AD-A166 548 COMPARISONS OF 76HZ TRANSVERSE AND RADIAL MAGNETIC FIELD STRENGTH COMPONE (U) NAVAL UNDERWATER SYSTEMS CENTER NEW LONDON CT NEW LONDON LAB P R BANNISTER

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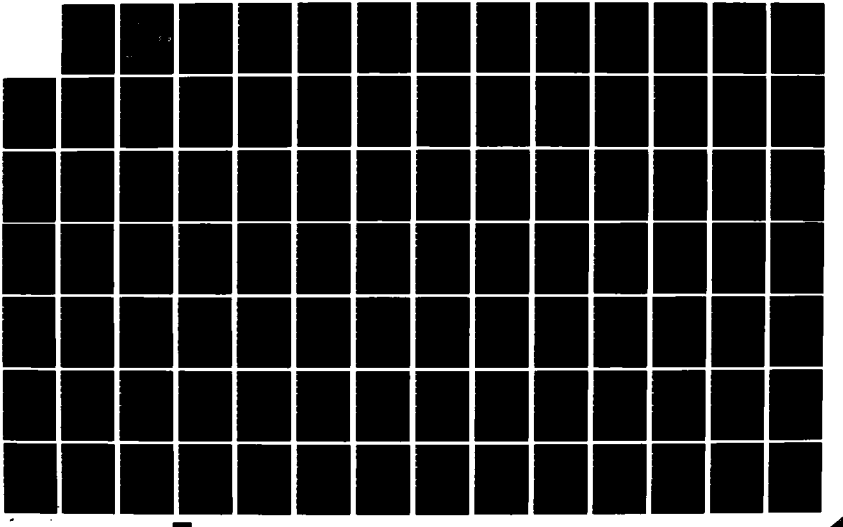
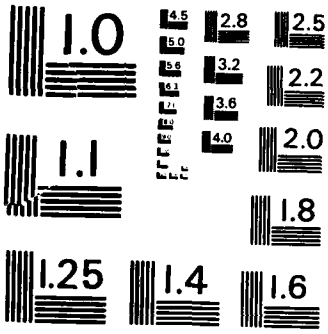
UNCLASSIFIED 11 MAR 86 NUSC-TD-7523 F/G 20/14 NL





NUSC Technical Document 7523
11 March 1986

Comparisons of 76Hz Transverse and Radial Magnetic Field Strength Components Received in Connecticut

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Preface

This report was prepared under NUSC Project No. A59007, "ELF Propagation RDT&E" (U), Principal Investigator, P. R. Bannister (Code 3411), Navy Program Element No. 11401N and Project No. XD792, Space and Naval Warfare Systems Command (SPAWARSYSCOM), Capt. R. Koontz (Code PDW 110–3), Program Manager ELF Communications.

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Reviewed and Approved: 11 March 1986

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UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

AD-A166548

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) TR7523	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Naval Underwater Systems Center 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) New London Laboratory New London, CT 06320	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11 TITLE (Include Security Classification)
COMPARISONS OF 76 Hz TRANSVERSE AND RADIAL MAGNETIC FIELD STRENGTH COMPONENTS RECEIVED IN CONNECTICUT

12. PERSONAL AUTHOR(S)
Peter R. Bannister

13a. TYPE OF REPORT	13b. TIME COVERED FROM ____ TO ____	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
		86/3/11	

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The results of 136 days of radial magnetic field measurements taken from November 1977 through June 1984 are discussed in this report. The main result is that during disturbed propagation conditions, the radial and transverse magnetic field strength daily plots (versus GMT) are usually dissimilar (in both amplitude and relative phase).

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL P.R. Bannister	22b TELEPHONE (Include Area Code) (203) 440-4885
	22c OFFICE SYMBOL Code 3411

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

TABLE OF CONTENTS

	Page
LIST OF ILLUSTRATIONS	ii
LIST OF TABLES	vi
INTRODUCTION	1
THEORY	1
NOVEMBER 1977 TO JUNE 1984 CONNECTICUT RADIAL MAGNETIC FIELD MEASUREMENTS	5
DAILY PLOTS OF TRANSVERSE VERSUS RADIAL MAGNETIC FIELD STRENGTH	5
CONCLUSIONS	11
REFERENCES	50
APPENDIX A – NOVEMBER 1977 CONNECTICUT FIELD STRENGTH MEASUREMENTS	A-1
APPENDIX B – DECEMBER 1977 CONNECTICUT FIELD STRENGTH MEASUREMENTS	B-1
APPENDIX C – MARCH 1978 CONNECTICUT FIELD STRENGTH MEASUREMENTS	C-1
APPENDIX D – OCTOBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS	D-1
APPENDIX E – NOVEMBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS	E-1
APPENDIX F – DECEMBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS	F-1
APPENDIX G – FEBRUARY 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS	G-1
APPENDIX H – MARCH 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS	H-1
APPENDIX I – APRIL 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS	I-1
APPENDIX J – MAY 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS	J-1
APPENDIX K – JUNE 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS	K-1

LIST OF ILLUSTRATIONS

Figure		Page
1	Magnitude and Phase of the Function y = -f(x) Versus x	12
2	Comparisons of Connecticut Radial Magnetic Field Strengths Versus GMT (10/26, 10/27, and 11/12, 1983 and 4/6, 1984)	13
3	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 16 November 1977	14
4	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 26 November 1977	15
5	Comparison of Connecticut Transverse Magnetic Field Strengths Versus GMT (10/2/83 and 3/26/84)	16
6	Comparison of Connecticut Radial Magnetic Field Strengths Versus GMT	17
7	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 3/1 to 3/8/84 Data)	18
8	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 11 November 1977	19
9	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 3 December 1977	20
10	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 13 December 1977	21
11	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 17 December 1977	22
12	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 26 March 1978	23
13	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 12 November 1983	24
14	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 10/11 December 1983	25
15	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 12 December 1983	26
16	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 23 February 1984	27
17	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 1 March 1984	28
18	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 2 March 1984	29
19	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 3 March 1984	30
20	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 March 1984	31
21	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 5 March 1984	32
22	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 March 1984	33
23	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 8 March 1984	34

LIST OF ILLUSTRATIONS (Cont'd)

Figure		Page
24	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 April 1984	35
25	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 April 1984	36
26	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 7 April 1984	37
27	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 9 April 1984	38
28	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 4/21 and 4/22/84 Data)	39
29	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 4/29 and 4/30/84 Data)	40
30	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 May 1984	41
31	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 May 1984	42
32	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 13 May 1984	43
33	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 14 May 1984	44
34	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 17 May 1984	45
35	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 19 May 1984	46
36	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 22 May 1984	47
37	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 9 June 1984	48
38	Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 10 June 1984	49
A-1	Connecticut Radial Magnetic Field Strength Versus GMT, 1 Through 4 November 1977 (ψ = 290 deg)	A-4
A-2	Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 6 November 1977 (ψ = 290 deg)	A-5
A-3	Connecticut Radial Magnetic Field Strength Versus GMT, 7, 8, and 10 November 1977 (ψ = 290 deg)	A-6
A-4	Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 November 1977 (ψ = 290 deg)	A-7
A-5	Connecticut Radial Magnetic Field Strength Versus GMT, 13 and 14 November 1977 (ψ = 21 deg)	A-8
A-6	Connecticut Radial Magnetic Field Strength Versus GMT, 15 and 16 November 1977 (ψ = 21 deg)	A-9
A-7	Connecticut Radial Magnetic Field Strength Versus GMT, 17 and 18 November 1977 (ψ = 21 deg)	A-10
A-8	Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 November 1977 (ψ = 21 deg)	A-11
A-9	Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 23 November 1977 (ψ = 21 deg)	A-12

LIST OF ILLUSTRATIONS (Cont'd)

Figure		Page
A-10	Connecticut Radial Magnetic Field Strength Versus GMT, 24 and 25 November 1977 (ψ = 21 deg)	A-13
A-11	Connecticut Radial Magnetic Field Strength Versus GMT, 26 and 27 November 1977 (ψ = 21 deg)	A-14
A-12	Connecticut Radial Magnetic Field Strength Versus GMT, 28, 29, and 30 November 1977 (ψ = 21 deg)	A-15
B-1	Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 2 December 1977 (ψ = 290 deg)	B-2
B-2	Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 December 1977 (ψ = 290 deg)	B-3
B-3	Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 13 December 1977 (ψ = 290 deg)	B-4
B-4	Connecticut Radial Magnetic Field Strength Versus GMT, 14 and 17 December 1977 (ψ = 290 deg)	B-5
B-5	Connecticut Radial Magnetic Field Strength Versus GMT, 18, 19, and 20 December 1977 (ψ = 290 deg)	B-6
C-1	Connecticut Radial Magnetic Field Strength Versus GMT, 24/25 and 25/26 March 1978 (ψ = 290 deg)	C-2
C-2	Connecticut Radial Magnetic Field Strength Versus GMT, 26/27 and 27/28 March 1978 (ψ = 290 deg)	C-3
C-3	Connecticut Radial Magnetic Field Strength Versus GMT, 29/30 and 30/31 March 1978 (ψ = 290 deg)	C-4
D-1	Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 October 1983 (ψ = 290 deg)	D-2
D-2	Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 22 October 1983 (ψ = 290 deg)	D-3
D-3	Connecticut Radial Magnetic Field Strength Versus GMT, 23 and 24 October 1983 (ψ = 290 deg)	D-4
D-4	Connecticut Radial Magnetic Field Strength Versus GMT, 25, 26, and 27 October 1983 (ψ = 290 deg)	D-5
E-1	Connecticut Radial Magnetic Field Strength Versus GMT, 2 and 3 November 1983 (ψ = 290 deg)	E-2
E-2	Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 November 1983 (ψ = 290 deg)	E-3
E-3	Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 November 1983 (ψ = 290 deg)	E-4
E-4	Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 November 1983 (ψ = 290 deg)	E-5
E-5	Connecticut Radial Magnetic Field Strength Versus GMT, 13 and 14 November 1983 (ψ = 290 deg)	E-6
E-6	Connecticut Radial Magnetic Field Strength Versus GMT, 15 and 16 November 1983 (ψ = 290 deg)	E-7
E-7	Connecticut Radial Magnetic Field Strength Versus GMT, 17 and 18 November 1983 (ψ = 290 deg)	E-8
F-1	Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 December 1983 (ψ = 290 deg)	F-3
F-2	Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 12 December 1983 (ψ = 290 deg)	F-4

LIST OF ILLUSTRATIONS (Cont'd)

Figure		Page
F-3	Connecticut Radial Magnetic Field Strength Versus GMT, 10 and 11 December 1983 (ψ = 290 deg)	F-5
G-1	Connecticut Magnetic Field Strength Comparisons, 14/15 February 1984 (ψ = 290 deg)	G-2
G-2	Connecticut Radial Magnetic Field Strength Versus GMT, 23 and 24 February 1984 (ψ = 290 deg)	G-3
G-3	Connecticut Radial Magnetic Field Strength Versus GMT, 25 and 26 February 1984 (ψ = 290 deg)	G-4
G-4	Connecticut Radial Magnetic Field Strength Versus GMT, 28 and 29 February 1984 (ψ = 290 deg)	G-5
H-1	Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 2 March 1984 (ψ = 290 deg)	H-2
H-2	Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 March 1984 (ψ = 290 deg)	H-3
H-3	Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 6 March 1984 (ψ = 290 deg)	H-4
H-4	Connecticut Radial Magnetic Field Strength Versus GMT, 7, 8 and 9 March 1984 (ψ = 290 deg)	H-5
H-5	Connecticut Radial Magnetic Field Strength Versus GMT, 12 and 13 March 1984 (ψ = 290 deg)	H-6
I-1	Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 April 1984 (ψ = 290 deg)	I-2
I-2	Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 April 1984 (ψ = 290 deg)	I-3
I-3	Connecticut Radial Magnetic Field Strength Versus GMT, 8 and 9 April 1984 (ψ = 290 deg)	I-4
I-4	Connecticut Radial Magnetic Field Strength Versus GMT, 20 and 21 April 1984 (ψ = 290 deg)	I-5
I-5	Connecticut Radial Magnetic Field Strength Versus GMT, 22 and 23 April 1984 (ψ = 290 deg)	I-6
I-6	Connecticut Radial Magnetic Field Strength Versus GMT, 24 and 25 April 1984 (ψ = 290 deg)	I-7
I-7	Connecticut Radial Magnetic Field Strength Versus GMT, 26 and 27 April 1984 (ψ = 290 deg)	I-8
I-8	Connecticut Radial Magnetic Field Strength Versus GMT, 29 and 30 April 1984 (ψ = 290 deg)	I-9
J-1	Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 3 May 1984 (ψ = 290 deg)	J-2
J-2	Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 May 1984 (ψ = 290 deg)	J-3
J-3	Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 May 1984 (ψ = 290 deg)	J-4
J-4	Connecticut Radial Magnetic Field Strength Versus GMT, 8 and 9 May 1984 (ψ = 290 deg)	J-5
J-5	Connecticut Radial Magnetic Field Strength Versus GMT, 10 and 11 May 1984 (ψ = 290 deg)	J-6
J-6	Connecticut Radial Magnetic Field Strength Versus GMT, 12 and 13 May 1984 (ψ = 290 deg)	J-7

LIST OF ILLUSTRATIONS (Cont'd)

Figure		Page
J-7	Connecticut Radial Magnetic Field Strength Versus GMT, 14 and 15 May 1984 (ψ = 290 deg)	J-8
J-8	Connecticut Radial Magnetic Field Strength Versus GMT, 16 and 17 May 1984 (ψ = 290 deg)	J-9
J-9	Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 May 1984 (ψ = 290 deg)	J-10
J-10	Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 22 May 1984 (ψ = 290 deg)	J-11
J-11	Connecticut Radial Magnetic Field Strength Versus GMT, 25 and 30 May 1984 (ψ = 290 deg)	J-12
K-1	Connecticut Radial Magnetic Field Strength Versus GMT, 7 and 8 June 1984 (ψ = 290 deg)	K-2
K-2	Connecticut Radial Magnetic Field Strength Versus GMT, 9 and 10 June 1984 (ψ = 290 deg)	K-3
K-3	Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 June 1984 (ψ = 290 deg)	K-4

LIST OF TABLES

Table		Page
1	Summary of Connecticut H_ρ Measurements	6
2	Summary of Simultaneous Connecticut H_ϕ Measurements	7
3	Comparison of Connecticut H_ρ and H_ϕ Measurements	8
4	Comparison of Transverse and Radial Magnetic Field Strengths During 3-hr Minimum Nighttime Field-Strength Period	10
A-1	November 1977 Connecticut Daily H_ρ Averages	A-2
B-1	December 1977 Connecticut Daily H_ρ Averages (ψ = 290 deg)	B-1
C-1	March 1978 Connecticut Daily H_ρ Averages (ψ = 290 deg)	C-1
D-1	October 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)	D-1
E-1	November 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)	E-1
F-1	December 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)	F-2
G-1	February 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)	G-1
H-1	March 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)	H-1
I-1	April 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)	I-1
J-1	May 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)	J-1
K-1	June 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)	K-1

COMPARISONS OF 76-Hz TRANSVERSE AND RADIAL MAGNETIC FIELD STRENGTH COMPONENTS RECEIVED IN CONNECTICUT

INTRODUCTION

Since June 1970, we have made extremely low frequency (ELF) measurements of the transverse horizontal magnetic field strength, H_ϕ, received in Connecticut.[1-15] Occasionally, we also have measured either the vertical electric field strength, E_v,[16] or the radial horizontal magnetic field strength, H_ρ. The AN/BSR-1 ELF receivers are located at the Naval Underwater Systems Center (NUSC), at New London, CT. The whip receiving antenna is also located at NUSC, while the loop receiving antennas are located at Fishers Island, NY (about 10 km from New London). The receivers and loop antennas are connected by means of a microwave link from Fishers Island to New London. The AN/BSR-1 receiver is composed of an AN/UYK-20 minicomputer, a signal timing and interface unit (STIU), a rubidium frequency time standard, two magnetic-tape recorders, and a preamplifier.

The transmission source for these farfield (1.6-Mm range) measurements is the U.S. Navy's ELF Wisconsin Test Facility (WTF), located in the Chequamegon National Forest in north-central Wisconsin, about 8 km south of the village of Clam Lake. The WTF consists of two 22.5-km antennas; one antenna is located approximately in the north-south (NS) direction and one is located approximately in the east-west (EW) direction. Each antenna is grounded at both ends. At 76 Hz, the electrical axis of the NS antenna is 14 deg east of north, while the electrical axis of the EW antenna is 114 deg east of north. The WTF array can be steered electrically toward any particular location and its radiated power is approximately 1 W.

In this report, we will discuss the results of 136 days of radial magnetic field measurements taken from November 1977 through June 1984. We also will compare them (in both amplitude and relative phase) with simultaneous transverse magnetic field measurements during both normal- and disturbed-propagation conditions.

THEORY

For measurement distances sufficiently removed from the antipode but greater than both 1.5L and an earth wavelength, λ_e, the H_ϕ and H_ρ components produced by the WTF EW antenna (of length L) can be[17,18] expressed as

$$H_\phi \sim -\frac{ILf_1(L)G(t)\cos\phi e^{-\alpha\rho}}{2\pi\gamma_e\rho^3}\left[\left(-\frac{i\pi x}{2}\right)H_1^{(2)}(x)f(x)\right]\left[\frac{(\rho/a)}{\sin(\rho/a)}\right]^{1/2} \text{ A/m} \qquad (1)$$

and

$$H_\rho \sim \frac{ILf_2(L)H(t)\sin\phi e^{-\alpha\rho}}{2\pi\gamma_e\rho^3}\left[\left(-\frac{i\pi x}{2}\right)H_1^{(2)}(x)\right]\left[\frac{(\rho/a)}{\sin(\rho/a)}\right]^{3/2} \text{ A/m} , \quad (2)$$

where

I = WTF EW antenna current (300 A),

L = WTF EW antenna length (2.25×10^4 m),

ϕ = azimuth angle (deg),

ρ = great-circle distance between WTF and receiver (m),

α = earth-ionosphere waveguide attenuation rate (Np/m),

a = radius of the earth ($\sim 6.37 \times 10^6$ m),

$\gamma_e \approx (i\omega\mu_0\sigma_e)^{1/2} = (1 + i)/\delta_e$ = propagation constant in the earth beneath the WTF EW antenna (meters^{-1}),

$\delta_e \approx \sqrt{2/(\omega\mu_0\sigma_e)}$ = skin depth in the earth beneath the WTF EW antenna (m),

$\lambda_e = 2\pi\delta_e$ = wavelength in the earth (m),

σ_e = effective conductivity beneath the WTF EW antenna (2.8×10^{-4} S/m at 45 Hz and 3.2×10^{-4} S/m at 75 Hz),

$H_0^{(2)}(x)$ = Hankel function of the second kind, order zero, and argument x,

$H_1^{(2)}(x)$ = Hankel function of the second kind, order one, and argument x,

$x = k\rho(c/v) = \frac{2\pi\rho}{\lambda}(c/v)$,

c = velocity of light in free space ($\sim 3 \times 10^8$ m/s),

v = earth-ionosphere waveguide phase velocity (m/s), and

λ = free-space wavelength (m).

The functions $f_1(L)$, $f_2(L)$, $f(x)$, $G(t)$, and $H(t)$ are defined by

$$f_1(L) = 1 + 2\left(\frac{L}{2\pi}\right)^{-\frac{1}{2}}\left(1 - \frac{15}{4}\sin^{-\frac{1}{2}}\right) , \quad (3)$$

$$f_2(L) = 1 - \left(\frac{L}{2\pi}\right)^{-\frac{1}{2}}(1 - 5\cos^{-\frac{1}{2}}) , \quad (4)$$

$$f(x) = 1 - x\left[\frac{H_0^{(2)}(x)}{H_1^{(2)}(x)}\right], \tag{5}$$

$$G(t) = \left(\frac{2t}{\pi}\right)\coth t + \left(1 - \frac{2}{\pi}\right)t^2 \operatorname{csch}^2 t, \tag{6}$$

and

$$H(t) = G(t) + t^3 \coth t \operatorname{csch}^2 t, \tag{7}$$

where

$$t = \frac{\pi\rho}{2h(c/v)^2} \tag{8}$$

and h is the effective ionospheric reflecting height (m).

From equations (1) and (2), we see that the ratio of the transverse to radial magnetic field components is given by

$$\frac{H_\phi}{H_\rho} \sim -\frac{f_1(L)G(t)}{f_2(L)H(t)} f(x)\cot\phi\left[\frac{\sin(\rho/a)}{(\rho/a)}\right]. \tag{9}$$

When $t > 4.5$, $G(t) \sim H(t) \sim 2t/\pi$, $\rho \gg L$, and $f_1(L) \sim f_2(L) \sim 1$. Therefore, when $t > 4.5$, equation (9) reduces to

$$\frac{H_\phi}{H_\rho} \sim -f(x)\cot\phi\left[\frac{\sin(\rho/a)}{(\rho/a)}\right]. \tag{10}$$

The magnitude and phase of the function $y = -f(x)$ are plotted in figure 1* versus x. For small values of x, $|y| \sim 1$ and $\theta(y) \sim -180$ deg. For $x > 1.6$, $|y| \sim x$, while for $x > 10$, $\theta(y) \sim -90$ deg. When $x > 1.6$, the magnitude of equation (10) reduces to

$$\left|\frac{H_\phi}{H_\rho}\right| \sim \frac{2\pi a}{\lambda}(c/v)\sin(\rho/a)\cot\phi, \tag{11}$$

which is identical to Galejs' farfield result.[19]

The H_ϕ and H_ρ components produced by the WTF antenna array can be obtained from equations (1), (2), (9), (10), and (11) by replacing cos ϕ with $F(\phi)/B$, sin ϕ with $F(\phi - 90\text{ deg})/B$, and cot ϕ with their ratio. $F(\phi)/B$ is the WTF array pattern factor,[6,20] which equals unity in the direction of the EW antenna axis. At the Connecticut site, $20\log[F(\phi)/B] \sim +0.8$ dB and $20\log[F(\phi - 90\text{ deg})/B] \sim +0.6$ dB for a WTF phasing angle, ϕ, of 290 deg.

*All figures have been placed together at the end of this report or in the applicable appendix.

For $x > 1.6$ and $\rho \leq 19$ Mm, the direct-path 76-Hz H_ϕ and H_ρ components produced by the WTF antenna array also can be expressed as

$$20 \log H_\phi \sim -139.1 + 20 \log E - \alpha\rho - 10 \log(a \sin \rho/a) + 20 \log F(\phi)/B \quad \text{dBA/m} \tag{12}$$

and

$$20 \log H_\rho \sim 20 \log H_\phi - 4.0 - 20 \log(a \sin \rho/a) - 20 \log(c/v) + 20 \log F(\phi - 90 \text{ deg})/B - 20 \log F(\phi)/B \quad \text{dBA/m}, \tag{13}$$

where $E = (h_{KM} \sqrt{\sigma_e \ c/v})^{-1}$ is defined as the earth-ionosphere waveguide excitation factor. In equations (12) and (13), h is in km, ρ and a are in Mm, ρ/a is in radians, and α is in dB/Mm.

The average 75-Hz-band phase-velocity ratio (c/v) inferred from propagation measurements taken over various paths from 1966 to 1982 was ~ 1.25 during the day and ~ 1.09 at night.[21] Therefore, on the average, at the Connecticut site (for ψ = 290 deg)

$$20 \log H_\rho \sim 20 \log H_\phi - 10.1 \text{ dB} \tag{14}$$

during the day,

$$20 \log H_\rho \sim 20 \log H_\phi - 9.5 \text{ dB} \tag{15}$$

during the transition periods, and

$$20 \log H_\rho \sim 20 \log H_\phi - 8.9 \text{ dB} \tag{16}$$

at night.

The average 75-Hz-band daytime and nighttime attenuation rates inferred from propagation measurements taken over east and northeast paths from 1966 to 1982 were 1.25 and 1.0 dB/Mm, respectively, while the average excitation factors were -0.8 dB during the day and -3.2 dB at night.[21] Employing equations (12) through (16) and the abovementioned values of α and 20 log E results in predicted Connecticut 76-Hz average field strengths of -143.2, -144.2, and -145.2 dBA/m (H_ϕ) and -153.3, -153.7, and -154.1 dBA/m (H_ρ), respectively, during daytime, transition period (TP), and nighttime propagation conditions.

At the Connecticut site, the predicted H_ϕ and H_ρ average difference in relative phase ($\Delta\phi$) between the nighttime and daytime periods is 20 to 23 deg. This is based on the average relative phase-velocity difference between daytime and nighttime propagation conditions [$\Delta(c/v)$] of 0.14 to 0.16.[21]

NOVEMBER 1977 TO JUNE 1984 CONNECTICUT RADIAL MAGNETIC FIELD MEASUREMENTS

During November 1977 to June 1984, field strength data were obtained on 136 days at the Connecticut site. The daily plots of radial magnetic field strength (both amplitude and relative phase) versus Greenwich Mean Time (GMT) (in 1-hr increments) and the H_ρ daily field strength averages are presented in appendixes A through K. The data are broken up into four time periods, which are representative of nighttime, sunrise transition period (SRTP), daytime, and sunset transition period (SSTP) propagation conditions. From 11 to 30 November 1977, the WTF antenna array phasing angle, ψ, was 21 deg. During the rest of the radial magnetic-field measurement period, ψ was 290 deg. (The Connecticut H_ρ measured field strengths for ψ = 290 deg should be 0.5 dB higher than those for ψ = 21 deg.) Throughout the H_ρ measurement period, the WTF transmitting frequency was 76 ±4 Hz.

Presented in tables 1 and 2 are the radial and (simultaneous) transverse magnetic field average monthly field strengths, while a comparison of the Connecticut H_ρ and H_ϕ field strengths is presented in table 3. (All data are normalized to a WTF antenna current of 300 A and an array phasing angle of 290 deg.) Referring to tables 1, 2, and 3, we see that the average transverse magnetic field strengths are about as expected (in both amplitude and relative phase), as are the average nighttime and transition-period radial magnetic field strengths. On the other hand, the average daytime H_ρ field strengths are ~ 1 dB less than predicted and the average H_ρ night-to-day relative-phase variation is 7 to 10 deg higher than predicted. (It should be noted, however, that most of the H_ρ daytime measurement period consisted of only 1 to 4 hr/day.)

As an example of the dispersion obtained in the radial magnetic field strength measurements, consider figure 2, which is a comparison of the H_ρ field strengths measured during four different nights. Note that, on both 10/26 and 10/27/83, the H_ρ field strengths were greater throughout the nighttime measurement period (by ~ 1.5 to 5 dB) than the predicted value (-154.1 dBA/m). Moreover, on both 11/12/83 and 4/6/84, the nighttime field strength amplitude dip was ~ 8 dB! Also, the difference between the highest measured 1-hr H_ρ sample (0300 on 10/26/83) and lowest (0500 on 4/6/84) was ~ 13 dB!

DAILY PLOTS OF TRANSVERSE VERSUS RADIAL MAGNETIC FIELD STRENGTH

In a recent report,[16] we discussed the results of 60 days of selected whip-antenna measurements taken during the 5-month period of November 1977 to March 1978. The main result is that the Connecticut vertical electric field strength behavior usually is very similar to the transverse horizontal magnetic field strength behavior (in both amplitude and relative phase) during both normal- and disturbed-propagation conditions.

Presented in figures 3 and 4 are sample comparisons of the transverse and radial magnetic-field strengths measured during normal-propagation conditions.

Table 1. Summary of Connecticut H_ρ Measurements*

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	SSTP H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Number of Measurement Days
November 1977	-153.7	-154.4	-154.3	-153.4	18	28
December 1977	-154.0	-154.3	-154.5	-153.5	35	11
March 1978	-154.6	-153.9	-153.9	-154.1	39	6
October 1983	-153.1	-153.4	-	-152.6	-	9
November 1983	-154.0	-154.1	-	-154.4	-	14
December 1983	-154.1	-154.4	-154.4	-154.2	25.3	6
February 1984	-154.5	-154.6	-154.2	-154.3	31.5	7
March 1984	-154.6	-153.8	-154.3	-	35	11
April 1984	-154.4	-153.6	-153.9	-	25.5	16
May 1984	-154.3	-153.6	-153.9	-154.0	31.5	22
June 1984	-153.4	-152.8	-153.4	-152.8	33	6
Measured Average	-154.0	-153.9	-154.1	-153.7	30	136
Predicted Average	-154.1	-153.7	-153.3	-153.7	20 to 23	-

*All data normalized to a WTF antenna current of 300 A and an array phasing angle of 290 deg.

Table 2. Summary of Simultaneous Connecticut H_ϕ Measurements*

Date	Night H_ϕ (dBA/m)	SRTP H_ϕ (dBA/m)	Day H_ϕ (dBA/m)	SSTP H_ϕ (dBA/m)	Approximate $\Delta\phi$ (deg)
November 1977	-145.0	-144.1	-143.2	-143.7	22.9
December 1977	-145.4	-144.2	-143.3	-144.2	23.2
March 1978	-145.5	-144.0	-143.3	-144.0	24.8
October 1983	-144.2	-143.8	-	-143.4	-
November 1983	-145.0	-144.1	-	-144.9	-
December 1983	-145.1	-144.1	-143.2	-143.8	23.5
February 1984	-145.3	-144.2	-143.4	-143.6	21.5
March 1984	-145.7	-144.3	-143.0	-	20.0
April 1984	-145.3	-144.2	-143.3	-	16.0
May 1984	-145.3	-144.2	-143.4	-144.4	17.5
June 1984	-144.9	-144.1	-143.2	-144.0	20.5
Measured Average	-145.2	-144.1	-143.2	-144.0	21.2
Predicted Average	-145.2	-144.2	-143.2	-144.2	20 to 23

*All data normalized to a WTF antenna current of 300 A and an array phasing angle of 290 deg.

Table 3. Comparison of Connecticut H_ρ and H_ϕ Measurements*

Date	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)	Day H_ϕ/H_ρ (dB)	Approximate $H_\rho\Delta\phi - H_\phi\Delta\phi$ (deg)
November 1977	8.7	9.8	11.1	-5
December 1977	8.6	10.3	11.2	12
March 1978	9.1	10.0	10.6	14
October 1983	8.9	9.4	-	-
November 1983	8.9	9.7	-	-
December 1983	9.4	10.2	11.2	2
February 1984	9.2	10.2	10.9	10
March 1984	8.9	9.5	11.3	15
April 1984	9.0	9.6	10.7	9.5
May 1984	8.8	9.4	10.4	14
June 1984	9.3	9.2	10.1	11
Measured Average	9.0	9.7	10.8	7-10
Predicted Average	8.9	9.5	10.1	0

*All data normalized to a WTF antenna current of 300 A and an array phasing angle of 290 deg.

During normal-propagation conditions, the Connecticut H_ρ amplitude behavior usually is similar to the H_ϕ amplitude behavior, while the H_ρ night-to-day relative-phase variation ($\Delta\phi$) usually is greater than the $H_\phi\Delta\phi$ variation (e.g., see table 3). Occasionally, however, the $H_\rho\Delta\phi$ variation is less than the $H_\phi\Delta\phi$ variation (e.g., see figures 3 and 4).

Two typical transverse and radial magnetic field strength variations during disturbed nighttime propagation conditions are presented in figures 5 and 6. In the Type A variation, the field strength amplitude rapidly decreases 2 to 8 dB, then rapidly increases 2 to 8 dB. Meanwhile, the Type A relative phase gradually increases, peaks about 1 hr before the minimum amplitude time, rapidly decreases to below (or well below) the nighttime starting level (~ 20 deg), and gradually increases to about the starting level by the end of the nighttime measurement period.

In the Type B variation, the field strength amplitude gradually decreases 2 to 8 dB, levels off, and gradually increases 2 to 8 dB. Meanwhile, the Type B relative phase substantially increases, peaks, and substantially decreases.

Presented in figure 7 is a comparison of the Connecticut transverse and radial magnetic field strengths measured during the disturbed-propagation period of 1 to 8 March 1984. Here, we see that the H_ϕ variation is closer to Type A, while the H_ρ variation is closer to Type B. Note, also, that the H_ϕ amplitude variation is greater than the H_ρ amplitude variation, while the H_ρ relative-phase variation is greater than the H_ϕ relative-phase variation.

Various comparisons of the Connecticut transverse and radial magnetic field strengths are presented in figures 8 through 38. From these plots, we see that, during disturbed nighttime propagation conditions, the transverse and radial magnetic field strength variations usually are dissimilar (in both amplitude and relative phase). In particular, the radial magnetic field strength variations usually are greater than the transverse magnetic field strength variations (see figures 13 through 18 and 25 through 30).

This fact is further illustrated in table 4, which is a comparison of the transverse and radial magnetic field strengths measured during the 3-hr minimum-amplitude nighttime field strength period. This period usually is from 0500 to 0800 GMT, with the relative phase peaking 1 hr earlier (0400 to 0700 GMT). Comparing tables 1 through 4, we see that the average H_ρ field strength is 2.1 dB lower than predicted (-156.2 compared to -154.1 dBA/m), while the average H_ϕ field strength is 1.0 dB lower than predicted (-146.2 compared to -145.2 dBA/m). Furthermore, the H_ρ relative-phase variation is 20 deg greater than the H_ϕ relative-phase variation.

Table 4. Comparison of Transverse and Radial Magnetic Field Strengths During 3-hr Minimum Nighttime Field Strength Period

Date	Starting Time A, ϕ	H_ρ (dBA/m)	$H_\rho \Delta\phi$ (deg)	H_ϕ (dBA/m)	$H_\phi \Delta\phi$ (deg)	H_ϕ / H_ρ (dB)	$H_\rho \Delta\phi - H_\phi \Delta\phi$ (deg)
12/3/77	05, 04	-156.0	45	-146.4	20	9.6	25
12/13/77	05, 04	-155.9	52	-145.4	21	10.5	31
12/17/77	04, 03	-156.8	33	-146.8	30	10.0	3
3/26/78	05, 04	-156.5	58	-146.4	25	10.1	33
11/12/83	03, 03	-158.0	24	-145.6	13	12.4	11
12/11/83	04, 03	-156.7	56	-145.4	29	11.3	27
12/12/83	02, 01	-157.7	51	-143.9	25	13.8	26
2/23/84	05, 04	-158.1	49	-146.7	22	11.4	27
3/1/84	06, 05	-157.2	63	-147.1	29	10.1	34
3/2/84	04, 03	-156.7	24	-145.9	16	10.8	8
3/3/84	06, 05	-154.8	48	-146.3	24	8.5	24
3/4/84	06, 05	-154.6	42	-146.8	22	7.8	20
3/5/84	06, 05	-154.0	49	-146.6	26	7.4	23
3/6/84	05, 04	-157.1	38	-147.0	22	10.1	16
3/8/84	06, 05	-153.5	29	-148.3	28	5.2	1
4/4/84	06, 05	-154.8	45	-147.9	15	6.9	30
4/6/84	04, 03	-160.3	16	-146.8	13	13.5	3
4/7/84	05, 04	-155.8	22	-145.4	5	10.4	17
4/9/84	05, 04	-157.5	34	-144.9	13	12.6	21
4/21/84	06, 05	-157.4	32	-145.4	21	12.0	11
4/22/84	06, 05	-156.0	37	-146.7	27	9.3	10
4/29/84	05, 04	-154.8	36	-145.6	22	9.2	14

Table 4. (Cont'd) Comparison of Transverse and Radial Magnetic Field Strengths During 3-hr Minimum Nighttime Field Strength Period

Date	Starting Time A, ϕ	H_ρ (dBA/m)	$H_\rho\Delta\phi$ (deg)	H_ϕ (dBA/m)	$H_\phi\Delta\phi$ (deg)	H_ϕ/H_ρ (dB)	$H_\rho\Delta\phi - H_\phi\Delta\phi$ (deg)
4/30/84	05, 04	-154.7	56	-145.7	25	9.0	31
5/4/84	05, 04	-155.8	69	-147.6	30	8.2	39
5/6/84	05, 04	-158.5	21	-146.7	24	11.8	-3
5/13/84	06, 05	-155.0	12	-148.1	18	6.9	-6
5/14/84	06, 05	-152.8	43	-145.3	20	7.5	23
5/17/84	05, 04	-158.1	47	-146.7	19	11.4	28
5/19/84	04, 03	-157.6	24	-147.9	16	9.7	8
5/22/84	05, 04	-155.6	42	-144.6	14	11.0	28
6/9/84	05, 04	-154.7	47	-145.4	26	10.3	21
6/10/84	06, 05	-156.1	67	-144.8	26	11.3	41
Averages	05, 04	-156.2	41	-146.2	21	10.0	20

CONCLUSIONS

In this report, we have presented the results of 136 days of radial magnetic field-strength measurements taken from November 1977 through June 1984. During normal-propagation conditions, the Connecticut H_ρ amplitude behavior usually is similar to the H_ϕ amplitude behavior, while the H_ρ night-to-day relative-phase variation ($\Delta\phi$) usually is somewhat greater than the $H_\phi\Delta\phi$ variation.

During disturbed-propagation conditions, the H_ρ and H_ϕ daily plots (versus GMT) usually are dissimilar (in both amplitude and relative phase). In particular, the radial magnetic field-strength variations usually are greater than the transverse magnetic field-strength variations.

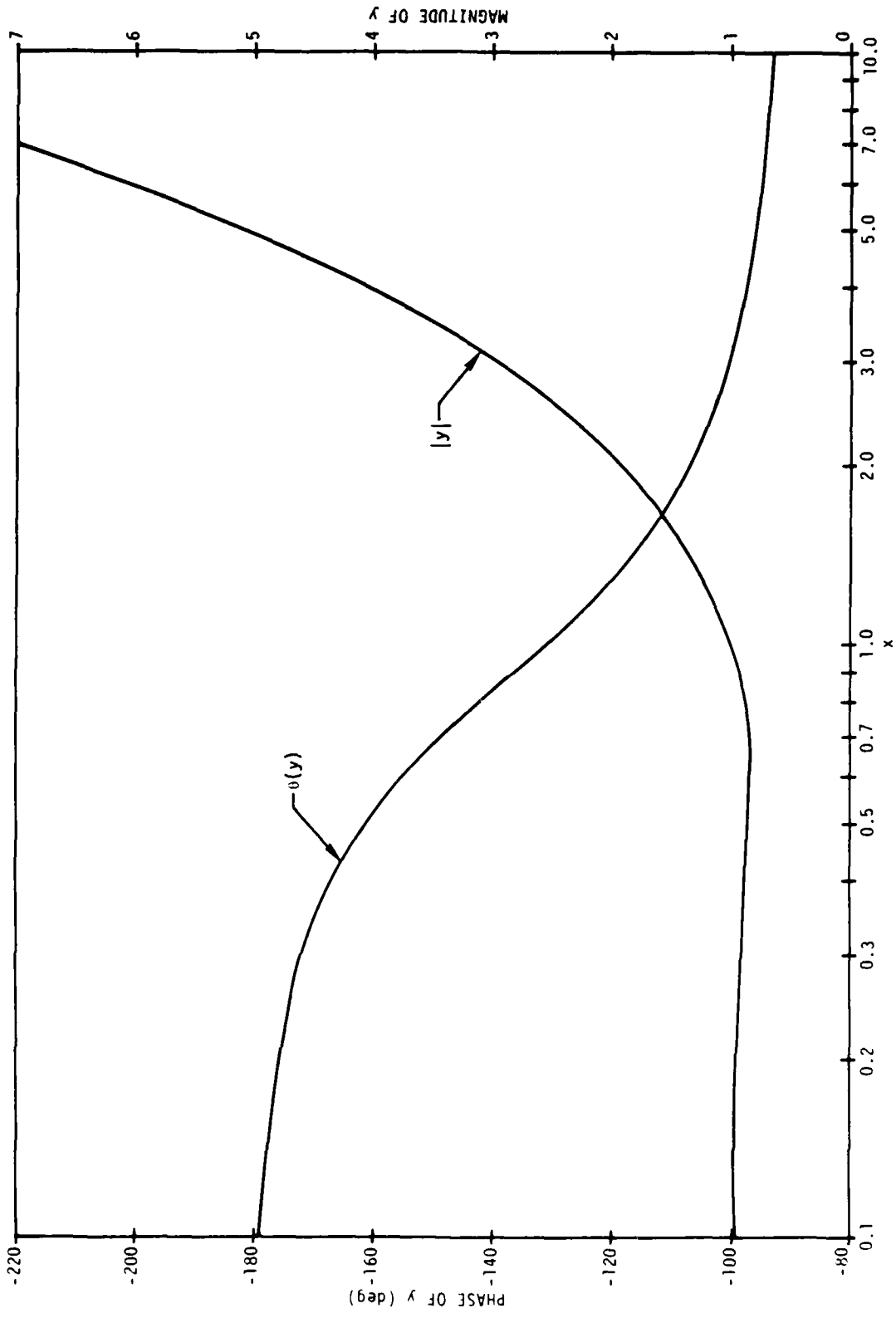

Figure 1. Magnitude and Phase of the Function $y = -f(x)$ Versus x

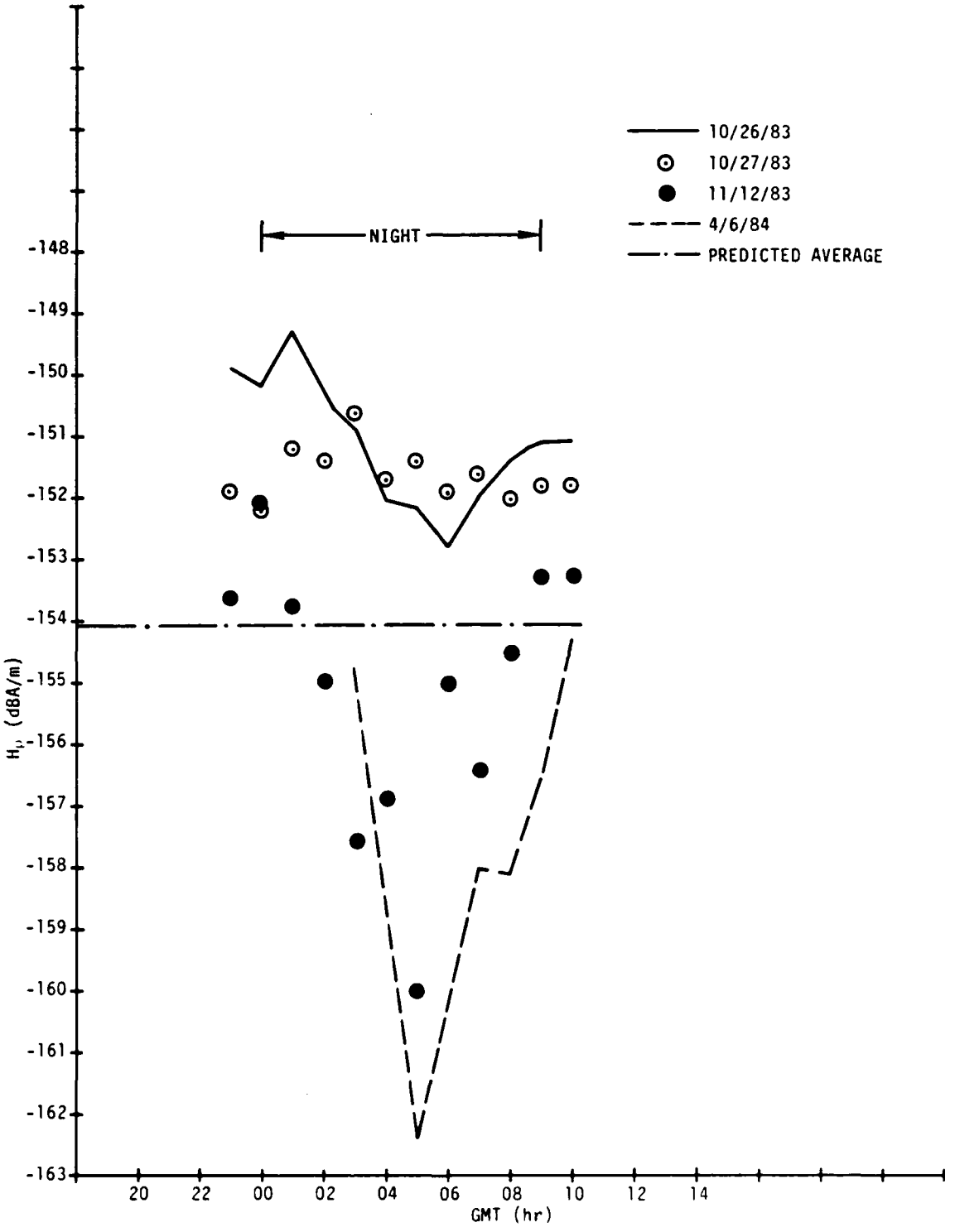

Figure 2. Comparisons of Connecticut Radial Magnetic Field Strengths Versus GMT (10/26, 10/27, and 11/12, 1983 and 4/6, 1984)

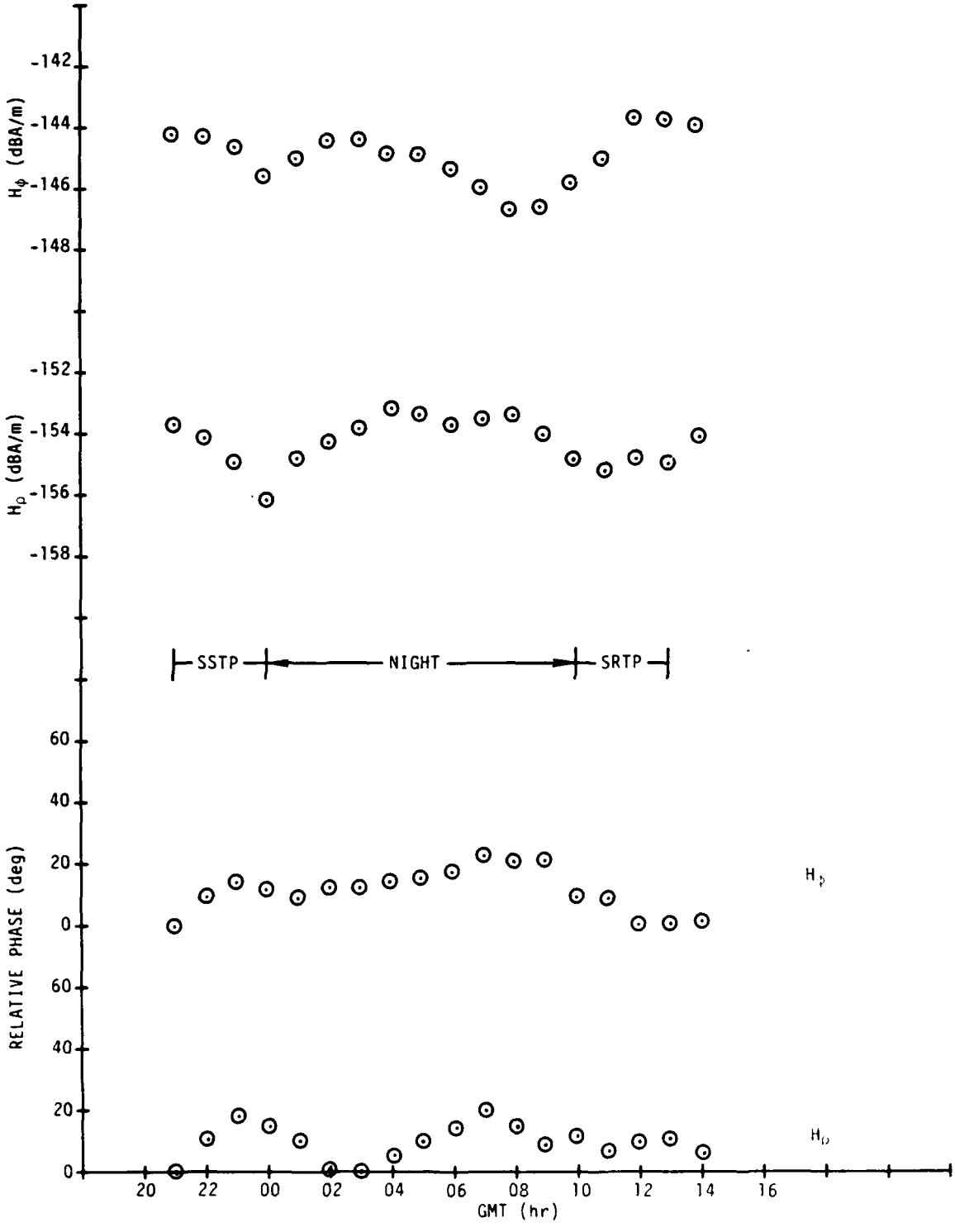

Figure 5. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 16 November 19[illegible]

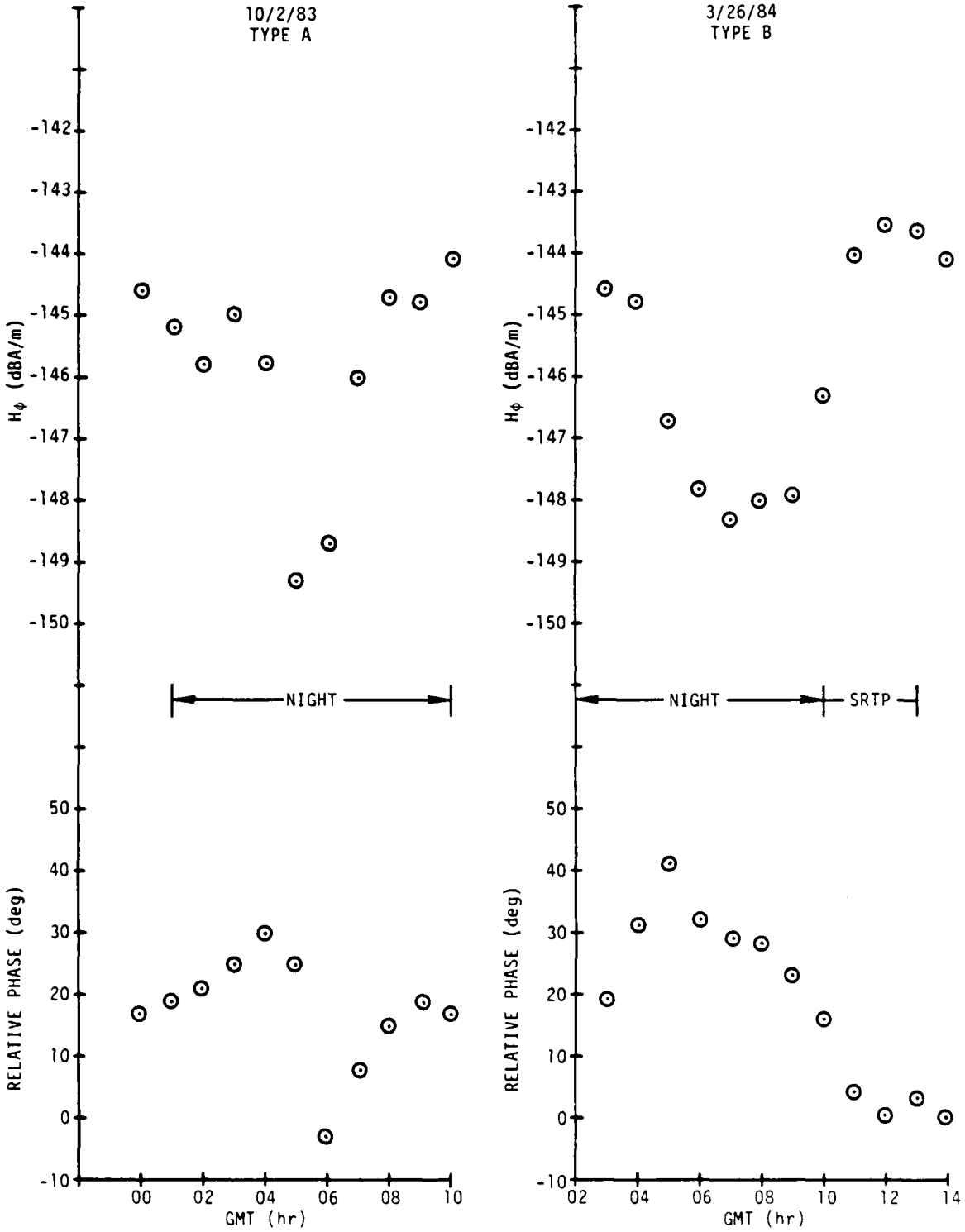

Figure 5. Comparison of Connecticut Transverse Magnetic Field Strengths Versus GMT (10/2/83 and 3/26/84)

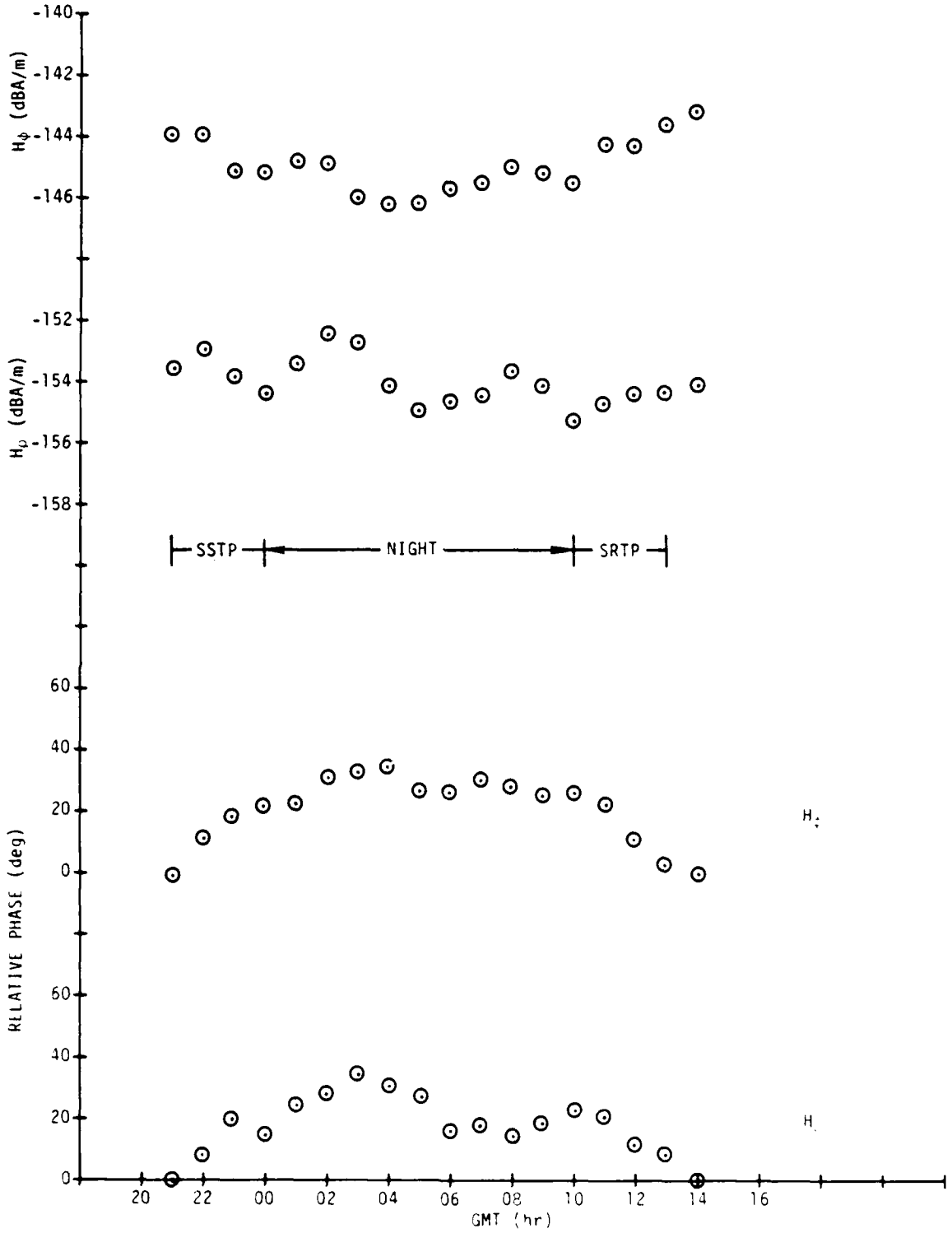

Figure 4. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 26 November 19[illegible]

