Welcome to
L'Garde, Inc.

Full Development Capability--
Design, Manufacture, Test

L'GARDE, INC.

Over 33,000 Sq. Ft. of Office, Labs, and Test Facilities

L'GARDE, INC.

L'Garde, Inc. 15181 Woodlawn Ave., Tustin, CA 92680-6487
Phone (714) 259-0771 FAX (714) 259-7822

Experts in Replica Decoys and Other Space Inflatable Structures

L'GARDE, INC.

LREP - 2 INFLATION

TCR 00:06:44:00

Experts in Handling, Customizing and Use of Thin Films and Elastomers

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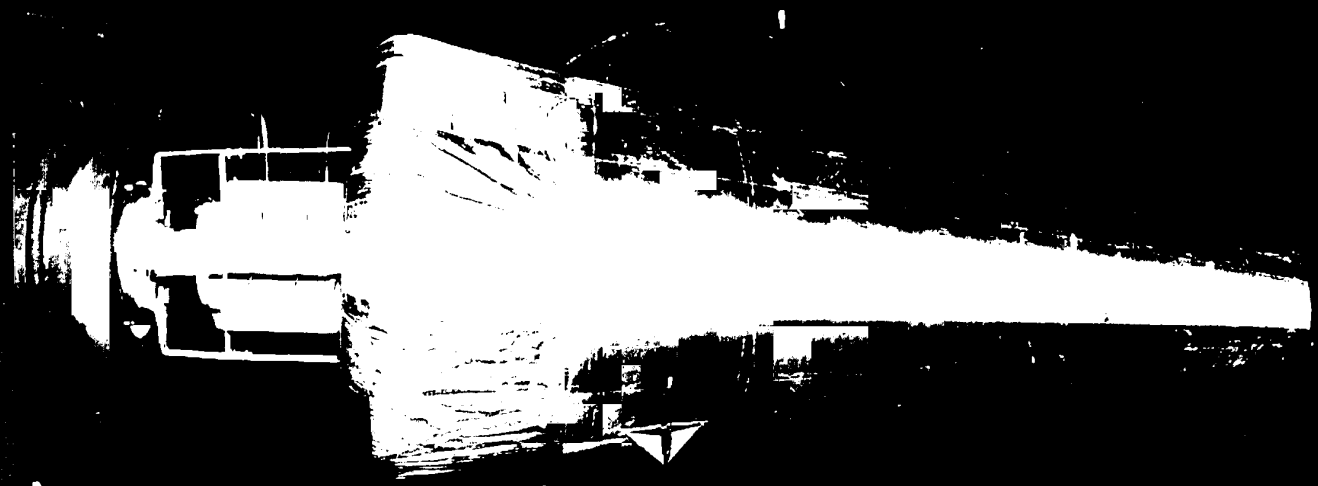
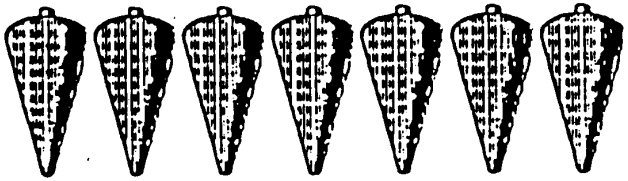


(U) L'Garde Produced Strategic Decoys

PROGRAM	DESCRIPTION			TESTS
IEO, with MIT/LL	Radar	H-REP Radar/Optical	Related Contract AMT materials Dev. Contract "Hard" Bladder, Adv. Design	Flight 1972 (RVTO-3A)
DDT for AVCO /SAMSO	Shroud for MK 12 Decoy	Superinsulated Shroud for MK 12 RV	Related Contract Husky Ace UGT Samples [redacted]	Ground 1976 (Nuclear, LWIR)
T-REP for AVCO /SAMSO	Seven Vehicles for Ground and Flight Test 		UNCLASSIFIED	Ground 1976-1978 Flight 1978
A-REP for McDonnell Douglas/SAMSO	Active Thermal Control Replica. Design of Optical Analog of T-REP			None
E-REP for McDonnell Douglas/SAMSO	Electrically -Heated Replica Production of Decoy Bladders			None
Molecular Flare for WRDC/BMO	Study and Ground Test of Pyrotechnic Countermeasure Over 60 Firings			Ground 1982-1985

PROGRAM	DESCRIPTION	TESTS
SRMP for BMO /USASDC	Many Ground Test Balloons; Emmissive L-REP; Anti-Simulation L-REP; Anti-Simulation L-REP 2	Ground 1986-1987 Flight 1987-1988
	Many Ground Test Balloons; Emissive S-REP; Anti-Simulation S-REP; Reflecting S-REP; Emissive S-REP with Pinger	Ground and Flight 1988
	Many Ground Test Balloons; Emissive C/DV's .5 m; Reflective C/DV's .5 m; Thermal Disipation .5 m; Structural Disipation 2.2 m	Ground 1988-1989 Flight 1991-1992
Firefly for MIT/LL	Ground Test Units; Fully Instrumented Targets, including Telemetry, Accelerometers, Sun Sensor, 3-Axis Magnetometers, P&T Transducers	Ground 1987-1989 Flight 1990
CIRD Repackaged L-REP	Ground Test Units; Flight Units	Ground 1990-1991 Flight 1991

Design, Test and Production of Custom Mil-Spec Electronics

L GARDE, C.

Inflatable Space Structures

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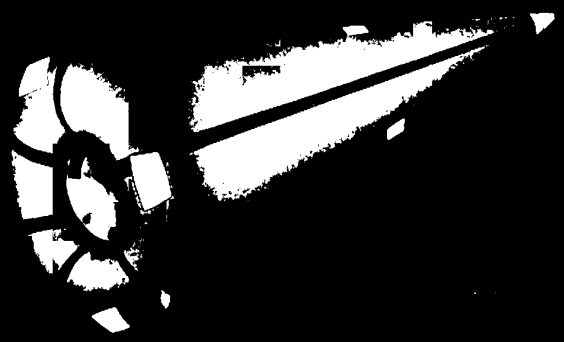
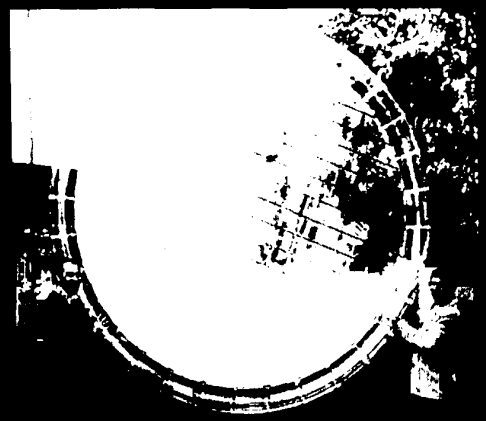
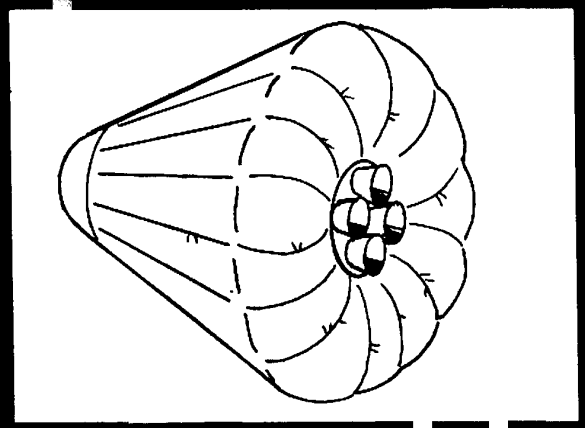


USAF - BSD - Decoys
USASDC - Decoys

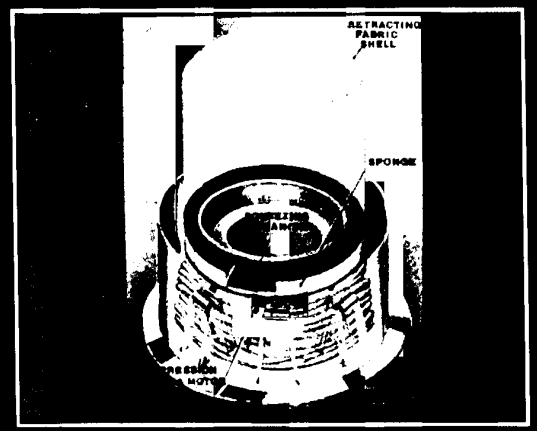


USAF - SSD - ITV

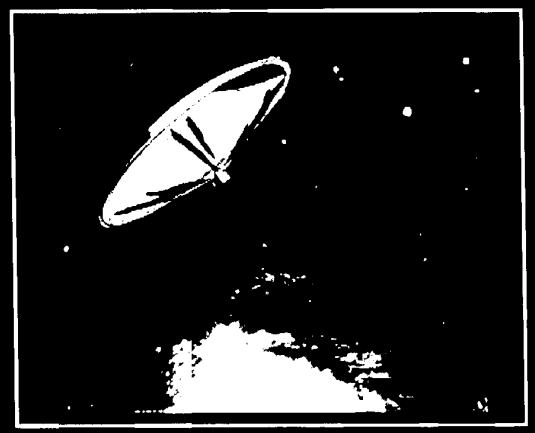
AFAL -- Solar Collector



ALS - Ballutes



WRDC, SDIO - Radiator



NASA - Antennas

AEROSPACE COMPANIES: TRW, Martin, Hughes, RI, MDAC, Avco, MIT/LL

Military Electronics

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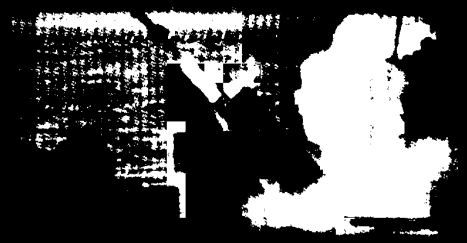

