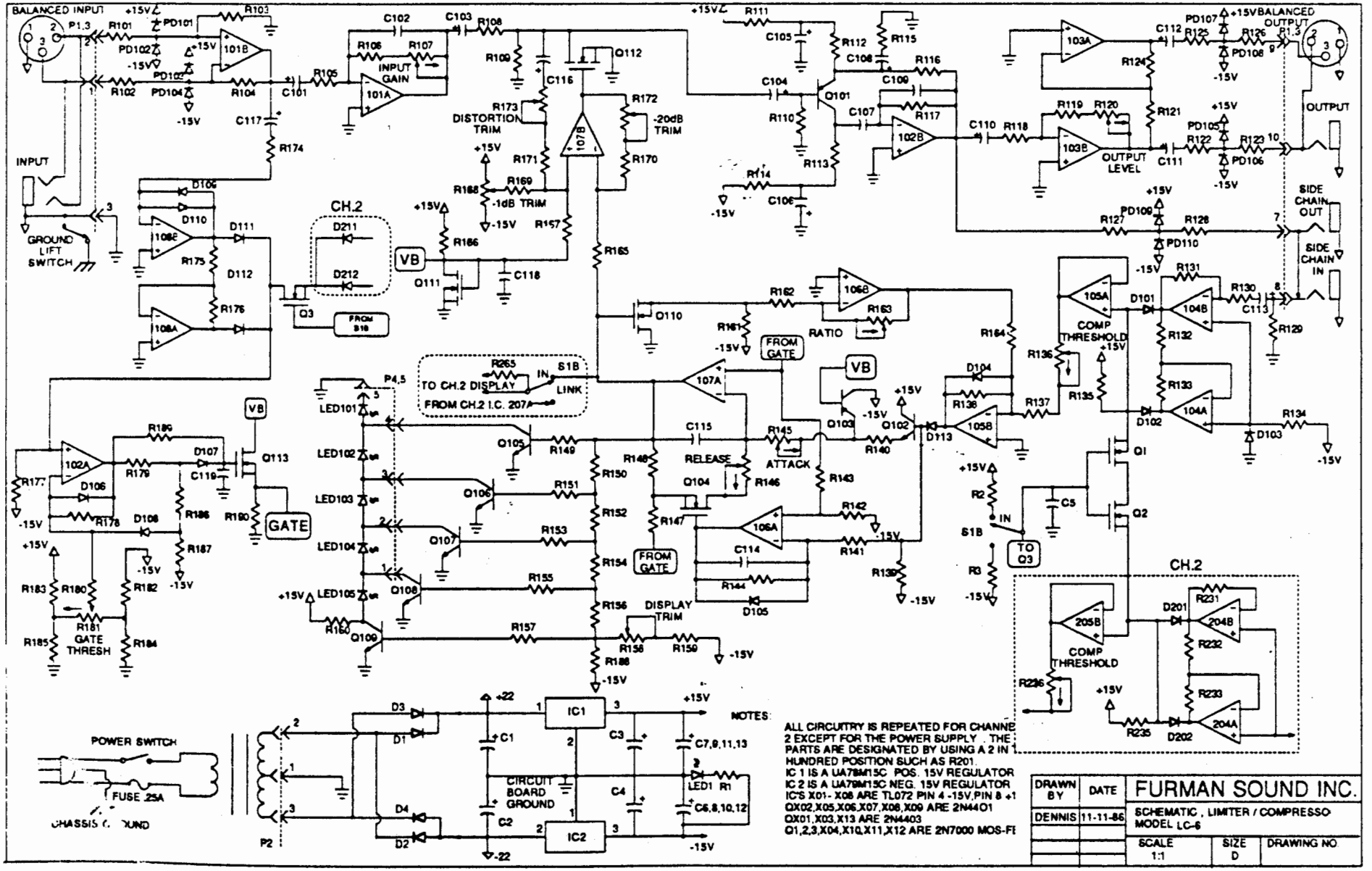

BALANCED INPUT
INPUT
GROUND LIFT SWITCH
INPUT GAIN
DISTORTION TRIM
-20dB TRIM
-1dB TRIM
CH.2
VB
FROM GATE
TO CH.2 DISPLAY
FROM CH.2 I.C. 207A
RELEASE
ATTACK
RATIO
COMP THRESHOLD
OUTPUT LEVEL
BALANCED OUTPUT
OUTPUT
SIDE CHAIN OUT
SIDE CHAIN IN
GATE
GATE THRESH
DISPLAY TRIM
TO Q3
POWER SWITCH
FUSE .25A
CHASSIS GROUND
CIRCUIT BOARD GROUND
NOTES:
ALL CIRCUITRY IS REPEATED FOR CHANNEL 2 EXCEPT FOR THE POWER SUPPLY . THE PARTS ARE DESIGNATED BY USING A 2 IN HUNDRED POSITION SUCH AS R201.
IC 1 IS A UA78M15C POS. 15V REGULATOR
IC 2 IS A UA79M15C NEG. 15V REGULATOR
IC'S X01- X08 ARE TL072 PIN 4 -15V,PIN 8 +15
QX02,X05,X06,X07,X08,X09 ARE 2N4401
QX01,X03,X13 ARE 2N4403
Q1,2,3,X04,X10,X11,X12 ARE 2N7000 MOS-FE
DRAWN BY
DATE
DENNIS
11-11-86
FURMAN SOUND INC.
SCHEMATIC , LIMITER / COMPRESSOR
MODEL LC-6
SCALE
1:1
SIZE
D
DRAWING NO.

