DIESEL MECHANIC

MINING QUALIFICATIONS AUTHORITY

CODE: DCC

MAINTAIN AND ALIGN COUPLINGS

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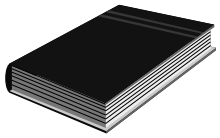
TRG 9

INDEX

The following elements are contained in this learning guide:

SOURCE REFERENCES



Demonstration by a competent person, e.g. a Training Officer.

Audio-visual aids if available.

Display board in the training centre.

OBJECTIVE

You will be learning towards the outcome “Maintain and align couplings”. Whilst learning towards the outcome you will be required to achieve the following:

- Familiarise yourself with the different types of couplings and enable yourself to maintain and align couplings.

On completion of this module, the learner must be able to:

- Name nine different types of couplings used in the mining industry.
- Remove, replace and line up a “Fenner Flex” coupling to the standards contained in this module.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- A practical test will be set at the end of the module and must be completed without using references other than the standard chart for Fenner Flex couplings.
- The learner will be given a drive fitted with an F40, F50 or F60 “Fenner Flex” coupling and will be required to remove, replace and line up the “Fenner Flex” coupling.
- The following standards must be achieved:
    a. The tyre must be removed correctly from the coupling.
    b. All the parts removed must be marked with a marking pen to ensure correct re-assembly.
    c. The run-out on the flanges must be within the limits of 0.10mm.
    d. The parallel alignment must be within the limits of 0.10mm.
    e. The angular alignment must be within the limits of 0.10mm.
    f. The dimension “M” must be within the limits of ± 1mm of the specified gap.
    g. The tyre gap must within the limits of ± 0.25mm of that specified.
    h. The clamping screws must be tightened to the torque specifications.
    i. There must not be any damage to the parts.

j. Guards must be fitted on completion of the job.

k. After test running the coupling for ten minutes there must be:

- no vibration.
- no slip
- no heat build-up in the tyre or flanges.

- All safety procedures must be adhered to.

HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM

DCC

MAINTAIN AND ALIGN COUPLINGS

STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Use hand tools.	• Using damaged tools or wrong tools for the job can cause injury and damage to equipment.	• Always use the correct tool for the job. • Ensure tools are in good condition. • Use tools correctly. • Wear appropriate PPE where necessary. • Always take good care of tools. Maintain, clean and store it properly.
2. Work on machinery.	• Injury to person if working on moving machinery.	• Ensure that power to the machine is switched off, and if possible, physically locked out. Place a warning sign stating: “Men at work. Do not switch on” in a prominent position. • Ensure that machinery is stationary before commencing work. • Replace machine guards after completing the task an before starting the machine.

NOTE:Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner: _____

Signature of Training Officer: _____

Date: _____

DICTIONARY

Coupling	**:**	A device for connecting parts of machinery, e.g. Electrical motor to a gearbox and shaft to shaft
Ridgid coupling	**:**	A coupling that cannot bend, i.e. that is not flexible.
Flexible coupling	**:**	A coupling that is able to bend.
Align	**:**	To put in a straight line, or bring in to line.
Misaligned	**:**	Not to be in a straight line

1.FUNCTION OF COUPLINGS

ITEM / TASK: Introduction.

DESCRIPTION:

A. In most instances electric motors are joined to another piece of equipment by a coupling.
B. Sometimes the couplings will be rigid or solid but usually it is of a flexible type.
C. A coupling performs several functions.

ITEM / TASK: Functions of a coupling.

DESCRIPTION:

A. A coupling is used to couple two rotating shafts together and transfer the rotary motion from one shaft to the other. (Fig 1)

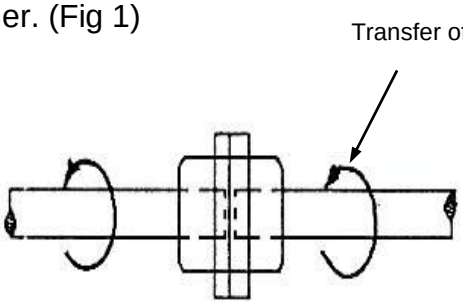


FIG 1.

B. A coupling compensates or allows for some misalignment between the rotating coupled shafts. (Fig 2)

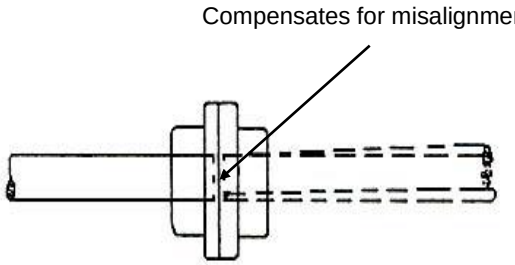


FIG 2.

C. It allows axial or end movement of the coupled shafts. (Fig 3)

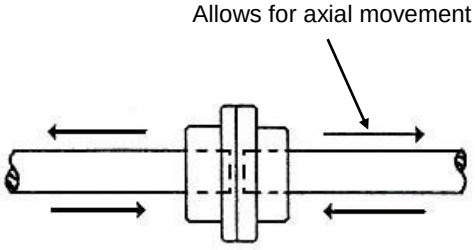


FIG 3.

2. TYPES OF COUPLINGS

ITEM / TASK: Introduction.

DESCRIPTION:

A. Couplings, like any other equipment, are made in many different designs and sizes.
B. Each type of coupling has features that make it more suitable for one application than for another as is illustrated below.

ITEM / TASK: Sleeve couplings.

DESCRIPTION:

A. Sleeve couplings (Figs 4 and 5) are not used frequently between drive motors and driven equipment because of the need to align them exactly.

Split sleeve coupling

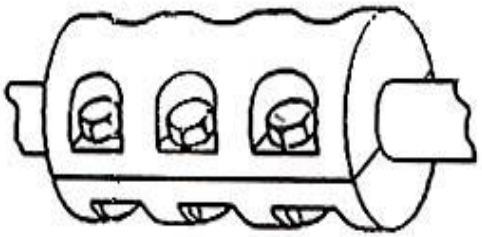


FIG 4.

Solid sleeve coupling

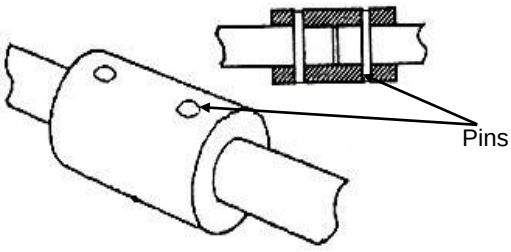


FIG 5.

ITEM / TASK: Chain couplings.

DESCRIPTION:

A. Chain couplings (Fig 6) are normally fitted to the drive and driven shaft with a solid or bushed hub.
B. The coupling halves are held together with a chain, which provides a means of easy disconnection of the shafts.
C. If the coupling is fitted with a cover, it must be packed with grease.

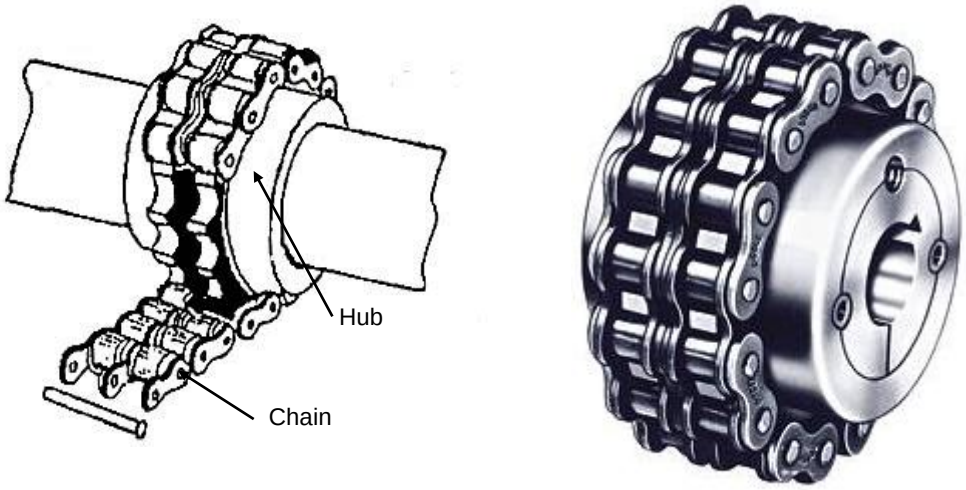


FIG 6.

ITEM / TASK: Geared couplings.

