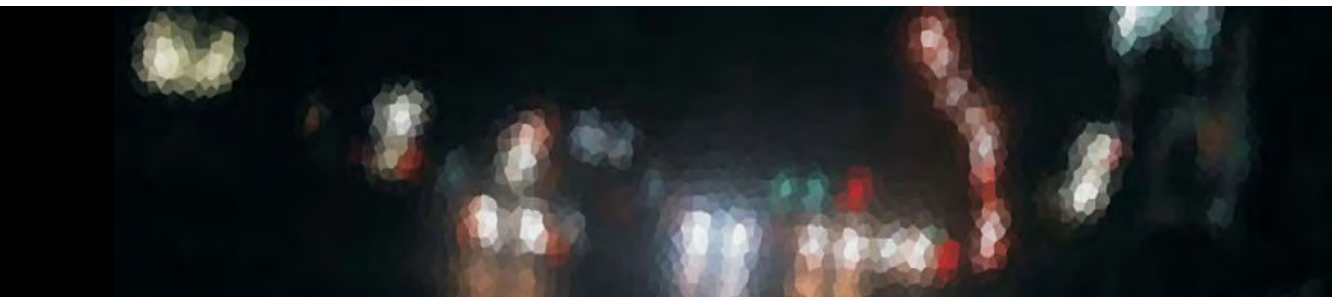




Operating Manual

ASTC 100VDC Connection Interface Tester

Cabinet Test Equipment



ASTC 100VDC COMMUNICATIONS INTERFACE TESTER 104733

Technical Manual

/n: MN078125, Revision 2



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1. REVISIONS

Rev	By	Date	Reason
E	B Prior	6/4/02	Edited for draft release
F	M Leatt	2/14/03	Re-formatted
G	P. Vu	7/14/2003	Version control reconciliation
H	Mark Leatt	7/1/2005	Customer comments
I	P. Vu	1/26/2006	Per 11/1/2005 teleconference
1	Ray Deer	2/6/2008	Initial ECN release
2	Jay Oyster	12/30/2008	Rebranding, Manual Cover, Revision table update

2. GLOSSARY

Abbreviation	Description
DCI	100 VDC Communications Interface Unit
DCIT	100 VDC Communications Interface Unit Tester
K Ω	Kilohm (1,000 ohms)
LCD	Liquid Crystal Display
LED	Light Emitting Diode
VDC	Volts Direct Current
Ω	Ohm, ohms

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3. INTRODUCTION

The 100 VDC Communication Interface Tester (DCIT) is a stand-alone tester which requires only a 115 VAC power source and a 100VDC Communications Interface Unit (DCI) to be fully functional. The DCI slides into a slot in the front of the DCIT to ensure that the operator is protected from the high voltages used on the board.

Features:

- Requires 115 VAC power source.
- DCI under test slides into a slot in the front of the tester.
- Visual display (LEDs) of power on, DC voltage, transmit and receive.
- Visual display (LCD) of voltage on tip and ring lines.
- Selector switches for selecting system transmit (+) and (–) and DCI under test transmit (+) and (–).
- Digital potentiometer for setting a specific resistance in the range of 0 to 99 K Ω on the Tip line.
- Switch to create a short between the TIP and RING lines.

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4. SPECIFICATIONS

PROGRAMMING:	None
INDICATORS:	6 Status LEDs, one 3½ digit LCD Tip/Ring line impedance in KΩ
CIRCUITRY:	100% solid-state, high speed CMOS
INPUTS/OUTPUTS:	+24 VDC, +9 VDC, ±100 VDC, 115 VAC
CONNECTORS:	One female 22-pin dual-row edge connector with gold plated contacts.
POWER REQUIREMENTS:	115 VAC
PRINTED CIRCUIT BOARDS:	NEMA FR-4 glass epoxy, 1/16 inch minimum thickness
DIMENSIONS:	8.7" W x 4.3" H x 10.6" D
OPERATING TEMPERATURE:	+32° to +120° F (0° to +50° C)

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5. INSTALLATION

The installation of the DCIT is a simple procedure; however, U.S. Traffic Corporation recommends that the following step-by-step procedure be used to ensure proper operation.

