LINEAR STANDARD COMPONENTS LIBRARY

Packaged Parts

Preliminary
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p-cad™
PERSONAL CAD SYSTEMS INC.

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OVERVIEW

This manual and the three Linear Standard Components Packaged Parts Diskettes comprise the P-CAD Linear Standard Components Packaged Parts Library. The library has been developed at the request of our users, and we welcome any suggestions for improvements or additions.

The library diskettes contain the following files for use with the PC-CARDS printed circuit board (PCB) layout program:

- Layer structure file, MULTI.PCB
- Standard-size drawing sheet files, ASIZE.PCB through ESIZE.PCB
- Component files

Storage of these files in a practical and efficient directory structure is discussed in the next section of this manual. The following section, "Creating a Design", tells you how to use the files with PC-CARDS.

The remainder of the manual is devoted to lists of components by sequence and function, component plots, and the Gerber Photoplotter Aperture Chart. The aperture chart describes the padstack shapes and sizes for Types 0 through 10.

DIRECTORY STRUCTURE

For more efficient storage and easier access to the library, P-CAD recommends that you store the library components within a directory structure tailored to your particular applications and design methods. An example of an efficient directory structure is shown in Figure 1.

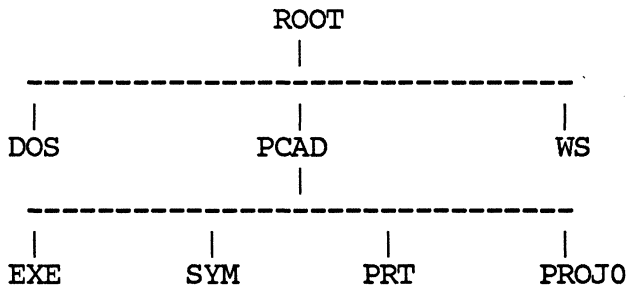


Figure 1. Sample Directory Structure

In this example, symbols are stored in the SYM directory and parts are stored in the PRT directory. For each part in this library there is a corresponding symbol in the Linear Standard Components Schematic Symbols Library.

CREATING A DESIGN

To use the library in a PCB layout, run PC-CARDS. Instructions are given in the Tutorial section of your PC-CARDS User's Manual. When the menu is displayed, select FILE/LOAD and load the layer structure. You can load MULTI.PCB or one of the standard-size drawing sheet files, ASIZE.PCB through ESIZE.PCB.

Layer Structure

The following layer structure, MULTI.PCB, is a standard P-CAD layer structure and was used to create the library components.

Layer	Name	Pen	Status	Use
1	PADCOM	7	ON	Graphic component pads
2	FLCOMP	7	OFF	Flash component pads
3	PADSLD	8	OFF	Graphic solder pads
4	FLSOLD	8	OFF	Flash solder pads
5	PADINT	9	OFF	Graphic internal pads
6	FLINT	9	OFF	Flash internal pads

Layer	Name	Pen	Status	Use
7	GNDCON	10	OFF	Graphics internal ground connection
8	FLGCON	10	OFF	Flash internal ground connection
9	CLEAR	12	OFF	Graphic universal clearance
0	FLCLER	12	OFF	Flash universal clearance
11	PWRCON	13	OFF	Graphic internal power connections
12	FLPCON	13	OFF	Flash internal power connections
13	SLDMSK	14	OFF	Graphic solder mask relief
14	FLSMSK	14	OFF	Flash solder mask
15	DRILL	15	OFF	Graphic drill template
16	FLDRLL	15	OFF	Flash drill template

Layer	Name	Pen	Status	Use
17	PIN	4	ON	Pin color
18	BRDOUT	4	ON	Board outline
19	FLTARG	4	OFF	Flash alignment targets
20	SLKSCR	6	ON	Silkscreen paint
21	DEVICE	5	ON	Device names
22	ATTR	6	OFF	Attributes
23	REFDES	6	OFF	Reference designator
24	COMP	1	ABL	Component traces
25	SOLDER	2	ABL	Solder side traces
26	INT1	3	OFF	Internal traces

Drawing Sheets

The standard-size drawing sheet files, ASIZE.PCB through ESIZE.PCB, were created using the MULTI.PCB layer structure. When loaded, they provide the correct layer structure for the library plus a standard-size drawing sheet border.

Components

When you have loaded the layer structure or drawing sheet file, you can enter the components, wires, text, instances, and net

names. Complete instructions are given in the tuturial section of your PC-CARDS User's Manual. Each PC-CARDS component contains the electrical "intelligence" required to extract data and lay out a printed circuit board.

To enter a component part in PC-CARDS, give the number of the part plus the extension .PRT; for example, AD7530.PRT. In most cases, the filename is the same as the part number. However, if the part number exceeds eight characters, as in (LM)78M05CP, then the first two characters in parentheses are dropped. For example, the filename of part (LM)78M05CP is 78M05CP.PRT.

COMPONENT LIST BY SEQUENCE

The component filename is the component number plus the extension .PRT; for example, AD7530.PRT. "Plot Page" refers to the plots in the last section of this manual.

COMPONENT LIST BY FUNCTION

The component filename is the component number plus the extension .PRT; for example, LM304H.PRT.