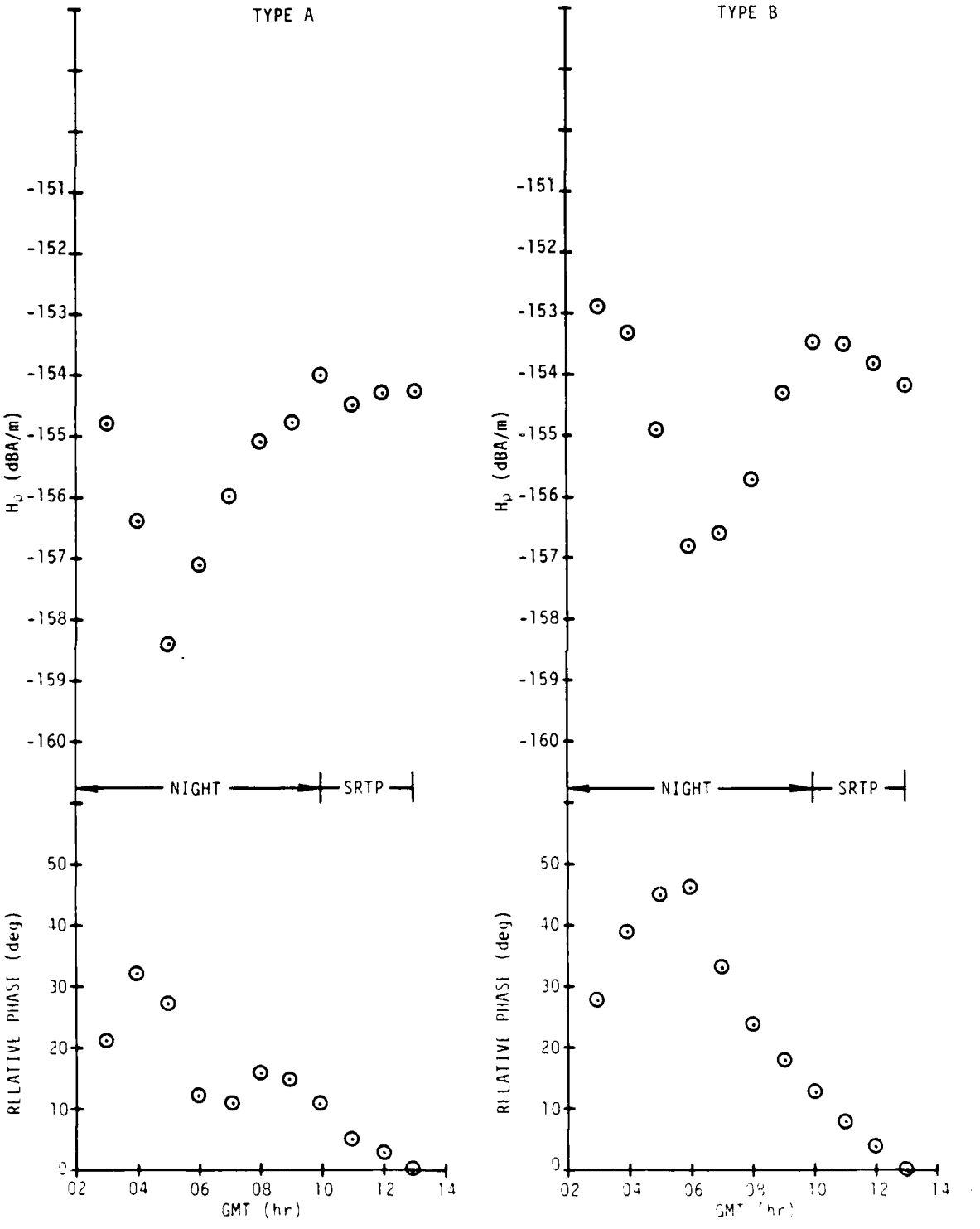

Figure 6. Comparison of Connecticut Radial Magnetic Field Strengths Versus GMT

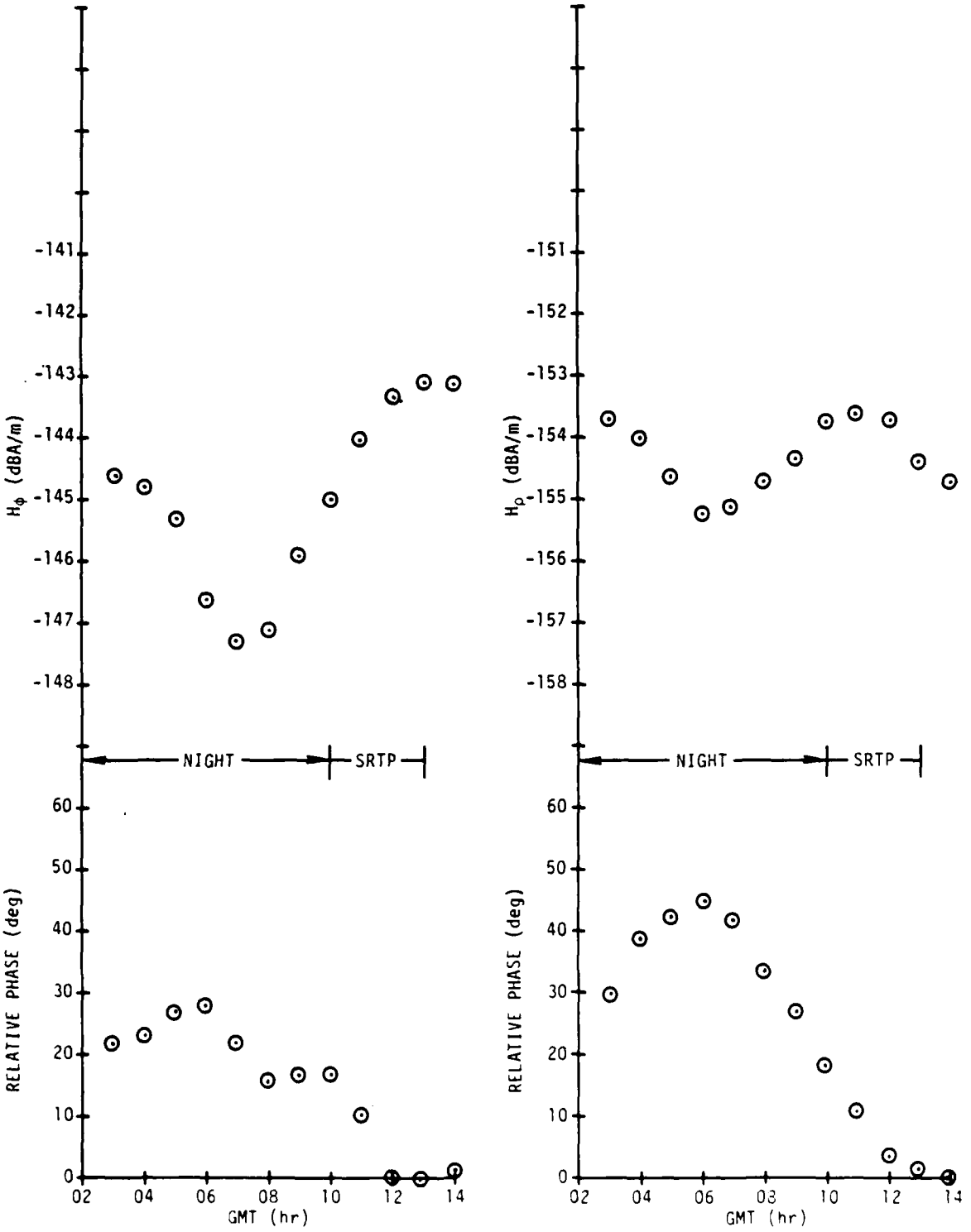

Figure 7. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 3/1 to 3/8/84 Data)

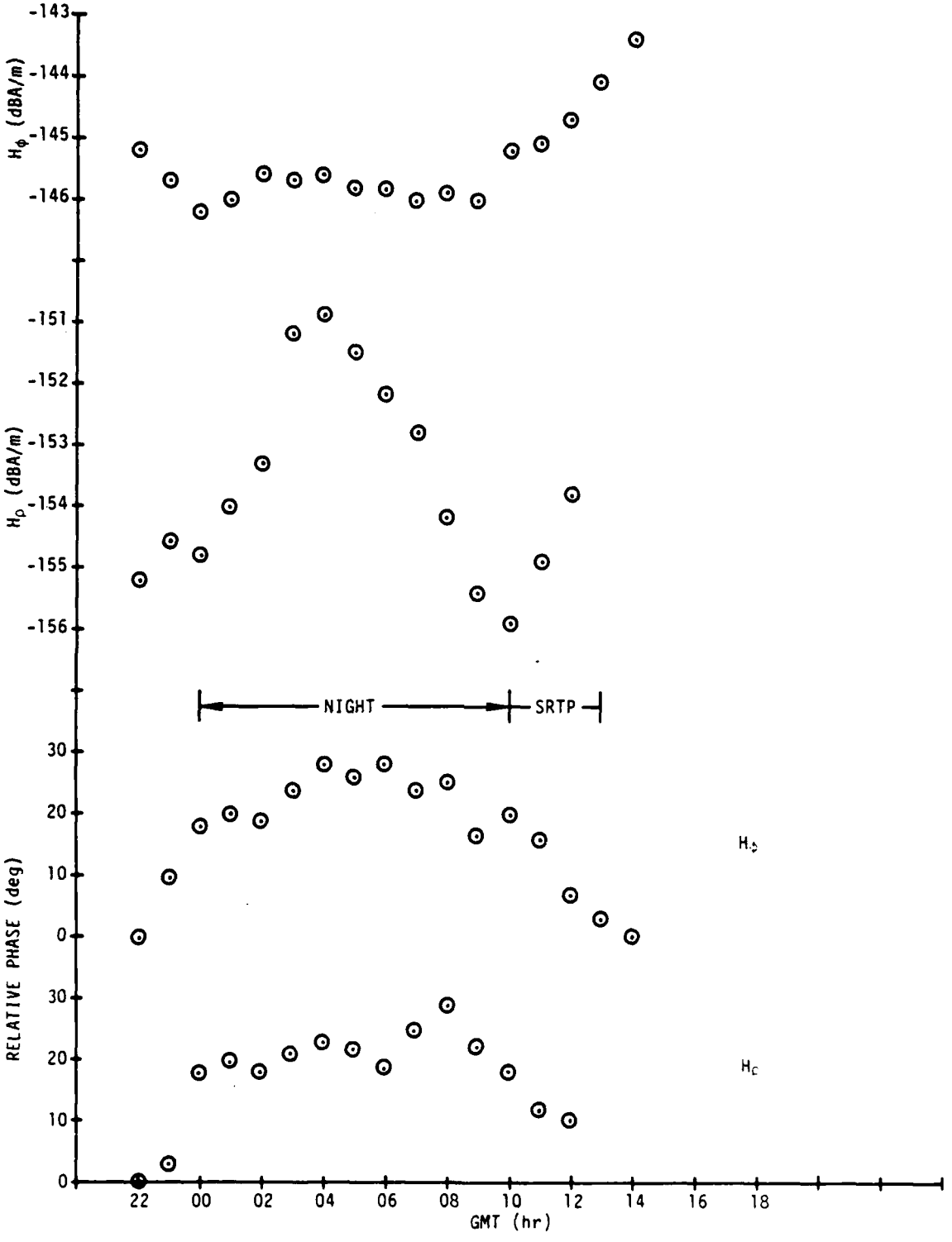

Figure 8. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 11 November 1977

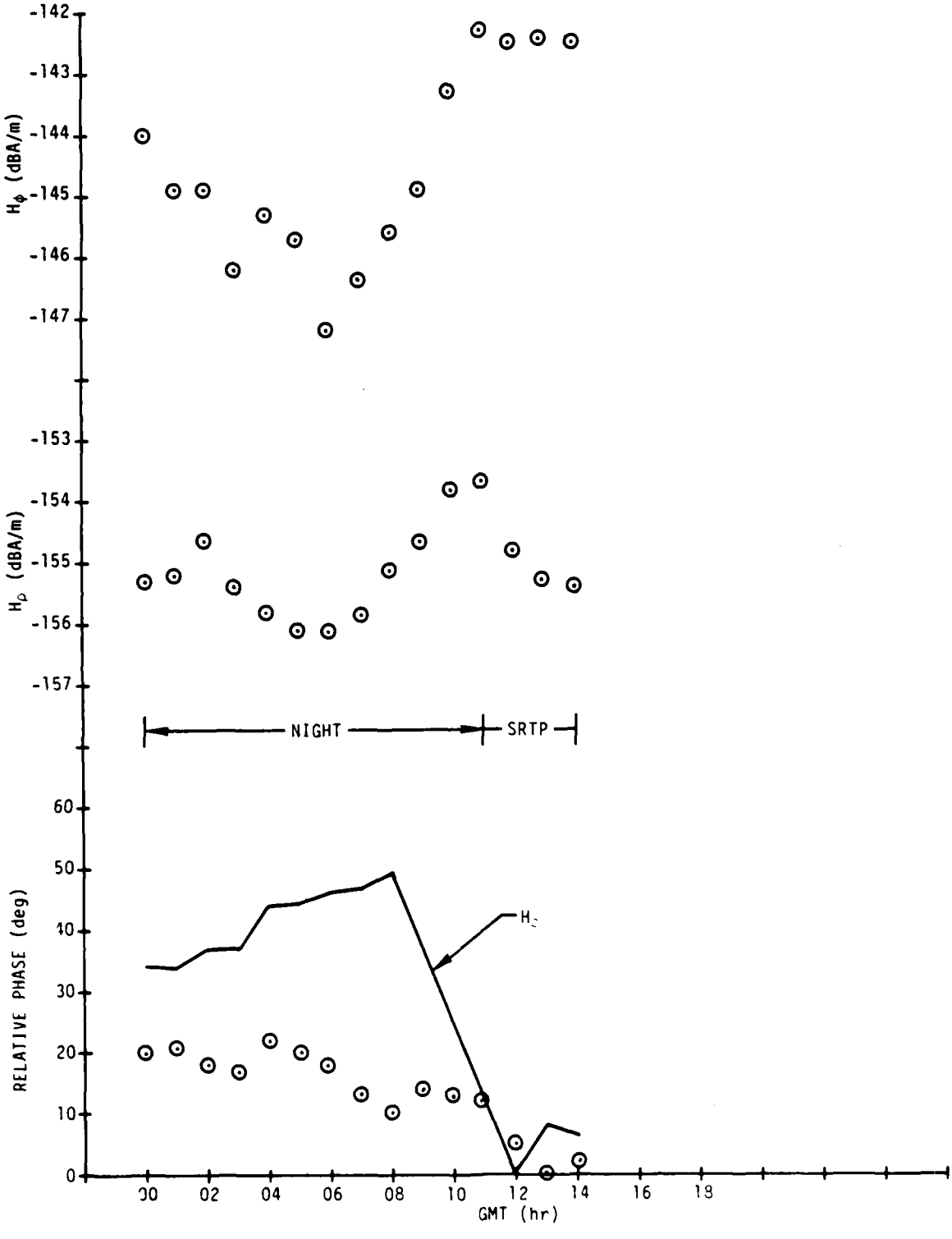

Figure 9. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 3 December 197[illegible]

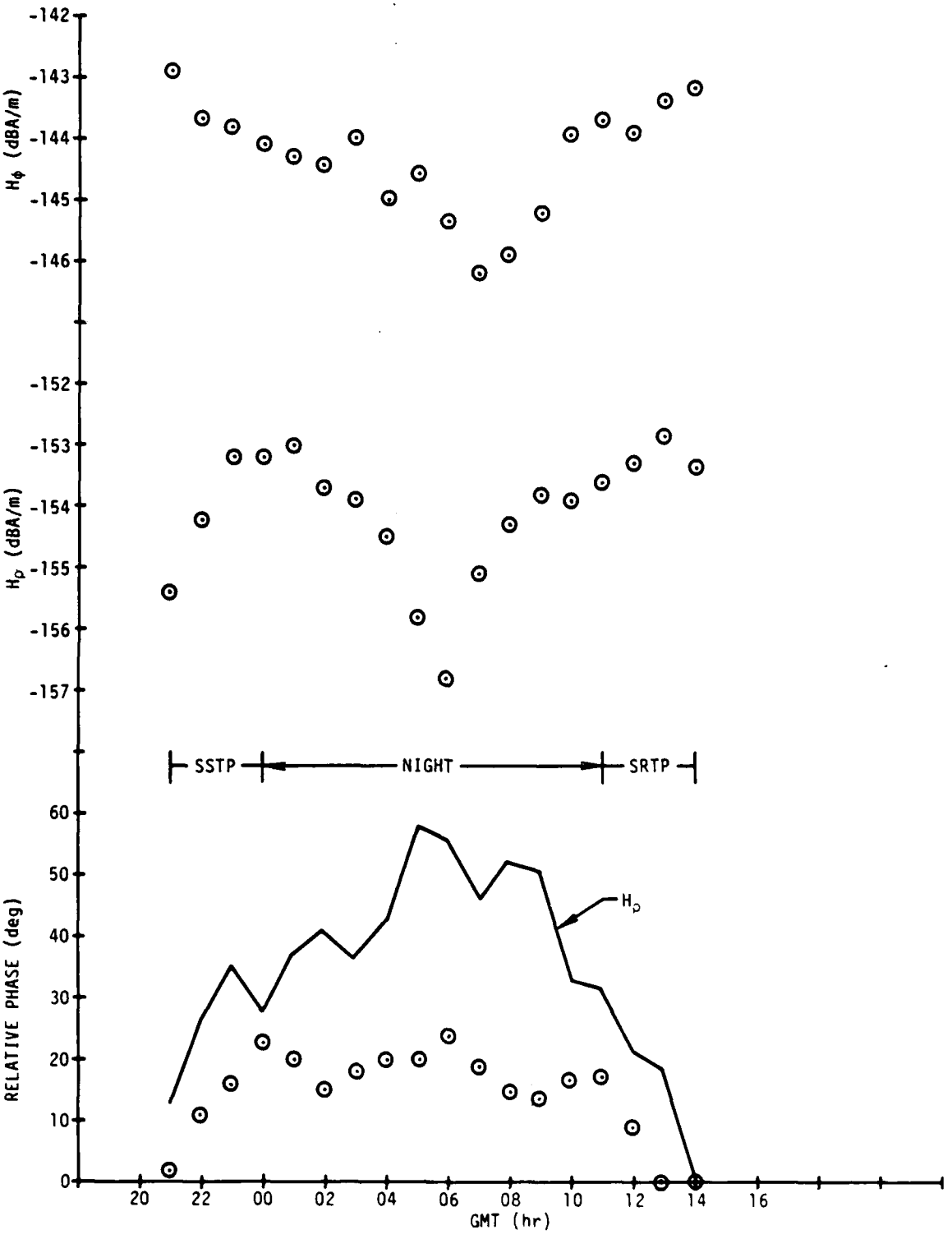

Figure 10. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 13 December 1977

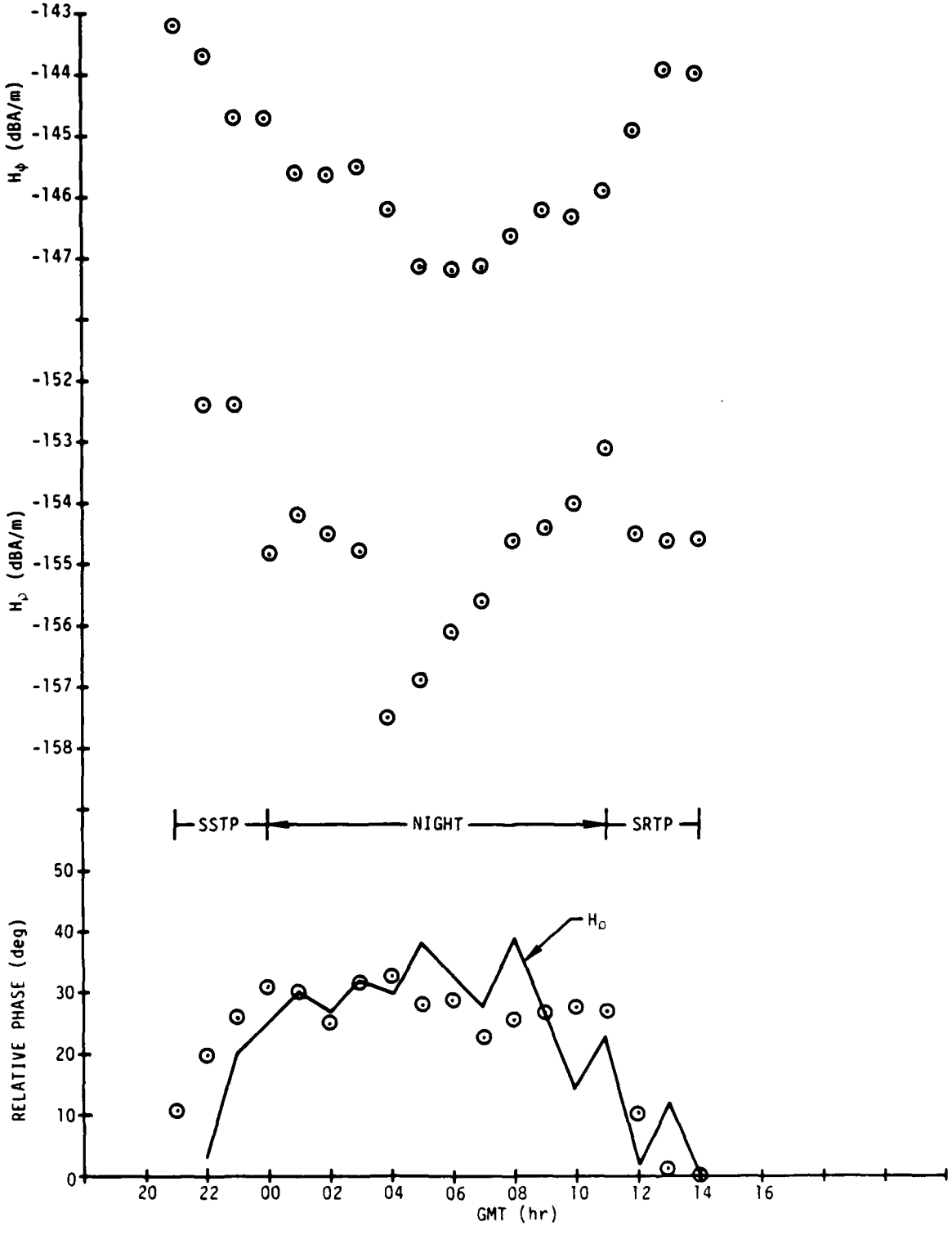

Figure 11. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 17 December 1977

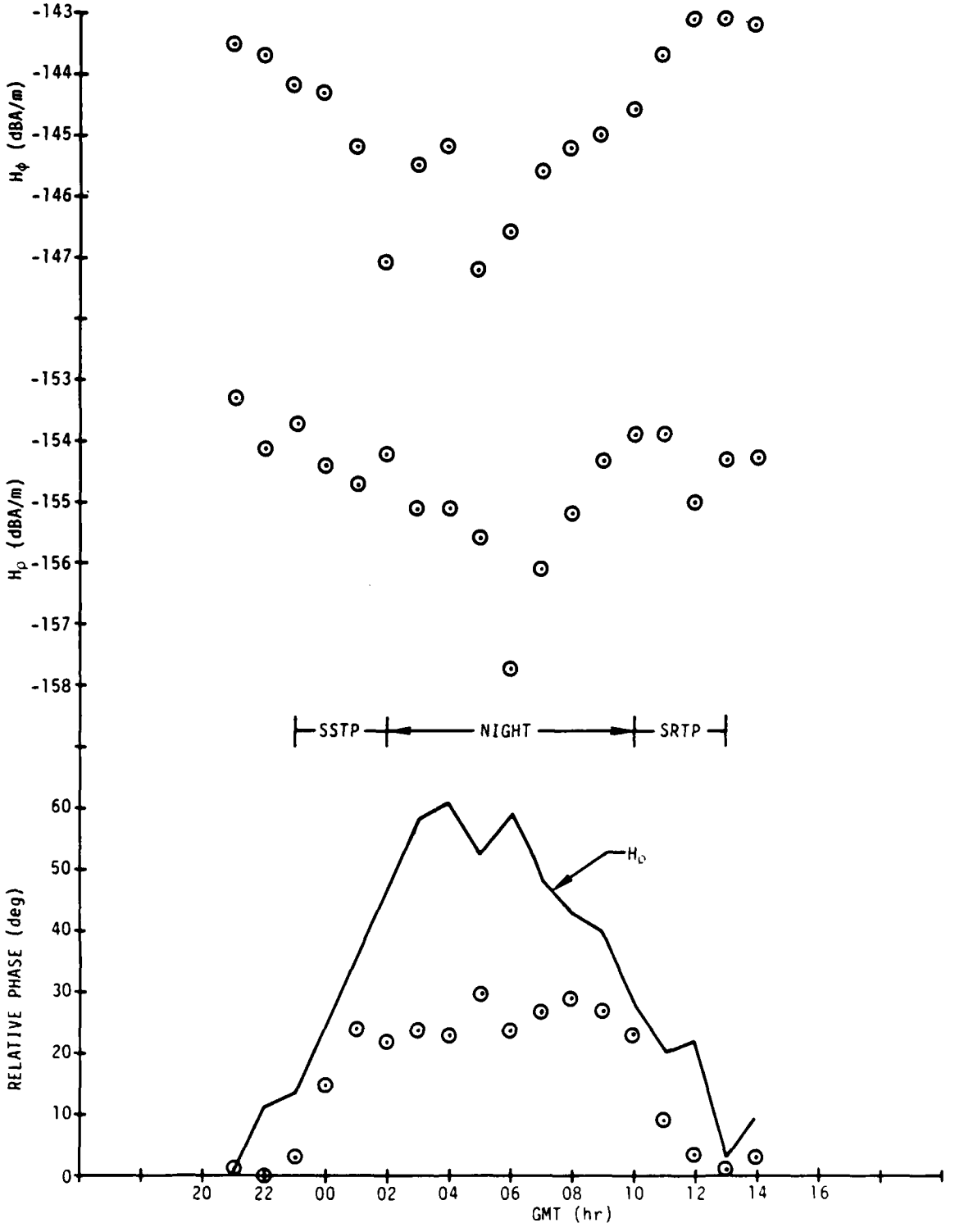

Figure 12. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 26 March 1978

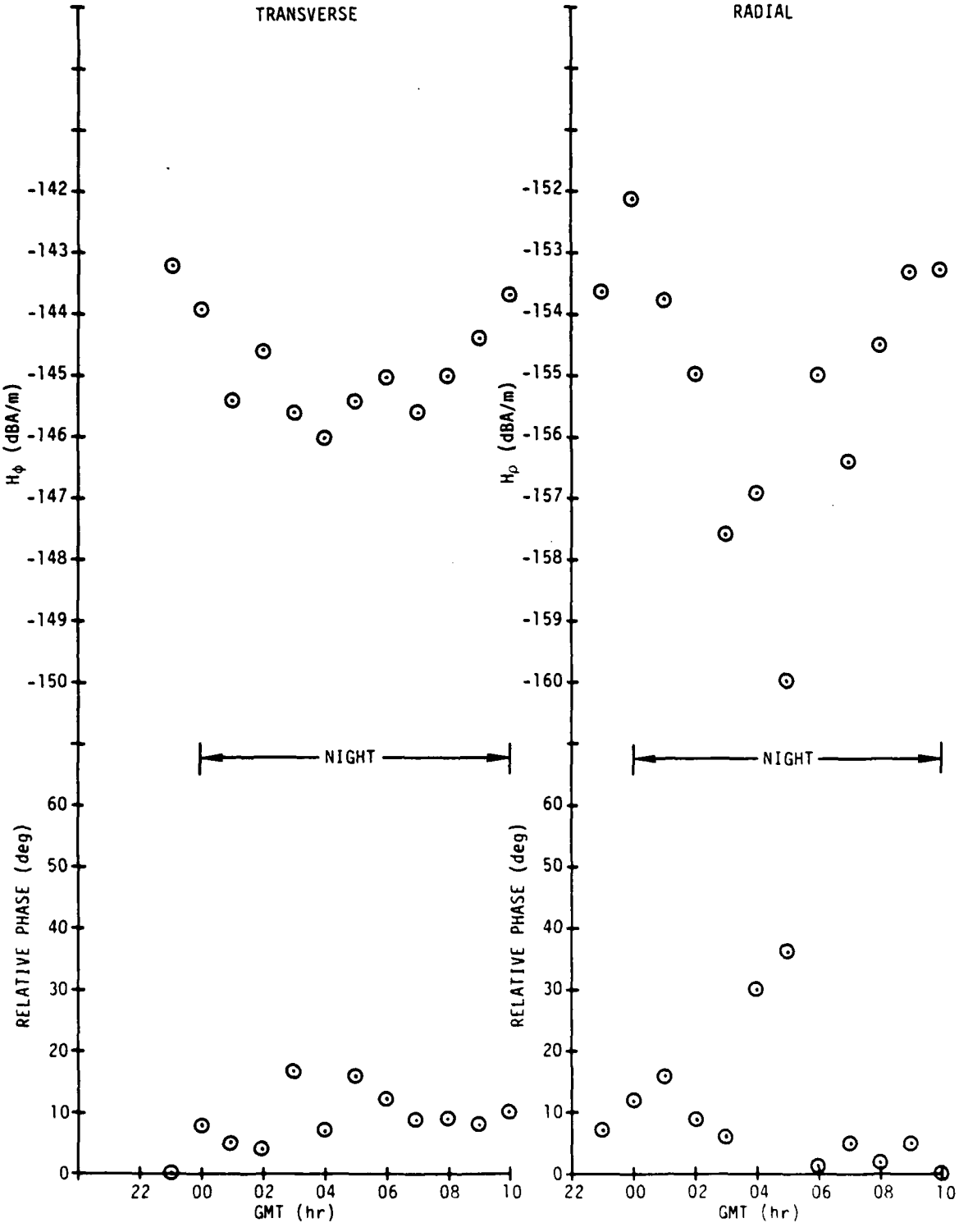

Figure 13. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 12 November 1985

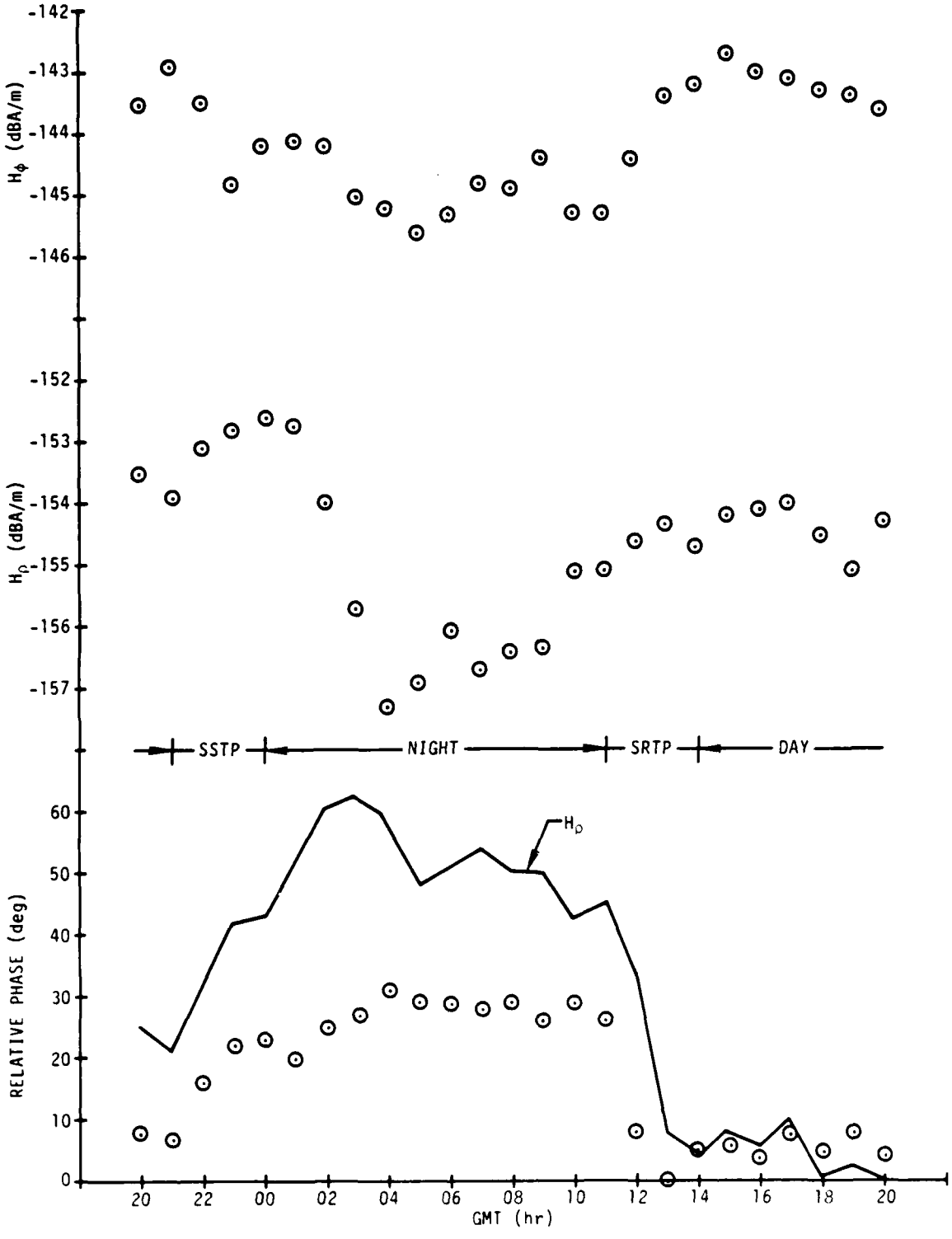

Figure 14. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 10/11 December 1985

