Instruction Manual

for

Baising Of Transistor for Class 'A' operation

ME- 623

The instrument comprises of the following builtin parts:-

1. One DC Regulated Power Supply of 0-15V DC.

2. One DC moving coil Voltmeter of 0-15V DC range.

3. 3 different values of RL & RE selectable using band switches provided on the front panel.

4. Circuit diagram is engraved & connections are brought out at terminals.

Theory

We are using the most commonly used biasing called voltage divider-bias. The name voltage divider comes from the voltage divider formed by R_{B1} and R_{B2}. The voltage across R_{B1} forward biases the emitter diode. The Vee supply reverse biases the collector diode.

Biasing means the establishment of suitable D.C. values of the different currents and voltages of a transistor by connecting it to external batteries via suitable circuits.

All operating points between cut off and saturation are the active region of a transistor. In the active region, the emitter diode is forward-biased and the collector diode is reverse biased. If throughout the A.C. cycle the transistor remains in active region, then it is said to be in class A operation. In terms of the A.C. load line, class-A operation means that no. clipping occurs at either end of the A.C. load line.

In a class-A operation, the best place to locate the Q-point is in the centre of the A.C. load line. In this case we get to largest possible unclipped output signal.

Procedure

1. **Connect Audio Frequency Function Generator at the input points. Also connect CRO at the output terminals.**

2. **Connect 15V DC voltmeter to the Power supply.**

3. **Switch on the instrument by using toggle switch provided on the front panel.**

4. Adjust the Bias voltage to 15V DC & also adjust the Sine Wave Input Signal from the Function Generator to 50mV by using fine & course controls of the function generator.

5. Adjust R_E at 3KOhm & R_L at 25KOhm for class 'A' operation.

6. Check the output on the CRO.

Calculations

$V_{CE} = V_{CC} - I_C (R_C + R_E)$
When $I_C = 0$, $V_{CE} = V_{CC} = 15$ Volts

when the transistor operated in the saturation region, it appears shorted & all the supply voltage appears across the series connections of R_C & R_E

$I_C(Sat) = V_{CC} / R_C + R_E = 15/28 = .535$ mA

Voltage Across R2 (4.7K) base register is .72 V. For silicon Transistor $V_{BC} = 0.7$ Volts.
So the potential across emitter of transistor $R_C = .72 - .7 = .02$ V.

$I_E = .02/3K = 6.6$uA
Because β is close to unity. Therefore $I_E = I_C = 6.6$ uA
The collector emitter voltage is $V_{CE} = V_{CC} - I_C (R_C + R_E)$

15-6.6(1/1000000) (28000) = 14.81V
So the co-ordinates of Q points are (14.81, 6.6 uA)

Repeat the experiment for different values of $R_{\_}$ & R_E