Voltage Regulators

LM304H	Negative regulator
LM305AH	Voltage regulator
LM376N	Voltage regulator
LM309H	5-volt regulator
LM309K	5-volt regulator
LM317H	3-terminal adjustable regulator
LM317K	3-terminal adjustable regulator
LM317T	3-terminal adjustable regulator
LM317MP	3-terminal adjustable regulator
LM323K	3-amp, 5-volt positive regulator
LM325AN	Voltage regulator
LM326H	Voltage regulator
LM337H	3-terminal adjustable negative regulator
LM337K	3-terminal adjustable negative regulator

Voltage Regulators (Cont'd)

LM337T	3-terminal adjustable negative regulator
LM337MP	3-terminal adjustable negative regulator
LM338K	5-amp adjustable power regulator
LM340AK	Series 3-terminal positive regulator
LM340AT	Series 3-terminal positive regulator
LM340LAH	1-series 3-terminal positive regulator
LM340LAZ	1-series 3-terminal positive regulator
LM345K	Negative 3-amp regulator
LM350K	3-amp adjustable power regulator
LM350T	3-amp adjustable power regulator
LM396K	10-amp adjustable voltage regulator
LM317LZ	3-terminal adjustable regulator
LM320LZ	Series 3-terminal negative regulator

Voltage Regulators (Cont'd)

LM320MLP	Series 3-terminal negative regulator
LM330T	3-terminal positive regulator
LM337LZ	3-terminal adjustable regulator
LM341P5	Series 3-terminal positive regulator
LM341P12	Series 3-terminal positive regulator
LM341P15	Series 3-terminal positive regulator
LM342P5	Series 3-terminal positive regulator
LM342P12	Series 3-terminal positive regulator
LM342P15	Series 3-terminal positive regulator
LM723CN	Voltage regulator
LM3524J	Regulating pulse width modulator
LM3524N	Regulating pulse width modulator
LM7805CT	Series voltage regulator
LM7812CT	Series voltage regulator

Voltage Regulators (Cont'd)

LM7815CT	Series voltage regulator
LM7805CK	Series voltage regulator
LM7812CK	Series voltage regulator
LM7815CK	Series voltage regulator
(LM)78L05ACH	Series 3-terminal positive regulator
(LM)78L12ACH	Series 3-terminal positive regulator
(LM)78L15ACH	Series 3-terminal positive regulator
(LM)78L05ACZ	Series 3-terminal positive regulator
(LM)78L12ACZ	Series 3-terminal positive regulator
(LM)78L15ACZ	Series 3-terminal positive regulator
(LM)78M05CP	Series 3-terminal positive regulator
(LM)78M12CP	Series 3-terminal positive regulator
(LM)78M15CP	Series 3-terminal positive regulator
LM7905CK	Series 3-terminal negative regulator

Voltage Regulators (Cont'd)

LM7912CK	Series 3-terminal negative regulator
LM7915CK	Series 3-terminal negative regulator
LM7905CT	Series 3-terminal negative regulator
LM7912CT	Series 3-terminal negative regulator
LM7915CT	Series 3-terminal negative regulator
(LM)79L05ACZ	Series 3-terminal negative regulator
(LM)79L12ACZ	Series 3-terminal negative regulator
(LM)79L15ACZ	Series 3-terminal negative regulator
(LM)79M05CH	Series 3-terminal negative regulator
(LM)79M12CH	Series 3-terminal negative regulator
(LM)79M15CH	Series 3-terminal negative regulator
(LM)79M05CP	Series 3-terminal negative regulator
(LM)79M12CP	Series 3-terminal negative regulator

Voltage Regulators (Cont'd)

(LM)79M15CP	Series 3-terminal negative regulator

Voltage References

LM313H	Reference diode
LM329H	Precision reference
LM329Z	Precision reference
LM336Z25	2.5-volt reference diode
LM336H25	2.5-volt reference diode
LM336Z50	5.0-volt reference diode
LM336H50	5.0-volt reference diode
LM385Z12	MicroPower voltage reference diode
LM385H12	MicroPower voltage reference diode
LM385Z25	MicroPower voltage reference diode
LM385H25	MicroPower voltage reference diode
LM339AH	Precision reference

Operational Amplifiers/Buffers

LF347N	Wide-bandwidth quad JFET input operational amplifier
LF355N	Monolithic JFET input operational amplifier
LF356N	Monolithic JFET input operational amplifier
LF351N	Wide-bandwidth JFET input operational amplifier
LF353N	Wide-bandwidth dual JFET input operational amplifier
LF400C	Fast settling JFET input operational amplifier
LM10CN	Operational amplifier and voltage reference
LM11CLN	Operational amplifier
LM301AN	Operational amplifier
LM302H	Voltage follower
LM307N	Operational amplifier
LM308N	Operational amplifier
LM308AN	Operational amplifier
LM310N	Voltage follower
LM318N	Operational amplifier

Operational Amplifiers/Buffers (Cont'd)

LM324AN	Low-power quad operational amplifier
LM343H	High-voltage operational amplifier
LM344H	High-voltage, high slew rate operational amplifier
LM346N	Programmable quad operational amplifier
LM149N	Series quad 741 operational amplifier
LM358N	Low-power dual operational amplifier
LM359N	Dual high-speed programmable, current mode (Norton) amplifier
LM392N	Low-power operational amplifier/voltage comparator
LM725CN	(Instrumentation) operational amplifier
LM741CN	Operational amplifier
LM748CN	Operational amplifier
LM1458N	Dual operational amplifier
LM3900N	Quad amplifier
LM3301N	Quad amplifier
LM3401N	Quad amplifier

