The MkIII Difference

The MkIII

Original 2020

The 2020 MkIII comprises significant new circuits and processing methods and numerous improvements to existing circuitry. Some new controls were added and some old controls were deleted. In addition, the remote control program has been updated to reflect all of these changes. You will find it easier than ever to get the sound that you want with a wider range of possibilities at hand.

The Technical Advances

- New Dual Band Optical Pre-Emphasis Limiter
- New "Ultra Clean" Non-Overshooting Lowpass Filters
- Dual Output Stereo Generator with RDS Interface
- Improved Baseband Spectral Purity
- Dual Mono & Stereo Capability
- Improved Remote Control
- Improved Leveler
- Improved Multiband Compression Algorithm
- Improved Interactive Split Band Limiter
- European ITU BS 412-9 Modulation Compliance
- Ultra Stable OCXO (Oven Controlled Crystal Oscillator) Option for Pilot Frequency Control

The Benefits

- Greater Clarity - More Sonic Detail
- More Flattering Voice Quality with no Distortion
- Greater Loudness Whenever Needed
- Fewer Undesirable Processing Artifacts
- Already Acclaimed Leveling Even More Effective and Transparent
- Economical - Handles Two Independent Mono Program Chains
- Ready for European broadcast standards
- Feeds Two Transmitters Simultaneously with Separate Level Controls
- RDS Injection Port Accepts Any Subcarrier Input
- Ready for use with *TFT "Reciter" Boosters (Using the OCXO Option)

* "Reciter" is a trademark of TFT, Inc., San Jose, CA.

Features and Options

MkIII OPTIONS

	Analog Stereo Input	Analog Stereo Output	AES/EBU I/O	Pre-Emp Limiter	PPDM MPX Output	OCXO Freq Standard
Basic	X	X				
Option 1	X	X	X			
Option 2	X	X		X		
Option 3	X	X		X	X	
Option 4	X	X		X	X	X

FUNCTIONS AND FEATURES

1. Analog and Digital Stereo Inputs
2. Input Processing Functions
    a. 20Hz Highpass Filter
    b. 16.5KHz Lowpass Filter
    c. SPR Process
    d. Selectable External Processing Insert Loop
3. Frequency Discriminate Leveler
    a. Improved Parametric Controls
    b. “Sticky” Leveling Feature
    c. Selectable Patented “DVG”
    d. Selectable Silence Gate
    e. Adjustable Silence Gate Threshold
    f. Adjustable AGC Upper and Lower Control Limits
4. Multiband Compressor
    a. 4-Bands
    b. Adjustable Crossover Frequencies
    c. Easyrider Compression
    d. Band-by-Band Stereo Elastic Coupling
    e. Band-to-Band Forward Elastic Coupling
    f. Adjustable Compression Drive
    g. Separate adjustable release time per band
    h. Selectable Stereo Hard Coupling
    i. Compression Drive Control
    j. Output Band Mixing Facility
    k. “Post Crossover” Multiband Technique
    l. Stereo/Dual-Mono Mode Selector
5. Bass Processor
    a. Distortion Canceled Bass Clipper
    b. “Warm Bass” Equalizer
    c. “Sub Bass” Equalizer
    d. Total “Bass Mix” Control
6. Split Band Peak Limiter
    a. Bass Interactive to Reduce Intermod Distortion
    b. Instant Processing, i.e., No Pumping
    c. Zero Overshoot
    d. Master Drive Control
    e. Density Control
7. Optional Pre-Emphasis Processor
    a. Special 50 or 75 Microsecond Pre-Emphasis
    b. Selectable De-Emphasis for Line Output
    c. Brilliance Control
    d. Optimized Split Band Pre-Emphasis Limiter
    e. Ultra Clean Non-Overshooting Lowpass Filters
    f. Output Ready for Any Stereo Generator or STL
8. Optional Digital I/O Module
    a. AES/EBU Format Up to 20 Bits
    b. Selectable Output Sample Rate: 32K, 44.1K, 48K
    c. Auto “Lock On” for Input Rates of 32K, 44.1K or 48K
    d. Input and Output Sample Rates Independent or Locked
9. Optional Stereo Generator Module
    a. Patented PPDM Stereo Generator
    b. Dual Adjustable Multiplex Outputs
    c. Stereo/Mono Mode Switching
    d. Pilot On/Off
    e. Independently Trimmable Multiplex Output Levels
    f. 19kHz RDS Sync Output
    g. RDS Injection Input
10. Digital Remote Control
    a. RS232 Digital Interface
    b. Windows 95/98/2000 Compatible Software
    c. Complete Control of the MkIII
    d. Complete Real Time Meter Displays
    e. Password Security Option
11. Front Panel User Interface
    a. LCD Graphics Panel Display
    b. Password Security Feature
    c. Rotary Encoder Knob
    d. Up/Down, L/R Cursor Buttons
    e. Menu Selection System
    f. Real Time LED Bargraph Meters for:
        1. Leveling
        2. 4-band compression
        3. Limiting
        4. Stereo input VU
    g. Real time LED indicators for:
        1. 16.5KHz Lowpass
        2. 20Hz Highpass
        3. 50/75uS Pre-Emphasis
        4. SPR
        5. Analog Input
        6. Digital Input
        7. Digital Data Presence
        8. DVG
        9. Sticky On/Off
        10. Silence Gate
        11. L><R Hard Link
        12. L><R Elastic Link
        13. 1><2 Link
        14. 2><3 Link
        15. 3><4 Link
        16. Analog Output
        17. Digital Output
        18. Bypass On/Off
    h. Headphone Monitor Selector
        1. Monitor Input Signal & Volume
        2. Monitor Output Signal & Volume

