CUSTOM CALLING
SOFTWARE SUBSYSTEM DESCRIPTION
NO. 3 ELECTRONIC SWITCHING SYSTEM

CONTENTS PAGE

Figures

1. GENERAL

1.01 A No. 3 Electronic Switching System (ESS) customer can subscribe to one or a combination of custom calling services. The custom calling services available are:

- Speed calling
- Call forwarding
- Call waiting
- Threeway calling

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

1.03 Part 7 consists of a glossary of terms, abbreviations, and definitions necessary for comprehension of the information contained in this document.

1.04 The purpose of this software subsystem document (SSD) is to provide an overview of the software which handles the custom calling features available in a No. 3 ESS. Additional information related to custom calling functions in a No. 3 ESS may be found in the following SSD sections:

SECTION	TITLE
233-151-125	Input Processing and Scanning SSD, No. 3 ESS
233-151-130	Basic Call Processing SSD, No. 3 ESS
233-151-140	Network Path Hunt SSD, No. 3 ESS
233-151-145	Digit Processing SSD, No. 3 ESS
233-151-150	Translations SSD, No. 3 ESS

1.05 Translations data for each customer line indicates the presence of the custom calling features for the given line. The custom calling programs (CUSTOM and TREWAY) handle the processing of calls for a customer using these features. Control is passed to CUSTOM or TREWAY from various other call processing programs. These include the digit interpretation program (DNTRP), the completion of incoming and intraoffice calls program (TERM), the outgoing call program (OUTCAL), and the disconnect progress marks program (DISCON).

2. SPEED CALL—OVERVIEW

2.01 The speed calling service provides capability for the subscriber to call a number of preselected directory numbers by dialing abbreviated codes of 1 or 2 digits. Subscription to the 1-digit service provides a maximum of 8 stored codes (2-9), and subscription to the 2-digit service provides a maximum of 30 stored codes (20-49).

A. Change or Enter Speed Call

2.02 (See Fig. 1.) Changes and entries to the speed call list are made by dialing one of two access codes ("74" for the 8-code list or "75" for the 30-code list). (See Fig. 2.) When the digit interpretation program (DNTRP) detects the access code, control transfers to the speed calling routine in CUSTOM. CUSTOM, after a real time break (for concurrent processing), will then return dial tone to the subscriber as a signal to begin the entry update. The 1- or 2-digit code for the particular entry is dialed first and then the complete number (plus area code, if any, and prefix) is dialed. This data (both code and number) is then stored in the transient call record (TCR) digit storage area. The subscriber will receive a confirmation tone (see glossary) once the number is validated and the translation change is effected, ie, the number has been stored in the speed calling list.

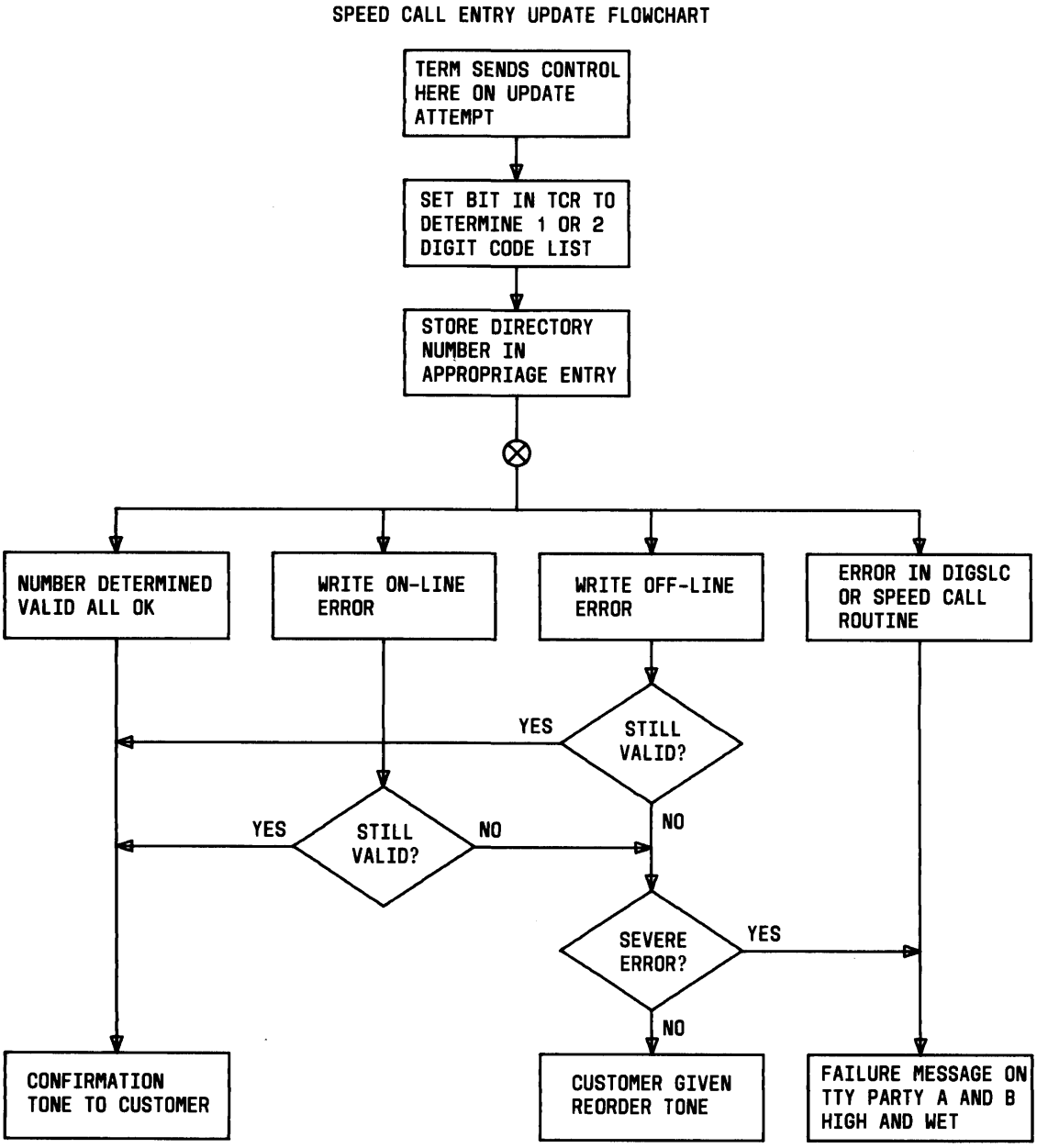


Fig. 1—Speed Call Entry Update Flowchart

B. Possible Errors and Resultant Actions

2.03 If the attempt to store the number fails, one of several error conditions could exist. Error conditions are passed to the CUSTOM subroutine, DIGSCL, via a call to subroutine SPDCL in the scan point number translation program (XSLSPN).

2.04 These possible errors and their resultant actions are:

(a) Error in DIGSCL on SPDCL:

