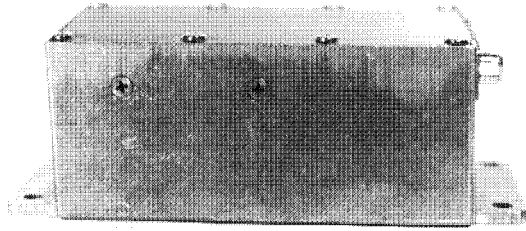
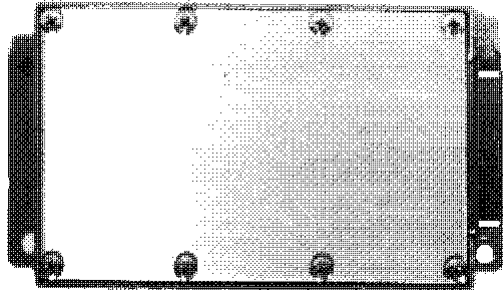


# Installation of TPS-28 Universal Lighting Power Supply



Size L 5.25 x W 2.70 x H 3.00 inches

## Input Voltage

28 - 33 VDC.

## Fixed Voltages

Output VDC 5 / 14 / 28

## Adjustable Voltages

Output VDC 0-5 / 0-14 / 0-28

## Input tracking Voltages

↓

0-5 for 0-5 / 0-14 / 0-28

0-14 for 0-5 / 0-14 / 0-28

0-28 for 0-5 / 0-14 / 0-28

(Output voltages) ↑

## VAC tracking

0-90 for 0-5 / 0-14 / 0-28

## Options

Other output voltages may be programmed into the TPS-28.

## WARRANTY

The TPS-28 comes with a one year limited warranty.

## Features Include

Half bright Day / Night switch

Over Voltage FAILSAFE protection (programmable)

Soft-Start Voltage (adds extra life to your lights)

6.0 Amp. continuous Output

Universal programmable connector (25 pin D)

Multi-Dimmer tracking (from a single source)

Input Voltage 28 - 33 Volts DC

Internal Fused at 10.0 AMP's

Tracking with noise immunity to radio signals

AC tracking voltage 0 - 90 VAC

Tracking frequency Volt AC Input 60-1000 HZ

Temperature Range -25 to +70 Degrees C

Installation manual for 18 different configurations.

Short circuit foldback protection. (max. time 3 MIN.)

Includes D type 25 pin mating connector and cover.

Solder cup type matting connectors

TPS-28 comes in a solid aluminum casting,

Four large mounting holes (DIA. 0.190).

Weighs less than 1 LB.

**EXECUTIVE ENGINEERING** 3143 N.W. 41ST STREET LAUDERDALE LAKES, FL. 33309  
PHONE / FAX / DATA / E-MAIL / (954) 485 - 0177 E-Mail: Sales@Exec-Eng.com

## **What the TPS-28 will do for you.**

The Incandescent lighting controller is designed to provide long life for your lights, with flexibility for almost every lighting situation that you will run into. Almost any D.C. Lighting can be run with the TPS-28. The supply has a soft-start mode that protects the filaments from those quick voltage jumps by allowing a ramped-voltage rise when the unit is turned on, thereby extending the life of the bulbs. In addition, you can add a day/night dimming switch that allows you, in any brightness condition, to instantly dim the light(s) to half their brightness. This feature was added for those cloudy, moonlit nights when the lighting intensity fluctuates. It enhances your visibility in the outside world.

## **Installation**

Schematic diagrams are supplied on the following pages. These installation drawings show you the general hookup of typical lighting systems. Use what is appropriate for your installation job. We recommend that you use at least 22GA wires and do not exceed the maximum rating. **Remember, always check your wiring as this will help avoid 99.9% of all mistakes.**

## **Note: (Warning)**

Each 22 GA wire should have no more than 2.0 AMP's going into or out of it.

The unit must be mounted to a solid metal surface to help dissipate heat and supply a ground return for the D.C.

Never use the TPS-28 to run motors, transmitters, power supplies, radios, TVS, or VCRS.

## **Basic Operation**

The TPS-28 is a switching power supply. Because it's a switching supply it runs cooler and uses less power than normal lighting supplies. The unit is programmed, by a connector, to your correct voltage and options. The connector supplies both the input and output voltages to run the unit and your lighting. The tracking feature, one of several unique features, allows you to tie the output of an existing lighting system to the units tracking input feature. This allows the TPS-28 to track the other lighting power supplies. The TPS-28 can be run in a fixed voltage operation, adjustable voltage operation, or tracking voltage operation. The unit has a selectable overvoltage protection option, insuring that your lighting will never be burnt out by overvoltage. Short circuit protection is also provided: if a wire should short for several seconds, the unit goes into a foldback mode allowing the unit to shut down and then restart. If for some reason the short lasts for several minutes, the unit is designed to blow the fuse thereby abating the chance of a fire. The unit also has a PWM fail circuit: if for some reason the voltage controlling circuit fails the unit is designed to go into a shut off mode. The TPS-28 has a special feedback loop designed to run instrument lighting and does not have instantaneous voltage changes. This helps to eliminate those flickers and flashes when an engine changes it's output RPM.

## **Tracking voltage, what it is and how it works. ( Optional )**

When you need to have the TPS-28 adjust its output voltage to follow another supply voltage, you need to use the tracking input of the TPS-28. The tracking input tells the TPS-28 how much voltage it should be putting out in proportion to the other lighting power supply. This works for both fixed and variable lighting supplies. You will need to select the proper range for the TPS-28 to run your application. We have supplied all the standard configurations of most lighting systems that you will need. The unit also has an AC tracking input of 0-90 Volts that allows 60 - 1000 Hz to be applied to the unit. This allows the DC lighting to be adjusted to an AC lighting circuit.

## **Dimmer switch, and what it does. ( Optional )**

The half bright dimmer switch is designed to work with any voltage or mode of operation. When the switch is in the on position this will dim the lights that are attached to the TPS-28 to half their brightness.

## **Dimmer pot resistor, and what it is used for. ( Optional )**

When you are not using a fixed voltage output, or a tracking voltage output, you will want to use a variable output for the TPS-28 lighting supply. The output of the supply can be adjusted by a variable 1K pot from 0 volts to the maximum voltage that you have selected for the TPS-28 supply. The 1k variable resistor can be of any power value. The 5 volt reference is used to adjust the TPS-28s supply feed back loop that controls the output voltage.

## **Overvoltage failsafe operation ( Optional )**

There are three overvoltage modes that are supplied with the TPS-28. Select the overvoltage level that coincides with your voltage. For maximum lighting protection, combine this option with any of the others.

## Technical notes for the TPS-28

1. The unit has a 0.5 to 1 volt drop from input to output at or below the voltage of 28 VDC input. This is because of its switching blocking design of the supply. However with a 30+ volts input, the output will never go above 28 volts if the unit is set to a 28 volt output range.
2. The unit should always be well grounded to a flat metal surface to help eliminate heat and provide good regulation.
3. Keep transmitter/receiver wires away from the unit. This will help eliminate any interference the unit may generate.
4. If the unit is connected to a circuit breaker it should be of the 7 to 10 AMP type designed for use with 28 volts.
5. The TPS-28 can be used down to 12 volts but will never put out more voltage than it's input has.
6. Non-standard output voltages can be obtained, you must consult the factory for correct wiring.
7. Tracking error will typically not exceed 6.0% with a stable input source.
8. Dimmer switch: output voltage will be typically 50% of what output voltage was when applied.
9. Dimmer switch line current will not exceed 5ma.
10. Dimmer switch line voltage will not exceed 6 volts.
11. Tracking input line current will not exceed 10 ma.
12. When using the unit as an adjustable output, you should always use a 1K pot.  
You may use one Pot to adjust more than one TPS-28 at one time.
13. Pin 20, max.current is 10ma.
14. Pin's 1-4, max.current 1.5 Amps each.
15. Pin's 11,12,24,25, Max. current 1.5 Amps each.
16. Pin 14 input current Max. less than 1ma.
17. Never connect the outputs of a TPS-28 to another TPS-28, the units **DO NOT** current share.  
You may connect the output of one TPS-28 to the tracking input of another TPS-28.
18. When using more than one TPS-28 with a half bright dimming switch: always use isolation diodes or use a separate switch contact for each circuit to ground.
19. The PWM's under voltage circuit will not let the unit operate until the input voltage reaches at least 10 VDC.
20. If the unit goes into overvoltage it is designed to blow the fuse in the TPS-28.
21. Connector style is a 25pin "D" female / soldercup / thumbscrew for the connecting power cable.
22. There are four mount holes in the TPS-28's two flanges, holes are 0.190 DIA.
23. Never paint the TPS-28 housing. This will cause the heat transfer to be lessened.
24. The TPS-28 can be used to run LED's, Wheat grain bulbs, Quartz lighting, Tungsten filament lighting.
25. Maximum output current is 6.0AMP's continuous at any output voltage selected.
26. The input voltage to the TPS-28 has surge protection that goes into operation above 38 volts.

## Overhaul, Exchange and Repair

If for some reason your TPS-28 should fail we have an overhaul and exchange program. Contact the factory for return authorization information. Executive Engineering reserves the right to refuse an exchange / overhaul unit. Other repairs will be done on a parts plus labor basis. Customer will be notified first before a repair is done.

## Technical Support

You can call or fax Executive Engineering with your questions. We will do our best to have your answers as soon as possible. Most answers will be faxed to you within 48 hours. For those special questions we may have to do some research on your problem, and those answers may take a little longer.

# Limited Warranty

---

**What does your warranty cover:**

Any defect in material or workmanship.

**For how long after purchase:**

Ninety days for labor.

One year for parts.

The warranty period for exchange unit begins with date sent.

**What will we do:**

Provide new or, at our option, replacement parts for repair of your unit.

**How do you get service:**

Get a return authorization number from the factory, or call the factory for a replacement unit and one will be charged to your account.

When the returned unit arrives and is evaluated as a good unit it will be credited to your account.

**What does your warranty *not* cover:**

Customer instruction. The installation manual provides information regarding operation.

Installation and set-up.

Damage from misuse or neglect.

Unit that has been modified or incorporated into other products.

**How does state law relate to this warranty:**

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

**What if you purchased your unit outside USA.**

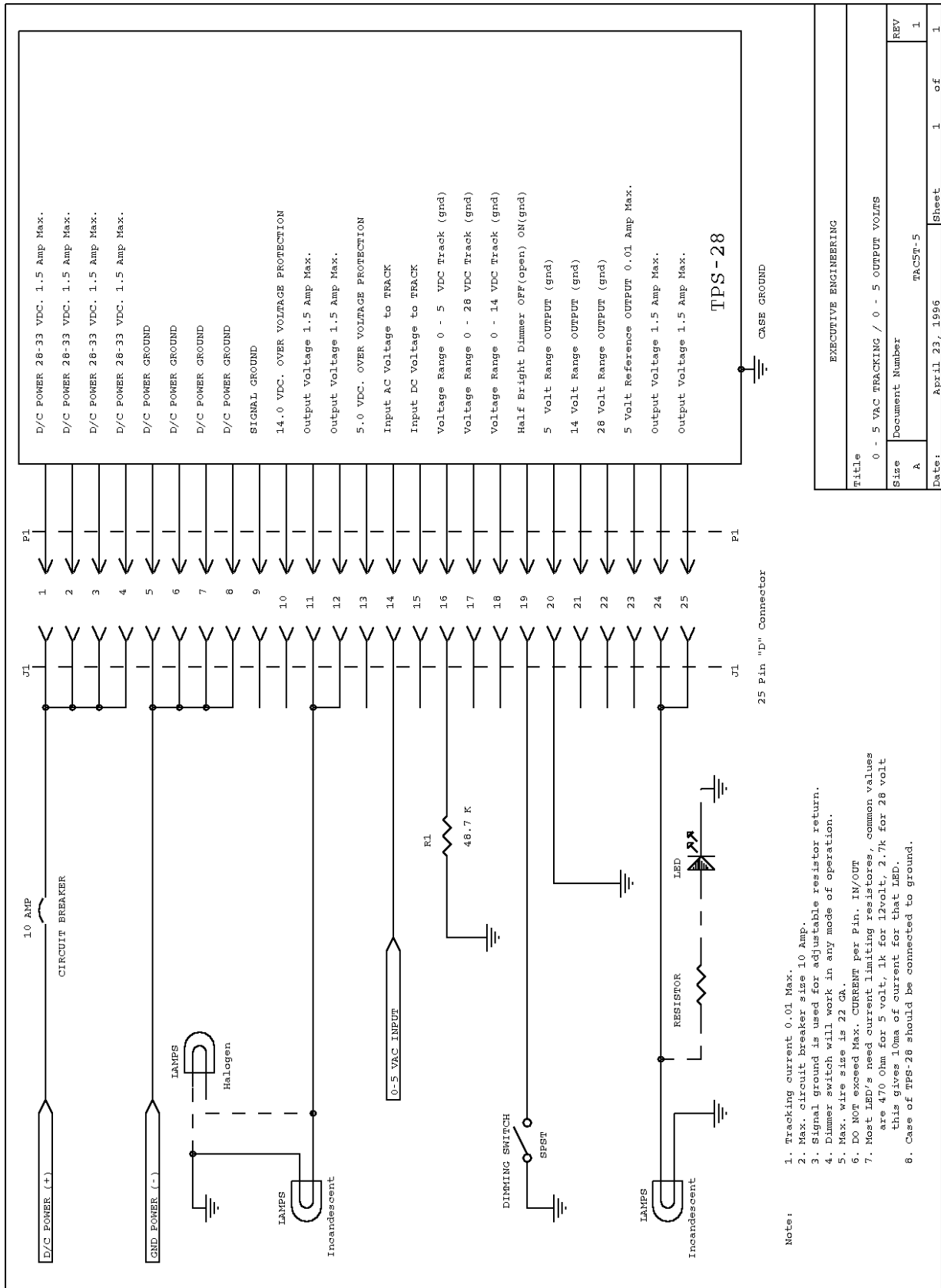
Call the factory for the nearest authorized service center to you.

