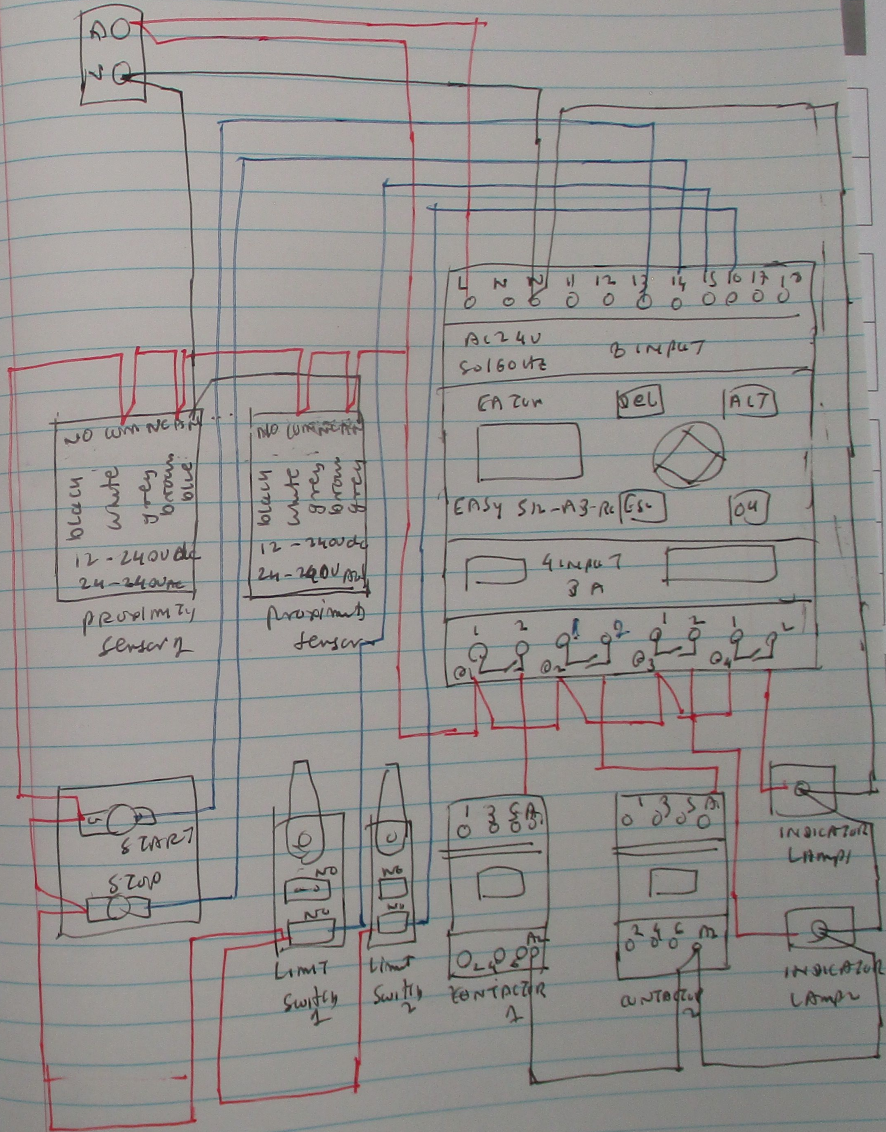
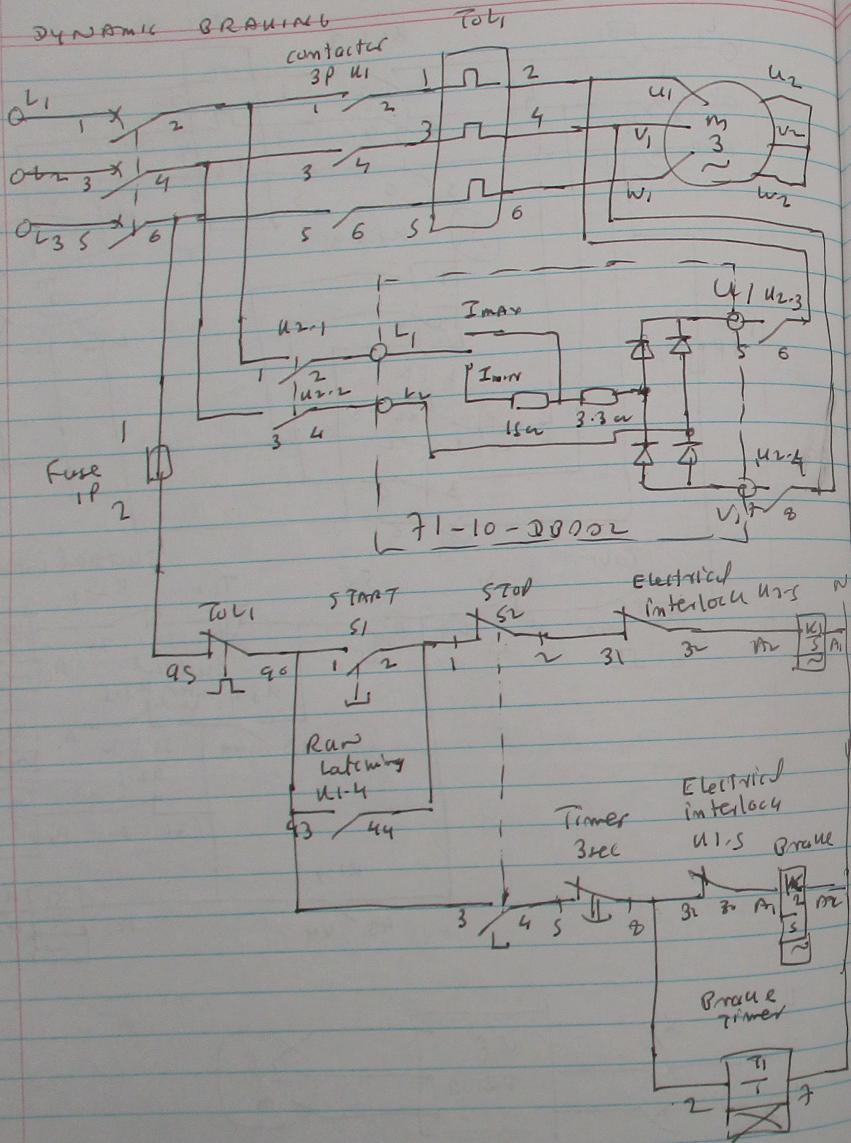
