RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA IN 1978

Kiyoshi Igarashi and Shigehiko Tsuzurahara

Radio Research Laboratories, Koganei-shi, Tokyo 184

1. Introduction

Observation of the ionospheric irregularities has been carried out at Syowa Station, Antarctica, by means of the auroral rader with the fixed frequency of 112.2 MHz (from March 1966 to January 1974) and with the changing four frequencies of 50, 65, 80 and 112 MHz (from February 1974 to date). The data covering the above period with the form of A-scope display on the 35 mm film and the intensity variation on the chart, are deposited in the Radio Research Laboratories, Tokyo, Japan.

This report is prepared in order to make the data from February 1978 to January 1979 available to scientists who are interested in this field.

Inquiries about detailes of the data should be addressed to:

Radio Research Laboratories
Ministry of Posts and Telecommunications
2-1, Nukui-Kitamachi 4-chome, Koganei-shi
Tokyo 184, Japan

2. Location

Syowa Station			
Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
69°00'S	39°35'	69.6°S	77.1°E

3. Observers

Kiyoshi Igarashi (Radio Research Laboratories)

Shigehiko Tsuzurahara (Radio Research Laboratories)

4. Method of Measurement

The antenna was fixed in the direction of the magnetic south and at an elevation angle of 25 degrees. The declination and inclination of the geomagnetic field at Syowa Station in 1978 were 46°36' Westward and 64°59' Upward, respectively. The 35 mm film records were taken every minute in the interval between 18:00 and 08:00 45° E.M.T. and the chart records were continuously made throughout the day. On account of malfunction at the first stage of transmission, the transmission power was reduced to 50% or less of the maximum at 112 MHz. The observation at 80 MHz was ceased from August 16 to December 18, 1978 on account of malfunction at the last stage of transmission. The radio doppler observation was carried out during auroral active period from March 25, 1978 to January 7, 1979. The data was recorded on the 1/4 inch magnetic tape.

Characteristics of the system are as follows;

Antenna

An 8-element Yagi with 0.75λ height

	(50 MHz)	(65 MHz)	(80 MHz)	(112 MHz)
Gain	: 12.3 dB	12.3 dB	12.2 dB	12.3 dB
Directivity (Front/Back)	: 16 dB	19 dB	18 dB	17 dB
Polarization	: horizontal			

Main equipment

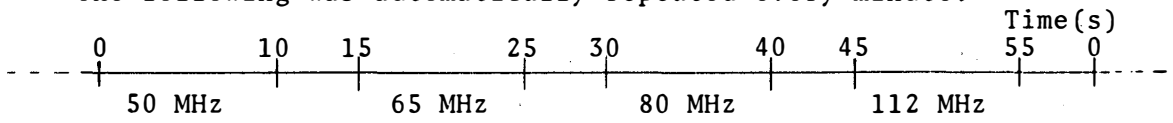
Frequency	: 50, 65, 80, 112 MHz
Transmission power	: 20 kW (peak)
Pulse width	: 50 or 100 μs
Pulse repetition frequency	: 50 Hz
Receiver bandwidth	: 25 kHz
Receiver noise figure	: less than 4 dB

Indicator and recorder
A-scope display on 5-inch oscilloscope
6 channel dot recorder

Recording	: 1 frame/10 s on the 35 mm film for each frequency
Maximum range	: 1000 or 1500 km
Range mark	: every 50 and 100 km

Operation schedule

The following was automatically repeated every minute.



5. Explanation of Diagrams

Fig. 1 shows the occurrence of the radio aurora and the operation of the aurora radar. The time is 45° E.M.T. (=U.T. + 3 hours) and the symbols used in the figures are as follows:

——————— : occurrence of radio aurora

←—— C ——→ : non-observation due to adjustments or troubles in instrumentation

Blank : no radar echo

Fig. 2 shows the examples of the radio aurora intensity recorded by 6 channel chart recorder. The data includes the H-component of geomagnetic variation (upper), the radio aurora intensities at 112 MHz (second), 80 MHz (third), 65 MHz (fourth), 50 MHz (fifth) and 30 MHz riometer record (lower).

References

Isozaki, S. and Miyazaki, S.(1974): Records of radio aurora at Syowa Station, Antarctica in 1972. JARE Data Rep., 23 (Ionosphere 10), 22p.

Nishimuta, I. and Yabuuma, H. (1975): Records of radio aurora at Syowa Station, Antarctica in 1973. JARE Data Rep., 26 (Ionosphere 12),

23p.

Ose, M., Hasegawa, S., Takeuchi, T., Nishimuta, I. and Isobe, T. (1969): Records of radio aurora at Syowa Station, Antarctica from March 1966 to January 1968. JARE Data Rep., 5 (Ionosphere 2), 64p.

Shiro, I. and Sakamoto, T.(1972): Records of radio aurora at Syowa Station, Antarctica from April 1970 to February 1971. JARE Data Rep., 15 (Ionosphere 6), 34p.

Shiro, I. and Yamazaki, I. (1976): Records of radio aurora at Syowa Station, Antarctica in 1974. JARE Data Rep., 33 (Ionosphere 14), 89p.

Shiro, I., Sugiuchi, H. and Komiya, N. (1977): Records of radio aurora at Syowa Station, Antarctica in 1975. JARE Data Rep., 37 (Ionosphere 16), 105p.

Shiro, I., Yamakoshi, A. and Sasaki, T. (1978): Records of radio aurora at Syowa Station, Antarctica in 1976. JARE Data Rep., 42 (Ionosphere 18), 105p.

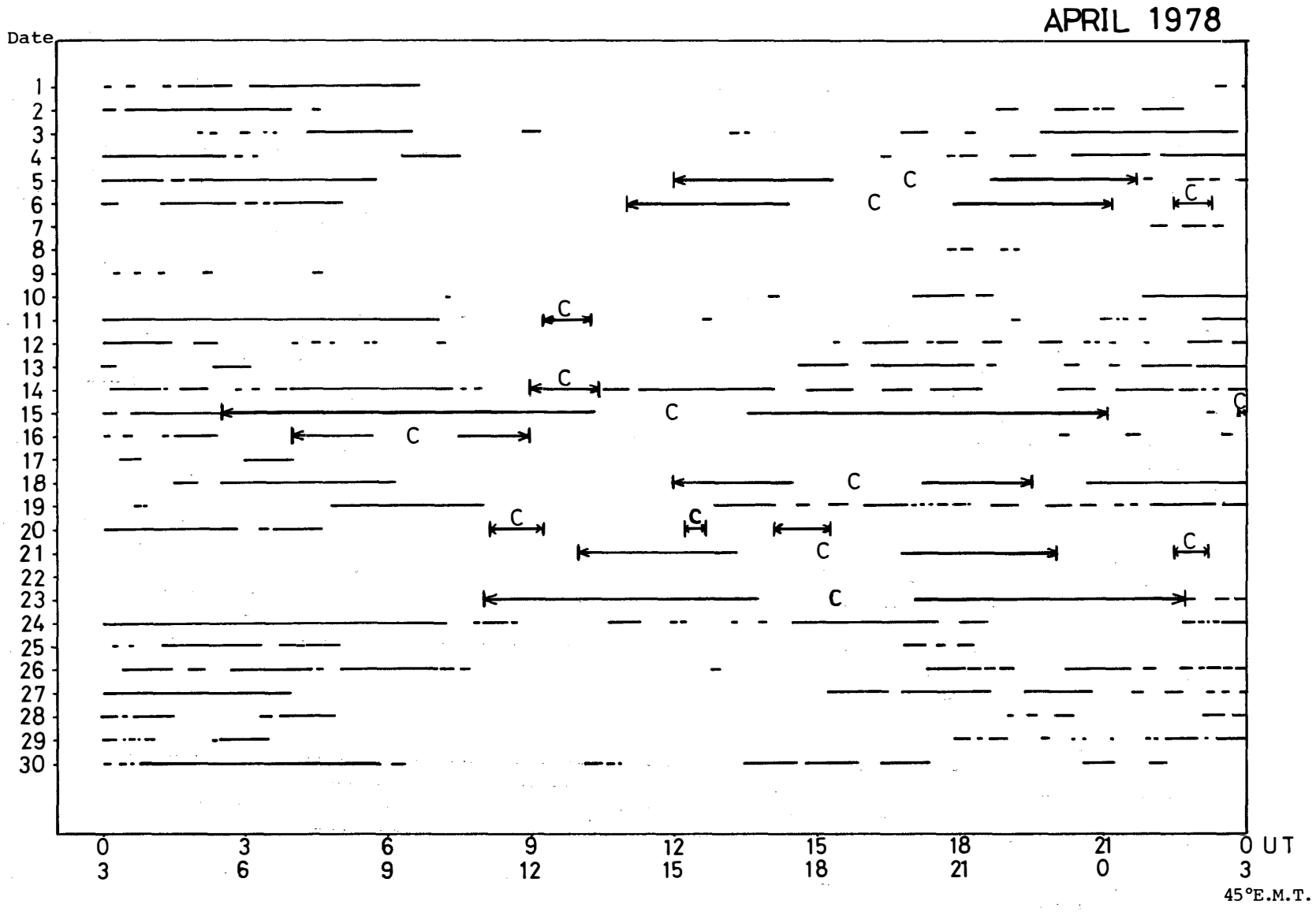

APRIL 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (1).

