# TRADE TRAINING III

## TTC PROGRAMME

# RADIO & TELEVISION

GOVERNMENT OF THE PUNJAB
TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY
PUNJAB BOARD OF TECHNICAL EDUCATION
TRADE TESTING CELL, LAHORE.

T.T.P. Series No.87

Price Rs. 30/-

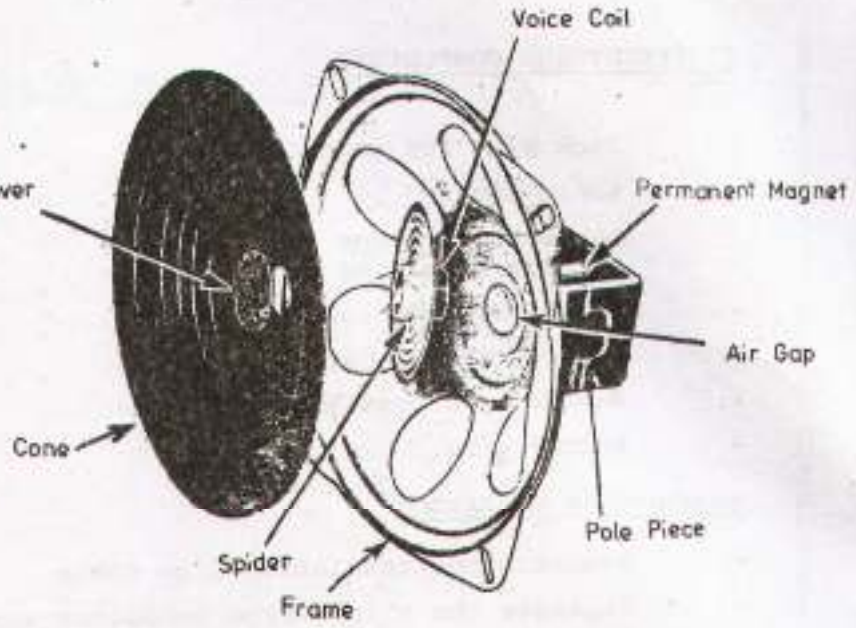
## EQUIPMENT AND COMPONENTS

- Jack plug for mono and stero
- 5 pin plug:-
  a) Forhead phone
  b) For recording cable
- 2 core coaxial cable
- 5 core coaxial cable
- Single core coaxial cable
- Solder wire
- Solder flux
- Side cutter
- Insulation remover
- Solder iron
- Screw driver
- Plier

## SEQUENCE OF OPERATION

- Remove outer insulation from cable.
- Separate the shield from conductor and twist it.
- Remove insulation from the conductor.
- Solder the ends of shield and conductor.
- Cut undesire length of conductors and shield.
- Open require plug.
- Solder ends of connection terminal.
- Solder of conductors and shield to proper pin of plug according to given terminal diagram.
- Fix and light pull relief properly on cable.
- Check continuity and shortage of terminal connections.
- Close plug with plug cover.

DIAGRAM




How a loudspeaker looks when taken a part for repair. The cone is glued to the front edge of the voice coil in an assembled speaker, and the dust cap of cover is glued over the hole in the cone.

SPEAKER TROUBLE

The three commonest types of troubles, you will encounter today in speakers are broken cones, Off-center voice coils, and dust in the air gap.

EQUIPMENT AND COMPONENTS

- Required parts of loudspeaker
- Glue
- Solder wire
- Solder flux
- Plier
- Soldering iron
- Screw driver
- Multi-meter

SEQUENCE OF OPERATION

FIND OUT THE FAULT OF LOUDSPEAKER

| IF VOICE COIL IS DAMAGE | IF CONE IS DAMAGE |
|---|---|
| - Desolder the terminal of voice coil. | Remove cone from the frame of loudspeaker. |
| - Remove cone with dust cover and spider. | Remove spider and dust cover from cone. |
| - Remove voice coil from the magnet. | Replace cone according to the size. |
| - Prepare coil according to require size. | Fix spider and dust cover with cone. |
| - Fix coil in to the magnet properly. | Check function of loudspeaker. |
| - Fix cone, spider and dust cover with glue. | |
| - Solder the terminal of voice coil. | |
| - Check function of loudspeaker. | |

EQUIPMENT AND COMPONENTS

- Mechanical system of casette recorder
- Require parts if necessary
- Tool kit

SEQUENCE OF OPERATION

- Demount and mount key board.
- Demount and mount flywheel with capstan.
- Demount and mount pullies.
- Demount and mount right and left hand spindles.
- Demount and mount rubber pressure roller.
- Demount and mount motor unit.

EQUIPMENT AND COMPONENTS

- complete cassette recorder
- Carbon tetra-chloride
- Piece of cotton
- Soldering wire
- Cassette
- Tool kit
- Soldering iron
- Spirit
- Soldering flux

SEQUENCE OF OPERATION

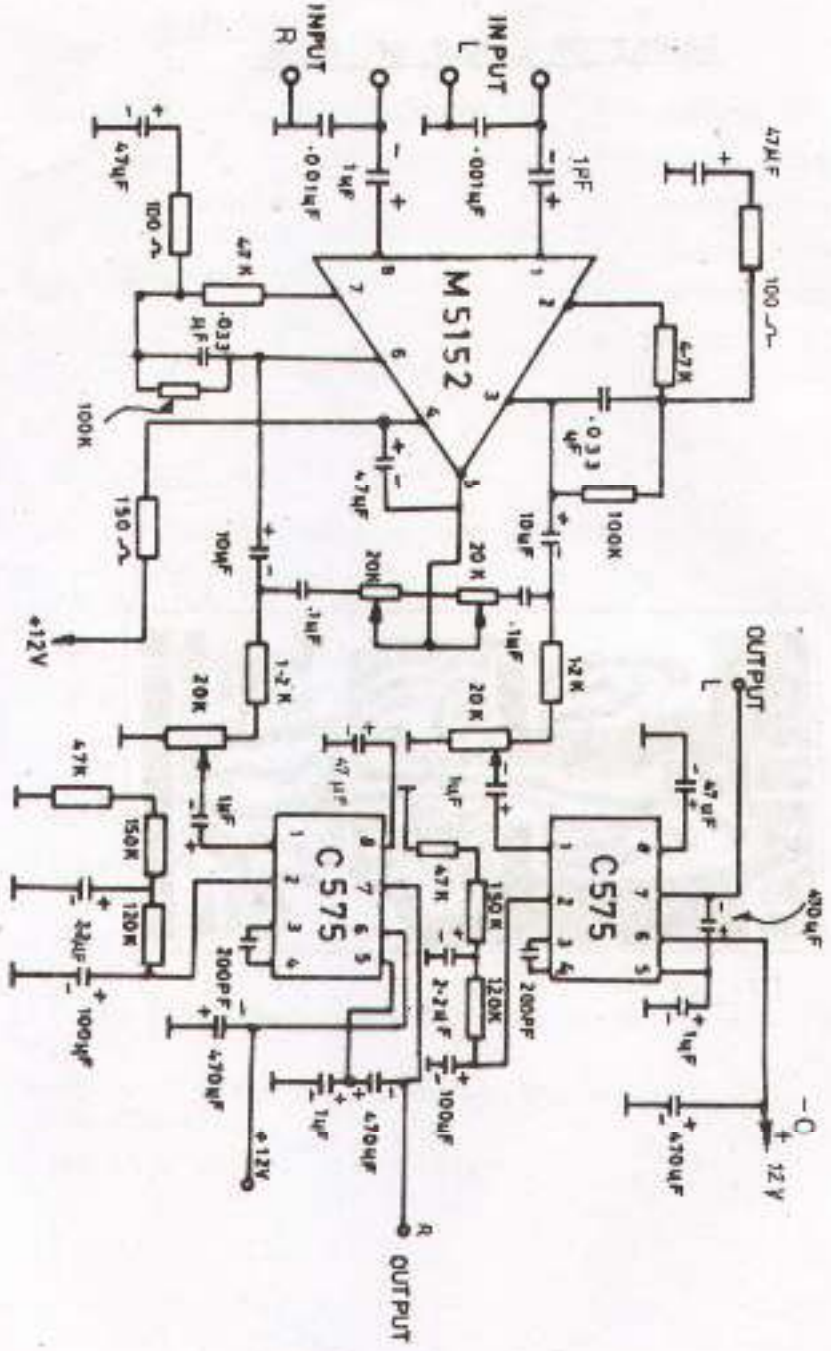
- Remove front cover/cabinet of cassette recorder.
- Remove electrical connection of magnetic head.
- Demound play/record head in the cassette recorder.
- Make electrical connection of magnetic head.
- Clean head properly.
- Fix cassette in recorder.
- Bring cassette recorder in play position.
- Adjust play/record head by changing its position to get optimal sound.

