INSTRUCTIONS FOR INSTALLING THE 186627 SET LOGIC ASSEMBLY

1. GENERAL

1.01 The 186627 set logic assembly is a basic module to provide facilities for the interconnection of Teletype terminal equipment and data sets which conform to the standards of the Electronics Industries Association. In accordance with these standards, all data and control leads of the data set carry polar voltage signals.

1.02 The 186627 set logic assembly accepts current-no-current data and control signals from the teletypewriter and converts them into suitable polar signals for use by the data set. In addition, it accepts polar data and control signals from the data set and converts them into current-no-current signals for use by the teletypewriter.

1.03 The logic assembly contains two time delay circuits and a timed break generator circuit.

(a) Two second time delay indicates data terminal ready.

(b) Two minute time delay will terminate call if data set is not ready.

(c) Timed break generator will provide a timed break of approximately 500 millisecond duration.

1.04 The 186627 set logic assembly is intended to provide a basic logic package suitable for installation into basic teletypewriter apparatus containing a UCC29.

1.05 The 186627 set logic assembly is basically intended for use with data sets such as the Bell System data sets 113, 403E4, 103G, 820DL1/AR 430 data auxiliary sets and 1A data stations, both single and multichannel arrangements.

1.06 Serialized data signals may be utilized at signalling rates up to 1200 baud. Transmission speed of the terminal apparatus and the data set must be the same. The above data sets are limited to 300 baud.

1.07 All data and control signals between the logic assembly and the data set are polar. The logic assembly is sensitive to received signals of ±3 to ±25 volts dc and send signals of ±3 to ±25 volts dc to the data set. All data and control signals between the logic assembly and the terminal set are neutral dc signals (current-no current).

1.08 All polar data signals are considered negative for mark and positive for space.

1.09 All polar control signals are considered positive for "on" and negative for "off".

1.10 The logic assembly provides a terminating impedance for the receiving end of an interchange circuit having a dc resistance of not less than 3000 ohms or more than 7000 ohms and an effective shunt capacitance of not more than 2500 picofarads.

1.11 All voltages between ±3 volts are undefined.

1.12 Transistorized switching devices are utilized where necessary to provide the required signal conversion between the data set and teletypewriter. No interchange circuits are used to operate inductive devices directly, such as relay coils.

1.13 Interconnection between the logic assembly and data set is provided by an eight-foot cable provided with the logic assembly. The cable terminates in a 25-pin connector in accordance with EIA standards.

1.14 Interconnection between the logic assembly and the teletypewriter is provided with the logic assembly. The cable terminates in two Molex connectors and are plugged into the rear of the UCC29 at positions 1 and 2.

1.15 All power for the logic assembly is provided for by the UCC29.

1.16 The 186627 set logic assembly is a basic logic package approximately 7-1/8 inches by 4-3/4 inches by 3-1/2 inches in size and weighs approximately 3 pounds. The logic assembly mounts under the teletypewriter cover at the lower right-hand side of the typing unit.

1.17 The 186627 logic assembly provides coupling for the following EIA interchange circuits:

Circuit Designation	Description
AA	Protective Ground
AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CE	Ring Indicator

1.18 The logic assembly may be used with other data sets provided that the circuits conform to EIA standards and that additional circuits to those shown above are not required.

1.19 The 186627 set logic assembly provides the option of receiving local copy when the teletypewriter is transmitting (similar to half-duplex) or allowing remote traffic to be received when transmitting locally (similar to full-duplex).

1.20 If the logic assembly is connected for half-duplex operation, a noninterfering line break feature is provided whereby, if traffic is being received by the teletypewriter, line break may be transmitted without interfering with the traffic being received.

1.21 If the data set is disconnected or has power off, the logic assembly holds circuit BB (received data) in the mark condition and circuit CD (data set ready) in the OFF condition.

1.22 The average power consumption of the logic assembly does not exceed 7.5 watts.

1.23 It is recommended that signal generators equipped with gold contacts be used in conjunction with this logic assembly. Although the circuit is designed to accommodate a relatively high voltage drop in the BA circuit, tests have shown that tungsten contacts can exhibit complete nonconductivity under some operating conditions.