DESCRIPTION:

A. Flexible geared couplings, like roller chain couplings, require lubrication. Therefore all covers are fitted with lubrication fittings and seals on the ends. (Fig 7)

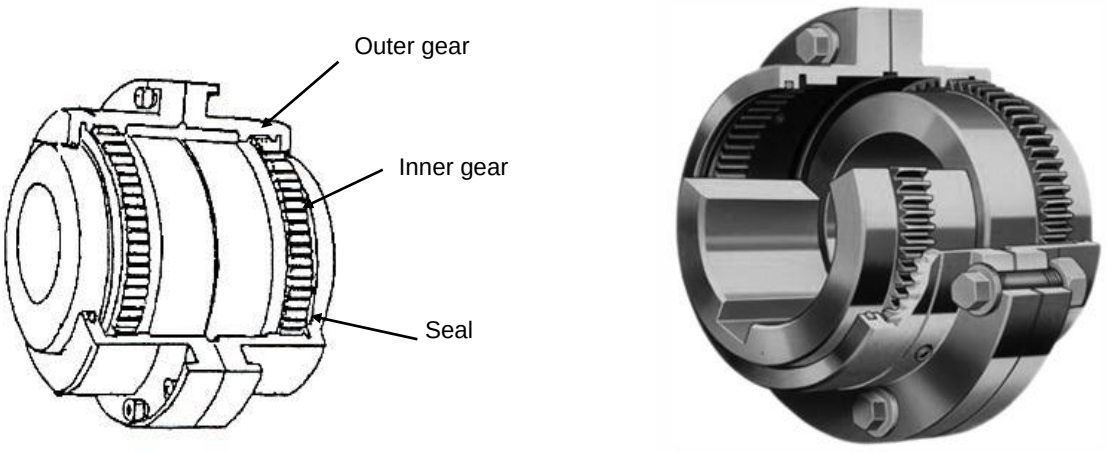


FIG 7.

ITEM / TASK: Rubber disc couplings.

DESCRIPTION:

A. The rubber disc coupling (Fig 8) has pins equally spaced near its outer edge. The pins fit into compatible holes in a moulded centre disc.
B. The centre disc allows for a small amount of misalignment.
C. The disc must be regularly checked for wear or damage.

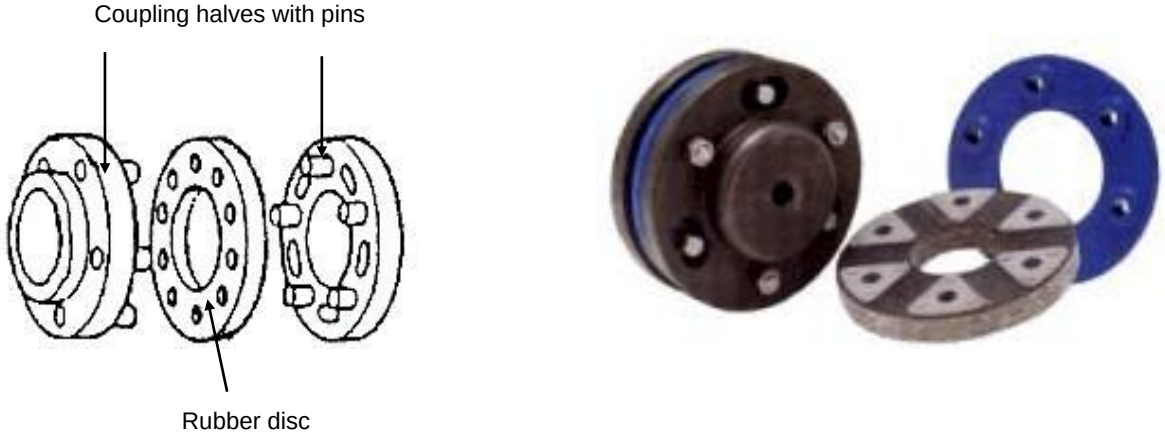


FIG 8.

ITEM / TASK: Pin and rubber bush coupling.

DESCRIPTION:

A. This coupling (Fig 9) also has pins equally spaced near its outer edge.
B. The pins are fitted with rubber bushes, which allow for a small amount of misalignment.
C. The bushes must be regularly checked for wear.

FIG 9.

ITEM / TASK: Tyre couplings.

DESCRIPTION:

A. The tyre coupling (Fig 10) consists of two flanges connected by means of a moulded rubber tyre.
B. The coupling is flexible and will allow minor misalignment.

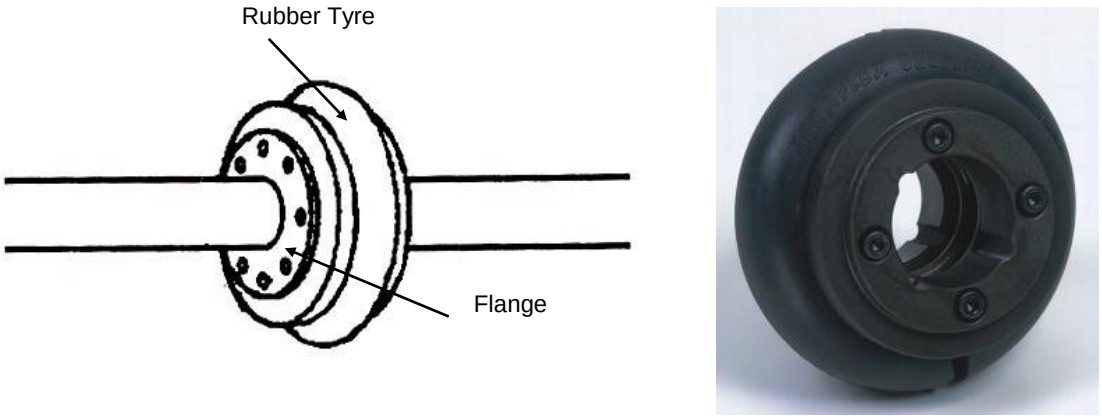


FIG 10.

ITEM / TASK: Spider couplings.

DESCRIPTION:

A. The spider coupling (Fig 11) has a cut or moulded rubber-like insert located between the jaws on the face of the coupling.
B. The moulded insert allows a small amount of misalignment without causing wear, and also provides a cushion for any shock or high torsion loading.

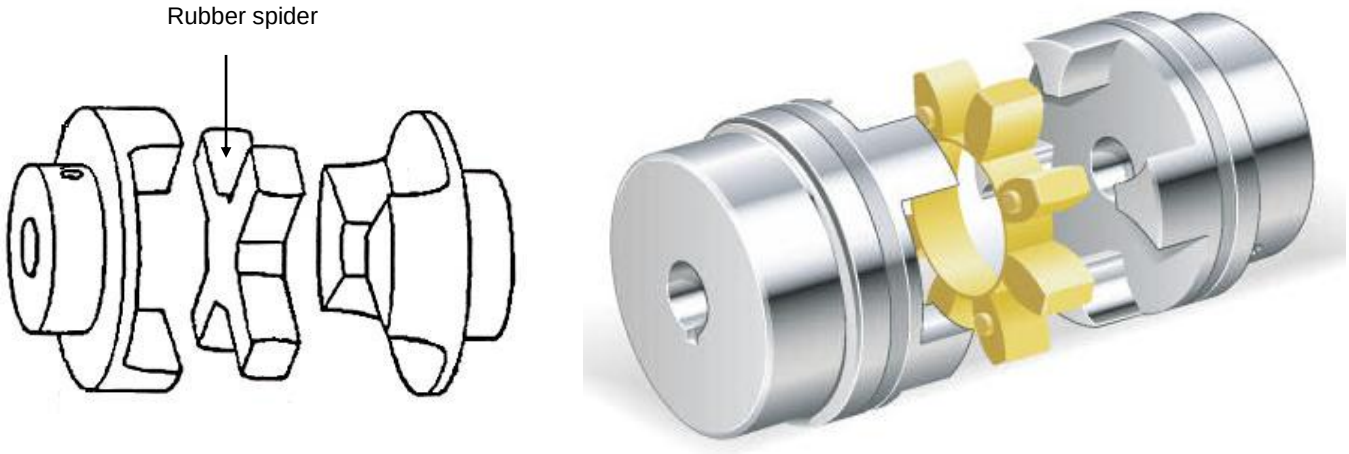


FIG 11.

ITEM / TASK: Metal disc couplings.

