CHAPTER 7

Design a 20 Mc/s

In this chapter, the circuit adopted fo harmonic of 20 Mc/s frequency from a 2 Mc/s in described. The design that has been described connection with generation of 2 Mc/s harmonic f frequency of 200 Kc/s, had to be changed for

(a) driver pulses of much shorter durat than 0.05 μ sec (see footnote on page 86) ar

(b) the impedance of a tank circuit at less compared to that at 2 Mc/s, so the harmon to become small;

(c) the task of the limiter (which remo decay in amplitude) is more difficult because limiter is small and because shorter grid-circ are necessary.

The circuit presented utilises a crysta short drive-pulses. This has made the design more economical. The performance as realised, with this simplified drive is comparable to th generator.

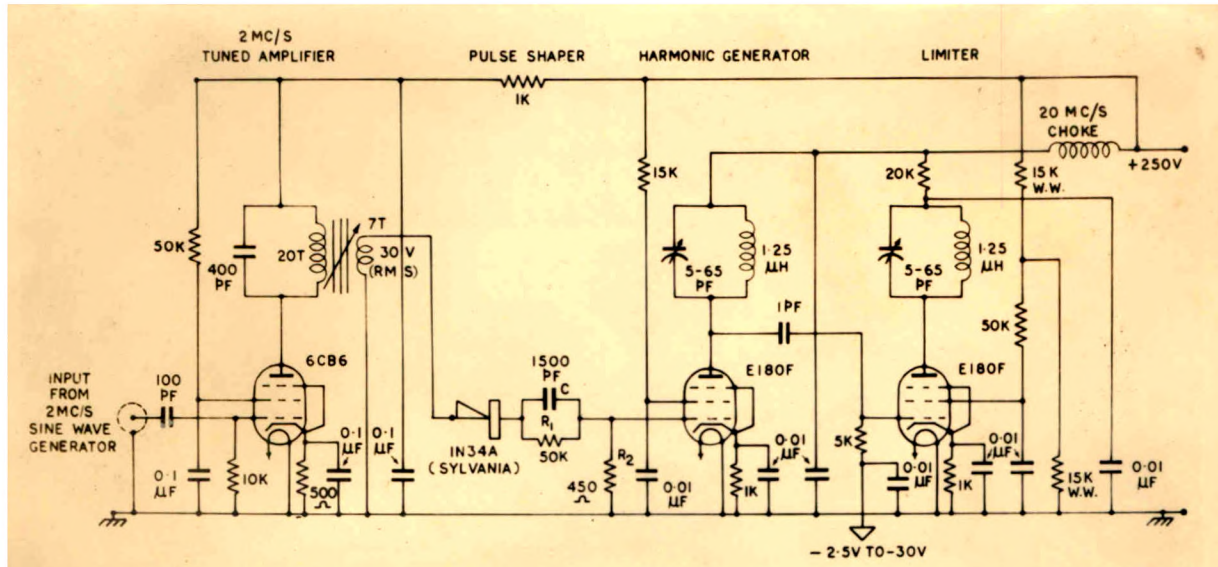


FIG. 7.1 SCHEMATIC DIAGRAM OF 20 MC/S HARMONIC GENERATOR

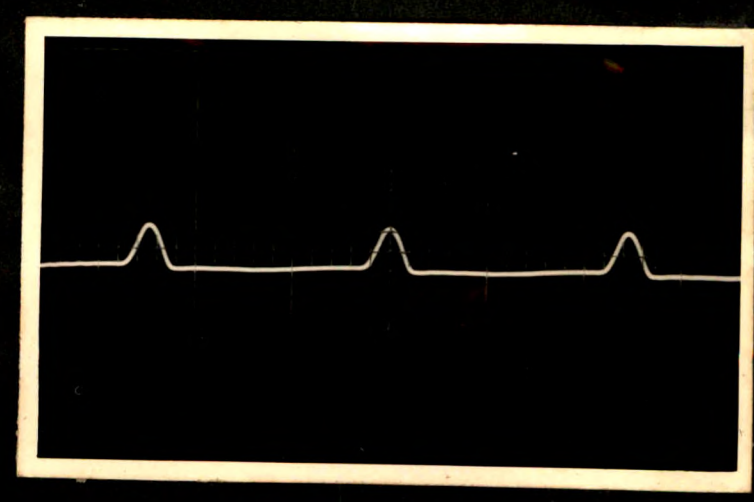


Fig.7.2 Oscillogram of the driver pulse at the control-grid of E180F multiplier. Time scale is 0.2 μ sec/cm.

