daeg ⋈ SPO2 Analyzer
User and Service Manual

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METRON warrants that the daeg SPO2 Analyzer will substantially conform to published specifications and to the documentation, provided that it is used for the purpose for which it was designed. METRON will, for a period of twelve (12) months from date of purchase, replace or repair any defective analyzer, if the fault is due to a manufacturing defect. In no event will METRON or its local representatives be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of or inability to use the daeg SPO2 Analyzer, even if advised of the possibility of such damages. METRON or its local representatives are not responsible for any costs, loss of profits, loss of data, or claims by third parties due to use of, or inability to use the daeg SPO2 Analyzer. Neither METRON nor its local representatives will accept, nor be bound by any other form of guarantee concerning the daeg SPO2 Analyzer other than this guarantee. Some jurisdictions do not allow disclaimers of expressed or implied warranties in certain transactions; therefore, this statement may not apply to you.

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daeg ⋈ SpO2 Analyzer Specifications

SPO2 SIMULATION

GENERAL
- Factory installed, downloadable and user programmable R-curves, patient conditions and templates.
- Probe signal and LED test x

ACTIVE PROBE SPO2 SIMULATION
- O2 saturation range: 30 - 100 %
- Simulation resolution: 1% SpO2%
- Simulation accuracy:
  ± 0.5 SpO2% 65-100% SpO2%
  ± 1 SpO2% 30-64% SpO2%
- Simulation repeatability:
  ± 0.2 SpO2%
- Simulation rate: 30 - 300 bpm, res. 5 bpm (sync. to ECG for "C-lock" testing)
- Rate accuracy: ± 0.1%
- Pulse amplitude: 0 - 100% of nominal pleth amplitude.
- Amplitude accuracy:
  ≥30% amplitude ±1%.
  1-29% amplitude ±5%.
- Pigmentation:
  Low, medium and high
- Light repeater bandwidth:
  DC - 1MHz
- Optical slew rate: 50 mcd/μs
- Light repeater dynamic range:
  1mcd + 13 dB - 60 dB
- Receiver optical 3 dB bandwidth:
  600 - 1050 nm.

INSTALLED R-CURVES
- BCI International
- Criticare
- Masimo
- Nellcor
- Novametrix
- Philips (Agilent)
- Ohmeda

INSTALLED PATIENT CONDITIONS
- Normal patient
- Geriatric patient
- Obese patient
- Patient with weak pulse
- Bradycardia
- Tachycardia

ARTIFACTS (ACTIVE PROBE ONLY)
- Motion: 0 - 4Hz
- Ambient sunlight: Ambient, Sun
- Interfering light: 50Hz, 60Hz

PROBE LED OPTICAL FREQUENCY
- Frequency range: 550 - 1050 nm
- Resolution: 1nm
- Accuracy: ±2% of range

PROBE TEST
- Available with release of Probe Test Adaptor Box and firmware update.

ECG SIMULATION - GENERAL
The data below is related both to factory installed and downloadable waveforms.
- Lead configuration:
  5 lead RL, RA, LA, LL, V1-6
- Low level output amplitude:
  0.2-2mV, resolution 100 mV
- Low level output impedance:
  1000 ohm to RL
- High level output amplitude:
  0.5V/mV of low level.
- High level output impedance:
  50 ohm
- System amplitude accuracy:
  ±2% @1mV
- System rate accuracy: ± 0.1%
- System time resolution: 10 μs
  (100 kHz maximum update rate)

ECG OUTPUT
The data below is related to factory installed waveform types.

NORMAL ECG SINUS
- 30 - 300 BPM, resolution 1 BPM

GENERAL INFORMATION
POWER SUPPLY
- Power sources: 4 standard AA/LR6/MN-1500 cells.
  230VAC/115VAC to 9vDC battery eliminator.
- Power consumption:
  200 mA w/o display backlight.
  400 mA w/full backlight.
- Battery lifetime:
  12 h for alkaline cells without backlight.

HOUSING
High impact plastic case.

DIMENSIONS
- Height: 237 mm/9.2"
- Width: 122 mm/4.8"
- Depth: 42 mm/1.6"

WEIGHT
With battery: 0.6 kg/1.3 lb.

TEMPERATURE
- Storage temperature:
  0/32 to +50/122 ° C/F
- Operating temperature:
  + 15/59 to +35/95° C/F

HUMIDITY
Operating humidity:
10% - 80% (non-condensing)

DISPLAY
Graphical LCD, with backlighting.

CONNECTORS
- 9V DC power inlet
  (standard 2.1 mm power jack)
- RS-232/C for PC or printer communication (9-pin D-sub male)
- 1 probe connector (Redel 8-pin).
- 5 low level ECG outputs RA, RL, LA, LL and V1 (AHA color coded safety connector)
- 1 high level ECG output
  (standard phono jack).

daeg SpO2 Analyzer
Ordering Information

Order no:
12700: **daeg** SpO2 Analyzer

Accessories:
17021: Battery Eliminator 240V
or
17027: Battery Eliminator 115V
17030: Battery Package. 4-cells
12710: User and Service Manual

Options:
11150: Carrying case
12711: Cable Test Adapter Box
12712: PRO-Soft **daeg**
12713: PRO-Soft **daeg**, demo
12714: User Manual PRO-Soft daeg
17024: Universal Banana Adapter

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daeg Quick Start

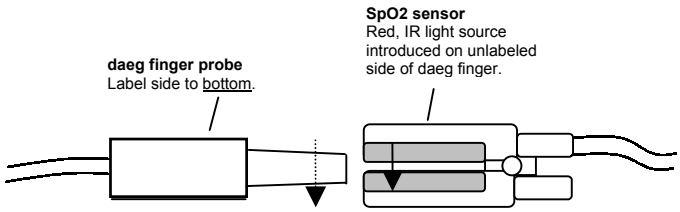
daeg Startup

1. Connect daeg's Finger Probe to the main daeg unit, and switch the daeg unit **on**.

   The daeg must be powered by the 9VDC 400mA power supply or by 4 AA alkaline batteries loaded into the unit's battery compartment.

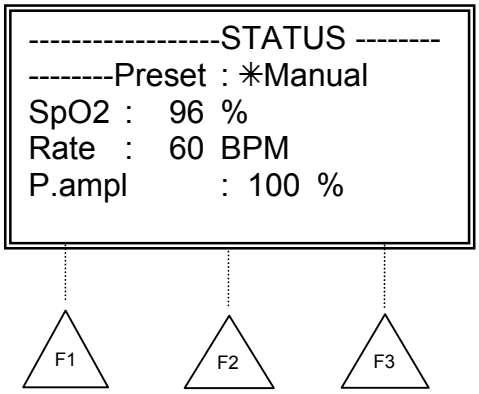
2. The version number of the firmware will be briefly displayed, followed by the first display screen (below). The unit is immediately outputting the simulation as displayed.

3. Apply the oximeter's sensor to the daeg finger probe. The sensor's transmitter must be on the bottom (unlabeled) side of the daeg finger.



Daeg Operation / Simulation

1. To adjust the simulation settings, use the **F2** function key to select the "active" parameter. The active parameter is marked with an asterisk (*).



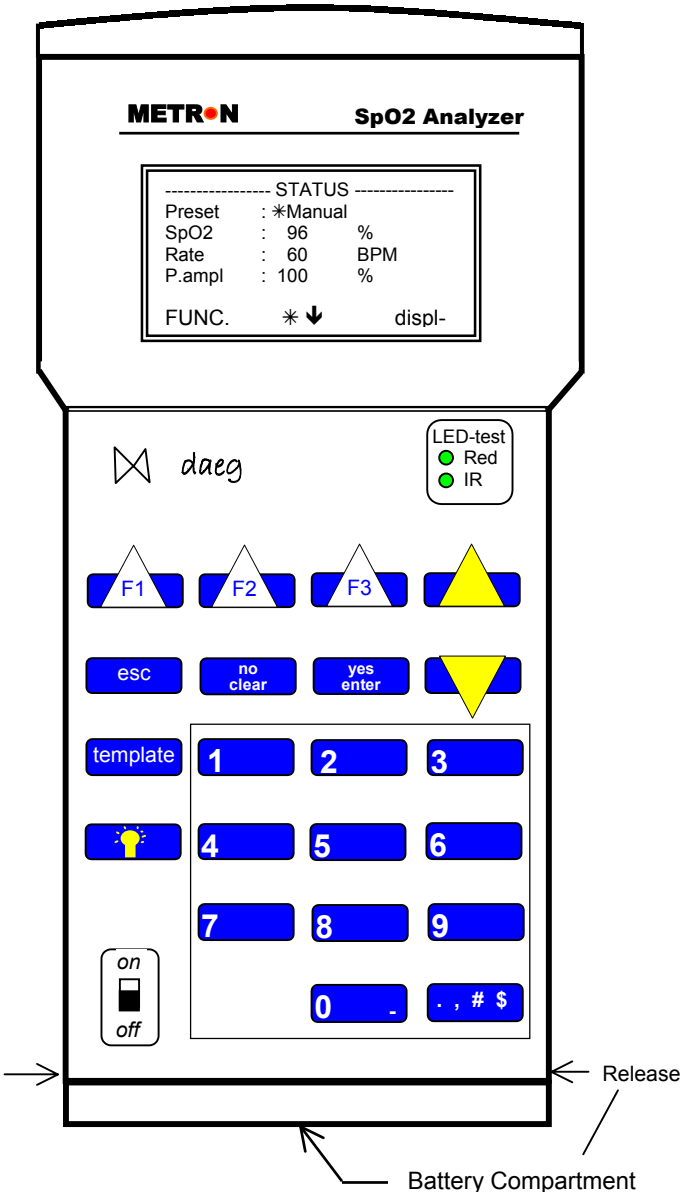
Note: Menu items at the bottom of the display are activated/accessed using the F1, F2, and F3 function keys.

2. Adjust the active parameter using the yellow Up and Down arrow keys on the keypad, then press **enter** to confirm the change.

3. To change the simulation setting for oximeter model (Make), Ambient Light, Pigmentation, or to select an automated simulation sequence, select the **F3** function key to go to the second display screen.

4. To access additional test and auxiliary functions, press the **F1** function key while in the first or second screen display.

   Additional / Auxiliary functions include:
   Alarm Tests, Print functions, Remote Control Operation, Probe Tests, and Simulation Setup.



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Unit Setup

Unpacking

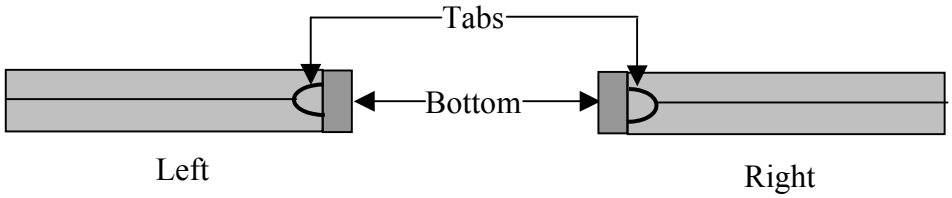
Unpack the unit and confirm the presence of the following components:

1 - daeg main unit
1 - daeg artificial finger
4 - AA batteries
1 – battery eliminator

If any of these items are missing or damaged, please contact your local Metron office.

Battery Installation

Refer to the diagram below when installing the batteries. You will need to depress the tabs shown in the diagram below and remove the bottom dark gray piece of the chassis. This will then expose the battery connector and battery tray. Disconnect the battery clip and remove the battery tray. When inserting the batteries into the tray, be sure to observe the polarity of the batteries. When the tray is loaded back into the unit, reconnect the clip, and then replace the chassis piece.



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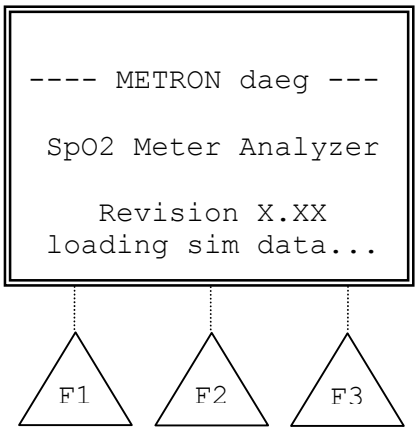
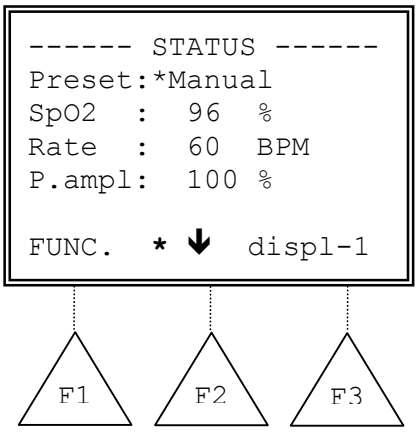
Operation

Power up Screen

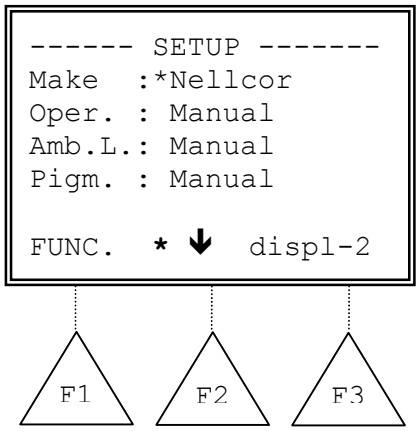


This screen is the first one that is visible when the unit is turned on. It indicates which version of the firmware is installed.