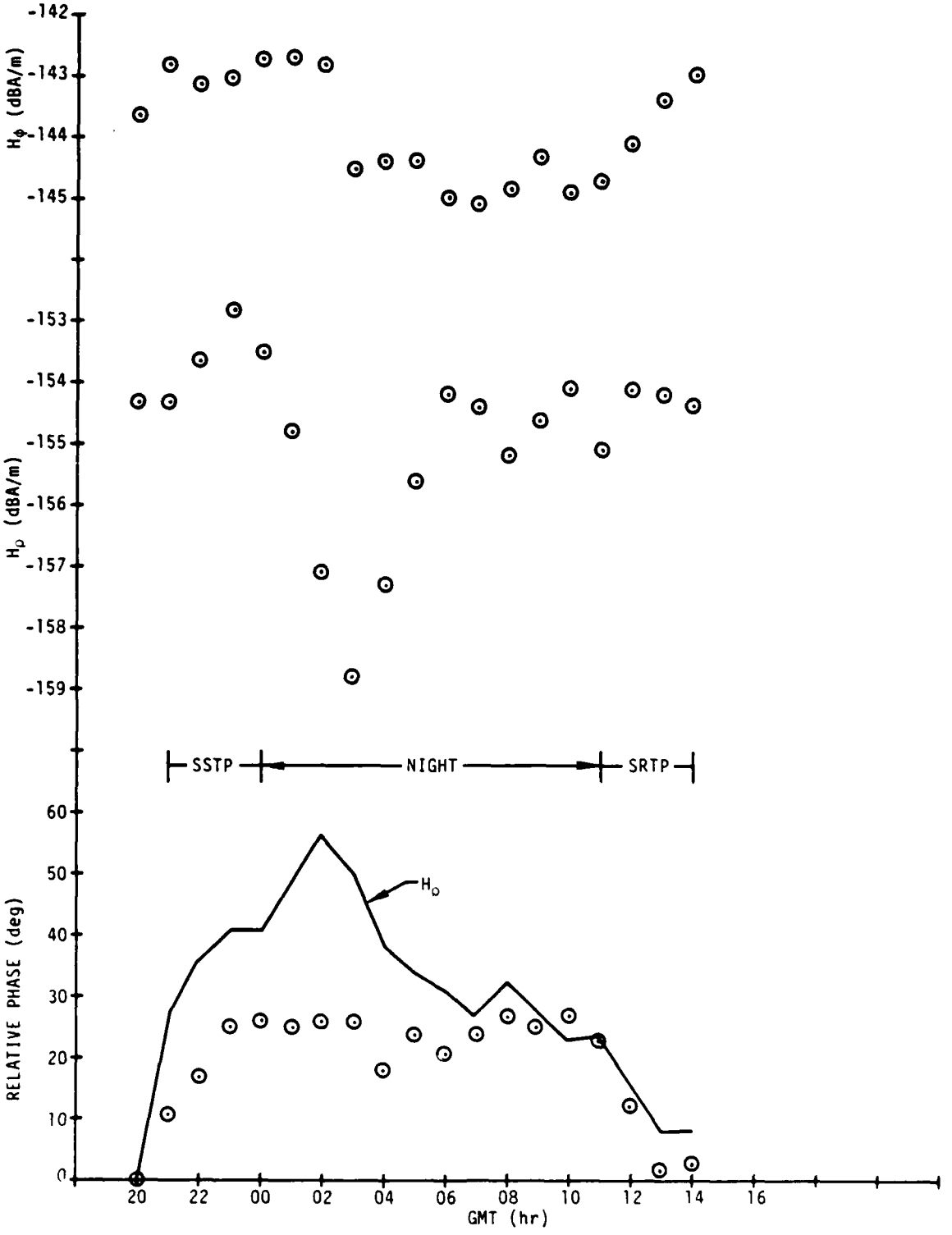

Figure 15. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 12 December 1985

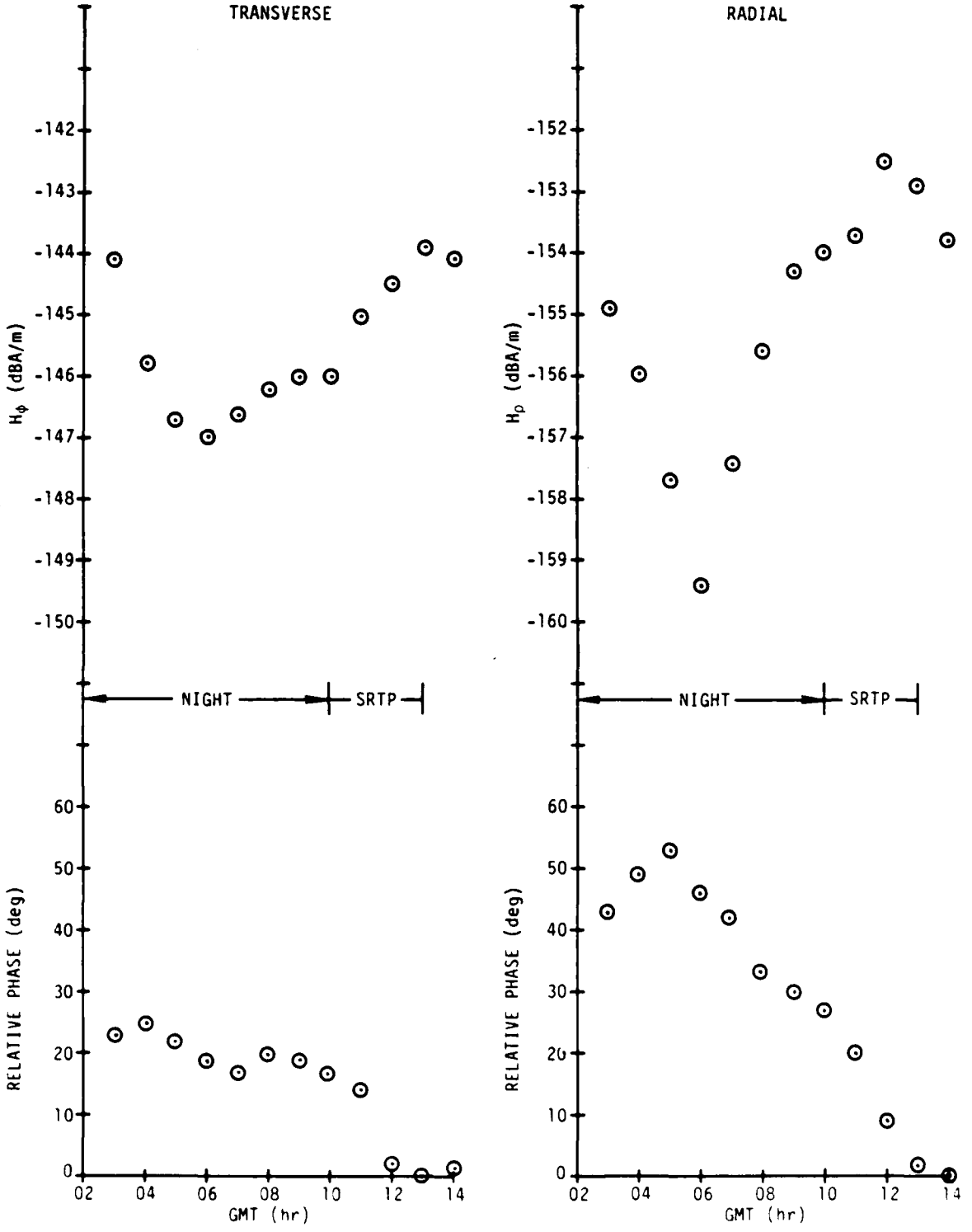

Figure 16. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 23 February 1984

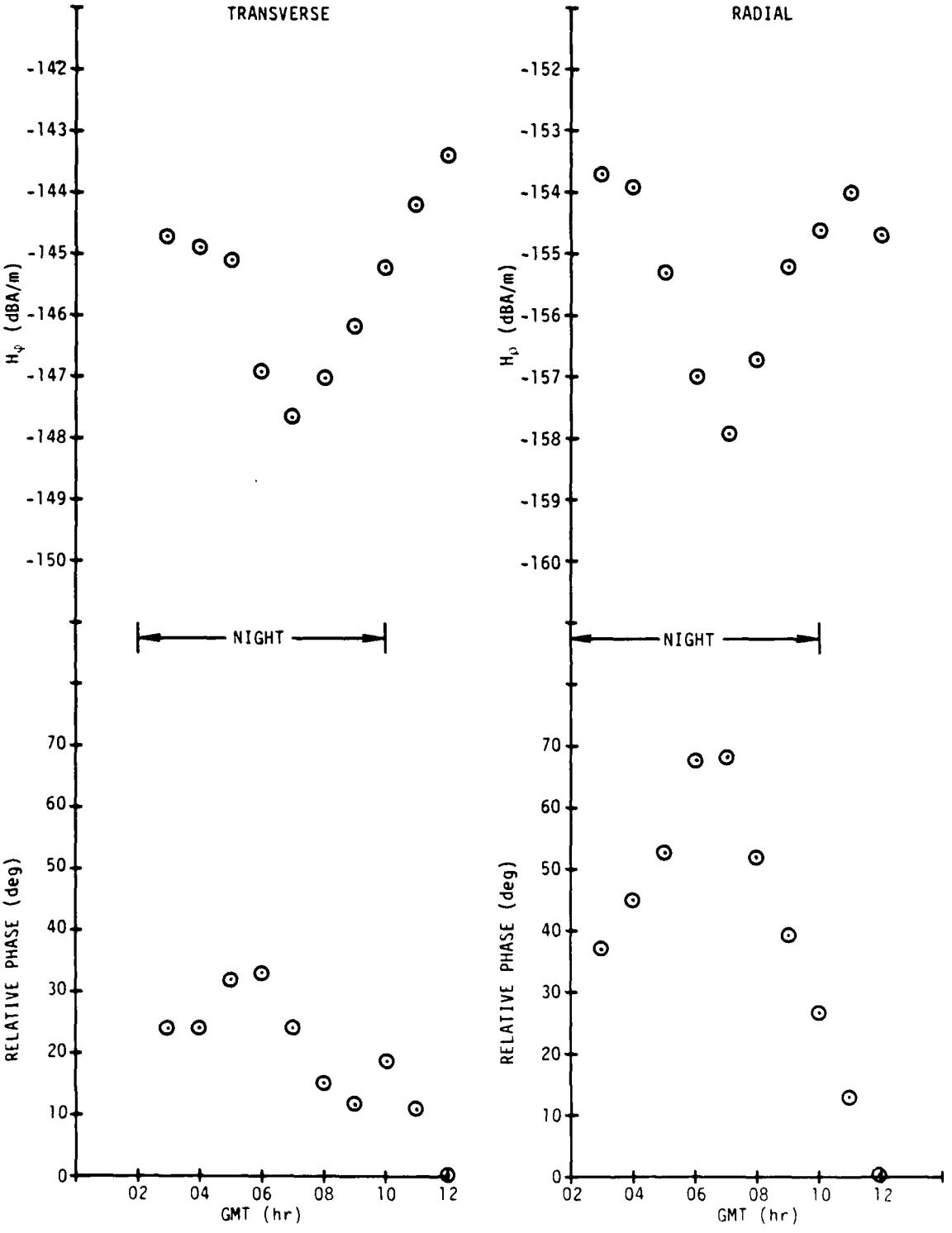

Figure 17. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 1 March 1984

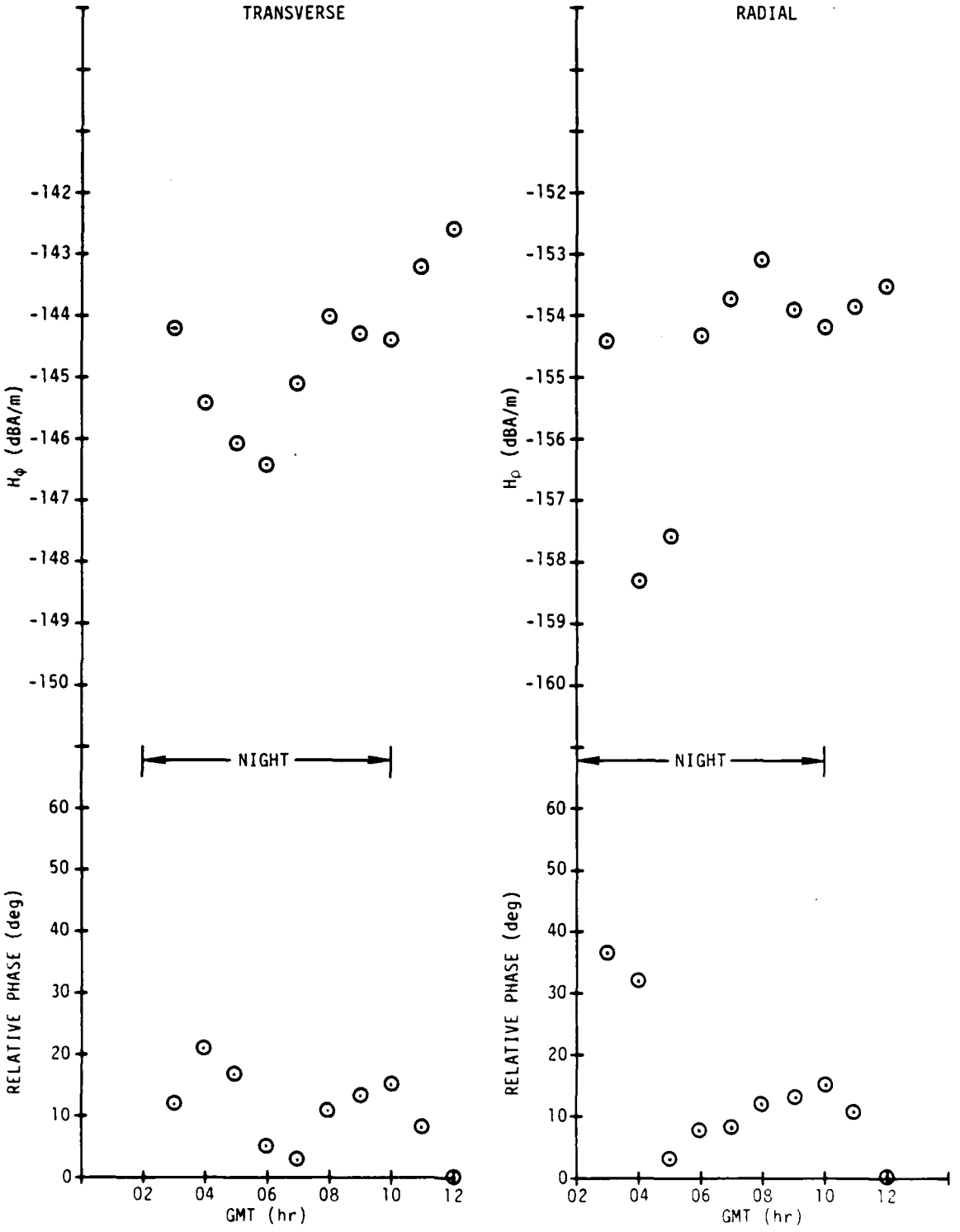

Figure 18. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 2 March 1984

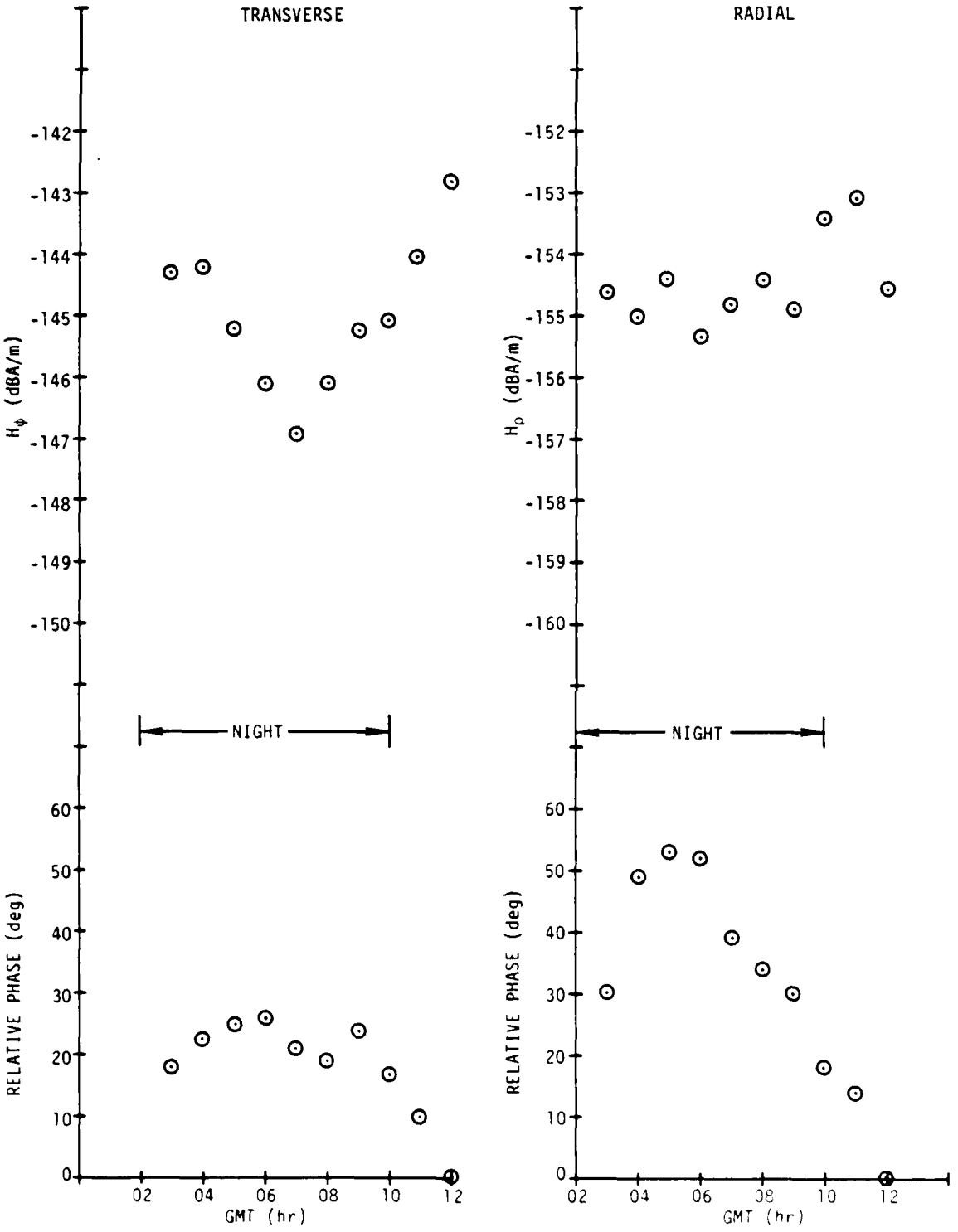

Figure 19. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 3 March 1984

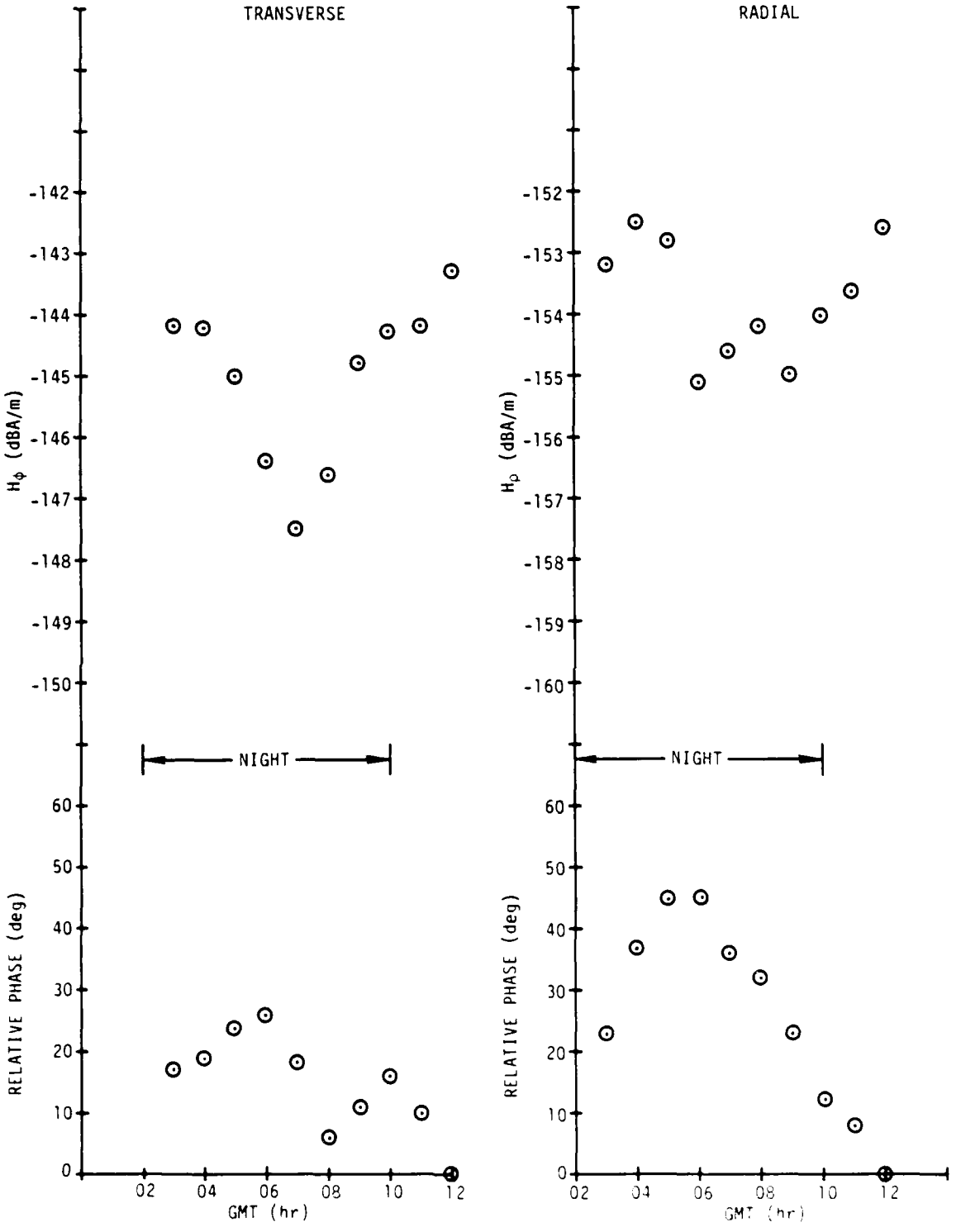

Figure 20. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 March 1984

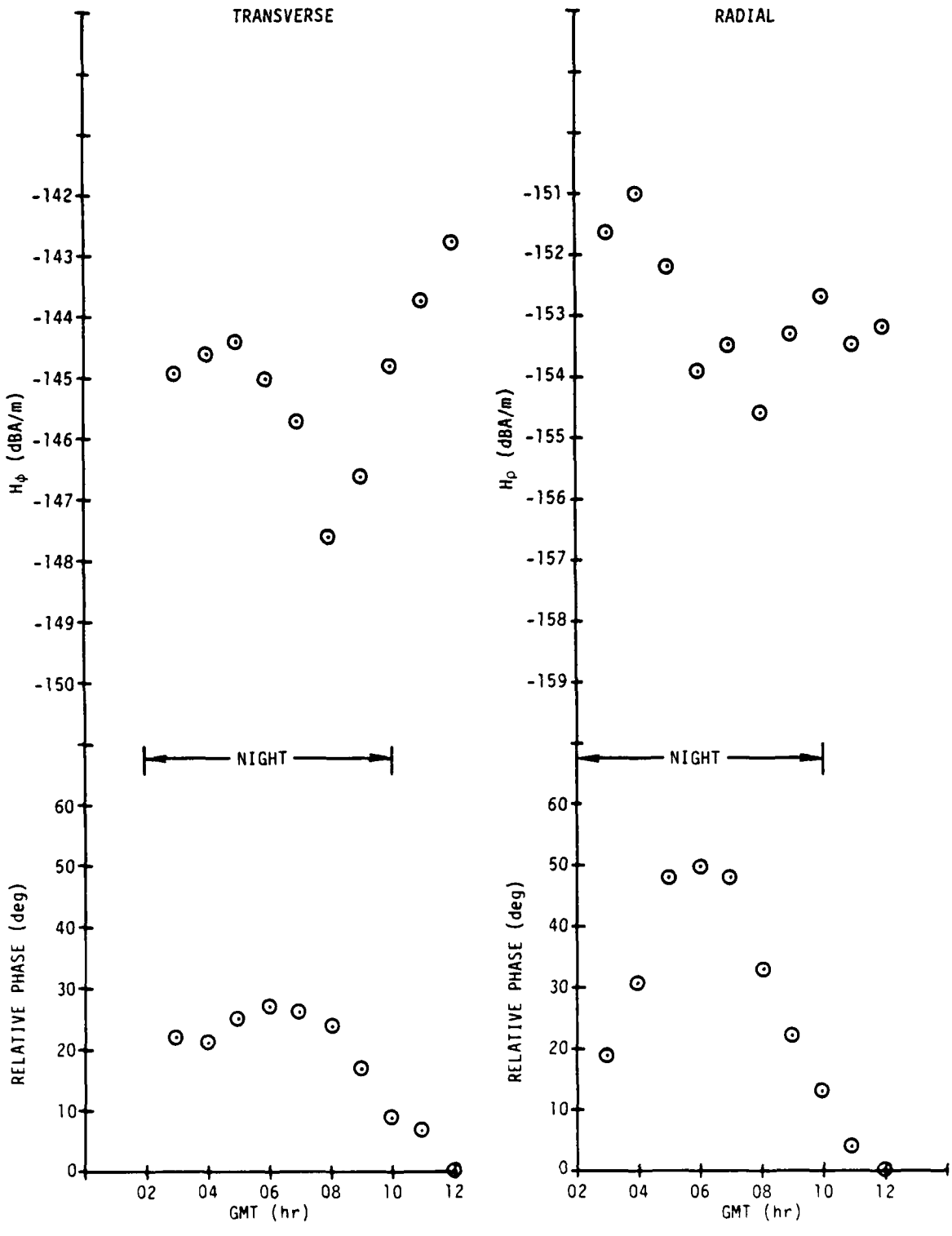

Figure 21. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 5 March 1984

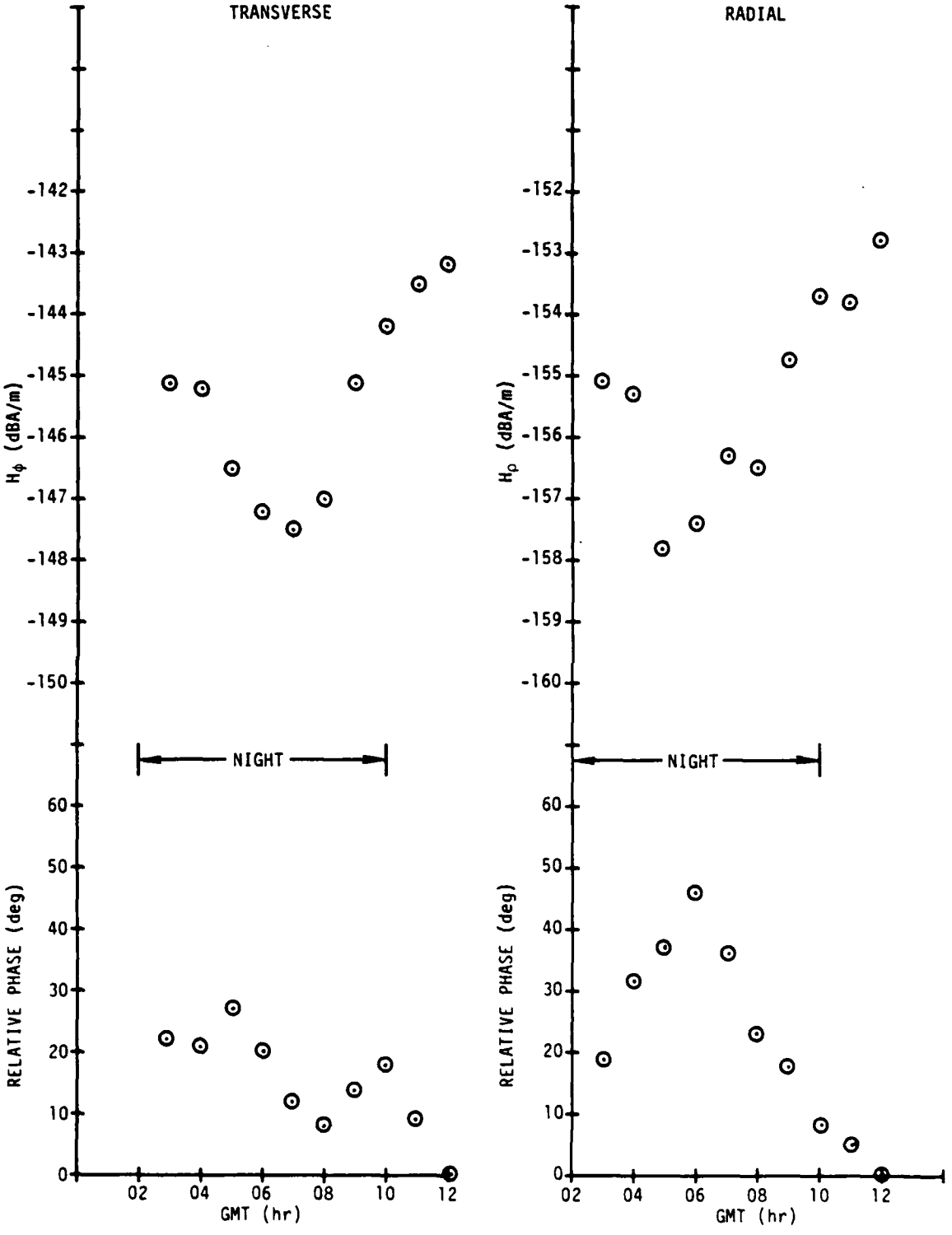

Figure 22. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 March 1984

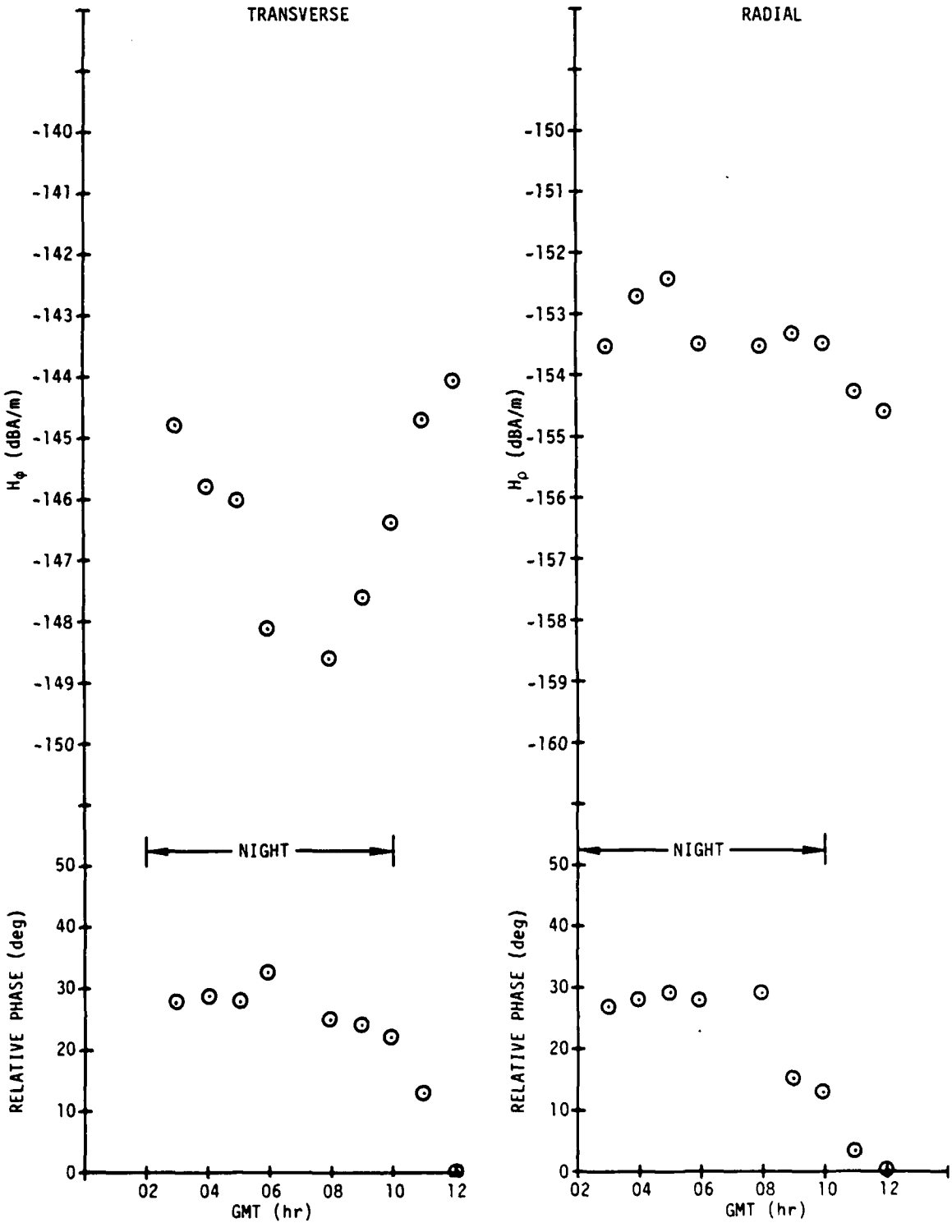

Figure 25. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 8 March 1984

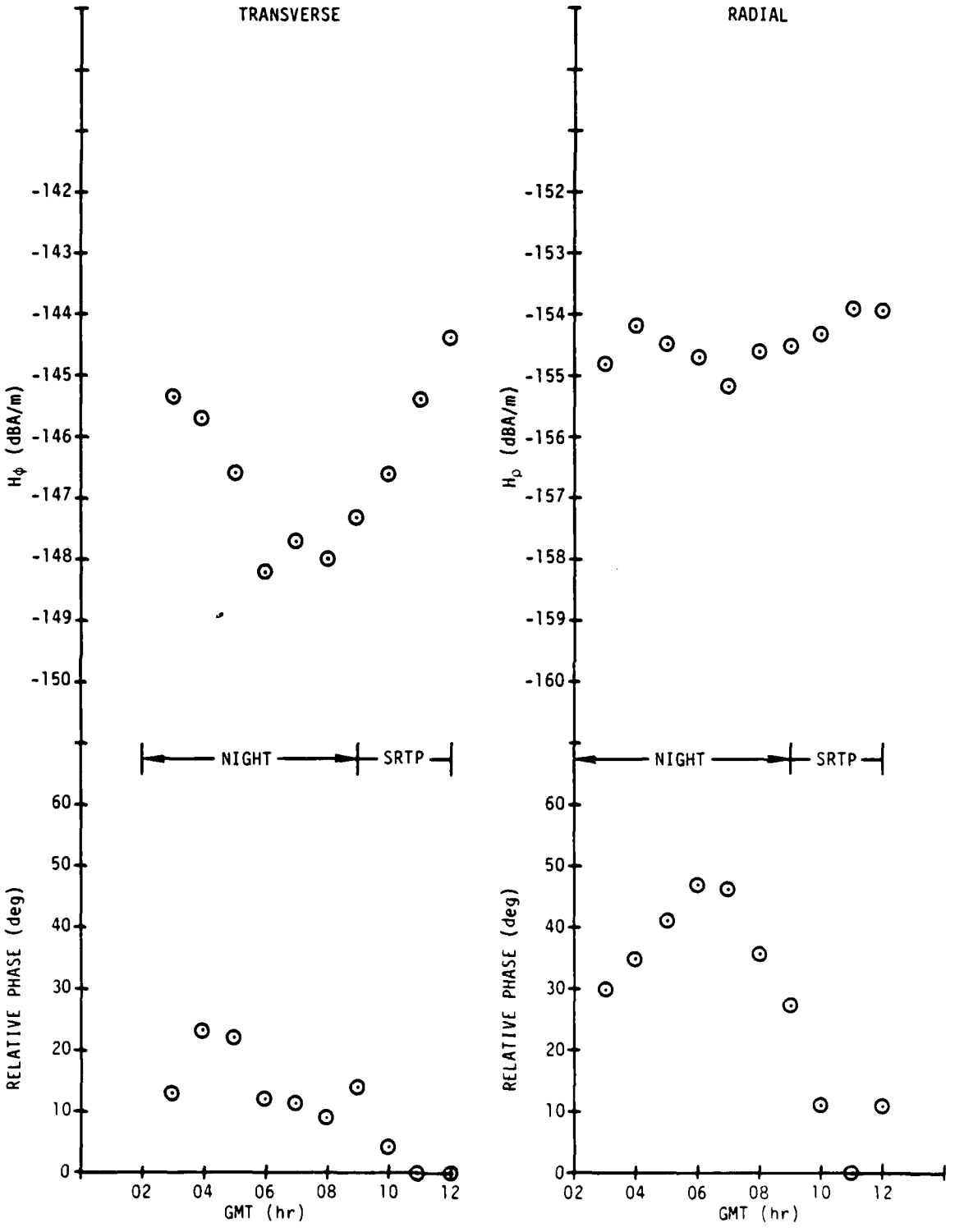

Figure 24. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 April 1984

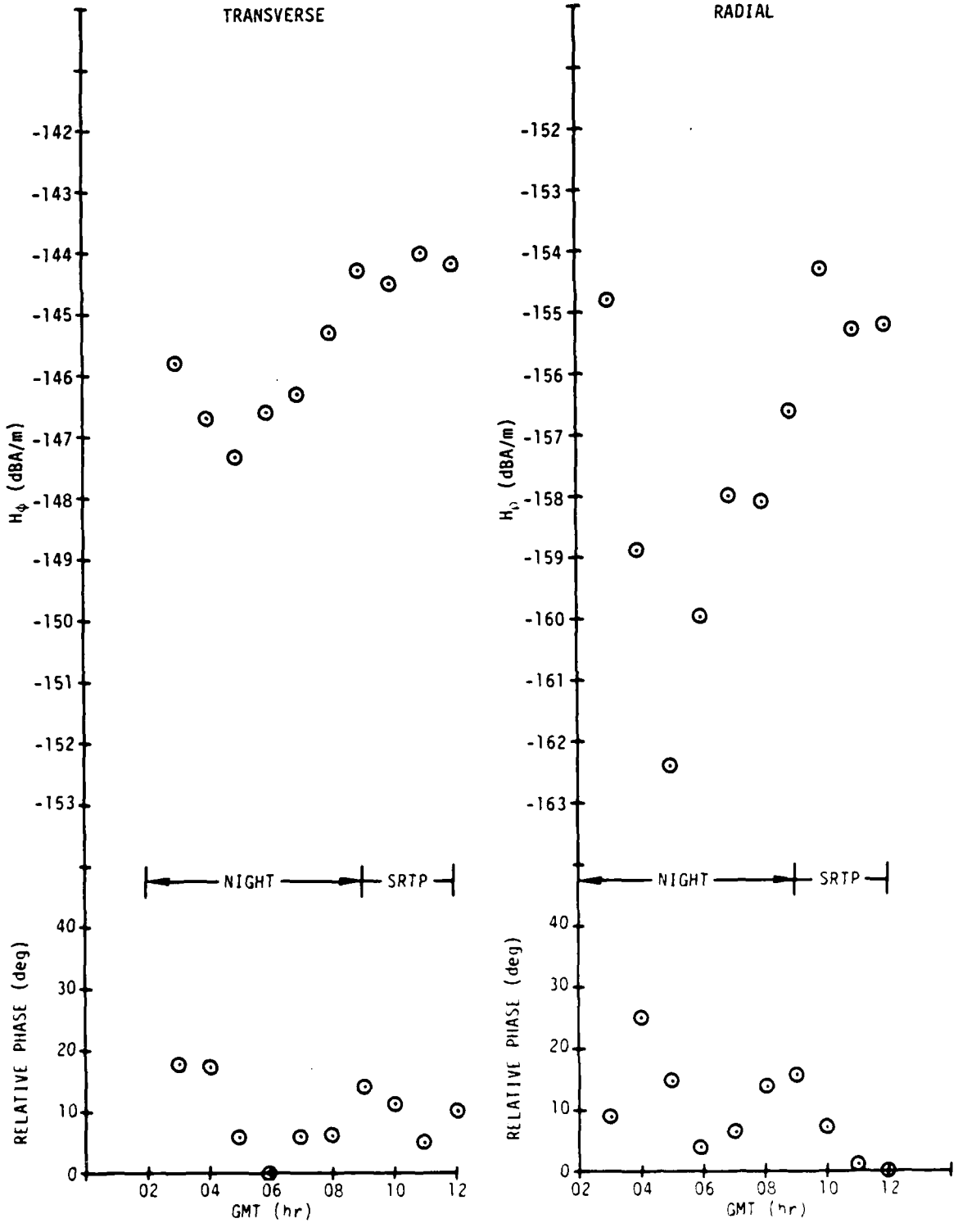

Figure 25. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 April 1984

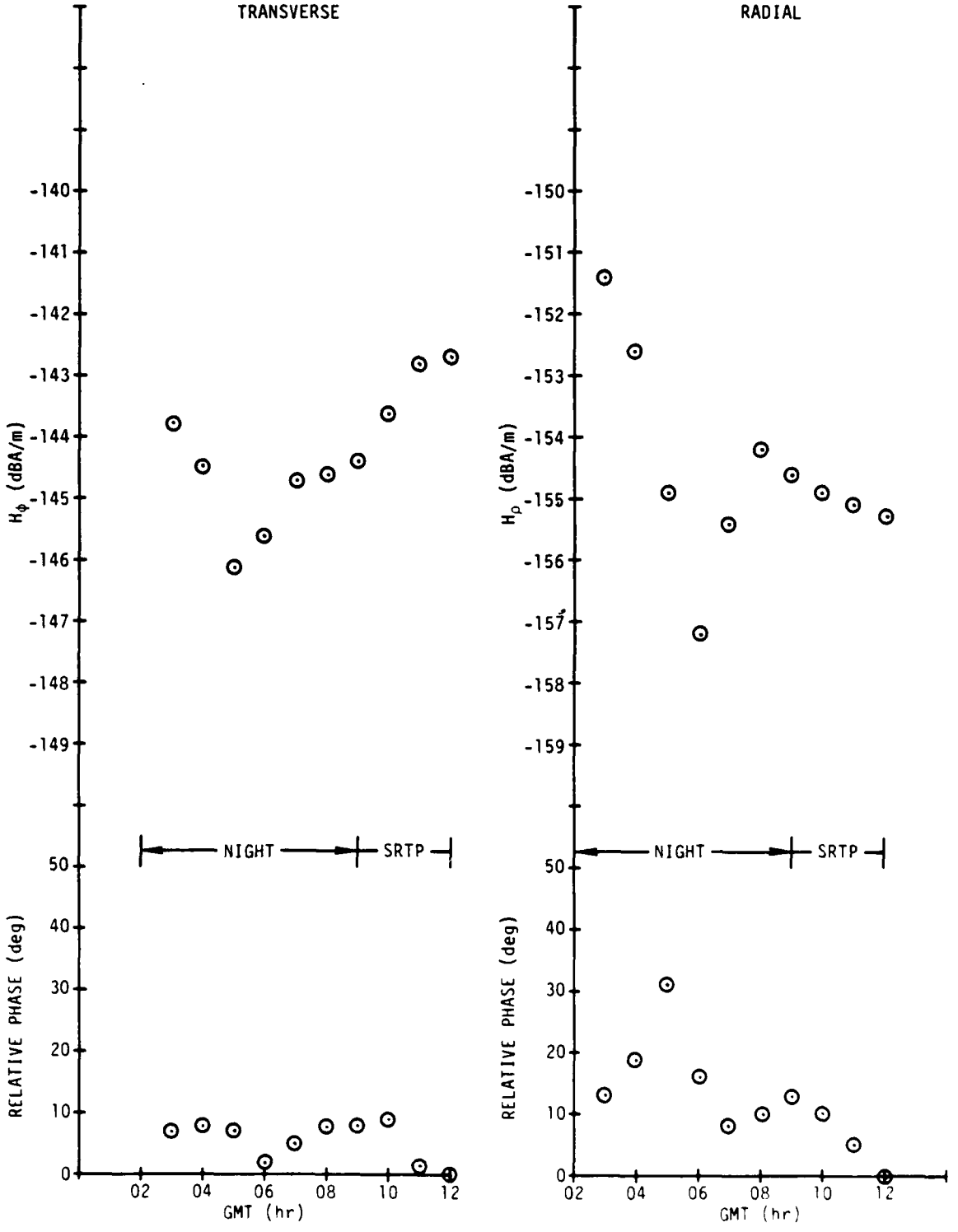

Figure 26. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 7 April 1984

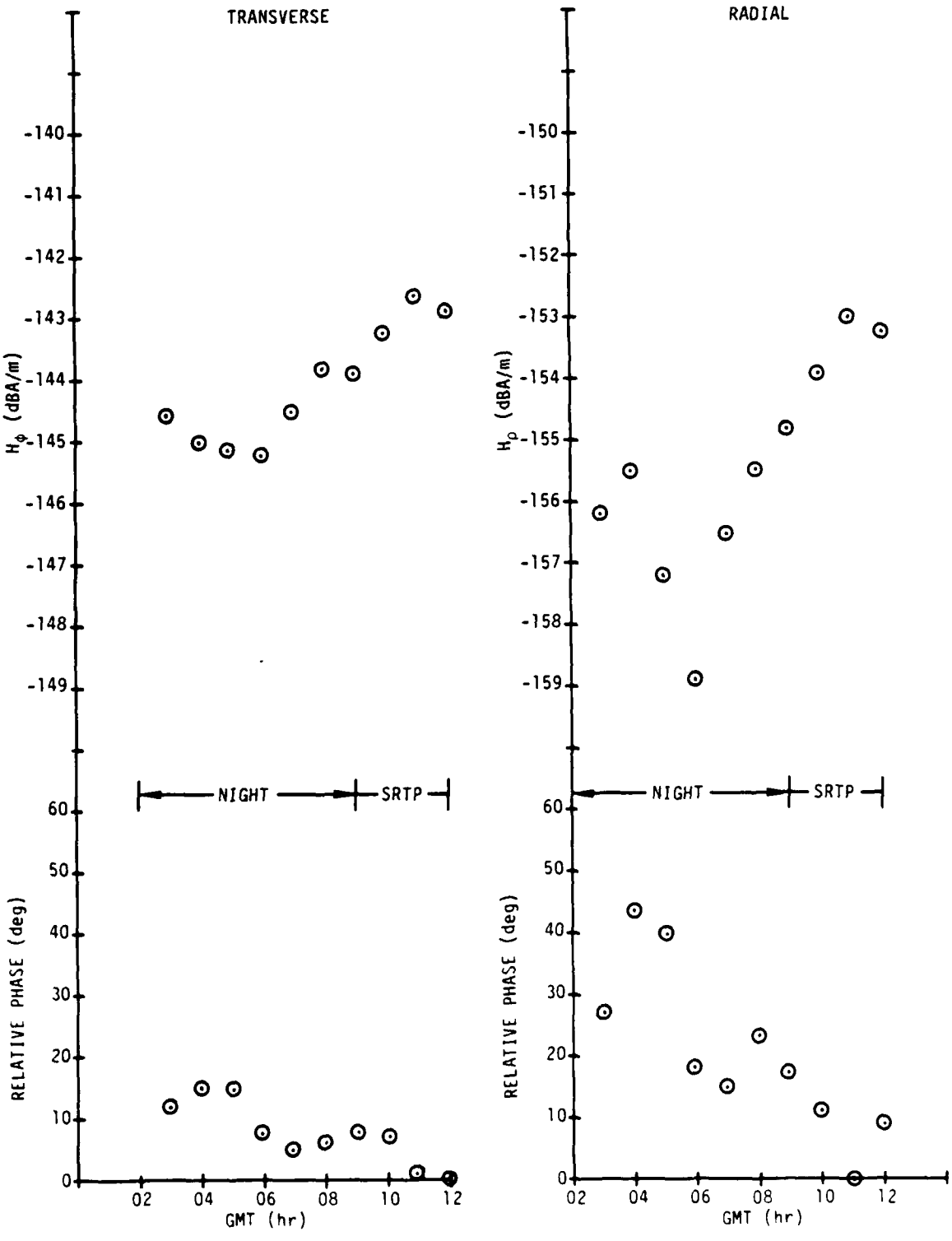

Figure 27. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 9 April 1984

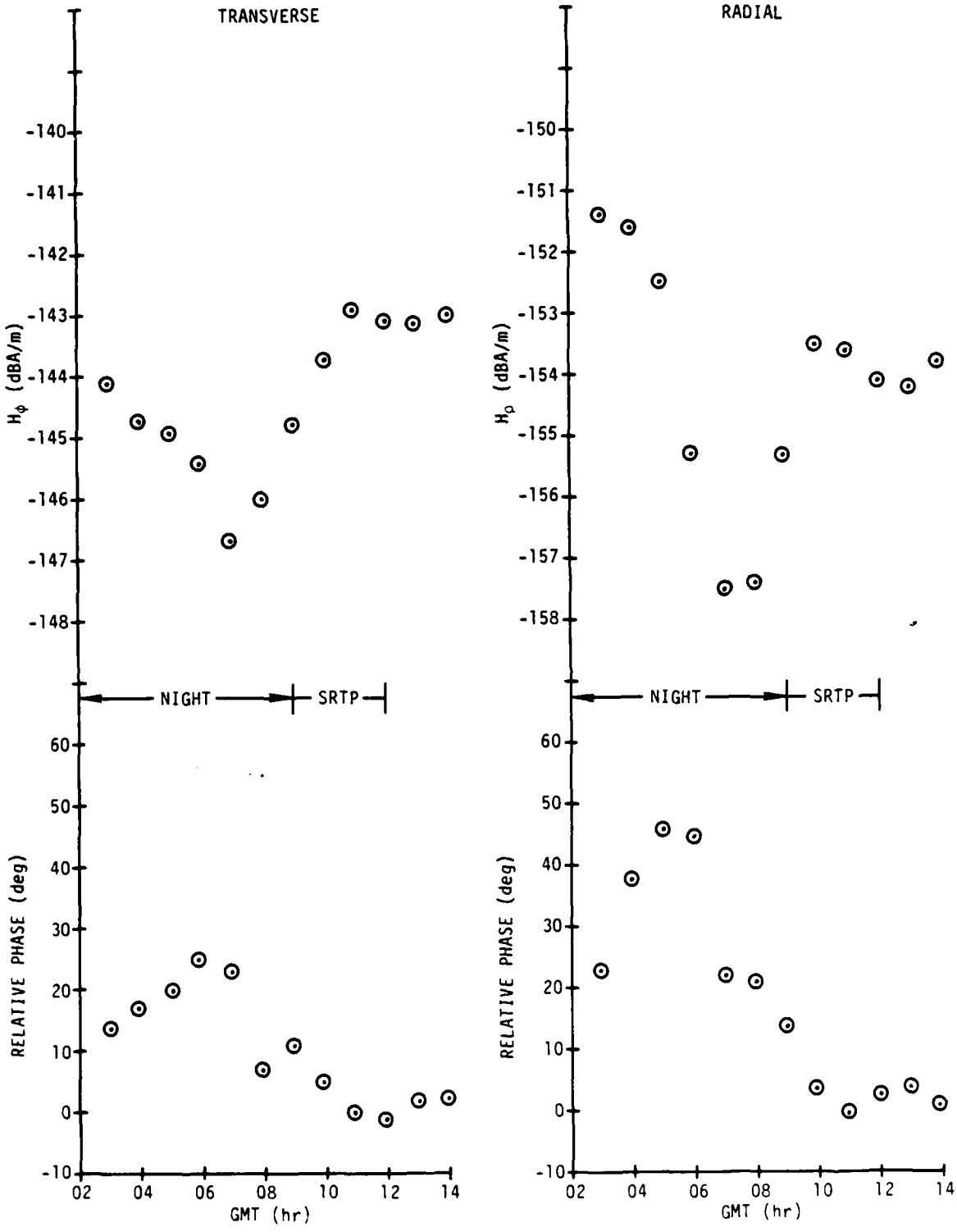

Figure 28. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 4/21 and 4/22/84 Data)

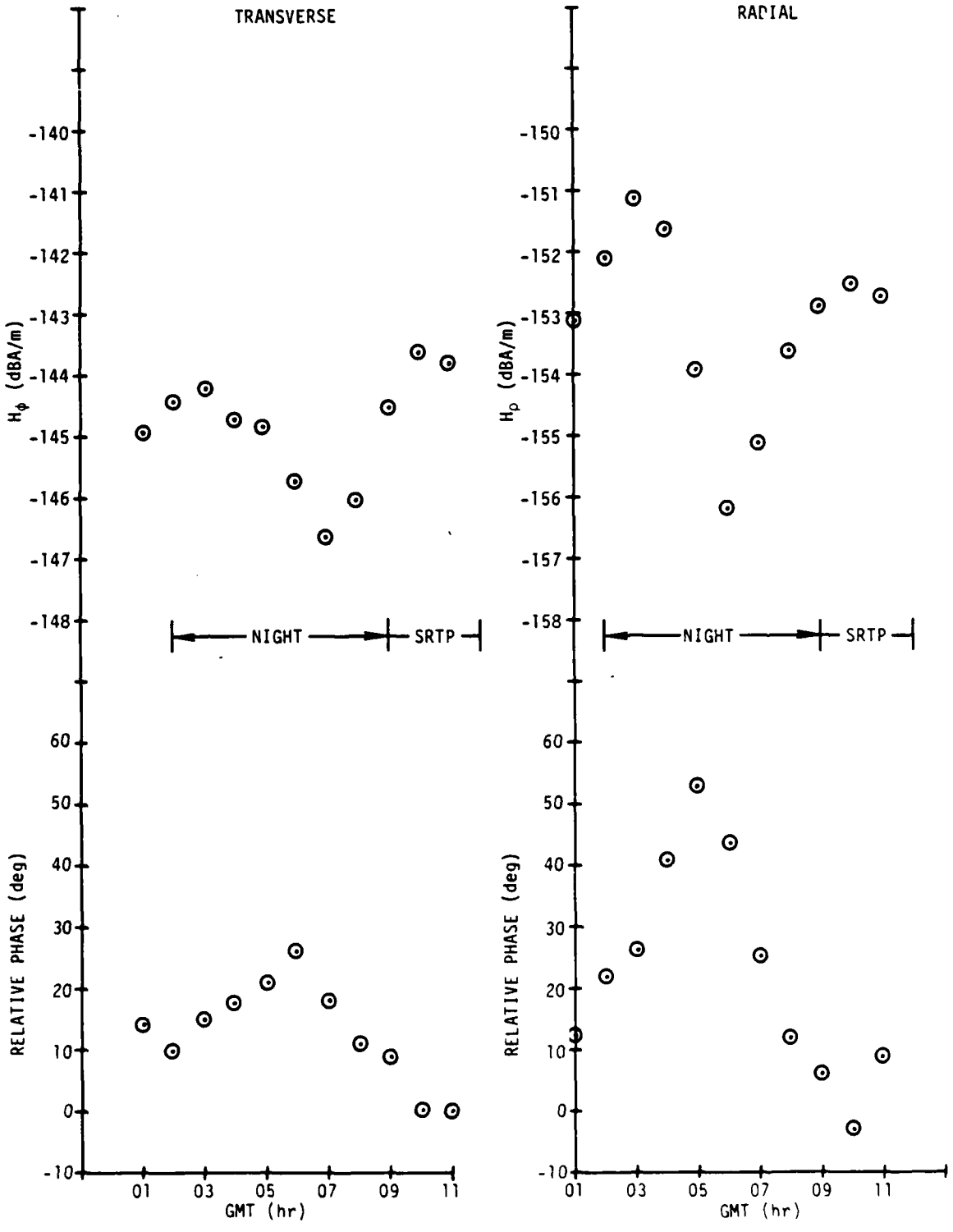

Figure 29. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths (Average of 4/29 and 4/30/84 Data)

