ULTRA II BIO-MED HANDBOOK

Part # 100546

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April 1992

In no event will EXCEL TECH LTD. be liable for direct, indirect, special incidental, or consequential damages resulting from any defect in the hardware, software, modality accessories (eg. lead wires, electrodes, etc.) or documentation, even if advised of the possibility of such damages. To initialize the unit warranty, the warranty card must be completed and returned to EXCEL TECH LTD. directly and immediately after purchase.

CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure to ultrasonic or electrical energy.

TABLE OF CONTENTS

1.0 INTRODUCTION

This manual outlines the procedures for verifying and calibrating the ULTRA II.

Section 2 outlines the procedures for verifying the accuracy of the stimulator portion of the unit.

Section 3 outlines the procedures for verifying that the applicator is functioning and that the ultrasound power output is accurate.

Section 4 outlines the procedure for calibrating the ultrasound portion of the unit.

Section 5 provides schematics for assembly of the complete unit.

Section 6 contains ultrasound warnings.

Section 7 contains the schedule of maintenance.

2.0 STIM VERIFICATION

The delivered current is displayed on the front panel led display with an accuracy of +/- 10% into a 500 ohm resistive load.

The units of measure are milliamps or fractions of milliamps (microamps). The current is displayed as a peak or rms value depending on the treatment type selected. For Interferential, Russian, and Premod treatments, the rms value is displayed. For Biphasic the peak current divided by 2 is displayed.

2.1 Equipment

The following equipment is required to verify the output accuracy of the stimulator.

1. Resistive Test Loads: 1, 5W between 200 and 1000 ohms.
2. RMS Volt Meter: operating range of 4000 Hz.
3. Peak Voltage Meter (dc) or high precision oscilloscope.

2.2 Procedure

Sine Waves

The Interferential, Premod and Russian feedback is measured with the same circuit. Thus, the accuracy of only one of these needs to be verified. The easiest waveform to measure is a Premod waveform with a fixed beat frequency of 0 hz. This will output a pure sine wave of the carrier frequency. The carrier frequency should be set to 4000 hz.

Insert the test load in the resistance range of 200 to 1000 ohms. Set up a Premod treatment by following the menus on the screen. From the main screen with no treatments running, perform the following steps:

1. Select ELECTROTHERAPY
2. Select PREMOD
3. Select CUSTOM
4. Select Frequency mode FIXED using top left key.
5. Enter Frequency of 0 hz.
6. Select CONTINUE, Set Output Level.

This is the Adjust Output Level screen. At this point, current can be output to channels 1 or 2 by turning the output up. It is NOT necessary to press START. Note that the bar graph on the screen will move according to the turning of the knob. The knob has a much greater resolution than the screen, thus the screen bar graph will not move with every click of the knob.

When both channel 1 and channel 2 currents are set to zero, it is possible to change the output range. Note that when the output of either channel is greater than zero, the arrow for selecting the output range will disappear, and the selection will not be allowed. The output ranges are:

Low	(10 micro amps to 1.5 Ma using 500 ohm load),
Medium	(.1 mA to 15 mA using 500 ohms load) and
High	(1 mA to 60 mA using 500 ohms load).

To determine the output accuracy of the stimulator, set the output above 1/2 scale in each of the output ranges and measure the rms voltage. The rms current is the rms voltage divided by the resistance of the test load.

$$I_{rms} = V_{rms} / R$$

The current will be displayed within the specified tolerance at output levels above half scale.

Note: if the test load is removed while the current is set above 1/4 scale, the unit will detect an error condition and stop the output and return to the main screen. The word RESUME will flash above ELECTROTHERAPY and a graphic will be displayed indicating that a pad has fallen off. To resume the testing, select ELECTROTHERAPY and you will return to the Adjust Output Level Screen.

Press STOP or EXIT to end the test.

Biphasic Waves

The Biphasic peak voltage is displayed by the unit. The Biphasic wave is an a.c. coupled waveform with short positive and negative pulses. The duration of the pulses is adjustable from 40 to 160 microseconds with a repeat frequency from 20 to 200 hz.

Insert the test load in the resistance range of 200 to 1000 ohms. Set up a Biphasic treatment by following the menus on the screen. From the main screen with no treatments running:

1. Select ELECTROTHERAPY
2. Select BIPHASIC
3. Select CUSTOM
4. Select Output mode CONSTANT using top left key.
5. Select CUSTOMIZE WAVEFORM to change the output waveform. Press DONE to continue.
6. Select CONTINUE, Set Output Level

This is the Adjust Output Level screen. Current can be output to channels 1 or 2 by turning the output up. It is NOT necessary to press START. Note that the bar graph on the screen will move according to the turning of the knob. The knob has a much greater resolution than the screen, thus the screen bar graph will not move with every click of the knob.

When both channel 1 and channel 2 currents are set to zero, it is possible to change the output range. Note that when the output of either channel is greater than zero, the arrow for selecting the output range will disappear, and the selection will not be allowed. The output ranges are Low, Medium and High.

To determine the output accuracy of the stimulator, set the output above 1/2 scale in each of the output ranges and measure the peak voltage. The peak current is the peak voltage divided by the resistance of the test load.

Ipeak = Vpeak / R

Note: The current displayed is the peak divided by 2.

I displayed = Ipeak / 2

Note: if the test load is removed while the current is set above 1/4 scale, the unit will detect an error condition and stop the output and return to the main screen. The word RESUME will flash above ELECTROTHERAPY and a graphic will be displayed indicating that a pad has fallen off. To resume the testing, select ELECTROTHERAPY and you will return to the Adjust Output level screen.

Press STOP or EXIT to end the test.

3.0 ULTRASOUND VERIFICATION

This section outlines how to determine the functional adequacy of the ultrasound applicator and power generator.

The delivered ultrasound power or intensity is displayed on the front panel seven segment display.

The units of display are user selectable as either power or intensity. The unit of measure (Watts or Watts/cm^2) is indicated by the light below the display.

3.1 Equipment

The following equipment is required to determine the output accuracy of the ultrasound portion of the ULTRA II.

1. Ultrasound Power Meter

3.2 Procedure

3.2.1 Applicator Verification

To verify the integrity of the applicator perform the following steps:

1. Frequency calibrate the applicator
2. Run a treatment at 1 or 3 MHz
3. Verify the applicator couples and uncouples properly.

To frequency calibrate the applicator, perform the following steps.

1. Clean and dry the applicator and place in holder
2. Select ULTRASOUND
3. Select Recalibrate Applicator

To run a treatment perform the following steps:

1. Select ULTRASOUND
2. Select 1 or 3 MHz
3. Select Custom
4. Select Continuous
5. Select time as the Treatment Mode
6. Enter a treatment time of 99 minutes
7. Select CONTINUE Set Output Level
8. Press Start

This will start a treatment and begin the delivery of

ultrasound power to the applicator. The ultrasound does not function in the same way as the muscle stimulator in that you must press START before any ultrasound power is delivered.

9. Press ULTRA STATUS
10. Select Power as the Display Mode
11. Place the applicator head in water.

The ultrasound power dial controls the set power (set point) displayed on the screen. When the applicator is coupled to a patient or to water, the coupling meter will give an indication of the level of coupling. If the coupling is sufficient the coupling meter will be in the green zone and the delivered power will be equal to the set point. The delivered power is displayed on the LED display.

In order for the applicator to be acceptable it must meet the following two requirements.

1. At the maximum set point, the coupling meter must read less than 3 yellow points when the applicator is uncoupled, clean and dry.

2. At the maximum set point, the coupling meter must measure coupled (at least one green point) when the applicator is coupled to water.

If either of these conditions is not met at either frequency, frequency calibrate the applicator and repeat the test. If the applicator still fails, restore the default power calibration for that applicator (see section 3) and repeat the test.

Note that if the applicator remains uncoupled (the coupling meter shows less than 3 dots) for 5 seconds, the unit will go into pause mode. In pause mode the light beside the pause key will flash and the coupling meter will turn off. To continue from pause mode, press the pause key once.

3.2.2 Power Output Verification

When power calibrated, the delivered power displayed on the front panel should be within +/- 10% of the power meter reading. The intensity will be displayed within +/- 25% of the actual intensity (calculated as: power / Effective Radiating Area). If the delivered power is outside this range, the device needs to be power calibrated for that applicator size.

To verify the accuracy of the power output perform the following steps:

1. Frequency calibrate the applicator
2. Run a treatment at 1 or 3 MHz
3. Check the delivered power against the power meter

See section 3.2.1 for instructions on frequency calibrating the applicator and running a treatment.

When the applicator is sufficiently coupled to water, the output power will be displayed within the specified tolerance when power calibrated.

4.0 ULTRASOUND POWER CALIBRATION

The ultrasound power calibration is **For Service Adjustment Only.** The power calibration procedures enable the technician to calibrate the ultrasound output power of the device for each size applicator. The power accuracy will be within +/- 5% of the power meter measurement after power calibration. The absolute accuracy of the system is dependant upon the accuracy of the power meter used.

Note that there are two independent calibrations. The first calibration is the frequency calibration. The frequency calibration calibrates the generator frequency to drive the applicator at the frequency of optimum efficiency. The frequency calibration occurs every time the unit is powered on or the applicator is changed.

The second calibration is the power calibration. This calibration calibrates the delivered power. The power calibration is performed by the service technician only. One set of power calibrations can be stored for each size of applicator. When a second applicator of the same size is power calibrated with the device it overwrites any previous power calibration for that size applicator.

The ULTRA II should not be power calibrated when the unit is cold. If the unit or applicator has been exposed to cold temperatures, the unit should be placed in self warming mode until the applicator has warmed and the unit returns to room temperature. Self warming can be initiated through the following steps.

1. Press the assist key and turn self warming to LOW. Press EXIT to return to the main menu.

2. Clean and dry the applicator head and place the applicator in the holder.

3. Frequency calibrate the applicator by selecting ULTRASOUND from the main menu, then selecting RECALIBRATE APPLICATOR from the FREQUENCY menu. Once the applicator has been calibrated, the unit will return to the main menu.

4. The unit will then start self warming.

The self warming light on the front panel will flash as the applicator is warming and will be steady on once the applicator has reached the warming temperature selected. If the applicator is removed from the holder, self warming will be cancelled and the self warming light will turn off. To continue self warming replace the applicator in the holder. Self warming will continue

automatically. The warming procedure should take less than 5 minutes to complete.

4.1 Restrictions

The ULTRA II power calibration applies only to the applicator which is being power calibrated. Only one applicator of each size can be power calibrated with the unit at any time. If a second applicator of the same size is used for power calibration, the power calibration for the second applicator overwrites the power calibration for the first applicator.

4.2 Equipment

The following equipment is required to power calibrate the ultrasound portion of the ULTRA II.

1. Ultrasound Power Meter

4.3 Procedure

1. Set up the ultrasound power meter according to the instructions in you power meter manual.

2. If the ultrasound applicator is cold, initiate self warming at the low level and wait until the applicator has warmed (see Section 4.0 for details on self warming).

3. Initiate power calibration by pressing ASSIST and then POWER CALIBRATION. Enter the password and press ENTER to begin power calibration. The password is "63xx", where xx is the day of the month stored in the device. The date is displayed on the main screen.

4. Select an applicator to be calibrated. Place the CLEAN and DRY applicator in the holder and press CONTINUE. If the applicator is removed from the holder or unplugged from the unit during frequency or power calibration, the Power calibration will be terminated and the unit will return to the main menu.

5 Place the applicator in the power meter and zero the power meter. For proper power meter operation refer to your power meter manual. If at any time during the power calibration procedure, the meter needs to be adjusted, the ultrasound power can be turned off by pressing PAUSE. The pause light will turn on. The power can then be re-started by pressing PAUSE again

and the pause light will turn off.

6. The ultrasound power will be turned on at either 1 or 3 MHz.

Four power points must be entered for each of the frequency ranges in order to complete the power calibration. To enter power calibration data press POWER and enter the power from the power meter, press ENTER. An asterisk will appear in the status box beside the point you have entered. The program will advance to the next point. Corrections are limited to a 30% deviation from the factory power calibration. If the actual power delivered is outside of the allowable correction range, please call EXCEL for factory service.

The procedure begins at 1 MHz. Once all 4 points for a frequency range have been entered, the calibration for that frequency will be saved. Pressing EXIT will terminate the power calibration and return to the applicator selection screen. If EXIT is pressed before all points for a frequency range have been entered, the power calibration for that frequency will be aborted.

To change frequencies press the FREQUENCY key. This will change the frequency and reset the procedure to the first point in the next frequency selected. If the previous frequency had not been completed, the data to that point will be ignored. Thus, if you make a mistake, the easiest way to recover is to change the frequency twice. This will return you to the beginning of the frequency you were calibrating.

To restore the default power calibration for the current applicator size, press RESTORE DEFAULTS. This will restore the factory defaults for that applicator size only. All of the asterisks will disappear from the status box indicating that none of the power calibration has been completed. It may be advantageous to press restore defaults before beginning the calibration for each applicator size. This will help you keep track of where you are in the power calibration process.

Once all of the power calibration points have been entered for both ranges, press EXIT to return to the applicator selection menu.

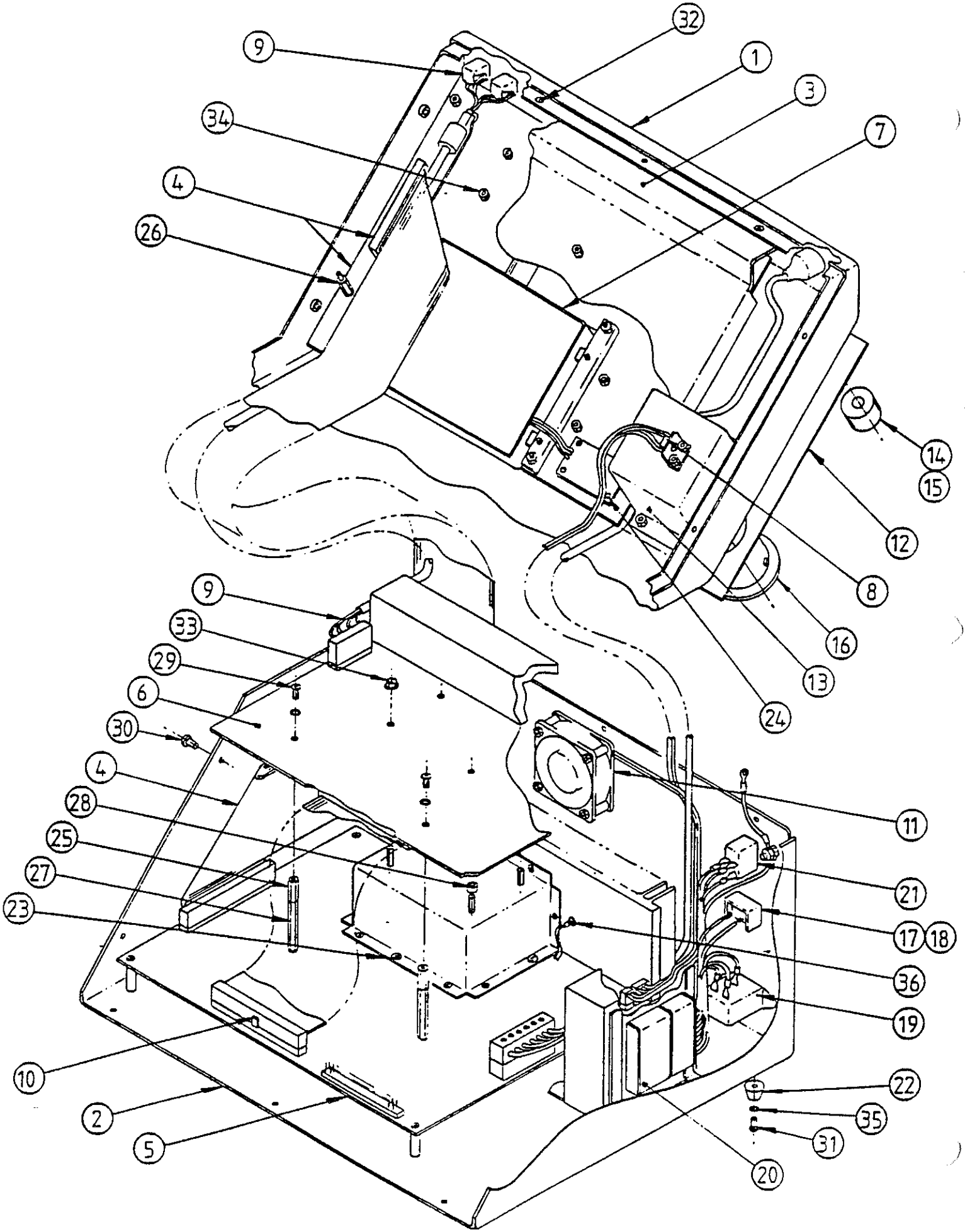
7. Repeat for each applicator size by inserting the new applicator and following steps 2 through 6.

8. Verify the power calibration by running a treatment into the power meter. Set the DISPLAY MODE to POWER. The value displayed on the POWER/INTENSITY DIGITAL DISPLAY should correspond to the value on the power meter.

5.0 PARTS LIST AND ASSEMBLY

Item No.	Description	Part No.
1	Chassis Top	100146
2	Chassis Base	100147
3	Faceplate Shield	100314
4	Faceplate PCB	100160
5	Main PCB	100156
6	Sub PCB	100157
7	LCD Assy	100385
8	Sensor Assy	100186
9	Stim Cable	100165
10	50 Conductor Cable	100162
11	Fan	L1150X
12	Lexan	100150
13	Holder Enclosure	100207
14	Knob Dia..75	100197
15	Knob Dia..50	100196
16	Applicator Holder	100209
17	Fuse Holder	F9118X
18	Fuse 3A	F2213X
19	Power Inlet	100239
20	Transformer	X2908X
21	Power Switch	S2127X
22	Foot	H8154X
23	Main PCB Shield	100149
24	PCB Mounts	100368
25	Standoff No.4 X .75L	100203
26	Standoff No.6 X 1.0L	100349
27	Standoff No.4 X 1.5L	100192
28	Spacer No.4 nom X .25L	H6569X
29	Screw, pan, No.4 X .25L	H0603S
30	Screw, pan, No.6 X .25L	H0703S
31	Screw, pan, No.6 X .50L	H2092S
32	Screw, csk, No.4 X .25L	100350
33	Nut, locking, No.4	H4004S
34	Nut, locking, No.4	100191
35	Washer, plain, NO.6	H5005S
36	Thermistor Assy	100151

Item No.	Accessories	Part No.
45	Probes	10008
46	Leads, black	100223
47	Electrodes	A1002X
48	Lead, single	100224
49	Applicator 5CM (articulated)	100100
49	Applicator 5CM (fixed)	100447
50	Gel	A1034X
51	Ultra II	10004
52	Straps, 24"	A1008X
53	Straps, 48"	A1009X
54	Leads, red	100222
55	Applicator 2CM (fixed)	100459
56	Applicator 10CM (fixed)	100453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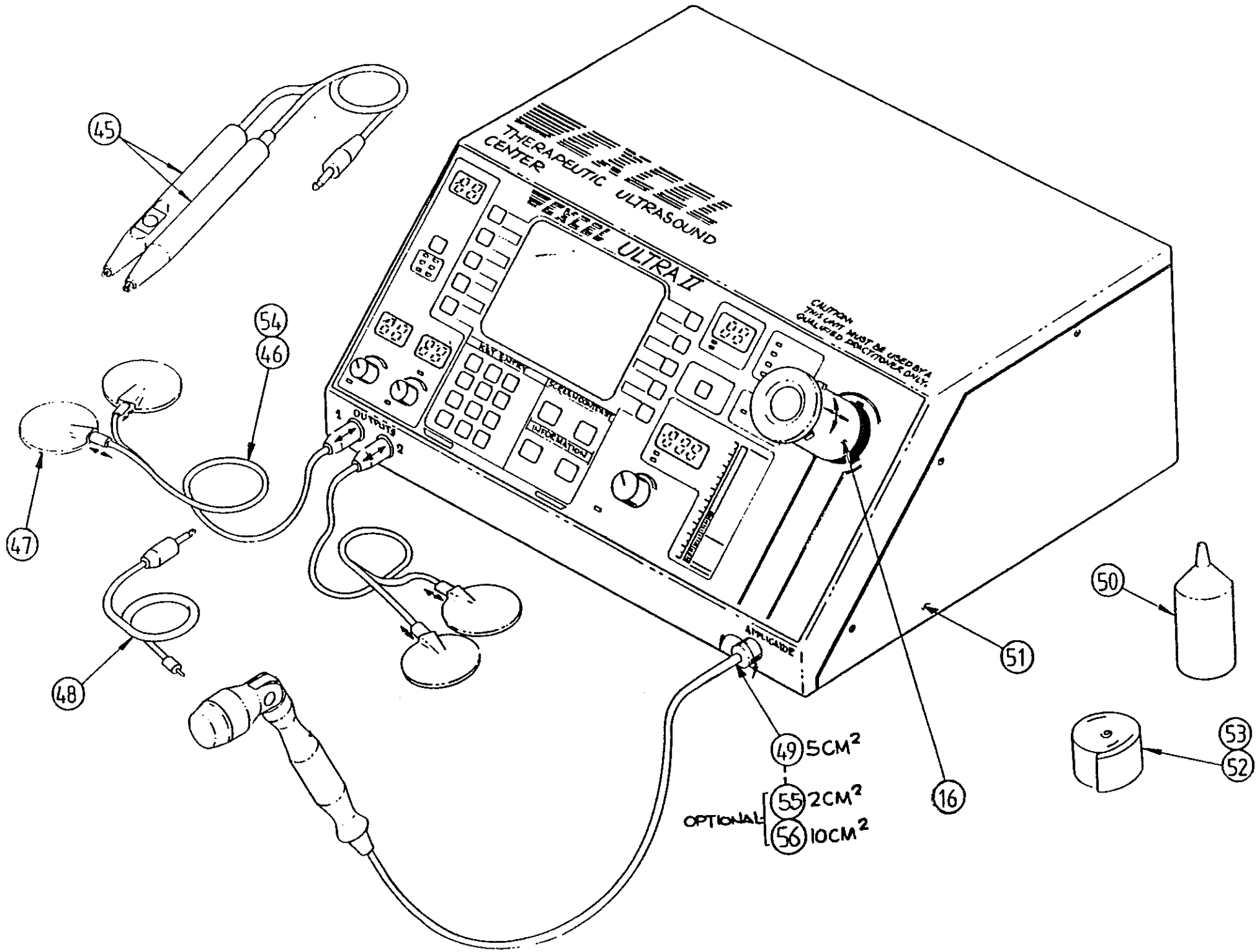

45
54
46
47
48
49 5CM²
OPTIONAL
55 2CM²
56 10CM²
16
50
51
53
52
THERAPEUTIC ULTRASOUND CENTER
ULTRA II
CAUTION
OUTPUTS
1
2

6.0 ULTRASOUND WARNINGS

DO NOT USE ULTRASOUND:

- On specialized tissues such as the eyes (cavitation in ocular fluid), ears, ovaries, testes, brain, or spinal cord

- On cancerous cells and precancerous lesions

- Over infection or infectious conditions

- Over viscera (spleen, liver, stomach)

- On pregnant uterus

- On acute sepsis

- On tumours whether malignant or benign

- After or during treatment by deep x-ray, radium or radioactive isotopes (ultrasound only after six months after completion of above treatments)

- On lungs

- On patient with haemophilia

- On deep vein thrombosis, thrombophlebitis or arterial disease

- On areas with lack of sensation (diabetics, nerve root, etc.)

