UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
SEPTEMBER 2016 SEMESTER

COURSE CODE	:	LEB40103
COURSE NAME	:	RADIO DETECTION AND RANGING (RADAR) SYSTEM
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN MARINE ELECTRICAL AND ELECTRONIC
DATE	:	16 JANUARY 2017
TIME	:	09.00 AM – 12.00 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) With the aid of a diagram, explain the basic concept of a RADAR in relationship with SOUND or ECHO. **(CLO 1)**

(6 marks)

(b) You just finished installing a FURUNO Navigation Radar. Your subordinate ask you to explain him the function of the radar. With the aid of a diagram, explain a simple functional block diagram of a RADAR system. The explanations should include the function of each module in the diagram. **(CLO 3)**

(14 marks)

Question 2

(a) A Search RADAR has a pulse repetition frequency (PRF) of 6000 Hz, a pulse width of 15 microsecond, and a peak power of 225 kilowatts, recovery time of 0.25 microsecond. Solve and calculate for the minimum range. **(CLO 1)**

(2 marks)

(b) The Search RADAR of a FRIGATE has a pulse width of 4 microsecond, pulse repetition time (PRT) of 0.0028572 second and a peak power of 350 kilowatts. Solve and calculate for the average power of the RADAR transmitter. **(CLO 1)**

(4 marks)

(c) A Long Range RADAR has a recovery time of 1 microsecond, pulse repetition frequency (PRF) of 700 Hz, a pulse width of 20 microsecond, and a peak power of 100 kilowatts Solve and calculate for the maximum ambiguous range. **(CLO 1)**

(2 marks)

(d) A navigation RADAR has a pulse repetition frequency (PRF) of 400 Hz, pulse width of 5 microsecond and a peak power of 100 kilowatts, recovery time of 1 microsecond. Solve and calculate for the Range Resolution. **(CLO 1)**

(2 marks)

(e) For a range of 250 nautical miles, solve and calculate for the RADAR pulse repetition frequency. **(CLO 1)**

(2 marks)

(f) Navigational RADAR mostly use 2 types of RADAR Band that is S Band and X Band. State the frequency of X Band Radar? **(CLO 3)**

(2 marks)

(g) A shipboard RADAR antenna situated 90 feet above sea level. Solve and calculate for the Radar range at horizon? **(CLO 3)**

(2 marks)

(h) A Tracking Radar is tracking an aircraft. With the aid of a diagram, estimate the altitude of the aircraft if the slant range is 2000 feet and the antenna elevation angle is 45 degree? **(CLO 3)**

(4 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions.
Please use the answer booklet provided.

Question 3

(a) Analyze the circuit in Figure 1. Discuss the circuit operation. Component (a), (b), (c), (d), (e) and (f) should be included and stated in the explanation. **(CLO 2)**

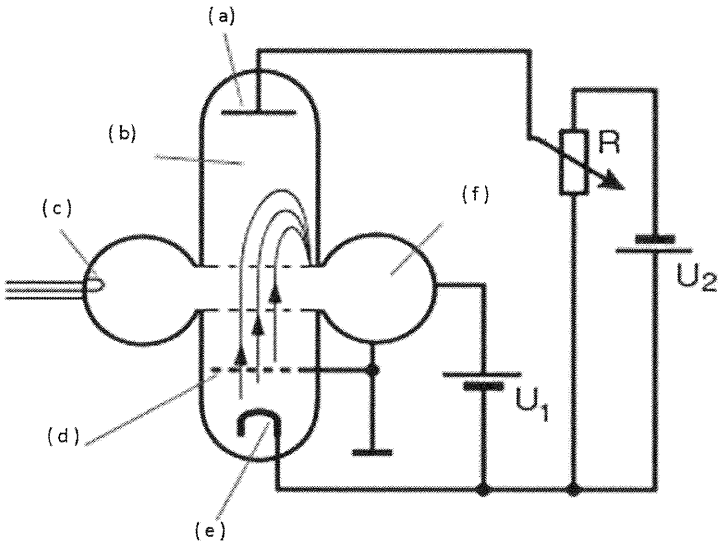

Figure 1

(16 marks)

