DATA SET 212AR-L1A/2A

DESCRIPTION AND OPERATION

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1. GENERAL

1.01 This section contains the physical and functional description and operating procedures for data set (DS) 212AR. Other than a description of interface signals and customer options, information pertaining to the customer-provided equipment (CPE) is not given.

1.02 When this section is reissued, the reason for reissue will be contained in this paragraph.

1.03 Data set 212A has been replaced by DS 212AR which is the registered version of the data set. The DS 212AR meets the requirements of the FCC registration program. The registration number for DS 212AR is AS593M-67742-DM-E. The ringer equivalence number of the DS 212AR is 1.3A.

1.04 General information concerning registered data sets and arrangements follows:

- Registered versions of data sets are coded with an "R" in the data set code.
- All Bell System switched network data sets not coded with an "R" in the data set code are grandfathered.
- Grandfathered DS 212A may be connected in registered arrangements provided the interface with the network is made with the appropriate jack and cord as shown in the connection diagrams in this section.

- The DS 212AR may be connected in grandfathered arrangements provided the interface with the network is made using the appropriate cords as shown in the connection diagrams in this section.

- Connections to the telephone lines must be made via the proper cords to the voice or data jack as shown in the connection diagrams in this section.

- In the one-to-five data set arrangements a mixture of new-family data sets (103JR, 113CR, 113DR, 201CR, 202SR, 208BR, and 212AR) may be used as shown in the connection diagrams in this section.

1.05 Data set 212AR (Fig. 1) provides full-duplex transmission and reception of serial binary data at two distinct bit rates over the switched network. In the low-speed mode, the maximum bit rate is 300 bits per second (bps). In the high-speed mode, operation is synchronous or character-asynchronous at 1200 bps.

1.06 The following is a technical specification summary for DS 212AR.

Data Rates:

- Low-Speed—Asynchronous, 0 to 300 bps.

- High Speed—Character-asynchronous format, 1200 bps (+1.0, -2.5 percent).

  High-Speed—Synchronous format, 1200 bps (±0.01 percent).

Operation:

- Low-Speed—Asynchronous, binary, serial.

- High-Speed—Character-asynchronous or synchronous, binary, serial.

Operating Mode: Full-duplex at all speeds.

Line Requirement: 2-wire switched network.

Line Signals:

- Low-Speed—Frequency shift keyed (FSK).

- High-Speed—Phase shift keyed (PSK).

Data Set Compatibility:

- Low-Speed—Existing 100-type, 300-baud FSK switched network data sets, and DS 212AR.

- High-Speed—DS 212AR only.

Interface Voltages: Per EIA RS-232-C.

