AM

mono

from CRL SYSTEMS

AM 4 mono Processing Systems

CRL has incorporated the latest advances in AM broadcast processing technology to make the NEW AM systems more flexible and even better

The CRL AM systems consist of input AUDIO GAIN CONTROL, MULTIBAND COMPRESSION and final PEAK LIMITING devices, which may be configured to obtain the desired audio control and meet budget requirements of the broadcast facility.

When used together these units provide complete audio control to maximize modulation while maintaining tonal clarity and integrity of the original source material.

AGC-400: As the input unit to either the CRL top performance AM-4 or budget oriented AM-2 systems, the AGC-400 AUDIO GAIN CONTROLLER offers the following main features:

LINEARIZED, DUAL BAND AUTOMATIC GAIN CONTROL. User may select wide band, dual band, or a combination of both. When combined, average levels are gain controlled in wide band, followed by dual band peak control. Crossover frequency is 340 Hz with gentle 6 dB per octave filters. Linearized control circuits provide low distortion, typically less than .15% with 9 dB of gain reduction.

GATING. This circuit freezes gain at a pre-determined threshold (typically -20 dB) to prevent amplification of the noise floor during pauses in program content. Internally adjustable from -10 to -30 dB below reference level.

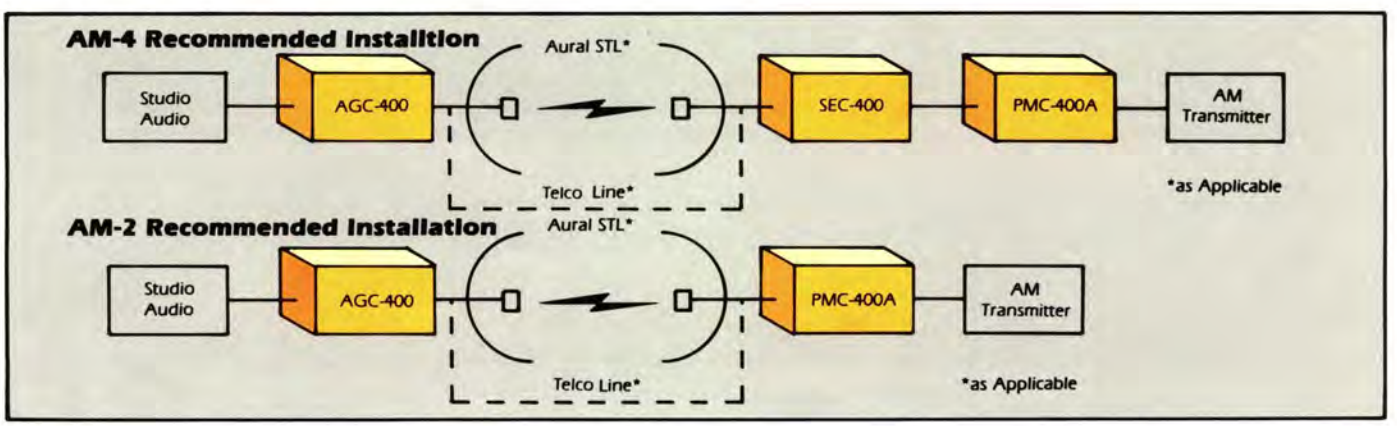
DYNAFEX® NOISE REDUCTION. This CRL patented circuit (U.S. Patent #4,609,878) dramatically improves the signal to noise ratio of program sources. With the threshold control set at -25 dB, the AGC 400 has an operating S+N/N ratio of better than 80 dB! This circuit uses downward expansion coupled with a sliding bandwidth filter to achieve outstanding improvement in nearly all noisy source material, without degrading high quality audio sources. See Fig. A.

PULSED OR STATIC USASI NOISE GENERATOR: These internal noise generators can be inserted during calibration to accurately simulate the frequency and dynamics of typical program sources, making proper adjustment quick and easy.

