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ENVISAT ASAR

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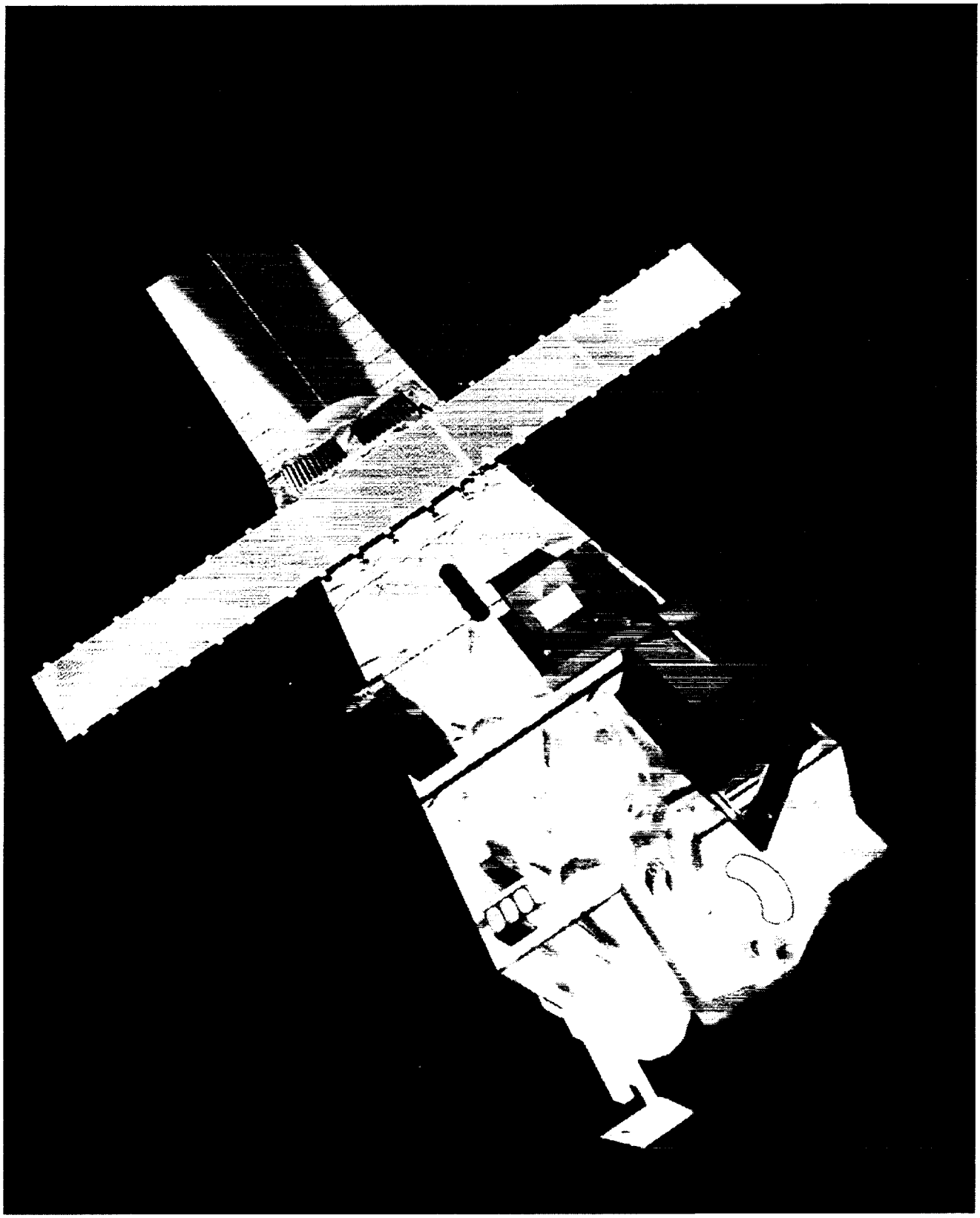


Objectives

The Objectives of ASAR are to measure:

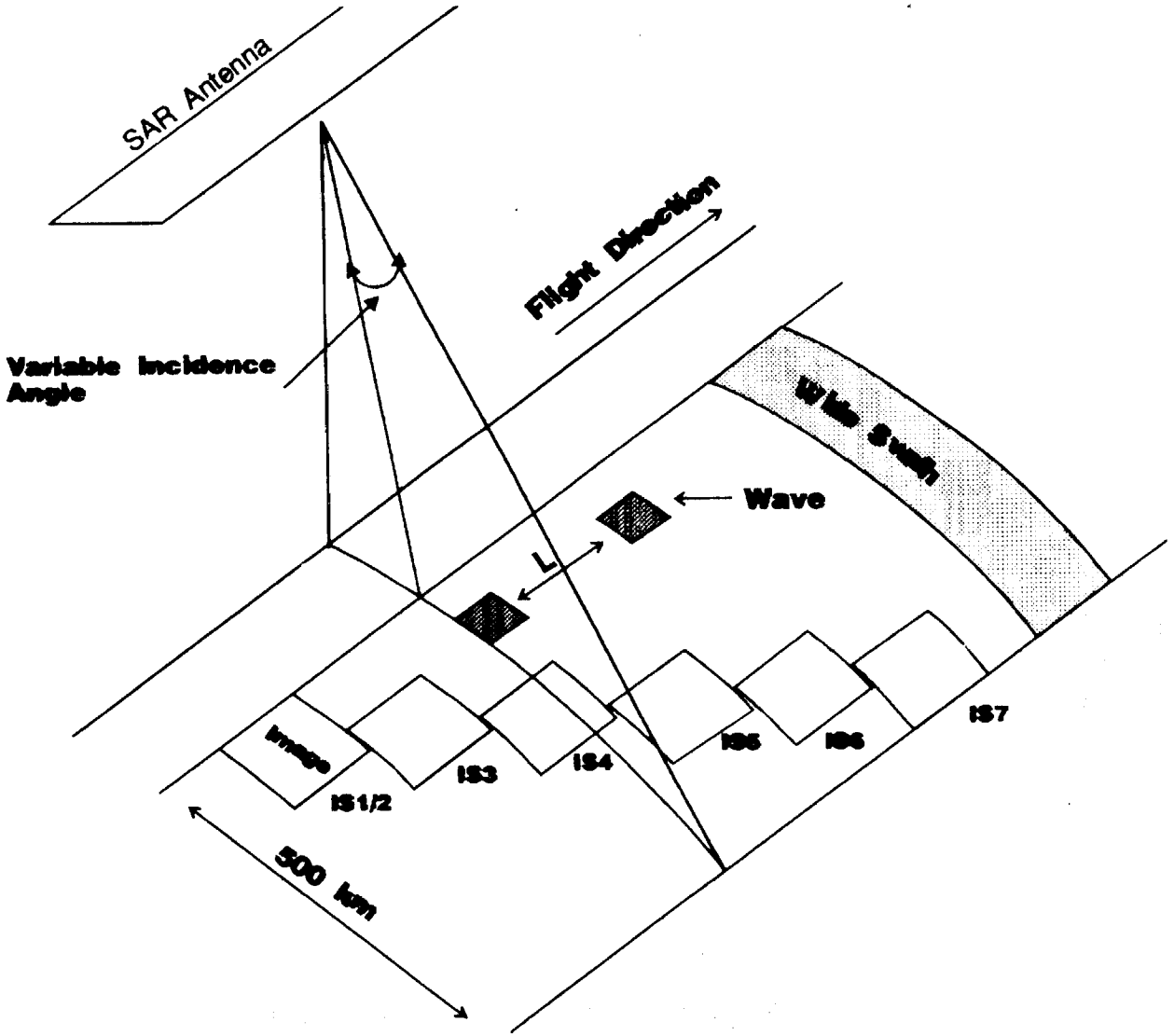
- Sea ice extent, character and motion
- Snow and ice extent and character
- Vegetation, Land use
- Surface topography
- Ocean waves and circulation

