

INSTRUCTION MANUAL

TB3/TC 911

NIM BIN and POWER SUPPLY

WARRANTY

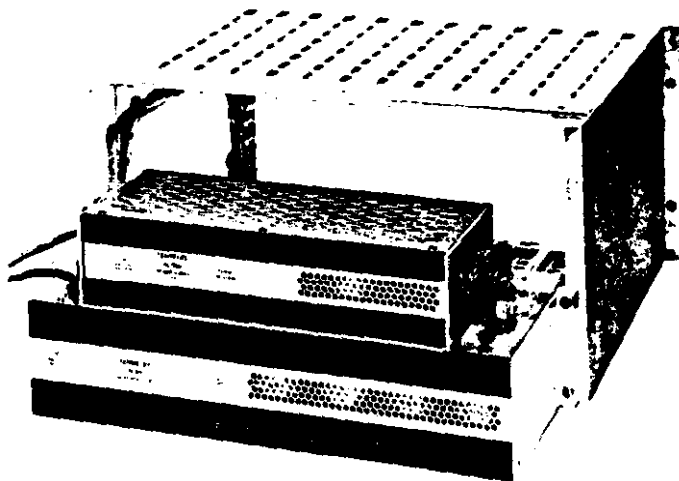
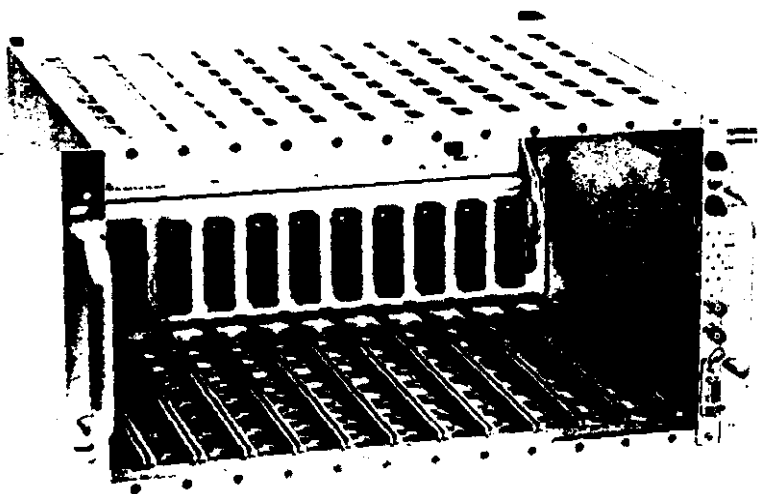
TENNELEC, INC. warrants that the products or components manufactured by it shall be free from defects in material or workmanship for a period of one year from the date of delivery to purchaser. If such product or component is determined to be defective by TENNELEC, its sole warranty obligation shall be limited to either replacing or repairing such defective product or component or allowing credit therefor, at TENNELEC's option. Such warranty is further conditioned upon the purchaser's giving prompt notice of any such defect and satisfactory proof thereof to TENNELEC's customer service manager, thereafter upon TENNELEC's approval, the purchaser shall return such defective product or component to TENNELEC's factory at Oak Ridge, Tennessee, all transportation charges prepaid. TENNELEC shall be responsible only for transportation charges incurred in returning such product or component to purchaser. All customs, brokerage and duty charges shall be at the expense of the purchaser. Damage in transit due to inadequate packaging will be repaired at purchaser's expense. Any repairs or replacements by the purchaser without TENNELEC's approval, any willful abuse or any evidence that the product or component was not properly used and maintained, would automatically void this warranty.

TENNELEC makes no warranty whatsoever in respect to products or components not manufactured by it but instead the applicable warranties, if any, of the respective manufacturers thereof shall apply. Likewise fuses, batteries and input transistors in ultra low-noise amplifiers are specifically excluded from this warranty.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS.

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INSTRUCTION MANUAL
TB-3/TC 911 & TC 966
NIM BIN
AND POWER SUPPLIES

MODEL NO. **TB-3/TC 911 & TC 966**

SERIAL NO.

TENNELEC P. O. Box D / Oak Ridge, Tenn. 37930 / Telephone (615) 483-8405 / TWX 810-572-1018

1.0 INTRODUCTION

The **TB-3/911** Tennebin is a rackmounted modular systems bin designed to **accommodate** up to twelve NIM (Nuclear Instrument Nodules) standard width modules. The TB-3 bin is constructed of extruded aluminum panels with top and bottom cover plates. Nodule guides of machined extruded aluminum provide for precision fit of modules and eliminate warping, distortion and/or breakage associated with die-cast plastic or teflon guides. Floating power connectors allow for easy insertion of out-of-tolerance modules.

The TC 911 rear mounted power supply provides stable regulated power at **$\pm 12V$** dc at 2A each, and **$\pm 24V$** dc at **1A** each and **115 Vac** at **.5A** via AMP 202516-3 floating connectors. In addition, the connectors are provided with a power return ground and a high quality ground for elimination of ground loops. All power connectors are wired in parallel to prevent the cumulative voltage drops associated with "daisy chain" wiring.

Tennebin-3 also features front-panel-mounted BNC connectors which provide access to preamplifier output signals and test pulse inputs as well as an **Amphenol** 17-10090 connector wired to TENNELEC preamplifier-amplifier specifications.

Options available with Tennebin-3 are external connectors for muting NIM standard voltages to additional modular systems bins and a cover to improve appearance for stand-alone, table-top installations.

TENNELEC's TC 966 is a **$\pm 6V$** dc power supply designed to operate in conjunction with the TC 911 NIM power supply. It mounts "piggyback" on top of the TC 911 and is hinged on the rear panel for ease of installation and maintenance. The output of the supply, **+6V** dc or **-6V** dc at **5A**, 30 VA maximum, is muted to the TC 911 via the PG-16 connector. Overload protection is provided along with a **thermal** cut out switch which opens in case excessive operating temperatures are reached.

The unit is constructed of **frfdfted** aluminum with an extruded aluminum rear panel which serves as the heat sink and features a black anodized finish for rapid heat dissipation. The supply may be purchased attached to the TC 911 NIM supply or **may** be ordered separately at any future date. Field installations takes less than **15 minutes** and requires only a screwdriver.