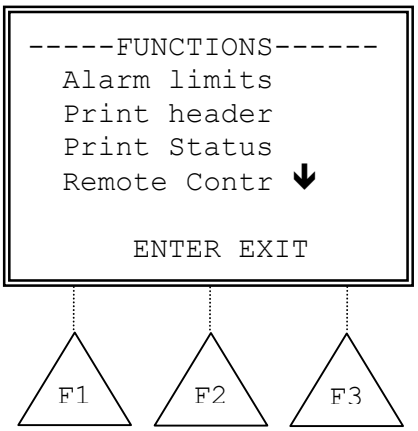
Main Simulation Screens

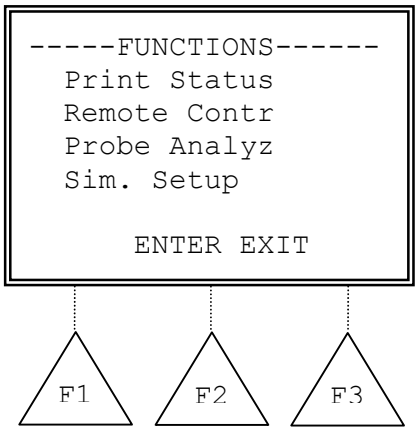


These are the two screens that are used when performing SPO2 simulations. You can change between the screens by pressing the (**F3**) button. The (**F2**) button will move the cursor, (*****), to the next parameter. Using the Up and Down arrows will let you change the value of the selected parameter. You will then need to press the (**yes/enter**) button to accept the change. Pressing the (**F1**) button will take you the **Function Selection Menu**.



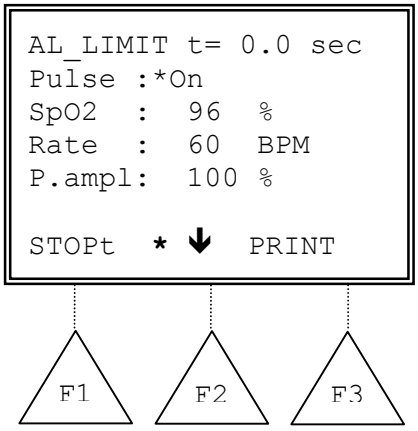
Function Selection Menu





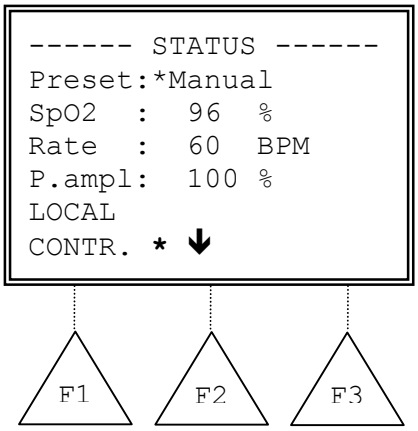
This screen will let you select which testing function of the daeg that you wish to perform. Using the **Up** and **Down** arrows will let you move the cursor (**->**) next to the function that you wish to use. Once the cursor is placed press the (**F2**) button or the (**yes/enter**) button to enter that function. Pressing the (**F3**) or (**esc**) buttons will take you back to the **Main Simulation Screen**.

Alarm Limits



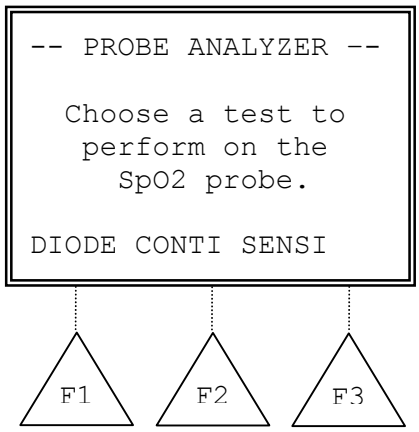
This test is designed to test your alarm system on your monitor. The (**F2**) button will move the cursor, (*****), to the next parameter. Using the Up and Down arrows will let you change the value of the selected parameter. You will then need to press the (**yes/enter**) button to accept the change and start the timer. Press the (**F1**) button to stop the clock when you hear the alarm from your monitor. The (**F3**) button will generate a line of printout via the parallel port. Pressing the (**esc**) button will take you back to the **Main Simulation Screen**.

Remote Control



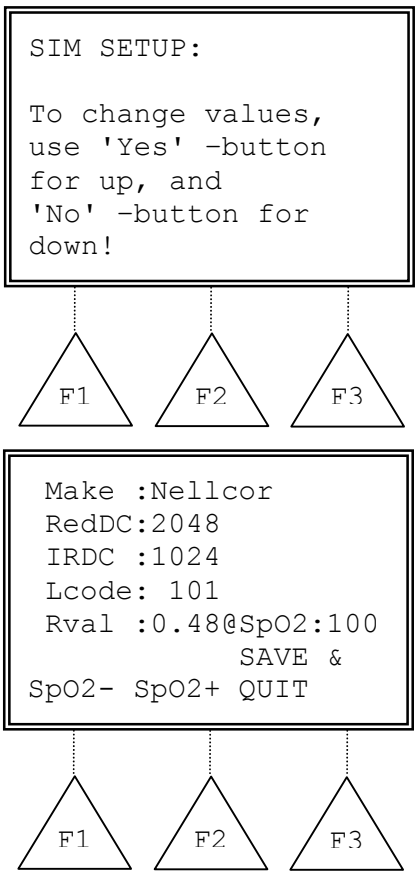
This is the screen that is shown when the daeg is in remote control mode. All currently active parameters are displayed on the screen. Pressing (**F1**) will cancel the remote control mode and take you back to the **Main Simulation Screen**.

Probe Analyzer



This screen will let you select which test you wish to perform on the finger probe when you have the probe tester adaptor box attached.

Simulation Setup



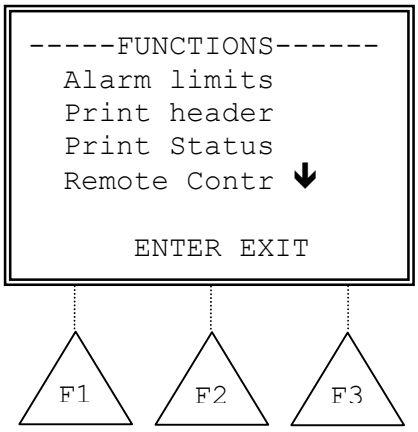
This function lets you manually alter the R-Curves within the daeg unit.

Be cautious when using this mode as you are altering the analyzer output. If you make any changes that you do not wish to keep you must turn off the daeg for 5 seconds then turn it back on.

When in this mode the controls will be as follows:
Up and **Down** arrows control the cursor position.
(**yes/enter**) increases the indicated value.
(**no/clear**) decreases the selected value.
(**F1**) decreases the selected SPO2 value.
(**F2**) increases the selected SPO2 value.
(**F3**) Saves the changes and takes you back to the **Main Simulation Screen**.

The saving procedure may take up to 5 minutes. Do not turn off the power during this time.

Print Options



The daeg unit may be attached directly to most printers via the 25-pin parallel printer port located on the side of the unit. Information is sent to the printer in standard ASCII text format. From the (**FUNCTION**) menu, you may select the (**Print Header**) or (**Print Status**) items. Pressing (**F2**) **ENTER** or (**yes/enter**) will initiate the print command.

If you select (**Print Header**) a header will be printed, identifying the daeg unit and version of firmware installed in the analyzer. The header provides spaces for the user to enter information concerning the identity and location of the device being tested, as well as spaces to verify that the test has passed or failed. There are also spaces to enter the date, sign the form, and add any comments. (See page xx for example of printout.)
Selecting (**Print Status**) will provide a line that identifies the simulation parameter (make, ambient light, pigmentation, SpO2, heart rate, and pulse amplitude. A space is also provided for recording the resulting SpO2 and rate as viewed on the oximeter. (See page 16 for example of printout.)

There is also an option to print from the Alarm Limits Test. At the conclusion of a test, press (**F3**) to print the result of the Alarm Test. The results show the settings for the test and the time/delay until the oximeter alarm was activated. (See page 16 for example of printout.)

NOTE:
Many printers will hold the header and status/result lines in memory until you prompt the printer to go/advance with the print job. The printer should indicate that it is receiving or has received data when the print commands are made from daeg.

METRON daeg SpO2-meter Analyzer Ver.1.02

DAEG Serial no.:_____

Establishment :_____

Appliance code:_____
Serial no. :_____
Status :_____
Group :_____
Manufacturer :_____
Model :_____
Type :_____
Location :_____

Unit passed test:_____ Unit failed test:_____
Comments :_____
_____

Date :_____
Signature :_____

Test#	Make	Simulation parameters: AmbL.	Pigm.	Preset	SpO2	Rate	Ampl.	Result: SpO2	Rate
1	Nellcor	Normal	Medium	Normal	98%	60bpm	100%	____%	____bpm
2	Nellcor	Normal	Medium	Weak P	90%	95bpm	10%	____%	____bpm
3	Nellcor	Normal	Medium	Bradyc	88%	45bpm	100%	____%	____bpm
4	Nellcor	Normal	Medium	Tachyc	85%	130bpm	20%	____%	____bpm
5	Nellcor	Normal	Medium	Geriat	92%	95bpm	40%	____%	____bpm
6	Nellcor	Normal	Medium	Motion	96%	75bpm	100%	____%	____bpm
7	Nellcor	Normal	Medium	Motion			83%	75bpm	100%
	SpO2 alarm responce time: 11.7 Seconds								
8	Nellcor	Normal	Medium	Normal			98%	50bpm	100%
	Rate alarm responce time: 15.1 Seconds								

Troubleshooting

Q: SPO2 values do not match.
A: Confirm that the “Make” is properly selected.

Q: The monitor is not reading any values.
A: Check all connections and verify if the “Red” and “IR” lights on the daeg are illuminated.

