

**SWITCHBOARD TRUNK INTERFACE USING
DC SIGNALING
NO. 2 ELECTRONIC SWITCHING**

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NOTICE

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FEATURE DEFINITION AND DESCRIPTION**1. DEFINITION**

1.01 The Switchboard Trunk Interface Using DC Signaling feature provides for the use of direct current (DC) signaling for coin collect, coin return, and telephone rering control from switchboards to central offices. When an operator is required to collect coins, return coins, or apply ringback to a telephone, signals must be sent from the operator's switchboard to the central office where these functions are performed. The signals from the switchboard to the central office may be either DC or multifrequency (MF). This feature document is concerned only with the use of DC signals.

1.02 In the No. 2 Electronic Switching System (ESS), provision of the Switchboard Trunk Interface Using DC Signaling feature requires two special No. 2 ESS type trunk circuits for transmitting the ring and coin control signals. These trunks accept DC signals of different levels and polarity on the "tip" and "ring" leads, or on a third lead, from switchboards which are arranged for DC signaling. Prior to the introduction of this feature, with No. 2 ESS, only switchboards using MF inband signaling could be accommodated.

1.03 To obtain this feature, two types of special trunk circuits (incoming and outgoing) are installed as required. The quantity of trunks necessary to implement the feature will be determined by standard switchboard trunk engineering techniques. Each trunk circuit requires a 2-inch mounting plate and the EF-1 generic program must be available for No. 2 ESS processing of the DC signals originated by the switchboard operator.

2. DESCRIPTION

2.01 Many switchboards that utilize DC signaling (i.e., 3C and 3CL switchboards) for coin functions will require connection to the No. 2 ESS. Two special trunk circuits, J2H018BA (SD-2H105-01) and J2H018GC (SD-2H108-01), are available to connect the No. 2 ESS to these switchboards. The addition of these special trunks allows the No. 2 ESS to handle switchboards which use DC signaling for the ring and coin control functions.

2.02 The application of the Switchboard Trunk Interface Using DC Signaling feature is economically advantageous when connecting some

switchboard facilities (i.e., 3C and 3CL switchboards) to the No. 2 ESS. The usage of the above trunk circuits is more economical as compared to the alternative installation of MF in-band signaling equipment to achieve compatibility between these older switchboard facilities and the No. 2 ESS.

General Operation

2.03 In order to detect a request by the operator for ringing or coin functions, the DC signaling ferroids of the trunk circuit are defined and assigned sequentially to the slow scan field, which is examined periodically. A bit in the trunk group translations is provided to designate those trunks that use DC signaling for ring and coin control functions, allowing the programs dealing with this type of trunk to readily identify the DC signal.

2.04 DC signals that are received consist of an off-hook followed by an on-hook. The duration of the off-hook portion of the signal must be greater than the hit timing (greater than 50 milliseconds). This signal timing is determined by the interconnecting trunk at the switchboard and insures that the signal is recognized by the system and not discarded as a hit.

2.05 The off-hook portion of the signal from the DC operator trunk causes an entry to be made in the off-hook hopper. Later, the on-hook portion of the signal is entered in the on-hook timing list. At this point, the trunk group translations must be accessed and the DC signaling bit is tested. If the trunk is not a DC operator trunk, supervision from the trunk is processed in the normal manner.

2.06 If the trunk is a DC operator trunk, a test is then made on the scan point number. The scan point number is compared with the scan point number of the "first ferrod" for the trunk, which is obtained from translation (the four ferroids for the trunk are assigned in sequence, beginning with the first supervisory scan point). The DC signaling ferroids are always the third and fourth ferroids (numbered 2 and 3) assigned to the trunk. (Refer to Table A.) From this information, it can be determined whether the signaling comes from the DC signaling ferroids or the line or trunk side ferrod. If supervision is from one of the DC signaling ferroids, the off-hook entry in the off-hook hopper can be changed to appear as a flash and reported as such to the transient call record (TCR).