7.1 Experimental Details

The complete diagram of the 20 Mc/s harmonic ge is shown in Fig. 7.1. It consists of a 2 Mc/s driver harmonic generator and a limiter.

The pulse shaper is based on the fact that the current flow in a condenser-input-type rectifier circu small fraction of the a.c. period. Simpler in constru circuit proved to be advantageous in short pulse (cf. generation compared to the Schmitt-trigger-differentia tion, utilised at lower frequencies.

The performance of this circuit has been studie with various values of R_1. Table 7.1 presents the a duration of the pulse across R_2.

Table 7.1

Value of R_1 in the bias network (C = 1500 pF, R_2 = 450 Ω)	Specifications of the resulting at the grid of the multipl	
	Amplitude (Volts)	D (
10 K	10.5	
20 K	7.75	
30 K	6.25	
50 K	5.00	
75 K	4.00	

+ Each measurement was made with the amplifier output, loaded secondary winding, adjusted to 30-volts (RMS)

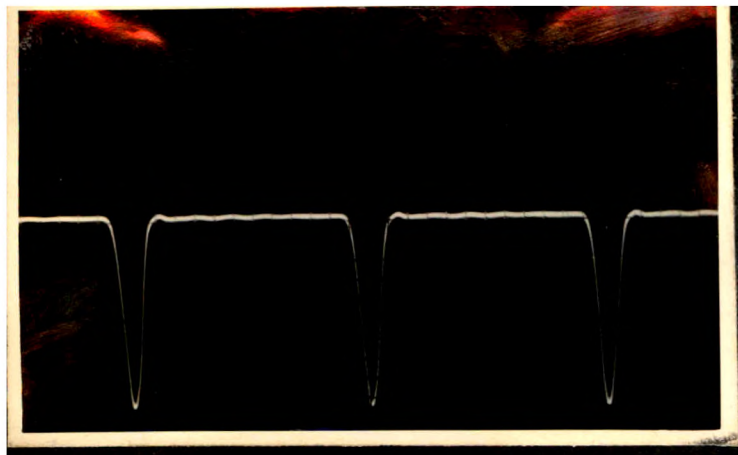
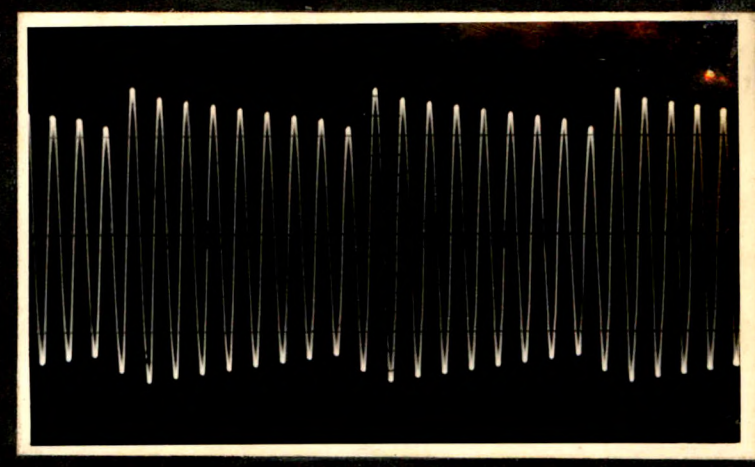
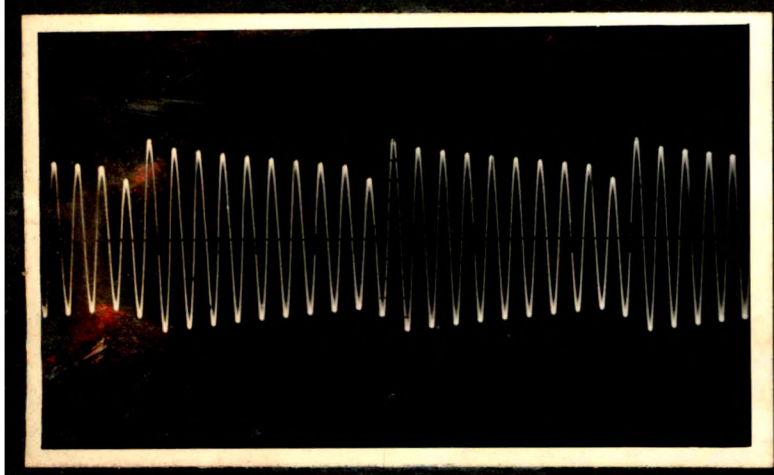


