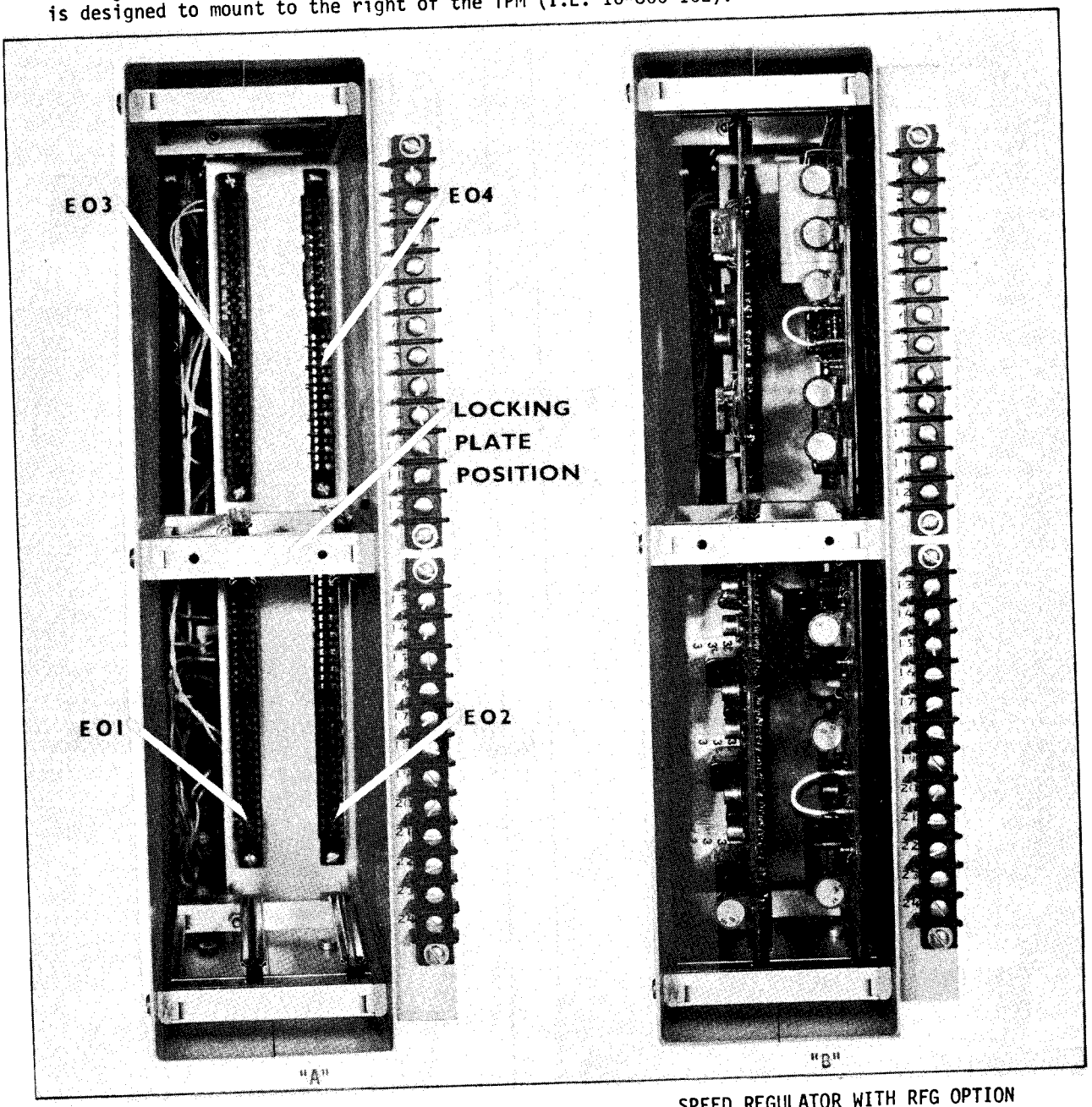
S-56 CAGE ASSEMBLY

I. INTRODUCTION

The cage assembly is used with all S-56 basic regulators (voltage, current, and speed), and is designed to mount to the right of the TPM (I.L. 16-800-102).



WITH NO CARDS

SPEED REGULATOR WITH RFG OPTION CARDS IN PLACE

CAGE ASSEMBLY
FIGURE 1

Combinations of four, plug-in type, printed circuit boards are used to provide the functions required by the regulators. The four boards are:

E01 --- S-56 gate pulse generator --- I.L. 16-800-105
E02 --- S-56 current controller and gate pulse suppression --- I.L. 16-800-106
E03 --- S-56 voltage controller --- I.L. 16-800-107
E04 --- S-56 speed controller and ramp-function generator --- I.L. 16-800-108.

