

DATA SET 202SR
TRANSMITTER-RECEIVER
SINGLE SET
DESCRIPTION AND OPERATION

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1. GENERAL

1.01 This section describes the physical and functional characteristics of data set (DS) 202SR (Fig. 1). The key telephone set shown is required if manual calling and/or answer is needed. General operating information is included for single set installations. Section 590-011-202 provides registered station arrangements that include multiset installations in 40A3 data mountings and Bell System provided cabinets.

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

1.03 DS 202S has been replaced by DS 202SR which is the registered version of the data set. DS 202SR meets the requirements of the FCC registration program. The registration number for DS 202SR is AS593M-62935-MD-E.

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 202S may be connected in registered arrangements provided the interface with the network is made with

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Fig. 1—DS 202SR With 2565HKM Telephone Set

the appropriate jack and cord as shown in Section 592-037-200.

- DS 202SR may be connected in grandfathered arrangements provided the interface with the network is made using the appropriate cords as shown in Section 592-037-200.
- Connections to the telephone lines must be made via the proper cords to the voice or data jack as shown in Section 592-037-200.
- 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 Section 592-037-200.

1.05 DS 202SR is intended for use on 2-wire switched network circuits at speeds up to 1200 bps. An optional reverse channel allows the set to signal at up to 5 bps in the opposite direction to the signal on the primary channel.

1.06 The following is a specification summary for DS 202SR:

Operation: Nonsynchronous, binary, serial.

Modulation: Frequency shift keying.

Rate: Up to 1200 bps on 2-wire switched network.

Interface Voltages: Electronic Industries Association (EIA) Standard RS-232-C.

Modes: Simplex (1-way) or half-duplex (2-way nonsimultaneous).

Customer Interface Connection: Customer-provided equipment 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 must not exceed 50 feet in length per EIA Standard RS-232-C.

Power: 105 to 129 Vac at 57 to 63 Hz; 7 watts maximum per data set.

Environment: Ambient temperature = 4 to 49° Celsius (40 to 120°F), relative humidity = 20 to 95 percent.

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

Dimensions: Height 2.2 in., width 5.8 in., depth 10.8 in.

Weight: 4.3 lb (5.2 lb with reverse channel and KS-21239-L5 transformer).

Compatibility: Line signal compatible with all DS 202-type on switched network. Call setup sequence difference between 202C and 202S-L1 (MD) may require modification of latter or replacement with 202S-L1A (MD), 202S-L1C, or 202SR-L1C.

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

Testing: Two local modes are local self test and analog loopback; also, a remote test capability is provided.

2. PHYSICAL DESCRIPTION

2.01 List code designations have been assigned to DS 202SR as follows:

- DS 202SR-L1C: Consists of a printed circuit pack assembly with a faceplate as shown in Fig. 2.
- DS 202SR-L1C/2: Consists of DS 202SR-L1C mounted in 47A1 data mounting and an M4AU cord. The 47A1 data mounting consists of a housing assembly, power cord, transformer, and M13F cord.
- DS 202SR-L1C/3B: Consists of reverse channel circuit pack JY3B mounted on DS 202SR-L1C as shown in Fig. 3.
- DS 202SR-L1C/2/3B: Consists of DS 202SR-L1C/3B mounted in 47A1 data mounting and an M4AU cord.

A. Data Set 202SR-L1C

2.02 This list code specifies the basic data set, which is a printed wiring board measuring 1.5 in. high, 5.6 in. wide, and 10.4 in. long. The data set weighs 1.5 lb. A faceplate is provided which contains the status indicators described in Table A and the three test switches covered in Part 3. All interconnections to the circuit pack are made via a connector at the rear of the board. DS 202SR-L1C incorporates a mother-daughter board arrangement and is similar in appearance to, and has the same features as DS 202S-L1C. This arrangement is illustrated in Fig. 2.

2.03 The dual in-line package (DIP) switch assemblies S2, S3 and S4 allow the telephone company (telco) employee to select options. All options are listed in Table B.

B. Data Set 202SR-L1C/2

2.04 These list codes specify the basic "stand alone" configuration. They consist of the basic data set previously described, enclosed in a 47A1 data mounting.

2.05 The data mounting (Fig. 4) is an extruded aluminum shell 2.2 in. high, 5.8 in. wide, and 10.8 in. deep. The data mounting weighs 2.3 lb (3.2 lb with KS-21239-L5 transformer). 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.

2.06 A KS-21239-L5 transformer, which is attached to the mounting by a power cord, a transformer mounting screw, and an M13F telephone set cord, are included with the mounting. The transformer plugs into a standard nonswitched 117-volt, 60-Hz, 3-wire grounded outlet.