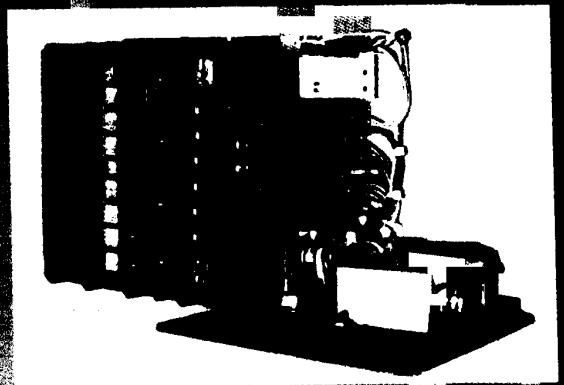

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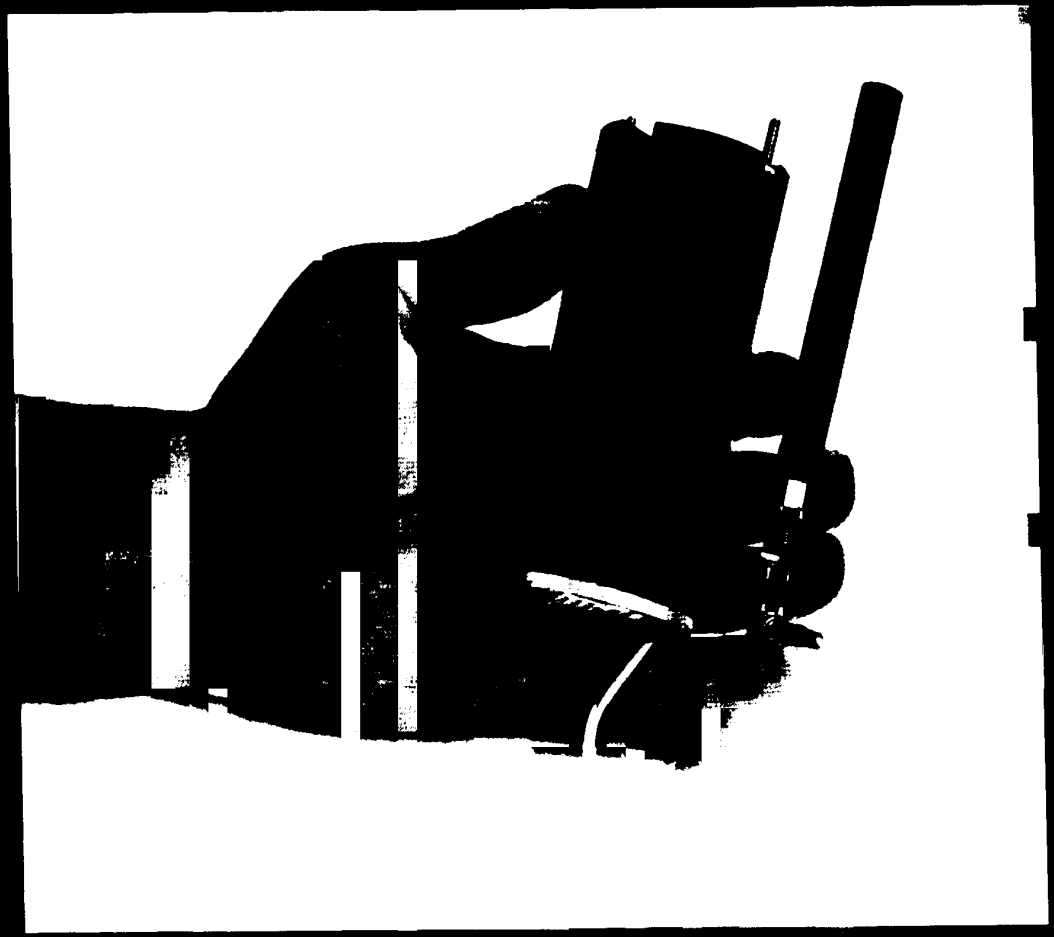
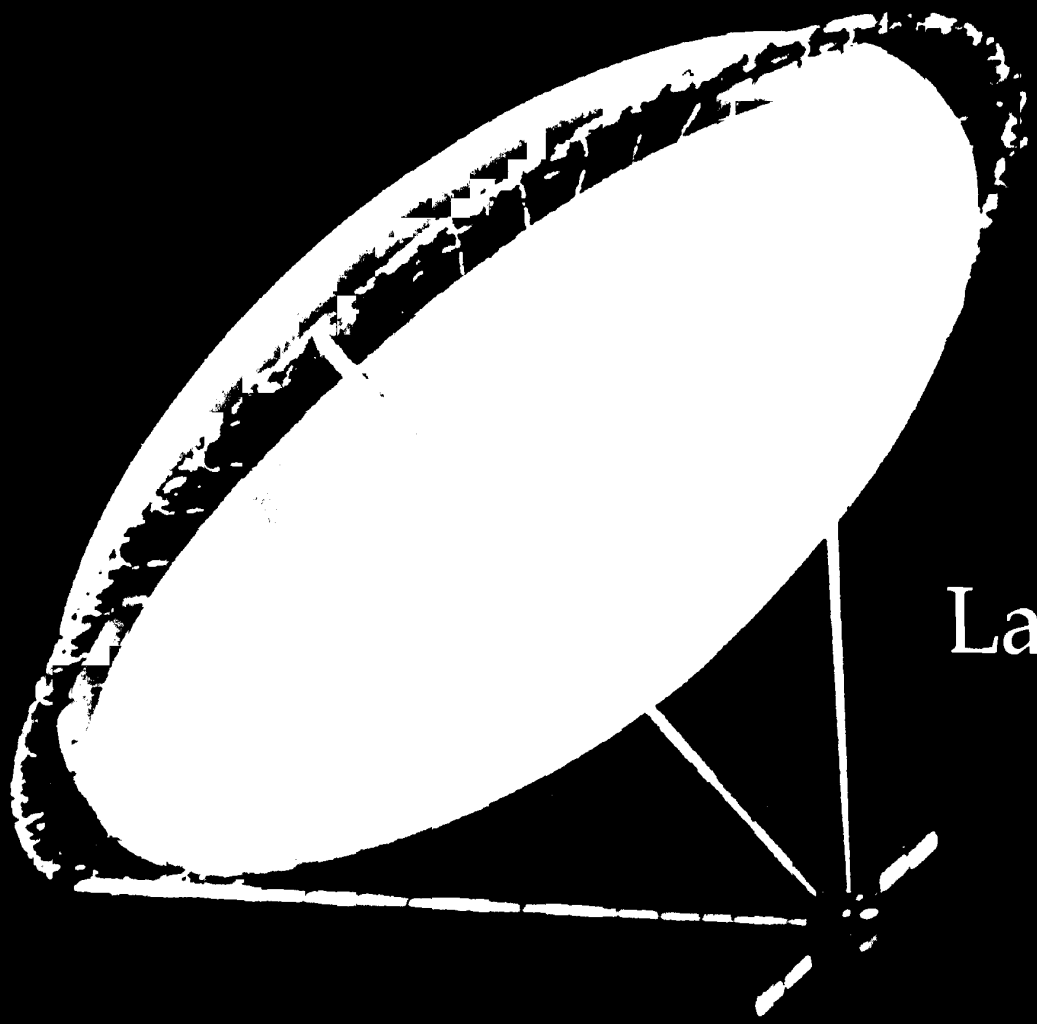


Miniature Data Acquisition System



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Concept of Large Inflatable Antenna

