

# DATASPEED

## TAPE SENDER AND RECEIVER

### INSTALLATION AND TEST PROCEDURES

#### 1. INTRODUCTION

**1.01** Information in this section was formerly covered in Section 592-210-500, Issue 2, entitled DATASPEED Tape Sender and Receiver, Installation and Testing Procedures.

**1.02** This section contains installation and test procedures for DATASPEED tape senders and receivers. It includes testing instructions for testing with data test center and end-to-end.

**1.03** A list of special tools and test instruments, as well as their description and operating instructions, is also included.

#### 2. GENERAL

**2.01** Installation of the data line and tests of the data set 202A are covered in Section 592-013-200. Particular care should be taken to ascertain that local loop requirements in regard to loss, noise, and return loss objectives have been met on the data facilities by those responsible. Since no error control is provided with this system, poor transmission performance will result in obvious errors in the tapes.

**2.02** To clear troubles encountered during pre-installation and installation tests, see Section 592-800-501.

**2.03** The customer shall provide and maintain a 117-volt ac 3-wire receptacle for each power cord. This outlet should be on a circuit not under control of a switch. The third wire will provide a chassis ground for the DATASPEED cabinet.

**2.04** Fig. 1 and 2 are of tape sender electronic modules. Fig. 3 and 4 illustrate tape receiver electronic modules.

**2.05** Fig. 5 is an illustration of the power module which is the same for both tape sender and receiver.

**2.06** Photographs are of shop models and may differ slightly from the manufactured product. These differences will be corrected in later issues of this section.

**2.07** Double letter designations on the modules (such as BQ) indicate position of circuit card in module.

**2.08** Circuit elements within each card are designated by Z numbers.

**2.09** EC numbers designate the circuit number of each card. These numbers correspond to the last three digits of the schematic drawing numbers.

**2.10** Circuit cards plug into connector-type jacks. Jack terminals and their corresponding points on the card are designated by letters. (See Fig. 6.)

**2.11** On the logic schematic diagrams test points are circled and numerically designated. These test points are on the outside edge of the card. These test points are designed for test leads equipped with small alligator-type clips. The lettered designations on the cards are sometimes referred to in the test charts. Connections to lettered test points are made at the connector wiring terminal on rear of module.

**Caution: DO NOT short out connector wiring terminals. Excessive voltages will damage the low voltage transistors and electronic elements of circuit cards.**