TABLE A
ENCODING FOR DC SIGNALING FERRODS

OFFICE WITH NEGATIVE COIN RETURN POTENTIAL	
<u>Ferrod Operated</u>	<u>Request</u>
3	Ring
2	Coin Return
2 & 3	Coin Collect
OFFICE WITH POSITIVE COIN RETURN POTENTIAL	
<u>Ferrod Operated</u>	<u>Request</u>
3	Ring
2	Coin Collect
2 & 3	Coin Return

2.07 At a later time, the on-hook timing list is processed and the same test mentioned in 2.06 is performed to determine if the on-hook entry is connected with an operator trunk capable of DC signaling. If this entry is the on-hook portion of the DC signal, it is thrown out (not reported to the TCR) to prevent the trunk from releasing.

2.08 In the outgoing operator trunk program, the test to determine the type of signaling is made after the connection of the line to the circuit junctor. The test involves accessing the trunk group translations for the operator trunk engaged in the call and testing the DC signaling bit. If the bit is set (signal is DC), last look memory for the DC signaling ferrods is read from call store and stored in TCR word 3 (bits 0-3). A delay progress mark is then set up to allow one base level scan to occur before honoring the operator DC signal request. The last look memory bits for the trunk ferrods are then retrieved from the TCR word 3 and examined for the type of operator request (ring or coin function). Entry is then made into the appropriate section of the program bypassing the code which is used for processing MF in-band signaling requests.

3. FEATURE FLOW DIAGRAM

3.01 Figure 1 illustrates the functional operation of the Switchboard Trunk Interface Using DC Signaling feature.

4. INTERACTIONS

4.01 There are no interactions associated with this feature.

ATTRIBUTES

5. STATION/SYSTEM

5.01 This feature is assigned within a given trunk group(s) as required.

6. LIMITATIONS

6.01 There are no limitations associated with the Switchboard Trunk Interface Using DC Signaling feature other than those working limits specified in SD-2H105-01 and SD-2H108-01.

7. RESTRICTION CAPABILITY

7.01 This feature presents no restrictions to the overall system operation.

8. COST DATA

8.01 The costs involved with providing the Switchboard Trunk Interface Using DC Signaling feature are as follows:

Translations

- Terminal Equipment Number Translator—One word per member
- Scan Point Number Auxiliary Subtranslator—Two words per member
- Scan Point Number Subtranslator—Four words per member
- Trunk Group Information—Eight words per group
- Trunk Circuit List—Two words plus one additional word in the Trunk Circuit List per member

Call Store

- Five words per outgoing group
- No entry required for incoming group(s)

