DATA SET 113C-L1/2
TRANSMITTER-RECEIVER
SINGLE SET
DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section describes the physical and functional characteristics of data set (DS) 113C-L1/2 (Fig. 1). General operating information is included for single set installations. The 590-010-ZZZ layer provides examples and guidelines to be followed for station arrangements that include multi-set arrangements in 40A-type data mounting(s) and cabinet.

Fig. 1—DS 113C-L1/2 With 2565HK Telephone Set

1.02 When this section is reissued, this paragraph will contain the reason for reissue.

1.03 DS 113C-L1/2 is intended for use on 2-wire switched network circuits at speeds up to 300 baud.

1.04 The following is a specification summary for DS 113C.

Operation: Nonsynchronous, binary, serial, full-duplex on 2-wire switched network.

Modulation: Frequency shift keying.

Rate: Up to 300 baud.

Modes: Originate only.

Customer Interface Connection: EIA Standard RS-232-C. Customer-provided equipment (CPE) must connect via a 25-pin Cinch or Cannon DB-19604-432 (male) connector plug with Cinch DB-51226-1 hood (or equivalents). Interface cable should be less than 50 feet long per EIA Standard RS-232-C recommendations.

Power: 105 to 129 Vac at 57 to 63 Hz, approximately 8 watts.

Environment: Ambient temperature = 40 to 120°F, relative humidity = 20 to 95 percent.

Note: These environmental operational limits are valid only under the condition that no condensation occurs.

Dimensions and Weights: DS 113C-L1 overall dimensions are 5.6 inches wide, 10.4 inches long, and 1.5 inches high. The assembly weighs approximately 2 pounds. DS 113C-L1/2 dimensions are 5.8 inches wide, 10.9 inches long, and 2.2 inches high. The weight is approximately 5 pounds.

Compatibility: DS 113C is compatible with answer-only data sets such as DS 113B and 113D. It can also originate calls to originate-answer sets such as DS 212A and 103-type.

Installation Configurations: Single set or multiple, manual and/or automatic calling, manual answer.

Testing: Local self test, analog loopback, digital loopback, and end-to-end self test.

2. PHYSICAL DESCRIPTION

2.01 List code designations have been assigned to DS 113C as follows:

- ***DS 113C-L1:*** Printed circuit pack assembly shown in Fig. 2.
- ***DS 113C-L1/2:*** Printed circuit pack assembly DS 113C-L1 and 47F1 data mounting. The 47F1 data mounting consists of a housing assembly, power cord, transformer, and M13F cord.

A. DS 113C-L1

2.02 This list code specifies the basic data set. DS 113C-L1 consists of two printed circuit boards interconnected by two flexible cables. The overall dimensions are 1.5 inches high, 5.6 inches wide, 10.4 inches long, and the weight is 2 pounds. A faceplate is provided which contains the status indicators and the three test switches. All interconnections to the circuit packs are made via a plug at the rear of the board.