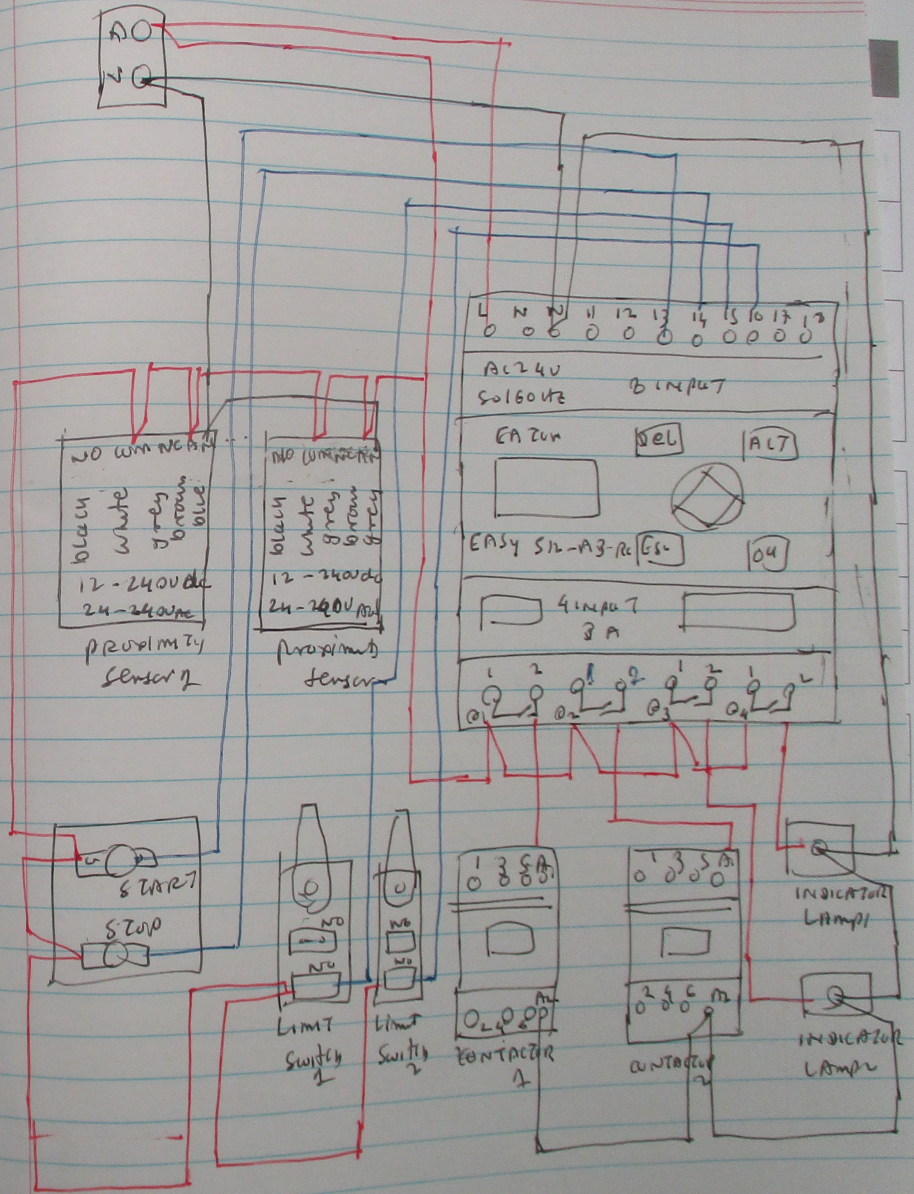
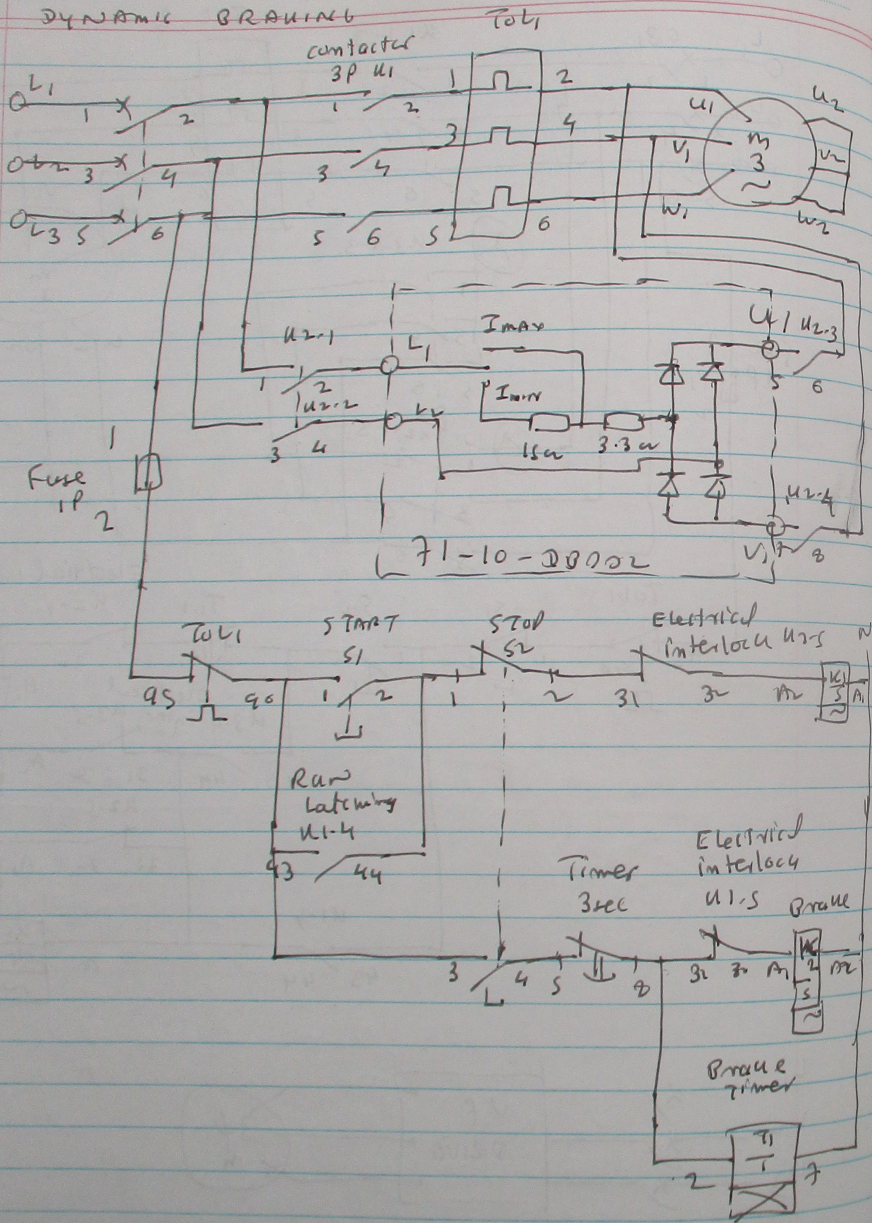


