINSON-like" configuration, enter Y; otherwise enter N.

(12) MS Compatible. Enter a single-letter entry (Y = Yes or N = No) to indicate whether the terminal is an MS Type 1. The AN/TYC-39 is an MS Type 1. Entries in (11), (12), and (13) are mutually exclusive. Y may be entered for one but not the other two.

(13) FAX. Enter a single letter (Y = Yes or N = No) to indicate whether the terminal is connected to FAX equipment.

(14) MS Type 2. Enter a single letter (Y = Yes or N = No) to indicate whether the terminal is MS Type 2. Always enter N.

(15) Progressive Conference. Enter a single letter (Y = Yes or N = No) to indicate whether or not the subscriber has progressive conference-initiating privileges.

(16) Call Transfer. Enter a single letter (Y = Yes or N = No) to indicate whether or not the subscriber has call-transfer privileges. Use this entry only if the terminal is part of a line-hunting group, is classmarked multimode (voice and data), or is classmarked data.

(17) Compressed-Dial Class. Enter a single letter (C = Common Pool, I = Individual, or N = None) to indicate whether the subscriber has compressed-dial privileges and, if so, what type. This entry must be compatible with the ACP and AIC worksheets.

(18) Compressed-Dial List. This element requires a single-digit entry. If the compressed-dial privilege is C, enter (1-5) to identify the list of common-pool numbers available. If the compressed-dial privilege is I, enter a single-digit number (1-8) to identify the list of individual compressed-dial numbers. This entry must be compatible with ACO and AIC worksheets. If no lists are to be accessed, enter 0.

(19) Zone Restrictions. Enter a single-digit number (0-8) to specify the zone restrictions placed on the subscriber. If there are no restrictions, enter 0. This entry must be compatible with the AZR worksheet.

(20) Preprogrammed Conference Only. Enter a single letter (Y = Yes or N = No) to indicate whether the subscriber is restricted to preprogrammed conferences.

(21) Commercial Network Access. Enter a single letter (Y = Yes or N = No) to indicate whether the subscriber may dial directly into the commercial system. If the entry is Y, a commercial route must be available on the ACN worksheet.

c. Trunk Entries. Data elements are described in the following subparagraphs.

(1) Terminal Address. Enter the terminal address in the format XX-XX to specify the trunk matrix location.

(2) Type of Terminal. Enter a 2-digit number to describe the type of trunk being assigned (see Table A-27).

(3) TGC Number. Enter the 1- to 3-digit number (1-127) to identify the TGC that contains the trunk. This entry must be compatible with the ATG worksheet and the network trunking plan.

Table A-27. Terminal Type Entries

Type Number	Equipment
1	TA-341 (ac), TA-838 (ac), or TA-720 (ac), entering the TDMX through a AVDTG
3	DSVT or KY-90
13	DNVT

(4) Path Delay. Enter a 1-or 2-digit number (0-40) to specify the milliseconds of expected delay during trunk connections when the transmission medium is LOS, tropo, or cable. Path delay is indicated on all outgoing trunks. The entry value is determined by the transmission equipment's technical characteristics. Because no delay is expected, the normal entry is 0.

(5) Satellite Trunk. Enter a single letter (Y = Yes or N = No) to indicate whether the trunk will transit a satellite link.

(6) In or Out of Service. Enter a single letter (I = In or O = Out) to indicate if the terminal is in or out of service. The entry is based on current equipment status reports.

(7) Trunk Number. Enter a 1- to 3-digit number (1-255) to identify the trunk being assigned. This entry is determined from the network trunking plan. (Both terminating AN/TTC-39 series CSs must use the same number in their database.)

(8) 16-kbps Trunk. Enter a single letter entry (Y = Yes or N = No) to indicate if the trunk rate is 16 kbps. Y indicates a rate of 16 kbps, and N indicates 32 kbps.

(9) MS Trunk. Enter a single letter (Y = Yes or N = No) to indicate if the trunk terminates at an AN/TYC-39 MS. This entry must be compatible with the ATG worksheet and the network trunking plan.

(10) MS Trunk Characteristics. Enter a 1- or 2-digit entry (0-15) to identify the trunk characteristics

if the entry for subparagraph 31c(4) above is Y. For digital trunks, the entry is 0. If the trunk is not an MS trunk, leave this entry blank.

(11) Transmission Type. Enter a 2-letter code to identify the type of transmission. The only entry is DN.

31. ATS Signaling Equipment. The signaling equipment worksheet (Figure A-33) has the data elements to assign the signaling equipment used. The data elements are described below.

a. Terminal Address. Enter the terminal address in the format X-XX-XX for signaling equipment terminated on the SDMX, or XX-XX for equipment terminated on the TDMX.

b. Terminal Type. Enter a 3-digit number to specify the type of equipment being assigned, in accordance with Table A-28.

c. Unit Number. Enter a 1-or 2-digit number (1-32 for terminal types 110 to 115 and 1-16 for terminal type 116) to identify the equipment item being assigned.

d. In or Out of Service. Enter a single letter (I = in or O = out) to indicate if the signaling equipment item is in service or out of service. This entry is made by the switch supervisor based on current equipment status.

32. ATT CSP. The CSP enables the attendant to perform a variety of call-service functions. Enter the following data elements on the worksheet (Figure A-34) to specify how the local CSP and up to three remote CSPs are connected.

a. Equipment Type. Enter a 2- or 3-digit number (96 or 121) to identify the type of line being assigned. Type 96 indicates an analog SDMX port, and 121 indicates a TDMX port.

b. Unit Number. Enter a single-digit number (1-4), which identifies the CSP being assigned. Number 1 is the local CSP, and 2 to 4 are remote CSPs.

c. In or Out of Service. Enter a single letter (I or O) to indicate whether this CSP is in-service or out-of service. The entry is made by the switch supervisor based on the equipment status.