DESCRIPTION:

A. The metal disc coupling (Fig 12) is similar to the rubber disc coupling and uses a compounded fibrous material disc to transmit the motion.
B. It also has several layers of thin steel discs to accommodate misalignment.

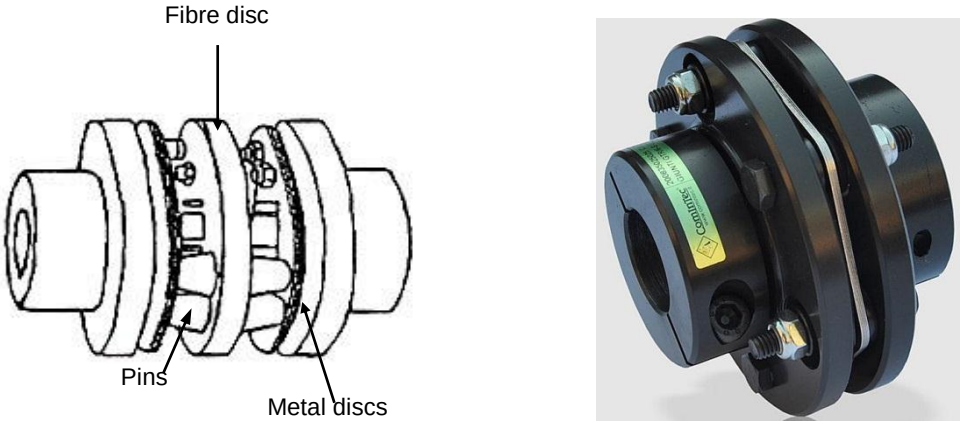


FIG 12.

ITEM / TASK: Steel grid flexible couplings.

DESCRIPTION:

A. The steel grid coupling (Fig 13) consists of two hubs with machined or slotted flanges connected by a spring steel grid and enclosed in a split housing.
B. The spring steel grid forms the cushion for torsional loading and component misalignment.

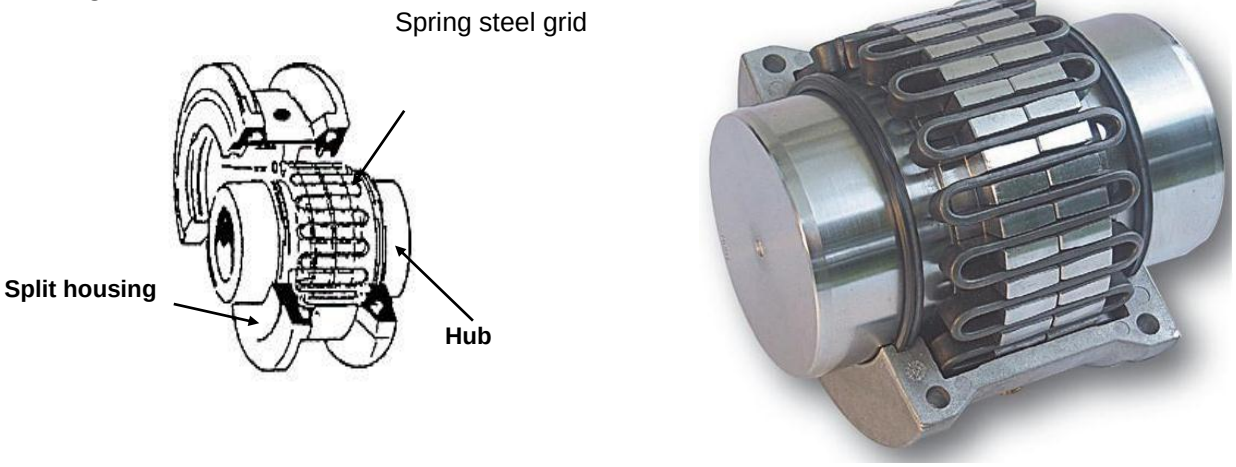


FIG 13.

DO THE SELF TESTON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.

SELF TEST 1

Answer the following questions without referring to your notes.

1. Name the three functions of a coupling.
   a. _____
   b. _____
   c. _____

2. Name nine different types of couplings used in the industry.
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____
   h. _____
   i. _____

Check your answers against those given below. Ask your Training Officer for assistance if yours are not correct.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

3. SECURING A COUPLING TO A SHAFT

ITEM / TASK: Methods of securing a coupling to a shaft.

DESCRIPTION:

A. There are basically three methods of securing a coupling, a pulley and a chain wheel to a shaft, namely by using:
   - a taper or gibhead key,
   - a plain (feather) key, or
   - a tapered locking bush.

B. The first two methods have been described in detail in Module KF and is only dealt with briefly here. The use of a tapered lock bush is described in detail below.

ITEM / TASK: Taper key.

DESCRIPTION:

A. A taper or gibhead key is used to key a component in position on a shaft. It is normally used on larger shafts. (Fig 14)

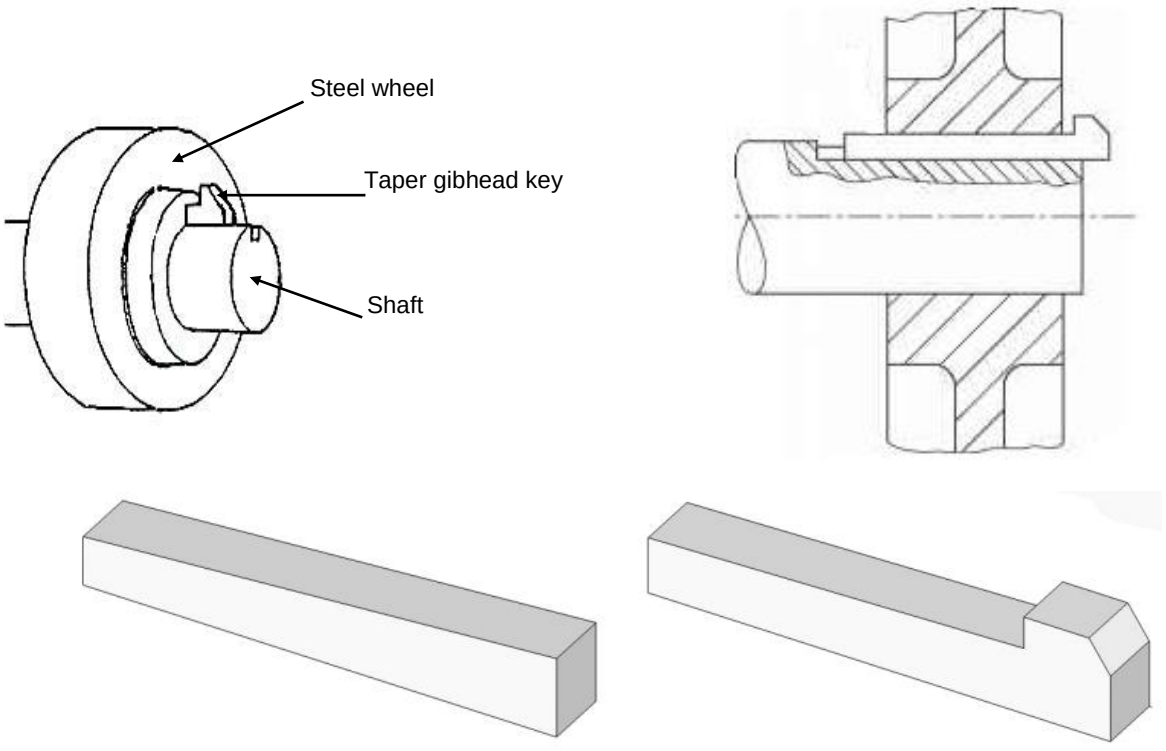


FIG 14.

ITEM / TASK: Plain (feather) key.