Part I - TENNEBIN-3 NIM BIN

2.0 SPECIFICATIONS

DIMENSIONS: (Standard EIA Rack) **19-in.** W x **8.72-in.** H x **11.94-in.** D (48.26 cm x 22.15 a x 29.23 cm).

CONSTRUCTION MATERIAL: All extruded aluminum construction with machined extruded **aluminum** module guides.

and OUTPUT, as well as supplying power to the preamplifier. When this connector is used, test pulses may be applied directly at the bin and the preamp OUTPUT may be connected from the bin to the **main** amplifier.

4.4 THERMAL OVERLOAD

Should the THERMAL OVERLOAD Indicator ever come on while the unit is in operation, it indicates that the power supply temperature has exceeded operational limits (60%) and the unit should be shut down until the source of the overload is determined;

4.5 TEST POINTS

Jacks are provided on the front panel for monitoring the output voltages of the bin power supply. These can be used for checking and adjusting **power supply** voltages if necessary.

4.6 SLAVE BIN OPERATION

The **TB-3** can be used as a slave bin receiving power from another **NIM** power supply. **NIM** specifications do not include 115V ac on slave bin connectors. **Therefore** if the customer desires to use modules (such as scalars) needing ac in a slave bin, he should specify this in ordering.

Part II - TC 911 POWER SUPPLY

2.0 SPECIFICATIONS

(USAEC Standard Class A Supply per TID-20693 (Rev. 4))

INPUT: **103V** to 129V ac, 50 to 60 Hz. 230V **±30V** ac, 50 to 60 Hz. (Specify 117V ac or 234V ac.)

OPERATING TEMPERATURE OUTPUT: **0°** to **60°C**.

OUTPUT: **±24V** dc at **1A** each; **±12V** dc at 2A each; **115V** ac at **0.5A**. Total combined output must not exceed 96VA.

REGULATION: Less than 0.06% for line voltage variation of **±10%** or **100%** changes in rated load.

RIPPLE AND NOISE: Less than **3mV** peak-to-peak.

THERMAL COEFFICIENT OF OUTPUT VOLTAGE: Less than **0.005%/°C**.

3.2 PG-14, PG-15 and PG-16 CONNECTORS

The PG-14 connector routes the output from the TC 911 to a NIM bin; it carries the six outputs and the sense lines. To operate the supply independent of the bin, an adapter **must** be used in order to switch on the supply. The optional PG-15 connector allows parallel operation of the supply with more than one NIM bin. The optional PG-16 connector is provided to accommodate a +6V or -6V input; it is wired in parallel with PG-14 and PG-15. (See Figs. 1 and 2.)

4.0 OPERATING PROCEDURE

4.1 INSTALLATION

The TC 911 should be attached to the rear of a twelve-width NIM bin (TB-3) in the following manner: (a) Connect the PG-14 receptacle to the NIM bin power distribution plug PG-13; (b) Bring the power supply frame flush with the NIM bin; (c) The power supply may now be secured to the bin with the four captive mounting screws; avoid trapping any wires between the power supply frame and the bin.

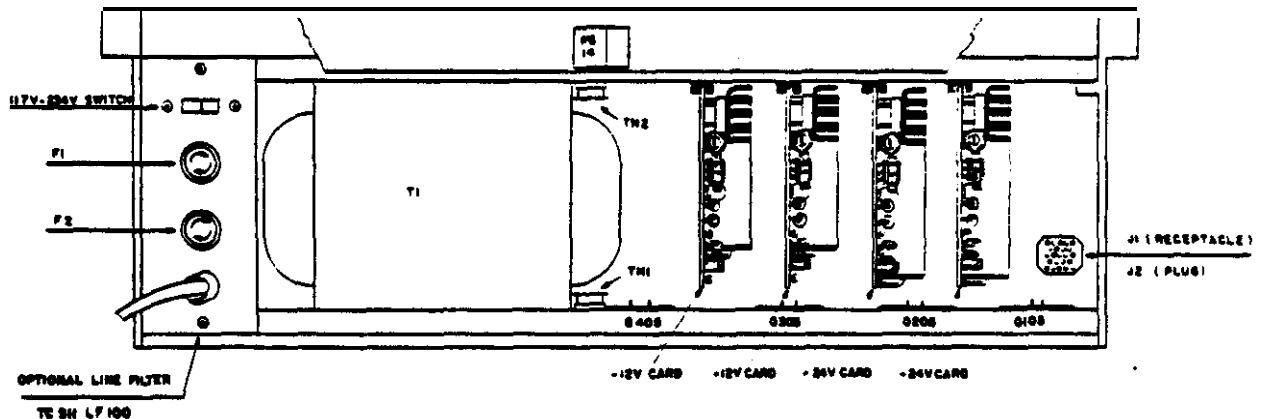


Figure 1 Mechanical and Component Placement

4.2 CIRCUIT CARD INTERCHANGE

Ease of maintenance is the primary advantage of plug-in cards; circuit cards may be easily interchanged. Remove cover plate and carefully extract the plug-in circuit card(s) to be interchanged. It is **recommended** that the power

5.0 CIRCUIT DESCRIPTION

The power transformer and the power transistors are fastened to the frame. Each plug-in circuit card contains a full-wave silicon rectifier, all of the filter capacitors, a **Zener** reference diode (**D102, IN823A**), and an error sensing **amplifier**. The input stage (IC 101 or IC 201) is a monolithic transistor array to minimize offset due to temperature drift.

The overload current sensing network consists of **R118, R119, R111**, and **Q102**. If the IR drop across **R118** and **R119** exceeds the set-point voltage across **R104** and the upper part of **R105, Q102** cuts off **Q101**. The fold-back circuit consists of **Q104, R122**, and **R123, Q104** is normally nonconducting. If the power supply voltage drops too low, **Q104** turns on and furnishes signal to **Q102** to limit the total output current. In effect, an auxiliary feedback amplifier circuit overrides the path through IC 101.

