

Logitek



# ULTRA-VU

## LED BARGRAPH AUDIO METER

Operation & Service Manual

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# Ultra-VU LED Meter OPERATION & SERVICE MANUAL TABLE OF CONTENTS

## SECTION 1— GENERAL INFORMATION

1-1	General Description	3
1-2	Electrical Specifications	3
1-3	Standards	3
1-4	Instrument Identification	3
1-5	Where to Find Help	3

## SECTION 2 — PREPARATION FOR USE

2-1	Initial Inspection	4
2-2	Claims	4
2-3	Repacking for Shipment	4
2-4	Installation	4
2-5	Connecting Mains Power	4
2-6	Input Selection on Dual Input Models	4
2-7	Connecting Digital Input Models	4
2-8	Connecting Analog Input Models	5
2-9	Rear Panel Programming Switches	5

## SECTION 3 — OPERATING INSTRUCTIONS

3-1	Bargraph Description	6
3-2	VU Display	6
3-3	PPM Display	6
3-4	Peak Hold Display	6
3-5	LOUD — Loudness Filter	6
3-6	I-S — Image/Sum Display	6
3-7	FINE — High Resolution Mode	7
3-8	Auxiliary Data Display	7
3-9	Changing Display Brightness	7
3-10	CLIP indicator set point	7
3-11	Resetting the Program	7

## SECTION 4 — MAINTENANCE

4-1	General Information	8
4-2	Fuse	8
4-3	Handling of CMOS Integrated Circuits	8
4-4	Access to Circuit Cards	8
4-5	Power Supply LG-253	8
4-6	Analog Input Control Card LG-266	8
4-7	Digital/Dual Input Control Card LG-265	9
4-8	Display Assembly LG-267	10
4-9	ADC Input Card LG-264	10

## SECTION 5 — REPLACEMENT PARTS LIST

5-1	Power Supply	11
5-2	Analog Input Control Card	11
5-3	Digital/Dual Input Control Card	12
5-4	Display Assembly	13
5-5	ADC Input Card	14

## SECTION 6 — MANUFACTURERS LIST

## SECTION 7 — DIAGRAMS

7-1	Power Supply	17
7-2	Analog Input Control Card	19
7-3	Dual Input Control Card	21
7-4	Display Assembly	23
7-5	ADC Input Card	27

## SECTION 8 — QUICK REFERENCE GUIDE

# SECTION 1— GENERAL INFORMATION

## 1-1 General Description

The Logitek Ultra-VU is a bargraph type audio meter featuring two tricolor LED bargraphs with clip indicators. Two function buttons and several auxiliary data indicators are also included on the front panel.

## 1-2 Electrical Specifications

**Bargraphs per meter:** Two

**Indicators per bargraph:** 63

**Normal Range:** -70 dB to 0 dB plus clip - digital  
-50 dB to + 20 dB plus clip - analog

**Fine Range:** .2 dB per segment around ref pt.

**Reference Point:** -10,-12,-14,-16,-18 or -20 dB

**Peak Markers:**  
8,9,10,12,14,16,18 dB above ref pt

### Ballistics:

VU Mode 300 mS/20dB attack & release  
PPM Mode 0 mS attack, 2.8S/24dB release  
Peak Hold 0 mS attack, 2 or 5 Second hold  
Max Hold 0 mS attack, pushbutton release  
Image/Phase 4 Sec hold on max image

**Clip Indicator:** trigger on 1 or 4 consecutive clipped samples

### Frequency Response:

Normal +/- .1 dB 20 Hz - 20 KHz  
Loudness Filter 58 dB SPL auditory curve  
-40 dB 20 Hz, 0 dB 1250 Hz, -50 dB 20 KHz

**Brightness control:** 8 levels

### Analog Input:

Sensitivity -10 to +20 dBu for full scale rear panel adjustable  
Overload Level +24 dBu  
Impedance 40 Kohm balanced  
Connector 3-pin XLR

### Digital Input:

Formats AES/EBU or S/PDIF  
Impedance 110 Ohm (XLR)  
75 Ohm (coax adapter)  
Pass-through 2200 Ohm (XLR)  
Termination transformer balanced

### AC Line Input Voltage:

50-60 Hz 105-129 VAC or  
(switch settable) 220-240 VAC

### Power Requirement:

UV1-(all), UDT-(all) 10 Watts  
UV2-(all) 20 Watts

### Dimensions:

1RU enclosure 19" W x 7" D x 1 $\frac{3}{4}$ " H  
Desk top enclosure 8 $\frac{1}{4}$ " W x 9" D x 2 $\frac{1}{4}$ " H

## 1-3 Standards

The Ultra-VU meters are designed to conform to the ballistic standards described in IEEE document G.2.1.2/13, IEC document 268 and EBU document 3205-E. This ensures that the bargraph motion will closely track other standard mechanical and electronic meters.

The one exception to these standards is the PPM attack time. The Ultra-VU uses a true peak measurement scheme that always displays the highest peak of the input signal. The PPM standard specifies a short averaging period for peak signals that keeps sounds with durations too short to be heard well from being displayed, no matter how loud they are. The delay also allows mechanical meters to keep up with fast changing inputs. Under most circumstances there is no noticeable difference between true peak and PPM peak readings. However, if you do need the Ultra-VU to conform to the PPM peak standard then please contact the Logitek factory for further information.

## 1-4 Instrument Identification

The Ultra-VU is identified by a model number and a three or four digit serial number. The model number and serial number appear on a label on the back of the unit near the power cord. All correspondence to your Logitek dealer or to the Logitek factory should refer to the model number and serial number.

## 1-5 Where to Find Help

Logitek customer service personnel are available to help with any questions, comments or problems you might have with the Ultra-VU meter, both during and after the warranty period. Our hours of operation are 8AM to 5PM central time. We may be contacted in one of the following ways.

**By Phone:** 877-231-5870 (USA & Canada)  
or 713-664-4470

**By Fax:** 713-664-4479

**By Email:** help@logitekaudio.com

**By Mail:** Logitek Electronic Systems, Inc.  
5622 Edgemoor Drive  
Houston, Texas 77081  
USA

## SECTION 2 — PREPARATION FOR USE

### 2-1 Initial Inspection

Check the shipping carton carefully for external damage. If the carton shows evidence of abuse, ask the carrier's agent to be present when the unit is unpacked. Carefully unpack the unit to avoid damaging the equipment through the use of careless procedures. Inspect all equipment for damages immediately after unpacking. Bent and broken parts, dents and scratches should be noted. If damage is found, refer to paragraph 2-2 for recommended claim procedures. Keep all packing material for possible future use.

### 2-2 Claims

If the unit has been damaged, notify the carrier immediately. File a claim with the carrier and advise Logitek of such action to arrange for repair or replacement without waiting for a claim to be settled with the carrier.

### 2-3 Repacking for Shipment

If the unit must be returned to Logitek, attach a letter to it showing the owner's name and address. A description of necessary service should be included in the letter. The original shipping carton and packaging materials should be used for reshipment if possible. Use FRAGILE labels on each surface. Return the unit freight prepaid. Be sure to insure the unit for its full value. The unit will be repaired promptly and returned freight prepaid.

### 2-4 Installation

#### Rackmount Enclosure

The Ultra-VU rackmount models are designed to be mounted in a standard 19" equipment rack by using the four mounting holes in the corners of the front panel. Plastic washers should be used to keep the mounting screw from marring the front panel finish.

#### Desktop Enclosure

The Ultra-VU desktop enclosure is designed to sit on any flat surface. The front of the meter may be angled up for easier viewing by raising the bale located on the bottom of the box.

While flow through ventilation is not necessary, the units should not be mounted directly above equipment which produces significant heat, such as equipment using vacuum tubes. The unit should never be operated if the ambient temperature is above 55 degrees C (131 degrees F).

### 2-5 Connecting Mains Power

Connect the meter to the power mains with the enclosed power cord. The unit is factory set for 115VAC

operation unless specifically labeled otherwise, but 230VAC operation can be selected via a slide switch located next to the power transformer inside the unit. To gain access to the voltage select switch, remove the enclosure top cover. The switch is located adjacent to the large power transformer.

### 2-6 Input Selection on Dual Input Models

If the digital receiver can lock onto an input signal then the meter will display that signal whether it contains errors or not. If no signal is connected to the digital input or the data rate is out of the receiver's capture range, then the meter will display the analog signal. This happens even if nothing is connected to the analog inputs. The Ultra-VU can be forced to display only one input by connecting a remote switch to the unit. Consult the factory for details.

### 2-7 Connecting Digital Input Models

The Ultra-VU accepts AES/EBU or S/PDIF serial data at sample rates of 30,000 to 50,000 samples per second via a female XLR connector on the rear panel. The input is also wired directly to the male XLR connector on the back panel for use in loop-through mode. The loop-through connector provides a convenient way to daisy-chain several pieces of equipment off of one digital output. Loop-through works well with AES/EBU signals but should be limited to 10 feet with S/PDIF signals and cables.

S/PDIF signals using RCA type plugs may be connected to the input using an RCA to XLR adapter. Coax cables using BNC connectors can be connected to the input using a BNC to XLR adapter. Both adapters are available from Logitek.

#### AES/EBU Connection

Pin 1	Shield
Pin 2	Signal +
Pin 3	Signal -

It is also important to set the two input load switches located between the two XLR connectors.

#### Input Load Switch Settings

Sw1	Sw2	Ohms	Use
Up	Up	2200	Loop-through mode
Up	Dn	110	balanced twisted pair (XLR)
Dn	Up	75	unbalanced coax (RCA & BNC)
Dn	Dn	44	do NOT use this combination

## 2-8 Connecting Analog Input Models

The Ultra-VU accepts balanced or unbalanced inputs via rear panel XLR connectors on analog input only models or 3-circuit 1/4" phone plugs on dual input models. The connectors are wired as follows:

### Balanced Connection

Pin 1 or Sleeve	Shield
Pin 2 or Tip	Signal +
Pin 3 or Ring	Signal -

### Unbalanced Connection

Pin 1 or Sleeve	Shield
Pin 2 or Tip	Center Hot
Pin 3 or Ring	Connect to pin 1

The Ultra-VU shield pins are bonded directly to the chassis at the connector and do not share any ground paths with the internal circuitry. This allows cable shields to be connected at both ends without causing hum problems.

The zero reference level for each input can be set anywhere between -10 dBu and +20 dBu by adjusting the multiturn gain control located adjacent to each input connector. A small flat blade screwdriver is needed to adjust the gain.

## 2-9 Rear Panel Programming Switches

A block of eight mode setting switches is located on the rear panel of the meter to the right of the input XLR connectors. The switches are numbered 1 through 8 and are set by pushing the white levers up or down with a small screwdriver or pen point.

The bargraph zero reference marker and the reference level of the zoom display is set via switches 6, 7 and 8 as shown.