Furman

R2 - 560K
R3 - 560K

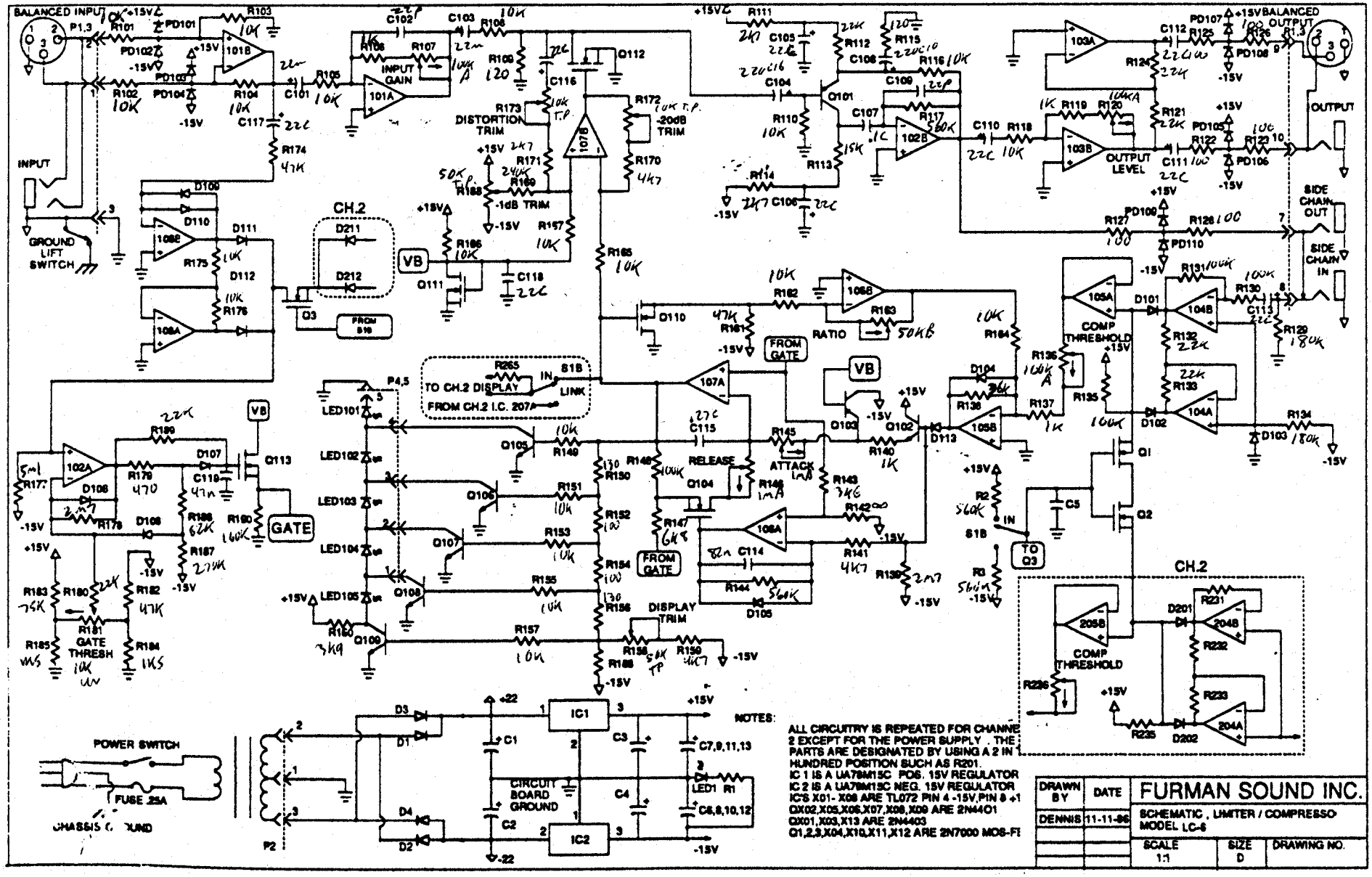
Noise gate / compressor

R 101 - 10K
102 - 10K
103 - 10K
104 - 10K
105 - 10K
106 - 1K
107 - 100K A
108 - 10K ~~A~~
109 - 120
110 - 10K
111 - 2K7
112 - 22K
113 - 15K
114 - 2K7
115 - 120
116 - 10K
117 - 560K
118 - 10K
119 - 1K
120 - 100KA
121 - 22K
122 - 100
123 - 100
124 - 22K
125 - 100
126 - 100
127 - 100
128 - 100
129 - 180K
130 - 100K
131 - 100K
132 - 22K
133 - 22K
134 - 180K
135 - 100K
136 - 100KA
137 - 1K
138 - 36K
139 - 2M7
140 - 1K
141 - 4K7
142 - OPEN
143 - 3K6
144 - 560K
145 - 1MA
146 - 1MA
147 - 6K8
148 - 100K
149 - 10K
150 - 130
151 - 10K
152 - 100
153 - 10K
54 - 100
55 - 10K
56 - 130
57 - 10K
58 - 50K T.P.
59 - 4K7
60 - 3K9
61 - 47K
62 - 10K
63 - 50K B
64 - 10K
65 - 10K
66 - 10K
67 - 10K
68 - 50K TP
69 - 240K
70 - 4K7
71 - 2K7
72 - 10K T.P.
73 - 10K TP
74 - 47K
75 - ~~10K~~
76 - 10K
77 - 5M1
78 - 2M7
79 - 470
80 - 22K
81 - 10K ~~470 680~~ 4n7
82 - 47K
83 - 75K
84 - 1K5
85 - 1K5
86 - 62K
87 - 270K
88 BY MSP
89 - 22K
90 - 100K

FETS = 2N7000

C101 - ~~10n~~ 22n
102 - 22p
103 - 22n
104 - 220 c16
105 22n
106 ~~10n~~ 22n
107 - ~~10n~~ ~~82n~~ .1
108 - ~~10n~~ 220 c10
109 - ~~.01~~ 22p
110 - 22n
111 - 22n
112 - 22n
113 - 22n
114 - .082
115 - .27
116 - 22n
117 - 22n
118 - 22n
119 .047

	CCW	Center	CW	
IP GAIN	-20 to ~~-20~~ 0		to +20	
	or			
Gate Threshold	-70	-35	+20	CCW to R182
Attack	.1us	.15	1sec	
	or			
Release	.05 sec	.5	5sec.	
	or			
Ratio	1.4:1	3:1	LIMIT	
Threshold	-20	0	+20 - On.	
	or			
O/D GAIN	-20	0	+20	
	On			


BALANCED INPUT
INPUT
GROUND LIFT SWITCH
CH.2
VB
GATE
FROM GATE
TO CH.2 DISPLAY
FROM CH.2 I.C. 207
RELEASE
ATTACK
RATIO
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-20dB TRIM
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Introduction

Congratulations on your purchase of a Furman Sound Model LC-6 Stereo Compressor/ Gate. You have chosen an instrument with outstanding features and performance specifications, and great versatility in modifying the dynamics of all kinds of musical and vocal program material. The LC-6 is expected to find applications in recording, concert sound reinforcement, musical instrument amplification, and in broadcasting.

LC-6 Features

- Two independent limiter/compressor/noise gate channels
- Compress section has Attack, Release, Threshold, and Ratio controls
- Gate section has its own Threshold control
- Gate and limit/compress may be used simultaneously
- Input and output level controls
- Side chain input and output
- Stereo Link switch
- Five-segment LED meter indicates gain reduction on each channel
- LED power indicator
