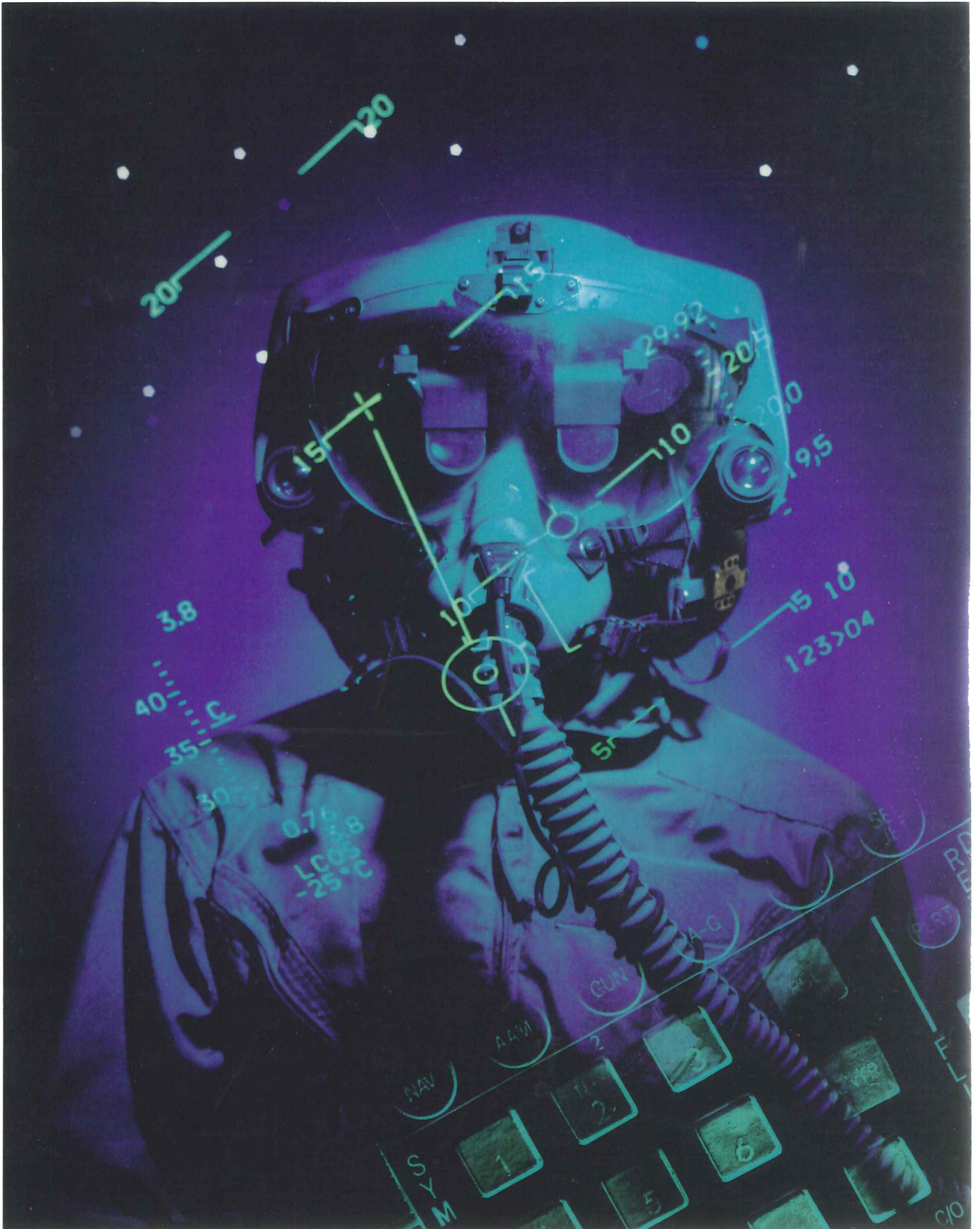


# AIRBORNE DISPLAY DIVISION



## PRODUCT GUIDE

# HISTORY OF ADD



## Corsair Building

- 1966
  - ADD was first formed with Rank Cintel
- 1967 (1.1.67)
  - ADD merged with ATE and PTE and became DADD (Data Analysis Display Division)
- 1967 (1.7.67)
  - ATE (SESD) split and DADD was re-named as ADD
- 1967 (29.10.67)
  - First contract awarded was for the A-7 Corsair, hence the naming of the Corsair building