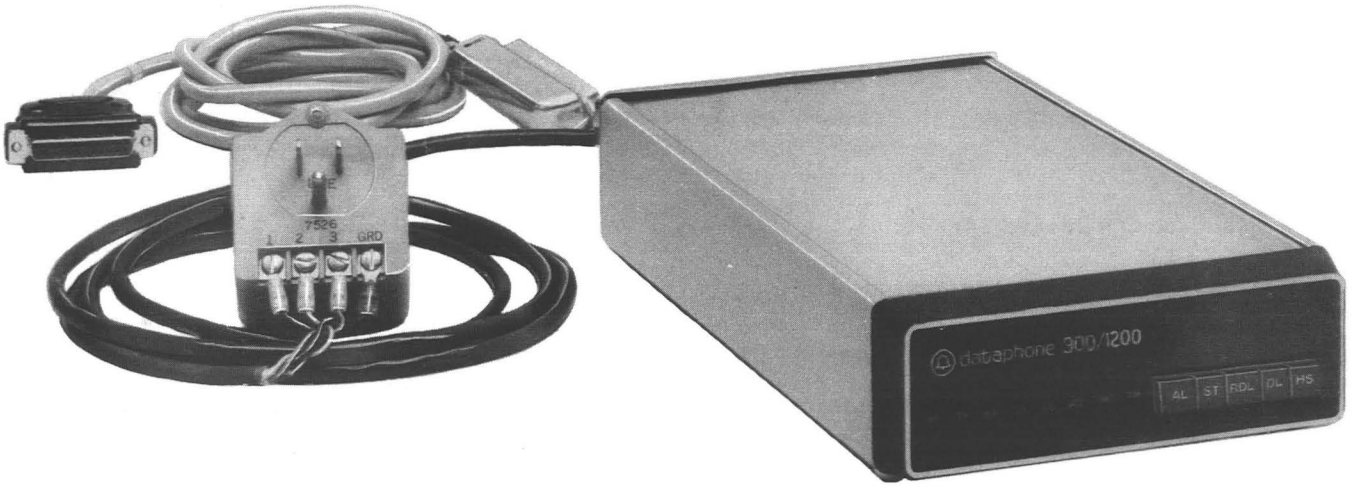

Fig. 1—Front View of DS 212AR-L1/2A

Interface Compatibility: Same as data sets 100-type with additional timing and control functions.

AC Power: 117 volts ±10 percent, 60 Hz ±5 percent. Single data set consumes 9 watts maximum. Power outlet should be a conventional 3-wire type not under switch control.

Environmental Requirements:

- Ambient temperature range from 40 to 120°F.
- Relative humidity from 20 to 95 percent at 75°F or 20 to 40 percent at 120°F with no condensation.

Dimensions of DS 212AR-L1/2A:

- Height: 2.2 inches
- Width: 5.8 inches
- Depth: 10.8 inches.

Weight of DS 212AR-L1A/2A: 4 pounds without transformer.

2. PHYSICAL DESCRIPTION

2.01 List code designations have been assigned to DS 212AR as follows:

- DS 212AR-L1A: Printed circuit pack assembly shown in Fig. 2.
- DS 212AR-L1A/2A: Housing assembly, front and rear covers, interface assembly, power cord and transformer, and M13F telephone interface cord. This group of apparatus is coded as the 47D2 data mounting to simplify ordering when needed for field conversion of DS 212AR-L1A to DS 212AR-L1A/2A.

Orderable codes are DS 212AR-L1A and DS 212AR-L1A/2A.

DS 212AR-L1A

2.02 Data set 212AR-L1A consists of two printed circuit boards interconnected by a flexible cable. The overall dimensions of the data set circuit board assembly are 5.55 inches wide, 10.40 inches long, and 1.50 inches high. The assembly weighs approximately 1.5 pounds. The circuit board has a faceplate through which are mounted the status indicators and buttons for test and control.

2.03 The status indicators are light emitting diodes (LEDs) which monitor the status of various interface leads and operating modes of the data set. When the data set is installed in the mounting with the covers in place, the LEDs illuminate "dropout" graphics on the front cover. "Dropout" graphics provide for the appearance of the 2-letter abbreviation when the LED is lighted and a continuous black opaque surface when the LED is off.

2.04 The indicators are as follows:

- MB (Made Busy): This indicator is lighted when the make busy relay is operated. The relay is operated when the analog loop (AL) button is depressed or when the CN (make-busy/analog loop) lead from the CPE is ***on*** and option YE (CN circuit—IN) is installed.
- TR (Terminal Ready): This indicator is lighted when the ST and DL switches are depressed and the CD (data terminal ready) lead from the CPE is ***on.***
- MR (Modem Ready): This indicator is normally lighted when the CC (data set ready) lead to the CPE is ***on,*** and is optionally lighted in certain test modes.
- SD (Send Data): This indicator monitors the BA (transmitted data) lead in both the data mode and the analog loopback mode. The indicator is lighted for space and off for mark.
- RD (Received Data): This indicator monitors the BB (received data) lead in both the data mode and the analog loopback mode. The indicator is lighted for space and off for mark.
- HS (High-Speed): This indicator is lighted when the data set is operating at 1200 bps (high-speed) in either the data mode or analog loopback test mode. It is off at all other times.
- MC (Modem Check): This indicator is lighted in the idle mode or in the data mode when

Fig. 2—DS 212AR-L1A

carrier is not being received. The indicator blinks for 300 ms when an error is detected in any test mode where the ST button is depressed.

- TM (Test Mode): This indicator is lighted when the data set is in any test mode.

2.05 Five push button switches are provided for control and testing of DS 212AR. These switches are mounted in a faceplate in order to be accessible to both customer and telephone company (telco) personnel.