- On patient with a cardiac pacemaker or the cardiac area in advanced heart disease diabetics

- Over ischemic tissue in patients with vascular disease

- Over the stellate ganglion

- After laminectomy (or use with caution because of the lack of soft tissue protection of the spinal cord)

- Over subcutaneous major nerves

- On an acute bursitis on a continuous setting because increased circulation may lead to increased inflammation of the bursa and may increase pain

- Over the epiphyseal areas of immature bones

7.0 SCHEDULE OF MAINTENANCE

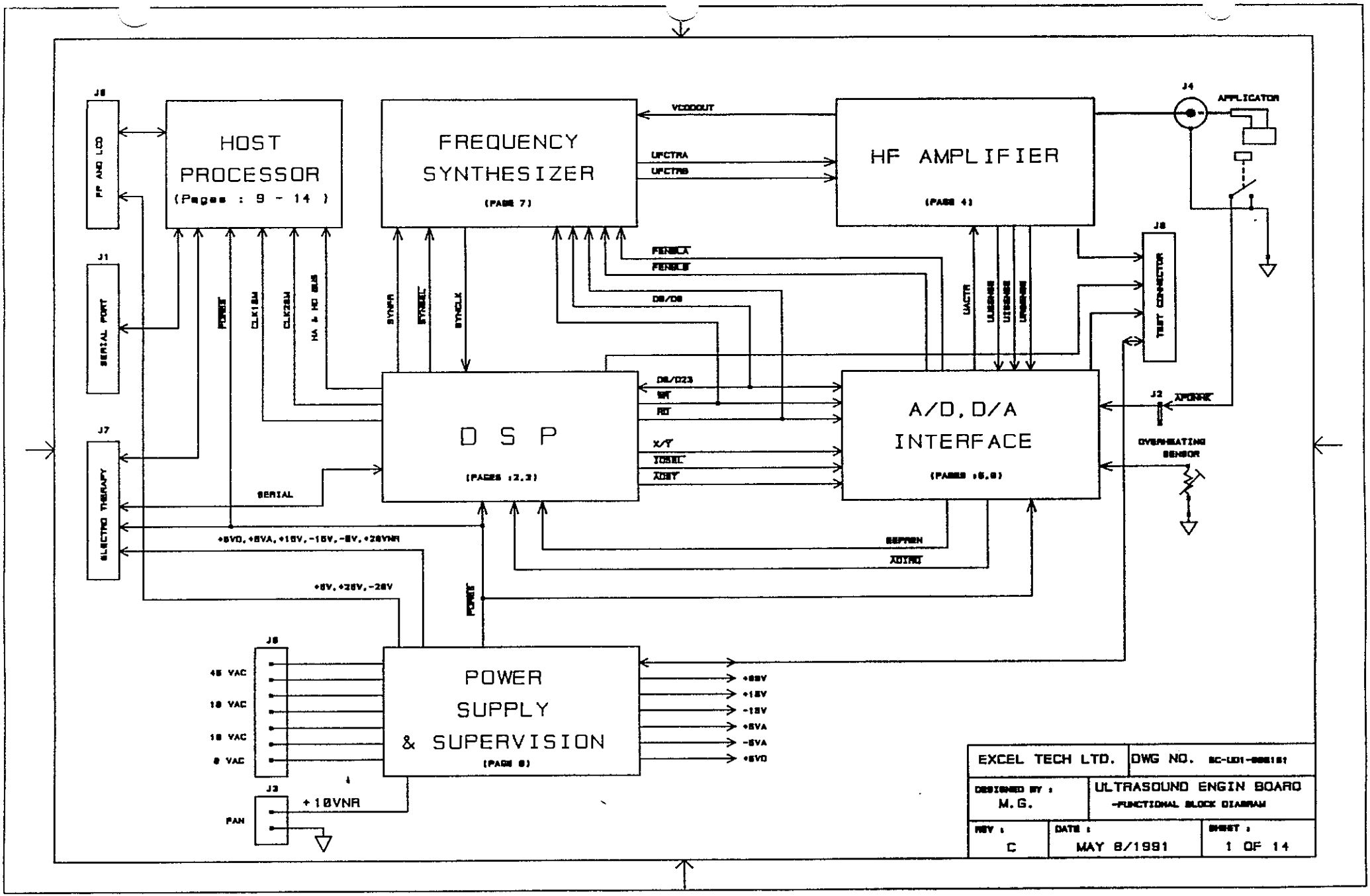
Ultrasound Power Calibration

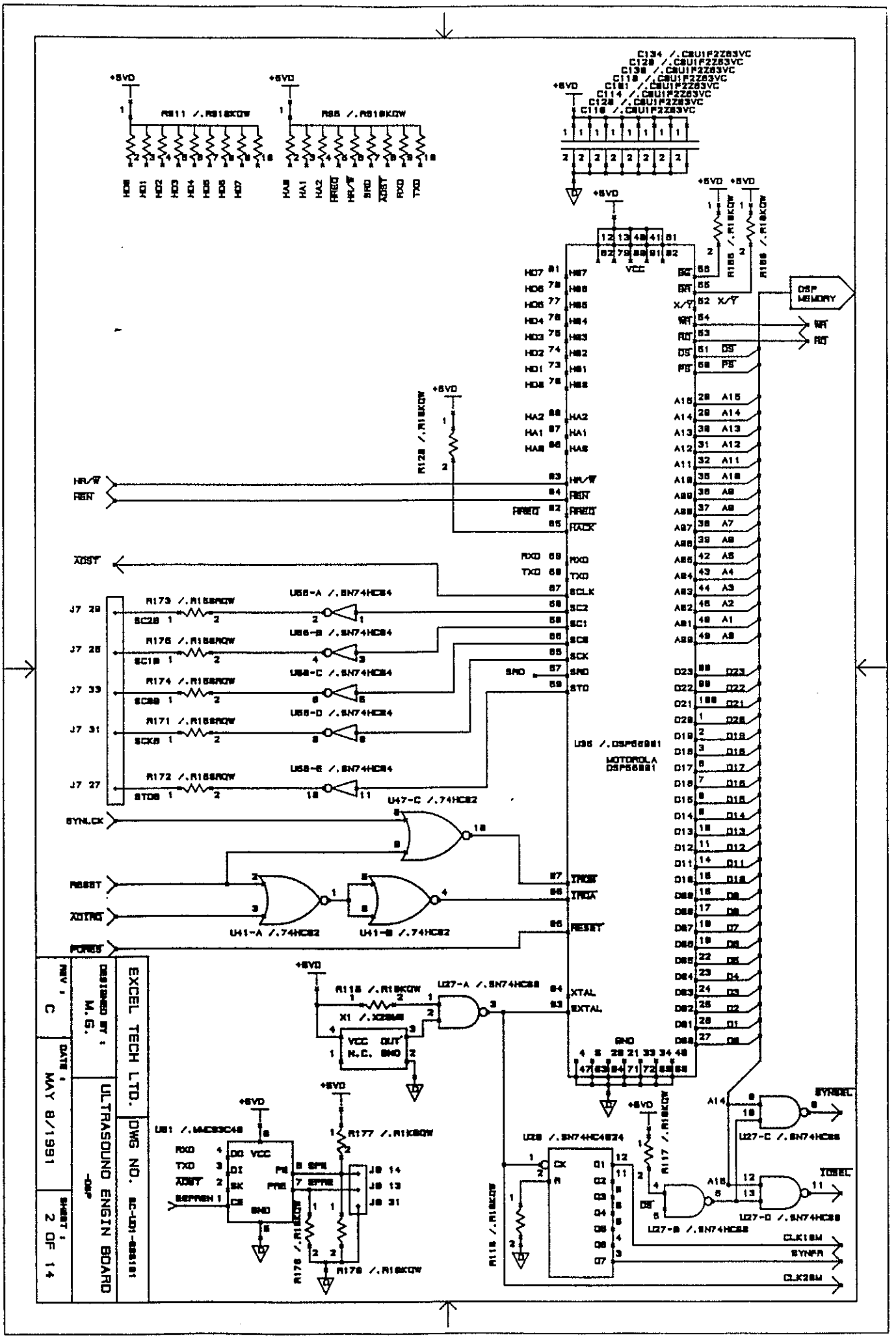
The unit will only hold power calibration data for one applicator of each size. Subsequent calibrations for other applicators of the same size will override the previous calibration for that applicator size.

The power output should be calibrated under the following conditions:

1) Whenever a new applicator is used with the unit.
2) Once yearly to ensure output accuracy.

APPENDIX A -- SCHEMATICS AND BILLS OF MATERIAL


J8
FP AND LED
HOST PROCESSOR
(Pages : 9 - 14)
FREQUENCY SYNTHESIZER
(PAGE 7)
VCODOUT
UFCTRA
UFCTRB
HF AMPLIFIER
(PAGE 4)
J4
APPLICATOR
J1
SERIAL PORT
POWER
CLK18M
CLK28M
HA & HD BUS
SYNFR
SYNSEC
SYNCLK
FENSCA
FENSCB
DB/D8
UACTR
UBSENSE
UTSENSE
UPSENSE
J8
TEST CONNECTOR
J7
ELECTRO THERAPY
D S P
(PAGES :2,3)
DB/D23
WR
RD
X/Y
TOSEL
XDSY
A/D, D/A INTERFACE
(PAGES :5,6)
J2
XPOWR
OVERHEATING SENSOR
SERIAL
+5VD, +5VA, +15V, -15V, -5V, +28VNR
EEPREN
XDIRQ
+5V, +28V, -28V
POWER
J6
45 VAC
18 VAC
18 VAC
8 VAC
POWER SUPPLY & SUPERVISION
(PAGE 8)
+5V
+15V
-15V
+5VA
-5VA
+5VD
J3
FAN
+10VNR
EXCEL TECH LTD.
DWG NO. SC-LD1-000151
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
-FUNCTIONAL BLOCK DIAGRAM
REV : C
DATE : MAY 8/1991
SHEET : 1 OF 14


+5VD
RS11 /.RS16X0W
RS6 /.RS16X0W
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HA0 HA1 HA2 AREQ HR/W REN XOST RXD TXD
C134 /.C8U1F2Z83VC
C129 /.C8U1F2Z83VC
C130 /.C8U1F2Z83VC
C118 /.C8U1F2Z83VC
C131 /.C8U1F2Z83VC
C114 /.C8U1F2Z83VC
C128 /.C8U1F2Z83VC
C116 /.C8U1F2Z83VC
VCC
R128 /.R16KOW
R165 /.R16KOW
R166 /.R16KOW
DSP MEMORY
WR
RD
HR/W
REN
AREQ
RXD
TXD
SCLK
SC2
SC1
SC0
SCK
SRD
STD
XOST
R173 /.R16KOW
R175 /.R16KOW
R174 /.R16KOW
R171 /.R16KOW
R172 /.R16KOW
U56-A /.SN74HC04
U56-B /.SN74HC04
U56-C /.SN74HC04
U56-D /.SN74HC04
U56-E /.SN74HC04
J7 29
J7 25
J7 33
J7 31
J7 27
SC2B
SC1B
SC0B
SCKB
STDB
U56 /.DSP56001
MOTOROLA
DSP56001
SYNLCK
RESET
XOINT
PORES
U47-C /.74HC02
U41-A /.74HC02
U41-B /.74HC02
TRDB
TRDA
RESET
XTAL
EXTAL
R118 /.R16KOW
X1 /.X20MM
U27-A /.SN74HC08
VCC
N.C.
GND
U61 /.MAC89C48
R177 /.R1KBOW
R176 /.R16KOW
R178 /.R16KOW
J8 14
J8 13
J8 31
U28 /.SN74HC4824
R117 /.R16KOW
U27-C /.SN74HC08
U27-D /.SN74HC08
U27-B /.SN74HC08
A14
A15
SYNSEL
IOSEL
CLK16M
SYNFR
CLK20M
EXCEL TECH LTD.
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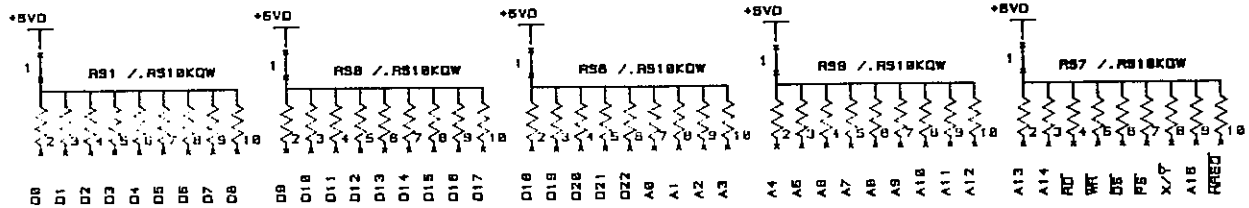
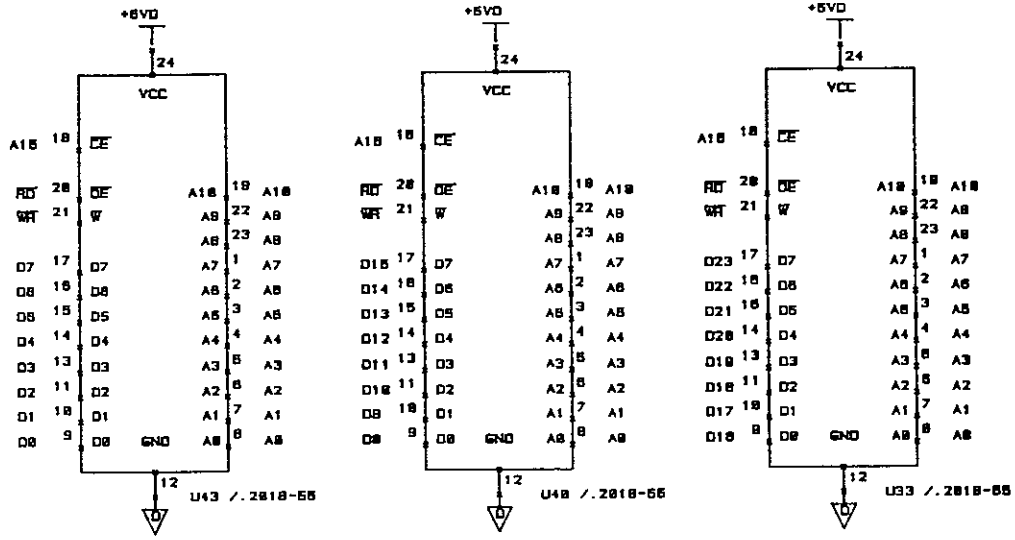
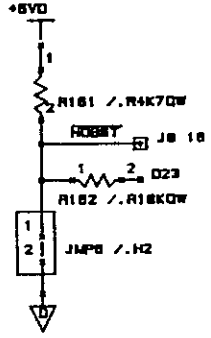
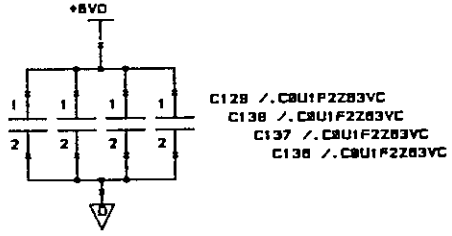
DWG NO. SC-U01-88181
REV : C
DESIGNED BY : M.S.
DATE : MAY 8/1991
SHEET : 2 OF 14









