

**BRITISH BROADCASTING CORPORATION
ENGINEERING TRAINING DEPARTMENT**

C ENGINEERING EXAMINATION NO. 91

Part II

December 1973

Communications

Answer FIVE questions

Full marks total 100

Time allowed: 3 hours

Each question is given a maximum of 20 marks. The marks allocated to each part are indicated in brackets. In descriptive questions marks are awarded for style and presentation of subject matter.

1. Sketch the BBC chrominance - luminance pulse and bar waveform and explain the need for the inclusion of each of its components. (8)
Briefly describe the advantages of the Pulse and Bar as a test waveform in comparison with other test signals. (6)
With the aid of diagrams describe how (a) 2T pulses and (b) chrominance-luminance pulses are generated. (6)
2. Describe the main characteristics of the following radio-link aerials:
(a) 4-ft parabolic reflector at 10 GHz,
(b) 2-ft parabolic reflector at 10 GHz,
(c) a horn aerial,
(d) a helical aerial. (10)
Discuss the operational uses of each aerial and the significance of polarisation. (10)
3. (a) Give a list of the units used in a colour Natlock system together with the signals required for each unit. (5)
Briefly describe how the Natlock system working in pure slavelock mode synchronises two colour video signals. (5)
(b) With reference to audio limiters and/or compressors explain briefly:
(1) the difference between limiting and compressing, (2)
(2) the meaning of the word threshold, (1)
(3) why a delay line is sometimes used, (3)
(4) how pulse width modulation can be used. (4)

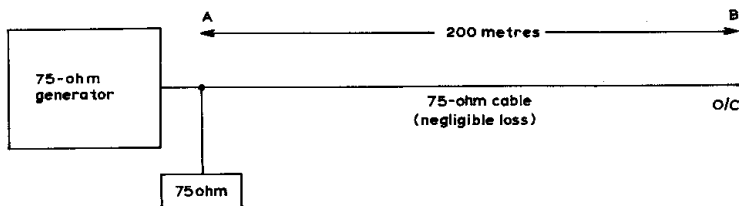


Figure 1



Figure 2

4. (a) The generator shown in Fig. 1 can feed the waveform shown in Fig. 2 into a 75-ohm termination. The cable has a velocity of propagation of 2×10^8 m/s. Draw a sketch of the waveform which appears at B when the circuit is connected as in Fig. 1. Mark in suitable scales. (10)
- (b) 1. Describe the effects heard by a listener to (a) stereo and (b) compatible mono when the two circuits carrying a stereo programme suffer unequal attenuations. (4)
2. A stereo O.B. site is connected to a studio centre by two lines having the same frequency/attenuation characteristic but having a difference in delay of 40 microseconds. Describe the effects heard by a listener with a mono receiver when the programme source material is (a) mono and (b) stereo. (6)

5. (a) A line has the following construction:

10 miles 10 lb U/L

20 miles 20 lb U/L

30 miles 40 lb Carrier Phantom

50 miles 40 lb 16 mH 1000 yads.

Calculate the loss of the line at a basic temperature of 18° C at each frequency mentioned in the table below:

f, kHz	loss at 10° C, dB
0.1	2.0
1.0	7.0
10.0	21.0

(12)

Note. CDS 201 is attached.

- (b) The circuit of Fig. 3 shows a 600-ohm constant-resistance equaliser. Calculate the basic loss and the value of L' . Which terminals of the equaliser should be connected (i) to the line and (ii) to the 600-ohm load? (8)

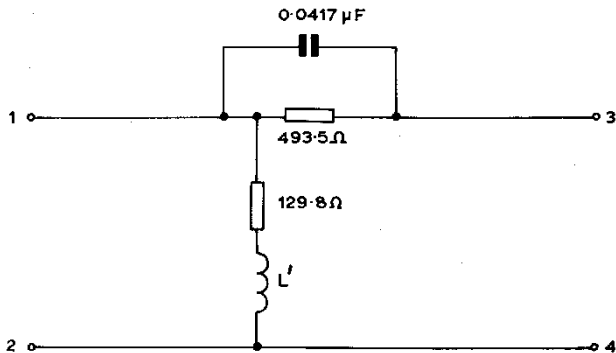


Figure 3

6. (a) Explain what is meant by the term *teleprinter margin*. Describe how the margin of a teleprinter can be measured. (10)
- (b) With the aid of response graphs explain the construction of the filter shown in Fig. 4, commenting on the reasons for such an arrangement of sections and the matching between sections and terminations. (10)

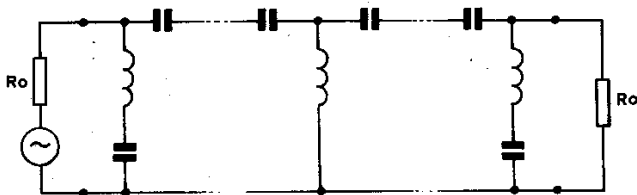


Figure 4

7. Explain what is meant by the following terms used in carrier telephone systems:
- (a) Group,
 - (b) Sub-group,
 - (c) Super-group,
 - (d) out-of-band signalling. (8)
- Draw a block diagram to show the main components of a channel card of a 12-channel carrier system. Briefly explain the function of each block. (12)
8. (a) With the aid of diagrams explain the function of stop coils on video-frequency coaxial cables. What precautions should be taken in their use? (10)
- (b) A circuit which normally carries a PAL colour signal is found to suffer from moderately large amounts of differential phase, differential gain and chrominance-luminance-crosstalk distortions.
- State briefly whether these distortions cause errors in the
- (a) luminance
 - (b) hue
 - (c) saturation
- of pictures displayed on a receiver using a delay PAL decoder. The same circuit is then used for a SECAM signal. How will the above parameters of these pictures be affected? (10)