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ELECTROSTATIC-PROBE MEASUREMENTS OF PLASMA PARAMETERS FOR TWO REENTRY FLIGHT EXPERIMENTS AT 25 000 FEET PER SECOND

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16. Abstract

Unique plasma diagnostic measurements at high altitudes from two geometrically similar blunt-body reentry spacecraft using electrostatic probe rakes are presented. The probes measured the positive-ion density profiles (shape and magnitude) during the two flights. The probe measurements were made at eight discrete points (1 cm to 7 cm) from the vehicle surface in the aft flow field of the spacecraft over the altitude range of 85.3 to 53.3 km (280 000 to 175 000 ft) with measured densities of 10^8 to 10^{12} electrons/cm^3, respectively. Maximum reentry velocity for each spacecraft was approximately 7620 meters/second (25 000 ft/sec).

In the first flight experiment, water was periodically injected into a flow field which was contaminated by ablation products from the spacecraft nose region. The nonablative nose of the second spacecraft thereby minimized flow-field contamination.

Comparisons of the probe-measured density profiles with theoretical calculations are presented with discussion as to the probable cause of significant disagreement. Also discussed are the correlation of probe measurements with vehicle angle-of-attack motions and the good high-altitude agreement between electron densities inferred from the probe measurements, VHF antenna measurements, and microwave reflectometer diagnostic measurements.

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SUMMARY

Unique plasma diagnostic measurements at high altitudes from two geometrically similar blunt-body reentry spacecraft using electrostatic probe rakes are presented. The probes measured the positive-ion density profiles (shape and magnitude) during the two flights. The probe measurements were made at eight discrete points (1 cm to 7 cm) from the vehicle surface in the aft flow field of the spacecraft over the altitude range of 85.3 to 53.3 km (280 000 to 175 000 ft) with measured densities of 10^8 to 10^{12} electrons/cm^3, respectively. Maximum reentry velocity for each spacecraft was approximately 7620 meters/second (25 000 ft/sec).

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INTRODUCTION

The plasma sheath (ionized gas) which envelops a spacecraft during entry into an atmosphere can disrupt radio communications and cause "radio blackout." This phenomenon has received much attention (refs. 1 and 2) from both the U.S. Department of Defense and the National Aeronautics and Space Administration because of the serious problems

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that it causes for mission planners. For instance, in manned flight missions there is a significant increase in the complexity of such onboard systems as navigation, guidance, and control due to the reduction of ground systems support during critical blackout periods. In other instances, provisions for onboard data storage and delayed playback, or even a recoverable package, may be required for data retrieval after blackout. Also, terminal-phase systems such as altimeters, landing radars, homing devices, and electronic countermeasures may be compromised for lack of real-time signal transmission. Consequently, a requirement exists for a fundamental understanding of the reentry plasma sheath and its interaction with spacecraft electromagnetic systems.

A project called "Radio Attenuation Measurements (RAM)" has been conducted at Langley Research Center where flow-field plasma characteristics and the resulting attenuation of propagating electromagnetic waves have been investigated both experimentally and theoretically. (See ref. 3.) Experiments have been performed in both ground facilities and on reentry flights to determine radio-frequency plasma attenuation and flow-field electron density and collision-frequency distribution.

This report presents electron density profiles (absolute magnitude and shape) inferred from electrostatic probe measurements during two blunt-body reentries at 7620 meters/second (25 000 ft/sec). A rake of eight negatively biased probes, located near the aft section of each spacecraft, collected positive ion current out to a normal distance of 7 cm (2.75 in.) and over an altitude range of 85.3 km (280 000 ft) to 53.3 km (175 000 ft). In addition, inferred electron densities are presented from VHF antenna measurements during both flights and from microwave reflectometer measurements during the second flight. Comparisons are made between the experimentally derived electron densities and theoretically calculated values to assess the validity of present plasma flow-field models. Also the effects on electron density profiles of material injection (during the first flight) and spacecraft motions are discussed.

Also included in this report are a discussion of electrostatic probe theory in appendix A, a description of the probe-data-reduction procedure and a listing of RAM C-I and C-II current and inferred density as a function of altitude and time for all probes in appendix B by Lorraine F. Satchell, and an analysis of spacecraft motions and wind angles in appendix C by William L. Weaver.

SYMBOLS

Values are given in both SI and U.S. Customary Units. The measurements and calculations in the text and appendix A were made in SI Units; those in appendixes B and C, in U.S. Customary Units.

A	current, amperes; also projected area of probe, cm^2
A_n	accelerometer-measured accelerations (normal)
a	radius of probe sheath, $R_p + d_s$, cm
a_y, a_n	accelerometer-measured accelerations due to aerodynamic force along Y-axis (tangential) and negative Z-axis (normal)
D	body nose diameter, cm
d_s	sheath thickness, cm
e	magnitude of electronic charge, 1.5921×10^{-19} coulomb
H	ratio of modified potential energy to kinetic energy, $\frac{\chi_p}{1 + S^2}$
H_l	lateral angular momentum
H_t	total angular momentum
H_X	roll angular momentum (about X-axis), $I_X p$
I, I_+	positive ion current collected by a probe, amperes
I_d	directed current into probe, $nev_f\left(2R_pL\right)$, amperes
I_l	lateral moment of inertia, $\frac{I_Y + I_Z}{2}$
I_n	normalized probe current, $\frac{I_+}{I_r}$
I_r	random ion current calculated for a probe, $\frac{nev_+}{4}\left(2\pi R_pL\right)$, amperes
I_X, I_Y, I_Z	moments of inertia about spacecraft axes, $kg\text{-}m^2$
J_i	saturation positive ion current density, $0.4nev_+$, $amperes\text{-}cm^{-2}$
k	Boltzmann's constant, 1.38044×10^{-23} $joule\text{-}K^{-1}$

L	probe length, cm
$\vec{L}$	angular impulse
M	ion mass, g
N_e	electron density, electrons-cm^{-3}
n	electron density, electrons-cm^{-3}, or ion density, ions-cm^{-3}
p,q,r	rotation rates about X-axis (roll), Y-axis (pitch), and Z-axis (yaw), rad-sec^{-1}
R	modified normalized probe current, $\frac{I_n}{\sqrt{1+S^2}}$, amperes
R_p	probe radius, cm
r_a	radius at which particles will just be collected, cm
S	ion speed ratio, $\frac{v_f}{v_+}$
T_e	mean electron temperature, K
V	probe potential, volts; also spacecraft velocity or wind axis
V'	absolute magnitude of applied probe bias, volts
V_o	initial energy of ion entering sheath, $\frac{kT_e}{e}$, joule-coulomb^{-1}
V_∞	plasma potential, volts
v_+	random thermal velocity of ions entering sheath, $\sqrt{\frac{8kT_e}{\pi M}}$, cm-sec^{-1}
v_f	normal component of flow velocity, cm-sec^{-1}
v_{flow}	flow velocity of ion flux past probe, cm-sec^{-1}
X,Y,Z	spacecraft body-axis system
x	distance from nose along body axis, cm

y	distance from body along normal to body surface, cm
α, β, η	wind angles: angle of attack, sideslip angle, total wind angle, deg
γ	ratio of probe-sheath radius to probe radius, $\frac{a}{R_p}$
ϵ	permittivity of free space
$\lvert\Delta\eta\rvert$	absolute variation in total wind angle
Θ	inverted form of the Child-Langmuir 3/2-power law, $\frac{\text{volts}^{3/2}}{\text{ampere}}$
θ	precession cone half-angle; also angle between flow velocity and probe axis, deg
λ_D	Debye length, $\frac{\epsilon_o k T_e}{e^2 n}$, cm
ν_b	precession frequency of vector ω_l about body axis
ν_H	precession frequency of X-axis about angular momentum vector
ρ	charge density
ϕ	angular coordinate for payload referenced to electrostatic probe rake, deg
χ_p	normalized potential difference between probe and plasma, $\frac{e(V - V_\infty)}{kT_e}$
ω_l	lateral angular velocity, $\sqrt{q^2 + r^2}$, rad-sec^{-1}

Subscripts:

cr	critical
o	initial

An arrow over a symbol denotes a vector.

EXPERIMENT DESCRIPTION

Three flight experiments were conducted in the medium velocity (7620 meters/second (25 000 ft/sec)) reentry region to obtain quantitative measurements of plasma parameters about a hemisphere-cone body and to test radio-attenuation alleviation techniques. Only the first two flights are discussed herein, since the analysis of probe data for the third flight is incomplete. (Descriptions of the third flight and the preliminary probe results are found in refs. 4 and 5.) This section provides a brief description of the flight objectives, launch vehicles, and payload experiments. A description of the electrostatic probe system is given which includes the mechanical construction of the probe rake, the electronic circuitry, characteristics of the circuit components, and data format. Also described briefly are other plasma diagnostic experiment systems onboard the respective payloads.

Flight Objectives

The primary objectives of the first flight (RAM C-I) were to test the effectiveness of water injection as an alleviation technique and to establish the operational system injection parameters (mass flow, penetration distance, and injection orifice size and location) necessary to achieve a required level of signal recovery. During this flight, electrostatic probes were the principal diagnostic instrumentation for assessing the plasma alleviation. In the second flight (RAM C-II), the primary objective was to measure the electron density time and altitude histories at several locations along the spacecraft using microwave reflectometers and electrostatic probes. Flight details are discussed in reference 6 for RAM C-I and in reference 7 for RAM C-II.

Launch Vehicles

Similar four-stage solid-fuel Scout vehicles were used to launch the RAM C-I and C-II payloads from the NASA Wallops Island Station in Virginia. The two Scout vehicles designated S-159 and S-168, ready for launching, are shown in the composite photograph of figure 1. Pertinent vehicle-payload identification and launch information are given in the following table:

Designation		Launch	
Scout	Payload	Date	Time, GMT
S-159	RAM C-I	10-19-67	17:33:00
S-168	RAM C-II	8-22-68	15:16:00

Approximate staging sequencing applicable to the RAM C-I and C-II launch vehicles and payloads with important events is shown in figure 2(b). The launch vehicles transported their respective payloads to apogees greater than 220.5 km (720 000 ft) before propelling them back into the earth's atmosphere. To minimize lateral rotations and trajectory dispersion during the thrusting of the fourth-stage motor which was unguided, the motor and spacecraft were spin-stabilized just prior to motor ignition. Tip-off moments produced by the separation of the expended fourth-stage motor at an altitude of about 113 km (370 000 ft) caused coning of the spacecraft and a resulting oscillatory relative wind angle. The earth-relative reentry flight-path angle was a nominal -15°, and both payloads reached their maximum velocities at an altitude of 67.0 km (220 000 ft). Some pertinent dynamic characteristics for each payload are given in the following table:

Payload	Spin rate		Maximum velocity		Total wind angle over probe data period, deg
	rad/sec	rps	m/sec	ft/sec	
RAM C-I	18.5	2.95	7670	25 165	5.0
RAM C-II	19.1	3.04	7678	25 193	4.0

The reentry data periods occurred just north of Bermuda as shown in the RAM C-II ground track. (See fig. 2(a).) The RAM C-I and C-II payloads flew nearly identical reentry trajectories, as indicated in figure 3 and in table I; and for this reason, the RAM C-I trajectory was used in the data reduction for both flights. Although the use of the RAM C-I trajectory produced approximately a 365.8-meter (1200-ft) bias error in the altitude for all RAM C-II probe data, this procedure introduced negligible errors in the inferred electron and ion densities.

Payloads

The payload geometries were essentially identical and are shown in figure 4. Each payload consisted of an approximately 15-cm (6-in.) radius hemispherical nose followed by a 9° half-angle cone and had an overall length of about 130 cm (51 in.). The physical characteristics of each payload are given in the following table:

Payload	Nose material	Nose diameter		Body length		Weight before launch		Afterbody material
		cm	in.	cm	in.	kg	lb	
RAM C-I	NARMCO 4028 (Phenolic-graphite charring ablator)	31.90	12.56	130.25	51.28	121.1	267.0	Teflon
RAM C-II	Beryllium nose cap*	30.48	12.00	129.54	51.00	121.8	268.5	Teflon

*Ejected at time of electrostatic-probe retraction.

RAM C-I had a phenolic-graphite charring ablator on the hemispherical nose, whereas the nose of RAM C-II was covered by a beryllium-cap heat sink. Since RAM C-I was primarily a material-injection experiment, the ability to maintain the integrity of the injection orifices during the ablation period was mandatory; therefore, the phenolic-graphite material was selected. (See ref. 8; RAM-CA designation is synonymous with RAM C-I.) An analysis of a sample of the NARMCO 4028 used to fabricate the heat shield showed that it contained about 1100 μg/g sodium. The analysis was incapable of detecting potassium, if present, at less than 3600 μg/g which means that the ablator could have contained up to 4700 μg/g of alkali. The beryllium nose cap and the teflon were found to be free of any significant amounts of alkaline impurities. For a sample of teflon, the analysis showed the alkali content to be less than 5 μg/g. Thus, during the RAM C-I reentry, the ablation of the nose fed easily ionizable alkali metals into the flow-field boundary layer. Since the primary objective of the RAM C-II flight was plasma flow-field diagnostics, the nonablative beryllium cap was selected to keep the flow field free of ablative contaminants so that a comparison could be made of measured plasma characteristics with pure-air theoretical calculations. The beryllium cap was ejected at an altitude of 56.4 km (185 000 ft) prior to the surface melting, and thus exposed a teflon-covered nose. For both flights, the effects of teflon ablation from the afterbodies are believed to be negligible at altitudes above 56.4 km (185 000 ft) (refs. 7 and 9) since the teflon had a low-alkali-metal contamination level; also, the ablation rates there were much less than those for the nose.

The location of the electrostatic and thermocouple probe rakes, the various radio-frequency antennas (diagnostic and instrumentation) on both payloads, and the water-injection orifices on the RAM C-I payload are shown in figure 5. Table II gives exact coordinate location and position of the various system sensors for both payloads.

Electrostatic Probe System

Design philosophy.- Realistic predictions of the electromagnetic wave attenuation to be experienced during atmospheric entry are dependent upon several factors, the foremost of which is the physical nature of the plasma itself. The requirement for accurate knowledge of gas composition is more stringent for an analysis of this problem than for other reentry problems such as heat transfer or aerodynamic flow. The reason for this requirement is that the free electrons, which control the electrical conductivity of the gas, are a trace species and, as such, require a comprehensive nonequilibrium flow-field analysis including finite-rate chemistry to determine the degree of gas ionization. For example, approximately 40 finite-rate chemical kinetic reactions involving 11 plasma species (free electrons, molecular and atomic ions, molecules, and atoms) must be considered in theoretical calculations of electron concentration. In addition, the dominant chemical kinetic process is dependent upon the velocity and body shape of the reentering spacecraft.

Moreover, calculations are more difficult to perform as one moves aft from the stagnation region because not only is a complete understanding of the local gas conditions required, but also of the entire gas history from the shock-entry point of each streamline to the location of interest.

The objective of the RAM-C electrostatic probe experiment for both flights was to determine experimentally the electron density profiles in the aft flow field in order to assess the validity of the theoretical calculations and to provide experimental data upon which to improve the analytical model used. The design of the RAM-C electrostatic probe system and the calibration testing in ground plasma facilities are discussed in detail in reference 4.

Configuration of electrostatic probe rakes on RAM C-I and C-II.- A photograph of the electrostatic probe rake is shown in figure 6(a); and the exterior configuration, a sectional view of the leading edge, and standoff dimensions of the ion collectors are shown in figure 6(b). Each of the iridium ion collectors extended 0.0254 cm (0.010 in.) beyond the wedge-shaped beryllium oxide leading edge of the rake. The two larger iridium pieces, one on each side of the rake, were electrically common and served as electron collectors. Iridium was chosen as the probe collector material because of its high melting temperature, high electronic work function, and negligible oxidation property. The beryllium oxide leading-edge material was a high-temperature insulator which mechanically and electrically separated the ion collectors and the electron collectors. The beryllium oxide leading edge was a 60° wedge with a leading-edge radius of 0.0254 cm (0.010 in.) and was inclined at an angle of 45° with respect to the payload surface. The main body of the probe was constructed of a phenolic fiber-glass ablation material.

Probe circuitry.- A fixed bias of -5.0 volts, referenced to the electron collectors, was applied simultaneously to all ion collectors to attract positive ions. Figure 7 gives a schematic drawing of the probe electronic system on both the RAM C-I and RAM C-II payloads. As each probe continuously collected plasma current, the mechanical commutator sampled the voltage developed across the probe load resistors and calibrate resistors and fed the signals to the logarithmic amplifier at the rate of 300 samples per second. The voltage developed across the probe load resistor was converted by the logarithmic amplifier to drive a telemetry subcarrier oscillator. A photograph of typical flight components is shown in figure 8.

For the RAM C-I experiment, the output of the logarithmic amplifier was connected single-ended to the input of the subcarrier oscillator; whereas on the RAM C-II experiment the output of the amplifier was connected to a differential-input subcarrier oscillator. This modification in the electronic system was made to correct an anomaly which occurred during the RAM C-I flight. The occurrence of the anomaly was ascertained during the onboard calibration of the logarithmic amplifier. The problem presented itself at an alti-

tude of about 67.0 km (220 000 ft) when the logarithmic amplifier output including all calibrate levels unexpectedly went to zero. During water injection, the amplifier returned to normal operation; however, after the injection stopped, the output returned to zero. Approximately 3 seconds later at 61.0 km (200 000 ft), the amplifier returned to normal and continued so for the remainder of the flight. The anomaly was analyzed and it could be reproduced in the laboratory by connecting a -1.85-volt potential between the electron collector and the payload ground. It is surmised that during the flight the electron collectors and the spacecraft metallic skin assumed different floating potentials in the plasma. This condition caused the internal input diodes of the logarithmic amplifier to conduct and thereby reduced the amplifier output to zero. The differential connection used on the RAM C-II system corrected the situation by effectively adding a large resistance (10 megohms) in series with this unwanted potential and thus prevented the diodes from conducting.

Logarithmic amplifier.- The solid-state logarithmic amplifier was developed specifically for the electrostatic probe experiments. The device was a low-level input, adjustable high gain, chopper-stabilized dc amplifier which converted a differential high-impedance input into a differential low-impedance output. Figure 9(a) shows the dynamic (commutated at 300 samples/sec) input-output voltage characteristics of the amplifiers used for flight. As can be seen from the figure, the device provided an output proportional to the logarithm of the input voltage for greater than a three-decade range. The amplifier gain was adjusted so that the voltage developed by an input current from the probes of at least 10^{-6} ampere, across the load resistor of 400 ohms, would be on the reasonably linear section of the characteristic curve. The maximum input current was 10^{-3} ampere and the minimum current value was determined by system noise (approximately 5×10^{-7} ampere for the RAM C-I experiment and 10^{-7} ampere for the RAM C-II experiment). The amplifier characteristics shown in figure 9(a) were obtained just prior to flight by calibrating the entire probe system as installed in the spacecraft. This calibration technique used a range of known resistances that were externally connected in sequence across the biased probe electrodes and thereby simulated a range of plasma currents. This calibration should not be confused with the onboard calibration the main purpose of which was to provide certain pulse levels in each data frame for automatic data reduction requirements.

Since the signal to the amplifier was commutated at 300 samples per second, good dynamic response was needed to reproduce the input accurately. Figure 9(b) shows a typical pulse-response curve of the amplifiers. With a delay time of less than 100 microseconds and rise and fall times of less than 75 microseconds each, the response was sufficient for data samples of approximately 3 milliseconds duration. For data-reduction purposes, only the center 50 percent of the pulse width was used.

Probe-experiment characteristics and data format.- The format used for electrostatic probe information from the logarithmic amplifier output, including currents from the probes and from the calibrates, is presented in figure 10. Shown in figure 10 is one complete data frame which has a duration of 100 milliseconds. There are five calibrate levels for each frame, which correspond to currents of 0.1, 1.0, 10.0, 100.0, and 1000.0 microamperes. Between the calibrate sequences are three consecutive samplings of the eight ion collectors. One profile measurement represents about 26.4 milliseconds or about 8 percent of a complete payload roll motion. The sampling rate of 300 samples per second was selected so that at least two data formats would be completed during the off time of the water-addition cycling system on RAM C-I. The same sampling rate was maintained for the RAM C-II experiment.

Thermocouple probes.- On both of the RAM-C payloads, a rake of thermocouples was located diametrically opposite the electrostatic probe rake to monitor the temperature of the leading edge. On RAM C-I, both the thermocouple and electrostatic probes were in line with the water-injection sites to insure similar heating environments. The external configuration of the thermocouple probe fin was the same as that of the electrostatic probe fin and is shown in figure 11. Instead of electrodes, however, three thermocouples were embedded 0.0635 to 0.1016 cm (0.025 to 0.040 in.) from the leading edge of the wedge. The thermocouples were platinum—platinum+13-percent-rhodium and were located 2, 4, and 6 cm (0.79, 1.57, and 2.36 in.) from the payload surface. The useful measurement range of the thermocouples was from 255 to 1977 K (0° to 3100° F).

At elevated temperatures, the insulating properties of the beryllium oxide degraded, and unwanted leakage currents flowed between ion collectors and between ion and electron collectors. The thermocouple probe was used therefore to determine the altitude at which probe heating became significant. The electrical resistivity degradation affected the accuracy of the inferred electron density because the leakage currents added to the measured plasma current and thereby caused a higher than actual electron density to be inferred. In reference 6, the electrostatic probe data were considered to be unusable in an absolute sense once the local probe temperature exceeded 811 K (1000° F). An improved analysis given in reference 4 estimated that the leakage current was on the order of 100 microamperes for a thermocouple temperature of 1366 K (2000° F). For both RAM-C flights the inferred plasma density was greater than 10^{11} electrons/cm^3 when the local temperature for a given probe exceeded 1366 K; thus, the error in the inferred density at that point was less than a factor of two. For higher leading-edge temperatures, the leakage current probably exceeded the plasma current; therefore, above 1366 K the data were considered to be degraded for useful plasma-density interpretation purposes.

Retraction of probe rakes.- Although it was desirable to make electrostatic probe measurements over the entire blackout data period from 85.3 to 24.4 km (280 000 to 80 000 ft), certain restrictions were imposed. The high heating rates predicted for the intermediate altitude range from 61.0 to 30.5 km (200 000 to 100 000 ft) would result in structural failure of the probes which could endanger the stability of the payload itself. Therefore, the rakes (electrostatic and thermocouple) were simultaneously retracted into the base region of the payload at a predetermined altitude by programer action. The RAM C-I rakes were retracted at an altitude of 53.6 km (176 000 ft). RAM C-II probe retraction was initiated simultaneously with the beryllium cap ejection at 56.4 km (185 000 ft), but the effects of retraction on the inferred density were not noted until 55.9 km (183 400 ft).

RAM C-I Water-Injection System

During the RAM C-I flight, water was periodically injected into the flow field from the spacecraft nose to provide for electron density reductions in the peak attenuating layer of the flow field. The water was injected at varying flow rates with specific penetrations over an altitude range of 83.2 to 33.8 km (273 000 to 111 000 ft). The injection locations are shown on the payload sketch in figure 5. Locations and positions of the nozzles are also given in table II. The electrostatic probe rake and two VHF slot antennas were located in line with the injection sites and were the principal diagnostic instrumentation for assessing the plasma alleviation.

The resultant programed variation of flow rates for the RAM C-I experiment is given in table III, with the altitude shown for the start of each pulse. Typical water flow-rate pulses are shown as a sequence of valve-on times. One complete injection cycle is shown and the cycles were repeated every 4 seconds. The valve-on times were 230 milliseconds and the valves were opened at 0.5-second intervals. A more detailed description of the RAM C-I water-injection system can be found in reference 6.

RAM C-II Microwave Reflectometer System

A four-frequency microwave reflectometer system was used to infer the peak electron density time and altitude histories about the RAM C-II spacecraft. A plasma-density measurement range of three decades (10^{10} to 10^{13} electrons/cm^3) was provided by the reflectometer system. The microwave reflectometer technique used the reflectivity of the plasma to infer the electron density and phase measurements to infer the electron density profile shape. Microwave antennas for the four frequencies (L-, S-, X-, and K_a-bands) were located at each of the four body stations (except station 1, L-band excluded), for a total of 15 antennas (fig. 5). Antenna locations are listed in table II. Greater detail on the microwave reflectometer system may be found in reference 7 and in table II.

VHF System

It has been shown that significant pattern changes can occur for plasma-clad cylindrical antennas when the electron density passes through the critical value. (See ref. 10.) These pattern changes are also accompanied by rapid changes in input impedance or input voltage standing wave ratio (VSWR). Received signal strength and onboard antenna VSWR were monitored during the RAM C-I and C-II flights and were used to determine the occurrence of the VHF critical electron density. The antenna VSWR was monitored by onboard directional couplers, and the antenna patterns were reconstructed by use of the signal received from the spinning spacecraft. There were several ground, airborne, and shipborne receiving stations with different look angles; thus, patterns were obtained in several planes. The arrangement of receiving stations for RAM C-II is shown in figure 2(a).

Two types of VHF antennas (cavity-backed slots and circumferential slot arrays) were used for the flights, as shown in figure 5. For the RAM C-I payload, two diametrically opposed, axially oriented, 259.7-MHz cavity-backed slot antennas transmitted the real-time telemetry, and an aft-positioned circumferential slot array (ring) antenna transmitted the delayed-time telemetry. In comparison, on the RAM C-II payload, the real-time and delayed-time telemetry systems utilized a pair of aft-located circumferential slot arrays (ring antennas). The axially oriented slot antennas on RAM C-I were in line with the material-injection orifices and the electrostatic probes. The ring antennas for all payloads were just forward of the electrostatic probes. A more complete description of the VHF antennas on RAM C-I may be found in references 6 and 11 and in table IV.

ELECTROSTATIC PROBE THEORY

The RAM-C electrostatic probe measurements were interpreted by use of a free-molecular cylindrical probe theory modified to account for a directed-ion flux due to the plasma flow. This theory was developed by Scharfman (refs. 12 and 13) based on the works of Hok et al. and Smetana (refs. 14 and 15, respectively) and is summarized in appendix A.

The configuration of the RAM-C probe rake is such that in relation to the flowing plasma, each ion collector appears to be a cylindrical wire 0.0254 cm (0.010 in.) in diameter and 0.5385 cm (0.212 in.) long, which is inclined at an angle of 45° with respect to the plasma flow. Experimental programs were performed at Langley Research Center, Stanford Research Institute, and Cornell Aeronautical Laboratories to verify that the RAM-C electrostatic probe rake could be used to infer accurate localized ambient plasma electron densities. (See refs. 4, 13, 16, and 17.) Typical results from references 13 and 17 are shown in figure 12. The conclusion based on this work is that free-stream electron density can be inferred within ±20 percent by using the described theory for the

RAM-C flight conditions for plasma densities from 10^{10} to 10^{11} electrons/cm^3 and within a factor of two over the 10^9 to 10^{13} electrons/cm^3 range.

FLIGHT DATA RESULTS AND DISCUSSION

Measured Electrostatic Probe Ion Currents

Ion currents measured by each of the eight electrostatic probes onboard the RAM C-I and C-II flights are presented as a function of altitude from 85.3 to 53.3 km (280 000 to 175 000 ft) in figures 13 and 14, respectively, and are listed in appendix B. (Altitudes for RAM C-II are too low by 0.3658 km (1200 ft).) In the figures, the measured probe-current data points are represented by the symbols which have been interconnected in order to show small variations clearly. Probes for both flights indicate an initial measurable current at an altitude of about 85.3 km (280 000 ft). Lowest measurable current for the probe electronic systems was about 10^{-7} A. Likewise, system saturation current was 10^{-3} A.

Figures 13(a) to 13(d) show the currents measured by the electrostatic probes aboard RAM C-I. The effects of periodic water injection into the flow field can be seen as respective periods of greatly reduced measured currents for all eight probes. The anomaly period, discussed in an earlier section, occurred between 67.1 and 61.0 km (220 000 and 200 000 ft). The data shown in the figures during the anomaly period are considered to be valid since they were selected only when the onboard calibrates indicated normal amplifier operation. All data are valid after the anomaly period. The probes aboard RAM C-I were retracted at 53.6 km (176 000 ft) from the aft-flow-field region into the payload base region. The probes continued to make measurements after retraction, but the analysis of these data is not presented in this report. Immediately after retraction, the outermost probes still indicated system saturation current because of electrical degradation of the beryllium-oxide probe insulator induced by aerodynamic heating.

Figures 14(a) to 14(d) show the electrostatic-probe-measured ion currents for RAM C-II. Effects of retraction can be seen at about 55.5 km (182 000 ft) in figures 14(a) to 14(c) as a steep dropoff of measured current. Again, the outermost probes of figure 14(d) were still saturated immediately after retraction because of leakage current through the degraded probe insulator.

The small sinusoidal-type variation superimposed on the curves shown in figures 13 and 14 are variations in the plasma density due to spacecraft motion. These variations will be discussed in detail in a later section and in appendix C.

Thermocouple Probe Results

An accurate knowledge of the probe-rake leading-edge temperature during reentry was necessary for valid interpretation of the fixed-bias probe currents because at thermocouple temperatures greater than 1366 K (2000° F), the insulating properties of the dielectric wedge were degraded to the point that the inferred plasma densities were questionable. Therefore, the first task in the data-reduction procedure was to examine the thermocouple data and to identify those probe data for which this threshold had been exceeded.

Measured thermocouple temperatures for both the RAM C-I and C-II reentries are presented in figure 15. Overall, for corresponding thermocouples at identical altitudes, the temperatures of RAM C-I were less than those of RAM C-II most likely because of the cooling effects of water injection which can be seen on the RAM C-I curves. Water-injection cycles for RAM C-I are shown at the top of the figure. The RAM C-I and RAM C-II data are presented in figure 16 as constant-temperature profiles of normal standoff distance y to a given temperature boundary plotted against altitude.

At any altitude, the temperature at any probe location on the leading edge may be determined from the intersection of a horizontal-probe location line, a vertical-altitude line, and a constant-temperature contour. When, for a given probe, this intersection occurs above the 1366 K (2000° F) contour, the interpretation of these data is questionable.

Electron Densities Inferred by Electrostatic Probe

By use of the probe interpretation discussed in appendix A, the collected ion currents given in figures 13 and 14 were converted into respective ion (electron) densities for the two flights. (Flow-field calculations (ref. 9) indicate that positive-ion and electron densities are very nearly equal for the RAM-C trajectory.) The electron densities for RAM C-I are shown in figure 17 and for RAM C-II in figure 18. The electron densities plotted against time and altitude are also tabulated for both flights in appendix B. The RAM C-I and RAM C-II results after probe retraction should be disregarded since no temperature and velocity data are presently available to allow proper interpretation of the ion current.

Flow-field electron-density profiles (electron density plotted against standoff distance y) were determined during both flights. Typical results are shown in figure 19 for selected altitudes during the RAM C-I flight where no water-injection effects were present and in figure 20 for similar altitudes on RAM C-II. The data represent the time-averaged electron density (averaged over one spacecraft revolution) at a given altitude for each probe, and the bars in figure 20 represent the peak-to-peak density change due to body

motions, to be discussed in a later section. The profiles for RAM C-I and RAM C-II flights are similar, although there was a slight difference in the absolute level at the specified altitudes. These differences are also observed in overlays of electron density plotted against altitude for RAM C-I and RAM C-II given in figure 21.

Effects of Ablation Impurities on Electron Density

Since the nose materials for the two RAM spacecraft were different (charring ablator for RAM C-I, nonablating heat sink for RAM C-II), a comparison can be made between contaminated and noncontaminated reentry plasma flow fields. The electron-density histories for RAM C-I and RAM C-II are superimposed for comparison in figure 21. The electron density for RAM C-I is approximately a factor of 2 higher than that for RAM C-II for the altitude range of 85.3 to 73.2 km (280 000 to 240 000 ft). Below this altitude, RAM C-II results are slightly greater than those for RAM C-I, although the RAM C-I anomaly period and the effects of material addition make a quantitative comparison less meaningful. The differences in measured electron density between these flights could be attributed to ablation product contamination effects because the payloads were nearly geometrically identical and they flew nearly identical trajectories. The RAM C-I charring phenolic-graphite nose fed easily ionizable alkali metals (sodium and potassium constituted approximately 1000 to 4000 $\mu g/g$ in the virgin material) into the flow-field boundary layer, whereas the nonablating beryllium nose cap on RAM C-II did not contaminate the flow. For both spacecraft the teflon afterbody did ablate slightly; however, additional ionization was not probable because here the alkali metal content was kept below 5 ppm of teflon. A detailed discussion of alkali ablation product contamination of the RAM-C flow field is given in reference 9.

Effects of Vehicle Angle-of-Attack Perturbations on Electron Density

An analysis of the accelerometer data (appendix C) revealed that each payload underwent small angle-of-attack oscillations which produced variations in the ion current collected by all probes and variations in the microwave reflectometer measurements (RAM C-II). This effect is more clearly observed in the RAM C-II results (fig. 18) since these results are not disturbed by water injection. Variations in electron density at the probe station were produced because the payload was at an angle of attack (unsymmetrical flow field about payload) while spinning at 18.84 rad/sec (3 rps). When the payload experienced a positive angle of attack (positive normal acceleration), the electrostatic probes were on the windward side of the payload and sensed a compression of the flow field. Conversely, for a negative angle of attack (negative normal acceleration), the probes sensed the leeward (less dense) side of the flow field.

A comparison of the RAM C-II vehicle angle-of-attack motions (determined by accelerometer data) with electron density (inferred from electrostatic probe 1) is shown for the altitude region from 59.4 to 55.8 km (195 000 to 183 000 ft) in figure 22. As seen in the figure, small angle-of-attack motions produced peak-to-peak density fluctuations in the aft part of the flow field approaching a factor of three. The sizable density variations close to the payload for relatively small changes in angle of attack can be one of the reasons that signal-attenuation models do not always accurately predict plasma-caused signal losses when normal zero angle-of-attack plasma profiles are used.

Effects of Water Injection on Electron Density

The effectiveness of water injection as a plasma alleviant in the RAM C-I flow field was assessed by means of two VHF slot antennas and the electrostatic probe rake located in line with the injection sites. The probe measurements provided an excellent means of determining injectant penetration distances as well as the resultant magnitudes of the suppressed plasma.

The amount of plasma suppression due to water injection on the RAM C-I plasma electron density is seen in figure 23. In the upper part of the figure, the water injection pulses are shown with varying magnitude. (Flow rates are given in table III.) Each pulse caused corresponding decreases in measured electron density. Cycle 1 (not shown in the figure) had no flow because of a slow fill rate in the lines. The very low flow rates of cycle 2 produced no detectable plasma alleviation for any of the probes. The larger flow rates of cycle 3, particularly the side-injection flow rates 3 and 4, caused appreciable electron-density reduction for all probes. Electron-density profiles for the various lateral injection flow rates of cycle 3 are shown in figure 24. Here, it is clearly seen that increasing flow rates are more effective in reducing electron density and in penetrating farther out into the flow. The electron-density profiles during stagnation injection (cycle 4, flow rate 5) are shown in figure 25 for selected altitudes over the 593 meter (1947 ft) altitude range.

The probe electronic system anomaly occurred immediately after cycle 4, flow rate 6, and persisted through cycle 4, flow rate 4. For intervals during the periods of water injection, however, the amplifier returned to normal operation and allowed reliable probe measurements.

The effectiveness of the water-injection technique was assessed by comparing density profiles with water injection against those without water for the same altitude range. Alleviation effects of water injection were noted by the ground stations on the signals received from all the onboard radio-frequency systems and good correlation was found between the probe electron-density profile changes and the observed attenuation changes of the signal strengths.

Microwave Reflectometer Measurements

The location and magnitude of the peak electron density inferred by the station 4 microwave reflectometers agree with the electron-density profiles inferred by the electrostatic probes for the RAM C-II flight. This good agreement lends credence to both measurements since both measured and theoretical electron-density gradients along the aft payload surface are small (refs. 7 and 9, respectively).

The microwave phase data (fig. 35 of ref. 7) indicate that there was a strong density gradient between the payload surface and a normal distance into the flow of 1 to 2 cm. Beyond this distance the profile appeared to be nearly uniform for another several centimeters.

The magnitudes of the electron density inferred by the probes and microwaves are also strongly correlated as shown in the longitudinal profiles of peak electron density for constant altitude. (See fig. 26.) In figure 26, the time-averaged peak electron densities as indicated by the reflectometer are plotted against distance along the body, where zero on the abscissa corresponds to the payload nose. Also shown in the figure for purposes of comparison are the time-averaged electron densities (averaged over one body revolution) for probes 1 and 8 (innermost and outermost probes, respectively). The bar on the probe data represents the peak-to-peak density fluctuation due to body motions.

VHF Antenna Measurements

The received VHF signal strengths (recorded at the Bermuda and U.S. Navy Ship (USNS) Twin Falls Victory stations) and the reflected power for the onboard antennas for RAM C-I are presented in figures 27 and 28 and for RAM C-II in figure 29. The Bermuda station was located approximately broadside to the payload during the data period and the Twin Falls Victory station was directly down range. (See fig. 2(a).)

The peak electron density at a given antenna location was inferred from the region where the received signal strength ripple pattern (due to spinning payload) and the onboard antenna reflected power changed abruptly. In reference 10, these changes were shown to occur at the critical electron density; however, since the RAM-C experimental conditions were slightly different than those in reference 10, the peak electron density is estimated to be the critical value within a factor of two uncertainty.

For the RAM C-I records, the time period of interest is from 385 to 394 seconds. In the Bermuda 225.7-MHz record, the pattern ripple is about 30 dB prior to the critical electron-density region (indicated by the arrows) which is in agreement with the measured free-space patterns in the equatorial plane. The ripple structure diminishes markedly in the critical electron-density region and then resumes as attenuation due to an overdense plasma occurs. The same sequential change was also noted by the Bermuda station in the 259.7-MHz antenna pattern ripple structure during a similar time frame.

A related change in the pattern ripple structure was also observed for both antennas in the signal received at the USNS Twin Falls Victory station between 386 and 394 seconds. At 386 seconds, the plasma electron density over the antennas is negligible and the antenna pattern ripple is about ±2 dB. Also the mean level of the signal received at the two frequencies is different by about 16 to 20 dB in absolute level. Both the magnitude of the pattern ripple and the absolute power levels agree very well with those predicted from the nose-on free-space absolute antenna patterns. During the time period from 390 to 392 seconds, the 225.7-MHz record experiences a 20-dB dip in the received signal level as the plasma goes through critical density. A similar but smaller signal-level dip also occurs at 259.7 MHz. The time of occurrence of these amplitude dips in the received nose-on signal closely correspond to the time period where a significant decrease in pattern ripple was observed from the broadside direction.

The records of reflected power to both the 225.7-MHz and the 259.7-MHz antennas are shown in the lower parts of figures 27 and 28. The sharp rise or increase in reflected power with the simultaneous occurrence of critical electron density over the antenna aperture corresponds to that altitude range where the pattern ripple changes were noted. For RAM C-II, nearly identical antenna effects were observed, as shown in figure 29.

Comparison of Inferred Electron Densities for the RAM-C Flights

The plasma diagnostic results for both flights are shown in figure 30 for the purpose of comparison. They include electron density as a function of altitude inferred from the RAM C-II electrostatic probes, RAM C-II microwave reflectometers, and the RAM C-I and RAM C-II VHF antenna measurements. The data presented for electromagnetic techniques are time-averaged peak electron densities. The probe data represent the envelope of maximum to minimum values for all probes. All inferred densities are corrected for body location and are referred to the probe station by use of the appropriate longitudinal profile in figure 26.

Comparison of Theoretical and Experimental Electron Density Profiles

Calculated electron density profiles for the RAM-C flights were provided by the authors of reference 9. These calculations began with pressure distributions derived from equilibrium inviscid flow-field solutions for sphere-cone shapes. A nonequilibrium streamtube method provided temperature, density, and composition (including electron concentration). Streamline positions were determined by means of mass flow conservation. An equilibrium thin boundary-layer solution was adapted for use with nonequilibrium edge conditions, and the combined viscous-inviscid solution was iterated to account for vorticity and displacement thickness. Inviscid streamline values were discarded upon entry into the boundary layer and were replaced by calculations based on conditions in the

boundary layer. The flow-field solutions described are not valid at altitudes above about 70.1 km (230 000 ft). It should be noted that ambipolar diffusion of the charged particles, which cannot be included in this treatment, was estimated in reference 9 to become an important influence at altitudes higher than 70.1 km (230 000 ft).

For RAM C-II the clean-air assumption should have been valid down to 56.4 km (185 000 ft) where the beryllium nose cap was ejected, but for RAM C-I the flow field was contaminated by ablation products from the phenolic-graphite nose. For both bodies the teflon afterbody did ablate to some extent, but no additional ionization would result because the alkali metal content was kept below 5 ppm in the heat shield. There is, however, an unanswered question concerning the reduction of the electron density due to the electrophilic action of teflon ablation products.

When the measured electron-density profiles shown in figures 19 and 20 were compared with the calculated profiles previously mentioned, the measured profiles were found to be lower and flatter than the calculated ones. Also the measurements appeared to extend to greater distances from the body surface than had been anticipated. A typical comparison is shown in figure 31 with the RAM C-II data bars representing the envelope of probe data (due to body motions). Comparison of the probe data with other available plasma flow-field calculations (ref. 18) also indicates this significant disagreement between experiment and theory in absolute magnitude and in shape of the electron-density profiles.

In an effort to resolve these differences above 71.0 km (233 000 ft), the effects of ambipolar diffusion were considered. Since the analytical model used a streamtube approach, the effects could not be handled directly; rather an ion diffusion correction factor was determined (ref. 9) which accounts for the reduction in the magnitude of the peak electron density. Unfortunately, no theoretical means is available for predicting the spreading of the electron-density profiles; conceptually, however, ambipolar diffusion should decrease the absolute magnitude of density and reduce its gradients.

The theoretical peak electron density and the RAM C-I and RAM C-II envelopes of time-averaged inferred densities from probe 8 are shown in figure 32. The RAM C-II data should provide a better comparison with the "pure air" plasma calculations because the RAM C-II beryllium nose cap minimized flow-field contamination down to an altitude of 56.4 km (185 000 ft). At 85.3 km (280 000 ft) the inviscid calculation of peak electron density must be reduced by approximately two decades because of the ambipolar diffusion correction factor. This correction goes to zero near 70.1 km (230 000 ft), and below this altitude both the inviscid calculations and the inviscid calculations corrected for boundary layer yield identical results and according to reference 9 are believed to be correct. The good agreement between the inviscid calculations corrected for ambipolar diffusion and the experimental measurements above 70.1 km supports the hypothesis that ambipolar

diffusion is a principal mechanism for shaping the high-altitude electron-density profiles. The RAM C-II electron densities from the inviscid calculations corrected for boundary layer, the microwave reflectometer measurements, and the electrostatic probe measurements are given for different body locations in figure 33. Although both the experimental and theoretical curves show a leveling of the electron density below 70.1 km (230 000 ft), the experimental values are greater. The electrostatic probe data envelope shown in the figure includes only those data that are below the 1366 K (2000° F) critical temperature. Although the probe data might be suspect below 70.1 km because of aerodynamic heating, the microwave reflectometer technique does not suffer from this effect.

CONCLUSIONS

Unique high-altitude electrostatic probe measurements have been made on the aft section of two high-velocity reentry spacecraft. Good agreement between the two RAM-C flight probe experiments with strong correlative data from microwave reflectometer and VHF antenna measurements support the following conclusions:

1. High-altitude (above 70 km (230 000 ft) for RAM-C configurations) calculations of electron-density profiles using an inviscid streamtube approach corrected for boundary layer are inadequate and modifications including ambipolar diffusion effects are necessary.

2. Increases in ionization due to phenolic-graphite ablation products in the aft-flow-field boundary layer were no greater than a factor of two over an altitude range of 56.4 to 82.3 km (185 000 to 270 000 ft).

3. Small angle-of-attack motions produce significant peak-to-peak density fluctuations in the aft parts of the flow field. These variations in electron-density profiles can be useful in qualitatively indicating vehicle angle of attack in the high altitudes where accelerometer data are limited.

4. The use of water addition into the flow field as a plasma alleviant is effective in reducing the electron density in the flow field and in alleviating radio blackout.

Langley Research Center,
National Aeronautics and Space Administration,
Hampton, Va., December 20, 1971.

APPENDIX A

ELECTROSTATIC PROBE THEORY

Simplicity makes the electrostatic probe attractive for plasma diagnostics; however, the theoretical interpretation of its current-voltage characteristics is extremely complicated. The difficulty stems from the fact that a probe represents a boundary to a plasma and near this boundary the equations which describe the motion of the charged particles change their character. At the surface of the probe, one polarity of charged particle is collected while the other is repelled; thus, a charge separation region or sheath is created where ion and electron densities differ and hence where large electric fields can be present. A fundamental result of the original theoretical interpretation of probes by Langmuir (ref. 19) is that under many experimental conditions, the sheath may be considered as a thin layer near the probe surface and the plasma appears to be field-free and electrically neutral up to the edge of this well-defined boundary. In recent years considerable progress has been made by the application of computer numerical integration techniques to the analysis of the collection of charged particles in the collisionless case for cylindrical and spherical probes in nonflowing plasmas (refs. 20 to 24). Thus, the artifice of a sheath boundary has been eliminated and the continuous transition from probe surface to ambient plasma is adequately described. Currently, the most realistic collisionless or free-molecular probe theory has been developed by Laframboise (ref. 20) who used the analytical model of Bernstein and Rabinowitz (ref. 21) to calculate the entire probe characteristic for both cylindrical and spherical probes in a Maxwellian plasma at rest. His plasma model consists of positive and negative species of charged particles, each having a Maxwellian velocity distribution with its own characteristic temperature. The analysis was based on the collisionless Boltzmann or Vlasov equations for two species coupled by Poisson's equation for the electric field. These equations are valid for only those conditions where binary collisions are negligible; that is, the collision mean free path is much greater than the probe radius and the plasma Debye length. The electric field, consistent with Poisson's equation, is therefore the dominant influence on the motion of the charged particles.

Flowing Plasmas

The theory for interpreting the response of an electrostatic probe in a plasma with directed flow is considerably more primitive than the classical probe theory just discussed. The available theories for including the effects of flow are oversimplified and their experimental verification are for the most part cursory. Fortunately, positive ion collection with an "infinitely long" cylindrical probe (long enough for end effects to be neglected) alined parallel to the flow can be interpreted by use of the theory of

Laframboise for nonflowing plasmas. Also, for most experimental conditions, this theory should be applicable for electron collection with any probe orientation because the random velocity of electrons is usually large compared with the directed velocity of the flowing plasma. However, this theory is not applicable for the interpretation of positive ion collection with a cylindrical probe of arbitrary orientation in a flowing plasma. In the following sections, an interpretation for cylindrical probes under these conditions by Scharfman (ref. 12), based on the works of Hok et al. (ref. 14) and Smetana (ref. 15), is presented.

Directed Flow Parallel to Probe

The ion current part of a cylindrical electrostatic probe characteristic has been numerically evaluated by Hok et al. (ref. 14) over a large range of ion densities and electron temperatures for a nonflowing plasma which is also applicable to a plasma with the directed flow parallel to the axis of the probe. For the flowing plasma case, it is advantageous to use this theory because it can easily be modified to account for an arbitrary probe orientation. These results are shown graphically in figure 34 as the variation of the normalized current I_n with the normalized potential difference χ_p between the probe and the plasma for selected values of ratio γ of sheath radius a to probe radius R_p. The normalized current is the ratio of the current I_+ collected by a probe to the random ion current I_r. The random ion current is defined by Hok et al. to be the product of the saturation ion current density and the area of the probe and is given by

$$I_r = \frac{nev_+}{4}\left(2\pi R_p L\right)$$

where

n electron density or ion density

e magnitude of electronic charge

R_p probe radius

L probe length

v_+ velocity of ions entering sheath

The velocity v_+ is defined to be

$$v_+ = \sqrt{\frac{8kT_e}{\pi M}} \tag{A1}$$

where

k	Boltzmann's constant
T_e	mean electron temperature
M	ion mass

It is to be noted that in equation (A1) the electron temperature T_e is used rather than the ion temperature. This departure from the classical definition for the mean thermal speed is the result of incomplete shielding of the probe sheath. Thus, a total potential drop of order of magnitude kT_e exists in the plasma and accelerates the ions into the probe sheath (ref. 25).

The normalized potential difference χ_p between the probe and the plasma is a dimensionless parameter defined as

$$\chi_p = \frac{e(V - V_\infty)}{kT_e}$$

where

V	probe potential
V_∞	plasma potential

Before Hok's results (fig. 34) can be used to interpret experimental probe data, the ratio γ of sheath to probe radii must be known. The ion sheath radius a is defined as

$$a = R_p + d_s$$

where d_s is the sheath thickness. For a planar probe geometry, the sheath thickness varies directly as the probe potential and inversely as the ion density and is given by

$$d_s = \lambda_D \chi_p^{3/4}$$

where λ_D is the Debye length and is defined as

$$\lambda_D = \left(\frac{\epsilon_o k T_e}{e^2 n}\right)^{1/2}$$

where ϵ_o is the permittivity of free space.

The approximation of a planar solution for sheath thickness is applicable to cylindrical probes only when the sheath thickness is small compared with the probe radius. When this is not the case, the ratio γ of the sheath to probe radius may be obtained from an inverted form of the Child-Langmuir 3/2-power law for space-charge-limited current flow. This relation has been derived by Hok for cylindrical probes and is plotted in figure 35 as $\gamma - 1$ against Θ where Θ is defined as

$$\Theta = \frac{L}{I_+ R_p}\left(V' + \frac{5kT_e}{e}\right)^{3/2}\left(1 + \frac{2.66}{\sqrt{\chi_p}}\right) \tag{A2}$$

and

I_+ measured probe current

V' absolute magnitude of applied probe bias

To give more physical significance to the current collection curves shown in figure 34, the following asymptotic cases are given:

Case I; thin sheath, $\gamma \approx 1$; $\chi_p < -1$:

$$I_+ = 2\pi R_p L J_i \tag{A3}$$

where J_i is the saturation positive ion current density for a collisionless Maxwellian plasma at rest and is given approximately by Bohm et al. (ref. 26) as

$$J_i = 0.4 n e v_+ \tag{A4}$$

Note that equation (A3) is independent of the applied probe bias.

Case II; moderate to thick sheaths, $\gamma > 1$; large negative probe bias, $\chi_p << -\gamma$:

$$I_+ = \gamma 2\pi R_p L J_i \tag{A5}$$

This current varies directly as the applied bias because of γ.

Case III; extremely thick sheaths, $\gamma >> |\chi_p|$; moderate negative probe bias, $\chi_p < -2$:

$$I_+ = \frac{2}{\sqrt{\pi}}\sqrt{\chi_p + 1}\left(2\pi R_p L J_i\right) \tag{A6}$$

In this region the current is approximately proportional to the square root of applied probe bias.

Directed Flow Normal to Probe

The effect of a normally directed ion flux (ions/unit area) on the current collected by free molecular cylindrical probes has been analyzed by several investigators. (See refs. 12, 15, 27, and 28.) If it is assumed that the flow does not distort the form of the ion sheath around the probe, the current density is the result of a superposition of random and directed ion fluxes (ref. 12). This effect is illustrated by figure 36, a curve of the normalized current I_n collected by a cylindrical probe not alined with the flow plotted against the ion speed ratio S. The speed ratio is defined as the normal component v_f of the flow velocity v_{flow} divided by the random thermal velocity v_+

$$S = \frac{v_f}{v_+} \tag{A7}$$

In figure 36 there are two asymptotes shown as dashed lines. The horizontal asymptote represents the value of current collected by a thin-sheathed ($\gamma \approx 1$) probe in a nonflowing plasma and is equal to the random current I_r or to a normalized current of unity. The other asymptote represents the superposition of the random current I_r and a directed current I_d. The directed current is

$$I_d = nev_f\left(2R_pL\right) = \rho v_f A \tag{A8}$$

where

ρ charge density

A projected area of probe

When the normal component of the flow velocity is small ($S << 1$), the probe current is approximately that collected in a nonflowing plasma. For larger values of the normal component of flow velocity, that is, $S > 3$, the current collected by the probe approaches the value given in equation (A8).

When the ion sheath is not thin, that is, $\gamma > 1$, the problem is more complicated because the ability of the relatively weak electrostatic potential field around the probe to

capture ions with increased inertial energy due to the flow is reduced. This problem was treated by Smetana (ref. 15) and the results are shown in figure 37.

Scharfman (ref. 12) gives the following qualitative explanation of Smetana's results: For the nonflowing plasma case (S = 0) with low values of applied bias $\left(\chi_p > -1\right)$ and a large sheath thickness ($\gamma >> 1$), the attraction of the probe's potential field is weak; consequently, most of the ions that enter the sheath orbit past the probe and are not collected. By using simple orbital theory, the radius r_a at which particles will just be collected is

$$r_a = R_p\left(1 + \frac{V}{V_o}\right)^{1/2}$$

where

V probe potential

V_o initial energy of ion entering sheath, kT_e/e

Thus, the current is proportional to the flux (ions/unit area) entering the sheath at the radius r_a and is proportionally given as

$$I_+ \propto nV_o{}^{1/2}R_p\left(1 + \frac{V}{V_o}\right)^{1/2}$$

In the limit of large applied potential $\left(\chi_p << -1\right)$,

$$I_+ \propto V^{1/2}R_p$$

When a directed velocity is included (S > 0), the flux is proportional to $SV_o{}^{1/2}$ and the capture radius becomes

$$r_a = R_p\left(1 + \frac{V}{S^2V_o}\right)^{1/2}$$

Thus, the effective capture radius for ions decreases while the flux increases. Therefore,

$$I_+ \propto nSV_o{}^{1/2}R_p\left(1 + \frac{V}{S^2V_o}\right)^{1/2}$$

In the limit of large applied potentials $\left(\chi_p << -S^2\right)$, this relationship reduces to the same value as when S = 0; that is,

$$I_+ \propto V^{1/2} R_p$$

In the limit of large directed velocity ($S \gg 1$), I_n approaches S in value, and the current I_+ is approximately given by equation (A8).

With this understanding of current collection under directed velocity conditions and with the asymptotic solutions for $S = 0$ and $S \gg 1$, the works of Hok and Smetana can be combined by a transformation of the coordinates of figure 34. This result from Scharfman is replotted in figure 38 as the variation of R with H where

$$R = \frac{I_n}{\left(1 + S^2\right)^{1/2}} \tag{A9}$$

$$H = \frac{\chi_p}{1 + S^2} \tag{A10}$$

where

R modified normalized probe current

H ratio of modified potential energy to kinetic energy

The results presented in figure 38 can be readily used to infer positive ion density n by the following algorithm:

(1) Determine T_e

(2) Measure the probe current I_+ at V' volts below floating potential

(3) Calculate the normalized probe to plasma potential

$$\chi_p = \left(\frac{eV'}{kT_e}\right) + 5 \pm 0.5 \tag{A11}$$

(4) Calculate Θ by use of equation (A2)

(5) Obtain the appropriate value of γ from figure 35

(6) Calculate v_+ by using equation (A1)

(7) Calculate S by using equation (A7)

(8) Calculate H by using equation (A10)

(9) Obtain the appropriate value of R from figure 38

(10) Calculate the positive ion density from

$$n = \frac{I_+}{\sqrt{1 + S^2} R \sqrt{\pi} e v_+ R_p L}$$

Interpretation of RAM-C Fixed-Bias Electrostatic Probe Data

The configuration of the RAM-C electrostatic probe is shown in figure 6(b). In relation to the flowing plasma, each ion collector appears to be a cylindrical wire 0.0254 cm (0.010 in.) in diameter and 0.5385 cm (0.212 in.) long, which is inclined at an angle of 45° with respect to the plasma flow. To illustrate the data-reduction procedure, a sample calculation is presented.

Sample Calculation

The following factors are given in the sample calculation:

Altitude, km (ft)	76.2 (250 000)
Ion collector	8
Potential of probe below floating potential, V', volts	5
Temperature, T, K	7500
Flow velocity, v_{flow}, km/sec (ft/sec)	5160 (16 930)
Angle between flow velocity and probe axis, θ, deg	45
Ion mass (NO^+), M, g	49.88×10^{-24}
Measured current, I_+, μA	50
Probe length, L, cm (in.)	0.5385 (0.212)
Probe radius, R_p, cm (in.)	0.0127 (0.005)
Boltzmann constant, k, J/K	1.38044×10^{-23}
Electronic charge, e, coulombs	1.5921×10^{-19}

For an altitude of 76.2 km (250 000 ft) and ion collector 8, the temperature was calculated to be 7500 K. The electron temperature is assumed to be equal to the local gas temperature. A plot of gas temperature as a function of altitude for the ion collector locations is shown in figure 39. These temperature data, as well as the flow velocity data given in figure 40, were generated by a nonequilibrium boundary-layer-corrected flow-field analysis of the RAM C-I trajectory.

The first factor to be calculated is the normalized potential difference between the probe and the plasma by using equation (A11)

$$\chi_p = \frac{eV'}{kT_e} + 5 = 12.69$$

Next, the ratio of ion sheath radius to probe radius γ is estimated by using figure 35 and equation (A2)

$$\Theta = \frac{L}{I_+ R_p}\left(V' + \frac{5kT_e}{e}\right)^{3/2}\left(1 + \frac{2.66}{\sqrt{\chi_p}}\right)$$

For a measured current of 50 μA, the value of Θ is 3.51×10^7 volts$^{3/2}$/ampere. The corresponding ratio of sheath radius to probe radius γ is 2.61.

The modified normalized probe current R is now determined. Figure 38 is a plot of R as a function of the ratio of modified potential energy to kinetic energy H (eq. (A10)) which is defined as

$$H = \frac{\chi_p}{1 + S^2}$$

The velocity of ions entering the sheath v_+ is calculated (eq. (A1)) to be

$$v_+ = \left(\frac{2kT_e}{M}\right)^{1/2} = 2.037 \times 10^5 \text{ cm/sec}$$

The ion speed ratio S is (from eq. (A7))

$$S = \frac{v_f}{v_+} = \frac{v_{flow} \sin \theta}{v_+}$$

From equation (A7), S = 1.791 and thus the value of H is 3.015. The corresponding value of R is 1.93 from figure 38.

Solving for the density n yields

$$n = \frac{I_+}{\sqrt{1 + S^2} R \sqrt{\pi} e v_+ R_p L} = 3.21 \times 10^{10} \text{ cm}^{-3}$$

APPENDIX B

ELECTROSTATIC-PROBE AUTOMATIC DATA REDUCTION PROCEDURE AND LISTINGS

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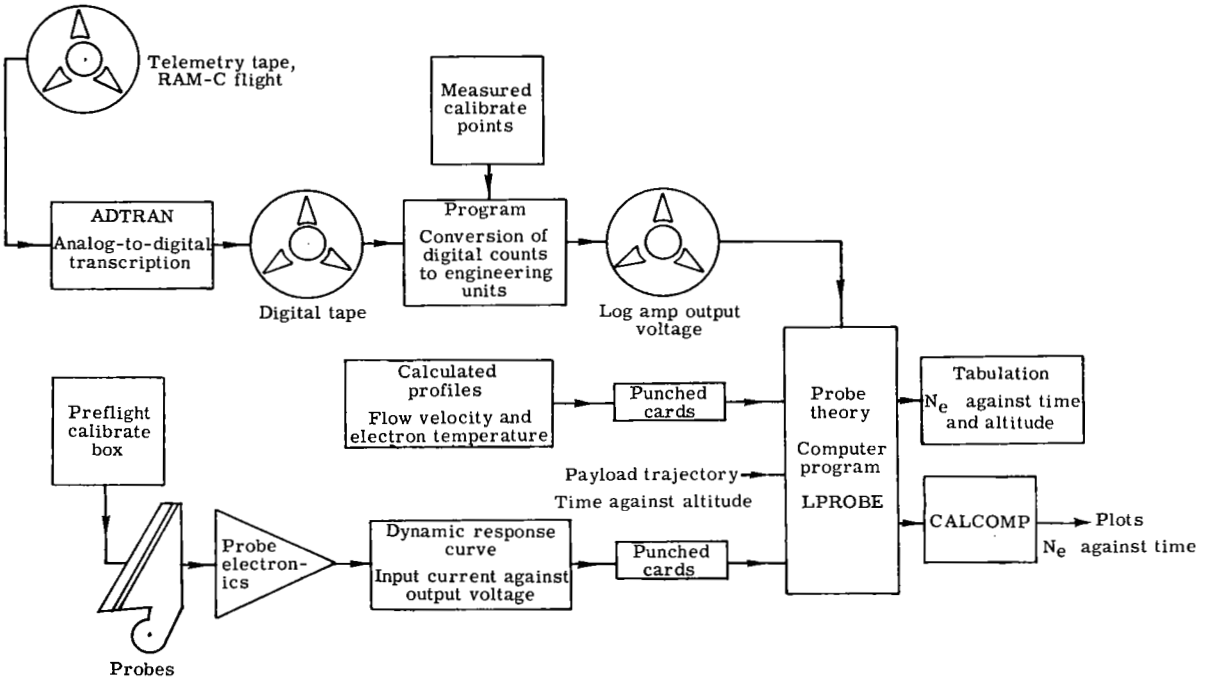
This appendix outlines the method for inferring electron density from telemetry data for the RAM-C flight experiments. The theoretical interpretation used was that of Scharfman (based on the works of Smetana and Hok) as presented in appendix A. A flow chart that illustrates the data-reduction procedure follows:



Telemetry signals containing the electrostatic probe data were recorded by ground receiving stations on magnetic tape. These data were in an analog—frequency-modulation form which consisted of subcarrier oscillator frequency deviations as a function of logarithmic amplifier output voltage. The format for this commutated probe data is given in figure 10. An analog-to-digital transcription made from magnetic telemetry tape data was converted to engineering units to be used as inputs to the probe theory computer program named LPROBE. LPROBE also required, as input data, theoretical flow-field velocities

and electron temperatures for each probe location, as functions of elapsed flight time and altitude, and preflight probe-electronic system calibration. Sufficient points from curves of these input data were tabulated and a second-order interpolation using FTLUP, a table look-up subroutine, provided the desired accuracy.

LPROBE was written in Fortran IV language for the Control Data 6000 series computer. The formats for the program inputs were flight time (FLTIME), delta time (DELTAT), synchronization code (ISYNC), and 24 channels of voltage and 24 channels of current. DNSTY was a subroutine with all tabular data listed internally. LPROBE provided the data in the call sequence and DNSTY computed the electron density. The outputs of LPROBE were CALCOMP plots (figs. 13, 14, 17, and 18) and/or tabulations of electron density (electrons/cm^3) as a function of time for each probe.

Presented in this appendix are: a listing of the program, logarithmic amplifier calibrates (output voltage as a function of input current in microamperes) for the two flights, tables of computed gas temperatures (for altitudes in thousands of feet), flow velocity calculations (as a function of time) for each of the probes, and tabulations of computed electron density as a function of time for each of the probes for both RAM C-I and RAM C-II.

```
C                    *CALL SEQUENCE FOR SUBROUTINE DNSTY*                    LFS  250
C                                                                            LFS  260
C  TE=ELECTRON TEMPERATURE,DEGREES KELVIN(COMPUTED FROM TABLES VS. TIME)LFS  270
C                                                                            LFS  280
C  TI=ION TEMPERATURE(NOT USED-DUMMY IN CALL STATEMENT)                      LFS  290
C                                                                            LFS  300
C  PDMILL(DIAMETER OF PROBE)=10.0 MILS                                       LFS  310
C                                                                            LFS  320
C  PLMILL(LENGTH OF PROBE)=212.0 MILLS                                       LFS  330
C                                                                            LFS  340
C  AV  POTENTIAL CC IS MEASURED WITH RESPECT TO PLASMA POTENTIAL.            LFS  350
C                                                                            LFS  360
C  CC  ION SATURATION CURRENT,MICROAMPS (COMPUTED VALUES).                   LFS  370
C                                                                            LFS  380
C  AMI(ION MASS)=28.0 AMU                                                    LFS  390
C                                                                            LFS  400
C  ANG(ORIENTATION ANGLE OF PROBE)=45.0 DEGREES OR .78539816 RADIANS         LFS  410
C                                                                            LFS  420
C  FLOVEL(FLOW-VELOCITY) IN M/SEC. (COMPUTED FROM TABLES VS. TIME)           LFS  430
C                                                                            LFS  440
C  AN(ELECTRON DENSITY) COMPUTED USING SUBROUTINE DNSTY.                     LFS  450
C                                                                            LFS  460
C  THERE ARE 8 PROBES-EACH SAMPLES THE DATA 3 TIMES PER FLIGHT TIME.         LFS  470
C  SEE FIGURE 11 AND TABLE BELOW.                                            LFS  480
C  DATA(1,09,17) ARE PROBE 1  (FTLUP USES CORRECTED TIME,TEMP1 AND VF 1)LFS  490
C  DATA(2,10,18) ARE PROBE 2  (FTLUP USES CORRECTED TIME,TEMP2 AND VF 2)LFS  500
C  DATA(3,11,19) ARE PROBE 3  (FTLUP USES CORRECTED TIME,TEMP3 AND VF 3)LFS  510
C  DATA(4,12,20) ARE PROBE 4  (FTLUP USES CORRECTED TIME,TEMP4 AND VF 4)LFS  520
C  DATA(5,13,21) ARE PROBE 5  (FTLUP USES CORRECTED TIME,TEMP5 AND VF 5)LFS  530
C  DATA(6,14,22) ARE PROBE 6  (FTLUP USES CORRECTED TIME,TEMP6 AND VF 6)LFS  540
C  DATA(7,15,23) ARE PROBE 7  (FTLUP USES CORRECTED TIME,TEMP7 AND VF 7)LFS  550
C  DATA(8,16,24) ARE PROBE 8  (FTLUP USES CORRECTED TIME,TEMP8 AND VF 8)LFS  560
C                                                                            LFS  570
      REAL N3(600)                                                           LFS  580
C                                                                            LFS  590
```

```
      DIMENSION VOLTS(50),CUR(50),TIMEA(40),ALTA(40),TEMP(40,8),TIMEB(40LFS  600
     1),ALTB(40),VF(40,8),FLTIME(200),VOLTAGE(200,24),CURRENT(200,24),  LFS  610
     1ISYNC(200),DELTAT(200),TIME(600),CURR(600)                        LFS  620
C                                                                       LFS  630
      EQUIVALENCE (TIMEA,TIMEB),(ALTA,ALTB)                             LFS  640
C                                                                       LFS  650
C     INITIALIZE PLOTTER.                                               LFS  660
      CALL CALCOMP                                                      LFS  670
C                                                                       LFS  680
C     USE PAPER 300 - SET PEN ON RIGHT MARGIN - SET ORIGIN.             LFS  690
      CALL CALPLT(0.0,1.0,-3)                                           LFS  700
C                                                                       LFS  710
C     PRINT CONSTANTS.                                                  LFS  720
      SIZE=.1                                                           LFS  730
      SIZED2=SIZE/2.0                                                   LFS  740
      W=(6./7.)*SIZE                                                    LFS  750
      SIZED=SIZE+SIZED2                                                 LFS  760
C                                                                       LFS  770
C     DATA CONSTANTS $ CAYDEP=K/EPSILON                                 LFS  780
      PDMILL=10.0                                                       LFS  790
      PLMILL=212.0                                                      LFS  800
      AMII=28.00                                                        LFS  810
      ANG=.78539816                                                     LFS  820
      E=5.0                                                             LFS  830
      CAYDEP=.00013854/1.60210                                          LFS  840
C                                                                       LFS  850
C     READ,STORE AND WRITE VOLTAGE VS. CURRENT FROM LOG-AMP CURVES(814  LFS  860
C     RAM C-I AND 813 RAM C-II)(DYNAMIC INPUT-OUTPUT CURVES)            LFS  870
      WRITE(6,1)                                                        LFS  880
    1 FORMAT(*1  VOLTAGE    CURRENT       LOG-AMP 814*/)                LFS  890
      DO 10 I=1,50                                                      LFS  900
      READ(5,3)VOLTS(I),CUR(I)                                          LFS  910
    3 FORMAT(2F10.3)                                                    LFS  920
      WRITE(6,3)VOLTS(I),CUR(I)                                         LFS  930
   10 CONTINUE                                                          LFS  940
C                                                                       LFS  950
C     READ,STORE AND WRITE TIME AND ALTITUDE VS. TEMPERATURE (1 THRU 8) LFS  960
C     (COMPUTED ELECTRON OR GAS TEMPERATURE AS A FUNCTION OF ALTITUDE   LFS  970
C     FOR ELECTROSTATIC PROBE LOCATIONS ON RAM C-I AND RAM C-II)        LFS  980
C                                                                       LFS  990
      WRITE(6,11)                                                       LFS 1000
   11 FORMAT(*1      TIME        ALT       TEMP1      TEMP2      TEMP3      TEMLFS 1010
     1P4      TEMP6      TEMP7      TEMP8*/)                            LFS 1020
      DO 20 I=1,40                                                      LFS 1030
      READ(5,12)TIMEA(I),ALTA(I),(TEMP(I,J),J=1,8)                      LFS 1040
   12 FORMAT(2F8.1,8F8.3)                                               LFS 1050
      WRITE(6,13)TIMEA(I),ALTA(I),(TEMP(I,J),J=1,8)                     LFS 1060
   13 FORMAT(2F10.1,8F10.3)                                             LFS 1070
   20 CONTINUE                                                          LFS 1080
C                                                                       LFS 1090
C     READ,STORE AND WRITE TIME AND ALTITUDE VS. FLOW VELOCITY (1 THRU 8LFS 1100
C     )(COMPUTED VELOCITY AS A FUNCTION OF ALTITUDE).                   LFS 1110
      WRITE(6,21)                                                       LFS 1120
   21 FORMAT(*1      TIME        ALT         VF1         VF2         VF3        VLFS 1130
     1F4        VF5         VF6         VF7         VF8*/)              LFS 1140
      DO 30 I=1,40                                                      LFS 1150
      READ(5,12)TIMEB(I),ALTB(I),(VF(I,J),J=1,8)                        LFS 1160
      WRITE(6,13)TIMEB(I),ALTB(I),(VF(I,J),J=1,8)                       LFS 1170
   30 CONTINUE                                                          LFS 1180
C                                                                       LFS 1190
C     READ AND STORE DATA FROM FLIGHTS (RAM C-I REEL 214009 AND RAM CII LFS 1200
C     REEL 314026).                                                     LFS 1210
      I=1                                                               LFS 1220
   60 READ(8)FLTIME(I),ISYNC(I),DELTAT(I),(VOLTAGE(I,J),J=1,24),(CURRENTLFS 1230
     1(I,J),J=1,24)                                                     LFS 1240
      IF(EOF,8)75,65                                                    LFS 1250
   65 I=I+1                                                             LFS 1260
      GO TO 60                                                          LFS 1270
```

```
   75 REWIND 8                                                          LFS 1280
      CALL EVICT(5LTAPE8)                                               LFS 1290
      IPTS=I                                                            LFS 1300
C                                                                       LFS 1310
C     COMPUTE DATA BY PROBES                                            LFS 1320
      DO 300 IPROBE=1,8                                                 LFS 1330
C                                                                       LFS 1340
C     HEADINGS FOR DATA                                                 LFS 1350
      NPTS=0                                                            LFS 1360
      WRITE(6,76)                                                       LFS 1370
   76 FORMAT(*1PROBE DIMETER=10 MILS     PROBE LENGTH=212 MILS     ION MASLFS 1380
     1S=28 AMU      ORIENTATION ANGLE=.78539816 RADIANS*/)              LFS 1390
      WRITE(6,77)                                                       LFS 1400
   77 FORMAT(*0PROBE  FL TIME SYNC    VOLTAGE    CURRENT  ALTITUDE  TEMPERLFS 1410
     1ATURE    F-VELOCITY          AV     TIME  ELECTRON DNSTY     LOG(N3)*)LFS 1420
      IF(IPROBE.EQ.1)GO TO 81                                           LFS 1430
      IF(IPROBE.EQ.2)GO TO 82                                           LFS 1440
      IF(IPROBE.EQ.3)GO TO 83                                           LFS 1450
      IF(IPROBE.EQ.4)GO TO 84                                           LFS 1460
      IF(IPROBE.EQ.5)GO TO 85                                           LFS 1470
      IF(IPROBE.EQ.6)GO TO 86                                           LFS 1480
      IF(IPROBE.EQ.7)GO TO 87                                           LFS 1490
      IF(IPROBE.EQ.8)GO TO 88                                           LFS 1500
   81 M1=1                                                              LFS 1510
      M2=17                                                             LFS 1520
      NC=-11                                                            LFS 1530
      GO TO 90                                                          LFS 1540
   82 M1=2                                                              LFS 1550
      M2=18                                                             LFS 1560
      NC=-12                                                            LFS 1570
      GO TO 90                                                          LFS 1580
   83 M1=3                                                              LFS 1590
      M2=19                                                             LFS 1600
      NO=-13                                                            LFS 1610
      GO TO 90                                                          LFS 1620
   84 M1=4                                                              LFS 1630
      M2=20                                                             LFS 1640
      NO=-14                                                            LFS 1650
      GO TO 90                                                          LFS 1660
   85 M1=5                                                              LFS 1670
      M2=21                                                             LFS 1680
      NO=-15                                                            LFS 1690
      GO TO 90                                                          LFS 1700
   86 M1=6                                                              LFS 1710
      M2=22                                                             LFS 1720
      NO=-16                                                            LFS 1730
      GO TO 90                                                          LFS 1740
   87 M1=7                                                              LFS 1750
      M2=23                                                             LFS 1760
      NO=-17                                                            LFS 1770
      GO TO 90                                                          LFS 1780
   88 M1=8                                                              LFS 1790
      M2=24                                                             LFS 1800
      NO=-18                                                            LFS 1810
C                                                                       LFS 1820
C     TI IS A DUMMY IN CALL STATEMENT TO SUBROUTINE DNSTY.              LFS 1830
   90 TI=1.0                                                            LFS 1840
      IS=1                                                              LFS 1850
      DO 100 I=1,IPTS                                                   LFS 1860
      IF(ISYNC(I).EQ.1)GO TO 100                                        LFS 1870
      IF(ISYNC(I).EQ.2)GO TO 100                                        LFS 1880
      DO 98 J=M1,M2,8                                                   LFS 1890
      JJ=J                                                              LFS 1900
      IF(VOLTAGE(I,J).LT.(-.080))GO TO 98                               LFS 1910
      IF(VOLTAGE(I,J).GT.(5.264))GO TO 98                               LFS 1920
```

```
      IF(CURRENT(I,J).LT.(.100))GO TO 98                                LFS 1930
      IF(CURRENT(I,J).GT.(1000.))GO TO 98                               LFS 1940
      IF(LEGVAR(VOLTAGE(I,J)))98,91,98                                  LFS 1950
   91 IF(LEGVAR(CURRENT(I,J)))98,92,98                                  LFS 1960
   92 ATIME=FLTIME(I)+(FLOAT(JJ))*DELTAT(I)                             LFS 1970
      IF(ATIME.GT.(406.000))GO TO 98                                    LFS 1980
      NPTS=NPTS+1                                                       LFS 1990
      TIME(NPTS)=ATIME                                                  LFS 2000
      CALL FTLUP(ATIME,ALT,2,40,TIMEB,ALTB)                             LFS 2010
      ALT=ALT*1000.                                                     LFS 2020
      CC=CURRENT(I,J)                                                   LFS 2030
      CURR(NPTS)=CURRENT(I,J)                                           LFS 2040
      CALL FTLUP(ATIME,TE,2,40,TIMEA,TEMP(1,IPROBE))                    LFS 2050
      TE=TE*1000.                                                       LFS 2060
      AV=E+5.0*CAYDEP*TE                                                LFS 2070
      CALL FTLUP(ATIME,FLOVEL,2,40,TIMEB,VF(1,IPROBE))                  LFS 2080
      FLOVEL=FLOVEL*1000.                                               LFS 2090
      CALL DNSTY(TE,TI,PDMILL,PLMILL,CC,AV,AMII,ANG,FLOVEL,AN)          LFS 2100
      N3(NPTS)=ALOG10(AN)                                               LFS 2110
      WRITE(6,96)IPROBE,J,FLTIME(I),ISYNC(I),VOLTAGE(I,J),CC,ALT,TE,    LFS 2120
     1FLOVEL,AV,TIME(NPTS),AN,N3(NPTS)                                  LFS 2130
   96 FORMAT(I2,I4,F9.3,I5,2F10.3,F10.1,2F13.3,F10.3,F8.3,E16.6,F12.6)  LFS 2140
      KPTS=NPTS                                                         LFS 2150
      IF(MOD(NPTS,40))98,97,98                                          LFS 2160
   97 WRITE(6,76)                                                       LFS 2170
      WRITE(6,77)                                                       LFS 2180
   98 CONTINUE                                                          LFS 2190
  100 CONTINUE                                                          LFS 2200
      NPTS=KPTS                                                         LFS 2210
C                                                                       LFS 2220
C     SCALE DATA TO BE PLOTTED                                          LFS 2230
      DO 110 I=1,NPTS                                                   LFS 2240
      TIME(I)=TIME(I)-386.0                                             LFS 2250
      N3(I)=(N3(I)-7.0)*2.5                                             LFS 2260
      CURR(I)=(1.0+ALOG10(CURR(I)))*2.5                                 LFS 2270
  110 CONTINUE                                                          LFS 2280
C                                                                       LFS 2290
C     PLOT TIME VS. ELECTRON DENSITY (N3) AND TIME VS. CURRENT (CURR).  LFS 2300
      DO 200 IPLOT=1,2                                                  LFS 2310
C                                                                       LFS 2320
C     DRAW X-AXIS AND LOGRID                                            LFS 2330
      CALL AXES(0.0,0.0,0.0,21.0,386.,1.0,1.0,.5,9HTIME,SEC.,.15,-9)    LFS 2340
      CALL LOGRID(21.0,2.5,-1,6,0.0,1.0,.5,.2)                          LFS 2350
C                                                                       LFS 2360
C     GENERAL IDENTIFICATION OF Y-AXIS                                  LFS 2370
      CALL CALPLT(0.0,15.0,2)                                           LFS 2380
      CALL CALPLT(0.0,0.0,3)                                            LFS 2390
      CALL NOTATE(-.3,0.0,SIZE,6HPROBE ,90.0,6)                         LFS 2400
      NPROBE=IPROBE                                                     LFS 2410
      XPROBE=NPROBE                                                     LFS 2420
      CALL NUMBER(-.3,(0.0+(6.0*W)),SIZE,XPROBE,90.0,-1)                LFS 2430
      CALL NOTATE(-.75,0.,SIZE,7HRAM C-A,90.0,7)                        LFS 2440
      IF(IPLOT.EQ.2)GO TO 140                                           LFS 2450
      CALL NOTATE(-.2,6.5,.15,8HELECTRON,90.0,8)                        LFS 2460
      CALL NOTATE(-.2,7.7,.15,7HDENSITY,90.0,7)                         LFS 2470
C                                                                       LFS 2480
C     TIME VS. N3                                                       LFS 2490
      DO 120 I=1,NPTS                                                   LFS 2500
      CALL PNTPLT(TIME(I),N3(I),NO,IS)                                  LFS 2510
  120 CONTINUE                                                          LFS 2520
      GO TO 190                                                         LFS 2530
C                                                                       LFS 2540
C     TIME VS. CURRENT                                                  LFS 2550
  140 CALL NOTATE(-.2,7.1,.15,7HCURRENT,90.0,7)                         LFS 2560
      DO 180 I=1,NPTS                                                   LFS 2570
      CALL PNTPLT(TIME(I),CURR(I),NO,IS)                                LFS 2580
  180 CONTINUE                                                          LFS 2590
C                                                                       LFS 2600
```

```
C      MOVE TO NEW PLOTTING AREA                                          LFS 2610
                                                                          LFS 2620
  190 CALL CALPLT(24.0,0.0,-3)                                            LFS 2630
  200 CONTINUE                                                            LFS 2640
C      CLEAR CORE FOR NEXT PROBE.                                         LFS 2650
       DO 250 I=1,NPTS                                                    LFS 2660
       TIME(I)=0.0                                                        LFS 2670
       N3(I)=0.0                                                          LFS 2680
       CURR(I)=0.0                                                        LFS 2690
  250 CONTINUE                                                            LFS 2700
  300 CONTINUE                                                            LFS 2710
C                                                                         LFS 2720
C      RELEASE PLOTTER AND STOP.                                          LFS 2730
       CALL CALPLT(0.0,0.0,999)                                           LFS 2740
       STOP                                                               LFS 2750
       END                                                                LFS 2760
       SUBROUTINE DNSTY(TE,TI,PDMILL,PLMILL,CC,AV,AMII,ANG,FLOVEL,AN)     LFS 2770
       DIMENSION B(6),C(6),EIF(9)                                         LFS 2780
       DIMENSION D(9),E1P5(9),E2(9),E3(9),E5(9),E10(9),E20(9),E50(9)      LFS 2790
       DIMENSION G(6) ,H(8)                                               LFS 2800
       DATA B/5.2,6.,7.,8.,9.,10./                                        LFS 2810
       DATA C/-1.,-.61,-.0926,.463,1.083,1.786/                           LFS 2820
       DATA D/-1.,-.5,0.,.5,1.,1.5,2.,2.5,3./                             LFS 2830
       DATA E1P5/.031,.056,.136,6*.175/                                   LFS 2840
       DATA  E2/.031,.079,.161,.253,5*.300/                               LFS 2850
       DATA  E3/.031,.074,.171,.316,.428,4*.475/                          LFS 2860
       DATA  E5/.031,.074,.191,.35,.521,.654,3*.7/                        LFS 2870
       DATA E10/.031,.074,.191,.37,.58,.755,.919,.988,1./                 LFS 2880
       DATA E20/.031,.074,.191,.37,.58,.802,1.04,1.19,1.29/               LFS 2890
       DATA E50/.031,.074,.191,.37,.58,.81,1.05,1.28,1.32/                LFS 2900
       DATA EIF/.031,.074,.191,.37,.58,.81,1.06,1.30,1.55/                LFS 2910
       DATA G/.175,.300,.475,.7,1.,1.3,1.7,10./                           LFS 2920
       PL=PLMILL*2.54E-5                                                  LFS 2930
     1 AC=ABS(CC)*1.E-6                                                   LFS 2940
C      PR=PDMILL*2.54E-5/2. $AMI=AMII*1.672E-27                           LFS 2950
       PR=.5*PDMILL*2.54E-5 $AMI=AMII*1.672E-27                           LFS 2960
C      A=AV*11604./TE                                                     LFS 2970
       A=ABS(AV*11604./TE)                                                LFS 2980
       T=PL*AV**1.5*(1.+2.66/SQRT(A))/(PR*AC)                             LFS 2990
       T=ALOG10(T)                                                        LFS 3000
       CALL DISCCT(T,T,B,C,C,-20,6,0,ANS)                                 LFS 3010
     2 AOR=1.+10.**ANS                                                    LFS 3020
     3 VP=SQRT(2.*1.38E-23*TE/AMI)                                        LFS 3030
     4 S=FLOVEL*SIN(ANG)/VP                                               LFS 3040
       T=A/(1.+S*S)                                                       LFS 3050
       T=ALOG10(T)                                                        LFS 3060
       CALL DISCCT(T,T,D,E1P5,E1P5,-20,9,0,ANS1P5)                        LFS 3070
       CALL DISCOT(T,T,D,E2 ,E2 ,-20,9,0,ANS2 )                           LFS 3080
       CALL DISCOT(T,T,D,E3 ,E3 ,-20,9,0,ANS3 )                           LFS 3090
       CALL DISCOT(T,T,D,E5 ,E5 ,-20,9,0,ANS5 )                           LFS 3100
       CALL DISCOT(T,T,D,E10,E10,-20,9,0,ANS10)                           LFS 3110
       CALL DISCOT(T,T,D,E20,E20,-20,9,0,ANS20)                           LFS 3120
       CALL DISCOT(T,T,D,E5C,E50,-20,9,0,ANS50)                           LFS 3130
       CALL DISCOT(T,T,D,EIF,EIF,-20,9,0,ANSIF)                           LFS 3140
       H(1)=ANS1P5 $ H(2)=ANS2 $ H(3)=ANS3 $ H(4)=ANS5 $ H(5)=ANS10       LFS 3150
       H(6)=ANS20 $ H(7)=ANS50 $ H(8)=ANSIF                               LFS 3160
       AOR=ALOG10(AOR)                                                    LFS 3170
       CALL DISCCT(AOR,AOR,G,H,H,-20,8,0,ANS)                             LFS 3180
       ANS=10.**ANS                                                       LFS 3190
       F=ANS*SQRT(1.+S*S)                                                 LFS 3200
       AREA=6.28*PR*PL                                                    LFS 3210
     5 AN=4.*AC/(AREA*F*1.6E-19*SQRT(8.*1.38E-23*TE/(3.14159*AMI)))       LFS 3220
       AN=AN*1.E-6                                                        LFS 3230
       RETURN                                                             LFS 3240
       END                                                                LFS 3250
```

