BERTAN
THE HIGH VOLTAGE PEOPLE

INSTALLATION

and

OPERATING

INSTRUCTION MANUAL

MODELS

375N	375P	375X
377N	377P	377X
380N	380P	380X

WARNING

THIS UNIT PRODUCES HAZARDOUS VOLTAGES. DO NOT APPLY INPUT POWER UNLESS ADEQUATE GROUNDING IS PROVIDED TO THE POWER SUPPLY AND THE HIGH VOLTAGE OUTPUT HAS BEEN PROPERLY CONNECTED.

WARRANTY

BERTAN Associates, Inc. warrants this instrument to be free from defects in material and workmanship for a period of one year from the date of shipment. This warranty does not apply to equipment that has been subjected to misuse or which has been repaired or altered in any way by the user. BERTAN Associates, Inc. is responsible only for the cost of materials and labor to repair or replace, FOB our factory, products proved to be defective during the warranty period. We are not liable for consequential damages incurred due to failure of this equipment. No other warranty is expressed or implied. All products returned under warranty must be shipped prepaid to the factory with documentation describing the malfunction noted. It is recommended that the factory be notified and a Return Authorization Number obtained prior to shipment. The equipment will be evaluated, then repaired or replaced and promptly returned if the warranty claims are found to be substantiated. A nominal service charge will be made for any unsubstantiated claims. Include the BERTAN Associates Model and Serial number in all correspondence with the factory.

IM:0008

Bertan High Voltage Corp.
121 New South Road • Hicksville, NY 11801
Phone: (516) 433-3110 • FAX: (516) 935-1766
A DEL Global Technologies Company

SECTION I GENERAL DESCRIPTION

1.1 PURPOSE OF EQUIPMENT

The BERTAN MWPC Modules are precision high voltage power supplies, designed for use in multi-wire, proportional chambers. The power supply is housed in a standard AEC NIM dual width module, powered by insertion into a standard AEC NIM bin.

1.2 DESCRIPTION

Each model is available with two identical polarity high voltage modules, or with one positive and one negative module. A suffix is added to the part number to define the polarity of the two independent outputs (see 1.3 below). The polarity of the outputs is indicated by the color of the front panel; red for two positive outputs, orange for two negative outputs, and grey for one output of each polarity.

The Model 375 is adjustable from 0 to 5kV, the Model 377 from 0 to 7.5 kV, and the Model 380 from 0 to 10kV. The models feature accurate, independent local and remote voltage control for each of the two outputs, fast and slow overcurrent detectors, proportional voltage and current monitors, low ripple and drift, and precise load regulation.

1.3 ELECTRICAL SPECIFICATIONS

Input Power:	+/-12V @ 800mA dc maximum from NIM BIN power supply.
Output Power:	(For each of two high voltage outputs) Model 375P - 0 to +5kV @ 500uA max. Model 375N - 0 to -5kV @ 500uA max. Model 377P - 0 to +7.5kV @ 500uA max. Model 377N - 0 to -7.5kV @ 500uA max. Model 380P - 0 to +10kV @ 300uA max. Model 380N - 0 to -10kV @ 300uA max. (An X at the end of the Model Number instead of a P or N indicates one output of each polarity.)
Control:	Multi-turn precision potentiometer and indicator dial for each output.
Programming:	+1V per 1kV of output voltage, applied at the Remote Program Connector.
Load Regulation:	0.002% for Models 375 and 377. 0.001% for Model 380.
Line Regulation:	$\pm$0.001%
Ripple:	$\leq$50mV peak-to-peak
Temp Coeff:	50ppm/°C over the range of 0 to 50°C
Stability:	.01%/hour, .02%/8hours after initial warm-up.
Protection:	Overvoltage limit, overcurrent shutdown

1.4 MECHANICAL SPECIFICATIONS

Size:	Double width standard NIM module. 2.7"W X 8.7"H X 9.7"D (69 x 221 x 246mm).
Weight:	7 pounds (2.8kg)
HV Connector:	Model 375: Kings SHV 1707-1 (Mating connector 1705-1) Models 377 and 380: Kings SHV 1064-1 (Mating connector 1065-1)
LV Connectors:	Remote Program - Burndy GOB 12-88 PNE Power Input - Winchester 111-20853 Monitor Outputs - Kings K-LOC 1074-1 Bin Gate - Kings K-LOC 1074-1

Mating connectors are not supplied, and must be ordered if required.