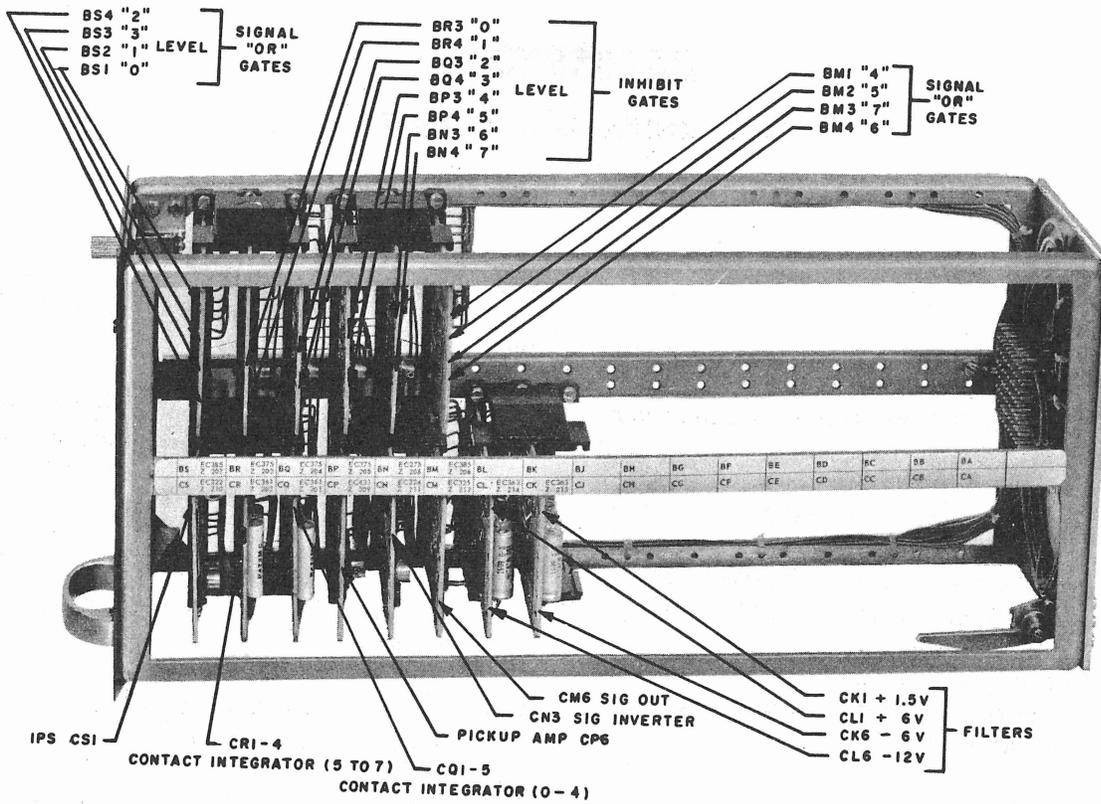


Fig. 1 - DATASPEED Signal Converter 1A-TTSC

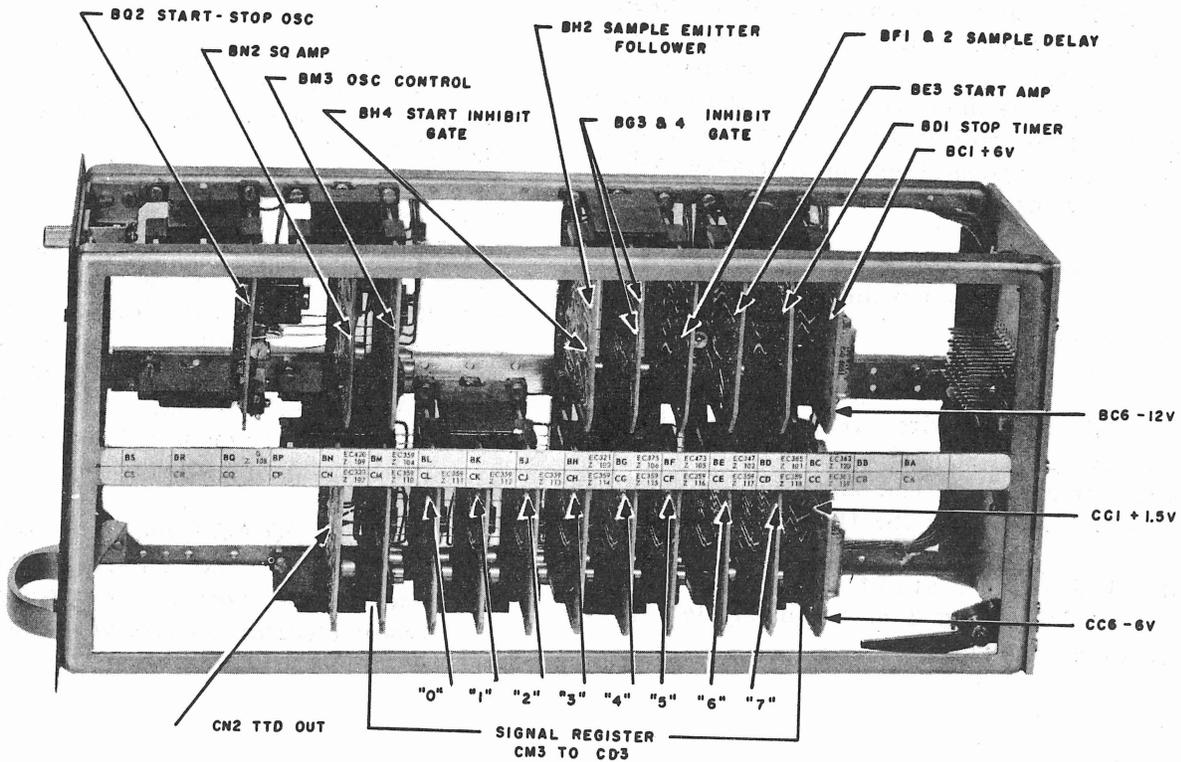
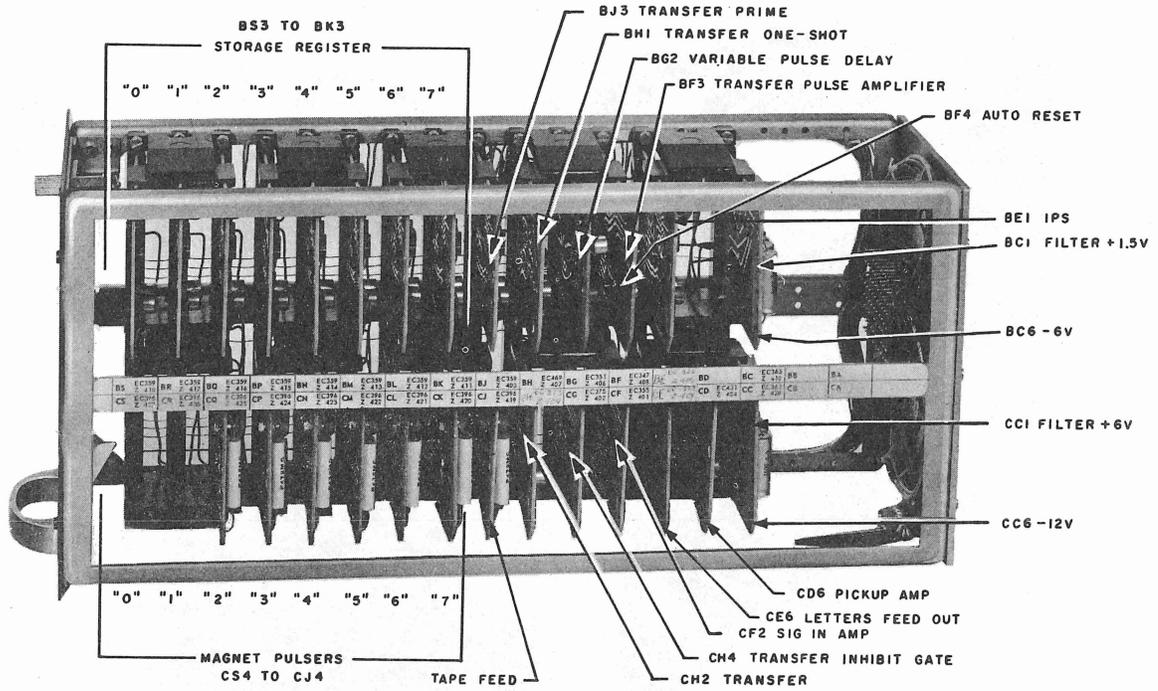


Fig. 2 - DATASPEED Sending Distributor 1A-TTD



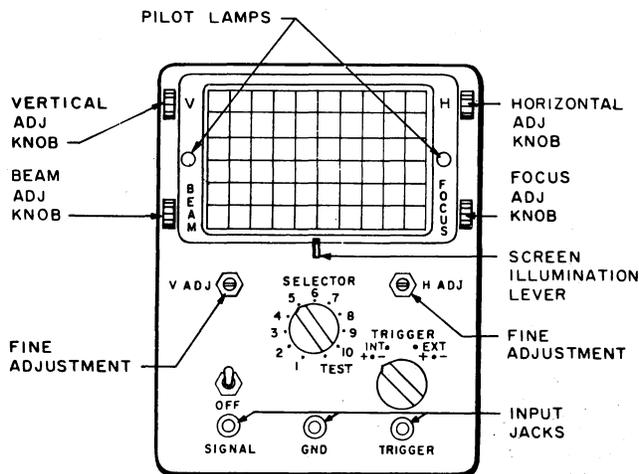


**3. INSTRUMENTS AND SPECIAL TOOLS**

**3.01** The following instruments and special tools are required to maintain DATASPEED tape senders and receivers.

- DATASPEED test point signal monitor KS-19146, L1 or a general purpose oscilloscope
- Volt-ohmmeter KS-14510 or equivalent
- Extension test card TP-172450
- Test tape Mylar (5-level) TP-146605
- Test tape Mylar (8-level) TP-146606

