



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**ADVANCED COMMUNICATION ENGINEERING LAB**

**STANDARD OPERATING PROCEDURE**

Name of the Lab./facility	ADVANCED COMMUNICATION LAB
Purpose	To provide training to the students to operate on the different microwave components and measure the necessary parameters
Scope	This experiments in the Microwave Lab enable the students to gather complete knowledge on the various microwave components and their operation
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

**STANDARD OPERATING PROCEDURE FOR REFLEX KLYSTRON**

- ✓ Set the variable attenuator at **minimum position**.
- ✓ Keep the control knobs of **klystron power supply** as below.
- ✓ Beam voltage switch : **OFF**
  - ✓ Mod switch : **AM**
- ✓ Beam voltage knob : **Fully anticlockwise**
  - Reflector voltage : **Fully clockwise**
  - AM-Amplitude: **Around fully clockwise**
  - Am-Frequency : **Around mid position**
- ✓ The klystron power supply is now ready to use.
- ✓ Experimental procedure to be followed as given in the manual.
- ✓ Upon completion of experiment the klystron power supply shall be turned off first, followed by turning off of the mains power supply.

**PRECAUTIONS TO BE FOLLOWED**

- ✓ During operation of Klystron, repeller does not carry any current and as such it may severely be damaged by electron bombardment. To protect repeller from such damage, the repeller negative voltage is always applied before anode voltage.
- ✓ The repeller voltage should be varied in one direction to avoid hysteresis in klystrons.
- ✓ The heater voltage should be applied first and cooling should be provided. After some time other voltages should be applied taking precaution.
- ✓ While measuring power, the frequency meter should be detuned each time because there is a dip in the output power when the frequency is tuned.
- ✓ To avoid loading of the klystron an isolator/attenuation should invariably be used between klystron and the rest of the set-up.

  
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**STANDARD OPERATING PROCEDURE FOR GUNN DIODE**

- ✓ Set the variable attenuator at **min position**.
- ✓ Keep the control knobs as **GUNN power supply** as below:
  - ✓ Meter switch : **Off**
  - ✓ The GUNN power supply is now ready to use.
  - ✓ Experimental procedure to be followed as given in the manual.
  - ✓ Upon completion of experiment the klystron power supply shall be turned off first, followed by turning off of the mains power supply.
  - ✓ Gunn bias knob : **Fully anti clock wise**
  - Pin bias knob : **Fully anti clock wise**
  - Pin mode frequency: **Any position**

**PRECAUTIONS TO BE FOLLOWED**

- ✓ Do not keep Gunn bias knob position at threshold position for more than seconds. Reading should be obtained as fast as possible. Otherwise due to excessive heating, Gunn diode may burn.

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**STANDARD OPERATING PROCEDURE**


Name of the Lab./facility	ADVANCED COMMUNICATION LAB
Purpose	To educate the students in using the different devices used in the RF, Microwave and Optical Communication Lab by way of doing the experiments and instill in them the common procedures to be followed in conducting the experiments
Scope	Procedure for usage of CRO while conducting experiments in the RF, Microwave and Optical Communication Lab
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

**STANDARD OPERATING PROCEDURE FOR CRO**

- ✓ **Switch on** the oscilloscope to warm up (it takes a minute or two).
- ✓ Do **not** connect the input lead at this stage.
- ✓ Set the **AC/GND/DC** switch (by the Y INPUT) to **DC**.
- ✓ Set the **SWP/X-Y** switch to **SWP** (sweep).
- ✓ Set **Trigger Level** to **AUTO**.
- ✓ Set **Trigger Source** to **INT** (internal, the y input).
- ✓ Set the **Y AMPLIFIER** to **5V/cm** (a moderate value).
- ✓ Set the **TIMEBASE** to **10ms/cm** (a moderate speed).
- ✓ Turn the time base **VARIABLE** control to **1** or **CAL**.
- ✓ Adjust **Y SHIFT** (up/down) and **X SHIFT** (left/right) to give a **trace across the middle of the screen**, like the picture.
- ✓ Adjust **INTENSITY** (brightness) and **FOCUS** to give a bright, sharp trace.
- ✓ The oscilloscope is now ready to use.
- ✓ Experimental procedure to be followed as given in the manual.
- ✓ Upon completion of experiment the CRO shall be turned off first, followed by turning off of the mains power supply.

**PRECAUTIONS TO BE FOLLOWED**

- ✓ Short circuit of the battery terminals or any source terminals has to be avoided.
- ✓ Make all measurements in the centre area of the screen; even if the CRT is flat, there is a chance of reading errors caused by distortion.
- ✓ Use only shielded probes. Never allow your fingers to slip down to the metal probe tip when the probe is in contact with a hot circuit.
- ✓ Avoid operating an oscilloscope in a strong magnetic field. Such fields can causes distortion of the display. Most quality oscilloscopes are well shielded against magnetic interference. However, the face of the CRT is exposed and is subjected to magnetic interference.
- ✓ Most oscilloscopes and their probes have some maximum input voltage specified in the instruction manual. Do not exceed this maximum value. Also, do not exceed the maximum line voltage or use a different power

  
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**STANDARD OPERATING PROCEDURE**

Name of the Lab./facility	RF, Microwave and Optical Communication Lab
Purpose	To educate the students in using the different devices used in the RF, Microwave and Optical Communication Lab by way of doing the experiments and instill in them the common procedures to be followed in conducting the experiments
Scope	Procedure for usage of DSO while conducting experiments in the RF, Microwave and Optical Communication Lab
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

**STANDARD OPERATING PROCEDURE FOR DSO**

- ✓ **Switch on** the oscilloscope to warm up (it takes a minute or two).
- ✓ Do **not** connect the input lead at this stage.
- ✓ Trig volt level at limit : When turning the trigger knob, Alerts the user that the trigger level reached its limit.
- ✓ Horizon position at limit When turning the horizontal position knob , alerts user that the horizontal position reached its limit
- ✓ Volts/Div at limit Alerts the user that the vertical volt/Div knob was adjusted to the min (2mV/div) or maximum ( 5V/div ) value
- ✓ Volts position at limit When turning the vertical position knob , alerts user that the vertical knob reached its limit.
- ✓ Sec/Div at limit : prompts the user that the Volts/Div is at full range while turning the vertical scale knob.
- ✓ A function isn't useable : Function not supported in this mode. (Example: Reference mode is not available in YX format)
- ✓ No signal! : The system could not detect a suitable signal ( used in the auto set )
- ✓ Adjust at limit: You could adjust the pulse width with the ADJUST knob until the pulse width has reached the min of 20.0ns or max 10.0s limit.
- ✓ Adjust **INTENSITY** (brightness) and **FOCUS** to give a bright, sharp trace.
- ✓ The DSO is now ready to use. Experimental procedure to be followed as given in the manual.
- ✓ Upon completion of experiment the DSO shall be turned off first, followed by turning off of mains power supply.

**PRECAUTIONS TO BE FOLLOWED**

- ✓ Short circuit of the battery terminals or any source terminals has to be avoided.
- ✓ DO not store or leave the instrument where the LCD display will be exposed to direct sunlight for long periods of time.

  
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