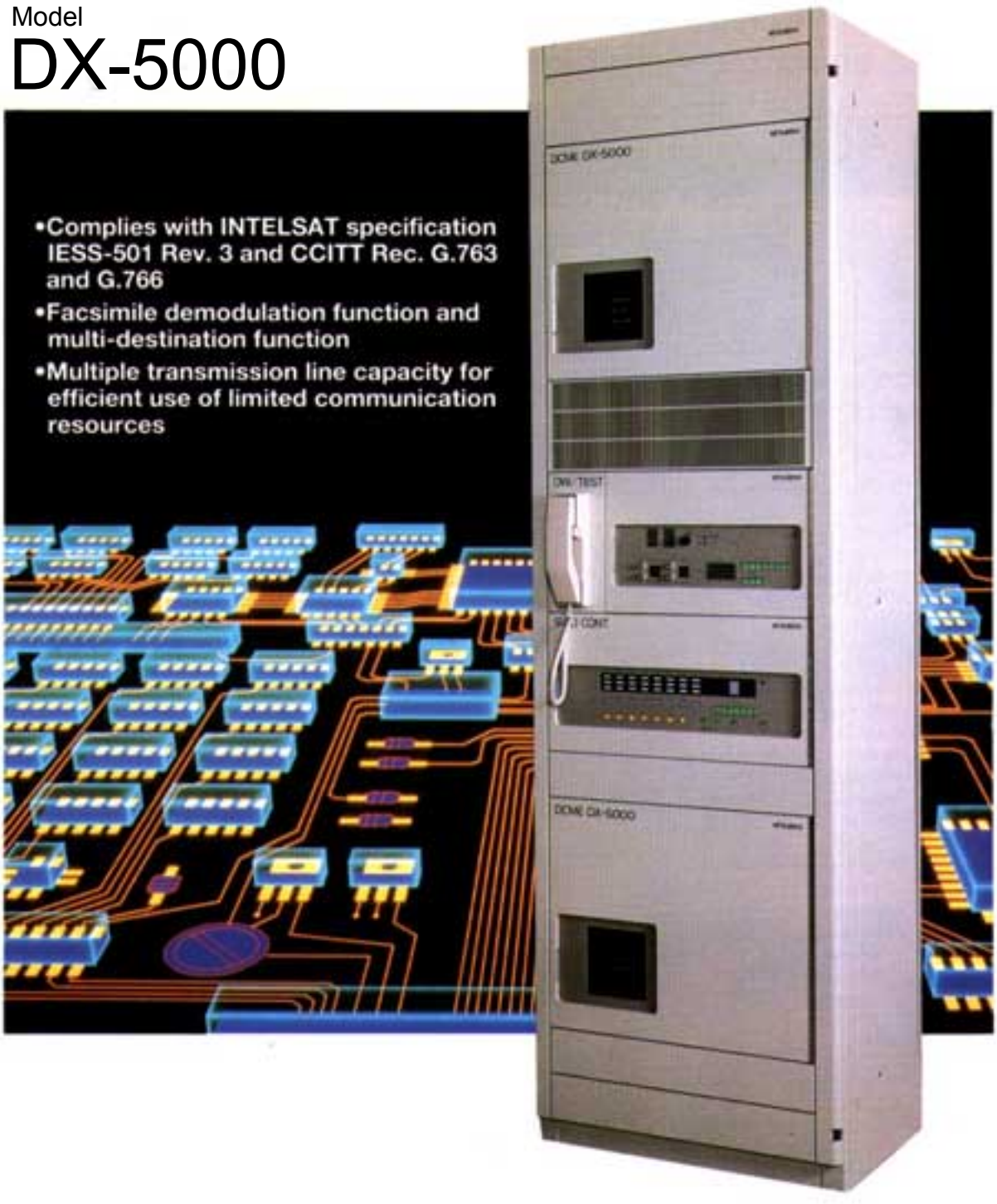
MITSUBISHI

DIGITAL CIRCUIT MULTIPLICATION EQUIPMENT
WITH FACSIMILE DEMODULATION
FOR INTELSAT SYSTEM

Model

DX-5000



Mitsubishi quality and dependability remain unsurpassed with the introduction of the DX-5000, boasting facsimile, DSI and ADPCM techniques, coupled with INTELSAT compatibility that enables installation between any International Switching Center and satellite or cable-link equipment.

These Are But a Few of the Best Reasons for Choosing the DX-5000:

High DCME gain
By utilizing the facsimile demodulation function, a DCME gain of 5 can be attained even under heavy facsimile traffic conditions.