The switch functions are as follows:

- AL (Analog Loopback)—The set will go into the analog loop mode when the switch is depressed and the customer data terminal ready lead (CD) is on. It can be used to make the data set loop data back to the terminal, or in conjunction with the ST button to give a self-check of the data set independent of customer equipment and telephone line. The make busy relay will be activated and the "TM" indicator lighted.

- ST (Self Test)—The switch is used, in the data mode, remote digital loopback mode, or in conjunction with AL to condition the set to transmit a test pattern and examine the received data for errors. With ST depressed it is not necessary to have CD on.

  Each error will cause the MC light to blink at least for 300 ms. The "TM and TR" indicators will be lighted when this switch is depressed.

- RDL (Remote Digital Loopback)—When depressed, the switch causes the far-end

data set to loop the data back to the near-end set. It is enabled only in the high-speed data mode. The "TM" indicator will be lighted.

- DL (Digital Loopback)—This switch conditions the set for automatic answer and allows the set to be tested from a remote location. It causes a local digital loop and overrides the customer controlled data terminal ready. The "TM and TR" indicators will be lighted.

- HS (High-Speed)—This switch will control the speed of an originating station if the CI (customer interface speed select) option is out. When depressed, the switch conditions an originating (calling) data set to operate at 1200 bps. When not depressed, a calling set is conditioned to operate at 0 to 300 bps. It must be depressed prior to going into the data mode if the high speed operation is desired. The speed mode of the answering set is automatically determined by the originating set, therefore, its HS switch position is inconsequential.

2.06 Installer options are accomplished by setting the positions of individual rockers of four multiple section rocker assemblies (Fig. 3), strapping plugs, and a screw switch on the backplane. Refer to Section 592-039-200 for instructions on selecting and installing options.

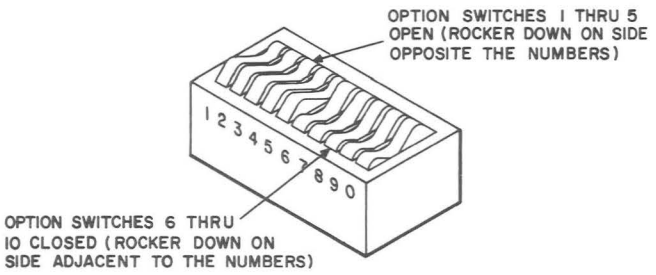

Fig. 3—Details of Option Switch

DS 212AR-L1A/2A

2.07 This list code specifies the single set configuration. It consists of the data set previously described, enclosed in a 47D2 data mounting.

2.08 The mounting provided as part of list 2 is extruded aluminum with brushed finish. The front and rear covers are of molded plastic with the reverse side painted black. The circuit pack assembly plugs into an interface assembly (Fig. 4) which mounts in the rear of the mounting.

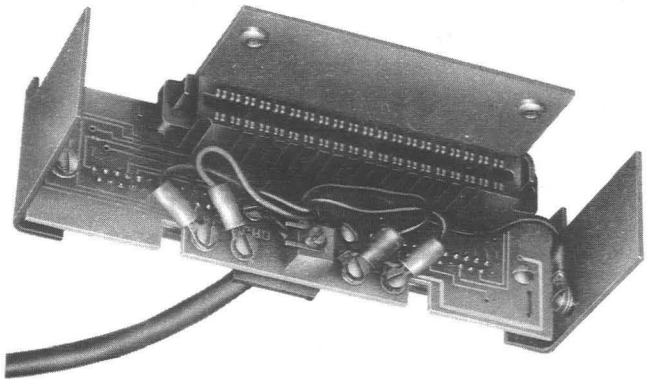

Fig. 4—Interface Assembly

2.09 The housing with data set installed measures 5.8 inches wide, 11.2 inches long, and 2.2 inches high. The weight is approximately 4 pounds.

2.10 The interface assembly has two interface connectors which are accessible through the rear cover. One connector provides a 25-pin interface between the data set and CPE. The other connector provides a 25-pin interface between the data set and telephone equipment via the M13F cord. The interface assembly provides the electrical interconnection from the gold fingers of the data set circuit board to the two interface connectors and the power transformer.

2.11 Power to the data set is provided by a KS-21239-L5 transformer which plugs into a standard 117 Vac 3-wire grounded outlet. The transformer weighs about 1 pound. This transformer provides 24 Vac and a ground which are brought out on four screw terminals to which the data set power cord is attached.

