FEATURE DOCUMENT
CALL FORWARDING—BUSY LINE, CALL FORWARDING—DON'T ANSWER, AND STATION HUNTING
(CENTREX)
NO. 2 ELECTRONIC SWITCHING SYSTEM

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FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION

1.01 Centrex Call Forwarding—Busy Line, Call Forwarding—Don't Answer, and Station Hunting are a group of features that automatically redirects a call (which has been directed to a given station) to the attendant or another station in the same customer group when the called station is busy or does not answer within a specified interval of time. The exact time is an option for each customer group.

1.02 The No. 2 Electronic Switching System (ESS) can provide the following centrex call forwarding features which are covered by this feature.

- Call Forwarding—Don't Answer (CF-DA)
- Call Forwarding—Don't Answer—All Calls (CF-DA-AC)
- Call Forwarding—Busy Line (CF-BL)
- Call Forwarding—Busy Line—All Calls (CF-BL-AC)
- Station Hunting

Call Forwarding—Variable (sometimes called Call Forwarding—All Calls) is not covered by this document. (See Section 232-190-308/GL76-09-131.)

1.03 Call forwarding—busy line, call forwarding—don't answer, and station hunting are software features and are made available as part of the extended features (EF-1) generic program in a No. 2 ESS office. Since this is a software feature, no additional hardware is required.

1.04 The features described in this document are implemented into the No. 2 ESS system via an office data administration (ODA) run or by a recent change message.

1.05 In this feature document, an ***incoming call*** is defined as any call where the originating party is any station not in the same customer group. This includes calls from the exchange network (incoming trunk calls as well as local noncentrex stations) and from any common control switching arrangement (CCSA) network.

1.06 ***Call Forwarding—Don't Answer (CF-DA)***—This feature automatically redirects an incoming call (which has been directed to a given station) to the attendant or another station within the same customer group when the called station does not answer in some predefined amount of time.

1.07 ***Call Fowarding—Don't Answer—All Calls (CF-DA-AC)***—This feature is similar to CF-DA except that CF-DA-AC is not limited to incoming calls.

1.08 ***Call Forwarding—Busy Line (CF-BL)***—This feature automatically redirects an incoming call (which has been directed to a given station) to the attendant or another station within the same customer group when the called station is busy.

1.09 ***Call Fowarding—Busy Line—All Calls (CF-BL-AC)***—This feature is similar to CF-BL except that CF-BL-AC is not limited to incoming calls.

1.10 ***Station Hunting***—Station hunting is another name for CF-BL-AC when the forwarded call is taken to another centrex station as opposed to the centrex attendant.

2. DESCRIPTION

A. Customer (User) Perspective

2.01 When a centrex station with the Call Forwarding—Don't Answer feature is dialed, the incoming call is automatically forwarded to the attendant or another preassigned centrex station if the called station fails to answer within a minimum of 11 seconds. This interval may be extended as explained in 2.08.

2.02 Similarly, when a centrex station with the Call Forwarding—Busy Line feature is dialed, the incoming call is automatically forwarded to the attendant or another preassigned centrex station if the called station is busy.

2.03 Only one "forward-to" station number can be specified. This number is used for all call forwarding (CF-BL, CF-BL-AC, CF-DA, and station hunting).

2.04 Each centrex station user may have one of the following combinations of call forwarding—busy line and/or call forwarding—don't answer features.

(1) None

(2) CF-DA alone

(3) CF-BL alone

(4) Both CF-DA and CF-BL

In addition, each centrex station that has either 2, 3, or 4 above may have the ***all calls*** option or not. Without the all calls option, when the particular feature is used, only incoming calls are forwarded. With the all calls option, all calls are forwarded. The all calls option applies to both CF-BL and CF-DA. It is not possible for a centrex station to have CF-BL and CF-DA-AC or CF-BL-AC and CF-DA.