### Zero Reference Setting

Sw6	Sw7	Sw8	dBs below full scale
Up	Up	Up	-10 dB
Up	Up	Dn	-12 dB
Up	Dn	Up	-14 dB
Up	Dn	Dn	-16 dB
Dn	Up	Up	-18 dB
Dn	Up	Dn	-20 dB
Dn	Dn	Up	-20 dB
Dn	Dn	Dn	-20 dB

A second set of orange markers indicate the desired peak operating level. Switches 3, 4 and 5 set these markers a fixed number of dBs above the zero reference level.

### Peak Marker Setting

Sw3	Sw4	Sw5	Function
Up	Up	Up	+18 dB above reference
Up	Up	Dn	+16 dB above reference
Up	Dn	Up	+14 dB above reference
Up	Dn	Dn	+12 dB above reference
Dn	Up	Up	+10 dB above reference
Dn	Up	Dn	+9 $\frac{1}{3}$ dB above reference
Dn	Dn	Up	+8 dB above reference
Dn	Dn	Dn	Off

Switch 1 turns the peak display on and off. This is a single red dot with a fast attack time and a slow release time. Peak hold is controlled from the front panel and is unaffected by switch 1. Switch 2 sets the dynamics of the peak display. True peak shows the largest single peak. This mode is useful for avoiding digital clipping. PPM mode averages the peak reading over a short period and is comparable to PPM mechanical meters. The green average display is unaffected by switch 2 and is always VU response.

### Bargraph Settings

Sw1	Sw2	Function
Up		Peak display OFF
Dn		Peak display ON
	Up	True peak dynamics
	Dn	PPM dynamics

The programming switches are only checked occasionally, so it may take up to two seconds for switch changes to be reflected in the meter's operation.

## SECTION 3 — OPERATING INSTRUCTIONS

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### 3-1 Bargraph Description

The Ultra-VU display contains two multi-LED bargraph displays mounted one above the other. The top bar shows either left channel (L) or image/phase( $\phi$ ) information. The bottom bar shows either right channel (R) or mono sum (S) information. The bars are marked at the left end to indicate their function. The tricolor LEDs can be green, red or orange depending on their function and cover the range from -70 dBFS to 0 dBFS.

The top LED of each bar is larger and red only. It is used as a clipping indicator and can be set to illuminate on any clipped signal or only after four consecutive clipped samples.

The zero reference point of the meter is indicated by a dim orange marker in the bargraph. The reference mark can be varied between -10 and -20 dBFS via switches on the back panel. An optional peak marker can be set from +8 to +18 dB above the zero reference and is used as a reference indicator for the PPM display.

### 3-2 VU Display

VU is indicated by a solid green bar. VU represents the perceived loudness of the input signal. The motion of the bars conforms to the industry standard 300 mSec per 20 dB rise and fall times. Note that the speed of the bar will appear faster near the top of the meter display because each segment there represents fewer dBs than at the bottom of the meter. The VU display can be turned off by pressing the MODE button at the bottom left corner of the front panel repeatedly until the VU bars disappear.

### 3-3 PPM Display

Peak program meter (PPM) information is shown by a single red segment. PPM represents the highest point of the input signal. The display has a zero rise time and an industry standard 2.8 Sec per 24 dB fall time. The dot will appear to fall faster near the top of the meter range because each segment there represents fewer dBs than at the bottom of the meter. The PPM display is always active unless it is turned off by the programming switches on the back panel.

The VU and PPM displays are calibrated so that they will read the same when connected to sine wave signals. The red PPM dot will be on top of the highest green segment of the VU bar resulting in a bright orange dot. For dynamic signals the difference between the top of the VU bar the PPM dot is approximately the crest factor.

### 3-4 Peak Hold Display

The peak hold display is a single red segment that maintains the highest PPM reading for a user se-

lectable amount of time. If the holding period expires before the PPM dot equals or exceeds the peak hold dot, then the peak hold dot will turn off. It will turn on again when the PPM dot reaches a peak and starts falling again.

Two holding modes are available. Release (Rel) mode holds the peak reading for either 2 or 5 seconds depending on the position of the rear panel program switches. Maximum (Max) mode holds the highest peak reading until it is manually reset by turning the peak hold off and then on again.

Peak hold can be cycled through Off, Rel and Max modes by repeatedly pressing the HOLD button at the lower right corner of the meter front panel.

### 3-5 LOUD — Loudness Filter

The VU display can be compensated to match the frequency response of the human ear by enabling the loudness filter. This will cause the VU bars to more closely represent the actual loudness perceived by the listener and allow better level matching between different kinds of program material.

The loudness filter is calibrated for a listening level of 58 dB SPL. The filter will be less accurate for listening levels above and below this point.

To activate the filter, press the MODE button in the lower left corner of the meter front panel until the "Loud" indicator is lit.

Users of the digital input meters should note that filtering is a function of sample rate. The meter has a separate filter for each of the five sample rates listed on the front panel. If a non listed sample rate is used the loudness filter will be deactivated.

### 3-6 I-S — Image/Sum Display

The image and sum displays are activated by pressing the MODE button in the lower left corner of the meter front panel until the " $\phi$ " indicator is lit.

In this mode, the lower bargraph displays the mono sum of the left and right input channels. The display operates identically to the left and right bargraphs except that the loudness filter is not available.

The upper bargraph shows the stereo image and relative phase information. Three orange markers are located at 90 degrees left, 0 degrees center and 90 degrees right. The scale covers 180 degrees which is the largest relative phase difference two signal can have.

The red dot indicates the current location of the left channel in the stereo sound field and the green dot indicates the current location of the right channel in the stereo sound field. The overall width and location of the stereo image is shown by a second pair of red and

green segments that hold the furthest left and right readings for about four seconds.

If a mono signal is being displayed, then the red and green segments will be at the same location resulting in a dot that looks orange. If the mono signal is off center (such as left channel only), the resulting orange dot will be off to one side of the display.

### 3-7 FINE — High Resolution Mode

Fine is a high resolution mode that expands the meter scale to .2 dB per segment around the 0 VU point. This mode is useful when doing precise alignments using steady state signals. Fine is activated by pressing the MODE button at the bottom left of the meter front panel until the FINE indicator lights..

### 3-8 Auxiliary Data Display

Ultra-VU models with serial digital inputs provide information about the input data format via indicator lights along the bottom of the meter front panel.

EMPH indicates pre-emphasis has been applied to the audio and is recovered from the embedded channel status data. The circle is lit only when emphasis is detected. The indicator is accurate with both AES/EBU and S/PDIF input formats.

PRO indicates whether the data stream is in the professional or consumer format and is recovered from the embedded channel status data. The circle is lit only when the AES/EBU professional format is detected.

SAMPLE RATE is the actual data sample frequency measured by the meter in one second intervals. This function is active even when the received data is invalid.

Sample Rate Data Display

Label	Meaning
32.0	32,000 Hz, +/- .1%
44.0	44,056 Hz, +/- .1%
44.1	44,100 Hz, +/- .1%
47.9	47,952 Hz, +/- .1%
48.0	48,000 Hz, +/- .1%
-none-	no data or non standard rate

### 3-9 Changing Display Brightness

The overall illumination level of the meter can be set to one of eight levels. To change the brightness level, press the MODE button until the BRT indicator lights. Then press the HOLD button until the desired illumination level is achieved.

### 3-10 CLIP indicator set point

The large red clip segment at the top of each bargraph can be set to light on the reception of either one

or four clipped samples in a row. To change the setting press the MODE button until the CLIP indicator along the bottom of the meter lights. A segment in the lower bargraph will start to blink alternately red and green to indicate the current setting. Press the HOLD button until the desired setting is shown on the bargraph.

### 3-11 Resetting the Program

The Ultra-VU contains software that executes on a programmable DSP chip. If the processor memory becomes corrupted, the meter will probably fail to operate. In most cases, an independent watchdog circuit will notice that the meter is working incorrectly and restart the system.

The processor can be reset manually by turning the power off and then back on again.

\*\*\*\*\* **NOTICE** \*\*\*\*\*

Once a day the display will freeze for a second while the meter goes through a reset and the analog to digital converter recalibrates itself.

\*\*\*\*\*



# SECTION 4 — MAINTENANCE

## 4-1 General Information

The Ultra-VU is designed to need a minimum of maintenance for long trouble-free operation. Should repair be necessary, the technician should first read the information in the manual concerning the circuits in question and should follow proper procedures for testing and replacing semiconductors. Logitek engineers are readily available at the factory to provide technical assistance both during and after the warranty period.

\*\*\*\*\* **WARNING** \*\*\*\*\*

The inside of the Ultra-VU contains no controls or user serviceable parts. The cover should only be removed by competent technical personnel capable of servicing this type of equipment. Hazardous voltages exist on the underside of some circuit cards.

\*\*\*\*\*

## 4-2 Fuse

The primary winding of the power transformer is fused with a 1/2 amp slow-blow 20mm fuse housed in a fuse holder in a slide-out drawer under the power cord on the rear panel of the unit. It should only be replaced with fuses of the same type and current rating. The power cord must be unplugged from the rear panel to gain access to the fuse holder.

\*\*\*\*\* **WARNING** \*\*\*\*\*

Do *NOT* replace the fuse without first disconnecting the meter's power cord from the wall socket, as dangerous voltages are present which may cause electrical shock. Always use fuses of the same value and type as specified in this manual. Do *NOT* use fuses of a higher value than those specified, as shock hazard and fire hazard may result.

\*\*\*\*\*

A blown fuse is most often, although not always, a symptom of another failure. Related circuitry should always be carefully examined after any fuse failure, especially if a replacement fuse also blows.

## 4-3 Handling of CMOS Integrated Circuits

All logic components in the Ultra-VU meter are CMOS type integrated circuits. Even though all circuits have built in static discharge protection, special care must be taken in the handling of these devices, particularly in dry environments.

\*\*\*\*\* **IMPORTANT** \*\*\*\*\*

Do *NOT* remove or handle CMOS integrated circuits except in a grounded environment which is free of the risk of static electricity. Store such circuits on conductive foam or in anti-static controllers. Do *NOT* store on styrofoam or other plastic sheets. Improper handling may damage these devices.

\*\*\*\*\*

## 4-4 Access to Circuit Cards

Access to the circuitry of the rackmount and half-rack meters is accomplished by removing the six screws that attach the top cover. The inside of the desktop unit is accessed by removing the four screws along the edges of the bottom panel and pulling apart the two halves of the plastic case.

## 4-5 Power Supply LG-253

Each Ultra-VU contains a ground isolated and filtered step-down power supply to create the necessary operating voltages. This supply is located on a PCB on the right side of the meter enclosure.

Mains AC from the power entry module J2 is fed through fuse F1, located in a drawer under the power cord in J2, to J1 on supply card LG-253. J1 feeds voltage selection switch S1 which connects the dual primaries of transformer T1 in series for 230VAC operation or parallel for 115VAC operation. The dual secondaries of T1 are wired in parallel and loaded with a full-wave bridge rectifier RT1. The DC output of RT1 is filtered by capacitors C1 and C2 and fed to the red and green output pads. The voltage should be between 8 to 10 VDC with less than .5 volt of ripple.