**Quality is a continuous on-going effort at Executive Engineering. We do what others only wish they could do.**

**Our goal is to have you tell your friends what a great product we have.**

**President**

*David G. Weber*



Note:

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
7. Most LED's need current limiting resistors, common values are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
8. Case of TPS-28 should be connected to ground.

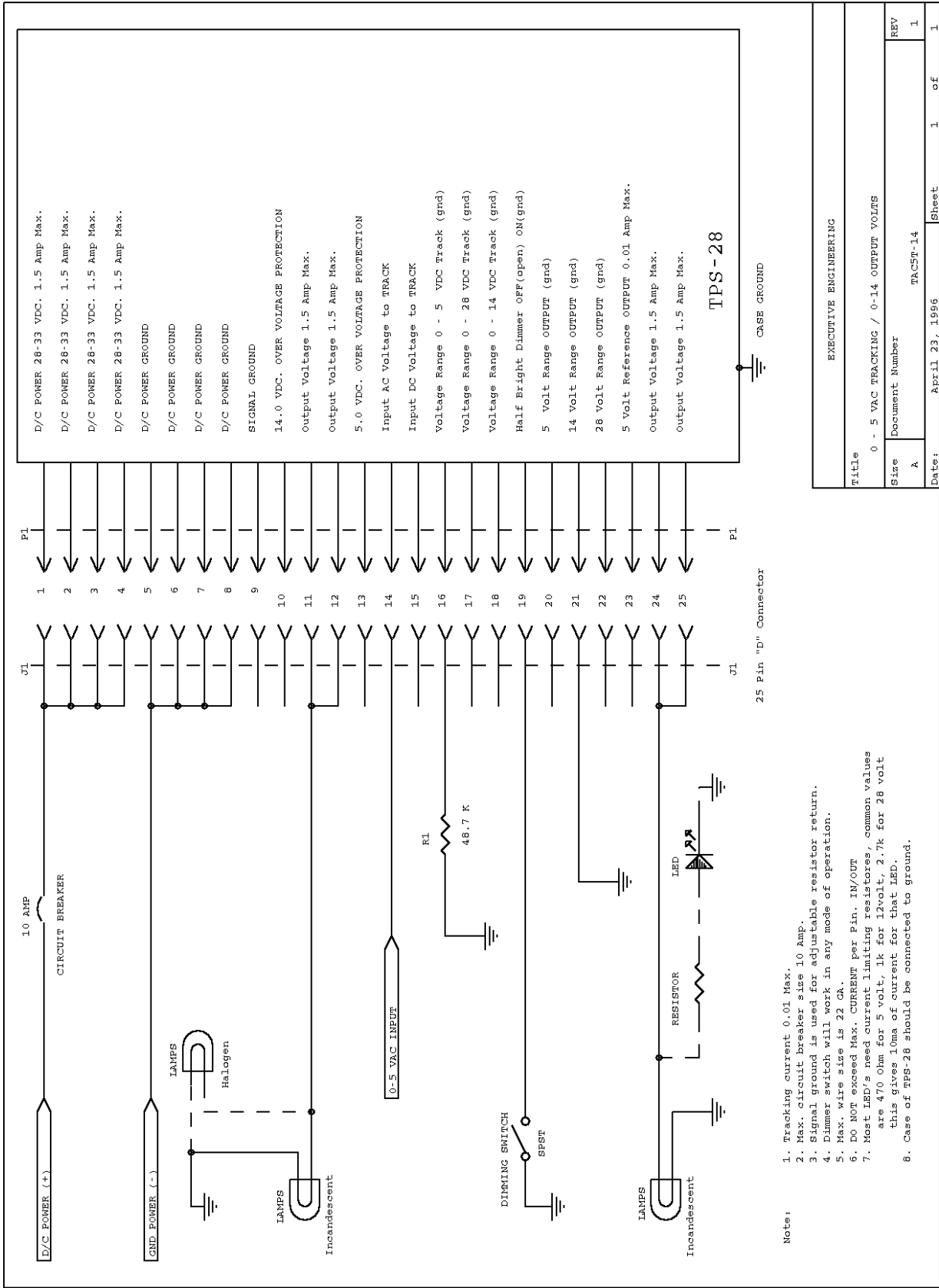
D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 SIGNAL GROUND  
 14.0 VDC. OVER VOLTAGE PROTECTION  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.  
 5.0 VDC. OVER VOLTAGE PROTECTION  
 Input AC Voltage to TRACK  
 Input DC Voltage to TRACK  
 Voltage Range 0 - 5 VDC Track (grd)  
 Voltage Range 0 - 28 VDC Track (grd)  
 Voltage Range 0 - 14 VDC Track (grd)  
 Half Bright Dimmer OFF (open) ON (grd)  
 5 Volt Range OUTPUT (grd)  
 14 Volt Range OUTPUT (grd)  
 28 Volt Range OUTPUT (grd)  
 5 Volt Reference OUTPUT 0.01 Amp Max.  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.

TPS-28

CASE GROUND

25 Pin "D" Connector

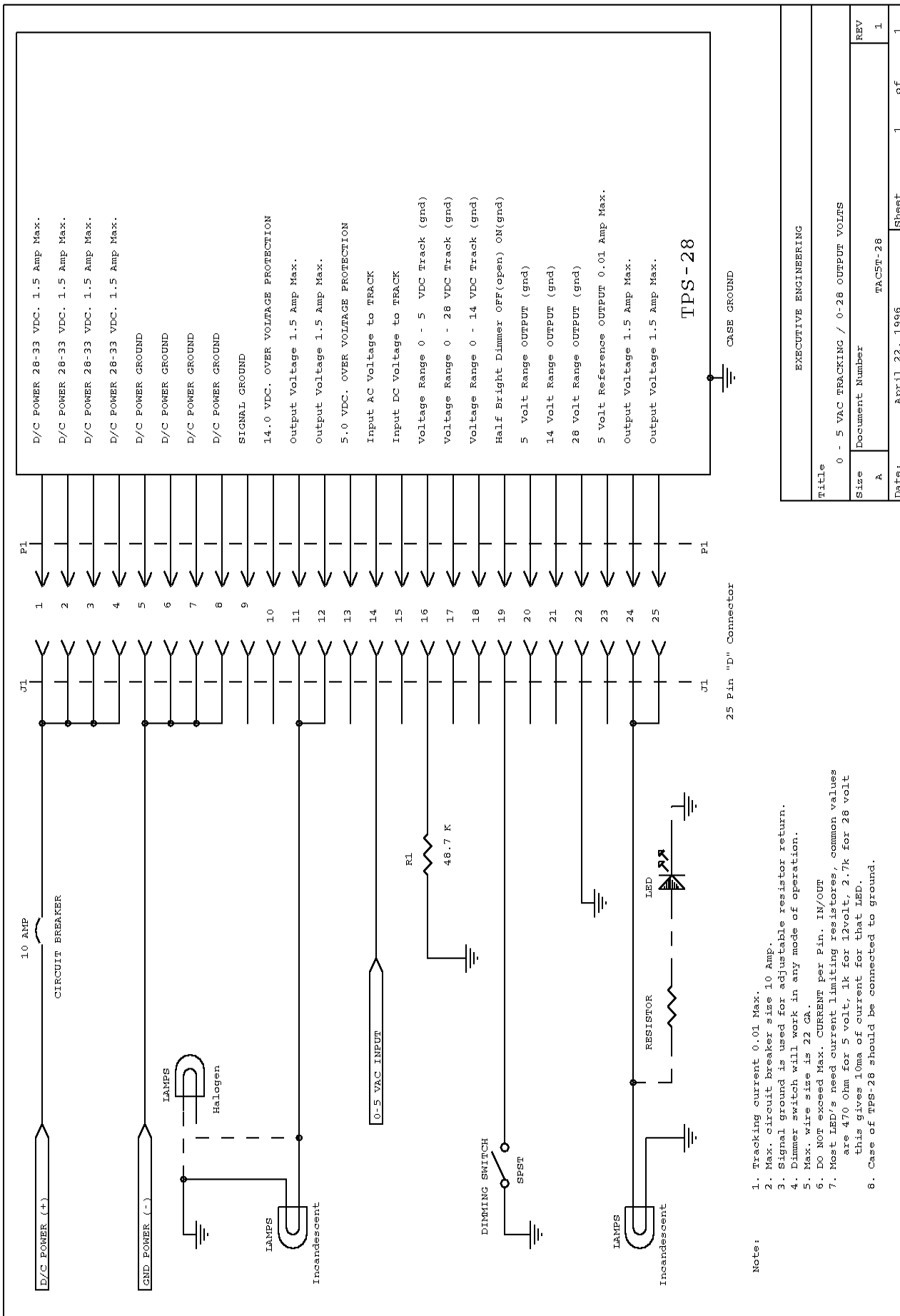
EXECUTIVE ENGINEERING	
Title	0 - 5 VAC TRACKING / 0 - 5 OUTPUT VOLTS
Size	A
Document Number	TACST-5
REV	1
Date:	April 23, 1996
Sheet	1 of 1



- 1 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 2 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 3 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 4 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 5 D/C POWER GROUND
- 6 D/C POWER GROUND
- 7 D/C POWER GROUND
- 8 D/C POWER GROUND
- 9 SIGNAL GROUND
- 10 14.0 VDC. OVER VOLTAGE PROTECTION
- 11 Output Voltage 1.5 Amp Max.
- 12 Output Voltage 1.5 Amp Max.
- 13 5.0 VDC. OVER VOLTAGE PROTECTION
- 14 Input AC Voltage to TRACK
- 15 Input DC Voltage to TRACK
- 16 Voltage Range 0 - 5 VDC Track (grnd)
- 17 Voltage Range 0 - 28 VDC Track (grnd)
- 18 Voltage Range 0 - 14 VDC Track (grnd)
- 19 Half Bright Dimmer OFF (open) OR (grnd)
- 20 5 Volt Range OUTPUT (grnd)
- 21 14 Volt Range OUTPUT (grnd)
- 22 28 Volt Range OUTPUT (grnd)
- 23 5 Volt Reference OUTPUT 0.01 Amp Max.
- 24 Output Voltage 1.5 Amp Max.
- 25 Output Voltage 1.5 Amp Max.

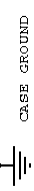
EXECUTIVE ENGINEERING	
Title	
0 - 5 VAC TRACKING / 0-14 OUTPUT VOLTS	
Size	Document Number
A	TAC5T-14
REV	1
Date:	April 23, 1996
Sheet	1 of 1

- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.



- 1 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 2 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 3 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 4 D/C POWER 28-33 VDC. 1.5 Amp Max.
- 5 D/C POWER GROUND
- 6 D/C POWER GROUND
- 7 D/C POWER GROUND
- 8 D/C POWER GROUND
- 9 SIGNAL GROUND
- 10 14.0 VDC. OVER VOLTAGE PROTECTION
- 11 Output Voltage 1.5 Amp Max.
- 12 Output Voltage 1.5 Amp Max.
- 13 5.0 VDC. OVER VOLTAGE PROTECTION
- 14 Input AC Voltage to TRACK
- 15 Input DC Voltage to TRACK
- 16 Voltage Range 0 - 5 VDC Track (gnd)
- 17 Voltage Range 0 - 28 VDC Track (gnd)
- 18 Voltage Range 0 - 14 VDC Track (gnd)
- 19 Half Bright Dimmer OFF(open) ON(gnd)
- 20 5 Volt Range OUTPUT (gnd)
- 21 14 Volt Range OUTPUT (gnd)
- 22 28 Volt Range OUTPUT (gnd)
- 23 5 Volt Reference OUTPUT 0.01 Amp Max.
- 24 Output Voltage 1.5 Amp Max.
- 25 Output Voltage 1.5 Amp Max.

