

**DATAPORT OPERATION**  
**DESCRIPTION, APPLICATION, AND TROUBLESHOOTING**  
**D3B CHANNEL BANK**  
**DIGITAL TRANSMISSION SYSTEMS**

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<b>E. Dataport Tandem Connections</b> . . . . .	6	<b>1.01</b> This section describes the D3B channel bank and also contains installation procedures and troubleshooting. The D3B channel bank is a D3 channel bank that is equipped for dataport operation. The dataport channel units connect digital data directly to the carrier channel and onto the T1 line without a separate data multiplexer. D3B 56-KB dataport channel units are available which allow for any T1 facility to qualify for the transmission	
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of 56 kb/s data if it meets voice quality (see Fig. 1). This is accomplished in the channel units via an error-correction scheme which can remove bit errors introduced by the T-Carrier lines. Dataport operation is used primarily in the digital data system (DDS), but can also be used for a stand-alone system between two offices outside the DDS. The old method of 56 kb/s service (see Fig. 2) as discussed in this section is no longer recommended but may be useful for reference.

**1.02** This section is being reissued to add information on the newly developed 56-kb/s dataport channel units. Waveform patterns and flow charts have been added to aid in initial installation and/or troubleshooting. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

**1.03** Channel units for D3 dataport operation are listed in Table A. The data logic unit (DLU) is shown since it replaces the interface unit (IU) in a D3B channel bank. Notice that the J98718AH-2 (SD3C410-02) allows for up to seven banks/clock terminations and 56 kb/s service. Test accessories are also included in Table A.

**1.04** The D3 channel bank must have external or loop-timing capability to accommodate dataport operation. When so equipped (see Fig. 1), the D3B channel bank can provide dataport operation in channels 3, 4, 5, 6, 15, 16, 17, and 18. For 56 kb/s, two channels are required to provide a single data channel. The next higher channel of the two is required for error correction. Dependent on dataport channel unit selection, 2.4, 4.8, or 9.6 kb/s subrate-data service can be furnished directly to DDS using channels 4, 5, 16, or 17. The recommended type of 56 kb/s service utilizes 56-kb/s dataport channel units which can be used in channels 3 and 4, 5 and 6, 15 and 16, or 17 and 18. These channels use the double-wide channel units for error-corrected 56 kb/s service which needs the extra channel to provide for error correction at the higher 56 kb/s rate. Since these are double wide faceplate units channels 4 and 5, or 16 and 17 could be used but these double wide units would consume access to two DLU jacks when only one is needed, reducing the number of dataport channels available. Any channels not being used for dataport can be used for message and special service circuits, except program service. If dataport service is removed that channel is immediately available for other service. A D3B

channel bank is end-to-end compatible with the D4B channel bank.

**1.05** The main use of D3 dataport is extending the DDS network, which consists of data banks, multiplexers and T-Carrier facilities, to provide all-digital data facilities. Customer premises data service units send data at rates of 2.4, 4.8, 9.6, or 56 kb/s over loops to end offices which are connected to intermediate and hub offices by T Carrier. This data is raised to the 64-kb/s DS0 signal rate before being connected to the carrier. The DS0 rate signal is grouped into 8-bit bytes. For nonmultiplexed subrate data, each byte consist of a 0 bit, six customer data bits, and a DDS control bit. Each byte is repeated an appropriate number of times to increase the data rate to 64 kb/s. This repetition of data (or byte stuffing) is used to implement an error correction feature at the receiving end of the dataport circuit. Hub offices serve as test centers and concentration points for connecting to long haul carrier facilities. Offices using dataports to serve customer loops are called dataport offices when the offices provide no deeper entry or no other function in the DDS.

**1.06** For 56 kb/s data transmission, each byte consist of seven customer data bits and a network control bit, resulting in a 64 kb/s rate with no repetition of customer data. But, an error correction feature is provided in the 56 kb/s dataport circuitry which sends a parity byte in the following channel time slot (next higher numbered channel slot). At the receiving end, the two data bytes are used to determine the correct data byte, even if three of the bits are in error.

**1.07** In addition to the predominant application in DDS offices, dataport operation can be applied to stand-alone service. The stand-alone facility provides 2.4, 4.8, 9.6, or 56-kb/s data service between two locations with synchronized timing. The transmit clock in one bank operates in the local mode and the clock in the other bank operates in the loop-time mode.

## **2. TIMING, WAVEFORMS, T1 LINE SELECTION**

**2.01 *Timing.*** The timing of the DDS equipment is synchronized to produce the correct phase relationship throughout the system. This network synchronization produces the precise transmit and receive timing required for data transmission. The reference source is the Master Timing Supply

located at Hillsboro, Missouri. Timing supplies in hub offices derive timing information from the network of T1 lines which includes connection to the master timing supply. Each timing supply produces an office clock signal containing both byte timing (8 kHz) and bit timing (64 kHz) which is distributed to the DDS equipment in the office. When the D3B channel banks function as part of the DDS, the banks must be synchronized to the timing reference. At hub offices, the office clock signal from the timing supply is cabled to the D3B channel bank which is arranged for external timing (properly equipped, one clock input can time all banks in the bay). Refer to note in paragraph 5.12. At offices without a timing supply, the D3B channel bank is arranged for loop timing which locks the transmit timing of the bank to the timing of the received T1 signal. In this case, the timing at the dataport office is synchronized to the office at the other end of the carrier.

**2.02 Waveforms.** With the dataport channel unit installed in the D3B channel bank, the channel unit faceplate connector can provide oscilloscope probe access for the purpose of verifying the following:

- (a) The 8- and 64-kHz integrated clock at pin 3.
- (b) Data load pulse (DLP) at pin 4. (Single pulse for subrate and double pulse for 56 kb/s.)
- (c) Transmit clock (TCLOCK) (1.544 MHz) at pin 5.
- (d) Transmit data (TDATA) at pin 6.
- (e) Receive data (RDATA) at pin 7.
- (f) Receive clock (RCLOCK) (1.544 MHz) at pin 8.

Pins 1 and 2 are ground and -48V, respectively.

**2.03** The "EXT" jack on the face of the DLU unit can provide oscilloscope probe access for observing the 8-kHz clock waveform. On the backplane at the DLU unit position at J108, using two probes, a differential measurement can be made at pins 10 and 35 to observe the waveform of the office DDS composite clock input to the D3B channel bank. Also, at J108 pin 28 the waveform

of the 8-kHz clock from the transmit unit (TU) can be observed. Refer to Fig. 3 through 9 for examples of typical waveforms which should be observed when probing the points shown. Unless otherwise indicated all pin numbers are on the channel unit faceplate connector.

**2.04 T1 Line Selection.** Although the minimum requirement for general-voice use of T1 lines is an error rate of  $10^{-6}$  (one error per million bits), most lines are better and lines can be selected for the more critical DDS application. Lines for conventional DDS data banks are tested to ensure that the performance meets the DDS objective, but lines for dataport-equipped carrier system handling byte-stuffed 2.4, 4.8, or 9.6-kb/s data and 56 kb/s data with the double wide 56 kb/s office channel units need not be tested because the OCU and DSØ dataports have error correcting circuitry to prevent T-line errors from causing customer data errors.

### 3. PHYSICAL DESCRIPTION

**3.01** The dataport channel units and the DLU common unit plug into the channel and common unit slots of the channel bank. They are distinguished from regular units by the blue faceplates and special faceplate connectors. The 56-KB dataport channel units have double wide faceplates. The duplicate connectors on the front of the dataport channel units are wired in parallel and accommodate ED-3C832 jumpers for coupling to one of the four connectors, on the DLU faceplate (see Fig. 10). On the DSØ DP and OCU DP units, the TST jack, Fig. 11 is a card jack that provides two-way test access at 64-kb/s points. Each of the four leads is wired through a set of contacts on the TST jack so that when a card plug is inserted, it will break the path and contact both sides of the circuit. When inserted, the ED-3C793 loopback connector places a loop on both sides of the circuit at the 64 kb/s DSØ point and provides jack access.

**3.02** The data logic unit (DLU), Fig. 11, occupies both the TMU and IU slots on the common equipment shelf. It provides CODE IN jack access for the 1-kHz code generator signal during bank turnup. The LOCAL and EXT jacks on the DLU allow 8-kHz timing signals to be observed with an oscilloscope, (see Fig. 4). The TST jack supplies 8- and 64-kHz clock for the DDS KS-type data test sets via the ED-3C792 test interface unit.

**3.03** The subrate DSØ DP, OCU DP, 56-KB OCU DP, and DLU dataport units have selectable options (the 56-KB DSØ DP has no selectable options). These options, their functions, physical location on the unit, and mechanical features are described in detail in Table B.

#### **4. FUNCTIONAL DESCRIPTION**

##### **A. D3B Channel Bank Circuits**

**4.01** The D3B channel bank performs the normal functions of multiplexing 24 channels into time slots and producing a digital signal at the DS1 rate (1.544 Mb/s). Figure 12 shows the block diagram of the D3B channel bank. The main difference between D3 and D3B channel banks is the substitution of the DLU common plug-in for the IU and the use of the external clock. In essence, the DLU unit replaces the IU, performs all of its functions for D3 message channels, and supplies timing to the DSØ DP, OCU DP and the 56-KB channel units. Section 365-150-100 provides a description of the conventional D3 channel bank.

##### **B. DLU Circuits**

**4.02** The DLU inserts the dataport channel outputs on the PCM bus of the transmit unit, supplies 8- and 64-kHz timing for the dataports (Fig. 13), and also contains its own logic powering circuit. Options on the DLU select whether the D3B channel bank uses local, looped, or external timing (select options per Table B). The clock in the transmit unit generates the timing in the local mode and produces timing from the received DS1 signal in the looped mode. An office DDS source supplies the timing in the external mode. In the DLU, the phase lock circuit produces the 8- and 64-kHz dataport signals with local and looped timing, and the composite clock circuit produces the signals with external timing. In either case the signals are applied to the dataports through the integrated clock circuit. One regenerated composite clock output is available at the DLU position for timing DDS equipment (chaining), and 8-and 64-kHz signals are available at the TST jack for the KS test sets. The four identical jacks on the DLU are multiplied together and couple data and timing between the dataports and the DLU via faceplate connectors. Like the IU for the conventional D3 channel bank, the DLU connects the incoming DS1 signal through the CODE IN jack to the receive unit. When the D3 code generator is connected, the DLU syncs

the receiver with the test signal, inhibits alarms, and keeps the trunk processor operated during the tests.

##### **C. DSØ DP Circuits (J98718BM)**

**4.03** This is a 4-wire unit that matches the office connecting circuits, accomplishes signal conversions in each direction, and for subrate data corrects errors. In the transmit path of Fig. 14, the data is applied to the 135-ohm input and converted from bipolar-to-unipolar form for processing. Under control of the control logic, data is read into the shift registers and onto the bank data-out bus during the channel sampling time. There is no PAM to PCM conversion; dataport information is inserted beyond the encoding circuitry of the bank TU. In the receive path, channel information is demultiplexed from the carrier PCM signal, read into shift register at 1.544 Mb/s rate and read out at the 64 kb/s rate. The error correcting circuit improves performance in the presence of errors on the T-Carrier line by using a majority vote of the bytes to obtain the best signal. This circuit is selected by the EC option on the faceplate and is effective only for byte-stuffed 2.4-, 4.8-, and 9.6-kb/s customer data. If carrier synchronization is lost, the DSØ DP also sends a mux-out-of-sync signal toward the end office. The contacts of the TST jack are placed in the circuit to provide two-way access to the 64 kb/s signals on the office side of the unit at the T, R, T1, and R1 leads.

**4.04** The DSØ DP 56-KB unit is used similarly to subrate units but includes forward error correction as described in paragraph 5.08.

##### **D. OCU DP Circuits**

**4.05** The OCU DP subrate unit contains most of the DSØ DP circuitry plus additional circuits for processing subrate data and connecting to the customer loop. The input circuit to the transmit path of Fig. 15 contains a transformer producing a 135-ohm balanced input and contains circuits for bipolar to unipolar signal conversion, and automatic line buildout (ALBO). One side of the sealing current feed to the loop connects to the transformer and a surge protection diode connects across the input. The ALBO produces a fixed level input signal by adjusting the amount of loss inserted in the path; an additional 10 dB of loss can be introduced in the output signal path by means of the fixed line buildout (FLBO) option to compensate

for short loops. Byte stuffing to bring the subrate data up to the 64 kb/s rate is performed in the subrate conversion logic unit. Shift registers in the transmit and receive paths read the 64 kb/s data into and out of the carrier channel. The shift registers and error correction circuitry are the same as used in the DSØ DP except that error correction is always connected. The contacts on the TST jack provide two-way access on the 64 kb/s DSØ side of this circuitry. The subrate conversion logic in the circuit path toward the customer produces the subrate data and detects system control codes which operate the remote looping relay. The output circuit contains a surge protection diode and connects the other side of the sealing current supply to the transformer which produces the 135-ohm balanced output.

**Note:** The OCU DP error correction is always connected except as noted in paragraph 5.15.

**4.06** The subrate conversion logic checks the data received from the carrier once every 5, 10, or 20 bytes (depending on the speed) for all-zeros or system control codes (idle, OCU loopback, CHAN loopback). If the OCU loopback code is detected, the logic circuit operates the loopback relay to loop the signal toward the STC. If CHAN loopback is received, the OCU DP signals the customer equipment to loop by reversing the polarity of the simplex sealing current.

**4.07** The OCU DP 56-KB unit is similar to the subrate unit and it interfaces directly with the 56-kb/s customer loop, converts data to DSØ-A (64 kb/s) format, and applies the error correction algorithm before inserting the data and parity bytes.

## 5. APPLICATION INFORMATION

**5.01** Two basic arrangements for serving customer loops at dataport offices are (1) the use of a OCU DP unit for a subrate-data speed, and (2) the use of the 56-KB OCU & DSØ dataport channel units with forward error correction. (See paragraph 5.04.) When connecting the customer for subrate data to a DDS hub office or a dataport tandem office, a DSØ DP is always used at the other end of the channel. At a dataport tandem office, the DSØ DP is connected back-to-back with another DSØ DP unit. In stand-alone operation, the first two arrangements for dataport offices are used at both

ends. These very basic applications are shown in Fig. 2, 16, 17, and 18. The OCU DP includes error correction as a design feature, but is obtained by option selection in the J98718BM DSØ DP. This option is only selected for a 64 kb/s signal produced from byte-stuffed subrate data, not for 56 kb/s or multiplexed data. The basic applications are discussed further in the following paragraphs.

### A. DDS Subrate-Data Application

**5.02** This application of D3 dataport operation is to extend subrate service to a dataport office from the hub office as shown in Fig. 16. The hub-end D3B channel bank bay receives DDS composite clock from the timing-supply bay. Selected banks within the bay are optioned to accept the external clock at the dataport DLU unit. For this subrate application the DSØ DP unit at the hub end is optioned with the error correction feature "in". At the dataport office the D3B channel bank is operated on loop timing from the incoming T1 line. Its OCU DP for the selected subrate is connected directly to a four-wire customer loop.

### B. DDS 56 kb/s-Data Application With DSØ DP Code J98718BM Channel Unit

**5.03** For this type 56-kb/s service, it is necessary to use the J98718BM DSØ DP channel units in the D3B channel banks in both the hub and dataport offices, Fig. 2. At the dataport office, a conventional DDS OCU unit is mounted in a suitably equipped OCU or DDGT (digital data group terminal) shelf. The OCU unit then interfaces on one side at the 56 kb/s rate with customer four-wire loops and on the other side at the 64 kb/s DSØ rate with the DPØ DP channel unit. Timing at the hub office is operated from external clock and at the end office on loop timing received from the T1 line. However, at the dataport office the received composite clock must be wired from the D3B channel bank to the OCU or DDGT shelf. When more than one system is loop timed in the office, the data circuits deriving timing from one such system can not be cross-connected to another because the timing may differ. The DSØ DP channel units at both ends have the error correction feature "out". This type 56 kb/s service requires qualification of the T1 line in accordance with Section 365-228-500.