Instrumentation Amplifiers

LM363D	Precision instrumentation amplifier

Voltage Comparators

LM319N	High-speed dual comparator
LM339AN	Low-power low-offset voltage quad comparator
LM360N	High-speed differential comparator
LM361N	High-speed differential comparator
LM393AN	Low-power low-offset voltage dual comparator
LM311N	Voltage comparator

Analog Switches

LF13201D	4 normally closed switches
LF13202D	4 normally open switches
LF13508D	8-channel analog multiplexer
LF13509D	4-channel differential analog multiplexer

Sample and Hold

LF398AN	Monolithic sample and hold circuit

A/D and D/A Converters

AD7530	10-bit binary multiplying D/A converter
AD7531	12-bit binary multiplying D/A converter
ADB1200	12-bit binary A/D building block
ADC0800	8-bit A/D converter
ADC0801	8-bit microprocessor compatible A/D converter
ADC0802	8-bit microprocessor compatible A/D converter
ADC0803	8-bit microprocessor compatible A/D converter
ADC0804	8-bit microprocessor compatible A/D converter
ADC0805	8-bit microprocessor compatible A/D converter
ADC0808	8-bit microprocessor compatible A/D converter with 8-channel multiplexer

A/D and D/A Converters (Cont'd)

ADC0809	8-bit microprocessor compatible A/D converter with 8-channel multiplexer
ADC0816	8-bit microprocessor compatible A/D converter with 16-channel multiplexer
ADC0817	8-bit microprocessor compatible A/D converter with 16-channel multiplexer
ADC0833	8-bit serial I/O A/D converter with 4-channel multiplexer
ADC1021	10-bit microprocessor compatible A/D converter
ADC1080	12-bit successive approximation A/D converter
ADC1280	12-bit successive approximation A/D converter
DAC0808	8-bit D/A converter
DAC0830	8-bit microprocessor compatible double-buffered D/A converter
DAC0831	8-bit microprocessor compatible double-buffered D/A converter

A/D and D/A Converters (Cont'd)

DAC0832	8-bit microprocessor compatible double-buffered D/A converter
DAC1000	Microprocessor compatible double-buffered D/A converter
DAC1001	Microprocessor compatible double-buffered D/A converter
DAC1002	Microprocessor compatible double-buffered D/A converter
DAC1006	Microprocessor compatible double-buffered D/A converter
DAC1007	Microprocessor compatible double-buffered D/A converter
DAC1008	Microprocessor compatible double-buffered D/A converter
DAC1022	10-bit binary multiplying D/A converter
DAC1222	12-bit binary multiplying D/A converter
DAC1201	12-bit D/A converter
DAC1208	12-bit microprocessor compatible, double-buffered D/A converter

A/D and D/A Converters (Cont'd)

DAC1219	12-bit binary multiplying D/A converter
LM331AN	Precision voltage-to-frequency converter

Industrial Blocks

LM322H	Precision timer
LM322N	Precision timer
LM3905N	Precision timer
LM334H	3-terminal adjustable current source
LM334Z	3-terminal adjustable current source
LM555CN	Timer
LM555CH	Timer
LM556CN	Dual timer
LM565CN	Phase-locked loop
LM565CH	Phase-locked loop
LM566CN	Voltage controlled oscillator
LM567CN	Tone decoder
LM567CH	Tone decoder

Industrial Blocks (Cont'd)

LM733CN	Differential video amplifier
LM733CH	Differential video amplifier
LM3911N	Temperature controller
LM3914N	Dot/bar display driver
LM3915N	Dot/bar display driver
LM3916N	Dot/bar display driver
MF10CN	Universal Monolithic dual-switched capacitor filter

Audio/Radio Circuits

LM377N	Dual 2-Watt audio amplifier
LM378N	Dual 4-Watt audio amplifier
LM379S	Dual 6-Watt audio amplifier
LM380N-8	Audio power amplifier
LM381AN	Low-noise dual preamplifier
LM382N	Low-noise dual preamplifier
LM383AT	7-Watt audio power amplifier
LM386N	Low-voltage audio power amplifier
LM387AN	Low-noise dual preamplifier

Audio/Radio Circuits (Cont'd)

LM388N	1.5-Watt audio power amplifier
LM389N	Low-voltage audio power amplifier with NPN transistor array
LM390N	1-Watt battery-operated audio power amplifier
LM391N	Audio power driver
LM1035	Dual DC-operated tone/volume/balance circuit
LM1037	Dual 4-channel analog switch
LM1038	Dual 4-channel analog switch
LM1310	Phase-locked loop FM stereo demodulator
LM1391N	Phase-locked loop block
LM1496N	Balanced modulator/demodulator
LM1496H	Balanced modulator/demodulator
LM1965	Advanced FM IF system
LM3011H	Wide-band amplifier
LM3089N	FM receiver IF system