Terminal Address	Terminal Type	Unit Number	I/O Service	Terminal Address	Terminal Type	Unit Number	I/O Service	Terminal Address	Terminal Type	Unit Number	I/O Service

ATS (Signaling Equipment) Worksheet

ATS	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-33. ATS, Terminal Service Worksheet (Signaling Equipment)

Equipment Type	Unit No.	In/Out Service	Matrix Address Port # 1	2	3	4	5	Equipment Type	Unit No.	In/Out Service	Voice Port 1	Voice Port 2	TDMX Signal Term	Directory Number	Digital Receiver Unit Number

ATT Worksheet (Conference Bridge and CSP)

ATT	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-34. ATT, Terminal Type Worksheet, CSP, and Conference Bridge

Table A-28. ATS Terminal Type Entries

Number	Terminal Type
110	In-band TSB on TDSG
111	DTMF receiver on SDSG
112	MF receiver on SDSG
113	Digital receiver on TDSG
114	DTMF receiver on TDSG (RMU)
115	Auxiliary sender or receiver on SDSG
116	DTMF or MF sender on SDSG

d. Voice Port 1 and Voice Port 2. This element requires SDMX entries for each of the two voice ports: addresses for line type 96 or TDMX addresses for line type 121. Entries for SDMX addresses are in the form X-XX-XX; entries for TDMX addresses are in the form XX-XX.

e. TDMX Signaling Terminal. Enter the TDMX signaling terminal address in the format XX-XX to identify the TDMX terminal that the CSP will use for signaling.

f. Directory Number. Each CSP has associated with it a unique directory number. Dialing this number is one method of accessing a particular attendant. Enter a 3- or 4-digit subscriber code (GXX or GXXX) depending on the switch numbering plan (4/3 or 3/4).

g. Digital Receiver Unit Number. Enter a single-digit number (1-5) to designate the digital receiver that will be associated with each CSP. This number is assigned based on receiver availability. Assign this digital receiver out of service on the ATS worksheet.

33. ATT Conference Bridge. The conference bridge worksheet (Figure A-34) is used to assign the data elements associated with conference bridges. There are four five-party analog conference bridges in the AN/TTC-39A(V)1. Conference bridges are usable as independent five-party bridges and can be interconnected to form larger bridges.

a. Equipment Type. Enter a 2- or 3-digit number (95 or 120) to identify the type of equipment being assigned. Enter 120.

b. Unit Number. Enter a single-digit number (1-6) to identify the bridge to be assigned.

c. In or Out of Service. Enter a single letter (I or O) to indicate whether this particular bridge is in service or out of service. This entry is made by the switch supervisor based on equipment status.

d. Matrix Addresses. This element requires entries for each of the five ports. The entries identify the port matrix address. Enter the address in the form X-XX-XX for Type 95. Enter the address in the form XX-XX for Type 120.

34. ATT IMU. The IMU unit provides A/D and D/A conversions to interface between the SDMX and TDMX. Assignment of the IMUs is made on the worksheet in Figure A-35. The following elements are entered on the worksheet to specify how IMUs are connected between the matrices.

a. Equipment Type. Enter type number 98 for all IMUs.

b. Unit Number. Enter a 1- or 2-digit number (1-36) to identify the IMUs being assigned. (See Chapter II, Section A2, for unit numbers and matrix locations.)

c. In or Out of Service. Enter a single letter (I or O) to specify whether this particular IMU is in service or out of service. The entry is made by the switch supervisor, based on the equipment status.

d. SDMX/TDMX Terminals. This element requires entries for the IMU address location on the SDMX and TDMX. The format of these entries is X-XX-XX for the SDMX and XX-XX for the TDMX.

35. ATT LKG. LKGs encrypt digital calls at specific times. LKG assignment is made on the worksheet in Figure A-36. The following data elements are entered on the worksheet to specify how the LKGs are connected to the switch.

a. Equipment Type. Enter type number 123 for all LKGs.

b. Unit Number. Enter a 1- or 2-digit number (1-64) to identify the LKGs being assigned. See Chapter II, Section A2, for unit number and matrix locations.

Equipment Type	Unit Number	I/O Service	SDMX Terminal	TDMX Terminal

ATT Worksheet (IMU)

ATT	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-35. ATT, Terminal Type Worksheet, Intermatrix Unit

Equipment Type	Unit Number	I/O Service	Cipher Terminal	Plain Terminal

ATT Worksheet (LKG)

ATT	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-36. ATT, Terminal Type Worksheet, LKG

c. In or Out of Service. Enter a single letter (I or O) to indicate if this LKG is in or out of service. The entry is made by the switch supervisor based on the equipment status.

d. Cipher and Plain Terminal. These elements require entries for cipher terminal and plain terminal TDMX addresses. The format of these entries is XX-XX.

36. ATT (CVSD RCU). Use the CVSD RCU worksheet (Figure A-37). There are five RCUs. These are pooled and used when AVDTG subscribers with 16-kbps trunks are connected through the TDMX. Because the groups used with AVDTG subscribers operate at 32 kbps, a rate change is required when interfacing with 16 kbps trunks or loops. The RCU's 2 CVSD units (ports), 1 operating at 32 kbps and the other at 16 kbps, provide the rate change. The following subparagraphs define the data elements found on the RCU worksheet. The equipment-type (line-type) entry, 100, is shown at the top of the worksheet.

a. Unit Number. Enter the unit number of the RCU being assigned. The range for this entry is 1-5.

b. In or Out of Service. Enter I or O to indicate whether or not the RCU is in service.

c. Rate-Change Port 1. Enter the TDMX address of RCU port 1 in the form XX-XX.

d. Rate-Change Port 2. Enter the TDMX address of RCU port 2 in the form XX-XX.

37. AVL. The worksheet shown in Figure A-38 is used to enter data elements for assigning COMSEC variable locations in the HUS device.

a. Start or Stop. Enter Start or Stop.

b. Rekey Cycle Number. Enter 00-99 or Blank.

c. Start Code (COMSEC ID)). Enter 1-1007 or leave blank.

d. COMSEC ID. Enter 1-1007 or Blank, see Table A-29 for the recommended storage location or range of locations for each variable type.

CVSD RCU (Line Type 100)

Unit Number	In/Out Of Service	Rate-Change Port 1	Rate-Change Port 2
1			
2			
3			
4			
5			

Remarks:

ATT Worksheet (CVSD RCU)

ATT	PRSL/NNX	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-37. ATT, Terminal Type Worksheet, CVSD RCU

COMSEC ID	Directory or Number BS-LA	Type	Variable ID	COMSEC ID	Directory or Number BS-LA	Type	Variable ID	COMSEC ID	Directory or Number BS-LA	Type	Variable ID

AVL Worksheet

AVL	SW CODE	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-38. AVL, Variable Location Worksheet

Table A-29. Classification of Variable Types-
AN/TTC-39A(V)1

Variable Type	Dir No./ BS-LA	Storage Location	Net. No
Interswitch Rekeying			
CIRV	N/A	1	Blank
UIRV	N/A	11-50	PRSLNXX
AIRV	N/A	2-10	NYX
IAUR	N/A	11-50	NYXNNXX
CSS and SEN			
M 1/	N/A		N/A
HN	10-98	902-998 2/	PRSL/NNXX
HRV	2-9	60-99	PRSL/NNXX
SRV	N/A	52-59	PRSL/NNXX
SN	N/A	902-998 2/	PRSL/NNXX
Terminals			
TERN	10-9	GXX or XXX	GXXX/GXX
TERV	N/A	902-998 2/	GXXX/GXX
RH	N/A	68-98	Blank
CS--MS			
MSNV	10-98	902-998 2/	BS-LA
MSRV	N/A	80-99	BS-LA
Essential User Bypass			
EUN	10-98	902-998 2/	PRSLGXX
EURV	N/A	80-99	PRSLGXX
Miscellaneous			
T	N/A		N/A
M	N/A		N/A
CNV	N/A		N/A

1/ Also used for the Messge Switch, EU, and local DSVTs.
2/ Last two digits equal Net No.

e. Directory Number or BS-LA. Enter the required data to uniquely identify each key. The field is left blank for the CIRV and RH keys. See Table A-29 for the format of this

entry for each variable type.

f. Key Type. Enter two to four letters to designate the type of variable being stored. See Table A-29.

g. Net Number. Enter 02-98. See Table A-29.