## EQUIPMENT AND COMPONENTS

- Copper coating plate
- Material for etching
- Solder wire
- Solder flux
- Components according to given circuit
- Tool kit
- Soldering iron
- Drill machine
- Twist drill
- Hook up wire

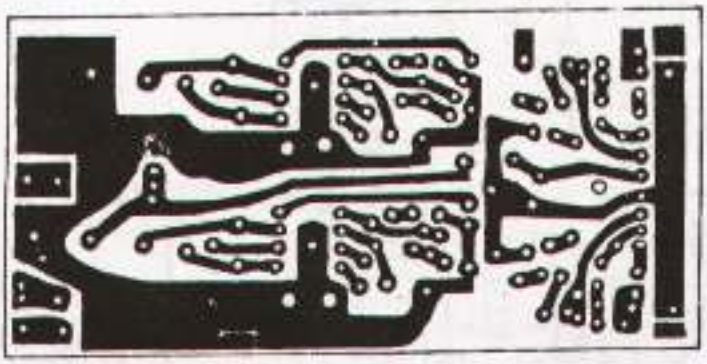
## SEQUENCE OF OPERATION

- Prepare printed circuit board.
- Prepare layout for placement of components.
- Drill holes in printed circuit board.
- Fix and solder components properly.
- Dress components properly.
- Check circuit visually according to given circuit diagram.
- Connect assembled circuit with cassette recorder.
- Check the function of assembled circuits.




| | | |
|---|---|---|
| Trade Training III | ASSEMBLING OF STEREO AMPLIFIER | RT-P 2-3/3-11-1/7<br>C / Recorders |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | Radio & T.V<br>7 |

## SAMPLE OF LAYOUT OF P·C·B



DELUXE

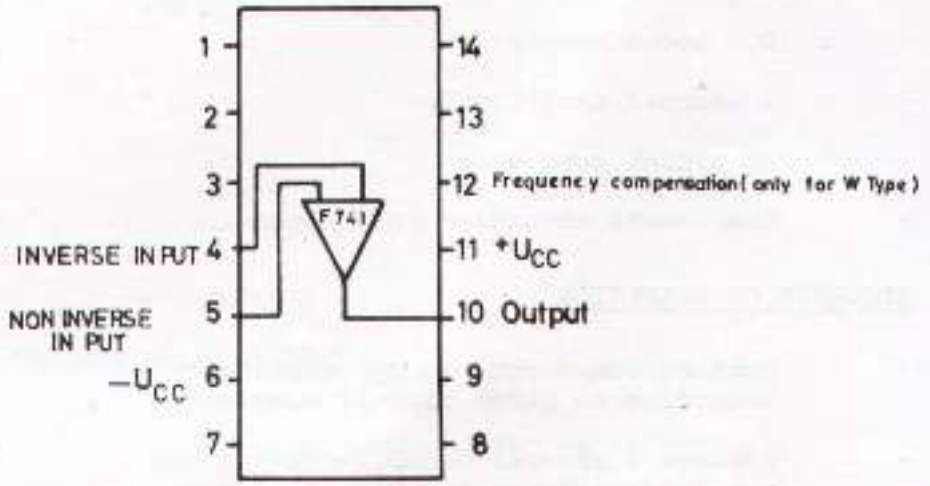
## EQUIPMENT AND COMPONENTS

- D.C power supply
- 2 channel oscilloscope
- AF signal generator
- Components according to diagram

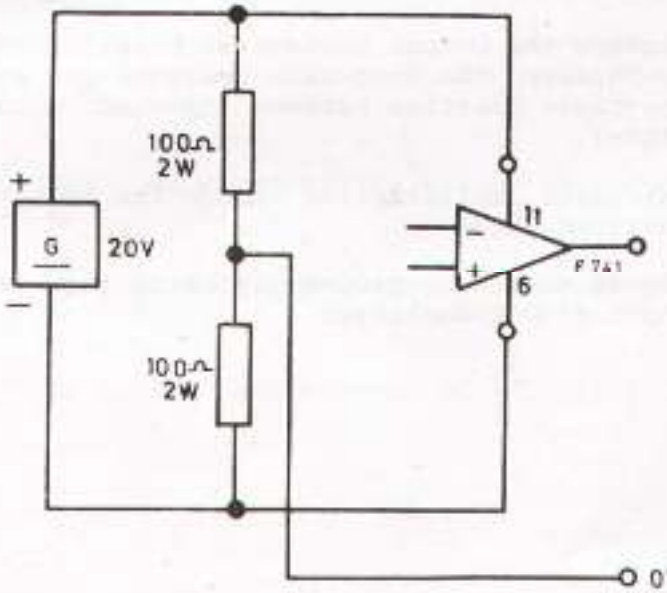
## SEQUENCE OF OPERATION

- Connect components to O-P amplifier according to given circuit diagram.
- Connect 2 channel oscilloscope to the non inverse Input and Output of O-P amplifier.
- Apply D.C voltage to circuit according to given circuit diagram.
- Apply AC voltage 50m $V_{p-p}$/1KHZ from signal generator to the non inverse Input.
- Measure the Output voltage with oscilloscope by changing the feed back resistor and abserve the phase position between Input and Output signal.
- Calculate amplification factor for each measured value.
- Repeat measuring process by using inverse Input of O-P amplifier.

TERMINAL DIAGRAM OF IC F741
DUAL IN-LINE PACKAGE

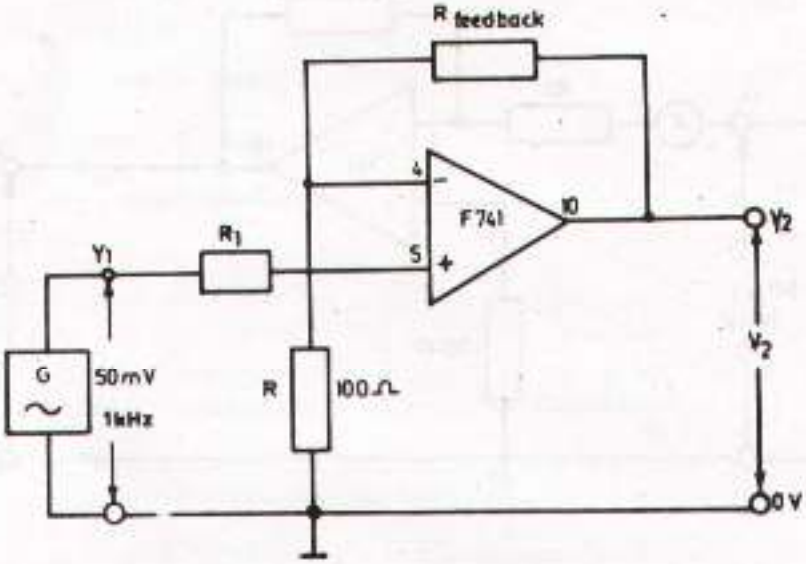



CONNECTION OF DC SUPPLY VOLTAGE




| | | |
|---|---|---|
| Trade Training III | MEASURING OF O P AMPLIFIER WITH INVERSE & NOT INVERSE | RT-P 23/3-II-2/2 |
| | | Special Comp. Cir. |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | Radio & T.V |

CIRCUIT DIAGRAM




TABLE

| $V_1$ (mV) | $R_f$ (kΩ) | $R_1$ (kΩ) | $V_2$ (V) | $\frac{R_f}{R_1}$ | Voltage given | Phase position between in and output signal |
|---|---|---|---|---|---|---|
| 50 m Vpp | 10 | 1 | | | | |
| 50 m Vpp | 100 | 1 | | | | |
| 50m Vpp | 200 | 1 | | | | |

| | | |
|---|---|---|
| Trade Training III | MEASURING OF O.P AMPLIFIER WITH INVERSE & NOT INVERSE | RT-P 2-3/3-II-2/3 Special Comp Cir. |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

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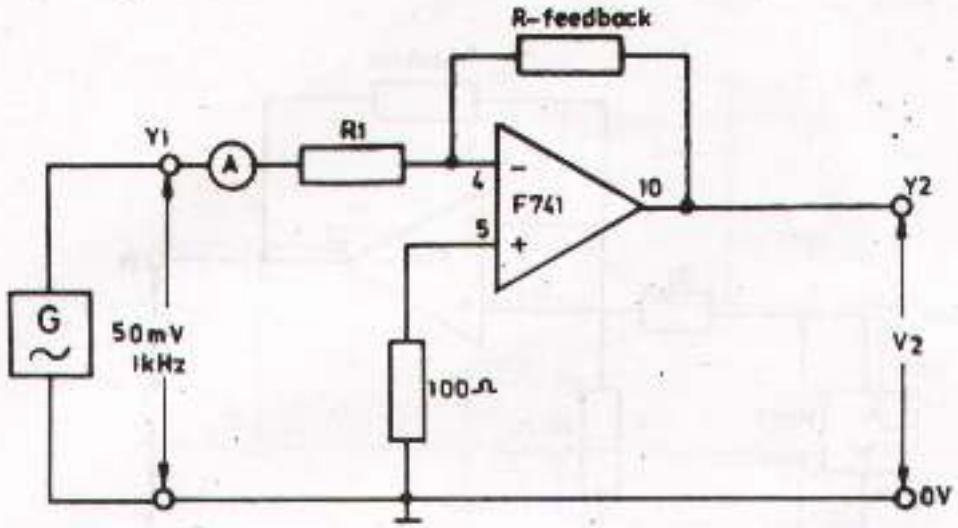
Radio & T.V




| Vim(V) | $R_f$ (kΩ) | R1 (kΩ) | $V_2$(V) | $\frac{R_f}{R1}$ | Voltage given | Phase position between in-and output signal |
|---|---|---|---|---|---|---|
| 50mV$_{pp}$ | 10 | 1 | | | | |
| 50mV$_{pp}$ | 100 | 1 | | | | |
| 50mVpp | 220 | 1 | | | | |

# MEASURING OF O P AMPLIFIER WITH INVERSE & NOT INVERSE

RT.P 2-3/3.II.2/4

Special Comp Ckt.