2.05 In addition to the above, each centrex station that has CF-BL and/or CF-DA (with or without all calls), may have the forwarded calls directed toward either the centrex attendant, or to another assigned centrex station within the same customer group. It is not possible to have CF-BL to the attendant and CF-DA to a station. Similarly, it is not possible to have CF-BL to one station, and CF-DA to another.

2.06 The centrex feature CF-BL-AC, which hunts to a centrex station as opposed to the centrex attendant is the centrex feature "Station Hunting."

2.07 The EF-1 generic program of the No. 2 ESS offers five types of call forwarding—don't answer and call forwarding—busy line options. These options have been listed and defined in the DEFINITION paragraph of this document. The following paragraphs describe the functions of each of the call forwarding options.

B. System Implementation

Call Forwarding—Don't Answer

2.08 When a centrex station that has the CF-DA feature receives an incoming call, the station is rung for 11 to 60 seconds (see Table A). The timing is variable as a customer group option and may be assigned by a recent change message (see OFFICE DATA for example of the recent change message). If the station is not answered before the timing period elapses, an attempt is made to forward the call to a new destination, either to the attendant or to another station in the same customer group. This new destination must be preassigned either by ODA or recent change.

TABLE A

VARIABLE TIMING INDEX

VTI	TIMING (SECONDS)	APPROX. NO. OF RINGS
00	10.4 — 11.2	1 — 2
01	11.2 — 14.4	2
02	14.4 — 17.6	2 — 3
03	17.6 — 20.8	3
04	20.8 — 24.0	3 — 4
05	24.0 — 27.2	4
06	27.2 — 30.4	5
07	30.4 — 33.6	5 — 6
08	33.6 — 36.8	6
09	36.8 — 40.0	6 — 7
10	40.0 — 43.2	7
11	43.2 — 46.4	7 — 8
12	46.4 — 49.6	8
13	49.6 — 52.8	8 — 9
14	52.8 — 56.0	9
15	56.0 — 59.2	9 — 10

2.09 To determine where to forward the incoming call, the called station's line translation is examined for a hunt number. If that hunt number is zero, the call is routed to the attendant. In the event that an attendant is not available, an attempt is made to place the call into the attendant waiting queue. If the attendant queue is full or night service is in effect, the call forwarding does not take place. In this case, the called station continues to be rung and control is passed to the ringing and answer detection program.

2.10 If the called station's line translations indicate a hunt number of nonzero (i.e., another

station) a directory number translation is done on the hunt number. The incoming call is then routed to the station associated with that hunt number provided that that station is idle. If that station is busy, the original called station continues to be rung.

2.11 Only one "forward-to" number can be specified and the number must be assigned and within the same centrex customer group. This "forward-to" number is used for CF-DA, CF-BL, and/or station hunting.

2.12 This feature is assigned and cancelled by a recent change message or by an ODA run (i.e., not dialable by means of an access code).

Call Forwarding—Don't Answer—All Calls

2.13 Call forwarding—don't answer—all calls is a feature which forwards ***all calls*** to the attendant or to a specified centrex station when the called station does not answer. The call is forwarded in the same manner as described in 2.05 through 2.12.

Call Forwarding—Busy Line

2.14 For stations having the CF-BL feature, incoming calls are forwarded to the attendant or to a preselected centrex station when the called station is busy. To determine where to forward the call, the called line's translation is examined for a hunt number. If the hunt number is zero, the call is routed to the attendant. If the hunt number is other than zero, the call is routed to the preselected station. If the attendant and preselected station are both busy, busy tone is returned.

Call Forwarding—Busy Line—All Calls

2.15 Call forwarding—busy line—all calls is a feature which forwards ***all calls*** to a centrex station (as opposed to the centrex attendant) when the call station is busy is more commonly known as station hunting (see 2.16).

Station Hunting

2.16 Station hunting is another name for CF-BL-AC, where the forwarded call is taken to another centrex station as opposed to the centrex attendant.