Perform the following procedure:

1. Ensure that the DCIT power switch is in the OFF position.
2. Apply power to the DCIT.
3. Set the digital potentiometer to 0Ω
4. Set the LINE SHORT switch to NORMAL.
5. Insert the DCI card to be tested, with the components facing upwards, into the slot on the front panel of the tester.
6. Switch the DCIT power switch to the ON position.

The DCIT is now ready for use.

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6. OPERATION

The DCI under test plugs into the DCIT via a 22-pin connector in a slot in the front panel. The DCIT supplies all signals and power to the DCI under test.

The DCIT consists mainly of the following items:

- **DC power supply:** The 115V AC is rectified and regulated to generate +24 VDC and +9 VDC. The +24 VDC is used to supply the circuitry on both the system DCI and the DCI under test. The +9 VDC is used to power the digital voltmeter.
- **System DCI:** The system DCI is used to simulate an external control system and is used to both drive and receive signals on the TIP and RING lines.
- **Digital voltmeter:** The voltmeter is connected across the TIP and RING lines and displays the actual voltage on these lines.
- **Control switches:** There are three control switches, SYSTEM, DCI and LINE SHORT. The SYSTEM control switch will either cause the system DCI to generate a ± 100 VDC signal on the TIP and RING lines or allow the DCI under-test to take control of the TIP and RING lines. The DCI control switch cause the DCI under-test to generate a ± 100 VDC signal on the TIP and RING lines
- **Control LEDs:** The control LEDs show the state of the system DCI.
- **Digital potentiometer:** This component is used to set a specific line resistance (in $K\Omega$) in series with the tip line to simulate the line impedance found in the telephone lines.
- **Line short switch:** The switch is used to create a temporary short between the tip and ring lines.
- **Power LEDs:** There are two power LEDs on the front panel of the tester, 115 VAC and +24 VDC. When the 115 VAC LED is lit, it signifies that the tester is switched on and that the system DCI and DCI under test both have power applied to them. The +24 VDC LED shows that the +24V power supply is operating correctly.

6.1 Input/Output Connectors

The DCIT uses a single female, 22 pin, dual-row, gold plated connector to interface with the DCI under test. Table 1 details the pin assignment of the connector.

PIN NUMBER	FUNCTION
A/1	Ground
B/2	+24 VDC
C/3	Not Used
D/4	Tip
E/5	Ring
F/6	Receive Plus
H/7	Not Used
J/8	Not Used
K/9	Not Used
L/10	Chassis Ground
M/11	AC Neutral
N/12	AC Line
P/13	Not Used
R/14	Not Used
S/15	Transmit Plus
T/16	Not Used
U/17	Not Used
V/18	Not Used
W/19	Receive Minus
X/20	Not Used
Y/21	Transmit Minus
Z/22	Ground

Table 1. Connector Pin Functions

6.2 Test Procedures

6.2.1 Power Supply Test

1. Insert the DCI to be tested into the slot on the front panel of the DCIT. Apply firm pressure to the front panel of the DCI to ensure that the DCI mates properly with the backplane connector inside the DCIT.
2. Set the POWER switch on the front panel of the DCIT to the ON position.

3. Verify that the 115V AC and the 24V DC LEDs illuminate on the DCIT front panel.
4. Verify that the POWER LED on the test DCI illuminates.

6.2.2 Line Short Test

1. Set the LINE SHORT/NORMAL switch on the DCIT front panel to the LINE SHORT position for approximately 1 minute. Verify that the POWER LED on the test DCI front panel turns off.
2. Return the LINE SHORT/NORMAL switch to the NORMAL position. Verify that the DCI POWER LED on the DCI front panel illuminates.
3. Verify correct transmit and receive operations per sections 7.2.3 and 7.2.4.

6.2.3 Receive + and – Verification

NOTE: The LINE RES thumbswitch on the DCIT front panel is a line resistance decade potentiometer. The thumbswitch display indicates resistance in K Ω .

