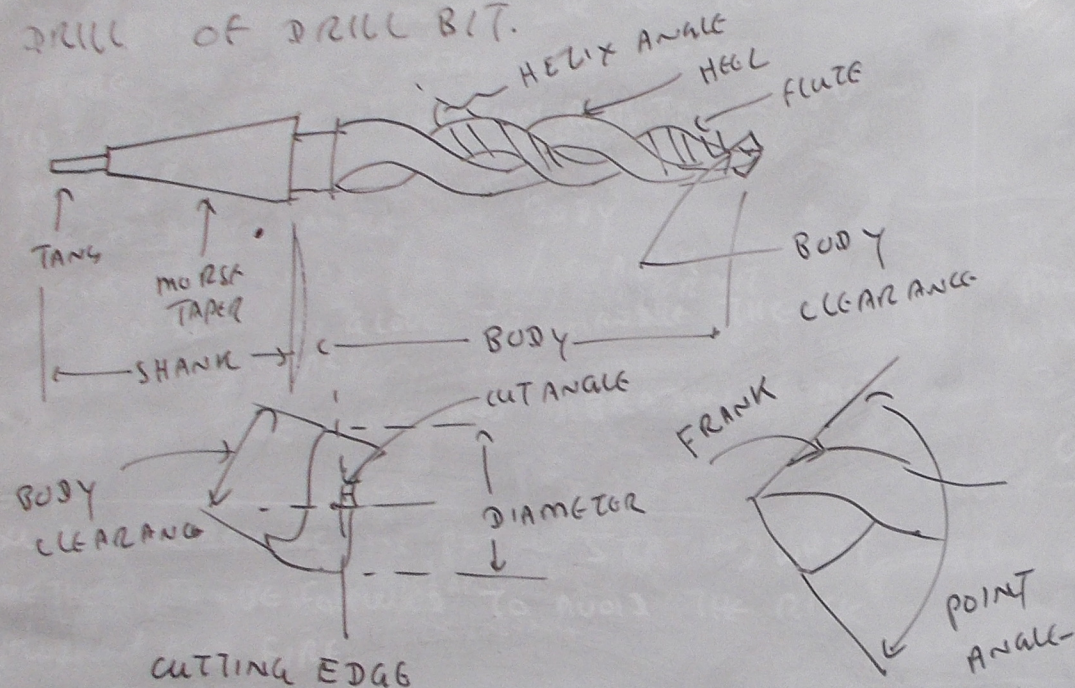


## DRILL AND DRILLING

THE DRILLING OPERATION IS USED TO MAKE HOLES IN A JOB USING A ROTATING CUTTING TOOLS CALLED DRILL OR DRILL BIT.



### CUTTING EDGE

- WORKING PART OF DRILL
- MUST BE IN CONTACT WITH THE JOB

### CHISEL EDGE

- LOCATE THE DRILL
- FORM PIVOT POINT

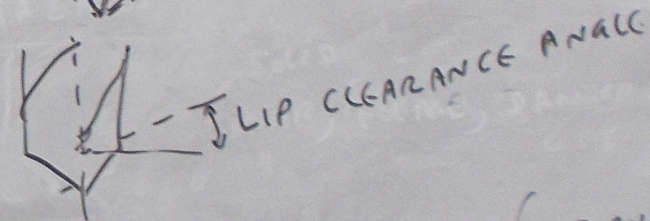
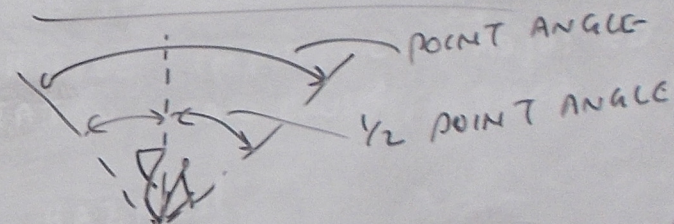
### FLUTE

HELICAL GROOVE

### SHANK

STRAIGHT PORTION

CUTTING CLEARANCE ANGLE



- LENGTH AND POINT ANGLE
- LIP CLEARANCE ANGLE
- CORRECT LOCATION OF CHISEL POINT

DRILLING PROBLEM

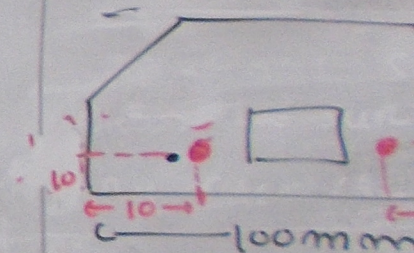
SECTION(S) PAGE 4/15

CAUSE OF OVR SIZE / UNDER SIZE

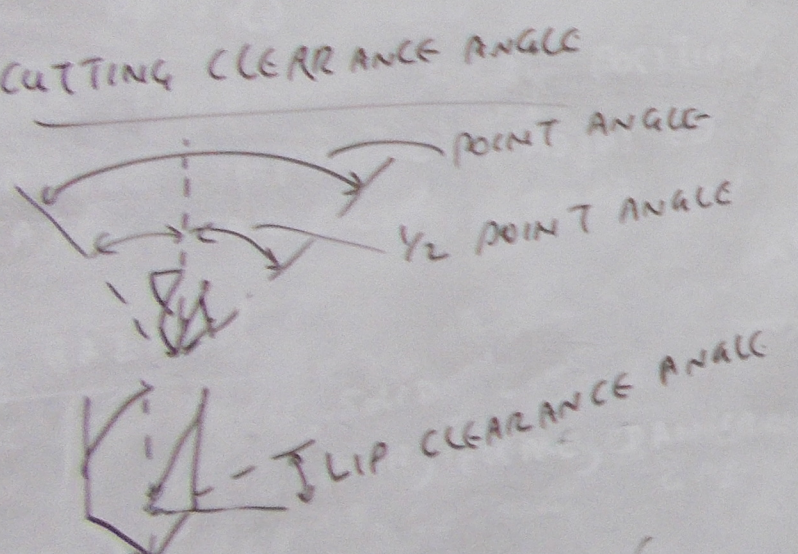
## DRILLING MACH

CLEAR SPINDLE GUARD

VICE



FLUTE  
 HELICAL GROOVE  
 SHANK  
 STRAIGHT PORTION

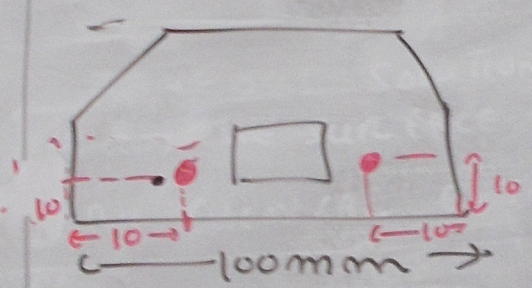
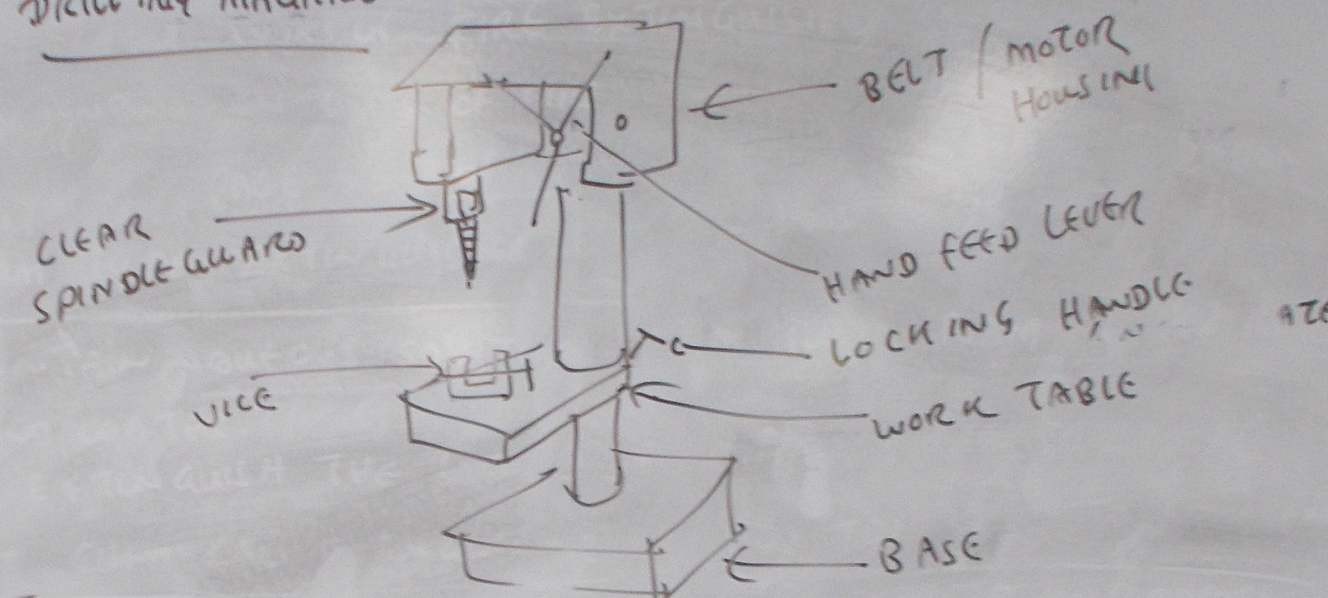