3. FEATURE FLOW DIAGRAM

3.01 The flow diagram, illustrated in Figure 1 is a graphical representation of the centrex call forwarding—don't answer, call forwarding—busy line, and station hunting features.

4. INTERACTIONS

4.01 If the attendant attempts to busy verify a busy station having the call forwarding—busy line feature (with or without the all calls option) the busy verify feature takes precedence. The attendant's busy verify request is processed through the test vertical to the original station.

4.02 On any one call, a maximum of 12 forwards is allowed with the centrex call forwarding feature. This limit of 12 forwards includes CF-BL, CF-BL-AC, station hunting, and call forwarding—variable. If one of the stations in this call forwarding chain is not forwarded, but instead has the CF-DA feature (and is idle), the call program stops forwarding and applies ringing to the station. If this station does not answer within the appropriate timing interval, the CF-DA feature forwards the call to another station. At this point, the count of 12 begins all over again. In general, this count restarts each time the CF-DA feature is applied.

4.03 When the centrex call forwarding—variable feature is activated by the station user, it takes precedence over the CF-DA, CF-BL, and station hunting feature.

4.04 Call forwarding—don't answer does not apply to ringback from call hold or camp-on features.

4.05 The call forwarding features described in this document may be used in conjunction with the night station to provide for further night answering capability. But, when night service is in effect, the features CF-DA and CF-BL, will not forward to the attendant. When in night service, calls that normally would CF-BL to the attendant, are given busy tone; and calls that normally would CF-DA to the attendant, continue to ring the original called party.

4.06 A centrex station that is provided with the call pickup feature and is call forwarded cannot exercise call pickup.

4.07 In the No. 2 ESS, certain centrex line features take precedence over other centrex line features. Accordingly, the following call hierarchy exists when a centrex station is provided with the features described in this document.

(1) Call Forwarding—Variable

(2) Busy Verify

(3) Fully Restricted Terminating and Denied Terminating

(4) Call Forwarding—Busy Line and Station Hunting

(5) Attendant Camp-On.

4.08 Incoming call identification (ICI) lamps may be assigned to identify CF-DA, CF-BL to the attendant. These lamps enable the attendant to answer each call with an appropriate verbal response and to handle traffic more efficiently.

ATTRIBUTES

5. STATION/SYSTEM

5.01 The centrex call forwarding features described in this document are provided on a per-station basis.

6. LIMITATIONS

6.01 The number of forwards by call forwarding—variable, call forwarding—busy line, and station hunting is limited to twelve.

6.02 Call forwarding—busy line and call forwarding—don't answer are assigned or unassigned by either an ODA run or recent change. These cannot be changed by dial control.

6.03 Each centrex station within a centrex customer group may have CF-BL or CF-DA or both or neither.

6.04 A given centrex station can have only one hunt number. This hunt number applies to both CF-BL or CF-DA, if appropriate. Hunt number equal zero means hunt to the attendant. CF-BL and CF-DA hunting to separate destinations is not possible.

6.05 For a given centrex station, the ***all calls*** option applies to both CF-BL and CF-DA. One station may have the all calls option while another may not, as desired.

6.06 The following combinations of call forwarding and station hunting are not allowed and cannot be defined.

- CF-DA to attendant and CF-BL to station
- CF-DA to attendant and station hunting
- CF-BL to attendant and station hunting
- CF-DA-AC and CF-BL
- CF-DA and station hunting.