38. AXL. This worksheet (Figure A-39) is used to assign COMSEC identifiers to a home or lateral transfer list. It is also used to delete existing COMSEC identifiers from the lists.

a. List Type. Enter 1 = Home or 2 = Lateral.

b. Start. Enter start COMSEC ID range number = 0001 - 1007.

c. End. Enter COMSEC ID Range number = 0001 - 1007.

d. Eliminate. Enter E when the associated COMSEC ID range needs to be deleted from the list while leaving the remainder of the list intact.

39. AXX. Figure A-40 shows the worksheet used to enter data for XXX routing. The XXX code defines routing to designated terminal equipment such as converters and manual switchboards. Data elements are described below.

a. XXX Code. Enter a 3-digit code (XXX) to identify the XXX code being routed to. This entry is based on the network routing plan. The range for this entry is 100-999.

b. Operator Routing. Enter a single letter (Y = Yes or N = No) to indicate whether routing for this XXX code is to the AN/TTC-39 series CSP attendant for manual call completion, or if the routing will be automatic. Enter Y if operator intervention is required. Enter N for automatic routing. If the entry is Y, then no primary or alternate TGCs are assigned. The planner-engineer determines this, based on communications plan data.

40. AZR. Zone restriction provides traffic control by establishing categories of allowable calling areas. Some lists are restrictive (the codes listed may not be called), and some are permissive (the codes listed may be called). Each loop and trunk is classmarked on the ATS worksheet for only one of eight lists or for global (no restrictions).

_____ List Type. 1 + Home, 2 = Lateral		
COMSEC ID Start	Range End	Eliminate

AXL Worksheet

AXL	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-39. AXL, Assign Transfer List Worksheet

XXX Code	Routing Operator	Primary TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	XXX Code	Routing Operator	Primary TGC	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5

AXX, XXX Routing Worksheet

AXX	SW CODE	SW TYPE	SW LOCATION	DATE	REV #	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-40. AXX, XXX Routing Worksheet

Two of the 8 lists may contain up to 101 entries; the remaining 6 lists may contain up to 33 entries. The data elements are entered on the AZR worksheet, Figure A-41.

a. List Number. Enter a single-digit number (1-8) to identify the list. When making multiple assignments, complete all entries for list 1 before going to list 2, rather than mixing lists on the worksheet. This makes the database easier to check.

b. Permissive or Restrictive Classmark. Enter a single letter (P = permissive or R = restrictive) to identify the type of list. Permissive lists contain only those codes that may be called by the subscriber classmarked for the list. Restrictive lists contain codes that may not be called by subscribers classmarked for those lists.

c. Start Code. Enter a 2- to 6-digit number to specify the first code to be assigned to the list. If an individual code, rather than a range, is to be specified, it is also entered in the end code column. The permissible code is: AN/TTC-39A(V)1 Single Code = NN, NYX, or NYXNN.

List Number	Permissive/Restrictive Classmark	Start Code	End ode	Eliminate

AZR WORKSHEET

AZR	PRSL/NNX	SW TYPE	SW LOCATION	DATE	REV#	PREPARED BY	CHECKED BY	PAGE __OF__

Figure A-41. AZR, Zone Restriction Worksheet

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APPENDIX B

THEATER DEPLOYABLE COMMUNICATIONS

1. Introduction. This appendix provides a capsule description of the Air Force TDC program and the voice switch module planned for in the near and mid terms.

2. Near Term (1996-1997) TDC. In 1997, the Air Force fielded the following: (See Figure B-1.)

a. The tactical secure data communications system (TASDAC) and network encryption system (NES) are being employed to support the Transmission Control Protocol/Interface Protocol (TCP/IP) network. (See CJCSM 6231.03A, Chapters VII and VIII.)

b. Initial TDC program implementation:

(1) The light multi-band satellite terminal (LMST), an SHF tri-band (X, C, and K_u) terminal, will gradually assume some of the duties of the AN/TSC-94A and AN/TSC-93B GMF terminals.

(2) The integrated communications access packages (ICAP) and customer access module (CAM), includes the switching, multiplexing, transmission, security, and management functions. The CAM, the "heart" of the ICAP, will be introduced incrementally to replace the SB-3865 switchboard. The CAM combines a Redcom ISDN Gateway Exchange (IDX) switch with a commercial-off-the-shelf (COTS) integrated digital network exchange (IDNX) (Smart Mux) in an integrated transit case. The IDX, model IDX.C, is a fully digital switching system featuring open data access that allows for on-site or remote system reconfiguration. Standard network interfaces and protocols allow the IDX.C to be deployed in a variety of networks. Interfaces include ISDN primary and basic rates, direct T1 (1.544 Mbps), and E-1 (2.048 Mbps) along with standard analog trunks supporting ground start, ringdown, loop start ringdown, E&M, and two-way loop. Signaling System No.5 is supported over both analog and digital trunk circuits.

c. Single channel ground and airborne radio system (SINCGARS) frequency hopping radios will be introduced to perform the close air support (CAS) mission by