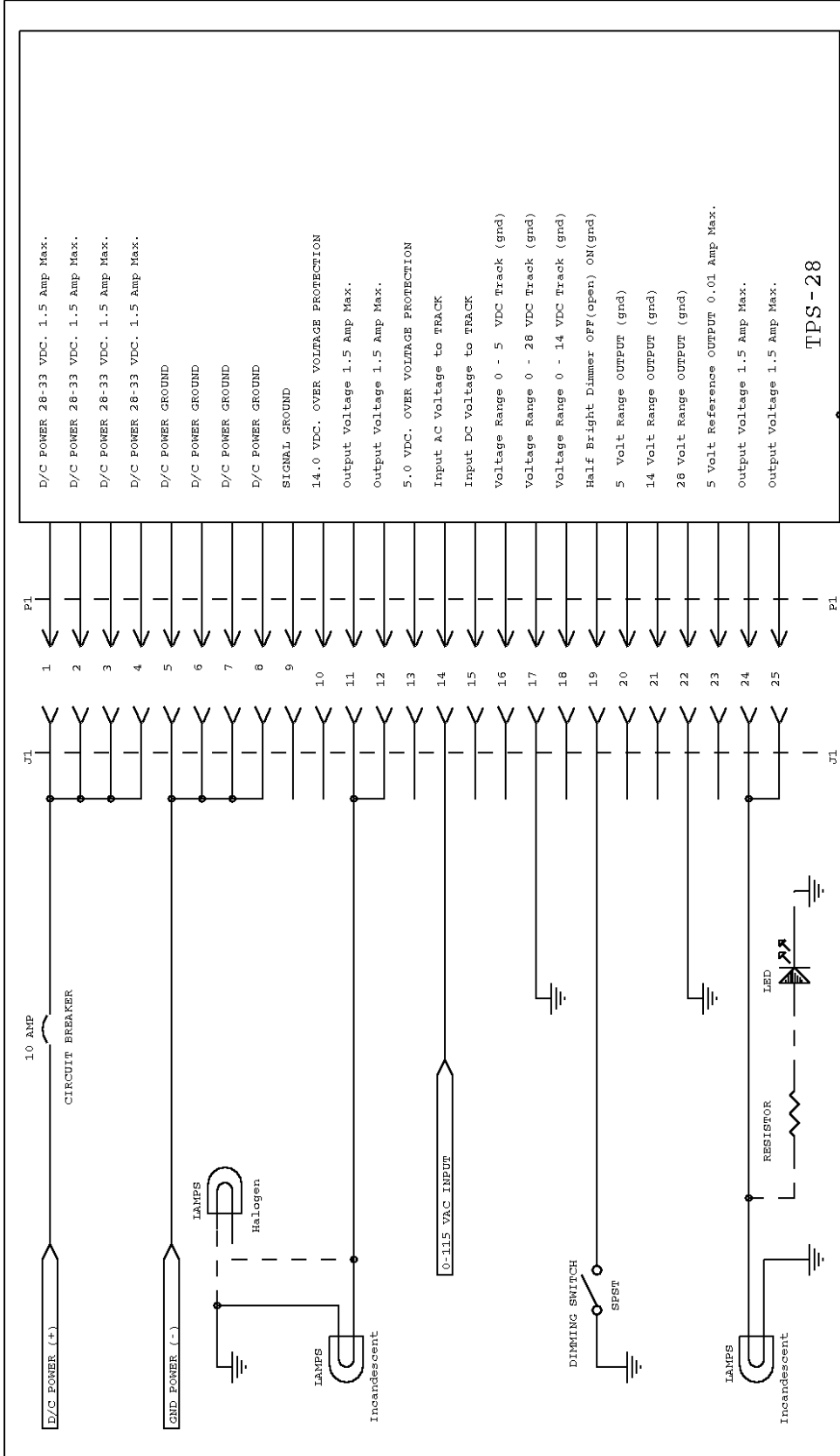
TPS-28



25 Pin "D" Connector

- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT
  7. Most LED's need current limiting resistors, common values are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 26 volt this gives 10ma of current for that LED.
  8. Case of TPS-28 should be connected to ground.

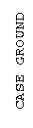
EXECUTIVE ENGINEERING	
Title	0 - 5 VAC TRACKING / 0-28 OUTPUT VOLTS
Size	Document Number
A	TACSr-28
Date:	April 22, 1996
Sheet	1 of 1



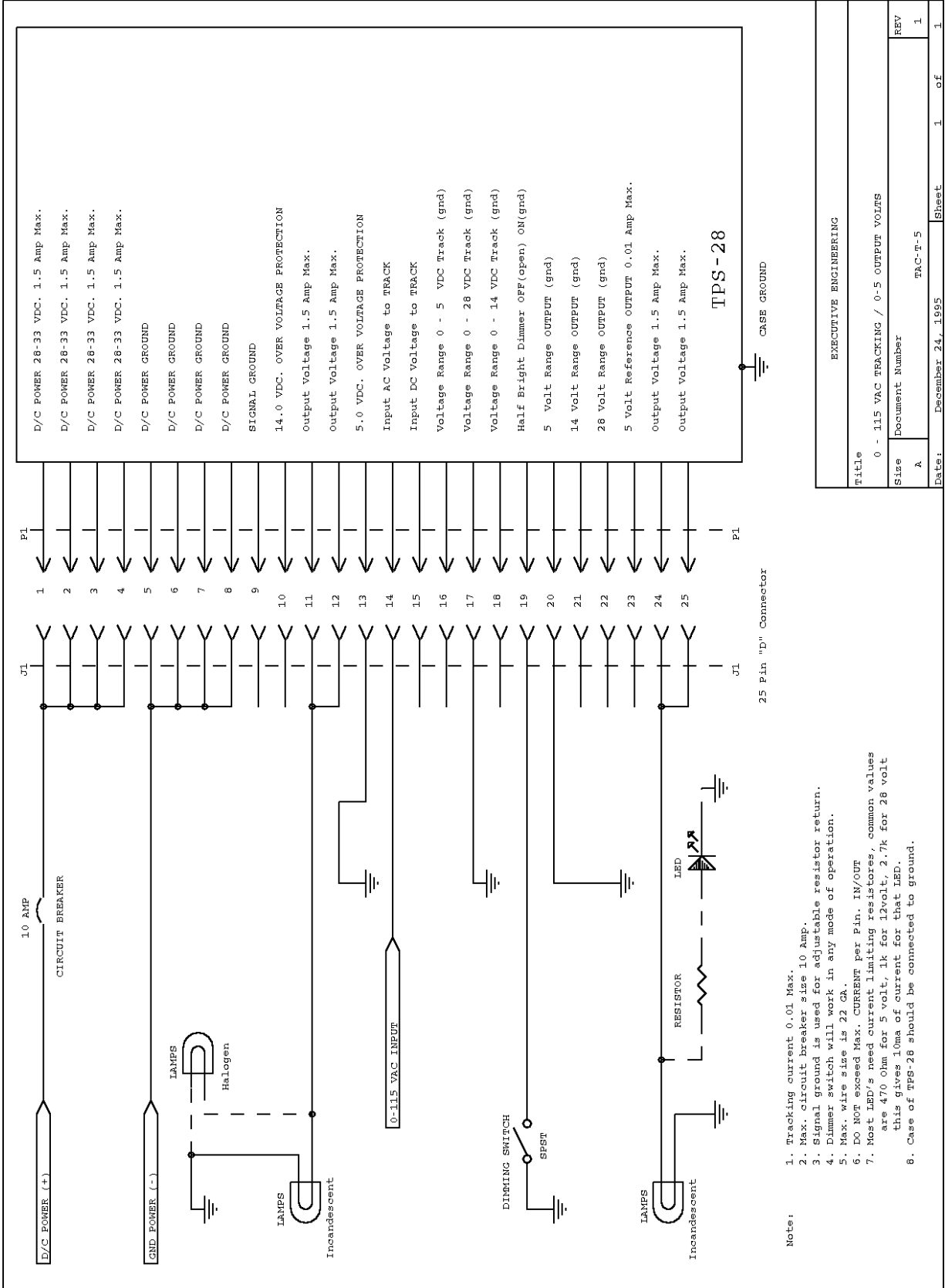
25 Pin "D" Connector

- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.

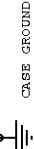
**TPS-28**



EXECUTIVE ENGINEERING	
Title	0 - 115 VAC TRACKING / 0-28 OUTPUT VOLTS
Size	Document Number
A	TPS-T-28
REV	1
Date:	December 24, 1995
Sheet	1 of 1



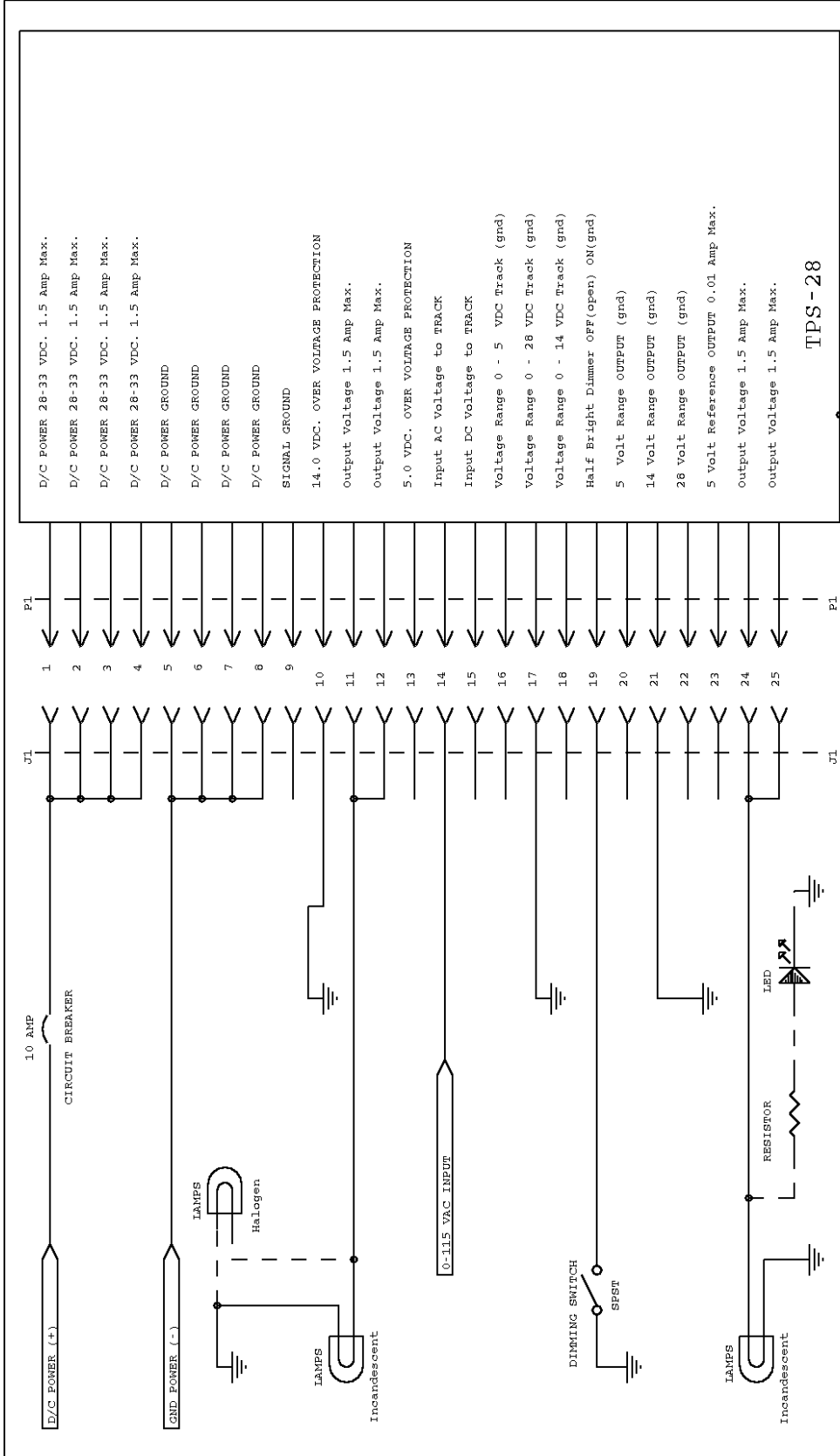
TPS-28



25 Pin "D" Connector

- Note:
- Tracking current 0.01 Max.
  - Max. circuit breaker size 10 Amp.
  - Signal ground is used for adjustable resistor return.
  - Dimmer switch will work in any mode of operation.
  - Max. wire size is 22 GA.
  - DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
  - Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	0 - 115 VAC TRACKING / 0 - 5 OUTPUT VOLTS
Size	Document Number
A	TPS-28
REV	1
Date:	December 24, 1995
Sheet	1 of 1