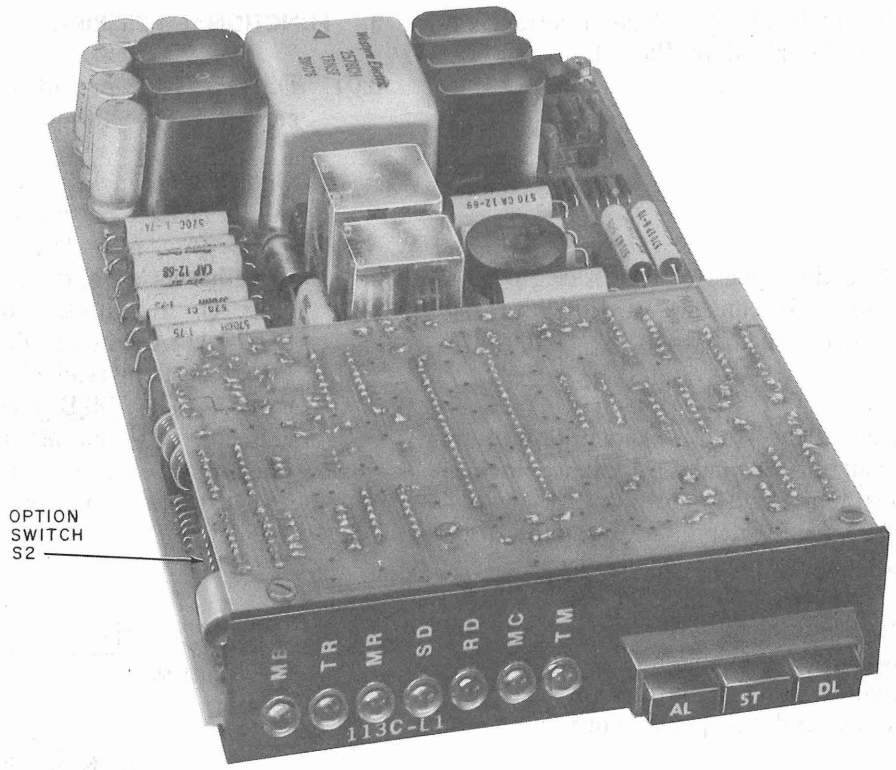


Fig. 2—DS 113C-L1

2.03 The test switches perform the same function in DS 113C-L1 as in DS 113C-L1/2. The status indicators perform the same function; however, in DS 113C-L1 the light emitting diodes (LEDs) are viewed directly, while in DS 113C-L1/2 the LEDs illuminate dropout graphics. The options are the same for both codes except that the common ground options are made on their respective data mountings.

2.04 The indicators are described as follows:

- MB (Analog Loop): Lighted when the CN lead is turned ***on*** by the CPE, if the ST and DL buttons are released; or when the AL test button is operated.

- TR (Terminal Ready): Lighted when the data terminal ready (CD) lead is ***on.***

- MR (Modem Ready): Lighted when the data set ready (CC) lead is ***on.***

- SD (Send Data): Lighted when the transmitted data (BA) lead is spacing.

- RD (Receive Data): Lighted when the received data (BB) lead is spacing.

- MC (Modem Check): Lighted in any of the following situations:

  (1) In idle mode if power is present

  (2) In data mode if carrier has not been detected

  (3) In self test if test fails.

  Note: May be lighted for first few seconds while handshaking.

- TM (Test Mode): Lighted when one or more of the AL, ST, or DL switches is depressed.

2.05 The data set is equipped with three locking pushbutton switches on the faceplate, which are used to test the data set. These switches are the depress-to-operate and depress-to-release type, and are designated AL (analog loopback), ST (self

test) and DL (digital loopback). The functions of these switches are described in Part 4.

B. DS 113C-L1/2

2.06 This list code specifies the single set configuration. It consists of the data set previously described, enclosed in a 47F1 data mounting.

2.07 The data mounting is an extruded aluminum shell measuring 2.2 inches high, 5.8 inches wide, 10.9 inches long, and weighing 2.3 pounds (3.2 with KS-21239 transformer). The data mounting and data set plus transformer weigh approximately 5 pounds. The front cover is molded black plastic with seven translucent designations and a cutout for the test switches. The rear cover is also molded black plastic, with a cutout for the two interface connectors and the power cord.

2.08 A KS-21239-L4 transformer, which is attached to the mounting by a power cord, a transformer mounting screw, and an M13F set cord, is included with the mounting. The transformer plugs into a standard nonswitched 117-volt 60-Hz, 3-wire grounded outlet. It is equipped with a tab which should be secured to the outlet (where allowed by local electrical codes) to prevent inadvertent removal of power from the data set.

Caution: If the outlet has a metal cover, do not remove the center screw to mount the transformer. When this screw is removed, it is possible for the metal cover to fall across the prongs of the transformer.

2.09 The status indicators are LEDs. When DS 113C-L1 is placed in its mounting with the covers installed, the LEDs illuminate "dropout" graphics on the front cover. Dropout graphics provide for the appearance of the 2-letter abbreviation when the indicator is lighted and a continous black opaque surface when the indicator is off.

2.10 Installer options are accomplished by setting the position of individual switches on multiple section rocker assembly S2 and screw switch S1 on the data mounting. Refer to Section 591-041-200 for installation of options.

3. FUNCTIONAL DESCRIPTION

3.01 DS 113C-L1/2 provides 300-baud originating service in the following configurations:

- One data set enclosed in a 47F1 data mounting and a 565HK or 2565HK key telephone set (Fig. 3). Any 801C-type ACU may be installed as an option, using a 149B adapter (Fig. 4). Installation of DAS 801C-L1/2 or 801C-L1/2A can be simplified by using an M15H cord instead of the M13G and M13F cords. The 149B adapter is not needed (Fig. 5). If the M15H cord is used, the telephone set is not required when manual operation and voice communications are not needed.

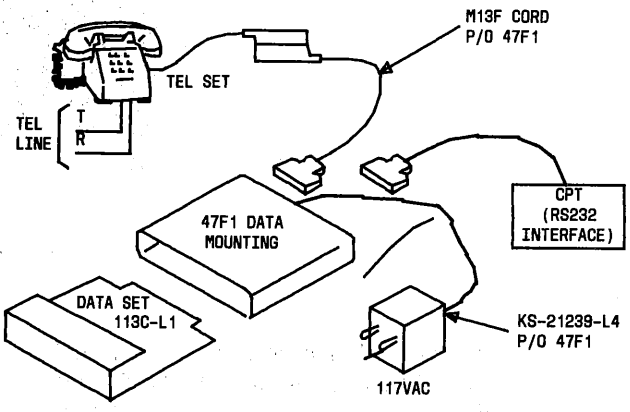


Fig. 3—Single Data Set Installation Without ACU

- A maximum of five data sets in an individual data mounting sharing a single telephone set via a KS-21253-L3 adapter (Fig. 6).