APPENDIX B – Continued

PRE-FLIGHT CALIBRATION OF LOGARITHMIC AMPLIFIERS

RAM C-I Logarithmic amplifier, serial number 814		RAM C-II Logarithmic amplifier, serial number 813	
VOLTAGE	CURRENT	VOLTAGE	CURRENT
-.080	.100	-.136	.100
-.060	.570	0.000	.298
-.040	.695	.090	.370
0.000	.754	.240	.450
.055	.830	.495	.580
.150	.922	.780	.720
.305	1.020	.925	.790
.400	1.085	1.115	.870
.545	1.175	1.375	.990
.700	1.260	1.540	1.090
.850	1.340	1.725	1.240
1.055	1.480	1.825	1.340
1.210	1.625	1.950	1.480
1.300	1.725	2.025	1.600
1.480	1.980	2.140	1.800
1.600	2.185	2.215	2.000
1.710	2.450	2.310	2.300
1.800	2.695	2.375	2.550
1.900	3.030	2.500	3.200
1.990	3.400	2.605	4.000
2.100	3.890	2.651	4.500
2.250	4.810	2.715	5.200
2.300	5.220	2.765	6.000
2.385	6.010	2.810	7.000
2.500	7.640	2.865	8.500
2.635	10.490	2.905	10.000
2.800	13.800	2.940	11.000
3.065	20.700	2.980	12.500
3.200	24.900	3.040	14.500
3.300	28.600	3.130	18.500
3.460	33.400	3.175	21.000
3.600	36.600	3.230	23.500
3.750	49.500	3.330	28.500
3.900	58.900	3.430	34.000
4.000	65.500	3.535	40.000
4.200	80.500	3.725	53.000
4.325	92.700	3.880	65.000
4.400	104.500	4.030	79.000
4.530	133.000	4.110	90.000
4.600	162.500	4.170	100.000
4.700	226.000	4.185	102.000
4.755	274.000	4.190	105.000
4.800	302.000	4.225	120.000
4.900	392.000	4.265	140.000
5.000	505.000	4.330	180.000
5.055	579.000	4.480	277.000
5.100	626.000	4.520	310.000
5.170	717.000	4.615	390.000
5.200	770.000	4.770	550.000
5.264	1000.000	5.023	1000.000

RAM C-I AND C-II COMPUTED GAS TEMPERATURES FOR PROBES 1 - 8

TIME	ALT	TEMP1	TEMP2	TEMP3	TEMP4	TEMP5	TEMP6	TEMP7	TEMP8
386.5	302.6	5.870	7.060	8.530	9.900	10.630	11.160	11.690	12.220
387.0	299.2	5.760	7.030	8.500	9.850	10.570	11.120	11.670	12.220
387.5	295.9	5.660	6.990	8.460	9.760	10.490	11.060	11.630	12.200
388.0	292.6	5.570	6.970	8.400	9.660	10.420	10.990	11.560	12.130
388.5	289.4	5.470	6.920	8.360	9.560	10.340	10.900	11.460	12.020
389.0	286.1	5.380	6.880	8.270	9.450	10.250	10.800	11.350	11.900
389.5	282.8	5.280	6.830	8.200	9.320	10.150	10.680	11.210	11.740
390.0	279.6	5.190	6.780	8.120	9.190	10.030	10.570	11.110	11.650
390.5	276.3	5.100	6.720	8.050	8.060	9.850	10.460	11.070	11.550
391.0	273.0	5.000	6.660	7.940	8.900	9.650	10.250	10.850	11.450
391.5	269.8	4.900	6.580	7.840	8.750	9.440	10.050	10.660	11.270
392.0	266.5	4.810	6.510	7.720	8.590	9.220	9.760	10.300	10.840
392.5	263.3	4.700	6.430	7.620	8.440	9.010	9.470	9.930	9.850
393.0	260.0	4.600	6.330	7.490	8.260	8.770	9.120	9.100	8.920
393.5	256.8	4.510	6.230	7.370	8.070	8.530	8.800	8.610	8.380
394.0	253.5	4.400	6.130	7.230	7.870	8.280	8.470	8.200	7.930
394.5	250.3	4.310	6.030	7.080	7.690	8.050	8.180	7.870	7.580
395.0	247.0	4.200	5.910	6.920	7.480	7.760	7.860	7.540	7.240
395.5	243.7	4.100	5.780	6.750	7.260	7.500	7.540	7.230	6.920
396.0	240.4	4.000	5.660	6.670	7.040	7.220	7.230	6.940	6.630
396.5	237.1	3.890	5.520	6.380	6.810	6.930	6.920	6.670	6.360
397.0	233.9	3.800	5.360	6.180	6.550	6.640	6.630	6.360	6.090
397.5	230.6	3.680	5.200	5.970	6.300	6.340	6.350	6.150	5.840
398.0	227.3	3.580	5.040	5.770	6.050	6.070	6.070	5.920	5.620
398.5	224.1	3.480	4.860	5.530	5.770	5.820	5.820	5.710	5.400
399.0	220.8	3.380	4.660	5.280	5.510	5.550	5.550	5.460	5.160
399.5	217.6	3.270	4.460	5.020	5.230	5.300	5.300	5.240	4.940
400.0	214.3	3.180	4.260	4.760	4.950	5.050	5.020	5.020	4.720
400.5	211.0	3.070	4.020	4.460	4.660	4.770	4.800	4.800	4.500
401.0	207.7	2.970	3.770	4.140	4.370	4.490	4.560	4.560	4.280
401.5	204.7	2.870	3.530	3.830	4.090	4.250	4.320	4.320	4.080
402.0	201.1	2.760	3.250	3.480	3.720	3.980	4.110	4.110	3.860
402.5	197.9	2.660	2.960	3.110	3.500	3.750	3.900	3.900	3.650
403.0	194.6	2.550	2.640	2.730	3.210	3.480	3.690	3.690	3.430
403.5	191.4	2.460	2.350	2.380	2.950	3.270	3.490	3.490	3.270
404.0	188.1	2.350	1.990	1.990	2.660	3.030	3.290	3.290	3.030
404.5	184.9	2.240	1.580	1.580	2.360	2.820	3.100	3.100	2.820
405.0	181.6	2.140	1.250	1.250	2.100	2.610	2.910	2.910	2.590
405.5	178.3	2.040	.920	.920	1.840	2.360	2.750	2.750	2.420
406.0	175.1	1.940	.610	.610	1.600	2.120	2.570	2.570	2.200

RAM C-I AND C-II COMPUTED FLOW VELOCITY FOR PROBES 1 - 8

TIME	ALT	VF1	VF2	VF3	VF4	VF5	VF6	VF7	VF8
386.5	302.6	.850	1.070	1.170	1.240	1.310	1.360	1.420	1.470
387.0	299.2	.845	1.110	1.230	1.340	1.440	1.520	1.640	1.720
387.5	295.9	.840	1.140	1.300	1.450	1.600	1.700	1.850	1.970
388.0	292.6	.830	1.180	1.360	1.560	1.730	1.900	2.060	2.230
388.5	289.4	.825	1.200	1.430	1.660	1.880	2.060	2.275	2.450
389.0	286.1	.820	1.240	1.500	1.770	2.010	2.230	2.470	2.660
389.5	282.8	.818	1.270	1.570	1.870	2.150	2.420	2.710	2.910
390.0	279.6	.815	1.300	1.630	1.980	2.310	2.620	2.920	3.160
390.5	276.3	.810	1.330	1.700	2.080	2.430	2.770	3.120	3.400
391.0	273.0	.808	1.370	1.770	2.190	2.570	2.970	3.350	3.590
391.5	269.8	.805	1.400	1.830	2.300	2.720	3.140	3.560	3.860
392.0	266.5	.804	1.430	1.880	2.400	2.850	3.310	3.750	4.110
392.5	263.3	.810	1.460	1.980	2.500	2.980	3.450	3.940	4.350
393.0	260.0	.830	1.490	2.020	2.570	3.070	3.590	4.120	4.580
393.5	256.8	.850	1.520	2.070	2.630	3.160	3.720	4.300	4.780
394.0	253.5	.880	1.560	2.130	2.710	3.260	3.850	4.490	4.980
394.5	250.3	.910	1.600	2.200	2.790	3.370	3.990	4.660	5.180
395.0	247.0	.950	1.650	2.280	2.880	3.480	4.140	4.830	5.380
395.5	243.7	1.000	1.720	2.370	2.980	3.610	4.280	4.990	5.530
396.0	240.4	1.050	1.790	2.470	3.100	3.730	4.430	5.140	5.680
396.5	237.1	1.120	1.880	2.570	3.220	3.880	4.590	5.300	5.840
397.0	233.9	1.180	1.960	2.690	3.360	4.010	4.740	5.440	5.980
397.5	230.6	1.260	2.070	2.830	3.510	4.180	4.890	5.590	6.120
398.0	227.3	1.320	2.180	2.970	3.670	4.340	5.050	5.730	6.230
398.5	224.1	1.410	2.300	3.130	3.840	4.520	5.210	5.860	6.350
399.0	220.8	1.500	2.440	3.320	4.030	4.720	5.370	5.990	6.460
399.5	217.6	1.600	2.600	3.490	4.230	4.900	5.530	6.120	6.570
400.0	214.3	1.700	2.760	3.700	4.460	5.090	5.700	6.230	6.660
400.5	211.0	1.800	2.950	3.940	4.700	5.310	5.860	6.340	6.750
401.0	207.7	1.930	3.150	4.200	4.970	5.540	6.020	6.450	6.830
401.5	204.4	2.050	3.370	4.480	5.250	5.770	6.190	6.550	6.920
402.0	201.1	2.170	3.630	4.800	5.580	6.020	6.370	6.670	6.980
402.5	197.9	2.290	3.780	5.020	5.760	6.150	6.480	6.750	7.020
403.0	194.6	2.420	3.940	5.230	5.870	6.230	6.570	6.800	7.050
403.5	191.4	2.530	4.050	5.380	5.950	6.290	6.620	6.830	7.070
404.0	188.1	2.640	4.160	5.490	6.030	6.350	6.650	6.870	7.090
404.5	184.9	2.760	4.250	5.570	6.090	6.400	6.680	6.890	7.100
405.0	181.6	2.880	4.330	5.640	6.130	6.440	6.710	6.900	7.110
405.5	178.3	2.990	4.110	5.700	6.170	6.480	6.730	6.910	7.110
406.0	175.1	3.110	4.490	5.740	6.200	6.500	6.750	6.920	7.110

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 1

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.785	280989	.640	3.99E+08
389.829	280704	.640	4.00E+08
389.880	280375	.640	4.00E+08
389.925	280085	.640	4.00E+08
389.976	279753	.640	4.00E+08
390.021	279462	.640	4.00E+08
390.047	279295	.640	4.00E+08
390.072	279128	.490	3.06E+08
390.117	278835	.700	4.38E+08
390.143	278664	.640	4.00E+08
390.215	278192	.700	4.38E+08
390.240	278025	.710	4.45E+08
390.266	277845	.670	4.20E+08
390.310	277552	.700	4.39E+08
390.336	277382	.730	4.58E+08
390.362	277211	.700	4.39E+08
390.407	276912	.780	4.90E+08
390.433	276744	.790	4.97E+08
390.458	276575	.770	4.84E+08
390.503	276279	.850	5.36E+08
390.528	276114	.840	5.29E+08
390.553	275946	.800	5.04E+08
390.597	275658	.820	5.17E+08
390.623	275488	.860	5.43E+08
390.649	275317	.820	5.17E+08
390.694	275018	.860	5.43E+08
390.720	274847	.890	5.62E+08
390.746	274677	.890	5.62E+08
390.791	274366	.960	6.08E+08
390.816	274201	.960	6.08E+08
390.841	274037	1.000	6.34E+08
390.885	273745	1.206	7.69E+08
390.911	273579	1.123	7.15E+08
390.937	273411	1.061	6.74E+08
390.982	273116	1.191	7.60E+08
391.008	272947	1.283	8.21E+08
391.034	272775	1.106	7.05E+08
391.079	272486	1.156	7.38E+08
391.105	272321	1.153	7.36E+08
391.130	272156	1.159	7.40E+08
391.175	271867	1.286	8.24E+08
391.201	271703	1.457	9.37E+08
391.226	271539	1.465	9.43E+08
391.271	271277	1.421	9.13E+08
391.297	271111	1.413	9.09E+08
391.323	270944	1.401	9.01E+08
391.368	270653	1.387	8.92E+08
391.394	270486	1.417	9.12E+08
391.420	270319	1.280	8.22E+08
391.465	270026	1.401	9.02E+08
391.491	269860	1.496	9.66E+08
391.516	269693	1.564	1.01E+09
391.561	269401	1.501	9.69E+08
391.587	269234	1.524	9.85E+08
391.612	269067	1.544	9.98E+08
391.657	268772	1.564	1.01E+09
391.683	268603	1.595	1.03E+09
391.709	268433	1.544	9.99E+08
391.754	268110	1.645	1.07E+09
391.780	267941	1.640	1.06E+09
391.805	267772	1.737	1.13E+09
391.850	267476	1.939	1.27E+09
391.876	267306	1.835	1.20E+09
391.902	267139	1.797	1.17E+09
391.947	266844	1.972	1.29E+09
391.973	266675	1.998	1.31E+09
391.999	266507	1.657	1.08E+09
392.044	266213	1.791	1.17E+09
392.070	266047	2.077	1.37E+09
392.095	265882	2.651	1.78E+09
392.140	265592	3.769	2.63E+09
392.166	265426	3.837	2.68E+09
392.192	265260	4.229	2.99E+09
392.237	264969	3.235	2.22E+09
392.263	264831	3.208	2.20E+09
392.288	264666	2.764	1.87E+09
392.333	264378	2.693	1.82E+09
392.359	264212	2.421	1.62E+09
392.385	264045	3.257	2.24E+09
392.430	263753	4.064	2.87E+09
392.456	263585	4.500	3.22E+09
392.482	263417	5.487	4.03E+09
392.527	263123	6.247	4.67E+09
392.553	262954	8.247	6.47E+09
392.579	262785	6.811	5.17E+09
392.624	262489	6.819	5.17E+09
392.650	262320	6.819	5.17E+09
392.676	262150	6.897	5.24E+09
392.721	261857	5.839	4.34E+09
392.747	261680	6.381	4.80E+09
392.774	261482	6.451	4.86E+09
392.819	261182	6.381	4.81E+09
392.845	261012	6.522	4.93E+09
392.871	260842	7.055	5.40E+09
392.916	260546	6.817	5.19E+09
392.942	260377	7.477	5.78E+09
392.968	260208	7.130	5.47E+09
393.013	259914	8.456	6.71E+09
393.039	259746	11.467	5.77E+09
393.065	259579	10.485	8.74E+09
393.110	259286	10.815	9.09E+09
393.136	259117	11.794	1.01E+10
393.163	258949	10.924	9.21E+09
393.208	258655	7.130	5.48E+09
393.234	258491	7.300	5.64E+09
393.259	258352	6.451	4.89E+09
393.304	258065	5.439	4.03E+09
393.330	257899	4.767	3.47E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.356	257732	3.920	2.79E+09
393.401	257440	10.153	8.44E+09
393.427	257275	11.361	9.71E+09
393.452	257109	12.331	1.08E+10
393.497	256818	11.686	1.01E+10
393.523	256650	14.665	1.34E+10
393.549	256481	12.438	1.09E+10
393.594	256186	11.902	1.03E+10
393.620	256016	11.578	9.97E+09
393.646	255847	9.819	8.13E+09
393.691	255550	7.754	6.10E+09
393.717	255381	6.819	5.24E+09
393.742	255213	9.472	7.79E+09
393.787	254892	11.252	9.65E+09
393.813	254724	13.074	1.16E+10
393.838	254556	13.180	1.18E+10
393.883	254262	12.969	1.15E+10
393.909	254093	15.301	1.42E+10
393.935	253924	12.651	1.12E+10
393.980	253629	12.863	1.14E+10
394.006	253462	15.301	1.42E+10
394.031	253296	12.969	1.16E+10
394.075	253006	13.180	1.18E+10
394.102	252840	17.067	1.64E+10
394.127	252675	14.294	1.31E+10
394.172	252387	34.159	3.99E+10
394.197	252228	21.692	2.23E+10
394.222	252069	29.588	3.32E+10
394.265	251815	11.200	9.66E+09
394.291	251651	12.300	1.09E+10
394.316	251487	13.000	1.16E+10
394.361	251198	15.000	1.40E+10
394.387	251033	14.800	1.37E+10
394.412	250868	16.000	1.52E+10
394.457	250578	17.200	1.66E+10
394.483	250412	16.700	1.60E+10
394.508	250245	15.600	1.47E+10
394.553	249954	15.000	1.40E+10
394.579	249787	14.200	1.31E+10
394.604	249619	13.000	1.17E+10
394.649	249325	11.450	9.98E+09
394.676	249148	12.300	1.09E+10
394.703	248971	12.300	1.09E+10
394.750	248648	11.794	1.04E+10
394.776	248478	27.379	3.03E+10
394.802	248307	14.417	1.34E+10
394.847	248008	6.897	5.38E+09
394.873	247840	17.916	1.76E+10
394.898	247671	17.207	1.68E+10
394.943	247375	15.823	1.51E+10
394.969	247204	17.067	1.66E+10
394.995	247033	16.224	1.56E+10
395.040	246734	14.294	1.33E+10
395.066	246564	16.494	1.59E+10
395.092	246393	16.089	1.54E+10
395.137	246094	14.665	1.37E+10
395.163	245924	15.823	1.51E+10
395.189	245753	5.736	4.37E+09
395.234	245454	8.892	7.36E+09
395.260	245285	7.947	6.41E+09
395.285	245116	9.472	7.96E+09
395.330	244820	12.224	1.09E+10
395.356	244650	18.791	1.89E+10
395.382	244479	19.540	1.98E+10
395.427	244180	19.693	2.00E+10
395.453	244012	22.997	2.44E+10
395.478	243843	21.226	2.21E+10
395.523	243547	15.823	1.52E+10
395.549	243376	19.389	1.97E+10
395.575	243205	15.691	1.50E+10
395.620	242906	14.050	1.31E+10
395.646	242734	17.347	1.71E+10
395.673	242561	18.205	1.82E+10
395.718	242260	14.541	1.37E+10
395.744	242091	15.044	1.43E+10
395.769	241922	14.665	1.38E+10
395.814	241626	13.390	1.23E+10
395.840	241457	27.060	3.03E+10
395.865	241288	24.758	2.70E+10
395.910	240992	18.205	1.82E+10
395.936	240822	22.997	2.46E+10
395.962	240651	20.153	2.08E+10
396.007	240352	17.067	1.68E+10
396.033	240184	18.940	1.92E+10
396.058	240015	18.644	1.88E+10
396.103	239719	19.239	1.96E+10
396.129	239549	22.829	2.44E+10
396.155	239377	15.430	1.48E+10
396.200	239079	4.574	3.41E+09
396.226	238910	2.682	1.88E+09
396.251	238728	4.937	3.72E+09
396.296	238433	5.635	4.32E+09
396.322	238263	2.262	1.56E+09
396.348	238093	6.522	5.11E+09
396.393	237796	27.762	3.14E+10
396.419	237629	30.275	3.51E+10
396.444	237462	28.326	3.22E+10
396.489	237170	22.829	2.44E+10
396.515	237004	23.510	2.54E+10
396.540	236838	21.380	2.25E+10
396.585	236547	25.314	2.79E+10
396.611	236380	30.275	3.51E+10
396.637	236213	28.694	3.28E+10
396.682	235922	.959	6.35E+08
396.708	235756	1.020	6.77E+08
396.734	235590	1.231	8.22E+08
396.779	235325	1.009	6.70E+08
396.805	235161	1.203	8.03E+08

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
396.830	234997	1.016	6.75E+08
396.875	234708	17.630	1.76E+10
396.901	234541	16.359	1.60E+10
396.927	234374	14.791	1.41E+10
396.972	234081	9.817	8.44E+09
396.998	233914	21.692	2.29E+10
397.023	233748	29.934	3.47E+10
397.068	233456	29.588	3.42E+10
397.094	233287	32.913	3.92E+10
397.120	233117	32.323	3.83E+10
397.165	232821	1.249	8.36E+08
397.191	232653	1.147	7.65E+08
397.216	232484	1.219	8.15E+08
397.261	232177	.940	6.24E+08
397.286	232011	1.030	6.86E+08
397.311	231846	.940	6.24E+08
397.355	231556	1.080	7.20E+08
397.381	231387	2.520	1.76E+09
397.406	231218	1.850	1.26E+09
397.451	230922	1.980	1.35E+09
397.477	230751	11.700	1.05E+10
397.503	230580	11.700	1.05E+10
397.548	230282	22.000	2.34E+10
397.574	230113	25.900	2.88E+10
397.599	229944	25.900	2.88E+10
397.644	229648	28.500	3.26E+10
397.670	229477	28.500	3.26E+10
397.696	229307	29.200	3.36E+10
397.741	229008	30.000	3.48E+10
397.767	228825	30.250	3.52E+10
397.793	228654	28.500	3.26E+10
397.838	228356	23.200	2.51E+10
397.864	228185	21.000	2.21E+10
397.891	228014	13.000	1.20E+10
397.936	227715	29.934	3.48E+10
397.962	227547	34.274	4.14E+10
397.988	227378	34.026	4.10E+10
398.033	227084	33.871	4.07E+10
398.059	226917	49.622	6.63E+10
398.085	226749	39.820	5.01E+10
398.130	226457	14.541	1.39E+10
398.156	226292	25.314	2.80E+10
398.181	226127	8.351	6.96E+09
398.226	225840	3.144	2.26E+09
398.252	225699	2.343	1.63E+09
398.278	225533	1.453	9.81E+08
398.323	225243	6.976	5.60E+09
398.349	225078	12.969	1.20E+10
398.374	224913	17.067	1.69E+10
398.419	224624	27.762	3.15E+10
398.445	224456	34.804	4.20E+10
398.471	224289	34.291	4.12E+10
398.516	223995	33.993	4.07E+10
398.542	223828	46.742	6.11E+10
398.567	223661	5.685	4.41E+09
398.639	223193	6.247	4.91E+09
398.666	223018	12.117	1.10E+10
398.712	222712	1.160	7.78E+08
398.738	222543	1.020	6.82E+08
398.763	222349	.980	6.55E+08
398.808	222054	1.220	8.20E+08
398.834	221886	1.200	8.06E+08
398.859	221718	14.200	1.34E+10
398.904	221426	28.500	3.24E+10
399.151	219820	12.300	1.12E+10
399.196	219532	3.620	2.64E+09
399.222	219366	1.550	1.05E+09
399.248	219201	3.120	2.24E+09
399.293	218937	4.300	3.21E+09
399.317	218781	1.750	1.19E+09
399.342	218625	1.250	8.41E+08
399.409	218189	10.705	9.41E+09
399.624	216791	.900	6.01E+08
399.695	216322	1.500	1.01E+09
399.722	216150	8.100	6.69E+09
399.767	215838	11.700	1.05E+10
399.791	215679	10.000	8.63E+09
399.815	215521	12.650	1.15E+10
400.163	213223	.930	6.21E+08
400.189	213052	.940	6.28E+08
400.215	212881	1.000	6.68E+08
400.260	212584	1.020	6.82E+08
400.284	212426	1.010	6.75E+08
400.308	212267	.910	6.08E+08
400.646	210035	1.030	6.88E+08
400.672	209867	1.040	6.95E+08
400.699	209690	1.060	7.09E+08
400.744	209388	1.000	6.68E+08
400.770	209217	1.060	7.08E+08
400.796	209047	.920	6.13E+08
400.841	208749	1.070	7.15E+08
400.865	208591	4.700	3.69E+09
400.889	208433	6.500	5.10E+09
401.229	206187	1.030	6.86E+08
401.255	206016	1.060	7.06E+08
401.281	205846	.980	6.52E+08
401.326	205548	.900	5.99E+08
401.417	204946	1.082	7.21E+08
401.443	204776	3.020	2.13E+09
401.469	204605	32.323	3.57E+10
402.132	200244	2.750	1.91E+09
402.157	200083	3.750	2.70E+09
402.201	199800	1.810	1.21E+09
402.227	199634	1.190	7.89E+08
402.253	199494	1.040	6.90E+08
402.298	199203	.900	5.96E+08
402.422	198407	11.200	9.55E+09
402.447	198241	160.000	2.48E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
402.492	197950	175.000	2.75E+11
402.518	197782	151.500	2.31E+11
402.544	197614	138.000	2.06E+11
402.589	197319	120.000	1.73E+11
402.615	197151	113.000	1.61E+11
402.640	196983	1.120	7.41E+08
402.685	196689	1.190	7.87E+08
402.711	196517	.980	6.48E+08
402.738	196345	1.710	1.14E+09
402.783	196019	1.400	9.25E+08
402.809	195850	1.230	8.13E+08
402.834	195682	1.320	8.72E+08
402.879	195389	94.000	1.27E+11
402.905	195219	109.000	1.52E+11
402.931	195050	113.000	1.59E+11
402.976	194755	153.500	2.30E+11
403.002	194586	189.000	2.95E+11
403.028	194418	202.000	3.19E+11
403.073	194125	189.000	2.94E+11
403.099	193960	167.500	2.54E+11
403.124	193794	138.000	2.01E+11
403.169	193506	5.200	3.87E+09
403.195	193339	1.330	8.77E+08
403.221	193173	2.200	1.49E+09
403.266	192909	3.570	2.53E+09
403.292	192745	20.600	1.93E+10
403.317	192580	11.200	9.39E+09
403.362	192292	109.000	1.49E+11
403.388	192127	120.000	1.67E+11
403.413	191961	129.000	1.81E+11
403.458	191671	160.000	2.37E+11
403.484	191505	167.500	2.50E+11
403.509	191339	175.000	2.63E+11
403.554	191047	216.000	3.38E+11
403.580	190878	255.000	4.12E+11
403.606	190709	262.500	4.26E+11
403.651	190412	5.400	4.02E+09
403.677	190243	128.000	1.79E+11
403.703	190072	147.000	2.12E+11
403.748	189774	41.000	4.44E+10
403.774	189581	1.290	8.49E+08
403.799	189412	.900	5.93E+08
403.844	189119	138.000	1.95E+11
403.870	188950	128.000	1.78E+11
403.895	188782	128.000	1.78E+11
403.940	188489	216.000	3.33E+11
403.966	188321	255.000	4.05E+11
403.992	188152	290.000	4.71E+11
404.037	187859	290.000	4.71E+11
404.062	187699	307.500	5.04E+11
404.087	187538	255.000	4.03E+11
404.229	186621	.860	5.67E+08
404.255	186482	1.190	7.82E+08
404.280	186318	1.040	6.84E+08
404.325	186030	1.200	7.88E+08
404.351	185861	1.500	9.85E+08
404.378	185693	128.000	1.74E+11
404.423	185398	120.000	1.61E+11
404.448	185234	147.000	2.06E+11
404.474	185070	216.000	3.25E+11
404.518	184781	430.000	7.28E+11
404.544	184611	575.000	1.02E+12
404.571	184441	485.000	8.34E+11
404.616	184142	385.000	6.38E+11
404.641	183976	.760	5.01E+08
404.667	183810	.950	6.25E+08
404.711	183518	.900	5.92E+08
404.737	183348	.890	5.85E+08
404.763	183164	.860	5.66E+08
404.808	182866	1.000	6.57E+08
404.833	182699	.980	6.44E+08
404.859	182532	160.000	2.23E+11
404.903	182239	71.000	8.34E+10
404.929	182069	22.500	2.07E+10
404.955	181997	128.000	1.70E+11
405.000	181599	147.000	2.01E+11
405.026	181430	216.000	3.17E+11
405.051	181261	430.000	7.09E+11
405.096	180965	560.000	9.58E+11
405.122	180794	575.000	9.86E+11
405.148	180623	.840	5.52E+08
405.193	180325	.840	5.52E+08
405.218	180158	.940	6.17E+08
405.244	179991	.860	5.65E+08
405.288	179686	.860	5.65E+08
405.314	179517	.900	5.91E+08
405.339	179349	.910	5.97E+08
405.384	179055	262.500	3.94E+11
405.410	178886	216.000	3.12E+11
405.436	178717	157.500	2.31E+11
405.481	178422	30.000	2.89E+10
405.507	178256	160.000	2.18E+11
405.532	178090	138.000	1.82E+11
405.577	177799	216.000	3.10E+11
405.603	177634	345.000	5.36E+11
405.628	177469	417.500	6.68E+11
405.673	177180	442.500	7.12E+11
405.699	177016	442.500	7.11E+11
405.724	176851	455.000	7.34E+11
405.769	176565	520.000	8.53E+11
405.794	176403	695.000	1.18E+12
405.820	176242	1000.000	1.78E+12
405.864	175959	1000.000	1.77E+12
405.890	175797	1000.000	1.77E+12
405.915	175634	455.000	7.26E+11
405.960	175351	125.000	1.63E+11
405.986	175190	245.000	3.53E+11

(a) 1 meter · 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 2

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.640	281897	.670	3.93E+08
389.666	281729	.470	2.76E+08
389.737	281269	.670	3.93E+08
389.788	280969	.490	2.87E+08
389.832	280684	.720	4.23E+08
389.858	280519	.640	3.76E+08
389.884	280354	.700	4.11E+08
389.928	280064	.700	4.11E+08
389.954	279899	.730	4.29E+08
389.980	279733	.640	3.76E+08
390.024	279441	.670	3.94E+08
390.050	279274	.640	3.76E+08
390.076	279107	.640	3.76E+09
390.121	278814	.720	4.23E+08
390.147	278642	.700	4.11E+08
390.173	278471	.700	4.11E+08
390.218	278171	.800	4.70E+08
390.244	278004	.780	4.59E+08
390.269	277825	.760	4.47E+08
390.313	277531	.790	4.65E+08
390.339	277360	.760	4.47E+08
390.365	277190	.780	4.59E+08
390.410	276891	.840	4.94E+08
390.436	276722	.850	5.00E+08
390.462	276553	.840	4.94E+08
390.506	276259	.860	5.06E+08
390.531	276093	.820	4.82E+08
390.556	275929	.860	5.06E+08
390.600	275637	.850	5.00E+08
390.626	275466	.900	5.30E+08
390.652	275295	.860	5.06E+08
390.697	274997	.900	5.30E+08
390.723	274826	.840	4.94E+08
390.749	274655	.910	5.36E+08
390.794	274346	.910	5.36E+09
390.819	274181	1.040	6.13E+08
390.844	274016	1.000	5.89E+08
390.848	273727	1.064	6.27E+08
390.914	273559	1.020	6.01E+08
390.940	273389	.967	5.70E+08
390.985	273095	1.002	5.91E+08
391.011	272926	1.041	6.14E+08
391.037	272758	1.064	6.28E+08
391.082	272465	1.061	6.26E+08
391.108	272300	1.075	6.34E+08
391.134	272135	1.147	6.77E+08
391.178	271847	1.257	7.43E+08
391.204	271682	1.275	7.53E+08
391.230	271519	1.269	7.50E+08
391.274	271256	1.303	7.69E+08
391.300	271090	1.312	7.75E+08
391.326	270924	1.194	7.05E+08
391.371	270632	1.280	7.57E+08
391.397	270465	1.275	7.54E+08
391.423	270298	1.254	7.42E+08
391.468	270005	1.312	7.76E+08
391.494	269829	1.359	8.04E+08
391.520	269673	1.380	8.17E+08
391.564	269381	1.383	8.19E+08
391.590	269213	1.448	8.58E+08
391.616	269046	1.353	8.07E+08
391.660	268752	1.387	8.21E+08
391.686	268562	1.505	8.92E+08
391.712	268412	1.501	8.89E+08
391.757	268069	1.617	9.59E+08
391.783	267920	1.559	9.24E+08
391.809	267751	1.753	1.05E+09
391.853	267457	1.617	9.59E+08
391.879	267287	1.923	1.14E+09
391.905	267119	1.687	1.00E+09
391.950	266827	1.717	1.02E+09
391.976	266654	1.859	1.10E+09
392.002	266486	1.692	1.00E+09
392.047	266192	1.799	1.07E+09
392.073	266027	2.079	1.24E+09
392.099	265861	2.464	1.47E+09
392.143	265572	2.934	1.75E+09
392.169	265405	3.937	2.36E+09
392.195	265239	3.964	2.38E+09
392.240	264949	3.461	2.11E+09
392.266	[illegible]	3.537	2.14E+09
392.292	264645	2.715	1.63E+09
392.336	264354	2.192	1.30E+09
392.362	264191	2.792	1.67E+09
392.388	264024	3.081	1.86E+09
392.432	263737	4.574	2.87E+09
392.458	263564	4.852	3.06E+09
392.484	263396	5.890	3.80E+09
392.530	263102	7.650	5.12E+09
392.556	262933	7.548	5.05E+09
392.582	262764	8.045	5.41E+09
392.627	262468	7.460	5.12E+09
392.653	262299	6.667	4.38E+09
392.679	262129	7.754	5.19E+09
392.725	261830	6.119	3.98E+09
392.751	261637	7.477	4.99E+09
392.777	261461	7.214	4.79E+09
392.822	261160	7.754	5.20E+09
392.848	260995	7.398	4.92E+09
392.874	260821	8.351	5.66E+09
392.919	260525	7.130	4.73E+09
392.945	260356	7.477	4.99E+09
392.971	260187	8.345	5.43E+09
393.016	259893	10.047	7.01E+09
393.042	259725	11.469	8.20E+09
393.068	259559	12.009	8.66E+09
393.114	259265	12.117	8.75E+09
393.140	259056	12.757	9.30E+09
393.166	258928	12.117	8.76E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.211	258635	9.119	6.28E+09
393.237	258471	10.153	7.12E+09
393.263	258332	7.300	4.87E+09
393.307	258044	6.451	4.24E+09
393.333	257878	4.429	2.79E+09
393.359	257711	7.130	4.75E+09
393.404	257420	12.757	9.32E+09
393.430	257254	13.929	1.04E+10
393.456	257088	14.917	1.12E+10
393.500	256797	15.044	1.13E+10
393.526	256629	14.917	1.12E+10
393.552	256460	14.171	1.06E+10
393.597	256165	13.929	1.04E+10
393.623	255995	12.969	9.52E+09
393.649	255826	12.117	8.79E+09
393.694	255529	9.353	6.49E+09
393.720	255360	9.708	6.78E+09
393.746	255192	11.469	8.24E+09
393.790	254871	14.171	1.06E+10
393.816	254703	14.917	1.13E+10
393.842	254535	15.560	1.18E+10
393.886	254241	15.044	1.14E+10
393.912	254071	15.560	1.18E+10
393.938	253902	15.823	1.21E+10
393.983	253608	14.917	1.13E+10
394.009	253442	15.823	1.21E+10
394.035	253275	16.224	1.25E+10
394.079	252985	16.652	1.29E+10
394.105	252820	17.067	1.32E+10
394.131	252655	17.630	1.38E+10
394.175	252367	15.301	1.16E+10
394.200	252208	14.791	1.12E+10
394.225	252049	13.074	9.66E+09
394.268	251795	13.900	1.04E+10
394.294	251631	15.300	1.16E+10
394.320	251466	16.700	1.29E+10
394.364	251178	18.000	1.41E+10
394.390	251013	20.200	1.62E+10
394.416	250847	22.500	1.85E+10
394.460	250557	25.000	2.10E+10
394.486	250391	24.000	2.00E+10
394.512	250225	21.500	1.75E+10
394.556	249933	18.000	1.42E+10
394.582	249766	17.200	1.34E+10
394.608	249598	15.600	1.19E+10
394.653	249303	14.600	1.10E+10
394.680	249126	15.300	1.17E+10
394.707	248949	15.000	1.14E+10
394.753	248627	15.132	1.16E+10
394.779	248456	16.652	1.29E+10
394.805	248286	16.089	1.24E+10
394.850	247987	11.902	8.68E+09
394.876	247818	24.942	2.10E+10
394.902	247649	23.684	1.97E+10
394.946	247353	21.073	1.72E+10
394.972	247183	20.773	1.69E+10
394.998	247012	19.389	1.55E+10
395.043	246713	18.940	1.51E+10
395.069	246542	19.239	1.54E+10
395.095	246372	19.540	1.57E+10
395.140	246073	19.239	1.54E+10
395.166	245902	18.644	1.48E+10
395.192	245731	7.300	4.94E+09
395.237	245433	10.815	7.78E+09
395.263	245264	9.472	6.66E+09
395.289	245095	11.578	8.43E+09
395.333	244799	13.074	9.73E+09
395.359	244628	26.662	2.28E+10
395.385	244458	26.860	2.30E+10
395.430	244159	28.511	2.47E+10
395.456	243990	27.571	2.37E+10
395.482	243821	27.379	2.35E+10
395.526	243525	22.333	1.84E+10
395.552	243355	21.692	1.78E+10
395.578	243184	20.464	1.66E+10
395.624	242885	18.940	1.51E+10
395.650	242712	14.791	1.13E+10
395.676	242540	17.207	1.35E+10
395.721	242239	22.497	1.86E+10
395.747	242070	24.576	2.07E+10
395.773	241901	25.127	2.12E+10
395.817	241605	23.167	1.93E+10
395.843	241436	32.473	2.92E+10
395.869	241267	31.259	2.77E+10
395.913	240971	28.876	2.51E+10
395.939	240800	29.056	2.53E+10
395.965	240630	28.140	2.43E+10
396.010	240331	23.510	1.96E+10
396.036	240162	27.379	2.35E+10
396.062	239993	26.270	2.24E+10
396.106	239697	28.511	2.47E+10
396.132	239527	30.774	2.72E+10
396.158	239356	20.629	1.68E+10
396.203	239058	9.005	6.31E+09
396.229	238889	7.660	5.24E+09
396.255	238707	8.456	5.87E+09
396.299	238412	9.119	6.41E+09
396.325	238241	7.947	5.47E+09
396.351	238072	37.313	3.44E+10
396.396	237776	34.274	3.10E+10
396.422	237608	33.871	3.05E+10
396.449	237441	34.291	3.10E+10
396.492	237149	31.575	2.80E+10
396.518	236983	30.275	2.66E+10
396.544	236817	30.609	2.69E+10
396.588	236527	32.323	2.88E+10
396.614	236359	33.369	2.99E+10
396.640	236193	34.291	3.10E+10
396.685	235901	.963	5.82E+08

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
396.711	235735	.905	5.48E+08
396.737	235569	.853	5.16E+08
396.782	235305	.967	5.85E+08
396.808	235141	.951	5.76E+08
396.834	234976	1.002	6.07E+08
396.878	234687	28.976	2.51E+10
396.904	234520	18.791	1.50E+10
396.930	234353	13.390	1.01E+10
396.975	234060	15.691	1.21E+10
397.001	233893	32.323	2.88E+10
397.027	233727	30.937	2.73E+10
397.071	233434	38.313	3.56E+10
397.097	233265	45.441	4.39E+10
397.123	233096	44.999	4.34E+10
397.168	232800	1.120	6.79E+08
397.194	232631	1.237	7.50E+08
397.220	232463	.999	6.06E+08
397.264	232156	1.070	6.49E+08
397.289	231990	.900	5.46E+08
397.314	231825	1.040	6.31E+08
397.358	231525	1.350	8.19E+08
397.384	231365	12.650	9.43E+09
397.410	231197	10.000	7.17E+09
397.454	230901	14.600	1.11E+10
397.480	230730	17.200	1.35E+10
397.506	230559	18.700	1.49E+10
397.551	230261	30.000	2.62E+10
397.577	230092	33.000	2.95E+10
397.603	229923	39.000	3.50E+10
397.647	229627	42.000	3.96E+10
397.673	229456	45.000	4.31E+10
397.699	229285	43.000	4.08E+10
397.744	228987	48.000	4.67E+10
397.770	228803	42.000	3.96E+10
397.796	228635	42.000	3.96E+10
397.842	228335	33.000	2.94E+10
397.868	228164	29.600	2.57E+10
397.894	227993	18.700	1.49E+10
397.939	227694	41.081	3.85E+10
397.965	227526	48.422	4.75E+10
397.991	227357	51.170	5.04E+10
398.036	227063	59.329	6.04E+10
398.062	226896	67.564	7.09E+10
398.088	226728	70.645	7.48E+10
398.132	226436	24.465	2.24E+10
398.159	226272	51.546	5.07E+10
398.195	226107	16.552	1.30E+10
398.229	225819	5.892	3.92E+09
398.255	225638	2.934	1.75E+09
398.281	225513	1.906	1.16E+09
398.326	225222	15.423	1.22E+10
398.352	225058	27.571	2.35E+10
398.378	224893	31.867	2.81E+10
398.422	224603	36.708	3.33E+10
398.448	224435	47.587	4.58E+10
398.474	224268	53.215	5.26E+10
398.519	223974	60.372	6.13E+10
398.545	223807	65.811	6.94E+10
398.571	223640	10.485	7.57E+09
398.642	221171	30.275	2.63E+10
398.669	222996	34.678	3.10E+10
398.715	222691	1.120	6.93E+08
398.741	222522	1.120	6.93E+08
398.767	222328	2.470	1.52E+09
398.811	222033	2.500	1.60E+09
398.837	221865	2.600	1.60E+09
398.862	221657	24.000	1.98E+10
398.907	221405	39.290	3.47E+10
399.155	219903	2.970	1.85E+09
399.199	219511	3.300	2.07E+09
399.225	219445	2.087	1.27E+09
399.251	219209	4.550	2.95E+09
399.296	218917	2.220	1.36E+09
399.322	218761	2.130	1.30E+09
399.345	218505	1.810	1.10E+09
399.412	218168	1.231	7.51E+08
399.627	216773	1.140	6.97E+08
399.699	216301	2.420	1.75E+09
399.725	216129	14.600	1.10E+10
399.770	215818	14.600	1.10E+10
399.796	215660	19.700	1.46E+10
399.838	215502	54.500	5.25E+10
400.166	213201	1.020	6.24E+08
400.192	213031	1.200	7.33E+08
400.218	212867	1.120	6.85E+08
400.243	212564	1.200	7.33E+08
400.297	212406	1.160	7.09E+08
400.311	212247	1.130	6.91E+08
400.650	210013	1.030	6.31E+08
400.676	209841	1.010	6.19E+08
400.702	209668	1.041	6.37E+08
400.747	209367	1.040	6.37E+08
400.773	209156	1.000	6.13E+08
400.799	209025	.900	5.52E+08
400.844	208720	.980	6.01E+08
400.868	208571	11.700	8.42E+09
400.892	208413	14.200	1.05E+10
401.232	206166	.970	5.95E+08
401.258	205995	.970	5.95E+08
401.284	205824	.910	5.59E+08
401.329	205528	.830	5.10E+08
401.446	204754	1.053	6.46E+08
401.472	204583	.865	5.31E+08
402.135	200224	24.000	1.85E+10
402.160	200063	48.000	4.15E+10
402.204	199779	2.420	1.76E+09
402.230	199613	13.000	9.27E+09
402.256	199473	1.350	8.26E+08
402.302	199182	1.470	8.99E+08
402.425	198386	32.000	2.58E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
402.425	198386	32.000	2.58E+10
402.451	198221	307.000	3.66E+11
402.495	197929	337.000	4.06E+11
402.521	197761	280.000	3.28E+11
402.547	197593	255.000	2.94E+11
402.592	197298	202.000	2.24E+11
402.618	197130	175.000	1.89E+11
402.644	196962	2.470	1.54E+09
402.699	196667	6.000	3.98E+09
402.715	196495	3.050	1.93E+09
402.741	196323	3.050	1.93E+09
402.786	195998	2.900	1.83E+09
402.812	195829	1.580	9.71E+08
402.838	195661	1.220	7.52E+08
402.882	195367	147.000	1.53E+11
402.908	195198	189.000	2.05E+11
402.934	195029	216.000	2.40E+11
402.979	194734	345.000	4.10E+11
403.005	194565	405.000	4.92E+11
403.031	194397	417.500	5.09E+11
403.076	194105	385.000	4.64E+11
403.102	193939	345.000	4.09E+11
403.128	193774	280.000	3.22E+11
403.172	193485	2.470	1.55E+09
403.198	193319	3.200	2.04E+09
403.224	193152	8.500	5.85E+09
403.269	192988	19.500	1.46E+10
403.295	192724	48.000	4.12E+10
403.321	192560	20.200	1.52E+10
403.365	192271	189.000	2.04E+11
403.391	192106	216.000	2.38E+11
403.417	191941	262.500	2.99E+11
403.461	191651	325.000	3.80E+11
403.487	191484	365.000	4.34E+11
403.513	191318	405.000	4.84E+11
403.557	191026	485.000	5.97E+11
403.583	190857	575.000	7.23E+11
403.609	190688	590.000	7.44E+11
403.654	190391	25.900	2.03E+10
403.680	190221	202.000	2.20E+11
403.706	190051	270.000	3.07E+11
403.751	189728	69.000	6.28E+10
403.777	189559	1.030	6.44E+08
403.803	189391	.900	5.64E+08
403.847	189097	235.000	2.61E+11
403.873	188929	235.000	2.61E+11
403.899	188761	95.000	9.13E+10
403.943	188468	485.000	5.94E+11
403.969	188300	620.000	7.81E+11
403.995	188131	695.000	8.86E+11
404.040	187839	590.000	7.39E+11
404.065	187678	593.000	7.38E+11
404.090	187518	540.000	6.69E+11
404.232	186600	.820	5.10E+08
404.258	186461	1.300	8.20E+08
404.294	186297	.980	6.29E+08
404.329	186009	1.160	7.34E+08
404.355	185840	30.000	2.43E+10
404.381	185672	255.000	2.87E+11
404.426	185378	235.000	2.62E+11
404.452	185214	345.000	4.05E+11
404.477	185049	520.000	6.41E+11
404.522	184760	1000.000	1.32E+12
404.548	184590	1000.000	1.32E+12
404.574	184419	1000.000	1.32E+12
404.619	184121	1000.000	1.32E+12
404.645	183955	.640	4.10E+08
404.673	183789	.640	4.10E+08
404.714	183497	.780	4.99E+08
404.749	183126	.700	4.49E+08
404.766	183143	.860	5.55E+08
404.811	182445	.740	4.74E+08
404.837	182678	.860	5.51E+08
404.962	182511	325.000	3.76E+11
404.936	182237	64.000	5.86E+10
404.932	182047	83.000	7.07E+10
404.958	181876	216.000	2.39E+11
405.033	181678	345.000	4.09E+11
405.029	181469	520.000	6.41E+11
405.055	181240	1000.000	1.32E+12
405.099	180944	1000.000	1.32E+12
405.125	180773	1000.000	1.32E+12
405.151	180602	1.230	7.91E+08
405.196	180304	.840	5.41E+08
405.222	180137	.900	5.82E+08
405.247	179970	.760	4.97E+08
405.291	179665	.900	5.86E+08
405.317	179496	.900	5.86E+08
405.343	179328	.860	5.61E+08
405.397	179034	520.000	6.86E+11
405.413	178865	430.000	5.56E+11
405.439	178696	270.000	3.29E+11
405.484	178401	60.000	5.79E+10
405.510	178235	325.000	4.07E+11
405.536	178069	270.000	3.30E+11
405.590	177779	485.000	6.36E+11
405.606	177613	710.000	9.67E+11
405.632	177448	1000.000	1.40E+12
405.676	177160	1000.000	1.40E+12
405.702	176995	1000.000	1.39E+12
405.728	176831	1000.000	1.39E+12
405.772	176545	1000.000	1.37E+12
405.798	176383	1000.000	1.37E+12
405.823	176221	1000.000	1.36E+12
405.867	175939	1000.000	1.35E+12
405.893	175776	1000.000	1.34E+12
405.919	175614	1000.000	1.33E+12
405.963	175331	202.000	2.24E+11
405.989	175169	560.000	6.92E+11

[a]1 meter = 0.3040 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 3

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.669	281708	.470	2.63E+08
389.740	281248	.670	3.76E+08
389.836	280663	.640	3.59E+08
389.861	280498	.640	3.59E+08
389.887	280333	.640	3.59E+08
389.932	280044	.670	3.76E+08
389.957	279878	.760	4.26E+08
389.983	279712	.670	3.76E+08
390.028	279420	.700	3.93E+08
390.053	279254	.640	3.59E+08
390.079	279087	.700	3.93E+08
390.124	278792	.720	4.04E+08
390.150	278621	.740	4.15E+08
390.176	278449	.760	4.26E+08
390.221	278150	.780	4.38E+08
390.247	277983	.780	4.38E+08
390.272	277804	.830	4.66E+08
390.317	277510	.880	4.94E+08
390.343	277339	.860	4.82E+08
390.368	277168	.900	5.05E+08
390.414	276870	.820	4.60E+08
390.439	276701	.910	5.11E+08
390.465	276532	.860	4.83E+08
390.509	276238	.910	5.11E+08
390.534	276073	.960	5.39E+08
390.560	275907	.940	5.28E+08
390.604	275616	.940	5.28E+08
390.630	275445	.950	5.33E+08
390.655	275274	.920	5.17E+08
390.701	274975	.910	5.11E+08
390.727	274805	.980	5.50E+08
390.752	274621	1.000	5.62E+08
390.797	274325	1.140	6.40E+08
390.822	274160	1.200	6.74E+08
390.848	273996	1.220	6.85E+08
390.892	273706	1.260	7.08E+08
390.918	273537	1.209	6.79E+08
390.943	273368	1.231	6.92E+08
390.989	273073	1.246	7.00E+08
391.015	272905	1.260	7.08E+08
391.040	272738	1.297	7.29E+08
391.086	272445	1.280	7.19E+08
391.111	272280	1.380	7.75E+08
391.137	272115	1.421	7.98E+08
391.182	271826	1.580	8.87E+08
391.207	271662	1.757	9.86E+08
391.233	271498	1.777	9.98E+08
391.278	271235	1.835	1.03E+09
391.304	271069	1.663	9.34E+08
391.329	270903	1.704	9.57E+08
391.375	270611	1.723	9.68E+08
391.401	270444	1.730	9.72E+08
391.426	270277	1.981	1.11E+09
391.472	269984	1.791	1.01E+09
391.497	269818	1.931	1.08E+09
391.523	269652	1.947	1.09E+09
391.568	269360	1.923	1.08E+09
391.593	269192	2.052	1.15E+09
391.619	269025	2.128	1.20E+09
391.664	268731	2.215	1.24E+09
391.690	268561	2.560	1.44E+09
391.715	268390	2.355	1.32E+09
391.761	268068	2.651	1.49E+09
391.786	267899	2.731	1.53E+09
391.812	267730	2.815	1.58E+09
391.857	267436	3.020	1.70E+09
391.883	267266	3.101	1.75E+09
391.908	267097	3.060	1.73E+09
391.954	266801	2.904	1.63E+09
391.980	266633	3.302	1.87E+09
392.005	266465	2.748	1.54E+09
392.051	266172	3.507	2.00E+09
392.076	266006	4.135	2.39E+09
392.102	265840	5.250	3.10E+09
392.147	265551	6.381	3.84E+09
392.173	265384	7.056	4.30E+09
392.198	265218	7.130	4.35E+09
392.244	264928	6.313	3.80E+09
392.269	264790	5.438	3.22E+09
392.295	264625	5.024	2.95E+09
392.340	264337	5.296	3.12E+09
392.366	264170	5.685	3.38E+09
392.391	264003	5.994	3.58E+09
392.437	263711	6.819	4.13E+09
392.463	263543	8.351	5.10E+09
392.488	263375	9.235	5.81E+09
392.534	263081	11.469	7.43E+09
392.560	262912	11.252	7.27E+09
392.585	262742	12.757	8.40E+09
392.631	262447	11.143	7.19E+09
392.657	262277	10.705	6.87E+09
392.682	262108	10.705	6.87E+09
392.728	261809	9.472	5.98E+09
392.754	261612	10.264	6.56E+09
392.780	261435	10.595	6.80E+09
392.826	261139	11.469	7.45E+09
392.852	260969	10.264	6.56E+09
392.877	260800	11.469	7.45E+09
392.923	260504	10.485	6.73E+09
392.949	260335	10.595	6.81E+09
392.974	260166	11.469	7.45E+09
393.020	259872	13.454	8.96E+09
393.046	259704	14.751	9.99E+09
393.071	259537	16.089	1.10E+10
393.117	259244	16.494	1.13E+10
393.143	259075	17.067	1.18E+10
393.169	258907	16.494	1.13E+10
393.215	258614	13.690	9.15E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.240	258450	12.969	8.60E+09
393.266	258311	11.902	7.79E+09
393.311	258023	9.353	5.92E+09
393.337	257857	7.300	4.48E+09
393.362	257690	11.578	7.55E+09
393.408	257399	16.928	1.17E+10
393.433	257233	18.644	1.31E+10
393.459	257067	21.073	1.51E+10
393.504	256776	22.997	1.67E+10
393.530	256608	22.010	1.59E+10
393.555	256439	20.464	1.46E+10
393.601	256143	18.497	1.30E+10
393.627	255974	16.928	1.17E+10
393.652	255805	16.928	1.17E+10
393.698	255508	12.757	8.46E+09
393.723	255339	13.454	8.99E+09
393.749	255170	16.224	1.12E+10
393.794	254850	19.845	1.41E+10
393.819	254682	21.226	1.53E+10
393.845	254514	21.850	1.58E+10
393.890	254219	21.535	1.55E+10
393.916	254050	22.829	1.66E+10
393.941	253881	22.333	1.62E+10
393.987	253587	22.171	1.61E+10
394.012	253421	22.829	1.66E+10
394.038	253255	24.215	1.78E+10
394.083	252964	24.942	1.84E+10
394.108	252799	25.883	1.93E+10
394.134	252634	25.127	1.86E+10
394.178	252347	21.850	1.58E+10
394.203	252188	19.239	1.36E+10
394.228	252029	16.652	1.15E+10
394.272	251774	18.000	1.26E+10
394.297	251610	21.500	1.55E+10
394.323	251446	24.000	1.76E+10
394.368	251157	27.250	2.05E+10
394.393	250992	28.500	2.16E+10
394.419	250826	30.500	2.33E+10
394.464	250536	32.000	2.47E+10
394.489	250370	31.000	2.38E+10
394.515	250204	30.250	2.31E+10
394.560	249912	27.000	2.02E+10
394.585	249745	26.500	1.98E+10
394.611	249577	22.500	1.64E+10
394.656	249280	18.700	1.32E+10
394.683	249104	22.500	1.64E+10
394.710	248926	19.100	1.35E+10
394.757	248606	18.960	1.34E+10
394.783	248435	20.153	1.44E+10
394.808	248264	24.576	1.82E+10
394.854	247966	28.326	2.14E+10
394.879	247797	33.057	2.57E+10
394.905	247628	32.473	2.51E+10
394.950	247332	31.259	2.40E+10
394.976	247161	30.443	2.33E+10
395.001	246991	29.934	2.28E+10
395.047	246692	28.876	2.19E+10
395.073	246521	29.235	2.22E+10
395.098	246350	30.105	2.30E+10
395.144	246057	29.412	2.24E+10
395.170	245881	29.588	2.25E+10
395.195	245710	12.224	8.11E+09
395.241	245412	11.578	7.62E+09
395.266	245243	14.665	1.00E+10
395.292	245074	17.630	1.24E+10
395.337	244778	16.359	1.13E+10
395.363	244607	34.679	2.72E+10
395.388	244436	34.929	2.75E+10
395.434	244139	34.604	2.71E+10
395.459	243969	34.929	2.74E+10
395.485	243800	34.550	2.71E+10
395.530	243504	30.443	2.33E+10
395.556	243333	30.443	2.33E+10
395.581	243163	30.105	2.30E+10
395.627	242863	29.762	2.27E+10
395.653	242691	22.333	1.62E+10
395.679	242519	29.588	2.25E+10
395.725	242218	33.619	2.61E+10
395.750	242047	34.026	2.65E+10
395.776	241880	33.871	2.63E+10
395.821	241584	31.867	2.44E+10
395.846	241415	45.880	3.79E+10
395.872	241246	36.708	2.90E+10
395.917	240950	37.634	2.98E+10
395.943	240779	34.274	2.66E+10
395.968	240608	33.892	2.63E+10
396.014	240310	33.892	2.63E+10
396.039	240141	34.421	2.68E+10
396.065	239972	33.993	2.64E+10
396.110	239676	35.415	2.77E+10
396.136	239505	37.004	2.92E+10
396.161	239335	12.009	7.94E+09
396.207	239036	13.929	9.40E+09
396.232	238867	13.454	9.04E+09
396.258	238686	13.690	9.24E+09
396.303	238390	13.454	9.06E+09
396.329	238220	14.294	9.72E+09
396.354	238050	60.024	5.27E+10
396.400	237755	55.563	4.80E+10
396.425	237587	53.882	4.67E+10
396.451	237420	52.647	4.49E+10
396.496	237129	39.041	3.13E+10
396.521	236962	34.788	2.73E+10
396.547	236796	36.708	2.91E+10
396.592	236506	45.441	3.76E+10
396.618	236339	48.822	4.10E+10
396.643	236172	34.026	2.65E+10
396.689	235981	1.086	6.26E+08

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
396.715	235715	.995	5.75E+08
396.740	235549	1.068	6.16E+08
396.786	235284	1.194	6.88E+08
396.811	235120	1.031	5.95E+08
396.837	234955	1.203	6.94E+08
396.882	234666	34.433	2.69E+10
396.908	234499	30.774	2.35E+10
396.933	234332	18.205	1.28E+10
396.979	234039	27.952	2.10E+10
397.004	233873	46.742	3.88E+10
397.030	233706	56.581	4.88E+10
397.075	233413	61.071	5.35E+10
397.101	233244	69.477	6.25E+10
397.126	233075	69.477	6.25E+10
397.172	232779	.100	5.81E+07
397.197	232610	.931	5.37E+08
397.223	232442	1.218	7.03E+08
397.267	232135	.770	4.46E+08
397.292	231970	.760	4.41E+08
397.318	231804	.980	5.67E+08
397.362	231513	2.250	1.29E+09
397.387	231344	16.000	1.10E+10
397.413	231176	16.000	1.10E+10
397.458	230879	22.000	1.59E+10
397.484	230708	30.500	2.31E+10
397.509	230538	29.200	2.20E+10
397.555	230240	42.000	3.39E+10
397.580	230071	53.000	4.48E+10
397.606	229902	59.000	5.09E+10
397.651	229605	69.000	6.14E+10
397.677	229435	72.250	6.49E+10
397.702	229264	71.000	6.35E+10
397.748	228965	69.000	6.13E+10
397.774	228782	58.000	4.98E+10
397.799	228612	64.000	5.60E+10
397.845	228314	50.250	4.18E+10
397.871	228142	38.100	3.00E+10
397.897	227971	28.500	2.13E+10
397.943	227673	66.811	5.88E+10
397.969	227505	72.626	6.50E+10
397.994	227336	76.871	6.95E+10
398.040	227042	89.125	8.29E+10
398.066	226875	101.299	9.68E+10
398.091	226707	107.135	1.03E+11
398.137	226416	89.764	8.35E+10
398.162	226251	86.184	7.95E+10
398.188	226086	13.393	9.00E+09
398.233	225798	6.897	4.29E+09
398.259	225658	1.784	1.03E+09
398.284	225492	2.250	1.29E+09
398.330	225202	34.291	2.64E+10
398.355	225037	37.967	2.97E+10
398.381	224872	50.015	4.13E+10
398.426	224582	63.187	5.45E+10
398.452	224414	71.828	6.35E+10
398.477	224247	80.533	7.28E+10
398.522	223953	91.094	8.42E+10
398.548	223786	100.503	9.47E+10
398.574	223619	16.224	1.11E+10
398.619	223324	4.500	2.70E+09
398.646	223149	69.477	6.08E+10
398.672	222974	34.985	2.68E+10
398.719	222670	13.000	8.68E+09
398.744	222501	1.750	1.01E+09
398.770	222307	16.700	1.15E+10
398.815	222012	5.600	3.42E+09
398.840	221844	6.500	4.02E+09
398.866	221676	33.000	2.50E+10
398.910	221387	61.500	5.21E+10
399.132	219944	73.500	6.41E+10
399.158	219779	10.500	6.83E+09
399.203	219491	10.500	6.83E+09
399.229	219325	7.000	4.37E+09
399.254	219184	12.300	8.14E+09
399.299	218898	10.000	6.47E+09
399.323	218742	4.900	2.97E+09
399.348	218586	15.600	1.06E+10
399.630	216749	1.370	7.97E+08
399.676	216451	.760	4.45E+08
399.702	216279	13.000	8.63E+09
399.728	216107	19.100	1.32E+10
399.773	215798	17.200	1.18E+10
399.797	215640	18.000	1.24E+10
399.821	215481	102.000	9.26E+10
400.170	213180	1.470	8.55E+08
400.196	213009	1.600	9.30E+08
400.221	212839	1.260	7.35E+08
400.266	212544	1.370	7.98E+08
400.290	212386	1.370	7.98E+08
400.314	212228	1.450	8.44E+08
400.653	209992	1.060	6.20E+08
400.679	209819	1.120	6.55E+08
400.705	209647	1.030	6.03E+08
400.751	209345	.950	5.57E+08
400.777	209175	.810	4.75E+08
400.802	209004	1.000	5.86E+08
400.847	208710	.900	5.28E+08
400.871	208551	18.000	1.22E+10
400.895	208393	21.500	1.48E+10
401.236	206144	.960	5.63E+08
401.262	205974	.920	5.40E+08
401.287	205803	.813	4.76E+08
401.332	205508	.813	4.76E+08
401.475	204562	3.122	1.86E+09
402.138	200204	14.200	9.23E+09
402.164	200047	51.000	3.77E+10
402.208	199759	6.500	4.02E+09
402.234	199593	15.000	9.78E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
402.259	199452	1.320	7.79E+08
402.305	199161	22.500	1.51E+10
402.428	198366	605.000	6.06E+11
402.454	198200	590.000	5.89E+11
402.499	197908	560.000	5.55E+11
402.525	197740	485.000	4.73E+11
402.550	197572	395.000	3.65E+11
402.596	197277	280.000	2.56E+11
402.621	197109	60.000	4.49E+10
402.647	196941	21.000	1.40E+10
402.692	196646	2.250	1.34E+09
402.718	196474	2.600	1.56E+09
402.744	196302	5.050	3.09E+09
402.790	195976	16.000	1.05E+10
402.815	195808	10.000	6.34E+09
402.841	195640	5.600	3.44E+09
402.886	195346	255.000	2.28E+11
402.912	195176	307.500	2.80E+11
402.937	195007	417.500	3.93E+11
402.983	194713	680.000	6.72E+11
403.009	194544	860.000	8.65E+11
403.034	194376	1000.000	1.02E+12
403.080	194084	820.000	8.19E+11
403.105	193918	620.000	6.04E+11
403.131	193753	430.000	4.04E+11
403.176	193464	4.400	2.69E+09
403.202	193298	12.300	7.91E+09
403.227	193132	4.400	2.69E+09
403.273	192868	30.000	2.07E+10
403.298	192704	35.900	2.52E+10
403.324	192539	43.000	3.08E+10
403.369	192251	307.500	2.77E+11
403.394	192085	385.000	3.55E+11
403.420	191920	430.000	4.01E+11
403.465	191630	560.000	5.35E+11
403.490	191464	660.000	6.40E+11
403.516	191297	880.000	8.73E+11
403.561	191005	1000.000	1.00E+12
403.587	190836	1000.000	1.00E+12
403.612	190667	1000.000	1.00E+12
403.658	190370	65.000	4.86E+10
403.684	190200	202.000	1.73E+11
403.709	190030	375.000	3.44E+11
403.755	189707	33.000	2.31E+10
403.780	189538	.840	5.02E+08
403.806	189370	.900	5.39E+08
403.851	189076	385.000	3.53E+11
403.876	188908	385.000	3.53E+11
403.902	188740	53.000	3.89E+10
403.947	188447	1000.000	9.95E+11
403.973	188278	1000.000	9.95E+11
403.998	188110	1000.000	9.95E+11
404.043	187819	1000.000	9.94E+11
404.068	187658	1000.000	9.94E+11
404.093	187498	1000.000	9.94E+11
404.261	186441	.960	5.80E+08
404.287	186277	.640	3.87E+08
404.332	185988	.760	4.59E+08
404.359	185819	109.000	8.75E+10
404.384	185651	385.000	3.54E+11
404.429	185357	375.000	3.44E+11
404.455	185193	560.000	5.32E+11
404.480	185029	1000.000	9.93E+11
404.525	184739	1000.000	9.93E+11
404.551	184568	1000.000	9.93E+11
404.577	184398	1000.000	9.92E+11
404.622	184101	1000.000	9.92E+11
404.718	183475	.640	3.90E+08
404.744	183305	.500	3.04E+08
404.814	182824	.470	2.86E+08
404.840	182657	.640	3.90E+08
404.865	182490	345.000	3.14E+11
404.910	182196	195.500	1.68E+11
404.936	182025	175.000	1.49E+11
404.961	181855	355.000	3.24E+11
405.007	181556	560.000	5.32E+11
405.032	181387	1000.000	9.90E+11
405.058	181219	1000.000	9.90E+11
405.103	180922	1000.000	9.90E+11
405.129	180751	16.000	1.08E+10
405.154	180581	.920	5.64E+08
405.199	180283	.780	4.78E+08
405.225	180116	.730	4.49E+08
405.250	179936	.730	4.48E+08
405.295	179644	.820	5.04E+08
405.320	179475	.820	5.04E+08
405.346	179307	.730	4.49E+08
405.391	179013	765.000	7.44E+11
405.417	178844	605.000	5.78E+11
405.442	178675	430.000	4.00E+11
405.488	178381	74.200	5.79E+10
405.513	178214	485.000	4.56E+11
405.539	178048	485.000	4.56E+11
405.584	177758	1000.000	9.90E+11
405.609	177593	1000.000	9.90E+11
405.635	177427	1000.000	9.90E+11
405.680	177139	1000.000	9.90E+11
405.705	176975	1000.000	9.90E+11
405.731	176810	1000.000	9.90E+11
405.775	176524	1000.000	9.91E+11
405.801	176363	1000.000	9.91E+11
405.826	176201	1000.000	9.91E+11
405.871	175919	1000.000	9.91E+11
405.896	175756	1000.000	9.92E+11
405.922	175594	1000.000	9.92E+11
405.967	175311	1000.000	9.92E+11
405.992	175149	1000.000	9.92E+11

(a) 1 meter = 0.3048 feet

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 4

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.646	281855	.840	4.54E+08
389.672	281687	.800	4.33E+08
389.698	281519	.780	4.22E+08
389.744	281228	.800	4.33E+08
389.769	281091	.760	4.10E+08
389.794	280928	.800	4.31E+08
389.839	280643	.860	4.64E+08
389.864	280478	.900	4.86E+08
389.890	280313	.900	4.86E+08
389.935	280023	.890	4.81E+08
389.960	279857	.840	4.54E+08
389.986	279691	.900	4.87E+08
390.031	279400	.900	4.87E+08
390.056	279233	.840	4.55E+08
390.082	279066	.900	4.88E+08
390.127	278771	.910	4.95E+08
390.153	278600	.920	5.01E+08
390.179	278428	.940	5.12E+08
390.225	278130	.930	5.08E+08
390.250	277963	.980	5.36E+08
390.275	277783	.980	5.42E+08
390.320	277488	.920	5.10E+08
390.346	277318	.990	5.49E+08
390.372	277147	1.000	5.55E+08
390.417	276849	1.020	5.67E+08
390.442	276680	1.020	5.67E+08
390.468	276511	1.060	5.90E+08
390.513	276217	1.040	5.79E+08
390.538	276052	1.040	5.79E+08
390.563	275886	1.070	5.95E+08
390.607	275594	1.100	6.11E+08
390.633	275424	1.040	5.78E+08
390.659	275253	1.080	6.00E+08
390.704	274954	1.120	6.21E+08
390.730	274783	1.060	5.87E+08
390.756	274600	1.180	6.46E+08
390.801	274304	1.210	6.61E+08
390.826	274140	1.220	6.65E+08
390.851	273975	1.330	7.24E+08
390.895	273685	1.387	7.54E+08
390.921	273516	1.370	7.44E+08
390.947	273347	1.330	7.22E+08
390.992	273052	1.334	7.23E+08
391.018	272484	1.306	7.08E+08
391.044	272717	1.356	7.34E+08
391.089	272424	1.444	7.81E+08
391.114	272259	1.544	8.34E+08
391.140	272094	1.574	8.50E+08
391.185	271806	1.763	9.51E+08
391.210	271641	1.883	1.02E+09
391.236	271477	1.964	1.06E+09
391.281	271214	2.079	1.12E+09
391.307	271048	1.987	1.08E+09
391.333	270882	2.044	1.10E+09
391.378	270590	2.019	1.09E+09
391.404	270423	1.947	1.05E+09
391.430	270256	1.898	1.03E+09
391.475	269964	1.875	1.01E+09
391.500	269797	2.159	1.17E+09
391.526	269631	2.317	1.25E+09
391.571	269339	2.181	1.18E+09
391.596	269172	2.367	1.28E+09
391.622	269004	2.682	1.45E+09
391.667	268709	2.560	1.38E+09
391.693	268539	2.665	1.44E+09
391.719	268369	3.101	1.67E+09
391.764	268046	3.302	1.79E+09
391.789	267878	3.554	1.93E+09
391.815	267709	3.625	1.97E+09
391.860	267414	3.837	2.09E+09
391.886	267245	3.144	1.70E+09
391.912	267076	3.347	1.81E+09
391.957	266780	3.187	1.72E+09
391.983	266612	3.000	1.62E+09
392.009	266444	3.976	2.18E+09
392.054	266151	3.948	2.16E+09
392.079	265985	5.585	3.14E+09
392.105	265820	5.497	3.08E+09
392.150	265530	7.947	4.62E+09
392.176	265363	8.780	5.16E+09
392.202	265197	9.235	5.46E+09
392.247	264908	7.849	4.56E+09
392.272	264765	7.050	4.05E+09
392.298	264605	5.994	3.39E+09
392.343	264316	7.130	4.10E+09
392.369	264149	7.947	4.62E+09
392.395	263982	7.849	4.56E+09
392.440	263690	7.947	4.62E+09
392.466	263522	10.595	6.36E+09
392.492	263354	11.902	7.25E+09
392.537	263060	13.809	8.57E+09
392.563	262891	13.572	8.41E+09
392.589	262722	13.180	8.13E+09
392.634	262426	13.074	8.06E+09
392.660	262256	13.285	8.21E+09
392.686	262086	12.757	7.84E+09
392.731	261787	12.224	7.48E+09
392.757	261590	12.438	7.63E+09
392.783	261418	13.390	8.27E+09
392.829	261118	12.969	8.00E+09
392.855	260948	12.967	8.00E+09
392.881	260775	13.690	8.51E+09
392.926	260483	13.390	8.30E+09
392.952	260314	13.285	8.23E+09
392.978	260145	14.917	9.38E+09
393.023	259851	17.067	1.09E+10
393.049	259683	19.237	1.25E+10
393.075	259516	20.464	1.35E+10
393.120	259222	22.333	1.49E+10
393.146	259054	21.535	1.43E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.172	258886	21.535	1.43E+10
393.218	258594	16.652	1.06E+10
393.243	258430	15.172	9.58E+09
393.269	258291	14.171	8.88E+09
393.314	258003	11.361	6.92E+09
393.340	257836	10.374	6.25E+09
393.366	257670	12.757	7.89E+09
393.411	257378	22.333	1.49E+10
393.436	257213	27.379	1.88E+10
393.462	257047	30.105	2.10E+10
393.507	256755	30.275	2.11E+10
393.533	256587	30.937	2.17E+10
393.559	256418	29.235	2.03E+10
393.604	256122	24.758	1.68E+10
393.630	255953	22.333	1.49E+10
393.656	255783	21.073	1.40E+10
393.701	255487	16.359	1.05E+10
393.726	255318	16.928	1.09E+10
393.752	255124	21.073	1.40E+10
393.797	254829	27.952	1.93E+10
393.822	254661	29.588	2.06E+10
393.848	254493	30.774	2.16E+10
393.893	254198	29.934	2.09E+10
393.919	254029	30.937	2.17E+10
393.945	253860	30.609	2.14E+10
393.990	253566	30.105	2.10E+10
394.015	253400	31.099	2.18E+10
394.041	253234	31.259	2.20E+10
394.086	252944	32.020	2.26E+10
394.111	252778	32.173	2.27E+10
394.137	252613	31.575	2.22E+10
394.181	252327	29.762	2.08E+10
394.206	252168	25.692	1.76E+10
394.231	252009	20.922	1.39E+10
394.275	251754	25.900	1.77E+10
394.300	251589	27.500	1.90E+10
394.326	251425	29.630	2.06E+10
394.371	251136	31.000	2.18E+10
394.396	250971	34.100	2.43E+10
394.422	250806	39.000	2.84E+10
394.467	250516	42.000	3.11E+10
394.492	250349	39.000	2.84E+10
394.518	250183	34.300	2.44E+10
394.563	249891	31.000	2.18E+10
394.588	249724	30.000	2.10E+10
394.614	249556	28.500	1.98E+10
394.659	249258	26.500	1.82E+10
394.686	249081	28.500	1.98E+10
394.713	248904	24.500	1.66E+10
394.760	248584	21.692	1.45E+10
394.786	248414	30.937	2.17E+10
394.812	248243	33.480	2.38E+10
394.857	247945	34.127	2.43E+10
394.882	247776	39.041	2.85E+10
394.908	247607	36.708	2.65E+10
394.953	247311	34.274	2.44E+10
394.979	247140	33.871	2.41E+10
395.005	246969	34.159	2.43E+10
395.050	246670	33.756	2.40E+10
395.076	246500	33.756	2.40E+10
395.102	246329	34.421	2.46E+10
395.147	246030	33.892	2.41E+10
395.173	245860	32.473	2.30E+10
395.199	245689	15.172	9.69E+09
395.244	245391	16.089	1.04E+10
395.269	245222	20.308	1.35E+10
395.295	245053	27.762	1.92E+10
395.340	244756	34.159	2.44E+10
395.366	244586	48.003	3.65E+10
395.392	244415	54.217	4.22E+10
395.437	244117	52.647	4.07E+10
395.462	243948	50.016	3.83E+10
395.488	243779	45.441	3.42E+10
395.533	243481	34.604	2.47E+10
395.559	243312	33.871	2.41E+10
395.585	243141	34.291	2.45E+10
395.630	242842	34.678	2.48E+10
395.656	242669	33.892	2.41E+10
395.682	242497	34.985	2.50E+10
395.728	242197	47.622	3.79E+10
395.753	242028	49.622	3.79E+10
395.779	241859	38.671	2.82E+10
395.824	241563	32.473	2.29E+10
395.849	241394	62.478	4.98E+10
395.875	241225	53.882	4.17E+10
395.920	240928	57.636	4.52E+10
395.946	240758	49.224	3.75E+10
395.972	240587	44.552	3.33E+10
396.017	240289	45.441	3.41E+10
396.042	240120	47.167	3.56E+10
396.068	239951	50.790	3.89E+10
396.113	239655	54.552	4.23E+10
396.139	239484	32.913	2.33E+10
396.165	239313	5.934	3.44E+09
396.210	239015	17.347	1.13E+10
396.235	238846	17.773	1.16E+10
396.261	238665	14.541	9.26E+09
396.306	238367	16.494	1.07E+10
396.332	238199	12.544	7.85E+09
396.358	238029	80.533	6.72E+10
396.403	237734	73.448	6.02E+10
396.428	237566	69.091	5.59E+10
396.454	237399	66.811	5.37E+10
396.499	237108	55.902	4.35E+10
396.524	236942	53.005	4.08E+10
396.550	236776	54.888	4.25E+10
396.595	236485	61.071	4.82E+10
396.621	236318	64.593	5.16E+10
396.647	236151	3.864	2.18E+09
396.692	235860	1.203	6.72E+08

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
396.718	235694	1.002	5.61E+08
396.744	235528	1.100	6.15E+08
396.789	235264	1.693	5.46E+08
396.814	235100	1.312	7.33E+08
396.840	234935	1.038	5.82E+08
396.885	234645	45.880	3.43E+10
396.911	234478	34.127	2.42E+10
396.937	234311	23.684	1.60E+10
396.982	234018	34.929	2.49E+10
397.007	233852	62.832	4.97E+10
397.033	233685	70.645	5.71E+10
397.078	233392	84.138	7.02E+10
397.104	233223	87.897	7.39E+10
397.130	233054	89.764	7.57E+10
397.175	232758	.761	4.28E+08
397.200	232589	.394	2.22E+08
397.226	232421	1.203	6.74E+08
397.271	232114	.970	5.45E+08
397.296	231945	1.000	5.62E+08
397.321	231784	1.080	6.07E+08
397.365	231492	14.200	9.03E+09
397.390	231323	29.600	2.05E+10
397.416	231154	31.000	2.16E+10
397.461	230858	31.000	2.16E+10
397.487	230687	39.000	2.82E+10
397.513	230516	41.000	2.99E+10
397.558	230219	60.000	4.67E+10
397.583	230050	71.000	5.70E+10
397.609	229881	75.000	6.07E+10
397.654	229584	87.000	7.43E+10
397.680	229413	89.000	7.42E+10
397.706	229243	87.000	7.22E+10
397.751	228931	85.000	7.02E+10
397.777	228761	87.000	7.21E+10
397.803	228590	77.000	6.24E+10
397.848	228292	64.000	5.02E+10
397.874	228121	50.250	3.78E+10
397.900	227950	36.550	2.60E+10
397.946	227652	83.669	6.86E+10
397.972	227483	89.125	7.39E+10
397.998	227315	97.096	8.17E+10
398.043	227021	113.494	9.81E+10
398.069	226854	117.606	1.02E+11
398.095	226686	123.334	1.08E+11
398.140	226395	94.718	7.91E+10
398.165	226230	108.153	9.24E+10
398.191	226066	19.540	1.28E+10
398.236	225778	8.045	4.84E+09
398.262	225637	2.942	1.66E+09
398.288	225471	2.575	1.44E+09
398.333	225181	47.587	3.52E+10
398.358	225016	57.264	4.37E+10
398.384	224851	64.559	5.06E+10
398.429	224561	79.605	6.42E+10
398.455	224393	92.492	7.64E+10
398.481	224226	101.393	8.51E+10
398.526	223932	114.614	9.82E+10
398.551	223765	120.355	1.04E+11
398.577	223598	16.790	1.08E+10
398.622	223302	82.365	6.65E+10
398.649	223127	70.254	5.52E+10
398.676	222952	81.581	6.57E+10
398.722	222646	31.000	2.14E+10
398.747	222480	2.650	1.49E+09
398.773	222286	28.590	1.94E+10
398.818	221991	4.700	2.72E+09
398.843	221823	23.200	1.54E+10
398.869	221655	43.000	3.11E+10
399.135	219924	31.590	2.16E+10
399.161	219759	6.250	3.70E+09
399.206	219470	14.400	9.11E+09
399.232	219304	11.700	7.27E+09
399.258	219163	10.000	6.13E+09
399.302	218878	14.200	8.97E+09
399.326	218722	4.150	2.40E+09
399.351	218566	28.500	1.93E+10
399.394	218290	8.455	5.11E+09
399.634	216728	.560	5.45E+08
399.679	216430	1.810	1.02E+09
399.705	216258	21.500	1.40E+10
399.731	216086	27.000	1.80E+10
399.776	215778	20.600	1.34E+10
399.800	215620	16.950	1.08E+10
399.824	215462	120.000	9.92E+10
400.173	213159	1.950	1.10E+09
400.199	212988	1.950	1.10E+09
400.225	212817	1.850	1.05E+09
400.269	212525	1.850	1.05E+09
400.293	212366	1.800	1.02E+09
400.317	212208	1.400	7.95E+08
400.656	209970	.820	4.67E+08
400.682	209797	.900	5.13E+08
400.708	209625	1.030	5.87E+08
400.754	209324	.860	4.90E+08
400.780	209153	.860	4.90E+08
400.806	208983	.900	5.13E+08
400.874	208532	21.500	1.38E+10
400.898	208373	30.000	1.59E+10
401.239	206123	.470	2.68E+08
401.265	205952	.470	2.68E+08
401.291	205782	.760	4.33E+08
401.335	205488	.640	3.64E+08
401.479	204541	17.630	1.10E+10
402.117	200345	160.000	1.23E+11
402.142	200184	226.000	1.81E+11
402.167	200022	35.900	2.34E+10
402.211	199738	16.000	9.81E+09
402.237	199572	71.000	4.94E+10
402.263	199431	25.000	1.58E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
402.308	199140	42.000	2.78E+10
402.406	198511	540.000	4.69E+11
402.431	198345	655.000	6.16E+11
402.457	198179	710.000	6.30E+11
402.502	197887	710.000	6.29E+11
402.528	197719	680.000	6.00E+11
402.554	197551	520.000	4.48E+11
402.599	197256	345.000	2.85E+11
402.624	197088	31.500	2.02E+10
402.650	196920	25.900	1.64E+10
402.695	196624	7.300	4.30E+09
402.721	196452	5.400	3.14E+09
402.747	196280	13.000	7.87E+09
402.793	195955	31.000	1.99E+10
402.818	195787	21.000	1.31E+10
402.844	195619	69.000	4.76E+10
402.889	195324	345.000	2.84E+11
402.915	195155	430.000	3.62E+11
402.941	194986	560.000	4.83E+11
402.986	194691	1000.000	9.03E+11
403.012	194523	1000.000	9.02E+11
403.038	194355	1000.000	9.02E+11
403.083	194063	1000.000	9.01E+11
403.108	193898	820.000	7.28E+11
403.134	193733	4.900	2.86E+09
403.179	193443	14.200	8.66E+09
403.205	193277	27.500	1.75E+10
403.231	193111	2.650	1.57E+09
403.276	192847	21.000	1.31E+10
403.301	192683	55.000	3.80E+10
403.327	192519	53.000	3.58E+10
403.372	192230	405.000	3.38E+11
403.397	192065	485.000	4.11E+11
403.423	191899	560.000	4.80E+11
403.468	191609	680.000	5.93E+11
403.493	191443	880.000	7.82E+11
403.519	191276	1000.000	8.97E+11
403.564	190984	1000.000	8.96E+11
403.590	190815	1000.000	8.96E+11
403.616	190645	1000.000	8.96E+11
403.661	190349	85.000	6.01E+10
403.687	190179	270.000	2.16E+11
403.713	190009	355.000	2.92E+11
403.758	189686	15.300	9.41E+09
403.783	189517	.920	5.28E+08
403.809	189349	.800	4.59E+08
403.854	189055	430.000	3.59E+11
403.879	188887	455.000	3.87E+11
403.905	188719	520.000	4.42E+11
403.950	188426	1000.000	8.93E+11
403.976	188257	1000.000	8.92E+11
404.002	188089	1000.000	8.92E+11
404.046	187799	1000.000	8.92E+11
404.071	187638	1000.000	8.92E+11
404.096	187473	1000.000	8.92E+11
404.239	186559	.690	3.98E+08
404.264	186420	.910	5.25E+08
404.361	185798	147.000	1.11E+11
404.387	185630	430.000	3.59E+11
404.433	185317	485.000	4.09E+11
404.458	185173	710.000	6.17E+11
404.483	185008	1000.000	8.91E+11
404.528	184717	1000.000	8.90E+11
404.554	184547	1000.000	8.90E+11
404.580	184177	1000.000	8.90E+11
404.626	184080	1000.000	8.90E+11
404.651	183914	.820	4.76E+08
404.676	183748	.760	4.41E+08
404.721	183456	.760	4.41E+08
404.747	183284	.740	4.30E+08
404.818	182903	.700	4.07E+08
404.843	182636	.470	2.73E+08
404.868	182469	405.000	3.37E+11
404.913	182175	216.000	1.70E+11
404.939	182004	345.000	2.83E+11
404.965	181831	485.000	4.10E+11
405.010	181535	820.000	7.21E+11
405.035	181366	1000.000	8.91E+11
405.061	181197	1000.000	8.91E+11
405.106	180901	1000.000	8.91E+11
405.132	180730	138.000	1.04E+11
405.158	180559	.740	4.32E+08
405.203	180262	.780	4.56E+08
405.228	180095	1.010	5.90E+08
405.253	179916	.730	4.27E+08
405.298	179622	.760	4.44E+08
405.323	179454	.700	4.09E+08
405.349	179286	.920	5.38E+08
405.394	178992	1000.000	8.91E+11
405.420	178823	1000.000	8.91E+11
405.446	178654	620.000	5.35E+11
405.491	178360	98.500	7.19E+10
405.516	178193	695.000	6.05E+11
405.542	178027	820.000	7.21E+11
405.587	177737	1000.000	8.91E+11
405.612	177572	1000.000	8.91E+11
405.638	177407	1000.000	8.91E+11
405.683	177118	1000.000	8.91E+11
405.708	176954	1000.000	8.91E+11
405.734	176790	1000.000	8.91E+11
405.779	176504	1000.000	8.91E+11
405.804	176342	1000.000	8.91E+11
405.829	176181	1000.000	8.92E+11
405.874	175898	1000.000	8.92E+11
405.899	175736	1000.000	8.92E+11
405.925	175574	1000.000	8.92E+11
405.970	175290	1000.000	8.92E+11
405.995	175129	1000.000	8.92E+11