Things That Are New or Different

Dual Mono or Stereo Operation

The original 2020 was designed for stereo operation only. The 2020 MkIII can be set for either dual mono or stereo operation. The purpose of this addition to the MkIII is to allow for greater economy when two simultaneous mono channels of processing are needed such as for television or internet broadcasting.

The operating mode can be selected from the front panel by going through page 2 of the Multiband menu or through the remote control program on the Input/Output tab control.

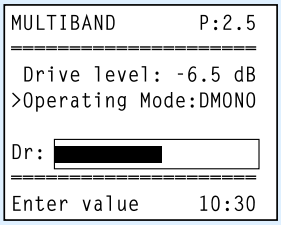


Figure 1
Operating Mode Selection

Setting the Stereo mode links up the left and right gain control of the Leveler and the left and right dynamic thresholds of the Multiband Compressor. In Dual Mono mode, the Leveler and Multiband Compressor channels operate independently.

To fully enact the Dual Mono mode, you must also make sure the L><R linking of the Multiband Compressor is turned OFF. **This is not automatically enacted by the Operating Mode selector.**

Leveler

The MkIII Leveler has been redesigned to follow RMS detection rather than peak. This will make the leveler even more musical and not susceptible to any 'ducking' effects when there is a large transient in the input. When the unit is in Dual Mono mode the Leveling indicator will only show the channel with the most amount of leveling.

When operating in Stereo mode, the leveler maintains the two channels at exactly the same gain at all times, letting the channel that is louder at any instant control both. In Dual-Mono mode, the Leveler unlinks the level detectors for completely independent operation.

Regardless of the Stereo or Dual-Mono mode, both leveling channels operate with the same control parameters. In other words, the control panel always adjusts both Leveler channels to the same settings.

Multiband Compressor

After creating the improved MkIII Pre-Emphasis Limiter, we were able to re-optimize the Multiband Compressor very favorably. The MkIII Multiband Compressor now operates upon a flatter, more ideal dynamic threshold platform that eliminates the voice energy distortion that was sometimes a problem with the original model. In addition, the crossover of band edges may now be adjusted over a wider practical range to achieve useful musical settings. The effects of band tuning are now more easily felt and heard.

Although the dynamic and static parameters of the Multiband Compressor have been reconfigured, there are no changes to the user adjustments other than the Dual Mono/Stereo selection from page 2 of the front panel Multiband menu.

Whether operating in stereo or dual-mono, the front panel Multiband Meters always show the channel with the most gain reduction at any instant.

