

RECORDS OF RADIO AURORA AT SYOWA STATION,

ANTARCTICA IN 1980

Kiyoshi Igarashi and Kenrou Nozaki

(Radio Research Laboratories, Koganei-shi, Tokyo)

1. Introduction

Observation of ionospheric irregularities has been carried out at Syowa Station, Antarctica, by means of an auroral radar since March 1966. A report has been prepared which includes the periods of radio auroral echoes detected in 1980 and characteristic examples of echo intensity-time variation.

Inquiries about details 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.

Three kinds of data are available: a) 35 mm film records of radio auroral echo intensity with range (A-scope), b) 35 mm film records of range-time intensity (A'-scope), and c) chart records of the time variation of echo intensity.

2. Location

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

### 3. Observers

Kiyoshi Igarashi        (Radio Research Laboratories)  
Kenrou Nozaki            (Radio Research Laboratories)

### 4. Method of Measurement

In 1980, auroral radar was operated continuously with time sharing of the following frequencies 50, 65, 80 and 112 MHz in January and at a fixed frequency of 50 MHz from February to December. Transmitting and receiving antennas, each of which was a horizontally polarized 8-element Yagi-Uda, were directed towards the magnetic south. The geomagnetic dip angle is  $64^{\circ}55'$  so that the radar viewed the ionospheric E layer at about 300 km distant from Syowa Station.

The A-scope record was taken every 5 min. The A'-scope record and the chart record were made continuously throughout the day.

Characteristics of the system are as follows:

Transmitting antenna	(50 MHz)	(65 MHz)	(80 MHz)	(112 MHz)
Gain	: 12.3 dB	12.4 dB	12.3 dB	12.3 dB
Directivity (Front/Back)	: 16 dB	15 dB	14 dB	14 dB
Receiving antenna	(50 MHz)	(65 MHz)	(80 MHz)	(112 MHz)
Gain	: 12.4 dB	12.3 dB	12.2 dB	12.3 dB
Directivity (Front/Back)	: 15 dB	15 dB	14 dB	14 dB

#### Main equipment

Frequency : 50, 65, 80 and 112 MHz (January)  
          : 50 MHz (February - December)  
Transmitting power : 20 kW (peak)  
Modulation : Single pulse  
Pulse width : 100  $\mu$ s  
Pulse repetition frequency : 50 Hz  
Receiver bandwidth : 25 kHz  
Receiver noise figure : less than 4 dB

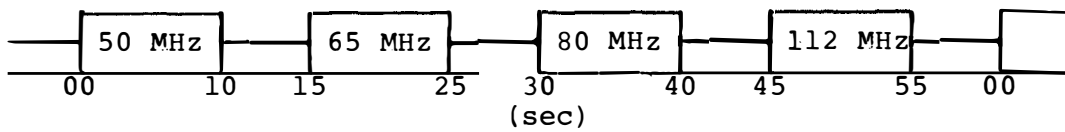
Display and recorder

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

Maximum range : 1000 km  
Range mark : every 100 km

Operating schedule

The following frequency-time schedule was automatically repeated every minute during January.



5. Explanation of Diagrams Contained in the Report

Figs. 1(1-12) show the periods of radio auroras and operation status of the auroral radar. Time used in 45° EMT (= UT + 3 h).

Symbols used in the figures are as follows:

- : occurrence of radio aurora
- ← C → : no observation
- Blank : no radar echo.

Figs. 2(1-12) show the typical examples of radio auroral echo intensity at the frequency of 50 MHz with the simultaneously recorded geomagnetic H-component and the 30 MHz cosmic noise absorption detected by riometer. Fig. 2(1) includes also the radio auroral intensity at 80 MHz.

Bibliography relevant to  
records of radio aurora at Syowa Station, Antarctica.

Observing period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
Mar. 1966 - Jan. 1968	Ose, M. Hasegawa, S. Takeuchi, T. Nishimuta, I. Isobe, T.	5 (Ionosphere 2)	64	1969
Apr. 1970 - Feb. 1971	Shiro, I. Sakamoto, T.	15 (Ionosphere 6)	34	1972
Feb. 1972 - Dec. 1972	Isozaki, S. Miyazaki, S.	23 (Ionosphere 10)	22	1974
Feb. 1973 - Jan. 1974	Nishimuta, I. Yabuuma, H.	26 (Ionosphere 12)	23	1975
Mar. 1974 - Dec. 1974	Shiro, I. Yamazaki, I.	33 (Ionosphere 14)	89	1976
1975	Shiro, I. Sugiuchi, H. Komiya, N.	37 (Ionosphere 16)	105	1977
1976	Shiro, I. Yamakoshi, A. Sasaki, T.	42 (Ionosphere 18)	105	1978
Apr. 1978 - Dec. 1978	Igarashi, K. Tsuzurahara, S.	53 (Ionosphere 21)	23	1980
Jan. 1979 - Dec. 1979	Igarashi, K. Ojima, S. Komiya, N.	58 (Ionosphere 23)	28	1980

# January 1980

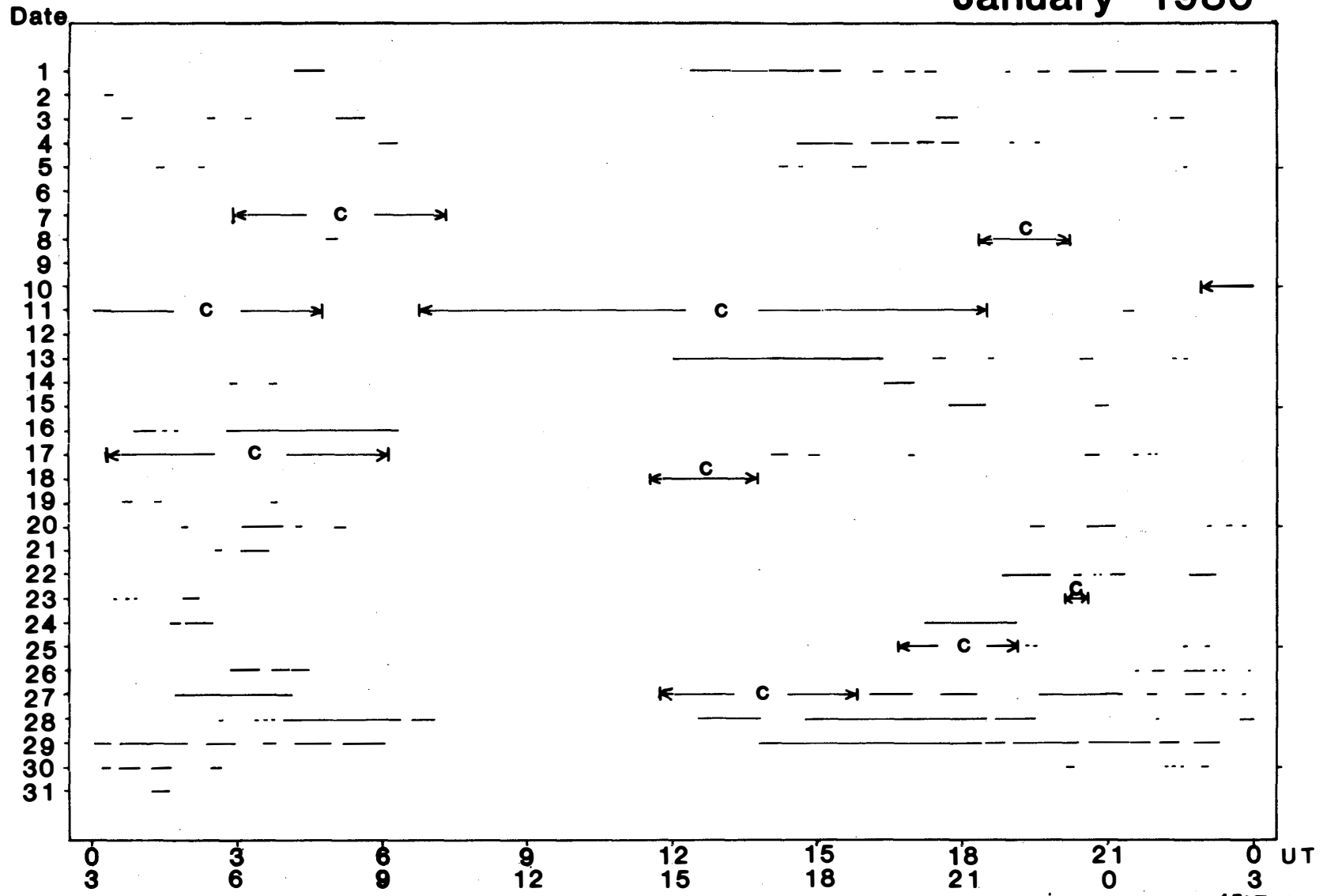


Fig.1 (1).

45° E.M.T.

February 1980

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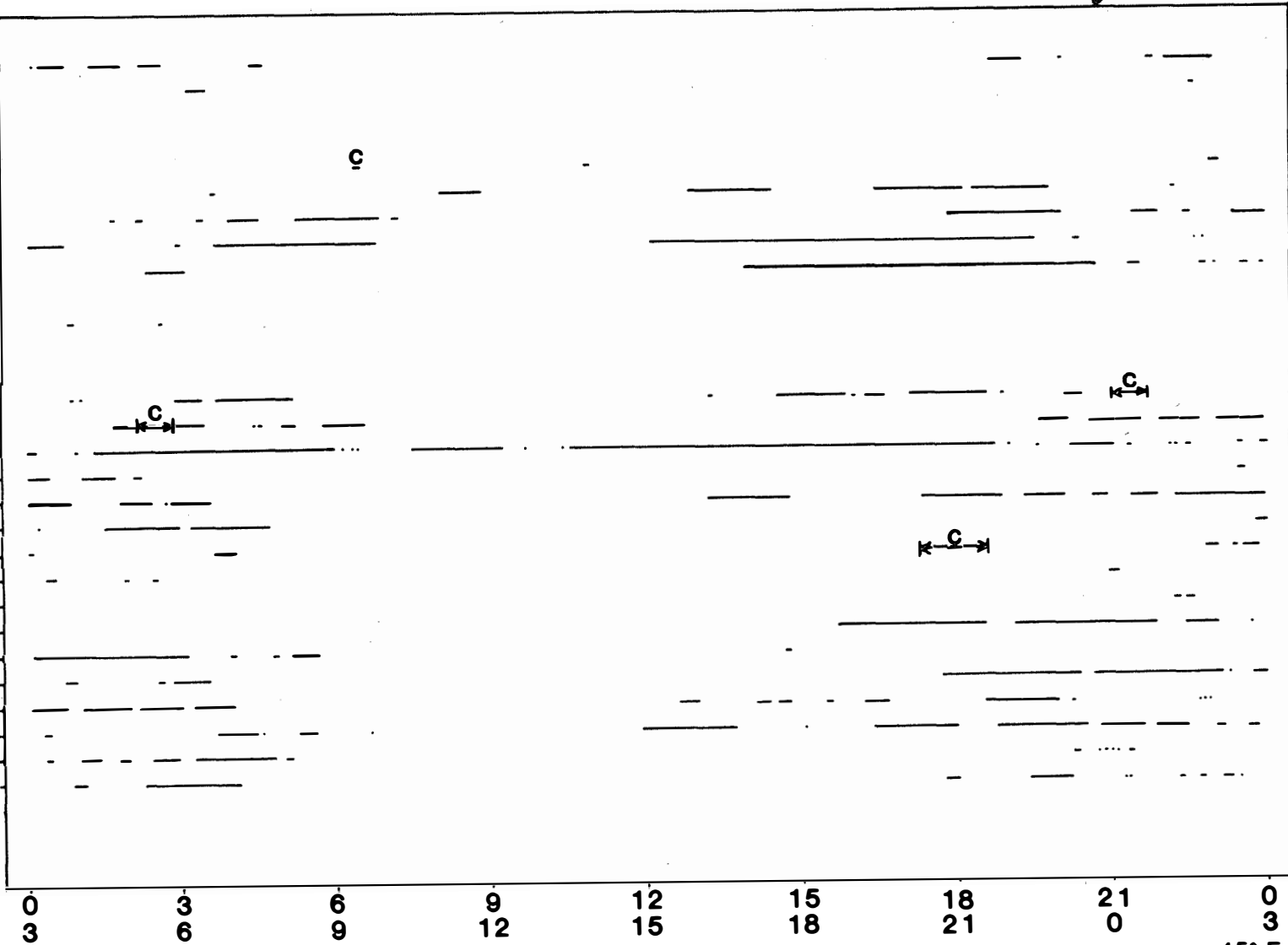


Fig.1 (2).