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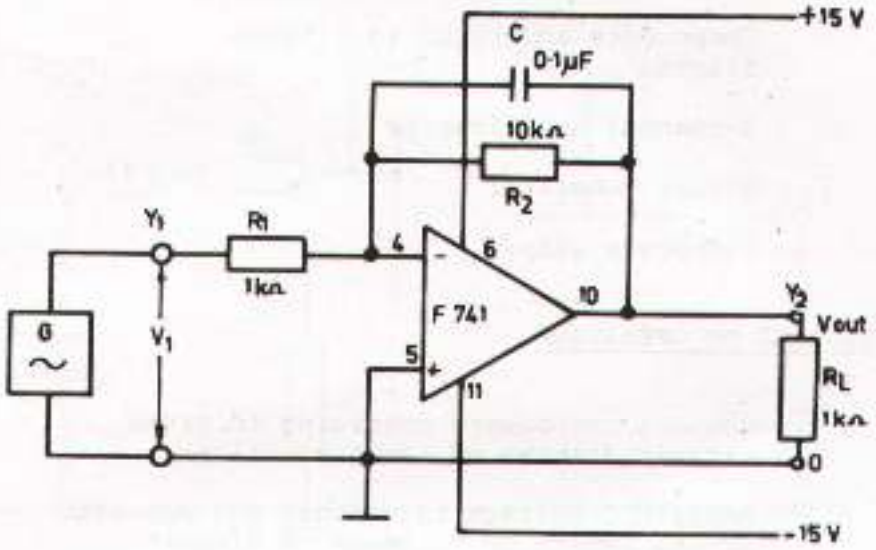
## EQUIPMENT AND COMPONENTS

- Components according to circuit diagram
- 2-channel oscilloscope
- Signal generator
- D.C power supply

## SEQUENCE OF OPERATION

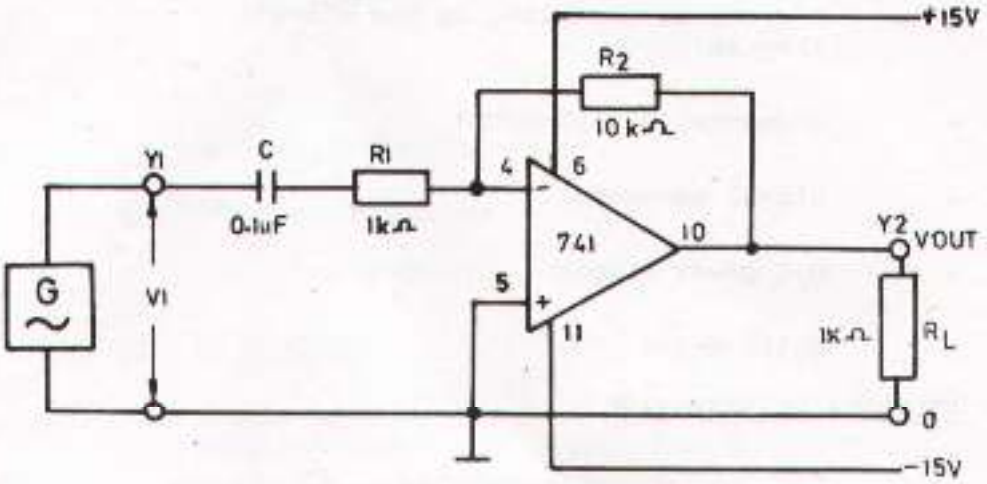
- Connect components according to given circuit diagram of low pass filter.
- Apply D.C voltage to circuit and connect signal generator to Input of circuit.
- Connect 2-channel oscilloscope to Input and Output of circuit.
- Change Input frequency according to given values in the table and measure Output voltage by constant Input voltage.
- Draw graph of low pass filter, Output voltage depends upon frequency.
- Change connection of circuit from low pass to high pass filter.
- Repeat above mentioned measurements for high pass filter.
- Draw graph of high pass filter, Output voltage depends upon frequency.

CIRCUIT DIAGRAM ( LOW PASS FILTER )




TABLE

| f (Hz) | Vinput (Vpp) | Voutput (Vpp) |
|---|---|---|
| 100 | | |
| 500 | | |
| 1000 | | |
| 1500 | | |
| 2000 | | |
| 5000 | | |




| f (Hz) | Vinput ($V_{pp}$) | Voutput (Vpp) |
|---|---|---|
| 100 | | |
| 500 | | |
| 1000 | | |
| 1500 | | |
| 2000 | | |
| 5000 | | |

ACTIVE LOW & HIGH PASS FILTER

RT-P 23/3.11-2/7

Special Comp. Cir.

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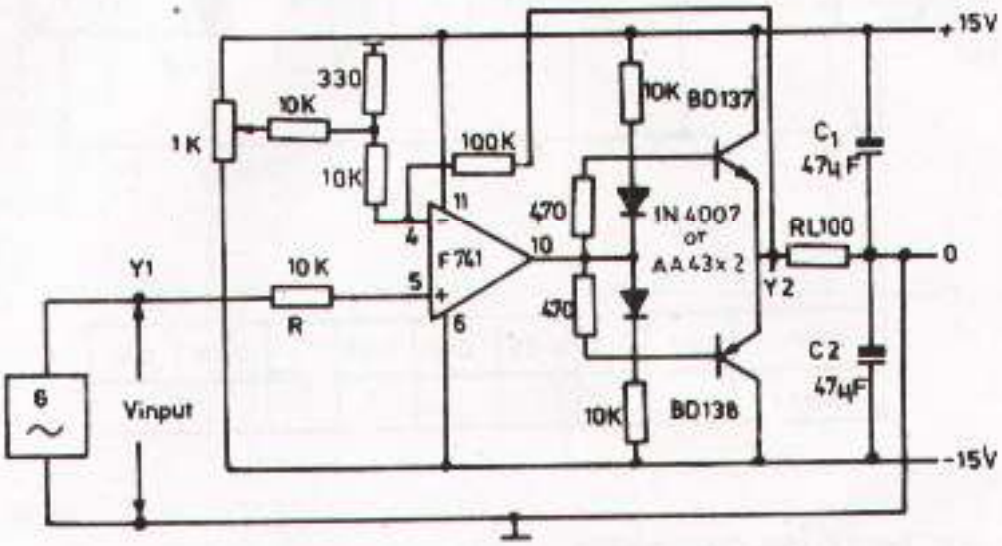
EQUIPMENT AND COMPONENTS

- Components according to the circuit diagram
- 2-channel oscilloscope
- Signal generator
- D.C power supply
- Multi-meter

SEQUENCE OF OPERATION

- Connect components according to circuit diagram.
- Apply require D.C voltage to circuit.
- Make Offset adjustment of O.P amplifier by varying potentio-meter 1K Ohm.
- Connect signal generator Input of circuit.
- Connect oscilloscope to Input and Output of circuit.
- Apply AC Input signal from signal generator to circuit.
- Measure Output voltage across load resistor with volt-meter.
- Determine Output power of amplifier.

CIRCUIT DIAGRAM



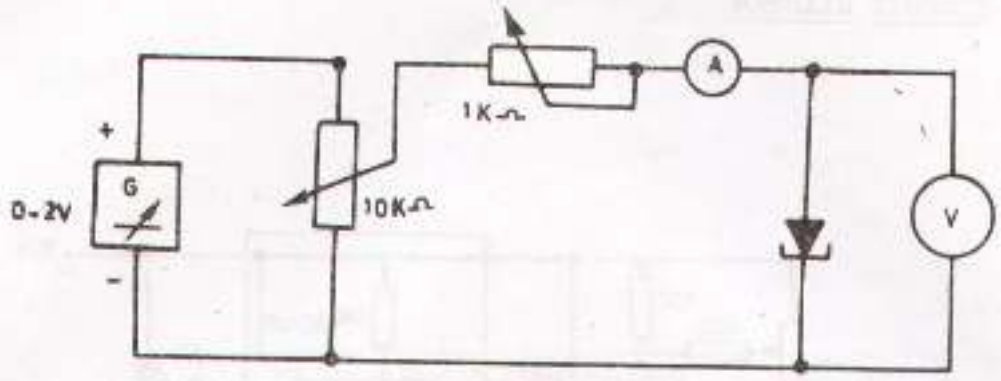

NOTE:-

Adjust AC Input voltage to get maximum Output signal without distortion. Adjustment should be checked with oscilloscope.

Heat sink must be mounted on Output transistor.

$$P_{out} = \frac{V^2}{R}$$

CIRCUIT DIAGRAM




TABLE

| V (V) | 0·1 | 0·2 | 0·25 | 0·3 | 0·35 | 0·4 | 0·45 | 0·5 |
|---|---|---|---|---|---|---|---|---|
| I (mA) | | | | | | | | |

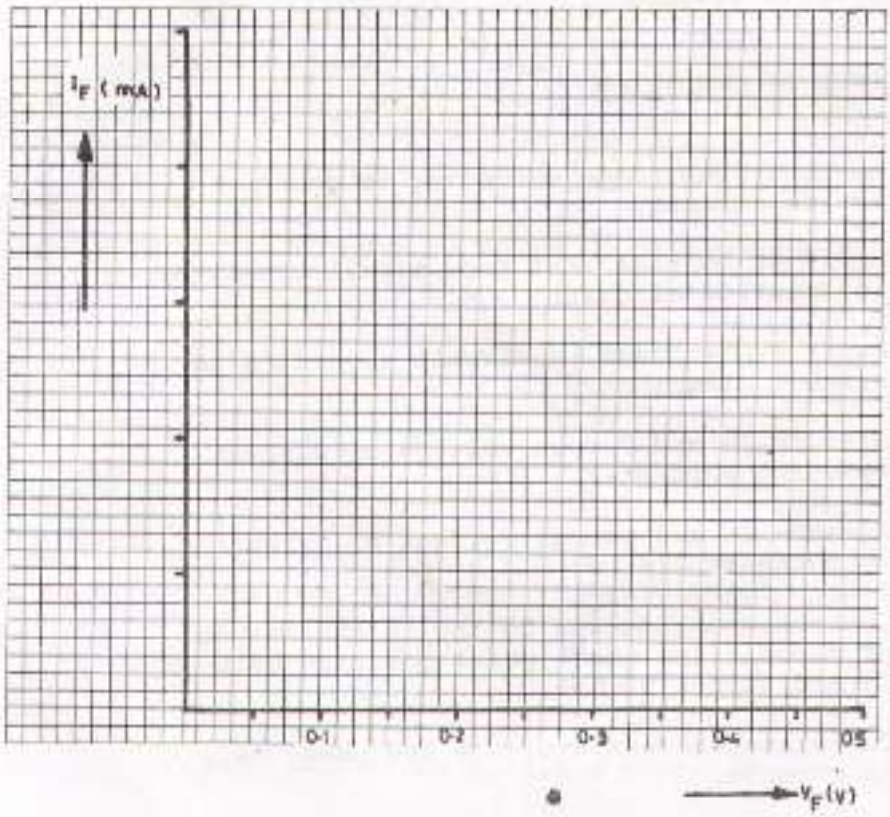
EQUIPMENT AND COMPONENTS

- Components according to given circuit diagram
- Variable D.C power supply
- One ampere-meter
- One volt-meter

SEQUENCE OF OPERATION

- Connection of circuit according to given circuit diagram.
- Connection of D.C power supply to circuit.
- Apply D.C voltage to circuit according to given values in table.
- Measure farword current of tunnel-diode by changing applied voltage.
- Draw graph of characteristic curve according to measured values.