(a) 1 meter = 0.3048 feet

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 5

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.649	281834	.760	4.00E+08
389.675	281666	.730	3.84E+08
389.702	281498	.720	3.79E+08
389.747	281208	.700	3.69E+08
389.772	281071	.730	3.84E+08
389.797	280908	.760	4.00E+08
389.842	280622	.780	4.10E+08
389.868	280457	.820	4.32E+08
389.893	280292	.820	4.32E+08
389.938	280002	.780	4.11E+08
389.964	279836	.840	4.42E+08
389.989	279670	.800	4.21E+08
390.034	279379	.820	4.32E+08
390.060	279212	.820	4.32E+08
390.085	279045	.810	4.26E+08
390.130	278749	.790	4.15E+08
390.156	278578	.820	4.32E+08
390.183	278406	.840	4.42E+08
390.228	278109	.910	4.79E+08
390.253	277929	.910	4.79E+08
390.278	277762	.900	4.74E+08
390.323	277467	.920	4.85E+08
390.349	277296	.840	4.43E+08
390.375	277126	.910	4.80E+08
390.420	276828	.940	4.96E+08
390.446	276659	.940	4.96E+08
390.471	276490	.980	5.17E+08
390.516	276197	1.000	5.27E+08
390.541	276031	.960	5.06E+08
390.566	275866	.960	5.06E+08
390.610	275573	.910	4.80E+08
390.636	275402	.920	4.85E+08
390.662	275231	.980	5.17E+08
390.707	274933	1.010	5.33E+08
390.733	274762	1.040	5.49E+08
390.759	274579	1.070	5.65E+08
390.804	274284	1.130	5.96E+08
390.829	274119	1.200	6.33E+08
390.854	273955	1.210	6.38E+08
390.898	273664	1.212	6.39E+08
390.924	273495	1.184	6.25E+08
390.950	273326	1.229	6.48E+08
390.995	273031	1.175	6.20E+08
391.021	272863	1.209	6.38E+08
391.047	272696	1.251	6.60E+08
391.092	272404	1.246	6.58E+08
391.118	272238	1.343	7.09E+08
391.143	272073	1.449	7.64E+08
391.188	271785	1.675	8.82E+08
391.214	271621	1.617	8.52E+08
391.239	271457	1.692	8.91E+08
391.284	271194	1.667	8.79E+08
391.310	271028	1.730	9.11E+08
391.336	270861	1.784	9.39E+08
391.381	270570	1.645	8.67E+08
391.407	270403	1.629	8.58E+08
391.433	270235	1.813	9.55E+08
391.478	269943	1.843	9.70E+08
391.504	269777	1.723	9.08E+08
391.529	269610	2.006	1.06E+09
391.574	269318	2.089	1.10E+09
391.600	269151	2.262	1.19E+09
391.625	268983	2.192	1.15E+09
391.670	268698	2.087	1.10E+09
391.696	268518	2.590	1.36E+09
391.722	268348	2.620	1.37E+09
391.767	268025	3.060	1.60E+09
391.793	267857	2.799	1.47E+09
391.818	267688	3.507	1.84E+09
391.863	267393	3.081	1.61E+09
391.889	267224	3.507	1.84E+09
391.915	267055	3.235	1.69E+09
391.960	266759	3.347	1.76E+09
391.986	266591	3.302	1.73E+09
392.012	266423	2.942	1.54E+09
392.057	266130	3.920	2.07E+09
392.083	265964	4.574	2.44E+09
392.108	265795	6.118	3.33E+09
392.153	265509	6.594	3.61E+09
392.179	265343	7.947	4.43E+09
392.205	265177	8.351	4.67E+09
392.250	264988	6.667	3.66E+09
392.276	264749	6.742	3.70E+09
392.301	264584	6.667	3.66E+09
392.346	264295	6.247	3.41E+09
392.372	264129	7.300	4.04E+09
392.398	263962	7.389	4.09E+09
392.443	263669	9.709	5.52E+09
392.469	263501	10.374	5.94E+09
392.495	263333	11.686	6.77E+09
392.540	263039	13.180	7.74E+09
392.566	262870	13.809	8.16E+09
392.592	262701	12.544	7.33E+09
392.637	262405	13.180	7.75E+09
392.663	262235	12.651	7.40E+09
392.689	262065	12.544	7.34E+09
392.734	261766	11.907	6.92E+09
392.760	261568	13.074	7.69E+09
392.787	261396	13.390	7.90E+09
392.812	261057	13.929	8.25E+09
392.858	260927	13.390	7.90E+09
392.904	260757	13.807	8.18E+09
392.929	260461	13.285	7.84E+09
392.955	260293	13.807	8.19E+09
392.981	260124	15.044	9.00E+09
393.026	259830	17.773	1.09E+10
393.052	259662	19.693	1.22E+10
393.078	259495	21.226	1.32E+10
393.123	259201	21.535	1.35E+10
393.149	259033	21.692	1.36E+10
393.176	258865	20.464	1.27E+10
393.221	258573	17.630	1.08E+10
393.247	258409	16.224	9.81E+09
393.272	258270	14.294	8.52E+09
393.317	257982	12.331	7.24E+09
393.343	257815	11.469	6.68E+09
393.369	257649	14.417	8.61E+09
393.414	257358	24.942	1.59E+10
393.440	257192	29.412	1.92E+10
393.465	257026	31.259	2.05E+10
393.510	256734	32.323	2.13E+10
393.536	256566	31.575	2.08E+10
393.562	256397	29.588	1.93E+10
393.607	256101	26.076	1.67E+10
393.633	255932	24.942	1.59E+10
393.659	255762	21.692	1.36E+10
393.704	255466	18.497	1.14E+10
393.730	255297	19.089	1.18E+10
393.755	255103	23.167	1.47E+10
393.800	254808	29.762	1.94E+10
393.826	254640	31.259	2.06E+10
393.851	254472	31.259	2.06E+10
393.896	254177	31.575	2.08E+10
393.922	254008	32.323	2.13E+10
393.948	253839	32.323	2.13E+10
393.993	253546	32.323	2.13E+10
394.019	253379	32.767	2.17E+10
394.044	253213	32.621	2.16E+10
394.089	252923	33.480	2.22E+10
394.115	252758	33.619	2.23E+10
394.140	252593	33.340	2.21E+10
394.184	252308	31.867	2.10E+10
394.209	252148	30.443	2.00E+10
394.234	251989	27.379	1.77E+10
394.278	251733	28.500	1.85E+10
394.304	251569	30.000	1.96E+10
394.329	251404	30.500	2.00E+10
394.374	251116	34.300	2.28E+10
394.400	250951	39.000	2.64E+10
394.425	250785	43.000	2.96E+10
394.470	250495	48.000	3.37E+10
394.496	250329	43.000	2.96E+10
394.521	250162	41.000	2.80E+10
394.566	249870	33.000	2.18E+10
394.592	249703	32.000	2.11E+10
394.617	249535	30.500	2.00E+10
394.663	249236	28.500	1.85E+10
394.690	249059	28.500	1.85E+10
394.717	248882	21.500	1.35E+10
394.763	248563	16.790	1.03E+10
394.789	248392	34.804	2.32E+10
394.815	248222	34.604	2.31E+10
394.860	247924	50.405	3.58E+10
394.886	247755	49.224	3.48E+10
394.911	247586	48.003	3.38E+10
394.956	247289	39.424	2.68E+10
394.982	247119	38.671	2.62E+10
395.008	246948	35.895	2.41E+10
395.053	246649	34.788	2.32E+10
395.079	246479	35.895	2.41E+10
395.105	246308	37.004	2.49E+10
395.150	246009	35.649	2.39E+10
395.176	245838	27.952	1.82E+10
395.202	245667	18.791	1.17E+10
395.247	245370	23.510	1.50E+10
395.273	245201	28.511	1.86E+10
395.298	245032	21.850	1.38E+10
395.343	244735	33.057	2.19E+10
395.369	244564	56.581	4.09E+10
395.395	244394	62.832	4.62E+10
395.440	244096	64.230	4.74E+10
395.466	243927	58.293	4.23E+10
395.491	243758	55.902	4.03E+10
395.536	243461	44.999	3.13E+10
395.562	243291	38.313	2.59E+10
395.588	243120	34.788	2.32E+10
395.633	242820	33.756	2.24E+10
395.659	242649	35.895	2.40E+10
395.686	242475	46.313	3.23E+10
395.731	242175	53.882	3.86E+10
395.757	242006	55.563	4.00E+10
395.782	241837	48.415	3.41E+10
395.827	241542	51.170	3.63E+10
395.853	241373	73.862	5.58E+10
395.878	241204	64.230	4.74E+10
395.923	240907	62.832	4.62E+10
395.949	240736	58.293	4.23E+10
395.975	240566	53.882	3.86E+10
396.020	240268	54.552	3.91E+10
396.046	240099	54.889	3.94E+10
396.071	239930	58.637	4.26E+10
396.116	239633	63.542	4.67E+10
396.142	239463	5.635	3.16E+09
396.168	239292	20.922	1.32E+10
396.213	238994	20.922	1.32E+10
396.239	238825	23.338	1.49E+10
396.264	238644	22.171	1.40E+10
396.309	238349	20.153	1.26E+10
396.335	238178	19.540	1.22E+10
396.361	238008	90.421	7.04E+10
396.406	237713	83.217	6.38E+10
396.432	237546	80.075	6.10E+10
396.457	237379	75.128	5.66E+10
396.502	237087	63.868	4.68E+10
396.528	236921	62.478	4.57E+10
396.553	236755	63.868	4.68E+10
396.598	236464	71.037	5.30E+10
396.624	236297	77.317	5.85E+10
396.650	236130	2.731	1.48E+09
396.695	235839	1.275	6.97E+08
396.721	235673	1.166	6.38E+08
396.747	235507	1.219	6.68E+08
396.792	235243	1.251	6.86E+08
396.818	235079	1.955	1.07E+09
396.843	234914	1.153	6.32E+08
396.888	234624	56.241	4.04E+10
396.914	234457	39.041	2.65E+10
396.940	234290	32.767	2.17E+10
396.985	233997	48.415	3.39E+10
397.011	233831	72.226	5.39E+10
397.036	233664	81.965	6.24E+10
397.081	233371	96.286	7.52E+10
397.107	233202	99.624	7.82E+10
397.133	233033	102.312	8.06E+10
397.178	232737	.988	5.44E+08
397.204	232568	1.169	6.43E+08
397.229	232400	.955	5.26E+08
397.274	232094	.950	5.23E+08
397.299	231928	.700	3.86E+08
397.324	231763	.860	4.74E+08
397.368	231471	27.000	1.74E+10
397.394	231302	35.100	2.34E+10
397.419	231133	38.100	2.57E+10
397.464	230836	45.000	3.10E+10
397.490	230666	54.500	3.87E+10
397.516	230495	56.000	3.99E+10
397.561	230197	73.500	5.46E+10
397.587	230028	83.000	6.28E+10
397.612	229859	85.000	6.45E+10
397.657	229563	98.500	7.64E+10
397.683	229392	95.000	7.32E+10
397.709	229221	102.000	7.95E+10
397.754	228910	98.500	7.63E+10
397.780	228739	95.000	7.31E+10
397.806	228569	85.000	6.43E+10
397.851	228271	74.250	5.50E+10
397.877	228099	60.750	4.37E+10
397.904	227928	51.000	3.57E+10
397.949	227631	95.493	7.33E+10
397.975	227462	100.503	7.77E+10
398.001	227294	112.392	8.85E+10
398.046	227000	120.355	9.57E+10
398.072	226833	131.795	1.06E+11
398.098	226666	141.432	1.15E+11
398.143	226375	110.239	8.62E+10
398.169	226210	89.125	6.74E+10
398.194	226045	34.291	2.26E+10
398.239	225757	13.690	8.29E+09
398.265	225616	5.024	2.84E+09
398.291	225450	3.696	2.06E+09
398.336	225161	64.593	4.65E+10
398.362	224996	74.702	5.48E+10
398.387	224831	81.965	6.09E+10
398.432	224540	99.624	7.61E+10
398.458	224372	109.187	8.45E+10
398.484	224205	115.089	8.98E+10
398.529	223911	128.237	1.02E+11
398.555	223745	137.564	1.10E+11
398.580	223577	16.494	1.01E+10
398.626	223280	29.235	1.88E+10
398.652	223105	85.647	6.37E+10
398.679	222930	41.526	2.79E+10
398.725	222627	28.500	1.83E+10
398.751	222434	14.200	8.61E+09
398.776	222265	21.500	1.35E+10
398.821	221970	13.000	7.83E+09
398.847	221802	42.000	2.82E+10
398.872	221634	64.000	4.55E+10
399.139	219903	7.300	4.23E+09
399.164	219738	28.500	1.82E+10
399.209	219449	10.500	6.23E+09
399.235	219283	14.600	8.85E+09
399.261	219143	18.700	1.15E+10
399.305	218859	8.500	4.97E+09
399.329	218703	3.200	1.79E+09
399.354	218547	61.500	4.31E+10
399.397	218270	11.143	6.63E+09
399.611	216876	1.450	8.07E+08
399.637	216706	3.510	1.98E+09
399.682	216408	5.600	3.21E+09
399.708	216236	28.500	1.81E+10
399.735	216064	35.900	2.34E+10
399.779	215759	19.850	1.23E+10
399.803	215600	16.550	1.04E+10
399.827	215442	133.000	1.02E+11
400.176	213137	2.650	1.48E+09
400.202	212967	3.200	1.80E+09
400.228	212796	4.100	2.32E+09
400.272	212505	2.220	1.24E+09
400.296	212346	2.750	1.54E+09
400.320	212188	1.500	8.35E+08
400.712	209603	.640	3.56E+08
400.853	208670	2.080	1.16E+09
400.877	208517	25.450	1.58E+10
400.901	208353	216.000	1.70E+11
401.242	206102	.470	2.61E+08
401.456	204690	1.867	1.04E+09
401.482	204519	34.604	2.18E+10
402.120	200325	109.000	7.55E+10
402.145	200163	175.000	1.29E+11
402.170	200002	29.200	1.79E+10
402.214	199717	41.000	2.59E+10
402.240	199551	85.000	5.72E+10
402.266	199411	16.700	9.91E+09
402.311	199119	65.000	4.27E+10
402.409	198490	650.000	5.37E+11
402.435	198324	765.000	6.40E+11
402.460	198158	1000.000	8.54E+11
402.505	197866	1000.000	8.53E+11
402.531	197698	1000.000	8.53E+11
402.557	197530	710.000	5.90E+11
402.602	197235	430.000	3.42E+11
402.628	197067	28.500	1.75E+10
402.653	196900	58.000	3.77E+10
402.698	196603	27.500	1.68E+10
402.724	196431	20.200	1.21E+10
402.751	196234	25.900	1.58E+10
402.796	195934	54.500	3.53E+10
402.822	195766	51.000	3.28E+10
402.847	195598	385.000	3.03E+11
402.892	195303	485.000	3.89E+11
402.918	195134	605.000	4.94E+11
402.944	194965	710.000	5.88E+11
402.989	194670	1000.000	8.49E+11
403.015	194502	1000.000	8.48E+11
403.041	194334	1000.000	8.48E+11
403.086	194042	1000.000	8.48E+11
403.112	193877	1000.000	8.48E+11
403.137	193712	202.000	1.49E+11
403.182	193423	120.000	8.38E+10
403.208	193256	89.600	6.03E+10
403.234	193091	80.000	5.36E+10
403.279	192827	91.000	6.18E+10
403.305	192662	93.000	6.33E+10
403.330	192498	77.000	5.14E+10
403.375	192209	620.000	5.06E+11
403.401	192044	695.000	5.72E+11
403.426	191879	1000.000	8.46E+11
403.471	191588	1000.000	8.45E+11
403.497	191422	1000.000	8.45E+11
403.522	191256	1000.000	8.45E+11
403.567	190963	1000.000	8.45E+11
403.593	190794	1000.000	8.45E+11
403.619	190624	1000.000	8.44E+11
403.664	190329	710.000	5.85E+11
403.690	190159	1000.000	8.44E+11
403.716	189987	765.000	6.34E+11
403.761	189665	215.000	1.60E+11
403.787	189496	160.000	1.15E+11
403.812	189328	71.000	4.71E+10
403.857	189034	710.000	5.84E+11
403.883	188866	1000.000	8.43E+11
403.908	188698	1000.000	8.43E+11
403.953	188405	1000.000	8.43E+11
403.979	188236	1000.000	8.42E+11
404.005	188068	1000.000	8.42E+11
404.049	187779	1000.000	8.42E+11
404.074	187619	1000.000	8.42E+11
404.099	187458	1000.000	8.42E+11
404.242	186539	37.200	2.36E+10
404.269	186409	65.000	4.29E+10
404.364	185777	455.000	3.61E+11
404.391	185609	1000.000	8.41E+11
404.436	185316	1000.000	8.40E+11
404.461	185152	1000.000	8.40E+11
404.486	184989	1000.000	8.40E+11
404.531	184696	1000.000	8.40E+11
404.557	184526	1000.000	8.40E+11
404.584	184355	1000.000	8.40E+11
404.629	184059	1000.000	8.40E+11
404.654	183893	1.260	7.12E+08
404.679	183727	3.300	1.88E+09
404.724	183433	.860	4.86E+08
404.750	183250	.670	3.79E+08
404.821	182782	.640	3.62E+08
404.871	182449	1000.000	8.39E+11
404.916	182153	147.000	1.05E+11
404.942	181983	1000.000	8.39E+11
404.968	181812	1000.000	8.39E+11
405.013	181514	1000.000	8.39E+11
405.039	181345	1000.000	8.39E+11
405.064	181176	1000.000	8.39E+11
405.109	180879	1000.000	8.39E+11
405.135	180709	255.000	1.93E+11
405.161	180538	1.370	7.78E+08
405.206	180241	1.300	7.38E+08
405.231	180074	1.090	6.19E+08
405.256	179895	1.200	6.82E+08
405.301	179601	.670	3.81E+08
405.352	179265	1000.000	8.39E+11
405.397	178971	1000.000	8.39E+11
405.423	178801	1000.000	8.39E+11
405.449	178633	1000.000	8.39E+11
405.494	178339	175.000	1.28E+11
405.520	178173	1000.000	8.39E+11
405.545	178007	1000.000	8.39E+11
405.590	177717	1000.000	8.39E+11
405.616	177551	1000.000	8.39E+11
405.641	177386	1000.000	8.39E+11
405.686	177098	1000.000	8.40E+11
405.712	176934	1000.000	8.40E+11
405.737	176769	1000.000	8.40E+11
405.782	176484	1000.000	8.40E+11
405.807	176322	1000.000	8.40E+11
405.832	176161	1000.000	8.40E+11
405.877	175878	1000.000	8.40E+11
405.903	175716	1000.000	8.41E+11
405.928	175553	1000.000	8.41E+11
405.973	175270	1000.000	8.41E+11
405.999	175109	1000.000	8.41E+11

(a) 1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 6

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.653	281813	.780	4.03E+08
389.679	281645	.700	3.62E+08
389.705	281477	.720	3.72E+08
389.750	281188	.760	3.93E+08
389.775	281050	.810	4.18E+08
389.801	280888	.800	4.13E+08
389.845	280601	.860	4.44E+08
389.871	280436	.900	4.65E+08
389.896	280271	.900	4.65E+08
389.941	279982	.860	4.44E+08
389.967	279816	.860	4.44E+08
389.992	279649	.810	4.18E+08
390.037	279358	.800	4.13E+08
390.063	279191	.840	4.34E+08
390.088	279024	.860	4.44E+08
390.134	278728	.930	4.80E+08
390.160	278557	.890	4.59E+08
390.186	278385	.910	4.70E+08
390.231	278088	.960	4.95E+08
390.256	277908	.960	4.95E+08
390.282	277741	1.000	5.16E+08
390.326	277446	.960	4.95E+08
390.352	277275	.960	4.95E+08
390.378	277104	1.000	5.16E+08
390.423	276807	1.010	5.21E+08
390.449	276638	1.120	5.78E+08
390.474	276469	1.040	5.36E+08
390.519	276176	1.070	5.52E+08
390.544	276010	1.070	5.52E+08
390.569	275845	1.090	5.62E+08
390.613	275552	1.050	5.42E+08
390.639	275381	1.040	5.36E+08
390.665	275210	1.030	5.31E+08
390.710	274911	1.140	5.88E+08
390.736	274741	1.160	5.98E+08
390.762	274557	1.220	6.29E+08
390.807	274263	1.370	7.06E+08
390.832	274099	1.320	6.80E+08
390.857	273934	1.470	7.57E+08
390.901	273643	1.554	8.00E+08
390.927	273474	1.505	7.75E+08
390.953	273305	1.429	7.36E+08
390.998	273010	1.353	6.97E+08
391.024	272842	1.334	6.87E+08
391.050	272675	1.387	7.15E+08
391.095	272383	1.505	7.75E+08
391.121	272218	1.623	8.35E+08
391.146	272053	1.964	1.01E+09
391.191	271765	2.238	1.15E+09
391.217	271600	2.575	1.32E+09
391.242	271436	2.492	1.28E+09
391.287	271173	2.437	1.25E+09
391.313	271007	2.535	1.30E+09
391.339	270840	2.383	1.22E+09
391.384	270549	2.465	1.26E+09
391.410	270382	2.521	1.29E+09
391.436	270214	2.410	1.23E+09
391.481	269922	2.343	1.20E+09
391.507	269756	2.383	1.22E+09
391.532	269589	2.852	1.46E+09
391.577	269297	3.324	1.70E+09
391.603	269130	3.554	1.81E+09
391.628	268962	3.811	1.95E+09
391.673	268667	4.094	2.10E+09
391.699	268497	4.260	2.19E+09
391.725	268326	4.094	2.10E+09
391.770	268004	4.894	2.54E+09
391.796	267836	4.852	2.52E+09
391.821	267667	4.894	2.54E+09
391.866	267372	5.113	2.66E+09
391.892	267203	4.650	2.41E+09
391.918	267033	4.894	2.54E+09
391.963	266738	4.464	2.31E+09
391.989	266570	4.857	2.52E+09
392.015	266402	4.427	2.27E+09
392.060	266109	6.451	3.41E+09
392.086	265944	6.817	3.62E+09
392.111	265778	8.351	4.51E+09
392.156	265488	10.153	5.58E+09
392.182	265322	11.034	6.11E+09
392.208	265156	11.143	6.18E+09
392.253	264892	9.005	4.90E+09
392.279	264728	9.119	4.97E+09
392.304	264564	8.351	4.52E+09
392.349	264274	8.045	4.34E+09
392.375	264108	9.472	5.18E+09
392.401	263941	9.817	5.37E+09
392.446	263648	10.815	5.99E+09
392.472	263480	11.794	6.58E+09
392.498	263312	13.572	7.68E+09
392.543	263018	15.560	8.53E+09
392.569	262849	15.430	8.85E+09
392.595	262680	14.665	8.37E+09
392.640	262383	14.665	8.38E+09
392.666	262214	14.294	8.14E+09
392.692	262044	14.050	7.99E+09
392.738	261744	13.927	7.92E+09
392.764	261547	14.665	8.39E+09
392.790	261375	15.172	8.71E+09
392.835	261075	16.652	9.65E+09
392.861	260906	15.823	9.13E+09
392.887	260736	16.224	9.38E+09
392.932	260440	15.691	9.05E+09
392.958	260272	16.652	9.66E+09
392.984	260103	17.347	1.01E+10
393.029	259809	21.073	1.25E+10
393.055	259641	23.684	1.43E+10
393.081	259474	25.692	1.56E+10
393.127	259180	25.883	1.58E+10

(a) 1 meter = 0.3040 foot

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.153	259012	26.465	1.62E+10
393.179	258844	23.338	1.41E+10
393.224	258553	18.940	1.12E+10
393.250	258389	17.630	1.03E+10
393.275	258250	14.917	8.58E+09
393.320	257961	13.572	7.74E+09
393.346	257795	12.757	7.23E+09
393.372	257628	17.630	1.03E+10
393.417	257337	29.934	1.85E+10
393.443	257171	31.731	1.98E+10
393.468	257005	33.756	2.12E+10
393.513	256713	33.619	2.11E+10
393.539	256544	34.026	2.14E+10
393.565	256376	33.199	2.08E+10
393.610	256080	30.774	1.91E+10
393.636	255911	28.140	1.73E+10
393.662	255741	25.692	1.57E+10
393.707	255445	20.620	1.23E+10
393.733	255276	22.333	1.34E+10
393.758	255082	28.876	1.78E+10
393.803	254787	32.473	2.03E+10
393.829	254619	33.480	2.10E+10
393.854	254451	33.619	2.11E+10
393.899	254156	34.159	2.15E+10
393.925	253987	34.929	2.20E+10
393.951	253818	34.421	2.17E+10
393.996	253525	34.678	2.19E+10
394.022	253358	33.993	2.14E+10
394.047	253192	33.993	2.14E+10
394.092	252902	34.788	2.19E+10
394.118	252737	34.433	2.17E+10
394.143	252572	34.604	2.18E+10
394.188	252288	33.619	2.11E+10
394.212	252128	31.867	1.99E+10
394.237	251969	29.412	1.82E+10
394.281	251713	30.500	1.90E+10
394.307	251548	32.500	2.03E+10
394.332	251384	33.600	2.11E+10
394.377	251095	41.500	2.68E+10
394.403	250930	49.000	3.17E+10
394.428	250764	53.000	3.55E+10
394.473	250474	56.000	3.78E+10
394.499	250308	53.000	3.55E+10
394.524	250141	49.500	3.28E+10
394.569	249849	39.000	2.49E+10
394.595	249682	37.200	2.36E+10
394.620	249515	33.000	2.07E+10
394.666	249214	31.000	1.93E+10
394.693	249037	30.750	1.88E+10
394.720	248860	20.200	1.20E+10
394.766	248542	21.692	1.30E+10
394.792	248371	36.708	2.33E+10
394.819	248200	56.581	3.82E+10
394.863	247903	62.478	4.28E+10
394.889	247734	58.637	3.98E+10
394.914	247565	56.241	3.79E+10
394.959	247268	51.546	3.43E+10
394.985	247097	49.224	3.25E+10
395.011	246927	46.313	3.03E+10
395.056	246628	44.101	2.87E+10
395.082	246457	45.441	2.97E+10
395.108	246286	48.003	3.16E+10
395.153	245988	45.880	3.00E+10
395.179	245817	19.845	1.18E+10
395.205	245646	23.684	1.44E+10
395.250	245349	32.473	2.03E+10
395.276	245180	29.588	1.83E+10
395.301	245011	22.333	1.35E+10
395.346	244714	32.621	2.04E+10
395.372	244543	66.437	4.59E+10
395.398	244372	72.626	5.09E+10
395.443	244075	74.280	5.22E+10
395.469	243906	68.324	4.74E+10
395.494	243737	64.593	4.44E+10
395.539	243440	51.918	3.46E+10
395.565	243269	47.167	3.10E+10
395.591	243099	41.081	2.65E+10
395.637	242799	34.421	2.16E+10
395.663	242626	40.278	2.58E+10
395.689	242453	55.225	3.71E+10
395.734	242154	58.983	4.00E+10
395.760	241985	59.676	4.05E+10
395.785	241816	44.999	2.93E+10
395.830	241521	75.128	5.27E+10
395.856	241352	79.605	5.63E+10
395.881	241183	66.065	4.55E+10
395.926	240986	69.864	4.85E+10
395.952	240715	63.542	4.35E+10
395.978	240544	58.637	3.96E+10
396.023	240247	60.372	4.10E+10
396.049	240078	62.832	4.29E+10
396.074	239909	67.187	4.63E+10
396.119	239612	72.626	5.06E+10
396.145	239441	12.544	7.23E+09
396.171	239271	16.652	9.81E+09
396.216	238973	22.333	1.35E+10
396.242	238804	22.662	1.37E+10
396.267	238623	20.308	1.22E+10
396.312	238326	17.488	1.04E+10
396.338	238156	19.540	1.17E+10
396.364	237987	95.493	6.90E+10
396.409	237692	89.125	6.37E+10
396.435	237525	83.217	5.89E+10
396.460	237358	78.220	5.49E+10
396.505	237066	67.564	4.64E+10
396.531	236900	67.187	4.61E+10
396.556	236734	69.091	4.76E+10
396.601	236443	76.430	5.34E+10
396.627	236276	83.669	5.92E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
396.653	236109	3.122	1.69E+09
396.698	235818	2.304	1.23E+09
396.724	235652	1.390	7.47E+08
396.750	235512	1.698	9.12E+08
396.795	235223	1.947	1.04E+09
396.821	235058	3.530	1.91E+09
396.846	234894	16.652	9.83E+09
396.891	234604	60.721	4.10E+10
396.917	234436	47.167	3.08E+10
396.943	234269	37.004	2.34E+10
396.988	233977	56.581	3.78E+10
397.014	233810	76.871	5.35E+10
397.039	233644	85.647	6.05E+10
397.084	233350	103.242	7.47E+10
397.110	233181	108.153	7.87E+10
397.136	233011	82.783	5.81E+10
397.181	232716	.807	4.36E+08
397.207	232547	1.300	7.01E+08
397.232	232379	1.181	6.38E+08
397.277	232073	.970	5.24E+08
397.302	231908	.940	5.08E+08
397.327	231742	1.030	5.56E+08
397.371	231450	41.000	2.63E+10
397.397	231281	49.500	3.24E+10
397.422	231112	46.500	3.02E+10
397.467	230815	56.000	3.72E+10
397.493	230644	60.000	4.02E+10
397.519	230474	67.000	4.56E+10
397.564	230176	83.000	5.80E+10
397.590	230007	85.000	5.95E+10
397.615	229836	93.000	6.59E+10
397.660	229541	109.000	7.88E+10
397.686	229371	95.000	6.74E+10
397.712	229200	94.000	6.66E+10
397.757	228885	102.000	7.29E+10
397.783	228718	93.000	6.57E+10
397.809	228548	91.000	6.41E+10
397.855	228249	78.500	5.43E+10
397.881	228078	67.000	4.54E+10
397.907	227907	61.500	4.12E+10
397.952	227610	95.493	6.75E+10
397.978	227441	106.137	7.60E+10
398.004	227273	115.752	8.39E+10
398.049	226979	126.237	9.42E+10
398.075	226812	141.432	1.05E+11
398.101	226645	143.562	1.07E+11
398.146	226354	117.392	8.09E+10
398.172	226189	71.037	4.83E+10
398.197	226025	36.708	2.31E+10
398.242	225736	8.562	4.86E+09
398.268	225596	8.247	4.67E+09
398.294	225430	4.094	2.26E+09
398.339	225140	79.605	5.47E+10
398.365	224975	89.125	6.20E+10
398.390	224810	95.493	6.70E+10
398.435	224519	112.392	8.05E+10
398.461	224351	115.089	8.26E+10
398.487	224184	126.237	9.34E+10
398.512	223890	141.432	1.04E+11
398.558	223724	152.800	1.14E+11
398.583	223557	15.172	8.90E+09
398.629	223258	13.809	8.05E+09
398.656	223083	63.868	4.26E+10
398.682	222908	69.477	4.68E+10
398.728	222606	24.000	1.45E+10
398.754	222412	8.500	4.82E+09
398.779	222244	14.600	8.54E+09
398.824	221949	15.600	9.16E+09
398.850	221781	53.000	3.45E+10
398.875	221613	75.000	5.08E+10
399.142	219882	1.520	8.27E+08
399.167	219718	25.000	1.51E+10
399.212	219428	21.000	1.25E+10
399.238	219263	21.000	1.25E+10
399.264	219122	23.600	1.42E+10
399.308	218839	18.000	1.06E+10
399.332	218683	16.000	9.39E+09
399.357	218527	89.000	6.10E+10
399.400	218249	11.469	6.60E+09
399.614	216855	1.250	6.81E+08
399.640	216685	4.400	2.44E+09
399.686	216387	2.780	1.52E+09
399.712	216215	54.500	3.53E+10
399.738	216043	45.000	2.86E+10
399.782	215739	24.000	1.44E+10
399.806	215580	19.100	1.13E+10
399.830	215422	142.500	1.02E+11
400.179	213116	6.000	3.35E+09
400.205	212945	8.500	4.81E+09
400.231	212775	5.200	2.89E+09
400.275	212485	3.200	1.76E+09
400.299	212327	1.810	9.87E+08
400.323	212168	1.320	7.20E+08
400.715	209582	.640	3.49E+08
400.856	208650	17.200	1.01E+10
400.880	208492	30.000	1.82E+10
400.904	208334	77.000	5.07E+10
401.245	206080	.470	2.56E+08
401.459	204669	9.235	5.23E+09
401.485	204498	282.464	2.11E+11
402.123	200305	98.500	6.50E+10
402.148	200143	307.000	2.27E+11
402.173	199982	235.000	1.69E+11
402.217	199656	62.000	3.92E+10
402.243	199531	120.000	8.06E+10
402.269	199390	23.200	1.37E+10
402.315	199098	102.000	6.74E+10
402.412	198469	820.000	6.57E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
402.438	198304	1000.000	8.12E+11
402.463	198138	1000.000	8.11E+11
402.508	197845	1000.000	8.11E+11
402.534	197677	1000.000	8.10E+11
402.560	197508	1000.000	8.10E+11
402.605	197214	1000.000	8.09E+11
402.631	197046	245.000	1.76E+11
402.656	196879	189.000	1.33E+11
402.702	196581	128.000	8.64E+10
402.728	196409	138.000	9.38E+10
402.754	196212	120.000	8.04E+10
402.799	195913	142.500	9.71E+10
402.825	195745	138.000	9.37E+10
402.850	195577	620.000	4.83E+11
402.895	195282	1000.000	8.05E+11
402.921	195113	1000.000	8.05E+11
402.947	194944	1000.000	8.05E+11
402.992	194649	1000.000	8.05E+11
403.018	194481	1000.000	8.04E+11
403.044	194314	1000.000	8.04E+11
403.089	194022	1000.000	8.04E+11
403.115	193856	1000.000	8.04E+11
403.140	193691	1000.000	8.03E+11
403.185	193402	1000.000	8.03E+11
403.211	193236	1000.000	8.03E+11
403.237	193070	1000.000	8.03E+11
403.282	192806	1000.000	8.03E+11
403.308	192642	1000.000	8.03E+11
403.333	192477	1000.000	8.03E+11
403.378	192189	1000.000	8.03E+11
403.404	192023	1000.000	8.03E+11
403.429	191858	1000.000	8.02E+11
403.474	191568	1000.000	8.02E+11
403.500	191401	1000.000	8.02E+11
403.525	191235	1000.000	8.02E+11
403.570	190941	1000.000	8.02E+11
403.596	190772	1000.000	8.02E+11
403.622	190603	1000.000	8.02E+11
403.667	190306	1000.000	8.02E+11
403.693	190136	1000.000	8.02E+11
403.719	189966	1000.000	8.02E+11
403.764	189644	1000.000	8.02E+11
403.790	189475	1000.000	8.02E+11
403.815	189307	1000.000	8.02E+11
403.860	189013	1000.000	8.02E+11
403.886	188845	1000.000	8.02E+11
403.911	188677	1000.000	8.02E+11
403.956	188384	1000.000	8.02E+11
403.982	188215	1000.000	8.02E+11
404.008	188047	1000.000	8.02E+11
404.053	187759	1000.000	8.02E+11
404.077	187598	1000.000	8.02E+11
404.102	187438	1000.000	8.02E+11
404.245	186519	1000.000	8.02E+11
404.271	186379	710.000	5.57E+11
404.296	186215	430.000	3.25E+11
404.342	185925	43.000	2.67E+10
404.368	185756	1000.000	8.02E+11
404.394	185588	1000.000	8.02E+11
404.439	185296	1000.000	8.02E+11
404.464	185132	1000.000	8.02E+11
404.490	184967	1000.000	8.02E+11
404.535	184675	1000.000	8.02E+11
404.561	184504	1000.000	8.02E+11
404.587	184334	1000.000	8.02E+11
404.632	184039	1000.000	8.02E+11
404.657	183872	385.000	2.89E+11
404.683	183706	41.000	2.54E+10
404.727	183412	22.500	1.34E+10
404.753	183228	2.200	1.22E+09
404.779	183058	3.120	1.74E+09
404.824	182762	1.520	8.44E+08
404.849	182594	485.000	3.70E+11
404.875	182427	1000.000	8.02E+11
404.919	182132	680.000	5.32E+11
404.945	181961	1000.000	8.02E+11
404.971	181791	1000.000	8.02E+11
405.016	181493	1000.000	8.02E+11
405.042	181324	1000.000	8.02E+11
405.067	181155	1000.000	8.02E+11
405.112	180858	1000.000	8.02E+11
405.138	180687	590.000	4.57E+11
405.164	180517	48.000	3.02E+10
405.209	180221	27.000	1.64E+10
405.234	180053	43.000	2.69E+10
405.260	179876	61.500	3.54E+10
405.304	179580	.470	2.62E+08
405.355	179244	1000.000	8.02E+11
405.400	178949	1000.000	8.02E+11
405.426	178780	1000.000	8.02E+11
405.452	178612	1000.000	8.02E+11
405.497	178318	395.000	2.97E+11
405.523	178152	1000.000	8.03E+11
405.548	177986	1000.000	8.03E+11
405.593	177696	1000.000	8.03E+11
405.619	177531	1000.000	8.03E+11
405.644	177366	1000.000	8.03E+11
405.689	177077	1000.000	8.03E+11
405.715	176913	1000.000	8.03E+11
405.740	176749	1000.000	8.03E+11
405.785	176464	1000.000	8.03E+11
405.810	176302	1000.000	8.03E+11
405.836	176141	1000.000	8.03E+11
405.880	175858	1000.000	8.03E+11
405.906	175695	1000.000	8.03E+11
405.931	175533	1000.000	8.03E+11
405.976	175250	1000.000	8.03E+11

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 7

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.656	281792	.640	3.25E+08
389.682	281624	.640	3.25E+08
389.708	281456	.640	3.25E+08
389.753	281192	.470	2.39E+08
389.778	281030	.700	3.55E+08
389.804	280867	.730	3.70E+08
389.848	280581	.860	4.36E+08
389.874	280416	.900	4.56E+08
389.900	280251	.900	4.56E+08
389.944	279961	.890	4.51E+08
389.970	279795	.860	4.36E+08
389.996	279629	.840	4.26E+08
390.040	279337	.850	4.31E+08
390.066	279170	.870	4.41E+08
390.092	279003	.890	4.51E+08
390.137	278707	.910	4.61E+08
390.163	278535	.950	4.81E+08
390.189	278363	.980	4.96E+08
390.234	278067	1.020	5.16E+08
390.259	277887	1.040	5.26E+08
390.285	277720	1.070	5.41E+08
390.330	277424	1.130	5.71E+08
390.355	277254	1.180	5.96E+08
390.381	277083	1.200	6.06E+08
390.426	276786	1.220	6.16E+08
390.452	276617	1.280	6.46E+08
390.478	276448	1.280	6.46E+08
390.522	276155	1.310	6.61E+08
390.547	275990	1.260	6.36E+08
390.572	275824	1.260	6.36E+08
390.617	275530	1.220	6.15E+08
390.642	275360	1.280	6.45E+08
390.668	275189	1.280	6.45E+08
390.714	274890	1.450	7.30E+08
390.739	274719	1.470	7.40E+08
390.765	274536	1.750	8.80E+08
390.810	274243	2.400	1.20E+09
390.835	274078	2.750	1.38E+09
390.860	273913	3.120	1.56E+09
390.905	273622	2.868	1.43E+09
390.930	273453	2.635	1.32E+09
390.956	273284	2.464	1.23E+09
391.002	272989	2.005	1.01E+09
391.027	272821	2.279	1.14E+09
391.053	272654	2.279	1.14E+09
391.098	272362	2.816	1.41E+09
391.124	272197	3.257	1.62E+09
391.150	272032	4.064	2.03E+09
391.194	271744	4.420	2.22E+09
391.220	271580	4.894	2.47E+09
391.246	271416	4.894	2.47E+09
391.291	271152	4.729	2.38E+09
391.316	270986	4.420	2.22E+09
391.342	270820	4.612	2.32E+09
391.388	270528	4.228	2.12E+09
391.413	270361	4.537	2.28E+09
391.439	270193	4.852	2.44E+09
391.484	269901	5.340	2.70E+09
391.510	269735	5.438	2.75E+09
391.536	269568	6.181	3.15E+09
391.580	269276	5.994	3.05E+09
391.606	269109	6.247	3.19E+09
391.632	268941	6.451	3.30E+09
391.677	268646	6.522	3.34E+09
391.702	268476	6.976	3.59E+09
391.728	268305	7.055	3.64E+09
391.773	267983	7.754	4.02E+09
391.799	267815	8.780	4.60E+09
391.825	267646	8.671	4.54E+09
391.870	267351	9.235	4.86E+09
391.895	267181	8.351	4.36E+09
391.921	267012	8.145	4.25E+09
391.967	266717	7.384	3.83E+09
391.992	266545	7.843	4.09E+09
392.018	266381	8.145	4.25E+09
392.063	266085	9.113	4.80E+09
392.089	265923	11.252	6.02E+09
392.115	265756	12.544	6.78E+09
392.160	265467	14.665	8.04E+09
392.185	265301	15.560	8.58E+09
392.211	265135	14.417	7.89E+09
392.256	264872	12.144	6.77E+09
392.282	264707	12.863	6.96E+09
392.308	264543	12.438	6.71E+09
392.353	264254	11.902	6.40E+09
392.378	264087	12.544	6.78E+09
392.404	263920	12.544	6.78E+09
392.450	263627	14.665	8.05E+09
392.475	263459	16.080	8.99E+09
392.501	263291	18.205	1.02E+10
392.547	262996	20.464	1.16E+10
392.572	262828	21.380	1.22E+10
392.598	262659	25.692	1.49E+10
392.644	262362	19.239	1.09E+10
392.669	262193	18.791	1.06E+10
392.695	262022	18.791	1.06E+10
392.741	261723	18.350	1.03E+10
392.767	261525	18.350	1.04E+10
392.793	261353	19.845	1.13E+10
392.839	261054	20.153	1.15E+10
392.864	260984	21.535	1.24E+10
392.890	260715	20.153	1.15E+10
392.936	260419	20.773	1.19E+10
392.961	260251	22.010	1.27E+10
392.987	260082	23.860	1.39E+10
393.033	259788	29.588	1.76E+10
393.058	259620	32.473	1.95E+10
393.084	259453	32.767	1.97E+10
393.130	259159	32.767	1.98E+10
393.156	258991	33.057	1.99E+10
393.182	258823	32.621	1.97E+10
393.227	258532	23.338	1.36E+10
393.253	258393	22.010	1.28E+10
393.279	258229	18.350	1.05E+10
393.324	257940	18.497	1.06E+10
393.349	257774	18.791	1.08E+10
393.375	257607	24.037	1.41E+10
393.420	257316	33.892	2.05E+10
393.446	257150	34.985	2.12E+10
393.472	256984	37.004	2.26E+10
393.517	256692	36.425	2.22E+10
393.542	256523	36.425	2.22E+10
393.568	256355	34.985	2.12E+10
393.614	256059	34.804	2.11E+10
393.639	255889	32.767	1.98E+10
393.665	255720	32.473	1.96E+10
393.710	255424	29.762	1.78E+10
393.736	255255	31.867	1.92E+10
393.762	255061	34.026	2.06E+10
393.806	254766	36.154	2.20E+10
393.832	254598	37.967	2.33E+10
393.858	254430	39.424	2.43E+10
393.903	254135	39.820	2.45E+10
393.928	253966	44.999	2.82E+10
393.954	253797	41.081	2.54E+10
393.999	253504	41.081	2.54E+10
394.025	253338	45.441	2.85E+10
394.051	253172	46.742	2.94E+10
394.095	252882	47.587	3.00E+10
394.121	252716	48.415	3.06E+10
394.147	252551	47.167	2.97E+10
394.191	252268	37.313	2.28E+10
394.215	252109	33.993	2.06E+10
394.240	251950	32.913	1.99E+10
394.284	251692	35.900	2.18E+10
394.310	251528	42.000	2.60E+10
394.336	251363	43.000	2.67E+10
394.380	251075	54.500	3.49E+10
394.406	250909	60.000	3.90E+10
394.432	250744	64.000	4.19E+10
394.476	250453	65.000	4.27E+10
394.502	250287	60.000	3.90E+10
394.528	250120	58.000	3.75E+10
394.572	249828	49.500	3.13E+10
394.598	249661	45.000	2.81E+10
394.624	249454	39.000	2.39E+10
394.670	249192	39.000	2.39E+10
394.696	249015	35.900	2.18E+10
394.723	248838	30.500	1.83E+10
394.770	248520	34.550	2.09E+10
394.795	248350	50.016	3.16E+10
394.821	248179	66.811	4.39E+10
394.866	247882	72.226	4.79E+10
394.892	247713	69.091	4.56E+10
394.918	247544	67.187	4.41E+10
394.963	247247	60.372	3.91E+10
394.988	247076	57.606	3.71E+10
395.014	246905	57.264	3.68E+10
395.060	246606	56.241	3.61E+10
395.085	246436	55.225	3.53E+10
395.111	246265	56.922	3.66E+10
395.157	245966	56.581	3.63E+10
395.182	245796	19.239	1.11E+10
395.208	245625	32.323	1.94E+10
395.253	245328	34.291	2.07E+10
395.279	245159	34.421	2.08E+10
395.305	244990	41.081	2.53E+10
395.350	244692	44.552	2.77E+10
395.375	244522	80.865	5.42E+10
395.401	244351	83.217	5.60E+10
395.446	244054	85.647	5.78E+10
395.472	243885	83.217	5.59E+10
395.498	243716	71.828	4.74E+10
395.543	243419	57.606	3.70E+10
395.568	243249	56.922	3.65E+10
395.594	243077	51.918	3.29E+10
395.640	242777	38.313	2.34E+10
395.666	242604	55.563	3.55E+10
395.692	242432	64.593	4.20E+10
395.737	242131	49.622	3.12E+10
395.763	241964	61.422	3.97E+10
395.789	241795	38.671	2.37E+10
395.833	241500	93.959	6.39E+10
395.859	241331	84.138	5.64E+10
395.885	241162	71.037	4.67E+10
395.930	240964	76.871	5.09E+10
395.955	240694	73.027	4.81E+10
395.981	240523	66.811	4.35E+10
396.026	240226	70.645	4.63E+10
396.052	240057	71.828	4.72E+10
396.078	239888	77.317	5.12E+10
396.123	239591	84.624	5.66E+10
396.148	239420	33.993	2.05E+10
396.174	239249	37.634	2.29E+10
396.219	238952	27.060	1.60E+10
396.245	238783	24.037	1.41E+10
396.271	238602	18.940	1.09E+10
396.316	238305	18.060	1.04E+10
396.341	238135	23.860	1.40E+10
396.367	237966	103.242	7.04E+10
396.412	237671	96.286	6.51E+10
396.438	237504	89.764	6.02E+10
396.464	237337	87.309	5.83E+10
396.509	237045	75.558	4.96E+10
396.534	236879	73.862	4.84E+10
396.560	236713	79.140	5.22E+10
396.605	236422	85.647	5.70E+10
396.630	236255	94.718	6.37E+10
396.656	236089	4.500	2.42E+09
396.702	235796	2.923	1.56E+09
396.727	235632	3.101	1.65E+09
396.798	235202	4.894	2.65E+09
396.824	235038	3.060	1.63E+09
396.850	234873	59.676	3.81E+10
396.895	234583	68.706	4.45E+10
396.920	234415	56.581	3.59E+10
396.946	234248	50.016	3.13E+10
396.991	233956	68.706	4.45E+10
397.017	233789	85.127	5.64E+10
397.043	233623	95.493	6.41E+10
397.088	233329	111.306	7.60E+10
397.113	233160	115.088	7.89E+10
397.139	232990	48.822	3.04E+10
397.184	232695	1.465	7.79E+08
397.210	232526	1.188	6.32E+08
397.236	232357	.985	5.24E+08
397.280	232052	1.000	5.32E+08
397.305	231887	.780	4.15E+08
397.330	231722	1.140	6.06E+08
397.374	231429	58.500	3.70E+10
397.400	231260	61.500	3.91E+10
397.426	231091	59.500	3.77E+10
397.471	230794	65.000	4.16E+10
397.496	230623	73.500	4.76E+10
397.522	230452	75.000	4.87E+10
397.567	230155	87.000	5.73E+10
397.593	229986	93.000	6.17E+10
397.619	229817	95.000	6.31E+10
397.664	229520	102.000	6.82E+10
397.689	229349	105.500	7.09E+10
397.715	229179	109.000	7.35E+10
397.761	228867	95.000	6.30E+10
397.786	228697	102.000	6.81E+10
397.812	228527	95.000	6.30E+10
397.858	228228	87.000	5.71E+10
397.884	228057	77.000	4.99E+10
397.910	227886	77.000	4.99E+10
397.956	227589	111.306	7.50E+10
397.981	227420	113.494	7.66E+10
398.007	227252	123.334	8.41E+10
398.053	226958	145.764	1.01E+11
398.078	226791	163.187	1.15E+11
398.104	226624	165.963	1.17E+11
398.149	226333	135.583	9.33E+10
398.175	226169	79.605	5.16E+10
398.201	226004	50.405	3.12E+10
398.246	225715	11.578	6.47E+09
398.271	225575	12.331	6.91E+09
398.297	225409	8.351	4.57E+09
398.342	225119	93.217	6.12E+10
398.368	224955	102.312	6.79E+10
398.394	224789	107.136	7.14E+10
398.439	224498	118.951	8.03E+10
398.464	224330	131.795	9.00E+10
398.490	224163	143.562	9.90E+10
398.535	223870	157.850	1.10E+11
398.561	223703	160.483	1.12E+11
398.587	223536	16.224	9.22E+09
398.632	223236	79.140	5.10E+10
398.659	223061	75.992	4.88E+10
398.686	222886	86.738	5.64E+10
398.731	222585	15.600	8.84E+09
398.757	222391	6.500	3.55E+09
398.783	222223	29.200	1.72E+10
398.827	221928	11.200	6.25E+09
398.853	221760	69.000	4.38E+10
398.879	221592	87.000	5.65E+10
399.145	219862	56.000	3.48E+10
399.171	219697	37.200	2.23E+10
399.216	219408	30.250	1.78E+10
399.241	219242	19.500	1.12E+10
399.267	219101	17.200	9.79E+09
399.311	218820	16.000	9.07E+09
399.335	218664	24.000	1.39E+10
399.360	218508	95.000	6.19E+10
399.403	218225	10.374	5.76E+09
399.617	216833	1.130	6.04E+08
399.643	216664	1.120	5.98E+08
399.689	216365	23.600	1.37E+10
399.715	216193	65.000	4.08E+10
399.741	216021	53.000	3.27E+10
399.785	215719	21.500	1.24E+10
399.809	215561	22.500	1.30E+10
399.833	215402	41.000	2.47E+10
400.183	213095	15.600	8.83E+09
400.208	212924	6.000	3.27E+09
400.234	212753	8.500	4.69E+09
400.278	212465	4.700	2.55E+09
400.302	212307	11.200	6.25E+09
400.326	212148	2.900	1.56E+09
400.859	208631	27.500	1.61E+10
400.883	208472	216.000	1.52E+11
400.907	208314	270.000	1.94E+11
401.249	206059	.640	3.44E+08
401.437	204818	.698	3.76E+08
401.462	204648	14.791	8.38E+09
401.488	204477	455.761	3.41E+11
402.126	200285	1000.000	7.85E+11
402.151	200123	1000.000	7.85E+11
402.176	199962	1000.000	7.84E+11
402.221	199676	1000.000	7.84E+11
402.246	199510	1000.000	7.84E+11
402.272	199369	820.000	6.34E+11
402.318	199077	710.000	5.43E+11
402.415	198448	1000.000	7.82E+11
402.441	198283	1000.000	7.82E+11
402.467	198117	1000.000	7.82E+11
402.512	197824	1000.000	7.81E+11
402.537	197656	1000.000	7.81E+11
402.563	197487	1000.000	7.81E+11
402.608	197193	1000.000	7.81E+11
402.634	197025	1000.000	7.81E+11
402.660	196858	1000.000	7.81E+11
402.705	196560	1000.000	7.80E+11
402.731	196388	1000.000	7.80E+11
402.757	196190	1000.000	7.80E+11
402.802	195892	1000.000	7.80E+11
402.828	195724	1000.000	7.80E+11
402.854	195556	1000.000	7.80E+11
402.899	195261	1000.000	7.80E+11
402.924	195092	1000.000	7.80E+11
402.950	194923	1000.000	7.80E+11
402.996	194629	1000.000	7.80E+11
403.021	194460	1000.000	7.80E+11
403.047	194293	1000.000	7.79E+11
403.092	194001	1000.000	7.79E+11
403.118	193836	1000.000	7.79E+11
403.144	193671	1000.000	7.79E+11
403.189	193391	1000.000	7.79E+11
403.214	193215	1000.000	7.79E+11
403.240	193049	1000.000	7.79E+11
403.285	192786	430.000	3.16E+11
403.311	192621	430.000	3.16E+11
403.337	192457	430.000	3.16E+11
403.381	192168	1000.000	7.80E+11
403.407	192003	1000.000	7.80E+11
403.433	191837	1000.000	7.80E+11
403.477	191547	1000.000	7.80E+11
403.503	191380	1000.000	7.80E+11
403.529	191214	1000.000	7.80E+11
403.574	190920	1000.000	7.79E+11
403.599	190751	1000.000	7.79E+11
403.625	190582	1000.000	7.79E+11
403.671	190285	1000.000	7.79E+11
403.696	190115	1000.000	7.79E+11
403.722	189945	1000.000	7.79E+11
403.767	189623	1000.000	7.79E+11
403.793	189454	1000.000	7.79E+11
403.819	189286	1000.000	7.79E+11
403.863	188992	1000.000	7.79E+11
403.889	188824	1000.000	7.79E+11
403.915	188657	1000.000	7.79E+11
403.960	188363	1000.000	7.79E+11
403.985	188194	1000.000	7.79E+11
404.011	188026	1000.000	7.79E+11
404.056	187739	1000.000	7.79E+11
404.080	187579	1000.000	7.79E+11
404.105	187418	1000.000	7.79E+11
404.248	186498	1000.000	7.79E+11
404.274	186359	680.000	5.17E+11
404.300	186195	175.000	1.19E+11
404.345	185904	61.500	3.85E+10
404.371	185735	1000.000	7.79E+11
404.397	185567	1000.000	7.79E+11
404.442	185275	1000.000	7.79E+11
404.467	185111	1000.000	7.79E+11
404.493	184947	1000.000	7.79E+11
404.538	184654	1000.000	7.80E+11
404.564	184483	1000.000	7.80E+11
404.590	184313	1000.000	7.80E+11
404.635	184018	1000.000	7.80E+11
404.660	183852	620.000	4.69E+11
404.686	183685	385.000	2.81E+11
404.731	183390	80.000	5.12E+10
404.756	183207	30.500	1.83E+10
404.782	183036	34.300	2.08E+10
404.827	182741	17.200	1.00E+10
404.852	182574	1000.000	7.81E+11
404.878	182406	1000.000	7.81E+11
404.923	182111	1000.000	7.81E+11
404.948	181940	1000.000	7.81E+11
404.974	181769	1000.000	7.81E+11
405.019	181472	1000.000	7.81E+11
405.045	181303	1000.000	7.82E+11
405.071	181134	1000.000	7.82E+11
405.116	180837	1000.000	7.82E+11
405.141	180666	375.000	2.74E+11
405.167	180495	455.000	3.38E+11
405.212	180200	147.000	9.96E+10
405.237	180033	37.200	2.27E+10
405.263	179853	65.000	4.11E+10
405.307	179559	35.900	2.19E+10
405.333	179391	21.500	1.27E+10
405.359	179223	1000.000	7.82E+11
405.404	178928	1000.000	7.83E+11
405.429	178759	1000.000	7.83E+11
405.455	178591	1000.000	7.83E+11
405.500	178297	1000.000	7.83E+11
405.526	178131	1000.000	7.83E+11
405.552	177965	1000.000	7.83E+11
405.596	177675	1000.000	7.83E+11
405.622	177510	1000.000	7.83E+11
405.648	177345	1000.000	7.83E+11
405.692	177057	1000.000	7.83E+11
405.718	176893	1000.000	7.84E+11
405.744	176728	1000.000	7.84E+11
405.788	176444	1000.000	7.84E+11
405.813	176282	1000.000	7.84E+11
405.839	176121	1000.000	7.84E+11
405.883	175837	1000.000	7.84E+11
405.909	175675	1000.000	7.84E+11
405.935	175513	1000.000	7.84E+11
405.979	175230	1000.000	7.85E+11

[a] 1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-I, PROBE 8

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.659	281771	.493	2.45E+08
389.756	281172	.473	2.35E+08
389.782	281010	.673	3.34E+08
389.807	280847	.803	3.99E+08
389.852	280560	.913	4.54E+08
389.877	280395	.923	4.59E+08
389.903	280230	.943	4.68E+08
389.948	279940	.923	4.58E+08
389.973	279774	.863	4.28E+08
389.999	279608	.863	4.28E+08
390.044	279316	.903	4.48E+08
390.069	279149	.903	4.48E+08
390.095	278982	.923	4.58E+08
390.140	278685	1.003	4.98E+08
390.166	278514	1.023	5.07E+08
390.192	278342	1.123	5.57E+08
390.237	278046	1.223	6.06E+08
390.263	277866	1.263	6.26E+08
390.288	277699	1.303	6.46E+08
390.333	277403	1.343	6.65E+08
390.359	277232	1.343	6.65E+08
390.385	277062	1.433	7.09E+08
390.430	276765	1.583	7.83E+08
390.455	276596	1.593	7.88E+08
390.481	276427	1.660	8.22E+08
390.525	276135	1.753	8.66E+08
390.550	275969	1.750	8.66E+08
390.575	275804	1.803	8.90E+08
390.620	275509	1.773	8.75E+08
390.646	275338	1.793	8.85E+08
390.672	275167	1.803	8.90E+08
390.717	274869	2.203	1.09E+09
390.743	274698	2.520	1.24E+09
390.769	274525	3.123	1.53E+09
390.813	274222	3.623	1.77E+09
390.838	274057	4.403	2.16E+09
390.863	273893	4.403	2.16E+09
390.908	273601	4.293	2.11E+09
390.934	273432	3.811	1.86E+09
390.960	273263	3.948	1.93E+09
391.005	272968	3.577	1.75E+09
391.031	272800	3.461	1.69E+09
391.057	272633	3.744	1.83E+09
391.102	272342	4.228	2.07E+09
391.127	272176	5.024	2.48E+09
391.153	272011	5.994	2.98E+09
391.198	271723	6.313	3.15E+09
391.223	271555	6.594	3.30E+09
391.249	271395	6.742	3.38E+09
391.294	271131	6.247	3.11E+09
391.320	270965	6.247	3.11E+09
391.346	270799	5.994	2.98E+09
391.391	270507	6.381	3.18E+09
391.417	270340	5.536	2.74E+09
391.443	270172	12.224	6.38E+09
391.488	269881	7.214	3.62E+09
391.513	269714	7.947	4.02E+09
391.539	269547	9.113	4.65E+09
391.584	269255	9.005	4.59E+09
391.609	269088	8.455	4.29E+09
391.635	268920	8.892	4.53E+09
391.680	268624	9.813	5.04E+09
391.706	268454	10.465	5.41E+09
391.732	268284	10.815	5.59E+09
391.777	267962	11.686	6.07E+09
391.802	267794	12.007	6.26E+09
391.828	267625	11.794	6.14E+09
391.873	267330	11.034	5.72E+09
391.899	267160	11.361	5.90E+09
391.925	266991	10.815	5.60E+09
391.970	266696	10.153	5.24E+09
391.996	266528	10.595	5.48E+09
392.022	266360	11.469	5.97E+09
392.067	266068	12.863	6.77E+09
392.092	265902	13.454	7.11E+09
392.118	265737	17.916	9.70E+09
392.163	265447	19.693	1.08E+10
392.189	265280	21.073	1.16E+10
392.215	265114	18.943	1.03E+10
392.260	264851	15.823	8.53E+09
392.285	264687	15.044	8.09E+09
392.311	264523	15.044	8.09E+09
392.356	264233	13.693	7.32E+09
392.382	264066	14.917	8.04E+09
392.408	263895	16.652	9.06E+09
392.453	263606	19.239	1.06E+10
392.479	263438	20.922	1.16E+10
392.505	263270	25.502	1.44E+10
392.550	262975	29.588	1.70E+10
392.576	262807	30.609	1.77E+10
392.602	262638	28.694	1.65E+10
392.647	262341	27.762	1.59E+10
392.673	262171	26.662	1.52E+10
392.699	262001	25.127	1.43E+10
392.744	261701	22.829	1.29E+10
392.770	261504	24.576	1.40E+10
392.796	261332	25.127	1.43E+10
392.842	261033	26.076	1.50E+10
392.868	260863	28.694	1.66E+10
392.894	260694	26.465	1.52E+10
392.939	260398	28.694	1.66E+10
392.965	260229	30.937	1.81E+10
392.991	260061	32.173	1.88E+10
393.036	259767	34.553	2.04E+10
393.062	259599	35.415	2.09E+10
393.088	259432	35.649	2.11E+10
393.133	259138	35.194	2.08E+10
393.159	258970	34.274	2.02E+10
393.185	258802	33.993	2.01E+10
393.231	258512	30.275	1.77E+10
393.256	258373	26.662	1.54E+10
393.282	258209	21.380	1.21E+10
393.327	257919	24.394	1.40E+10
393.353	257753	23.510	1.35E+10
393.379	257586	33.340	1.96E+10
393.424	257295	40.228	2.42E+10
393.449	257130	41.526	2.50E+10
393.475	256964	47.587	2.92E+10
393.520	256671	46.742	2.86E+10
393.546	256502	44.101	2.68E+10
393.572	256334	39.424	2.36E+10
393.617	256038	37.634	2.24E+10
393.643	255868	34.985	2.07E+10
393.669	255698	34.550	2.04E+10
393.714	255402	34.421	2.04E+10
393.739	255234	35.194	2.08E+10
393.765	255040	38.671	2.31E+10
393.810	254745	48.415	2.98E+10
393.835	254577	52.647	3.27E+10
393.861	254409	53.215	3.31E+10
393.906	254114	53.215	3.31E+10
393.932	253945	54.217	3.38E+10
393.958	253776	53.215	3.31E+10
394.003	253483	53.882	3.35E+10
394.028	253317	56.241	3.52E+10
394.054	253151	55.902	3.49E+10
394.099	252861	58.293	3.66E+10
394.124	252696	56.922	3.56E+10
394.150	252531	56.922	3.56E+10
394.194	252248	50.016	3.08E+10
394.219	252089	44.101	2.68E+10
394.243	251930	35.194	2.08E+10
394.288	251672	45.000	2.74E+10
394.313	251507	53.000	3.28E+10
394.339	251343	57.000	3.56E+10
394.384	251054	65.000	4.12E+10
394.409	250889	69.000	4.41E+10
394.435	250723	71.000	4.55E+10
394.480	250433	74.200	4.78E+10
394.505	250266	69.000	4.40E+10
394.531	250100	66.000	4.19E+10
394.576	249807	56.000	3.48E+10
394.601	249640	53.000	3.27E+10
394.627	249473	48.000	2.93E+10
394.673	249170	49.500	3.03E+10
394.700	248993	45.000	2.73E+10
394.727	248816	33.600	1.97E+10
394.773	248499	48.415	2.95E+10
394.799	248328	53.548	3.30E+10
394.825	248158	67.943	4.31E+10
394.870	247861	81.215	5.25E+10
394.895	247692	78.678	5.07E+10
394.921	247523	75.128	4.81E+10
394.966	247225	69.264	4.43E+10
394.992	247055	66.811	4.22E+10
395.018	246884	64.230	4.04E+10
395.063	246585	63.542	3.99E+10
395.089	246414	65.326	4.11E+10
395.115	246244	66.437	4.19E+10
395.160	245945	66.437	4.19E+10
395.186	245774	28.511	1.65E+10
395.212	245603	32.473	1.90E+10
395.257	245306	37.634	2.23E+10
395.282	245137	48.415	2.95E+10
395.338	244769	49.622	3.03E+10
395.353	244671	73.027	4.65E+10
395.379	244500	89.764	5.84E+10
395.405	244330	95.493	6.26E+10
395.450	244033	96.286	6.31E+10
395.475	243864	91.394	5.93E+10
395.501	243695	83.217	5.36E+10
395.546	243397	65.695	4.13E+10
395.572	243227	67.564	4.25E+10
395.598	243056	58.983	3.66E+10
395.643	242755	53.005	3.25E+10
395.669	242583	64.959	4.07E+10
395.695	242410	73.430	4.66E+10
395.741	242112	71.828	4.55E+10
395.766	241943	59.676	3.70E+10
395.792	241774	34.127	2.00E+10
395.837	241478	100.533	6.59E+10
395.862	241309	92.492	6.01E+10
395.888	241141	78.678	5.07E+10
395.933	240843	84.624	5.46E+10
395.959	240672	81.965	5.25E+10
395.985	240502	77.317	4.92E+10
396.030	240205	81.581	5.22E+10
396.055	240036	82.365	5.27E+10
396.081	239867	89.764	5.80E+10
396.126	239569	99.624	6.50E+10
396.152	239399	64.230	4.00E+10
396.178	239228	37.313	2.20E+10
396.223	238931	29.056	1.68E+10
396.248	238762	30.443	1.77E+10
396.274	238581	25.127	1.44E+10
396.319	238284	21.380	1.21E+10
396.345	238114	20.308	1.15E+10
396.371	237944	114.614	7.57E+10
396.416	237650	110.238	7.24E+10
396.441	237483	106.137	6.94E+10
396.467	237316	97.096	6.29E+10
396.512	237025	85.647	5.47E+10
396.537	236858	86.184	5.51E+10
396.563	236693	91.785	5.90E+10
396.608	236401	100.503	6.52E+10
396.634	236234	110.238	7.22E+10
396.660	236068	15.430	8.59E+09
396.705	235777	11.034	6.04E+09
396.731	235611	8.456	4.58E+09
396.802	235182	10.264	5.60E+09
396.827	235017	4.260	2.26E+09
396.853	234852	89.764	5.74E+10
396.898	234562	79.605	5.03E+10
396.924	234395	69.864	4.36E+10
396.950	234227	61.422	3.79E+10
396.995	233935	83.217	5.28E+10
397.020	233769	101.399	6.55E+10
397.046	233602	107.136	6.97E+10
397.091	233308	123.334	8.15E+10
397.117	233139	137.564	9.23E+10
397.143	232969	22.171	1.26E+10
397.188	232674	1.215	6.38E+08
397.213	232505	1.009	5.30E+08
397.239	232336	1.585	8.33E+08
397.283	232032	.953	4.99E+08
397.308	231866	1.043	5.47E+08
397.333	231701	.953	4.99E+08
397.378	231408	73.503	4.59E+10
397.403	231239	75.003	4.69E+10
397.429	231070	73.503	4.59E+10
397.474	230772	77.003	4.83E+10
397.500	230602	83.003	5.24E+10
397.526	230431	83.003	5.24E+10
397.571	230134	95.003	6.06E+10
397.596	229965	105.503	6.81E+10
397.622	229796	105.503	6.80E+10
397.667	229499	113.003	7.34E+10
397.693	229328	116.503	7.59E+10
397.719	229157	113.003	7.34E+10
397.764	228846	113.003	7.34E+10
397.790	228676	111.000	7.19E+10
397.816	228505	91.003	5.78E+10
397.861	228206	95.003	6.05E+10
397.887	228035	89.003	5.64E+10
397.913	227864	91.003	5.77E+10
397.959	227568	116.906	7.61E+10
397.985	227399	126.545	8.30E+10
398.011	227231	150.383	1.01E+11
398.056	226937	171.733	1.17E+11
398.082	226770	180.917	1.23E+11
398.108	226603	174.721	1.19E+11
398.153	226313	163.187	1.10E+11
398.178	226148	87.897	5.55E+10
398.204	225984	74.283	4.62E+10
398.249	225695	24.037	1.37E+10
398.275	225554	16.793	9.38E+09
398.301	225388	11.902	6.54E+09
398.346	225099	113.494	7.33E+10
398.371	224934	120.355	7.82E+10
398.397	224769	117.606	7.63E+10
398.442	224477	137.564	9.07E+10
398.468	224310	152.803	1.02E+11
398.494	224142	160.483	1.07E+11
398.539	223849	186.720	1.27E+11
398.564	223682	200.608	1.38E+11
398.590	223515	17.207	9.62E+09
398.636	223214	108.153	6.94E+10
398.662	223040	46.742	2.79E+10
398.689	222864	110.238	7.08E+10
398.735	222564	25.503	1.45E+10
398.760	222370	1.753	9.24E+08
398.786	222201	58.003	3.52E+10
398.831	221907	5.600	3.01E+09
398.856	221739	87.000	5.46E+10
398.882	221571	102.003	6.50E+10
399.148	219841	69.000	4.24E+10
399.174	219676	54.503	3.27E+10
399.219	219387	31.003	1.79E+10
399.245	219221	36.503	2.14E+10
399.271	219081	30.253	1.75E+10
399.314	218800	28.503	1.64E+10
399.339	218644	31.003	1.79E+10
399.363	218488	113.003	7.25E+10
399.406	218209	11.143	6.12E+09
399.621	216812	.923	4.87E+08
399.647	216643	13.903	7.70E+09
399.692	216344	37.203	2.19E+10
399.718	216172	93.003	5.84E+10
399.744	215999	67.003	4.10E+10
399.788	215699	31.503	1.82E+10
399.812	215541	29.203	1.68E+10
399.836	215382	147.000	9.66E+10
400.186	213073	27.003	1.55E+10
400.212	212903	18.703	1.05E+10
400.238	212732	19.503	1.10E+10
400.281	212445	16.953	9.50E+09
400.305	212287	1.663	8.82E+08
400.329	212129	4.903	2.63E+09
400.862	208611	255.000	1.76E+11
400.886	208452	270.003	1.87E+11
400.910	208294	128.000	8.26E+10
401.252	206038	.743	3.95E+08
401.440	204797	4.813	2.60E+09
401.466	204626	409.208	2.92E+11
402.129	200264	1000.003	7.58E+11
402.154	200103	1000.003	7.58E+11
402.179	199942	1000.003	7.58E+11
402.224	199655	1000.003	7.58E+11
402.250	199489	1000.003	7.58E+11
402.276	199349	820.003	6.14E+11
402.321	199056	820.003	6.14E+11
402.419	198428	1000.003	7.58E+11
402.444	198262	1000.003	7.58E+11
402.470	198096	1000.000	7.58E+11
402.515	197803	1000.000	7.58E+11
402.541	197635	1000.000	7.58E+11
402.567	197466	1000.000	7.58E+11
402.612	197172	1000.000	7.58E+11
402.637	197004	1000.000	7.58E+11
402.663	196836	1000.000	7.58E+11
402.708	196538	1000.000	7.58E+11
402.734	196366	1000.000	7.58E+11
402.760	196169	1000.000	7.58E+11
402.806	195871	1000.000	7.58E+11
402.831	195703	1000.000	7.58E+11
402.857	195535	1000.000	7.58E+11
402.902	195240	1000.000	7.58E+11
402.928	195071	1000.000	7.58E+11
402.954	194902	1000.000	7.58E+11
402.999	194607	1000.000	7.58E+11
403.025	194439	1000.000	7.58E+11
403.051	194272	1000.000	7.58E+11
403.096	193980	1000.000	7.58E+11
403.121	193815	1000.000	7.58E+11
403.147	193650	1000.000	7.58E+11
403.192	193360	1000.000	7.58E+11
403.218	193194	1000.000	7.58E+11
403.244	193028	1000.000	7.58E+11
403.289	192765	1000.000	7.58E+11
403.314	192601	1000.000	7.58E+11
403.340	192436	1000.000	7.58E+11
403.385	192147	1000.000	7.58E+11
403.410	191982	1000.000	7.58E+11
403.436	191816	1000.000	7.58E+11
403.481	191526	1000.000	7.58E+11
403.506	191360	1000.000	7.58E+11
403.532	191193	1000.000	7.59E+11
403.577	190899	1000.000	7.59E+11
403.603	190730	1000.000	7.59E+11
403.629	190561	1000.000	7.59E+11
403.674	190264	1000.000	7.59E+11
403.700	190094	1000.000	7.59E+11
403.726	189923	1000.000	7.59E+11
403.771	189602	1000.000	7.59E+11
403.796	189433	1000.000	7.59E+11
403.822	189265	1000.000	7.59E+11
403.867	188971	1000.000	7.60E+11
403.892	188803	1000.000	7.60E+11
403.918	188636	1000.000	7.60E+11
403.963	188342	1000.000	7.60E+11
403.989	188173	1000.000	7.60E+11
404.015	188005	1000.000	7.60E+11
404.059	187718	1000.000	7.60E+11
404.084	187555	1000.000	7.60E+11
404.108	187398	1000.000	7.60E+11
404.252	186502	1000.000	7.61E+11
404.277	186338	1000.000	7.61E+11
404.303	186174	1000.000	7.61E+11
404.348	185883	1000.000	7.61E+11
404.374	185714	1000.000	7.62E+11
404.400	185545	1000.000	7.62E+11
404.445	185255	1000.000	7.62E+11
404.471	185090	1000.000	7.62E+11
404.496	184926	1000.000	7.62E+11
404.541	184632	1000.000	7.62E+11
404.567	184462	1000.000	7.62E+11
404.593	184291	1000.000	7.62E+11
404.638	183997	1000.000	7.63E+11
404.664	183831	1000.000	7.63E+11
404.689	183664	1000.000	7.63E+11
404.734	183369	1000.000	7.63E+11
404.760	183186	270.000	1.89E+11
404.786	183015	680.000	5.08E+11
404.830	182720	620.000	4.60E+11
404.856	182553	1000.000	7.64E+11
404.881	182385	1000.000	7.64E+11
404.926	182089	1000.000	7.64E+11
404.952	181919	1000.000	7.64E+11
404.978	181748	1000.000	7.64E+11
405.023	181451	1000.000	7.65E+11
405.048	181282	1000.000	7.65E+11
405.074	181113	1000.000	7.65E+11
405.119	180815	1000.000	7.65E+11
405.145	180645	1000.000	7.65E+11
405.171	180474	1000.000	7.65E+11
405.215	180179	1000.000	7.66E+11
405.241	180012	1000.000	7.66E+11
405.266	179832	820.000	6.21E+11
405.311	179538	620.000	4.62E+11
405.336	179370	430.000	3.13E+11
405.362	179202	1000.000	7.66E+11
405.407	178907	1000.000	7.66E+11
405.433	178738	1000.000	7.67E+11
405.459	178569	1000.000	7.67E+11
405.504	178277	1000.000	7.67E+11
405.529	178110	1000.000	7.67E+11
405.555	177944	1000.000	7.67E+11
405.600	177655	1000.000	7.68E+11
405.625	177489	1000.000	7.68E+11
405.651	177324	1000.000	7.68E+11
405.696	177036	1000.000	7.68E+11
405.721	176872	1000.000	7.68E+11
405.747	176708	1000.000	7.69E+11
405.791	176423	1000.000	7.69E+11
405.817	176262	1000.000	7.69E+11
405.842	176100	1000.000	7.69E+11
405.887	175817	1000.000	7.70E+11
405.912	175655	1000.000	7.70E+11
405.938	175493	1000.000	7.70E+11
405.983	175210	1000.000	7.70E+11