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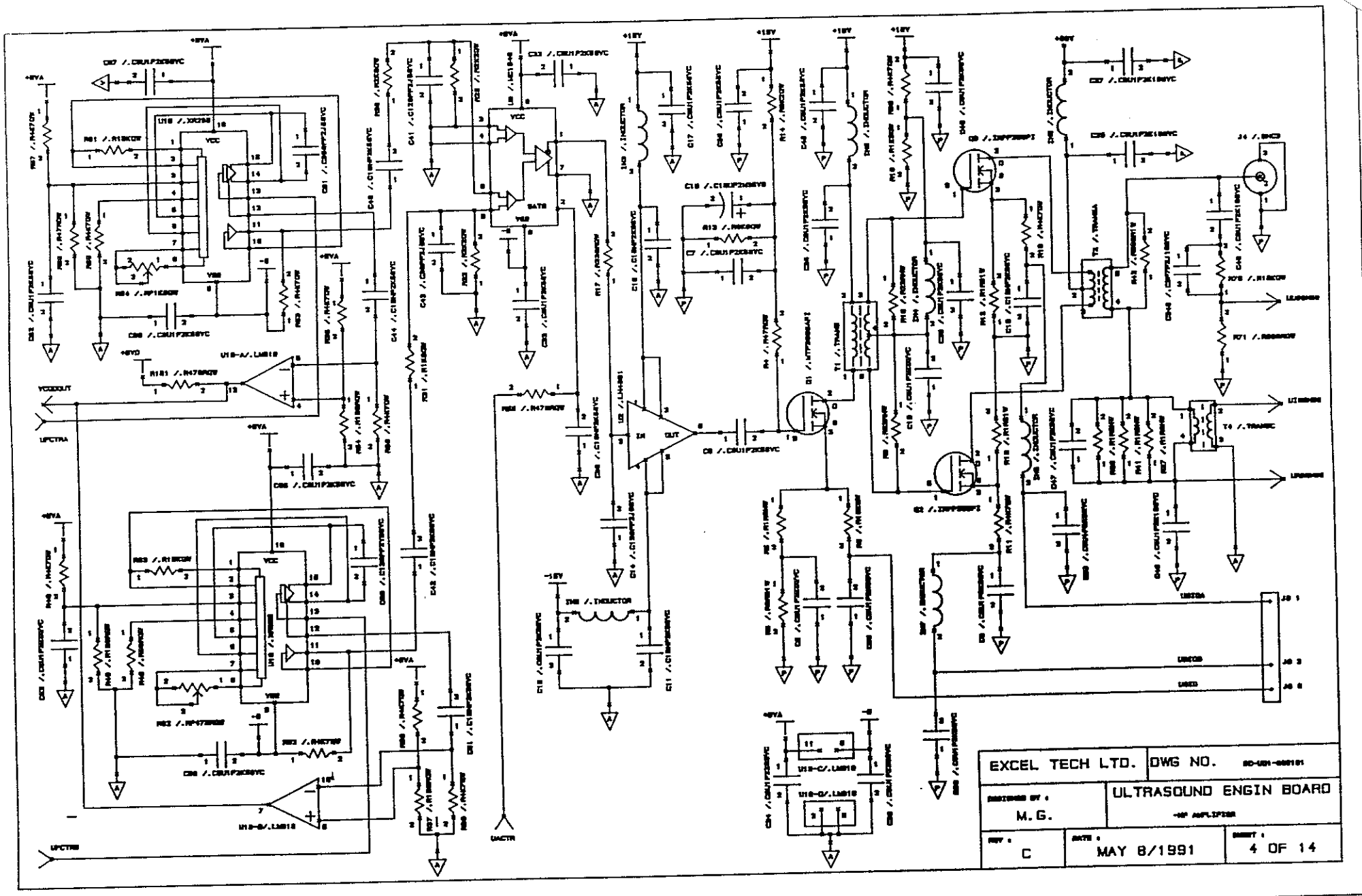
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DWG NO.
ULTRASOUND ENGIN BOARD
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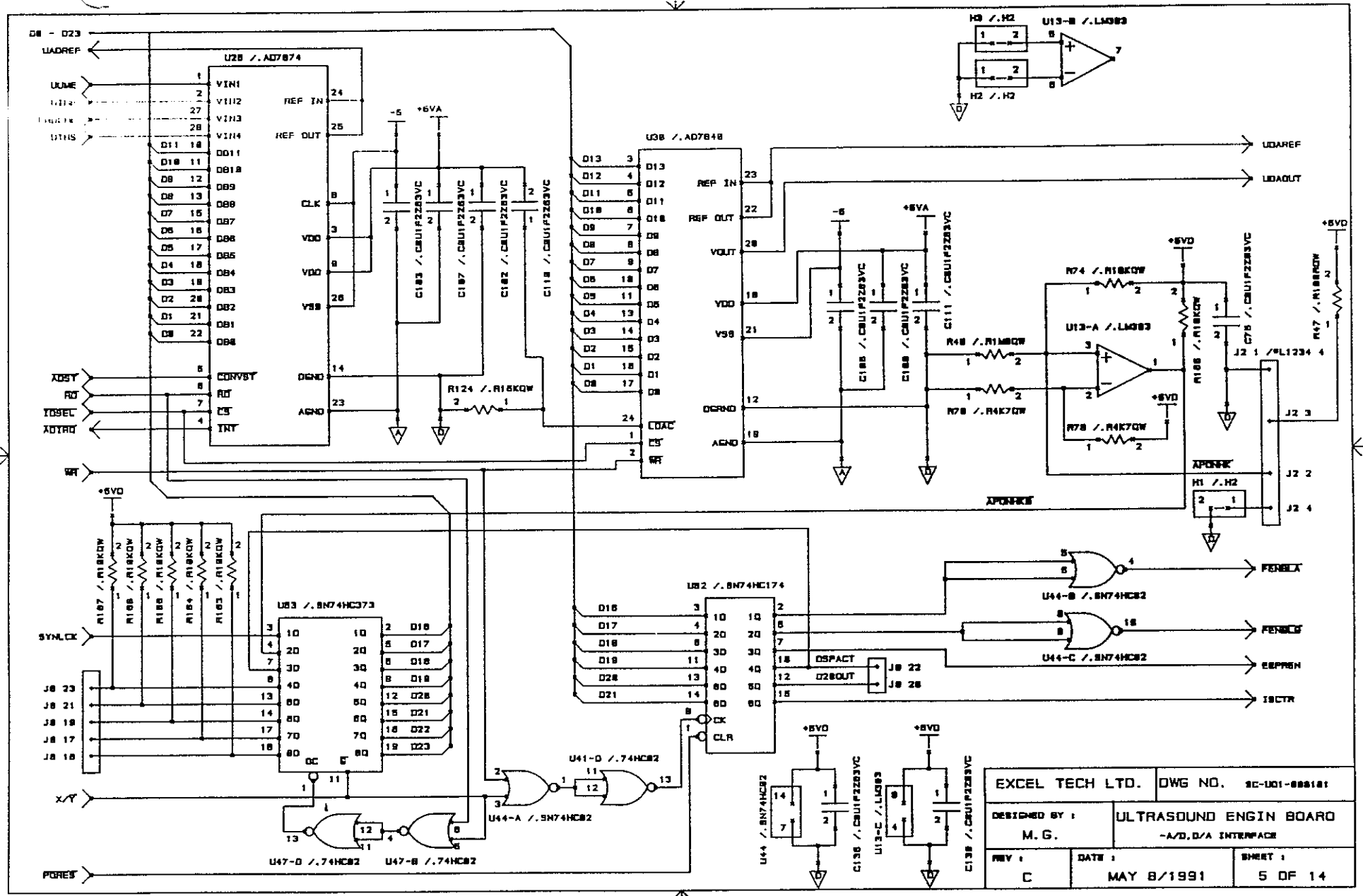
4 OF 14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VIN4
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AGND
CONVST
RD
CS
INT
XDST
RD
YDSEL
XDTRD
WR
U38 /.AD7848
REF IN
REF OUT
VOUT
VDD
VSS
DGND
AGND
CDAC
CS
WR
UDAREF
UDAOUT
H2 /.H2
U13-B /.LM393
R124 /.R15KOW
R48 /.R1MEGW
R78 /.R4K7OW
R74 /.R15KOW
U13-A /.LM393
R76 /.R15KOW
R47 /.R15KOW
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J2 3
J2 2
J2 4
APONNK
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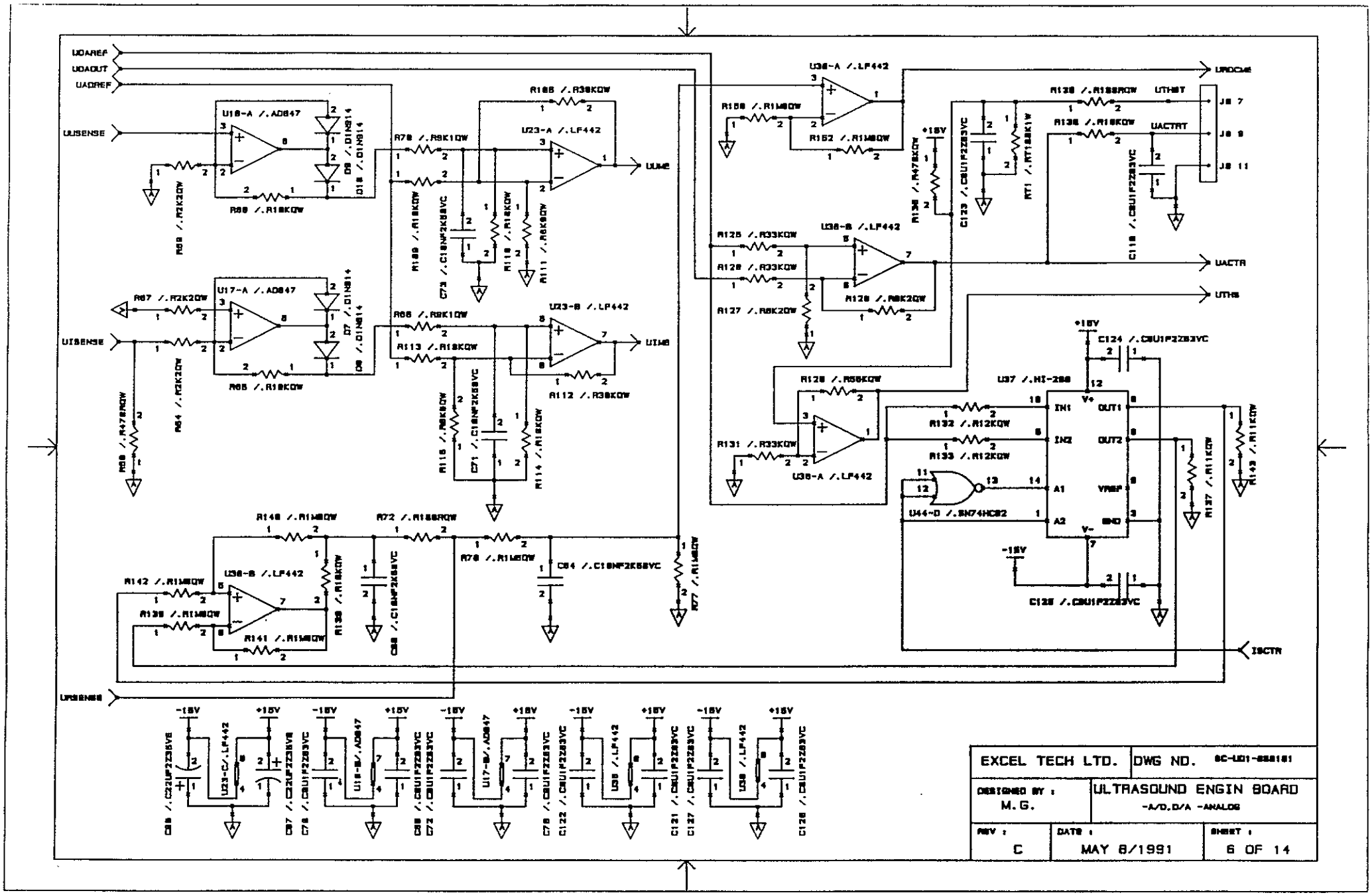
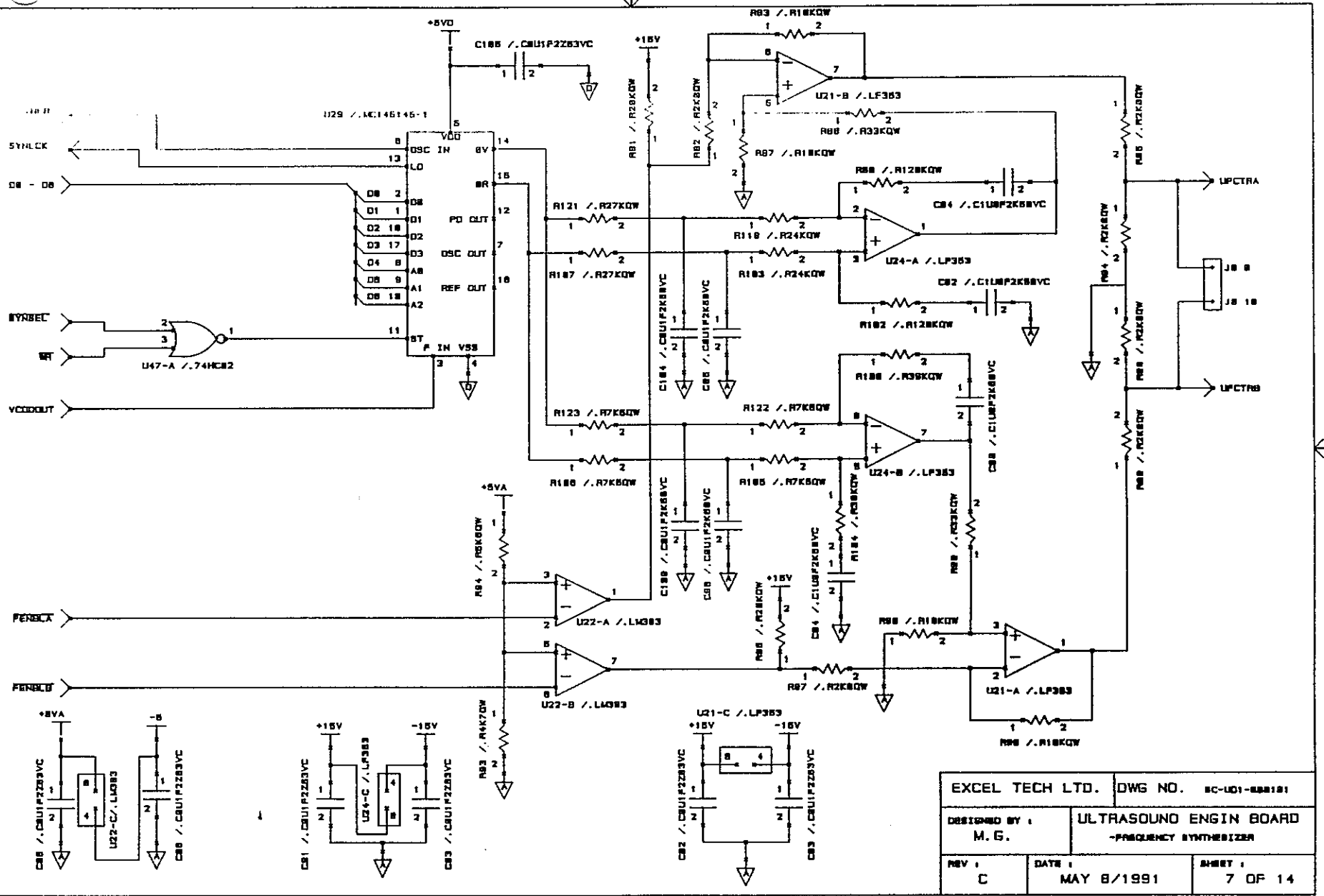
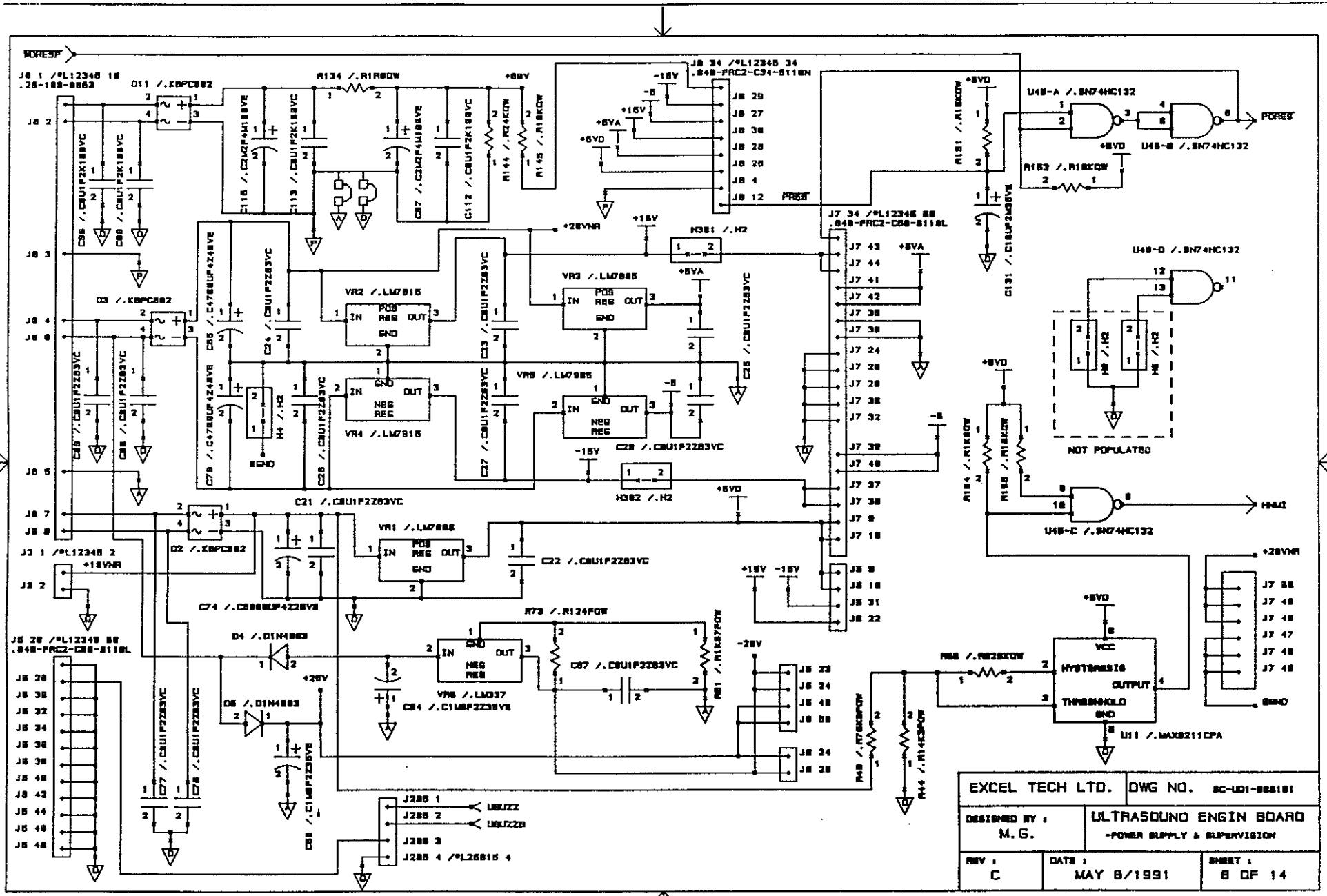
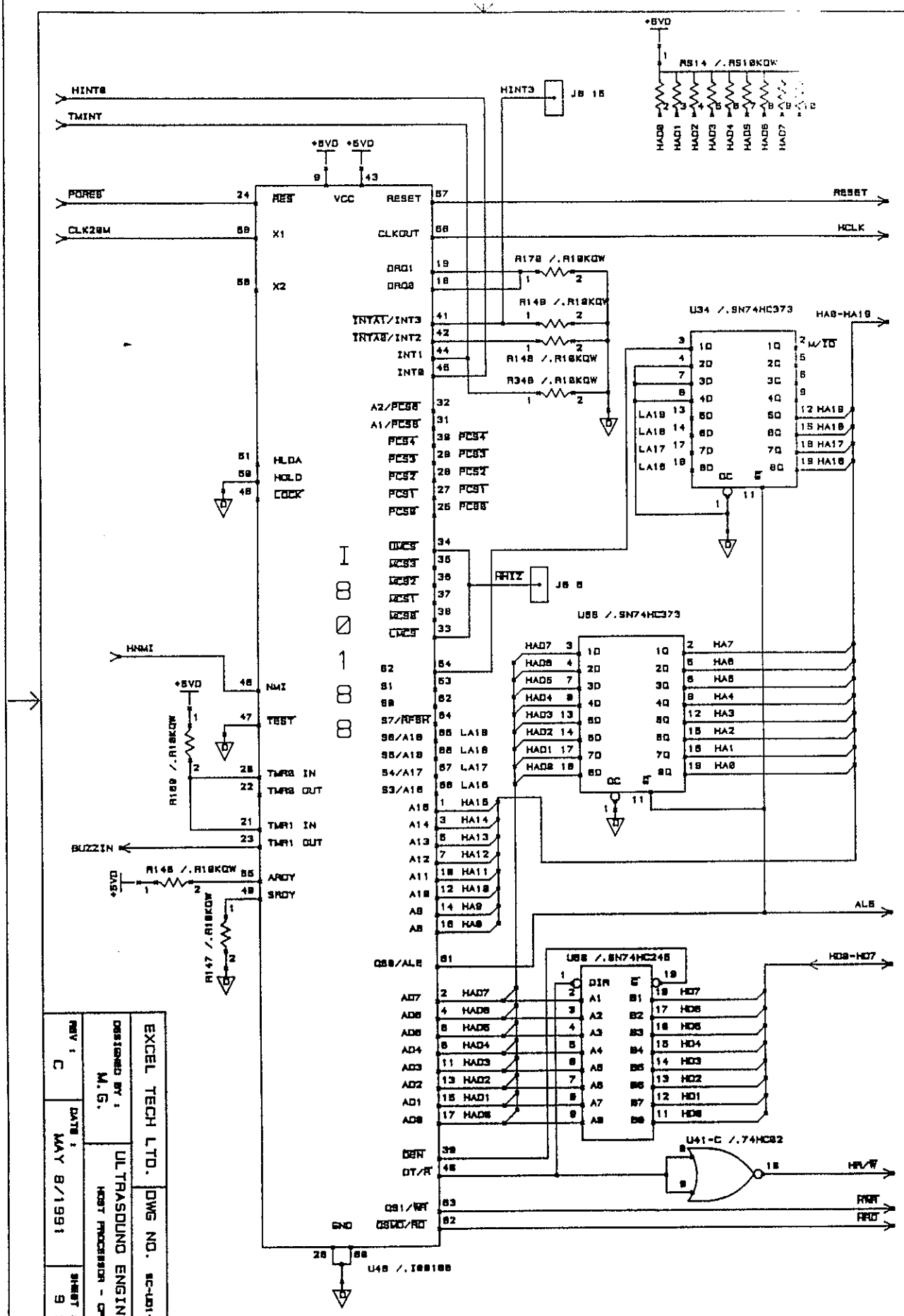
SYNLCK
J8 23
J8 21
J8 19
J8 17
J8 15
X/Y
PDRES
U83 /.SN74HC373
U82 /.SN74HC174
U41-D /.74HC02
U44-A /.SN74HC02
U47-D /.74HC02
U47-B /.74HC02
U44-B /.SN74HC02
U44-C /.SN74HC02
U44 /.SN74HC02
U13-C /.LM393
FENBLA
FENBLB
ESPREN
ISCTR
DSPACT
D28OUT
J8 22
J8 26
EXCEL TECH LTD.
DWG NO. SC-U01-000101
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
-A/D,D/A INTERFACE
REV : C
DATE : MAY 8/1991
SHEET : 5 OF 14



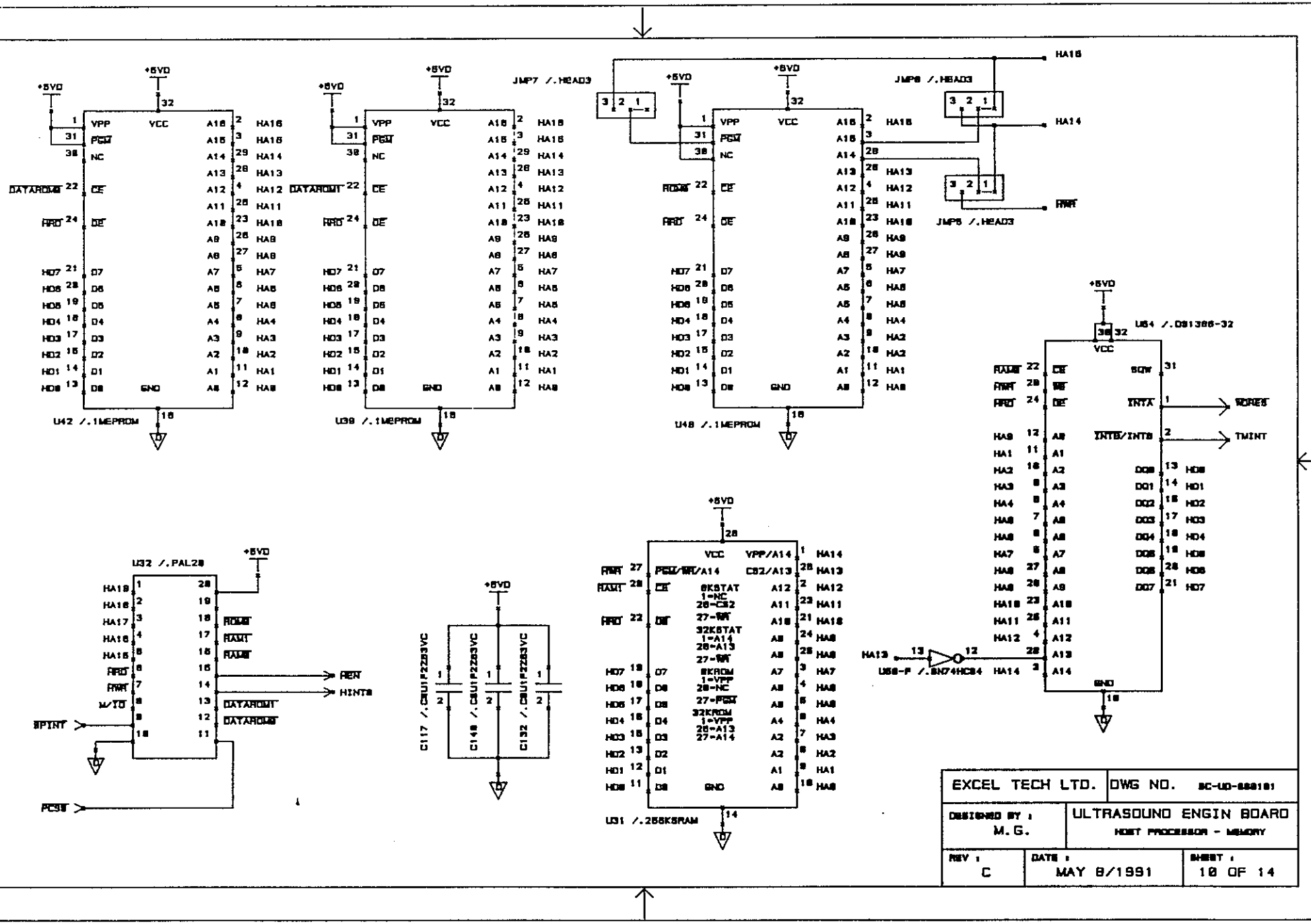
EXCEL TECH LTD.	DWG NO.	SC-UD1-888181
DESIGNED BY : M.G.	ULTRASOUND ENGIN BOARD -A/D,D/A -ANALOG	
REV : C	DATE : MAY 8/1991	SHEET : 6 OF 14

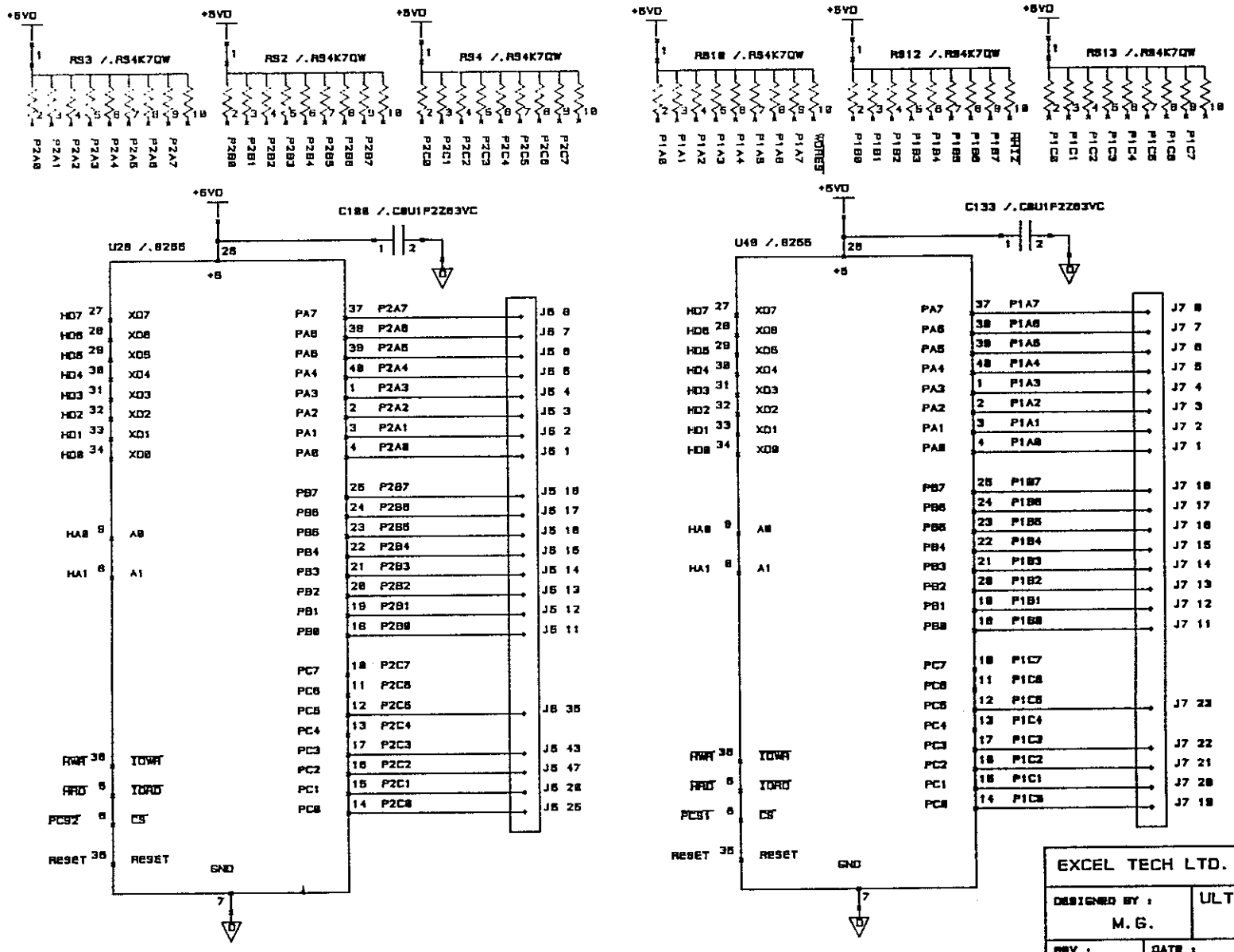

+5VD
C185 /.C8U1F2Z83VC
U29 /.MC145145-1
SYNLCK
D8 - D0
SYNBEC
WR
VCOOOUT
U47-A /.74HC02
+15V
R93 /.R16KQW
R91 /.R20KQW
R92 /.R2K8QW
R87 /.R18KQW
U21-B /.LF353
R88 /.R33KQW
R89 /.R12BKQW
C84 /.C1U8F2K88VC
R121 /.R27KQW
R187 /.R27KQW
R118 /.R24KQW
R183 /.R24KQW
U24-A /.LP353
C82 /.C1U8F2K88VC
R182 /.R12BKQW
C184 /.C8U1F2K88VC
C85 /.C8U1F2K88VC
R186 /.R39KQW
R122 /.R7K8QW
R123 /.R7K8QW
R185 /.R7K8QW
U24-B /.LP353
C88 /.C1U8F2K88VC
R94 /.R5K8QW
C186 /.C8U1F2K88VC
C86 /.C8U1F2K88VC
R184 /.R39KQW
R90 /.R33KQW
+5VA
U22-A /.LM393
PENBLA
PENBLB
U22-B /.LM393
R96 /.R20KQW
R97 /.R2K8QW
R98 /.R18KQW
U21-A /.LP353
R99 /.R18KQW
R93 /.R4K7QW
R84 /.R2K8QW
R85 /.R2K8QW
R86 /.R2K8QW
R95 /.R2K8QW
UPCTRA
UPCTRB
J8 8
J8 18
-5
U22-C/.LM393
C8A /.C8U1F2Z83VC
C8B /.C8U1F2Z83VC
U24-C /.LP353
C81 /.C8U1F2Z83VC
C83 /.C8U1F2Z83VC
U21-C /.LP353
C82 /.C8U1F2Z83VC
C83 /.C8U1F2Z83VC
EXCEL TECH LTD.
DWG NO. SC-UD1-8B8181
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
-FREQUENCY SYNTHESIZER
REV : C
DATE : MAY 8/1991
SHEET : 7 OF 14


EXCEL TECH LTD.
DWG NO. SC-UD1-888181
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
-POWER SUPPLY & SUPERVISION
REV : C
DATE : MAY 8/1991
SHEET : 8 OF 14

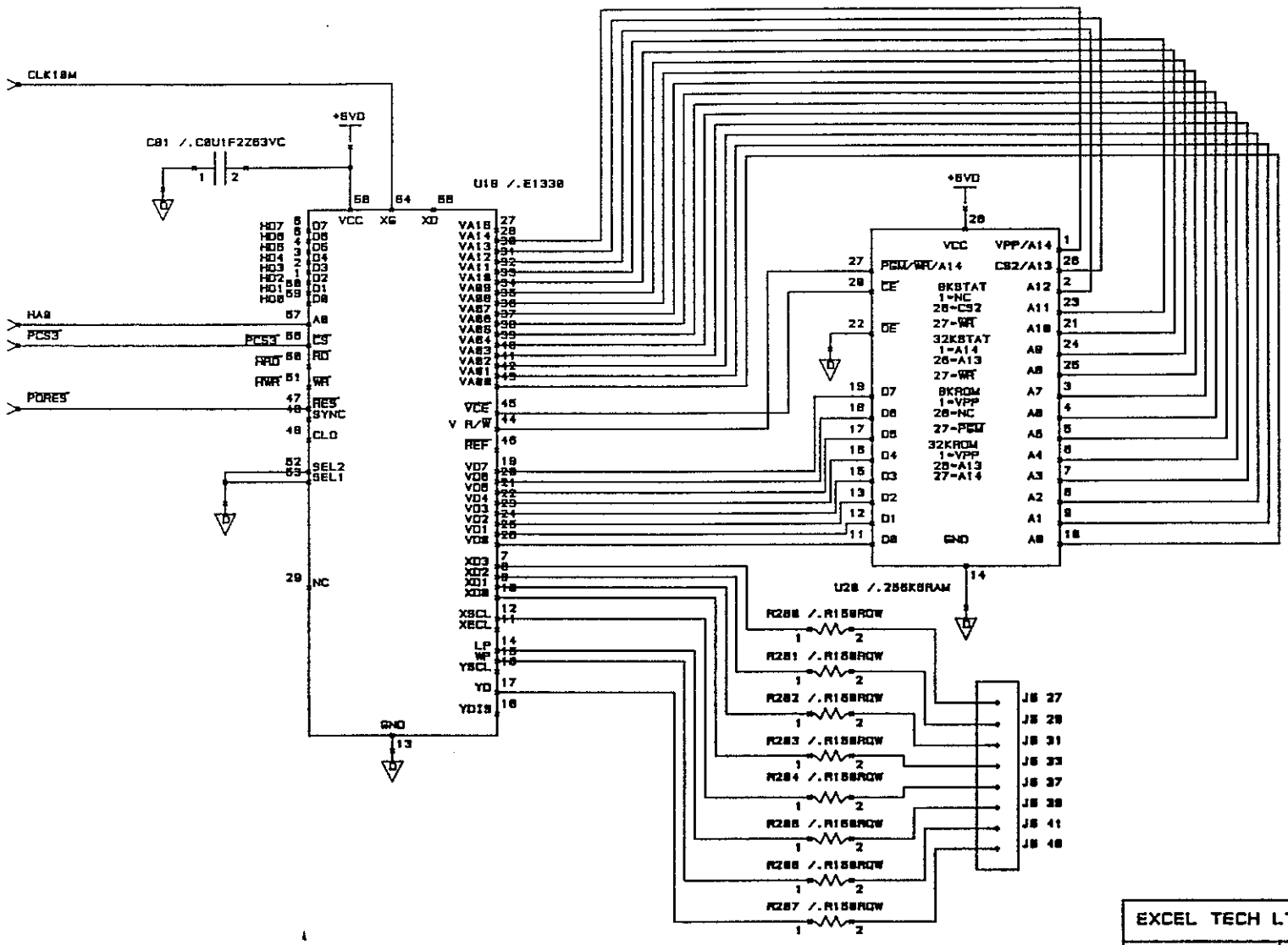


EXCEL TECH LTD.	DWG NO. SC-UD1-88181	REV : C
DESIGNED BY : M.G.	ULTRASOUND ENGIN BOARD	DATE : MAY 8/1991
	HOST PROCESSOR - CPU	SHEET : 9 OF 14

