# DATA AUXILIARY SET 811F-L1

# DESCRIPTION AND OPERATION

## 1. GENERAL

**1.01** This section contains information concerning the description and operation of Data Auxiliary Set 811F-L1. Information concerning the associated customer equipment is not included.

**1.02** Data Auxiliary Set 811F-L1 is installed between Data Sets 207-type regenerative repeaters on the AUTOVON network, thus making it possible for the customer security equipment to recode the digital data. The regenerator with the 811F-L1 is capable of operating in either a keychange mode or in a regenerate-only mode. The mode of operation may be selected either manually or automatically. When Data Auxiliary Set 811F-L1 is set for automatic mode selection, the associated switching office will provide the control. In the regenerate-only mode, the 4-phase line signal is demodulated into baseband digital data by the receiver portion of the first Data Set 207. This digital signal passes unchanged through the 811F-L1 to the transmitter portion of the second Data Set 207 which generates a new 4-phase line signal. This is a 4-wire system; therefore, the same process occurs to the signal going in the opposite direction. This second direction utilizes the receiver portion of the second Data Set 207 and the transmitting portion of the first Data Set 207.

**1.03** In the keychange mode, the digital data does not pass directly through the Data Auxiliary Set 811F-L1 as previously described. The 811F-L1 descrambles the digital data from the data sets into the form originally transmitted by the customer equipment. The descrambled data then proceeds to the customer security equipment where its cryptographic key can be changed. The customer sends this encrypted digital data back to the 811F-L1 which scrambles it into the format used by the Data Set 207-type system. The Data Auxiliary Set 811F-L1 then presents this data to the data set transmitter. Again, this is a 4-wire system; therefore, the same process occurs to the data going in the opposite direction.

*Note:* One Data Auxiliary Set 811F-L1 handles signal flow in both directions.

**1.04** Data Auxiliary Set 811F-L1 is capable of operating at 2400 or 1200 bits per second (bps). Normal operating speed is 2400 bps. The 1200-bps operating speed is provided as a backup under degraded network conditions. This speed selection is accomplished manually at the data auxiliary set. The speed selector of the associated 207-type regenerator remains in the 2400-bits per second position, regardless of the mode or speed of the 811F-L1. In the keychange mode, data and clock signals at 1200 bps or 2400 bps are exchanged with the security equipment. In the regenerate-only mode, the data auxiliary set is bypassed and regeneration is possible at all Data Set 207 speeds.

## 2. PHYSICAL DESCRIPTION

**2.01** Figure 1 shows a front view of Data Auxiliary Set 811F-L1. This set mounts in a 23-inch relay rack. It is 6 inches high, 9 inches deep, and weighs approximately 23 pounds.

**2.02** Data Auxiliary Set 811F-L1 contains 16 circuit boards, an Interface Control Unit (ICU) relay, and an alarm and control panel. Connections from the associated security equipment to J1, a 25 pin KS-19067 L6 connector are made at the front of the set. The rear connector shown in Fig. 2 is provided with a 180A adapter for making connections with the associated data sets and central office equipment.