DESCRIPTION:

A. Plain or feather keys are normally used on small shafts and when the coupling or pulley is located on the shaft against a shoulder. (Fig 15)

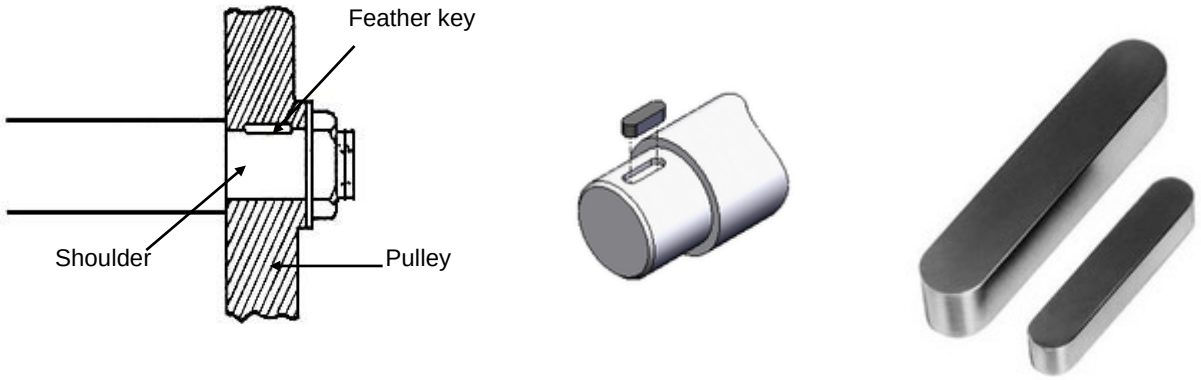


FIG 15.

ITEM / TASK: Tapered locking bush.

DESCRIPTION:

A. The locking bush is split and can easily be positioned on the shaft and is used to clamp a coupling or pulley anywhere along the shaft.

B. It is keyed on to the shaft. (Fig 16)

FIG 16.

4. REMOVE AND INSTALL A COUPLING USING A TAPER LOCK BUSH

ITEM / TASK: Remove the coupling.

DESCRIPTION:

A. Mark the shaft and taper lock bush with a scriber (Fig 17), so that it can be replaced in the same position on the shaft.

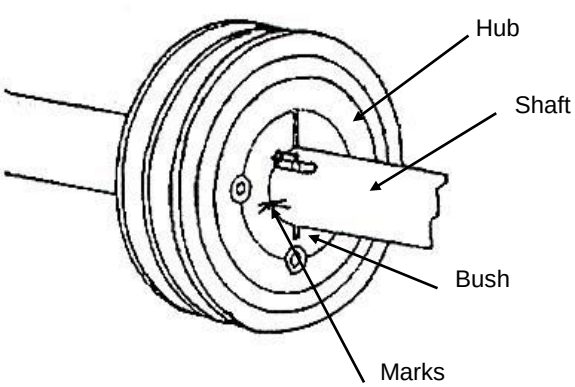


FIG 17.

B. Slacken all the screws by four complete turns.

C. Remove one or two screws, apply oil to the thread and the points and screw them into the jacking-off holes. (Fig 18)

Note:

The jacking-off holes are threaded in the bush only.

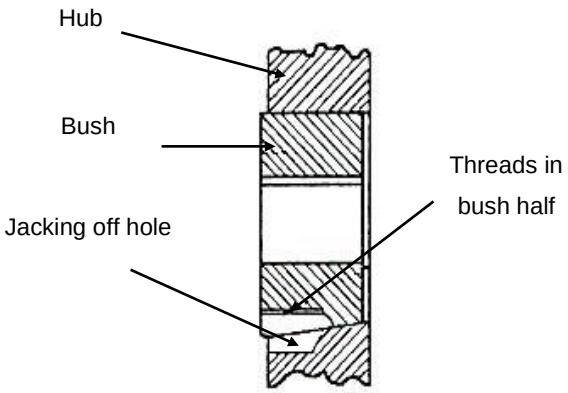


FIG 18.

D. Tighten the screws alternately until the bush is loosened in the hub and the assembly is free on the shaft.

Note.

Sometimes a jacking-off screw becomes very tight, in which case a blow with a soft hammer on the flange, as close as possible to the bush, will be required. This will assist the taper in parting.

E. Remove the assembly from the shaft.
F. Remove the bush from the shaft by inserting a wedge, e.g. a small screwdriver, in the split part of the bush to expand it **slightly.** Care must be taken to avoid expanding the bush too much, because this may break it.

ITEM / TASK: Install the coupling.

DESCRIPTION:

A. Inspect the shaft, keyway, bush and flange for burrs, screw marks and rust.
B. Clean all the parts with emery tape and remove the burrs with a smooth file.
C. Ensure that the matching tapered surfaces are completely free from oil and insert the bush in the hub so that the holes and the marks line up. (Fig 19)

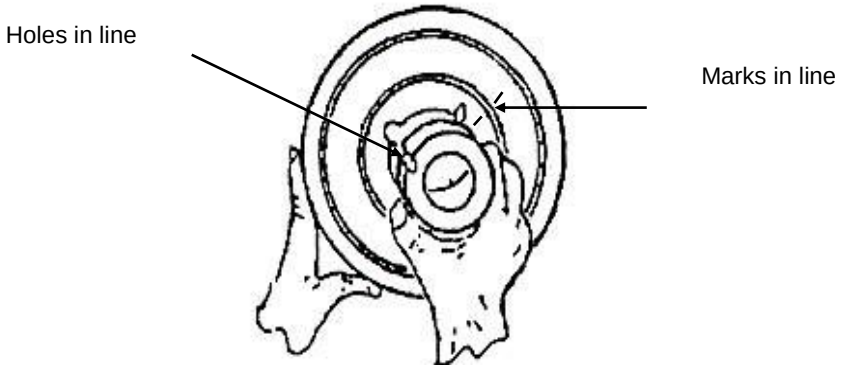


FIG 19.

D. Apply lubricant to the threads and the points of the grub screws.
E. Place the screws loosely in the jacking-on holes.

Note.

The jacking-on holes are threaded in the hub only. (Fig 20 on the following page)

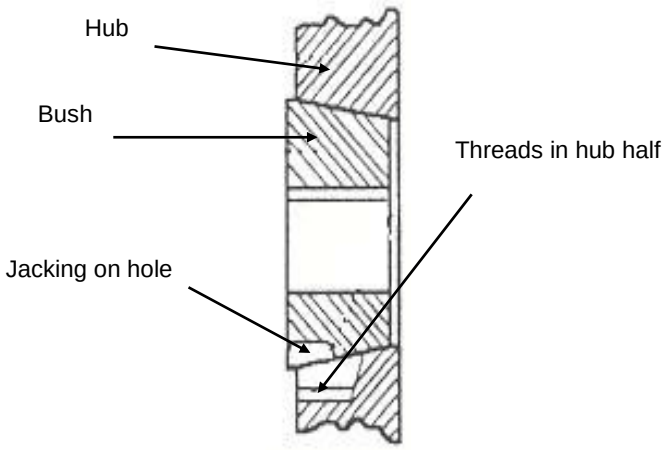


FIG 20.

F. Fit the hub and bush on the shaft as one unit (Fig 21) and locate it in position as desired. Remember that the bush will nip onto the shaft first, after which the hub will be slightly drawn onto the bush. Ensure that the keyways line up.

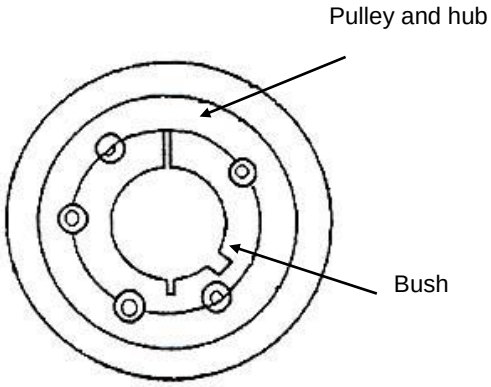


FIG 21.

G. Repeat this alternate hammering and tightening of the screws once or twice.
H. Tighten the screws gradually and alternately until all are pulled up tight.
I. Fit a dial test indicator to measure and ensure that the run-out is not more than ±0.10mm.
J. Tap around the bush with a mallet to seat it and the screws properly. The screws will now turn a little more.
K. Repeat this alternate hammering and tightening of the screws once or twice.
L. Measure the depth of the keyways on the bush and shaft. (Fig 22). Measure the height “T” of the key. Make sure that there will be approximately 0.10mm top clearance.

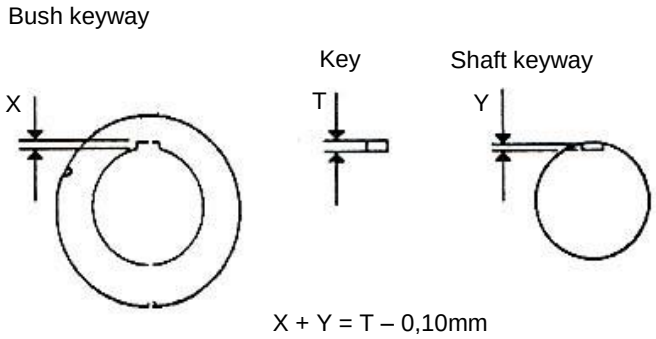


FIG 22.