(b) Analyze the diagram of a magnetron in Figure 2, identify and state 4 types of cavities used or manufactured for Radar or Microwave devices. **(CLO 2)**

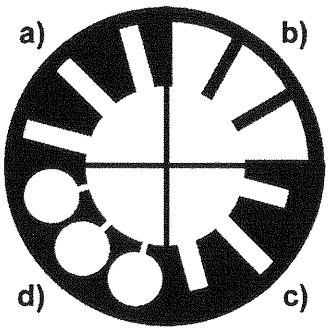

Figure 2

(4 marks)

Question 4

(a) Refer to figure 3. Describe the function of box **A, B, C, D, E, N, M** in the Pulse RADAR block diagram. Discuss the operation during TRANSMITTING of a pulse radar. **(CLO 3)**

(16 marks)

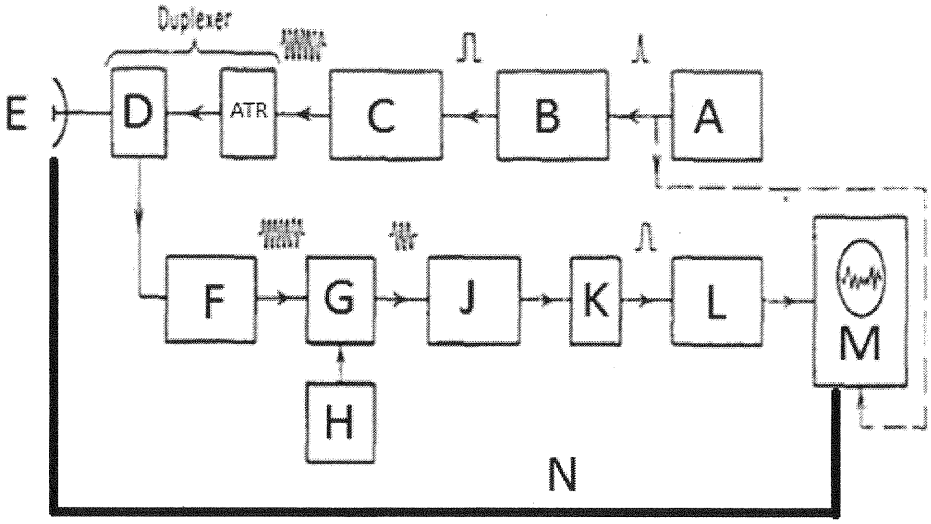

Figure 3

(b) There are 3 types of display unit for the radar system. With the aid of a diagram, evaluate and explain the function, operation and how the data or related target information transmitted or transferred to the screen of a B scope / display unit. **(CLO 3)**

(4 marks)

Question 5

(a) RADAR CAN be classified by its function. Classify and explain FIVE (5) of Radar function in the Military World. **(CLO 4)**

(b) You are representing EUREQA HITECH Services Sdn Bhd as a Radar Engineer to a Radar Maintenance Seminar. Classify and write 5 (FIVE) **Radar Setting To Work Activities** and explain each activities. **(CLO 5)**

(10 marks)

Question 6

(a) You are the Test Engineer at LAMBRECT Electronic Services Sdn Bhd. You are to brief the job scope or procedure to your subordinate whilst making a repair. Classify and write 5 (FIVE) **Radar Installation Site Survey Activities** and explain each activities. **(CLO 5)**

(10 marks)

(b) You are the Service Engineer of EURORADAR Services Sdn Bhd. While testing the operational of UniKL MIMET Radar Trainer your client show a photo taken of their Navigational RADAR display. Help your client and advise them on the operation of their radar. Evaluate the photos in Figure 4, Figure 5 and Figure 6 as attached in attachment 1, 2 and 3. Figure 4 or attachment 1 and is the normal operating display.

i. Compare and evaluate Figure 5 with Figure 4. Justify whether University Radar Trainer is Faulty? Is it the OPERATORS FAULT or a TECHNICAL FAULT? **(CLO 5)**