**3.02** DATASPEED test point signal monitor is a special purpose oscilloscope designed specifically for this equipment. Its modular design permits it to be stored in the base of cabinet, next to the power module. Fig. 7 is a sketch of the front panel and may differ slightly from the manufactured product. These differences will be corrected in later issues of this section.



**Fig. 7 — DATASPEED Test Point Signal Monitor KS-19146, L1**

**3.03** Front panel of DATASPEED test point signal monitor is equipped as follows:

- ON-OFF switch, power switch
- Power indicator lamps
- V knob, vertical adjust

- V ADJ, vertical fine adjust
- H knob, horizontal adjust
- H ADJ, horizontal fine adjust
- FOCUS knob, focus adjust
- BEAM knob, intensity adjust
- SELECTOR switch, rotary switch positions 1 to 10 plus eleventh step designated TEST
- Screen illumination lever
- SIGNAL } input jacks
- GND }
- TRIGGER }

**3.04** If a DATASPEED test point signal monitor is not available, a general purpose oscilloscope may be used. Some types of satisfactory oscilloscopes are Tektronix 310A and 516, Packard Bell 5Mc2P, and Hewlett-Packard 122AR.

**3.05** Vertical sensitivity and sweep speeds are automatically set by the SELECTOR switch on the signal monitor (see Table A).

**TABLE A**

**SIGNAL MONITOR SELECTOR SWITCH SETTINGS**

Position	Volts/Division	Sensitivity Sweep Speed
1	1	2 usec/div
2	2	
3	1	100 usec/div
4	2	
5	1	2 msec/div
6	2	
7	2	
8	10	
9	1	50 msec/div
10	1	

**3.06** The extension card is a blank plug-in circuit card. A circuit card may be plugged into the extension card to make adjustments or check out circuit elements. (See Fig. 8.)

**3.07** A Mylar test tape, consisting of a 14-character test pattern, will be provided at sending stations.

#### 4. DATASPEED TEST POINT SIGNAL MONITOR CALIBRATION

**4.01** Each time the DATASPEED test point signal monitor is used it must be calibrated as follows:

- (1) Plug power cord into ac convenience outlet provided on front panel of power module.
- (2) Turn power switch to ON and observe that power indicator lamps light. Allow approximately 5 minutes warm-up time.
- (3) Set SELECTOR switch to TEST.
- (4) Set TRIGGER switch to INT +.
- (5) When test signal appears on screen adjust V (vertical) knob until signals fill the six vertical divisions.
- (6) Adjust H (horizontal) knob until the four sine waves fill the ten horizontal divisions and are of equal amplitude.

*Note:* Two screw-type adjustments H and V are provided as fine adjustments for Steps 5 and 6.

- (7) Adjust BEAM and FOCUS control knobs to obtain a clear sharp signal.

*Note:* The lever under center bottom of screen is provided for screen illumination.

#### 5. LOCAL OPERATIONS TEST

**5.01** Operations test of DATASPEED tape sender or tape receiver is recommended before proceeding with network tests with a data test center. The following check list will assure proper operations of associated features and functions and minimize unnecessary testing time on toll facilities.

##### 5.02 Check List for DATASPEED Tape Sender

- (1) To operate sender, TEST-OPERATE switch on line break and automatic answer kit must be in TEST position.

*Note:* The automatic answer feature for the DATASPEED tape sender is inoperable at this time.

- (2) Check power supply and indicator lamps.
- (3) Place test tape in reader with start-stop lever in STOP position.

