COMMONWEALTH OF AUSTRALIA

NATIONAL STANDARDS COMMISSION

Weights and Measures (National Standards) Act 1960-1966

Weights and Measures (Patterns of Instruments) Regulations

Certificate of Approval

CERTIFICATE NUMBER 6/9C/15

In respect of the pattern of

Avery Self-indicating Weighing Instrument of 999-lb Capacity and Variants.

Submitted and manufactured by: W. & T. Avery (Aust.) Pty. Ltd.,
3-5 Birmingham Avenue,
Villawood,
New South Wales. 2163.

This is to certify that the pattern and variants of the instrument illustrated and described in this Certificate have been examined by the National Standards Commission under the provisions of the abovementioned Regulations and have been approved as being suitable for use for trade.

The pattern and variants were approved on 23rd May 1972.

Approval was granted on condition that:

1. all instruments conforming to this Certificate:

   (a) are appropriately marked NSC No 6/9C/15 and, where required by State legislation, with the State approval number also; and

   (b) comply with the General Specifications for Measuring Instruments to be Used for Trade, in respect of that

Cont'd over

part of the instrument which was not previously approved by a State;

2. the Commission is notified‡ of the location and serial number of the first ten instruments fitted with digitizers and conforming to the pattern and variants, which are submitted to State or Territorial Weights and Measures Authorities for verification;

3. the Commission may re-examine any instrument after verification; and

4. the instruments are tested in accordance with the test procedure described in this Certificate.

This Certificate comprises:

Pages 1 to 8 dated 30th May 1972.
Figures 6/9C/15 - 1 to 20 dated 30th May 1972.

Pursuant to regulation 12 of the abovementioned Regulations, this Certificate is applicable in all States, in respect of instruments fitted with Component No 19.

Date of issue 30th May 1972.

Signed

A person authorized by the Commission to sign Certificates under the abovementioned Regulations.

‡ Inspectors shall not verify any instrument conforming to the pattern and variants until advice that this condition has been complied with has been received in writing from the Pattern Approval Laboratory

DESCRIPTION OF PATTERN

The pattern is of a self-indicating weighing instrument of 999-lb capacity (see Figure 2). An Avery digitizer, fitted with a digital indicator, is attached to the weighing machine, and the dial and the digital indicator are graduated to 999 lb by 1-lb increments. The instrument comprises the components tabulated in Column 5 of Figure 1.

DESCRIPTION OF VARIANTS

The components tabulated in Columns 6, 7 and 8 of Figure 1 make up the variants of the pattern with capacities up to the capacities of the baseworks described in Components Nos 1, 2 and 5.

DESCRIPTION OF COMPONENTS

1. Two-lever system (see Figures 3 and 4) — consists of two second-order main levers with knife-edges mounted in machined grooves and held in position by studs passing through the lever into the back of the knife-edge block (see Figure 5). The two levers are coupled by a self-aligning link and the nose-end of the long lever is coupled to the headwork pullrod. The platform stool is fitted with self-aligning bearings which seat on the load knife-edges of the main levers (see Figure 5). The capacity is limited to 2240 lb.

2. Three-lever system (see Figures 6 and 7) — consists of three fabricated second-order levers with knife-edges mounted as described in Component No 1. The two short levers are coupled by self-aligning links to the long lever, the nose-end of which is coupled to the headwork pullrod. The platform stool is as described in Component No 1. The capacity is limited to 2240 lb.

3. Lever suspension (see Figures 8 and 9) — the long lever fulcrum knife-edges seat in self-aligning bearings fixed to the frame; the short lever fulcrum knife-edges seat in self-aligning bearings mounted in swinging links suspended from the frame.

4. Ball-bearing platform supports (see Figures 10 and 11) — constructed as integral units which are screwed into the platform and locate in recesses in the top of the platform stool described in Component No 1.

5. The basework of any State-approved pattern* or Commission-approved pattern.

6. Pillar headwork — described in Certificate No 6/9C/10.

7. Headwork cabinet — any cabinet described in Certificate No 6/9C/10, provided that, if it is fitted with unit-weight depositing mechanism described in Certificate No 6/9C/10, microswitches are fitted to the mechanism so that for each unit weight a signal is transmitted to the digitizer to indicate the appropriate digit on the digital indicator.

8. Spring-resistant mechanism Type CLA (see Figure 12) — described in Certificate No 6/9C/10. In addition to the dial and indicator, an analogue voltage generator, a motion detector, and an indicator clamp are fitted. The resistant mechanism with the analogue voltage generator is suitable only for dials with up to 3.0 graduations per degree.

   The analogue voltage generator (AVG) (see Figure 12) comprises a shaft mounted in ball races, fitted with a solenoid-actuated wiper brush on one end, the indicator on the other end, and surrounded by a single-turn resistor connected across a stabilized voltage source; the AVG replaces the original indicator shaft. When energized, the solenoid causes the wiper brush to contact the resistor and pick off a voltage which is proportional to the angular displacement of the indicator shaft and, therefore, proportional to the indicated weight.

   The motion detector (see Figure 12) comprises a first-order lever mounted on a flexure-plate fulcrum support and balanced by an adjustable ball so that the end of the lever is midway between two fixed electrical contacts when the system is at rest. Movement of the headwork pullrod is transmitted through a dashpot and its piston to the lever.

   The dashpot is fixed to the pullrod and the coupling between the

* Approved pursuant to regulation 12.

dashpot and its piston is adjustable. The coupling is adjusted so that, when the load on the platform is changed by a load equivalent to $1\frac{1}{2}$ graduations, the lever will touch one of the electrical contacts. Contact is indicated by a light, described in Component No 13, on the control panel. The motion detector is contained within a metal enclosure sealed by a lead plug (see Figure 13).

An indicator clamp (see Figure 20) comprising a metal disc mounted on the AVG shaft, which is held by an electro-magnet when the AVG solenoid is energized, prevents indicator oscillation and thus wiper-brush movement when the wiper brush is in contact with the resistor.

9. Spring-resistant mechanism Type CFA — described in Certificate No 6/9C/10, is fitted, in addition to the dial and indicator, with the AVG, the motion detector and the indicator clamp described in Component No 8. The resistant mechanism with the AVG is suitable only for dials with up to 3.0 graduations per degree.

10. Pendulum-resistant mechanism Type CGA — described in Certificate No 6/9C/10, is fitted, in addition to the dial and indicator, with the AVG, the motion detector and the indicator clamp described in Component No 8. The resistant mechanism with the AVG is suitable only for dials with up to 3.0 graduations per degree.

11. Digitizer unit (see Figures 14 and 15) — converts the analogue voltage from the AVG in the headwork to a digital form for display on a digital indicator.

    Referring to Figure 16, a stabilized power supply produces an AC voltage which is applied to the AVG on the indicator shaft, and to a resistance network in the digitizer. The AVG output voltage, which is proportional to the indicated weight, is compared to the output voltage of the resistance network. The voltage difference causes a group of stepping switches to vary the selected tapping on the resistance network in digitally related steps until the two output voltages are equal. The position of the stepping switches is then displayed on the indicator.

    The digitizer is provided with the following interlocks to prevent incorrect operation:

(a) The selected unit weights (if fitted) must be fully deposited before digitizing can take place.

(b) The digitizing sequence and display will not take place if the indicator is beyond the range of the dial.

(c) If there is an error in the digitizing signal, for example, if the indicator moves after the sequence has started, the digitizer will not display and will automatically reset.

The digitizer resets automatically 6 seconds after the "start" button is pressed if the sequence is interrupted in any way, for example, interruption of the AVG voltage supply.

The digitizer has three sets of adjustable potentiometers which are covered and sealed as shown in Figure 17 by three lead-and-wire seals.

In the case of the span and zero resistance network printed circuit boards, the wire is looped around the digitizer frame and passes through holes in the panel and cover so that neither the circuit board nor the potentiometer covers can be removed.

12. Digital indicator (see Figure 14) — comprises neon-lighted digits not less than 16 mm high and a neon decimal point, where necessary; a specular reflection shield is fitted. The increment on the digital indicator shall not be less than the graduation value on the dial.

13. Control station (see Figure 14) — the push-button control station is operated in the following manner:

(a) The "mains on" button is operated.

(b) After the load has been placed and any necessary unit weights added, the "start" button is pressed.

(c) The motion detector will prevent the digitizing sequence from initiating during the period the motion-detector lever is moving between the two inhibiting contacts due to the oscillation of the pullrod. A time delay further inhibits the digitizing sequence for at least 2 seconds after the contacts

in the motion detector open, or after the "start" button is pressed, to allow time for the natural decay of the indicator oscillation. The end of the time delay will be shown by a "settling" light which is illuminated while the indicator is oscillating, or by a "ready-to-weigh" light which is illuminated when the indicator is stationary.

(d) Operation of the "print" button causes the weight to be printed on a ticket.

14. Printer (see Figure 19) — known as Kienzle D24E parallel input printer, prints the weight and other non-weight information, such as date and code numbers. A sample ticket is shown in Figure 18.

15. Switching arrangement — allows the AVG outputs from more than one headwork to be fed separately to a single digitizer, in which case the headwork in use is automatically identified in a position adjacent to the digital indication.

16. Additional controls and indicators — more than one control station as described in Component No 13, and more than one indicator as described in Component No 12.

17. Inertia disc (see Figure 20) — fitted to the indicator shaft to provide inertial damping of short-duration indicator fluctuations due to an unsteady load.

18. Additional dashpot (see Figure 12) — attached to the resistant mechanism.

19. The headwork of any State-approved pattern* or Commission-approved pattern.

GENERAL NOTES

Test Procedure

To test that the digital conversion equipment is adjusted within tolerance and that all connections to various digital indicators have

* Approved pursuant to regulation 12.

been made correctly, it is necessary to ensure that, during the testing of an instrument, all available digits in each decade of the indicators are operating in the correct sequence.