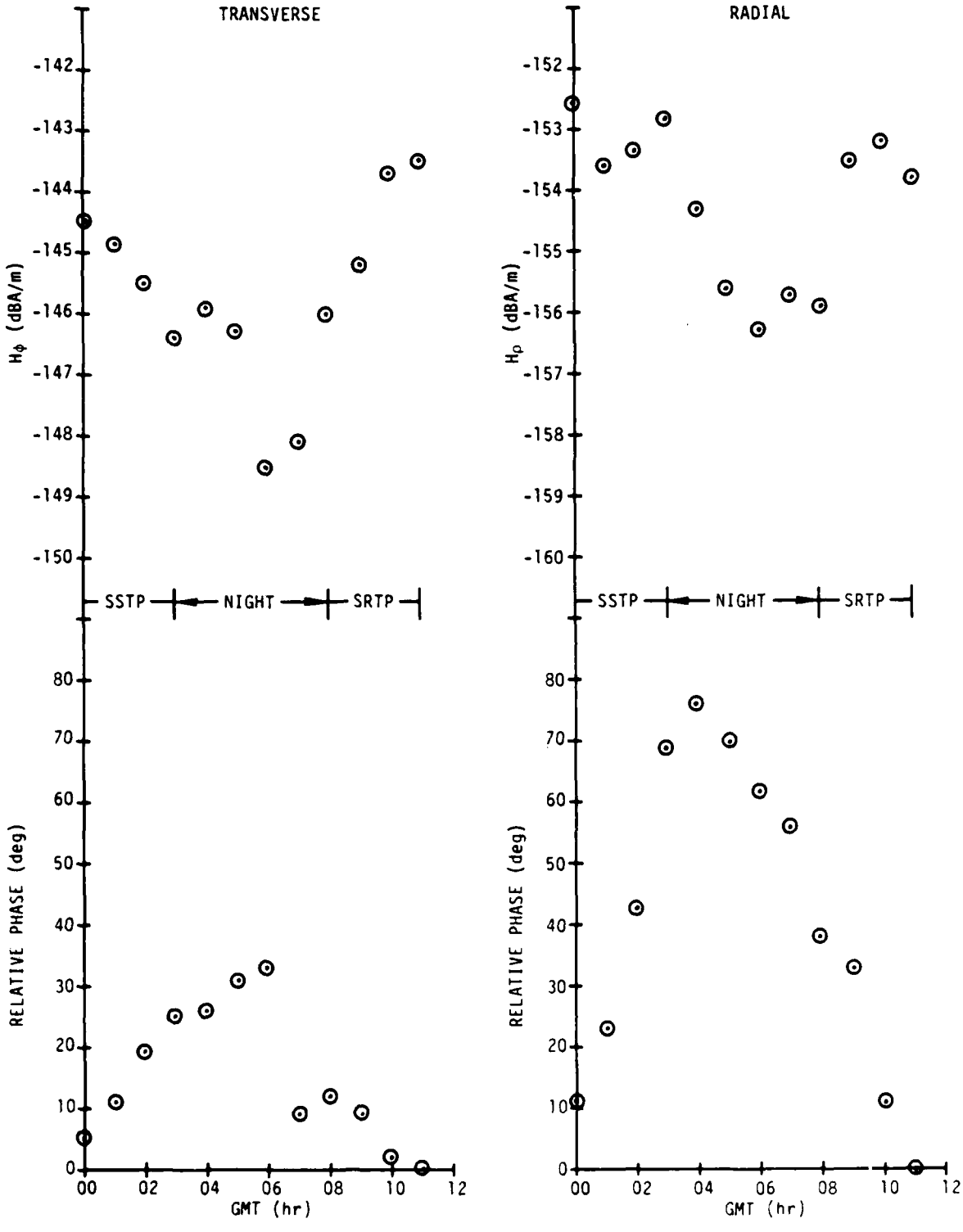

Figure 30. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 4 May 1984

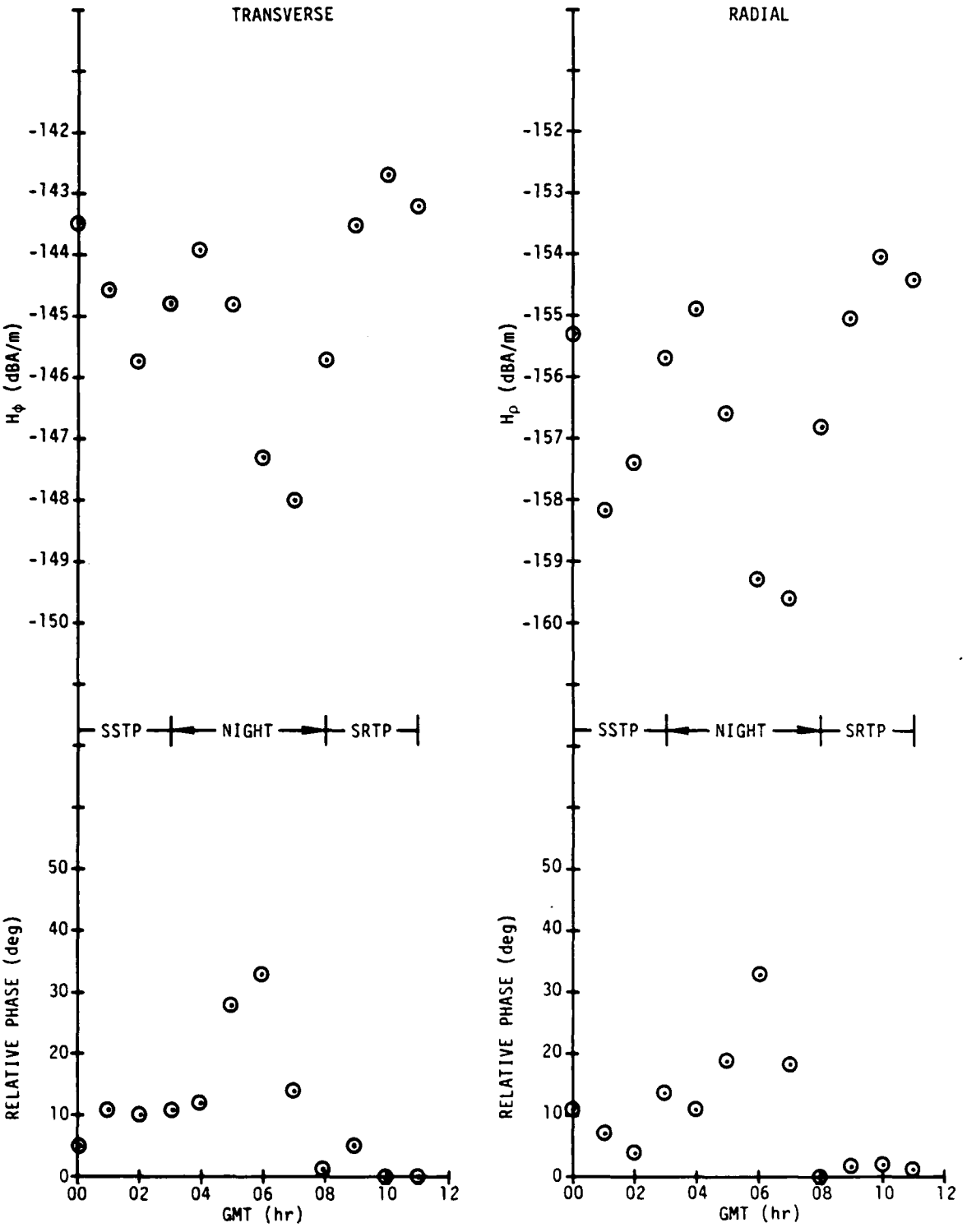

Figure 31. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 6 May 1984

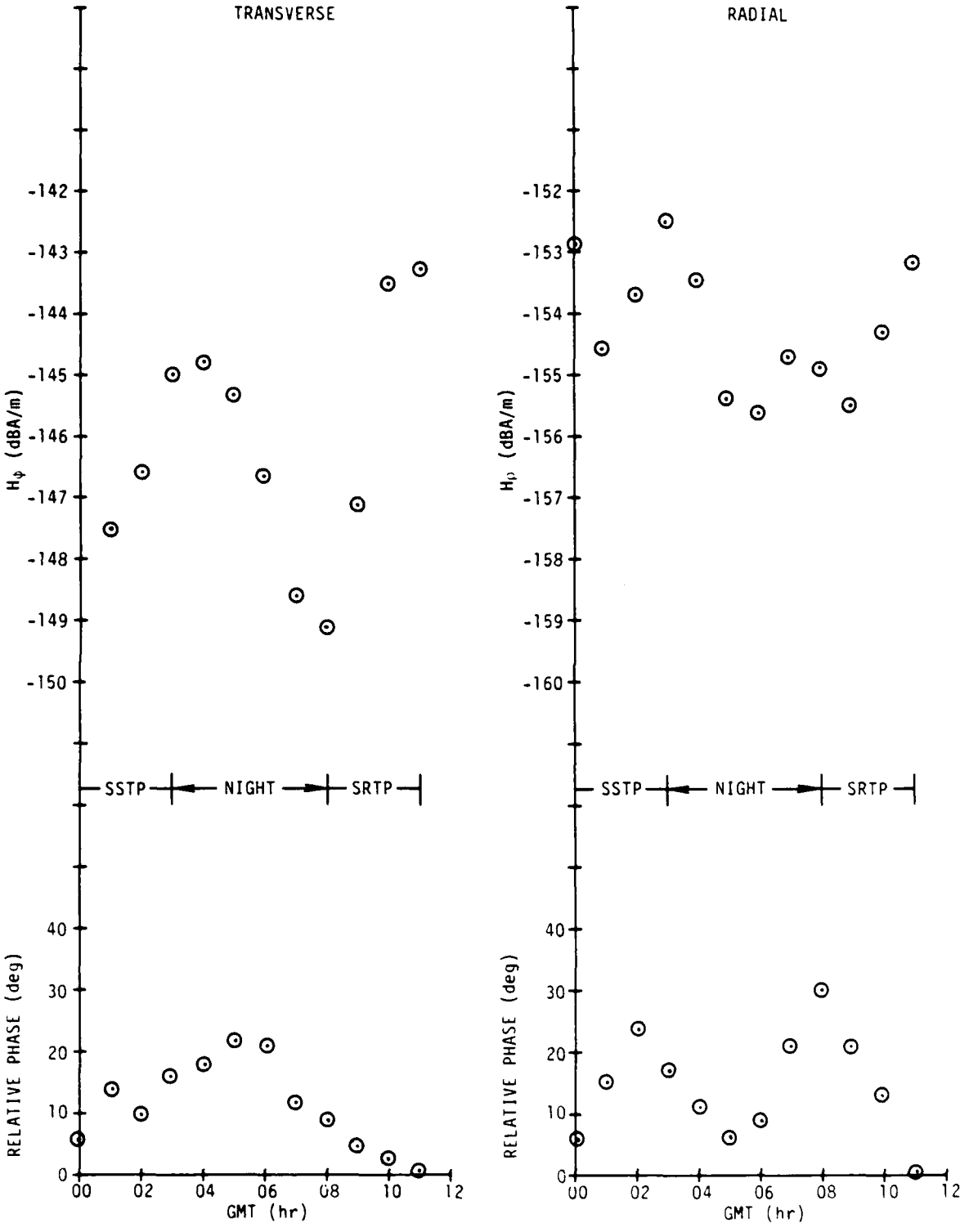

Figure 32. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 13 May 1984

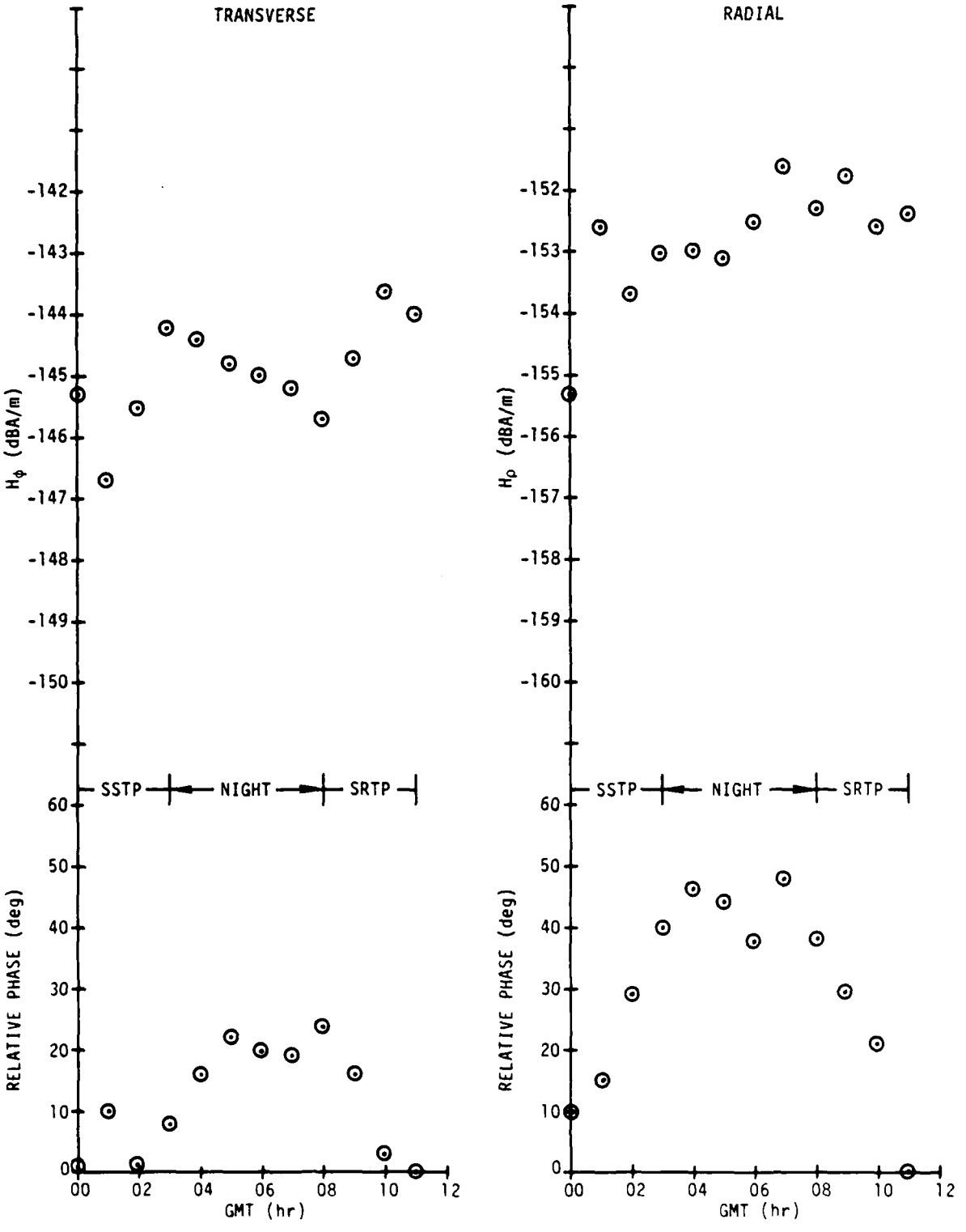

Figure 33. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 14 May 1984

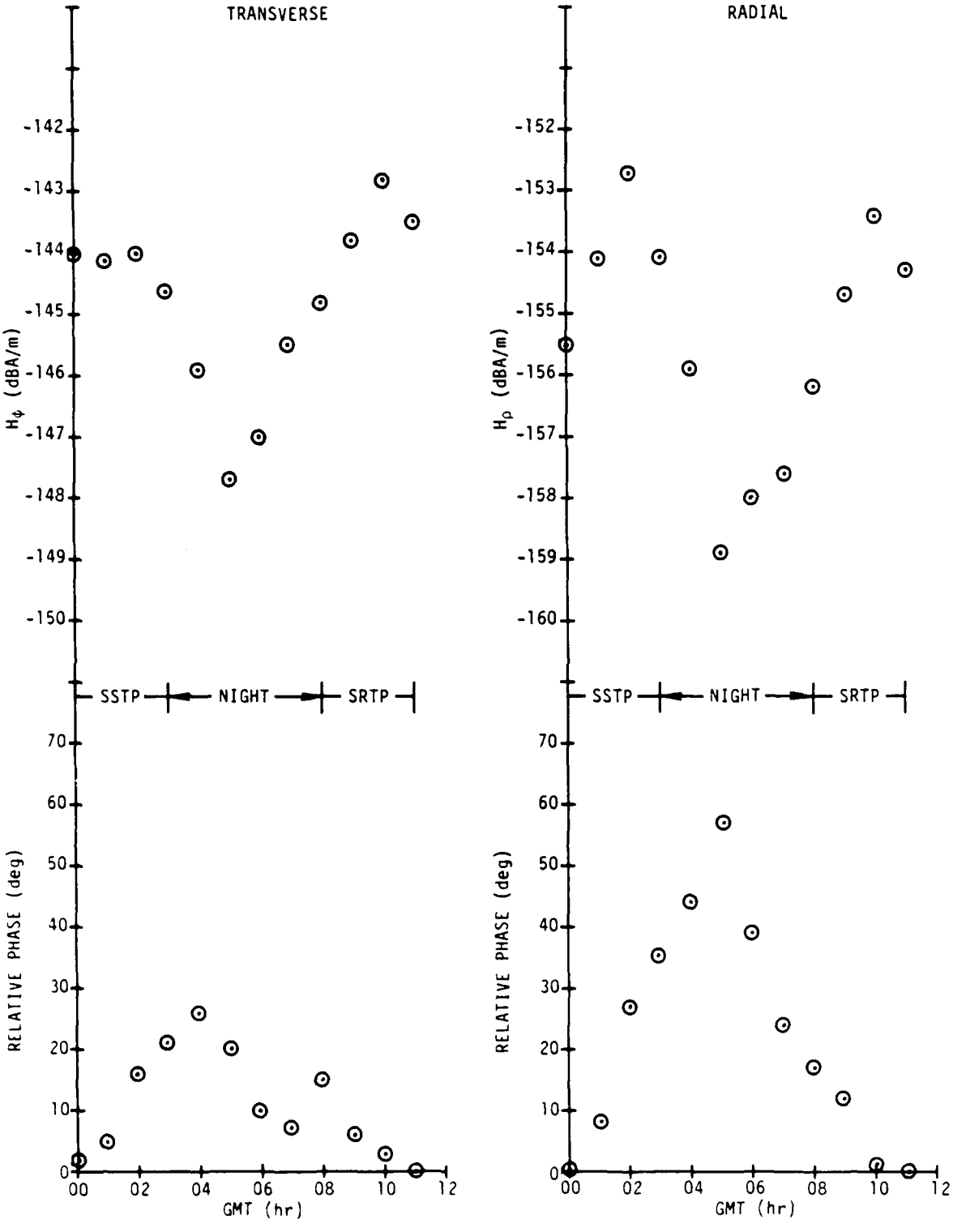

Figure 34. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 17 May 1984

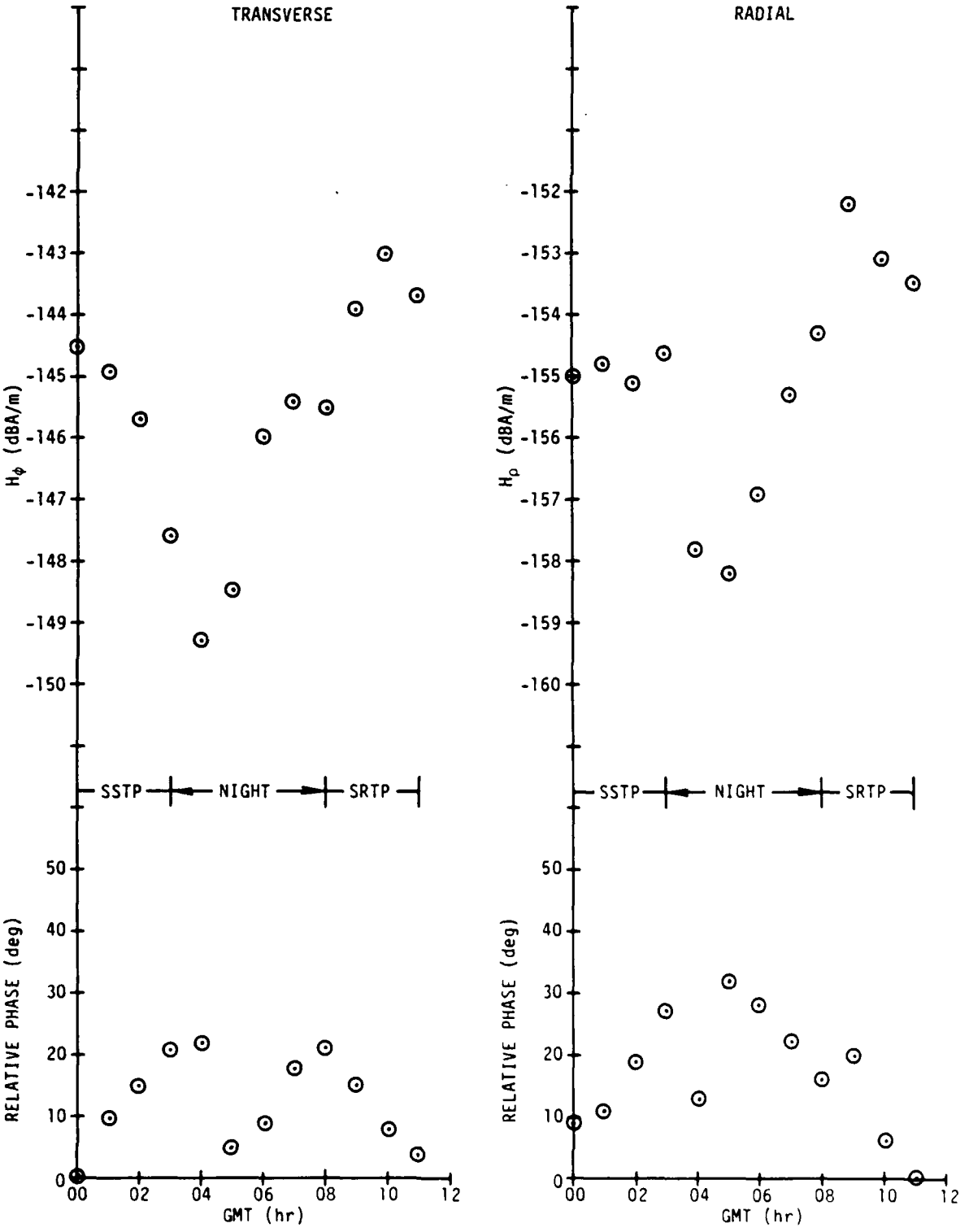

Figure 35. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 19 May 1984

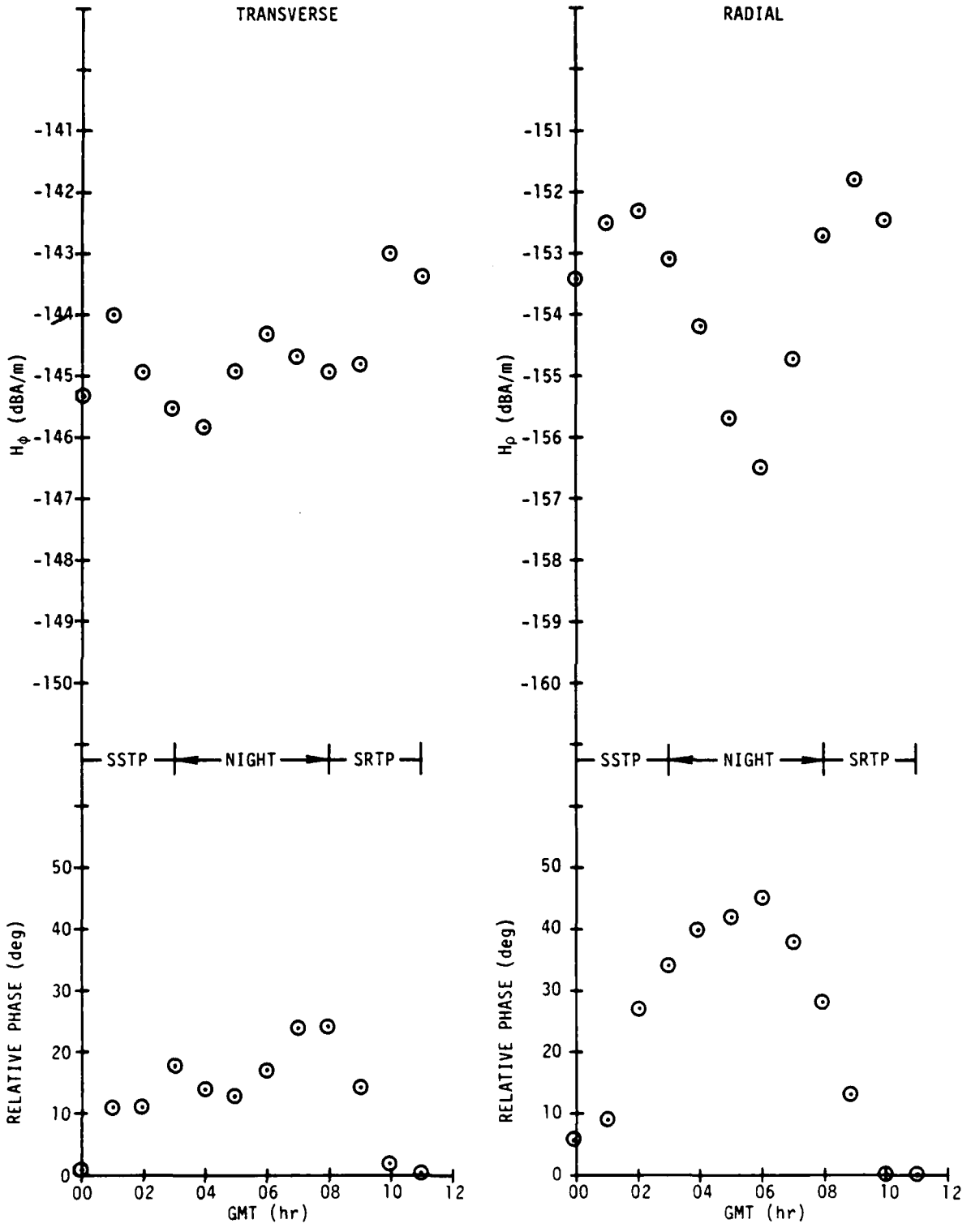

Figure 36. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 22 May 1984

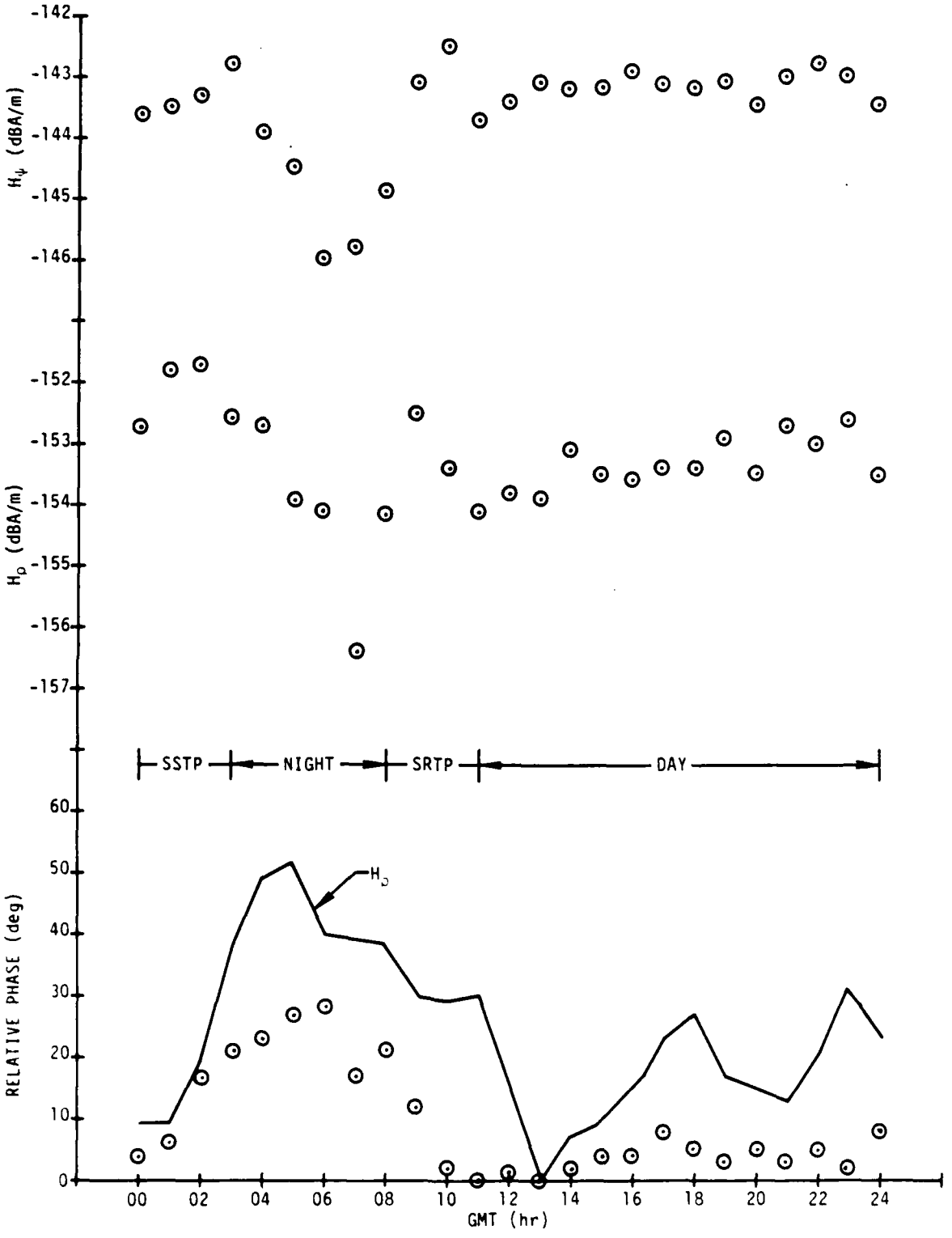

Figure 37. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 9 June 1984

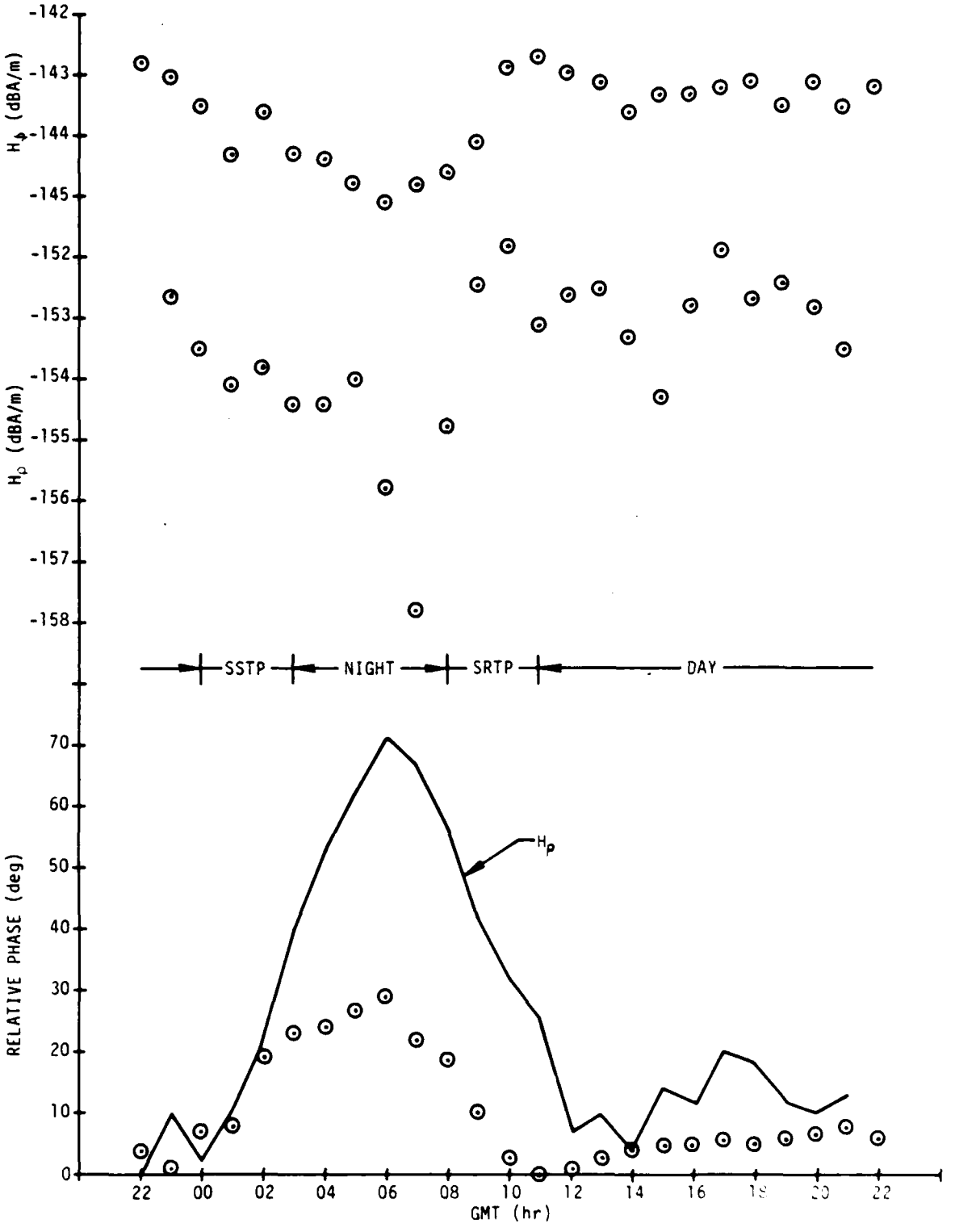

Figure 38. Comparison of Connecticut Transverse and Radial Magnetic Field Strengths, 10 June 1984

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Appendix A

NOVEMBER 1977 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The November 1977 Connecticut daily field strength averages are given in table A-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures A-1 through A-12.

Table A-1. November 1977 Connecticut Daily H_ρ Averages

Date	ψ (deg)	SSTP H_ρ (dBA/m)	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
11/1	290	-153.4	-152.2	-153.6	-154.4	-	7.9	9.5
11/2	290	-153.0	-154.1	-154.3	-154.4	-	8.7	9.8
11/3	290	-153.2	-154.4	-154.6	-155.8	22	9.1	10.5
11/4	290	-155.3	-154.6	-154.9	-155.5	25	9.4	10.6
11/5	290	-154.0	-154.3	-154.8	-156.8	29	9.6	10.7
11/6	290	-154.3	-153.9	-155.2	-156.7	38	8.7	10.8
11/7	290	-154.1	-155.4	-155.9	-157.1	38	10.1	11.2
11/8	290	-154.1	-154.9	-154.3	-155.4	29	9.3	10.2
11/10	290	-154.2	-154.6	-155.7	-155.6	37	-	-
Averages	290	-153.9	-154.2	-154.8	-155.7	31	9.1	10.4
11/11	21	-154.9	-153.2	-154.8	-	22	7.4	9.7
11/12	21	-	-154.5	-154.6	-154.2	0	8.9	9.0
11/13	21	-153.5	-154.7	-154.8	-154.5	1	8.7	9.3
11/14	21	-153.2	-154.5	-154.7	-	19	8.5	9.4
11/15	21	-	-154.0	-154.9	-154.0	9	8.5	9.9
11/16	21	-154.2	-154.1	-154.8	-154.5	2	8.7	10.0
11/17	21	-153.8	-154.3	-155.3	-154.2	1	8.9	9.5
11/18	21	-152.8	-154.5	-154.7	-153.3	-1	-	-
11/19	21	-153.7	-154.0	-154.7	-154.3	18	8.6	9.6
11/20	21	-153.1	-153.7	-154.7	-154.2	15	8.6	9.2

Table A-1. (Cont'd) November 1977 Connecticut Daily H_ρ Averages

Date	ψ (deg)	SSTP H_ρ (dBA/m)	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
11/21	21	-152.2	-152.1	-153.6	-153.1	25	6.2	8.3
11/23	21	-154.8	-155.0	-155.2	-154.2	18	9.3	10.2
11/24	21	-	-154.4	-154.8	-155.3	15	9.0	10.3
11/25	21	-153.4	-153.7	-154.6	-154.5	19	8.4	9.9
11/26	21	-153.4	-154.0	-154.8	-154.2	9	8.5	9.4
11/27	21	-154.3	-154.0	-154.3	-153.9	10	9.3	10.3
11/28	21	-154.4	-155.0	-155.9	-154.2	15	9.5	10.5
11/29	21	-154.7	-153.8	-154.7	-154.0	19	8.7	9.6
11/30	21	-153.7	-153.3	-154.0	-	13	8.0	9.2
Averages	21	-153.7	-154.0	-154.7	-154.1	12	8.5	9.6
28-Day Averages*		-153.4	-153.7	-154.4	-154.3	18	8.7	9.8

*Normalized to a WTF array phasing angle of 290 deg.

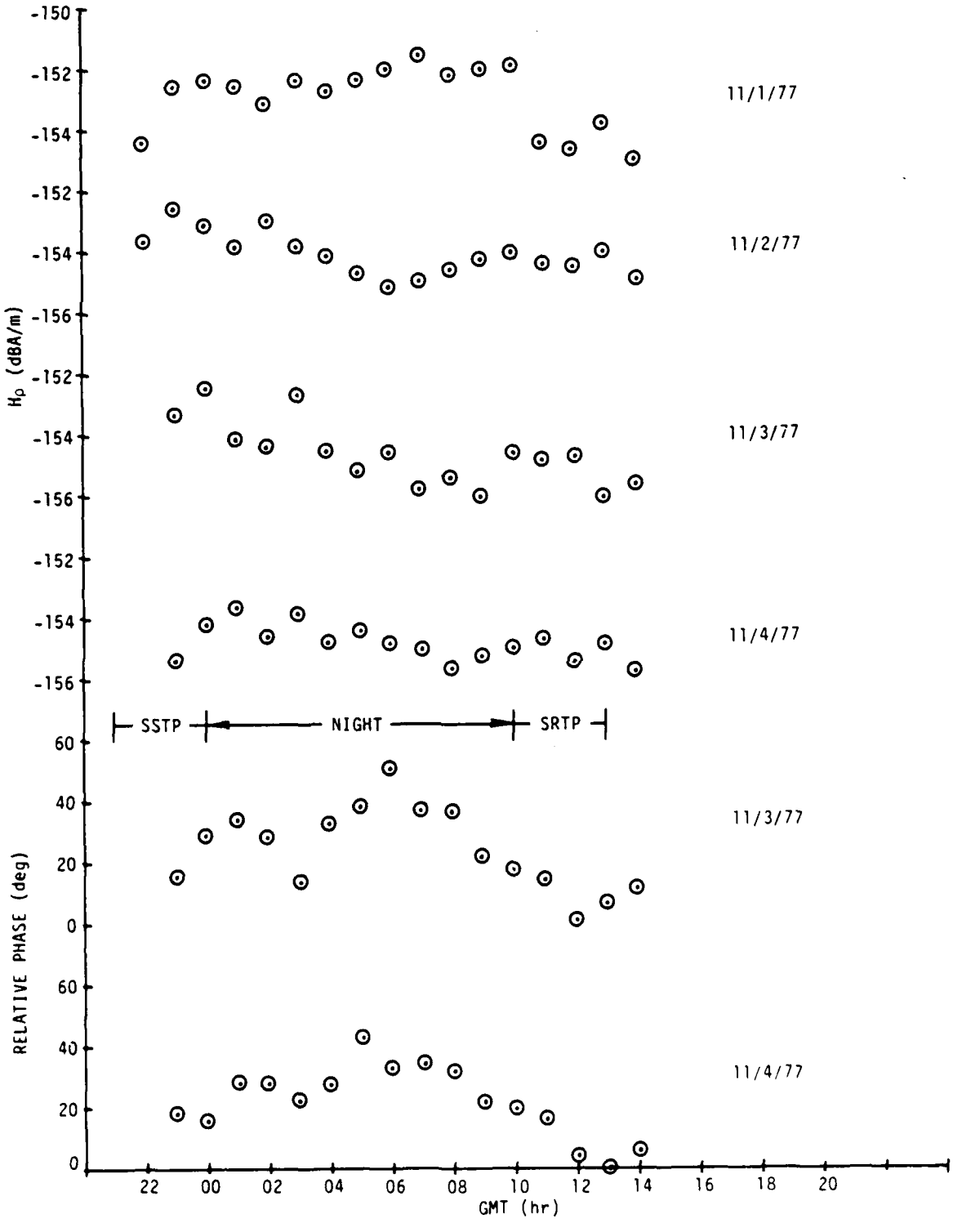

Figure A-1. Connecticut Radial Magnetic Field Strength Versus GMT, 1 Through 4 November 1977 (ρ = 290 deg)

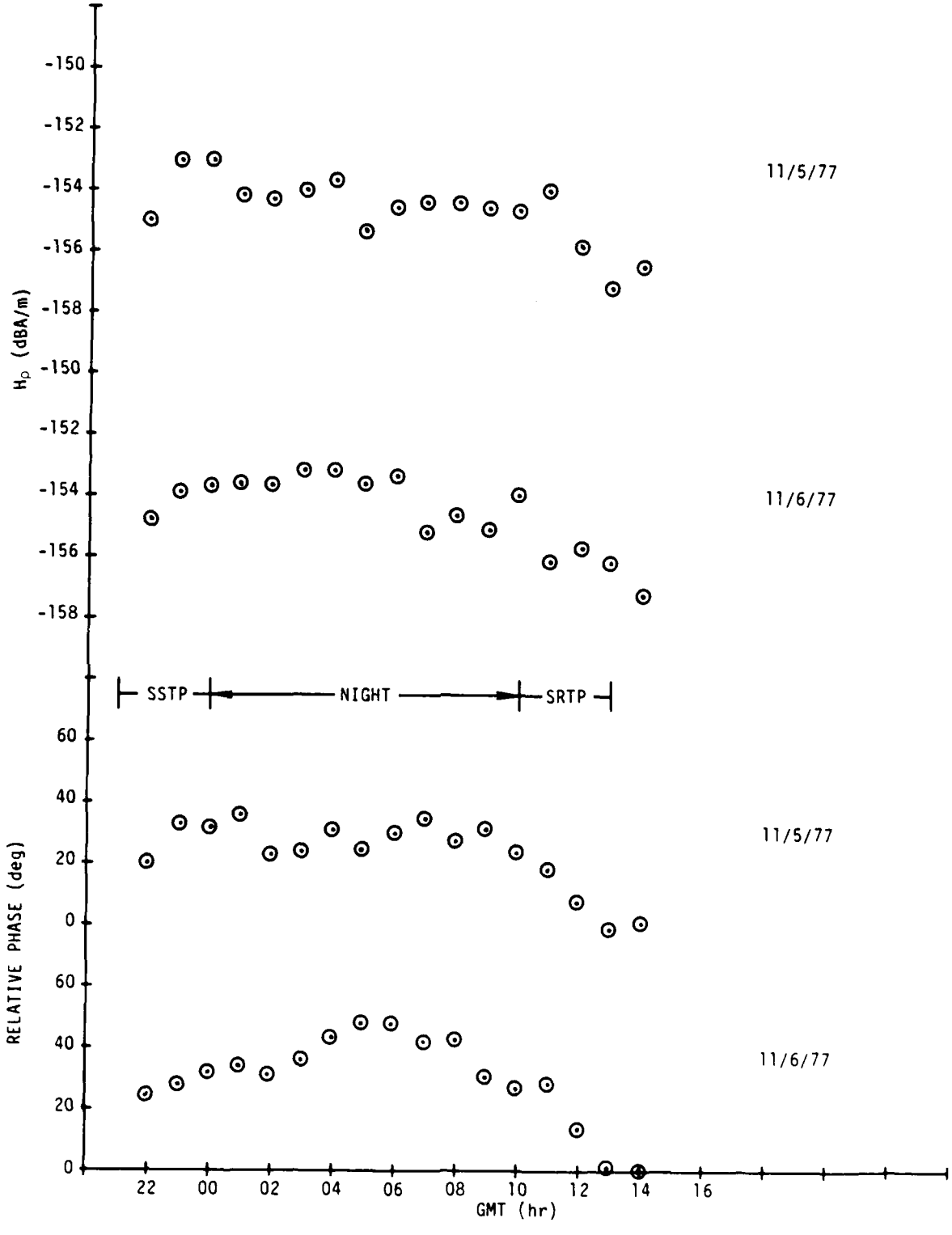

Figure A-2. Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 6 November 1977 (ϕ = 290 deg)

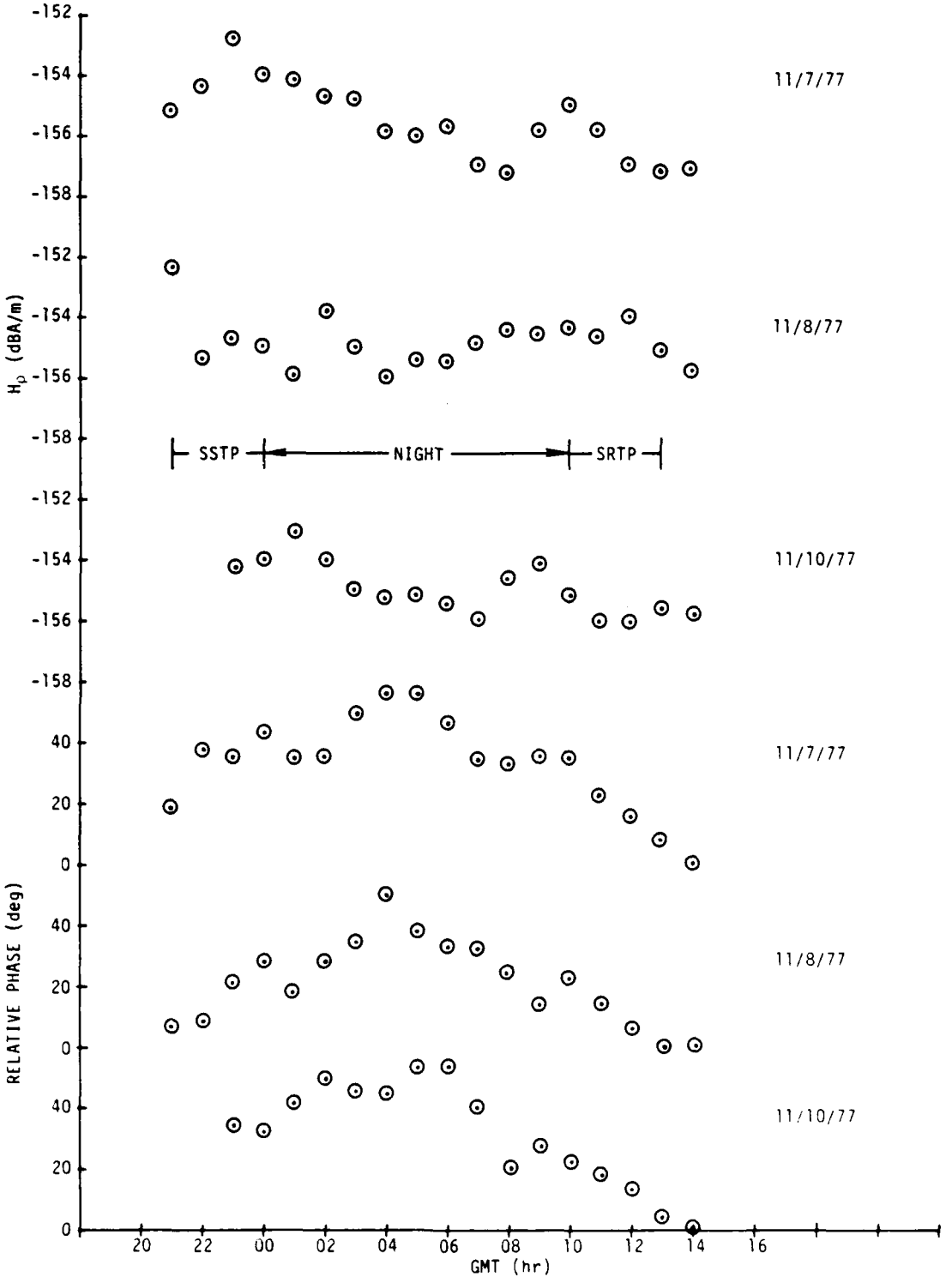

Figure A-5. Connecticut Radial Magnetic Field Strength Versus GMT, 7, 8, and 10 November 1977 (ϕ = 290 deg)

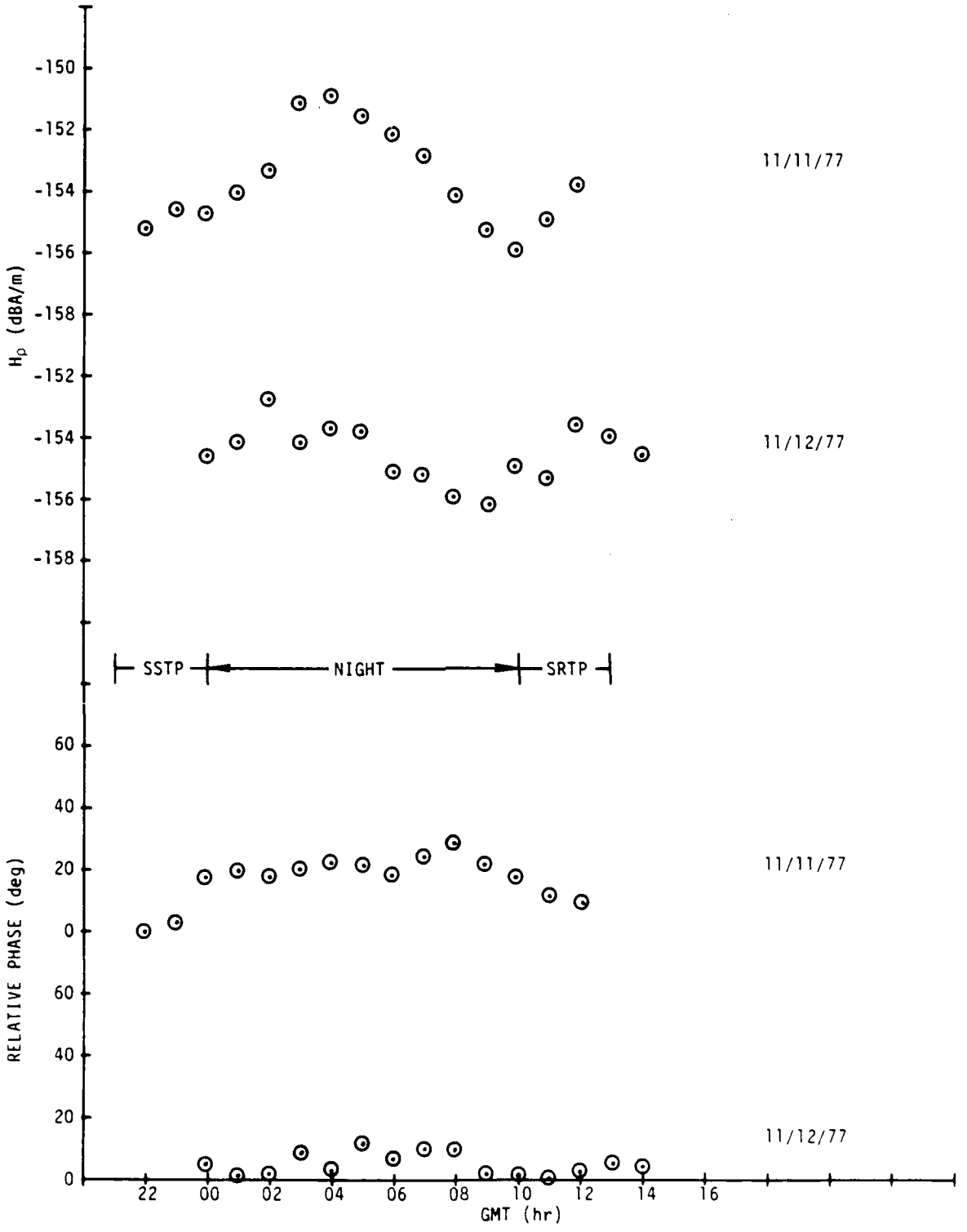

Figure A-4. Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 November 1977 (χ = 21 deg)

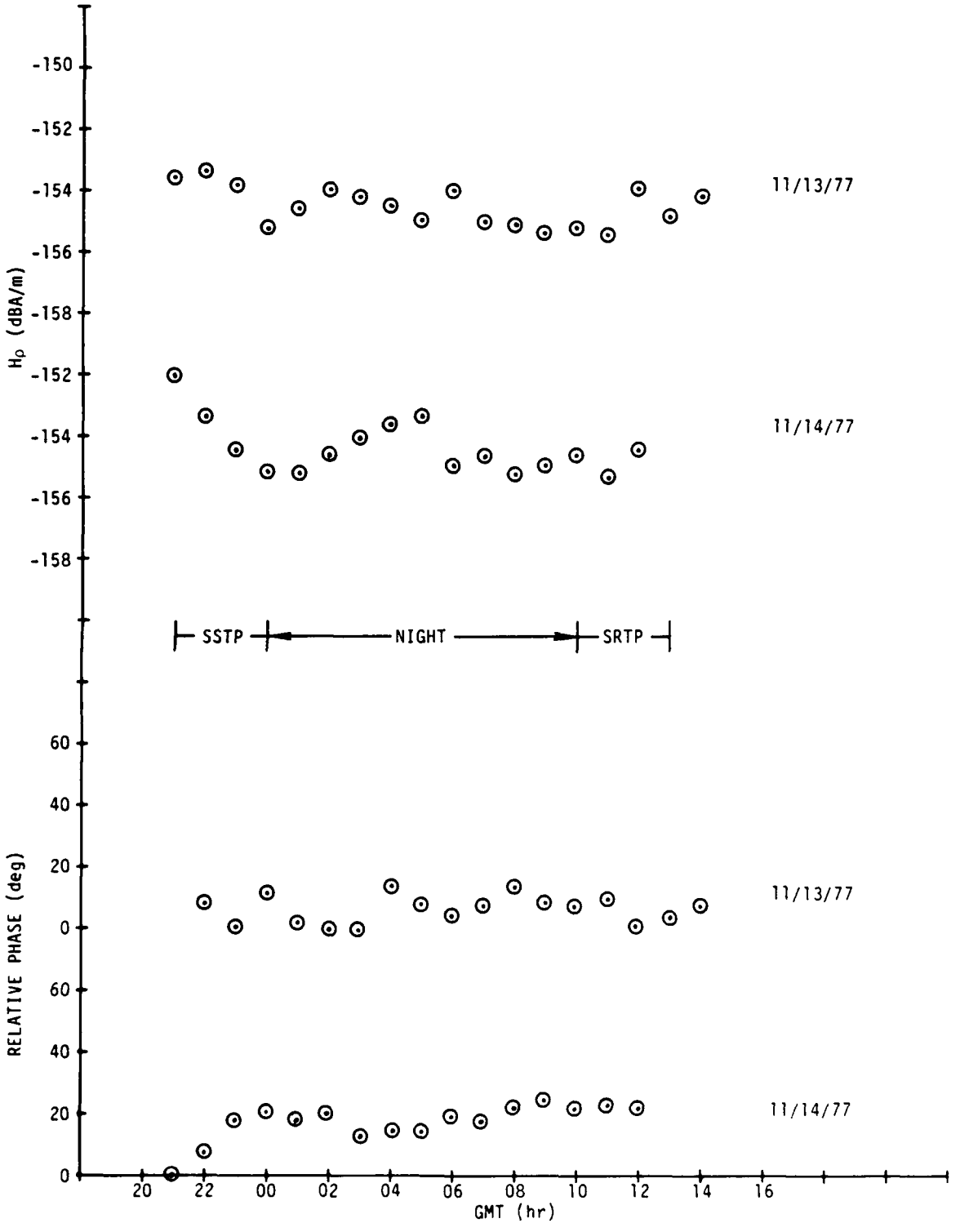

Figure A-5. Connecticut Radial Magnetic Field Strength versus GMT, 13 and 14 November 1977 (χ = 21 deg)

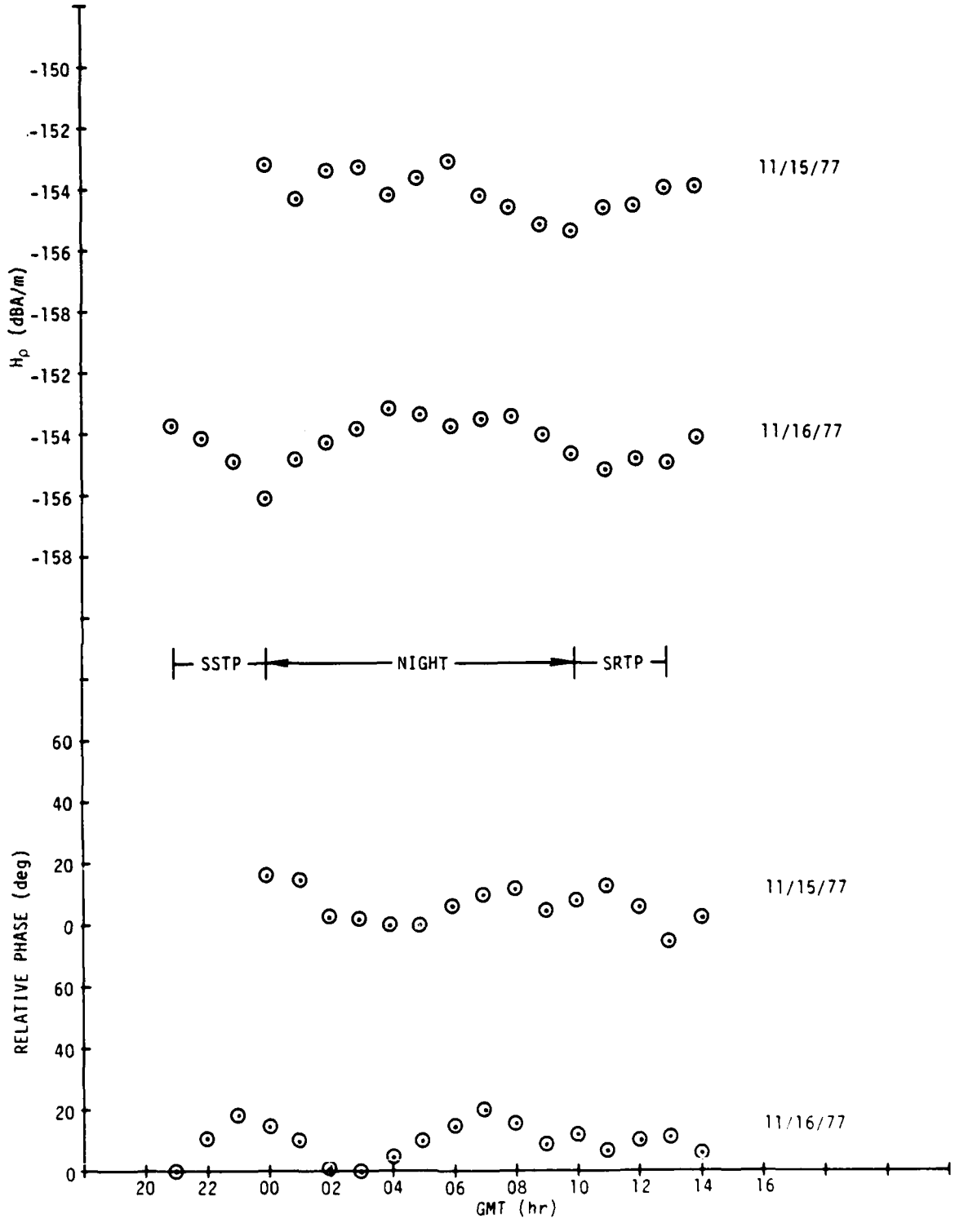

Figure A-6. Connecticut Radial Magnetic Field Strength Versus GMT, 15 and 16 November 1977 (= 21 deg)

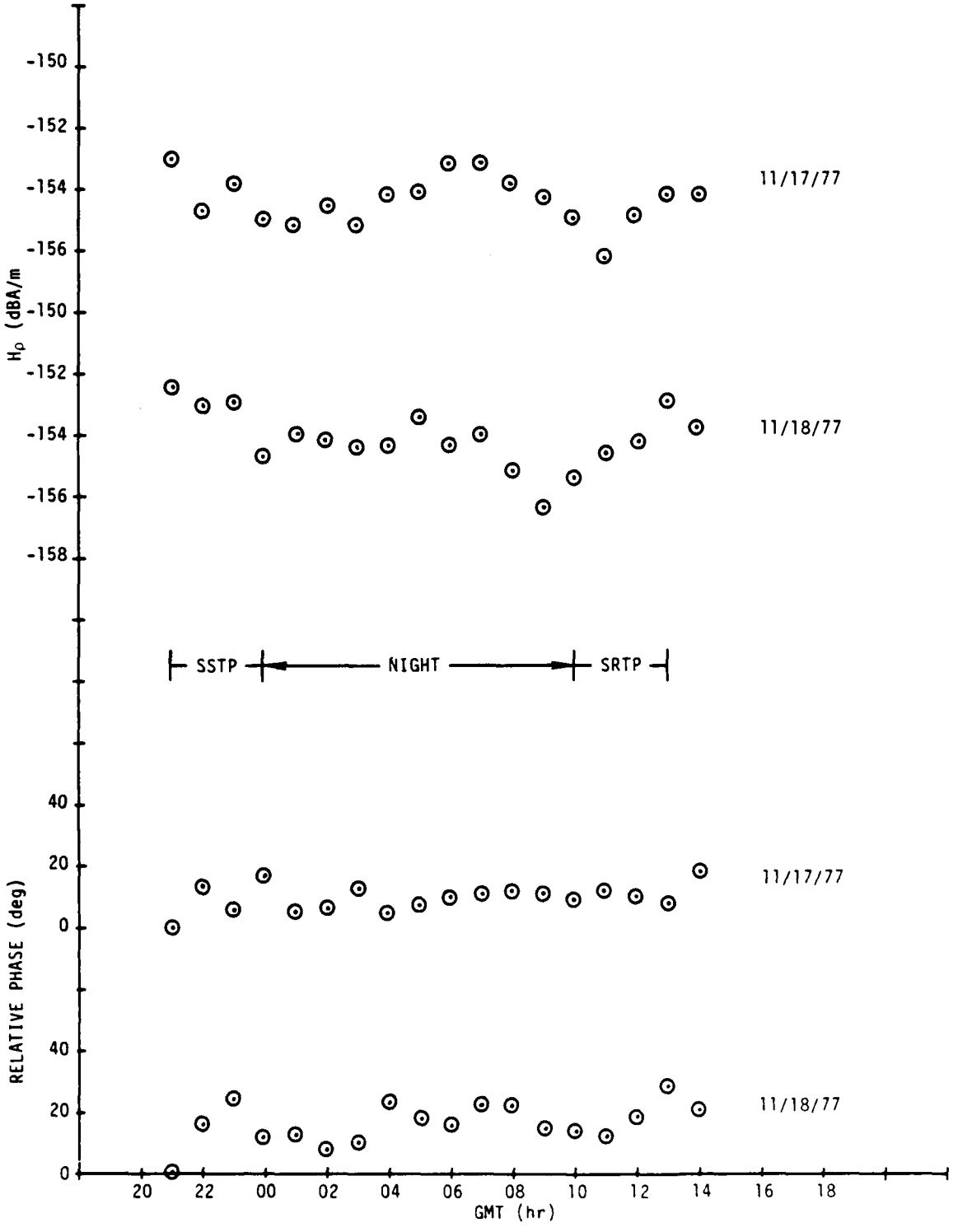

Figure A-7. Connecticut Radial Magnetic Field Strength Versus GMT, 17 and 18 November 1977 (ρ = 21 deg)

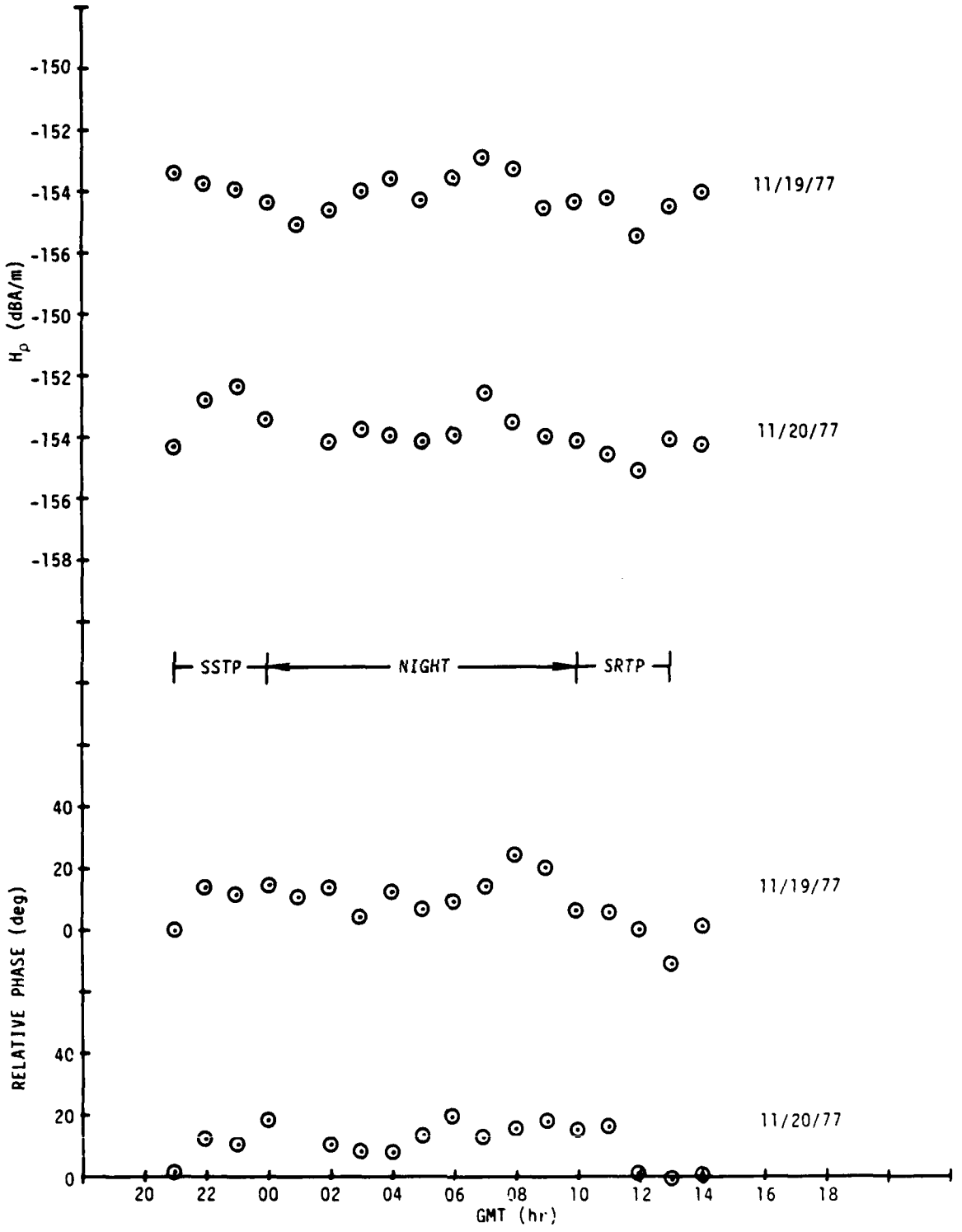

Figure A-8. Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 November 1977 (. = 21 deg)

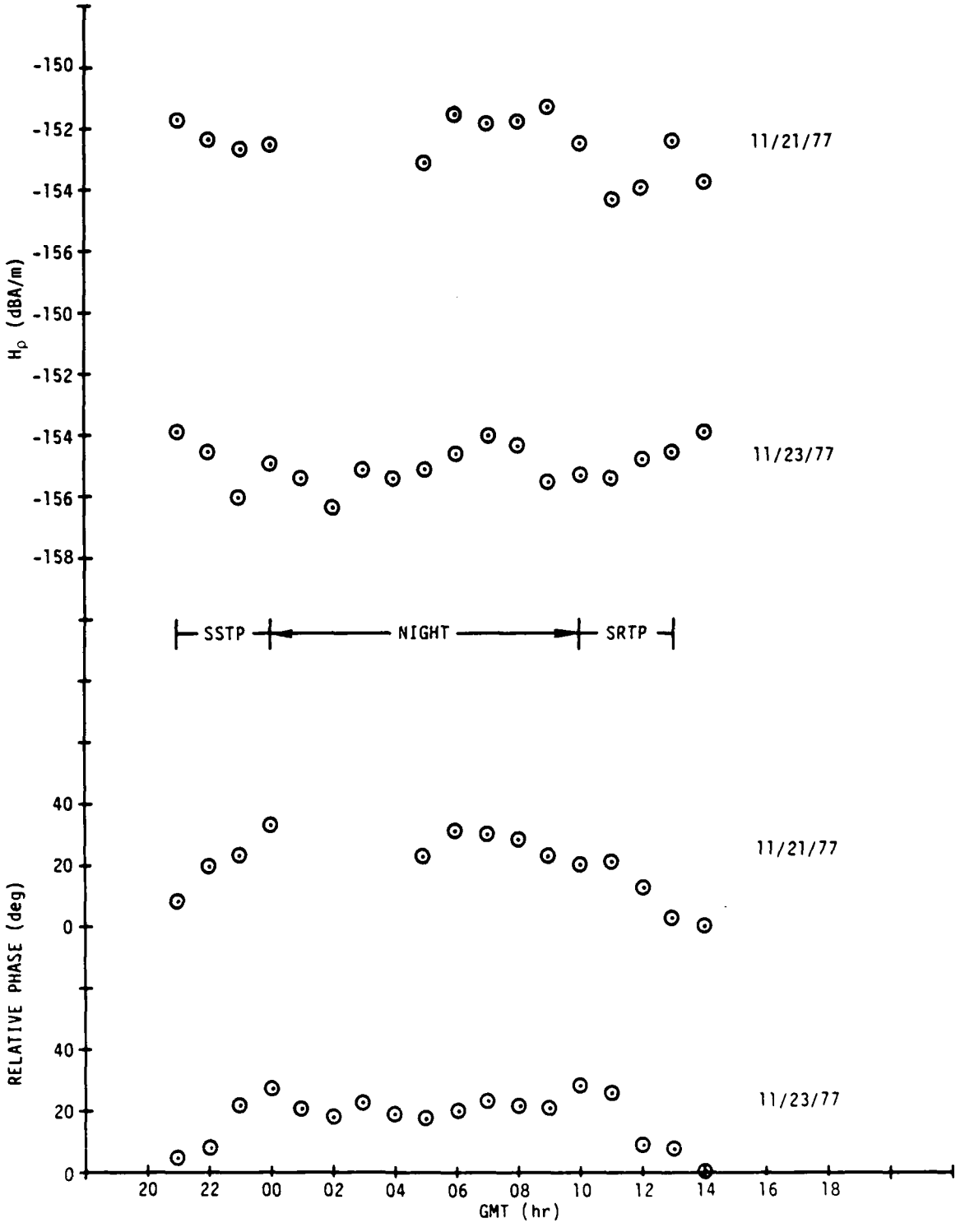

Figure A-9. Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 23 November (. = 21 deg)

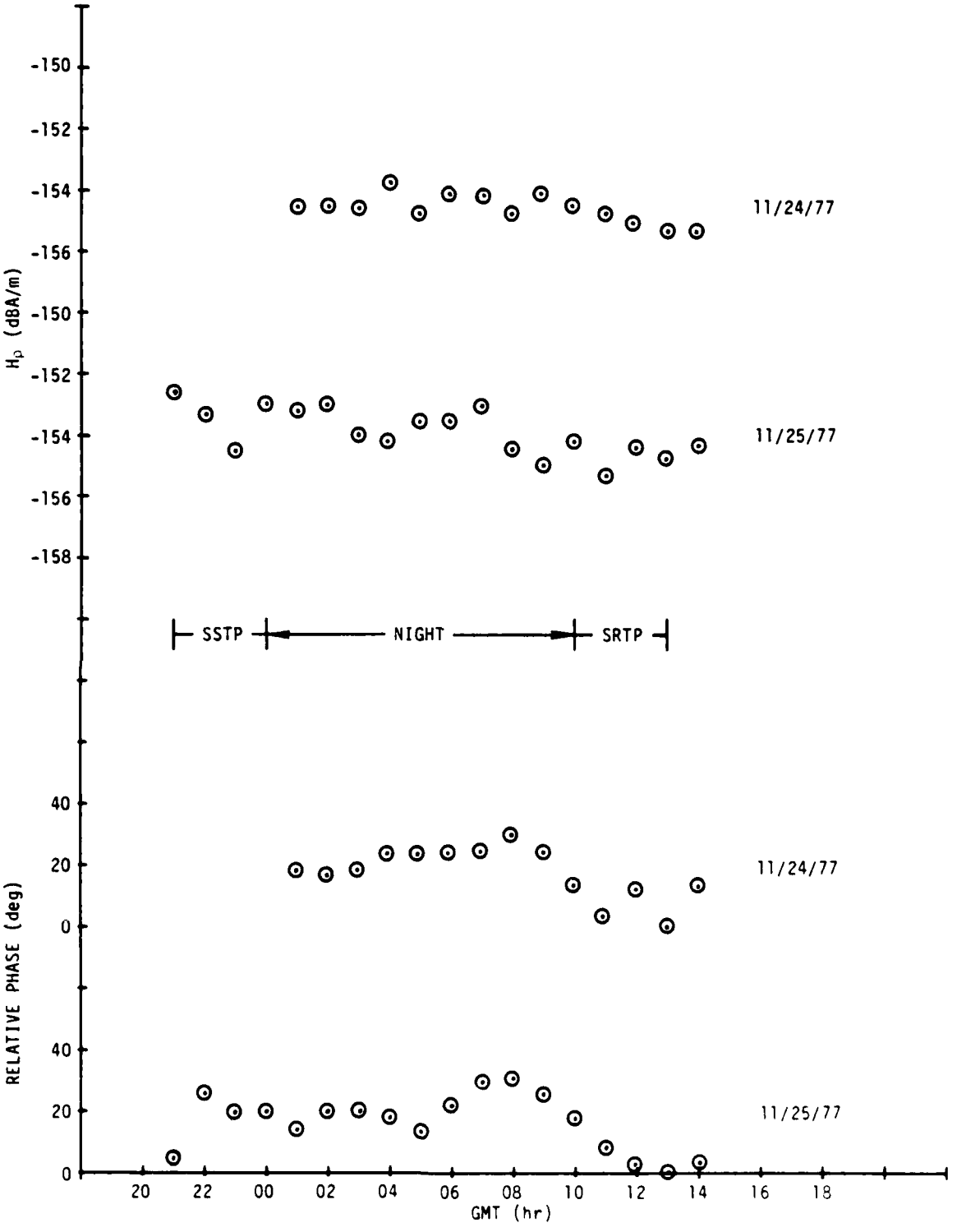

Figure A-10. Connecticut Radial Magnetic Field Strength Versus GMT, 24 and 25 November 1977 (ρ = 21 deg)

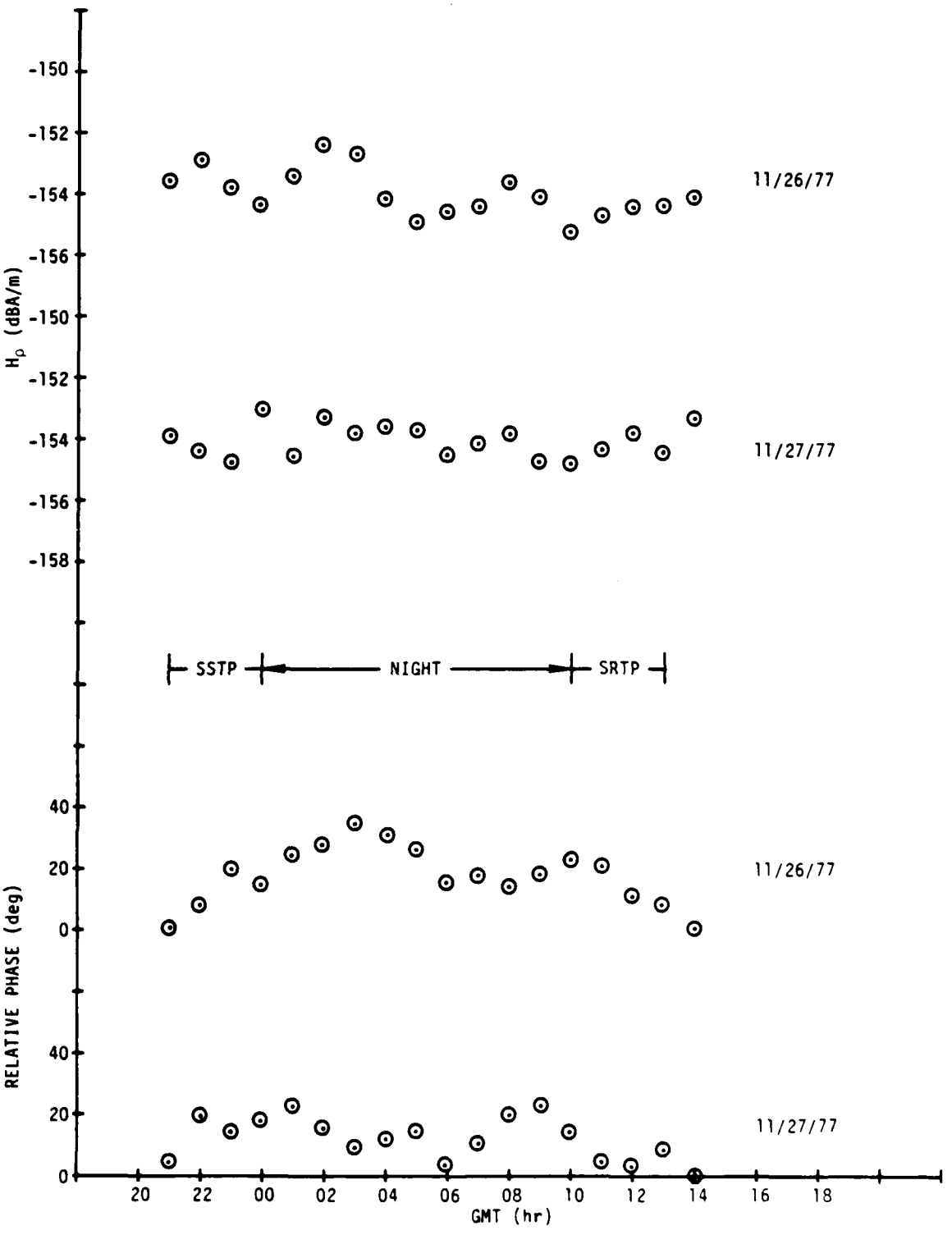

Figure A-11. Connecticut Radial Magnetic Field Strength Versus GMT, 26 and 27 November 1977 (ρ = 21 deg)

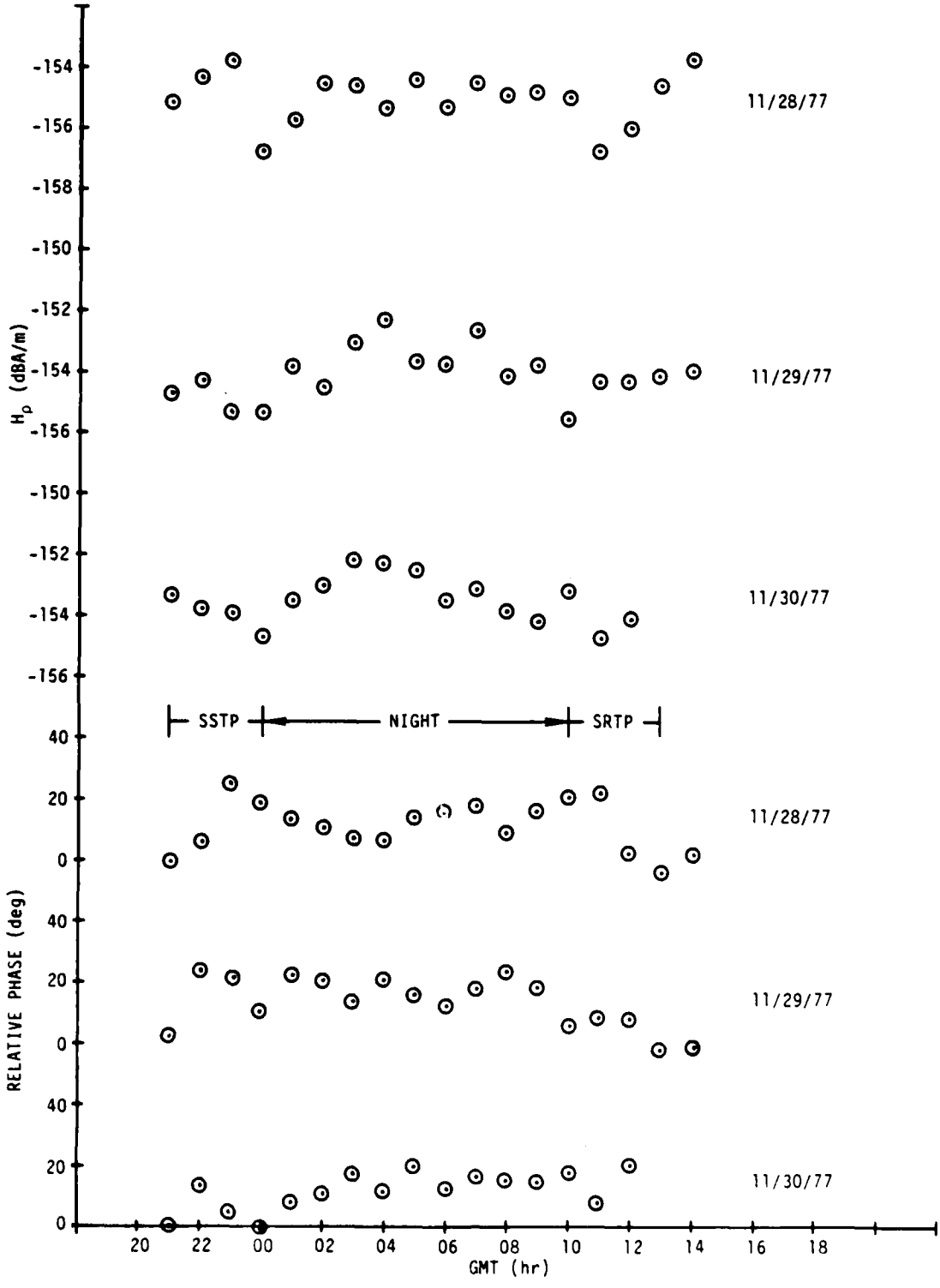

Figure A-12. Connecticut Radial Magnetic Field Strength Versus GMT, 28, 29, and 30 November 1977 (. - 21 deg)

Appendix B

DECEMBER 1977 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The December 1977 Connecticut daily field strength averages are given in table B-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures B-1 through B-5.

