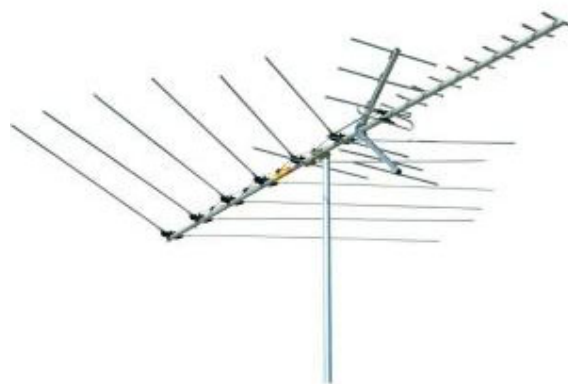# Aligning a VHF / UHF Digital Off-Air OTA Antenna using the XR-3 Modular Test Instrument with XR-CA-01 Cable-Air Meter Module

Connections: Connect coax cable from the antenna's output port to input port on XR-3's Cable Air module

Meter set-up
- Press the **Menu** soft-key (located near bottom right corner of LCD screen) to enter the Main Menu.
- Then select 'Channel Plans' and press *Enter*.
- Then select the Standard Off-Air channel plan 'OTA DIGITAL' and press *Enter* or select a custom plan if you've already created one and press *Enter*.
- *To make selections, press up/down arrow keys to scroll to the item and press Enter.*

Antenna Pointing
Install the mast plumb, mount antenna to mast and grossly align azimuth.

LNA / Pre-Amp Power
If you're connected to an antenna preamplifier and need to power up the preamp with the XR-3, press **LNA** soft-key once (located near middle right side of LCD screen). After pressing the **LNA** soft-key to power the preamp (if desired):

Run Mode (Single Channel View)
1) Press Up/Down arrow keys to scroll to desired channel and frequency. Or direct tune to a particular channel by typing the channel number on the meter's alphanumeric keypad and pressing Enter. Or direct tune to a particular frequency by first pressing the top left soft-key (Ch / Freq) and then typing the frequency on the meter's alphanumeric keypad and pressing Enter.
2) Adjust the antenna azimuth to obtain maximum signal level (left bar graph), MER signal quality (right bar graph), and LOCK status.
3) If desired, you may use Up/Down arrow keys to scroll through other channels to check for proper signal level and quality.

Run Mode (Multi Channel View)

1) Press the **Favs Graph** soft-key (located near lower left corner of main Run screen). If no favorite channels have been set, you may press the 'Chan Scan' soft-key, then select favorite/tilt channels after the scan is complete using the Fav/Tilt soft-key, then Save your Fav/Tilt changes to the plan. If you have already set favorite channels, then you should immediately graphically see the signal level and quality of your favorites upon entering the Favs Graph screen.
2) Adjust the antenna azimuth to obtain maximum signal level (left bar graph), signal quality (right bar graph), and LOCK status for your favorite channels. Since the transmitter towers may be located in directions away from one another, the final antenna position may have to be a compromise to adequately receive signal from all related towers.

Custom Channel Plans

To create a custom channel plan, there are 4 methods to do so:

1) Connect the XR-3 to an off-air OTA antenna that is already aligned and detect your local channels to create a custom channel plan for your area.
    a. Press **Menu** soft-key to enter the Main Menu
    b. Select 'Channel Plans' and press Enter.
    c. Highlight the Standard Off-Air channel plan 'NTSC ATSC' (for analog NTSC & digital 8VSB) or 'OTA DIGITAL' (recommended, for 8VSB digital channels only) to use as your base plan and then press **Enter**.
    d. Now connect a coax cable from the antenna's output port to input port on XR-3's Cable Air module
    e. While on the main Run screen where your bar graphs are, press the 'Chan Scan' soft-key to initiate a channel scan. The meter will sound an audible tone (beep) when the scan is complete.
    f. If you wish to pick favorite channels and tilt channels, highlight the desired channel using the up/down arrow buttons and then press the **Fav/Tilt** soft-key (by pressing the #1 button on the alphanumeric keypad that corresponds to that soft-key). Press soft-key once to flag the channel as one of your favorites. Press soft-key a 2nd time to flag channel as one of your tilt channels. Press soft-key a 3rd time to remove the flags. You may pick up to 5 favorite channels per channel plan. The 2 tilt channels count as favorite channels as well.
    Choosing favorite channels in an off-air plan can be very useful since you'll then be able to view all 5 favorite channels on the screen at once (in the Favs Graph) while aligning the off-air antenna. Since off-air antenna alignment sometimes ends up being a compromise because some transmitter towers are located in one direction and other transmitter towers are located in another direction, seeing multiple channels on the screen at once is critical to be sure that improving the signal on one channel isn't significantly lowering the signal on another channel.
    g. Press the **Save** soft-key (by pressing the #2 button on the alphanumeric keypad that corresponds to that soft-key).
    h. Then select 'Save Found Channels as new Plan'. If you have flagged any channels as favorite / tilt channels, then these will be saved to the new plan, too.
2) Manually edit all of the desired channel numbers and frequencies on the meter.
    a. Press **Menu** soft-key to enter the Main Menu
    b. Select 'Channel Plans' and press Enter.
    c. Highlight the Standard Off-Air channel plan 'NTSC ATSC' (for analog NTSC & digital 8VSB) or 'OTA DIGTAL' (recommended, for 8VSB digital channels only) to use as your base plan and then press the **Edit / Create** soft-key.
    d. In the Channel Plan File Summary screen,
        i. Using the alphanumeric keypad, type the desired filename for your custom channel plan in the Filename field and then press Enter.
        ii. Specify the location, technician name, and enter any notes in their respective fields, as desired.

      iii. In the 'LNA voltage' field, select whether you want to allow voltage output from the meter for this channel plan (choices are 5V, 13V, 18V, or NONE). You would want to allow voltage output if you envision powering off-air antenna pre-amplifiers using the XR-3.

      iv. Press the **Next** soft-key to enter the Channel Lineup screen.

      v. Delete any channels that don't exist in your area by highlighting the channel and then pressing the **Delete** soft-key.

      vi. To edit the parameters for any channel, highlight the channel and press **Enter** to enter the Channel Parameters screen.

1. You may edit or enter a new Channel Number by entering the new desired channel number (i.e. 4.1, 44.1, 61.1, etc.) using the meter's alphanumeric keypad. Then press **Enter**.
2. You may edit or enter a new Channel Label by entering the new desired channel label (i.e. KTFD-DT or WTTV, etc.) using the meter's alphanumeric keypad. Then press **Enter**.
3. If the channel is a digital over-the-air channel, then you should ensure that these parameters are entered in the following fields:
    a. Type: 8VSB
    b. Subtype: NONE
    c. Bandwidth: 6000 kHz
    d. Symbol Rate: 10762 kSym/Sec
    e. Noise Offset: 0 kHz
4. If you want a particular channel to be marked as one of your Favorite channels or tilt channels, then you may specify that in the Favorite/Tilt field. You may select up to 5 favorite channels.
5. After you've finished editing the channel parameters, press the **Back** soft-key to reach the Channel Lineup screen, then press the **Back** soft-key again, then press the **Save** soft-key to save your changes.

3) Manually edit all of the desired channel numbers, frequencies, and labels using a text editor on a PC and then use the MeterMaid application to load a custom channel plan (.pln) file to the XR-3.
4) Request a custom over the air channel plan for your city from Applied Instruments. Write an email to info@appliedin.com. Applied Instruments can create a custom over the air channel plan for your area, based on OTA website data, which includes station identifiers (i.e. WXIN), channel label (i.e. 59.1), RF channel number (5), etc.