

HFC Enhance[®] HEIX4FSKD13C, ISX-3030 FULL 2X4, DUAL 1310/ CWDM SEGMENTATION KIT

1. Overview

DISCONTINUED

D3.1/CCAP[™] Compliant

Parts for the HEIX4FSKD13C ISX-3030 2x4, Dual 1310/CWDM Segmentation Kit are listed below and illustrated in Figure #1. Please ensure that all the parts for the kit you received are in the kit. Please note the RF Tray of the kit has been upgraded by ATX Networks and is shipped completely configured. RF and optical connections are color-coded or labeled to aid installation.

| Part | Description | QTY | |
|----------------|---|-----|--|
| HEIX40RF1 | Fully configured ISX Node RF Tray (includes 4 HEIX4JF Forward RF Jumpers, 4 HEIX4JR Return RF Jumpers, 8 HEIXTDF Adhesive Blocks and Tie Wraps to secure HEIX4J* RF Jumpers) | | |
| HEIX47/49SA2.5 | Dual Return Path CWDM Transmitter (1470,1490nm, 2.5mW, SC/APC) | | |
| HEIX30TM | 3030 Dual Transmitter Configuration Board | | |
| HEIX40RC | 3030 x2 and x4 Return Configuration module, fixed 40 MHz low pass, with JXP 15 MHz high pass (installed on RF Tray) | | |
| HEIXDFRSA | Dual Forward Receiver, SC/APC | | |
| HEIXFMP1 | Dual 1310/ 1470+1490 Mux with Velcro-backed Mounting Plate with Fiber Management SC/APC 0.5m Pigtails on CWDM ports and SC/UPC socket on commons (COM 1 and COM 2) | | |
| HEIX4TWF | Tie Wrap(s) for HEIX4JF* Forward RF Jumpers | | |
| HEIX4JTWR | Tie Wrap(s) for HEIX4JR* Return RF Jumpers | | |

NOTE: Always cap bare or open fiber connectors to avoid dust and oil contamination. Clean fiber using cartridge type fiber cleaner or denatured alcohol and lint free wipes.



2. Installation

- 1. Remove AC power from the ISX Node.
- 2. Open the node and remove the plastic RF Tray cover.
- 3. Disconnect the ISX Lid/Base Cable Assembly (connector J9) which connects the RF Lid to the Optical Lid.
- 4. In the optical section of the node, disconnect the fiber pigtails from the existing return path transmitters and forward path receivers and carefully unwind the fiber pigtails from the existing Fiber Management Plate (location shown in Figure # 2) and lay aside. Cap fiber pigtails to avoid dust or oil contamination. Remove the existing Fiber Management Plate (location shown in Figure #2) and set aside this component will not be required for use in the Segmentation Kit.
- 5. Remove the existing RF Tray by loosening the 6 captive screws which secure the RF Tray.
- 6. Install the HEIX40RF1, fully configured ISX Node RF Tray received in the Return Segmentation Kit into the RF Lid of the node.
- 7. Secure the HEIX40RF1 upgraded ISX RF Tray by tightening the 6 captive screws which secure the RF Tray to the RF Lid.
- 8. Reconnect ISX Lid/Base Cable Assembly (connector J9) to the upgraded RF Tray.
- 9. In the optical section of the ISX Node, as shown in Figure #2 below, remove the tall stand-off and then remove the existing configuration board.
- 10. Replace the existing configuration board with the HEIX30TM Dual Transmitter Configuration Board; Figure #2 shows the location to install the HEIX30TM. After installing the HEIX30TM Dual Transmitter Configuration Board, replace the tall stand-off, first threading through the grounding lug on the bottom HEIX30TM. Tighten the stand-off securely.