- Failure message on TTY
- Party A and B placed in high and wet state

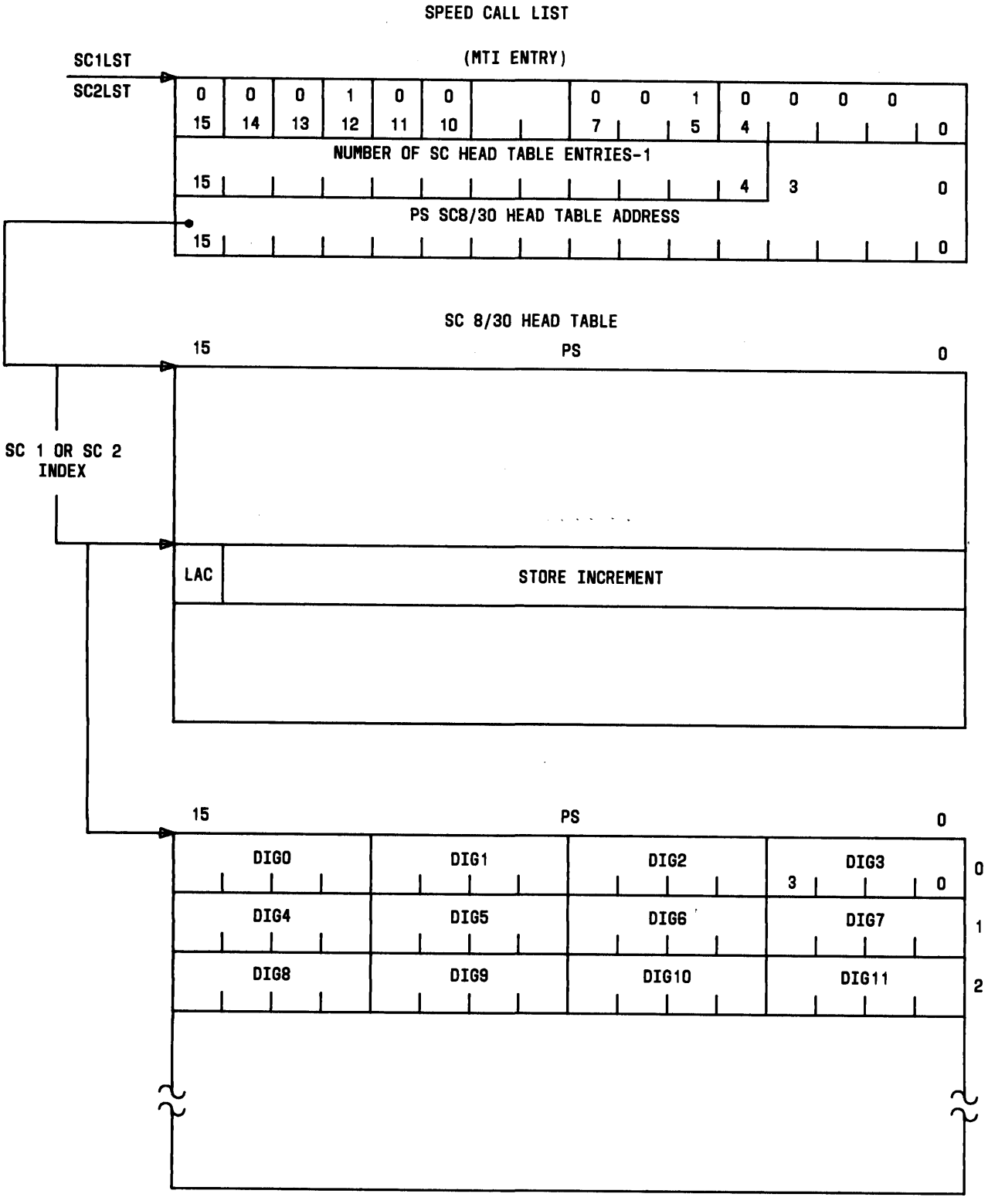


Fig. 2—Speed Call List

- 5-Second delay and TCR cleared

(b) 6 Possible Errors in Write On-Line Store:

(1) Off-line not accessible

- Digits stored anyway, confirmation tone

(2) Off-Line SYC not in standby

- Give customer reorder, disconnect

(3) Backdate office data or past office data lamps on

- Give customer reorder, disconnect

(4) Reallocation in progress

- Give customer reorder, disconnect

(5) Write error, on-line store, switch OK

- Give customer reorder, disconnect

(6) Write error, on-line store, switch denied

- Failure message on TTY
- Control returned to calling program
- Party A and B placed in high and wet state
- 5-Second delay and TCR cleared

(c) Two possible errors in WRITE_OFF_LINE store:

(1) New digits were written into OFF_LINE store also

- Confirmation tone

(2) Bad Data in OFF_LINE

- Failure message on TTY
- Control returned to calling program
- Party A and B placed in high and wet state
- 5-Second delay and TCR cleared

(d) Reallocation is in progress

- Message is punched to prevent loss

C. Processing Speed Call

2.05 (See Fig. 3.) DNTRP interprets the 1- or 2-digit code dialed by the speed calling customer. Control is passed to CUSTOM where the speed call code is converted into the address of the directory number it represents. This translation is handled by a subroutine (SPDCL) in the scan point number translations program (XSLSPN). The number is inserted into the TCR and control is returned to DNTRP for continuation of call processing.

2.06 If the attempt to obtain the directory number address fails, subroutine FAILRØ of the call failure program (FALTCR) is invoked to fail the call. A failure message is printed by the TTY.

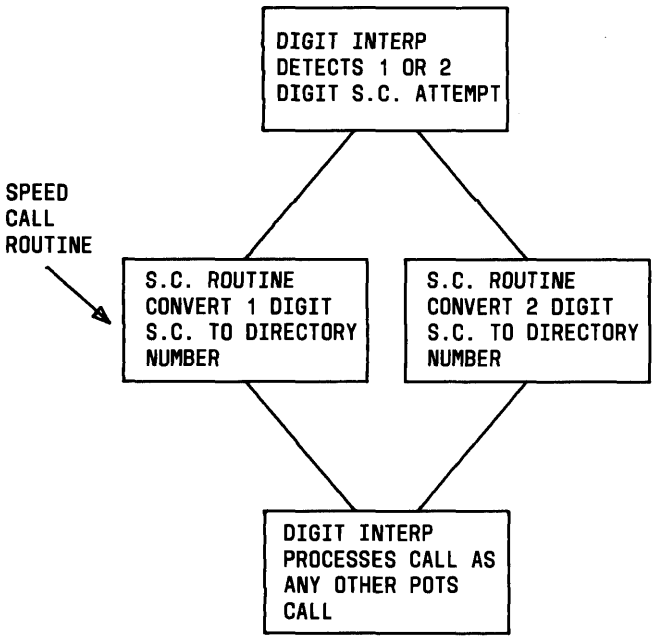


Fig. 3—Speed Call Processing Flowchart

3. CALL FORWARDING—OVERVIEW

3.01 The call forwarding service provides capability for the subscriber to receive calls at any number other than his own. If the call forwarding customer chooses to forward the directory number

to one associated with a toll charge, then the user will be billed for that leg of the call every time the directory number is called (if answered). The call forwarding service can be activated or deactivated at any time, but only from the original subscriber phone.

A. Activation—Call Forwarding

3.02 (See Fig. 4.) To activate the call forwarding service, the subscriber dials "72". DNTRP detects and interprets the code, then after a real time break, a dial tone is reissued. The desired forwarding number is now dialed including the prefix "1" and area code, if needed. Once call processing receives all digits and checks for validity, control is passed to the custom call action check routine (CCACTCK) in CUSTOM. At this point, CCACTCK differentiates between a speed call or a call forward attempt.

3.03 If the dialed number is answered, call forwarding is activated. If the dialed number is not answered or is busy, the call forwarding service is not activated. However, the subscriber may still activate the call forward service to the dialed number by hanging up and repeating the procedure above within 2 minutes. In this case, if the second dialing matches the first and is still not answered or is busy, the subscriber will receive a confirmation tone. However, when the second dialing does not match the first dialing, then the first dialing is ignored and the second is treated as another first activation attempt.

3.04 Actual activation of the call forward entry occurs in subroutine CF_ACTIVATE in CUSTOM, which sets the ACTENT bit in a CF entry (denoting an active entry), zeroes the INPROG bit (denoting progress of service), and clears the CF_TCR field and the entry timer (for future tests). Further, if reallocation is in progress, a recent change message will be punched. (See Fig. 5.)

B. Possible Error

3.05 If an activation attempt is made by a subscriber and reallocation is in progress, then a message is punched in case of loss (via PCHCF in PCHSUB).

C. Processing—Call Forwarding

3.06 (See Fig. 6.) Once the termination program (TERM) recognizes that the called party (B) is a line with call forwarding service, CFACTCK in CUSTOM is entered. If the calling party is an operator (no-test trunk), the call is completed normally regardless of whether call forwarding is active. Normal completion is handled through LBT in TERM.

3.07 Assume that the calling party (A) is not an operator and the called party (B) has an active call forwarding entry (Fig. 5). Then CF_ADDR in CUSTOM is accessed to obtain the address of the CF entry. Next, the directory number stored in the CF entry is loaded into the TCR and control of the call is returned to the digit interpretation routines (DNTRP). If the attempt to obtain the address of the call forwarding entry fails, a terminating branch to TCR_FAIL in CUSTOM is made and a failure message is printed by the TTY.

3.08 In event the call forwarding service has not been activated, the call is terminated in the normal manner by branching to LBT in the TERM program.