Fig.7.3 Oscillogram of the plate current pulse waveform at the anode of E180F multiplier. Time scale is 0.2 μ sec/cm.

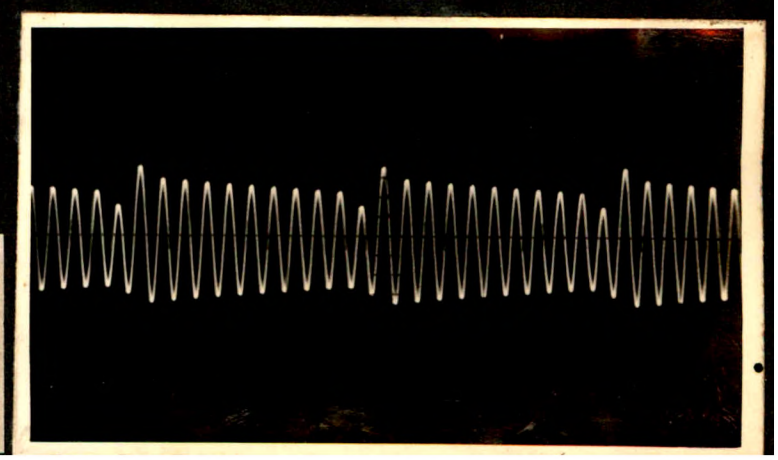
(a)





(b)

(c)

