ELECTRON DENSITIES
IN THE LOWER IONOSPHERE

(SUPPLEMENTARY VOLUME)

A THESIS PRESENTED FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY IN PHYSICS
IN THE UNIVERSITY OF CANTERBURY,
CHRISTCHURCH, NEW ZEALAND.

by

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1965
CONTENTS

PART A : CROSS MODULATION

Figure No.

A.1 Nomenclature of the Atmosphere for a Given Temperature Profile.
A.2 Typical Electron Density Profile.
A.3 Collision Frequency Profile (Kane 1961).
A.4 Response Function 'D' of the Ionosphere.
A.5 Cross Modulation Calculation.
A.6 Wanted Echo.
A.7 'Phase Coherent Detector' System.
A.8 Split-Channel Detection System.
A.9 Filter-Amplifier System.
A.10 Birdling's Flat Field Station.
A.11 Filter-Amplifier System.
A.12 Sequence of Events.
A.13a,b Multivibrators (3 types)
A.14 Gating Circuit, Pulse Stretching Unit.
A.16 Passive Filters (Pass 37.5 c/s).
A.17 Parallel-T Rejection Filter (75 c/s).
A.18 Selective Amplifier (37.5 c/s).
A.19 Reference Signal Generator, Recording Circuitry.
A.20 Form of Construction.
A.21 Cross Modulation Charts, 30.9.64; 19.10.64.
A.22a. "Smoothed" Cross Modulation; H(h) Profile, 30.9.64.
A.22b. "Smoothed" Cross Modulation; H(h) Profile, 19.10.64.
A.23 Electron Densities (5.10.64; 7.10.64)
A.24 "Quiet Day" E Region Echoes (7.9.64).
A.25 "Quiet Day" Analysis.
A.26 "Noisy" E Region Echoes (6.12.64).
A.29 Bad Conditions : Rapid Changes in Structure (23.2.65).
A.30 "Rapid Structure Change" Analysis
PART B: DIFFERENTIAL ABSORPTION EXPERIMENT

Figure No.

B.1  Reflection Coefficient Ratio ($\mu \rightarrow 1$).
B.2  Reflection Coefficient Ratio; High $N(h)$.
B.3  Differential Absorption Coefficient ($\mu \rightarrow 1$).
B.4  Differential Absorption Coefficient; High $N(h)$.
B.5  Log $A_e/A_o$, Log $R_e/R_o$; Sample Mesosphere.
B.6  $N(h)$; Sample Mesosphere.
B.7  Collision Frequency Profile (Kane 1961).
B.8  $N(h)$; Errors Due to $\gamma_\pm$ Error Bars.
B.9  $N(h)$; $\gamma_\pm$ Profile Variations (Seasonal).
B.10 $N(h)$; $\gamma_\pm$ Profile Variations ($\pm 40\%$).
B.11, 13, 14, 16, 17. Log $R_e/R_o$ versus Collision Frequency Irregularity at 60, 65, 70, 75, 80 km, respectively.
B.12, 15. $R_e, R_o$ versus Collision Frequency Irregularity; 60, 70 km, respectively.
B.18  Log $A_e/A_o$, Log $R_e/R_o$; Low echo system.
B.18b  $N(h)$; $\Delta \gamma_\pm$ 0, 3, 5%; $\Delta N(h)/N(h)$ 10%.
B.19  D.A.E. Display.
B.20  Integrator.
B.21  Error Chart.
B.22  $A_e/A_o$ (7.8.64).
B.23  Error Chart.
B.24  $N(h)$; Errors due to $A_e/A_o$ errors.
B.25  $N(h)$; Visual, Integration Method (7.8.64).
PART C : THE MESOSPHERE

**Figure No.**

| C.1 | N(h); Diurnal Variations (11.11.64). |
| C.2 | Summer Profile (11.12.63-10.2.64). |
| C.3 | Winter Profile (25.5.63-8.7.63). |
| C.4 | Changes in the Winter N(h) Profile (and λ). |
FIGURE A1. NOMENCLATURE OF THE ATMOSPHERE FOR A GIVEN TEMPERATURE PROFILE.
FIGURE A2. TYPICAL ELECTRON DENSITY PROFILE.
FIGURE A3. COLLISION FREQUENCY PROFILE ($\gamma_m$) (KANE 1961)
h is the leading edge of the disturbing pulse.

