

Digital Communications: JAIA's Universal Standard

D-Star

For the last few years, we have seen booths making the approach toward digital communication. Not only JARL, but also a number of private groups and manufacturers have displayed experimental sets and demonstrations. From a few years ago, some licensed systems were shown sporadically, but this never seemed to leave the experimental stage.

At HAM Fair 2001, member companies of JAIA at JAIA's booth, as well as ICOM and Kenwood at their respected booths, displayed sample digital transceivers and units based on the universal JAIA D-star standard. The panels showed the concept of digital transceivers, and also that they are not only two-way communication devices, but look as though they can also be set up as the main line in a network structure.

The systems displayed were separated into three types. One was a transceiver for voice and data using the 1200 MHz band, one used as a main line with a 10 GHz digital repeater, and one terminal type 1200 MHz digital repeater. The panels did not go into any other details, and it is likely that production units will be different to these, but we will introduce the units displayed.



Photo 1: 1.2 GHz digital transceiver. Photo shows 8kpbs voice communication demo.



Sample Exhibition:
D-Star standard
Digital Transceiver:

This unit complies with the JAIA universal standard, D-Star. The operating modes are, digital voice (8kbps), high-speed digital data communication (128kbps,GMSK) with three analogue voice modes (FM) also included. Operation is carried out by connection to 10Base-T via a USB port to a PC, with all controls carried out from the PC. Also, by using the optional controller, voice communication is possible without the PC.

Main Specifications:

- Frequency : 1.2 GHz band
- Wave Type : FM (Analog voice), 0.5 GMSK (Digital voice/data)
- Communication Speed : 8kbps (Voice)/128kbps (Data)
- Vocoder : G723.1
- Data Interface : IEEE802.3 (10Base-T)
- Tx Output : 10W/1W
- Rx Sensitivity : FM -16dBu
8kbps GMSK Voice -10dBu
128kbps GMSK Data +2dBu
- Switching Speed : 10ms (Digital Mode)
- GMSK Modulation : Quadrature Modulator/FPGA (Baseband)



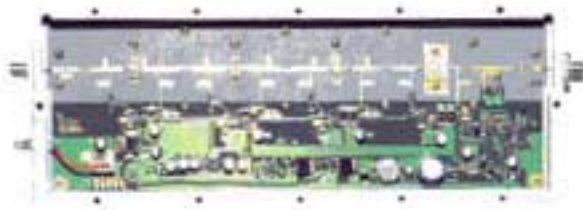
Photo 2: 1.2 GHz Digital Transceiver in 128kbps data mode.



10 GHz Digital repeater supposedly to be used as the main line.



1.2 GHz Terminal type digital repeater. The user will likely use this for communication.



10GHz repeater power unit.

Digital Narrow Band Transceiver:

This unit utilizes the CODEC voice compression method called AMBE, developed by DVSI's (Digital Voice System Inc.). This voice compression method is a DVSI improved method of voice compression technology first designed by MIT in 1980, that is used in many communication systems worldwide. Because the voice signal is compressed at an amazingly low speed of 2.4kbps, even though it is a digital signal, it can be used for communication in narrow bandwidths equal that of narrow band voice signals like SSB. This experimental unit uses GMSK modulation, but by changing this to QPSK, it is possible to further reduce the occupied bandwidth to 7.7 kHz. As a result, audio quality far superior to that of cell phones is possible.

— 参考出品 —
**デジタル・ナロー通信
トランシーバー**

本機は、DVSI(Digital Voice System Inc.)社の開発したAMBE[®]という音声圧縮方式のCODECを採用しています。この音声圧縮方式は、1980年マサチューセッツ工科大学(MIT)で考案された音声圧縮技術をDVSI社が独自の技術で改善したもので、世界中で多くの通信システムに採用されています。

音声信号を2.4kbpsという驚異的な低速に圧縮したため、デジタル信号でありながらも、もっとも狭帯域の音声信号として知られるSSBに匹敵する狭帯域で通信することができます。本試作機はGMSK変調方式ですが、QPSK変調にすることにより、1.7kHz程度まで、さらに占有帯域を狭くすることができます。

デジタル携帯電話より遙かに優れた音質を実現した本デモ機を、ぜひご試聴ください。

送信帯域特性図

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Photo showing the 1.2 GHz digital transceiver that operates at a low speed audio of 2.4kbps.