C. Data Set 202SR-L1C/3B

2.07 These list codes specify the basic data set with the reverse-channel circuit pack JY3B installed (Fig. 3). The reverse-channel circuit pack JY3B is a printed wiring board 1 in. high, 3.4 in. wide, and 7.5 in. long, and is similar to reverse-channel circuit pack JY3. It includes filters, switching circuits, and demodulator circuits needed to perform the reverse-channel function. Interconnection to

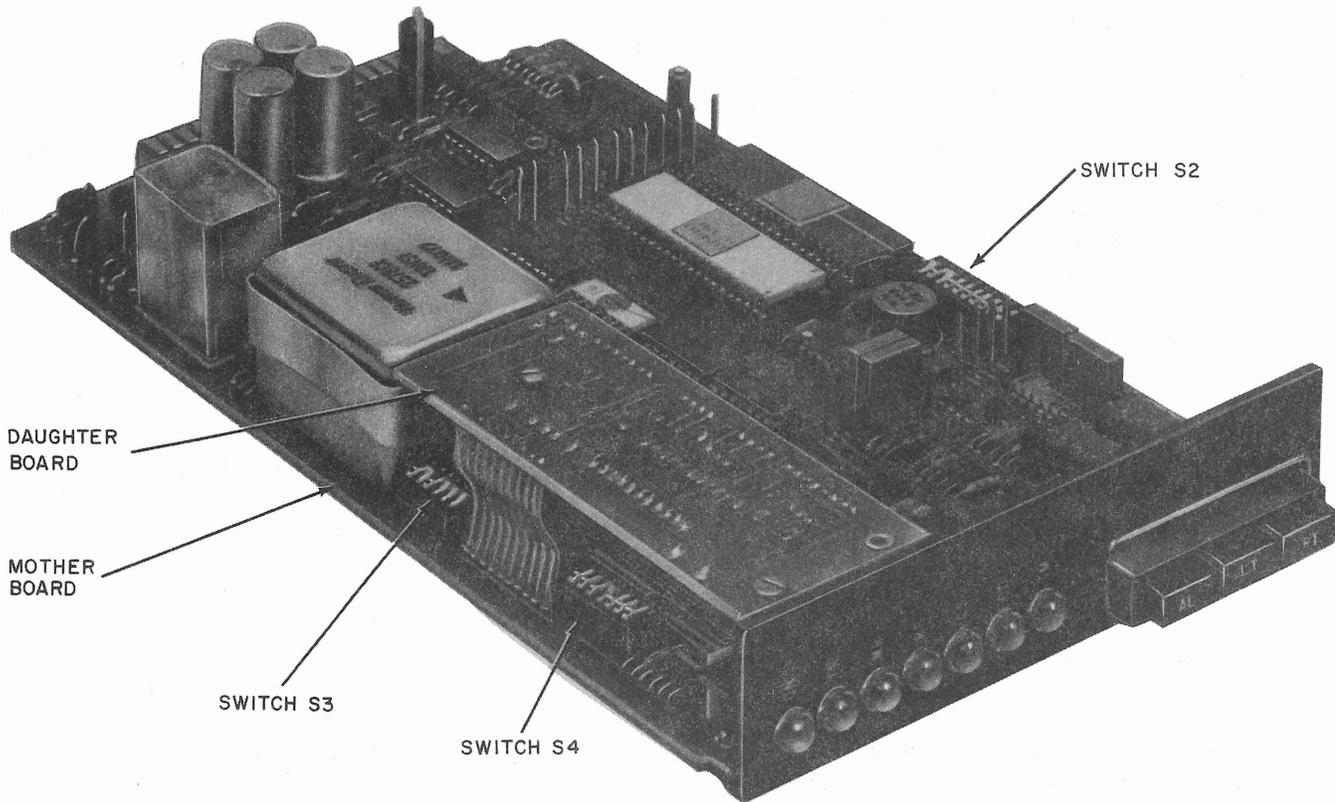


Fig. 2—DS 202SR-L1C

the data set is via 20 female contact receptacles mounted on the bottom of the board which mate with the contact posts on the data set. Four retaining screws secure the circuit packs together mechanically. The screws are stored in threaded eyelets on the front edge of the circuit pack.

Note: The reverse channel circuit pack must not be installed if option ZD is installed (reverse channel OUT).

D. Data Set 202SR-L1C/2/3B

2.08 These list codes are the basic data set equipped with reverse channel and enclosed in the 47A1 data mounting. These are the only allowable codes.

3. FUNCTIONAL DESCRIPTION

3.01 This part contains information on DS 202SR-L1C and DS 202SR-L1C/3B transmitter, receiver, reverse channel, test modes, and interface.

Refer to Fig. 5 for a simplified block diagram of DS 202SR.

TRANSMITTER

3.02 An 844.8-kHz square-wave signal from a crystal-controlled oscillator is used to generate primary channel transmitted carrier, reverse channel carrier, clear-to-send timing, and soft turn-off. In order for the transmitter to operate, the CA lead must be positive and the data set must be in the data mode. The modulator generates a frequency-shift-keyed (FSK) signal consisting of 1200 Hz for a mark and 2200 Hz for a space in response to negative and positive voltages, respectively, on the BA lead. The transmit level is -4 dBm, adjustable down to -12 dBm in 1-dB steps.