# INTRODUCTION

**ADD have an excellent record of success in aircraft display systems, and have built up valuable skills and expertise in all fields into which we have entered.**

**The HUD systems for the C/D version of the F-16 aircraft, the A-7D/K retrofit programme and the 'smart' HUD for the C-17 aircraft are all produced from the production facilities of ADD, the largest division on the Rochester site.**

**In 1990, ADD were awarded the Prime Contract by Eurofighter to supply the Head Up Display for the European Fighter Aircraft (EFA). This will incorporate a highly sophisticated wide-angle diffractive lens which has taken five years to develop.**

**The latest achievement for ADD has been the contract award for the Head Up Display for the F-22 programme, the new Advanced Tactical Fighter.**

**At present, over 8000 Head Up Displays have been delivered with more than 6 million flight hours accumulated, including combat experience during the Gulf War.**

**Helmet Mounted Display development has been led by Airborne Display Division in collaboration with the Company's Research Laboratories. Work was started in 1969, and by 1974 had resulted in the successful development of the Helmet Mounted Display System.**

**The F-16 "Falcon Eye" Helmet Mounted Display System developed under contract from General Dynamics is a new lightweight helmet, integrated with an advanced binocular CRT displaying video received from a fully gimballed FLIR with cursive symbology. "Falcon Eye" is a true "HUD on the Head" system and led to the award of contracts for similar equipment for the F-16 AFTI aircraft and the V-22 Osprey tiltrotor aircraft.**

**The Integrated Night Vision Helmet (INVH) Display System is currently undergoing trials in the PAH1 helicopter in Germany.**

**The very successful "Cats Eyes" Night Vision Goggles continue to be produced for several customers in the USA along with orders for "Ground Owl" Night Vision Goggles.**

**At present, over 200 Head Mounted Display devices have been delivered and the Company has just been awarded major contracts for the PAH German and Franco-German helicopter programmes.**

**In Europe, GEC Avionics has been awarded the contract for the Cockpit Interface Unit which houses an electromagnetic tracker and the associated Computer Symbol Generator which provides all the display processing for the European Fighter Aircraft.**

**A summary of manufactured systems is shown in Table 1 and a summary of HMD programmes and their deliveries is presented in Table 2.**

**Table 1 Summary of Manufactured Systems**

<b>YEAR</b>	<b>EQUIPMENT</b>	<b>QTY.</b>	<b>CUSTOMER</b>
1968	A-7 D/E	2065	LTV Corp Dallas
1977	F-16 A/B	1900*	General Dynamics/USAF
1980	LANTIRN F-16 & A-10	11	USAF
1983	F-16 C/D	3500*	General Dynamics/USAF
1985	A-7 D/K	115*	LTV Corp Dallas
1985	EAP	3	British Aerospace
1986	C-17	16*	Douglas Aircraft Co.
1986	F-16 D/H	542*	General Dynamics/USAF
1988	YF-22 (ATF)	9	Lockheed
1989	EFA CIU	TBD	Eurofighter
1990	EFA CSG	TBD	Eurofighter
1990	EFA HUD	TBD	Eurofighter