45° E.M.T.

March 1980

Date

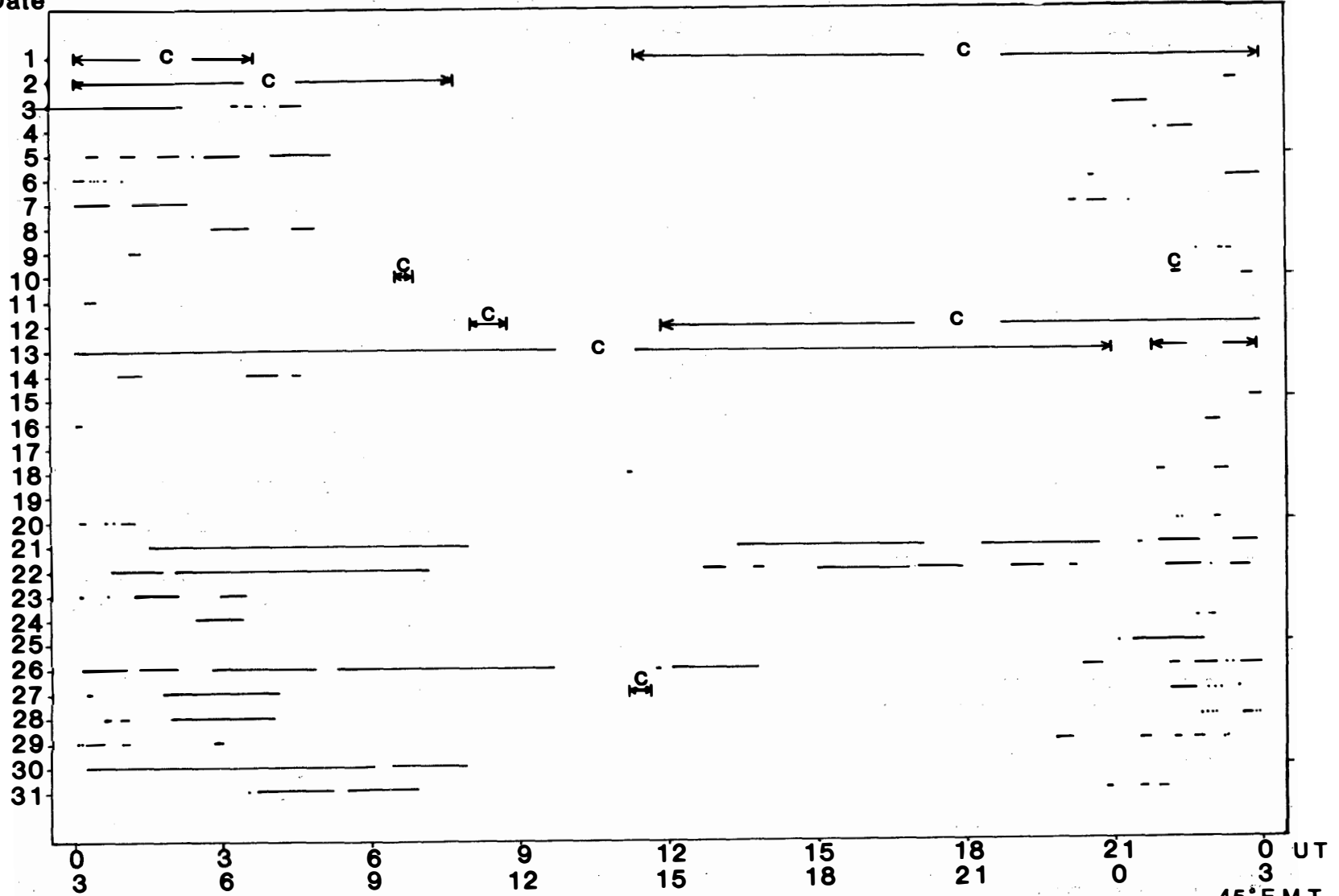


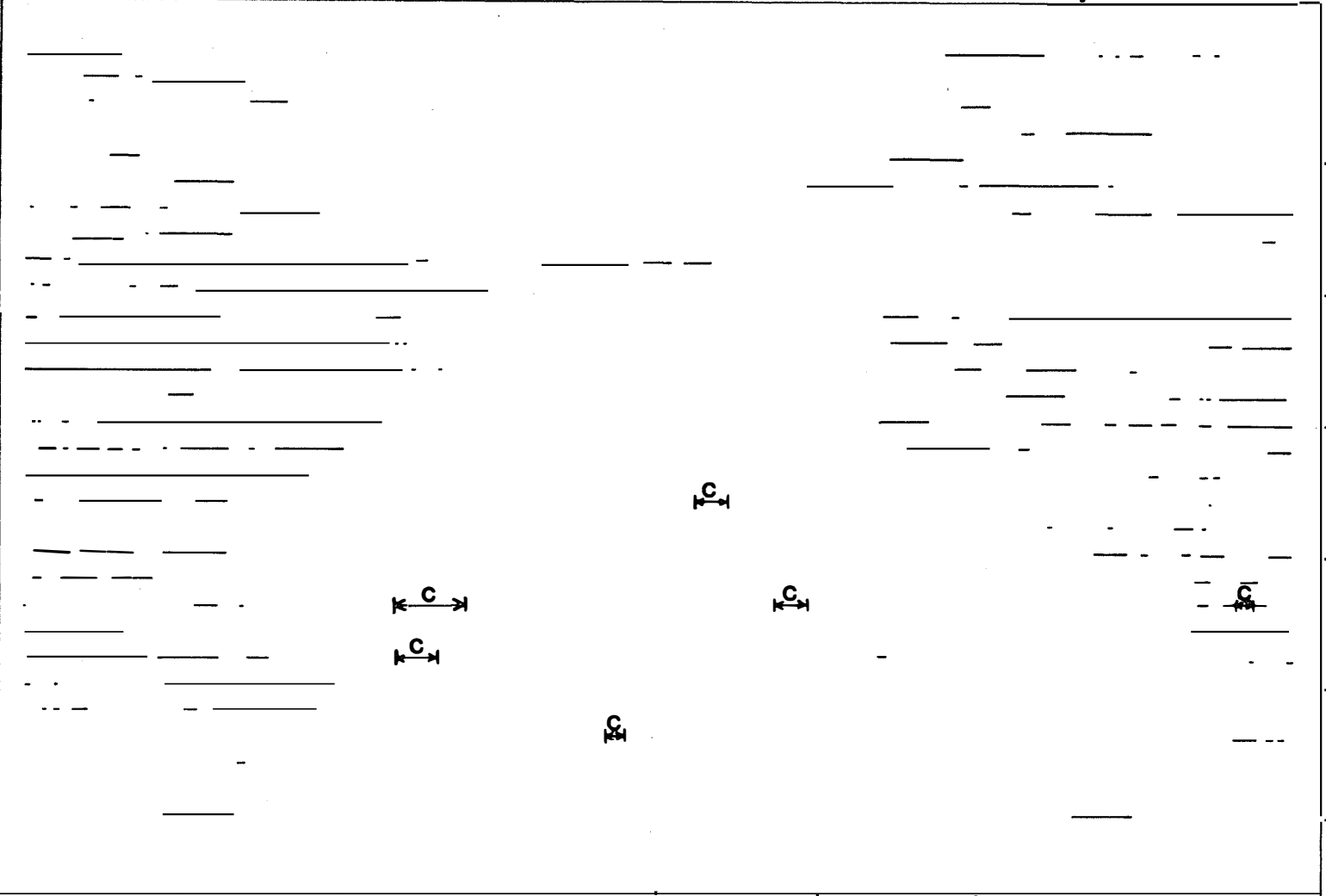
Fig.1 (3).

45° E.M.T.

April 1980

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3 6 9 12 15 18 21 0 3

45° E.M.T.

Fig.1 (4).

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May 1980

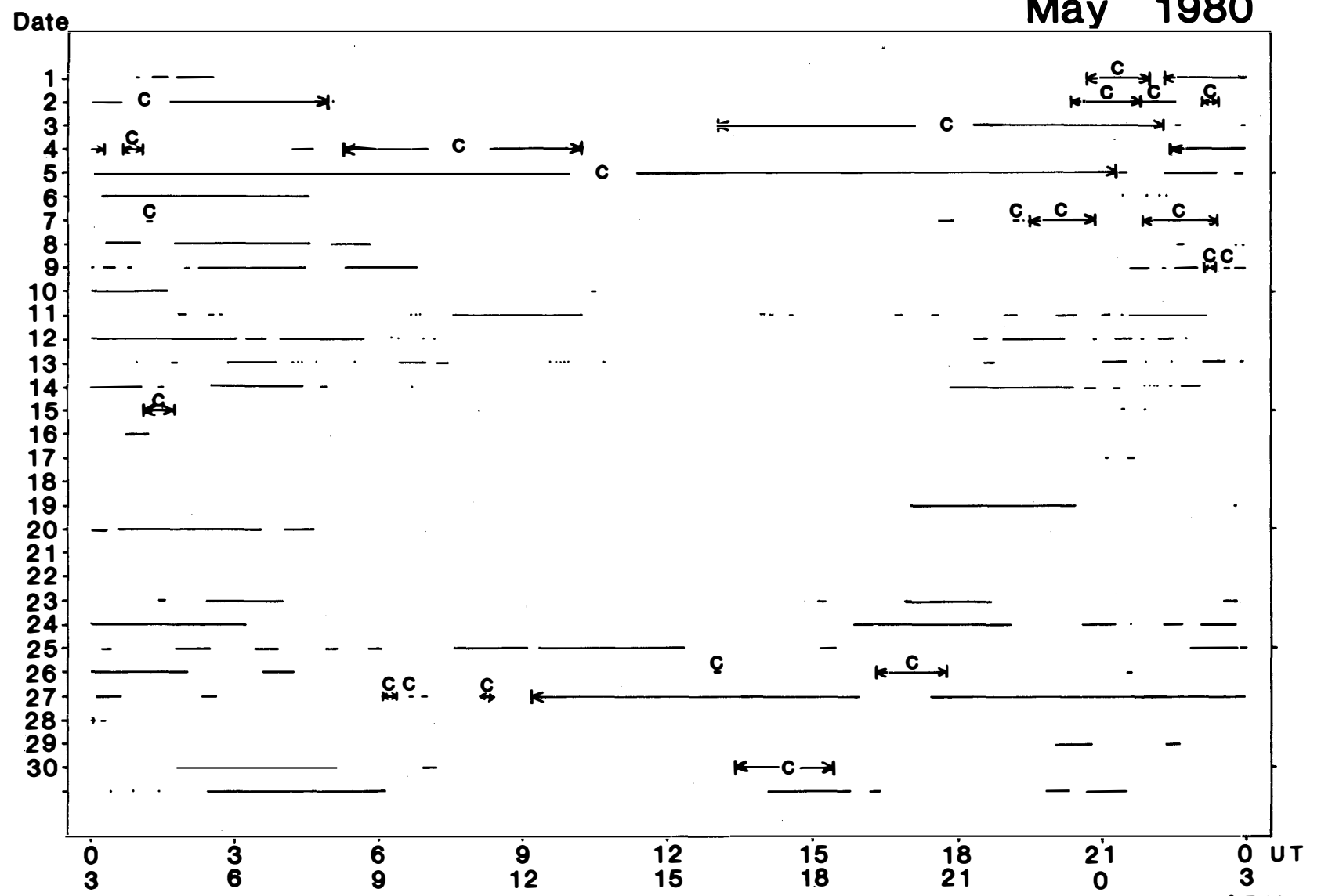


Fig.1 (5).