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Calibration

<<Coming Soon>>

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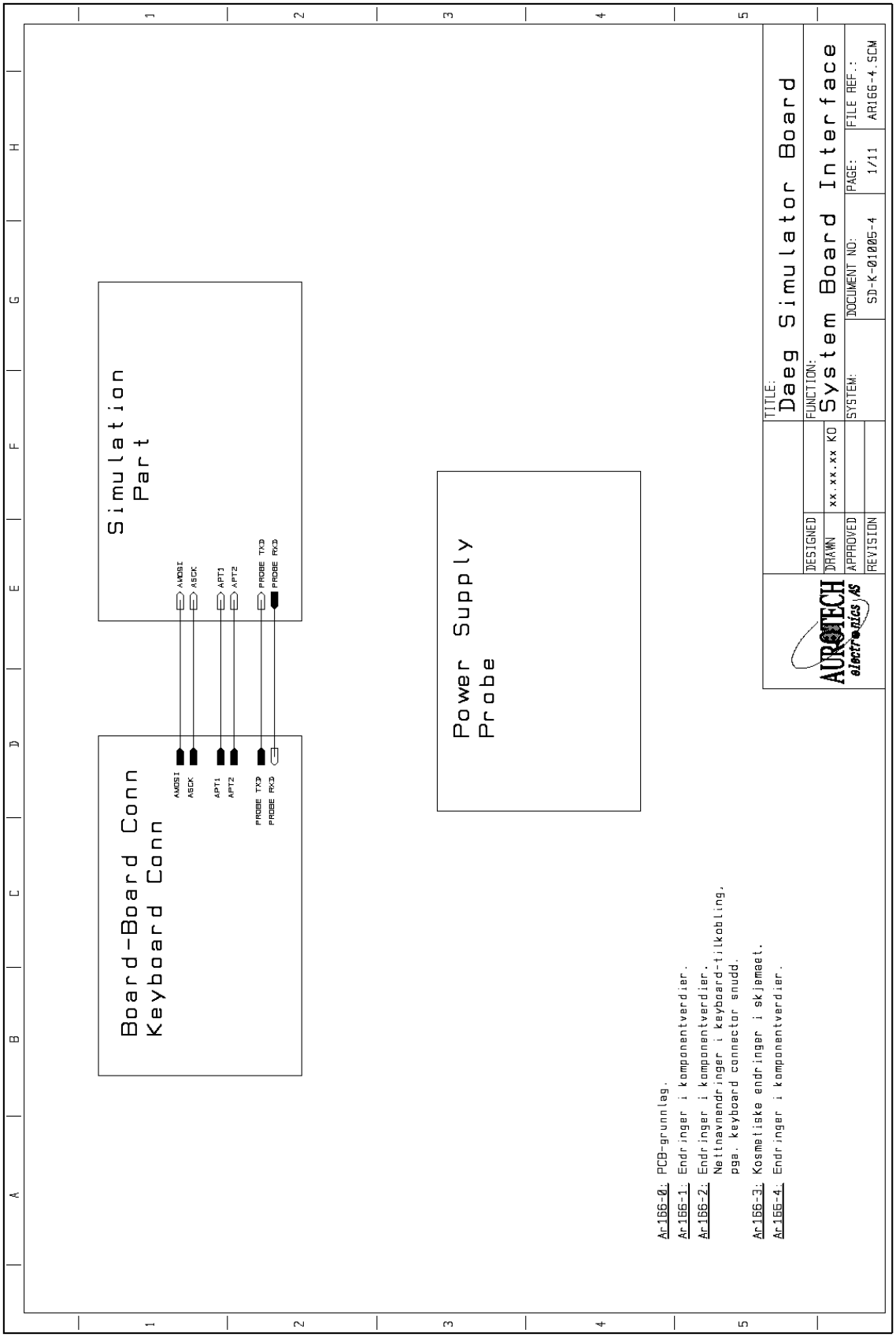
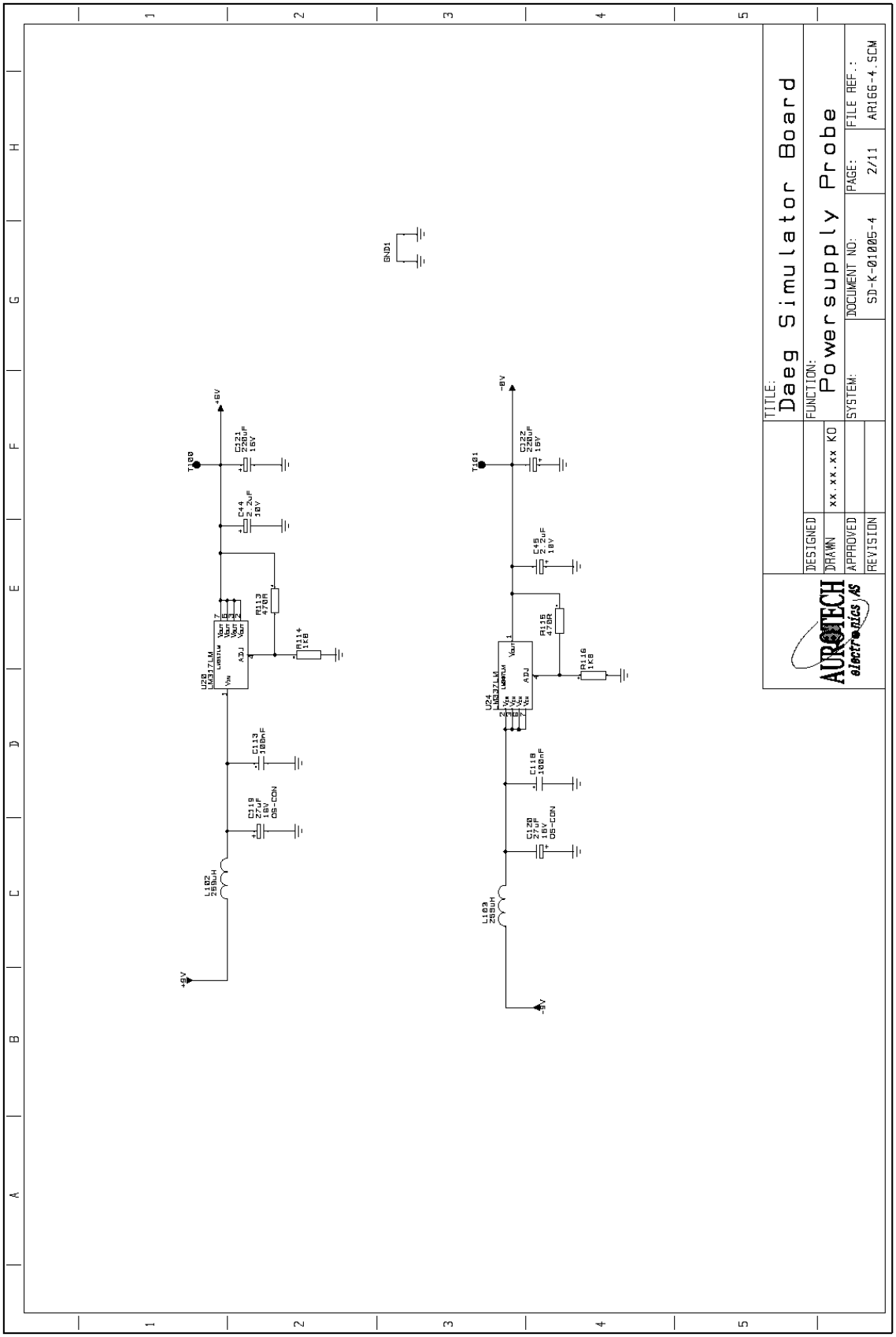
Schematics

The schematics on the following page are for the **daeg** unit and the **Finger Probe**.


Simulation
Part
AMOSI
ASCK
APT1
APT2
PROBE TXD
PROBE RXD
Board-Board Conn
Keyboard Conn
Power Supply
Probe
Ar166-0: PCB-grunnlag.
Ar166-1: Endringer i komponentverdier.
Ar166-2: Endringer i komponentverdier.
Nettnavnendringer i keyboard-tilkobling,
pga. keyboard connector snudd.
Ar166-3: Kosmetiske endringer i skjemaet.
Ar166-4: Endringer i komponentverdier.
TITLE:
Daeg Simulator Board
FUNCTION:
System Board Interface
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
1/11
FILE REF.:
AR166-4.SCH
AUROTECH
electronics AS