CHARACTERISTIC




NOTE:-

Trainee has to make scale for current on Y-axis according to the measured values.

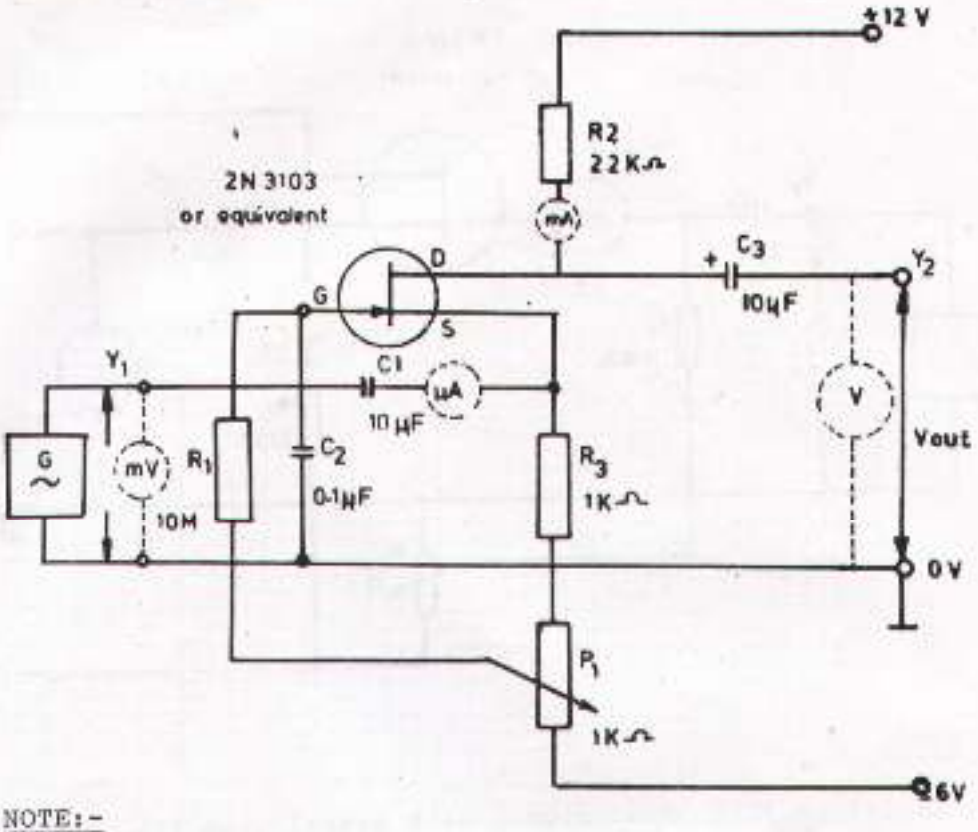
## EQUIPMENT AND COMPONENTS

- Frequency generator
- Volt-meter
- Components according to circuit diagram
- D.C power supply
- Ampere meter
- 2 channel oscilloscope

## SEQUENCE OF OPERATION

- Connect components according to common source circuit.
- Apply AC voltage 1KHZ from signal generator to Input of circuit.
- Apply D.C voltage to circuit according to circuit diagram.
- Measure In and Output voltage of circuit by using voltmeter.
- Measure In and Output current of circuit by using ampere meter.
- Connect oscilloscope to the In and Output of circuit and check phase position between In and Output signal.
- Calculate current, voltage and power gain of circuit.
- Repeat above measurement for common gate and common drain circuit-

CIRCUIT DIAGRAM




NOTE:-

1. Adjust Input signal with signal generator to get maximum Output signal without distortion, check signal with oscilloscope.

2. Use ampere meter which has a range between UA to mA.

3. Use volt-meter which has a range of m volt.

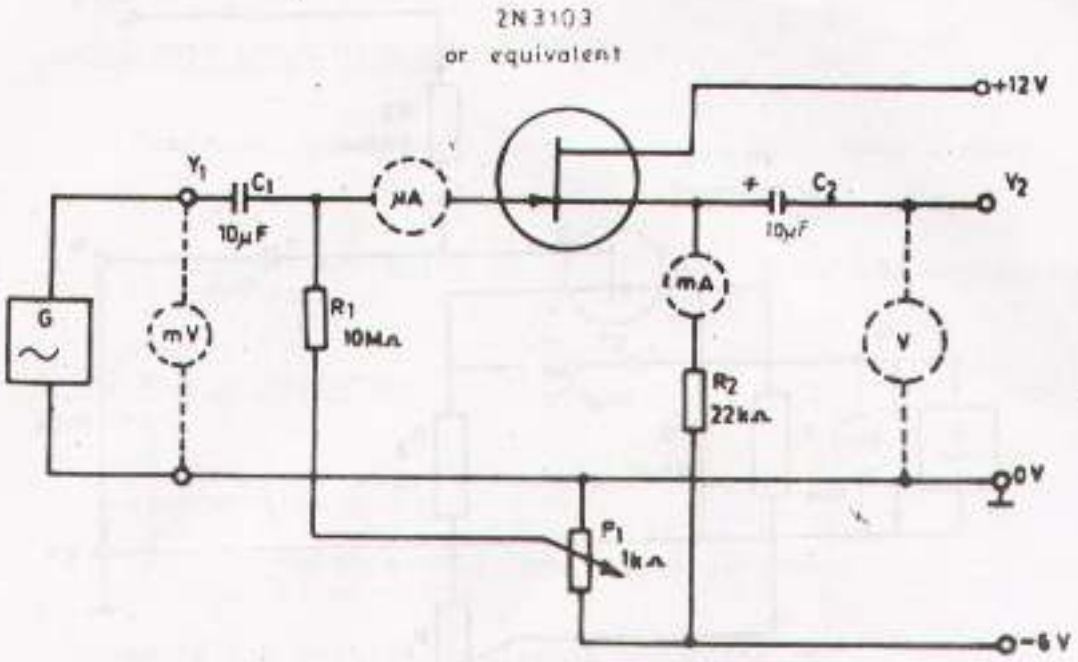
4. Each value should be measured separately to avoid measure error.

$$\text{Current gain} = \frac{I_s}{I_G}$$

$$\text{Voltage gain} = \frac{V_{out}}{V_{in}}$$

$$\text{Power gain} = V_{gain} \times I_{gain}$$

## CIRCUIT DIAGRAM




NOTE:

1. Adjust Input signal with signal generator to get maximum Output signal without distortion, check signal with oscilloscope.

2. Use Ampere meter which has a range between UA to mA.

3. Use volt-meter which has a range of m volt.

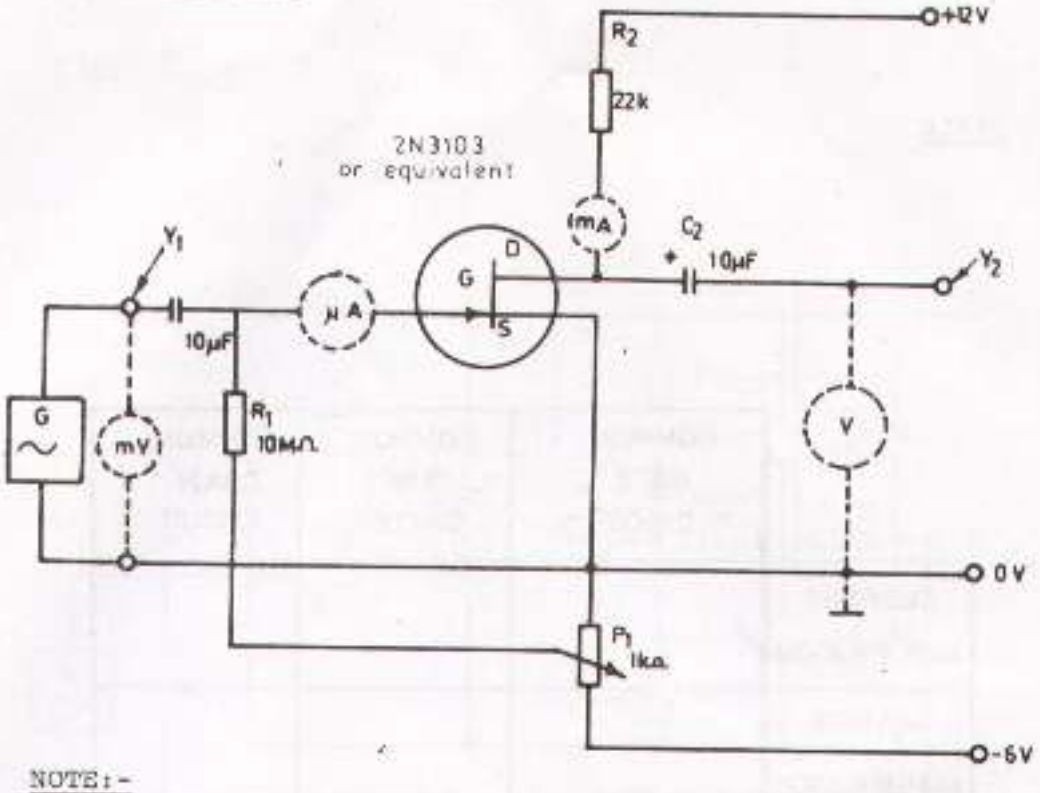
4. Each value should be measured separately to avoid measure error:-

   Current gain = $\frac{I_D}{I_s}$

   Voltage gain = $\frac{V_{out}}{V_{in}}$

   Power gain = $V_{gain} \times I_{gain}$

CIRCUIT DIAGRAM




NOTE:-

1. Adjust Input signal with signal generator to get maximum Output signal without distortion, check signal with oscilloscope.