Cost Savings

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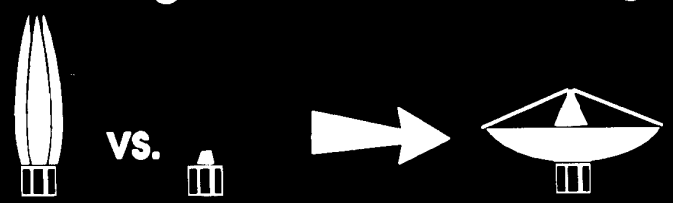
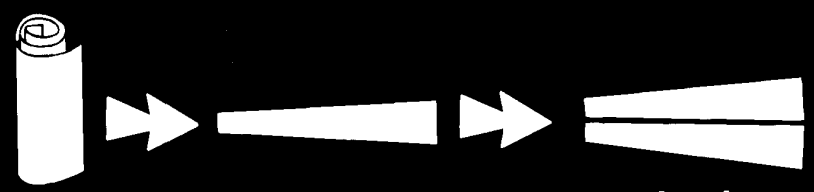
- Lower Packaged Volume and Weight



- Lower Development and Manufacturing Costs



off-the-shelf films simple patterns simple construction

- Dual Usage
  - Deep Space antenna and heat source
  - GEO-sync antenna and solar propulsion
  - Etc.
- High–Reliability
  - Note terrestrial uses: aircraft escape slides, life rafts, air bags, auto tires

PAYOFF

Booster downsizing

At least a factor of 10 reduction

Elimination of subsystems

More data per mission

Packaged Volume of Space Antenna Dishes

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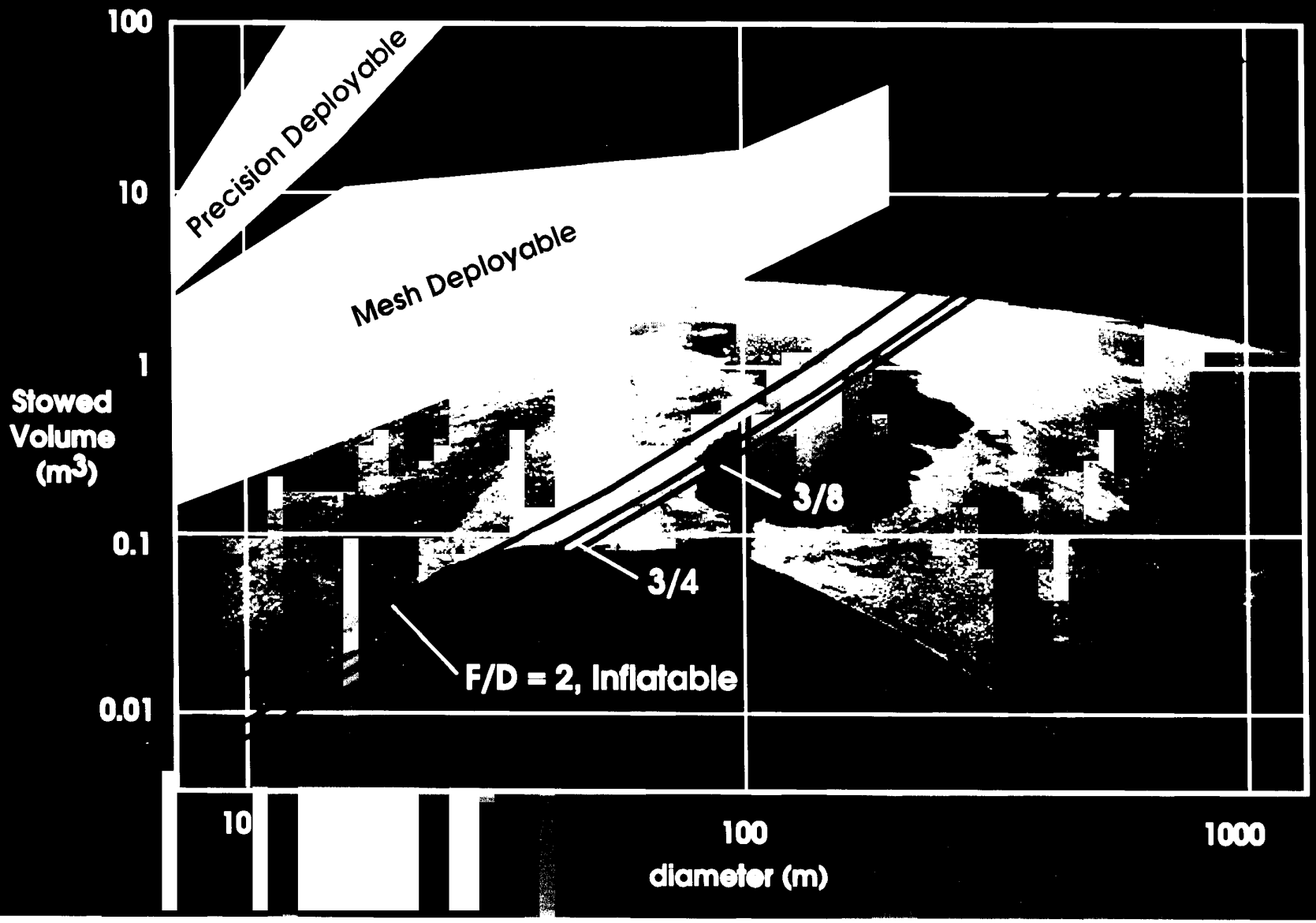

Inflatable Antenna Cost

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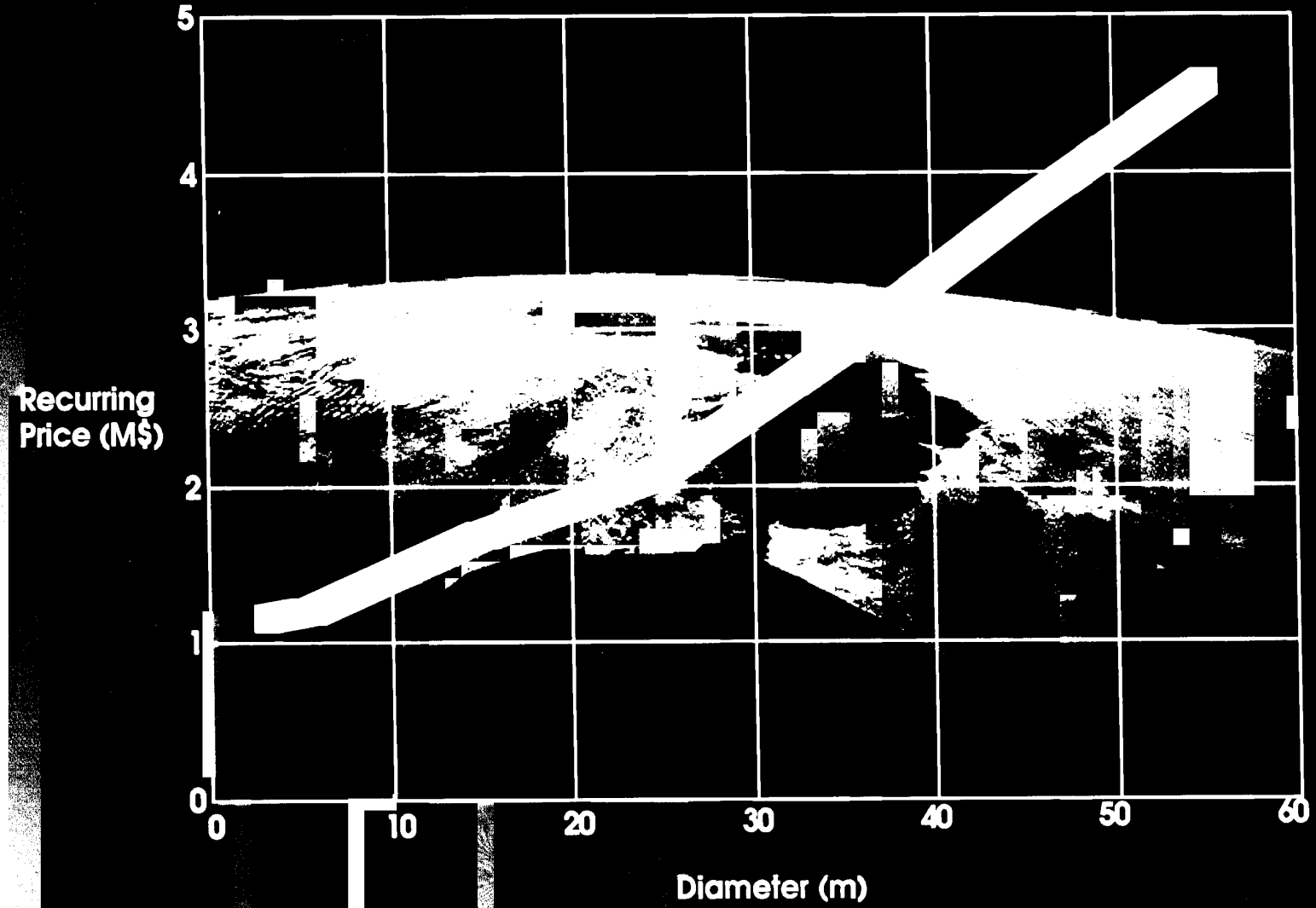
1993 DOLLARS



Microwave Antennas

L'GARDE, INC.

