

**FEATURE DOCUMENT
CALL FORWARDING—VARIABLE
(CENTREX)**

NO. 2 ELECTRONIC SWITCHING SYSTEM

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NOTICE

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FEATURE DEFINITION AND DESCRIPTION**1. DEFINITION**

1.01 Centrex call forwarding—variable is an arrangement that allows a centrex station user to redirect calls intended for the user's telephone to another telephone inside the customer's group or to the centrex attendant. The user initiates call forwarding by dialing the call forwarding access code followed by the station number to which calls are to be forwarded. The user cancels call forwarding by dialing the call forwarding cancel code.

1.02 The centrex call forwarding—variable feature is available in any No. 2 Electronic Switching System (ESS) which has been equipped with the EF-1 generic program.

1.03 No special equipment other than the EF-1 generic program is required in order to implement this feature.

2. DESCRIPTION**A. Customer (User) Perspective**

2.01 To activate the centrex call forwarding—variable feature, the station user dials the call forwarding activate access code. After receiving second dial tone, the station user dials the station number to which calls are to be forwarded. The station user then receives a confirmation tone, indicating that call forwarding has been activated. The "forwarded-to" station must be within the same centrex group or intercentrex calling group (ICCG) as the forwarding station.

2.02 The attendant may redirect calls from one station to another station (within the same centrex group) by dialing the call forwarding activate access code and receiving second dial tone. The attendant then dials the number of the station to be forwarded. After hearing a third dial tone, the attendant dials the number of the station to which calls are to be forwarded. The attendant then hears confirmation tone indicating that call forwarding has been activated for the first station dialed.

2.03 The station user may terminate call forwarding by dialing the cancellation code. Confirmation

tone is returned indicating that call forwarding is no longer activated for the station.

2.04 The attendant may terminate call forwarding by dialing the cancellation code and receiving second dial tone. The attendant then dials the number of the station for which calls have been forwarded and receives confirmation tone, indicating that call forwarding is no longer activated for the station.

2.05 The call forwarding access codes are optional and must be selected prior to the time the digit interpreter table is built.

B. System Implementation**Activating Call Forwarding**

2.06 The user first dials the call forwarding access code (defined by the digit interpreter table), then on receipt of second dial tone, dials the station number to which calls are to be forwarded. The "forwarded-to" station must be within the same centrex group or have the same intercentrex calling group number. The station user then hears confirmation tone, indicating that call forwarding is activated and a call forward entry is made in the centrex scatter table. If there is no room in the scatter table for the call forwarding entry, reorder is returned.

2.07 The scatter table contains an entry for every centrex line that is involved in a call, in addition to an entry for each centrex station that is call forwarded. The scatter table is engineered based on the total number of entries needed. Entries in the scatter table are referenced whenever call hold or camp-on is exercised, and on all terminating calls for a call forwarding—variable entry. If on request to activate call forwarding—variable no entries are available, the station user receives reorder tone indicating that the request has failed. If confirmation tone is received, the entry is made and call forwarding is activated.

2.08 When a station with the call forwarding feature activated is dialed, the call is completed to the "forwarded-to" station as though it had been dialed. The forwarded station does not receive any indication that an incoming call has been forwarded (such as short ring).

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2.09 During the time that this feature is activated, the forwarded station may only be used for dialing the attendant ("0") or dialing the call forwarding cancellation code.

2.10 If a centrex station user attempts to activate call forwarding when the service is already active, reorder tone is returned.

2.11 The centrex station user may cancel call forwarding by dialing the cancellation code. Confirmation tone is returned indicating that the call forwarding entry has been cleared in the centrex scatter table.

Calls to a Forwarded Line

2.12 When a centrex station with the call forwarding feature is dialed, a check is made to see if that station has a centrex scatter table entry. If no entry is associated with the called station, calls to that station are not forwarded and control passes back to normal call processing.

2.13 If a scatter table entry is present for the called station, a check is made to see if it indicates call forwarding. If so, the "forwarded-to" terminal equipment number (TEN) is retrieved and substituted for the called station TEN to appear as if that number was actually dialed. At this point, control passes back to normal call processing.

2.14 A maximum of 12 forwards (including station hunting and call forwarding—busy line) are allowed with this feature. If for example, station "A" is forwarded to station "B" which in turn is forwarded to station "C", a call destined for station "A" is forwarded to station "B" and then to station "C". If the maximum number of 12 forwards is exceeded, busy tone is returned.

Activating Centrex Call Forwarding by Attendant

2.15 The attendant redirects calls from one station to another station within the same centrex group by obtaining dial tone and dialing the call forwarding access code. After receiving second dial tone, the attendant dials the station number of the station to be forwarded and receives a third dial tone. After receiving the third dial tone, the attendant dials the station number to which calls are to be forwarded and receives a confirmation

tone indicating that call forwarding has been activated.