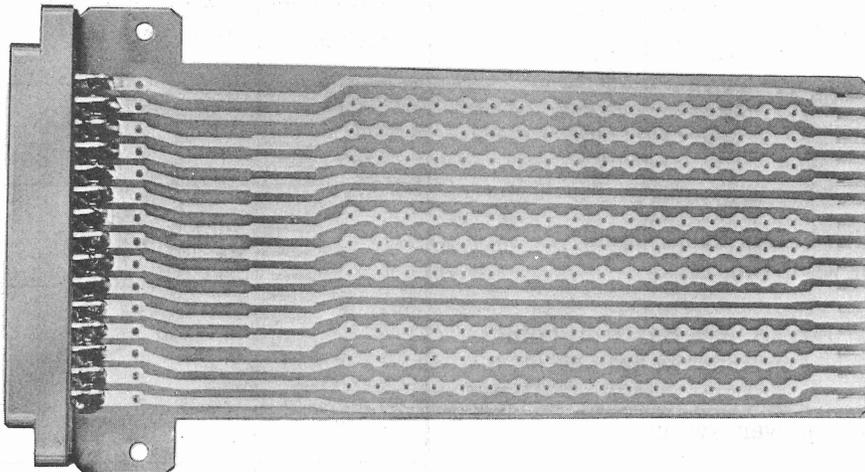


Fig. 8 - TP 172450 Extension Card

- (4) Depress READER button on control panel; reader motor should start.
- (5) Move start-stop lever to RUN position; tape should feed through reader.
- (6) Move start-stop lever to STOP. Tape should stop.
- (7) Depress READER button. Reader motor should stop.
- (8) Depress WINDER button. Winder motor should start.
- (9) With winder motor running move tape tension arm toward chad depressor; motor will stop. As tension arm is moved away from chad depressor, motor will start.
- (10) Depress WINDER button. Winder motor stops.
- (11) Telephone network of data set 202A shall be checked in the normal manner.
- (12) Go to a nearby telephone and call number designated as the data number.
- (13) Have operator or an assistant answer on the data set when it rings.
- (14) When TALK button on data set is depressed and receiver is off-hook, a talking path is established.
- (15) Request that DATA button be depressed. Data set will go to data mode and DATA lamp will light. Carrier tone will now be heard.
- (16) Hang up calling telephone and observe that DATA light times out on data set.

### 5.03 Check List for Receiving Station.

- (1) Check power supply and indicator lamps.
- (2) Thread tape as described in Section 592-800-100.
- (3) Depress PUNCH and WINDER buttons. With motor on, proceed to Steps 4 and 5 while observing that movement of tape tension

arm causes winder motor to stop and start as tape is wound by take-up reel.

- (4) Open cabinet door and operate TEST switch to TEST position for approximately 30 seconds. (TEST switch is located directly below control panel.) Blank tape should feed from reperforator.
- (5) Momentarily depress LTRS FO button and observe that reperforator is punching letters tape.
- (6) Depress PUNCH and WINDER button to stop motors.
- (7) Telephone network of data set 202A shall be checked in the normal manner.
- (8) Go to a nearby telephone and call number designated as the data number.
- (9) Have operator or an assistant answer on the data set when it rings.
- (10) When TALK button on data set is depressed and receiver is off-hook, a talking path is established.
- (11) Request that DATA button be depressed. Data set will go to data mode and DATA lamp will light.
- (12) Hang up calling telephone and observe that DATA light times out on data set.

### 5.04 Automatic Answer Feature for Receivers are tested as follows:

- (1) Observe that power lamps are ON.
- (2) Depress AUTO button on data set 202A.
- (3) Go to a nearby telephone or use SPARE line of data set to call the DATASPEED line in the normal telephone manner.
- (4) When the connection is established ringing shall trip, and, in 3 to 7 seconds DATA lamp shall light indicating data set is in data mode, and reperforator motor shall start.

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(5) The 2- to 5-second answer-back tone is heard at calling station.

(6) Hang up calling station and observe that reperforator motor stops, telephone connection times out and returns to normal, and DATA light goes out.

### 6. PREINSTALLATION

**6.01** In cases where DATASPEED equipment is delivered to telephone company storeroom or shop, tests with the data test center should be conducted before equipment is delivered to customer's premises. Section 592-013-500 describes tests of data set 202A. Part 5 of this section describes checks of DATASPEED equipment. These tests must be conducted before proceeding with pre-installation tests.