7. RESTRICTION CAPABILITY

7.01 There are no restrictions that apply to the features described in this document.

8. COST DATA

8.01 Two words (4 and 5) are required to expand the centrex line expansion to a 6-word expansion in order to provide these call forwarding features. Translation memory requirements required include (see Figure 2):

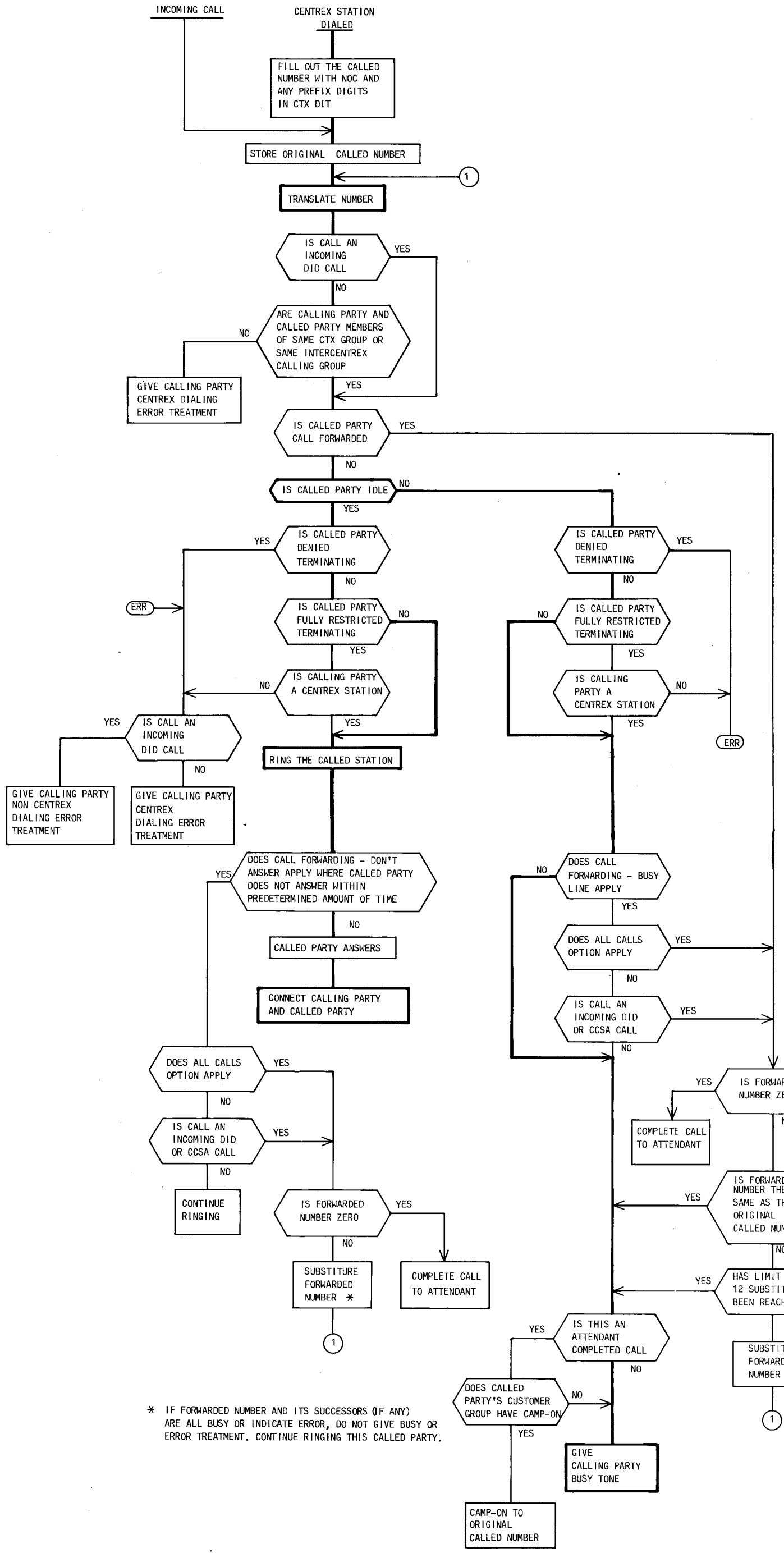
- One bit required for call forwarding—busy line
- One bit required for call forwarding—don't answer
- Seventeen bits required for the hunt number
- One bit in word 3 for the All Calls option.