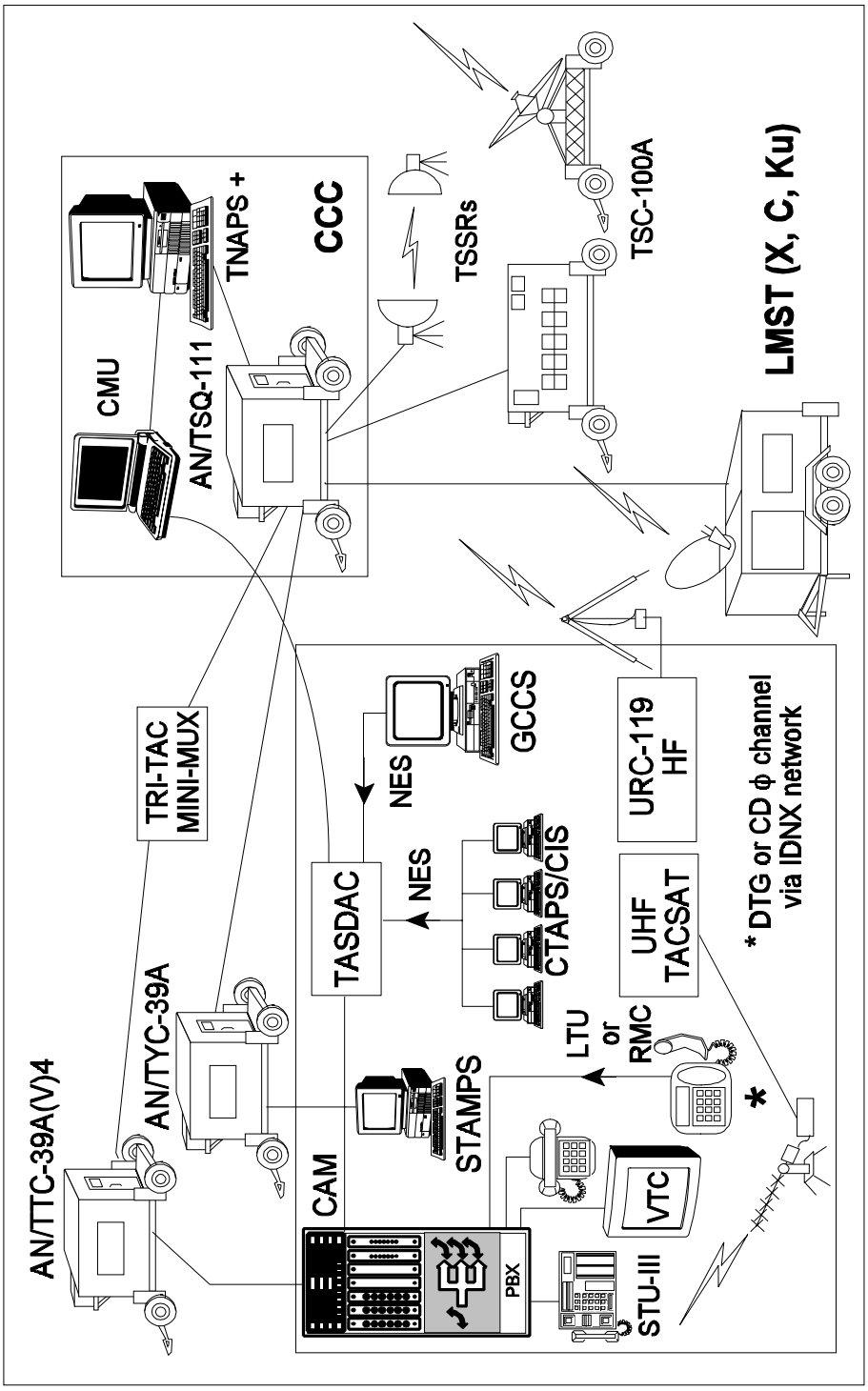

Figure B-1. Near-Term (1997) Air Force Architecture (Notional AOC)

interfacing with the Army's CNR system. The TRI-TAC based Mini Mux will be increasingly deployed in place of the AN/TSQ-146. (See CJCSM 6231.04, Chapter II.) Mobile video teleconferencing (VTC) terminals will be increasingly employed. The stand-alone message processing system (STAMPS) will replace the need for the AN/UYK-83 for message processing. (See CJCSM 6231.03.)

3. Mid Term (2000) TDC. In the mid-term, the following advancements are planned (See Figure B-2.):

a. ATM functionality will be added to the CAMs, where appropriate, and CAMs will continue to incrementally replace CSs such as the AN/TTC-39A(V)4 and AN/TTC-42.

b. The joint communications planning and management system (JCPMS) will replace tactical network analysis and planning system plus (TNAPS+) and begin to automate the SYSCON function as it is introduced in the base network control center (BNCC).

c. TRI-TAC message switches are expected to be phased out as multilevel information systems security initiative (MISSI) products and the Defense Message System (DMS) are introduced. STAMPS will be DMS compliant and upgraded to function as a DMS message transfer agent (MTA).

d. Demand assigned multiple access (DAMA)-based TACSAT terminals will begin superseding non-DAMA terminals. GMF TACSAT terminals will be replaced by the secure mobile anti-jam reliable tactical terminal (SMART-T), a EHF-band MILSTAR terminal. The SMART-T will be used to interconnect widely dispersed tactical communications nodes. P3I improvements will be added to the LMST to add the K_a band.

e. Laser technology will be introduced to augment the tropo-satellite support radio (TSSR) for intrabase communications. (See CJCSM 6331.04, Chapter XI.)

f. The contingency tactical air planning system (CTAPS) and CIS will be fully integrated with the global command and control system (GCCS). The global broadcast system (GBS) will appear throughout the theater. The multimedia terminal (MMT) will be the follow-on to the STU-III and, along with the STU-III, will constitute the bulk of the telephones in use. The KY-68 will be phased out.