The basic circuit of each of the cards is the same, differing only in component values and component series number. Above description is for -24V card. **+24V** card (**200** series), **+12V** card (**300** series), and -12V card (400 Series).

Part III - TC 966 POWER SUPPLY

2.0 SPECIFICATIONS

DIMENSIONS: **2.8-in.** H x **4.5-in.** D x **12-in.** W (7.11 cm x 11.43 cm x 30.48 cm).

INPUT: 103 to **130V** ac, 50 to 60 Hz; **206** to 260V ac. **50** to **60** Hz.

OUTPUT: **+6V** or -6V at 5A. 30 VA maximum.

RANGE OF ADJUSTMENT: **±0.5%**.

REGULATION: Less than 1.0% for line voltage variation of **±10%** as the output current **varies** from no load to full load.

RIPPLE AND NOISE: 5mV peak-to-peak.

THERMAL COEFFICIENT OF OUTPUT VOLTAGE: Less than **0.01%/°C**.

STABILITY: Less than **0.3%/six** months with constant ambient temperature after warm-up and with constant line voltage and load.

RECOVERY TIME: Less than 200 **µsec** to return to regulation limits for a 100% step-change in rated load.

To attach the TC 966 to the TC 911, first remove the top cover plate of the **TC 911**. Plug the connector on the PG-16 cover **plate (J2)** into the matching connector on the TC 911 Power Supply **(J1)** as shown in Fig. 2 in the TC 911 section of this manual and attach this cover plate to the TC 911. Use the washers supplied as spacers between the hinge on the TC 966 and the back frame of the TC 911 and screw on the TC 966. The front of the TC 966 is then screwed onto the TC 911. Connecting PG-16 to its mating connector on the TC 911 completes the installation. If access to the TC 911 is necessary, removing the front screws **from** the TC 966 allows it to swing back on its hinge.

4. 1 OPERATION

The power control on the bin controls both the TC 911 and the TC 966. After installation, the unit should be allowed to warm up for about 30 minutes and the voltage checked. A potentiometer located on the right side of the unit (and accessible through the top cover) allows for adjustments to the output voltage if necessary. An insulated screwdriver should be used to prevent accidental grounding of the circuit.

4. 2 CAPTIVE LINE CORD

The line cord of the TC 966 should be plugged into the same ac lines as the TC 911 to prevent ground loop problems. A good ground should be provided for both power supplies.

5. 0 FIRST-TIME OPERATION

Every instrument from TENNELEC, Inc. is thoroughly checked before it leaves the plant. However, it is possible for damage to occur during shipping; it is therefore advisable to conduct appropriate tests (see Section 4.3) before the instrument is put into actual operation.

Visually check the instrument upon receipt for possible external damage. If the unit is damaged, proceed according to instructions given in the SHIPPING DAMAGE section of this manual.

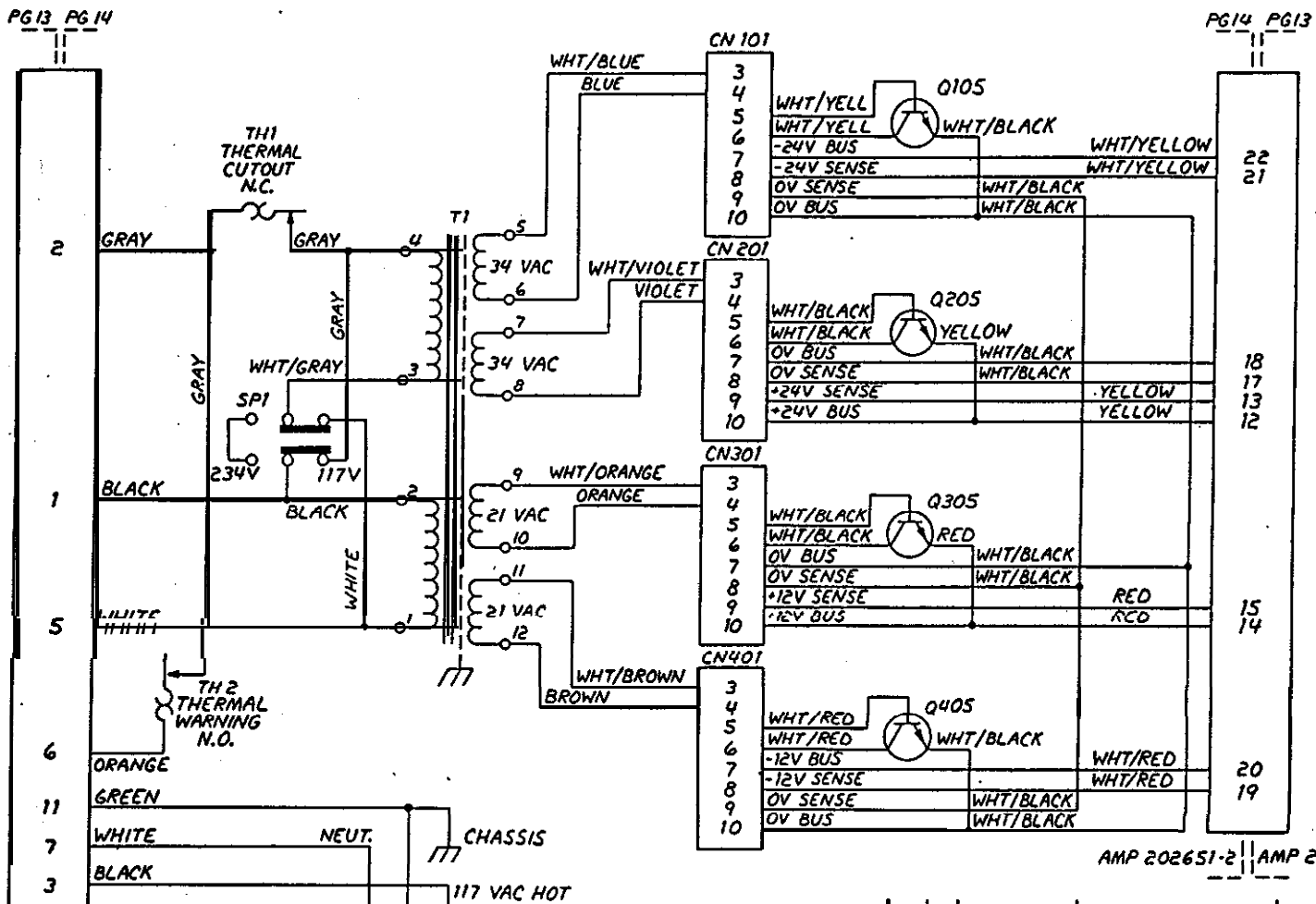
6. 0 SERVICING

In the event of a **component** failure, replacement may be done in the field or the instrument may be returned to our plant for repair. There will be no charge for repairs that fall within the warranty.