The test loads shall be equivalent to each of the graduations in the following Table; the loads shall be applied successively in 1-graduation increments between each of the tabulated values:

000 graduations,	in 1-graduation increments,	to 009 graduations	
110	"	119	"
220	"	229	"
330	"	339	"
440	"	449	"
$550\frac{1}{2}$	"	$559\frac{1}{2}$	"
$660\frac{1}{2}$	"	$669\frac{1}{2}$	"
$770\frac{1}{2}$	"	$779\frac{1}{2}$	"
$880\frac{1}{2}$	"	$889\frac{1}{2}$	"
$990\frac{1}{2}$	"	$998\frac{1}{2}$	"

The method of digital testing is described in the General Specifications.

The indication on all indicators shall be identical and within tolerance.

For instruments with extra decades on the indicators it will be necessary to extend the test-weight programme.

FIGURE 6/9C/15 - 1

1	2	3	4	5	6	7	8
	COMPONENTS	DATE APPROVED	FOOT-NOTES	PATTERN	VARIANTS		
					1	2	3
	BASEWORK COMPONENTS						
1	Two-lever system (Figures 3 & 4)	23 MAY 72		*	A	A	
2	Three-lever system (Figures 6 & 7)	23 MAY 72			A	A	
3	Lever suspension (Figures 8 & 9)	23 MAY 72		*	*	*	
4	Platform support (Figures 10 & 11)	23 MAY 72		*	*	*	
	BASEWORKS						
5	State or Commission-approved	23 MAY 72					*
	HEADWORK COMPONENTS						
6	Pillar	23 MAY 72		*	B		B
7	Headwork cabinet	23 MAY 72			B		B
8	CLA resistant with AVG and dial (Figure 12)	23 MAY 72		*	C		C
9	CFA resistant with AVG and dial	23 MAY 72			C		C
10	CGA resistant with AVG and dial	23 MAY 72			C		C
11	Digitizer (Figures 14 & 15)	23 MAY 72		*	*		*
12	Digital indicator (Figure 14)	23 MAY 72		*	*		*
13	Control station (Figure 14)	23 MAY 72		*	*		*
14	Printer (Figure 19)	23 MAY 72			‡		‡
15	Switching arrangement	23 MAY 72			‡		‡
16	Controls and indicators, additional	23 MAY 72			‡		‡
17	Inertia disc (Figure 20)	23 MAY 72			‡		‡
18	Additional dashpot (Figure 12)	23 MAY 72		*	‡		‡
	HEADWORKS						
19	State or Commission-approved	23 MAY 72				*	

* - indicates required component
A, B, C - indicates alternative components, one only of each being required
‡ - indicates optional components

Compatibility Table for Components Described in this Certificate

FIGURE 6/9C/15 - 2

Avery Self-indicating Weighing Instrument
and Digitizer

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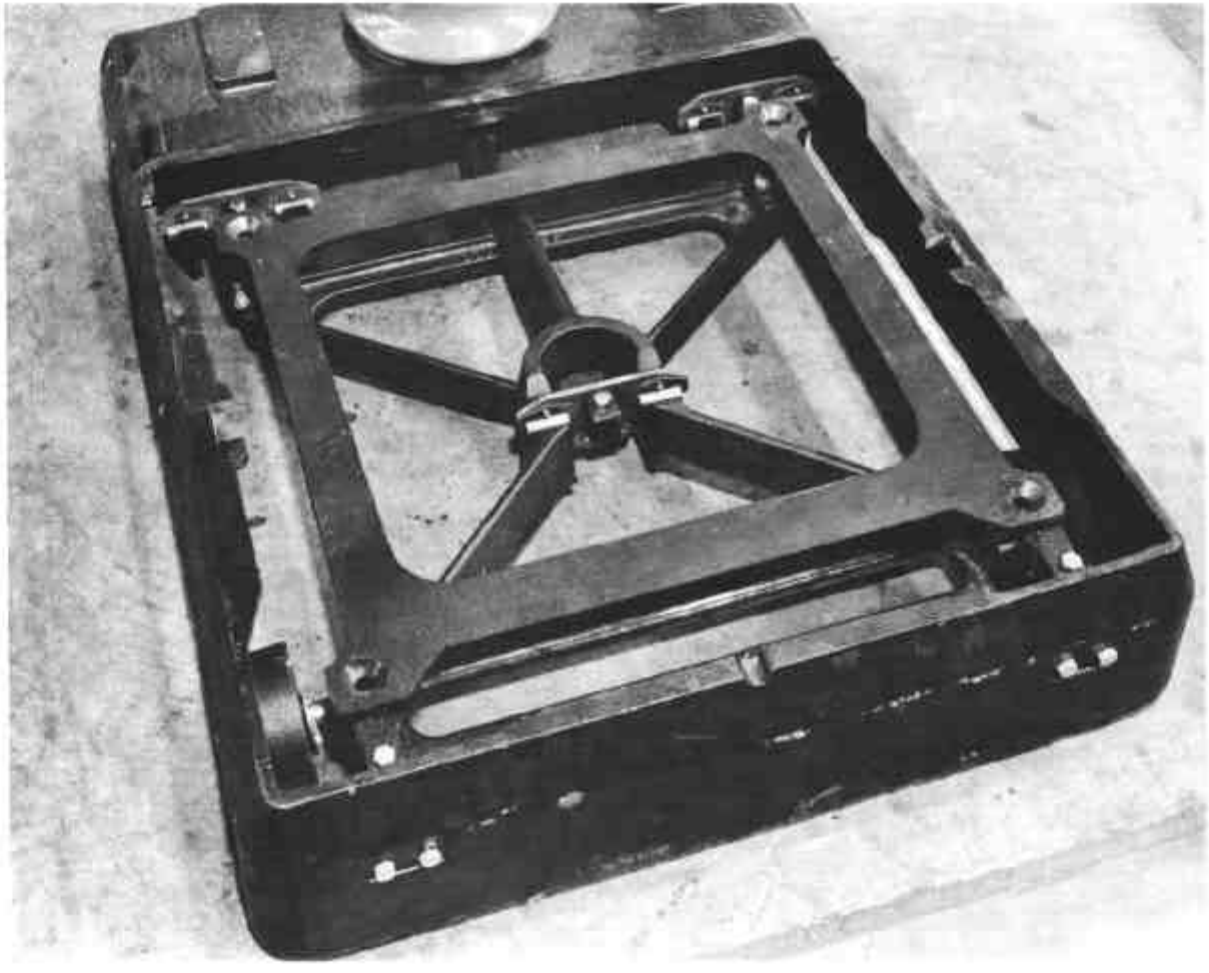
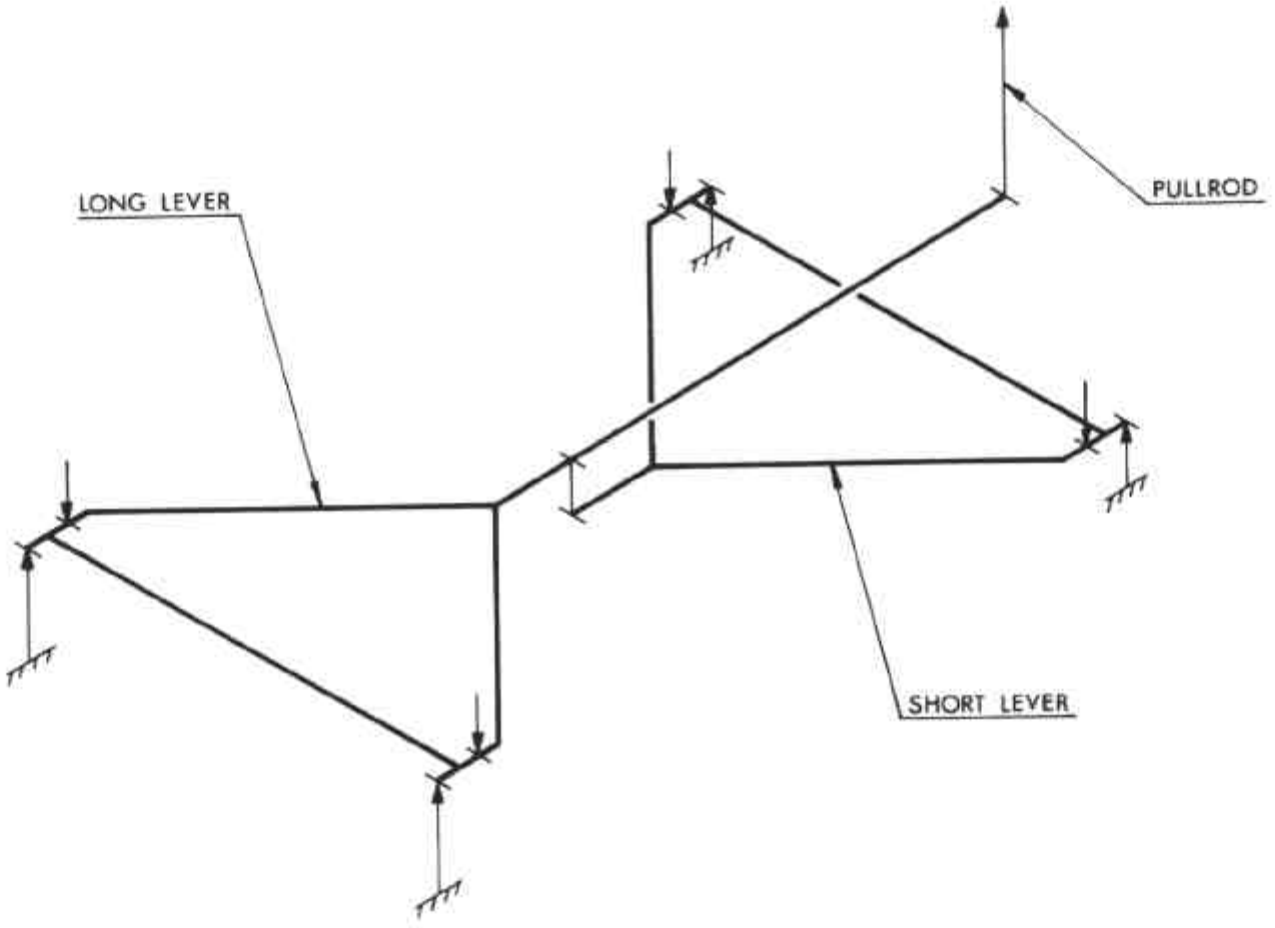
FIGURE 6/9C/15 - 3