45° E.M.T.

June 1980

Date

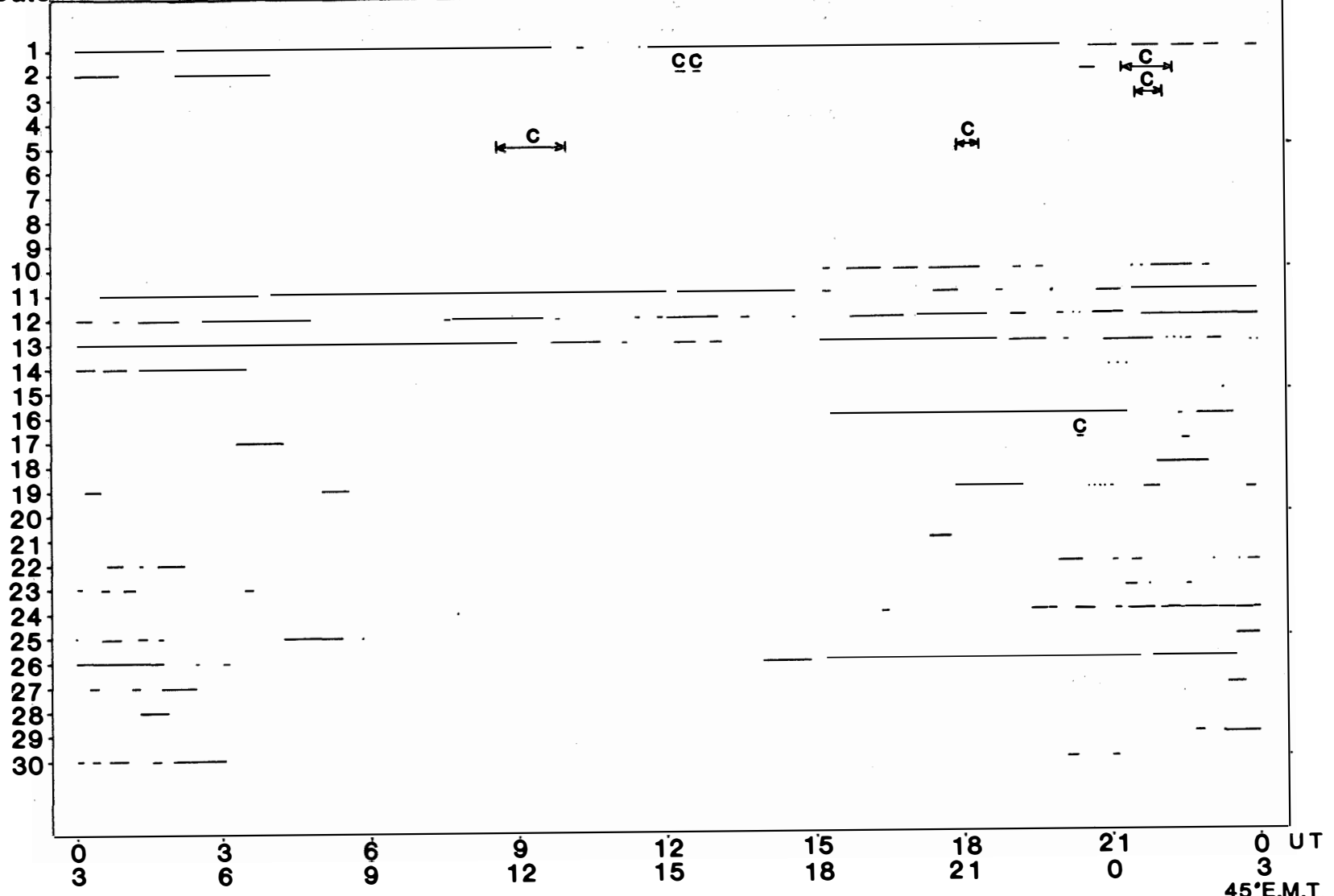


Fig.1 (6).

45°E.M.T.

July 1980

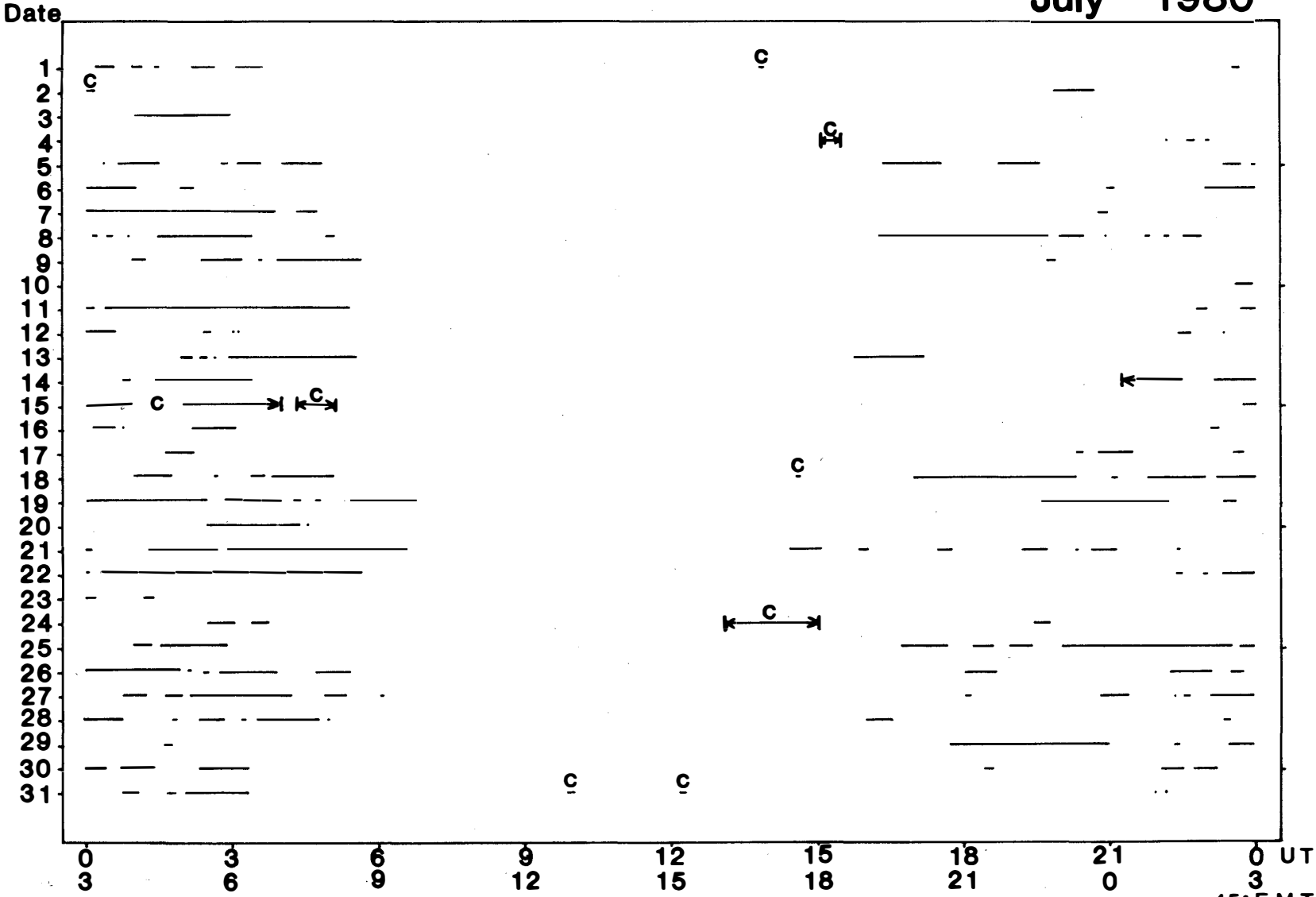


Fig.1 (7).

45° E.M.T.

August 1980

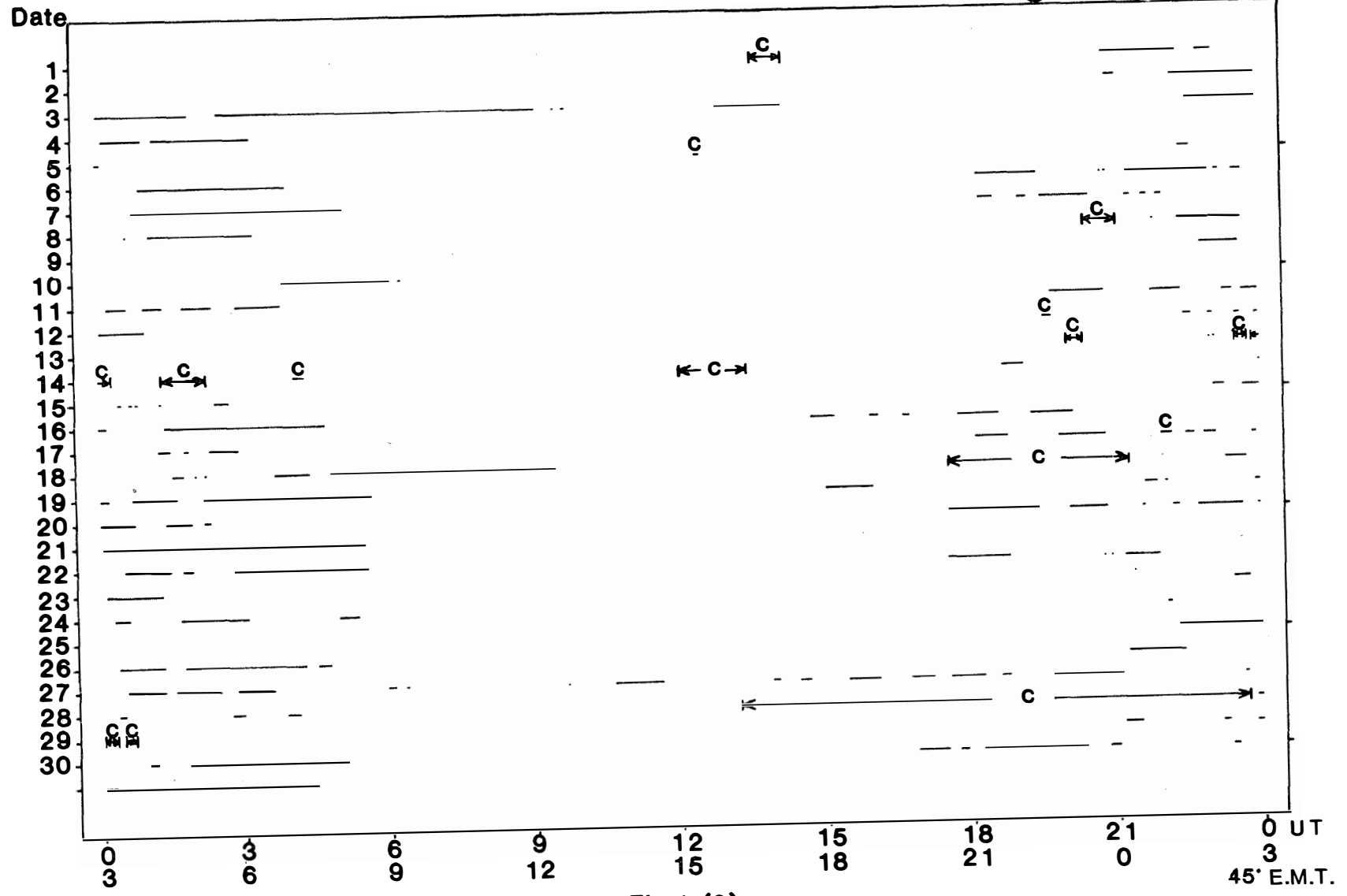


Fig.1 (8).

