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A Processing Method on Telegraphic Code for Chinese NAVTEX Receiver

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중국어 NAVTEX 수신기를 위한 Telegraphic Code 처리방법

*방복문** · *순문력*** · *홍창희****

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요 약

한자는 복잡한 상형문자로서 표음문자와 비교하여 볼 때, 문자의 처리, 프로그램의 작성 및 전송에 있어서 많은 차이점이 있다. 지금까지 NAVTEX 프로그램중 한자 전송의 핵심적인 기술을 해결하지 못하고 있다.

따라서, 본 논문에서는 NAVTEX 프로그램중 한자처리 방법을 모색을 하고자 하였으며, 이러한 프로그램을 이용하면 NAVTEX단말기에서 바로 한자를 인쇄할 수 있게 될 것으로 기대된다.

1. Introduction

1.1 NAVTEX concept

NAVTEX is an element of the Global Maritime Distress and Safety System (GMDSS). NAVTEX carries information, which is broadcast at fixed time and frequency (518kHz) and in English, relevant to all sizes and types of vessels within a region established for this service. It also carries routine meteorological forecast and warnings and other urgent safety information to ships[1].

Up to 17th September of 1997, NAVTEX systems in 48 countries have been operational or set up[2]. Now many countries are developing the NAVTEX system of transmitting native languages, where 8 kinds of languages were

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Table 1.1 NAVTEX service for using native language

Language	Country	Condition	Language	Country	Condition
Chinese	China	Operational	Japanese	Japan	Operational
Greek	Greece	Operational	Spanish	Argentia Chile Peru Spain	Operational Planned Trial Operational
Italian	Italy	Trial	Vietnamese	Vietnam	Planned

used to broadcast NAVTEX service in 11countries.

1.2 Necessary

Since China is a developing country of a very large population, the sea fishery, the comprehensive exploitation, and survey of marine resources are not developed. The equipment of inshore fishery vessels and shipping in coastal waters are backward in technique. The level that many fishermen master the advanced science technique is low, because they don't know English. As they cannot bring GMDSS's faculties into play, so the perils of the sea are often happened.

From 1982 to 1995, more than 6,000 peoples died and 40,000 wounded. 17,000 vessels (all kinds of sizes) sank and 12,000 damaged because of the storm[3].

If there is a kind of Chinese NAVTEX receiver on board, they can utilize it to obtain more safety information. The ability of fishermen withstanding natural calamities will be increased greatly, and the perils of the sea decreased or avoided.

Therefore, in order to make ships safer and ocean cleaner, and considering the practical condition of China, it is very necessary that develops the study on Chinese NAVTEX System.

1.3 NAVTEX service information of China

In China, except Taiwan and Hong Kong, 5

Table 1.2 Chinese NAVTEX service information[4]

Station Name	Station position	covering Radius	Sending Frequency	Sending Time (UTC)	Language
Sanya	18.14N, 109.30E	250 miles	518 kHz	0200 0600 1000 1400 1800 2200	English
Guangzhou	23.08N, 113.29E	250 miles	518 kHz	0210 0610 1010 1410 1810 2210	English
Fuzhou	26.01N, 119.18E	250 miles	518 kHz	0220 0620 1020 1420 1820 2220	English
Shanghai	31.08N, 121.32E	250 miles	518 kHz	0240 0640 1040 1440 1840 2240	English & Chinese
Dalian	38.50N, 121.31E	250 miles	518 kHz	0250 0650 1050 1450 1850 2250	English

NAVTEX stations were set up. From South to North, they are Sanya, Guangzhou, Fuzhou, Shanghai and Dalian Stations in proper order, and according to the stipulation of Recommendation ITU-R 541, they are broadcasting the NAVTEX Service on the schedule of Table1.2.

At present only Shanghai station broadcasts the NAVTEX service in English and Chinese language that is Telegraphic Code (TC). General NAVTEX only prints the TC, then translating into Chinese Character (CC) by operator.

According to the stipulation of ITU, after Feb. 1, 1999, the NAVTEX service of local language can not broadcast in 518 kHz. China is considering that broadcasts local NAVTEX service in 490 kHz.

2. CC transmission

Because CC is a kind of Pictograph, so it cannot be transmitted directly. At present, there are two kind of different codes for interchanging CC information between CC processing or communication system, which are the Telegraphic Code and CC Code for Information Interchange.

In this paper, TC is only discussed.

2.1 Telegraphic code

In 1879, the first telegraphic line was set up in Tianjin of China[5]. The Chinese Telegraphic Code Book, which was published in 1880, collected 8075 CCs. Every character is expressed by 4-digit numbers of Arabic alphabet, that is Telegraphic Code. For example

1129 大 ; 3189 海

In earlier telecommunication and maritime communication department, this kind of work is finished by the operator, that is operator translating CC into TC; then transmitting the TC to the user, last translating the TC into CC by operator again.

Now, the translator has replaced by computers or microprocessors in many regions.

2.2 The key technology

For printing CC directly, we need to set up a relation between TC and CC font library (CC-Base). Because of the relation between them is no direct, so we need set up a "Mapping" Data Base, which is called DD-Base.

