

E2 STATUS REPORTING AND CONTROL SYSTEM

STATUS REPORTING REMOTE

DESCRIPTION

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information from remotely monitored equipment. Section 201-644-100 contains an overall description of the E2 system. The status polling central description is contained in Section 201-644-113.

1.03 Communication between the central and remote stations is performed using frequency-shift-keyed (FSK) signals over 4-wire voice-frequency data networks meeting 3002 requirements. The information is encoded into binary words (see Fig. 1) having a 6.5 bit preparatory and word start portion, a 17-bit control and information portion, and a 7-bit parity portion for a total of 30.5 bits per word.

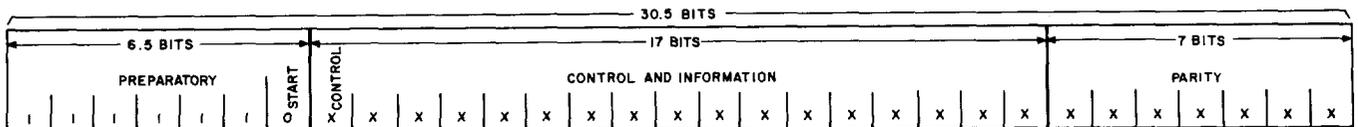
1.04 The basic equipment at each remote station is modular in nature. Each shelf in the remote bay is dedicated to one aspect or feature (e. g., filters and fuses, group reporting shelf, etc.). The number of shelves is limited by the size of the bay; therefore, the number of bays depends on the number of status points to be monitored and the number of relay memory shelves required.

1.05 The basic status reporting remote bay is equipped to status group report only. The remote can additionally be equipped for eavesdropping on one or more other remotes. The features, mentioned above will be discussed in detail in Part 3 of this section.

1. GENERAL

1.01 This section describes the equipment and operating features associated with E2 status reporting remote bays used in the E2 Status Reporting and Control System. These remotes are not available as equipment coded bays, but are assembled from panels as described later in this section.

1.02 The E2 system is a solid-state general-purpose telemetry system. A typical E2 system consists of a central station and a number of remote stations which are used for gathering



NOTE:
X INDICATES EITHER A LOGIC 0 OR 1.

Fig. 1—Basic E2 Word Format

2. PHYSICAL DESCRIPTION

2.01 The basic equipment in each remote consists of a status input panel capable of handling 128 statuses, a tandem interface panel, a remote office shelf, and a filter and fuse panel to supply power to the bay. The remainder of space in the bay is reserved in part for expansion (e. g., additional filter and fuse panel, regenerator, etc.) and in part for additional status input shelves and/or relay memory shelves. A typical status reporting remote bay is shown in Fig. 2.

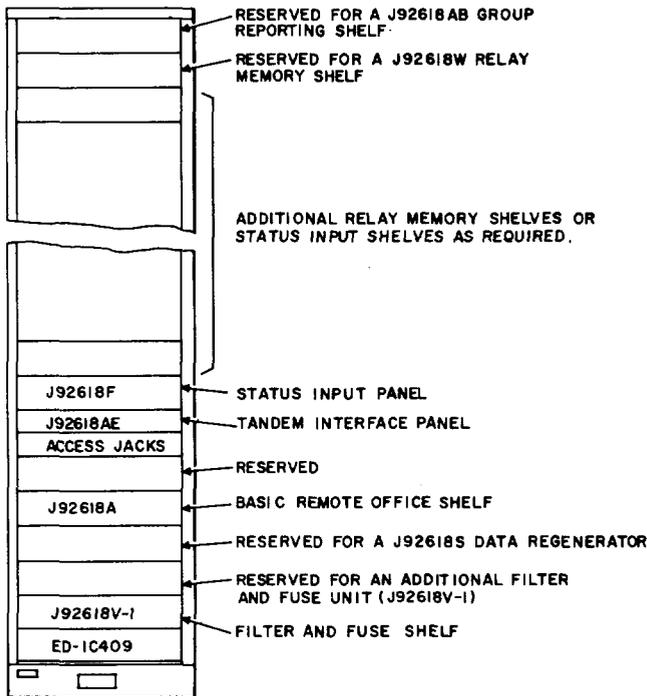


Fig. 2—Typical Status Reporting Remote Bay

3. FUNCTIONAL DESCRIPTION

A. General

3.01 Figure 3 is a block diagram of the status reporting remote. Information, as stated previously, is transferred between the remotes and central, and vice-versa, over 4-wire voice-frequency data networks. The interface between the data network and the E2 equipment is provided by the data transmission circuit (data set). The receiver in the data transmission circuit converts the incoming FSK tones into binary bits (1s and 0s). This

information is then sent to the data transmission control (DTC) circuit for processing. The transmitter in the data transmission circuit reverses the above operation.