# September 1980

Date

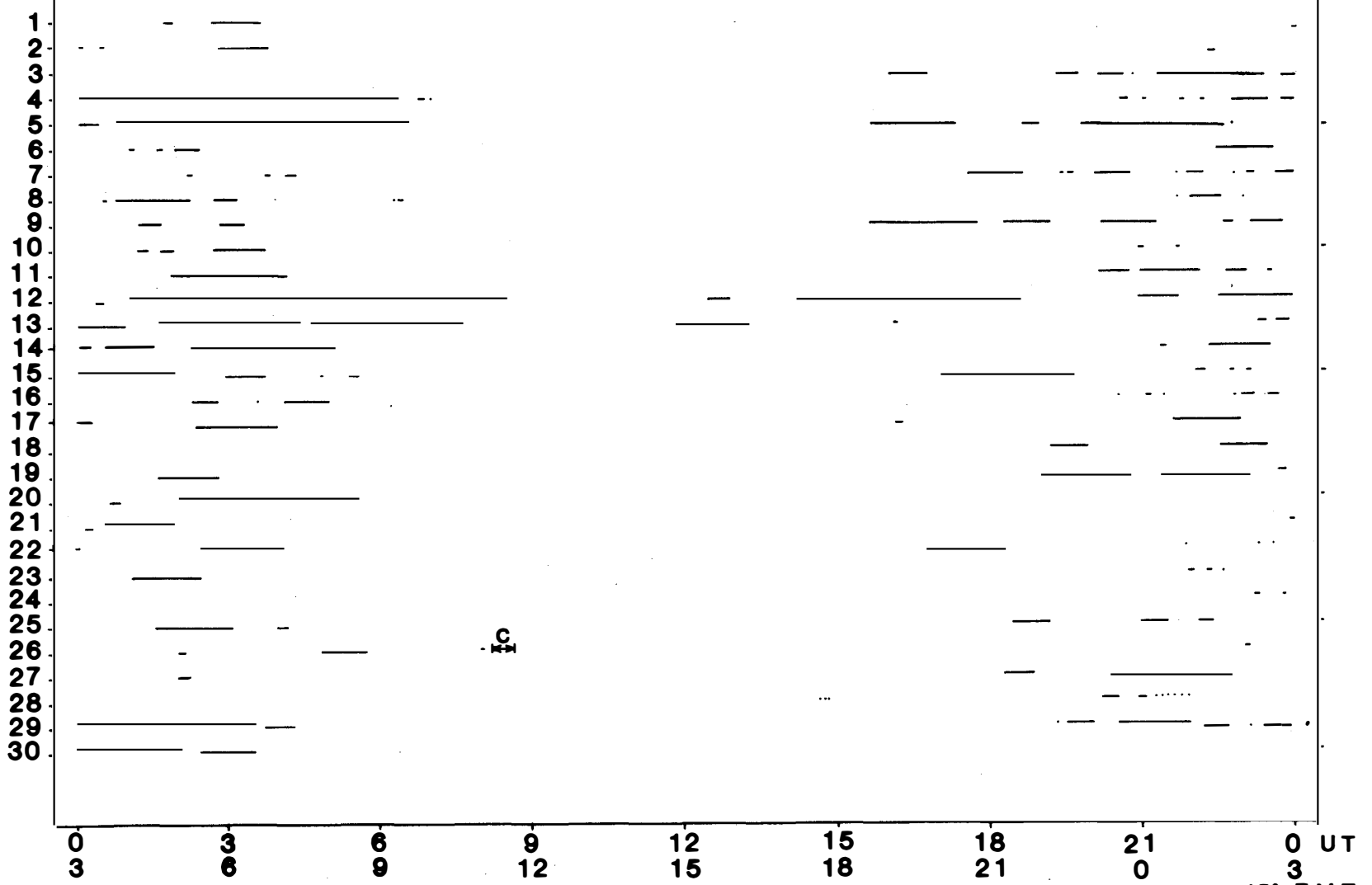


Fig.1 (9).

October 1980

Date

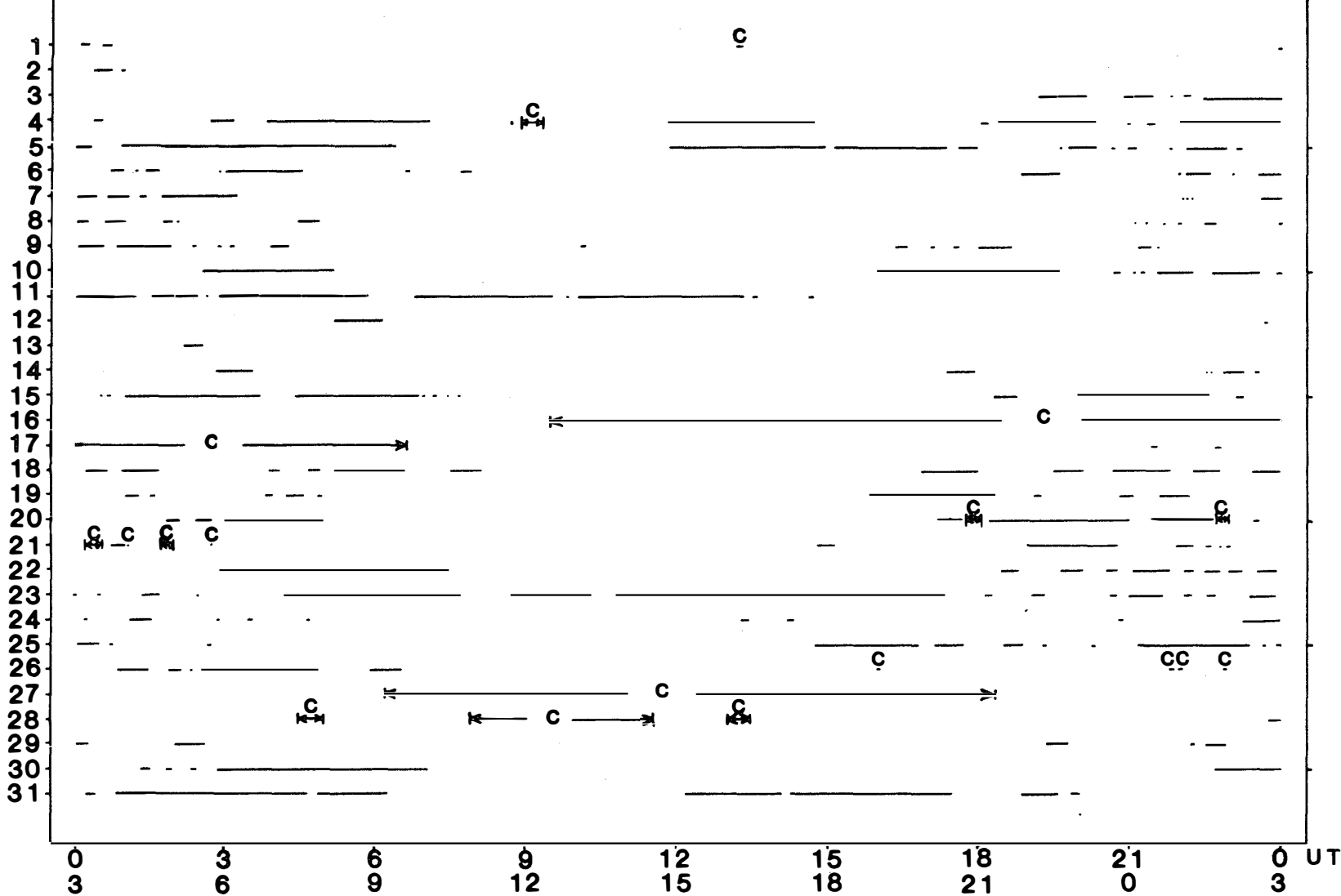


Fig.1 (10).

45°E.M.T.

# November 1980

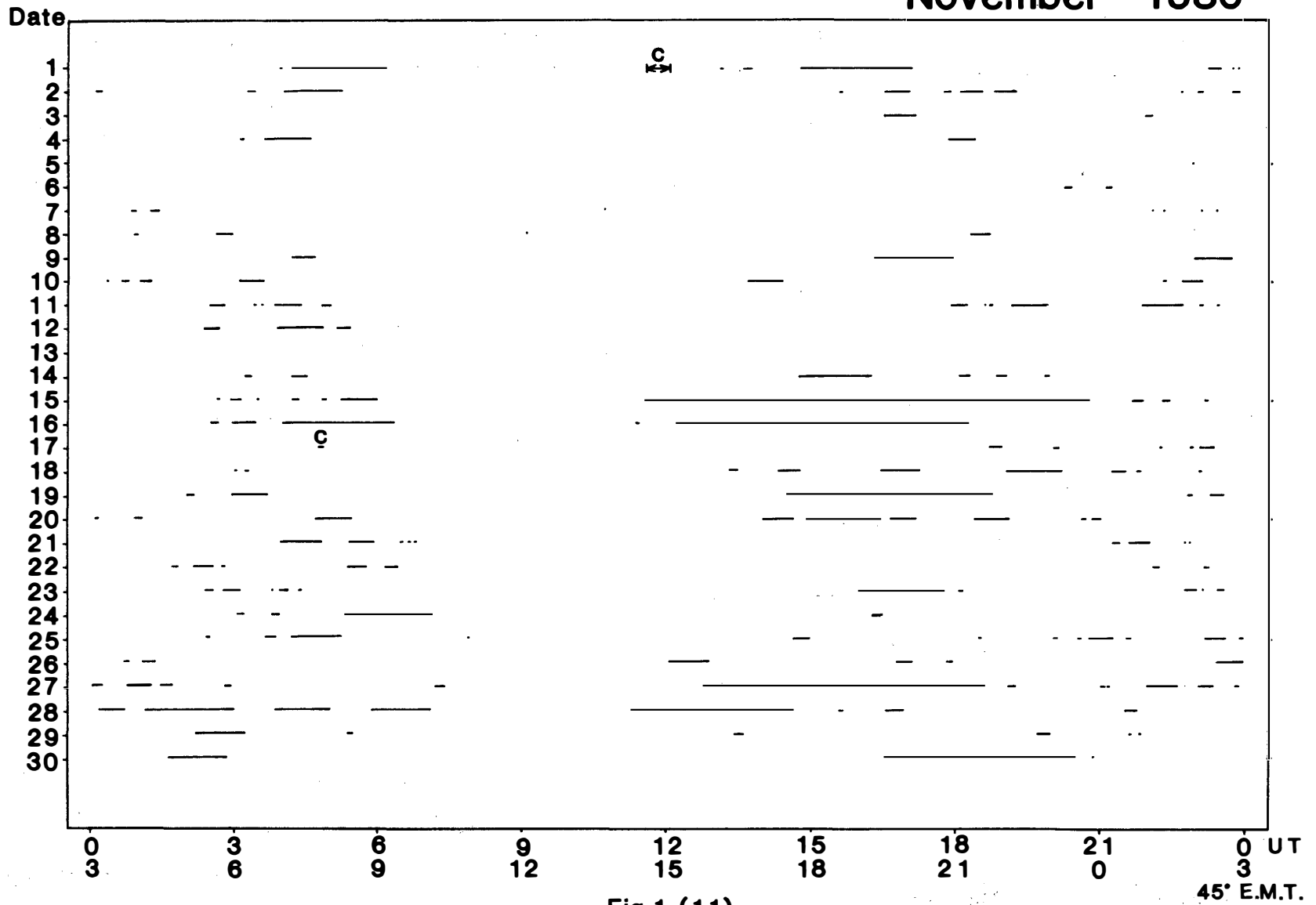


Fig.1 (11).