RECEIVER

3.03 The carrier detector responds to valid incoming line signals, provided the CA lead is negative.

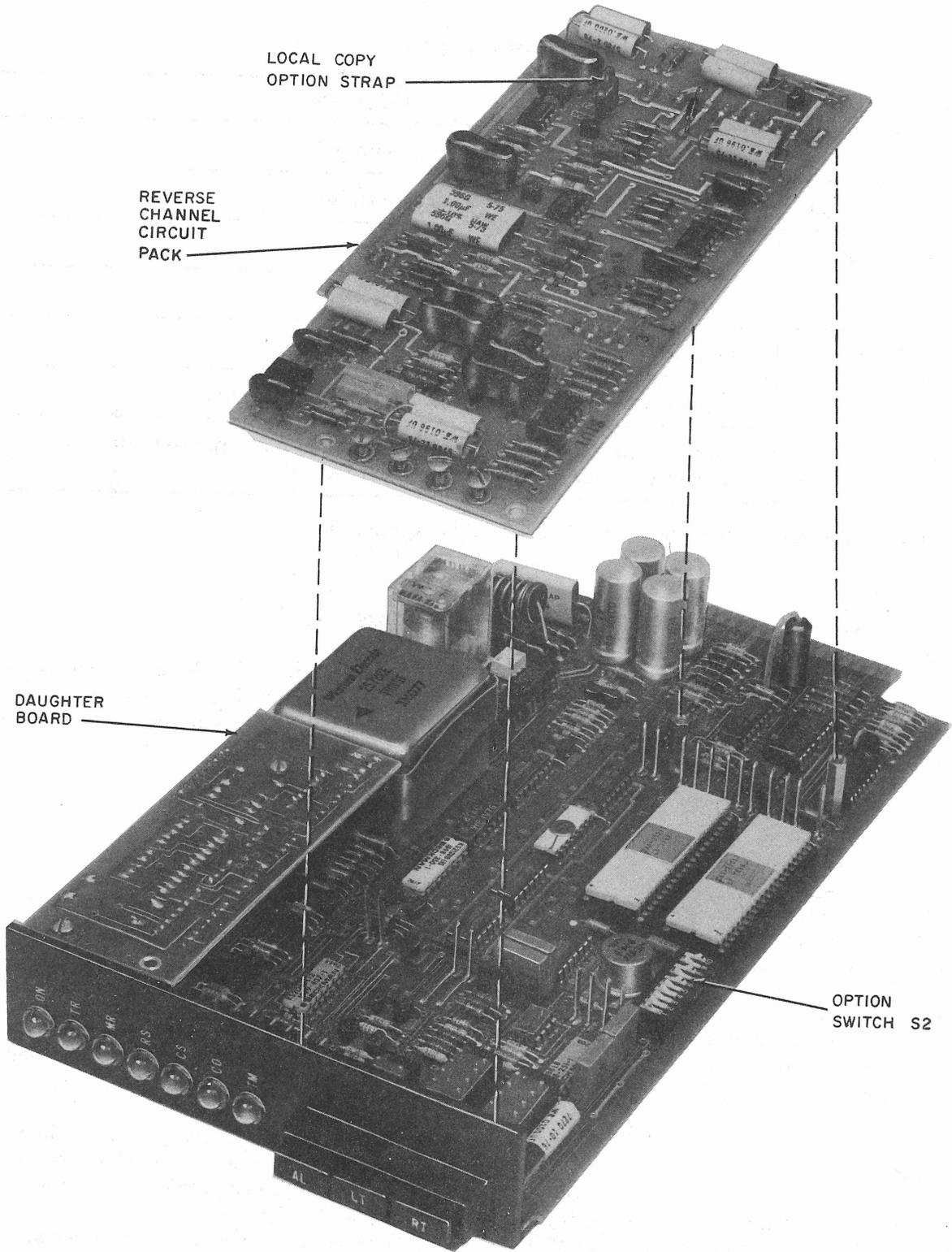


Fig. 3—DS 202SR-L1C/3B

TABLE A
STATUS INDICATORS

| INDICATOR | DESCRIPTION |
|----------------------|---|
| ON | Lighted when power is applied to data set. |
| TR (Terminal Ready) | Lighted when data-terminal-ready lead is <i>on</i> . |
| MR (Modem Ready) | Lighted when data-set-ready lead is <i>on</i> . |
| RS (Request-to-Send) | Lighted when request-to-send lead is <i>on</i> . |
| CS (Clear-to-Send) | Lighted when clear-to-send lead is <i>on</i> . |
| CO (Carrier On) | Lighted when received line signal detector lead is <i>on</i> . |
| TM (Test Mode) | Lighted when any of the three test switches are depressed. It extinguishes if an error is detected in the local self test mode. |

Note: All indicators are lighted when the RT or LT key is depressed.

The amplitude detector portion of the carrier detector turns *on* if the received line signal is greater than -42 dBm. With the amplitude detector *on*, the carrier frequency detector turns *on* if the frequency of the incoming line signal is within the limits determined by the carrier detection option. The normal response time is 23 ms if the carrier frequency is between 1075 and 2325 Hz. The fast response time is 7 ms if the carrier frequency is between 1185 and 1325 Hz and the fast carrier detection option is installed. If the carrier frequency is outside the limits of the fast response option but within the limits of the normal response option, the normal time applies.