3. FUNCTIONAL DESCRIPTION

3.01 This part contains information pertaining to the operating modes, test modes, interface leads, and options.

GENERAL OPERATION

3.02 The DS 212AR simultaneously transmits and receives serial binary data over the voice-grade switched telephone network. This full-duplex operation is achieved by frequency division multiplexing (similar to that used in data sets 100-type). The originating data set transmits in a low frequency band and receives in a high frequency band. The operation of the answering data set is complementary; it receives in the low frequency band and transmits in the high frequency band.

3.03 The data set has three operating formats:

- Asynchronous 0 to 300 bps
- Character asynchronous with the data in 9-bit or 10-bit start-stop character format at 1200 bps (+1, -2.5 percent)
- Synchronous at 1200 bps.

3.04 Character-asynchronous operation is when characters arrive at the CPE interface at random intervals. It is not bit asynchronous as is the low-speed mode but gives the appearance of asynchronous operation to the CPE. Each character must consist of an initial (spacing) start bit, 8 (or optionally 7) information bits, and one (marking) stop bit.

3.05 Option switches are provided to select either the synchronous or character-asynchronous data format at 1200 bps. A speed mode—HIGH option is provided which causes the data set to block the transmission and reception of customer data if the data set enters the low-speed mode. When the synchronous format is selected, transmit and receive clocks are provided at the CPE interface.

3.06 Speed selection is performed differently at the originating and answering stations. At the originating station, speed selection is under customer control by use of a pushbutton switch (HS) on the front panel of the data set. At the answering station, speed selection is performed automatically, independent of the speed selection at that end. For the purpose of speed selection and recognition, there is no distinction between 1200-bps synchronous and 1200-bps character-asynchronous operation. The answering station replies at the same speed used at the originating station. During data transmission both stations are at the same speed. Changing speed during the data portion of a call is not possible and should not be attempted.

TEST MODES

3.07 The DS 212AR is provided with built-in test features which can be used during installation or maintenance. These tests make use of the test buttons and status indicators on the data set. Procedures and requirements for these tests are contained in Section 592-039-500.

A. Analog Loopback

3.08 The purpose of this test is to check the local data set by the use of a full-duplex CPE, data set self-test feature, or 914- or 921-type data test set. This test can be initiated in either of two ways:

(a) The AL switch is depressed and the CD (data terminal ready) lead is ***on***

(b) The CN (make-busy/analog loop) and the CD (data terminal ready) leads are both ***on*** and option YE (CN circuit—IN) is installed.

3.09 The speed mode of the test is selected by use of the HS button on the front panel. DS 212AR follows a "handshaking" sequence when entering the analog loopback test mode which resembles the data mode sequence. The speed mode of the test can be changed during the test, in which case, the data set reinitializes the test sequence in the new speed mode.

3.10 If option ZF (CC indication for analog loop—ON) is installed, the customer interface CC (data set ready) lead is ***on*** whenever the AL switch is depressed or if the CN (make-busy/analog loop) circuit is ***on*** and option YE (CN circuit—IN) is installed. The TM indicator on the front panel is lighted whenever the AL switch is depressed or the CN circuit is ***on*** and option YE is installed.

B. Analog Loopback Self Test

3.11 The test is initiated by depressing both the AL and ST switches. Internal to the data set, an analog loopback is established in the same way as the analog loop test mode except that the customer interface circuits remain ***off.*** DS 212AR generates a dotting test pattern which is applied

to the transmitter, looped back to the receiver, and applied to an error detection circuit. If the analog loopback self test is being done in the low-speed mode, the error detection circuitry causes the MC indicator to blink if the length of a received data bit is outside the nominal length by 25 percent or more. If DS 212AR is in the high-speed mode, the MC indicator blinks if a bit error is detected in the received data.

C. End-to-End Self Test

3.12 This test can be used to check the local data set, the distant data set, and the communication channel. This test is performed by pressing the ST switch at each end, placing a call from one end to the other, and then going to the data mode. Each data set sends the test pattern to the other end. The error-detecting circuitry at each end monitors the received data signal and causes the MC indicator to blink if the distortion threshold is exceeded (low-speed) or if an error is detected (high-speed). The speed mode of this test is controlled by the speed mode at the originating station.