Figure #1 Kit Contents





Figure # 2 HEIX30TM Installation in Optical Lid

- 11. Remove the existing return path transmitter(s) and install the new HEIX47/49SA2.5 Dual Return Path Transmitter modules into the optical section of the ISX Node. The units should be installed in the module slot identified on the optical section motherboard as "Primary Return TX" and "Secondary Return TX". Secure the HEIX47/49SA2.5 Dual Return Path Transmitters by tightening the two captive screws located on top of each module. Figure #3 below shows location to install the HEIX47/49SA2.5 Dual Reverse Path Transmitters.
- 12. The Primary RF connection of the HEIX47/49SA2.5 Dual Return Path Transmitter is located on the bottom of the transmitter module. The RF connection for the second return path transmitter (B) is an SMB connector located on the top of the transmitter module and is labeled as "RF B IN".
- 13. Remove the existing forward receiver.
- 14. Install the new HEIXDFRSA Dual Forward Receiver supplied in the segmentation kit as shown in Figure #3 below. First, connect the "D" style connector from the HEIXDFRSA Dual Forward Receiver to the connector labeled "Primary Receiver" in the optical section of the ISX Node, then tighten the captive screws on the "D" style connector to ensure a secure connection. Next, install the HEIXDFRSA Dual Forward Receiver and secure by tightening the four captive screws located on top of the module. **Use care not to damage the fiber pigtails of the receivers.**
- (15.see next page)





Figure # 3 Optical Lid Component Installation

- 15. On the bottom inside wall of the optical section of the ISX Node, directly below the HEIXDFRSA Dual Forward Receiver module, install the HEIXFMP1 Dual 1310/CWDM Mux supplied in the segmentation kit using the supplied Velcro patches as shown in Figure # 3 above. Remove the clear protective backing from the Velcro patches on the back of the HEIXFMP1 to expose the adhesive side. Using care not to damage the fibers, slide the HEIXFMP1 in between the "D" connector of the HEIXDFRSA Dual Forward Receiver and the inside wall of the node. Use firm pressure to press it against the inside wall of the Optical Lid to secure the Velcro patches. Ensure that the fiber pigtails are clear of any object which will cause bends in the fiber or cause the fiber pigtails to become entangled or crushed. **The top of the HEIXFMP1 should not rise above the plane of the Optical Lid so that the node can close securely.**
- (16.see next page)





Figure #4 Self-adhesive Block Locations

- 16. In the optical section of the ISX Node, lift the existing Fiber Management Tray (shown in Figure #4 above) and swing upward.
- 17. Route the Forward and Return RF Jumpers from the RF Section underneath the Fiber Management Tray into the Optical Section of the node as depicted in Figure# 4 above. Using the self-adhesive blocks which are already installed on the RF Jumpers, secure the jumpers to the top inside wall of the Optical Section of the node. Placement of the self-adhesive blocks is shown in Figure #4. Ensure that each jumper has enough slack so that when the node lid is closed the jumpers do not bind or are subject to strain.
- 18. Reinstall the original Fiber Management Tray but do not tighten the screws; this will be one of the final steps. Ensure all RF Jumpers and cables are routed securely underneath of the original Fiber Management Tray.
- 19. Both the Forward and Return RF Jumpers are pre-installed in the HEIX40RF1 ISX Node RF Tray provided in the kit. The RF Jumpers are color coded to simplify installation. See Figure # 5 below for RF Jumper connection table.
- 20. Connect Forward Path RF Cables (for Right-Left segmentation) as shown in Figure #5: There are 4 Forward Path RF Jumpers. Connect Red jumper to HEIXDFRSA Primary Dual Forward Receiver RF Out SMB labeled "A1". Connect Yellow jumper to HEIXDFRSA Primary Dual Forward Receiver RF Out SMB labeled "A2". Connect Blue jumper to HEIXDFRSA Secondary Dual Forward Receiver RF Out SMB labeled "B1". Connect Green jumper to HEIXDFRSA Secondary Dual Forward Receiver RF Out SMB labeled "B1".
- 21. Connect Return Path RF Cables as detailed in Figure #5: There are 4 Return Path RF Jumpers. Connect Orange jumper to the SMB on the HEIX30TM Transmitter Configuration Board labeled "Tx 2A In" and Green jumper to the SMB on the HEIX30TM Transmitter Configuration Board labeled "Tx 1A In". The HEIX30TM connections are illustrated in Figure # 2.
- 22. Connect Black jumper to HEIX47/49SA2.5 Primary Return Path Transmitter SMB labeled "RF B In" and connect White jumper to HEIX47/49SA2.5 Secondary Return Path Transmitter SMB labeled "RF B In" which are located on top of the HEIX47/49SA2.5 Dual Transmitter modules.
- 23. Once the Forward and Return Path RF Jumpers are connected, secure the jumpers to the self-adhesive blocks using the supplied tie wraps. Ensure the RF Jumpers have enough slack to prevent binding and strain when the node lid is closed.