**2.03** Power for Data Auxiliary Set 811F-L1 is supplied by both associated Data Sets 207-type.

## 3. FUNCTIONAL DESCRIPTION

**3.01** Data Auxiliary Set 811F-L1 contains the following major circuits:

(a) Descrambler

(b) 1/2-Bit Delay


**Fig. 1—Data Auxiliary Set 811F-L1 Front View**

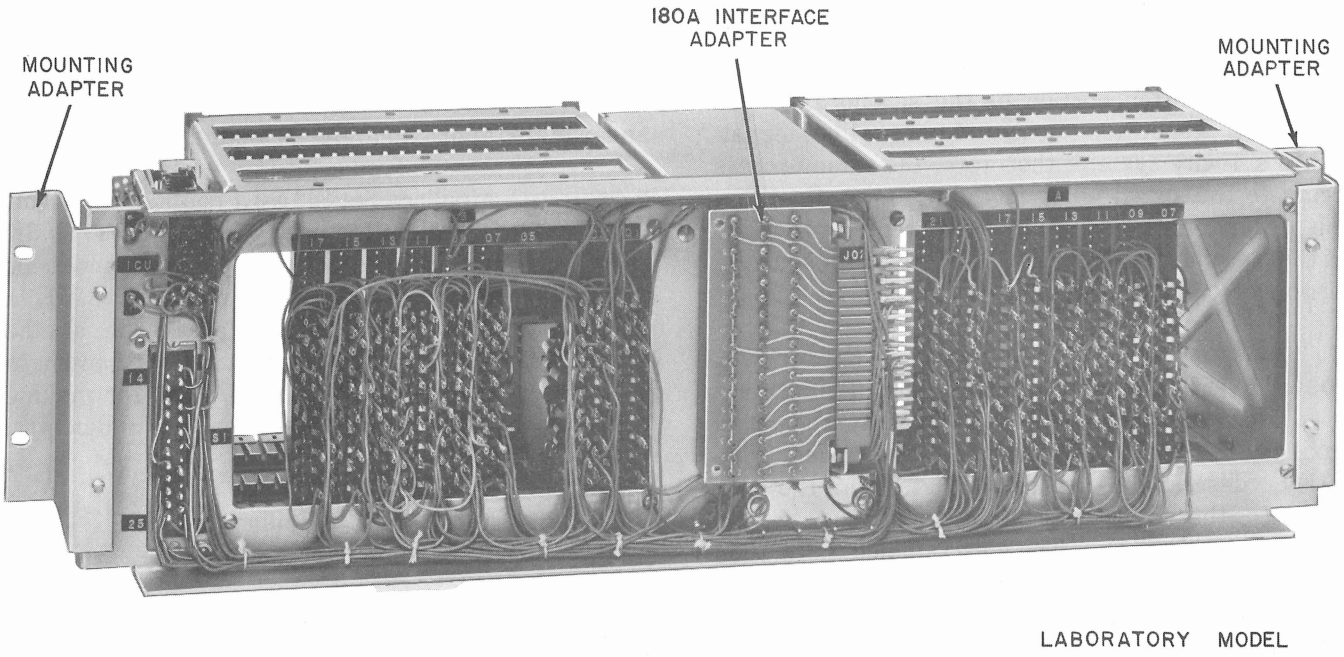


**Fig. 2—Data Auxiliary Set 811F-L1, Rear View**

(c) Scrambler

(d) Data Sync Initiate

(e) Alarm

**3.02** Refer to Fig. 3 for a block diagram of Data Auxiliary Set 811F-L1. Table A provides information regarding the customer interface leads. Refer to Table B for a list of pin assignments for leads between the data auxiliary set and the security equipment.

**3.03** Data from Data Set 207 is received on the Received Data A (RDA) lead. The data goes through the customer equipment when either of the following conditions exists:

(a) The MODE switch is in the KEY CHANGE position.

(b) The MODE switch is in the AUTO position and ground is applied to the Control (CNTRL) lead at the central office.

If either of these conditions is not met, the 811F-L1 will be in the regenerate mode. When in the regenerate mode, the data leads to the customer equipment are clamped at +6 volts (binary ***one*** ).

**3.04** Assume that the MODE switch is in the KEY CHANGE position. Since the data received from Data Set 207 is scrambled, it must go through the descrambler circuit before entering the customer equipment.

**3.05** The signal is recoded in the customer equipment and returned to the 811F-L1 where it goes through a 1/2-bit delay circuit before it is scrambled. This circuit compensates for a data delay caused by the security equipment. The delay circuit can be bypassed by an installer-connected strap. This allows the data auxiliary set to be used with customer security equipment which does not have this delay. Since the terminal Data Set 207 must receive scrambled data, the data goes through the scrambler circuit before entering the send data circuit of the second Data Set 207.

**3.06** This data system is capable of simultaneous communication in two directions. Therefore, the data auxiliary set has another set of circuits to provide for a keychange to data traveling in the reverse direction. These circuits are identical to those previously described.

**3.07** At the start of operation, Synch Initiate signals to the customer occur when a +6 volt signal is received on the Receive Signal Sensor (RSS) leads from both half-regenerator Data Sets 207. When both signals are present at the AND gate, a +6 volt signal is sent to the customer security equipment on leads DSI1 and DSI2. When either (or both) RSS signal fails, the AND gate gives a 0-volt indication to the delayed sensor alarm circuit. If both RSS signals are not restored within 2.025 seconds, this circuit will send a 0-volt signal to the customer equipment on leads DSI1 and DSI2.

