

SATCOM ON MOVE

PROVIDED BY NWIEE DZT2000A



General Description

DZT2000A is a technical Innovation in satellite communication earth station. It is the most significant feature of DZT200A to keep high data rate transmission while bumping along rough and dirt road in mountain areas. It is a **Ku and Ka** band mobile station, designed, manufactured and system integrated by the North West China Research Institute of Electronic Equipment(NWIEE), called 'Dong Zhong Tong' in Chinese, as shown in Fig 1-1. The specification of DZT2000A can meet the requirements of INTELSAT IEES and associated China National Standards and Industrial Standards. Field operation and tests approved it very successful recently.

The transmission data rate can be 512KBS~2MBS(6MBS is available with larger antenna). The DZT2000A system configuration of is also shown in Figure 1-1.

DZT2000A is a moving satellite communication earth station (remote station) equipped with NWIEE know-how, a combination of monopulse tracking/acquisition, positioning and pointing keeping. Referring the Fig1-1, provided with this advanced technology combination, DZT2000A can perform the functions of a remote earth station or SNG(Satellite News Gathering), but more powerful than SNG, provide high quality transmission of voice, data, fax and TV programs(3.68KBPS~2MBPS) while bumping along rough and dirt road at a speed of 30~70Km/hour, even in mountain areas or no road for trucks on grass land.

It was tested in field operation that DZT2000A completed 360° turning within 8 seconds while non-stopped high quality TV program(3.68KBPS~2MBPS) transmission was kept.



Fig1-1 A DZT2000A Mobile Satellite Earth Station

Features of DZT2000A

Main subsystems of DZT2000A includes a Cassegrain reflector antenna subsystem capable of monopulse tracking with associated servo control system capable of electrical stabilization for antenna pedestal, a communication subsystem(ODU, LNA, MODEM and multiplexer),a system control/monitoring subsystem, air conditioning, a truck with GPS and so on. All of these can offer the following significant features:

- Transmission with data rate, wide bandwidth in motion,
- easily installed on Airplane, Ship ,Van,Bus, and SUV etc
- High performance monopulse tracking and control system ensures the antenna to always automatically point to satellite without stopping communications while DZT2000A bumping along rough and dirt road in mountain areas, even the vehicle turns 360° within 8 seconds. It is equivalent to the bore sight of the antenna moving away from satellite at velocity of 45°/S,
- Fast recovery of transmission only requires 8~30 seconds after blocked by tall buildings, tunnels or bridges up to 7 miles in length,
- Automatic and quick acquisition ensures the system to build up access to satellite within 30 seconds by the technologies of GPS, digital compass and programs
- High dynamics of the antenna subsystem with monopulse auto-tracking ensures the high data rate of 512KBPS~2MBS (6MBS available with larger antenna or higher power

- ODU) transmission,
- Wide applications of transmission in motion from DZT2000A which can be installed in airplanes, trucks and on ships for different purpose, such as SNG, high speed and wide band transmission of data, and TV, special monitoring in side airplanes.
- Flexible in equipment configuration to provide different service, such as transceivers,
- Well engineering proven since 2000.

System Principle and Application of DZT2000A

The system operation principle of DZT2000A is shown in Figure 2-1. The system is in the configuration of a fixed hub station and N mobile remote stations or fixed remote stations to provide following communication services in motion.

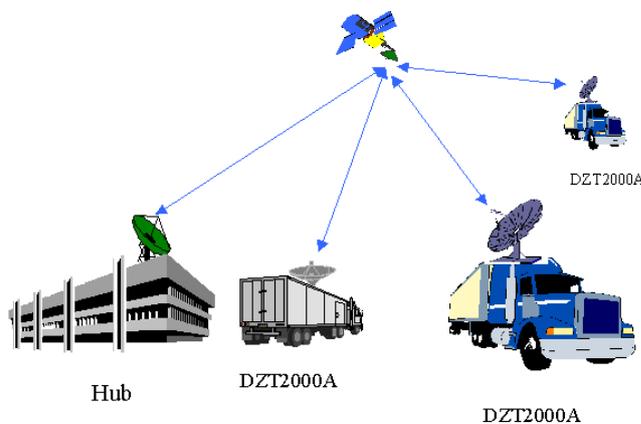


Figure 2-1 DZT2000A in System Operation

- Communications with hub and any moving or fixed remote terminals,
- Communications for accidents or other public affairs,
- Communications for disasters or emergency conditions,
- Other communications for many different purposes.

Main Specifications of DSZT2000A

DZT2000A includes the subsystems of antenna and tracking/control, communications, power supply, track with GPS and air conditioned operation room.

