

**CHANGING A  
SECONDARY TIMING SUPPLY TO  
A NODAL TIMING SUPPLY—  
CONVERSION PROCEDURE—  
DIGITAL DATA SYSTEM**

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**1. GENERAL**

**1.01** This section provides the considerations and procedures to be used in converting an existing secondary timing supply (STS) to a nodal timing supply (NTS) which is part of the Digital Data System (DDS). A list of equipment and apparatus to be used when performing the conversion procedure is also provided in this section.

**1.02** Whenever this section is reissued, the reason(s) for reissue will be given in this paragraph.

**1.03** The DDS requires systemwide synchronization to preserve customer data. Synchronizing information, or timing, is transmitted to all offices in

the DDS via the DS-1 signal. The master timing supply (MTS), which is referenced to the Bell System frequency standard, sends timing information via T1 data multiplexers (T1DMs) to the first NTSs in the DDS structure. The timing conversion procedure given in this section is required and must be performed (1) if, due to growth, DS-1 facilities from a hub office form a closed loop with other hubs or (2) if the hub office has more than two DS-1 links to a single other hub.

**2. PRECONVERSION CONSIDERATIONS**

**2.01** The timing conversion procedures are not service affecting and can be made during either the busy or off hours in the office.

*Note:* Minor office alarms will occur and a few errors in the DS-1 signal *may* occur when changing out the various circuit packs. However, this will not cause any harm or result in an outage of customer service.

**2.02** The timing conversion process has two initial procedures that are made before the actual conversion change is started. These procedures are:

- (a) The installation of the 71E or 76E power unit in the top shelf (Section 314-913-310).
- (b) The installation of the 39A oscillators in the two bottom shelves (Section 314-913-310).

Then, the actual timing conversion procedure is performed.

**2.03** The initial parts of the conversion procedure assume the following:

- (a) All circuit packs (CPs) furnished and available for the timing conversion are operational.

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- (b) The initial phase build-out procedure (Section 314-913-510) is not required since the STS is operational and the timing supply interface unit (TSIU/HL65) is not changed out.
- (c) The Fast-Start Mode procedure in Section 314-913-310 is performed for each phase lock loop (PLL).
- (d) During the conversion, the INH control remains operated at all times.
- (e) The craft performing these procedures are aware that operation of the INH PLL switches on the Display and Control unit *may* cause loss of framing in all T1DMs.
- (f) The NORM key is not operated while the timing supply is being equipped with CPs HL60 through HL64.

**2.04** Verify that change notice CN-7573 MV has been worked prior to starting the conversion procedure. This CN corrects a wiring turnover in the timing bay.

**3. APPARATUS**

**3.01** The following test equipment is required to perform the procedures in this section:

- 3—Special test cords with P-11H966 terminal assemblies on each end
- 2—Clip leads.

**4. CONVERSION PROCEDURES**

**4.01** The procedures given in Charts 1, 2, and 3 are used to convert an existing STS in a DDS office to an NTS. The dual STS is electrically split, and the timing supply in the A shelf is inhibited to prevent switching to it automatically. The timing supply in the A shelf of the STS is converted first since the HL57 CP phase metering circuit is wired in on the A shelf assembly. After the timing supply in the A shelf is converted and the PLL is tested for proper phase, the timing supply in the A shelf will be switched in service as an NTS. Then the timing supply in the B shelf is inhibited and converted over to an NTS. After completing the conversion procedure on both timing supplies in the A and B shelves, the office timing supply will be an NTS.

**4.02** Light-emitting diodes (LEDs) or lamps that are not specifically mentioned in a step procedure should be ignored.

**4.03** If a trouble condition occurs or problems are met during the conversion procedure, the maintenance, troubleshooting, and test instructions in Sections 314-913-310, 314-913-315, 314-913-510, and 314-913-515 should be used to clear the trouble.

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**CHART 1**

**INSTALLATION OF 71E- OR 76E-TYPE POWER UNITS**

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STEP	PROCEDURE
1	Install the 71E- or 76E-type power units in the top shelf.
2	Depress the ACO key on the display and control (D&C) unit to silence the office alarm.
	<b>Requirement:</b> The FAILURE lights on these power units are on.

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**CHART 1 (Contd)**


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STEP	PROCEDURE
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**Note:** If the FAILURE lights are not on, check the fuse and the office battery voltage at the input to each power unit.

3 Depress the ALARM RESET button on each power unit.

**Requirement:** The FAILURE light turns off.

**Note:** If the FAILURE light does not turn off, there is a problem in the associated oscillator or in the wiring between the power unit and the oscillator.