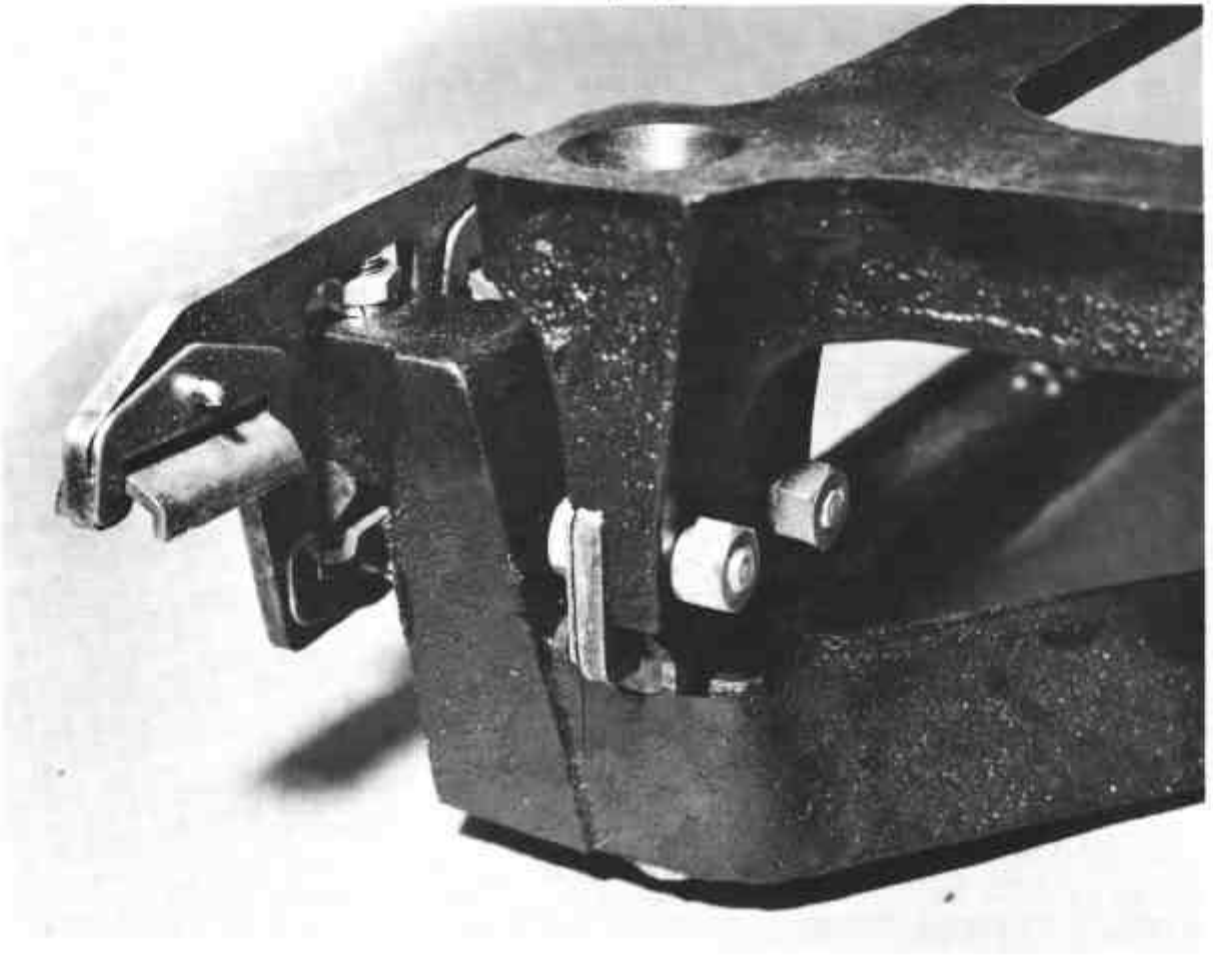
Two-lever System

FIGURE 6/9C/15 - 4



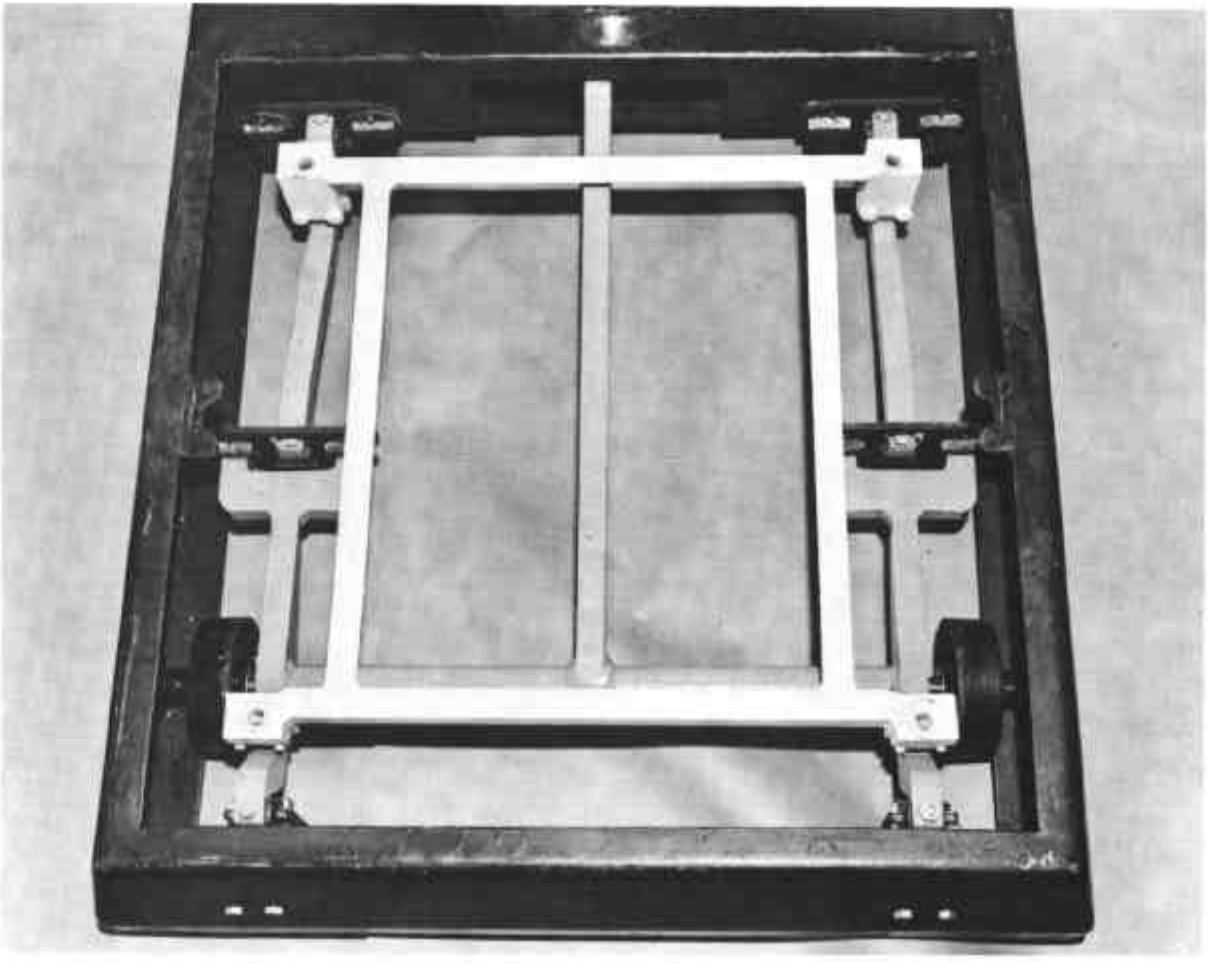
Two-lever System — Lever Diagram

FIGURE 6/9C/15 - 5



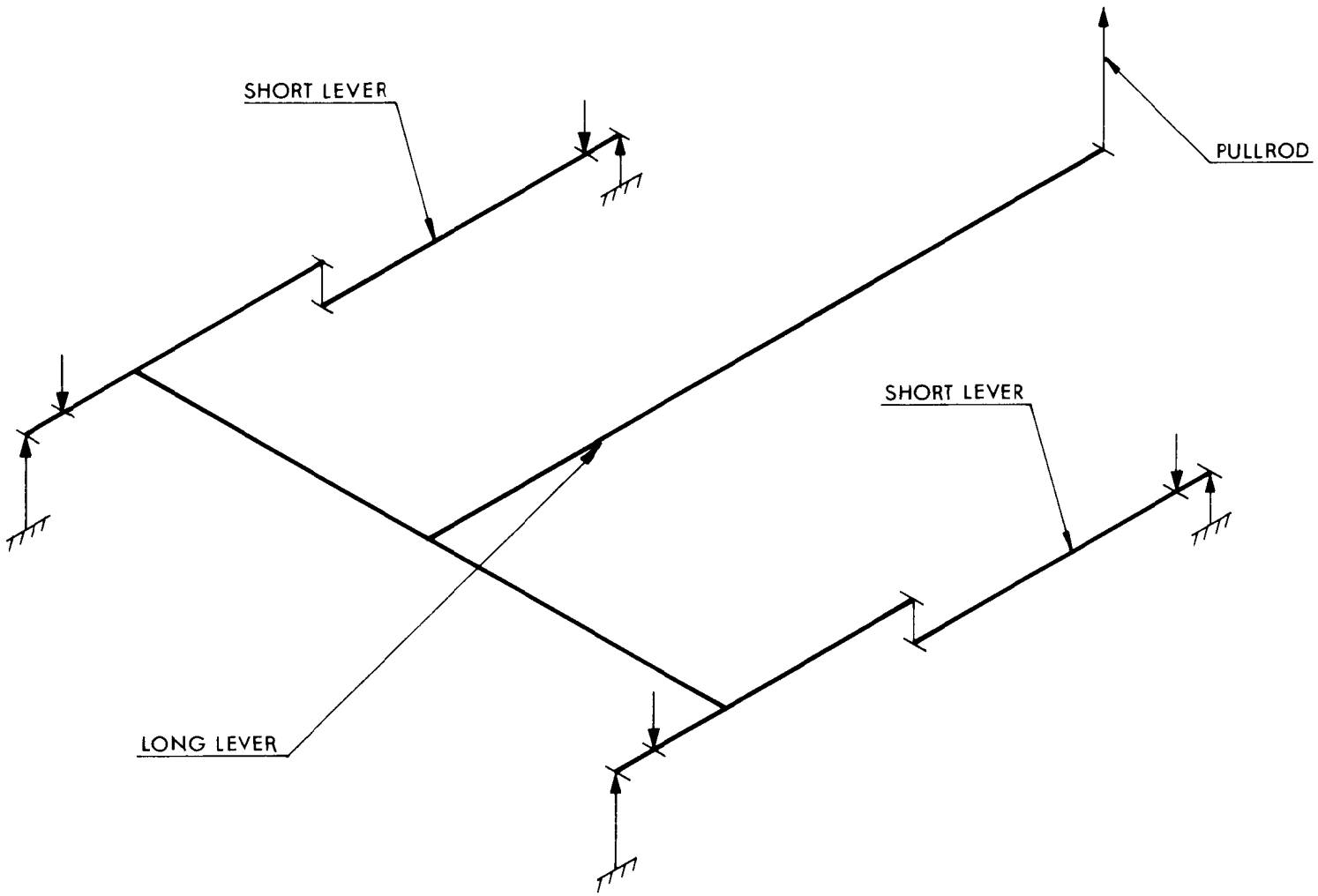
Load and Fulcrum Knife-edges and Bearings