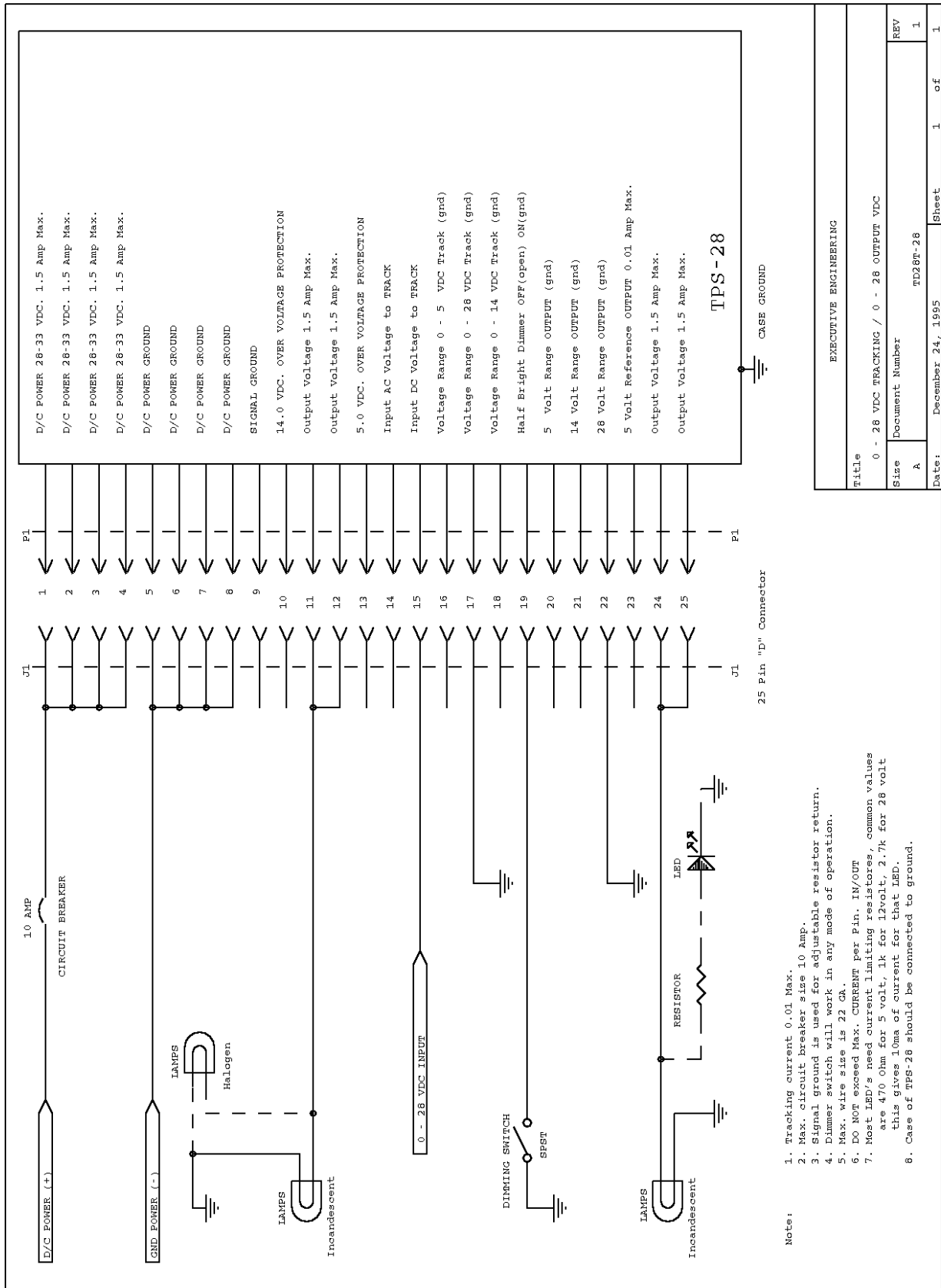


**TPS-28**

CASE GROUND

EXECUTIVE ENGINEERING	
Title	
0 - 115 VAC TRACKING / 0-14 OUTPUT VOLTS	
Size	Document Number
A	TPS-T-14
REV	1
Date:	December 24, 1995
Sheet	1 of 1

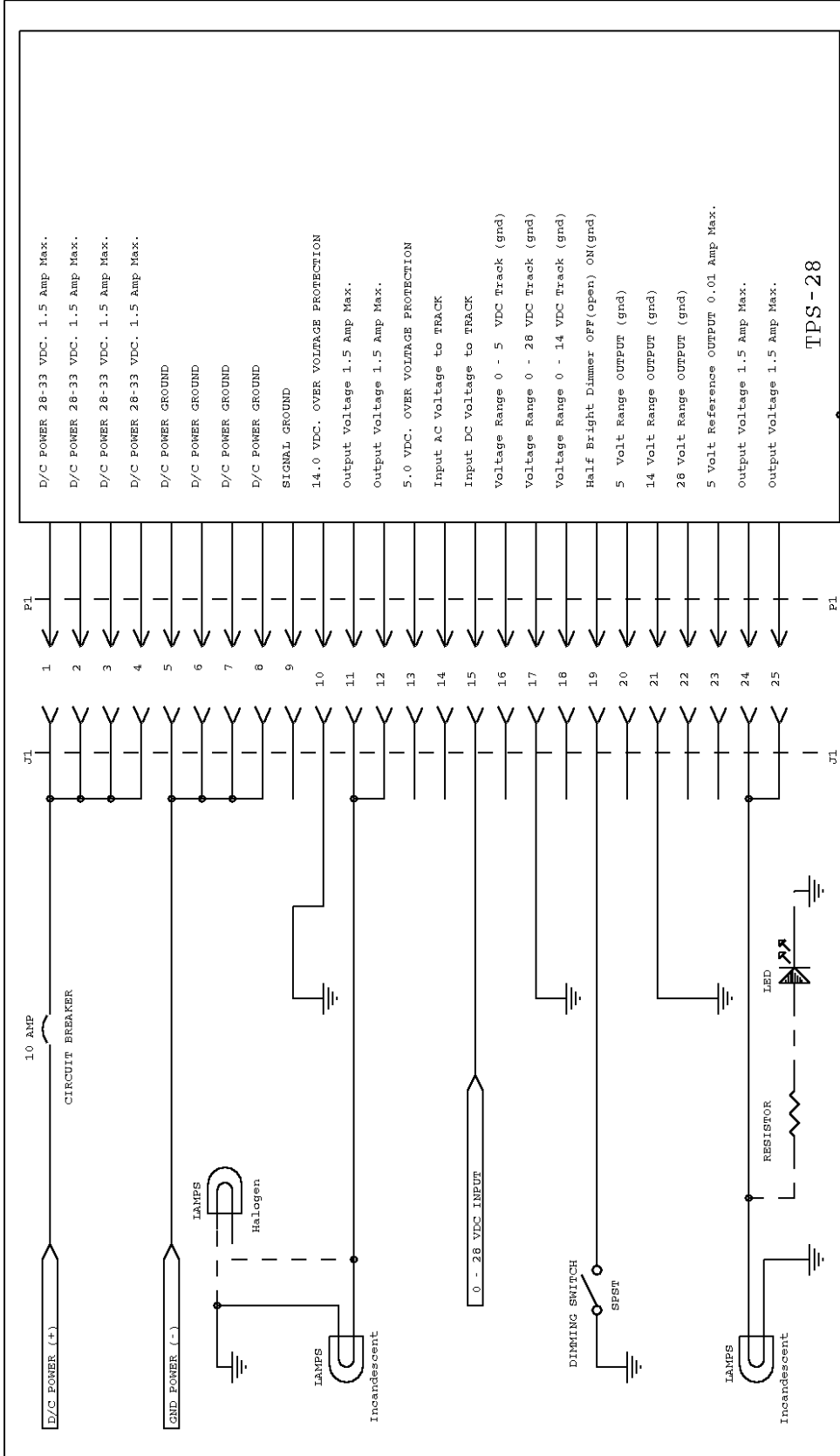
- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.



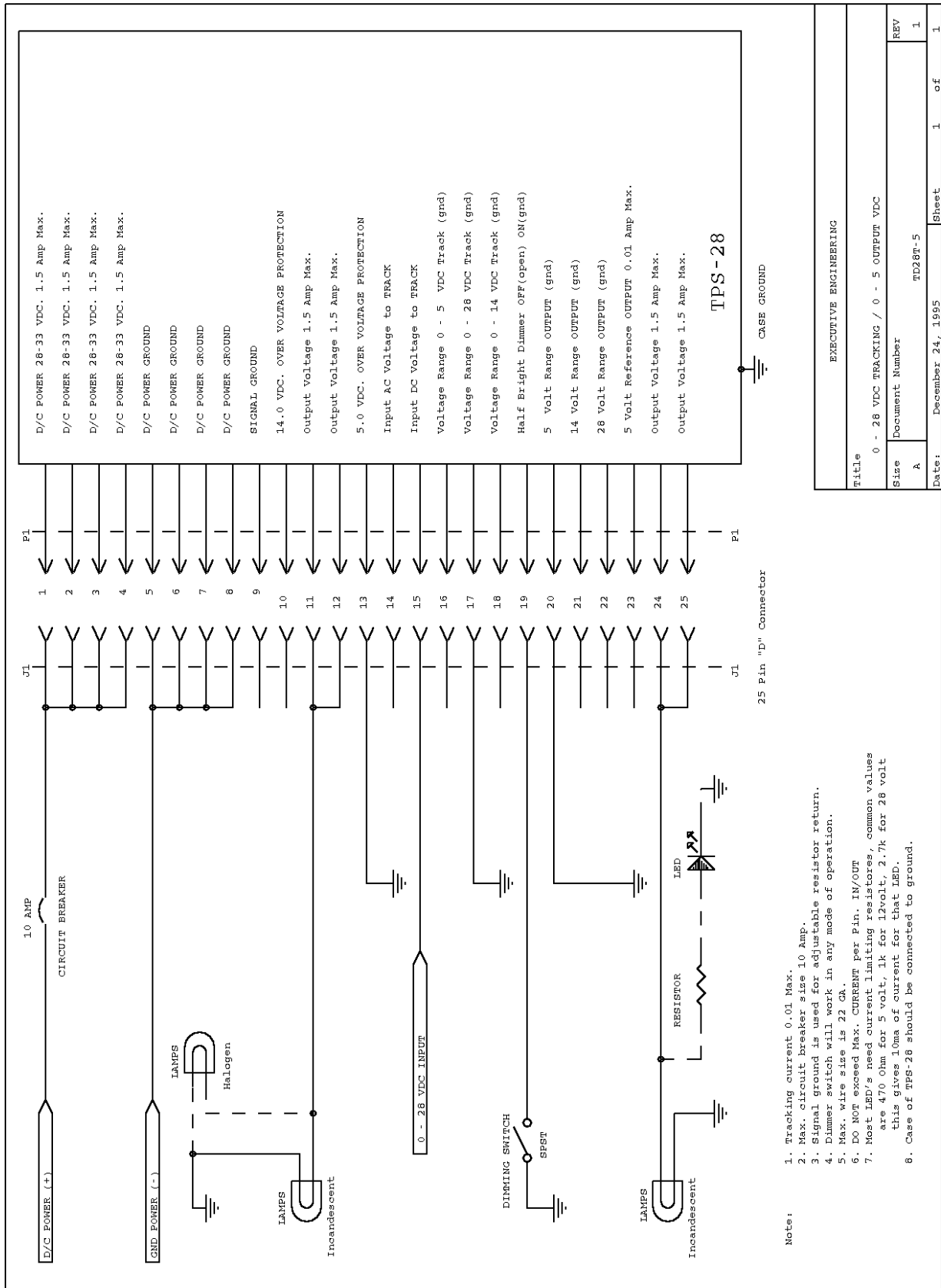
**Note:**

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	0 - 28 VDC TRACKING / 0 - 28 OUTPUT VDC
Size	A
Document Number	TD28T-28
REV	1
Date:	December 24, 1995
Sheet	1 of 1



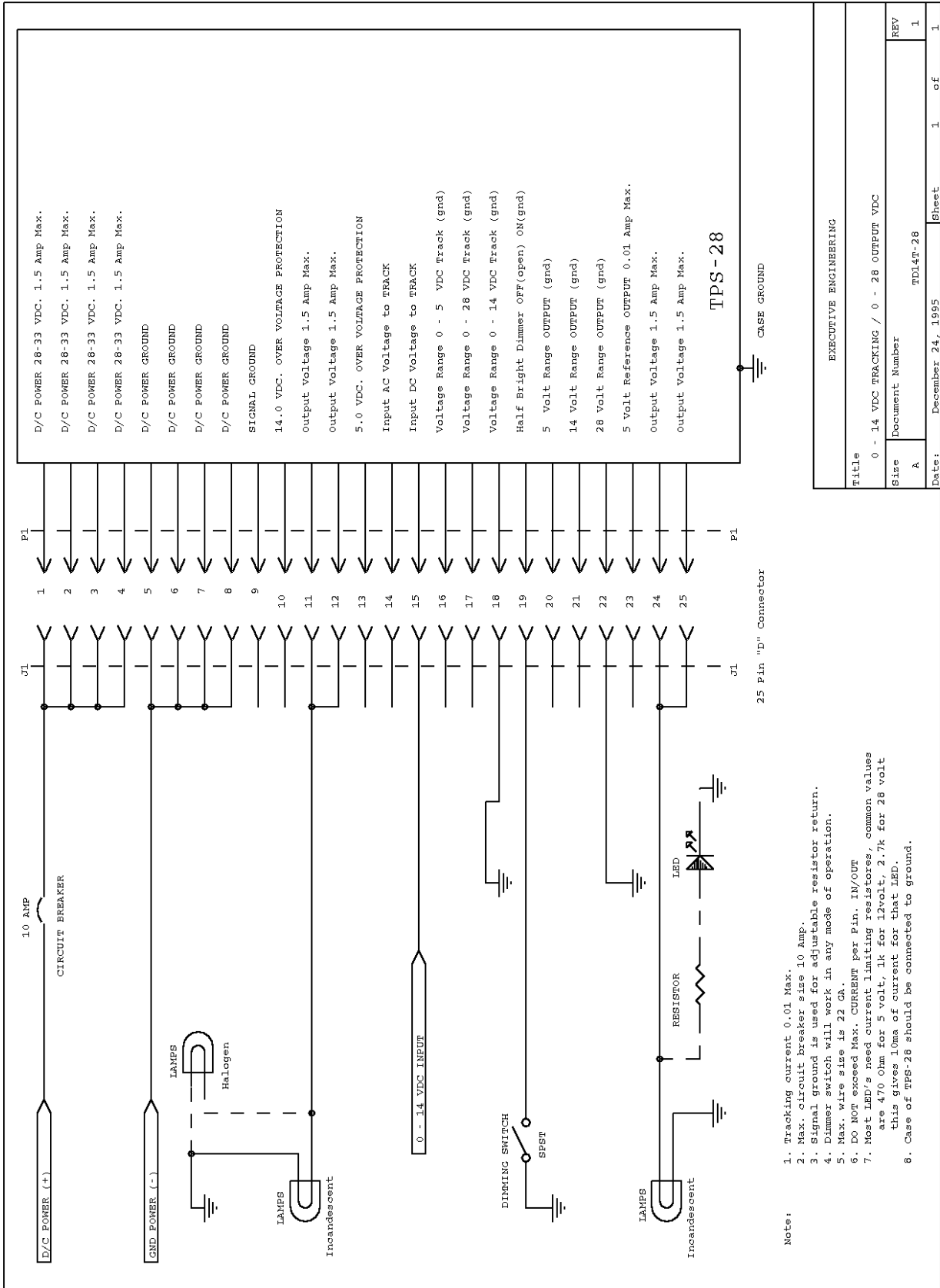
<b>TPS-28</b> CASE GROUND	
D/C POWER 28-33 VDC. 1.5 Amp Max. D/C POWER 28-33 VDC. 1.5 Amp Max. D/C POWER 28-33 VDC. 1.5 Amp Max. D/C POWER 28-33 VDC. 1.5 Amp Max. D/C POWER GROUND D/C POWER GROUND D/C POWER GROUND D/C POWER GROUND SIGNAL GROUND 14.0 VDC. OVER VOLTAGE PROTECTION Output Voltage 1.5 Amp Max. Output Voltage 1.5 Amp Max. 5.0 VDC. OVER VOLTAGE PROTECTION Input AC Voltage to TRACK Input DC Voltage to TRACK Voltage Range 0 - 5 VDC Track (grd) Voltage Range 0 - 28 VDC Track (grd) Voltage Range 0 - 14 VDC Track (grd) Half Bright Dimmer OFF (open) OR (grd) 5 Volt Range OUTPUT (grd) 14 Volt Range OUTPUT (grd) 28 Volt Range OUTPUT (grd) 5 Volt Reference OUTPUT 0.01 Amp Max. Output Voltage 1.5 Amp Max. Output Voltage 1.5 Amp Max.	
<b>TPS-28</b>	
CASE GROUND	
25 Pin "D" Connector	
<b>Note:</b> 1. Tracking current 0.01 Max. 2. Max. circuit breaker size 10 Amp. 3. Signal ground is used for adjustable resistor return. 4. Dimmer switch will work in any mode of operation. 5. Max. wire size is 22 GA. 6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED. 6. Case of TPS-28 should be connected to ground.	
<b>EXECUTIVE ENGINEERING</b>	
Title 0 - 28 VDC TRACKING / 0 - 14 OUTPUT VDC	
Size A	Document Number TD28T-14
Date: December 24, 1995	Sheet 1 of 1