1.24 See Part 3 of this specification for the theory of operation of this logic assembly.

2. INSTALLATION

2.01 Refer to Teletype Specification 50693S for the actual mounting arrangements of the set logic assembly.

MODEL 33 SETS

2.02 The 186627 assembly mounts in front of the UCC29 call control unit and is housed under the set cover.

2.03 The 186627 assembly mounts on the UCC29 base plate by means of three 181241 screws, and three 336493 posts.

2.04 A 336464 cable interconnects the 186627 interface and the UCC29 call control unit. Connectors 1 and 2 of the 336464 cable, mate with connectors 1 and 2 at the rear of the call control unit. Connectors J4 and J5 of the 336464 cable, mate with connectors J4 and J5 of the 186627 interface assembly.

2.05 Connect the 145914 connector of the 336601 cable coming out of the 186627 to the data set.

MODEL 35 SETS

2.06 The 186627 assembly mounts in front of the UCC29 call control unit.

2.07 It may be necessary to remove the 303826 circuit card and the smaller piggyback card from the 186627 assembly to facilitate mounting it in a Model 35 set. If so, proceed as follows:

(1) Remove the Molex connector from the 303826 circuit card.

(2) Remove the four mounting screws from the 303826 card.

(3) Carefully remove the two circuit cards from the mounting bracket.

2.08 Position the 336459 "T" shaped plate on the base of the Model 35 set towards the right front end. Mount the 186627 on top of the 336459 plate. Insert the 192271 nut plate between the base of the 186627 assembly and the 303826 circuit card. Align the two holes of the nut plate with the two holes of the T-plate and secure with two 55320 screws.

Note: Remove and discard the 192270 bracket which is attached to the base of the Model 35 set in the front area of the call control unit when installing the 186627 assembly.

2.09 A 336464 cable interconnects the 186627 interface assembly and the UCC29 call control unit. Connectors 1 and 2 of the 336464 cable, mate with connectors 1 and 2 at the rear of the call control unit. Connectors J4 and J5 of the 336464 cable, mate with connectors J4 and J5 of the 186627 interface assembly.

2.10 Connect the 311605 connector of the 336601 cable coming out of the 186627 interface to the data set.

STRAPPING OPTIONS

2.11 The 186627 assembly comes from the factory with the following factory wired options:

Option Designation	Strapping Required	Description
B	TB-1 to TB16	For full-duplex operation.
C	TB-7 to TB18	Will permit an operator to originate a call in a low paper-out condition.
F	TB5 to TB10	Required for distributor control.

2.12 The 186627 assembly may have the following additional options:

Option Designation	Strapping Required	Description
A	TB16 to TB17	For half-duplex operation.
D	TB14 to TB19	Will condition data terminal ready (CD) circuitry for Data-phone® operation.
E	TB15 to TB19	Will disable the data terminal ready timing circuit.
G	See 1051CD-SD	Disconnect on paper alarm.

2.13 The 186627 assembly should be replaced in the field, if it should fail to operate in the normal manner, and maintained in a repair center. The repair center should have equipment to simulate normal operation.

3. THEORY OF OPERATION

3.01 A cable is provided with the 186627 set logic assembly for connection to the data set. The cable terminates in a 25-pin connector which has been standardized for use with the data sets. Pin assignments for the circuits used by the logic assembly are shown below.

Pin Assignments for the 311605 Connector
(Part of the 336601 Cable Assembly)

Pin Number	Circuit Designation	Description
1	AA	Protective Ground
2	BA	Transmitted Data
3	BB	Received Data
5	CB	Clear to Send
6	CC	Data Set Ready
7	AB	Signal Ground
20	CD	Data Terminal Ready
22	CE	Ring Indicator

3.02 A 336464 cable is also provided with the 186627 set logic assembly for interconnecting the logic assembly with the UCC29.

3.03 Power Supplies -- The UCC29 must provide the logic assembly with a +24 v dc and a -20 v dc. These voltages are then utilized to provide the necessary clamped voltages for the operation of the logic assembly.

3.04 AA - Protective Ground -- This conductor shall be electrically bonded to the frame of the terminal apparatus. It may be further connected to external grounds as required by applicable regulations.

3.05 AB - Signal Ground -- This conductor establishes the common ground reference potential for all interchange circuits except circuit AA (protective ground). It may be connected to circuit AA or the frame, as required by applicable regulations, and is available at TB-18.

3.06 BA - Transmitted Data -- Signals on this circuit are generated by the terminal apparatus for transmission to remote data sets.

3.07 All signal generators or regenerators in the terminal apparatus should be installed in series between J4-14 and J4-1 (-20 volts). When the signal generator contact is closed (mark), -8 volts is presented at J1-2. When the contact is open (space), +20 volts is presented at J1-2 through R15. Local copy (similar to half-duplex) may be received through CR1, which is part of the input gate to circuit BB (received data), providing TB-16 is strapped to TB-17.