In addition, four bits in word 15 are required in the centrex group expansion for the Variable Timing Index plus 10 bits for ICI lamp numbers (see Figure 3).

INCORPORATION INTO SYSTEM

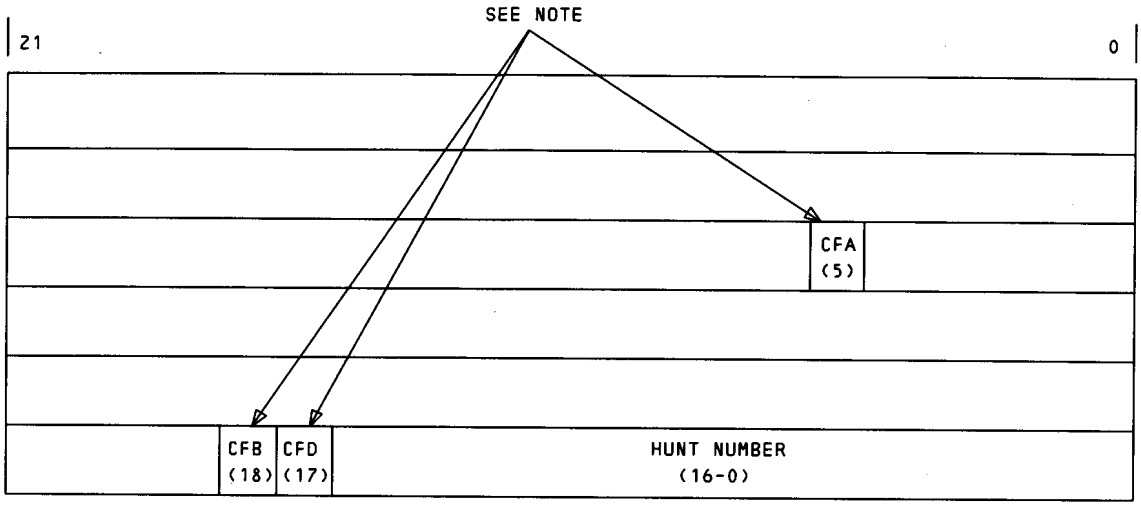
9. PLANNING

9.01 The call forwarding features described in this document operate in the No. 2 ESS environment.



* IF FORWARDED NUMBER AND ITS SUCCESSORS (IF ANY) ARE ALL BUSY OR INDICATE ERROR, DO NOT GIVE BUSY OR ERROR TREATMENT. CONTINUE RINGING THIS CALLED PARTY.

Fig. 1—Feature Flow Diagram Call Forwarding—Busy Line, Call Forwarding—Don't Answer, and Station Hunting



NOTE:
THE TYPE OF HUNT, CALL FORWARDING--BUSY LINE (CFB) OR CALL FORWARDING--DON'T ANSWER (CFD) SERVICE A LINE HAS DEPENDS ON THE HUNT NUMBER, THE "CFB" BIT, THE "CFD" BIT, AND THE "CFA" BIT. THE HUNT NUMBER APPLIES TO BOTH CFD AND CFB WHEN BOTH ARE PROVIDED. TABLE B SHOWS ALL VALID COMBINATIONS OF CFB, CFD, CFA, AND HUNT NUMBER

Fig. 2—Centrex Line 6-Word Expansion Showing Portion Used for Call Forwarding—Busy Line, Call Forwarding—Don't Answer, and Station Hunting

9.02 In planning for these features, completion of certain translation input forms is required to indicate whether or not each line is allowed the feature.