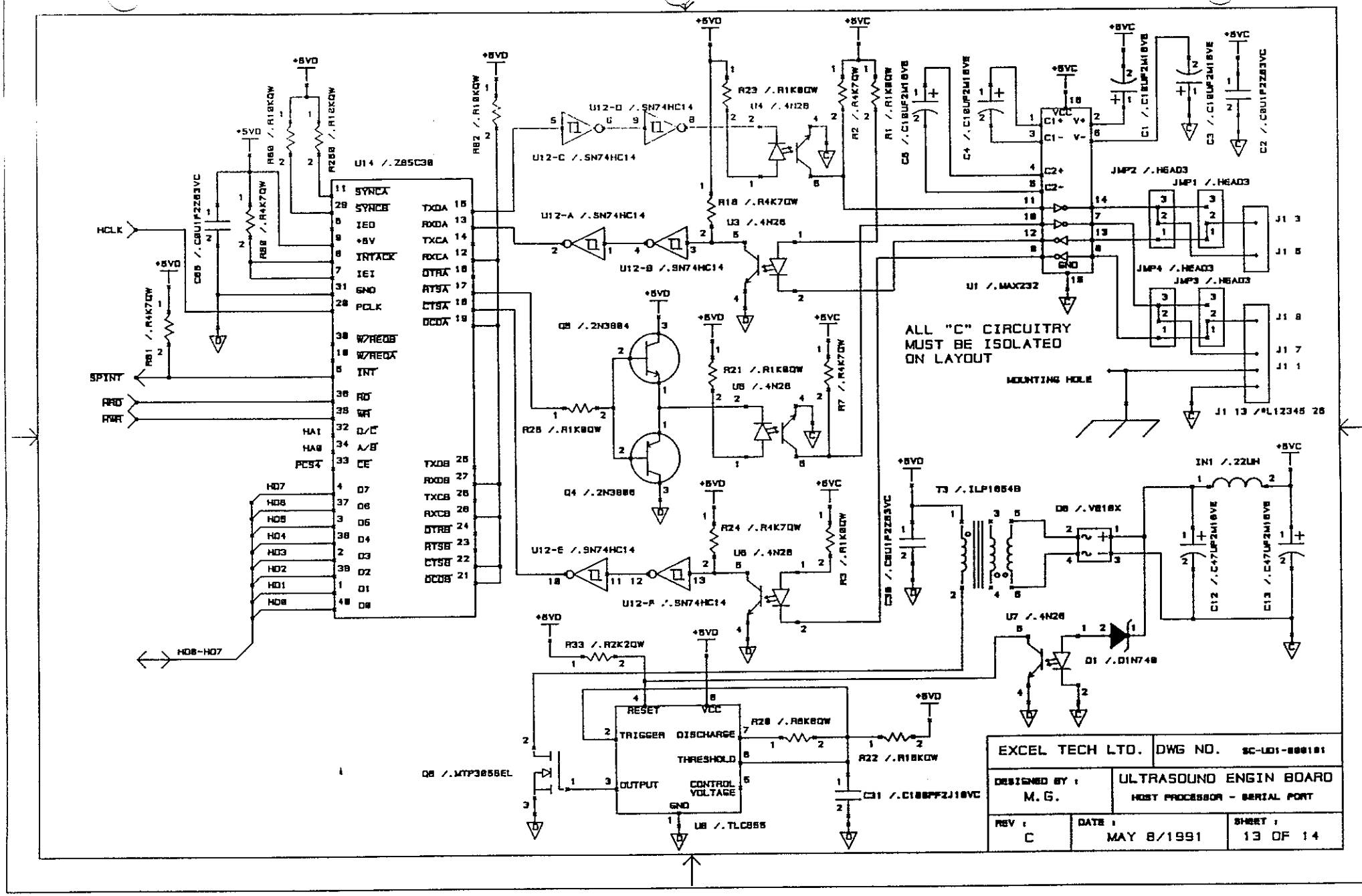

U42 /.1MEPROM
U39 /.1MEPROM
U48 /.1MEPROM
JMP7 /.HEAD3
JMP8 /.HEAD3
JMP5 /.HEAD3
U64 /.DS1386-32
U32 /.PAL28
U31 /.256KSRAM
U58-F /.SN74HC04
C117 /.CSU1F225Z3VC
C148 /.CSU1F225Z3VC
C132 /.CSU1F225Z3VC
EXCEL TECH LTD.
DWG NO. SC-UD-000101
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
HOST PROCESSOR - MEMORY
REV : C
DATE : MAY 8/1991
SHEET : 10 OF 14

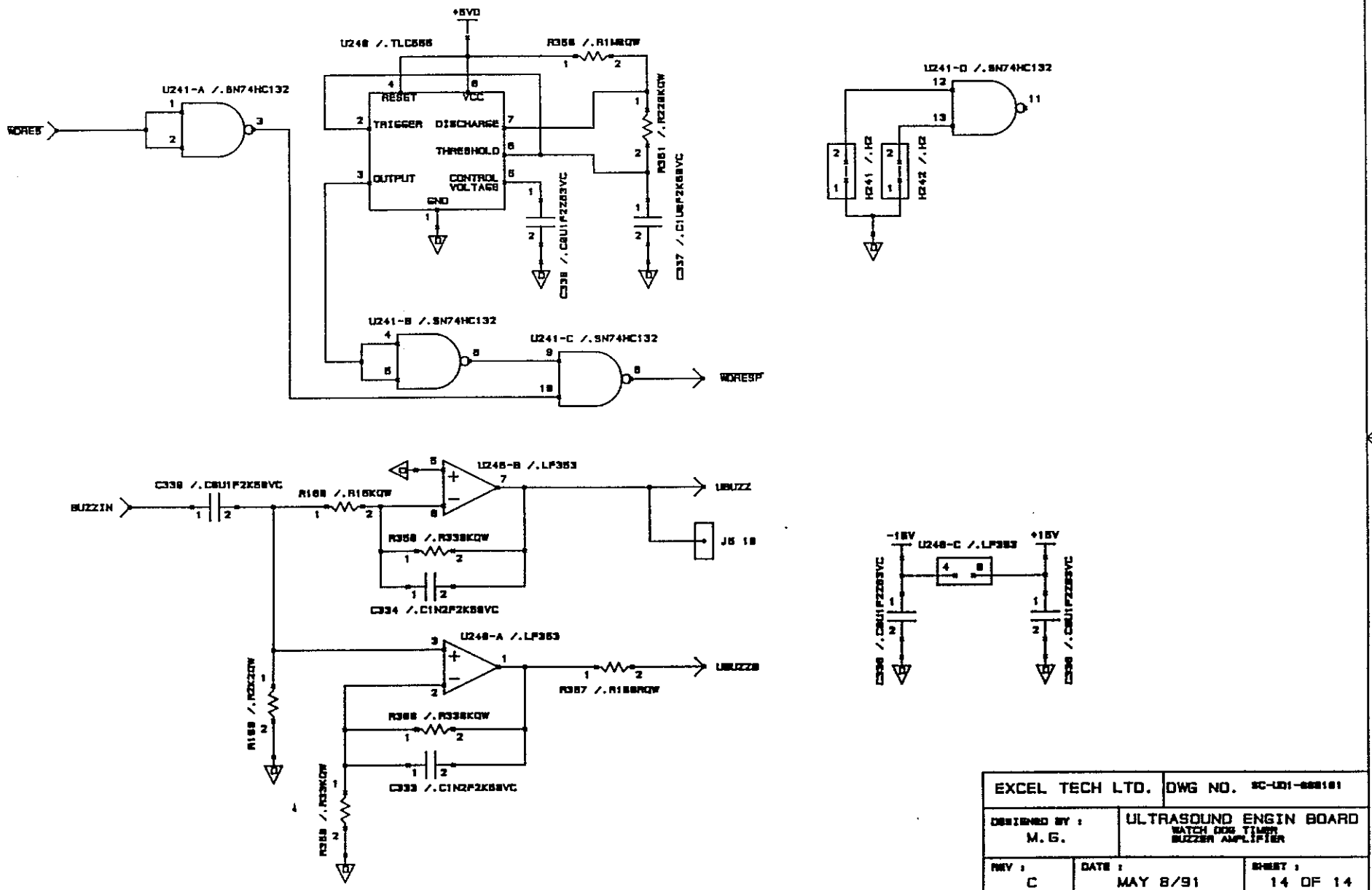


EXCEL TECH LTD.	DWG NO. SC-U01-888181	
DESIGNED BY : M.G.	ULTRASOUND ENGIN BOARD HOST PROCESSOR - PPI	
REV : C	DATE : MAY 8/1991	SHEET : 11 OF 14



EXCEL TECH LTD.	DWG NO. SC-U01-S60101	
DESIGNED BY : M.G.	ULTRASOUND ENGIN BOARD HOST PROCESSOR - LCD CONTROLLER	
REV : C	DATE : MAY 8/1991	SHEET : 12 OF 14


U14 /.Z85C30
U12-D /.SN74HC14
U12-C /.SN74HC14
U12-A /.SN74HC14
U12-B /.SN74HC14
U12-E /.SN74HC14
U12-F /.SN74HC14
U1 /.MAX232
U3 /.4N26
U4 /.4N26
U5 /.4N26
U6 /.4N26
U7 /.4N26
U8 /.TLC555
Q3 /.2N3904
Q4 /.2N3906
Q8 /.MTP3055EL
T3 /.ILP1654B
D1 /.D1N748
D8 /.VB18X
IN1 /.22UH
JMP1 /.HEAD3
JMP2 /.HEAD3
JMP3 /.HEAD3
JMP4 /.HEAD3
J1 3
J1 5
J1 8
J1 7
J1 1
J1 13 /*L12345 26
MOUNTING HOLE
ALL "C" CIRCUITRY
MUST BE ISOLATED
ON LAYOUT
HCLK
SPINT
HD7
HD8
HD9
HD4
HD3
HD2
HD1
HD0
HD8~HD7
+5VD
+5VC
EXCEL TECH LTD.
DWG NO. SC-UD1-000101
DESIGNED BY : M.G.
ULTRASOUND ENGIN BOARD
HOST PROCESSOR - SERIAL PORT
REV : C
DATE : MAY 8/1991
SHEET : 13 OF 14



EXCEL TECH LTD.	DWG NO. SC-UD1-000101	
DESIGNED BY : M.G.	ULTRASOUND ENGIN BOARD WATCH DOG TIMER BUZZER AMPLIFIER	
REV : C	DATE : MAY 8/91	SHEET : 14 OF 14

UPDATED 12/02/10 CHECKED 122 Mgn

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REF	PID	PD1	FEB 10,1992 EDI JANUARY 16, 1992
0000	ULTRA II MAIN	REVISION C0 C0A	
C006	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C007	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C008	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C009	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C010	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C011	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C014	C1095X	CAP, CER, DIS, 120 PFD.,	CK05BX121K
C015	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C016	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C017	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C018	C7061X	CAP,ELC,TAN,10UFD,35V	TAP10M35
C019	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C020	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C021	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C022	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C023	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C024	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C025	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C026	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C027	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C028	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C029	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C030	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C032	C2909X	CAP,FLM,DIS,1UFD 100V	C330C105K5R5CA
C033	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C034	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C035	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C036	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C037	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C039	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C040	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C041	C1095X	CAP, CER, DIS, 120 PFD.,	CK05BX121K
C042	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C043	C1087X	CAP,CER,DIS,39PFD,100V	681-10399
C044	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C045	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C046	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C047	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C048	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C049	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C050	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C051	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C052	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C053	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C054	C5186X	CAP,ELC,RAD,470UFD,40V	035-57471
C055	C5186X	CAP,ELC,RAD,470UFD,40V	035-57471
C056	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C057	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C058	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C059	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C060	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C061	C1015X	CAP, CER, DIS,390 PFD, 10	630-08391
C062	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C063	C1095X	CAP, CER, DIS, 120 PFD.,	CK05BX121K
C064	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C065	C6903X	4700UF/40V	80D472P050JE5
C066	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA

)0156

REF	PID	PD1	PD2
C067	C2909X	CAP,FLM,DIS,1UFD 100V	C330C105K5R5CA
C068	C2909X	CAP,FLM,DIS,1UFD 100V	C330C105K5R5CA
C069	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C070	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C071	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C072	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C073	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C074	C5179X	6800UF/50V	80D682P050KE5
C075	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C076	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C079	C6903X	4700UF/40V	80D472P050JE5
C081	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C082	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C083	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C084	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C085	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C086	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C087	C7063X	CAP,ELC,TAN,22UFD,35V	TAP22M35
C088	C7063X	CAP,ELC,TAN,22UFD,35V	TAP22M35
C090	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C091	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C092	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C093	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C094	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C095	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C096	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C097	C6950X	CAP EL 2200UF/100V/M	80D222P100KE5
C100	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C101	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C102	C7036X	CAP,TA,47UF/16V/M	TAP47M16
C103	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C104	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C105	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C106	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C107	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C108	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C109	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C110	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C111	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C112	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C113	C1929X	CAP,CER,DIS,100NFD,100V	CK06BX104K
C114	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C115	C6950X	CAP EL 2200UF/100V/M	80D222P100KE5
C116	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C117	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C118	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C119	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C120	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C121	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C122	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C123	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C124	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C125	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C126	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C127	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C128	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C129	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C130	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA

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ULTRA

REF	PID	PD1	PD2
C131	C7061X	CAP,ELC,TAN,10UFD,35V	TAP10M35
C132	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C133	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C134	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C135	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C136	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C137	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C138	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C139	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C140	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C249	C1059X	2.7PF, 100V, CER PL. CAP	681-09278
C333	C1025X	1.2 NF CER CAP 50V	630-09122
C334	C1025X	1.2 NF CER CAP 50V	630-09122
C335	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C336	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C337	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C338	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C339	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
CBL1	100166	ULTRA, TRIAX CABLE	
D002	D5040X	DIODE,ASS'Y,6A,200V	KBPC602
D003	D5040X	DIODE,ASS'Y,6A,200V	KBPC602
D004	D4003X	DIODE,PWR,1A,200V	1N4003
D005	D4003X	DIODE,PWR,1A,200V	1N4003
D007	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D008	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D009	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D010	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D011	D5040X	DIODE,ASS'Y,6A,200V	KBPC602
H001	100155	ULTRA, HEAT SINK, MAIN BD	
IN02	L1137X	FERRITE	ETA-BF60-1HO-1
IN03	L1137X	FERRITE	ETA-BF60-1HO-1
IN04	L1137X	FERRITE	ETA-BF60-1HO-1
IN05	L1137X	FERRITE	ETA-BF60-1HO-1
IN06	L1137X	FERRITE	ETA-BF60-1HO-1
IN07	L1137X	FERRITE	ETA-BF60-1HO-1
IN09	L1137X	FERRITE	ETA-BF60-1HO-1
INS1	100257	INSULATOR TO-220 SILPAD	1886-58
INS2	100257	INSULATOR TO-220 SILPAD	1886-58
J002	J3013M	CON,REC,M,PWB,4 POS	MFSS100-4
J003	J3011M	CONNECTOR,	2 PIN, MLSS100-2
J005	J1001M	CON,HDR,M,10 POS	10-88-7106
→ J006	~~J0100X~~ J0102X	CONNECTOR POWER 08PIN/.2	MVSTBR1.5/8-5T-5.08
J007	J1001M	CON,HDR,M,10 POS	10-88-7106
→ J008	~~J5126X~~ J1001M	CON,HDR,F/C,34POS	10-88-1340
MTL1	100173	ULTRA,SHIELD LOWER	SHIELD -
P001	P4007X	ULTRA II MOTHER BOARD	UD1-000101
Q001	Q0306X	A3055E	MTA3055E
Q002	Q0307X	TRAMS. POWER MOSFET	MTG20N20
Q003	Q0307X	TRAMS. POWER MOSFET	MTG20N20
R004	R1041C	RES,CAR,FLM,1/4W,5%,47R0	CR25-47R0
→ R005	~~R2001E~~ R1001E	RES,MTL,FLM,1/2W,1%,1R00	SFR25F-1R00
R006	R2010F	RES,MTL,FLM,1W,1%,6R8	PRO1/6R8
R008	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R009	R2100E	RES,MTL,FLM,1/2W,1%,22R0	5053HM22R00J
R010	R2001F	RES,MTL,FLM,1W,1%,1R00	PRO1/1ROO
R011	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R012	R2001F	RES,MTL,FLM,1W,1%,1R00	PRO1/1ROO
R013	R1093C	RES,CAR,FLM,1/4W,5%,6K80	CR25-6K80

.00156 REF	PID	PD1	PD2
R014	R1095C	RES,CAR,FLM,1/4W,5%,8K20	CR25-8K20
R015	R2100E	RES,MTL,FLM,1/2W,1%,22R0	5053HM22R00J
R016	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R017	R1061C	RES,CAR,FLM,1/4W,5%,330R	CR25-330R
R019	R1076C	RES,CAR,FLM,1/4W,5%,1K3	CR25-1K3
R025	R2298C	RES,MTL,FLM,1/4W,1%,4K22	MR25F-4K22
→ R027	~~R2001E~~ R1001E	RES,MTL,FLM,1/2W,1%,1R00	SFR25F-1R00
→ R028	~~R2001E~~ R1001E	RES,MTL,FLM,1/2W,1%,1R00	SFR25F-1R00
R029	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R030	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R031	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R032	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R034	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R035	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R036	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R037	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R038	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R039	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R040	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
→ R041	~~R2001E~~ R1001E	RES,MTL,FLM,1/2W,1%,1R00	SFR25F-1R00
R042	R1067E	RES,CAR,FLM,1/2W,5%,560R	SFR25F-560R
R044	R2350C	RES,MTL,FLM,1/4W,1%,14K3	MR25F-14K3
R045	R2420C	RES,MTL,FLM,1/4W,1%,75K0	MR25F-75K0
R046	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R047	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R048	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R049	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R050	R1143C	RES,CAR,FLM,1/4W,5%,820K	CR25-820K
R051	R1078C	RES,CAR,FLM,1/4W,5%,1K8	CR25-1K8
R052	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R053	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R054	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R055	R1065C	RES,CAR,FLM,1/4W,5%,470R	CR25-470R
R056	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R057	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R058	R1065C	RES,CAR,FLM,1/4W,5%,470R	CR25-470R
R059	R1045C	RES,CAR,FLM,1/4W,5%,68R0	CR25-68R0
R060	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R061	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R062	R1065C	RES,CAR,FLM,1/4W,5%,470R	CR25-470R
R063	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R064	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R065	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R066	R1096C	RES,CAR,FLM,1/4W,5%,9K10	CR25-9K10
R067	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R068	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R069	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R070	R1096C	RES,CAR,FLM,1/4W,5%,9K10	CR25-9K10
R071	R1069C	RES,CAR,FLM,1/4W,5%,680R	CR25-680R
R072	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R073	R1050C	RES,CAR,FLM,1/4W,5%,120R	CR25-120R
R074	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R075	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R076	R1149C	RES,CAR,FLM,1/4W,5%,1M50	CR25-1M50
R077	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R078	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R079	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R080	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70

0156 REF	PID	PD1	PD2
R081	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R082	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R083	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R084	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R085	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R086	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R087	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R088	R1123C	RES,CAR,FLM,1/4W,5%,120K	CR25-120K
R089	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R090	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R091	R1104C	RES,CAR,FLM,1/4W,5%,20K0	CR25-20K0
R092	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R093	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R094	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R095	R1104C	RES,CAR,FLM,1/4W,5%,20K0	CR25-20K0
R096	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R097	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R098	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R099	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R100	R1111C	RES,CAR,FLM,1/4W,5%,39K	CR25-39K
R101	R1065C	RES,CAR,FLM,1/4W,5%,470R	CR25-470R
R102	R1123C	RES,CAR,FLM,1/4W,5%,120K	CR25-120K
R103	R1106C	RES,CAR,FLM,1/4W,5%,24K0	CR25-24K0
R104	R1111C	RES,CAR,FLM,1/4W,5%,39K	CR25-39K
R105	R1094C	RES,CAR,FLM,1/4W,5%,7K50	CR25-7K50
R106	R1094C	RES,CAR,FLM,1/4W,5%,7K50	CR25-7K50
R107	R1107C	RES,CAR,FLM,1/4W,5%,27K0	CR25-27K0
R108	R1108C	RES,CAR,FLM,1/4W,5%,30K	CR25-30K
R109	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R110	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R111	R1093C	RES,CAR,FLM,1/4W,5%,6K80	CR25-6K80
R112	R1108C	RES,CAR,FLM,1/4W,5%,30K	CR25-30K
R113	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R114	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R115	R1093C	RES,CAR,FLM,1/4W,5%,6K80	CR25-6K80
R116	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R117	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R118	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R119	R1106C	RES,CAR,FLM,1/4W,5%,24K0	CR25-24K0
R120	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R121	R1107C	RES,CAR,FLM,1/4W,5%,27K0	CR25-27K0
R122	R1094C	RES,CAR,FLM,1/4W,5%,7K50	CR25-7K50
R123	R1094C	RES,CAR,FLM,1/4W,5%,7K50	CR25-7K50
R124	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R125	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R126	R1115C	RES,CAR,FLM,1/4W,5%,56K	CR25-56K
R127	R1095C	RES,CAR,FLM,1/4W,5%,8K20	CR25-8K20
R128	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R129	R1095C	RES,CAR,FLM,1/4W,5%,8K20	CR25-8K20
R130	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R131	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R132	R1099C	RES,CAR,FLM,1/4W,5%,12K0	CR25-12K0
R133	R1099C	RES,CAR,FLM,1/4W,5%,12K0	CR25-12K0
R134	R1001G	RES,CAR,FLM,5W,5%,1R00	CW5-1R0
R135	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R136	R1137C	RES,CAR,FLM,1/4W,5%,470K	CR25-470K
R137	R1098C	RES,CAR,FLM,1/4W,5%,11K	CR25-11K
R138	R1102C	RES,CAR,FLM,1/4W,5%,18K	CR25-18K

00156 REF	PID	PD1	PD2
R139	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R140	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R141	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R142	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R143	R1098C	RES,CAR,FLM,1/4W,5%,11K	CR25-11K
R144	R1106C	RES,CAR,FLM,1/4W,5%,24K0	CR25-24K0
R145	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R146	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R147	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R148	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R149	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R150	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R151	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R152	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R153	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R154	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R155	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R156	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R158	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R159	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R160	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R161	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R162	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R163	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R164	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R165	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R166	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R167	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R168	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R169	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R170	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R171	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R172	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R173	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R174	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R175	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R176	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R177	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R178	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R260	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R280	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R281	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R282	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R283	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R284	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R285	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R286	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R287	R1053C	RES,CAR,FLM,1/4W,5%,150R	CR25-150R
R348	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R350	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R351	R1129C	RES,CAR,FLM,1/4W,5%,220K	CR25-220K
R357	R1049C	RES,CAR,FLM,1/4W,5%,100R	CR25-100R
R358	R1133C	RES,CAR,FLM,1/4W,5%,330K	CR25-330K
R359	R1109C	RES,CAR,FLM,1/4W,5%,33K0	CR25-33K0
R360	R1133C	RES,CAR,FLM,1/4W,5%,330K	CR25-330K
RS01	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS02	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472
RS03	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472

