



Feedback

-  Computer Assisted Learning
-  Electricity & Electronics
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-  Process Control
-  Mechatronics
-  Robotics
-  Telecommunications
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DISSECTIBLE MACHINES TUTOR
BASIC COMPONENTS
62-100

PROVISIONAL



Feedback

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THE HEALTH AND SAFETY AT WORK ACT 1974

We are required under the Health and Safety at Work Act 1974, to make available to users of this equipment certain information regarding its safe use.

The equipment, when used in normal or prescribed applications within the parameters set for its mechanical and electrical performance, should not cause any danger or hazard to health or safety if normal engineering practices are observed and they are used in accordance with the instructions supplied.

If, in specific cases, circumstances exist in which a potential hazard may be brought about by careless or improper use, these will be pointed out and the necessary precautions emphasized.

While we provide the fullest possible user information relating to the proper use of this equipment, if there is any doubt whatsoever about any aspect, the user should contact the Product Safety Officer at Feedback Instruments Limited, Crowborough.

This equipment should not be used by inexperienced users unless they are under supervision.

We are required by European Directives to indicate on our equipment panels certain areas and warnings that require attention by the user. These have been indicated in the specified way by yellow labels with black printing, the meaning of any labels that may be fixed to the instrument are shown below:



CAUTION -
RISK OF
DANGER



CAUTION -
RISK OF
ELECTRIC SHOCK



CAUTION -
ELECTROSTATIC
SENSITIVE DEVICE

Refer to accompanying documents

PRODUCT IMPROVEMENTS

We maintain a policy of continuous product improvement by incorporating the latest developments and components into our equipment, even up to the time of dispatch.

All major changes are incorporated into up-dated editions of our manuals and this manual was believed to be correct at the time of printing. However, some product changes which do not affect the instructional capability of the equipment, may not be included until it is necessary to incorporate other significant changes.

COMPONENT REPLACEMENT

Where components are of a 'Safety Critical' nature, i.e. all components involved with the supply or carrying of voltages at supply potential or higher, these must be replaced with components of equal international safety approval in order to maintain full equipment safety.

In order to maintain compliance with international directives, all replacement components should be identical to those originally supplied.

Any component may be ordered direct from Feedback or its agents by quoting the following information:

- | | |
|------------------------|----------------------------|
| 1. Equipment type | 2. Component value |
| 3. Component reference | 4. Equipment serial number |

Components can often be replaced by alternatives available locally, however we cannot therefore guarantee continued performance either to published specification or compliance with international standards.

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SAFETY NOTES

SAFETY NOTES**IMPORTANT NOTICE CONCERNING SAFETY**

All rotating machinery is potentially dangerous, both from the electrical and mechanical points of view. Every effort has been made in the design of the system to ensure minimum risk but complete protection is neither possible nor desirable since an important part of the students' training is the acquisition of an awareness of possible hazards.

Adherence to the instructions given in this manual combined with common sense will prevent accidents.

The following DO's and DONT'S are worth noting.

DO:

- 1 SWITCH OFF ALL POWER BEFORE CHANGING OR HANDLING ELECTRICAL CONNECTIONS.
- 2 ENSURE THAT ALL PARTS ARE SECURE AND ALL SCREWS, BOLTS, ETC, ARE PROPERLY TIGHTENED BEFORE STARTING.

This applies to:

- Flexible shaft couplings
- Baseplate couplings
- Prony brake mountings (frame and brake drum)
- Centrifugal switch elements
- Commutator-to-shaft coupling
- Terminal pillars on commutator and their screws
- Pole-piece mounting on stator and rotor
- Removable end-bearing securing screws
- Brush mountings

- 3 ENSURE THAT THE ROTOR FLYING LEAD CONNECTIONS ARE SECURELY FIXED TO THE TERMINALS AND THAT THEY CANNOT FLY OUT UNDER CENTRIFUGAL FORCE TO TOUCH THE STATOR.
- 4 CHECK MANUALLY BEFORE STARTING THAT THE SHAFT IS FREE TO ROTATE.

DON'T:

- 1 ATTEMPT ANY ELECTRICAL OR MECHANICAL CHANGES WHEN THE MACHINE IS ENERGISED OR ROTATING
- 2 ALLOW HAIR OR NECKTIES TO HANG IN OR NEAR A ROTATING MACHINE.

CAUTION - HIGH VOLTAGES

HANDLE THE EQUIPMENT WITH EXTREME CARE AS **HIGH VOLTAGES** ARE PRESENT AT SOME SOCKETS AND EXPOSED TERMINALS,

SAFETY NOTES

NOTES

FOREWORD

This utility sheet describes the basic components that constitute 62-100 Dissectible Machines Tutor and provides basic assembly instructions.

For system and courseware information relevant to the student and instructor, see 62-005 Dissectible Machines System manual.

FOREWORD

NOTES

CONTENTS

CHAPTER 1	General Description
CHAPTER 2	Installation Checks
CHAPTER 3	Basic Assembly Instructions

NOTES

GENERAL DESCRIPTION**CHAPTER 1****DISSECTIBLE
MACHINES TUTOR**

The Dissectible Machine Tutor 62-100 is a kit from which basic component parts - shaft, coils, pole-pieces, stator, brushgear, etc - can be easily assembled or dismantled to enable nearly 60 different motors or generators to be constructed. Tests can then be carried out on the completed machine to verify its characteristics. The kit is delivered in two cartons, one containing the accessories, the other containing a Base Unit with some parts fitted to it.

The basic components of the dissectible machines comprise:

**Base Unit
Carton**

- 1 Baseplate with terminals
- 2 Bearing Housings (one with two thumb-screws)
- 1 Shaft (fitted in bearings)
- 1 Brushholder mounting block
- 1 Frame ring and brackets
- 1 12-slot stator (fitted to frame ring)
- 12 L6 Stator coils (fitted in 12-slot stator), 5Ω nominal
- 3 $1\frac{3}{8}$ " X $\frac{1}{4}$ " BSF cap-head socket screws (securing 12-slot stator)

**Accessories
Carton***Rotors*

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> 2 L1 Inner Rotor Coils, 2Ω nominal 2 L2 Outer Rotor coils, 2Ω nominal 4 Rotor poles 1 Rotor hub 3 1" x $\frac{1}{4}$" BSF cap-head socket screws 1 $1\frac{3}{4}$" x $\frac{1}{4}$" BSF cap-head socket screws | } | Assembled as
Distributed
pole rotor |
| <ul style="list-style-type: none"> 4 L3 Salient-pole coils, 1Ω nominal 1 Squirrel-cage rotor | | |

Field Poles and Coils

- 2 Field Poles
- 2 L9 Field coils, 2Ω nominal
- 2 L4 Inner compound coils, 16Ω nominal
- 2 L5 Outer compound coils, 2.5Ω nominal
- 2 Interpoles
- 2 L8 Interpole coils, 1Ω nominal
- 1 L10 2-turn coil

General Description

Chapter 1

Commutator

- 1 Slipring/commutator with fixing screw
- 6 4BA X 5/16" slotted pan head screws
- 6 Insulating pillars (in plastic bag)
- 2 Brushholders
- 2 Carbon brushes
- 2 Thumbscrews - brush-holder mounting (in large plastic bag).

Centrifugal Switch

- 1 Stationary element with switch contacts
- 1 Adaptor plate for mounting stationary part to bearing housing
- 2 Hexagonal pillars 14 mm long
- 4 Washers
- 4 M4 x 8 Pozidrive screws
- 2 2BA screws
- 2 2BA washers

Passive Components

- 1 Resistor-Capacitor Board containing:
 - 3 66 Ω Resistors
 - 1 8 μ F Capacitor
 - 1 4 μ F Capacitor
 - 1 2 μ F Capacitor
 - 1 On-Off Switch

Miscellaneous

- 4 14"(350 mm) connecting leads
- 9 8"(200 mm) connecting leads
- 12 5"(150 mm) connecting leads
- 1 Handcrank
- 1 Flexible coupling 1/2" dia to 1/2" dia. (couples two systems shafts)

- 2 Toggle fasteners
- 2 Catch plates
- 8 M4 x 8 mm pozidrive head screws
- 8 M4 washers
- 2 Locating pins, 5/16" BSF thread
- 2 Nuts 5/16" BSF
- 2 Washers 5/16"

} Base
coupling parts
to couple two
systems.
In plastic bag.

General Description**Chapter 1**

1	Magnetic compass (in plastic bag)	}	In plastic bag
1	1/4" BSF x 1" cap head socket screw (spare)		
2	1/4" BSF x 1½" cap head socket screws (one spare, one for field pole)		
1	Alien key 2.5 mm	}	In plastic bag
1	Alien key 3/16" (fits 1/4" BSF screws)		
1	Spanner (fits 5/16" BSF nuts)		
1	Spanner (fits 7/16" BSF head on locating pins)		
1	Screwdriver		
1	Set - Safety shields		
1	Screwdriver Pozidriver No 2		

The basic components and accessories are shown in figs 1.1 to 1.4

Full details of the construction and operation of assemblies are contained in 62-005 Dissectible Machines System.