D. Digital Loopback Test

3.13 When DS 212AR is placed in the digital loopback mode, it is conditioned to act as a repeater. This test mode can be used to test the data set from the distant end or from a data test center (DTC). The test is done by placing a call to the data set to be tested. The data set answers automatically and goes to the data mode. When the DL switch is pressed, DS 212AR is conditioned as follows:

- The data set answers automatically.
- The CD (data terminal ready) lead is held ***on.***
- Received data is looped back to transmitted data.
- Receiver timing is looped back to transmitter timing (in high-speed mode).
- Interface circuits CC (data set ready), CB (clear to send), and CF (received line signal detector) are held ***off.***
- TM and TR indicators light.

The digital loopback test cannot be done in the 1200-bps mode if the distant (testing end) DS 212AR is optioned for transmitter timing—SLAVE (WI).

3.14 If DS 212AR is installed in a multiple housing (40A3 data mounting), the data set is transferred to the service line when the DL button is depressed. When the data set is taken out of the DL mode, the data set is transferred back to the normal telephone line.

3.15 When the data set is in the digital loopback mode, it is conditioned to disconnect upon loss of carrier which may occur during the test. Therefore, when the testing end has completed testing and gone out of the data mode, the loss of carrier at the data set under test causes it to disconnect from the line. The data set is taken out of the digital loopback mode by releasing the DL switch.

E. Digital Loopback Self Test

3.16 This test takes advantage of the digital loopback capability of the data set at one end and the self-test (pattern generating and comparing) capability of the data set at the other end. The test is performed by putting one data set in the DL mode, placing the other data set in the ST mode, placing a call from one end to the other, and then going to the data mode. The MC indicator on the data set which is in the ST mode blinks when data distortion of a single bit exceeds 25 percent (low-speed) or if a received error occurs (high-speed). The data set in the DL mode is conditioned the same as previously described in paragraph 3.13. In the ST mode, the transmitter timing option is forced to the INTERNAL position.

F. Remote Digital Loopback

3.17 The DS 212AR has the capability to force the distant data set into a digital loopback mode. The test can only be used when the data set is in the high-speed mode. The distant data set must have option ZH (automatic answer—IN) installed and the CD (data terminal ready) interface circuit must be ***on.*** After a call has been placed to the distant data set, this test can be initiated by manually depressing the RDL switch (provided option XL is installed) or activated through pin 21 of the customer interface on the testing data set.

3.18 The digital loopback takes place at the distant data set only if option YK (receiver responds to digital loop—IN) is installed at that end.

This test cannot be done if the testing DS 212AR is equipped with option WI (transmitter timing—SLAVE).

G. Remote Digital Loopback Self Test

3.19 This test takes advantage of the remote digital loopback and self-test capability of the local data set and can be used to test both data sets and the communication channel. The distant data set is placed in the remote digital loopback mode as previously described in paragraph 3.17. The local data set is then placed in the self-test mode. The local data set pattern generator is used to send a signal to the distant end, where it is looped back and retransmitted. The error-detecting circuitry causes the MC indicator on the local data set to blink when an error is detected in the received data.

INTERFACE

3.20 The customer interface is accessible through a 25-pin female connector at the rear of the mounting. The pin assignments, lead designations, and lead descriptions are given in Table A.

3.21 The telephone interface is accessible through a 25-pin male connector at the rear of the mounting. The pin assignments, lead designations, and lead descriptions are given in Table B.

OPTIONS

3.22 The DS 212AR is provided with a number of features or options which may be requested by the user. Some of these features are available as customer options; others are available as telco engineering options.

3.23 Options are installed and removed by means of switches on the circuit board and by a screw switch on the backplane. Refer to Table C for a summary of data set options. Refer to Section 592-039-200 for a more complete description of the data set options.

4. OPERATION

4.01 A call may be originated either automatically with an automatic calling unit (ACU) or manually with the associated telephone set. Either manual or automatic answer may be used to receive a call; however, when a call is manually answered, manual calling must be used. The call setup procedures are the same for high- or low-speed operation.

A. Manual Call/Manual Answer

4.02 The procedure for manual call/manual answer is as follows:

(a) The calling attendant picks up the telephone handset, depresses the appropriate line key, and after hearing dial tone, dials the number of the distant data station.