10. HARDWARE ENGINEERING

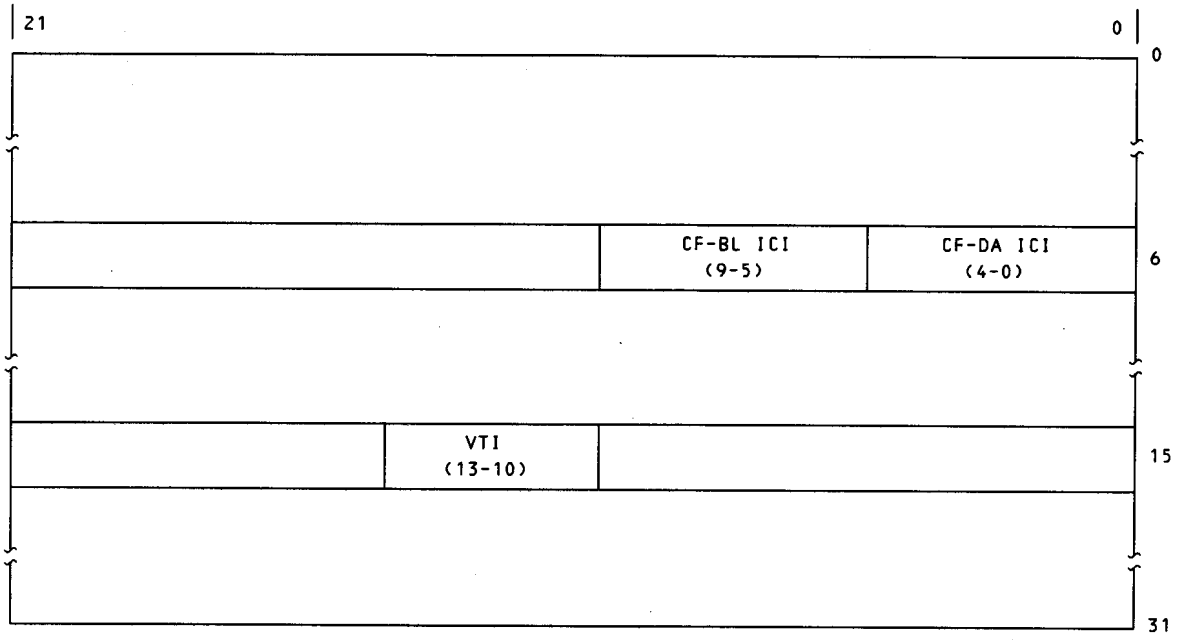
10.01 No hardware engineering is required for this feature.

11. SOFTWARE ENGINEERING

11.01 Provisions must be made for call forwarding in the program store. Refer to the Traffic Facilities Practices, Division D, Section 12n, for details in engineering the programs.

12. COMPATIBILITY

12.01 There are no compatibility or equipment interface problems associated with the call forwarding features described in this document.



VTI -- VARIABLE TIMING INDEX REPRESENTS AMOUNT OF TIME TO ALLOW CENTREX STATION TO RING BEFORE APPLYING CF-DA OR CF-DA-AC (SEE TABLE B)

ICI -- UNIVERSAL CONSOLE LAMP INCOMING CALL INDICATOR LAMP NUMBER TO BE USED WHEN A CF-BL OR CF-DA CALL IS FORWARDED TO THE ATTENDANT

Fig. 3—Centrex Group Expansion

13. OFFICE DATA

A. Translations

13.01 Figure 2 shows the portion of the centrex 6-word expansion used for call forwarding—busy line, call forwarding—don't answer, and station hunting. Table B shows all valid combinations of call forwarding—busy line, call forwarding—don't answer, and station hunting. In addition, Table B shows how the feature is assigned depending on the hunt number, the CFB bit, the CFD bit, and the CFA bit.