***Note:*** A manual SYNCH switch is provided to override the delayed sensor alarm circuits.

**3.08** The alarm system of the 811F-L1 will normally receive +6 volt signals from the customer's equipment on leads CAUA1 and CAUA2. If a 0-volt signal is received on either (or both) CAUA1 or CAUA2, relay K1 will operate. When relay K1 operates, the ALARM lamp lights and the message register increments. If the customer restores the +6 volt signal on leads CAUA1 and CAUA2 the ALARM lamp will extinguish. The LAMP TEST button allows the ALARM lamp to be tested. When this button is pressed, the lamp should light; however, the message register will not increment.

## 4. OPERATION

**4.01** Three switches are used in the operation of Data Auxiliary Set 811F-L1 (Fig. 1).

(a) ***MODE switch:*** This switch has positions REGEN, AUTO, and KEY CHANGE. In the REGEN position, the data auxiliary set allows normal regenerator operation. In the KEY CHANGE position, the data undergoes a keychange in the customer security equipment. When the switch is in the AUTO position, the associated switching office provides signals which select the regenerate or keychange mode for the data auxiliary set.

(b) ***BIT RATE switch:*** This switch has positions 2400, 1200, and 1200 RESTR (restricted). In the 2400 position, 2400-bps data and clock signals are exchanged with the security equipment. In the 1200 positions, 1200-bps data and clock signals

are exchanged with the security equipment. The 1200 and 1200 RESTR positions are for backup under degraded network conditions.

*Note:* The ***regenerator*** Data Sets 207 remain in the 2400-bps position at all times. When in the keychange mode, the setting of the 811F-L1 BIT RATE switch must agree with the setting of the ***terminal*** Data Sets 207.

(c) ***SYNCH switch:*** This switch has positions ENABLE, AUTO, and INHIBIT. As explained previously, the 811F-L1 supplies signals to initiate synchronization of the customer equipment. When the SYNCH switch is in the AUTO position with the 811F-L1 in the KEY CHANGE mode, the presence of data signals at both regenerator Data Sets 207 causes the 811F-L1 to provide +6 volt Data Synch Initiate (DSI) signals to the customer equipment. The ENABLE and INHIBIT positions are used to manually control the customer equipment. The ENABLE position puts a +6 volt signal on the DSI leads; the INHIBIT position puts ground on the DSI leads.

## 5. REFERENCES

**5.01** The following Bell System Practices provide more information which is pertinent to Data Auxiliary Set 811F-L1:

- 598-070-200 Data Auxiliary Set 811F-L1 Installation and Connection
- 598-070-300 Data Auxiliary Set 811F-L1 Maintenance
- 598-070-500 Data Auxiliary Set 811F-L1 Test Procedures

**5.02** Information pertaining to Data Sets 207-type is provided in the following Bell System Practices:

- 592-020-100 Data Set 207-Type, Identification and Operation
- 592-020-150 Data Set 207-Type, Theory of Operation and Supplementary Information
- 592-020-200 Data Set 207-Type, Installation
- 592-020-300 Data Set 207-Type, Maintenance
- 592-020-500 Data Set 207-Type, Test Procedures