**Note:**

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title 0 - 28 VDC TRACKING / 0 - 5 OUTPUT VDC	
Size A	Document Number TD28F-5
REV 1	Sheet 1 of 1
Date: December 24, 1995	



D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 SIGNAL GROUND  
 14.0 VDC. OVER VOLTAGE PROTECTION  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.  
 5.0 VDC. OVER VOLTAGE PROTECTION  
 Input AC Voltage to TRACK  
 Input DC Voltage to TRACK  
 Voltage Range 0 - 5 VDC Track (grd)  
 Voltage Range 0 - 28 VDC Track (grd)  
 Voltage Range 0 - 14 VDC Track (grd)  
 Half Bright Dimmer OFF (open) OR (grd)  
 5 Volt Range OUTPUT (grd)  
 14 Volt Range OUTPUT (grd)  
 28 Volt Range OUTPUT (grd)  
 5 Volt Reference OUTPUT 0.01 Amp Max.  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.

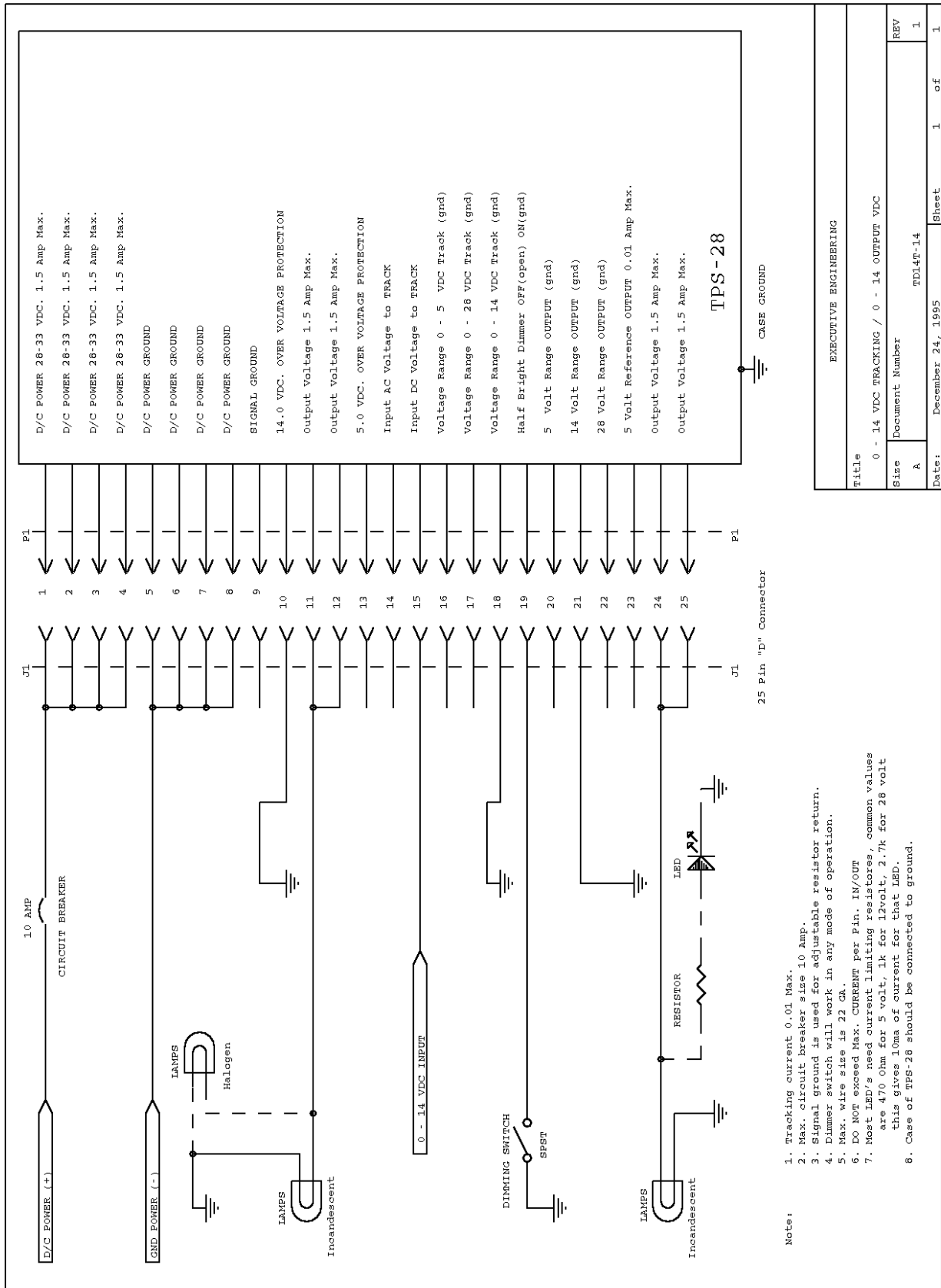
TPS-28

25 Pin "D" Connector

CASE GROUND

- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.

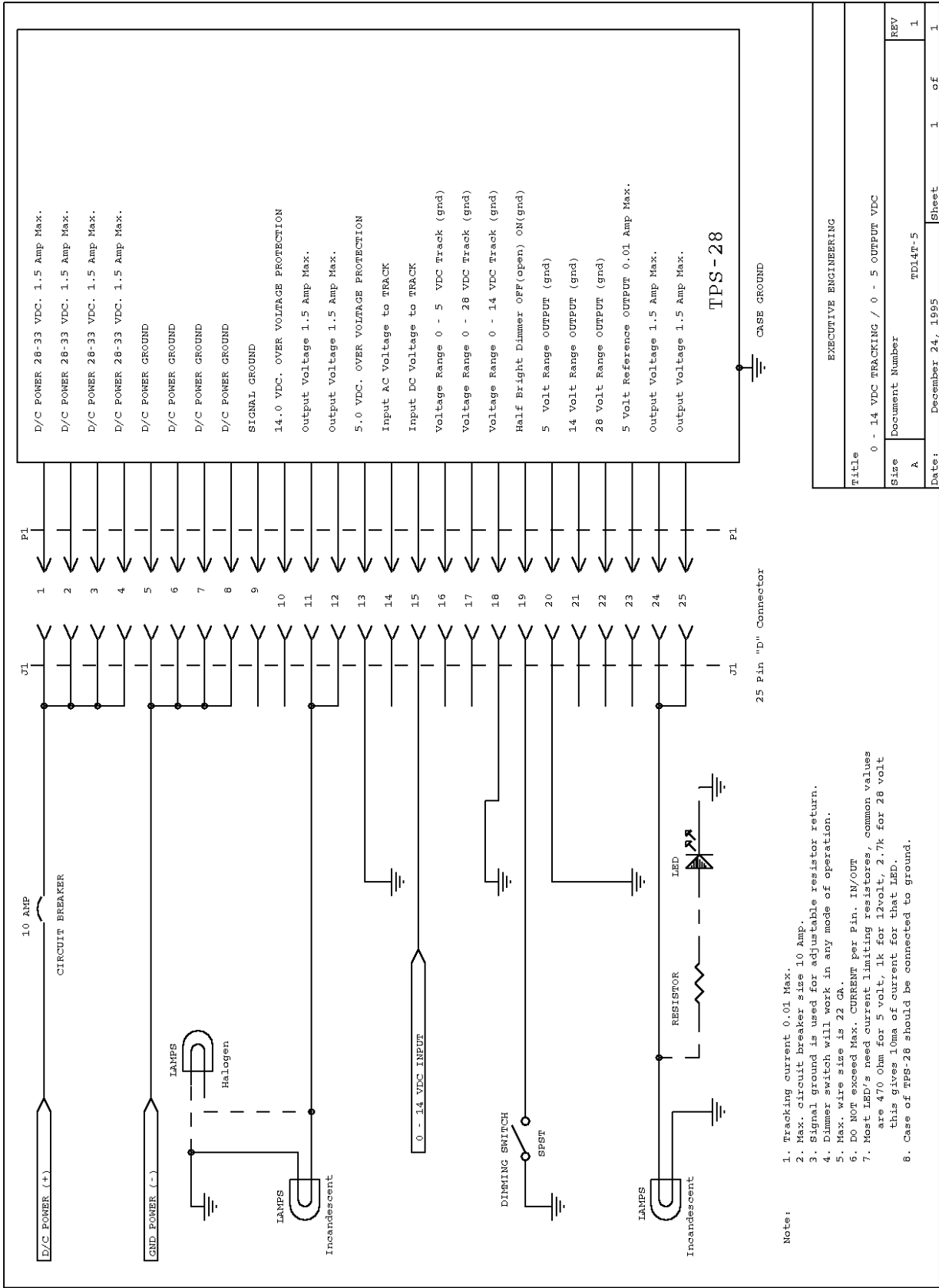
EXECUTIVE ENGINEERING	
Title	0 - 14 VDC TRACKING / 0 - 28 OUTPUT VDC
Size	Document Number
A	TD14P-28
REV	1
Date:	December 24, 1995
Sheet	1 of 1



Note:

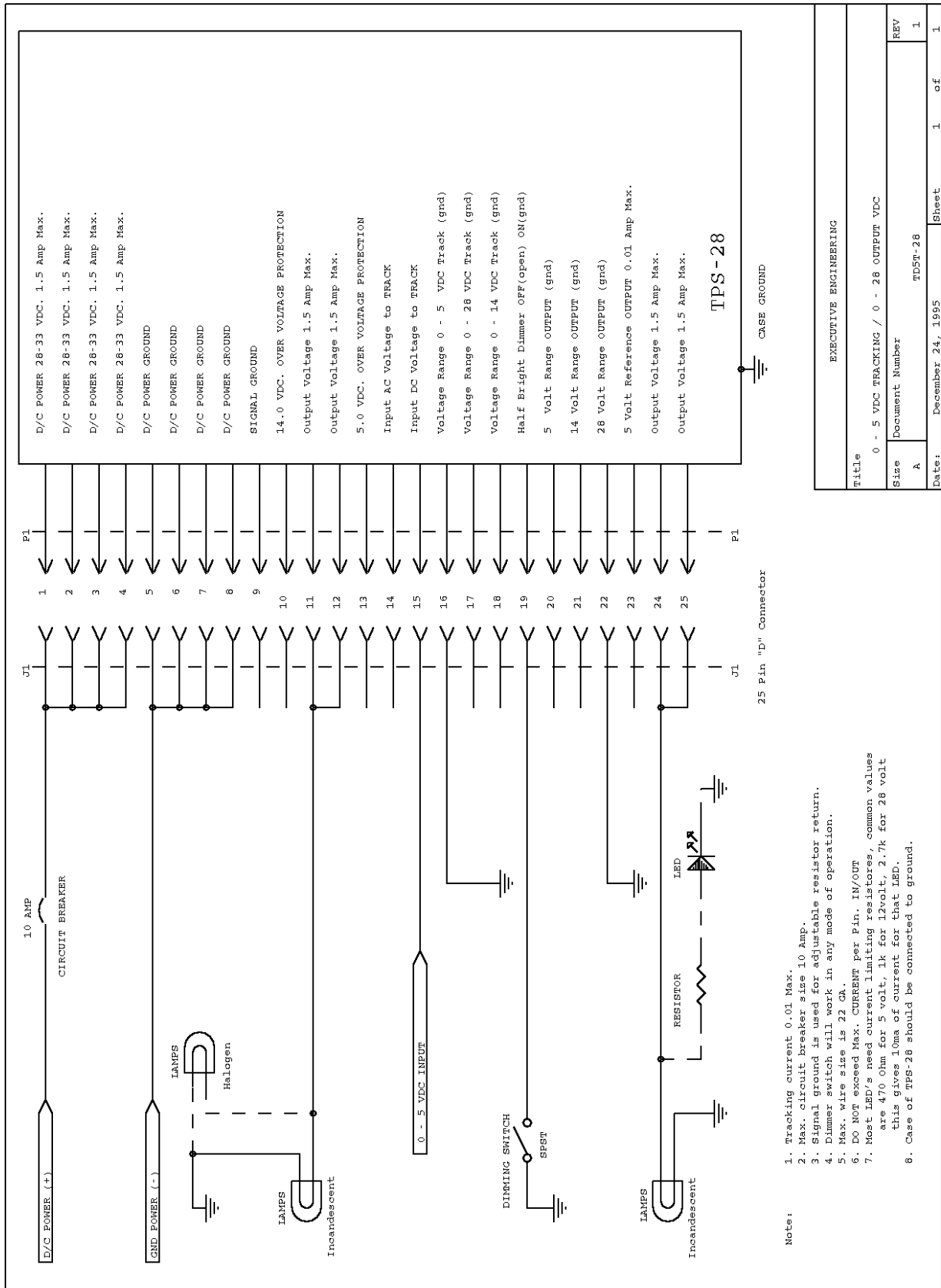
1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
7. Most LED's need current limiting resistors, common values are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
8. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	0 - 14 VDC TRACKING / 0 - 14 OUTPUT VDC
Size	Document Number
A	TPD14T-14
REV	1
Date:	December 24, 1995
Sheet	1 of 1



EXECUTIVE ENGINEERING	
Title	0 - 14 VDC TRACKING / 0 - 5 OUTPUT VDC
Size	A
Document Number	TDL4T-5
REV	1
Date:	December 24, 1995
Sheet	1 of 1

Note:  
 1. Tracking current 0.01 Max.  
 2. Max. circuit breaker size 10 Amp.  
 3. Signal ground is used for adjustable resistor return.  
 4. Dimmer switch will work in any mode of operation.  
 5. Max. wire size is 22 GA.  
 6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.  
 6. Case of TPS-28 should be connected to ground.



**Note:**

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER GROUND

D/C POWER GROUND

D/C POWER GROUND

D/C POWER GROUND

SIGNAL GROUND

14.0 VDC. OVER VOLTAGE PROTECTION

Output Voltage 1.5 Amp Max.

Output Voltage 1.5 Amp Max.

5.0 VDC. OVER VOLTAGE PROTECTION

Input AC Voltage to TRACK

Input DC Voltage to TRACK

Voltage Range 0 - 5 VDC Track (grd)

Voltage Range 0 - 28 VDC Track (grd)

Voltage Range 0 - 14 VDC Track (grd)

Half Bright Dimmer OFF (open) ON (grd)

5 Volt Range OUTPUT (grd)

14 Volt Range OUTPUT (grd)

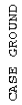
28 Volt Range OUTPUT (grd)

5 Volt Reference OUTPUT 0.01 Amp Max.

Output Voltage 1.5 Amp Max.

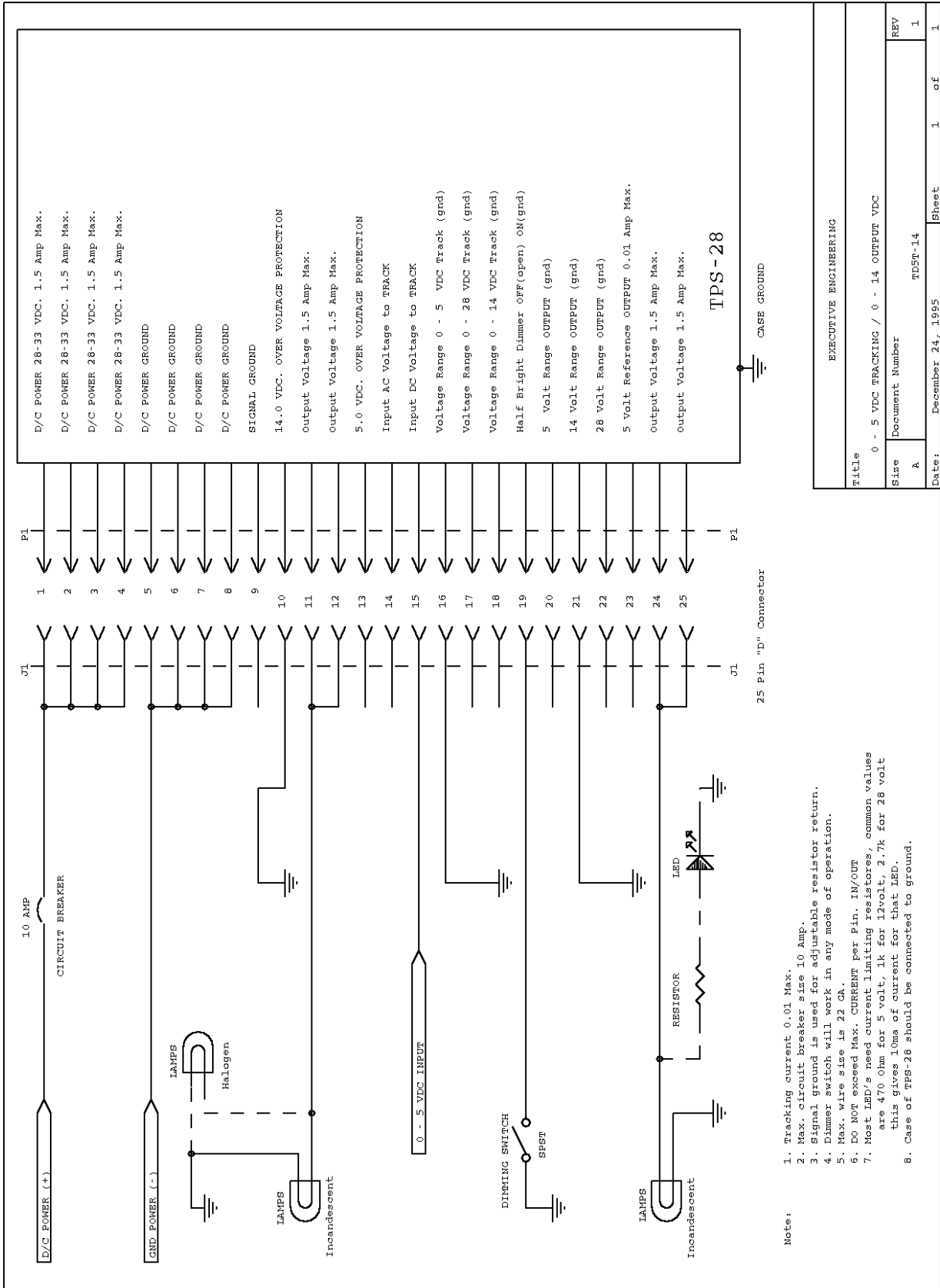
Output Voltage 1.5 Amp Max.

**TPS-28**

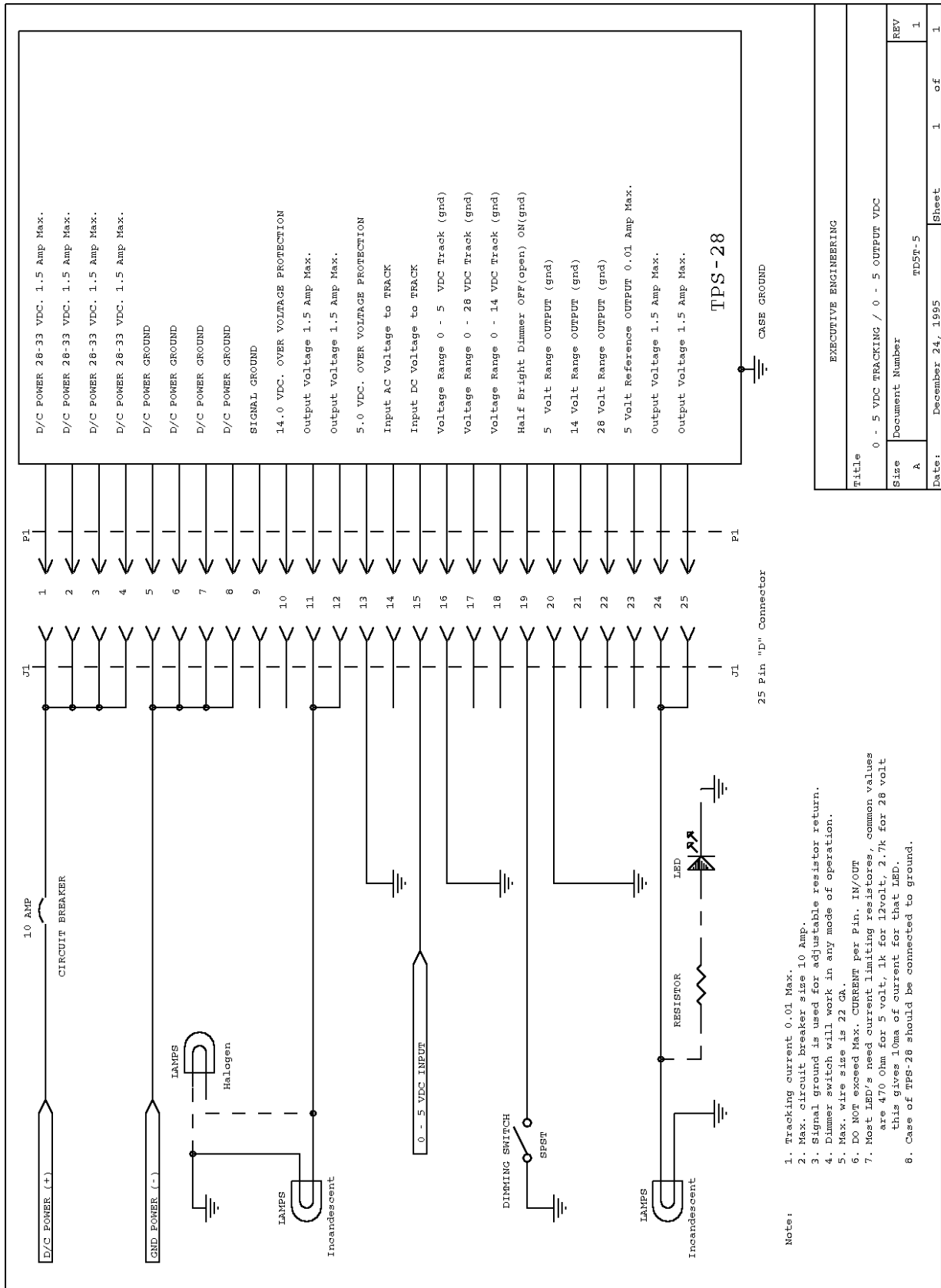


25 Pin "D" Connector

EXECUTIVE ENGINEERING	
Title	0 - 5 VDC TRACKING / 0 - 28 OUTPUT VDC
Size	A
Document Number	TDST-28
REV	1
Date:	December 24, 1995
Sheet	1 of 1