\( \tau \) is the width of the pulse in micro-seconds.

FIGURE A4. RESPONSE FUNCTION \( 'D' \) OF THE IONOSPHERE.
Figure A5. Cross modulation calculation

WANTED FREQUENCY 2.4 Mc/s.
DISTURBING FREQUENCY 6.1 Mc/s.
POWER 100 kw.
PULSE LENGTH 40 μs.
LOSS PARAMETER 'G' 10⁻³.
Figure A6a. Wanted echo - with disturber.

Figure A6b. Wanted echo - no disturber.
FIGURE A7. PHASE COHERENT DETECTOR SYSTEM.
FIGURE A8 SPLIT-CHANNEL DETECTION SYSTEM.
FIGURE A9. FILTER-AMPLIFIER SYSTEM.
FIGURE A10. BIRDLING'S FLAT FIELD STATION.
Figure A11. Filter-Amplifier System.
Figure A12. Sequence of Events.

a) Transmitter Trigger 2.4 Me/s

b) Transmitter Trigger 6.1 Me/s

c) Gated Echo

d) Stretched Pulse

e) 37.5 c/s. Modulation

f) Output Detector

g) Output Integrator
i. ASTABLE

ii. BISTABLE: FLIP-FLOP

FIGURE A13a. MULTIVIBRATORS
iii. MONOSTABLE.

iv. BUFFER-AMPLIFIER

FIGURE A13B. (CONTINUED)
FIGURE A14.

a. GATING CIRCUIT.

- Gating Pulse, \(-12\) V (10-100 μS)

- Components: OA85, Video, 2.7K, RCY21, T1, 4.7K, 10K, T2, 1K, 100K, 4700 μF

b. PULSE STRETCHING UNIT.

- Components: ORS, 1.2MΩ, 10KΩ, 1K
FIGURE A15. A. G. C. CIRCUIT.
a. M-TYPE: BAND PASS.
   \( f_1, 35\text{c/s.} \quad f_2, 40\text{c/s.} \)
   \( C_1 \quad 1\mu F. \)
   \( C_2 \quad 4\mu F. \)
   \( L_2 \quad 25\text{H.} \)

b. Volts out for 1 volt in.
   \[ \text{Combined filter} \]

FIGURE A16. PASSIVE FILTERS (PASS 375c/s)
\( \omega_0^2 = \frac{2}{LC} \)

\( Q_0 = \frac{\omega_0 RC_2}{R} \)

\( L = 5.5 \, \text{H} \)

\( C = 2 \, \mu\text{F} \)

\( R = 5 \, \text{K} \)

**FIGURE A17. PARALLEL-T REJECTION FILTER. (75c/s)**
a. Q-MULTIPLIER.

\[ \sqrt{LC} = \frac{1}{37.5} \text{ c/s} \]

\[ L = 5.5 \text{ H} \]
\[ C = 3 \mu \text{F} \]

b. COMMON Emitter Stage; BUFFER STAGE.

To Q-Multiplier

From rejection filter.

c. OVER-ALL GAIN.

**FIGURE A18 SELECTIVE AMPLIFIER**. (37.5 c/s)
a. REFERENCE SIGNAL GENERATOR.

b. RECORDING CIRCUITRY.

FIGURE A19.
(i) TAG BOARDS.

(ii) COPPER BOX.

(filter-amplifier)

FIGURE A 20. CONSTRUCTION.
FIGURE A21. CROSS MODULATION CHARTS.
'SMOOTHED' CROSS-MODULATION.

T(h) vs. km.

N(h) PROFILE

FIGURE A 22b. OCTOBER 19, 1964.
FIGURE A23. ELECTRON DENSITIES: $N(h)$. 

$N(h)$ PROFILE

OCTOBER 7, 1964  X---X
5, 1964  

R.T.
FIGURE A24. 'QUIET DAY' E REGION ECHOES (7.9.64.)
\[ f = \frac{b}{2 \cdot \pi} \cdot \frac{1}{\tau} \]
\( (m = 50; \tau = 1/75 \text{ Second}) \)

**FIGURE A25. 'QUIET DAY' ANALYSIS.**
FIGURE A26 'NOISY' E REGION ECHOES. (6.12.64.)

AMPLITUDE VARIATIONS
(Average amplitude - 1 Volt)

(i. NO A.G.C.)