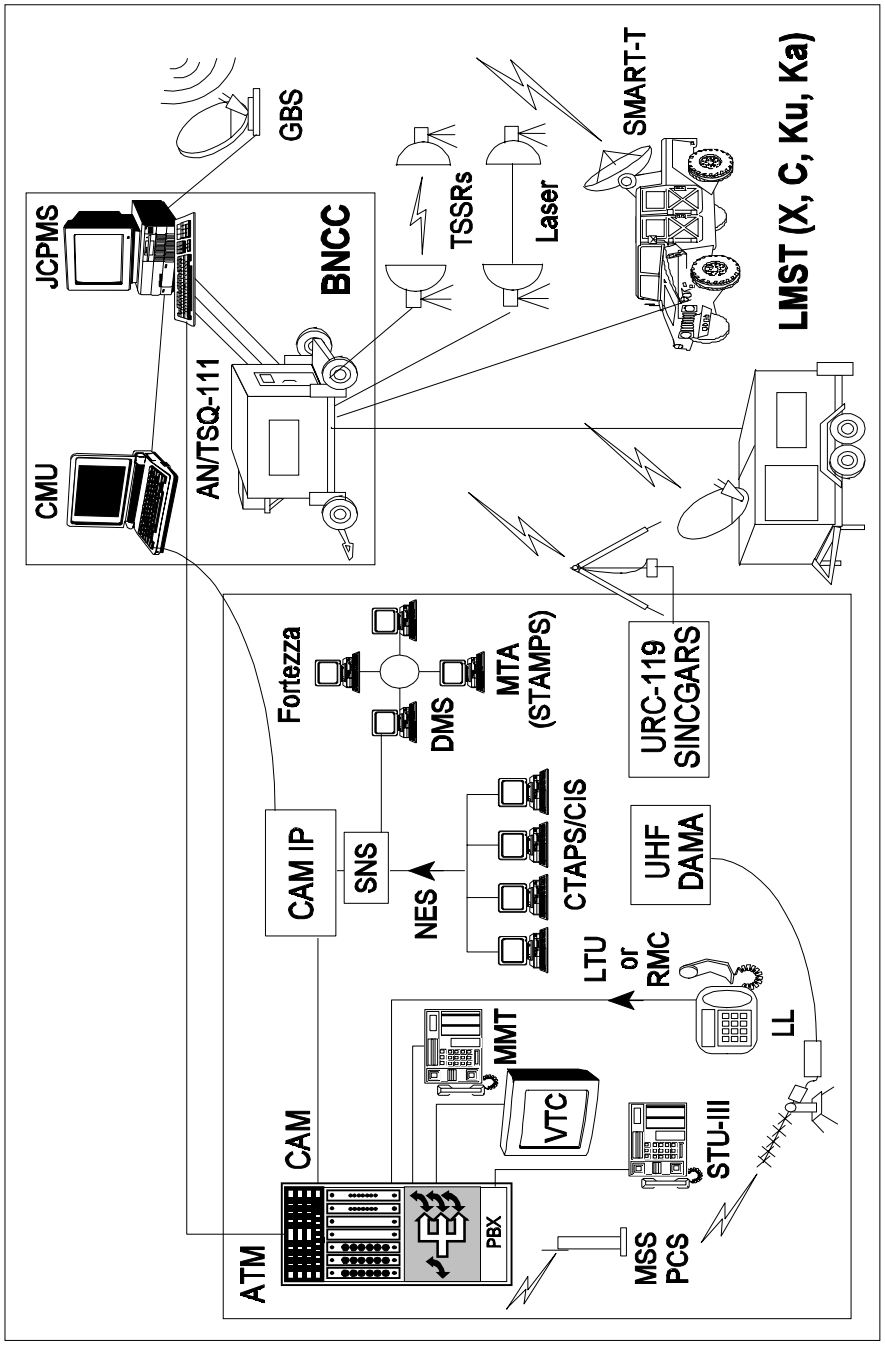

Figure B-2. Mid-Term (2000) Air Force Architecture (Notional AOC)

APPENDIX C

TELEPHONE, VOICE TERMINAL, AND SWITCHING EQUIPMENT DESCRIPTIONS

1. General. This appendix describes telephone, voice terminals, and circuit-switched equipment, not covered in Chapter II, available to support JTF contingency operations and exercises.

2. TA-954()/TT, DNVT

a. General Information. The DNVT is a ruggedized 4-wire telephone set with no encryption capability.

b. Technical Characteristics. See Table C-1.

Table C-1. TA-954 Technical Characteristics

Characteristic	Value
Loop Type	Digital 4-wire
Digital Loop Rate	16 or 32 kbps, CVSD
Power	CB, supplied by CS
Supervision	Digital code words
Signaling	Digital code words (16-key dialing)
Ringing	Digital code words
Maximum Loop Length	4 km (2.5 miles)
Additional Capabilities	Push-to-talk tones, conference, precedence handling up to 5 levels

c. AN/TTC-39 Series CS Interface. DLPMA termination unit, terminal Type 13.

3. TA-1035/U, DNVT. The TA-1035 is the DNVT version used by MSE subscribers. It incorporates a digital data port similar to the DSVT. The TA-1035 operates only at 16 kbps.

4. TA-1042A/U, DNVT. The TA-1042 is used at EAC. It operates at either 16 or 32 kbps and is equipped with a digital data port. It can operate in the auto-dial/answer mode with an attached data device, such as the AN/UGC-144.

5. KY-68, DSVT

a. General Information. The DSVT is a ruggedized field terminal that contains the audio processing, signaling, and cryptographic functions necessary to provide secure and nonsecure access.

b. Technical Characteristics. See Table C-2.

Table C-2. KY-68 Technical Characteristics

Characteristic	Value
Loop Type	Digital, 4-wire
Digital Loop Rate	16 or 32 kbps, CVSD
Power	CB, supplied by CS or LB provided by HYP-71
Supervision	Digital code words
Signaling	Digital code words (16-key dialing)
Ringing	Digital code words
Maximum Loop Length	4 km (2.5 miles)
COMSEC	Compatible with SEELEY-type devices
Additional Capabilities	Push-to-talk tones, interface with data devices to provide digital data on a half-or-full duplex basis, and precedence handling up to five levels.

c. AN/TTC-39 Series Interface. DLPMA termination unit, terminal Type 3.

6. Strategic/Tactical Secure Voice Terminal (STSVT). The STSVT (also referred to as the multimedia terminal (MMT)/DNVT) was developed by Motorola as a transitional, limited functional replacement for the STU-III when employed at tactical switches. It consists of two major components, a SECTEL ® 1500 STU-III terminal that can operate in the secure analog (STU-III) mode at 2.4, 4.8, or 9.6 kbps, plus a DNVT adaptor "wedge" attachment to provide DNVT signaling when connected to a tactical switch. When connected to a tactical switch, it is "treated" by that switch as a DNVT. When communicating with a DNVT or a DSVT in plain text (unencrypted) mode, its signaling and voice digitization at 16 kbps is identical to a DNVT. When it connects to a STU-III on the public switch telephone network (PSTN) or

DSN, the STSVT subscriber dials to a tactical interworking function (IWF), an ancillary device that provides a gateway that converts the STSVT digital signal to an analog message compatible with either the PSTN or DSN. The STSVT uses a proprietary black digital interface (BDI) mode for digital communications through the DNVT adaptor or to digital RF facilities. It is dual-homed so that it can be simultaneously attached to a TELCO and RF networks. The STSVT can also be attached to the SECTEL video docking unit (VDU) to achieve real-time transmission of still or near full-motion video images. It can be upgraded using a 3.5 inch crypto-sealed disk by downloading new software from a PC.

a. Capabilities

(1) Encryption compatibility with existing STU-IIIs.

(2) Direct connectivity to TRI-TAC and MSE switching systems.

(3) Clear voice capabilities with all TRI-TAC and MSE telephone terminals, TA-954, TA-1035, TA-1042, and KY-68, as well as other STSVTs.

(4) Secure voice and data calls with other MMT 1500 DNVTs within the digital switching system.

(5) Clear voice calls through the digital switching system to any subscriber of a Public Switching Telephone Network (PSTN) through Motorola's SECTEL ® Interworking Function (IWF). The IWF serves as a gateway between the tactical digital network and a commercial PSTN.