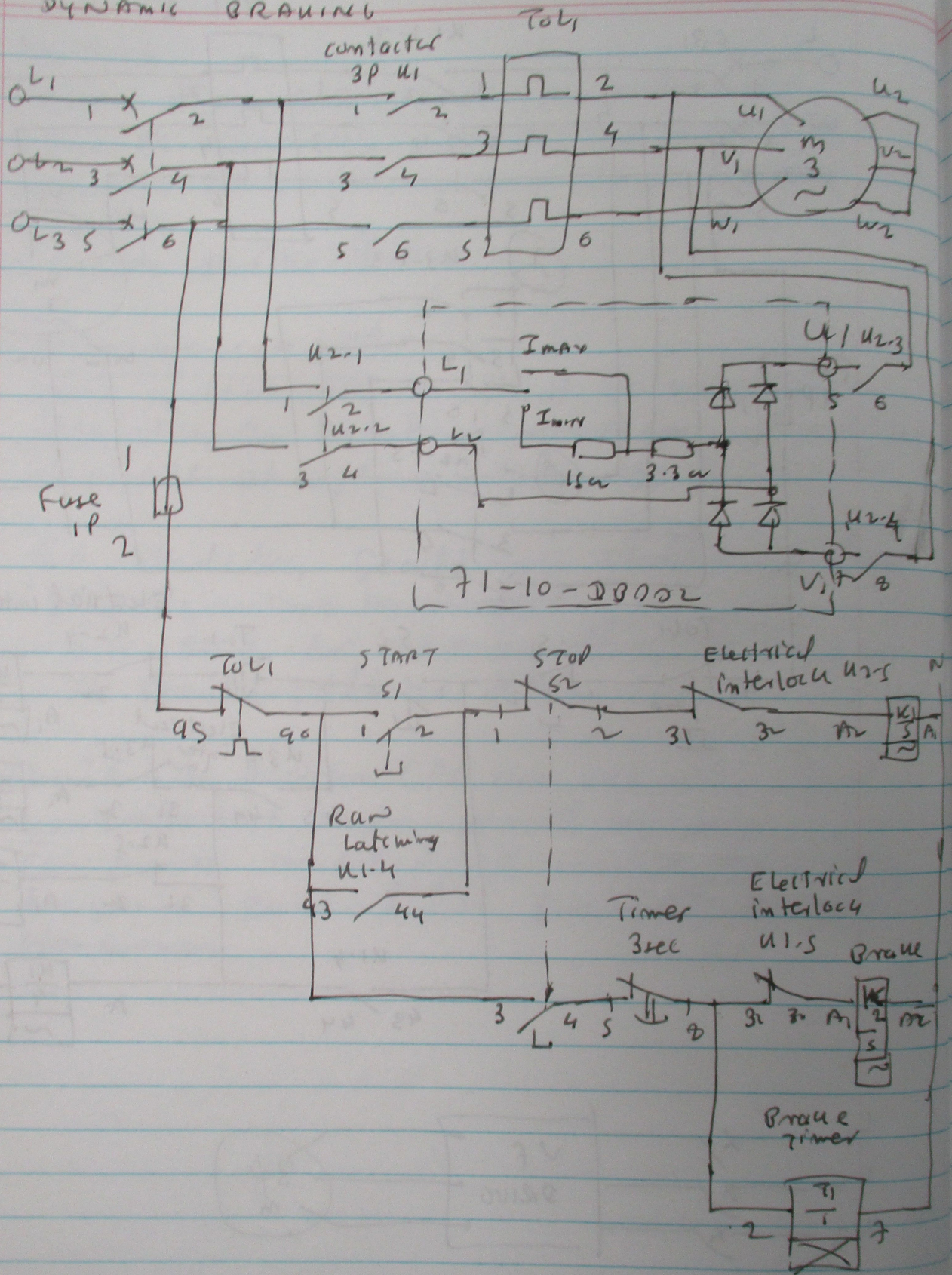
DYNAMIC BRAKING

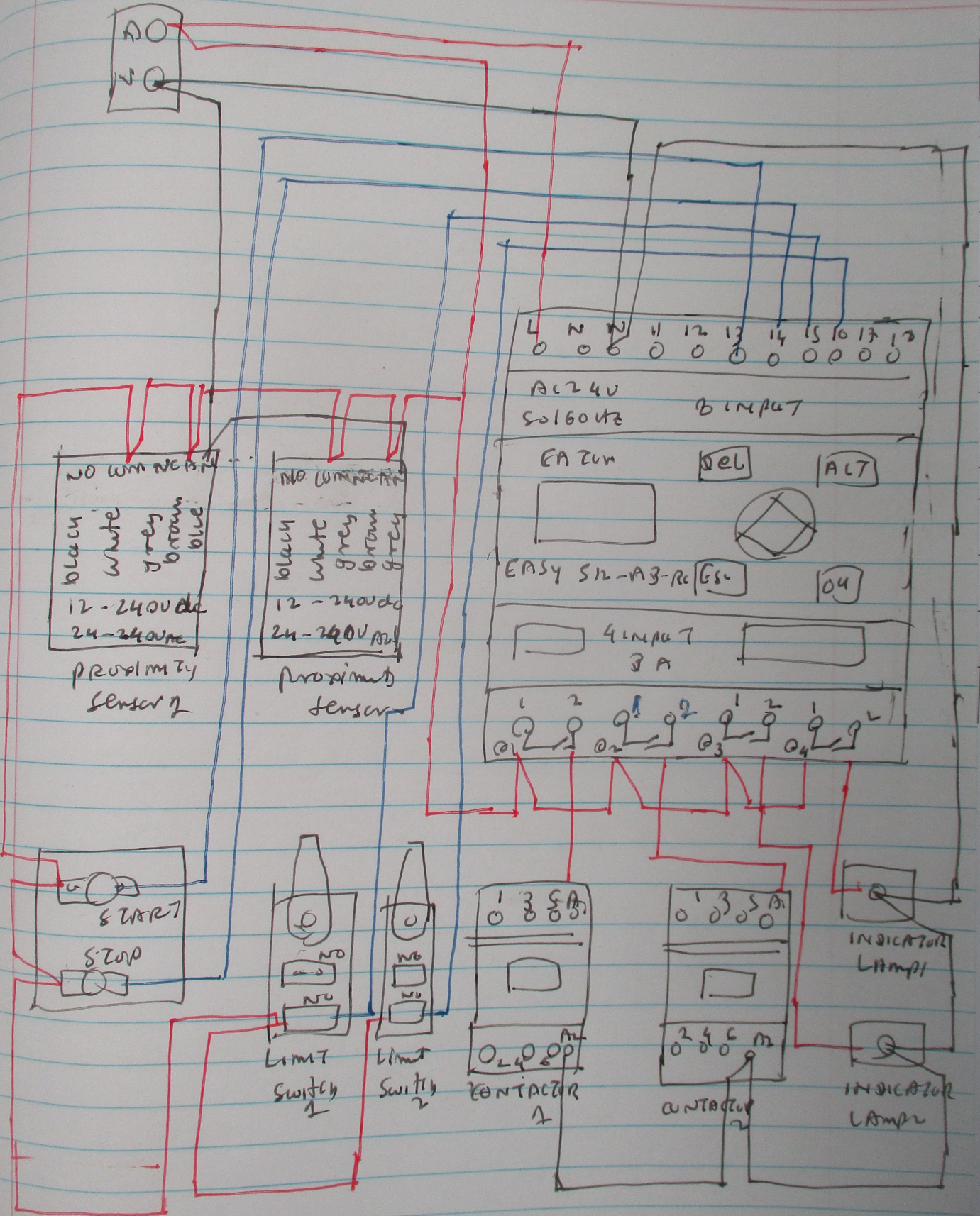
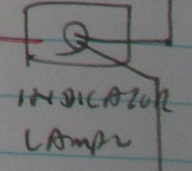
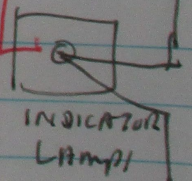
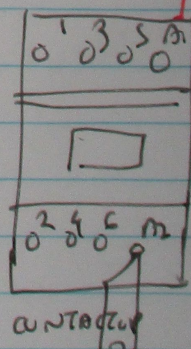