M. Fit the key. Ensure it is parallel and has a side fit. (i.e. that the width of the key and the keyway are exactly the same)

N. Fill the jacking off holes with grease to prevent any dirt entering them.

NB.

After the drive has run under a load for a short time, stop and check the tightness of the screws.

DO THE SELF TEST AND PRACTICE ON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.

SELF TEST 2

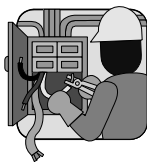
1. Name the three methods of securing a coupling to a shaft.
   a. _____
   b. _____
   c. _____

Check your answers against those given below. Ask your Training Officer for assistance if yours are not correct.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

PRACTICE



Remove and replace the flange of the given motor assembly, which is fitted with a Fenner Flex coupling flange.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

5. COUPLING ALIGNMENT

ITEM / TASK: Introduction.

DESCRIPTION:

A. Most couplings permit a small amount of misalignment. However, the better the alignment between the motor, the coupling and the shaft, the longer the bearings will last.

B. There are three types of misalignment, namely parallel, angular and combined parallel and angular.

ITEM / TASK: Types of misalignment.

DESCRIPTION:

A. Parallel misalignment (viewed from the side). (Fig 23)

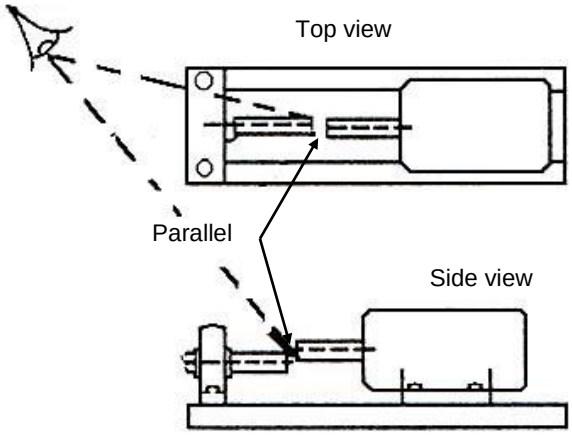


FIG 23.

B. Angular misalignment (viewed from the side). (Fig 24)

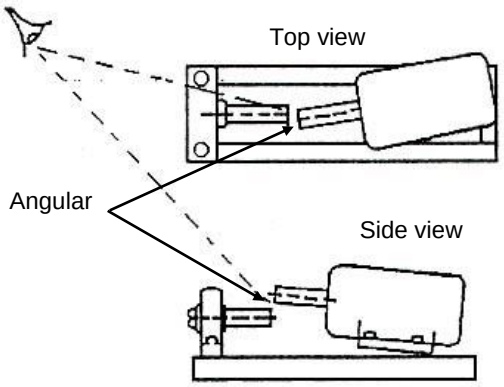


FIG 24.

C. Simultaneous parallel misalignment (viewed from the top) and angular misalignment (viewed from the side). (Fig 25)

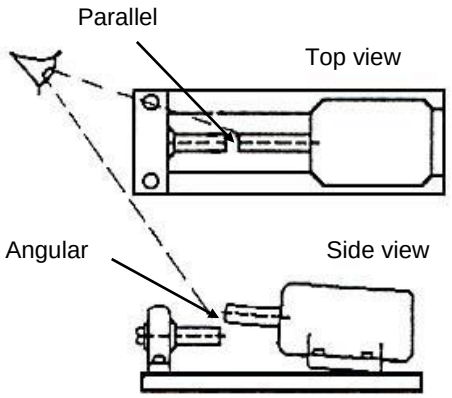


FIG 25.

ITEM / TASK: Correcting misalignment due to twisting of the base plate of an assembly (rocking).

DESCRIPTION:

A. One cause of misalignment is due to the base plate twisting after it has been welded. This results in rocking of the component. It is corrected by packing it with shims. A shim is a thin piece of metal.

B. The thickness of the shim required is measured with a taper **gauge** (or a feeler gauge).

The following is a brief explanation of how to use a taper gauge:

- A taper gauge is basically used for the same purpose as a feeler gauge, namely to determine the size of a gap. The taper gauge is a piece of metal machined on a taper.
- The thickness of the gauge varies on a taper from 0.5mm to 5mm. It is measured at intervals of approximately 8mm and the thickness is stamped on the top face of the gauge. (Fig 26)

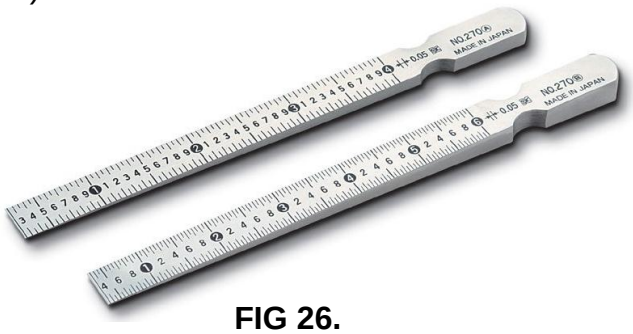


FIG 26.

- When a taper gauge is used, it must be pushed into the gap lightly until the top and bottom faces of the gauge are in contact with the material forming the gap. (Fig 27)

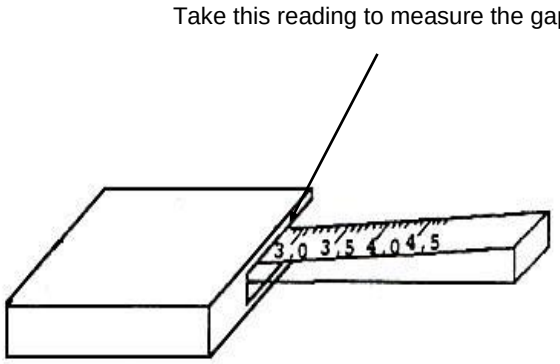


FIG 27.

- When the top part of the component, which forms the gap, overhangs the bottom part, the reading must be taken in line with the bottom face. (Fig 28)

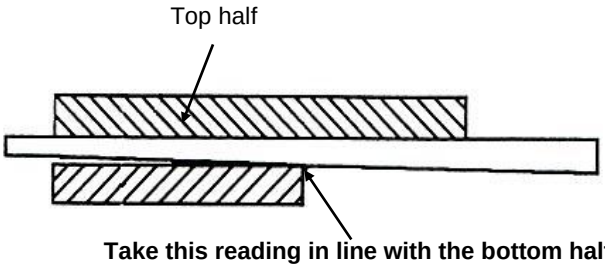


FIG 28.

- When the bottom part of the component protrudes under the top part, the reading must be taken in line with the top face. (Fig 29)

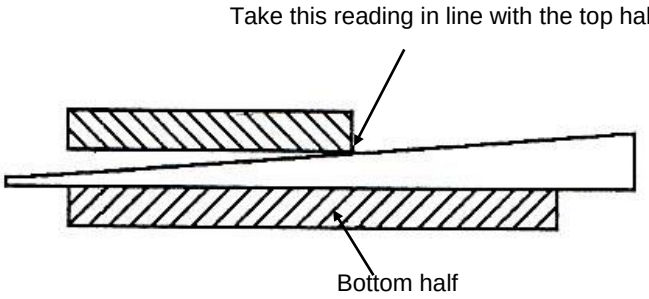


FIG 29.

NB.

Do not push the gauge too hard because this will damage it and you will not get a true reading.

C. Determining the size of packing to insert when a component is rocking on the base plate.

- Pull the motor over so that it will stand on at least three feet.
- Insert a taper gauge or feeler gauge between the base plate and the foot, which is not in contact with the base plate. (Fig 30)

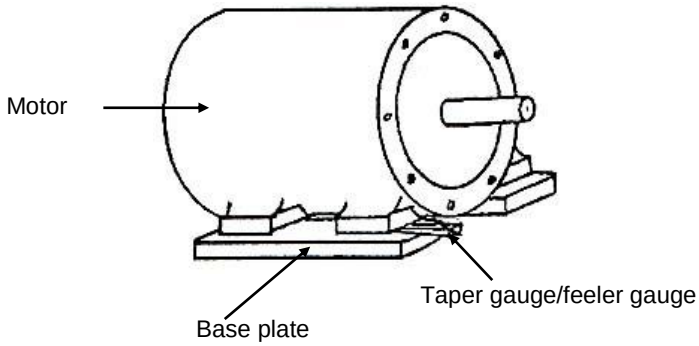
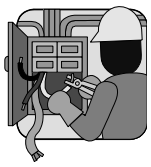


FIG 30.