Limiter/Bass Processor

One of the biggest advances in 2020 MkIII is the addition of the Density control. This allows the user to dial in the desired amount of peak related interactive processing, from open and airy to "in your face" audio. The Brightness control from the original 2020 has been eliminated.

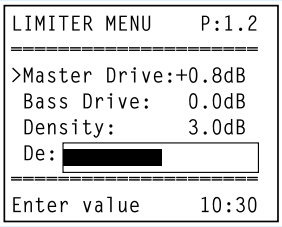


Figure 2: The New Density Control

At higher densities, there will be less interaction between the peak limiting and the multiband compression. This will permit a greater amount of clipping, and consequently greater loudness. At excessive density settings, you will hear increasing distortion. We recommend staying within the density ranges indicated below.

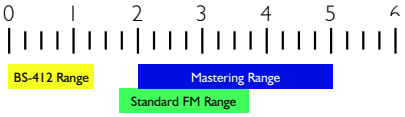


Figure 3
Recommended Density Limits

High Frequency Limiter and Low Pass Filter

The MkIII HF Limiter (Pre-Emphasis Processor) is a proprietary new split-band design that saves more of the high frequency content without distortion. This new limiter is a complete redesign, inheriting little from the MkII limiter.

The "Hardness" control in the original 2020 is eliminated totally. Taking its place is the "Brilliance" control. This controls the release time and thus the intensity of the pre-emphased frequencies. It is not an equalizer as with the MkII. Using a higher setting allows more highs to be retained. Adjust this control to obtain the smoothness or brightness you desire.

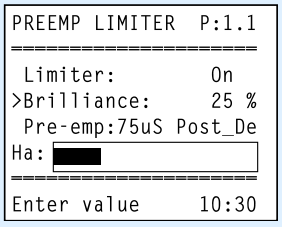


Figure 4
MkIII Pre-Emphasis Limiter Menu

First introduced with the MkII, The MkIII 15kHz Stereo Lowpass Filter is also a new proprietary design that eliminates almost all of the distortion associated with previous overshoot compensated filters. This new filter protects the pilot frequency by as much as 80dB even when heavy overshoot compensation is occurring. Out-of-band energy is equally well rejected with virtually no trash passing through and beyond the cutoff frequency while overshoot is held to less than 2 percent. The importance of this is will be appreciated both in the higher sound quality and in extended F.M. broadcast coverage.

Stereo Generator with RDS interface

The PPDM stereo generator in the MkIII is the same basic design as in the original 2020 and exactly the same as the MkII version. The MkIII has two separately trimmable multiplex outputs and that there is a direct RDS interface. The RDS interface consists of an output of an asymmetric 19kHz rectangular wave with level trim and an input with level trim for the RDS injection signal itself.