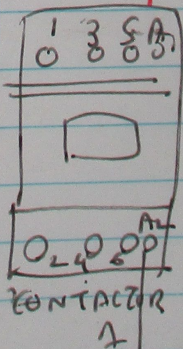
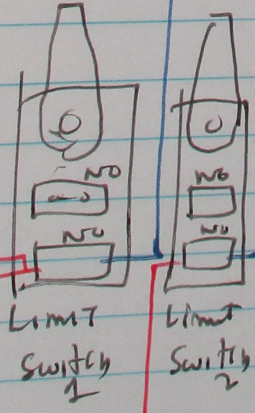
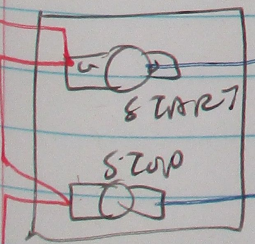
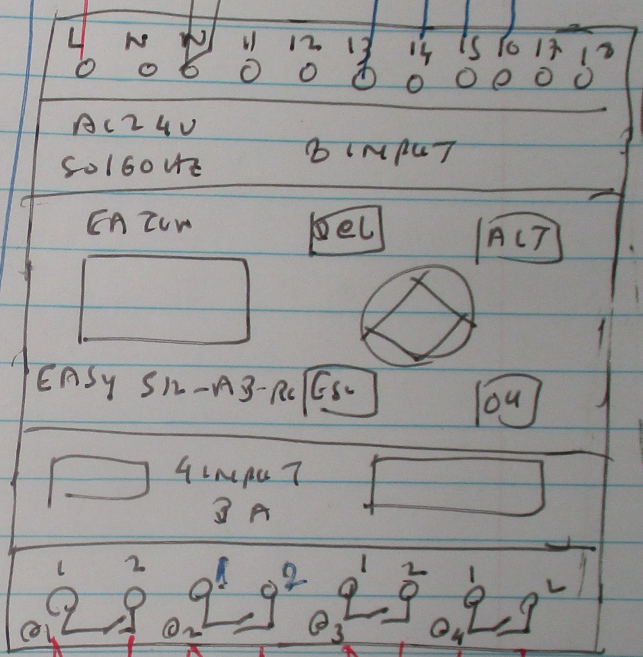
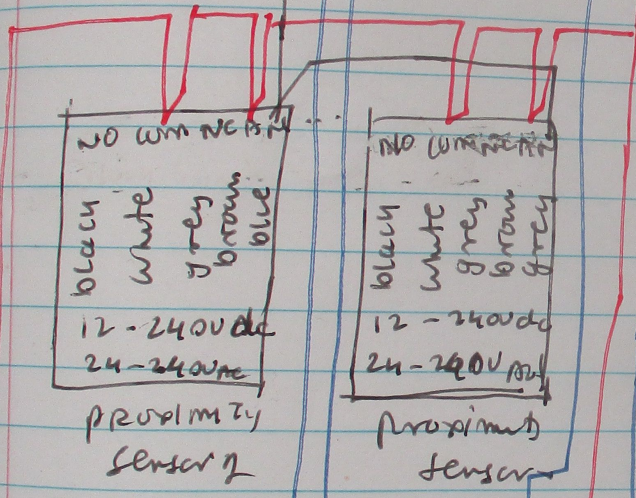
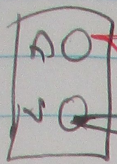