### C. 56 KB-Dataport Channel Units

**5.04** By using these channel units (J98718DA and DB) qualifying T1 lines for 56-kb/s data transmission is no longer necessary. The 56-KB dataport channel units make use of an error-correction scheme which can remove a substantial number of bit errors which might be introduced by the T-Carrier. This allows any T1 facility which meets voice quality requirements to meet DDS specifications for 56-kb/s data service quality.

**5.05** The 56-KB dataport channel units are similar to the subrate dataport units. There are DS0 DP and OCU DP versions. The OCU DP interfaces directly with the 56-kb/s customer loop, converts data to DS0-A (64-kb/s) format, and applies the error correction algorithm before inserting the data and parity bytes into the PCM stream at the 1.544 Mb/s (DS1) rate. The DS0 DP contains only the circuitry for error correction and rate conversion from 64 kb/s (DS0) to DS1 speeds.

**5.06** These 56-KB channel units have double-width faceplates and each occupy two channel positions in the D3B channel bank. A channel unit uses consecutive timeslots for the data and parity words. Parallel wired faceplate jacks allow access to the (DLU) common unit.

**Note:** When using the 56-KB channel units, the J98718AH-2 or later version of the DLU must be used (see Fig. 19).

A maximum of four channel slots can be used, as in the case for subrate units. The double wide 56-KB channel units use channels 3 and 4, 5 and 6, 15 and 16, or 17 and 18. A channel unit could use the positions 4 and 5, or 16 and 17, but this would block access to the DLU jacks reducing the number of usable dataport channels. In order for a channel unit to make use of timeslots for; say, channels "N" and "N + 1", both channels are physically occupied, even though the printed wiring board of the channel unit mates with the connector only at channel "N". For this reason, provision for the removal of the error correction algorithm (for use of only one channel) is not provided in D3, as both channels will be occupied in any case. This is to eliminate the administration of channel slots which must be left open.

**Note:** The drop side connection should be made into channel "N".

**5.07** The 56-KB OCU DP channel unit must have proper option switch settings upon installation in a D3B channel bank (the 56-KB DS0 DP channel unit has no options to set). The option switch (see Table B) is labeled CSU/DSU, CM/OUT, and CRTC/OUT. The CSU/DSU option should correspond to the type of equipment on the customer premises (ie, a channel service unit or a data service unit). The CM option is for use of a customer multiplexer DSU at the station equipment. When this station multiplexer DSU is available this option can be used. Until then this part of the switch should be set to "OUT". The CRTC/OUT option should be set to "OUT" for the same reason. The CRTC (customer remote test control) allows a customer to cause a loopback at the far end DSU (or CSU, depending on the far end OCU DP option). This allows an end-to-end test capability, to isolate trouble to either transmission equipment or customer terminal equipment.

**Note:** Both CM and CRTC should not be used simultaneously on a given OCU DP channel unit.

The plug-type option (see Table B) has a position labeled D and one labeled T. The plug should be in the D position since the T position is for factory testing only.

### D. 56 kb/s-Error Correction

**5.08** Error correction in the 56-KB dataport channel units is accomplished by using a (17, 9) cyclic code which has been shortened to a (16, 8) code. So, for each eight bits of data (a DS0-A or DS0-B byte), a sixteen bit codeword is transmitted over the T Carrier, requiring *two* channel time slots. The first eight bits of this codeword are the data bits and the second eight bits are called the parity word (see Fig. 20). If zero, one, or two out of the 16 received bits are in error, the correct data byte will always be recovered. About one-third of those cases with three errors can be decoded correctly. For randomly occurring bit errors, an uncorrected error rate of  $10^{-3}$  will be improved to about 6 ( $10^{-8}$ ) after correction.

### E. Dataport Tandem Connections

**5.09** Figure 17 shows a DDS dataport tandem office using back-to-back D3B channel banks. The bank nearest the hub office is operated on loop timing. Composite clock is wired from the

hub-office-side D3B channel bank to the D3B channel bank on the dataport-office side which uses external timing. The tandem connection will accommodate either subrate data or 56 kb/s. Both DSØ DP channel units are optioned with the error correction "in" for subrate data and "out" for 56 kb/s data using the J98718BM channel unit. Again for this type 56 kb/s-data operation, the T1 lines to the hub and dataport offices should be qualified in accordance with Section 365-228-500. 56 KB DSØ DP can also be used for tandem if the error corrected 56 KB service is used. Qualification of the T1 lines is not necessary in this case.

#### F. Stand-Alone Applications

**5.10** Stand-alone dataport operation, shown in Fig. 18A for subrate data and Fig. 18B for 56-kb/s data, is essentially the same as that described for DDS in paragraphs 5.02 and 5.03. The main difference is that DDS composite clock is not available and clock must be supplied by the channel bank in one office operating on local timing. Other differences are that STC testing capability is not available and there may not be a single point of contact for the customer. The T1 line supplies clock to the channel bank, operating on loop timing, in the other office. In this case, the channel bank on local timing acts as the master clock for both channel banks and both customer stations.

#### G. D3B Channel Bank Configuration Requirements

**5.11** The dataport approach for D3 requires no backplane modifications. Instead, connectors on the front of the channel bank provide the additional connections between the dataport channel units and the new common equipment plug-in data logic unit (DLU). D3 channel banks can be equipped for D3B operation and any of the dataport applications if the currently required wiring for loop timing and the correct external clock termination are provided. All vintages of D3 channel banks except very early ones have the correct loop timing wiring; the early ones must be modified per CN6482MV which can be done with the channel bank in service. In addition, the correct external clock connection must be verified per paragraph 5.12 for operation in a hub office.

**Note:** Installation of modification CN6482MV can be verified by the following ohmmeter readings: J108 (behind IU) Term 5 to Term 9: approx. 180Ω; Term 9 to Term 33: ΩΩ

**5.12** Externally supplied composite clock is terminated in a resistor-capacitor network on an equalizer and distribution panel (J98718A, B, and C bays) or a power distribution panel (J98718J, K, and L bays) at the top of the bay and bridged to all of the remaining channel banks in that bay.

**Note:** The number of banks that can be bridged to one timing tap will vary, depending upon the list number of the DLU unit as follows:

DLU LIST NO.	NO. OF BANKS PER BAY
1	1
1A	3
4	3
5	7

The wiring details are shown in CAD 48 and 49 of SD-3C104-01 for the J98718A, B, and C (-1 or -2) D3 bays and in CAD 16 of SD-3C104-02 for the J98718J, K, and L (-1) D3 bays. Connections to the clock termination must be provided by option M wiring, which includes CAD 16 for the J, K and L bays. Very early vintages of the J98718A, B, and C bays that will be receiving external clock require a modified CAD 25 or 35 of SD-3C104-1 to correct the clock termination. This modification is not required if only loop timing is used.

**Note:** Presence of an external timing signal waveform similar to that shown in Fig. 3 can be verified using a dual-trace oscilloscope and by probing J108 pins 10 and 35 behind the DLU unit on the backplane of the D3B channel bank.

**5.13** The rules on the use of shielded cable for dataport operation evolved from the existing arrangements for DDS equipment and for the D3 channel bank. Shielded cables are used between the DSX-Ø cross-connect bay and the DDS equipment for both directions of transmission. Existing unshielded cable is used for the drop channel wiring from the D3B channel bank to the distributing frame. At a hub office, the tie cable from the

intermediate distribution frame (IDF) to the DSX-0 must be shielded. At an end office, shielded cable is not used with the OCU DP; but, if a DDGT or DDS OCU arrangement is used, shielded connections are made from the DDS equipment to the associated distributing frame. All clock leads to DDS equipment and channel bank must be shielded.

**5.14** Once the dataport DLU is installed, dataport capability exists for four dataport circuits, subrates on channels 4, 5, 16, and 17 and kb/s services on channels 3 and 4, 5 and 6, 15 and 16, 17 and 18. Except when the wide units are used, any of these channels not being used for dataport can accommodate message or special service channel units. **However, none of the other channels may be used for 5- or 8-kHz program units.** The D3 reframe counter unit cannot be used in a D3B channel bank because the DLU occupies the slot of the removed IU unit and the adjacent vacant slot.

**5.15** A special application of D3 dataport requires an OCU-DP modification per CCN278MV. This modification, which inhibits the forward-error-correction feature from the OCU-DP is used on the master leg of a multipoint circuit which does not subrate multiplexing between the master station and the multipoint junction unit (MJU). Application of this modification requires that the associated T1 line be qualified per DDS requirements, see Section 365-228-500.

## 6. ESTABLISHING D3B DATAPORT SERVICE

**6.01** Chart 1 provides a suggested sequence of tasks to be performed in establishing D3 dataport service. Chart 1 applies to DDS hub, dataport tandem, and dataport offices as well as stand-alone dataport offices for subrate and 56-kb/s data service. It is assumed that the channel bank is already carrying message service. The exact sequence in which the tasks are performed may be varied depending on local conditions. For example, Step 1H of Chart 1 restoring service temporarily removed in Step 1E is performed immediately after the new DLU unit is installed. Removing voice service from a channel to be assigned for dataport operation can be performed much earlier than Step 1E of Chart 1. Of course, once a D3 channel bank has been converted to a D3B channel bank, adding an additional dataport channel is a much simpler task. The following paragraphs

discuss some considerations involved in performing the tasks in Chart 1.

### A. Local Loop Qualification Tests

**6.02** At the DDS or stand-alone dataport office (Fig. 2 and 18), the drop-side cable pairs going outside the office must undergo acceptance tests (Steps 1A, 1B, and 1C of Chart 1) to ensure that they are suitable for digital data before service is applied. The tests are made from the OCU DP channel unit position by means of the D3 ED-3C947 cable pair access tool. This tool plugs into the channel slot and is shown in Fig. 21 along with the connecting block at the customer's location. For 56 kb/s service without error correction, the tests are made from the DDS OCU or DDGT shelf using the DDS 789A tool plugged into the OCU unit slot as shown in Fig. 22. The cable acceptance tests to be used are covered in Section 314-410-510, Tests E through J. The results are to be recorded on the DDS E-6528 series of forms. These tests require two testers, one at each end of the cable. The required tests are named below:

- E. Foreign Voltage
- F. Insulation Resistance
- G. Loop Resistance
- H. Insertion Loss
- I. Background Circuit Noise
- J. Impulse Noise.

### B. Channel Bank and T1 Line Considerations

**6.03** Steps 1C through 4H of Chart 1 deal with checking that the channel bank and T1 line are configured for dataport operation, optioning and installing the dataport plug-ins, removing and restoring message service, and making DS0 signal connections at the distribution frame, if applicable. References in Chart 1 may be helpful in understanding these tasks. Some of these tasks (eg, cabling) may be performed by the Western Electric Company installation forces in preparation for dataport service.

**Note:** DDS and T Carrier terminals may follow different conventions for the T, R, and T1, R1 designations. Before cross

connecting the DS0 signals at the distribution frame, verify the proper assignment of T, R, and T1, R1.

### C. DDS Preservice Tests

**6.04** Step 1 I of Chart 1 is performed by the DDS tester at the STC. These are loopback tests toward the dataport office and customer premises which normally do not require assistance at the D3B channel bank. DDS Section 314-901-500 provides these preservice tests. In the event of a trouble occurring during the test, the carrier craftperson may be required to manually loop back the DS0 level signal (see Chart 2, Procedure A) and/or use the KS data test sets (see Tables C and D, Fig 23, and Chart 2) to sectionalize the trouble.

### D. Stand-Alone Preservice Tests

**6.05** Before service is applied to a stand-alone system, the carrier channel and customer loops must be tested for data transmission without errors using the DDS digital test sets, KS-20908 receiver and KS-20909 digital transmitter. The KS-20908 receiver and KS-20909 transmitter are similar in appearance and operate on 115 volts ac. Several different outputs can be obtained from the transmitter including quasi-random testwords, control and loopback signals and selectable byte patterns. The receiver indicates detection of control codes and byte patterns by lighting of lamps, and indicates errors on a counter. Tables C and D list the controls on the test sets and their functions. Detailed information and operational tests for the test sets are found in Section 107-600-100 for the transmitter and Section 107-601-100 for the receiver.

**6.06** Chart 2 contains the procedures for using dataport test fixtures and the data test sets. These procedures cover the connections that may be required for turnup or troubleshooting, (eg, establishing a loopback at the dataport and testing toward the carrier or drop side). Any or all of the tests can be used, but the Preservice Customer Loopback Test, performed alternately from each office is the best preservice test, checking the carrier and both customer loops. Figure 23 shows the test connections for the procedures of Chart 2.

### E. Dataport Pre-Test Evaluation

**6.07** Examples of some dataport system problem evaluations are given in Fig. 24, 25, 26, 27, and 28 using a single D3B channel bank at each end of the dataport system.

## 7. TROUBLESHOOTING CONSIDERATIONS

**7.01** Most initial troubles are cleared by replacing dataport plug-in units or correcting option settings. The DLU at either end would be suspected if the system does not restore after installing these units. Furthermore, an alarm accompanying the installation of a dataport channel unit indicates that the unit is defective. The placement of plugs on the socket-plug option blocks must be checked with Table B since the options directly affect the operation. Some options are selected by placing the plug so that the white half of the socket block is showing. When both halves of the socket block correspond to an option, however, the plug is placed alongside the designation for the required option.

### A. DDS Dataport Procedures

**7.02** To provide the grade of service required for DDS, the T Carrier facility must be treated like a high priority special service by identifying frame terminations and jack access to prevent service interruption. Concentrated effort using the guidelines in this part of the section and coordination with the STC and TRCC will be required to restore lost service within the 30-minute DDS objective. Before attempting any maintenance, confirmation that the data service has been released for testing must be obtained by contacting the STC.

**7.03** Generally, there are two categories of trouble: carrier failures with resulting alarms, and channel troubles bringing customer complaints. Alarm indications and channel bank looping are used to isolate trouble in the first category. Trouble in the second category is isolated by knowing the extent of the trouble and making channel tests. For trouble on a single data channel, the STC or responsible office will sectionalize the circuit using loopback and end-to-end tests that involve the channel test procedures of Chart 2 at the dataports. If isolated to the customer loop, loop troubleshooting tests A through J provided in Section 314-410-310 will confirm the need for cable repairs or cable reassignment. Whether both voice and data are

**SECTION 365-150-107**

affected by multichannel trouble must be considered in determining whether separate data or common plug-ins should be replaced at the D3B channel bank.

**B. Stand-Alone Dataport Procedures**

**7.04** For troubleshooting stand-alone dataport, the channel bank and T1 line considerations given in paragraphs 7.02 and 7.03 are valid. Trouble sectionalization and restoral of dataport channel service must be performed using the DDS digital test sets and D3 dataport test fixtures. The stand-alone preservice test procedures provided in Chart 2 are also applicable to trouble clearance as are the customer loop tests A through J given in Section 314-410-310.

**8. BSP REFERENCES**

**8.01** The 365 Division of Bell System Practices contains many sections, too numerous to list, which describe the channel bank and the T1 line and their operation and maintenance. Consult Section 365-000-000 for a listing of these BSPs.