- LENGTH AND POINT ANGLE
  - LIP CLEAR ANGLE ANGLE
  - CORRECT LOCATION OF CHISEL POINT
- DRILLING PROBLEM

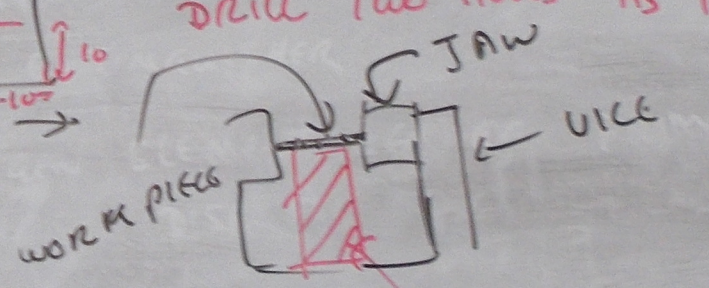
SECTION (S) PAGE 4/15

CAUSE OF OVERSIZE / UNDER SIZE

DRILLING MACHINING



DRILL TWO HOLES AS PER DIAGRAM



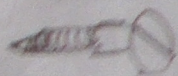
Q WHAT ARE THE FOLLOWING FASTENERS STATE WHERE THEY ARE USED



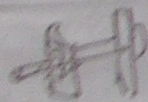
BOLT HEAD  
USE FIXING WOOD (OR) LIGHT GAUGE STEEL



DYNA ROD / SLEEVE  
ANCHOR / MASONARY ANCHOR  
FIXING TO CONCRETE



FLAT BLADE WIDER SHANK  
WOOD SCREW  
FIXING HEAVIER EQUIPMENTS  
TO WOOD



HEAVY TOGGLE  
FIXING LIGHT WEIGHT ITEM  
TO WALL



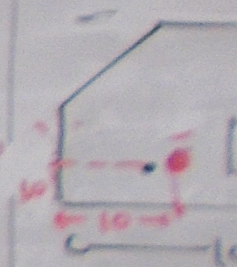
SPRING TOGGLE  
FIXING LIGHT ITEM TO  
CEILING

A COACH SCREW IS USED FOR  
HEAVY DUTY FIXING TO TIMBER

BRICK WORK IS DRILLED USING  
A TUNGSTEN TIPPED DRILL

DRILL

CLEAR  
SPACE



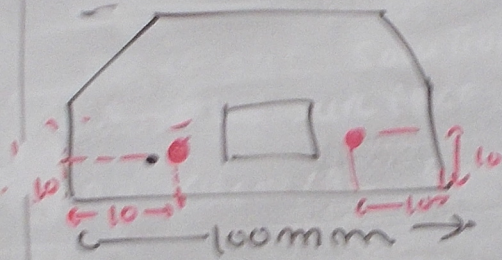
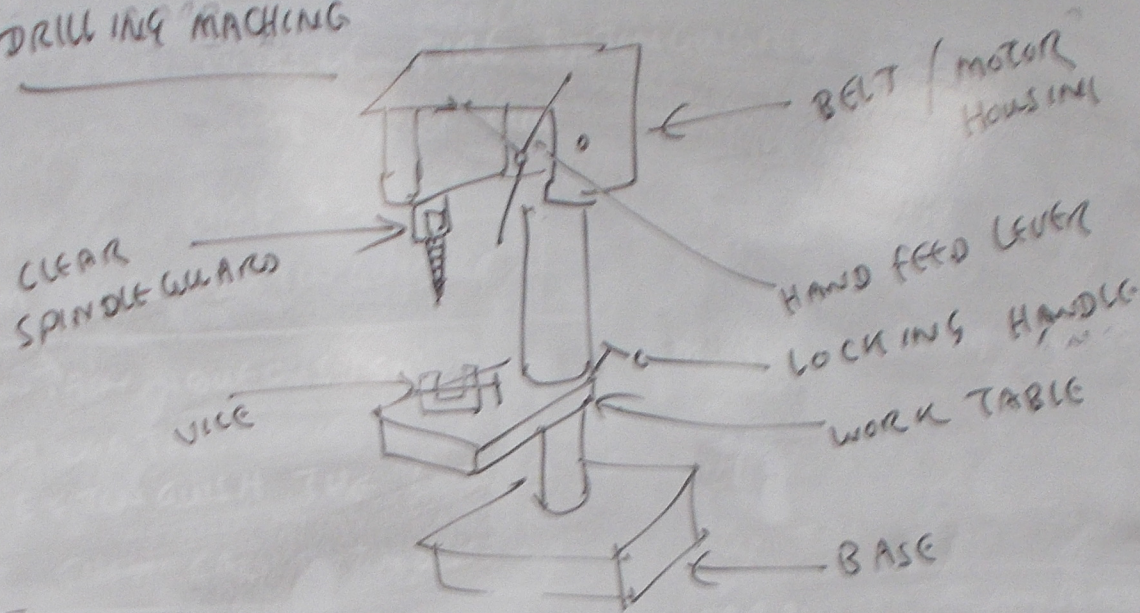
PROG

PA

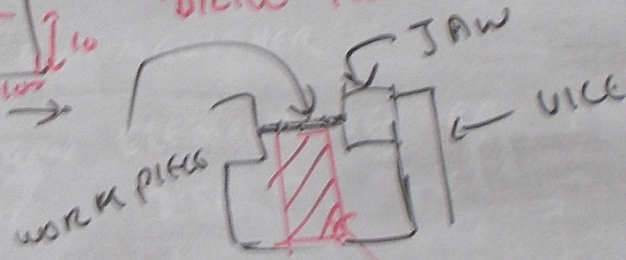
A COACH SCREW IS USED FOR  
HEAVY DUTY FIXING TO TIMBER

BRICK WORK IS DRILLED USING  
A TUNGSTEN TIPPED DRILL

### DRILLING MACHING



DRILL TWO HOLES AS PER DIAGRAM

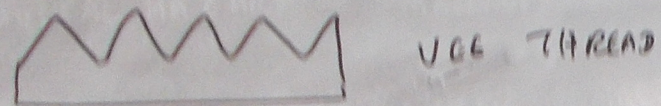


PAGE 5 OF 15 SECTION (D)

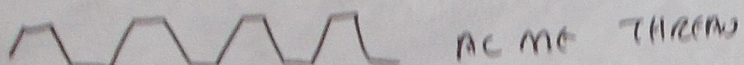
DRILL BITS

PAGE 7 OF 15 - DRILLING SAFETY

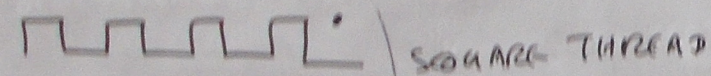
# TAPPING AND THREADING



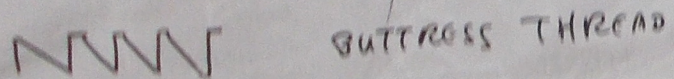
VEE THREAD



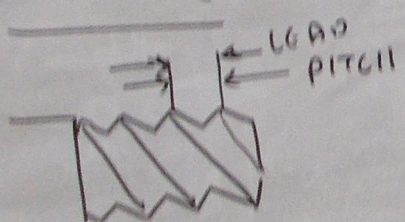
ACME THREAD



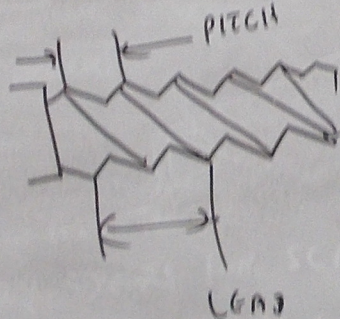
SQUARE THREAD



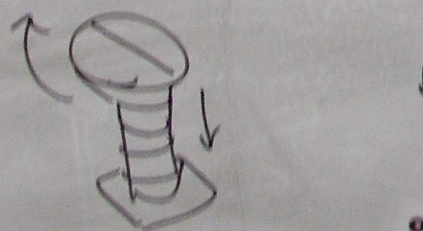
BUTTRESS THREAD



SINGLE START  
THREAD



LEAD

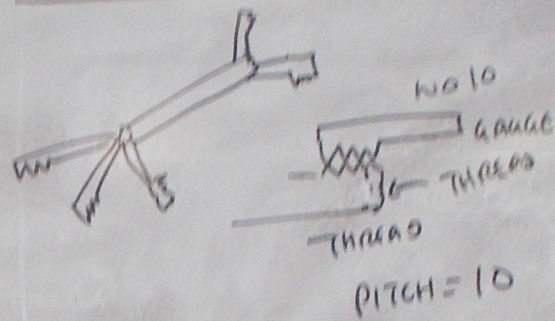


RIGHT HAND THREAD



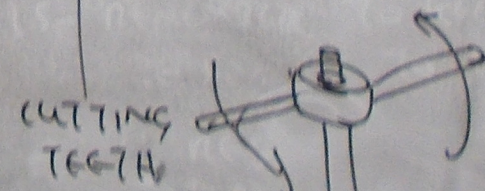
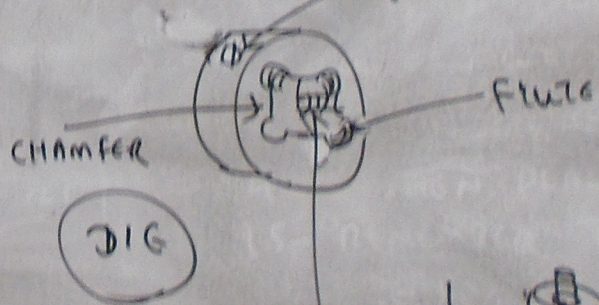
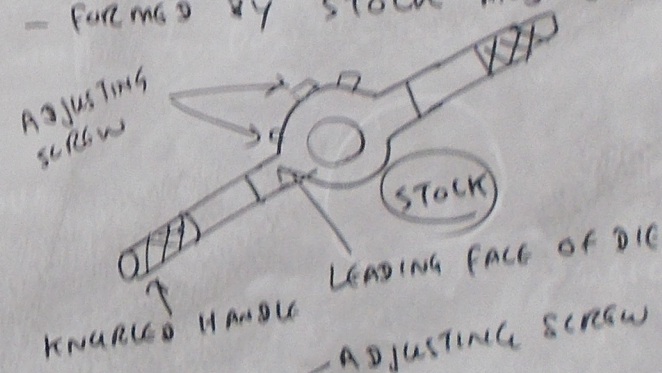
LEFT HAND  
THREAD

CHECK THE PITCH BY SCREW PITCH GAUGE



## EXTERNAL THREAD

FORMED BY STOCK AND DIE

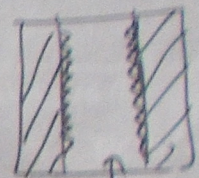


EXTERNAL

THREAD

## INTERNAL THREAD

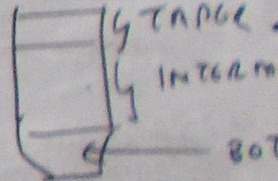
INTERNAL THREAD ARE



INTERNAL THREAD

FLUTE

TYPES OF TAPS - TAP



TAPPING HOLE SIZE

EX. M14x2 THREAD  
HOLE SIZE =

E102 SECTION

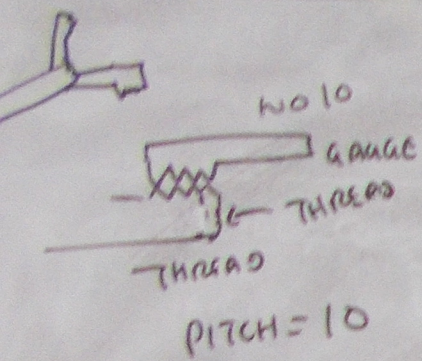
## TUTORIAL

Q1 - THROUGH FIXING

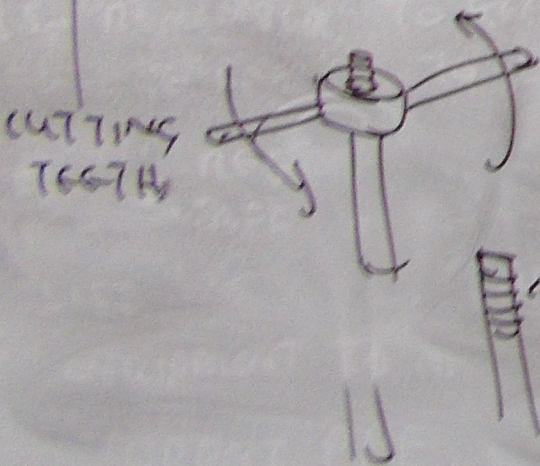
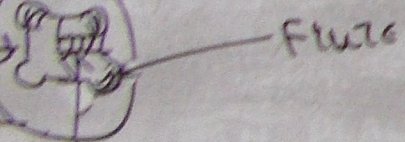
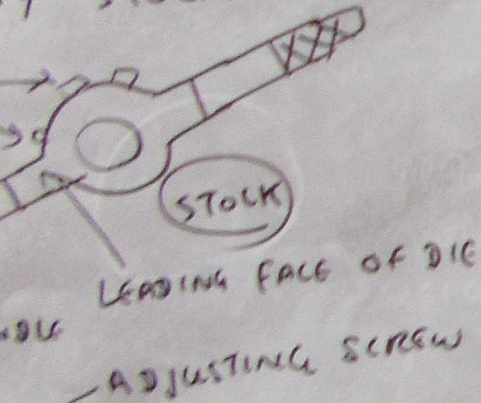
Q2 - SELF TAPPING SC