System Requirements

operational frequency range:	Ku Band, Ka band or Ku/Ka dual band
EIRP:	$\geq 49\text{dBW}$; stability: $\leq \pm 1.5\text{dB}$
antenna diameter:	0.8M Cassegrain reflector
antenna gain:	$G_t: \geq 39\text{dB}$; $G_r: \geq 37.7\text{dB}$
polarization:	linear polarization adjustable in $\pm 45^\circ$ electrically
system G/T(dBK):	$\geq 16 + 20\lg(f/12,5\text{GHz})$, clear sky, light wind and

	El.=10°
system availability:	≥ 99.98%
MTBF:	≥800hours
MTTR:	≤ 0.167 hour
tracking mode:	monopulse tracking and program tracking
tracking accuracy:	better than 1/30 received beam width
transmission system:	TDC-QPSK-FDMA(MCPC)
information rate:	N x 64KBPS, N=1, 2, 3, 4.....12,
transmission capability:	512KBPS–2MBPS, 6MBPS available
error correction:	FEC 1/2 ,3/4,
time to link with satellite:	20 seconds, recovery in 8 seconds once stopped

Environmental Requirements

Operation temperature:	in door....0°C ~40°C; out door....-40°C ~55°C
Storage temperature:	-50°C~70°C
Relative humidity:	95%(30°C --60°C)
Wind:	operational under the wind of 29m/S; survival under the wind of 33m/S
Power supply:	220VAC ±20%; 50Hz ±2Hz from truck borne power generator(4KVA), UPS or commercial

Main Specifications of the Antenna Subsystem

The Cassegrain antenna subsystem of DZT2000A consists of a CFRP main reflector, a combined feed assembly with TE₂₁ mode monopulse tracking coupler, linear polarized Tx/Rx network, corrugated horn, a LF slip ring, 3 rotary joints, a subreflector with struts, an electrical stabilized El.-over-Az. pedestal and an antenna control system with monopulse tracking receiver, a tracking down converter, an ACU, an ADU, GPS and digital compass, etc.. The antenna is mounted on the roof of the truck, Antenna control system is located in the vehicle. The antenna subsystem is shown in Figure 3-1.

Being made from CFRP and covered with a radome, the main reflector is characteristic of high dynamic performance and suitable to be installed in airplanes and on ships.

The Cassegrain antenna subsystem in DZT2000A has the following specifications:

Antenna Diameter :	0.8M Cassegrain reflector
Frequency range (GHz):	14.0-14.5/12.25-12.75
Antenna gain(dB):	Gt: ≥ 39; Gr: ≥ 37.7
Polarization:	Linear adjustable within ± 90° electrically
Antenna sidelobes:	First sidelobe ≤ -14dB,
Cross Polarization Discrimination(dB):	≥35 on axis and ≥ 30 within 1dB contour
Antenna Travel Range:	Az. 360° ,no limitation, El. 10° - 90°.
Travel Speed:	Az. 40°/s, El. 30°/s,
Acceleration:	Az. 261°/s ² , El. 608°/s ²

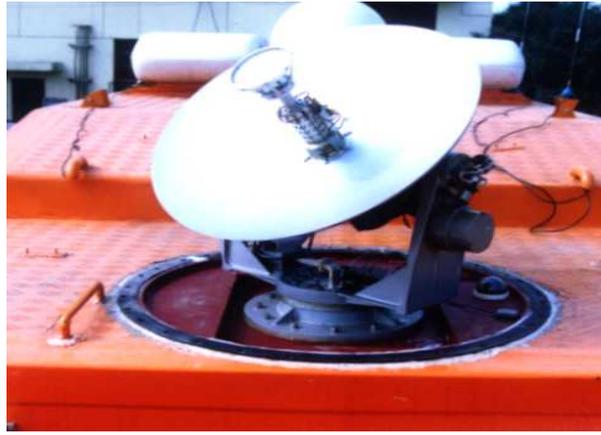


Figure 3-1 Antenna of DZT2000A

Main Specifications of Communications Subsystem

The communication subsystems in DZT2000A includes 16WODU, LNA, MODEM and multiplexer which are from US companies. LNA is installed in antenna. The specifications of the subsystem can meet the requirements of INTELSAT IESS. The others are installed in the air conditioned truck, as shown in Figure 3-2. The system control/monitoring, power supply, operation room and GPS in driver cab are shown in Figure 3-3 and 3-4,3-5 and 3-6 respectively.



Figure 3-2 communication subsystems installed in the air conditioned truck



Figure 3-3 System Control and Monitoring Subsystem



Figure 3-4 Air Conditioned Operation Room



Figure 3-5 GPS in Driver Cab



Figure 3-6 Truck Borne Power Supply System