AUDIO ASYMMETRY REMOVAL. Music is usually symmetrical, in contrast to voices, which can be asymmetrical in nature. Clipping these waveforms can result in audible distortion. An internal jumper selectable circuit in the AGC-400 removes the asymmetry, thereby reducing distortion.

E.Q. BALANCE: Equalization is adjustable +/- 6 dB. Increasing the output of the low band (below 340 Hz) reduces the output of the high band (above 340 Hz), and vice versa, in order to maintain a constant RMS total output. The output of the two bands is summed into a front panel screwdriver adjustment, permitting "tweaking" of the sound balance without requiring readjustment of later processing units. Overall output level is not affected.

ATTACK AND RELEASE TIME CONSTANTS: Attack time is determined by the program material, resulting in instantaneous adjustment regardless of program source. The release time is user adjustable by a front panel control for slow, medium or fast.



SEC400: The SEC-400 SPECTRAL ENERGY COMPRESSOR is a musical sounding four band compressor/limiter featured in the AM-4 system and may be added to existing AM-2 systems. The SEC400 is an all new monophonic design which contains proven CRL patented circuitry.

MULTIBAND CROSSOVER FREQUENCIES AND FILTERS: Like the human ear the SEC-400 interprets sound according to the predominant characteristics of the audio spectrum: musical bass, voice fundamentals, voice presence and musical high frequencies. When a high frequency sound, such as a cymbal crash, occurs at the same time as a low frequency bass, both qualities are preserved even with high levels of compression. Output equalization of each band is adjustable from +6 dB to -12 dB; crossover points are 200 Hz, 1 kHz and 5 kHz. Since gentle 6 dB per octave filters are used, the transition from one band to the next is subtle and smooth without the ripple caused by sharper filters.

The design of this unit allows it to act as a dynamic equalizer as well. For example, material that is lacking in highs will be brightened, and material that is overly bright will have the highs reduced. The same is true of each of the four bands, providing a very consistent, full bodied sound.

SELECTABLE MULTIBAND COMPRESSION RATIO: The action of each band is dependent on a master compression ratio, selectable in 3 dB steps up to -15 dB of input reference. Recommended setting for most applications is -6 dB. This means that the input can fall as much as 6 dB below threshold without any drop in output level. An intelligent feedback circuit determines the combined and weighted value of each band to ensure consistent sound quality.

JUMPER SELECTABLE BASS EQ: To help compensate for deficiencies in receiver bass response, the SEC-400 includes a jumper selectable 3 dB bass boost at 90 Hz, with a gentle roll off below. This filter is designed to prevent any subaudible transmission problems and medium to small speaker reproduction intermodulation effects.

TIME CONSTANTS: Like the AGC-400, the SEC-400 offers program dependent attack time constants and a selection of slow, medium or fast release. A front panel switch allows the selection of "limit" or "compress." In the limit position attack times are shortened to provide even faster control of peaks. This setting is ideal for some music formats that require a more restricted dynamic range that is free of clipping distortion artifacts.

PMC 400A: The PMC-400A PEAK MODULATION CONTROLLER incorporates many unique designs originally developed for AM Stereo. A combination of pre-emphasis, limiting, clipping and filtering permit maximum loudness with minimum distortion. The main features are:

INPUT GAIN CONTROL: 25 dB of input gain control prevents detrimental limiting effects by providing consistent levels into the limiter circuits. This eliminates "pumping," and other detrimental side effects caused by excessive peak limiting.