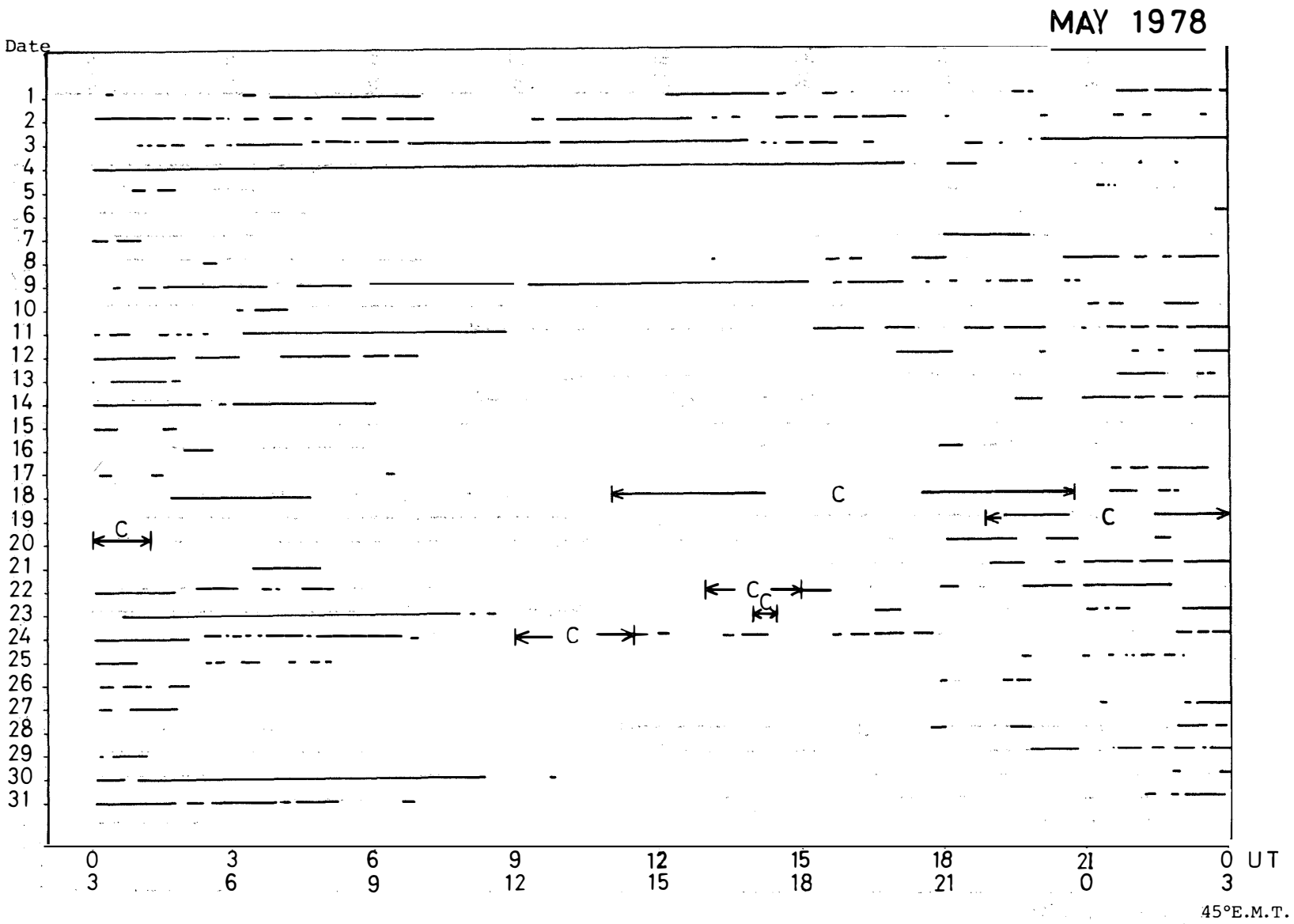

MAY 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
C
C
C
C
C
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (2).

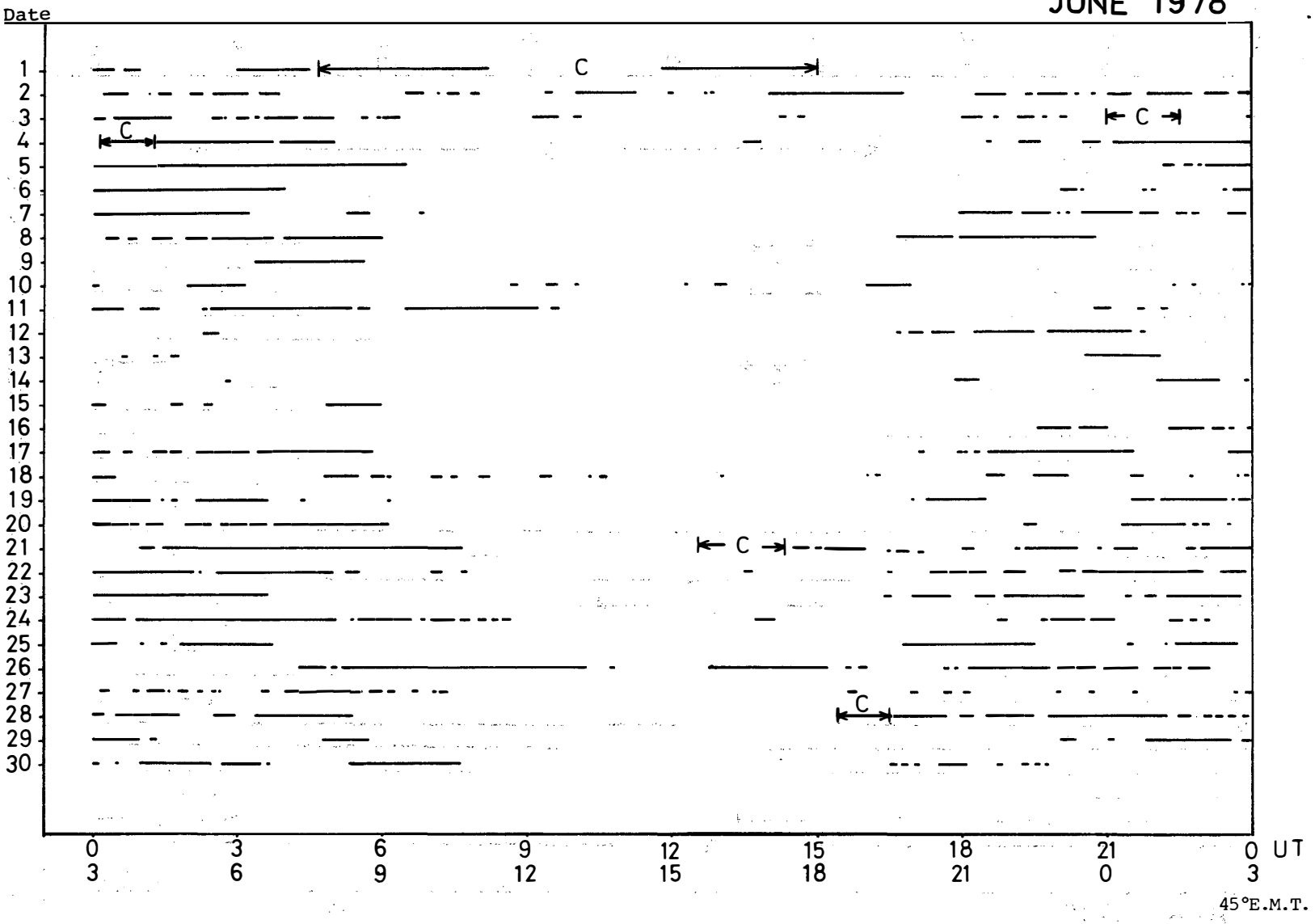

JUNE 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
C
C
C
C
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (3).

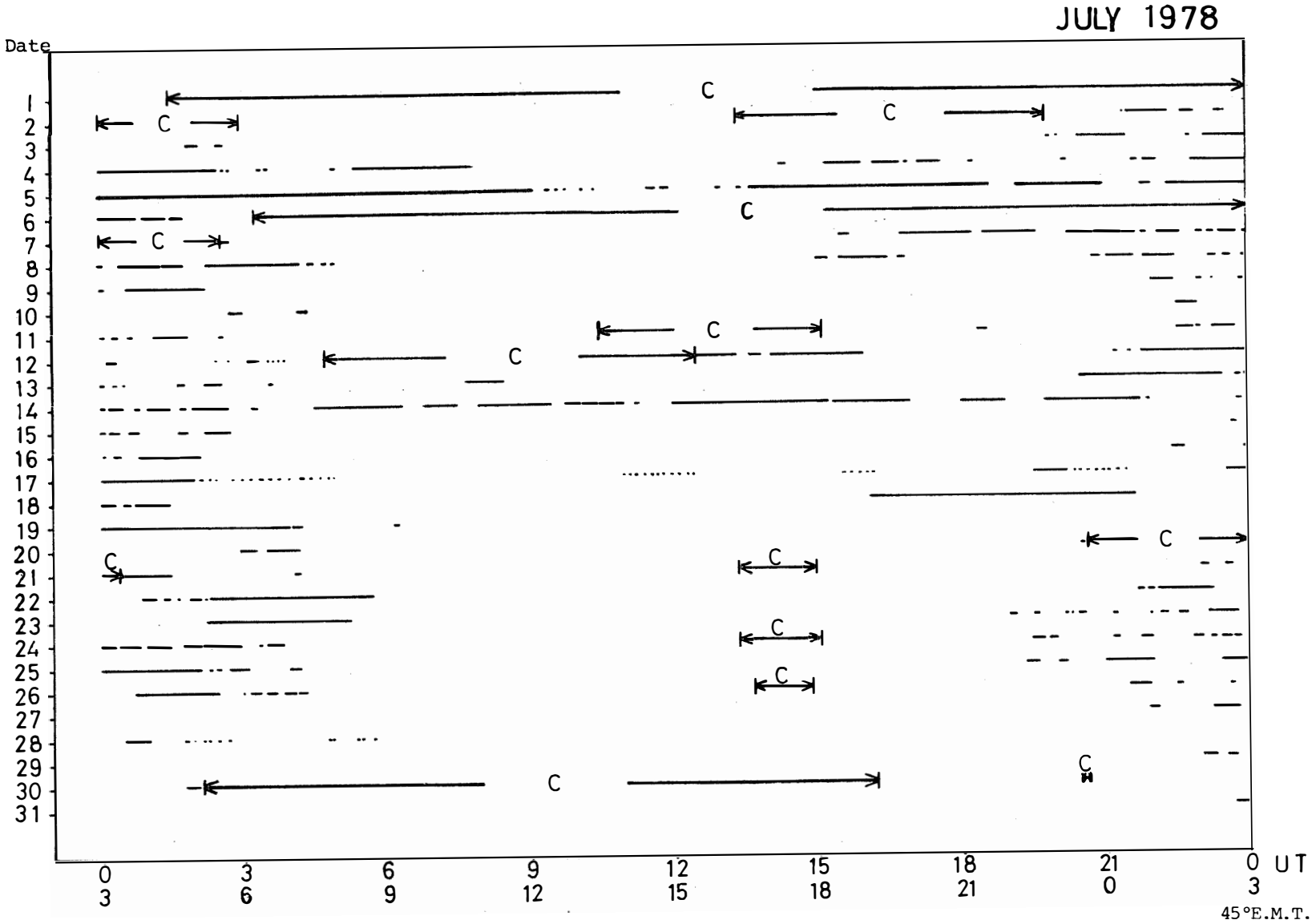

JULY 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (4).