FIGURE 6/9C/15 - 6



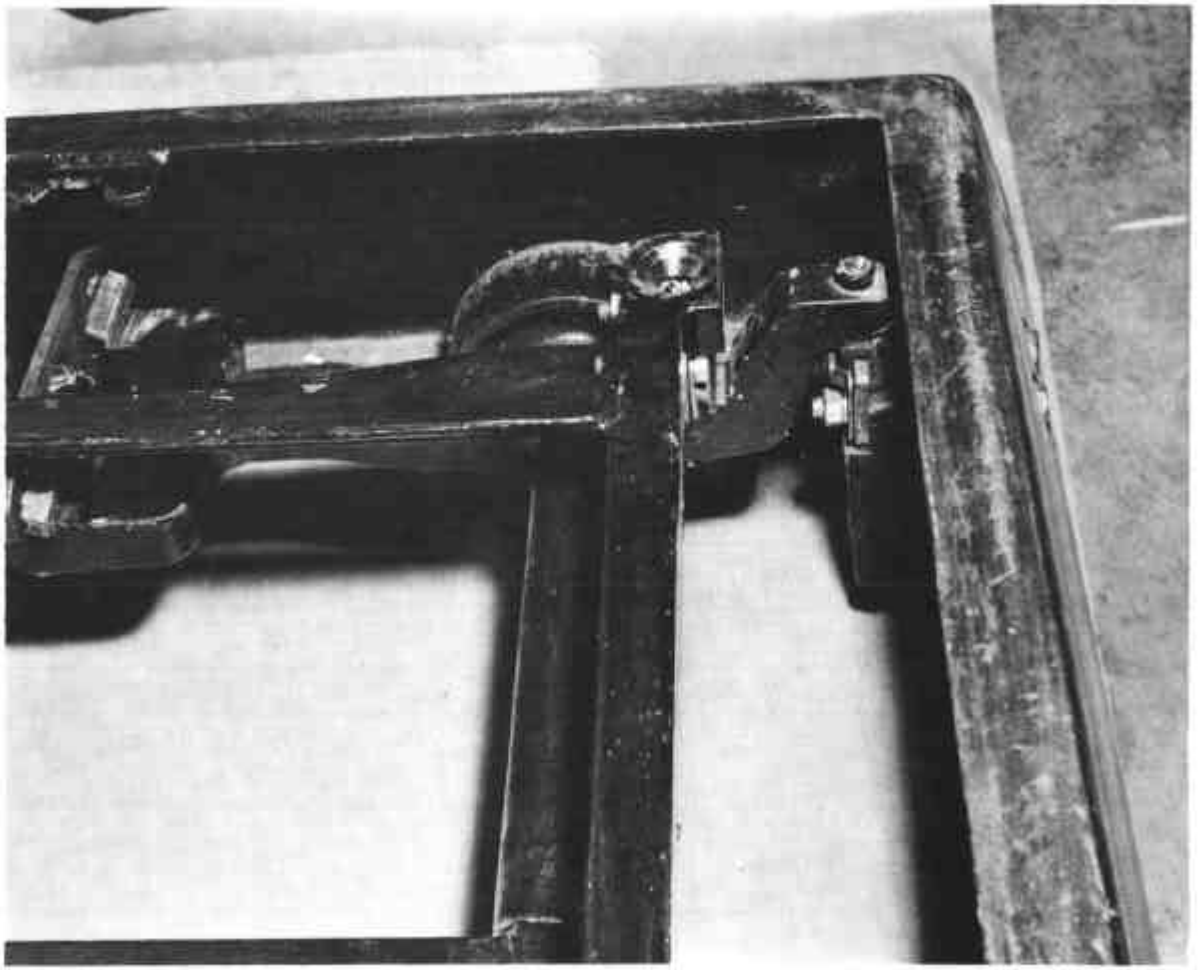
Three-lever System

FIGURE 6/9C/15 - 7



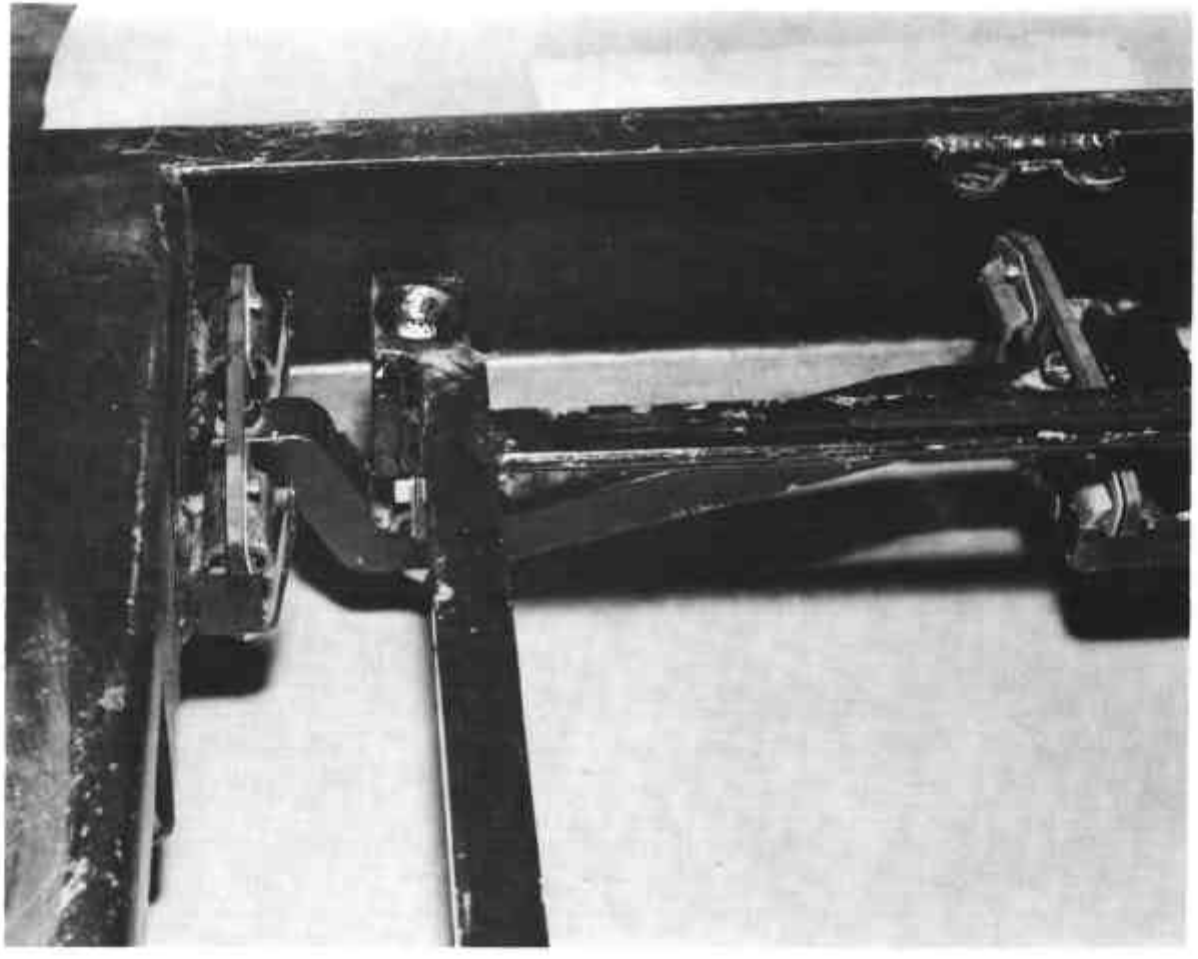
Three-lever System — Lever Diagram

FIGURE 6/9C/15 - 8



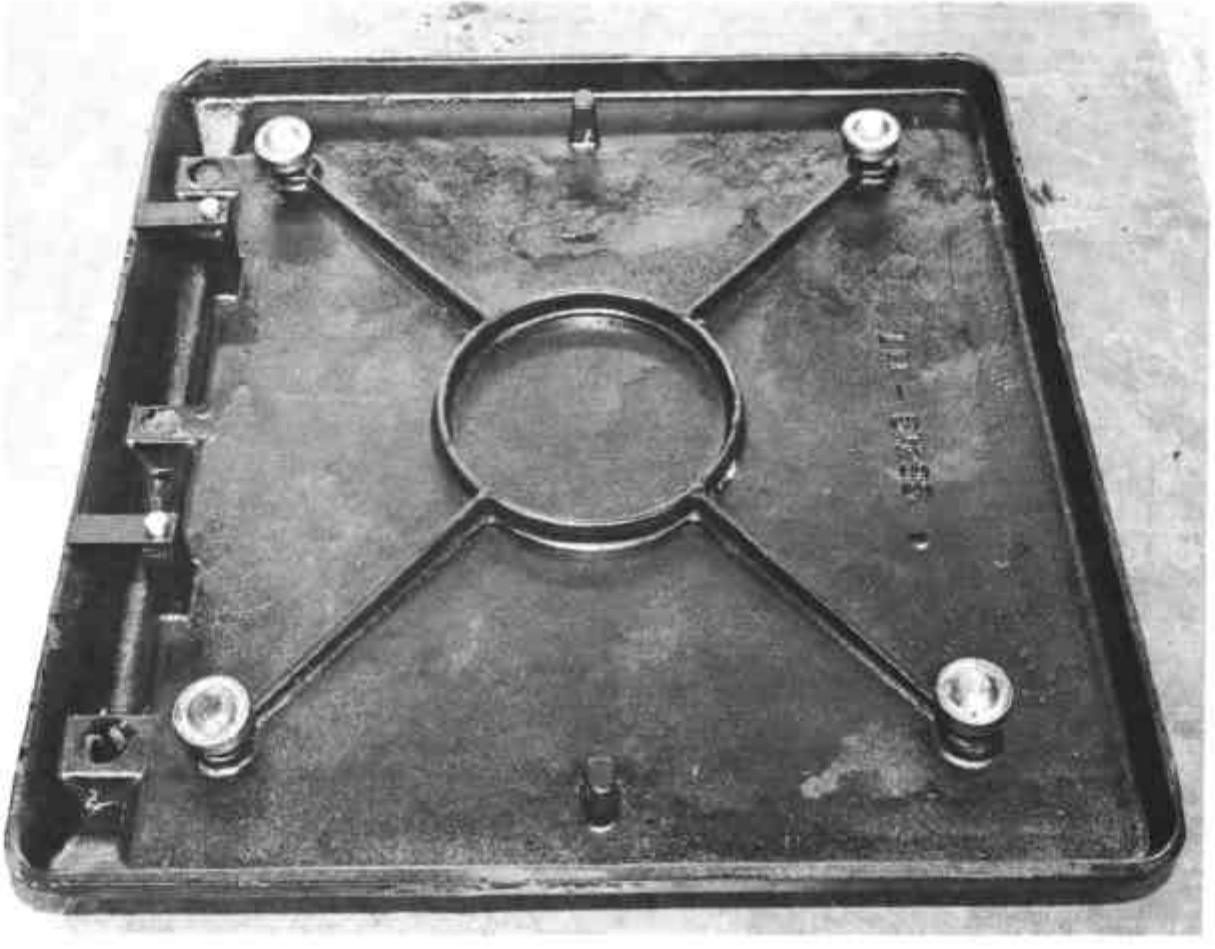
Long-lever Fixed Fulcrum Suspension

FIGURE 6/9C/15 - 9



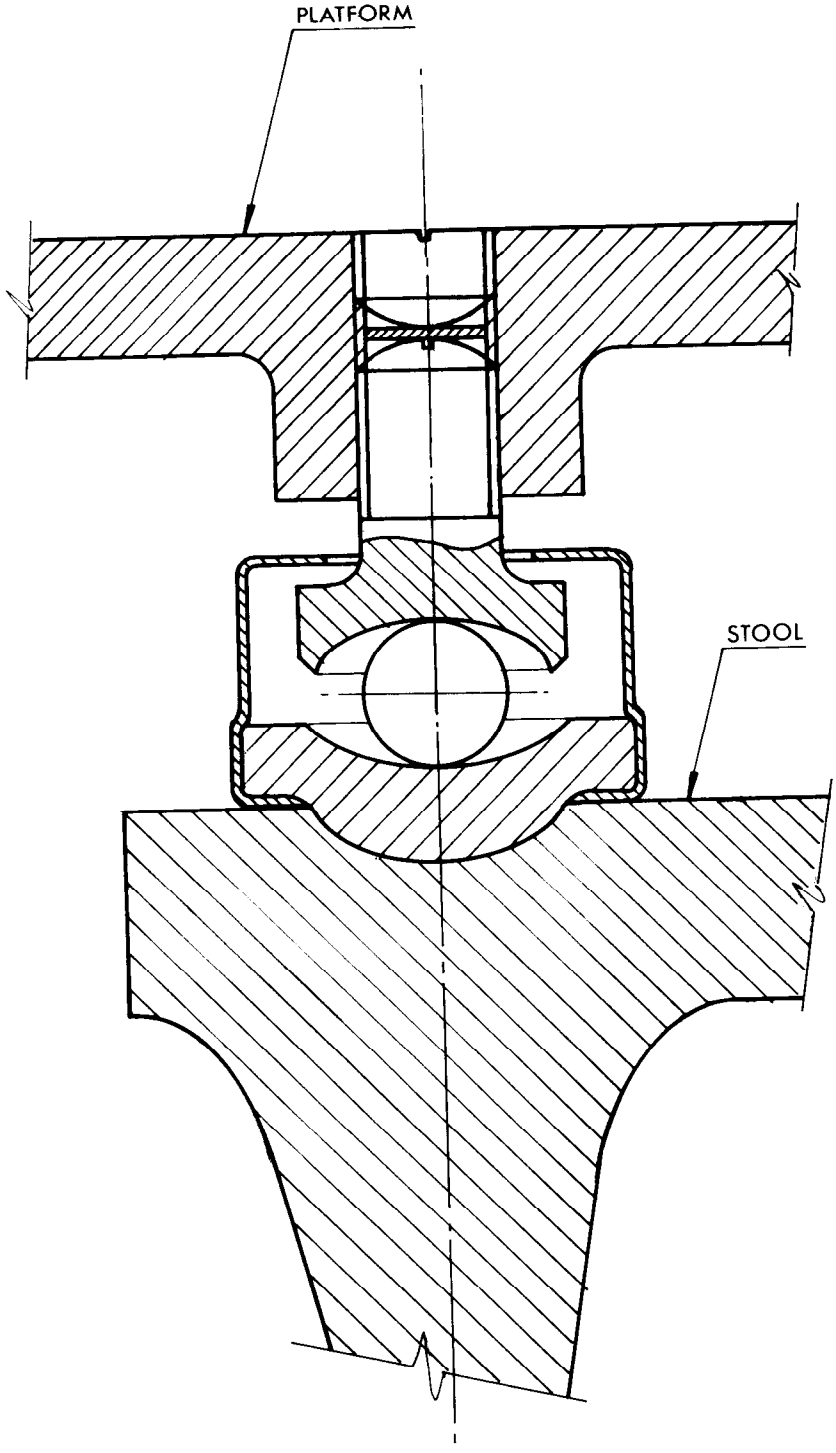
Short-lever Swinging-link Fulcrum Suspension

FIGURE 6/9C/15 - 10



Platform Supports (underside of platform)