TABLE B

VALID CALL FORWARDING COMBINATIONS

HUNT NBR	CFB	CFD	CFA	CALLED STATION BUSY					CALLED STATION DOES NOT ANSWER					NAME OF FEATURE(S)				
				EFFECTIVE FOR		FORWARD CALL TO:			EFFECTIVE FOR		FORWARD CALL TO:							
				ALL CALLS	INC CALLS ONLY	CALL FWD NBR	CTX ATT	BUSY TONE	ALL CALLS	INC CALLS ONLY	CALL FWD NBR	CTX ATT	CONT TO RING	STA HUNT	CALL FWD–BUSY LINE–ALL CALLS	CALL FWD–BUSY LINE	CALL FWD–DON'T ANS	CALL FWD–DON'T ANS–ALL CALLS
Zero	0	0	0	√				√	√				√			None		
Zero	1	0	0		√		√		√				√			√		
Zero	0	1	0	√				√		√		√					√	
Zero	1	1	0		√		√			√		√				√	√	
Zero	1	0	1	√			√		√				√		√			
Zero	0	1	1	√				√	√			√						√
Zero	1	1	1	√			√		√			√			√			√
Non-Zero	0	0	0	√				√	√				√			Invalid		
Non-Zero	1	0	0		√	√			√				√			√		
Non-Zero	0	1	0	√				√		√	√						√	
Non-Zero	1	1	0		√	√				√	√					√	√	
Non-Zero	1	0	1	√		√			√				√	√	√			
Non-Zero	0	1	1	√				√	√		√							√
Non-Zero	1	1	1	√		√			√		√			√	√			√
Any	0	0	1	√				√	√				√			Invalid		

13.02 In order to apply the centrex call forwarding—don't answer, call forwarding—busy line, and station hunting features in a No. 2 ESS office, the following input forms should be prepared and submitted to the WECo Regional Center.

- ***ESS 2101 - Centrex Directory Number Table***—This form is used to define the directory numbers (DN) associated with centrex groups that may have the call forwarding features described by this document. The call forwarding feature must be indicated in the features portion of the line class information for each line to be assigned this feature. In addition, if incoming calls are to be forwarded to another station within the centrex group, the preselected station number must be defined on this form.

- ***ESS 2107 - Supplementary Information Table***—This form is used by the Dial Administrator to provide additional information for directory numbers, supplementing data entered on ESS 2101.

- ***ESS 2109-1 Centrex Group Table*** - Centrex Universal Attendant Assignments—This form is used to assign the ICI lamps for CF-DA and CF-BL when the incoming call is forwarded to the attendant. The desired 2-digit ICI lamp numbers (00-23) should be entered in the appropriate ICI lamp assignment column. This form is also used to define the Variable Timing Index (VTI) required to obtain the desired timing interval for CF-DA. The desired 2-digit VTI number (00-15) should be entered in the VTI column.

B. Recent Change (RC) Messages

13.03 The A RC:L/ message is used to assign any of the call forwarding type features or combinations of features to an existing centrex station. The keywords shown in Table C and either ADD or DLT are used to define (or change) the call forwarding features. Refer to IM-2H200-01 for details of the recent change messages.

TABLE C

RECENT CHANGE MESSAGE KEYWORDS FOR CALL FORWARDING – BUSY LINE, CALL FORWARDING – DON'T ANSWER, AND STATION HUNTING

KEYWORD	DESCRIPTION
CFB	Used to assign the Call Forwarding — Busy Line feature
CFD	Used to assign the Call Forwarding — Don't Answer feature
CFA	Used to assign the All Calls option
CFA — CFB	Used to assign the Station Hunt feature
CFN	Used to cause a station that is forwarded to another centrex station to be forwarded to the attendant.
CFN nnx abcd/ (Where nnx abcd must be an assigned centrex station in the same centrex group)	Used to assign the call forward number. If nnx abcd is not specified, the calls will forward to the attendant.

13.04 An A RC:CTX message is used to assign ICI lamps to indicate either call forwarding—don't answer or call forwarding—busy line to the attendant. The keyword ICI plus the lamp number and either ADD or DLT is used to assign the lamps. Similarly, the keyword VTI plus the timing index is used to assign the timing interval for the call forwarding—don't answer feature.