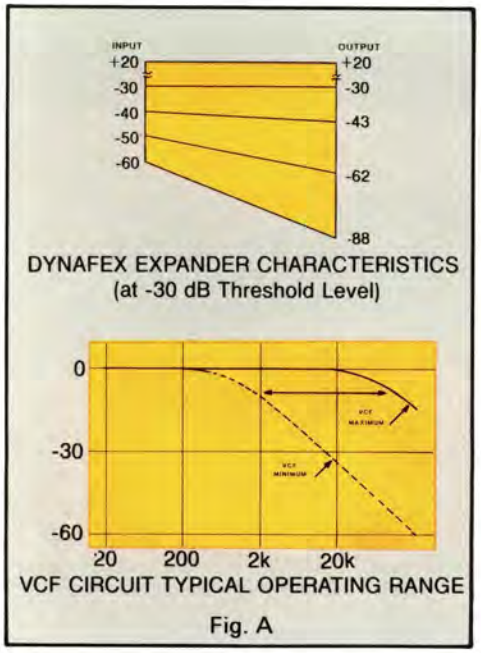
TILT CORRECT: Pioneered by CRL, this low frequency gain/phase adjustable equalizer compensates for low frequency phase shift common in plate modulated transmitters. This circuit allows older transmitters to perform almost as well as recent designs. Low frequency distortion is reduced and modulation capability can be increased from 5 to 20 percent in many transmitters.

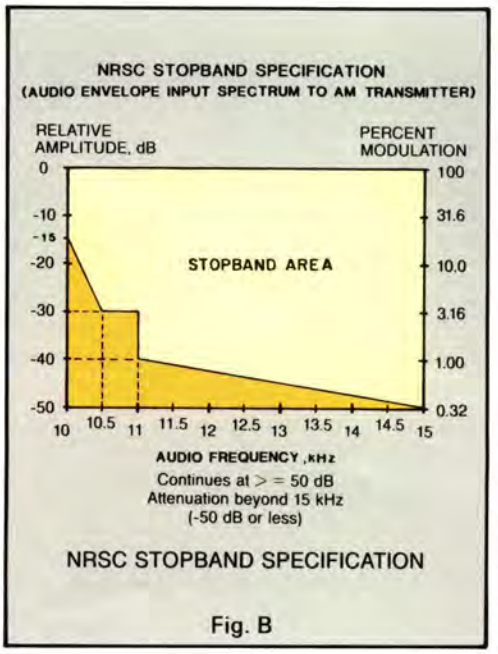
NRSC STANDARD PRE-EMPHASIS & LOW PASS FILTERING: The voluntary standards adopted by the NRSC are implemented in this unit. This consists of a modified 75 micro-second pre-emphasis curve, combined with a sharp low pass filter that reduces the bandwidth to 10 kHz. (See Figs. B+C) Response is down 40 dB at 11 kHz.

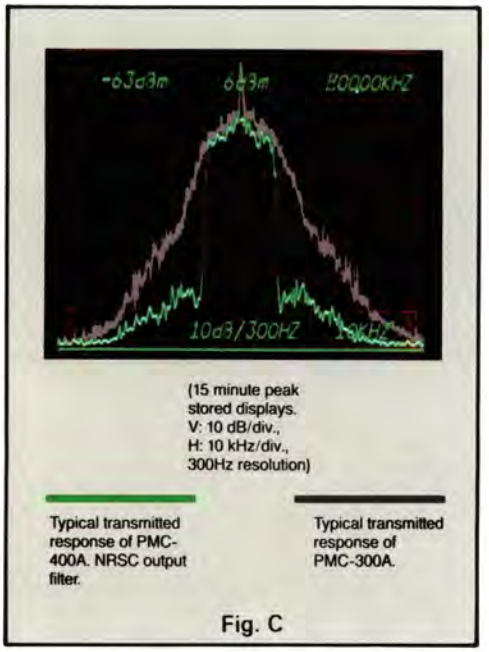
In addition, a front panel switch allows selection of adjustable pre-emphasis and a rear panel switch permits an optional 11 kHz bandwidth position. Note: 11 kHz operation is NOT recommended by CRL and does not comply with the U.S. NRSC Voluntary Standards.

RESONANT LOW PASS CLIPPING FILTER: Excessive clipping harmonics can cause out of band disturbances that may result in higher intermodulation artifacts. A unique, CRL patented (U.S. Patent #4,383,299) filter eliminates these excessive clipping harmonics, allowing the user to increase clipping to obtain maximum loudness capability without audible distortion.