- Ground lift and on/off switches
- Noticeably smooth and noise-free operation

Description

Model LC-6 is the newest member of Furman's family of dynamic modifiers. It is two complete, sophisticated limiter/compressor/ noise gates in one. They may be used independently or easily linked for stereo via a pushbutton switch. In stereo mode, channel 1's settings govern both sides, preventing loss of stereo perspective. Each channel has a complement of seven controls and a bar-graph LED meter indicating the amount of gain reduction. All controls are accurately calibrated in the actual units of measurement, so that precise and repeatable settings are easy. There are input and output gain controls, calibrated in decibels. In the Compress section, there are Threshold, Attack (100 µS to 1 Sec), Release (.05 to 5 Sec), and Ratio (1.4:1 to full limiting).

Each LC-6 channel includes a noise gate function that may be used to eliminate noise, hum, buzz, or leakage from other instruments during times when no signal is present. The fast-attack gate section may be used simultaneously with the compress section. The compress threshold may be set anywhere from -20 to +20 dBV; the gate threshold from -∞ to +20 dBV. The gate provides 35 dB of attenuation when closed. Side-chain input and output jacks are provided on the rear panel to allow access to the LC-6's compressor detector circuit. This permits patching in an equalizer to provide frequency-selective compression, or for special effects like "ducking" a musical background under a narrator's voice.

The LC-6's gain processing is the smoothest of any of the Furman compressors, and its noise level is the lowest. Other LC-6 features include an LED power indicator and ground lift and on/off switches.

Gating, Compression, and Limiting

Gating, compression, and limiting are signal processing effects which alter the signal's dynamic range, or ratio between the loudest and quietest parts. They are accomplished

without adding appreciable distortion to the signal. An LC-6 channel may be thought of as an automatic volume control. It senses the instantaneous loudness of the signals fed into it (as they appear at its output). Depending on the settings of its controls, the LC-6 leaves the volume unchanged or reduces it by varying amounts. In its most usual form, this gain change affects only relative loudness, and has no effect on tone or timbre. (However, for certain special applications, gain reduction may be applied selectively to specific frequency ranges. This will be discussed more fully in the Side Chain section.)