FIGURE 6/9C/15 - 11



Detail of Platform Support

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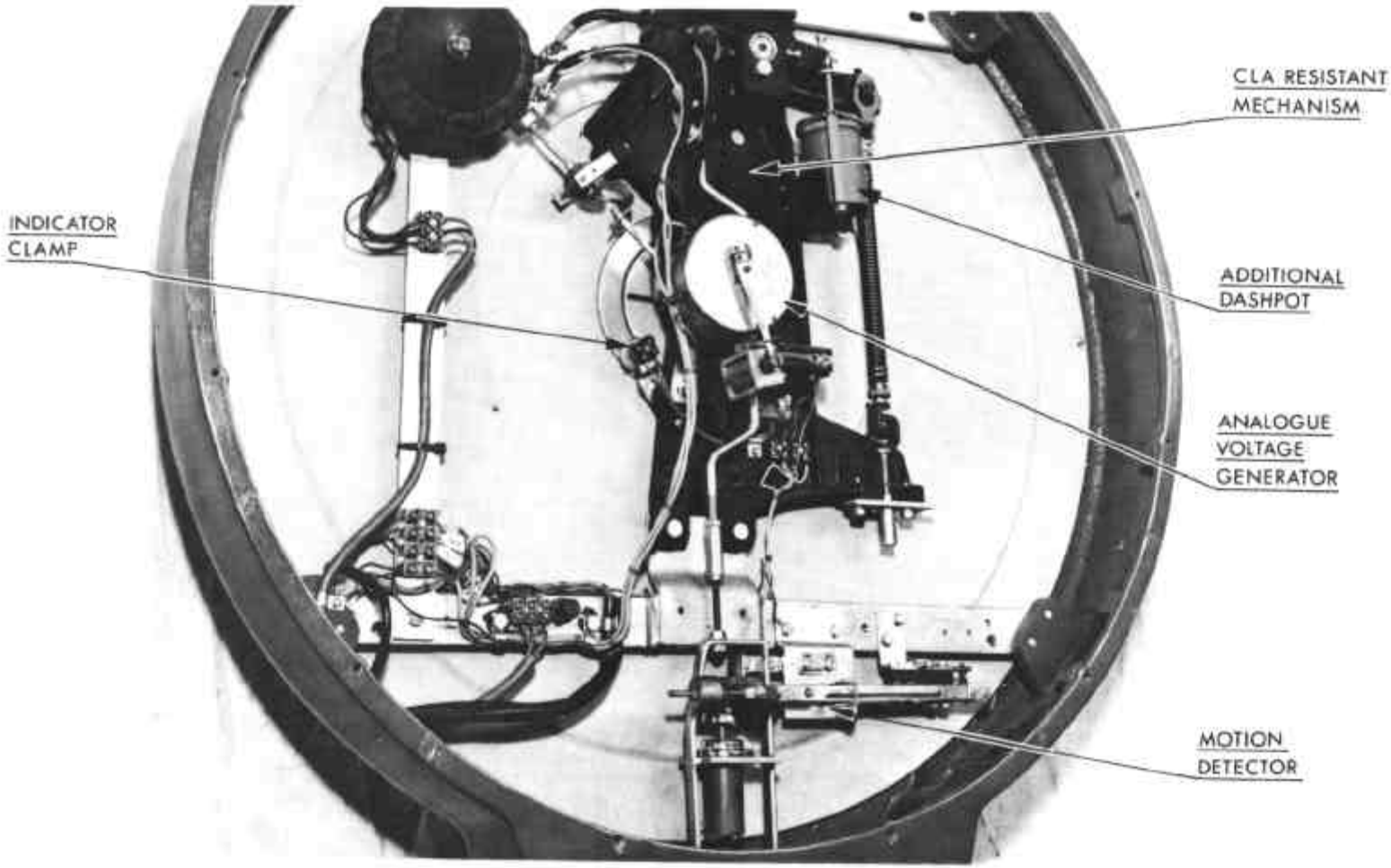
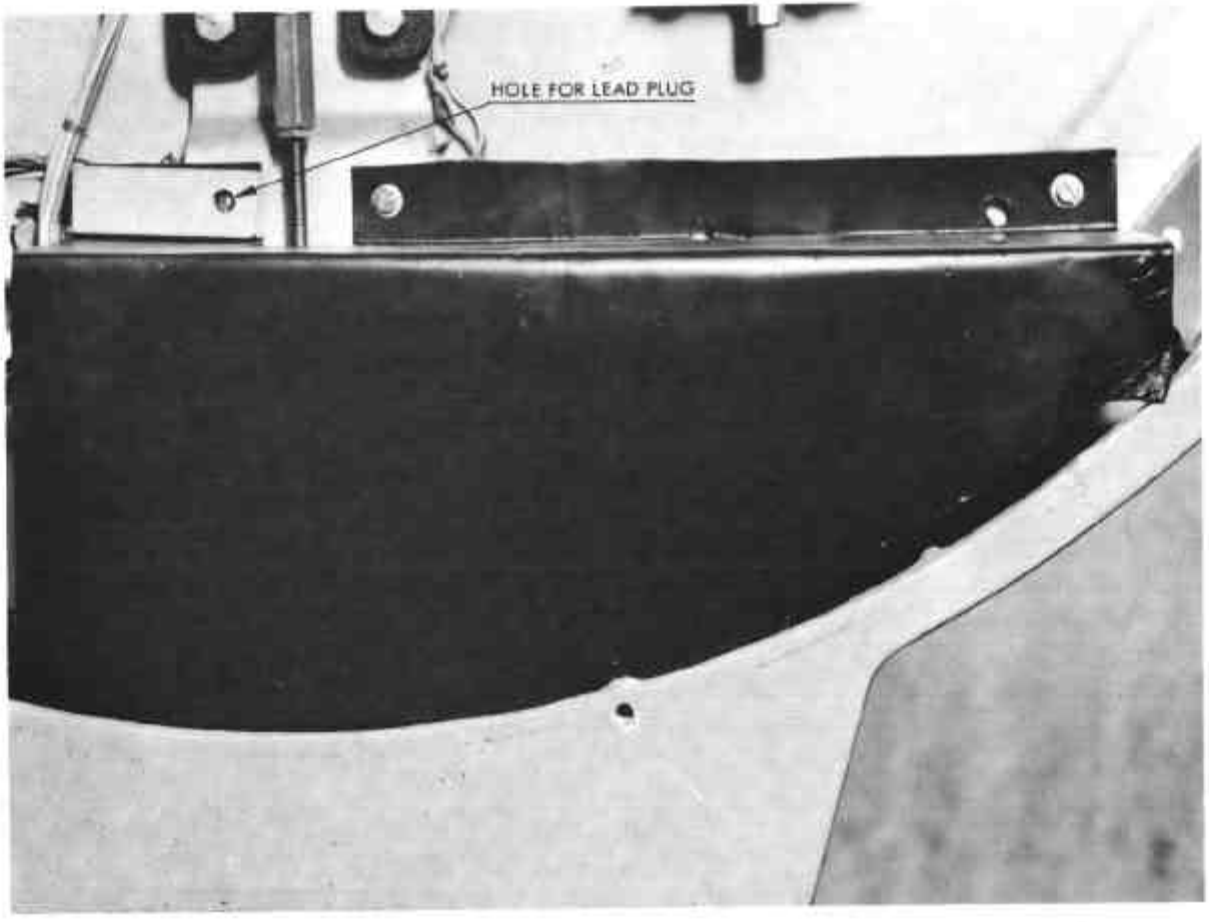
FIGURE 6/9C/15 - 12