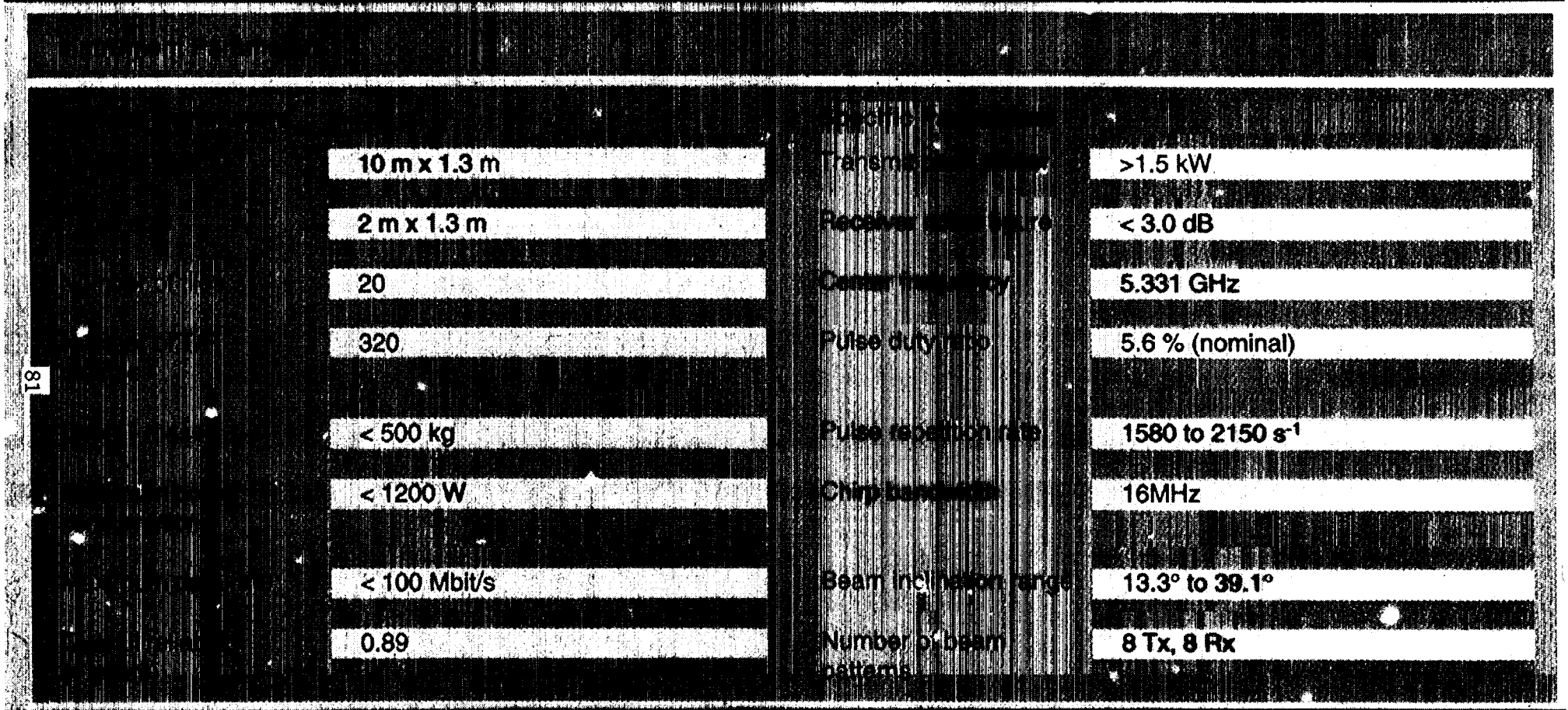
Independence of cloud cover/day or night

With respect to ERS-1: extended coverage and dual polarisation

Modes of operation

Image	"ERS" type image mode, high resolution, selectable swath position, two polarisations
Wide Swath	Wide swath with medium resolution, two polarisations
Alternating Polarisation	Alternating VV and HH operation in image mode swaths, using n samples of each polarisation
Wave	Sampled image mode. low data rate, selectable swath positions
Global Monitoring	Wide swath, low spatial resolution, low data rate, HH and VV polarisations


SAR Antenna
Flight Direction
Variable Incidence Angle
Wave
L
IS1/2
IS3
IS4
IS5
IS6
IS7
500 km


10 m x 1.3 m
2 m x 1.3 m
20
320
< 500 kg
< 1200 W
< 100 Mbit/s
0.89
>1.5 kW
< 3.0 dB
5.331 GHz
5.6 % (nominal)
1580 to 2150 s-1
16MHz
13.3° to 39.1°
8 Tx, 8 Rx

ASAR PARAMETERS

PARAMETER	*UNIT*	*IMAGE (H, V or H/V)*	*WIDE SWATH*	*GLOBAL SAR MONITORING*	*WAVE*
SPATIAL RESOLUTION	m	30	90	900	30
SWATH WIDTH	km	100 to 56 (7 swaths)	405 to 420 (5 swaths)	405 to 420 (5 swaths)	5 x 5 (any swath)
INCIDENCE ANGLE	deg.	15-45	17-43	17-43	15-45
DC POWER CONSUMPTION	W	1200	1200	750	520
DATA RATE	Mbps	96.5	97	1.1	0.9