45° E.M.T.

# December 1980

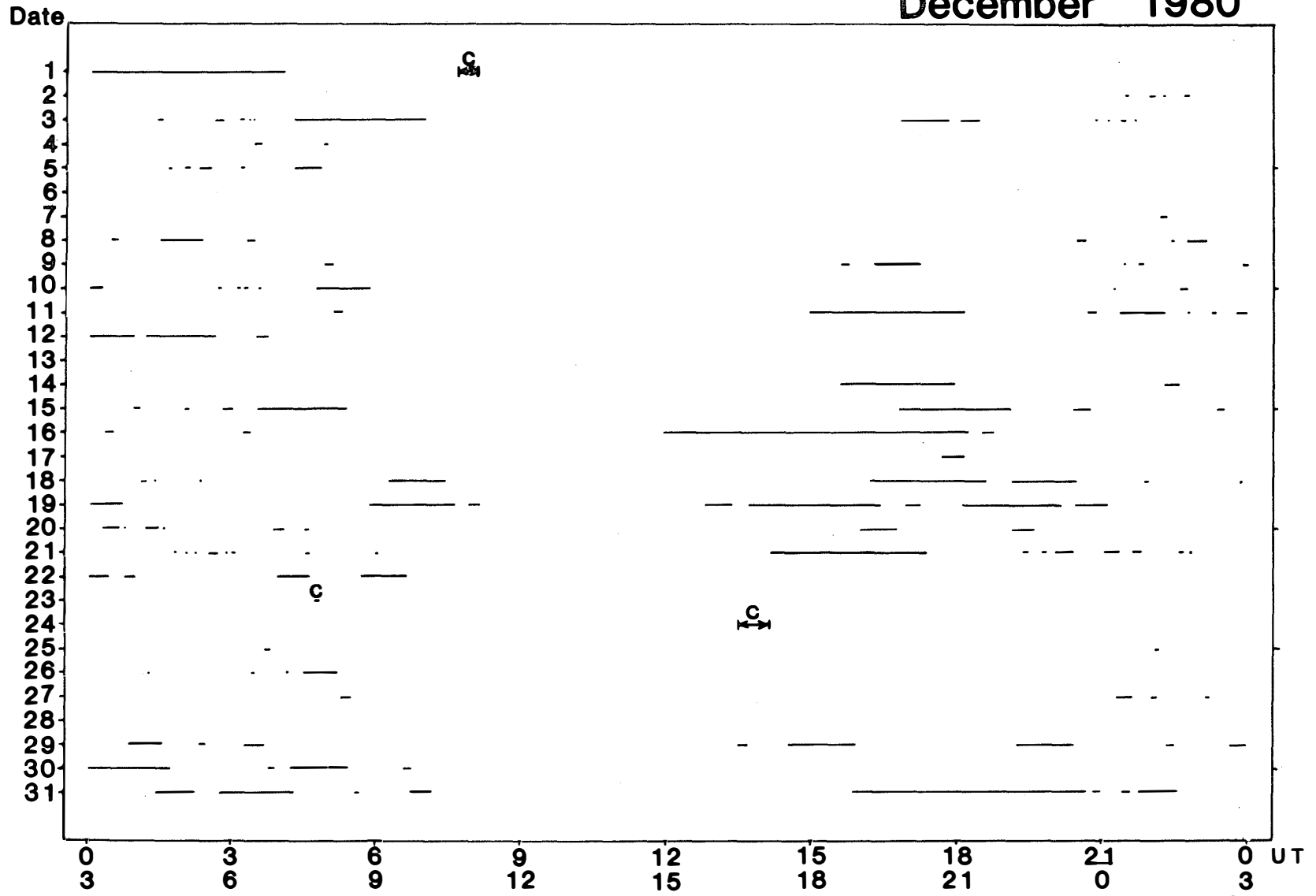


Fig.1 (12).



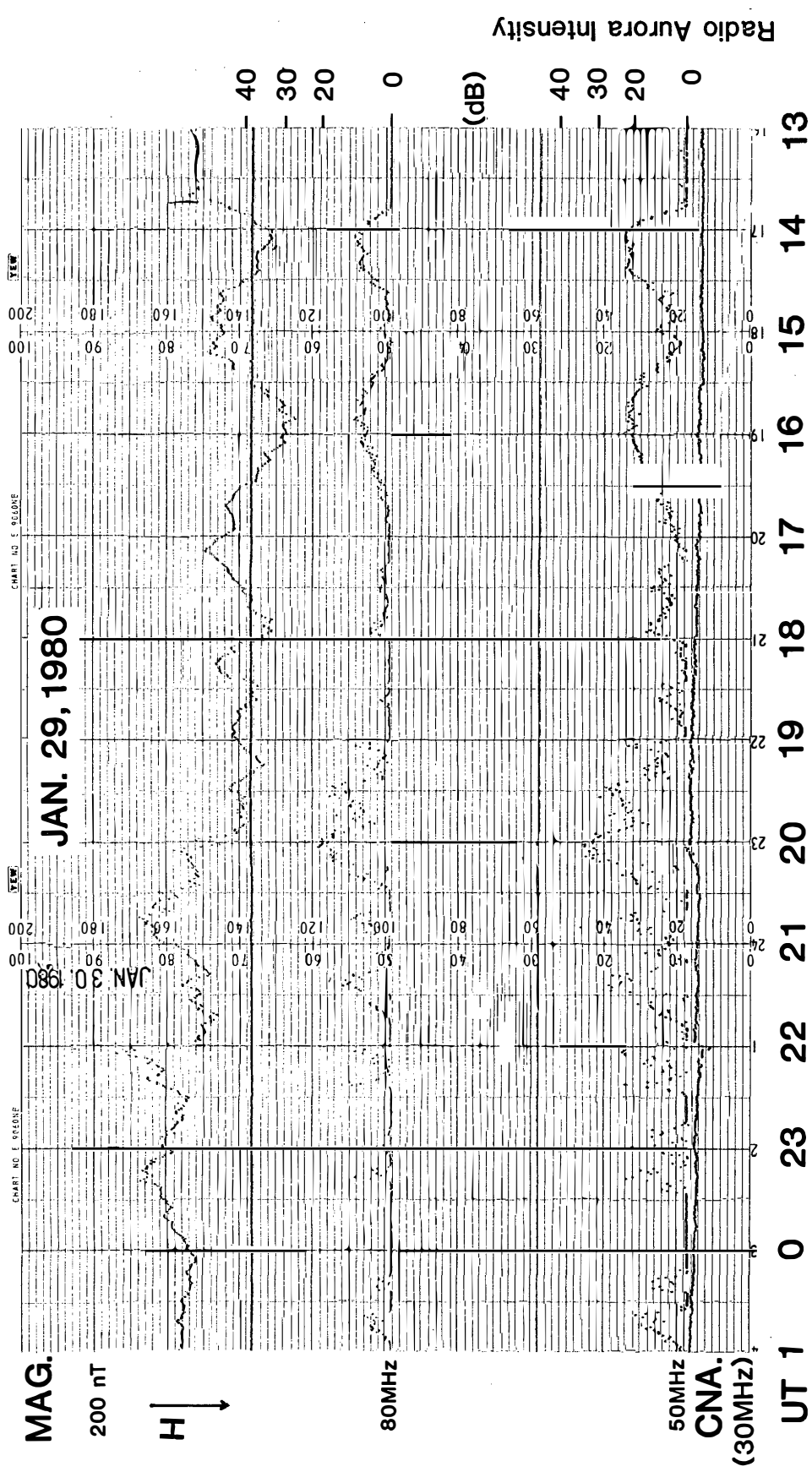


Fig.2 (1).

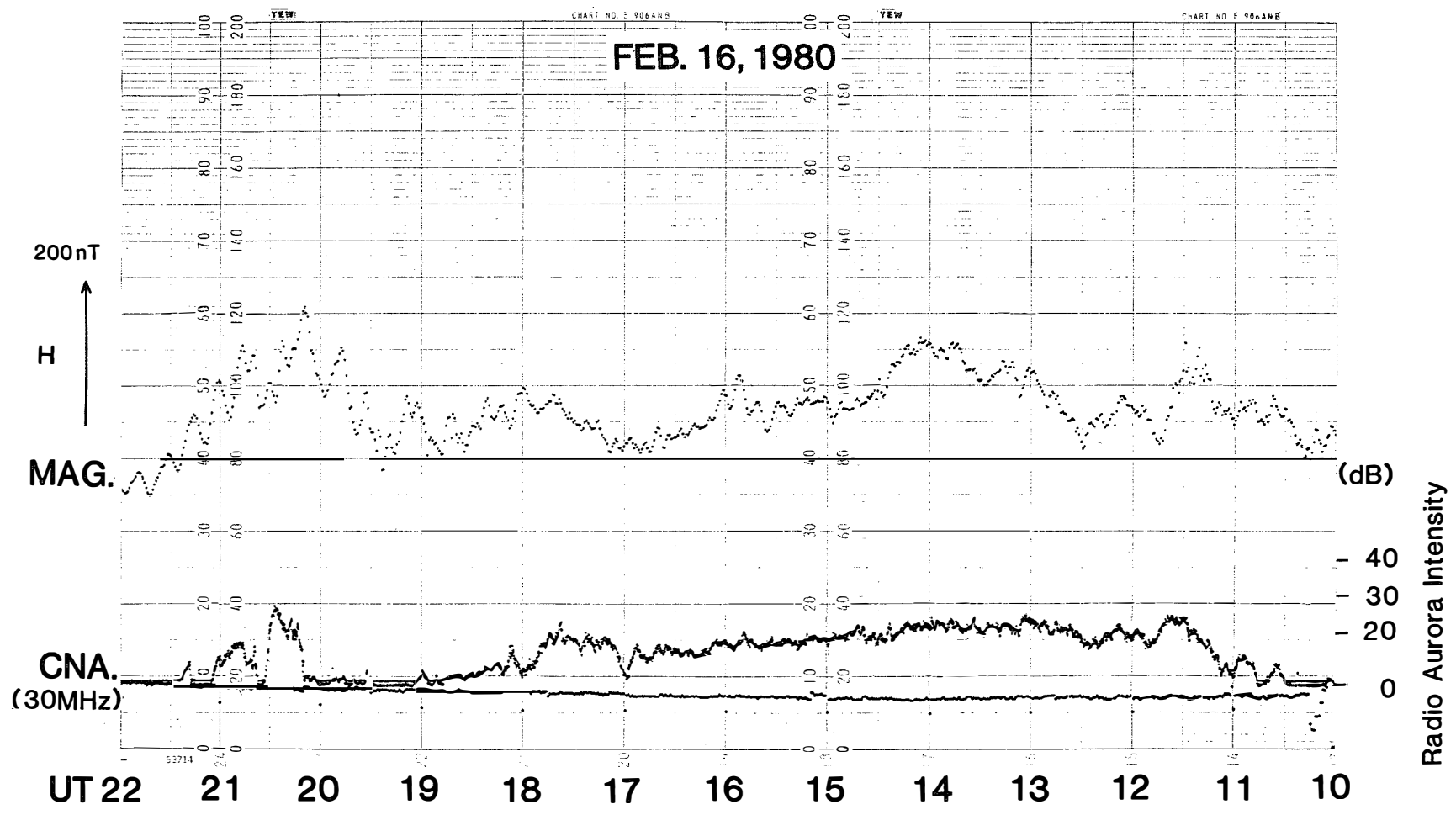


Fig.2 (2).