1. Set LINE RES thumbswitch to 00 and set the LINE SHORT/NORMAL switch to the NORMAL position.
2. Turn the 3-position rotary switch on the DCIT front panel to the “DCI-SYS +100V” position. Verify that the SYSTEM TMT + and REC+ LEDs on the DCIT illuminate. Verify that the REC+ LED on the DCI under test and the DCIT REC+ LED on the DCIT illuminate.
3. Digital voltmeter on DCIT should display 100 ± 5 VDC.
4. Increase the LINE RES thumbswitch until the DCIT REC+ LED on the DCIT switches off. The LINE RES thumbswitch should read between 30 and 40 K Ω and the digital voltmeter display should show 58 ± 5 VDC.
5. Return the LINE RES thumbswitch to 00 and verify that the DCIT REC+ LED on the DCIT illuminates.
6. Turn the 3-position rotary switch on the DCIT front panel to the DCI-SYS –100V position. Verify that the DCIT TMT – and SYSTEM REC– LEDs on the DCIT illuminate. Verify that the REC– LED on the DCI under test and the DCIT REC– LED on the DCIT illuminate.
7. Digital voltmeter on DCIT should display -100 ± 5 VDC.
8. Increase LINE RES thumbswitch until the DCIT REC– LED on the DCIT turns off. The LINE RES thumbswitch should read between 30 to 40 K Ω and the digital voltmeter display should show $-58v \pm 5$ VDC.
9. Return the LINE RES thumbswitch to 00 and verify that the DCIT REC– LED on the

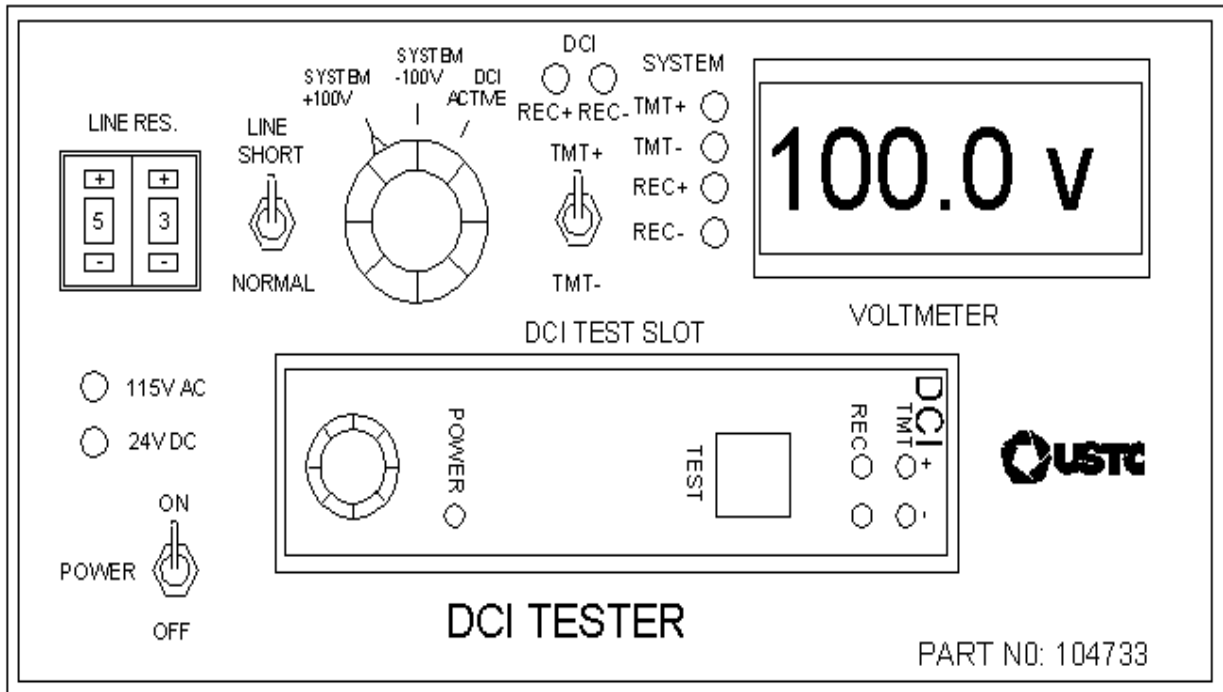
DCIT illuminates.