**8.02** The DDS BSPs listed below are being updated to cover dataport operation.

<b>SECTION</b>	<b>TITLE</b>
314-410-310	DDS Local Loop Maintenance
314-410-510	DDS Local Loop Tests
314-900-100	DDS Private Line Service Description
314-900-300	STC 2-Point Private Line Maintenance
314-901-500	STC 2-Point Private Line Circuit—Test Procedures
314-910-100	Office Channel Unit and Auxiliary Circuits
314-918-100	DDGT Description
314-918-300	DDGT Troubleshooting and Testing
365-228-500	T1 Digital Line Qualification Tests
880-601-110	Engineering Considerations Synchronization Network

TABLE A

## D3 DATAPORT UNITS AND TEST ACCESSORIES

EQUIPMENT	EQUIPMENT CODE	SD/CD	FUNCTION
<b>BANK PLUG-INS AND CONNECTORS</b>			
DLU (Data Logic Unit) Common Unit	J98718AH-1	3C410-01	Timing and interface between D3 channel bank common circuits and DS0 DP and OCU DP units
	J98718AH-2	3C410-02	Same as -1, but allows 56 kb/s service and 7 bank/clock terminations.
DS0 DP (Digital Signal Zero Dataport) Channel Unit	J98718BM-1	3C411-01	64 kb/s data access for DDS or stand-alone applications with error correction for subrate data but not for 56 kb/s data
OCU DP (Office Channel Unit Dataport) Channel Units	J98718BN	3C412-01	Subrate-data access to local loop for DDS and stand-alone applications
	2.4 kb/s	List 1, 4, 4A, 7, 7A	
	4.8 kb/s	List 2, 5, 5A, 8, 8A	
	9.6 kb/s	List 3, 6, 6A, 9, 9A	
56 KB DS0 DP Channel Unit (Double Wide)	J98718DA	3C419-01	Provide for 56 kb/s error corrected dataport service
56 KB OCU DP Channel Unit (Double Wide)	J98718DB	3C446-01	Provide for 56 kb/s error corrected dataport service
Front Plate Connector (Jumper)	ED-3C832		Connects DS0 DP or OCU DP units to DLU unit circuits
<b>TEST FIXTURES</b>			
Test Interface Unit	ED-3C792	3C403-01	Provides DLU unit composite clock to KS-20908 and KS-20909 data test sets
Loop Back Connector	ED-3C793	3C404-01	1. Provides DS0 level loopback at DS0 DP or OCU DP units for DDS STC testing  2. Provides jack access at DS0 DP or OCU DP unit DS0 level toward drop or line for KS-20908 and KS-20909 data test sets
Interface Unit Cord	ED-3C860	3C403-01	Connects DLU unit composite clock to test interface unit
D3 Dataport Access Tool	ED-3C947		Provides 4-wire access to OCUDP unit slot for customer loop qualification tests

**TABLE B  
DATAPORT OPTIONS**

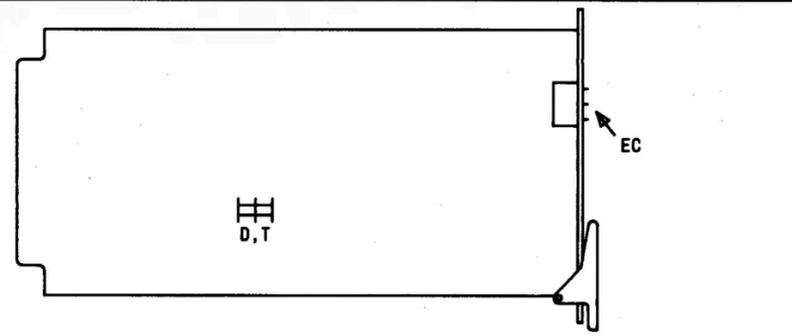
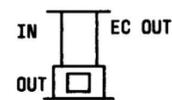
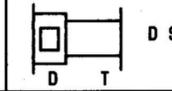
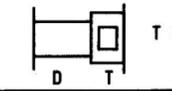
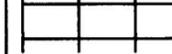
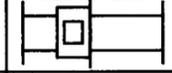
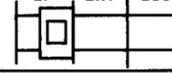
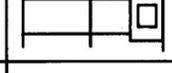
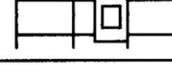
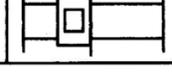
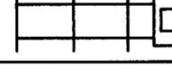
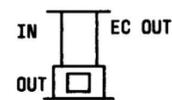
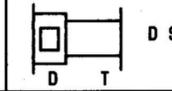
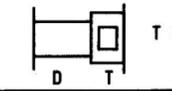
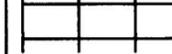
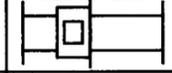
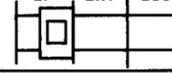
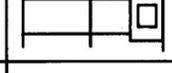
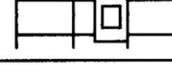
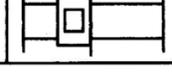
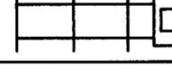
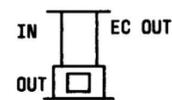
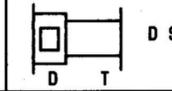
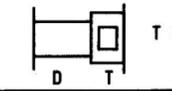
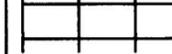
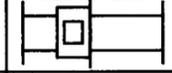
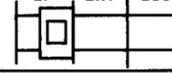
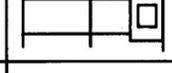
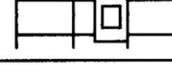
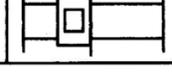
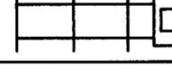
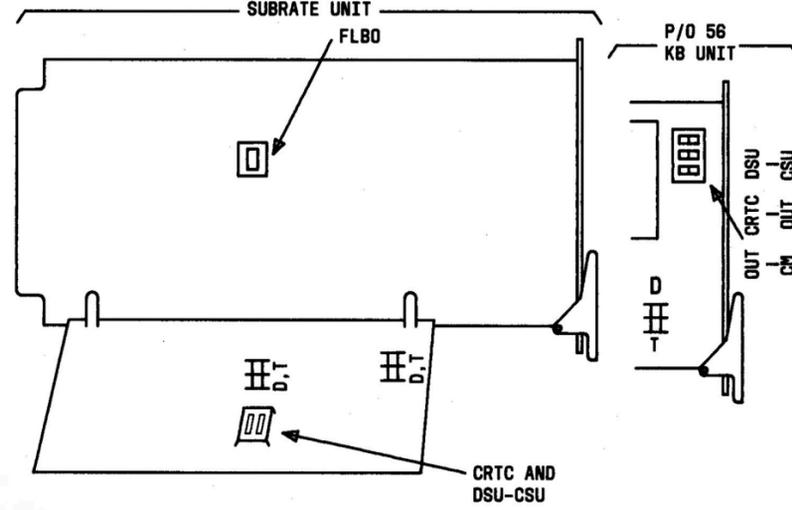
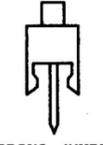
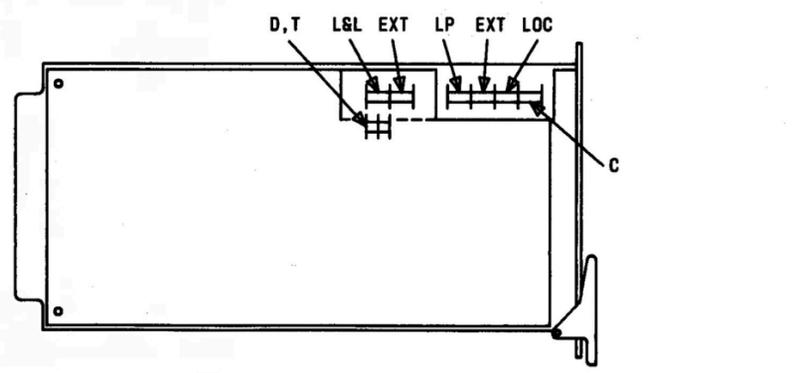
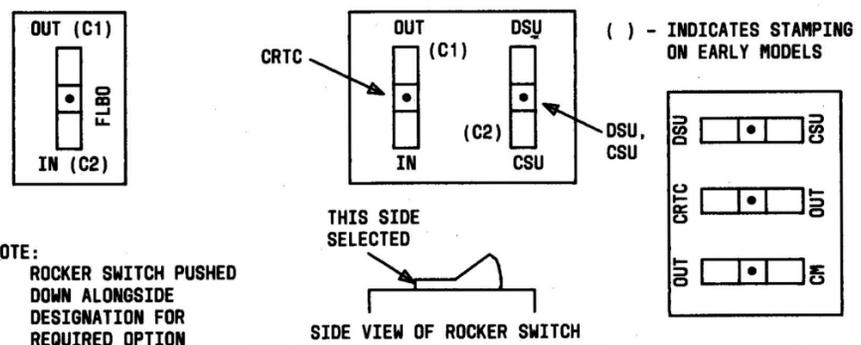
UNIT	OPTION	FUNCTION	LOCATION	SELECTION																		
DSØ DP	EC, IN or OUT (socket & plug)  D or T (socket & plug)  (56KB DSØ DP has no options)	Set IN only for byte-stuffed data (2.4, 4.8 or 9.6 kb/s); otherwise OUT  Select D for normal use; T is only for factory tests		<table border="1"> <tr> <td>EC</td> <td></td> <td></td> </tr> <tr> <td>DT</td> <td></td> <td></td> </tr> <tr> <td>C</td> <td></td> <td></td> </tr> <tr> <td>L&amp;L, LP</td> <td></td> <td></td> </tr> <tr> <td>EXT, EXT</td> <td></td> <td></td> </tr> <tr> <td>L&amp;L, LOC</td> <td></td> <td></td> </tr> </table>	EC			DT			C			L&L, LP			EXT, EXT			L&L, LOC		
EC																						
DT																						
C																						
L&L, LP																						
EXT, EXT																						
L&L, LOC																						
OCU DP	FLBO, IN or OUT (rocker switch)  CRTC, IN or OUT (rocker switch)  DSU or CSU (rocker switch)  D or T (socket & plug)  CM	Set IN only for short loops (<10 dB) to insert 10 dB in T, R pair coming from customer premises; otherwise OUT  Set out until customer remote test control (CRTC) is available; then set IN only if station has CRTC feature  Select DSU for data service unit at station; Select CSU with chan service unit.  Select D for normal use; T is only for factory tests. Same setting on both D,T sockets  Set Out - This option is for future use with customer multiplexing at the station equipment.		<p>NOTE: USE TWEEZER TYPE EXTRACTION TOOL (KS-21838) FOR REMOVING AND INSTALLING JUMPER PLUGS. JUMPER ALONGSIDE REQUIRED OPTION (EG, EC, D,T) OR PLACED SO THAT WHITE IS SHOWING FOR OTHERS. THERE IS ONE PLUG FOR LP, EXT OR LOC; AND ONE FOR L&amp;L OR EXT.</p> <p style="text-align: right;">SIDE VIEW OF JUMPER PLUG</p>  <p style="text-align: right;">2-PRONG JUMPER</p>																		
DLU	LP, EXT OR LOC, (socket & plug)  L & L or EXT (socket & plug) D or T (socket & plug) C (socket & plug)	Select one for required bank timing:  LP - loop timing for DDS when no office clock is available EXT - external timing for connection to office clock LOC - locally generated, for stand-alone application  Select one to match bank timing: L & L matches LP and LOC; EXT matches external Select D for normal use; T is only for factory tests Select C for normal operation; provides off hook during bank reframing that follows carrier hit		 <p>NOTE: ROCKER SWITCH PUSHED DOWN ALONGSIDE DESIGNATION FOR REQUIRED OPTION</p> <p style="text-align: right;">( ) - INDICATES STAMPING ON EARLY MODELS</p> <p style="text-align: right;">THIS SIDE SELECTED</p> <p style="text-align: right;">SIDE VIEW OF ROCKER SWITCH</p>																		

TABLE C

**KS-20908 DATA TEST SET  
(RECEIVER) CONTROLS AND INDICATORS**

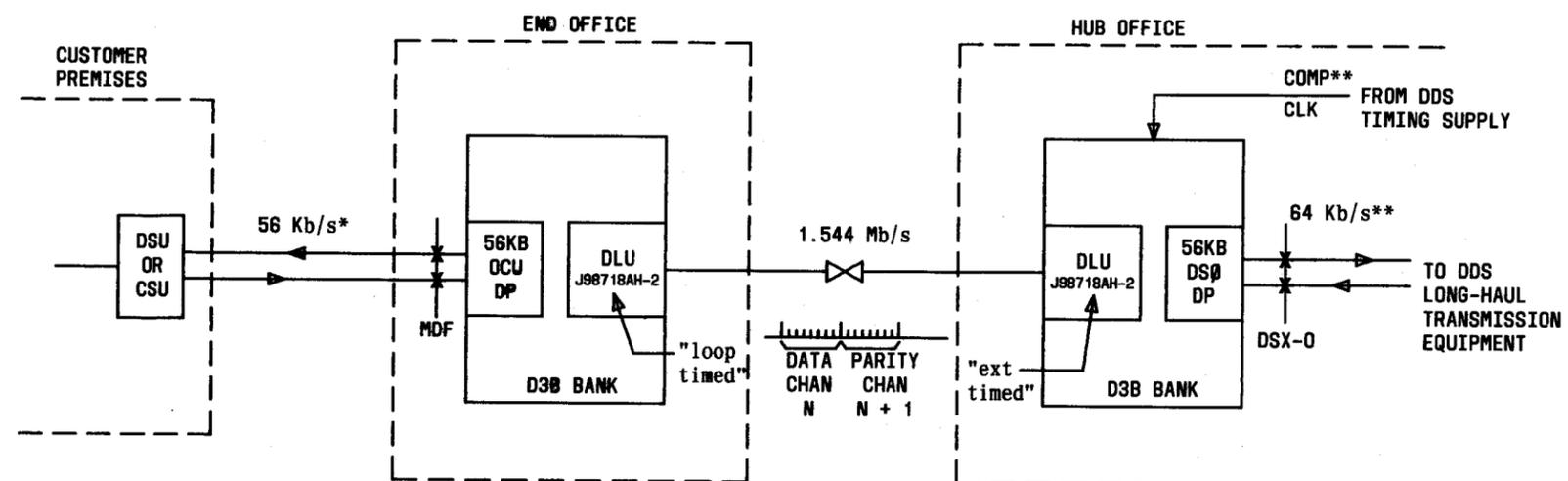
CONTROL/INDICATOR	FUNCTION
POWER ON (Switch and Lamp)	Turns set on or off.
TERMINATE* (Switch)	Matches impedance and terminates input circuit.
INPUT (Switch)	Conditions set for bipolar or logic level signals: BIPOLAR will be used for measurements at the DSØ DP and LOGIC, NEAR and FAR for measurements at OCU DP.
DATA-RATE (Switch)	Selects data rate being tested.
CHANNEL (or SUBRATE CHANNEL) (Switch)	Used to select one of the 5, 10 or 20 multiplexed subrate channels.
TESTWORD (Switch)	Selects 511- or 2047-bit words to be received from KS-20909 data test set or 921A test set. LOOPED is used for loopback test only.
COUNTER (Switch)	Registers BIT or BLOCK errors on counter, BIT for each error or BLOCK for number occurring in one second intervals. EXT PULSES enables counting errors from any logic level or bipolar source.
COUNTER MODE (Switch)	COUNT position received errors; HOLD freezes the count; RESET clears counter.
3-Digit Counter Display (LEDs)	Displays error or pulse counts as they occur. Starts over after count of 999.
CLOCK (LED)	Indicates required clock signal is present.
TERMINATED (LED)	Indicates circuit is terminated for bipolar measurement.
OVERFLOW (LED)	Indicates count over 999.
CONTROL CODES (LEDs)	Indicates any received control codes.
BYTE PATTERN (LEDs)	Indicates 1's in bit position when lighted.

\* TERMINATE will not be designated on later sets that automatically terminate upon connection.

TABLE D

**KS-20909 DATA TEST SET  
(TRANSMITTER) CONTROLS AND INDICATORS**

CONTROL/INDICATOR	FUNCTION
POWER ON (Switch and Lamp)	Turns set on or off.
OUTPUT (Switch)	Conditions set for bipolar or logic level signals: BIPOLAR will be used for sending at DSØ DP unit and LOGIC, NEAR and FAR for sending at OCU DP.
DATA RATE (Switch)	Selects data rate to be sent.
FUNCTION (Switch)	Selects test signal: 511 TESTWORD or 2047 TEST WORD for quasi-random words; CONTROL CODE enables button-selected codes to be sent; LOOPBACK TEST enables button-selected loopback signal to loopback signal to be sent with test-words; BYTE ENCODER enables thumbwheel-selected bytes to be sent.
MODE (Switch)	Used with FUNCTION switch set on CONTROL CODES, BYTE ENCODER, or TESTWORD to control whether sent repeatedly (REPEAT) or only on command (SINGLE). All 0's blocks output giving all zeros (receiver shows zero suppression code).
RESET (Momentary Pushbutton)	Allows changing LOOPBACK TEST pushbuttons.
CONTROL CODES (Pushbuttons and LEDs)	7 indicators associated with code pushbuttons.
LOOPBACK TEST (Pushbuttons and LEDs)	3 indicators associated with loopback pushbuttons.
BYTE ENCODER (Thumbwheels)	8 selectable bits to produce transmitted byte.
ALL 1's (Momentary Pushbutton)	Sends all ones.
CLOCK (LED)	Lights when office bit and byte clock signals are present.