3.04 The receiver performs compromise equalization to correct for the average slope distortion and envelope delay distortion encountered on switched facilities.

REVERSE CHANNEL

3.05 The reverse channel circuit pack JY3B provides a 387-Hz, on-off amplitude modulated signal at a maximum of 5 bits per second (bps). The reverse channel transmitter is inhibited when the CA circuit is *on* to prevent simultaneous transmission of data on both channels in the same direction.

TEST MODES

3.06 DS 202SR provides three test modes for use by the customer or a telephone company (telco) employee: local self test, analog loopback test, and remote test.

A. Local Self Test

3.07 When the nonlocking LT button is depressed, the data set is conditioned for self test as follows:

- (a) All interface leads are made inoperative.
- (b) All status indicator lamps light so that they may be checked for lamp failure.
- (c) A repeating 63-bit pseudorandom word (identical to the test word in the 914 and 903 test sets) is generated at 1547 bps.
- (d) The test word is processed by the transmitter and receiver circuitry and the resulting word is compared to the original.
- (e) If an error is detected, the TM lamp extinguishes.

TABLE B

DS 202SR-L1C OPTIONS

| OPTION | | OUTPUT LEVEL | SWITCH SETTING | | | | | | | | | | | | | | PROVIDE | |
|--|-----------------|--------------|---|---|---|---|---|---|---|----------------------|---|---|---|---|---|---|-------------|-------------|
| | | | S4 SWITCH CONTACT SETTING ON TRANSMITTER-RECEIVER | | | | | | | | | | | | | | | |
| | | | WITHOUT REVERSE CHANNEL | | | | | | | WITH REVERSE CHANNEL | | | | | | | | |
| DESCRIPTION | DESIG | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | |
| Transmit Line Signal Level | ZO ¹ | -4 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | One Per Set |
| | ZP | -5 | 0 | X | X | X | X | X | X | 0 | X | X | X | X | X | X | X | |
| | ZQ | -6 | X | 0 | X | X | X | X | X | 0 | 0 | X | X | X | X | X | X | |
| | ZR | -7 | 0 | 0 | X | X | X | X | 0 | X | X | 0 | X | X | X | X | 0 | |
| | ZS | -8 | X | X | 0 | X | X | X | 0 | X | 0 | 0 | X | X | X | X | 0 | |
| | ZT | -9 | X | 0 | 0 | X | X | X | 0 | X | 0 | X | 0 | X | X | X | 0 | |
| | ZU | -10 | X | X | X | 0 | X | X | 0 | 0 | 0 | 0 | 0 | 0 | X | X | 0 | |
| | ZV | -11 | 0 | 0 | X | 0 | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | 0 | |
| | ZW | -12 | 0 | 0 | 0 | 0 | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | | SOFT TURNOFF | SQUELCH | S2 SWITCH CONTACT SETTING ON TRANSMITTER-RECEIVER | | | | | | | | | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | | | | | |
| Soft Turnoff and Squelch Intervals | Z | 0 | 0 | — | 0 | 0 | — | — | — | — | X | — | X | | | | One Per Set | |
| | Y | 8 ms | 0 | — | 0 | 0 | — | — | — | — | 0 | — | X | | | | | |
| | X | 24 ms | 0 | — | X | 0 | — | — | — | — | 0 | — | X | | | | | |
| | W | 0 | 9 ms | — | 0 | 0 | — | — | — | — | X | — | 0 | | | | | |
| | V | 0 | 156 ms | — | 0 | X | — | — | — | — | X | — | 0 | | | | | |
| | T | 8 ms | 9 ms | — | 0 | 0 | — | — | — | — | 0 | — | 0 | | | | | |
| | S | 8 ms | 156 ms | — | 0 | X | — | — | — | — | 0 | — | 0 | | | | | |
| | R ¹ | 24 ms | 156 ms | — | X | X | — | — | — | 0 | — | 0 | | | | | | |
| Fast Carrier Detection | Q | In (7 ms) | | — | — | — | — | — | — | 0 | — | — | — | | | | One Per Set | |
| | N ¹ | Out (23 ms) | | — | — | — | — | — | — | X | — | — | — | | | | | |
| Clear to Send Interval | M | 8 ms | | — | — | — | 0 | 0 | — | — | — | — | — | | | | One Per Set | |
| | K | 30 ms | | — | — | — | 0 | X | — | — | — | — | — | | | | | |
| | J | 60 ms | | — | — | — | X | 0 | — | — | — | — | — | | | | | |
| | G ¹ | 180 ms | | — | — | — | X | X | — | — | — | — | — | | | | | |
| Automatic Answer | B ¹ | In | | X | — | — | — | — | — | — | — | — | — | | | | One Per Set | |
| | A | Out | | 0 | — | — | — | — | — | — | — | — | — | | | | | |
| Local Copy on Primary Channel | ZA | In | | — | — | — | — | — | — | 0 | — | — | — | | | | One Per Set | |
| | ZB ¹ | Out | | — | — | — | — | — | — | X | — | — | — | | | | | |
| Condition of CC (DSR) During Analog Loopback | YI | On | | — | — | — | — | — | — | — | — | — | X | — | | | One Per Set | |
| | YJ ¹ | Off | | — | — | — | — | — | — | — | — | — | 0 | — | | | | |
| | | | | S3 SWITCH CONTACT SETTING ON TRANSMITTER-RECEIVER | | | | | | | | | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | |
| Reverse Channel | ZC ² | In | | 0 | 0 | — | — | — | — | | | | | | | | One Per Set | |
| | ZD ¹ | Out | | X | X | — | — | — | — | | | | | | | | | |
| Transmit Only | YG | In | | — | — | X | — | — | — | | | | | | | | One Per Set | |
| | YH ¹ | Out | | — | — | 0 | — | — | — | | | | | | | | | |
| Echo Suppressor Enable | YQ | In | | — | — | — | 0 | — | — | | | | | | | | One Per Set | |
| | YR ¹ | Out | | — | — | — | X | — | — | | | | | | | | | |
| Carrier Controlled Turnaround | YS ¹ | In | | — | — | — | — | — | 0 | | | | | | | | One Per Set | |
| | YT | Out | | — | — | — | — | — | X | | | | | | | | | |
| Early CC (DSR) Indication | YU | In | | — | — | — | — | 0 | — | | | | | | | | One Per Set | |
| | YV ¹ | Out | | — | — | — | — | X | — | | | | | | | | | |