\*Programme Still Running

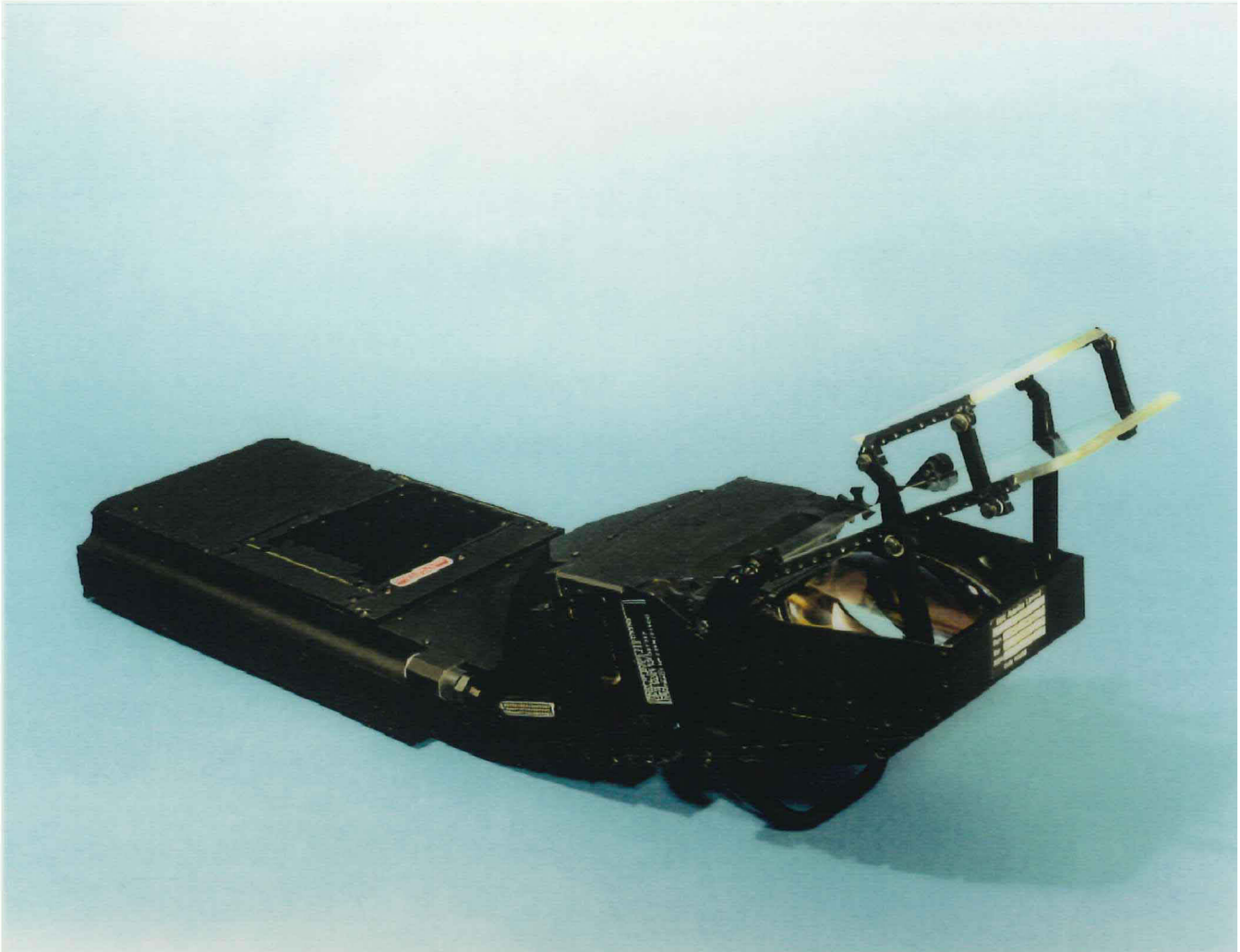
**Table 2 HMD Related Programmes and Deliveries**

<b>YEAR</b>	<b>EQUIPMENT</b>	<b>QTY.</b>	<b>CUSTOMER</b>
1976	Visor Projected LED HMD System	1	US Navy & USAF
1977	Visor Projected LED HMD System	5	Westlands, UK
1979	Visor Projected LED HMD System	5	RAE Farnborough
1980	CRT HMD System	1	RAE Farnborough
1984	Cats Eyes NVG	3	US Navy
1986	Cats Eyes NVG	25	US Navy
1987	Falcon Eye CRT HMD System	2	GD Fort Worth, USA
1987	Cats Eyes NVG	40	Air Nat. Guard, USA
1987	40 Degree HMD System	1	UK MoD (Army)
1988	Cats Eyes NVG	17	US Navy
1988	40 Degree HMD System	2	RAE Farnborough
1989	Daytime HMD for Falcon Eye	1	GD Fort Worth, USA
1989	Visor Projected LED Reticle HMD	3	RAE Farnborough
1990	Cats Eyes NVG	88	US Navy
1990	Cats Eyes NVG	4	GD Fort Worth, USA
1990	Modular HMD (SOFT Mock-up)	6	MCAIR
1990	Modular Integrated NVG-Reticle HMD	9	MCAIR
1990	Modular Integrated CRT-NVG HMD System	2	MBB, Germany
1991	Ground Owl NVG	68	Ground Forces
1991	Cats Eyes NVG	125	US Navy
1991	Modular Integrated CRT-NVG HMD System	2	GD Fort Worth, USA
1991	Modular Integrated CRT-NVG + Tracker HMD System	1	NAVAIR





# HEAD UP DISPLAYS (HUD)



## C-17

The world's first high integrity HUD with integral symbol generator. **Two** such HUDs are fitted to the C-17 transport. **Note the fold down combiner.**