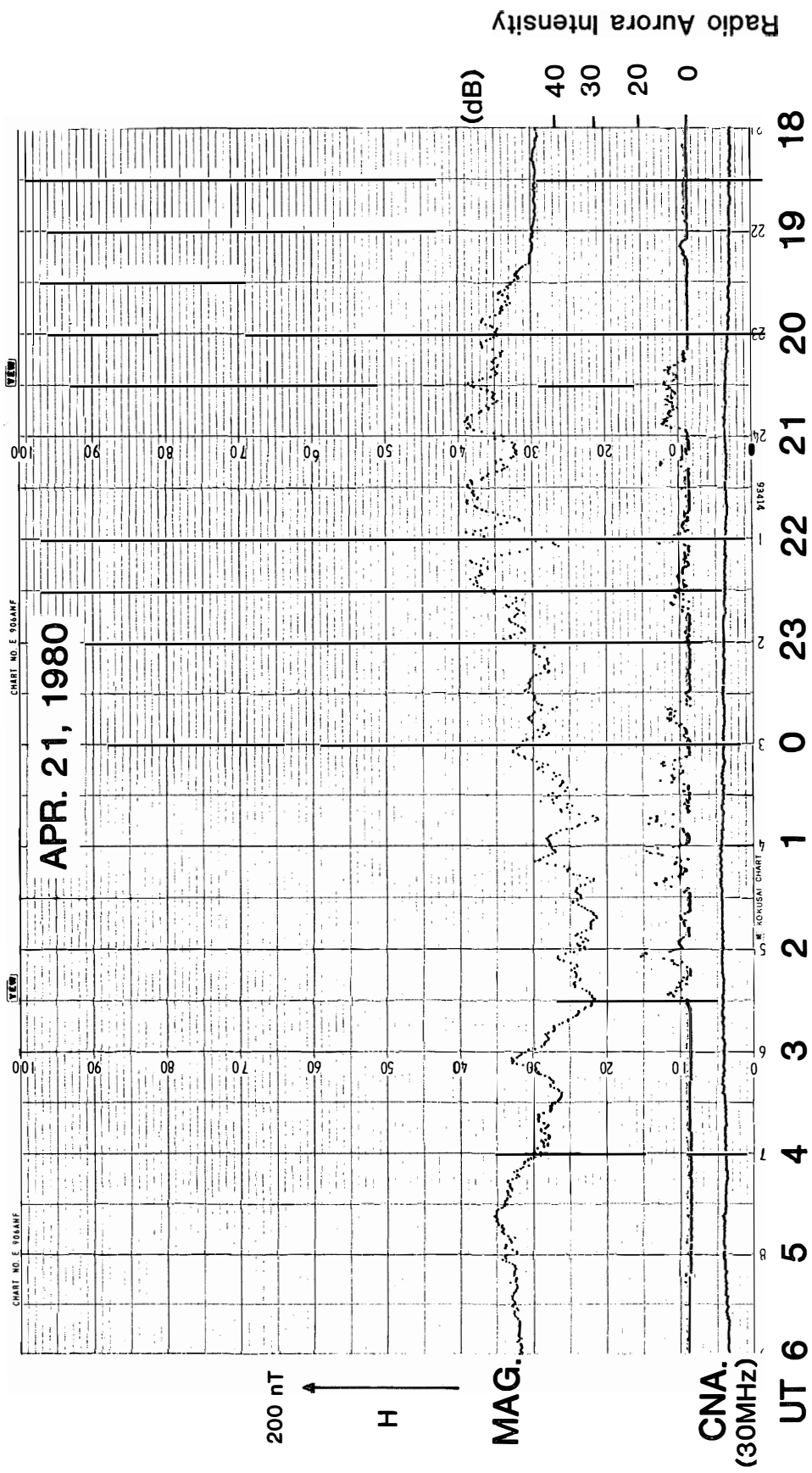


Fig.2 (4).

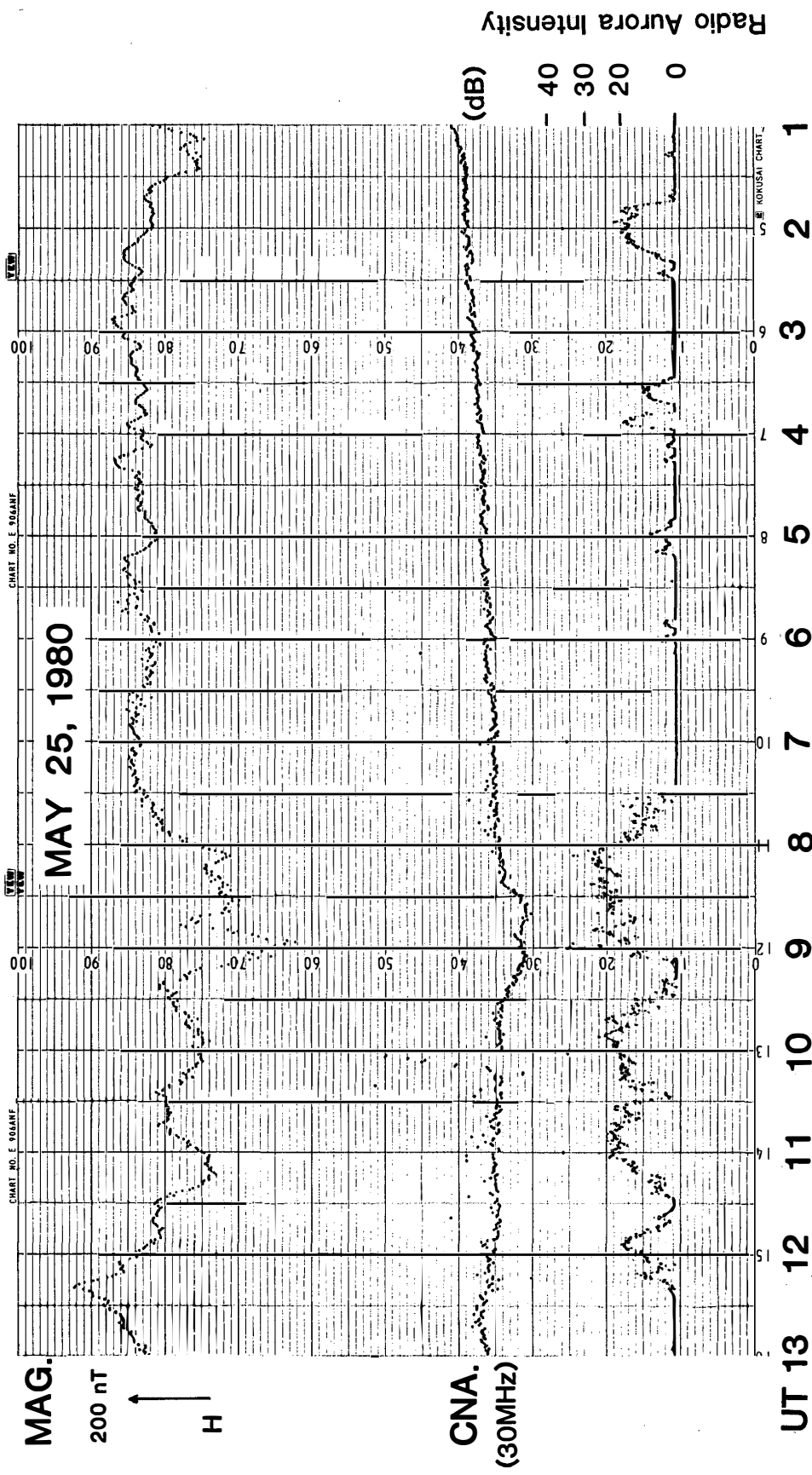


Fig.2 (5).

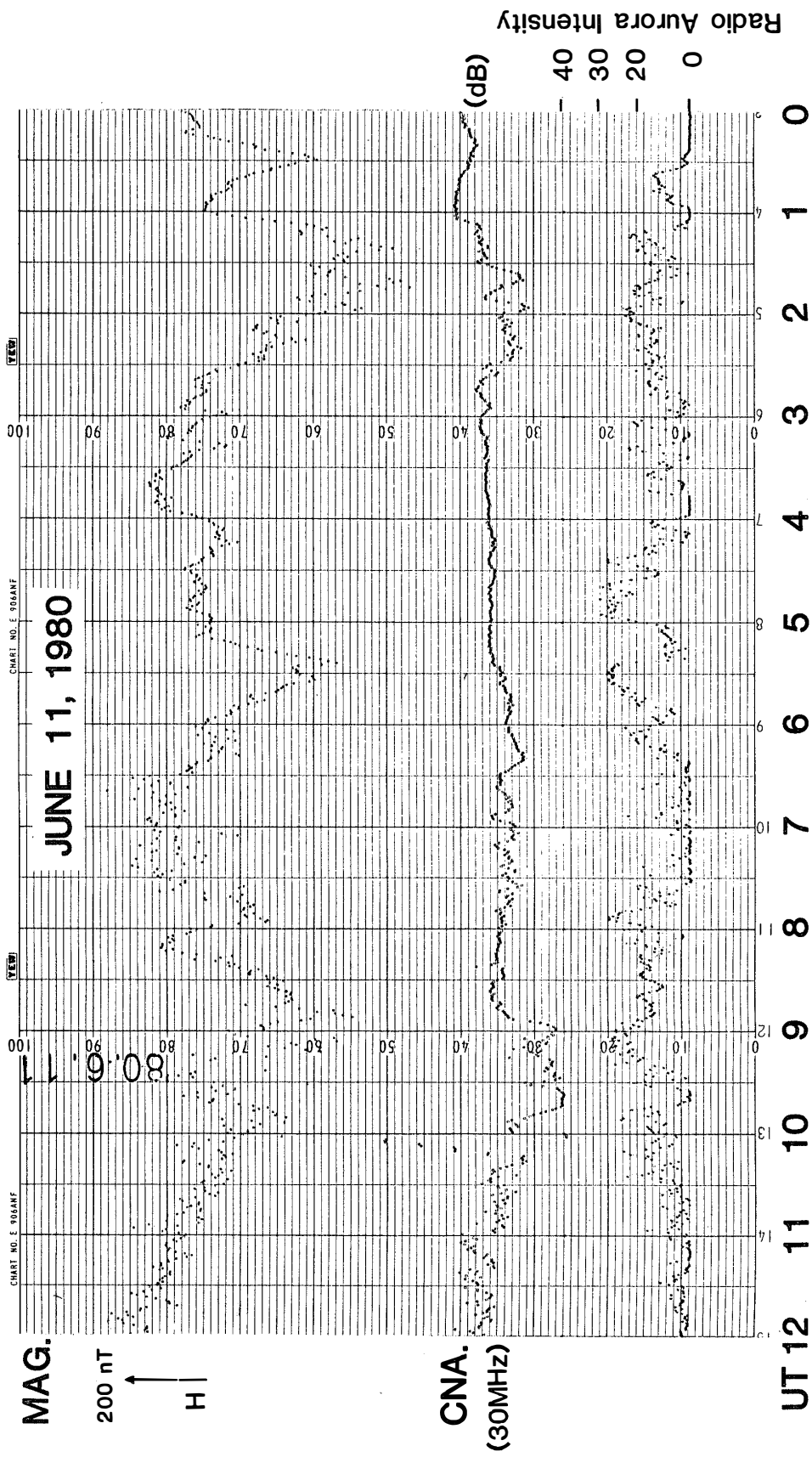


Fig.2 (6).