(a) 1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 1

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.732	281300	.100	6.18E+07
389.760	281151	.100	6.18E+07
389.787	280977	.100	6.18E+07
389.834	280671	.100	6.18E+07
389.862	280494	.100	6.18E+07
389.889	280317	.100	6.18E+07
389.937	280006	.100	6.14E+07
389.965	279828	.100	6.18E+07
389.992	279650	.100	6.19E+07
390.040	279337	.100	6.19E+07
390.068	279160	.100	6.19E+07
390.095	278982	.100	6.19E+07
390.142	278670	.110	6.81E+07
390.170	278492	.100	6.19E+07
390.197	278313	.100	6.19E+07
390.244	277999	.100	6.20E+07
390.272	277805	.119	7.37E+07
390.375	277128	.100	6.20E+07
390.402	276948	.137	8.51E+07
390.449	276634	.163	1.01E+08
390.477	276452	.129	7.95E+07
390.504	276271	.155	9.61E+07
390.553	275953	.198	1.17E+08
390.581	275767	.119	7.38E+07
390.658	275256	.163	1.02E+08
390.684	275085	.285	1.78E+08
390.710	274914	.211	1.32E+08
390.755	274602	.160	9.97E+07
390.783	274421	.230	1.44E+08
390.810	274240	.190	1.19E+08
390.858	273924	.180	1.12E+08
390.886	273746	.170	1.06E+08
390.913	273568	.120	7.48E+07
390.960	273258	.130	8.11E+07
390.988	273081	.260	1.63E+08
391.015	272904	.460	2.89E+08
391.062	272595	.610	3.84E+08
391.090	272417	.830	5.25E+08
391.117	272240	.750	4.74E+08
391.165	271930	.580	3.65E+08
391.193	271756	.590	3.72E+08
391.220	271581	.540	3.40E+08
391.268	271300	.610	3.85E+08
391.296	271119	.660	4.17E+08
391.324	270937	.840	5.33E+08
391.373	270619	.802	5.09E+08
391.401	270442	.858	5.45E+08
391.428	270265	.878	5.58E+08
391.476	269953	.836	5.31E+08
391.504	269775	.842	5.35E+08
391.531	269596	.876	5.57E+08
391.579	269283	.846	5.38E+08
391.607	269105	.971	6.19E+08
391.634	268927	.971	6.20E+08
391.681	268614	.974	6.22E+08
391.709	268433	1.087	6.96E+08
391.736	268252	1.135	7.28E+08
391.784	267910	1.036	6.63E+08
391.812	267730	1.117	7.16E+08
391.839	267549	1.136	7.29E+08
391.887	267234	.999	6.39E+08
391.915	267055	1.066	6.83E+08
391.942	266875	1.129	7.25E+08
391.990	266562	1.302	8.40E+08
392.018	266384	1.378	8.91E+08
392.045	266206	1.411	9.13E+08
392.093	265894	1.593	1.04E+09
392.121	265717	1.478	9.59E+08
392.148	265540	1.677	1.09E+09
392.196	265231	1.261	8.15E+08
392.224	265055	1.339	8.67E+08
392.251	264904	1.356	8.79E+08
392.299	264556	1.339	8.68E+08
392.327	264421	1.378	8.94E+08
392.354	264246	1.559	1.02E+09
392.401	263939	1.732	1.13E+09
392.429	263761	2.034	1.34E+09
392.456	263582	2.472	1.66E+09
392.504	263271	2.226	1.48E+09
392.532	263092	2.065	1.36E+09
392.559	262913	2.004	1.32E+09
392.607	262599	1.932	1.27E+09
392.635	262420	1.913	1.26E+09
392.662	262239	2.097	1.39E+09
392.710	261923	2.207	1.47E+09
392.738	261742	2.799	1.90E+09
392.765	261536	2.697	1.83E+09
392.813	261220	2.555	1.72E+09
392.841	261039	2.673	1.81E+09
392.868	260859	3.103	2.14E+09
392.916	260545	2.722	1.85E+09
392.944	260365	3.202	2.21E+09
392.971	260186	3.423	2.38E+09
393.019	259874	3.746	2.64E+09
393.047	259698	3.896	2.75E+09
393.074	259521	4.207	3.01E+09
393.121	259214	3.321	2.31E+09
393.149	259037	3.202	2.22E+09
393.176	258860	3.354	2.34E+09
393.224	258551	3.072	2.12E+09
393.252	258400	3.040	2.10E+09
393.279	258224	3.701	2.61E+09
393.327	257916	4.488	3.24E+09
393.355	257741	5.156	3.79E+09
393.382	257566	5.375	3.98E+09
393.429	257256	5.683	4.25E+09
393.457	257080	5.603	4.18E+09
393.484	256902	4.896	3.58E+09
393.532	256589	4.431	3.20E+09
393.560	256410	4.207	3.02E+09
393.587	256231	4.319	3.11E+09
393.635	255916	4.431	3.21E+09
393.663	255736	4.713	3.44E+09
393.690	255555	5.089	3.75E+09
393.738	255239	5.523	4.12E+09
393.766	255035	5.779	4.34E+09
393.793	254855	5.779	4.34E+09
393.840	254542	5.872	4.43E+09
393.868	254362	5.441	4.06E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.895	254182	5.872	4.43E+09
393.943	253868	5.872	4.43E+09
393.971	253689	6.172	4.69E+09
393.998	253511	6.279	4.79E+09
394.046	253199	6.279	4.79E+09
394.074	253023	5.969	4.52E+09
394.101	252847	5.689	4.28E+09
394.148	252540	5.375	4.02E+09
394.176	252363	4.896	3.61E+09
394.203	252186	5.300	3.96E+09
394.251	251904	5.779	4.37E+09
394.279	251729	7.122	5.55E+09
394.306	251555	8.217	6.60E+09
394.353	251248	8.984	7.36E+09
394.381	251071	8.551	6.93E+09
394.408	250894	7.758	6.16E+09
394.456	250583	6.504	5.01E+09
394.484	250405	5.969	4.54E+09
394.511	250226	6.172	4.72E+09
394.559	249913	5.969	4.55E+09
394.587	249736	6.504	5.02E+09
394.614	249558	6.995	5.45E+09
394.661	249245	8.551	6.96E+09
394.689	249065	9.747	8.18E+09
394.716	248884	10.439	8.88E+09
394.764	248555	9.566	8.00E+09
394.792	248375	10.253	8.72E+09
394.819	248196	9.566	8.01E+09
394.866	247882	8.217	6.65E+09
394.894	247702	8.381	6.82E+09
394.921	247523	8.551	6.99E+09
394.968	247208	8.727	7.17E+09
394.996	247027	9.747	8.22E+09
395.023	246846	14.075	1.30E+10
395.071	246529	9.747	8.23E+09
395.099	246349	9.566	8.04E+09
395.126	246170	9.379	7.85E+09
395.173	245855	11.307	9.90E+09
395.201	245674	10.796	9.35E+09
395.228	245493	11.680	1.03E+10
395.276	245176	13.223	1.21E+10
395.304	244996	14.239	1.32E+10
395.331	244817	14.574	1.36E+10
395.378	244502	11.680	1.03E+10
395.406	244321	11.490	1.01E+10
395.433	244140	10.091	8.62E+09
395.481	243823	10.409	8.96E+09
395.509	243643	10.091	8.63E+09
395.536	243464	9.922	8.45E+09
395.583	243149	10.486	9.05E+09
395.611	242968	10.960	9.57E+09
395.638	242787	11.876	1.06E+10
395.686	242470	13.046	1.19E+10
395.714	242290	13.046	1.19E+10
395.741	242111	12.501	1.13E+10
395.788	241796	11.139	9.77E+09
395.816	241615	10.091	8.66E+09
395.843	241434	9.566	8.10E+09
395.891	241117	12.315	1.11E+10
395.919	240937	13.223	1.21E+10
395.946	240758	13.741	1.28E+10
395.993	240443	14.379	1.35E+10
396.021	240262	14.574	1.42E+10
396.048	240081	15.181	1.45E+10
396.096	239764	15.181	1.45E+10
396.124	239584	16.719	1.64E+10
396.151	239405	18.217	1.83E+10
396.198	239090	21.314	2.23E+10
396.226	238909	24.124	2.62E+10
396.253	238715	25.377	2.80E+10
396.301	238399	23.878	2.59E+10
396.329	238220	22.060	2.34E+10
396.356	238041	22.060	2.34E+10
396.403	237730	19.089	1.94E+10
396.431	237552	19.089	1.94E+10
396.459	237375	20.520	2.13E+10
396.505	237065	23.195	2.49E+10
396.533	236886	26.408	2.95E+10
396.560	236708	29.917	3.46E+10
396.608	236398	35.389	4.29E+10
396.636	236222	36.855	4.52E+10
396.663	236047	35.097	4.25E+10
396.710	235741	29.089	3.34E+10
396.738	235565	27.471	3.10E+10
396.765	235414	27.471	3.10E+10
396.813	235106	27.206	3.06E+10
396.841	234929	28.545	3.26E+10
396.868	234752	30.195	3.50E+10
396.916	234442	32.785	3.89E+10
396.944	234266	34.226	4.12E+10
396.971	234090	35.389	4.30E+10
397.018	233780	35.389	4.30E+10
397.046	233603	35.973	4.39E+10
397.073	233426	36.267	4.44E+10
397.120	233114	38.930	4.86E+10
397.148	232934	41.417	5.26E+10
397.175	232754	43.739	5.64E+10
397.223	232438	45.458	5.93E+10
397.251	232246	43.739	5.64E+10
397.278	232067	41.743	5.31E+10
397.325	231752	36.560	4.48E+10
397.353	231571	35.681	4.35E+10
397.380	231390	34.806	4.21E+10
397.428	231073	36.855	4.53E+10
397.456	230893	40.453	5.10E+10
397.483	230714	45.808	5.99E+10
397.530	230399	60.544	8.54E+10
397.558	230218	66.586	9.64E+10
397.565	230037	67.493	9.81E+10
397.633	229719	55.528	7.65E+10
397.661	229538	50.236	6.74E+10
397.688	229357	46.514	6.11E+10
397.736	229040	43.739	5.64E+10
397.764	228846	43.739	5.65E+10
397.791	228665	46.870	6.17E+10
397.839	228349	52.848	7.19E+10
397.867	228171	54.371	7.46E+10
397.894	227993	57.727	8.05E+10
397.941	227681	59.320	8.33E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
397.969	227502	58.917	8.26E+10
397.996	227324	57.727	8.05E+10
398.044	227012	62.214	8.85E+10
398.072	226836	67.807	9.86E+10
398.099	226660	74.002	1.10E+11
398.146	226353	83.272	1.28E+11
398.174	226178	83.573	1.29E+11
398.201	226003	78.054	1.18E+11
398.248	225698	63.066	8.98E+10
398.276	225547	57.336	7.95E+10
398.303	225370	53.989	7.36E+10
398.351	225061	50.976	6.84E+10
398.379	224886	55.528	7.62E+10
398.406	224711	67.493	9.76E+10
398.453	224402	95.995	1.51E+11
398.481	224224	110.557	1.81E+11
398.508	224046	119.393	1.98E+11
398.556	223733	101.426	1.62E+11
398.584	223555	95.995	1.51E+11
398.611	223377	87.643	1.35E+11
398.658	223065	78.054	1.17E+11
398.686	222887	77.444	1.16E+11
398.713	222708	83.272	1.26E+11
398.760	222369	89.189	1.38E+11
398.788	222190	93.415	1.46E+11
398.815	222011	98.574	1.56E+11
398.862	221698	91.696	1.42E+11
398.890	221518	87.643	1.34E+11
398.917	221338	85.407	1.30E+11
398.965	221025	93.415	1.45E+11
398.993	220848	108.610	1.75E+11
399.020	220671	148.467	2.56E+11
399.067	220363	167.385	2.96E+11
399.095	220185	167.385	2.96E+11
399.122	220008	160.845	2.82E+11
399.170	219698	119.393	1.96E+11
399.198	219523	98.574	1.54E+11
399.225	219349	86.141	1.31E+11
399.272	219069	75.108	1.10E+11
399.300	218893	78.673	1.17E+11
399.327	218716	89.189	1.36E+11
399.375	218407	124.078	2.04E+11
399.403	218231	154.539	2.67E+11
399.430	218055	184.289	3.30E+11
399.477	217747	170.742	3.01E+11
399.505	217570	164.085	2.86E+11
399.532	217393	151.473	2.60E+11
399.579	217082	137.052	2.29E+11
399.607	216903	145.518	2.47E+11
399.634	216723	154.539	2.65E+11
399.682	216408	160.845	2.78E+11
399.710	216229	160.845	2.78E+11
399.737	216050	187.527	3.34E+11
399.784	215723	119.393	1.93E+11
399.812	215541	110.557	1.76E+11
399.839	215360	101.426	1.57E+11
399.887	215043	123.000	1.99E+11
399.915	214864	130.000	2.13E+11
399.942	214684	180.000	3.16E+11
399.989	214370	212.000	3.84E+11
400.017	214188	246.000	4.59E+11
400.044	214007	223.000	4.08E+11
400.092	213690	170.000	2.94E+11
400.120	213511	157.000	2.66E+11
400.147	213331	132.000	2.16E+11
400.194	213017	122.000	1.95E+11
400.222	212835	96.000	1.45E+11
400.249	212654	122.000	1.95E+11
400.297	212337	157.000	2.66E+11
400.325	212158	170.000	2.92E+11
400.352	211978	183.000	3.19E+11
400.399	211664	183.000	3.19E+11
400.427	211484	170.000	2.91E+11
400.454	211305	163.500	2.78E+11
400.501	210991	189.000	3.30E+11
400.529	210809	183.000	3.17E+11
400.556	210628	212.000	3.78E+11
400.604	210311	270.000	5.04E+11
400.632	210131	246.500	4.51E+11
400.659	209952	195.000	3.41E+11
400.706	209638	157.000	2.62E+11
400.734	209458	132.000	2.12E+11
400.761	209279	127.000	2.01E+11
400.808	208965	145.000	2.36E+11
400.836	208785	163.500	2.73E+11
400.863	208606	189.000	3.25E+11
400.910	208291	270.000	4.96E+11
400.938	208110	302.500	5.67E+11
400.965	207929	325.000	6.16E+11
401.013	207611	212.000	3.70E+11
401.041	207430	183.000	3.10E+11
401.068	207249	195.000	3.34E+11
401.116	206932	189.000	3.21E+11
401.144	206752	195.000	3.33E+11
401.171	206573	212.000	3.67E+11
401.218	206258	212.000	3.67E+11
401.246	206077	212.000	3.66E+11
401.273	205896	183.000	3.07E+11
401.321	205579	157.000	2.54E+11
401.349	205399	157.000	2.54E+11
401.376	205220	163.500	2.66E+11
401.423	204905	212.000	3.64E+11
401.451	204724	270.000	4.85E+11
401.478	204543	367.500	6.96E+11
401.526	204226	395.000	7.56E+11
401.554	204046	395.000	7.55E+11
401.581	203867	350.000	6.54E+11
401.628	203553	212.000	3.60E+11
401.656	203373	195.000	3.26E+11
401.693	203194	183.000	3.01E+11
401.730	202879	183.000	3.01E+11
401.758	202685	183.000	3.00E+11
401.785	202504	212.000	3.59E+11
401.833	202188	223.000	3.80E+11
401.861	202008	212.000	3.57E+11
401.888	201828	203.500	3.39E+11
401.936	201514	212.000	3.56E+11
401.964	201337	212.000	3.55E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
401.991	201160	246.500	4.25E+11
402.038	200851	350.000	6.42E+11
402.066	200674	395.000	7.39E+11
402.093	200499	432.500	8.20E+11
402.140	200191	375.000	6.93E+11
402.168	200014	302.500	5.38E+11
402.195	199838	212.000	3.52E+11
402.243	199530	163.500	2.57E+11
402.271	199381	157.000	2.44E+11
402.298	199206	170.000	2.68E+11
402.345	198900	183.000	2.93E+11
402.373	198723	217.500	3.60E+11
402.400	198546	270.000	4.65E+11
402.448	198235	290.000	5.05E+11
402.476	198058	302.500	5.30E+11
402.503	197882	302.500	5.30E+11
402.550	197572	290.000	5.03E+11
402.578	197394	325.000	5.74E+11
402.605	197217	337.500	6.00E+11
402.652	196905	385.000	6.98E+11
402.680	196724	395.000	7.18E+11
402.737	196544	350.000	6.23E+11
402.755	196202	223.000	3.64E+11
402.783	196023	183.000	2.87E+11
402.810	195844	163.500	2.50E+11
402.857	195531	157.000	2.37E+11
402.885	195351	183.000	2.85E+11
402.912	195171	189.000	2.96E+11
402.960	194857	290.000	4.92E+11
402.988	194679	375.000	6.65E+11
403.015	194500	385.000	6.85E+11
403.063	194189	375.000	6.63E+11
403.091	194013	350.000	6.11E+11
403.118	193837	337.500	5.84E+11
403.165	193530	325.000	5.58E+11
403.193	193354	375.000	6.59E+11
403.220	193177	375.000	6.58E+11
403.268	192895	350.000	6.06E+11
403.296	192720	280.000	4.65E+11
403.323	192546	223.000	3.55E+11
403.370	192239	176.500	2.67E+11
403.398	192062	170.000	2.55E+11
403.425	191884	170.000	2.55E+11
403.473	191573	212.000	3.32E+11
403.501	191394	290.000	4.81E+11
403.528	191215	375.000	6.49E+11
403.576	190902	455.000	8.11E+11
403.604	190722	445.000	7.90E+11
403.631	190543	420.000	7.38E+11
403.679	190227	375.000	6.45E+11
403.707	190049	367.500	6.29E+11
403.734	189869	375.000	6.44E+11
403.781	189530	395.000	6.83E+11
403.809	189349	385.000	6.62E+11
403.836	189169	375.000	6.41E+11
403.884	188854	223.000	3.47E+11
403.912	188674	203.500	3.11E+11
403.939	188495	176.500	2.62E+11
403.987	188182	163.500	2.38E+11
404.015	188003	189.000	2.83E+11
404.042	187825	217.500	3.35E+11
404.090	187514	375.000	6.74E+11
404.118	187338	445.000	7.73E+11
404.145	187163	465.000	8.12E+11
404.192	186857	455.000	7.90E+11
404.220	186680	432.500	7.44E+11
404.247	186504	420.000	7.18E+11
404.295	186221	412.500	7.02E+11
404.323	186045	420.000	7.15E+11
404.350	185868	432.500	7.39E+11
404.398	185558	395.000	6.64E+11
404.426	185382	337.500	5.52E+11
404.453	185206	280.000	4.43E+11
404.500	184897	189.000	2.77E+11
404.528	184719	183.000	2.66E+11
404.555	184540	189.000	2.77E+11
404.603	184226	270.000	4.21E+11
404.631	184048	325.000	5.23E+11
404.658	183869	395.000	6.55E+11
404.705	183556	455.000	7.70E+11
404.733	183375	455.000	7.69E+11
404.760	183182	455.000	7.68E+11
404.808	182865	420.000	6.98E+11
404.836	182685	420.000	6.97E+11
404.863	182506	455.000	7.64E+11
404.910	182191	75.000	8.91E+10
404.938	182010	7.000	5.33E+09
404.965	181829	1.050	6.89E+08
405.013	181511	2.850	1.96E+09
405.041	181330	.590	3.89E+08
405.068	181149	.140	9.26E+07
405.116	180832	.510	3.37E+08
405.144	180650	.350	2.31E+08
405.171	180469	.230	1.52E+08
405.219	180152	.820	5.39E+08
405.247	179970	.960	6.30E+08
405.274	179777	2.130	1.43E+09
405.322	179461	1.200	7.85E+08
405.350	179282	.590	3.89E+08
405.377	179104	.510	3.36E+08
405.424	178792	.590	3.89E+08
405.452	178613	.540	3.56E+08
405.479	178434	.630	4.15E+08
405.527	178122	.350	2.31E+08
405.555	177944	.290	1.92E+08
405.582	177766	.230	1.52E+08
405.630	177456	.140	9.26E+07
405.685	177102	.180	1.19E+08
405.733	176794	.230	1.52E+08
405.761	176619	.290	1.91E+08
405.788	176442	.610	4.02E+08
405.836	176136	3.500	2.44E+09
405.863	175963	5.930	4.35E+09
405.891	175790	7.000	5.27E+09
405.938	175489	10.200	8.07E+09
405.966	175315	1.050	6.87E+08
405.993	175142	.590	3.88E+08

[a] 1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 2

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.736	281278	.100	5.85E+07
389.763	281129	.100	5.85E+07
389.790	280955	.100	5.85E+07
389.838	280649	.100	5.85E+07
389.865	280472	.100	5.85E+07
389.893	280295	.100	5.85E+07
389.941	279984	.100	5.85E+07
389.968	279806	.100	5.85E+07
389.996	279627	.100	5.85E+07
390.044	279315	.100	5.85E+07
390.071	279137	.100	5.85E+07
390.098	278960	.100	5.85E+07
390.146	278648	.120	7.03E+07
390.173	278470	.110	6.44E+07
390.200	278291	.100	5.86E+07
390.248	277977	.128	7.50E+07
390.275	277783	.109	6.41E+07
390.303	277602	.100	5.86E+07
390.351	277285	.119	6.96E+07
390.378	277105	.109	6.42E+07
390.405	276926	.100	5.86E+07
390.453	276611	.146	8.55E+07
390.480	276430	.240	1.41E+08
390.508	276249	.163	9.57E+07
390.556	275930	.203	1.19E+08
390.584	275743	.266	1.56E+08
390.661	275234	.203	1.19E+08
390.687	275064	.260	1.53E+08
390.713	274893	.196	1.15E+08
390.759	274579	.210	1.23E+08
390.786	274358	.410	2.41E+08
390.814	274217	.290	1.70E+08
390.862	273902	.210	1.23E+08
390.889	273724	.170	9.98E+07
390.916	273546	.180	1.06E+08
390.964	273236	.150	8.81E+07
390.991	273055	.460	2.71E+08
391.018	272882	.580	3.41E+08
391.066	272573	.760	4.48E+08
391.093	272395	1.030	6.08E+08
391.121	272218	.930	5.48E+08
391.169	271908	.820	4.83E+08
391.196	271734	.750	4.42E+08
391.223	271555	.670	3.95E+08
391.271	271278	.790	4.66E+08
391.299	271096	.820	4.84E+08
391.328	270915	.940	5.55E+08
391.377	270597	.932	5.50E+08
391.404	270420	.903	5.36E+08
391.432	270242	1.018	6.01E+08
391.480	269931	1.024	6.05E+08
391.507	269752	1.021	6.03E+08
391.535	269574	.976	5.77E+08
391.583	269260	1.043	6.16E+08
391.610	269083	1.109	6.56E+08
391.637	268904	1.113	6.58E+08
391.685	268592	1.286	7.61E+08
391.712	268411	1.334	7.90E+08
391.740	268230	1.227	7.26E+08
391.788	267888	1.389	8.23E+08
391.815	267707	1.394	8.26E+08
391.843	267527	1.389	8.23E+08
391.891	267212	1.281	7.59E+08
391.918	267032	1.405	8.33E+08
391.946	266853	1.378	8.17E+08
391.994	266540	1.559	9.25E+08
392.021	266361	1.732	1.03E+09
392.049	266183	2.034	1.21E+09
392.097	265872	2.279	1.36E+09
392.124	265695	2.261	1.35E+09
392.152	265518	2.097	1.25E+09
392.200	265209	1.775	1.05E+09
392.227	265033	1.636	9.71E+08
392.255	264882	1.742	1.03E+09
392.303	264574	1.775	1.05E+09
392.330	264399	1.798	1.07E+09
392.357	264224	1.946	1.16E+09
392.405	263917	2.825	1.70E+09
392.432	263739	3.135	1.90E+09
392.460	263561	3.575	2.19E+09
392.508	263249	3.236	1.97E+09
392.535	263070	3.236	1.97E+09
392.563	262891	3.072	1.86E+09
392.611	262577	2.722	1.63E+09
392.638	262397	2.602	1.56E+09
392.666	262217	2.799	1.68E+09
392.714	261901	3.169	1.92E+09
392.741	261720	3.423	2.09E+09
392.769	261513	3.701	2.28E+09
392.817	261197	3.575	2.20E+09
392.844	261017	3.460	2.12E+09
392.872	260837	3.934	2.44E+09
392.920	260522	4.207	2.63E+09
392.947	260343	4.319	2.70E+09
392.975	260164	4.895	3.11E+09
393.023	259852	5.375	3.45E+09
393.050	259676	5.441	3.50E+09
393.077	259499	5.441	3.50E+09
393.125	259191	5.021	3.20E+09
393.152	259014	3.701	2.23E+09
393.180	258838	4.319	2.71E+09
393.228	258529	3.886	2.41E+09
393.255	258378	4.488	2.83E+09
393.283	258202	4.769	3.02E+09
393.331	257894	5.689	3.68E+09
393.358	257719	7.122	4.74E+09
393.385	257544	7.905	5.34E+09
393.433	257235	6.995	4.65E+09
393.460	257058	6.749	4.46E+09
393.488	256879	6.069	3.96E+09
393.536	256567	5.520	3.57E+09
393.563	256388	5.227	3.35E+09
393.591	256208	5.300	3.41E+09
393.639	255894	5.441	3.51E+09
393.666	255713	6.172	4.04E+09
393.694	255533	6.504	4.29E+09
393.742	255217	7.521	5.06E+09
393.769	255012	7.521	5.06E+09
393.796	254833	7.386	4.96E+09

[a]1 meter = 0.3048 feet

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.844	254520	7.905	5.36E+09
393.871	254340	7.905	5.36E+09
393.899	254160	7.905	5.36E+09
393.947	253846	8.381	5.73E+09
393.974	253667	9.185	6.36E+09
394.002	253488	8.551	5.86E+09
394.050	253177	8.551	5.86E+09
394.077	253001	8.058	5.48E+09
394.104	252825	7.758	5.25E+09
394.152	252517	7.253	4.87E+09
394.179	252341	7.386	4.97E+09
394.207	252164	7.386	4.97E+09
394.255	251882	8.551	5.87E+09
394.282	251707	10.253	7.25E+09
394.309	251533	11.680	8.46E+09
394.357	251226	12.685	9.32E+09
394.384	251049	11.876	8.63E+09
394.412	250872	10.796	7.71E+09
394.460	250561	8.381	5.75E+09
394.487	250382	7.758	5.26E+09
394.515	250204	7.617	5.16E+09
394.563	249891	7.617	5.16E+09
394.590	249713	8.217	5.62E+09
394.617	249535	9.566	6.71E+09
394.665	249223	11.130	8.01E+09
394.692	249042	13.223	9.82E+09
394.720	248862	13.046	9.66E+09
394.768	248533	12.867	9.51E+09
394.795	248353	13.046	9.67E+09
394.822	248173	12.867	9.52E+09
394.870	247859	12.078	8.83E+09
394.897	247680	11.876	8.66E+09
394.924	247500	11.876	8.66E+09
394.972	247186	12.315	9.05E+09
394.999	247004	12.501	9.21E+09
395.027	246823	12.685	9.37E+09
395.075	246506	13.046	9.69E+09
395.102	246327	12.685	9.38E+09
395.129	246147	13.223	9.85E+09
395.177	245833	14.075	1.06E+10
395.204	245651	14.772	1.12E+10
395.232	245470	16.254	1.26E+10
395.280	245153	18.751	1.49E+10
395.307	244974	20.245	1.64E+10
395.334	244794	19.964	1.61E+10
395.382	244480	15.181	1.16E+10
395.409	244298	14.574	1.11E+10
395.437	244117	13.046	9.71E+09
395.485	243800	12.315	9.07E+09
395.512	243621	12.315	9.08E+09
395.539	243441	13.570	1.02E+10
395.587	243127	17.200	1.35E+10
395.614	242945	19.386	1.56E+10
395.642	242764	22.757	1.89E+10
395.690	242447	24.871	2.10E+10
395.717	242268	23.195	1.93E+10
395.744	242088	23.195	1.93E+10
395.792	241774	17.448	1.37E+10
395.819	241592	16.254	1.26E+10
395.847	241411	16.719	1.31E+10
395.895	241094	19.386	1.56E+10
395.922	240915	21.817	1.79E+10
395.949	240735	23.195	1.93E+10
395.997	240421	24.620	2.07E+10
396.024	240239	24.871	2.10E+10
396.052	240058	25.123	2.12E+10
396.100	239741	26.408	2.25E+10
396.127	239562	26.670	2.28E+10
396.154	239382	29.089	2.53E+10
396.202	239068	33.937	3.06E+10
396.229	238886	36.560	3.36E+10
396.257	238693	37.741	3.49E+10
396.305	238376	34.516	3.12E+10
396.332	238198	32.785	2.93E+10
396.359	238019	31.038	2.74E+10
396.407	237708	28.545	2.47E+10
396.434	237530	27.737	2.39E+10
396.461	237353	29.364	2.56E+10
396.509	237042	33.648	3.03E+10
396.536	236964	37.741	3.49E+10
396.564	236686	43.739	4.18E+10
396.612	236376	55.917	5.67E+10
396.639	236200	57.727	5.90E+10
396.666	236025	53.227	5.34E+10
396.714	235719	44.078	4.23E+10
396.741	235543	39.820	3.73E+10
396.769	235392	38.334	3.56E+10
396.817	235384	37.445	3.46E+10
396.844	234907	38.334	3.56E+10
396.872	234730	39.528	3.70E+10
396.920	234420	43.739	4.19E+10
396.947	234244	46.514	4.52E+10
396.974	234068	48.774	4.79E+10
397.022	233758	49.138	4.84E+10
397.049	233581	49.138	4.84E+10
397.076	233404	50.236	4.97E+10
397.124	233092	56.698	5.77E+10
397.151	232912	62.214	6.47E+10
397.179	232731	66.586	7.04E+10
397.227	232416	69.083	7.36E+10
397.254	232224	65.245	6.85E+10
397.291	232044	59.725	6.14E+10
397.329	231729	50.976	5.05E+10
397.356	231548	48.052	4.69E+10
397.384	231367	46.870	4.55E+10
397.432	231050	50.236	4.95E+10
397.459	230871	55.141	5.55E+10
397.486	230691	69.529	7.39E+10
397.534	230376	94.275	1.07E+11
397.561	230195	106.169	1.24E+11
397.589	230014	106.169	1.24E+11
397.637	229697	86.887	9.71E+10
397.664	229515	76.845	8.34E+10
397.692	229334	69.529	7.37E+10
397.740	229017	65.689	6.87E+10
397.767	228823	66.136	6.93E+10
397.795	228642	67.807	7.14E+10
397.843	228327	79.300	8.65E+10
397.870	228148	84.684	9.38E+10

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
397.897	227970	88.410	9.88E+10
397.945	227659	88.410	9.88E+10
397.972	227480	86.141	9.56E+10
398.000	227301	86.141	9.56E+10
398.048	226990	94.275	1.07E+11
398.075	226814	101.426	1.17E+11
398.102	226638	117.427	1.40E+11
398.150	226331	134.356	1.64E+11
398.177	226156	129.115	1.57E+11
398.204	225981	124.078	1.49E+11
398.252	225701	95.995	1.09E+11
398.279	225525	86.141	9.52E+10
398.307	225348	83.973	9.22E+10
398.355	225040	81.236	8.85E+10
398.382	224864	89.978	1.00E+11
398.409	224689	100.222	1.14E+11
398.457	224380	160.845	2.04E+11
398.484	224202	187.527	2.46E+11
398.512	224023	194.025	2.56E+11
398.560	223711	177.631	2.30E+11
398.587	223533	151.473	1.89E+11
398.614	223355	137.052	1.67E+11
398.662	223043	121.635	1.44E+11
398.689	222864	119.393	1.41E+11
398.716	222685	129.116	1.55E+11
398.764	222346	142.629	1.75E+11
398.791	222167	154.539	1.93E+11
398.818	221988	164.085	2.07E+11
398.866	221675	145.518	1.79E+11
398.893	221496	131.710	1.58E+11
398.921	221316	131.710	1.58E+11
398.969	221003	157.662	1.97E+11
398.996	220826	184.287	2.37E+11
399.023	220649	203.831	2.68E+11
399.071	220340	258.278	3.56E+11
399.098	220163	247.027	3.37E+11
399.126	219985	239.776	3.25E+11
399.174	219676	194.025	2.51E+11
399.201	219502	170.742	2.15E+11
399.228	219327	139.797	1.68E+11
399.276	219047	124.078	1.45E+11
399.303	218871	131.710	1.56E+11
399.331	218694	157.662	1.94E+11
399.379	218385	213.707	2.80E+11
399.406	218209	243.377	3.27E+11
399.433	218032	266.029	3.63E+11
399.481	217725	254.478	3.44E+11
399.508	217548	236.226	3.14E+11
399.535	217371	236.225	3.14E+11
399.583	217060	222.523	2.92E+11
399.610	216880	225.874	2.97E+11
399.638	216701	239.776	3.18E+11
399.686	216385	243.377	3.23E+11
399.713	216206	239.776	3.17E+11
399.740	216027	219.222	2.85E+11
399.788	215700	200.555	2.55E+11
399.815	215519	190.772	2.40E+11
399.843	215338	187.527	2.35E+11
399.891	215021	182.000	2.26E+11
399.918	214841	210.000	2.69E+11
399.945	214662	290.000	3.94E+11
399.993	214347	395.000	5.66E+11
400.020	214166	420.000	6.08E+11
400.048	213985	395.000	5.65E+11
400.096	213668	290.000	3.92E+11
400.123	213488	270.000	3.59E+11
400.150	213309	183.000	2.25E+11
400.198	212994	183.000	2.25E+11
400.225	212813	189.000	2.34E+11
400.253	212632	212.000	2.68E+11
400.301	212315	270.000	3.56E+11
400.328	212135	302.500	4.07E+11
400.355	211956	302.500	4.06E+11
400.403	211642	290.000	3.86E+11
400.430	211462	290.000	3.85E+11
400.457	211282	270.000	3.53E+11
400.505	210968	337.500	4.59E+11
400.532	210787	375.000	5.19E+11
400.560	210605	395.000	5.50E+11
400.608	210289	420.000	5.89E+11
400.635	210109	412.500	5.76E+11
400.662	209929	325.000	4.35E+11
400.710	209615	223.000	2.78E+11
400.737	209436	183.000	2.19E+11
400.764	209256	195.000	2.36E+11
400.812	208942	189.000	2.27E+11
400.839	208763	280.000	3.62E+11
400.866	208583	350.000	4.69E+11
400.914	208268	445.000	6.19E+11
400.941	208087	495.000	6.99E+11
400.969	207906	480.000	6.73E+11
401.017	207589	412.500	5.63E+11
401.044	207407	385.000	5.19E+11
401.072	207226	375.000	5.02E+11
401.120	206909	367.500	4.89E+11
401.147	206730	375.000	5.00E+11
401.174	206550	385.000	5.14E+11
401.222	206236	375.000	4.97E+11
401.249	206054	380.000	5.04E+11
401.277	205873	325.000	4.19E+11
401.325	205556	290.000	3.66E+11
401.352	205377	290.000	3.65E+11
401.379	205197	325.000	4.16E+11
401.427	204883	395.000	5.20E+11
401.454	204701	465.000	6.27E+11
401.482	204520	555.000	7.66E+11
401.530	204203	640.000	8.98E+11
401.557	204024	585.000	8.09E+11
401.584	203844	527.500	7.17E+11
401.632	203530	420.000	5.50E+11
401.659	203351	375.000	4.81E+11
401.686	203171	367.500	4.69E+11
401.734	202856	367.500	4.67E+11
401.761	202663	385.000	4.90E+11
401.789	202482	420.000	5.40E+11
401.837	202166	432.500	5.57E+11
401.864	201986	432.500	5.56E+11
401.892	201806	420.000	5.36E+11
401.940	201492	420.000	5.35E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
401.967	201315	445.000	5.70E+11
401.994	201138	465.000	5.99E+11
402.042	200829	570.000	7.53E+11
402.069	200652	655.000	8.79E+11
402.096	200477	670.000	9.01E+11
402.144	200169	570.000	7.48E+11
402.171	199992	505.000	6.51E+11
402.199	199816	432.500	5.45E+11
402.247	199508	302.500	3.61E+11
402.274	199359	290.000	3.44E+11
402.301	199184	325.000	3.92E+11
402.349	198878	395.000	4.90E+11
402.376	198701	455.000	5.76E+11
402.404	198523	495.000	6.33E+11
402.452	198213	527.500	6.79E+11
402.479	198036	515.000	6.60E+11
402.506	197860	515.000	6.60E+11
402.554	197550	515.000	6.58E+11
402.581	197372	540.000	6.94E+11
402.608	197194	570.000	7.37E+11
402.656	196882	655.000	8.60E+11
402.683	196702	655.000	8.59E+11
402.711	196521	600.000	7.77E+11
402.759	196179	432.500	5.35E+11
402.786	196000	385.000	4.68E+11
402.813	195821	337.500	4.02E+11
402.861	195508	325.000	3.85E+11
402.888	195328	385.000	4.66E+11
402.916	195149	420.000	5.15E+11
402.964	194835	540.000	6.83E+11
402.991	194656	600.000	7.68E+11
403.019	194478	630.000	8.11E+11
403.067	194167	570.000	7.23E+11
403.094	193991	570.000	7.23E+11
403.121	193815	570.000	7.22E+11
403.169	193508	570.000	7.21E+11
403.196	193332	600.000	7.64E+11
403.224	193155	655.000	8.42E+11
403.272	192873	570.000	7.20E+11
403.299	192699	515.000	6.42E+11
403.326	192524	445.000	5.44E+11
403.374	192217	325.000	3.81E+11
403.401	192039	337.500	3.97E+11
403.429	191862	337.500	3.97E+11
403.477	191550	420.000	5.09E+11
403.504	191372	515.000	6.40E+11
403.532	191193	640.000	8.15E+11
403.580	190880	750.000	9.72E+11
403.607	190700	700.000	9.00E+11
403.635	190520	685.000	8.78E+11
403.683	190205	570.000	7.14E+11
403.710	190026	600.000	7.56E+11
403.737	189847	640.000	8.12E+11
403.785	189508	685.000	8.75E+11
403.812	189327	670.000	8.53E+11
403.840	189146	640.000	8.11E+11
403.888	188831	495.000	6.08E+11
403.915	188652	412.500	4.95E+11
403.943	188472	367.500	4.35E+11
403.991	188159	325.000	3.78E+11
404.018	187981	395.000	4.71E+11
404.046	187803	465.000	5.66E+11
404.094	187492	655.000	8.29E+11
404.121	187316	750.000	9.63E+11
404.148	187141	820.000	1.06E+12
404.196	186835	820.000	1.06E+12
404.223	186659	895.000	1.17E+12
404.251	186507	857.500	1.12E+12
404.299	186199	922.500	1.21E+12
404.326	186023	975.000	1.28E+12
404.354	185846	1000.000	1.32E+12
404.402	185536	1000.000	1.32E+12
404.429	185360	1000.000	1.32E+12
404.456	185184	1000.000	1.32E+12
404.504	184875	725.000	9.26E+11
404.531	184696	685.000	8.70E+11
404.559	184517	655.000	8.28E+11
404.607	184204	725.000	9.26E+11
404.634	184025	820.000	1.06E+12
404.661	183847	1000.000	1.32E+12
404.709	183534	1000.000	1.32E+12
404.736	183353	1000.000	1.31E+12
404.764	183159	1000.000	1.30E+12
404.812	182842	1000.000	1.30E+12
404.839	182663	1000.000	1.30E+12
404.866	182483	1000.000	1.30E+12
404.914	182169	50.000	4.39E+10
404.941	181997	38.000	3.22E+10
404.969	181806	15.500	1.16E+10
405.017	181489	7.000	4.93E+09
405.044	181307	2.450	1.61E+09
405.072	181126	1.430	9.23E+08
405.120	180809	2.850	1.90E+09
405.147	180629	2.200	1.45E+09
405.175	180446	1.510	9.81E+08
405.223	180129	3.950	2.70E+09
405.250	179935	7.030	5.04E+09
405.278	179754	15.500	1.21E+10
405.326	179439	5.300	6.10E+09
405.353	179260	3.150	2.15E+09
405.380	179082	1.600	1.05E+09
405.428	178770	1.650	1.09E+09
405.455	178591	2.850	1.94E+09
405.483	178412	3.150	2.16E+09
405.531	178100	1.600	1.06E+09
405.558	177922	1.070	7.00E+08
405.586	177744	.680	4.47E+08
405.634	177433	.490	3.23E+08
405.661	177257	.760	4.99E+08
405.689	177080	.820	5.38E+08
405.737	176772	.660	4.34E+08
405.764	176596	.960	6.29E+08
405.792	176420	1.510	1.00E+09
405.840	176114	15.500	1.21E+10
405.867	175941	20.000	1.61E+10
405.894	175769	23.000	1.89E+10
405.942	175467	26.900	2.24E+10
405.969	175293	.930	6.09E+08
405.997	175120	.680	4.46E+08

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 3

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.739	281257	.100	5.61E+07
389.766	281107	.100	5.61E+07
389.794	280933	.100	5.61E+07
389.841	280627	.100	5.61E+07
389.869	280450	.100	5.61E+07
389.896	280272	.100	5.61E+07
389.944	279961	.100	5.61E+07
389.972	279783	.100	5.61E+07
389.999	279605	.100	5.61E+07
390.047	279293	.100	5.61E+07
390.074	279115	.120	6.73E+07
390.102	278938	.100	5.61E+07
390.149	278626	.110	6.17E+07
390.176	278447	.100	5.61E+07
390.204	278266	.160	8.98E+07
390.251	277941	.100	5.61E+07
390.279	277760	.128	7.18E+07
390.306	277579	.119	6.67E+07
390.354	277262	.100	5.61E+07
390.381	277083	.119	6.67E+07
390.409	276903	.146	8.19E+07
390.456	276588	.100	5.62E+07
390.484	276407	.203	1.14E+08
390.511	276226	.240	1.35E+08
390.560	275907	.155	8.69E+07
390.588	275720	.155	8.68E+07
390.665	275213	.407	2.28E+08
390.691	275042	.488	2.74E+08
390.716	274872	.465	2.62E+08
390.762	274555	.290	1.63E+08
390.790	274375	.220	1.24E+08
390.817	274195	.320	1.80E+08
390.865	273880	.350	1.97E+08
390.892	273702	.150	8.44E+07
390.920	273524	.150	8.44E+07
390.967	273213	.140	7.88E+07
390.994	273036	.410	2.31E+08
391.022	272860	.570	3.21E+08
391.069	272551	.840	4.72E+08
391.097	272373	.900	5.06E+08
391.124	272196	.900	5.06E+08
391.172	271887	.850	4.78E+08
391.199	271712	.680	3.83E+08
391.227	271537	.640	3.60E+08
391.275	271255	.740	4.16E+08
391.303	271074	.860	4.84E+08
391.331	270892	.860	4.84E+08
391.380	270575	.909	5.11E+08
391.408	270398	.993	5.59E+08
391.435	270220	.923	5.19E+08
391.483	269908	.979	5.51E+08
391.511	269730	1.027	5.78E+08
391.538	269551	1.047	5.91E+08
391.586	269238	1.002	5.64E+08
391.613	269060	1.144	6.44E+08
391.641	268882	1.129	6.35E+08
391.698	268569	1.218	6.86E+08
391.716	268388	1.213	6.86E+08
391.743	268207	1.327	7.48E+08
391.791	267865	1.256	7.08E+08
391.819	267685	1.281	7.22E+08
391.846	267504	1.345	7.58E+08
391.894	267185	1.209	6.81E+08
391.922	267010	1.318	7.43E+08
391.949	266830	1.405	7.92E+08
391.997	266518	1.679	9.46E+08
392.025	266339	1.975	1.11E+09
392.052	266161	1.989	1.12E+09
392.100	265850	2.335	1.31E+09
392.128	265673	2.158	1.21E+09
392.155	265496	2.050	1.15E+09
392.203	265187	1.550	8.74E+08
392.231	265011	1.567	8.83E+08
392.258	264860	1.492	8.41E+08
392.306	264552	1.699	9.51E+08
392.333	264377	1.742	9.81E+08
392.361	264202	2.113	1.19E+09
392.408	263994	2.673	1.50E+09
392.436	263717	3.575	2.04E+09
392.463	263539	3.536	2.02E+09
392.511	263227	3.423	1.95E+09
392.539	263048	2.797	1.57E+09
392.566	262869	2.773	1.56E+09
392.614	262554	2.491	1.40E+09
392.642	262374	2.534	1.43E+09
392.669	262194	2.697	1.52E+09
392.717	261878	3.423	1.95E+09
392.745	261697	3.354	1.91E+09
392.772	261491	3.839	2.21E+09
392.820	261175	3.354	1.91E+09
392.848	260994	3.746	2.15E+09
392.875	260814	3.934	2.27E+09
392.923	260500	4.431	2.58E+09
392.951	260321	4.484	2.62E+09
392.978	260142	5.155	3.04E+09
393.026	259830	5.567	3.58E+09
393.053	259653	5.872	3.51E+09
393.081	259477	6.172	3.71E+09
393.128	259169	4.554	2.92E+09
393.156	258992	4.375	2.55E+09
393.183	258816	4.488	2.62E+09
393.231	258507	4.207	2.44E+09
393.259	258356	4.431	2.58E+09
393.266	258180	5.088	3.00E+09
393.314	257872	6.870	4.19E+09
393.361	257697	8.058	5.01E+09
393.389	257522	8.584	5.66E+09
393.436	257213	8.381	5.24E+09
393.464	257035	7.905	4.90E+09
393.491	256857	6.995	4.28E+09
393.519	256544	6.393	3.87E+09
393.567	256365	5.687	3.43E+09
393.594	256186	5.779	3.46E+09
393.642	255871	6.390	3.87E+09
393.670	255691	6.995	4.23E+09
393.697	255510	7.521	4.64E+09
393.745	255194	8.727	5.49E+09
393.772	254990	9.986	5.67E+09
393.800	254811	8.984	5.67E+09
393.847	254497	8.984	5.68E+09
393.875	254317	8.984	5.68E+09
393.902	254137	9.185	5.82E+09
393.950	253824	10.091	6.48E+09
393.978	253645	10.409	6.71E+09
394.005	253466	10.409	6.71E+09
394.053	253155	10.253	6.60E+09
394.080	252979	9.922	6.36E+09
394.109	252803	9.379	5.97E+09
394.155	252495	8.217	5.14E+09
394.183	252319	8.551	5.38E+09
394.210	252142	8.984	5.69E+09
394.259	251860	10.253	6.61E+09
394.285	251686	11.680	7.67E+09
394.313	251511	13.741	9.24E+09
394.360	251204	15.181	1.04E+10
394.388	251027	14.574	9.89E+09
394.415	250850	13.398	8.98E+09
394.463	250538	10.638	6.90E+09
394.491	250360	9.379	5.98E+09
394.518	250181	9.379	5.98E+09
394.566	249869	9.379	5.98E+09
394.593	249691	10.091	6.50E+09
394.621	249513	11.307	7.40E+09
394.668	249200	14.075	9.51E+09
394.696	249020	15.391	1.05E+10
394.723	248839	16.254	1.12E+10
394.771	248510	15.605	1.07E+10
394.798	248331	14.772	1.01E+10
394.826	248151	14.574	9.91E+09
394.873	247837	14.772	1.01E+10
394.900	247657	14.974	1.02E+10
394.928	247478	15.391	1.06E+10
394.975	247163	15.823	1.09E+10
395.003	246982	16.484	1.14E+10
395.030	246800	16.484	1.14E+10
395.078	246484	16.254	1.12E+10
395.105	246304	15.605	1.07E+10
395.133	246125	15.823	1.09E+10
395.180	245810	17.956	1.26E+10
395.208	245629	20.520	1.47E+10
395.235	245447	23.195	1.70E+10
395.283	245131	26.148	1.95E+10
395.310	244951	27.206	2.04E+10
395.338	244772	26.148	1.95E+10
395.385	244457	22.579	1.68E+10
395.413	244276	19.964	1.43E+10
395.440	244094	17.700	1.24E+10
395.488	243778	18.217	1.28E+10
395.515	243598	18.482	1.31E+10
395.543	243419	20.790	1.50E+10
395.590	243104	25.890	1.93E+10
395.618	242923	29.364	2.23E+10
395.645	242741	33.937	2.65E+10
395.693	242425	36.267	2.87E+10
395.720	242245	34.516	2.70E+10
395.748	242066	31.322	2.40E+10
395.795	241751	27.737	2.08E+10
395.823	241570	27.471	2.06E+10
395.850	241389	26.148	1.94E+10
395.898	241072	27.737	2.08E+10
395.925	240892	29.639	2.24E+10
395.953	240713	31.322	2.39E+10
396.000	240398	33.072	2.55E+10
396.028	240217	31.648	2.61E+10
396.055	240035	33.937	2.67E+10
396.103	239719	35.389	2.77E+10
396.130	239539	36.267	2.85E+10
396.158	239360	38.930	3.11E+10
396.205	239045	46.150	3.82E+10
396.233	238864	49.869	4.19E+10
396.260	238670	53.227	4.55E+10
396.308	238354	47.588	3.97E+10
396.335	238175	42.070	3.42E+10
396.363	237997	38.930	3.12E+10
396.410	237685	35.097	2.75E+10
396.437	237508	34.516	2.70E+10
396.465	237330	35.973	2.84E+10
396.512	237020	43.065	3.53E+10
396.540	236842	51.721	4.40E+10
396.567	236664	62.639	5.55E+10
396.615	236354	85.407	8.08E+10
396.642	236179	85.887	8.25E+10
396.670	236003	77.444	7.17E+10
396.717	235697	58.518	5.11E+10
396.745	235521	52.471	4.47E+10
396.772	235370	49.503	4.16E+10
396.820	235062	48.412	4.05E+10
396.848	234885	49.859	4.70E+10
396.875	234709	54.371	4.66E+10
396.923	234398	60.957	5.35E+10
396.950	234222	64.804	5.76E+10
396.978	234045	67.038	6.00E+10
397.025	233736	67.951	6.09E+10
397.052	233559	66.586	5.94E+10
397.080	233381	69.222	6.12E+10
397.127	233069	80.580	7.48E+10
397.155	232889	89.188	8.45E+10
397.182	232709	95.995	9.23E+10
397.230	232393	91.696	8.72E+10
397.257	232201	89.188	8.43E+10
397.285	232022	78.673	7.24E+10
397.332	231707	65.689	5.82E+10
397.360	231526	63.497	5.59E+10
397.387	231344	61.374	5.36E+10
397.435	231028	66.586	5.91E+10
397.462	230849	77.444	7.08E+10
397.470	230669	95.995	9.17E+10
397.537	230354	145.518	1.51E+11
397.565	230173	164.085	1.75E+11
397.592	229991	164.085	1.75E+11
397.640	229674	115.365	1.14E+11
397.669	229493	98.574	9.43E+10
397.695	229311	90.836	8.55E+10
397.743	228994	83.573	7.77E+10
397.771	228801	86.141	8.01E+10
397.798	228620	87.643	8.17E+10
397.846	228304	100.222	9.59E+10
397.873	228126	106.169	1.03E+11
397.901	227948	108.610	1.06E+11
397.948	227637	110.957	1.08E+11
397.976	227458	110.957	1.08E+11
398.003	227279	113.209	1.11E+11
398.051	226968	129.116	1.30E+11
398.078	226792	142.629	1.46E+11
398.106	226616	160.845	1.69E+11
398.153	226309	184.289	1.98E+11
398.180	226134	174.159	1.85E+11
398.208	225959	167.385	1.76E+11
398.255	225679	117.427	1.15E+11
398.283	225503	103.518	9.88E+10
398.310	225326	100.222	9.49E+10
398.358	225018	100.222	9.48E+10
398.385	224842	117.427	1.15E+11
398.413	224667	142.629	1.45E+11
398.460	224358	213.707	2.35E+11
398.488	224179	239.775	2.69E+11
398.515	224001	247.027	2.78E+11
398.563	223688	219.222	2.41E+11
398.590	223511	200.555	2.17E+11
398.618	223333	184.289	1.96E+11
398.665	223021	167.385	1.74E+11
398.692	222842	157.662	1.62E+11
398.720	222663	177.633	1.86E+11
398.767	222324	187.527	1.98E+11
398.794	222145	197.285	2.11E+11
398.822	221966	210.407	2.27E+11
398.869	221653	190.772	2.02E+11
398.897	221473	167.385	1.72E+11
398.924	221294	177.633	1.85E+11
398.972	220981	207.116	2.22E+11
398.999	220804	225.874	2.45E+11
399.027	220627	262.128	2.92E+11
399.074	220318	320.725	3.70E+11
399.102	220141	325.027	3.76E+11
399.129	219963	299.313	3.41E+11
399.177	219654	236.226	2.57E+11
399.204	219480	207.116	2.20E+11
399.232	219305	187.527	1.95E+11
399.279	219025	170.742	1.74E+11
399.307	218849	187.527	1.95E+11
399.334	218672	210.407	2.23E+11
399.382	218363	266.029	2.94E+11
399.409	218187	303.582	3.43E+11
399.437	218011	342.305	3.94E+11
399.484	217703	316.429	3.59E+11
399.511	217526	303.582	3.41E+11
399.539	217349	290.756	3.24E+11
399.586	217038	273.979	3.02E+11
399.614	216858	282.305	3.12E+11
399.641	216678	299.313	3.34E+11
399.689	216363	303.582	3.39E+11
399.716	216184	303.582	3.38E+11
399.744	216005	286.547	3.16E+11
399.791	215677	258.278	2.79E+11
399.819	215496	243.377	2.59E+11
399.846	215315	236.225	2.50E+11
399.894	214998	290.000	3.17E+11
399.921	214819	350.000	3.94E+11
399.949	214639	400.000	4.60E+11
399.996	214324	465.000	5.45E+11
400.024	214143	495.000	5.85E+11
400.051	213962	465.000	5.43E+11
400.099	213645	385.000	4.36E+11
400.126	213466	350.000	3.90E+11
400.154	213286	325.000	3.57E+11
400.201	212971	270.000	2.87E+11
400.229	212790	290.000	3.11E+11
400.256	212609	325.000	3.55E+11
400.304	212292	375.000	4.17E+11
400.331	212113	395.000	4.42E+11
400.359	211933	395.000	4.41E+11
400.406	211619	395.000	4.40E+11
400.433	211440	395.000	4.37E+11
400.461	211260	395.000	4.33E+11
400.508	210945	432.500	4.85E+11
400.536	210764	445.000	5.00E+11
400.563	210583	515.000	5.89E+11
400.611	210266	515.000	5.87E+11
400.638	210087	495.000	5.60E+11
400.666	209907	445.000	4.95E+11
400.713	209593	385.000	4.18E+11
400.740	209413	325.000	3.44E+11
400.768	209234	325.000	3.43E+11
400.815	208920	350.000	3.72E+11
400.842	208740	412.500	4.48E+11
400.870	208561	465.000	5.13E+11
400.917	208246	570.000	6.44E+11
400.945	208065	600.000	6.80E+11
400.972	207883	585.000	6.60E+11
401.020	207566	515.000	5.69E+11
401.048	207385	495.000	5.43E+11
401.075	207203	465.000	5.05E+11
401.123	206887	465.000	5.03E+11
401.150	206707	495.000	5.38E+11
401.178	206528	495.000	5.37E+11
401.225	206213	495.000	5.35E+11
401.253	206032	480.000	5.16E+11
401.280	205850	445.000	4.72E+11
401.328	205534	420.000	4.41E+11
401.355	205354	420.000	4.37E+11
401.383	205175	432.500	4.53E+11
401.430	204860	527.500	5.65E+11
401.458	204675	600.000	6.50E+11
401.485	204497	750.000	8.32E+11
401.533	204181	770.000	8.52E+11
401.560	204001	770.000	8.50E+11
401.598	203822	700.000	7.63E+11
401.635	203508	515.000	5.39E+11
401.662	203328	465.000	4.79E+11
401.690	203149	465.000	4.78E+11
401.737	202834	465.000	4.76E+11
401.765	202640	530.000	5.13E+11
401.792	202459	515.000	5.27E+11
401.840	202143	527.500	5.41E+11
401.868	201963	515.000	5.25E+11
401.895	201783	515.000	5.24E+11
401.943	201470	515.000	5.22E+11
401.970	201293	535.000	5.43E+11
401.998	201116	570.000	5.82E+11
402.045	200807	750.000	7.84E+11
402.072	200630	895.000	9.50E+11
402.100	200455	950.000	1.01E+12
402.147	200147	895.000	9.44E+11
402.175	199970	760.000	7.88E+11
402.202	199794	640.000	6.51E+11
402.250	199511	505.000	5.01E+11
402.277	199337	495.000	4.89E+11
402.305	199162	505.000	5.00E+11
402.352	198856	555.000	5.53E+11
402.380	198679	670.000	6.80E+11
402.407	198501	750.000	7.68E+11
402.455	198191	820.000	8.45E+11
402.482	198014	895.000	9.28E+11
402.510	197838	895.000	9.27E+11
402.557	197528	950.000	9.86E+11
402.584	197350	1000.000	1.04E+12
402.612	197172	1000.000	1.04E+12
402.659	196859	1000.000	1.04E+12
402.687	196679	1000.000	1.04E+12
402.714	196498	1000.000	1.03E+12
402.762	196157	1000.000	1.03E+12
402.789	195978	1000.000	1.03E+12
402.817	195799	1000.000	1.03E+12
402.864	195486	1000.000	1.03E+12
402.892	195306	1000.000	1.02E+12
402.919	195126	1000.000	1.02E+12
402.967	194813	1000.000	1.02E+12
402.995	194634	1000.000	1.02E+12
403.022	194456	1000.000	1.02E+12
403.070	194145	1000.000	1.02E+12
403.097	193969	1000.000	1.01E+12
403.125	193793	1000.000	1.01E+12
403.172	193486	1000.000	1.01E+12
403.200	193309	1000.000	1.01E+12
403.227	193133	1000.000	1.01E+12
403.275	192851	1000.000	1.01E+12
403.302	192677	1000.000	1.01E+12
403.330	192502	1000.000	1.01E+12
403.377	192195	1000.000	1.01E+12
403.405	192017	1000.000	1.00E+12
403.432	191840	1000.000	1.00E+12
403.480	191528	1000.000	1.00E+12
403.508	191350	1000.000	1.00E+12
403.535	191171	1000.000	1.00E+12
403.583	190857	1000.000	1.00E+12
403.611	190678	1000.000	1.00E+12
403.638	190498	1000.000	1.00E+12
403.686	190183	1000.000	9.99E+11
403.713	190004	1000.000	9.98E+11
403.741	189825	1000.000	9.98E+11
403.788	189485	1000.000	9.97E+11
403.816	189304	1000.000	9.97E+11
403.843	189124	1000.000	9.96E+11
403.891	188809	750.000	7.31E+11
403.919	188629	640.000	6.15E+11
403.946	188450	540.000	5.11E+11
403.994	188137	527.500	4.98E+11
404.022	187959	620.000	5.94E+11
404.049	187780	725.000	7.03E+11
404.097	187470	1000.000	9.94E+11
404.124	187294	1000.000	9.94E+11
404.152	187119	1000.000	9.93E+11
404.199	186812	1000.000	9.93E+11
404.227	186636	1000.000	9.93E+11
404.254	186485	1000.000	9.94E+11
404.302	186177	1000.000	9.94E+11
404.330	186001	1000.000	9.93E+11
404.357	185824	1000.000	9.93E+11
404.405	185514	1000.000	9.93E+11
404.432	185338	950.000	9.40E+11
404.460	185162	820.000	8.03E+11
404.507	184853	640.000	6.15E+11
404.535	184674	570.000	5.42E+11
404.562	184495	585.000	5.58E+11
404.610	184181	725.000	7.02E+11
404.637	184003	895.000	8.81E+11
404.665	183825	1000.000	9.92E+11
404.712	183511	1000.000	9.92E+11
404.740	183330	1000.000	9.92E+11
404.767	183136	1000.000	9.91E+11
404.815	182820	1000.000	9.91E+11
404.842	182640	1000.000	9.91E+11
404.870	182461	1000.000	9.91E+11
404.917	182146	212.000	1.84E+11
404.945	181965	157.000	1.32E+11
404.972	181783	112.000	9.08E+10
405.020	181466	66.000	5.04E+10
405.048	181285	50.000	3.71E+10
405.075	181103	41.000	2.99E+10
405.123	180786	31.000	2.21E+10
405.151	180605	28.300	2.00E+10
405.178	180424	25.500	1.79E+10
405.225	180106	23.000	1.60E+10
405.254	179913	25.500	1.79E+10
405.281	179732	31.000	2.21E+10
405.329	179416	20.000	1.38E+10
405.356	179238	16.750	1.14E+10
405.384	179059	13.700	9.17E+09
405.431	178747	11.700	7.77E+09
405.459	178568	11.700	7.77E+09
405.486	178390	11.700	7.78E+09
405.534	178077	9.250	6.08E+09
405.562	177899	7.000	4.54E+09
405.589	177722	5.900	3.80E+09
405.637	177411	3.950	2.51E+09
405.665	177234	1.960	1.22E+09
405.692	177058	2.680	1.69E+09
405.740	176750	2.130	1.33E+09
405.768	176574	2.680	1.65E+09
405.795	176398	2.850	1.80E+09
405.843	176093	10.200	6.78E+09
405.870	175920	10.950	7.31E+09
405.898	175747	10.950	7.32E+09
405.945	175445	11.700	7.86E+09
405.973	175272	1.330	8.11E+08

(a) 1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 4

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.743	281235	.100	5.42E+07
389.770	281086	.100	5.40E+07
389.797	280911	.100	5.40E+07
389.845	280604	.140	7.56E+07
389.872	280427	.120	6.49E+07
389.900	280250	.100	5.41E+07
389.948	279939	.100	5.41E+07
389.975	279761	.100	5.42E+07
390.003	279583	.110	5.96E+07
390.051	279271	.120	6.52E+07
390.078	279093	.110	5.98E+07
390.105	278915	.120	6.53E+07
390.153	278603	.140	7.63E+07
390.180	278425	.150	8.17E+07
390.207	278246	.300	1.64E+08
390.255	277919	.219	1.21E+08
390.282	277737	.188	1.04E+08
390.310	277556	.226	1.25E+08
390.358	277240	.196	1.09E+08
390.385	277060	.219	1.22E+08
390.412	276881	.219	1.22E+08
390.460	276566	.263	1.45E+08
390.487	276384	.322	1.79E+08
390.515	276203	.394	2.23E+08
390.563	275883	.374	2.08E+08
390.591	275697	.344	1.91E+08
390.668	275192	.410	2.28E+08
390.694	275021	.541	3.00E+08
390.720	274850	.556	3.08E+08
390.766	274534	.700	3.83E+08
390.793	274353	.670	3.66E+08
390.821	274172	.630	3.44E+08
390.869	273858	.570	3.11E+08
390.896	273679	.470	2.56E+08
390.923	273502	.543	2.94E+08
390.971	273191	.510	2.77E+08
390.998	273014	.840	4.56E+08
391.025	272838	1.000	5.43E+08
391.073	272528	1.260	6.82E+08
391.100	272351	1.350	7.30E+08
391.128	272173	1.300	7.03E+08
391.176	271865	1.200	6.49E+08
391.203	271690	1.130	6.12E+08
391.230	271516	1.050	5.69E+08
391.278	271232	1.120	6.08E+08
391.306	271051	1.180	6.41E+08
391.335	270869	1.300	7.05E+08
391.384	270553	1.204	6.54E+08
391.411	270376	1.443	7.82E+08
391.439	270198	1.485	8.05E+08
391.487	269986	1.584	8.59E+08
391.514	269708	1.688	9.15E+08
391.542	269529	1.688	9.15E+08
391.590	269216	1.636	8.87E+08
391.617	269036	1.742	9.44E+08
391.644	268860	2.004	1.08E+09
391.692	268546	2.034	1.10E+09
391.719	268366	1.904	1.03E+09
391.747	268184	2.512	1.36E+09
391.795	267843	2.142	1.16E+09
391.822	267662	2.192	1.19E+09
391.850	267482	2.209	1.20E+09
391.898	267167	2.273	1.23E+09
391.925	266987	2.354	1.27E+09
391.953	266808	2.412	1.30E+09
392.001	266495	3.460	1.88E+09
392.028	266317	4.207	2.31E+09
392.056	266139	4.713	2.61E+09
392.104	265828	4.656	2.58E+09
392.131	265651	4.544	2.51E+09
392.159	265474	4.488	2.48E+09
392.207	265165	3.423	1.86E+09
392.234	264985	3.103	1.68E+09
392.262	264838	3.497	1.90E+09
392.310	264530	3.202	1.73E+09
392.337	264355	4.037	2.21E+09
392.364	264180	4.769	2.65E+09
392.412	263972	6.172	3.50E+09
392.439	263694	6.873	3.94E+09
392.467	263516	7.122	4.09E+09
392.515	263204	6.504	3.71E+09
392.542	263025	5.603	3.15E+09
392.570	262846	5.523	3.10E+09
392.618	262532	5.375	3.01E+09
392.645	262352	5.227	2.92E+09
392.673	262172	5.300	2.97E+09
392.721	261855	6.504	3.71E+09
392.748	261674	6.995	4.02E+09
392.776	261468	6.995	4.02E+09
392.824	261152	6.995	4.02E+09
392.851	260972	7.253	4.19E+09
392.879	260792	7.521	4.36E+09
392.927	260477	7.617	4.42E+09
392.954	260298	8.551	5.03E+09
392.982	260119	9.565	5.69E+09
393.030	259808	10.796	6.52E+09
393.057	259631	10.960	6.63E+09
393.084	259455	10.486	6.31E+09
393.132	259147	8.727	5.15E+09
393.159	258970	7.758	4.52E+09
393.187	258794	7.617	4.43E+09
393.235	258485	7.253	4.20E+09
393.262	258334	8.058	4.72E+09
393.290	258158	8.984	5.33E+09
393.338	257850	12.315	7.58E+09
393.365	257675	14.075	8.81E+09
393.392	257500	15.605	9.91E+09
393.440	257191	14.974	9.46E+09
393.467	257013	13.223	8.22E+09
393.495	256835	11.876	7.28E+09
393.543	256522	10.796	6.55E+09
393.570	256343	10.253	6.18E+09
393.598	256163	10.407	6.29E+09
393.646	255848	10.638	6.45E+09
393.673	255668	11.680	7.16E+09
393.701	255488	13.046	8.11E+09
393.749	255172	13.909	8.72E+09
393.776	254967	14.239	8.56E+09
393.803	254788	14.772	9.34E+09
393.851	254475	14.379	9.06E+09
393.878	254295	14.239	8.96E+09
393.906	254115	15.181	9.63E+09
393.954	253801	16.029	1.02E+10
393.981	253622	16.719	1.08E+10
394.009	253444	16.719	1.08E+10
394.057	253133	15.391	9.79E+09
394.084	252957	14.772	9.35E+09
394.111	252781	14.574	9.21E+09
394.159	252473	13.909	8.74E+09
394.186	252297	13.909	8.74E+09
394.214	252120	14.772	9.36E+09
394.262	251838	17.200	1.11E+10
394.289	251664	19.964	1.32E+10
394.316	251489	22.757	1.53E+10
394.364	251182	25.633	1.75E+10
394.391	251005	24.620	1.67E+10
394.419	250827	22.530	1.51E+10
394.467	250516	16.957	1.09E+10
394.494	250338	14.974	9.51E+09
394.522	250159	14.974	9.51E+09
394.570	249847	14.974	9.51E+09
394.597	249669	16.957	1.10E+10
394.624	249491	16.957	1.10E+10
394.672	249178	23.406	1.58E+10
394.699	248997	25.377	1.73E+10
394.727	248816	26.670	1.83E+10
394.775	248488	25.123	1.71E+10
394.802	248308	24.620	1.67E+10
394.829	248129	23.195	1.56E+10
394.877	247814	23.633	1.60E+10
394.904	247635	23.878	1.62E+10
394.931	247455	24.620	1.67E+10
394.979	247140	25.633	1.75E+10
395.006	246959	26.408	1.81E+10
395.034	246778	26.148	1.79E+10
395.082	246461	25.377	1.73E+10
395.109	246282	24.371	1.66E+10
395.136	246102	25.890	1.77E+10
395.184	245787	29.364	2.05E+10
395.211	245606	32.499	2.30E+10
395.239	245425	37.445	2.71E+10
395.287	245108	44.764	3.36E+10
395.314	244929	45.110	3.39E+10
395.341	244749	42.400	3.15E+10
395.389	244434	35.097	2.51E+10
395.416	244253	30.756	2.16E+10
395.444	244072	28.035	1.94E+10
395.492	243755	28.005	1.94E+10
395.519	243576	29.364	2.05E+10
395.546	243396	31.927	2.25E+10
395.594	243081	40.135	2.95E+10
395.621	242900	47.588	3.61E+10
395.649	242719	55.141	4.30E+10
395.697	242402	57.727	4.54E+10
395.724	242223	53.989	4.19E+10
395.751	242043	49.533	3.78E+10
395.799	241728	42.070	3.11E+10
395.826	241547	40.453	2.97E+10
395.854	241366	38.037	2.76E+10
395.902	241049	41.743	3.08E+10
395.929	240870	44.764	3.35E+10
395.956	240690	48.052	3.64E+10
396.004	240375	49.533	3.77E+10
396.031	240194	50.976	3.90E+10
396.059	240013	52.848	4.08E+10
396.107	239696	53.789	4.18E+10
396.134	239517	57.090	4.47E+10
396.161	239337	61.793	4.91E+10
396.209	239022	74.550	6.13E+10
396.236	238841	82.582	6.93E+10
396.264	238647	83.272	7.00E+10
396.312	238332	72.936	5.97E+10
396.339	238153	65.689	5.27E+10
396.366	237975	58.518	4.59E+10
396.414	237663	52.095	4.00E+10
396.441	237486	52.848	4.07E+10
396.468	237309	55.528	4.31E+10
396.516	236998	69.529	5.63E+10
396.543	236820	83.973	7.05E+10
396.571	236642	96.855	8.35E+10
396.619	236332	117.427	1.05E+11
396.646	236157	129.116	1.18E+11
396.673	235981	101.426	8.81E+10
396.721	235675	86.141	7.25E+10
396.748	235499	77.444	6.39E+10
396.776	235348	75.677	6.21E+10
396.824	235040	73.464	6.00E+10
396.851	234863	76.845	6.32E+10
396.879	234686	84.684	7.09E+10
396.927	234376	95.135	8.14E+10
396.954	234200	97.715	8.39E+10
396.981	234023	97.715	8.39E+10
397.029	233714	99.905	8.61E+10
397.056	233537	98.574	8.47E+10
397.083	233359	103.518	8.97E+10
397.131	233047	117.427	1.04E+11
397.158	232867	131.710	1.19E+11
397.186	232686	139.797	1.28E+11
397.234	232371	142.629	1.31E+11
397.261	232179	126.571	1.14E+11
397.288	231999	115.365	1.02E+11
397.336	231684	95.995	8.17E+10
397.363	231503	90.836	7.65E+10
397.391	231322	90.836	7.64E+10
397.439	231005	99.905	8.54E+10
397.466	230826	119.393	1.06E+11
397.493	230646	148.467	1.37E+11
397.541	230331	200.555	1.95E+11
397.568	230150	213.707	2.10E+11
397.596	229969	210.407	2.06E+11
397.644	229651	160.845	1.50E+11
397.671	229470	148.467	1.36E+11
397.699	229289	129.116	1.15E+11
397.747	228972	117.427	1.03E+11
397.774	228778	129.116	1.15E+11
397.802	228597	129.116	1.15E+11
397.850	228282	154.539	1.42E+11
397.877	228104	164.085	1.53E+11
397.904	227926	170.742	1.60E+11
397.952	227614	170.742	1.60E+11
397.979	227435	164.085	1.52E+11
398.007	227257	167.385	1.56E+11
398.055	226946	190.772	1.81E+11
398.082	226770	207.116	2.00E+11
398.109	226594	219.222	2.14E+11
398.157	226287	229.274	2.25E+11
398.184	226112	229.274	2.25E+11
398.211	225937	213.707	2.07E+11
398.259	225657	174.159	1.62E+11
398.286	225481	160.845	1.47E+11
398.314	225304	154.539	1.41E+11
398.362	224996	154.539	1.40E+11
398.389	224820	181.059	1.69E+11
398.416	224645	207.116	1.98E+11
398.464	224335	278.070	2.79E+11
398.491	224157	312.143	3.19E+11
398.519	223979	307.859	3.14E+11
398.567	223666	282.305	2.83E+11
398.594	223489	243.377	2.38E+11
398.621	223311	236.226	2.29E+11
398.669	222998	219.222	2.10E+11
398.696	222820	219.222	2.10E+11
398.723	222641	236.226	2.29E+11
398.771	222302	239.776	2.32E+11
398.798	222122	266.029	2.62E+11
398.825	221944	262.128	2.57E+11
398.873	221630	239.775	2.31E+11
398.900	221451	232.725	2.23E+11
398.928	221271	243.377	2.35E+11
398.976	220959	269.973	2.64E+11
399.003	220782	307.858	3.07E+11
399.030	220605	346.541	3.52E+11
399.078	220296	409.606	4.26E+11
399.105	220118	395.142	4.08E+11
399.133	219941	381.574	3.92E+11
399.181	219633	299.311	2.95E+11
399.208	219458	273.973	2.66E+11
399.235	219284	243.377	2.32E+11
399.283	219003	232.725	2.20E+11
399.310	218826	254.479	2.43E+11
399.338	218650	286.547	2.79E+11
399.386	218341	364.054	3.67E+11
399.413	218165	390.402	3.97E+11
399.440	217989	273.973	2.64E+11
399.488	217681	395.142	4.01E+11
399.515	217504	385.971	3.90E+11
399.542	217327	372.801	3.74E+11
399.590	217015	368.424	3.68E+11
399.617	216835	372.801	3.72E+11
399.645	216555	385.971	3.87E+11
399.693	216341	395.142	3.96E+11
399.720	216162	385.971	3.85E+11
399.747	215982	377.186	3.74E+11
399.795	215655	342.305	3.34E+11
399.822	215473	337.975	3.29E+11
399.850	215292	325.027	3.14E+11
399.898	214976	390.003	3.85E+11
399.925	214796	440.003	4.41E+11
399.952	214617	470.003	4.75E+11
400.000	214307	570.003	5.88E+11
400.027	214120	585.003	6.05E+11
400.055	213939	555.003	5.69E+11
400.103	213623	465.003	4.65E+11
400.130	213443	432.503	4.27E+11
400.157	213264	420.003	4.13E+11
400.205	212949	385.003	3.73E+11
400.232	212767	355.000	3.83E+11
400.260	212586	420.003	4.10E+11
400.308	212270	445.003	4.36E+11
400.335	212090	465.003	4.58E+11
400.362	211911	495.003	4.90E+11
400.410	211597	480.003	4.72E+11
400.437	211417	495.003	4.88E+11
400.464	211238	495.003	4.87E+11
400.512	210923	527.503	5.21E+11
400.539	210741	555.003	5.50E+11
400.567	210569	655.003	6.61E+11
400.615	210244	670.003	6.75E+11
400.642	210064	655.003	6.57E+11
400.669	209885	570.003	5.61E+11
400.717	209570	495.003	4.78E+11
400.744	209391	455.003	4.34E+11
400.771	209211	465.003	4.43E+11
400.819	208897	465.003	4.42E+11
400.846	208718	515.003	4.94E+11
400.873	208538	570.000	5.52E+11
400.921	208223	725.000	7.18E+11
400.948	208042	820.003	8.20E+11
400.976	207861	755.003	7.90E+11
401.024	207543	750.003	7.39E+11
401.051	207362	725.003	7.10E+11
401.079	207181	700.003	6.82E+11
401.127	206864	685.003	6.63E+11
401.154	206685	700.003	6.78E+11
401.181	206505	750.003	7.30E+11
401.229	206190	795.003	7.75E+11
401.256	206009	700.003	6.73E+11
401.284	205828	685.003	6.56E+11
401.332	205511	570.000	5.34E+11
401.359	205332	630.003	5.64E+11
401.386	205152	640.003	6.04E+11
401.434	204837	820.003	7.90E+11
401.461	204656	1000.003	9.78E+11
401.489	204475	1000.003	9.76E+11
401.537	204158	1000.003	9.72E+11
401.564	203979	1000.003	9.70E+11
401.591	203799	1000.003	9.67E+11
401.639	203485	1000.003	9.63E+11
401.666	203306	990.003	9.51E+11
401.693	203126	980.003	9.38E+11
401.741	202811	960.003	9.14E+11
401.768	202617	1000.003	9.49E+11
401.796	202437	1000.003	9.47E+11
401.844	202121	1000.003	9.43E+11
401.871	201941	1000.003	9.41E+11
401.899	201761	1000.003	9.39E+11
401.947	201448	1000.000	9.36E+11
401.974	201270	1000.000	9.34E+11
402.001	201094	1000.000	9.33E+11
402.049	200785	1000.000	9.30E+11
402.076	200608	1000.000	9.29E+11
402.103	200433	1000.000	9.27E+11
402.151	200125	1000.000	9.24E+11
402.178	199948	975.000	8.98E+11
402.206	199772	820.000	7.44E+11
402.254	199489	600.000	5.29E+11
402.281	199315	640.000	5.67E+11
402.308	199141	655.000	5.80E+11
402.356	198834	750.000	6.71E+11
402.383	198656	820.000	7.39E+11
402.411	198479	975.000	8.90E+11
402.459	198169	1000.000	9.13E+11
402.486	197992	1000.000	9.12E+11
402.513	197815	1000.000	9.11E+11
402.561	197505	1000.000	9.10E+11
402.588	197328	1000.000	9.09E+11
402.615	197150	1000.000	9.08E+11
402.663	196837	1000.000	9.07E+11
402.690	196656	1000.000	9.07E+11
402.718	196476	1000.000	9.06E+11
402.766	196135	980.000	8.87E+11
402.793	195955	922.500	8.30E+11
402.820	195776	857.500	7.67E+11
402.868	195463	895.000	8.03E+11
402.895	195283	975.000	8.80E+11
402.923	195104	1000.000	9.04E+11
402.971	194790	1000.000	9.03E+11
402.998	194612	1000.000	9.02E+11
403.026	194433	1000.000	9.02E+11
403.074	194123	1000.000	9.01E+11
403.101	193947	1000.000	9.01E+11
403.129	193771	1000.000	9.01E+11
403.176	193464	1000.000	9.00E+11
403.203	193287	1000.000	9.00E+11
403.231	193111	1000.000	8.99E+11
403.279	192829	1000.000	8.99E+11
403.306	192655	1000.000	8.99E+11
403.333	192480	1000.000	8.99E+11
403.381	192172	1000.000	8.98E+11
403.408	191995	1000.000	8.98E+11
403.436	191817	1000.000	8.98E+11
403.484	191506	1000.000	8.97E+11
403.511	191327	1000.000	8.97E+11
403.539	191148	1000.000	8.97E+11
403.587	190835	1000.000	8.96E+11
403.614	190655	1000.000	8.96E+11
403.642	190475	1000.000	8.96E+11
403.690	190160	1000.000	8.95E+11
403.717	189981	1000.000	8.95E+11
403.744	189802	1000.000	8.95E+11
403.792	189462	1000.000	8.94E+11
403.819	189282	1000.000	8.94E+11
403.847	189101	1000.000	8.93E+11
403.895	188786	1000.000	8.93E+11
403.922	188607	1000.000	8.93E+11
403.950	188428	1000.000	8.93E+11
403.998	188115	980.000	8.73E+11
404.025	187936	1000.000	8.92E+11
404.053	187758	1000.000	8.92E+11
404.101	187448	1000.000	8.92E+11
404.128	187273	1000.000	8.91E+11
404.155	187097	1000.000	8.91E+11
404.203	186790	1000.000	8.91E+11
404.230	186614	1000.000	8.91E+11
404.258	186463	1000.000	8.91E+11
404.306	186155	1000.000	8.91E+11
404.333	185979	1000.000	8.91E+11
404.361	185802	1000.000	8.91E+11
404.409	185492	1000.000	8.91E+11
404.436	185316	1000.000	8.91E+11
404.463	185140	1000.000	8.91E+11
404.511	184830	1000.000	8.90E+11
404.538	184651	1000.000	8.90E+11
404.566	184472	1000.000	8.90E+11
404.614	184159	1000.000	8.90E+11
404.641	183981	1000.000	8.90E+11
404.668	183802	1000.000	8.90E+11
404.716	183488	1000.000	8.90E+11
404.743	183307	1000.000	8.90E+11
404.771	183114	1000.000	8.91E+11
404.819	182797	1000.000	8.91E+11
404.846	182618	1000.000	8.91E+11
404.873	182438	1000.000	8.91E+11
404.921	182123	1000.000	8.91E+11
404.948	181942	1000.000	8.91E+11
404.976	181761	1000.000	8.91E+11
405.024	181443	515.000	4.37E+11
405.051	181262	395.000	3.28E+11
405.079	181081	270.000	2.17E+11
405.127	180764	132.000	9.90E+10
405.154	180582	112.000	8.26E+10
405.182	180401	80.000	5.70E+10
405.230	180084	65.000	4.54E+10
405.257	179890	66.000	4.62E+10
405.285	179709	75.000	5.32E+10
405.333	179394	43.000	2.91E+10
405.360	179215	31.000	2.04E+10
405.387	179037	25.500	1.66E+10
405.435	178725	25.500	1.66E+10
405.462	178546	26.900	1.76E+10
405.490	178367	25.500	1.66E+10
405.538	178055	18.000	1.14E+10
405.565	177877	15.500	9.77E+09
405.593	177699	13.700	8.59E+09
405.641	177389	9.250	5.69E+09
405.668	177212	7.000	4.26E+09
405.696	177036	7.650	4.67E+09
405.744	176729	7.000	4.26E+09
405.771	176552	9.200	5.67E+09
405.799	176377	11.700	7.30E+09
405.847	176071	23.000	1.49E+10
405.874	175898	23.000	1.49E+10
405.901	175726	23.000	1.50E+10
405.949	175424	23.000	1.50E+10
405.976	175250	7.650	4.69E+09

[a]1 meter = 0.3048 feet

APPENDIX B – Continued

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 5

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.746	281213	.120	6.33E+07
389.773	281064	.140	7.38E+07
389.800	280985	.140	7.39E+07
389.848	280582	.100	5.28E+07
389.876	280405	.130	6.86E+07
389.903	280228	.130	6.86E+07
389.951	279917	.130	6.86E+07
389.979	279739	.100	5.28E+07
390.006	279560	.140	7.39E+07
390.054	279248	.140	7.39E+07
390.081	279071	.130	6.86E+07
390.109	278893	.120	6.33E+07
390.156	278581	.200	1.06E+08
390.183	278402	.190	1.00E+08
390.210	278224	.200	1.06E+08
390.258	277896	.285	1.50E+08
390.286	277715	.217	1.15E+08
390.313	277534	.203	1.07E+08
390.361	277217	.217	1.15E+08
390.388	277038	.163	8.61E+07
390.415	276858	.233	1.23E+08
390.463	276543	.301	1.59E+08
390.491	276362	.412	2.18E+08
390.518	276181	.371	1.96E+08
390.567	275860	.385	2.03E+08
390.595	275673	.421	2.22E+08
390.671	275170	.556	2.94E+08
390.697	275000	.600	3.17E+08
390.723	274829	.791	4.17E+08
390.769	274511	.680	3.59E+08
390.797	274330	.730	3.86E+08
390.824	274150	.690	3.64E+08
390.872	273835	.560	2.96E+08
390.899	273657	.540	2.85E+08
390.926	273479	.550	2.91E+08
390.974	273165	.500	2.64E+08
391.001	272992	.910	4.81E+08
391.028	272816	1.050	5.55E+08
391.076	272506	1.220	6.44E+08
391.104	272329	1.450	7.64E+08
391.131	272151	1.600	8.43E+08
391.179	271842	1.280	6.76E+08
391.206	271568	1.170	6.13E+08
391.233	271494	1.180	6.23E+08
391.282	271210	1.230	6.50E+08
391.310	271028	1.170	6.18E+08
391.338	270846	1.240	6.55E+08
391.387	270531	1.389	7.33E+08
391.415	270353	1.384	7.31E+08
391.442	270176	1.584	8.35E+08
391.490	269864	1.742	9.18E+08
391.518	269685	1.753	9.24E+08
391.545	269506	1.786	9.41E+08
391.593	269194	1.786	9.41E+08
391.620	269016	1.876	9.88E+08
391.647	268838	2.097	1.10E+09
391.695	268524	2.113	1.11E+09
391.723	268343	2.512	1.32E+09
391.750	268137	2.555	1.34E+09
391.798	267820	2.472	1.30E+09
391.826	267639	2.452	1.29E+09
391.853	267459	2.244	1.18E+09
391.901	267144	2.244	1.13E+09
391.929	266965	2.452	1.29E+09
391.956	266786	2.625	1.38E+09
392.004	266473	3.423	1.80E+09
392.032	266295	4.489	2.39E+09
392.059	266117	5.155	2.77E+09
392.107	265806	5.441	2.94E+09
392.135	265629	4.958	2.66E+09
392.162	265452	5.021	2.70E+09
392.210	265143	3.659	1.93E+09
392.238	264967	3.421	1.80E+09
392.265	264816	3.135	1.64E+09
392.313	264509	3.791	2.00E+09
392.340	264334	4.095	2.17E+09
392.367	264158	4.958	2.66E+09
392.415	263850	6.504	3.56E+09
392.443	263672	7.521	4.17E+09
392.470	263494	7.521	4.17E+09
392.518	263182	7.122	3.93E+09
392.546	263003	6.172	3.37E+09
392.573	262824	5.779	3.14E+09
392.621	262509	5.375	2.91E+09
392.649	262329	5.523	2.99E+09
392.676	262149	5.969	3.25E+09
392.724	261833	6.504	3.57E+09
392.752	261627	6.995	3.87E+09
392.779	261446	7.253	4.02E+09
392.827	261129	6.995	3.87E+09
392.855	260949	7.521	4.19E+09
392.882	260769	7.759	4.33E+09
392.930	260455	8.217	4.61E+09
392.958	260276	9.185	5.21E+09
392.985	260097	9.922	5.68E+09
393.033	259786	11.133	6.44E+09
393.060	259609	11.493	6.68E+09
393.097	259433	10.963	6.34E+09
393.135	259125	9.185	5.22E+09
393.163	258948	8.053	4.53E+09
393.190	258772	7.521	4.20E+09
393.238	258463	7.521	4.20E+09
393.266	258312	8.381	4.73E+09
393.293	258136	10.091	5.80E+09
393.341	257828	13.223	7.82E+09
393.368	257653	14.772	8.85E+09
393.395	257478	16.957	1.03E+10
393.443	257169	15.605	9.41E+09
393.471	256991	14.075	8.39E+09
393.498	256812	12.867	7.59E+09
393.546	256499	10.736	6.26E+09
393.574	256320	10.409	6.01E+09
393.601	256141	10.253	5.91E+09
393.649	255826	10.960	6.37E+09
393.677	255646	12.685	7.49E+09
393.704	255465	13.909	8.29E+09
393.752	255124	15.605	9.43E+09
393.779	254945	15.605	9.43E+09
393.806	254766	15.181	9.15E+09