6.2.4 Transmit + and – Verification

1. Set the LINE RES thumbswitch to 00 and set the LINE SHORT/NORMAL switch to NORMAL.
2. Set the 3-position rotary switch on the DCIT front panel to the DCIT ACTIVE position. Set the DCIT switch to the TMT+ position. Verify that the TMT + LED on the test DCI illuminates. Verify that the DCIT REC+ and the SYSTEM REC+ LEDs on the DCIT illuminate.
3. Digital voltmeter on the DCIT front panel should display 100 ± 5 VDC.
4. Increase the LINE RES thumbswitch until the SYSTEM REC+ LED on the DCIT turns off. LINE RES thumbswitch should read between 30 to 40 K Ω and the digital voltmeter display should show 58 ± 5 VDC.
5. Return the LINE RES thumbswitch to 00 and verify that the SYSTEM REC+ LED on the DCIT illuminates.
6. Set the DCIT switch to the TMT– position. Verify that the TMT– LED on the DCI under test illuminates. Verify that the DCIT REC– and the SYSTEM REC– LEDs on the DCIT illuminate.
7. Digital voltmeter on DCIT front panel should display -100 ± 5 VDC.
8. Increase the LINE RES thumbswitch until the SYSTEM REC– LED on the DCIT turns off. The LINE RES thumbswitch should read between 30 to 40 K Ω and the digital voltmeter should display -58 ± 5 VDC.
9. Return the LINE RES thumbswitch to 00 and verify that the SYSTEM REC– LED on the DCIT illuminates.

