BASIC SYSTEMS DRIVES (BSD)
Master Reference Calibration S#1781A03

I. INTRODUCTION

This printed circuit card is from the series of cards designed for the BSD MASTER CONTROLLER functions. The signal calibrations required for different modes of operation of the line, or several drive subsystems of the line, have been pre-engineered by committed circuits utilizing FET switching.

Figure 1 is a picture of the Master Reference Calibration board. A front view locating all components by schematic identification of group G05 (all functional circuits) is shown on the last page of the instruction leaflet.
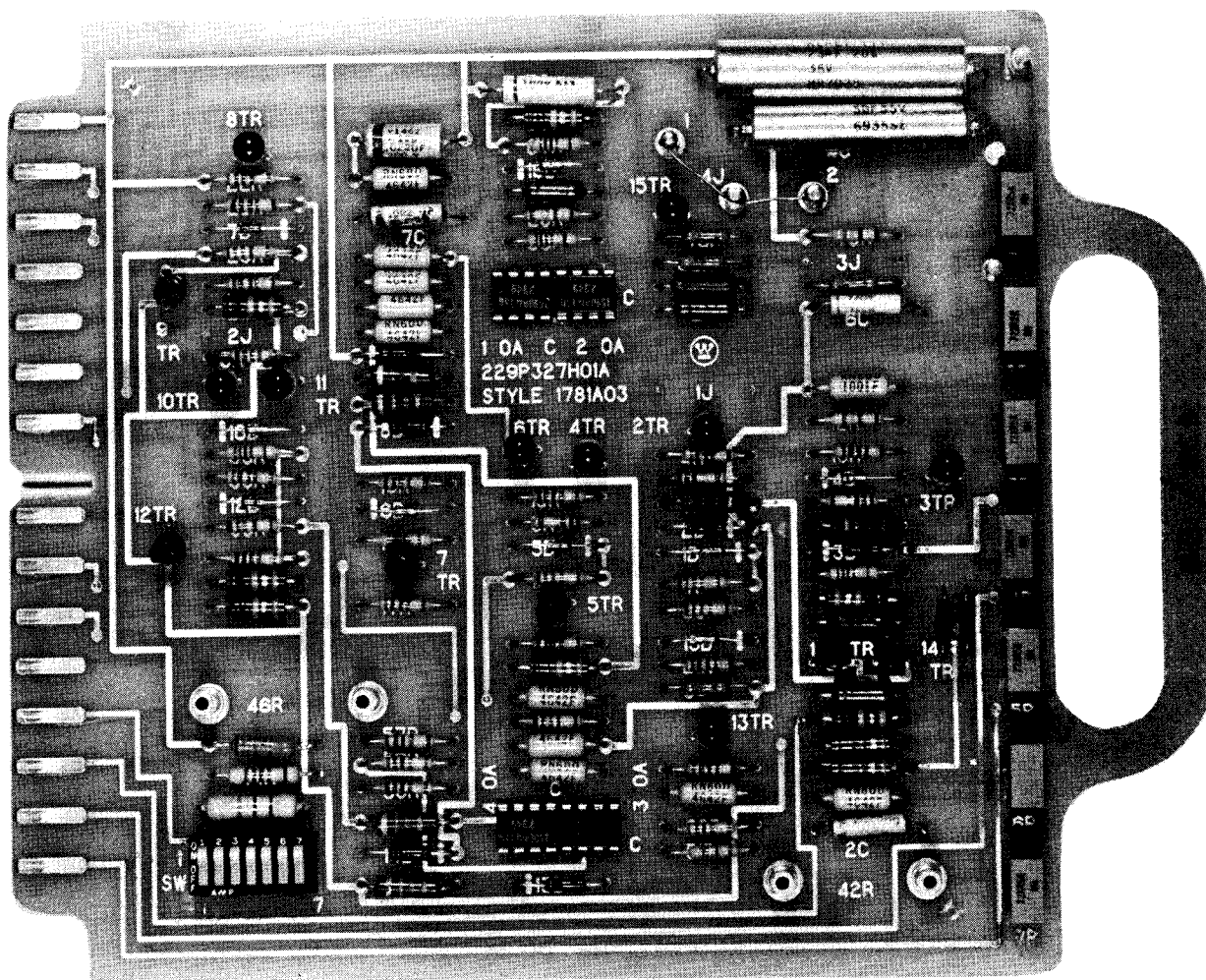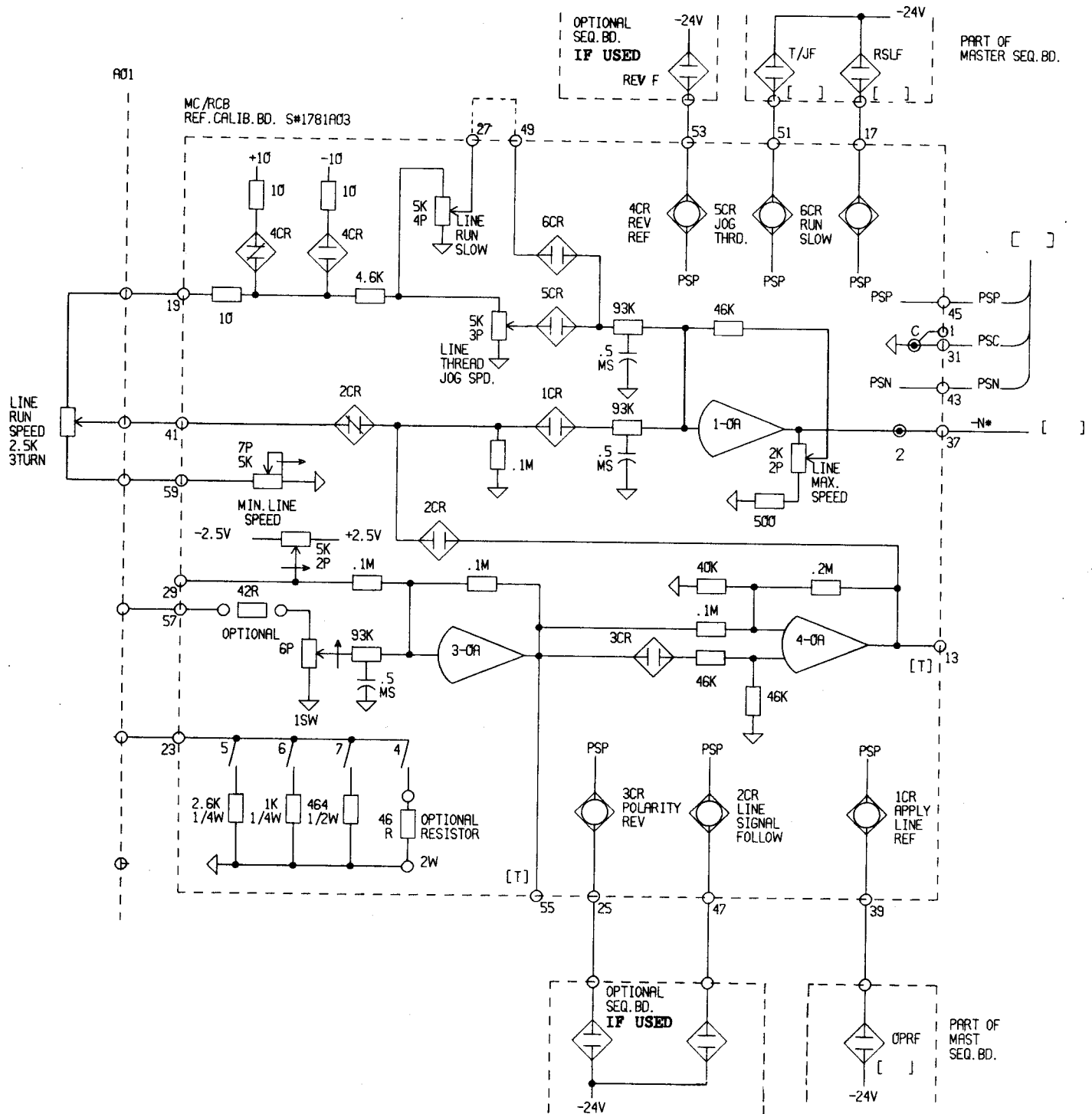

FIGURE 1

SIMPLIFIED SCHEMATIC DIAGRAM OF G05 CIRCUITS

FIGURE 2a

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Printed in USA

II. DESCRIPTION OF OPERATION

A. INTRODUCTION

As a part of the Basic Master Controller, the Reference Calibration Board S#1781A03 operates in conjunction with the Master Sequencer - Basic S#1781A01 and the Master Sequencer-Optional S#1781A02 to establish an interface between the operator command inputs and the individual TPS subsystems of a coordinated processing line.