(b) At the called data set, ringing is heard, the CE (ring indicator) circuit turns ***on***, and the appropriate line lamp lights when ringing voltage is applied. The attendant answers the call by depressing the appropriate line key, picking up the handset, and establishing voice contact with the calling attendant.

(c) Both attendants verify that the CD (data terminal ready) circuit is ***on*** (TR lamp on data set lighted). The calling attendant verifies that the proper speed mode has been selected.

(d) To transfer to the data mode, both attendants momentarily depress the nonlocking DATA key on the telephone set so that the line key releases and the line lamp lights. Both attendants place the handset on-hook.

> ***Note:*** Either attendant can depress the DATA key first. However, if the called data set enters the data mode first, the calling attendant must depress the DATA key within 15 seconds to prevent the called data set from aborting the call.

(e) When the data mode is entered, the line lamp lights, the MR lamp on the data set lights, and the CC (data set ready) circuit turns ***on.***

TABLE A

CUSTOMER INTERFACE

PIN NO.	EIA DESIG	FUNCTION	SIGNAL ORIGINATED BY CPE OR BY DS
1	—	Not Connected	
2	BA	Send Data (SD) (Note 1)	CPE
3	BB	Receive Data (RD) (Note 1)	DS
5	CB	Clear-to-Send (CS) (Note 2)	DS
6	CC	Data Set Ready (DSR) (Note 2)	DS
7	AB	Signal Ground (SG)	Ground
8	CF	Received Line Signal Detector (RLSD) (Note 2)	DS
9	—	+P	DS
10	—	—P	DS
12	CI	Speed Indication (CI) (Note 3)	DS
15	DB	Transmit Clock (SCT)	DS
17	DD	Receive Clock (SCR)	DS
18	(CN)	Make Busy/Analog Loop (Optional Pin)	DS
20	CD	Date Terminal Ready (DTR) (Note 2)	CPE
22	CE	Ring Indicator (RI) (Note 5)	DS
23	CH	Speed Select Originate	DS
24	DA	External Transmit Clock (SCTE)	CPE
25	CN or TM	Make Busy/Analog Loop or Test Mode (Note 4)	CPE

Note 1: Space = +V; Mark = —V

Note 2: ON = +V; OFF = —V

Note 3: High Speed = +V; Low Speed = —V

Note 4: Loopback = +V; Normal Use = -V

Note 5: Ringing = +V; No Ringing = —V

B. Manual Call/Automatic Answer

4.03 The procedure for manual call/automatic answer is as follows:

(a) The calling attendant picks up the telephone handset, depresses the appropriate line key, and after hearing dial tone, dials the number of the distant data station.

(b) At the called station, the CE (ring indicator) circuit turns ***on,*** and the appropriate line lamp lights when ringing voltage is applied.

(c) If the CD (data terminal ready) circuit is ***on*** and option ZH (automatic answer—IN) is installed, the distant data set answers automatically at the end of the ringing cycle, turns ***on*** the CC (data set ready) circuit, and

TABLE B

TELEPHONE AND ACU INTERFACE

PIN NO.	DESIGNATION	FUNCTION
1	L	Telephone set line lamp control from data set
2 3	MB1 MB	Make busy relay contact in data set
4	LG	Ground from data set for telephone set line lamp
5	TD	Talk/data lead from telephone set to data set
7	T	Telephone line tip
8	R	Telephone line ring
12	RD	Data set ring detector contact closure to ground
14	C	Data mode indication contact closure to ground for DAS 801C
16	D1	Data mode contact closure to ground to data set from DAS 801-type
21	T1	Tip of telephone set
22	R1	Ring of telephone set
23 24	A A1	"A" lead control for KTU or ACU applications
25	TDG	Data set ground return for TD control signal

lights the MR lamp on the data set and the line key lamp on the telephone set.

(d) At the calling station after a 2-second silent interval, the attendant hears the high-pitched answer tone (2225 Hz) transmitted by the distant data set. After verifying that the CD (data terminal ready) circuit is ***on*** and selecting the speed mode, the calling attendant transfers to data mode by depressing the DATA key on the telephone set until the line key releases and the line lamp lights. The CC (data set ready) circuit turns ***on.***

Note: Transfer to data mode must take place within 15 seconds after the answer tone begins.