TABLE B (Contd)

DS 202SR-L1C OPTIONS

| OPTION | | | STRAPPING ON REVERSE CHANNEL | PROVIDE |
|-------------------------------|-----------------|---|------------------------------|----------------------------|
| DESCRIPTION | DESIG | | | |
| Local Copy on Reverse Channel | ZE | In | Install E21-E22 | One Per JY3B CP |
| | ZF ¹ | Out | Install E21-E23 | |
| | | SCREW SWITCH SETTING ON INTERFACE CIRCUIT | | |
| Grounding Option | ZG ¹ | Signal Ground Connected to Frame Ground | Screw Switch S1 Closed | One Per 47A1 Data Mounting |
| | ZH | Signal Ground Not Connected to Frame Ground | Screw Switch S1 Open | |

X Contact closed

— Contact not applicable

O Contact open

Note 1: Factory furnished.

Note 2: Factory furnished instead of option ZD when reverse channel board is installed .

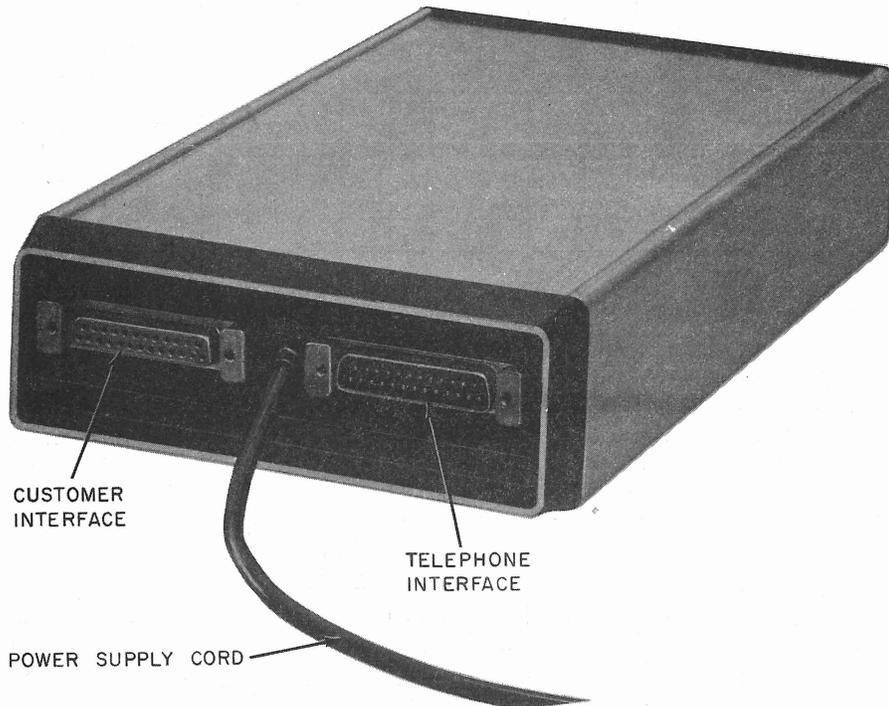


Fig. 4—DS 202SR—Rear View

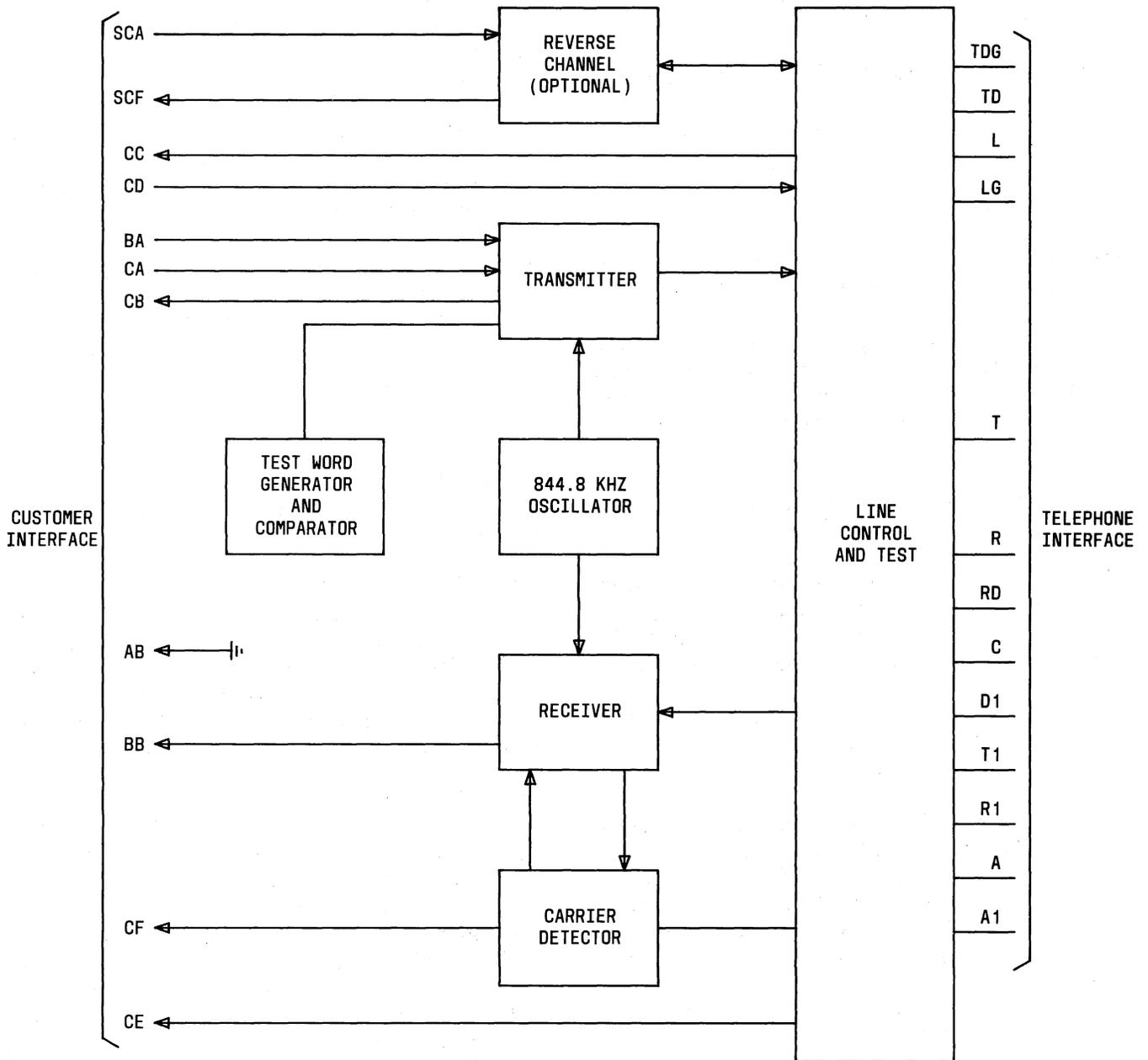


Fig. 5—Simplified Block Diagram of DS 202SR

Note: This test should be made with the associated telephone set on-hook.

When the AL button is depressed until it locks, the data set is conditioned as follows:

B. Analog Loopback Test

3.08 The data set is tested in the analog loopback mode by applying signals to the inputs at the customer interface and monitoring the outputs at the customer interface and the status lamps.

- (a) The data set is disconnected from the line.
- (b) The local copy control circuit is bypassed to provide local copy.

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- (c) The TM indicator lights and the auto-answer feature is disabled, if installed.
- (d) The data-set-ready lead is turned **off** (optional).

Note: The data set should be idle when the AL button is depressed.

C. Remote Test

3.09 When the locking RT button is depressed, the data set is conditioned as follows:

- (a) All customer interface leads are made inoperative and all status indicator lamps light. The data set is conditioned for automatic answer and a call is received from the data test center.
- (b) A repeating 63-bit pseudorandom word is generated at 1547 bps.
- (c) The test word is processed by the transmitter and receiver circuitry and the resulting word is compared to the original. In addition, the test word is transmitted to the data test center.
- (d) If an error is detected, constant spacing (2200 Hz) is transmitted to the data test center instead of the random word.
- (e) If the reverse channel circuit pack is installed, the reverse channel will send an on-off signal at 4.3 bps simultaneously with the line signal of the 63-bit word. After detecting an error or spacing (2200 Hz), the reverse channel transmitter is turned off, and the reverse channel receiver is on. A 387-Hz tone from the data test center switches the data set output from constant spacing to marking (1200 Hz).