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
393.854	254452	14.974	9.01E+09
393.882	254272	14.974	9.01E+09
393.909	254093	15.823	9.58E+09
393.957	253779	16.719	1.02E+10
393.985	253600	17.956	1.10E+10
394.012	253421	17.700	1.09E+10
394.060	253111	16.719	1.02E+10
394.087	252935	15.605	9.45E+09
394.114	252759	14.772	8.89E+09
394.162	252451	14.379	8.63E+09
394.190	252275	14.772	8.89E+09
394.217	252099	14.075	8.43E+09
394.265	251816	18.482	1.14E+10
394.292	251642	22.530	1.42E+10
394.319	251467	25.377	1.63E+10
394.367	251160	29.364	1.92E+10
394.395	250983	27.471	1.78E+10
394.422	250805	24.371	1.55E+10
394.470	250494	19.217	1.12E+10
394.498	250315	16.029	9.74E+09
394.525	250137	16.254	9.90E+09
394.573	249824	15.823	9.61E+09
394.600	249647	17.448	1.07E+10
394.627	249469	21.558	1.36E+10
394.675	249155	26.408	1.70E+10
394.703	248975	29.089	1.90E+10
394.730	248794	29.639	1.94E+10
394.778	248465	28.545	1.86E+10
394.805	248286	26.933	1.74E+10
394.832	248106	25.377	1.63E+10
394.880	247792	25.377	1.63E+10
394.907	247612	26.408	1.70E+10
394.934	247433	27.737	1.80E+10
394.982	247118	27.737	1.80E+10
395.010	246936	28.816	1.88E+10
395.037	246755	27.737	1.80E+10
395.085	246439	27.206	1.76E+10
395.112	246259	26.670	1.72E+10
395.139	246080	27.471	1.78E+10
395.187	245765	33.072	2.19E+10
395.215	245583	37.149	2.50E+10
395.242	245402	43.401	3.00E+10
395.290	245086	53.227	3.81E+10
395.317	244906	53.607	3.84E+10
395.344	244727	49.503	3.50E+10
395.392	244412	37.445	2.53E+10
395.420	244230	33.937	2.25E+10
395.447	244049	30.756	2.02E+10
395.495	243733	29.917	1.96E+10
395.522	243553	32.499	2.15E+10
395.549	243374	35.681	2.39E+10
395.597	243059	46.870	3.28E+10
395.625	242877	57.336	4.15E+10
395.652	242696	67.493	5.02E+10
395.700	242380	68.647	5.12E+10
395.727	242200	63.066	4.64E+10
395.754	242021	56.658	4.10E+10
395.802	241706	47.588	3.34E+10
395.830	241524	45.808	3.19E+10
395.857	241343	44.420	3.08E+10
395.905	241027	48.774	3.43E+10
395.932	240847	51.721	3.68E+10
395.959	240568	56.307	4.06E+10
396.007	240353	58.917	4.28E+10
396.035	240171	58.917	4.28E+10
396.062	239990	60.133	4.38E+10
396.110	239674	63.066	4.63E+10
396.137	239494	68.222	5.08E+10
396.164	239315	71.912	5.40E+10
396.212	239000	89.410	6.87E+10
396.240	238818	93.415	7.33E+10
396.267	238625	93.415	7.32E+10
396.315	238309	82.582	6.33E+10
396.342	238131	72.936	5.48E+10
396.369	237952	66.136	4.88E+10
396.417	237641	58.518	4.23E+10
396.444	237463	58.917	4.27E+10
396.471	237286	63.066	4.62E+10
396.519	236975	81.236	6.20E+10
396.547	236797	96.855	7.61E+10
396.574	236619	117.427	9.53E+10
396.622	236310	142.629	1.20E+11
396.649	236135	134.356	1.12E+11
396.676	235960	124.078	1.02E+11
396.724	235553	95.995	7.52E+10
396.752	235502	87.643	6.77E+10
396.779	235326	83.272	6.37E+10
396.827	235017	84.684	6.50E+10
396.855	234841	87.643	6.76E+10
396.882	234664	93.415	7.28E+10
396.930	234354	106.169	8.44E+10
396.957	234178	106.169	8.44E+10
396.984	234001	110.957	8.88E+10
397.032	233692	115.365	9.29E+10
397.059	233514	115.365	9.29E+10
397.086	233337	117.427	9.48E+10
397.134	233024	134.356	1.11E+11
397.162	232844	148.467	1.25E+11
397.189	232664	164.085	1.40E+11
397.237	232348	154.539	1.30E+11
397.264	232156	142.629	1.19E+11
397.291	231977	129.116	1.05E+11
397.339	231662	100.222	7.84E+10
397.367	231480	97.715	7.61E+10
397.394	231299	99.434	7.76E+10
397.442	230993	119.393	9.60E+10
397.469	230803	145.518	1.21E+11
397.496	230624	174.159	1.49E+11
397.544	230308	210.407	1.86E+11
397.572	230127	229.274	2.05E+11
397.599	229946	225.874	2.01E+11
397.647	229629	184.289	1.59E+11
397.675	229447	167.385	1.42E+11
397.702	229266	145.518	1.20E+11
397.750	228936	134.356	1.10E+11
397.778	228755	142.629	1.17E+11
397.805	228574	149.467	1.23E+11
397.853	228260	177.633	1.51E+11
397.880	228082	184.289	1.58E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
397.907	227904	187.527	1.61E+11
397.955	227592	184.289	1.58E+11
397.983	227413	177.633	1.51E+11
398.010	227234	184.289	1.57E+11
398.058	226924	207.116	1.80E+11
398.085	226748	222.523	1.95E+11
398.112	226572	229.274	2.02E+11
398.160	226265	250.727	2.24E+11
398.187	226090	243.377	2.16E+11
398.214	225916	229.274	2.01E+11
398.262	225635	190.772	1.62E+11
398.290	225459	177.633	1.49E+11
398.317	225282	167.385	1.39E+11
398.365	224974	170.742	1.42E+11
398.392	224798	207.116	1.78E+11
398.419	224623	232.725	2.03E+11
398.467	224313	290.795	2.62E+11
398.495	224135	316.429	2.89E+11
398.522	223956	325.027	2.97E+11
398.570	223644	299.313	2.70E+11
398.597	223466	258.278	2.28E+11
398.624	223288	262.128	2.31E+11
398.672	222976	235.775	2.08E+11
398.699	222797	239.776	2.08E+11
399.726	222618	250.727	2.19E+11
398.774	222279	273.579	2.42E+11
398.801	222100	278.070	2.46E+11
398.828	221921	282.305	2.50E+11
398.876	221608	262.128	2.29E+11
398.904	221428	258.278	2.25E+11
398.931	221249	247.027	2.13E+11
398.979	220937	303.582	2.70E+11
399.006	220760	333.653	3.00E+11
399.033	220583	359.691	3.26E+11
399.081	220274	395.142	3.62E+11
399.109	220096	409.608	3.77E+11
399.136	219919	399.924	3.66E+11
399.184	219611	320.725	2.85E+11
399.211	219436	286.547	2.50E+11
399.238	219262	262.128	2.26E+11
399.286	218981	262.128	2.25E+11
399.314	218804	282.305	2.45E+11
399.341	218628	307.659	2.73E+11
399.389	218319	377.184	3.39E+11
399.416	218143	414.511	3.77E+11
399.443	217967	429.462	3.92E+11
399.491	217658	414.511	3.76E+11
399.518	217482	395.142	3.56E+11
399.545	217304	385.971	3.46E+11
399.593	216993	377.184	3.36E+11
399.621	216813	381.574	3.40E+11
399.648	216633	390.402	3.49E+11
399.696	216318	404.746	3.62E+11
399.723	216139	424.439	3.82E+11
399.750	215947	395.142	3.52E+11
399.798	215632	359.691	3.16E+11
399.826	215451	355.334	3.11E+11
399.853	215270	346.641	3.02E+11
399.901	214953	430.000	3.84E+11
399.928	214774	460.000	4.14E+11
399.955	214594	490.000	4.44E+11
400.003	214279	585.000	5.39E+11
400.031	214098	670.000	6.26E+11
400.058	213917	640.000	5.94E+11
400.106	213600	540.000	4.91E+11
400.133	213421	515.000	4.65E+11
400.160	213241	515.000	4.65E+11
400.208	212926	465.000	4.14E+11
400.236	212745	480.000	4.28E+11
400.263	212564	505.000	4.52E+11
400.311	212247	540.000	4.86E+11
400.338	212068	540.000	4.85E+11
400.365	211888	600.000	5.45E+11
400.413	211574	640.000	5.83E+11
400.440	211395	655.000	5.98E+11
400.467	211215	655.000	5.97E+11
400.515	210900	750.000	6.91E+11
400.543	210719	820.000	7.61E+11
400.570	210537	950.000	8.92E+11
400.618	210221	975.000	9.15E+11
400.645	210042	975.000	9.13E+11
400.672	209862	820.000	7.55E+11
400.720	209548	685.000	6.18E+11
400.747	209368	640.000	5.73E+11
400.774	209189	670.000	6.02E+11
400.822	208875	700.000	6.30E+11
400.849	208695	770.000	6.99E+11
400.876	208516	895.000	8.21E+11
400.924	208201	1000.000	9.24E+11
400.952	208019	1000.000	9.22E+11
400.979	207838	1000.000	9.21E+11
401.027	207521	895.000	8.14E+11
401.055	207339	895.000	8.13E+11
401.082	207158	760.000	6.79E+11
401.130	206842	760.000	6.77E+11
401.157	206662	750.000	6.66E+11
401.184	206483	760.000	6.75E+11
401.232	206168	820.000	7.31E+11
401.260	205986	725.000	6.39E+11
401.287	205805	670.000	5.85E+11
401.335	205489	630.000	5.17E+11
401.362	205309	590.000	5.07E+11
401.389	205130	630.000	5.44E+11
401.437	204815	770.000	6.75E+11
401.465	204633	1000.000	8.95E+11
401.492	204452	1000.000	8.93E+11
401.540	204136	1000.000	8.91E+11
401.547	203956	1000.000	8.89E+11
401.594	203777	1000.000	8.88E+11
401.642	203463	1000.000	8.85E+11
401.669	203281	990.000	8.74E+11
401.696	203104	975.000	8.58E+11
401.744	202788	900.000	7.85E+11
401.772	202595	975.000	8.52E+11
401.799	202414	1000.000	8.74E+11
401.847	202098	1000.000	8.72E+11
401.875	201918	1000.000	8.71E+11
401.902	201738	1000.000	8.69E+11
401.950	201426	1000.000	8.67E+11

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
401.977	201248	1000.000	8.66E+11
402.004	201071	1000.000	8.65E+11
402.052	200763	1000.000	8.63E+11
402.079	200586	1000.000	8.62E+11
402.106	200411	1000.000	8.61E+11
402.154	200103	1000.000	8.60E+11
402.182	199926	1000.000	8.59E+11
402.209	199750	1000.000	8.58E+11
402.257	199468	1000.000	8.58E+11
402.284	199293	1000.000	8.57E+11
402.311	199119	1000.000	8.57E+11
402.359	198811	975.000	8.33E+11
402.387	198534	1000.000	8.55E+11
402.414	198457	1000.000	8.55E+11
402.462	198147	1000.000	8.54E+11
402.489	197970	1000.000	8.53E+11
402.516	197793	1000.000	8.53E+11
402.564	197483	1000.000	8.52E+11
402.591	197306	1000.000	8.52E+11
402.618	197129	1000.000	8.51E+11
402.666	196814	1000.000	8.51E+11
402.694	196634	1000.000	8.51E+11
402.721	196453	1000.000	8.50E+11
402.769	196112	1000.000	8.51E+11
402.796	195933	1000.000	8.50E+11
402.823	195754	1000.000	8.50E+11
402.871	195441	1000.000	8.50E+11
402.899	195261	1000.000	8.49E+11
402.926	195081	1000.000	8.49E+11
402.974	194768	1000.000	8.49E+11
403.002	194589	1000.000	8.49E+11
403.029	194411	1000.000	8.48E+11
403.077	194101	1000.000	8.48E+11
403.104	193925	1000.000	8.48E+11
403.131	193749	1000.000	8.48E+11
403.179	193442	1000.000	8.47E+11
403.207	193265	1000.000	8.47E+11
403.234	193089	1000.000	8.47E+11
403.282	192807	1000.000	8.47E+11
403.309	192633	1000.000	8.46E+11
403.336	192458	1000.000	8.46E+11
403.384	192150	1000.000	8.46E+11
403.412	191973	1000.000	8.46E+11
403.439	191795	1000.000	8.46E+11
403.487	191483	1000.000	8.45E+11
403.515	191305	1000.000	8.45E+11
403.542	191126	1000.000	8.45E+11
403.590	190812	1000.000	8.45E+11
403.618	190633	1000.000	8.44E+11
403.645	190453	1000.000	8.44E+11
403.693	190138	1000.000	8.44E+11
403.720	189959	1000.000	8.44E+11
403.747	189780	1000.000	8.44E+11
403.795	189440	1000.000	8.43E+11
403.823	189259	1000.000	8.43E+11
403.850	189079	1000.000	8.43E+11
403.898	188764	1000.000	8.43E+11
403.926	188584	1000.000	8.43E+11
403.953	188405	1000.000	8.43E+11
404.001	188092	1000.000	8.42E+11
404.029	187914	1000.000	8.42E+11
404.056	187736	1000.000	8.42E+11
404.104	187425	1000.000	8.42E+11
404.131	187251	1000.000	8.42E+11
404.158	187075	1000.000	8.42E+11
404.206	186768	1000.000	8.41E+11
404.234	186592	1000.000	8.41E+11
404.261	186441	1000.000	8.41E+11
404.309	186133	1000.000	8.41E+11
404.337	185957	1000.000	8.41E+11
404.364	185780	1000.000	8.41E+11
404.412	185470	1000.000	8.40E+11
404.439	185294	1000.000	8.40E+11
404.466	185118	1000.000	8.40E+11
404.514	184808	1000.000	8.40E+11
404.542	184629	1000.000	8.40E+11
404.569	184450	1000.000	8.40E+11
404.617	184137	1000.000	8.40E+11
404.644	183959	1000.000	8.40E+11
404.671	183790	1000.000	8.40E+11
404.719	183465	1000.000	8.40E+11
404.747	183285	1000.000	8.40E+11
404.774	183091	1000.000	8.40E+11
404.822	182775	1000.000	8.39E+11
404.849	182595	1000.000	8.39E+11
404.876	182416	1000.000	8.39E+11
404.924	182101	1000.000	8.39E+11
404.952	181919	1000.000	8.39E+11
404.979	181738	1000.000	8.39E+11
405.027	181421	1000.000	8.39E+11
405.055	181239	820.000	6.79E+11
405.082	181058	515.000	4.17E+11
405.130	180741	212.000	1.58E+11
405.158	180560	183.000	1.34E+11
405.185	180378	132.000	9.38E+10
405.233	180061	132.000	9.38E+10
405.261	179867	132.000	9.39E+10
405.288	179686	145.000	1.04E+11
405.336	179371	96.000	6.62E+10
405.363	179193	85.000	5.80E+10
405.390	179015	80.000	5.43E+10
405.438	178703	78.000	5.28E+10
405.466	178524	78.000	5.29E+10
405.493	178345	75.000	5.07E+10
405.541	178033	68.000	4.55E+10
405.569	177855	63.000	4.19E+10
405.596	177677	58.000	3.84E+10
405.644	177367	50.000	3.28E+10
405.672	177190	41.000	2.65E+10
405.699	177014	43.000	2.79E+10
405.747	176706	44.000	2.86E+10
405.775	176530	48.000	3.14E+10
405.802	176355	52.000	3.42E+10
405.850	176050	65.000	4.35E+10
405.877	175877	64.000	4.28E+10
405.904	175704	63.000	4.21E+10
405.952	175402	65.000	4.36E+10
405.980	175229	45.000	3.01E+10

[a] 1 meter = 0.3048 feet

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 6

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.749	281191	.100	5.18E+07
389.777	281042	.100	5.18E+07
389.804	280868	.100	5.18E+07
389.852	280560	.180	9.32E+07
389.879	280383	.150	7.77E+07
389.907	280206	.130	6.73E+07
389.955	279895	.130	6.73E+07
389.982	279717	.120	6.21E+07
390.010	279538	.100	5.18E+07
390.057	279226	.130	6.73E+07
390.085	279049	.120	6.21E+07
390.112	278871	.140	7.25E+07
390.159	278559	.240	1.24E+08
390.187	278380	.360	1.86E+08
390.214	278201	.510	2.63E+08
390.262	277873	.331	1.71E+08
390.289	277692	.348	1.80E+08
390.317	277511	.371	1.92E+08
390.364	277195	.335	1.73E+08
390.392	277015	.335	1.73E+08
390.419	276836	.371	1.92E+08
390.467	276520	.391	2.02E+08
390.494	276339	.456	2.35E+08
390.522	276159	.504	2.60E+08
390.570	275837	.423	2.19E+08
390.598	275650	.506	2.62E+08
390.674	275149	.673	3.48E+08
390.700	274978	.793	4.09E+08
390.726	274808	.834	4.30E+08
390.773	274488	.910	4.70E+08
390.800	274308	.870	4.49E+08
390.828	274127	.850	4.39E+08
390.875	273813	.740	3.82E+08
390.903	273635	.640	3.31E+08
390.930	273457	.660	3.41E+08
390.977	273147	.760	3.92E+08
391.005	272970	1.020	5.26E+08
391.032	272794	1.260	6.50E+08
391.080	272484	1.710	8.79E+08
391.107	272306	2.130	1.09E+09
391.135	272129	2.450	1.25E+09
391.182	271821	2.130	1.09E+09
391.210	271646	1.710	8.79E+08
391.237	271472	1.350	6.96E+08
391.285	271187	1.450	7.47E+08
391.313	271006	1.390	7.16E+08
391.342	270824	1.600	8.23E+08
391.391	270509	1.775	9.12E+08
391.418	270331	2.081	1.07E+09
391.446	270153	2.175	1.12E+09
391.494	269842	2.491	1.28E+09
391.521	269663	2.452	1.26E+09
391.549	269484	3.010	1.54E+09
391.596	269172	2.534	1.30E+09
391.624	268994	3.010	1.54E+09
391.651	268815	3.236	1.65E+09
391.699	268501	3.354	1.71E+09
391.726	268320	3.290	1.68E+09
391.754	268114	3.536	1.81E+09
391.802	267797	3.616	1.85E+09
391.829	267617	3.423	1.75E+09
391.857	267437	3.384	1.73E+09
391.905	267122	3.236	1.65E+09
391.932	266942	3.290	1.68E+09
391.960	266763	3.833	1.97E+09
392.008	266451	4.895	2.54E+09
392.035	266272	5.689	2.98E+09
392.063	266094	6.995	3.72E+09
392.111	265784	7.386	3.95E+09
392.138	265606	6.870	3.65E+09
392.166	265430	5.969	3.14E+09
392.214	265121	4.896	2.55E+09
392.241	264945	4.600	2.39E+09
392.269	264794	4.656	2.42E+09
392.316	264487	4.769	2.48E+09
392.344	264312	5.520	2.90E+09
392.371	264136	6.504	3.45E+09
392.419	263828	8.217	4.44E+09
392.446	263650	9.566	5.24E+09
392.474	263472	10.091	5.55E+09
392.522	263160	8.551	4.64E+09
392.549	262981	7.521	4.04E+09
392.577	262801	7.122	3.81E+09
392.625	262487	6.504	3.46E+09
392.652	262307	6.870	3.67E+09
392.680	262127	7.253	3.89E+09
392.728	261810	8.217	4.45E+09
392.755	261604	8.984	4.91E+09
392.783	261423	9.185	5.03E+09
392.831	261107	9.377	5.15E+09
392.858	260927	9.377	5.15E+09
392.886	260747	9.379	5.15E+09
392.934	260432	10.485	5.82E+09
392.961	260253	11.307	6.32E+09
392.989	260075	12.685	7.17E+09
393.036	259764	13.909	7.93E+09
393.064	259587	13.909	7.93E+09
393.091	259411	13.395	7.61E+09
393.139	259103	10.638	5.92E+09
393.166	258926	10.091	5.59E+09
393.194	258750	9.565	5.28E+09
393.242	258441	9.185	5.05E+09
393.269	258290	10.253	5.69E+09
393.297	258114	11.680	6.56E+09
393.344	257807	16.254	9.43E+09
393.372	257631	19.385	1.15E+10
393.399	257456	22.298	1.34E+10
393.447	257147	20.520	1.22E+10
393.474	256968	17.700	1.04E+10
393.502	256790	14.772	8.50E+09
393.550	256477	12.867	7.31E+09
393.577	256298	12.501	7.09E+09
393.605	256118	12.501	7.09E+09
393.653	255803	13.909	7.97E+09
393.680	255623	15.605	9.04E+09
393.708	255442	16.484	9.60E+09
393.755	255102	19.396	1.15E+10
393.783	254922	19.964	1.19E+10
393.810	254744	20.245	1.20E+10
393.858	254430	19.677	1.17E+10
393.885	254250	19.677	1.17E+10
393.913	254070	19.964	1.19E+10
393.961	253756	22.298	1.34E+10
393.988	253578	22.298	1.34E+10
394.016	253399	22.060	1.33E+10
394.063	253089	20.790	1.24E+10
394.091	252913	20.245	1.21E+10
394.118	252737	18.482	1.09E+10
394.166	252429	17.200	1.01E+10
394.193	252253	17.956	1.06E+10
394.221	252076	18.217	1.07E+10
394.268	251795	23.406	1.42E+10
394.296	251620	28.005	1.72E+10
394.323	251446	33.072	2.07E+10
394.371	251138	36.267	2.29E+10
394.398	250960	33.648	2.11E+10
394.426	250783	29.089	1.80E+10
394.474	250471	22.530	1.36E+10
394.501	250293	19.964	1.19E+10
394.529	250114	18.751	1.11E+10
394.576	249802	20.520	1.23E+10
394.604	249624	22.757	1.37E+10
394.631	249446	25.377	1.55E+10
394.679	249133	32.785	2.05E+10
394.706	248952	36.560	2.32E+10
394.734	248771	36.855	2.34E+10
394.781	248443	34.806	2.19E+10
394.809	248263	32.499	2.03E+10
394.836	248084	30.756	1.91E+10
394.883	247770	30.756	1.91E+10
394.911	247590	32.213	2.01E+10
394.938	247411	33.648	2.11E+10
394.986	247095	34.806	2.19E+10
395.013	246914	35.681	2.25E+10
395.041	246732	34.226	2.15E+10
395.088	246417	33.072	2.07E+10
395.116	246237	32.213	2.01E+10
395.143	246059	35.389	2.23E+10
395.191	245742	40.453	2.60E+10
395.218	245561	46.514	3.05E+10
395.246	245379	53.607	3.59E+10
395.293	245064	64.804	4.46E+10
395.321	244884	63.930	4.39E+10
395.348	244705	59.320	4.03E+10
395.376	244389	44.420	2.89E+10
395.423	244208	39.528	2.53E+10
395.451	244026	36.267	2.30E+10
395.498	243711	35.973	2.27E+10
395.524	243531	38.632	2.47E+10
395.553	243352	43.739	2.84E+10
395.601	243036	59.725	4.06E+10
395.628	242855	70.928	4.94E+10
395.656	242673	79.934	5.67E+10
395.703	242358	79.934	5.67E+10
395.731	242178	73.464	5.14E+10
395.758	241999	65.689	4.57E+10
395.806	241683	55.141	3.70E+10
395.833	241502	51.721	3.44E+10
395.861	241320	53.227	3.55E+10
395.908	241005	58.518	3.96E+10
395.936	240825	64.365	4.41E+10
395.963	240646	66.586	4.59E+10
396.011	240330	70.451	4.89E+10
396.038	240149	71.912	5.01E+10
396.066	239967	70.451	4.89E+10
396.113	239652	73.464	5.13E+10
396.141	239472	81.236	5.75E+10
396.168	239293	87.643	6.27E+10
396.216	238977	99.434	7.24E+10
396.243	238796	100.222	7.30E+10
396.271	238602	101.426	7.40E+10
396.318	238287	93.415	6.73E+10
396.346	238108	85.407	6.07E+10
396.373	237930	76.845	5.38E+10
396.420	237619	68.647	4.73E+10
396.448	237441	69.083	4.76E+10
396.475	237264	75.677	5.28E+10
396.523	236953	97.715	7.07E+10
396.550	236775	117.427	8.72E+10
396.578	236597	139.797	1.07E+11
396.625	236288	160.845	1.25E+11
396.653	236113	151.473	1.17E+11
396.680	235938	137.052	1.04E+11
396.728	235631	103.518	7.53E+10
396.755	235480	97.715	7.05E+10
396.783	235304	95.995	6.90E+10
396.831	234995	95.135	6.83E+10
396.858	234819	99.434	7.18E+10
396.886	234641	110.957	8.13E+10
396.933	234332	121.635	9.03E+10
396.961	234156	137.052	1.04E+11
396.988	233979	134.356	1.01E+11
397.035	233670	131.710	9.88E+10
397.063	233492	134.356	1.01E+11
397.090	233315	145.518	1.11E+11
397.139	233002	157.662	1.21E+11
397.165	232822	177.633	1.39E+11
397.193	232641	190.772	1.51E+11
397.240	232326	174.159	1.36E+11
397.268	232134	157.662	1.21E+11
397.295	231954	148.467	1.13E+11
397.343	231639	121.635	8.98E+10
397.370	231458	121.635	8.97E+10
397.398	231276	119.393	8.78E+10
397.445	230960	139.797	1.05E+11
397.473	230781	174.159	1.35E+11
397.500	230601	197.286	1.56E+11
397.548	230286	222.523	1.79E+11
397.575	230105	239.776	1.95E+11
397.603	229923	232.725	1.88E+11
397.651	229606	200.555	1.58E+11
397.678	229425	181.059	1.41E+11
397.706	229243	164.085	1.26E+11
397.754	228914	170.742	1.31E+11
397.781	228733	167.385	1.28E+11
397.809	228552	174.159	1.34E+11
397.856	228238	194.025	1.52E+11
397.884	228059	200.555	1.57E+11
397.911	227881	207.116	1.63E+11
397.959	227569	200.555	1.57E+11
397.986	227391	197.286	1.54E+11
398.014	227212	210.407	1.66E+11
398.061	226902	219.222	1.73E+11
398.089	226726	243.377	1.95E+11
398.116	226550	254.478	2.05E+11
398.163	226243	266.029	2.16E+11
398.191	226068	254.478	2.05E+11
398.218	225894	250.727	2.01E+11
398.266	225613	203.831	1.59E+11
398.293	225437	200.555	1.56E+11
398.321	225260	197.286	1.53E+11
398.368	224952	200.555	1.56E+11
398.396	224776	222.523	1.75E+11
398.423	224601	250.727	2.00E+11
398.471	224291	312.140	2.56E+11
398.498	224113	329.337	2.72E+11
398.526	223934	342.305	2.84E+11
398.573	223622	316.429	2.59E+11
398.601	223444	286.547	2.32E+11
398.628	223266	266.029	2.13E+11
398.675	222954	262.128	2.09E+11
398.703	222775	269.979	2.16E+11
398.730	222596	273.979	2.20E+11
398.777	222257	299.313	2.42E+11
398.805	222078	312.140	2.54E+11
398.832	221899	307.658	2.50E+11
398.880	221585	296.547	2.30E+11
398.907	221406	278.070	2.22E+11
398.935	221226	286.547	2.33E+11
398.982	220914	333.651	2.72E+11
399.010	220738	342.305	2.80E+11
399.037	220561	372.801	3.08E+11
399.085	220252	424.438	3.56E+11
399.112	220074	434.527	3.65E+11
399.140	219897	439.632	3.69E+11
399.187	219589	364.054	2.99E+11
399.215	219414	333.653	2.71E+11
399.242	219240	320.725	2.59E+11
399.290	218959	303.582	2.43E+11
399.317	218782	329.337	2.66E+11
399.345	218606	342.305	2.78E+11
399.392	218297	409.608	3.39E+11
399.420	218121	455.191	3.80E+11
399.447	217945	476.503	4.00E+11
399.494	217636	465.766	3.89E+11
399.522	217460	460.458	3.84E+11
399.549	217282	504.054	4.24E+11
399.597	216970	481.932	4.03E+11
399.624	216790	481.932	4.03E+11
399.652	216610	504.054	4.23E+11
399.699	216296	498.463	4.17E+11
399.727	216117	498.463	4.17E+11
399.754	215925	476.503	3.96E+11
399.802	215609	444.778	3.66E+11
399.829	215428	434.527	3.57E+11
399.857	215247	424.438	3.47E+11
399.904	214931	490.000	4.07E+11
399.932	214751	540.000	4.52E+11
399.959	214572	580.000	4.89E+11
400.007	214256	725.000	6.23E+11
400.034	214075	770.000	6.65E+11
400.062	213894	770.000	6.64E+11
400.109	213578	670.000	5.70E+11
400.137	213398	570.000	4.77E+11
400.164	213219	540.000	4.49E+11
400.212	212903	495.000	4.07E+11
400.239	212722	510.000	4.20E+11
400.267	212541	527.500	4.36E+11
400.314	212225	570.000	4.74E+11
400.342	212045	585.000	4.87E+11
400.369	211866	640.000	5.37E+11
400.416	211552	640.000	5.36E+11
400.444	211372	600.000	4.99E+11
400.471	211193	640.000	5.35E+11
400.519	210877	670.000	5.62E+11
400.546	210696	725.000	6.12E+11
400.574	210515	820.000	6.99E+11
400.621	210199	820.000	6.98E+11
400.649	210019	820.000	6.97E+11
400.676	209840	750.000	6.32E+11
400.723	209526	570.000	4.68E+11
400.751	209346	540.000	4.40E+11
400.778	209167	515.000	4.18E+11
400.825	208852	527.500	4.28E+11
400.853	208673	585.000	4.79E+11
400.880	208493	700.000	5.82E+11
400.928	208178	975.000	8.33E+11
400.955	207997	1000.000	8.55E+11
400.983	207815	1000.000	8.54E+11
401.031	207498	1000.000	8.52E+11
401.058	207317	1000.000	8.51E+11
401.086	207135	1000.000	8.51E+11
401.133	206820	1000.000	8.49E+11
401.161	206640	1000.000	8.48E+11
401.188	206461	1000.000	8.47E+11
401.236	206145	1000.000	8.46E+11
401.263	205964	1000.000	8.45E+11
401.291	205782	1000.000	8.44E+11
401.338	205467	1000.000	8.43E+11
401.366	205287	1000.000	8.42E+11
401.393	205108	1000.000	8.41E+11
401.441	204792	1000.000	8.39E+11
401.468	204611	1000.000	8.38E+11
401.496	204429	1000.000	8.37E+11
401.543	204114	1000.000	8.36E+11
401.571	203934	1000.000	8.35E+11
401.598	203755	1000.000	8.34E+11
401.645	203440	1000.000	8.32E+11
401.673	203261	1000.000	8.31E+11
401.700	203081	1000.000	8.30E+11
401.748	202766	1000.000	8.29E+11
401.775	202572	1000.000	8.26E+11
401.803	202391	1000.000	8.26E+11
401.851	202076	1000.000	8.24E+11
401.878	201896	1000.000	8.23E+11
401.906	201716	1000.000	8.22E+11
401.953	201403	1000.000	8.21E+11
401.981	201226	1000.000	8.20E+11
402.008	201049	1000.000	8.20E+11
402.055	200741	1000.000	8.18E+11
402.083	200564	1000.000	8.18E+11
402.110	200189	1000.000	8.17E+11
402.158	200081	1000.000	8.16E+11
402.185	199904	1000.000	8.16E+11
402.213	199728	1000.000	8.15E+11
402.260	199446	1000.000	8.15E+11
402.288	199272	1000.000	8.14E+11
402.315	199097	1000.000	8.14E+11
402.363	198789	1000.000	8.13E+11
402.390	198612	1000.000	8.13E+11
402.418	198435	1000.000	8.12E+11
402.465	198125	1000.000	8.11E+11
402.493	197948	1000.000	8.11E+11
402.520	197771	1000.000	8.11E+11
402.567	197461	1000.000	8.10E+11
402.595	197283	1000.000	8.10E+11
402.622	197105	1000.000	8.09E+11
402.670	196792	1000.000	8.08E+11
402.697	196611	1000.000	8.08E+11
402.725	196430	1000.000	8.08E+11
402.772	196090	1000.000	8.07E+11
402.800	195911	1000.000	8.07E+11
402.827	195732	1000.000	8.06E+11
402.875	195418	1000.000	8.06E+11
402.902	195238	1000.000	8.05E+11
402.930	195059	1000.000	8.05E+11
402.978	194746	1000.000	8.05E+11
403.005	194567	1000.000	8.04E+11
403.033	194389	1000.000	8.04E+11
403.080	194079	1000.000	8.04E+11
403.108	193903	1000.000	8.04E+11
403.135	193727	1000.000	8.03E+11
403.183	193420	1000.000	8.03E+11
403.210	193243	1000.000	8.03E+11
403.238	193067	1000.000	8.03E+11
403.285	192786	1000.000	8.03E+11
403.313	192611	1000.000	8.03E+11
403.340	192436	1000.000	8.03E+11
403.388	192128	1000.000	8.03E+11
403.415	191951	1000.000	8.02E+11
403.443	191771	1000.000	8.02E+11
403.491	191461	1000.000	8.02E+11
403.519	191283	1000.000	8.02E+11
403.546	191104	1000.000	8.02E+11
403.594	190790	1000.000	8.02E+11
403.621	190610	1000.000	8.02E+11
403.649	190430	1000.000	8.02E+11
403.696	190116	1000.000	8.02E+11
403.724	189937	1000.000	8.02E+11
403.751	189732	1000.000	8.02E+11
403.799	189417	1000.000	8.02E+11
403.826	189237	1000.000	8.02E+11
403.854	189056	1000.000	8.02E+11
403.902	188742	1000.000	8.02E+11
403.929	188562	1000.000	8.02E+11
403.957	188383	1000.000	8.02E+11
404.005	188070	1000.000	8.02E+11
404.032	187892	1000.000	8.02E+11
404.060	187714	1000.000	8.02E+11
404.107	187404	1000.000	8.02E+11
404.135	187229	1000.000	8.02E+11
404.162	187054	1000.000	8.02E+11
404.210	186746	1000.000	8.02E+11
404.237	186570	1000.000	8.02E+11
404.265	186419	1000.000	8.02E+11
404.313	186111	1000.000	8.02E+11
404.340	185934	1000.000	8.02E+11
404.368	185758	1000.000	8.02E+11
404.415	185449	1000.000	8.02E+11
404.443	185272	1000.000	8.02E+11
404.470	185096	1000.000	8.02E+11
404.518	184786	1000.000	8.02E+11
404.545	184607	1000.000	8.02E+11
404.573	184427	1000.000	8.02E+11
404.620	184115	1000.000	8.02E+11
404.648	183936	1000.000	8.02E+11
404.675	183758	1000.000	8.02E+11
404.723	183443	1000.000	8.02E+11
404.750	183250	1000.000	8.02E+11
404.779	183068	1000.000	8.02E+11
404.825	182752	1000.000	8.02E+11
404.853	182573	1000.000	8.02E+11
404.880	182393	1000.000	8.02E+11
404.928	182078	1000.000	8.02E+11
404.955	181897	1000.000	8.02E+11
404.983	181715	1000.000	8.02E+11
405.031	181398	1000.000	8.02E+11
405.059	181217	1000.000	8.02E+11
405.086	181035	1000.000	8.02E+11
405.134	180718	1000.000	8.02E+11
405.161	180537	1000.000	8.02E+11
405.189	180354	1000.000	8.02E+11
405.237	180038	1000.000	8.02E+11
405.264	179845	1000.000	8.02E+11
405.292	179664	1000.000	8.02E+11
405.339	179349	1000.000	8.02E+11
405.367	179171	1000.000	8.02E+11
405.394	178993	975.000	7.81E+11
405.442	178680	950.000	7.60E+11
405.469	178501	922.500	7.37E+11
405.497	178323	895.000	7.13E+11
405.545	178010	820.000	6.50E+11
405.572	177833	750.000	5.91E+11
405.600	177655	700.000	5.49E+11
405.648	177345	570.000	4.41E+11
405.675	177169	455.000	3.47E+11
405.703	176992	465.000	3.55E+11
405.751	176684	515.000	3.96E+11
405.778	176508	515.000	3.96E+11
405.806	176333	495.000	3.80E+11
405.853	176028	495.000	3.80E+11
405.881	175855	465.000	3.55E+11
405.908	175683	455.000	3.47E+11
405.956	175380	395.000	2.98E+11
405.983	175207	395.000	2.98E+11

(a) 1 meter = 0.3048 feet

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 7

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.753	281195	.150	7.63E+07
389.780	281020	.180	9.15E+07
389.807	280846	.140	7.12E+07
389.855	280538	.180	9.15E+07
389.882	280361	.200	1.02E+08
389.910	280184	.140	7.12E+07
389.958	279872	.140	7.12E+07
389.985	279694	.120	6.10E+07
390.013	279516	.100	5.08E+07
390.061	279204	.140	7.11E+07
390.088	279026	.170	8.63E+07
390.115	278849	.230	1.17E+08
390.163	278536	.410	2.08E+08
390.190	278358	.500	2.53E+08
390.217	278179	.550	2.79E+08
390.265	277851	.446	2.26E+08
390.292	277669	.374	1.89E+08
390.320	277488	.391	1.98E+08
390.368	277173	.394	2.00E+08
390.395	276993	.374	1.89E+08
390.422	276813	.379	1.91E+08
390.470	276498	.543	2.75E+08
390.497	276316	.493	2.49E+08
390.525	276135	.567	2.87E+08
390.574	275813	.587	2.97E+08
390.602	275627	.592	2.99E+08
390.678	275128	.686	3.46E+08
390.703	274957	.971	4.90E+08
390.729	274786	1.066	5.38E+08
390.776	274466	1.020	5.15E+08
390.803	274285	1.050	5.30E+08
390.831	274104	.950	4.80E+08
390.879	273791	.810	4.09E+08
390.906	273612	.790	3.99E+08
390.933	273435	.660	3.33E+08
390.981	273125	.940	4.75E+08
391.008	272948	1.150	5.80E+08
391.035	272771	1.230	6.21E+08
391.083	272462	2.170	1.09E+09
391.110	272284	2.690	1.34E+09
391.138	272107	2.680	1.34E+09
391.186	271799	2.360	1.18E+09
391.213	271625	1.840	9.24E+08
391.240	271450	1.710	8.60E+08
391.289	271164	1.460	7.35E+08
391.317	270983	1.600	8.05E+08
391.345	270801	1.780	8.94E+08
391.394	270487	1.876	9.42E+08
391.421	270309	2.432	1.22E+09
391.449	270131	2.852	1.42E+09
391.497	269819	3.040	1.52E+09
391.524	269641	3.354	1.67E+09
391.552	269462	3.270	1.63E+09
391.600	269149	3.321	1.66E+09
391.627	268971	3.354	1.67E+09
391.654	268793	3.384	1.69E+09
391.702	268479	3.388	1.69E+09
391.729	268298	3.746	1.87E+09
391.757	268092	3.886	1.94E+09
391.805	267775	4.207	2.11E+09
391.832	267594	3.886	1.94E+09
391.860	267414	3.985	2.00E+09
391.908	267099	3.497	1.75E+09
391.935	266920	3.886	1.95E+09
391.963	266741	4.544	2.29E+09
392.011	266428	5.779	2.95E+09
392.038	266250	7.122	3.68E+09
392.066	266072	8.727	4.58E+09
392.114	265761	8.584	4.73E+09
392.141	265584	7.905	4.12E+09
392.169	265407	6.870	3.55E+09
392.217	265099	5.021	2.55E+09
392.244	264923	5.021	2.55E+09
392.272	264772	5.155	2.62E+09
392.320	264465	5.300	2.70E+09
392.347	264290	6.279	3.23E+09
392.374	264115	7.521	3.51E+09
392.422	263806	10.633	5.68E+09
392.449	263628	11.490	6.17E+09
392.477	263450	11.680	6.29E+09
392.525	263137	10.796	5.78E+09
392.552	262958	8.551	4.50E+09
392.580	262779	8.217	4.32E+09
392.628	262465	7.905	4.15E+09
392.655	262284	8.058	4.24E+09
392.683	262104	8.058	4.24E+09
392.731	261788	9.922	5.31E+09
392.758	261581	10.407	5.61E+09
392.786	261400	10.634	5.75E+09
392.834	261084	10.796	5.85E+09
392.861	260904	10.639	5.76E+09
392.889	260724	10.795	5.86E+09
392.937	260410	11.690	6.39E+09
392.964	260231	13.046	7.21E+09
392.992	260052	14.772	8.25E+09
393.040	259742	16.484	9.31E+09
393.067	259565	16.029	9.03E+09
393.094	259389	15.181	8.52E+09
393.142	259081	12.685	7.02E+09
393.169	258904	10.960	6.00E+09
393.197	258727	10.960	6.00E+09
393.245	258419	10.638	5.82E+09
393.272	258268	12.078	6.66E+09
393.300	258092	13.741	7.66E+09
393.348	257785	20.520	1.18E+10
393.375	257609	24.871	1.46E+10
393.402	257434	28.545	1.70E+10
393.450	257124	25.123	1.48E+10
393.477	256946	22.060	1.23E+10
393.505	256768	18.217	1.04E+10
393.553	256455	14.574	8.19E+09
393.580	256275	14.772	8.31E+09
393.608	256096	14.772	8.31E+09
393.656	255781	16.029	9.08E+09
393.683	255601	17.200	9.81E+09
393.711	255420	20.790	1.20E+10
393.759	255079	22.979	1.34E+10
393.786	254900	23.878	1.40E+10
393.813	254721	23.633	1.37E+10
393.861	254407	23.406	1.37E+10
393.888	254227	23.406	1.37E+10
393.916	254048	24.124	1.42E+10
393.964	253734	26.670	1.58E+10
393.991	253555	27.471	1.63E+10
394.019	253377	26.933	1.60E+10
394.067	253067	25.123	1.48E+10
394.094	252891	23.633	1.39E+10
394.121	252715	22.530	1.32E+10
394.169	252407	20.790	1.21E+10
394.196	252230	21.314	1.24E+10
394.224	252054	22.298	1.30E+10
394.272	251773	29.089	1.74E+10
394.299	251598	36.855	2.25E+10
394.326	251424	46.870	2.95E+10
394.374	251116	49.138	3.11E+10
394.401	250938	42.070	2.61E+10
394.429	250761	34.806	2.11E+10
394.477	250449	25.890	1.53E+10
394.504	250271	23.633	1.39E+10
394.532	250092	23.406	1.37E+10
394.580	249780	24.620	1.45E+10
394.607	249602	27.471	1.63E+10
394.634	249424	31.927	1.92E+10
394.682	249110	41.743	2.58E+10
394.709	248929	45.110	2.82E+10
394.737	248749	46.514	2.92E+10
394.785	248420	42.070	2.60E+10
394.812	248241	38.930	2.39E+10
394.839	248061	37.445	2.29E+10
394.887	247747	38.334	2.35E+10
394.914	247568	38.930	2.39E+10
394.941	247388	41.417	2.56E+10
394.989	247072	42.731	2.65E+10
395.016	246891	43.065	2.67E+10
395.044	246710	42.400	2.63E+10
395.092	246394	39.229	2.41E+10
395.119	246215	39.229	2.41E+10
395.146	246035	42.070	2.60E+10
395.194	245719	50.236	3.17E+10
395.221	245538	58.121	3.74E+10
395.249	245357	69.985	4.61E+10
395.297	245041	83.973	5.66E+10
395.324	244862	82.582	5.55E+10
395.351	244682	70.928	4.68E+10
395.399	244366	53.989	3.44E+10
395.426	244185	46.870	2.93E+10
395.454	244004	43.401	2.69E+10
395.502	243688	42.731	2.65E+10
395.529	243509	47.228	2.96E+10
395.556	243329	53.989	3.44E+10
395.604	243013	75.677	5.02E+10
395.631	242832	93.415	6.36E+10
395.659	242651	100.222	6.88E+10
395.707	242335	95.995	6.55E+10
395.734	242156	87.643	5.91E+10
395.761	241976	78.673	5.24E+10
395.809	241660	67.493	4.41E+10
395.836	241479	66.136	4.31E+10
395.864	241298	66.136	4.31E+10
395.912	240982	71.912	4.73E+10
395.939	240803	78.673	5.23E+10
395.965	240623	81.903	5.47E+10
396.014	240307	86.141	5.78E+10
396.041	240126	86.141	5.78E+10
396.069	239945	85.407	5.72E+10
396.117	239629	89.188	6.00E+10
396.144	239450	97.715	6.65E+10
396.171	239270	99.905	6.81E+10
396.219	238954	124.078	8.69E+10
396.246	238773	134.356	9.51E+10
396.274	238579	131.710	9.29E+10
396.322	238265	101.476	6.91E+10
396.349	238086	95.135	6.43E+10
396.376	237908	91.696	6.17E+10
396.424	237596	79.934	5.29E+10
396.451	237419	81.903	5.43E+10
396.478	237242	89.578	6.03E+10
396.526	236931	115.365	7.96E+10
396.553	236753	139.797	9.89E+10
396.581	236575	174.159	1.27E+11
396.629	236266	184.289	1.35E+11
396.656	236091	184.289	1.35E+11
396.683	235916	160.845	1.16E+11
396.731	235609	124.078	8.62E+10
396.758	235458	115.365	7.95E+10
396.786	235282	103.518	7.03E+10
396.834	234973	108.610	7.42E+10
396.861	234796	115.365	7.94E+10
396.889	234619	131.710	9.22E+10
396.937	234310	142.629	1.01E+11
396.964	234134	151.473	1.08E+11
396.991	233957	148.467	1.05E+11
397.039	233647	154.539	1.10E+11
397.066	233470	160.845	1.15E+11
397.093	233292	160.845	1.15E+11
397.141	232979	184.289	1.34E+11
397.168	232799	200.555	1.48E+11
397.196	232619	203.831	1.50E+11
397.244	232303	203.831	1.50E+11
397.271	232111	177.633	1.28E+11
397.299	231932	170.742	1.23E+11
397.346	231616	139.797	9.78E+10
397.373	231435	134.356	9.35E+10
397.401	231254	139.797	9.77E+10
397.449	230938	170.742	1.22E+11
397.476	230758	200.555	1.47E+11
397.503	230579	217.015	1.60E+11
397.551	230263	247.027	1.85E+11
397.578	230082	282.305	2.15E+11
397.606	229901	278.070	2.11E+11
397.654	229583	225.874	1.67E+11
397.681	229402	207.116	1.51E+11
397.709	229221	197.286	1.43E+11
397.757	228891	184.289	1.33E+11
397.784	228710	190.772	1.38E+11
397.812	228529	200.555	1.46E+11
397.860	228215	215.972	1.58E+11
397.887	228037	217.015	1.59E+11
397.914	227859	225.874	1.66E+11
397.962	227547	215.972	1.58E+11
397.989	227368	229.274	1.69E+11
398.017	227190	222.523	1.63E+11
398.065	226880	239.776	1.77E+11
398.092	226704	266.029	1.99E+11
398.119	226528	269.979	2.02E+11
398.167	226221	282.305	2.12E+11
398.194	226047	296.547	2.16E+11
398.221	225872	266.029	1.98E+11
398.269	225591	225.674	1.65E+11
398.296	225414	215.972	1.57E+11
398.324	225238	203.831	1.47E+11
398.372	224930	222.523	1.62E+11
398.399	224754	254.478	1.88E+11
398.426	224579	282.305	2.11E+11
398.474	224265	333.653	2.54E+11
398.501	224090	368.424	2.84E+11
398.529	223912	381.574	2.95E+11
398.577	223600	359.691	2.76E+11
398.604	223422	329.337	2.50E+11
398.631	223244	325.027	2.46E+11
398.679	222931	303.582	2.28E+11
398.706	222753	299.313	2.24E+11
398.733	222573	316.429	2.39E+11
398.781	222234	329.337	2.49E+11
398.808	222055	359.691	2.75E+11
398.835	221877	346.641	2.64E+11
398.883	221563	312.140	2.34E+11
398.910	221383	316.429	2.38E+11
398.938	221204	325.027	2.45E+11
398.986	220892	364.054	2.77E+11
399.013	220716	395.142	3.04E+11
399.040	220539	444.778	3.46E+11
399.088	220229	564.054	4.49E+11
399.115	220052	679.815	5.50E+11
399.143	219875	638.793	5.13E+11
399.191	219567	476.503	3.72E+11
399.218	219393	439.632	3.40E+11
399.245	219218	385.971	2.94E+11
399.293	218937	368.424	2.79E+11
399.320	218760	409.608	3.14E+11
399.348	218524	455.191	3.52E+11
399.396	218275	630.881	5.03E+11
399.423	218099	817.486	6.67E+11
399.450	217923	878.689	7.21E+11
399.498	217614	788.197	6.40E+11
399.525	217437	741.334	5.98E+11
399.552	217260	797.863	6.48E+11
399.600	216948	623.067	4.94E+11
399.627	216768	646.803	5.15E+11
399.655	216588	679.815	5.43E+11
399.703	216274	705.596	5.65E+11
399.730	216094	696.905	5.57E+11
399.757	215902	630.881	5.00E+11
399.805	215587	515.358	4.00E+11
399.832	215406	487.402	3.76E+11
399.860	215224	481.532	3.72E+11
399.908	214909	560.000	4.38E+11
399.935	214729	745.000	5.97E+11
399.962	214549	1000.000	8.20E+11
400.010	214234	1000.000	8.19E+11
400.038	214052	1000.000	8.19E+11
400.065	213871	1000.000	8.18E+11
400.113	213556	1000.000	8.17E+11
400.140	213376	1000.000	8.17E+11
400.167	213196	1000.000	8.17E+11
400.215	212881	1000.000	8.16E+11
400.243	212699	1000.000	8.15E+11
400.270	212518	1000.000	8.15E+11
400.318	212203	1000.000	8.14E+11
400.345	212023	1000.000	8.13E+11
400.372	211843	1000.000	8.13E+11
400.420	211529	1000.000	8.12E+11
400.447	211350	1000.000	8.12E+11
400.474	211170	1000.000	8.11E+11
400.522	210855	1000.000	8.10E+11
400.549	210673	1000.000	8.10E+11
400.577	210492	1000.000	8.10E+11
400.625	210176	1000.000	8.09E+11
400.652	209997	1000.000	8.08E+11
400.679	209817	1000.000	8.08E+11
400.727	209503	1000.000	8.07E+11
400.754	209324	1000.000	8.07E+11
400.781	209144	1000.000	8.06E+11
400.829	208830	1000.000	8.05E+11
400.856	208650	1000.000	8.05E+11
400.883	208471	1000.000	8.05E+11
400.931	208155	1000.000	8.04E+11
400.958	207974	1000.000	8.03E+11
400.986	207793	1000.000	8.03E+11
401.034	207475	1000.000	8.02E+11
401.061	207294	1000.000	8.02E+11
401.089	207113	1000.000	8.01E+11
401.137	206797	1000.000	8.01E+11
401.164	206618	1000.000	8.00E+11
401.191	206438	1000.000	8.00E+11
401.239	206122	1000.000	7.99E+11
401.266	205941	1000.000	7.99E+11
401.294	205760	1000.000	7.99E+11
401.342	205444	1000.000	7.98E+11
401.369	205265	1000.000	7.98E+11
401.396	205085	1000.000	7.98E+11
401.444	204769	1000.000	7.97E+11
401.471	204588	1000.000	7.96E+11
401.499	204407	1000.000	7.96E+11
401.547	204091	1000.000	7.95E+11
401.574	203912	1000.000	7.95E+11
401.601	203732	1000.000	7.94E+11
401.649	203418	1000.000	7.93E+11
401.676	203238	1000.000	7.93E+11
401.703	203059	1000.000	7.92E+11
401.751	202731	1000.000	7.91E+11
401.779	202550	1000.000	7.90E+11
401.806	202369	1000.000	7.90E+11
401.854	202053	1000.000	7.89E+11
401.881	201873	1000.000	7.88E+11
401.909	201693	1000.000	7.88E+11
401.957	201381	1000.000	7.87E+11
401.984	201204	1000.000	7.87E+11
402.011	201027	1000.000	7.86E+11
402.059	200718	1000.000	7.86E+11
402.086	200542	1000.000	7.85E+11
402.113	200367	1000.000	7.85E+11
402.161	200058	1000.000	7.84E+11
402.189	199882	1000.000	7.84E+11
402.216	199706	1000.000	7.84E+11
402.264	199424	1000.000	7.83E+11
402.291	199250	1000.000	7.83E+11
402.318	199075	1000.000	7.83E+11
402.366	198767	1000.000	7.83E+11
402.394	198590	1000.000	7.82E+11
402.421	198412	1000.000	7.82E+11
402.469	198103	1000.000	7.82E+11
402.496	197926	1000.000	7.81E+11
402.523	197749	1000.000	7.81E+11
402.571	197439	1000.000	7.81E+11
402.599	197261	1000.000	7.81E+11
402.625	197083	1000.000	7.81E+11
402.673	196769	1000.000	7.80E+11
402.700	196589	1000.000	7.80E+11
402.728	196408	1000.000	7.80E+11
402.776	196067	1000.000	7.80E+11
402.803	195888	1000.000	7.80E+11
402.830	195709	1000.000	7.80E+11
402.878	195396	1000.000	7.80E+11
402.905	195216	1000.000	7.80E+11
402.933	195037	1000.000	7.80E+11
402.981	194723	1000.000	7.80E+11
403.008	194545	1000.000	7.80E+11
403.036	194366	1000.000	7.79E+11
403.084	194057	1000.000	7.79E+11
403.111	193881	1000.000	7.79E+11
403.138	193706	1000.000	7.79E+11
403.186	193398	1000.000	7.79E+11
403.213	193221	1000.000	7.79E+11
403.241	193045	1000.000	7.79E+11
403.289	192764	1000.000	7.80E+11
403.316	192589	1000.000	7.80E+11
403.343	192414	1000.000	7.80E+11
403.391	192106	1000.000	7.80E+11
403.418	191928	1000.000	7.80E+11
403.446	191751	1000.000	7.80E+11
403.494	191439	1000.000	7.80E+11
403.521	191260	1000.000	7.80E+11
403.549	191081	1000.000	7.80E+11
403.597	190767	1000.000	7.79E+11
403.624	190588	1000.000	7.79E+11
403.652	190408	1000.000	7.79E+11
403.700	190093	1000.000	7.79E+11
403.727	189914	1000.000	7.79E+11
403.754	189710	1000.000	7.79E+11
403.802	189395	1000.000	7.79E+11
403.829	189214	1000.000	7.79E+11
403.857	189034	1000.000	7.79E+11
403.905	188719	1000.000	7.79E+11
403.932	188540	1000.000	7.79E+11
403.960	188361	1000.000	7.79E+11
404.008	188048	1000.000	7.79E+11
404.035	187870	1000.000	7.79E+11
404.063	187692	1000.000	7.79E+11
404.111	187382	1000.000	7.79E+11
404.138	187207	1000.000	7.79E+11
404.165	187032	1000.000	7.79E+11
404.213	186724	1000.000	7.79E+11
404.240	186548	1000.000	7.79E+11
404.268	186397	1000.000	7.79E+11
404.316	186097	1000.000	7.79E+11
404.343	185912	1000.000	7.79E+11
404.371	185735	1000.000	7.79E+11
404.419	185426	1000.000	7.79E+11
404.446	185250	1000.000	7.79E+11
404.473	185074	1000.000	7.79E+11
404.521	184763	1000.000	7.79E+11
404.548	184584	1000.000	7.80E+11
404.576	184405	1000.000	7.80E+11
404.624	184092	1000.000	7.80E+11
404.651	183914	1000.000	7.80E+11
404.678	183735	1000.000	7.80E+11
404.726	183421	1000.000	7.80E+11
404.753	183227	1000.000	7.80E+11
404.781	183046	1000.000	7.81E+11
404.829	182730	1000.000	7.81E+11
404.856	182550	1000.000	7.81E+11
404.883	182371	1000.000	7.81E+11
404.931	182055	1000.000	7.81E+11
404.958	181874	1000.000	7.81E+11
404.986	181693	1000.000	7.81E+11
405.034	181375	1000.000	7.81E+11
405.061	181194	1000.000	7.82E+11
405.089	181013	1000.000	7.82E+11
405.137	180696	1000.000	7.82E+11
405.164	180514	1000.000	7.82E+11
405.192	180333	1000.000	7.82E+11
405.240	180016	1000.000	7.82E+11
405.267	179822	1000.000	7.82E+11
405.295	179641	1000.000	7.82E+11
405.343	179327	1000.000	7.82E+11
405.370	179148	1000.000	7.82E+11
405.397	178970	1000.000	7.83E+11
405.445	178658	1000.000	7.83E+11
405.472	178479	1000.000	7.83E+11
405.500	178300	1000.000	7.83E+11
405.549	177988	1000.000	7.83E+11
405.575	177810	1000.000	7.83E+11
405.603	177633	1000.000	7.83E+11
405.651	177323	1000.000	7.83E+11
405.678	177146	1000.000	7.83E+11
405.706	176970	1000.000	7.84E+11
405.754	176662	1000.000	7.84E+11
405.781	176486	1000.000	7.84E+11
405.809	176311	1000.000	7.84E+11
405.857	176006	1000.000	7.84E+11
405.884	175833	1000.000	7.84E+11
405.911	175661	1000.000	7.84E+11
405.959	175358	1000.000	7.84E+11
405.986	175185	1000.000	7.85E+11

(a) 1 meter = 0.3048 feet

APPENDIX B – Concluded

TABULATIONS OF CURRENT AND INFERRED ELECTRON DENSITY FOR RAM C-II, PROBE 8

ELAPSED TIME, SECONDS	ALTITUDE, FEET (a)	CURRENT, MICROAMPS	ELECTRON DENSITY, ELECTRONS PER CUBIC CENTIMETER
389.756	281173	.100	5.01E+07
389.783	280999	.180	9.00E+07
389.811	280824	.260	1.30E+08
389.858	280516	.220	1.10E+08
389.886	280339	.160	8.00E+07
389.913	280161	.290	1.45E+08
389.961	279850	.110	5.50E+07
389.989	279672	.120	6.00E+07
390.016	279493	.120	6.00E+07
390.064	279182	.140	6.99E+07
390.091	279004	.240	1.20E+08
390.119	278826	.420	2.09E+08
390.166	278514	.540	2.69E+08
390.193	278335	.600	2.99E+08
390.221	278156	.640	3.19E+08
390.268	277828	.444	2.21E+08
390.296	277647	.501	2.49E+08
390.323	277466	.450	2.24E+08
390.371	277150	.385	1.91E+08
390.398	276971	.461	2.29E+08
390.426	276791	.480	2.39E+08
390.473	276475	.522	2.60E+08
390.501	276294	.610	3.03E+08
390.528	276113	.694	3.44E+08
390.577	275790	.546	2.71E+08
390.606	275603	.714	3.54E+08
390.634	275417	70.451	4.58E+10
390.681	275106	.163	8.11E+07
390.707	274936	.128	6.37E+07
390.733	274765	100.222	6.92E+10
390.779	274443	1.090	5.40E+08
390.807	274262	1.170	5.80E+08
390.834	274082	1.090	5.40E+08
390.882	273768	.840	4.17E+08
390.909	273591	.900	4.46E+08
390.937	273413	.860	4.26E+08
390.984	273103	.930	4.61E+08
391.011	272926	1.210	5.99E+08
391.039	272749	1.470	7.27E+08
391.086	272435	2.570	1.26E+09
391.114	272262	3.500	1.71E+09
391.141	272085	4.200	2.06E+09
391.189	271777	3.150	1.54E+09
391.216	271603	2.280	1.12E+09
391.244	271428	1.960	9.66E+08
391.292	271142	1.710	8.43E+08
391.321	270960	1.840	9.06E+08
391.349	270778	2.130	1.05E+09
391.397	270464	2.316	1.14E+09
391.425	270287	2.799	1.37E+09
391.452	270109	3.168	1.55E+09
391.500	269797	4.319	2.12E+09
391.528	269618	4.095	2.00E+09
391.555	269439	3.838	1.87E+09
391.603	269127	4.151	2.03E+09
391.630	268949	4.431	2.18E+09
391.658	268771	3.934	1.92E+09
391.705	268456	4.769	2.35E+09
391.733	268275	4.896	2.42E+09
391.760	268069	4.958	2.45E+09
391.808	267752	4.895	2.42E+09
391.836	267572	4.769	2.35E+09
391.863	267392	4.375	2.15E+09
391.911	267077	4.431	2.18E+09
391.939	266858	4.713	2.33E+09
391.966	266719	5.441	2.70E+09
392.014	266406	7.521	3.81E+09
392.042	266228	9.922	5.12E+09
392.069	266050	11.490	5.99E+09
392.117	265739	11.690	6.11E+09
392.145	265562	10.403	5.40E+09
392.172	265385	8.551	4.38E+09
392.220	265077	6.504	3.29E+09
392.248	264901	5.962	3.01E+09
392.275	264750	5.779	2.92E+09
392.323	264443	6.748	3.44E+09
392.350	264268	7.521	3.86E+09
392.378	264093	9.747	5.09E+09
392.425	263783	13.741	7.37E+09
392.453	263605	15.181	8.21E+09
392.480	263427	14.379	7.75E+09
392.528	263115	13.046	6.99E+09
392.556	262936	10.560	5.81E+09
392.583	262757	10.795	5.72E+09
392.631	262442	10.091	5.33E+09
392.659	262262	10.091	5.34E+09
392.686	262081	10.796	5.74E+09
392.734	261765	11.876	6.37E+09
392.762	261559	12.501	6.74E+09
392.789	261378	12.501	6.75E+09
392.837	261062	13.046	7.08E+09
392.865	260882	12.685	6.87E+09
392.892	260702	13.398	7.29E+09
392.940	260388	14.574	7.99E+09
392.968	260209	16.719	9.27E+09
392.995	260030	18.751	1.05E+10
393.043	259720	22.530	1.28E+10
393.070	259543	21.568	1.22E+10
393.098	259368	19.964	1.13E+10
393.145	259059	14.974	8.27E+09
393.173	258882	13.570	7.44E+09
393.200	258705	13.223	7.24E+09
393.248	258397	13.046	7.14E+09
393.276	258246	14.379	7.92E+09
393.303	258070	17.955	1.01E+10
393.351	257763	27.471	1.59E+10
393.378	257587	38.632	2.31E+10
393.406	257412	38.334	2.29E+10
393.453	257102	30.756	1.80E+10
393.481	256924	26.148	1.51E+10
393.508	256745	22.299	1.27E+10
393.556	256432	18.751	1.06E+10
393.584	256253	17.448	9.78E+09
393.611	256073	19.677	1.11E+10
393.659	255758	21.569	1.23E+10
393.687	255578	23.633	1.36E+10
393.714	255397	26.408	1.53E+10
393.762	255057	29.917	1.75E+10
393.789	254878	29.639	1.73E+10
393.817	254699	29.089	1.70E+10
393.864	254385	28.005	1.63E+10
393.892	254205	28.545	1.66E+10
393.919	254025	29.639	1.73E+10
393.967	253712	31.642	1.86E+10
393.995	253533	33.072	1.95E+10
394.022	253355	32.499	1.91E+10
394.070	253045	29.639	1.73E+10
394.097	252869	28.545	1.66E+10
394.125	252693	26.408	1.53E+10
394.172	252385	25.633	1.48E+10
394.200	252208	25.377	1.47E+10
394.227	252032	26.670	1.55E+10
394.275	251751	37.445	2.23E+10
394.302	251577	46.160	2.81E+10
394.330	251402	63.497	4.02E+10
394.377	251093	57.727	3.61E+10
394.405	250916	48.774	2.99E+10
394.432	250738	39.820	2.39E+10
394.480	250427	29.917	1.75E+10
394.508	250248	27.471	1.59E+10
394.535	250070	26.933	1.56E+10
394.583	249758	29.639	1.73E+10
394.610	249580	33.360	1.96E+10
394.638	249402	39.820	2.38E+10
394.685	249088	51.721	3.18E+10
394.713	248907	55.917	3.47E+10
394.740	248726	56.307	3.50E+10
394.788	248398	50.236	3.08E+10
394.815	248218	45.458	2.75E+10
394.843	248039	43.401	2.62E+10
394.890	247725	45.110	2.73E+10
394.917	247545	46.514	2.82E+10
394.945	247366	49.138	3.00E+10
394.992	247050	50.605	3.10E+10
395.020	246868	52.095	3.20E+10
395.047	246687	50.236	3.07E+10
395.095	246372	46.870	2.84E+10
395.122	246192	46.160	2.80E+10
395.150	246013	51.348	3.14E+10
395.197	245697	60.957	3.80E+10
395.225	245515	71.912	4.57E+10
395.252	245334	87.643	5.69E+10
395.300	245019	99.905	6.58E+10
395.327	244839	95.995	6.30E+10
395.355	244660	81.236	5.23E+10
395.402	244344	62.214	3.89E+10
395.430	244162	54.371	3.35E+10
395.457	243981	51.348	3.14E+10
395.505	243666	50.605	3.09E+10
395.532	243486	55.917	3.45E+10
395.560	243307	66.136	4.16E+10
395.607	242991	94.275	6.15E+10
395.635	242809	119.391	8.01E+10
395.662	242628	151.473	1.05E+11
395.710	242313	115.365	7.69E+10
395.737	242133	99.905	6.55E+10
395.765	241954	88.410	5.72E+10
395.812	241638	78.673	5.03E+10
395.840	241456	75.108	4.77E+10
395.867	241275	76.845	4.89E+10
395.915	240960	85.407	5.50E+10
395.942	240780	88.410	5.71E+10
395.970	240601	93.415	6.07E+10
396.017	240285	96.855	6.31E+10
396.045	240103	98.574	6.43E+10
396.072	239922	98.574	6.43E+10
396.120	239607	100.222	6.54E+10
396.147	239427	103.518	6.78E+10
396.175	239248	124.078	8.30E+10
396.222	238932	160.845	1.11E+11
396.250	238750	170.742	1.19E+11
396.277	238557	148.467	1.01E+11
396.325	238242	124.078	8.28E+10
396.352	238064	106.169	6.95E+10
396.380	237885	95.995	6.22E+10
396.427	237574	92.556	5.97E+10
396.454	237397	93.415	6.03E+10
396.482	237220	101.426	6.59E+10
396.529	236909	139.797	9.43E+10
396.557	236731	160.845	1.10E+11
396.584	236553	217.015	1.54E+11
396.632	236244	219.222	1.56E+11
396.659	236069	217.015	1.54E+11
396.687	235894	187.527	1.31E+11
396.734	235587	137.052	9.20E+10
396.762	235436	129.116	8.61E+10
396.789	235260	137.052	9.20E+10
396.837	234951	126.571	8.41E+10
396.865	234774	137.052	9.19E+10
396.892	234597	151.473	1.03E+11
396.940	234288	157.662	1.07E+11
396.967	234112	170.742	1.17E+11
396.995	233935	174.159	1.20E+11
397.042	233625	174.159	1.20E+11
397.069	233448	177.633	1.22E+11
397.097	233270	177.633	1.22E+11
397.144	232957	200.595	1.40E+11
397.172	232777	215.972	1.52E+11
397.199	232596	229.274	1.63E+11
397.247	232281	215.972	1.52E+11
397.274	232089	203.831	1.42E+11
397.302	231909	184.289	1.27E+11
397.349	231594	157.662	1.07E+11
397.377	231412	157.662	1.07E+11
397.404	231231	160.845	1.09E+11
397.452	230915	194.025	1.34E+11
397.479	230736	213.707	1.50E+11
397.507	230556	236.226	1.67E+11
397.554	230241	325.027	2.38E+11
397.582	230059	342.305	2.52E+11
397.609	229878	320.725	2.34E+11
397.657	229561	243.377	1.72E+11
397.685	229379	219.222	1.53E+11
397.712	229198	207.116	1.44E+11
397.760	228868	210.407	1.47E+11
397.788	228687	200.555	1.39E+11
397.815	228507	217.015	1.52E+11
397.863	228193	222.523	1.56E+11
397.890	228015	236.226	1.66E+11
397.918	227837	232.725	1.64E+11
397.965	227525	232.725	1.63E+11
397.993	227346	229.274	1.61E+11
398.020	227167	239.775	1.69E+11
398.068	226858	262.128	1.86E+11
398.095	226682	278.070	1.99E+11
398.123	226506	286.547	2.05E+11
398.170	226199	329.337	2.39E+11
398.197	226025	303.582	2.19E+11
398.225	225850	295.051	2.12E+11
398.272	225569	254.478	1.80E+11
398.300	225392	232.725	1.63E+11
398.327	225216	217.015	1.51E+11
398.375	224908	247.027	1.74E+11
398.402	224732	273.979	1.95E+11
398.430	224557	286.547	2.04E+11
398.477	224246	364.054	2.66E+11
398.505	224068	471.114	3.53E+11
398.532	223889	571.090	4.35E+11
398.580	223577	481.932	3.61E+11
398.607	223400	414.511	3.06E+11
398.635	223221	381.574	2.79E+11
398.682	222909	350.984	2.55E+11
398.709	222730	355.334	2.58E+11
398.737	222551	346.641	2.51E+11
398.784	222212	368.424	2.68E+11
398.811	222033	368.424	2.68E+11
398.839	221854	385.971	2.82E+11
398.886	221541	364.054	2.65E+11
398.914	221361	350.984	2.54E+11
398.941	221182	359.691	2.61E+11
398.989	220870	390.402	2.85E+11
399.016	220692	429.462	3.16E+11
399.044	220517	538.451	4.05E+11
399.119	220030	943.399	7.42E+11
399.146	219853	732.254	5.64E+11
399.194	219545	455.191	3.36E+11
399.221	219371	409.608	3.00E+11
399.249	219196	355.334	2.56E+11
399.296	218915	368.424	2.66E+11
399.324	218738	381.574	2.77E+11
399.351	218561	399.924	2.91E+11
399.399	218253	460.459	3.39E+11
399.426	218077	550.275	4.12E+11
399.454	217901	600.207	4.52E+11
399.501	217592	600.207	4.52E+11
399.528	217415	544.325	4.06E+11
399.556	217238	509.685	3.78E+11
399.603	216925	515.358	3.82E+11
399.631	216746	487.402	3.60E+11
399.658	216565	504.054	3.73E+11
399.706	216251	521.073	3.87E+11
399.733	216072	532.617	3.96E+11
399.761	215880	487.402	3.59E+11
399.808	215564	449.964	3.29E+11
399.836	215383	434.527	3.17E+11
399.863	215202	434.527	3.17E+11
399.911	214886	490.000	3.61E+11
399.938	214707	520.000	3.85E+11
399.966	214527	600.000	4.49E+11
400.013	214211	1000.000	7.78E+11
400.041	214030	1000.000	7.77E+11
400.068	213849	1000.000	7.77E+11
400.116	213533	895.000	6.89E+11
400.143	213354	750.000	5.70E+11
400.171	213174	620.000	4.64E+11
400.218	212858	570.000	4.24E+11
400.246	212677	585.000	4.36E+11
400.273	212496	670.000	5.04E+11
400.321	212180	770.000	5.85E+11
400.348	212001	975.000	7.53E+11
400.376	211821	1000.000	7.73E+11
400.423	211507	1000.000	7.73E+11
400.450	211327	1000.000	7.73E+11
400.478	211148	1000.000	7.72E+11
400.525	210832	1000.000	7.72E+11
400.553	210651	1000.000	7.71E+11
400.580	210469	1000.000	7.71E+11
400.628	210154	1000.000	7.71E+11
400.655	209974	1000.000	7.70E+11
400.683	209795	1000.000	7.70E+11
400.730	209481	1000.000	7.70E+11
400.757	209301	1000.000	7.70E+11
400.785	209122	1000.000	7.69E+11
400.832	208807	1000.000	7.69E+11
400.859	208628	1000.000	7.69E+11
400.887	208448	1000.000	7.68E+11
400.934	208133	1000.000	7.68E+11
400.962	207951	1000.000	7.68E+11
400.989	207770	1000.000	7.67E+11
401.037	207453	1000.000	7.67E+11
401.065	207271	1000.000	7.67E+11
401.092	207090	1000.000	7.66E+11
401.140	206775	1000.000	7.66E+11
401.167	206595	1000.000	7.65E+11
401.195	206416	1000.000	7.65E+11
401.242	206100	1000.000	7.65E+11
401.270	205918	1000.000	7.64E+11
401.297	205737	1000.000	7.63E+11
401.345	205422	1000.000	7.63E+11
401.372	205242	1000.000	7.63E+11
401.400	205063	1000.000	7.62E+11
401.447	204747	1000.000	7.62E+11
401.475	204565	1000.000	7.62E+11
401.502	204384	1000.000	7.61E+11
401.550	204069	1000.000	7.61E+11
401.577	203889	1000.000	7.61E+11
401.605	203710	1000.000	7.61E+11
401.652	203395	1000.000	7.60E+11
401.679	203216	1000.000	7.60E+11
401.707	203036	1000.000	7.60E+11
401.754	202708	1000.000	7.60E+11
401.782	202527	1000.000	7.60E+11
401.809	202346	1000.000	7.59E+11
401.857	202031	1000.000	7.59E+11
401.885	201851	1000.000	7.59E+11
401.912	201671	1000.000	7.59E+11
401.960	201359	1000.000	7.59E+11
401.987	201182	1000.000	7.59E+11
402.015	201005	1000.000	7.59E+11
402.062	200696	1000.000	7.58E+11
402.089	200520	1000.000	7.58E+11
402.117	200345	1000.000	7.58E+11
402.164	200036	1000.000	7.58E+11
402.192	199860	1000.000	7.58E+11
402.219	199684	1000.000	7.58E+11
402.267	199402	1000.000	7.58E+11
402.294	199228	1000.000	7.58E+11
402.322	199053	1000.000	7.58E+11
402.369	198745	1000.000	7.58E+11
402.397	198568	1000.000	7.58E+11
402.424	198390	1000.000	7.58E+11
402.472	198081	1000.000	7.58E+11
402.499	197904	1000.000	7.58E+11
402.527	197727	1000.000	7.58E+11
402.574	197417	1000.000	7.58E+11
402.601	197239	1000.000	7.58E+11
402.629	197061	1000.000	7.58E+11
402.676	196747	1000.000	7.58E+11
402.704	196566	1000.000	7.58E+11
402.731	196385	1000.000	7.58E+11
402.779	196045	1000.000	7.58E+11
402.806	195866	1000.000	7.58E+11
402.834	195687	1000.000	7.58E+11
402.881	195373	1000.000	7.58E+11
402.909	195194	1000.000	7.58E+11
402.936	195014	1000.000	7.58E+11
402.984	194701	1000.000	7.58E+11
403.012	194522	1000.000	7.58E+11
403.039	194344	1000.000	7.58E+11
403.087	194035	1000.000	7.58E+11
403.114	193859	1000.000	7.58E+11
403.142	193694	1000.000	7.58E+11
403.189	193376	1000.000	7.58E+11
403.217	193199	1000.000	7.58E+11
403.244	193023	1000.000	7.58E+11
403.292	192742	1000.000	7.58E+11
403.319	192567	1000.000	7.58E+11
403.347	192392	1000.000	7.58E+11
403.394	192084	1000.000	7.58E+11
403.422	191906	1000.000	7.58E+11
403.449	191728	1000.000	7.58E+11
403.497	191416	1000.000	7.58E+11
403.525	191238	1000.000	7.58E+11
403.552	191059	1000.000	7.59E+11
403.600	190745	1000.000	7.59E+11
403.628	190565	1000.000	7.59E+11
403.655	190385	1000.000	7.59E+11
403.703	190071	1000.000	7.59E+11
403.730	189892	1000.000	7.59E+11
403.758	189687	1000.000	7.59E+11
403.805	189372	1000.000	7.59E+11
403.833	189192	1000.000	7.59E+11
403.860	189011	1000.000	7.59E+11
403.908	188697	1000.000	7.60E+11
403.936	188517	1000.000	7.60E+11
403.963	188338	1000.000	7.60E+11
404.011	188025	1000.000	7.60E+11
404.039	187847	1000.000	7.60E+11
404.066	187669	1000.000	7.60E+11
404.114	187360	1000.000	7.60E+11
404.141	187185	1000.000	7.61E+11
404.169	187010	1000.000	7.61E+11
404.216	186702	1000.000	7.61E+11
404.244	186526	1000.000	7.61E+11
404.271	186375	1000.000	7.61E+11
404.319	186067	1000.000	7.61E+11
404.347	185890	1000.000	7.61E+11
404.374	185713	1000.000	7.62E+11
404.422	185404	1000.000	7.62E+11
404.449	185229	1000.000	7.62E+11
404.477	185052	1000.000	7.62E+11
404.524	184741	1000.000	7.62E+11
404.552	184562	1000.000	7.62E+11
404.579	184393	1000.000	7.62E+11
404.627	184070	1000.000	7.63E+11
404.654	183892	1000.000	7.63E+11
404.682	183713	1000.000	7.63E+11
404.729	183398	1000.000	7.63E+11
404.757	183204	1000.000	7.63E+11
404.784	183023	1000.000	7.63E+11
404.832	182707	1000.000	7.64E+11
404.859	182528	1000.000	7.64E+11
404.887	182348	1000.000	7.64E+11
404.934	182033	1000.000	7.64E+11
404.962	181951	1000.000	7.64E+11
404.989	181670	1000.000	7.64E+11
405.037	181353	1000.000	7.65E+11
405.065	181171	1000.000	7.65E+11
405.092	180990	1000.000	7.65E+11
405.140	180673	1000.000	7.65E+11
405.168	180492	1000.000	7.65E+11
405.195	180310	1000.000	7.65E+11
405.243	179993	1000.000	7.66E+11
405.271	179799	1000.000	7.66E+11
405.298	179619	1000.000	7.66E+11
405.346	179304	1000.000	7.66E+11
405.373	179126	1000.000	7.66E+11
405.401	178948	1000.000	7.66E+11
405.448	178635	1000.000	7.67E+11
405.476	178457	1000.000	7.67E+11
405.503	178279	1000.000	7.67E+11
405.551	177966	1000.000	7.67E+11
405.579	177788	1000.000	7.68E+11
405.606	177611	1000.000	7.68E+11
405.654	177301	1000.000	7.68E+11
405.682	177124	895.000	6.83E+11
405.709	176948	1000.000	7.68E+11
405.757	176640	1000.000	7.69E+11
405.785	176464	1000.000	7.69E+11
405.812	176289	1000.000	7.69E+11
405.860	175985	1000.000	7.69E+11
405.887	175812	1000.000	7.70E+11
405.915	175639	1000.000	7.70E+11
405.962	175337	1000.000	7.70E+11
405.990	175163	1000.000	7.70E+11

(a) 1 meter = 0.3048 feet

APPENDIX C

ANALYSIS OF SPACECRAFT MOTIONS AND WIND ANGLES

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The spacecraft axis system employed and its relation to the wind axis are illustrated in figure 41.

The rate gyro data show coning of the RAM C-I and C-II spacecraft after separation of the expended fourth-stage motors, but the very low dynamic pressures and resulting low accelerations did not permit accurate determinations of the spacecraft wind angles from accelerometer data. Coning of the spacecraft was also indicated by the cyclic variations in the electrostatic probe-measured electron densities observed during both flights. Figure 42 shows the correlation of measured normal aerodynamic acceleration with variations in electron densities measured by probe 1 on RAM C-II during the last few seconds before probe-rake retraction. Figure 43 shows that the electrostatic probe rake was in the same plane as the measured normal acceleration, and thus the correlation of figure 42 suggests that the cyclic variations in measured electron densities were due to displacements of the probe rake from the wind axis in the angle-of-attack (α) plane. The variations were generally symmetrical; this symmetry further suggest that the average value of the electron densities corresponded to the zero-angle-of-attack case.

Determination of Wind Angles

Prior to separation of the fourth-stage motors, the RAM C-I and C-II spacecraft had roll momenta only with the X-axes fixed in direction. The separation impulses produced uniform coning (precession) of the X-axes about the total angular momentum vectors. The motion is illustrated in figure 44, and the equations which describe it are

$$L = I_l \omega_l \tag{C1}$$

$$\tan \theta = \frac{I_l \omega_l}{I_X p} \tag{C2}$$

$$\nu_H = \frac{I_X p}{I_l \cos \theta} \frac{1}{2\pi} \tag{C3}$$

$$\nu_b = \frac{I_X - I_l}{I_l} \frac{p}{2\pi} \tag{C4}$$

Values computed by these equations for both flights are given in table V. The preflight-measured moments of inertia and the flight-measured rotation rates are given in table VI. It can be seen from figures 41 and 44 that for the case of $\eta_0 = 0$ (X-axes initially alined with velocity vectors), the total wind angles will describe the cones of half-angle θ. Thus the absolute change in the total wind angle $(|\Delta\eta|)$ is given by 2θ.

To study the spacecraft motions further, a computer-programed set of equations for the angular motions of a rigid body was employed. At about 380 seconds, short-duration (0.01 second) angular impulses were applied; these impulses produced matchups of the gyro-measured lateral rotation rates. Total wind angle was set to zero $(\eta_0 = 0)$. Figure 45 shows the comparisons of the measured and program-computed spacecraft rotation rates. The required impulses were

L = 3.93 N-m-sec (2.9 lb-ft-sec) (RAM C-I)

L = 3.25 N-m-sec (2.4 lb-ft-sec) (RAM C-II)

These values are in good agreement with the impulses computed by equation (C1). (See table V.) Figure 45 shows that both the magnitudes and frequencies of the rotation rates are closely matched. The frequencies are identical with the values of ν_b given in table V.