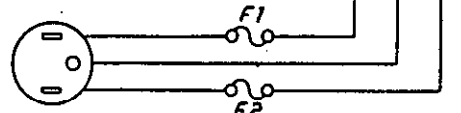
7. 0 SHIPPING DAMAGE

Upon receipt of the instrument, examine it for shipping damage. Damage claims should be filed with the carrier. The claims agent should receive a full report; a copy of that report should be sent to TENNELEC, Inc., P.O. Box **D**,

REV	ECN NO.	REVISION	DATE	BY
1	82-160		9-82	D.E./JW

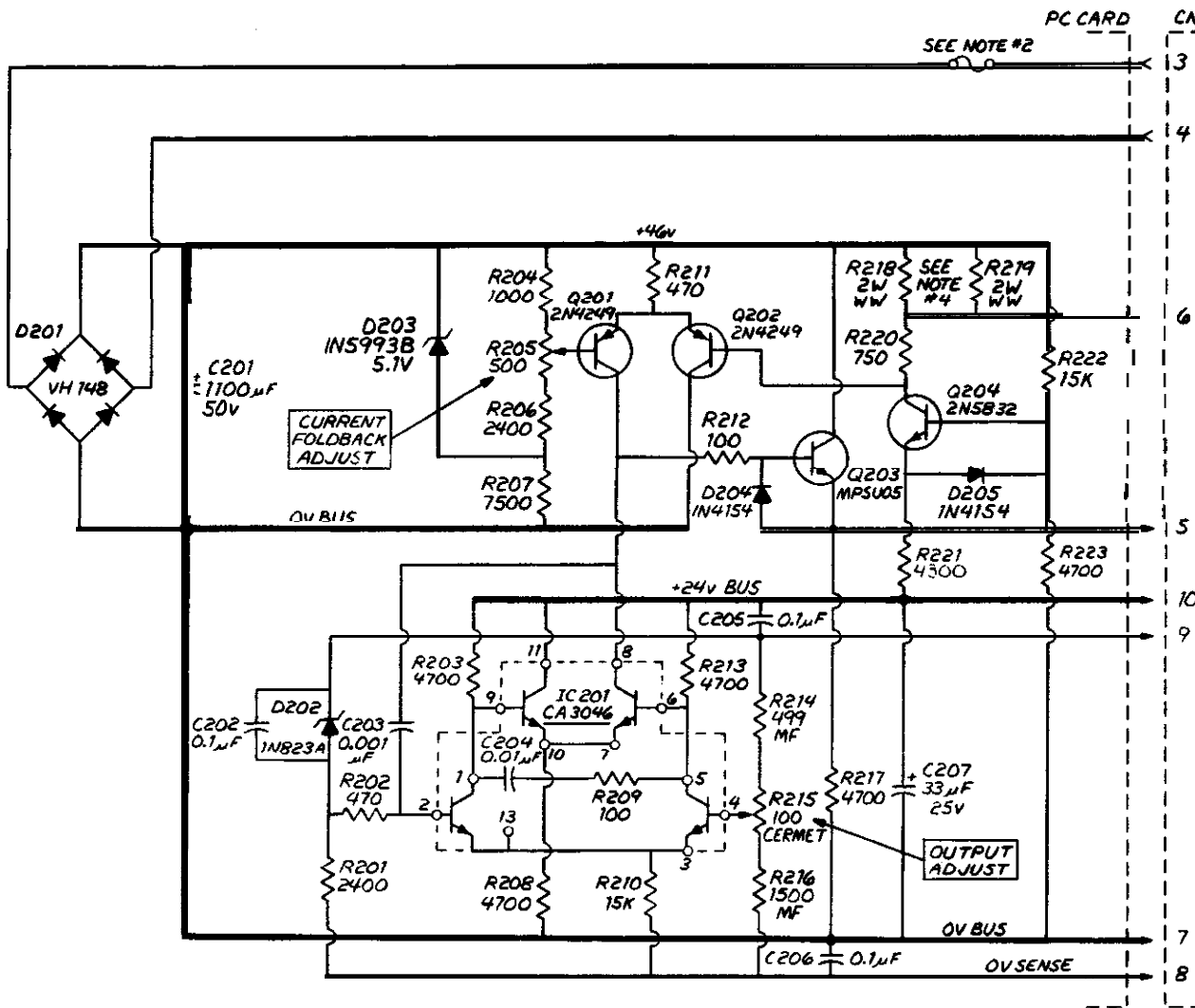


AMP 202650-2 || AMP 202651-2
ON NIM BIN



3.0 A. SLO-BLO @ 117 VAC
1.5 A. SLO-BLO @ 234 VAC

QTY	ITEM	PART NO.	DESCRIPTION	REMARKS
LIST OF MATERIALS OR PARTS LIST				
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES				
TENNELEC				
P. O. BOX 8, OAK RIDGE, TENNESSEE 37830				
TC 911 WIRING DIAGRAM				
TOLERANCES: DECIMALS .XXX ± .005 .XX ± .015 .X ± .030 FRACTIONS 3/16 ± .004		DATE: 9-20-82 BY: S. HANSHAW CHECKED: S. L. G. 10/22/82 DRAWING NO.: TC 911		
MATERIAL: C		DATE: 10/22/82 BY: S. HANSHAW CHECKED: S. L. G. 10/22/82 DRAWING NO.: TC 911		