3.09 Further, when the timer in the CF entry (Fig. 5) is not equal to 0, then the busy tone is returned to the caller and control passes to the tone routine, ANTON.

3.10 The actual forwarding leg of the call proceeds after a check on the charge index is made. If a toll is required, TMRSEL in CUSTOM is called to select an auxiliary TMR (Fig. 7). This secondary TMR is used purely for charging the forwarded leg of the call to the CF subscriber.

3.11 CUSTOM now rings the CF subscriber base phone for 1/2 second as a reminder that the CF option is in effect. This is done by the following programs: TCRSEL and TKRSEL in EQPSEL; PATHST in PATHNT; and CONNECT in POPS. Lines, ringer, and TCR used for the 1/2 second ring are idled upon completion of the ring and control returns to the base level monitor.

3.12 It should be noted that if TCRSEL fails to locate an idle TCR, or if TRKSEL fails to find an idle ringer, the (1/2 second ring) associated line and TCR are idled, the 1/2 second ring is

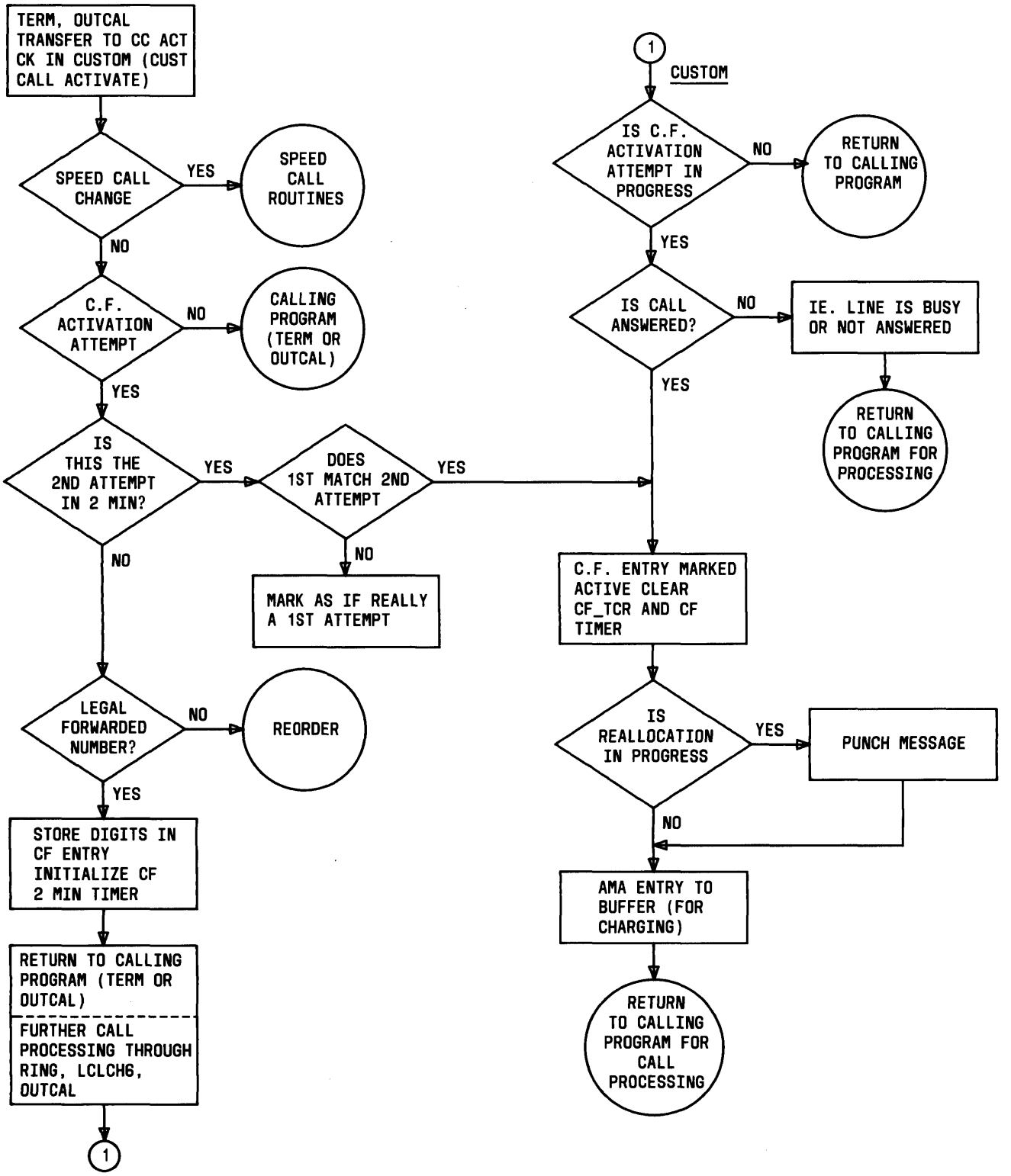


Fig. 4—Call Forward Activate Flowchart

0	DIGITS				DIGITS				DIGITS				DIGITS			
1	DIGITS				DIGITS				DIGITS				DIGITS			
2	DIGITS				DIGITS				ACTENT	INPROT	PFX		CFTIM 1 = 10 SEC			
3	CF_TCR NO. OF TCR FOR CF ACTIVATION								IAO			CF_CHARGE CHARGE INDEX FOR B-C CALL				
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Fig. 5—Call Forward Entry

skipped, and control returns to the base level monitor.

D. Deactivate—Call Forwarding

3.13 (See Fig. 8.) Since the forwarding service remains activated for an unspecified time, a deactivation process is necessary. Therefore, to deactivate the service, "73" is dialed. DNTRP detects and interprets this cancellation code and control is passed to subroutine CFOFF in CUSTOM. If the CF entry is not active, then the customer receives the custom calling error treatment (a special announcement). Otherwise, the CF entry is cleared via CLR_WRDS in the common systems program (CSYSUB). If reallocation is in progress, PCHCFR in the peripheral order interpreter program (PCHSUB) is called to write a removal message in case of loss. Finally, the customer is given a confirmation tone to let him know deactivation is complete.

E. Special Cases—Call Forwarding

3.14 The customer can determine whether call forwarding is active by dialing his own number. If the service is not active the customer hears busy tone. If the service is active and the forward-to line is not busy, an audible ring will be heard when the forward-to station is rung.

3.15 If two or more call forwarding customers forward calls to each other forming a closed loop (eg, A forwards to B and B forwards to A), then customers who attempt to call any party involved in the loop will receive busy tone. Therefore, no calls will be completed to any customer unless at least one of the customers deactivates the call forwarding service. This loop is assumed to be in a No. 3 ESS office. If A or B is a non-No. 3 ESS customer, then the attempted call to that party may be handled differently.

3.16 A customer who attempts to activate call forwarding when it is already active will receive reorder tone or an error announcement.

3.17 Calls cannot be forwarded to n11 codes, 11n codes, a number involving an operator, or a number involving an announcement.

3.18 An attempt by the no-test operator to verify a forwarded line will result in a busy tone.

3.19 Call forwarding service for any customer can be activated or deactivated by the local test desk.

4. CALL WAITING—OVERVIEW

4.01 (See Fig. 9.) The call waiting service enables the customer to receive a second call although another call is in process. Once the second call is answered, the customer may alternate between parties as necessary by flashing the switchhook. The service is in effect regardless of whether the customer was the calling or called party in the original connection.

4.02 The subscriber to call waiting service is provided (see glossary) a special tone as notification that a third party is trying to call.

