بسم الله الرحمن الرحيم

King Fahd University of Petroleum and Minerals
Department of Electrical Engineering

Semester I 2005/2006 EE455 Analog Communication Electronics Final Test

ATTEMPT ALL QUESTIONS
TIME ALLOWED THREE HOURS

Q1. Consider the circuit shown in Fig. 1 and answer the following questions:

a. Assign trap for the 41.25 MHz sound carrier.
b. Assign trap for the 47.25 MHz, adjacent sound carrier.
c. Assign a chroma takeoff. **Justify your answer.**
d. Select design values for the resistors R_1, R_2 and R_3 so that g_m of transistor Q_1 will be 40mA/V. $\beta = 100$.
e. What is the function of the capacitor C_1?
f. Assign a sound take off. Draw a possible circuit for the sound detector.
g. What is the function of the capacitor C_2?

Q2. Consider the circuit shown in Fig. 2 and answer the following questions: **(Assume** $\gamma = 1$**)**

a. Find the design values of the resistors of the simple matrix that produce the luminance signal.
b. Roughly, what are the frequency bands occupied by the luminance and color signals?
c. Suggest an adder circuit to produce the color-difference signal(s). Draw a circuit diagram for your suggested solution.
d. Suggest an inverting amplifier. Draw a circuit diagram for your suggested solution.

Q3. Consider the circuit shown in Fig. 3 and answer the following questions:

a. What is the function of the variable resistor R_1?
b. What is the function of the variable resistor R_2?
c. What is the function of the delay line?

Q4. **Intermodulation products are always harmful and electronic engineers are always doing their best to get rid of them.**

Discuss this statement and clearly show your position whether you accept it as is or not, always justify your answer and give examples from real life applications to support your answers.

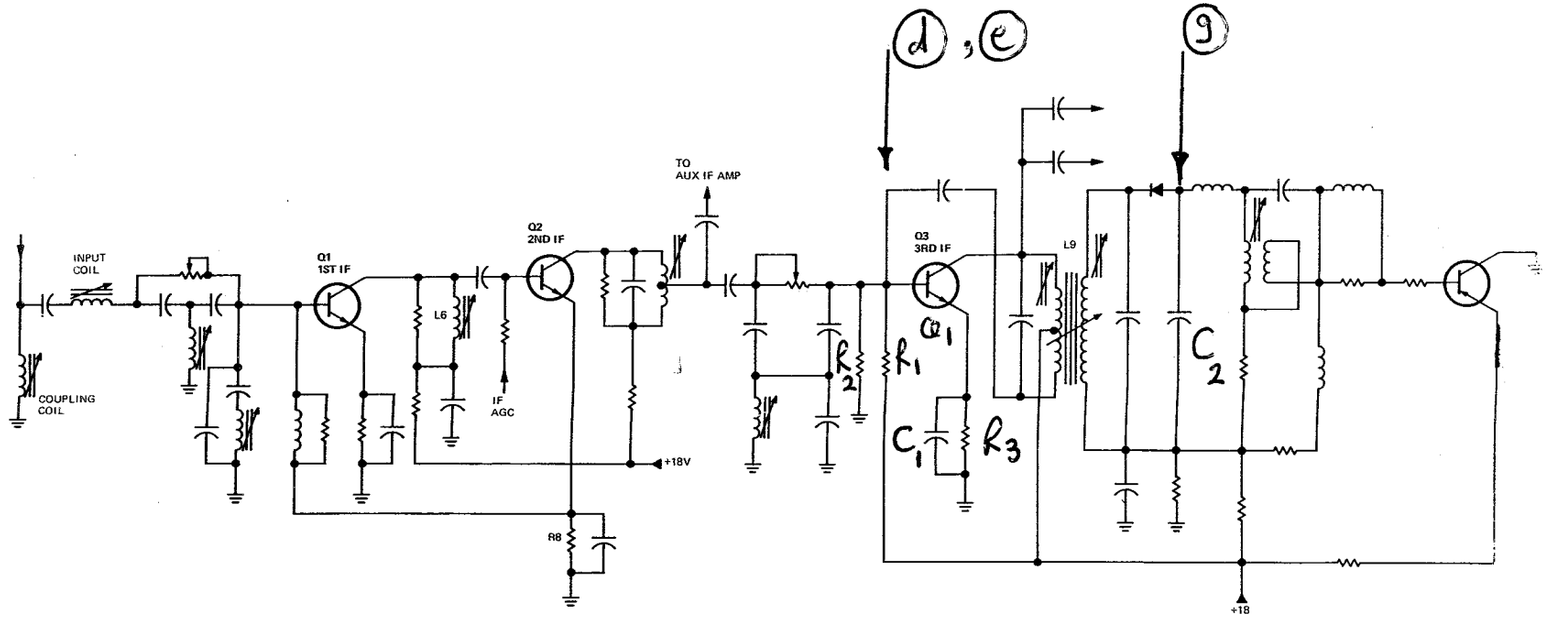
d , e
g
INPUT COIL
COUPLING COIL
Q1 1ST IF
L6
IF AGC
Q2 2ND IF
TO AUX IF AMP
+18V
R8
Q3 3RD IF
L9
Q_1
R_1
R_2
C_1
R_3
C_2
+18