Q3 - CHEMICAL ANO

PITCH BY SCREW PITCH GAUGE

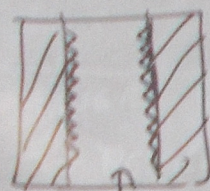


INTERNAL THREAD BY STOCK AND DIE

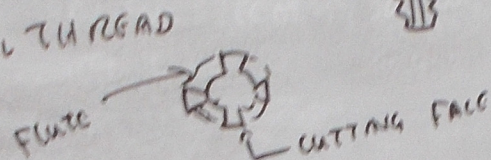
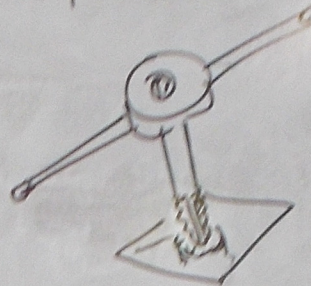


### INTERNAL THREAD

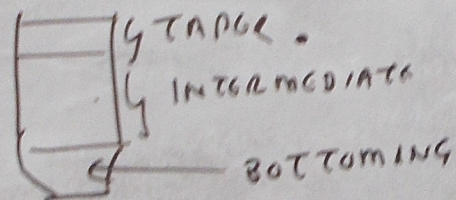
INTERNAL THREAD ARE TO BE FORMED BY TAP.



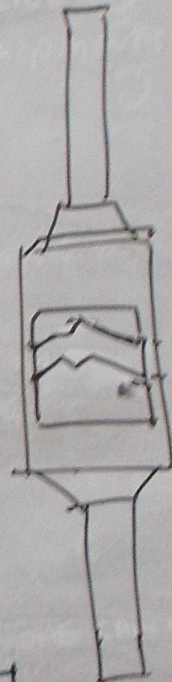
INTERNAL THREAD



TYPES OF TAPS - TAPER / INTERMEDIATE / BOTTOMING



TAP WRENCH



$$\text{TAPPING HOLE SIZE (mm)} = \text{NOMINAL DIAMETER} - \text{PITCH}$$

Ex. M14x2 THREAD  
 HOLE SIZE = 14 - 2 = 12 mm

E102 SECTION (6) PAGE 2 OF 14 → 10 OF 14  
 E102 RESOURCES FOR ANSWER ZIP (PDF PAGE 127  
 Q1 → 9)

### TUTORIAL

Q1. A THROUGH FIXING IS A FIXING MADE THROUGH THE ITEM TO BE SUPPORTED

Q2. SELF TAPPING SCREWS ARE USED FOR FIXING INTO SHEET METAL OR TIMBER

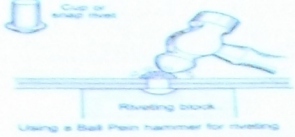
Q3. CHEMICAL ANCHORS ARE USED FOR FIXING INTO MASONRY NEAR EDGE



3. Soft faced instruments  
Soft faced instruments or materials should be used on surfaces which might be damaged with a steel tool. Soft faced instruments have a tip or end made of replaceable soft metal, leather or plastic. For a copper or brass face would be used in a lathe position, a leather face would be used on a motor winding and a plastic face may finish metal surfaces.

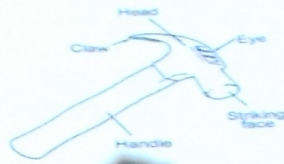
5 6.3 8.5 10.3 mm 8 10 12 mm

Here the ball end of the ball-peen hammer is being used to spread the shank of a rivet.



### 2. Claw hammer

Another common type of hammer, used in installation of wiring, is the claw hammer, designed for driving and removing nails in timber. Care must be taken not to damage the timber surface when driving or removing nails. If nails are to be driven flush or recessed it is necessary to use a nail punch. When removing nails a suitable wood block should be used between the hammer and the timber surface to increase the mechanical advantage of the hammer by moving the fulcrum point closer to the nail.



### 3. Soft faced hammers

Soft faced hammers or mallets should be used to strike surfaces which might be damaged with a steel hammer. Soft faced hammers have a iron or steel body with replaceable soft metal, leather or plastic faces. A copper or brass face would be used to drive steel parts into position, a leather face could be used to seat in coils a motor winding and a plastic face may be used for striking finished metal surfaces.



Fabricate, assemble and distribute... industry of... Electrical/Miller... Owner: Elect, ICT & Design Fa... Disclaimer: Printed copies of this... Version 1... Page 3 of 16... 7/12/2012





WORK SHOP

AND TAPPING

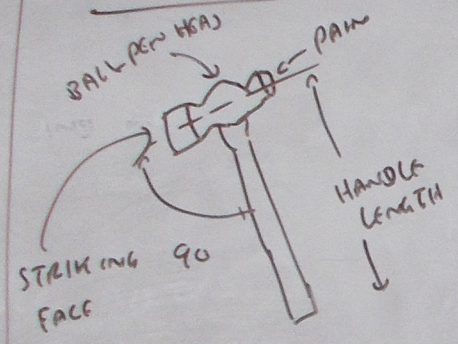
SAFETY GOGGLE MUST BE WORN  
USE DRILLING MACHINE  
FIRMLY GRIP THE WORK PIECE

NO 5 HOLE  
NO (6) TAP

PIECE  
DRILL BIT  
TAP + STOCK

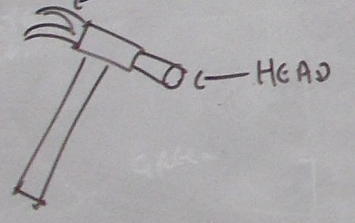
E102 SECTION (7) HAND TOOLS

Hammer - ENGINEER HAND HAMMER



NEVER USE HAMMER WITH LOOSE HEAD  
NEVER STRIKE HARD METAL  
WEAR SAFETY GLOVE, GLASS

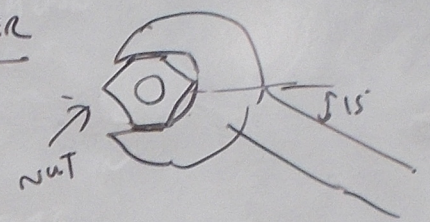
CLAW HAMMER - TO REMOVE NAIL



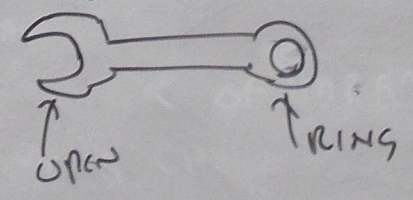
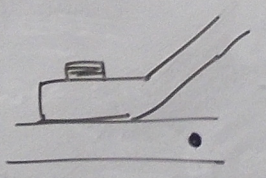
SOFT FACE HAMMER  
COPPER, BRASS FACE

SCREW DRIVER → FLAT BLADE  
→ PHILLIP HEAD  
TO TIGHTEN/LOOSE SCREW

SPANNER



RING SPANNER



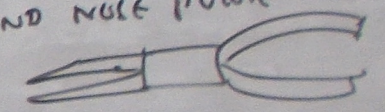
TO FIX/REMOVE NUT

PIPE WRENCHES → TO FIX THE PIPE

PLIER → COMBINATION  
→ DIAGONAL CUTTING

ELECTRICIAN PLIER - ALL INSULATED  
MULTI GRIP PLIER

WRENCH + PLIER  
ROUND NOSE PLIER



TO HANDLE SCREW, ELECTRICIAN

TUTORIAL 3

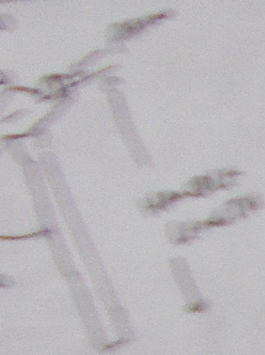
Q1 STATE THE THREAD ANGLE OF METRIC THREAD  
- SYMMETRIC U SHAPE THREAD  
U HAS ANGLE 60°  
THREAD DEPTH IS 0.614 x PITCH

Q2 WRITE THE OPERATION STEPS  
DRILLING AND INSERTION

- 1) DRILL A HOLE TO THE SIZE AND DEPTH AND EMBEDMENT REQUIRED.
- 2) INSERT THE ANCHOR IN TO FIT.
- 3) HAMMER THE SCREW IN TO THE BODY TO EXPAND.
- 4) TO REMOVE, PRESS PHILLIP SCREW DRIVER FIRMLY INTO THE HEAD AND TURN COUNTER CLOCKWISE.