TITLE:
Daeg Simulator Board
FUNCTION:
Powersupply Probe
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
2/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics as
GND1
T100
T101
+8V
-8V
+5V
-5V
C121
220uF
16V
C44
2.2uF
16V
R113
470R
R114
1KB
U23
LM317LM
ADJ
C113
100nF
C119
27uF
16V
OS-CON
L102
250uH
C122
220uF
16V
C45
2.2uF
16V
R115
470R
R116
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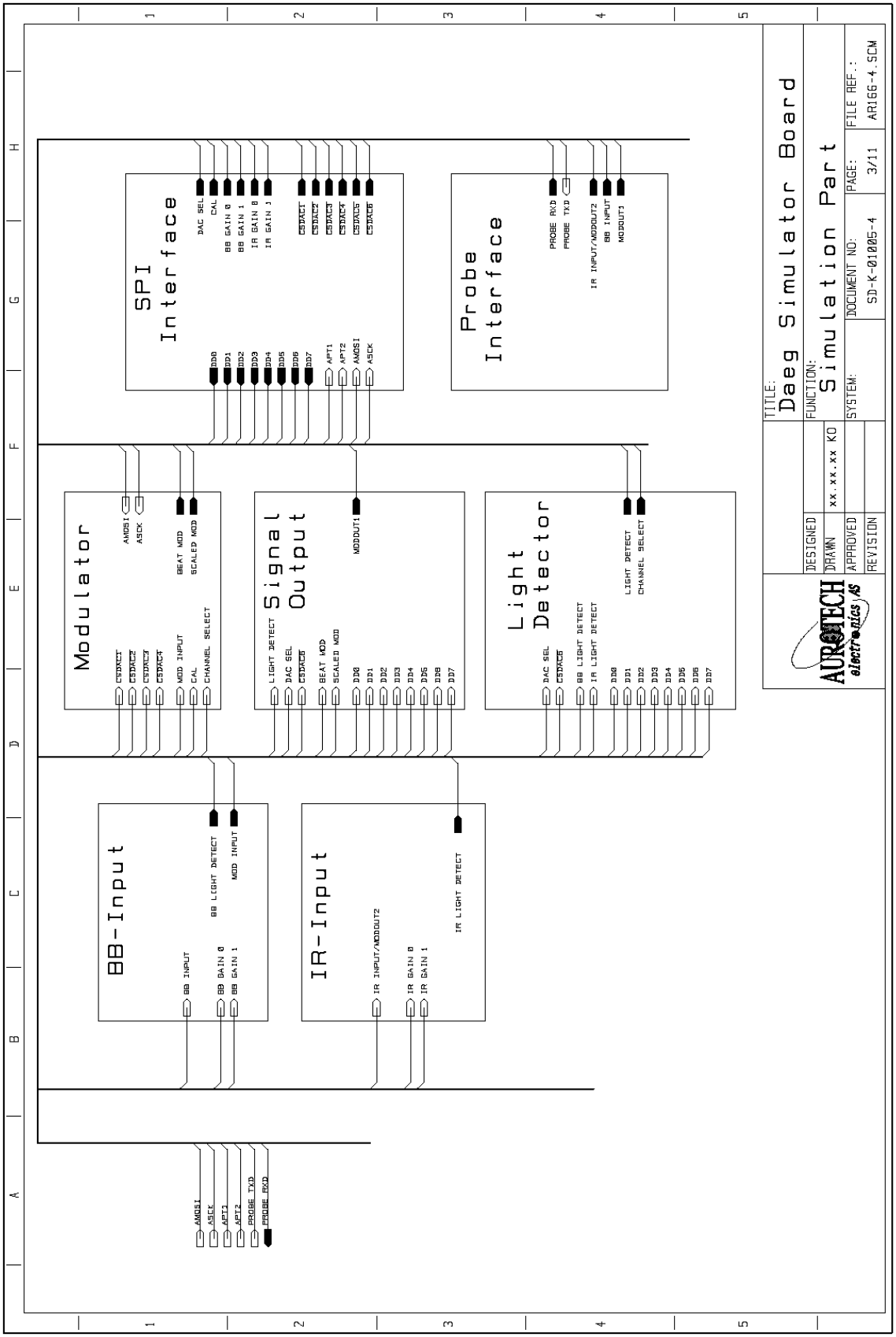
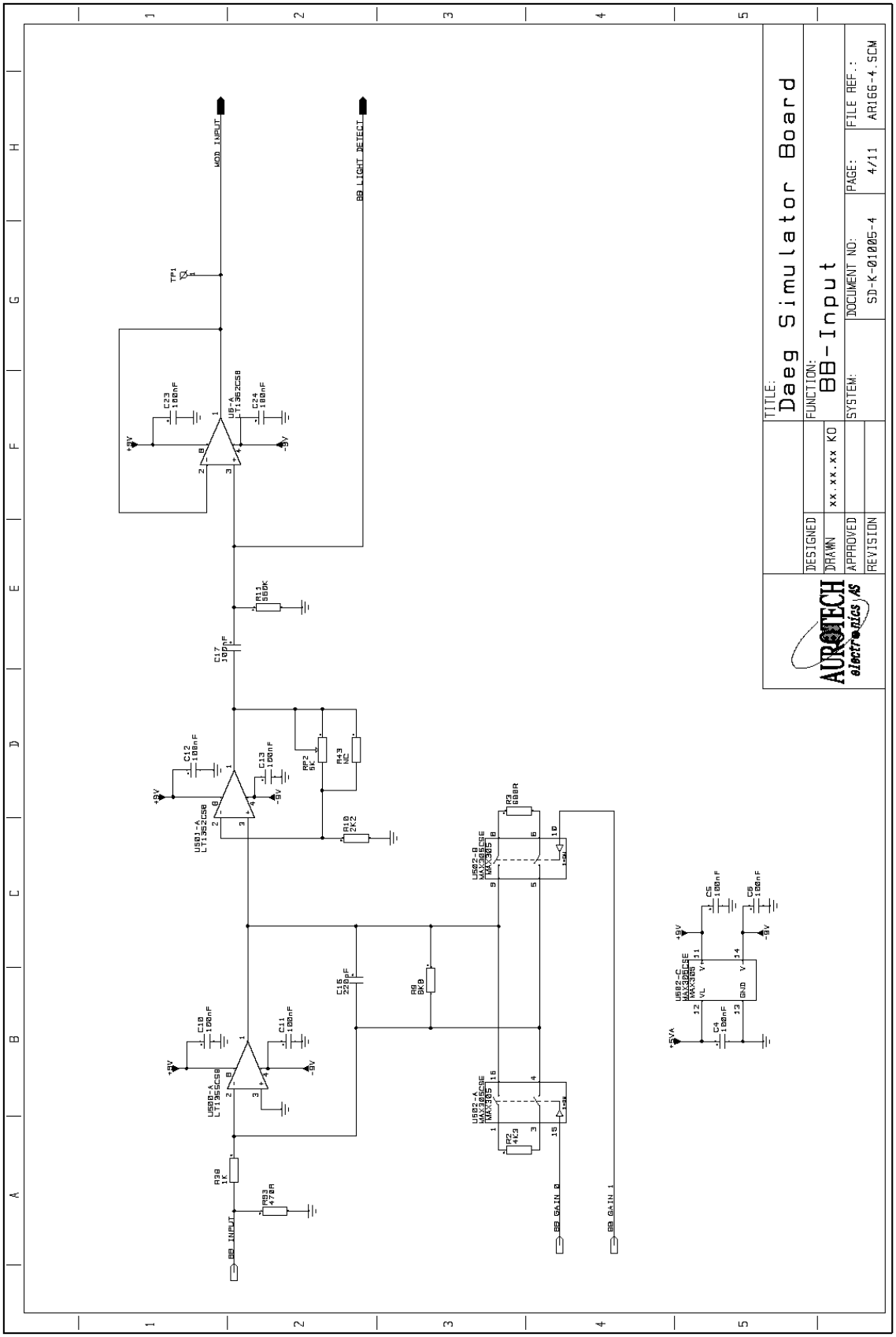
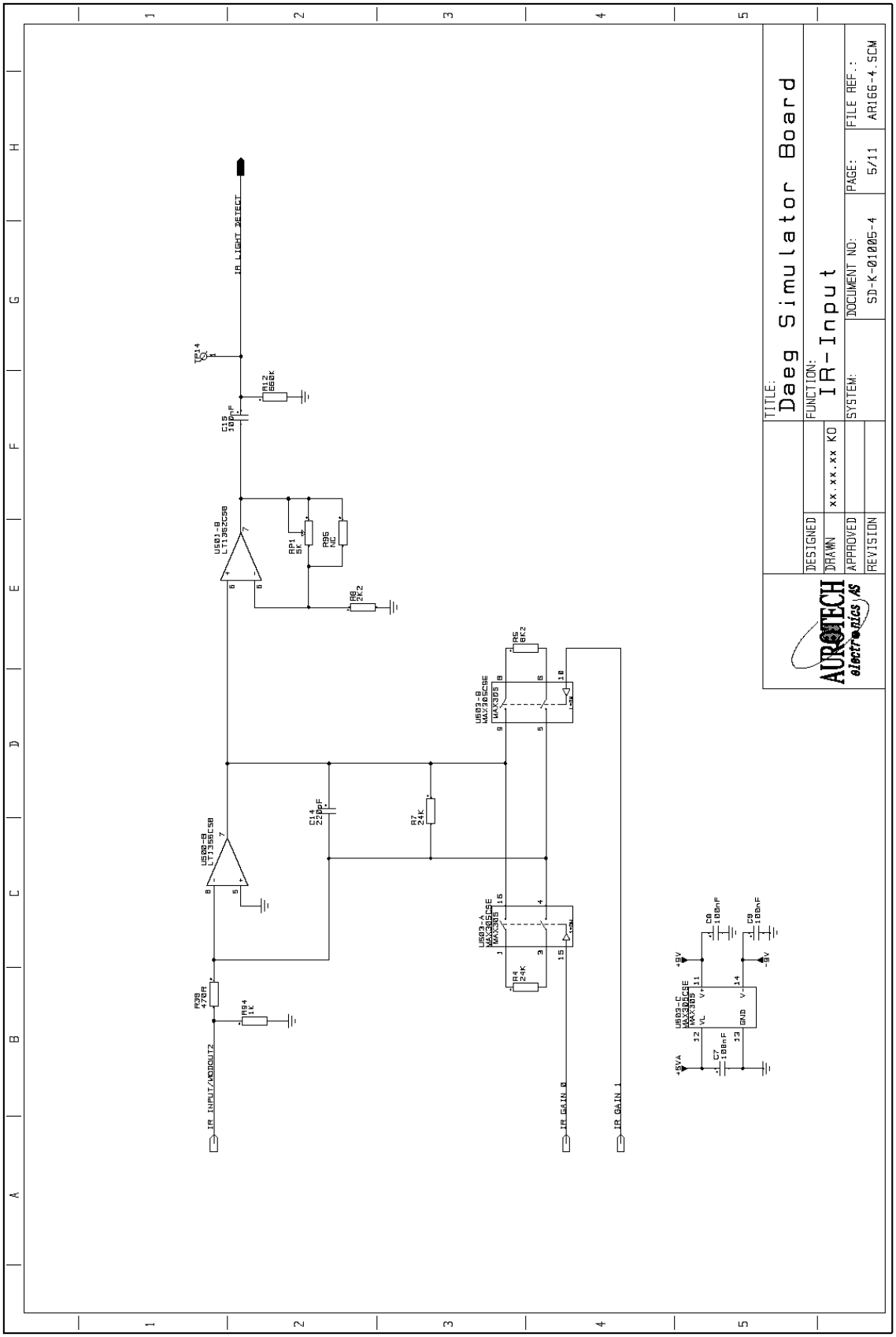
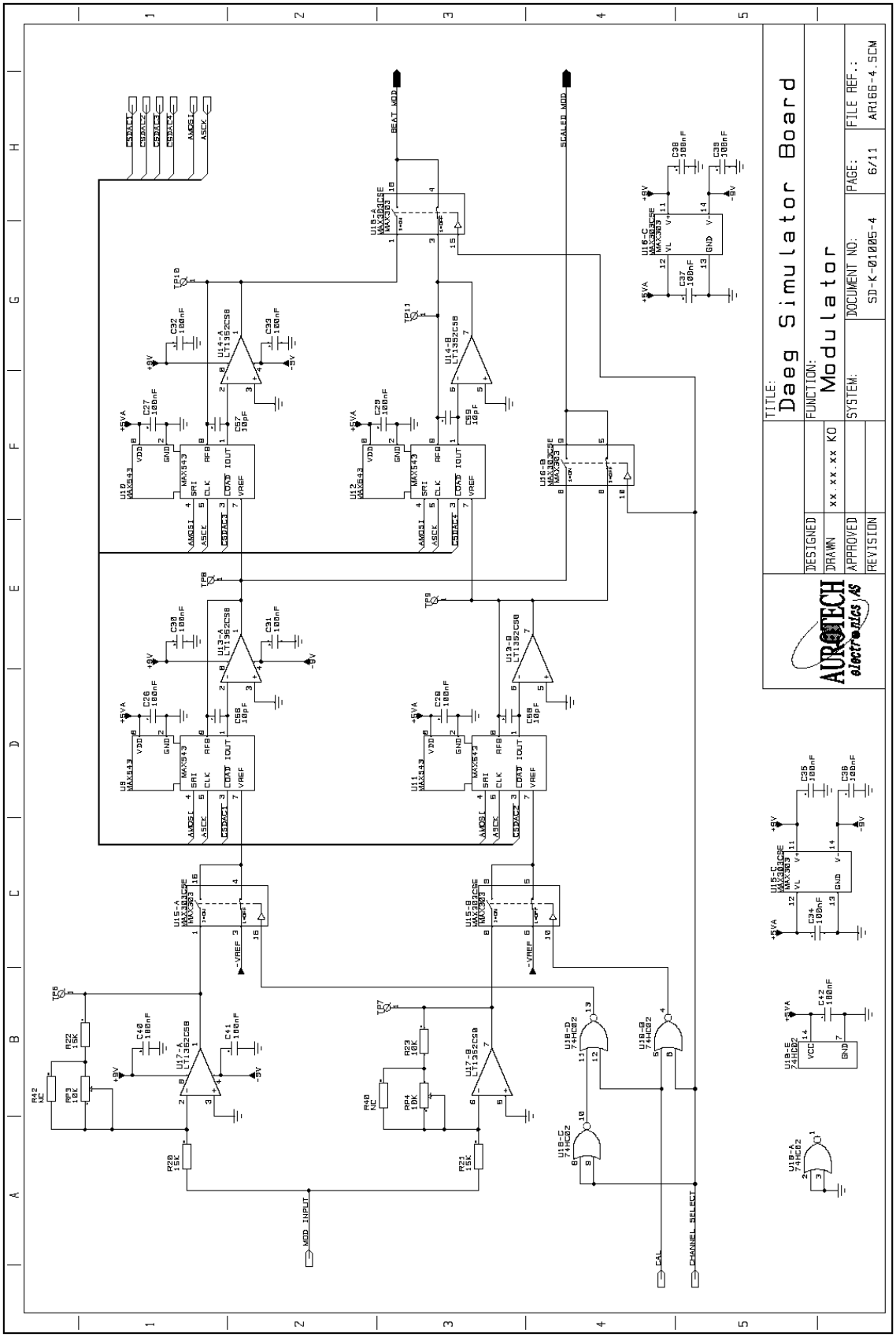
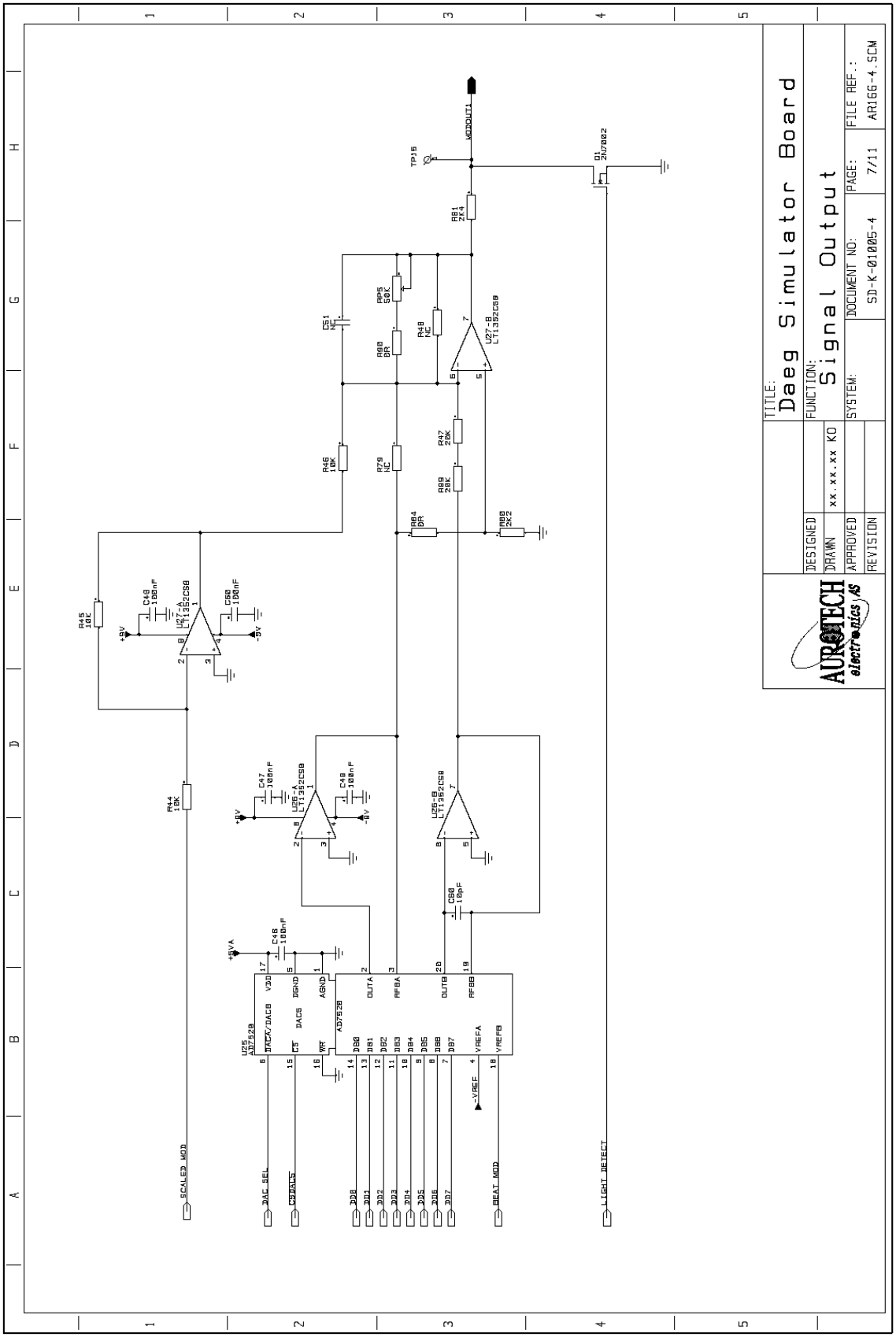
C120
27uF
16V
OS-CON
L103
250uH

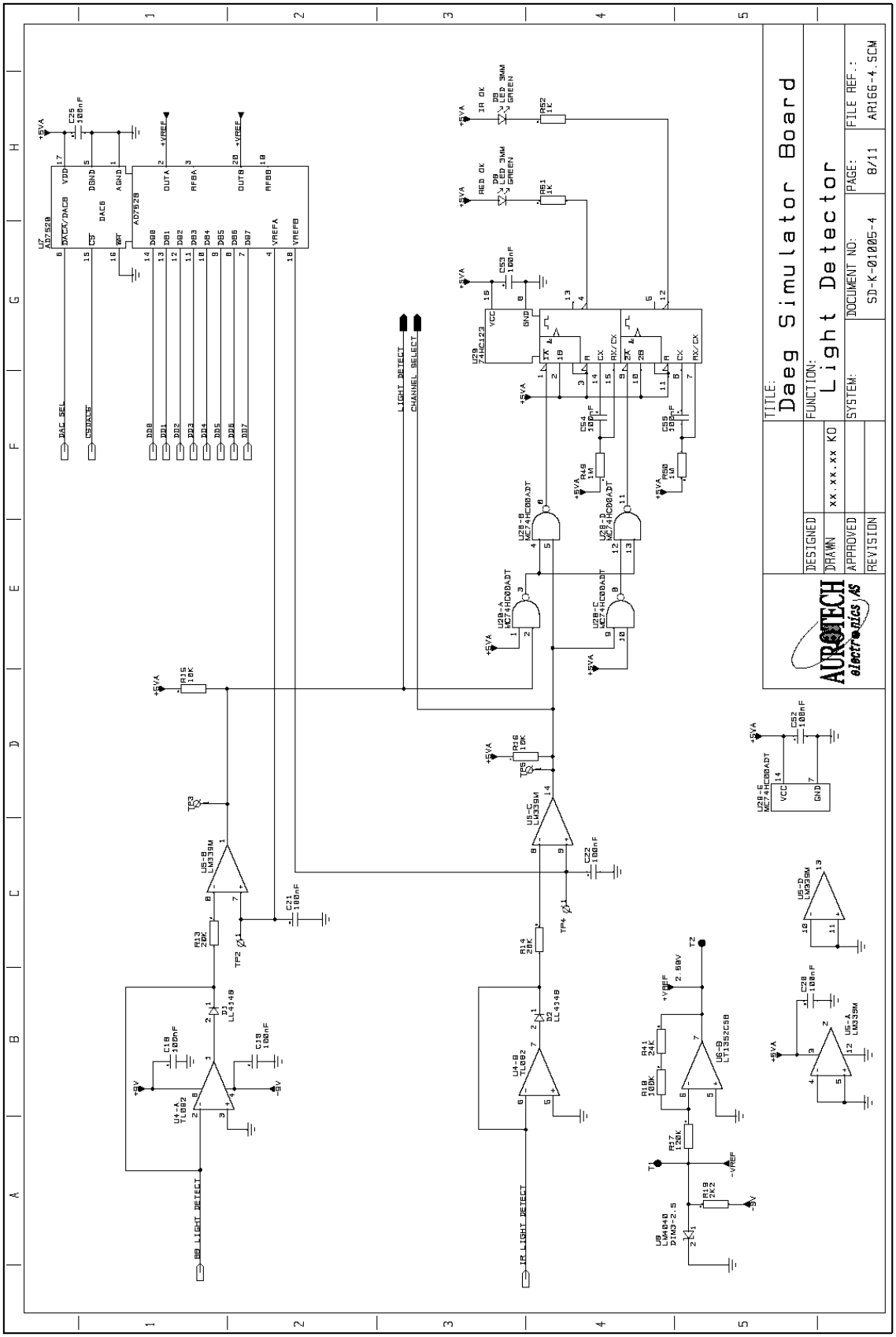

SPI Interface
Probe Interface
Modulator
Signal Output
Light Detector
BB-Input
IR-Input
TITLE: Daeg Simulator Board
FUNCTION: Simulation Part
DESIGNED
DRAWN
APPROVED
REVISION
xx.xx.xx KO
SYSTEM:
DOCUMENT NO: SD-K-01005-4
PAGE: 3/11
FILE REF.: AR16G-4.SCH
AUROTECH electronics AS