B. CIRCUIT FUNCTIONALIZATION

The Figures 2a and 2b are simplified schematic representations of the various functional circuits of this board. The functions that are provided by this card are:

1. Generation of an analog reference signal proportional to the operator's speed adjust potentiometer setting.

2. Establishment of Forward or Reverse polarity for the reference signal.

3. Thread/Jog (T/J) and Run Slow (RSL) Adjustments.

4. Minimum Speed Adjustment.

5. Soft Start Adjustment.

6. Selection of Either a Set or a Follow Mode of Operation.

7. Polarity Selection, Bias Cancellation, Signal Loading and Gain Adjustment in the Follow Mode.

8. Maximum Speed Adjustment.

As is shown, all sequencing is done statically. If a function is optional and has an associated set of static relay contacts, then, when the function is deleted, the static relay and its associated contacts are eliminated. For example, if only a forward reference polarity is selected, static relay 4CR is eliminated and a jumper wire is used in place of the normally closed contacts of 4CR.
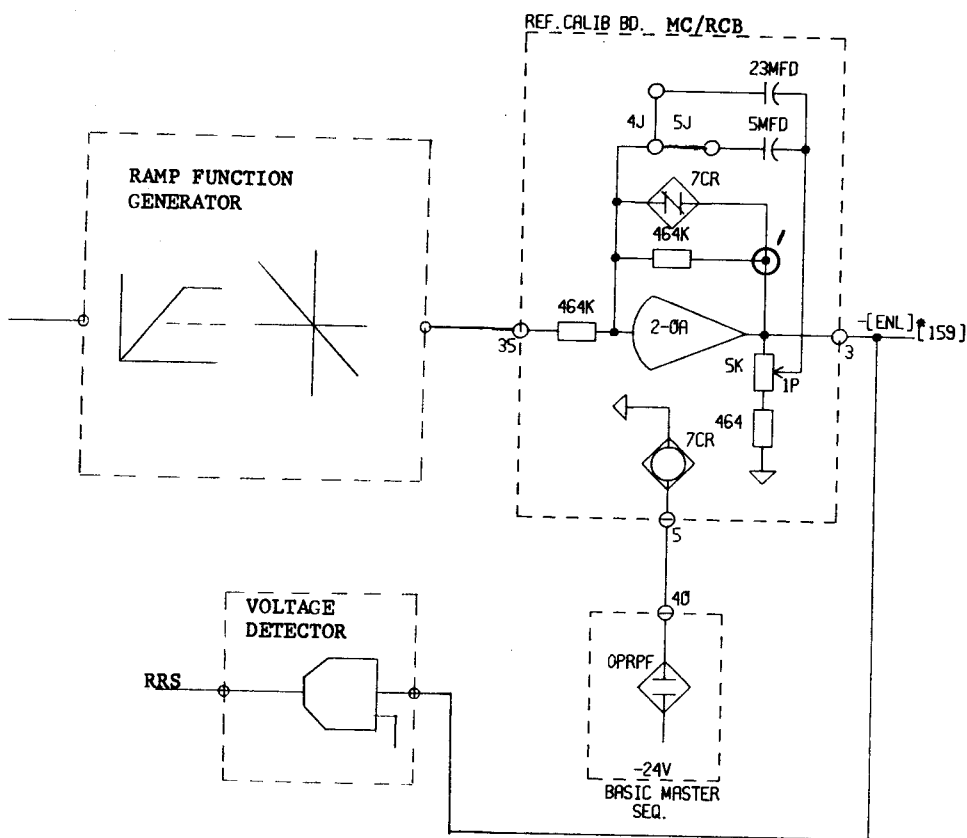
The polarity for forward line operation is supplied from a +10V supply. This voltage is applied to 3P (Thread/Jog), 4P (Run Slow) and an external Operator Pot which should be connected in series with 7P (Minimum Line Speed). If 4CR is used, energizing of the relay changes the polarity of the supplied voltage.