SECTION (3) HAND TOOLS

FOR REMOVING HAND HAMMER



USE HAMMER WITH LARGE HEAD

STRIKE HARD METAL SURFACE GLASS, ALLOY

A HAMMER TO REMOVE NAIL

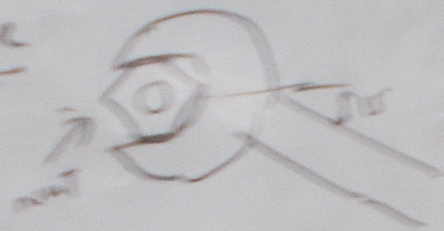


FACE HAMMER

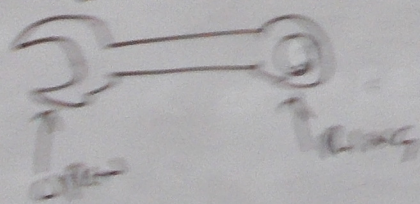
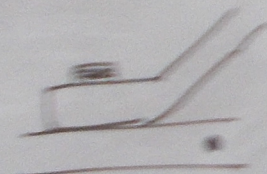
CLIPPING FACE

SIZES DRILL → FLAT BLADE  
 → PHILLIP HEAD  
 TO TURN/WIDE SCREWS

Spanner



Ring Spanner



TO FIX/REMOVE NUT

PIPE WELDER → TO FIX THE PIPE

PLIER → COMBINATION

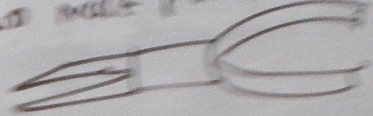


→ DIAGONAL CUTTING



ELECTRICIAN Plier - ALL INSULATED  
MULTI GRIP Plier

WIRE CUT + Plier  
ROUND NICK Plier



TO REMOVE SMALL SCREW, ELECTRONIC Pliers

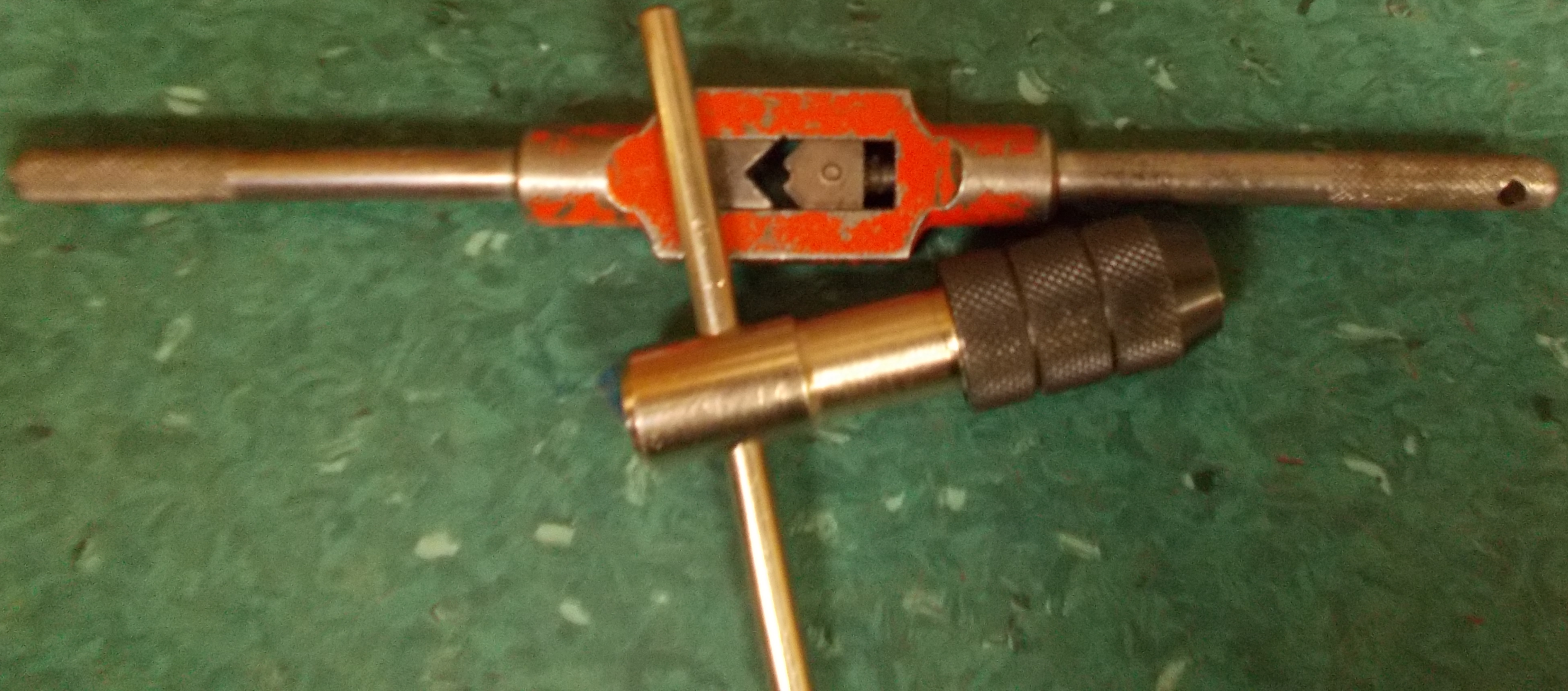
TUTORIAL 3

Q1 STATE THE THREAD ANGLE OF IS2 METRIC THREADS

- SYMMETRIC V SHAPED THREAD
- V HAS ANGLE 60
- THREAD DEPTH IS 0.613 x PITCH

Q2 WRITE THE OPERATIONAL STEPS FOR DRILLING AND INSERTING ANCHOR

- 1) DRILL A HOLE TO THE SIZE AND EMBEDMENT REQUIRED.
- 2) INSERT THE ANCHOR IN TO HOLE.
- 3) HAMMER THE SCREW IN TO ANCHOR BODY TO EXPAND.
- 4) TO REMOVE, PRESS PHILLIP SCREW DRIVER FIRMLY IN TO SCREW HEAD AND TURN COUNTER CLOCK WISE.



## E102 WORKSHOP

### DRILLING AND TAPPING

- SAFETY - SAFETY GOGGLES MUST BE WORN TO USE DRILLING MACHINE
- SECURELY GRIP THE WORK PIECE BY VICE
  - DRILL NO 5 HOLE
  - TAP WITH NO (6) TAP

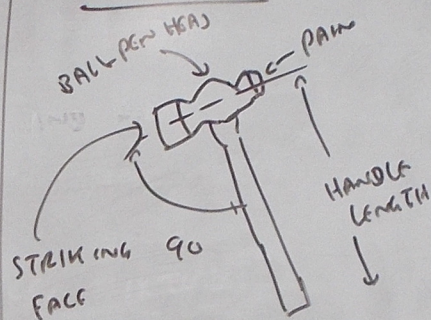
### TOOLS + EQUIPMENT

- WORK PIECE
- NO 5 DRILL BIT
- NO 6 TAP + STOCK

## E102 SECTION (7) HAND TOOLS

### Hammer

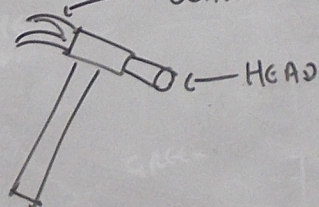
ENGINEER HAND HAMMER



- NEVER USE HAMMER WITH LOOSE HEAD
- NEVER STRIKE HARD METAL
- WEAR SAFETY GLOVE, GLASS

### CLAW HAMMER

CLAW - TO REMOVE NAIL



SOFT FACE HAMMER

COPPER, BRASS FACE

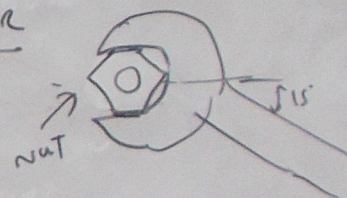
### SCREW DRIVER

FLAT BLADE

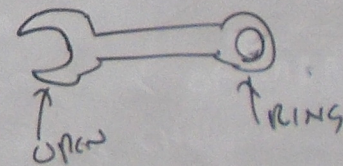
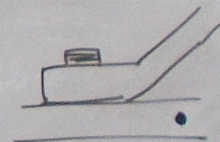
PHILLIP HEAD

TO TIGHTEN/LOOSE SCREW

### SPANNER



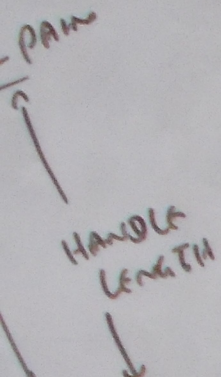
### RING SPANNER



TO FIX/REMOVE NUT

(7) HAND TOOLS

ENGINEER HAND HAMMER



HAMMER WITH LOOSE HEAD

LE HARD METAL  
TY GLOVE, GLASS

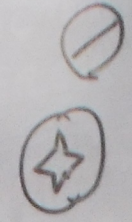
WRENCH - TO REMOVE NAIL

HEAD

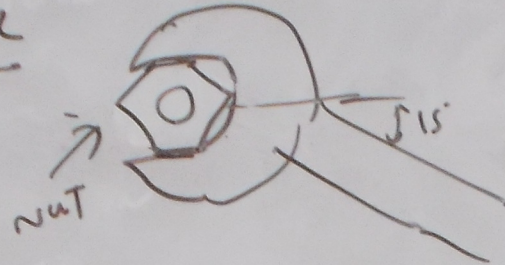
HAMMER

BRASS FACE

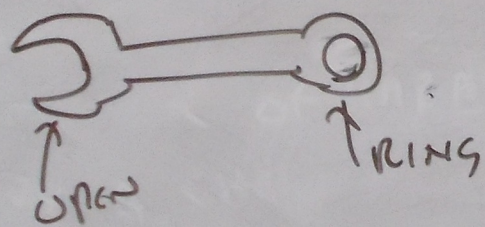
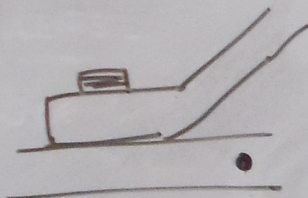
SCREW DRIVER → FLAT BLADE  
→ PHILLIP HEAD  
TO TIGHTEN/LOOSE SCREW



SPANNER



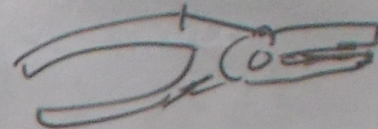
RING SPANNER



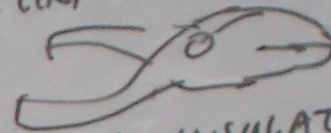
TO FIX/REMOVE NUT

PIPE WRENCHES → TO FIX THE PIPE

PLIER → COMBINATION



DIAGONAL CUTTING

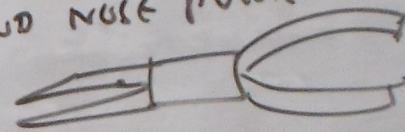


ELECTRICIAN PLIER - ALL INSULATED

MULTI GRIP PLIER

WRENCH + PLIER

ROUND NOSE PLIER



TO HANDLE SMALL SCREW, ELECTRONIC PIECES

TUTORIAL

Q1 STATE THE THREAD ANGLE OF ISO METRIC THREAD

- SYMMETRIC U SHAPE THREAD

U HAS ANGLE 60°

THREAD DEPTH IS 0.614 X PITCH

Q2 WRITE THE OPERATION STEPS FOR DRILLING AND INSERTING ANCHOR

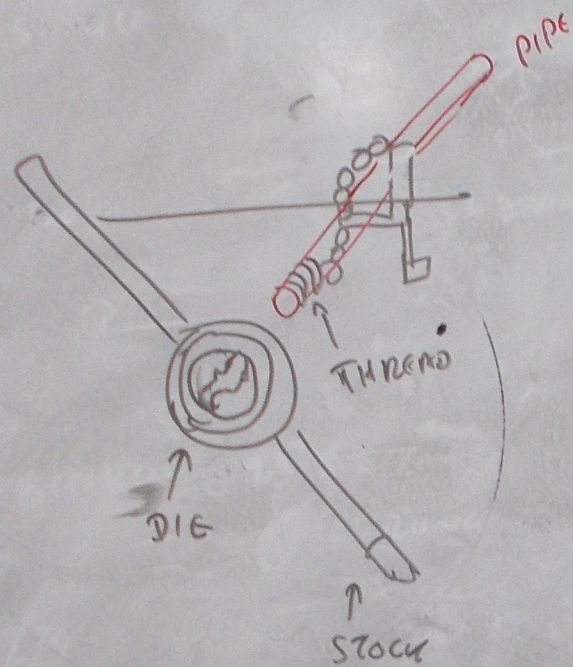
(1) DRILL A HOLE TO THE SIZE AND EMBEDMENT REQUIRED.