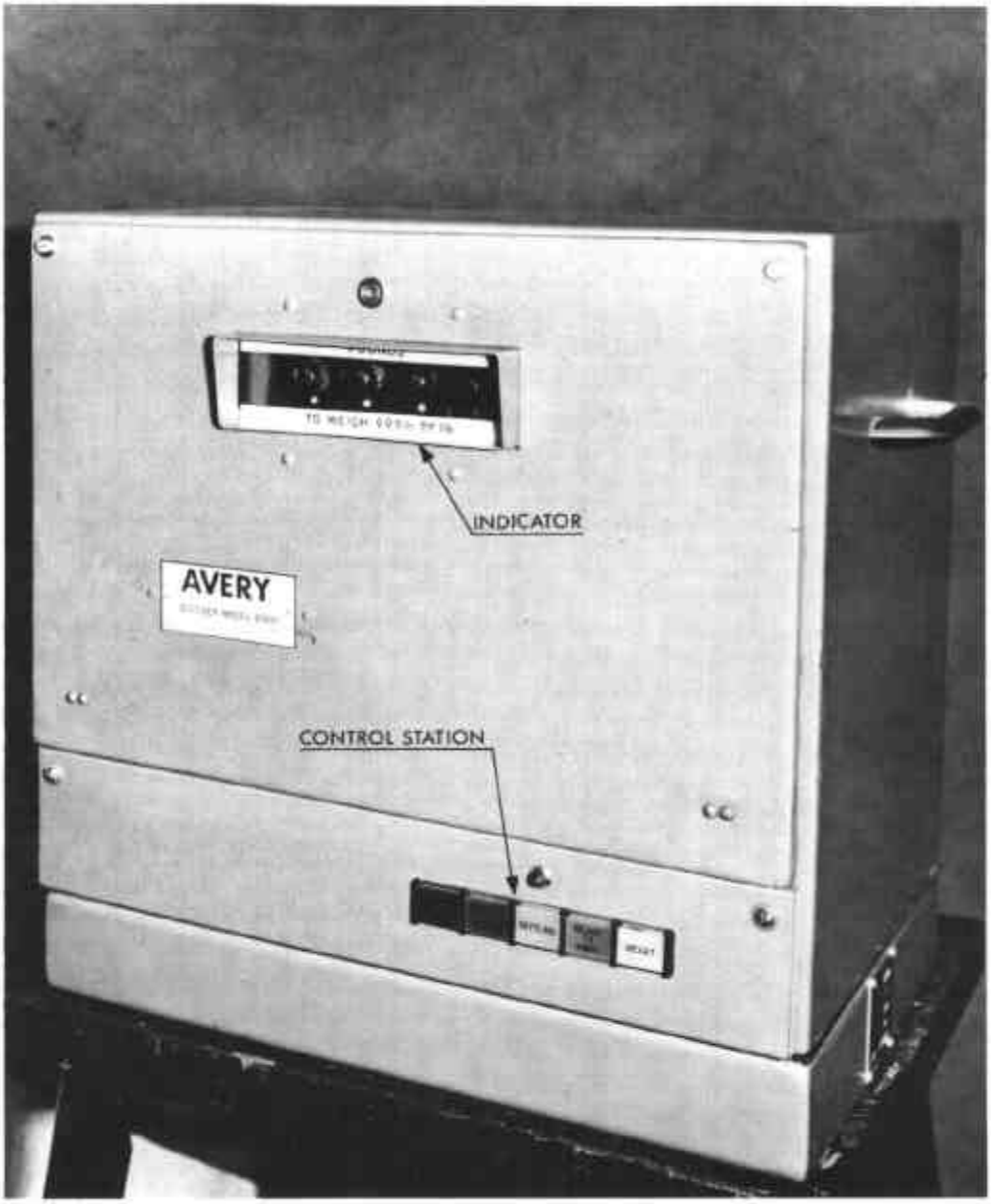


CLA Resistant Mechanism Fitted with Digitizing Equipment

FIGURE 6/9C/15 - 13

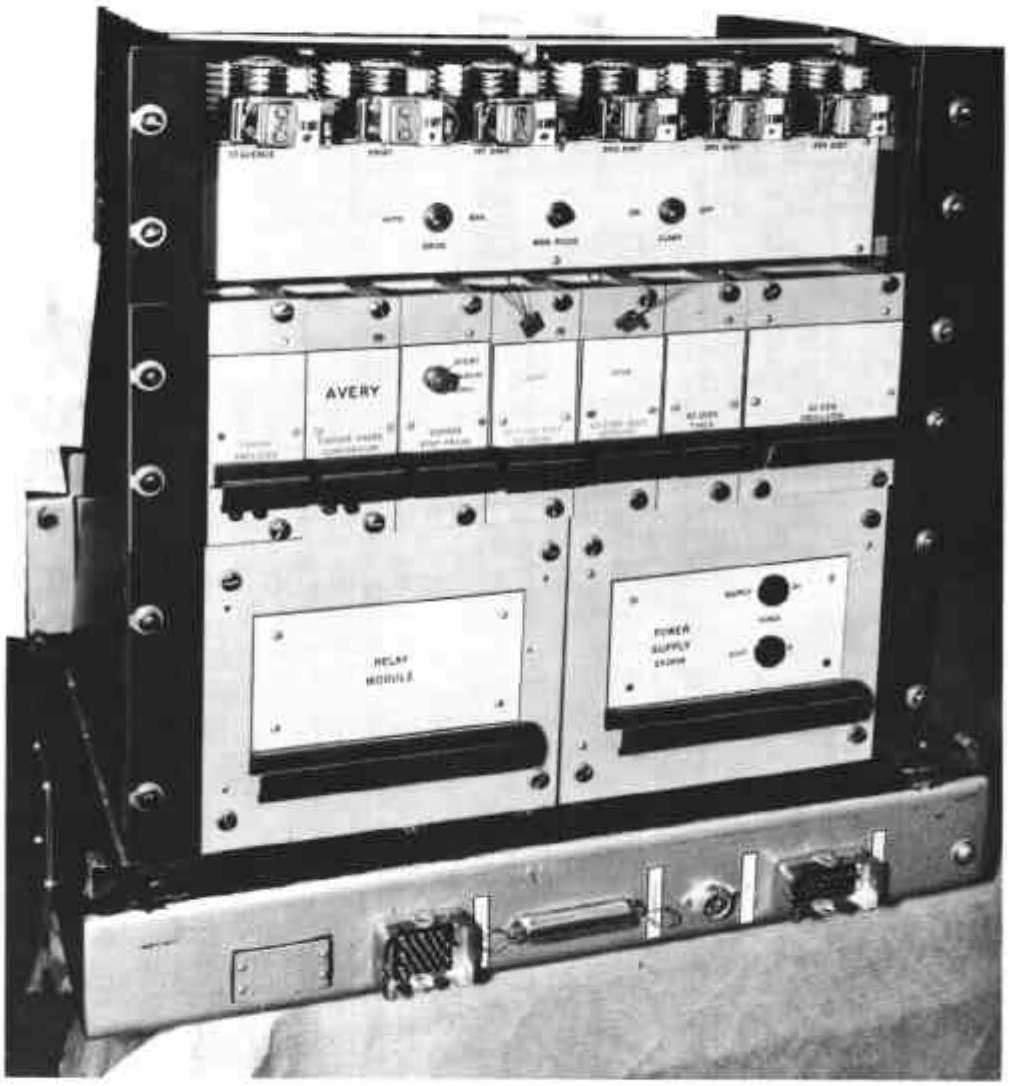


Lead-plug Sealing for Motion Detector



Avery Digitizer

FIGURE 6/9C/15 - 15