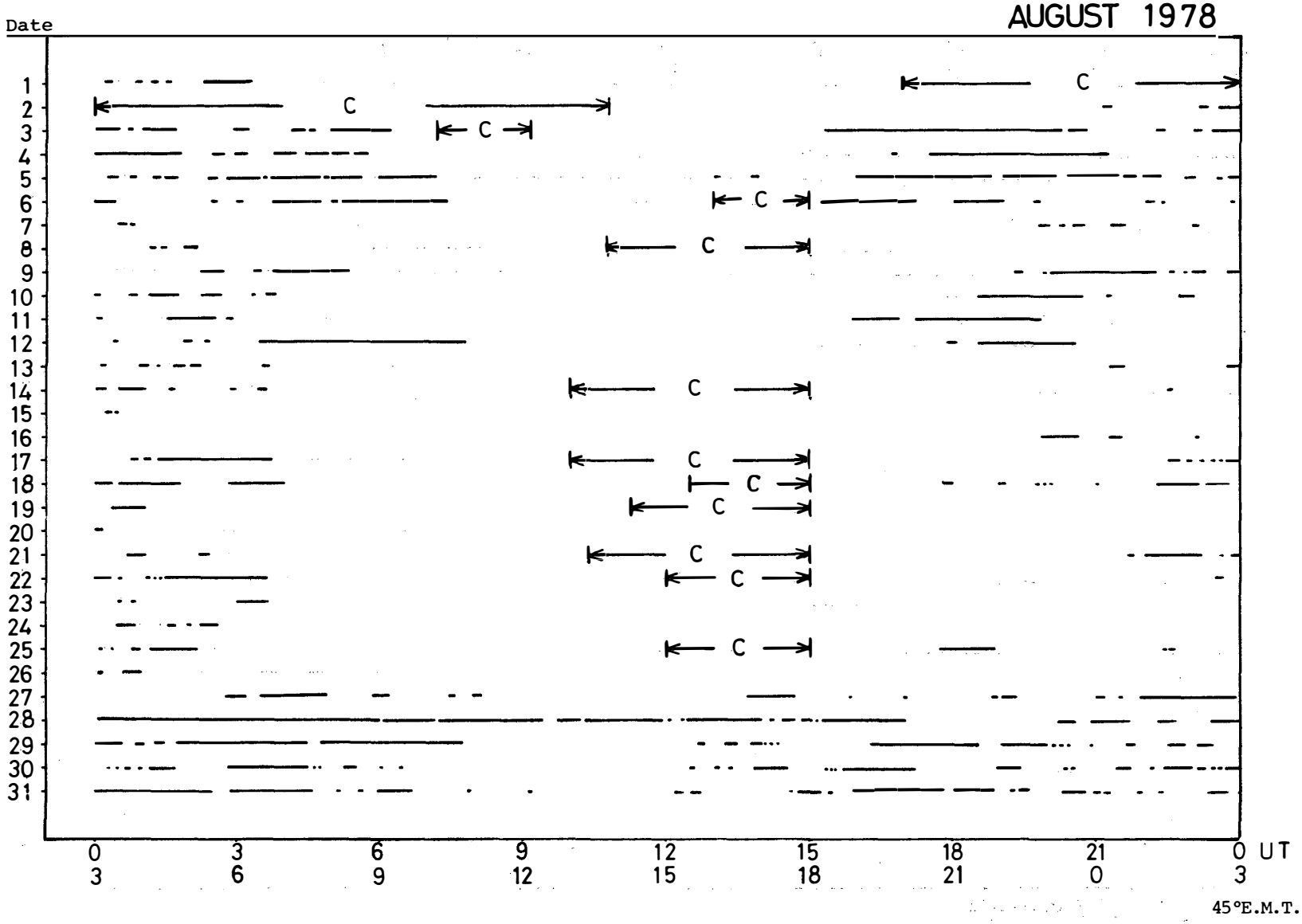

AUGUST 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (5).

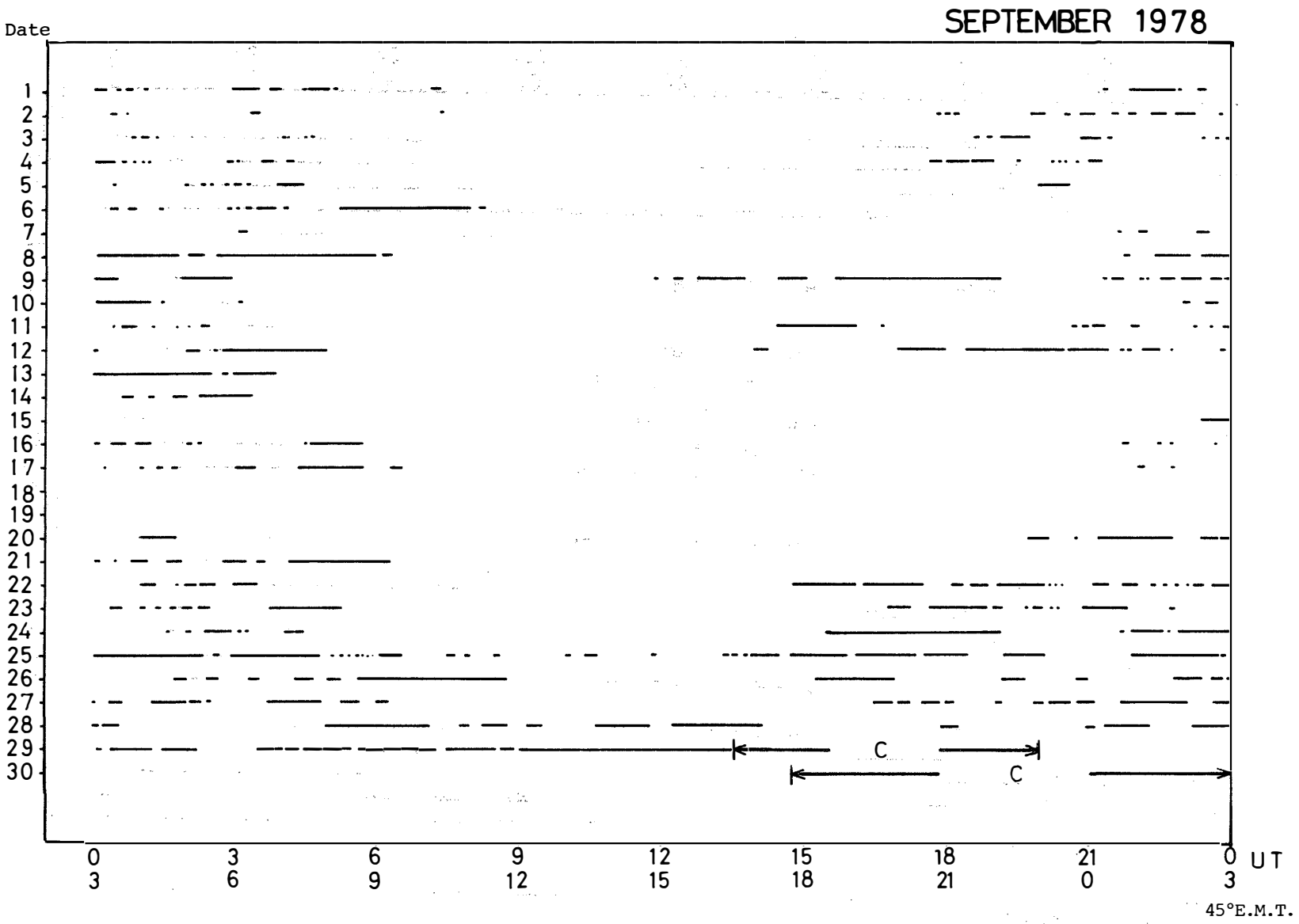

SEPTEMBER 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
C
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (6).