(e) The calling attendant places the handset on-hook.

C. Automatic Calling/Automatic Answering

4.04 The procedure for automatic calling and answering is as follows:

(a) An ACU originates the call and detects the answer tone from the distant DS 212AR.

(b) Provided the CD (data terminal ready) circuit is ***on,*** the ACU causes the local data set to transfer to the data mode at the beginning of the answer tone.

(c) When transfer is complete, the telephone set line lamp lights and the CC (data set ready) circuit in the data set turns ***on.***

D. Data-to-Talk Transfer

4.05 Transferring the telephone line back to the telephone handset can be accomplished by depressing the line key for the appropriate telephone line and lifting the handset. DS 212AR immediately

TABLE C

DATA SET 212AR OPTIONS

FEATURE	OPTION	DESCRIPTION	SWITCH SETTING											PROVIDE
			S1 SWITCH CONTACTS											
			1	2	3									
Tip, Ring Make Busy	F	IN	X	—	—									One per set
	E*	OUT	O	—	—									
CC Indication for Analog Loop	ZF*	ON	—	—	X									One per set
	ZE	OFF	—	—	O									
						SWITCH CONTACTS								
			S2									S5		
			1	2	3	4	5	6	7	8	9	1	2	
Speed Control	XJ	INTERFACE	O	—	—	—	—	—	—	—	—			One per set
	XK*	HS BUTTON	X	—	—	—	—	—	—	—	—			
Interface Controlled Make Busy/Analog Loop-CN	YE	IN	—	O	—	—	—	—	—	—	—			One per set
	YF*	OUT	—	X	—	—	—	—	—	—	—			
Transmitter Timing	YC*	INTERNAL	—	—	O	O	—	—	—	—	—			One per set
	YD	EXTERNAL	—	—	O	X	—	—	—	—	—			
	WI	SLAVE	—	—	X	O	—	—	—	—	—			
1200-bps Operation	YG*	ASYNC/START-STOP	—	—	—	—	O	—	—	—	—	O	O	One per set
	YH	SYNC	—	—	—	—	X	—	—	—	—	X	X	
Character Length (Use With YG)	YI	9-BIT	—	—	—	—	—	O	—	—	—			One per set
	YJ*	10-BIT	—	—	—	—	—	X	—	—	—			
Receiver Responds to Digital Loop	YK*	IN	—	—	—	—	—	—	O	—	—			One per set
	YL	OUT	—	—	—	—	—	—	X	—	—			
Interface Controlled Remote Digital Loop	XL	IN	—	—	—	—	—	—	—	X	—			One per set
	XM*	OUT	—	—	—	—	—	—	—	O	—			
			S3 SWITCH SETTINGS											
			1	2	3	4	5	6	7	8				
Loss of Carrier Disconnect	S*	IN	X	—	—	—	—	—	—	—				One per set
	R	OUT	O	—	—	—	—	—	—	—				
Receive Space Disconnect	V*	IN	—	X	—	—	—	—	—	—				One per set
	Y	OUT	—	O	—	—	—	—	—	—				
CB and CF Indications	A*	COMMON	—	—	X	—	—	—	—	—				One per set
	B	SEPARATE	—	—	O	—	—	—	—	—				
Send Space Disconnect	T*	IN	—	—	—	X	—	—	—	—				One per set
	U	OUT	—	—	—	O	—	—	—	—				
Automatic Answer	ZH*	IN	—	—	—	—	O	—	—	—				One per set
	ZG	OUT	—	—	—	—	X	—	—	—				
Answer Mode Indication	X	CE ON	—	—	—	—	—	X	—	—				One per set
	W*	CE OFF	—	—	—	—	—	O	—	—				
Speed Mode	YO	HIGH	—	—	—	—	—	—	X	—				One per set
	YP*	DUAL	—	—	—	—	—	—	O	—				
Interface Speed Indication - CI	YQ	IN	—	—	—	—	—	—	—	X				One per set
	YR*	OUT	—	—	—	—	—	—	—	O				
			STRAPPING OPTIONS											
CN and TM Assignments	XO*	CN 25, TM NC	INSTALL E1 - E2, E3 - E4											One per set
	XN	CN 18, TM NC	INSTALL E1 - E2, E4 - E5											
	XR	CN 18, TM 25	INSTALL E2 - E3, E4 - E5											
Signal Ground to Frame Connection	Q*	IN	S1 CLOSED											One per 47D2 DM
	P	OUT	S1 OPEN											

X = Contact Closed — = Contact Not Applicable O = Contact Open * = Factory-Provided

terminates the data mode, which includes removing carrier from the channel. If the distant data set is equipped to disconnect on loss of carrier, this transfer may cause it to disconnect and go on-hook. If the data set is in the answer mode when the transfer to the talk mode is made, it stores this fact internally so a transfer back to the data mode can be made as an answering station.