A. Customer Interface

3.02 The customer interface conforms to EIA Standard RS-232-C. The 25-pin female connector is not part of the data set card but is provided on the mounting (Fig. 7). The connector pin designations and functions are listed in Table A.

3.03 All other interface connector pins on the mounting are unused. As specified in EIA Standard RS-232, connector pins 9 and 10 are not to be used by the CPE. An additional interface circuit, CN on pin 25, is provided, as it is in DS

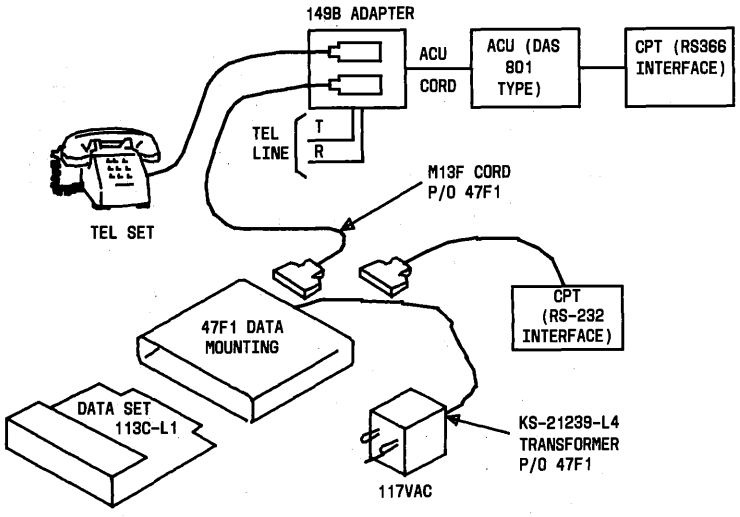
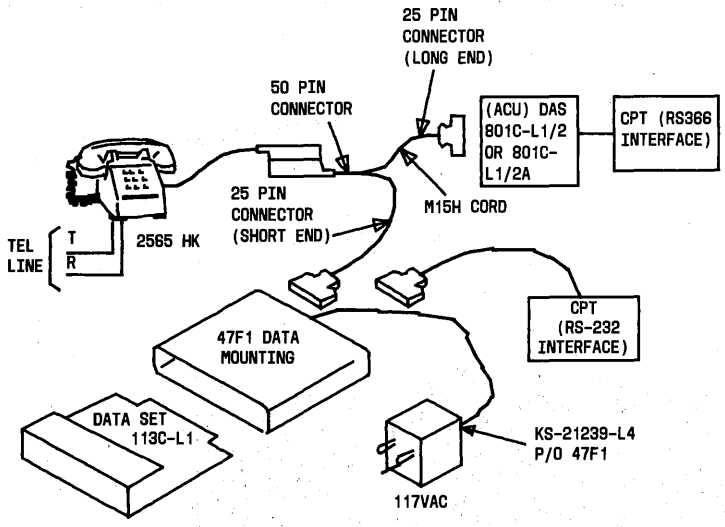


Fig. 4—Single Data Set Installation With New Family ACU



SINGLE SET INSTALLATION WITH NEW FAMILY ACU

NOTE:
A 149B ADAPTER, AN M13G CORD AND M13F CORD CAN BE USED INSTEAD OF AN M15H CORD.

Fig. 5—Single Data Set Installation With 801C ACU

103J and 113D. Its function is to activate the analog loop feature via the interface, but no make-busy features are provided.

B. Telephone Interface

3.04 A plug is provided on the mounting for all telephone company connections (Fig. 7). The plug pin designations and functions are itemized in Table B.