3.02 The DTC circuit contains a 17-bit shift register, memory for the register, an address recognizer, and transmission, timing, and error control circuits. The first 5.5 bits of every word (preparatory bits) are used to turn on the data sets at the remotes. The next bit, logic 0 start bit, synchronizes the clocks in the receiver at each remote. The following 17 bits (information bits) which contain the remote address, type of operation, etc., are received by the control circuits and then sent to the shift register. At the same time that the bits are sent to the shift register, they are sent to the error control circuit where they are used to generate the parity bits. When the word-length counter indicates that all the information bits are in the register, the input to the shift register is disabled. The last 7 bits (parity bits) are then sent to the error control circuit where they are compared with the parity bits generated from the 17 information bits. If both sets of parity bits are the same, the information is without error. If they are not the same, an error is indicated and the work is ignored. Once the entire word is determined to be without error, the remote address portion is compared by each remote with its own address. If the two addresses match, the word is sent to the appropriate circuits. If the addresses do not match, the word is ignored.

B. Status Group Reporting

3.03 Figure 4 shows the block diagram for the major circuitry of the status group reporting feature and the associated word formats. To request a status group report, the central sends a one-word command to the remotes (Fig. 4B). The word contains the remote address of the desired station and the number of the group to be reported, along with a logic 1 in bit position 3, all of which identifies it as a status group report command. When the request from the central is received by the remote, it is first checked for errors (parity). If the word is without an error, the portion of the word containing the remote address is sent to the address recognizer and compared to the address of that remote station. If both addresses match, the remaining portion of the word is processed, which includes both the group number going to the matrix selector circuit (via the 4-bit memory in the DTC)