\* LOOP IS SUBJECT TO DDS 56 Kb/s REQ  
 \*\* COMP CLK AND 4-WIRE CONNECTIONS ARE SUBJECT TO THE SAME SPECS (AND 1500 FT. LIMIT) AS OTHER DDS CONFIGURATIONS (SEE IL79-07-348)

NOTE: T1 LINE DOES NOT NEED TO BE QUALIFIED.

Fig. 1—56-KB Dataport Application With Automatic Error Correction

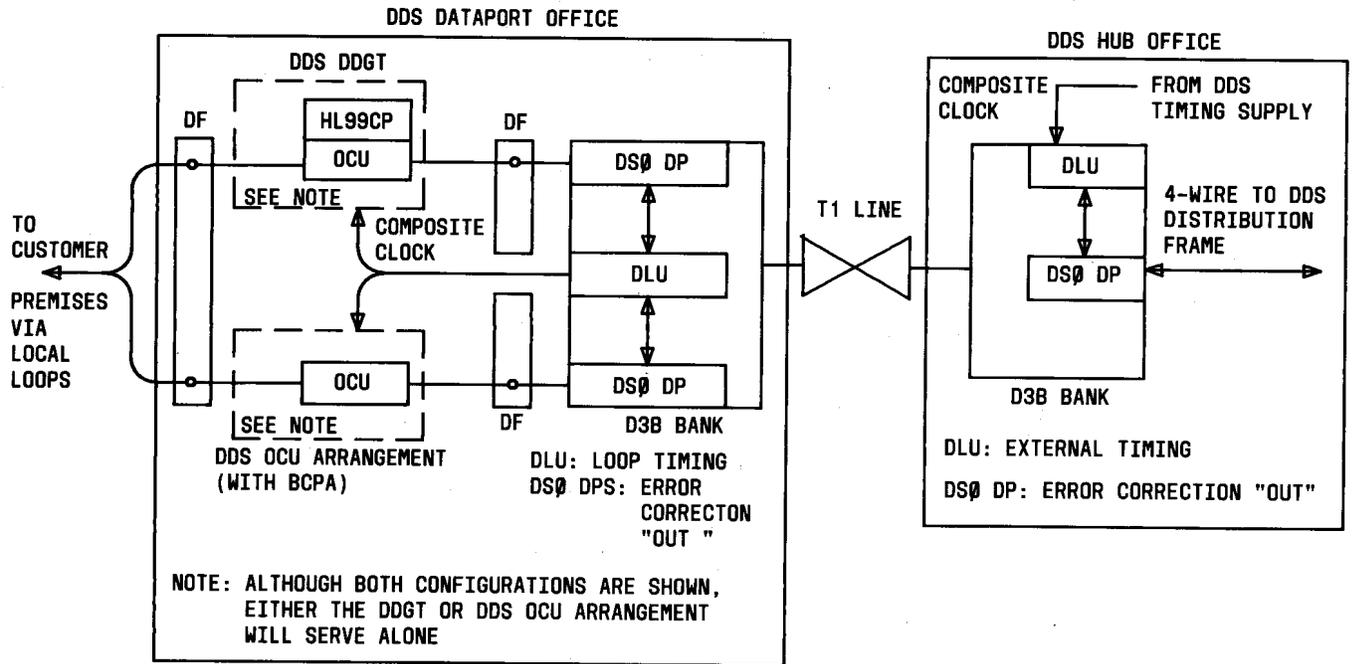


Fig. 2—56-kb/s DDS Dataport Application Without Error Correction

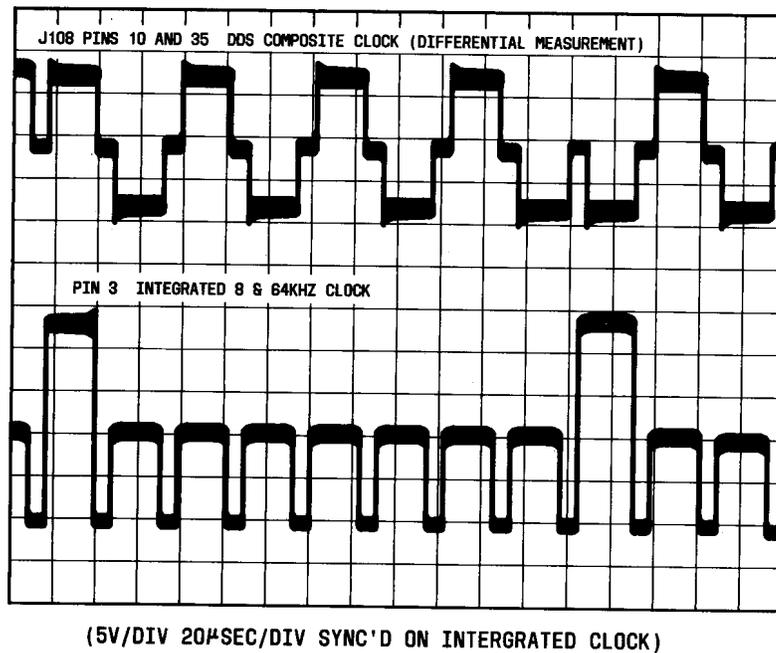


Fig. 3—DDS Composite Clock and Integrated Clock

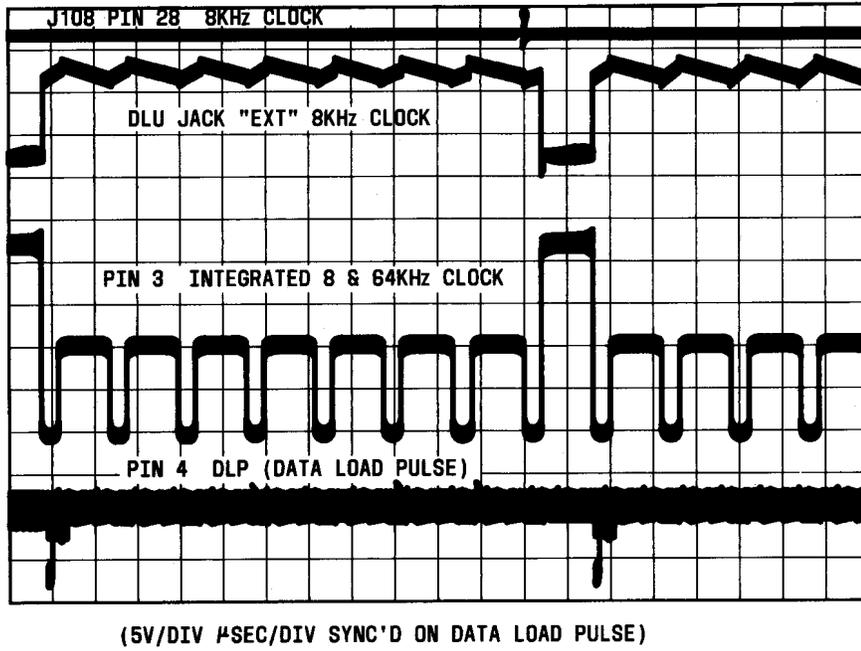


Fig. 4—8-kHz Clock at Back of Bank and Front of DLU, Integrated Clock, and DLP

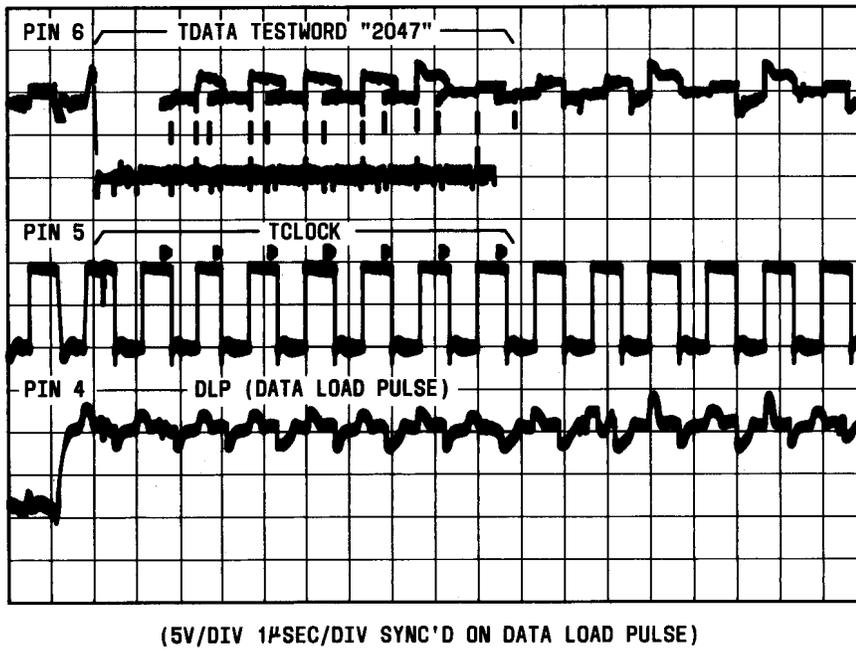
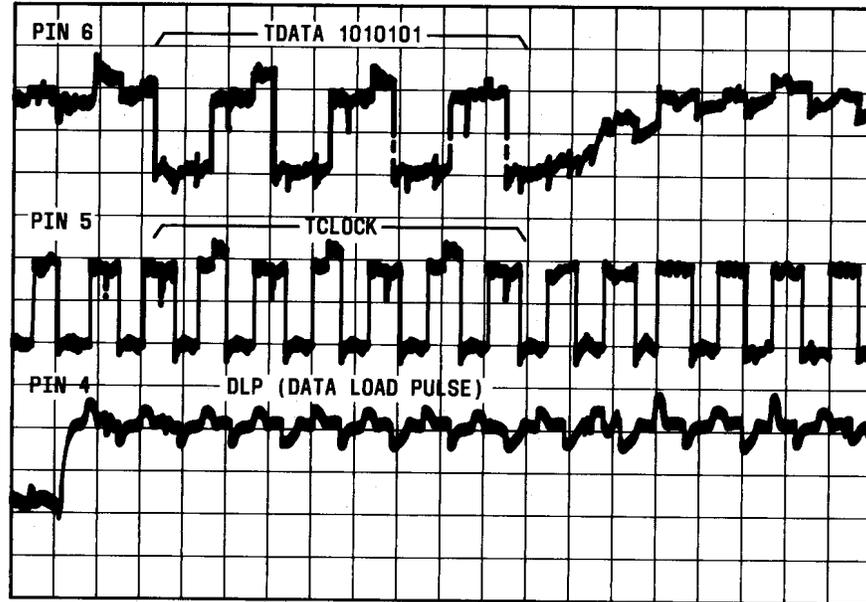
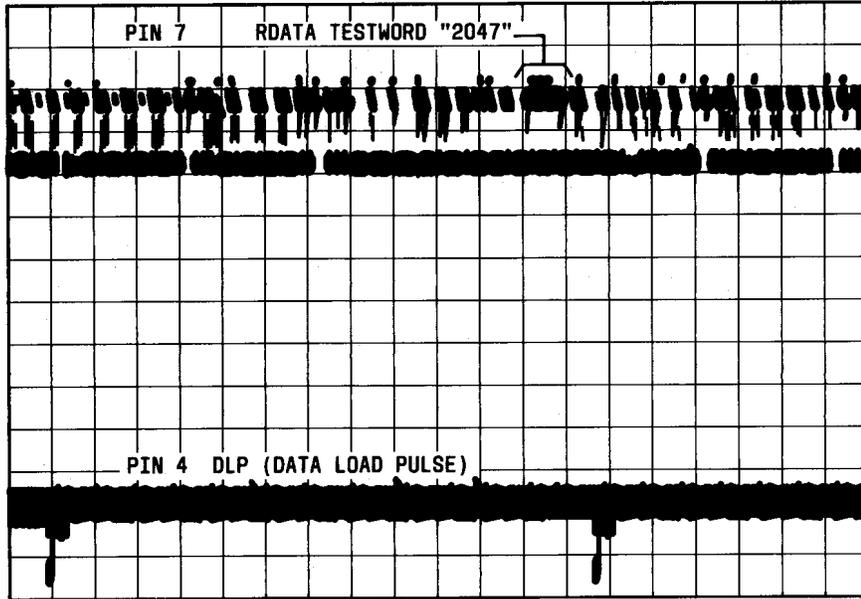


Fig. 5—TDATA Testword, TCLOCK, and DLP



(5V/DIV 1 $\mu$ SEC/DIV SYNC'D ON DATA LOAD PULSE)

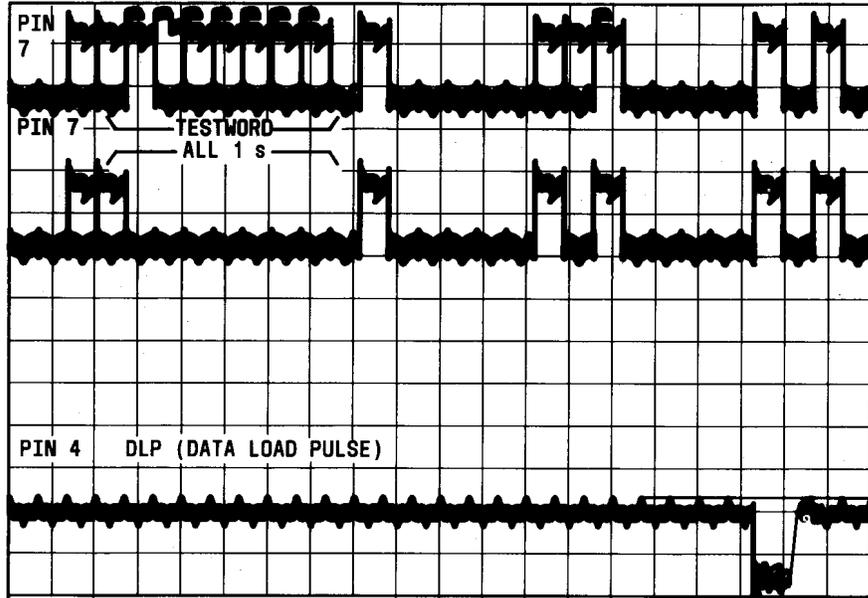
Fig. 6—TDATA Ones and Zeros, TCLOCK, and DLP



(5V/DIV  $\mu$ SEC/DIV SYNC'D ON DATA LOAD PULSE)

NOTE: BETWEEN THE TWO DATA LOAD PULSES, ALL 24 CHANNEL DATA IS PRESENT ON THE TRACE AT THE TOP PLUS THE TESTWORD. BY DEPRESSING THE ALL 1 BUTTON, ON THE DATA TEST SET, WILL BLANK OUT PULSES WHERE TESTWORD WAS LOCATED.