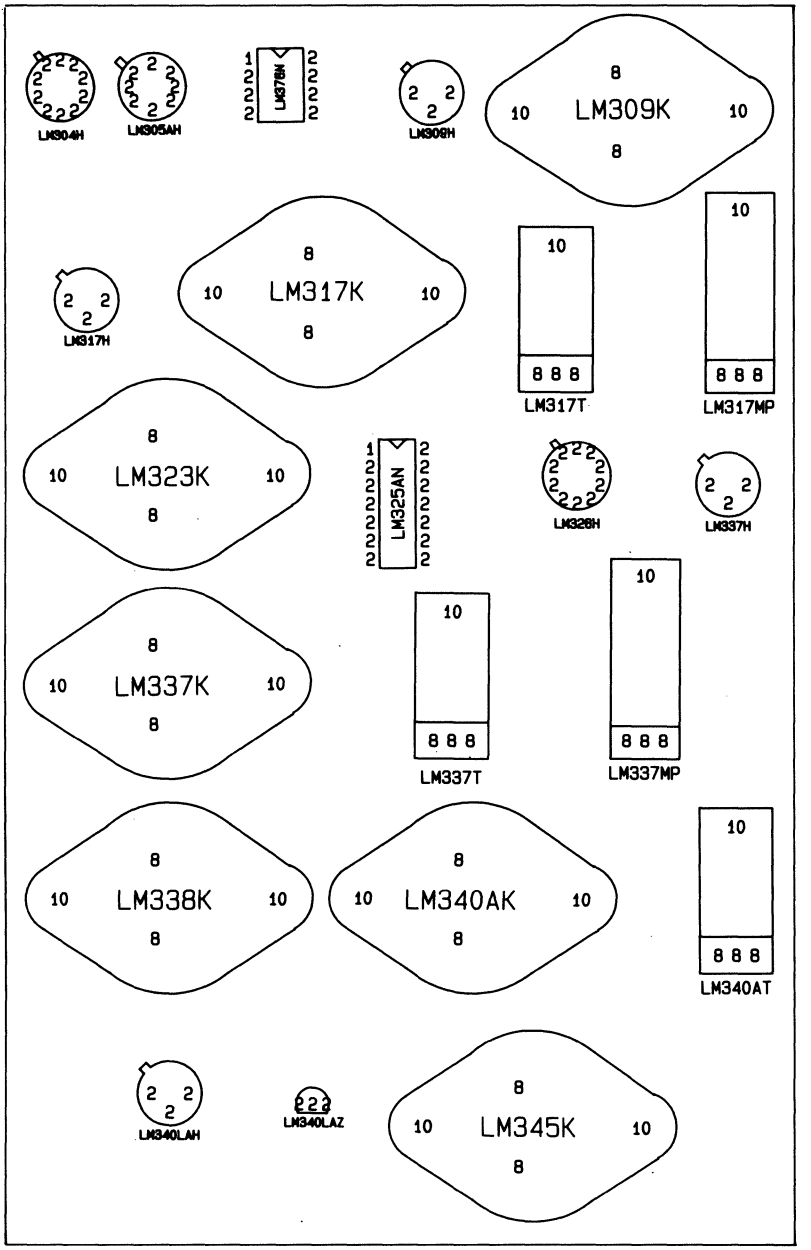
Transistor/Diode Arrays

LM394H	Supermatch pair
LM395H	Ultra-reliable power transistor
LM395K	Ultra-reliable power transistor
LM3045N	Transistor array
LM3046N	Transistor array
LM3086N	Transistor array
LM3146N	High-voltage transistor array

COMPONENT PLOTS

The numbers 0 through 10 on the following component plots reflect the padstack types used for the corresponding pins. The Gerber Photoplotter Aperture Chart describes the padstack shapes and sizes for Types 0 through 10.

COMPONENT PLOTS (Cont'd)



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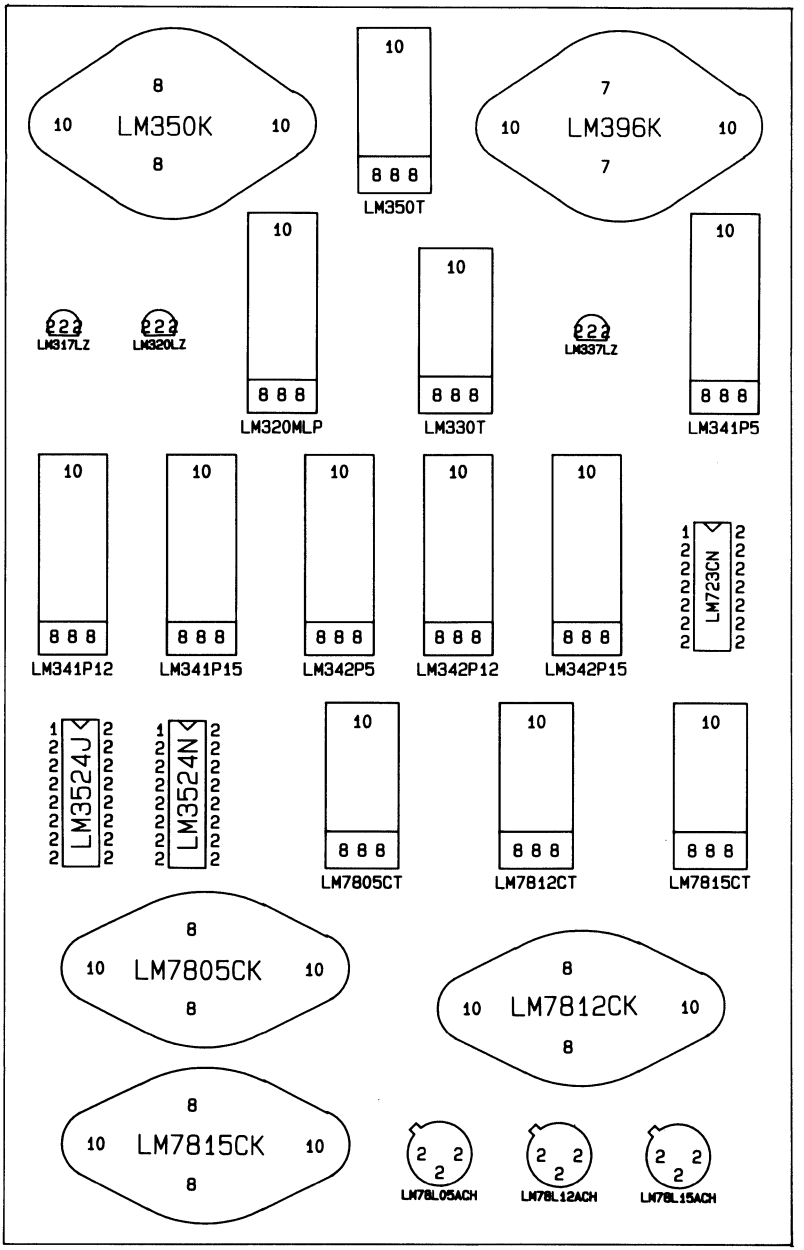

