



# INSTRUCTION DATA

Dowty RFL Industries Inc. • Boonton, New Jersey

## Model 66 NVG Negative-Voltage Generator

### DESCRIPTION

The Model 66 NVG is one of the RFL Series 66 TDMS plug-in modules. It is a low-cost dc-dc converter used to generate an unregulated  $-12\text{-Vdc}$  output from a  $12\text{-Vdc}$  source. The output voltage has a common zero-volt reference with the input voltage.

The Model 66 NVG is particularly attractive for use in systems which require  $12\text{ Vdc}$  at high current, but where there is also a need for  $-12\text{ Vdc}$  at relatively low current, to power equipment such as A/D converters and voice-frequency carrier transmitters and receivers.

### SPECIFICATIONS

#### OUTPUT VOLTAGE

$-11.5$  to  $-12.8\text{ Vdc}$  with  $12\text{ Vdc}$  at the input and zero to full load.

#### OUTPUT CURRENT

$250\text{ mA}$  maximum.

#### INPUT VOLTAGE

$11$  to  $16\text{ Vdc}$ .

#### INPUT CURRENT

Approximately  $120\text{ mA}$  plus load current.

#### AMBIENT TEMPERATURE

$-20$  to  $70^{\circ}\text{C}$ .

#### SIZE

The circuit card occupies two standard one-half-inch module spaces in an RFL Model 68 Chassis.

### THEORY OF OPERATION

The schematic of the circuit of the negative-voltage generator appears in Figure 2. T1 is a saturated-core transformer connected to give positive feedback to the switching transistors, Q1 and Q2.

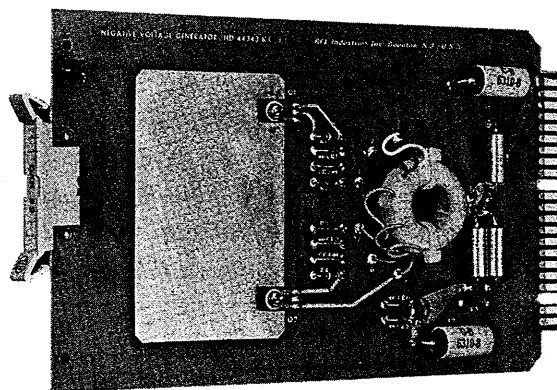


Figure 1. Model 66 NVG Negative-Voltage Generator.

The transformer's center tap (blue wire) is always at zero voltage. Thus, when Q1 is conducting the yellow wire will be at  $+12\text{ volts}$  and, by induction, the red wire will be somewhat higher, so that Q1 is biased on in its saturated condition. Simultaneously, the voltage at the green wire is somewhat more negative than  $-12\text{ Vdc}$ , to account for the diode voltage drop through CR6, so that the voltage at C3 is  $-12\text{ Vdc}$ .

After approximately  $50\text{ microseconds}$ , the core of T1 saturates, so that the drive current to the base of Q1, and all transformed voltages are reduced to zero. As the magnetic field collapses through the winding, voltages of reverse polarity will be induced so that Q1 is forced off, Q2 is forward biased, and CR5 conducts. After another  $50\text{ microseconds}$ , the cycle repeats itself, so that the operating frequency is approximately  $10\text{ kHz}$ .

R1 and R4 provide bias for starting the oscillation, and L1 and L2, together with C1, C2, and C3, provide filtering. CR1 through CR4 are used to guarantee startup when input power is first applied.

# PARTS LIST

CIRCUIT SYMBOL	DESCRIPTION	RFL PART NO.
<b>Model 66 NVG, Assembly HB-44340</b>		
C1, 2, 3	Capacitor, tantalum, 22 $\mu$ F, 20%, 35V, Mallory 1AS22GM035P1F, or eq. . . . .	H-1007-699
C4, 5	Capacitor, ceramic, .033 $\mu$ f, 10%, 50V . . . . .	H-1007-1453
CR1-4	Diode, silicon, Type 1N914B/1N4448 . . . . .	HA-26482
CR5, 6	Rectifier, 2A, 400V, Gen. Elec. A114D, or eq. . . . .	HA-47659
DS1	Lamp, LED, Dialight 550-0102, or eq. . . . .	HA-39568
L1, 2	Choke, ferrite, 100 $\mu$ H, 10%, 2 amp., Caddell-Burns 6310-8, or eq. . . . .	HA-41074
Q1, 2	Transistor, silicon, NPN, Motorola MJE-223, or eq. . . . .	HA-34756
R1, 4	Resistor, fixed, composition, 1.3K ohms, 5%, 0.5W, Allen Bradley CB, or eq. . . . .	H-0410-1299
R2, 3	Resistor, fixed, composition, 47 ohms, 5%, 0.5W, Allen Bradley CB, or eq. . . . .	H-1009-832
R5	Resistor, fixed, composition, 470 ohms, 5%, 0.5W, Allen Bradley CB, or eq. . . . .	H-0410-1257
T1	Transformer, switching . . . . .	HA-44345
—	Schematic (Figure 2) . . . . .	HD-44344