(2) INSERT THE ANCHOR IN TO FIXTURE

(3) HAMMER THE SCREW IN TO ANCHOR BODY TO EXPAND

(4) TO REMOVE, PRESS PHILLIP SCREW DRIVER FIRMLY IN TO SCREW HEAD AND TURN COUNTER CLOCK WISE.

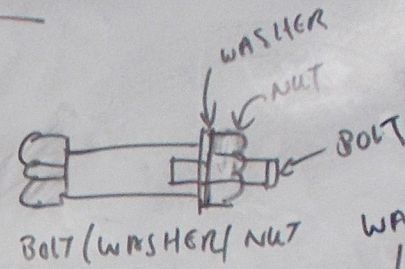
EXTERNAL THREADING



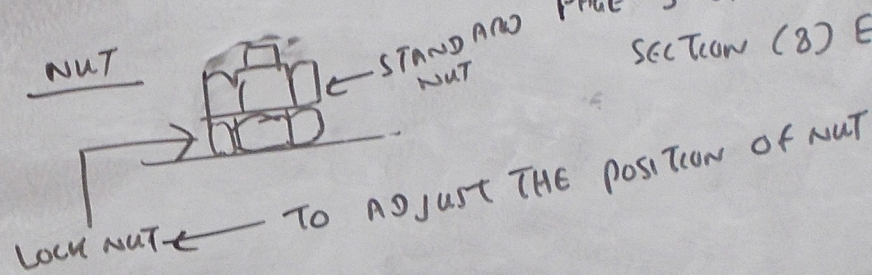
SECTION (8) JOINING TECHNIQUES

FASTENING DEVICE

- THREAD (BOLT / NUT)
- METAL THREAD
- CAP SCREW / SET SCREW

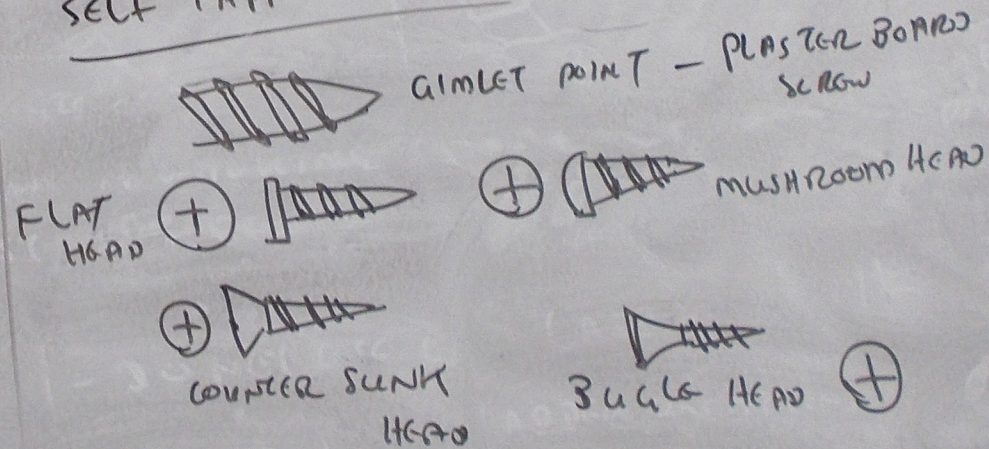


PAGE 3 of 22  
SECTION (8) E102

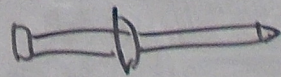


- WASHER
- SPRING WASHER
- FLAT WASHER

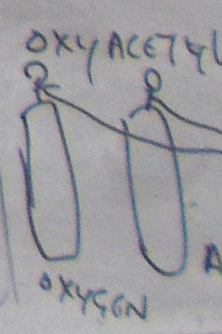
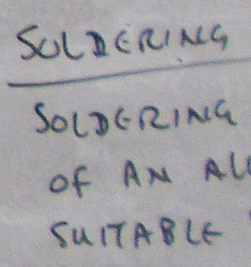
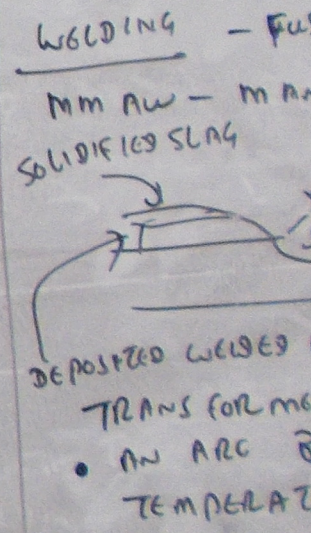
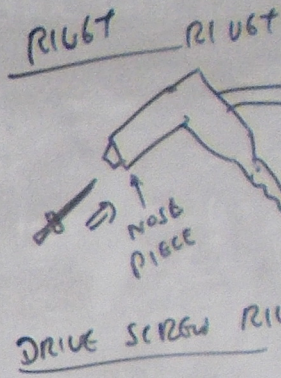
SELF TAPPING SCREW

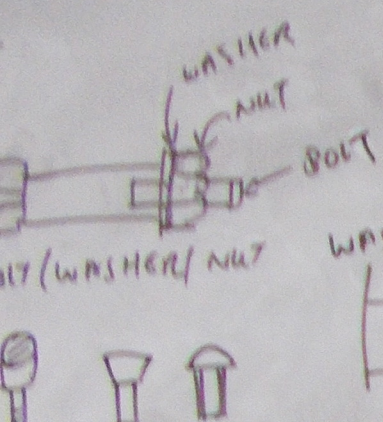


POP RIVET



NYLON POP RIVET





SECTION (B) E102

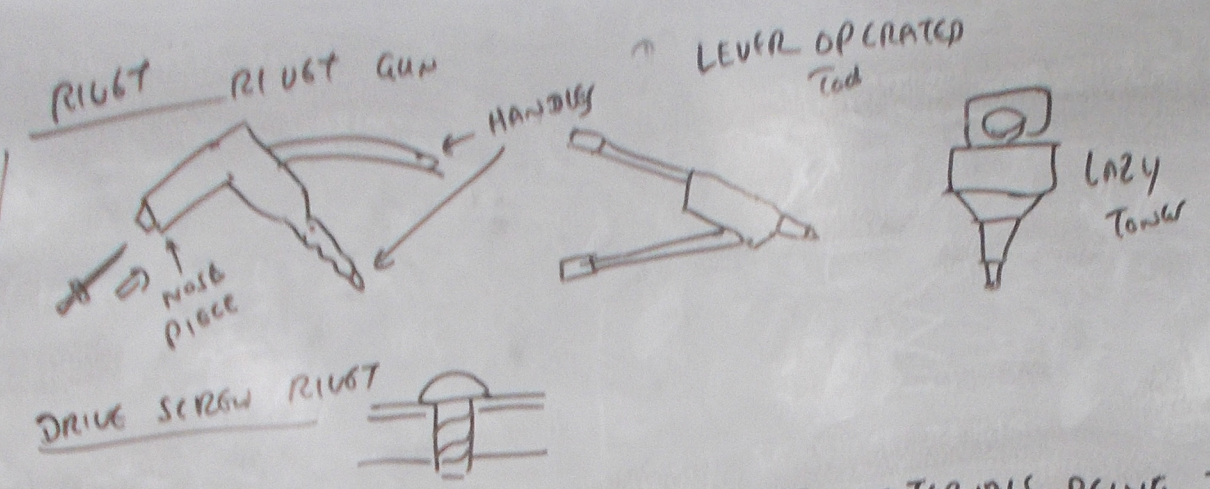
POSITION OF NUT

PLASTER BOARD SCREW

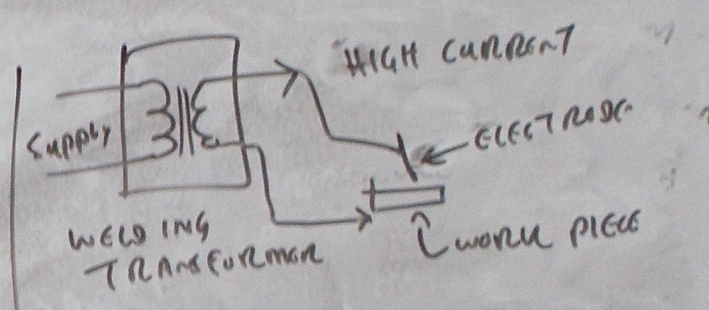
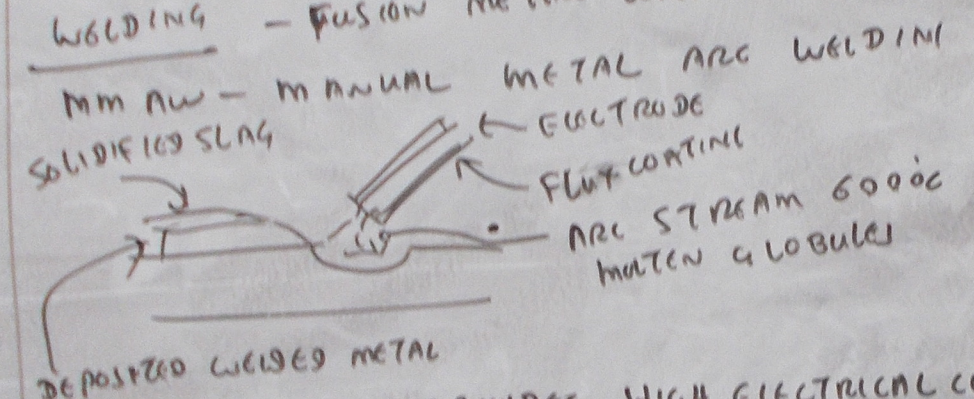
MUSHROOM HEAD