General Description

Chapter 1

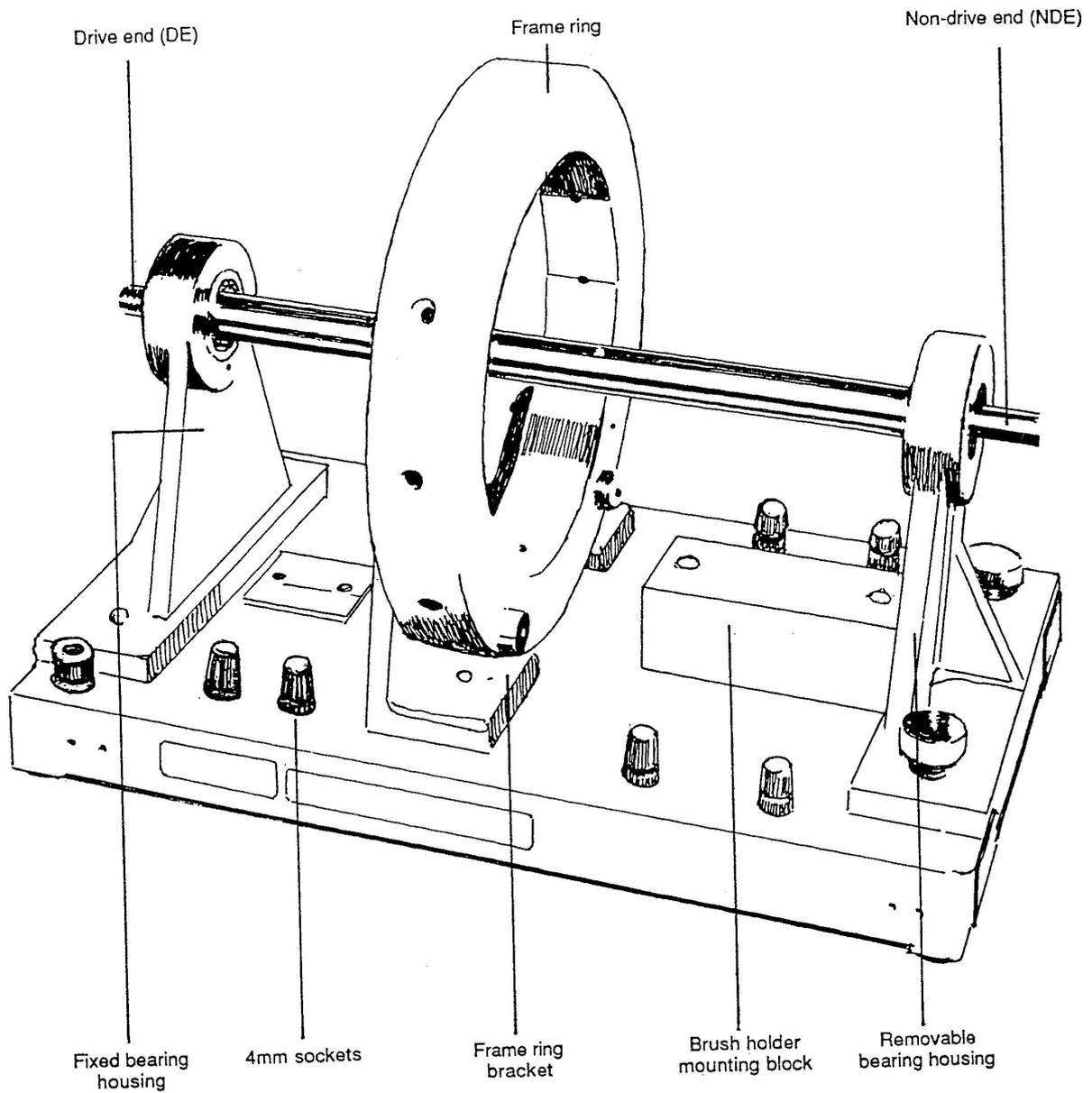


Fig 1.1 Base Unit

General Description

Chapter 1

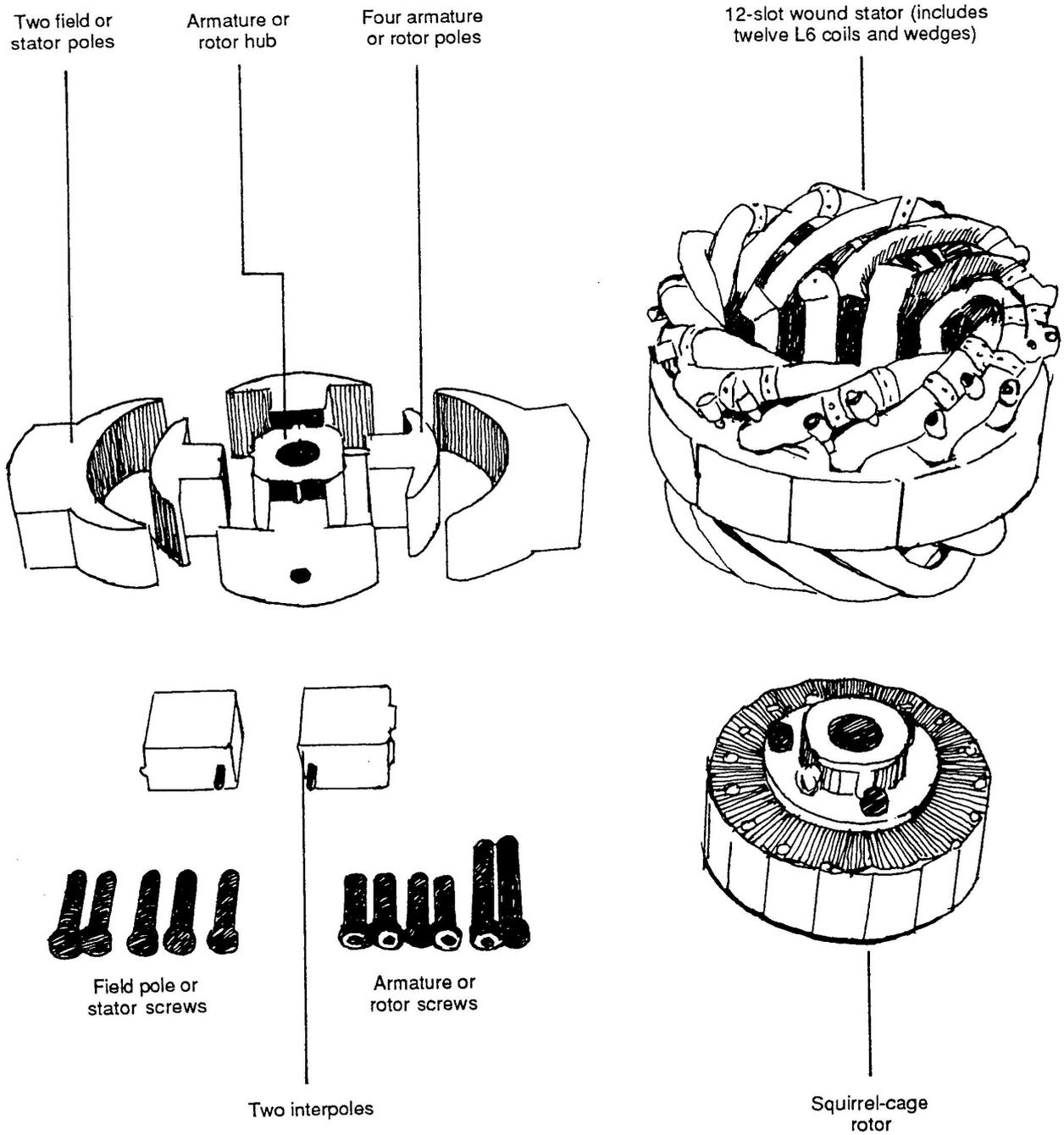


Fig 1.2 Laminated Parts

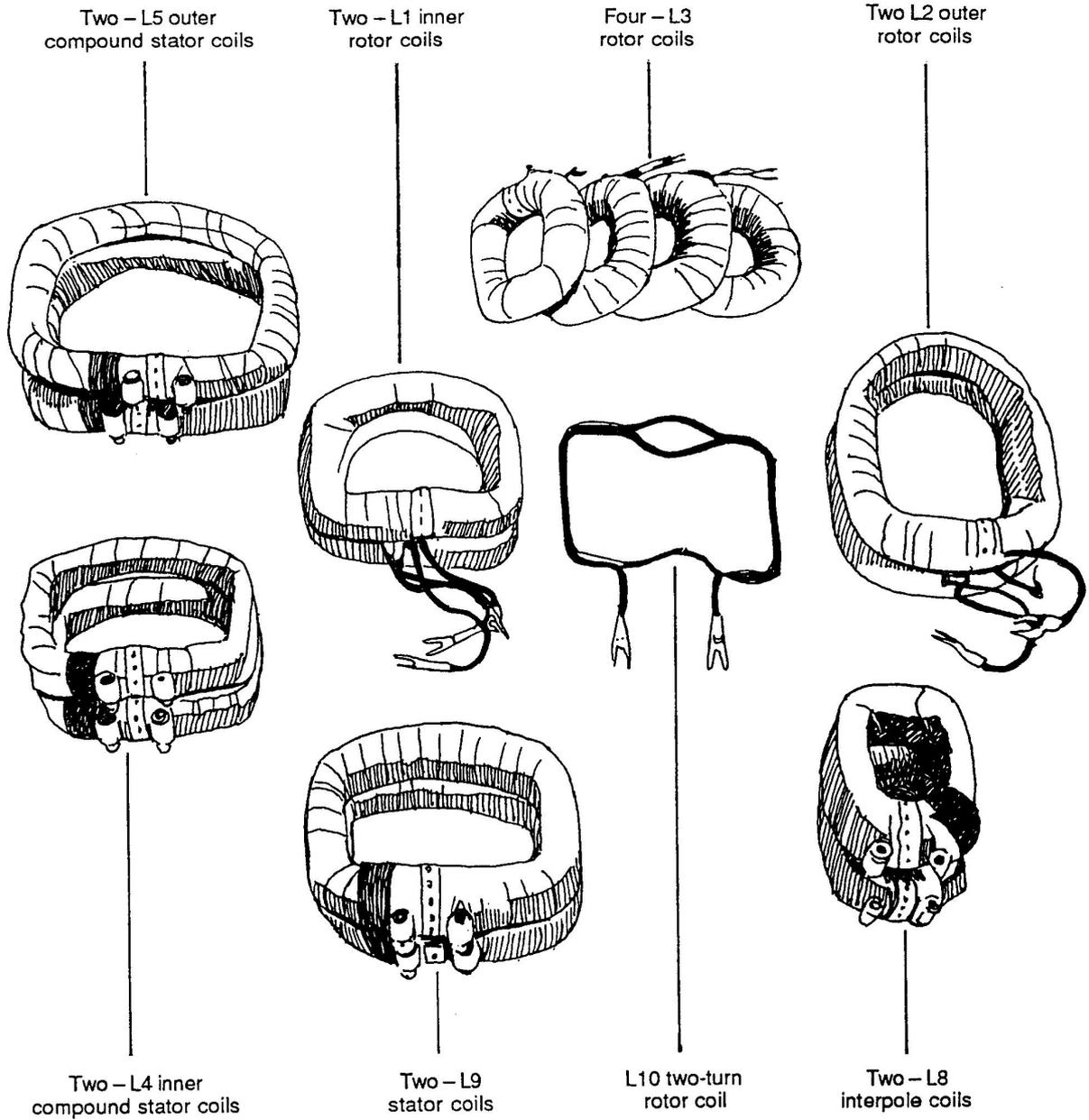


Fig 1.3 Coils

General Description

Chapter 1

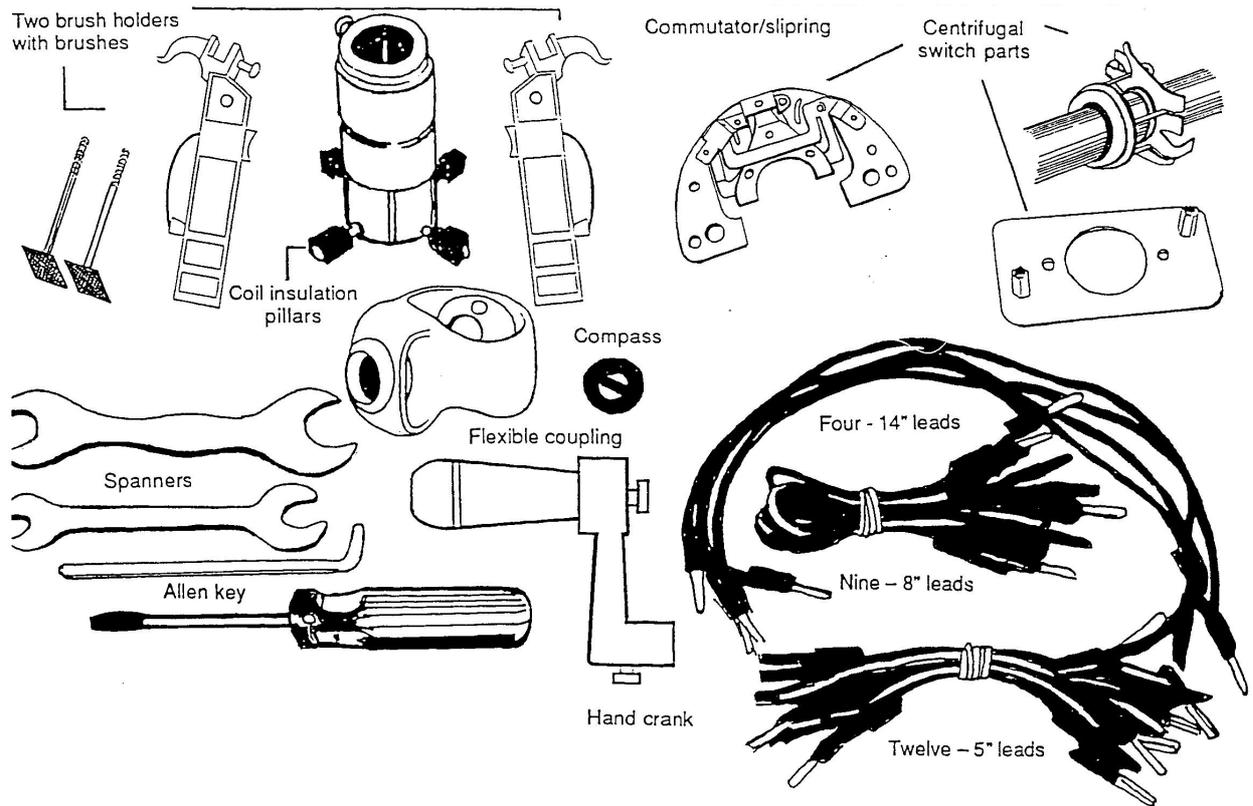


Fig 1.4 Accessories

**ANCILLARY
EQUIPMENT**

The Dissectible Machines Tutor is designed to be used with various other items of Feedback equipment which is either housed on a systems frame or available for use with the tutor. These items are listed below and described in full on the appropriate Module Utility Sheet.

Qty	Designation	Description
1	65-130	Control Switches
1	67-190	Resistor/Capacitor Unit
1	63-501	dc Variable Speed Unit
1	67-113	Variable Resistance 200Ω 3A
1	67-470	Friction (Prony) Brake
1	68-800	Standard Set of Patch Leads
1	91-200	System Frame
1	91-240	Universal Bin

For the components that make up the Dissectible Machines Tutor, storage facilities are provide on a further Systems Frame. These items are grouped under the number 90-100 and comprise:

Qty	Designation	Description
1	62-101	Storage Panel
1	91-200	System Frame
3	91-240	Universal Bins
1	91-245	Lead Storage

It should be noted that the basic components kit (62-100) is supplied with Control Switches (65-130) and a Resistor/Capacitor Unit (67-190). The combined package of Dissectible Machines Components is designated 62-110.

The assemblies and procedures described in this manual and in 62-005 assume that the ancillary equipment is available and that all users have studied the description and operating instructions given on the appropriate Module Utilities Sheet.

The Dissectible Machines Tutor and its associated equipment can also be used with the Feedback Electro-Technology range of single and three-phase panels, where they combine to provide a comprehensive electro-technology laboratory.

General Description**Chapter 1****POWER SUPPLIES**

The following power supplies are required:

ac single-phase, 0 -135V, 5A, 50/60 Hz

ac three-phase, 210V, 5A, 50/60 Hz

The three-phase supply can be replaced by a 350-415V three-phase supply providing the limitations stated in the instructions are noted.

dc 0 -120V, 5A

The single-phase ac and dc requirements are provided by 60-121 Variable ac/dc supply 5A , and the three-phase supply requirement is provided by 60-105 Universal Power Supply (230/380V). Both units are housed in the associated equipment system frame.