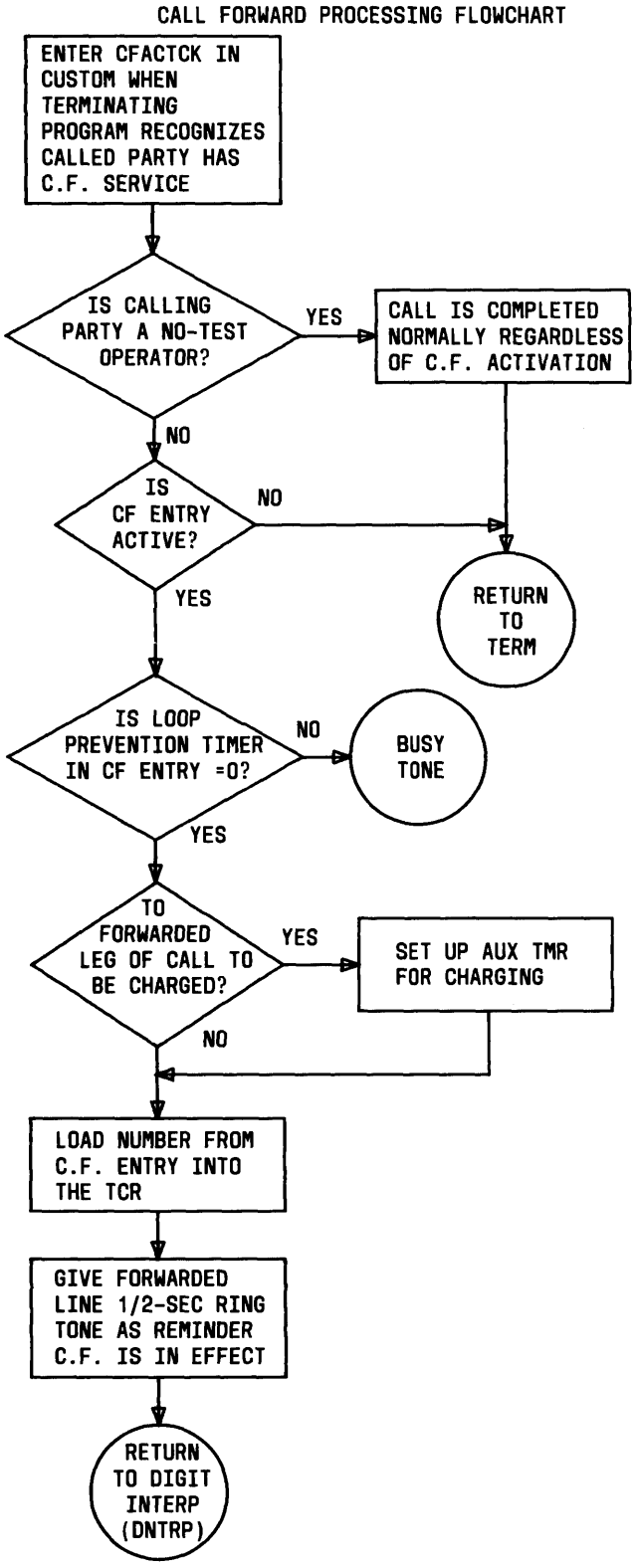


Fig. 6—Call Forward Processing Flowchart

The third party receives audible ring (not busy tone) until the called subscriber responds.

A. Processing—Call Waiting

4.03 All calls which are candidates for call waiting (CW) treatment are passed to CWACTV in the call waiting routines. Entry in made from program TERM which has determined that the called party meets 3 requirements: (1) the called party is a line, (2) the called customer subscribes to call waiting service, and (3) the called line is not idle. Various checks are performed that are also performed for normal calls. If the calling party is a coin line, a coin-presence test is performed. If the calling party is a two-party line, a second party test is performed and the call is failed (failure message on TTY, both parties high and wet) if results of the second party test disagree. If the called line is being traced, a trace message is printed from ICT in the resident call trace program (CTRACR).

4.04 Once the called customer is determined to be in a stable connection, a call waiting group is established. This is accomplished by selecting an auxiliary TCR (TCRSEL) to keep track of the original stable connection (A-B). This extra TCR is called a permanent call record (PCR). It is filled with pertinent data for tracking the appropriate connection. Once this is complete, the original TCR is free to be used on the C-Party to A-party call (split party).

4.05 A talk path and CW tone circuit are hunted (C-A) (via PATHUNT). If either is unavailable, one retry is made before giving C the reorder tone. Reorder tone is issued through program DISCON.

4.06 Charging conditions are initialized via a call to AMA. The calling party half of the above path is connected and caller receives audible ring. The called customer (one who subscribes to the CW service) receives a burst of call waiting tone (440 Hz for 300 ms).

4.07 AMA is called to record the number of times call waiting is utilized. When parties disconnect, entries are also made to AMA for end-of-time charging.

STABLE

WORD	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	ACTIVE 1	AMA	LINEA	CALLING CALLING-PARTY SCAN POINT NUMBER												
1	RVRS	STABL 1	LINEB	CALLED CALLED-PARTY SCAN POINT NUMBER												
2	TIM 1	TIPTY	CHARGE_INDEX 1					TIMER								
3	TMRPM	CALL4	CWA	ASPLIT	CWB	BSPLIT	BOTH3WA			CCPM			APORT		BPORT		CUSTOM CALLING INFORMATION

TRANSIENT

WORD	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	ACTIVE 1	AMA	LINEA	CALLING CALLING-PARTY SCAN POINT NUMBER												
1	RVRS	STABL 0	LINEB	CALLED CALLED-PARTY SCAN POINT NUMBER												
2	TIM 0	TIPTY	CHARGE_INDEX 1					2PTSVC	TCR NUMBER							
3	TMRPM	CALL4	CWA	ASPLIT	CWB	BSPLIT	BOTH3WA			CCPM			APORT		BPORT		CUSTOM CALLING INFORMATION

Fig. 7—Stable and Transient TMRS

CALL FORWARD DEACTIVATE FLOWCHART

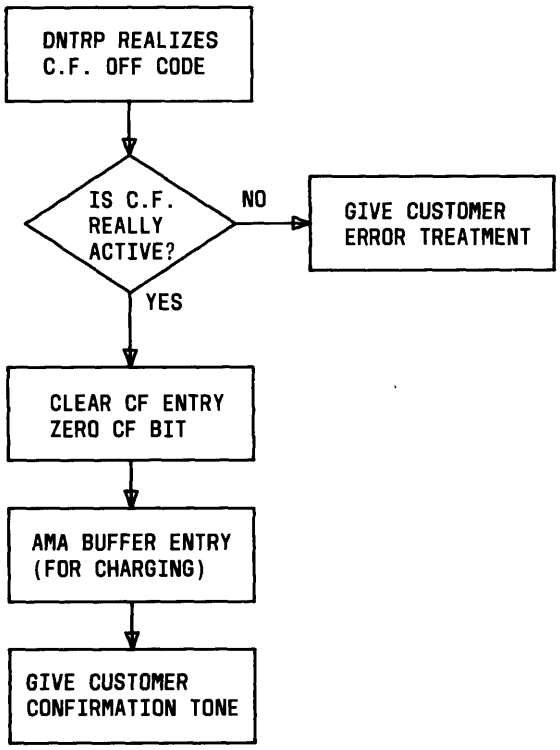


Fig. 8—Call Forward Deactivate Flowchart

B. Call Waiting Tone Application

4.08 Applying call waiting tone to A-party is a multistep procedure. First, the address of the A-B TCR (tone circuit TEN) must be derived. Next, subroutine NT_CONN in the peripheral order subroutines program (POPS) is called to select a test vertical and establish the connection. Then TV_CLOSE, also in POPS, closes the test vertical crosspoint. Since only A is allowed to hear the tone, the B half of the A-B path is disconnected while the tone is being provided. The tone is cut through to A by setting the tone circuit-to-A junctor into the appropriate talk state for 300 ms. The tone is then discontinued by reopening the test vertical crosspoint and disconnecting the no-test path (via NT_DISCON in POPS). Finally, the B-party half of the A-B talk path is reconnected, thereby reestablishing the A-B talk path.

4.09 Once the CW tone has been issued, A-party has up to 10 seconds of response time available for either going on-hook or flashing the switchhook. If no response is detected (progress mark in call waiting), then a second burst of CW tone is issued. The customer (A-party) now has 5 minutes to respond, provided C-party waits that long.

4.10 If at the end of 5 minutes A-party has not responded, then C-party is given reorder via DISCON and A-B is returned to normal (noncall waiting) stable state. Further, if B-party went on-hook during the 5 minutes and A-party still did not respond, then all remaining paths and parties are idled (via DISCON).

C. Response to Call Waiting Tone

4.11 As mentioned previously, the called customer (A-party) may respond to the call waiting tone by either flashing the switchhook or by going on-hook. Flashes and disconnects (on-hooks) are detected by the scanning routines (SCANS). Control returns to the appropriate CW monitor routine. The timing bit in the TCR is checked for differentiation between a flash (less than 1.2 seconds) and a disconnect (greater than 1.2 seconds).