MISSION LIFETIME 4 YEARS

RELIABILITY .89

Parameter	IMAGE	WIDE SWATH	[illegible]	ALTERNATING POLARIZATION	GLOBAL MONITORING
Spatial Resolution along track across track	≤ 30 m ≤ 30 m	≤ 100 m ≤ 100 m	≤ 30 m ≤ 30 m	≤ 30 m ≤ 30 m	≤ 1000 m ≤ 1000 m
Ambiguity Ratio (Point) along track across track	≥ 25 dB ≥ 31 dB	≥ 25 dB ≥ 31 dB	≥ 25 dB ≥ 31 dB	≥ 25 dB ≥ 31 dB	≥ 25 dB ≥ 31 dB
Ambiguity Ratio (Distrib.) along track across track	≥ 22 dB 13 dB below σo min.	≥ 22 dB 13 dB below σo min.	≥ 22 dB 13 dB below σo min.	≥ 22 dB 13 dB below σo min.	≥ 22 dB 13 dB below σo min.
Radiometric Resolution	≤ 2.5 dB	≤ 2 dB	≤ 2 dB	≤ 3.5 dB	≤ 1.5 dB
Radiometric Accuracy	≤ 0.65 dB	≤ 0.65 dB	≤ 0.65 dB	≤ 0.65 dB	≤ 0.65 dB
Swath Width	up to 100 km	400 km	5 km	up to 100 km	400 km

BACKSCATTER MODEL

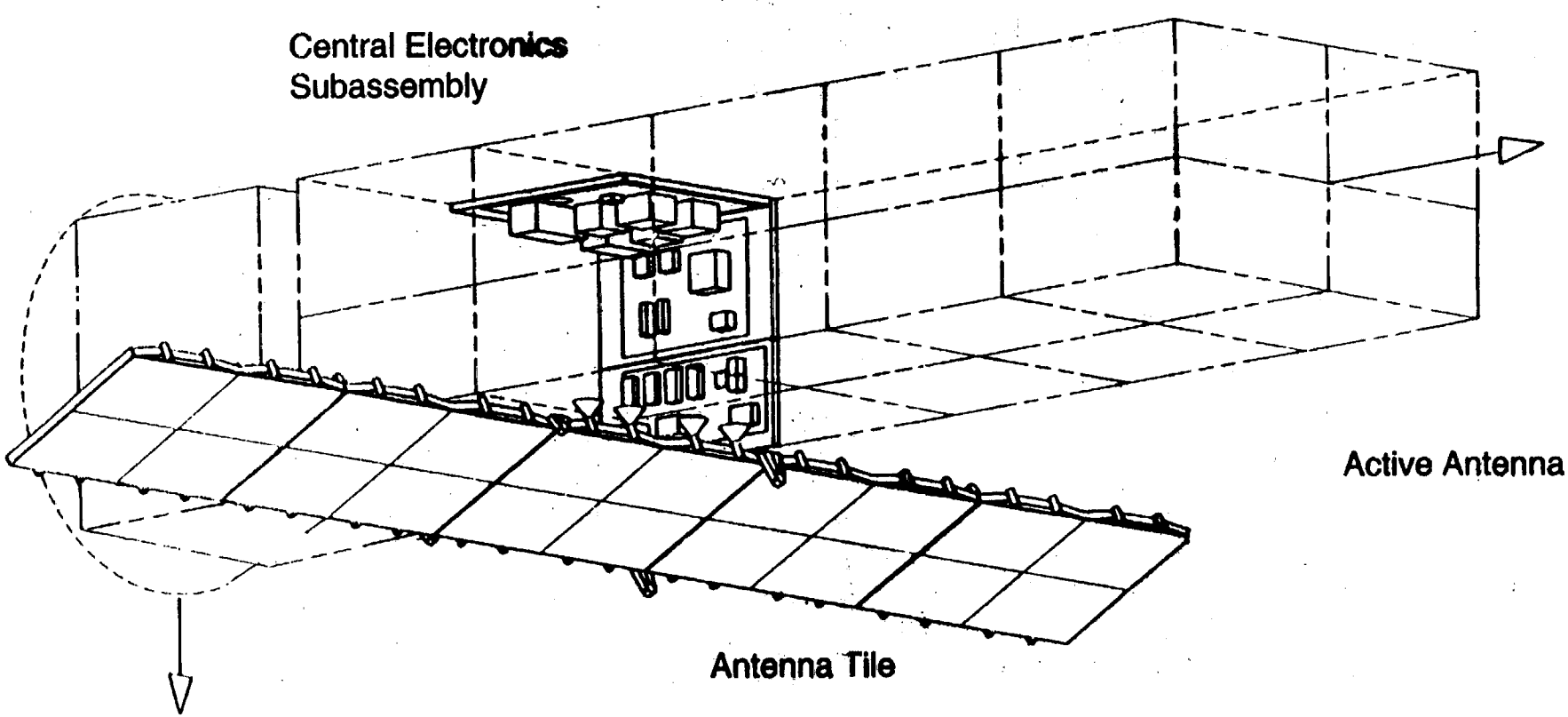
Incidence Angle (degrees)	*Sigma Naught value (dB)*
10	-10
20	-14
30	-17
40	-20
45	-22
50	-24.4
55	-26.2
60	-27.6