Table B-1. December 1977 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	SSTP H_ρ (dBA/m)	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
12/1	-	-153.5	-154.4	-155.9	37	8.1	9.4
12/2	-	-156.2	-155.9	-155.6	48	10.1	12.0
12/3	-	-155.2	-154.6	-155.3	31	9.9	12.3
12/4	-	-153.3	-156.0	-155.6	38	9.3	12.6
12/5	-	-153.1	-153.9	-154.4	27	8.9	10.6
12/13	-154.2	-154.3	-153.2	-153.3	44	9.5	10.0
12/14	-153.3	-153.8	-154.6	-153.6	23	8.2	10.0
12/17	-152.4	-155.2	-154.0	-154.6	29	9.0	8.6
12/18	-154.8	-153.0	-154.1	-154.5	43	7.4	10.0
12/19	-153.5	-153.1	-153.4	-153.2	38	7.5	9.0
12/20	-153.0	-153.1	-153.3	-153.8	29	7.5	8.8
Averages	-153.5	-154.0	-154.3	-154.5	35	8.7	10.3

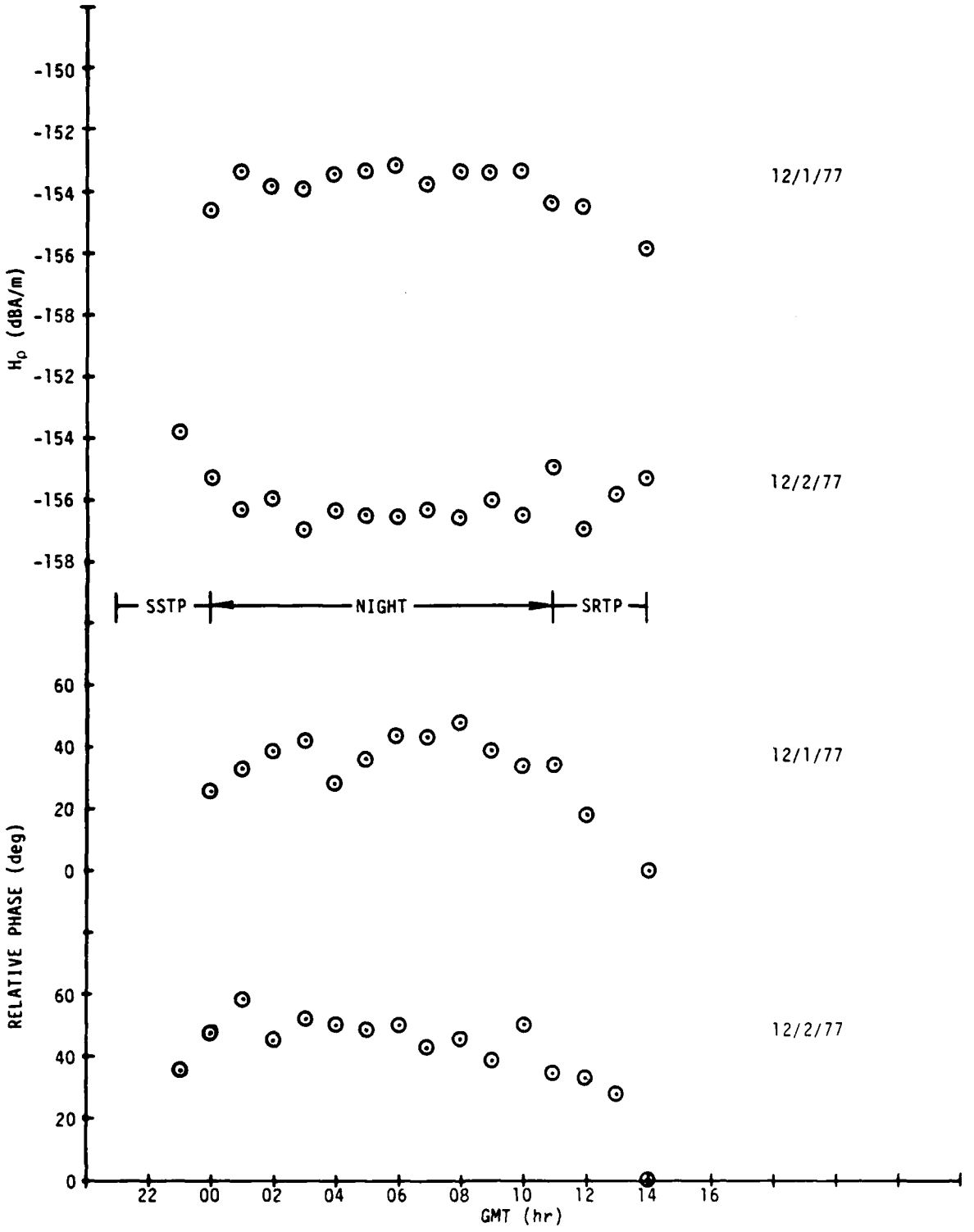

Figure B-1. Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 2 December 1977 (λ = 290 deg)

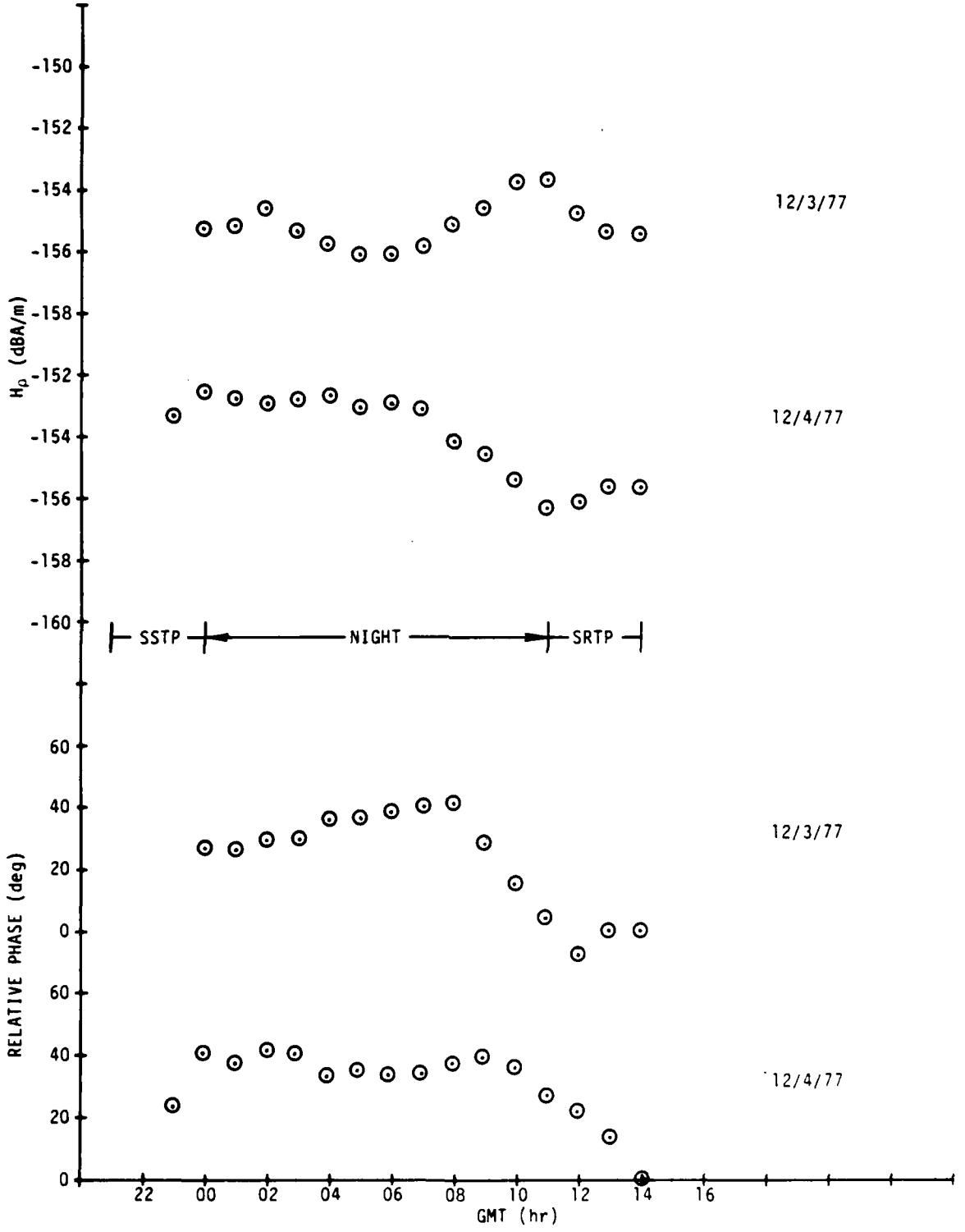

Figure B-2. Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 December 1977 (ϕ = 290 deg)

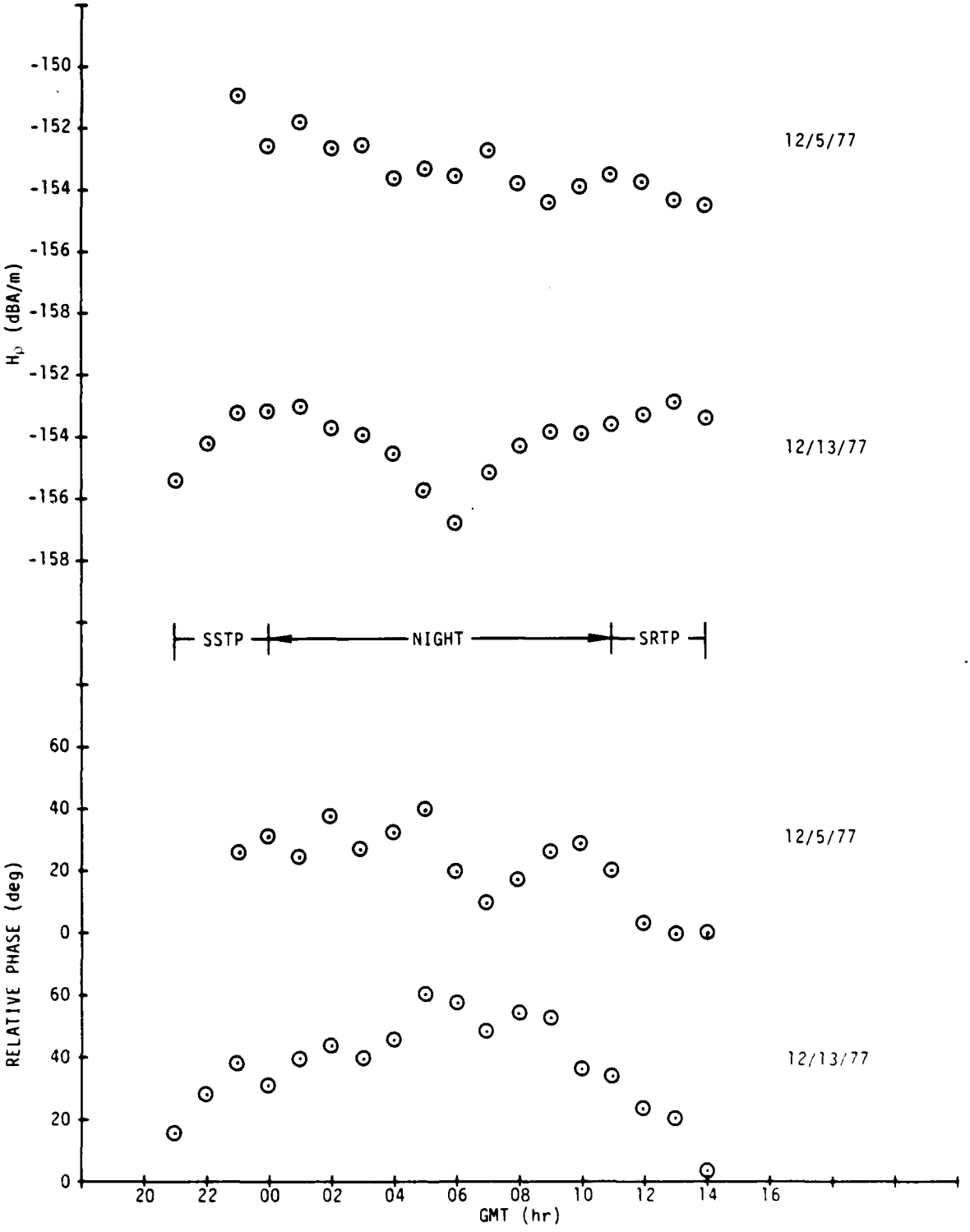

Figure B-3. Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 13 December 1977 (. = 290 deg)

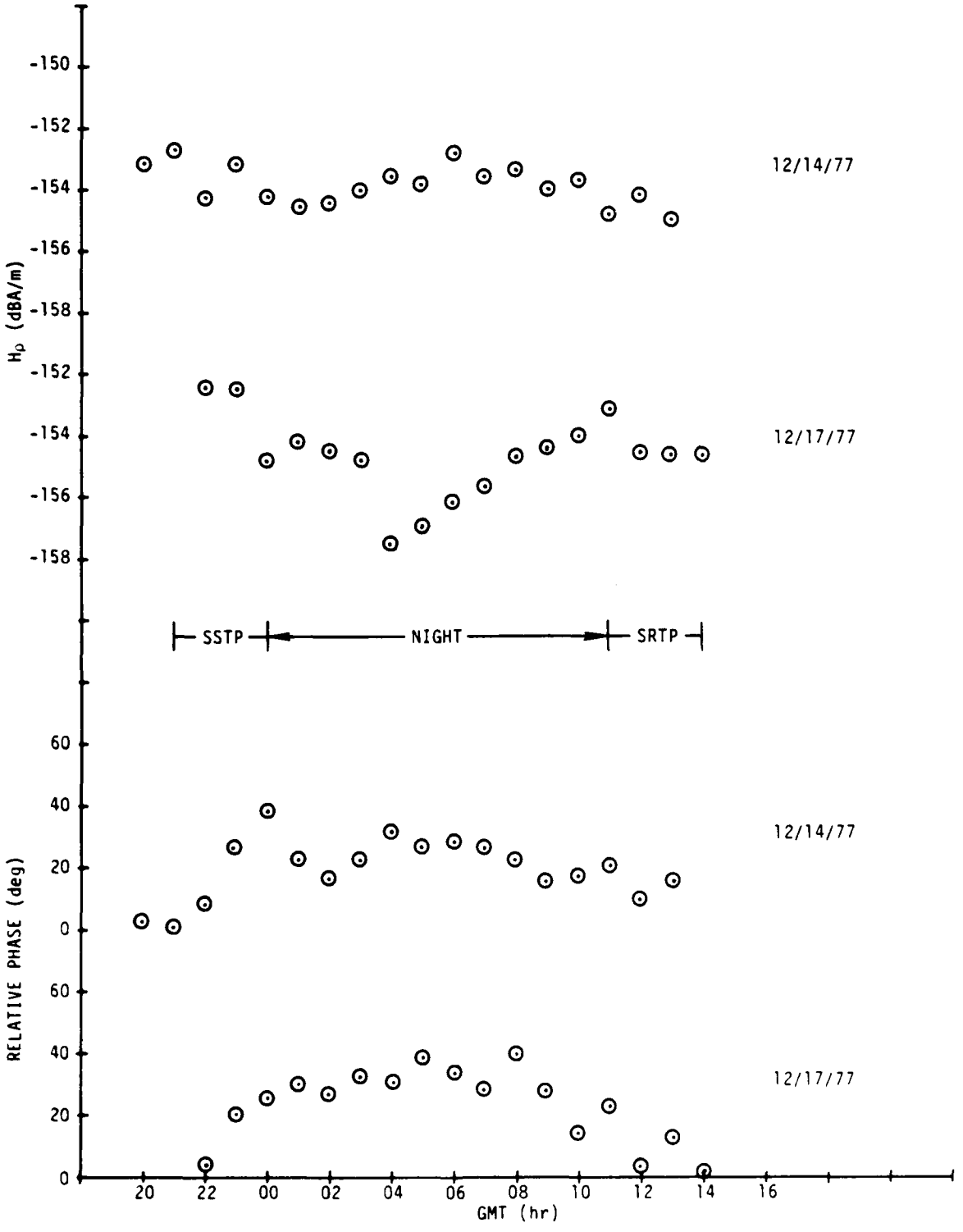

Figure B-4. Connecticut Radial Magnetic Field Strength Versus GMT, 14 and 17 December 1977 (. = 290 deg)

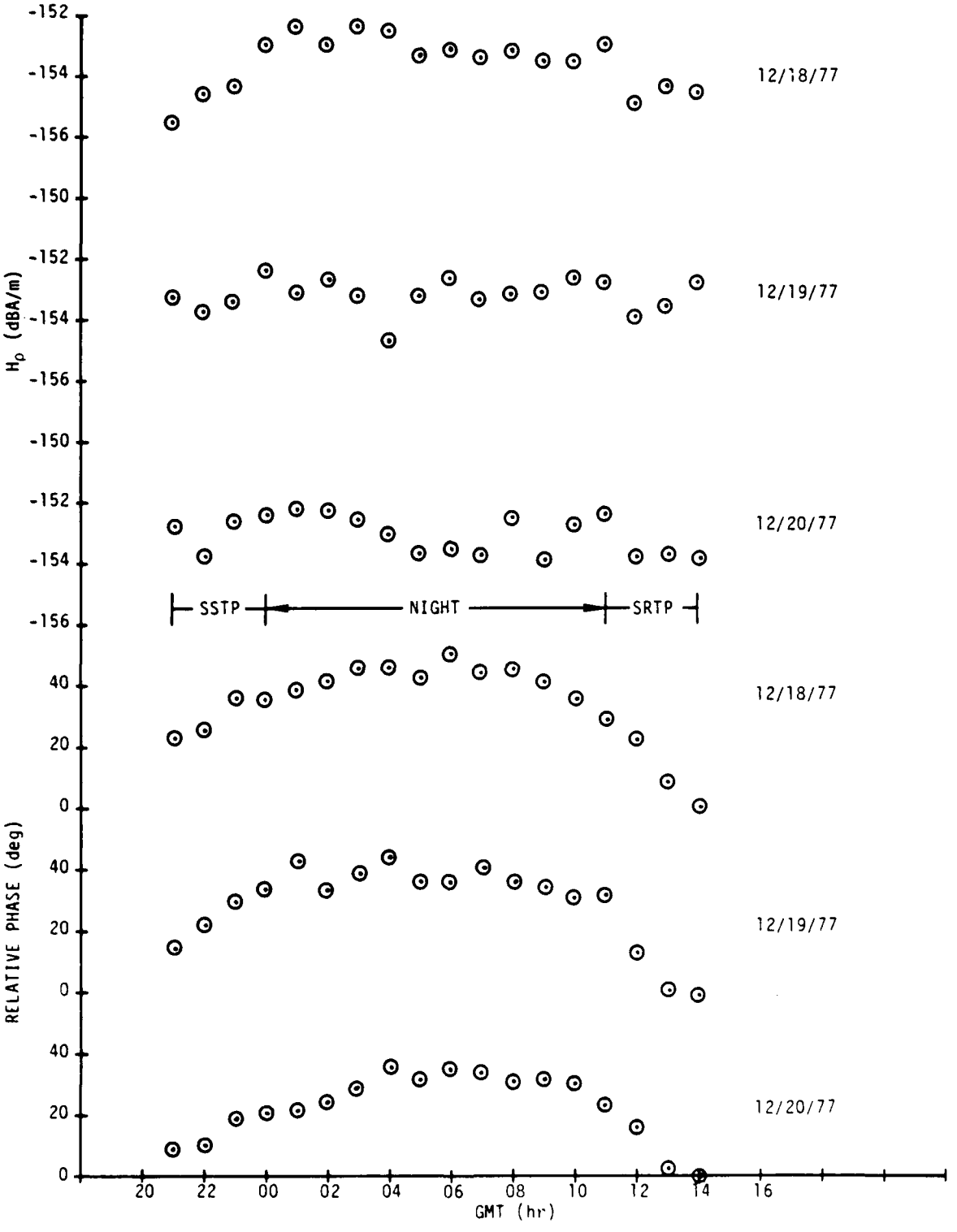

Figure B-5. Connecticut Radial Magnetic Field Strength Versus GMT, 18, 19, and 20 December 19[illegible] (ϕ = 290 deg)

Appendix C

MARCH 1978 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The March 1978 Connecticut daily field strength averages are given in table C-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures C-1 through C-3.

Table C-1. March 1978 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	SSTP H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
3/25	-154.8	-154.5	-153.6	-153.6	41	9.4	9.8
3/26	-155.4	-154.2	-154.0	-154.2	45	9.6	10.1
3/27	-154.9	-154.4	-154.6	-155.8	37	-	-
3/28	-156.3	-	-	-154.2	39	11.2	10.5
3/30	-153.8	-153.8	-	-153.1	32	8.2	9.6
3/31	-152.8	-153.0	-153.4	-153.8	41	-	-
Averages	-154.6	-153.9	-153.9	-154.1	39	9.6	10.0

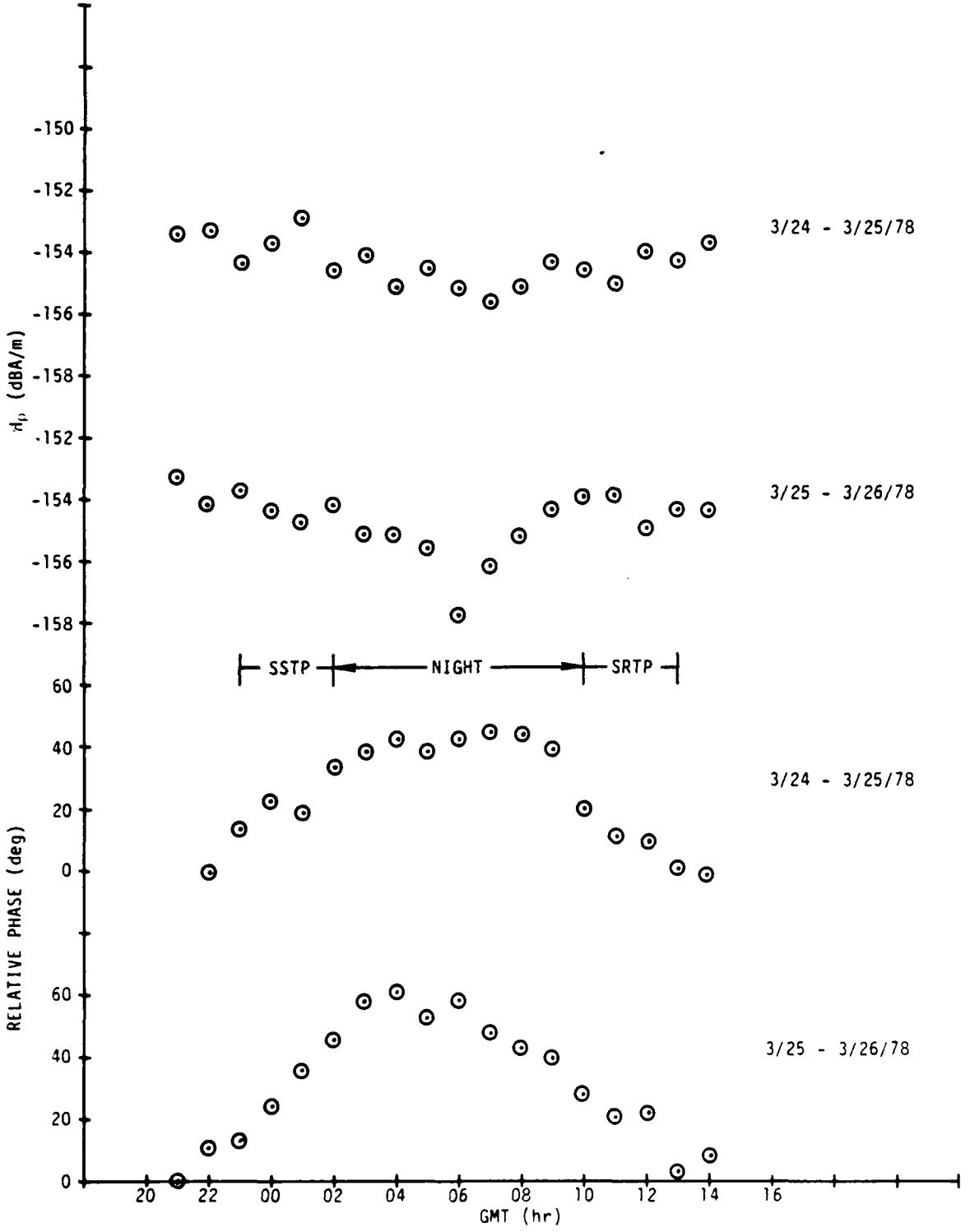

Figure C-1. Connecticut Radial Magnetic Field Strength Versus GMT, 24/25 and 25/26 March 1978 (ρ = 290 deg)

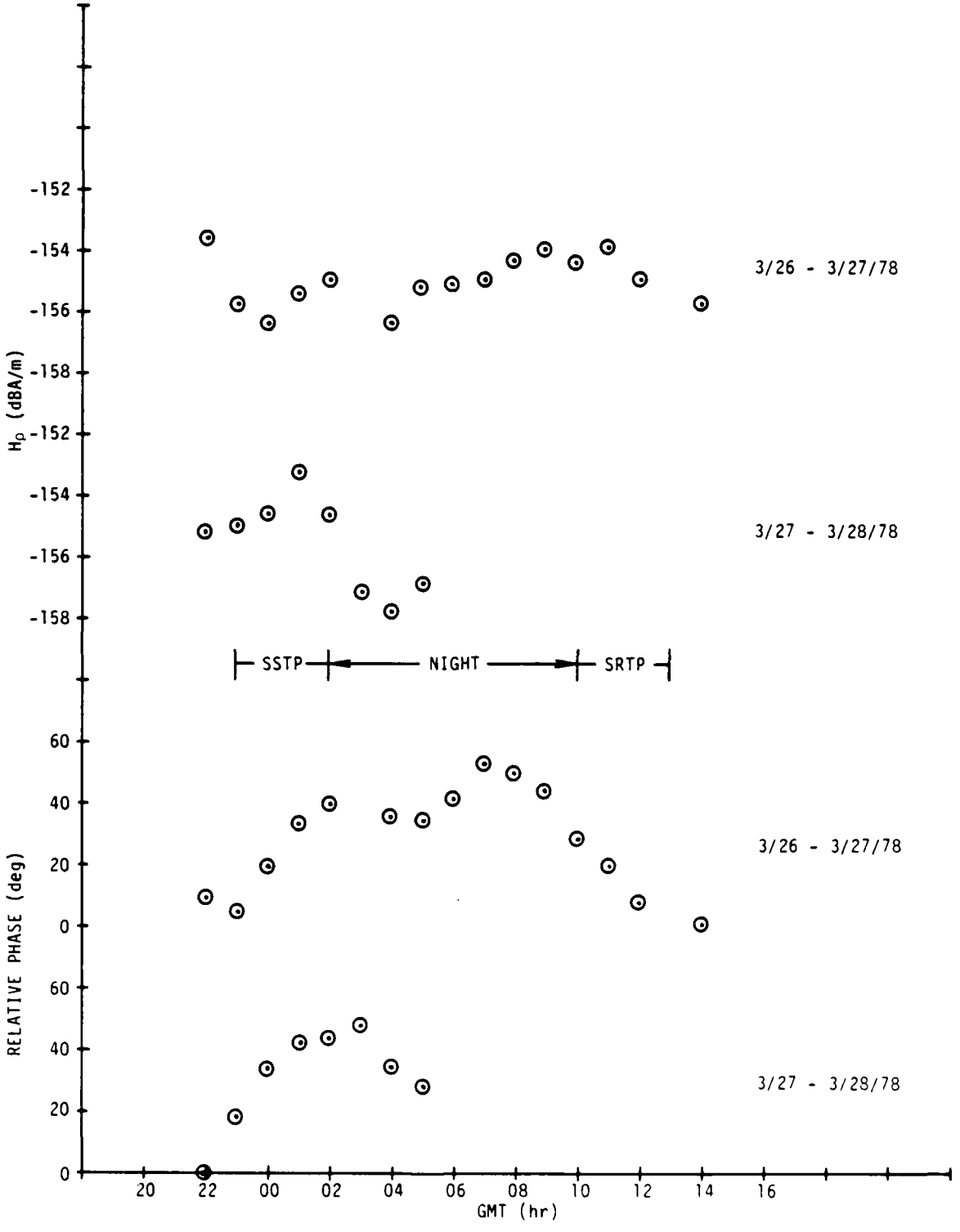

Figure C-2. Connecticut Radial Magnetic Field Strength Versus GMT, 26/27 and 27/28 March 1978 (ρ = 290 deg)

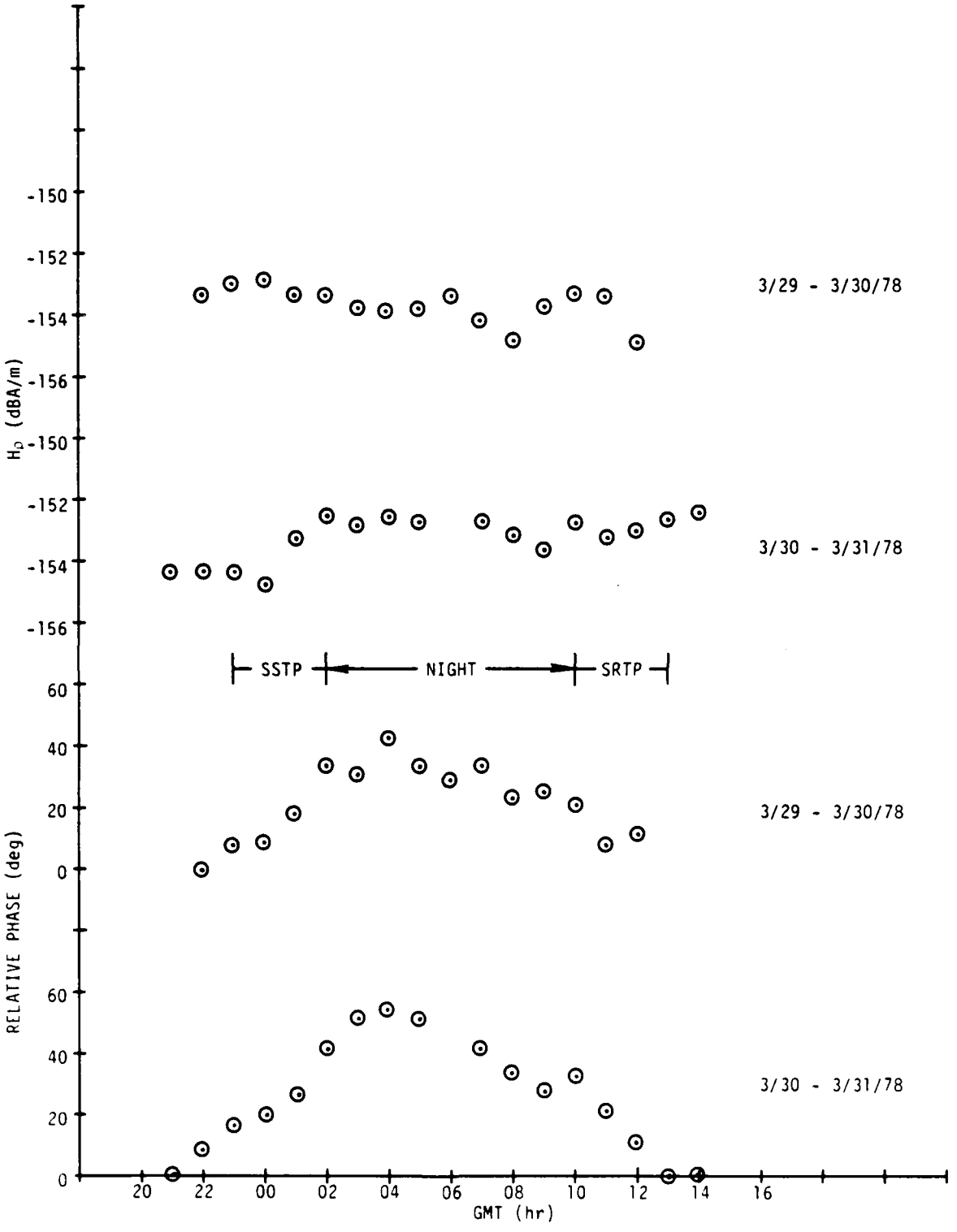

Figure C-3. Connecticut Radial Magnetic Field Strength Versus GMT, 29/30 and 30/31 March 1978 (. = 290 deg)

Appendix D

OCTOBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The October 1983 Connecticut daily field strength averages are given in table D-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures D-1 through D-4.

Table D-1. October 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	Date	Night H_ρ (dBA/m)
10/19	-153.7	10/24	-153.2
10/20	-154.5	10/25	-153.0
10/21	-153.8	10/26	-151.3
10/22	-153.2	10/27	-151.6
10/23	-153.5	Average	-153.1

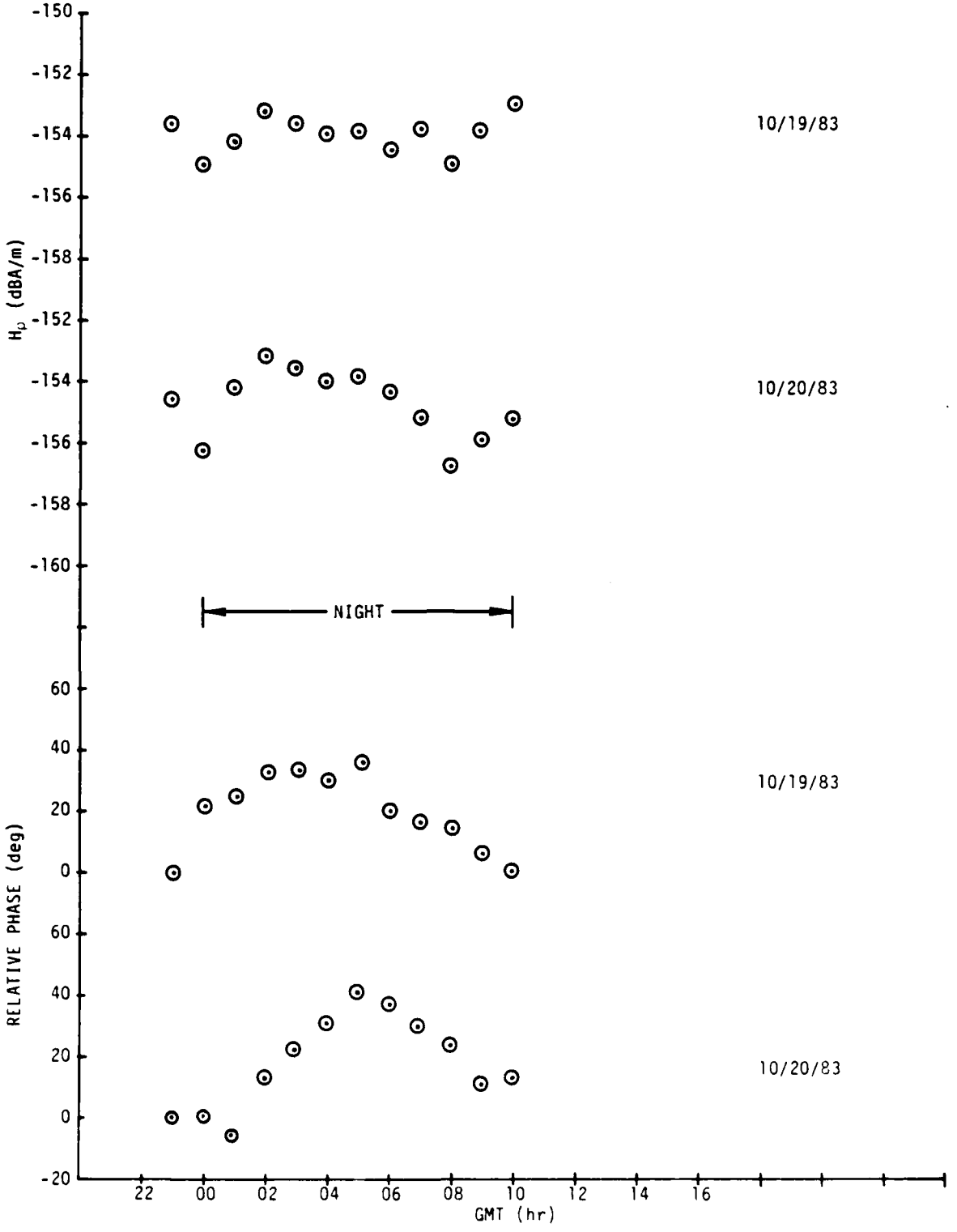

Figure D-1. Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 October 1983 (ϕ = 290 deg)

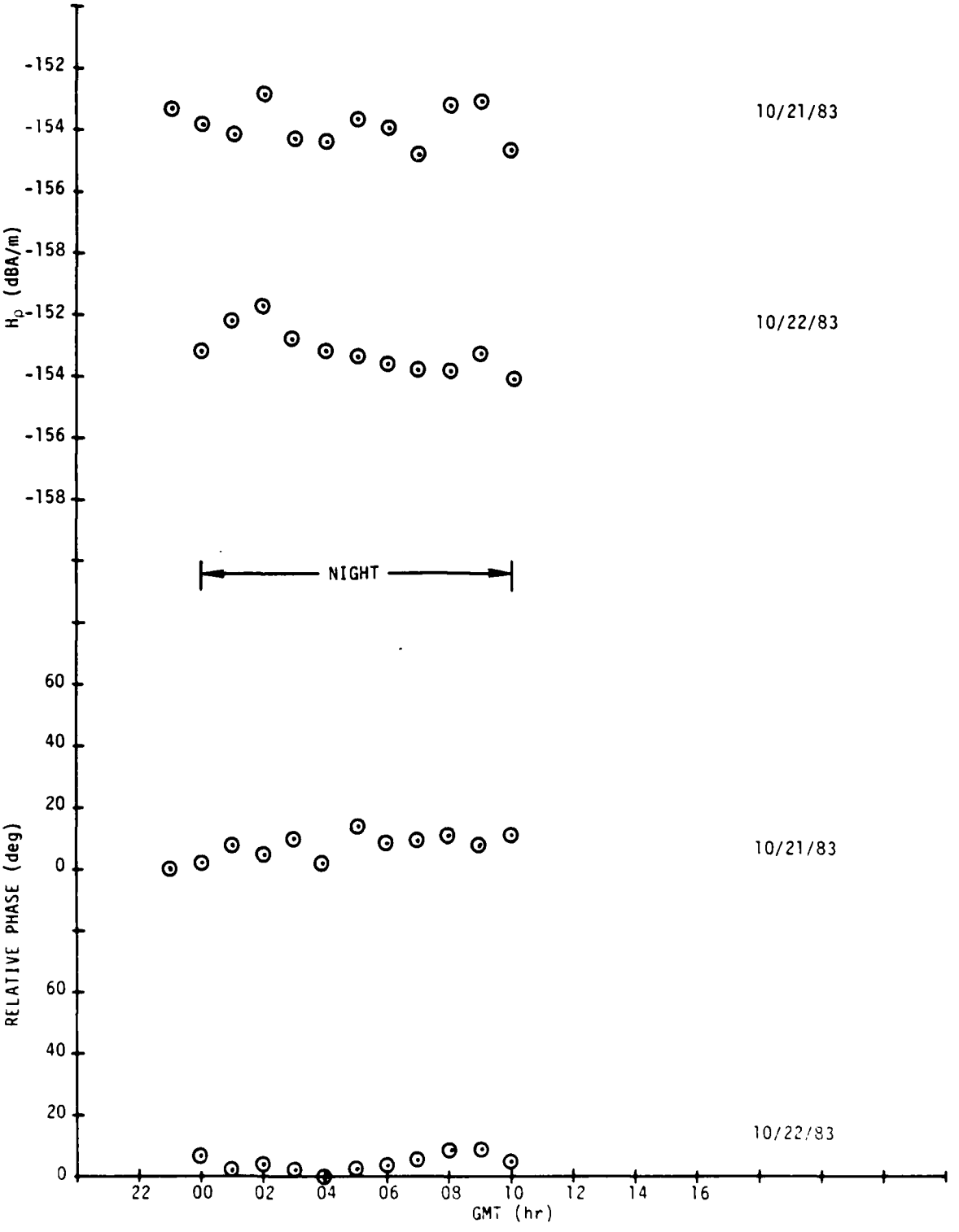

Figure D-2. Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 22 October 1983 (ρ = 290 deg)

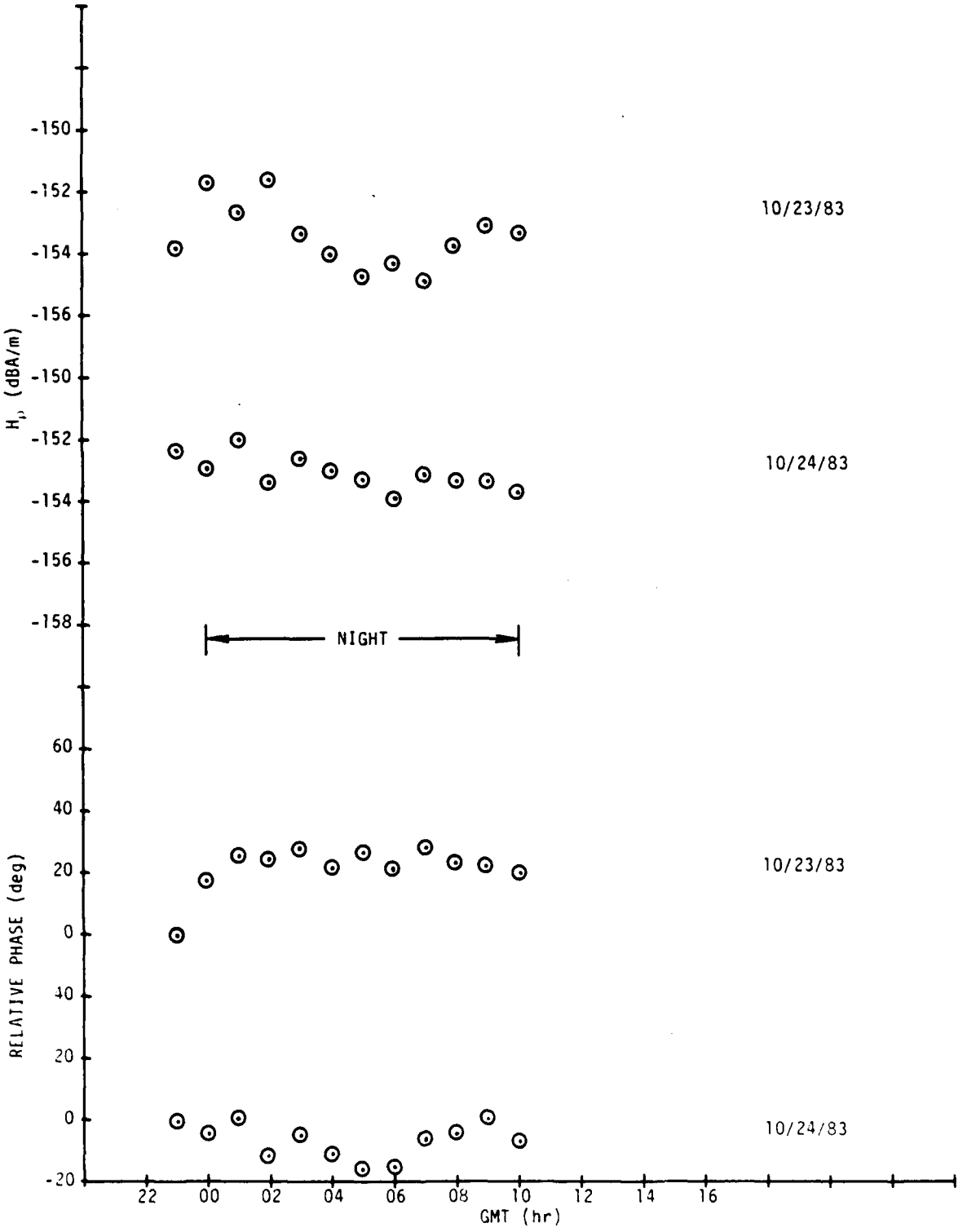

Figure D-3. Connecticut Radial Magnetic Field Strength Versus GMT, 23 and 24 October 1983 (ϕ = 290 deg)

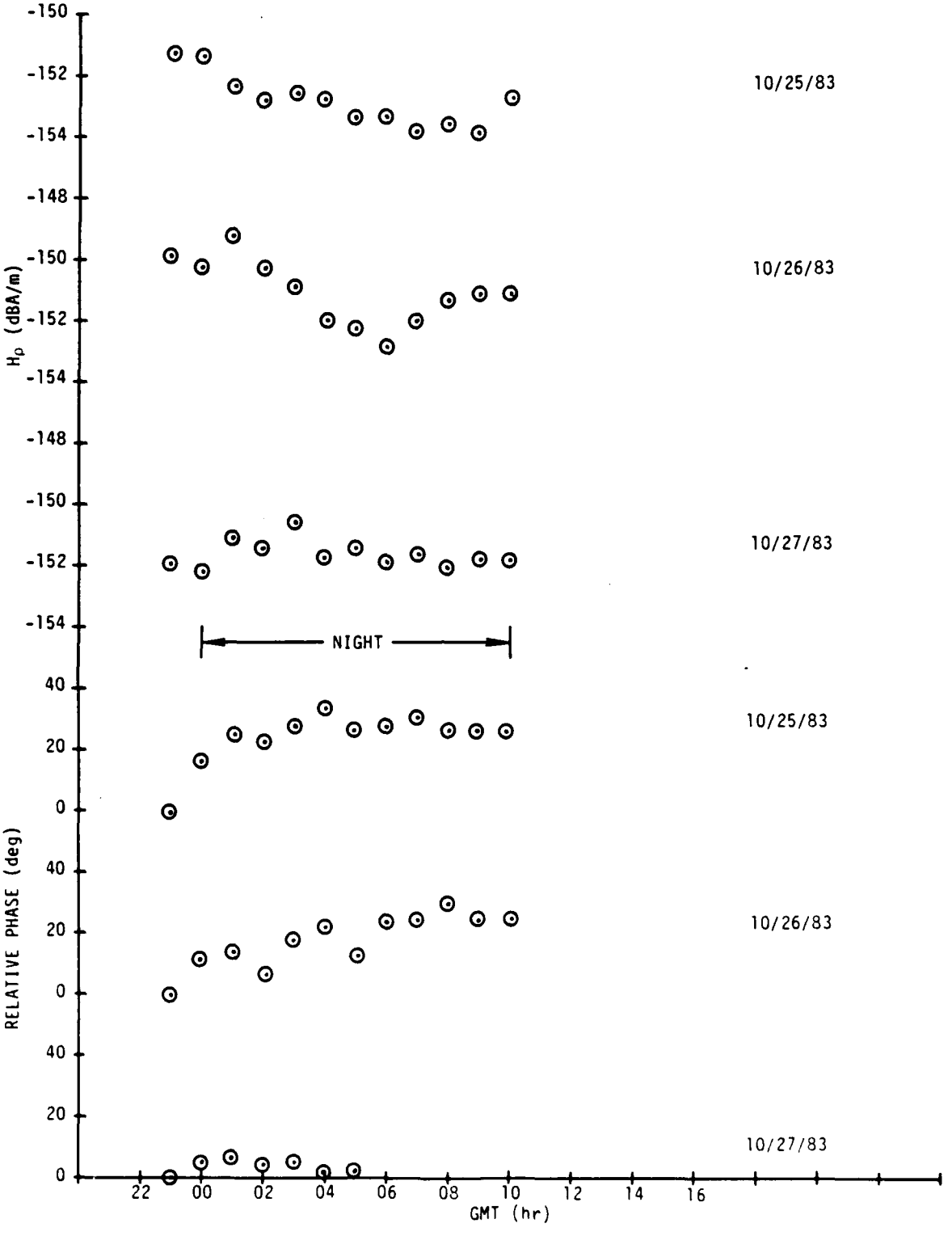

Figure D-4. Connecticut Radial Magnetic Field Strength Versus GMT, 25, 26, and 27 October 1983 (ϕ = 290 deg)

Appendix E

NOVEMBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The November 1983 Connecticut daily field strength averages are given in table E-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures E-1 through E-7.