Digitizer — Rear View (cover removed)

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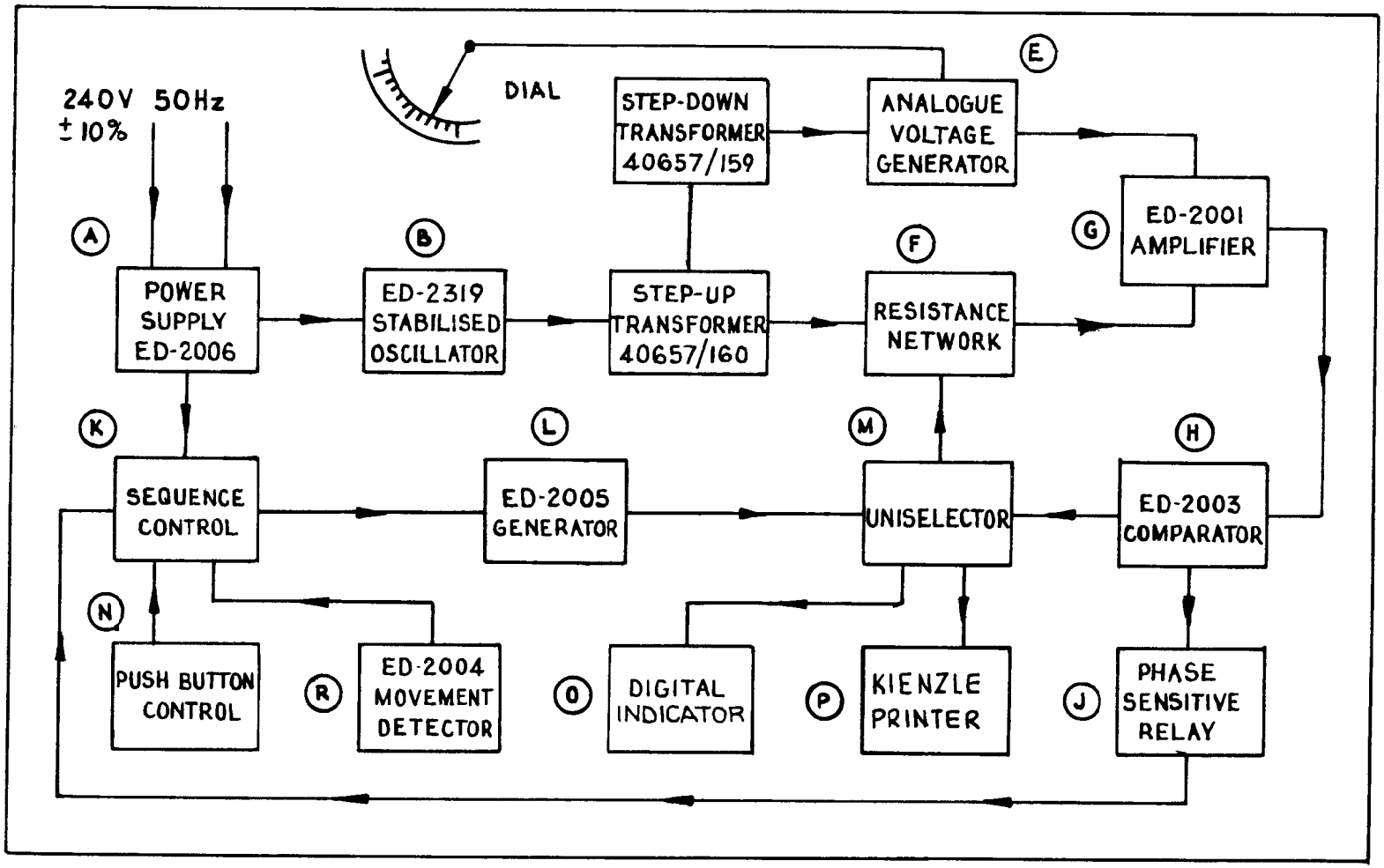
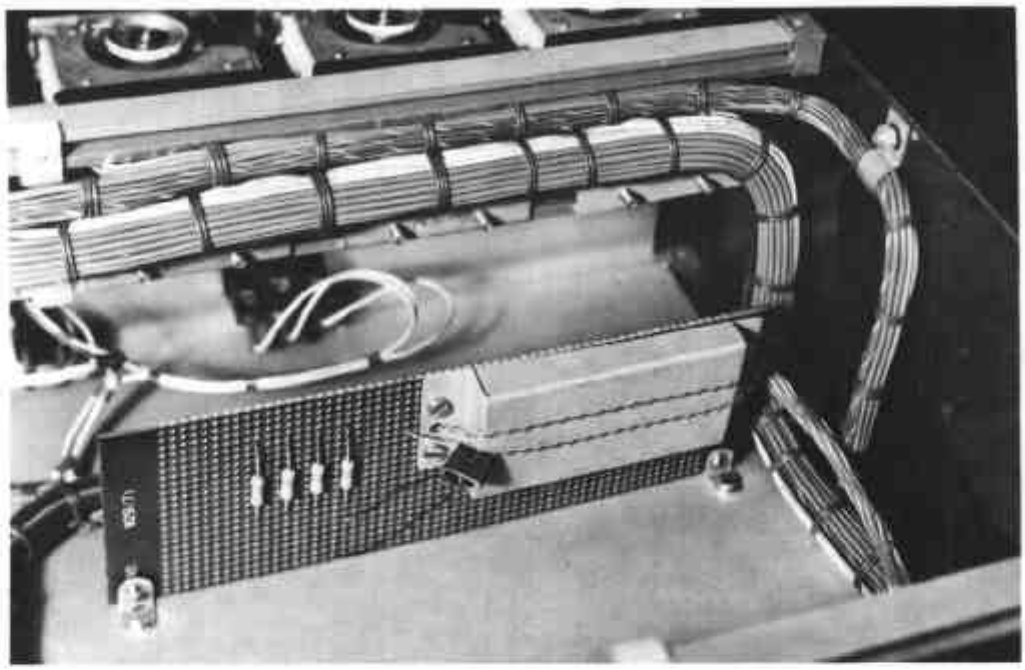
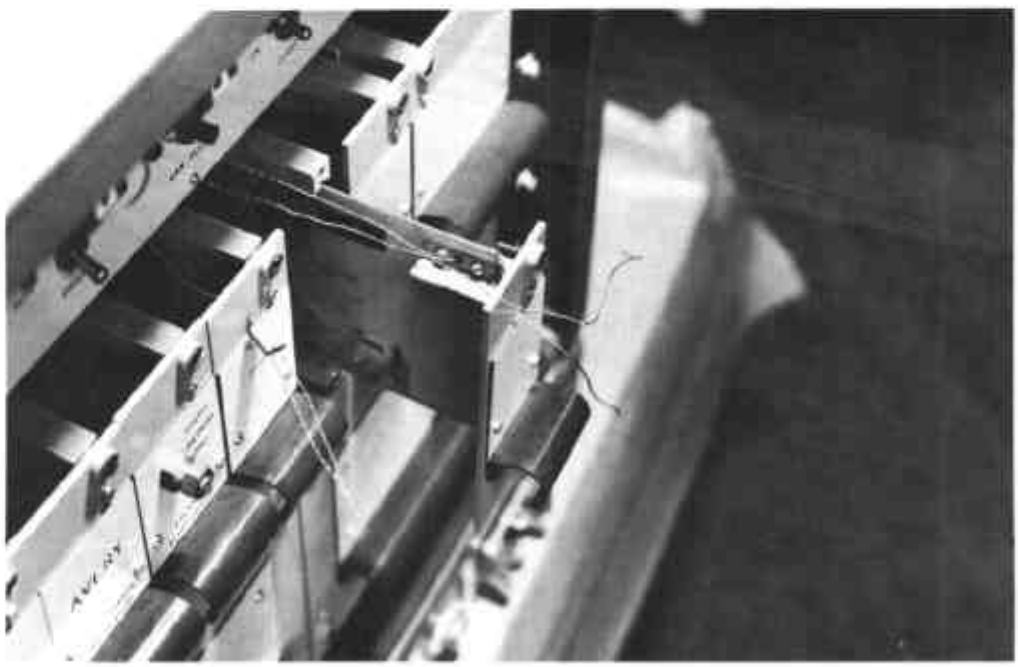
FIGURE 6/9C/15 - 16