SECTION II INSTALLATION

2.1 INSTALLATION

The MWPC Series is a family of regulated, dual output, high voltage power supplies that conform to AEC Standards for insertion into a NIM bin. Each unit is a double width module, secured into the NIM by means of captive front panel screws. Input power is obtained from the bin dc power via the rear panel Winchester 111-20853 connector.

Set the LOCAL/REMOTE switches on the rear panel to LOCAL if front panel control is desired. If remote control operation is required, set the switches to REMOTE, and connect the programming signal input at the rear panel to the remote program connector. The high voltage output connectors must be properly terminated before the power supply is turned on.

SECTION III OPERATION

3.1 OPERATION

The operation of the power supplies is controlled and monitored by the meter, switches, indicators and connectors located on the front and rear panels. Remote and local control operation can be selected and the operation fully monitored for each of the two independent outputs.

3.2 FRONT PANEL CONTROLS, METER, INDICATORS AND CONNECTORS

3.2.1 CURRENT METER

The front panel current meter reads the current output from either of the two high voltage power supplies. The METER SELECT switch determines which supply output current is displayed on this meter. The sensitivity of the meter is selected by the METER RANGE switches. The full scale sensitivity can be varies from 0.1uA to 1mA.

3.2.2 METER RANGE SWITCHES
The two independent rotary switches select the current overload and meter sensitivity for the two power supplies. 1mA, 100uA, 10uA, 1uA and 0.1uA full scale current meter sensitivity can be selected for each output. Current trip and high voltage shut down will occur when the current exceed 80% of the selected range.

3.2.3 METER SELECT SWITCH
The meter select toggle switch selects which high voltage power supply output current is monitored by the current meter.

3.2.4 HV INDICATORS
The two independent LED indicators are each lit when the appropriate power supply is switched on.

3.2.5 ON/OFF SWITCHES
The two toggle switches provide independent ON/OFF control of each power supply.

3.2.6 TRIP HOLD/REST SWITCHES
Two independent toggle switches select HOLD or AUTO RESET modes after a power supply has tripped. In HOLD mode, the high voltage will stay off after overload. In AUTO RESET mode, the high voltage will cycle off and on until the overload is removed.

3.2.7 HIGH VOLTAGE CONTROL
Two independent multi-turn potentiometers and calibrated dials set the output voltage for A and B power supplies in the local operating mode.

3.2.8 HIGH VOLTAGE MONITORS
Two miniature coaxial connectors for independently monitoring A and B high voltage outputs (+1V/kV monitor output).

3.2.9 CURRENT MONITORS
Two miniature coaxial connectors for independently monitoring A and B power supply current (+1V/100uA monitor output).

3.2.10 TRIP MONITORS
Two miniature coaxial connectors, wired in parallel, provide trip monitoring for A and/or B power supply. When either both power supplies trip, a monitor output is grounded. The two connectors permit daisy-chaining multiple units to a single remote trip indicator.

3.3 REAR PANEL SWITCHES AND CONNECTORS
The back panel contains the input power, two high voltage output, remote input, and bin gate connectors. REMOTE/LOCAL selector switches for each power supply are also located on the back panel.

3.3.1 HIGH VOLTAGE OUTPUT CONNECTORS (J1A and J1B)
The high voltage output connectors, one for each of the two independent high voltage power supplies, are located at the top of the rear panel. See Section 1.4 for the appropriate output connector and mating connector part numbers.

3.3.2 REMOTE/LOCAL SWITCHES
The two toggle switches independently select remote or local mode of operation for the A and B power supplies.

3.3.3 BIN GATE CONNECTOR (J3)

A single miniature coaxial connector is provided for bin gate control input. A logic zero signal forces both the A and B power supplies to reduce the outputs to 90% of the programmed level.

3.3.4 REMOTE INPUT CONNECTOR (J4)

A multi-pin connector (BURNDY GOB 12-88 PNE) is provided for remote control inputs. Pin A controls power supply A, and Pin C controls power supply B. Pins B, D and E are ground.

3.3.5 INPUT POWER CONNECTOR (J5)

A standard NIM bin connector provides power to unit from the NIM bin. Pin 16 is +12V, Pin 17 is -12V, Pin 34 is ground, and Pin 36 is bin gate. There are no other pins in the connector. The connector is Winchester 111-20853.