The output reference from this card is selected by 1CR, 5CR or 6CR. The output from 1-0A supplies a negative reference (forward direction) to a Ramp Function Generator. The Line Maximum Speed Pot (2P) should be used to set the output signal to the desired level (10V) when the Operator Speed Pot is at its maximum speed setting. This adjustment should be made prior to the setting of any other pots.

The Thread/Jog Pot (3P) and the Run Slow Pot (4P) provide similar functions of operating the line at reduced reference levels. Pre-engineered external sequencing dictates their use in a system.

If the Follow option is not used, the normally closed contacts of 2CR are replaced by a jumper wire. If the option is used, then energizing of 2CR changes the normal line reference from the Operator Speed Pot to the Follow Signal.
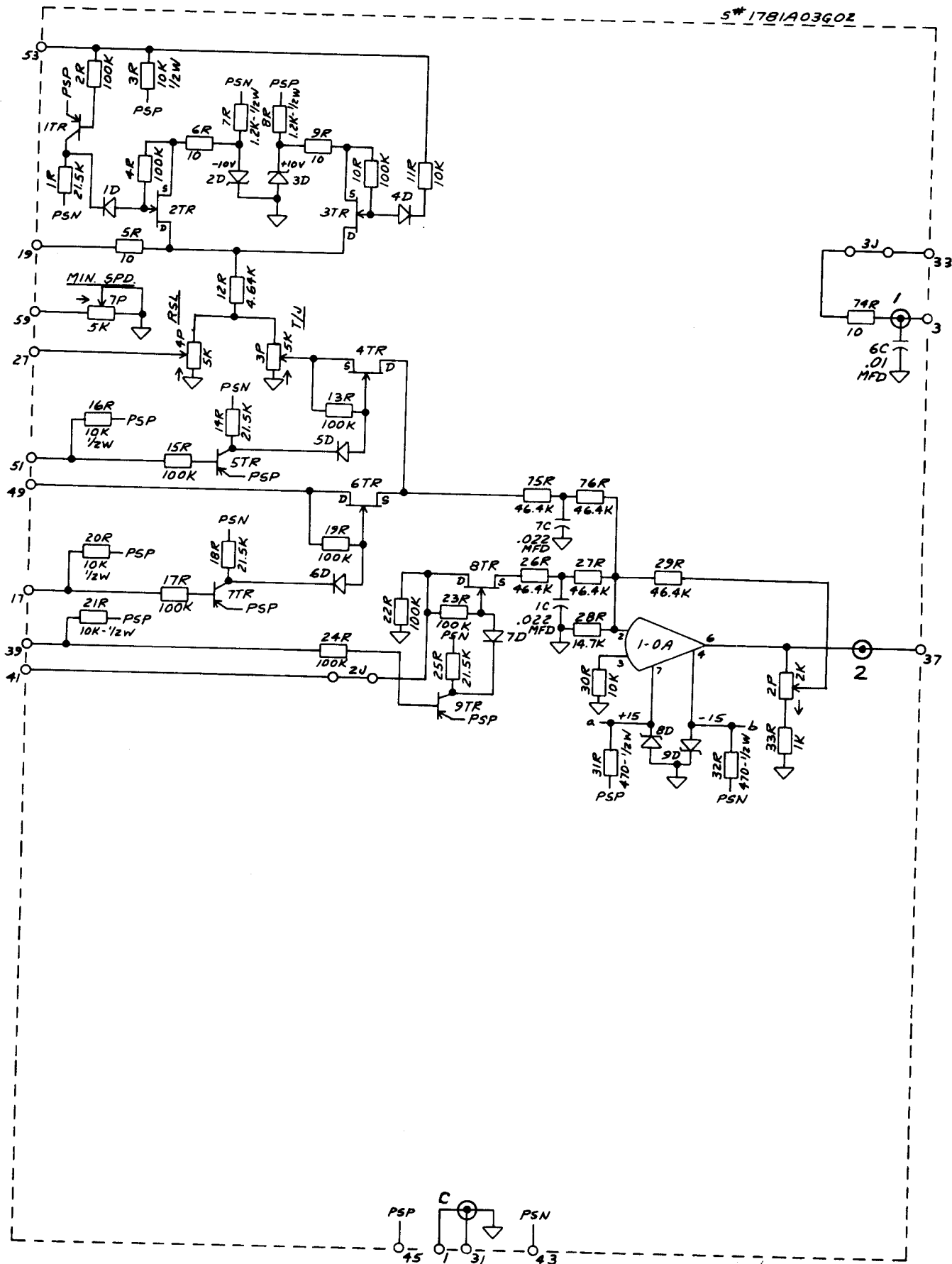
Amplifiers 3-0A and 4-0A and associated circuitry provide an interface function for the Follow signal which should be applied to terminal 57. If this signal is a voltage signal, attenuation may be required and 42R or a jumper wire has to be specified for this input signal. If the input signal is from a current source, loading may be required and terminals 23 and 57 should be wired together to provide loading. If the required loading is