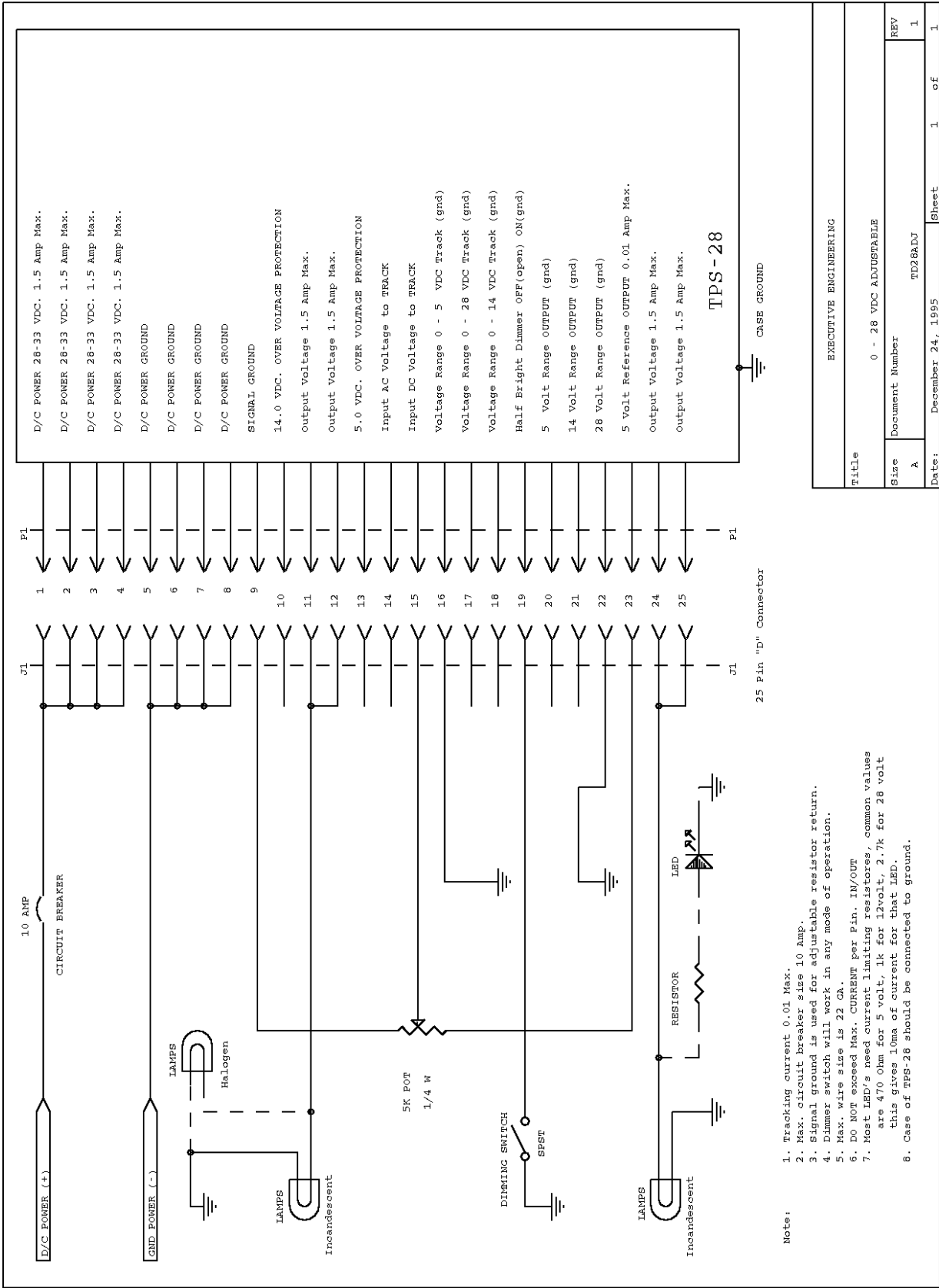
- D/C POWER 28-33 VDC. 1.5 Amp Max.
- D/C POWER 28-33 VDC. 1.5 Amp Max.
- D/C POWER 28-33 VDC. 1.5 Amp Max.
- D/C POWER 28-33 VDC. 1.5 Amp Max.
- D/C POWER GROUND
- D/C POWER GROUND
- D/C POWER GROUND
- D/C POWER GROUND
- SIGNAL GROUND
- 14.0 VDC. OVER VOLTAGE PROTECTION
- Output Voltage 1.5 Amp Max.
- Output Voltage 1.5 Amp Max.
- 5.0 VDC. OVER VOLTAGE PROTECTION
- Input AC Voltage to TRACK
- Input DC Voltage to TRACK
- Voltage Range 0 - 5 VDC Track (grd)
- Voltage Range 0 - 28 VDC Track (grd)
- Voltage Range 0 - 14 VDC Track (grd)
- Half Bright Dimmer OFF (open) OR (grd)
- 5 Volt Range OUTPUT (grd)
- 14 Volt Range OUTPUT (grd)
- 28 Volt Range OUTPUT (grd)
- 5 Volt Reference OUTPUT 0.01 Amp Max.
- Output Voltage 1.5 Amp Max.
- Output Voltage 1.5 Amp Max.



Note:

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	0 - 5 VDC TRACKING / 0 - 5 OUTPUT VDC
Size	Document Number
A	TP5T-5
REV	1
Date:	December 24, 1995
Sheet	1 of 1



D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.  
 D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND  
 D/C POWER GROUND

SIGNAL GROUND  
 14.0 VDC. OVER VOLTAGE PROTECTION  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.

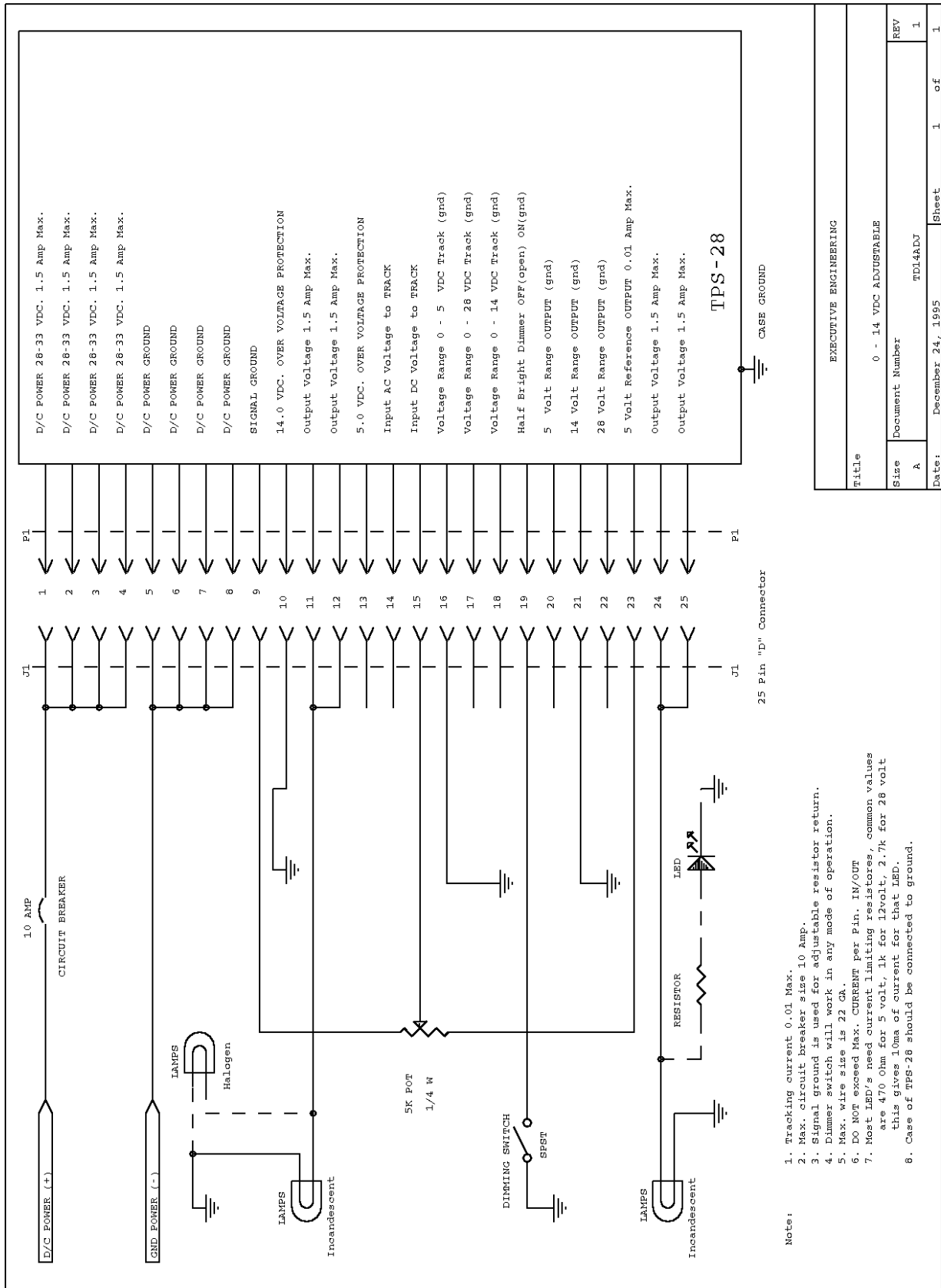
5.0 VDC. OVER VOLTAGE PROTECTION  
 Input AC Voltage to TRACK  
 Input DC Voltage to TRACK  
 Voltage Range 0 - 5 VDC Track (grd)

Voltage Range 0 - 28 VDC Track (grd)  
 Voltage Range 0 - 14 VDC Track (grd)  
 Half Bright Dimmer OFF (open) OR (grd)

5 Volt Range OUTPUT (grd)  
 14 Volt Range OUTPUT (grd)  
 28 Volt Range OUTPUT (grd)

5 Volt Reference OUTPUT 0.01 Amp Max.  
 Output Voltage 1.5 Amp Max.  
 Output Voltage 1.5 Amp Max.

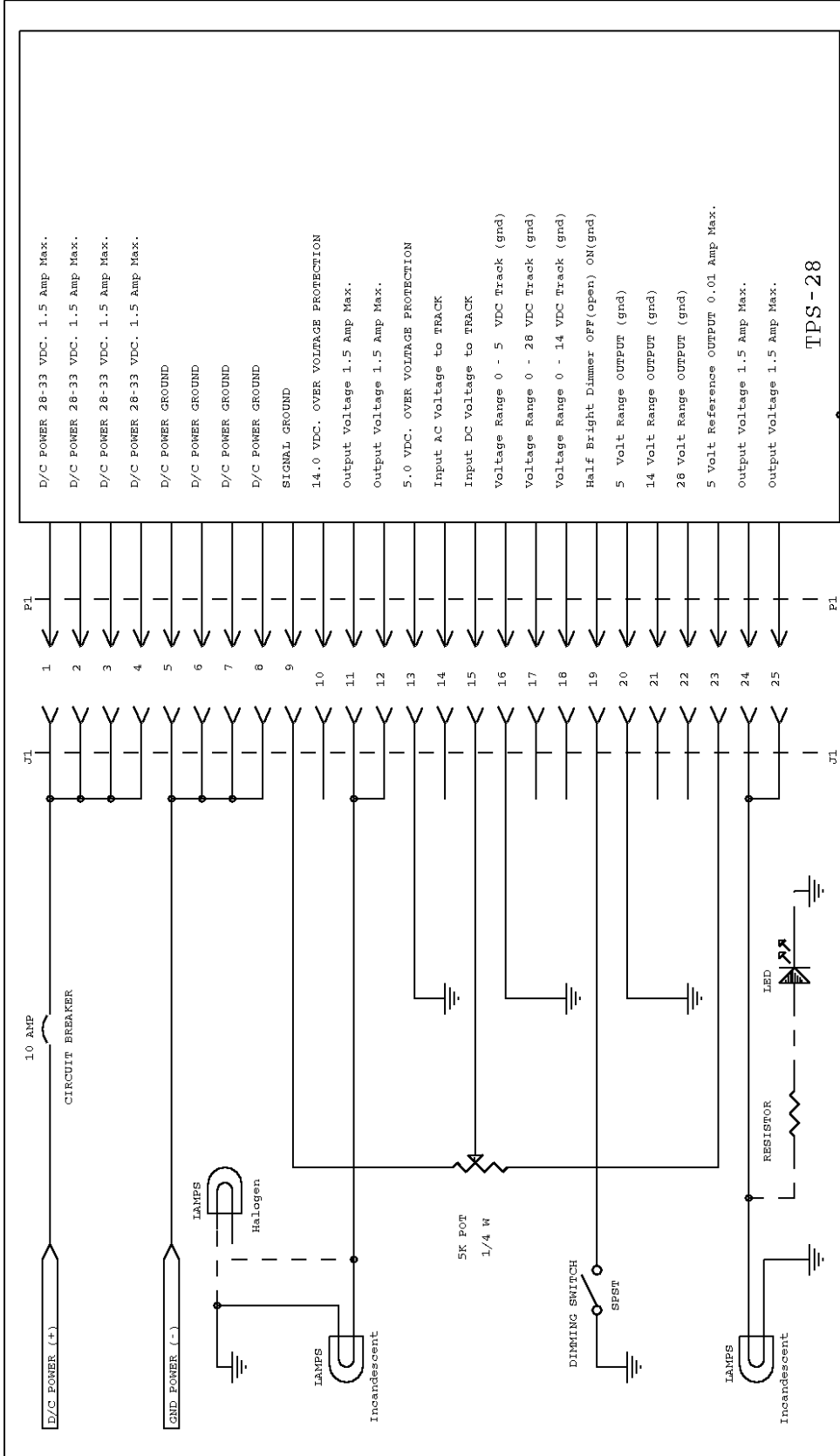
EXECUTIVE ENGINEERING	
Title	0 - 28 VDC ADJUSTABLE
Size	A
Document Number	TD28ADJ
REV	1
Date:	December 24, 1995
Sheet	1 of 1



**Note:**

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt, 1k for 12volt, 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