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**CHART 2**
**INSTALLATION OF 39A OSCILLATORS**


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STEP	PROCEDURE
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1 Remove front cover from the respective PLL oscillator shelf.

2 Install the 39A oscillators into the two bottom shelves reserved for their use. Connect the four connectors to each oscillator.

**Note:** It may be necessary to cut the tie cable cord to release the connectors that are part of the bay wiring assembly.

3 Move the STROBE switch to the ENABLE position and let the oscillator warm up for at least 48 hours.

4 Install front covers on the respective PLL oscillator shelves.

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**CHART 3**  
**TIMING SUPPLY CONVERSION**

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STEP	PROCEDURE
1	On the Display and Control (D&C) unit, set the IS switch to the A position and depress the INH PLL-A key.  <i>Note:</i> This will bring in a minor office alarm.
2	Depress ACO and RESET keys on the D&C unit.  <i>Requirement:</i> The INH PLL-A lamp and A ON, B-B, and B-A LEDs are on.
3	Remove CPs HL53 and HL54 from PLL-A.  <i>Requirement:</i> All PLL-A LEDs are on. Also, the MN and PLL A OFF LEDs are now on.
4	Remove D&C unit (J70177AN, L2) from the timing bay.
5	Remove 841494479 AM-1 card located at the center of the mounting backplane.
6	Reinstall card with the nodal side plugged into the backplane connector (option V).
7	On the new J70177AN, L1 D&C unit, set the IS switch to the A position and depress the INH PLL-A key.
8	Plug new D&C unit into the shelf and depress RESET and ACO keys.  <i>Requirement:</i> The INH PLL-A, MN, and ABN lamps are on. Also, the A ON, PLL A OFF, B-A, B-B, and FST and EOR LEDs of PLL-A are on.
9	Plug CP HL56 into shelf for PLL-A and depress RESET and ACO keys on the D&C unit.  <i>Requirement:</i> The B NORM and NO TRACK LEDs are now on.
10	Plug CP HL63 into shelf slot for PLL-B and depress RESET and ACO keys on the D&C unit.
11	Set the FST-NORM switch to NORM on the new HL61 CP to be installed.
12	Plug CPs HL60, HL61, HL62, HL63, and HL64 into shelf for PLL-A.
13	Momentarily depress RESET and ACO control keys on the D&C panel.  <i>Requirement:</i> The A NORM LED is now on. The EOR LED of PLL-A is now off.
14	Set the FST-NORM switch, located on the faceplate of CP HL61 for this PLL, to the FST position.

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**CHART 3 (Contd)**


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STEP	PROCEDURE
	<p><b>Requirement:</b> Within 9 seconds, the FST light for this PLL turns on. The FR and SLIP lights for this PLL should be off.</p>
15	<p>Momentarily depress the INT RESET button located on CP HL62 for this PLL and <b>record the time</b>.</p> <p><b>Requirement:</b> If the EOR light was on, it should turn off within 17 seconds.</p>
16	<p>Using the phase measuring procedure in Section 314-913-510 as a reference, measure the phase between the output of the selected TSIU and the PLL in Steps <b>17 to 29</b>.</p> <p><b>Note:</b> To ensure proper connection between P-11H966 terminal assembly and CP, the terminal assembly <b>must</b> be inserted into the test point (TP) with the metal strip facing to the right.</p>
17	Set switches S1 and S2 on CP HL57 to positive (+) position.
18	Connect one end of a special test cord (with a P-11H966 terminal assembly) to TP1 (IN1) on CP HL57.
19	Connect one end of another special test cord to TP8 on CP HL60 of PLL.
20	Using clip leads, connect two free ends of the special test cords together.
	<p><b>Requirement:</b> Within 2 seconds, the invalid (INV) LED lights. The numerical display remains off.</p>
21	Connect a third special test cord from TP7 (IN2) on CP HL57 to the clip lead connection so that the same signal from TP8 on CP HL60 is connected to both phase meter inputs.
	<p><b>Requirement:</b> Within 2 seconds, the INV LED is off and a 2-digit number appears on the D&amp;C unit numerical display. This number is either 00 or 64.</p>
22	Set switch S1 on CP HL57 to minus (-) position.
	<p><b>Requirement:</b> The numerical display reads 32.</p>
23	Set switch S2 on CP HL57 to minus (-) position.
	<p><b>Requirement:</b> The numerical display reads either 00 or 64.</p>
24	Remove connector or lead at TP1 on CP HL57.
	<p><b>Requirement:</b> Within 2 seconds, the INV LED lights and numerical display on the D&amp;C unit is blanked.</p>