DYNAMIC BRAKING



DYNAMIC BRAKING





$$I^2 R = W = 0.77^2 \times 12 = 7.1 \text{ mW}$$

$$V_A = 0.8 \times 10 = 8$$

$$\phi = 8.14^\circ$$

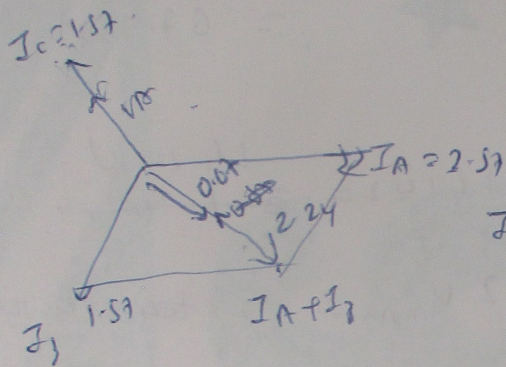
$$W = 0.77^2 \times 12 = 7.1$$

$$V_A = I \times V = 0.8 \times 10 = 8 \text{ uA}$$

$$V_{AN} = V \times (I_C - I_L)$$

$$= 10 (0.14 - 0.29)$$

$$= 10 \times 0.111 = 1.11 \text{ uA}$$



$$I_N = \sqrt{I_A^2 + I_C^2 + I_C^2 - I_A I_C - I_C I_A - I_C I_A}$$

$$I_N = \sqrt{2.57^2 + 1.57^2 + 1.57^2 - 2.57 \times 1.57 - 1.57 \times 1.57 - 2.57 \times 1.57}$$

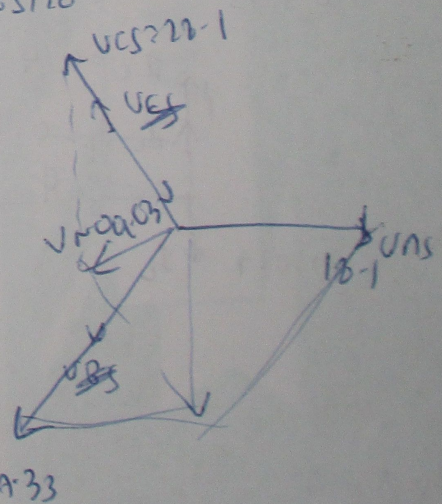
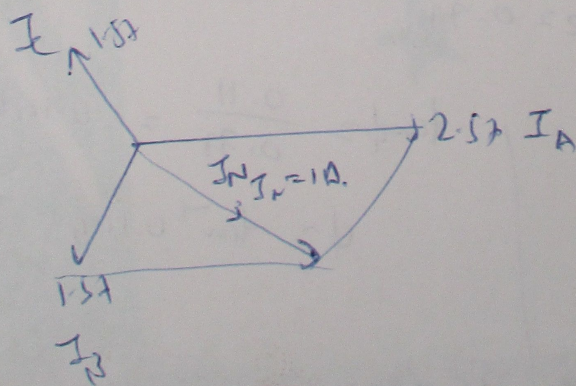
$$= 1.0 \text{ A}$$

I_A

$$I_A I_B = \sqrt{I_A^2 + I_B^2 + 2 I_A I_B \cos 120}$$

$$= \sqrt{2.57^2 + 1.57^2 + 2 \times 2.57 \times 1.57 \times \cos 120}$$

$$= 2.24$$



$$V_{NO} = \sqrt{V_{AS}^2 + V_{BS}^2 + V_{CC}^2 - V_{AS} V_{BS} - V_{BS} V_{CC} - V_{CC} V_{AS}}$$

$$= \sqrt{18.1^2 + 29.33^2 + 28.1^2 - 18.1 \times 29.33 - 29.33 \times 28.1 - 28.1 \times 18.1}$$

$$= \sqrt{928} = 9.63 \text{ V}$$

$$X_L = 2\pi fL = 2 \times 3.1416 \times 50 \times 1.082 = 339.7 \Omega$$

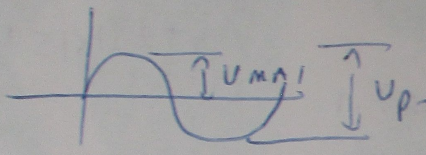
$$R = 12 \Omega$$

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2 \times 3.1416 \times 50 \times 47 \times 10^{-6}} = \frac{106}{2 \times 3.1416 \times 50 \times 47}$$

$$= 67.75 \Omega$$

$$V_{rms} = 10V$$

$$V_{max} = V_{rms} \times 1.4142 = 10 \times 1.4142 = 14.14V$$

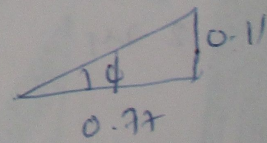
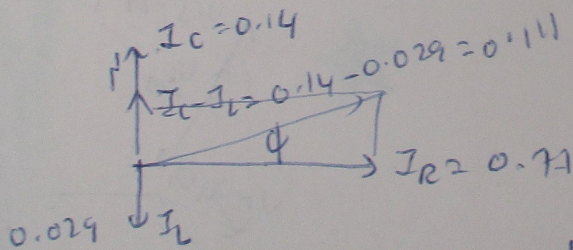
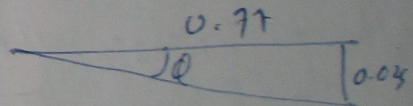