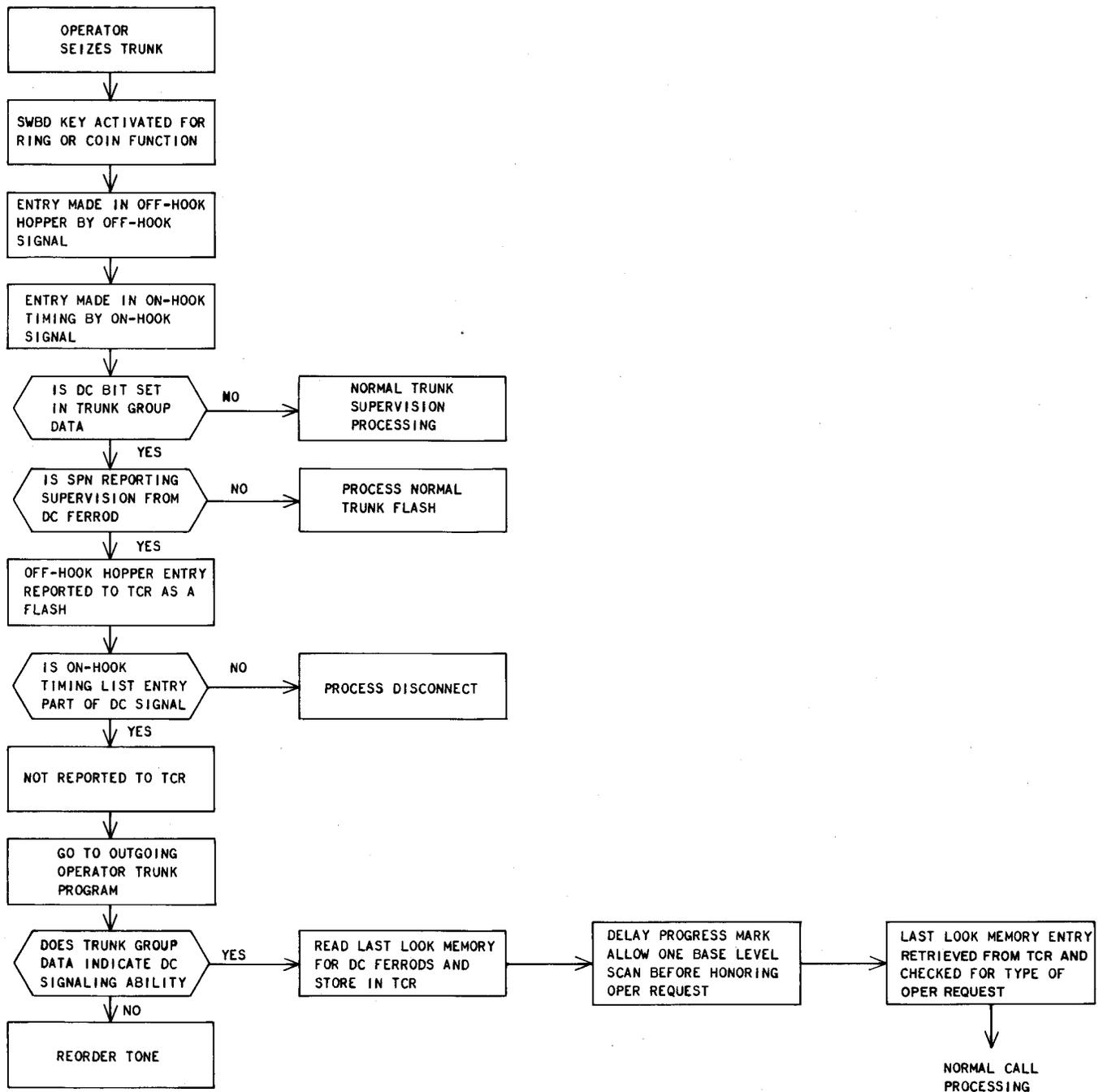


Fig. 1—Switchboard Trunk Interface Using DC Signaling Feature Flow Diagram

Generic Program

- 80 words of code

Equipment

- Trunks—J2H018BA (SD-2H105-01) outgoing trunk
- Trunks—J2H018GC (SD-2H108-01) incoming trunk
- Hardware—One 2-inch mounting plate per trunk

INCORPORATION INTO SYSTEM

9. PLANNING

9.01 No extraordinary planning or coordination is associated with this feature. Normal lead times should be observed when ordering the required hardware and making office data administration (ODA) changes.

10. HARDWARE ENGINEERING

10.01 In order to connect DC signaling switchboards to the No. 2 ESS, two special trunk circuits are required. These circuits are:

- Outgoing Trunk Circuit J2H018BA (SD-2H105-01) handles calls to DC switchboards in a distant location by using reverse battery ringback, coin control over the tip and ring leads, and high and low supervision. This trunk is also capable of providing "dial tone first" if required by the service area.
- Incoming Trunk Circuit J2H018GC (SD-2H108-01) handles the calls from a distant switchboard using third wire coin control and rering signaling simplex on tip and ring leads. The third wire is also used to send a low resistance signal to the switchboards to indicate that the requested coin function has been completed.
- Mounting Space—Each of the above trunk circuits requires a 2-inch mounting space.

11. SOFTWARE ENGINEERING

11.01 None required.

12. COMPATIBILITY

12.01 Refer to J2H031A—Trunk and Service Circuit Engineering Specification for information concerning trunk circuits J2H018BA (SD-2H105-01) and J2H018GC (SD-2H108-01). These circuits are unique to the Switchboard Trunk Interface Using DC Signaling feature and other trunk circuits are not compatible with the DC signaling required by this feature.