COMPARISON ASAR-AMI

A S A R

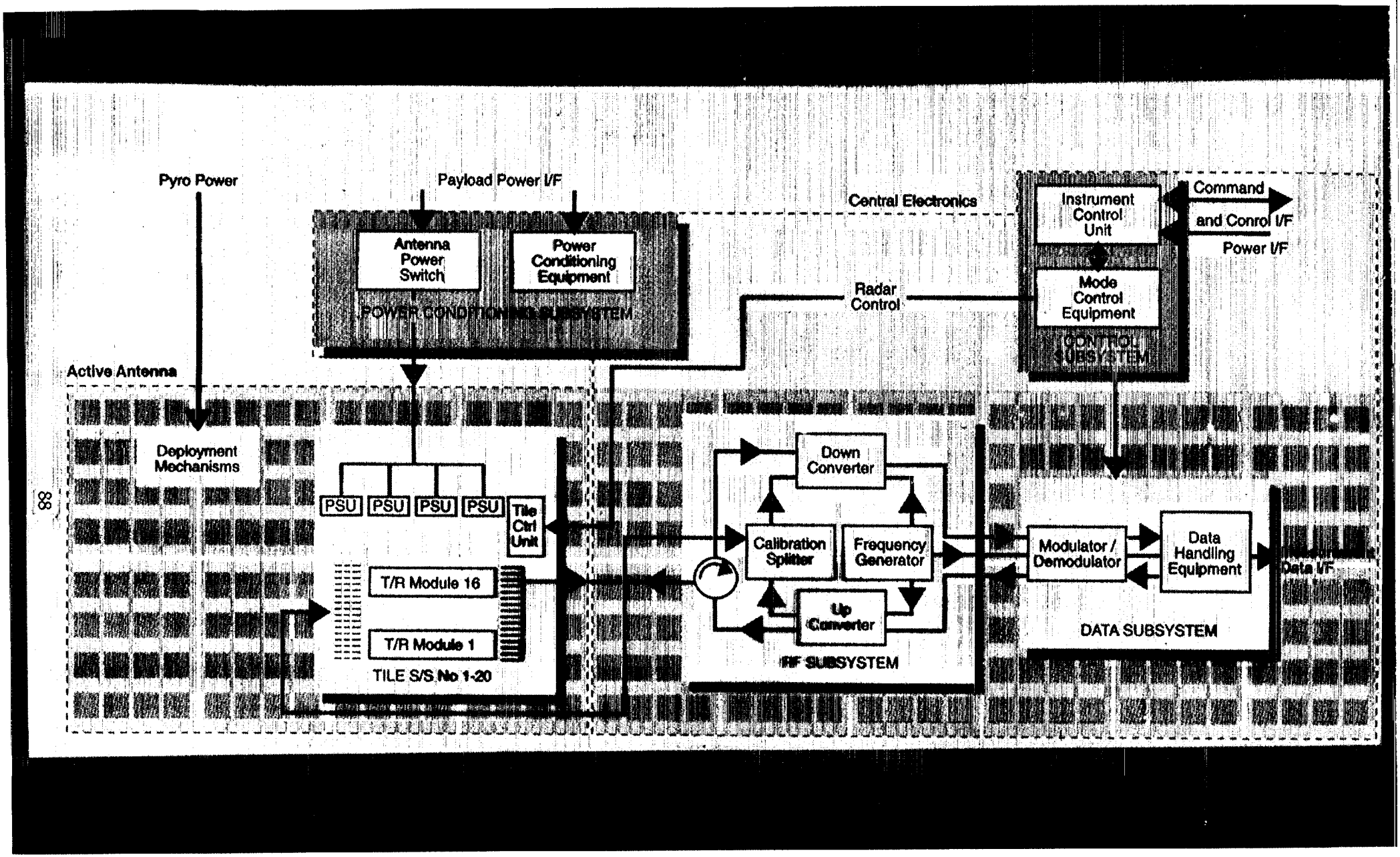
	ERS-1 AMI	ASAR AMI SWATH	Swath 1	Swath 2	Swath 3	Swath 4	Swath 5	Swath 6	Swath 7
Incidence Angle mid swath	23°	23°	18.8°	22.8°	28.7°	33.7°	37.7°	41,1°	44.0°
Swath Width	80 km	80 km	100 km	100 km	80 km	85 km	65 km	70 km	55 km
Nominal Spatial Resolution	30 m	30 m	30 m	30 m	30 m	30 m	30 m	30 m	30 m
Achievable Spatial Resolution (range)	30 m	30 m	30 m	24 m	19.5 m	17 m	15 m	15 m	13.5 m
Signal to Noise Ratio (worst case) (σ0-18dB, nom.res.)	7.0	5.0 dB(1)	5.5 dB	4.8 dB	5.5 dB	4.8 dB	4.2 dB	7.47 dB	8.65 dB
Polarisation	VV	HH,VV	HH,VV	HH,VV	HH,VV	HH,VV	HH,VV	HH,VV	HH,VV

Instrument Design and Technology

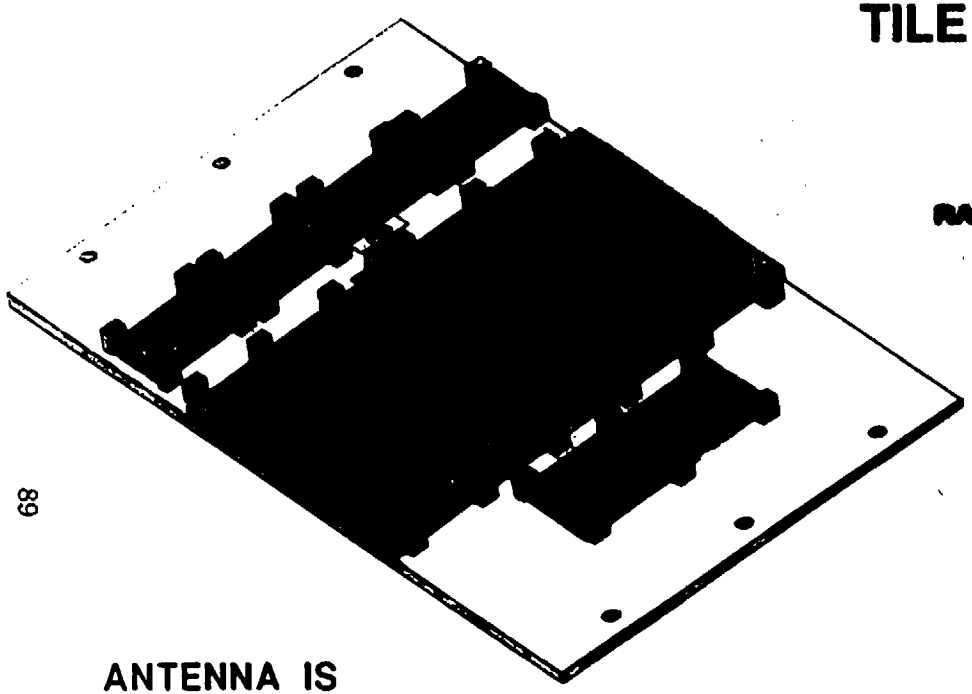


- Distributed transmit/receive modules employing integrated microwave technology for dynamic and adaptive beamforming
- Digital chirp generation, for maximizing pulse duty ratio
- Online instrument calibration

Tx and Rx beams independently controllable to achieve flexible swath coverage


Pyro Power
Payload Power I/F
Central Electronics
Instrument Control Unit
Command and Conrol I/F
Power I/F
Antenna Power Switch
Power Conditioning Equipment
POWER CONDITIONING SUBSYSTEM
Radar Control
Mode Control Equipment
CONTROL SUBSYSTEM
Active Antenna
Deployment Mechanisms
PSU
PSU
PSU
PSU
Tile Ctrl Unit
T/R Module 16
T/R Module 1
TILE S/S No 1-20
Down Converter
Calibration Splitter
Frequency Generator
Up Converter
RF SUBSYSTEM
Modulator / Demodulator
Data Handling Equipment
Data I/F
DATA SUBSYSTEM