0156 REF	PID	PD1	PD2
RS04	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472
RS05	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS06	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS07	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS08	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS09	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS10	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472
RS11	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
RS12	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472
RS13	R6153X	RES,NET, SIP,CBUS,10P,4K7	4610X-101-472
RS14	R6157X	RES,NET,SIP,CBUS,10P,10K	4610X-101-103
S014	J3310X	SOC,IC,40 PIN	2-641268-3
S026	J3310X	SOC,IC,40 PIN	2-641268-3
S032	J3306X	SOC,IC,20 PIN	2-641264-3
S035	J3314X	SOCKET, DSP5600/SOCKET02	DSP5600/SOCKET 02
S039	J3311X	SOC,IC,32 PIN	2-644018-3
S042	J3311X	SOC,IC,32 PIN	2-644018-3
S046	J3313X	SOC,IC,68 PIN, PLCC	821574-1
S048	J3311X	SOC,IC,32 PIN	2-644018-3
SC01	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC02	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC03	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC04	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC05	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC06	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC07	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC08	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC09	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC10	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC11	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC12	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
SC13	H0603S	SCR,SS,PH,PHL,4-40X0.25"	SS,4-40X0.25"
T001	X1010X-med.	TOROIDAL TRANSFORMER	DRIVER
T002	X1011X-large	TOROIDAL TRANSFORMER	OUTPUT
T004	X1013X-small	TRANSFORMER, TOROIDAL	CURRENT SENSING
TUB1	100185	TUBING, HEATSHRINK 3/16	
TY01	H8137X	TY-WRAP,SMALL,SHORT	PLT1M-M
TY02	H8137X	TY-WRAP,SMALL,SHORT	PLT1M-M
U002	U2044P	IC,WIDEBAND BUFFER	LH4001CN
U009	U2002P	IC,WIDEBAND AMP	MC1445L
U010	U2003P	IC,COMPAR H.SPEED	LM319N
U011	U3016P	IC,8211,UNDERVOLTAGE SENS	MAX8211CPA2
U013	U2004P	IC,COMPAR DUAL	LM393N
U015	U2038P	IC, WAVE FORM GEN.	XR-205
U016	U2038P	IC, WAVE FORM GEN.	XR-205
U017	U2039P	IC,OPAMP,H.SPEED	AD847JN
U018	U2039P	IC,OPAMP,H.SPEED	AD847JN
U019	U3503P	IC,LCD DISPLAY CTRL,DRV	E1330
U020	U8207P	IC,DIG,MEM,16KX8,RAM	P51256SL-10
U021	U2040P	IC,OAMP,JFET,DUA.	LF353N
U022	U2004P	IC,COMPAR DUAL	LM393N
U023	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U024	U2040P	IC,OAMP,JFET,DUA.	LF353N
U025	U3212P		AD7874AN
U026	U8008P	IC,DIG,PPI,8 BIT	8255
U027	U4000H	IC,DIG,CMOS,HC	SN74HC00N
U028	U4024H		SN74HC4024
U029	U2042P	IC,FREQ.SYNTHES	MC145145P-1

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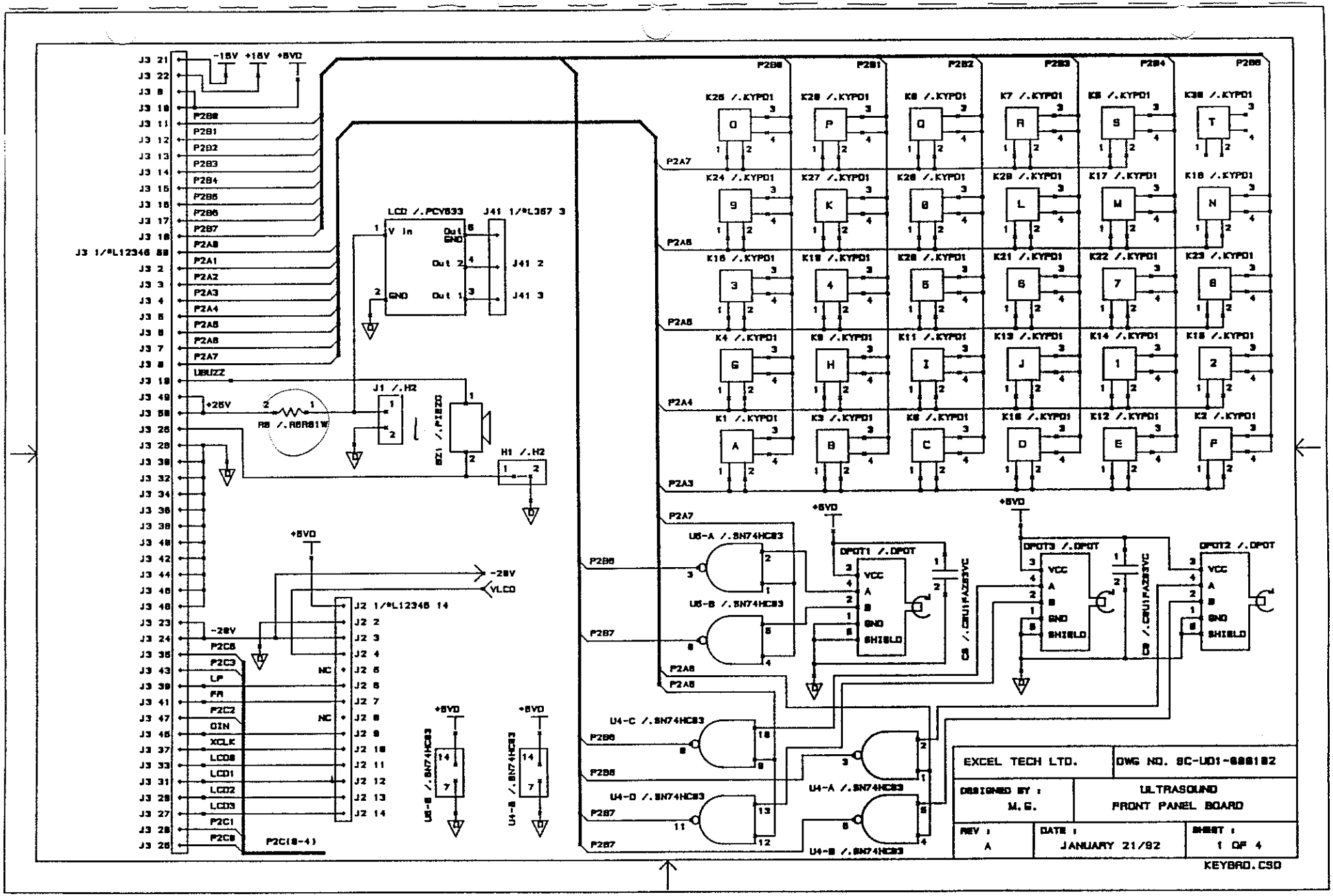
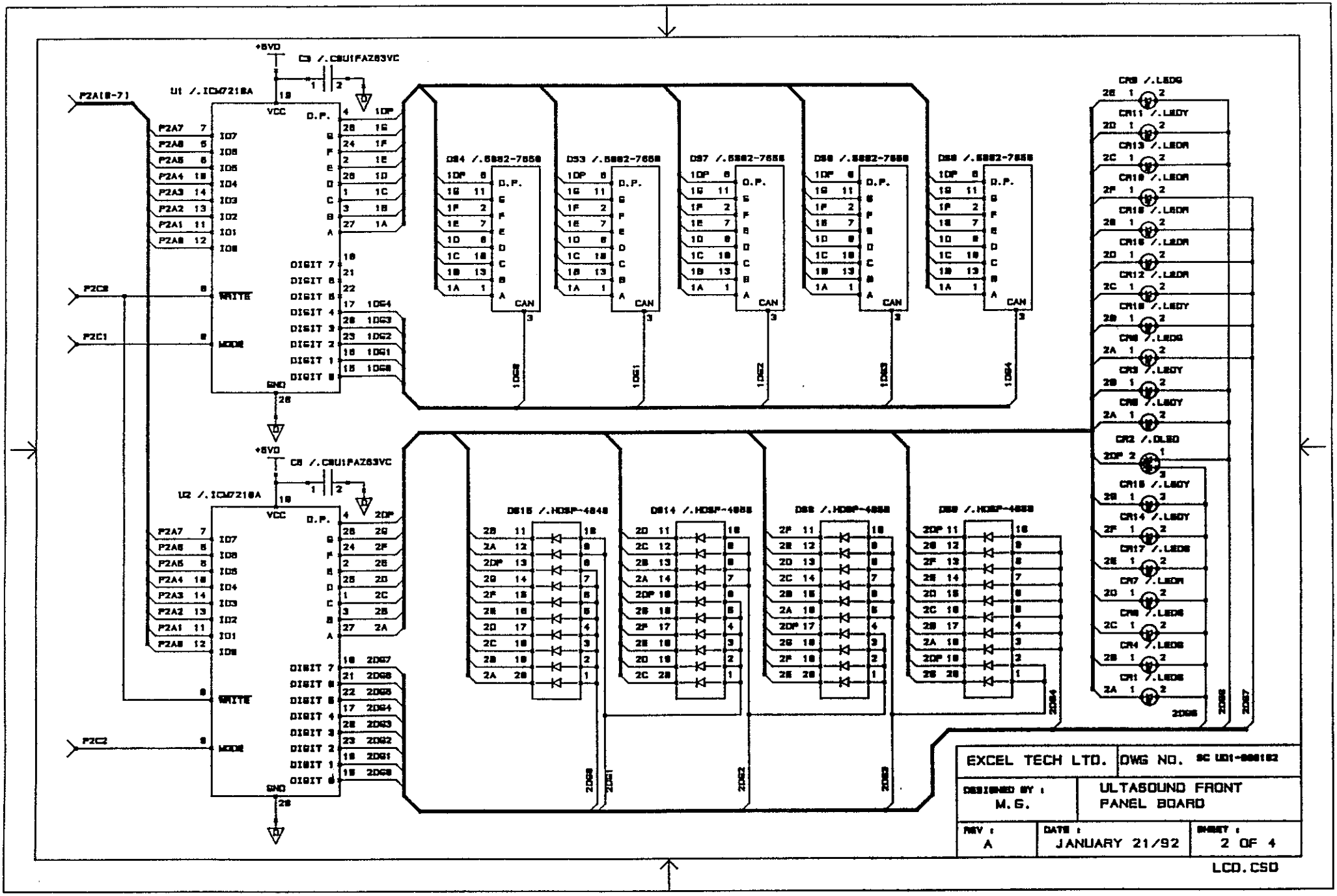
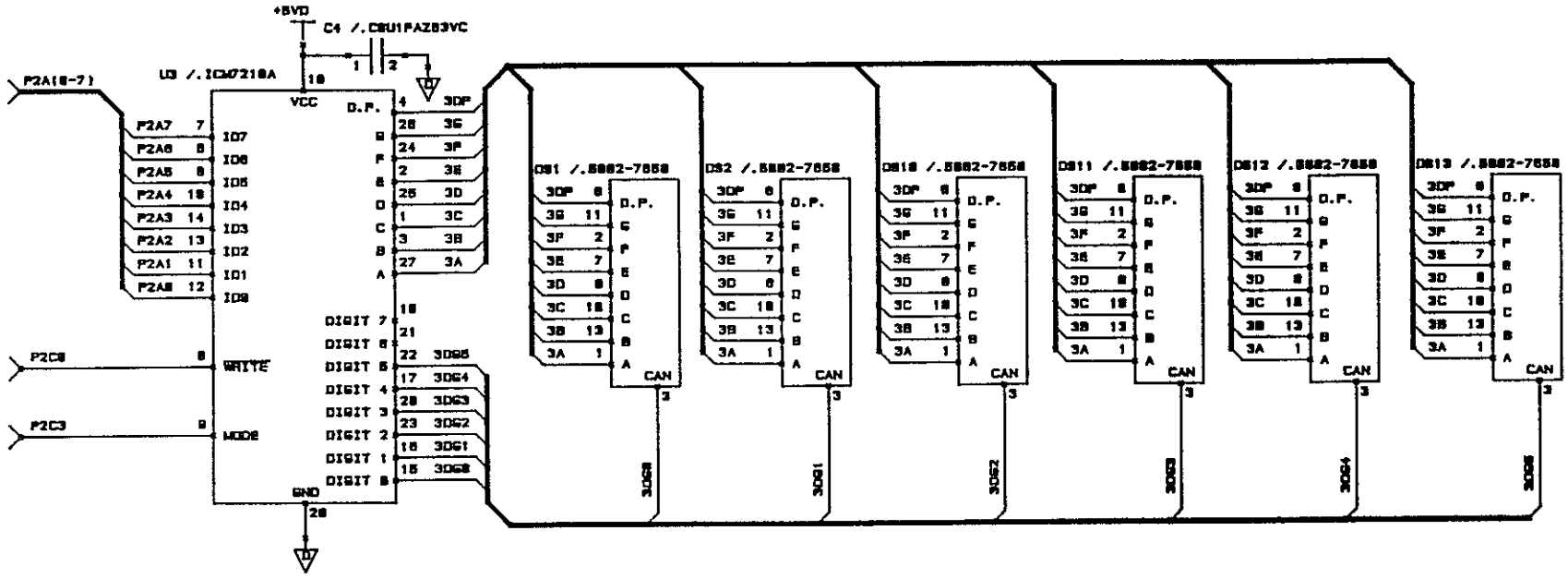
REF	PID	PD1	PD2
U030	U3403P		AD7840JN
U031	U8207P	IC,DIG,MEM,16KX8,RAM	P51256SL-10
U032	U8412P	IC,DIG,MEM,16X8,PAL	PAL16L8ACN
U033	U8405P		MCM2018AN45
U034	U4373H	IC,DIG,CMOS,HC	SN74HC373N
U035	U8300P	IC DSP56001 SLAMPACK	XSP560012L20
U036	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U037	U2043P	IC ANALOG SWITCH	HI 1-0200-5
U038	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U039	U8411C	IC,DIG,MEM,128KX8,PROM	D27C010-12
U040	U8405P		MCM2018AN45
U041	U4002H		SN74HC02
U042	U8411C	IC,DIG,MEM,128KX8,PROM	D27C010-12
U043	U8405P		MCM2018AN45
U044	U4002H		SN74HC02
U045	U4132H	IC. CMOS	SN74HC132AN
U046	U8011P	IC,DIG,UPROC,8 BIT	N80C188-12
U047	U4002H		SN74HC02
U048	U8411C	IC,DIG,MEM,128KX8,PROM	D27C010-12
→ U049	~~U8008P~~ V8009P	IC,DIG,PPI,8 BIT	8255
U050	U4245H	IC,DIG,CMOS,HC	SN74HC245N
U051	U8450P	IC EPROM, 1K SERIAL	CAT93C46P
U052	U4174H		SN74HC174
U053	U4373H	IC,DIG,CMOS,HC	SN74HC373N
U054	U8013P		DS1386-32
U055	U4373H	IC,DIG,CMOS,HC	SN74HC373N
U056	U4004H	IC,DIG,CMOS,HC	SN74HC04N
U240	U2027P	IC,LIN,TIMER,CMOS	TLC555CP
U241	U4132H	IC. CMOS	SN74HC132AN
U246	U2040P	IC,OAMP,JFET,DUA.	LF353N
VR01	U1023P	IC,LIN,+5 VOLT, 3 AMP	78T05
VR02	U1025P	IC,LIN,REG,+15V,1A	MC7815ACT
VR03	U1021P	IC,LIN,REG,+5V,1A	MC7805CT
VR04	U1117P	IC,LIN,REG,-15V,1A	MC7915CT
VR05	U1115P	IC, V REG-5,0.5A	MC79M05CT
VR06	U1307P	IC,LIN,REG,-ADJ,1A	LM337T
WA01	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA02	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA03	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA04	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA05	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA06	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA07	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA08	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA09	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA10	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA11	100264	WASHER LOCK EXT TOOTH #4	42-SN
WA12	100265	WASHER INSULATNG #4 TO220	B09489A034
WA13	100265	WASHER INSULATNG #4 TO220	B09489A034
X001	Y1030X	CRYSTAL OSCILLATOR 20MHZ	XO-53B-20.0MHZ
→ WA14	100257	INSULATOR TO 220 SILPAD	
→ WA15	100257	INSULATOR TO 220 SILPAD	

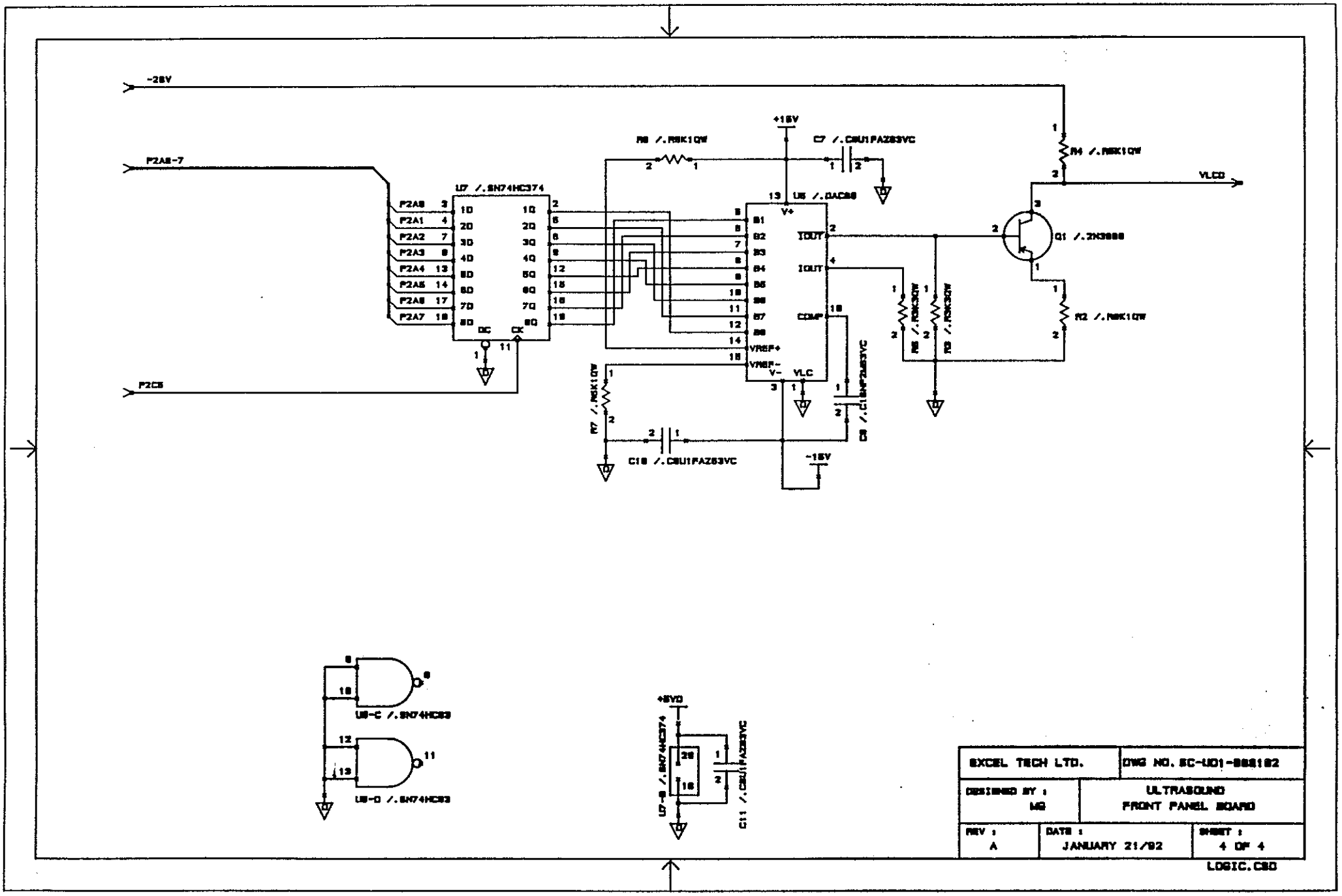

J3 21
J3 22
J3 8
J3 19
J3 11
J3 12
J3 13
J3 14
J3 15
J3 16
J3 17
J3 18
J3 1/*L12346 50
J3 2
J3 3
J3 4
J3 5
J3 6
J3 7
J3 8
J3 19
J3 49
J3 50
J3 26
J3 28
J3 30
J3 32
J3 34
J3 36
J3 38
J3 40
J3 42
J3 44
J3 46
J3 48
J3 23
J3 24
J3 35
J3 43
J3 39
J3 41
J3 47
J3 45
J3 37
J3 33
J3 31
J3 29
J3 27
J3 28
J3 25
-15V
+15V
+5VD
P2B0
P2B1
P2B2
P2B3
P2B4
P2B5
P2B6
P2B7
P2A0
P2A1
P2A2
P2A3
P2A4
P2A5
P2A6
P2A7
UBUZZ
+25V
-25V
VLCD
P2C0
P2C3
LP
FR
P2C2
DIN
XCLK
LCD0
LCD1
LCD2
LCD3
P2C1
P2C0
P2C(0-4)
LCD /.PCY833
J41 1/*L387 3
V In
GND
Out 1
Out 2
Out 3
J41 2
J41 3
J1 /.H2
R8 /.R0R81W
BZ1 /.PIEZO
H1 /.H2
J2 1/*L12346 14
J2 2
J2 3
J2 4
J2 5
J2 6
J2 7
J2 8
J2 9
J2 10
J2 11
J2 12
J2 13
J2 14
NC
U5-B /.SN74HC83
U4-B /.SN74HC83
U5-A /.SN74HC83
U5-B /.SN74HC83
U4-C /.SN74HC83
U4-D /.SN74HC83
U4-A /.SN74HC83
U4-B /.SN74HC83
DPOT1 /.DPOT
DPOT3 /.DPOT
DPOT2 /.DPOT
VCC
A
B
GND
SHIELD
C5 /.CBU1FA223VC
C6 /.CBU1FA223VC
K26 /.KYPD1
K28 /.KYPD1
K8 /.KYPD1
K7 /.KYPD1
K6 /.KYPD1
K30 /.KYPD1
K24 /.KYPD1
K27 /.KYPD1
K26 /.KYPD1
K29 /.KYPD1
K17 /.KYPD1
K18 /.KYPD1
K16 /.KYPD1
K19 /.KYPD1
K20 /.KYPD1
K21 /.KYPD1
K22 /.KYPD1
K23 /.KYPD1
K4 /.KYPD1
K9 /.KYPD1
K11 /.KYPD1
K13 /.KYPD1
K14 /.KYPD1
K15 /.KYPD1
K1 /.KYPD1
K3 /.KYPD1
K5 /.KYPD1
K10 /.KYPD1
K12 /.KYPD1
K2 /.KYPD1
O
P
Q
R
S
T
9
K
8
L
M
N
3
4
5
6
7
8
G
H
I
J
1
2
A
B
C
D
E
F
EXCEL TECH LTD.
DWG NO. SC-U01-688182
DESIGNED BY : M.G.
ULTRASOUND FRONT PANEL BOARD
REV : A
DATE : JANUARY 21/92
SHEET : 1 OF 4
KEYBRD.CSD


+5VD
C9 /.C8U1FAZ83VC
U1 /.ICM7218A
P2A(8-7)
VCC
D.P.
P2A7
P2A6
P2A5
P2A4
P2A3
P2A2
P2A1
P2A0
IO7
IO6
IO5
IO4
IO3
IO2
IO1
IO0
P2C0
WRITE
P2C1
MODE
DIGIT 7
DIGIT 6
DIGIT 5
DIGIT 4
DIGIT 3
DIGIT 2
DIGIT 1
DIGIT 0
GND
1DP
1G
1F
1E
1D
1C
1B
1A
1DG4
1DG3
1DG2
1DG1
1DG0
DS4 /.5082-7650
DS3 /.5082-7650
DS7 /.5082-7650
DS6 /.5082-7650
DS5 /.5082-7650
D.P.
CAN
+5VD
C8 /.C8U1FAZ83VC
U2 /.ICM7218A
2DP
2G
2F
2E
2D
2C
2B
2A
2DG7
2DG6
2DG5
2DG4
2DG3
2DG2
2DG1
2DG0
DS15 /.HDSP-4848
DS14 /.HDSP-4855
DS13 /.HDSP-4855
DS12 /.HDSP-4855
CR9 /.LEDG
CR11 /.LEDY
CR13 /.LEDR
CR10 /.LEDR
CR15 /.LEDR
CR16 /.LEDR
CR12 /.LEDR
CR18 /.LEDY
CR8 /.LEDG
CR3 /.LEDY
CR6 /.LEDY
CR2 /.DLSD
CR5 /.LEDY
CR14 /.LEDY
CR17 /.LEDG
CR7 /.LEDR
CR4 /.LEDG
CR1 /.LEDG
EXCEL TECH LTD.
DWG NO. SC UD1-000152
DESIGNED BY : M.G.
ULTASOUND FRONT PANEL BOARD
REV : A
DATE : JANUARY 21/92
SHEET : 2 OF 4
LCD.CSD



EXCEL TECH LTD.	DWG NO. EC LD1-000102	
DESIGNED BY : M.G.	ULTASOUND FRONT PANEL BOARD	
REV : A	DATE : JANUARY 21/92	SHEET : 3 OF 4