(24.see next page)



| Forward RF Jumpers | Connection on RF Tray to node port | SMB Connection on Dual Forward Path RX (color coded) |
|--------------------|--|--|
| Red | Port 1 Insertion Point | RF Out A1 |
| Yellow | Port 3 Insertion Point | RF Out A2 |
| Blue | Port 4 Insertion Point | RF Out B1 |
| Dark Green | Port 6 Insertion Point | RF Out B2 |
| Return RF Jumpers | SMB Connection on HEIX40RC Return Configuration Board (plugged into RF Tray) | SMB Connection on HEIX30TM Transmitter Configuration Board (plugged into Optical Tray) and Dual Return Path TX |
| Black | Out P1 | HEIX30TM TX 1 A In (Primary TX 1470nm) |
| Green | Out P3 | Primary TX RF B In (Primary TX 1490nm) |
| White | Out P4 | HEIX30TM TX 2 A In (Secondary TX 1470nm) |
| Orange | Out P6 | Secondary TX RF B in (Secondary TX 1490nm) |

Figure #5 RF Jumper Connection Table Left-Right Segmentation

- 24. Proceed with connection of Optical Forward and Return Paths Fibers. The fibers are labeled to simplify installation.
- 25. As shown in Figure #6 below, connect the Forward Path 1310nm Fibers which are labeled as "1310-1" and "1310-2" from the HEIXFMP1 Dual 1310/CWDM Mux to the Dual Forward Path Receiver Optical Inputs labeled "A" and "B" located on top of the Dual Return Path Receivers.
- 26. As shown in Figure #6, connect fibers labeled as "1470-1" and "1490-1" to the Primary Dual Return Path Transmitter Outputs labeled "1A" and "1B" respectively. Connect fibers labeled "1470-2" and "1490-2" to Secondary Dual Return Path Transmitter Outputs labeled "2A" and "2B" respectively.
- 27. Reconnect the fibers from the headend to the connectors on the HEIXFMP1 Dual 1310/CWDM Mux labeled "Fiber 1" and "Fiber 2" as shown in Figure # 6 below. If all connections have been appropriately made, "Fiber 1" will carry the 1310nm downstream signal and the 1470/1490nm upstream from Primary Return Path TX (Ports 1 and 3). "Fiber 2" will carry 1310nm downstream and 1470/1490nm upstream from Secondary Return Path TX (Ports 4 and 6).
- 28. Securely tighten screws on the original Fiber Management Tray.
- 29. Power the ISX Node back on.
- 30. See sections #3 and #4 to adjust levels of HEIX47/49SA2.5 Dual Return Path Transmitters for optimum RF drive level and to adjust forward path levels.



Figure #6 Optical Section Forward and Return Fiber Connections



3. Setting Return Path Laser Drive Levels

- 31. The Dual Return Path Transmitter features LEDs labeled "LASER PWR A" and "LASER PWR B" which light Green when the transmitter's laser output power is within nominal range.
- 32. The Dual Return Path Transmitters optical output power can be measured at the 1V/mW test points located on the top of the transmitters or alternately by connecting the optical output connectors of the transmitter to an optical power meter. Nominal output power for Dual Return Path Transmitters TX A and TX B is labeled on the top of the return path transmitter as "PWR A" and "PWR B" respectively.
- 33. The HFC Enhance Dual Return Path DFB transmitters for the ISX Nodes have been optimized based on the assumption that they will be driven with 37 MHz of loading. Please note the ISX Node station has about 10 dB insertion loss from any of the ports to the transmitters input with 0 dB pads installed.
- 34. The return path can be optimized by injecting a CW carrier at a level equivalent to the EXPECTED RETURN CARRIER LEVEL +20 dB on each return path port and then measuring that carrier level at the -20 dB test points located on the HEIX40RC Return Configuration Board as shown in Figure # 9 below. A level at the test point of -18 dBmV indicates the optimum RF drive level at the Dual Return Path Transmitters input. For any port that exceeds -18 dBmV at the test point, adjust the Return Path Attenuator JXP Pads on the HEIX40RC Return Configuration Board for that port until the -20 dB test point measurement of -18 dBmV is achieved.