TILE



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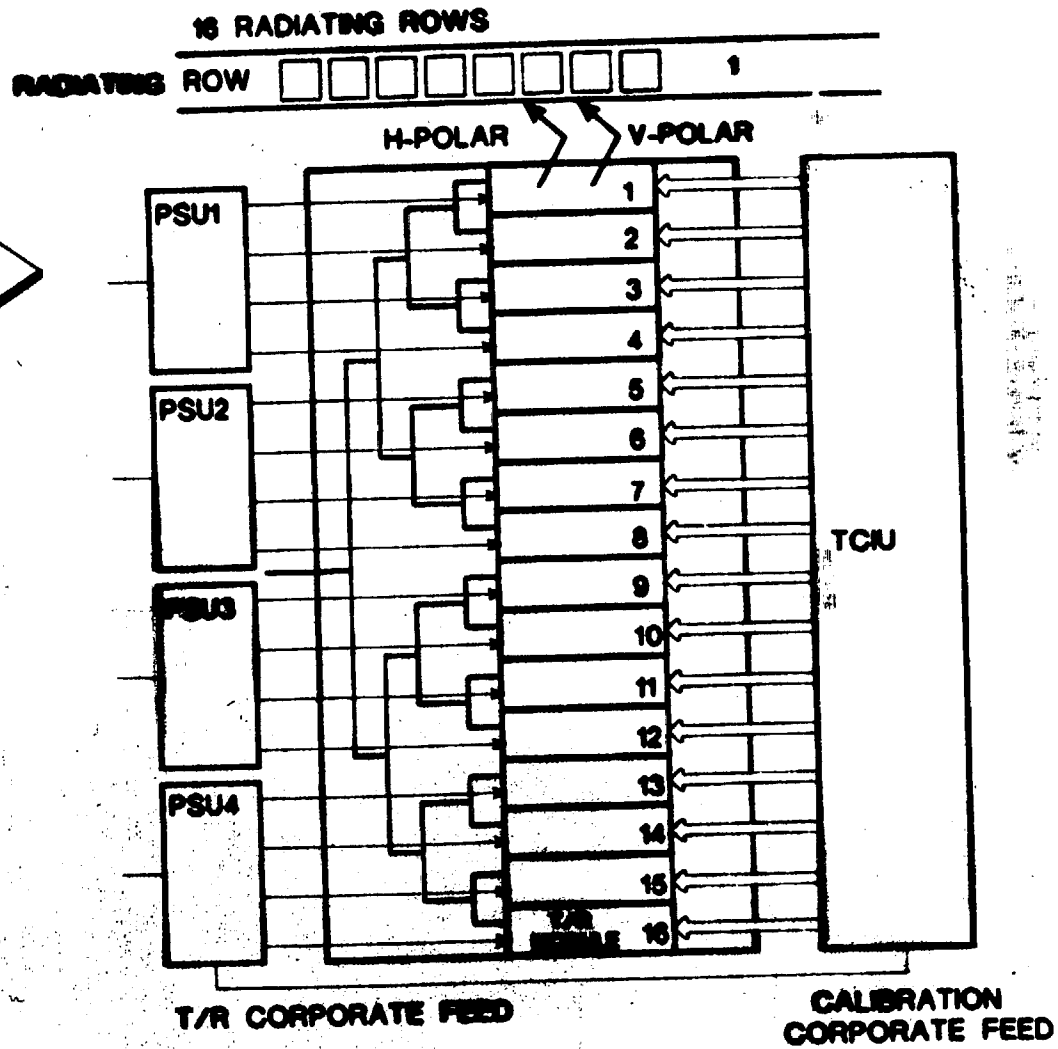
ANTENNA IS

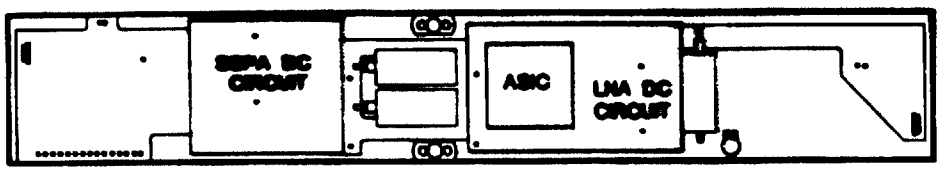
COMPOSED OF 20 TILES



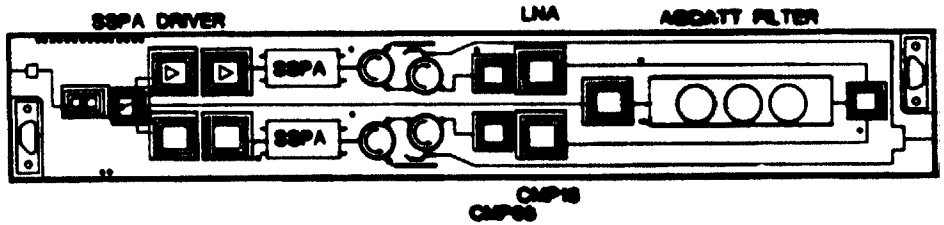
EACH TILE IS COMPOSED OF :

- 1 RADIATING PANEL
- 16 T/R MODULES
- 4 POWER SUPPLY UNITS
- 1 TILE CONTROLLER INTERFACE UNIT
- 1 RX/TX CORPORATE FEED
- 1 CALIBRATION CORPORATE FEED

TRANSMIT / RECEIVE MODULE



90



320 modules on the antenna, each of which can provide :

In Transmit :

- Output of 8W
- Phase control on 360° by 5-6 steps

On Receive :