A Chinese NAVTEX receiver is based on general NAVTEX and added in the functions as follows:

1) According to the rule, determine which is TC in ASCII code flow;
2) For decoding TC and determining CC, need to set up a Decode Data Base (DD- Base);
3) For printing directly, need to determine the relation between CC and CC- Base;
4) Determine which kind of CC-Base.

For realizing Chinese NAVTEX receiver, it is important to set up the optimum relation among TC, DD-Base and CC-Base. How to make the DD-Base is the key technology in Chinese NAVTEX receiver.

3. Fundamentals of Chinese NAVTEX receiver

3.1 Relation between NAVTEX receiver and CC processor

The difference of Chinese NAVTEX receiver from general NAVTEX receiver is added with a CC processor. Its main function is that input TC,

expressed in ASCII code, is decoded into CC, and controls the printer.

In China, when the technical code B2 was defined as V, that means the national NAVTEX message to be sending.

When receiving unit gets the international NAVTEX message, the technical code B2 is not V, the information processing unit deals with the input data, and decides whether feeds to printer for printing.

Figure 3.1 Block diagram of Chinese NAVTEX receiver

3.2 A decoding rule of CC processor

If the technical code B2 is V, CC processor begins to work, a decoding rule as follows

1) Directly print the masthead part and dont decode.
2) If each 4-digit Arabic number is a group and the space between groups is existing, it is decoded into CC and printed.
3) When there are one, two, three or four asterisks "*" in one group, the "*" is printed at the position of corresponding CC.
4) If NAVTEX returns the witching state from printing automatically, it stops to decode, for example, when the error ratio of the code received is more than the special value (30%).
5) Directly print English alphabet.
6) Directly print Arabic number in the brackets.
7) If the code of end of message, NNNN is received, CC processor stops to get signal of message and decode.

3.3 CC processor

According to the above method, TC and CC-Base are set up a kind of relation by means of DD-Base. When CC NAVTEX is receiving TC, it may do the addressing of CC-Base by DD-Base and directly print CC.

In practice, it only increases one DD-Base (ROM larger than 16-kbyte) and one CC-Base (standard produce) in general NAVTEX, and amends the decoding rule suitably, it may directly print CC.

The principle block diagram of CC processor mainly contains CPU, I/O (the input/output interface circuit), DD-Base, CC-Base and printer driver. The fundamental is described as follows:

Passing through the interface I/O of CC processor, the ASCII code from the information processing unit, which is located at the main board of NAVTEX receiver, is fed into CPU. According to the decoding rule and the relation of flow-chart, CPU decodes the input ASC II code and sends the relevant instruction.

When receiving unit gets the international NAVTEX message, the technical code B2 is V, it means that is a national NAVTEX message, so CC processor is excited. ASC II code from the information processing unit is processed in CC processor and is decided whether is feed to printer for printing.

CPU sends the printing instruction to CC-Base through DD-Base and picks up the information about CC dot matrix into the printing driver.

3.4 Basic theory circuit

The block diagram of CC processor is shown in Figure 3.2.

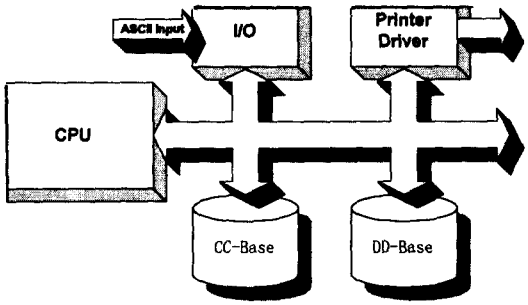

Figure 3.2 Block diagram of CC processor

The working process is

1) ASCII codes from the main board of NAVTEX receiver transmit into CPU of CC Processor by means of I/O interface.
2) CPU decodes the input ASC II code, calculates the address of DD-Base, and sends the instruction to decoder for searching address.
3) Under the address of DD-Base, it has the address of CC-Base dot matrix.

4. Conclusion

4.1 Basic requirement

Because the working condition on fishery vessels is very bad, the basic requirement of Chinese NAVTEX receiver is satisfied by the followings:

1) The price that can be afforded by fishermen,
2) The stable and reliable function,
3) The simplest operation, and
4) The least maintenance.

Under the reliability being satisfied, the equipment is required to be simpler in operation, the lower price, and the better.

4.2 Limitations

Some reasons are limited to install the general NAVTEX receiver on board of fishery vessels of China, which are only printing English character, bad working condition and the expensive price.

4.3 Objective reality

Now the general NAVTEX receiver is a direct printing installation. As the condition of the most fishery vessels is poor, such as the extreme temperature (high or low), heavy moisture and salt in air, unstable power supply, NAVTEX receiver printing on paper may be not suitable for the practical condition of China.

4.4 New concept

So it is to be necessary that developing the NAVTEX receiver is developed with LCD display and sound processing is very necessary. As they can reduce greatly the coast price, save power supply and maintenance.

4.5 Feasibility

In addition, the change of transmitting and displaying method is needed by the national government and international organization to accept.

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