Experiment 10

Aim- To Study of Pulse Position Modulation

Equipment Link A kit, 20 MHz Oscilloscope

1 meter Fiber cable

Power supply

THEORY:

MODULATION:

The position of the TTL pulse is changed on time scale according to the variation of input modulating signal amplitude.

Now pulse width modulated signal is fed as input to this circuit. Please note that input modulating signal must be converted into pulse width modulated form before applying to pulse modulator. As the signal is PWM, naturally, according to the input signal, the pulse duration is changing and this change in pulse duration causes the delay in triggering. The input is given to trailing edge trigger input of monoshot. So finally we get the pulses at the output, which are shifted on the time slot. This is nothing but pulse position modulation.

The Pulse Positions are directly proportional to the instantaneous values of modulating signal.

DEMODULATION:

The pulse position modulated signal is ORed with pulse generated by the rising edge of pulse width modulated signal. The o/p of the OR gate is fed to clk l/p of flip-flop. Thus flip-flop acts as a bistable multivibrator giving out high o/p for the duration between rising edge of PWM signal & PPM signal. Since PPM corresponds to the end of PWM pulse, o/p of flip-flop is exactly same as that of PWM signal. This signal is then demodulated using the same technique of PWM demodulation as described in previous experiment.

PROCEDURE:

1. Slightly unscrew the cap of SFH 756V (660 nm). Do not remove the cap from the connector. Once the cap is loosened, insert the fiber into the cap. Now tight the cap by screwing it back.
2. Make the connections and jumper settings as shown in FIG. 8.1 Connect the power supply cables with proper polarity to kit. While connecting this, ensure that the power supply is OFF.
3. Connect SINE post of the Function Generator section to PPM IN post of PWM/PPM Modulator Section.
4. Keep the Function Generator in sine wave mode & select the frequency 1- 10Hz with amplitude

of 2V p-p (Max) for proper observation of phenomena. Connect PPM OUT post of PWM/PPM Modulator section to IN post of Digital Buffer Section.

5. Switch on the power supply.
6. Observe PPM signal at PPM OUT post by connecting I ST Channel of CRO at PPM OUT post. Refer FIG. 8.2c. Variation in width of square wave is seen clear by connecting II ND Channel of CRO at PWM OUT post. If the frequency is high i.e. frequency is 1 KHz having Level 2Vp-p then due to persistence of vision, only blurt band in the waveform will be observed. If the Function generator is OFF, only square wave of fundamental frequency and fixed ON time will be observed and no width position variations are present.
7. Connect OUT post of the Digital Buffer Section to TX IN post of TRANSMITTER.
8. Connect the other end of the fiber to detector SFH551V (Digital Detector) very carefully as per the instructions in step 1.
9. Observe the received signal over fiber at TTL OUT Post. It should be exactly similar to the signal available at PPM OUT post.
10. Connect this TTL OUT post to PPM DEMOD IN Post in PWM / PPM Demodulator Section.
11. Vary input freq. (not more than 3 KHz) & observe demodulated signal at DEMOD OUT post (FIG. 8.2d).
12. Connect DEMOD OUT post to FILTER IN post & observe output at FILTER OUT post (FIG. 8.2e), which is same as Input signal (FIG. 8.2a).
13. For Different Sampling frequencies change the jumper cap of JP1 from 32 KHz to the desired value of frequency.
14. Repeat the above all procedures for SFH450V.

Result :

Conclusion :

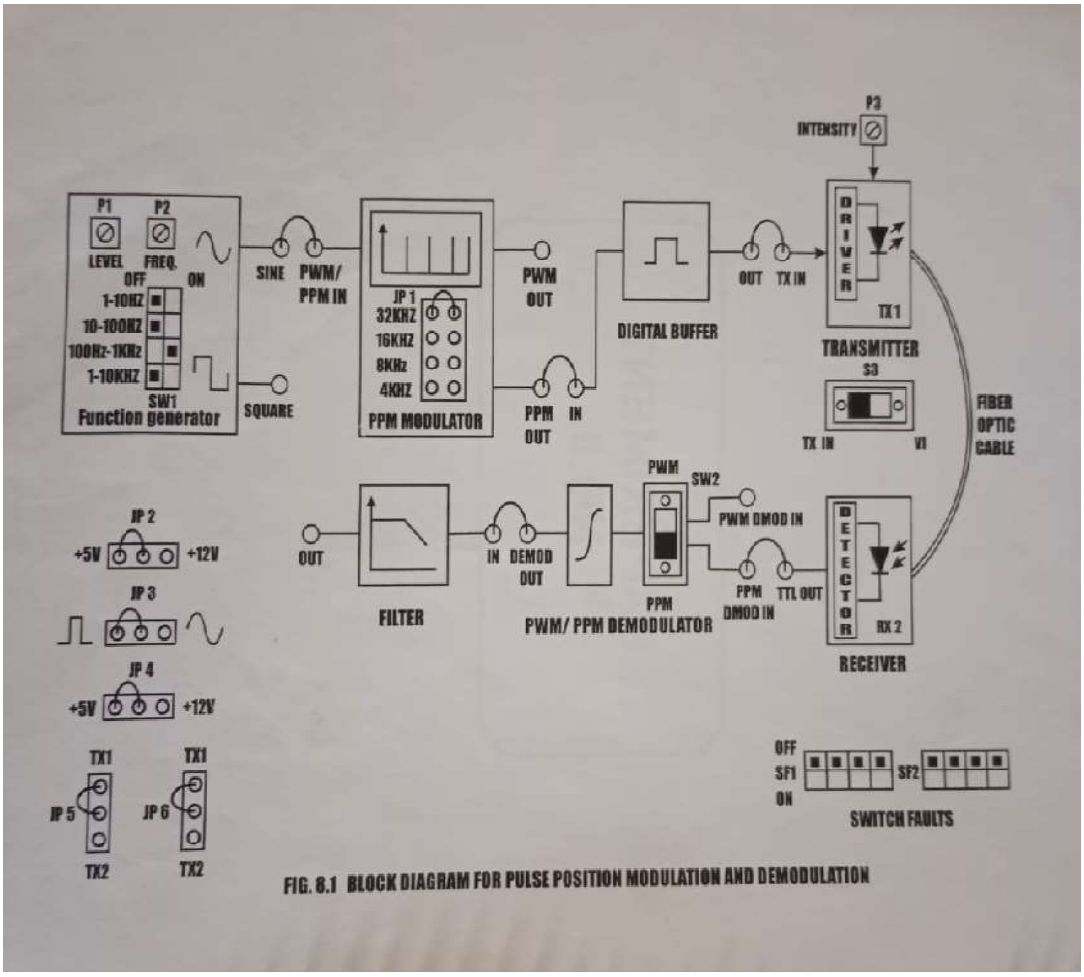

FIG. 8.1 BLOCK DIAGRAM FOR PULSE POSITION MODULATION AND DEMODULATION