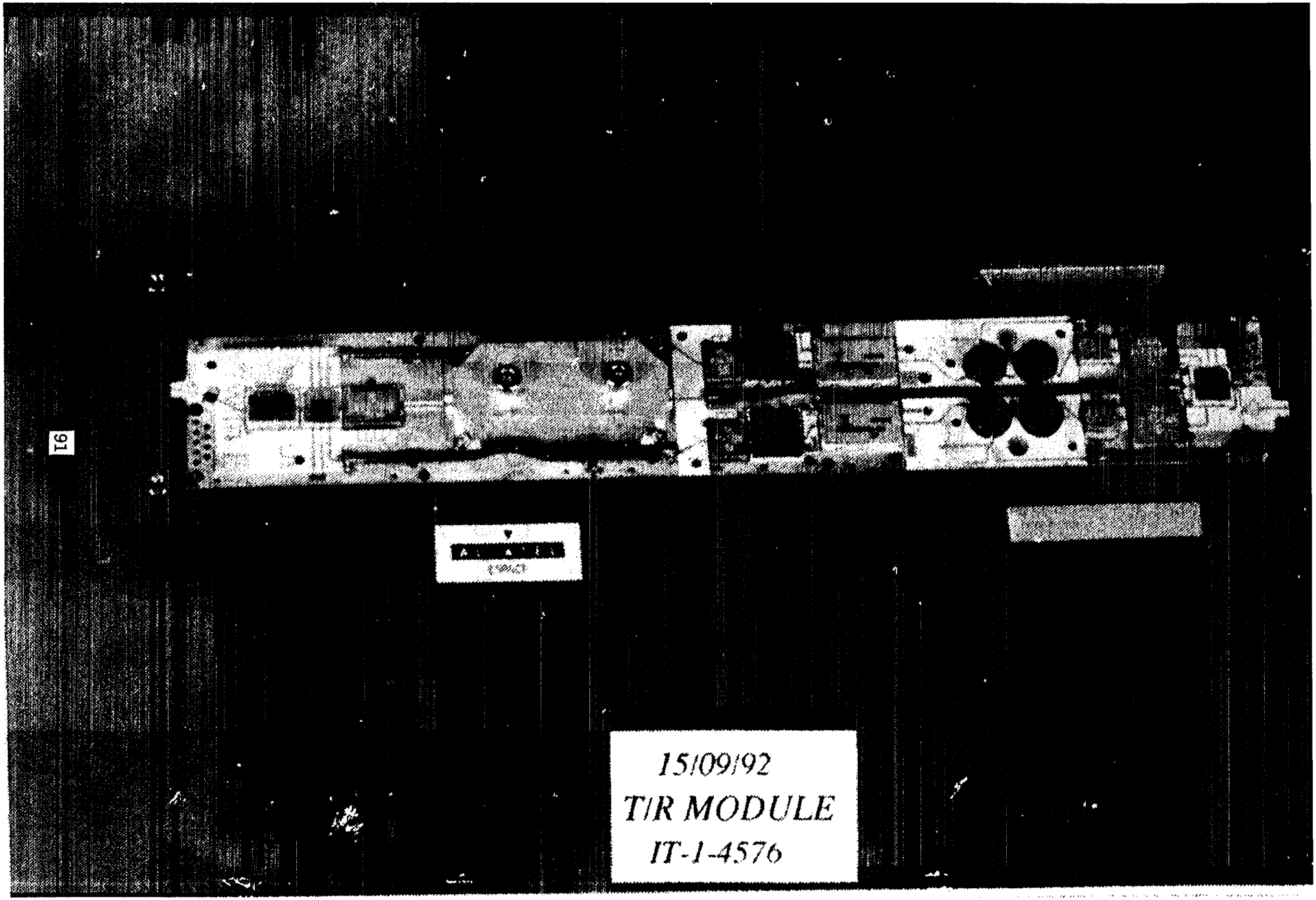
- Noise figure of 3dB
- 20dB dynamic range by 0.5dB step.
- Phase control on 360° by 5-6 steps

Dimensions :

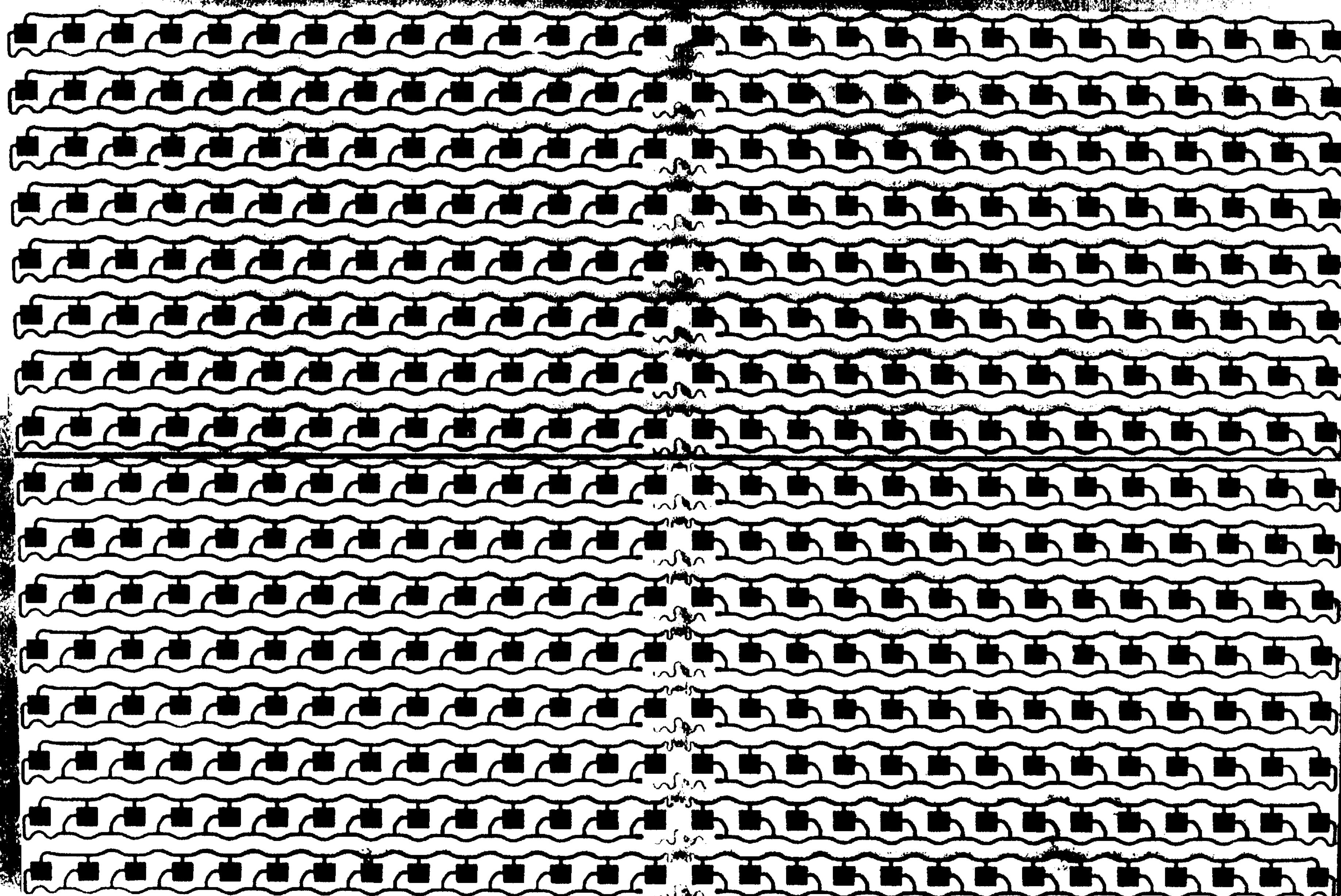
266x38.8x31.4mm3 (l x w x h)

