CITY AND GUILDS OF LONDON INSTITUTE

PAPER NUMBER	EXAMINATION	
765 – 1 – 01 / 02	RADIO AMATEURS' EXAMINATION	Thursday 10 May 1973
SERIES	PAPER	6.30 to 9.30 pm 3 hours
MAY – JUNE 1973	WRITTEN	

YOU SHOULD HAVE THE FOLLOWING FOR THIS EXAMINATION

one answer book
'Castle's Logs'

This examination is divided into two parts; failure in either part will carry with it failure in the examination as a whole.

The maximum mark for each question is shown.

Answer EIGHT of the following ten questions as follows: BOTH questions in PART I (which are compulsory) and SIX questions in PART II.

PART I – Answer BOTH questions in this part

1. (a) What are the restrictions on the type of book to be used as a logbook for recording the operation of an amateur radio station?
   (b) (i) State the entries to be made in the log.
   (ii) State the method of making and timing entries.
   (c) Under what conditions may persons other than the licensee operate the station? (15 marks)

2. (a) What factors should be taken into account in the construction of a variable frequency oscillator to ensure a satisfactory degree of frequency stability?
   (b) With the aid of a circuit diagram describe a typical variable frequency oscillator and explain carefully how each of the factors you have mentioned in (a) has been dealt with. (15 marks)

PART II – Answer SIX questions in this part

3. (a) With the aid of a sketch describe the construction of a tuning coil suitable for use in a variable frequency oscillator operating from 1·8 MHz to 2 MHz.
   (b) Why is a screening can normally placed around such a coil?
   (c) Describe briefly how this screen performs its function. (10 marks)

4. (a) State what is meant by 'phase difference' between voltage and current in an a.c. circuit.
   (b) What causes phase shift?
   (c) State TWO conditions of an a.c. circuit which result in current and voltage being in phase.
   (d) What is the impedance at 50 Hz of a series a.c. circuit consisting of a capacitor of 1·6 μF, an inductor of 3·2 H and having a resistance of 1000 Ω?
   NOTE. 3·2 π can be taken as 10. (10 marks)

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5. The block diagram opposite represents a double side band radiotelephony transmitter.
   (a) What is the function of the buffer amplifier stage?
   (b) (i) What amateur frequency bands are covered by this transmitter?
   (ii) Which position of switch SI corresponds to each band?
   (c) What is the function of switch SID?
   (d) What is the function of the low pass filter and what would be a suitable cut-off frequency?
   (e) What class of operation would be suitable for the modulator?
   (f) What class of operation would be most suitable for the power amplifier? (10 marks)

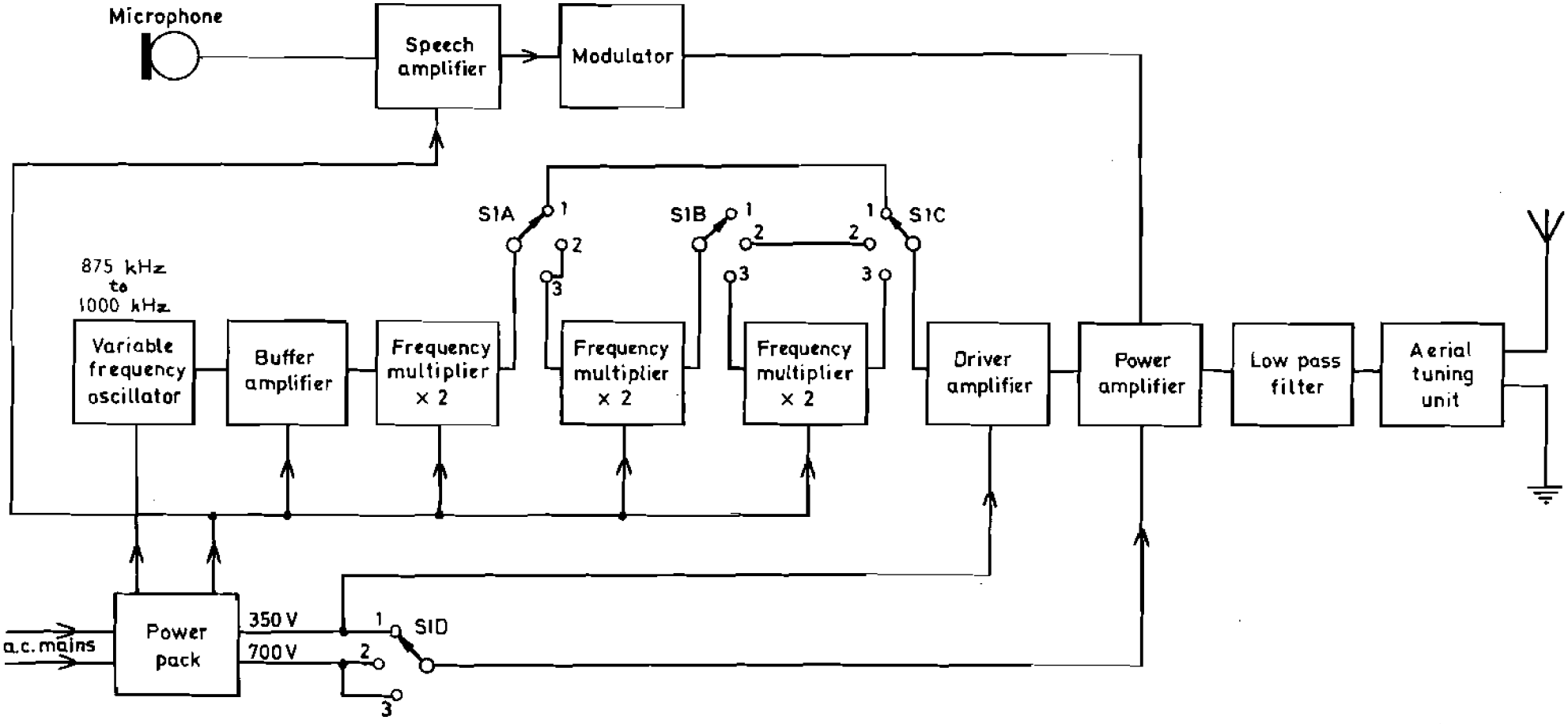
6. Describe with the aid of a circuit diagram the action of EITHER a transistor as an amplifier OR a thermionic valve as an amplifier. (10 marks)

7. (a) With the aid of a block diagram explain the principle of operation of a superheterodyne receiver.
   (b) What are the advantages and disadvantages of
   (i) a relatively high intermediate frequency?
   (ii) a relatively low intermediate frequency? (10 marks)

8. (a) What is meant by fading?
   (b) Describe TWO causes of fading. (10 marks)

9. Describe carefully the procedure to be followed when measuring the radiated frequency of an amateur transmission with the aid of a heterodyne wavemeter. (10 marks)

10. (a) Describe the construction of a transmission line suitable for use as an aerial feeder. State whether your example is intended for use as a balanced or unbalanced line.
   (b) What is meant by the 'characteristic impedance' of a transmission line? (10 marks)


Microphone
Speech amplifier
Modulator
S1A
S1B
S1C
875 kHz to 1000 kHz
Variable frequency oscillator
Buffer amplifier
Frequency multiplier × 2
Frequency multiplier × 2
Frequency multiplier × 2
Driver amplifier
Power amplifier
Low pass filter
Aerial tuning unit
a.c. mains
Power pack
350 V
700 V
S1D