A-Party Responds Via Hang Up

4.12 If the A-party response is a disconnect, the A-B path and B-party are idled. The TCR is set as for a normal C-A call. A ringing circuit and a path from A to the ringer are hunted via PATHUNT. The TCR is passed to the call waiting ringing routine to ring A. The remainder of the call is passed to base level call processing programs for completion.

A-Party Responds Via Flash

4.13 A-party may respond to the CW tone with a flash instead of on-hook. In this case, audible ring is removed from C-party, B-party is placed on silent termination (split-party), and A-party and C-party are connected with a talk path.

D. Monitoring of Split-Party

4.14 Base level progress mark CWMON1 handles supervision of B-party (split party). Only a disconnect from the split party is valid at this point. The talk path (A-B) remains transient until some supervision occurs. Hence, B cannot flash either to add on a party or to answer a waiting call. If B-party disconnects, the B half of the A-B talk

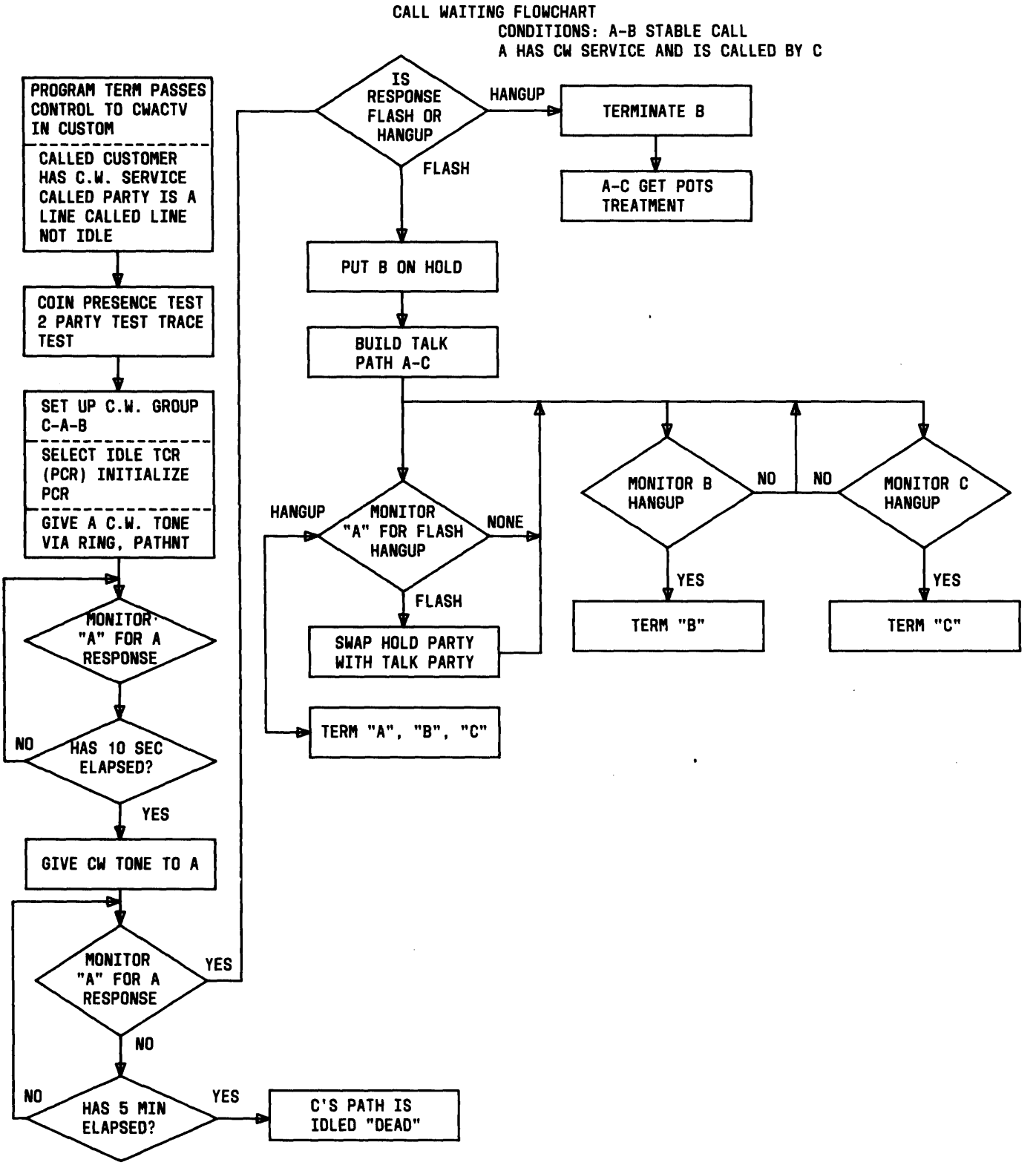


Fig. 9—Call Waiting Flowchart

path and B-party are software-idled. A-party continues to be monitored for some response.

4.15 If B-party does not disconnect (continues to remain on hold), A-party (controller) may place C-party (the present stable party) on hold and talk again to B-party (split party) by simply flashing the switchhook. A-party may switch parties as often as desired.

> ***Note:*** A-party (controller) is the only one of the three parties involved which may switch calls.

E. Disconnects

Controller Disconnects

4.16 Once the call waiting group has been established, all three parties (ie, A-party=controlling party, B-party=stable party, and C-party=split party) are monitored for disconnects. If A-party at any time disconnects, all parties and paths are idled via DISCON. TCRs are sent to coin clean-up for any possible coin work.

Split Party Disconnects

4.17 If C-party (split) disconnects, that half of the path is idled and the remaining stable A-B connection is reconfigured to a normal, stable call. The split party TCR is sent to coin clean-up for possible coin work. Since A and B are now connected as a normal POTS call, they are both eligible again for call waiting service. (See special note following 4.18.)

Stable Party Disconnects

4.18 If B-party (stable) disconnects while C-party is still on hold (split), then B-path is idled. The TCR associated with B-party is sent to coin clean-up for possible coin work. A response from A-party (controller) is now monitored (up to 5 minutes). If A-party flashes, then the split party (C) and A are turned into a normal, stable POTS call. However, if A-party disconnects, then all parties and paths are idled via DISCON. Also, appropriate TCRs are sent to coin clean-up for coin work.

> ***Special Note:*** Assume a customer has call waiting and 3-way calling features. Once a call waiting group is set up, the controlling party may alternate talk paths to the two noncontrolling parties by flashing the switchhook. However, an interesting situation arises when the split party goes on-hook and the controller, intending to talk to the split party, flashes. Since the split party went on-hook, the existing stable connection was transformed to a normal call. Therefore, the flash by the controlling party will systematically be interpreted as a flash to originate a 3-way connection. A 3-way dial tone will be provided for the controller. So if the controller is to talk again to the previous stable party, 3-way processing must be used.

F. Errors—Call Waiting

4.19 When an error in call waiting occurs, the talk portion (whenever possible) is preserved by returning it to a normal (non-call-waiting) stable state. The offending party of the group is then failed or sent to the disconnect program (DISCON) for reorder. A 2-bit code is maintained in each TCR so that in the event of failure, determination of the type of error is possible. There are three severe errors which generate a message at the TTY:

(1) Translation error

(2) Bad talk TMR address

(3) PCR failure due to TCR failure.

5. THREEWAY CALLING—OVERVIEW

5.01 Threeway Calling service (see Fig. 10) enables a customer to add a third party into an existing connection, thereby creating a connection in which the three parties can converse at once. The operating procedure for establishing a 3-way call follows. (See Fig. 11.)

5.02 The customer with Threeway Calling service (party A) is engaged in a telephone conversation with another customer (party B). To add on a third party, A flashes the switchhook. (Note that if B is in another central office, A may flash to add on before B answers.) B is then held on a silent termination (the "consultation hold" feature) until A flashes again, and A receives special dial tone. Party A may flash either before or after C answers, establishing a 3-way connection.