Figure 46 shows the histories of the program-computed values of the wind angles for the computer runs which produced the matchup in rotation rates. These values are not the actual histories of the in-flight wind angles. They do represent the characteristic trends, and the frequencies and absolute variations in the angles should closely approximate those in flight. Note that the maximum values of η are twice the values of the cone angles θ in table V and that the frequencies of η are identical to those listed for ν_H in table V. The component wind angles (α,β) are seen to have variations approximately equal to $\pm 2\theta$ because the spacecraft is rolling on the surface of the precession cone as illustrated in figure 44. If it is assumed that the velocity vectors were alined with the spacecraft X-axes at stage separations, the variations in η were

$0 \leqq \eta \leqq 5^o$ (for RAM C-I)

$0 \leqq \eta \leqq 4^o$ (for RAM C-II)

and the peak-to-peak variations in the component wind angles were

$\alpha,\beta = \pm 5^o$ (for RAM C-I)

$\alpha,\beta = \pm 4^o$ (for RAM C-II)

APPENDIX C – Concluded

Summary of Wind-Angle Analysis

Cyclic changes in the measured electron densities were shown to be due to the displacements of the electrostatic probe from the wind axis in the angle-of-attack (α) plane. Peak-to-peak variations in the densities were produced by variations in angle of attack of $\alpha = \pm 5^{o}$ (for RAM C-I) and $\alpha = \pm 4^{o}$ (for RAM C-II). The symmetry of the density variation suggests that the average values corresponded to the case where $\alpha = 0$.

REFERENCES

1. Bachynski, M. P.: Electromagnetic Wave Penetration of Reentry Plasma Sheaths. Radio Sci., J. Res. NBS, vol. 69D, no. 2, Feb. 1965, pp. 147-154.

2. Anon.: Proceedings of the NASA Conference on Communicating Through Plasmas of Atmospheric Entry and Rocket Exhaust. NASA SP-52, 1964.

3. Akey, Norman D.: Overview of RAM Reentry Measurement Program. The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems, Vol. I, NASA SP-252, 1970, pp. 19-31.

4. Jones, William Linwood, Jr.: Probe Measurements of Electron Density Profiles During a Blunt-Body Reentry. Ph. D. Thesis, Virginia Polytechnic Inst. & State Univ., June 1971.

5. Jones, W. Linwood, Jr.; and Cross, Aubrey E.: Electrostatic Probe Measurements of Plasma Surrounding Three 25 000 Foot Per Second Reentry Flight Experiments. The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems, Vol. I, NASA SP-252, 1970, pp. 109-136.

6. Akey, Norman D.; and Cross, Aubrey E. (With appendix A by Thomas G. Campbell; appendix B by Fred B. Beck; and appendix C by W. Linwood Jones, Jr.): Radio Blackout Alleviation and Plasma Diagnostic Results From a 25 000 Foot Per Second Blunt-Body Reentry. NASA TN D-5615, 1970.

7. Grantham, William L.: Flight Results of a 25 000-Foot-Per-Second Reentry Experiment Using Microwave Reflectometers To Measure Plasma Electron Density and Standoff Distance. NASA TN D-6062, 1970.

8. Sutton, Kenneth; Zoby, Ernest V.; and Butler, David H.: An Evaluation Test of a Full-Scale Replica of the RAM-CA Flight Heat Shield in a Rocket-Engine Exhaust. NASA TM X-1841, 1969.

9. Schexnayder, Charles J., Jr.; Huber, Paul W.; and Evans, John S.: Calculation of Electron Concentration for a Blunt Body at Orbital Speeds and Comparison With Experimental Data. NASA TN D-6294, 1971.

10. Swift, C. T.; Gooderum, P. B.; and Castellow, S. L., Jr.: Experimental Investigation of a Plasma Covered, Axially Slotted Cylinder Antenna. IEEE Trans. Antennas Propagation, vol. AP-17, no. 5, Sept. 1969, pp. 598-605.

11. Croswell, William F.; and Jones, W. Linwood, Jr.: Effects of Reentry Plasma on RAM C-I VHF Telemetry Antennas. The Entry Plasma Sheath and Its Effects on Space Vehicle Electromagnetic Systems, Vol. I, NASA SP-252, 1970, pp. 183-201.

12. Scharfman, W. E.: The Use of Langmuir Probes To Determine the Electron Density Surrounding Re-Entry Vehicles. SRI Project 5034 (Contract NAS 1-3942), Stanford Res. Inst., June 1965.

13. Scharfman, W. E.; and Bredfeldt, H. R.: Use of the Langmuir Probe To Determine the Electron Density and Temperature Surrounding Re-Entry Vehicles. SRI Project 5771 (Contract NAS 1-4872), Stanford Res. Inst., Dec. 1966. (Available as NASA CR-66275.)

14. Hok, Gunnar; Spencer, N. W.; Reifman, A.; and Dow, W. G.: Dynamic Probe Measurements in the Ionosphere. AFCRC TN-58-616, U.S. Air Force, Nov. 1958.

15. Smetana, Frederick O.: On the Current Collected by a Charged Circular Cylinder Immersed in a Two-Dimensional Rarefied Plasma Stream. Rarefied Gas Dynamics, Vol. II, J. A. Laurmann, ed., Academic Press, Inc., 1963, pp. 65-91.

16. Dunn, Michael G.: Laboratory Measurements of Electron Density and Electron Temperature With RAM Flight Probes. The Entry Plasma Sheath and Its Effect on Space Vehicle Electromagnetic Systems, Vol. I, NASA SP-252, 1970, pp. 261-276.

17. Dunn, Michael G.: Experimental Plasma Studies. NASA CR-1958, 1972.

18. Webb, H., Jr.; Dresser, H.; Korkan, K.; and Raparelli, R.: Theoretical Flow Field Calculations for Project RAM. NASA CR-1308, 1969.

19. Suits, C. Guy; and Way, Harold E., eds.: The Collected Works of Irving Langmuir. Vol. 4 – Electrical Discharge. Pergamon Press, Inc., c.1961.

20. Laframboise, James G.: Theory of Spherical and Cylindrical Langmuir Probes in a Collisionless, Maxwellian Plasma at Rest. Rep. No. 100, Inst. Aerosp. Studies, Univ. of Toronto, June 1966. (Available from DDC as AD 634 596.)

21. Bernstein, Ira B.; and Rabinowitz, Irving N.: Theory of Electrostatic Probes in a Low-Density Plasma. Phys. Fluids, vol. 2, no. 2, Mar.-Apr. 1959, pp. 112-121.

22. Allen, J. E.; Boyd, R. L. F.; and Reynolds, P.: The Collection of Positive Ions by a Probe Immersed in a Plasma. Proc. Phys. Soc., vol. 70, pt. 3, no. 447B, Mar. 1, 1957, pp. 297-304.

23. Lam, S. H.: The Langmuir Probe in a Collisionless Plasma. AFOSR 64-0353, U.S. Air Force, Mar. 1964. (Available from DDC as AD 434 342.)

24. Chen, Francis F.: Numerical Computations for Ion Probe Characteristics in a Collisionless Plasma. MATT-252 (Contract AT(30-1)-1238), Plasma Phys. Lab., Princeton Univ., Feb. 1964.

25. Chen, Francis F.: Electric Probes. Plasma Diagnostic Techniques, Richard H. Huddlestone and Stanley L. Leonard, eds., Academic Press, 1965, pp. 113-200.

26. Bohm, David.; Burhop, E. H. S.; and Massey, H. S. W.: The Use of Probes for Plasma Exploration in Strong Magnetic Fields. The Characteristics of Electrical Discharges in Magnetic Fields, A. Guthrie and R. K. Wakerling, eds., McGraw-Hill Book Co., Inc., 1949, pp. 13-76.

27. Sonin, A. A.: The Behaviour of Free Molecular Cylindrical Langmuir Probes in Supersonic Flows, and Their Application to the Study of the Blunt Body Stagnation Layer. UTIAS Rep. No. 109, Univ. of Toronto, Aug. 1965.

28. Hoegy, W. R.; and Brace, L. H.: The Dumbbell Electrostatic Ionosphere Probe: Theoretical Aspects. Rep. JS-1 (Contracts AF 19(604)6124, DA-20-018-509-ORD-103, and NASw-139), College Eng., Univ. Michigan, Sept. 1961.

TABLE I.- ALTITUDE, VELOCITY, AND TIME OF RAM C-I AND RAM C-II* REENTRY TRAJECTORIES

Altitude		Velocity		Time from lift-off, sec
km	ft	m/sec	ft/sec	
152.4	500×10^3	7012	23 004	355.98
150.9	495	7095	23 279	356.83
149.4	490	7183	23 567	357.64
147.8	485	7277	23 875	358.42
146.3	480	7366	24 166	359.19
144.8	475	7460	24 476	359.98
143.2	470	7527	24 696	360.77
141.7	465	7564	24 816	361.57
140.2	460	7580	24 872	362.34
138.7	455	7579	24 866	363.11
137.2	450	7578	24 863	363.87
135.6	445	7580	24 872	364.64
134.1	440	7587	24 892	365.40
132.6	435	7590	24 902	366.18
131.1	430	7596	24 920	366.95
129.5	425	7597	24 926	367.73
128.0	420	7594	24 916	368.49
126.5	415	7594	24 914	369.25
125.0	410	7597	24 924	370.00
123.4	405	7602	24 941	370.75
121.9	400	7609	24 965	371.52
120.4	395	7614	24 982	372.30
118.9	390	7611	24 971	373.08
117.3	385	7610	24 967	373.85
115.8	380	7610	24 969	374.61
114.3	375	7612	24 973	375.37
112.8	370	7616	24 986	376.14
111.2	365	7617	24 991	376.92
109.7	360	7619	24 996	377.70
108.2	355	7622	25 008	378.47
106.7	350	7626	25 019	379.23
105.2	345	7629	25 029	379.99
103.6	340	7627	25 024	380.75
102.1	335	7629	25 031	381.52
100.6	330	7631	25 037	382.29
99.1	325	7628	25 026	383.07
97.5	320	7628	25 025	383.86
96.0	315	7633	25 042	384.63
94.5	310	7640	25 065	385.39
93.0	305	7650	25 098	386.14
91.4	300	7649	25 094	386.88
89.9	295	7646	25 087	387.64
88.4	290	7642	25 074	388.40
86.9	285	7645	25 082	389.17
85.3	280	7649	25 095	389.93
83.8	275	7651	25 103	390.70
82.3	270	7649	25 094	391.46
80.8	265	7649	25 096	392.23
79.2	260	7654	25 113	393.00

Altitude		Velocity		Time from lift-off, sec
km	ft	m/sec	ft/sec	
77.7	255×10^3	7657	25 121	393.77
76.2	250	7661	25 135	394.54
74.7	245	7670	25 164	395.30
73.2	240	7664	25 143	396.07
71.6	235	7660	25 131	396.83
70.1	230	7662	25 139	397.59
68.6	225	7665	25 148	398.36
67.0	220	7670	25 165	399.13
65.5	215	7668	25 156	399.89
64.0	210	7664	25 145	400.65
62.5	205	7657	25 123	401.41
61.0	200	7651	25 102	402.18
59.4	195	7655	25 115	402.94
57.9	190	7653	25 108	403.71
56.4	185	7643	25 076	404.48
54.9	180	7640	25 064	405.25
53.3	175	7630	25 034	406.02
51.8	170	7623	25 009	406.79
50.3	165	7610	24 967	407.56
48.8	160	7596	24 923	408.32
47.2	155	7568	24 829	409.09
45.7	150	7544	24 752	409.86
44.2	145	7517	24 663	410.64
42.7	140	7477	24 532	411.42
41.4	135	7432	24 384	412.20
39.6	130	7363	24 157	412.99
38.1	125	7279	23 882	413.80
36.6	120	7182	23 563	414.61
35.0	115	7072	23 202	415.43
33.5	110	6938	22 763	416.26
32.0	105	6759	22 176	417.12
30.5	100	6539	21 455	418.00
29.0	95	6232	20 446	418.91
27.4	90	5938	19 483	419.87
25.9	85	5555	18 226	420.87
24.4	80	5089	16 697	421.96
22.9	75	4552	14 935	423.16
21.3	70	3945	12 942	424.51
19.8	65	3238	10 624	426.12
18.3	60	2438	8 000	428.22
16.8	55	1739	5 706	430.88
15.2	50	1049	3 441	434.69
13.7	45	581	1 906	440.26
12.2	40	271	890	448.98
10.7	35	220	721	459.34
9.1	30	239	785	467.88
7.6	25	227	744	475.40
6.1	20	276	907	484.45

*For time correlation purposes, between the times of 386.88 and 406.79 seconds, the C-II spacecraft was 365.8 m (1200 ft) higher in altitude than listed in the table with a velocity of approximately 18 m/sec (60 ft/sec) greater than the value listed.

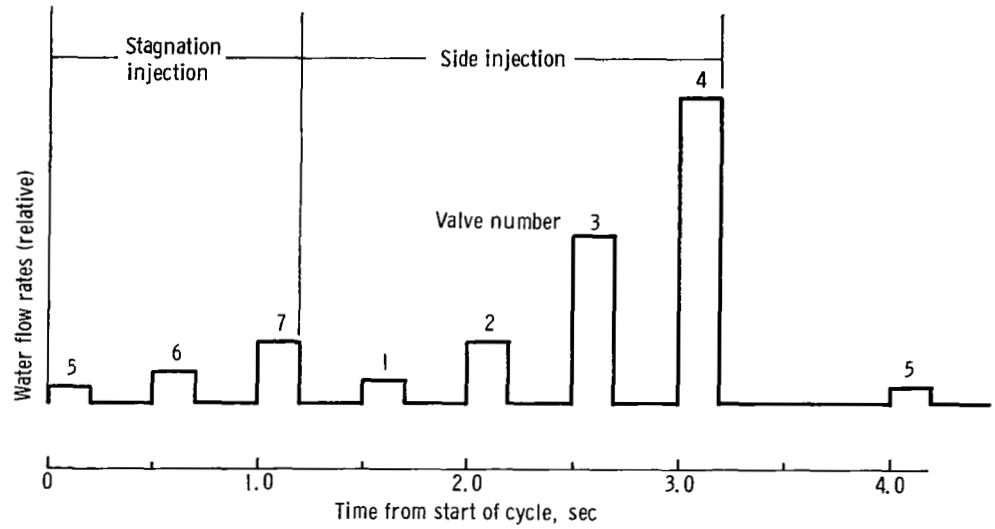
TABLE II.- POSITION OF FUNCTIONAL PARTS ON THE RAM C-I AND C-II PAYLOADS

Payload	Part and function	x		ϕ, deg (a)	x/D (b)
		cm (a)	in. (a)		
	Water-injection nozzle				
RAM C-I	Stagnation	0	0	---	0
	Lateral	15.2	6.0	0	.48
	Lateral	15.2	6.0	180	.48
	Antenna				
RAM C-II	S-band open-ended guide (3344 MHz)	4.6	1.8	90	0.15
	X-band conical horn (10 044 MHz)	4.6	1.8	330	.15
	K_a-band conical horn (35 000 MHz)	4.6	1.8	210	.15
	L-band open-ended guide (1116 MHz)	23.1	9.1	195	.76
	S-band open-ended guide (3344 MHz)	23.1	9.1	15	.76
	X-band conical horn (10 044 MHz)	23.1	9.1	285	.76
	K_a-band conical horn (35 000 MHz)	23.1	9.1	227	.76
	L-band open-ended guide (1116 MHz)	70.1	27.6	195	2.30
	S-band open-ended guide (3344 MHz)	70.1	27.6	15	2.30
	X-band conical horn (10 044 MHz)	70.1	27.6	285	2.30
	K_a-band conical horn (35 000 MHz)	70.1	27.6	105	2.30
RAM C-I	VHF axial cavity-backed slot (259.7 MHz)	75.2	29.6	0	2.36
	VHF axial cavity-backed slot (259.7 MHz)	75.2	29.6	180	2.36
RAM C-I	X-band rectangular horn (9210 MHz)	82.8	32.6	60	2.60
	X-band rectangular horn (9210 MHz)	82.8	32.6	150	2.60
	X-band rectangular horn (9210 MHz)	82.8	32.6	240	2.60
	X-band rectangular horn (9210 MHz)	82.8	32.6	330	2.60
RAM C-II	X-band rectangular horn (9210 MHz)	80.5	31.7	15	2.65
	X-band rectangular horn (9210 MHz)	80.5	31.7	105	2.65
	X-band rectangular horn (9210 MHz)	80.5	31.7	195	2.65
	X-band rectangular horn (9210 MHz)	80.5	31.7	285	2.65
RAM C-II	VHF circumferential-slot array (259.7 MHz)	97.5	38.4	---	3.20
RAM C-I	VHF circumferential-slot array (225.7 MHz)	109.2	43.0	---	3.42
RAM C-II	L-band open-ended guide (1116 MHz)	106.2	41.8	195	3.48
	S-band open-ended guide (3344 MHz)	106.2	41.8	15	3.48
	X-band conical horn (10 044 MHz)	106.2	41.8	285	3.48
	K_a-band conical horn (35 000 MHz)	106.2	41.8	105	3.48
RAM C-II	C-band rectangular horn (5800 MHz)	106.7	42.0	32	3.50
RAM C-I	C-band rectangular horn (5700 MHz)	118.4	46.6	30	3.71
RAM C-II	VHF circumferential-slot array (225.7 MHz)	114.8	45.2	---	3.76
	Probe rake				
RAM C-I	Electrostatic	123.4	48.6	0	3.87
	Thermocouple	123.4	48.6	180	3.87
RAM C-II	Electrostatic	123.4	48.6	0	4.05
	Thermocouple	123.4	48.6	180	4.05

[a] Center-line location of parts.

[b] Nose diameter D is 31.90 cm (12.56 in.) for RAM C-I; nose diameter D is 30.48 cm (12.00 in.) for RAM C-II.

TABLE III.- RAM C-I TYPICAL INJECTION CYCLE AND FLOW RATE HISTORY



Cycle	Valve for –		Flow rate		Altitude		Cycle	Valve for –		Flow rate		Altitude	
	Stagnation injection	Side injection	kg/sec	lb/sec	km	ft		Stagnation injection	Side injection	kg/sec	lb/sec	km	ft
1	5		0	0			5	5		0.023	0.05	61.1	200 490
	6		0	0				6		.068	.15	60.1	197 236
	7		0	0				7		.127	.28	59.1	193 982
		1	0	0					1	.045	.10	58.1	190 724
		2	0	0					2	.109	.24	57.1	187 462
		3	0	0					3	.295	.65	56.1	184 202
		4	0	0					4	.458	1.01	55.2	180 943
2	5		0	0	85.0	278 908	6	5		0.027	0.06	53.2	174 451
	6		0	0	84.0	275 639		6		.082	.18	52.2	171 212
	7		.014	.03	83.2	273 027		7		.163	.36	51.2	167 968
		1	.004	.01	82.0	269 115			1	.059	.13	50.2	164 722
		2	.018	.04	81.0	265 866			2	.145	.32	49.2	161 466
		3	.045	.10	80.0	262 616			3	.408	.90	48.2	158 199
		4	.068	.15	79.0	259 363			4	.644	1.42	47.2	154 937
3	5		0.009	0.02	77.1	252 861	7	5		0.032	0.07	45.2	148 484
	6		.032	.07	76.1	249 598		6		.104	.23	44.3	145 267
	7		.064	.14	75.1	246 328		7		.195	.43	43.3	142 058
		1	.027	.06	74.1	243 048			1	.068	.15	42.3	138 864
		2	.064	.14	73.1	239 771			2	.159	.35	41.4	135 684
		3	.181	.40	72.1	236 486			3	.444	.98	40.4	132 511
		4	.299	.66	71.1	233 205			4	.703	1.55	39.5	129 532
4	5		0.018	0.04	69.1	226 690	8	5		0.036	0.08	37.5	123 137
	6		.054	.12	68.1	223 442		6		.109	.24	36.6	120 058
	7		.109	.24	67.1	220 185		7		.195	.43	35.7	117 010
		1	.036	.08	66.1	216 915			1	.068	.15	34.7	113 987
		2	.095	.21	65.1	213 635			2	.159	.35	33.8	110 986
		3	.249	.55	64.1	210 348			3	0	0		
		4	.404	.89	63.1	207 054			4	0	0		

TABLE IV.- RAM C-I AND RAM C-II RADIO-FREQUENCY SYSTEMS

Payload	Purpose	Frequency		Antenna type	Transmitter		Body location, x/D	Remarks
		Band	MHz		Approximate RF power, watts	Modulation		
RAM C-I	Real-time telemetry	VHF	259.7	Axial cavity-backed slots	5	FM	2.36	Two slots, diametrically opposed
RAM C-II		VHF	259.7	Circumferential-slot array	5	FM	3.20	----------
RAM C-I	Delayed-time telemetry	VHF	225.7	Circumferential-slot array	5	FM	3.42	Same data as real-time telemetry, but delayed by onboard tape loop for approximately 45 sec
RAM C-II		VHF	225.7	Circumferential-slot array	5	FM	3.76	
RAM C-I	Radar beacon	C	5 700	Rectangular horn	900 peak	Pulse	3.71	----------
RAM C-II		C	5 800	Rectangular horn	800 peak	Pulse	3.50	----------
RAM C-I	Real-time telemetry	X	9 210	Rectangular-horn array	500 peak	PPM	2.60	Four horns, 90° spacing
RAM C-II		X	9 210	Rectangular horn	500 peak	PPM	2.65	Four horns, 90° spacing
RAM C-II	Reflectometer experiment	L	1 116	T-fed slot	0.1	CW	---, 0.76, 2.30, and 3.48	Station number 1; x/D of 0.15
		S	3 344	Open-ended waveguide	.1	CW	0.15, 0.76, 2.30, and 3.48	Station number 2; x/D of 0.76
		X	10 044	Conical horn	.1	CW	0.15, 0.76, 2.30, and 3.48	Station number 3; x/D of 2.30
		K_a	35 000	Conical horn	.1	CW	0.15, 0.76, 2.30, and 3.48	Station number 4; x/D of 3.48

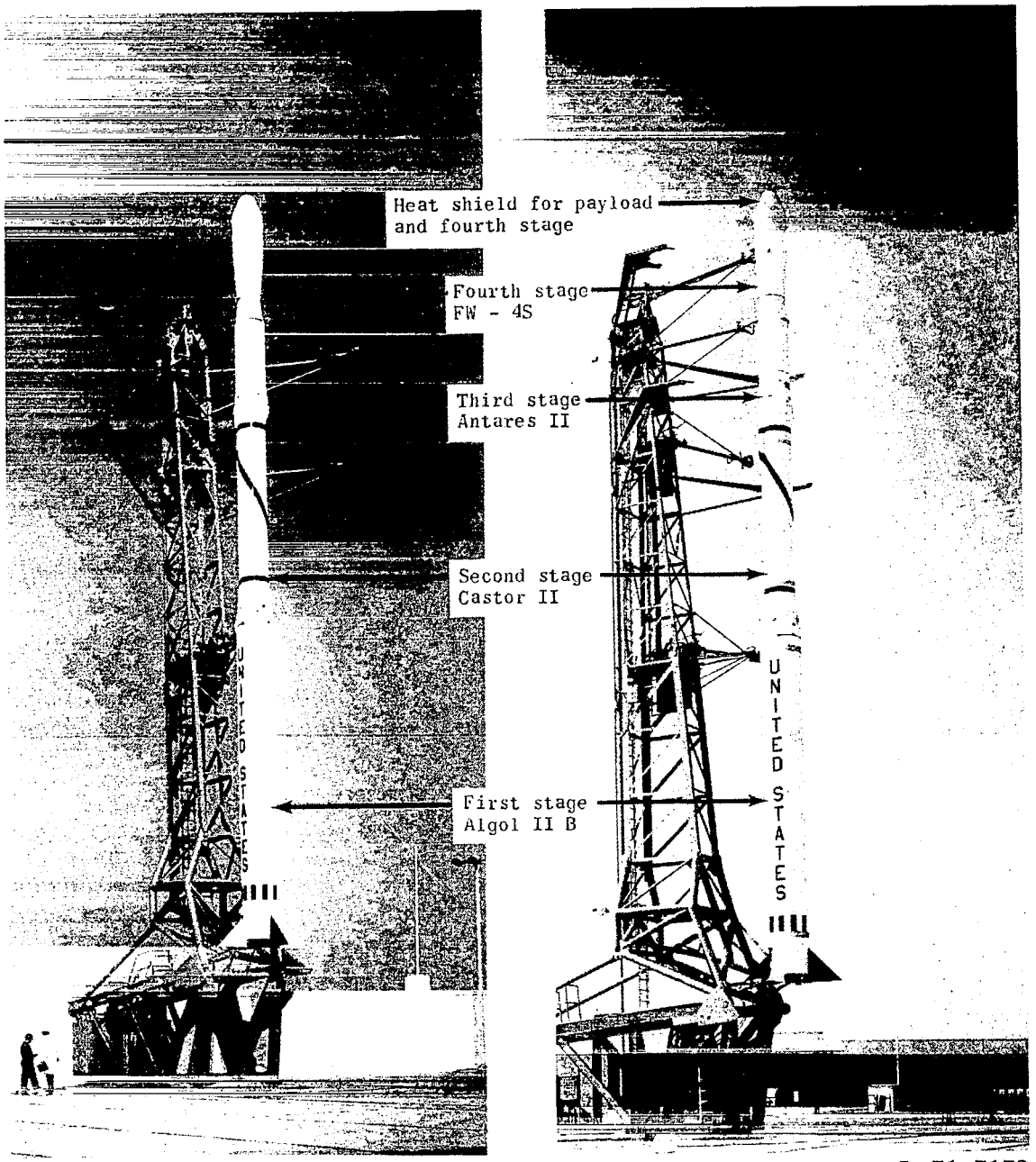
TABLE V.- COMPUTED VALUES OF IMPULSE, PRECESSION CONE ANGLE, AND PRECESSION FREQUENCIES (EQS. (C1) TO (C4))

Flight	L		θ, deg	ν_H, Hz	ν_b, Hz
	N-m-sec	lb-ft-sec			
C-I	3.7	2.7	2.48	0.704	2.25
C-II	3.2	2.3	2.00	.800	2.25

TABLE VI.- PREFLIGHT-MEASURED SPACECRAFT MOMENTS OF INERTIA* AND FLIGHT-MEASURED ROTATION RATES

Flight	I_X		I_Y		I_Z		p, rad/sec	ω_l, rad/sec
	kg-m^2	slug-ft^2	kg-m^2	slug-ft^2	kg-m^2	slug-ft^2		
C-I	4.62	3.41	19.31	14.24	19.66	14.50	18.5	0.190
C-II	4.68	3.45	18.06	13.32	17.92	13.22	19.1	.175

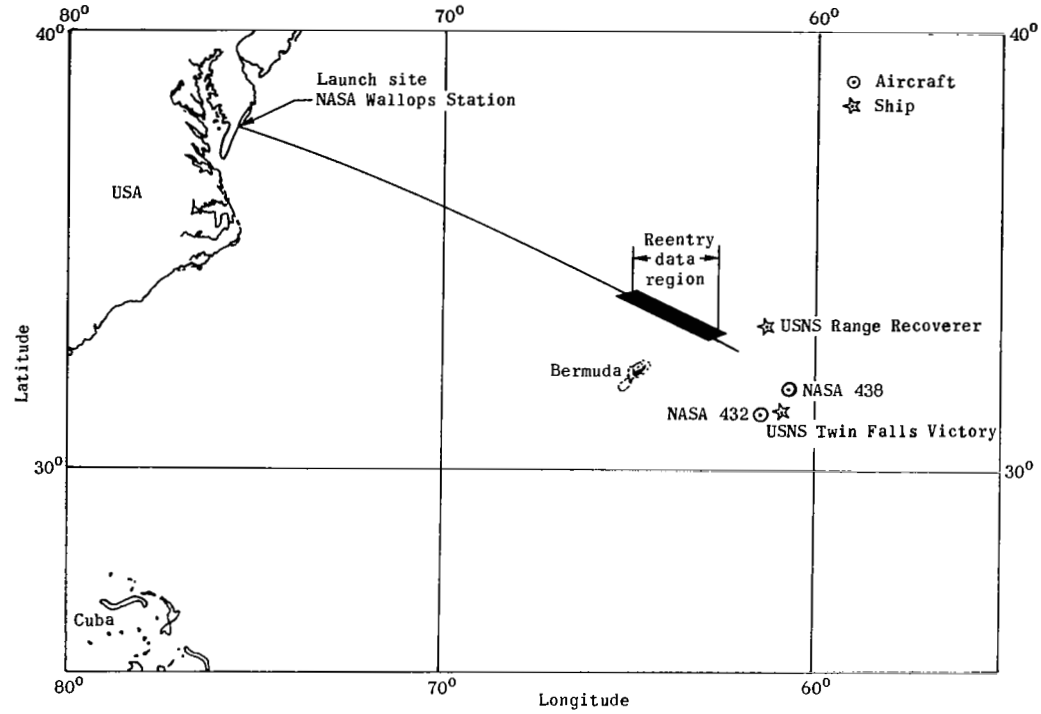
*Moments of inertia constant during data period.



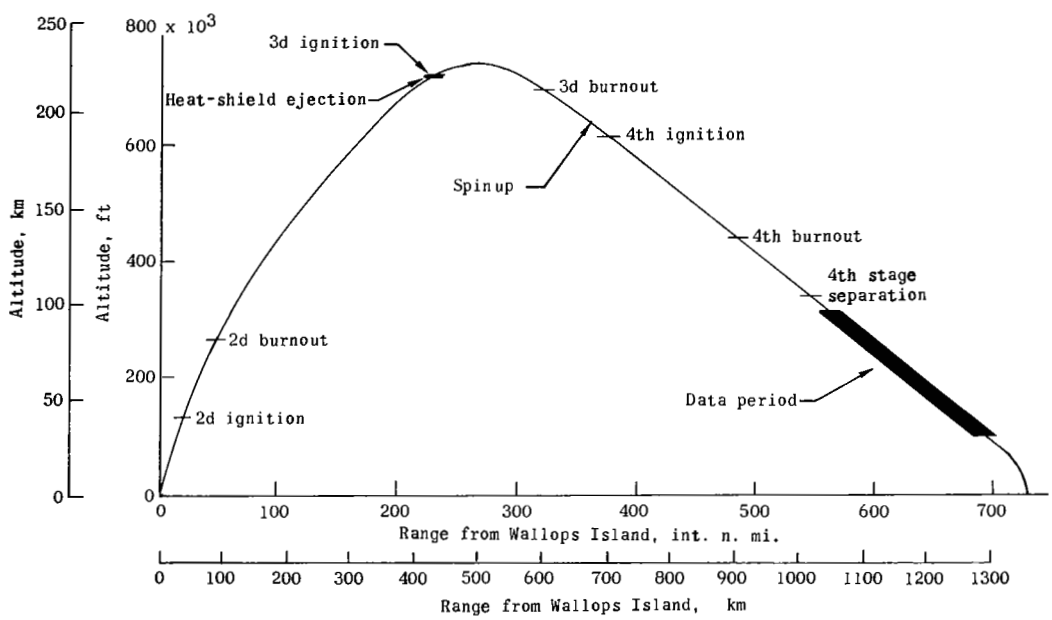
(a) S-159; RAM C-I.

(b) S-168; RAM C-II.

Figure 1.- Launch vehicles.



(a) RAM C-II ground track.



(b) RAM C-I and C-II flight events.

Figure 2.- Ground track and flight events.

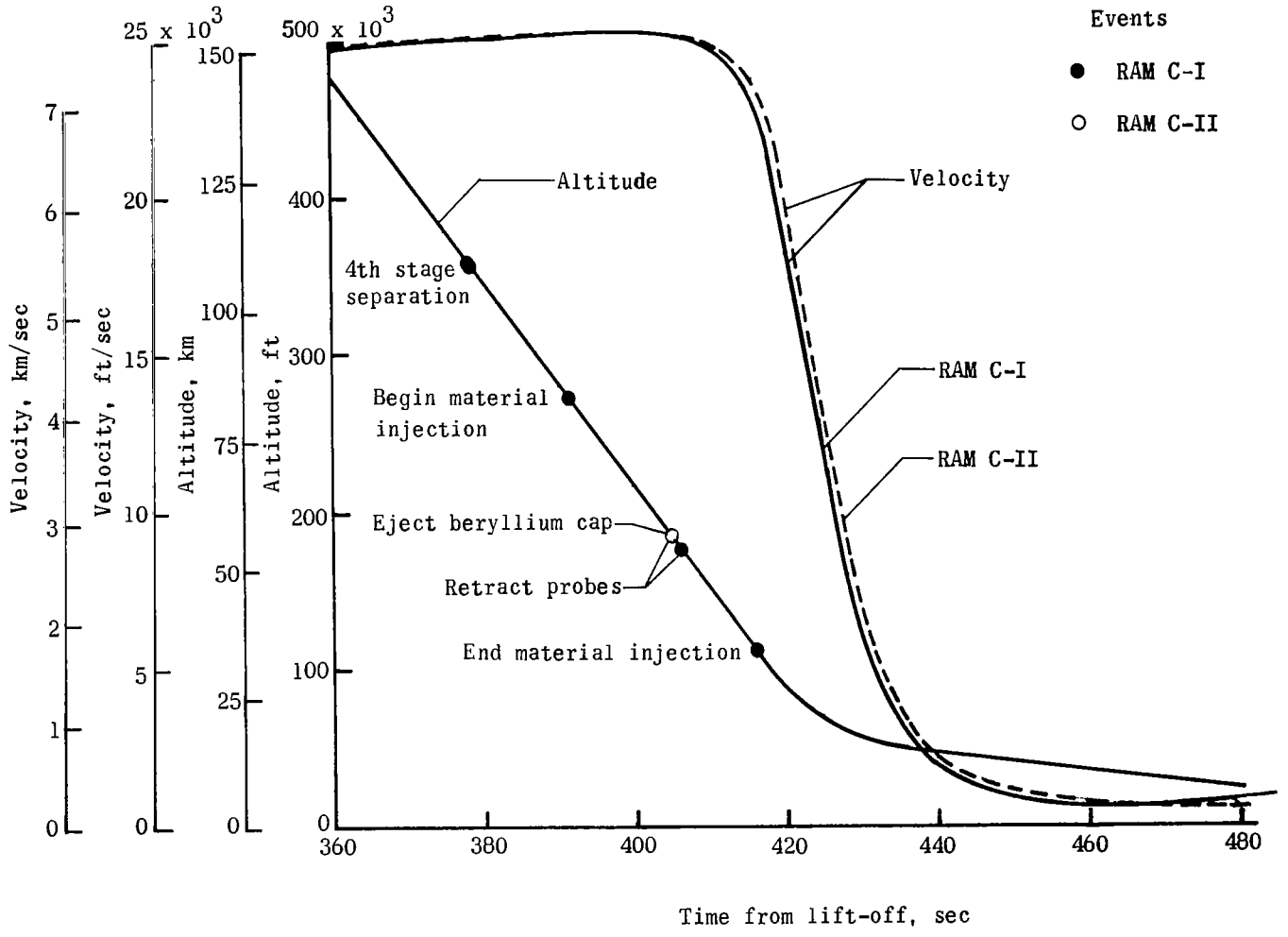
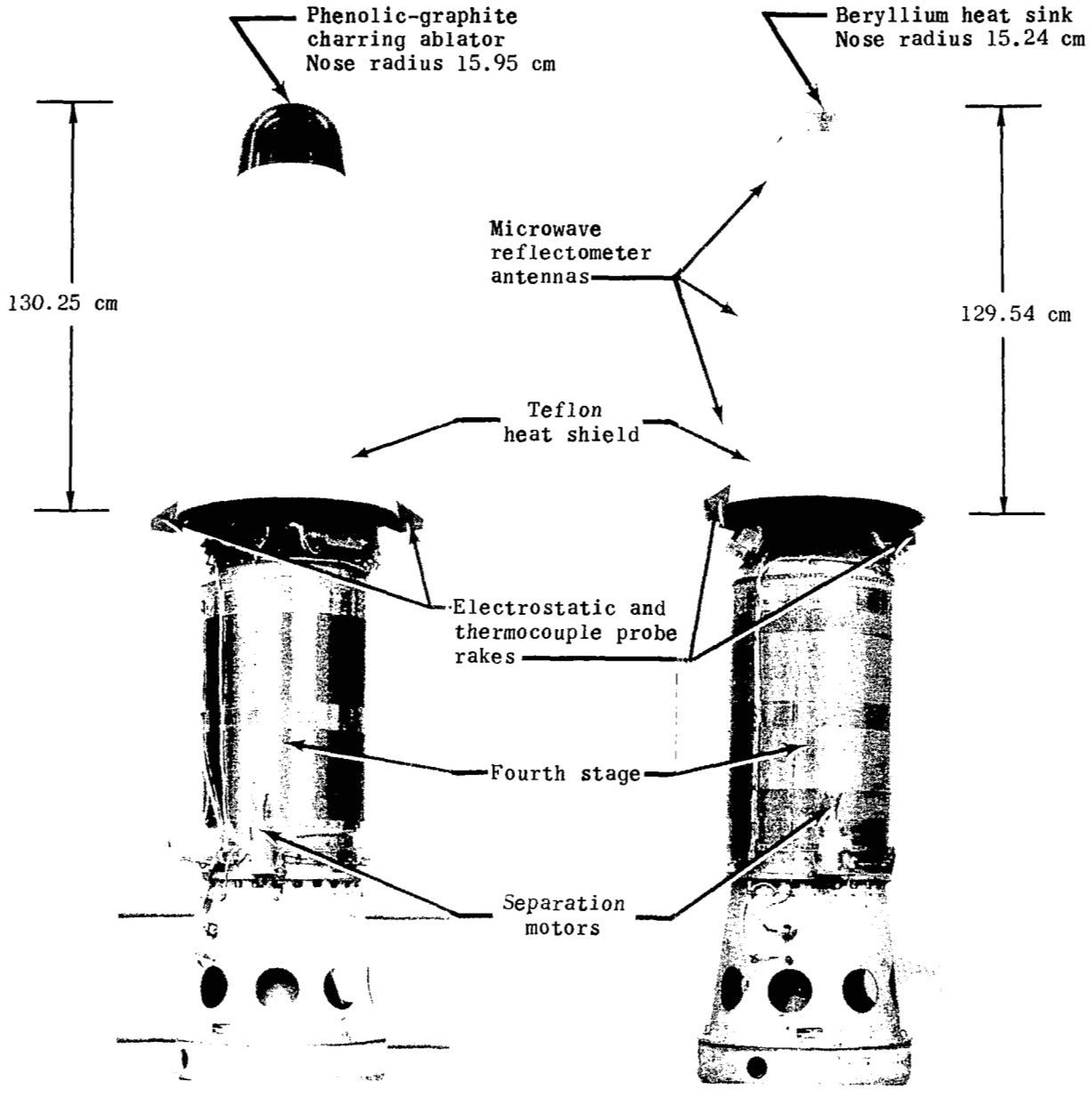


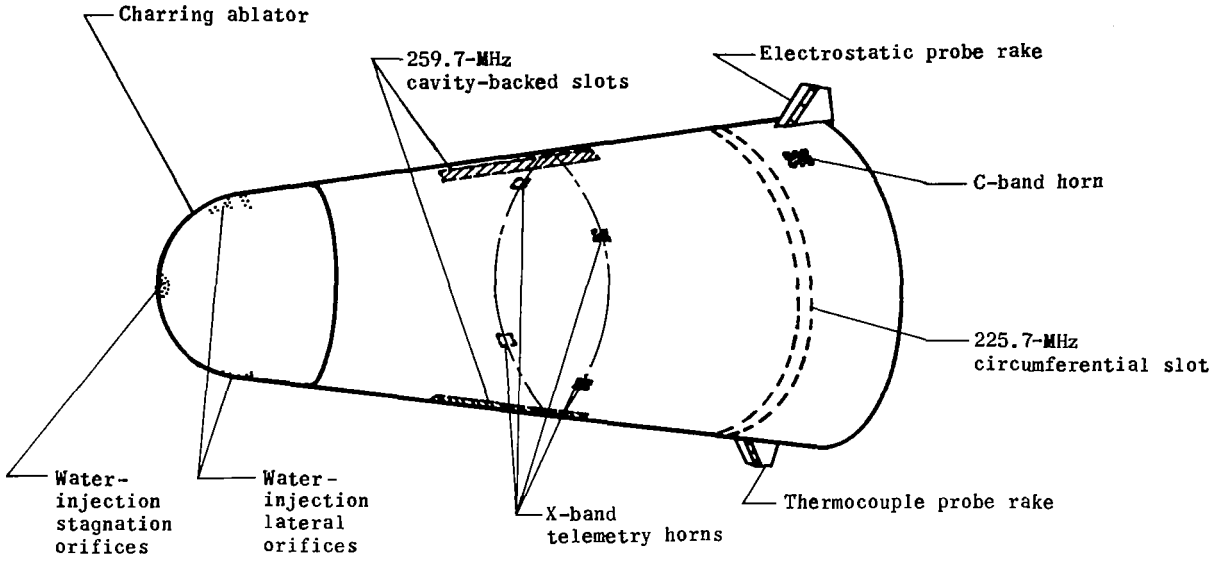
Figure 3.- Reentry trajectories.



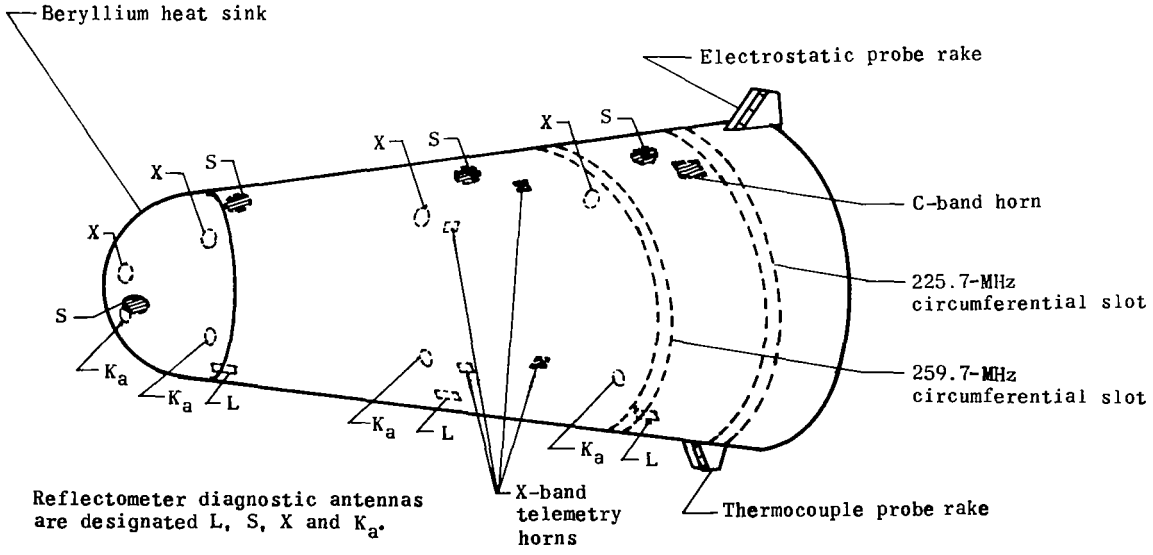
(a) RAM C-I.

(b) RAM C-II.

Figure 4.- Payload configurations shown with fourth-stage engines and separation motors.

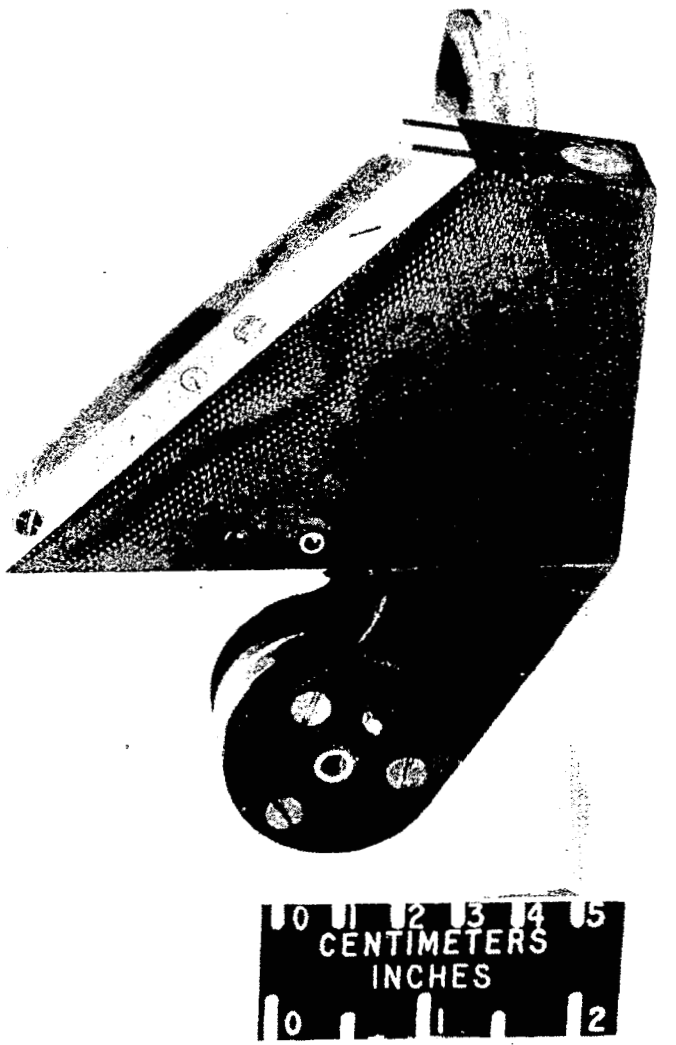


(a) RAM C-I.



(b) RAM C-II.

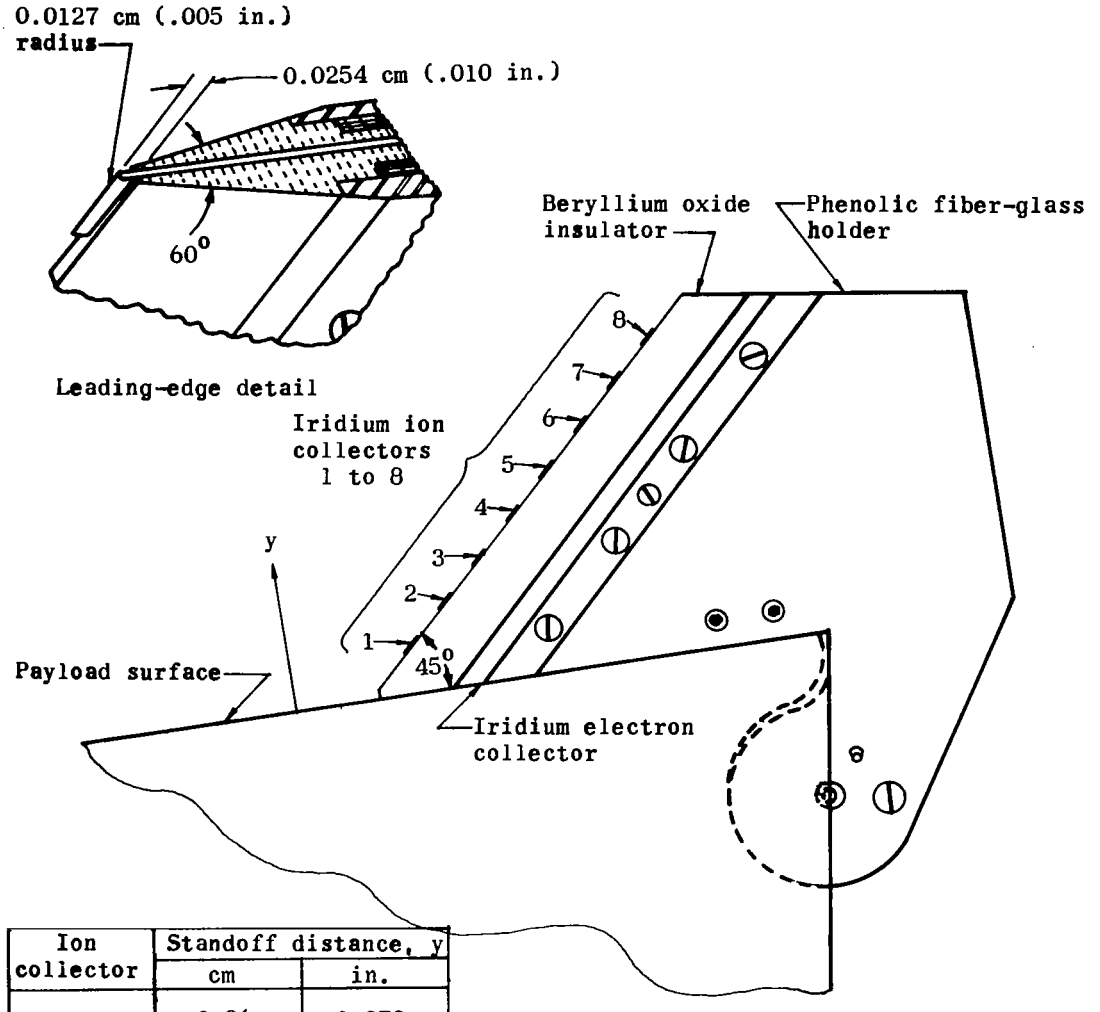
Figure 5.- Electrostatic probe and radio-frequency antenna locations.



L-67-5814

(a) Photograph of rake.

Figure 6.- Electrostatic probe rake.



Ion collector	Standoff distance, y	
	cm	in.
1	0.96	0.378
2	1.84	.724
3	2.70	1.062
4	3.58	1.408
5	4.46	1.754
6	5.34	2.102
7	6.20	2.438
8	7.08	2.790

(b) Detail sketch of rake. Collection area of each ion collector was 0.0420 cm^2 (0.006 in^2).

Figure 6.- Concluded.

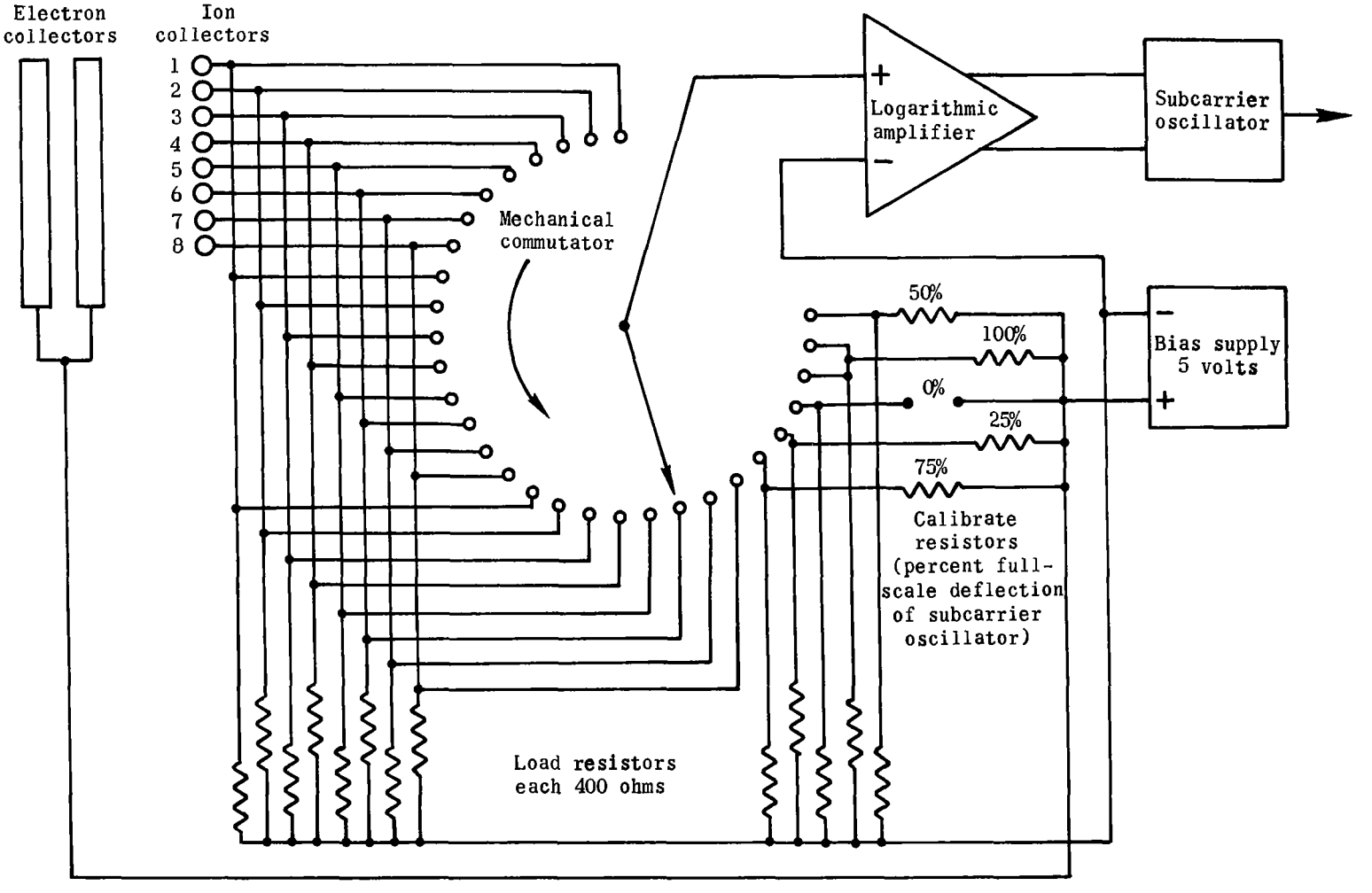
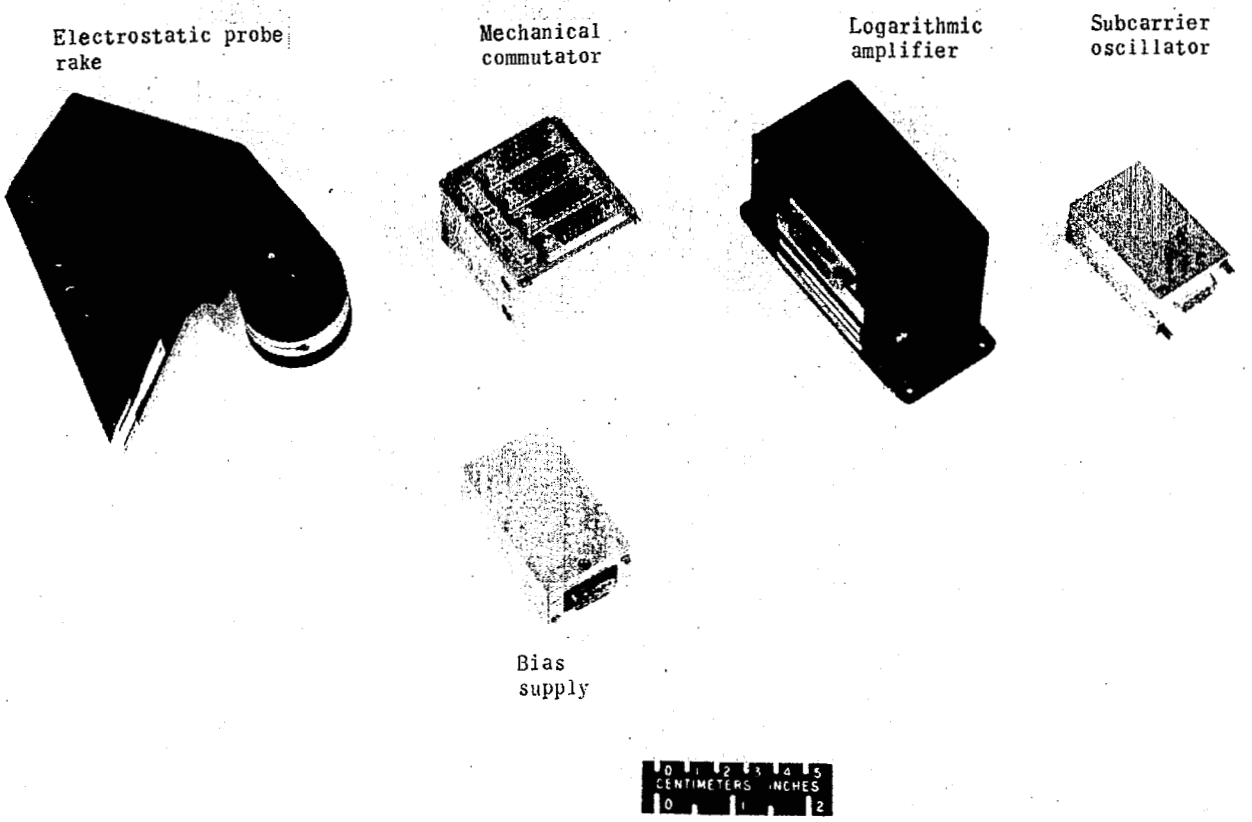
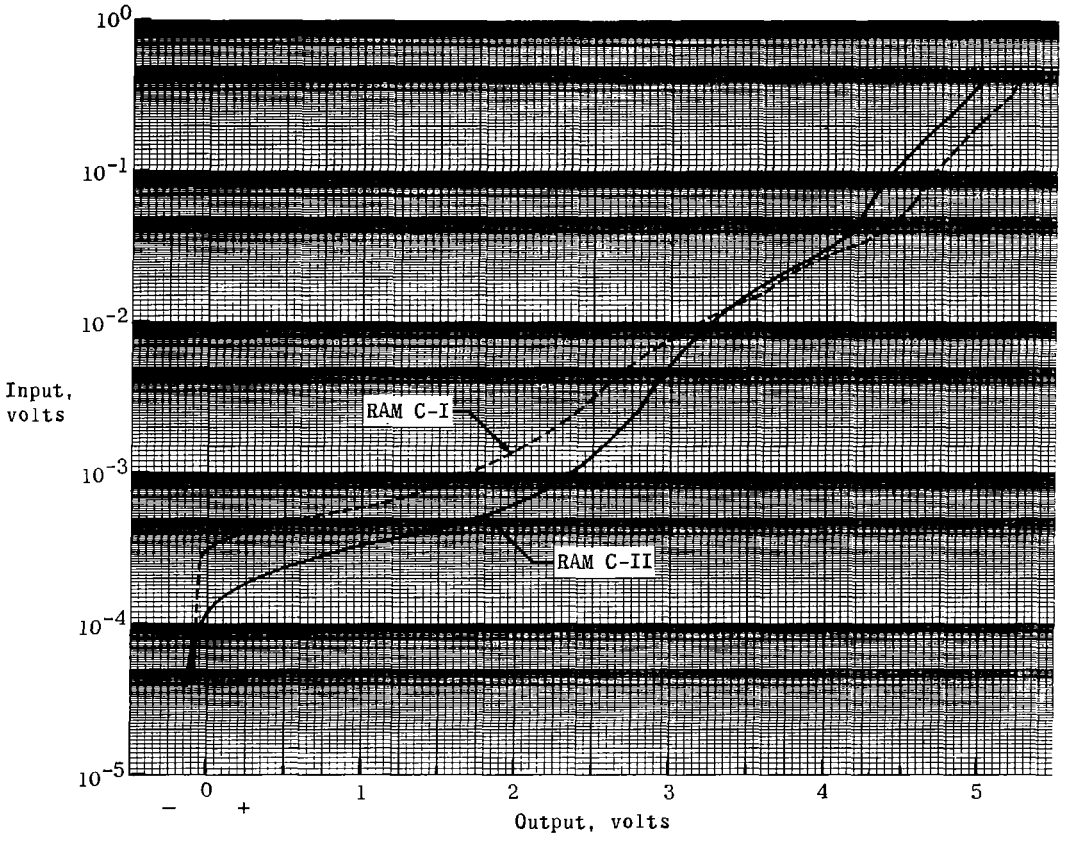


Figure 7.- Circuit diagram for electrostatic probe system.

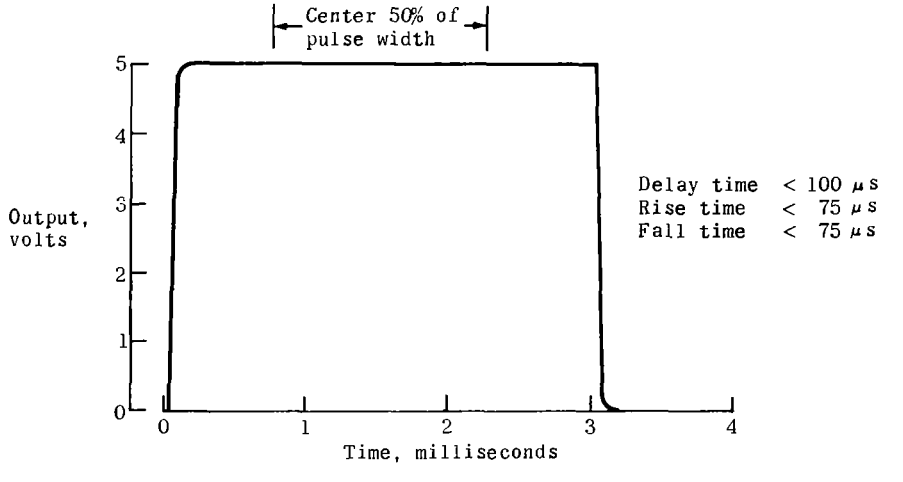


L-70-8365.1

Figure 8.- Major components of electrostatic probe system.



(a) Dynamic input-output curves.



(b) Typical pulse-response curve.

Figure 9.- Electrical characteristics of logarithmic amplifiers.

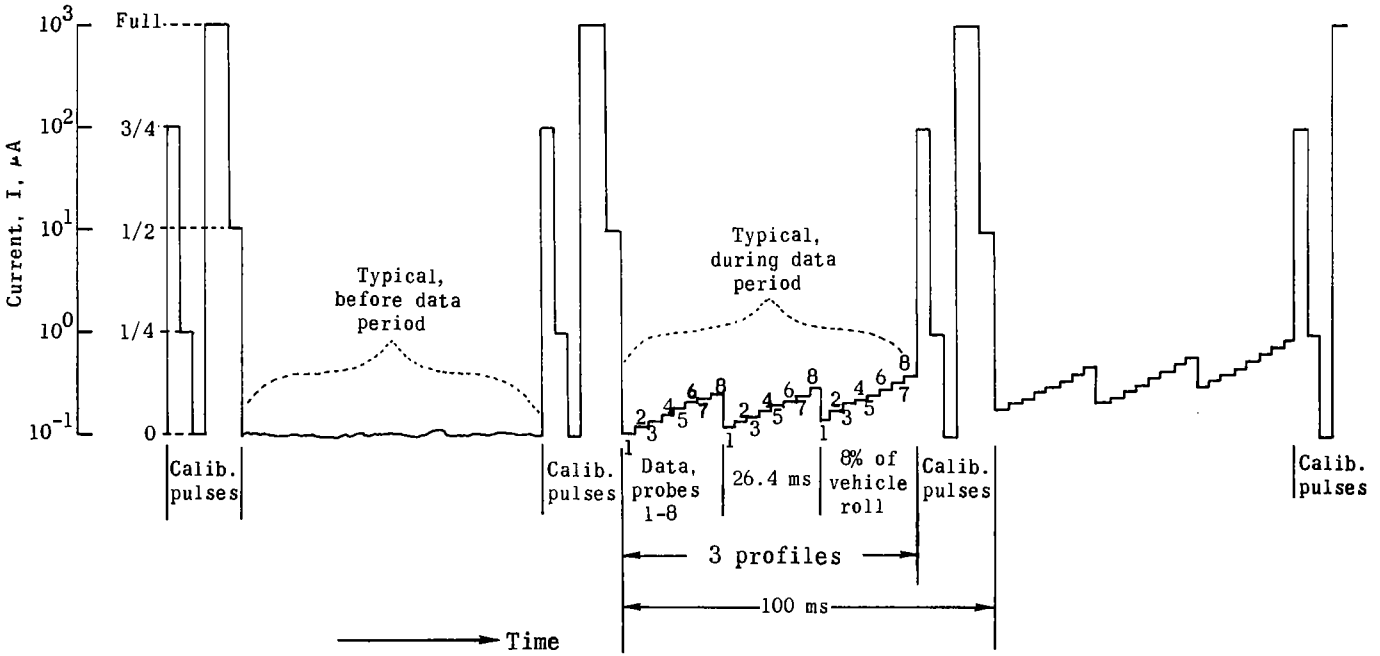
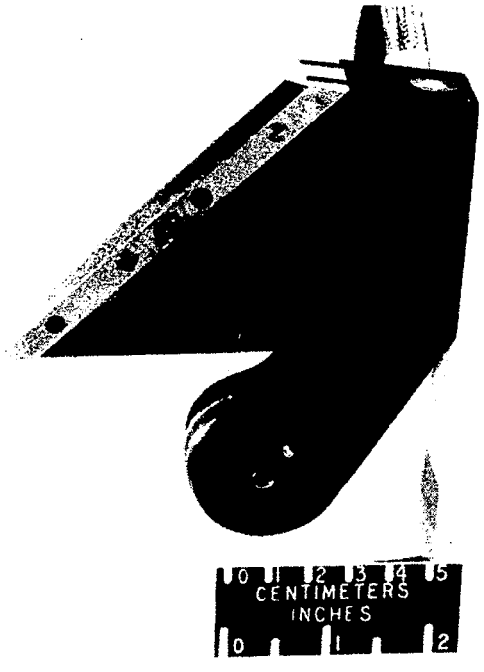
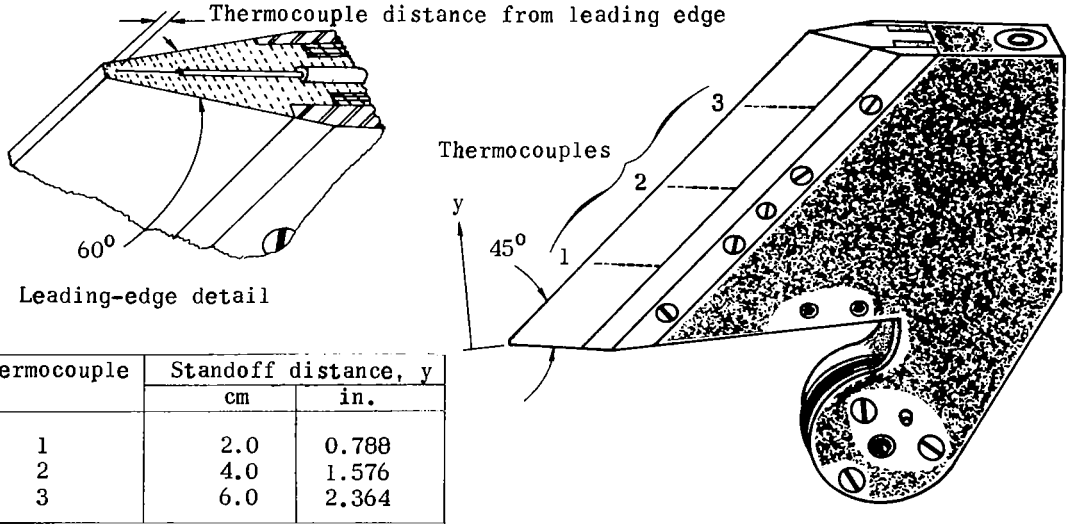


Figure 10.- Electrostatic probe data format.



L-71-7150

(a) Photograph of rake.



Thermocouple	Standoff distance, y	
	cm	in.
1	2.0	0.788
2	4.0	1.576
3	6.0	2.364

(b) Rake configuration. Thermocouple distance from leading edge for RAM C-I was 0.0635 cm (0.025 in.) and for RAM C-II, the distance was 0.1016 cm (0.040 in.).

Figure 11.- Thermocouple probe rake.

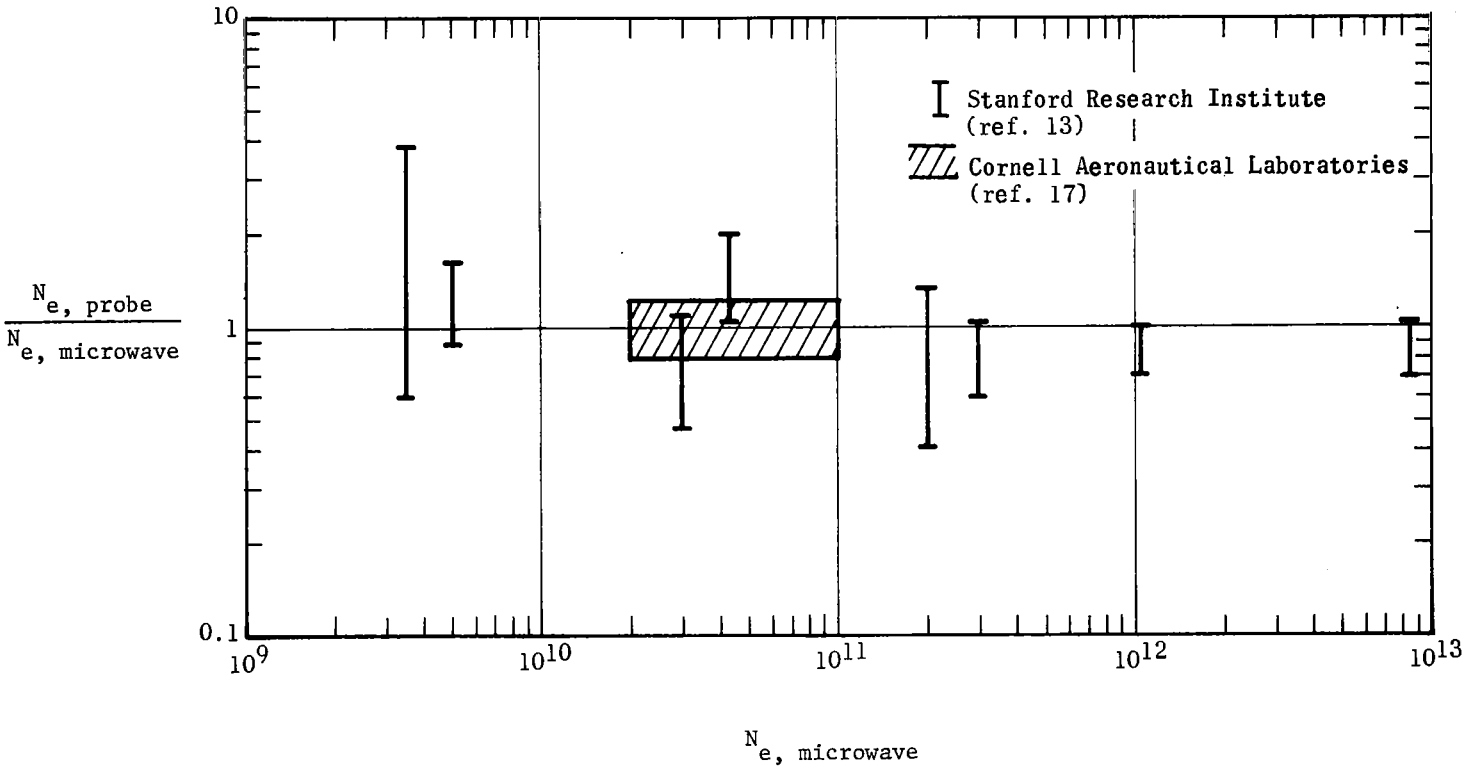
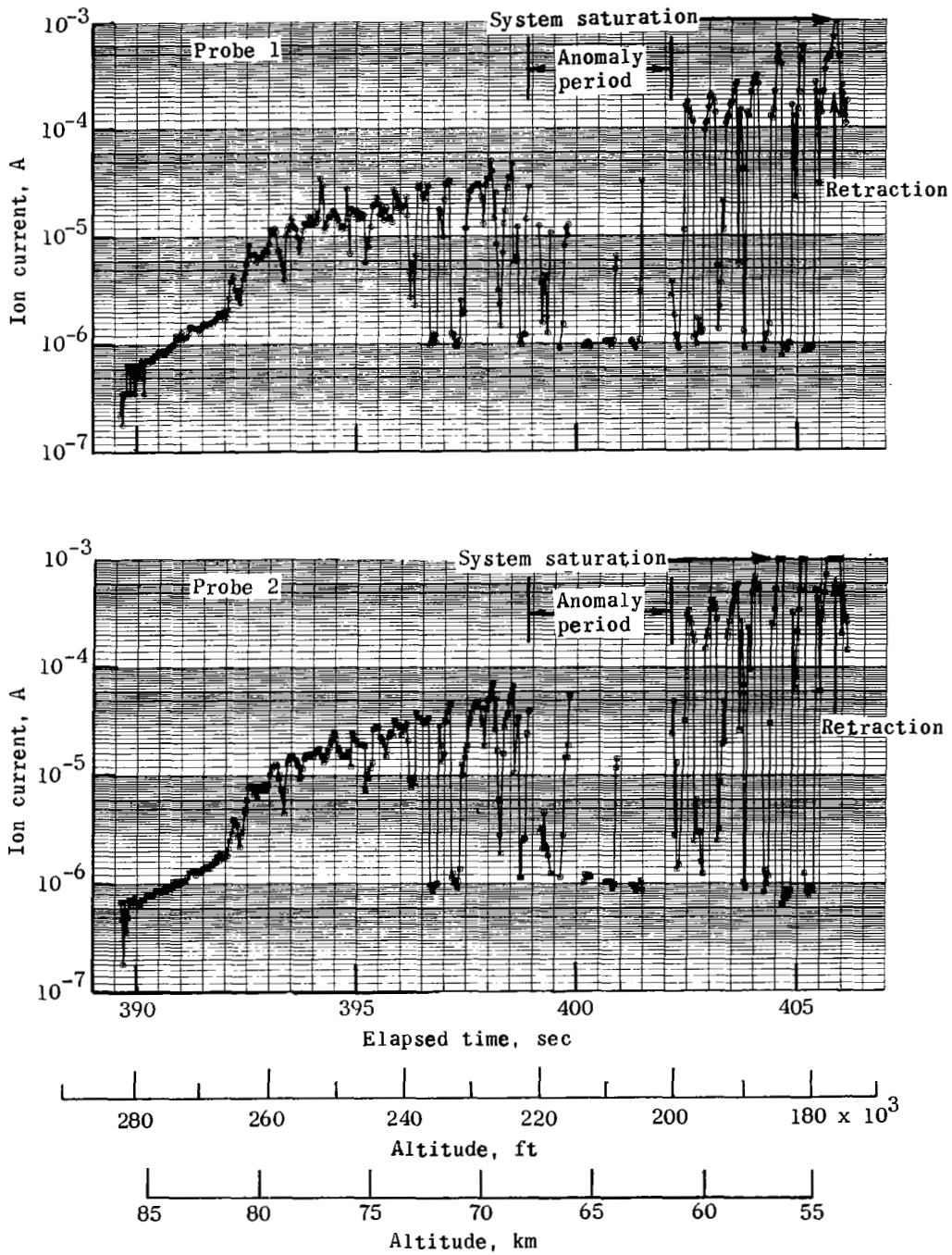
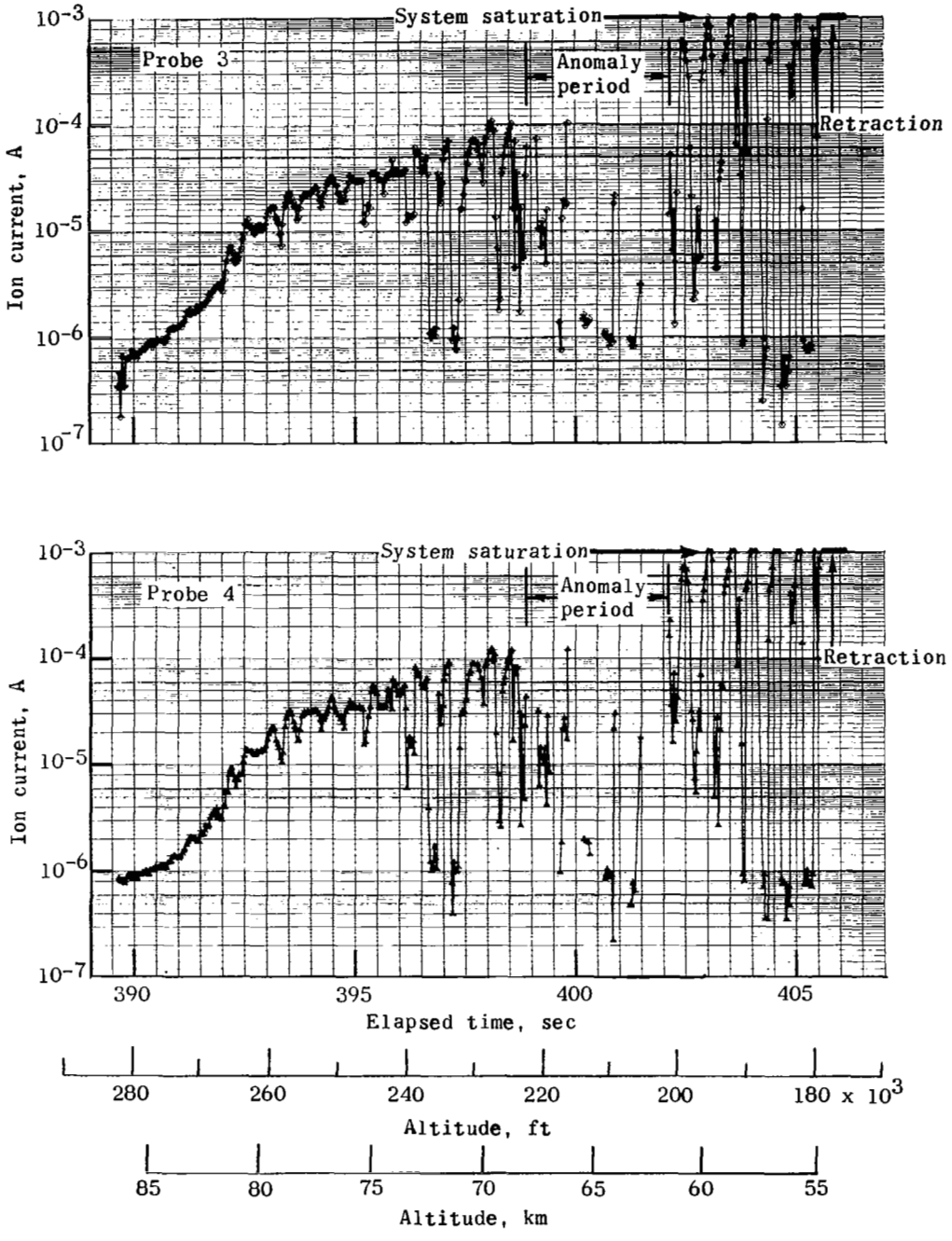


Figure 12.- Ratio of electron densities inferred from probes and from microwave data as a function of electron density inferred from microwave data.



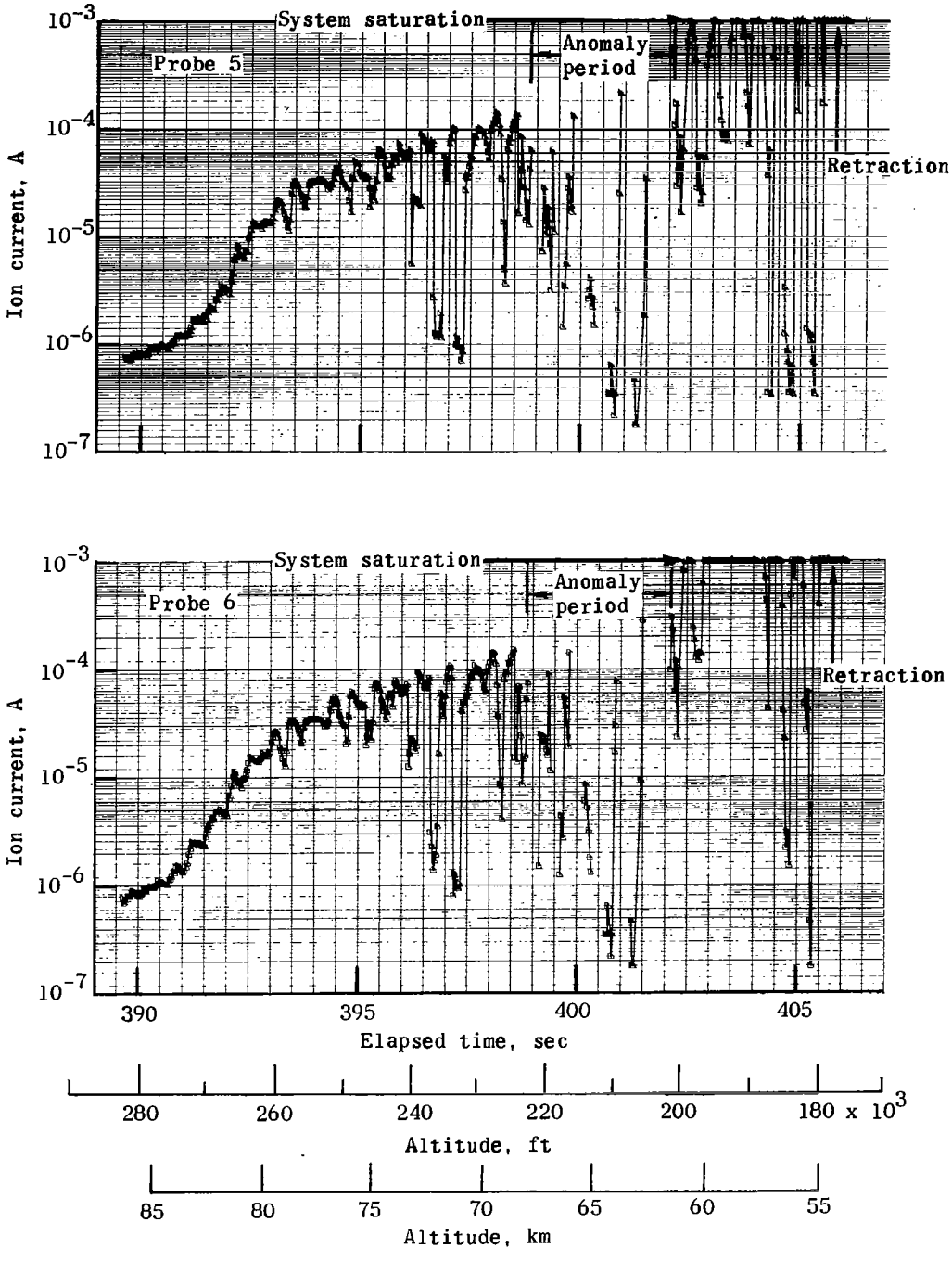
(a) Electrostatic probes 1 and 2.

Figure 13.- Ion current measurements from electrostatic probes on RAM C-I flight experiment.