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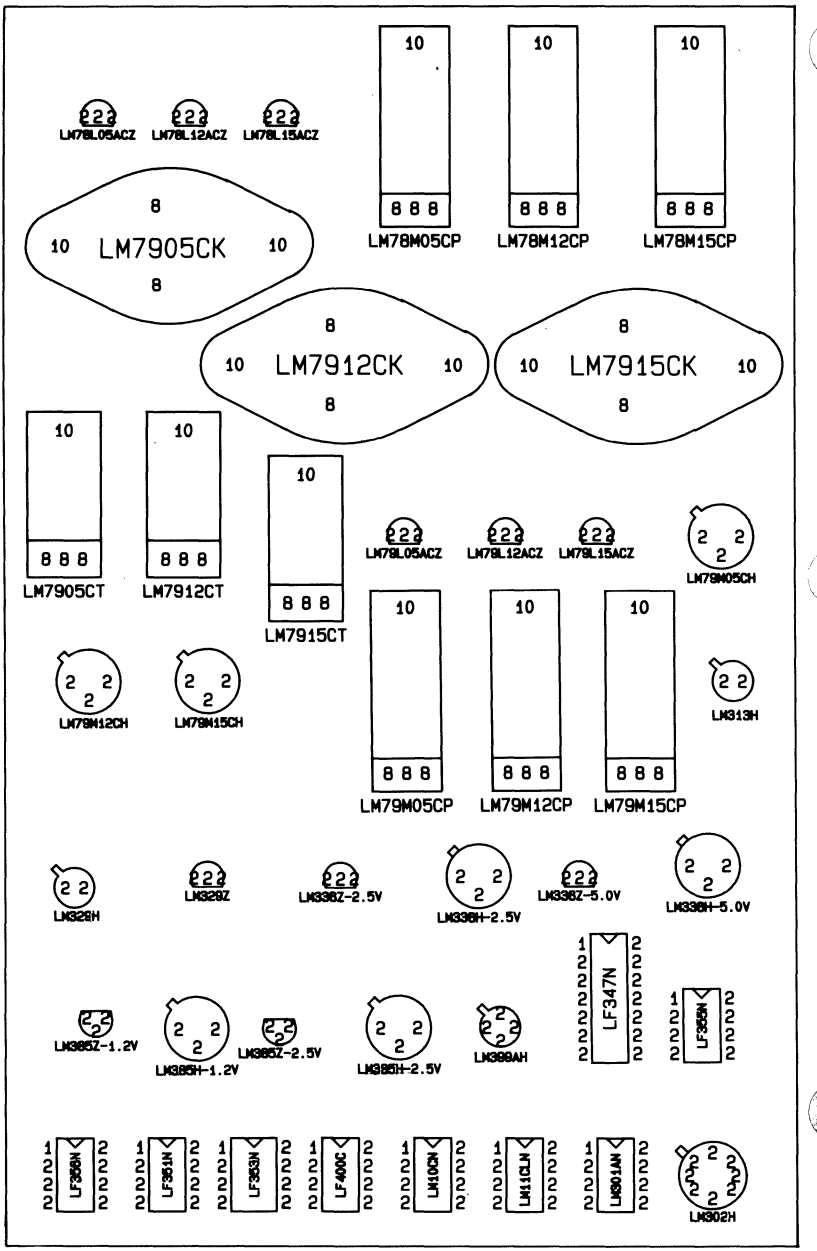