- (1) ALL RESISTORS 1/4W 5% DEPOSITED CARBON EXCEPT AS NOTED.
- (2) 346A. COPPER WIRE, PC CARD PROTECTION.
- (3) ALL VOLTAGE MEASUREMENTS IN RESPECT TO GROUND (NO LOAD) 117 VAC LINE INPUT.
- (4) RESISTOR VALUES ARE AS FOLLOWS FOR R218 AND R219:
 TC 909-5.6Ω
 TC 910-3.6Ω
 TC 911-2.7Ω
 TC 930A-3.6Ω

84-196 THRU 84-200	11-5-84	D.E./SMH
84-138 THRU 84-142	6-13-84	D.E./SMH
83-93, 94, 95 & 96	7-14-83	D.E./SMH
82-85, 86, 87, 88, 89	5-11-82	D.G./SMH
81-280, 281, 282, 283, 284	12-09-81	D.E./SMH
81-17	1-26-81	D.E./SMH
75-123	9-10-75	R.C.S.
73-34	4-16-73	R.C.S.
ECH NO.	DATE	BY

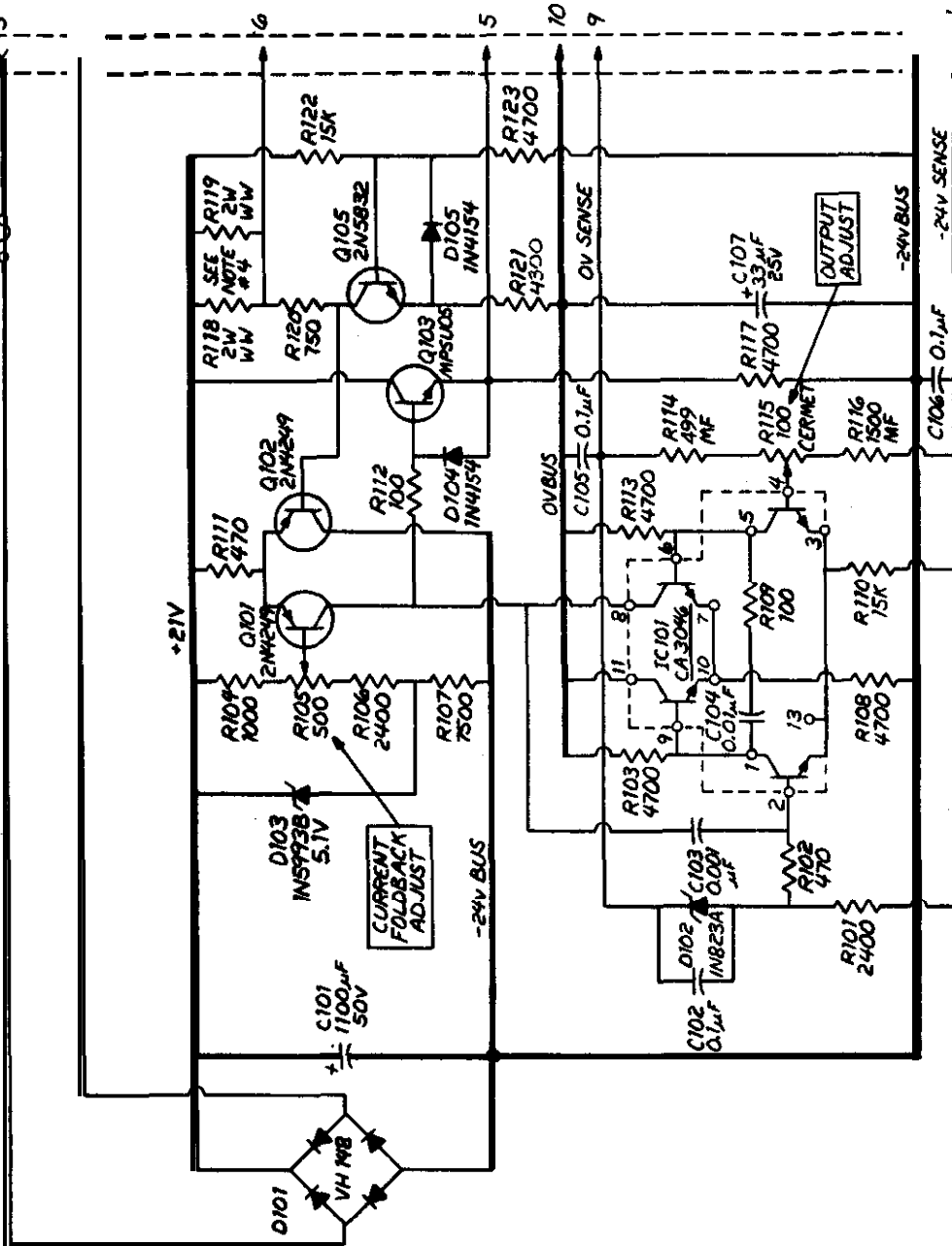
TENNELEC
 P O BOX 0, OAK RIDGE, TENNESSEE 37850

TC 909-TC 910-TC 911-TC 930A
 +24V CIRCUIT DIAGRAM

DESIGNED BY ART SMITH	DATE 8-16-73	APPROVED BY R.S.	DATE 8-16-73
DRAWN BY C. COFFEY	DATE 1-10-73	DRAWING APPROVED BY R.C.S.	DATE 4-16-73
SCALE	NO. REVISIONS	RELEASED BY	DATE

PC CARD CN 101, REFER TO WIRING DIAGRAM.

SEE NOTE #2



NOTES:
 (1) ALL RESISTORS 1/4 W 5% DEPOSITED CARBON, EXCEPT AS NOTED.
 (2) 34 GA. COPPER WIRE, PC CARD PROTECTION.
 (3) ALL VOLTAGE MEASUREMENTS IN RESPECT TO GROUND (NO LOAD) 117 VAC NO LOAD.
 (4) RESISTOR VALUES ARE AS FOLLOWS FOR R118 AND R119:
 TC 909-5.6R
 TC 910-3.6R
 TC 911-2.7R
 TC 930A-3.6R

TENNELEC
 P. O. BOX D, OAK RIDGE, TENNESSEE 37830

TITLE
 TC 909-TC 910-TC 911-TC 930A
 -24V CIRCUIT DIAGRAM

DATE
 1-26-81

BY
 R.C.S.