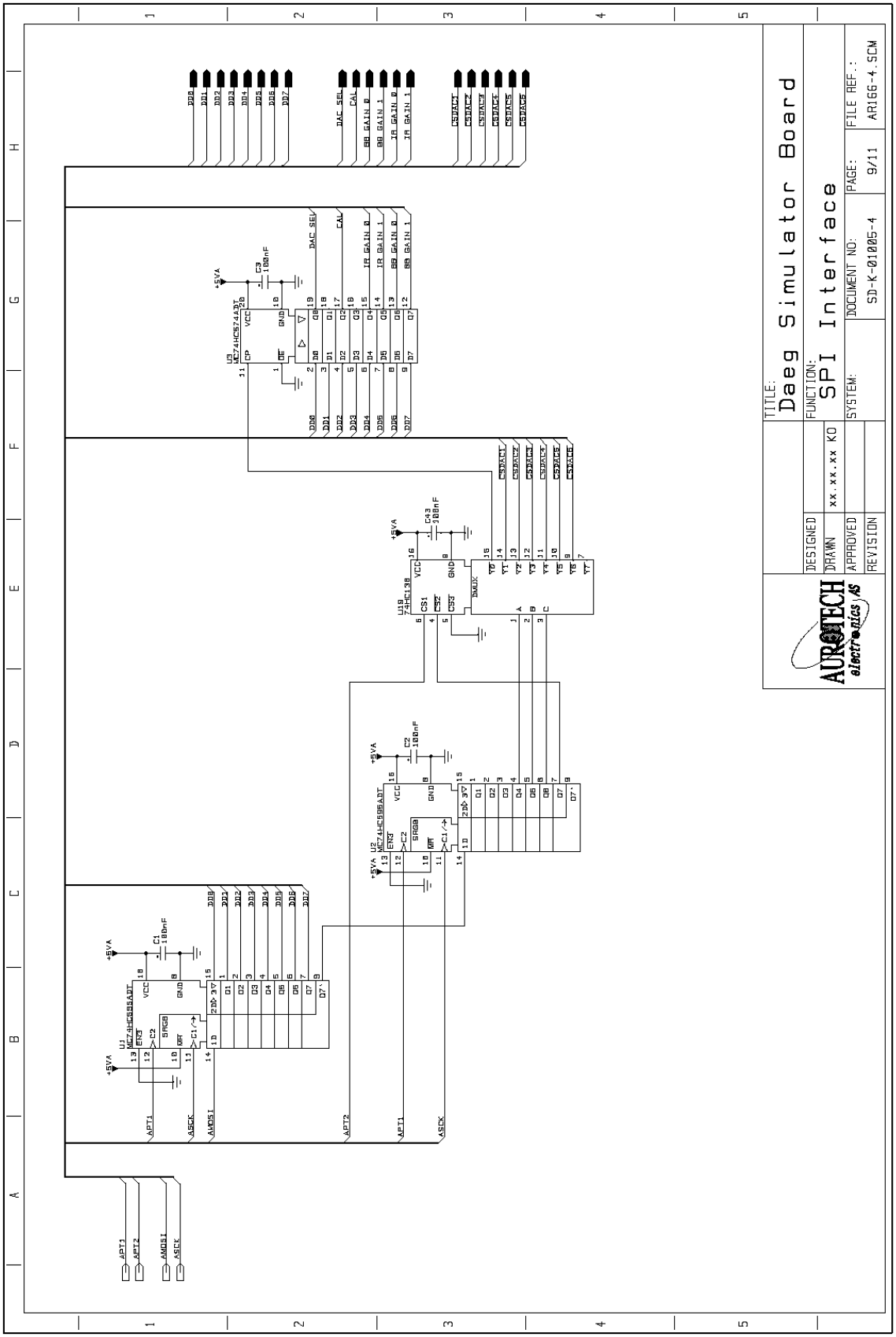

WDB INPUT
BB LIGHT DETECT
TP1
U6-A
LT1362CS8
C23
180nF
C24
180nF
+9V
-9V
R11
680K
C17
10pF
RP2
5K
R43
NC
R10
21K
C12
100nF
C13
100nF
U501-A
LT1362CS8
R3
680R
U502-B
MAX306CSE
MAX306
R2
42R
U502-A
MAX306CSE
MAX306
C16
220pF
R8
8K9
C10
100nF
C11
100nF
U500-A
LT1365CS8
R39
1K
R93
470R
BB INPUT
BB GAIN 0
BB GAIN 1
U502-C
MAX306CSE
MAX306
C5
100nF
C6
100nF
C4
100nF
+5VA
TITLE:
Daeg Simulator Board
FUNCTION:
BB-Input
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
4/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics AS

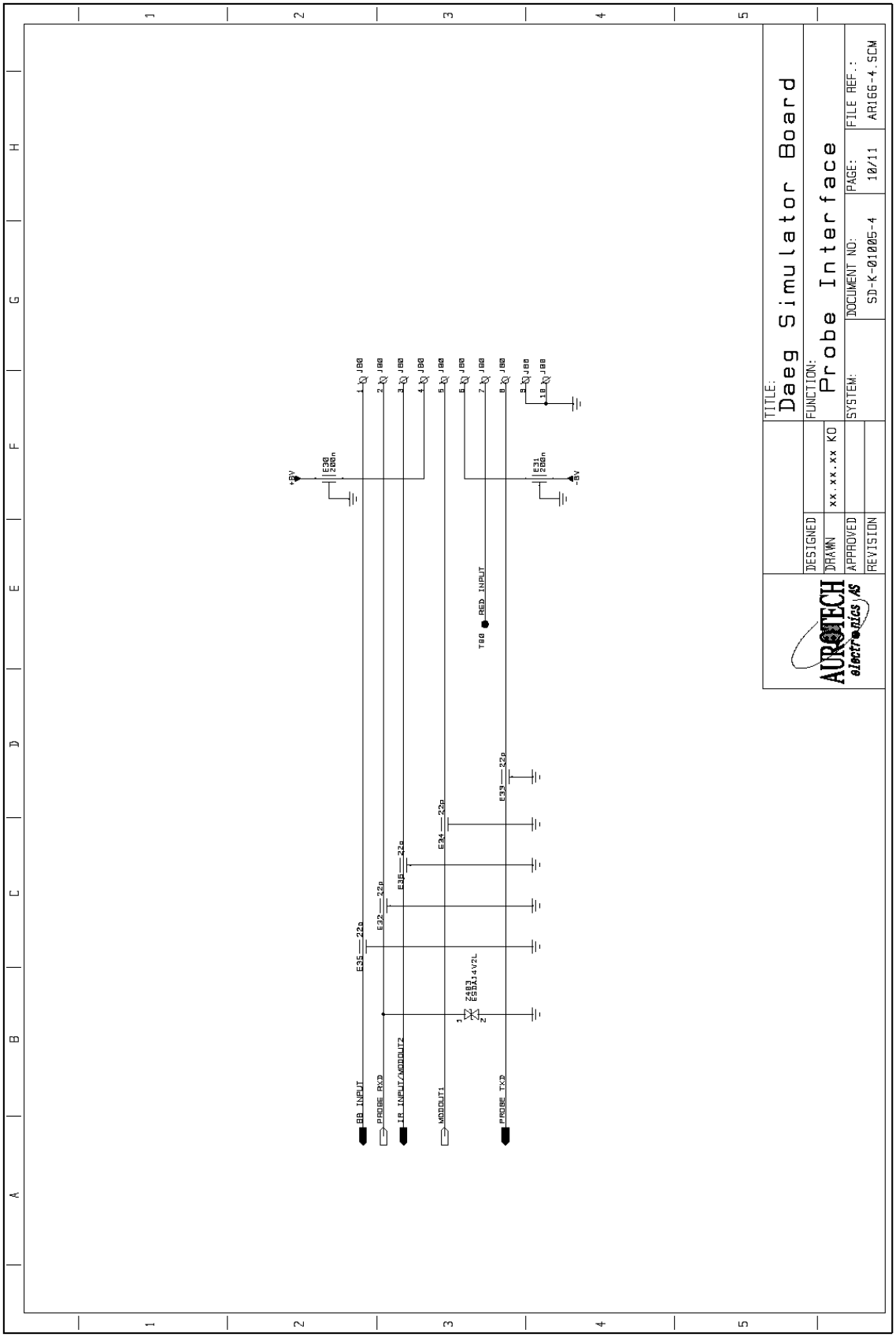

IR LIGHT DETECT
IR INPUT/MODOUT2
IR GAIN 0
IR GAIN 1
+5V
-5V
+5VA
TITLE:
Daeg Simulator Board
FUNCTION:
IR-Input
DESIGNED
DRAWN
APPROVED
REVISION
xx.xx.xx KO
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
5/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics A/S

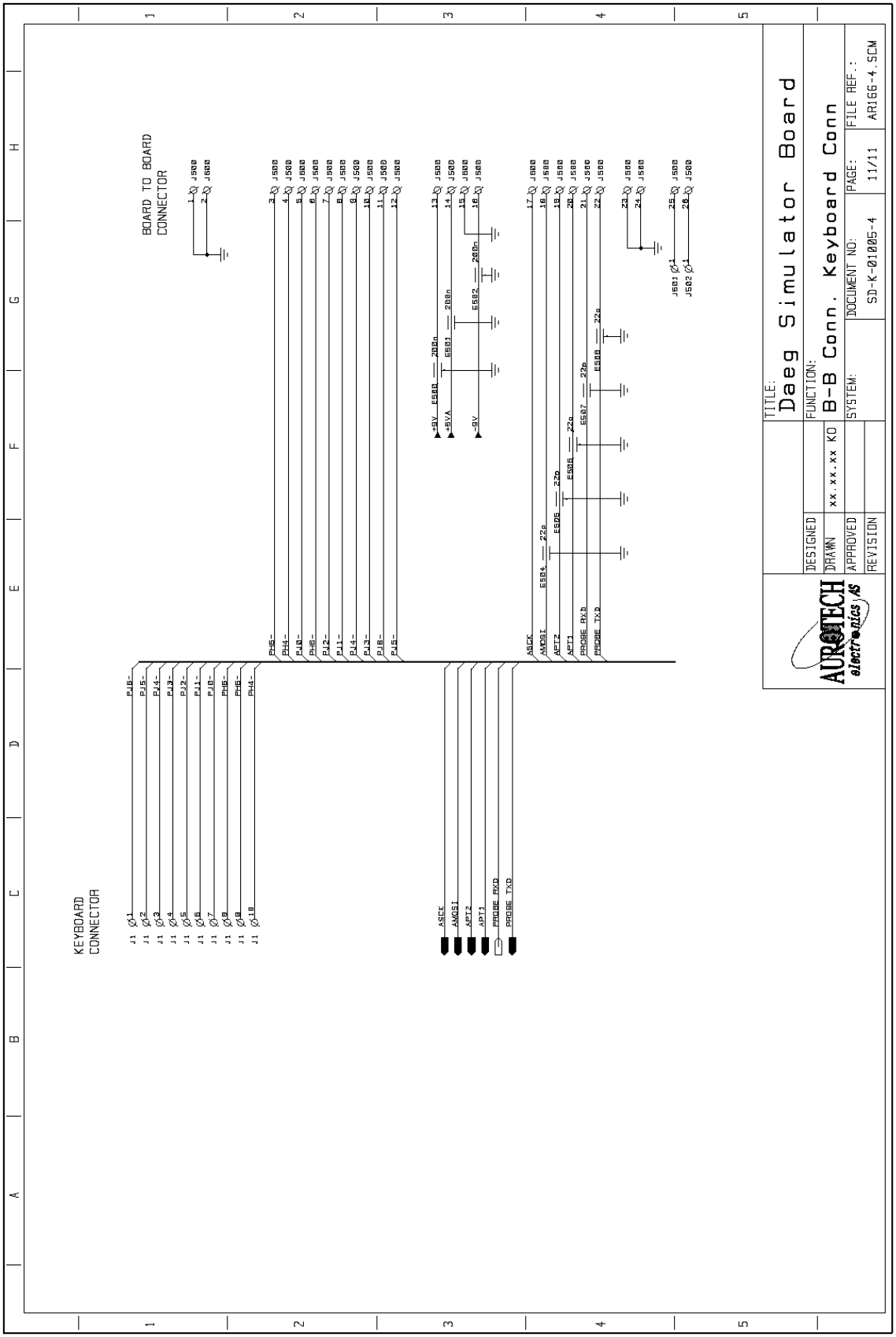

TITLE:
Daeg Simulator Board
FUNCTION:
Modulator
DESIGNED
DRAWN
APPROVED
REVISION
xx.xx.xx KO
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
6/11
FILE REF.:
AR166-4.SCM
AUROTECH
electronics AS
BEAT MOD
SCALED MOD
MOD INPUT
CAL
CHANNEL SELECT