APPLICATION	APERTURE SIZE RANGE (m)	RF RANGE (GHz)
Mobile Communications	10-20	1.5
Mobile Communications	4-8	20-30
Earth Observation Radiometry	20-40	1.4-60
Active Microwave Sensing	0.4 x 2 & 4 x 16	1-94
OVLBI	20-25	0.3-90
DOD Space Based Radar	20-30	1.5-2.5
Microspace Craft	0.5-3	8.5/32

Nine Meter Solar Concentrator Reflector Structure

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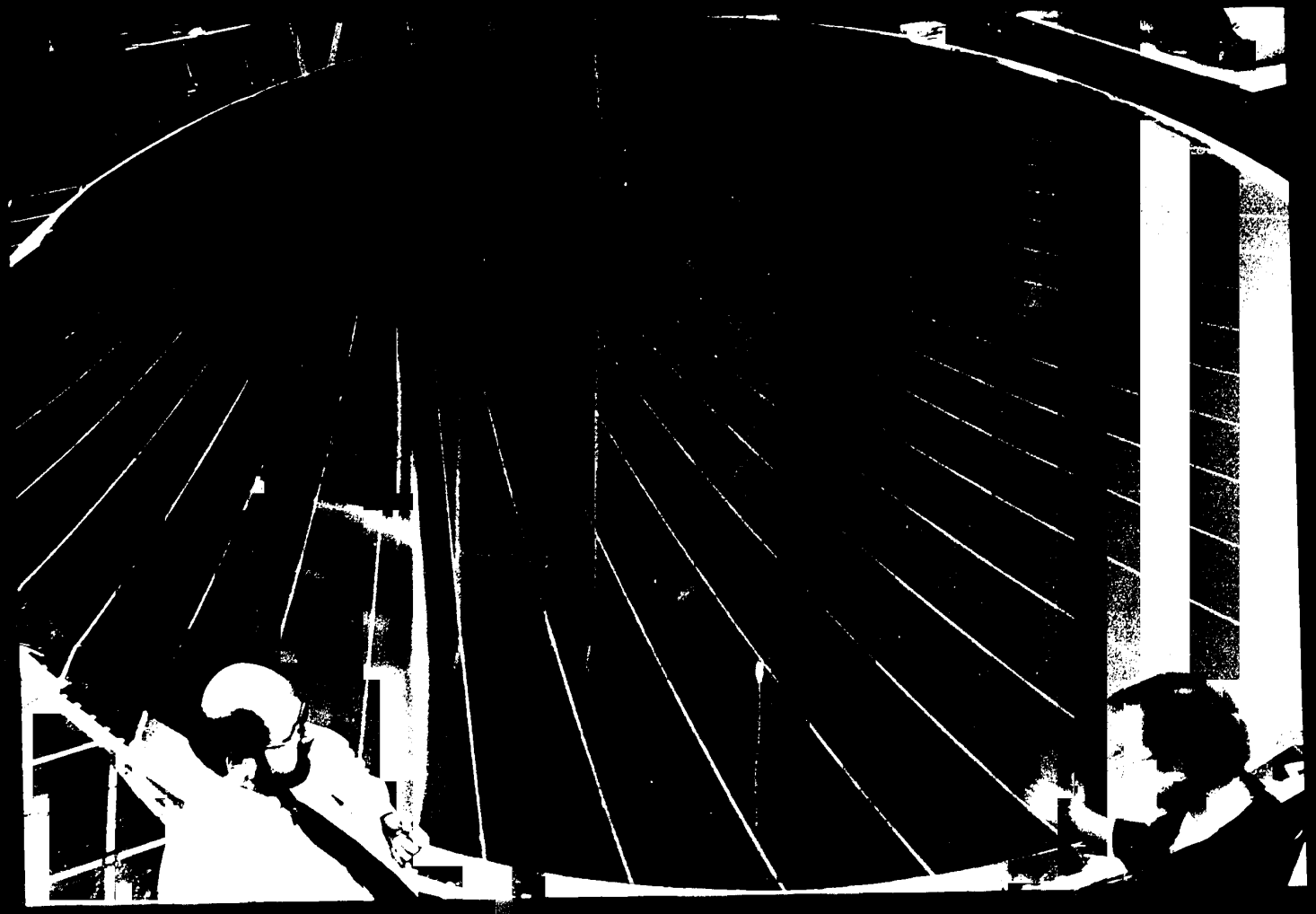

IN-STEP Inflatable Antenna Experiment

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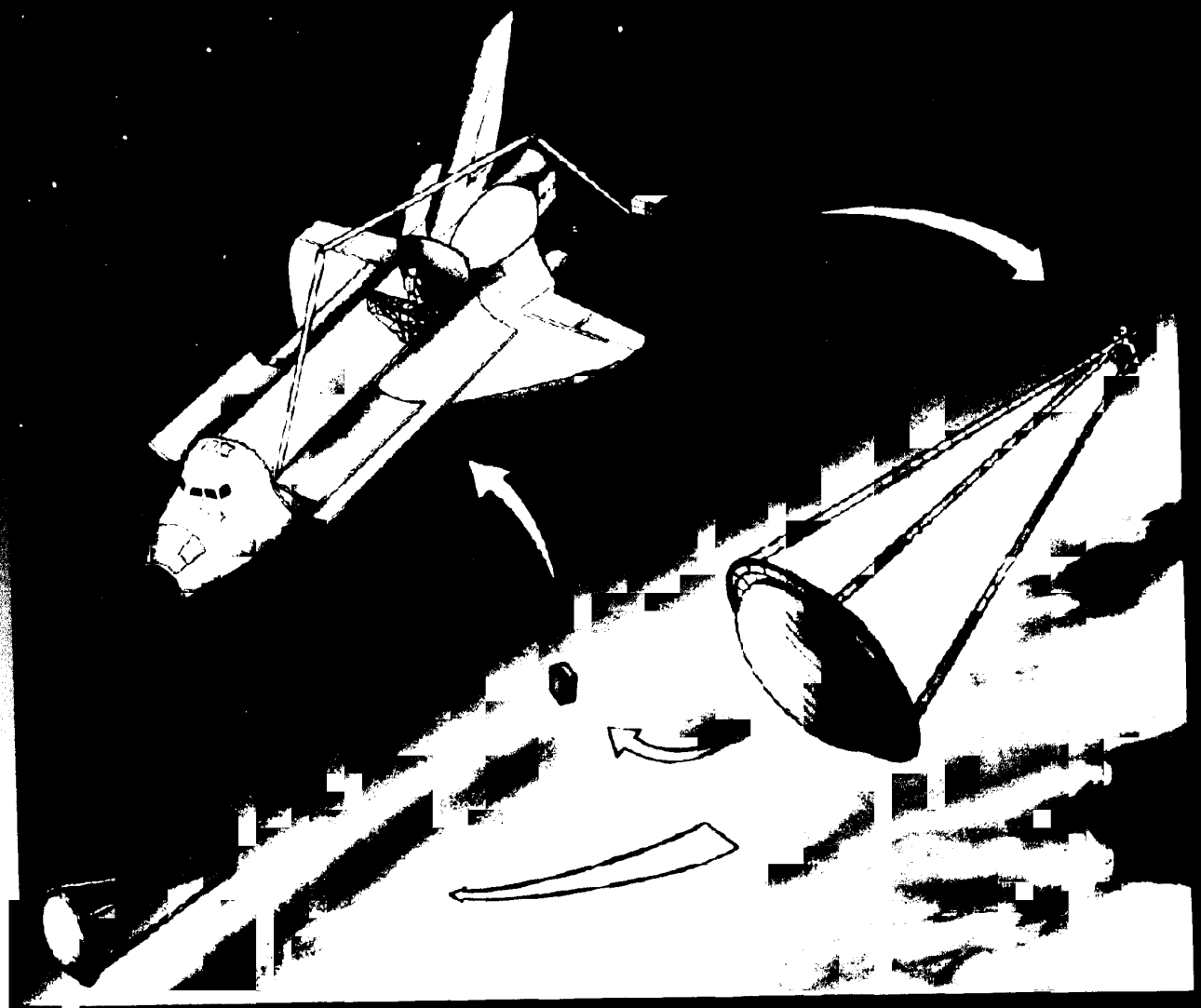