LCD1.CSD

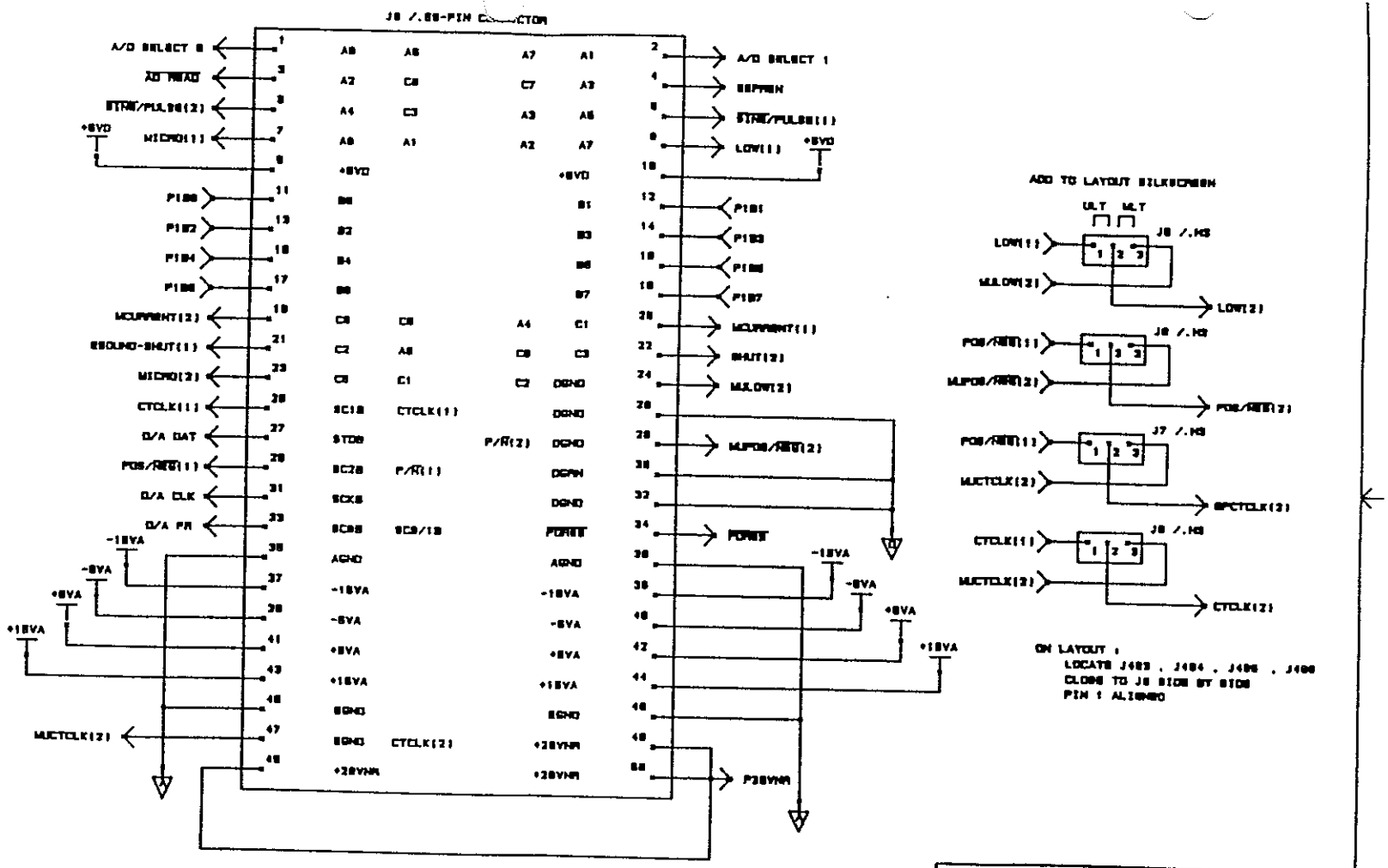

-28V
P2A0-7
P2C6
U7 /.SN74HC374
P2A0
P2A1
P2A2
P2A3
P2A4
P2A5
P2A6
P2A7
+15V
R8 /.R6K1QW
C7 /.C6U1PAZ63VC
U6 /.DAC80
V+
IOUT
IOUT
COMP
VREF+
VREF-
V-
VLC
R4 /.R6K1QW
VLCO
Q1 /.2N3906
R2 /.R6K1QW
R5 /.R6K3QW
R3 /.R6K3QW
R7 /.R6K1QW
C10 /.C6U1PAZ63VC
C9 /.C10NPZ63VC
-15V
U8-C /.SN74HC03
U8-D /.SN74HC03
+5VD
U7-B /.SN74HC374
C11 /.C6U1PAZ63VC
EXCEL TECH LTD.
DWG NO. SC-UD1-868182
DESIGNED BY : MG
ULTRASOUND FRONT PANEL BOARD
REV : A
DATE : JANUARY 21/92
SHEET : 4 OF 4
LOGIC.CSD

92/02/26

160

REF	PID	PD1	PD2
0000	ULTRA II FACE	REVISON P4. A	~~JANUARY 16, 1992~~ FEB. 26 1992
AS01	100163	CABLE ASSY 50PIN TO 50SKT	
BZ01	Y2058X	PIEZO BUZZER	PKM33EP-1001
C003	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C004	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C005	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C006	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C007	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C008	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C009	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C010	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
C011	C1951X	CAP 100NF2Z50 BYPASS 0.3"	IC30Z5U104M050B
CR01	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR02	E2012X	DUAL COLOUR LED	GL8ED5
CR03	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR04	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR05	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR06	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR07	E1006X	LED,RED,1V6,0A02	HLMP-3365
CR08	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR09	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR10	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR11	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR12	E1006X	LED,RED,1V6,0A02	HLMP-3365
CR13	E1006X	LED,RED,1V6,0A02	HLMP-3365
CR14	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR15	E1008X	LED,YELLOW,1V6,0A02	HLMP-3466
CR16	E1006X	LED,RED,1V6,0A02	HLMP-3365
CR17	E1007X	LED,GREEN,1V6,0A02	HLMP-3568
CR18	E1006X	LED,RED,1V6,0A02	HLMP-3365
CR19	E1006X	LED,RED,1V6,0A02	HLMP-3365
DP01	K2000X	DIGITAL POT	HRPG-AD32-16F
DP02	K2000X	DIGITAL POT	HRPG-AD32-16F
DP03	K2000X	DIGITAL POT	HRPG-AD32-16F
DS01	E2006X	7 SEG, LEFT DEC.	5082-7650
DS02	E2006X	7 SEG, LEFT DEC.	5082-7650
DS03	E2006X	7 SEG, LEFT DEC.	5082-7650
DS04	E2006X	7 SEG, LEFT DEC.	5082-7650
DS05	E2006X	7 SEG, LEFT DEC.	5082-7650
DS06	E2006X	7 SEG, LEFT DEC.	5082-7650
DS07	E2006X	7 SEG, LEFT DEC.	5082-7650
DS08	E2007X	10 SEG GREEN BARGRAPH	HDSP-4850
DS09	E2007X	10 SEG GREEN BARGRAPH	HDSP-4850
DS10	E2006X	7 SEG, LEFT DEC.	5082-7650
DS11	E2006X	7 SEG, LEFT DEC.	5082-7650
DS12	E2006X	7 SEG, LEFT DEC.	5082-7650
DS13	E2006X	7 SEG, LEFT DEC.	5082-7650
DS14	E2007X	10 SEG GREEN BARGRAPH	HDSP-4850
DS15	E2008X	10 SEG YELLOW BARGRAPH	HDSP-4840
J001	J1002M	CON,HDR,M,3 POS	10-88-8069
J002	J5139X	FLAT RIBBON(LCD)CONNECTOR	39-51-3144
K001	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K002	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K003	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K004	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K005	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K006	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K007	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050

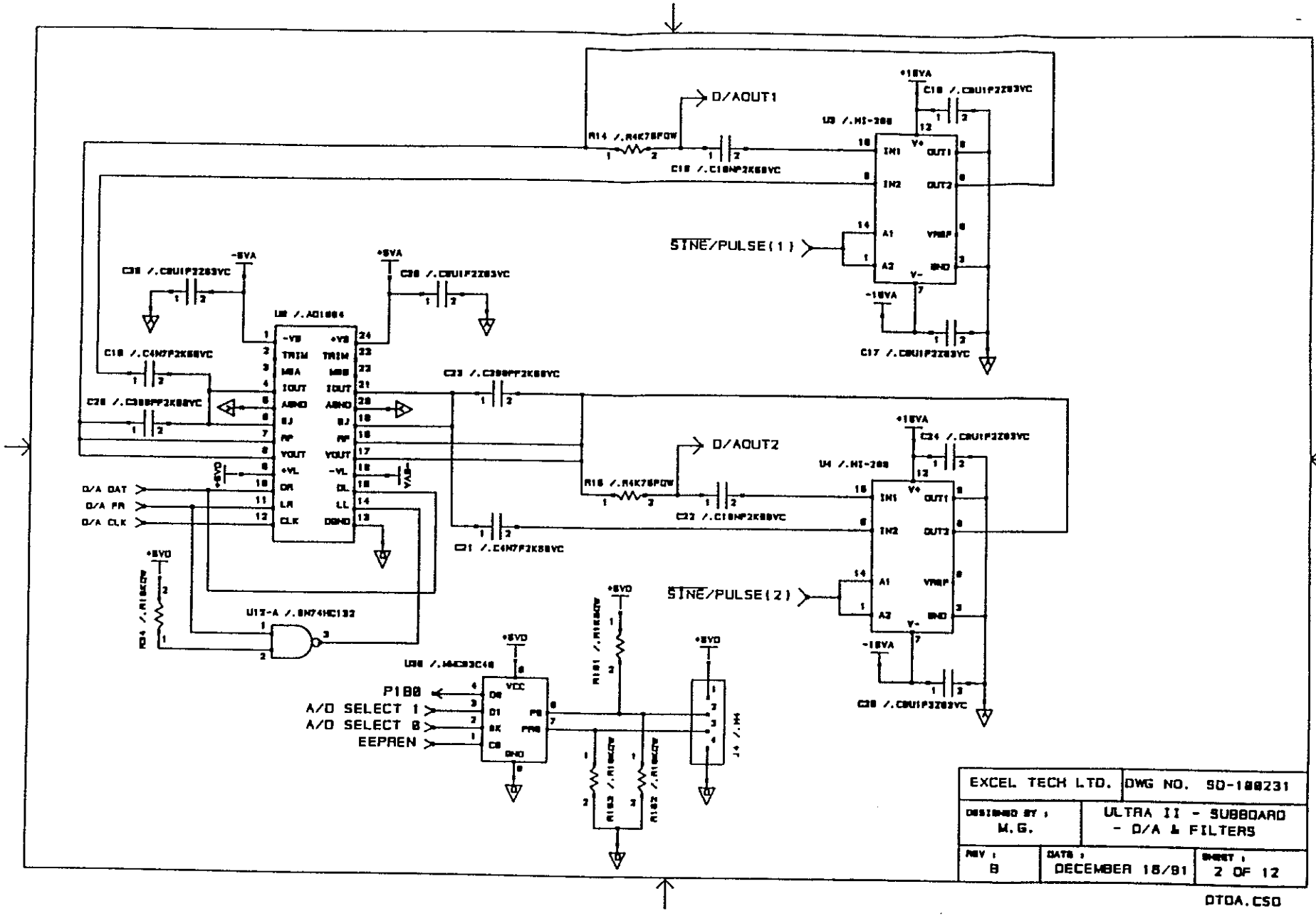
00160 REF	PID	PD1	PD2
K008	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K009	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K010	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K011	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K012	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K013	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K014	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K015	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K016	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K017	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K018	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K019	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K020	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K021	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K022	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K023	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K024	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K025	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K026	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K027	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K028	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
K029	S1204X	SWITCH,PWB,PB,SPDT	OMRB3F-4050
~~LCD1~~	~~E3003X~~	~~DISP,LCD,320X200 GRAPHIC~~	~~EG7500BNS~~
P001	P4006X	ULTRA 2 FACE PLATE	ULTRA 2 FACE BOARD
Q001	Q3906X	TRANS,SI,PL,PNP,40V,0A2	2N3906
R001	R1000C	RES,CAR,FLM,1/4W,5%,0R00	SFR25F-0R00
R002	R1096C	RES,CAR,FLM,1/4W,5%,9K10	CR25-9K10
R003	R1086C	RES,CAR,FLM,1/4W,5%,3K3	CR25-3K3
R004	R1090C	RES,CAR,FLM,1/4W,5%,5K10	CR25-5K10
R005	R1086C	RES,CAR,FLM,1/4W,5%,3K3	CR25-3K3
R006	R1090C	RES,CAR,FLM,1/4W,5%,5K10	CR25-5K10
R007	R1090C	RES,CAR,FLM,1/4W,5%,5K10	CR25-5K10
U001	U3502P	IC, LED COMMON ANODE, MUX	ICM7218AIJI
U002	U3502P	IC, LED COMMON ANODE, MUX	ICM7218AIJI
U003	U3502P	IC, LED COMMON ANODE, MUX	ICM7218AIJI
U004	U4003H	IC, CMOS	MC74HC03AN
U005	U4003H	IC, CMOS	MC74HC03AN
U006	U3402P	IC,I/F,D/A,8 BIT	DAC-08CP
U007	U4374H	IC, CMOS	MC74HC374N
WA01	~~H5021S~~ H5012S	VW375-062, WASHER, .375ID	NYLON
WA02	~~H5021S~~ H5012S	VW375-062, WASHER, .375ID	NYLON
WA03	~~H5021S~~ H5012S	VW375-062, WASHER, .375ID	NYLON
R008	R2010F	6.8Ω RES MTL FLM 1W 5% 6R8	PR011/6R8

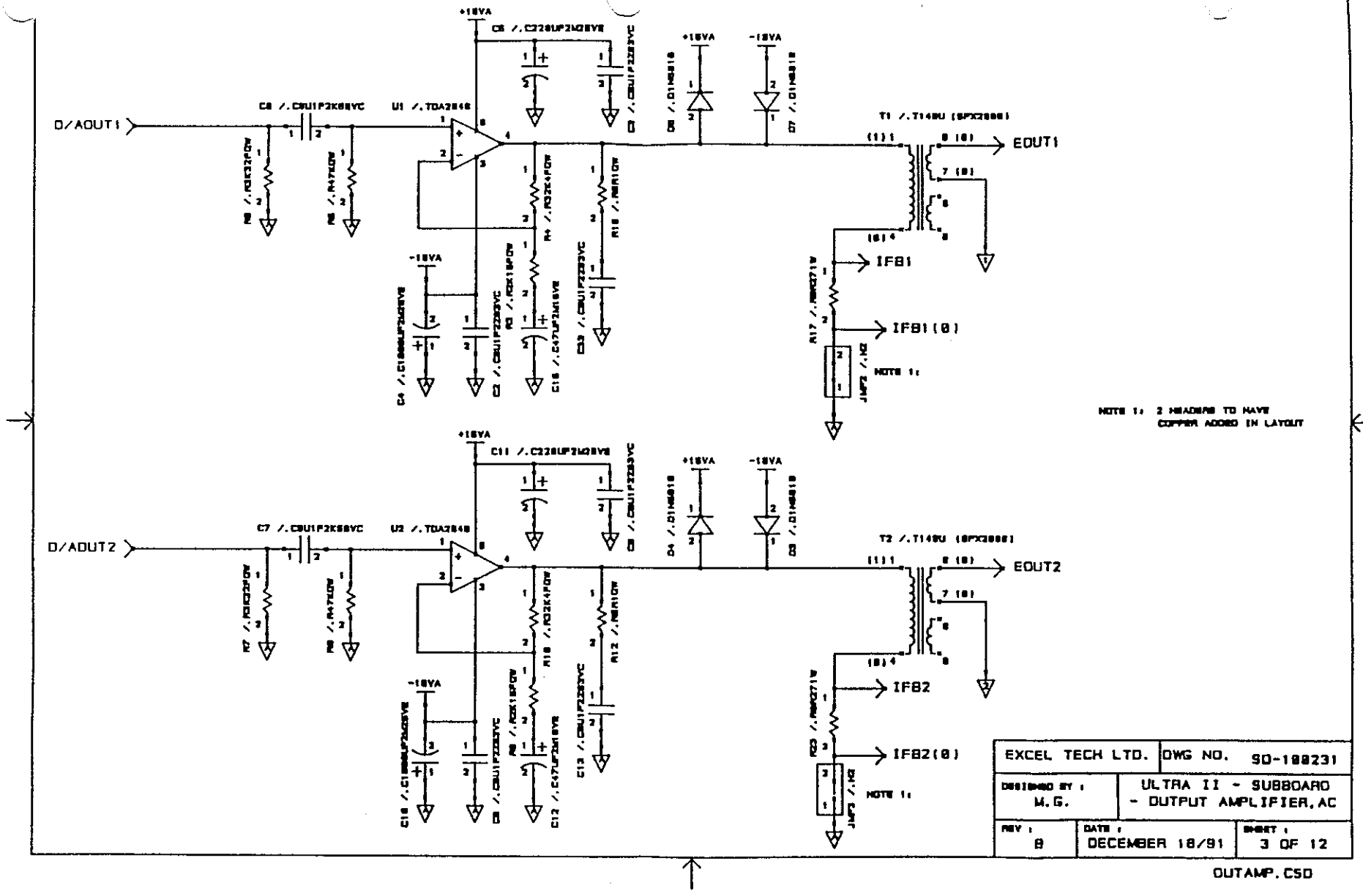


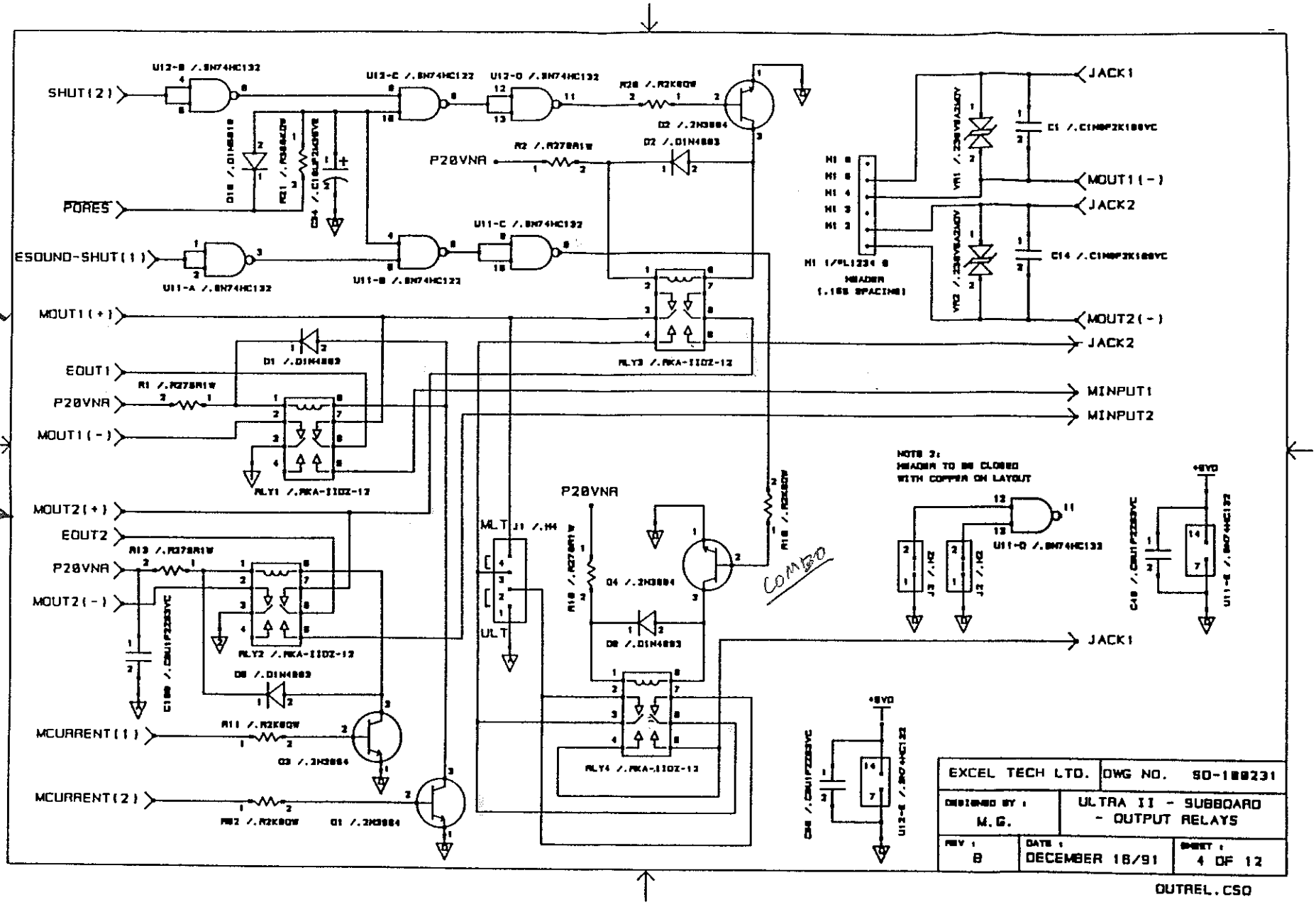
EXCEL TECH LTD.	DWG NO.	SD-188231
DESIGNED BY : M.G.	ULTRA II - SUBBOARD - INTERFACE CONNECTOR	
REV : B	DATE : DECEMBER 18/91	SHEET : 1 OF 12

CONN.CSD

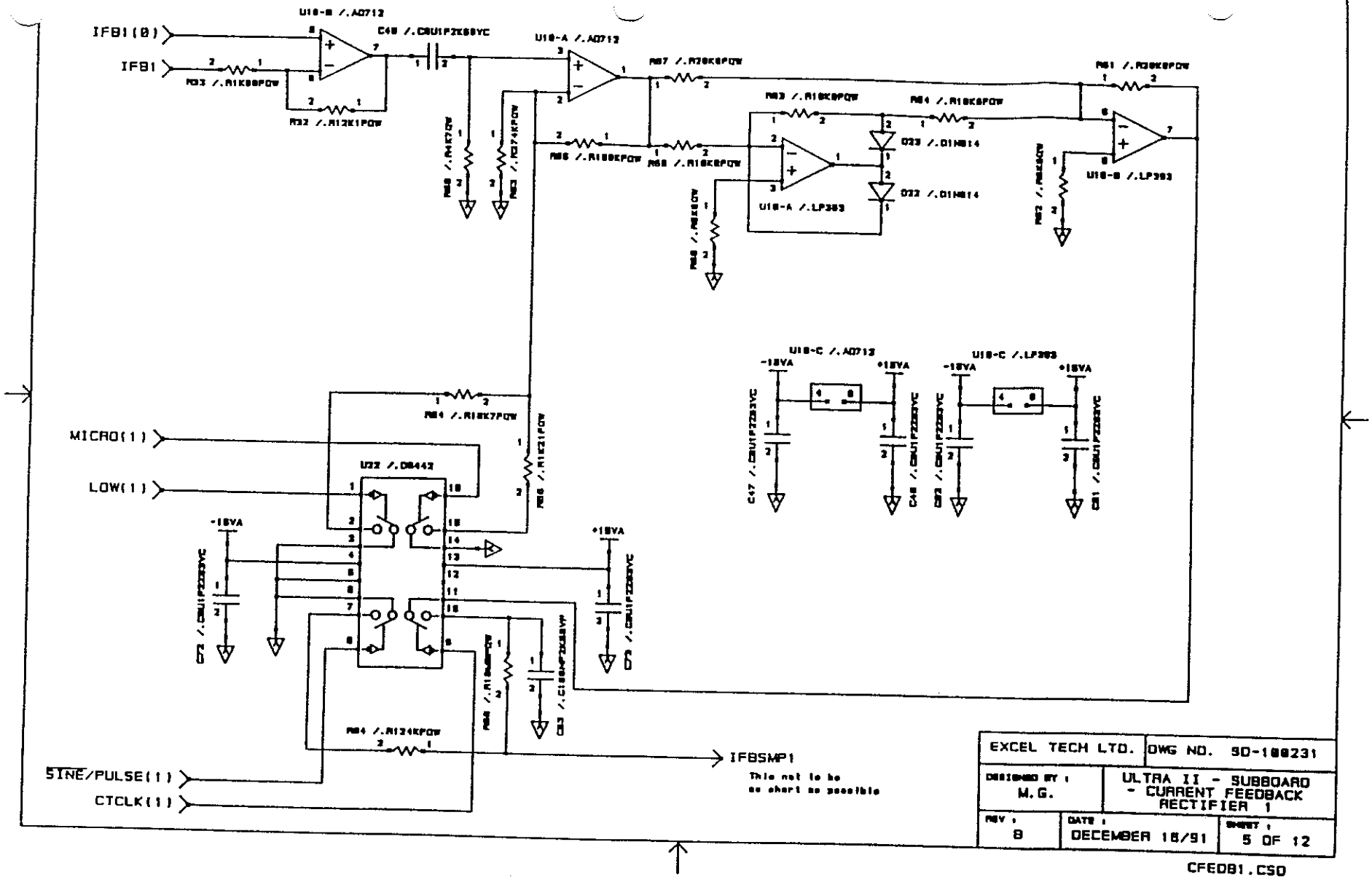
V - 4.XX


D/AOUT1
D/AOUT2
SINE/PULSE(1)
SINE/PULSE(2)
D/A DAT
D/A FR
D/A CLK
P1B0
A/D SELECT 1
A/D SELECT 0
EEPREN
+18VA
-18VA
+5VA
-5VA
+5VD
EXCEL TECH LTD.
DWG NO. SD-188231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - D/A & FILTERS
REV : B
DATE : DECEMBER 16/91
SHEET : 2 OF 12
DTOA.CSD