5.03 If C does not answer and A wishes to reestablish the 2-way connection with B, A must flash once more. When A flashes the second time, party C is dropped whether or not C has answered, and only A and B remain as in the original connection. If A goes on-hook at any point, all connections associated with the call are released. If B or C hangs up after the 3-way connection is established, the remaining parties are retained in a 2-way connection. Note that either B or C could be an operator, a tone or announcement from a distant office, etc, as well as another customer.

A. Processing—Threeway

5.04 The original parties will be designated A and B with A having threeway calling service. The A-B path is stable. A flash from A is detected by DISCON. Control of the call and a TCR that contains the A-B path is passed to ADDONJOB in TREWAY.

5.05 ADDONJOB selects a new TCR for the add-on call (via TCRSEL in EQPSEL), a conference circuit (via GET_CKT in OUTCAL), a port 1-to-B party path (via PATHUNT), and an A-party-to-port-0 path (via PATHUNT). The A-party half of the original talk path is disconnected, thus leaving B supervised in the original talk path junctor. The 3-way TCR is filled with the original talk path, conference circuit, ports 0 and 1 paths, and the add on 0 monitor (ADØMON) progress mark. A line origination hopper entry is filled and control then passes to the 3_WAY_ORIG in the line origination program (LNORIG).

5.06 Once LNORIG connects the CDPR to the flashing line, control is passed to CDRCON in TREWAY for the three bursts of dial tone that distinguish special dial tone from normal dial tone. Upon completion of dial tone, the add-on call is transferred to the digit interpretation program (DNTRP) and is processed as a normal call while digits are received and the final route is determined.

5.07 After the final route is determined (trunk, line in office, reorder, busy tone, announcement, etc), OUTCAL or TERM calls CCHOOK in TREWAY. CCHOOK is informed that the final talk path from A to C has been selected for the add-on call. CCHOOK now searches for the 3-way TCR (via FIND_3WAY_TCR_FROM_TMR), hunts a path from Port 2 to the C-party (via PATHUNT), and stores that path in the 3-way TCR. Finally,

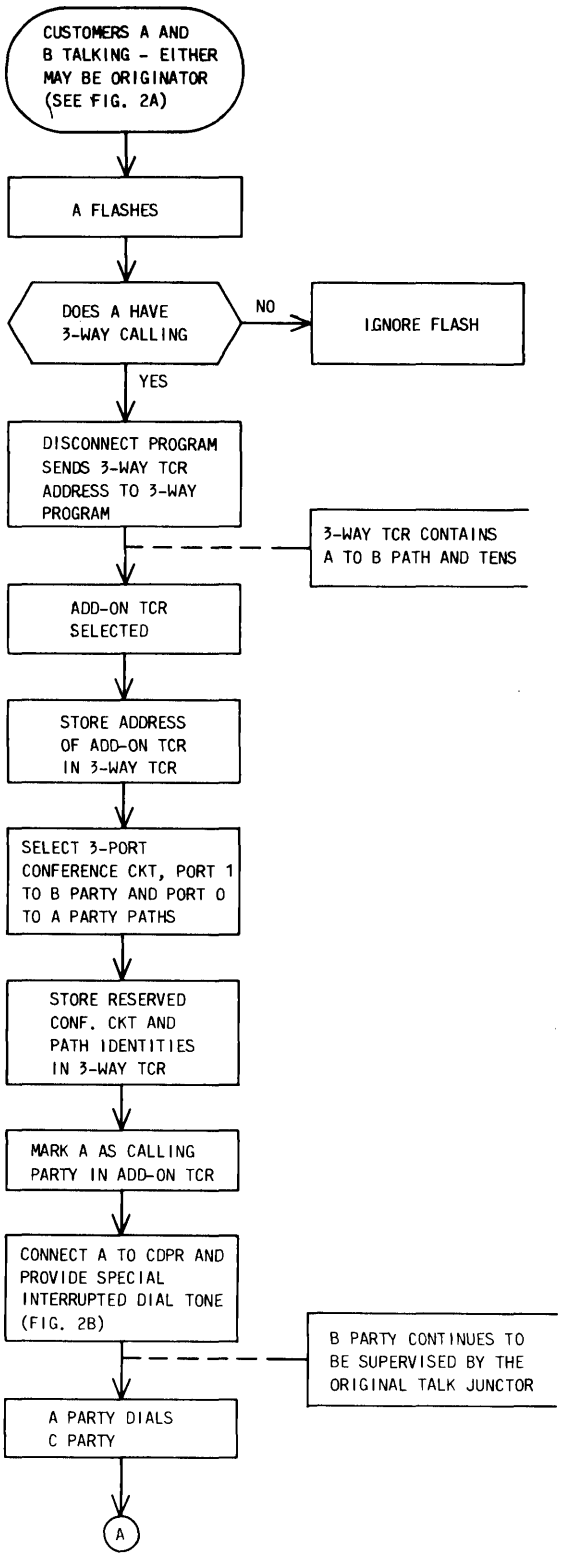


Fig. 10—Threeway Calling Flowchart (Sheet 1 of 3)

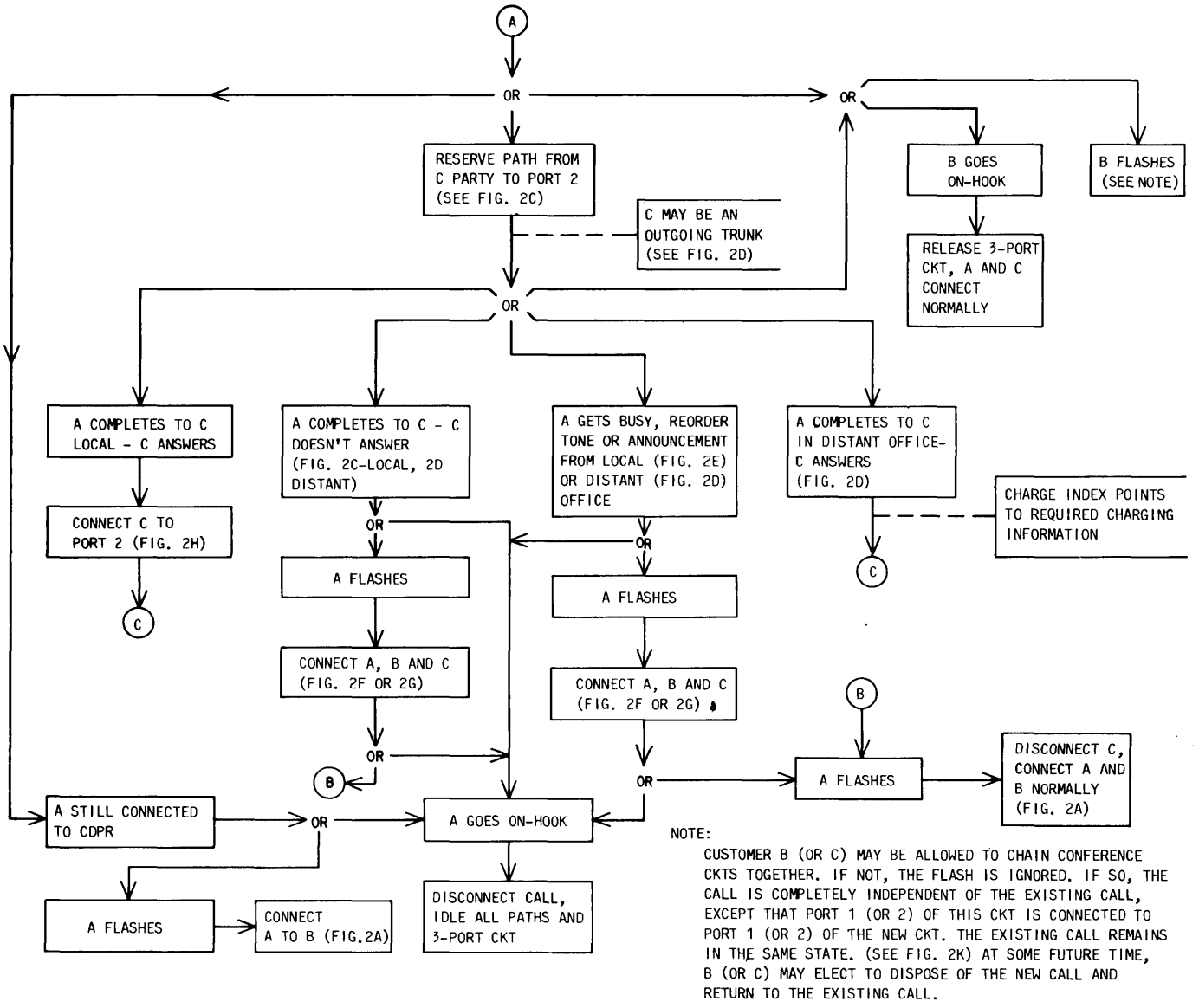


Fig. 10—Threeway Calling Flowchart (Sheet 2 of 3)

CCHOOK updates the TCR's progress mark to AD1MON and loads the special add-on-TMR progress mark into the A-to-C TMR.