14 Meter IAE Reflector

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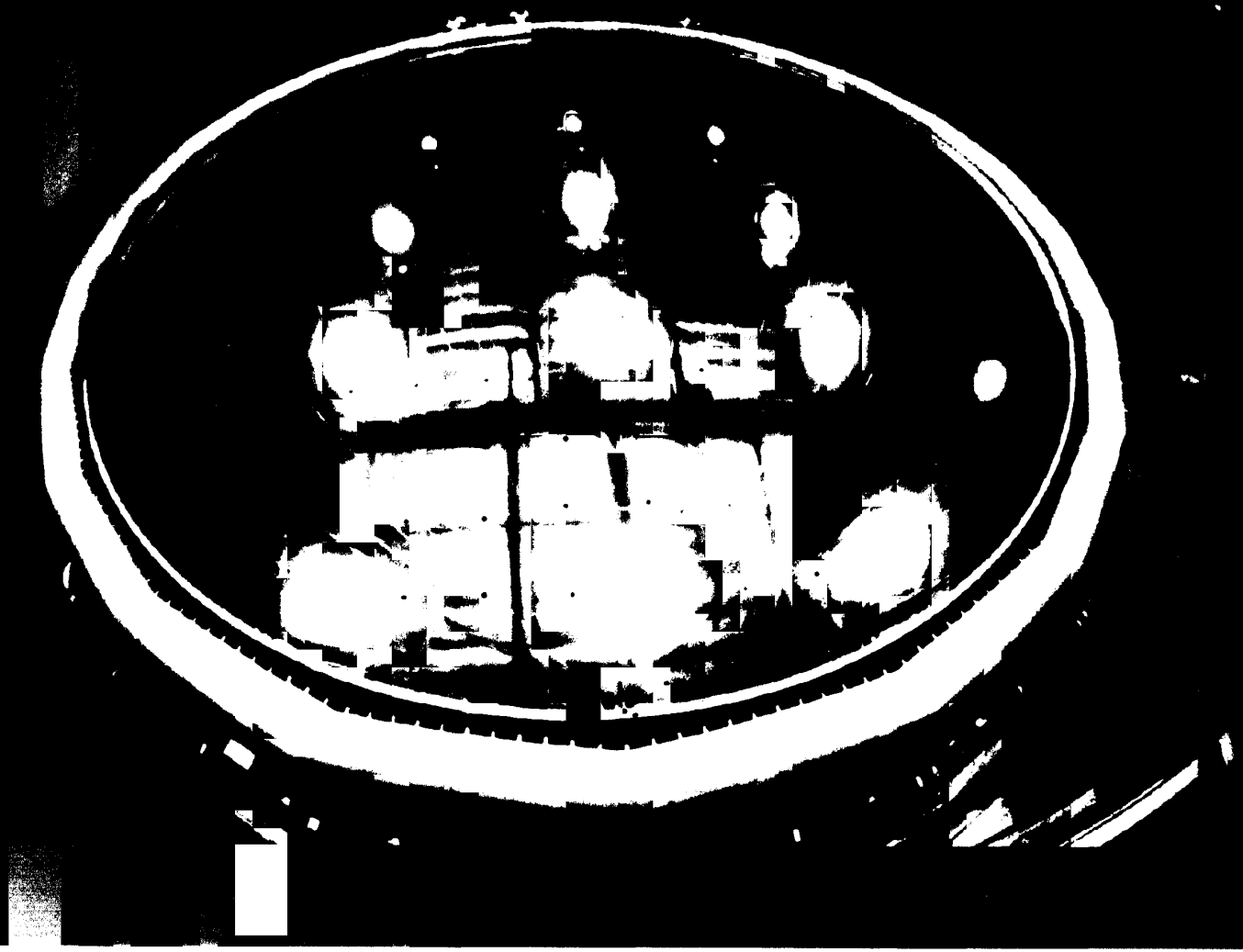