D/AOUT1
D/AOUT2
EOUT1
EOUT2
IFB1
IFB1(0)
IFB2
IFB2(0)
+15VA
-15VA
NOTE 1: 2 HEADERS TO HAVE COPPER ADDED IN LAYOUT
EXCEL TECH LTD.
DWG NO. 90-188231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - OUTPUT AMPLIFIER, AC
REV : B
DATE : DECEMBER 18/91
SHEET : 3 OF 12
OUTAMP.CSD

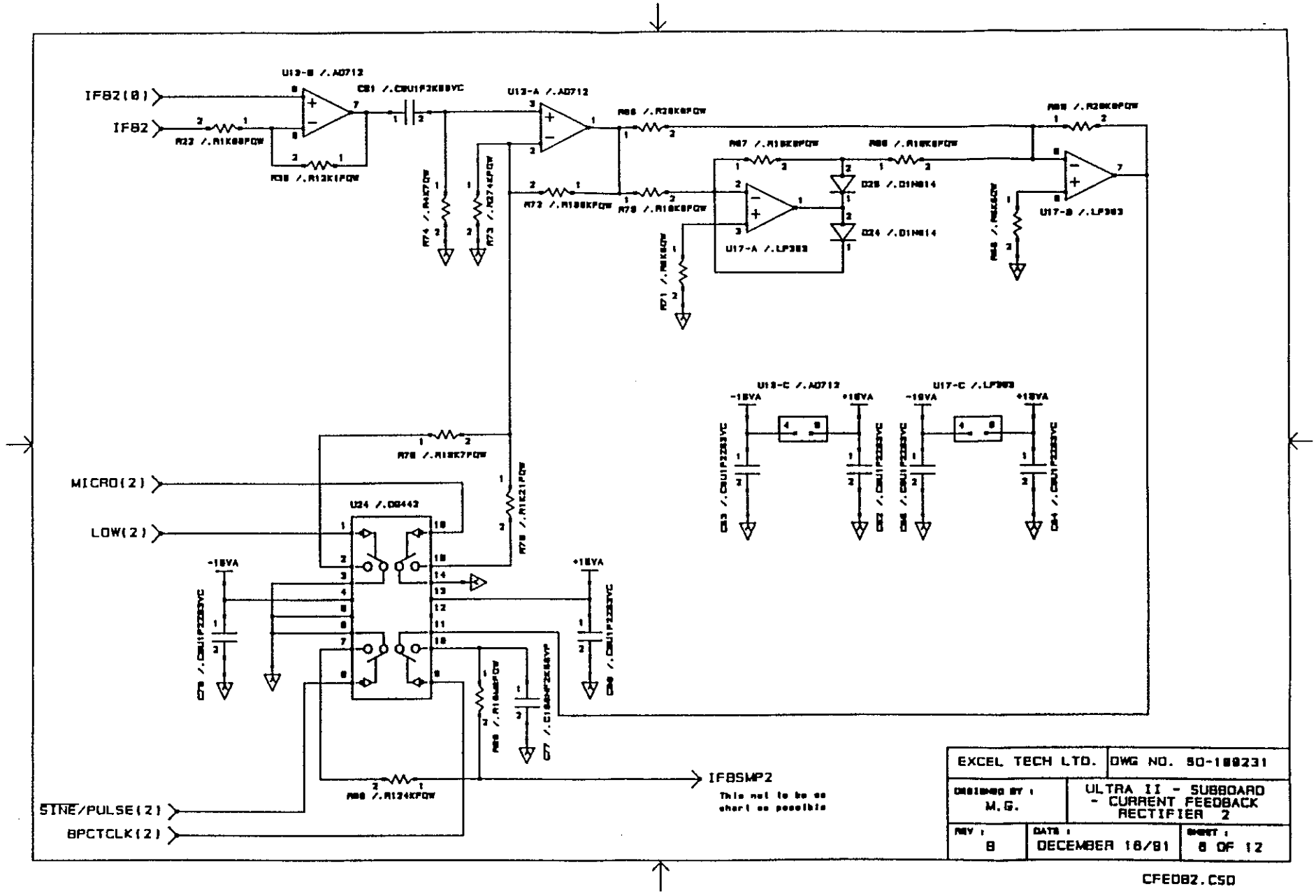


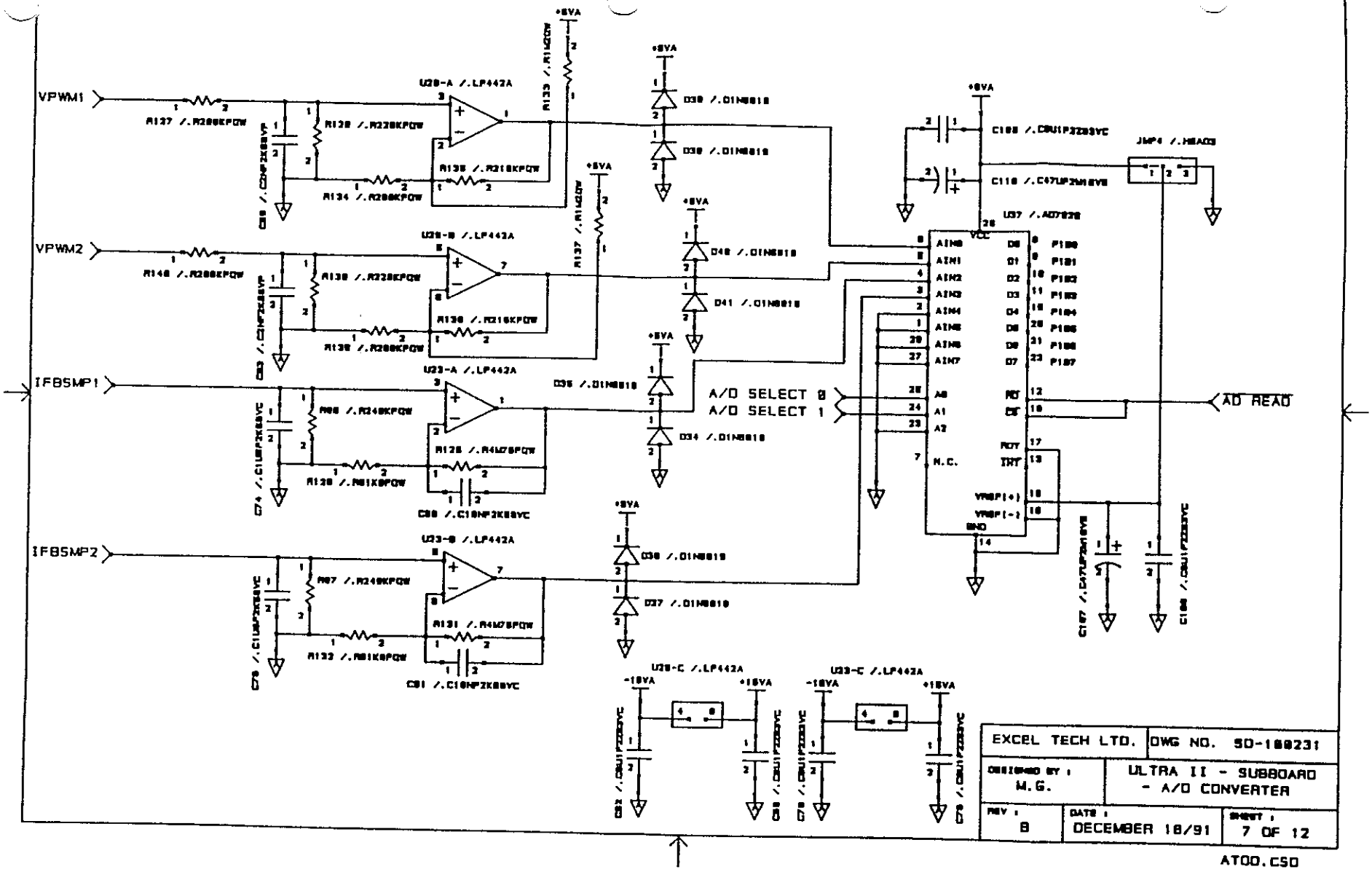
RELAY 4 = OUT 1 = Jack1 COMBO
Relay 3 main OUT 1 & 2

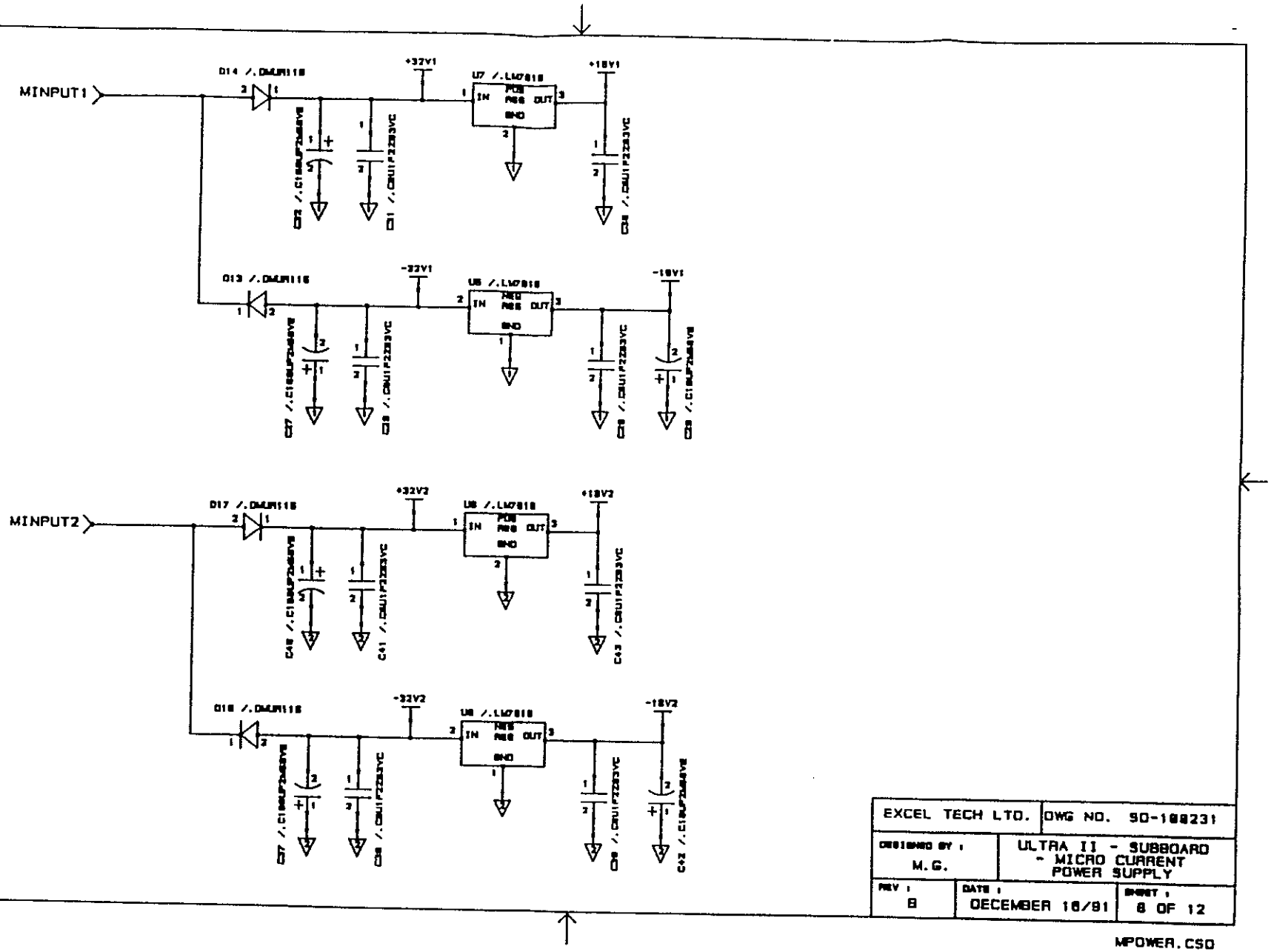


EXCEL TECH LTD.	DWG NO. SD-100231	
DESIGNED BY : M.G.	ULTRA II - SUBBOARD - CURRENT FEEDBACK RECTIFIER 1	
REV : B	DATE : DECEMBER 16/91	SHEET : 5 OF 12

CFED81.CSD

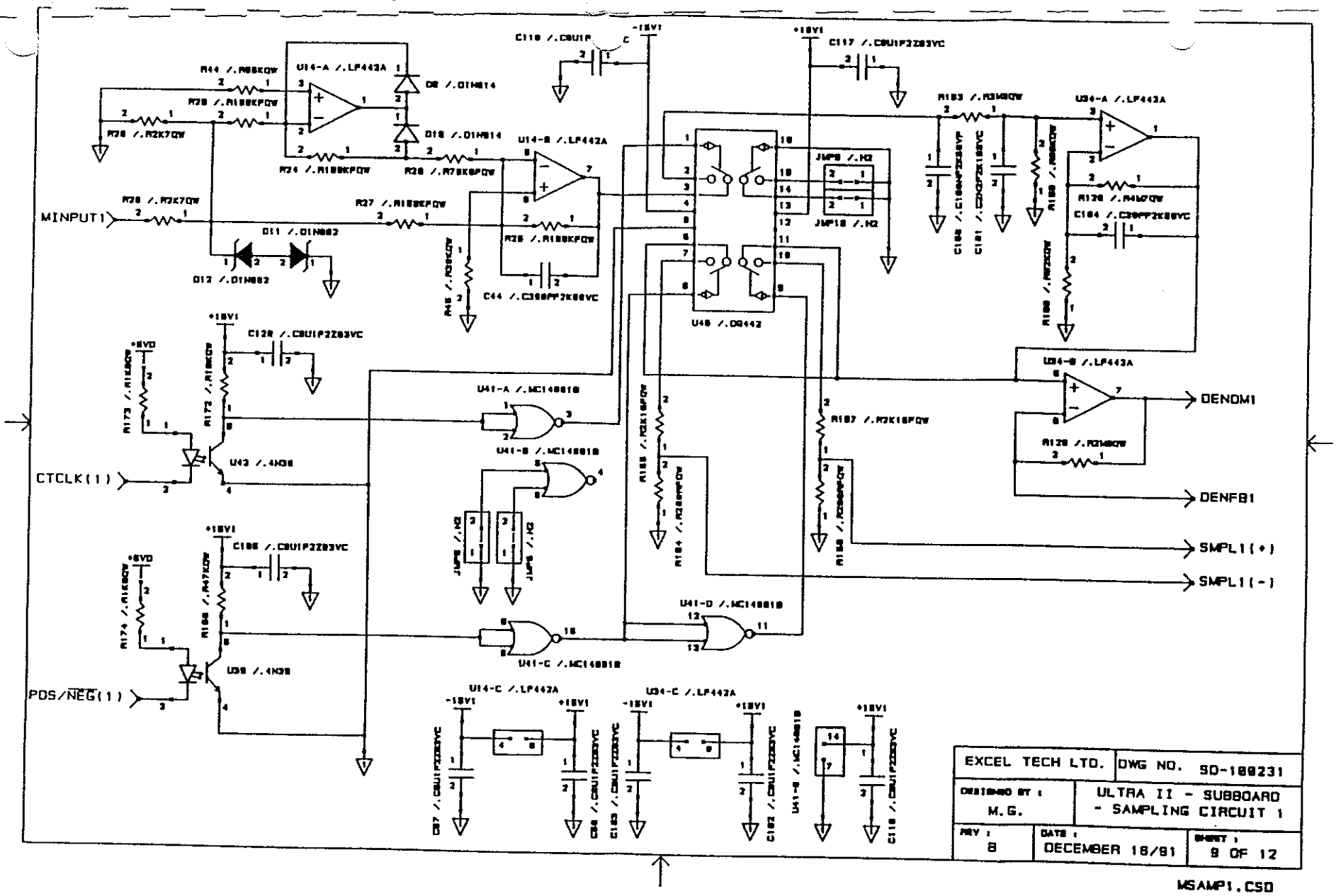

IFB2(0)
IFB2
MICRO(2)
LOW(2)
SINE/PULSE(2)
BPCTCLK(2)
IFBSMP2
This net to be as short as possible
U13-B /.AD712
U13-A /.AD712
U17-A /.LP393
U17-B /.LP393
U13-C /.AD712
U17-C /.LP393
U24 /.DG442
-15VA
+15VA
EXCEL TECH LTD.
DWG NO. 50-189231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - CURRENT FEEDBACK RECTIFIER 2
REV : B
DATE : DECEMBER 16/91
SHEET : 8 OF 12
CFED82.CSD


VPWM1
VPWM2
IFBSMP1
IFBSMP2
A/D SELECT 0
A/D SELECT 1
AD READ
EXCEL TECH LTD.
DWG NO. 50-188231
M.G.
ULTRA II - SUBBOARD - A/D CONVERTER
B
DECEMBER 18/91
7 OF 12
AT00.CS0

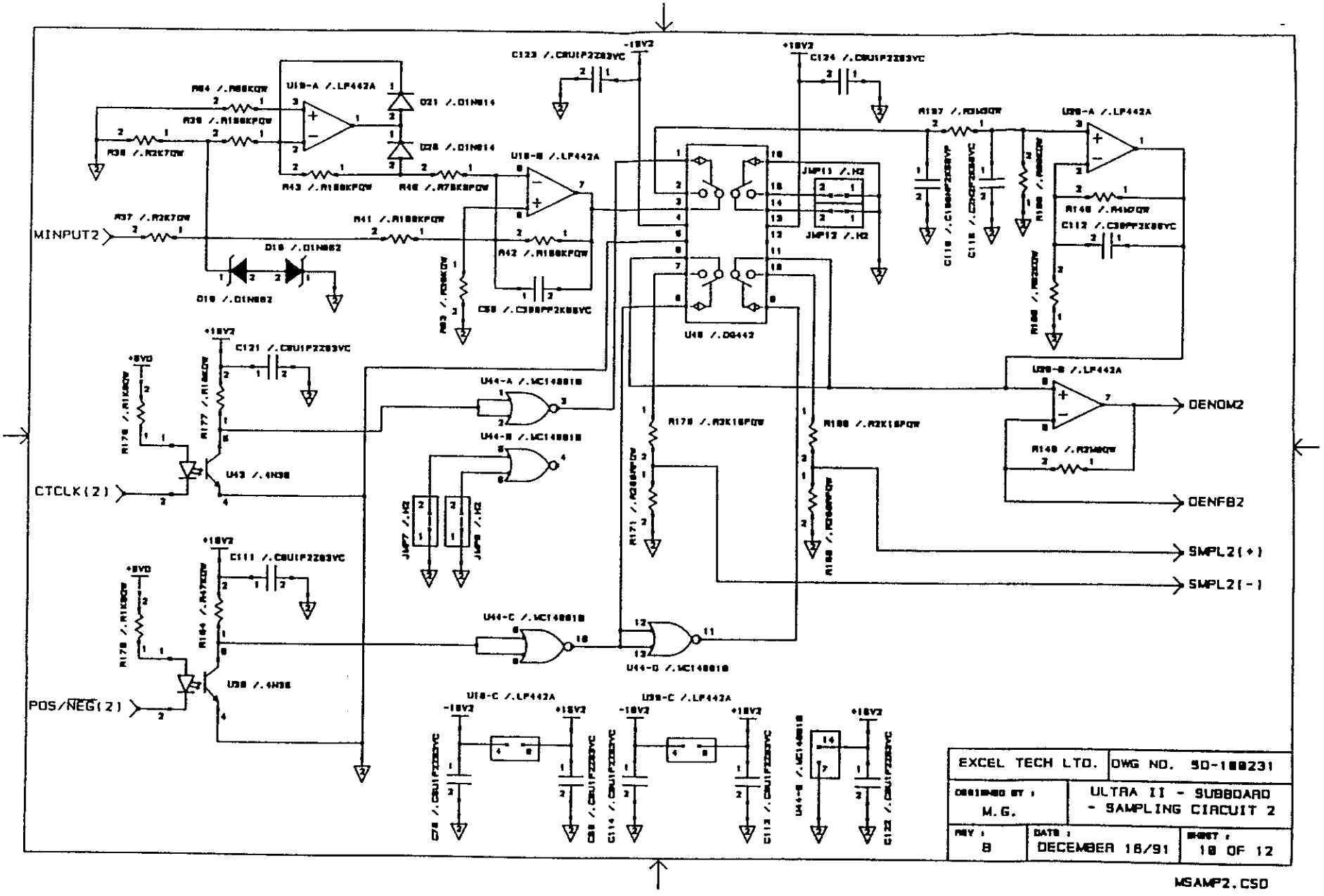


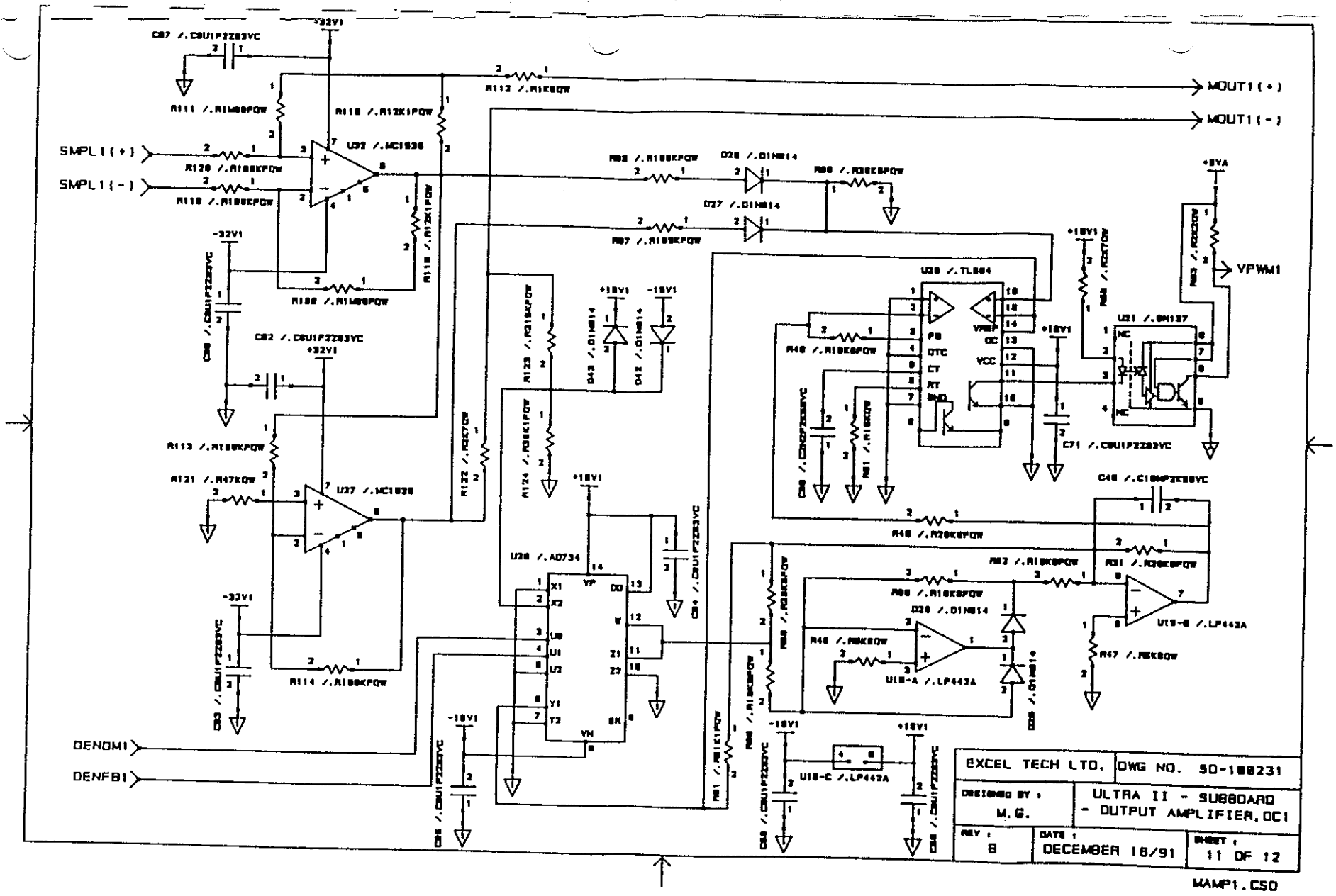
EXCEL TECH LTD.	DWG NO. 90-188231	
DESIGNED BY : M.G.	ULTRA II - SUBBOARD - MICRO CURRENT POWER SUPPLY	
REV : B	DATE : DECEMBER 18/91	SHEET : 8 OF 12