$$V_{p-p} = 2V_{max} = 2 \times 14.14 = 28.28V$$

$$I_R = \frac{10}{12} = 0.83A$$

$$I_L = \frac{10}{339.7} = 0.029A$$

$$I_C = \frac{10}{67.75} = 0.147A$$

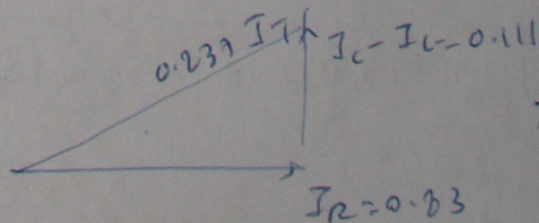
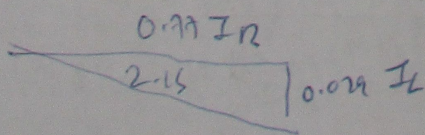
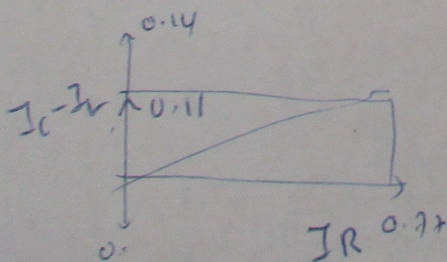


$$\phi = \tan^{-1} \frac{0.029}{0.77}$$

$$\tan \phi = \frac{0.11}{0.77} = 0.144$$

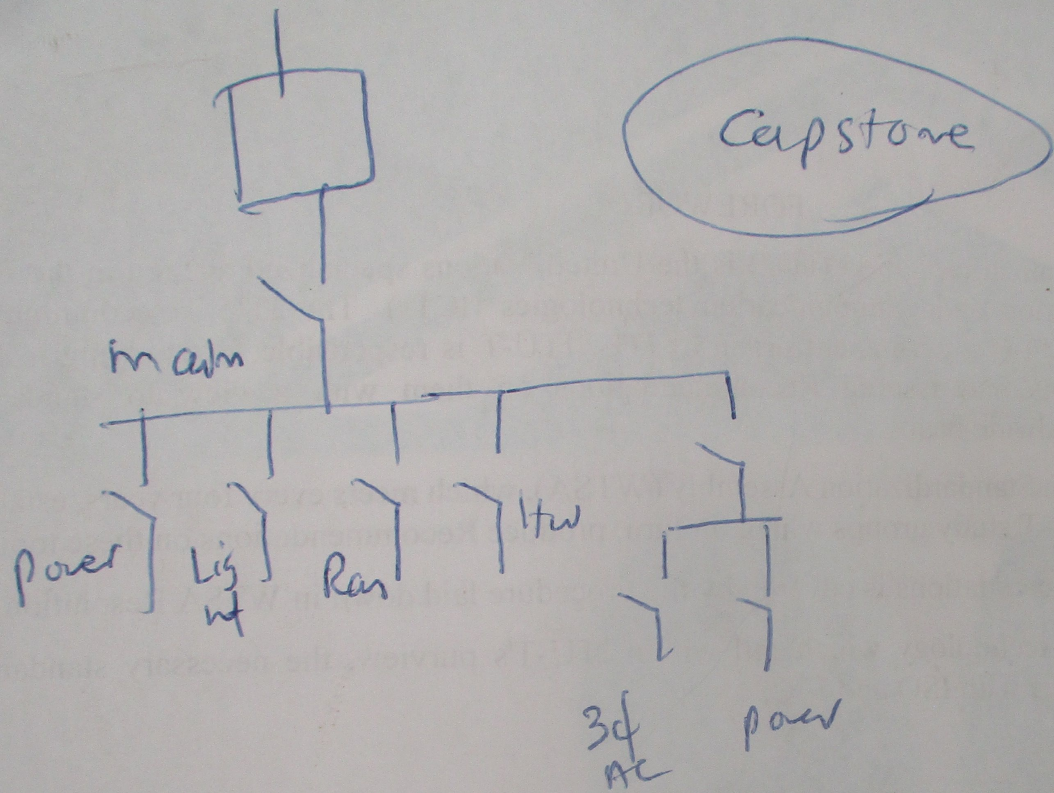
$$\phi = \tan^{-1} 0.144 = 8.19^\circ$$

Pf = $\cos 8.19^\circ$



$$Z_T = \sqrt{83^2 + 0.11^2}$$

$$\phi = \tan^{-1} \frac{0.11}{0.83} = 7.5^\circ$$



Capstone

msb, Fine raled metic
 socket screw support
 Sw fixtize

man Lima
 conswer man

Sw plate 1 Sw 1/2 Om
 Sw plate 2 Sw 3 Om

socket screw support

Sw fixture

new line

conductor main

Sw plate 1 switch 1/2 on

Sw plate 2 Sw 3 on

— stove / range Sw plate 3 Sw 2 — Active to earth

+ power 2 Sw plate 4 Sw 3 — Reverse polarity

N-E

— power 1/2 Sw plate 4 Sw 4 — High resist / Earth

— power 1/2 Sw plate 4 Sw 6 Intermittent Neutral

Sw plate 2 Sw 3 off

— Light Sw plate 3 Sw 3 — open ~~to~~ Active.

polarity

3d power

ms8, Fine roled metal
socket screw support
Sw fixture

man Lima
consumer man

Sw plate 1 Sw 1/2 Om

Sw plate 2 Sw 3 Om

— stove / range Sw plate 3 Sw 2 — Active to earth

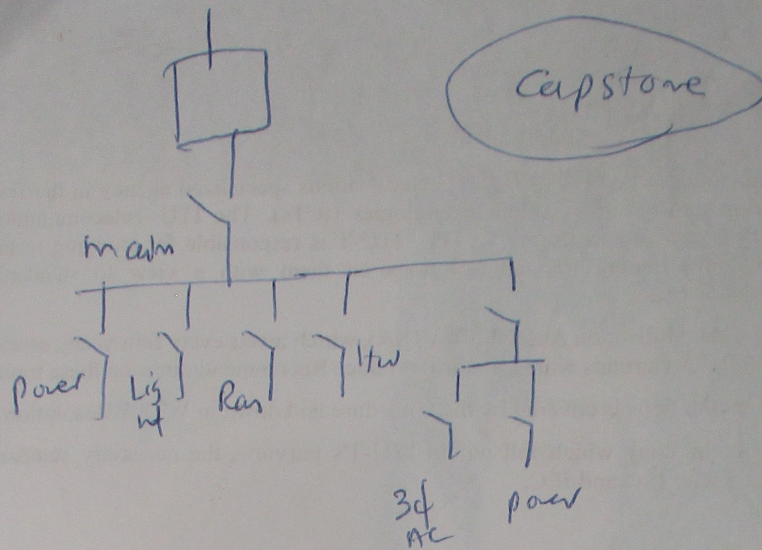
+ power 2 Sw plate 4 Sw 3 — Reverse polarity