not available with the available resistance combinations, 46R will have to be specified. The gain of 3-0A and 4-0A is +2.2 with 3CR de-energized and is -2.2 with 3CR energized. This gain is from the wiper arm of 6P to the output of 4-0A. 3CR and its polarity inversion capability provides flexibility in handling of the follow signal. Gain adjustment is performed by 6P. Offset or current cancellationsis provided by 5P which can be used to cancel 2V of the signal appearing on the wiper arm of 6P.
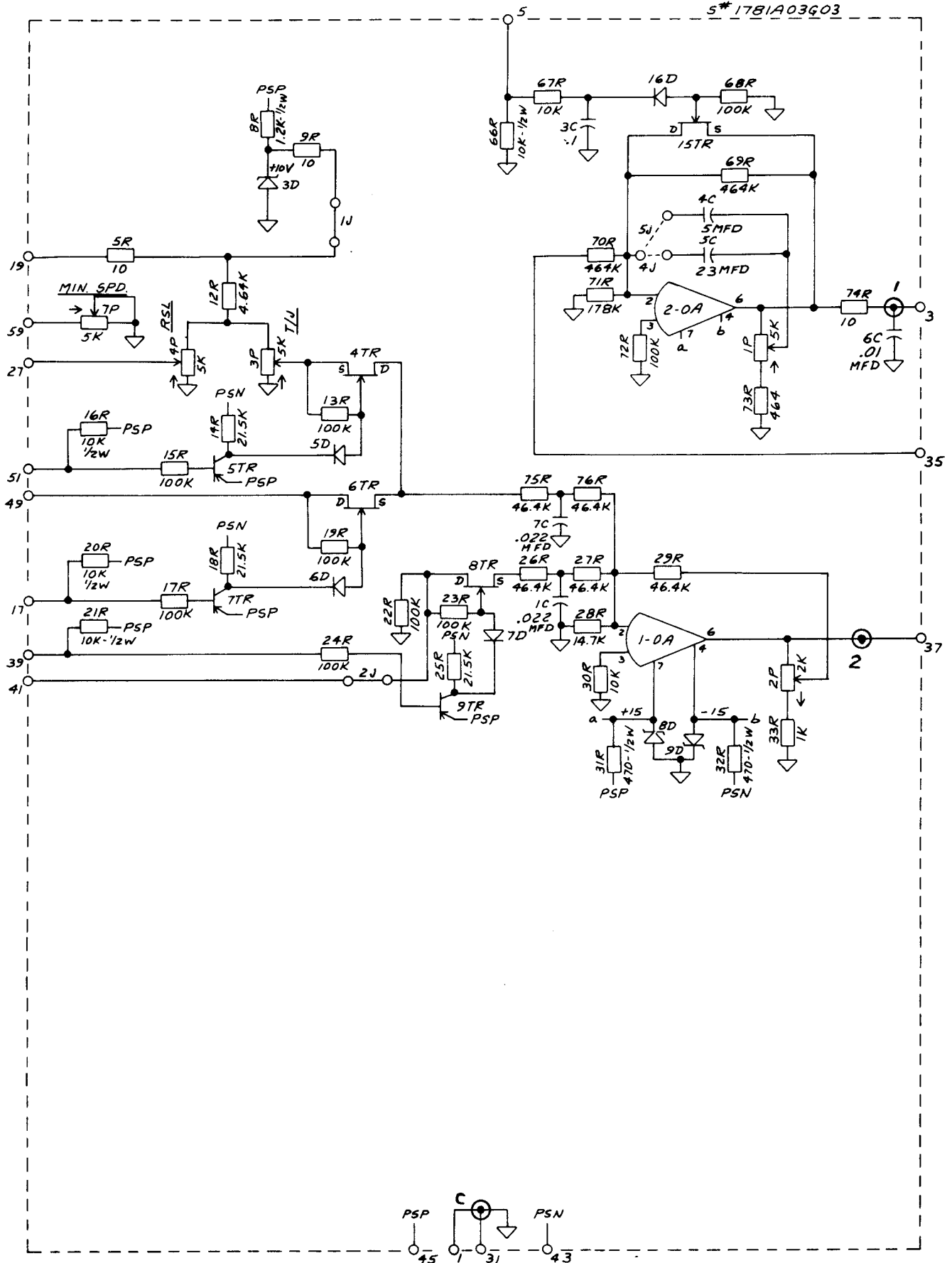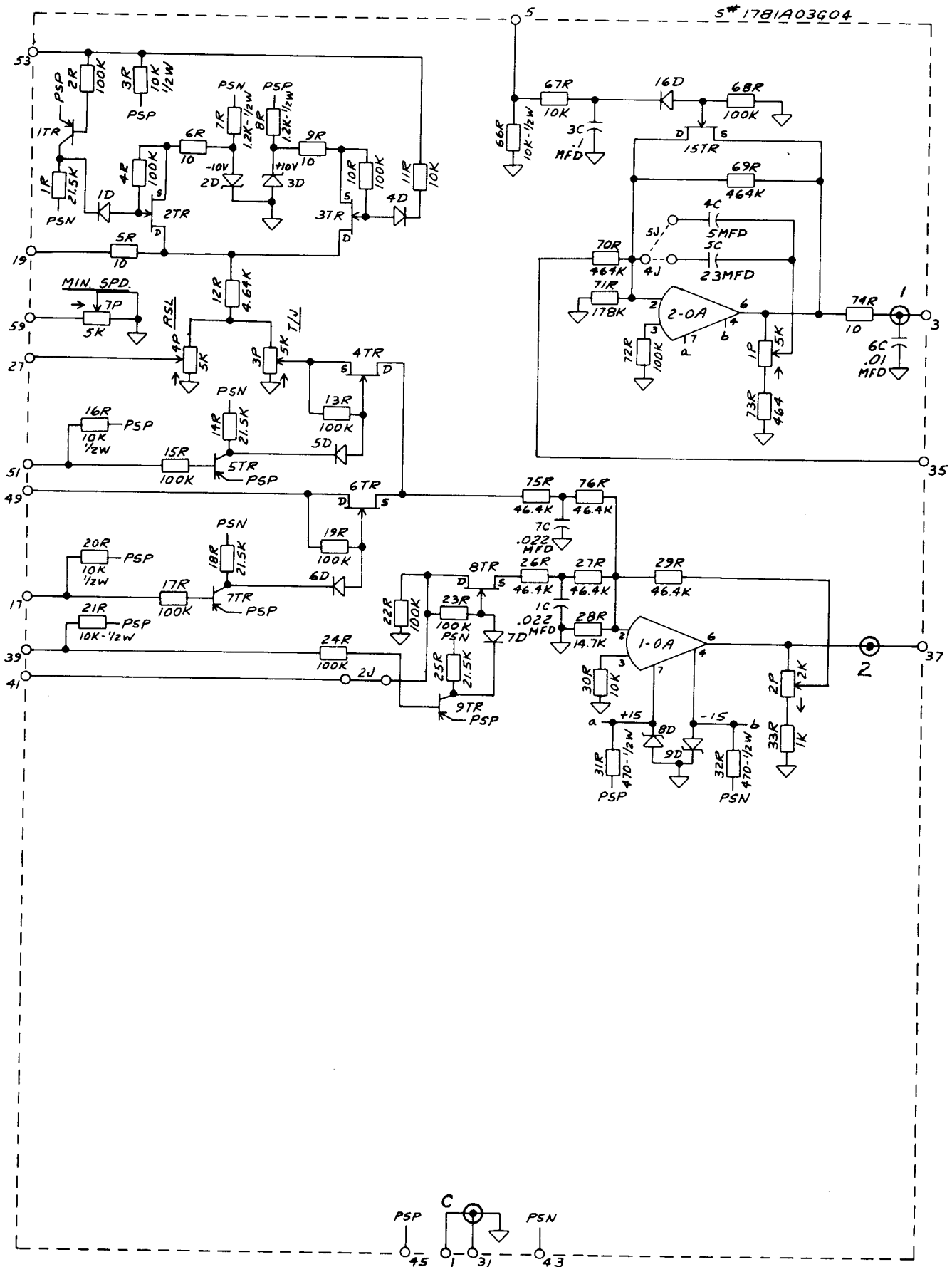
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REF. CALIB BD. MC/RCB