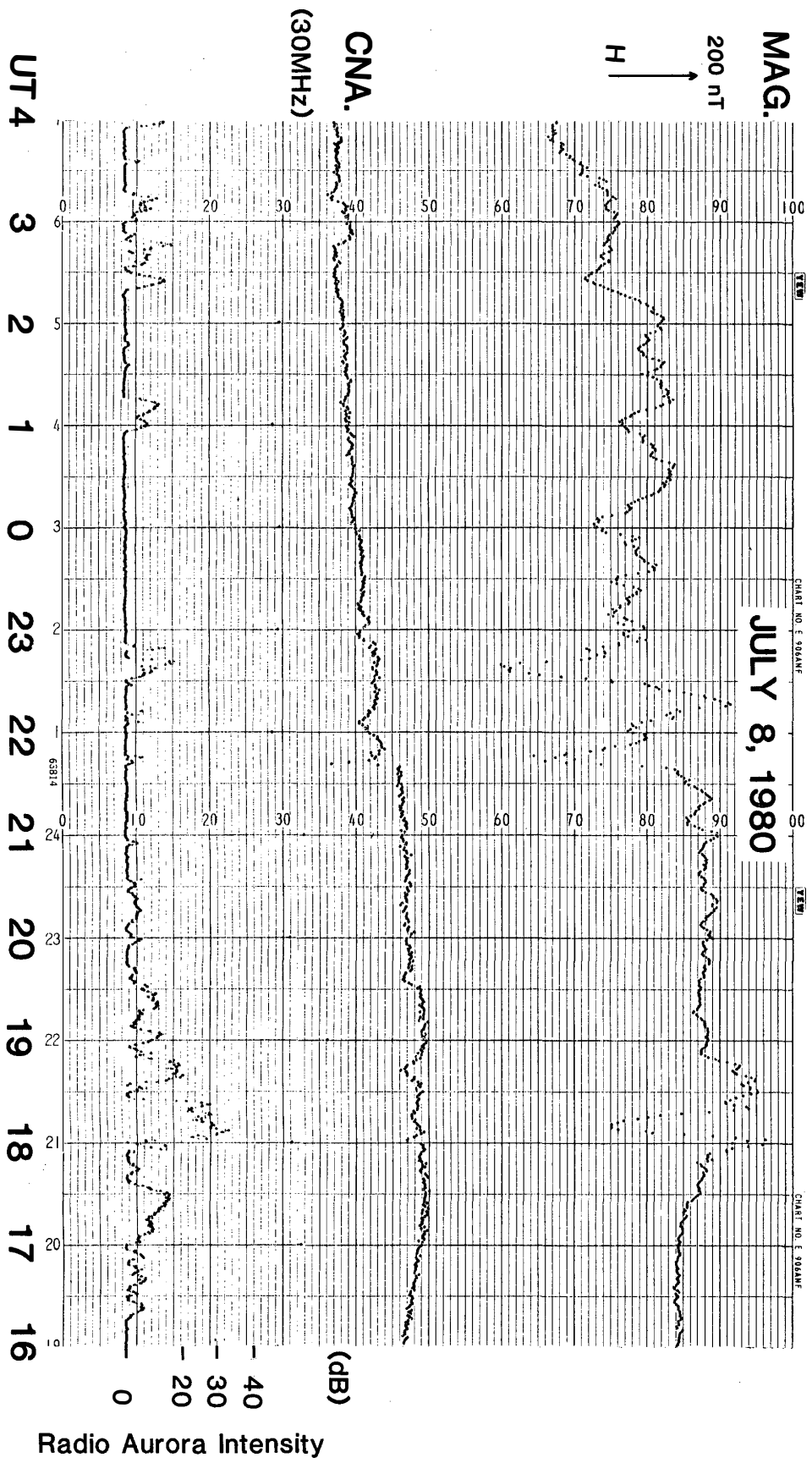


Fig.2 (7).

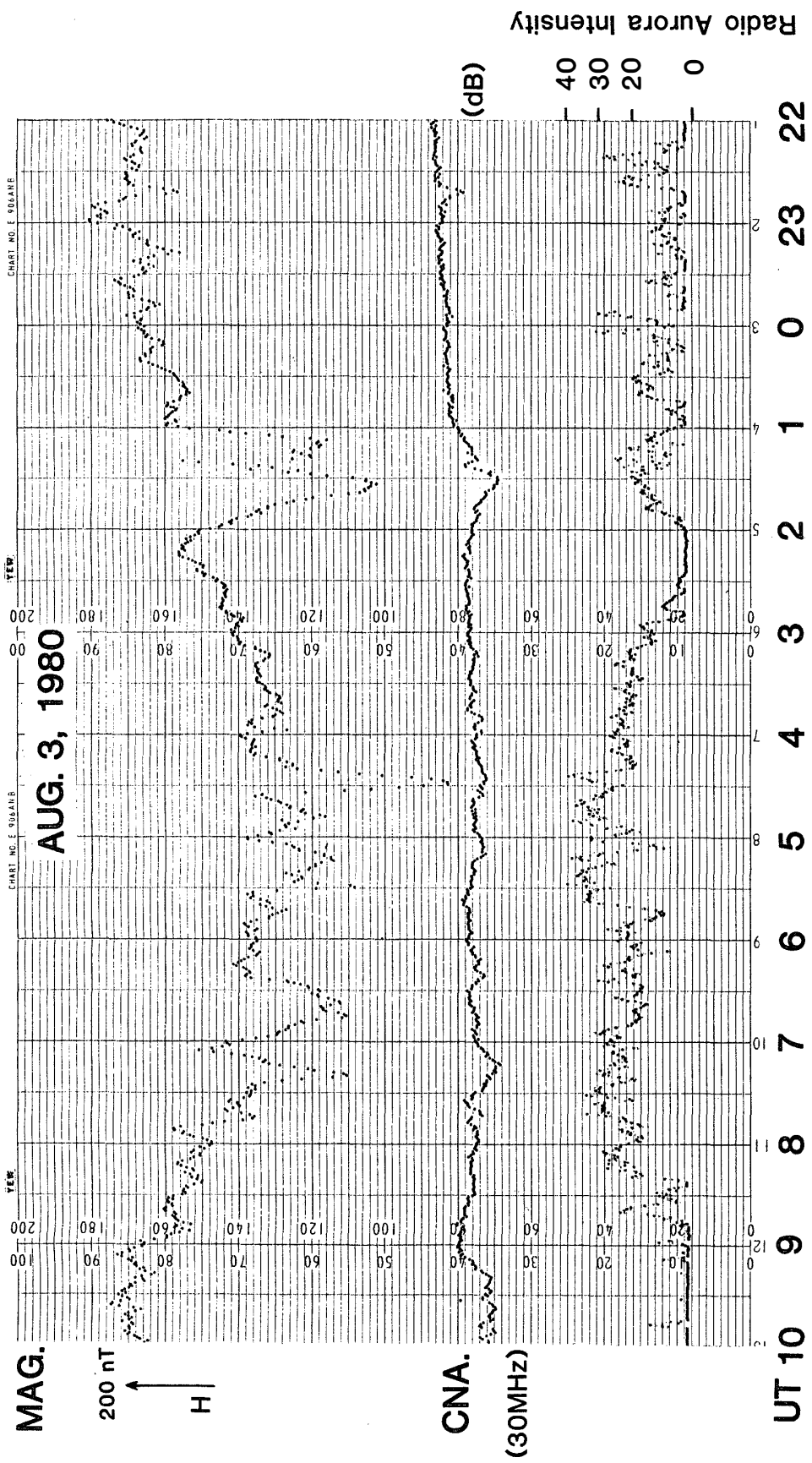


Fig.2 (8).



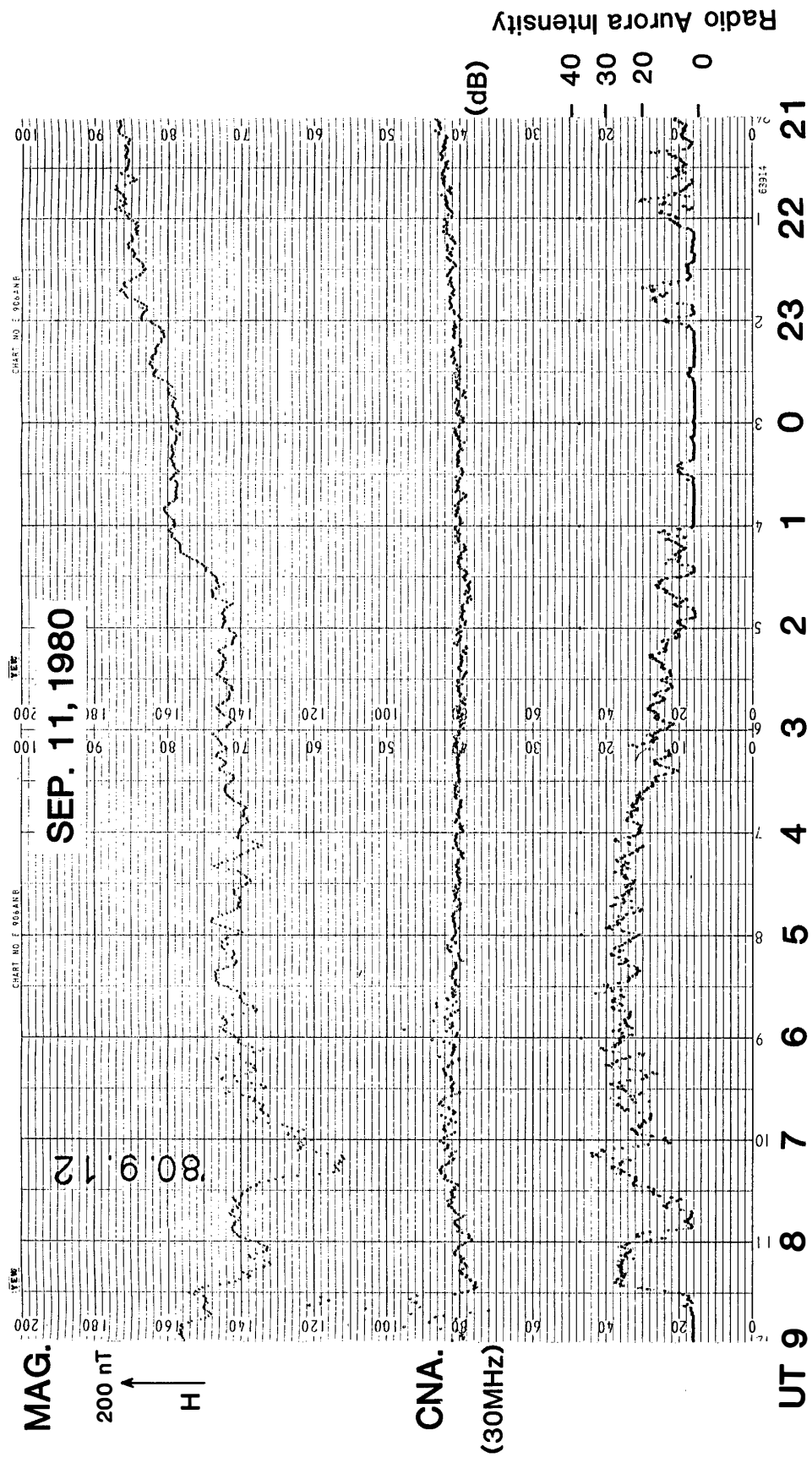


Fig.2 (9).