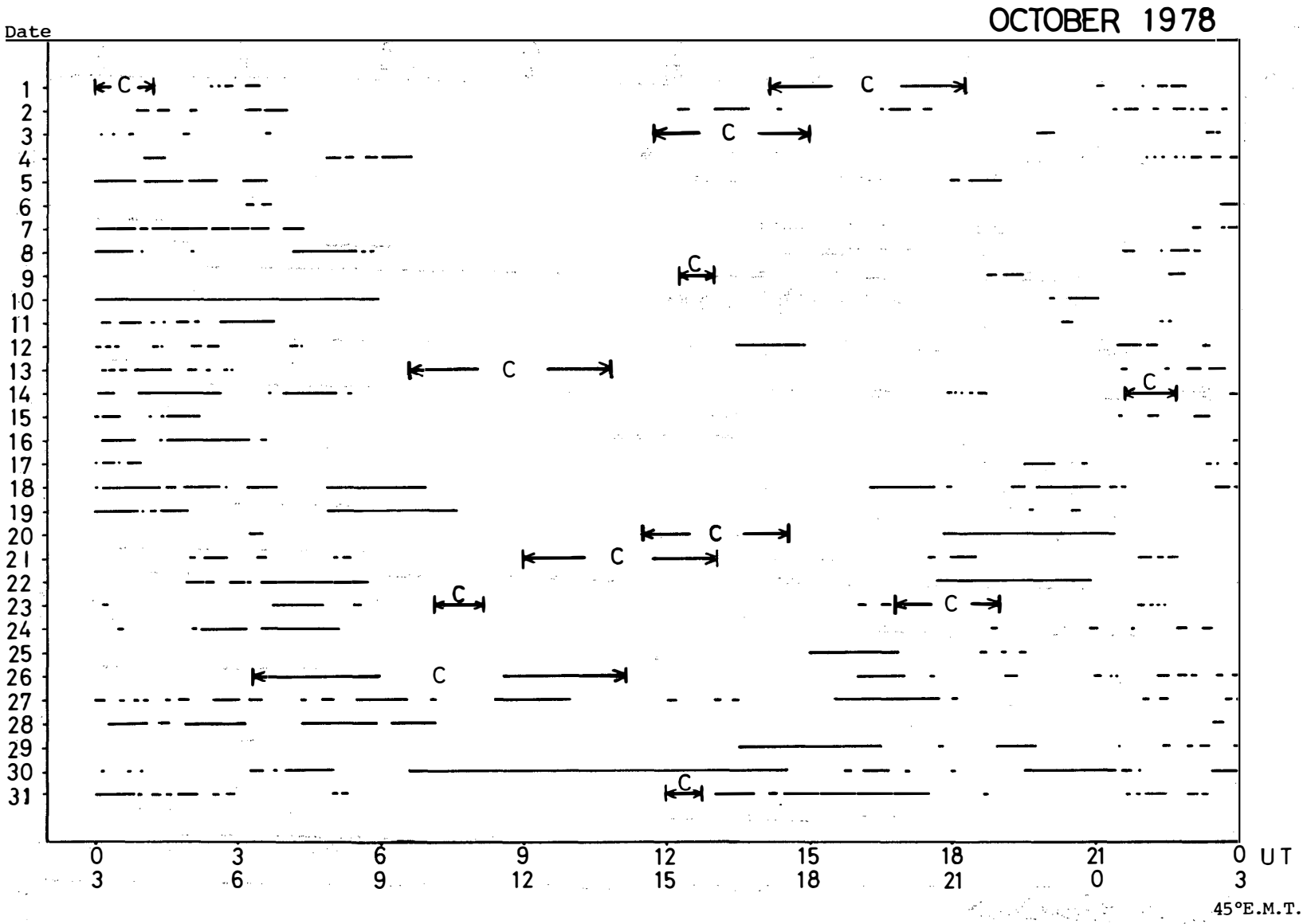

OCTOBER 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (7).

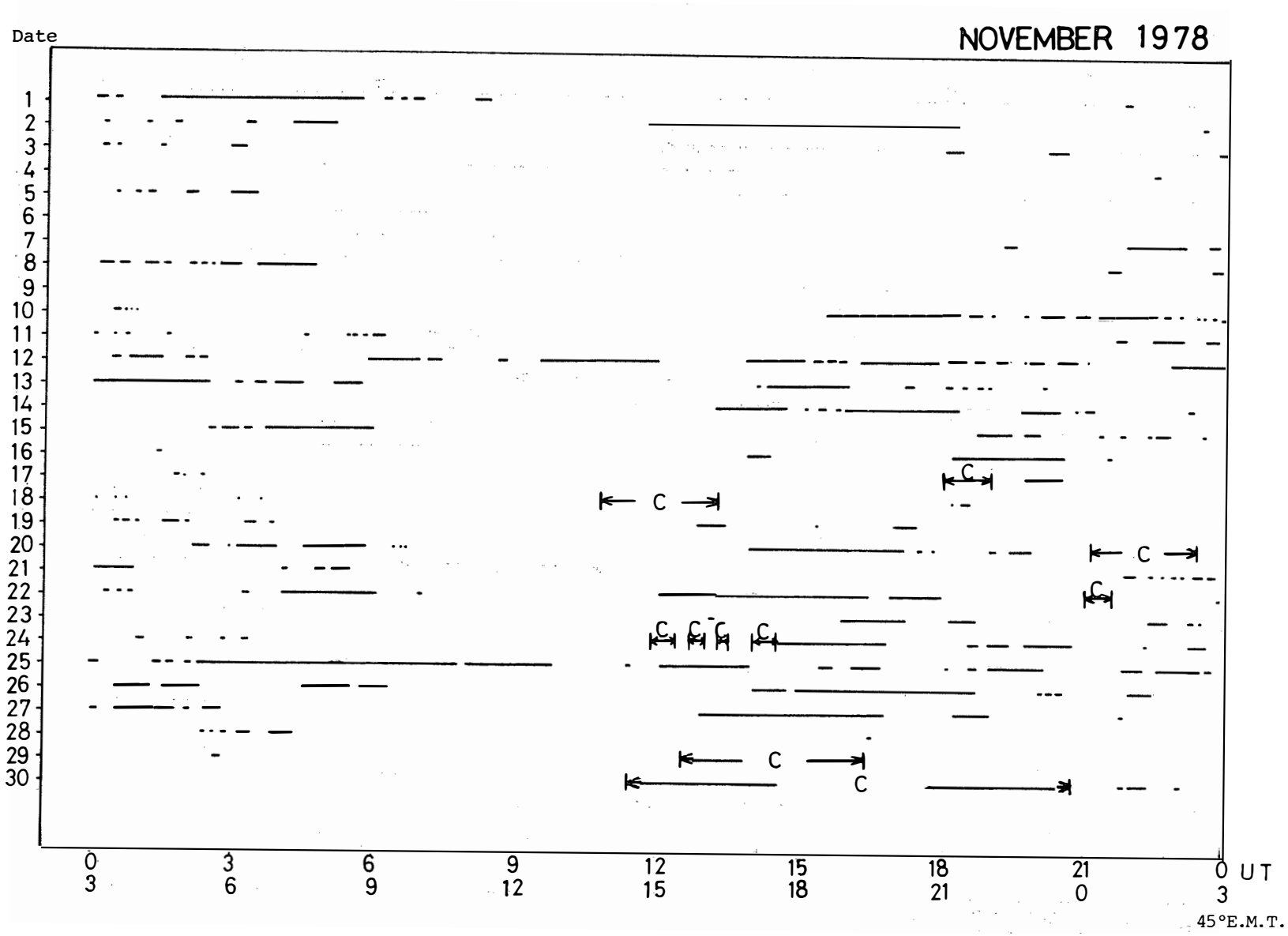

NOVEMBER 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
C
0 3 6 9 12 15 18 21 0 UT
3 6 9 12 15 18 21 0 3
45°E.M.T.

Fig.1 (8).

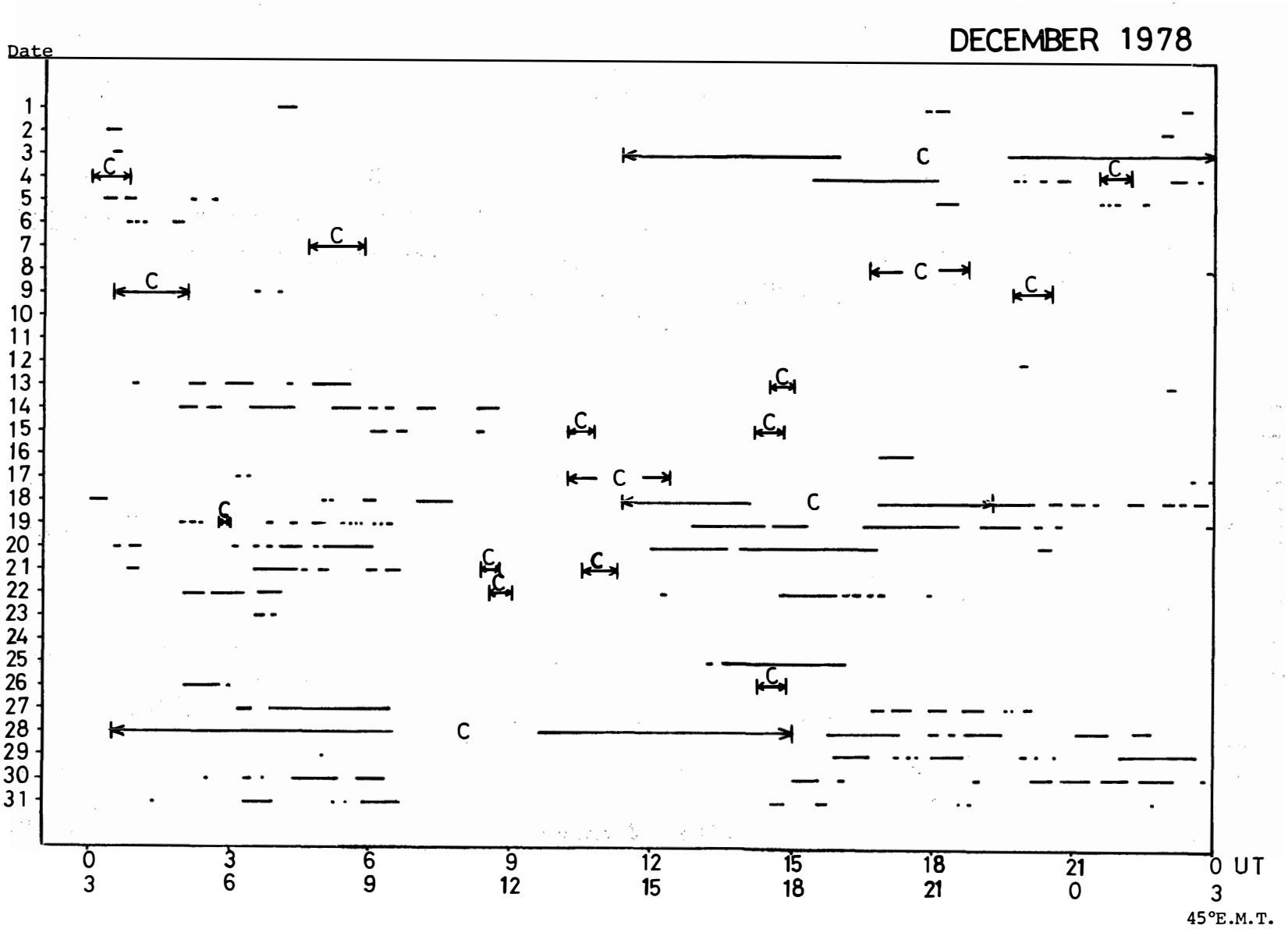

DECEMBER 1978
Date
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
C
0
3
6
9
12
15
18
21
0 UT
3
45°E.M.T.

Fig.1 (9).