Table E-1. November 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	Night H_ϕ/H_ρ (dB)	Date	Night H_ρ (dBA/m)	Night H_ϕ/H_ρ (dB)
11/2	-153.9	9.0	11/12	-155.1	10.1
11/3	-153.7	9.0	11/13	-154.2	8.4
11/4	-154.1	9.0	11/14	-153.4	8.6
11/5	-154.2	-	11/15	-152.9	8.4
11/6	-154.1	-	11/16	-152.9	8.3
11/7	-153.8	-	11/17	-155.5	9.9
11/11	-153.8	8.8	11/18	-154.7	-
			Averages	-154.0	8.9

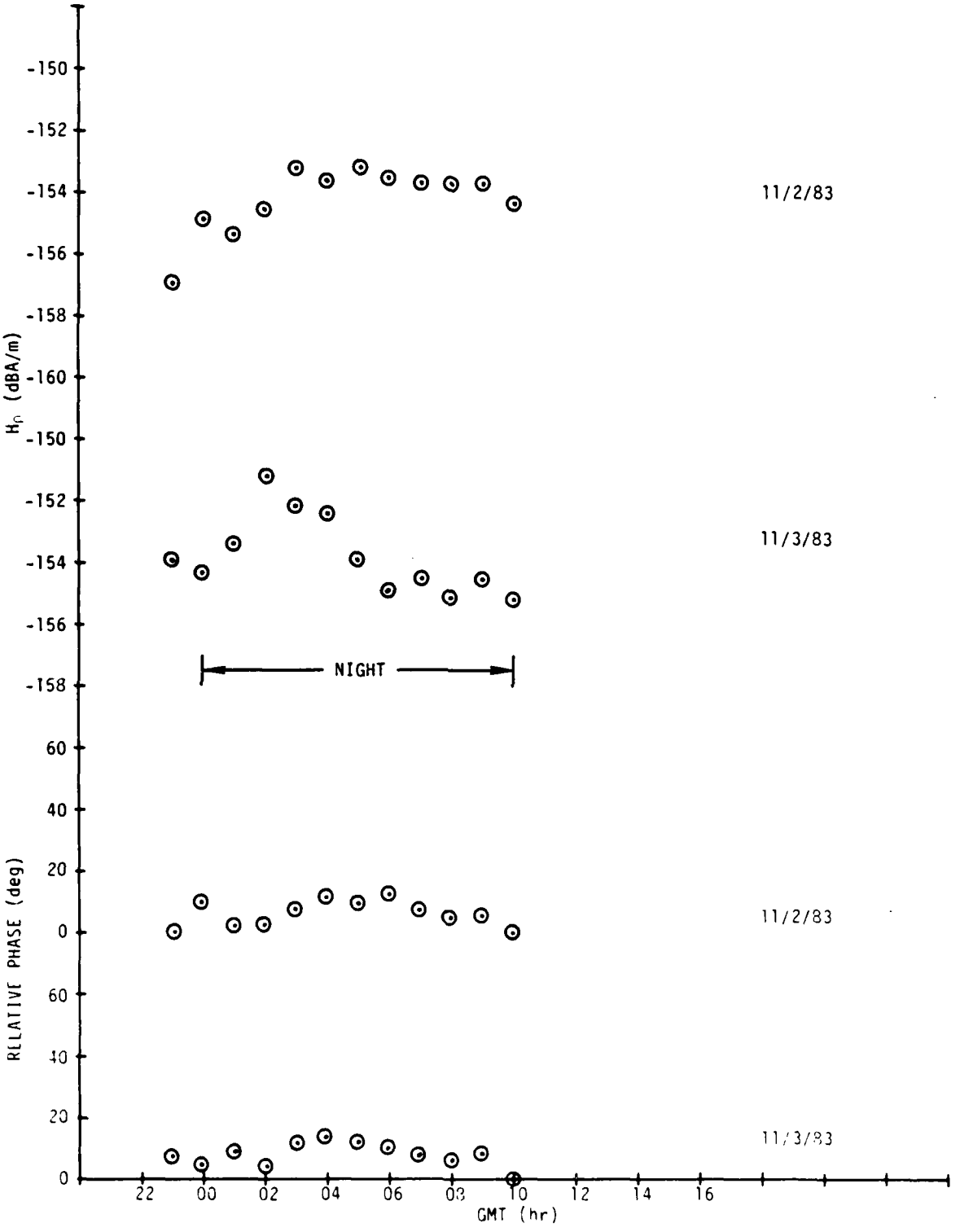

Figure E-1. Connecticut Radial Magnetic Field Strength Versus GMT, 2 and 3 November 1983 (ϕ = 290 deg)

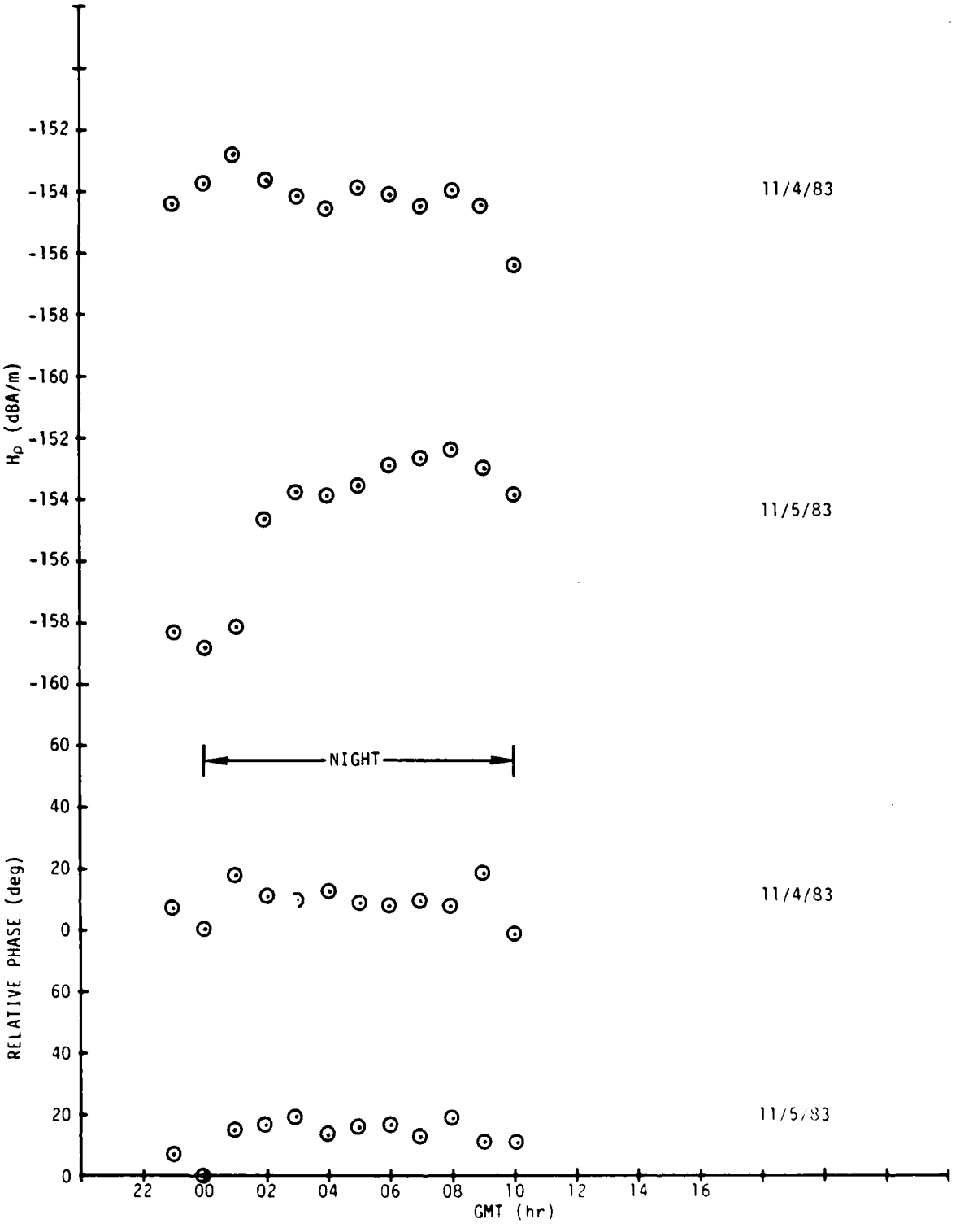

Figure E-2. Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 November 1983 (ρ = 290 deg)

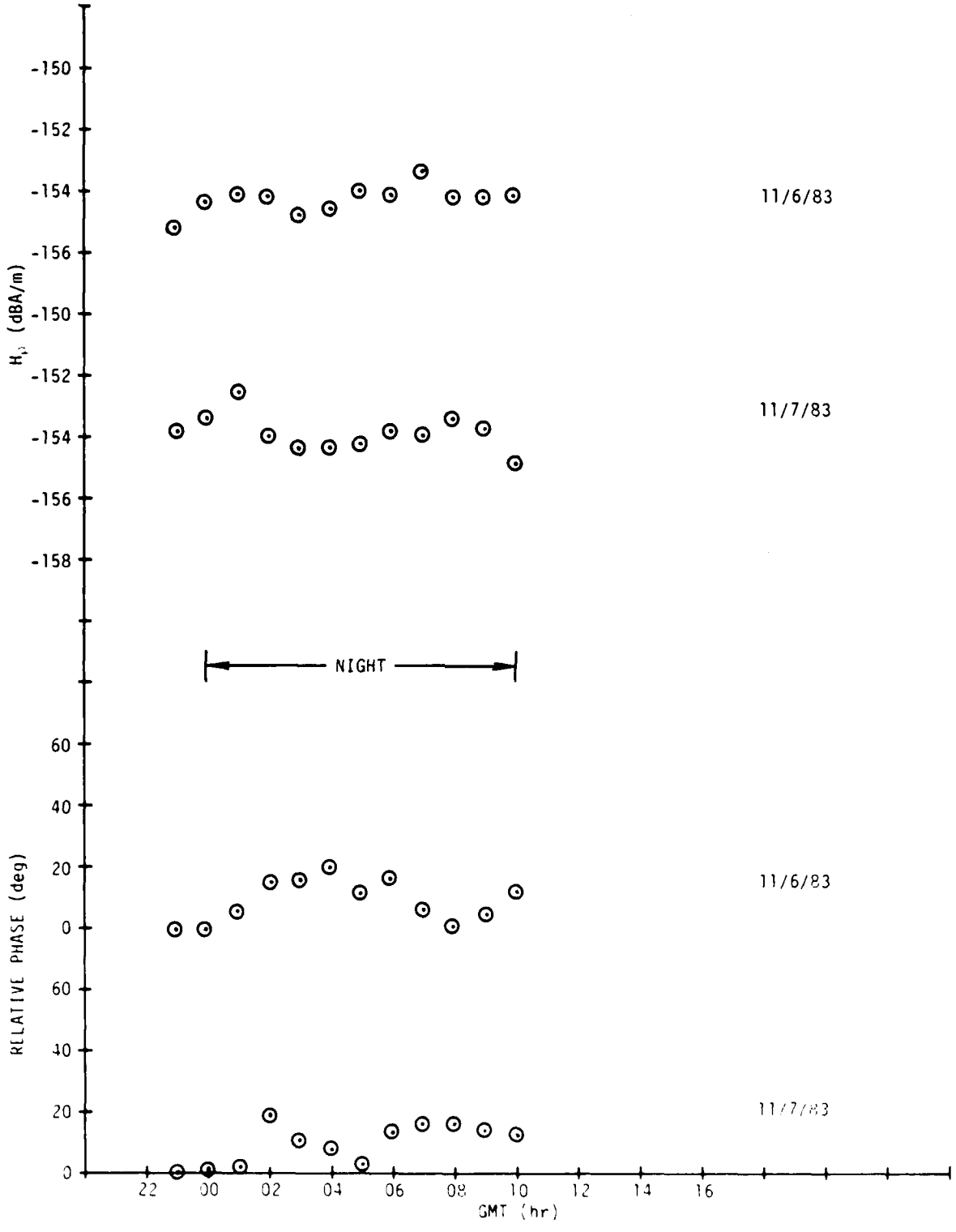

Figure E-3. Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 November 1983 (ϕ = 290 deg)

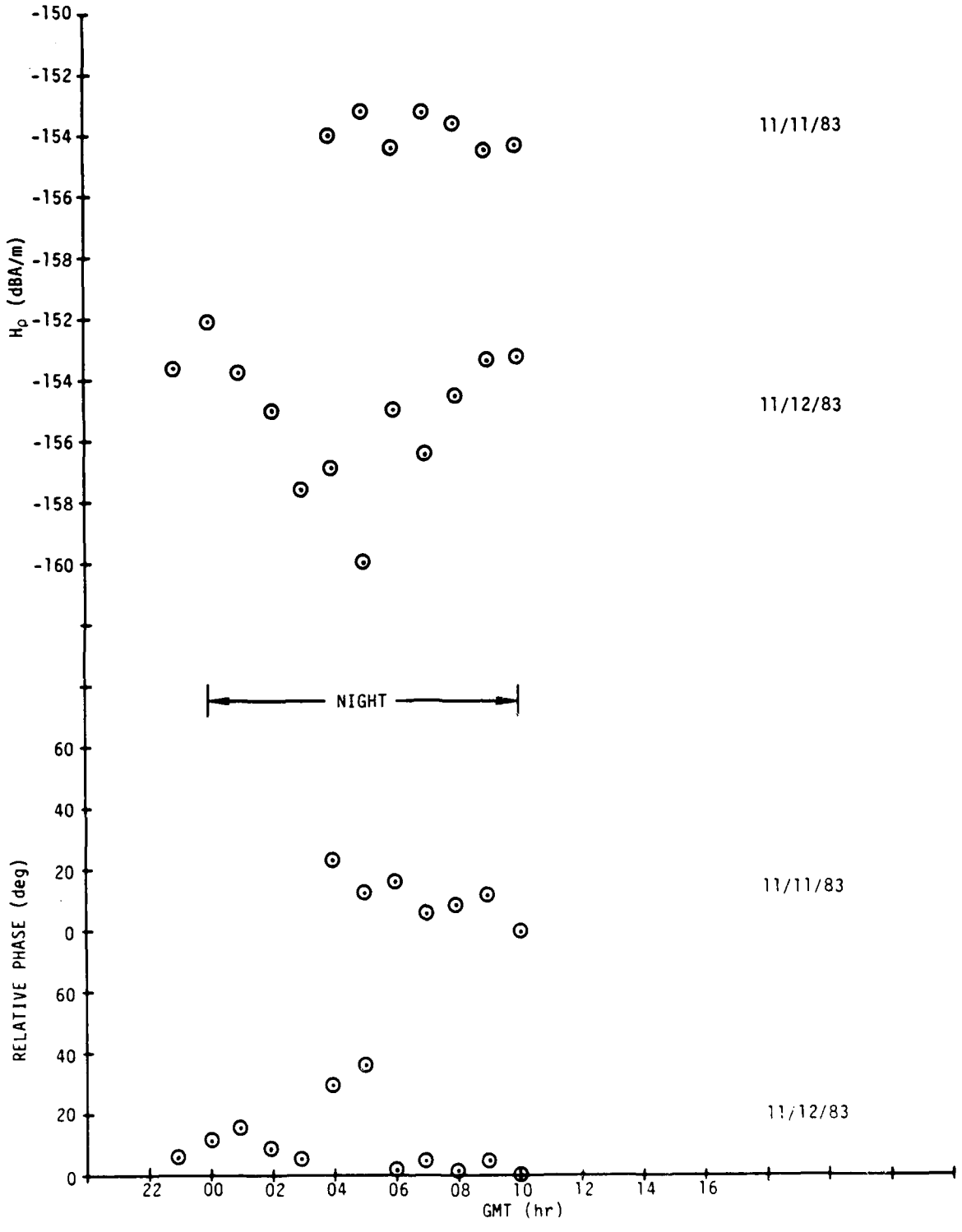

Figure E-4. Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 November 1985 (ϕ = 290 deg)

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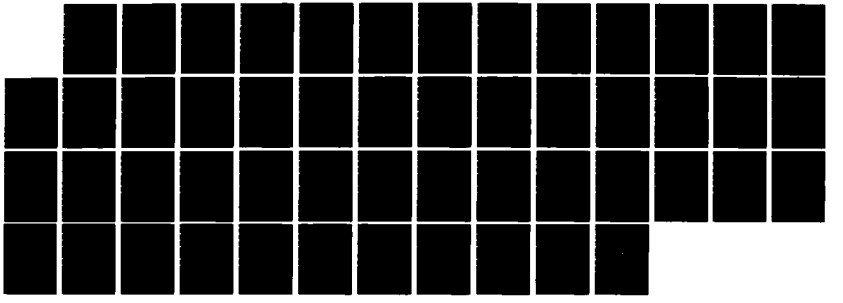

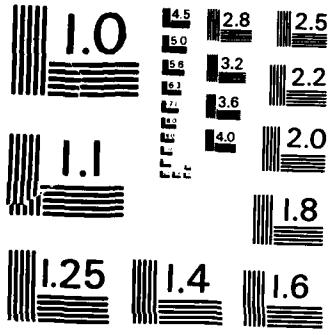

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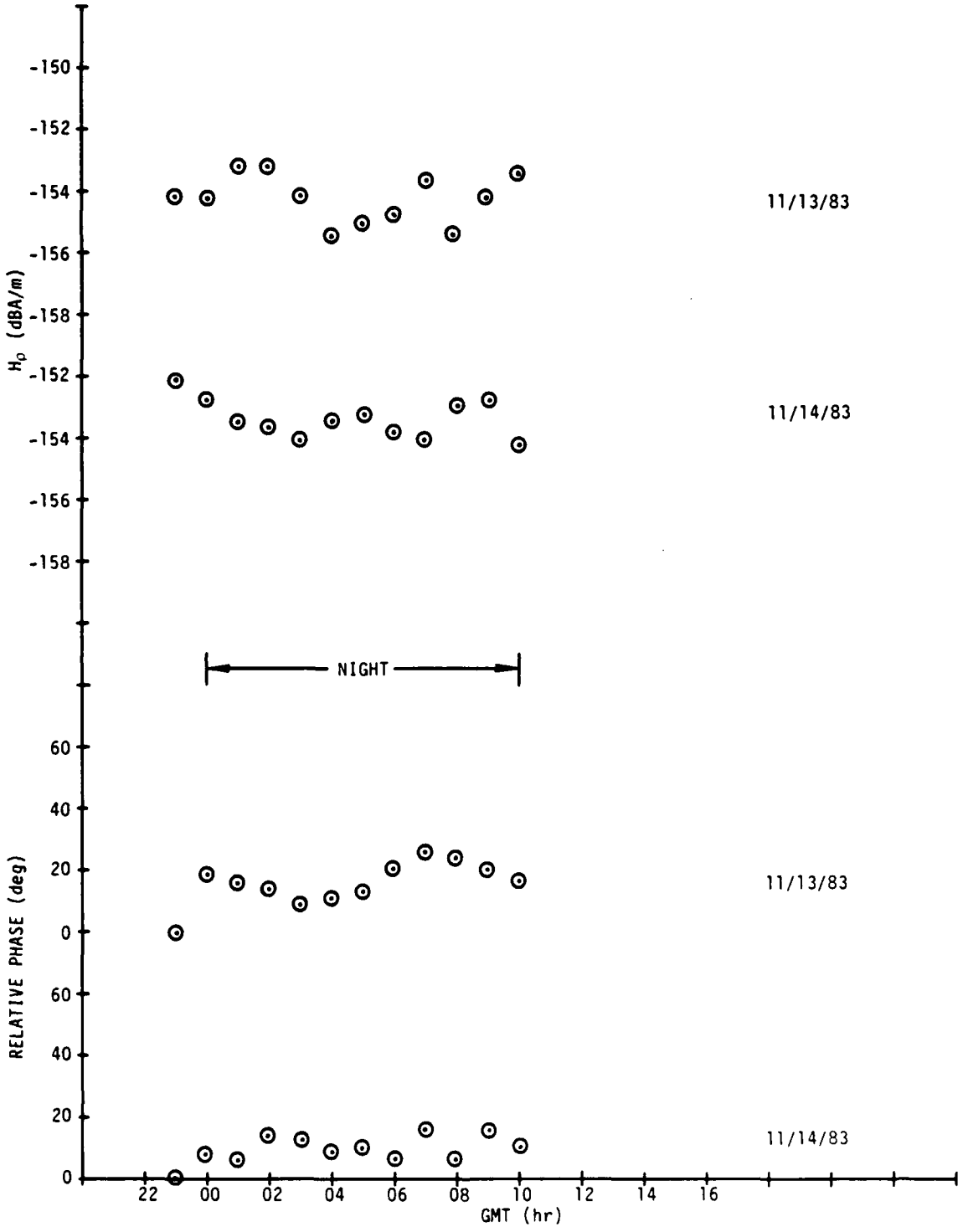

Figure E-5. Connecticut Radial Magnetic Field Strength Versus GMT, 13 and 14 November 1983 (ρ = 290 deg)

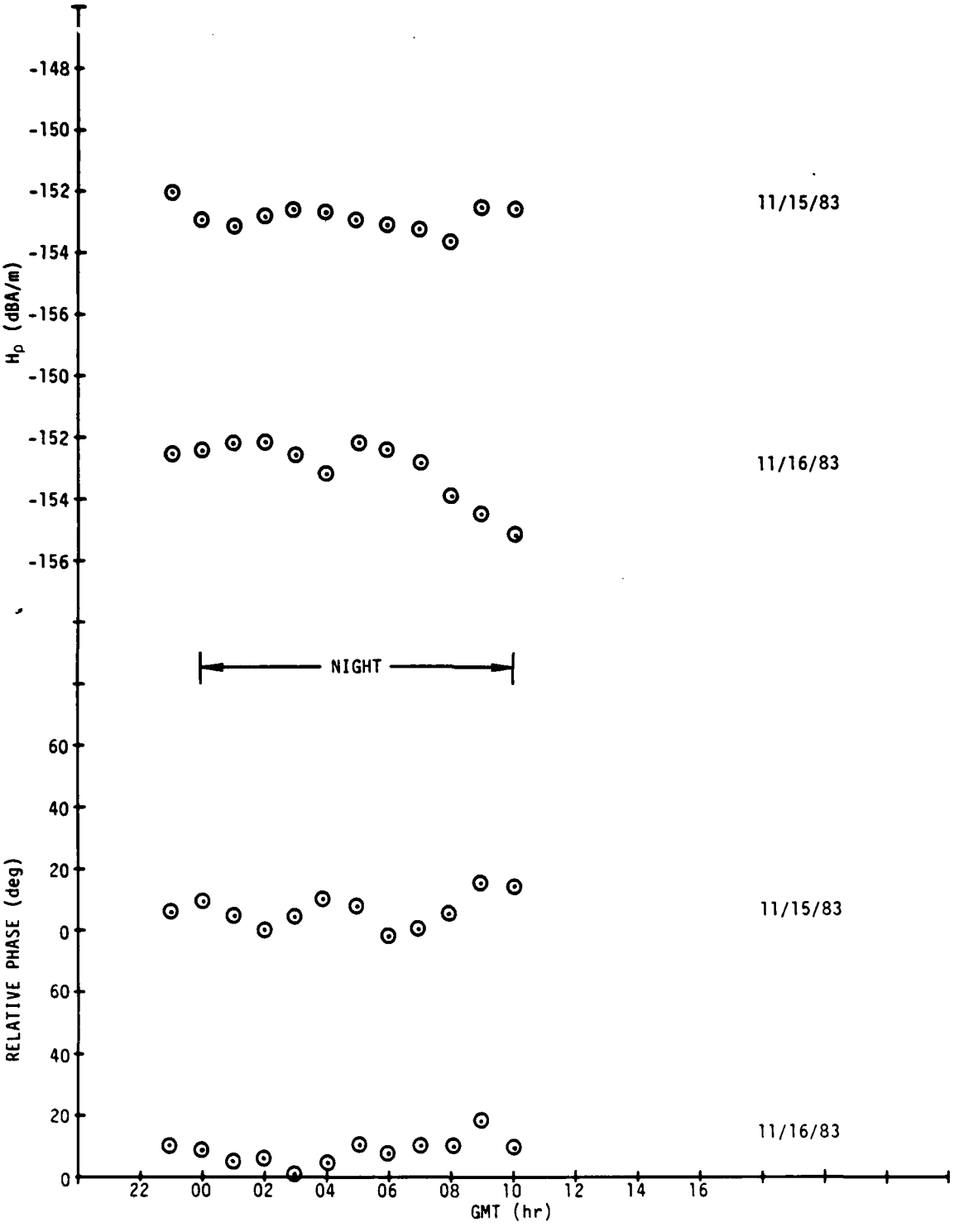

Figure E-6. Connecticut Radial Magnetic Field Strength Versus GMT, 15 and 16 November 1983 (ϕ = 290 deg)

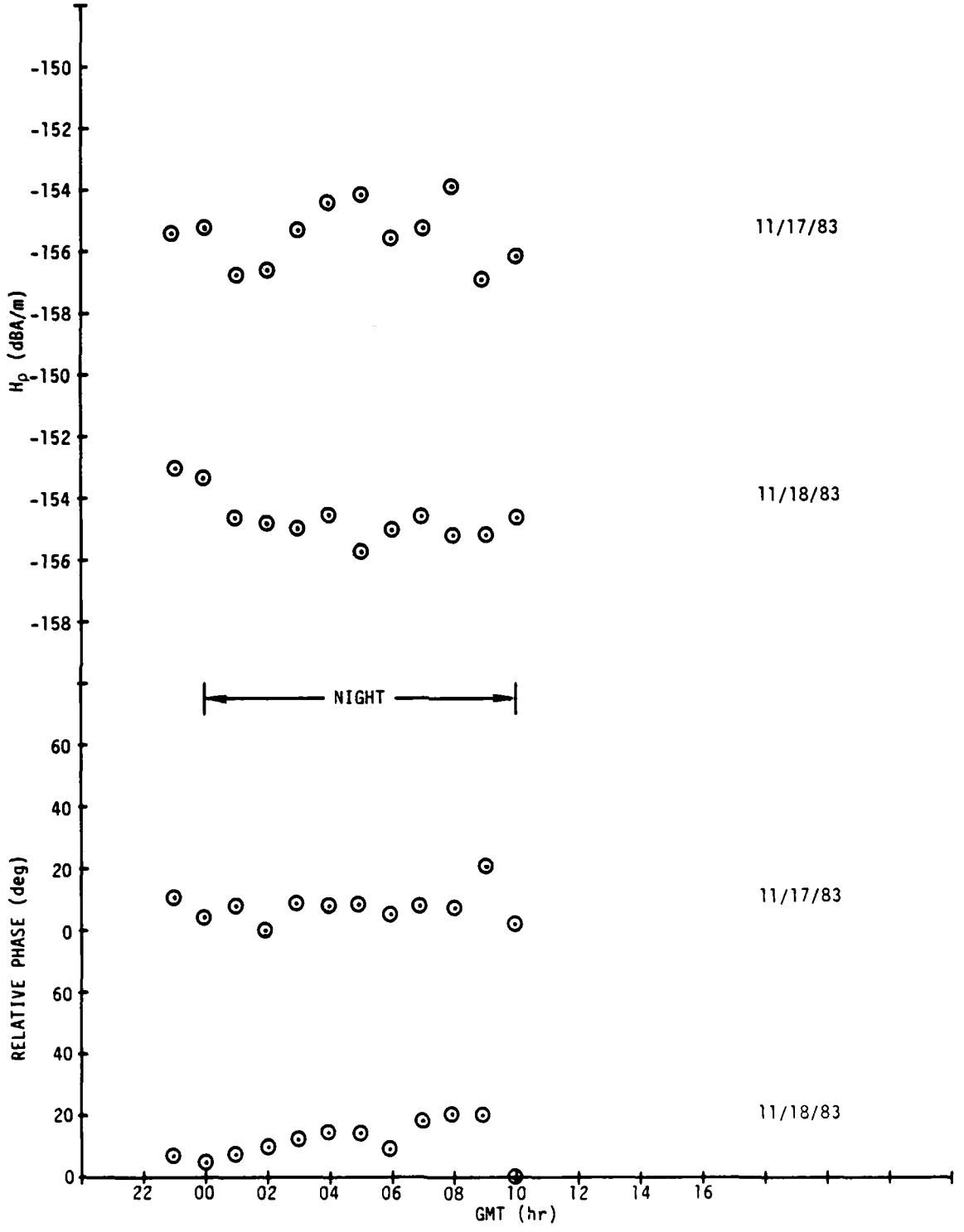

Figure E-7. Connecticut Radial Magnetic Field Strength Versus GMT, 17 and 18 November 1983 (ϕ = 290 deg)

Appendix F

DECEMBER 1983 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The December 1983 Connecticut daily field strength averages are given in table F-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures F-1 through F-3.

Table F-1. December 1983 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	SSTP H_ρ (dBA/m)	$\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)	Day H_ϕ/H_ρ (dB)
12/3	-153.2	-154.7	-154.6	-155.9	16.7	7.8	11.4	11.6
12/4	-153.0	-154.0	-153.3	-154.1	23.6	8.1	9.6	9.6
12/5	-153.6	-	-	-	12.6	8.8	-	-
12/10	-154.2	-154.6	-155.4	-153.3	23.1	9.8	10.0	12.0
12/11	-155.4	-154.6	-154.7	-153.5	46.6	10.6	10.2	11.6
12/12	-155.4	-154.4	-154.4	-	29.0	11.3	10.2	11.3
Averages	-154.1	-154.4	-154.4	-154.2	25.3	9.4	10.2	11.2

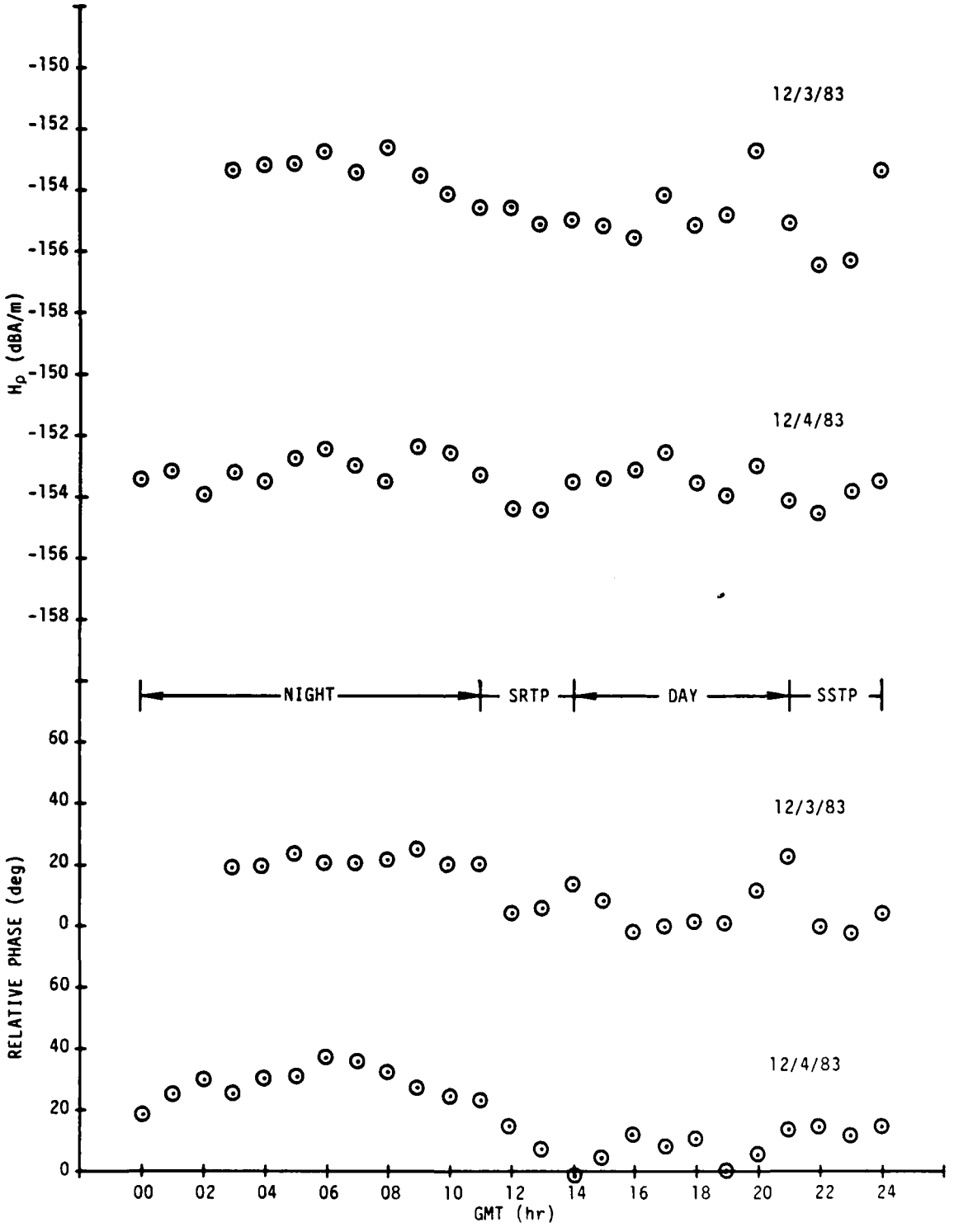

Figure F-1. Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 December 1983 (ϕ = 290 deg)

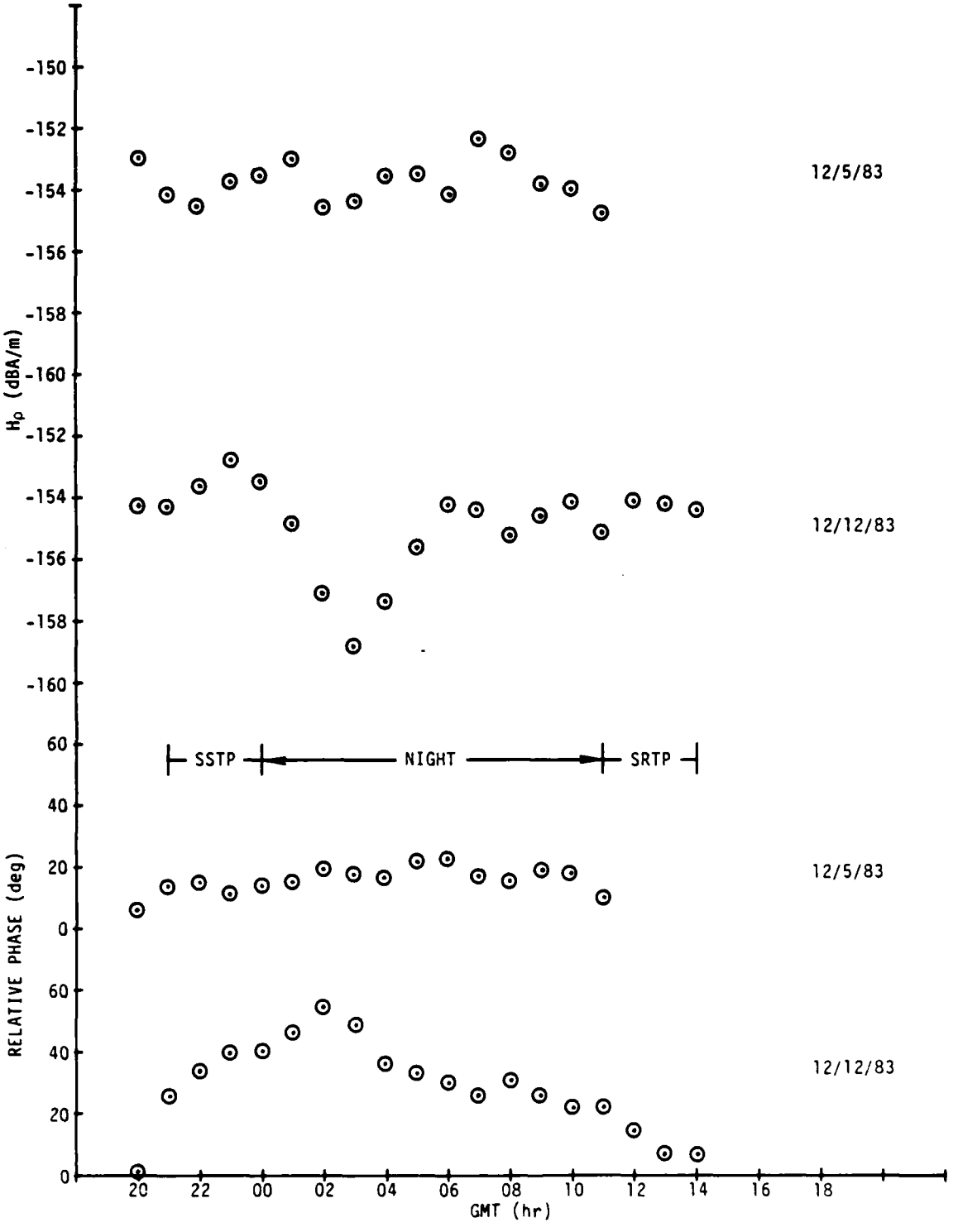

Figure F-2. Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 12 December 1985 (ϕ = 290 deg)

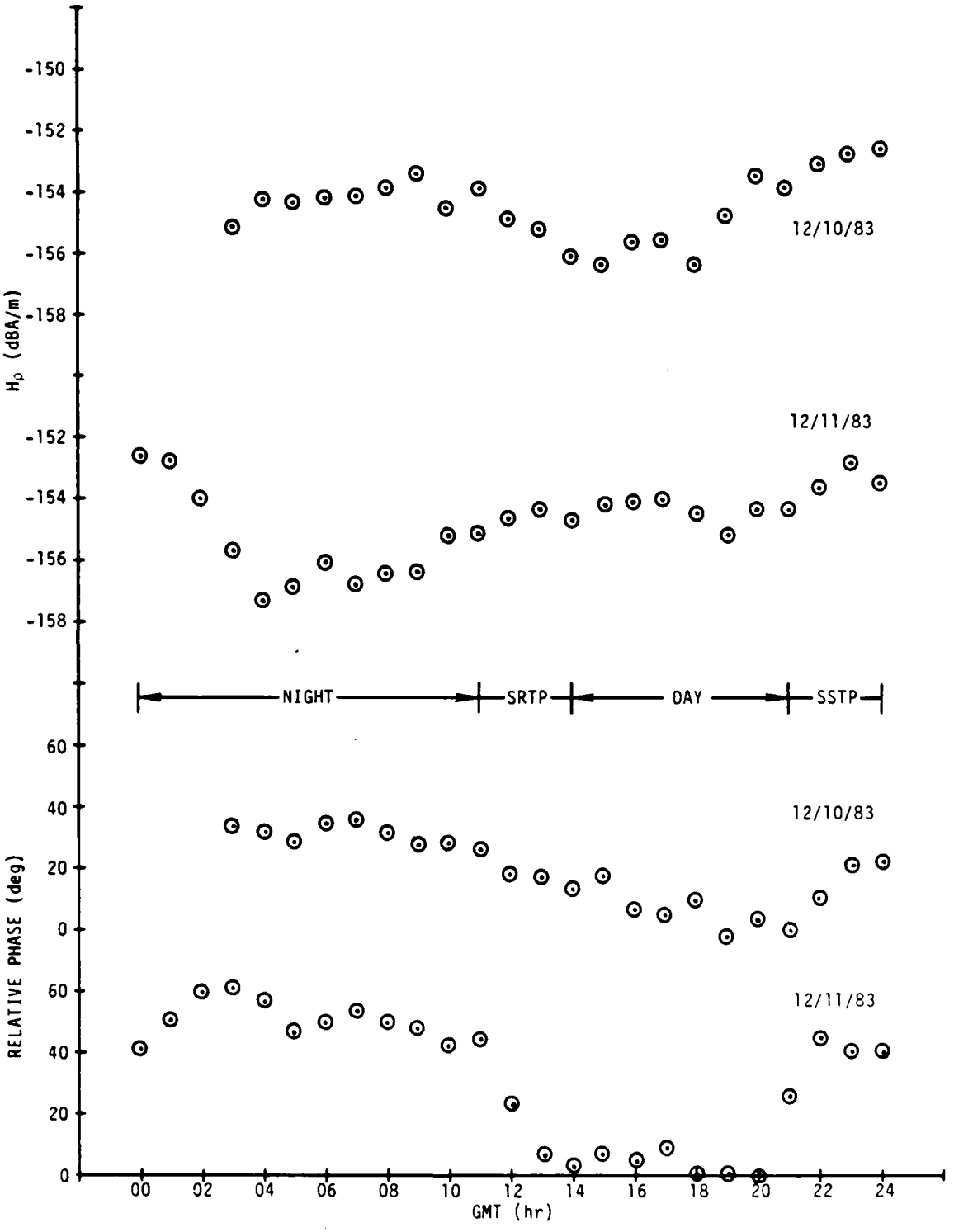

Figure F-3. Connecticut Radial Magnetic Field Strength Versus GMT, 10 and 11 December 1985 (. = 290 deg)

Appendix G

FEBRUARY 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The February 1984 Connecticut daily field strength averages are given in table G-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures G-1 through G-4.

Table G-1. February 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	SSTP H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
2/15	-154.1	-155.4	-156.1	-154.3	25.0	9.3	10.4
2/23	-156.4	-153.4	-153.3	-	41.5	10.4	8.5
2/24	-154.6	-154.1	-154.0	-	29.0	9.3	9.7
2/25	-153.8	-154.8	-154.6	-154.3	21.0	8.6	10.7
2/26	-153.3	-153.5	-153.1	-	16.5	8.1	9.8
2/28	-154.3	-154.3	-	-	40.0	8.8	9.8
2/29	-155.0	-156.8	-154.1	-	48.5	9.1	12.8
Averages	-154.5	-154.6	-154.2	-154.3	31.5	9.0	10.2

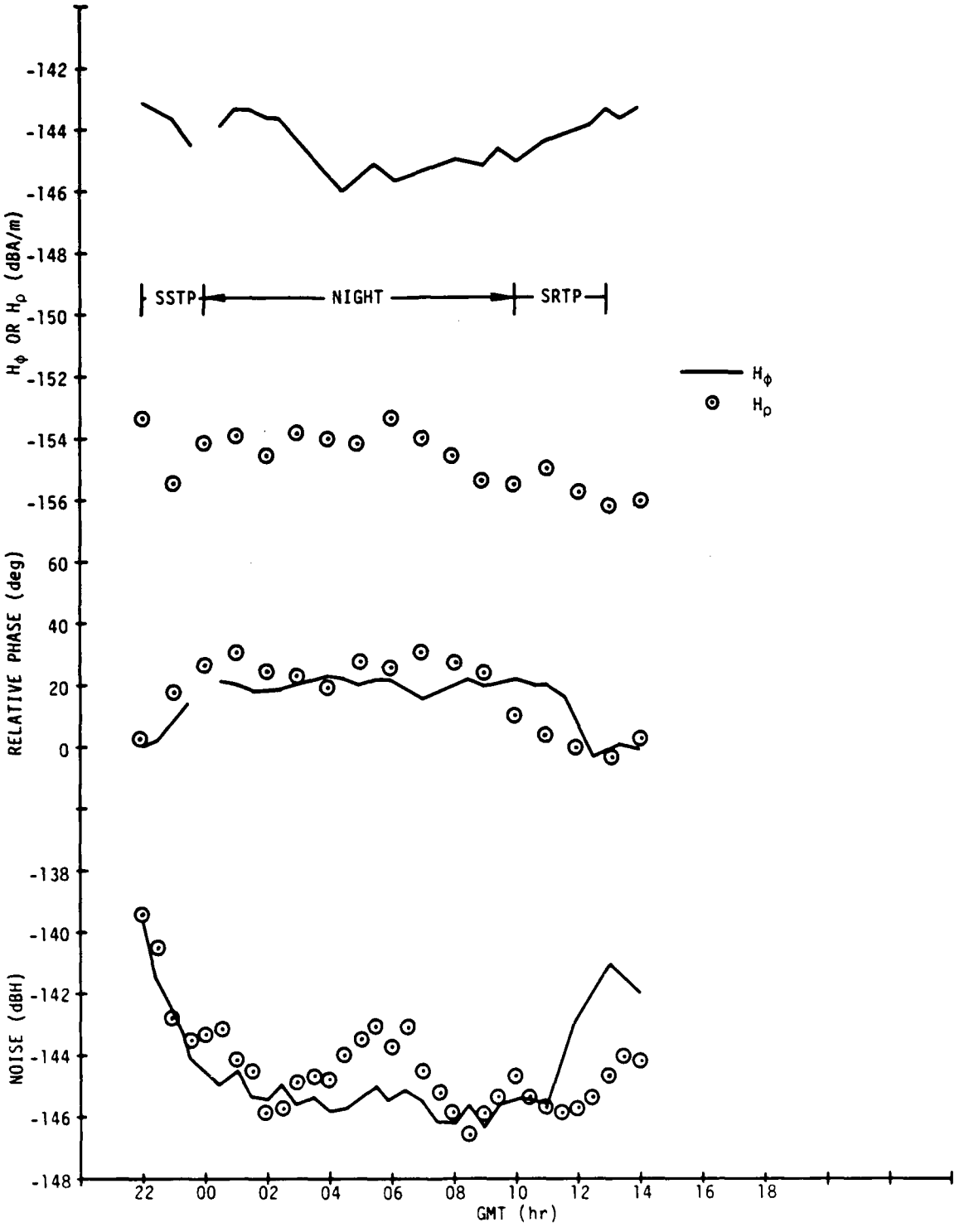

Figure G-1. Connecticut Magnetic Field Strength Comparisons, 14/15 February 1984 (ψ = 290 deg)

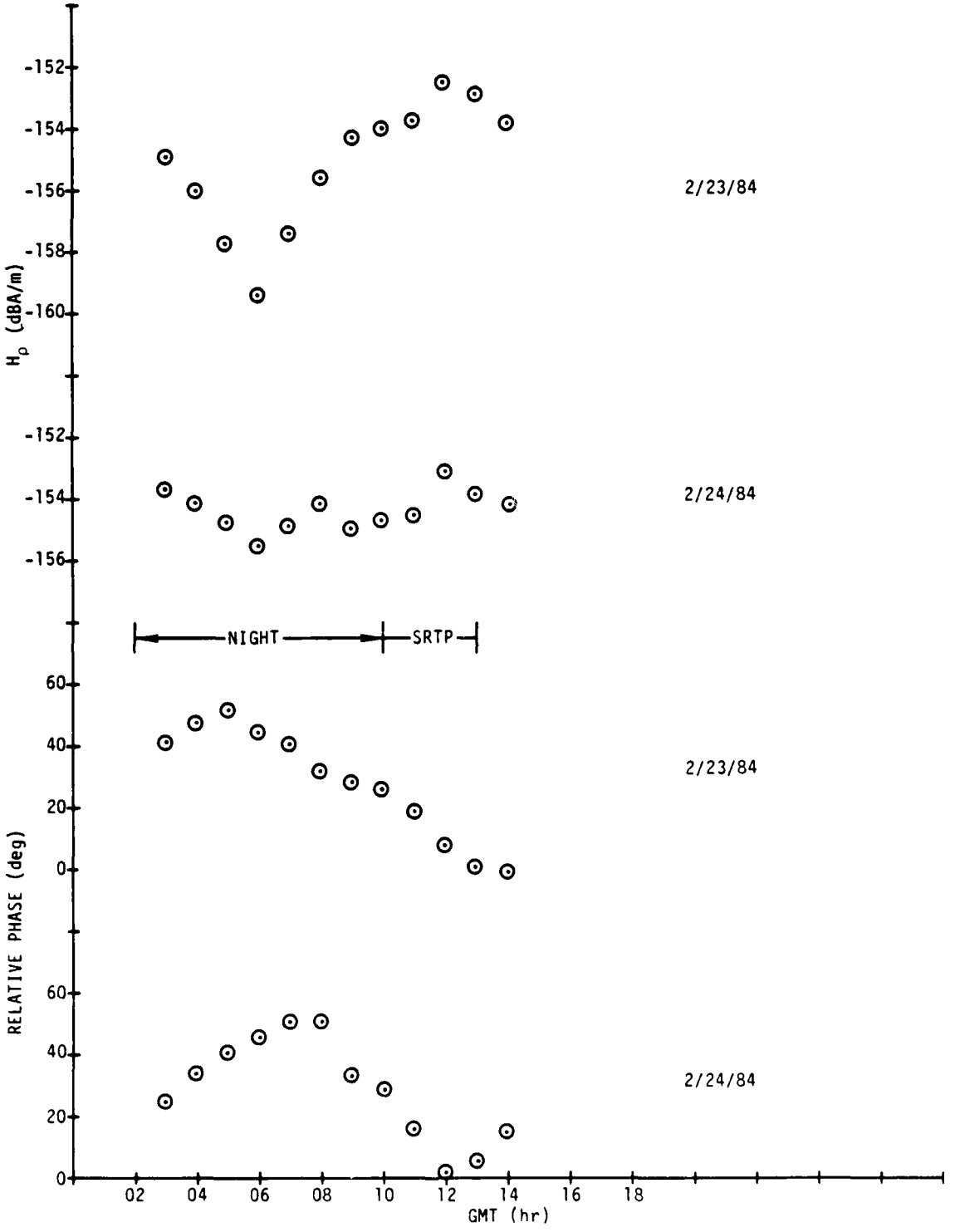

Figure G-2. Connecticut Radial Magnetic Field Strength Versus GMT, 23 and 24 February 1984 (ϕ = 290 deg)

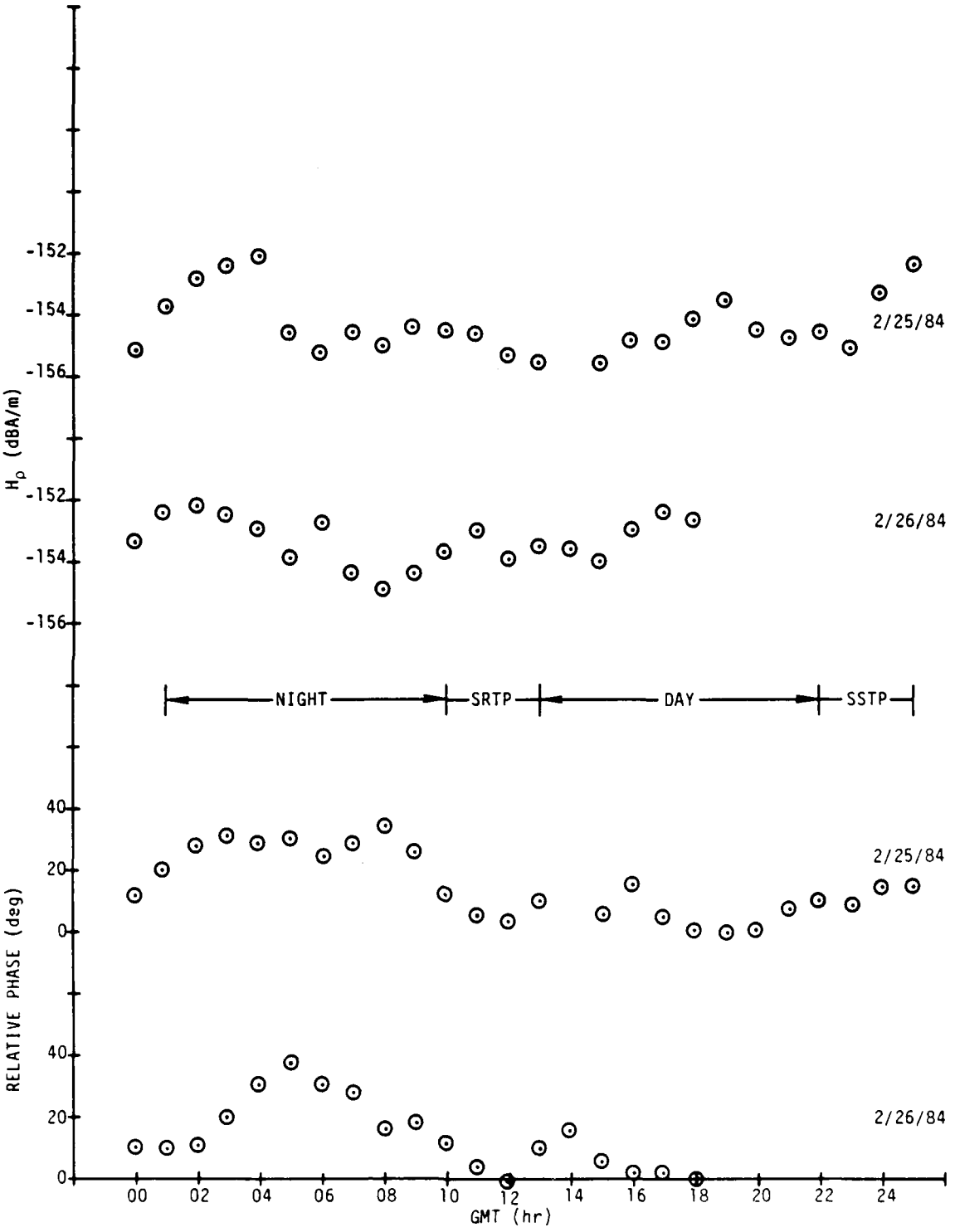

Figure G-3. Connecticut Radial Magnetic Field Strength Versus GMT, 25 and 26 February 1984 (ϕ = 290 deg)

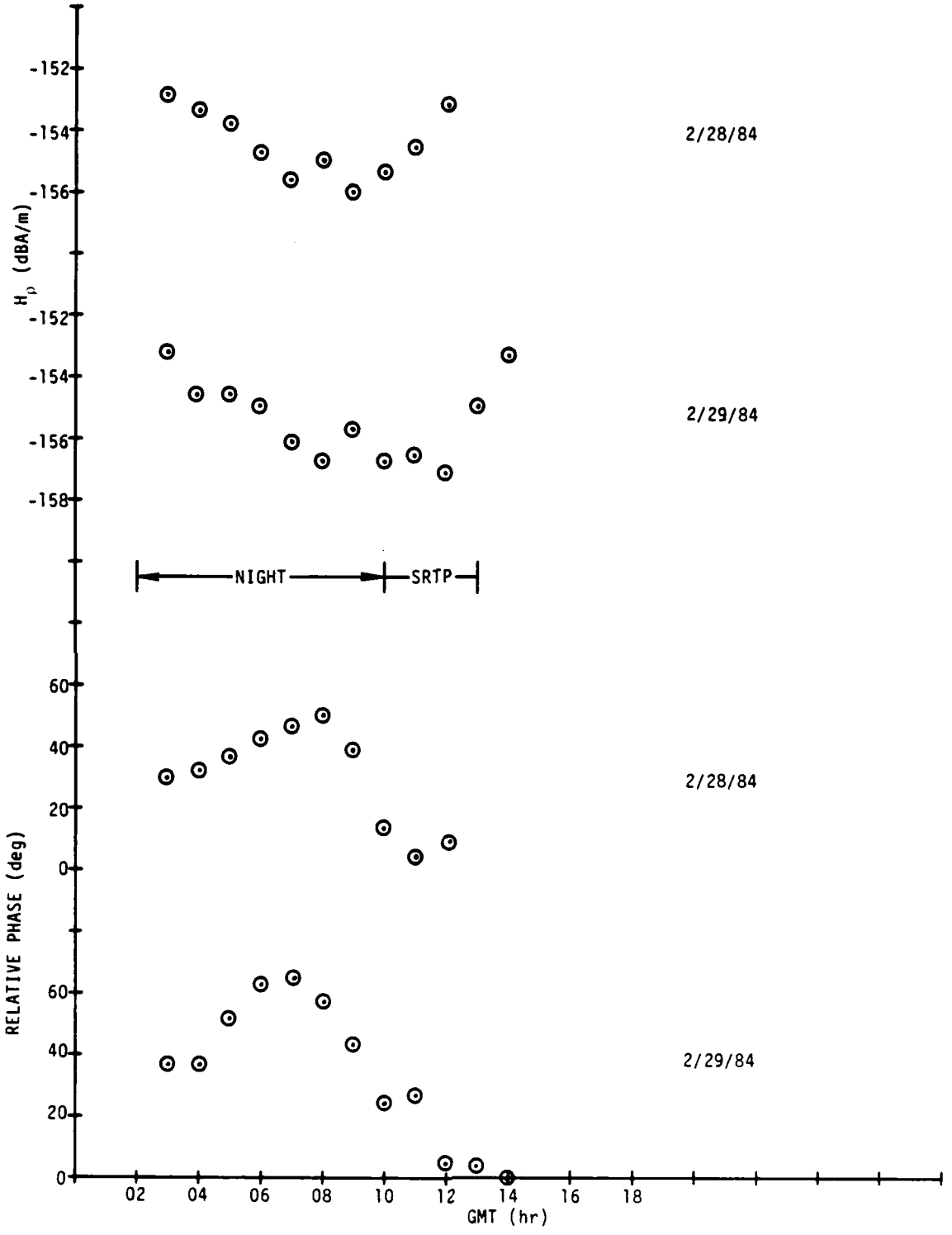

Figure G-4. Connecticut Radial Magnetic Field Strength Versus GMT, 28 and 29 February 1984 (, = 290 deg)

Appendix H

MARCH 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The March 1984 Connecticut daily field strength averages are given in table H-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures H-1 through H-5.