3.08 If local copy is not to be received when transmitting (similar to full-duplex operation), move the strap on TB-17 to TB-1.

3.09 BB - Received Data -- Signals on this circuit are generated by the data set in response to data signal received from remote data sets.

3.10 Data signals received by the data set are presented to CR3 as $\pm$3 to $\pm$25 volts signals. Signals generated by the local signal generator are similarly presented to CR1. CR1 and CR3 serve as an input gate to Q1. Negative signals (mark) to CR1 or CR3 are blocked and the base of Q1 is held negative by -20 volts through R2 which allows the transistor to conduct. This provides ground at the junction of the collector of Q1. The negative input to the selector magnet driver should be connected to signal ground. Positive signals (space) at CR1 or CR3 are conducted through R1 and CR2 to ground holding the base of Q1 positive which turns the transistor off.

3.11 CB - Clear to Send -- Signals on this circuit are generated by the data set to indicate that the data set is ready to transmit data when in the ON condition.

3.12 This circuit is brought into the logic assembly from the data set and is reserved for future applications.

3.13 CC - Data Set Ready -- Signals on this circuit are generated by the data set to indicate that it is ready to operate (ON condition). The OFF condition indicates either:

(a) Any abnormal or test condition which disables or impairs normal operation.

(b) That the communication channel is switched to an alternate means of communication.

(c) That the data set is not connected to the communication channel.

3.14 Signals of ±3 to ±25 volts are presented to R4 by the data set. Negative signals are conducted through CR7 to ground holding the base of Q2 negative, turning the transistor off and opening the collector circuit to RL1. Positive signals are conducted through R4 turning Q2 on and making the collector ground, thus turning RL1 on.

3.15 CD - Data Terminal Ready -- Signals on this circuit are generated by the terminal apparatus to control switching of the data set to a communications channel. The OFF condition removes the data set from a communication channel for such reasons as terminating a call, freeing the line for alternate use, or permitting the use of the terminal apparatus for an alternate function.

3.16 A normally closed contact, RL3-6B, between -20 volts and J1-1 presents -10 volts at J1-1 through R6 indicating an OFF condition. When this contact is opened +20 volts appears at J1-1 through R7 indicating an OFF condition. When this contact is opened +20 appears at J1-1 through R7 indicating an ON condition.

3.17 The following "Data Terminal Ready" options have been provided:

(a) By strapping TB-14 to TB-19 the data terminal ready relay RL3, will be held energized, thus indicating an ON condition as described in 3.15. This option is required in some DATA-PHONE operations.

(b) By strapping TB-15 to TB-19 the data terminal ready timer will be bypassed.

3.18 CE - Ring Indicator -- Signals on this circuit are generated by the data set to indicate that ringing current is being received from a remote station. The ON condition indicates that a ringing signal is being received with the OFF condition maintained at all other times.

3.19 This circuit is brought into the logic assembly from the data set and is reserved for future applications.

ORIGINATING A CALL

3.20 The operator must depress the nonlocking ON key. The RL2 relay energizes through the ON key. The RL2 relay is held energized through RL4-5B, RL1-4B, RL2-4M and the normally closed OFF key. When the RL2 relay energizes, RL2-5B opens, which de-energizes the RL4 relay, thus allowing the RL2-2M contact to energize the motor control relay, starting the motor and the disconnect timing circuit.

3.21 When the RL2 relay energized, RL2-3M closed, which started the data terminal ready timing circuit. After 2 seconds the data terminal ready timing circuit activated, energizing the RL3 relay through RL4-6B, RL5-2B, RL2-3M, and either the normally closed paper alarm contact or RL2-1M contact. The RL2-1M contact is an option that is provided by strapping TB-7 to TB-18, this will allow a station to originate a call in a low-paper or paper-out condition. The CC lead (P2-6) must go positive within 2 minutes after the ON key is depressed. The RL3 relay is now held energized through RL3-5M and RL1-2M. Normally, J1-1 is at -10 volts which indicates data terminal is not ready. When RL3 energizes RL3-6B opens, putting a +20 v dc on J1-1 which indicates data terminal ready.

