Technical Service Bulletin 040129

ADAPT Exciter DAP & CUDC Alignment

The ADAPT exciter employs direct frequency upconversion and downconversion to and from the desired UHF or VHF channel. In this scheme, separate I and Q baseband signals forming the 2-dimensional 8-VSB constellation are mixed with (modulate) an LO carrier at the center of the desired RF channel. For the resulting 8-VSB signal to have acceptable performance, the proper amplitude and phase relationship must be maintained between the I, Q, and LO signal components. This adjustment is frequency-dependent but typically must be performed only once, during the initial installation of the modules. This adjustment is also known as CUDC *modulator* and *demodulator alignment*. Failure to properly align the CUDC modulator and demodulator sections may result in poor transmitted signal to noise ratio, the inability to successful run the ALE and LUT automated precorrection routines, and/or the presence of a spurious LO carrier in the center of the transmitted RF spectrum. The CUDC modulator and demodulator sections must be realigned whenever a DAP or CUDC module is replaced.

When the ADAPT exciter was first introduced in 1998, the modulator and demodulator alignments were made manually via front panel trimmer potentiometers on the CUDC module. A short time afterwards, Comark adopted a policy of shipping replacement DAP and CUDC modules as a tuned pair, pre-aligned at the factory.

In 2002, Comark introduced the OLDC module, which automated the CUDC modulator and demodulator alignments for a significant time savings. This service bulletin provides a field alignment procedure for the CUDC modulator and demodulator sections for those exciters equipped with the OLDC module. This allows the DAP or CUDC modules to be replaced individually in the field.

For those exciters not equipped with the OLDC, the originally policy of DAP and CUDC modules being shipped as a tuned pair remains in place.

Procedure 040129: Field Alignment of DAP and CUDC Modules	
Applicability	All ADAPT exciters with OLDC module installed.
Prerequisites	None.
Equipment Required	HP89441 Vector Signal Analyzer or suitable 8-VSB test measurement set. Spectrum analyzer. Assortment of BNC attenuator pads. BNC-BNC RF coaxial cables PC with ADAPT Control software. RS-232 null modem cable.
Comments	This procedure must be performed whenever a DAP or CUDC module is replaced. Procedure applies only to exciters with OLDC module installed. DAP and CUDC modules must be shipped as a tuned pair for exciters without OLDC capability.

1. Disconnect coaxial cable from exciter output J23 as a safety precaution.

2. Install replacement DAP or CUDC module in exciter.

3. Connect serial port from laptop PC comm port to RS-232 port on front of DAP module.

4. Launch ADAPT Control GUI Software (Version 2.0 or higher).

5. Select pull-down menu **Comm Ports** and select appropriate number comm port from selections.

6. Issue commands **Comm Ports > Open Link** to establish communication with DAP module. The words "ecco umberto calixtinus" or other text should appear in Received window at right of screen. If a stream of junk characters appears in Received window, issue commands **Comm Ports > Computer Baud** and **ADAPT Baud**. Ensure that both baud rates are set to 9600.

7. Issue commands **Drive Commands > MGC Mode** to place exciter in manual gain control (MGC) mode.

8. Issue commands **Set > CUDC > MGC Level > 60 > OK** to set exciter MGC Level value to 60.

9. Issue commands **Software > Save CUDC Settings to File** and save CUDC settings under a new file name. These setting will serves as a baseline that may be recovered should the alignment procedure go terribly wrong.

10. Issue commands **Correction Commands > Clear Linear** and **> Clear Non-Linear** to clear all linear and nonlinear corrections.

11. Loop exciter output J23 back to exciter DAP input J50 on OLDC daughter board via a BNC coaxial cable.

12. Check feedback level by issuing commands **Correction Commands > Feedback** in ADAPT Control GUI software. "Max I" and "max Q" levels reported should be approximately 24000. Add or remove fixed attenuator pads as necessary to establish feedback level of 24000.

13. Issue commands **Correction Commands > OLDC Adaptive** to invoke to automated demodulator alignment routine. Allow routine to repeat until a "Rejection" figure of greater than 45-50dB is reported in the Received message screen of ADAPT Control.

14. Once adequate demodulator rejection has been achieved, issue commands **Correction Commands > OLDC Fixed** to terminate OLDC routine. Allow routine to complete final iteration.

15. Issue commands **Correction Commands > OLMC Adaptive** to invoke automated modulator adjustment routine. Allow routine to repeat until a "Modulator Adjustment" value of less than 1.5% - 2.0% is reported in Received message screen of ADAPT Control.

16. Once adequate performance has been achieved, issue commands **Correction Commands > OLMC Fixed** to terminate OLMC routine. Allow routine to complete final iteration.

17. If required OLDC and OLMC performance levels have not been obtained, issue commands **Correction Commands > New Linear** and **> New Non-Linear** to perform one iteration of the nonlinear (LUT) and Linear (ALE) correction routines, then repeat from step 12.

18. Once satisfactory OLDC and OLMC adjustment is achieved, verify 8-VSB signal performance using SCOUT software or 8-VSB measurement equipment connected to BNC sample point on front of exciter preamplifier module. Adjacent channel sideband levels of better than -55dB and a signal to noise ratio of greater than 35dB are typically possible.

19. If signal performance is adequate, save exciter settings by issuing commands **Correction Commands > Save Corrections** in ADAPT Control. Also issue commands **Software > Save CUDC Settings to File** and save CUDC settings under a new file name.

> **NOTE:** The **Save CUDC Settings to File** command saves only the drive level and modulator/demodulator adjustment parameters. This information may be recovered at any time via the command **Software > Load CUDC Settings from File**. The **Correction Commands > Save Corrections** command saves all exciter parameters (including precorrection curves), but may only be recovered (automatically) by cycling AC power to the exciter (or resetting the DAP module).

20. Issue commands **Drive Commands > Drive Off** to turn exciter output off.

21. Issue commands **Set > CUDC > MGC Level > 40 > OK** to set exciter MGC power level to its lowest setting (MGC = 40).

22. Reconnect J23 and J50 to the proper cables along with original attenuators.

23. Issue commands **Drive Commands > Drive On** to turn exciter output back on.

24. Issue commands **Drive Commands > Raise Power** to increase MGC level until transmitter is back to full power.

25. Consult Service Bulletin 040126 *Advanced ADAPT Correction Procedure* for instructions on performing transmitter precorrections.

At Comark, we are constantly striving to improve the satisfaction of both our new and existing customers. Please do not hesitate to contact Comark Customer Service with any questions you may have concerning the contents of this service bulletin.

Comark Communications
104 Feeding Hills Road
Southwick, MA 01077 U.S.A.
1-(800) 345-9295
http://www.comarktv.com/