Analog input models will also have a charge pump consisting of IC1 and C3 that feeds filter C4 and the black output pads. The voltage should be -8 to -10 VDC with less than .1 volt of ripple.

Jumpers soldered to the output pads feed power to one or two meter control cards.

\*\*\*\*\* **WARNING** \*\*\*\*\*

Dangerous voltages are present on the bottom of the power supply card. Always disconnect the AC power cord when servicing this circuit board.

\*\*\*\*\*

## 4-6 Analog Input Control Card LG-266

+7 VDC from input connector P4 is connected to voltage regulators IC12 and IC5 as well as display board connector P6. IC12 feeds the digital section of the PCB while IC5 feeds the analog front end. -7 VDC from input connector is connected to voltage regulator IC6 which feeds the analog front end.

On power up, the DSP is kept in reset by IC8 until the power has stabilized, ensuring a good power on reset. IC8 also contains a watchdog timer that will reset the DSP if its ST pin is not taken low at least once every 150 mSec. This pin is normally pulsed low every 5 mSec by the left bargraph load signal.

The DSP (IC11) is clocked by a 12.288 MHz crystal oscillator consisting of Y1, C26, C25 and an internal driver. IC11, Pin 43 is a buffered output of the oscillator.

The first thing the DSP (IC11) does after reset is copy its program from EPROM IC10 to internal RAM memory. The program executes continuously. Note that the 8 bit data bus is connected to the middle byte of the DSP's 24 bit data port.

Address decoder IC9 is used to reset the watchdog timer (IC8) and to connect the rear panel programming switches (S1-S8) to the data bus via resistor pack R20.

Front panel pushbutton switches S11 and S12 are connected to the DSP data port via resistor pack R19.

Serial data is sent synchronously (data, clock, load) to the display driver chips via display connector P6 in 32 bit strings. Data is placed on the top bit of the DSP data port and clocked into the display drivers via a write to address decoder IC9. Other writes to IC9 will load the 32 bit data string into the display drivers via P6. A write to the left bargraph will also be decoded by IC8 and used to reset the watchdog timer.

The audio from the left input XLR connector J1 is connected to a RF lowpass filter formed by R10, R11, C1 and C2. The resistors also form a -9 dB pad with the input impedance of the balanced receiver IC3. IC3 provides an additional -6 dB pad between its input and output. These pads allow +20 dBu input signals to be handled by the +/- 5 volt supply rails. The output of IC3 is unity gain inverted by op-amp IC2a and fed back to the reference input of IC3. This enables IC3 to present an identical resistive load on its two input pins. Input gain is adjusted via trimpot R1 which is the feedback resistor around gain stage IC1a.

**\*\*\*\*\* IMPORTANT \*\*\*\*\***

Only replace IC2 with an op-amp which is slower than the SSM2143 such as the TL072 used here. A faster op-amp like the NE5532 will cause the output of IC3 to oscillate.

**\*\*\*\*\***

Signal from IC1a is fed through antialias filter R15 C4 and DC isolated by C3 before connecting to the left input of the sigma delta analog to digital converter IC7. The right channel connects to the converter via similar circuitry.

The 12.288 MHz master clock input to the ADC is generated by a crystal oscillator located on the DSP chip. Combined left and right audio data is sent synchronously (data, clock, frame sync) to the DSP in 64-bit strings. The DSP reset signal from IC8 is also connected to the ADC. The DSP activates the reset once a day which causes the ADC to perform a self calibration routine for about half a second. If the meter has undergone a substantial temperature change, such as when it is first powered up, it may generate noise up to -70 dBFS until it undergoes a calibration cycle

#### 4-7 Digital/Dual Input Control Card LG-265

Power from input connector P4 is connected to voltage regulators IC2 and IC3 as well as display board connector P6. IC2 is a +5VDC regulator that feeds power to the analog front end of data receiver IC1. The voltage is filtered by C2, C6 and clamped against over voltage and voltage reversal by D1. IC3 is a +5VDC regulator that feeds the digital portion of IC1 and all other circuits on the control board. The output voltage is filtered by C3 and clamped by D2. Distributed power filtering is supplied by C4,7,8,9 & 10.

On power up, the DSP is kept in reset by IC4 until the power has stabilized, ensuring a good power on reset. IC4 also contains a watchdog timer that will reset the DSP if its ST pin is not taken low at least once every 150 mSec. This pin is normally pulsed low every 5 mSec by the left bargraph load signal.

The DSP (IC6) is clocked by a 12.288 MHz crystal oscillator consisting of Y1,C11,C12 and an internal driver. IC6, pin43 is a buffered output of the oscillator.

The first thing the DSP (IC6) does after reset is copy its startup program from EPROM IC5 to internal RAM memory. That program executes once and then loads the main program from EEPROM which executes continuously. Note that the 8 bit data bus is connected to the middle byte of the DSP's 24 bit data port.

The rear panel programming DIP switches S1-S8 are also connected to the DSP's middle data byte via isolation resistors R10 and control that portion of the data bus when neither the DSP nor the EEPROM output is active. The DSP inputs the switch positions via a read to address zero.

Front panel pushbuttons S11,12,13 are connected to the high byte of the DSP 24-bit data port via connector P3 and isolation resistors R9.

Serial data is sent synchronously (data, clock, load) to the display driver chips via the display connector P6 in 32 bit strings. Data is placed on the top bit (bit 23) of the DSP data port and clocked into the display drivers via a write to address decoder IC7. Other writes to IC7 will load the 32 bit data string into the left bargraph, right bargraph or scale/indicator driver groups via P6. A write to the left bargraph will also reset the watchdog timer.

Two channel audio data is fed synchronously (data, clock, frame sync) from digital data receiver IC1 to DSP (IC6) serial port 1.

Encoded audio data enters the meter via XLR connector J1 and is directly connected to the output connector P2. Note that no buffering is applied to the loop through output.

The input data signal is connected to pulse transformer T1 via DC blocking capacitor C5. The output of T1 is loaded by R1, R2, R3 and connected to data receiver IC1. C1 and R4 form a loop filter used by IC1 to recover the embedded clock from the coded input signal. IC1 separates the audio data, channel data and clock from the input data. The audio is sent to the DSP in 64 bit strings via a serial port. Three other signals from IC1 are read once per stereo sample and are connected to the DSP's parallel data port via isolation resistors R9. These are the channel status bit, start of subcode data block flag and receiver error flag. These are input to the DSP via a read to address zero.

Connector P5 attaches to the DSP's other serial port and allows analog data to be sent to the DSP via an external ADC card. The connector also provides power and the master processor clock for use by the ADC card.

If the digital receiver IC1 can lock onto an input signal then the DSP will display that signal whether it contains errors or not. If no signal is connected to J1 or the data rate is out of the receiver's capture range, then the DSP will display the data from P5. This happens even if nothing is connected to the analog inputs or the ADC card is absent.

#### 4-8 Display Assembly LG-267

Filtered power is connected to the driver card via P1. +5VDC regulator IC6 is bolted to the meter enclosure to increase heat dissipation and connects to the driver card via P2. C4 provides bulk power storage while C1, C2, C3 and C5 through C8 stabilize the 5 volt supply.

Each display driver IC controls 64 LEDs by scanning them in an eight by eight matrix. Segment lines are current controlled and connect to the LED anodes. Digit lines connect to the LED cathodes. Scanning is accomplished by taking each digit line low one at a time and sourcing current from the segment lines for whichever of the 8 LEDs in a digit group need to be lit. The driver chips can also selectively decode BCD data into 7-segment numeric display signals. Maximum LED brightness is set by the external resistors. The drivers further control brightness by pulse-width modulating the LED on times with a value supplied by the DSP.

The display drivers accept synchronous serial data (clock, data, load) in 16 bit strings composed of an address byte and a data byte. The driver ICs are arranged in two chip groups. The data out of one chip is hooked to the data in of the second chip such that 4 bytes can be loaded, two to each chip, with one load pulse.

IC1 and IC2 drive the upper bargraph (left channel). IC3 and IC4 drive the lower bargraph (right channel). IC5 drives the scale indicator LEDs along the bottom edge of the display.

Avoid removing all three LED alignment plates if at all possible. There is very little space around the indicator LEDs and, if any get bent, it can take some time to reassemble the alignment plate. If a LED needs replacing, pry it out of its socket with a screwdriver and remove it. Remember to consult the component diagram for the correct orientation before installing a new LED. Also note that the tricolor LEDs are graded according to color and brightness. A sticker on the back of the PCB denotes the correct lot number needed for reordering.

#### 4-9 ADC Input Card LG-264

The audio from the left input 1/4" phone connector J2 is connected to a RF lowpass filter formed by R10, R11, C3 and C4. The resistors also form a -9 dB pad with the input impedance of the balanced receiver IC4. IC4 provides an additional -6 dB pad between its input and output. These pads allow +20 dBu input signals to be handled by the +/- 5 volt supply rails. The output of IC4 is unity gain inverted by op-amp IC2b and fed back to the reference input of IC4. This enables IC4 to present an identical resistive load on its two input pins. Input gain is adjusted via trimpot R9 which is the feedback resistor around gain stage IC1b.

#### \*\*\*\*\* IMPORTANT \*\*\*\*\*

Only replace IC2 with an op-amp which is slower than the SSM2143 such as the TL072 used here. A faster op-amp like the NE5532 will cause the output of IC4 to oscillate.

#### \*\*\*\*\*

Signal from IC1b is fed through antialias filter R14 C8 and DC isolated by C11 before connecting to the left input of the sigma delta analog to digital converter IC7. The right channel connects to the converter via similar circuitry.

The 12.288 MHz master clock input to the ADC is generated by a crystal oscillator located on the DSP control card. Combined left and right audio data is sent synchronously (data, clock, frame sync) to the DSP in 64-bit strings via connector P3. The reset signal from the DSP control card is also connected to the ADC. The DSP activates the reset once a day which causes the ADC to perform a self calibration routine for about half a second. If the meter has undergone a substantial temperature change, it may generate noise up to -70 dBFS until it undergoes a calibration cycle

The three supply voltages from P3 are EMI isolated by ferrite beads FR1, FR2 and FR3 before connecting to the other circuitry. IC5 and IC6 supply low noise regulated +/- 5 VDC to the analog portions of the circuit. The digital part of the data converter gets its +5 VDC from the DSP control card.

## SECTION 5 — REPLACEMENT PARTS LIST

All replacement parts are stocked in depth at the Logitek factory. Most are also available through local electronic parts distributors. For your convenience in purchasing replacement parts locally, we include the following parts list.

All Logitek part numbers consist of a two-letter manufacturer code followed by that manufacturer's standard part number for the item. A list of manufacturers, arranged alphabetically by manufacturer code, follows this parts list in Section 7.

All resistors are 1/4 watt, +/- 5% tolerance unless otherwise noted.