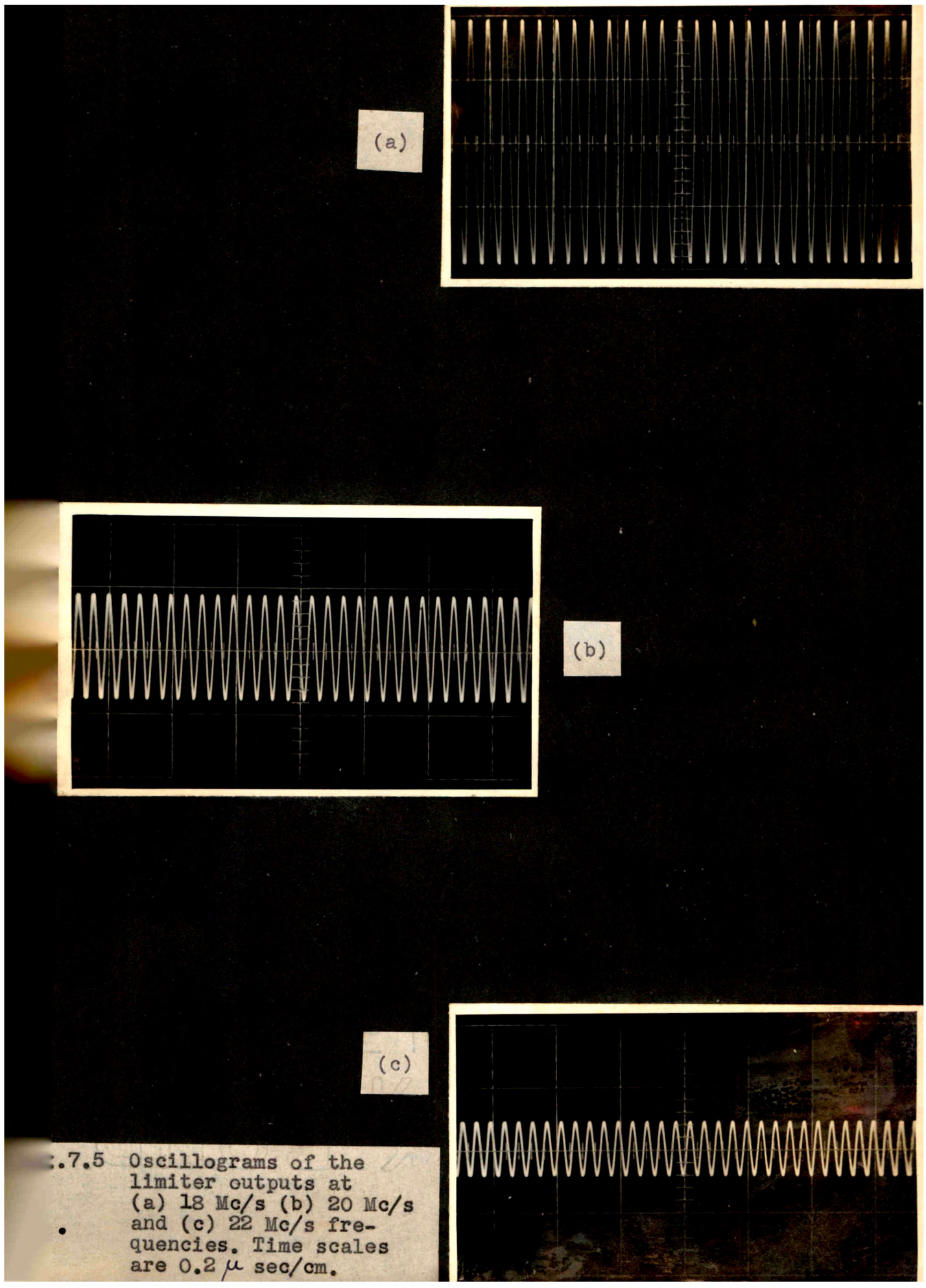


g.7.4 Oscillograms of the multiplier outputs at (a) 18 Mc/s, (b) 20 Mc/s and (c) 22 Mc/s harmonic frequencies. Time scales are 0.2 μ sec/cm.

It will be seen that as R_1 increases both the d
and amplitude diminishes. C_1, so long as it is sufficie
(> 1000 pF) affects the amplitude but little, while inc
R_2 increases amplitude. However, R_2 can not be incre
nitely, as the pulse width obtained at the grid of the h
generator tube E180F, will then increase. Optimum valu
20 Mc/s generator was found experimentally to be 450 ohm

E180F tube has a transconductance of 16 mA/V and
necessary in the multiplier position. It increases the
current in the harmonic generator. The waveshape of the
output current is observed to be almost Isosceles Triang
Fig. 7.3). The performance of the tube E180F as a mul
illustrated by the oscillograms of Fig. 7.4.

Removal of modulation in amplitude is also more s
with this tube at the limiter and a greater output (comp
6AH6) is obtained. To minimise damping on the harmonic-
tank circuit and to reduce the time-constant at the limi
very small coupling capacity, e.g., 1 pF, has been found
This reduces the limiter-grid drive, so that a lower scr
at the limiter becomes necessary for improved limiting ac
performance of the system can be judged from the output
7.5) obtained. It is 48 volts at 18 Mc/s, 38 volts at 2
26 volts at 22 Mc/s.



.7.5 Oscillograms of the limiter outputs at (a) 18 Mc/s (b) 20 Mc/s and (c) 22 Mc/s frequencies. Time scales are 0.2 μ sec/cm.