(4 marks)

ii. Compare and evaluate Figure 5 with Figure 4. Propose or gives instruction on how the FAULT can be solve for Figure 5. **(CLO 5)**

(2 marks)

iii. Compare and evaluate Figure 6 with Figure 4. Justify and describe why that MODE is SELECTED during RADAR OPERATION. Why we use that selection? **(CLO 5)**

(4 marks)

END OF EXAMINATION PAPER

Attachment 1

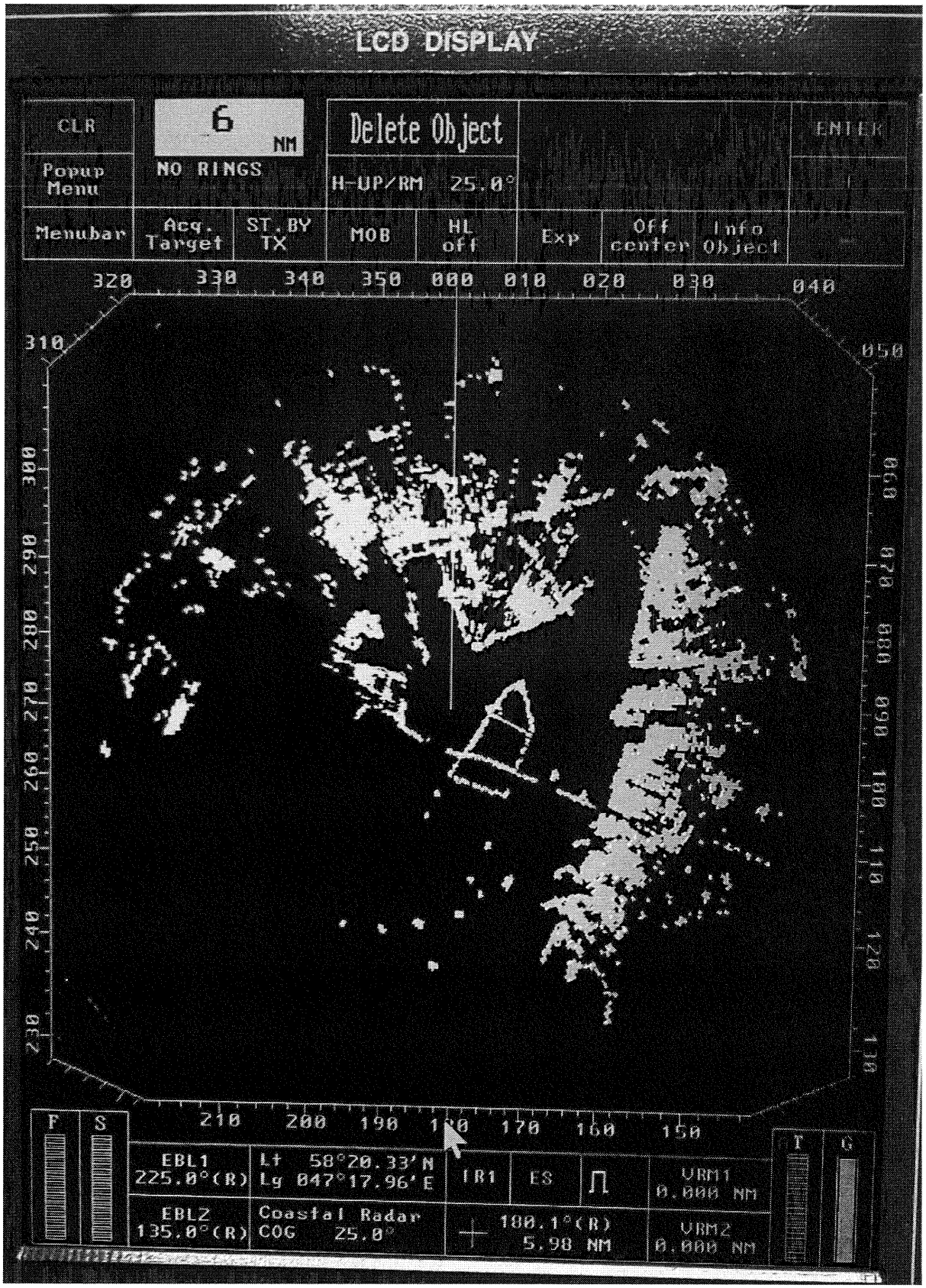

Figure 4

Attachment 2

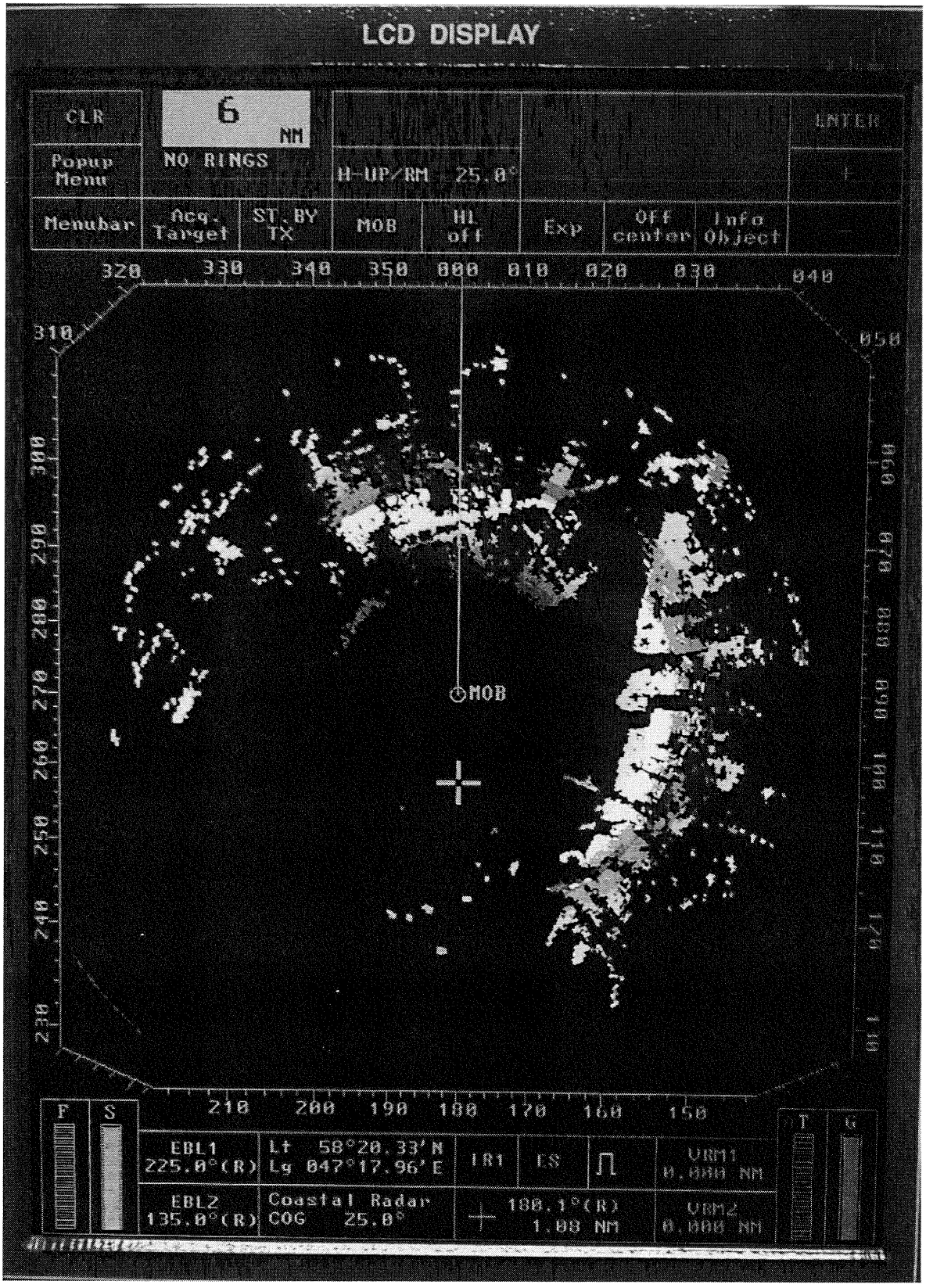

Figure 5

Attachment 3

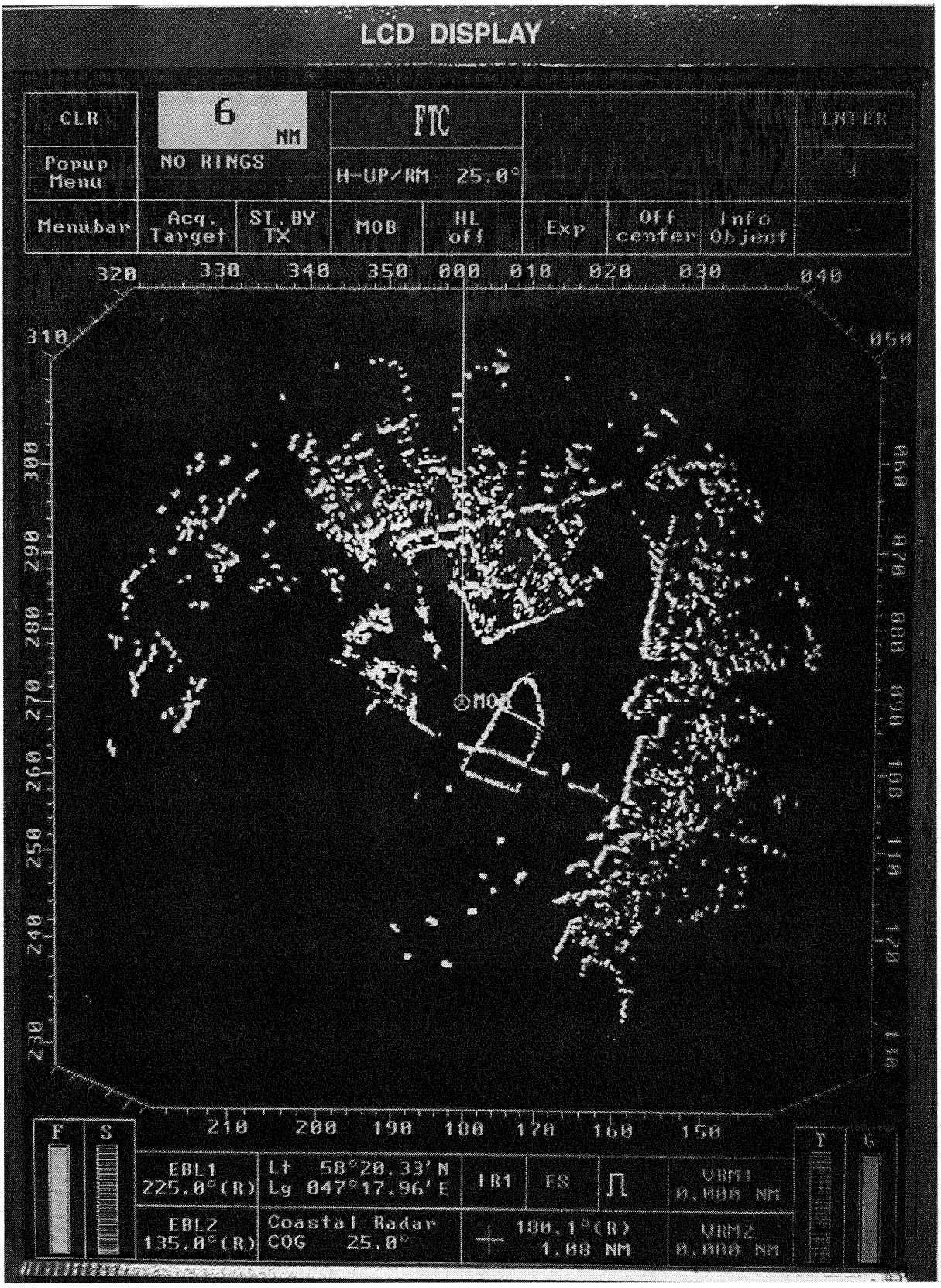

Figure 6