NOTE:

(1) The optimum operating point for the transmitter is selected as the point which is 5 dB above the point at which the noise side of the NPR curve intersects an NPR of 41 dB. The NPR curve is generated using 37 MHz of noise loading and the per carrier power level is calculated assuming that the total power as calculated at the optimum operating point is spread across 6 carriers.

4. Setting Forward Path Levels

- 35. The HEIXDFRSA Dual Forward Path Receivers provide LEDs for optical input power labeled as "OPT. POWER", the LED will display Green when optical input power is within nominal range (-4 to +3 dBm). If optical input power is too high, optical padding may be necessary.
- 36. Both the A side and B side of the dual receiver have a –20 dB test point that is an indication of the RF level before the interstage Pad and Equalizer locations. This can be used as an indication of RF being generated in the receiver.
- 37. The optical level into the receiver should be in the range of -1 to 1 dBm. Once this level is achieved choose a port on the node and monitor it's output at it's test point using the TPA-1 probe monitor. Adjust the interstage Pad and Equalizer values until the maximum desired output level and slope for the node is achieved at the node port. This needs to be repeated at each node port for both the A and the B side of the dual receiver. **NOTE:** Remember the reading from the TPA-1 is -20 dB relative to the actual level at the node port.
- 38. Once the maximum desired slope and level for the node is achieved at each node, specific node ports can be adjusted in order to obtain desired trunk levels. In order to do this, monitor desired node port's test point using the TPA-1 and adjust the JXP Pad located on the forward insertion points in the RF Tray of the ISX Node, as shown in Figure # 8 below. To change the JXP Pad on Port 1 or Port 6, you must first remove the RF Cover Plate on the left hand side of the node. After changing the JXP Pad, replace the RF Cover Plate and tighten the mounting screw securely.





Figure # 7 HEIXDFRSA Dual Forward Receiver



Figure #8 Forward Insertion and Padding Locations



5. Overview of HEIX40RC Return Configuration Board and Director Board



Figure #9 HEIX40RC Return Configuration Board and Director Board

The HEIX40RC Return Configuration Board as shown in Figure # 9 above has 4 pin style inputs that connect to the motherboard socket of the RF Tray and correspond to their respective ports of the ISX Node (Ports 1, 3, 4 and 6). Connections corresponding to each port are identified on the top of the configuration module. There are also SMB connectors on the Return Configuration Board for connection to the HEIX30TM Transmitter Configuration Board Primary inputs of the Dual Return Path Transmitters and to the Secondary inputs of the Dual Return Path Transmitters. RF test points (-20 dB) are also available on the Return Configuration Board to monitor the RF level for each port. The test points are labeled as "P1", "P3", "P4" and "P6" respectively.

Each individual return port can be padded using the JXP style pad locations on the Return Configuration Board, the pad locations are labeled as "Rev Port 1", "Rev Port 3", "Rev Port 4" and "Rev Port 6" respectively. JXP style High pass filters are installed for each port on the Return Configuration Board.

The Return Configuration Board has an integrated splitter system that along with 4 signal director boards (shown above) allows the technician to route the RF upstream traffic from a given node port to it's own specific SMB connector on the board or to the "TX A" or "TX B" outputs. "TX A" and "TX B" outputs are typically used for X2 return path segmentation while SMB outputs "Out P1", "Out P3", "Out P4" and "Out P6" are used for X4 return path segmentation. The orientation of the Director Board determines which of the ports is connected to the primary RF path or the secondary RF path. As an example, if the Director Board is installed in the Port 1 location and the arrow is pointed to the right as shown above, then that port would be connected to "TX B" output. If the Director Board was installed in location Port 1 and the arrow is pointed up towards the top of the Return Configuration Board are preconfigured in this kit for a x4 return segmentation.



Figure # 10 below depicts the fully installed and configured HFC Enhance 2x4 Dual 1310/CWDM Segmentation of ISX3030 Node.



Figure #10 Fully Configured 2x4 Dual 1310/CWDM Segmentation of ISX Node



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Warranty Information

All of ATX Networks' products have a 1-year warranty that covers manufacturer's defects or failures.

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