Cancellation of Call Forwarding by Attendant

2.16 The attendant cancels call forwarding by obtaining dial tone and dialing the call forwarding cancel code. After receiving a second dial tone, the attendant dials the station number for which call forwarding is to be cancelled and receives a confirmation tone indicating that call forwarding has been cancelled.

3. FEATURE FLOW DIAGRAM

3.01 The flow diagram illustrated in Figure 1 is a graphical representation of the centrex call forwarding feature.

4. INTERACTIONS

4.01 Calls are completed to the "forwarded-to" station whether the forwarding station is busy or idle.

4.02 Call forwarding is not permitted to be activated through the speed calling list. However, calls may be forwarded to a speed calling number.

4.03 When an attendant busy verifies a centrex station that has call forwarding activated, the call forwarding feature takes precedence whether the station is busy or idle. The "forwarded-to" station becomes the station which is busy verified.

4.04 The attendant can forward any station in the centrex customer group, *provided* that station has the call forwarding—variable feature.

4.05 Inasmuch as the attendant can forward any station in the centrex group, a manual station may be provided with the call forwarding feature.

4.06 A centrex station that is provided with both the call hold and call forwarding features cannot activate or deactivate the call forwarding feature while having a call on hold.

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

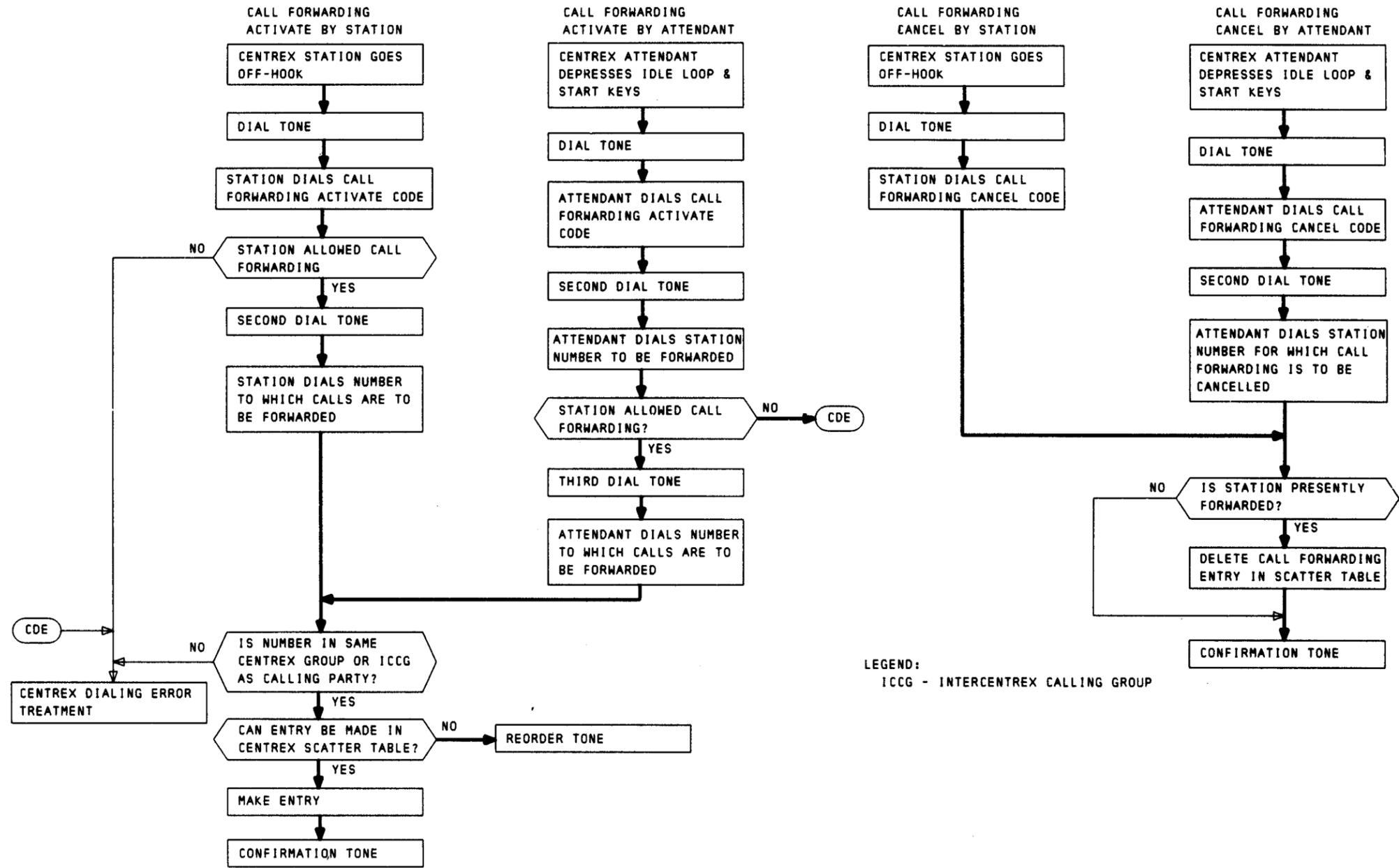


Fig. 1—Feature Flow Diagram—Call Forwarding—Variable

4.08 The call forwarding feature may be used with the night service feature to provide for further night answering capability. In addition, the trunk answer any station (TAS) feature can be used when the night station is call forwarded.

4.09 A centrex station provided with the call forwarding feature cannot activate or deactivate call forwarding by flashing from an existing connection. The existing call must first be disconnected or put on hold.

4.10 When the centrex call forwarding feature is activated by the station user, it takes precedence over call forwarding—don't answer, call forwarding—busy line, and station hunting.

4.11 As mentioned in 2.14, a maximum of 12 forwards is allowed for call forwarding. If one of the stations in this "chain" is not call forwarded, but instead has the call forwarding—don't answer feature (and is idle) the call program stops forwarding and applies ringing to this station. If this station does not answer within the appropriate timing interval, the call forwarding—don't answer 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 call forwarding—don't answer feature is applied.

ATTRIBUTES

5. STATION/SYSTEM

5.01 The centrex call forwarding—variable feature is provided on a per-centrex station basis.

6. LIMITATIONS

6.01 The centrex scatter table is engineered according to the number of centrex stations expected to be involved in calls during the busy hour and according to the number of call forwarding activations expected.

6.02 The maximum number of digits that may be forwarded is limited to a maximum of five. This limit does not include the call forwarding access codes.