All of the functions of the LC-6 are implemented by a single voltage controlled amplifier (VCA). The VCA works just like a regular volume knob, except that the volume level it produces is determined electronically, by a voltage, instead of by the turning of a knob. Signals normally pass through the VCA at full volume *except* when other circuits called level detectors "decide" that the volume (or gain) should be turned down. There are two circumstances that can cause the gain to be reduced:

1. Very low level signals trigger the Gate section:

Very low level signals in a system may be noise rather than music. Turning down the volume when only noise is present can make a PA system or recording much quieter. The LC-6 can reduce the loudness of signals that are weaker than a certain level called the *threshold*. When the signal level drops below the threshold, the LC-6 rapidly reduces the gain by about 35 dB. This sudden change in volume is called *gating*. It is analogous to a gate being closed, and results in low level signals being shut almost completely off, replacing them with silence.

2. Relatively high level signals trigger the Compress section:

As the input to the LC-6 rises from a very low level and crosses the Gate threshold, the gain reduction caused by gating is eliminated, and normal gain is restored. Additional increases cause no change in gain until the Compress section is triggered at the Compress threshold. Above that level, further increases cause the gain of the VCA to be turned down again. this moderates the increase at the output, reducing (compressing) fluctuations in level. The Compress Ratio control determines how much the gain is reduced by an increase in input level. If the Compress Ratio control is turned fully clockwise, each decibel of increase in input level causes one decibel of gain reduction. The result is that there is no change in output level at all. This extreme form of compression is called *limiting*. Less extreme settings of the Ratio control cause less gain reduction. For example, setting it to 2:1 adjusts the LC-6 to reduce its gain by 1 dB for each 2 dB increase in input level. In this case, a 20 dB increase at the input is compressed to a10 dB increase at the output.

The dynamic range of live music, from the quietest pianissimo to the loudest amplified electronic crescendo, can be as much as 120 decibels. On the other hand, the capacity of a recording or transmission medium is limited at the loud end of the scale by the point at which distortion occurs, and at the quiet end by the point at which system noise begins to reduce the intelligibility of the signal. This capacity is called the signal-to-noise ratio of the medium. For a cassette recorder, it is about 55 dB, for disk or open-reel recording about 70 dB, and still higher for compact disk recordings. Encode-decode noise reduction equipment (such as made by Dolby) can extend this range significantly, though not to 120 dB. But consider that the signal-to-noise ratio for AM radio transmission is only about 45 dB, and only 60 dB for normal FM radio. Obviously, for broadcast music, wide dynamic range would be futile. The presence of high ambient noise levels in the listening environment (such as engine noise in automobiles) only makes matters worse.

Given the limitations of recording and broadcasting, there are two approaches which may be taken to reduce dynamic range to an amount which is appropriate to the medium. One is for an engineer to "ride gain". For this to work, the engineer must have quick reflexes and a thorough familiarity with the music. The second approach is to use a device like the LC-6, which rides gain automatically and has adjustable "reflexes"!

Attack and Release Times

In the Compress section, the LC-6's "reflexes" are set with the Attack and Release controls. When a signal increases above the threshold, how quickly is the gain reduced? Setting this rate is the function of the Attack control. Similarly, when the signal decreases below threshold, the rate at which the gain is restored to normal is set by the Release control.

At first it might seem that the optimum setting for both controls is as fast as possible. Indeed, for many kinds of music this is the best setting. Sometimes, however, this yields too drastic a result. The main side effect of combined fast attack and release times is a reduction in short term dynamics of the compressed music, especially if the Ratio control is set high. The resulting "squashed" sound has a high average loudness, but may be fatiguing to listen to. Setting the release time longer will preserve the short moment to moment loudness changes in the music. Short attack times combined with relatively long release times are a good way to control the peak level with little audible alteration of the music. Longer release times and lower ratios will retain more of the natural dynamics of the music. The cost will be a reduction in the average loudness, since the gain will stay reduced longer after each musical peak. For the most "invisible" processing, use a relatively "soft" compression ratio of 2:1 and set the attack to 1-5 milliseconds, with release times of 500 milliseconds to 5 seconds, adjusted by ear for most pleasing result. These settings are recommended because attack times shorter than 1 millisecond may allow very brief impulses to trigger large amounts of gain reduction, causing an unpleasant "breathing" effect. Attack times longer than 10 milliseconds may exaggerate percussive sounds by allowing the initial part of the sound to come through at full volume.

Applications

Processing a finished recording with compression or limiting may be a necessity for a broadcast station to avoid illegal overmodulation of the transmitter (resulting in distortion and possible interference with other stations), while maintaining a good loud signal. The LC-6 will serve very well in this application. But if the finished product is to be a record or tape rather than a transmission, it is usually preferable to capture as full a dynamic range as possible.

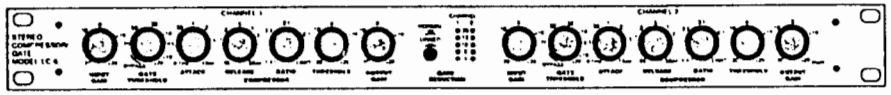
In recording, limiting or compression are most frequently applied to individual tracks, rather than to mixes. For example, suppose that a bass track is not prominent enough in a trial mix. One approach might be to run up the fader for that track until the bass is louder relative to the other instruments. However, when this is attempted, the VU meters both for the bass track and for the mix move well into the red zone and some clipping distortion occurs. A good solution would be compression of the bass track. By reducing the dynamic range of the bass, its apparent loudness can be increased without overwhelming the dynamics of the overall mix.