CHKD
 R.C.S.

APP. SMITH
 DATE 1-26-81

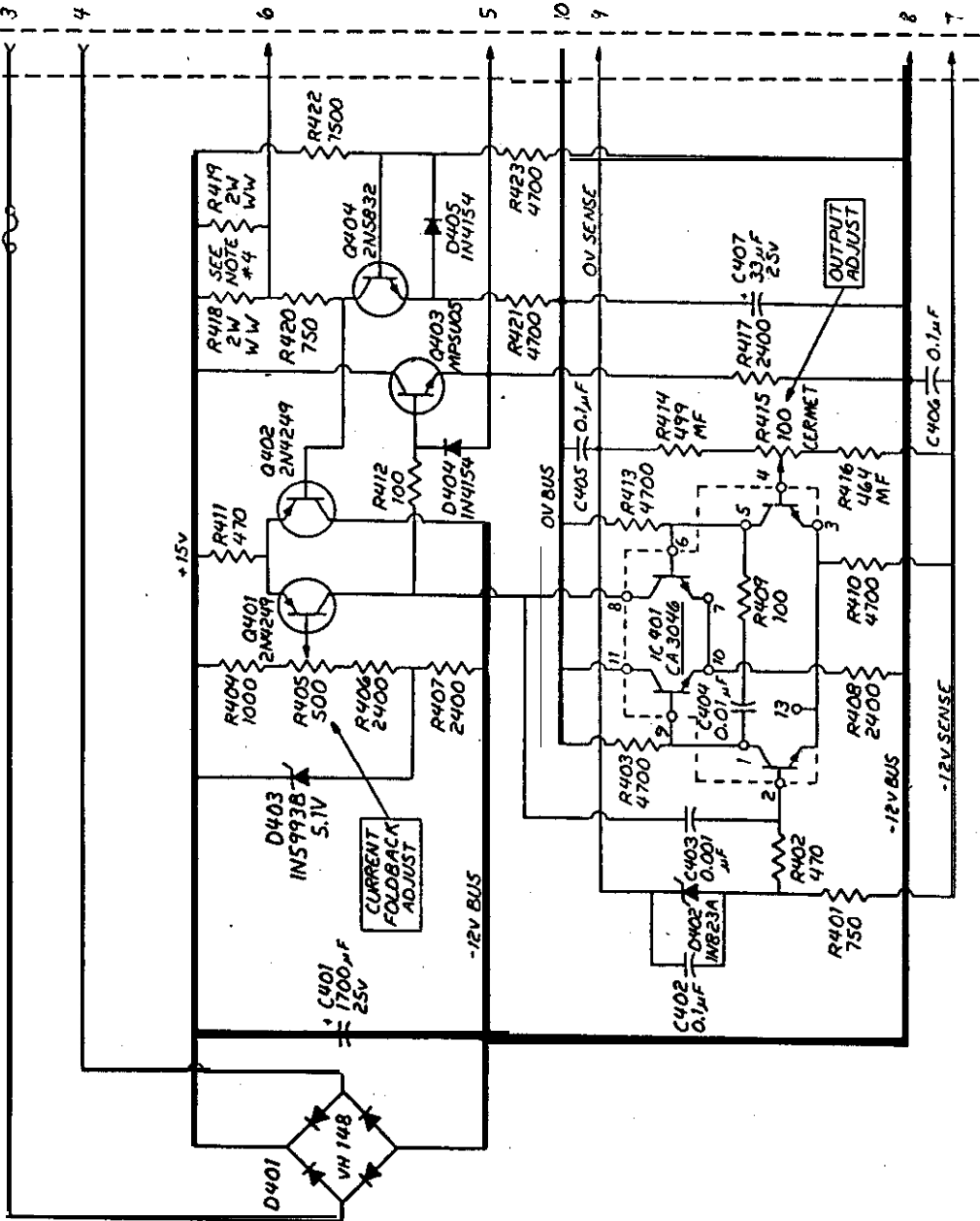
2. COFFEY 1-26-81

NO. 101

REV.	REV. NO.	DATE	BY
8	84-786 THRU 84-800	7-5-84	D.E./SMH
7	84-138 THRU 84-142	6-13-84	D.E./SMH
6	83-93, 94, 95, 96	7-5-83	D.E./SMH
5	82-85, 86, 87, 89, 91	5-11-82	D.B./SMH
4	81-201, 202, 203, 204	12-09-81	D.E./SMH
3	81-17	1-26-81	D.E./SMH
2	75-121	9-10-75	R.C.S.
1	73-34	4-76-73	R.C.S.

PC CARD CN 401, REFER TO WIRING DIAGRAM

SEE NOTE #2



NOTES:

- (1) ALL RESISTORS %W 5% DEPOSITED CARBON, EXCEPT AS NOTED.
- (2) 34GA. COPPER WIRE, PC CARD PROTECTION.
- (3) ALL VOLTAGE MEASUREMENTS IN RESPECT TO GROUND (NO LOAD) 117VAC LINE INPUT.
- (4) RESISTOR VALUES ARE AS FOLLOWS FOR R418 AND R419:

TC 909 - 2.7R

TC 910 - 1.6R

TC 911 - 1.3R

TC 930A - 1.6R

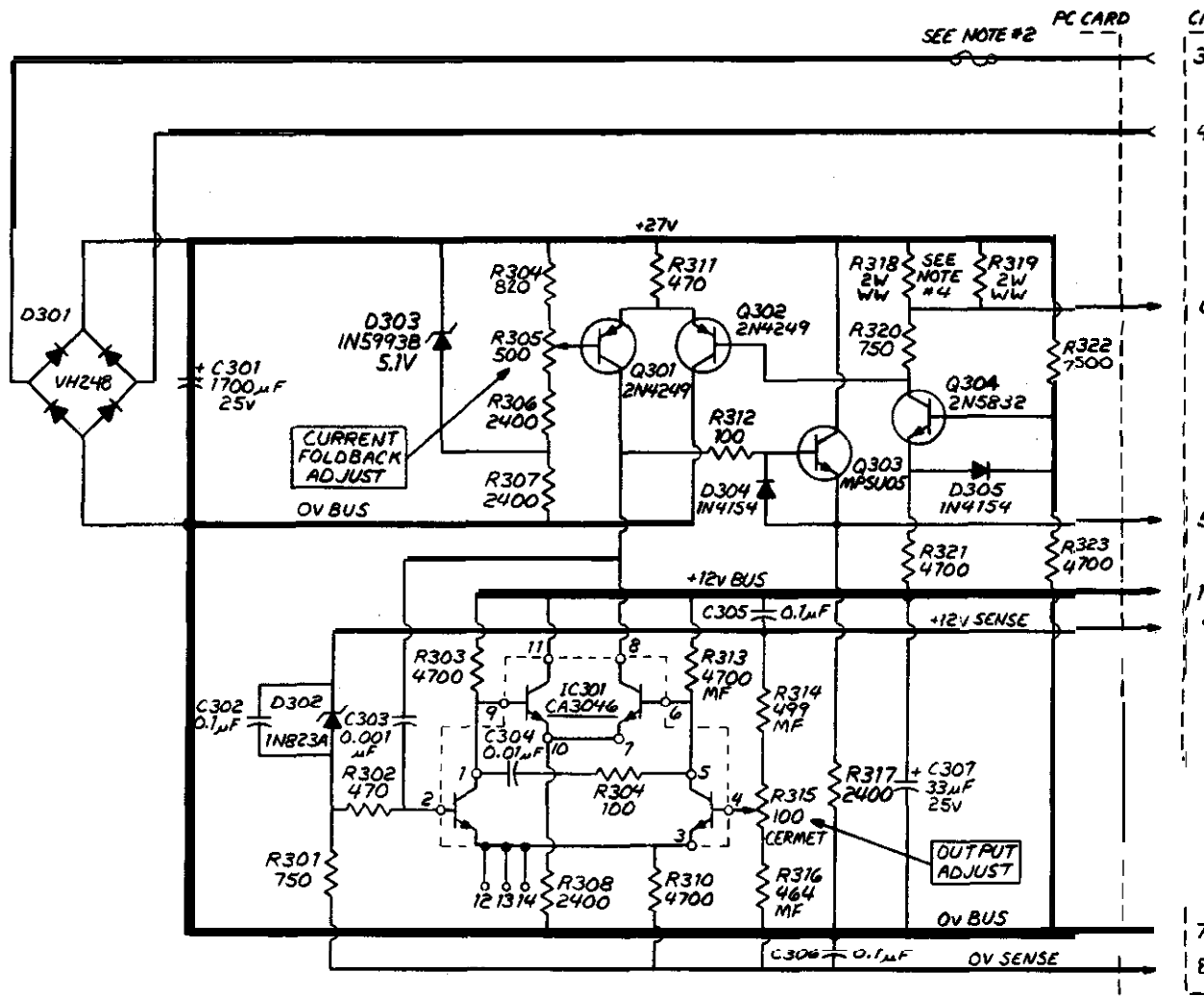
REV.	ECN NO.	DATE	BY
8	84-196 THRU 84-200	11-5-84	D.E./SMH
7	84-138 THRU 84-142	6-13-84	D.E./SMH
6	83-93, 94, 95 & 96	7-14-83	D.E./SMH
5	81-200, 201, 202, 203, 204	12-09-81	D.E./SMH
4	81-17	1-26-81	D.E./SMH
3	75-124	9-10-75	R.C.S.
2	73-54	7-12-73	J.W.
1	73-34	4-16-73	R.C.S.

TENNELEC

P O BOX 8, OAK RIDGE, TENNESSEE 37830

TC 909 - TC 910 - TC 911 - TC 930A
-12V CIRCUIT DIAGRAM

DESIGNED BY	ART SMITH	DATE	1-16-73
CHECKED BY	C. COFFEY	DATE	1-11-73
APPROVED BY		DATE	



SEE NOTE #2 PC CARD

CN 301, REFER TO WIRING DIAGRAM.

- NOTES:
- (1) ALL RESISTORS 1/4 W 5% DEPOSITED CARBON, EXCEPT AS NOTED.
 - (2) 34 GA. COPPERWIRE, PC CARD PROTECTION
 - (3) ALL VOLTAGE MEASUREMENTS IN RESPECT TO GROUND (NO LOAD) 117 VAC LINE INPUT.
 - (4) RESISTOR VALUES ARE AS FOLLOWS FOR R318 AND R319:
 TC 909-2.7 Ω
 TC 910-1.6 Ω
 TC 911-1.3 Ω
 TC 930A-1.6 Ω