Multi-clique and multi-destination operation
The DX-5000 provides 2 multi-clique operations and 4 multi-destination operations, which can be configured by the addition of expansion cards.

Wide range of operation modes
The DX-5000 supports 2Mbps and 1.5Mbps for the trunk and bearer sides, also supporting various signaling systems such as No. 5, No. 6, No. 7, R1 , R2 and Q.50.

Expandable fax-modem channels
The DX-5000 has a total of 8 FMD (fax-modem) cards, each comprising sixteen 14.4 kbps fax-modems. Thus, the number of fax-modems can be expanded to a maximum 128 in correspondence to the percentage of facsimile transmissions in the traffic.

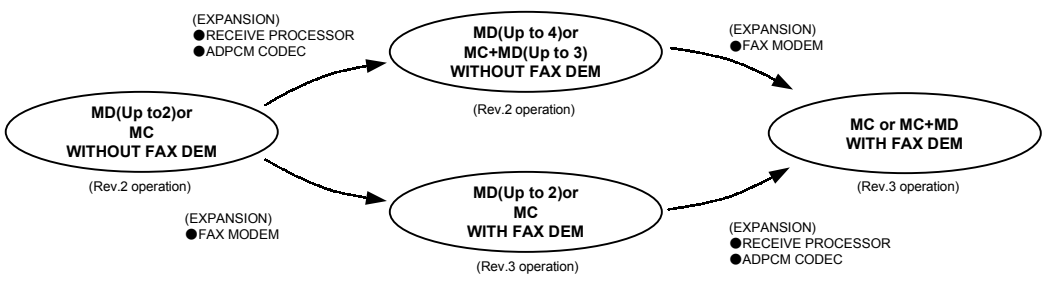
Self-diagnosis
The DX-5000 has useful on-line and off-line self-diagnostic functions. The on-line test is an automatic self-check of fax-modem and ADPCM channels at the terminal. The off-line test is a totally functional check utilizing the bearer loop-back.

Extensive Operation and maintenance facility
- In-circuit automatic end-to-end testing is continuously performed by the Channel Check Test signal.
- As a man-machine interface for operation, a single personal computer can support up to 80 DCME systems to collect alarm/event data, management statistics and other diagnostic data.

N to 1 redundancy
Up to 7 DCME terminals can be backed up by one common redundant DCME terminal and this is automatically switchable.

Compactness
One DCME terminal is housed in a single shelf, thus enhancing expandability and ease of maintenance. Three racks configure the 7:1 redundant system.

DCME DX-5000---EXPANSION FLEXIBILITY



The DX-5000, with multi-channel transmit and receive capability, is fully INTELSAT compatible. But its superior performance is also in its cost-effectiveness, by providing the best line-capacity gain and high-quality transmission at all times, even under heavy traffic conditions in the facsimile demodulation mode. Easy redundance configuration further ensures there will be no loss of data and costly down time.

The DX-5000 Circuit Multiplication Concept

DCME Operation

The DX-5000 uses three essential techniques: facsimile demodulation, DSI and ADPCM. Figure 1 shows the simplified mapping concept of the DX-5000. The maximum 2Mbps CEPT 10 ports (up to 300 channels) or 1 .5Mbps T1 10 ports (up to 240 channels) are fed to the trunk. The facsimile technique adopted for the facsimile signals achieves a six-fold gain for GIII-standard facsimiles. The DSI technique applied to the remaining (non-demodulated) signals assigns only active channels to ADPCM, achieving a gain of 2 - 2.5. ADPCM receives the assigned channels, condenses the bit rate, and achieves a gain of 2 - 2.6. The pre-assigned clear channels are fed to the bearer transparently. The above signals are combined and fed to the 2Mbps or 1.5Mbps bearer.

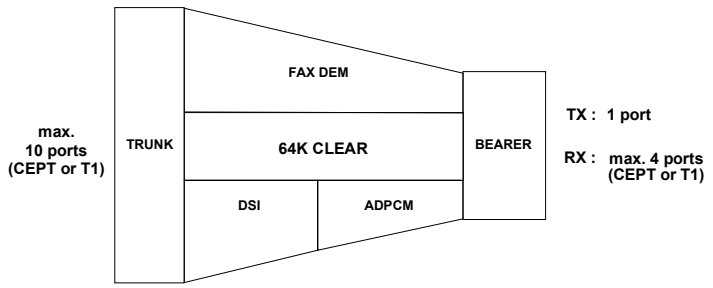


Figure 1 DX-5000 Essential Function

Gain Without Facsimile Demodulation

The gain curve of the DX-5000 without fax demodulation in the various VBD percentages is shown in Figure 2. When there is no VBD, the maximum trunk capacity of the DX-5000 is approximately 180 channels, which translates to a