7. SYSTEM DIAGRAMS

7.1 Front Panel Drawing



**Figure 1. 100 VDC Communications Tester Front Panel
(shown with test DCI installed)**



Figure 2. DCI Tester Front View



Figure 3. DCI Tester Side View

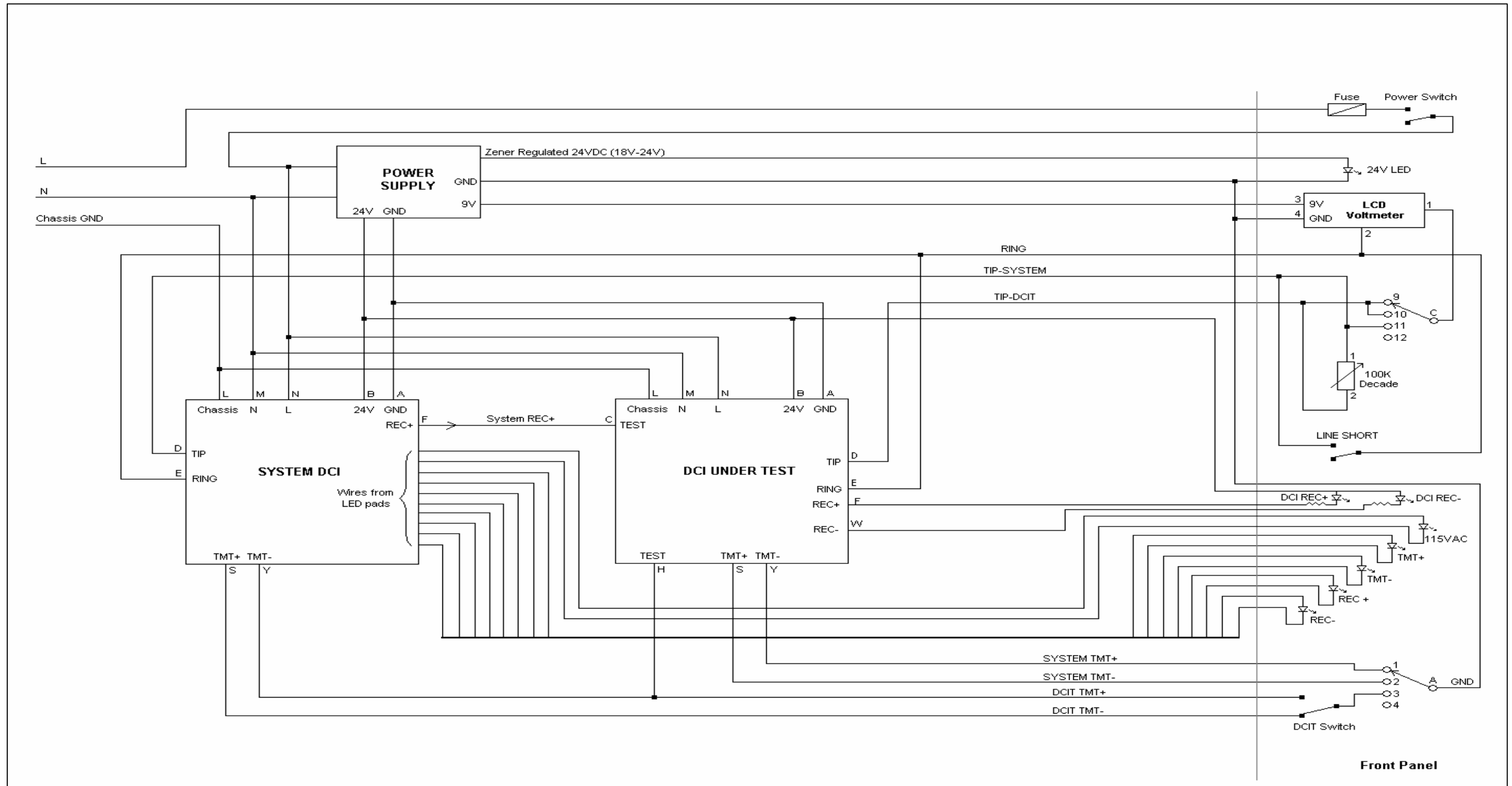
8. PARTS LIST

Component	Description	Manufacturer	Manufacturer's Part Number
000333	CORD PWR TYPE SJT	BELDEN CAROL	17405 GRAY 04806
000400	FUSE 0.50A 250V NORMAL	LTLFUSE BUSSMAN	312-500 AGC-1/2
000427	FUSE HOLDER 1/4X1-1/4	LTLFUSE	342-014
070180	STANDOFF 6-32X3/8 1/4 HEX	KEystone	2209
070227	CAP 470 μ F 35V 20% ELECT	ELNA	RE3-35V471M
070394	CONN PCB CARD EDGE 22POS	MICROPLASTIC	EMPS015622DPIEK
071039	RES 2.7K 1/4W 5% CF	MERITEK	CF25J2.7K
071331	DIGITAL MULTIMETER, 36 X 73 MM, PANEL MTG, W/BACK LT	TRUMETER	DPM952-T
071332	ENCLOSURE W/BAIL ARM ABS 10.55X8.50X4,25" BLACK	TEKO ENC	762.9
071333	IC LM7809 +9V REGULATOR 1A TO-220	MOTOROLA	LM7809CT
071986	CAP 10 μ F 35V 20% ALUM	NIC	NCX100K35V5X5.5
072402	RECTIFIER BRIDGE 600V 1A	DIODES INC. GENERAL INSTRUMENTS INTERNATIONAL RECTIFIER	DF06M DF06M DF06M
072659	POT 100K 2DECADE PNL MNT DIGITAL KNOB PRECISION	BOURNS NEWARK	3682S-1-104 76F1094
073098	CAP 0.1 μ F 100V 10% 1206	KEMET PANASONIC	C1206C104K1RACTU ECJ-3YB2A104K
073439	SCRW 6-32X1/4 PHIL P/HD	U.S. TRAFFIC	073439
080625	BOM-SCND PNL DCI TESTER BLK	U.S. TRAFFIC	080625
080640	DCI RACK MOUNT PANEL	U.S. TRAFFIC	080640
080704	DCI RACK MOUNT	U.S. TRAFFIC	080704