Another example is the case of a vocalist who gets too loud at one or more points in a song, perhaps because of moving too close to the mic. Limiting can help here. With the Compress Threshold set fairly high, gain reduction will only be applied to the occasional

crescendos. The dynamics of the remainder of the song will be left intact.

The Gate section's greatest potential is realized when it is used to eliminate unwanted sounds. With a low Gate Threshold set, hiss can be discriminated from quieter portions of the program, because the latter are still slightly louder than the hiss. When only hiss is present, the gain will be reduced so much that the hiss becomes inaudible—it is "gated out." This also works well on guitar buzz, and on leakage from other instruments in a multi-microphone recording setup. Gating finds use in many other situations. It can be used to reduce monitor system feedback and muddy leakage from open microphones on a stage, by gating each mic off when it is idle and turning it on instantly when a vocalist sings directly into it. Similarly, in a conference room with several open mics, gating the mics assures that only speech is picked up, not paper-shuffling noises. Gating can also be successfully applied to tightening up excessively reverberant sounds, such as often occur on drum tracks. In this case, the gate closes when the sound decays below the threshold, cutting short the reverb "tail."

Descriptions of Controls



Front Panel

INPUT GAIN: Adjusts level of signal relative to the Compress Threshold. When set to 0 dB, the actual threshold of compression relative to the signal at the LC-6's input will be as the threshold controls are calibrated. Increasing the Input Gain (while leaving other controls alone) will result in a louder, more compressed output.

GATE THRESHOLD: Sets the point below which gating occurs. Signals that are below the gate threshold cause 35 dB of gain reduction. Turning this control clockwise results in more gating, because signals will be, on average, farther and more often below the gate threshold. Turn it fully counterclockwise to eliminate gating. *The Gate Threshold is unaffected by the setting of the Input Gain control.*

ATTACK: Controls how fast the LC-6's Compress section responds to increases in signal level. Turning this control clockwise slows down the reaction to signals that exceed the compress threshold.

RELEASE: Controls how fast the LC-6's Compress section responds to decreases in signal level. When this control is fully clockwise, the gain will return to normal very slowly after a signal that had been high enough to trigger gain reduction falls below the compress threshold.

RATIO: Sets the "strength" of the compression effect. At the 3:1 setting, a 3 dB increase in a signal above threshold will cause only a 1 dB increase at the output. At full clockwise, the output level will not increase regardless of increases at the input. This makes it function as a hard limiter. (Note: To avoid distortion, the input signal still must not be allowed to exceed the LC-6's maximum input level of +18 dBV or +23 dBV balanced). Turning the Ratio control counterclockwise reduces the compression effect.

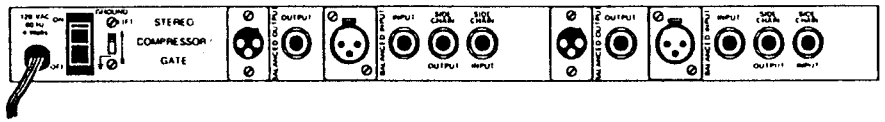
COMPRESS THRESHOLD: Signals that are above the level established with this control

cause gain reduction (provided they stay above it for at least the duration of the selected attack time). Turning this control counterclockwise (lowering the threshold) results in a quieter, more compressed output, since signals will, on average, be farther and more often above the threshold. Turning it fully clockwise, so that the threshold is set at +20 dBV, effectively eliminates any compression.

OUTPUT GAIN: Controls an amplification stage in the LC-6 which may be used to restore any signal level gained or lost through processing. The level selected with this control affects only the LC-6's output and any equipment connected to it.

NORMAL/LINKED SWITCH: If both channels of the LC-6 are to be used together for stereo, the Linked position (button in) should be selected. In this way, when gain reduction is triggered in one channel, the same amount of gain reduction will also be applied to the other channel, thereby preserving the original balance and stereo image. In Linked position, the settings of the Attack, Release, Ratio, and Threshold controls of channel 1 govern *both* channels. However, the Input and Output Gain controls of channel 2 are still functional. Therefore, for maximum symmetry between the two channels, be sure that the settings of channel 2's Input and Output Gain controls match those of channel 1's. When the switch is in Normal position (button out), both channels are completely independent and isolated.

GAIN REDUCTION METER: Two vertical columns of five LED's each, one for each channel, indicate the amount of gain reduction taking place at any instant in 5 dB steps. The first LED lights at just 1 dB of compression—indicating the slightest amount of processing.



Rear Panel

ON-OFF SWITCH: This switch turns the LC-6 on and off. For convenience, it is recommended that the LC-6 and any other rack-mount equipment be powered through a switchable outlet box, such as the Furman Sound PL-8 Power Conditioner and Light Module. The PL-8 provides an easy way to power up the whole rack with one front-panel switch, and provides discreet illumination on dark stages and studios as well. If you do use a switchable outlet box, leave the LC-6's on-off switch in the On position at all times.