— power 1/2 Sw plate 4 Sw 4 — High resist / Earth
N-E

— power 1/2 Sw plate 4 Sw 6 Intermix Neutral
Sw plate 2 Sw 3 O/A

— Light Sw plate 3 Sw 3 — open ~~to~~ Active.

Polarity



Capstone

msg, Fine rated metal
 socket screw support
 Sw fixture

main line
 consumer main

Sw plate 1 switch 1/2 OM

Sw plate 2 Sw 3 OM

- stove/Range Sw plate 3 Sw 2 - Active to earth
- + power 2 Sw plate 4 Sw 3 - Reverse polarity
- power 1/2 Sw plate 4 Sw 4 - N-E High resist / Earth
- power 1/2 Sw plate 4 Sw 6 Intermix Neutral
- Sw plate 2 Sw 3 off
- Light Sw plate 3 Sw 3 - open ~~to~~ Active.

Polarity

Addition Table

+	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Multiplication Table

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
10	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
11	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165
12	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180
13	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195
14	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210
15	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225

SI - International System of Units of Measure

Length - SI Base Unit: metre (m)

1 millimetre	(mm)	=	1,000 microns	(μm)
1 centimetre	(cm)	=	10 millimetres	(mm)
1 decimetre	(dm)	=	10 centimetres	(cm)
1 metre	(m)	=	1,000 millimetres	(mm)
1 kilometre	(km)	=	1,000 metres	(m)

Area - SI Base Unit: square metre (m²)

1 square centimetre	(cm ²)	=	100 square millimetres	(mm ²)
1 square decimetre	(dm ²)	=	100 square centimetres	(cm ²)
1 square metre	(m ²)	=	100 square decimetres	(dm ²)
1 square kilometre	(km ²)	=	1,000,000 square metres	(m ²)

Volume - SI Base Unit: cubic metre (m³)

1 cubic centimetre	(cm ³)	=	1 millilitre	(mL)
1 cubic decimetre	(dm ³)	=	1 litre	(L)
1 cubic metre	(m ³)	=	1,000 litres	(L)

Mass - SI Base Unit: kilogram (kg)

1 milligram	(mg)	=	1,000 micrograms	(μg)
1 gram	(g)	=	1,000 milligrams	(mg)
1 kilogram	(kg)	=	1,000 grams	(g)
1 tonne	(t)	=	1,000 kilograms	(kg)

Conversion

Imperial System to Metric System

Linear Measure

1 inch	=	25.4 mm
1 foot	=	0.3048 m
1 yard	=	0.9144 m
1 mile	=	1.609 km

Square Measure

1 inch ²	=	6.45 cm ²
1 foot ²	=	9.29 dm ²
1 yard ²	=	0.836 m ²
1 mile ²	=	2.59 km ²

Cubic Measure

1 inch ³	=	16.4 cm ³
1 foot ³	=	28.3 dm ³
1 yard ³	=	0.765 m ³

Weight Measure

1 ounce	=	28.35 g
1 pound	=	453.6 g
1 stone	=	6.35 kg
1 Ton (long)	=	1.02 (metric) tonne

Metric System to Imperial System

1 mm	=	0.039 inch
1 cm	=	0.394 inch
1 m	=	1.094 yards
1 km	=	0.6214 mile

1 cm ²	=	0.155 inch ²
1 dm ²	=	0.0107 foot ²
1 m ²	=	1.196 yard ²
1 km ²	=	0.386 mile ²

1 cm ³	=	0.061 inch ³
1 dm ³	=	0.035 foot ³
1 m ³	=	1.308 yard ³

1 g	=	0.0353 oz
1 kg	=	2.205 lb
1 kg	=	0.157 stone
1 tonne	=	0.984 Ton (long)

The Metric Prefixes

Prefix	Symbol	Factor	Value
exa	E	10 ¹⁸	1,000,000,000,000,000,000
peta	P	10 ¹⁵	1,000,000,000,000,000
tera	T	10 ¹²	1,000,000,000,000
giga	G	10 ⁹	1,000,000,000
mega	M	10 ⁶	1,000,000
kilo	K	10 ³	1,000
hecto	H	10 ²	100
deca	D	10 ¹	10
—	—	10 ⁰	1

Prefix	Symbol	Factor	Value
deci	d	10 ⁻¹	0.1
centi	c	10 ⁻²	0.01
milli	m	10 ⁻³	0.001
micro	μ	10 ⁻⁶	0.000 001
nano	n	10 ⁻⁹	0.000 000 001
pico	p	10 ⁻¹²	0.000 000 000 001
femto	f	10 ⁻¹⁵	0.000 000 000 000 001
atto	a	10 ⁻¹⁸	0.000 000 000 000 000 001