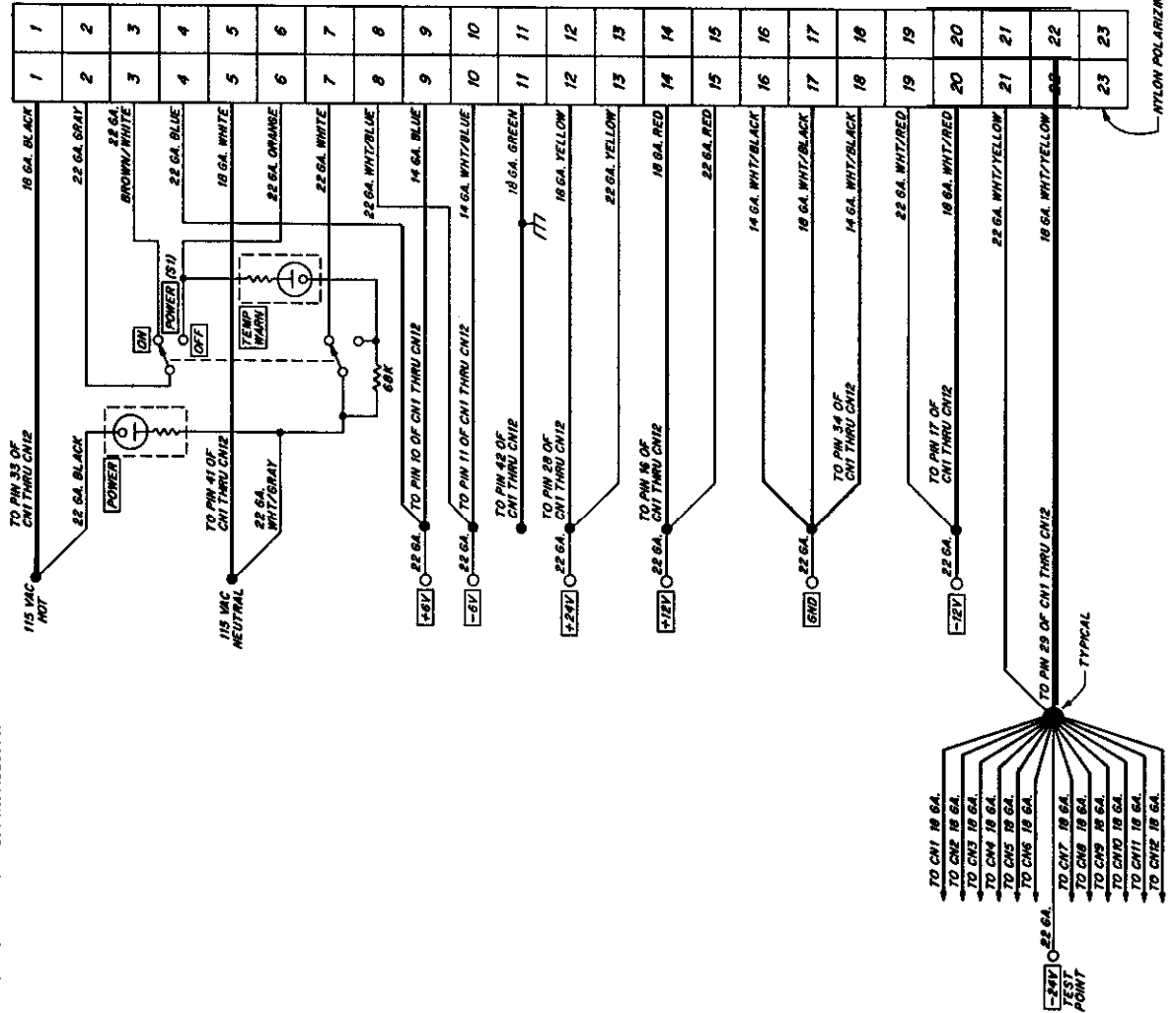
REV.	ECN NO.	DATE	BY
9	84-196 THRU 84-200	11-5-84	D.E./SMH
8	84-138 THRU 84-142	6-13-84	D.E./SMH
7	83-93, 94, 95 & 96	7-14-83	D.E./SMH
6	83-60	5-2-83	DG/SMH
5	81-280, 281, 282, 283, 284	12-09-81	D.E./SMH
4	81-17	1-26-81	D.E./SMH
3	75-122	9-10-75	R.C.S.
2	73-54	7-12-73	J.W.
1	73-34	4-16-73	R.C.S.

TENNELEC
P. O. BOX D, OAK RIDGE, TENNESSEE 37830

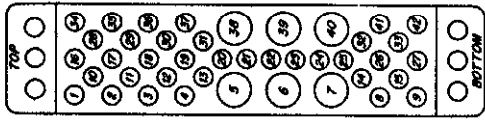
TITLE
TC 909-TC 910-TC 911-TC 930A
+12V CIRCUIT DIAGRAM

DESIGNED BY ART SMITH	DATE 4-16-73	ENG. APPROVAL A.S.	DATE 4-16-73	PART NO.
CHECKED BY C. COFFEY	DATE 1-12-73	DRAWING APPROVAL G.W. BRYNE	DATE 1-12-73	DRAWN BY
SCALE NONE		RELEASED BY	DATE	

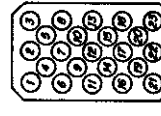
1) THE HIGH QUALITY GROUND BUS FEED WIRE AND THE POWER RETURN BUSS FEED WIRE ARE CONNECTED TO GROUND AT SOME PNT. THESE MAY BE DISCONNECTED IF DESIRED.
 2) REFER TO STANDARD NIN CATALOG NO. T1920093.



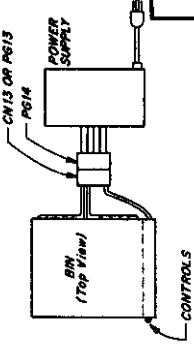
PIN	FUNCTION
1	+3 VOLTS
2	-3 VOLTS
3	SPARE
4	RESERVED
5	COAXIAL
6	COAXIAL
7	COAXIAL
8	+100 VOLTS D.C.
9	SPARE
10	+6 VOLTS
11	-6 VOLTS
12	RESERVED
13	CARRY NO. 1
14	SPARE
15	RESERVED
16	+12 VOLTS
17	-12 VOLTS
18	SPARE
19	RESERVED
20	SPARE
21	SPARE
22	RESERVED
23	RESERVED
24	RESERVED
25	RESERVED
26	SPARE
27	SPARE
28	+54 VOLTS
29	-54 VOLTS
30	SPARE
31	CARRY NO. 2
32	SPARE
33	117 VOLTS A.C. (H)
34	POWER RETURN BND
35	RESET
36	GATE
37	SPARE
38	COAXIAL
39	COAXIAL
40	COAXIAL
41	117 VOLTS A.C. (H)
42	HIGH QUALITY BND



REAR VIEW
 MODULE CONNECTOR
 AMP NO. 200519-5
 (ALL PINS MALE)



REAR VIEW
 BIN
 AMP NO. 200520-2
 (ALL PINS FEMALE)



TENNELEC
 TENNEBIN 3
 CIRCUIT DIAGRAM

NYLON POLARIZING PIN

WEISSELL 5-30 SYMPOSIUM
 TTNMFRIN 3