GROUND LIFT SWITCH: In many installations, hum-causing ground loops are formed by the common connection of various pieces of equipment to the power line ground, and by contact between chassis, as in a rack with metal rails. Sliding the Ground Lift switch up completely isolates all signal grounds from the chassis, breaking any ground loops. The chassis always remains connected to the ground pin on the AC cord for safety and to provide shielding against RF interference. Try both positions of the Ground Lift switch, and leave the switch in the position that results in the least hum in your system. *Note:* The ground lift can be rendered ineffective by 3 pin audio connectors that tie pin 1 (signal ground) to the metal shell of the connector (chassis ground). The connection from pin 1 to the shell is optional on all 3 pin connectors, and can be removed if present, by opening up the connector on the cable and disconnecting it.

INPUTS AND OUTPUTS: The LC-6 is designed to process medium to high level audio signals in the -30 to +4 dBV range. Some low level sources, such as low impedance microphones, may have to be preamplified before they have sufficient level to drive an LC-6 channel. High impedance mics and most instrument pickups can usually drive the LC-6 directly.

BALANCED OPTION: If the balanced option has been installed (Model LC-6B), XLR connectors will be present on each channel for both inputs and outputs. Balanced lines offer the benefits of cancellation of hum, noise, and RF interference which may be picked up in the interconnecting cables. For balanced connections, shielded twisted pair cable must be used. The wiring is as follows: Pin 1—shield; Pin 2—signal positive; and Pin 3—signal negative. If desired, the XLR (balanced) and phone (unbalanced) outputs may all be used simultaneously. However, only one of the two inputs should be used. *Caution:* Do not connect an unbalanced line to the Balanced Output connector. If an unbalanced line is used in the output circuit, connect it to the phone jack output only. Use of XLR-to-phone adaptors with the LC-6 is not recommended.

SIDE CHAIN INPUT AND OUTPUT: An equalizer or filter may be inserted here to allow for frequency-selective triggering of gain reduction. (See section on Side Chain function for more details.) Connect the Side Chain output to the equalizer's input, and connect the Side Chain input to the equalizer's output.

Side Chain Function

Sometimes the objectionably loud peaks that require limiting are all in one range of frequencies. For example, problems often occur with the sibilant sounds of speech (consonants S, T, C, G, H, J, K, and X) which contain much energy above 4 KHz. The Side Chain feature may be employed to produce compression or limiting in just one frequency range, leaving sounds in other ranges unchanged. To selectively compress just the 4 to 20 KHz sibilance range (sometimes known as "de-essing"), patch an equalizer or filter into the Side Chain jacks (see Description of Controls above for exact connections). Adjust the equalizer so that it only passes sounds in the desired range, in this case, 4 to 20 KHz, and cuts everything outside that range. This will have the effect of only allowing sibilance frequencies to trigger gain reduction. Peaks at frequencies below 4 KHz are not limited or compressed, regardless of whether they exceed the threshold. For most effective de-essing, set the Attack and Release times very short, and the Ratio control to LIMIT.

Note that the Gate function is not affected by the use of the Side Chain. Gating is always based on the full frequency range of the signal appearing at the LC-6's input.

Ducking

One very special capability of the LC-6 is the use of the Side Chain *Input* alone, to control the gain of program material which may be completely unrelated to the controlling signal. For example, suppose you wish to use a background music tape to accompany a live vocal narrative for a slide show. Feed the narrator's voice into the Side Chain input while the LC-6 is adjusted for compression and is processing the music track. The result will be a music track whose volume is decreased just at those times when the narrator is speaking. This process is called "ducking" the background under the voice-over. Use the Ratio and Compress Threshold to control the amount that the background is reduced.

Installation

The LC-6 is intended for mounting in standard 19" equipment racks. Standard racks

come equipped with mounting rails with holes tapped for 10-32 machine screws. Be sure to use only 10-32 screws (in particular, avoid 10-24 screws, which will fit if forced but will strip the threads). To avoid marring the panel when tightening the screws, use nylon washers under the screw heads.

For best results, all cables plugged into the LC-6 should be shielded. Balanced connections should use shielded, twisted-pair cable. If the LC-6 is not permanently installed in a system, but is available to be used when and where needed (this is usually the case in recording studio applications), it may be most convenient to wire the system with a Patch Bay such as the Furman PB-40 series. Then, each LC-6 channel can be easily patched into the track that needs it. Each LC-6 input/output pair should be connected to a vertical pair of jacks on the patch bay. The "normal" jumper on that patch bay circuit board should be cut, so that the LC-6 input and output are not connected together when it is not in use.

Circuit Description

CAUTION! This section is intended to assist the professional user with considerable experience in electronics to achieve a better understanding of the LC-6's operation. Under no circumstances should persons without electronics troubleshooting experience and training undertake repairs on their own. There are no user serviceable parts inside the LC-6. All problems should be referred to the Factory or to other qualified service personnel.

The LC-6 has six sections: input, voltage controlled amplifier (VCA), output, detector/control, gate, and power supply.