RAMP FUNCTION
GENERATOR

VOLTAGE
DETECTOR

RRS

OPRPF

-24V
BASIC MASTER
SEQ.

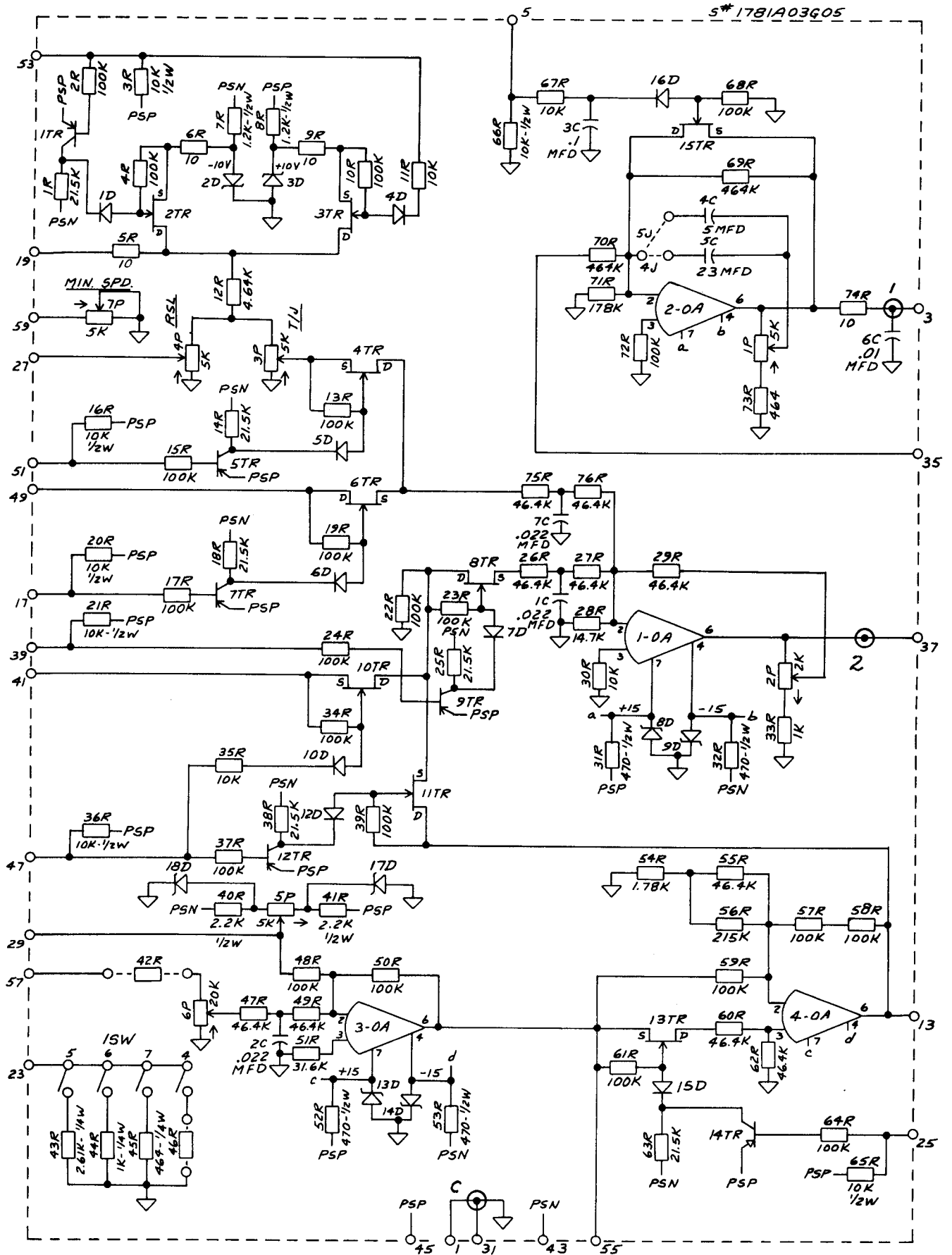SIMPLIFIED SCHEMATIC OF THE "SOFT START" CIRCUIT

FIGURE 2b

Figure 2b is a simplified schematic for the Soft Start Function which is provided by 2-OA and its associated components. If the Soft Start function is not provided, then a jumper wire is connected between terminals 3 and 33. When setting the soft start adjustment, the time delay should be set for a time constant somewhere between 5 and 10 percent of the time required for the Ramp Function Generator to go from 0 to 10V. It may be necessary to remove one of the jumpers (4J or 5J) which connect 5C and 4C into the circuit in order to obtain reasonable adjustment with 1P. If the Soft Start Time constant is set too high, there may be an extended period of time past when the Ramp Function Generator returns to zero for 2-OA output to reach zero. The detection of zero voltage condition of this signal may be delayed extensively causing slow-up in the opening of the drive subsystems dc contactors and setting-up of holding brakes.

S# 1781A03G01

PSP
8R 1.2K-½W
9R
10

+10V 3D

1J

5R
10

19

MIN. SPD.
7P
5K

RSL
12R
4.64K

59

4P 5K
27

3P 5K
T/J

4TR
S   D

13R
100K

5D

PSN
14R
21.5K

16R PSP
10K
½W

15R
100K

5TR
PSP

51

49

6TR
D   S

75R
46.4K

76R
46.4K

7C
.022
MFD

19R
100K

6D

PSN
18R
21.5K

20R PSP
10K
½W

17R
100K

7TR