13. OFFICE DATA

13.01 For new installations, an ODA run is required and DC operator trunk circuits can be allocated and grouped as required. If planning for future growth, when the initial ODA run is made, spare trunk and "dummy" trunk groups should also be defined. When installing or expanding the Switchboard Trunk Interface Using DC Signaling feature in existing offices, an ODA run is not required if sufficient spare and "dummy" trunk groups exist.

13.02 When an ODA run is required to install the Switchboard Trunk Interface Using DC Signaling feature, the following ESS Translation Input Forms must be completed and submitted to the WECO Regional Center for processing:

- Form ESS 2201—Trunk Assignment Table is used to associate the scan points, peripheral decoder points, and their associated Central Pulse Distributor points with particular circuits. This form must be completed with the following information:

- (1) Terminal Equipment Number Assignment
- (2) Equipment Location Code
- (3) Auxiliary PD Point-Trunk PD Point
- (4) Supervisory Scan Point
- (5) Directed Scan Point
- (6) Option
- (7) Trunk Group
- (8) Member

- Form ESS 2202-2—Trunk Group Table is used to establish a trunk group number for each trunk group entering or leaving the office including all service circuit groups and for “dummy” or future growth trunk groups. This form is completed to identify the DC operator trunk groups and assign the trunk group number(s). The J2H018BA (SD-2H105-01) trunk circuit is designated by Trunk Order Code (TOC) 20302 and 20321. The J2H108GC (SD-2H108-01) is identified by TOC 30500.
- Form ESS 2204—Trunk Feature Table provides information outlining the features that are available with the trunk group(s) indicated on Form ESS 2202-2.
- Form ESS 2301—Rate and Route Table is used to relate the appropriate line and trunk class code to its proper charge index and route index. This form is also used to set up the internal line screening codes.
- Form ESS 2303—Route Index Expansion Table is used to define the routing information for any office. The route index information will include trunking to be used, any prefixing or deletion of digits, the normalized office code for 4-digit translation, and alternate routing information.

Translations

13.03 The Switchboard Trunk Interface Using DC Signaling feature requires a DC bit (Figure 2) in the trunk and service circuit group data that must be set to indicate those trunks that are of the DC signaling type. There is also a

word in the scan point number translation (Figure 3) to indicate the assignment of the DC signaling ferroids, which must be assigned in groups of four.

Recent Change Messages

13.04 Rearrangement of existing trunks or the activation of additional (spare or “dummy” trunks) DC operator trunk circuits can be accomplished by using recent change messages. The A RC:TRK message is to be used when the trunk configuration requires change. Key words OGP (old trunk group number), OMB (old trunk member number), GRP (new trunk group number), MBR (new trunk member number), TEN (terminal equipment number), and NTE (new terminal equipment number) are used with the A RC:TRK message to make the required trunk assignment changes. Refer to IM-2H200-01 for details concerning the usage of these key words in conjunction with the A RC:TRK recent change message.

13.05 The A VY:TRK message is used to verify that the recent change input message has defined the DC operator trunk(s) correctly in translations. Refer to OM-2H200 for information concerning the interpretation of the verify printout.

14. GROWTH/RETROFIT PROCEDURES

14.01 To incorporate this feature into an existing EF-1 office, an ODA run is necessary as specified in OFFICE DATA. All spare and “dummy” trunks in the office are defined in the ODA run in spare and “dummy” trunk groups so that the translations exist when they are needed. The physical equipment may or may not be installed until the trunk or service circuit is activated. When the circuit is activated, it will be moved from the