2. Use ampere meter which has a range between UA to mA.

3. Use volt-meter which has a range of m volt.

4. Each value should be measured separately to avoid measure error:-

$$\text{Current gain} = \frac{I_D}{I_G}$$

$$\text{Voltage gain} = \frac{V_{out}}{V_{in}}$$

$$\text{Power gain} = V_{gain} \times I_{gain}$$

TABLE

| | COMMON GATE CIRCUIT | COMMON SOURCE CIRCUIT | COMMON DRAIN CIRCUIT |
|---|---|---|---|
| CURRENT AMPLIFICATION | | | |
| VOLTAGE AMPLIFICATION | | | |
| POWER AMPLIFICATION | | | |
| PHASE POSITION & OUT PUT SIGNAL | | | |

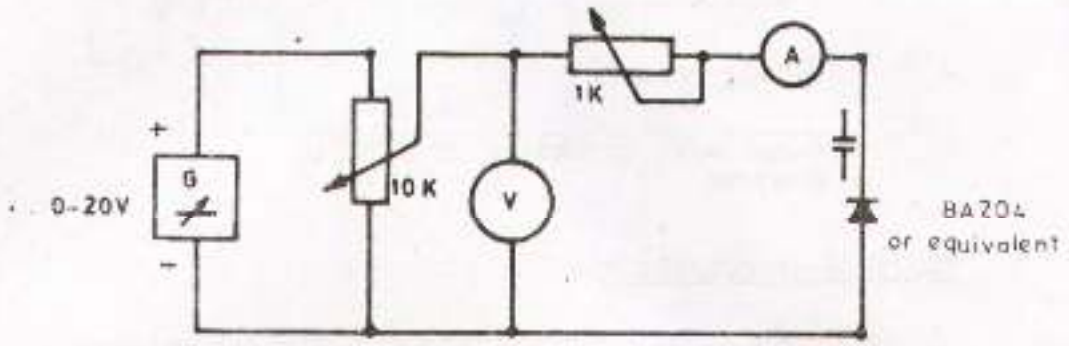
## EQUIPMENT AND COMPONENTS

- D.C power supply
- 1-Ampere meter
- 1-Volt meter
- Components according to circuit diagram

## SEQUENCE OF OPERATION

- Connection of circuit according to given circuit diagram.
- Connect D.C power supply to circuit.
- Apply D.C voltage to the circuit according to given value in table.
- Measure reverse current of capacitor diode by changing applied voltage.
- Draw graph of diode current with respect to applied voltage.

CIRCUIT DIAGRAM



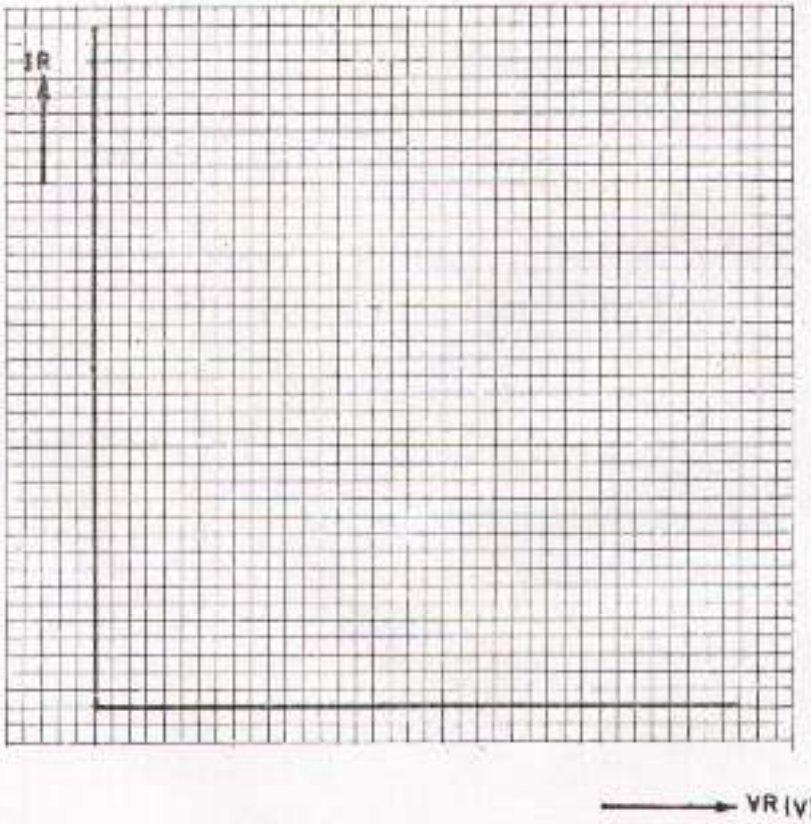

Table

| V (V) | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|
| I (μA) | | | | | | | | |

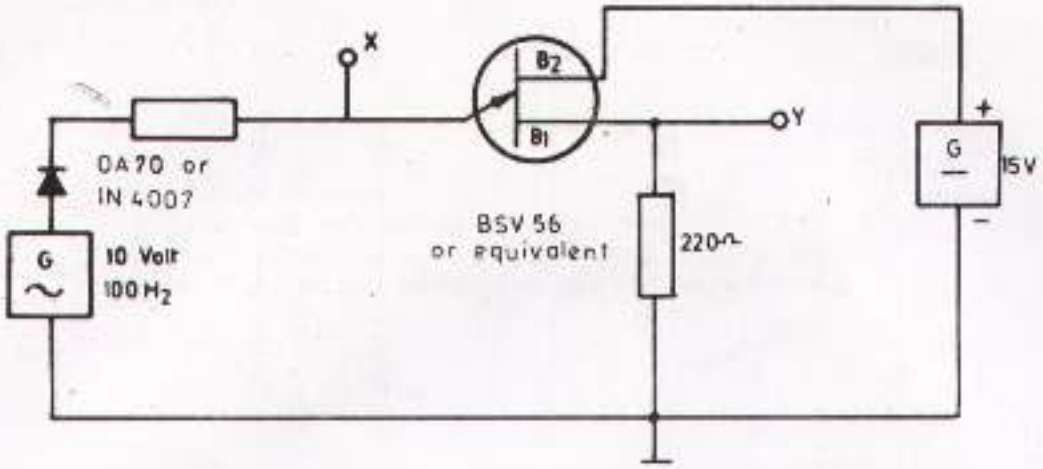
GRAPH

NOTE:-

Trainees has to make scale for current on Y-axis and for voltage on X-axis according to the measured values.



## CIRCUIT DIAGRAM




## EQUIPMENT AND COMPONENTS

- D.C power supply
- Signal generator
- Components according to circuit diagram
- 1-Volt meter
- 1-Ampere meter
- 2-channel oscilloscope

## SEQUENCE OF OPERATION

- Connect components according to given circuit diagram.
- Apply D.C voltage to circuit.
- Apply AC voltage to circuit.
- Connect oscilloscope to circuit.
- Adjust oscilloscope properly that it can be use to plot characteristic curve.
- Plotting of characteristic curve.
- Make graph of oscilloscope.

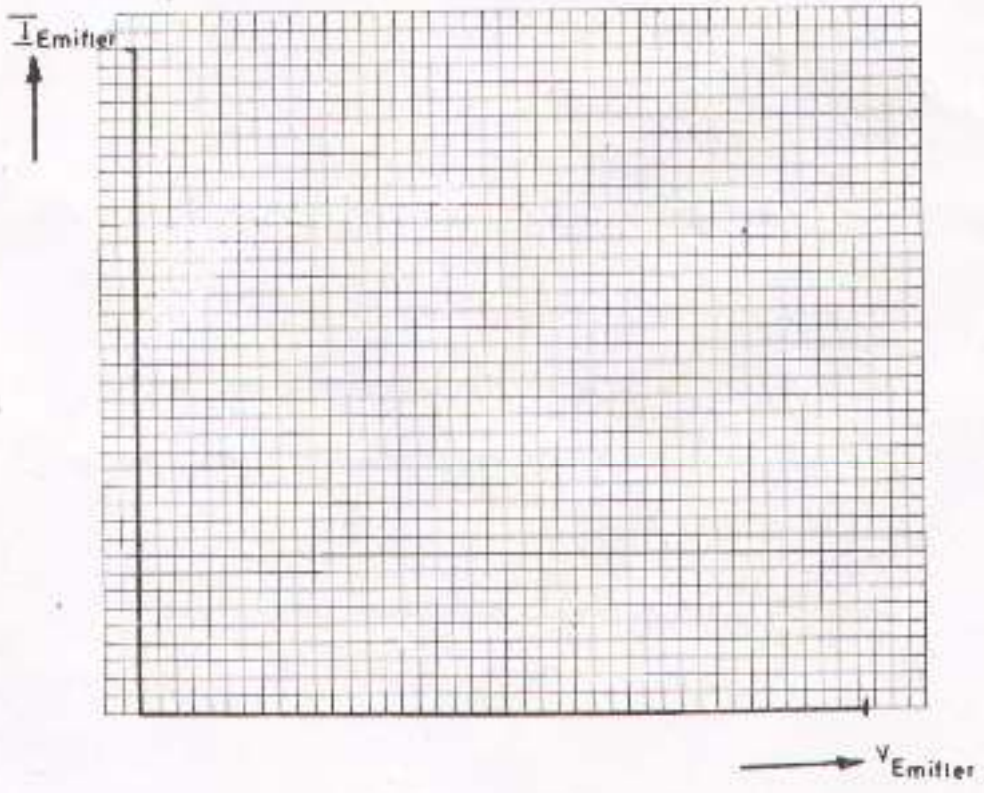
GRAPH

## CHARACTERISTIC CURVE OF UNIJUNCTION TRANSISTOR

NOTE:-

1. Adjustment of oscilloscope:
   $Y_a$ Input 1V/division
   X ($Y_b$) Input 1V/division
   Switch of time base has to be adjusted on extra position.
   Adjust D.C. operation.