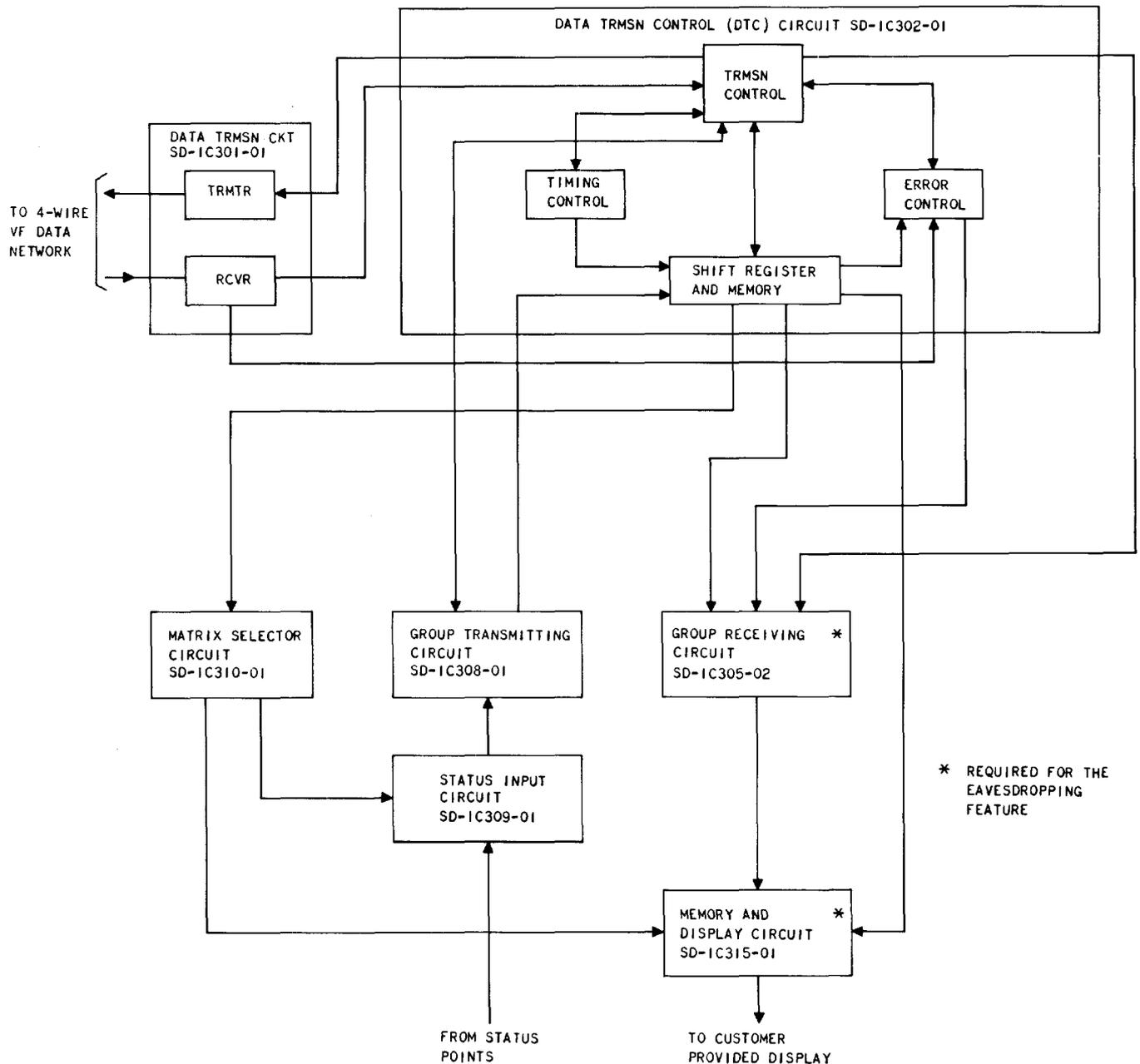
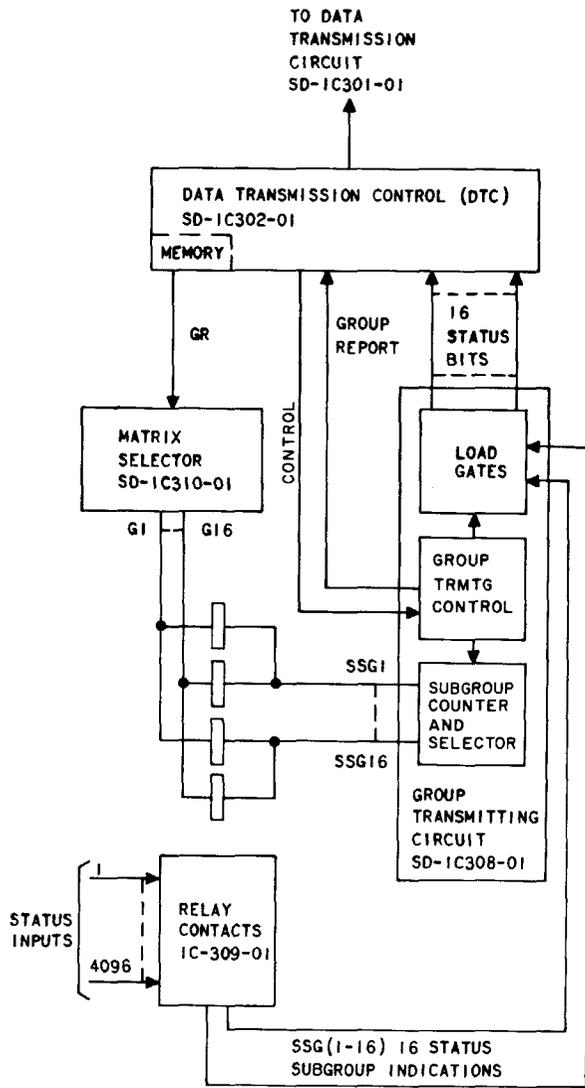