- Take different sizes of shim stock and measure their thickness with a micrometer.
- Make up a pack of shims to have the same thickness as the size of the gap measured in the step above.
- Place it under the foot of the component.
- Check if motor is now stable, i.e. it does not rock.
- Tighten and torque the clamping down bolts.

DO THE PRACTICE ON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.



PRACTICE

Correct the rocking of the given drive unit by packing shims under the motor.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

ITEM / TASK: Correcting angular alignment (viewed from the side).

DESCRIPTION:

For angular alignment (viewed from the side) (Fig 31) for a pin and bush coupling, a taper gauge / feeler gauge is used to measure the error between the front faces of the coupling.

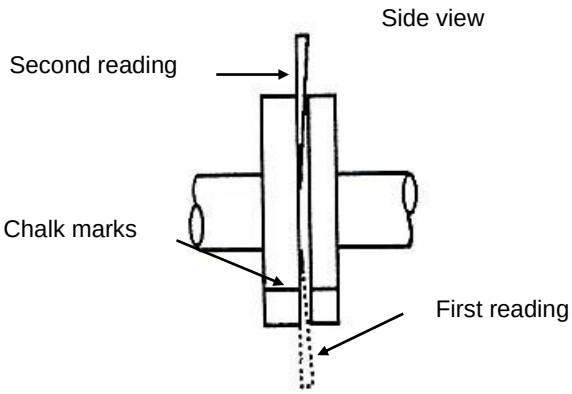


FIG 31.

- Line up the reference marks on the top.
- Measure the gap at the top and the bottom between the two front faces of the coupling with a taper gauge/feeler gauge. (Fig 31)
- If the difference between the measurements taken at the top or bottom is larger than the required specification (i.e. 0.10mm), determine the size of the shims required to align the coupling in the following manner:
  - Subtract the two sizes measured previously from each other. Call this “x”.
  - Measure the outside diameter (OD) of the coupling.
  - Measure the centre distance between the clamping down bolts “L”. See Fig 32 on the next page.
  - Calculate the thickness of the shims “t” by using the formula :

    $t = \frac{L \times X}{OD}$ where all measurements are in millimetres.

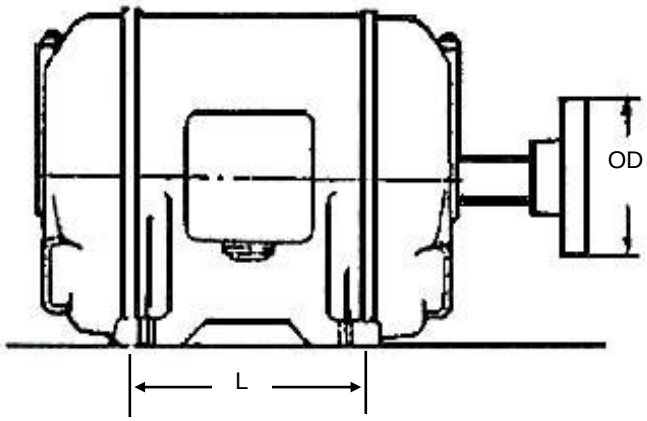


FIG 32.

Example:

If the difference in the gap "X" = 0.15mm,
centre distance of the bolts "L" = 250mm, and
outside diameter of the coupling "OD" = 150mm,

$$\therefore \text{The thickness } t = \frac{L \times X}{OD}$$

$$= \frac{250 \times 0{,}15}{150}$$

$$= 0.25\text{mm}$$

Thickness of the shims must be 0.25mm.

- Insert the shims under the feet that require lifting.

Note:

a. When the gap is bigger at the top than at the bottom of the coupling, **lift the driver (motor) or driven at the back**. (Fig 33 on the next page)
b. When the gap is bigger at the bottom than at the top of the coupling, **lift the driver or driven at the front**. (Fig 34 on the next page)

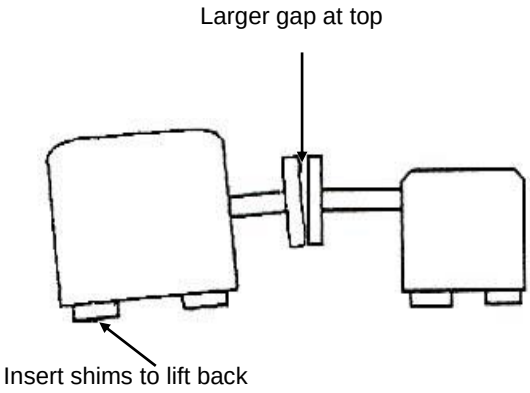


FIG 33.

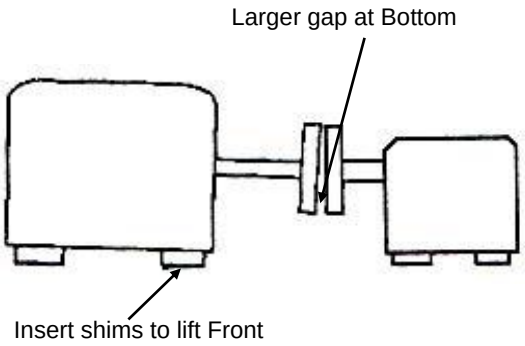


FIG 34.

- Now check the alignment again by measuring the gap at the top and at the bottom of the coupling with a taper gauge/feeler gauge, and repeat the process if necessary to improve the alignment.

Remember:

When you are using a taper gauge/feeler gauge to measure the gap between flanges, measure the size at equidistant points from the centre line of the shaft. (Fig 35)

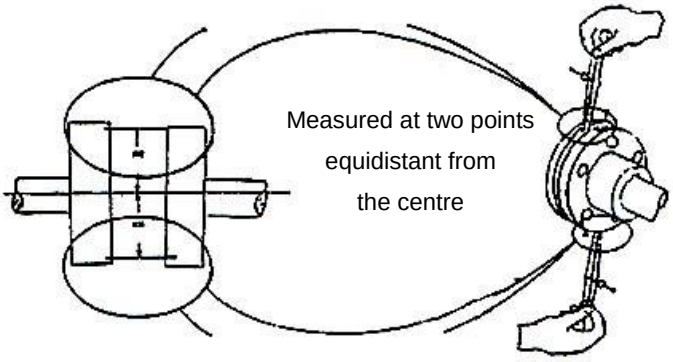
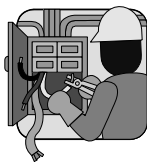


FIG 35.

DO THE PRACTICE ON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.



PRACTICE

At the unit which is fitted with a pin and bush coupling, do the angular alignment (view from the side) using a taper gauge/feeler gauge.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

ITEM / TASK: Correct parallel alignment (viewed from the side).

DESCRIPTION:

For **parallel alignment (viewed from the side)** use a rule or square and a feeler gauge or taper gauge.

- Line up the reference marks on the top.
- Place a rule, straight edge or square on edge over the peripheral surface of the highest coupling flange.
- Measure the gap between the rule/square and the peripheral surface of the lowest coupling flange with a taper gauge or feeler gauge. (Fig 36)

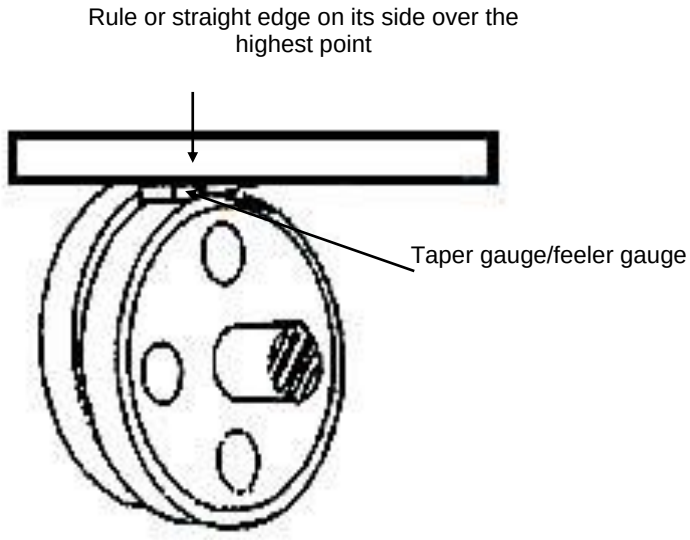
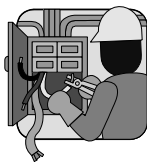


FIG 36.