Fig. 1

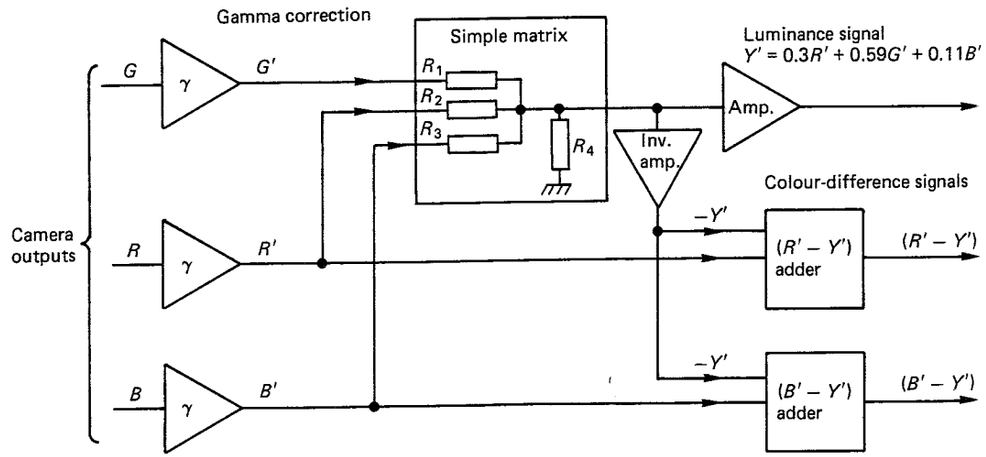
Gamma correction
Simple matrix
Luminance signal
$Y' = 0.3R' + 0.59G' + 0.11B'$
G
γ
G'
R_1
R_2
R_3
R_4
Amp.
Inv. amp.
Colour-difference signals
Camera outputs
R
R'
−Y'
(R' − Y') adder
(R' − Y')
B
B'
(B' − Y') adder
(B' − Y')

Fig. 2

Q5. You are working for a company that provides consulting services in the area of electronic circuit design. A client wants an amplifier to feed a 50 Ω load with 1 kW at a frequency = 100 MHz. You are requested to submit a brief proposal to this client to help him select the most suitable design. What are the main points you should consider in your proposal? Based on these main points which circuit design you would suggest in your proposal?

