Experiment # 09

PULSE POSITION MODULATION (PPM)

1. **OBJECT**:

   Study the Pulse Position Modulation and Demodulation schemes using Scientech kit model ST-2110.

2. **APPARATUS:**

   1) Scientech PPM kit model ST-2110.

   2) 20 MHz dual trace CRO.

   3) Sine wave oscillator.

3. **Brief Theory :**

In Pulse-Position modulation (PPM), the position of a pulse relative to its unmodulated time of occurrence is varied in accordance with the message signal.

Amplitude and width of the pulses is kept constant in this system, while the position of each pulses, in relation to the position of a recurrent reference pulse is varied by each instantaneous sampled value of the modulating wave. Pulse-Position Modulation has the advantage of requiring constant transmitter power output, but the disadvantages of depending on transmitter receiver is synchronization.

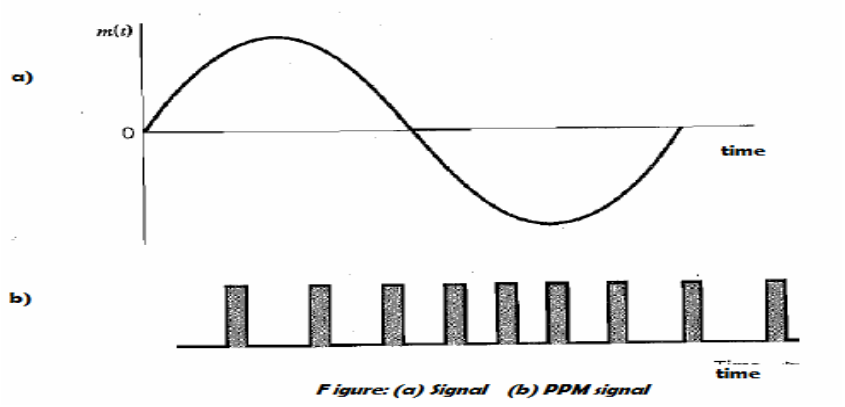
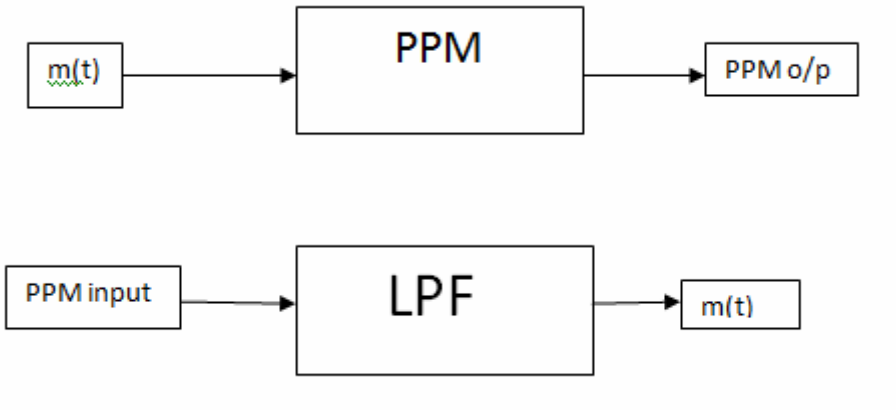


Figure: (a) Signal (b) PPM signal

4.Experiment Setup:



Where m(t) is a message signal (2KHz/1v $_{p-p}$)……

5. OBSERVATIONS:

a) FOR PULSE POSITION MODULATION:

A train of pulses p(t), used as carrier, is internally connected to the modulator and can be viewed on CRO at the PPM output socket (t_{p-7}), keeping message input socket (t_{p-6}) not connected with any signal.

1. Amplitude of the carrier p(t) = …… Volts $_{p-p}$

2. Time period of the carrier p(t) T= ……. ms, PRR = -------- KHz

3. Width τ =…….

4. Duty cycle D= T/ τ = ……. %

The position of the carrier pulses p(t) can be modulated by connecting a sinusoidal signal of variable amplitude & variable frequency to the message input socket (t_{p-6}) of the modulator.

Adjust the amplitude (A_m) and frequency (f_m) of the message signal m(t) to get a clear pulse position modulation pattern on the CRO screen and record the settling of m(t) at this moment .

That is ,,,,,,, Amplitude of m(t) A_m =……V_{p-p}

Frequency of m(t) f_m=……..KHz

b) FOR DEMODULATION OF PPM:

After making above experimental-setup, when a clear PPM signal appears on the CRO screen, connect this signal to the input of the LPF at (t_{p-11}) and observe the output of the LPF at (t_{p-12}) on CRO. It will be the message signal which was transmitted by PPM process .

To verify it, record its parameters:-

1. Amplitude of received signal=……..

2. Frequency of the received signal=……

3. Waveshape of received signal= sinusoidal

This verifies that the message input m(t) can be recovered for the PPM signal by passing it through a LPF .