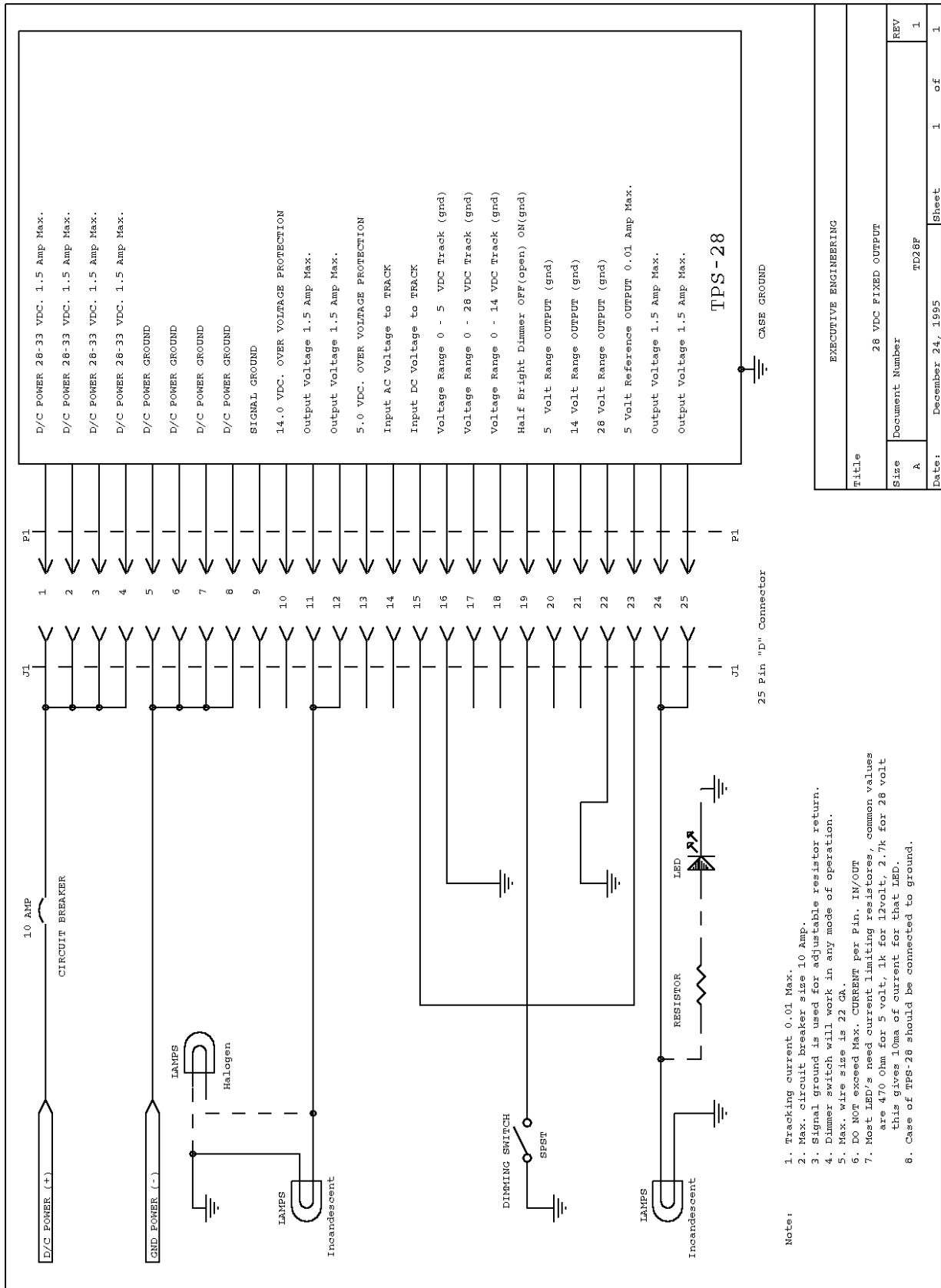
EXECUTIVE ENGINEERING	
Title	
0 - 14 VDC ADJUSTABLE	Document Number
A	REV
1	1
December 24, 1995	Sheet
1	of
1	1



25 Pin "D" Connector

- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	0 - 5 VDC ADJUSTABLE
Size	Document Number
A	TPD5ADJ
REV	1
Date:	December 24, 1995
Sheet	1 of 1



D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER 28-33 VDC. 1.5 Amp Max.

D/C POWER GROUND

D/C POWER GROUND

D/C POWER GROUND

D/C POWER GROUND

SIGNAL GROUND

14.0 VDC. OVER VOLTAGE PROTECTION

Output Voltage 1.5 Amp Max.

Output Voltage 1.5 Amp Max.

5.0 VDC. OVER VOLTAGE PROTECTION

Input AC Voltage to TRACK

Input DC Voltage to TRACK

Voltage Range 0 - 5 VDC Track (grd)

Voltage Range 0 - 28 VDC Track (grd)

Voltage Range 0 - 14 VDC Track (grd)

Half Bright Dimmer OFF (open) ON (grd)

5 Volt Range OUTPUT (grd)

14 Volt Range OUTPUT (grd)

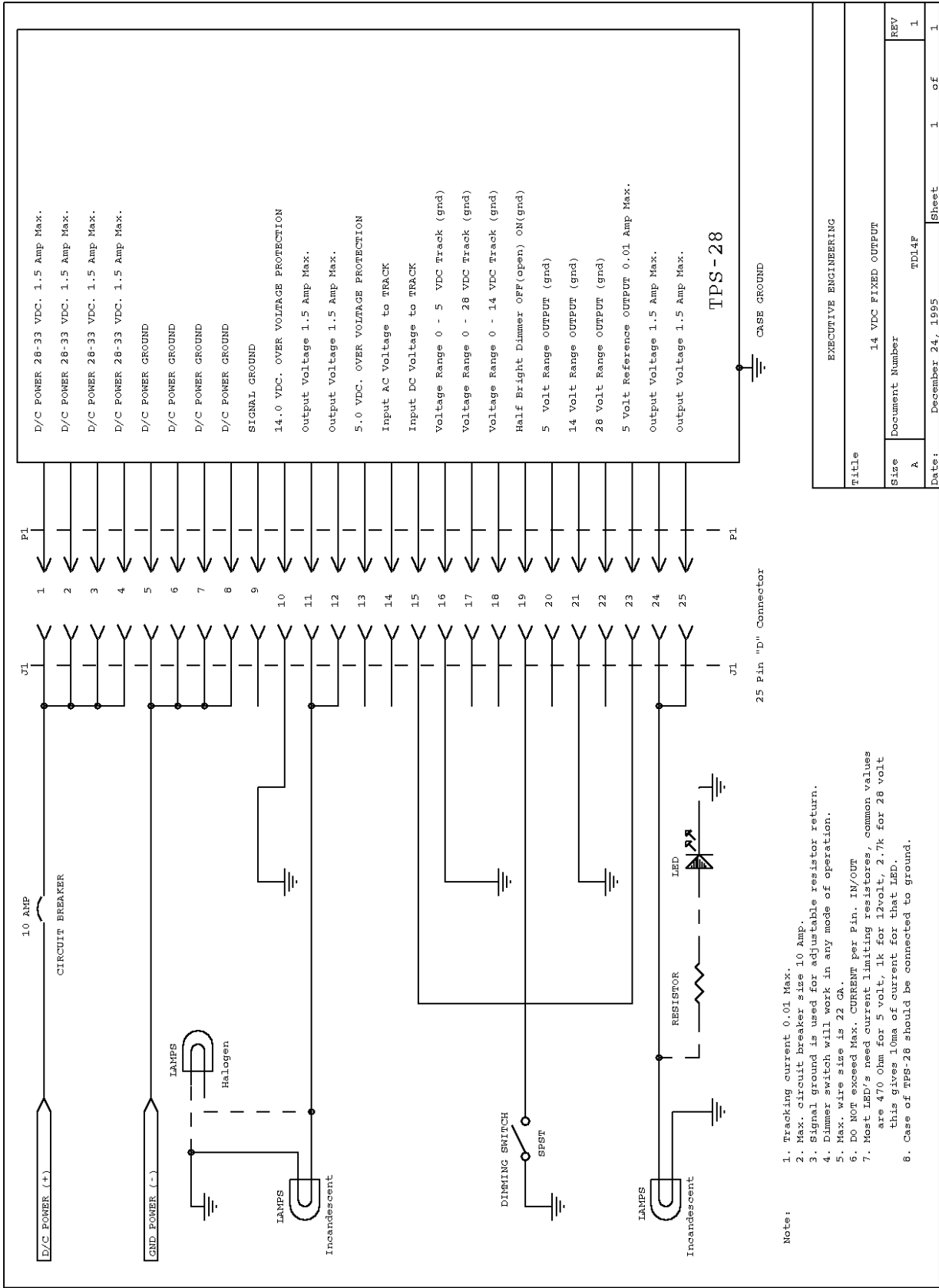
28 Volt Range OUTPUT (grd)

5 Volt Reference OUTPUT 0.01 Amp Max.

Output Voltage 1.5 Amp Max.

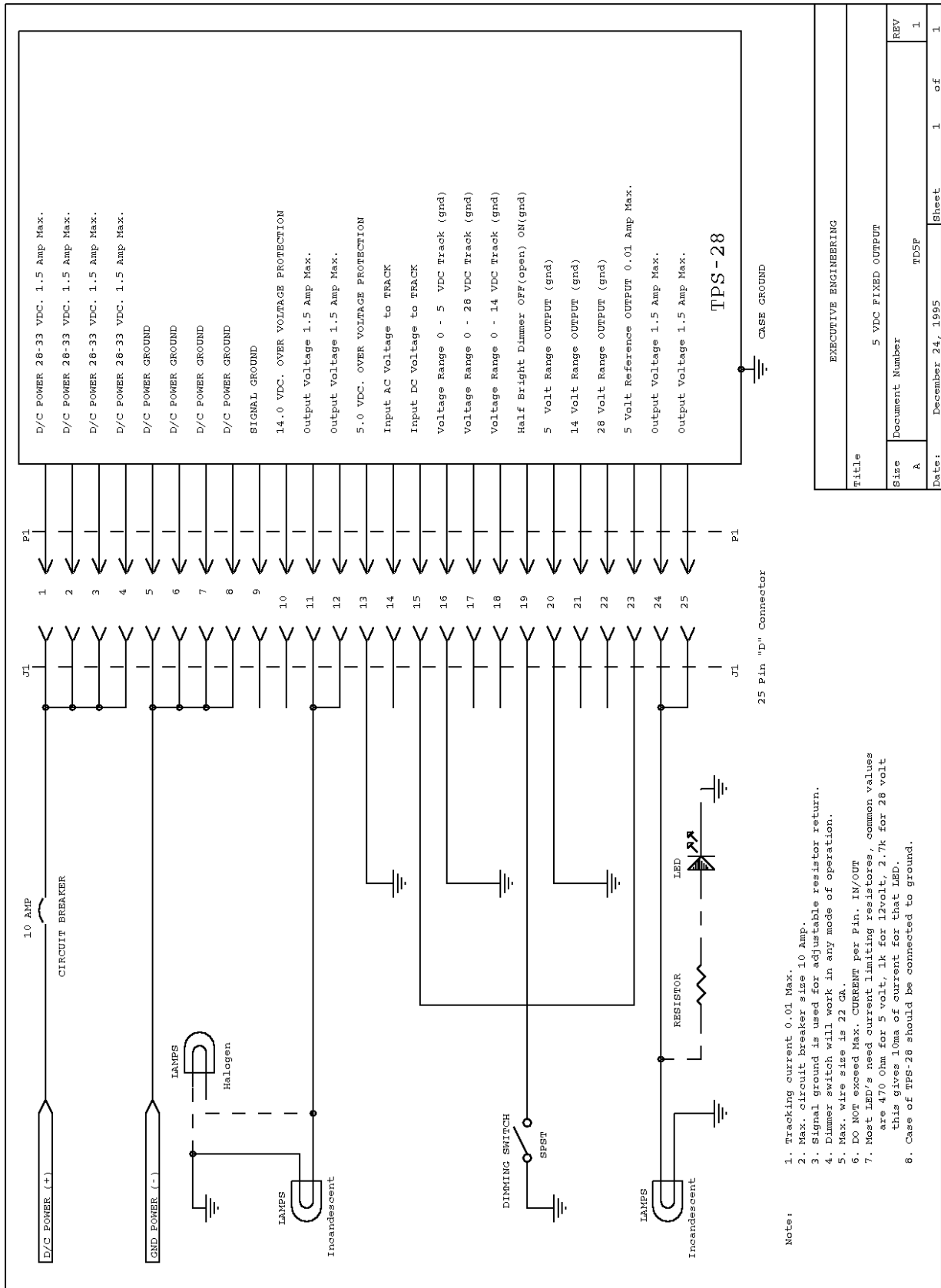
Output Voltage 1.5 Amp Max.

EXECUTIVE ENGINEERING	
28 VDC FIXED OUTPUT	
Title	
Size	REV
A	1
Document Number	TDD8F
Date:	December 24, 1995
Sheet	1 of 1



- Note:
1. Tracking current 0.01 Max.
  2. Max. circuit breaker size 10 Amp.
  3. Signal ground is used for adjustable resistor return.
  4. Dimmer switch will work in any mode of operation.
  5. Max. wire size is 22 GA.
  6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
  6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	14 VDC FIXED OUTPUT
Size	Document Number
A	TDI4F
REV	1
Date:	December 24, 1995
Sheet	1 of 1



**Note:**

1. Tracking current 0.01 Max.
2. Max. circuit breaker size 10 Amp.
3. Signal ground is used for adjustable resistor return.
4. Dimmer switch will work in any mode of operation.
5. Max. wire size is 22 GA.
6. DO NOT exceed Max. CURRENT per Pin. IN/OUT are 470 Ohm for 5 volt. 1k for 12volt. 2.7k for 28 volt this gives 10ma of current for that LED.
6. Case of TPS-28 should be connected to ground.

EXECUTIVE ENGINEERING	
Title	
5 VDC FIXED OUTPUT	
Size	REV
A	1
Date: December 24, 1995	
Sheet	1 of 1