(ii. A.G.C. USED.)
POWER SPECTRUM.

\[ f = \frac{b}{2m} \frac{1}{\tau} \]

\((m = 50; \tau = 1/75 \text{ Second.})\)

AUTOCORRELATION FUNCTION.

FIGURE A27. 'NOISY DAY' ANALYSIS. (AGC. USED)
(i) STRUCTURE CHANGE. 29.9.64.

(ii) RADIO INTERFERENCE. 3.2.65.

FIGURE A28. E REGION ECHOES.
E REGION PULSES; (SEE BELOW)

AMPLITUDE VARIATIONS.
(Average amplitude - 1 Volt.)

(NO A.G.C.)

FIGURE A29. BAD CONDITIONS: RAPID CHANGES IN STRUCTURE. (23.2.65)
FIGURE A30: RAPID STRUCTURE CHANGE ANALYSIS.
FIGURE B1. REFLECTION COEFFICIENT RATIO. (μ → 1)
Figure B2. Reflection Coefficient Ratio; High N(h).
FIGURE B4. DIFFERENTIAL ABSORPTION COEFF: HIGH N(h).
FIGURE B5. $\log \frac{A_e}{A_o}$, $\log \frac{R_e}{R_o}$: SAMPLE MESOSPHERE.
FIGURE B6  \( N(h) \), SAMPLE PROFILE.
FIGURE B7. COLLISION FREQUENCY PROFILE (γₘ) (KANE 1961)
FIGURE B8. N(h) ERRORS DUE TO $\sqrt{m}$ ERROR BARS.
FIGURE B9. $N(h); \eta_m$ PROFILE VARIATIONS (Seasonal Variations)
FIGURE B10. $N(h)$; $\gamma_m$ PROFILE VARIATIONS (±40%)
FIGURE B11. \( \log \frac{R_e}{R_0} \) vs. COLLISION FREQUENCY IRREGULARITY, \( \frac{\Delta N(h)}{N(h)} \). (60 km)
FIGURE B12. $R_e, R_o$ vs. $\frac{\Delta \gamma_m}{\gamma_m}$, 60 km.
Figure B13. \( \log \frac{R}{R_0} \) vs. \( \Delta \gamma_m / \gamma_m \): 65 km.
FIGURE B14. \[ \log \frac{R_e}{R_o} \text{ vs. } \frac{\Delta v_m}{v_m} : 70 \text{ km.} \]
FIGURE B15. $R_e, R_0$ vs. $\frac{\Delta\gamma_m}{\gamma_m}$; 70 km.
Figure B16. \[ \log \frac{R_e}{R_o} \text{ vs. } \frac{\Delta \nu_m}{\nu_m} : 7.5 \text{ km} \]
FIGURE B17. \[ \log \frac{R_e}{R_o} \text{ vs. } \frac{\Delta m}{m} : 80 \text{ km.} \]
Figure B18. Log $\frac{A_e}{A_o}$, Log $\frac{R_e}{R_o}$; Low Echo System.
Figure B10 b. \( N(h); \ \Delta V_0/V_0 = 0.3, 5\%; \ \Delta N(h)/N(h) = 10\% \).
FIGURE B19. D.A.E. RECEIVING SYSTEM.
IDEALIZED DISPLAY; NOT TO SCALE.

FIGURE B20. D.A.E. DISPLAYS.
FIGURE B21. INTEGRATOR.
a) HEIGHT-TIME; 7.8.64.

FIGURE B22. HEIGHT-TIME; $A_e/A_0$ (7.8.64.)
FIGURE B23. ERROR CHART.
FIGURE B24. $N(h)$ ERRORS DUE TO $A_e/A_0$ ERRORS
FIGURE B.25. $N(h)$: VISUAL, INTEGRATION METHOD.
(7.6.64)
Figure C1. \( N(h) \); Diurnal Variations; II. II. 64.
FIGURE C2. SUMMER PROFILE 11.12.63.-10.2.64.
FIGURE C.3. WINTER PROFILE, 25.5.63-12.6.63; 1.7.63-8.7.63.
Figure C4. Changes in the Winter N(h) Profile (and \( v_m \))