C. Options

3.05 Table C provides a listing of DS 113C-L1/2 options.

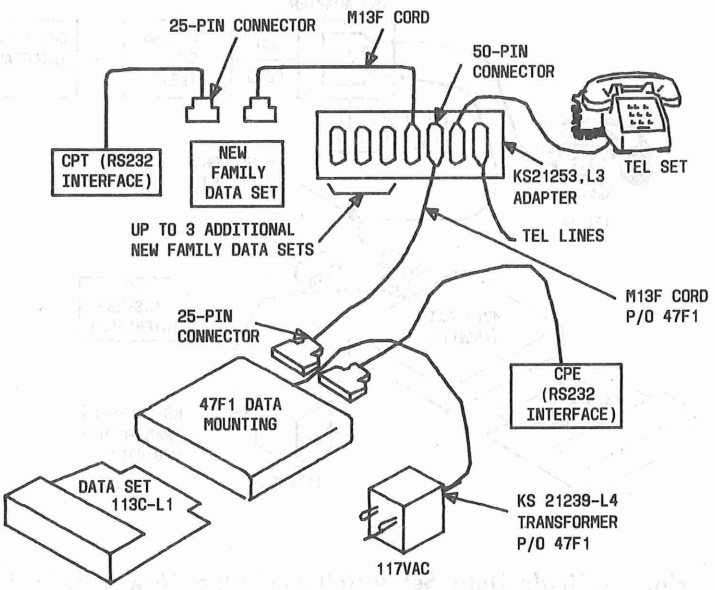


Fig. 6—DS 113C-L1/2 Sharing Telephone Set With up to Five Other New Family Data Sets

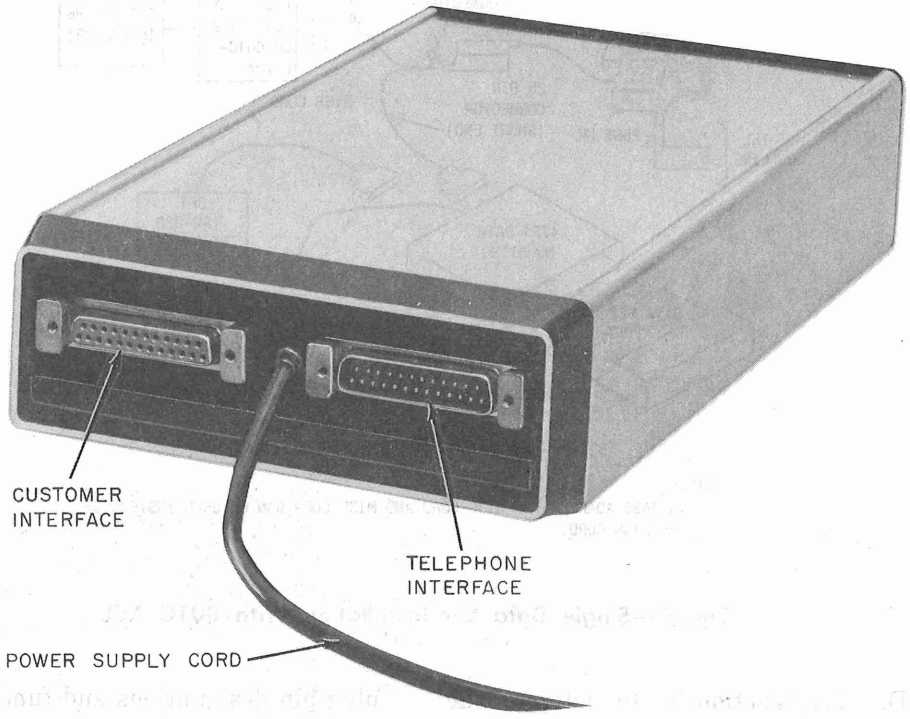


Fig. 7—DS 113C-L1/2—Rear View

TABLE A

CUSTOMER INTERFACE

EIA DESIG-NATION	CIRCUIT	CP CONNECTOR PIN ASSIGNMENT	CUSTOMER INTERFACE CONNECTOR PIN ASSIGNMENT
AA	Protective Ground	—	Note 1
BA	Transmitted Data	2	2
BB	Received Data	3	3
CB	Clear to Send	5	5
CC	Data Set Ready	6	6
AB	Signal Ground	7	7
CF	Data Carrier Detector	8	8
+P	Data Set Test (+12V)	27	9
—P	Data Set Test (—12V)	26	10
—	Not Used	—	11 } Note 2
—	Not Used	—	19 }
CD	Data Terminal Ready	22	20
CN	Analog Loop	25	25

Note 1: Not wired in connector but available in data mounting.

Note 2: Pin 19 is connected to pin 11 in the housing. This circuit is not used in low-speed data sets.

Note 3: All other interface connector pins on the mounting are unused. As specified in EIA Standard RS-232, connector pins 9 and 10 are not to be used by the CPE.

D. General Operation

3.06 DS 113C-L1/2 is a single mode data set, suitable for originating calls. The frequencies used are as follows:

Transmit: f_1 mark—1270 Hz
f_1 space—1070 Hz
Receive: f_2 mark—2225 Hz
f_2 space—2025 Hz

E. Originating a Call

3.07 Either of the following methods may be used to originate a data call:

(a) The associated telephone set is used in the normal way to establish a telephone connection to a DS 103-type, 113B, 113D, or 212A at the far end. If the call is answered in the telephone mode, the caller requests a transfer to the data mode; if the called station is arranged for automatic answer, it answers in the data mode. In either case, an f_2 mark tone is heard by the caller, who then depresses the data key on the telephone.