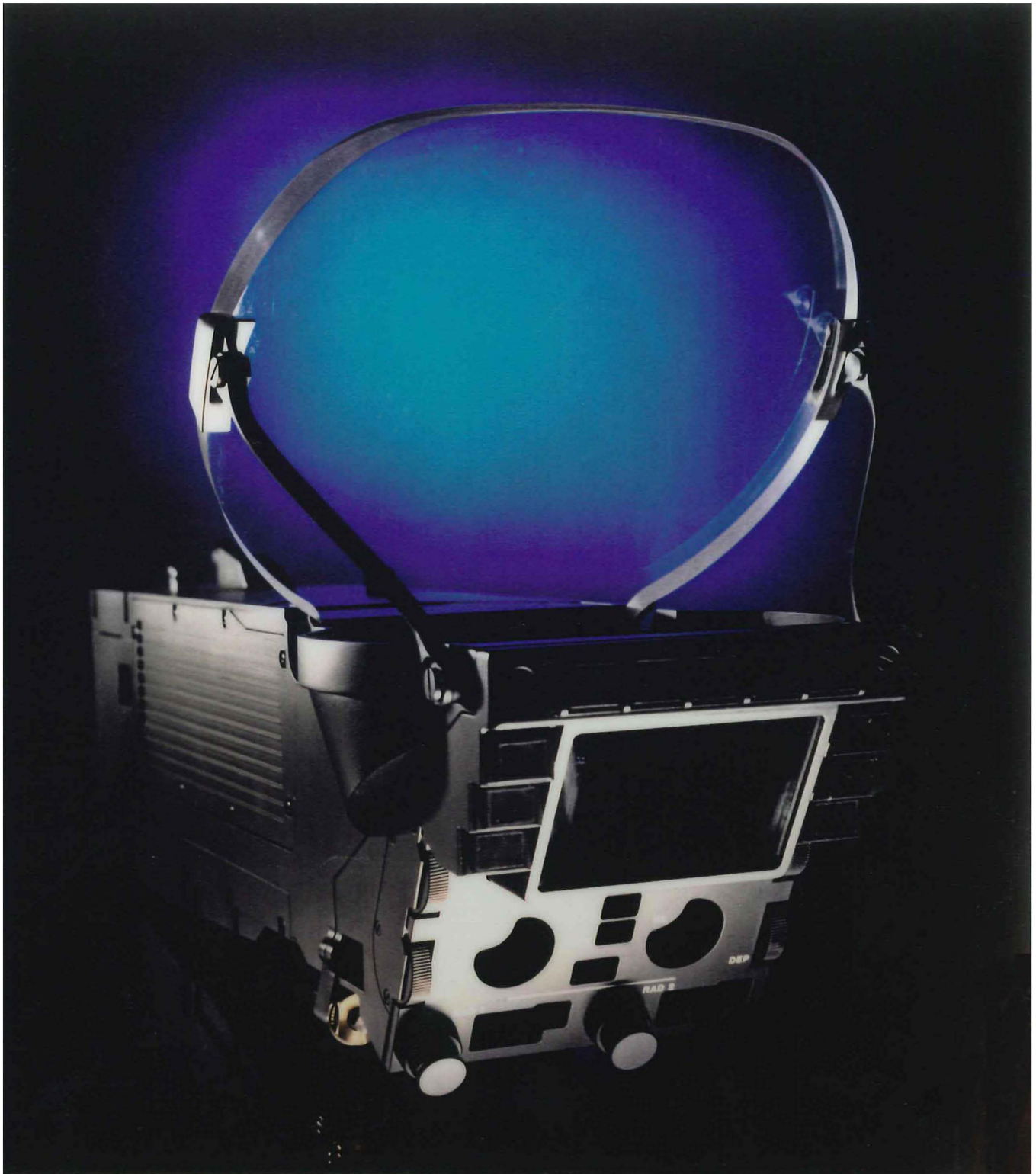
# HEAD UP DISPLAYS (HUD)



## F-16 D/H LANTIRN

The world's first large scale production holographic or diffractive HUD. It uses three holographic elements of which some units were made at Rochester in the Falcon Building.