7. RESTRICTION CAPABILITY

7.01 Centrex stations are provided with the ability to call forward on a per-station basis. Either

a recent change input message, or an office data administration (ODA) run must be provided in order to allow or deny call forwarding for each station.

7.02 When the centrex call forwarding—variable feature is activated, the centrex station is restricted to either dialing attendant ("0") or dialing the call forwarding deactivate code.

8. COST DATA

8.01 *Translation Memory:* One bit in each centrex line expansion is required to define whether the line has call forwarding—variable or not. In addition, two words are required for the Master Table Index (MTI).

8.02 *Call Store:* Each forwarded centrex station requires two words in the centrex scatter table.

8.03 *Processor Capacity:* Real time is required to process a call forwarded call. The cost in addition to a normal call, is approximately four milliseconds per call.

INCORPORATION INTO SYSTEM

9. PLANNING

9.01 The centrex call forwarding—variable feature operates in the No. 2 ESS when it is equipped with the EF-1 generic program.

10. HARDWARE ENGINEERING

10.01 No hardware engineering is required for this feature.

11. SOFTWARE ENGINEERING

11.01 *Program Store:* Centrex call forwarding—variable requires a 4- or 6-word originating and terminating translation entry per appropriate centrex station.

11.02 *Call Store:* The Traffic Facilities Practices (TFP), Division D, Section 12n contain guidelines for determining the centrex scatter table requirements.

12. COMPATIBILITY

12.01 There are no compatibility or equipment interface problems with the centrex call forwarding—variable feature.

13. OFFICE DATA

13.01 The centrex scatter table entry shown in Figure 2 is an area of call store (CS) used for storing information concerning call forwarded stations and for keeping track of stations involved in calls in the system. Each scatter table entry consists of two CS words. The station's TEN is stored in the low 15 bits of word 0. The high bit of this word is 0 for call forwarding and 1 for keeping track of the station while it is involved in a call. Word 1 is used to save the TEN of the forwarded to station for call forwarding.

If the station is not forwarded, word 1 includes the scan point number or the pseudo scan point number of the circuit to which the station is connected and bits indicating the hold or camp-on state of the station.

13.02 Figure 3 illustrates the centrex call forwarding—variable line translation layout.

13.03 In order to apply the centrex call forwarding—variable feature 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 feature 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.

- **ESS 2109-9B—Centrex Group Table**—This form is used to build portions of the centrex number translators which identify the feature options for all stations associated with a specific centrex group. Data Type 10, Sub Type 07 defines Activate Call Forwarding and Data Type 10, Sub Type 08 defines Cancel Call Forwarding.

13.04 Recent change messages are available for adding and deleting the call forwarding feature for an existing centrex station.