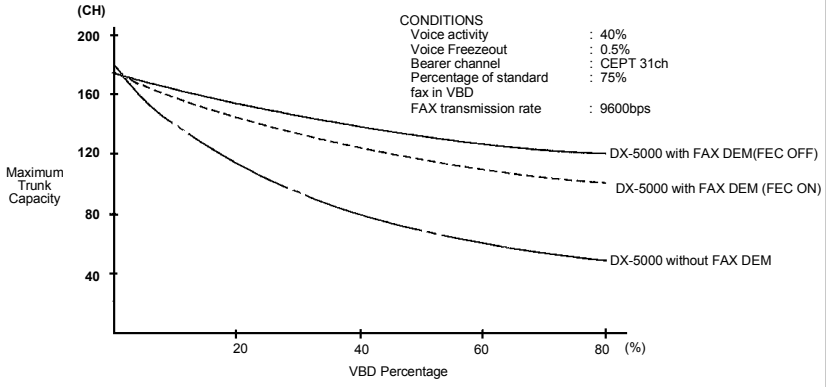


Figure 2 Transmission Capacity of the DX-5000

DCME gain of 6. Thus when the traffic has a lower VBD percentage, the DX-5000 without facsimile demodulation has a high gain of 5-6. However, traffic having 50% VBD reduces the maximum trunk capacity of the DX-5000 without demodulation to approximately 75 channels, resulting in a DCME gain of 2.5.

Gain Recovery

The facsimile demodulation technique recovers the above reduced DCME gain. When all facsimile traffic is GIII standard 9.6Kbps, the combined gain of the DX-5000 with facsimile demodulation can attain a level of 6 in the FEC OFF condition. When a proprietary facsimile is linked to the system, the gain will decrease due to its signal being carried through the ADPCM. Figure 2 shows the theoretical transmission capacity of the DCME DX-5000 assuming that the percentage of the standard facsimile in VBD is 75010. Even with 80010 of VBD in the traffic, the DX-5000 achieves a gain of 4, while the gain of the DX-5000 without facsimile demodulation is only I .7. Under FEC ON operation, the combined gain within an 80010 VBD condition is 3.3.

Operation Mode

Flexibility is ensured by the DX-5000's single, multi-clique, and multi-destination operation modes, as shown in Figures 3,4 and 5. Multi-clique and multi-destination operation in particular provide numerous cost-performance advantages in configurations where traffic flow is light for each destination. In the multi-clique mode, bearer circuit capacity is precisely divided into two equal pools of traffic for each destination to speed transmission. The multi-destination mode dynamically shares the bearer circuit among a maximum of four destinations in the channel bases. Both of these operation modes automatically adjust to the traffic plan of each destination. The DX-5000's basic configuration allows for single-destination and multi-clique operation, while multi-destination operation is enabled by the addition of expansion cards.