INSTRUMENTATION

The instrumentation required to carry out the practical work on the assignments is either located in the system frame or is hand held. Equipment is as follows:

Qty	Designation	Description
1	68-100	Electronic Single & Three Phase Measurements
1	68-110	dc Voltmeter & Ammeter
1	68-113	dc Milliammeter, Centre Zero
1	68-117	Rectifier Voltmeter & Ammeter
1	68-120	Synchronising Lamps
1	68-121	ac Voltmeter & Frequency Meter
1	68-470	Optical/Contact Tachometer

The only additional instruments specified in the assignments, which are not supplied, are as follows:

Qty	Designation	Description
1	68-201	Electrodynamic Wattmeter
1	-	Oscilloscope, Single-Channel

General Description

Chapter 1

SPECIFICATION

<i>Input Supplies</i>	AC machines	All relevant assemblies: 0-135V, 5A, 50/60Hz single-phase 210V, 5A, 50/60Hz three-phase line Note: A 350-415V, 5A, 50/60Hz three-phase line supply may be used in Assignments 3.39, 3.40 and 3.41. See relevant assignments in 62-005 for detailed information.			
	DC machines	0 – 120V, 5A			
<i>Output speeds and power</i>	Shaft speed range	AC machines: 0 – 3600 rev/min DC machines: 0 – 5000 rev/min			
	Max motor output	447W (0.6hp), as three-phase induction motor			
	Max generator output	330VA, as three-phase synchronous generator			
<i>Dimensions and Weight</i>	Base Unit	<u>Width</u>	<u>Depth</u>	<u>Height</u>	<u>Weight</u>
		390mm	240mm	275mm	10.9kg
		15.4in	9.5in	10.8in	24lb
	Weight of complete kit	31.3kg (69lb)			
	Air gap diameter	100mm (3.94in) nominal			
Core length	33mm (1.3in) nominal				
Brush size and grade	32mm x 9.5mm x 19mm (1¼in x 3/8in x ¾in) Nobrac RB11				

NOTES

INSTALLATION CHECKS**Chapter 2****INSPECTION**

Check that you have all the components and accessories listed in Chapter 1. Inspect them for mechanical damage.

INSTALLATION

The relative arrangement of the equipment forming an electrical machines laboratory will depend on the space available, but for the assemblies described in this manual it is assumed that a 1.5m x 0.75m (5ft x 2 1/2ft) bench top is used and that the units are positioned approximately as in fig 2.1 below.

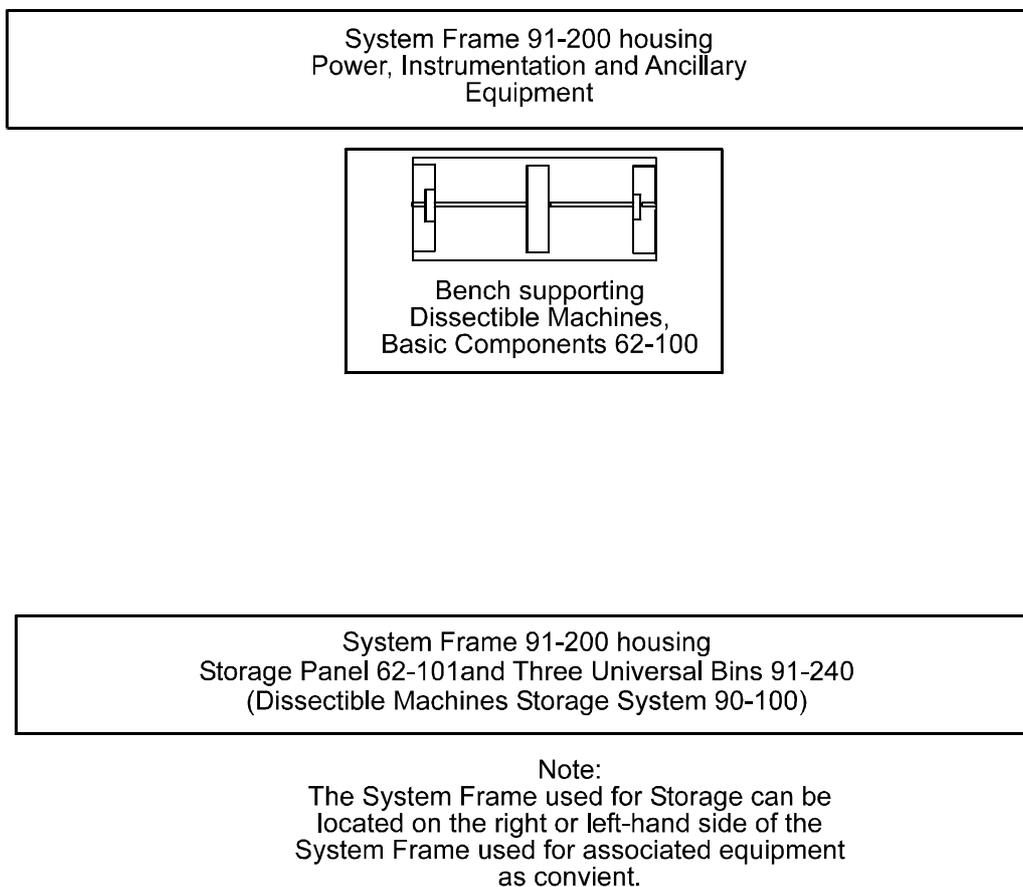


Fig 2.1 Typical Laboratory Layout

A mains supply of 200V-240V, 7A or 100V-120V, 14A, 50/60Hz is required for the Variable ac/dc Supply 5A unit (60-121) in the system frame. For the Universal Power Supply (60-105), a 380-415V line-to-line, 3kVA supply is required.

INSTALLATION CHECKS**Chapter 2****Dissectible
Machines Tutor**

To provide a means of checking the operation of the tutor, a dc series motor is assembled as described below. When the power supply units have been installed on the system frame, they provide the electrical power required to operate the motor.

The base unit is despatched with the 12-slot stator fitted to the frame ring. For preliminary testing of the equipment, this is removed, and the field poles with L9 coils are fitted in its place as follows:

1. Remove the thumb screws on the removable bearing housing and withdraw the housing from the shaft.
2. Withdraw the shaft from the fixed bearing housing.
3. Unscrew the three 1 3/8" long cap-head screws holding the 12-slot stator to the frame ring, and remove the stator.
4. Place L9 coils over the field poles and fit these to the frame ring in the 3 o'clock and 9 o'clock position.
5. Fit the standard Distributed-pole Rotor and commutator on the shaft, as described in Basic Assembly Instruction 1 Chapter 3.
6. Fit the shaft into its bearings. Before finally tightening the thumb screws on the removable housing, check that the shaft rotates freely and moves axially against the pre-loading washer.
7. As described in Basic Assembly Instruction 3 of Chapter 3, fit the brushes into their holders and attach these to the mounting block, on each side of the commutator. The brushes should move freely in their holders under the action of the brush springs.
8. Make the connections shown in the wiring diagram, fig 2.2, which is for a dc series motor covered in Assignment 19 of Dissectible Machines System manual 62-005 The 62-100 is now ready for use when the appropriate power supply unit has been set up.