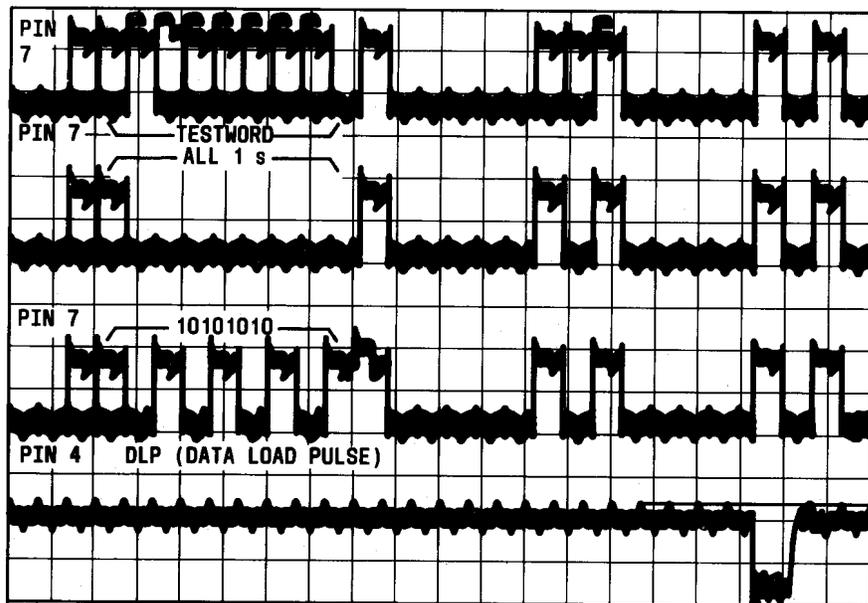
Fig. 7—RDATA Testword and DLP



(5V/DIV 2 $\mu$ SEC/DIV (SWEEP - 20 $\mu$ SEC DELAY) SYNC'D ON DATA LOAD PULSE)

NOTE: THE TRACES AT PIN 7 ALSO INCLUDES DATA FROM OTHER CHANNELS

Fig. 8—RDATA Testword, All 1s, and DLP



(5V/DIV 2 $\mu$ SEC/DIV (SWEEP - 20 $\mu$ SEC DELAY) SYNC'D ON DATA LOAD PULSE)