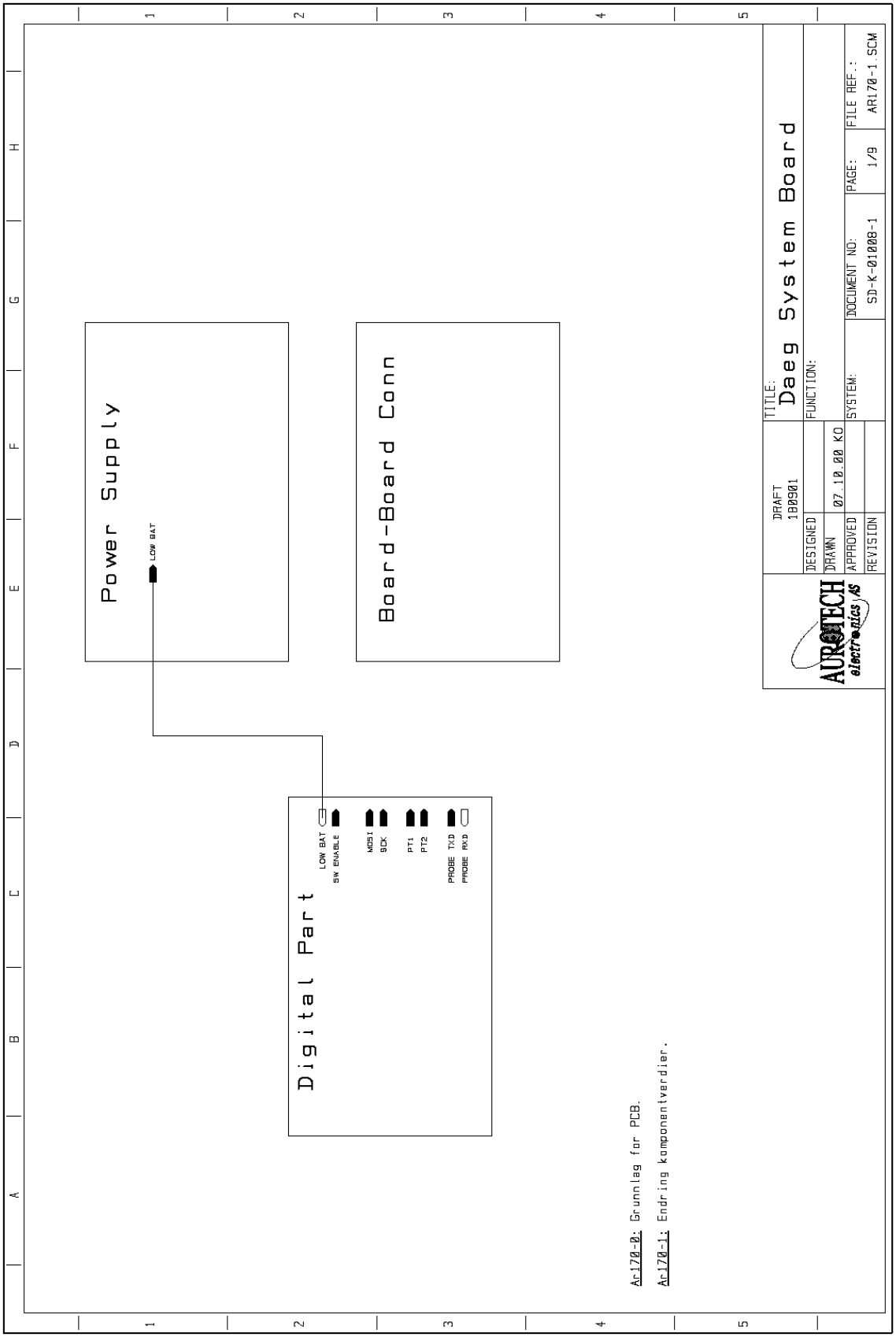

TITLE:
Daeg Simulator Board
FUNCTION:
Signal Output
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
7/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics A/S
MODOUT1
TP15
D1
2N7002
RB1
2K4
RB5
50K
RB8
0R
R48
NC
U27-B
LT1352CS8
C51
15pF
R46
10K
R79
NC
R47
20K
R89
20K
RB4
0R
RB9
2K2
R45
10K
C49
100nF
U27-A
LT1352CS8
C50
100nF
+9V
-9V
R44
10K
C47
100nF
U26-A
LT1352CS8
C48
100nF
U26-B
LT1352CS8
C52
10pF
+5VA
C46
100nF
U25
AD7528
DACA/DACB
CS
WR
DGND
AGND
VDD
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
OUTA
RFBA
OUTB
RFBB
VREFA
VREFB
-VREF
SCALED MOD
DAC SEL
CS2AUS
DD0
DD1
DD2
DD3
DD4
DD5
DD6
DD7
BEAT MOD
LIGHT DETECT

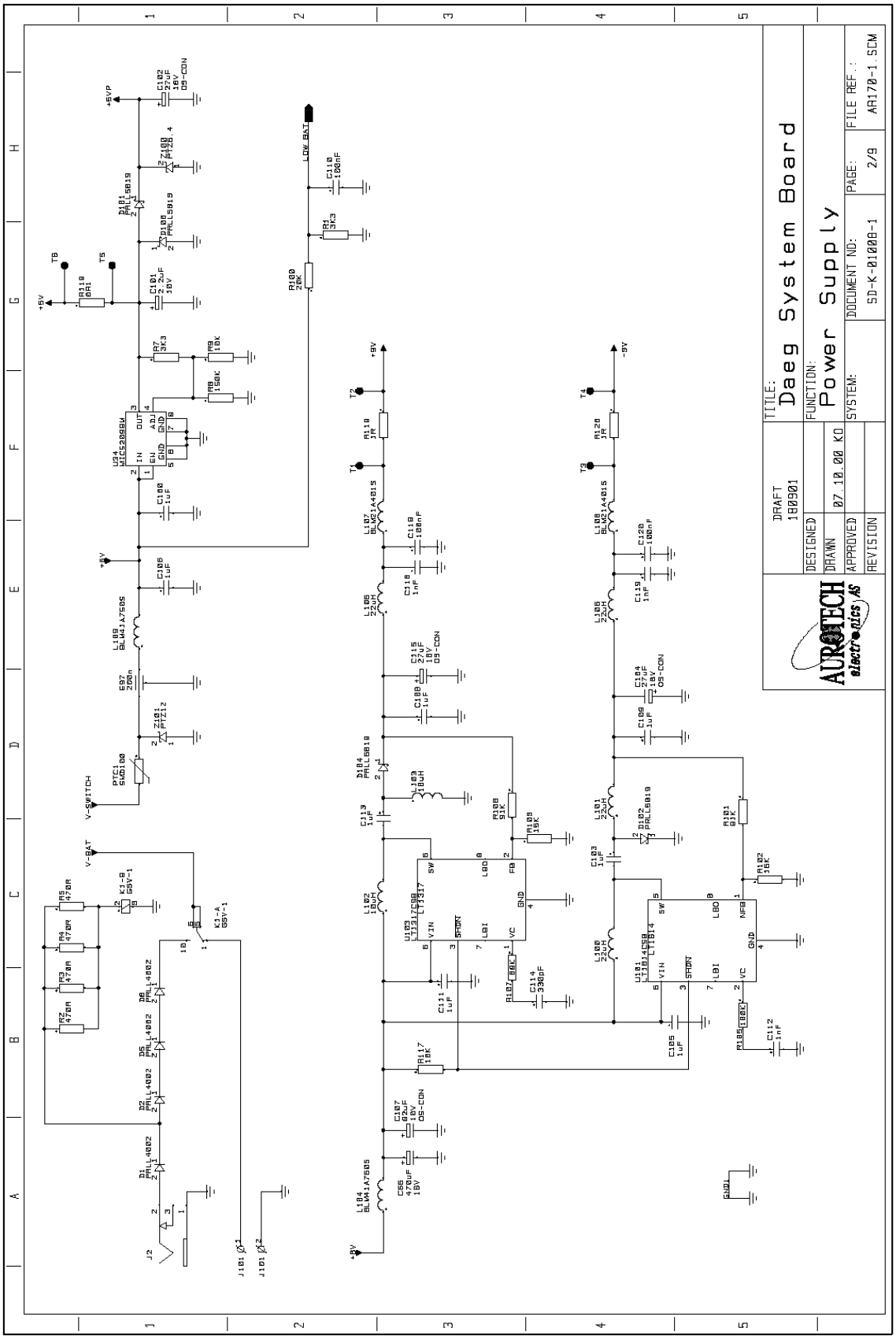

TITLE:
Daeg Simulator Board
FUNCTION:
Light Detector
DESIGNED
DRAWN
APPROVED
REVISION
xx.xx.xx KO
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
8/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics as
LIGHT DETECT
CHANNEL SELECT
DAC SEL
CSDACS
IR LIGHT DETECT
RD LIGHT DETECT

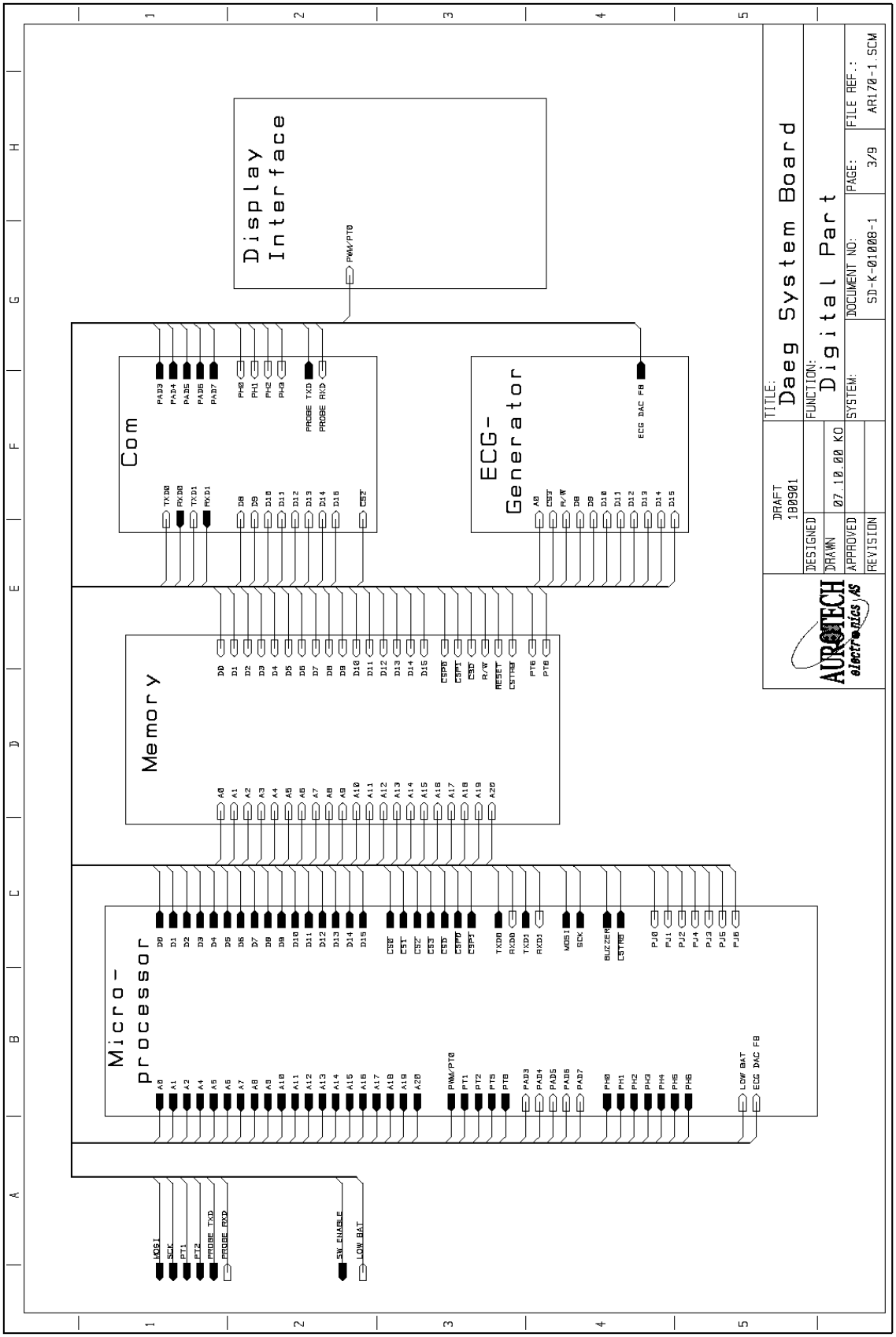

TITLE:
Daeg Simulator Board
FUNCTION:
SPI Interface
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
9/11
FILE REF.:
AR166-4.SCM
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
AUROTECH
electronics AS