Table H-1. March 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)
3/1	-155.6	-154.4	-156.0	57.0	9.6	9.9
3/2	-155.0	-153.8	-154.5	18.5	10.0	10.5
3/3	-154.7	-153.7	-154.3	41.0	9.3	9.5
3/4	-153.9	-153.4	-154.2	32.5	8.4	9.3
3/5	-152.8	-153.1	-153.6	43.5	7.3	9.3
3/6	-156.1	-153.4	-154.2	30.0	9.9	9.6
3/7	-156.0	-154.0	-154.9	22.0	-	-
3/8	-153.1	-154.1	-	27.0	6.3	9.1
3/9	-155.9	-155.0	-	30.0	-	-
3/12	-153.0	-154.2	-154.2	41.0	-	-
3/13	-154.6	-153.1	-153.2	50.5	-	-
Averages	-154.6	-153.8	-154.3	35	8.7	9.6

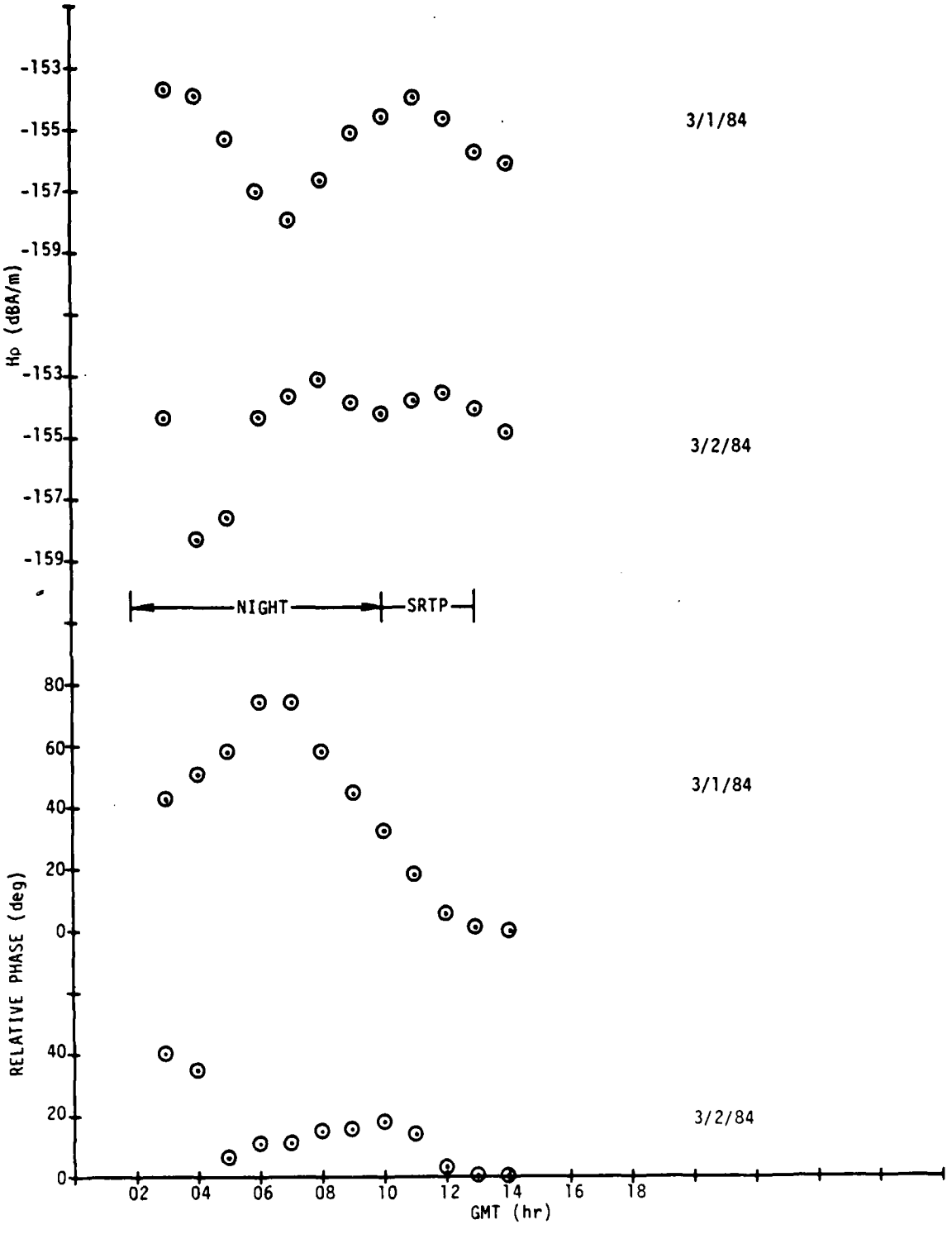

Figure H-1. Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 2 March 1984 (. = 290 deg)

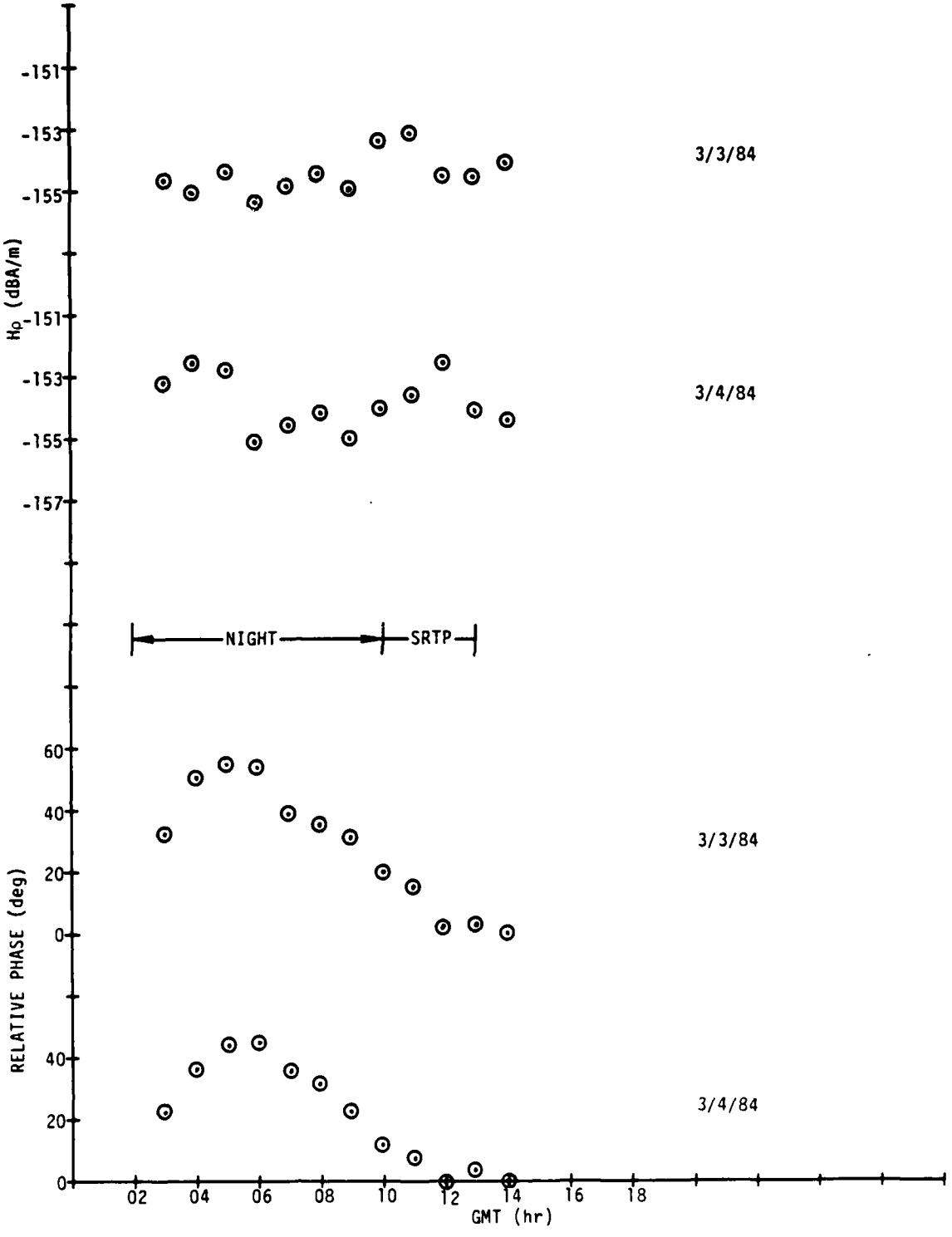

Figure II-2. Connecticut Radial Magnetic Field Strength Versus GMT, 3 and 4 March 1984 (ρ = 290 deg)

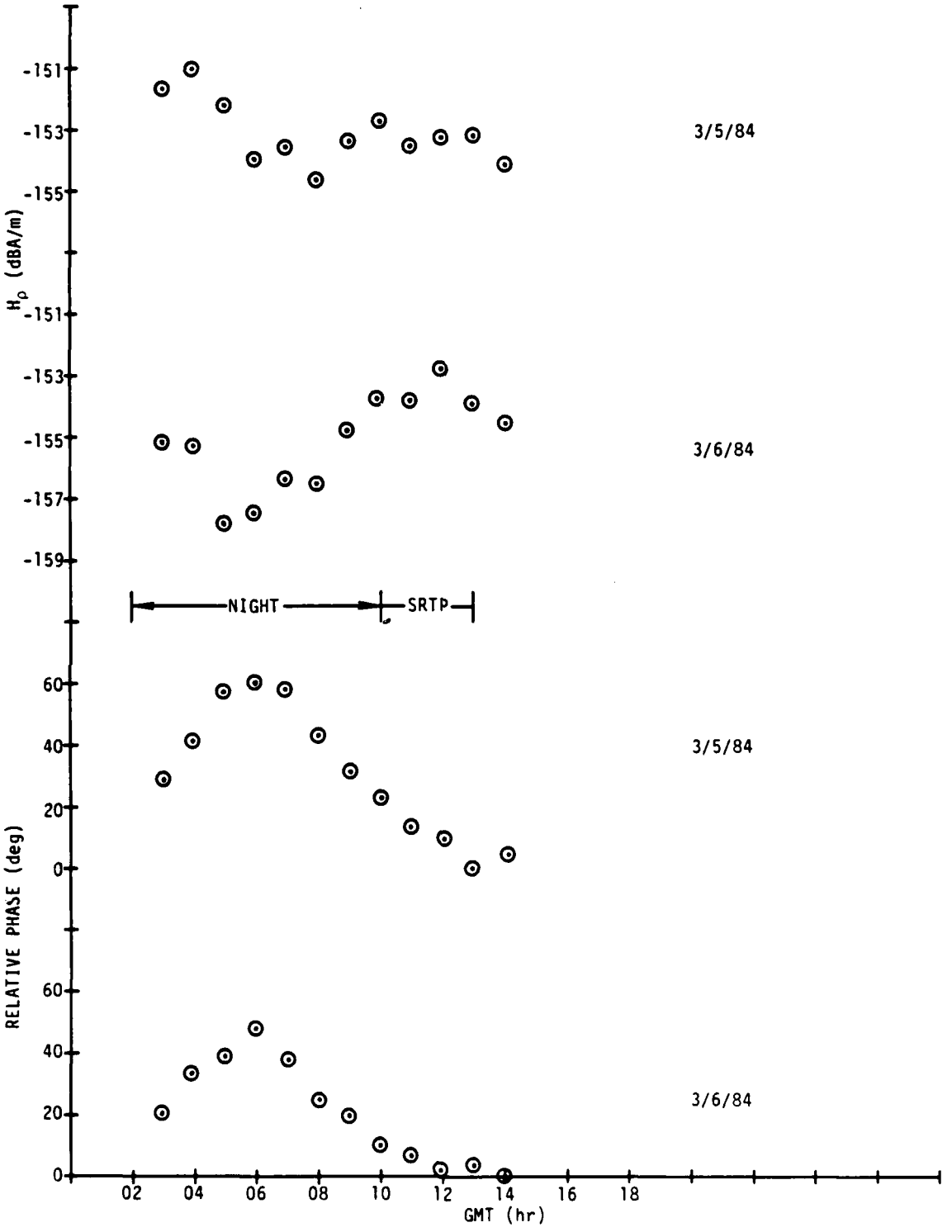

Figure II-3. Connecticut Radial Magnetic Field Strength Versus GMT, 5 and 6 March 1984 (ϕ = 290 deg)

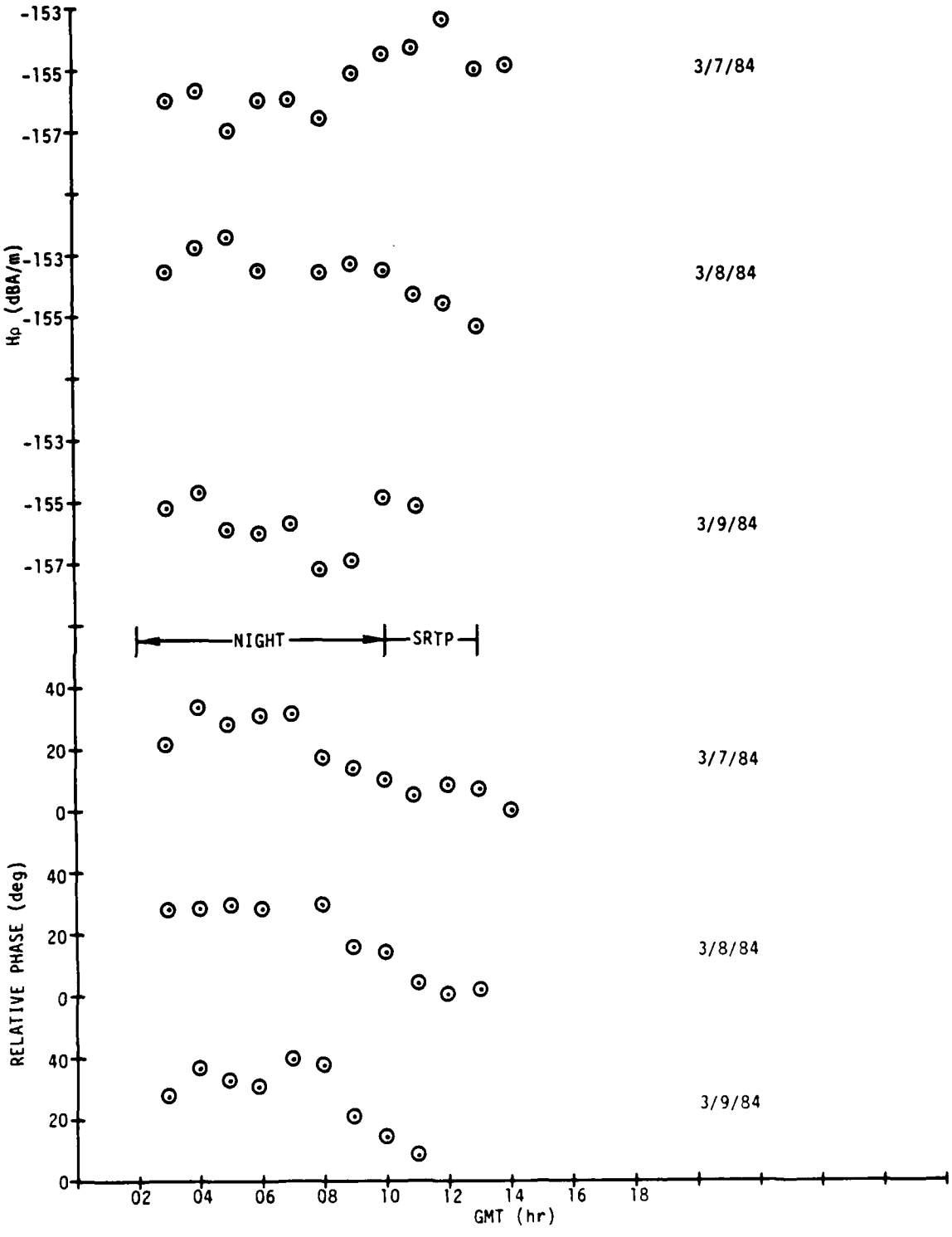

Figure H-4. Connecticut Radial Magnetic Field Strength Versus GMT, 7, 8, and 9 March 1984 (ϕ = 290 deg)

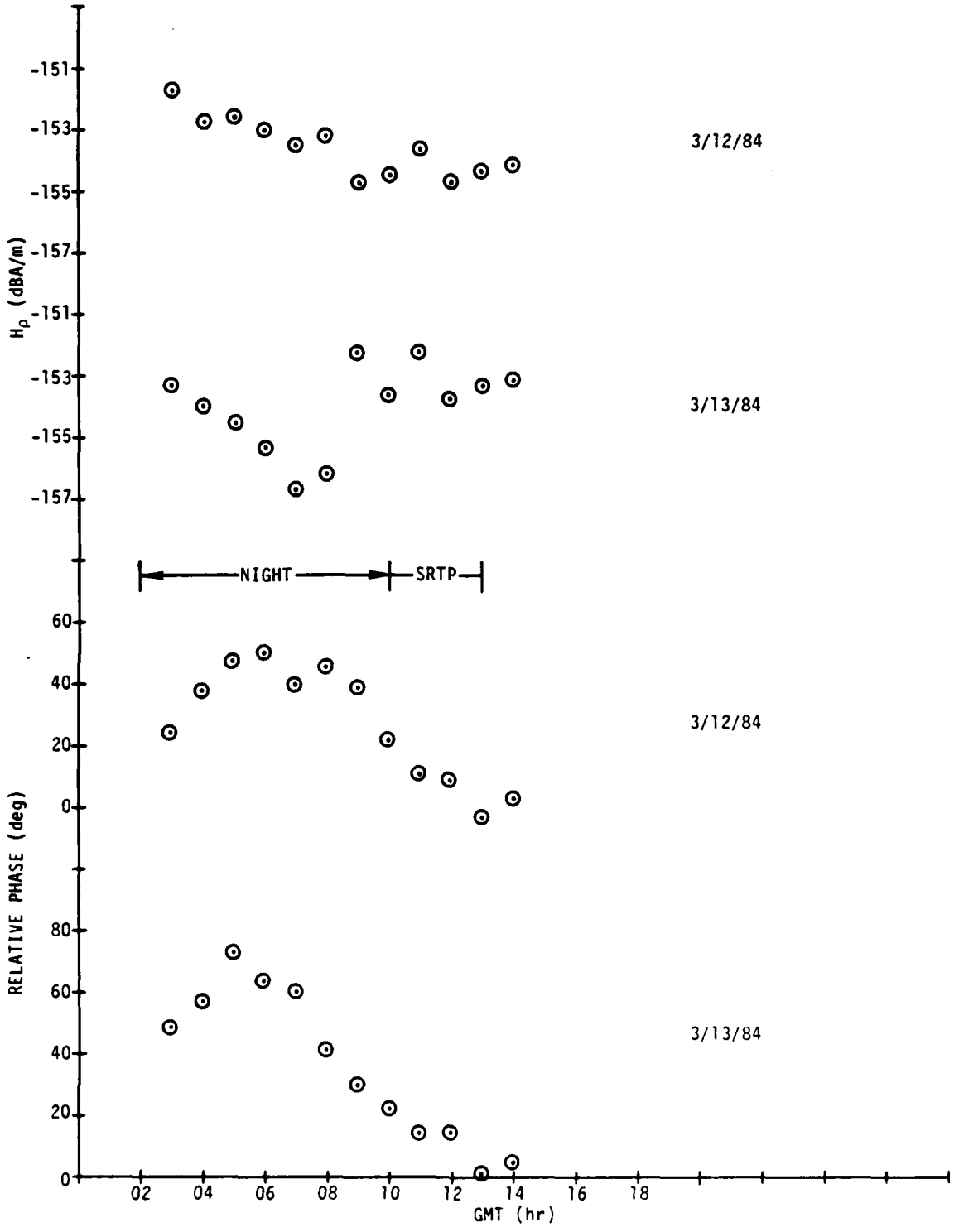

Figure H-5. Connecticut Radial Magnetic Field Strength Versus GMT, 12 and 13 March 1984 (ϕ = 290 deg)

Appendix I

APRIL 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The April 1984 Connecticut daily field strength averages are given in table I-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures I-1 through I-8.

Table I-1. April 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)	Day H_ϕ/H_ρ (dB)
4/4	-154.6	-154.2	-154.1	30.0	7.7	7.5	-
4/5	-152.6	-152.6	-153.1	30.0	7.5	8.4	9.3
4/6	-158.5	-155.5	-155.3	17.5	12.2	11.6	12.0
4/7	-154.2	-154.8	-155.1	16.0	9.3	11.0	12.1
4/8	-155.4	-154.1	-155.3	33.5	9.8	10.5	12.0
4/9	-156.6	-153.9	-153.1	20.5	11.9	10.5	10.3
4/20	-155.3	-154.2	-153.7	29.0	9.7	10.4	10.5
4/21	-154.9	-154.3	-154.4	19.0	9.9	10.6	11.5
4/22	-153.6	-153.9	-153.7	30.0	8.1	9.9	10.5
4/23	-153.3	-153.5	-153.1	28.0	7.9	9.5	10.1
4/24	-154.4	-152.2	-152.9	36.5	8.4	8.6	9.9
4/25	-153.1	-153.7	-154.7	17.5	7.7	9.5	11.6
4/26	-155.2	-153.9	-153.9	17.5	10.4	10.0	10.4
4/27	-153.6	-152.8	-152.9	23.5	8.6	8.7	9.4
4/29	-153.2	-152.3	-	24.0	8.1	8.3	-
4/30	-153.2	-153.1	-	34.0	8.0	9.2	-
Averages	-154.4	-153.6	-153.9	25.5	9.0	9.6	10.7

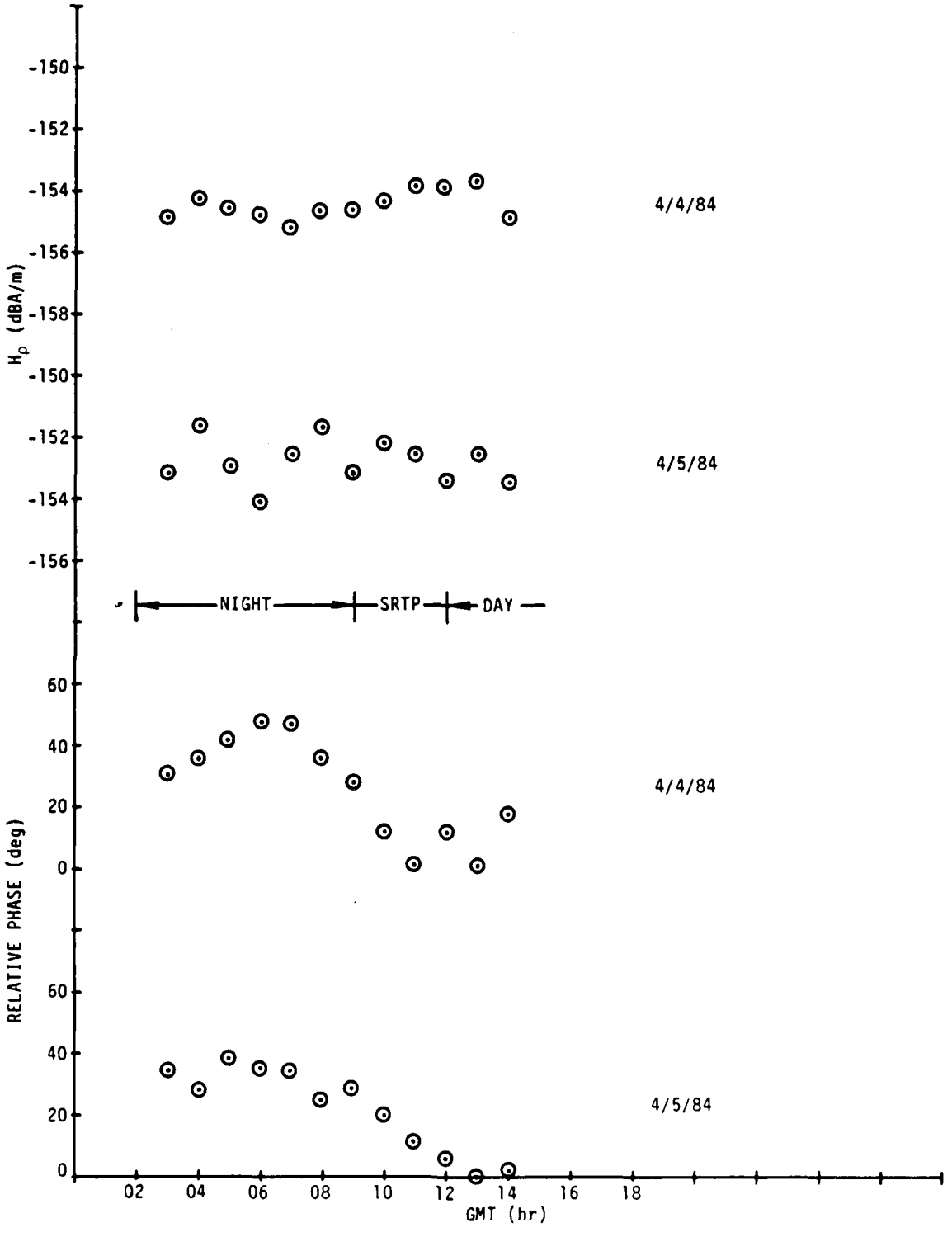

Figure I-1. Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 April 1984 (, = 290 deg)

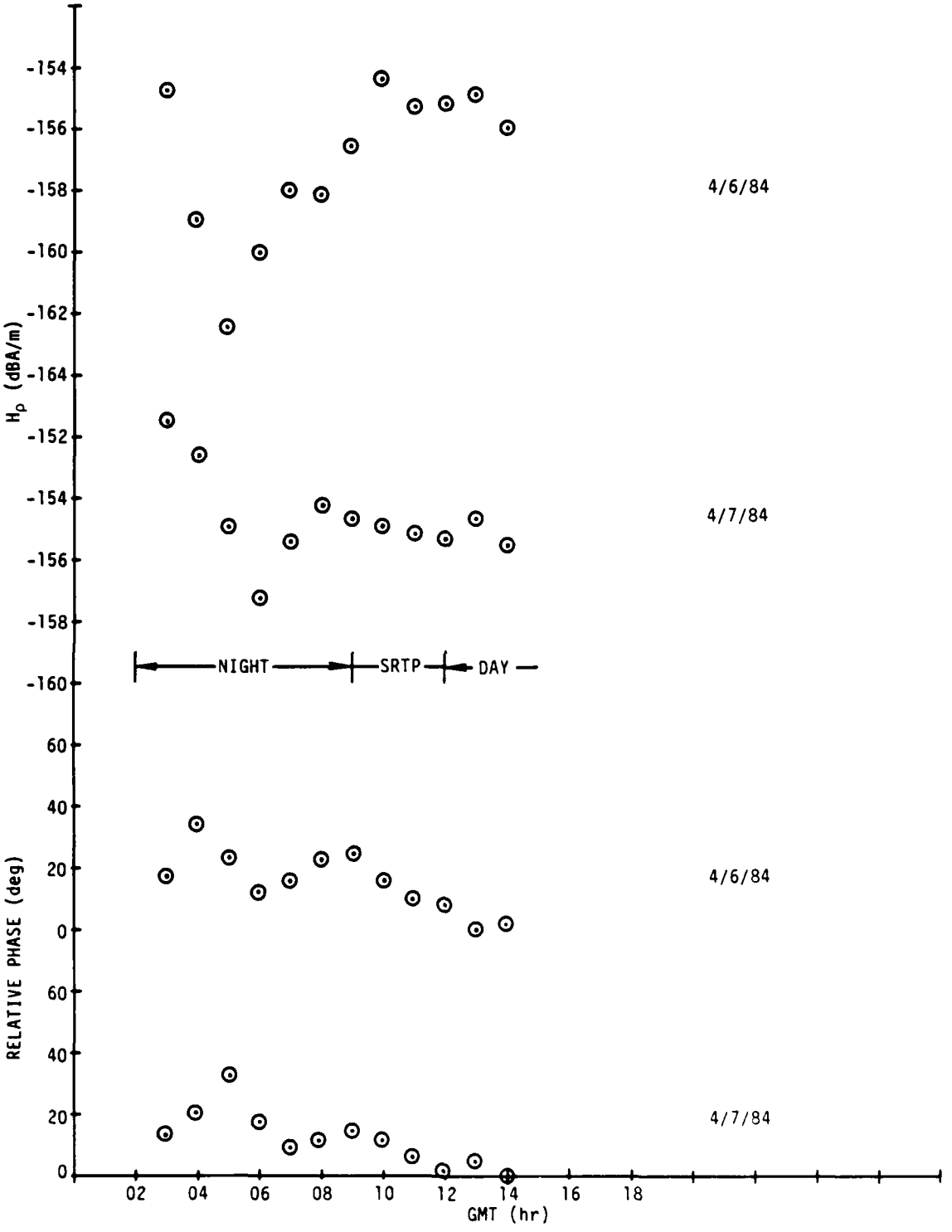

Figure I-2. Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 April 1984 (. = 290 deg)

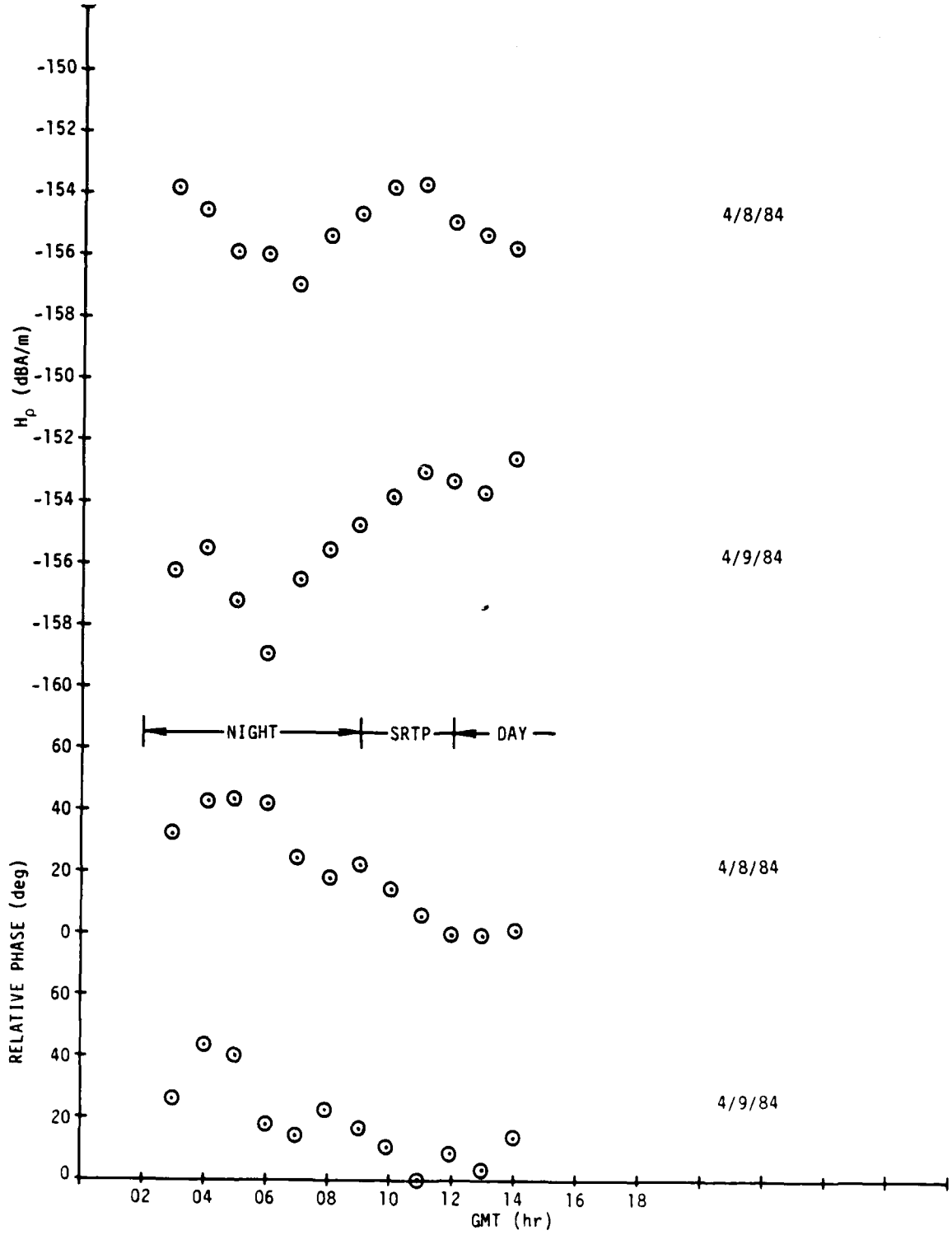

Figure I-3. Connecticut Radial Magnetic Field Strength Versus GMT, 8 and 9 April 1984 (ϕ = 290 deg)

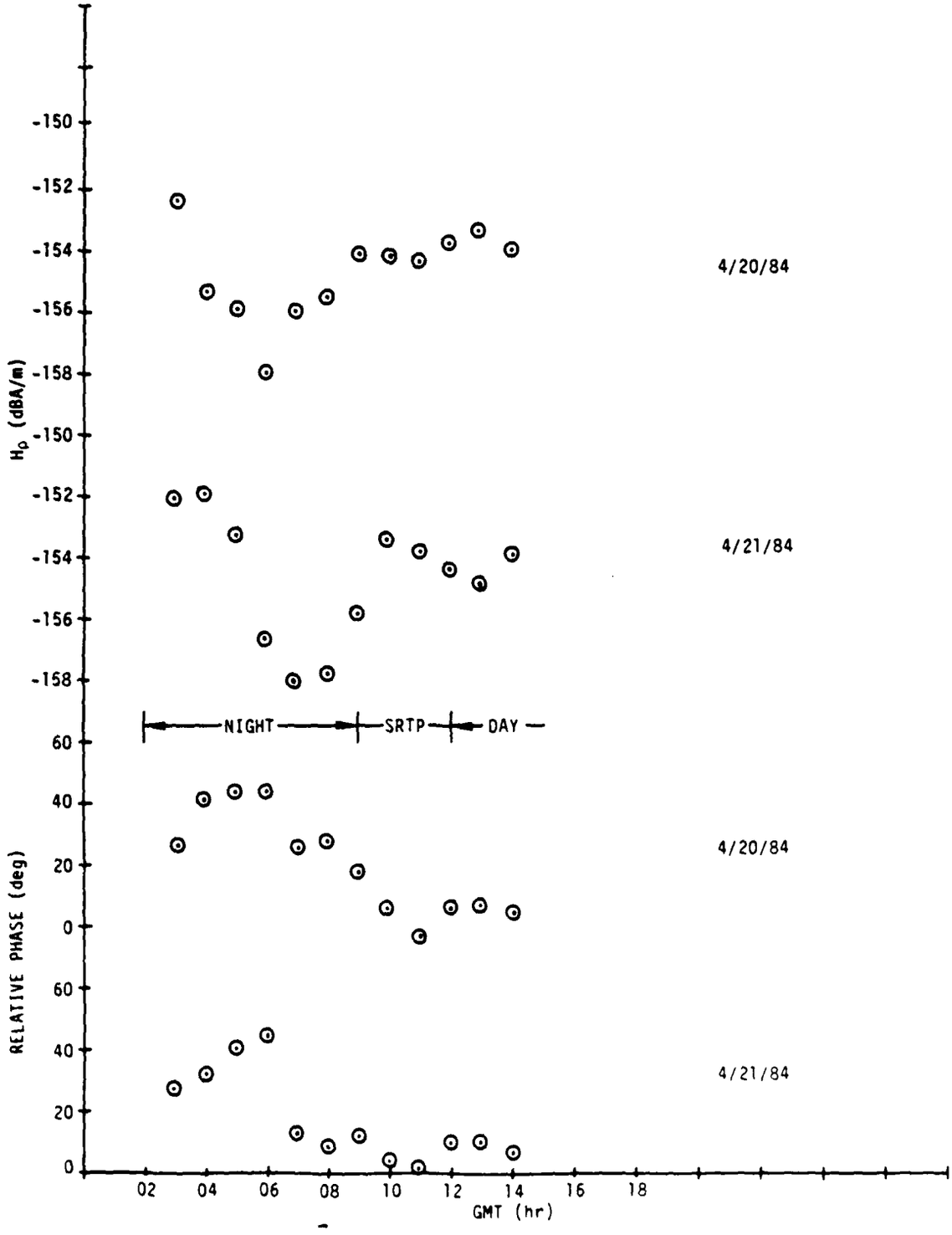

Figure I-4. Connecticut Radial Magnetic Field Strength Versus GMT, 20 and 21 April 1984 (ϕ = 290 deg)

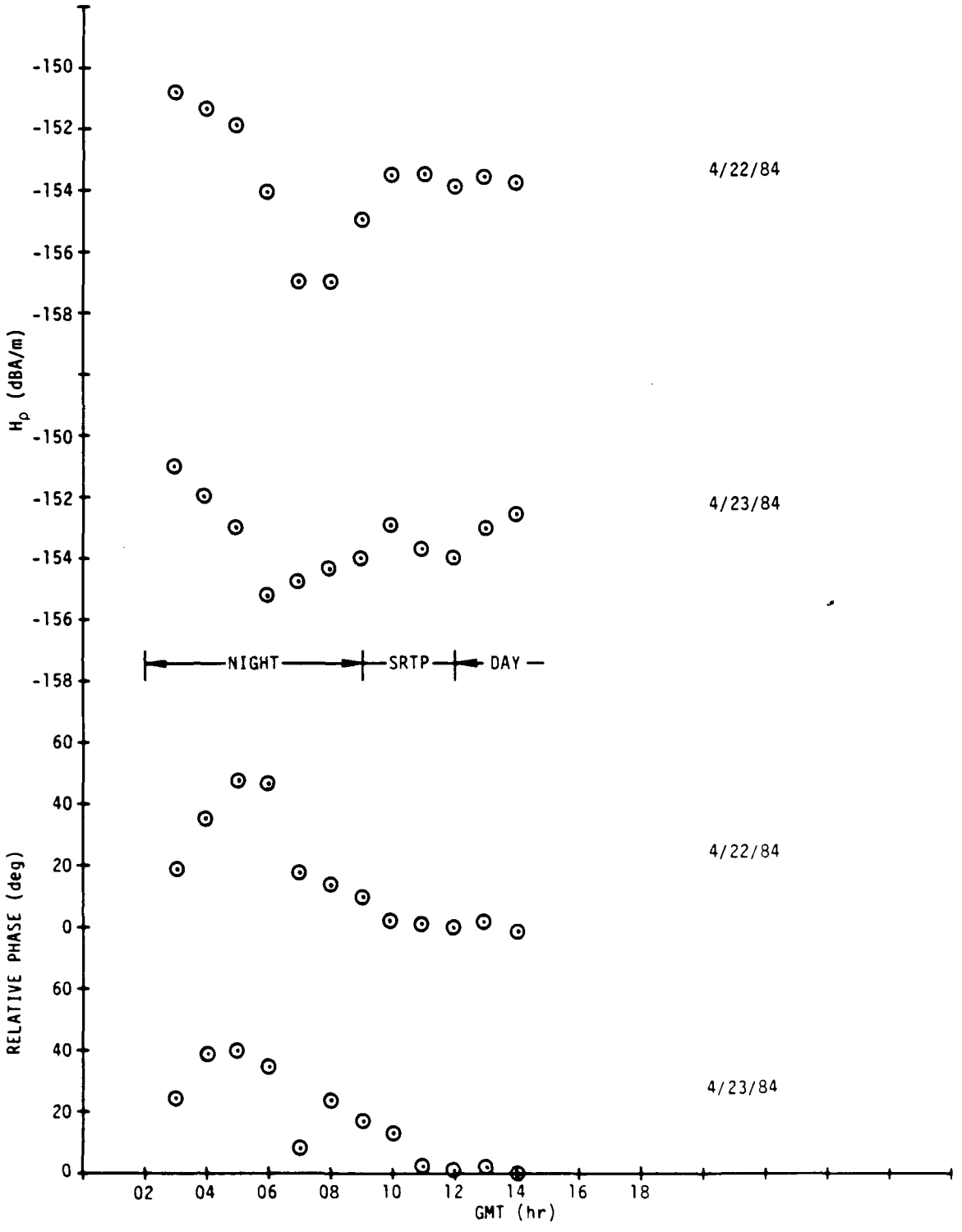

Figure I-5. Connecticut Radial Magnetic Field Strength Versus GMT, 22 and 23 April 1984 (ϕ = 290 deg)

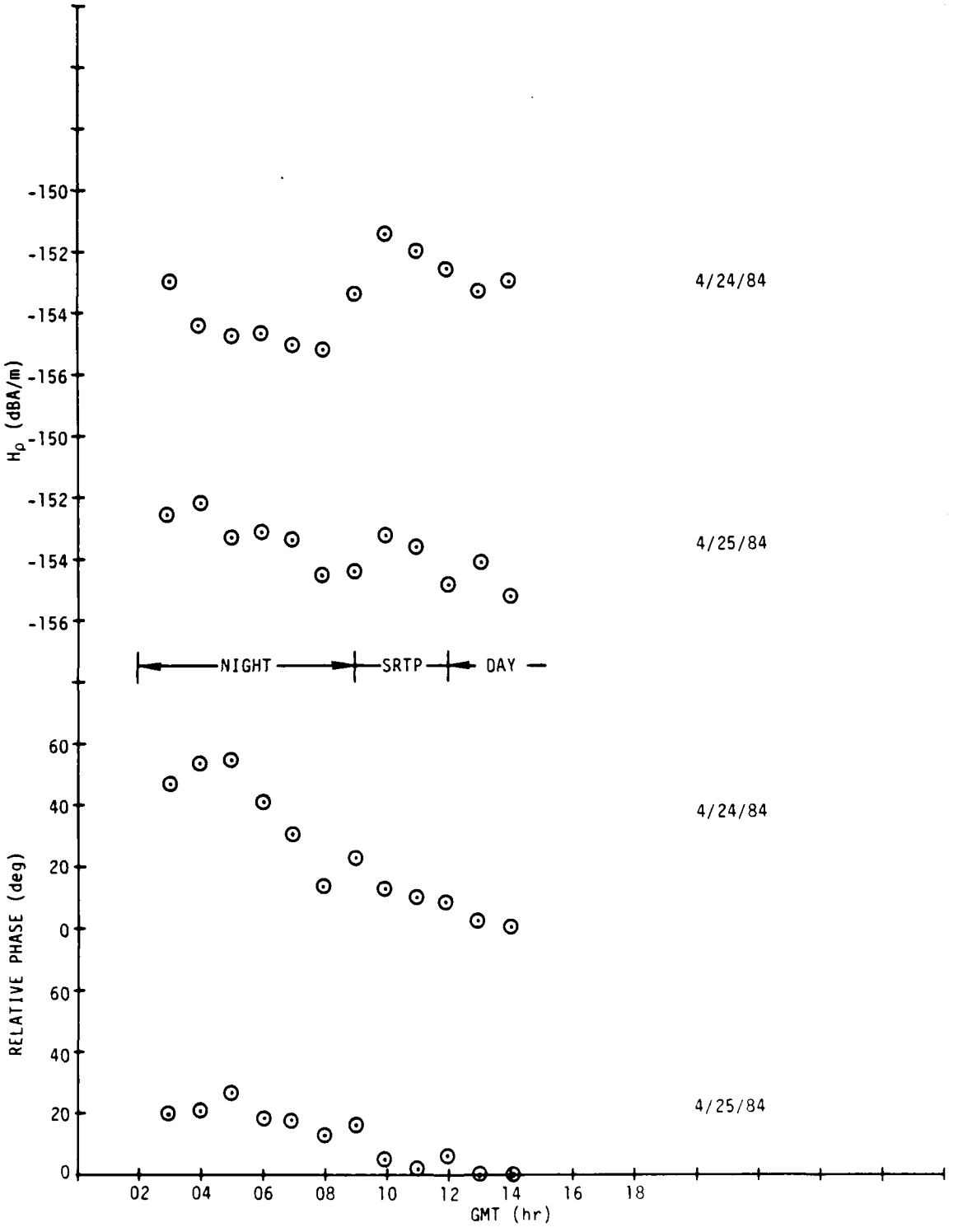

Figure I-6. Connecticut Radial Magnetic Field Strength Versus GMT, 24 and 25 April 1984 (ϕ = 290 deg)

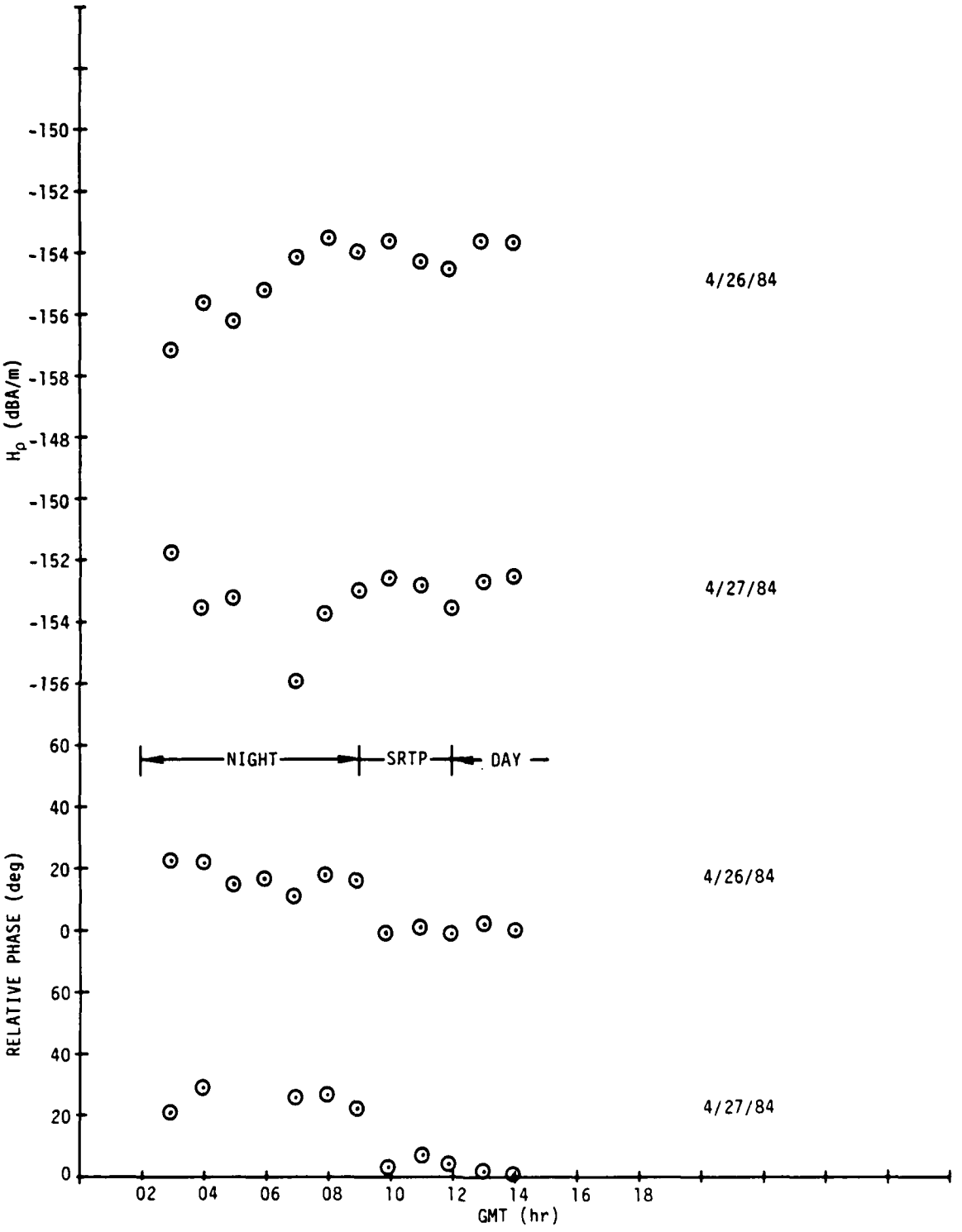

Figure I-7. Connecticut Radial Magnetic Field Strength Versus GMT, 26 and 27 April 1984 (ϕ = 290 deg)

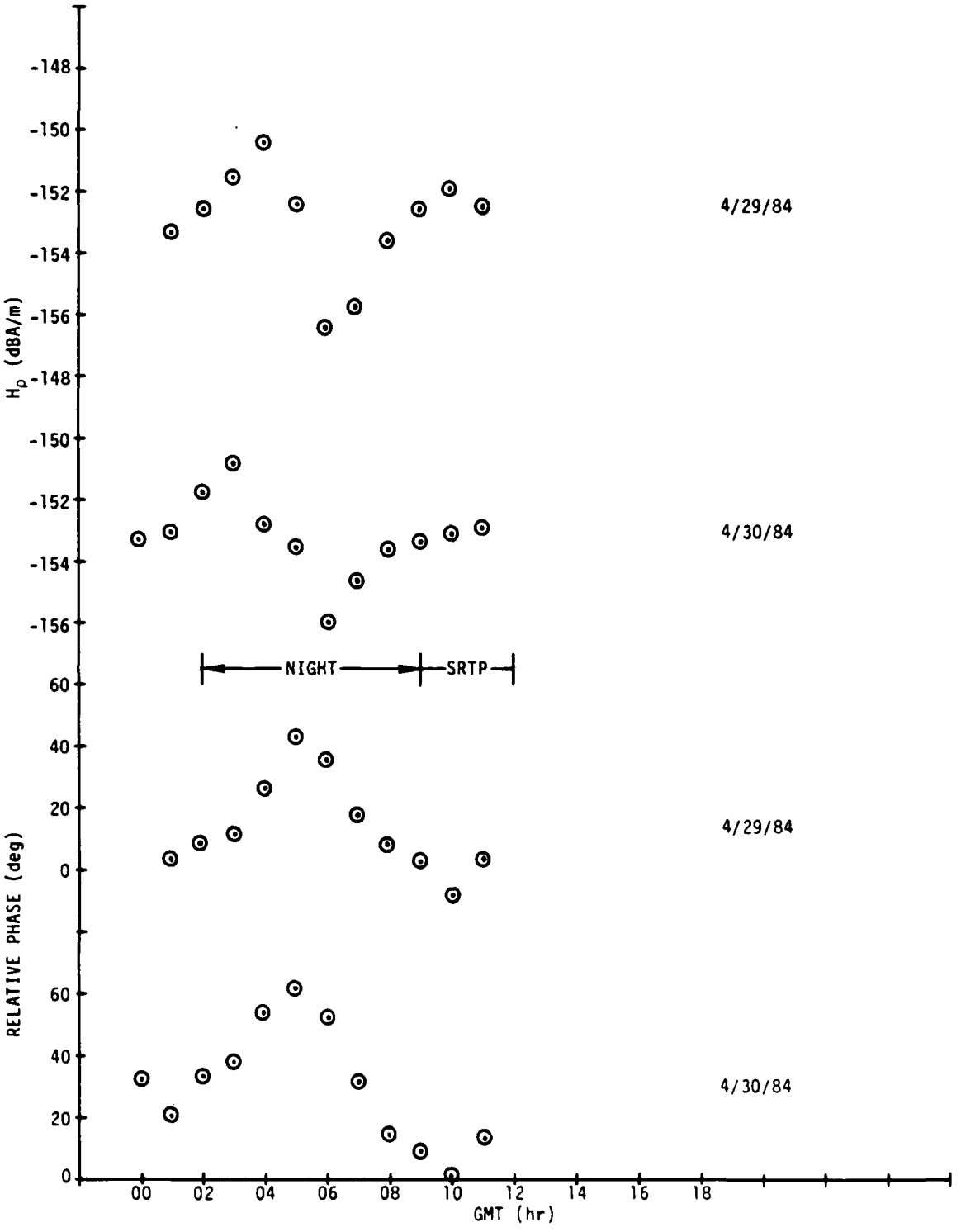

Figure I-8. Connecticut Radial Magnetic Field Strength Versus GMT, 29 and 30 April 1984 (, = 290 deg)

Appendix J

MAY 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The May 1984 Connecticut daily field strength averages are given in table J-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures J-1 through J-11.