(b) An alternate way to originate a call is via an optional automatic calling unit (ACU). In this case, the dialing of the call and the subsequent monitoring for f_2 mark tone is accomplished by the ACU, which puts DS 113C in the data mode. For either method, the originating data set when going into the data mode does the following:

(1) Turns ***on*** the CC lead when going off-hook, provided option ZD (CC indication early)

TABLE B

TELEPHONE AND ACU INTERFACE

DESIG-NATION	DESCRIPTION	CIRCUIT PACK CONNECTOR PIN ASSIGNMENT	P1 PLUG PIN ASSIGNMENT
L	Tel set line lamp voltage from data set	18	1
LG	Tel set line lamp control from data set	35	4
TD	Talk/data control from tel set	14	5
R	Tel line tip lead	20	7
C	Contact closure to ground from data set to ACU to indicate data mode	15	14
D1	Contact closure to ground from ACU to data set to place set off-hook	16	16
T1	Tel set tip lead	34	21
R1	Tel set ring lead	33	22
A, A1	Used to provide the talk indication to ACU	37, 38	23, 24
TDG	Ground lead	36	25
RT	Remote test (Note 1)	17	—

Note 1: Used in 40A-type data mounting only.

is installed, and monitors the line for an f_2 mark tone.

(2) When a continuous f_2 mark is detected, the data set does the following within a short time interval:

- Turns ***on*** the CF lead.
- Turns ***on*** the CC lead, provided option ZC (CC indication delayed) is installed.
- Removes the marking clamp on the BB lead.
- Applies an f_1 mark to the line.
- Turns ***on*** the CB lead. As soon as the CB lead is ***on***, the CPE can send data.

(3) If f_2 mark is not received within 14 ±4 seconds, an abort timer automatically disconnects the set.

F. Answering a Call

3.08 Voice calls can be answered in the normal way by using the associated telephone set. If the call is originated from an answer-only data set such as a 113D, a data call can be established. After the far-end data set has been transferred into the data mode and an f_2 mark tone is heard, the called attendant can proceed to put DS 113C into the data mode.

G. Mode Compatibility

3.09 DS 113C can originate a call to any DS 212A, 103- or 113-type except an originate-only set such as DS 113A or another 113C. It can be called from an answer-only data set such as the 113D. If a call were originated from a DS 103-type or 212A to a 113C, both sets would be in the originate mode, and a glare (wrong mode) condition would exist. If the call were originated by a DS 103J, that set could be switched to the answer mode; however, such a procedure is only recommended

TABLE C

DS 113C OPTIONS

FEATURE		OPTION
Receive Space Disconnect	YES NO	V* Y
Send Space Disconnect	YES NO	T* U
Loss of Carrier Disconnect	YES NO	S* R
CC Indication	EARLY DELAYED	ZD* ZC
CB and CF Indications	COMMON SEPARATE	A* B
CC Indication for Analog Loop	ON OFF	ZF* ZE
Common Grounds	YES NO	Q* P

* Factory-furnished option

when carried out by Telco craft employees for test purposes in accordance with procedure specified in Section 591-038-100.

H. Carrier in Data Mode

3.10 In the data mode, any frequency in the band keeps the carrier detector ***on.*** A loss for approximately 10 ms results in CF being turned ***off*** and BB clamped to mark. CB either goes ***off*** or stays ***on*** during periods of carrier fail, depending on the option selected. Any in-band signal of sufficient amplitude and duration is capable of restoring the carrier detector to the ***on*** state.

I. Disconnecting the Data Set

3.11 There are four ways by which DS 113C can be disconnected.

(1) The data set can be disconnected by turning the CD lead ***off*** for at least 50 ms. Provided option T is installed, the data set then transmits 3 ±1 seconds of spacing signal prior to disconnecting.

(2) Provided option V is installed, the data set disconnects upon receipt of a continuous space disconnect signal of at least 2.0 seconds.

(3) If option S is installed, the data set disconnects when incoming carrier is lost for approximately 250 ms.

(4) The data set may also be manually disconnected by using the associated telephone.

J. Telephone Sets

3.12 As indicated in Fig. 3 through 6, the 565HK or 2565HK telephone sets can be used with the 47F1 data mounting. As described in the 590-010-ZZZ BSP layer, a 565HK, 2565HK, 830C, or 2830C telephone set may be used with one 40A2 data mounting, and the 831C or 2831C with two data mountings. The 662A1 or 2662A1 telephone set may be substituted for the 565HK or 2565HK telephone set if a card reader is required.