RC MESSAGE	FUNCTION
A RC:L/	To add or delete a feature to a station, CFV is the keyword for centrex call forwarding—variable.
A VY:L/	May be used to verify a station feature.

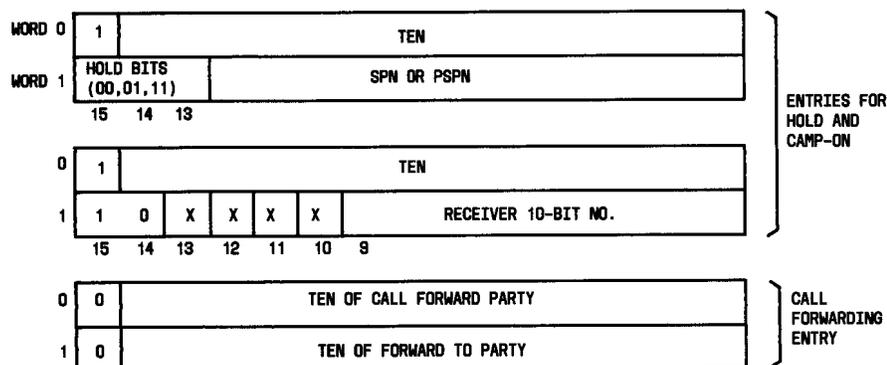


Fig. 2—Centrex Scatter Table Layouts

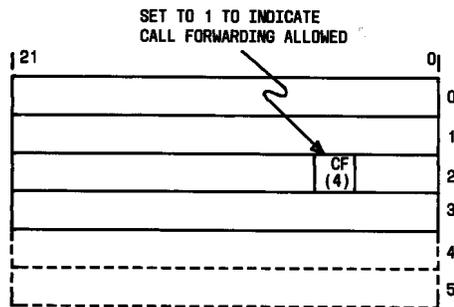


Fig. 3—Centrex Line 4- or 6-Word Expansion

14. GROWTH/RETROFIT PROCEDURES

14.01 At certain times, such as when retrofitting a generic program or changing translations resulting from an ODA run, it is necessary to clear areas of the call store including the centrex scatter tables. When this occurs, it is necessary to punch out the call forwarding list on paper tape before the call store is clear, and reinsert the list after the clear is accomplished. The following input messages aid in this procedure. (Refer to IM-2H200 for full details.)

A CF:PUN/ Punch call forwarding list

A CF:PR/ Print call forwarding list

A CF:ENT/ Add entries to list

A CF:RMV/ Remove an entry from list

15. TESTING

15.01 No special testing is required for this feature other than placement of a test call to verify that the call forwarding—variable feature is operating correctly.

ADMINISTRATION

16. MEASUREMENTS

16.01 There are no traffic measurements available for the centrex call forwarding—variable feature.

17. RECORD KEEPING

17.01 ODA output records, 2101-R and 2109-9B-R provide information as to which lines have the call forwarding feature and which digits have been assigned for call forwarding—activate and call forwarding—cancel. In addition, verify message A VY:L/ may be used to verify any line to determine if call forwarding has been assigned.

18. CHARGING

18.01 Not applicable.

AVAILABILITY

19. NEW INSTALLATIONS

19.01 The centrex call forwarding—variable feature is available for application with the EF-1 generic program.

20. GROWTH/RETROFIT

20.01 The centrex call forwarding—variable feature may be retrofitted into any working office by simply using a recent change input message or an ODA run to assign the call forwarding feature to stations.

SUPPLEMENTARY INFORMATION

21. GLOSSARY

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

- **Call Store (CS):** The equipment unit of the No. 2 ESS that provides temporary memory storage of information pertaining to call processing, maintenance, and traffic measurement data.
- **Centrex Scatter Table:** The centrex scatter table is an area of CS used for storing information concerning call forwarded stations and for keeping track of stations involved in calls in the system.
- **EF-1:** Extended feature generic program.
- **Intercentrex Calling Group (ICCG):** This feature allows a centrex station in one centrex customer group to dial a station in

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another centrex customer group within the same No. 2 ESS on a 4-digit basis.

- **Master Table Index (MTI):** A fixed area of program store which contains an index into the translation data.
- **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.
- **Program Store (PS):** The equipment unit of No. 2 ESS that stores the program and the translation information regarding lines and trunks.
- **Terminal Equipment Number (TEN):** A 6-digit number representing the physical location of a line, trunk, or service circuit in the switching network.

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 call forwarding—variable feature:

- PD-2H211-01, Program Specification-Custom Calling Service Program
- Translation Guide, TG-2H
- 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

FD 232-190-105 Call Forwarding, Noncentrex, No. 2 Electronic Switching System