2

MASTER

SLAC-TN-79-6
R. H. Seefred
D. Farwell
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INSTRUCTION MANUAL
FOR
NIM BIN TEST MODULE II*

1. INTRODUCTION

A test module was constructed for insertion into a standard NIM crate to test all voltage and load conditions of all manufactured NIM power supplies. Three basic tests are conducted; voltage, current limiting characteristics, and the ability of the power supply to resist oscillations. The unit is packaged in a NIM #4 module and can be read out through a DVM output or with meters located on the front panel.

2. SPECIFICATIONS

Inputs:

A standard NIM connector carries $\pm 6V$, $\pm 12V$ and $\pm 24V$. 10 Amps can be loaded at ± 6 and ± 12 , 5 amps at $\pm 24V$ absolute maximum conditions.

Outputs:

A digital voltmeter and an oscilloscope can be connected to the unit if accuracy of $> 5\%$ is desired. Oscilloscope output is capacitively coupled (see text).

Power Requirements:

No external power is required. Voltages under test supply all the power needed.

Accuracy:

Accuracy = DVM used, or approximately 5% (.25V/Division) if internal meter is used.

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3. OPERATION:

Place module in NIM crate to be tested. Connect oscilloscope and DVM (if desired) to corresponding inputs. Turn on power to bin. To check if all voltages are present, advance voltage switch to desired voltages (with lower switch to "volts"). The meter above the voltage switch will show the voltage on the red scale. Switch through scales. Be sure that load switch is switched to (+) when reading positive voltages and is (-) when negative voltages are desired. This procedure is required for both voltage and current measurements.

For current measurements (lower switch to "amps") set voltage switch to desired voltage to be loaded. Advance current. Adjust potentiometer until voltage null meter changes. Read other meter (black scale) for current. The table below will show currents for typical operation on a model 1012H Packer power supply.

The last test is to simulate conditions which could create oscillations. Place the oscilloscope vertical amplifier at 10 millivolts/cm. Switch both switches (next to the volts/amps switch) to "on". Look for oscillations on the oscilloscope. This completes all tests.

TABLE OF NIM VOLTAGE/CURRENT

± 6 volts	=	10 amps
±12 volts	=	2 amps
±24 volts	=	1 amp

4. CIRCUIT DESCRIPTION

The circuit operation is best understood with the aid of the accompanying diagram. Observe that the circuit is divided into three parts: the voltage null, an RC network and a transistor load.

The voltage input to the voltage null meter is compared with a lesser voltage appearing across a zener diode (CRL-3.9V). R3 is adjusted so when +6 volts is applied, the null meter will read at half scale. (Note the meter is not normally zero center). Any deviation will show on either side of this half scale reading. The meter is calibrated in (±) volts from this half scale (zero center) reading.

Examining the RC network portion of the circuit, the networks connected to the ±12 volt and ±24 volt inputs will simulate the EGG discriminator model TR204/N which, when plugged into a standard NIM crate, could cause its power supply to oscillate if that power

supply is of marginal design or has a fault. The circuit consists of a Pi network looking into a resistive load as seen in schematic. The Pi network has an RC time constant to simulate the conditions for these oscillations, while R9 and R10 provide basic current loads. The transistor load circuit consists of a power transistor (2N3055) which, when biased via R1 toward saturation, applies a load (emitter to collector) across the power supply under test. The diode CR7 allows the current to flow in one direction only, protecting the power transistor from reverse currents. The load switch (S3) is used to reverse the polarity when negative power supplies are tested.

The volt/ammeter is shunted for both current and voltage measurements. The meter is calibrated using a black scale from 0 to 10 amps and a red scale for voltages from 0 to 24 volts.

5. FINAL ADJUSTMENTS

Several final adjustments to this unit must be made before it will be operational. The null adjustments should be made. First, all wipers of R3 thru R8 should be adjusted to the ground side of the potentiometers before the power is applied. After power is on, the wipers should be advanced clockwise until all scales are at mid-scale which should read zero. Using the DVM output, advance the current adjust until current limiting occurs. It is best to use +12V for this adjustment because current limiting begins near 2 amps. Turn the current adjust knob until current limiting is reached. As this occurs, the null meter will change. When the DVM shows a drop of 1 volt, calibrate the meter face for that value. Repeat for the other voltages.

For the volt/ammeter, the ampere scale may be calibrated by adding or subtracting resistance in the shunt. The voltmeter is calibrated by advancing the 50K potentiometer (R2) until the meter reads the correct voltage. This concludes the adjustments.