3.13 The operation of all telephone sets is similar. One locking line key is associated with each

particular data set and its telephone line. Depressing the line key and lifting the handset makes the telephone set available for dialing or answering calls and for talking. The lamp under the key does not light in the talk mode.

3.14 To transfer a call from the talk mode to the data mode, momentarily depress the nonlocking red data key. This key is used for all data sets sharing the telephone set. The lamp under the line key lights whenever the associated data set is off-hook. The handset may be replaced during the data call.

3.15 To transfer a call from the data mode to the talk mode, depress the associated line key and pick up the handset.

3.16 A data call may be manually disconnected by entering the talk mode and then replacing the handset.

3.17 During ringing on any line, the lamp under the associated line key flashes at the ringing rate.

3.18 For installations where only ACU dialing and/or automatic answering is used and the talk mode is not required, the telephone set can be omitted. Nevertheless, its use is recommended for ease of maintenance.

K. Performance

3.19 The performance of DS 113C over the switched telephone network is as good as or better than the performance of the older 103-type or 113A sets. The transmit level is fixed at a nominal -9.75 dBm into a 600-ohm line and will not exceed -9 dBm. It can receive at any level between 0 and -50 dBm, and detects loss of carrier when the signal falls below this level, typically at -53 dBm.

L. Status Lamps

3.20 DS 113C-L1 is equipped with seven status lamps. These are useful for checking the status of the data set, for observing the progress of a call and the exchange of data, and for checking the results of tests. The lamps are designated as follows:

MB—Analog Loop

TR—Terminal Ready

MR—Modem Ready

SD—Send Data

RD—Receive Data

MC—Modem Check

TM—Test Mode.

3.21 These lamps and the associated line keys light as follows.

Data Set in Idle Mode (On-Hook, All Test Buttons Released), or Talk Mode

- MC is lighted.
- TR is lighted if CD lead (data terminal ready) is ***on.***
- SD is lighted if BA lead (send data) is spacing.

Note: The MC lamp in idle mode serves as a "power on" indication. No ON lamp is provided.

Ringing

- MC is lighted.
- TR is lighted if CD lead is ***on.***
- SD is lighted if BA lead is spacing.

Entering the Data Mode

- MC is lighted.
- SD is lighted if BA lead is spacing.
- TR is lighted (CD lead must be ***on,*** otherwise the set cannot enter the data mode).
- The line key lamp lights.
- MR lights when the data set goes off-hook.
- MC goes off when the CF lead is turned ***on.***

Data Mode

- TR and MR are lighted.
- SD lights whenever the CPE applies a space on the BA (send data) leads.
- RD lights whenever the data set receives a space and the BB (receive data) lead is spacing.

Note: A steady mark on BA or BB can be recognized by a nonlighted SD or RD lamp. Data transmission can be detected by a flickering lamp. Reversals at rates above 60 baud may look like a steadily lighted lamp.

Test Modes

- TM lights if any of the test keys of the data set are depressed, and serves as an indication to the attendant that a manual operation is required to restore the set to normal. On a test initiated by turning ***on*** of the CN lead (analog loop) by the CPE, TM does not light.

Analog Loop Test

- MB lights if an analog loop test is requested, either by depressing the AL button or applying a positive potential to the CN lead. (MB is an acronym for "made busy," a carryover from DS 103J and 113D.)

M. Installation and Maintenance

3.22 No special tools are required at installation.

3.23 DS 113C does not require routine maintenance or adjustments. Troubles isolated to the set should be cleared by data set replacement.

4. TEST FEATURES

A. Test Buttons

4.01 The data set is equipped with three push-to-operate, push-to-release buttons which are accessible at the front panel. The buttons are designated as follows:

AL—Analog Loopback

ST—Self Test

DL—Digital Loopback.

B. Analog Loopback Test

4.02 This test can be initiated by either of two methods:

- The AL button is operated.
- CPE applies an ***on*** condition to the CN lead.

4.03 In the analog loopback test mode, the data set is isolated from the telephone line, with the exception of the ringing frequency impedance network. During this test, the data set circuits are modified to keep both the transmitter and the receiver in the f_2 mode. The output of the transmitter is looped via an attenuating circuit to the receiver.

4.04 The test is performed in the following manner.

(a) The AL button is depressed or the CN lead is turned ***on*** by the CPE. If at this time the CD lead is ***off,*** the MC and MB lamps are lighted, indicating that an idle data set is in the AL test mode. The TM lamp is also lighted if AL is depressed, and the SD lamp is off only if the BA lead is marking.

(b) When the CD lead is turned ***on,*** the data set goes through the "handshaking" sequence. The TR and MR lamps light and after a slight delay, the MC lamp goes off and the CB and CF leads are turned ***on.***

Note: If option ZE is installed, the CC lead remains ***off*** per RS-232-C for the duration of the test. If option ZF is installed, the CC lead is turned ***on*** for the duration of the test. Some terminals require the CC ***on*** indication to be able to proceed with this test.