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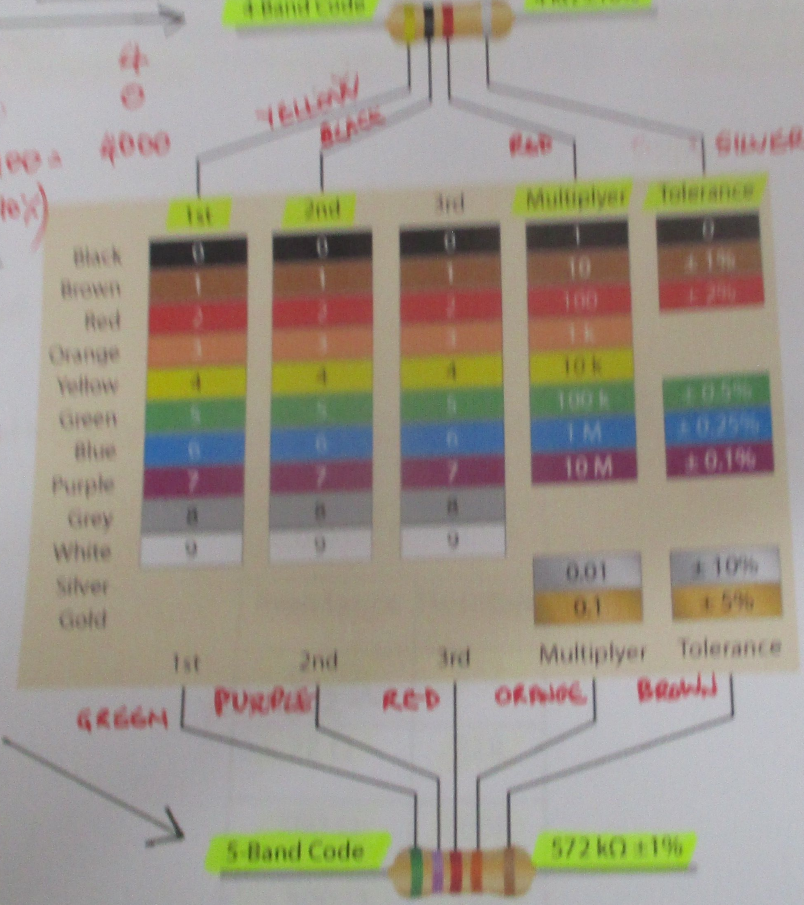
If you're not 100% happy
with your purchase,
we'll replace or refund.

4 Bands
 Green 5
 Black x1
 25Ω ± 10%
 100 Ω ± 5%
 5 Ω ± 10%

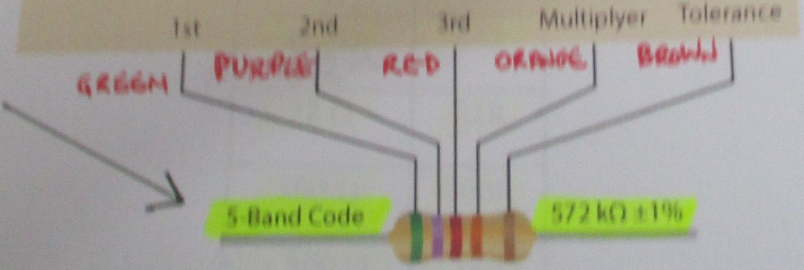
7.3 SELECTION OF RESISTORS

RESISTOR COLOUR CODE

4 BAND EXAMPLE:
 1st BAND COLOUR: Yellow = 4
 2nd " " " " Black = 0
 3rd " " " " MULTIPLIER RED, x100 = 4000
 4th " " " " TOLERANCE SILVER (10%)
 VALUE OF 4 BAND EXAMPLE IS: -
 4000Ω ± 10% TOLERANCE
 SAME AS
 4kΩ ± 10%



5 BAND EXAMPLE:
 1st BAND GREEN = 5
 2nd " " " " PURPLE = 7
 3rd " " " " RED = 2
 4th " " " " MULTIPLIER ORANGE = x1000
 5th " " " " TOLERANCE BROWN = ± 1%
 VALUE OF 5 BAND EXAMPLE IS: -
 2,000Ω ± 1%
 SAME AS
 2kΩ ± 1%



7.3 SELECTION OF RESISTORS

Resistor Power Ratings

AS APPLIED V ↑, I ↑, P_{dissipated} as HEAT ↑.

Resistors are given power ratings based on how much heat they can dissipate continuously without sustaining damage. This rating indicates the maximum voltage that can be safely applied across the resistor. Remember - an increase in applied voltage causes an increase in current and therefore an increase in the power dissipated as heat within the resistor.

RESISTOR COLOUR CODE

4 BAND EXAMPLE

1st BAND COLOUR: **YELLOW** = 4
 2nd " " **BLACK** = 0
 3rd " " **MULTIPLIER RED**, $\times 100 = 4000$
 4th " " **TOLERANCE SILVER** (10%)

VALUE OF 4 BAND EXAMPLE IS:-
 $4000 \Omega \pm 10\%$ TOLERANCE
 SAME AS
 $4K \Omega \pm 10\%$

5 BAND EXAMPLE

1st BAND **GREEN** = 5
 2nd " **PURPLE** = 7
 3rd " **RED** = 2
 4th " **MULTIPLIER ORANGE** = $\times 1000$
 5th " **TOLERANCE BROWN** = $\pm 1\%$

VALUE OF 5 BAND EXAMPLE IS:-
 $572,000 \Omega \pm 1\%$
 SAME AS
 $572K \Omega \pm 1\%$

4-Band Code

$4k\Omega \pm 10\%$

YELLOW
BLACK

RED

SILVER

	1st	2nd	3rd	Multiplier	Tolerance
Black	0	0	0	1	0
Brown	1	1	1	10	$\pm 1\%$
Red	2	2	2	100	$\pm 2\%$
Orange	3	3	3	1 k	
Yellow	4	4	4	10 k	
Green	5	5	5	100 k	$\pm 0.5\%$
Blue	6	6	6	1 M	$\pm 0.25\%$
Purple	7	7	7	10 M	$\pm 0.1\%$
Grey	8	8	8		
White	9	9	9		
Silver				0.01	$\pm 10\%$
Gold				0.1	$\pm 5\%$

GREEN PURPLE RED ORANGE BROWN

5-Band Code

$572k\Omega \pm 1\%$

7.3
SELECTION
RESIST

Resistor Power Ratings

AS APPLIED $V \uparrow$, $I \uparrow$, $P_{\text{dissipated as HEAT}} \uparrow$.

Resistors are given power ratings based on how much heat they can dissipate continuously without sustaining damage. This rating indicates the maximum voltage that can be safely applied across the resistor. Remember - an increase in applied voltage causes an increase in current and therefore an increase in the power dissipated as heat within the resistor.