The primary objectives for PureSignal 2.0 are:

* Make the algorithm more robust. Improve ease of automatic calibration and improve operation (1) for "difficult" amplifiers, and (2) for amplifiers being driven into heavy gain compression. ("Difficult" amplifiers are generally those with significant memory effects, typically poor plate/drain and bias voltage regulation.)

* Streamline the user interface. In particular, (1) place Auto-Calibrate OFF/ON control and the 'Feedback' and 'Correcting' indicators on the main console, (2) reduce the screen real-estate required for the 'Linearity' window, and (3) separate 'Advanced' controls that only need to be accessed for diagnostic purposes or special situations.

SIGNAL PROCESSING

In the 'Advanced' controls section, the 'Calibration Information' panel is visible, and, there are four new controls that were not in PureSignal 1.0. These new controls represent new functionality that has been added and they should normally be left at their default settings. The controls are:

** 'PIN': Applies a priori knowledge of the required amplifier gain and phase correction in situations where the collected samples are insufficient for optimal calibration. This need can arise when the radio is not being properly driven to allow sample collection over the entire operating range, or due to some other fault or incorrect operation. This is very useful when there is a significant voltage regulation problem in an amplifier and, therefore, the gain and phase of the amplifier appear somewhat "unstable" as PureSignal collects feedback for calibration.

** 'MAP': Changes the sample-collection requirements to allow easier calibration in situations where the amplifier is detected to be in heavy gain compression. This is done by mapping the collection intervals to a different set of intervals based upon the level of compression. Note that this relaxation in sample-collection requirements MIGHT cause some degradation in high-order IMD. This is adaptive; the extent of the remapping depends upon the level of compression. If there is no compression, this function has no effect.

** 'STBL': Substantially separates the "static non-linearity" of the amplifier from the memory effects before computing the correction. This is a step toward further work on memory effects in a future release. When this is enabled, the "blue" and "yellow" displays on AmpView will show the extracted static non-linearity.

** 'TINT': A largely experimental feature allowing selection of the size of the upper interval within which samples are required to be collected. The dB value reflects the reduction from full-scale. For example, 2.5dB means ~75% of full-scale voltage or ~56% of full-scale power. This should normally be left at the default setting of 0.5dB (~94% of full-scale voltage and ~88% of full-scale power). This feature can be useful in situations where an external processing system,

for example a Digital Audio Workstation, is used to precisely control the audio drive amplitude. Note, however, that Auto-Attenuate should probably be disabled when not driving to full-scale as there may not be enough information to accurately calculate its setting which can result in instability in the attenuator value.

NOTE ON AMPLIFIER GAIN COMPRESSION AND TUNING. For modes requiring linear amplification, it is NOT recommended to drive amplifiers into heavy gain compression or "flat-topping." Doing so will increase IMD significantly when PureSignal is NOT active and may increase it slightly when PureSignal is active, due to heavy reliance on the MAP function. Driving into heavy compression will not increase your peak output power by any meaningful amount and, when using PureSignal, it will not increase your average power at all since PureSignal will remove the compression in the output signal to restore linearity. For vacuum-tube amplifiers with 'Tune' and 'Load' controls, if your amplifier has excess power capability compared to your desired output level, you can generally avoid heavy gain compression by tuning the amplifier for a higher power level than your desired output and then backing down the drive level to achieve the desired output. The down-side of this tuning approach may be a slight reduction in amplifier efficiency. It should be noted that there are "proper" ways to increase your average transmit power; those include the use of the Compressor and the CESSB Overshoot Control algorithm.

USER INTERFACE

PureSignal Auto-Calibrate mode can now be used without opening the "Linearity" window. Simply click the "PS-A" button in the upper-left region of the console to activate PureSignal Auto-Calibrate. The "PS-A" setting will also be remembered in the database. Indicators for Auto-Calibrate functionality will appear immediately below the panadapter display area, on the right side. "PureSignal 2.0", when displayed in green, indicates this functionality is active. Immediately to the right of that, the "Feedback" indicator will flash each time there is a new automatic calibration and the "Correcting" indicator will light when correction is being applied. Note that the color-scheme of the PureSignal items will not follow the color scheme of the other below-panadapter information. This is because, for PureSignal, color is used to indicate the status of the various items:

OFF/ON - Blue (Auto-Calibrate OFF), Green (Auto-Calibrate ON)
Feedback Level - Red (too low), Yellow (marginally low), Green (just right), Blue (too high)

Correcting - Green (correcting), Yellow (attempting correction but with marginal feedback level), Black (no correction being applied)
Note that the "PS-A" button is dominant over the "Disable PureSignal" check-box in Setup. In other words, if you click "PS-A" to turn-on Auto-Calibrate, if "Disable PureSignal" was checked, it will become Unchecked. While "PS-A" is active, you will NOT be able to check "Disable PureSignal".

Note that the "Linearity" window has been stream-lined. You can click "Advanced" to expand

the window to show the advanced signal processing controls and indicators; however, it is expected that the typical operator will leave settings at defaults and has no need to open this section. The width of the "Linearity" window has been expanded to match the width of the "AmpView" window, making it easier to stack the two on the screen.

Advanced Signal Processing Controls and Indicators