**6.02** Where installation will include a tape sender and receiver, a back-back test may be conducted in either of two ways, with Y-connector kit or without Y-connector kit.

#### **6.03** *With Y-Connector Kit:*

- Receiver is operated as follows:
  - (1) Operate PUNCH and WINDER buttons to start motors.
- Sender is operated as follows:
  - (1) Operate DATA button on data set.
  - (2) Operate SEND-RECEIVE-TEST switch to TEST.
  - (3) Operate TEST-OPERATE switch on line break and automatic answer kit to TEST.
  - (4) Operate AUTO-MANUAL switch to MANUAL.
  - (5) With 14-character test tape in Reader, operate READER button to start reader motor.
  - (6) Operate START-STOP lever to START. Reader should start sensing tape and receiver's reperforator should start punching tape.

Sending 5 to 10 continuous minutes of error-free tape using the 14-character test pattern will assure that DATASPEED equipment is performing properly.

#### **6.04** *Without Y-Connector Kit or to Bypass Data Set*

- Disconnect the data set connectors and connect tape sender connector and receiver connector together as follows:
  - (1) Connect pin 2 of sender to pin 3 of receiver.
  - (2) Connect pin 7 of sender to pin 7 of receiver.
  - (3) Connect signal ground to pin 7 of sender or receiver.
- Receiver is operated as follows:
  - (1) Remove circuit board EC521 on receiver automatic answer kit. Operate PUNCH and WINDER buttons to start motors.
- Sender is operated as follows:
  - (1) Operate SEND-RECEIVE-TEST switch to TEST.
  - (2) Operate TEST-OPERATE switch on line break and automatic answer kit to TEST.
  - (3) Operate AUTO-MANUAL switch to MANUAL.
  - (4) With 14-character test tape in Reader, operate READER button to start reader motor.
  - (5) Operate START-STOP lever to START. Reader should start sensing tape and receiver's reperforator should start punching tape.

Sending 5 to 10 continuous minutes of error-free tape using the 14-character test pattern will assure that DATASPEED equipment is performing properly.

#### **6.05** *Send Station*

When data set installation test requirements are met, the following tests, conducted dur-

ing the busy hours, will verify circuit facilities for send station:

- (1) Disconnect DATASPEED connector from data set 202A.
- (2) Connect data test sets 901A, 902A, and 903A to data set. Connections and switch setting information are contained in Section 592-013-500.
- (3) Call data test center. See part 8 of this section.
- (4) Conduct a 5-minute test. During this test, error counter of 902A shall not register more than ten errors. Maximum distortion average shall not exceed 20 per cent.

If necessary, place more than one call to test center until a connection is established that will meet requirements.

- (5) Establish voice communication with test center to hold this connection.



*So that this same connection may be used for the next test, take care not to hang up or otherwise disconnect from test center.*

- (6) Disconnect 901A connector from data set and connect DATASPEED connector.
- (7) Transmit 14-character test tape on this connection for two minutes to test center.

**Note:** There should be no more than four errors. If error rate is exceeded, check alignment procedures of DATASPEED electronic modules, covered in Section 592-800-501.

## 6.06 Receive Station

When data set installation test requirements are met, the following tests, conducted during the busy hours, will verify the circuit facilities for receive station.

- (1) Disconnect DATASPEED connector from data set 202A.

(2) Connect data test sets 901A, 902A, and 903A to data set. Connection and switch setting information are contained in Section 592-013-500.

(3) Call data test center. See part 8 of this section.

(4) Conduct a 5-minute test. During this test, error counter of 902A shall not register more than ten errors. Maximum distortion average shall not exceed 20 per cent.

If necessary, place more than one call to test center until a connection is established that will meet requirements.

- (5) Establish voice communication with test center to hold this connection.



*So that this same connection may be used for next test, take care not to hang up or otherwise disconnect from test center.*

(6) Disconnect 901A connector from data set and connect DATASPEED connector.