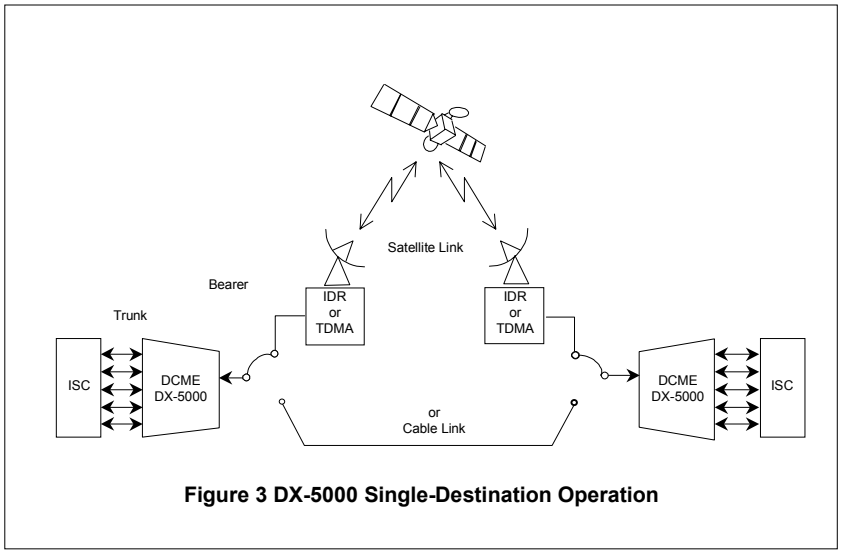


Figure 3 DX-5000 Single-Destination Operation

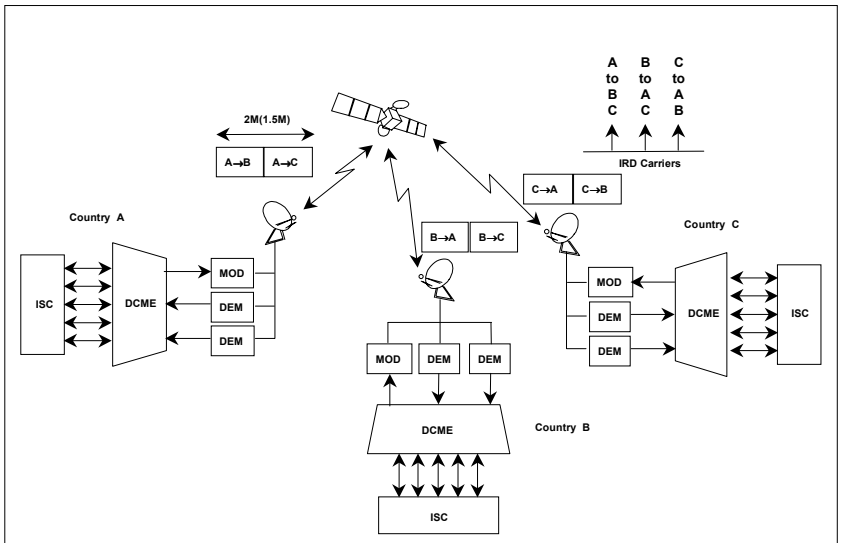


Figure 4 DX-5000 Multi-Clique Operation

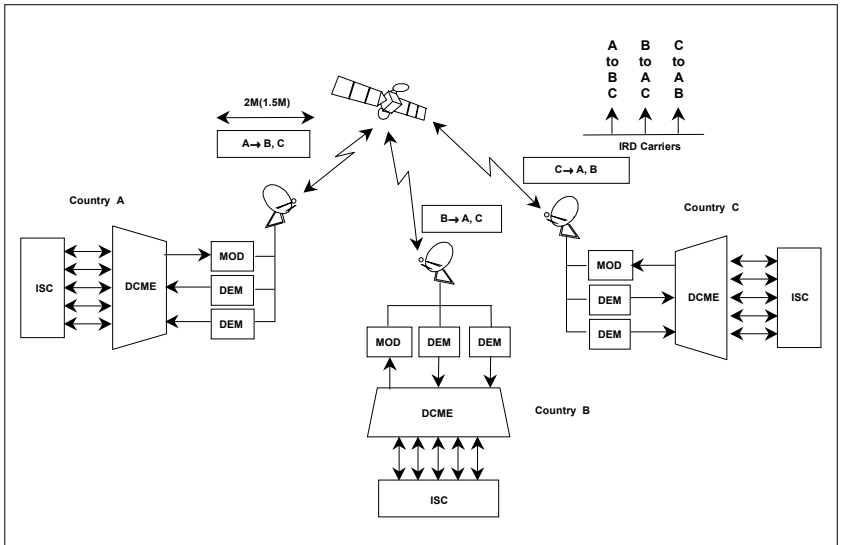


Figure 5 DX-5000 Multi-Destination Operation

Center of a Flexible and Versatile System

Operation and Monitor Console (OMC)

The OMC consists of an IBM PC-compatible desktop computer having the following functions:

- Interface: RS485
- OS: MICROSOFT WINDOWS OPERATING SYSTEM.
- Capacity: One OMC can control 80 DX-5000s in 10 clusters.
- Monitoring an control: The operator can not only control the configuration data (map), redundancy switch, and test function, but also monitor equipment status, interface alarms, statistical data, and error performance.
- Remote terminal control and monitoring: The OMC can also monitor the remote DX-5000 through the transmission line.
- "Remote" OMC: Two OMC interface ports are provided. One is for the main OMC and the other can be used for an OMC to control and monitor the DX-5000s at the remote site by using the modem and public network.