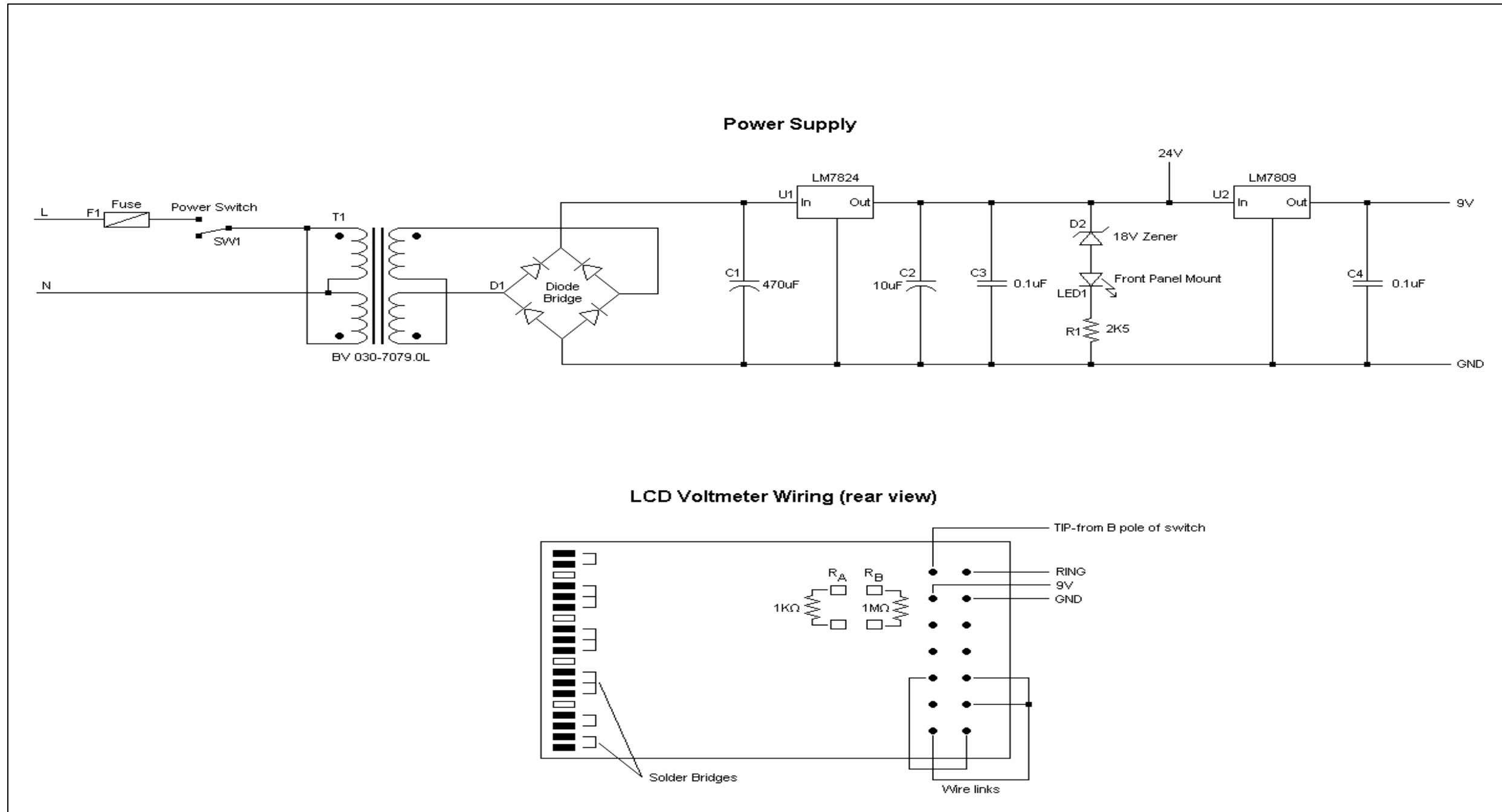
Component	Description	Manufacturer	Manufacturer's Part Number
28023094-003	SWITCH TOG SPDT 6A@125V	C&K TAIWAY APEM	7101SYZQE 100-SP-1-T1B1M1QE 5636AB
DSP0055	LED ORN LTL-4296	LITEON KINGBRIGHT	LTL-4296 L934EC
SWH0195	SWITCH ROTARY 2POLE 6 POS	MOUSER	10WA165
DIO0074	DIODE 1N5248B ZENER	MOTOROLA	1N5248B
T107-183	TRANFMR 24V CT 1A 115V	SIGNAL	PC-24-1000

9. DRAWINGS

9.1 Block Diagram



9.2 Wiring Diagram





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