INSTALLATION CHECKS

Chapter 2

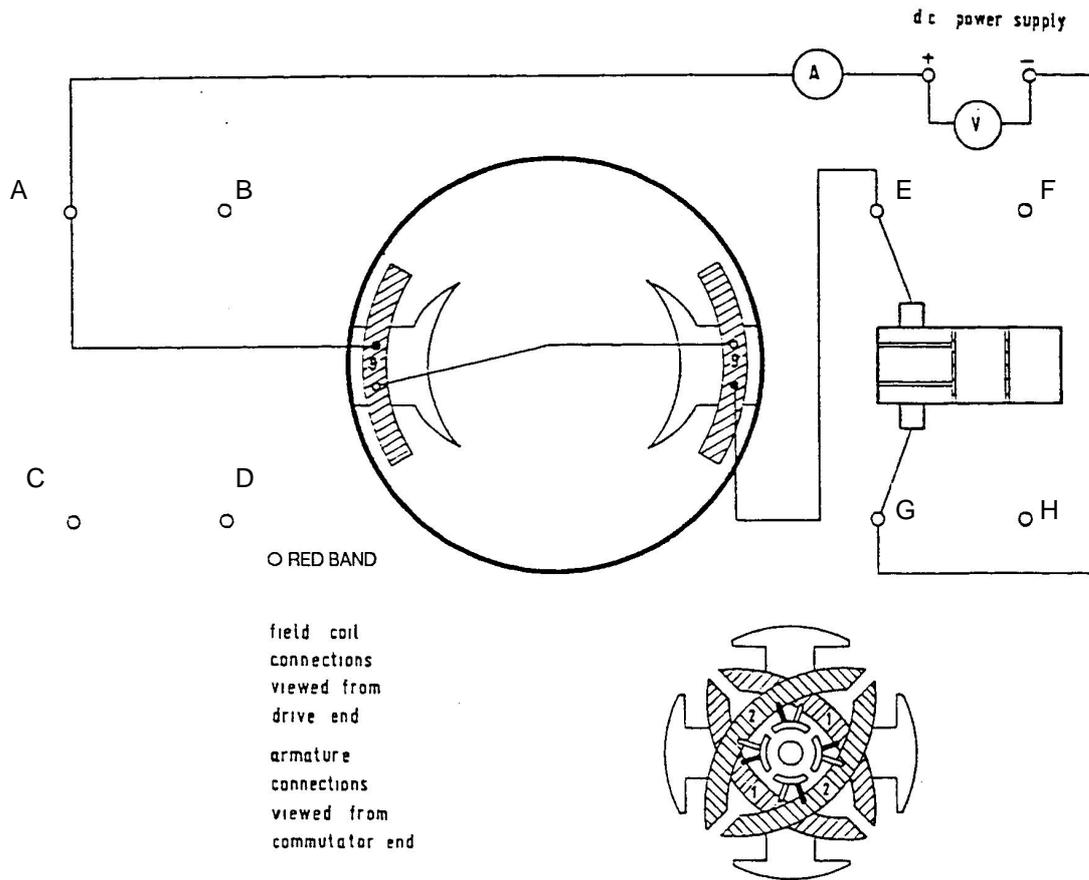


Fig 2.2 Wiring Diagram dc Series Motor

INSTALLATION CHECKS

Chapter 2

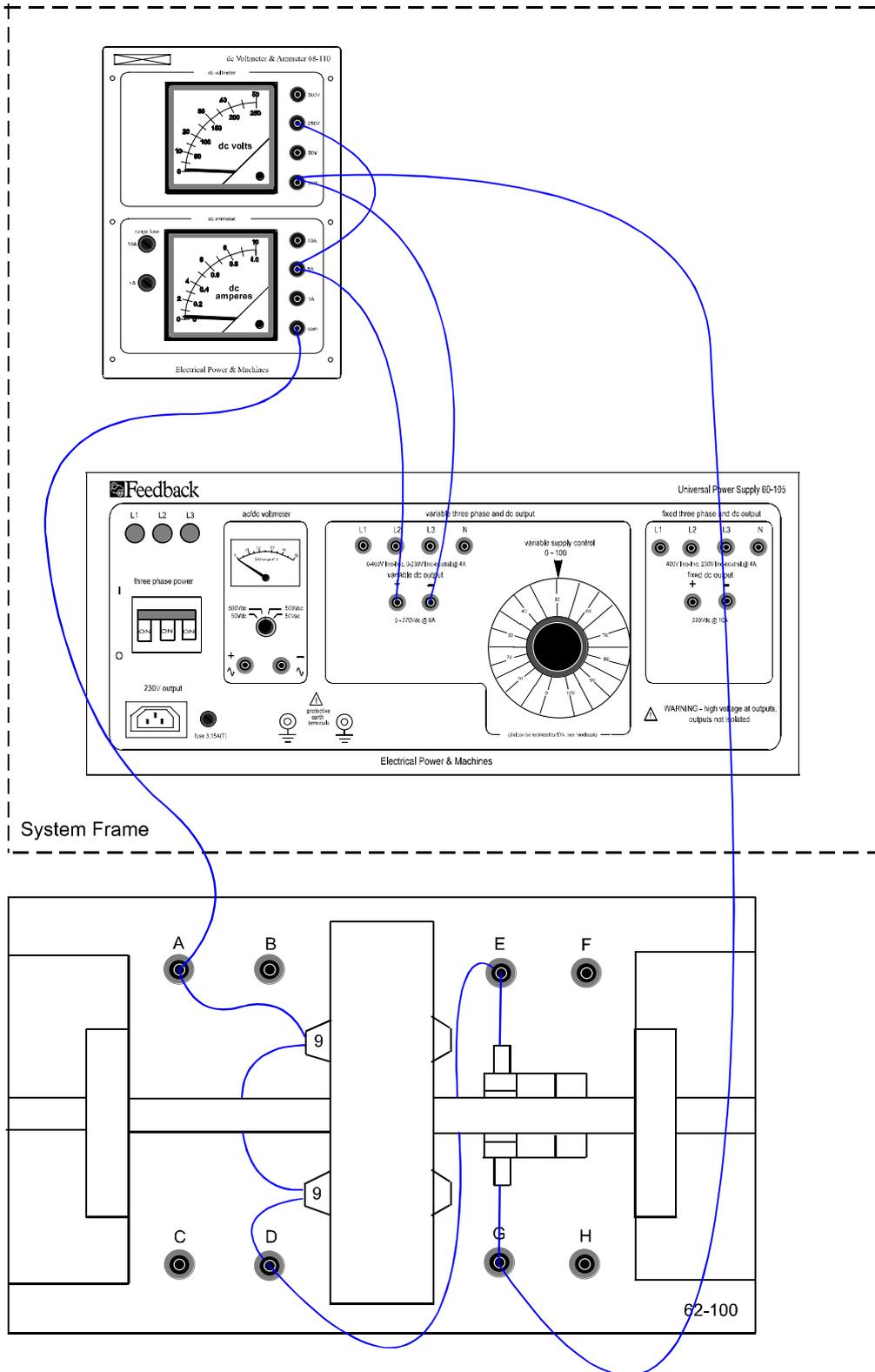


Fig 2.3 Connections dc Series Motor

INSTALLATION CHECKS

Chapter 2

Power Supplies Check

Two power supply units are provided and housed in the system frame. The Universal Power Supply 60-105 supplies single-phase, three-phase or dc outputs whilst the Variable ac/dc Supply 60-121 supplies single-phase or dc outputs. Both are described in appropriate Module Utility Sheets. For this check, power supply 60-105 supplies a variable dc output, and power supply 60-121 supplies a variable ac output as shown in Fig 2.3.

Note: It is recommended that circuit breakers, such as the Feedback Earth Leakage Breaker 60-140-1, be used to connect mains supplies to the power supply units.

Both power supply units are hard wired at the rear to connect incoming supplies.

WARNING:

All panels housed in the system panel are provided with earth terminals on the front and/or back which must be connected to each other using the earth leads supplied, or personal injury might occur. The exception to this are panels which are directly supplied with power and are earthed through the supply,

Power supply Operation

On the Universal Power Supply 60-105:

1. Connect the three-phase mains supply to power supply 60-105.. The presence of the supply is indicated by lamps L1, L2 and L3 lighting.
2. Ensure the 'variable supply control' is set to '0'.
3. Set the 'three phase power' switch to 1 (on).
4. Connect the 'variable dc output' + and – terminals to the ac/dc voltmeter + and - terminals on the unit.
5. With the ac/dc voltmeter set to the 500V dc range, rotate the 'variable supply output' control until the voltmeter indicates 270 V.
6. Reduce the voltage to zero, set the 'three phase power' switch to 0 (off), and disconnect the voltmeter.

INSTALLATION CHECKS**Chapter 2**

On the Variable ac/dc Supply 60-121:

1. Connect the single-phase mains supply to power supply 60-121.
2. Set the 'output' switch to 'ac'.
3. Ensure the 'output voltage' control is set to '0'.
4. Depress the 'power' pushbutton.
5. Connect the + and – terminals to the 250 V and com terminals on Rectifier Voltmeter & Ammeter 68-117.
6. Rotate the 'output voltage' control on the 60-121 unit until the voltmeter indicates 240 V.
7. Reduce the voltage to zero, depress the 'power' pushbutton again, and disconnect 68-117.

Motor operation

Make the interconnections as shown in fig 2.3 which allow power to be connected to the dc series motor previously assembled. The operation of the power supplies and the electrical machine is now checked together.

1. On power supply 60-105, set the 'three phase power' switch to 1 (on).
2. Rotate the 'variable supply output' control until the voltmeter on 68-110 indicates 15 V dc. The motor should start readily and runs at a shaft speed of approximately 500 rev/min.
3. Using the tachometer 68-470 measure the shaft speed. The tachometer reads full scale at 5000 rev/min in either direction of rotation.
4. On the power supply 60-105, rotate the 'variable supply output' control until the voltmeter on 68-110 indicates 30 V dc.
5. Bring the shaft speed to approximately 1000 rev/min and the input current to 1A. The motor will have no tendency to race at this voltage but since the series motor on no load can reach very high speeds, do not raise the applied voltage above 30V without shaft loading.

INSTALLATION CHECKS**Chapter 2**

6. Check that the motor runs smoothly over a range of shaft speeds. Sparking at the brushes maybe quite pronounced under these conditions. This is due to two causes
 - Although the brushes are ground to approximately the correct arc, they will not seat properly until they have been bedded in by prolonged running.
 - Good commutation requires either the use of interpoles or adjustment of 'brush-angle'
7. On power supply 60-105, reduce the applied voltage to zero and set the 'three phase power' switch to '0' (off).

If the equipment fails any of the foregoing checks, please contact your supplier.