Avery Digitizer — Schematic Diagram

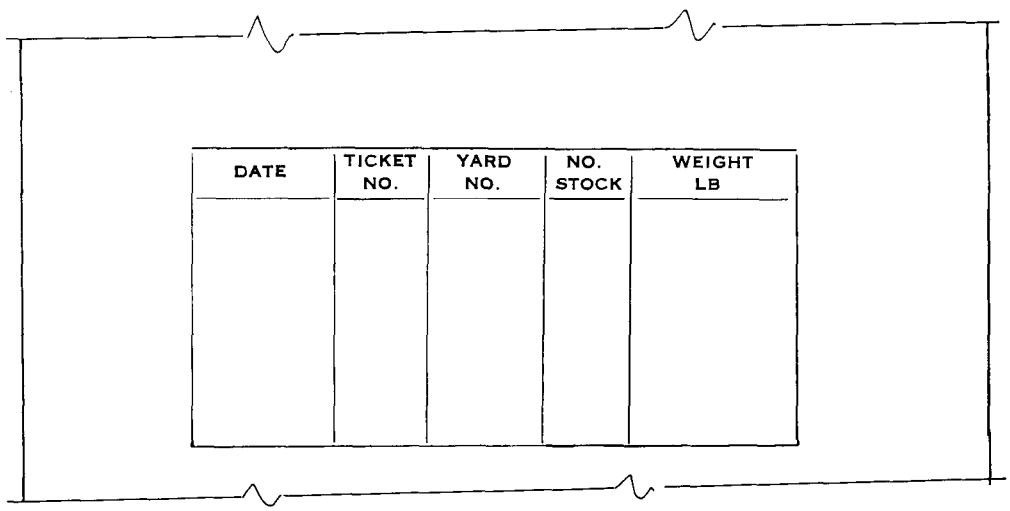


Sealing of Linearizing Potentiometers

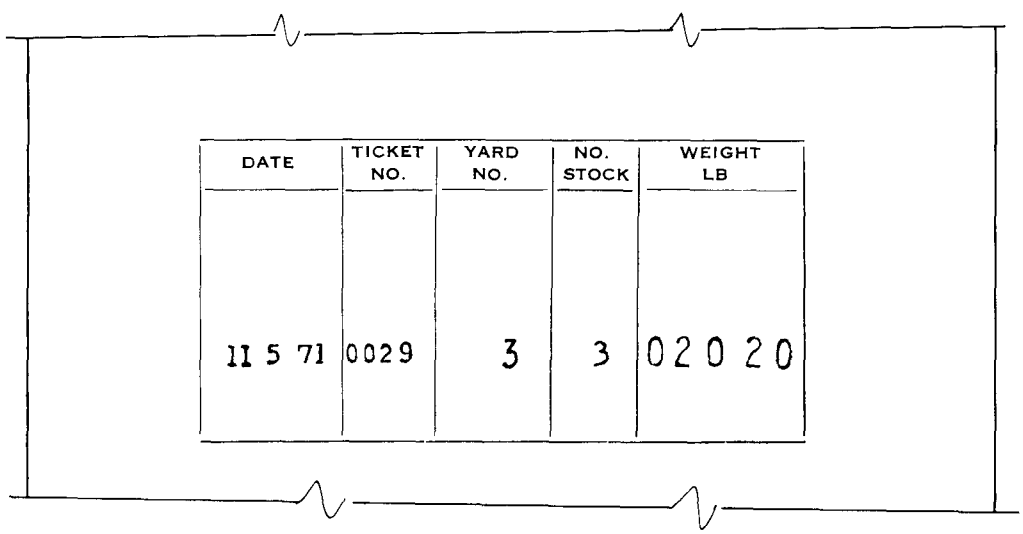


Sealing of Span and Zero Network Potentiometers

FIGURE 6/9C/15 - 18



BEFORE PRINTING



AFTER PRINTING

Portion of Kienzle Printed Ticket (actual size)

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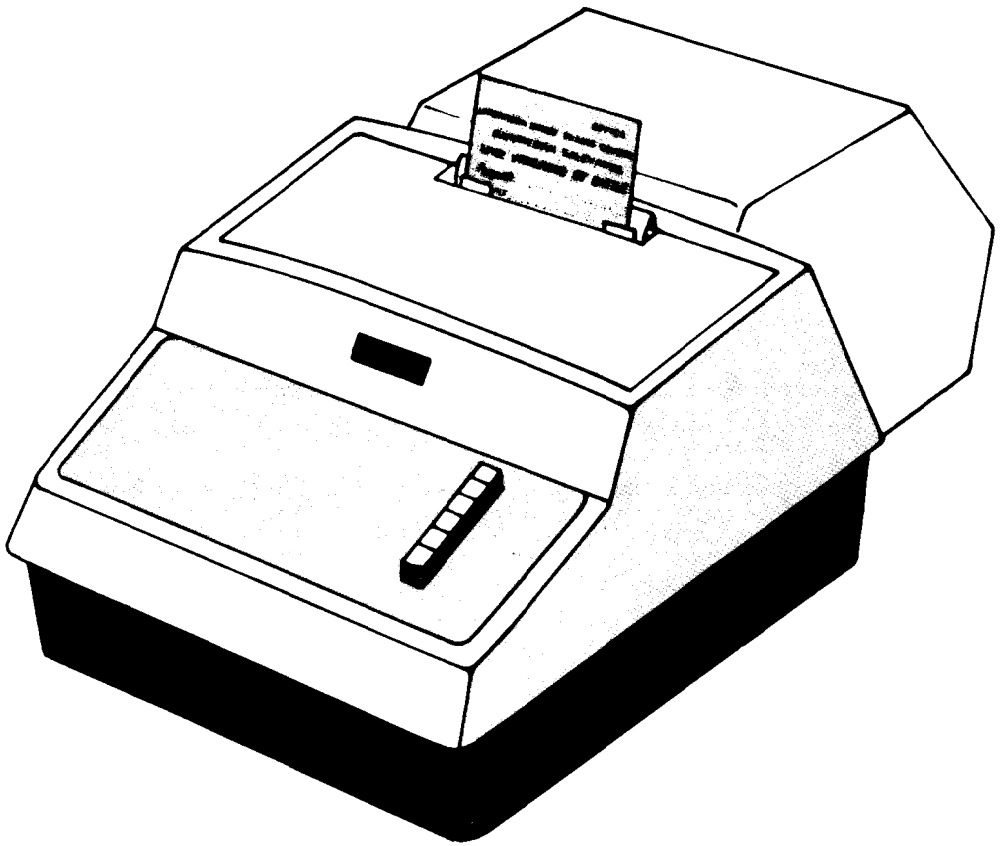
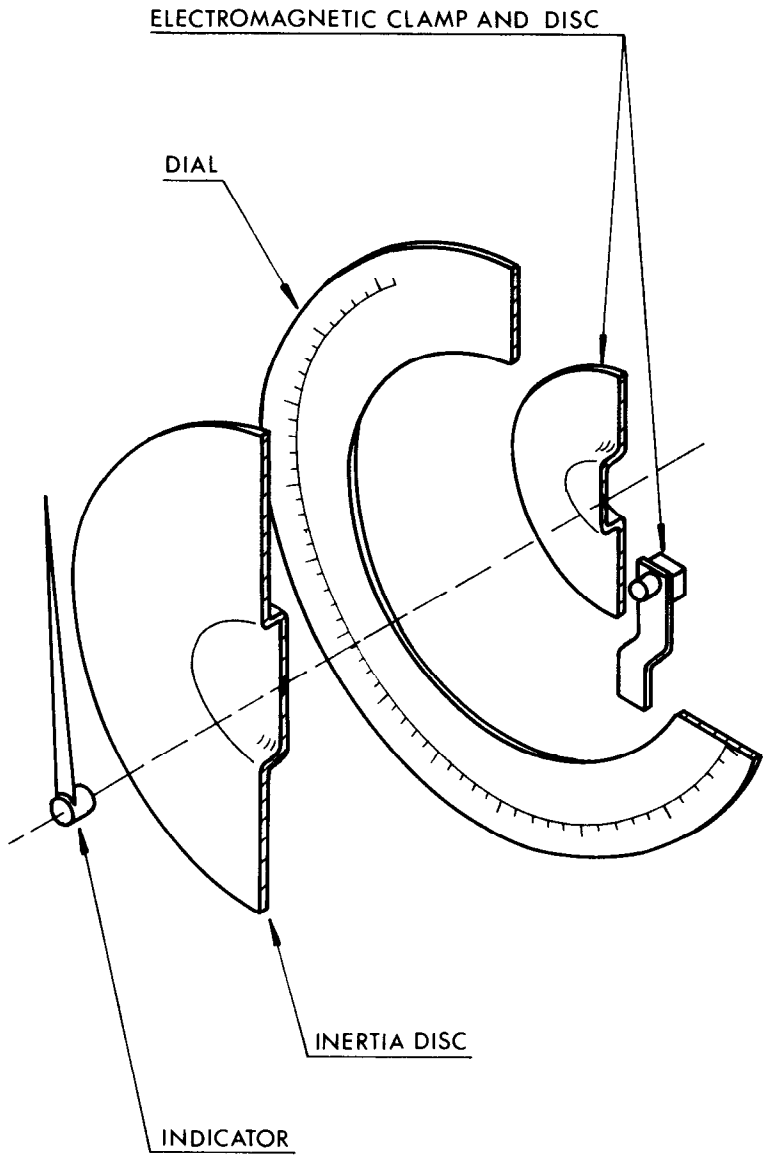
FIGURE 6/9C/15 - 19



Kienzle D24E Printer with Ticket Holder

FIGURE 6/9C/15 - 20



Indicator Shaft Assembly

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