PSP

17

26R
46.4K

27R
46.4K

29R
46.4K

8TR
D   S

1C
.022
MFD

22R
100K

23R
100K
PSN

7D

28R
14.7K

2

1-OA 6
4

21R PSP
10K-½W

24R
100K

25R
21.5K

9TR
PSP

39

2J
41

30R
10K 3

7

+15 8D -15

a   b

31P 47D-½W
PSP

9D

32R 47D-½W
PSN

2P
2K

33R
1K

37
2

3J
33

74R 1
10
3

6C
.01
MFD

C

PSP   PSN

45 1 31 43

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S# 1781A03G02

S# 1781A03G03

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S# 1781A03G04

S# 1781A03G05

III. CHARACTERISTICS AND RATINGS

Power Supplies

				G01 - G04	G05
PSP	+24V	±2V	@	48 ma	85 ma
PSN	-24V	±2V	@	48 ma	85 ma

The currents listed are for nominal voltages.

Output Capacity

The output signal to the drive controllers should be taken from terminal 3. ±10V at 3ma is available.

Allowable Operating Temperature

0°C to 55°C

Static Relays

-24V is required for energizing. With the exception of the soft start reset (referenced to PSC), the static relays are referenced to PSP. Current requirements for normal operation have been calculated into the listed values under Power Supplies.

Group Options

G01 Forward Reference; Thread/Jog and Run Slow.

G02 Forward/Reverse Reference; Thread/Jog and Run Slow.

G03 Forward Reference; Thread/Jog and Run Slow; Soft Start.

G04 Forward/Reverse Reference; Thread/Jog and Run Slow; Soft Start.

G05 Forward/Reverse Reference; Thread/Jog and Run Slow; Soft Start; Signal Follow.