**5.03** Further information concerning Data Auxiliary Set 811F-L1 is found in CD- and SD-1D165-01.

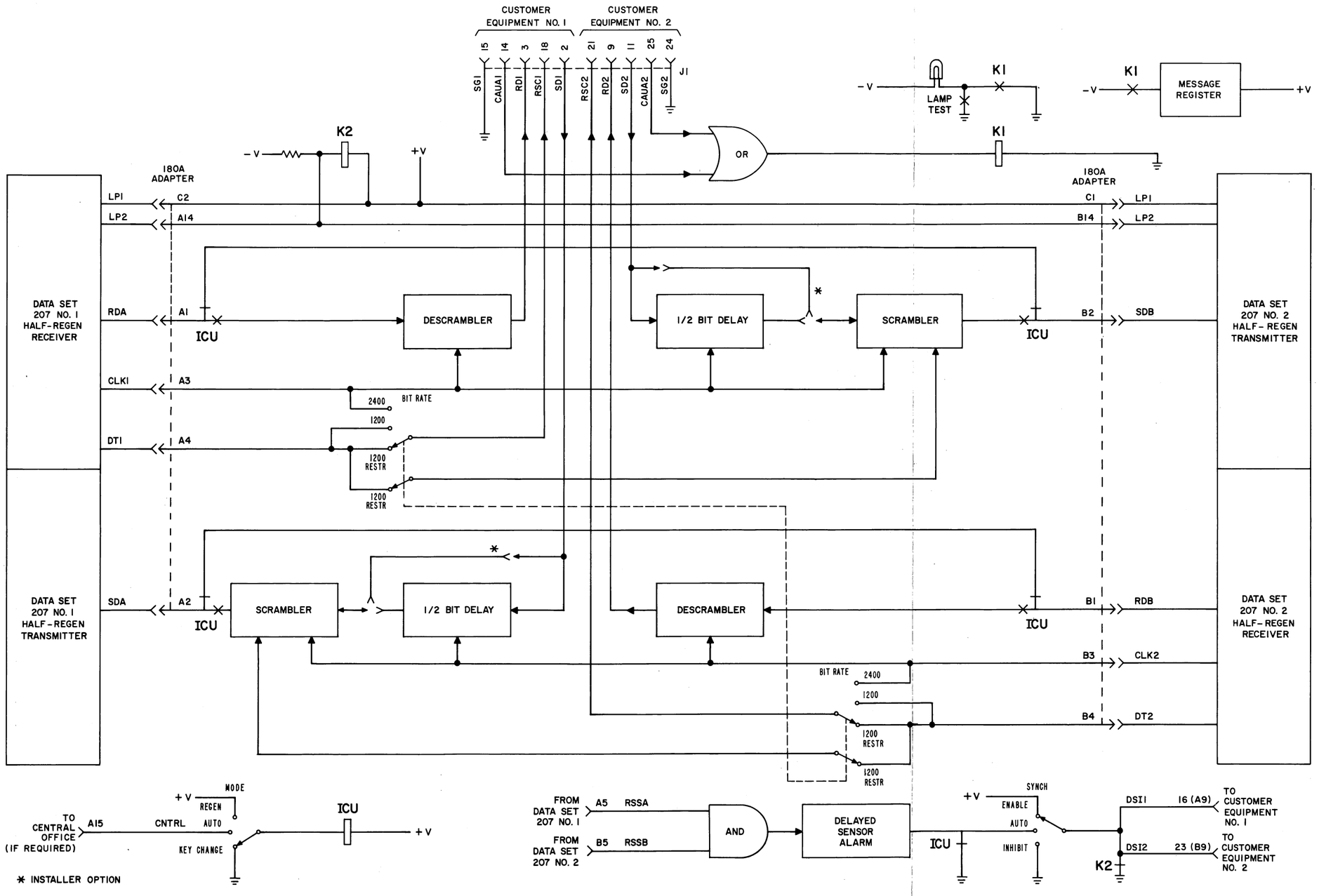


**Fig. 3—Data Auxiliary Set 811F-L1, Block Diagram**

**TABLE A**

**DESCRIPTION OF INTERFACE LEADS**

| LEAD | DESCRIPTION |
|---|---|
| SD1 & SD2 | Send Data (1 and 2) To Customer Equipment |
| SDA & SDB | Send Data (A and B) To Data Set Transmitter |
| RD1 & RD2 | Receive Data (1 and 2) From Customer Equipment |
| RDA & RDB | Receive Data (A and B) From Data Set Receiver |
| RSC1 & RSC2 | Received Serial Clock (1 and 2) From Data Set |
| DSI1 & RSI2 | Data Sync Initiate (1 and 2) To Customer Equipment |
| CAUA1 & CAUA2 | Crypto Ancillary Unit Alarm (1 and 2) To Customer Equipment |
| CLK1 & CLK2 | Clock (1 and 2) From Data Set Receiver |
| DT1 & DT2 | Dibit Timing (1 and 2) From Data Set Receiver |
| RSSA & RSSB | Receive Signal Sensor (A and B) From Data Set |
| CNTRL | Control—To Switching Office |

**TABLE B**

**INTERFACE TO SECURITY EQUIPMENT**

| J1 PIN NUMBER | DESIGNATION |
|---|---|
| 1 | SD1G |
| 2 | SD1 |
| 3 | RD1 |
| 4 | RD1G |
| 5 | NOT USED |
| 6 | FG1 |
| 7 | NOT USED |
| 8 | FG2 |
| 9 | RD2 |
| 10 | RD2G |
| 11 | SD2 |
| 12 | SD2G |
| 13 | CAUA1G |
| 14 | CAUA1 |
| 15 | SG1 |
| 16 | DSI1 |
| 17 | RSC1G |
| 18 | RSC1 |
| 19 | +6 VOLTS |
| 20 | NOT USED |
| 21 | RSC2 |
| 22 | RSC2G |
| 23 | DSI2 |
| 24 | SG2 |
| 25 | CAUA2 |