# HEAD UP DISPLAYS (HUD)

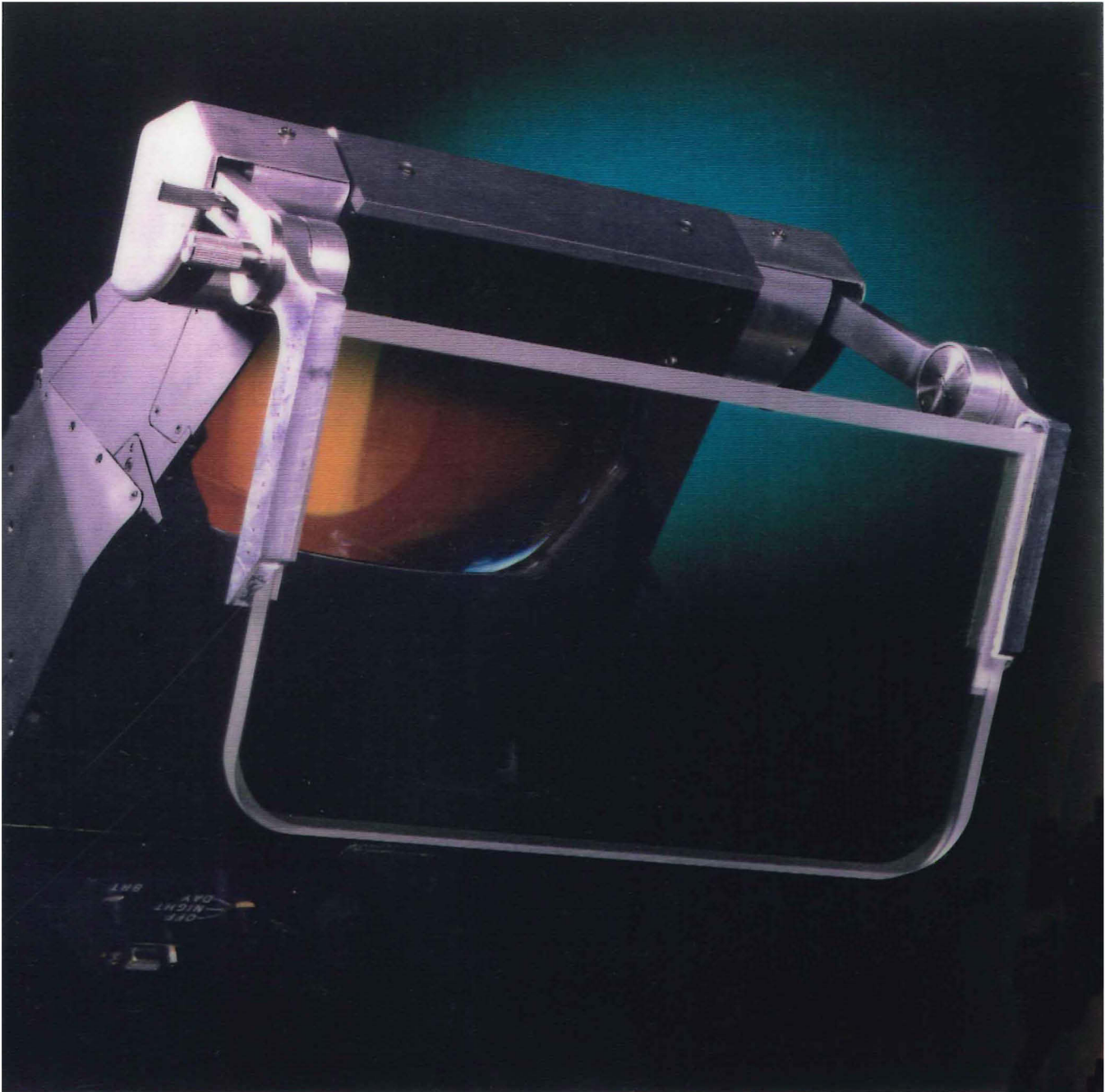


## EUROPEAN FIGHTER AIRCRAFT (EFA) WIDE-ANGLE DISPLAY

The world's first application of Computer Generated Holographic techniques, to provide a wide field of view and a highly accurate HUD.



# HEAD UP DISPLAYS (HUD)



## TRANSPORT HUD

Head Up Displays for transport aircraft are in development to capture new non-military business. The HUD is mounted overhead.

## HEAD DOWN DISPLAYS (HDD)



### TORNADO TERRAIN FOLLOWING E-SCOPE

This small display forms part of the Tornado automatic terrain following system.