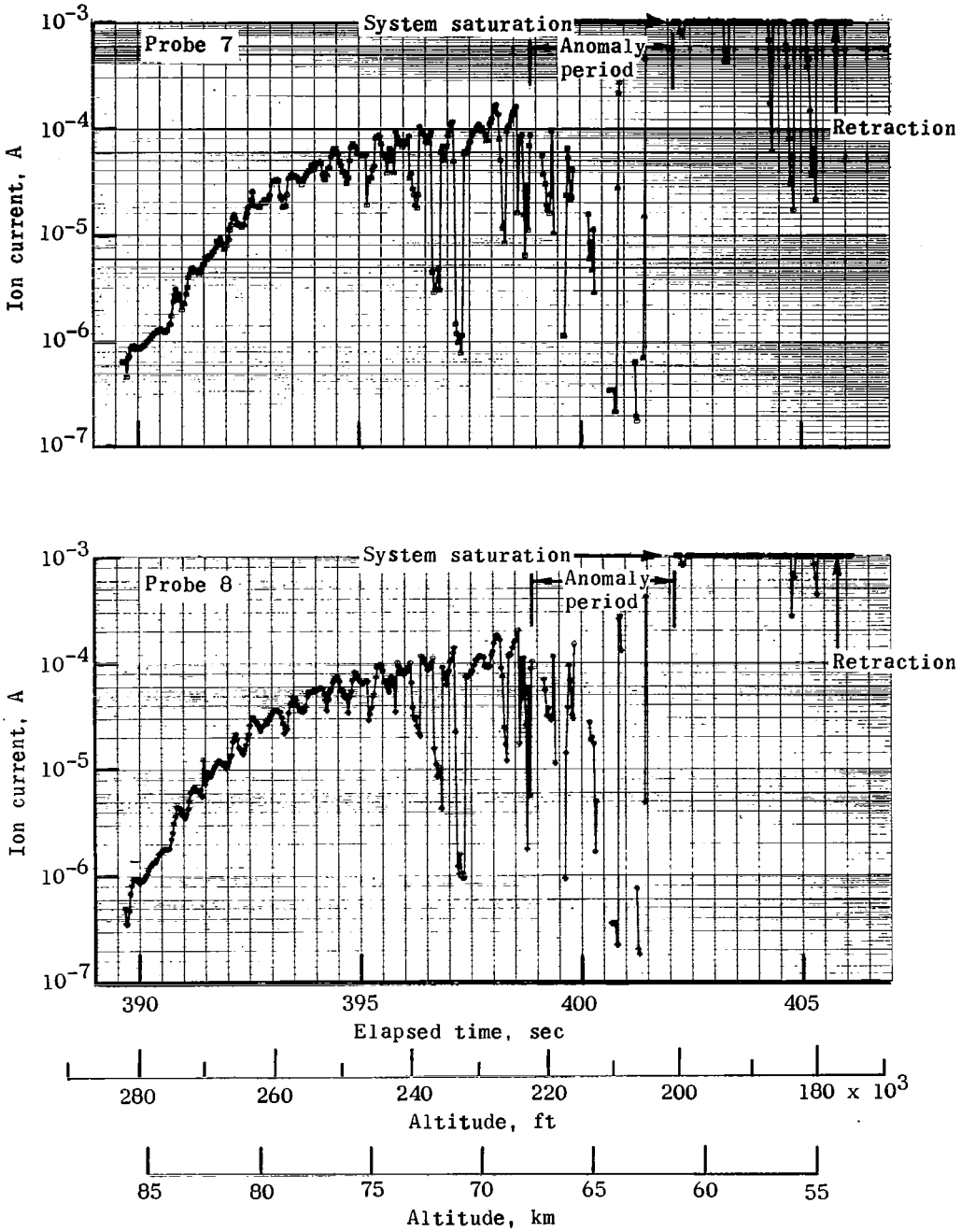
(b) Electrostatic probes 3 and 4.

Figure 13.- Continued.



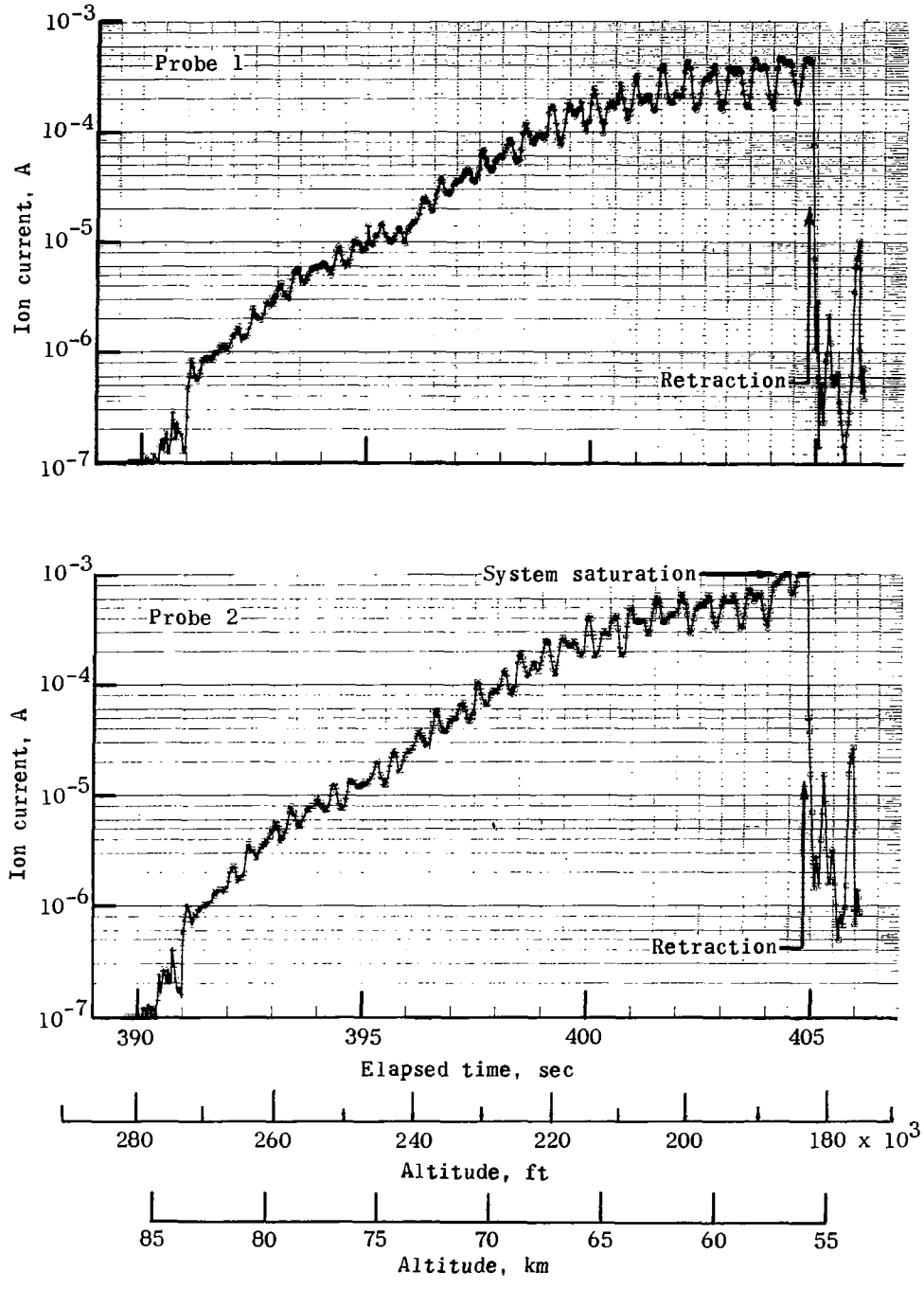
(c) Electrostatic probes 5 and 6.

Figure 13.- Continued.



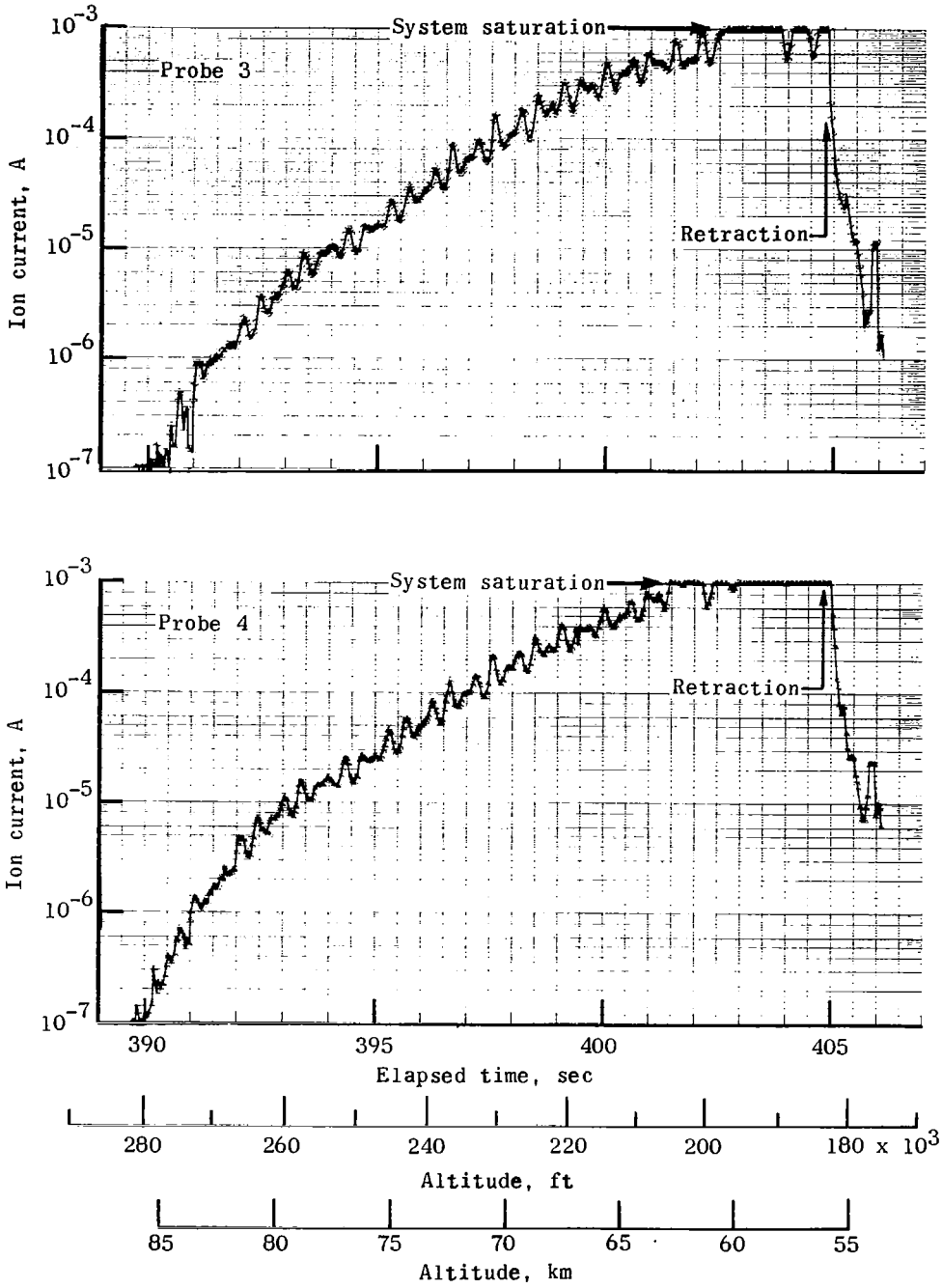
(d) Electrostatic probes 7 and 8.

Figure 13.- Concluded.



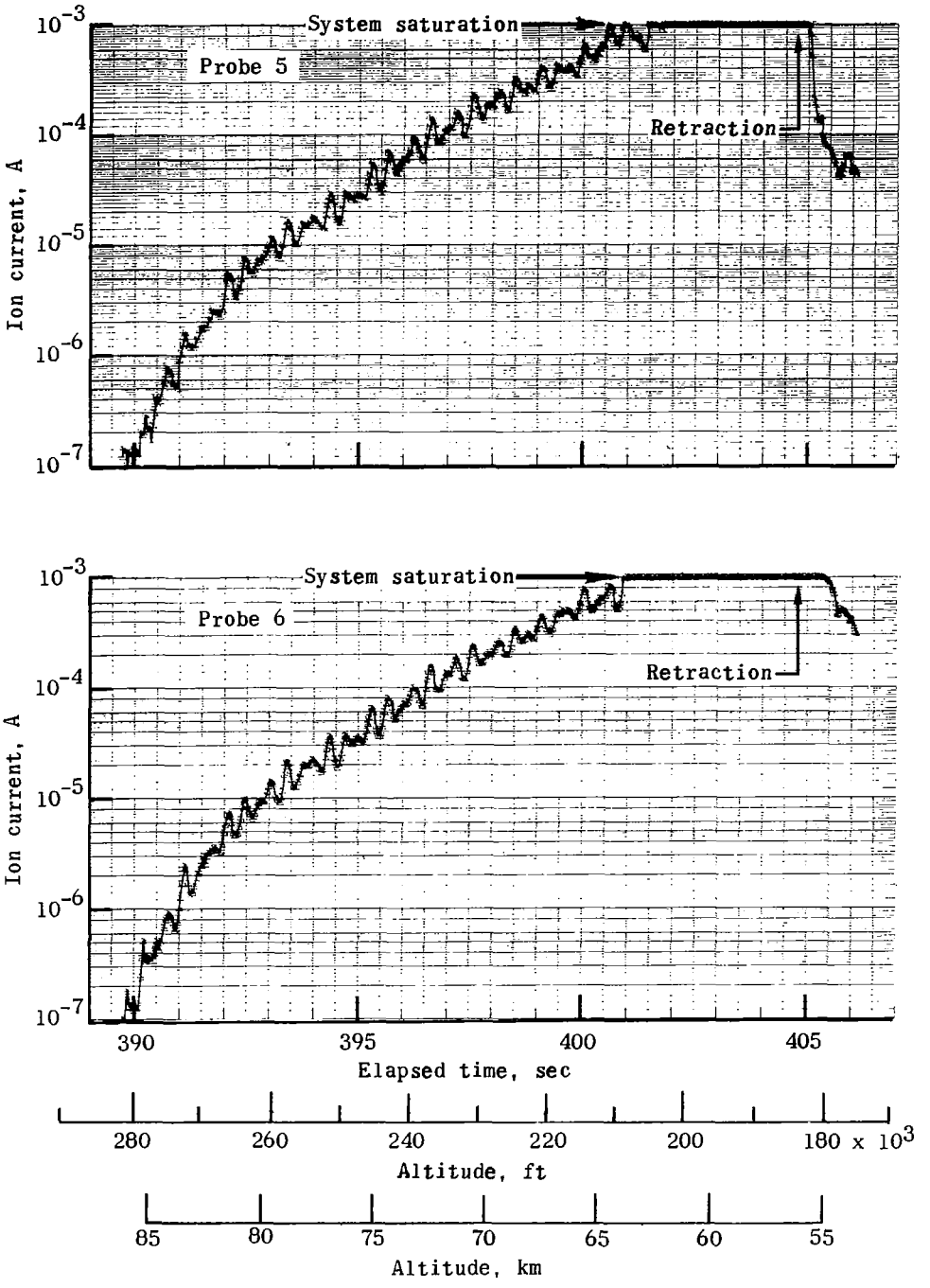
(a) Electrostatic probes 1 and 2.

Figure 14.- Ion current measurements from electrostatic probes on RAM C-II flight experiment. Altitudes shown are 0.3658 km (1200 ft) too low because of use of RAM C-I trajectory.



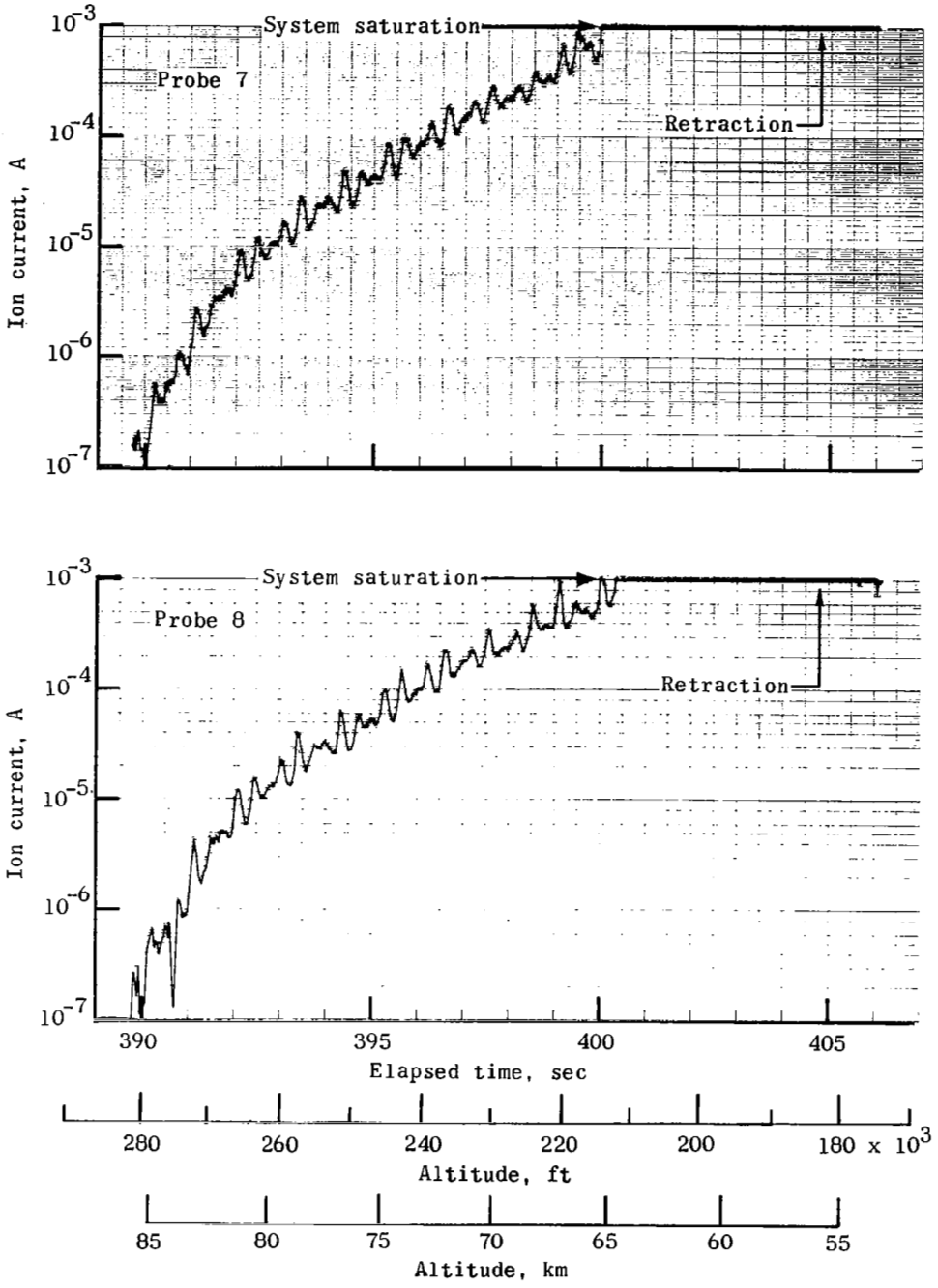
(b) Electrostatic probes 3 and 4.

Figure 14.- Continued.



(c) Electrostatic probes 5 and 6.

Figure 14.- Continued.



(d) Electrostatic probes 7 and 8.

Figure 14.- Concluded.

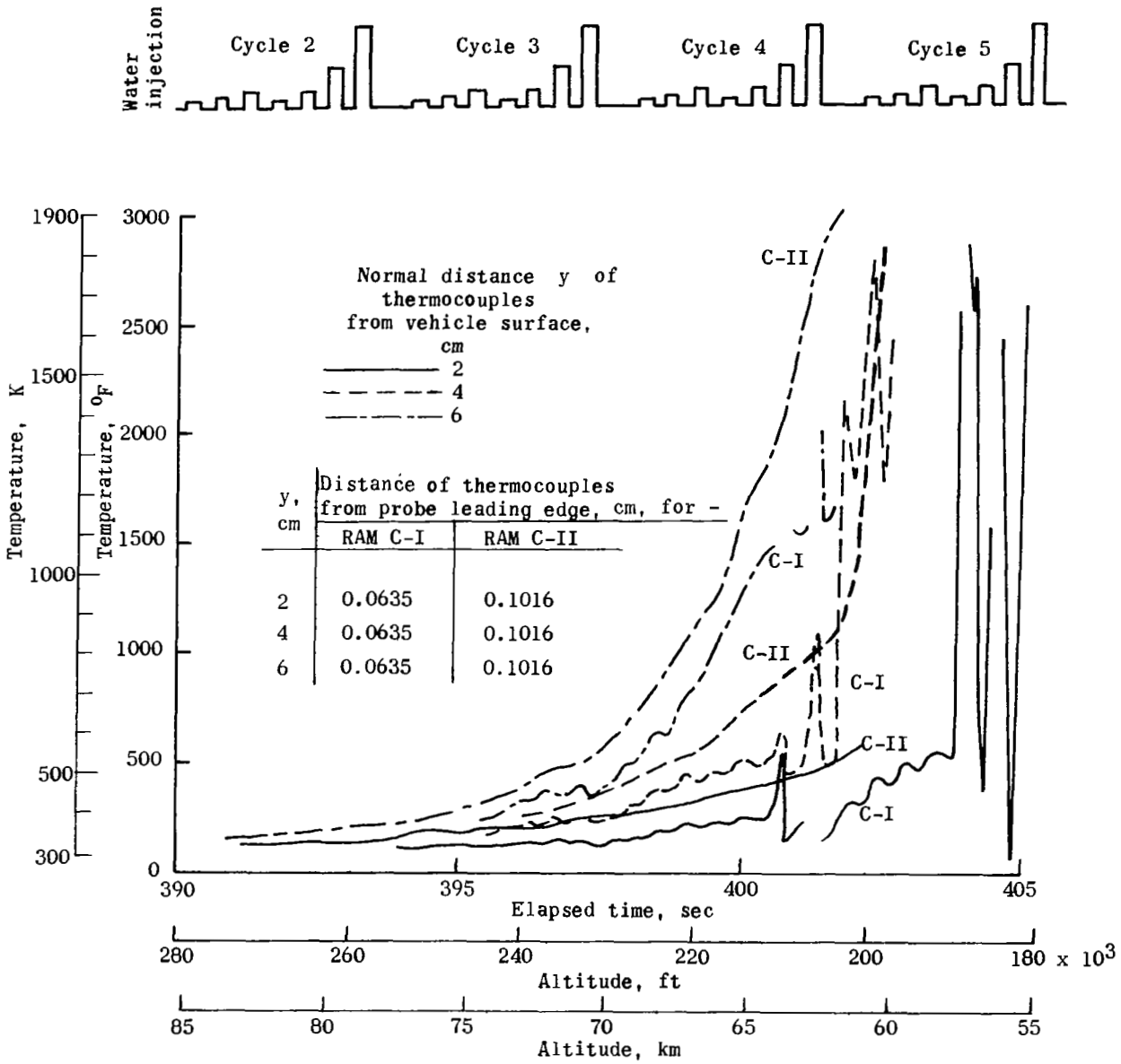


Figure 15.- Comparison of thermocouple-rake leading-edge temperatures.

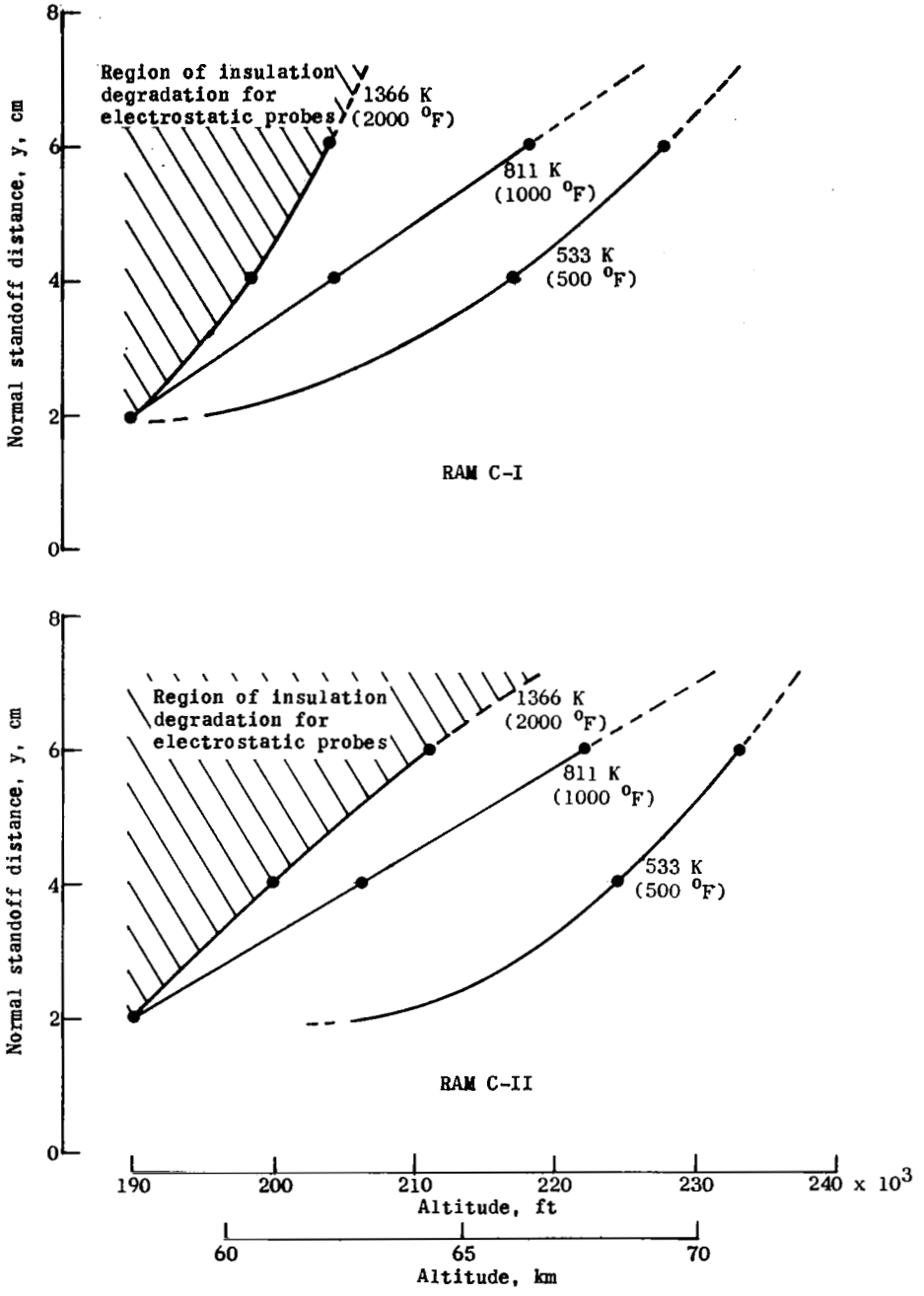
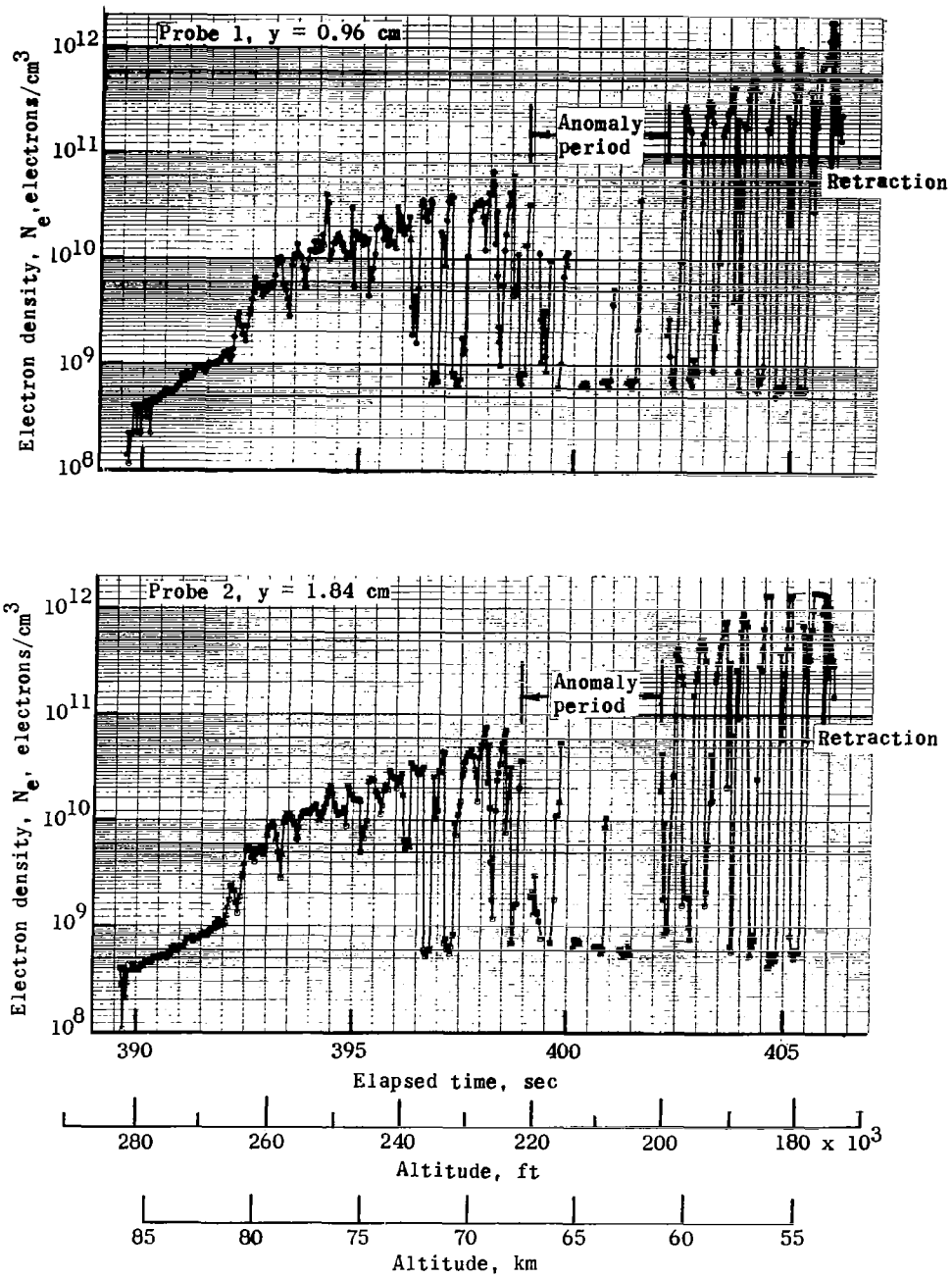
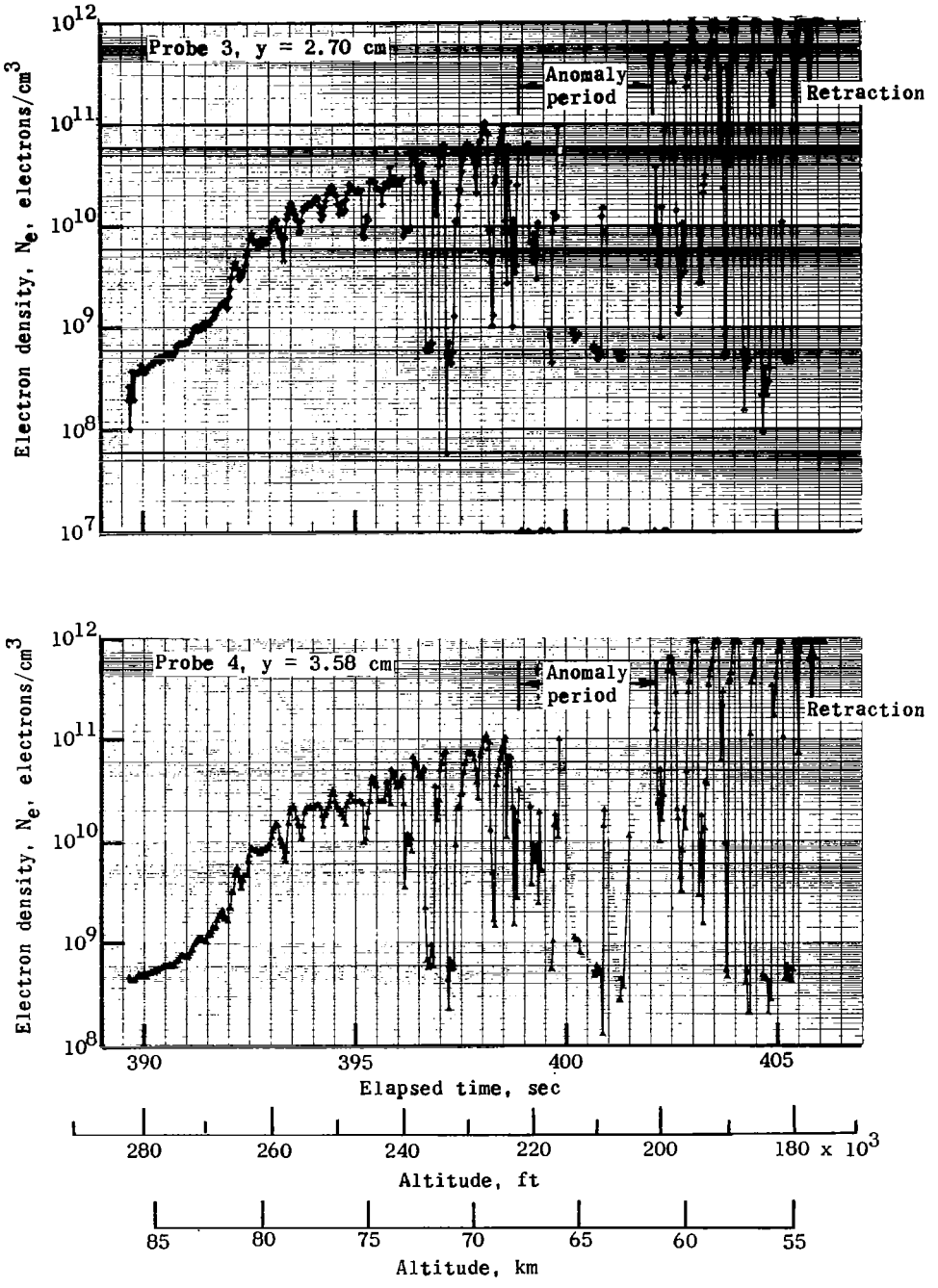


Figure 16.- Constant-temperature profiles from thermocouple measurements.



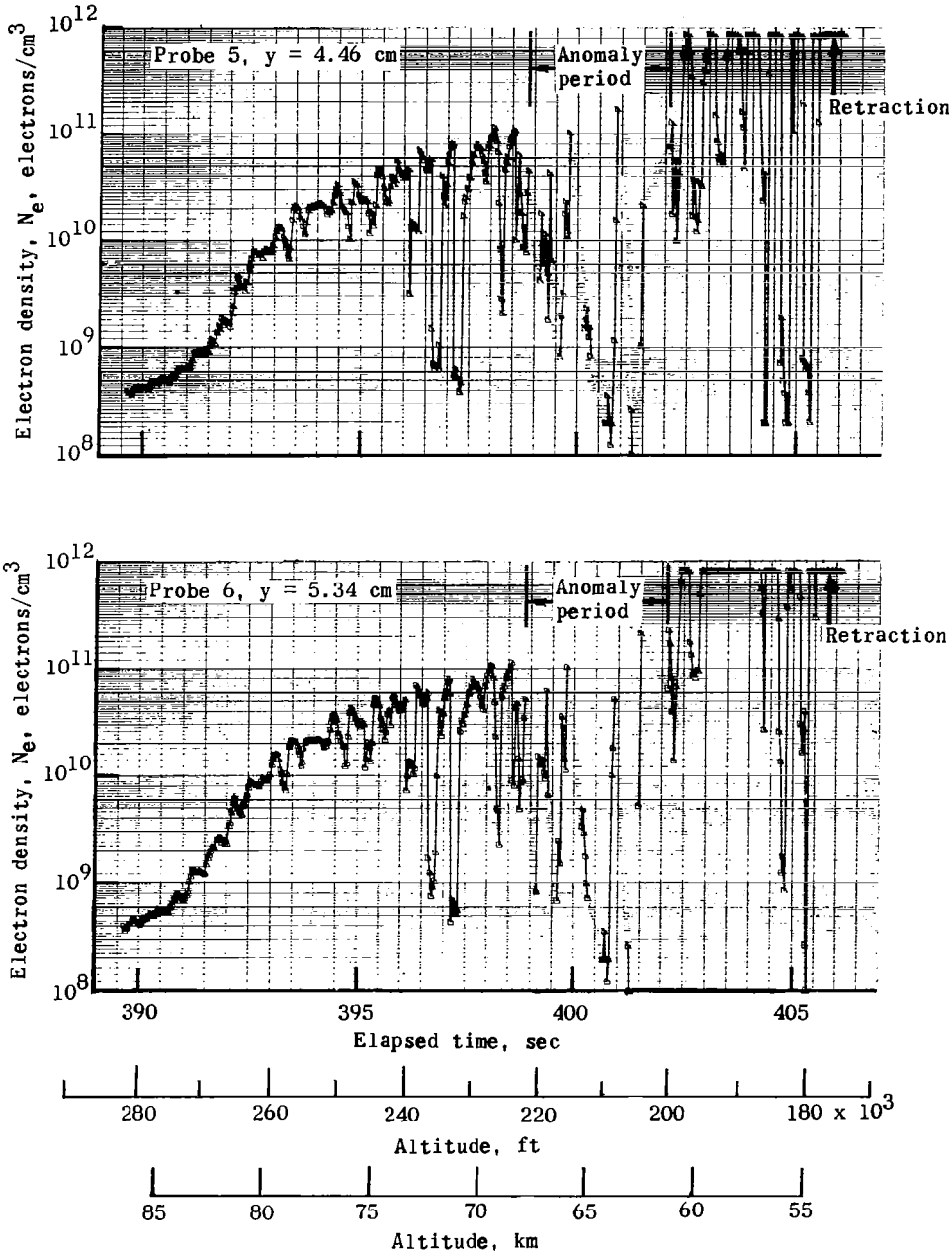
(a) Electrostatic probes 1 and 2.

Figure 17.- Electron density of RAM C-I flow field at standoff distances y ranging between 1 and 7 cm as inferred from electrostatic probe measurements.



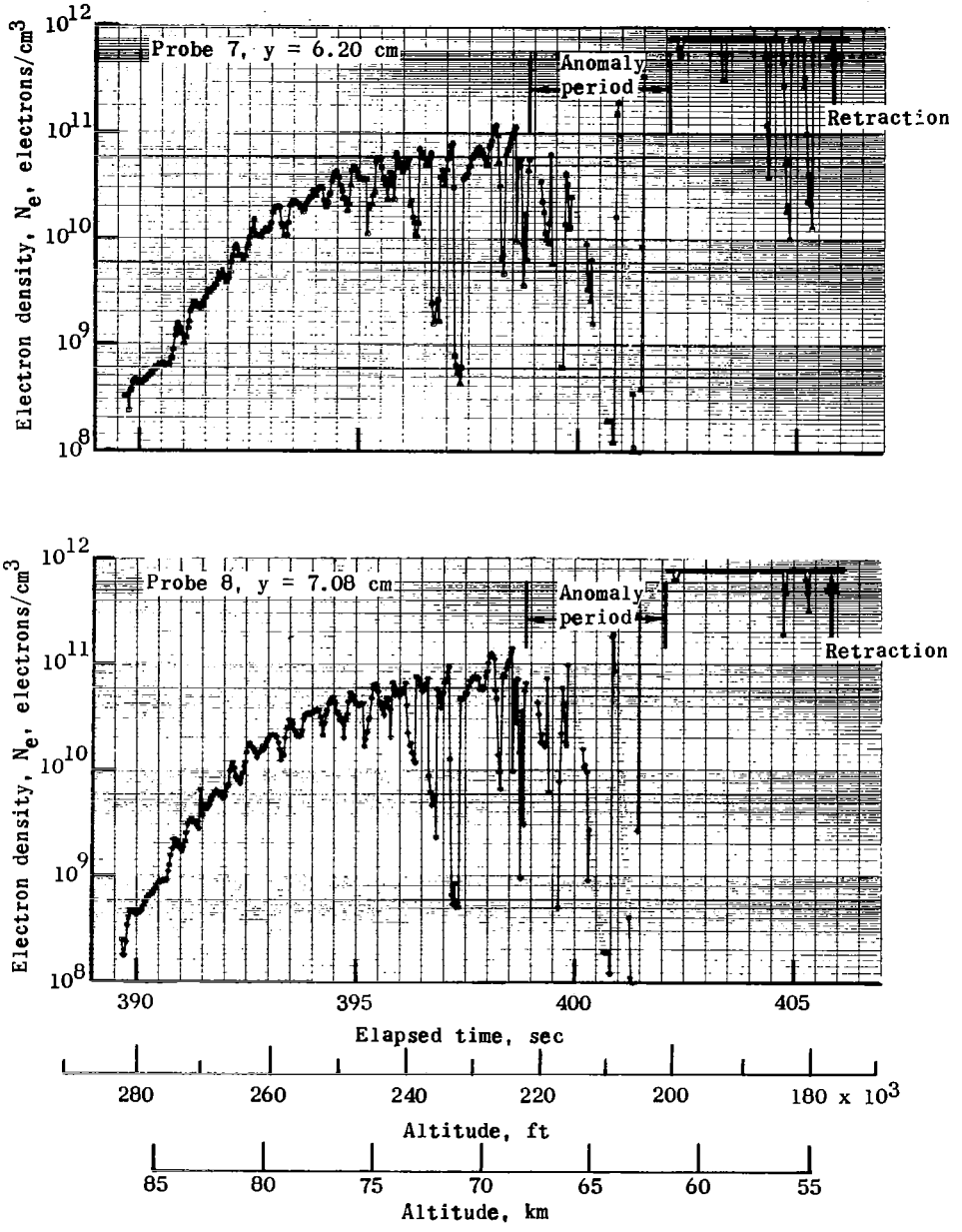
(b) Electrostatic probes 3 and 4.

Figure 17.- Continued.



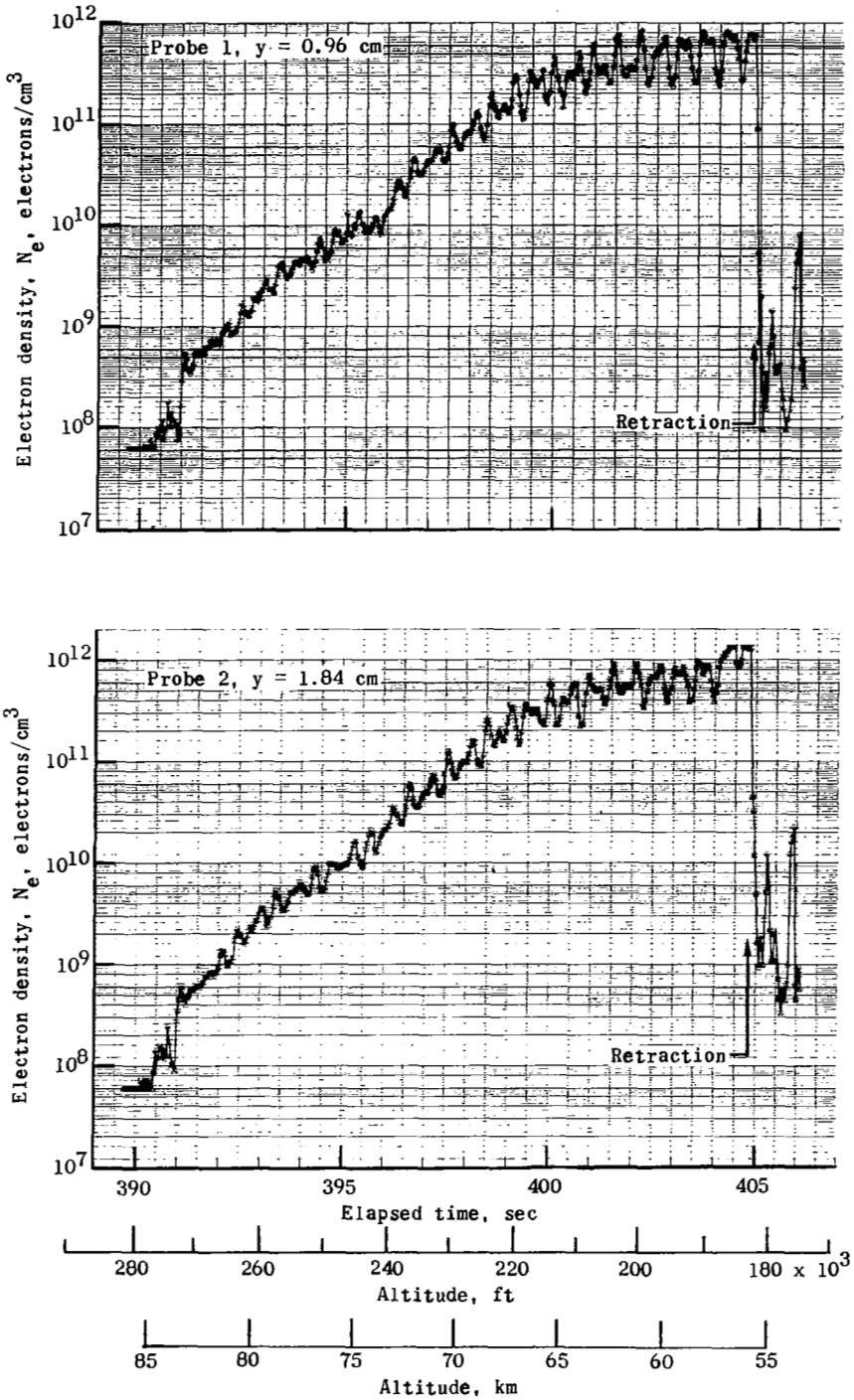
(c) Electrostatic probes 5 and 6.

Figure 17.- Continued.



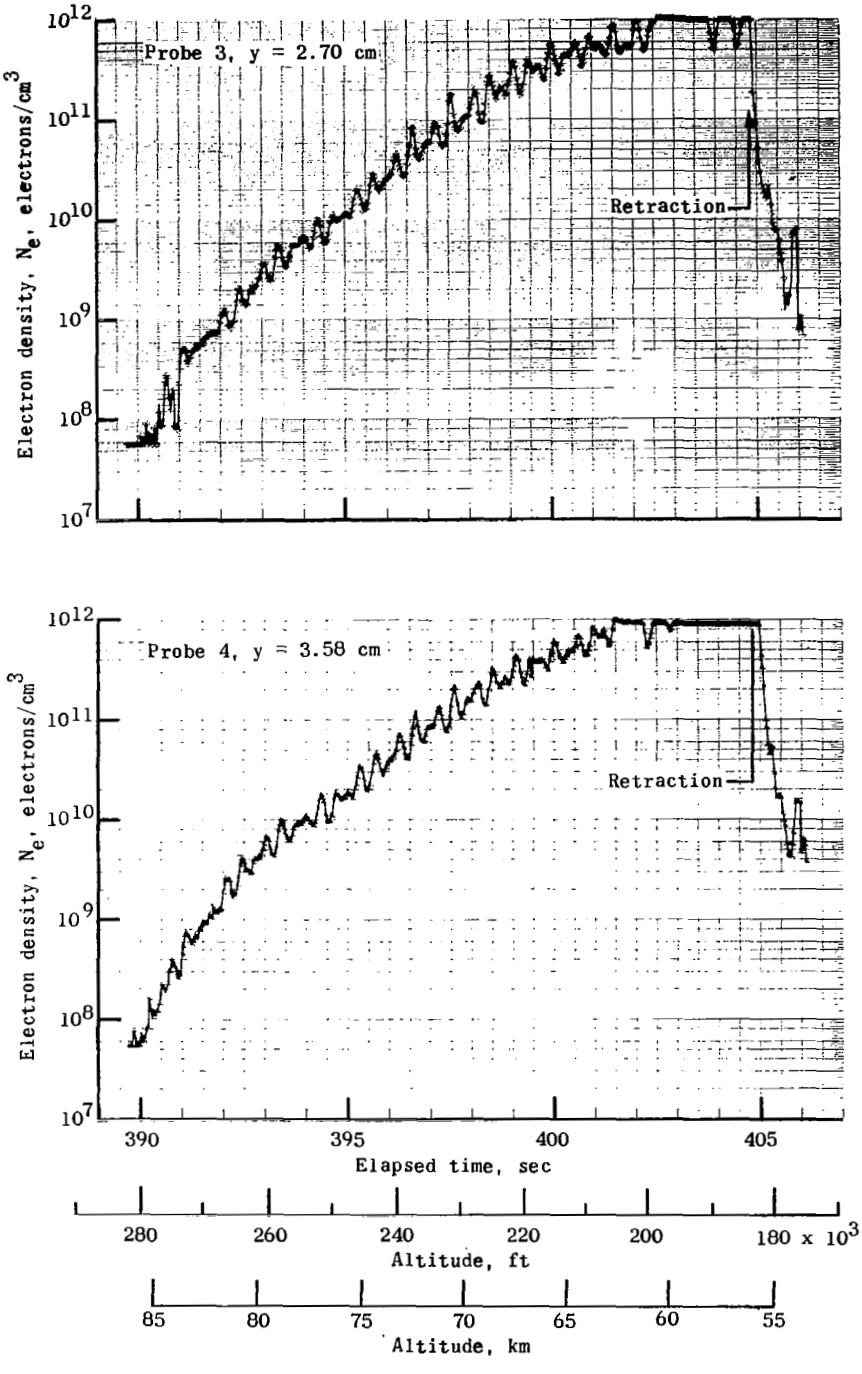
(d) Electrostatic probes 7 and 8.

Figure 17.- Concluded.



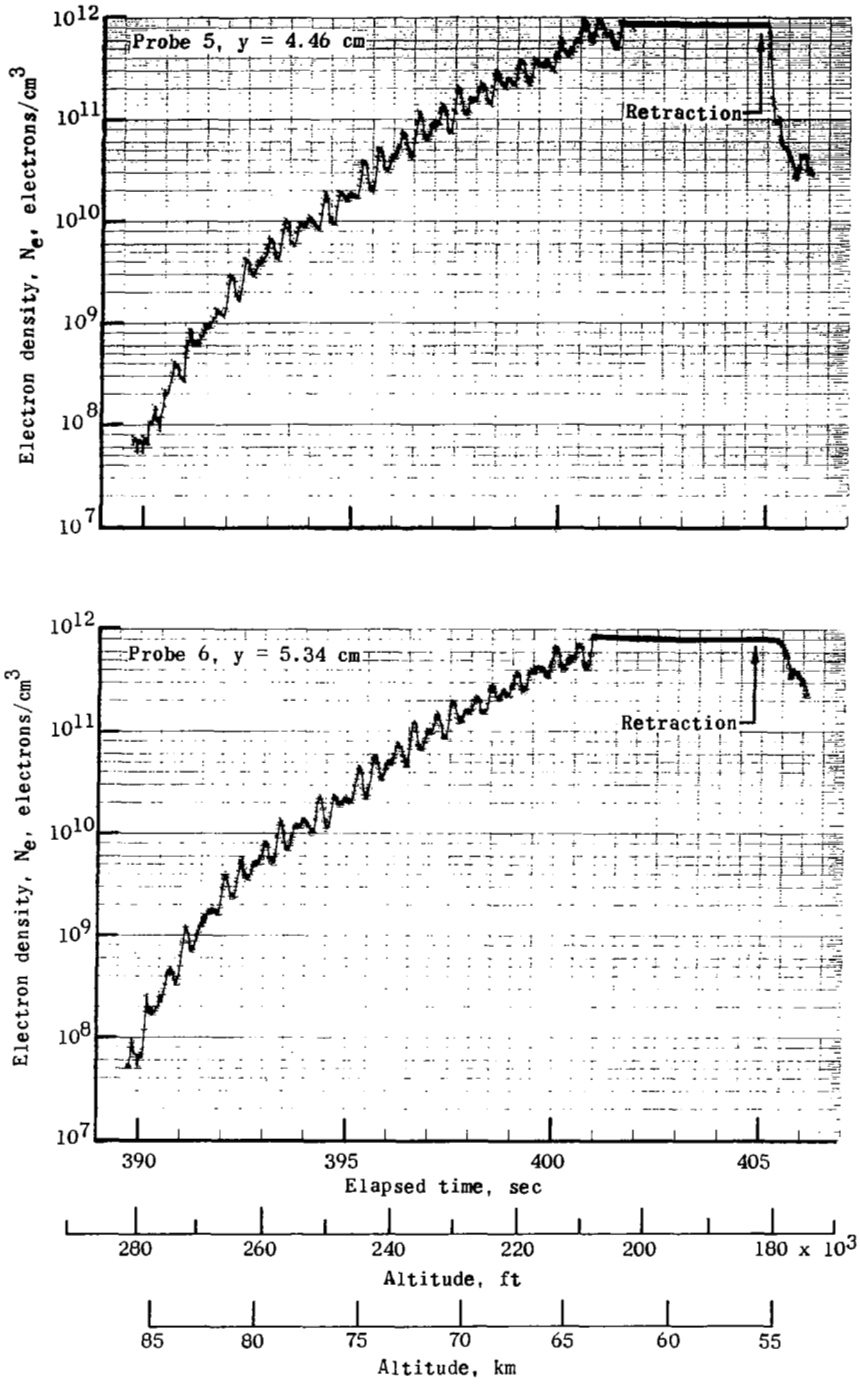
(a) Electrostatic probes 1 and 2.

Figure 18.- Electron density of RAM C-II flow field at standoff distances y ranging between 1 and 7 cm as inferred from electrostatic probe measurements. Altitudes shown are 0.3658 km (1200 ft) too low because of use of RAM C-I trajectory.



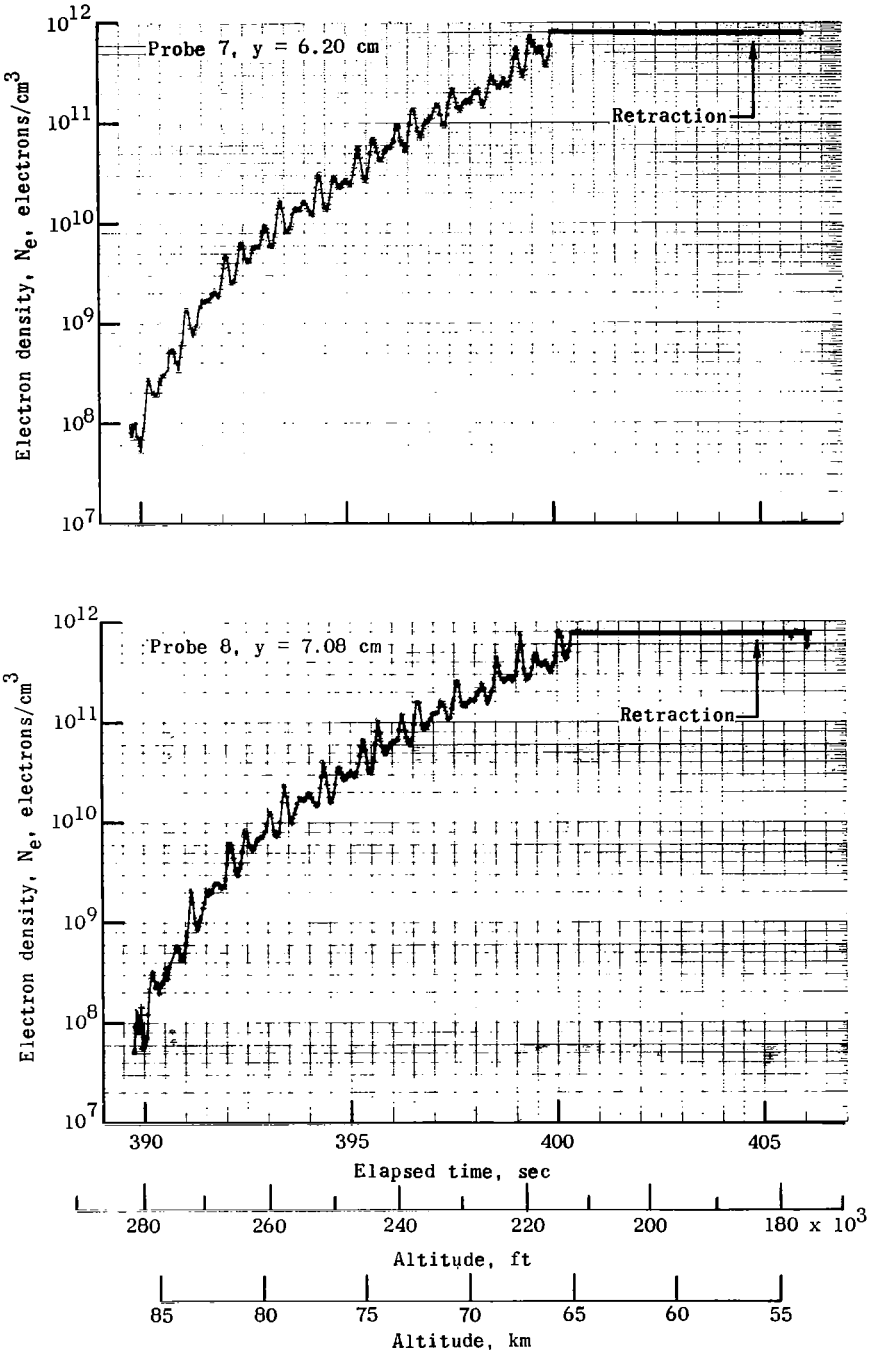
(b) Electrostatic probes 3 and 4.

Figure 18.- Continued.



(c) Electrostatic probes 5 and 6.

Figure 18.- Continued.



(d) Electrostatic probes 7 and 8.

Figure 18.- Concluded.

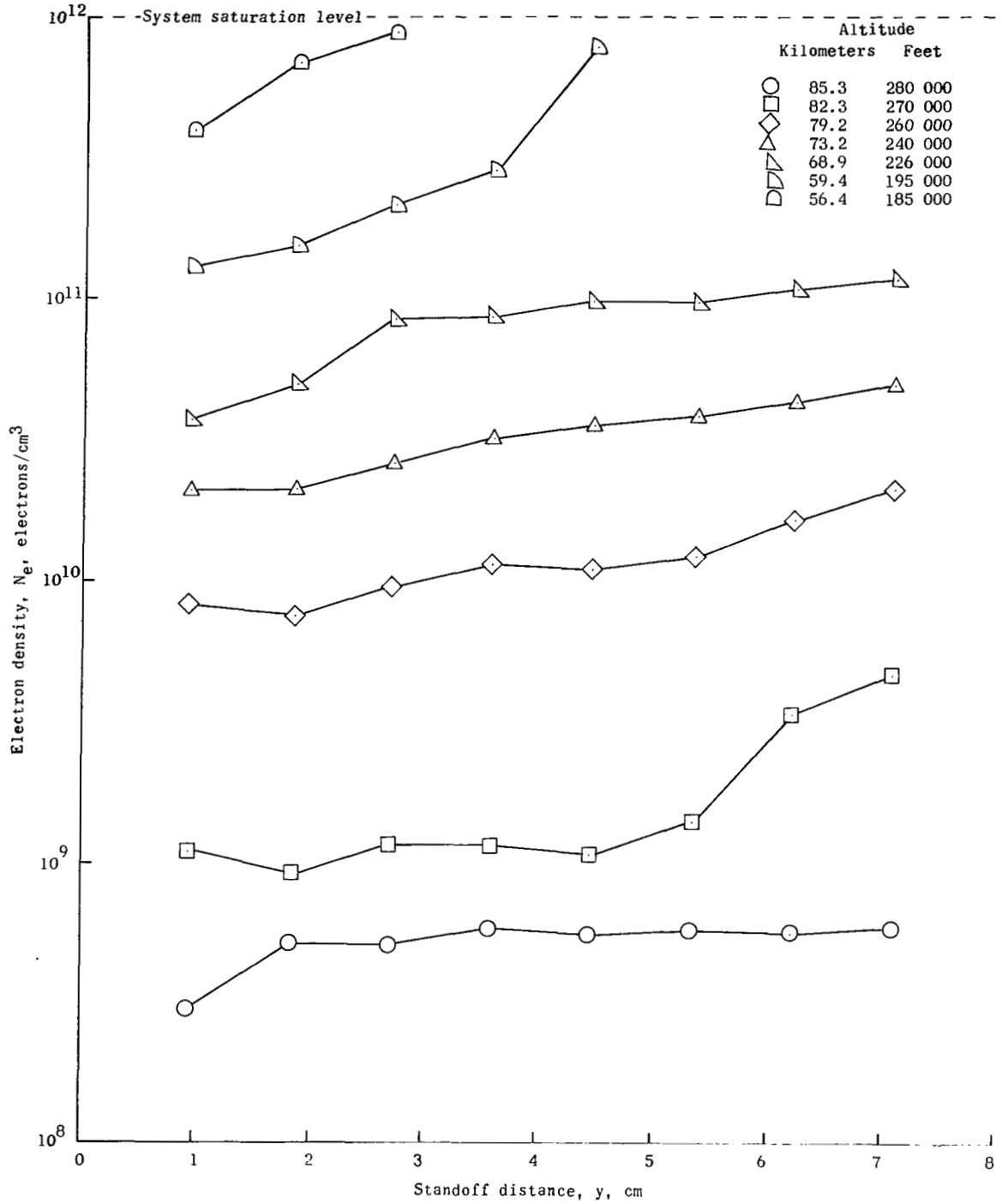


Figure 19.- Measured time-average electron density profiles for RAM C-I at selected altitudes during no water injection.

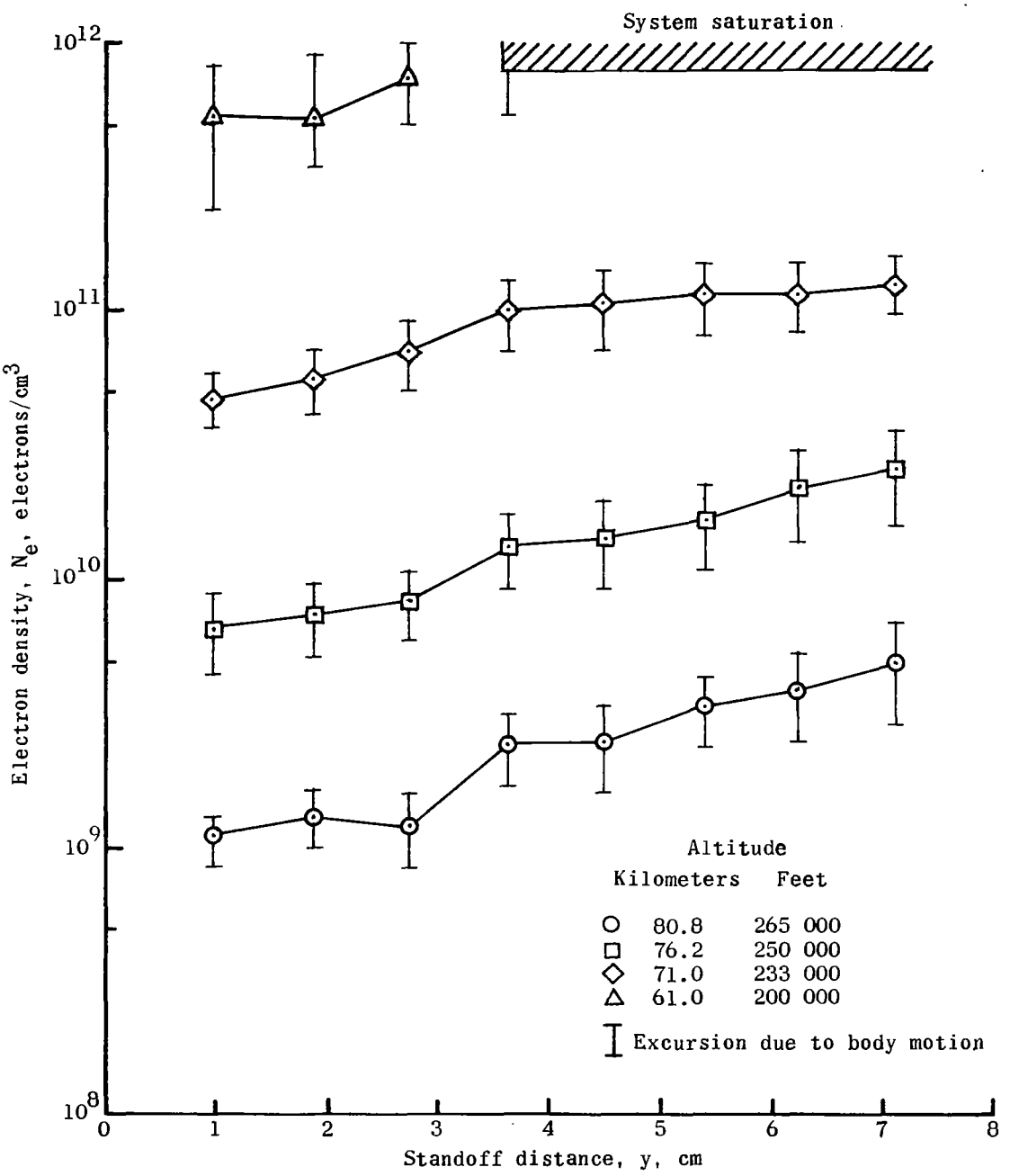
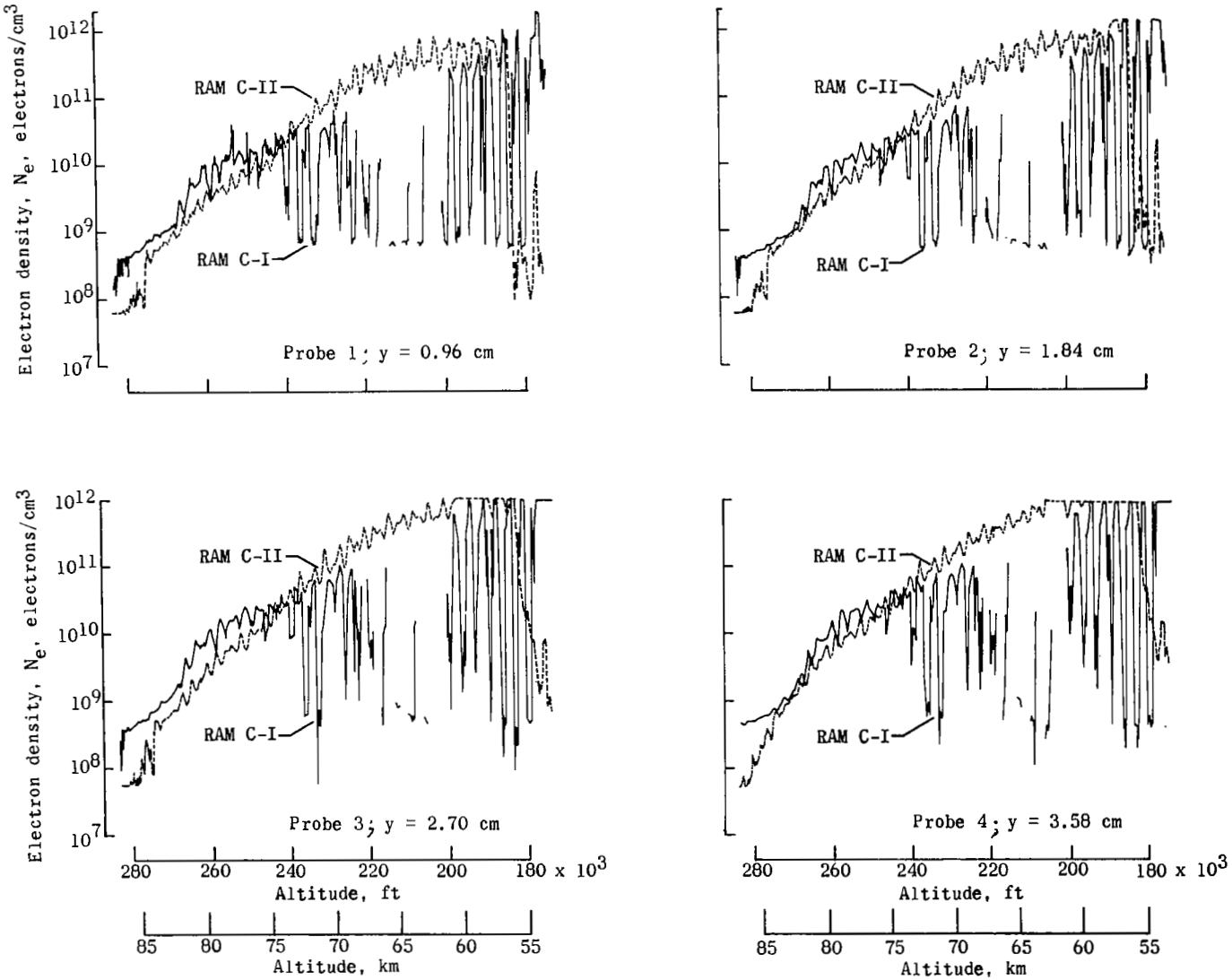
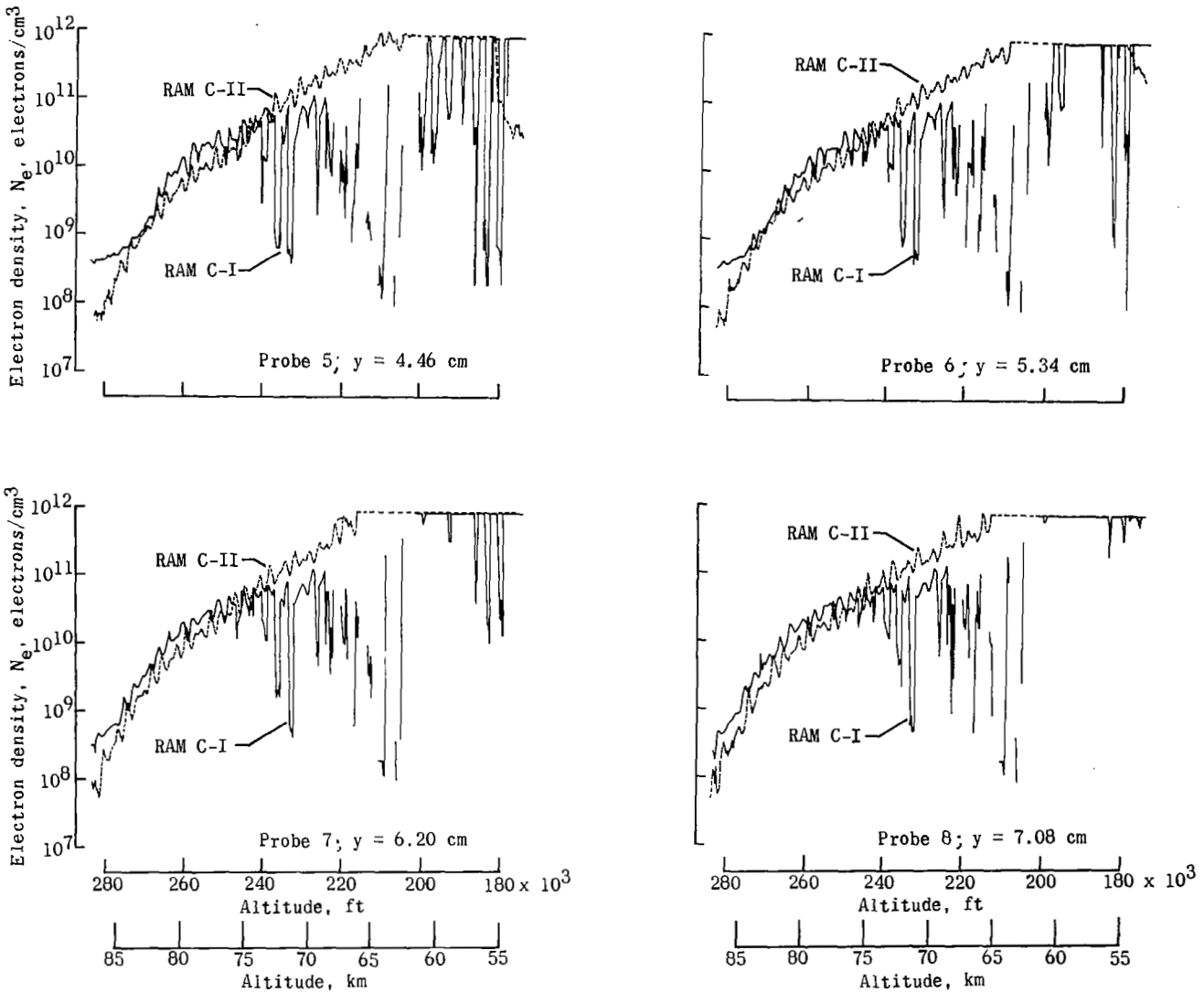


Figure 20.- Measured time-average electron density profiles for RAM C-II at four altitudes.



(a) Probes 1 to 4.

Figure 21.- Comparison of measured electron densities for individual probes on RAM C-I and C-II. Altitudes for RAM C-II data are 0.3658 km (1200 ft) too low because of use of RAM C-I trajectory.



(b) Probes 5 to 8.

Figure 21.- Concluded.

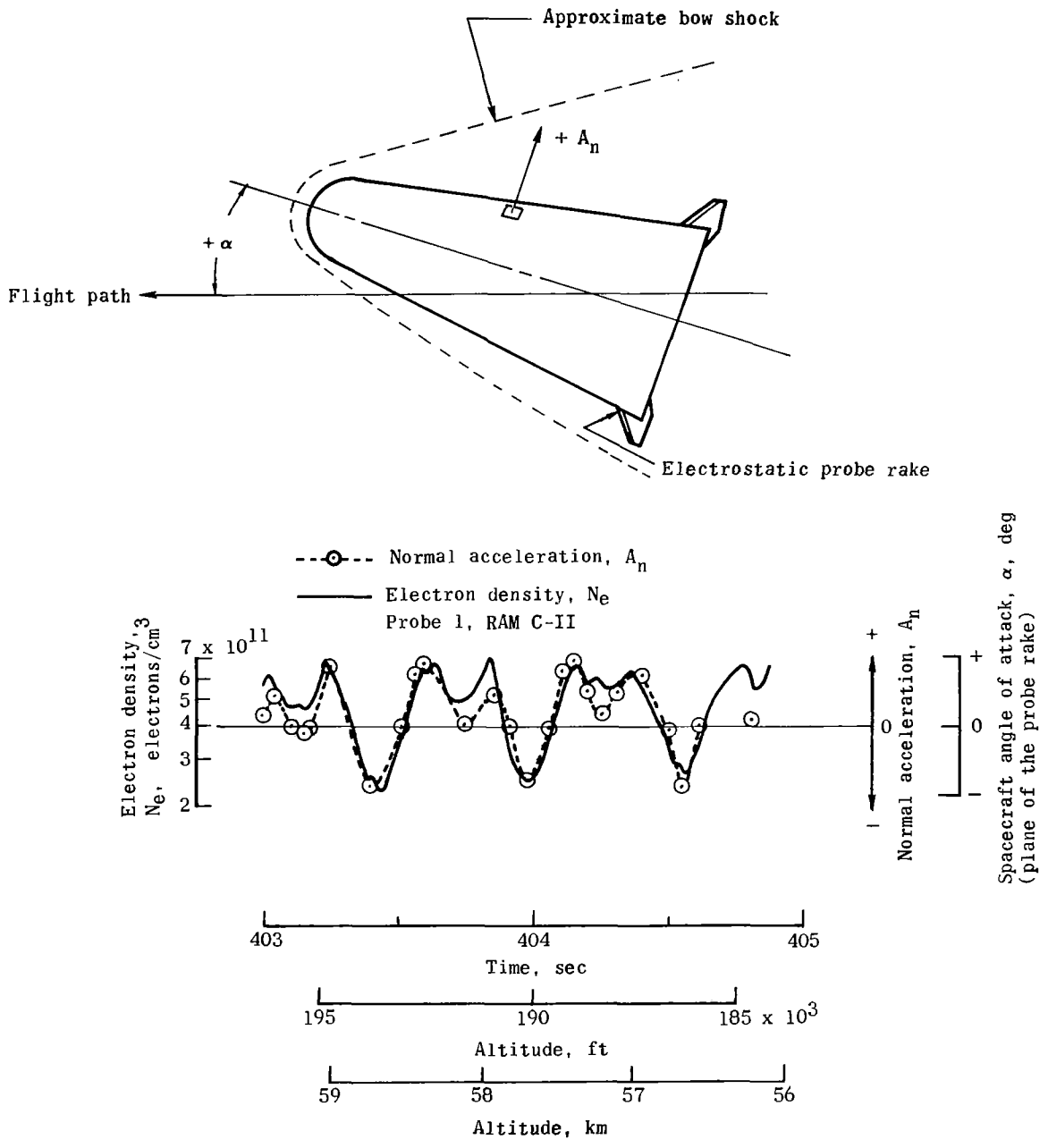


Figure 22.- Correlation of RAM C-II fixed-bias electrostatic probe measurements with spacecraft angle-of-attack motions.

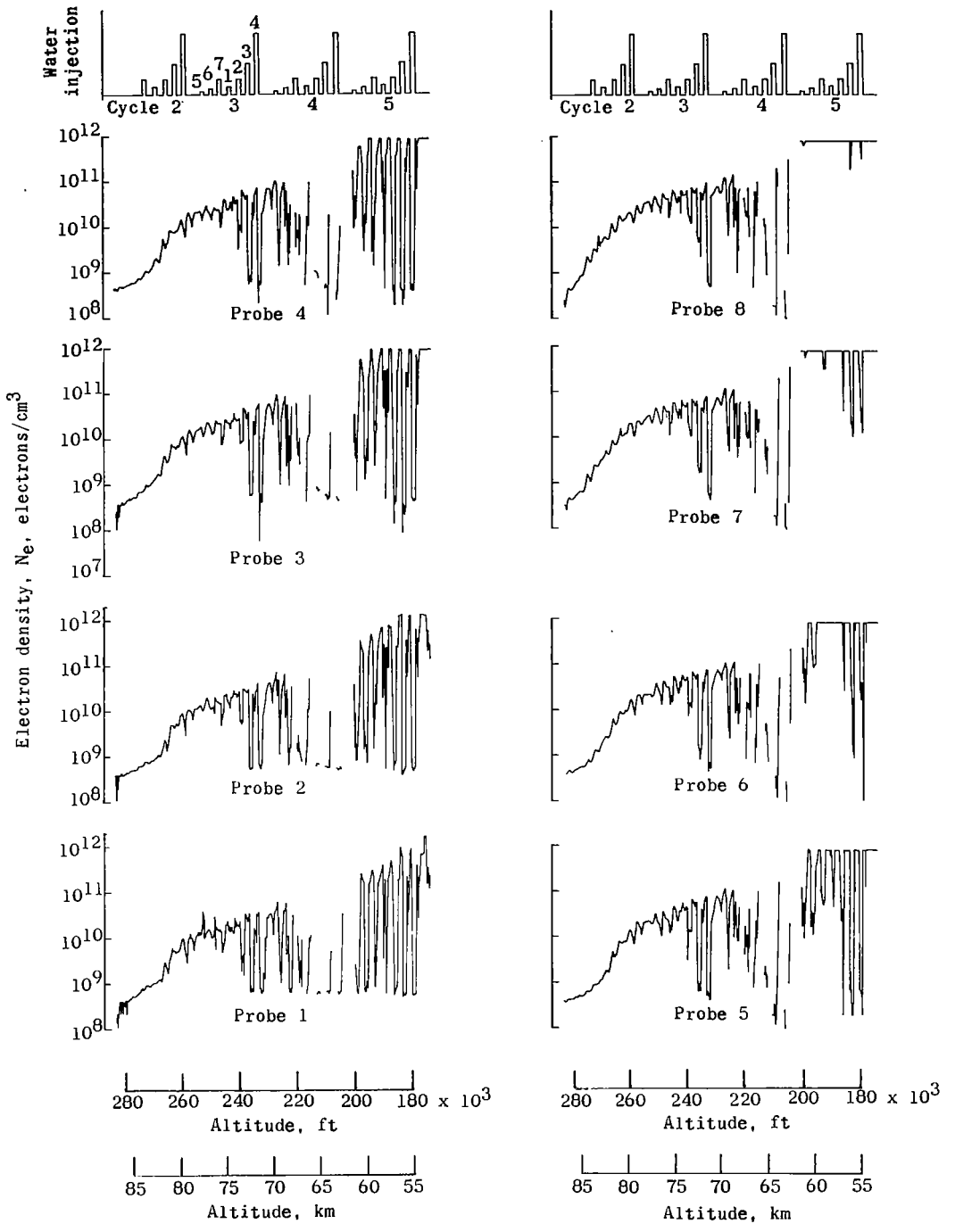


Figure 23.- Effects of water injection on electron density as inferred by RAM C-I electrostatic probes.

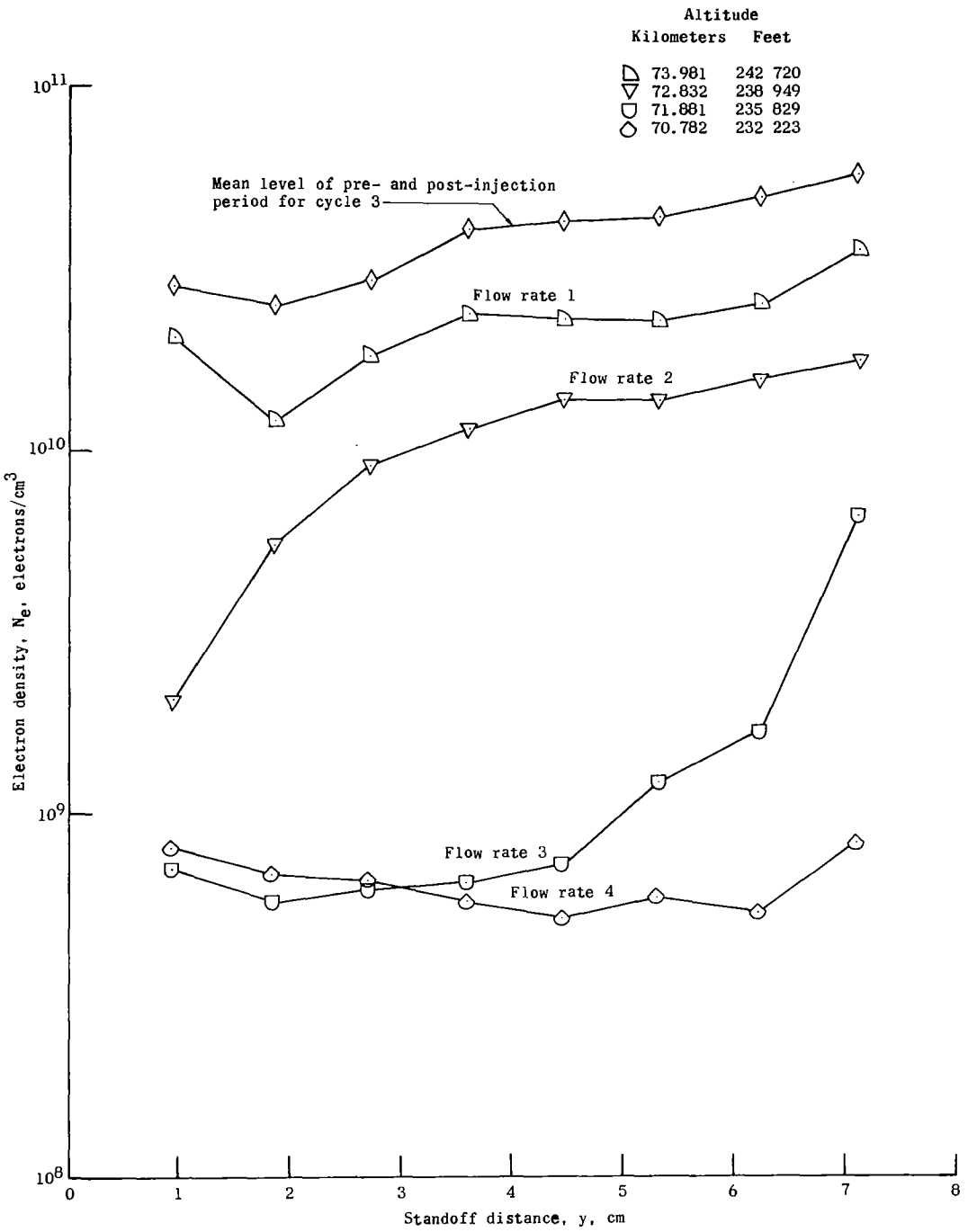


Figure 24.- RAM C-I electron-density distribution profiles during side injection portion of cycle 3.