INSTALLATION CHECKS

Chapter 2

NOTE

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

BASIC ASSEMBLY INSTRUCTIONS

- 1 Standard Distributed-Pole Rotor
- 2 Salient-Pole Rotor –2 and 4-pole
- 3 Brushgear and Slipping Commutator
- 4 Centrifugal Switch
- 5 Rotatable Brushgear
- 6 Prony Brake
- 7 Coupling for two 62-100's

1. Standard Distributed-Pole Rotor

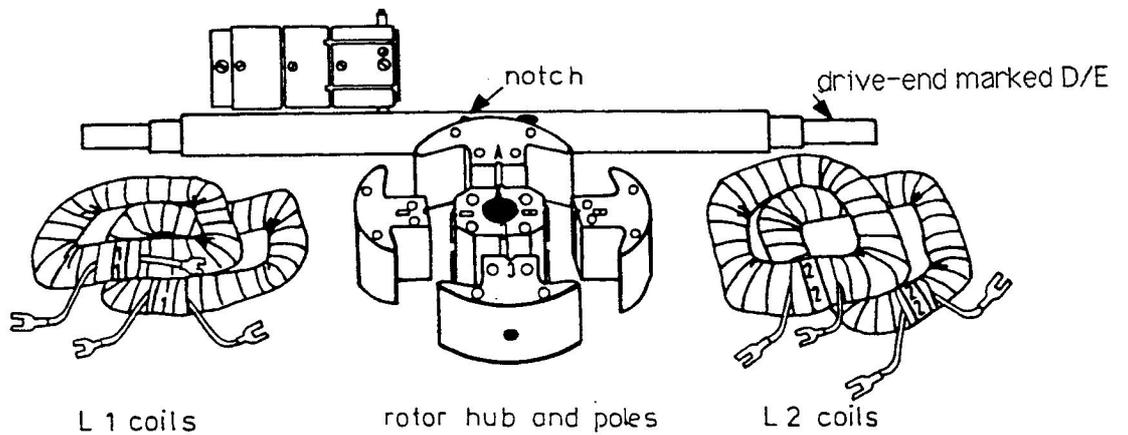


Fig 3.1a

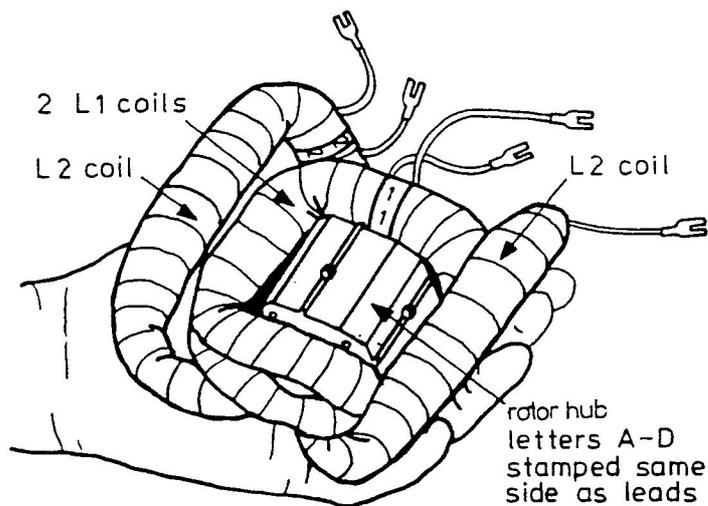


Fig 3.1b

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

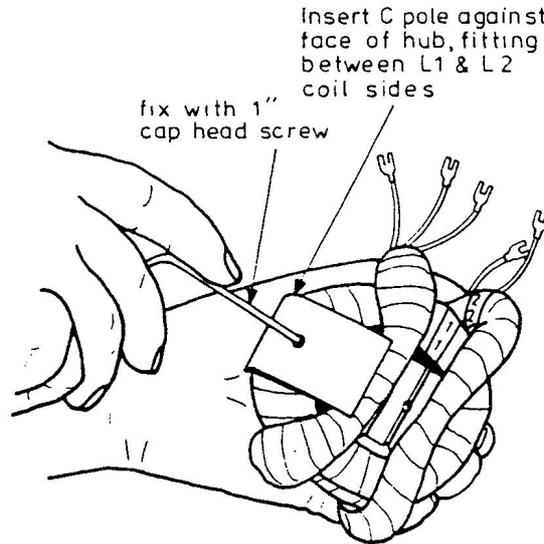


Fig 3.1c

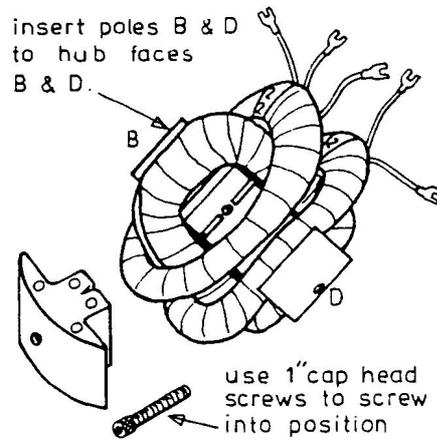


Fig 3.1d

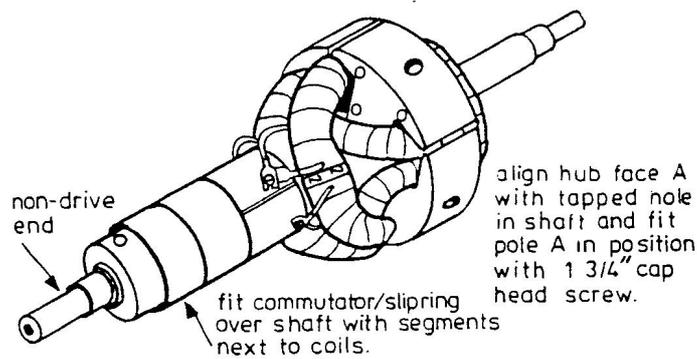


Fig 3.1e

BASIC ASSEMBLY INSTRUCTIONS**Chapter 3**

Adjust the commutator circumferentially to bring the slots between segments in line with the pole gaps, and axially to bring it as close to the No 2 coils as possible. Tighten the commutator set screw. Connect the coil terminals to the segments as shown. The lead lengths are chosen to allow all necessary rotor connections to be made without excessive length, which constitutes a hazard at high speed. Care should be taken to orientate the spade clips on the longer leads (red) to further minimize the chance of the leads flying out and touching the stator. This is specially necessary when using the 12-slot stator ring.

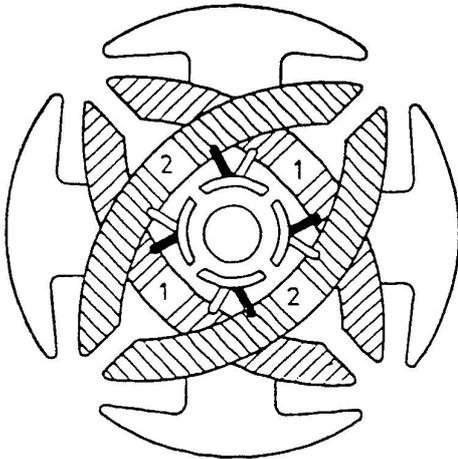


Fig 3.1f

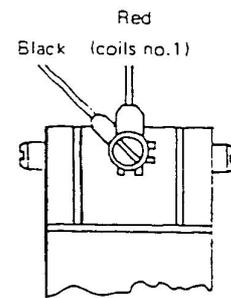


Fig 3.1g

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

2. Salient-Pole Rotor, 2 and 4-Pole

Fit No. 3 coils over rotor poles A,B,C,D as shown for 4-pole rotor.

For 2-pole, use only pole pieces A and C.

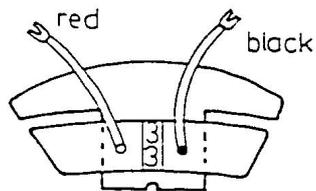


Fig 3.2a

Fit poles B, C, D (Pole C only for 2-pole) to the rotor hub using 1" cap-head screws.

Then slip hub over shaft with coil leads at non-drive end. Align hole A in hub with tapped hole in shaft and fit pole A with 1 3/4" caphead screw.