Regardless of the type of regulator, the cards--when required--will occupy the positions shown in Figure 1A.

A plastic insert is positioned in the AMP terminal block and pc cards are keyed to prevent them from being put in improper cage positions. Rails are provided to aid insertion; and in conjunction with a locking plate fastened over the front edge of the cards, securely hold them in place.

Figure 1B is a front view of a speed regulator cage and cards with the ramp-function generator option. For voltage or current regulators, the E04 position would be used only if the ramp-function generator option were supplied.

II. DESCRIPTION

In addition to providing support for printed circuit cards, the following equipment is mounted in the rear of the basic regulator cage assembly as shown in Figure 2.

(a) interconnections
(b) zener regulators and filters
(c) pulse transformers
(d) resistor board
(e) gate control transformer.

A. Interconnections

Terminal blocks and wiring harnesses are identified by the letter A in Figure 2 and explained in detail below.

A1. High-voltage terminal block through which three-phase ac power is connected to the primary of the gate control transformer.

A2. Front accessible, 24-point, terminal block through which all required control inputs and outputs are taken.

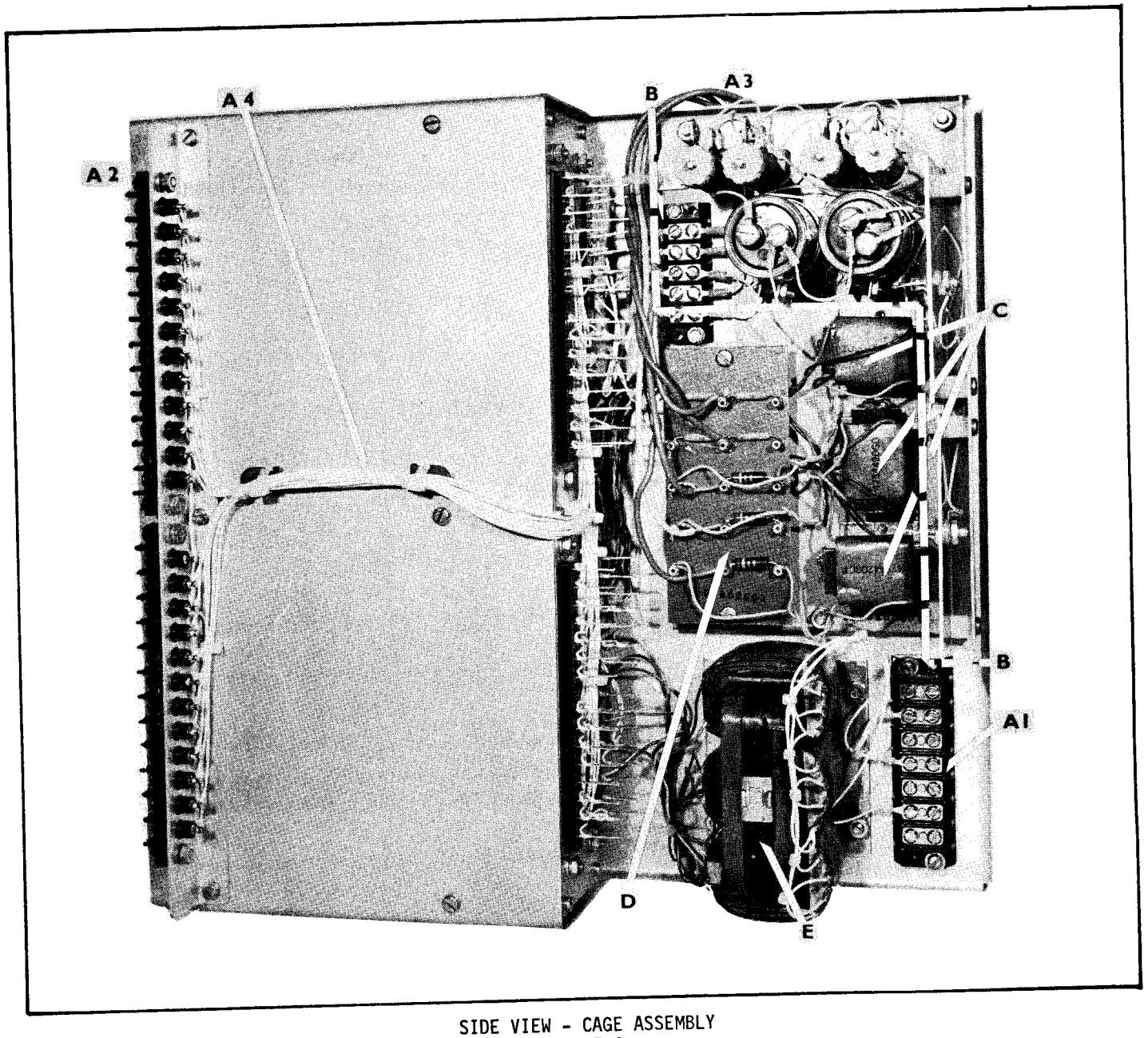
A3. Prewired five-cable harness which interconnects the TPM and regulator. Included in the cable are three, shielded, color-coded leads for transmission of gate pulses, and a twisted pair to complete voltage feedback.