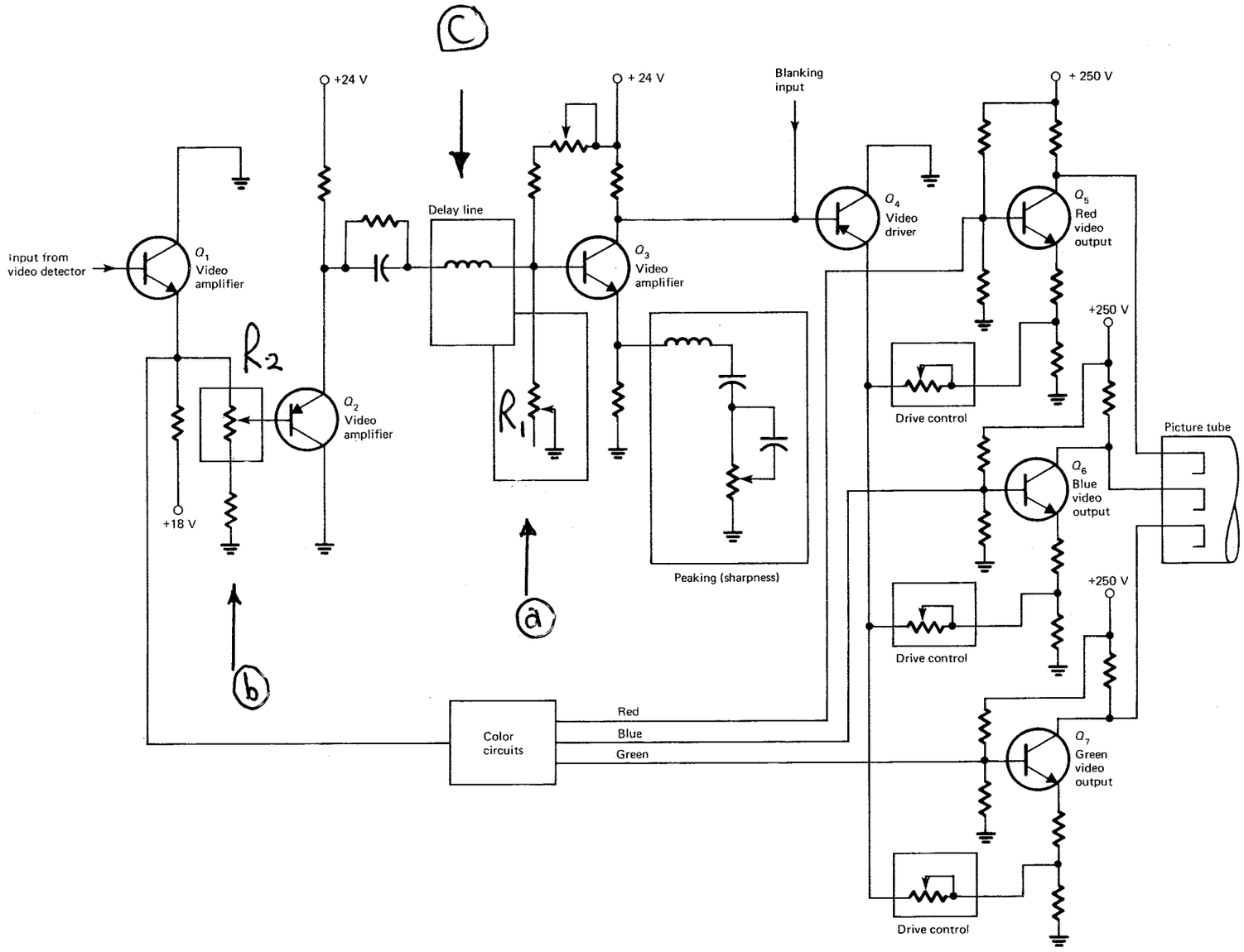
C
+24 V
+ 24 V
Blanking input
+ 250 V
Delay line
input from video detector
Q_1 Video amplifier
Q_2 Video amplifier
Q_3 Video amplifier
Q_4 Video driver
Q_5 Red video output
Q_6 Blue video output
Q_7 Green video output
R2
R1
+18 V
+250 V
Drive control
Picture tube
Peaking (sharpness)
a
b
Color circuits
Red
Blue
Green

Fig. 3