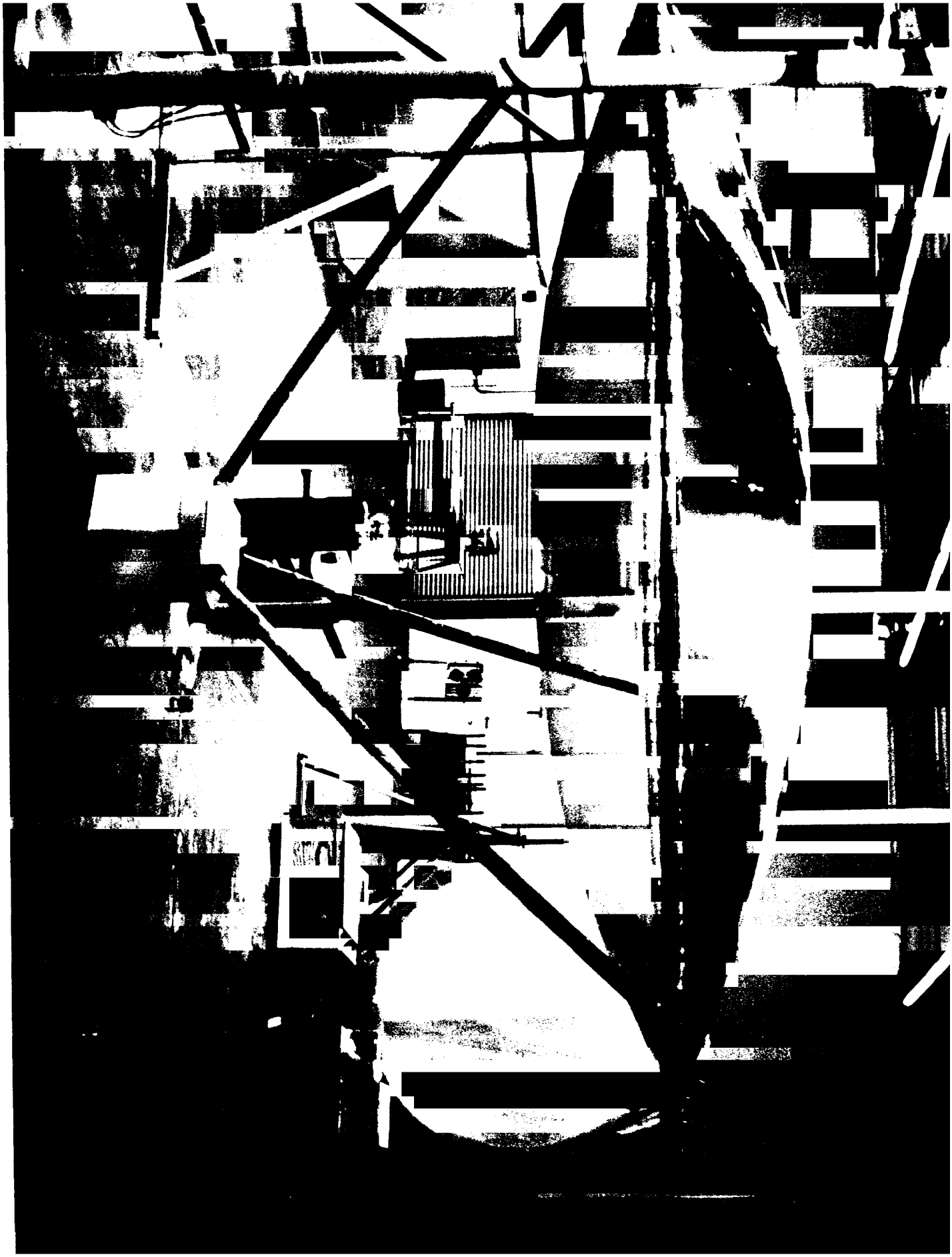

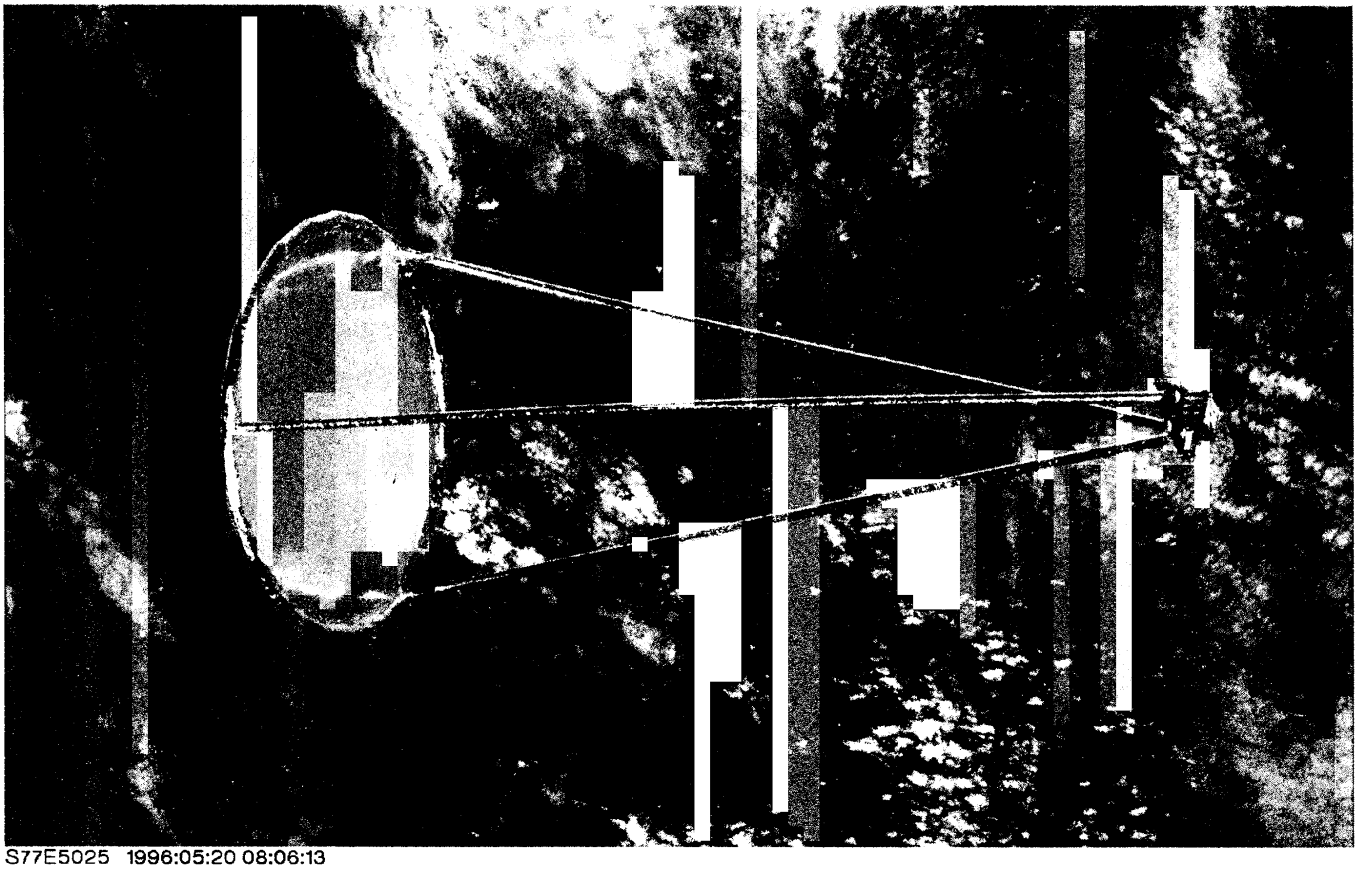

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Parabolic Inflatable Reflectors

Surface Figures

PROGRAM	APERTURE	YEAR	DEVIATION
Initial Development Inflatable Antenna	3 meter, On-Axis	1983	0.76 mm rms
HAIR I	0.9 meter, On-Axis	1984	0.61 mm rms
HAIR II	0.9 meter, On=Axis	1985	0.35 mm rms
	3 meter, On-Axis	1986	0.29 mm rms
IAE	3 meter, Off-Axis (Sector of 14 m)	1988-1996	0.678 mmrms