NOTE: THE TRACES AT PIN 7 ALSO INCLUDES DATA FROM OTHER CHANNELS

Fig. 9—RDATA Testword, All 1s, Ones and Zeros, and DLP

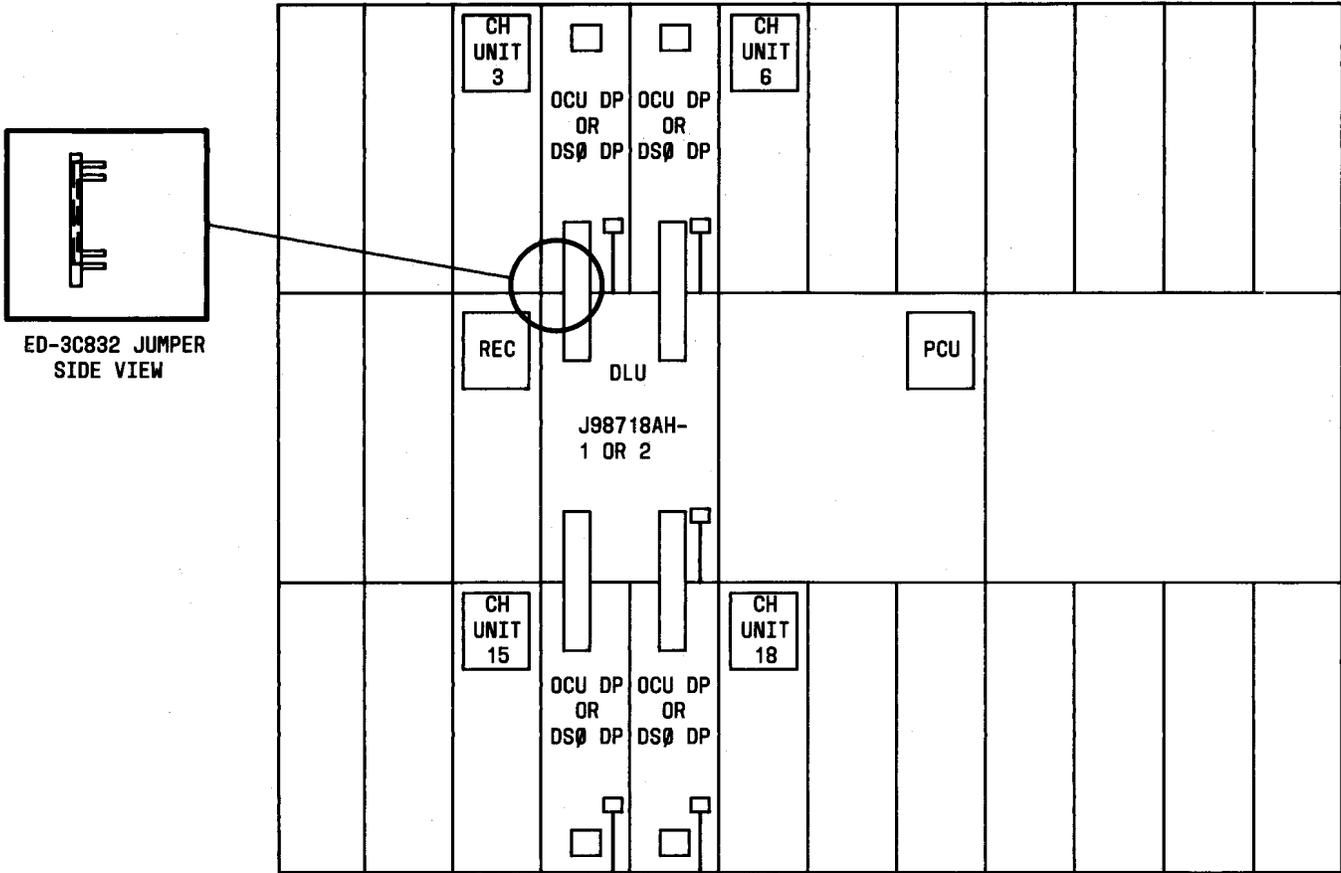


Fig. 10—D3B Channel Bank Configuration

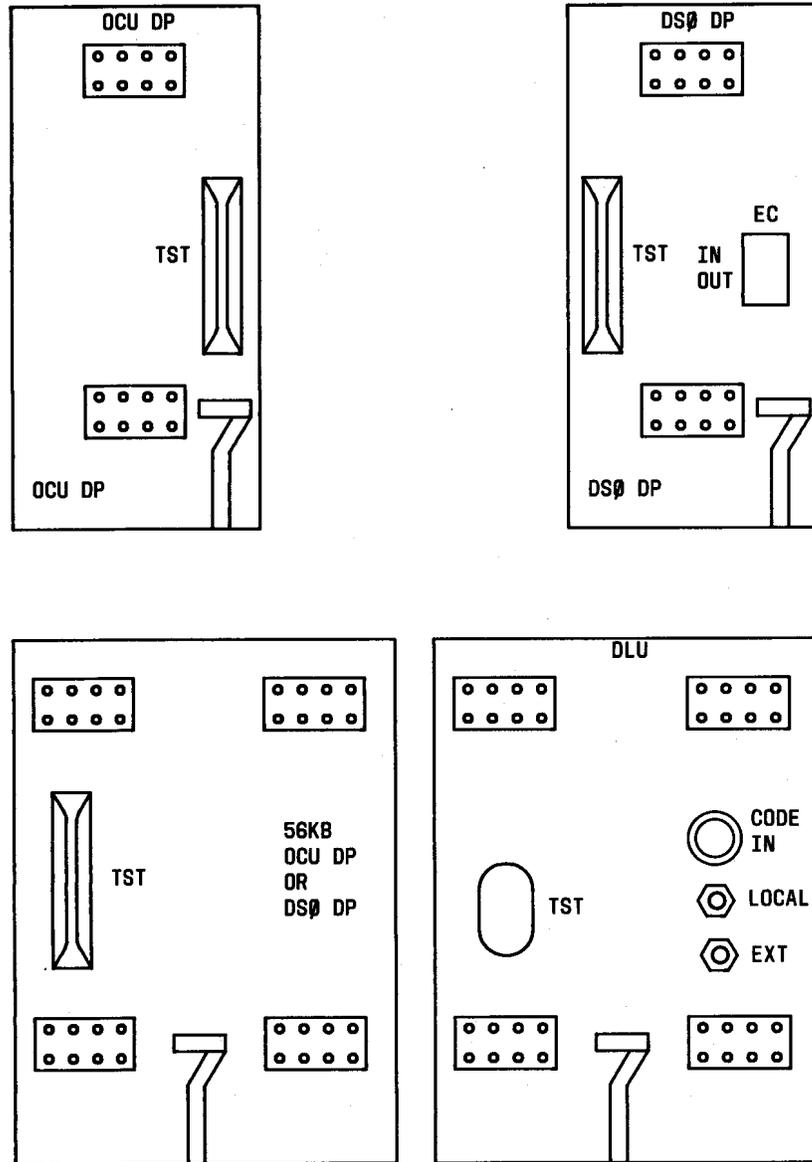


Fig. 11—Dataport Plug-ins

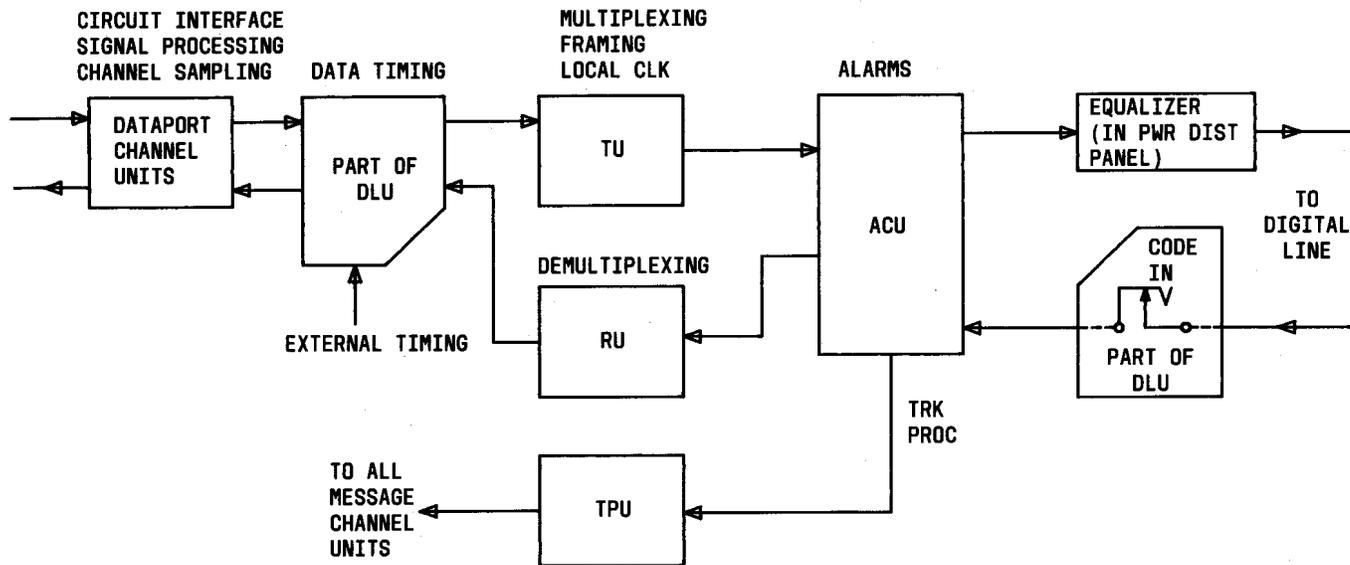


Fig. 12—D3B Block Diagram

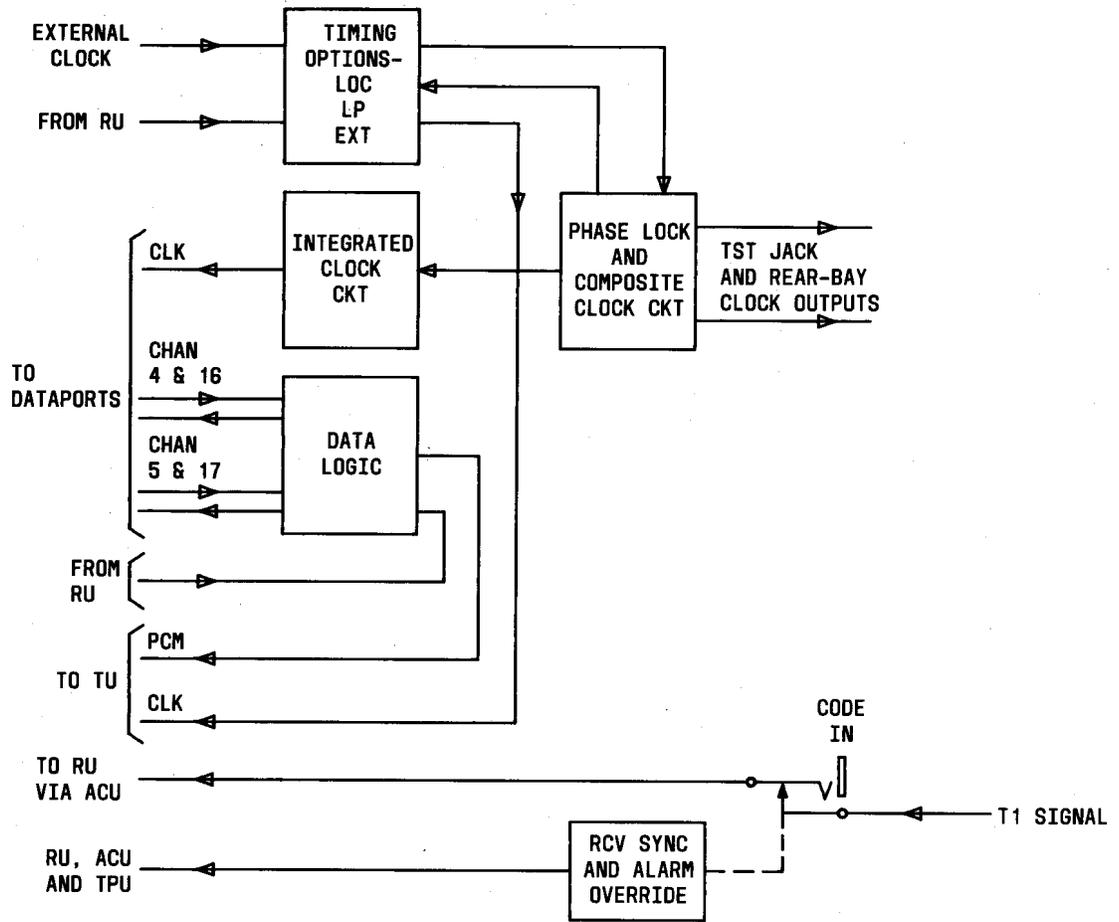


Fig. 13—DLU Block Diagram

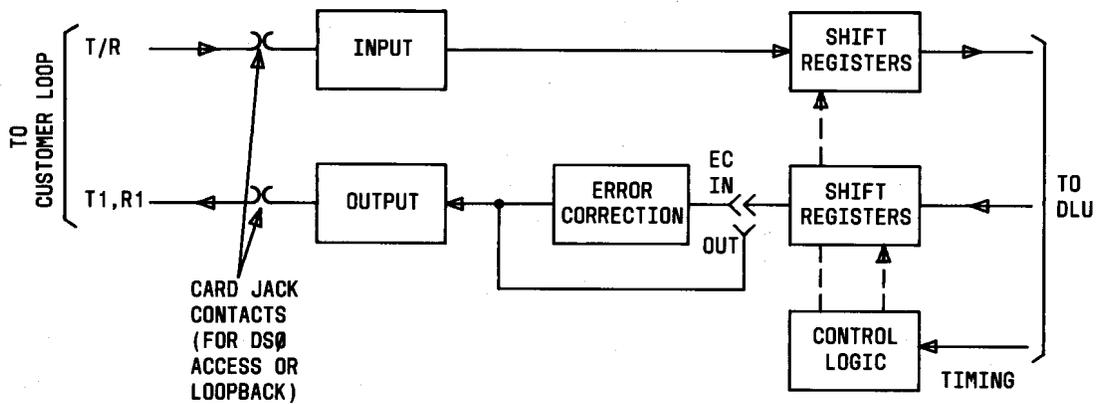


Fig. 14—DSØ DP (J98718BM) Block Diagram

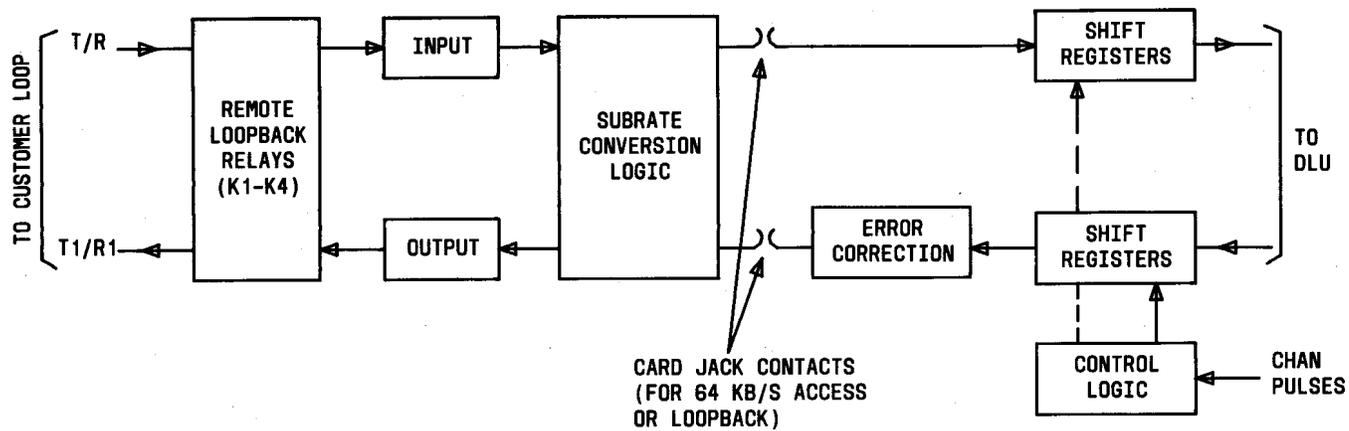


Fig. 15—Subrate OCU DP Block Diagram

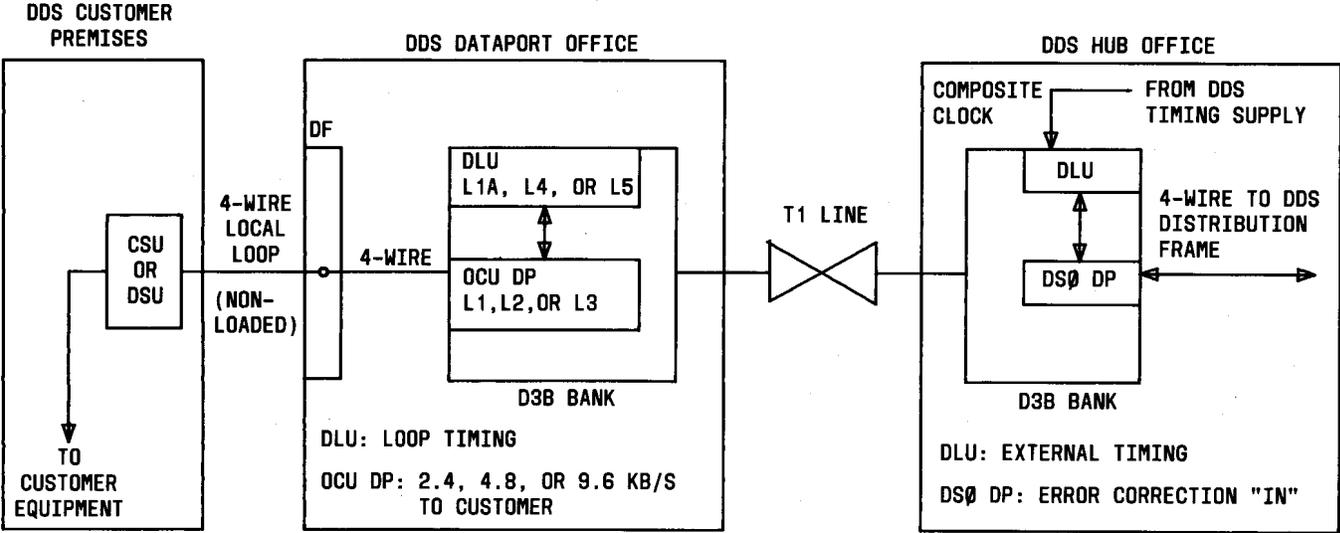


Fig. 16—DDS Dataport Subrate-Data Application

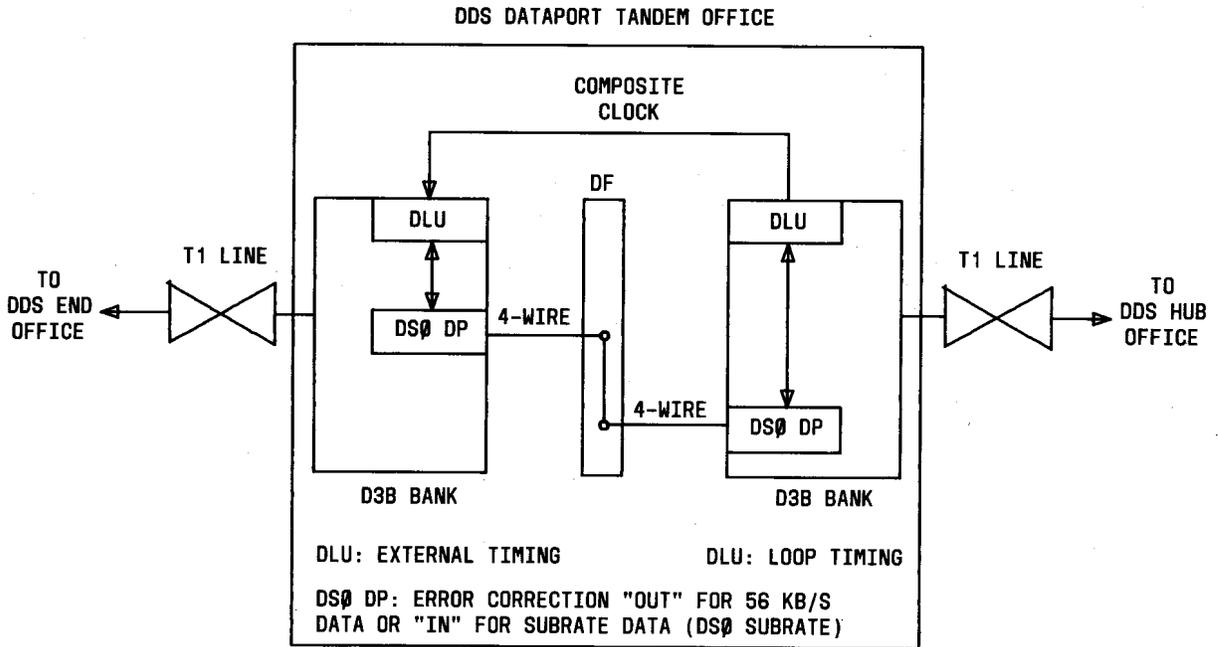