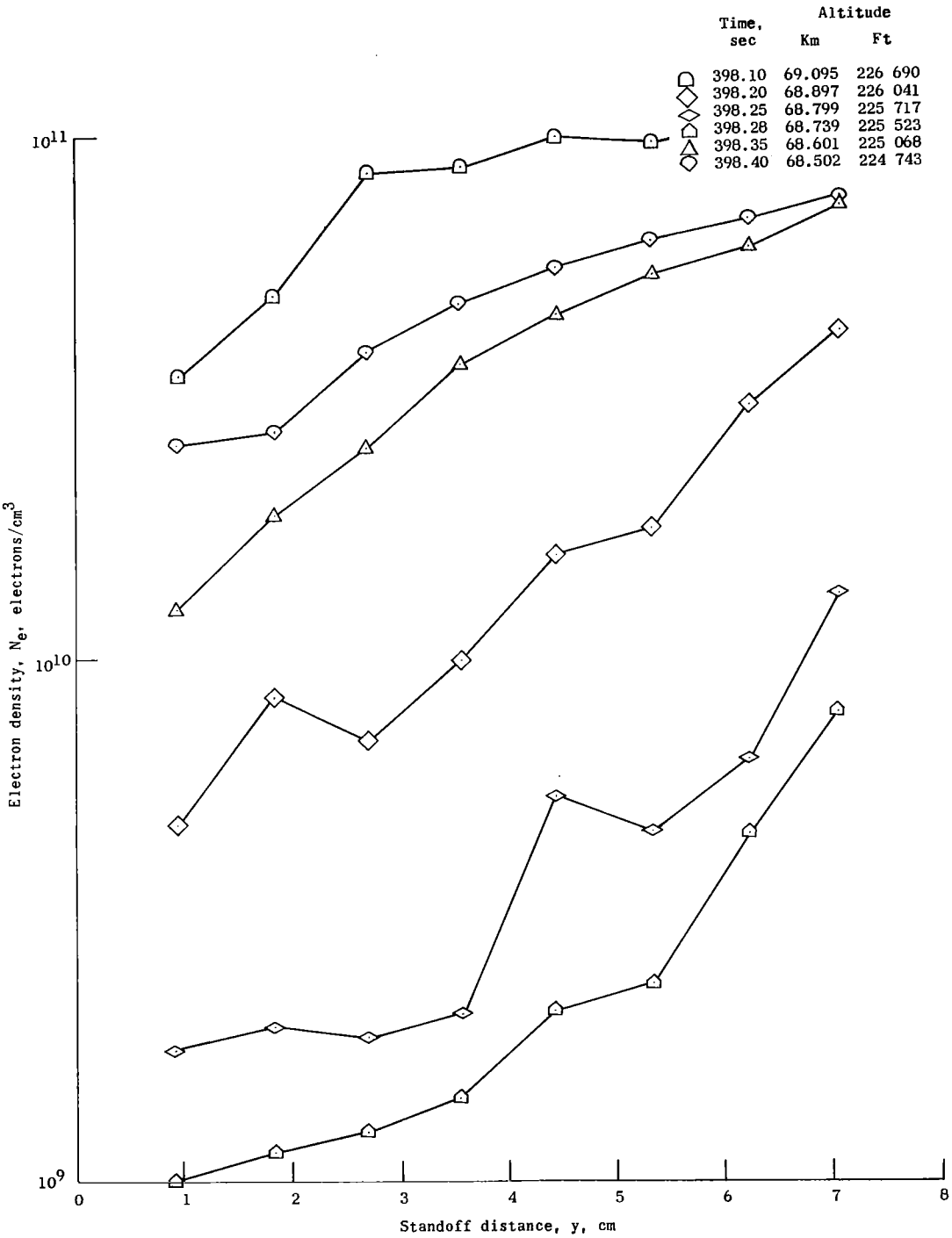


Figure 25.- Effect of stagnation injection at flow rate 5 of cycle 4 on RAM C-I electron density distribution profiles at various altitudes.

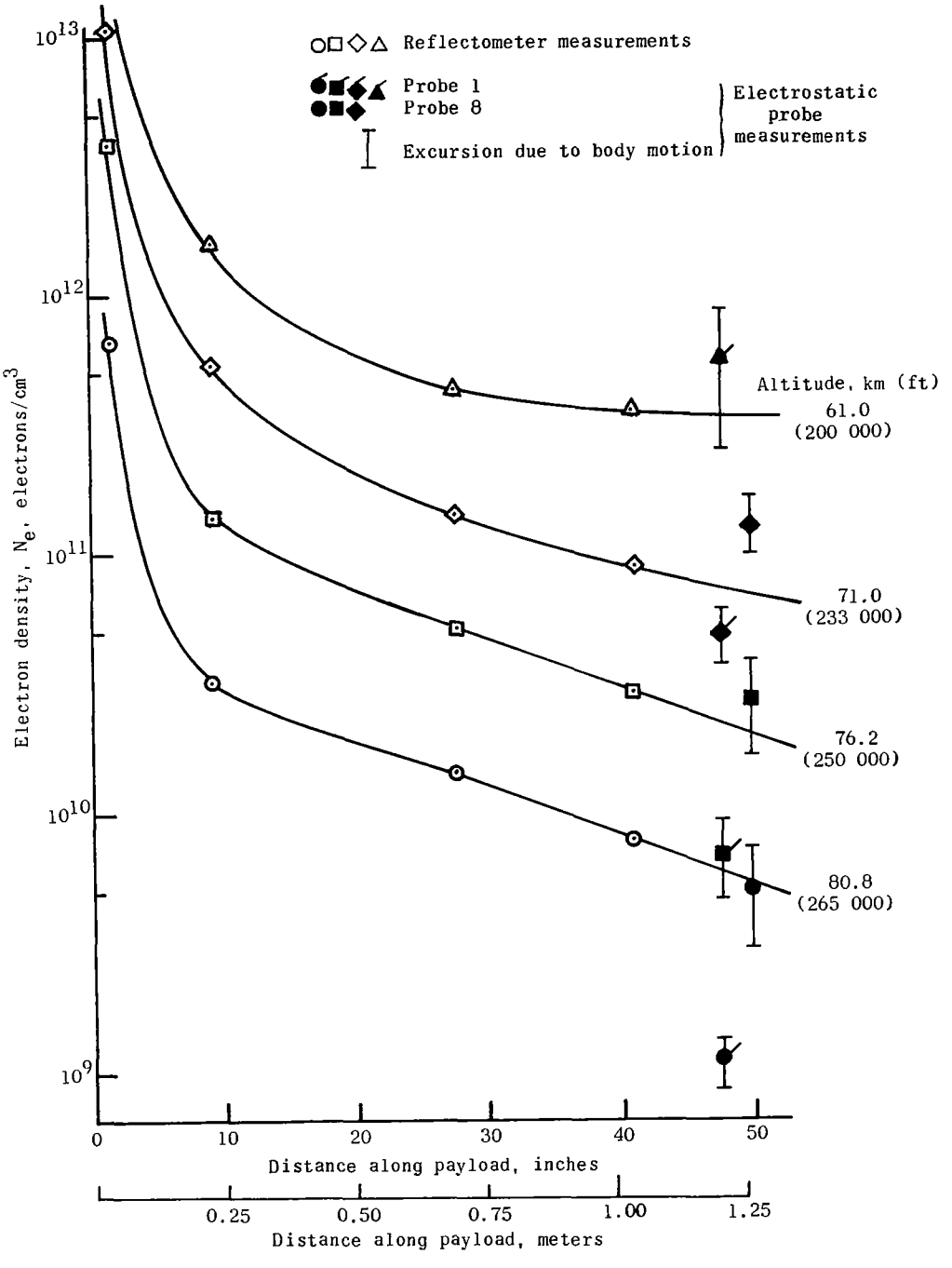


Figure 26.- RAM C-II longitudinal profiles of inferred peak electron density for constant altitudes.

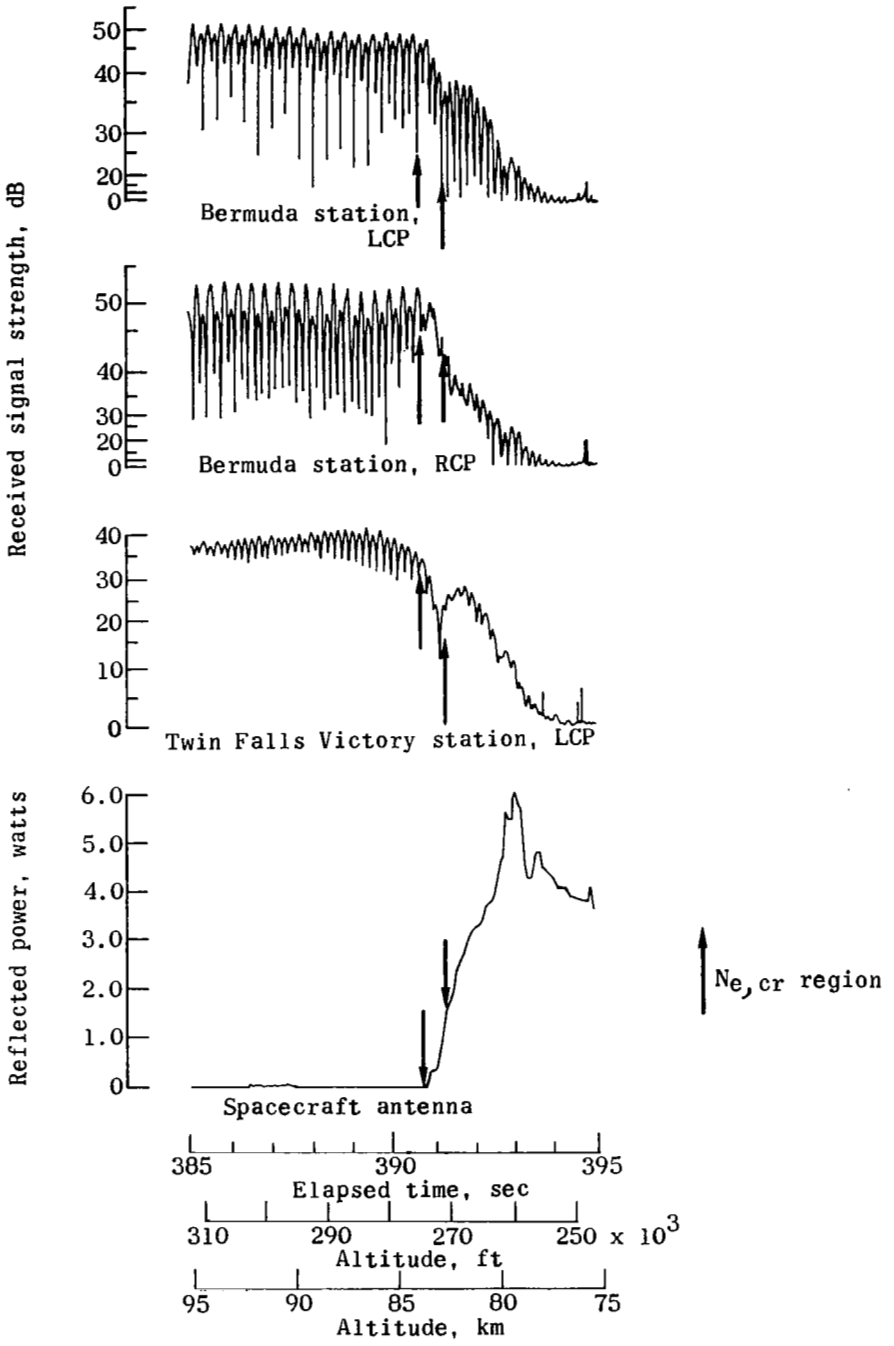


Figure 27.- Effects of RAM C-I reentry plasma on 225.7 MHz telemetry antenna. LCP, left circular polarization; RCP, right circular polarization.

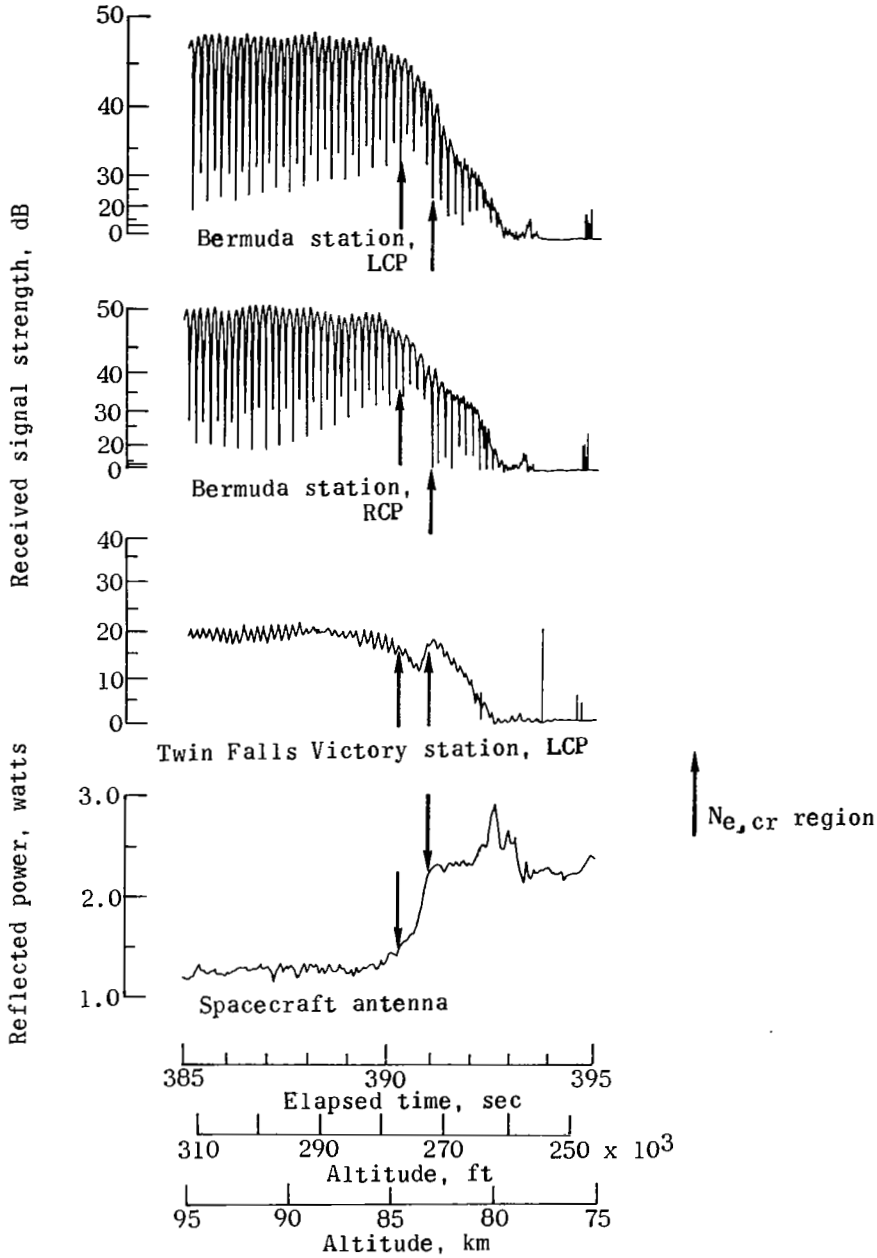


Figure 28.- Effects of RAM C-I reentry plasma on 259.7 MHz telemetry antenna. LCP, left circular polarization; RCP, right circular polarization.

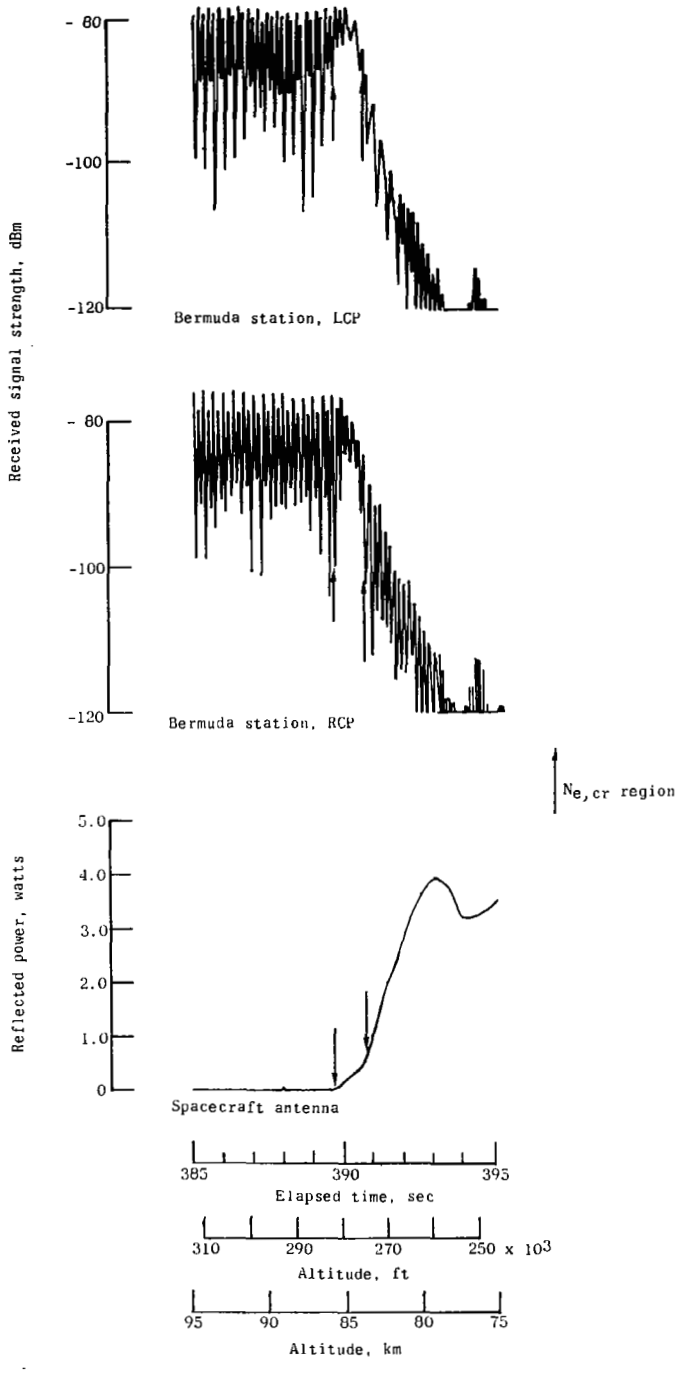


Figure 29.- Effects of RAM C-II reentry plasma on 225.7 MHz telemetry antenna. LCP, left circular polarization; RCP, right circular polarization.

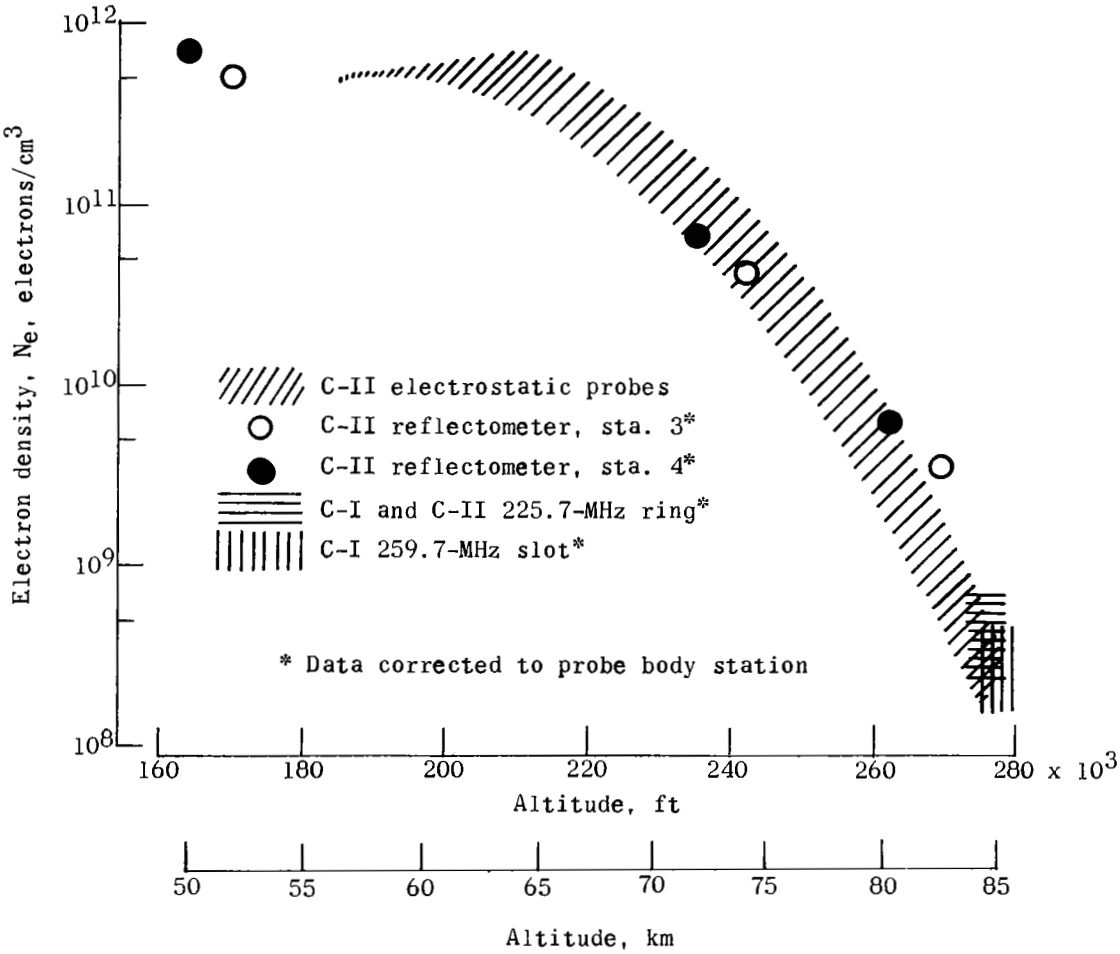


Figure 30.- Comparison of inferred electron densities.

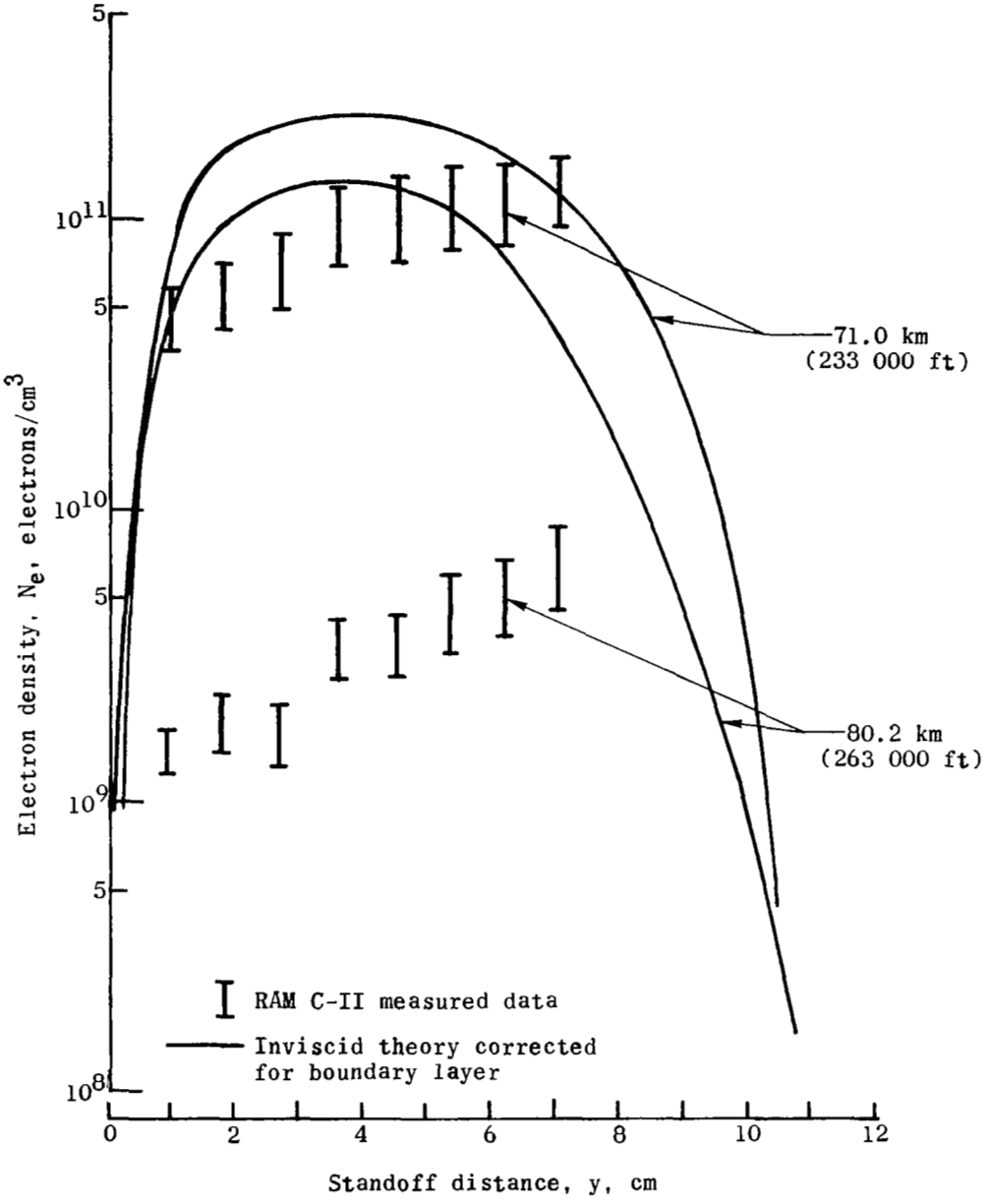


Figure 31.- Comparison of RAM C-II electrostatic probe measured data with theoretical electron density profiles.

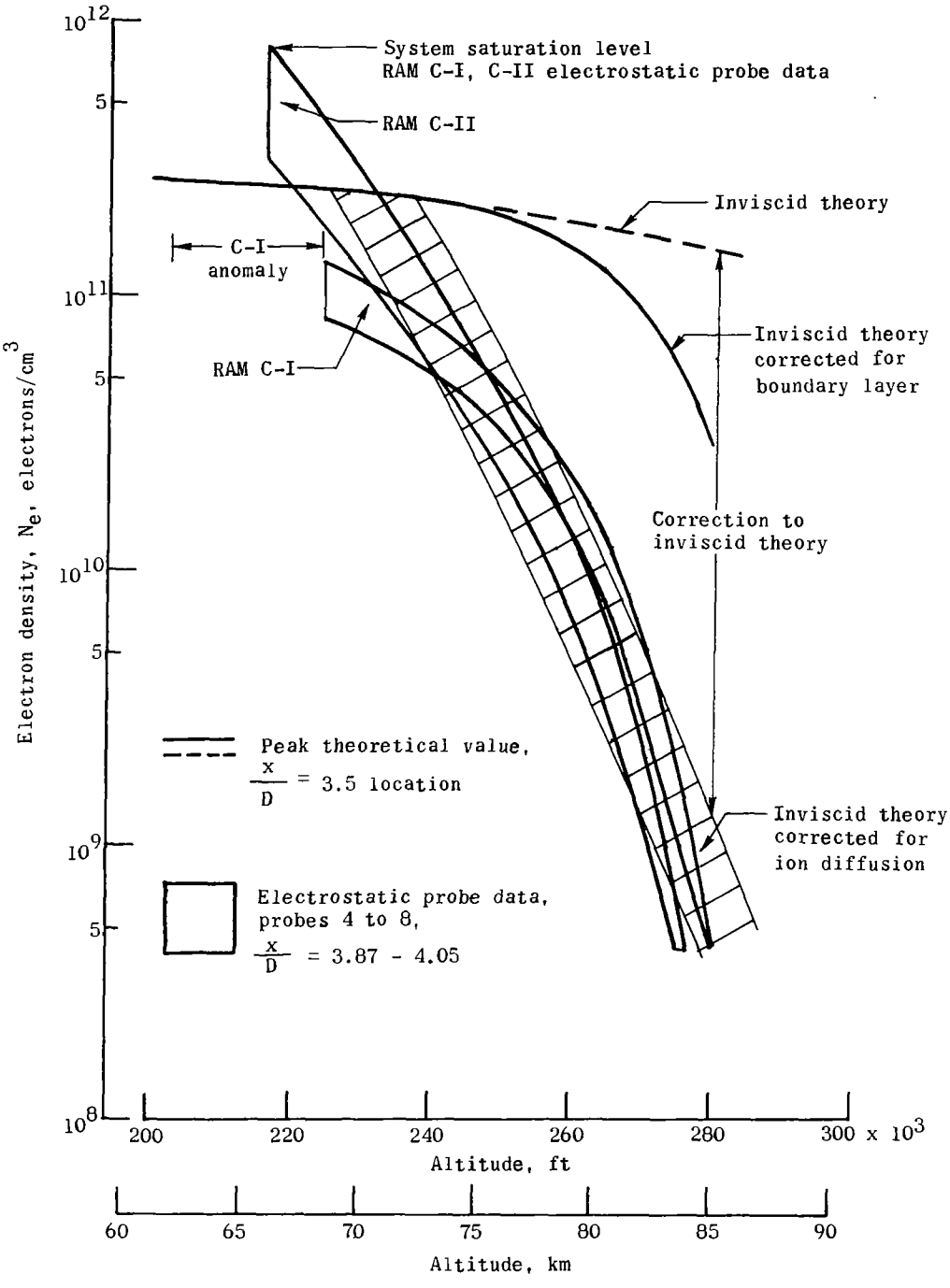


Figure 32.- Comparison of high-altitude electron density at aft body station.

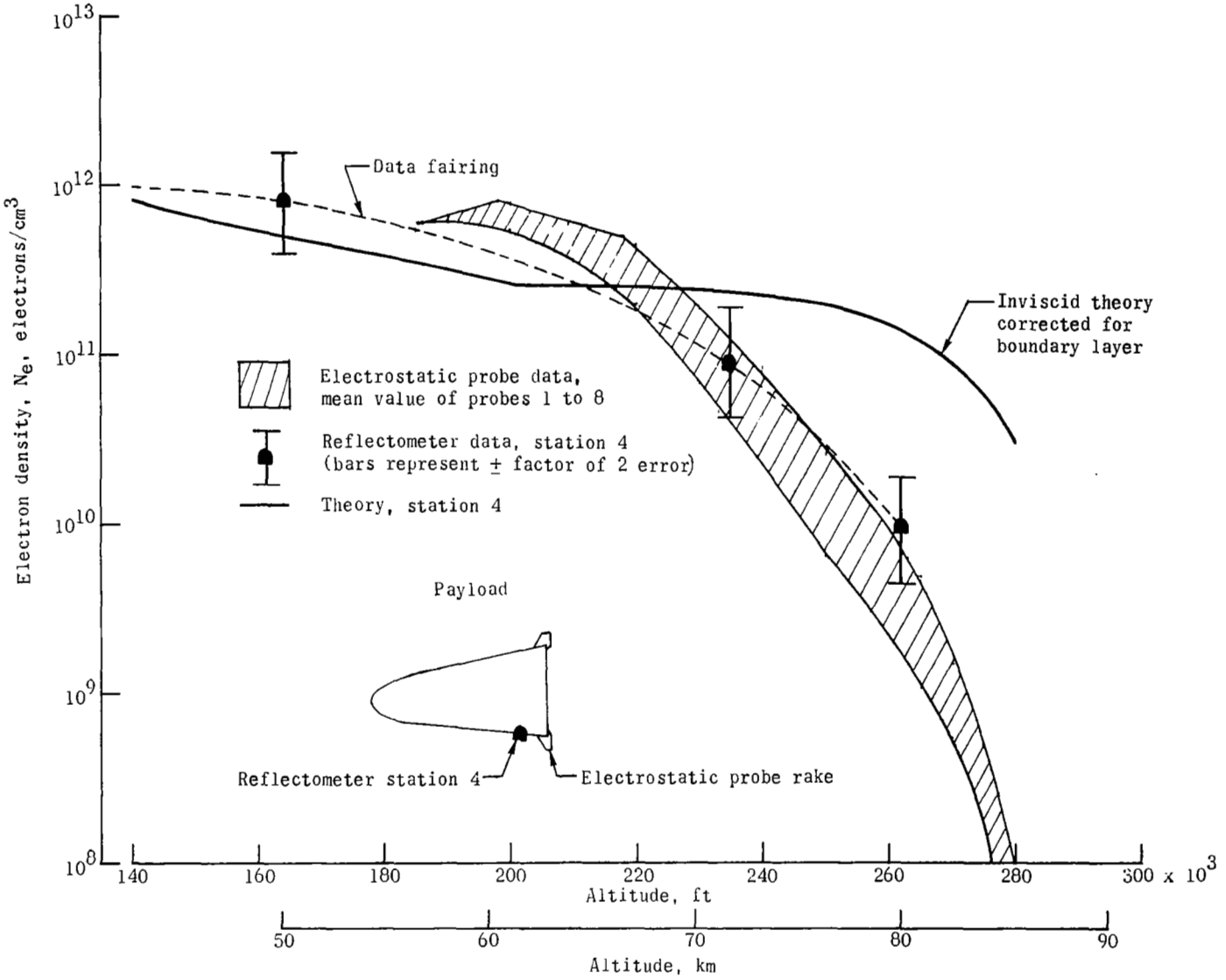


Figure 33.- Comparison of RAM C-II plasma diagnostic measurements with theoretical calculations.

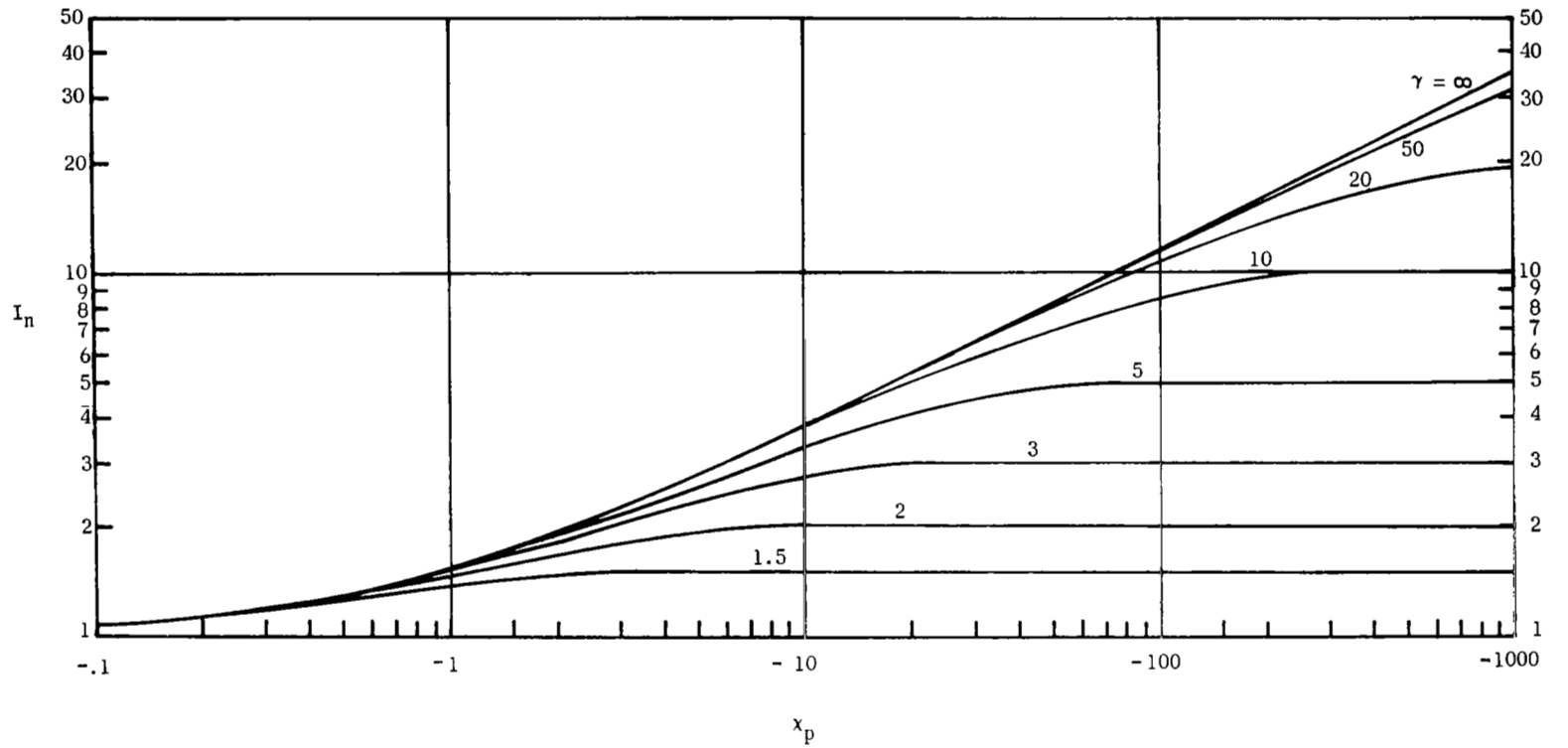


Figure 34.- Variation of normalized probe current with normalized potential difference between probe and plasma for range of γ.

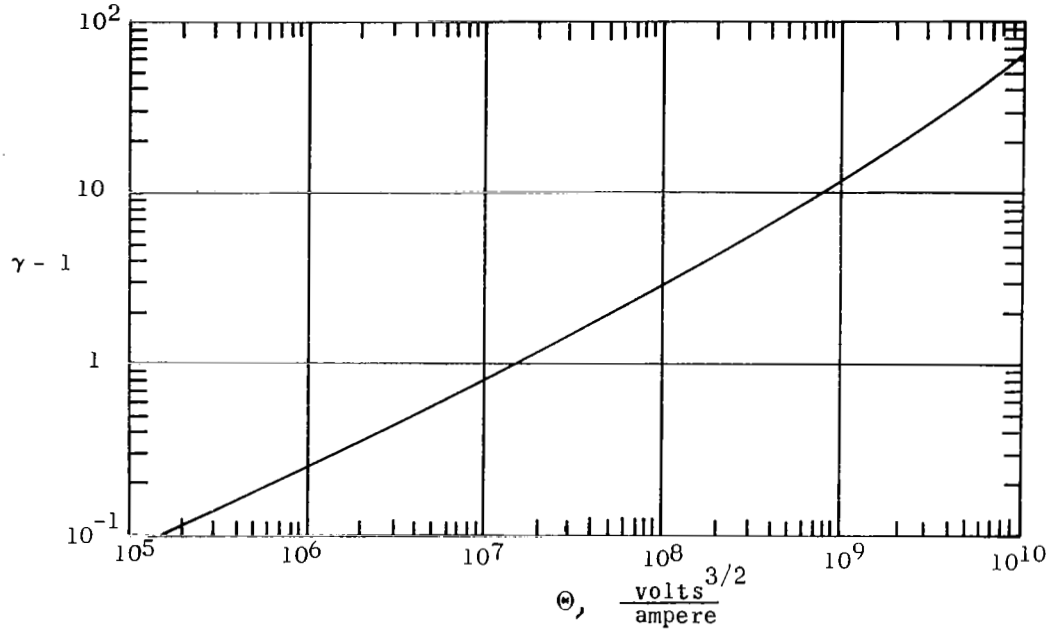


Figure 35.- Inverted form of space-charge-limited diode equation.

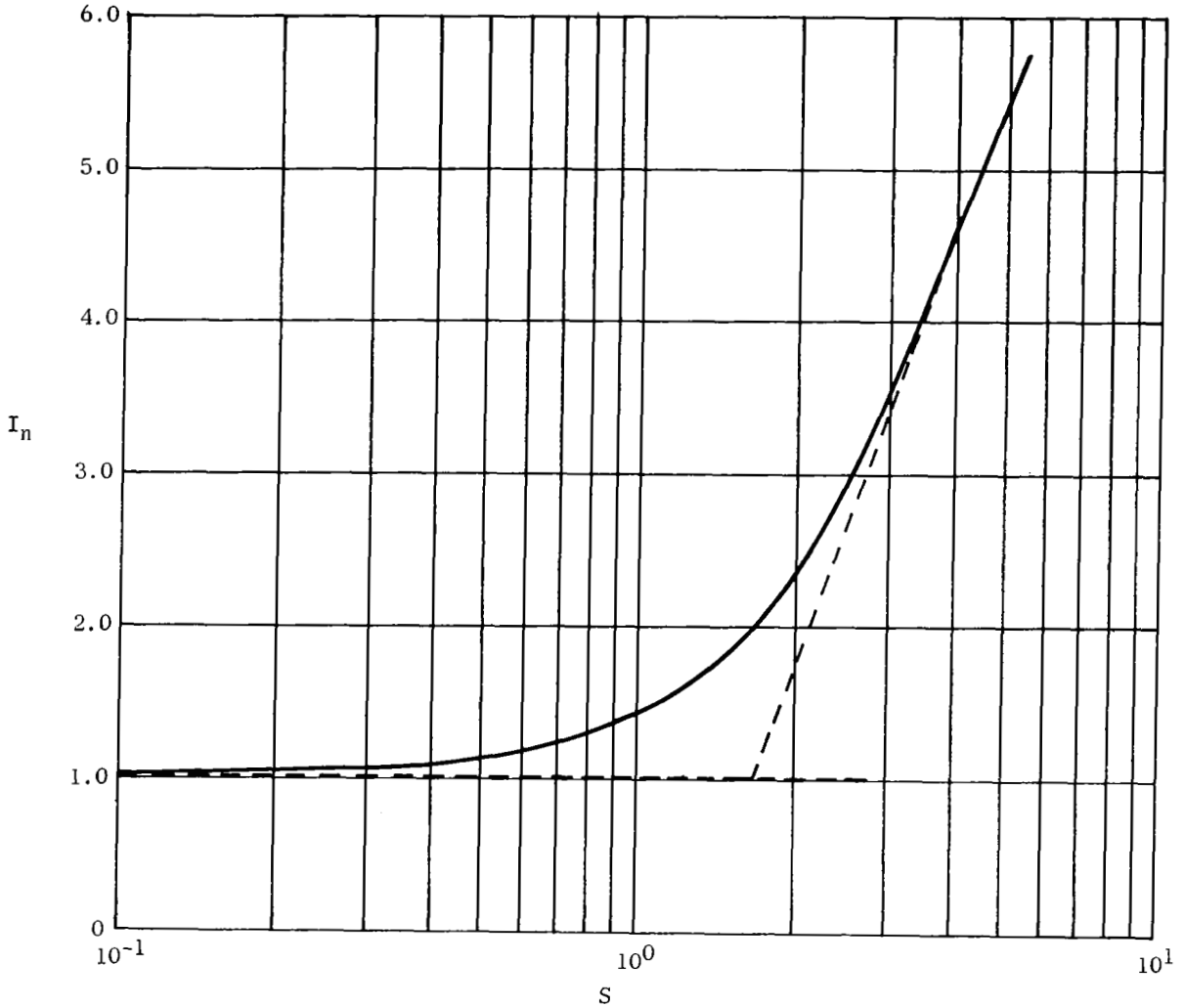


Figure 36.- Normalized current I_n collected by a probe perpendicular to the directed velocity as a function of the ratio S of directed to random velocity. Dashed lines indicate asymptotes.

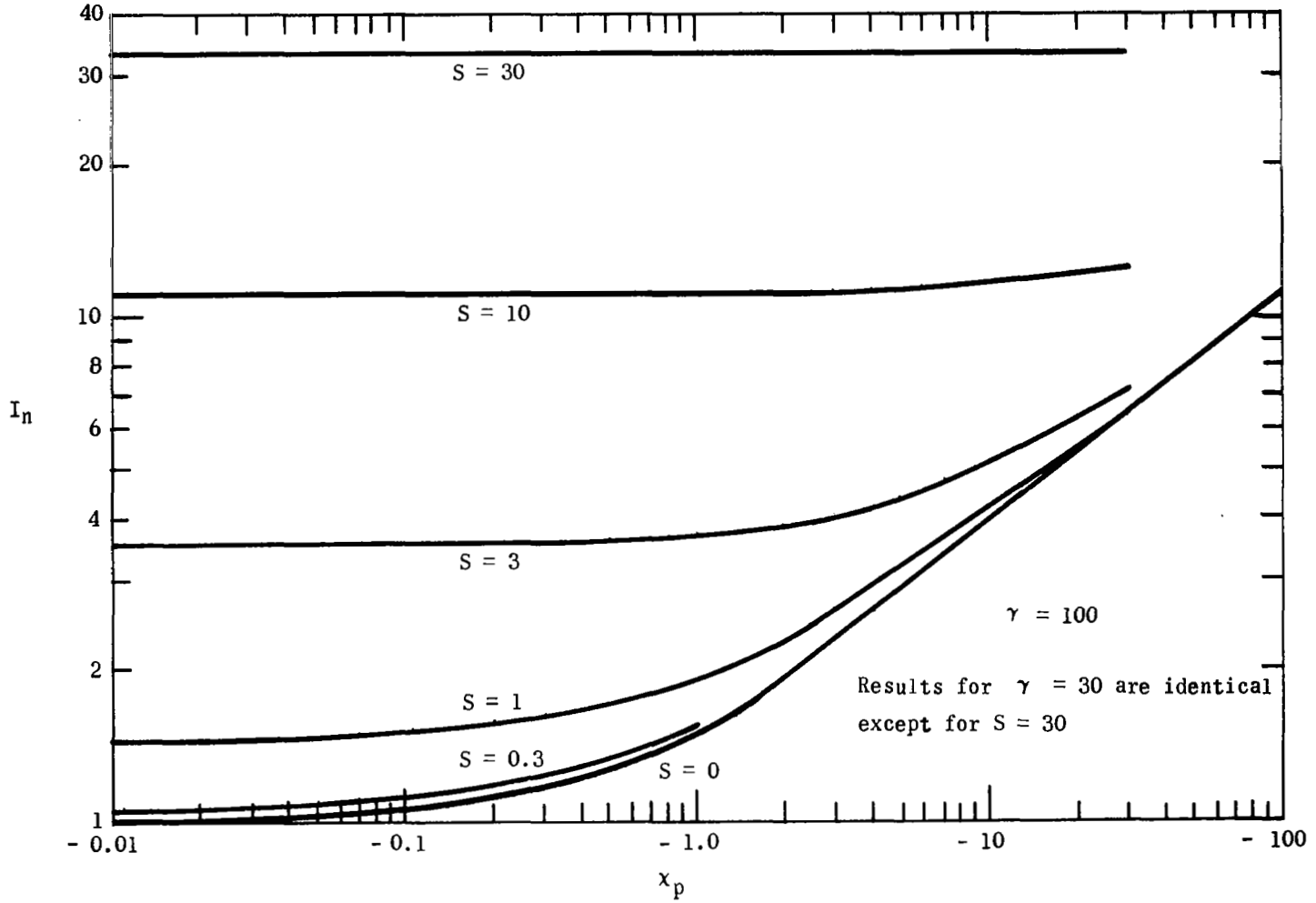


Figure 37.- Variation of normalized current with dimensionless probe potential for various speed ratios at $\gamma = 100$.

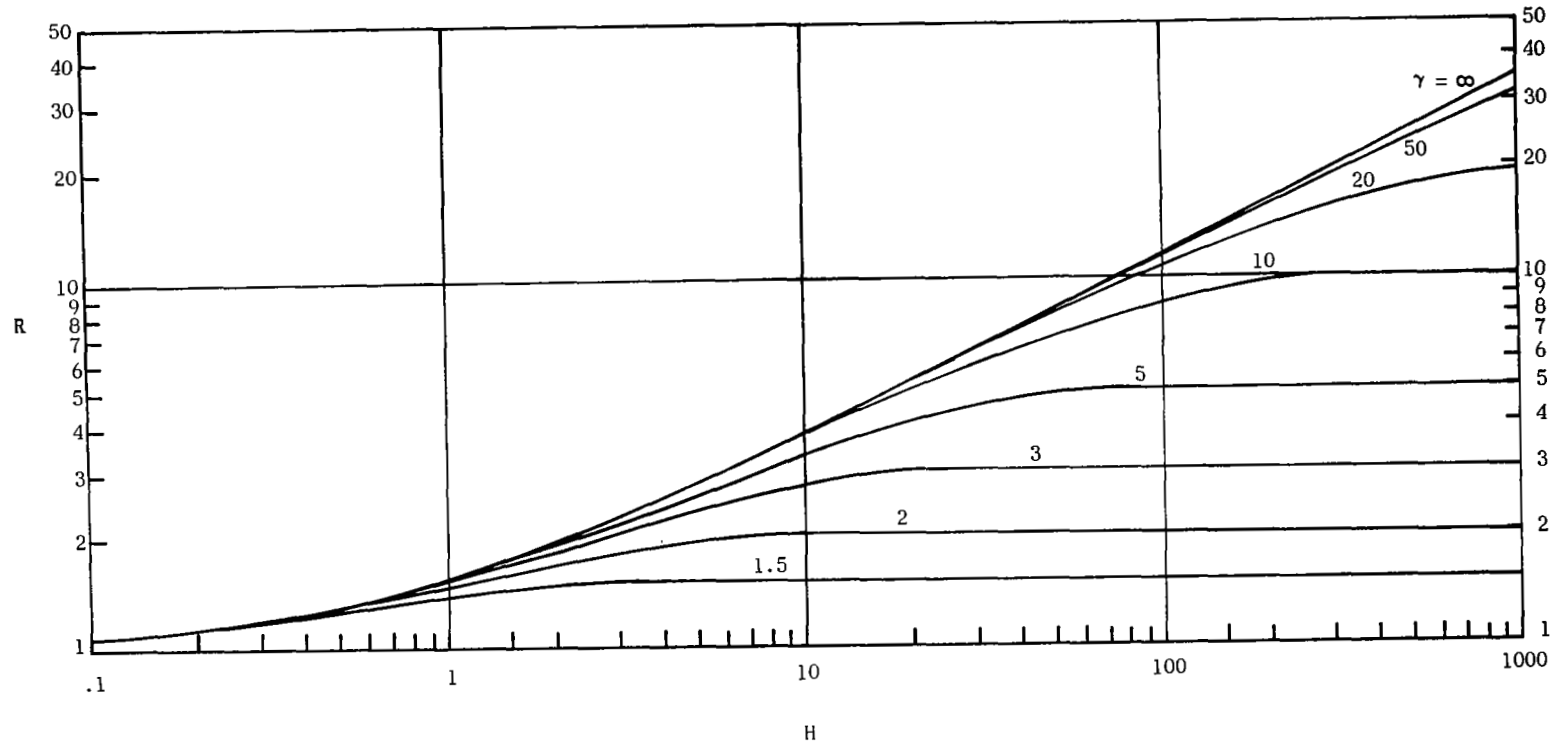


Figure 38.- Normalized probe current R as a function of the ratio of modified potential energy to the kinetic energy H for various values of γ.

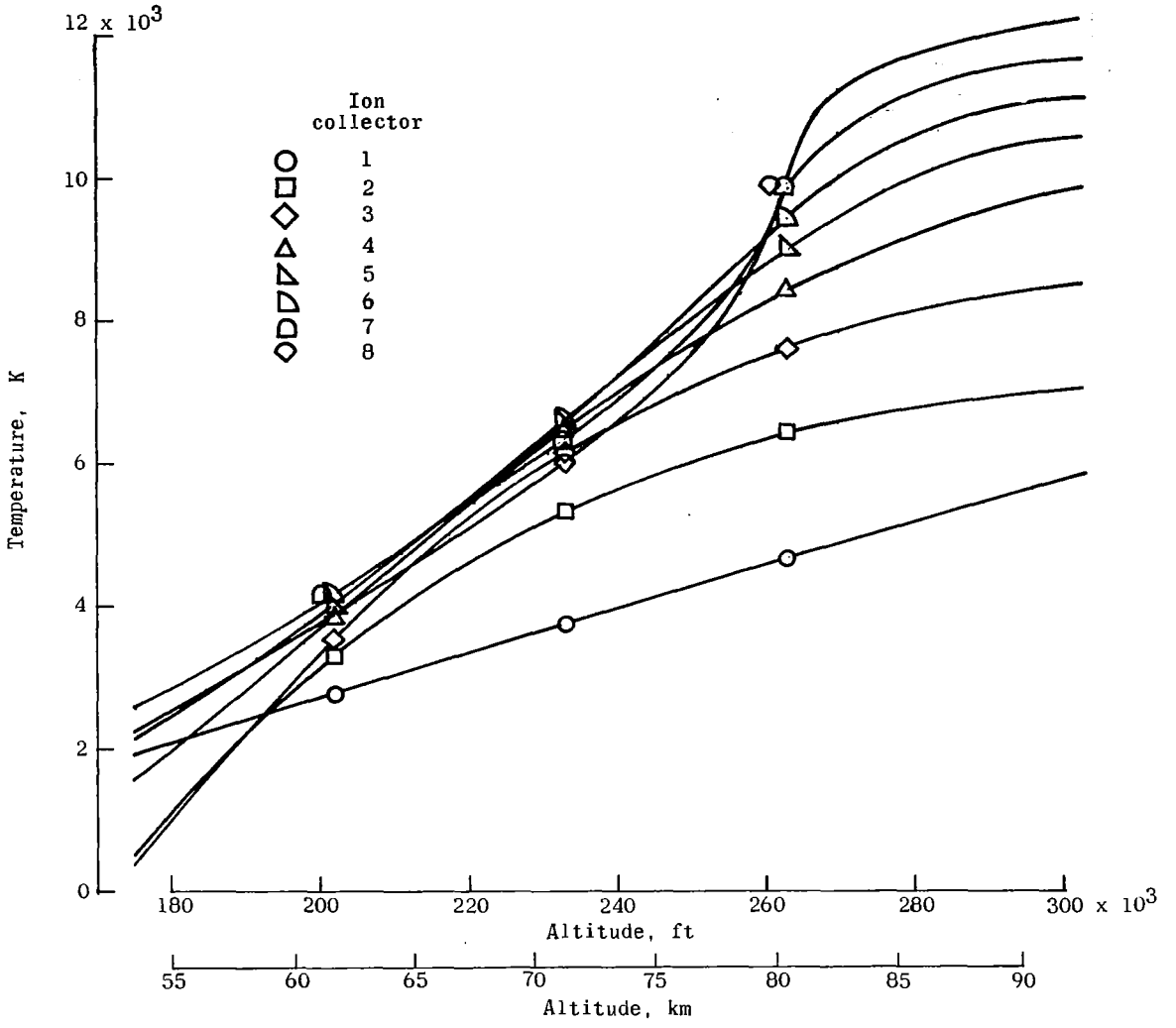


Figure 39.- Computed gas temperature as a function of altitude for electrostatic probe locations.

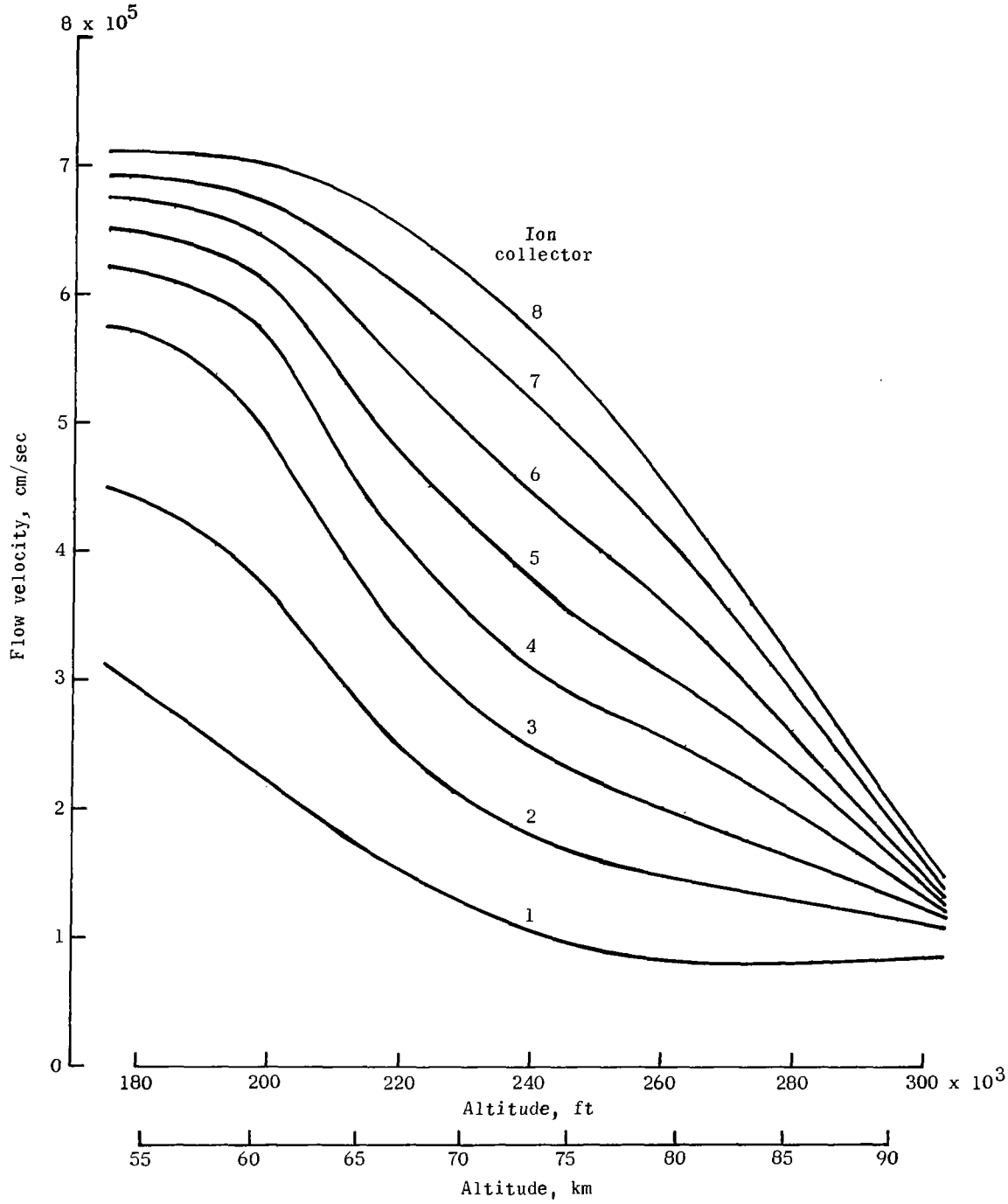
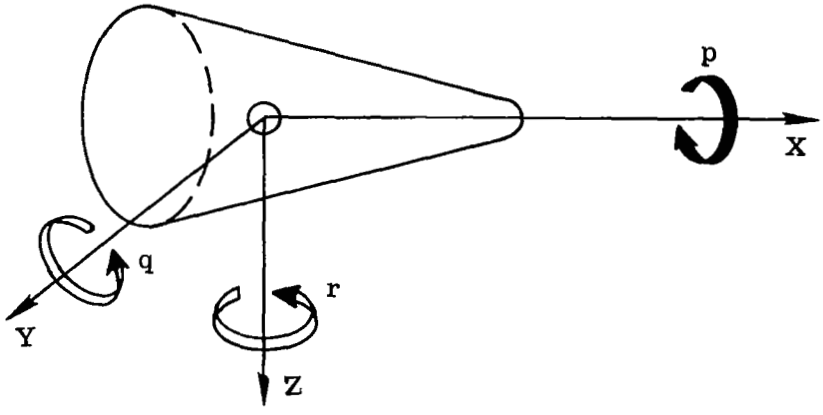
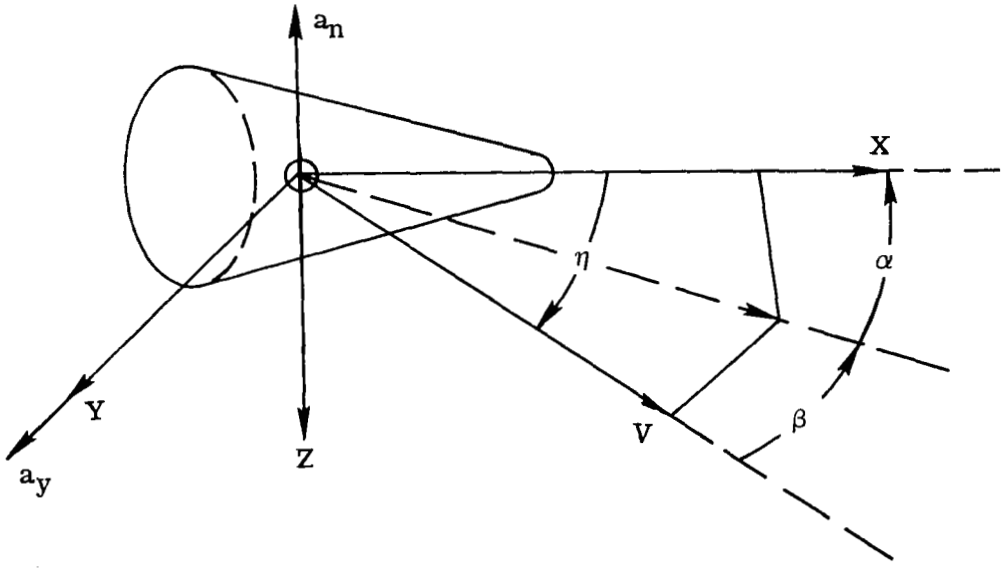


Figure 40.- Computed flow velocity as a function of altitude for electrostatic probe locations.



(a) Illustration of body rotations.



(b) Illustration of orientation with wind axis.

Figure 41.- Spacecraft axis system.

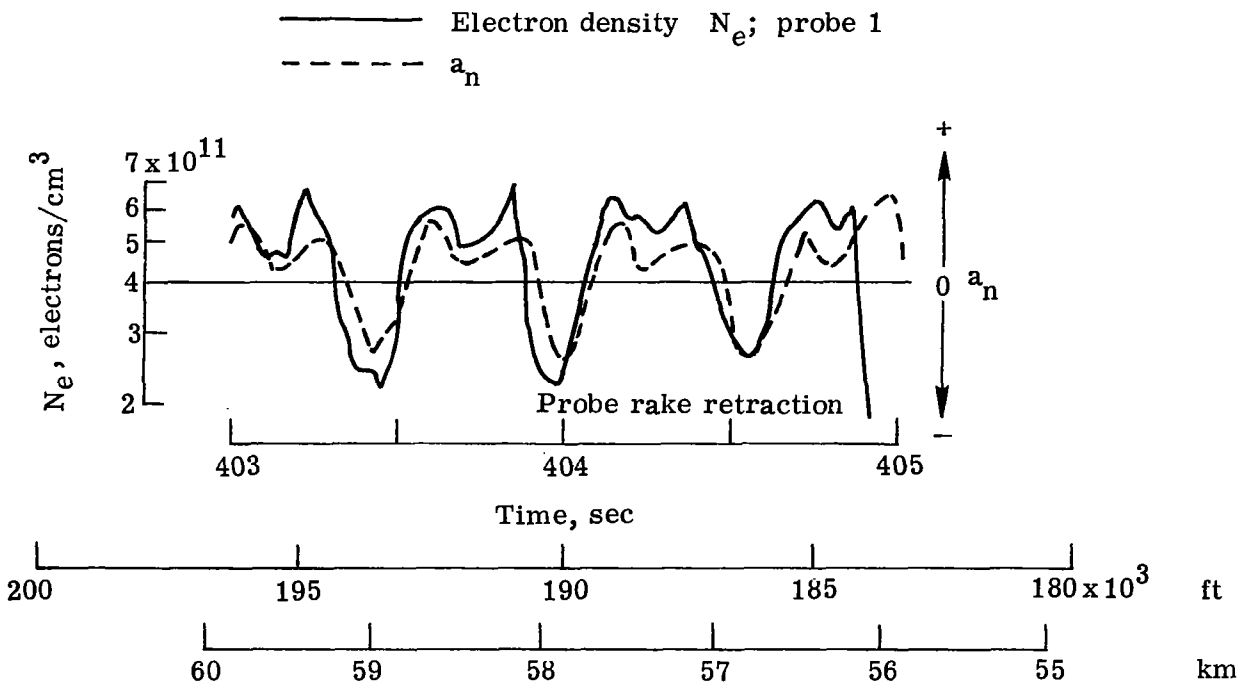


Figure 42.- Correlation of measured electron densities with measured normal acceleration on RAM C-II.

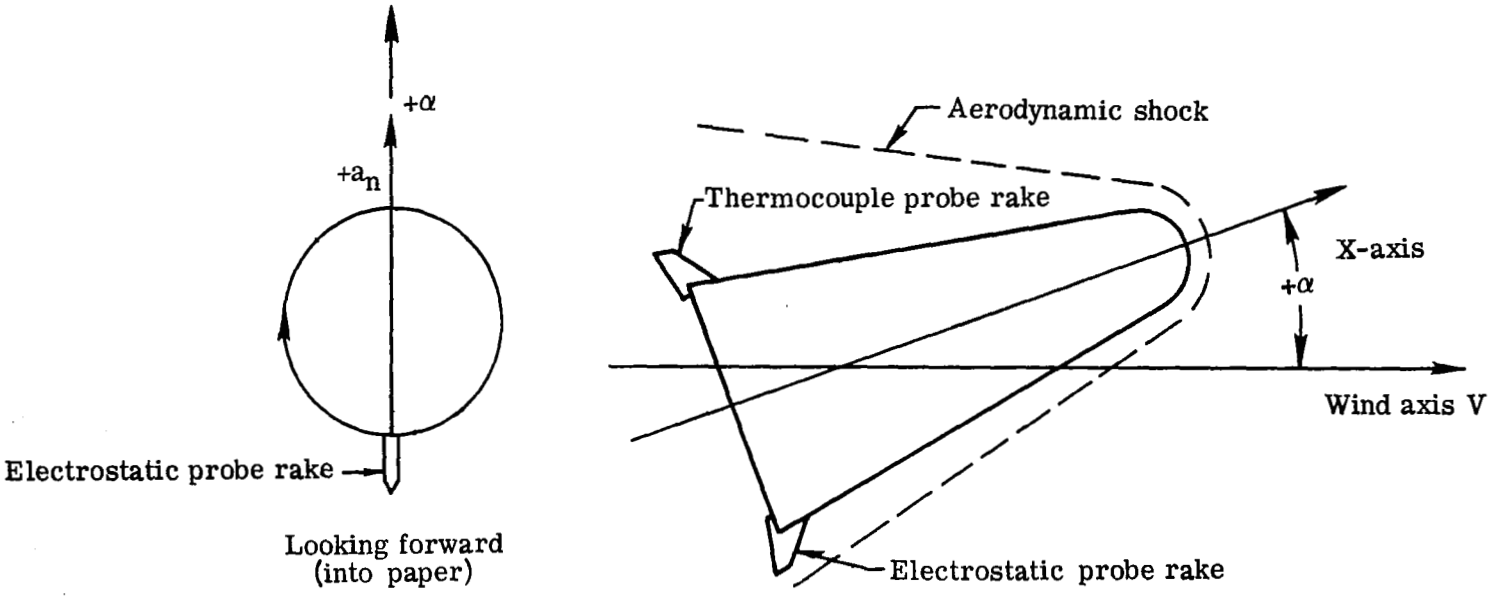


Figure 43.- Locations of probe rakes relative to axes systems.

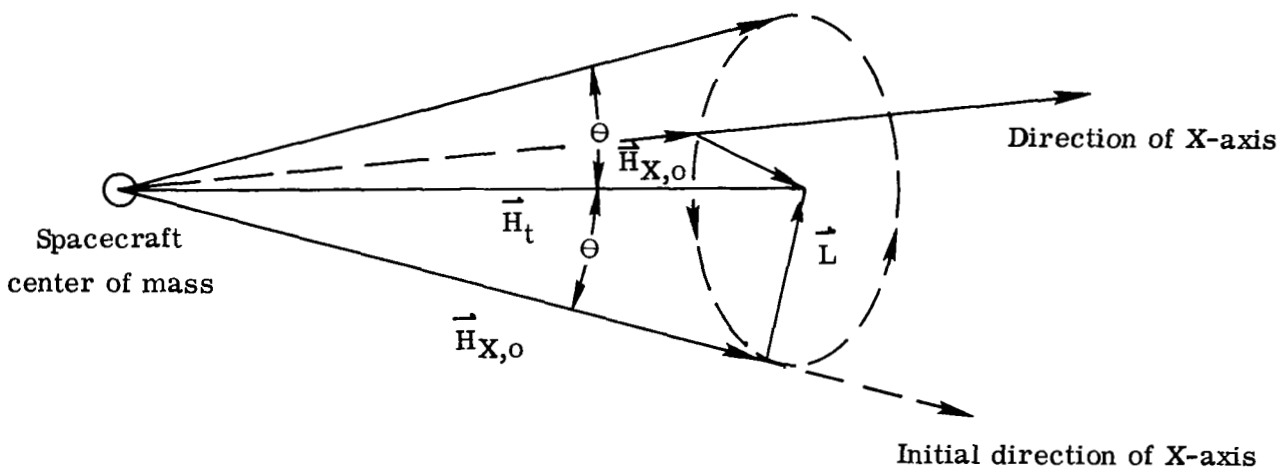
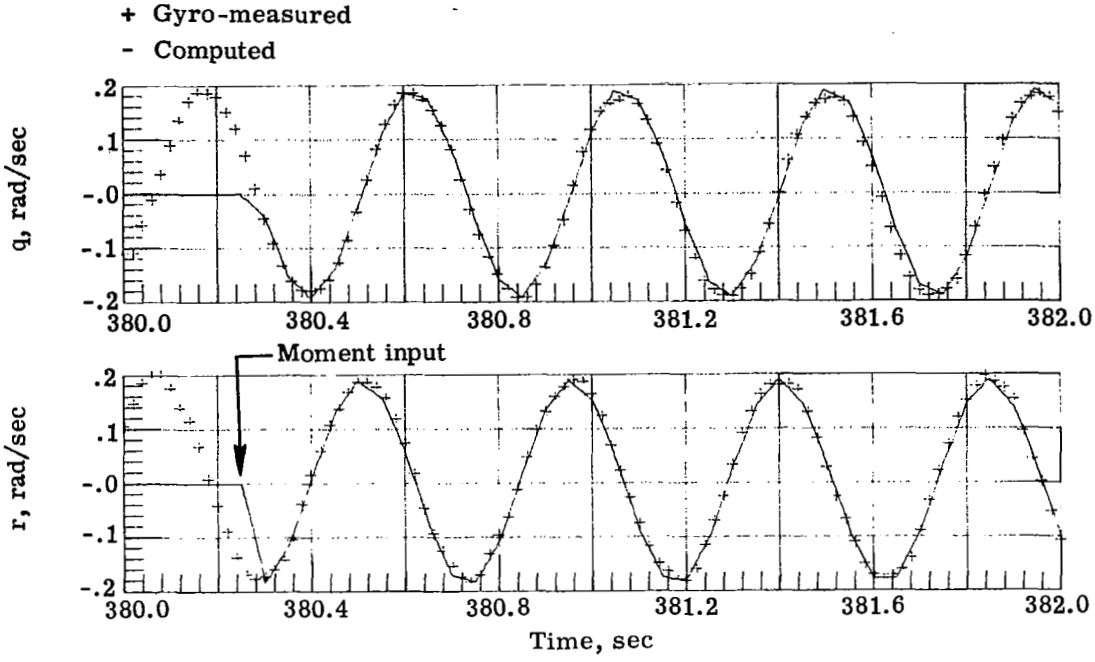
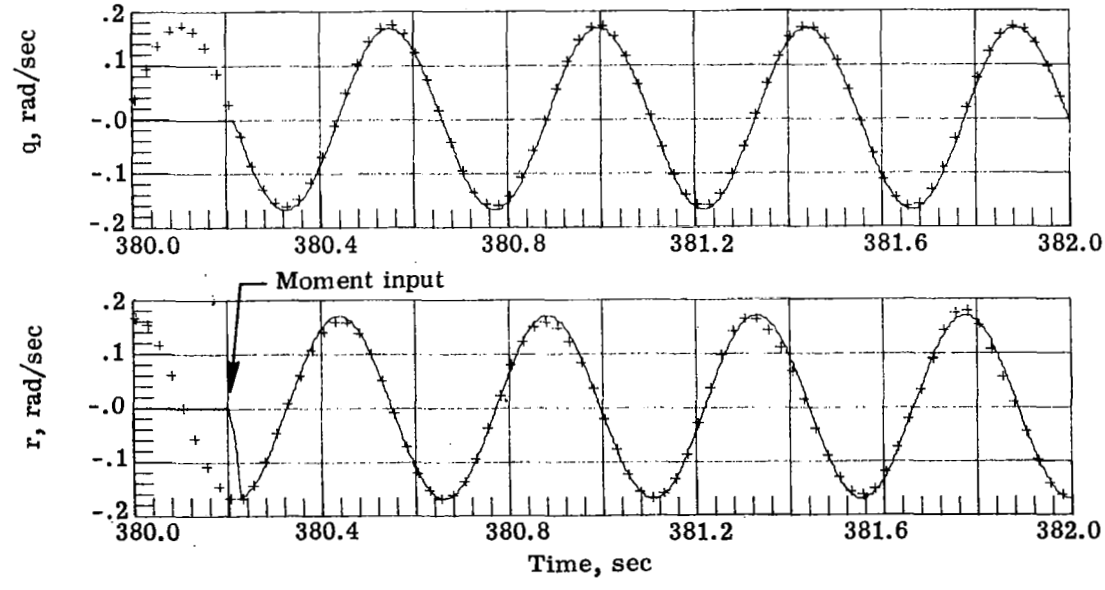


Figure 44.- Spacecraft precession in force-free space.

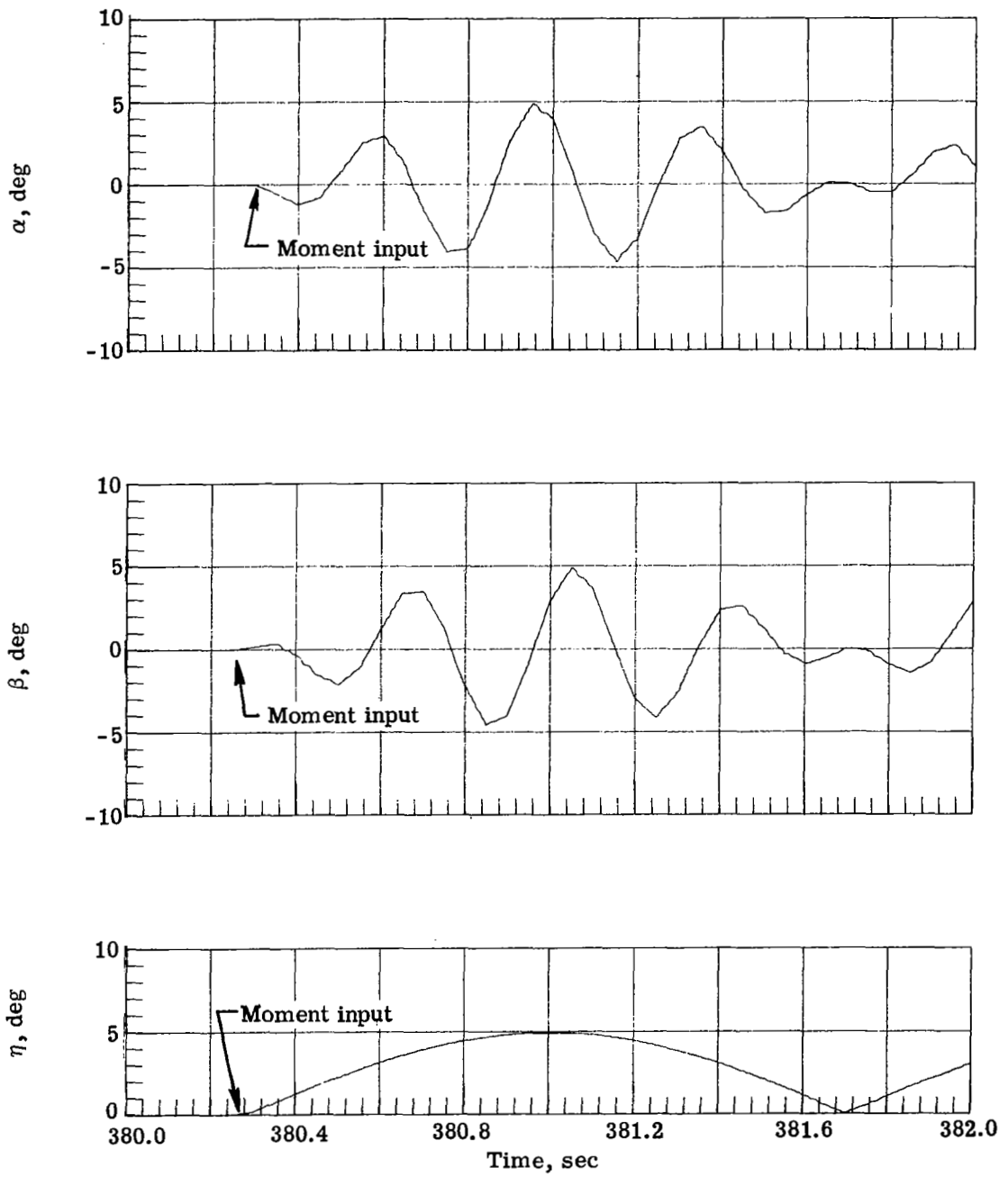


(a) RAM C-I.



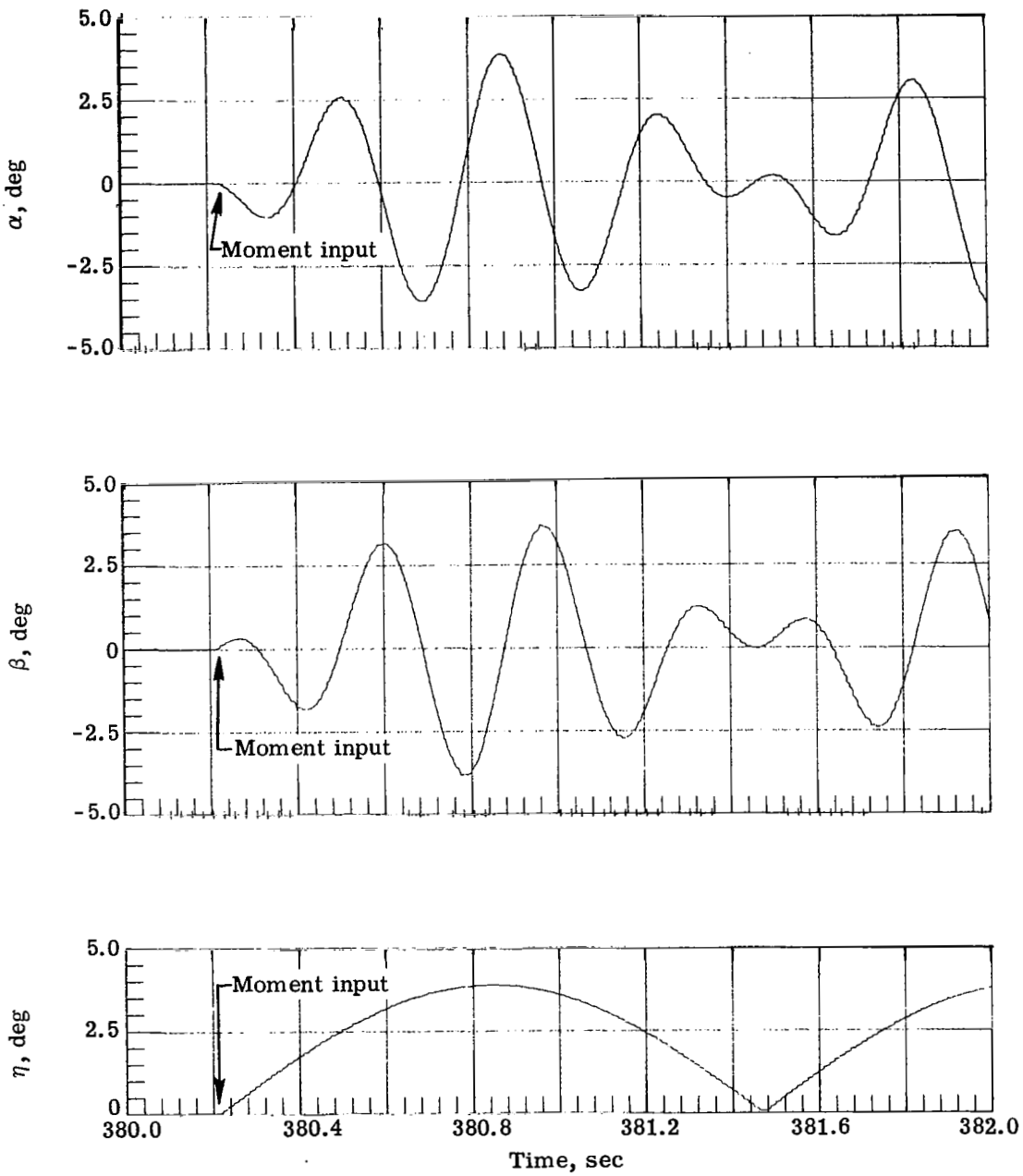
(b) RAM C-II.

Figure 45.- Comparisons of gyro-measured spacecraft rotation rates with computed rotation rates.



(a) RAM C-I.

Figure 46.- Computed characteristic wind angles.



(b) RAM C-II.

Figure 46.- Concluded.

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