SYMBOL	DESCRIPTION	LOGITEK PART NUMBER
<b>5-1 Power Supply</b>		
<b>Capacitors</b>		
C1	6800 uf/25V electrolytic	IL-688LBA025M2CD
C2	.1uf/50V ceramic disc	NC-.100MF50ME2
C3,4	100uf/25V electrolytic	NI-UFS1E101MPJ
<b>Integrated Circuits</b>		
IC1	Charge pump	TI-LT1054CN
1 pc.	8-pin dip socket	EM-100-083-10-1003
<b>Rectifiers</b>		
RT1	6A pc mount/240V	GI-GBPC-602
<b>Fuses</b>		
F1	1/2 amp slow blow 20mm	LF-218.500
<b>Connectors</b>		
P1	3-pin large header - locking	PN-MLSS156-3A
J1	3-pin large socket	PN-CE156F20-3A
J2	Power entry module/fuse holder	SR-6200.4115
<b>Switches</b>		
S1	Slide DPDT	CK-L202-121MS02QE
<b>Transformers</b>		
T1	8V, 3A international rating	SI-IF-24-16
1 pc.	Super-VU Supply circuit card	LG-253B
1 pc.	Power card (North America)	BE-17251
<b>5-2 Analog Input Control Card</b>		
<b>Capacitors</b>		
C1,2	75pf/1000V ceramic	CE-DD750
C3	1uf/35V tantalum	AV-TAP105K035HSB
C4	2200pf/50V NPO ceramic SMD	NC-NMC1206NPO222K50TR
C5	4.7uf/25V tantalum	AV-TAP475K025CCS
C6	.1uf/50V ceramic SMD	NC-NMC1206Z5U104M50T
C8	.01uf/50V ceramic SMD	AV-12065E103MATMA
C9,10	470pf/50V NPO ceramic SMD	AV-12061A471JATMA
C11	2200pf//50V NPO ceramic SMD	NC-NMC1206NPO222K50TR
C12	1uf/35V tantalum	AV-TAP105K035HSB
C13,14	75pf/1000V ceramic	CE-DD750
C15,16	470pf/50V NPO ceramic SMD	AV-12061A471JATMA
C17	.1uf/50V ceramic SMD	NC-NMC1206Z5U104M50T
C18-20	4.7uf/25V tantalum	AV-TAP475K025CCS
C21	.1uf/50V ceramic SMD	NC-NMC1206Z5U104M50T
C22	.01uf/50V ceramic SMD	AV-12065E103MATMA
C23	1uf/35V tantalum	AV-TAP105K035HSB
C24	10uf/25V tantalum	AV-TAP106K025HSB

<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>LOGITEK PART NUMBER</b>
C25	15pf/1000V ceramic	CE-DD-150
C26	25pf/1000V ceramic	CE-DD-250
C27-29	.1uf/50V ceramic	CE-UK50-104
C30	10uf/25V tantalum	AV-TAP106K025HSB
<b>Diodes</b>		
D1	5.4V zener	GI-1N4734A
<b>Ferrites</b>		
FR1-7	600 ohm @ 100Mhz	MU-BLM31A601SPB
<b>Integrated Circuits</b>		
IC1,2	Dual bi-fet op amp	TI-TLO72CP
IC3,4	Balanced receiver -6dB	AD-SSM2143P
IC5	-5 VDC regulator/100mA	MO-MC79L05ACP
IC6	+5VDC regulator/100 mA	MO-MC78L05ACP
IC7	16 bit ADC	AD-AD1877JR
IC8	Watchdog timer/uP reset	MM-MAX1232CPA
IC9	3 to 8 decoder	MO-SN74HC138AD
IC10	PROM 128K 120ns	MC-27C128-12/L
IC11	16 bit DSP	AD-ADSP-2105KP40
IC12	+5VDC regulator/1.5A	MO-MC7805CT
5 pcs.	8-pin dip socket	EM-100-083-10-1003
1 pc.	32-pin PLCC socket	EM-150-032-11-02
1 pc.	68-pin PLCC socket	EM-150-068-11-02
<b>Connectors</b>		
J1,2	Female XLR	NT-NC3FK-H
J3	3-pin socket	PN-CE100F28-3A
J4	3-pin large socket	PN-CE156F20-3A
J6,7	10-pin dual row socket	PN-050-010-455
P3	3-pin header	PN-MFSS100-3A
P4	3-pin large header	PN-MFSS156-3A
P5,6	10-pin dual row header	PN-051-010-153
<b>Resistors</b>		
R1,2	50K trimpot multiturn	MP-CT9X503
R3-5	4220, 1%	
R6,7	100K	
R8,9	100K 2% 5 position bussed	CT-770-61-R104
R10,11	21K, .1%	DL-RNC55H2102BS
R12-14	4220, 1%	
R15,16	300	
R17,18	21K, .1%	DL-RNC55H2102BS
R19,20	20K 8 position isolated SMD	DL-SOMC1603203G
R21,22	10K	
<b>Switches</b>		
S(1-8)	Dip switch block	CT-194-8MST
<b>Crystals</b>		
Y1	12.288 Mhz	CT-MP122
1 pc.	Circuit Card	LG-266 (Analog Control)
<b>5-3 Digital/Dual Input Control Card</b>		
<b>Capacitors</b>		
C1	.047uf/1000V ceramic	CE-CW-20C473K
C2-4	10uf/25V tantalum	AV-TAP106K025HSB
C5-10	.1 uf/50V SMD	NC-NMC1206Z5U104M50T
C11	25pf/1000V ceramic	CE-DD-250
C12	15pf/1000V ceramic	CE-DD-150

SYMBOL	DESCRIPTION	LOGITEK PART NUMBER
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	<b>Diodes</b>	
D1,2	5.4V zener	GI-1N4734A
	<b>Integrated Circuits</b>	
IC1	AES/EBU receiver without uP port	CS-CS8412-CS
IC2	+5VDC regulator/100 mA	MO-MC78L05ACP
IC3	+5VDC regulator/1.5A	MO-MC7805CT
IC4	Watchdog timer/uP reset	MM-MAX1232CPA
IC5	PROM 128K 120ns	MC-27C128-12/L
IC6	DSP 16 bit 2K/1K	AD-ADSP-2101KP40
IC7	3 to 8 decoder SMD	MO-MC74HC138D
1 pc.	8-pin dip socket	EM-100-083-10-1003
1 pc.	32-pin PLCC socket	EM-150-032-11-02
1 pc.	68-pin PLCC socket	EM-150-068-11-02

	<b>Connectors</b>	
J1	3-pin large socket	PN-CE156F20-3A
J3	3-pin socket (2 pcs.)	PN-CE100F28-3A
J5-7	10-pin dual row socket	PN-050-010-455
J1	Female XLR	NT-NC3FK-H
P2	Male XLR	NT-NC3MK-H
P3	6-pin header	PN-MFSS100-6A
P4	3-pin large header locking	PN-MFLS156-3A
P5-7	10-pin dual row header	PN-051-010-153

	<b>Crystal</b>	
Y1	12.288 Mhz crystal	CT-MP122

	<b>Resistors</b>	
R1	2200	
R2	110	
R3	75	
R4	1000	
R5,6	100K	
R7,8	100K 2% 5 position bussed	CT-770-61-R104
R9,10	20K 8 position isolated SMD	CT-767163203G
R11,12	10K	

	<b>Switches</b>	
S(1-8)	Dip switch block	CT-194-8MST
S(12,13)	Dip switch block	CT-194-2MST

	<b>Transformers</b>	
T1	AES/EBU	SS-67129600
1 pc.	Ultra-VU Dual Control circuit card	LG-265

#### 5-4 Display Assembly

	<b>Capacitors</b>	
C1	10uf/25V tantalum	AV-TAP106K025HSB
C2,3	.1 uf/50V Z5U SMT(1206)	NC-NMC1206Z5U104M50T
C4	100uf/20V tantalum	AV-TAP107K020CCS
C5	10uf/25V tantalum	AV-TAP106K025HSB
C6-8	.1 uf/50V Z5U SMT(1206)	NC-NMC1206Z5U104M50T
	<b>Diodes</b>	
D1-62	Tricolor LED bar 2mm x 5mm (order by brightness number on display card)	SY-VBRG5641X
D63	Red LED bar 3mm x 6mm	QT-MV57124A
D64-125	Tricolor LED bar 2mm x 5mm (order by brightness number on display card)	SY-VBRG5641X
D126	Red LED bar 3mm x 6mm	QT-MV57124A
D127-141	Yellow LED bar 3mm x 6mm	QT-MV53124A

<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>LOGITEK PART NUMBER</b>
	<b>Integrated Circuits</b>	
IC1-5 IC6	64 LED driver +5VDC regulator 1.5A	MM-MAX7219CWG MO-MC7805CT
	<b>Connectors</b>	
P1 P2,3 J1 J2,3	10-pin dual row header 3-pin header 10-pin dual row socket 3-pin socket	PN-051-010-153 PN-MFSS100-3A PN-050-010-455 PN-CE100F28-3A
	<b>Resistors</b>	
R1-5	5100	
	<b>Switches</b>	
S1,2	pushbutton	NK-AB11AP-FA
6 pcs. 1 pc.	62-pin SIP socket Display circuit card	LG-267
<b>5-5 ADC Input Card</b>		
	<b>Capacitors</b>	
C1-4 C5,6 C7,8 C9-12 C13,14 C15 C16,17 C18 C19 C20,21 C22 C23 C24,25 C26	75pf/1000V ceramic 4.7uf/25V tantalum 2200pf/50V ceramic SMD 1uf/35V tantalum 4.7uf/25V tantalum .1 uf/50V ceramic SMD 470pf/100V ceramic SMD .1 uf/50V ceramic SMD .01uf/ 1uf/35V tantalum .01uf/ 1 uf/50V ceramic SMD 470pf/100V ceramic SMD 1 uf/50V Z5U SMD(1206)	CE-DD-750 AV-TAP475K025CCS NC-NMC1206NPO222K50TR AV-TAP105K035HSB AV-TAP475K025CCS NC-NMC1206Z5U104M50T AV-12061A471JATMA NC-NMC1206Z5U104M50T AV-12065E103MATMA AV-TAP105K035HSB AV-12065E103MATMA NC-NMC1206Z5U104M50T AV-12061A471JATMA NC-NMC1206Z5U104M50T
	<b>Diodes</b>	
D1,2	5.4V zener	GI-1N4734A
	<b>Integrated Circuits</b>	
IC1,2 IC2,3 IC5 IC6 IC7 4 pcs.	Quiet op amp Balanced line receiver -5VDC regulator/100 mA +5VDC regulator/100 mA ADC 16-bit stereo 8-pin dip socket	SG-NE5532N AD-SSM2143P MO-MC79L05ACP MO-MC78L05ACP AD-AD1877JR EM-100-083-10-1003
	<b>Connectors</b>	
J1,2 J3	Phone jack switch PC 10-pin dual row socket	SW-RN-114BCP PN-050-010-455
	<b>Ferrites</b>	
FR1-3	Ferrite bead	MU-BLM32A07PB
	<b>Resistors</b>	
R1,2 R3-7 R8,9 R10,11 R12 R13-14 1 pc.	21k, .1% 4220, 1% 50K multiturn trimpot 21K, .1% 4220, 1% 300 ADC Input circuit card	DL-RNC55H2102BS MP-CT9X503 DL-RNC55H2102BS LG-264A