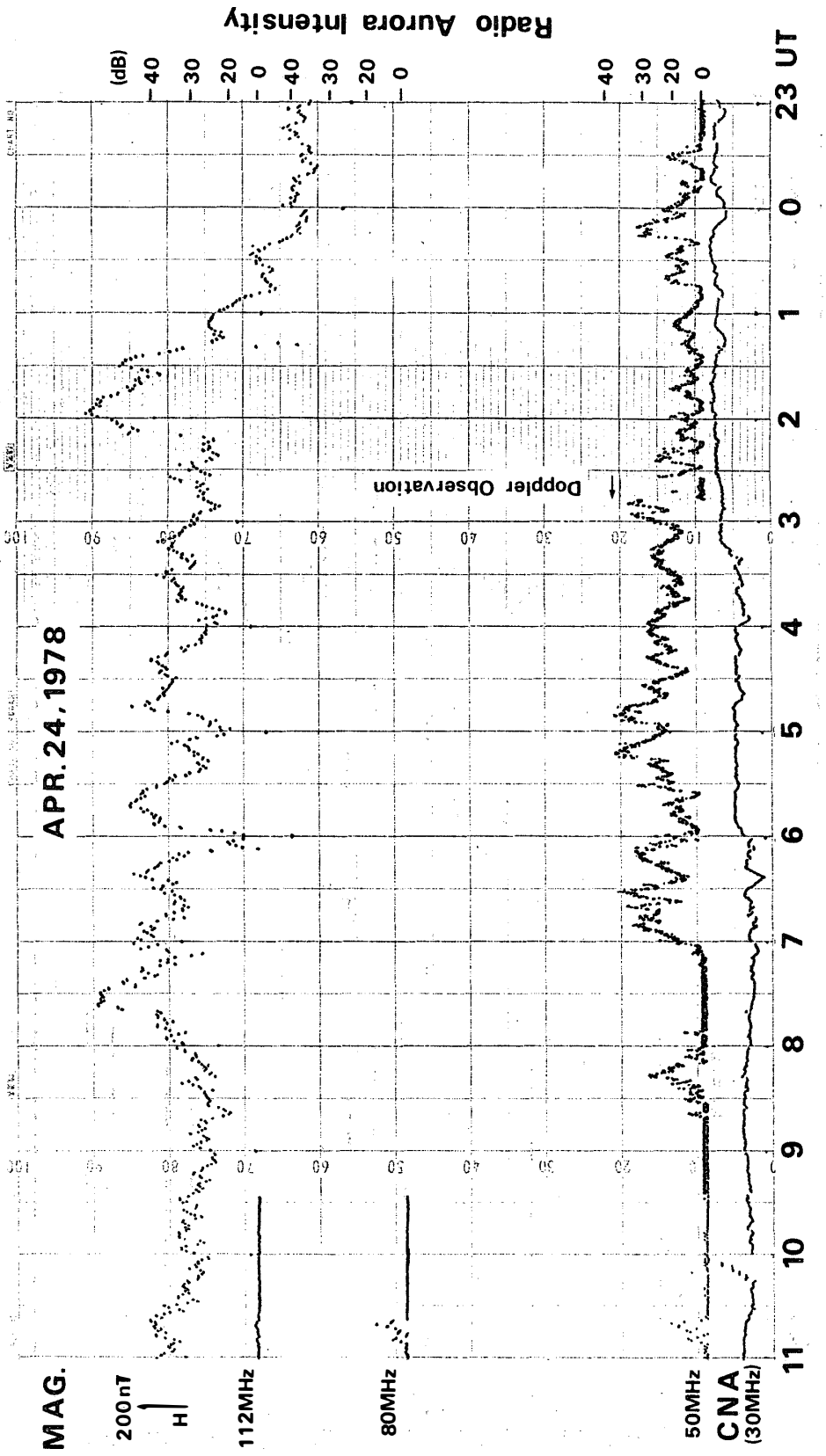

Radio Aurora Intensity
(dB)
40
30
20
0
Doppler Observation
APR.24,1978
23 UT
0
1
2
3
4
5
6
7
8
9
10
11
MAG.
200nT
H
112MHz
80MHz
50MHz
CNA
(30MHz)

Fig.2 (1).

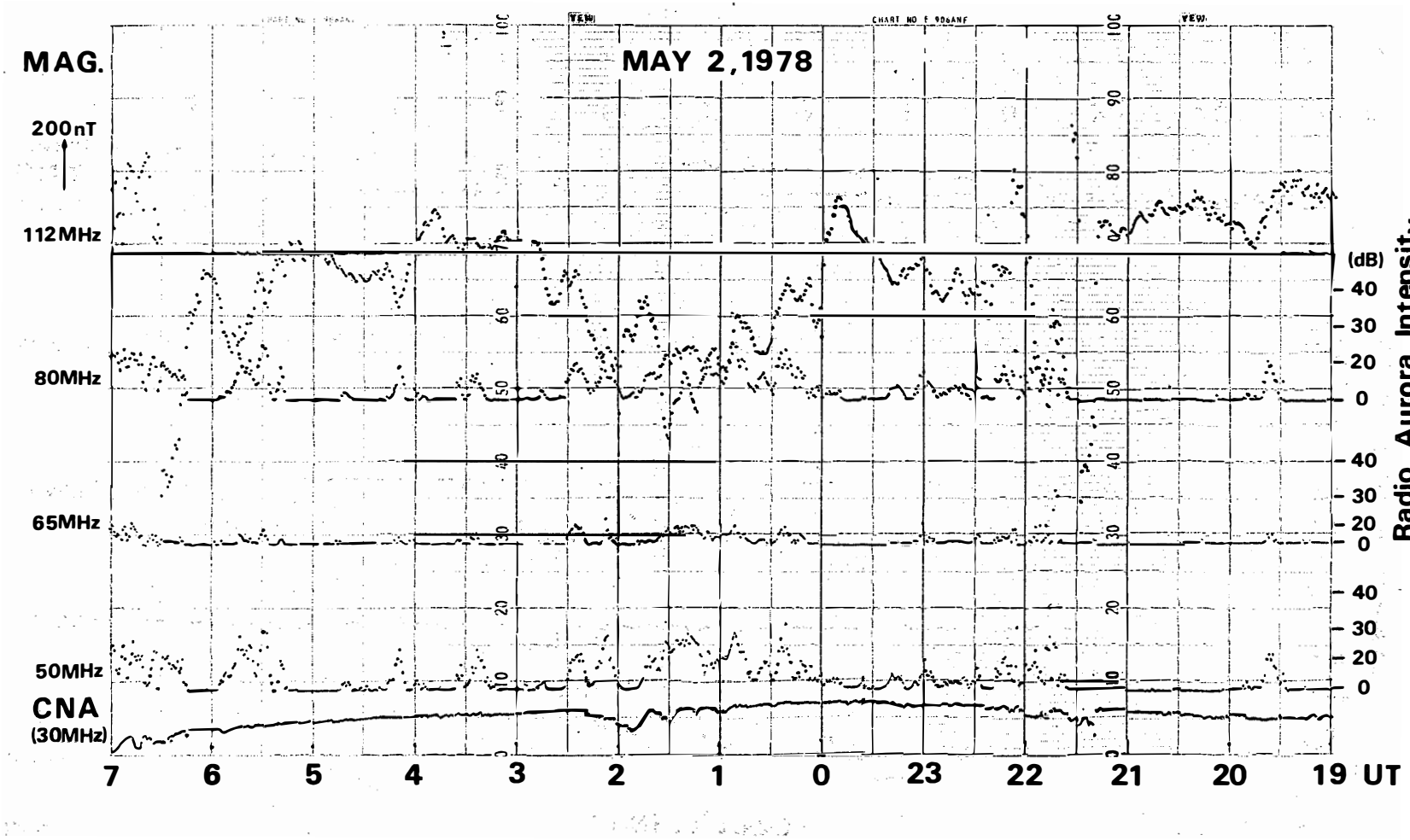

MAG.
MAY 2,1978
200nT
112MHz
80MHz
65MHz
50MHz
CNA
(30MHz)
(dB)
Radio Aurora Intensity
7
6
5
4
3
2
1
0
23
22
21
20
19 UT

Fig.2 (2).