INTERFACE

A. Customer Interface

3.10 The customer interface is accessible through a 25-pin female connector at the rear of the data set (Fig. 4). The pin assignments, lead designations, and lead functions are shown in Table C.

3.11 Protective Ground (AA): In earlier model data sets, this lead is electrically bonded to the data set housing and chassis, and

is connected to local power ground through the power transformer. Later model data sets, such as the DS 202SR, do not provide frame ground at the interface.

3.12 Transmitted Data (BA): Signals on this lead are generated by the transmitting data terminal and are transferred to the modulator of the data set for transmission to the distant end. A positive signal is a binary "0" or space, and a negative signal is a binary "1" or mark. The CPE must not transmit data unless an **on** condition is present on the clear-to-send (CB) and data set ready (CC) interface circuits (except for analog loopback test, described later). The transmitting CPE should hold BA in the marking condition when no data is to be transmitted. With 0 volts on the BA circuit and the clear-to-send and data set ready circuits **on**, the BA circuit is in an indeterminate state and either a marking or spacing data signal will be transmitted.

3.13 Received Data (BB): Signals on this lead are generated by the receiving data set in response to data signals received from the distant data set. With the local copy option installed in half-duplex operation, the BB signal follows the transmitted data signal delayed by less than 2 ms, and may be used to monitor the transmitted data.

3.14 Request-to-Send (CA): Signals on this lead are generated by the CPE to condition the local data set to transmit data. With the data set ready lead **on**, the carrier is transmitted in less than 1 ms after the CA lead turns **on**. The **on** condition must be maintained whenever the CPE has information ready for transmission. The data set transmits all signals on the transmitted data lead while the **on** condition is maintained on the request-to-send and clear-to-send leads. In half-duplex operation, the **off** condition of request-to-send holds the data set in the receive mode, and the **on** condition holds the data set in the transmit mode. CPE designed for either transmit-only or duplex operation may continuously hold CA in the **on** condition. If the data set is equipped with reverse channel circuit pack JY3B, a signal may be received on the reverse channel regardless of the state of the local CA lead. This type of operation is called independent reverse channel operation.

3.15 Clear-to-Send (CB): The **on** condition of the CB lead is a response to an **on**

TABLE C

CUSTOMER INTERFACE

| LEAD NO. | FUNCTION | EIA DESIGNATION (RS-232-C) |
|----------|---|----------------------------|
| 1 | Protective Ground | AA |
| 2 | Transmitted Data | BA |
| 3 | Received Data | BB |
| 4 | Request-to-Send | CA |
| 5 | Clear-to-Send | CB |
| 6 | Data Set Ready | CC |
| 7 | Signal Ground | AB |
| 8 | Received Line Signal Detector | CF |
| 9 | Positive 14 Volts | — |
| 10 | Negative 14 Volts | — |
| 11 & 19 | Secondary Request-to-Send | SCA |
| 12 | Secondary Received Line Signal Detector | SCF |
| 20 | Data Terminal Ready | CD |
| 22 | Ring Indicator | CE |

condition on the request-to-send circuit delayed by 180, 60, 30, or 8 ms, depending on the clear-to-send interval option selected. The **on** state of CB indicates to the CPE that signals presented on the transmitted data lead will be transmitted to the communication channel. The **off** condition is an indication to the CPE that it should not transfer data on the transmitted data lead. When request-to-send is turned **off** by the CPE, CB goes **off** in less than 1 ms.

3.16 Data Set Ready (CC): Signals on the CC lead indicate the mode of the data set. The **on** condition indicates that the data set is in the data mode and is capable of transmitting and receiving data signals. The **on** condition is required in conjunction with an **on** condition on the request-to-send and clear-to-send circuits when

transmitting data. The **off** condition indicates that the data set is in some mode other than the data mode. The **on** condition of this circuit should not be interpreted to mean that a communication channel has been established to a remote data station or to determine the status of any remote terminal equipment.

3.17 Signal Ground (AB): This circuit establishes the common ground reference potential for all interface circuits except protective ground. This circuit is normally connected to protective ground to minimize the introduction of longitudinal power line noise into electronic circuitry through the power transformer. Depending on local procedures and conditions, this connection to protective ground can be removed by the telco installer.

3.18 Received Line Signal Detector (CF):

An **on** condition on the CF lead indicates that the data carrier is being received and has been received for at least 7 ms (option Q) or 23 ms (option N). This circuit normally does not turn **on** in the presence of noise, out-of-band signals or other non-FSK signals even when the fast mode carrier detection option (Q) is selected. When the data carrier is lost due to an end of transmission or to a telephone line interruption, the **off** condition follows after a 10 ms time delay. The **off** condition on CF causes the received data circuit to be clamped to the mark condition if the clamp option (F) is installed. The CF circuit responds to carrier signals from either the local or distant transmitting data set when optioned for local copy of the primary channel (option ZA). The CF circuit is **off** during the squelch interval when the squelch option is used.