	14 meter, Off-Axis	"	Total: 7.8 mm rms Center 10 m: 1.5 mm rms
LDP	3 meter, On-Axis Operational Quality	1995-1997	1.7 mm rms
IRD	7 meter, On-Axis	1991-1997	Initial: 6.1 mm rms 2nd unit (est) : ~1-2 mmrms
LIS	3, 7, 17 and 25 m, On-Axis	1996-1999	1-2 mm rms

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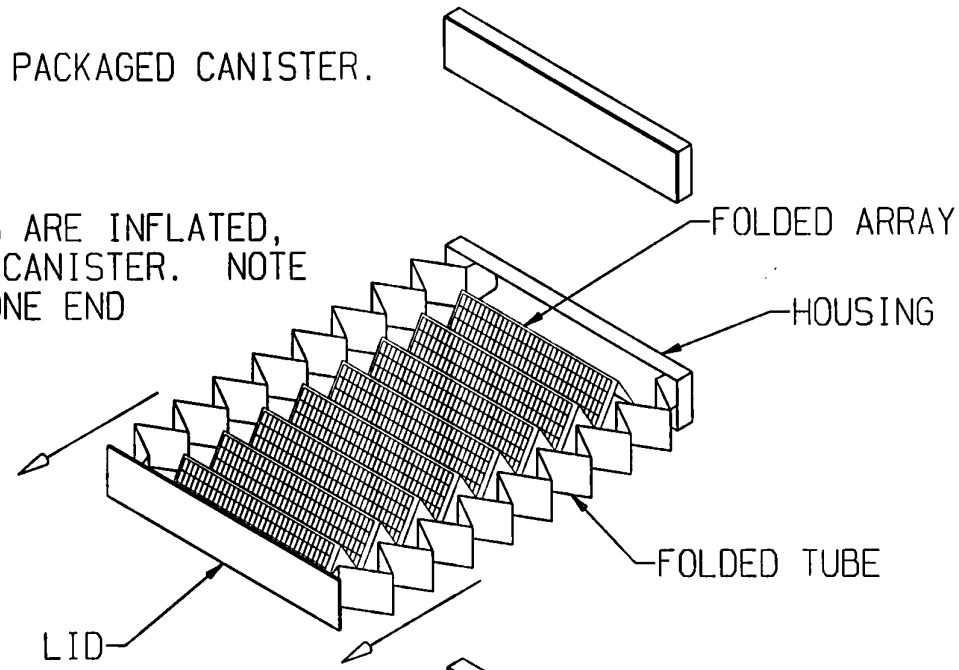
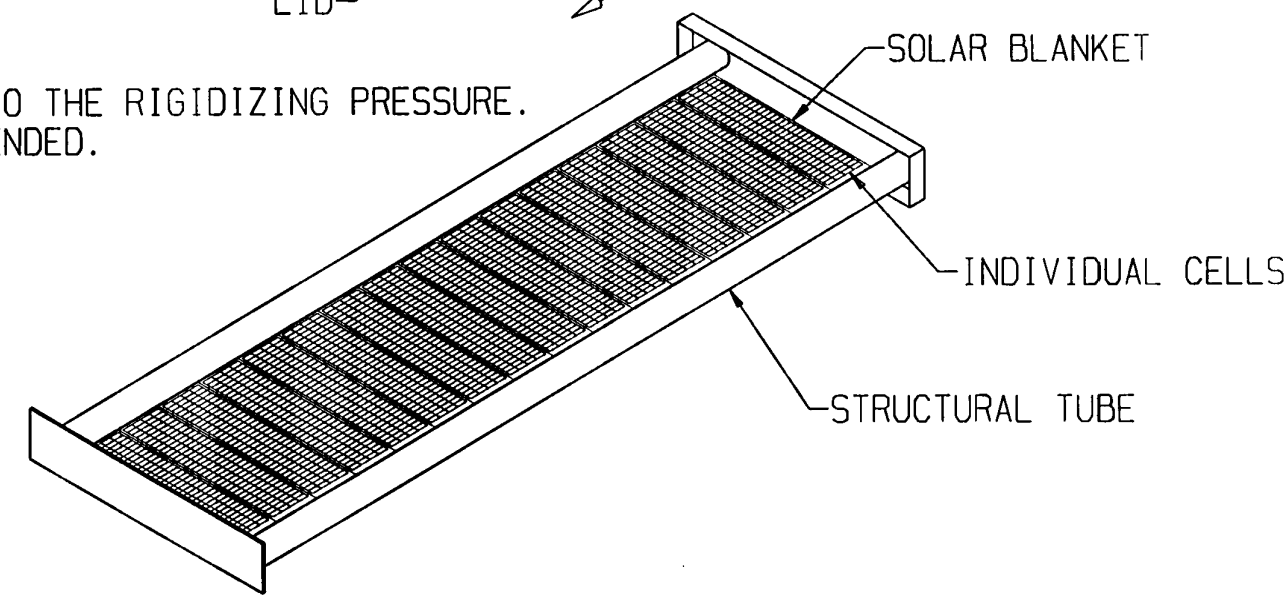
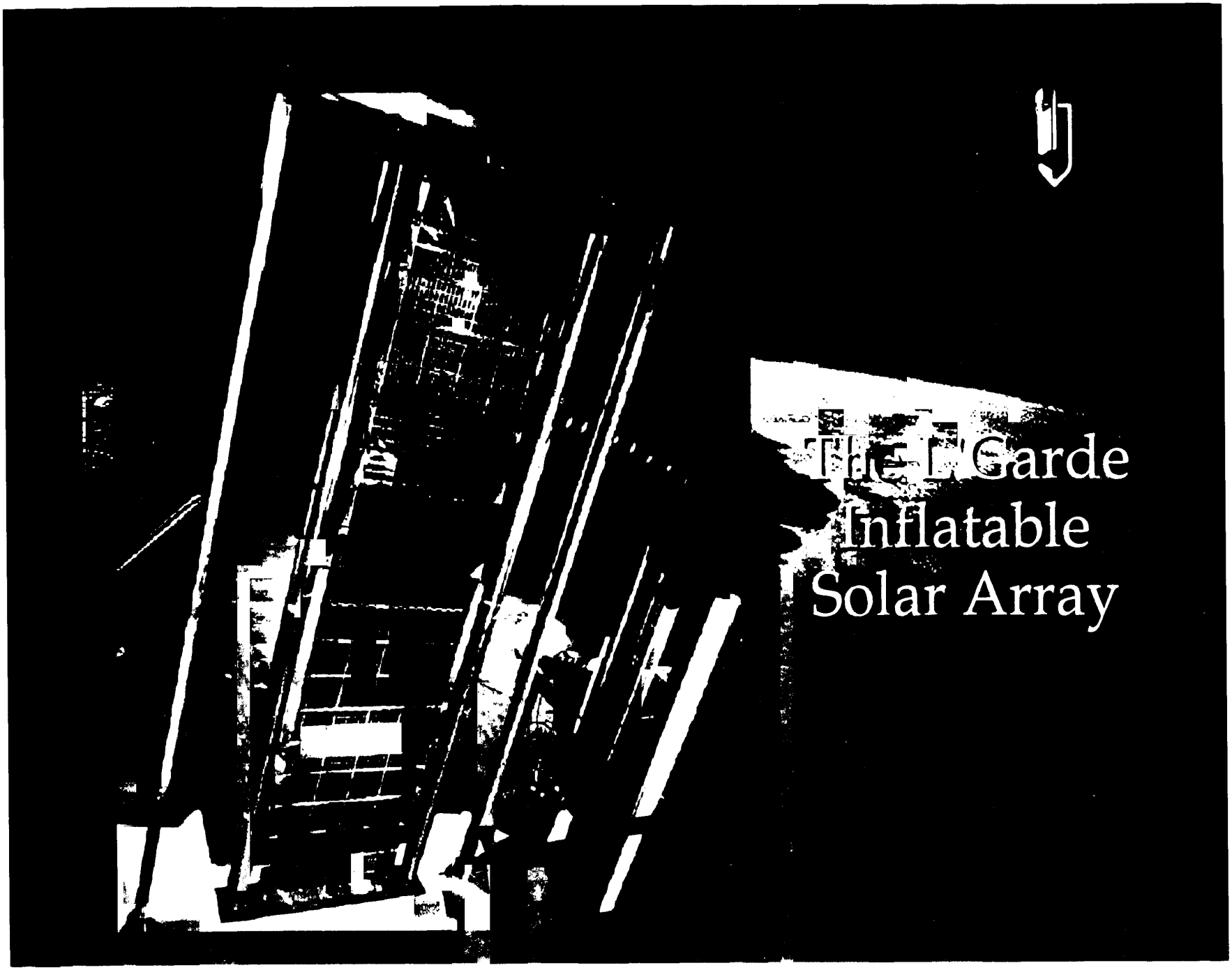
1. SOLAR ARRAY IN PACKAGED CANISTER.