SECTION IV THEORY OF OPERATION

4.1 GENERAL

The unit consists of two high voltage power supply modules. The Schematic Block Diagram (DWG. 103729) clearly shows the interconnections and functions of all major assemblies and circuits. Additional schematics are for the high voltage control PC Board; DWG. 104765 (Models 375 &377) and DWG. 104764 (Model 380).

4.2 FUNCTIONAL DESCRIPTION

The high voltage module is basically a DC-DC converter which converts low voltage DC power to a high voltage DC output. This output voltage is highly regulated and filtered, and can be varied. The DC input to the converter is obtained from the low voltage power supplies in the NIM bin.

An oscillator in the module determines the high frequency (approximately 20kHz) at which all amplification, high voltage transformation, rectification and filtering occurs. The amplification is controlled by a circuit which performs the function of control and regulation. A sample of the output high voltage is compared to the a reference voltage in the sensing circuit. The sensing circuit generates the control voltage to set and maintain a fixed high voltage output. Output current is sensed, and overcurrent conditions cause the unit to shut down.

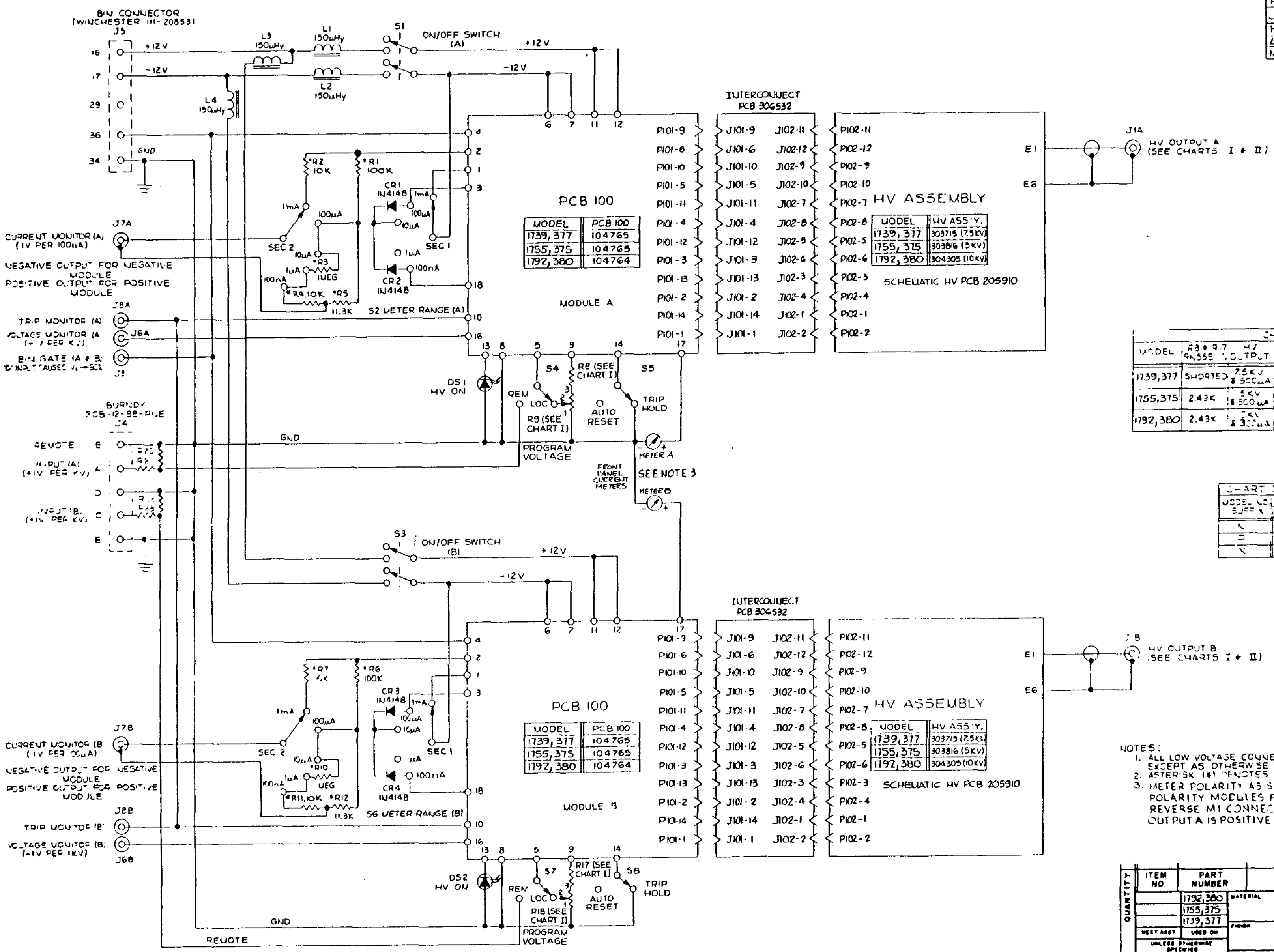
SECTION V SERVICE AND REPAIR

5.1 GENERAL

The high voltage power supply should not require any maintenance or calibration. It is designed for reliable, trouble free operation. If any question should arise, contact BERTAN Customer Service Department for assistance or return authorization. Although adequate information is provided in the schematics included with this manual and in Section 4, it is suggested that the unit be returned to the factory if service should become necessary.

880223
hsb

LTR	REVISIONS	DATE	APPROVED
G	REVISED + REDRAWN ECN 2791, 2433	5/25/83	
H	SEE ECN 3016		
J	SEE ECN 3348		
K	SEE ECN 3440		
L	SEE ECN 3517		
M	SEE ECN 3921		



MODEL	PCB 100
1739, 377	104765
1755, 375	104765
1792, 380	104764

MODEL	HV ASS'Y.
1739, 377	303715 (7.5KV)
1755, 375	303816 (5KV)
1792, 380	304305 (10KV)

CHART I

MODEL	R8 + R17 RN55E	HV OUTPUT	J1A + J1B KINGS P/N	R20 + R22 RN55E	[illegible] RN55E	R9 + R18 [illegible]
1739, 377	SHORTED	7.5KV & 500uA	[illegible]	[illegible]K	4.[illegible]K	[illegible] TURNS
1755, 375	2.43K	5KV & 500uA	[illegible]	[illegible]	[illegible]	[illegible] TURNS
1792, 380	2.43K	[illegible]KV & 300uA	[illegible]	4.[illegible]K	4.[illegible]K	[illegible] TURNS

CHART II POLARITY

MODEL NO. SUFFIX	MODULE + HV OUTPUT A	B
N	NEG	NEG
P	POS	POS
X	POS	NEG

NOTES:
1. ALL LOW VOLTAGE CONNECTORS TO BE KINGS [illegible] EXCEPT AS OTHERWISE SPECIFIED.
2. ASTERISK (*) DENOTES RN55C [illegible]
3. METER POLARITY AS SHOWN IS FOR NEGATIVE POLARITY MODULES FOR POSITIVE POLARITY MODULES REVERSE M1 CONNECTIONS FOR-X MODELS OUTPUT A IS POSITIVE AND OUTPUT B IS NEGATIVE

QUANTITY	ITEM NO	PART NUMBER	DESCRIPTION	COMP DESIG
		1792,380		
		1755,375		
		1139,377		
	NEXT ASSY	USED ON		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE ON FRACTIONS DECIMALS ANGLES