3.22 When the CC lead goes positive the Q2 transistor turns on which energizes the RL1 relay through RL4-4B, and the ON key is illuminated. Two minutes after depressing the ON key the disconnect timing circuit activates and attempts to energize the RL4 relay through RL1-1B, since the CC lead is on, the RL1 relay would be energized opening the RL1-1B, thus preventing the RL4 relay from being energized. If the CC lead did not turn on within 2 minutes, the RL1 relay would not energize, thus the RL1-1B contact would be closed and the RL4 relay would be energized which would terminate the call and turn off the motor.

3.23 If the CC lead did come up, then the motor is running and the terminal is ready to transmit or receive data. At the conclusion of transmission, the call can be terminated by receiving an EOT character which causes operation of the RL4 relay or by the operator pushing the OFF key which also operates the RL4 relay. This causes the RL3 relay to drop out by opening the RL4-6B contact which turns off the CD lead and transferring the RL4-4 contact which causes RL1 to drop out. RL4-4M locks RL4 to ground through the Q2 transistor. When the CD lead turns off, the data set takes down the CC lead and RL4 drops out. The ON lamp is extinguished.

RECEIVING A CALL

3.24 The Teletype terminal can answer a call unattended, as follows: The CC lead comes up turning on Q2 which energizes the RL1 relay, with the RL1 relay energized, RL1-5M closes which enables the break detection circuit. Once RL1 energizes the sequence is the same as a manual start except the motor is started by the RL1-6M contact and data terminal ready timing circuit is started by the RL1-3M contact. The CD lead (P2-20) going on indicates to the data set that the terminal is ready and the call should be maintained. If CD does not come up, CC will go down, thus removing power from the RL1 relay and turning the motor off.

SEND CIRCUIT OPERATION

3.25 Half-duplex operation; when the send and break contacts are closed, -20 volts is applied to the junction R10 and CR11. Diode CR11 conducts causing the positive terminal of capacitor C1 to charge rapidly to about -15 volts from the voltage divider formed by CR11, R11 and R12 turning transistor Q7 off due to the application of this negative voltage to its base. A voltage of -8 volts is applied to the BA lead (P2-2) through the voltage divider consisting of R10, CR10, and the data set impedance indicating a mark. At the same time a -20 volts is applied to the anode of CR1 which turns Q1 on, energizing the selector magnet driver. When either the send or break contact opens +20 volts is applied to the BA lead (P2-2) indicating a space. The send contact opening will cause +20 volts to be applied to the anode of CR1 which turns off Q1, dropping out the selector magnet driver. The break contact opening will have no effect on CR1, therefore, it will not be recognized by the selector magnet driver. If this open contact condition lasts for more than 500 milliseconds, as would be caused by holding the BREAK key operated, capacitor C1 discharges through R12 to ground. After about 500 milliseconds of discharge, Q7 conducts and remains conducting until the open contact condition ceases. With Q7 conducting -6 volts is applied to the BA lead (P2-2) through R14, CR12 and Q7 which forms a voltage divider with the data set impedance.

3.26 Full-duplex operation would be the same as for half-duplex operation, except that the path to the anode of CR1 is now open, therefore, the local selector magnet driver will not respond to incoming signals and no local copy will be received.

RECEIVE CIRCUIT OPERATION

3.27 A negative voltage of -20 volts maximum at BB (P2-3) will cause Q1 to be on, which indicates mark, causing the selector magnet driver to be energized. A positive voltage of +20 volts maximum will cause Q1 to be off, indicating space, and de-energizing the selector magnet driver.

LOCAL

3.28 The LOCAL locking key will energize the RL5 relay. This closes RL5-6M which will keep the BA lead at a -20 volts. The RL5-2B contact opens the operate path for the RL3 relay, thus maintaining the CD lead at a -10 volts indicating that the data terminal is not ready. The RL5-3M contact also closes which operates the motor control relay starting the station's motor. The terminal now operates locally. To get out of local and in an off condition, the OFF key is depressed which mechanically releases the LOCAL key, dropping out the RL5 relay. When the LOCAL key is depressed, the lamp under the key is on.

OUT-OF-SERVICE

3.29 The OUT OF SERVICE key operates the RL4 relay, thus locking the station in the OFF condition. The OFF key releases the OUT OF SERVICE key. When the OUT OF SERVICE key is depressed, the lamp under the key is on.

ALARM

3.30 An alarm indication lamp is provided which will indicate a low-paper condition.

TEST

3.31 When the TEST key is depressed the L1-1/3 contact closes, this contact is presented at TB-2 and TB-4. This contact has been provided in order to activate external test circuitry. The OFF key releases the TEST key. When the TEST key is depressed, the lamp under the key is on.

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