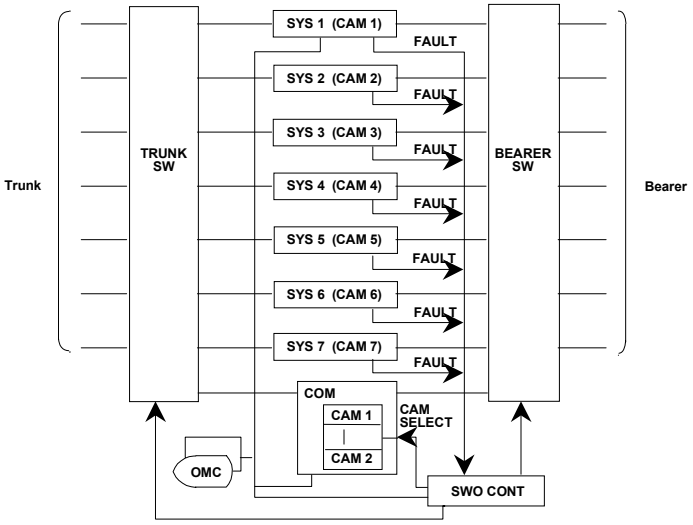


Figure 6 Sample Redundant configuration

Center of a Flexible and Versatile System

Redundancy

- Full redundancy to a factor of 7 is provided for control functions via a switching control panel independent of the OMC.
- The control panel handles all control functions redundantly. Even if the OMC becomes faulty, there is no traffic interruption.
- Both automatic and manual switchover modes are available.

Orderwire and Test Facility

An orderwire/test panel is available to facilitate orderwire and end-to-end test functions.

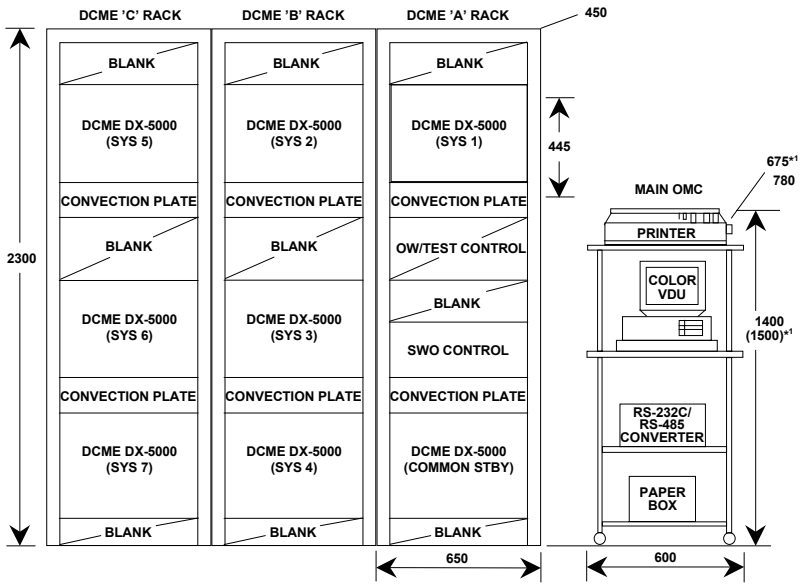


Figure 7 Front Elevation of a Cluster Configuration of 7:1 DCME Terminal

SPECIFICATIONS

INTELSAT specification	IESS-501 Rev. 3
Compression	
Typical DCME gain	5
Compression algorithm	DSI, ADPCM, fax compression
Channel capacity	
Number of trunk channels	Max. 300 (10 CEPT PGs) or Max. 240 (10 T1 PGs)
Number of operation channels for trunk	Max. 216
Number of bearer channels	Max. 31 (1 CEPT PG) or Max. 24 (1 T1 PG) for transmit;
	4 CEPT PGs or 4 T1 PGs for receive
Electrical interfaces (complying with CCITT Rec.G703/704)	
CEPT	2.048Mbps
Code	HDB3
Impedance	75 ohms unbalanced or 120 ohms balanced
T1	1.544Mbps
Code	B8ZS or AMI
Impedance	100 ohms balanced
Signalling	CCITT No. 5, No. 6, No. 7, R1 , R2
CCITT Q.50 function	Annex A & Annex B
Dimensions (W x D x H)	
DX-5000	552 x 370 x 445mm (weight: Max.60kg)
Rack	695 x 450 x 2,100mm
Power	
Power voltage	-48VDC +6/-9V or 115/230VAC +20/-26%
Power consumption	
DX-5000 (fully mounted)	Max. 350W
Rack (fully configured)	Max. 1,050W
OMC	Max. 370W
Environmental	
Operation temperature	+5 - +40degrees centigrade
Humidity	Less than 90%

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