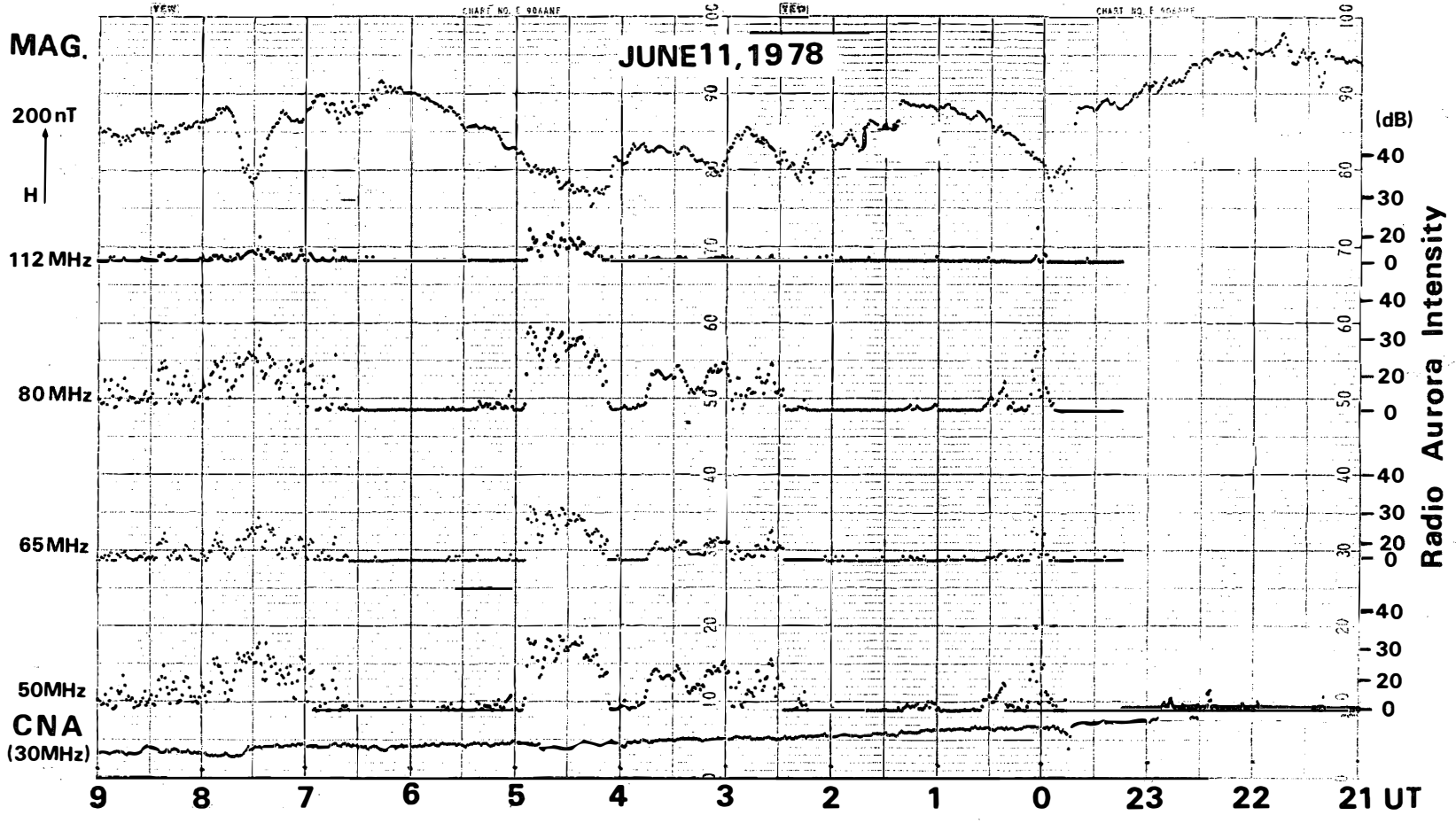

MAG.
200nT
H
JUNE11,1978
112 MHz
80 MHz
65 MHz
50MHz
CNA
(30MHz)
(dB)
Radio Aurora Intensity
9 8 7 6 5 4 3 2 1 0 23 22 21 UT

Fig.2 (3).

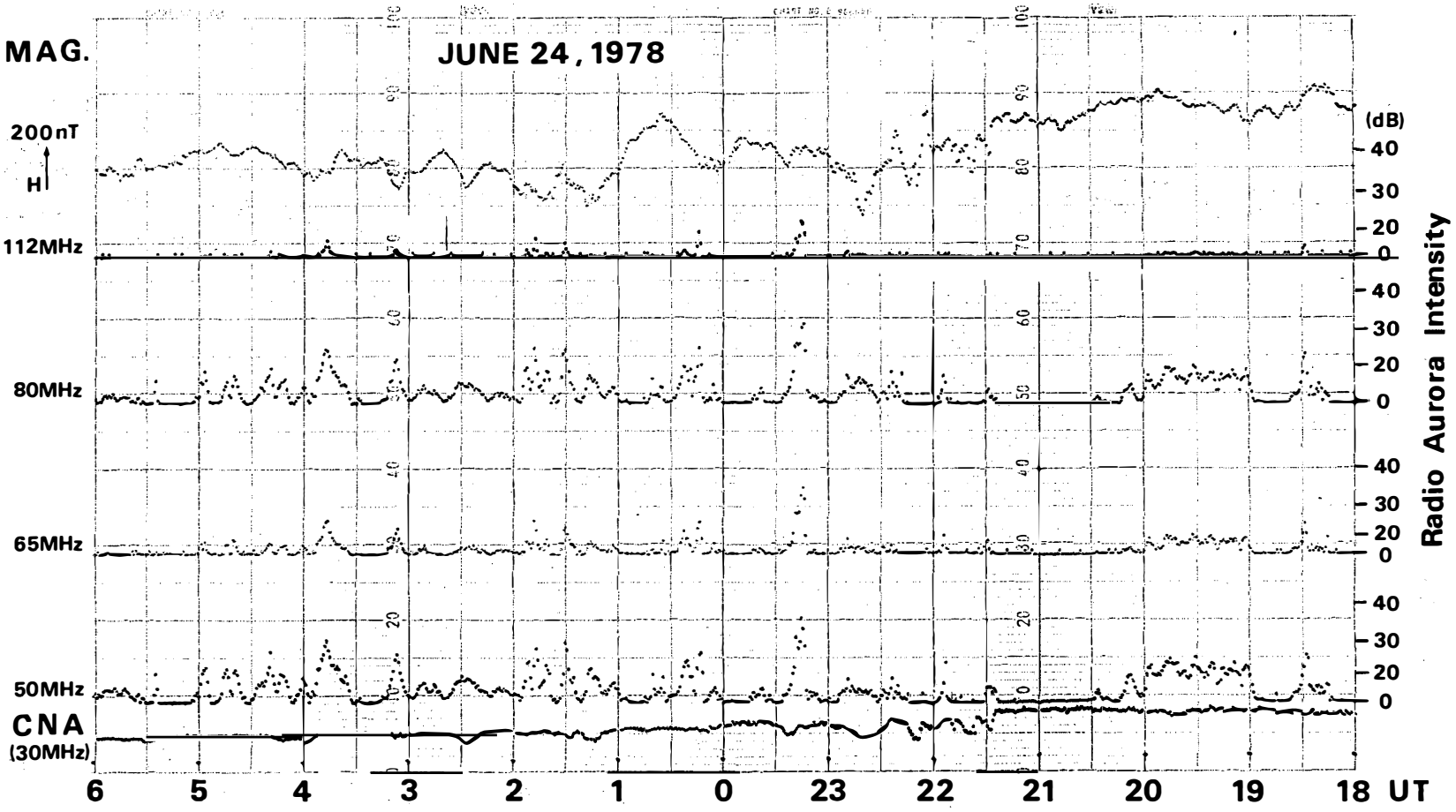

MAG.
JUNE 24, 1978
200nT
H
112MHz
80MHz
65MHz
50MHz
CNA
(30MHz)
(dB)
Radio Aurora Intensity
6 5 4 3 2 1 0 23 22 21 20 19 18 UT

Fig.2 (4).

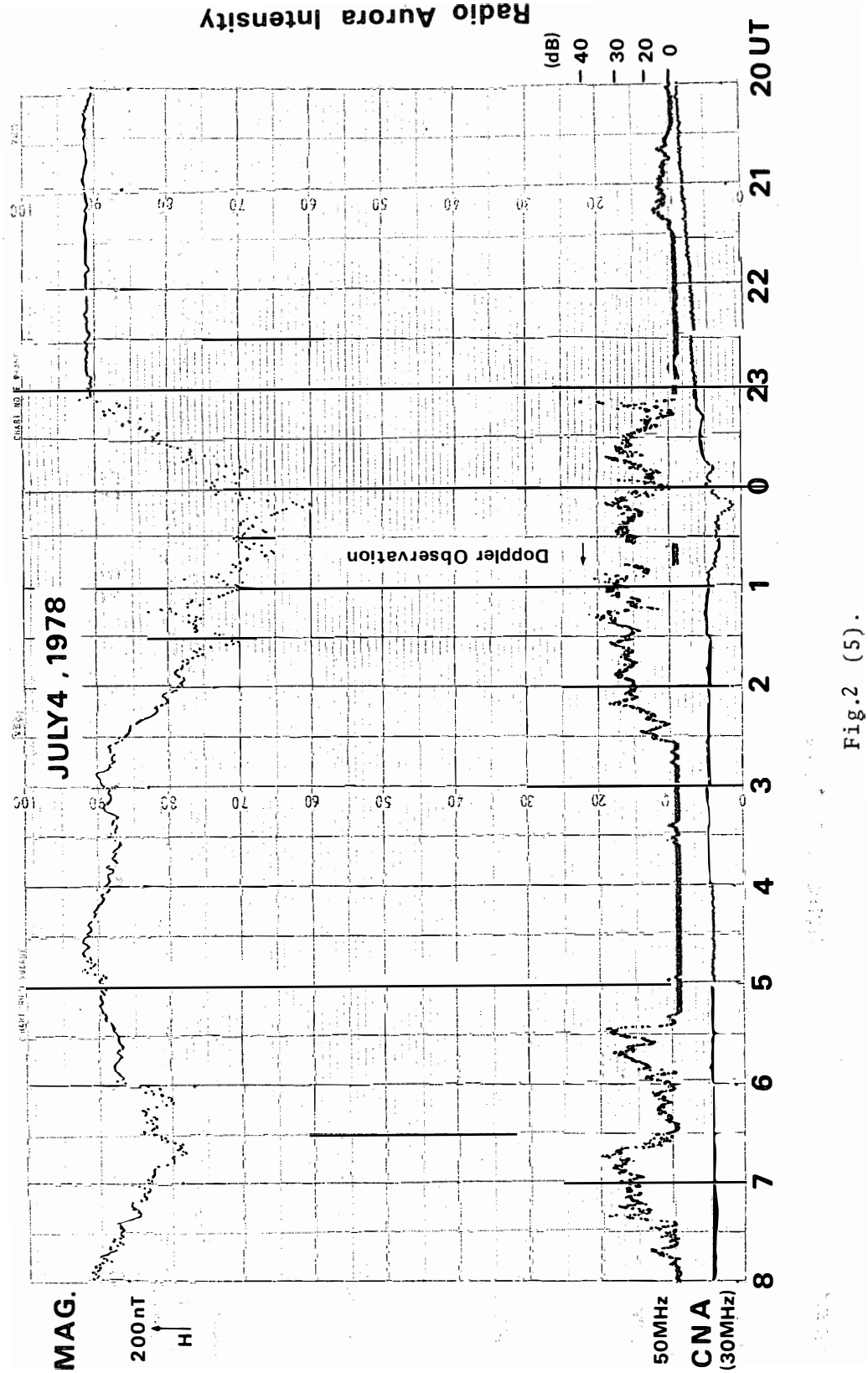

Radio Aurora Intensity
(dB)
40
30
20
0
20 UT
21
22
23
0
1
2
3
4
5
6
7
8
JULY4 , 1978
Doppler Observation
MAG.
200nT
H
50MHz
CNA
(30MHz)

Fig.2 (5).