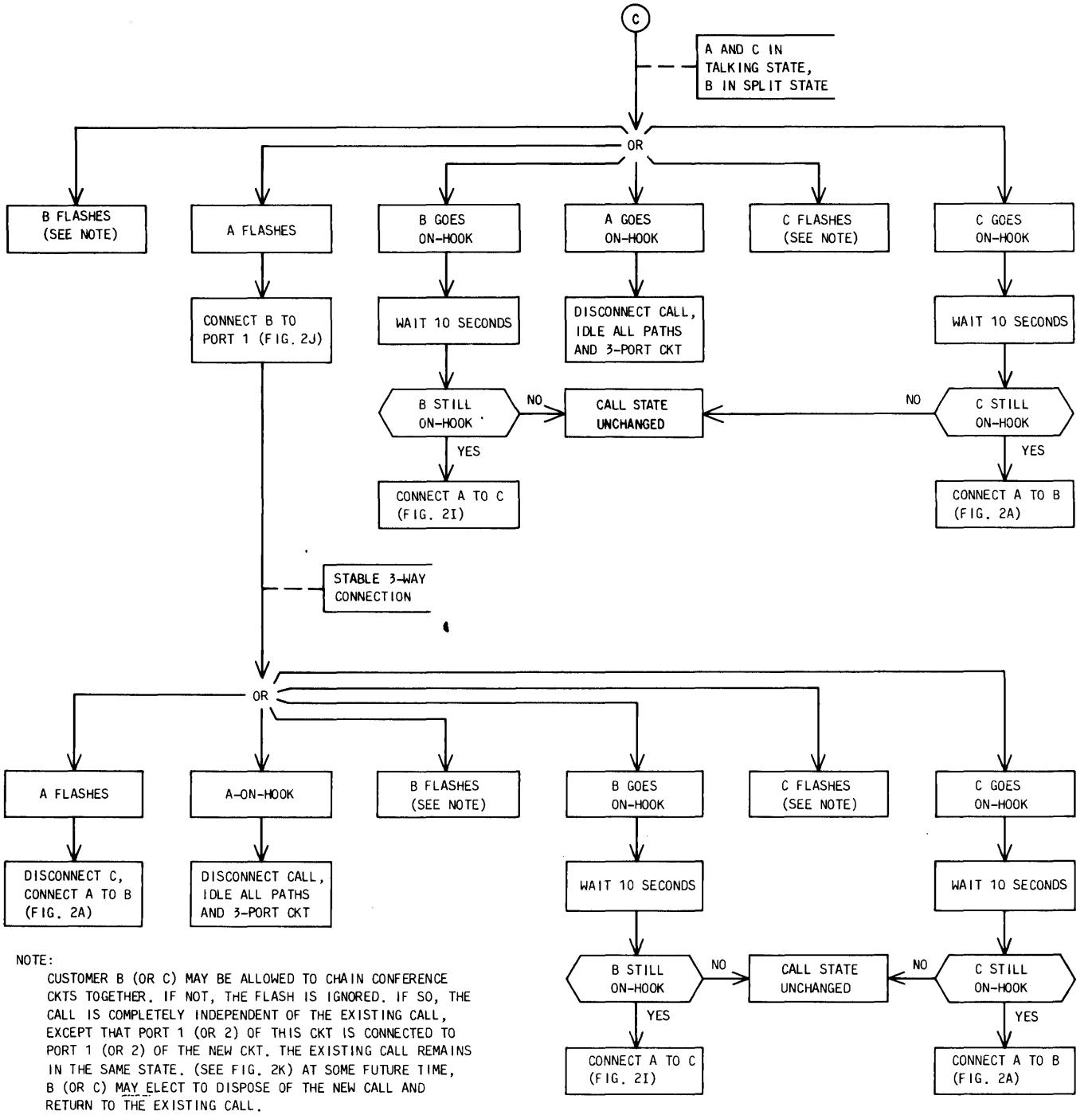
5.08 Ringing (or outpulsing) now occurs. The AD1MON progress mark is checking for 1 of 3 conditions:

(a) The outgoing call becoming stable,

(b) The call waiting call entering the audible ring state,

(c) The IAO call going into the RRING progress mark for timing of the ringing cycle. When one of these conditions exists, both the add on (A to C) connection and the original (A to B) connection are disconnected (via DISC in POPS) and the 3-way connections are established from A to Port 0, Port 2 to C, and from Port 1 to its junctor (via CONNECT in POPS). The B-Party remains split from the conference connection.

5.09 Now a flash by A will complete the 3-way connection by cutting B through to the



NOTE:
CUSTOMER B (OR C) MAY BE ALLOWED TO CHAIN CONFERENCE CKTS TOGETHER. IF NOT, THE FLASH IS IGNORED. IF SO, THE CALL IS COMPLETELY INDEPENDENT OF THE EXISTING CALL, EXCEPT THAT PORT 1 (OR 2) OF THIS CKT IS CONNECTED TO PORT 1 (OR 2) OF THE NEW CKT. THE EXISTING CALL REMAINS IN THE SAME STATE. (SEE FIG. 2K) AT SOME FUTURE TIME, B (OR C) MAY ELECT TO DISPOSE OF THE NEW CALL AND RETURN TO THE EXISTING CALL.

Fig. 10—Threeway Calling Flowchart (Sheet 3 of 3)

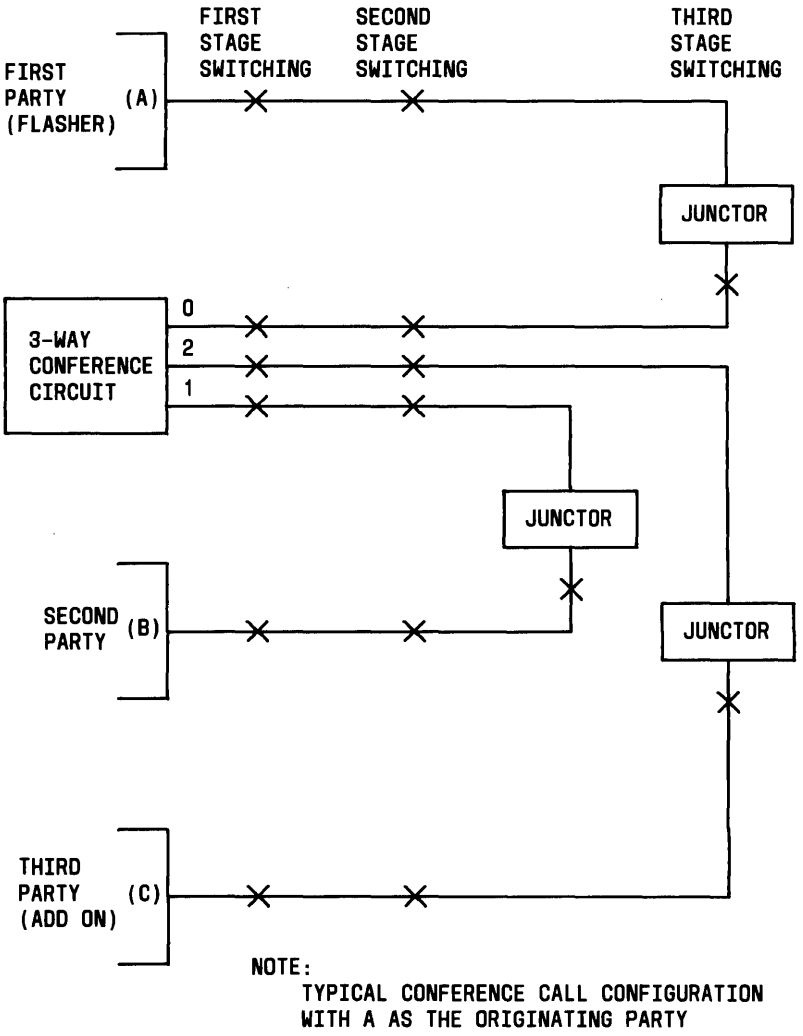


Fig. 11—Threeway Conference Call

conference circuit. Note that it is not necessary for C to answer prior to B being cut through.