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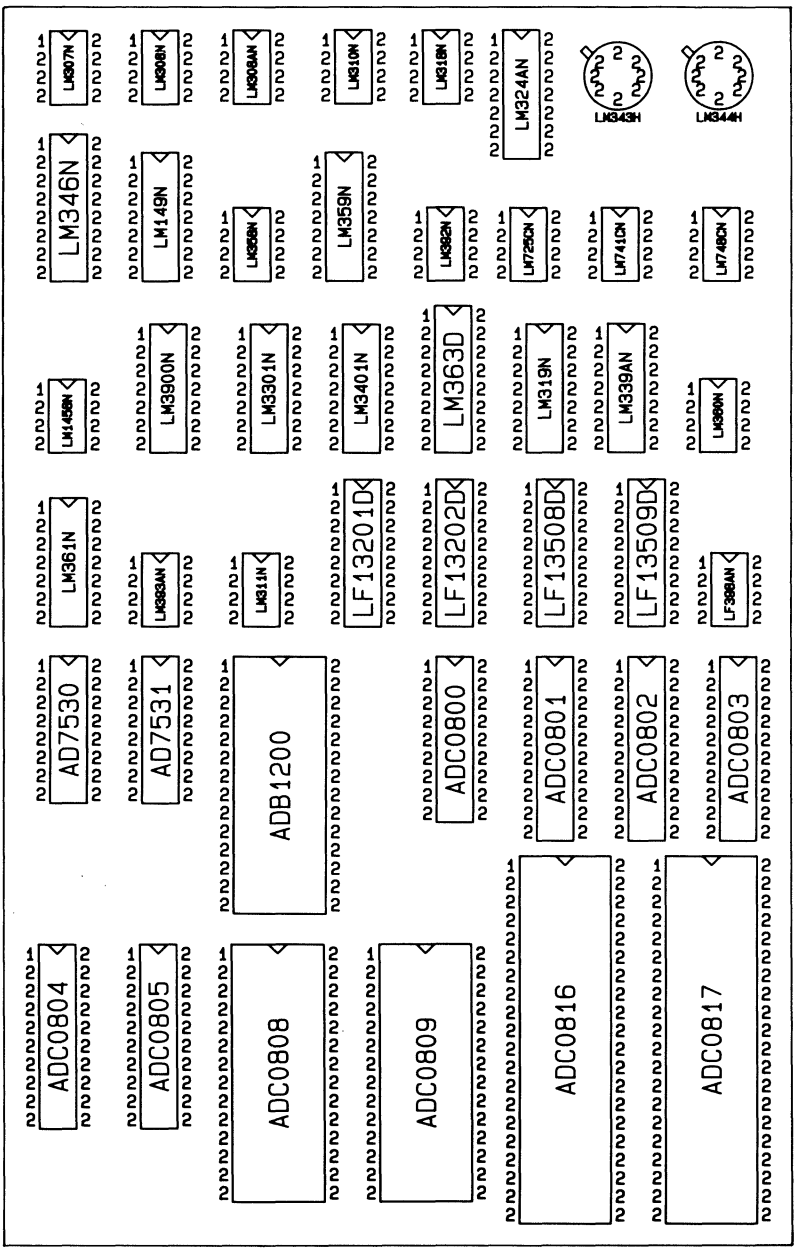

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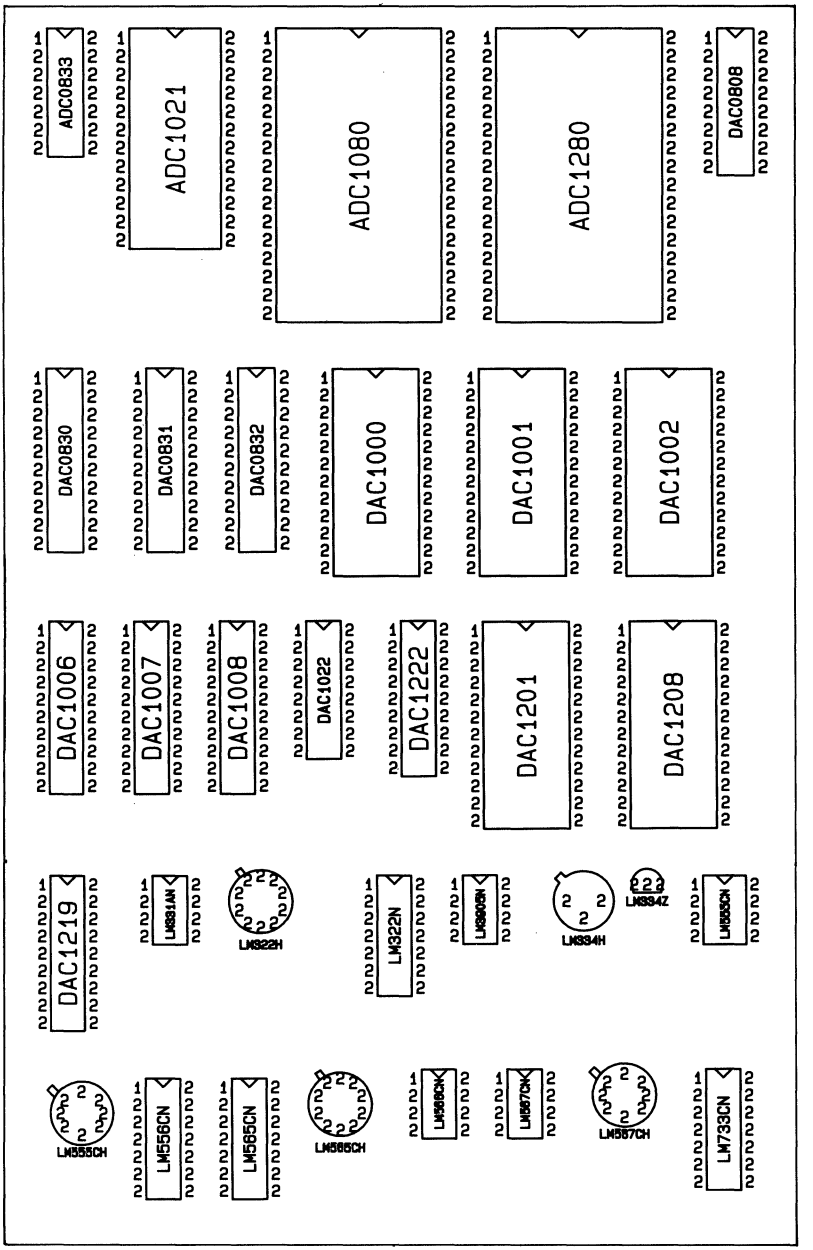