2. CANISTER LID RELEASES. TUBES ARE INFLATED, PULLING THE ARRAY OUT OF THE CANISTER. NOTE THAT THE CANISTER LID FORMS ONE END OF THE STRUCTURE.



3. TUBES INFLATED TO THE RIGIDIZING PRESSURE. ARRAY FULLY EXTENDED.



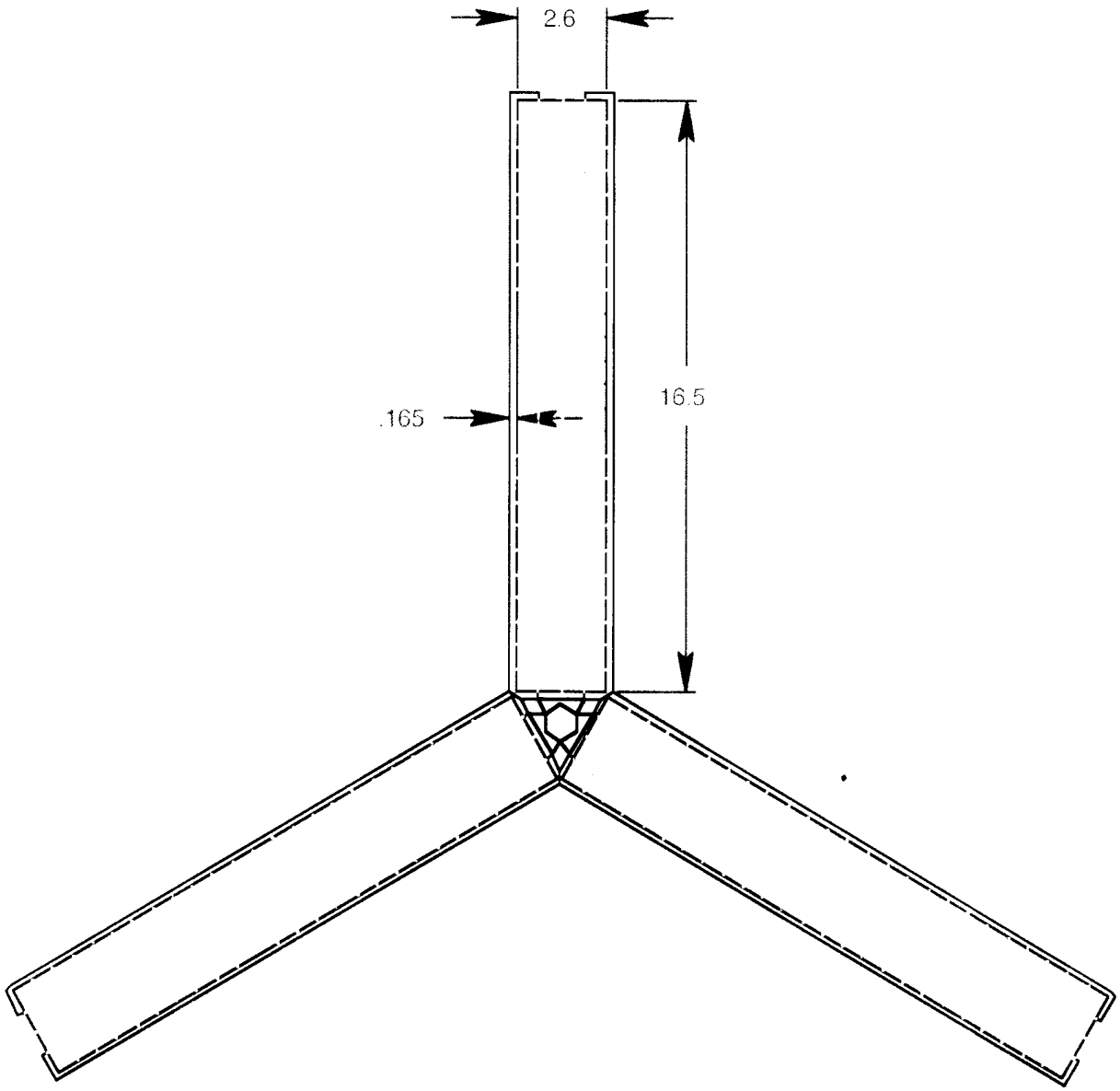


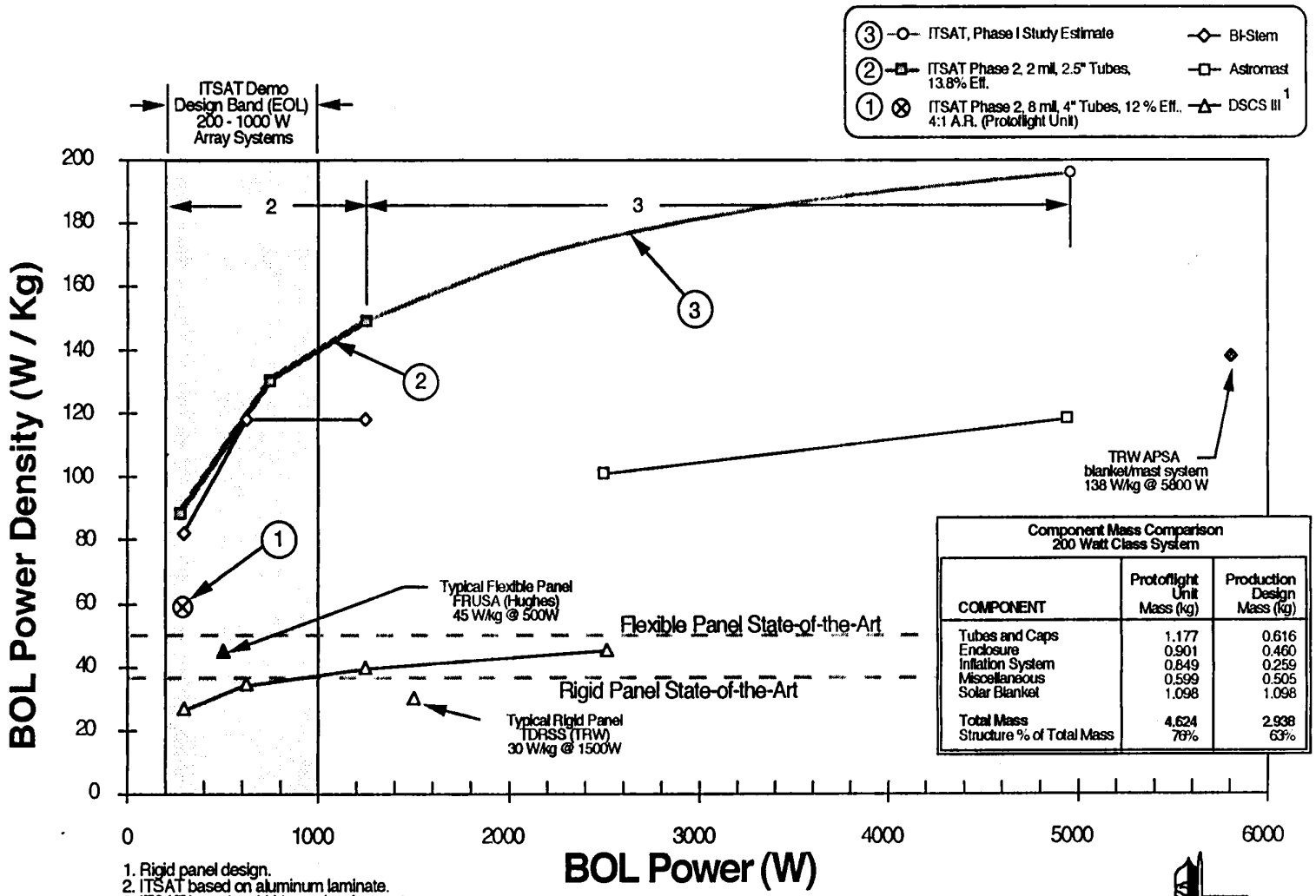
The L'Garde Inflatable Solar Array

L'GARDE, INC.

INFLATABLE-RIGIDIZABLE SOLAR ARRAY (IRSA)

3-Wing Trifold Configuration (Champollion NMP DS-4)





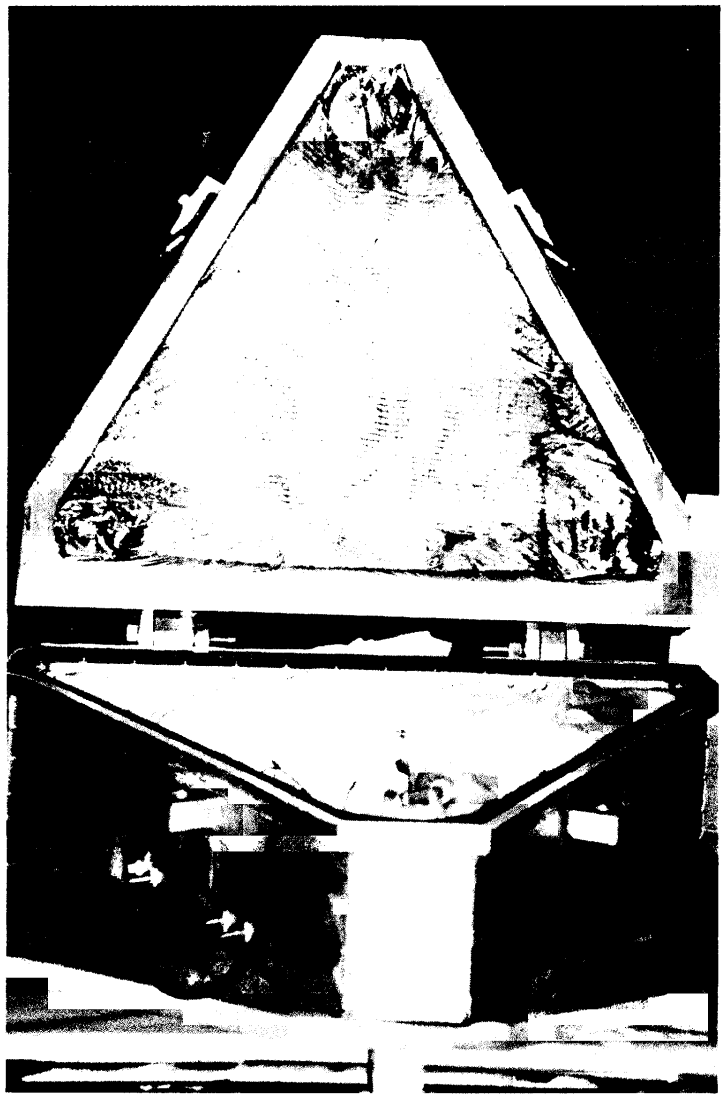
Component Mass Comparison
200 Watt Class System

COMPONENT	Protoflight Unit Mass (kg)	Production Design Mass (kg)
Tubes and Caps	1.177	0.616
Enclosure	0.901	0.460
Inflation System	0.849	0.259
Miscellaneous	0.599	0.505
Solar Blanket	1.098	1.098
Total Mass	4.624	2.938
Structure % of Total Mass	76%	63%

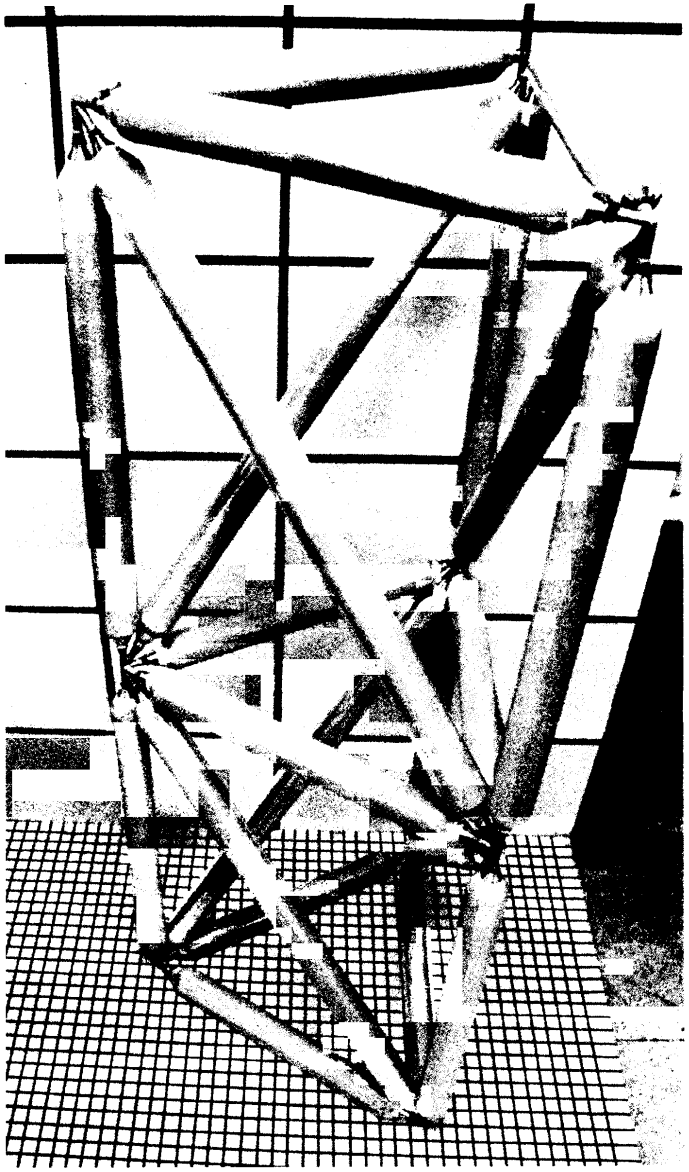
1. Rigid panel design.
2. ITSAT based on aluminum laminate.
3. ITSAT based on U-V cured resin structure.
4. All arrays are compared using crystaline-silicon cells.

This project was sponsered by ARPA and monitored by Phillips Laboratory.

FOLDED TRUSS INSIDE THE CANISTER



TRUSS BEFORE PACKAGING



Our Leadership in Space Inflatables

L'GARDE, INC.

- Over 100 Inflatable Devices Flown in Space Since 1972
  - IEO, TREP, SRMP, FIREFLY, RED TIGRESS
- Precision Inflatables Under Development Since 1972
  - ITV, HAIR, DSCE, SIREX, IRD, IAE
- Supporting Technologies Advanced
  - Meteoroid Protection INSTEP
  - Analysis of Precision Inflatable Structures LDIPS, FAIM
  - Structures that Inflate, then rigidize INSTEP, IRD, ITSAT