- Select four sets of shims with the same thickness as the gap.
- Insert the shims under the four feet of the lowest unit (one set per foot).
- Tighten and torque the holding-down bolts.
- Check the parallel alignment (viewed from the side) by using a feeler gauge/taper gauge to measure the gap between the rule and the lowest coupling flange. Insert more shims if necessary.

DO THE PRACTICE ON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.



PRACTICE

Correct the parallel alignment (viewed from the side) of the given unit which is fitted with a pin and bush coupling.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

ITEM / TASK: Correct angular misalignment (horizontal taper).

DESCRIPTION:

Angular alignment (viewed from above) can be corrected using one of the three methods described below, namely using a taper gauge, a telescopic gauge or calliper, or a dial test indicator.

A. **Using a taper gauge.**

- Measure the distance on both sides, between the front faces of the couplings with a taper gauge. (Fig 37) Align the chalk marks.
- Move the components sideways until the gaps on both sides are the same.

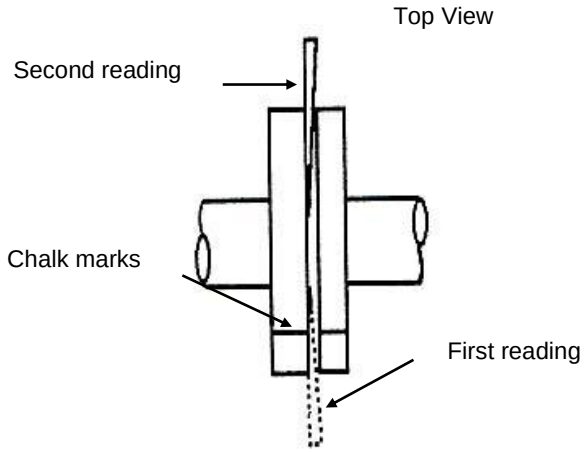


FIG 37.

B. **Using a calliper or telescopic gauge.**

- When the distance between the two coupling faces cannot be measured with a taper gauge, an inside calliper or telescopic gauge must be used and the size transferred onto a micrometer or Vernier calliper.

NB.

When using a calliper or telescopic gauge, the measurement must be taken equidistant from the centre line of the shaft.

C. **Using a dial test indicator.**

NB:

This is the more accurate, and thus preferred method of correcting horizontal taper.

Proceed as follows:

- Measure the distance between the two couplings on both sides with a calliper or telescopic gauge (angular alignment).
- If the difference between the measurements taken on the two sides is larger than the required specification (i.e. 0.10mm), calculate the value “t” as explained previously:
  - Subtract the two sizes measured previously from each other. Call this “X”.
  - Measure the outside diameter (OD) of the coupling.
  - Measure the centre distance between the clamping down bolts “L”.
  - Calculate “t” by using the formula:

$$t = \frac{L \times X}{OD}$$ where all measurements are in millimetres.

- Clamp a magnetic dial test indicator against the base of the motor with the test indicator against the motor (parallel alignment).
- Using a dial test indicator and the value “t”, move the motor sideways until the gaps on both sides are the same or the difference between the gaps is within specification (0.10mm).
- Tighten the clamping down bolts of the motor and check the alignment again. Repeat the process until the alignment is satisfactory.

N.B.

Another critical factor in coupling alignment is the distances between the opposing flanges dimension “M” will vary depend on the size of the pin and bush coupling which must be within certain specified limits. The dimension is contained in the coupling charts.

ITEM / TASK: Correct parallel misalignment (alignment).

DESCRIPTION:

Parallel misalignment (viewed from above) can be corrected using a ruler or an engineer's square and two dial test indicators:

- The error in parallel alignment (viewed from above) can be corrected by moving one of the two components sideways as required.
- To make sure that the angular alignment (viewed from above) is not disturbed while correcting the parallel misalignment, two dial test indicators will be required as shown in Fig 38.

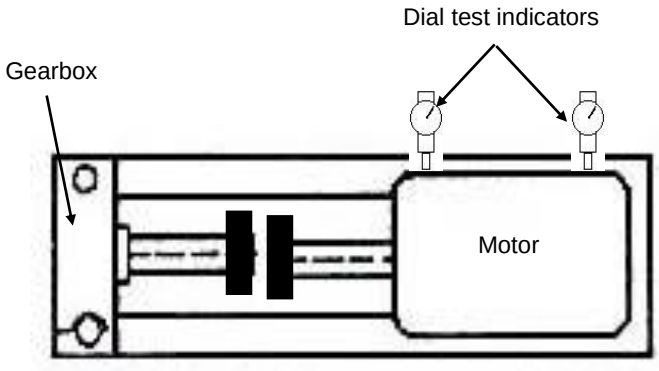


FIG 38.

- Place a rule or engineers square on its edge on one of the coupling flanges.
- Move one component sideways until the peripheral faces of both flanges are touching the rule over their entire width.
- Tighten and torque the mounting bolts to the required specifications.

ITEM / TASK: Correcting angular and parallel misalignment (viewed from above) using a rule or square.

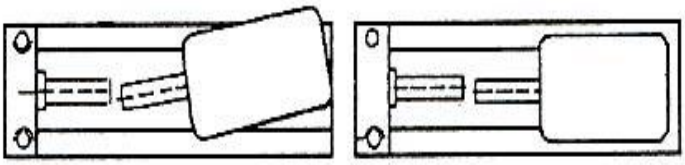
DESCRIPTION:

NB.

This method is not very accurate for angularalignment. For a more accurate angular alignment a taper gauge, dial test indicator, telescopic gauge or calliper is used to measure the error.

- The error in the parallel and angular alignment (when viewed from above) can be corrected by moving the components sideways or swinging them as required. (Fig 39)

Top view



Angular misalignment Parallel misalignment

FIG 39.

- Place a square or ruler on its edge on one of the coupling flanges. (Fig 40)

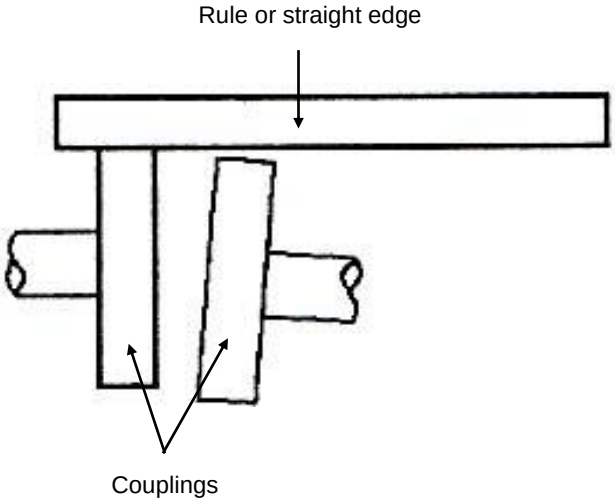


FIG 40.

- Move the other component sideways until the peripheral faces (flanges) of both the couplings are touching the rule over their entire width. (Fig 41)

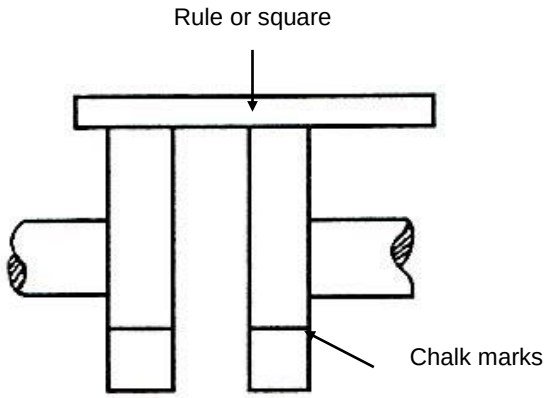
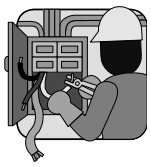


FIG 41.

- Draw a line with chalk over the coupling flanges. (Fig 41) Keep them in line for all operations. This will compensate for bent shafts.

DO THE PRACTICE ON THE NEXT PAGE BEFORE CONTINUING WITH THE REST OF THE MODULE.