Mass :

170g


15/09/92
T/R MODULE
IT-1-4576

ASAR C-band Microstrip Patch Antenna Design



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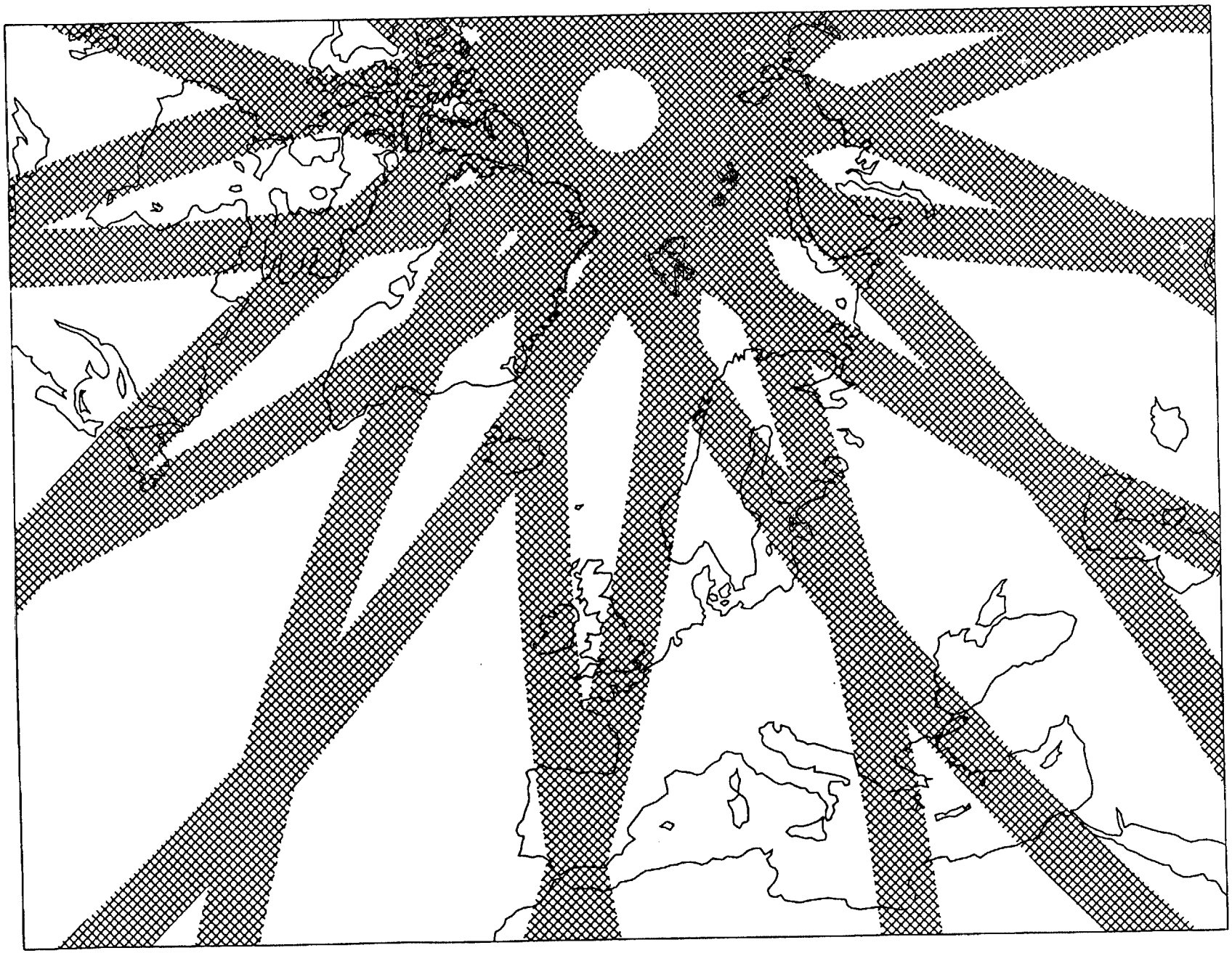
DATA RATES