(6) Secure voice and data calls through the digital switching network to any subscriber of a PSTN equipped with an MMT 1500 or STU-III type terminal through the IWF.

b. Digital Mode Dialing Sequence. When a STSVT subscriber on the tactical network and a STU-III or STSVT subscriber on the PSTN or DSN need to connect, the tactical STSVT subscriber must be in the BDI mode. The initiating party must first dial the telephone number of the IWF. The terminal display tells the subscriber that an IWF has been reached; the caller waits to hear a pseudo dial tone from the IWF and then enters the telephone number of the destination subscriber. Since the IWF only permits calls through it to be completed in the secure mode, call waiting

tone is provided during the extended call completion phase so that the caller is aware the process is active.

c. Gateway. The STSVT and IWF gateway appear like DNVT loop terminations to the TRI-TAC/MSE switches. Both 16 and 32 kbps operation is available.

d. Software Modifications. No switch software modifications are required.

e. IWF Gateway. The IWF gateway can be located at a NCS or LENS(AN/TTC-47 or AN/TTC-46), AN/TTC-39 series switch, or an US Navy NCTAMS. The IWF provides a signal path between a 16 or 32 kbps digital switched network and a commercial PSTN. The IWF supports both clear and secure voice operations between the STSVT and PSTN telephones. Secure operations may be made to any PSTN STU-III terminal. The IWF is designed to prevent any non-STSVT from accessing the PSTN by performing an up-front authentication process on incoming and outgoing digital signals. The gateway is automated and generates NSWT during strategic/tactical clear conversations. The ratio of terminals to gateways is 4:1.

f. STSVT Calling Capabilities

(1) Tactical STSVT to a tactical STSVT-clear or encrypted.

(2) Tactical STSVT to a strategic STSVT-clear or encrypted.

(3) Tactical STSVT to a strategic STU-III-clear or encrypted.

(4) Tactical STSVT to a strategic POTS terminal-clear only.

(5) Tactical STSVT to DNVT or DSVT-clear only.

(6) DSVT or DNVT cannot access the strategic network by way of a STSVT gateway.

(7) Strategic STSVT to strategic STSVT-clear or encrypted.

7. Secure Telephone Unit III (STU-III). The STU-III family of secure telephones provides secure point-to-point access among all STU-III units on a dialup basis through a public switch or over private circuits. The STU-IIIA is a variant

of the STU-III that is backward compatible with the STU-II that is in use by NATO allies. Early models of the STU-III had only analog outputs though they could accept RED side digital inputs. More recent versions provide both digital (RS-232) and analog BLACK outputs. These versions also have special features and options such as access control and greater tolerance of time delays.

a. The STU-III multimedia (MMT) terminal is stable over multiple satellite hops and is compatible with standard ISDN switching used by the Navy and by way of the IWF used by TRI-TAC switches (see paragraph above). The MMT can operate at 2,400, 4,800, and 9,600 bps. The video docking unit (VDU) provides limited motion two-way video and has a built-in camera and small (6 inch) flat screen display. Though the built-in display has limited resolution, there is an NTSC video output which, when fed to a standard TV display, provides higher resolution. Because of the limited frame rate, the VDU is not as capable as video teleconferencing (VTC) systems operating at 128 kbps and higher. However, for transfer of still images and short one-on-one sessions, it is acceptable.

b. The STU-III secure terminal equipment (STE) currently approaching production status has additional enhancements including a nonsecure data mode. All STU-III variants must be in the secure mode to access the RED digital port. This limits the ability of the STU-III to access nonsecure LANs, bulletin boards, and E-mail systems. (See paragraph 8 below.)

c. STU-III dial-up access to the SIPRNET is currently available. Although the STU-III is inherently a point-to-point dial-up terminal, once a call is made to the SIPRNET point of presence the baseband system can address any other SIPRNET user. The STU-III is also used as a link between CTAPS remote and host systems.

d. By multiplexing several STU-III circuits, using an AN/FCC-100(V), it is possible to carry more than one voice or digital call in a single 16 kbps TRI-TAC channel. Currently, STU-III conferencing requires establishment of individual point-to-point calls to a central bridge that breaks out the signal BLACK to RED, then distributes it to the RED side of STU-IIIs at the bridge for return to the end user point-to-point circuits. This technique is needed because of characteristics of the encryption method used in establishing the secure link. (NSA is continuing design efforts in this area.) Another means of conferencing using

the STU-III (operating at 2,400 bps) and ANDVTs, is to use a radio wire integration (RWI) to patch a STU-III into an ANDVT net. Because both units use LPC-10, there is no degradation in voice quality.

8. Secure Terminal Equipment (STE)

a. Description. The STE is the next generation family of secure telephone terminals that will provide secure voice/data digital communications to meet future requirements well into the 21st century. The design is based on an open architecture that allows user based upgrades. Five models are planned which are all based on the same basic mother board design. The models: STE Office (ISDN/PSTN), STE Office (ISDN only), STE Data (ISDN/PSTN), STE Data (ISDN only), and STE Tactical.

b. Security

(1) Security for the STE is provided by a removable FORTEZZA PLUS PCMCIA card. The terminal is a COTS equipment which may be releasable to allies.

(2) The FORTEZZA PLUS PCMCIA card contains the cryptographic algorithm and initially the keying material for secure communications. It can be used to encrypt classified information up through Top Secret. The STE is fully compatible with the key and privilege infrastructure being implemented under the Government's Multi-Level Information Security Initiative (MISSI). The Office STE model provides STU-III interoperability.

c. Capabilities of Release 0 STE. The operating modes of the release 0 STE are as depicted in Table C-3.

d. Added Features in Release 1 Models. The Release 1 STE ISDN mode will transmit secure data at up to 128 kbps with ISDN compliant ST or U interfaces. The STU-III mode can use either the 2.4 or 4.8 kbps STU-III compatible vocoder. The tactical model will contain MSE DNVT signaling capability equivalent to that contained in the STSVT terminal described in paragraph 6 above.

Table C-3. Release 0 STE Capabilities

Capability	Value
Non-Secure Voice	ISDN-PCM, Speaker Phone
Secure Voice	ISDN-ADPCM @ 32 kbps (STE) CELP @ 4800 bps (STU) LPC-10e @2400 bps (STU)
Secure Data Port Encryption	Full Duplex Asynchronous: 2.4, 4.8, 9.6, 19.2, 38.4 kbps (STE-ISDN) 2.4, 4.8, 9.6 kbps (STU-ISDN) Full Duplex Synchronous: 2.4, 4.8, 9.6, 19.2, 38.4, 64 kbps (STE-ISDN) 2.4, 4.8, 9.6 kbps (STU-ISDN)
Levels of Subscriber Privilege	TPA, SSO, User
Secure Mode Initiation Options	Auto Secure (Secure Mode will be attempted first) Secure Only (Non-secure modes will not be permitted) Traditional (Call is established in non-secure mode; subscriber may select secure mode later)
Network Interoperability	National ISDN Interfaces NI-1, NI-2, NI-3 ISDN Switch Compatibility (NI-1 and NI-2) AT&T 5ESS, AT&T Definity, and Northern Telecom
DMS-100	