A4. Standard wiring harness which interconnects modules and components within the cage assembly. The harness is invariant regardless of the regulator type.

B. Zener Regulators and Filters

Diodes mounted on the E01 pc board and the gate control transformer comprise two, six-phase, star rectifiers. The ±75V unregulated output from these rectifiers are supplied to π-type filters and zener regulators in the rear of the cage assembly to generate ±24V for controller modules. See Figure 3.

Current available from PSP or PSN (terminals 11 and 10 of the 24-point block) for use external to the basic regulator is limited to 50 ma with speed regulators and 100 ma with voltage or current regulators. Should additional power be required for reference circuits or options, or if regulation better than 2% be needed, it must be obtained from a power supply packaged externally.



SIDE VIEW - CAGE ASSEMBLY
FIGURE 2

AC power must not be applied for extended periods of time with only the gate pulse generator card (E01) inserted. This forces the zener diodes to carry rated current which they are not designed to do. If such operation is required, dummy load PSP and PSN externally with $\approx 200\Omega$.

C. Pulse Transformers

Gate pulses are coupled from the gate pulse generator to thyristors in the semiconverter by three isolation pulse transformers mounted as shown in Figure 2. Double secondaries are provided when paralleling TPMs.

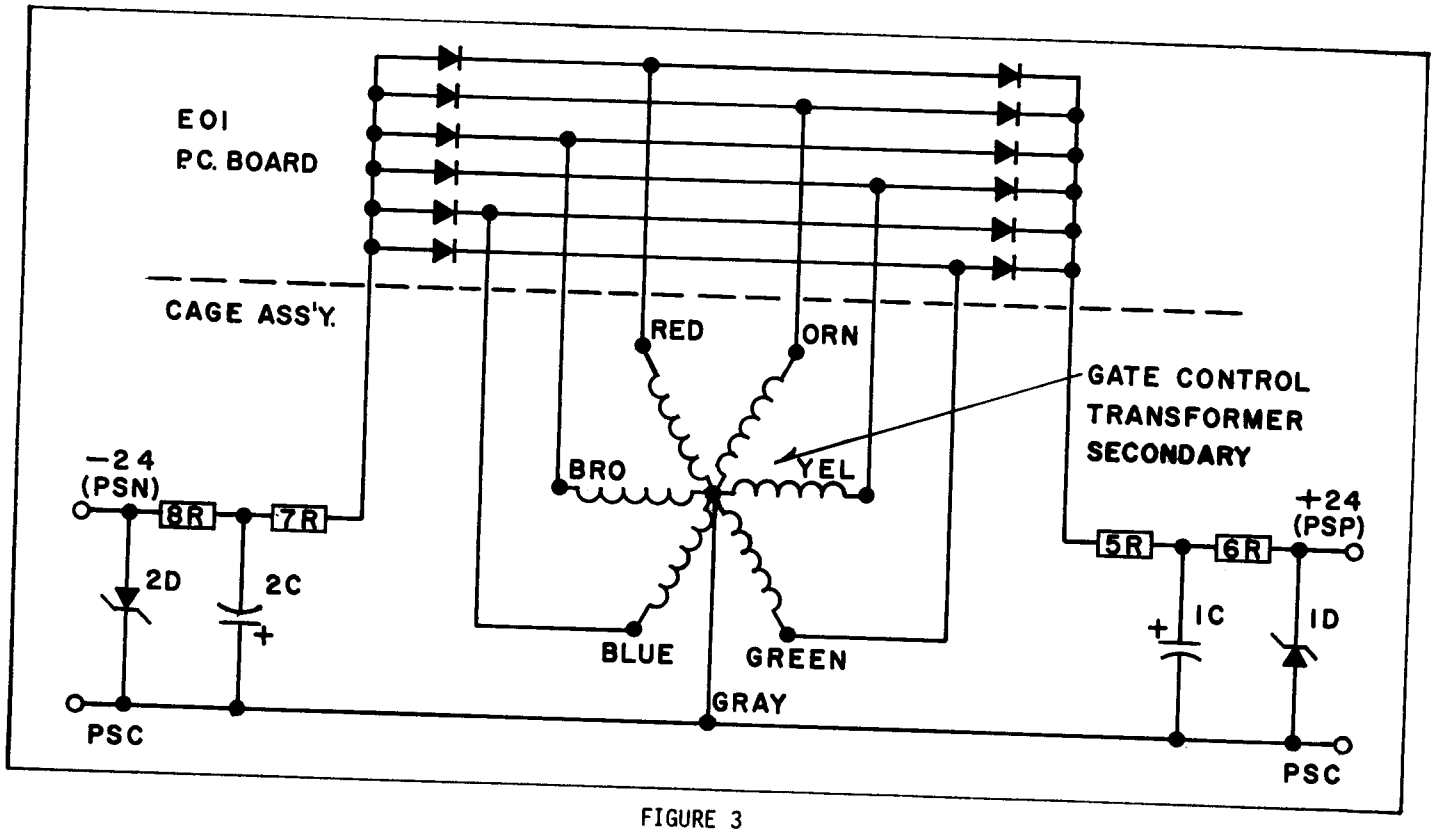


FIGURE 3

D. Resistor Board

Resistors on this pegboard limit peak power supplied to thyristor gates, and complete the differential voltage feedback loop. Figure 4 shows the resistors relative to the system and outlines the combinations which may exist.

By changing resistors on the pegboard, the E01 and E03 pc boards are kept the same regardless of thyristors size or TPM voltage output.

When paralleling TPMs, a second resistor board is mounted above the one described to hold three additional series limiting resistors for thyristor gates.

E. Gate Control Transformer

Main power transformers feeding S-56 systems may be either wye-wye (autotransformers) or wye-delta (isolation transformer) connected. To insure proper phasing (see I.L. 16-800-105), the gate control transformer must be available in wye-wye or delta-wye configurations. Similarly, various primary voltages can be present, and these must be transformed to the required 60-volt rms, line-to-neutral voltage at the input to the gate pulse generator.

Four, standard, cage assemblies exist which accommodate the most frequently-encountered line voltages and these are listed in Figure 5.

Subgrouping within these drawings allow the resistor board assembly (previously described) to be changed for appropriate size of voltage feedback resistance and series resistance in the secondaries of the gate pulse transformer.

III. SERVICE

Operation of the basic regulator cage assembly may be quickly checked using an oscilloscope, multimeter, and information contained in relative instruction leaflets.