PRACTICE

At the unit which is fitted with a pin and bush coupling:

a. Do the angular and parallel alignment (viewed from above) using a rule.
b. Do the angular alignment, viewed from above (horizontal taper), using a taper gauge, a telescopic gauge and a dial test indicator. (All three methods)
c. Do the parallel alignment, viewed from above using a rule or engineer's square and two dial test indicators.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

6. REPLACE A FENNER FLEX COUPLING

ITEM / TASK: Remove the coupling.

DESCRIPTION:

A. Isolate the machine, i.e. switch it off, lock out all power supply to the machine and put a warning notice (MEN AT WORK. DO NOT SWITCH ON) on the main switch.

B. Ensure that the drive is stationary before commencing work.

C. Remove the safety guard.

NB.

All the moving parts of any machine must be fitted with safety guards to prevent injuries.

D. Loosen the clamping ring screws on both flanges. Do not remove the screws completely.

E. Remove the tyre. (Fig 42)

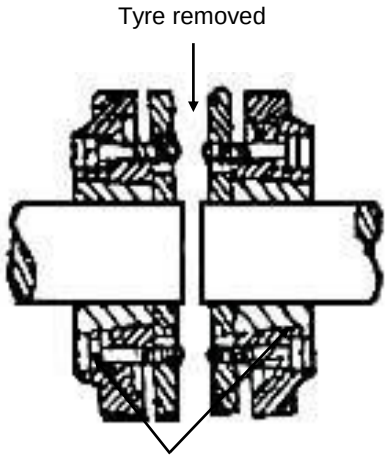


FIG 42.

F. Remove the clamping down bolts on the motor. (Fig 43)

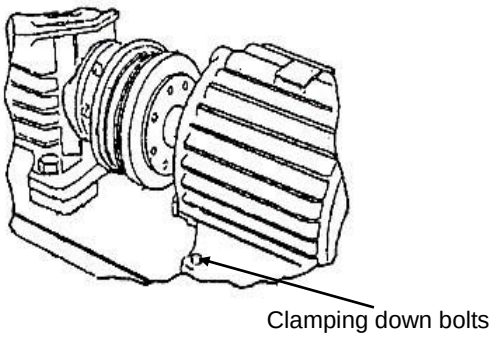


FIG 43.

G. Remove the motor from the base plate.

H. Remove the taper lock bushes and flanges from both the shafts.

ITEM / TASK: Fit the new coupling.

DESCRIPTION:

A. Fit the new coupling flanges on their respective shafts.

B. Replace the motor onto the base plate.

ITEM / TASK: Line up the coupling.

DESCRIPTION:

A. Remove all the clamping ring screws and both the clamping rings. (Fig 44)

B. From the coupling chart **(Table 1 or 2 at the end of this section)** determine dimension "M", i.e. the distance between the flange faces. (Fig 44)

Note 1:

The coupling sizes are normally stamped on the tyre (e.g. F70 or F100). For an F70 stepped flange, "M" is 40mm and for an F100, "M" is 48mm.

Note 2:

Flat flanges (see Fig. 45) will have different dimensions "M". (See Table 2)

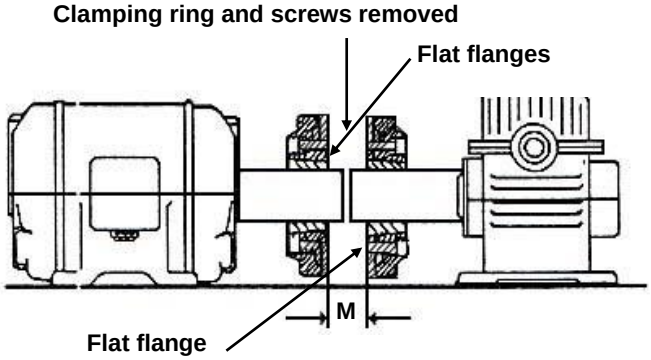


FIG 44.

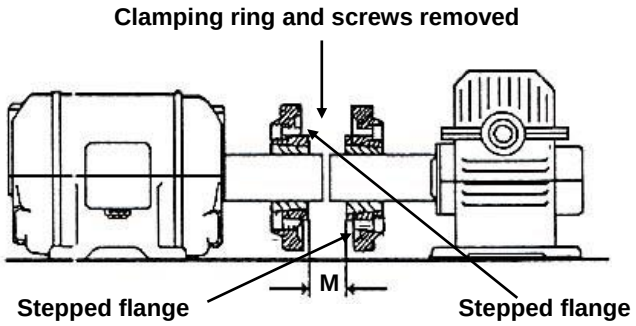


FIG 45.

C. See if it is possible for the motor and the driven unit to be placed in such a position that the required dimension “M” can be obtained within the limits of ±1.00mm. It is possible that the flanges on the shafts may have to be moved.
D. Check both the units, the motor and the driven, for **rocking** on the base plate. Pack with shims if it is necessary, as learnt earlier in the module.
E. Do the angular and parallel alignment (viewed from the top) using a rule (approximate alignment will be sufficient).
F. Do the angular alignment viewed from the side. (Vertical taper). The tolerance is 0.10mm.
G. Now do the final parallel alignment, viewed from the side (height), using a rule and a feeler gauge. The tolerance is ± 0.10mm.
H. Do the final angular alignment, viewed from above (horizontal taper) by using a dial test indicator or one of the other methods described previously, to within the limits of 0.10mm.
I. Do the parallel misalignment (viewed from above) using a ruler or an engineer’s square and two dial test indicators.
J. Tighten and torque the clamping down bolts and check the dimension “M”. It must be within the limits of ±1.00mm.
K. Check the alignment in the following sequence and correct it if necessary :
    - Parallel and angular alignment. (Viewed from the side)
    - Parallel and angular alignment. (Viewed from above)
L. Replace the clamping rings and screws. Do not tighten the screws.
M. Open out the tyre and fit it over the coupling flanges, ensuring that the tyre beads seat properly on the flanges and clamping rings. To ensure proper seating, it may be necessary to strike the outside diameter of the tyre with a small mallet. When seated there should be a gap between the ends of the tyre as specified in Tables 1 and 2.
N. Tighten the clamping ring screws in one flange alternately and evenly (approximately a half turn per screw) working round the flange until metal to metal contact is felt between the clamping ring and the flange. Tighten the screws in the other flange in a similar manner.
O. Now tighten the screws by using a torque wrench to the specified torque. (Table 1 or 2 depending on the type of flange)

    e.g. For a F70 stepped flange the torque is 24 Nm and for a F100 flat flange the torque is 40 Nm.

P. Refit the safety guard, checking that the guard is not dented or broken and that it fits correctly and is clear of the coupling and shaft.

Q. Check that no tools have been left on or near the drive.

R. Remove the warning notice and start the motor.

TABLE 1 : COUPLING CHART

FENNER FLEX COUPLING WITH STEPPED FLANGES

COUPLING SIZE	FLANGE GAP	TYRE GAP	CLAMP SCREW TORQUE
	M	X	Nm
F40	22	1.5	14
F50	25	1.5	14
F60	33	1.5	14
F70	40	1.5	24
F80	43	1.5	24
F90	46	1.5	30
F100	48	1.5	30
F110	45	1.5	30
F120	49	1.5	35
F140	25	3.0	35
F160	22	3.0	55
F180	33	5.0	55
F200	33	5.0	55
F220	40	5.0	142
F250	46	5.0	142

NB.

X = Approximate tyre gap in mm.

TABLE 2 : COUPLING CHART

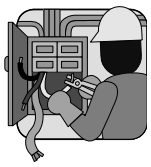
FENNER FLEX COUPLING WITH FLAT FLANGES

COUPLING SIZE	FLANGE GAP	TYRE GAP	CLAMP SCREW TORQUE
	M	X	Nm
F40	22	1.5	15
F50	25	1.5	15
F60	33	1.5	15
F70	23	1.5	24
F80	25	1.5	24
F90	27	1.5	40
F100	27	1.5	40
F110	25	1.5	40
F120	29	1.5	50
F140	32	3.0	55
F160	30	3.0	80
F180	46	5.0	105
F200	48	5.0	120
F220	55	5.0	165
F250	59	5.0	165

NB.

X = Approximate tyre gap in mm.

DO THE PRACTICE ON THE NEXT PAGE.



PRACTICE

Proceed to the given assembly, which is fitted with a “Fenner Flex” coupling.

Remove and replace the coupling and then line up the assembly in accordance with the procedures contained in the module.

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

REMEMBER ALWAYS WORK SAFE

Once you have passed the entire self-tests and practices, you are now at liberty to request a Formative Assessment from your Assessor.