9. Advanced Narrowband Digital Terminal (ANDVT). The ANDVT provides secure transmission of voice, data and/or signaling information using narrowband HF, UHF, or VHF radios, wireline facilities, or 2.4 kbps digital transmission equipment. The ANDVT consists of a family of interoperable equipment encompassing the AN/USC-43(V), tactical terminal (TACTERM); the KY-99, miniaturized terminal (MINTERM); and the KY-100, airborne terminal (AIRTERM). The AN/USC-43(V) consists of the unclassified basic terminal unit, CV-3591, and the plug-in COMSEC module, KYV-5. When not employing the KYV-5, the TACTERM includes a modem-only plug-in unit/voice processor-only unit (MPU/VPU). The CV-3591 provides the voice processing, modem functions, error protection, and the required interface to data terminal equipment and radios. The linear predictive coding algorithm (LPC-10) is used for high voice quality through narrowband channels. The AN/USC-43(V) is the primary Navy unit used to satisfy tactical narrowband secure voice requirements on HF, UHF satellite and UHF LOS, UHF non-DAMA

and DAMA, SHF SATCOM, and the Navy's EHF SATCOM program (NESP).

10. SB-3614(V)/TT Switchboard. The SB-3614(V)/TT is a tactical, ruggedized, 30-terminal automatic or semiautomatic switchboard. The basic 30-terminal unit can be stacked to provide a 60- or 90-termination switchboard using cross point cards to interconnect the individual units as discussed below. The SB-3614(V)/TT is deployed as a stand-alone unit or housed in an S-250 shelter. The latter configuration, when equipped to provide 90 lines of service, is designated as the AN/TTC-41(V)3. Specific termination card configurations required to support the several line types are discussed in subparagraph 10e below. Two levels of precedence and various service call features are provided as discussed below.

a. Functional Description. The basic SB-3614(V)/TT provides cordless service to 2-wire CB signaling lines, 20-Hz RD lines or trunks, CB, dial-pulse or DTMF lines, and 4-wire tone-signaling trunks. The capacity of a 60- or 90-line switchboard is increased by the addition of four cross point PCBs to each unit for both the 60- and 90-line configurations. One of the units is designated as the MASTER with the other unit(s) left in the SLAVE mode. The SB-3614(V)/TT can be operated either as a fully automatic or semiautomatic switchboard, depending on the card configuration.

b. Operational Capabilities. The configuration and capabilities for each mode of operation, the programmable memory considerations, service features, and numbering schemes are discussed in the following subparagraphs.

(1) Semiautomatic Operation. In the semiautomatic mode the operator monitors, answers, initiates, and extends calls through the use of a keypad and other function keys. In this mode of operation the basic unit can be configured with 30 terminal cards, Type I or II. These cards provide service for CB signaling lines, ringdown lines or trunks, and dial-pulse or DTMF lines. Two levels of precedence are provided (Routine or Priority).

(2) Automatic Operation. The SB-3614(V)/TT provides fully automatic operation with DTMF touch-tone subsets, and 2- and 4-wire automatic trunks. It also provides limited automatic operation with rotary dial pulse subsets. This operation is limited to call extension for local calls and manual trunks. Precedence, conferencing,

and automatic trunk-call extension features are provided by the operator position. In CB signaling or ringdown lines and trunks, the SB-3614(V)/TT provides call extension service by the operator. For automatic operation, an automatic kit and a maximum of nine Type III termination PCBs are used in each unit. These nine Type III terminal cards can support DTMF tone-signaling terminals or trunks. These cards are discussed in subparagraph 10e(3) below. Increasing the capacity to a 60- or 90-line unit for automatic operation requires the same increase in cross-point cards and MASTER/SLAVE control as discussed above.

(3) Programmable Memory Considerations. The programmable memory must contain data peculiar to each particular installation. Data assignment is entered by the key sender in the program mode. The following functions are programmable:

(a) Trunk Group. The trunk group function assigns a switch locator number to the trunk-hunting group. Each switchboard can accommodate trunk-hunting groups, which include from 1 to 30 2-wire trunks and from 1 to 18 4-wire trunks with a maximum total of 30.

(b) Trunk Terminal. The trunk terminal function assigns a specific wired trunk as part of a trunk-hunting group.

(c) Precedence. Precedence is a means of assigning a priority classmark to a specific wired terminal. Two levels of precedence are available, Routine and Priority. This classmark applies to Type I and Type II terminals.

(d) Intercept. Intercept on a terminal causes all calls destined to that specific terminal to be routed to the operator.

(e) 01 Classmark. An 01 classmark designates a terminal wired to a Type III terminal card as a 4-wire converter trunk operating in the manual mode.

(f) 02 Classmark. An 02 classmark designates a terminal wired to a Type I terminal card as an automatic DTMF trunk.

(g) 03 Classmark. An 03 classmark designates a terminal wired to a Type I terminal card as a 20-Hz/DTMF applique trunk.

(h) Procedures for entering programmable data, as well as the assignment of line terminals for a specified numbering plan, are in TM 11-5805-695-12. (See Appendix A.)

c. Numbering Plan. The SB-3614/TT uses a 5-digit numbering scheme, SL-KXX. See Chapter III, paragraphs 2 and 8, for details on the SB-3614/TT numbering plan and routing.

d. Power Requirements. The SB-3614(V)/TT operates off a 24-Vdc prime power, 5-amp (max) power source.

e. Interfaces. The SB-3614(V)/TT switchboard interfaces with most analog telephone sets, switchboards, and converter units. A list of compatible equipment is provided in Table C-4. The five types of line cards, discussed below, provide the interface to the equipment based on the type of line or trunk required.

(1) Type I Terminal Card. The Type I terminal card can interface with 2-wire ringdown lines and trunks or CB signaling lines. A mode selection switch on the card allows the selection of either ringdown line or trunk, or CB signaling lines. A precedence switch may be set to Routine or Priority as required.

Table C-4. SB-3614(V)/TT Compatible Equipment

Terminal	Circuit Type
TA-312/PT	CBS or RD
CV-425/U	RD or 4-wire tone-signaling trunk
TH-85/GGC	RD line
TA-236/FT	CB dial
TA-838/TT	CB DTMF (2-wire)
TA-938/TT	CB DTMF
CV-1538	2-wire RD trunk
AN/TTC-42	3-digit, PABX tone burst
SB-3865	3-digit, PABX tone burst
AN/TTC-39 series	4-wire tone-signaling trunk

(2) Type II Terminal Card. The Type II terminal card can interface with a 2-wire dial-pulse or a 2-wire DTMF line. The mode switch on this card may be set to CB dial pulse, DTMF, or unassigned positions. No precedence switch is available. The choice between routine and priority is made by memory assignment, as discussed in subparagraph 10b(3) above.

