4. CONCLUSION AND SUGGESTIONS FOR FURTHER WORK

4.1 Conclusions

1) By employing these recording method and techniques the apparatus can be used as a plotting device which can substitute the galvanometer-type plotting devices for multi-channel recorder. The advantages of this method are firstly its capability of recording multi-channel input signal on the full chart width and secondly the number of channels can easily be changed as required.

2) Error existing in the final results depends largely on poor input and output voltage tracking and low input impedance of the buffer amplifier, the output terminal of which served as a positive return of the grid voltage supply unit.

3) Some of the circuits employed in the apparatus is found to be unnecessarily complicated and can be simplified by circuit rearrangement, for example, by using paper-edge sensing circuit (see section 4.2-2)

4) Application of this recording method should be limited by accuracy of the voltage comparator circuit. Another factor is the speed limit of the belt which depends largely on mechanical construction of the belt driving unit and its vibrational characteristics. It is thought that application in the low recording speed range should not raise any problem.

4.2 Suggestions for Further Work

1) As previously discussed, some of the error is produced by the transverse movement of paper and the vibration of belt. The effects of which can be minimized by using Paper-edge-sensing circuit. Operation of this circuit is described below.

An electrode is placed under the paper, it is located such that the writing arm of the stylus touches the electrode just before the stylus sweeps into the paper. At the moment stylus writing arm touches the electrode, and the other arm touches the stylus trolley, potential of the electrode is as the same as the bias voltage of the stylus trolley. As the stylus sweeps, writing arm is separated from the electrode by the edge of paper resulting in voltage drop of the electrode. This voltage drop is served as a keying pulse for triggering the ramp-function generator. It is obvious that the effect of papar transverse displacement will be compensated by this method. Furthermore, the effect of wear of the stylus marking end will be improved as well.

2) A higher frequency repetition wave form may be recorded by using sampling technique. As a result, the x-time base scale can be enlarged even though the actual operating chart speed is low. The high frequency response of the recorder depends largely on the frequency response of the voltage comparator circuit.

3) Application of this recording method to a very low recording speed recorder, for example a 24 hour or 7 day circular chart may be accomplished by the following modification;

a) The stylus driving unit should be replaced by a receiprocating stylus rack assembly and an automatic reversible rotating pinion driven by a motor. The object of which is to eliminate belt slip, enable the use of direct coupled

of a high accuracy potentiometer to the stylus driving mechanisms. This potentiometer is employed as an ultralinear low frequency ramp-function generator with very low output voltage level shift. Furthermore, the light triggering circuit as well as the monostable circuit for sweep width control are no longer required with this arrangement.

b) The output from voltage comparator amplifier may be fed to a coil of a reed relay which its contact position change during comparison. Operation of the reed relay contact is then served as a pilot switching signal for the marking pulse. Furthermore, it is possible to compare both forward and reversed stylus sweep resulting in improving of trace sharpness or trace resolution.