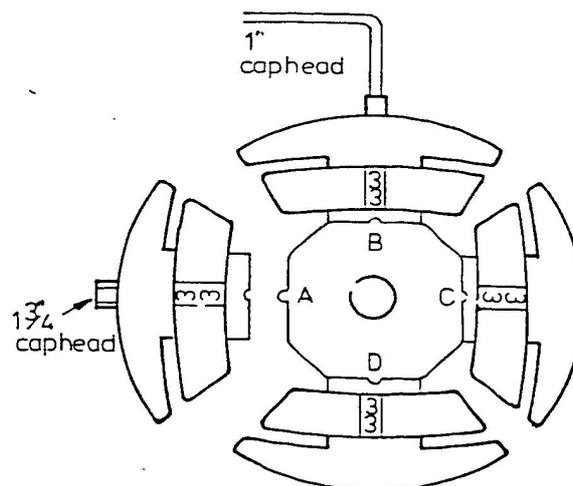
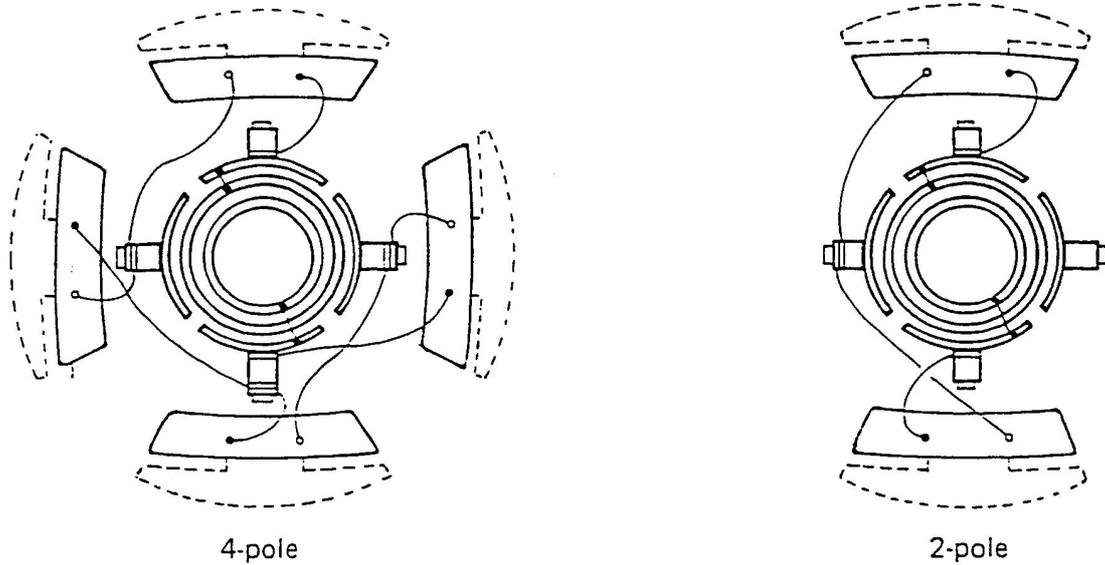


Fig 3.2b

BASIC ASSEMBLY INSTRUCTIONS**Chapter 3**

This assembly requires the use of insulating pillars. Refer to the instructions under the following item 3 'Brushgear and Slipring/Commutator'. Connect coil leads to commutator as shown for 4 and 2 pole rotors, linking free ends under screws at tops of insulating pillars. Ensure pillars are tightened into commutator segments and that unused top screws are tight. Where excess lead length occurs, ensure that there is no danger of it flying out and touching the stator. It is usually best to point the wire end of the spades in these cases towards the rotor.

*Fig 3.2c*

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

3. Brushgear and Slipping/Commutator

Brush Spring Adjustment

The electrographite brushes used in the 60-100 are suitable for operation over a wide range of shaft speeds and load currents. The spring load on the brush can vary from 2.5 to 7.5 Newtons (0.59 to 1.69 lbf, or a pressure of approximately 2 to 6 lbf/in²). For self-excited dc generator assemblies, it is advisable to work at fairly high spring loadings. In some lightly loaded motors, the minimum load can be used.

Adjustment of spring load is made by rotating the cap-head screw on the brush box pressure arm. An average setting is given when the screw is set to its mid-position.

On completion of an assembly in which brushes are used, check that they move freely in their holders against the spring load before operating the machine.

Connections from the base unit terminals to the brushholder are made by two S' plug leads.

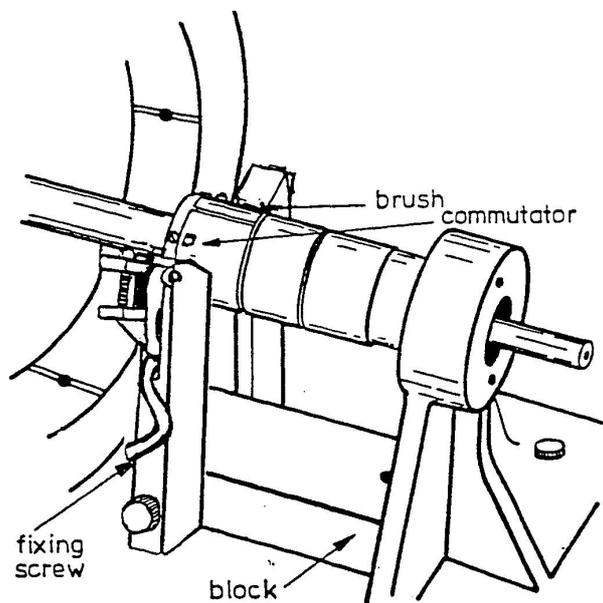


Fig 3.3a Brushes in contact with commutator segments

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

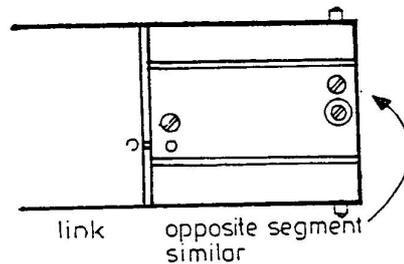


Fig 3.3 b Brushes in contact with slip-rings. Each slip-ring is connected to a commutator segment identifiable by the rivet and link as indicated.

Insulating Pillars

Six insulating pillars are provided in a plastic bag. They are for use in assemblies where the armature or rotor connections cannot be terminated directly at the commutator or slipring, and are called for in the instructions when required. A pillar can be used to either connect a coil lead to the commutator by securing the lead under the pillar, or to insulate the lead from the commutator by holding the lead with the top screw, as shown in fig 3.3c. A pillar may hold leads in both positions at the same time.

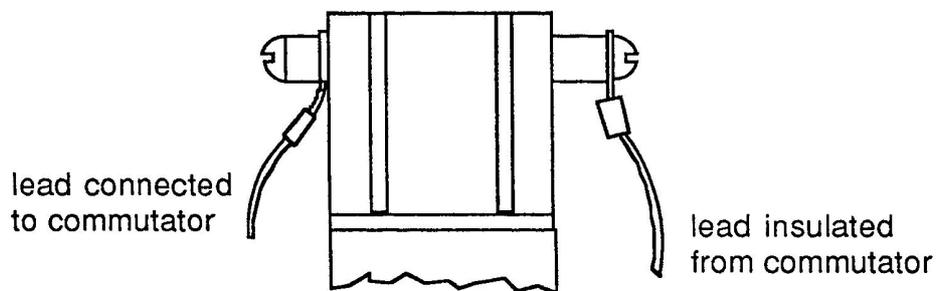


Fig 3.3c Coil terminations using the insulating pillars

It is important that the pillars and the top screws, even those which are not in use, be firmly secured so that nothing shall fly out when rotated. On the other hand some care is needed not to overtighten the pillars, since the plastic pillar is not as strong as a metal screw.

When the pillars are not required they should be removed and the normal coil termination screws should be used.

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

4. Centrifugal Switch

Fit the two hexagonal pillars to the two outermost holes of the adaptor plate using the M4 x 8 Pozidrive screws and washers provided.

Attach the adaptor plate to the drive-end bearing housing using the two screws which secure the bearing in the fixed bearing housing. Screw the fixed element to the adaptor plate with the two M4 x 8 Pozidrive screws and washers provided.

Fit the shaft into its bearings. Fig 3.4 shows the centrifugal switch in a motor assembly.