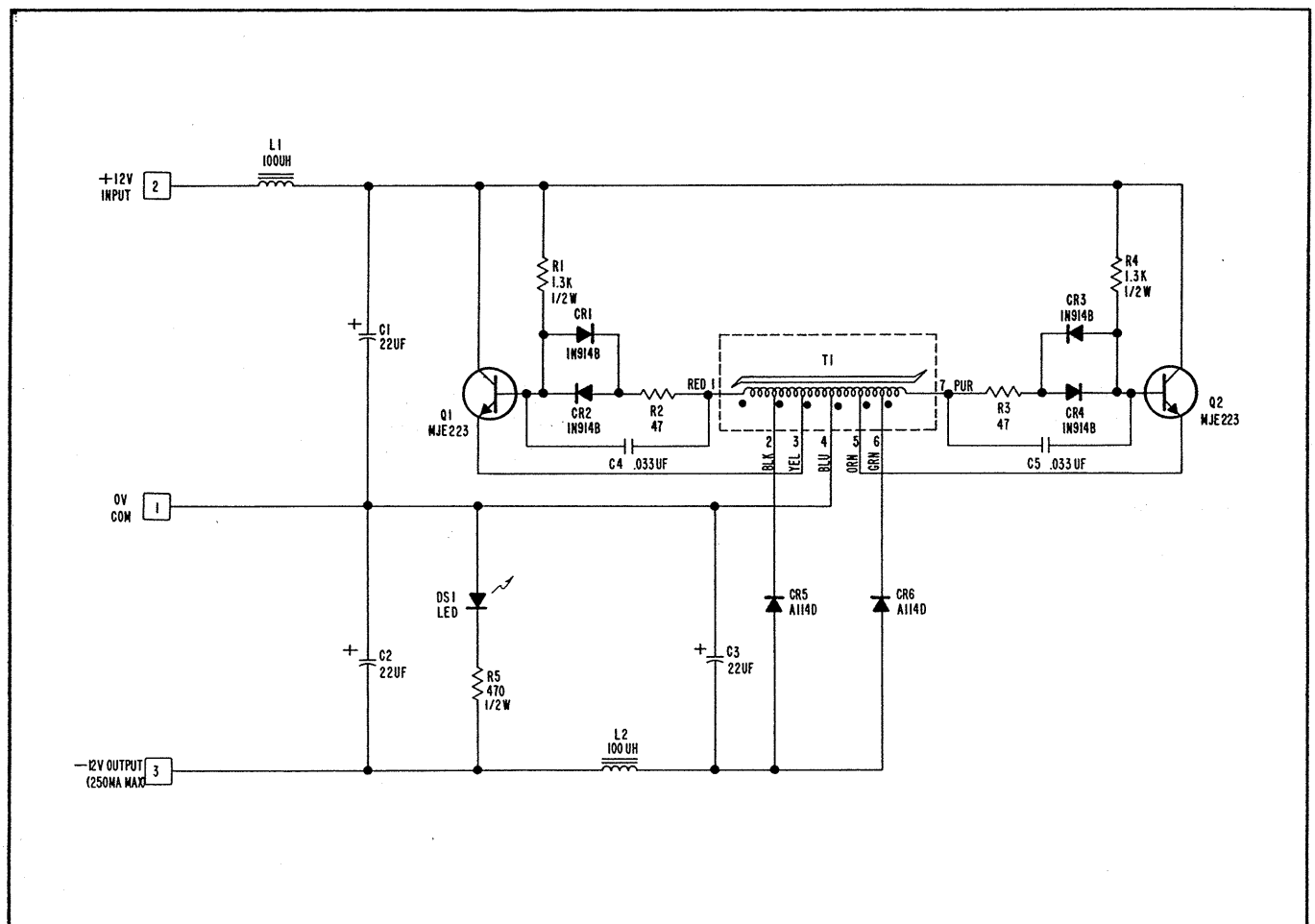


Figure 2. Schematic of circuit, Model 66 NVG.