14. GROWTH/RETROFIT PROCEDURES

14.01 The call forwarding features described in this document may be added to any centrex station by either an ODA run or RC message. Refer to OFFICE DATA for the proper input forms required and the RC messages.

15. TESTING

15.01 No special testing is required for these features other than placement of test calls to verify that the call forwarding features are operating correctly.

ADMINISTRATION

16. MEASUREMENTS

16.01 Traffic measurements for these call forwarding features are outlined in Section 232-120-301 Traffic and Plant Measurements.

- Register CTX07 provides a peg count of calls routed to another station or attendant because the originally called station did not answer.

- Register CTX08 provides a peg count of the calls routed to another line or attendant because the originally called line was busy.

17. RECORD KEEPING

17.01 ODA output records 2101-R and 2109-R provide information as to which lines have the CF-DA, CF-BL, and station hunting features. In addition, verify message A VY:L/ may be used to verify any station to determine if these features have been assigned. In addition, verify message A VY:CTX may be used to verify the ICI and VTI assignments for the call forwarding features.

18. CHARGING

18.01 Not applicable.

AVAILABILITY

19. NEW INSTALLATIONS

19.01 The call forwarding features described in this document are available for application with the EF-1 generic program.

20. GROWTH/RETROFIT

20.01 The call forwarding features described in this document may be retrofitted into any working office by simply using a recent change input message or an ODA run to assign the features to stations.

SUPPLEMENTARY INFORMATION

21. GLOSSARY

21.01 The following list identifies terms used in this feature document.

- ***Busy Verification of Station Lines:*** A centrex feature which permits the attendant to establish a "talking connection" to an apparently busy station in order to determine if the line is in working order.

- ***Common Control Switching Arrangement (CCSA):*** A switched services network which provides private line facilities between customer locations via common control switching machines which may be shared with other users.

- ***Direct Inward Dialing (DID):*** The feature that allows an incoming exchange network call to reach a specific station without attendant assistance.

- ***EF-1:*** Extended feature generic program.

- ***Foreign Exchange (FX) Service:*** An exchange service furnished under tariff provisions by means of a circuit connecting a subscriber's main station with a central office of an exchange other than that which regularly serves the exchange area in which the subscriber is located.

- ***Incoming Call Indicator (ICI) Lamp:*** Indicator lamp used to identify the type of call being extended to the attendant consoles. In this feature, the lamps are used to identify CF-DA and CF-BL to the attendant.

- ***Office Data Administration (ODA):*** Mechanism by which translation information may be assembled or changed for a No. 2 ESS. Information from the ESS input forms is inputted into the regional ODA computer, assembled, then sent to the No. 2 ESS.

- ***Variable Timing Index (VTI):*** The basic period of time used to initiate the call forwarding—don't answer feature. In the No. 2 ESS, the ringing cycle is about six seconds from ring start to ring start.

22. REASONS FOR REISSUE

22.01 This is the initial issue of this document.

23. REFERENCES

23.01 The following documents may be referenced for supplementary information concerning the centrex feature described in this document.

- PD-2H304-01, Program Specification - Centrex Digit Interpretation Program

- Translation Guide, TG-2H

- IM-2H200 Input Message Manual No. 2 ESS

- OM-2H200 Output Message Manual No. 2 ESS

- Traffic Facilities Practices - TFP, Division D, Section 12n

- Bell System Practices:

  Section 232-103-101, Call Processing Description, No. 2 Electronic Switching System

  Section 232-118-103 Recent Change Procedures (Central Office Changes) (EF-1)

  Section 232-124-301 Office Update Procedures Using Regional ODA Program

  Section 540-576-302 Centrex Station Equipment and Attendant Equipment - 1B- and 2B-Type Telephone Consoles with Switched Loop Operation - Method of Operations - No. 2 ESS.