(c) The CPE can now send data signals which will be modulated by the transmitter, looped back to the receiver, demodulated, and presented to the CPE via the BB lead. In this way the CPE, in a full duplex mode, can test both the complete operation of the data set and its own capability to generate and read data signals.

The data signals may be observed at the SD and RD lamps.

(d) Release of the AL button and/or turning ***off*** of the CN lead restores the station and lamps to normal.

C. End-to-End Self Test

4.05 Operation of the ST button turns ***off*** the CC, CB, and CF leads, opens the BA and BB leads, and arranges the data set circuits to ignore the CN and CD leads from the CPE. It simulates internally the ***on*** condition of the CD circuit, and connects a square wave (reversals) signal generator of about 300 baud to the transmitting circuits and a bias detector to the output of the receiver.

4.06 To perform an end-to-end self test, a call is set up to another DS 100-type equipped with a self test button. The ST buttons are operated at both ends, and the data mode is entered in the normal way. The test can be performed with or without a terminal connected to the data set. The TR lamp continues to monitor the terminal and can be ignored. The TM, SD, and MC lamps are lighted. When entering the data mode, the MR and RD lamps light, and the MC lamp goes off only if the signal from the far end is received with less than 35 percent distortion. Similarly, the MC lamp at the far end indicates the proper reception of the square wave generated at the near-end data set. On noisy connections, the MC lamp may go off but flash on occasionally, indicating a "hit" or error.

4.07 A similar test may be conducted when the set is connected to a testboard, with the testboard using a square wave (reversals) generator and a bias indicator. It should be noted that some TMS bias indicators will give excessive readings if the speed setting of the indicator differs from the actual speed of the generator. At DS 113C, the speed is held to 300 ±15 baud. The built-in bias detector of DS 113C is speed-insensitive.

4.08 If the far-end data set does not have a self test button but is provided with a digital loopback feature, it is still possible to make an end-to-end test, but the results may be ambiguous. Have the far-end data set placed in the digital loopback mode and depress the ST button on the near-end DS 113C. The square wave signal makes one complete round trip, and the signal detector of DS 113C checks if the round-trip distortion exceeds 35 percent. If the MC lamp goes off now, there is a very strong indication that both data sets and the line facilities are satisfactory.

> ***Note:*** There is a slight possibility that the bias may be excessive in at least one direction, but that this bias is compensated for by bias of the opposite polarity in the other direction.

A successful test indicates that all circuits of both data sets seem to be working. If the MC lamp does not go off, the only conclusion that can be drawn is that the round-trip distortion exceeds 35 percent. As the bias distortion in the two directions of transmission may be additive, no conclusion about the proper operability of the sets and the line facilities can be drawn.

D. Local Self Test

4.09 By operating the ST and then the AL button, a local self test can be performed. The effect on the telephone line and the telephone set is outlined in 4.03, and the effect on the CPE is outlined in 4.05.

4.10 In the local self test, an internal CD ***on*** condition is applied; the data set goes through the "hand-shaking" sequence; and a data signal is applied to the transmitter, looped back to the receiver (both in the f_2 mode), and the demodulated signal is checked by the bias detector. In this way, most of the circuits of the data set are checked. The MC lamp goes out after a short delay if the bias of the received signal is under 20 percent, indicating proper operation of the set.

E. Digital Loopback Test

4.11 A digital loop-back test is normally set up at the request of the test center. Operation of the DL button turns ***off*** the CC, CB, and CF leads, clamps the BB lead marking, and arranges the data set circuits to ignore the BA and CD leads from the CPE. It simulates internally the ***on*** condition of the CD circuit, and internally loops BB to BA. When a data call is established between the test center and the data set, the test center can measure the round trip data distortion.

4.12 The digital loopback test can also be set up between two data sets, as described in 4.08.

During the test, TR monitors the CD lead and SD monitors the BA lead; MB, RD, and MC lamps are off; and MR and TM lamps are lighted.

4.13 The set must be manually restored to normal by releasing the DL button.

5. OPERATION

A. Manually Originating a Call

5.01 To originate a call manually, perform the following:

- Depress the appropriate line button and lift handset.
- Listen for dial tone.
- Dial the call in the usual way.
- If the call is answered in the talk mode, request a transfer to the data mode. If the called station is arranged for automatic answer, it will answer in the data mode. In either case, an f_2 (2225 Hz) mark tone should be heard by the caller.
- If the TR lamp is lighted, depress the red data key on the telephone set. The line key lights and remains lighted.

Note: If the data key is depressed when TR is not lighted, the call will be lost.