STANFORD LINEAR ACCELERATOR CENTER						DATE			
MATERIAL LIST FOR NIM BIN TEST MODULE II (FOR BINS CONTAINING ± 6 VOLTS)						9-14-78			
						PREPARED			
						REVIEWED			
						CHECKED BY			
						APPROVED BY			
☐ MECHANICAL ☐ ARCH/CIVIL ☒ ELECTRONIC/ELECTRICAL									
ITEM NO.	STOCK OR PART NO.				COMP DESIG	TITLE OR DESCRIPTION	QUAN		
	PREFIX	BASE	SUFFIX	REV.					
1	PF	135-595	01			FRONT PANEL, FAB FROM 99-359-809-06	1		
2	PF	135-595	02			REAR PANEL, FAB FROM 99-359-809-06	1		
3	59	313-309	03		CR1,4	DIODE, ZENER, 103.9B	2		
4	59	313-309	07		CR2,5	DIODE, ZENER, 105.6B	2		
5	59	313-308	18		CR3,6	DIODE, ZENER, 1N4410B	2		
6	59	313-501	01		CR7	RECTIFIER 1N1196A	1		
7	59	299-101	01		P1	CONNECTOR, AMP # 204106-5	1		
8	59	299-101	50			GUIDE PIN, AMP # 200833-4	1		
9	59	299-101	51			GUIDE SOCKET, AMP # 203964-6	2		
10	59	299-101	53			GUIDE PIN, GND, AMP # 20254-1	1		
11	59	299-101	54			PIN HOOD, INT, AMP # 202394-2	1		
12	59	294-001	20		J1	BINDING POST, DEL., BLACK-RED	1		
13	59	299-014	01		J2	CONNECTOR, BNC REPT.	1		
14	59	296-402	01		S1	SWITCH, ROT, SHAFT ASSEMBLY	1		
15	59	296-402	03		S1	SWITCH, ROT, WAFER, 4399151-3C	3		
16	59	296-517	13		S2	SWITCH, MIN. TOG, DPDT, ON-OFF-ON	1		
17	59	296-516	10		S3	SWITCH, TOG, DPDT, ON-OFF-ON	1		
18	59	297-517	16		S4,5	SWITCH, MIN. TOG, DPDT, ON-ON	2		
19	59	305-501	05		R1	POT, PREC, WW, 10T, 200 Ω , 5W	1		
20	59	305-611	12		R2	POT, CER, 25T, 50K, 1W, WIRE LEADS	1		
21	59	305-611	06		R3-R8	POT, CER, 25T, 500 Ω , 1W, WIRE LEADS	6		
22	59	306-042	02		R9,10	RESISTOR, CC, 2W, 5% TOL., 110 Ω	2		
23	59	305-370	15		R15,16	RESISTOR, WW, 11W, 5% TOL., 40 Ω	2		
24	59	305-370	18		R11-R14	RESISTOR, WW, 11W, 5% TOL., 100 Ω	4		
REV	DESCRIPTION					DRN	CHK	APP	DATE
1	ADDED CAPACITORS, C13-C17.					BR			
ML-135-595-001-R3						PAGE 1 OF 2			

STANFORD LINEAR ACCELERATOR CENTER						DATE 9-15-78	
MATERIAL LIST FOR NIM BIN TEST MODULE II (FOR BINS CONTAINING ± 6 VOLTS)						PREPARED REVILLAR	
						CHECKED BY <i>[Signature]</i>	
						APPROVED BY <i>[Signature]</i>	
☐ MECHANICAL ☐ ARCH/CIVIL ☒ ELECTRONIC/ELECTRICAL							
ITEM NO.	PREFIX	BASE	SUFFIX	REV.	COMP DESIG	TITLE OR DESCRIPTION	QUAN
25	59	313-400	15		Q1	TRANSISTOR, SIL., 2N3055	1
26	59	312-407	06		C1-C16	CAPACITOR, CER. DISC, .02 μ F	16
27	59	324-003	05		L1-L8	CHOKE, RF, MOLDED, .22 μ H	8
28					V1, 2	METER TRIPLET MODEL 120 G, DC, 0-1mA, # 10111 02	2
29	99	358-401	01			BRACKET, POT, PANEL MTG.	6
30	59	299-302	01			PIN, TYPE III, AMP # 66099-4	7
31	66	800-800	01			DIAL, TURNS- COUNTING, # 2607-178-0	1
32					R17	RESISTOR, 100 W, 1% TOL, .6 Ω	1
33					C17	DALE OHM RH-100 CAPACITOR, DISC, .1 μ F, 600V	1
						ML-135-595-00-R1	PAGE 2 of 2

[illegible]

**TOP OF FRONT PANEL
SHOWING METER FACES**

STANFORD LINEAR ACCELERATOR CENTER U.S. DEPARTMENT OF ENERGY STANFORD UNIVERSITY STANFORD, CALIFORNIA		METER FACE LAYOUT NIM BIN TEST MODULE II (FOR BINS CONTAINING 16 VOLTS)	
ENGR R. SEEFRED DFTS LME	APPROVED BY 	GPI35-595-00-RO	A