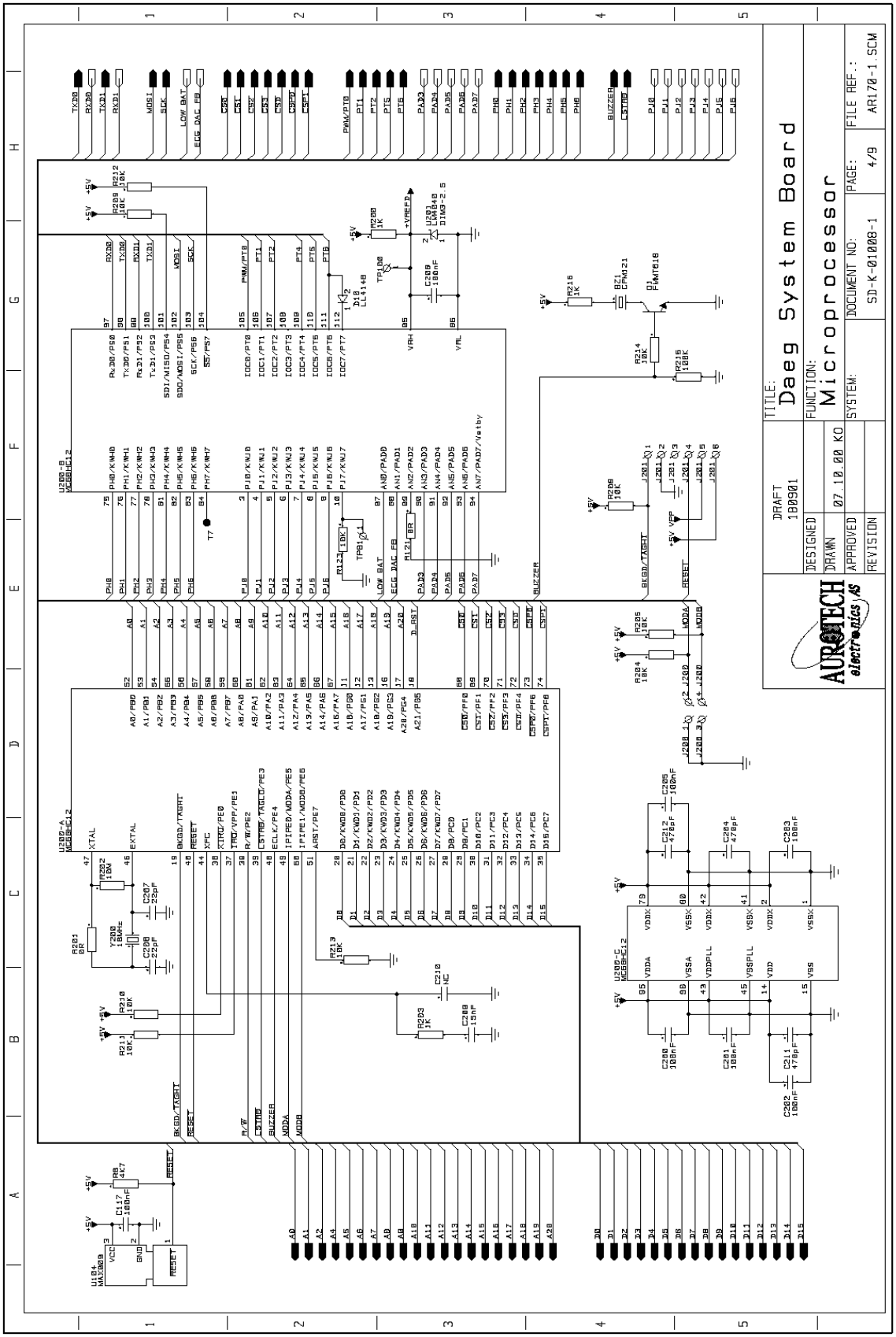

TITLE:
Daeg Simulator Board
FUNCTION:
Probe Interface
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
10/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics AS
+5V
-5V
RED_INPUT
BB_INPUT
PROBE_RXD
IR_INPUT/MODOUT2
MODOUT1
PROBE_TXD

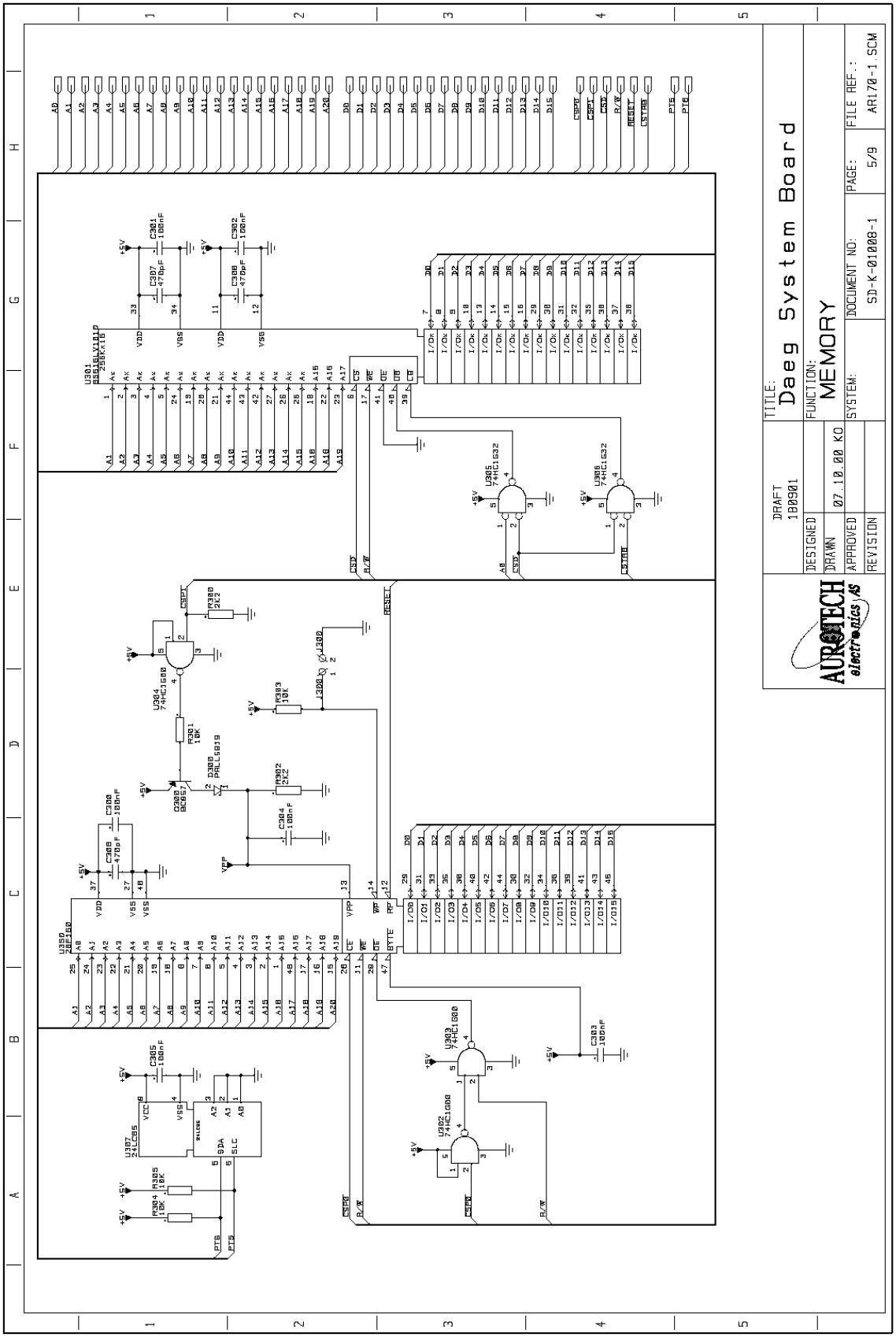

BOARD TO BOARD
CONNECTOR
KEYBOARD
CONNECTOR
TITLE:
Daeg Simulator Board
FUNCTION:
B-B Conn. Keyboard Conn
DESIGNED
DRAWN
xx.xx.xx KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01005-4
PAGE:
11/11
FILE REF.:
AR16G-4.SCH
AUROTECH
electronics AS

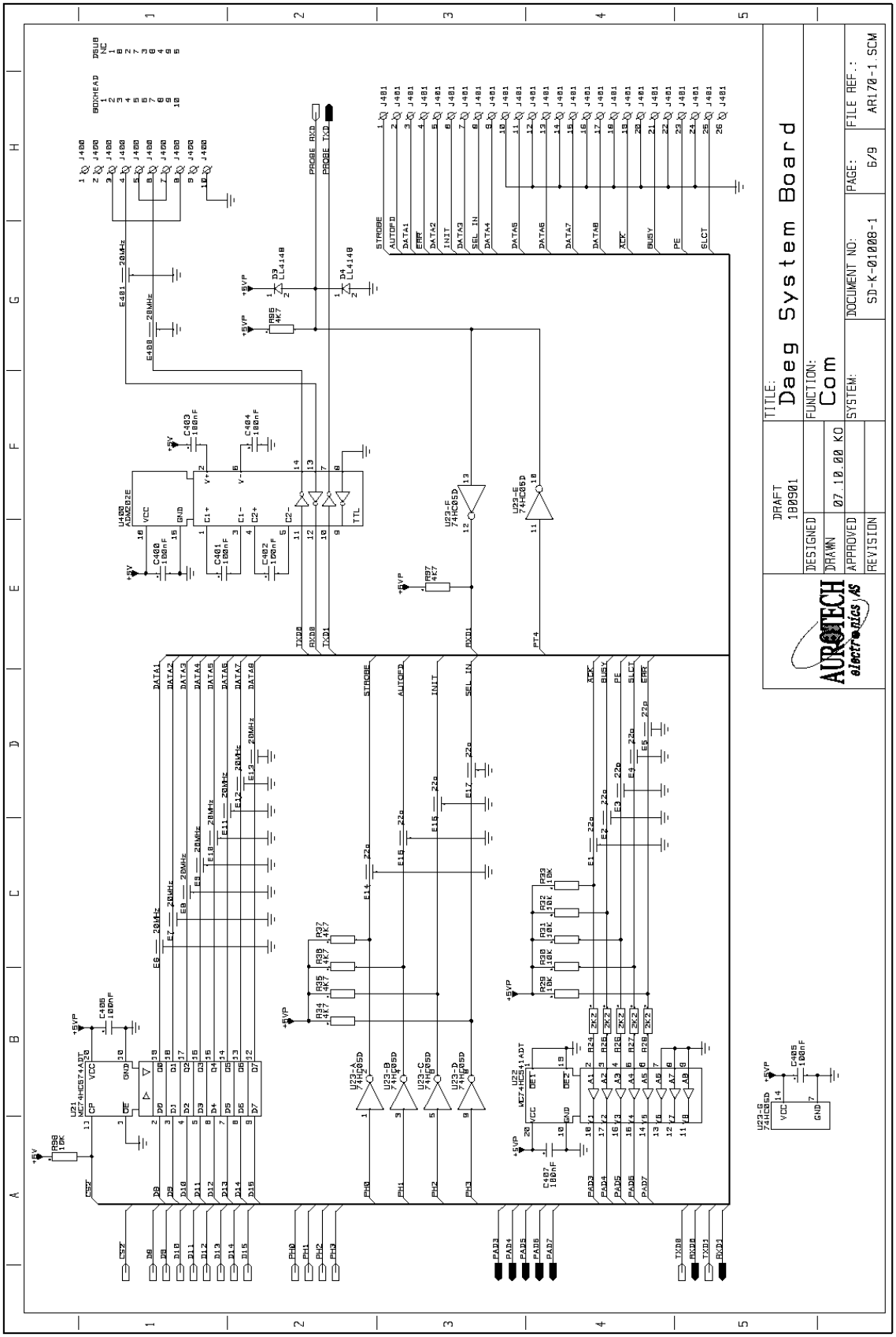

Power Supply
LOW BAT
Board-Board Conn
Digital Part
LOW BAT
SW ENABLE
MOSI
SCK
PT1
PT2
PROBE TXD
PROBE RXD
Ar170-0: Grunnlag for PCB.
Ar170-1: Endring komponentverdier.
DRAFT
1B0901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
TITLE:
Daeg System Board
FUNCTION:
SYSTEM:
DOCUMENT NO:
SD-K-01000-1
PAGE:
1/9
FILE REF.:
AR170-1.SCM
AUROTECH
electronics AS