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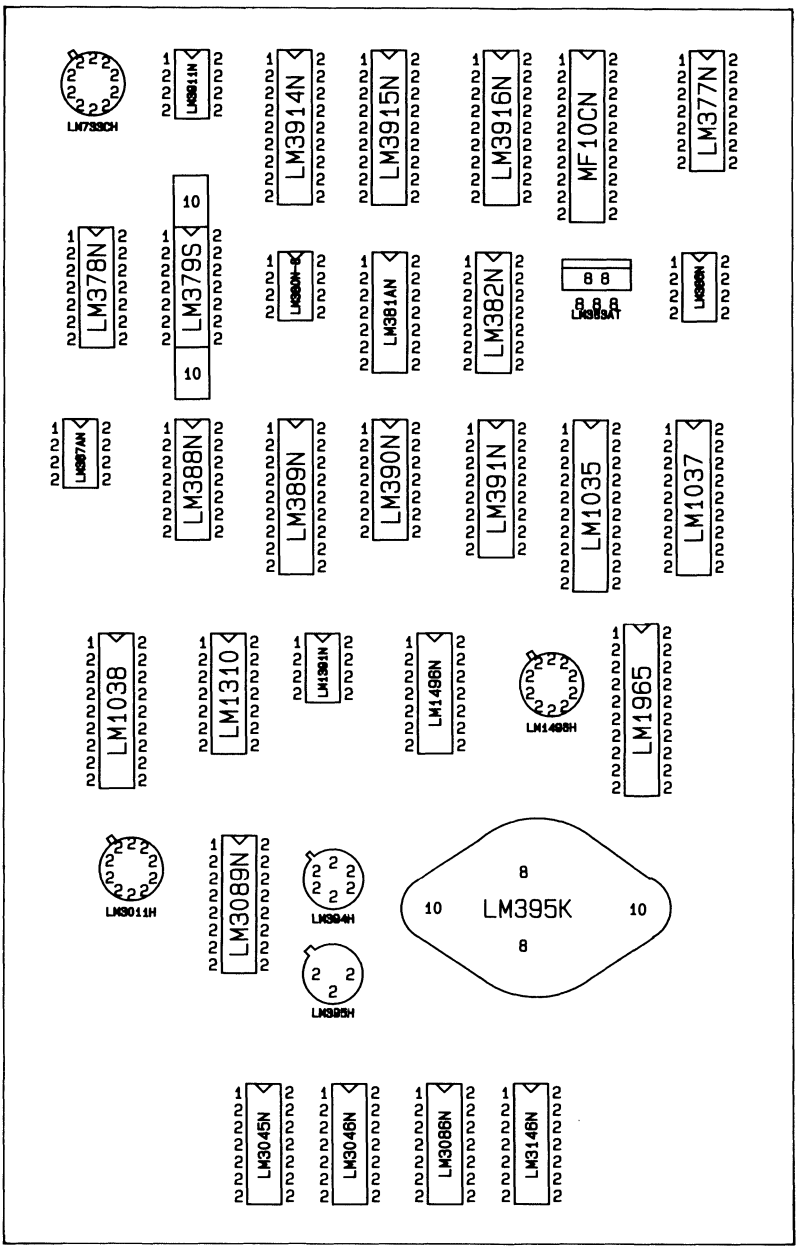


GERBER PHOTOPLOTTER APERTURE CHART

LOAD MULTI.PCB	TYPE 0 V50R28C.PS	TYPE 2 (N/C) 60R32C.PS	TYPE 3 (N/C) 60R32G.PS	TYPE 4 (N/C) 60R32P.PS
PADCOM	.050 Circle	.060 Circle	.060 Circle	.060 Circle
FLCOMP	Aperture 15	Aperture 9	Aperture 9	Aperture 9
PADSLD	.050 Circle	.060 Circle	.060 Circle	.060 Circle
FLSOLD	Aperture 15	Aperture 9	Aperture 9	Aperture 9
PADINT	.050 Circle	.060 Circle	.060 Circle	.060 Circle
FLINT	Aperture 15	Aperture 9	Aperture 9	Aperture 9
GNDCON	.020 Ring .060 Inner Diam .100 Outer Diam	.020 Ring .060 Inner Diam .100 Outer Diam	Aperture 9 .025 Width X	.020 Ring .060 Inner Diam .100 Outer Diam
FLGCON	Aperture 8	Aperture 8	Aperture 22	Aperture 8
CLEAR	.100 Circle Solid Circle	.125 Circle Solid Circle	.125 Circle Solid Circle	.125 Circle Solid Circle
FLCLER	Aperture 20	Aperture 21	Aperture 21	Aperture 21
PWRCON	.020 Ring .060 Inner Diam .100 Inner Diam	.020 Ring .060 Inner Diam .100 Inner Diam	.020 Ring .060 Inner Diam .100 Inner Diam	Aperture 9 .025 Width X
FLPCON	Aperture 8	Aperture 8	Aperture 8	Aperture 22
SLDMSK	.060 Circle	.070 Circle	.070 Circle	.070 Circle
FLSMSK	Aperture 9	Aperture 11	Aperture 11	Aperture 11
DRILL	+28	+32	+32	+32
FLDRLL	Aperture 23 Text 28	Aperture 23 Text 32	Aperture 23 Text 32	Aperture 23 Text 32
PIN*	.050	.050	.050	.050

* The pin layer reflects connectivity (C) with a solid circle or no connectivity (N) with a hollow circle.