JUMPER SELECTABLE BASS EQ: To help compensate for deficiencies in receiver bass response, the PMC-400A includes a jumper selectable 3 dB bass boost at 105 Hz, with an aggressive roll off below. This filter is provided primarily for stations using the PMC-400A without the SEC-400 (AM-2 system).







SPECIFICATIONS

AGC-400

Dynafex® noise reduction out, EQ set to FLAT unless specified

INPUT (Ref. OdBm = 0.775 VRMS into 600 ohms)
- TYPE: Active balanced (differential)
- IMPEDENCE: >10 k ohms balanced bridging
  >5 k ohms unbalanced
- TERMINATION: 600 ohms (selectable)
- LEVEL: -30 TO +20 dBm referenced to input G/R threshold

OUTPUT
- TYPE: Active balanced (transformerless)
- IMPEDENCE: <200 ohms balanced (designed to drive 600 ohm load)
- LEVEL: Selectable in steps. -10, 0, +4, +8, +10 dBm

FREQUENCY RESPONSE
+/— 0.25 dB proof, +/— 0.5 dB operate at 9 dB G/R
(BAND switch in BOTH position),
50 Hz to 20 kHz, +10 dBm output level

HARMONIC DISTORTION
<0.1% proof, <0.25% operate (<0.15% typical) at 9 dB G/R
(BAND switch in BOTH position)
50Hz to 20 kHz, +10 dBm output level

IM DISTORTION
<0.05% proof, <0.25% operate (<0.15% typical) at 9 dB G/R
(BAND switch in BOTH position)
SMPTE method, 4:1 ratio

S+N/N
>80 dB proof, >70 dB operate (>72 dB typical)
>80 dB operate with dynafex NR in (dynafex threshold at -25 dB),
measured from threshold of G/R, 50 Hz to 20 kHz bandwidth

GAIN REDUCTION RANGE
>30 dB, 50 Hz to 20 kHz

COMPRESSION RATIO
20:1 typical above 9 dB G/R

TIME CONSTANTS
Progam dependent attack,
switch selectable release action (Slow, Medium, Fast)

GAIN REDUCTION METHOD
Two independent linearized bands of gain reduction riding atop a wideband AGC platform. BAND switch allows individual selection of WIDEband only, MULTIband only or BOTH

CROSSOVER FREQUENCY
340 Hz, DUAL and BOTH operating modes

GAIN REDUCTION ELEMENTS
Voltage controlled resisitor (patented by CRL)

GATE FUNCTION
Locks gain reduction at 20 dB below G/R threshold to prevent amplification of noise floor.
Internally adjustable (—30 to —10 dB)

NOISE GENERATOR
Pulsed or Static USASI weighted (jumper selectable)

FRONT PANEL INDICATORS:
10 Segment LED relative input level meter with 22 dB, (28 dB with OVLD) dynamic range

SEC-400

INPUT (Ref. 0 dBm = 0.775 VRMS into 600 ohms)
- TYPE: Active balanced (differential)
- IMPEDENCE: >10 k ohms balance bridging
  >5 k ohms unbalanced
- TEMINATION: 600 ohms (selectable)
- LEVEL: —30 TO +20 dBm referenced to input G/R threshold

OUTPUT
- TYPE: Active balanced (transformerless)
- IMPEDENCE: <200 ohms balanced (designed to drive 600 ohm load)
- LEVEL (maximum): +18 dBm into 600 ohms + 400 Hz

FREQUENCY RESPONSE
+1 to - 6 dB proof, at 9 dB G/R
(BAND switch in MULTI position),
50 Hz to 15 kHz, +4 dBm output level

HARMONIC DISTORTION
<0.25% proof, <0.6% operate (<0.25% typical) at 9 dB G/R
(BAND switch in MULTI position)
50 Hz to 15 kHz, +4 dBm output level

IM DISTORTION
<0.08% proof, <0.35% operate (<0.3% typical) at 9 dB G/R
(BAND switch in MULTI position)
SMPTE method, 4:1 ratio

S+N/N
>75 dB proof, >70 dB operate (>75 dB typical)
measured from threshold of G/R,
+10 dBm input/output level