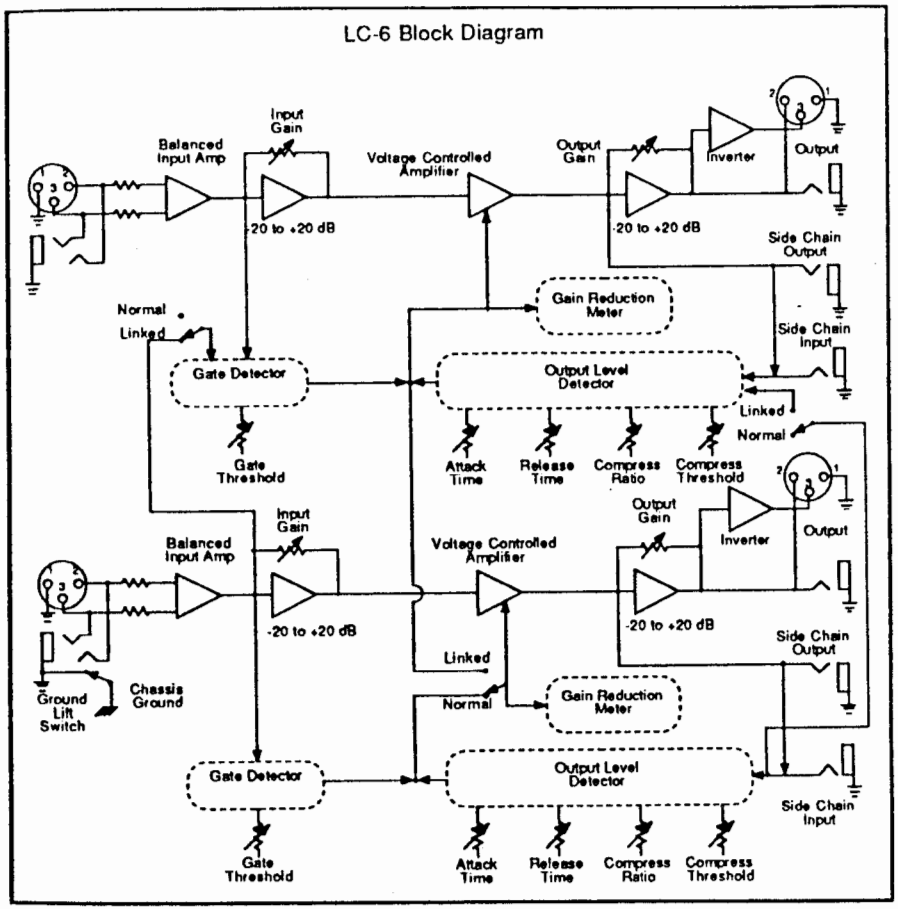
Referring to the schematic diagram, for Channel 1, op-amp 101B is the input buffer. It is a differential amplifier which uses the tight matching of precision resistors to achieve high common-mode rejection. The 1/4" input is a balanced tip-ring-sleeve configuration. Unbalanced inputs may be used, and will automatically ground the ring connection. Optional balanced 3-pin connectors are wired in parallel with the 1/4" jack.

The gain of op-amp 101A is variable from -20 dB to +20 dB by means of the Input Gain control. This method of level adjustment assures minimum noise in the LC-6. The gain stage feeds the VCA. The VCA consists of an FET (Q112) that acts as a variable resistor that attenuates the signal when it is turned on. The signal is reduced in amplitude by voltage divider resistors R108 and R109 before the FET to prevent distortion. Normal signal level at the FET is about 10 mVrms. Q101 and IC 102B are an extremely low-noise preamp to re-amplify the signal to normal levels. The noise voltage at the output of IC 102B is approximately 20 µVrms (bandwidth 20 Hz to 20 KHz), or -94 dBV.

The DC control voltage applied to the gate of the 2N7000 FET is generated by the gate and output level detector circuits. The control voltage sent to the 2N7000 varies from about 1.8 V (no compression) to 3.6 V (20 dB compression). These figures will vary from FET to FET. If the 2N7000 needs to be replaced, contact the Furman Sound factory for instructions on recalibration.

Gating is controlled by comparing the signal level at the output of the input buffer to an adjustable reference voltage. If the input is less than the reference, Q113 is turned off, and the "GATE" voltage goes to zero. Larger inputs turn on Q113, and the GATE voltage rises to 1.8 volts.

Compression is controlled by comparing the output of IC 102B to "VB". The amount of signal from IC 102B sent to the comparator IC 105B is adjusted by the Compress Threshold control, R136. Turning R136 clockwise reduces the gain of IC 105B, and allows the output



to go higher before compression is triggered. The output of IC 105B is integrated by IC 107A, with time constants set by R145 and R146. IC 106A disables the release until the signal drops below the threshold. The output of IC 107A is sent to the bar graph meter, and inverted by IC 107B before it is applied to the gate of Q112 to control the gain.

Channel 2 is identical to Channel 1, except that parts are labeled 2XX instead of 1XX. The power supply is a full-wave bridge, regulated to ±15 volts by three-terminal regulators IC1 and IC2.