Fig. 17—Connections at Dataport Tandem Office

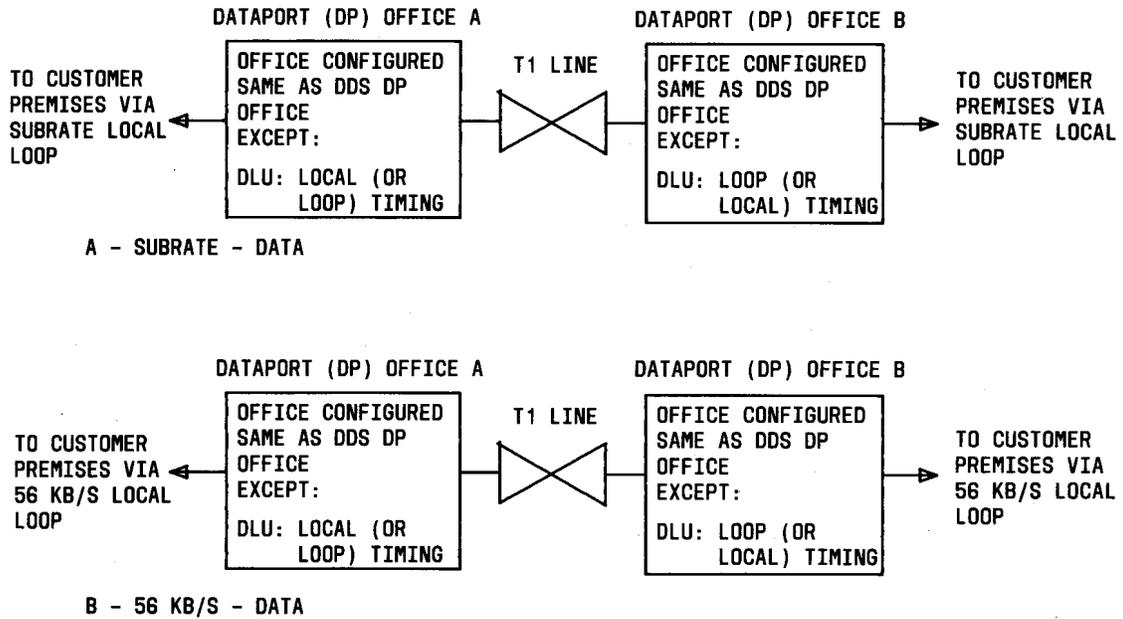


Fig. 18—Dataport Stand-Alone Application

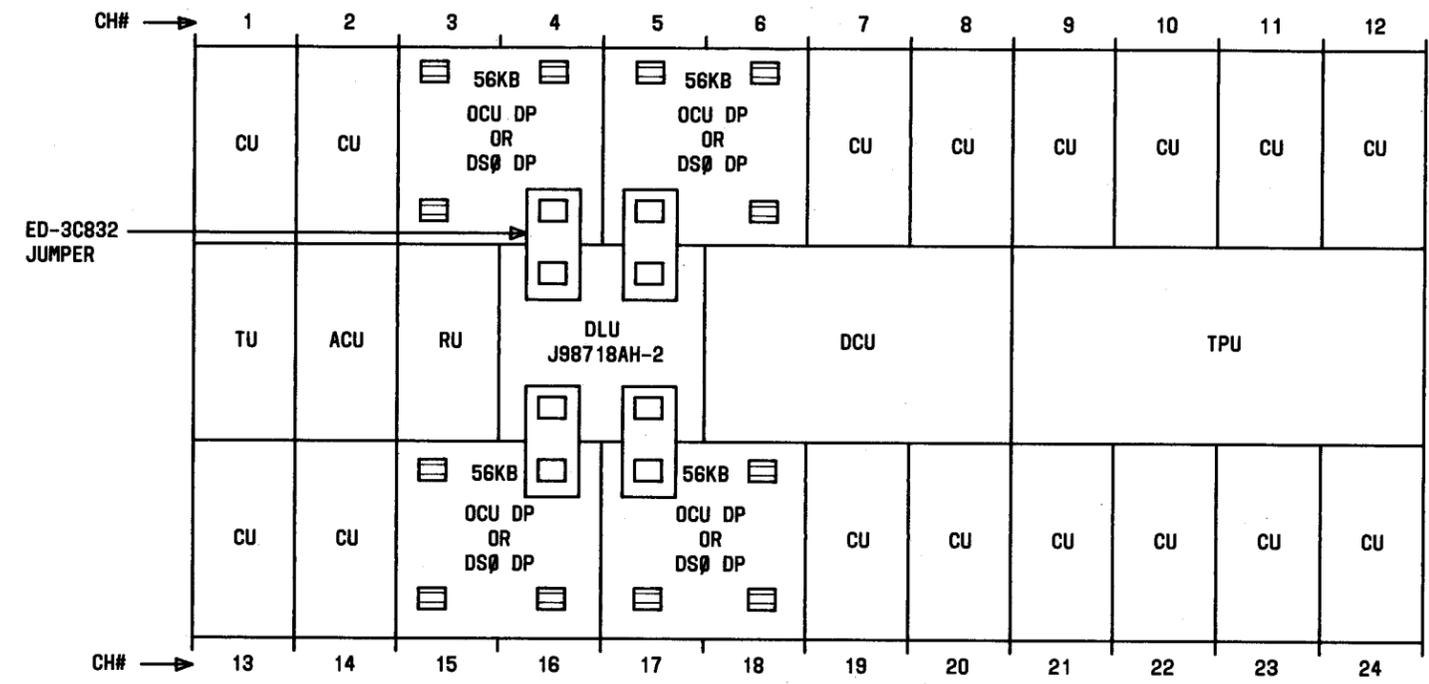


Fig. 19—Channel Bank Configuration With 56-KB Channels

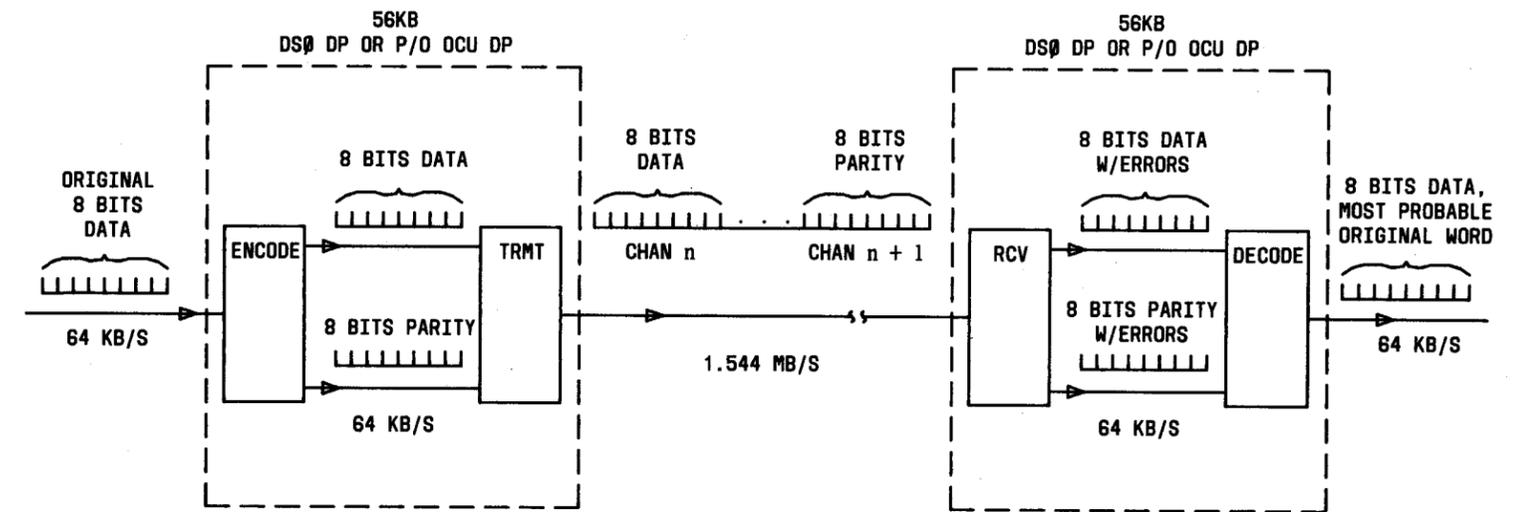


Fig. 20—56-KB Error Correction Scheme

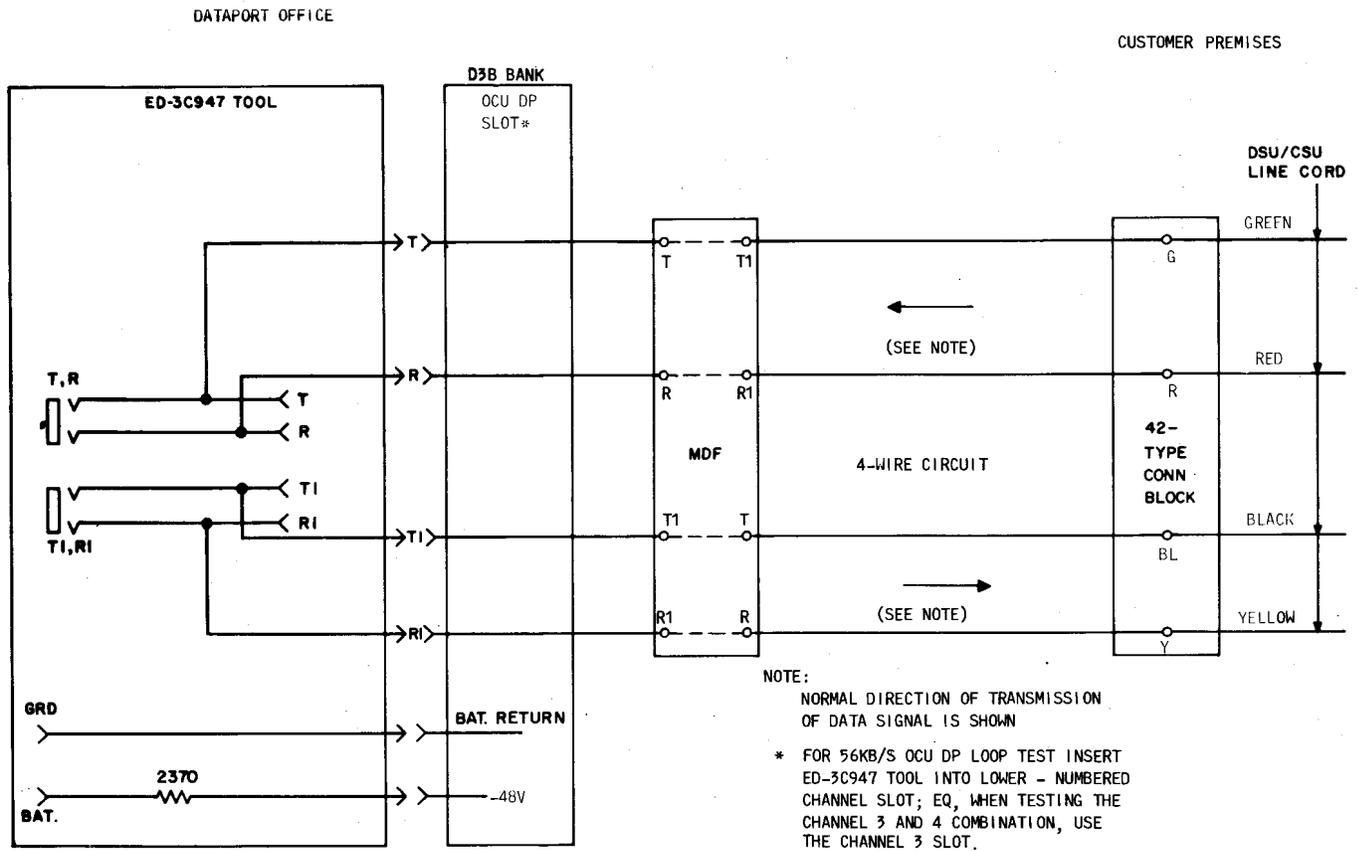


Fig. 21—Test Access For Subrate-Data Local Loop Tests

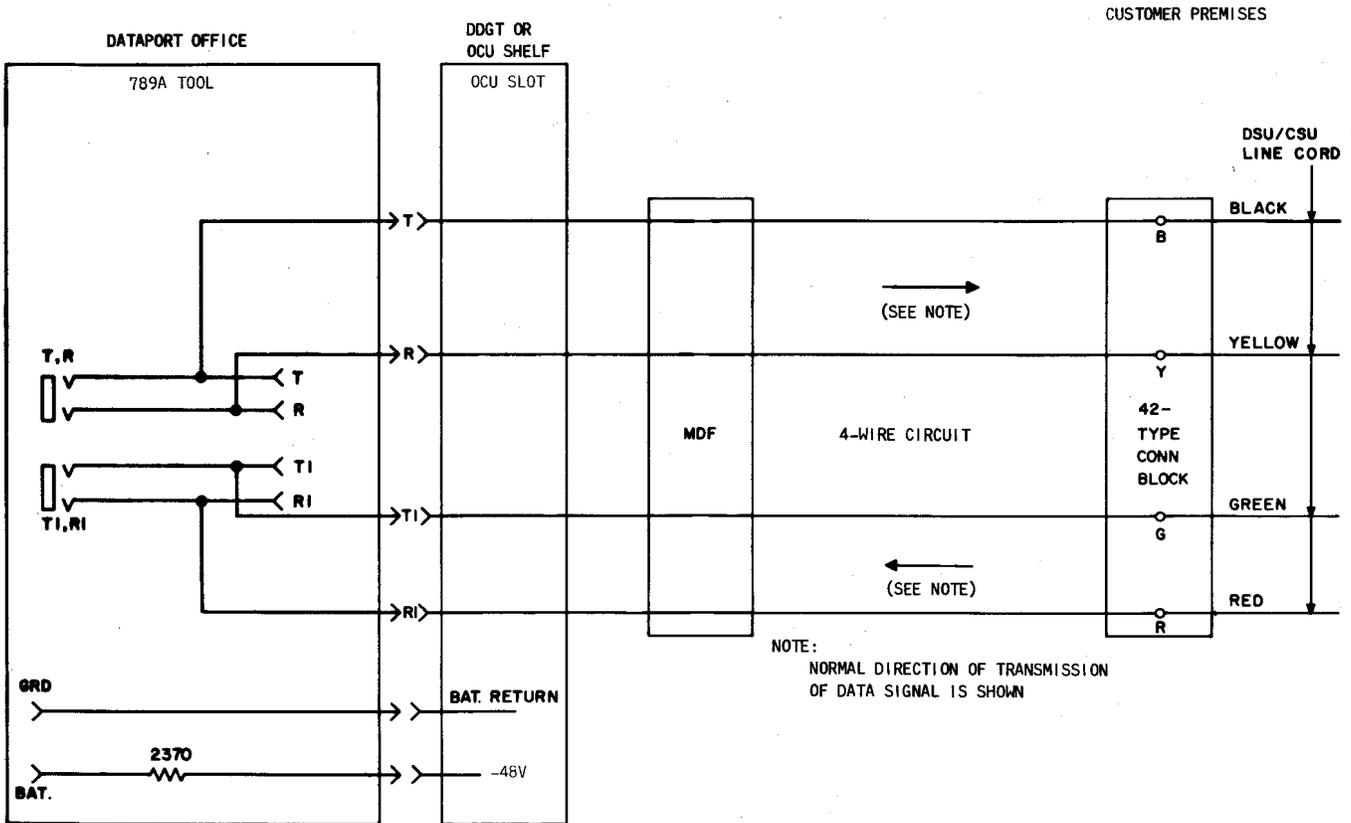


Fig. 22—Test Access For Data (Without Error Correction) Local Loop Tests

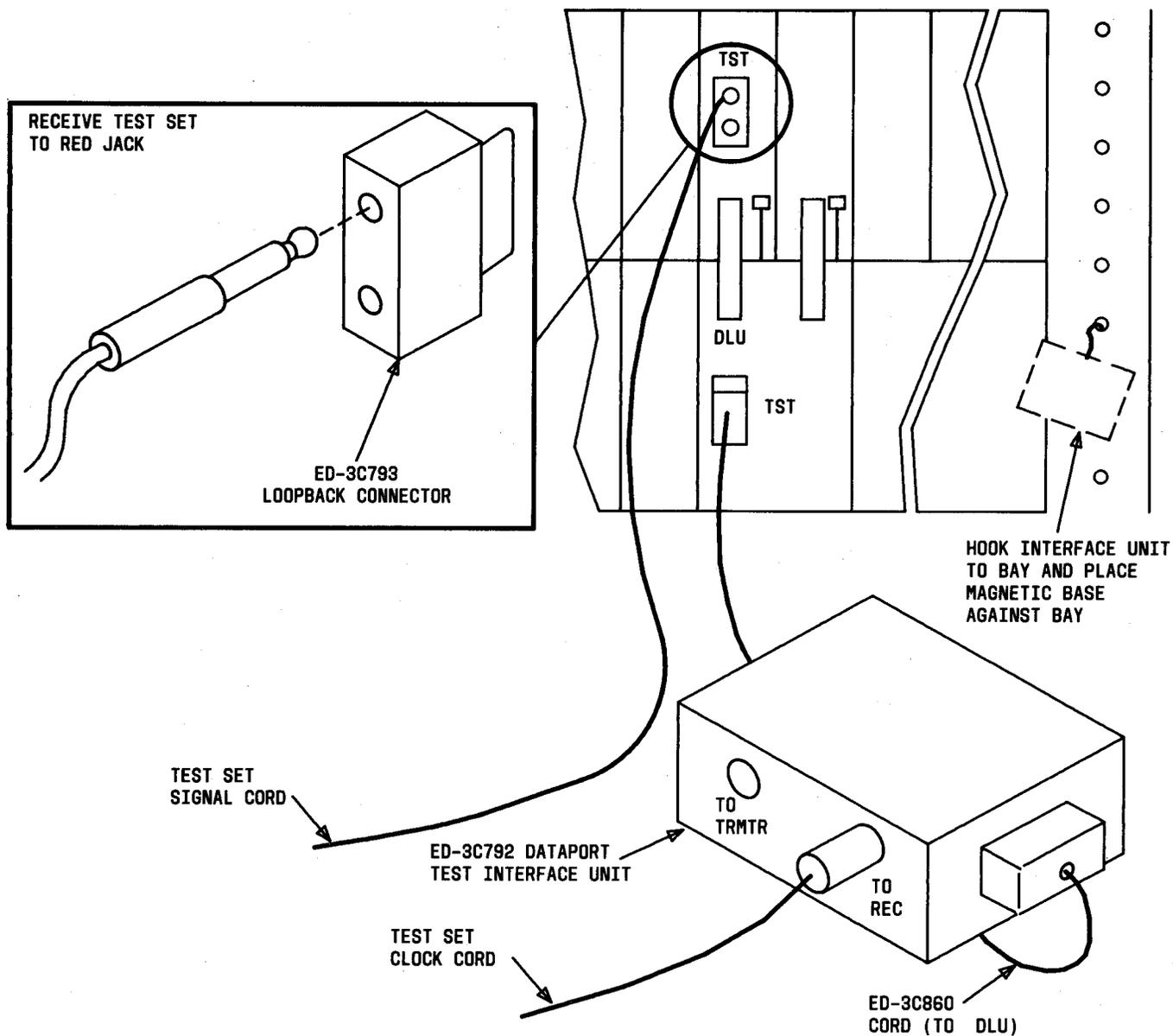


Fig. 23—Test Connections At Dataport Units

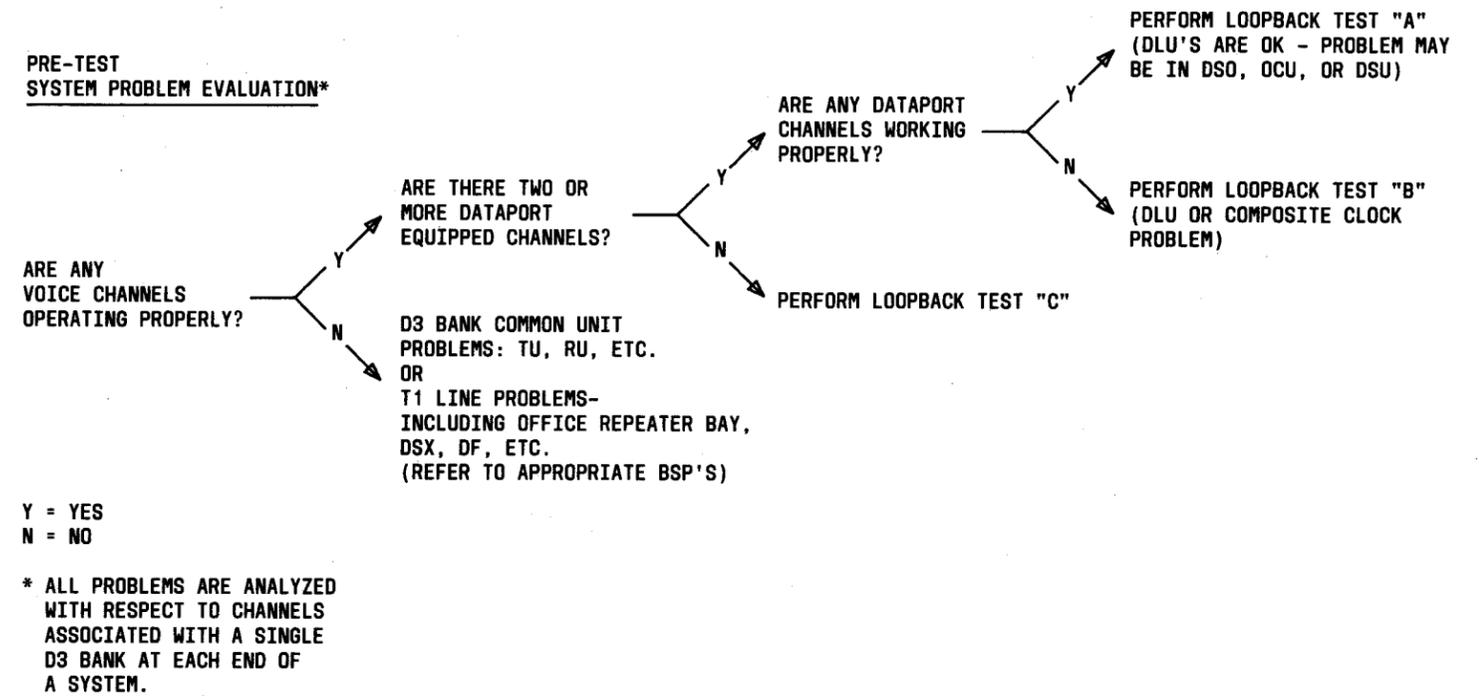


Fig. 24—Dataport Pre-Test Problem Evaluation

LOOPBACK TEST "A"