GAIN REDUCTION RANGE
>30 dB, 50 Hz to 15kHz

TIME CONSTANTS
Program dependent attack;
switch selectable release action (Slow, Medium, Fast)

GAIN REDUCTION METHOD
4 band VCR followed by 4 output control VCA's. BAND switch allows individual selection of WIDEband only, or MULTIband

CROSSOVER FREQUENCIES
200 Hz, 1 kHz, and 5 kHz with 6 dB/ octave filters

GAIN REDUCTION ELEMENTS
Voltage controlled resistor (patented by CRL)

GATE FUNCTION
Locks gain reduction at 10 or 20 dB below G/R threshold (switch selectable) to prevent amplification of noise floor.

FRONT PANEL INDICATORS:
10 Segment LED relative input level meter with 22 dB, (28 dB with OVLD) dynamic range

PMC-400A

INPUT (Ref. 0dBm = 0.775 VRMS into 600 ohms)
- TYPE: Active balanced (differential)
- IMPEDENCE: >10 k ohms balance bridging
  >5 k ohms unbalanced
- TEMINATION: 600 ohms (selectable)
- LEVEL (adjustable): -10 TO +20 dBm referenced to 0 dB indication of front panel level meter

OUTPUT
- TYPE: Active balanced (differential)
- IMPEDENCE: 100 ohms (designed to drive 600 ohm load)
- LEVEL (adjustable): <—20 to +20 dBm; ref. to 100% negative modulation level, as established internally

FREQUENCY RESPONSE
(0 dB ref. @ 400 Hz, +10 dBm input/output)
9.5 kHz filter bandwidth selected:
- 50 Hz to 8 kHz: +0/-1.5 dB
- —3 dB at 9.5 kHz
- >30 dB atten. at 10.5 kHz
- >40 dB atten. at 11.0 kHz

Conforms to NRSC standard using required dynamic measurement method

11 kHz filter bandwidth selected:
- 50 Hz to 10 kHz, +0/—1.5 dB
- —3 dB at 11 kHz
- >30 dB atten. at 13.5 kHz

Proof mode:
- 50 Hz to 15 kHz, +/- 0.5 dB

HARMONIC DSTORTION
9.5 or 11 kHz BW:
- (+10 dBm input/output, 20 kHz bandwidth)
- <0.25% over selected operating bandwidth,
- at or below 100% negative modulation level

Proof mode: <0.1%

S+N/N
>75 dB proof, >65 dB operate

INPUT GAIN REDUCTION
Input leveling AGC, selectable in 2 dB increments to 8 dB
>20 dB overall range

LIMITING:
Selectable in 1 dB increments from 0 to +5 dB;
dual band, crossover frequency: 3.5 kHz

PRE-EMPHASIS:
Follows NRSC standard pre-emphasis characteristic; 20 Hz to 10 kHz when front panel PRE-EMPHASIS switch is in STD. position.
Continuously variable via front panel HI-FREQ EQUALIZATION control when front panel PRE-EMPHASIS switch is in VAR. postion

FRONT PANEL INDICATORS:
10 Segment LED relative input level meter with 22 dB, (28 dB with OVLD) dynamic range

+/—limit indicators monitor activity of patented overshoot-corrected filter circuitry

GENERAL SPECIFICATIONS
(AGC-400, SEC-400, PMC-400A)

POWER REQUIREMENTS:
100-130 or 200-250 VAC, 48-440 Hz, 20 VA max
EMI suppressed, IEC connector standard

OPERATING TEMP.RANGE:
32 to 122 degrees F (0 to 50 degrees C)

OPERATING HUMIDTY:
0-95% RH, non-condensing

OPERATING ALTITUDE:
0-15,000 feet AMSL

DIMENSIONS:
19" (48.3 cm) W, 1.75" (4.5 cm) H, 16" (40.6 cm) D
including protruding controls and connectors

SHIPPING WEIGHT:
18 lbs. (including standard accessories)

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THE PROFESSIONAL'S CHOICE

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