## SECTION 6 — MANUFACTURERS LIST

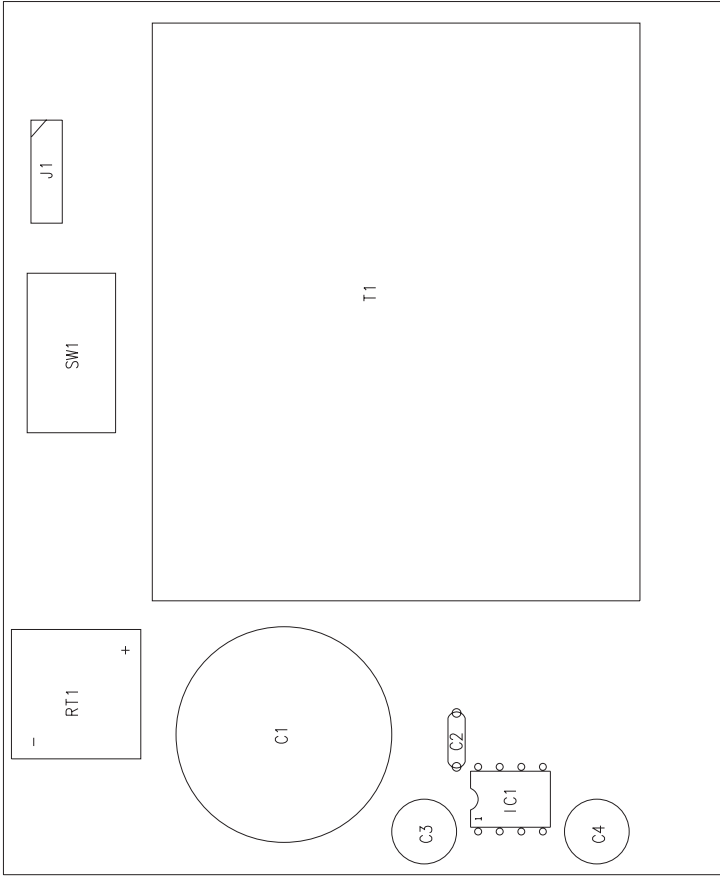
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CODE	MANUFACTURER	LOCATION
AD	Analog Devices	Norwood, MA
AV	AVX/Stantel Corp.	Myrtle Beach, SC
BE	Belden	Richmond, IN
CE	Centralab Electronics Div.	Milwaukee, WI
CK	C&K Components	Newton, MA
CS	Crystal Semiconductor	Austin, TX
CT	CTS	Elkhart, IN
DL	Dale	Tempe, AZ
EM	Ecam Technology	Scottsdale, AZ
GI	General Instruments	Sunnyvale, CA
IL	Illinois Capacitor	Lincolnwood, IL
LF	Littlefuse	Des Plaines, IL
LG	Logitek (Circuit Cards)	Houston, TX
MC	Microchip Technology, Inc.	Chandler, AZ
MM	Maxim	Sunnyvale, CA
MO	Motorola Semiconductor Products	Phoenix, AZ
MP	Mepcopal	San Diego, CA
MU	Murata Electronics	Smyrna, GA
NC	NIC Components Corp.	North Amityville, NY
NI	Nichicon	Schaumburg, IL
NK	NKK Switches	Scottsdale, AZ
NT	Neutrik	Lakewood, NJ
PR	Mill-Max Mfg. (Preci-dip)	Oyster Bay, NY
PN	Panduit Corp.	Tinsley Park, IL
QT	Quality Technologies	Sunnyvale, CA
SG	Signetics Corporation	Sunnyvale, CA
SI	Signal Transformer	Inwood, NY
SR	Schurter Inc.	Petaluma, CA
SS	Schott Corp.	Minneapolis, MN
SW	Switchcraft, Inc.	Chicago, IL
SY	Stanley	Battle Creek, MI
TI	Texas Instruments, Inc.	Dallas, TX

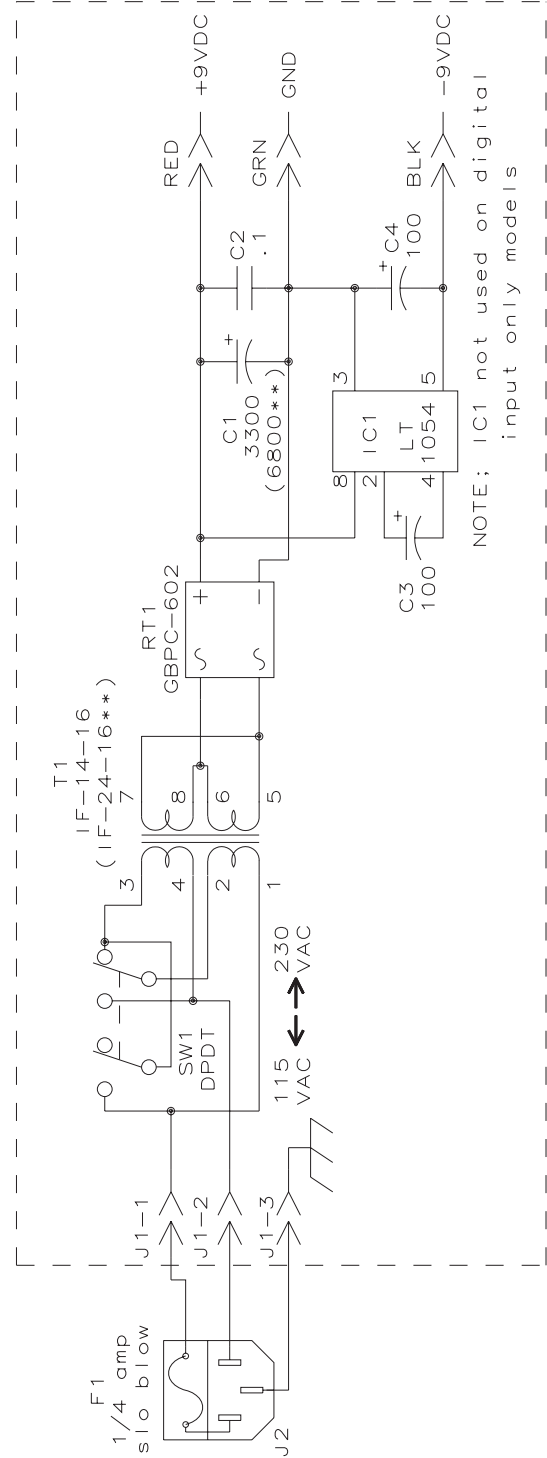


## ***SECTION 7 — Diagrams***

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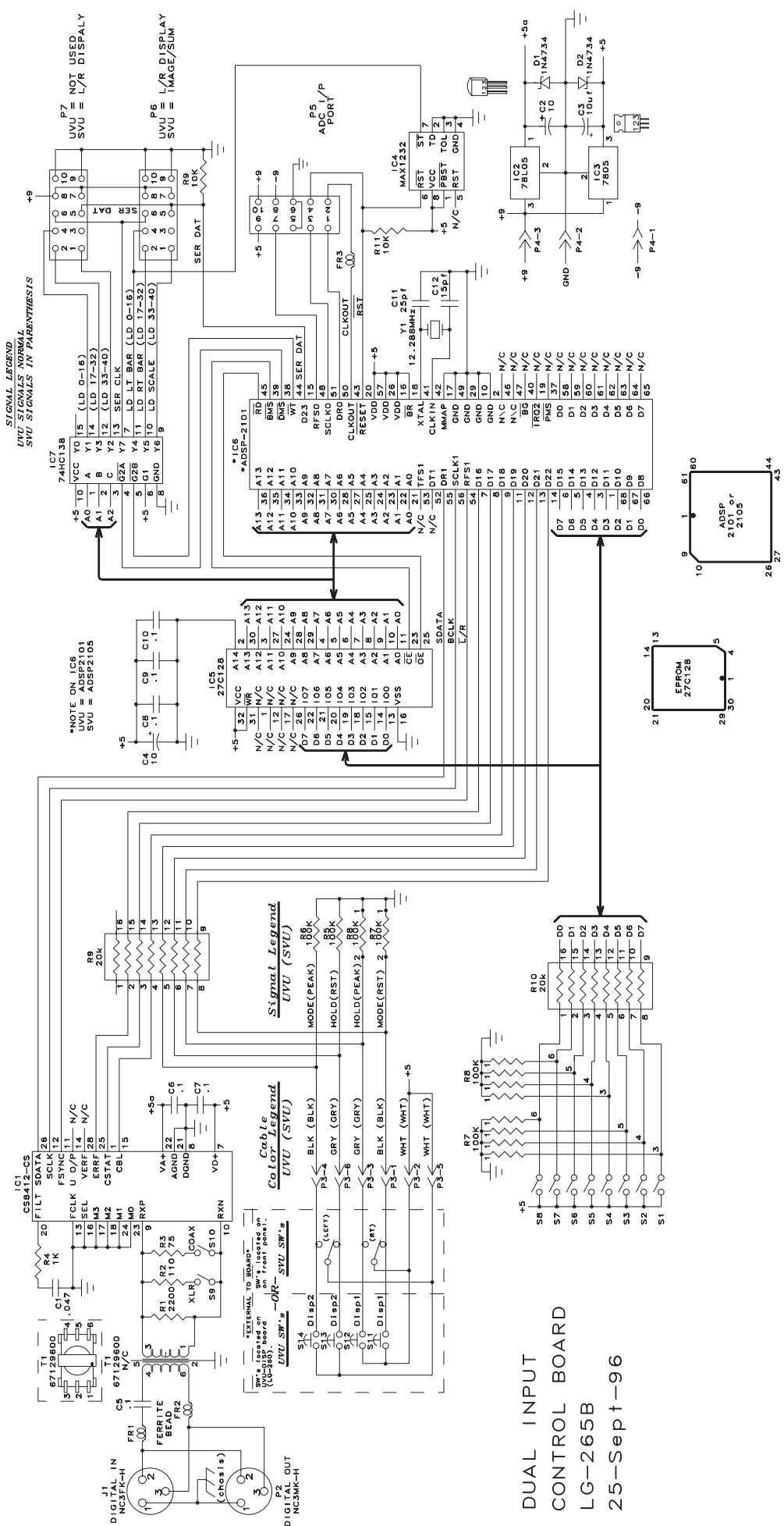