E. Data Call Termination

4.06 ***DTR Control:*** The local DS 212AR enters an irreversible disconnect sequence when the CD (data terminal ready) circuit is turned ***off*** during the data mode for more than 50 ms, unless the data set is in certain test modes. If option U (send space disconnect—OUT) is installed, the CC (data set ready) circuit turns ***off*** 68 ±10 ms after the CD circuit turns ***off.*** If option T (send space disconnect—IN) is installed, then the data set enters the space transmit sequence. The CD circuit can be turned ***on*** any time after the 50-ms required ***off*** interval.

4.07 ***Send Space Disconnect:*** If option T (send space disconnect—IN) is installed, the space transmit sequence is initiated by either of two conditions.

- The CD (data terminal ready) circuit is turned ***off*** for at least 50 ms.
- Option S (loss of carrier disconnect—IN) is installed and the carrier detector is turned ***off*** for at least 307 ms.

When the space transmit sequence begins, the transmit data lead is clamped to the spacing condition and the CF (received line signal detector) circuit is turned ***off.*** After 3.95 ±0.15 seconds have elapsed, DS 212AR disconnects from the telephone line and the CC (data set ready) circuit turns ***off.*** The sequence cannot be interrupted by any condition of the CD (data terminal ready) circuit or a restoration of received carrier. It is possible to transfer to the talk mode before the 4-second time interval has elapsed and not lose the telephone connection.

4.08 ***Carrier Fail Disconnect:*** The installation of option S (loss of carrier disconnect—IN) causes DS 212AR to terminate a data call when a substantial loss of received carrier is detected. The CC (data set ready) and CB (clear to send) circuits turn ***off*** 433 ±17 ms after the carrier falls below the carrier detector threshold, disconnecting the telephone line. If the carrier is interrupted for less than 175 ms, a disconnect does not occur; if a carrier interrupt lasts for more than 307 ms, a disconnect always occurs. The CF (received line signal detector) circuit turns ***off*** 17 ±7 ms after the loss of carrier, and turns ***on*** 155 ±50 ms after carrier is restored. If DS 212AR is put into the digital loop test mode by a remote DS 212AR, the loss of carrier disconnect option is forced to the IN condition electronically for the remainder of the data call.

4.09 ***Receive Space Disconnect:*** When option V (receive space disconnect—IN) is installed, DS 212AR disconnects the data call when the BB (received data) circuit remains in a spacing condition for 1.6 ±0.15 seconds. At the time of disconnect, the CC (data set ready), CB (clear to send), and CF (received line signal detector) circuits turn ***off*** and the data set goes on-hook. If the remote digital loop feature is activated in DS 212AR, the receive space disconnect option is forced to the OUT state internally. At the DS 212AR which is put into the digital loop test mode, the option is also forced to the OUT condition. These overrides exist only as long as DS 212AR is in the test mode.

4.10 ***Abort Disconnect:*** The abort disconnect feature is not optional, but is always activated when DS 212AR is transferred to the data mode as an answering data set. From the time that the CC (data set ready) circuit turns ***on,*** received carrier must be detected within 17.87 ±0.15 seconds or the data set goes on-hook.

4.11 ***Manual Disconnect:*** A manual disconnect can be forced by the attendant by first transferring to the talk mode, then placing the handset on-hook. This method of disconnecting overrides all of the others, and works for either the originating or answering data sets.

5. REFERENCES

5.01 The following Bell System Practices provide additional information concerning DS 212AR.

SECTION	TITLE
592-039-200	Data Set 212AR Transmitter-Receiver—Installation and Connections
592-039-500	Data Set 212AR Transmitter-Receiver—Test Procedures