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## CHART 3 (Contd)

STEP	PROCEDURE
25	Remove all test point connectors. <b>Requirement:</b> The INV LED is off.
26	Set both transition switches (S1 and S2) on CP HL57 to positive (+) position.
27	Insert a special test cord from TP1 (IN1) on CP HL57 to TP6 on CP HL65 of TSIU "A". This is the input signal to PLL. <b>Requirement:</b> The INV LED is lighted.
28	Insert another special test cord from TP7 (IN2) on CP HL57 to TP8 of the high-frequency count-down circuit, CP HL60, of PLL to be checked. This is the output signal of the PLL. <b>Requirement 1:</b> A number between 00 and 64 appears on the numerical display. The INV LED is off. <b>Requirement 2:</b> At the end of <b>50 minutes</b> , after Step 15 is completed, the phase meter reads between 63 and 03; any of the following indications are acceptable: 63, 64, 00, 01, 02, or 03. <b>Requirement 3:</b> The FR and SLIP lights for this PLL must be off.
29	Observe the phase meter for another 60 seconds. <b>Requirement:</b> The phase meter reading does not change by more than one unit and still meets requirements 2 and 3 above.
30	After all requirements have been met, set the FST-NORM switch on CP HL61 for this PLL to the NORM position. <b>Requirement:</b> Within 9 seconds, the FST light turns off.
31	Remove phase metering connections and depress NORM control key and then momentarily depress RESET and ACO control keys. <b>Note:</b> The NO TRACK lamp comes on.
32	Remove CPs HL53 and HL54 from PLL-B shelf assembly. (This forces the switch to A shelf.)
33	Depress the INH PLL-B key and then momentarily depress RESET and ACO keys. <b>Requirement:</b> The INH PLL-B, MN, and ABN lamps are on. Also, the A ON, A NORM, B NORM, NO TRACK, PLL B OFF, A-A, A-B, and the FST and EOR LEDs of PLL-B are on.

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**CHART 3 (Contd)**

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<b>STEP</b>	<b>PROCEDURE</b>
34	Verify that the PLL is supplying output circuits. If pair of LEDs A-A and A-B are on while pair B-A and B-B are off, then PLL-A is the supply.
35	Plug CPs HL60, HL61, HL62, and HL64 into shelf slots for PLL-B.  <i>Note:</i> The FST-NORM switch on CP HL61 to be installed must be in the NORM position prior to installing CP.
36	Repeat Steps 13 through 15 and 27 through 31 for PLL B. Then, proceed to Step 37.
37	Observe that the NTS should now be operating normally on PLL-A.  <i>Note:</i> The NO TRACK lamp should now be off.  <i>Requirement:</i> The A ON, A NORM, B NORM, A-A, and A-B LEDs are on. All other lamps and LEDs are off.
38	Using procedures given in Section 314-913-510 as a reference, verify the output phase of PLL-A and PLL-B in Steps 39 and 40.
39	Insert a special test cord from TP1 (IN1) on CP HL57 to TP8 of the high frequency countdown circuit, CP HL60, of PLL-A.  <i>Requirement:</i> The INV LED is lighted.
40	Insert another special test cord from TP7 (IN2) on CP HL57 to TP8 of the high frequency count-down circuit, CP HL60, of PLL-B.  <i>Requirement:</i> Phase meter display indicates a reading of between 62 and 02, example, 62, 63, 64, 00, 01, or 02.
41	Procedure completed. Remove all test cords and test equipment connections.

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**SECTION 314-913-215**

**5. REFERENCES**

**5.01** The following descriptive, maintenance, and test sections provide additional information.

<b>SECTION</b>	<b>TITLE</b>
314-900-100	Digital Data System—Private Line Service—Overall Description
314-913-310	Digital Data System—Nodal Timing Supply—Maintenance and Troubleshooting
314-913-510	Digital Data System—Nodal Timing Supply—Tests
314-916-100	Digital Data System—Bay Clock, Power, and Alarms Circuit—Description

**5.02** Detailed schematics and circuit information are contained in the following SDs and CDs.

<b>NUMBER</b>	<b>TITLE</b>
CD- & SD-73082-01	Digital Data System—Central Office Bay Clock, Power, and Alarms Circuit
CD- & SD-73083-01	Digital Data System—Central Office Nodal Timing Supply
SD-73087-01	Digital Data System—Station and Central Office System Interconnection and Application Schematic
CD- & SD-99503-01	DSX-1 Patch and Cross-Connect
SD-99596-01	System Block Diagram—Digital Data Service