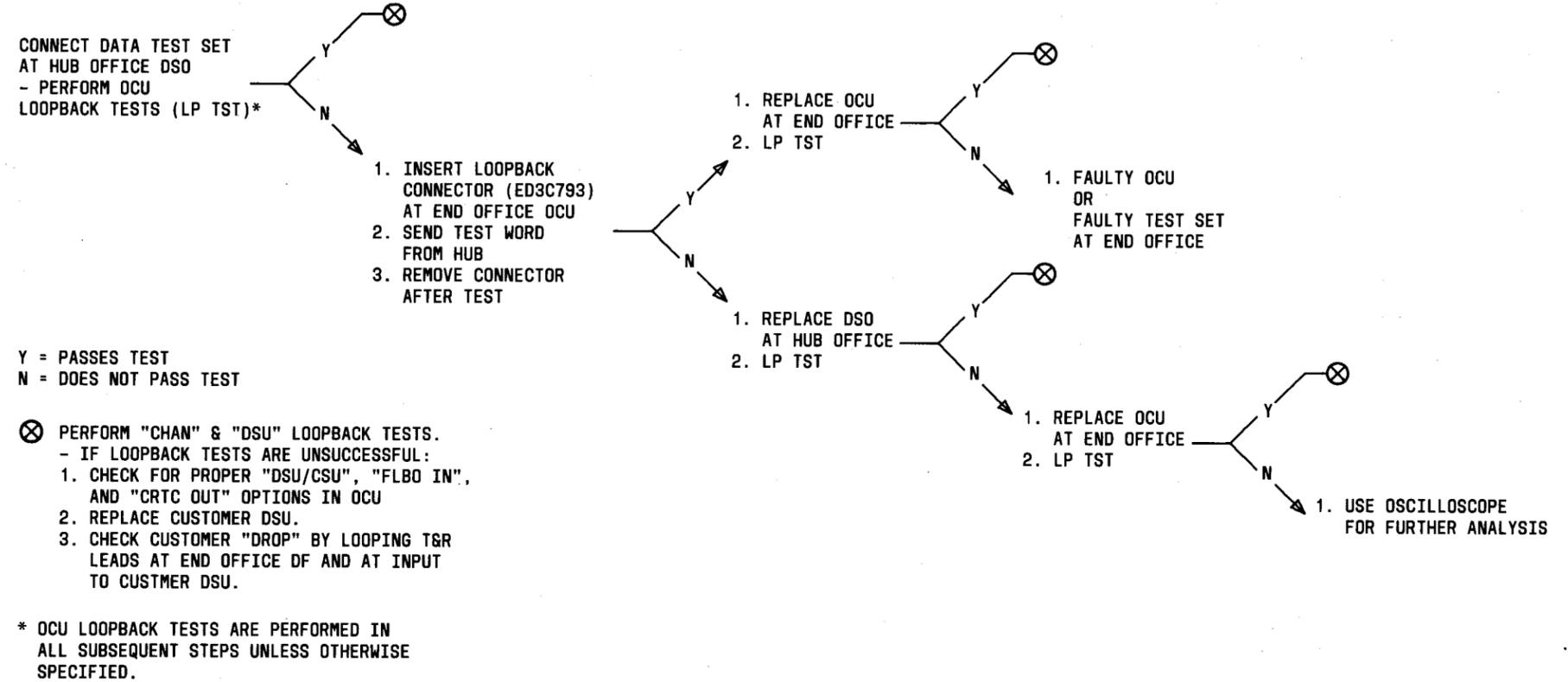
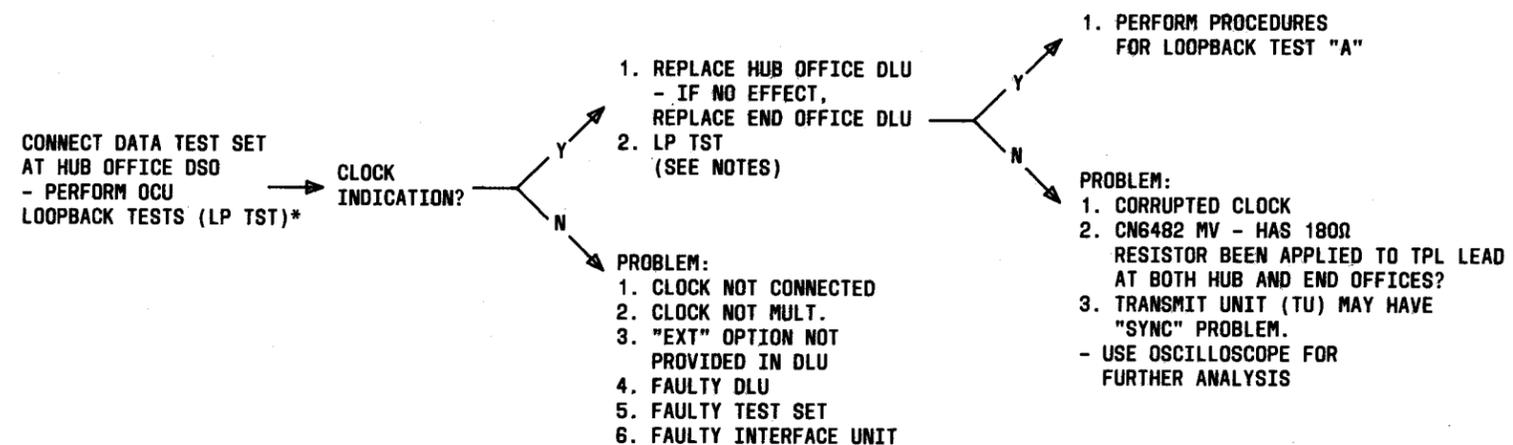


Fig. 25—Dataport Loopback Test A

LOOPBACK TEST "B"



Y = PASSES TEST  
N = DOES NOT PASS TEST

\* OCU LOOPBACK TESTS ARE PERFORMED IN ALL SUBSEQUENT STEPS UNLESS OTHERWISE SPECIFIED.

NOTES:

1. IF MORE THAN ONE DATAPORT PLUG-IN ARE FAULTY, THE NUMBER OF POSSIBLE EQUIPMENT REPLACEMENT COMBINATIONS MAKE IT DIFFICULT ISOLATING THE PROBLEM BY SINGLE UNIT SUBSTITUTION. IN SUCH A SITUATION, BOTH DLU'S, THE DSO & OCU SHOULD BE SUBSTITUTED BEFORE ANY OF THE ORIGINAL UNITS ARE PUT BACK IN THE SYSTEM.
2. REPLACING DLU WILL INTERRUPT POWER TO ENTIRE BANK.

Fig. 26—Dataport Loopback Test B

LOOPBACK TEST "C"

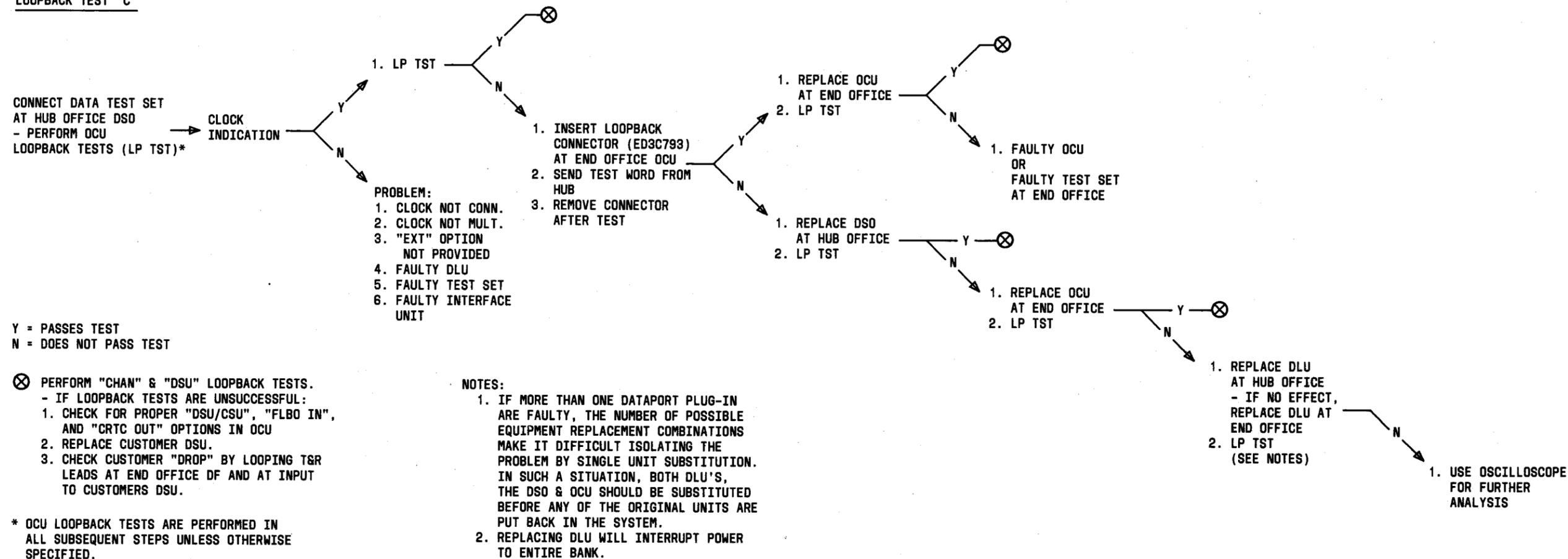


Fig. 27—Dataport Loopback Test C



## CHART 1

## ESTABLISH D3 DATAPORT SERVICE

STEP	PROCEDURE	APPLICABLE TO				DETAILED REFERENCES
		DDS HUB OFFICE	DDS DATAPORT END OFFICE	DDS DATAPORT TANDEM OFFICE	STAND-ALONE DATAPORT OFFICES	
			SUBRATE AND 56 kb/s		SUBRATE AND 56 kb/s	
1	<u>A. Make Cross-Connections</u> At DF, cross-connect local loop to D3, OCU shelf, or DDGT; as applicable.		X		X	None
1	<u>B. Use of ED-3C947</u> Test local loop using ED-3C947 tool at D3 OCU DP slot.		X		X	814-410-510
1	<u>C. Check for Timing and Clock</u> For early D3 channel banks, verify loop timing capability (CN6482MV).	X	X	X	X	Para. 5.11
2	Verify that DDS composite clock is wired to D3 frame and multipled to D3 channel bank.	X		X		Para. 5.12
3	Verify that composite clock is wired from D3 channel bank on hub side to D3 channel bank on opposite side, for tandem connection.			X		Para. 5.09
1	<u>D. Optioning Channel Units</u> Option DLU unit as required.	X	X	X	X	Para. 4.02
2	Option J98718BM, DSØDP unit per circuit layout record card. (56 KB has no options)	X	X	X	X	Para. 4.03 and 5.04
3	Option OCU DP unit per circuit layout record card.		X		X	Para. 4.04 and 5.07

## CHART 1 (Contd)

## ESTABLISH D3 DATAPORT SERVICE

STEP	PROCEDURE	APPLICABLE TO				DETAILED REFERENCES
		DDS HUB OFFICE	DDS DATAPORT END OFFICE	DDS DATAPORT TANDEM OFFICE	STAND-ALONE DATAPORT OFFICES	
			SUBRATE AND 56 kb/s		SUBRATE AND 56 kb/s	
	<u>E. Removing Service from Channel Bank</u>					
1	Have service removed from D3 channel banks to be equipped with dataports and remove channel units from positions 3, 4, 5, 6, 15, 16, 17 or 18 which are being reassigned to dataport service.	X	X	X		Local Telco Option
2	Remove IU common unit from D3 channel banks.	X	X	X	X	None
	<u>F. Install DLU</u>					
1	Install DLU L1A, L4, or L5 unit in D3 channel banks.	X	X	X	X	Para. 3.01
	<u>G. Verification</u>					
1	Verify that system is in frame (no alarms)	X	X	X	X	None
	<u>H. Restore Service</u>					
1	Restore D3 service removed in Step 1 Procedure E.	X	X	X	X	None
2	Install DS0 DP unit in D3 channel banks.	X	X	X	X	None
3	Install OCU DP unit in D3 channel banks.					None
4	Install ED-3C832 jumper between DS0 DP or OCU DP and DLU unit in D3 channel banks. (carefully)	X	X	X	X	Para. 3.01
5	At DF, make DS0 cross-connections between D3 channel bank and DSX-0, OCU shelf, or DDGT shelf; as applicable.	X	X	X	X	None

CHART 1 (Contd)

ESTABLISH D3 DATAPORT SERVICE

STEP	PROCEDURE	APPLICABLE TO				DETAILED REFERENCES
		DDS HUB OFFICE	DDS DATAPORT END OFFICE	DDS DATAPORT TANDEM OFFICE	STAND-ALONE DATAPORT OFFICES	
			SUBRATE AND 56 kb/s		SUBRATE AND 56 kb/s	
1	<u>I. Perform Loop Test</u> At STC, perform preservice looped tests of D3 dataport circuit to end office and customer premises.	X	X			314-901-500 Para. 7.04
2	Perform preservice looped tests of D3 dataport circuit to customer premises using KS-20908 and KS-20909 data test sets.	X			X	Para. 6.06
1	<u>J. Establish Service</u> Establish D3 dataport service.	X	X	X	X	Local Telco Option

CHART 2

DATAPORT TEST PROCEDURES

STEP	PROCEDURE
1	<p><b>A. PERFORM DSØ SIGNAL LOOPBACK</b></p> <p>Insert ED-3C793 loopback connector in DSØ DP or OCU DP TST jack with red jack up.</p> <p><b>Note:</b> Since the connector establishes a loopback in both directions, either jack could be up, but the red jack will be up for all test connections except when testing toward the drop side from DSØ DP.</p>
	<p><b>B. CONDITION KS-20908/KS-20909 DATA TEST SETS</b></p> <p>1 Open lid on test sets and withdraw cords; connect power cord to 115-volt ac outlet.</p> <p>2 Press POWER ON switches.</p> <p>3 Attach ED-3C792 test interface unit to bay frame and connect ED-3C860 cord between test interface unit and DLU plug-in (Fig. 13).</p> <p><b>Note:</b> The magnetic base holds the test interface unit against the bay while the hook keeps it from sliding down.</p> <p>4 Connect clock cord of test set to appropriate jack, TRMTR or REC, on test interface unit.</p> <p><b>Note:</b> Operation of both the transmit and receive test sets are given for looped tests; when only one set is being used, the instructions on the other test set will be applicable at the far end.</p> <p>5 On the transmit test set, press RESET pushbutton and set the following switches.</p> <p style="padding-left: 40px;">MODE to REPEAT FUNCTION to TESTWORD 2047</p> <p><b>Note:</b> Selectable byte patterns and control codes are obtained by means of FUNCTION switch. See Table C.</p> <p>6 On receive test set, set the following switches:</p> <p style="padding-left: 40px;">COUNTER MODE to COUNT COUNTER to ERRORS — BLOCK TESTWORD to 2047</p> <p>7 On transmitter and receiver, set OUTPUT, INPUT and DATA RATE switches per table below. If INPUT on receiver is set to BIPOLAR on receivers with TERMINATE key, press key after signal cord is connected.</p>

## CHART 2 (Contd)

## DATAPORT TEST PROCEDURES

STEP	PROCEDURE		
	TEST SET SWITCH	TEST LOCATION	SWITCH SETTING
	INPUT or OUTPUT	DSØ DP	BIPOLAR
		OCU DP	LOGIC, NEAR to test toward customer, FAR to test toward T line
	DATA RATE	DSØ DP	MATCH DATA RATE of SERVICE
		OCU DP	
	<b>C. SEND TO OTHER OFFICE</b>		
1	Condition transmit test set per Procedure B.		
2	Insert ED-3C793 loopback connector in TST jack of dataport with red jack up.		
3	Connect transmit test set signal cord to the white jack on loopback connector at hub office and to the red jack at the end office.		
	<b>D. RECEIVE FROM OTHER OFFICE</b>		
1	Condition receive test set per Procedure B.		
2	Insert ED-3C793 loopback connector in TST jack of dataport with red jack up.		
3	Connect receive test set signal cord to the red jack on loopback connector at hub office and to the white jack at the end office.		
	<b>E. PRESERVICE CUSTOMER LOOPBACK TEST (FROM DSØ)</b>		
1	Prepare transmit and receive test sets per Procedure B but condition test sets for loopback test as follows: Transmitter: FUNCTION to LOOPBACK TEST Receiver: TESTWORD to LOOPED		
2	Insert loopback connector in TST jack of dataport with red jack up.		
3	Connect transmit signal cord to white jack and receiver signal cord to red jack on loopback connector.		
4	Set LOOPBACK TEST pushbutton on transmitter to CHAN or DSU as required.		
	<b>Requirement:</b> No more than 2 block errors for 15 minute test.		

CHART 2 (Contd)

DATAPORT TEST PROCEDURES

STEP	PROCEDURE
	<b>F. SEND TOWARD CHANNEL DROP SIDE</b>
1	Condition transmit test set per Procedure B and any other test set switch settings per Table D.
2	Insert loopback connector in TST jack of dataport as follows: at OCU DP: red jack up at DSØ DP: white jack up
3	Connect transmit signal cord to white jack on loopback connector.
	<b>G. RECEIVE FROM CHANNEL DROP SIDE</b>
1	Condition receive test set per Procedure B and test set switch settings, per Table C.
2	Insert loopback connector in TST jack of dataport as follows: at OCU DP: red jack up at DSØ DP: white jack up
3	Connect receive signal cord to red jack on loopback connector.
	<b>H. SEND TO AND RECEIVE FROM CHANNEL DROP SIDE</b>
1	Condition both the transmit and receive test sets per Procedure B.
2	Insert loopback connector in TST jack of dataport as follows: at OCU DP: red jack up at DSØ DP: white jack up
3	Connect transmit signal cord to white jack and receive signal cord to red jack on loopback connector.
	<b>Note:</b> A loopback inside the OCU DP or at the customer equipment can be activated from the OCU DP. The transmit test set is conditioned for LOOPBACK TEST, the receiver is set to TESTWORD:LOOPED, and the associated pushbutton selected for loopback test.