MATERIAL

FINISH

DR SUMAKIS 5/25/83

CK CB

APVD

BERTAN ASSOCIATES, INC
SYOSSET, NEW YORK

SCHEMATIC BLOCK DIAGRAM
MWPC SERIES
DUAL HV POWER SUPPLIES

SIZE D | CODE IDENT NO 50429 | DRAWING NO 103729

SCALE — | SHEET 1 OF 1

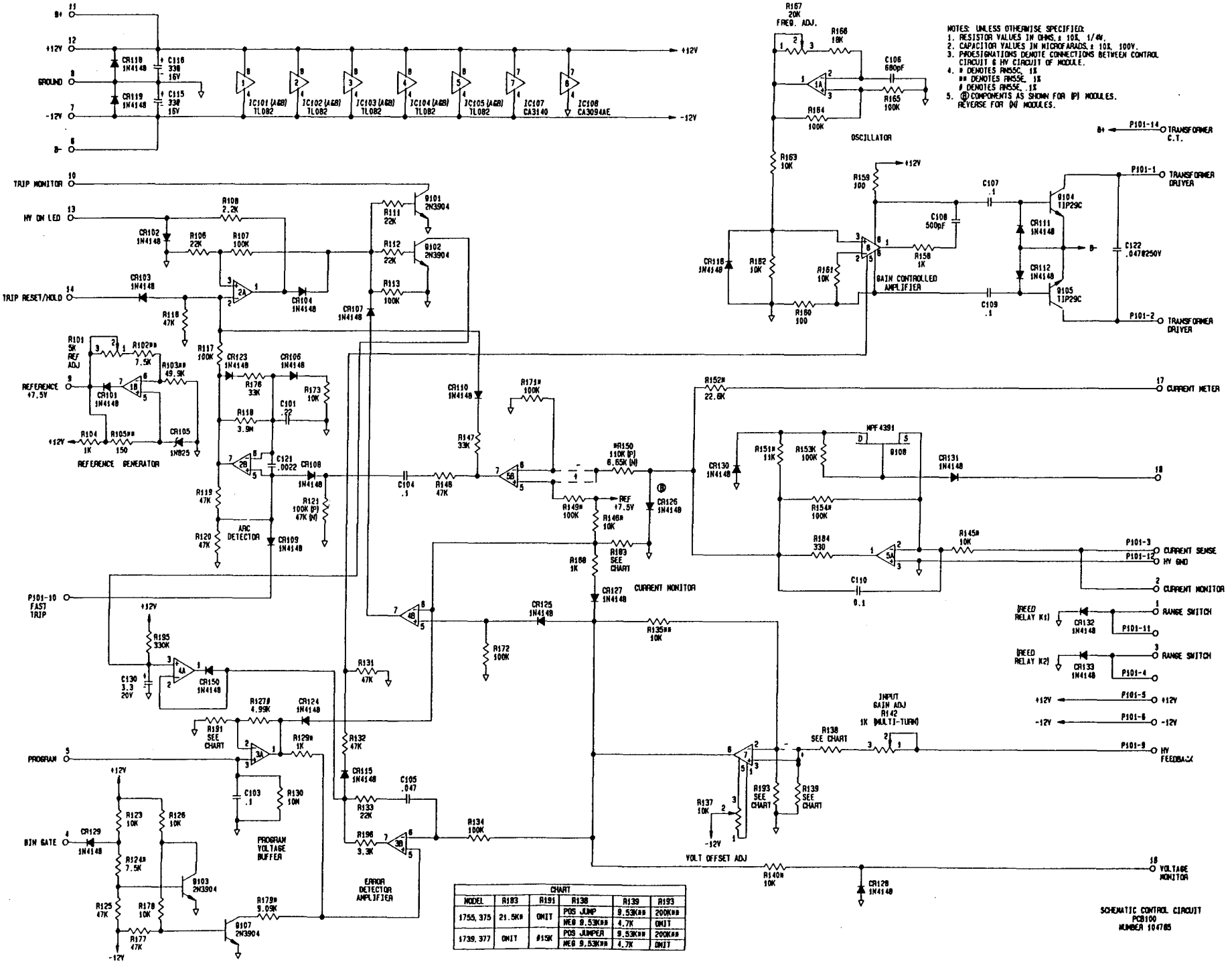
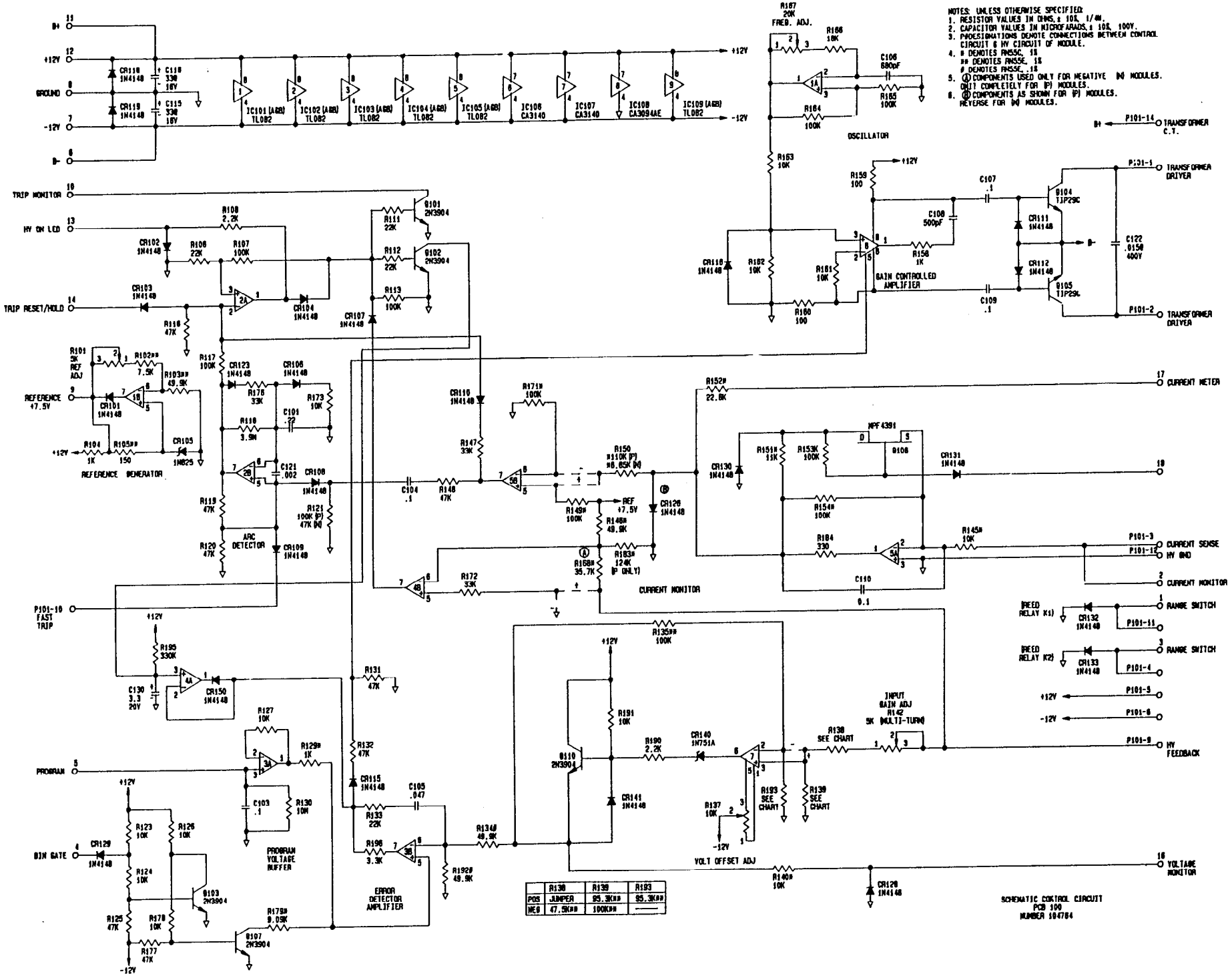