Table J-1. May 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	SSTP H_ρ (dBA/m)	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)	Day H_ϕ/H_ρ (dB)
5/1	-152.9	-153.6	-153.2	-153.4	21.5	8.5	8.6	10.1
5/3	-153.9	-154.1	-153.3	-154.3	35.5	-	-	-
5/4	-153.1	-154.9	-154.2	-153.8	66.5	8.1	8.9	10.3
5/5	-153.9	-154.4	-154.0	-154.1	35.5	7.8	9.3	10.4
5/6	-156.8	-157.2	-155.2	-154.4	18.0	11.5	12.0	11.2
5/7	-153.1	-152.1	-153.6	-153.5	-	8.5	9.4	10.9
5/8	-152.4	-152.4	-152.7	-153.8	28.5	7.9	8.8	9.7
5/9	-152.6	-153.1	-154.0	-154.0	49.5	7.5	8.9	9.9
5/10	-153.3	-155.3	-154.4	-155.4	32.0	10.3	9.8	12.6
5/11	-154.8	-154.6	-154.1	-154.2	38.5	-	-	-
5/12	-154.2	-152.9	-154.0	-153.5	16.8	8.4	9.6	10.0
5/13	-153.7	-154.3	-154.9	-153.2	12.0	8.0	8.2	9.9
5/14	-153.8	-152.6	-152.2	-152.4	43.0	7.9	7.8	8.4
5/15	-152.3	-154.0	-153.4	-152.8	41.5	8.8	8.8	8.8
5/16	-154.1	-154.4	-153.7	-154.2	25.5	8.9	9.7	11.1
5/17	-154.1	-156.8	-154.7	-154.3	38.0	10.8	10.5	10.8
5/19	-155.0	-156.5	-153.2	-153.5	24.5	9.5	10.1	9.8
5/20	-156.7	-155.5	-153.2	-152.8	34.0	9.6	10.5	9.9
5/21	-155.4	-152.6	-153.0	-154.1	34.0	6.7	9.8	11.2
5/22	-152.7	-154.8	-152.3	-	39.0	9.8	8.2	-
5/25	-156.1	-154.4	-153.6	-154.9	11.5	8.9	10.6	11.8
5/30	-154.4	-154.7	-153.5	-155.4	20.0	9.1	9.8	11.9
Averages	-154.0	-154.3	-153.6	-153.9	31.5	8.8	9.4	10.4

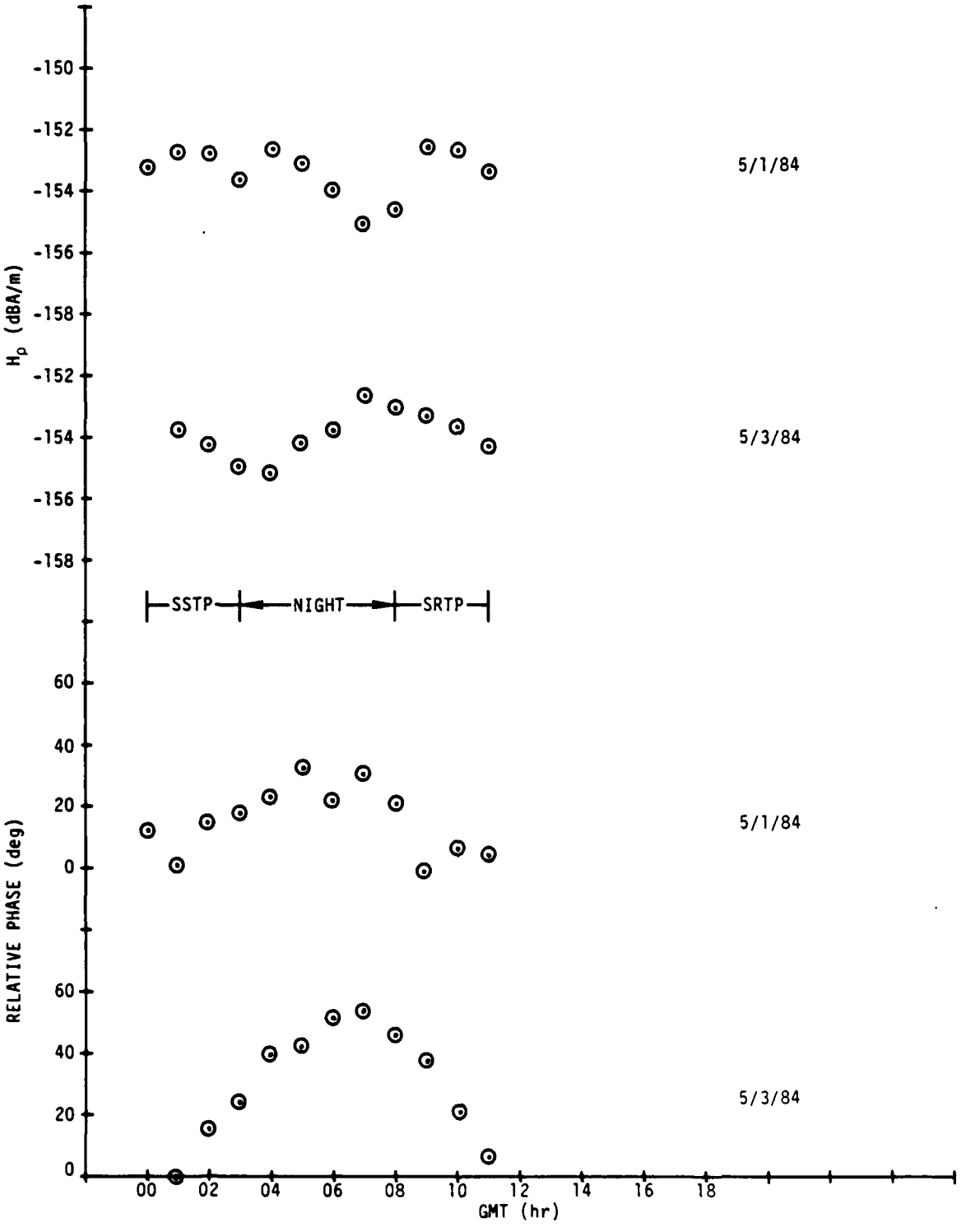

Figure J-1. Connecticut Radial Magnetic Field Strength Versus GMT, 1 and 3 May 1984 (ϕ = 290 deg)

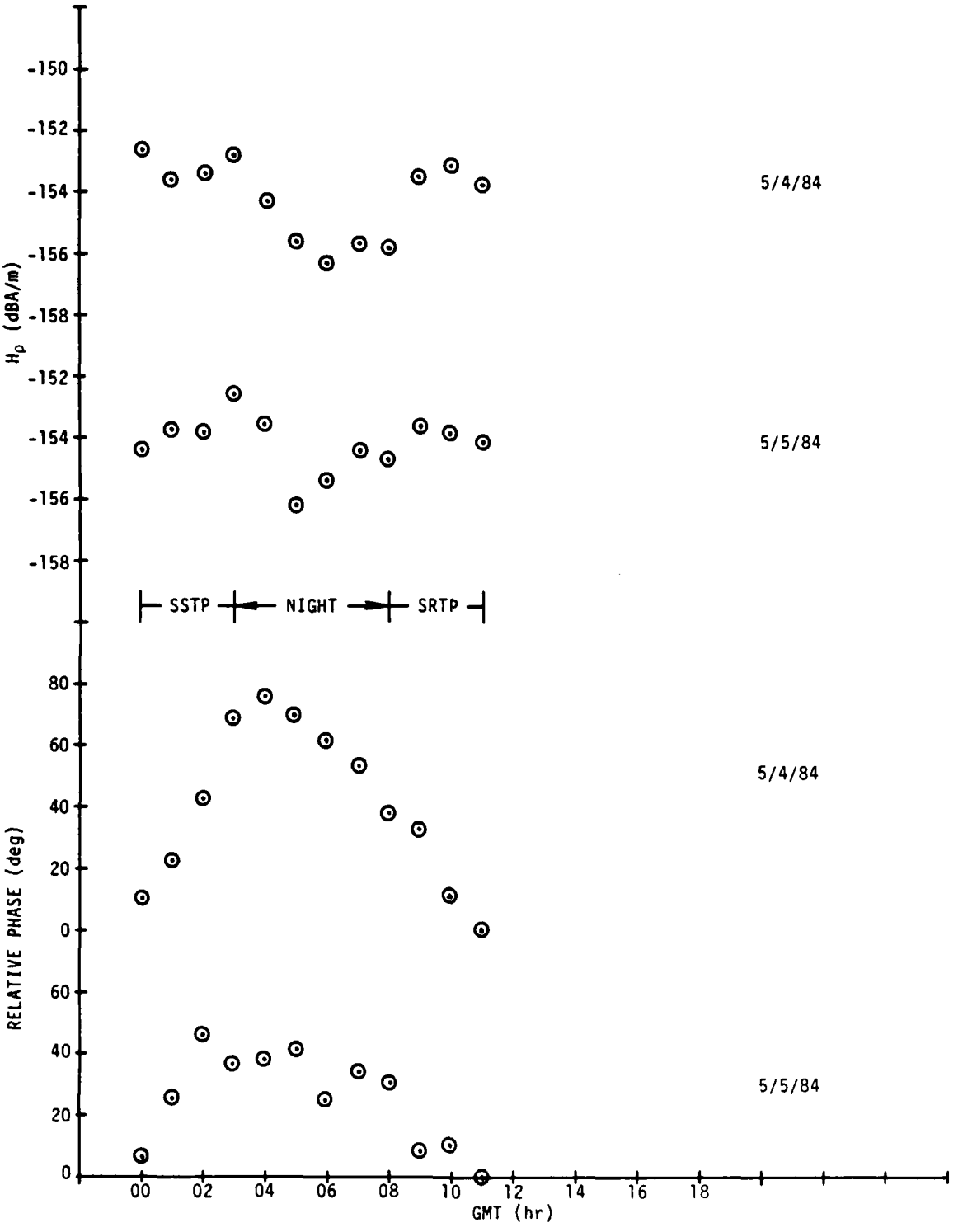

Figure J-2. Connecticut Radial Magnetic Field Strength Versus GMT, 4 and 5 May 1984 (ϕ = 290 deg)

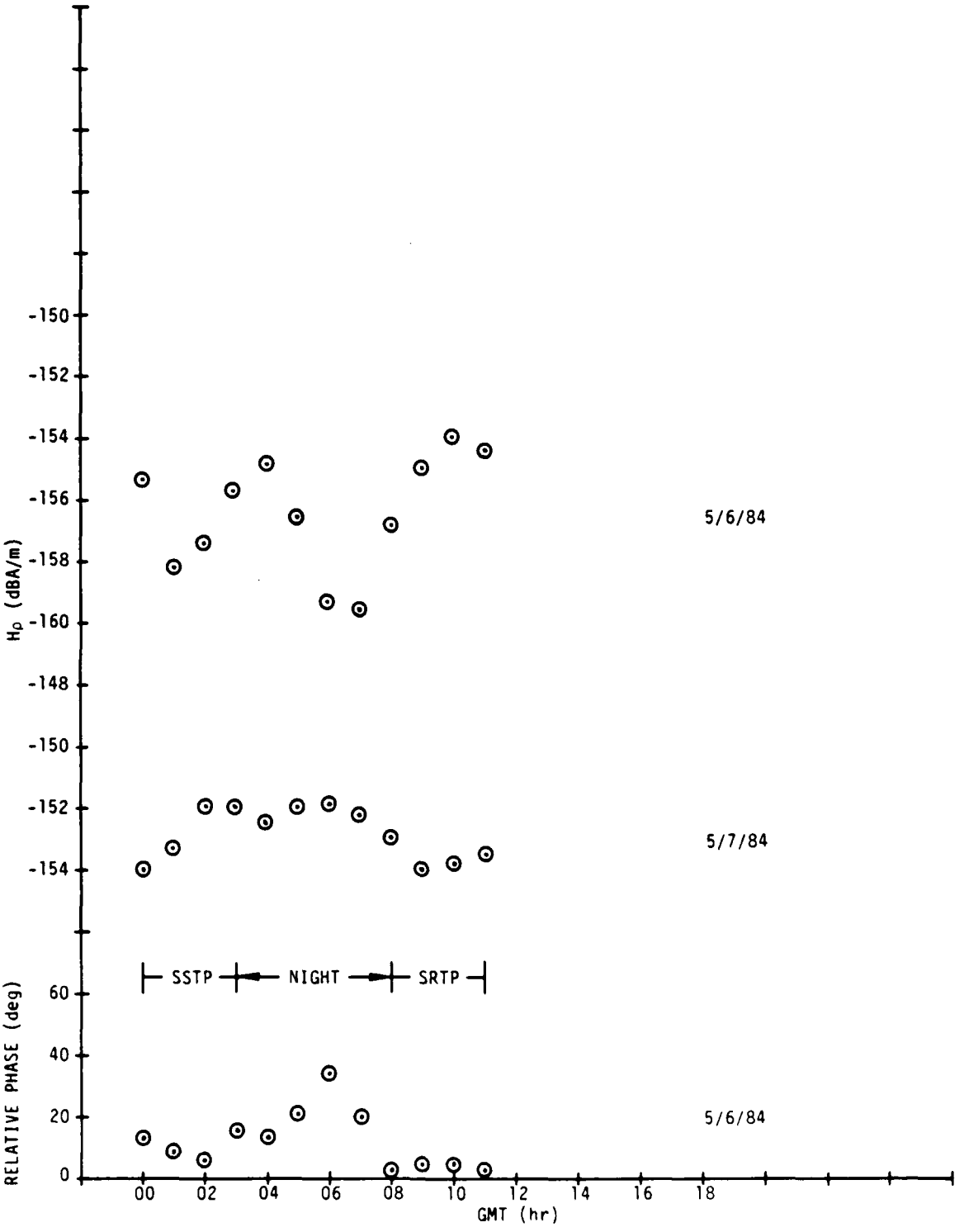

Figure J-3. Connecticut Radial Magnetic Field Strength Versus GMT, 6 and 7 May 1984 (ρ = 290 deg)

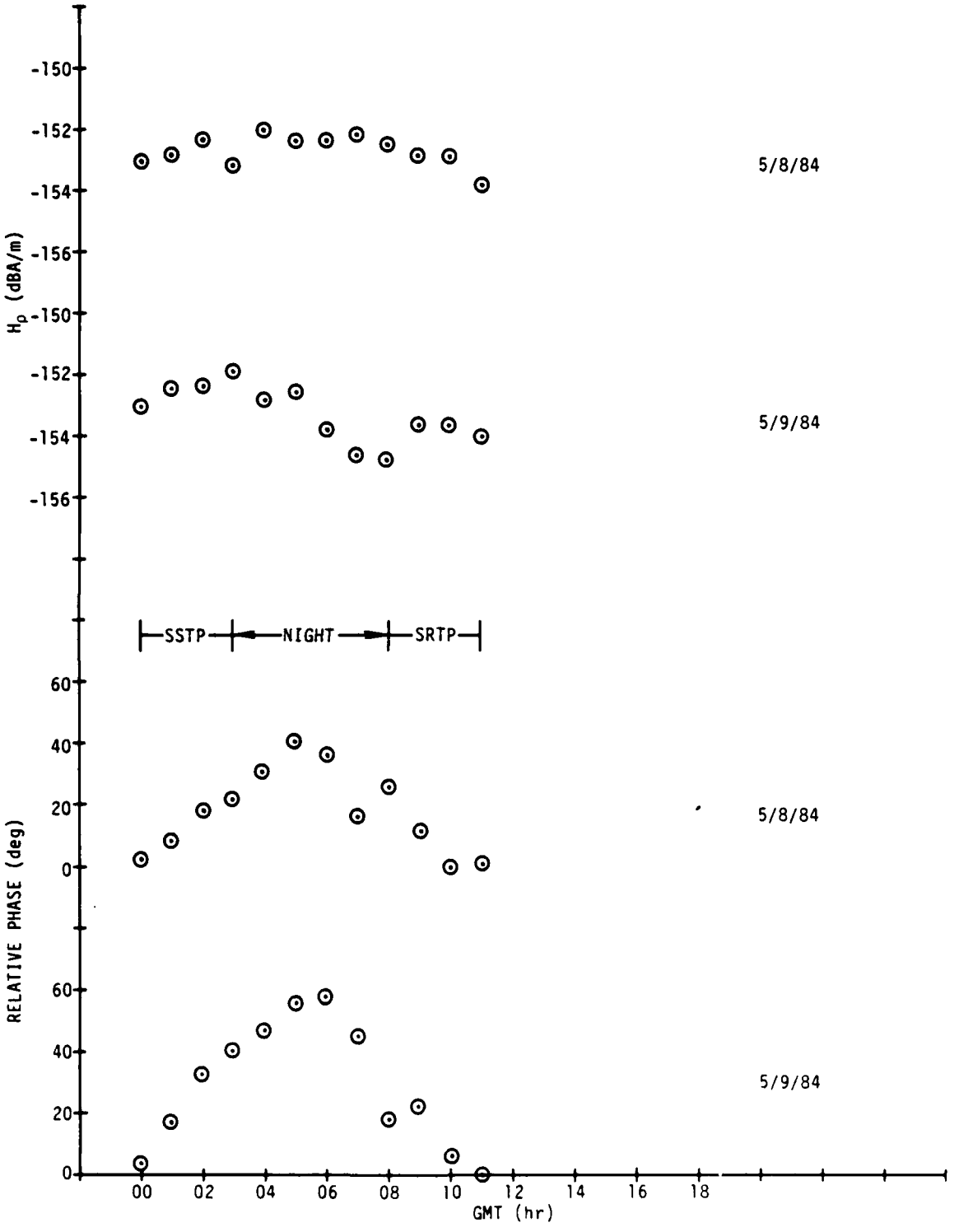

Figure J-4. Connecticut Radial Magnetic Field Strength Versus GMT, 8 and 9 May 1984 (. = 290 deg)

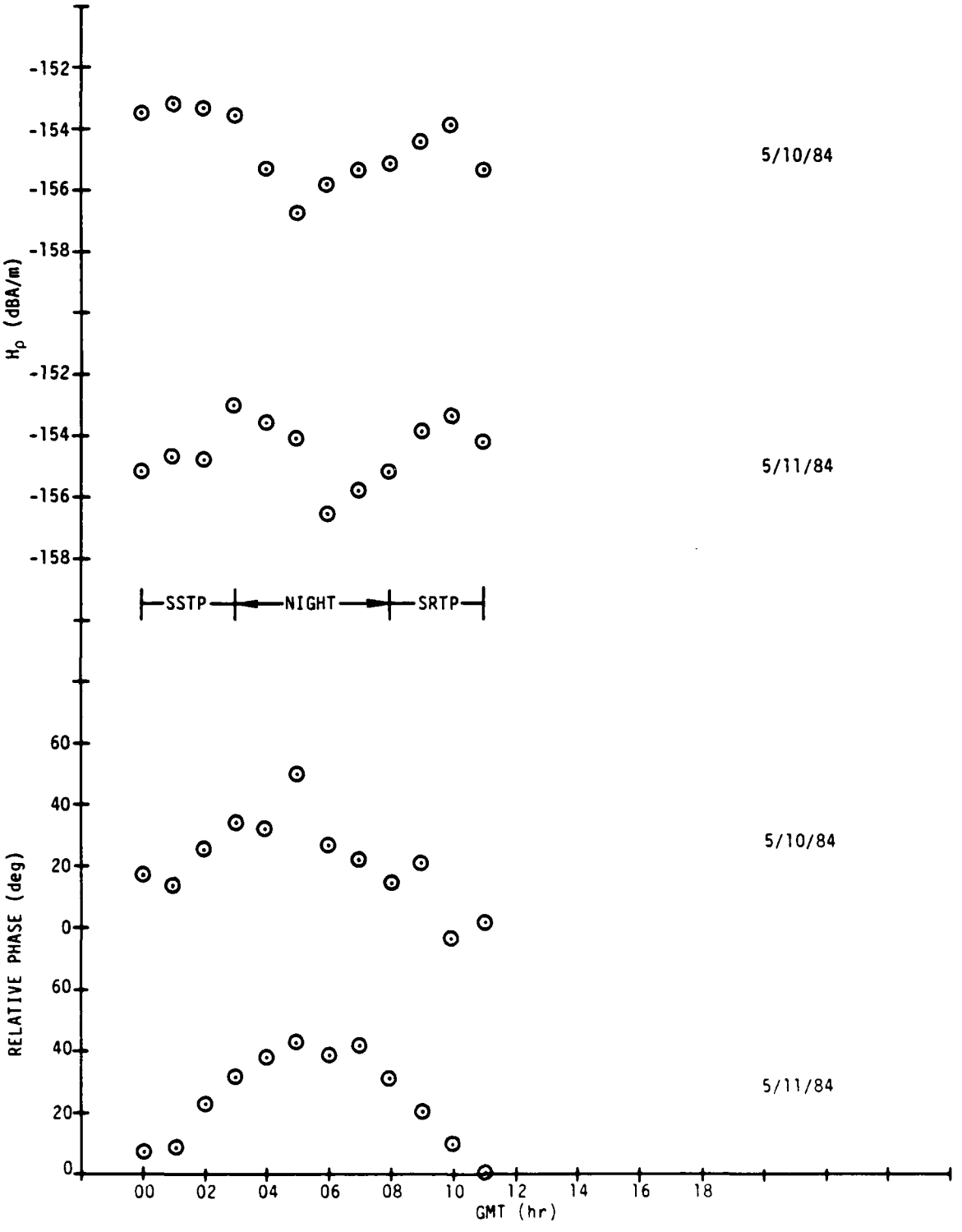

Figure J-5. Connecticut Radial Magnetic Field Strength Versus GMT, 10 and 11 May 1984 (. = 290 deg)

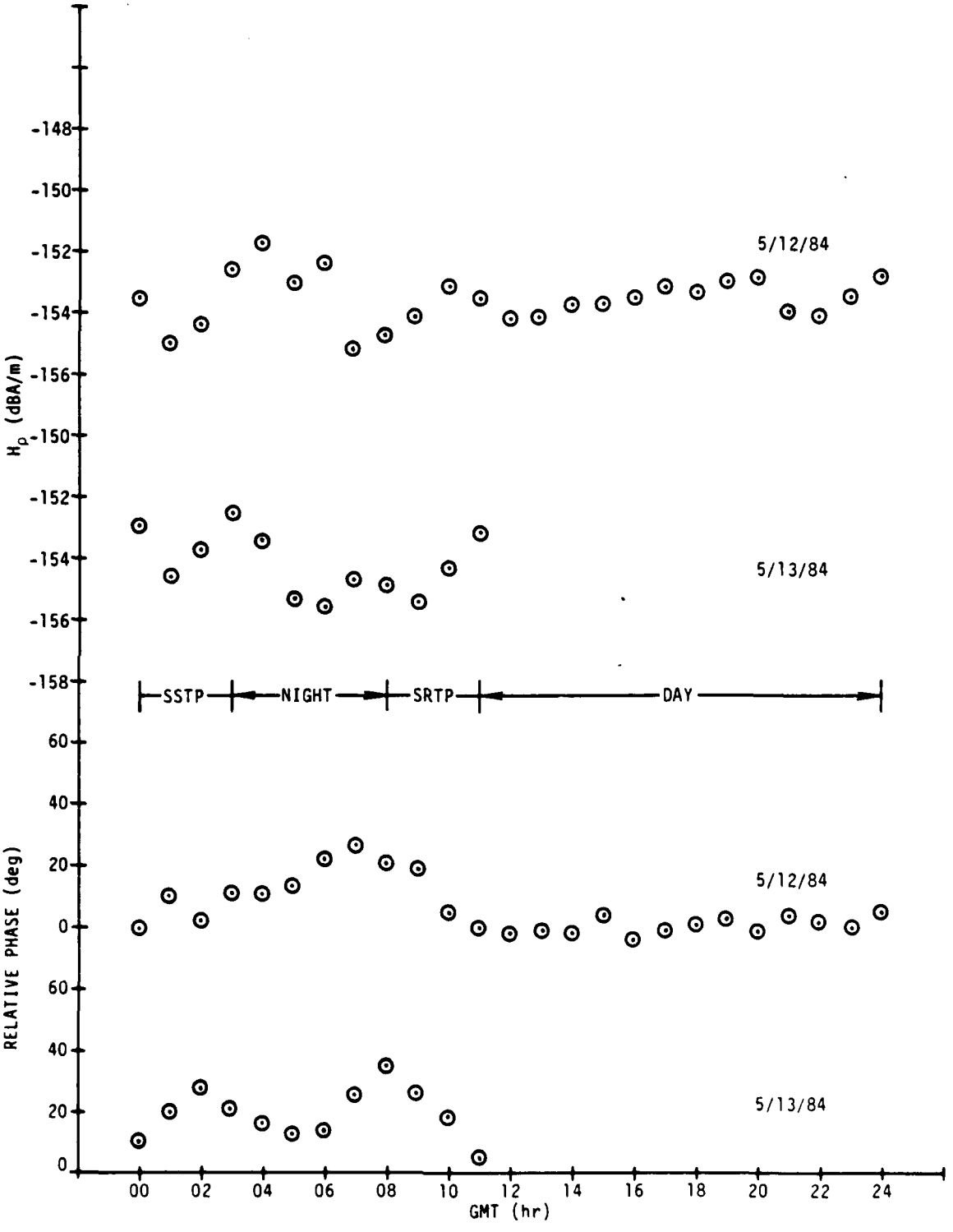

Figure J-6. Connecticut Radial Magnetic Field Strength Versus GMT, 12 and 13 May 1984 (. = 290 deg)

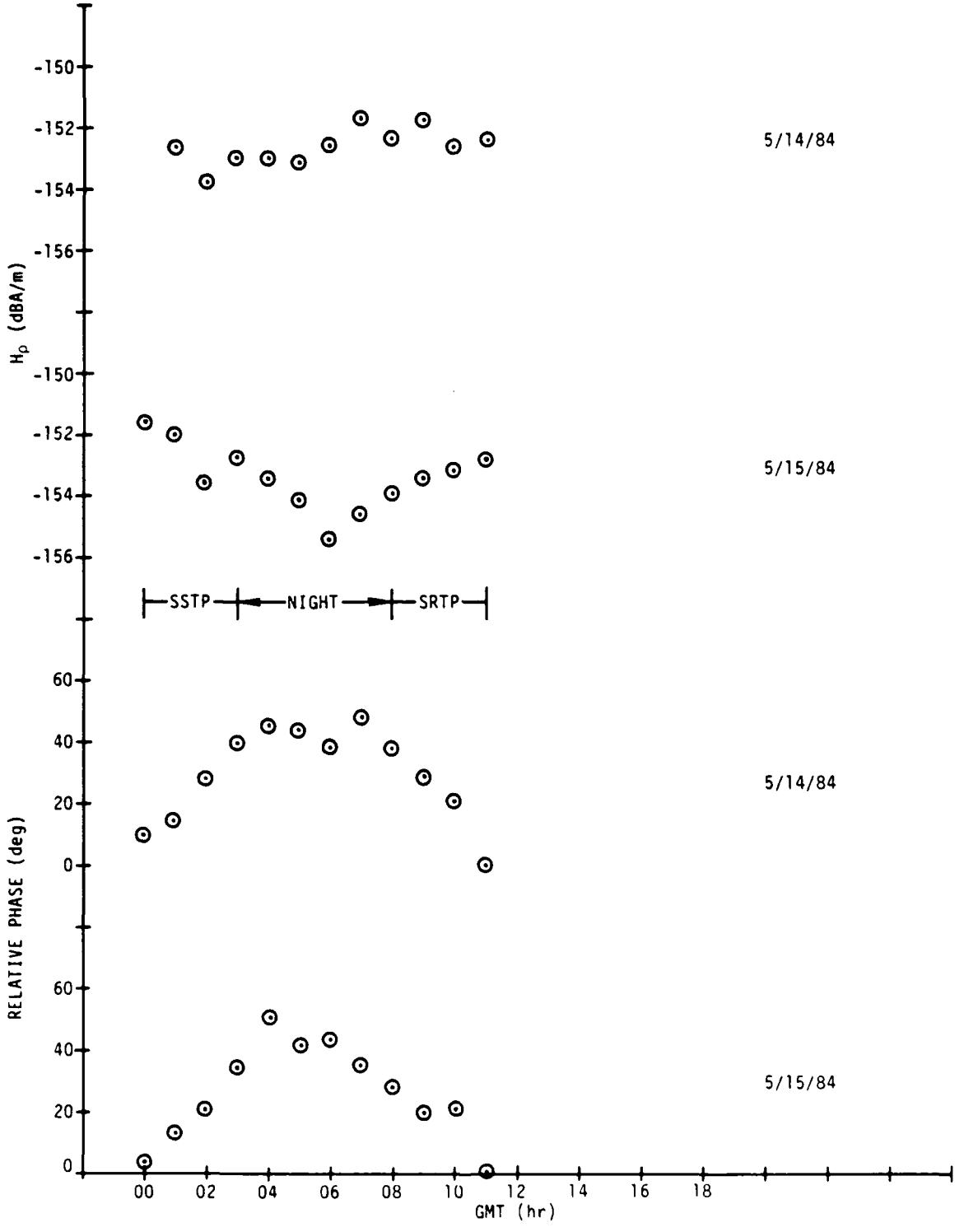

Figure J-7. Connecticut Radial Magnetic Field Strength Versus GMT, 14 and 15 May 1984 (λ = 290 deg)

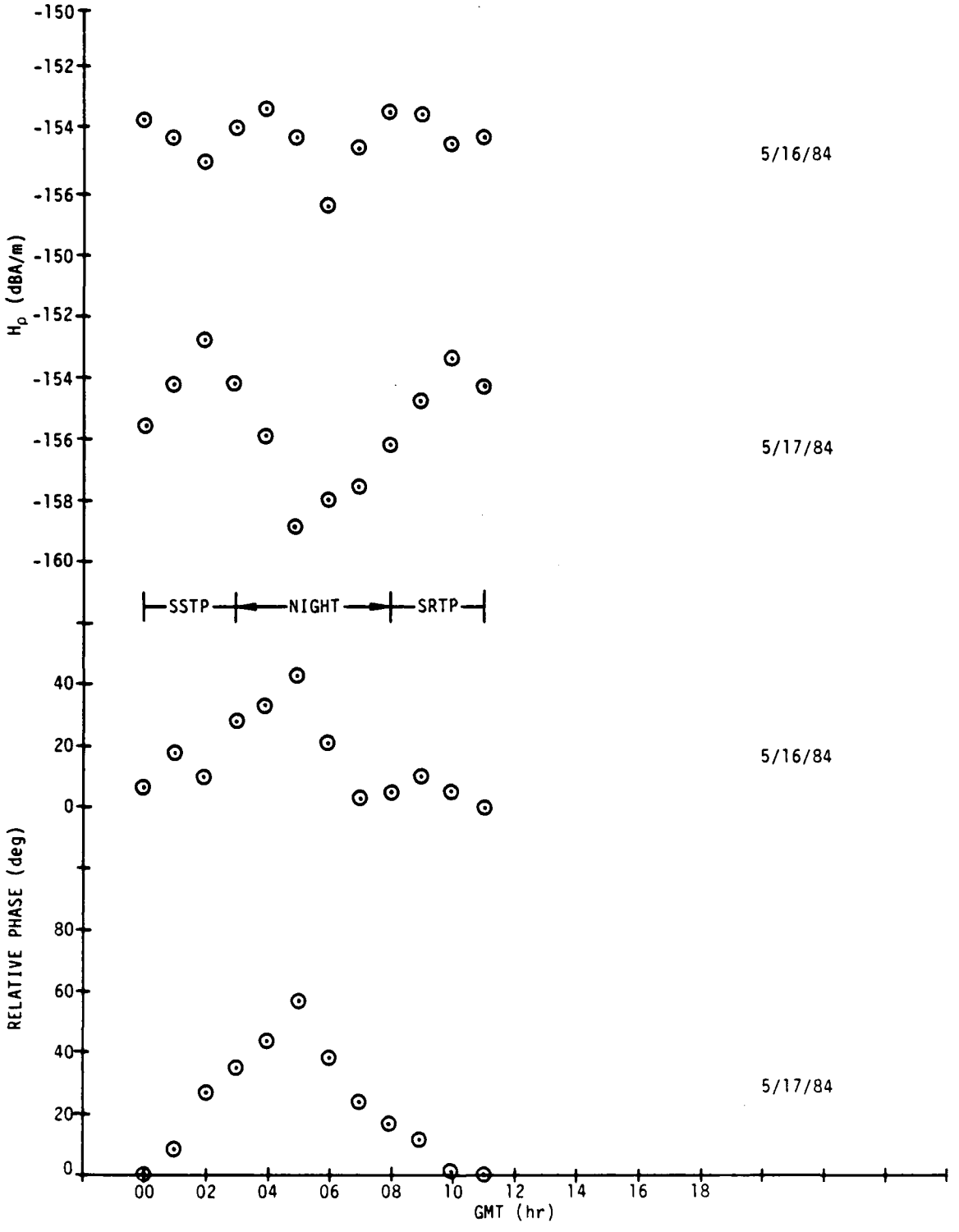

Figure J-8. Connecticut Radial Magnetic Field Strength Versus GMT, 16 and 17 May 1984 (ϕ = 290 deg)

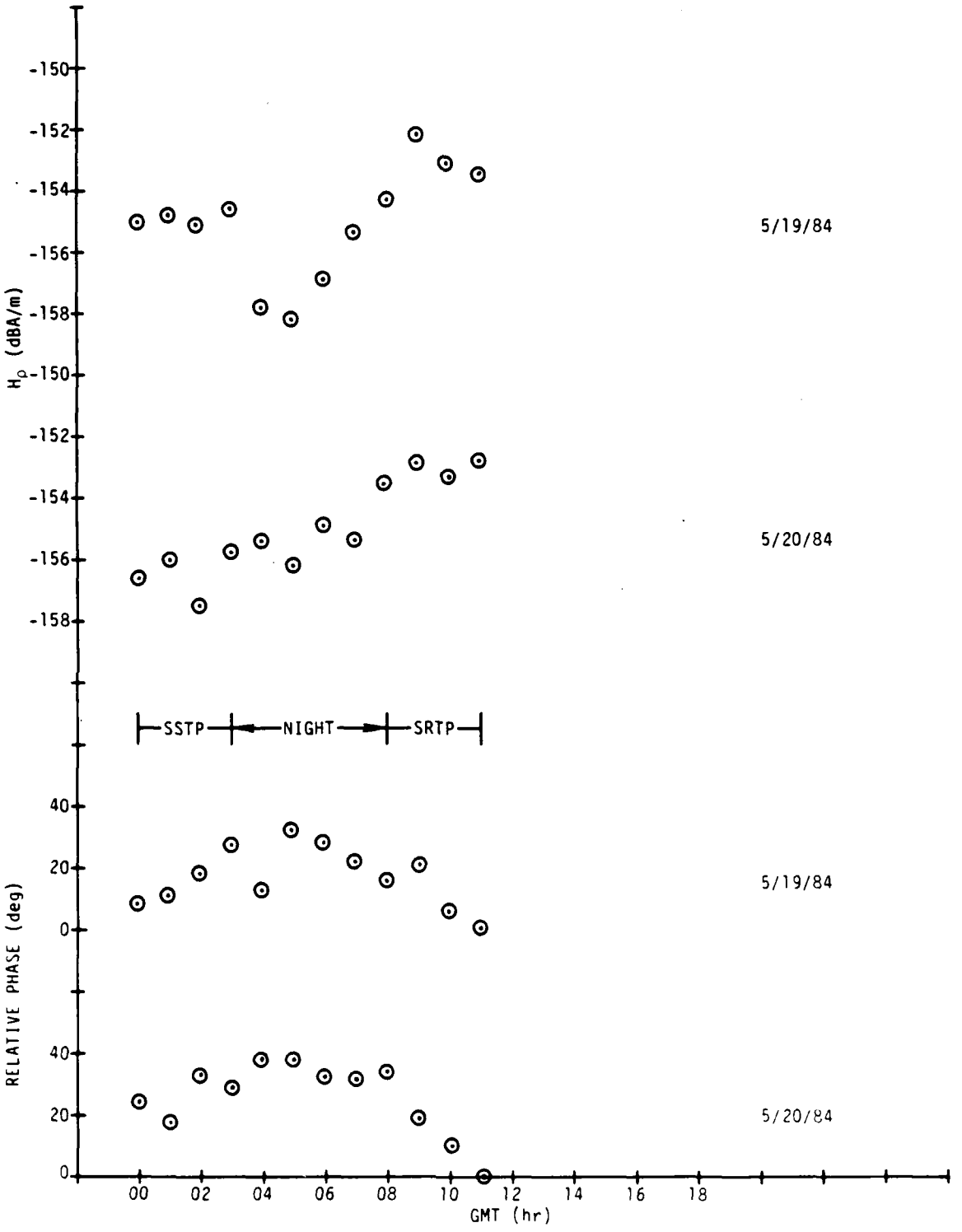

Figure J-9. Connecticut Radial Magnetic Field Strength Versus GMT, 19 and 20 May 1984 (ϕ = 290 deg)

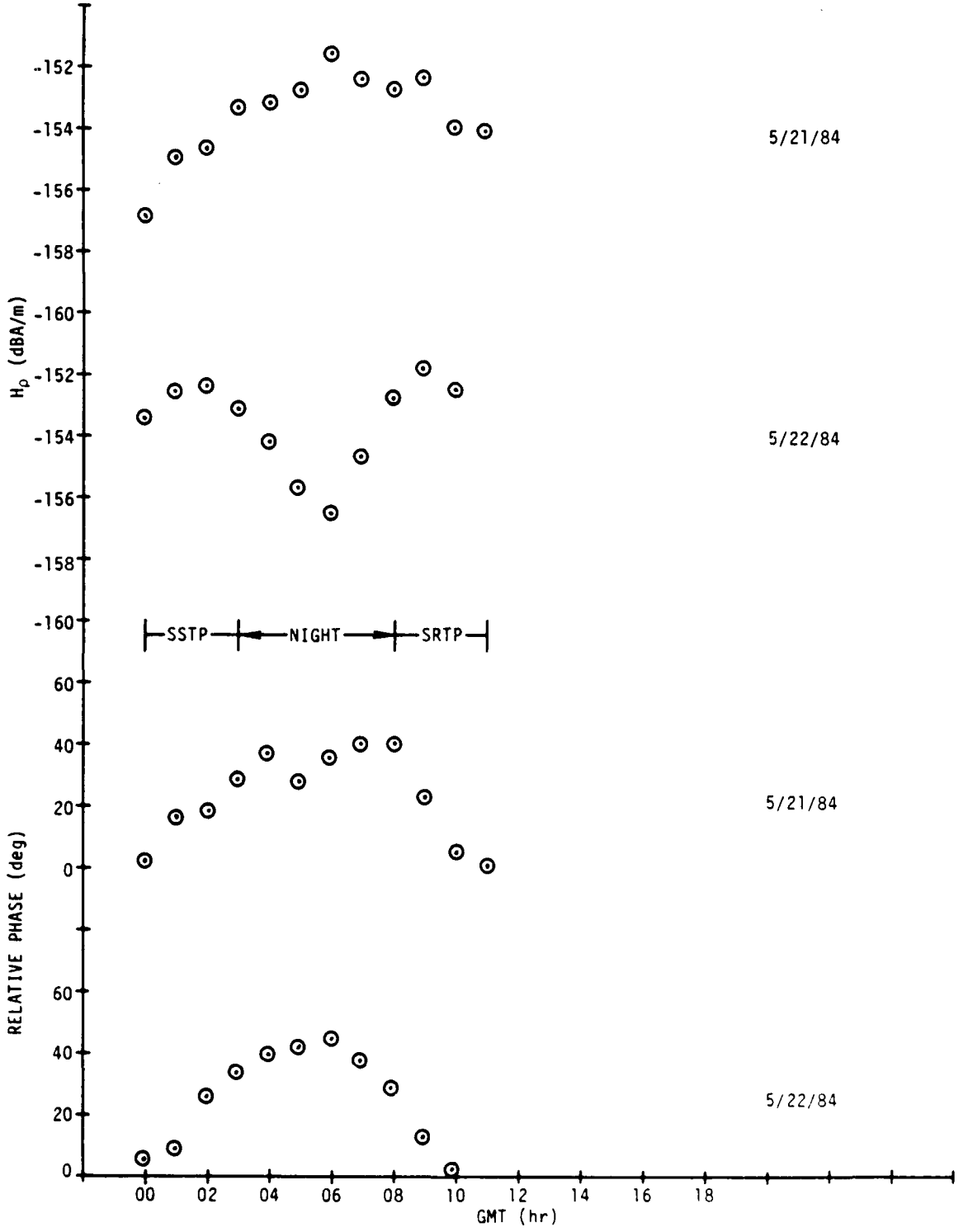

Figure J-10. Connecticut Radial Magnetic Field Strength Versus GMT, 21 and 22 May 1984 (ρ = 290 deg)

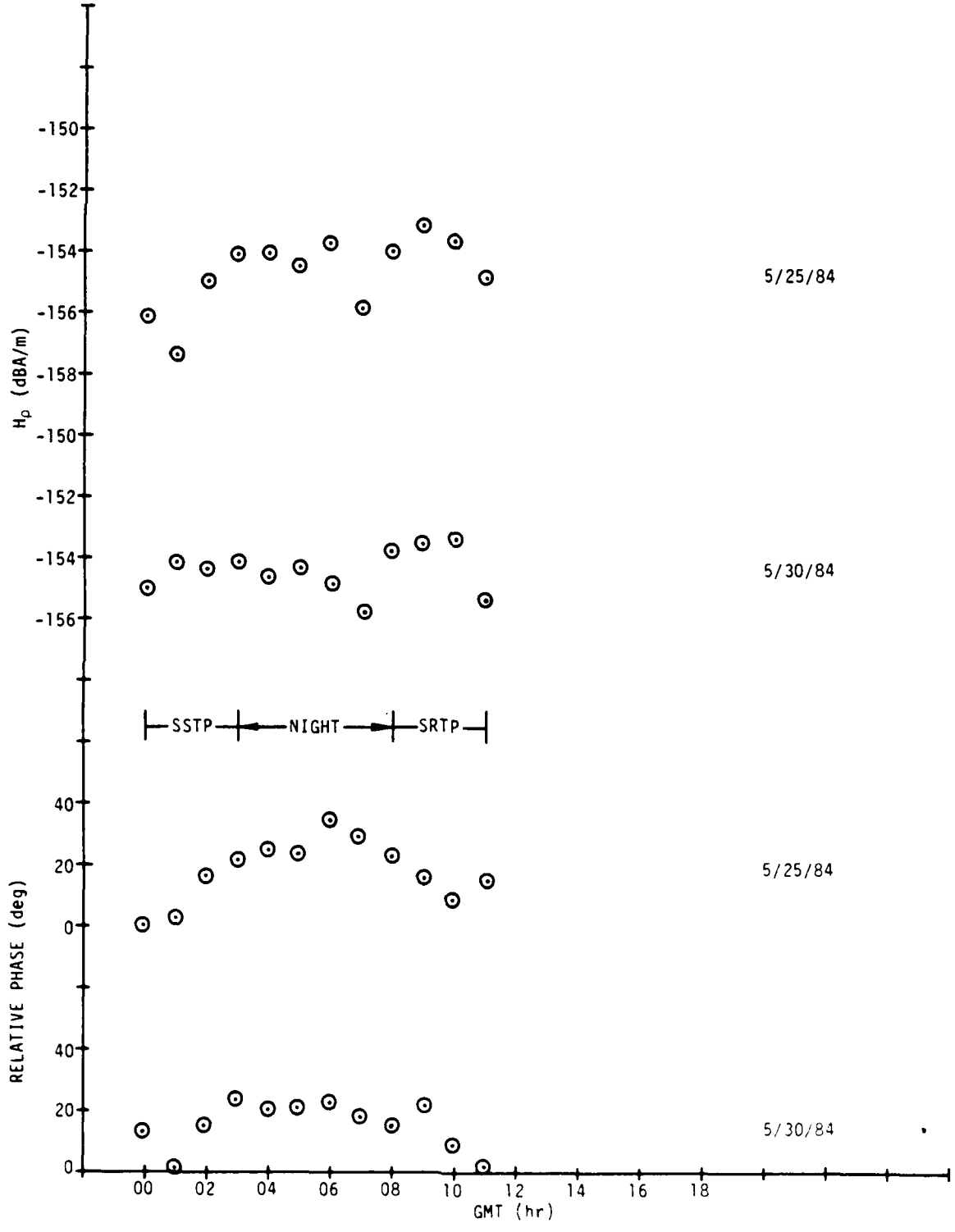

Figure J-11. Connecticut Radial Magnetic Field Strength Versus GMT, 25 and 30 May 1984 (. = 290 deg)

Appendix K

JUNE 1984 CONNECTICUT FIELD STRENGTH MEASUREMENTS

The June 1984 Connecticut daily field strength averages are given in table K-1. Daily plots of radial magnetic field strength versus GMT, in 1-hr increments, are given in figures K-1 through K-3.

Table K-1. June 1984 Connecticut Daily H_ρ Averages (ψ = 290 deg)

Date	SSTP H_ρ (dBA/m)	Night H_ρ (dBA/m)	SRTP H_ρ (dBA/m)	Day H_ρ (dBA/m)	Approximate $\Delta\phi$ (deg)	Night H_ϕ/H_ρ (dB)	TP H_ϕ/H_ρ (dB)	Day H_ϕ/H_ρ (dB)
6/7	-	-	-	-153.2	-	-	-	9.9
6/8	-	-152.4	-151.9	-153.5	20	8.0	9.2	10.7
6/9	-152.0	-153.9	-153.5	-153.3	26	9.4	9.2	10.2
6/10	-153.8	-155.2	-152.9	-153.0	49	10.6	9.4	9.9
6/11	-152.9	-152.8	-153.2	-154 0	36	-	-	-
6/12	-152.7	-153.1	-152.8	-153.8	35	-	-	-
Averages	-152.8	-153.4	-152.8	-153.4	33	9.3	9.2	10.1

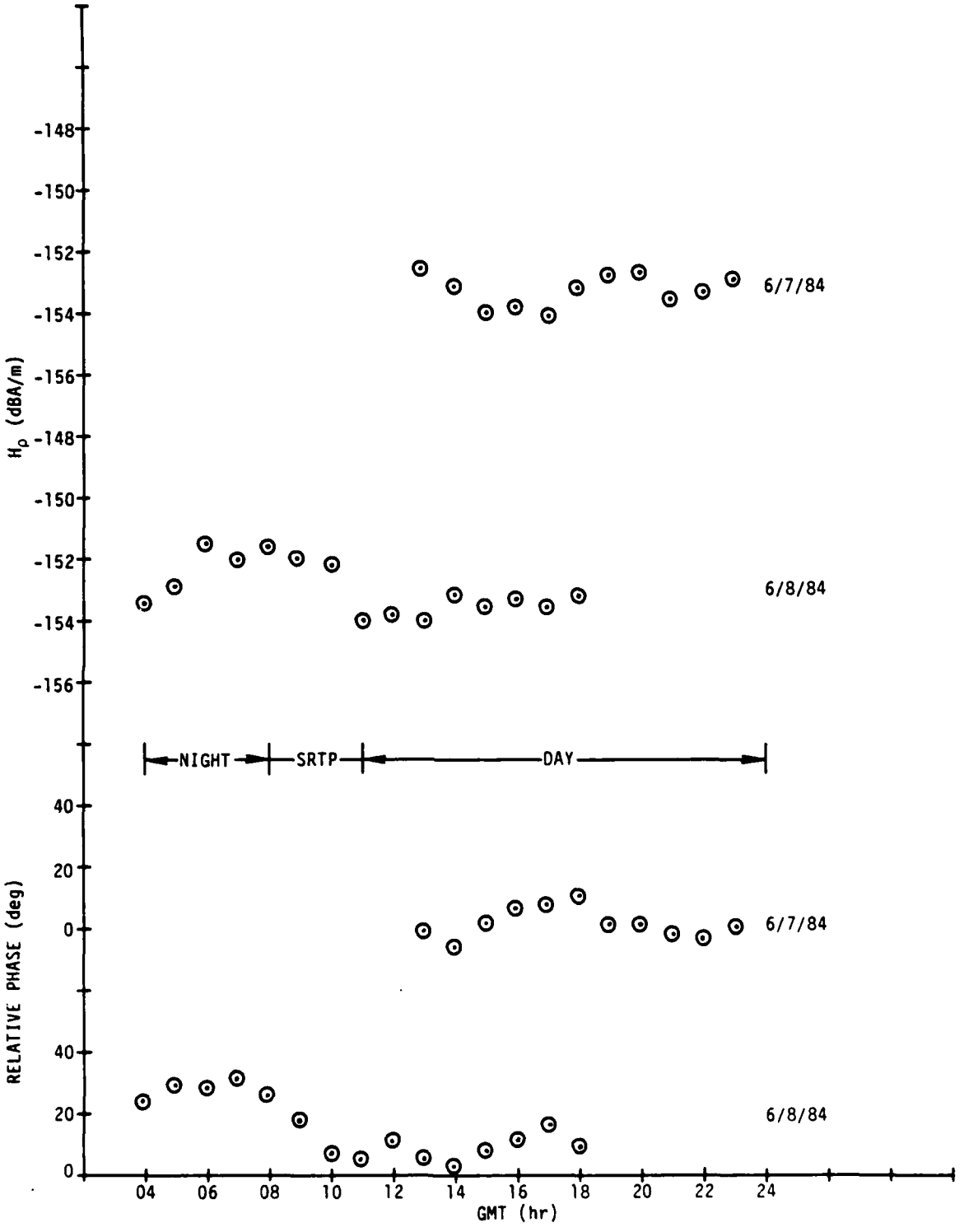

Figure K-1. Connecticut Radial Magnetic Field Strength Versus GMT, 7 and 8 June 1984 (ψ = 290 deg)

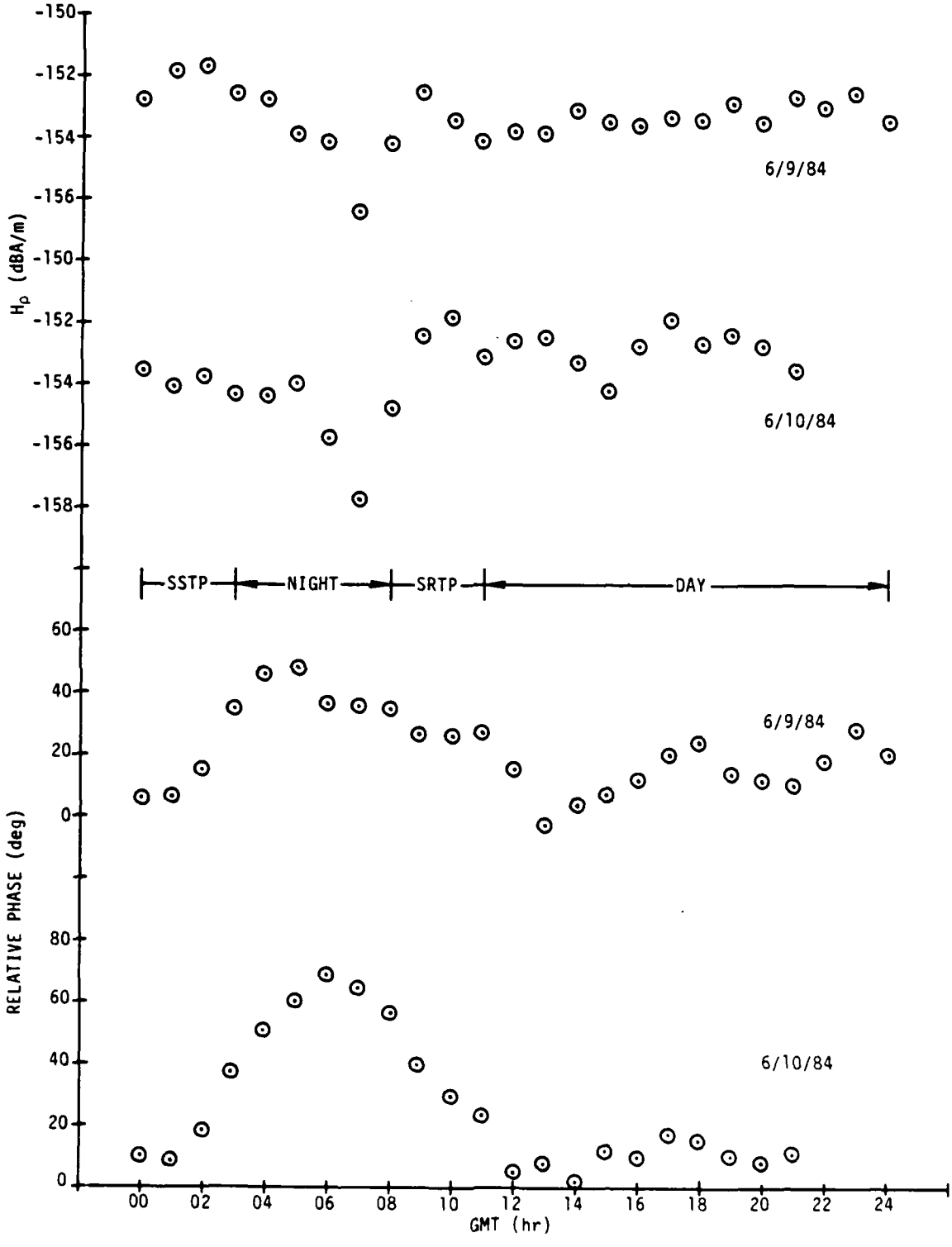

Figure K-2. Connecticut Radial Magnetic Field Strength Versus GMT, 9 and 10 June 1984 (ϕ = 290 deg)

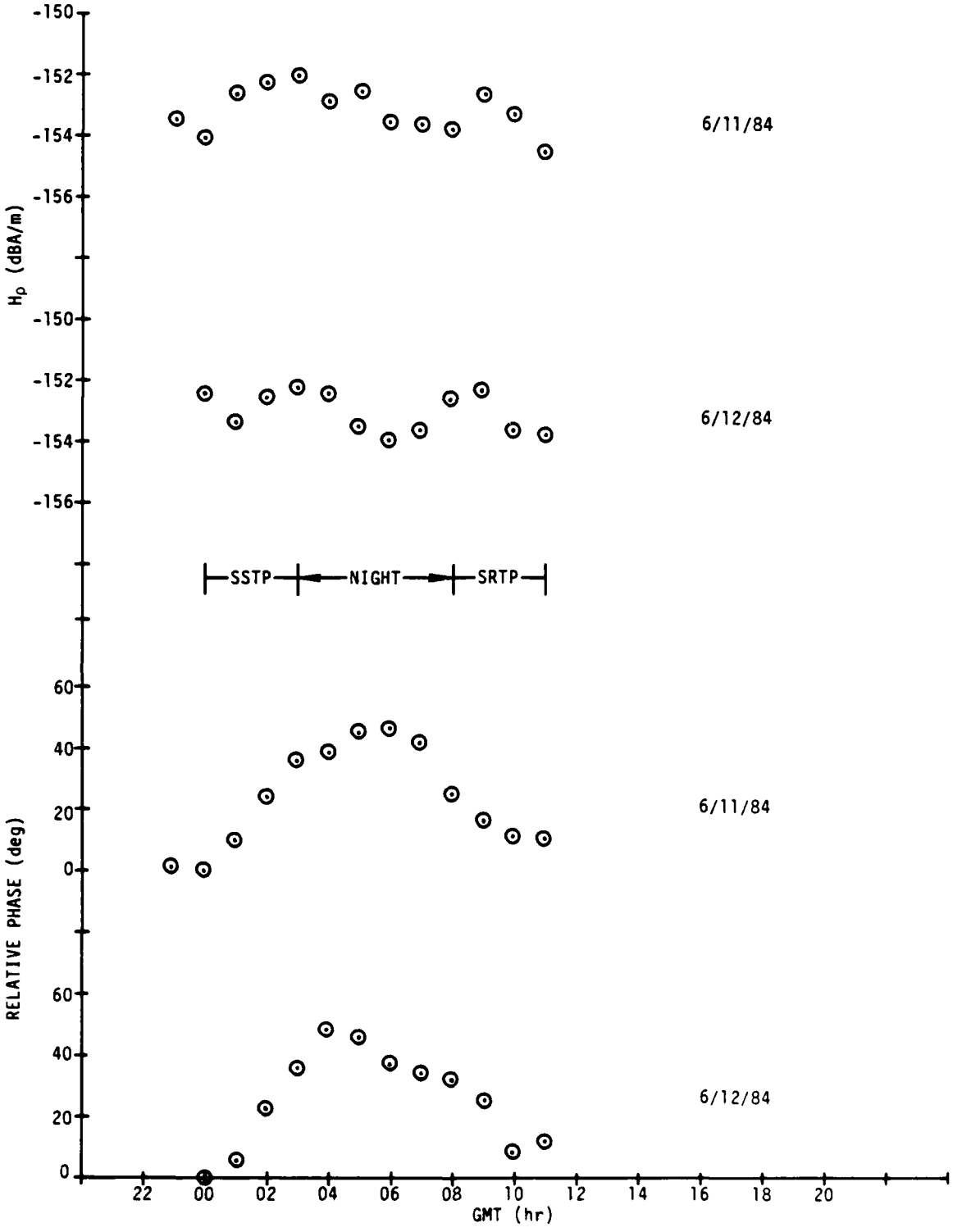

Figure K-3. Connecticut Radial Magnetic Field Strength Versus GMT, 11 and 12 June 1984 (ϕ = 290 deg)

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