MOOG

NF123-208A1 Series
4-Channel Permaset Relay Card

SPECIFICATIONS

Power Supply:
±15 VDC regulated
+24 VDC

Relays:
Consumption = 15 mA/
24 VDC each
Contact rating = 2.50 mA/
175 VDC/3 watts
Coil Resistance: 2KΩ @ 20°C
Max pick-up VDC @ 20°C: 18.0VDC
Min drop-up VDC @ 20°C: 2.0VDC

Temperature Range:
10°C to 50°C (50°F to 120°F)

Connector:
DIN 41612 style C

Form Factor:
Eurocard 100 x 160 mm, 7 HP, 3 U

Weight:
0.38 lb (0.17 kg)

This Four Channel Permaset Relay Card is designed to easily accommodate the setting of four set point voltages between –15 VDC and +15 VDC. These voltages can be used as set point values for a control device such as a position or velocity controller. The set point voltages can also be switched by externally controlled relays.

The NF123-208A1 Four Channel Permaset Relay Card is a forward compatible replacement for the F123-208-A001.

ADJUSTMENTS

Output Voltages
Potentiometer 1 – P1 (R1-R2-R3)
Potentiometer 2 – P2 (R6-R7-R8)
Potentiometer 3 – P3 (R11-R12-R13)
Potentiometer 4 – P4 (R16-R17-R18)

Function Selection
Jumpers select input voltage for each potentiometer:
  J1, J8, J15, J22   input voltage is from external source.
  J2, J9, J16, J23   input voltage is +15 VREF.
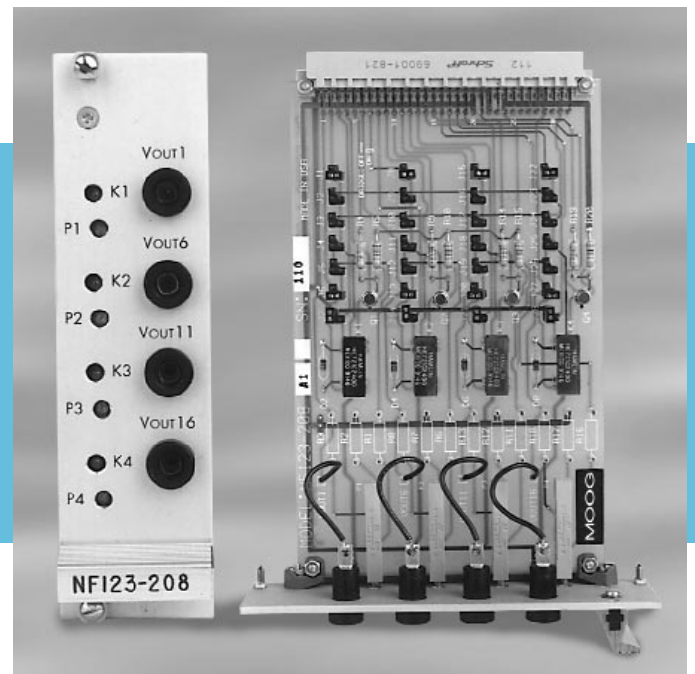 J3, J10, J17, J24 input voltage is -15 VREF.
Jumpers select each output voltage:
  J4, J11, J18, J25 output is potentiometer output direct
  J5, J12, J19, J26 output is potentiometer switched by relay
  J6, J13, J20, J27 output is input voltage switched by relay
  J7, J14, J21, J28 relay latch/reset operation
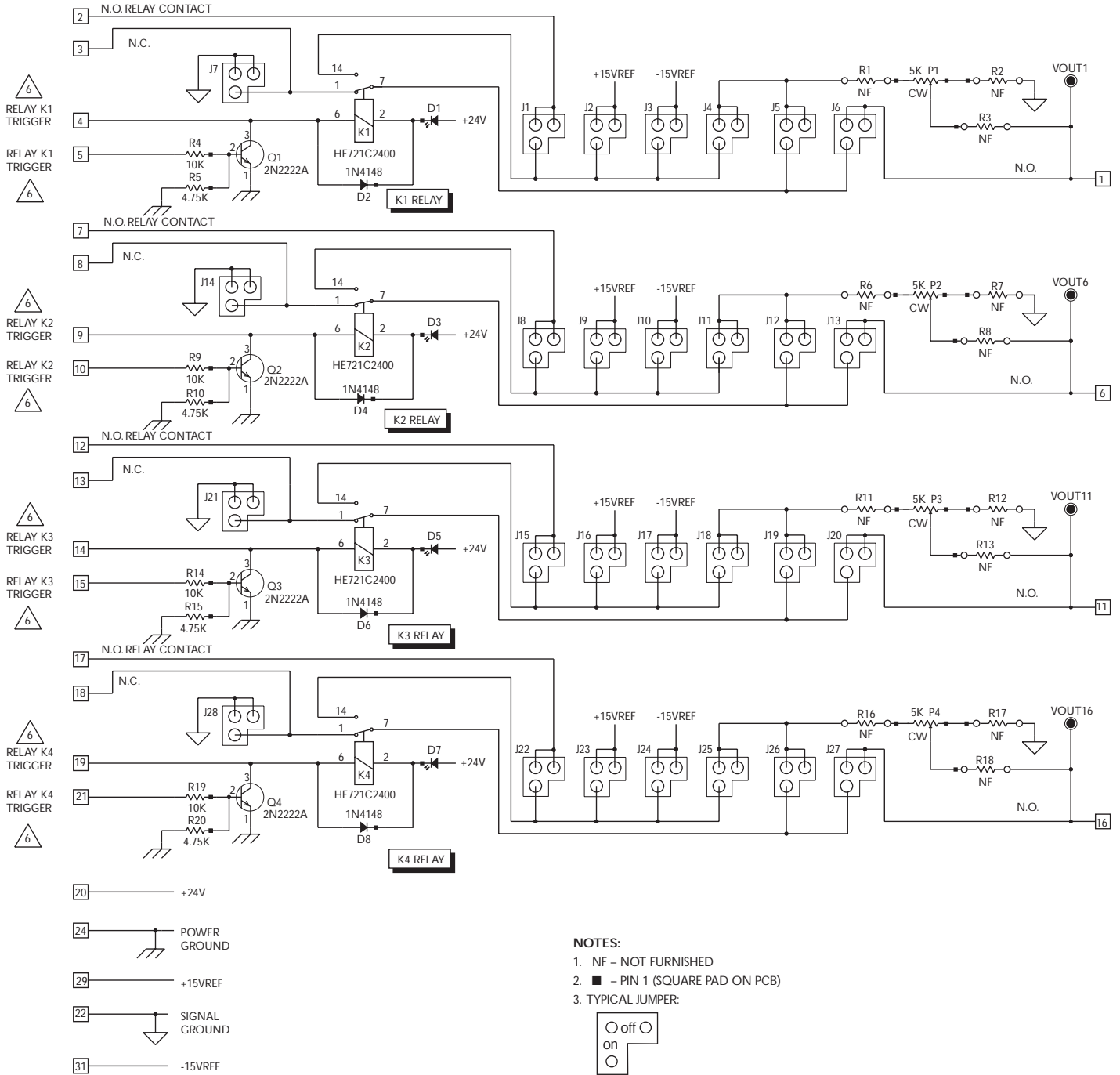
TEST POINTS