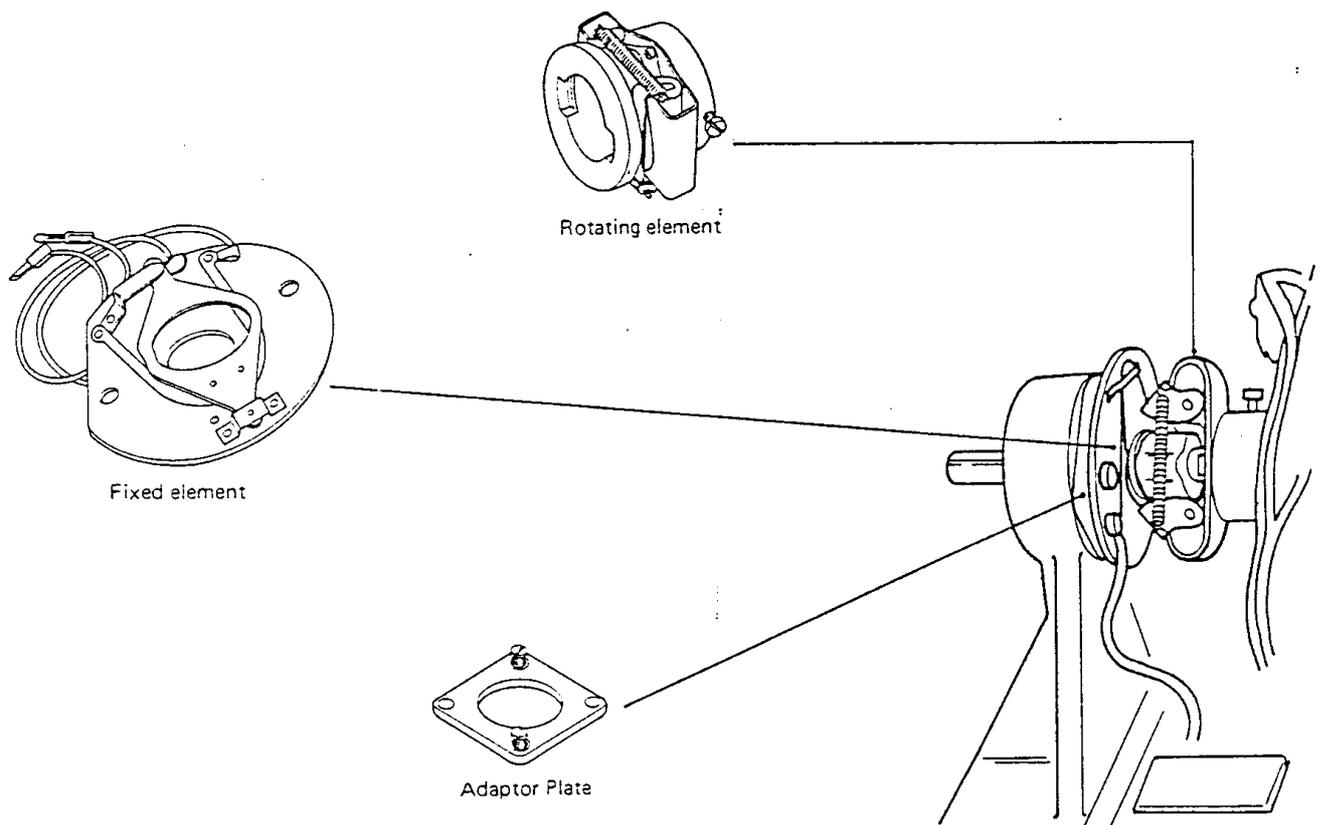


Figure 3.4 Assembling Centrifugal Switch to Bearing Housing

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

5. Rotatable
Brushgear

Remove the non-drive-end bearing plate from the baseplate. Remove the two pan-head 2BA screws securing the bearing retaining ring. Remove the retaining ring.

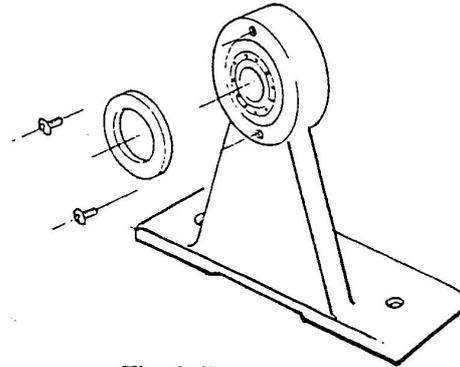


Fig 3.5a

Fit the stationary ring of the rotatable brushgear to the end plate, locating the projecting spigot in the recess left vacant by the removal of the retaining ring.

Replace the two 2BA screws to secure the brushgear.

Slightly loosen the thumbscrew on the rotating member and check that this rotates smoothly.

Lift the brush pressure clips withdraw the brushes and refit the end plate to the baseplate.

Lower the brush pressure clips. The brushes should now bear on the commutator.

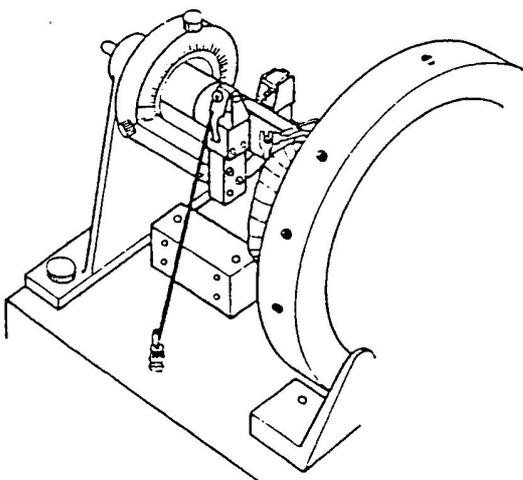


Fig 3.5b

Note:

The brush carrier is secured to the stationary trunnion ring by two preset slotted grub screws and one thumbscrew. These are arranged so that loosening the thumbscrew alone permits the carrier to be rotated. If, for any reasons, it is necessary to separate the two pairs, all three screws must be retracted. When reassembling, tighten the two grub screws just sufficiently so that tightening or loosening the thumbscrew locks or unlocks the rotating carder.

BASIC ASSEMBLY INSTRUCTIONS**Chapter 3****6. Prony Brake
(67-470)**

*Fitting to 62-100
(Either End)*

Use two 5/16" BSF x 1 " caphead screws inserted from inside the baseplate. Secure with 5/16" washers and nuts, tightening with spanner provided.

Insert the adaptor bush into the brakedrum bush, aligning the clearance hole with the securing screw.

Fit the brakedrum to the shaft in line with the slot in the scale and tighten the screw onto the shaft flat.

Fit the spring band over the drum and secure the adjusting mechanism by hooking the bar on the adjusting screw into the brake band. Check that the arm moves freely in the scale slot. Adjust the frame to centre the arm at zero torque.

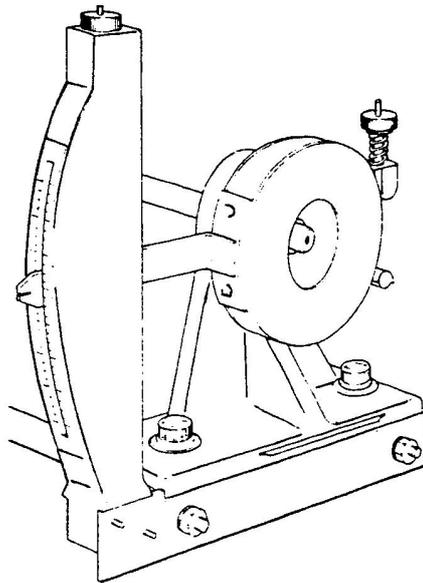


Fig 3.6a

BASIC ASSEMBLY INSTRUCTIONS

Chapter 3

7. Coupling for Two 62-100

Fit the catch plates and toggles to both sides of the baseplates as shown in fig 3.8.

Fit locating pins to one baseplate, securing them by two 5/16" BSF nuts provided, inside the baseplate, using the 5/16" spanner.

Slide the coupling over one of the 62-100 shafts, pushing it onto the shaft as far as possible. Offer the other 62-100 shaft up to the open end of the coupling and slide the coupling onto the shaft so that the coupling is on both shafts. Push the 62-100's together ensuring that the locating pins are properly engaged. Tighten up the coupling fixing screws onto the flat on the shafts.

Close the toggle fasteners.

Check for free rotation.

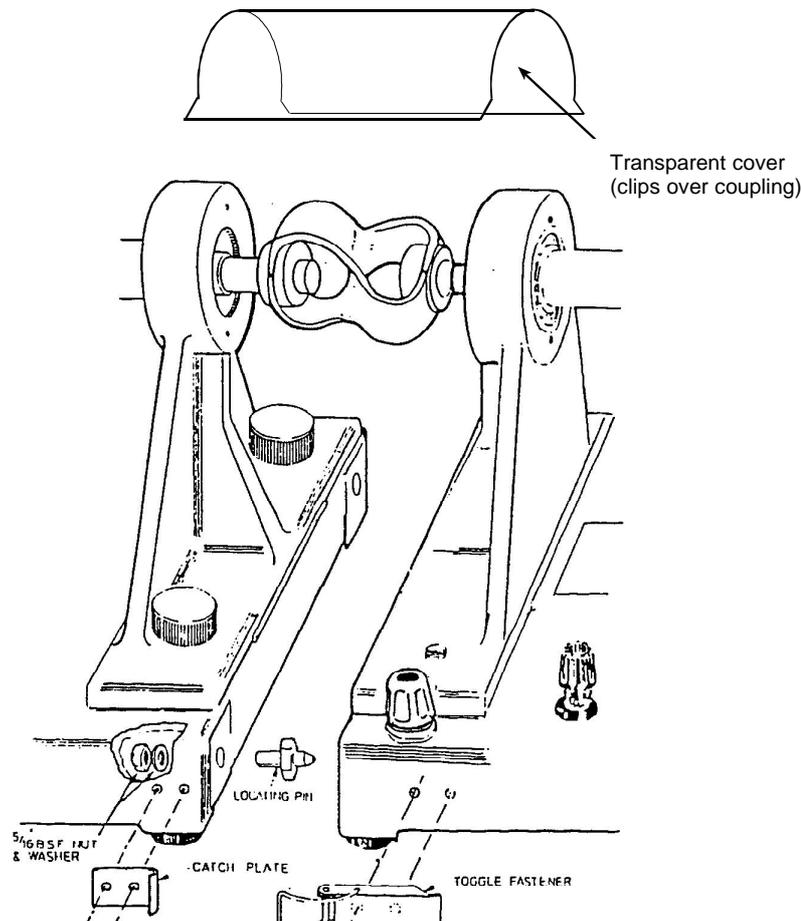


Fig 3.8

NOTES