Service Hints: Most failures will be op-amps. All op-amps are type TL072 and are socketed for easy replacement. The TL072's can be replaced by RC4558, MC4558, LF353, or NE5532, with the exception of IC's 107 and 207, which must be only a TL072 or LF353. Exact replacement of the 2N4401, 2N4403, and 2N7000 transistors is recommended to avoid degrading the performance.

Limited Warranty

The Furman Sound Model LC-6 is warranted against failures due to defective parts or faulty workmanship for a period of one year after delivery to the original owner. During this

period, Furman Sound will make any necessary repairs without charge for parts or labor. However, shipping charges to and from the factory or repair station shall be borne by the owner. This warranty applies only to the original owner and is not transferable. Also, it does not apply to repairs done other than by the Furman Sound factory or Authorized Repair Stations.

This warranty shall be cancellable by Furman Sound at its sole discretion if the LC-6 has been subjected to physical abuse, or has been modified in any way without written authorization from Furman Sound. Furman Sound's liability under this warranty is limited to repair or replacement of the defective unit.

Furman Sound will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

When returning any equipment for repair, please be sure that it is adequately cushioned against damage in shipment, that it is insured, and that a note is enclosed giving your name, address, phone number, and a description of the problem.

Other Furman Sound Products

PQ-3	Parametric Equalizer/Preamp
PQ-6	Stereo Parametric Equalizer/Preamp
SG-10	Sweep Graphic Equalizer
GC-15	Stereo 15-Band Graphic Equalizer
GC-31	31-Band Graphic Equalizer
TX-3A	Tunable Crossover
TX-324	Stereo 2-Way/Mono 3-Way 24 dB/Octave Crossover
TX-424	Stereo 3-Way/Mono 4,5-Way 24 dB/Octave Crossover
TX-524	Stereo 4-Way 24 dB/Octave Crossover
LC-3A	Compressor/Limiter
LC-6	Stereo Compressor/Gate
LC-X	Expander/Compressor/Limiter
QN-4A	Quad Noise Gate
MM-4A	4 x 1 Rack-Mount Mixer
MM-8A	4 x 2 Rack-Mount Mixer
RV-3	Digital Reverberation System
PB-40	Patch Bay
PL-8	Power Conditioner & Light Module
PL-PLUS	Enhanced Power Conditioner & Light Module
VU-40	Stereo System Monitor
SC-1, 2	Security Covers

About Furman Sound

Furman Sound, Inc. was founded in 1974 by Jim Furman. After many years of experience as a recording engineer, he concluded that high quality signal processing equipment need not be confined to recording studios and commercial sound installations. He set out to

design a line of products that would bring the benefits of studio sophistication to a wider group that would include not only the purely professional sound contracting, recording, and broadcast industries, but also musicians, disco operators, and even home recording enthusiasts. At the time, turning a musician loose with a tool as powerful as a parametric equalizer was considered a novel, even a risky idea. Yet as technology progressed, musicians mastered that and much more. Today, musical creativity demands familiarity with high-tech tools. High-tech has become commonplace. In the interim, Furman has earned a well-respected position in the professional audio industry through its commitment to building high performance, high reliability, cost-effective pro sound equipment.

Furman Sound's original location was in San Francisco, California. In 1977 the firm moved to much larger quarters across the Golden Gate Bridge in suburban San Rafael. At present it is located a short distance away in Greenbrae. The very first product was the PQ-3 Parametric Equalizer, originally produced with a green front panel.

LC-6 SPECIFICATIONS

INPUTS	Standard:	Input Impedance: 20K ohms. Maximum input level: +18 dBV. Connectors: 1/4" phone.
	Balanced:	Input Impedance: 20K ohms. Maximum input level: +23 dBV. Connectors: Both XLR and 1/4" phone.
OUTPUTS	Standard:	Output Impedance: Less than 100 ohms. Maximum output level: +18 dBV into minumum recommended terminating load of 2.5K ohms. Connectors: 1/4" phone.
	Balanced:	Output Impedance: Less than 200 ohms. Maximum output level: +23 dBV into minimum recommended terminating load of 2.5K ohms. Connectors: Both XLR and 1/4"phone.
GENERAL	Freq. Response:	±0.5 dB from 20 Hz to 20 KHz.
	Noise:	-92 dBV, unweighted, 20 Hz to 20 KHz, no limiting.
	Distortion:	Less than .008% THD, 20 Hz to 20KHz, no limiting; less than .1% with limiting.
	Compress Sect.:	Attack time: 100 µSec to 1 Sec. Release time: .05 Sec to 5 Sec. Threshold (input gain at unity): -20 dBV to +20 dBV. Threshold (input gain at +20 dB): -40 dBV to 0 dBV. Ratio: 1.4:1 to full limit (>50:1).
	Gate Section:	Attack time: less than 1 mSec (fixed). Release time: 250 mSec (fixed). Attenuation: Greater than 30 dB. Threshold: -70 to +20 dB, independent of input gain.
	Output Gain:	-20 to +20 dB
	Gain Red. Meter:	1 to 20 dB (-1, -5, -10, -15, -20 dB)
NOTES		0 dBV equals 1 Vrms. Outputs can be connected to less than the indicated minimum load without damage or excessive distortion, but maximum output levels will be reduced.

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