2. Trainees have to make scale for current on Y-axis and scale for voltage on X-axis according to oscillogram.



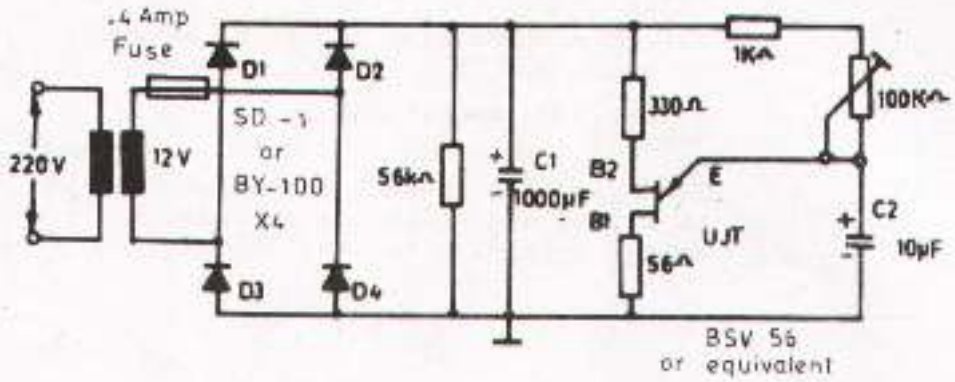

| Trade Training III | MEASURING OF UNIJUNCTION TRANSISTOR | RT-P 2-3/3 II-2/21 |
|---|---|---|
| | | Special Comp. Ckt. |

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

Radio & T.V

CIRCUIT DIAGRAM



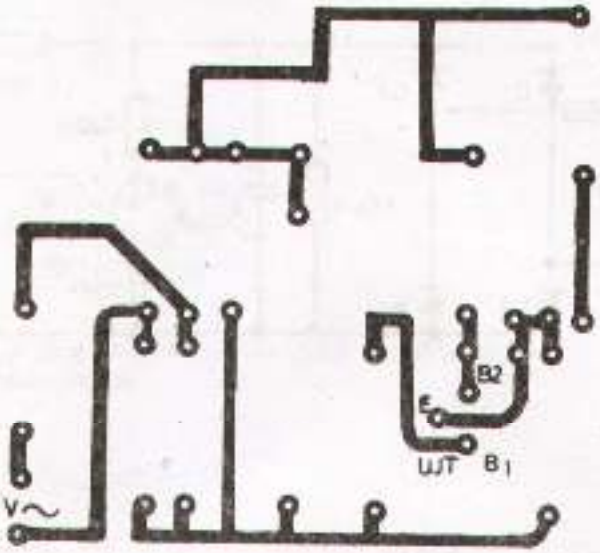

EQUIPMENT AND COMPONENTS

- Copper coating plate
- Material for etching
- Soldering iron
- Drill machine
- Components according to diagram
- Solder wire
- Solder flux
- Hook up wire
- Tool kit

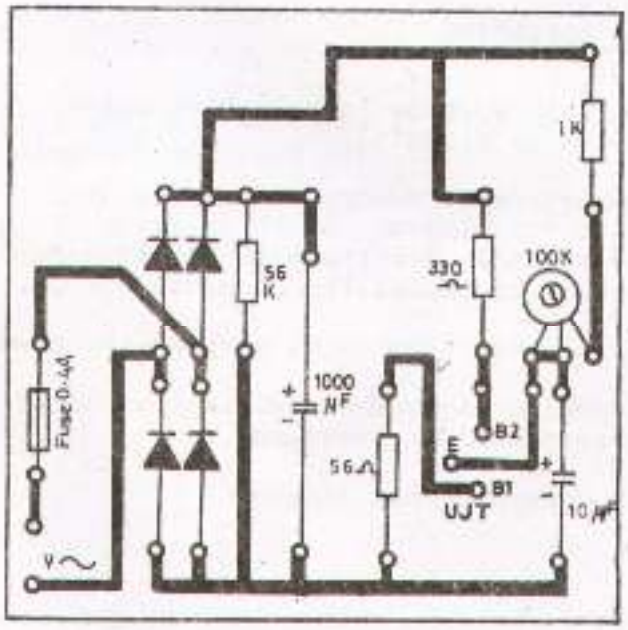
SEQUENCE OF OPERATION

- Prepare printed circuit board properly.
- Drill holes in printed circuit board properly.
- Fix and sold component on printed circuit board.
- Dressing of components.
- Check circuit visually according to circuit diagram.

LAYOUT OF PRINTED CIRCUIT BOARD

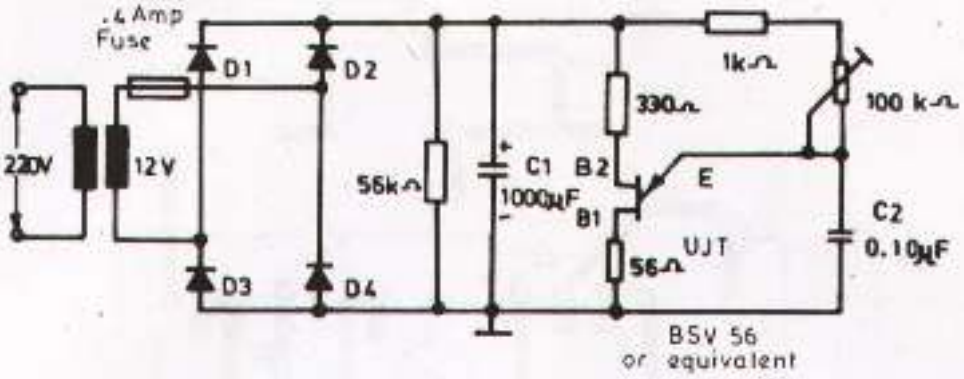



LAYOUT WITH COMPONENTS




| | | |
|---|---|---|
| Trade Training III | ASSEMBLING OF PULSE GENERATOR | R.T.P 2.3/3.11-2/23 |
| | | Special Comp Ckt |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAN-GERMAN TECHNICAL TRAINING PROGRAMME | | Radio & T.V 31 |

CIRCUIT DIAGRAM



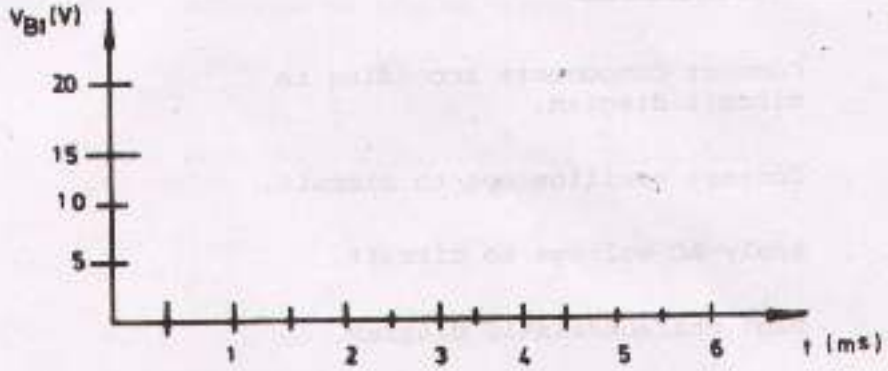

EQUIPMENT AND COMPONENTS .

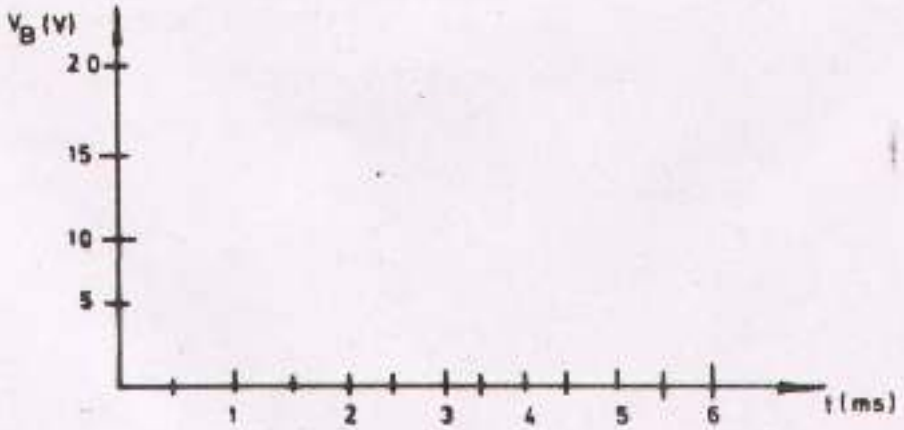
- Assembled circuit
- Oscilloscope(2-channel)
- Screw driver
- AC power supply

SEQUENCE OF OPERATION

- Apply AC voltage to assembled pulse generator circuit.
- Connect oscilloscope to the circuit.
- Check shape of voltage on B1, B2 and emitter of transistor on oscilloscope.
- Observe oscillogram by varying the trimmer.
- Determine minimum and maximum value of pulse generator frequency.
- Draw graph of oscillogram.