6.Comments on your observation and results

REFERENCE: - Work-book of the kit (ST-2110)

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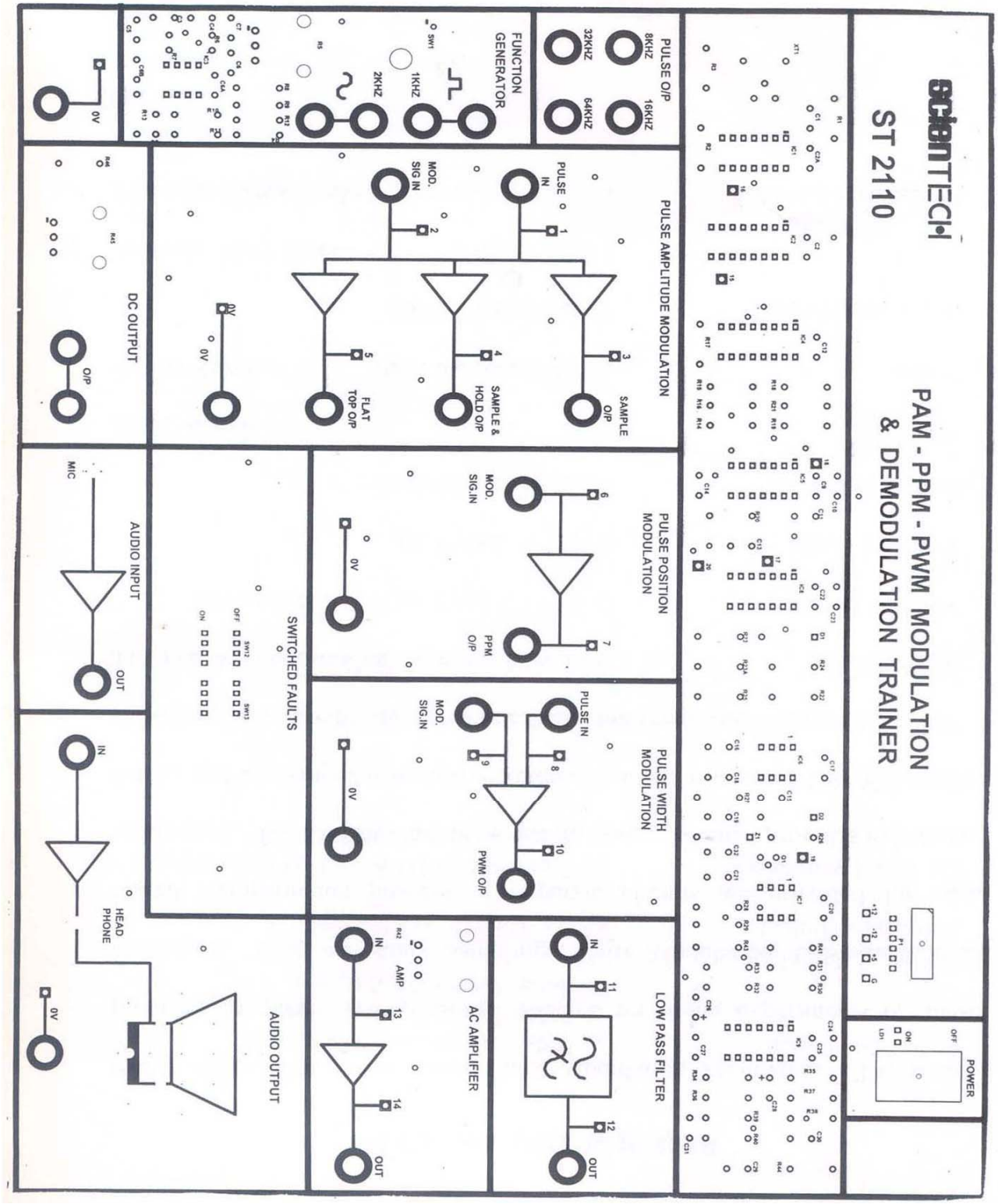
scientech
ST 2110
PAM - PPM - PWM MODULATION
& DEMODULATION TRAINER
POWER
OFF
ON
PULSE O/P
8KHZ
16KHZ
32KHZ
64KHZ
FUNCTION GENERATOR
1KHZ
2KHZ
0V
PULSE AMPLITUDE MODULATION
PULSE IN
MOD. SIG IN
SAMPLE O/P
SAMPLE & HOLD O/P
FLAT TOP O/P
DC OUTPUT
O/P
PULSE POSITION MODULATION
MOD. SIG.IN
PPM O/P
PULSE WIDTH MODULATION
PULSE IN
MOD. SIG.IN
PWM O/P
LOW PASS FILTER
IN
OUT
AC AMPLIFIER
AMP
AUDIO INPUT
MIC
SWITCHED FAULTS
AUDIO OUTPUT
HEAD PHONE