Fig. 3—Status Reporting Remote Block Diagram

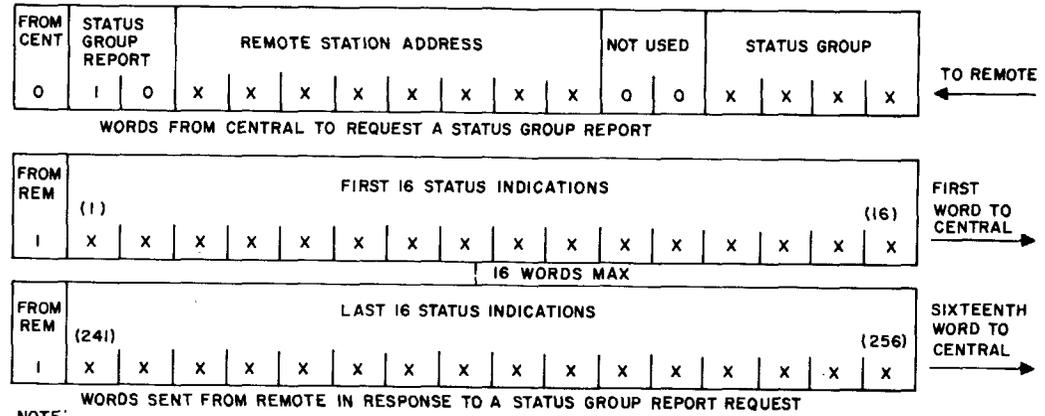
and the bits indicating that the word is a group report request going to the group transmitting circuit.

3.04 A remote station can have a maximum capacity of 4096 statuses which are divided into 16 groups with each group containing 16 subgroups and each subgroup containing 16 individual statuses. A group number acting through the

matrix selector circuit enables one of the columns in the 16-by-16 array of relays, while a subgroup number from the group transmitting circuit enables one of the rows in the array. This combined action of the group and subgroup number activates one relay. Each relay has 16 contacts, one for each status in the subgroup. A group report is accomplished by the matrix selector enabling a column of relays corresponding to the group being reported. At



A. STATUS GROUP REPORT BLOCK DIAGRAM



NOTE:
X INDICATES EITHER A LOGIC 0 OR 1

B. STATUS GROUP REPORT WORD FORMAT

Fig. 4—Status Group Report, Feature

the same time, the group transmitting circuit counts from 1 to 16, enabling one subgroup relay in that group at each count. The counting is done slowly (about 10 counts per second) so that enough time is allowed for the 16 bits to be loaded into the load gates for transmission back to the central.

3.05 The group transmitting circuit contains two monostable flip-flop delay circuits. One delay circuit is needed to give the relays time to close before loading the information into the shift register. The other gives the operated relay time to open before activating the next relay. Most E2 remotes have an interleaving feature which isolates the odd- from the even-numbered subgroups. This feature makes it possible to eliminate the delay used for relay release time which, in turn, provides a faster delivery of the status group reports.

C. Eavesdropping

3.06 Figure 5 is a functional block diagram showing the eavesdropping feature circuitry. Remote stations equipped with this feature can receive group reports sent to the central by other remotes.

3.07 When the central sends a group report request to a specific remote, all the remotes on that data network receive the command but only the specifically addressed remote will respond with the 16 or fewer status words. Another remote which has been equipped to eavesdrop on that remote receives the group report request and sends the remote address and group number to the matrix selector circuit. The group receiving circuit is then set to count the words as they are received from the responding remote.

3.08 The eavesdropping remote requires two circuit packs to store each 16-bit word. These circuit packs act as one unit and require three inputs to enable all 16 relays. These three inputs are the remote station number, the group number, and the subgroup number and are provided by the matrix selector circuit and group receiver circuit. Only one pair of circuit packs will have all three input conditions satisfied at any one time. The output from the shift register in the DTC is connected to every pair of circuit packs but only the pair which satisfies the input to the enabling gate will be loaded with the status word.

3.09 The contacts of the relays are either open or closed depending on the received status.

Thus, the relays can be used to complete circuits for lighted displays, audible alarms or any other suitable customer-supplied display network.

4. MAINTENANCE CONSIDERATIONS

4.01 If trouble occurs at a remote station, the problem can be isolated to a circuit pack (CP) or group of circuit packs through the use of the E-telemetry station test set (KS-20937). The circuit packs are then checked on the circuit pack test set (KS-21448) to verify that they are defective and to identify the defective circuit pack(s). The defective circuit packs are then replaced with the spares provided. Defective CP(s) are repaired and then placed with the other spares.

5. REFERENCES

5.01 The following is a list of circuit descriptions (CDs), schematic drawings (SDs), and Bell System Practices (BSPs) associated with the E2 status reporting remote bay.