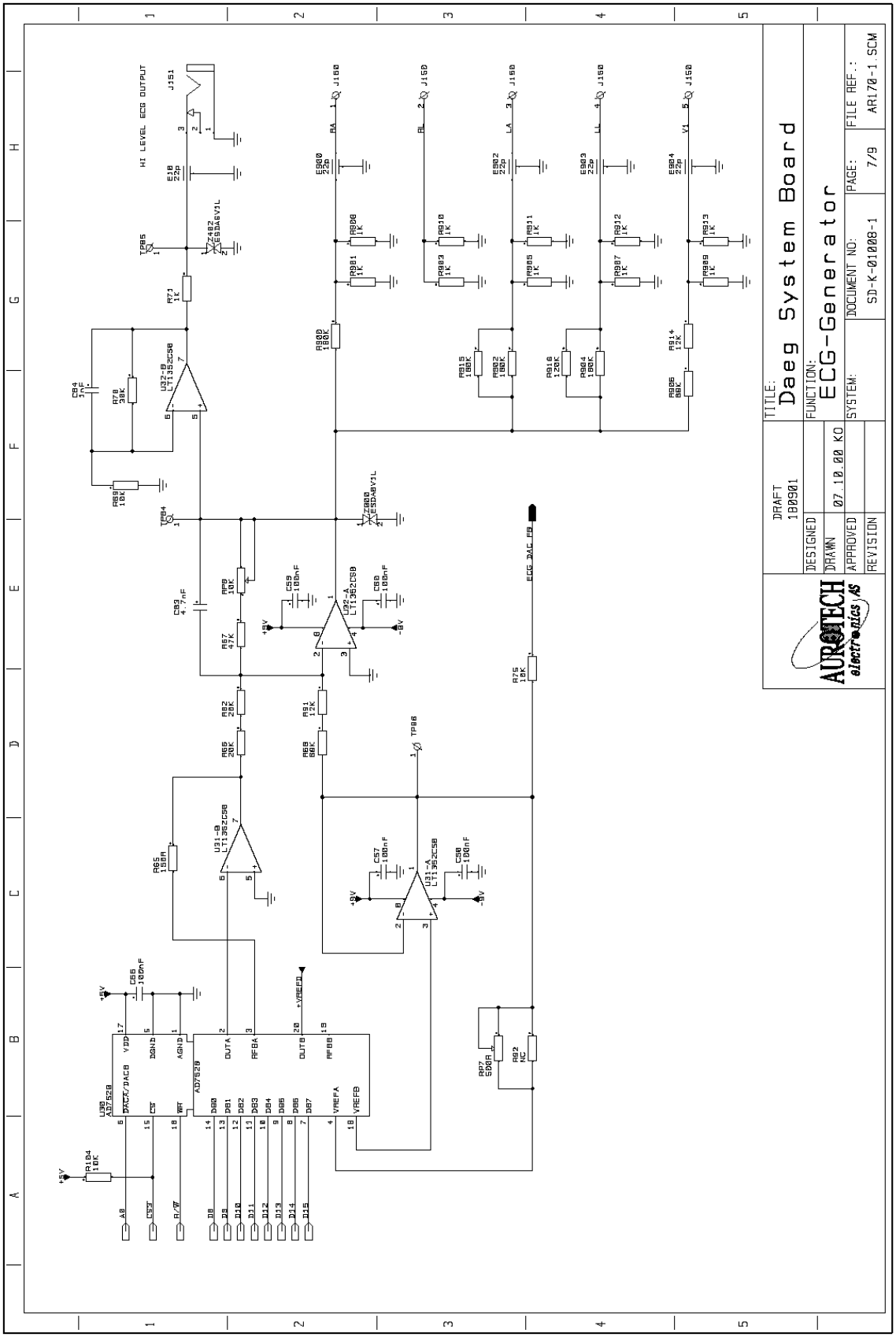

TITLE:
Daeg System Board
FUNCTION:
Power Supply
SYSTEM:
DOCUMENT NO:
SD-K-01000-1
PAGE:
2/9
FILE REF.:
AR178-1.SCM
DRAFT
180901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
AURATECH
electronics AS
+5VP
+5V
+8V
-8V
+6V
V-BAT
V-SWITCH
LOW BAT
GND

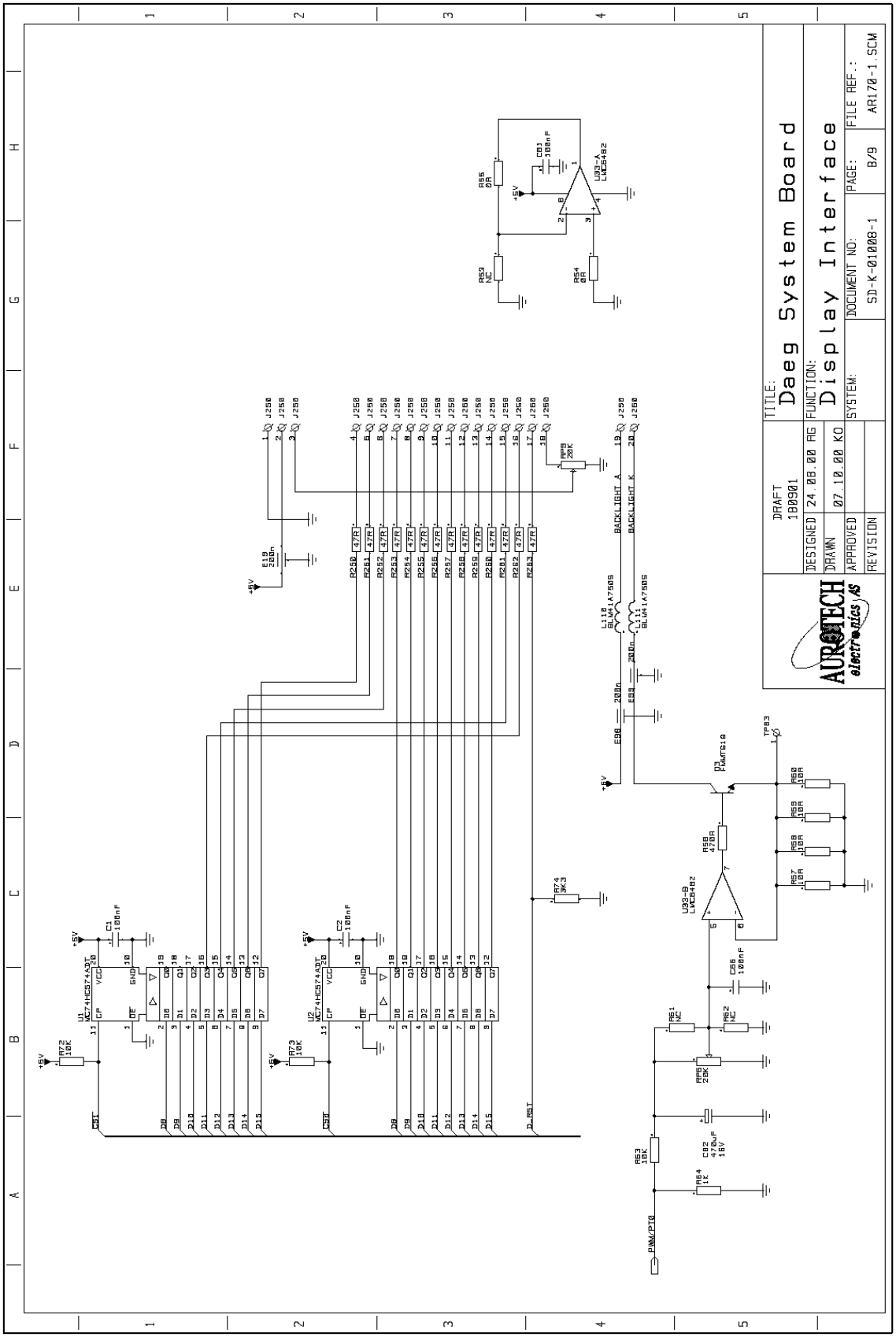

Display Interface
PWM/PT0
Com
ECG-Generator
Memory
Micro-processor
TITLE: Daeg System Board
FUNCTION: Digital Part
DRAFT 180901
DESIGNED
DRAWN 07.10.00 KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO: SD-K-01008-1
PAGE: 3/9
FILE REF.: AR178-1.SCM
AUROTECH electronics A/S
MOSI
SCK
PT1
PT2
PROBE TXD
PROBE RXD
SW_ENABLE
LOW BAT

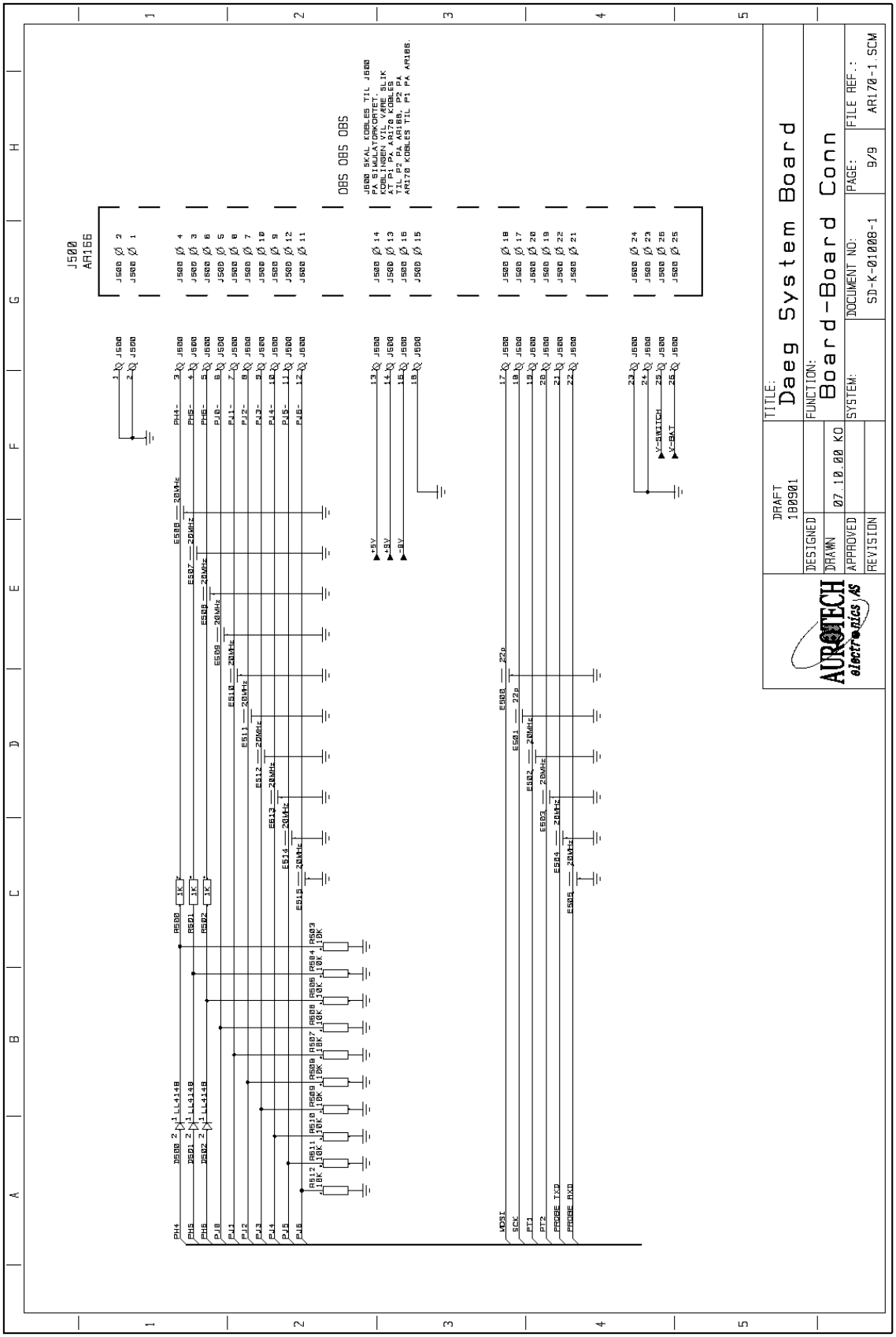

TITLE:
Daeg System Board
FUNCTION:
Microprocessor
DRAFT
180901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01000-1
PAGE:
4/9
FILE REF.:
AR170-1.SCM
AUROTECH
electronics


TITLE:
Daeg System Board
FUNCTION:
MEMORY
DRAFT
1B0901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01008-1
PAGE:
5/9
FILE REF.:
AR178-1.SCM
AUROTECH
electronics A/S


TITLE:
Daeg System Board
FUNCTION:
Com
SYSTEM:
DOCUMENT NO:
SD-K-01008-1
PAGE:
6/9
FILE REF.:
AR178-1.SCM
DRAFT
1B0901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
AUROTECH
electronics A/S


TITLE:
Daeg System Board
FUNCTION:
ECG-Generator
SYSTEM:
DOCUMENT NO:
SD-K-01008-1
PAGE:
7/9
FILE REF.:
AR170-1.SCM
DRAFT
180901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
AUROTECH
electronics AS
HI LEVEL ECG OUTPUT
ECG DAC FB
AD7528
LT1352CS8


TITLE:
Daeg System Board
FUNCTION:
Display Interface
SYSTEM:
DOCUMENT NO:
SD-K-01008-1
PAGE:
8/9
FILE REF.:
AR178-1.SCM
DRAFT
1B0901
DESIGNED
24.08.00 AG
DRAWN
07.10.00 KO
APPROVED
REVISION
AUROTECH
electronics A/S
BACKLIGHT A
BACKLIGHT K
D_RST
PWM/PIO


TITLE:
Daeg System Board
FUNCTION:
Board-Board Conn
DRAFT
1B0901
DESIGNED
DRAWN
07.10.00 KO
APPROVED
REVISION
SYSTEM:
DOCUMENT NO:
SD-K-01008-1
PAGE:
9/9
FILE REF.:
AR178-1.SCM
AUROTECH
electronics AS
J500
AR166
OBS OBS OBS
J600 SKAL KOBLES TIL J600
PA SIMULATORKORTET.
KOBLINGEN VIL VÆRE BLIK
AT P1 PA AR178 KOBLES
TIL P2 PA AR166, P2 PA
AR178 KOBLES TIL P1 PA AR166.
+5V
+8V
-8V
V-SWITCH
V-BAT
MOSI
SCK
PT1
PT2
PROBE TXD
PROBE RXD