3.19 Circuits 9 and 10: These circuits originate in the data set for use by the telco personnel in data set testing. Pin 9 provides an access to the +14 volt dc supply; pin 10 provides an access to the -14 volt dc supply. The CPE must not be connected to these leads.

3.20 Secondary Request-to-Send (SCA):

This circuit is available on data sets equipped with reverse channel, and is used to provide communication from the receiving data set to the transmitting data set simultaneously with the primary data channel. This circuit is operational only when the request-to-send (CA) lead is **off**.

3.21 Secondary Received Line Signal Detector (SCF):

This lead is provided only on data sets equipped with reverse channel. It is used to signal the data set transmitting on the primary channel regarding conditions at the receiving data set simultaneously with the transmission on the primary data channel. With the local copy option for the reverse channel (option ZE), the SCF circuit responds to reverse channel carrier from either the local or distant data set.

3.22 Ring Indicator (CE): The CE circuit permits automatic answering (option B) of incoming calls. The **on** condition of this lead indicates that a ringing signal is being received. The **off** condition is maintained at all other times. Operation of this circuit is not disabled by an **off** condition on data terminal ready (CD). The CE

circuit turns **on** and **off** with the ring and silent intervals of the ringing sequence.

3.23 Data Terminal Ready (CD):

Signals on this lead control the connection of the data set to the telephone line. The **on** condition permits the data set to be connected to the communication channel upon auto answer or talk-to-data transfer. When the station is arranged for automatic answer, the data set goes off-hook in response to a ringing signal when circuit CD is turned **on**. CD must be held **on** or turned **on** before transferring to the data mode for stations optioned for manual answer. When the data set is in the data mode, the turning **off** of the CD circuit removes the data set from the communication channel by causing the data set to go on-hook. The **off** condition does not disable the operation of the ring indicator (CE) circuit.

B. Telephone Interface

3.24 The telephone interface is accessible through a 25-pin male connector at the rear of the data set (Fig. 4). The pin assignments, lead designations, and lead functions are shown in Table D.

4. OPTIONS

4.01 A summary of the options available on DS 202SR is presented in Table B. A detailed description of these options is contained in Section 592-037-200.

4.02 Options are installed and removed by means of switches on the data set circuit pack, by a strapping plug on the reverse channel circuit pack (when provided), and by a screw switch on the backplane (frame ground to signal ground option).

5. OPERATION

5.01 Manual Data Call: When a data call is placed or answered manually, the following occurs:

- (a) Attendant initiates or answers call.
- (b) Data terminal ready (CD) lead must be positive.

TABLE D
TELEPHONE INTERFACE

| LEAD NO. | DESIGNATION | DESCRIPTION |
|----------|-------------|---|
| 1 | L | Telephone set line lamp control from data set |
| 4 | LG | Telephone set line lamp ground from data set |
| 5 | TD | Talk/data control from telephone set |
| 7 | T | Telephone line tip lead |
| 8 | R | Telephone line ring lead |
| 12 | RD | Common ringer control contact to ground |
| 14 | C | Data mode contact closure to ground from data set to ACU |
| 16 | D1 | Data mode contact closure to ground from ACU to data set |
| 21 | T1 | Telephone set tip lead |
| 22 | R1 | Telephone set ring lead |
| 23 | A | A lead control: Used to provide an indication to ACU or KTU when the line is in use |
| 24 | A1 | |
| 25 | TDG | Talk/data control ground lead |

(c) When the data set is used to originate a call, the attendant depresses DATA (red) key which causes the line to transfer to the data set and the data-set-ready indication to be sent to the customer immediately. When answering a call, the procedure is the same as for DS 202S-L1. For DS 202SR-L1C (as for DS 202S-L1C) with echo suppressor option in, the length of answer tone is reduced to 1.4 seconds.

5.02 Auto-Answer Data Call: If the auto-answer option is installed in the data set and the CD lead is positive, the set automatically answers an incoming call, and 1.3 seconds after the end of the first ringing cycle, sends the answer-tone signal (2017 Hz) for 1.9 seconds (or 1.4 seconds).

5.03 Data Call With Automatic Calling Unit (ACU): When a call is placed from an installation equipped with an ACU, the following occurs:

- (a) The ACU seizes the line in response to a call request from the customer equipment.
- (b) The ACU places the call and detects answer tone from the called station.
- (c) At the end of answer tone, the ACU transfers the line to the data set.
- (d) The data set enters the data mode if CD is positive.

SECTION 592-037-100

6. REFERENCES

6.01 The following BSPs provide additional information:

| SECTION | TITLE | SECTION | TITLE |
|----------------|---|----------------|--|
| 590-011-202 | Registered Data Sets—Station Arrangements for Registered Data Sets in 40A3 Data Mountings | 592-037-200 | Data Set 202SR—Transmitter-Receiver—Single Set—Installation and Connections |
| | | 592-037-500 | Data Set 202SR—Transmitter-Receiver—Single Set—Test Procedures and Maintenance |