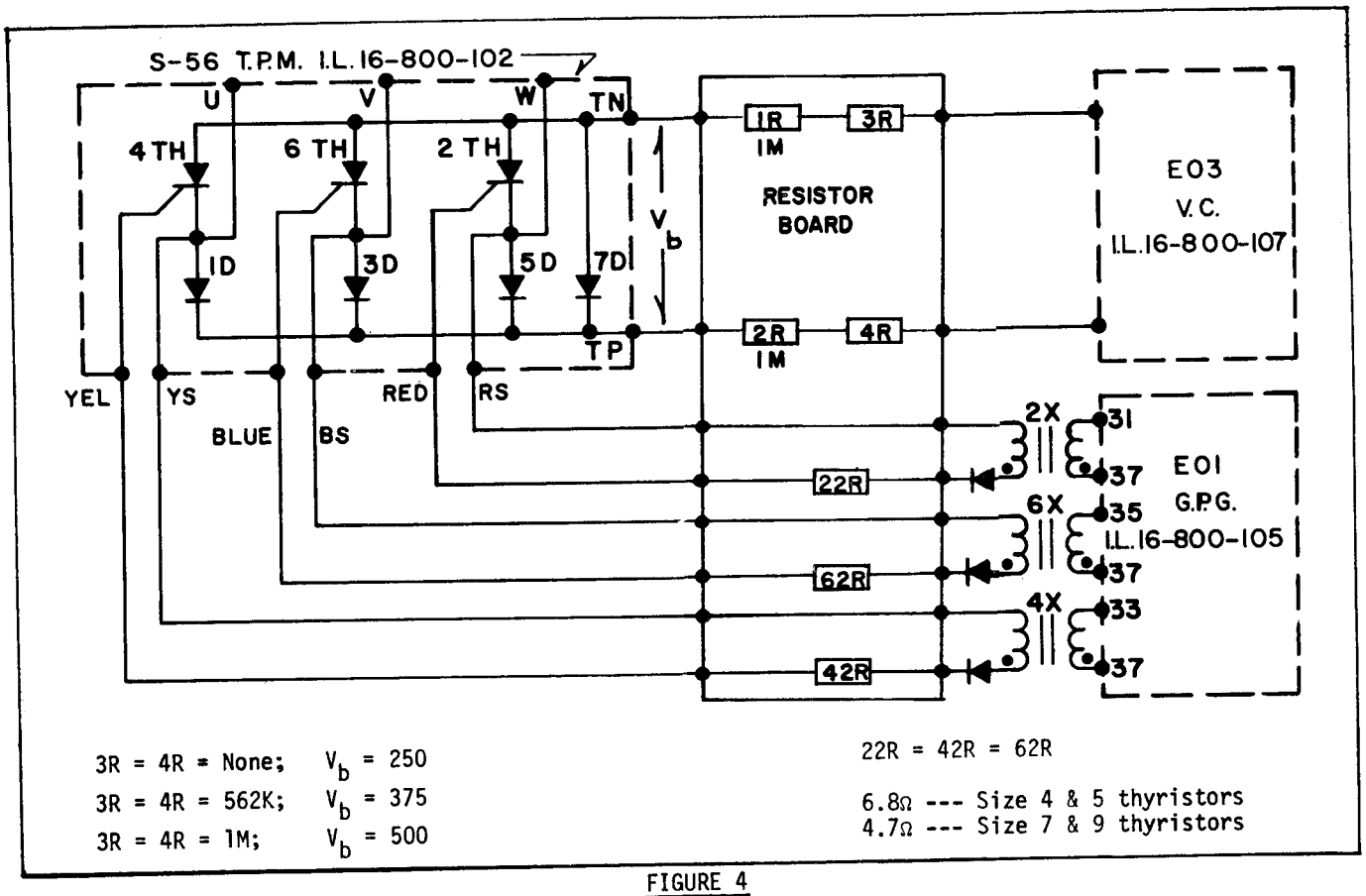


FIGURE 4

Cage Assembly	AC Primary Line Voltage	Frequency	Main Transformer Connection	Gate Control Transformer
1298A65	230/460	60 Hz	Wye-Wye	475A462G01
1298A66	380/550	50/60 Hz	Wye-Wye	475A462G02
1298A67	230/460	60 Hz	Wye-Delta	475A461G01
1298A68	380/550	50/60 Hz	Wye-Delta	475A461G02

FIGURE 5

With ac power applied, check:

(1) Phasing and amplitude of line-to-neutral voltages from the gate control transformer secondary. Leads from the transformer are color coded (using resistor color code designation) and brown-to-neutral (gray) should lead red to neutral by 60°, red to neutral lead orange to neutral by 60°, ... green to neutral lead blue to neutral by 60°.

(2) Output characteristics of thyristor gate pulses should be checked per I.L. 16-800-105.

Should a complete TPM or S-56 cage assembly be received as a replacement part, check the polarity of gate pulses at the terminal block located at the top front of the TPM. The gate of thyristor 2TH, 4TH, and 6TH must receive a positive pulse with respect to the cathode or the amplifier will not phase on. If the gate does not receive a positive pulse interchange gate and cathode leads from the thyristors to the terminal block.

Diodes mounted on the pulse transformers (see Fig. 4) were not part of units shipped prior to June 1968 and the shields of the color coded cables from the cage assembly were positive hence connected to the gate leads of 2TH, 4TH, and 6TH.

(3) Presence of ±24 volts from zener regulators.

Remaining problems in the assembly (open feedback resistors, faulty connections, etc.) may be found in continuity checks.

Semiautomatic equipment is available at the factory to test performance and wiring of the cage. Major repairs are facilitated by returning the assembly to:

Westinghouse Electric Corporation
Industrial Systems Division
P. O. Box 225
Buffalo, New York 14240