(7) Test center will transmit the following tape test patterns for 2 minutes:

- 30 seconds of 14-character test pattern
- 30 seconds of all letters
- 30 seconds of all blank
- 30 seconds of reversals (all odd levels marking)

Above tests should contain no more than four errors. If error rate is exceeded, check alignment procedures of DATASPEED electronic modules.

## 7. INSTALLATION

**7.01** DATASPEED installations may consist of a DATASPEED tape sender or DATASPEED tape receiver, or both. Since the data set 202A is a combined modulator-demodulator and

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can operate in both directions, a Y-connector kit may be obtained to connect a tape sender and a tape receiver to one data set 202A at multiple installations. A blank panel is provided to cover the data set opening left in the receiver unit. The kit also provides a 3-position switch for mounting on the front panel of the sender.

<i>Position</i>	<i>Function</i>
SEND	Connects DATASPEED sender to data set
RECEIVE	Connects DATASPEED receiver to data set
TEST	Connects DATASPEED equipment back-to-back

Either DATASPEED terminal may be operated with the data set but not both at the same time.

**7.02** The following operating conditions are required at DATASPEED locations.

- Space should be provided for access to and for operation of equipment by the customer.
- Provide adequate space for opening doors and sliding panels, and for performing maintenance operations.
- Temperature should not exceed +40 to 110 degrees F.
- Shock and vibration, none.
- Line voltage  $115 \pm 10$  volts ac 60 cycles.

**7.03** The data set 202A is mounted on a shelf provided on DATASPEED cabinet. It is held in place by a panel. To perform work operations on data set it will be necessary to remove the three screws holding the panel. Remove panel. Lift data set from shelf and remove covers.

**7.04** Data line installation, connection, and option tables for the data set 202A are covered in Section 592-013-200.

**Note:** This equipment uses data set 202A, option Z. Other options will be designated as required by the particular installation.

**7.05** Before plugging in power cord of DATASPEED cabinet, make the following visual inspections:

- Correct fuses are firmly in place.
- Power module connector cable is connected and locked securely.
- Electronic module connector cable is connected securely.
- Circuit cards are securely in place and in their correct positions.
- **INSPECT CABINET GROUND CONNECTION.**
- Doors and panels work freely.
- Modules are in their proper positions.
- Motors and other moving parts are free of any possible operating interference or obstructions.
- Noise and vibration reduction material is not damaged or out of adjustment.
- All mechanical requirements and adjustments are met.

**7.06** When DATASPEED cabinet power cord is plugged into ac outlet, turn power switch ON at power module. Observe that power indicator lamps on module and POWER lamp of control panel are lit.

**7.07** A voltmeter and associated selector switch are provided on front panel of power module. Rotate selector switch to each designated voltage. Meter readings shall correspond to switch settings; if not, adjust associated potentiometer located on top of module. (See Fig. 5.)

**7.08** In a case where DATASPEED equipment was not delivered to company storeroom or shop, the tests in parts 5 and 6 will have to be made at this time.

## 8. CALLING THE DATA TEST CENTER

**8.01** DATASPEED tape senders and receivers shall be tested with the nearest data test center capable of performing the type of test required. These tests should be made during the busy hour using same local telephone facilities that the customer will be using, eg, PBX trunk, DDD, operator, or attendant assisted.



*When using toll facilities for tests, take necessary precautions that customer will not be billed for test calls charged to his telephone.*

## 9. END-TO-END TESTS

**9.01** As the end-to-end tests are the final tests of the system, they should be conducted

between points which normally send to or receive from each other. Transmit or receive at least 1 minute of 14-character test tape. There should be no more than two errors per minute. It may be necessary to make more than one attempt but no more than three. If the requirements are not met, coordinate with data test center to locate trouble in data set, loop, or DATASPEED equipment.

**9.02** *DO NOT* turn the service over to the customer until satisfactory end-to-end tests are completed. However, as the system may contain operational variations to fit the customer's need, it would obviously be more beneficial to test the system as it has been designed for the customer. This may best be accomplished and coordinated on a local basis.