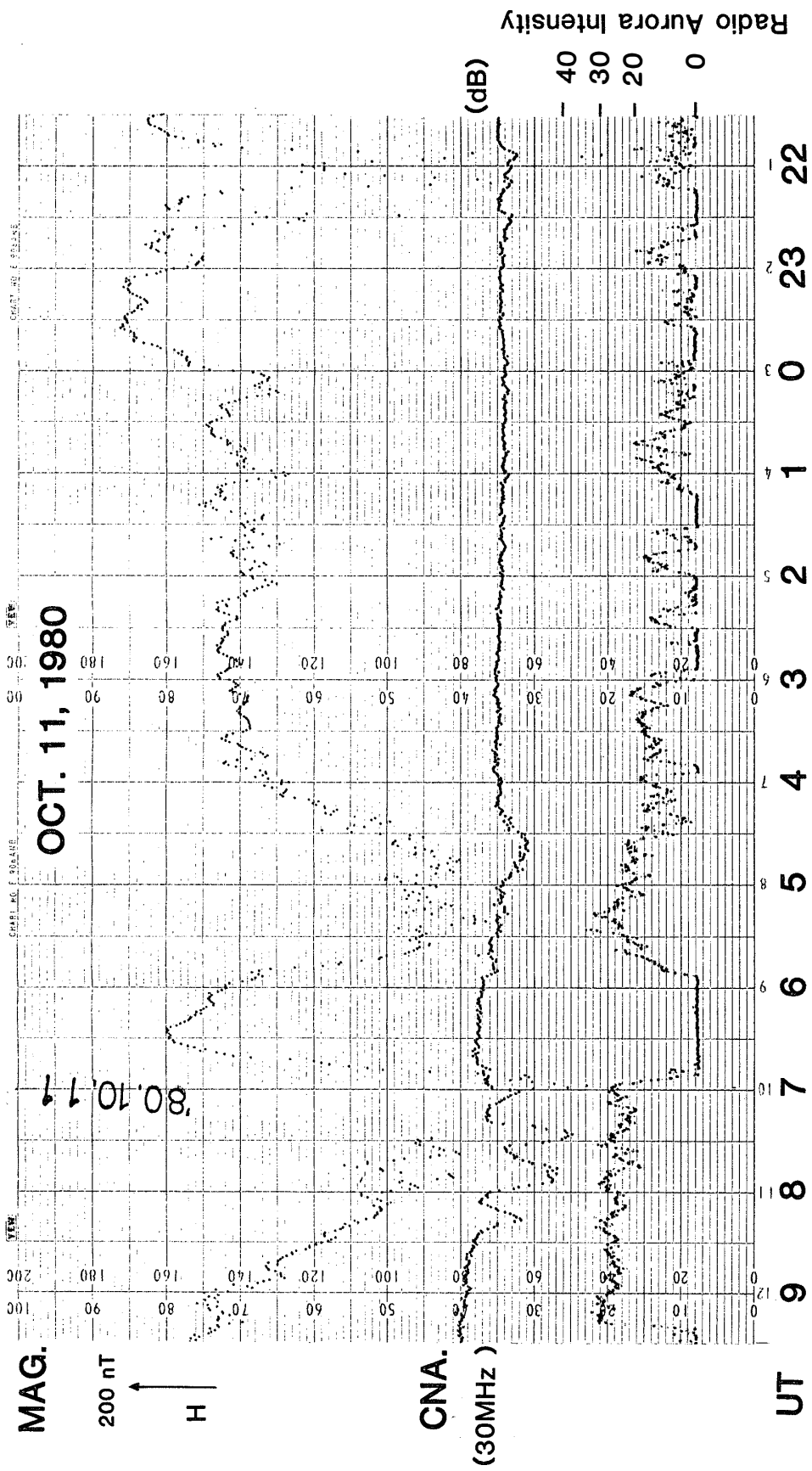


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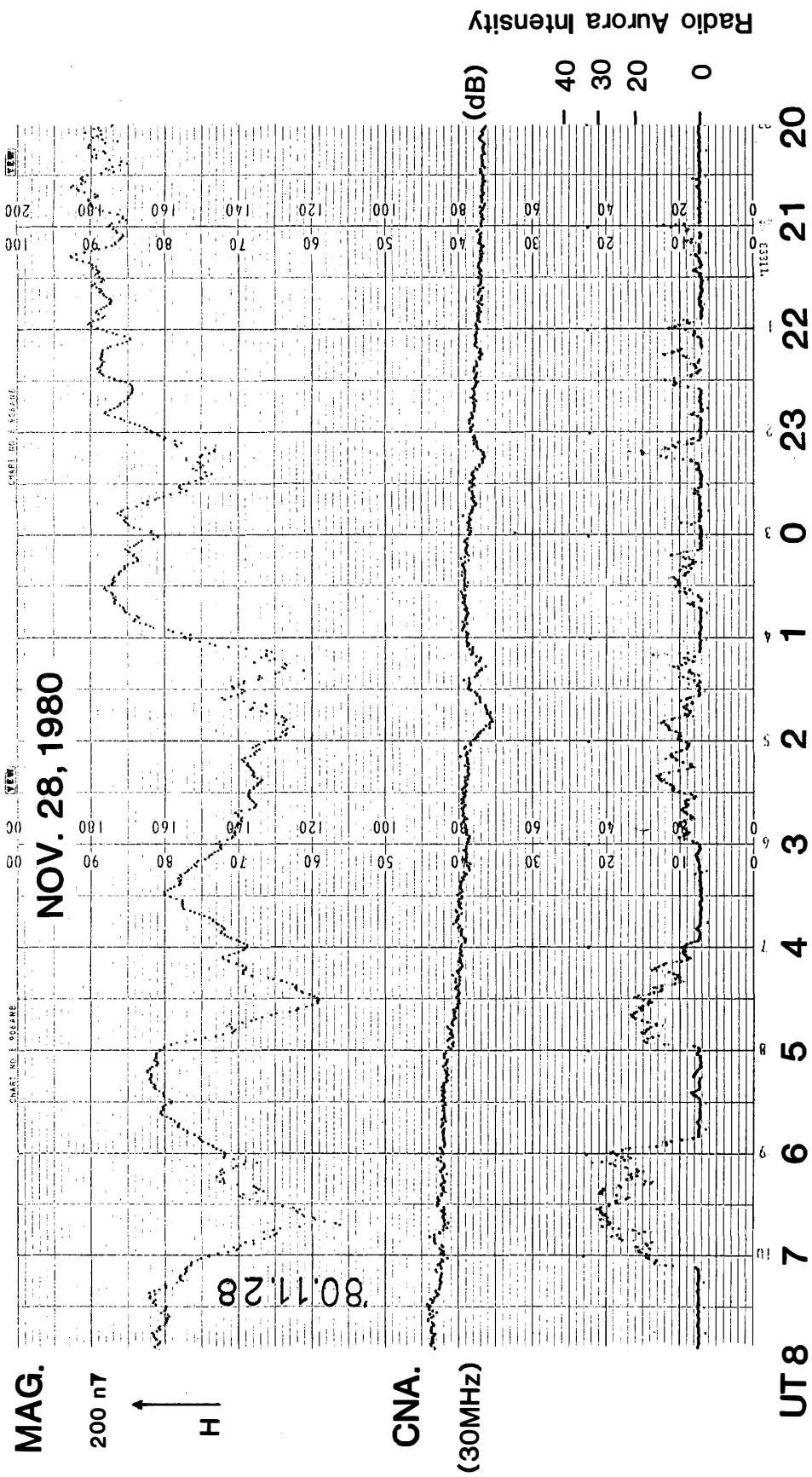


Fig.2 (11).

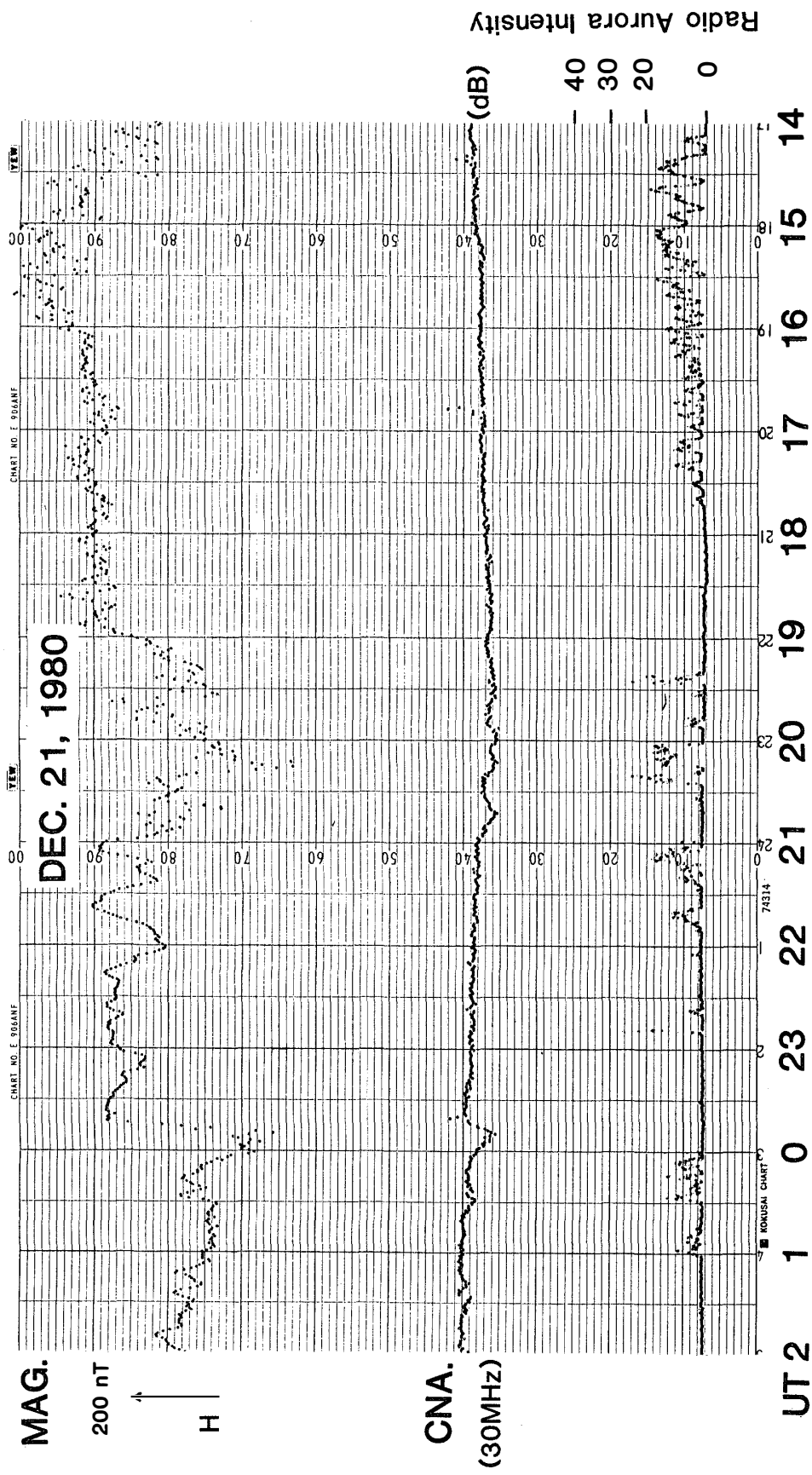


Fig.2 (12).