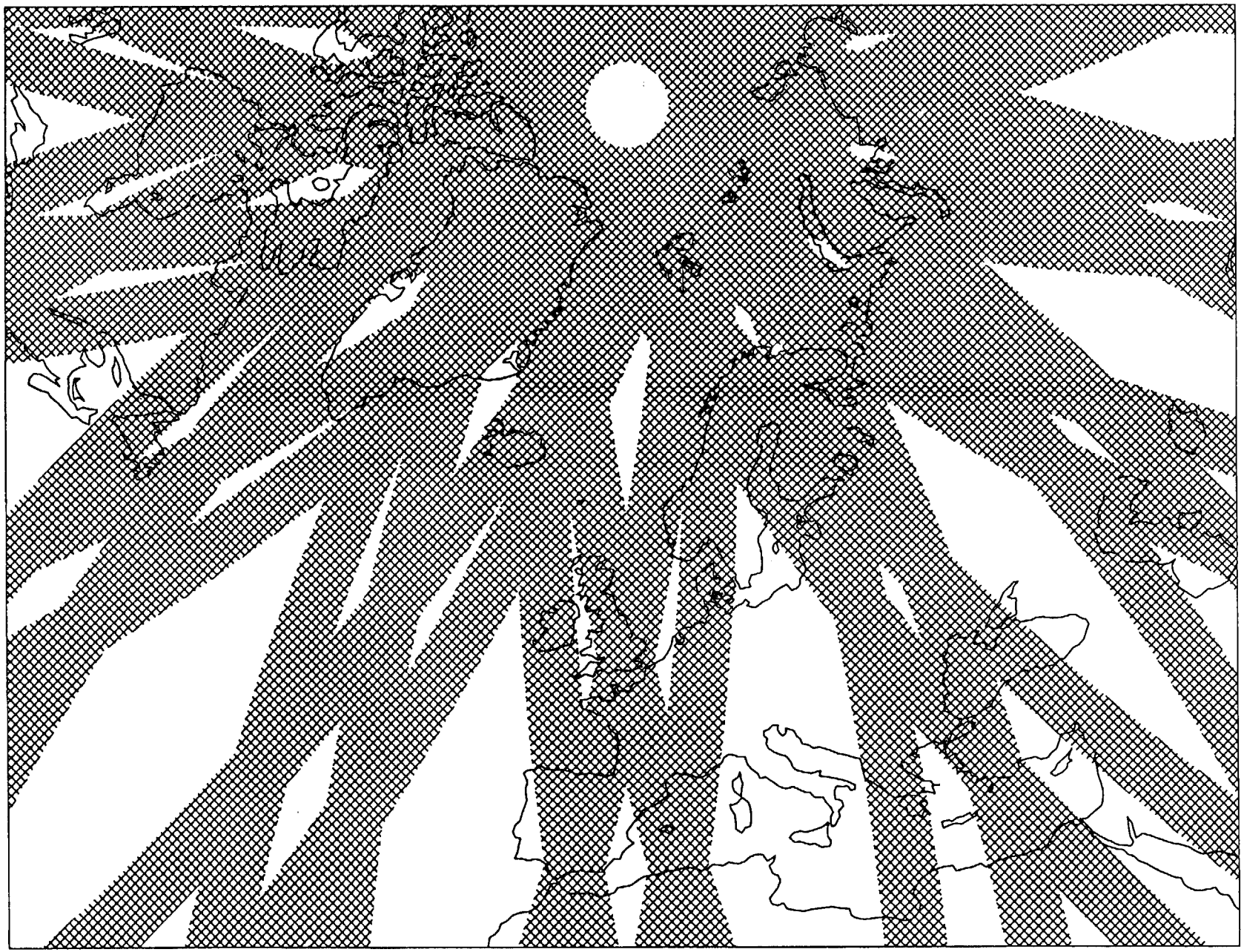
IMAGE SINGLE SWATH (H, V or ALTERNATE H&V)	< 100 Mbps
WIDE SWATH (>400Km)	< 100 Mbps
WAVE MODE	900 Kbps
GLOBAL SAR MODE	1100 Kbps

WAVE & GLOBAL SAR MODE ARE ON BOARD RECORDED, FOR ALL OTHER ASAR MODES DIRECT TRANSMISSION X BAND AND/OR KA BAND VIA EUROPEAN DRS SYSTEM.

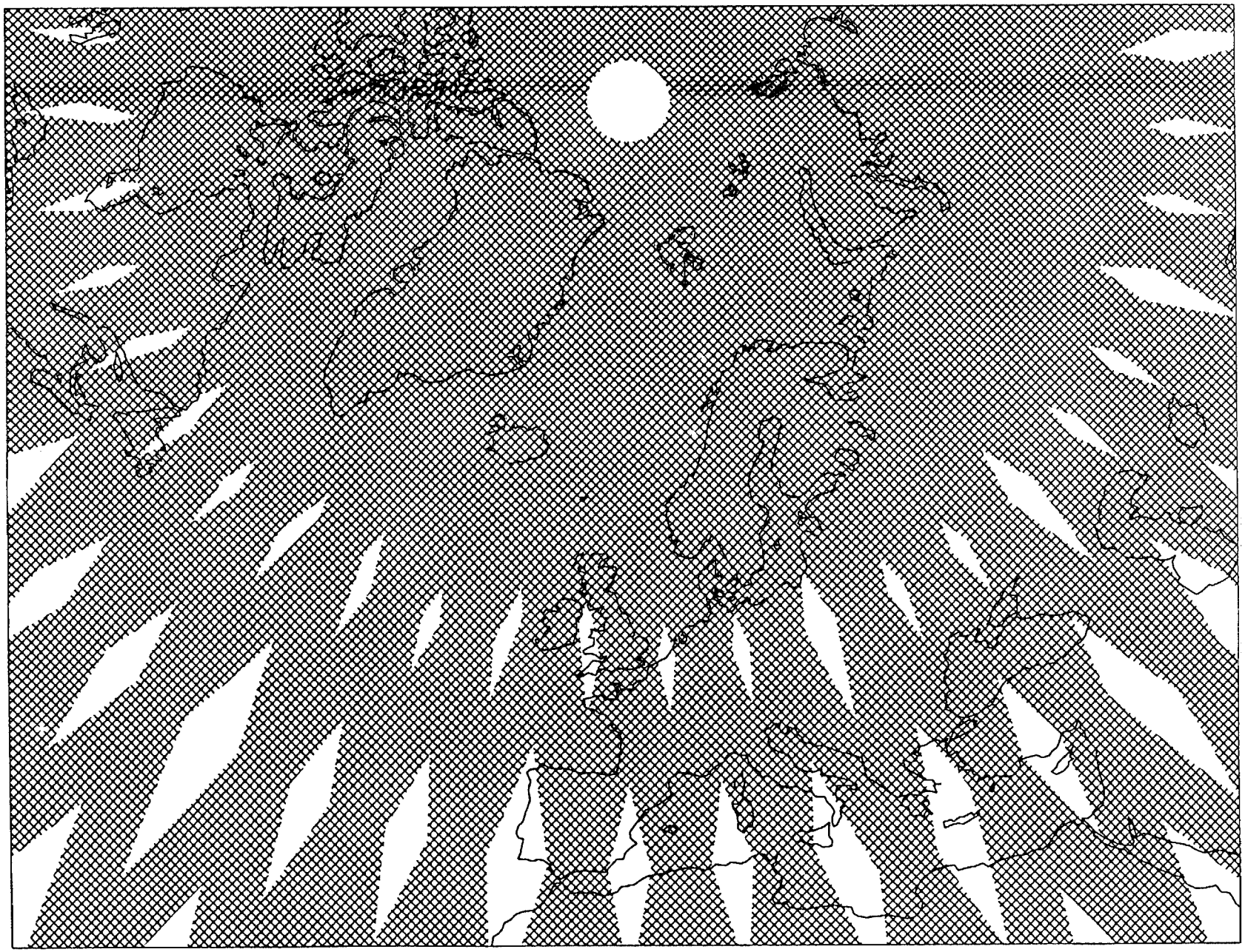
ASAR WIDE SWATH COVERAGE WITHIN 1 DAY



ASAR WIDE SWATH COVERAGE WITHIN 2 DAYS



ASAR WIDE SWATH COVERAGE WITHIN 3 DAYS



ASAR Programme