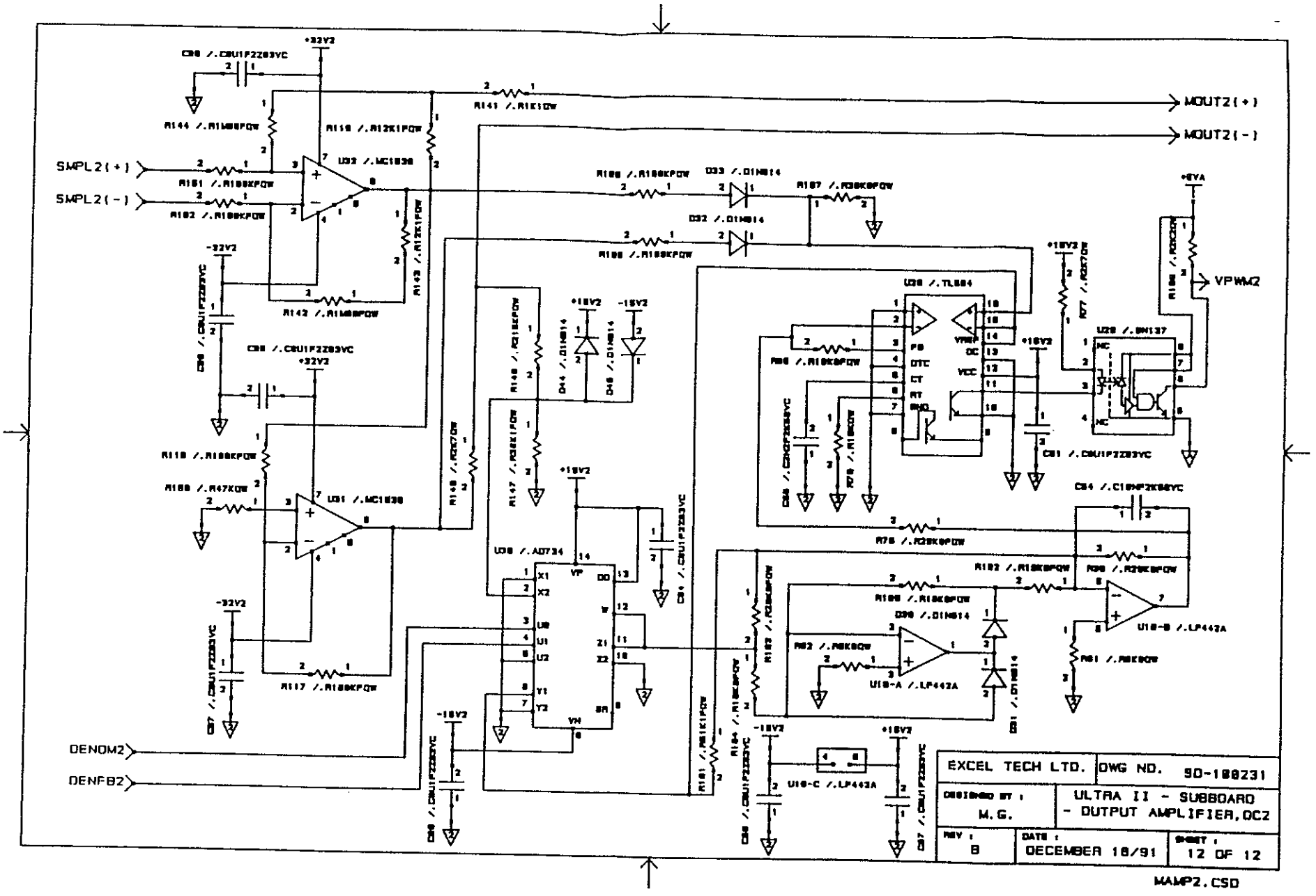
MPOWER.CSD


MINPUT1
CTCLK(1)
POS/NEG(1)
DENOM1
DENFB1
SMPL1(+)
SMPL1(-)
U14-A /.LP442A
U14-B /.LP442A
U14-C /.LP442A
U34-A /.LP442A
U34-B /.LP442A
U34-C /.LP442A
U41-A /.MC14081B
U41-B /.MC14081B
U41-C /.MC14081B
U41-D /.MC14081B
U43 /.4N38
U39 /.4N38
U40 /.DG442
D8 /.D1N814
D10 /.D1N814
D11 /.D1N882
D12 /.D1N882
JMP8 /.H2
JMP10 /.H2
JMP9 /.H2
JMP6 /.H2
+15V1
-15V1
+8VD
EXCEL TECH LTD.
DWG NO. 90-100231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - SAMPLING CIRCUIT 1
REV : 8
DATE : DECEMBER 18/91
SHEET : 9 OF 12
MSAMP1.CSD

V-4.


MINPUT2
CTCLK(2)
POS/NEG(2)
DENOM2
DENFB2
SMPL2(+)
SMPL2(-)
U48 /.DG442
U43 /.4N38
U39 /.4N38
U44-A /.MC14001B
U44-B /.MC14001B
U44-C /.MC14001B
U44-D /.MC14001B
U18-A /.LP442A
U18-B /.LP442A
U18-C /.LP442A
U39-A /.LP442A
U39-B /.LP442A
U39-C /.LP442A
JMP11 /.H2
JMP12 /.H2
JMP7 /.H2
JMP8 /.H2
D19 /.D1N882
+18V2
-18V2
+5VD
EXCEL TECH LTD.
DWG NO. 50-188231
ULTRA II - SUBBOARD - SAMPLING CIRCUIT 2
M.G.
REV : B
DATE : DECEMBER 18/91
SHEET : 18 OF 12
MSAMP2.CSD


SMPL1(+)
SMPL1(-)
MOUT1(+)
MOUT1(-)
VPWM1
DENOM1
DENFB1
+32V1
-32V1
+18V1
-18V1
+8VA
U32 /.MC1536
U27 /.MC1536
U28 /.AD734
U28 /.TL594
U21 /.6N137
U18-A /.LP442A
U18-B /.LP442A
U18-C /.LP442A
D26 /.D1N814
D27 /.D1N814
EXCEL TECH LTD.
DWG NO. 90-188231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - OUTPUT AMPLIFIER, DC1
REV : B
DATE : DECEMBER 16/91
SHEET : 11 OF 12
MAMP1.CSO


MOUT2(+)
MOUT2(-)
SMPL2(+)
SMPL2(-)
VPWM2
DENOM2
DENFB2
+32V2
-32V2
+18V2
-18V2
+8VA
U33 /.MC1536
U31 /.MC1536
U30 /.AD734
U28 /.TL594
U29 /.SN137
U18-A /.LP442A
U18-B /.LP442A
U18-C /.LP442A
EXCEL TECH LTD.
DWG NO. 90-188231
DESIGNED BY : M.G.
ULTRA II - SUBBOARD - OUTPUT AMPLIFIER, DC2
REV : B
DATE : DECEMBER 18/91
SHEET : 12 OF 12
MAMP2.CSD

CHECKED 91/12/20

100158 REF	PID	PD1	PD2
0000	ELECTRO SUB	REVISION A4	DECEMBER 13, 1991
C001	C1020X	CAP,CER,DIS,1NFD0,100V	630-09102
C002	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C003	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C004	C5177X	CAP,ELC,RAD,1K0UFD,25V	037-56102 OR 037-661
C005	C5177X	CAP,ELC,RAD,1K0UFD,25V	037-56102 OR 037-661
C006	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C007	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C008	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C009	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C010	C5177X	CAP,ELC,RAD,1K0UFD,25V	037-56102 OR 037-661
C011	C5177X	CAP,ELC,RAD,1K0UFD,25V	037-56102 OR 037-661
C012	C5215X	CAP,ELC,RAD,47UFD,50V	035-90015
C013	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C014	C1020X	CAP,CER,DIS,1NFD0,100V	630-09102
C015	C5215X	CAP,ELC,RAD,47UFD,50V	035-90015
C016	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C017	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C018	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C019	C1002X	CAP,CER,MONO,4N7FD,50V	AVX:CK05BX472K
C020	C1015X	CAP, CER, DIS,390 PFD, 10	630-08391
C021	C1002X	CAP,CER,MONO,4N7FD,50V	AVX:CK05BX472K
C022	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C023	C1015X	CAP, CER, DIS,390 PFD, 10	630-08391
C024	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C025	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C026	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C027	C5217X	CAP,ELC,RAD,100UFD,50V	3476GD101M050SMBS
C028	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C029	C7061X	CAP,ELC,TAN,10UFD,35V	TAP10M35
C030	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C031	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C032	C5217X	CAP,ELC,RAD,100UFD,50V	3476GD101M050SMBS
C033	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C034	C7061X	CAP,ELC,TAN,10UFD,35V	TAP10M35
C035	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C036	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C037	C5217X	CAP,ELC,RAD,100UFD,50V	3476GD101M050SMBS
C038	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C039	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C040	C5217X	CAP,ELC,RAD,100UFD,50V	3476G0101M050SMBS
C041	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C042	C7061X	CAP,ELC,TAN,10UFD,35V	TAP10M35
C043	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C044	C1015X	CAP, CER, DIS,390 PFD, 10	630-08391
C045	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C046	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C047	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C048	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C049	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C050	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C051	C1928X	CAP,CER,DIS,100NFD,100V	CK05BX104K
C052	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C053	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C054	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C055	C1015X	CAP, CER, DIS,390 PFD, 10	630-08391
C056	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C057	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA

10015[illegible] REF	PID	PD1	PD2
C058	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C059	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C060	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K
C061	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C062	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C063	C1933X	CAP,CER,DIS,0UFD1 63V	370-11104
C064	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C065	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C066	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K
C067	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C068	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C069	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C070	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C071	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C072	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C073	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C074	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C075	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C076	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C077	C1933X	CAP,CER,DIS,0UFD1 63V	370-11104
C078	C2909X	CAP,FLM,DIS,1UFD 100V	CK06BX105K
C079	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C080	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C081	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C082	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C083	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C084	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C085	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C086	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C087	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C088	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C089	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K
C090	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C091	C1925X	CAP CER DIS 10NFD 100V	CK05BX103K
C092	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C093	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K
C094	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C095	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C096	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C097	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C098	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C099	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C100	C1933X	CAP,CER,DIS,0UFD1 63V	370-11104
C101	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K
C102	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C103	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C104	C1087X	CAP,CER,DIS,39PFD,100V	681-10399
C105	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C106	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C107	C7036X	CAP,TA,47UF/16V/M	TAP47M16
C108	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C109	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C110	C7036X	CAP,TA,47UF/16V/M	TAP47M16
C111	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C112	C1087X	CAP,CER,DIS,39PFD,100V	681-10399
C113	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C114	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C115	C1924X	CAP,CER,DIS,2NFD2,100V	CK05BX222K

100157 REF	PID	PD1	PD2
C116	C1933X	CAP,CER,DIS,OUFD1 63V	370-11104
C117	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C118	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C119	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C120	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C121	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C122	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C123	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
C124	C1951P	0.1UF BYPASS CERAMIC 0.2"	C322C104Z5U5CA
D001	D4003X	DIODE,PWR,1A,200V	1N4003
D002	D4003X	DIODE,PWR,1A,200V	1N4003
D003	D5819X	DIODE	1N5819
D004	D5819X	DIODE	1N5819
D005	D4003X	DIODE,PWR,1A,200V	1N4003
D006	D5819X	DIODE	1N5819
D007	D5819X	DIODE	1N5819
D008	D4003X	DIODE,PWR,1A,200V	1N4003
D009	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D010	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D011	D0962B	DIODE,ZEN,11V,0.4W	1N962B
D012	D0962B	DIODE,ZEN,11V,0.4W	1N962B
D013	D0115X	DIODE	MUR115
D014	D0115X	DIODE	MUR115
D015	D5819X	DIODE	1N5819
D016	D0115X	DIODE	MUR115
D017	D0115X	DIODE	MUR115
D018	D0962B	DIODE,ZEN,11V,0.4W	1N962B
D019	D0962B	DIODE,ZEN,11V,0.4W	1N962B
D020	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D021	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D022	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D023	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D024	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D025	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D026	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D027	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D028	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D029	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D030	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D031	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D032	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D033	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D034	D5819X	DIODE	1N5819
D035	D5819X	DIODE	1N5819
D036	D5819X	DIODE	1N5819
D037	D5819X	DIODE	1N5819
D038	D5819X	DIODE	1N5819
D039	D5819X	DIODE	1N5819
D040	D5819X	DIODE	1N5819
D041	D5819X	DIODE	1N5819
D042	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D043	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D044	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
D045	D0914B	DIODE,SIG,SI,100V,100MA	1N914B
J001	4PIN.1		
J005	J1002M	CON,HDR,M,3 POS	10-88-8069
J006	J1002M	CON,HDR,M,3 POS	10-88-8069
J007	J1002M	CON,HDR,M,3 POS	10-88-8069

1, DOS 9

10015? REF	PID	PD1	PD2
J008	J1002M	CON,HDR,M,3 POS	10-88-8069
P001	P4005X	ULTRA SUB BOARD	UD1-100311
Q001	Q3904X	TRANS,SI,PL,NPN,40V,0A2	2N3904
Q002	Q3904X	TRANS,SI,PL,NPN,40V,0A2	2N3904
Q003	Q3904X	TRANS,SI,PL,NPN,40V,0A2	2N3904
Q004	Q3904X	TRANS,SI,PL,NPN,40V,0A2	2N3904
R001	R1059F	RES,CAR,270R,1W,5%	
R002	R1059F	RES,CAR,270R,1W,5%	
R003	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15
R004	R2385C	RES,MTL,FLM,1/4W,1%,32K4	MR25F-32K4
R005	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R006	R2287C	RES,MTL,FLM,1/4W,1%,3K32	
R007	R2287C	RES,MTL,FLM,1/4W,1%,3K32	
R008	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R009	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15
R010	R2385C	RES,MTL,FLM,1/4W,1%,32K4	MR25F-32K4
R011	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R012	R1018C	RES,CAR,FLM,1/4W,5%,5R10	CR25-5R10
R013	R1059F	RES,CAR,270R,1W,5%	
R014	R2300C	RES,MTL,FLM,1/4W,1%,4K75	MR25F-4K75
R015	R2300C	RES,MTL,FLM,1/4W,1%,4K75	MR25F-4K75
R016	R1059F	RES,CAR,270R,1W,5%	
R017	R4927X	RES,WW,1W,5%,0R27	
R018	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R019	R1018C	RES,CAR,FLM,1/4W,5%,5R10	CR25-5R10
R020	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00
R021	R1132C	RES,CAR,FLM,1/4W,5%,300K	CR25-300K
R022	R2239C	RES,MTL,FLM,1/4W,1%,1K00	MR25F-1K00
R023	R4927X	RES,WW,1W,5%,0R27	
R024	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R025	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R026	R2420C	RES,MTL,FLM,1/4W,1%,75K0	MR25F-75K0
R027	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R028	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R029	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R030	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R031	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R032	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1
R033	R2239C	RES,MTL,FLM,1/4W,1%,1K00	MR25F-1K00
R034	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R035	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1
R036	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R037	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K0
R038	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R039	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R040	R2420C	RES,MTL,FLM,1/4W,1%,75K0	MR25F-75K0
R041	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R042	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R043	R2449C	RES,MTL,FLM,1/4W,1%,150K	MR25F-150K
R044	R1115C	RES,CAR,FLM,1/4W,5%,56K	CR25-56K
R045	R1111C	RES,CAR,FLM,1/4W,5%,39K	CR25-39K
R046	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R047	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R048	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R049	R2335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R050	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R051	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R052	R1080C	RES,CAR,FLM,1/4W,5%,2K00	CR25-2K00

100154 REF	PID	PD1	PD2
R053	R2466C	RES,MTL,FLM,1/4W,1%,274K	MR25F-274K
R054	RZ361C	RES,MTL,FLM,1/4W,1%,18K7	MR25F-18K7
R055	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R056	R2243C	RES,MTL,FLM,1/4W,1%,1K21	MR25F-1K21
R057	RZ364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R058	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R059	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R060	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R061	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R062	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R063	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R064	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R065	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R066	R2335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R067	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R068	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R069	RZ364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R070	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R071	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R072	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R073	R2466C	RES,MTL,FLM,1/4W,1%,274K	MR25F-274K
R074	R1089C	RES,CAR,FLM,1/4W,5%,4K70	CR25-4K70
R075	RZ361C	RES,MTL,FLM,1/4W,1%,18K7	MR25F-18K7
R076	R2243C	RES,MTL,FLM,1/4W,1%,1K21	MR25F-1K21
R077	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R078	R2364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R079	R1101C	RES,CAR,FLM,1/4W,5%,15K0	CR25-15K0
R080	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R081	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R082	R1091C	RES,CAR,FLM,1/4W,5%,5K60	CR25-5K60
R083	R1111C	RES,CAR,FLM,1/4W,5%,39K	CR25-39K
R084	R1115C	RES,CAR,FLM,1/4W,5%,56K	CR25-56K
R085	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R086	RZ389C	RES,MTL,FLM,1/4W,1%,36K5	
R087	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R088	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R089	RZ364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R090	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R091	R2404C	RES,MTL,FLM,1/4W,1%,51K1	MR25F-51K1
R092	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R093	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R094	R2441C	RES,MTL,FLM,1/4W,1%,124K	MR25F-124K
R095	R2602C	RES,MTL,FLM,1/4W,1%,10M0	MR25F-10M0
R096	R2173C	RES,MTL,FLM,1/4W,1%,249K	MR25F-249K
R097	R2173C	RES,MTL,FLM,1/4W,1%,249K	MR25F-249K
R098	R2602C	RES,MTL,FLM,1/4W,1%,10M0	MR25F-10M0
R099	R2441C	RES,MTL,FLM,1/4W,1%,124K	MR25F-124K
R100	R1081C	RES,CAR,FLM,1/4W,5%,2K20	CR25-2K20
R101	R2404C	RES,MTL,FLM,1/4W,1%,51K1	MR25F-51K1
R102	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R103	RZ364C	RES,MTL,FLM,1/4W,1%,20K0	MR25F-20K0
R104	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R105	RZ335C	RES,MTL,FLM,1/4W,1%,10K0	MR25F-10K0
R106	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R107	RZ389C	RES,MTL,FLM,1/4W,1%,36K5	
R108	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R109	R2528C	RES,MTL,FLM,1/4W,1%,1M00	MR25F-1M00
R110	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1

REF	PID	PD1	PD2
R111	R2528C	RES,MTL,FLM,1/4W,1%,1M00	MR25F-1M00
R112	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R113	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R114	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R115	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1
R116	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R117	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R118	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1
R119	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R120	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R121	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R122	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R123	R2464C	RES,MTL,FLM,1/4W,1%,215K	MR25F-215K
R124	R2382C	RES,MTL,FLM,1/4W,1%,30K1	MR25F-30K1
R125	R1152C	RES,CAR,FLM,1/4W,5%,2M00	CR25-2M00
R126	R1161C	RES,CAR,FLM,1/4W,5%,4M70	CR25-4M70
R127	R2461C	RES,MTL,FLM,1/4W,1%,200K	MR25F-200K
R128	R2465C	RES,MTL,FLM,1/4W,1%,226K	MR25F-226K
R129	R2601C	RES,MTL,FLM,1/4W,1%,4M87	MR25F-4M87
R130	R2405C	RES,MTL,FLM,1/4W,1%,61K9	
R131	R2601C	RES,MTL,FLM,1/4W,1%,4M87	MR25F-4M87
R132	R2405C	RES,MTL,FLM,1/4W,1%,61K9	
R133	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R134	R2461C	RES,MTL,FLM,1/4W,1%,200K	MR25F-200K
R135	R2464C	RES,MTL,FLM,1/4W,1%,215K	MR25F-215K
R136	R2464C	RES,MTL,FLM,1/4W,1%,215K	MR25F-215K
R137	R1145C	RES,CAR,FLM,1/4W,5%,1M00	CR25-1M00
R138	R2461C	RES,MTL,FLM,1/4W,1%,200K	MR25F-200K
R139	R2465C	RES,MTL,FLM,1/4W,1%,226K	MR25F-226K
R140	R2461C	RES,MTL,FLM,1/4W,1%,200K	MR25F-200K
R141	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R142	R2528C	RES,MTL,FLM,1/4W,1%,1M00	MR25F-1M00
R143	R2343C	RES,MTL,FLM,1/4W,1%,12K1	MR25F-12K1
R144	R2528C	RES,MTL,FLM,1/4W,1%,1M00	MR25F-1M00
R145	R1161C	RES,CAR,FLM,1/4W,5%,4M70	CR25-4M70
R146	R1152C	RES,CAR,FLM,1/4W,5%,2M00	CR25-2M00
R147	R2382C	RES,MTL,FLM,1/4W,1%,30K1	MR25F-30K1
R148	R2464C	RES,MTL,FLM,1/4W,1%,215K	MR25F-215K
R149	R1083C	RES,CAR,FLM,1/4W,5%,2K70	CR25-2K70
R150	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R151	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R152	R2432C	RES,MTL,FLM,1/4W,1%,100K	MR25F-100K
R153	R1157C	RES,CAR,FLM,1/4W,5%,3M30	CR25-3M30
R154	R2172C	RES,MTL,FLM,1/4W,1%,200R	MR25F-200R
R155	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15
R156	R2172C	RES,MTL,FLM,1/4W,1%,200R	MR25F-200R
R157	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15
R158	R1116C	RES,CAR,FLM,1/4W,5%,68K	
R159	R1119C	RES,CAR,FLM,1/4W,5%,82K0	CR25-82K0
R160	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R161	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R162	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R163	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R164	R1113C	RES,CAR,FLM,1/4W,5%,47K0	CR25-47K0
R165	R1119C	RES,CAR,FLM,1/4W,5%,82K0	CR25-82K0
R166	R1116C	RES,CAR,FLM,1/4W,5%,68K	
R167	R1157C	RES,CAR,FLM,1/4W,5%,3M30	CR25-3M30
R168	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15

100157 REF	PID	PD1	PD2
R169	R2172C	RES,MTL,FLM,1/4W,1%,200R	MR25F-200R
R170	R2271C	RES,MTL,FLM,1/4W,1%,2K15	MR25F-2K15
R171	R2172C	RES,MTL,FLM,1/4W,1%,200R	MR25F-200R
R172	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
R173	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R174	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R175	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R176	R1073C	RES,CAR,FLM,1/4W,5%,1K00	CR25-1K00
R177	R1097C	RES,CAR,FLM,1/4W,5%,10K0	CR25-10K0
RLY1	K1008X	RELAY,PWB,DPDT,12VDC	RKA11DZ12V
RLY2	K1008X	RELAY,PWB,DPDT,12VDC	RKA11DZ12V
RLY3	K1008X	RELAY,PWB,DPDT,12VDC	RKA11DZ12V
RLY4	K1008X	RELAY,PWB,DPDT,12VDC	RKA11DZ12V
T001	100374	XFMR,OUTPUT,SPX2906	SPX2906
T002	100374	XFMR,OUTPUT,SPX2906	SPX2906
U001	100321	IC,LIN,POWER AUDIO AMP	TDA2040V
U002	100321	IC,LIN,POWER AUDIO AMP	TDA2040V
U003	U2043P	IC ANALOG SWITCH	HI 1-0200-5
U004	U2043P	IC ANALOG SWITCH	HI 1-0200-5
U005	U1117P	IC,LIN,REG,-15V,1A	MC7915CT
U006	U1117P	IC,LIN,REG,-15V,1A	MC7915CT
U007	U1025P	IC,LIN,REG,+15V,1A	MC7815CT
U008	U3404P	18 BIT SERIAL DUAL DAC	AD1864N
U009	U1025P	IC,LIN,REG,+15V,1A	MC7815CT
U010	U2045P	OP AMP LOW OFFSET	AD712JN
U011	U4132H	IC. CMOS	SN74HC132AN
U012	U4132H	IC. CMOS	SN74HC132AN
U013	U2045P	OP AMP LOW OFFSET	AD712JN
U014	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U015	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U016	U2040P	IC,OAMP,JFET,DUA.	LF353N
U017	U2040P	IC,OAMP,JFET,DUA.	LF353N
U018	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U019	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U020	U2051P	TL594	
U021	U3507P	6N137	IC, OPTO COUPLER
U022	U2053P	DG442DJ	IC,
U023	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U024	U2053P	DG442DJ	IC,
U025	U3507P	6N137	IC, OPTO COUPLER
U026	U2051P	TL594	
U027	U2052P	MC1536U	IC,
U028	U2054P	AD734AQ	IC,
U029	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U030	U2054P	AD734AQ	IC,
U031	U2052P	MC1536U	IC,
U032	U2052P	MC1536U	IC,
U033	U2052P	MC1536U	IC,
U034	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U035	U3508P	4N35	IC, OPTO COUPLER
U036	U8450P	IC EPROM, 1K SERIAL	CAT93C46P
U037	U3204P	AD7828KN	IC
U038	U3508P	4N35	IC, OPTO COUPLER
U039	U2041P	IC,OAMP,JFET,DUAL	LF442ACN
U040	U2053P	DG442DJ	IC,
U041	U4001P	IC,DIG,CMOS,4X2 NOR	MC14001BCP
U042	U3508P	4N35	IC, OPTO COUPLER
U043	U3508P	4N35	IC, OPTO COUPLER

10015 REF	PID	PD1	PD2
U044	U4001P	IC,DIG,CMOS,4X2 NOR	MC14001BCP
U045	U2053P	DG442DJ	IC,
VR01	Q8402X	VARISTOR,MET/OX Z30V/5A	2322-592-52316
VR02	Q8402X	VARISTOR,MET/OX Z30V/5A	2322-592-52316