- On the data set, the MR lamp lights and the MC lamp goes off.
- Data transmission can begin.
- The handset may be placed in the on-hook position.

B. ACU-Originated Call

5.02 The ACU accomplishes the dialing of the call and the subsequent monitoring for f_2 mark tone. When the f_2 mark tone is detected, the ACU automatically places the data set in the data mode.

C. Answering a Call

5.03 Answer voice calls in the normal way by using the associated telephone set.

5.04 If a call was originated by an answer-only data set such as DS 113D, a data call can now be established by performing the following procedure:

- Request the far-end data set to transfer to the data mode. An f_2 (2225 Hz) mark tone will be heard at the near-end DS 113C.
- If the TR lamp on the near-end DS 113C is lighted, depress the red data key on the telephone set. The line key lights and remains lighted.

Note: If the data key is depressed when the TR lamp is not lighted, the call will be lost.

- On the data set, the MR lamp lights and the MC lamp goes off.
- Data transmission can begin.
- The handset may be placed in the on-hook position.

D. Terminating a Data Call

5.05 A data call can be terminated in any of four ways.

(1) The attendant can terminate a call by entering the talk mode and hanging up.

- Depress the associated line key.
- Lift the handset. Line key goes off.
- Hang up the handset.

(2) The CPE can terminate the call by momentarily turning off the CD lead (data terminal ready).

(3) With option V (receive space disconnect) installed, the data set disconnects on reception of a long spacing signal.

(4) With option S (loss of carrier disconnect) installed, the data set disconnects upon loss of carrier.

6. COMPARISON OF DS 113C-L1/2 WITH DS 103J AND 113A-L1B

6.01 ***Comparison of DS 113C With DS 103J:*** DS 113C is similar in construction and in circuitry to DS 103J, and has all its important features. DS 113C has a single mode of operation, and lacks options deemed unnecessary for an originate-only set. Refer to Table D for a comparison of the options. The main differences between DS 113C and 103J are as follows:

- DS 113C is an originate-only data set, transmitting f_1 and receiving f_2 frequencies. DS 103J does the same in its originate mode.
- DS 113C has no automatic answer feature.
- DS 113C has no common ringer feature, of use when two or more data sets share a telephone set.
- DS 113C has no make-busy feature.

6.02 ***Comparison of DS 113C With DS 113A-L1B:*** Both DS 113C and 113A-L1B are originate-only, low-speed data sets. DS 113C-L1/2, the single set arrangement, resembles DS 113A-L1B in appearance, but many differences exist between these two sets. DS 113A can be used only in completely manual operation. It has an incomplete EIA interface, few options, only one test (digital loop), no LED status display, and cannot be used in multiple mountings.

7. REFERENCES

SECTION	TITLE
590-001-112	Data Set 113C-L1/2—Reference Guide
591-041-200	Data Set 113C-L1/2 Transmitter-Receiver—Installation
591-041-500	Data Set 113C-L1/2 Transmitter-Receiver—Test Procedures
590-010-ZZZ	Data Sets—Station Arrangements for Mixed Data Set Types in 40A2 Data Mountings

TABLE D

COMPARISON OF OPTIONS IN DATA SETS 113C AND 103J

FEATURE		DS 113C OPTION (NOTE 1)	DS 103J OPTION
Receive Space Disconnect	YES NO	V* Y	V* Y
Send Space Disconnect	YES NO	T* U	T* U
Loss of Carrier Disconnect	YES NO	S* R	S* R
CC Indication	EARLY DELAYED	ZD* ZC	ZD* ZC
CB and CF Indications	COMMON SEPARATE	A* B	A* B
CC Indication for Analog Loop	ON OFF	ZF* ZE	ZF* ZE
Fail-Safe State of CN Circuit	ON OFF	NA Provided	K J*
Automatic Answer	YES NO	NA Provided	ZH* ZG
Common Ringer	YES NO	NA Provided	ZB ZA*
Tip-Ring Make Busy	YES NO	NA Provided	F (Note 2) E*
Contact to Ground Make Busy Floating Contact Make Busy		NA	(Note 3)
Common Grounds	YES NO	Q*† (Note 4) P†	Q*‡ (Note 4) P‡
Transmit Level (Telco Selected Adjustment		Fixed	Fixed

Note 1: All 113C options are identical to corresponding options in DS 103J. There is no correlation between DS113A-L1B options and DS 113C options.

Note 2: Also install option ZX on 40A-type data mounting when used in multiple installation.

Note 3: For use with 40A-type data mounting only.

Note 4: Also install option ZI or ZJ on 40A-type data mounting when used in multiple installation.

* Factory-furnished option
† Options P and Q are on the 47F1 data mounting.
‡ Options P and Q are on the 47C1 data mounting.
NA = Not Available