SVU, BVU, UVU SUPPLY LG-253  
Component Diagram  
31-Jan-94

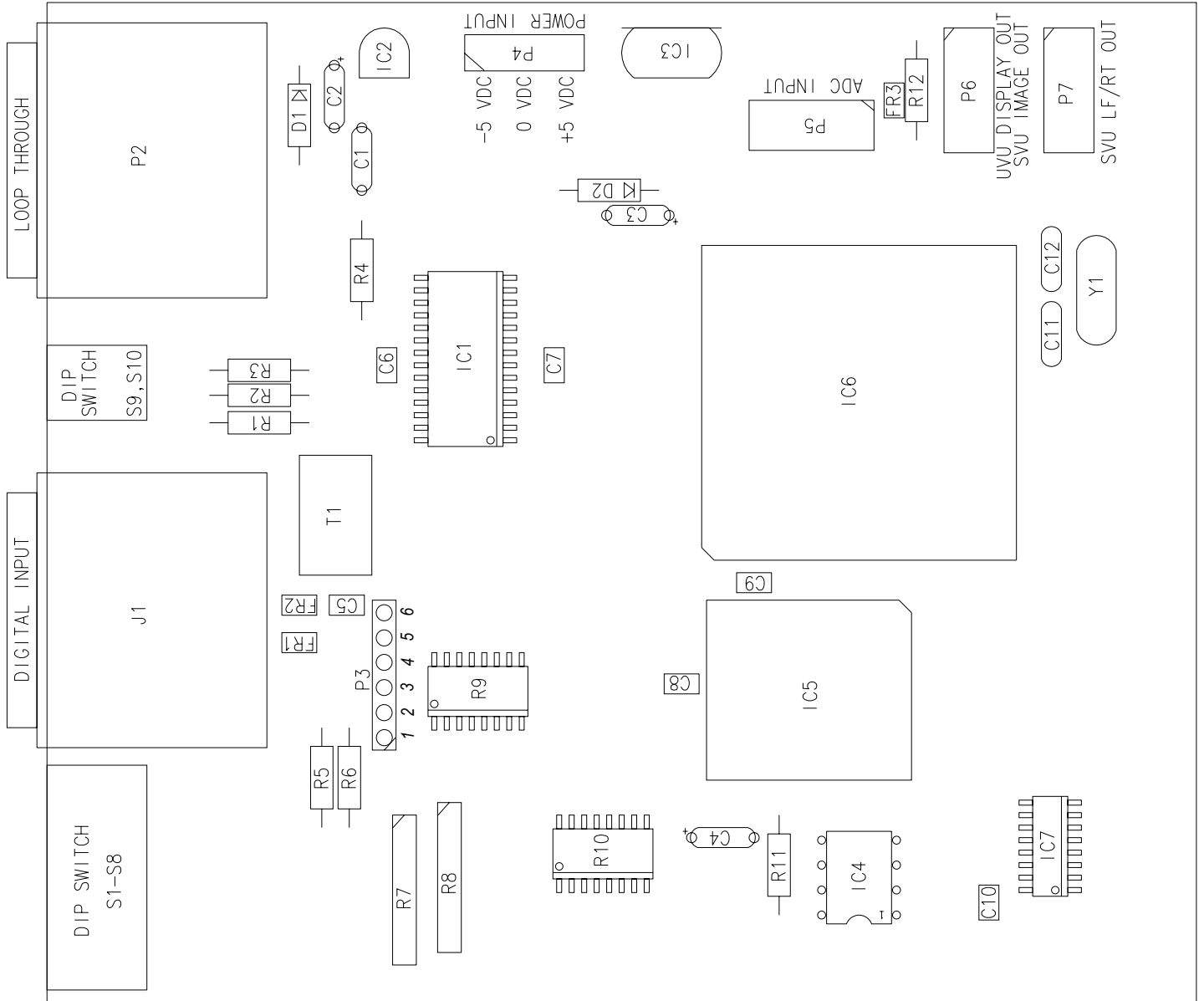


\*\* These values are used on models SIS2 and UV2 only

POWER SUPPLY  
LG-253A



DUAL INPUT  
 CONTROL BOARD  
 LG-265B  
 25-Sept-96



Connector P3

Pin2 = Pin5 = 5VDC

The Mode button momentarily connects Pins 1 & 2

The Peak Hold button momentarily connects pins 3 & 2

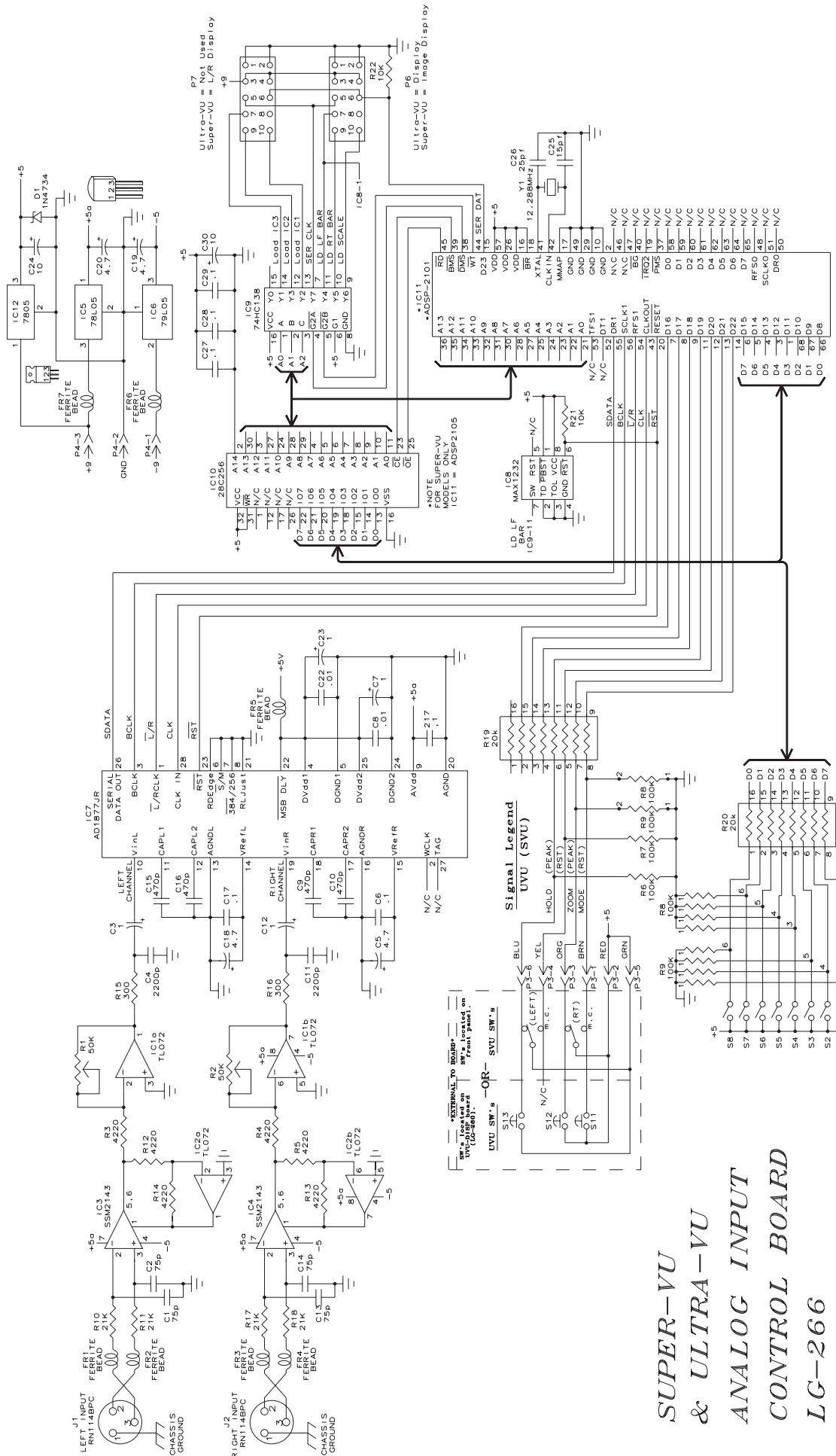
Connect pins 4 & 5 to display the analog input when a valid digital input is present (automatic switching is disabled)