HEAD ⊕

NYLON POP RIVET



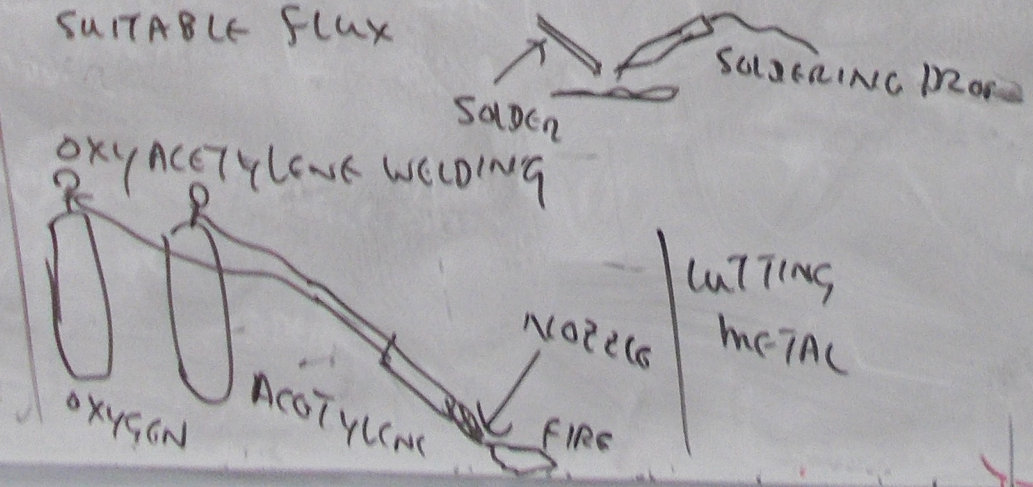
WELDING - FUSION METHOD WHERE THE MATERIALS BEING JOINED ARE MELTED



TRANSFORMER PROVIDES HIGH ELECTRICAL CURRENT LARGE ENOUGH TO MAKE AN ARC BETWEEN A FLUX COVERED ELECTRODE AND THE WORK TEMPERATURE (6000c)

SOLDERING

SOLDERING IS A PROCESS OF JOINING METALS TOGETHER BY MEANS OF AN ALLOY MELTED INTO THE JOINT, AFTER THE APPLICATION OF SUITABLE FLUX



RESISTANCE SPOT WELDING  
IT USES THE HEAT RESULTING FROM RESISTANCE TO AN ELECTRIC CURRENT PASSING THROUGH METALS BEING JOINED.



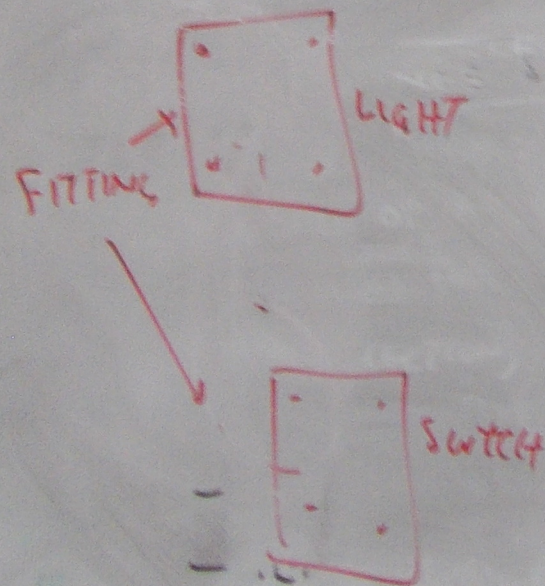
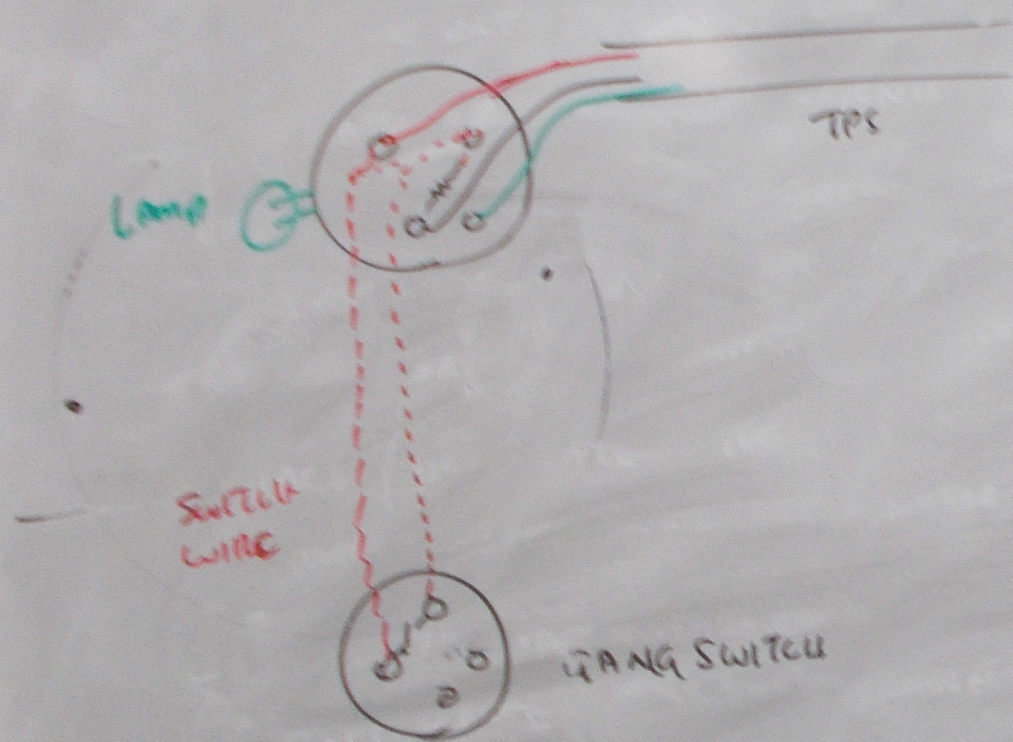






# BASIC WIRING

ONE SWITCH CONTROLLING ONE LIGHT



## SECTION (A) PORTABLE POWER TOOLS

### POWER TOOL SAFETY

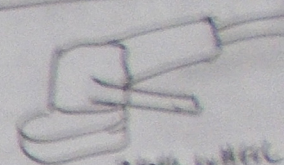
- ALWAYS WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT
- KEEP WORK AREA TIDY
- BE AWARE OF HIGH TORQUE RATING OF SOME TOOLS
- DON'T LAY DOWN UNTIL THEY HAVE STOPPED ROTATING
- MAINTAIN YOUR BALANCE, ESPECIALLY ON LADDERS
- WHEN DRILLING (OR) GRINDING, THE WORKPIECE IS SECURELY CLAMPED

### ELECTRICAL SAFETY

- ALWAYS INSPECT THE TOOLS BEFORE AND AFTER USE
- VERIFY TOOL HAS BEEN TESTED FOR SAFETY RECENTLY
- CHECK THE CONDITION OF CABLE BEFORE USE
- LAY OUT ELECTRICAL CABLE SO THEY ARE NOT TANGLED
- DON'T USE ELECTRICAL CABLE WHILE COILED
- USE EARTH LEAKAGE PROTECTION DEVICE
- DISCONNECT LEAD BEFORE DOING ADJUSTMENT

TAKE CARE TO STORE TOOL AND LEAD

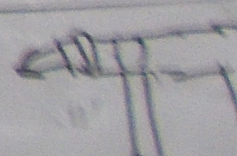
### GRINDER



- EYE PROTECTION
- STRAIGHT GRINDER
- ANGLE GRINDER
- DISC GRINDER
- SANDER
- TO SMOOTH THE SURFACE
- TO REMOVE UNDERMETAL PART

- NEVER PUT EXCESS PRESSURE ON WORKPIECE WHILE GRINDING
- NEVER GRIND ON FLAMMABLE MATERIALS

### DRILLING MACHINE



- CHECK THE CONDITION OF THE DRILL BIT
- CHECK THE CONDITION OF THE DRILLING MACHINE

SECTION (4) PORTABLE POWER TOOLS

POWER TOOL SAFETY

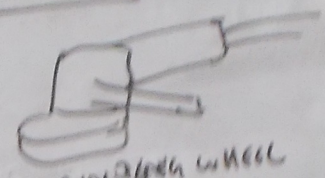
- ALWAYS WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT
- KEEP WORK AREA TIDY
- BE AWARE OF HIGH TORQUE RATING OF SOME TOOLS
- DON'T LAY DOWN UNTIL THEY HAVE STOPPED ROTATING
- MAINTAIN YOUR BALANCE, ESPECIALLY ON LADDER
- WHEN DRILLING (OR) GRINDING, THE WORK PIECE IS SECURELY CLAMPED.

ELECTRICAL SAFETY

- ALWAYS INSPECT THE TOOLS BEFORE AND AFTER USE
- VERIFY TOOL HAS BEEN TESTED FOR SAFETY RECENTLY
- CHECK THE CONDITION OF CABLES BEFORE USE
- LAY OUT ELECTRICAL CABLES SO THEY ARE NOT TANGLED
- DON'T USE ELECTRICAL CABLES WHILE COILED
- USE EARTH LEAKAGE PROTECTION DEVICE
- DISCONNECT LEAD BEFORE USING ADJUSTMENT

TAKE DAMAGE TOOL STORE TOOL AND LEADS

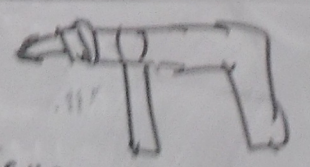
GRINDERS



- EYE PROTECTION
- STRAIGHT GRINDER
- ANGLE GRINDER
- DIG GRINDER
- SANDER
- TO SMOOTH THE SURFACE
- TO REMOVE UNDESIRED METAL PART

- ✗ NEVER PUT EXCESSIVE PRESSURE ON WHEEL WHILE GRINDING.
- ✗ NEVER GRIND SOFT MATERIALS

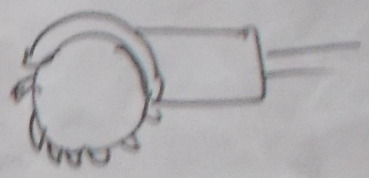
DRILLING MACHINE



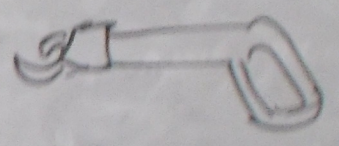
- CHECK THE CAPACITY
- CHECK CHUCK CAPACITY

CIRCULAR SAW

- TIMBER CUTTING
- TIMBER CUT WITH CIRCULAR SAW SHOULD BE WELL SUPPORTED CLEAR OF THE GROUND WITH SUPPORT UNDER CUT OFF MATERIALS