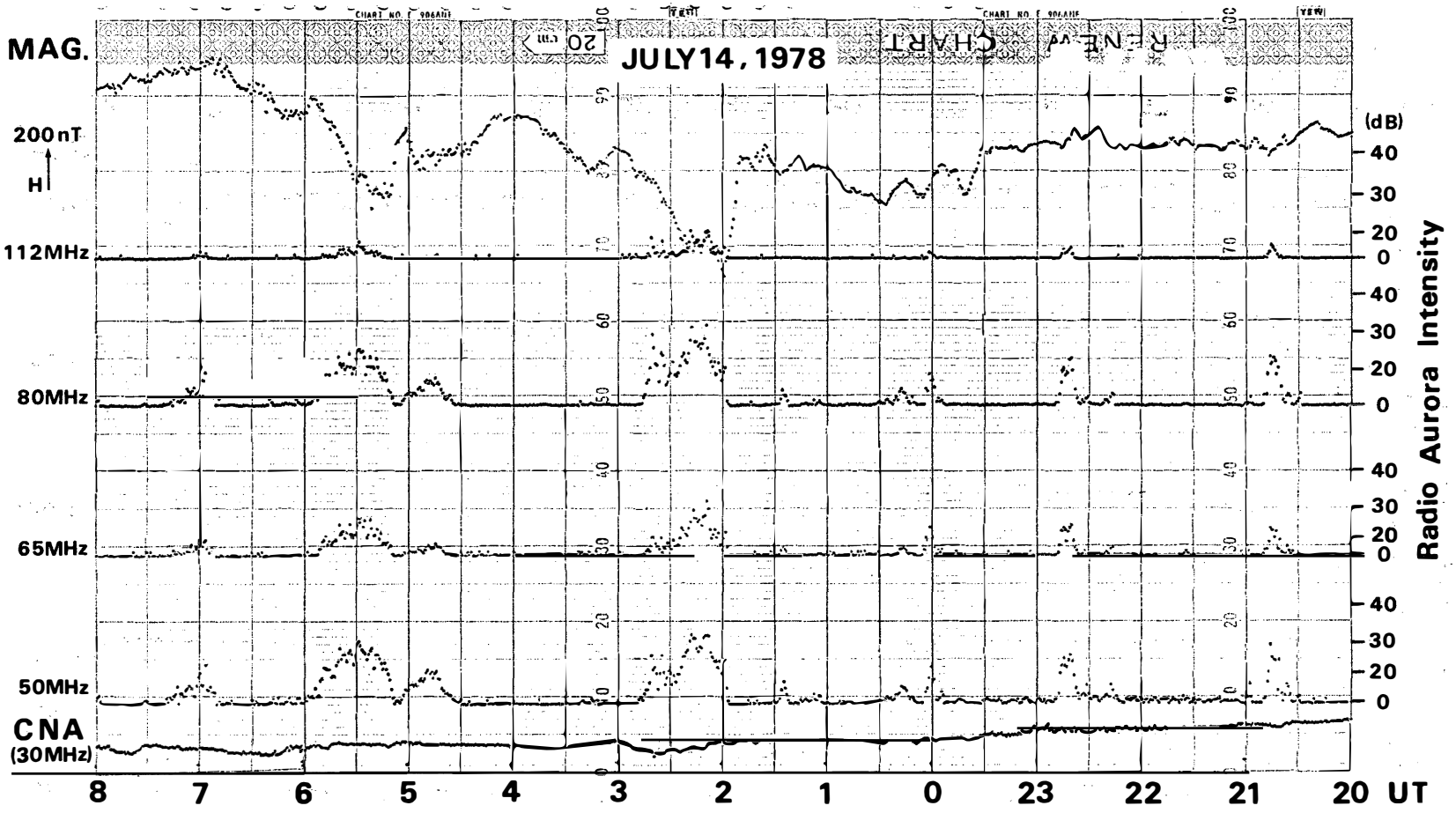

MAG.
200nT
H
112MHz
80MHz
65MHz
50MHz
CNA
(30MHz)
JULY14, 1978
(dB)
Radio Aurora Intensity
8 7 6 5 4 3 2 1 0 23 22 21 20 UT

Fig.2 (6).

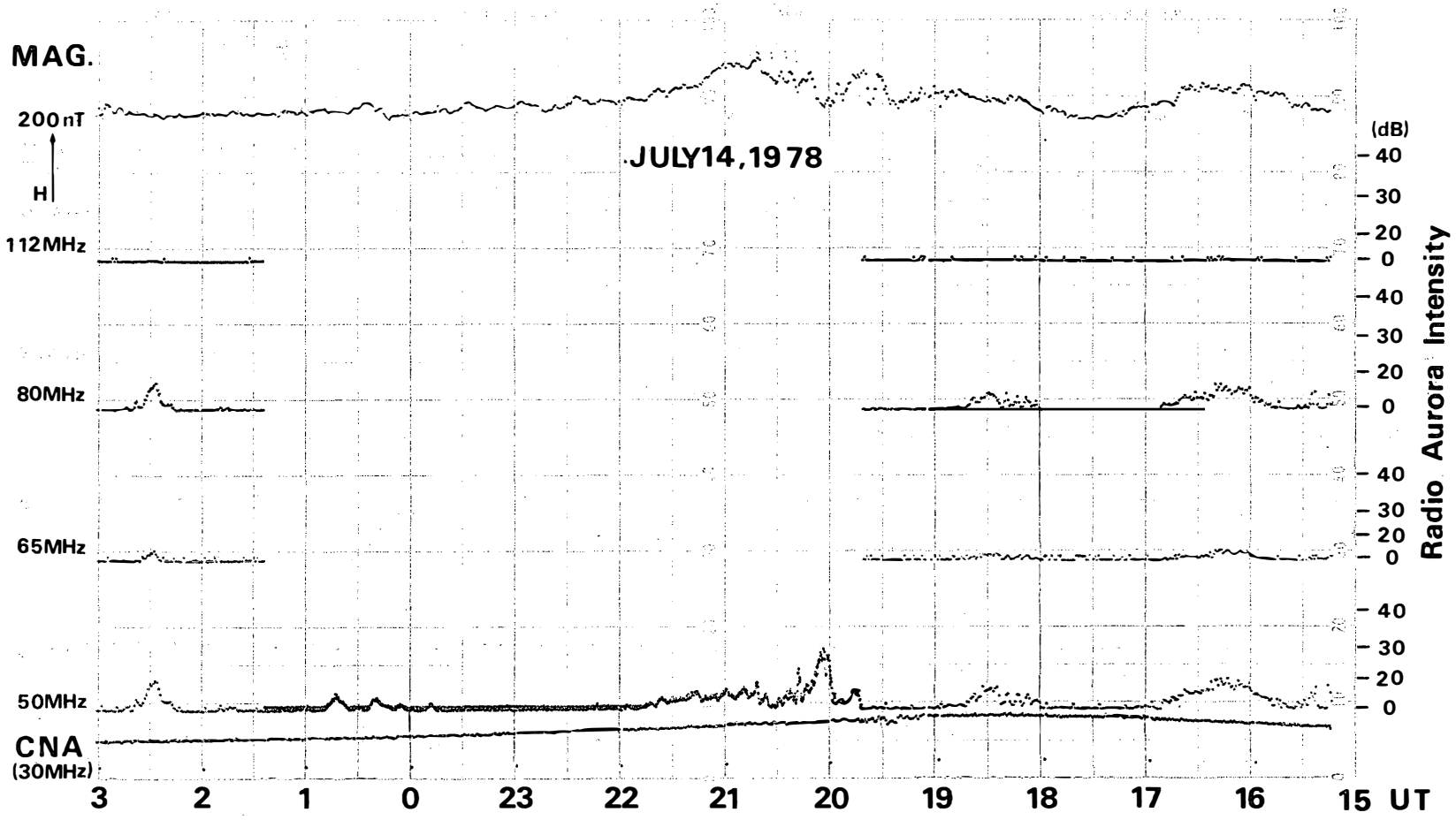

MAG.
200nT
H
JULY14,1978
112MHz
80MHz
65MHz
50MHz
CNA
(30MHz)
(dB)
40
30
20
0
Radio Aurora Intensity
3
2
1
0
23
22
21
20
19
18
17
16
15 UT

Fig.2 (7).