GERBER PHOTOPLOTTER APERTURE CHART (Cont'd)

LOAD MULTI.PCB	TYPE 1 (N/C) 60S32C.PS	TYPE 5 (N/C) 60S32P.PS	TYPE 6 (N/C) 60S32G.PS
PADCOM	.060 Circle	.060 Circle	.060 Circle
FLCOMP	Aperture 10	Aperture 10	Aperture 10
PADSLD	.060 Circle	.060 Circle	.060 Circle
FLSOLD	Apertue 10	Aperture 10	Aperture 10
PADINT	.060 Square	.060 Square	.060 Square
FLINT	Aperture 9	Aperture 9	Aperture 9
GNDCON	.020 Ring .060 Inner Diam .100 Outer Diam	.020 Ring .060 Inner Diam .100 Outer Diam	Aperture 9 .025 Width X
FLGCON	Aperture 8	Aperture 8	Aperture 22
CLEAR	.125 Circle Solid Circle	.125 Circle Solid Circle	.125 Circle Solid Circle
FLCLER	Aperture 21	Aperture 21	Aperture 21
PWRCON	.020 Ring .060 Inner Diam .100 Outer Diam	Aperture 9 .025 Width X	.020 Ring .060 Inner Diam .100 Outer Diam
FLPCON	Aperture 8	Aperture 22	Aperture 8
SLDMSK	.070 Square	.070 Square	.070 Square
FLSMSK	Aperture 12	Aperture 12	Aperture 12
DRILL	+32	+32	+32
FRDRLL	Aperture 23 Text 32	Aperture 23 Text 32	Aperture 23 Text 32
PIN*	.050	.050	.050

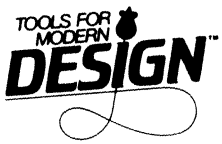
* The pin layer reflects connectivity (C) with a solid circle or no connectivity (N) with a hollow circle.

GERBER PHOTOPLOTTER APERTURE CHART (Cont'd)

LOAD MULTI.PCB	TYPE 8 (N/C) 80R50C.PS	TYPE 9 (N/C) 90R60C.PS	TYPE 10* 210R182C.PS	TYPE 7 (N/C)100R70C.PS
PADCOM	.080 Circle	.090 Circle	.210 Circle	.100 Circle
FLCOMP	Aperture 17	Aperture 19	.210 Solid Circle	Aperture 20
PADSLD	.080 Circle	.090 Circle	.210 Circle	.100 Circle
FLSOLD	Aperture 17	Aperture 19	.210 Solid Circle	Aperture 20
PADINT	.080 Circle	.090 Circle	.210 Circle	.100 Circle
FLINT	Aperture 17	Aperture 19	.210 Solid Circle	Aperture 20
GNDCON	.025 Ring .080 Inner Diam .130 Outer Diam	.025 Ring .090 Inner Diam .140 Outer Diam	.025 Ring .210 Inner Diam .260 Outer Diam	.025 Ring .100 Inner Diam .150 Outer Diam
FLGCON	.025 Ring .080 Inner Diam .130 Outer Diam	.025 Ring .090 Inner Diam .140 Outer Diam	.025 Ring .210 Inner Diam .260 Outer Diam	.025 Ring .100 Inner Diam .150 Outer Diam
CLEAR	.160 Solid Circle	.180 Solid Circle	.420 Solid Circle	.200 Solid Circle
FLCLER	.160 Solid Circle	.180 Solid Circle	.420 Solid Circle	.200 Solid Circle
PWRCON	.025 Ring .080 Inner Diam .130 Outer Diam	.025 Ring .090 Inner Diam .140 Outer Diam	.025 Ring .210 Inner Diam .260 Outer Diam	.025 Ring .100 Inner Diam .150 Outer Diam
FLPCON	.025 Ring .080 Inner Diam .130 Outer Diam	.025 Ring .090 Inner Diam .140 Outer Diam	.025 Ring .210 Inner Diam .260 Outer Diam	.025 Ring .100 Inner Diam .150 Outer diam
SLDMSK	.090 Circle	.100 Circle	.220 Circle	.110 Circle
FLSMSK	Aperture 19	Aperture 20	.220 Solid Circle	.110 Solid Circle
DRILL	+50	+60	+182	+70
FLDRLL	Aperture 23 Text 50	Aperture 23 Text 60	Aperture 23 Text 182	Aperture 23 Text 70
PIN**	.070	.080	.200	.090

* Type 10 is a connect only pin.

** The pin layer reflects connectivity (C) with a solid circle or no connectivity (N) with a hollow circle.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