(3) Type III Terminal Card. The Type III terminal card can interface with 4-wire PABX trunks and 4-wire converter trunks. The mode select switch allows selection of either PABX trunks, converter trunk operation, or the unassigned position.

(4) Type IV Terminal Card. The Type IV terminal card can interface with 6-wire voice circuit, a 2-wire E-lead (receive and return) circuit, and a 2-wire M-lead (transmit and return) circuit. The E&M leads provide either contact or standard signaling, selected by strapping options in the circuit. A toggle switch in the E&M trunk circuit determines whether digits are transmitted as dial-pulse or as DTMF tones to the distant end terminal.

(5) Type V Terminal Card. The Type V terminal card provides a 2-wire loop-signaling, dc closure trunk used to interface most PBXs and central offices. Toggle switches on the card determine whether digits are transmitted as dial-pulse or DTMF tones to the distant end terminal.

f. Impedance and Signal Levels. All lines terminating on the SB-3614 have a characteristic impedance of 600 ohms ± 10 percent. Ringdown tones are transmitted as 20 Hz, 90 Vrms ± 10 percent. DTMF signaling tones and control tones are transmitted at a nominal level of -14 dBm and received at a level of 0 dBm to -20 dBm, except for ringback and control tones from an automatic switchboard, which are received at a level of -10 dBm, maximum. (See TM 11-5805-695-12, Appendix A.)

11. SB-3614A(V)/TT. The SB-3614A(V)/TT switchboard is a product improvement of the SB-3614(V)/TT.

a. Table C-5 lists some of the principal technical characteristics.

Table C-5. SB-3614A Technical Characteristics

Analog Loops	2-wire ringdown, long local loop, CBS, DP, DTMF
Analog Trunks	2-wire RD (20 or 1600 Hz), dc closure 4-wire, 3-digit DTMF 4-wire DSN SF 4-wire, 7-digit tone burst Six-wire E&M
Number of Channels 4-wire 2-wire	30 maximum 18 maximum 30 maximum

b. The SB-3614A differs from the SB-3614(V)/TT model by providing the following additional features and capabilities.

(1) Precedence. Five levels of precedence.

(2) TRI-TAC Compatibility. Interconnection to the AN/TTC-39 series, AN/TTC-42, and SB-3865 is available using the Type VI card.

(3) NNXXXXX (PR+SL+XXX) Numbering Plan. The expanded numbering plan enables the switchboard to automatically interface with 4-wire tactical CSs and DSN, using automatic supervision and DTMF signaling, and a 7-, 10-, and 13-digit tactical numbering plan. The expanded numbering plan also enables the SB-3614A to serve as an intermediate or tandem switch that can automatically extend calls to other switches. The switch retains the 3-digit capability of the SB-3614(V).

(4) DSN PBX Access. This capability is possible using the Type XI card. (See subparagraph 11b(10)(b) below.)

(5) Automatic Tandem Trunk Switching. This capability is possible by using the 7-digit numbering plan and Type VI card. (See subparagraph 11b(10)(a) below.)

(6) Automatic Primary /Alternate Trunk Routing. One primary and one alternate route is provided for each primary routing (PR) zone code and each switch location (SL) code. Each route may consist of 18 4-wire trunks. A maximum of 15 trunk groups may be assigned.

(7) Automatic Call Forwarding/Intercept. This feature permits routing/intercept of calls for up to 30 subscribers to another specified subscriber or the switchboard operator.

(8) Subscriber Initiated (Progressive) Conferences. Any subscriber possessing a classmark-authorization origination privilege may access the conference bridge by keying C.

(9) Direct Access Capability (DAC). Up to 10 subscribers may be classmarked for DAC service for outgoing calls and in conjunction with the automatic call-forward feature, incoming calls may be placed directly or intercepted to the operator or another subscriber.

(10) Two additional trunk interface cards:

(a) Type VI: 7-digit, 4-wire, analog tone burst or confirmation signaling.

1. Tone Burst Trunk. This interface enables the switchboard to interoperate with other SB-3614As or TRI-TAC tandem switches on an 4-wire, automatic tandem basis. Operation is identical to the 3-digit tone burst trunk in the SB-3614(V), with the exception that a 2,600 Hz tone vice 570 Hz is required for Release Acknowledge and 7 digits are tone burst.

2. Confirmation Trunk. Once a trunk has been selected and seized the 7-digit NNXXXXX address is forwarded in DTMF tone-burst signaling to the distant switch, which returns DTMF tone-burst confirmation signals.

(b) Type XI: This card provides a 4-wire analog trunk, DTMF to DSN and SF pulses from DSN.

(11) Database Entry. The SB-3614A requires a larger and more sophisticated database. The entry of database information by keypad is not adequate. Such features as primary/alternate route direction, subscriber precedence, line grouping, and call forwarding may change on a periodic basis, requiring a separate menu-driven I/O terminal. Using such a terminal, the operator can quickly enter subscriber features and network routing.

12. Secure Digital Net Radio Interface Unit, TSEC/KY-90

a. General Description. The KY-90 provides a secure interface between the AN/TTC-39 series and various single-channel radio sets. Either voice or data service is available. The radio side interface may be either VINSON or NESTOR-PARKHILL-compatible.

b. Technical Characteristics. See Table C-6.

c. Modes of KY-90 Operation

(1) Mode I. This mode is used with a ringdown signaling telephone. It allows the KY-90 to provide R/T control by using VOX.

Table C-6. KY-90 Technical Characteristics

Characteristic	Value
Loop Type	Digital 4-wire
Digital Loop Rate	16 or 32 kbps, CDϕ
Power	LB, 22-32 Vdc
Supervision	Digital code words
Signaling	Digital code words
Ringing	Digital code words
Maximum Loop Length	4 km (2.5 miles) from switch using WF-16 telephone cable

(2) Mode II. This mode is used with an analog DTMF telephone terminal. In this mode a 1/3 tone detector within the KY-90 provides R/T control. The radio is keyed to transmit when the subscriber sends a DTMF 1 and remains so until the subscriber sends a DTMF 3.

(3) Mode III. This mode allows remote R/T control by push-to-talk tones originated from a DNVT or DSVT.

(4) Mode IV. This mode is used with a DSVT. It provides R/T control by digital code words.

(5) Mode V. This mode is classified and is not addressed in this manual.

d. AN/TTC-39 Series Interface. The KY-90 interfaces to the AN/TTC-39 series CS by means of DLPMA termination unit, terminal type 3. Classmark the line for 16 kbps, security preferred, half-duplex, when the KY-90 is in the VINSON-like configuration.

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