$V_E$ (V)
10
5
0
1
2
3
4
5
6
t (ms)


$V_{B1}$ (V)
20
15
10
5
1
2
3
4
5
6
t (ms)


$V_B$ (V)
20
15
10
5
1
2
3
4
5
6
t (ms)

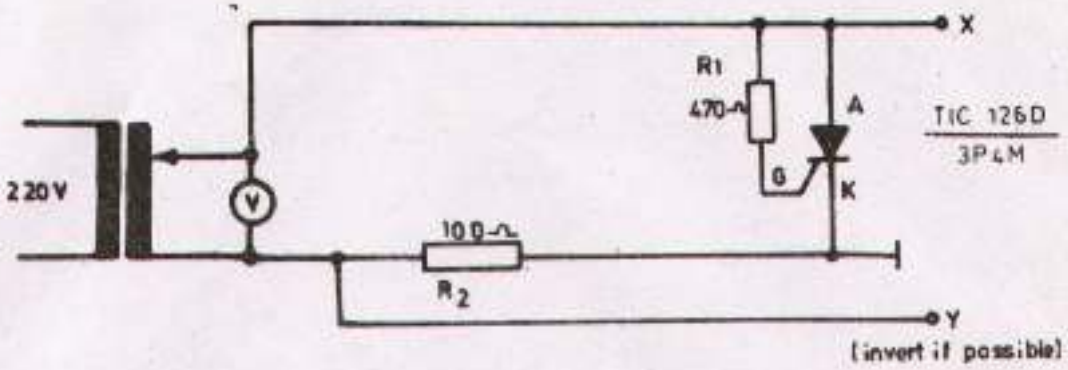
EQUIPMENT AND COMPONENTS

- Components according to circuit diagram
- AC power supply
- 2 channel oscilloscope

SEQUENCE OF OPERATION

- Connect components according to circuit diagram.
- Connect oscilloscope to circuit.
- Apply AC voltage to circuit.
- Plot characteristic diagram.
- Draw graph of circuit diagram.

CIRCUIT DIAGRAM




NOTE:-

Circuit must be connected through protection variable transformer.

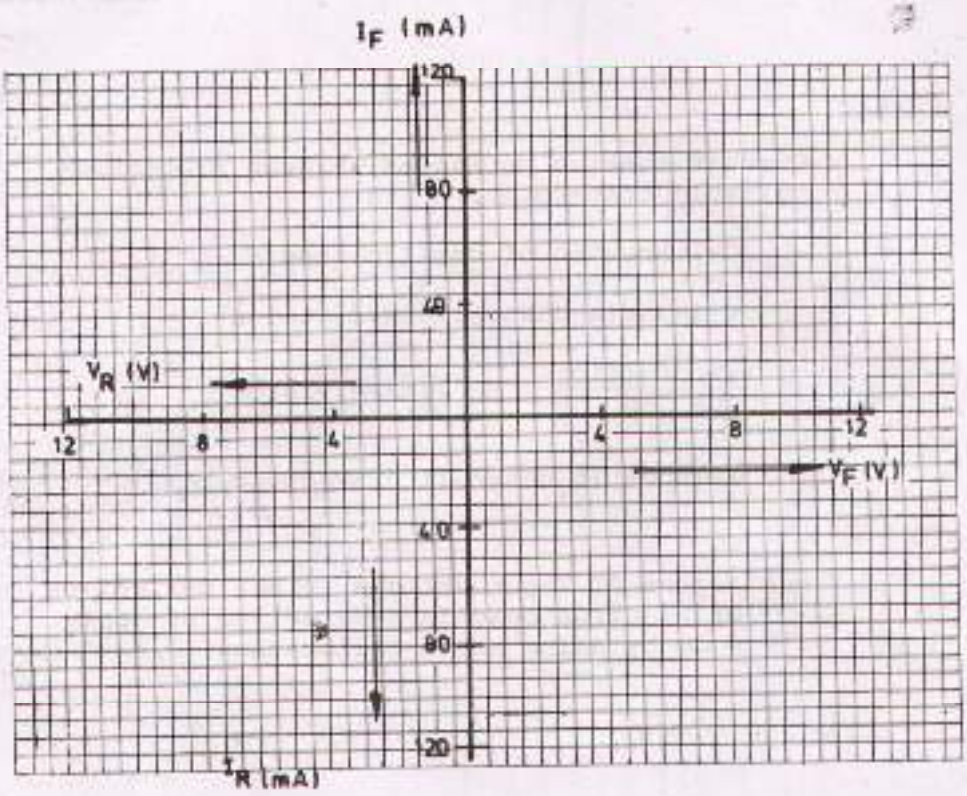
- Calibration of oscilloscope:-

  Y-input(a channel) 2V/division

  $\frac{\text{2V/division}}{\text{100 Ohm}}$ = 20mA/division

  X-input (b channel) 0.5V/division

- Adjust AC Input voltage to get deflection of electron beam in Y-direction of appr: 6 Cm by using above calibration.




| | | |
|---|---|---|
| Trade Training III | MEASURING OF THYRISTOR | RTP 2.3/3.11.2/28<br>Special Comp. Cir. |
| DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING<br>PAK-GERMAN TECHNICAL TRAINING PROGRAMME | | Radio & T.V<br>36 |

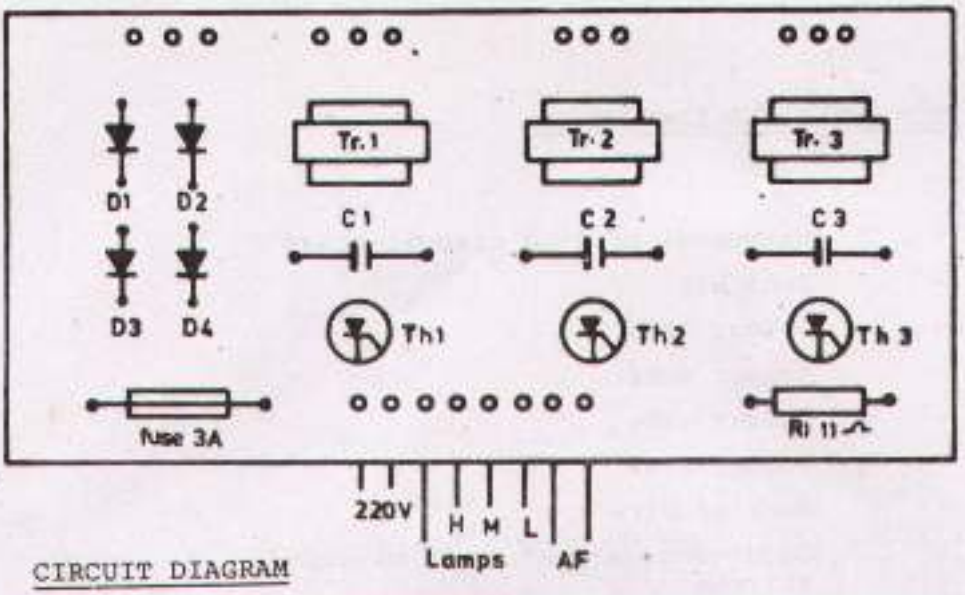
EQUIPMENT AND COMPONENTS

- Universal printed circuit board
- Tool kit
- Solder iron
- Solder suker
- Solder wire
- Solder flux
- Hook up wire
- Components according to circuit diagram

SEQUENCE OF OPERATION

- Prepare layout for placement of components.
- Fix and solder components on universal printed circuit board.
- Dressing of components.
- Check circuit visually according to circuit diagram.
- Apply input signal to circuit.
- Check function of circuit.

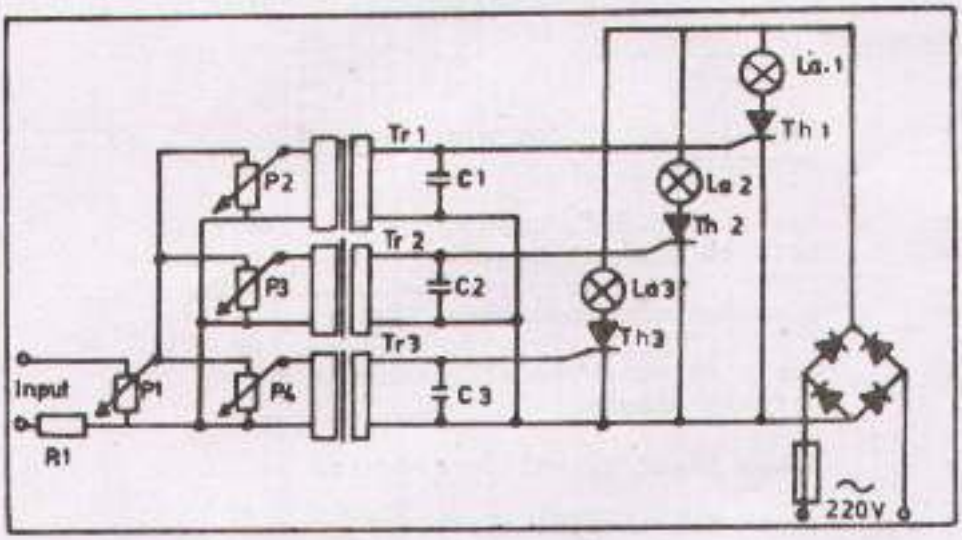
LAYOUT





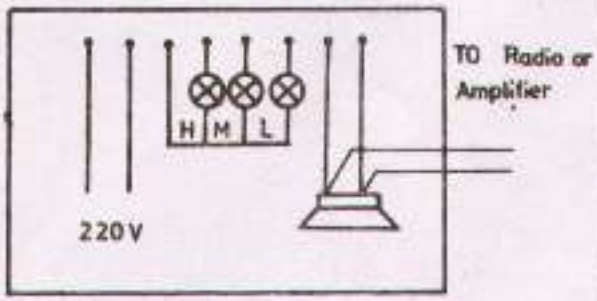


CIRCUIT DIAGRAM




LIST OF COMPONENTS

| | |
|---|---|
| Tr.1-3 | Transformer 1:4 |
| C.1 | 1.5pF |
| C.2 | 3300pF |
| C.3 | 0.33UF |
| D1.D4 | 1N4007 or equiv: |
| Th1-3 | BstB 0233 or eqv: |
| R1 | 11 Ohm |
| Si | 3A |
| P1-4 | 10K Ohm |




| | | |
|---|---|---|
| Trade Training III | ASSEMBLING OF THYRISTOR CIRCUIT (DISCO LIGHT) | RT.P 2.3/3.11.2/30 |
| | | special Comp. Cir. |

EQUIPMENT AND COMPONENTS

- T.V antenna, Mast
- Mast clamp with screw
- Mast standoff insulator
- Screw, dowel, antenna wire
- Tool kit
- Drill machine
- Balancing unit
- B.N.C adopter if necessary