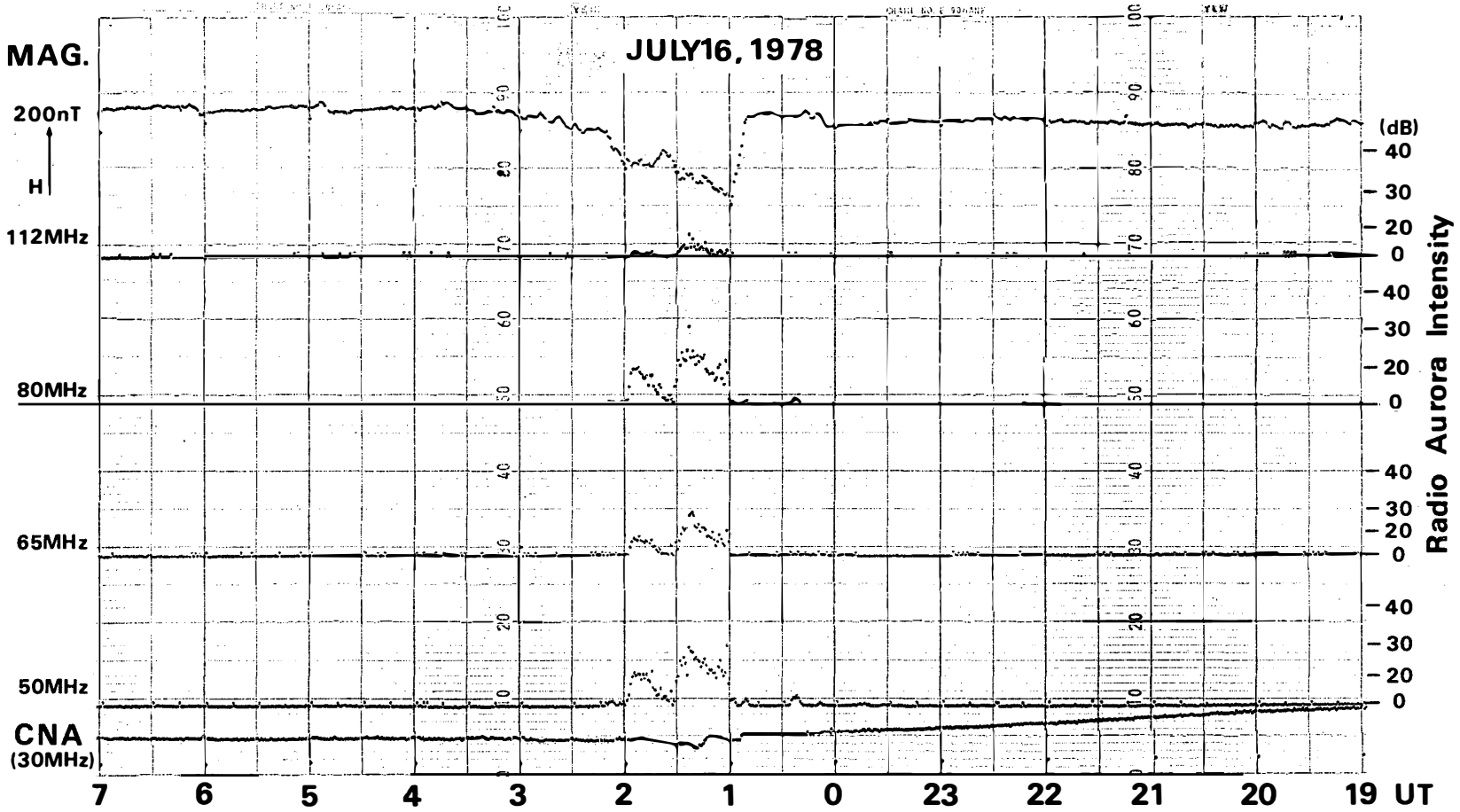

MAG.
200nT
H
JULY16, 1978
112MHz
80MHz
65MHz
50MHz
CNA
(30MHz)
(dB)
Radio Aurora Intensity
7
6
5
4
3
2
1
0
23
22
21
20
19 UT

Fig.2 (8).

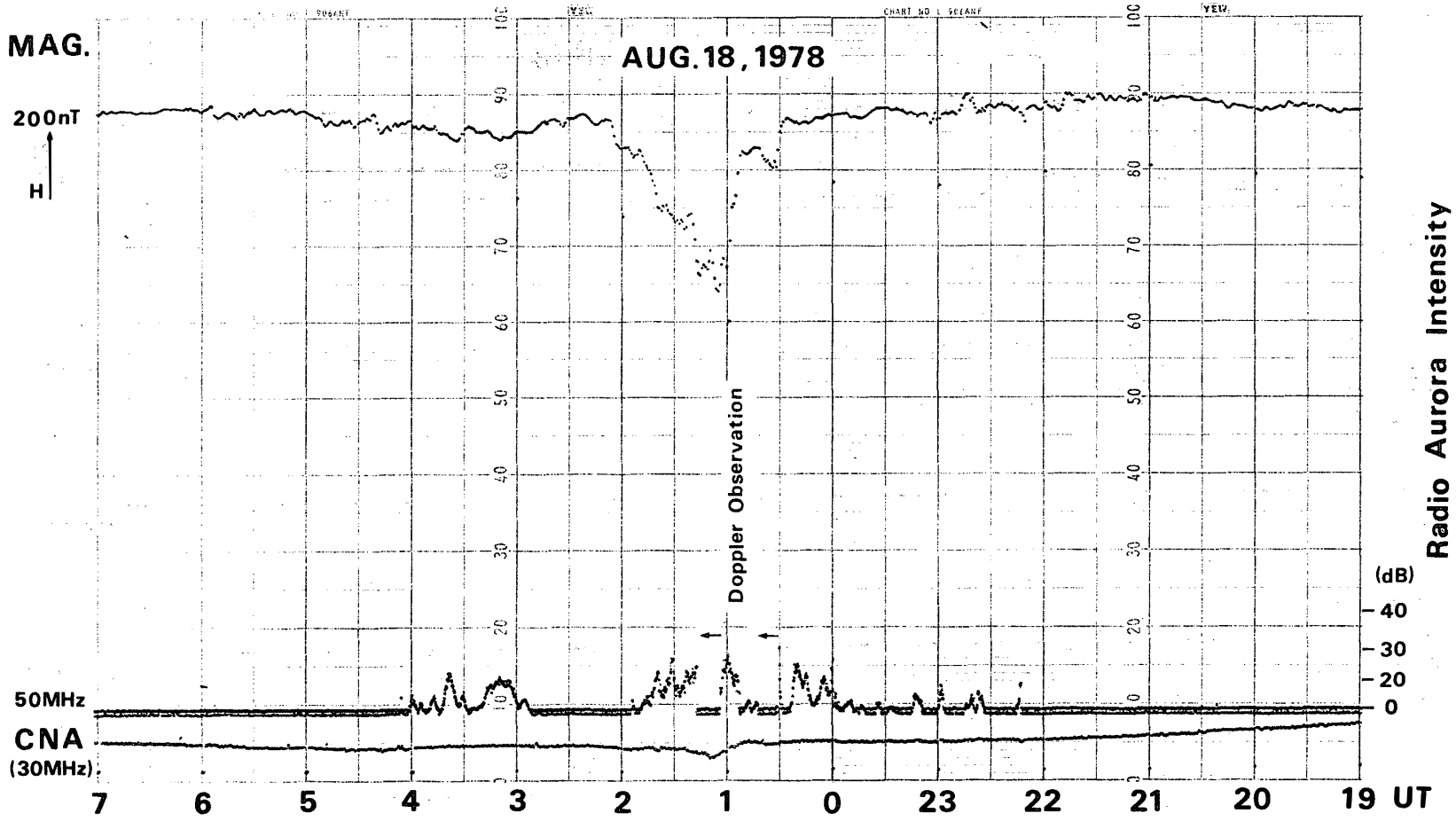

MAG.
AUG.18,1978
200nT
H
Doppler Observation
Radio Aurora Intensity
(dB)
40
30
20
0
50MHz
CNA
(30MHz)
7
6
5
4
3
2
1
0
23
22
21
20
19 UT

Fig.2 (9).

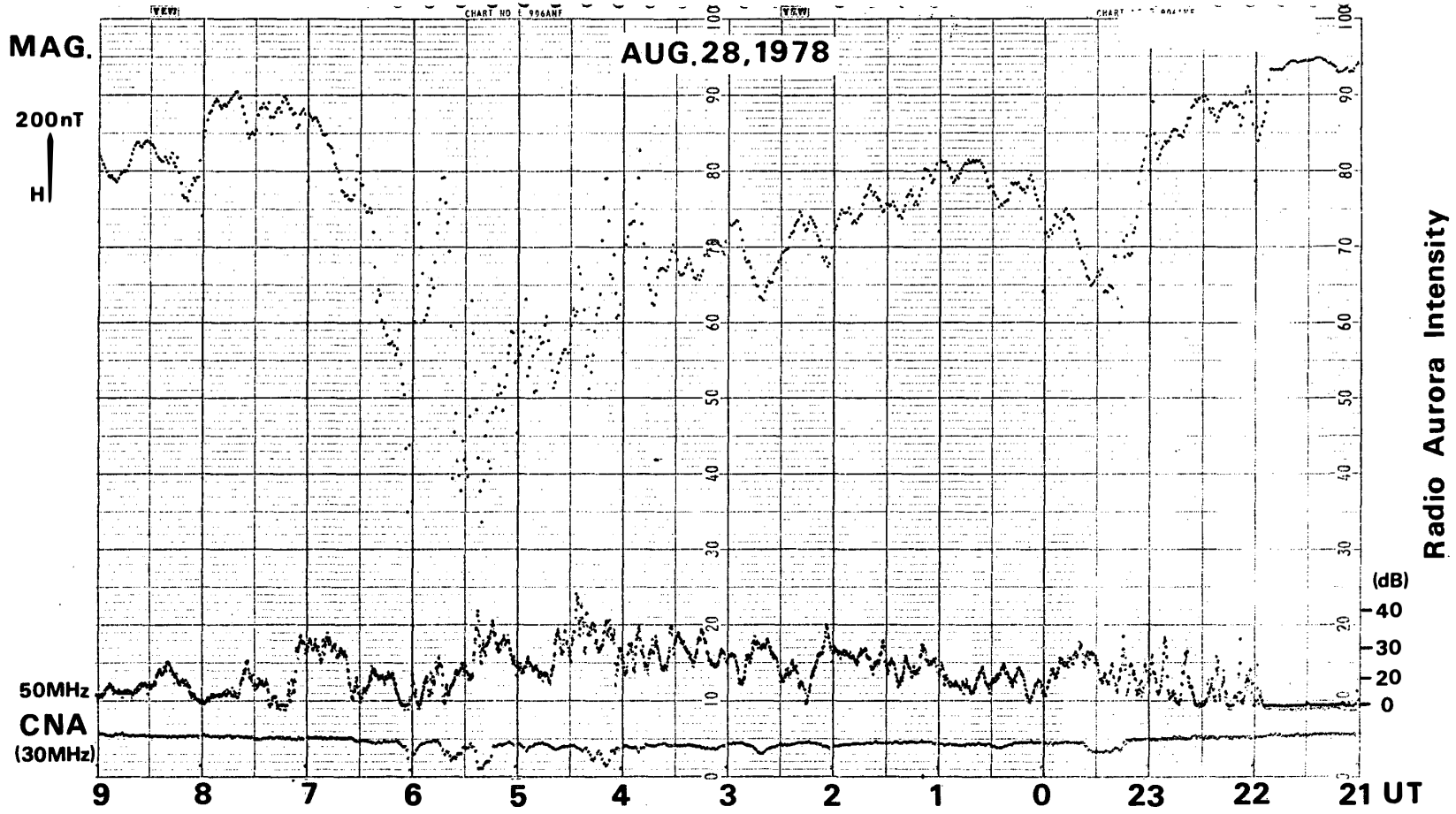

MAG.
AUG.28,1978
200nT
H
50MHz
CNA
(30MHz)
Radio Aurora Intensity
(dB)
40
30
20
0
9
8
7
6
5
4
3
2
1
0
23
22
21 UT

Fig.2 (10).