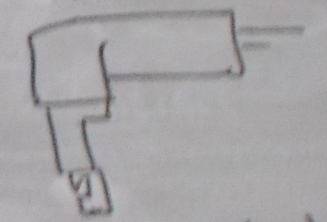


SHEAR CUT ACTION IN SNIP



NIBBLER

- TO CUT THE SHEET METALS



- REMOVE 'C' SHAPE PIECES OF MATERIALS UNDER DOWN STROKE

PAGE 2 OF 12 TO 9 OF 12

E102 WORK BOOK

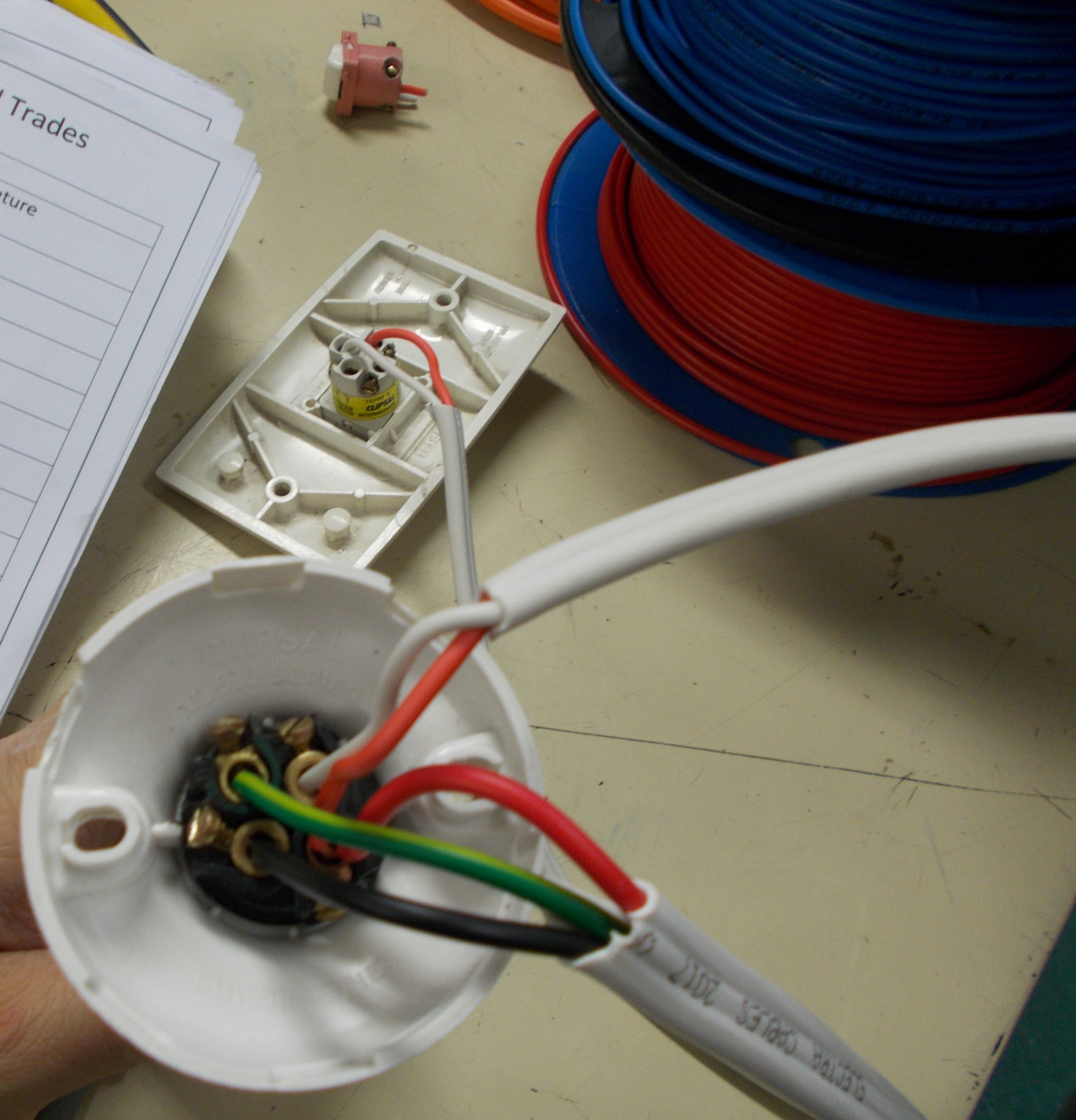


CLIPSAV  
NO. 680 SERIES

ELECTRIC  
20117

Teacher		Signature		Topic	
Time in	Time out	Signature	Signature	Topic	Time out
8:00	8:00	<i>[Signature]</i>			
8:00	8:00	<i>[Signature]</i>			
8:00	8:00	D. <i>[Signature]</i>			
8:00	8:00	J. Ayoub			
8:00	8:00	Alexandra			
8:00	8:00	HA			
8:00	8:00	<i>[Signature]</i>			
8:00	8:00	<i>[Signature]</i>			
8:00	8:00	<i>[Signature]</i>			

11:30  
*[Signature]*



Barley

1 mA

Cutting metal  
Hole.

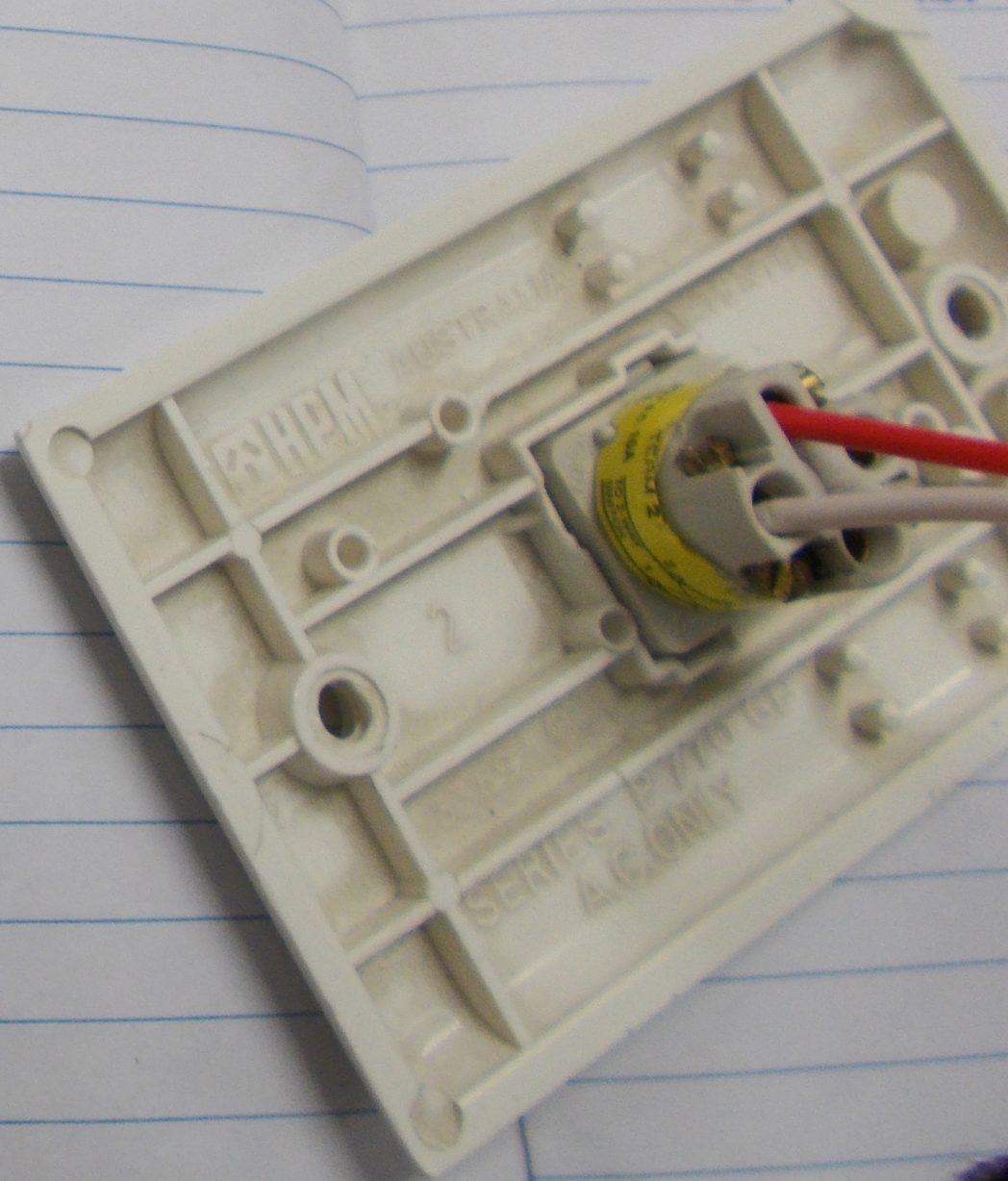
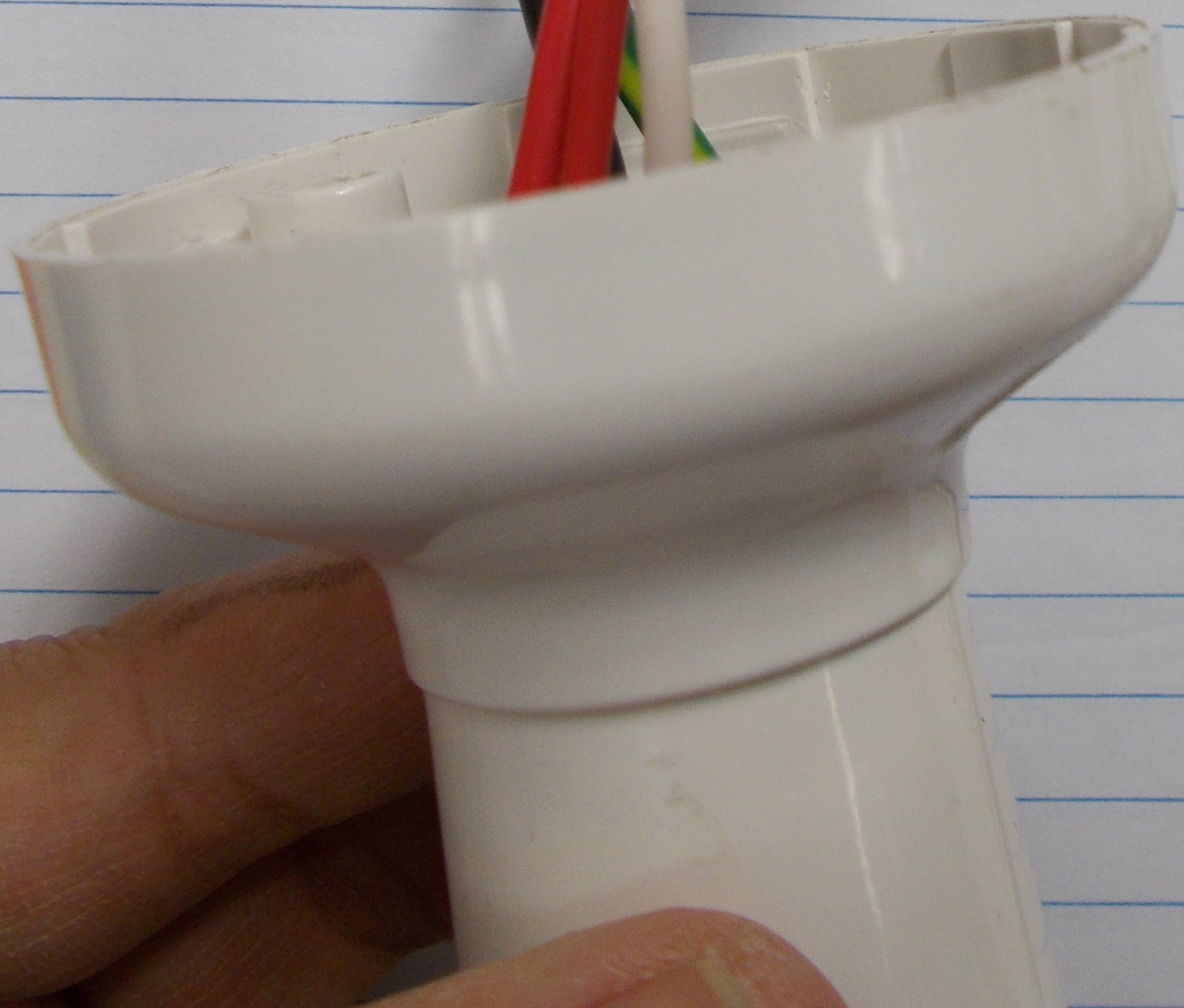
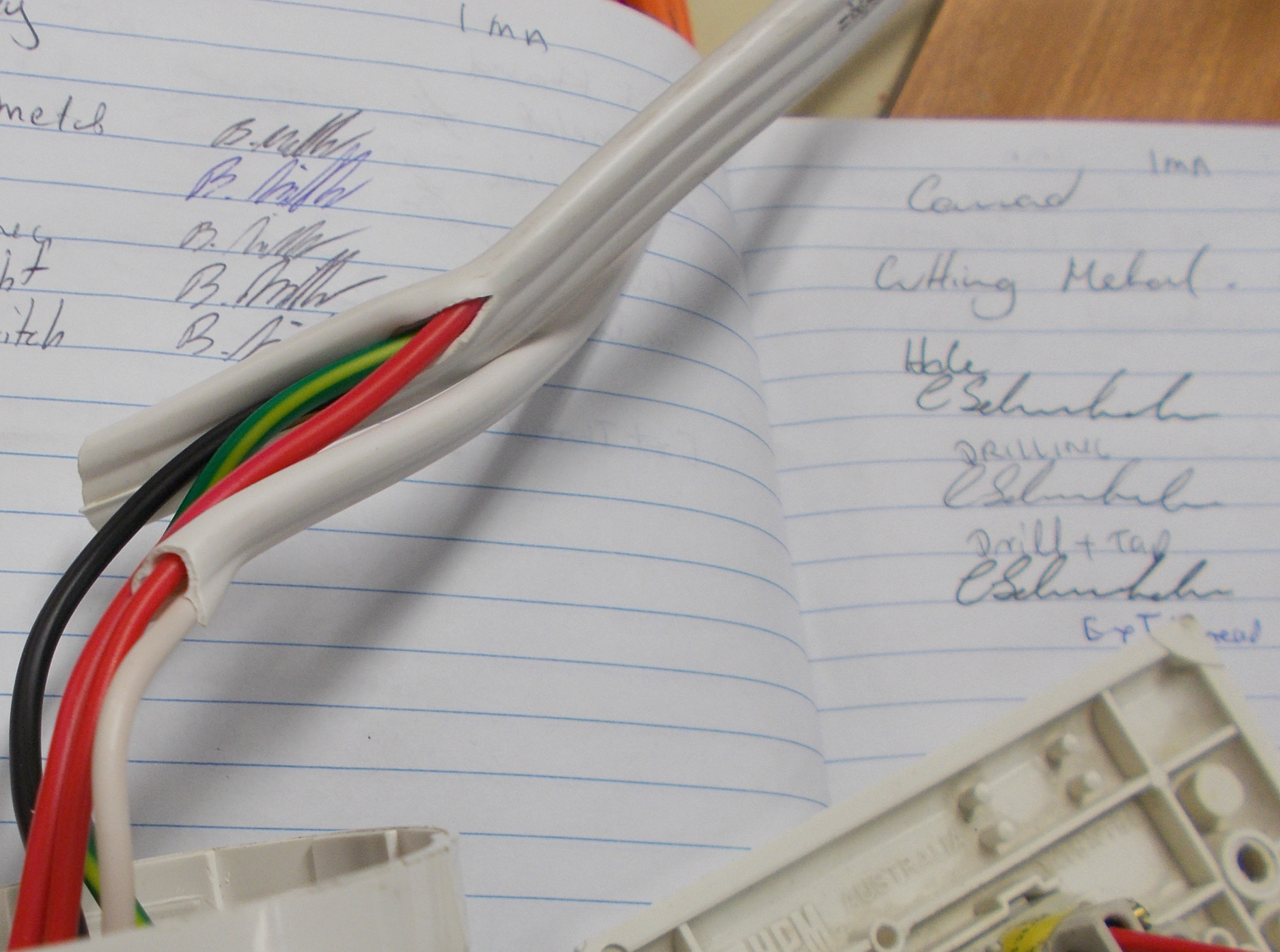
DRILLING  
one light  
one switch