Connect pins 6 & 5 to add 20 dB of gain to the inputs

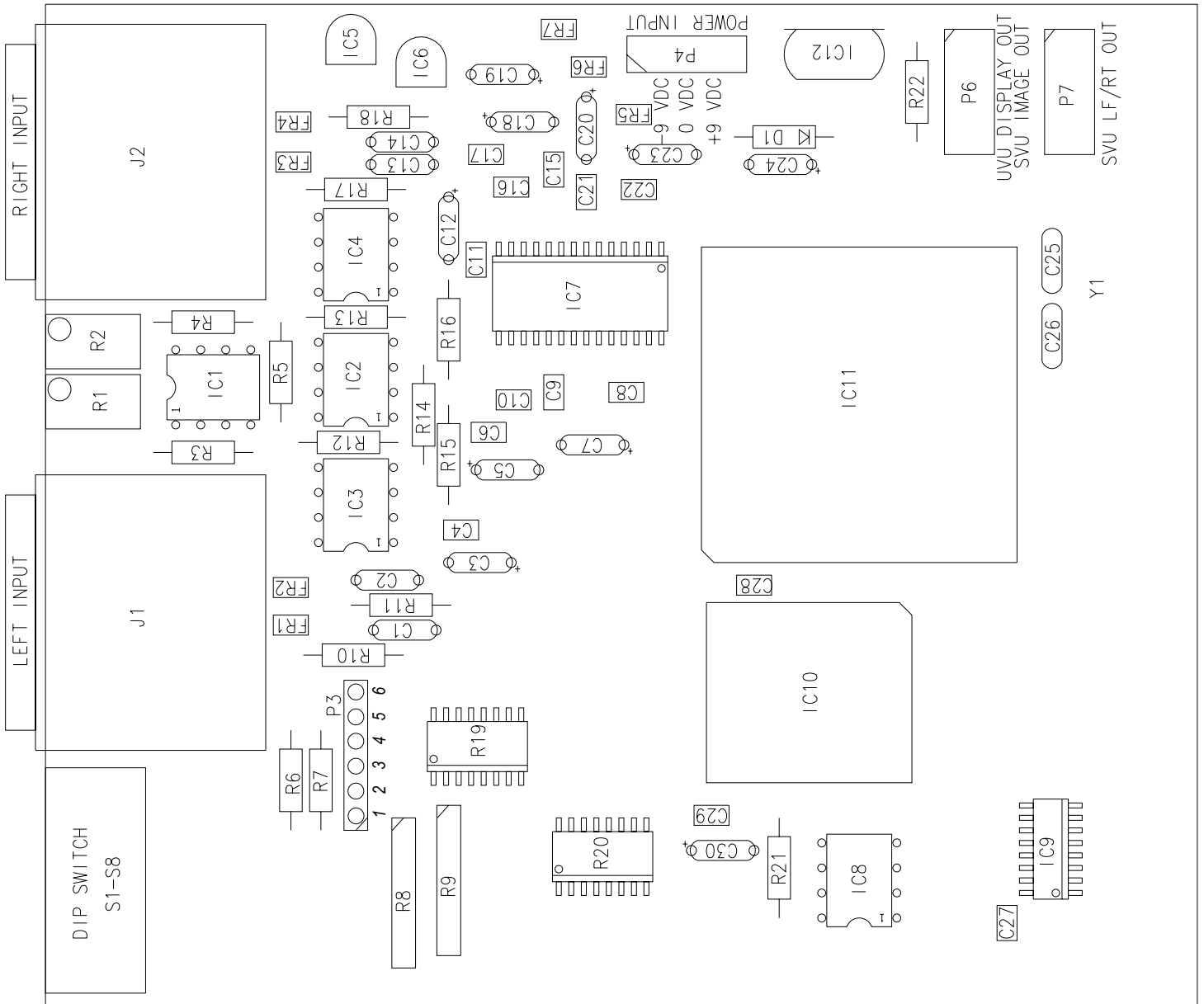
SVU/UUV Digital/Dual Control  
LG-265B

Component Diagram

4-Mar-96

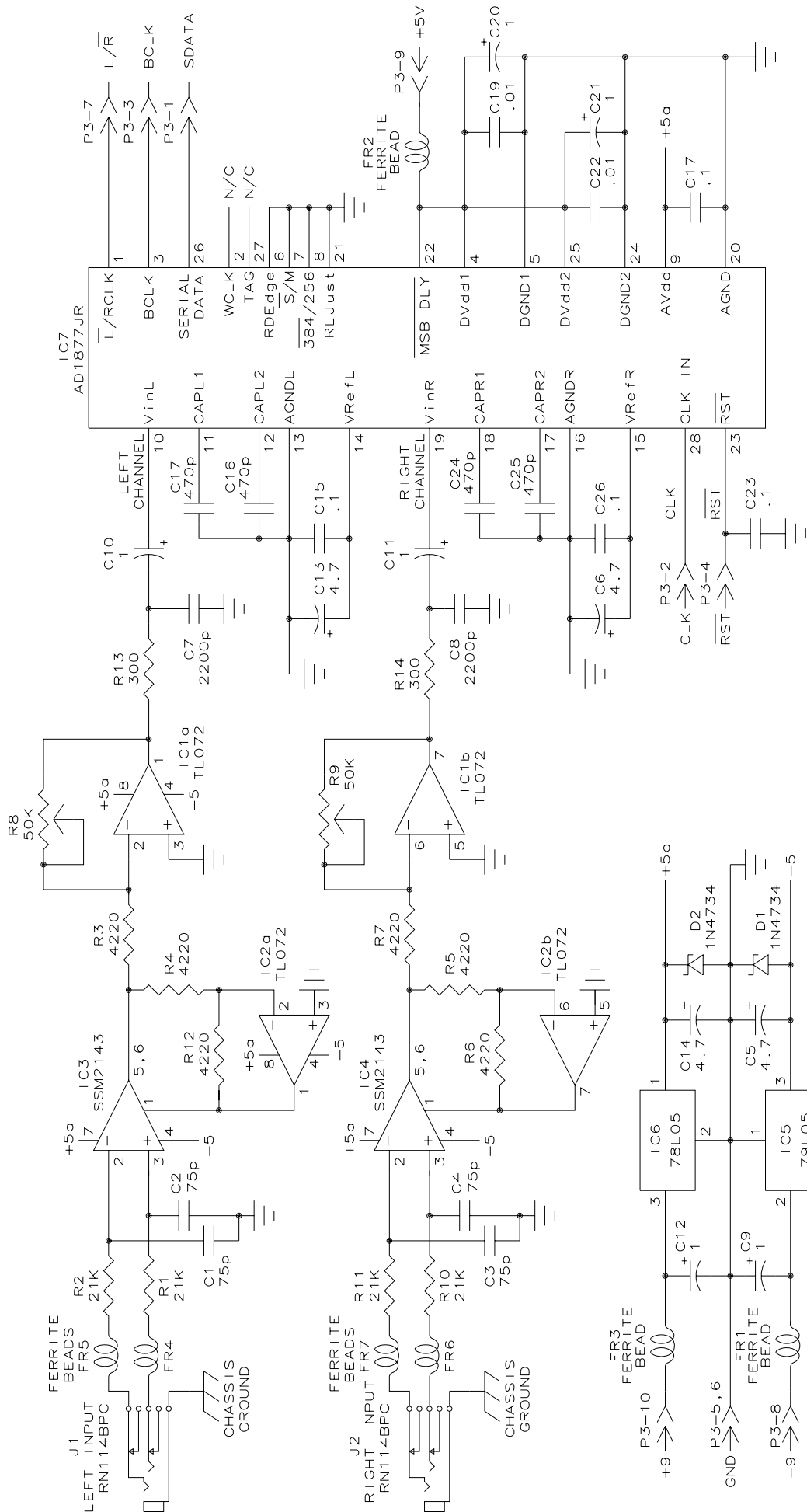


**SUPER-VU  
 & ULTRA-VU  
 ANALOG INPUT  
 CONTROL BOARD  
 LG-266**  
 26 JAN 96



Connector P3  
Pin2 = Pin5 = 5VDC

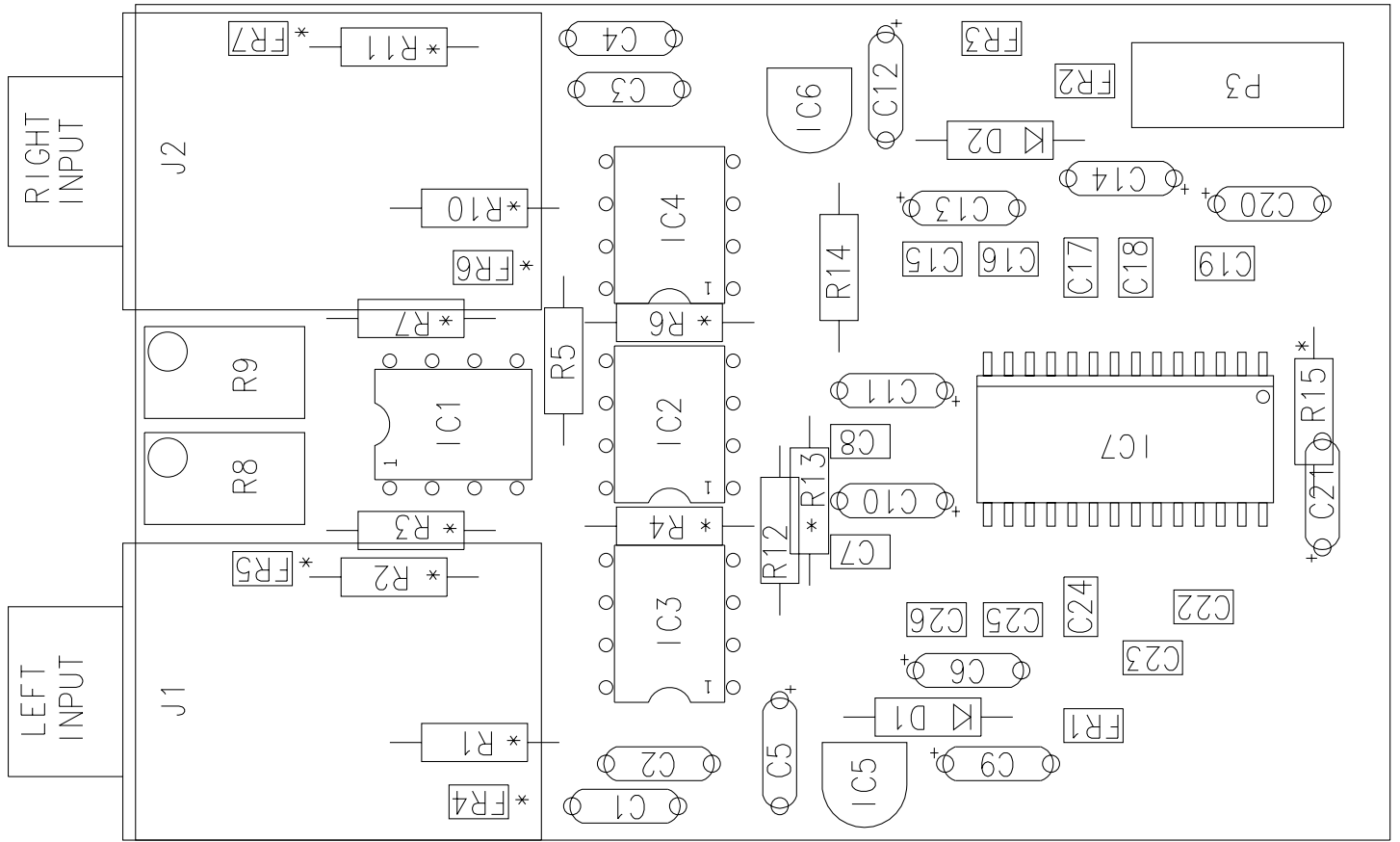
The Mode button momentarily connects Pins 1 & 2  
The Peak Hold button momentarily connects pins 3 & 2