Figure 5
MkIII Stereo Generator I/O

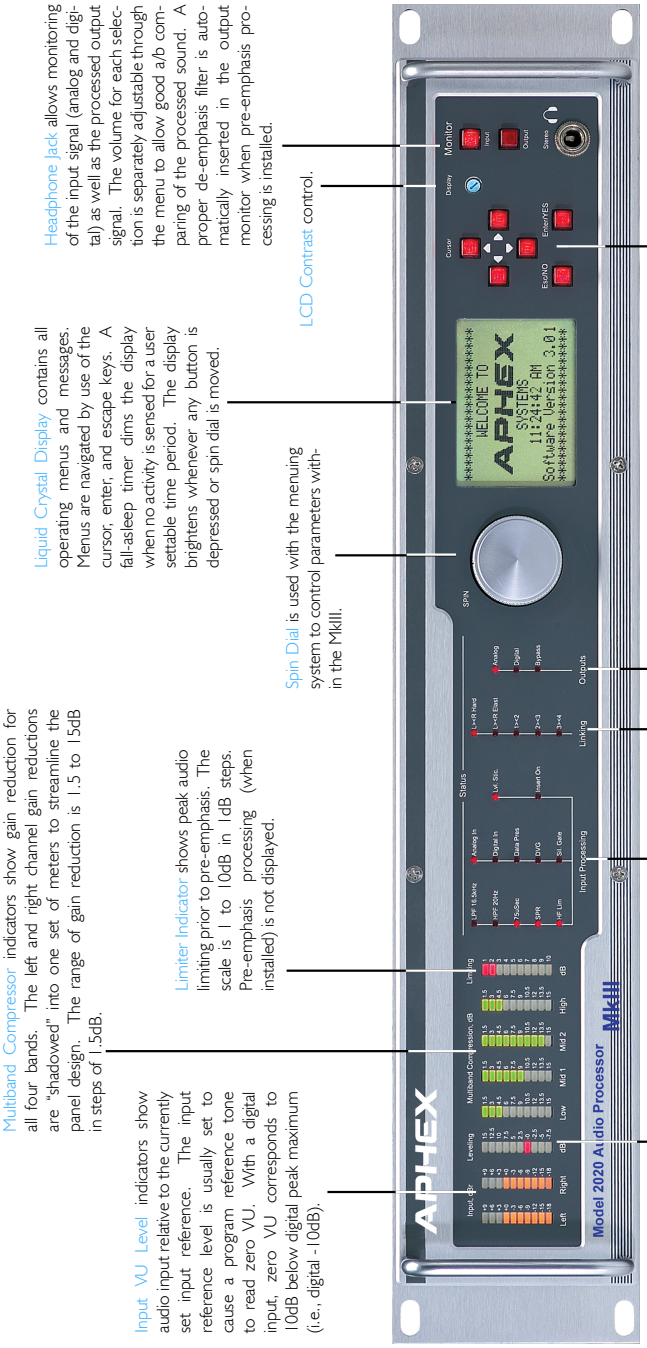
Front Panel

The front panel of the MkIII is updated with cosmetic improvements but remains essentially the same as the original 2020 except for the addition of a display contrast adjustment. Navigating the menus is also the same. The menus themselves are same with only the exceptions that have been pointed out presently.

Remote Control Software

The remote control software has been updated with improved graphics and features. It is now much more reliable with modem connections. The new software is a 32-Bit application and is therefore not Windows 3.x compatible. You will need to run Windows 95, 98, or 2000. We have not tested it on Windows NT 4.x.

MkIII Front Panel



Multiband Compressor indicators show gain reduction for all four bands. The left and right channel gain reductions are "shadowed" into one set of meters to streamline the panel design. The range of gain reduction is 1.5 to 15dB in steps of 1.5dB.

Limiter Indicator shows peak audio limiting prior to pre-emphasis. The scale is 1 to 10dB in 1dB steps. Pre-emphasis processing (when installed) is not displayed.

Spin Dial is used with the menuing system to control parameters within the MkIII.

Liquid Crystal Display contains all operating menus and messages. Menus are navigated by use of the cursor, enter, and escape keys. A fall-asleep timer dims the display when no activity is sensed for a user settable time period. The display brightens whenever any button is depressed or spin dial is moved.

LCD Contrast control.

Headphone Jack allows monitoring of the input signal (analog and digital) as well as the processed output signal. The volume for each selection is separately adjustable through the menu to allow good a/b comparing of the processed sound. A proper de-emphasis filter is automatically inserted in the output monitor when pre-emphasis processing is installed.

Navigation Buttons operate the menus and allow entry and escape from every function. Buttons are continuously lighted for better visibility.

Output Status indicators show if the analog and digital outputs are currently turned on or off and whether the FM Pro has been bypassed. When bypassed, the analog and digital input jacks are coupled directly to their respective output jacks through metallic relay contacts to assure signal throughput for testing or emergency operation. Bypass is defaulted when the power is shut off.

Multiband Coupling indicators show the status of the left-to-right and band-to-band coupling coefficients within the multiband compressor subsystem.

Input Processing indicators show the current on-air status of all vital process functions which are on/off in nature.

Input VU Level indicators show audio input relative to the currently set input reference. The input reference level is usually set to cause a program reference tone to read zero VU. With a digital input, zero VU corresponds to 10dB below digital peak maximum (i.e., digital -10dB).

Leveling Meter indicates the amount of automatic gain correction presently taking place. The scale goes from +15dB to -7dB in 2.5dB steps. The indication will be zero dB for a true reference level input tone.

Updated Block Diagram

Updated MkIII Block Diagram

Superimpose this over Figure 5-2 of the original 2020 manual.