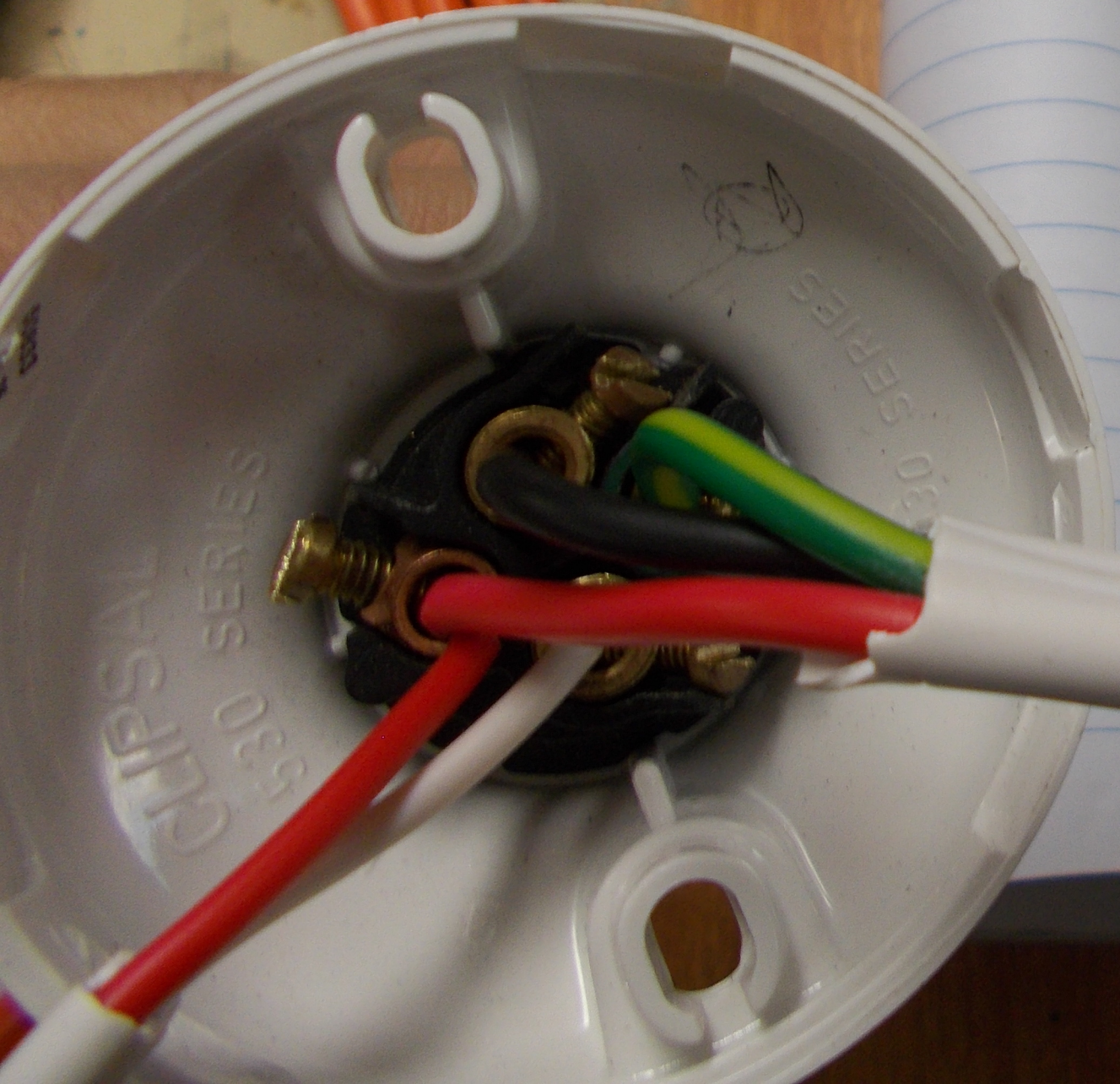
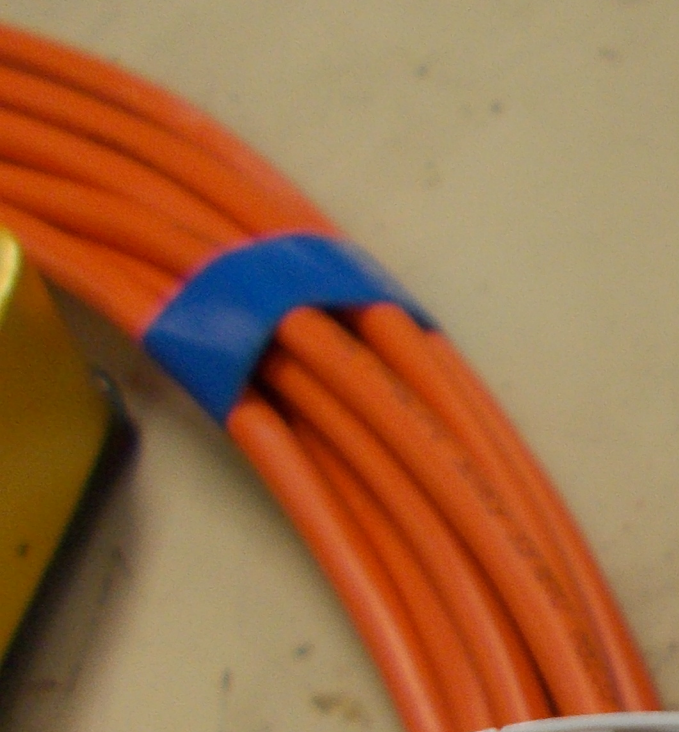
B. Miller  
B. Miller  
B. Miller  
B. Miller  
B. Miller

Canada 1 mA

Cutting Metal.

Hole  
Schubert  
DRILLING  
Schubert  
Drill + Tap  
Schubert  
BPT read





1mm  
Carved  
Cutting Material.  
Hole  
Schubert  
Drilling  
Schubert  
Drill + Tap  
Schubert  
E+T Thread  
1 light 1 switch  
Schubert