CHART					
MODEL	R183	R191	R138	R139	R193
1755, 375	21.5K#	OMIT	POS JUMP	9.53K##	200K##
			NEG 9.53K##	4.7K	OMIT
1739, 377	OMIT	#15K	POS JUMPER	9.53K##	200K##
			NEG 9.53K##	4.7K	OMIT


NOTES: UNLESS OTHERWISE SPECIFIED:
1. RESISTOR VALUES IN OHMS, ± 10%, 1/4W.
2. CAPACITOR VALUES IN MICROFARADS, ± 10%, 100V.
3. PDESIGNATIONS DENOTE CONNECTIONS BETWEEN CONTROL CIRCUIT & HV CIRCUIT OF MODULE.
4. # DENOTES RN55C, 1%
DENOTES RN55E, 1%
# DENOTES RN55C, 1%
5. Ⓐ COMPONENTS USED ONLY FOR NEGATIVE (N) MODULES. OMIT COMPLETELY FOR (P) MODULES.
6. Ⓑ COMPONENTS AS SHOWN FOR (P) MODULES. REVERSE FOR (N) MODULES.
B+
+12V
GROUND
-12V
B-
TRIP MONITOR
HV ON LED
TRIP RESET/HOLD
REFERENCE +7.5V
+12V
REFERENCE GENERATOR
ARC DETECTOR
P101-10 FAST TRIP
PROGRAM
BIN GATE
PROGRAM VOLTAGE BUFFER
ERROR DETECTOR AMPLIFIER
OSCILLATOR
GAIN CONTROLLED AMPLIFIER
P101-14 TRANSFORMER C.T.
P101-1 TRANSFORMER DRIVER
P101-2 TRANSFORMER DRIVER
CURRENT METER
CURRENT MONITOR
P101-3 CURRENT SENSE
P101-12 HV GND
REED RELAY K1
REED RELAY K2
RANGE SWITCH
P101-11
P101-4
P101-5
P101-6
P101-9 HV FEEDBACK
INPUT GAIN ADJ R142 5K (MULTI-TURN)
VOLT OFFSET ADJ
VOLTAGE MONITOR
SCHEMATIC CONTROL CIRCUIT PCB 100 NUMBER 104784
POS JUMPER 95.3K## 95.3K##
NEG 47.5K## 100K## ——