Output Voltage
Potentiometer 1: jack V out 1
Potentiometer 2: jack V out 6
Potentiometer 3: jack V out 11
Potentiometer 4: jack V out 16

NF123-208A1 PERMASET RELAY CARD SCHEMATIC

N.O. RELAY CONTACT — 2

N.C. — 3

RELAY K1 TRIGGER — 4 /6\

RELAY K1 TRIGGER — 5 /6\

J7

14 1 7

K1 HE721C2400

D1 +24V

D2 1N4148

K1 RELAY

R4 10K Q1 2N2222A

R5 4.75K

+15VREF -15VREF

J1 J2 J3 J4 J5 J6

R1 NF 5K P1 CW R2 NF VOUT1

R3 NF N.O. 1

N.O. RELAY CONTACT — 7

N.C. — 8

RELAY K2 TRIGGER — 9 /6\

RELAY K2 TRIGGER — 10 /6\

J14

14 1 7

K2 HE721C2400

D3 +24V

D4 1N4148

K2 RELAY

R9 10K Q2 2N2222A

R10 4.75K

+15VREF -15VREF

J8 J9 J10 J11 J12 J13

R6 NF 5K P2 CW R7 NF VOUT6

R8 NF N.O. 6

N.O. RELAY CONTACT — 12

N.C. — 13

RELAY K3 TRIGGER — 14 /6\

RELAY K3 TRIGGER — 15 /6\

J21

14 1 7

K3 HE721C2400

D5 +24V

D6 1N4148

K3 RELAY

R14 10K Q3 2N2222A

R15 4.75K

+15VREF -15VREF

J15 J16 J17 J18 J19 J20

R11 NF 5K P3 CW R12 NF VOUT11

R13 NF N.O. 11

N.O. RELAY CONTACT — 17

N.C. — 18

RELAY K4 TRIGGER — 19 /6\

RELAY K4 TRIGGER — 21 /6\

J28

14 1 7

K4 HE721C2400

D7 +24V

D8 1N4148

K4 RELAY

R19 10K Q4 2N2222A

R20 4.75K

+15VREF -15VREF

J22 J23 J24 J25 J26 J27

R16 NF 5K P4 CW R17 NF VOUT16

R18 NF N.O. 16

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20 — +24V

24 — POWER GROUND

29 — +15VREF

22 — SIGNAL GROUND

31 — -15VREF

NOTES:

1. NF – NOT FURNISHED
2. ■ – PIN 1 (SQUARE PAD ON PCB)
3. TYPICAL JUMPER:

   off
   on

4. ⊖ – INDICATES COMPONENT STANDOFF
5. CW – CLOCKWISE
6. K1 THROUGH K4 RELAY LOGIC OPERATION
   RELAY K1 TO K4 MAY BE OPERATED IN EITHER OF TWO ACTIATION STATES, NAMELY ACTIVE-LOW OR ACTIVE-HIGH. TO ENERGIZE RELAY IN ACTIVE-LOW STATE, CONNECT PIN-4, 9, 14 OR 19 TO PIN-22 (SIG GND). FOR ACTIVE-HIGH STATE, CONNECT +5 TO +15 VDC TO PIN-5, 10, 15 OR 21 (BASE OF TRANSISTORS Q1-Q4) FOR EACH RESPECTIVE RELAY K1 TO K4 AS DESIRED.

An 'Extender Card' is highly recommended to gain access to 'Test Points' and 'Adjustments' while cards are powered-up within a Eurocard Rack Assembly.

(Moog ref P/N A81750-1 Extender)

The products described herein are subject to change at any time without notice, including, but not limited to, product features, specifications, and designs.

NF123-208A1 PERMASET RELAY CARD

Q. What are resistors R11, R12 and R13 (Channel-1) typically sized to? Purpose?

A. R11 to R13 are NF or 'Not Furnished' resistor components which have 'standoffs' for ease of adding a specific resistance value to the circuit. R11 & R12 along with 5K Pot (P3) form a 'voltage divider network'. With a resistor installed at R11 & R12, the pot range of P3 would be limited from reaching the 'rail' or max reference input voltage. Without R11 & R12 installed, the output range is regulated by the full span of P3. The values of R11 & R12 are based on the desired output set-point voltage. The existing circuit is designed to produce an output set-point voltage between -15 VDC and +15 VDC (Input ref voltage). Other input voltages from an external source may be applied, but will result in adding resistors R11 & R12. Resistor R13 is used in the 'wiper' position of P3 for providing 'authority' to the pot or sensitivity / range to the output. The higher R13 is, the less 'authority' or range the pot will have. Typical value assignments are R11=4.7K, P3=5K, R12=330Ω & R13=5K for input voltages outside ±15V range. Keep in mind that R11 to R13 *may* need to be added for conditions between ±15V such as reducing or increasing pot authority or sensitivity depending on actual application. The rule of thumb is to be able to adjust the pot (P3) for an output without being at the end on the pot turns ratio for best stability. So, setting pot around the mid-range of turns-ratio is highly recommended. R11 to R13 may be jumpers or Zero Ohm resistors.

The 4-Channel Permaset relay card is designed to easily accommodate the settings of 4-set-point voltages between -15 VDC and +15 VDC. These voltages can be used as set-point values for a control device such as a position or velocity controller. The set-point voltages can be switched by externally controlled SPDT relays (K1 to K4).

Consider Channel-1 for discussion purposes. Relay K1 can be energized by high (5-15 VDC) or low (0 VDC) logic signal and may be used for integrator reset, signal switching, alarm sensing, LED status indication, or other related functions. Pin-3 is the N.C. relay contact; Pin-2 is the N.O. relay contact (J1 'ON'; J2 through J5 OFF & J6 'ON'); Pin-1 is the common relay contact. Pin-4 & 5 are Relay Trigger connections for relay latch/reset configuration. To energize relay, connect Pin-4 (active low or enable low state) to Pin-24 (Power Gnd). Grounding Pin-4 will cause relay K1 to activate. For activating high state (enable high), connect +5 to +15 VDC to Pin-5 to activate relay. This provides flexibility in changing activation state of relay logic.

EXAMPLE - SET-POINT VOLTAGE ANALYSIS

Let's say the input voltage is +24V ref and a set-point voltage of +10V is desired.
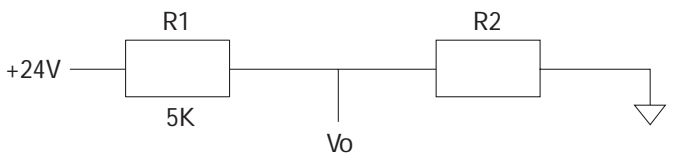
$$V_o = +V_{in} (R2 / R1 + R2) \Rightarrow +10V = +24V (R2 / 5K + R2) \Rightarrow R2 = 1.3K$$

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