ADC for DUAL INPUT METERS

LG-264B

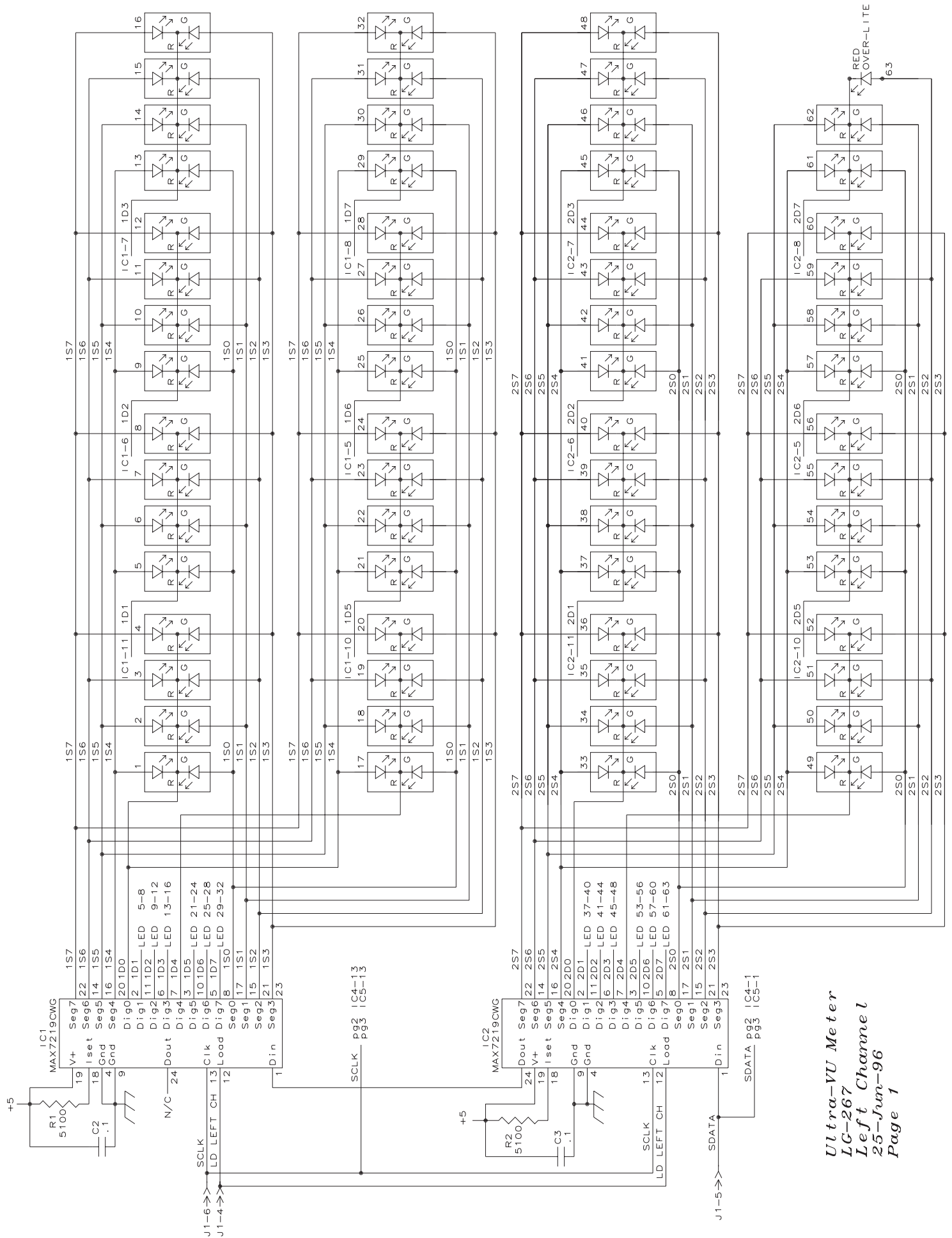
24-JUL-97



PARTS MARKED WITH "\*" ARE MOUNTED ON THE UNDER SIDE OF THE BOARD

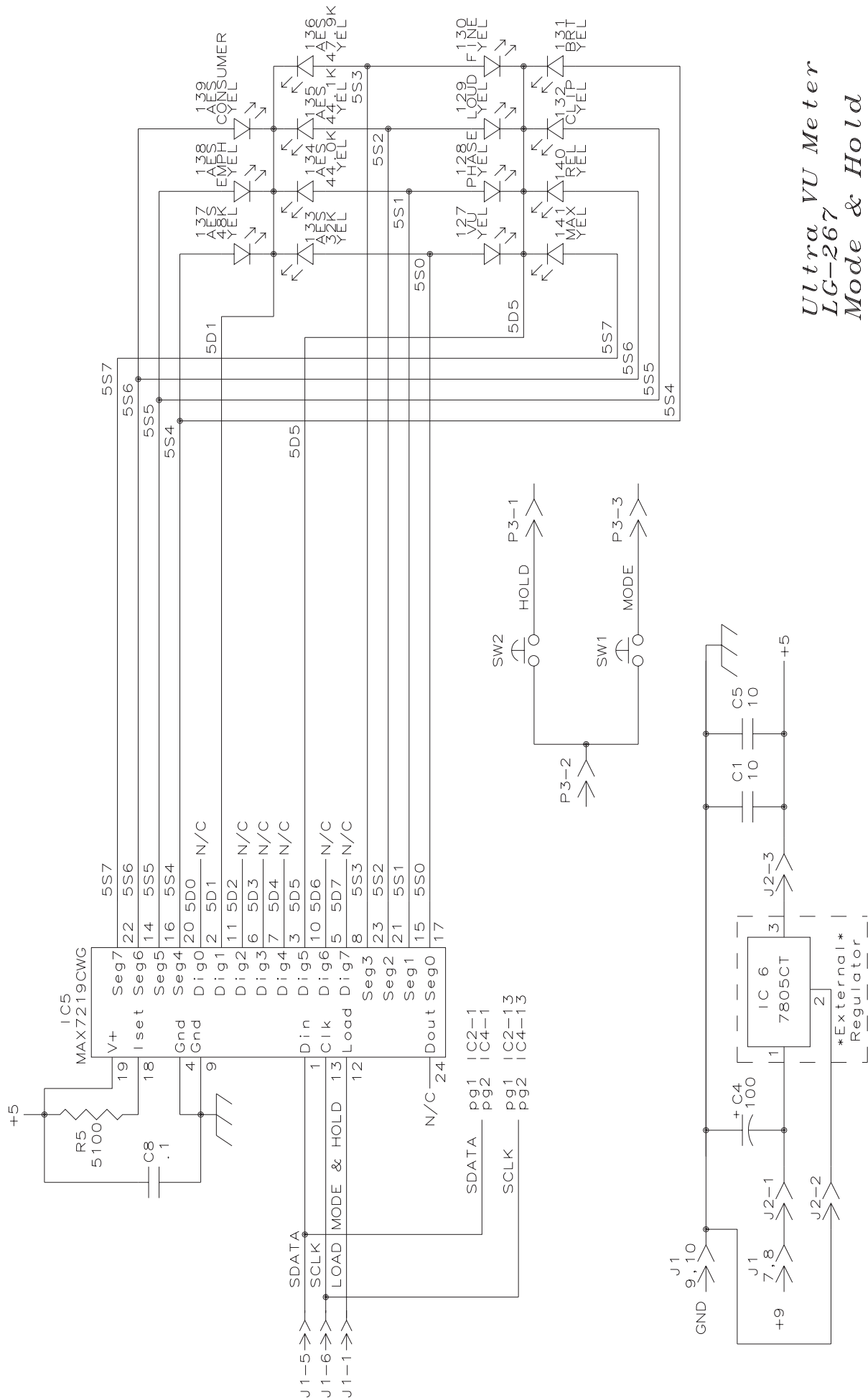
ADC for DUAL INPUT METERS LG-264B  
 Component Diagram  
 18-Jun-96





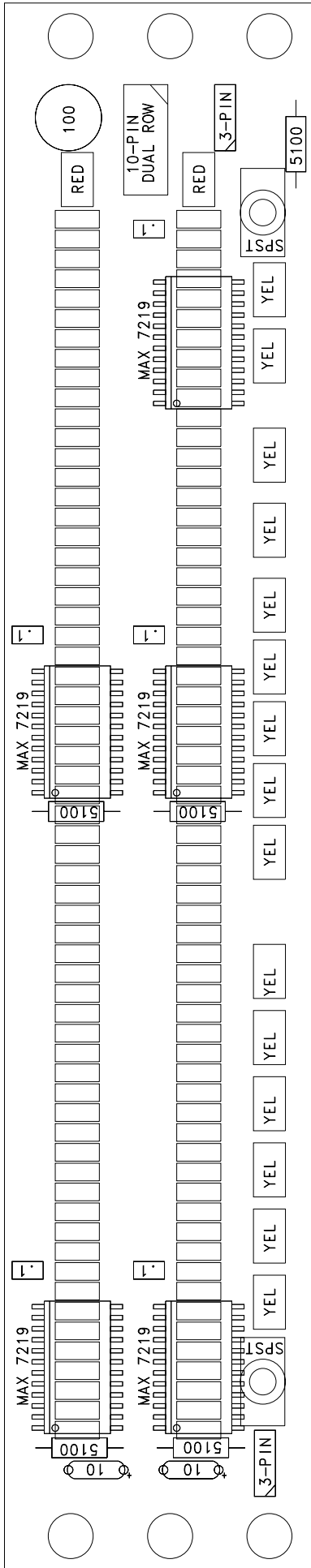
Ultra-VU Meter  
 LG-267  
 Left Channel  
 25-Jun-96  
 Page 1





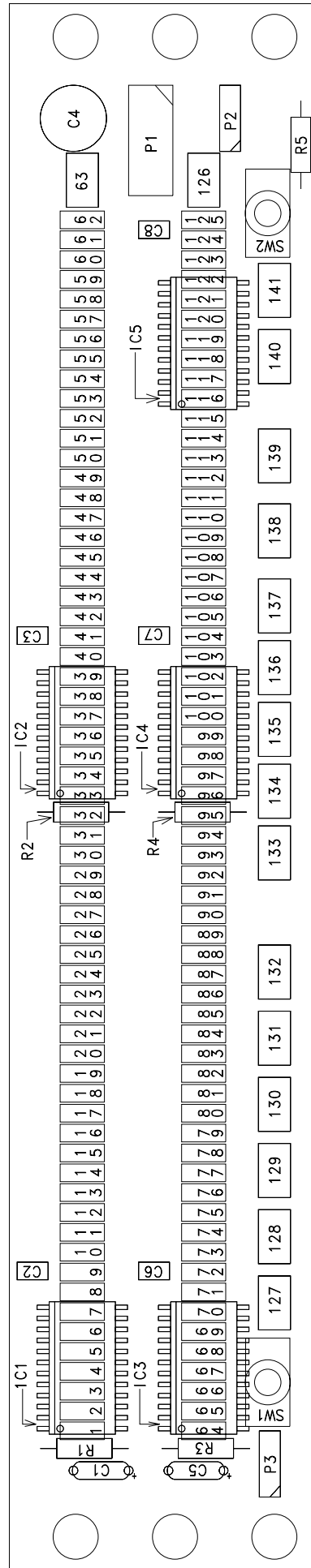
Ultra VU Meter  
 LG-267  
 Mode & Hold  
 Page 3  
 25-Jun-96

# ULTRA-VU DISPLAY TOP VIEW (LED SIDE)



ULTRA-VU DISPLAY  
 LG-267  
 ASSEMBLY DIAGRAM  
 25-Jun-96

# ULTRA-VU DISPLAY TOP VIEW (LED SIDE)



ULTRA-VU DISPLAY  
 LG-267  
 COMPONENT DIAGRAM  
 25-Jun-96



## TWO YEAR LIMITED WARRANTY

Logitek Electronic Systems, Inc. warrants its professional equipment (excluding Logitek Software, which is covered by a separate warranty) against defects in materials and workmanship for two years pursuant to the following terms and conditions. The warranty extends to the original purchaser only.

LOGITEK will repair or replace, at its option, at its factory without charge professional equipment if a defect in materials or workmanship develops during the first two years following purchase, when the equipment is returned to the factory or LOGITEK authorized service centers freight prepaid with a description of the nature of the failure. No reimbursements can be made for repair charges that are not factory authorized. After repair or replacement, LOGITEK will return the equipment to the purchaser freight prepaid.

In the event that any part of this professional equipment becomes defective during the first two years following purchase, and purchaser wishes to attempt repair, purchaser may obtain a replacement part by notifying LOGITEK of the part of the equipment which has failed. LOGITEK will thereafter ship a replacement part, freight prepaid. LOGITEK may require the purchaser to return the defective part to LOGITEK freight prepaid as a condition of such replacement, either before or after LOGITEK ships the replacement part. LOGITEK shall not be responsible for any other charges or liabilities associated with purchaser--made repairs.

No part or equipment shall be considered defective if it fails to operate due to exposure to extreme temperatures or excessive moisture in the atmosphere.

Light bulbs, batteries, potentiometers or other equipment not manufactured by Seller shall carry only the warranty, if any, of the original equipment manufacturer in effect at the time of shipment of this order; and Seller's obligation under this warranty shall be limited to such adjustment as Seller may obtain from the original manufacturer.

This limited warranty is void if equipment is modified or repaired without authorization; subjected to

misuse, abuse, accident, water damage or other neglect; or has had its serial number defaced or removed.

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