DRAWING	TITLE
1C301-01	Data Transmission Circuit
1C302-01	Data Transmission Control (DTC) Circuit
1C308-01	Group Transmitting Circuit
1C309-01	Status Input Circuit
1C310-01	Matrix Selector Circuit
1C305-01	Group Receiving Circuit
1C315-01	Memory and Display Circuit
1C320-01	System Block Diagram

SECTION	TITLE
103-117-101	E-Telemetry Station Test Set—Description, Operation, and Maintenance
201-644-100	Overall System—Description
201-644-113	Status Polling Central—Description
314-411-110	E2 Data Network—Description

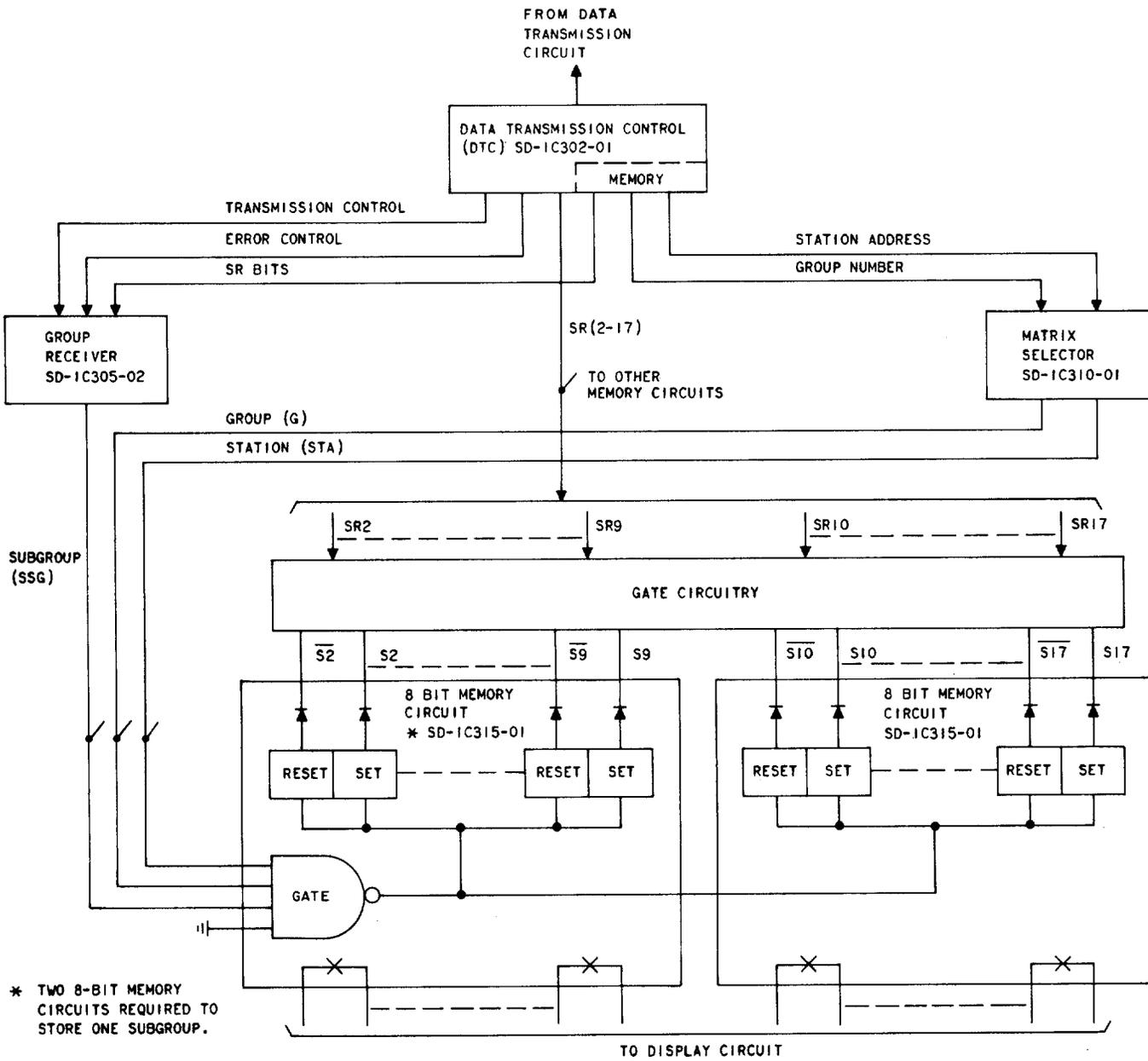


Fig. 5—Eavesdropping Feature Circuitry—Block Diagram