SEQUENCE OF OPERATION

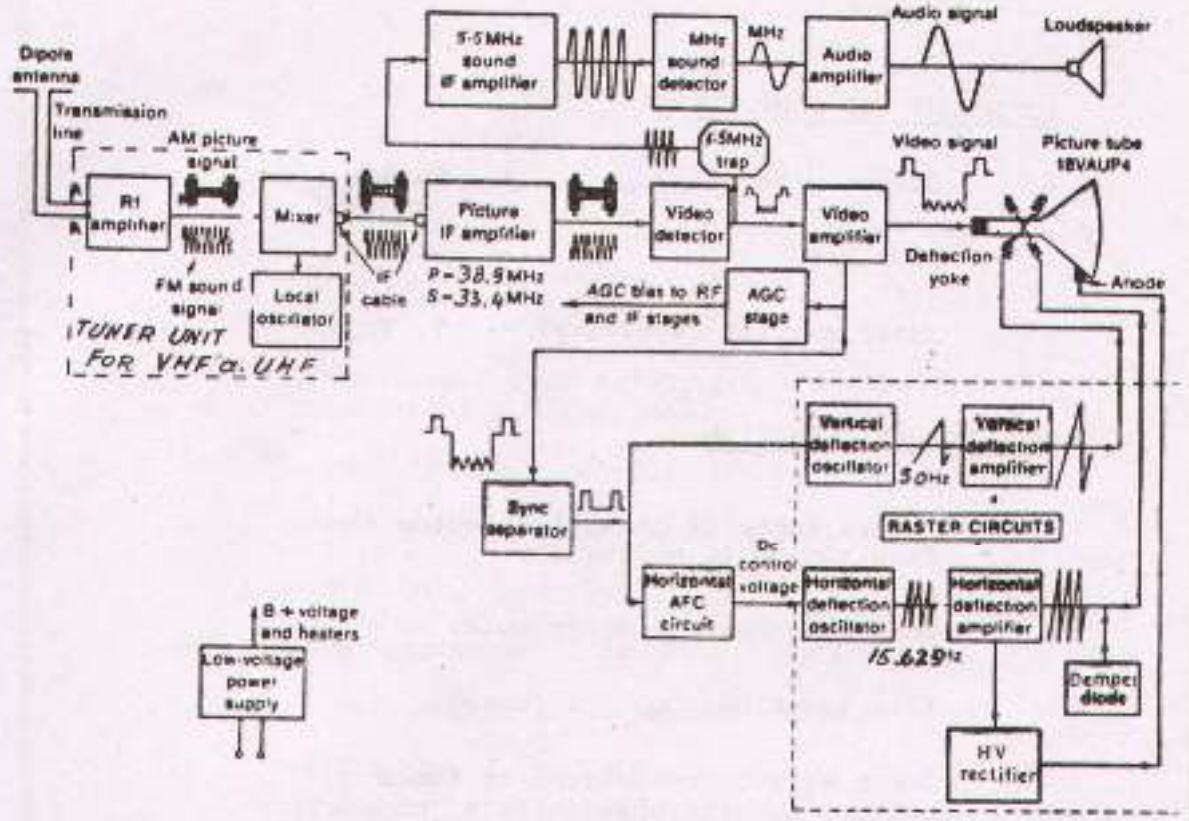
- Fix elements of antenna on antenna rod.
- Connect antenna wire to terminal lugs of antenna.
- Mount antenna on top of mast.
- Fix antenna wire with stand off insulator on mast.
- Mount mast with clamp on wall and adjust direction of antenna properly.
- Fix antenna wire with stand off insulator on wall.
- Install antenna wire properly upto T.V set.
- Check D.C resistance (continuity) of T.V antenna system with Ohm meter.
- Connect antenna wire to input of T.V receiver, use B.N.C adopter or balancing unit if necessary.
- Check fault of T.V picture.

EQUIPMENT AND COMPONENTS

- Black and white T.V. receiver
- Pattern generator
- Screw driver

SEQUENCE OF OPERATION

- Apply signal from pattern generator to input of T. V. receiver.
- Switch "ON" T.V. receiver.
- Adjust proper range (range III for V.H.F).
- Select proper channel.
- Fine tunning of channel.
- Adjust proper brightness of picture.
- Adjust proper contrast of picture.
- Adjust vertical linearity.
- Adjust height control.
- Adjust vertical hold.
- Adjust horizontal hold.
- Adjust width control.
- Adjust volume control for proper sound.




EQUIPMENT AND COMPONENTS

- Black and white TV receiver
- Circuit diagram same of T.V. receiver

SEQUENCE OF OPERATION

Locate following stages of Black and white T.V. receiver:-

- Tuner unit
- Picture IF amplifier
- Video amplifier
- A.G.C. stage
- Sync separator
- Vertical section
- Horizontal oscillator and horizontal output stage
- Sound section
- Power supply

EQUIPMENT AND COMPONENTS

- Solder wire
- Solder flux
- Tool kit
- Solder
- Tuner unit(if necessary)
- T. V. set

SEQUENCE OF OPERATION

- Remove knobs of channel selector and fine tuning if necessary.
- Remove secrews of tuner unit.
- Take tuner unit out of chassi.
- Check wiring connections of tuner belongs to main chassi (Note connection of wiring if necessary).
- Replace tuner unit if necessary.
- Connect wiring of tuner unit.
- Mount tuner unit properly.
- Check the function of T. V. receiver.

EQUIPMENT AND COMPONENTS

- T. V. receiver
- Tool kit
- Solder wire
- Solder flux
- Soldering iron
- Solder sucker
- Vertical output and line transformer if necessary

SEQUENCE OF OPERATION

- Note wiring connection of vertical and line transfomer before desoldering.
- Desolder connections with solder properly.
- Take vertical and line transformers out from the chassi carefully.
- Replace vertical and line transformers if necessary.
- Mount vertical and line transformer properly.
- Check connection of wiring and solder properly.
- Check the function of T.V receiver.

EQUIPMENT AND COMPONENTS

- Solder wire
- Solder flux
- Tool kit
- Solder
- Black and white TV set
- Solder iron
- Picture tube if necessary

SEQUENCE OF OPERATION

- Demount front panel and tuner unit.
- Remove E.HT lead from anode of picture tube.
- Remove base socket and yoke coil of picture tube.
- Remove earth connection of picture tube from chassi.
- Take chassi out from cabinet.
- Take picture tube out from cabinet.
- If replacement of picture tube is consider remove metal frame from tube.
- Mount picture tube and all other parts in the opposite sequence like mention above.
- Check adjustment of pin cushion and centering magnet and make correction if necessary.

EQUIPMENT AND COMPONENTS

- Volt-meter
- Ampere meter
- Solder wire
- Solder flux
- Circuit diagram
- Tool kit
- Soldering iron
- Solder
- Black and white TV set

SEQUENCE OF OPERATION

- Measure component voltage and current on transistor, valves and IC`s according to given values in circuit diagram of following stages:-

  - Picture IF amplifier.
  - Video amplifier.
  - Video demodulator.
  - A. G. C stage.
  - Synic separator
  - Vertical section.
  - Horizontal oscillator.
  - Sound section.
  - Power supply.

EQUIPMENT AND COMPONENTS

- Black and white T.V set - Tool kit
- Oscilloscope
- Circuit diagram

SEQUENCE OF OPERATION

- Measure and compare pulse of following stages as indicated in circuit diagram:-
  - Video stage.
  - Synic separator.
  - Vertical stage
  - Horizontal stage.

EQUIPMENT AND COMPONENTS

- Colour T.V receiver
- Colour pattern generator
- Screw driver

SEQUENCE OF OPERATION

- Apply signal from colour pattern generator to input of T.V receiver.
- Switch "ON" T.V receiver.
- Adjust proper range(range III for V.H.F).
- Select proper channel.
- Fine tunning of channel.
- Adjust proper brightness of picture.
- Adjust proper contrast of picture.
- Adjust colour saturation control properly.
- Adjust vertical linearity.
- Adjust height control.
- Adjust vertical hold.
- Adjust horizontal hold.
- Adjust width control.
- Adjust red gun drive control.
- Adjust blue gun drive control.
- Adjust green gun drive control.
- Adjust volume control for proper sound.

EQUIPMENT AND COMPONENTS

- Complete colour T.V. receiver
- Circuit diagram of same T.V receiver.

SEQUENCE OF OPERATION

- Locate following stages of colour T.V. receiver:-
  - Tunner unit
  - Picture IF amplifier
  - Sound section
  - Video stage
  - Chrominance amplifier
  - Pal-delay line
  - Adder stage
  - U/V demodulator
  - Matrix and amplifier stage
  - Burst amplifier
  - Sub carrier oscillator
  - Pal switch
  - Colour killer circuit
  - Sync separator
  - Vertical section
  - Horizontal oscillator and horizontal Output stage.
  - Power supply

## EQUIPMENT AND COMPONENTS

- T.V. receiver
- Line transformer if necessary
- Solder wire
- Solder flux
- Tool kit
- Soldering iron
- Solder sucker

## SEQUENCE OF OPERATION

- Notewiring connection of line transformer.
- Discharge EHT lead.
- Desolder connection with solder sucker properly.
- Take line transformer oil from chassi carefully.
- Replace line transformer if necessary.
- Mount line transformer properly.
- Check connection of wiring and solder properly.
- Check function of T.V. receiver.

EQUIPMENT AND COMPONENTS

- Colour T. V. set
- Ampere meter
- Solder flux
- Tool kit
- Solder sucker
- Volt-meter
- Solder wire
- Circuit diagram
- Solder iron

SEQUENCE OF OPERATION

- Measure component voltage and current on transistor, value and IC's according to given values in circuit diagram of following stages:-
  - Picture IF amplifier
  - Sound section
  - Video stage
  - Chrominance amplifier
  - Pal delay line
  - Adder stage
  - U/V demodulator
  - Matrix and amplifier stage
  - Burst amplifier
  - Sub carrier oscillator
  - Colour killer circuit
  - Synic separator
  - Vertical section
  - Horizontal oscillator
  - Power supply