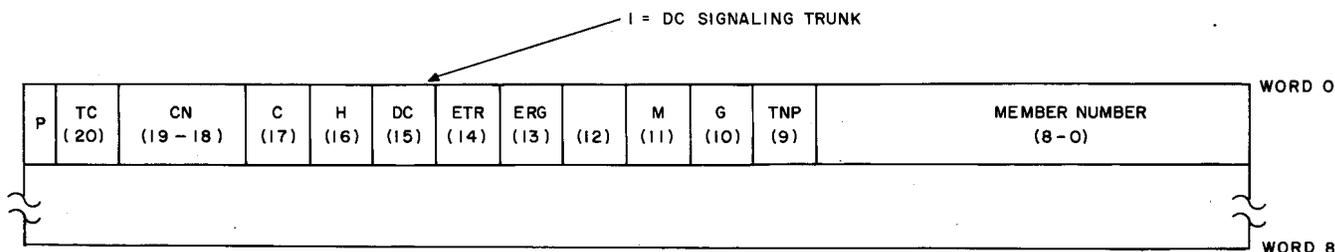


Fig. 2—Trunk and Service Circuit Group Data

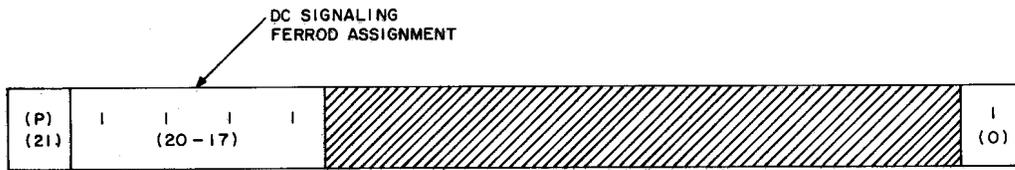


Fig. 3—Scan Point Number Translation

spare or “dummy” group to its new group via a recent change message. Refer to 13.04 for recent change message format information.

15. TESTING

15.01 Circuit state and scan point tests are conducted to verify the operation of circuit relays and the saturation of the ferrod sensors associated with the incoming and outgoing DC operator trunk circuits.

15.02 Transmission loss measurements are made to check transmission signal levels on the incoming and outgoing trunk circuits.

ADMINISTRATION

16. MEASUREMENTS

16.01 Traffic measurements are available in the standard form of a peg count, usage count, overflow count, and maintenance usage count within a given trunk group.

17. RECORD KEEPING

17.01 No special record keeping is required for the Switchboard Trunk Interface Using DC Signaling feature other than maintaining the applicable ESS-R forms:

- ESS 2201-R Trunk Assignment Table
- ESS 2202-R Trunk Group Table
- ESS 2301-R Rate and Route Table
- ESS 2303-R Route Index Expansion Table
- ESS 2270-R Miscellaneous Trunk Frame Equipment Record

18. CHARGING

18.01 There are no provisions for automatic message accounting charging on the Switchboard Trunk Interface Using DC Signaling feature.

AVAILABILITY

19. NEW INSTALLATIONS

19.01 The programs required to operate this feature are available to new installations in the EF-1 generic program. The DC operator trunks, J2H018BA (SD-2H105-01) and J2H018GC (SD-2H108-01), are currently available and can be ordered as required.

20. GROWTH/RETROFIT

20.01 The Switchboard Trunk Interface Using DC Signaling feature is contained in the EF-1 generic program and will be available in subsequent issues of this program.

SUPPLEMENTARY INFORMATION

21. GLOSSARY

21.01 The following list defines abbreviations and nonstandard terms used in this feature:

- EF-1—Extended feature generic program
- Multifrequency (MF)—Type of signaling arrangement
- Office Data Administration System (ODA)—This system provides the facility for generating the required office tables and related computer generated documentation of these data tables

- Transient Call Record (TCR)—A call store register designated for storage of information concerning calls in progress.

22. REASONS FOR REISSUE

22.01 This is the initial issue of this document.

23. REFERENCES

23.01 The following list contains source documents for the Switchboard Trunk Interface Using DC Signaling feature:

- Translation Guide, TG-2H

- PD-2H209-01 Outgoing Operator Trunk Program

- CD-2H108-01 Circuit Description of the SD-2H108-01, Incoming Trunk Circuit

- CD-2H105-01 Circuit Description of the SD-2H105-01, Outgoing Trunk Circuit

- IM-2H200 Input Message Manual.

DATA -

A