B. Threeway Call Established

5.11 The 3-way conference call is now established and the three parties may talk as long as desired. A is charged for the Port 2 connection and either A or B is charged for the Port 1 connection (original caller is always charged).

C. Flashes

5.12 Flashes may occur from any of the three parties engaged in a stable 3-way connection. However, for this immediate connection, a flash from controller (A) is the only one normally expected. Therefore, flashes from B or C are ignored. (Either B or C could be engaged in a call waiting group or a controlling 3-way connection; in that case a flash would be expected.)

5.13 The first flash from A (controlling party), after the A-party 3-way conference connection is set stable, is detected by the TREWAY reconfigure progress mark. The result is that the add-on party is disconnected and the original talk connection between A and B is reconfigured as a normal connection through a junctor. This is accomplished by the equipment selection program (EQPSEL) (IDLECKT subroutine) initiating a reconfiguration task by calling the reconfigure subroutine RECONINIT in TREWAY. See 5.18 (Reconfigure).

D. Disconnects

5.14 Disconnects (on-hooks) may occur before or after establishment of the 3-way conference circuit. In either case, a disconnect by the flasher (A) causes all circuits and paths to be idled (via DISCON and IDLECKT). Also in either case, a disconnect by the add-on party (C) or the original stable party (B) causes the call to be reconfigured to a normal call between A and the remaining party (B or C).

Before Threeway Circuit Established

5.15 If the disconnect occurs before the 3-way circuit is completed, the various monitor progress marks of TREWAY detect the disconnection. If the disconnect is made by the noncontrolling party (B), it results in the original talk path being disconnected (DISCON), the 3-way conference port path being idled, and the add-on call being normalized (Custom Call bit cleared). If the disconnect is made by the add-on party (before A flashes for 3-way connection), the original call is reestablished.

After Threeway Circuit Established

5.16 Once the 3-way conference call is established, a different set of progress marks monitor the call. If a disconnect now occurs from either noncontrolling party (B or C), 10-second disconnect timing is performed. (Note: To eliminate annoying oscillations, the conference circuit gain must be lowered within 800 ms of on-hook). After 10 seconds, the disconnect is processed by providing DISCON with an input monitor report marking the port (1 or 2) which went on-hook.

5.17 DISCON calls for immediate disconnect. IDLECKT in EQPSEL is called for the proper port. IDLECKT verifies that the proper first port is idled and initiates a reconfiguration task by calling the reconnect subroutine (RCONINIT) in TREWAY. This reconfigures the two remaining parties of the now defunct 3-way call into a POTS call.

E. Reconfigure

5.18 RCONINIT selects a TCR (via TCRSEL in EQPSEL). It then finds the A-party-to-Port-0 path and makes it the transient talk path. Next, the Port-2-to-C party TMR is located (via TMRSCAN in TKPROC) and its address is loaded into the TCR. Finally, the reconfigure progress mark is loaded into the TCR so that reconfiguration can begin during the next base level loop.

5.19 The reconfigure progress mark, when invoked during the next TCR scan, proceeds to reconfigure the A to B (or C) connection. To do this, it verifies that the port (1 or 2) to (B or C) party path is stable, finds a path from A to B (or C) (via PATHUNT), disconnects and idles the port (2 or 1) and 0 paths, idles the conference circuit, and connects the A to B (or C) path leaving it stable as a normal POTS connection.

> ***Note:*** The A-party is free to add on again or to allow the call to proceed normally. Note also that either party is free to expand this POTS connection by using other available features such as call waiting or chaining of 3-way connection.

5.20 A customer having the threeway calling feature may be the noncontrolling party of one call and simultaneously be the controlling party of another call. This allows conference circuits to be connected in tandem so that additional parties may be added to the 3-way connection by either or both of the noncontrolling parties of the original 3-way connection.

5.21 The noncontrolling parties of a 3-way connection may flash to answer a call-waiting call. Subsequent flashes allow the customer to alternate between the 3-way connection and the waiting call.

6. RESTRICTIONS ON CUSTOM CALLING SERVICES

6.01 All four custom calling services are denied, as a group, to certain types of lines.

(a) Only individual lines will be permitted to have custom calling. On a party line with parties A and B, an on-hook from A followed by an off-hook from B would be erroneously interpreted as a flash from A if the interval between the on-hook and off-hook were between 0.2 and 1.2 seconds.

(b) Coin lines are denied custom calling services because they cannot be charged for two calls at once, a situation which could arise for a line with call forwarding.

7. GLOSSARY

7.01 The following list identifies terms and abbreviations used in this document which may not be familiar to the reader.

Base Level—Major software loop including all functions not completed during interrupt level

Call Waiting Group—For ease of reading, the 3 parties associated with the established call waiting group will be labeled A-, B-, and C-parties. The A-party is the called party of the incoming call, ie, the party which program TERM found to be busy and to have the call waiting feature. Hence, A-party is the controlling party of the group; B-party is the party to which A was talking when the tone was given, and C is the party trying to call A. Thus, B- and C-parties are the noncontrolling parties of the group.

Call Waiting Tone—A burst of 440 Hz tone lasting 300 ms used to inform a call waiting customer involved in a stable connection that another party is calling. The tone is heard only by the call waiting customer

Clear—to restore a storage device to the "zero" state

Confirmation Tone—two bursts of dial tone, 100 ms on, 100 ms off, and 300 ms on. After 1 second, a steady dial tone then follows. This tone is used to indicate to the customer that his speed call repertory charge or call forwarding activation attempt was successful

Customer Dial Pulse Receiver (CDPR)—a circuit that provides dial tone to the customer and detects the dialed digits

FLASH—see switchhook flash

HIGH and WET—the state in which the trunk or line is monitored for an on-hook only

Junctor—a circuit associated with the switching network which provides a path for a call through the network

No Test Trunk—circuitry allowing access to a party regardless of busy state

Off-Hook—the condition indicating that a station is in use (line loop closed)

On-Hook—the condition indicating that a station is idle (line loop open)

Outpulsing—generation of pulses to match the stored digit information and of the proper type to be used by the distant switching office

Program—a set of instructions assembled as one unit under a program name

Progress Marks—areas in the TCR which indicate next software routines to be executed for the call

Real Time Break—when a task is of such a nature that it causes the call to wait for its completion (digit reception, network connection, etc) the call is said to take a "real time break"

Reorder Tone—an audible signal (interrupted tone) sent back to the calling party to indicate that the call cannot be completed. It says that equipment between the calling and called parties is busy. It is interrupted at a 120-IPM rate and is sometimes called fast busy

Special Dial Tone—three bursts of dial tone, 100 ms on, 100 ms off, followed by a steady dial tone. This tone is issued to a

threeway calling customer who has flashed to add on a third party

Split Party—a party in silent hold, the waiting party in a call waiting group or the Port 1 party in a 3-way connection that has not been completed.

Stable Party—a party engaged in an active connection of a multiparty group, such as call waiting or threeway

Switchhook Flash—a depression of the switchhook lasting for a minimum of 200 ms and a maximum of 1.2 seconds

Threeway Conference Circuit—a hardware circuit which allows 3 parties to join into one conversation

Threeway Conference Group—Consists of 3 parties: A, B, C. For consistency of reading, A is designated the controlling party (the one attempting 3-way service), B is designated the party with whom A had a stable connection prior to flashing, and C is designated the third party which A is attempting to add to a conference circuit

Time Out—Critical Timing—a nominal 4-second period. If no customer action occurs during this period and the correct number of digits were dialed, end of dialing is assumed. The '#' on a TOUCH-TONE® handset serves the same purpose when it is used as an end-of-dialing signal

TMR—Terminal Memory Record; temporary store block assigned to each junctor. The TMR is used whenever a path is connected through the associated junctor.

Transient Call Record (TCR)—a 16-word block of temporary store assigned to monitor calls in a transient state