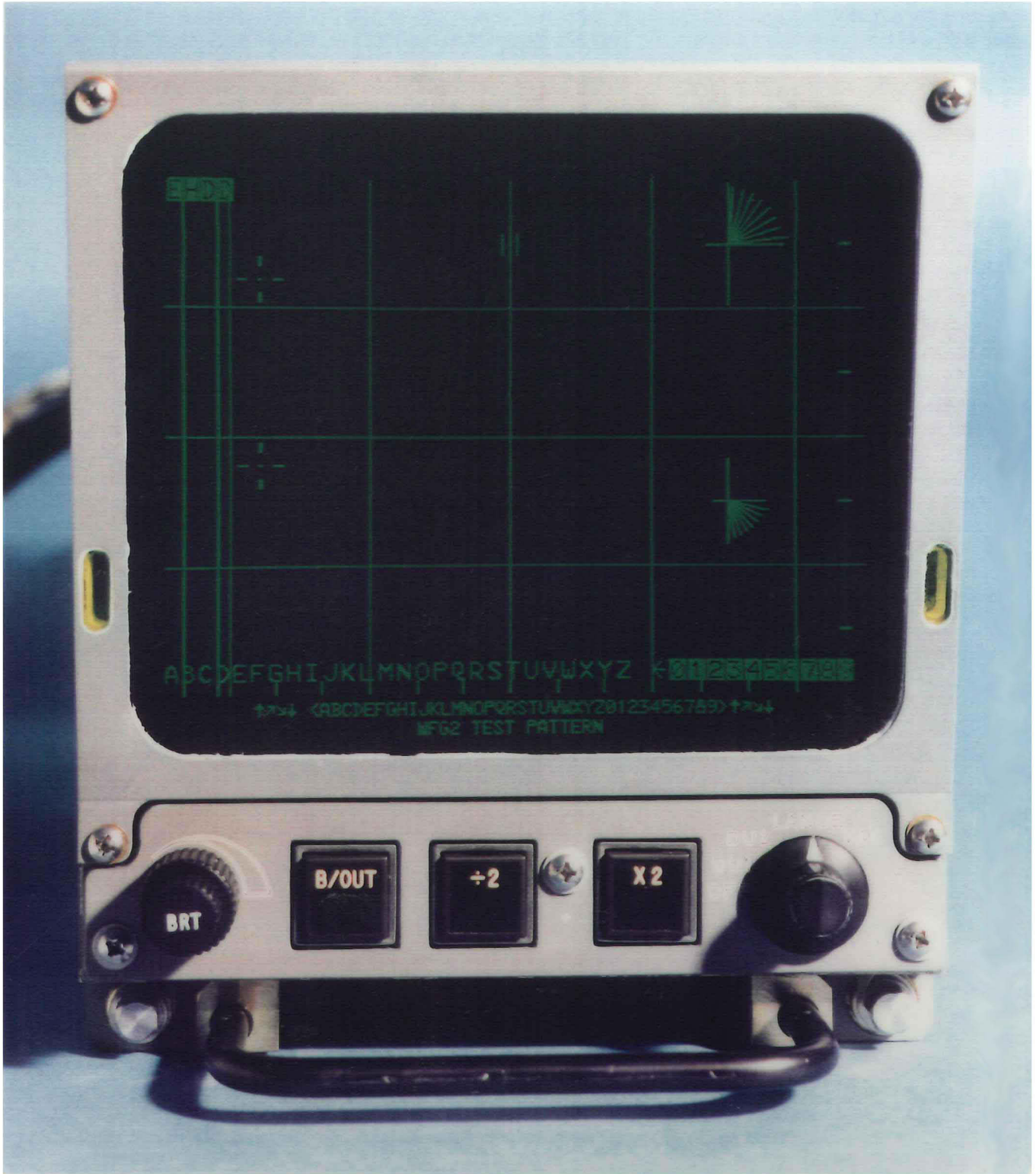
# HEAD DOWN DISPLAYS (HDD)



## TORNADO GR1 TV TAB

Two of these TV display units are used by Tornado Navigators for route planning and for control of TV guided missiles.

# HEAD DOWN DISPLAYS (HDD)



## TORNADO F3 ELECTRONIC HDD

This display is used by the Pilot in the Air Defence Variant (ADV) to display video as seen by the Navigator on the TV Tabulator displays and also to display aircraft failures and status information.



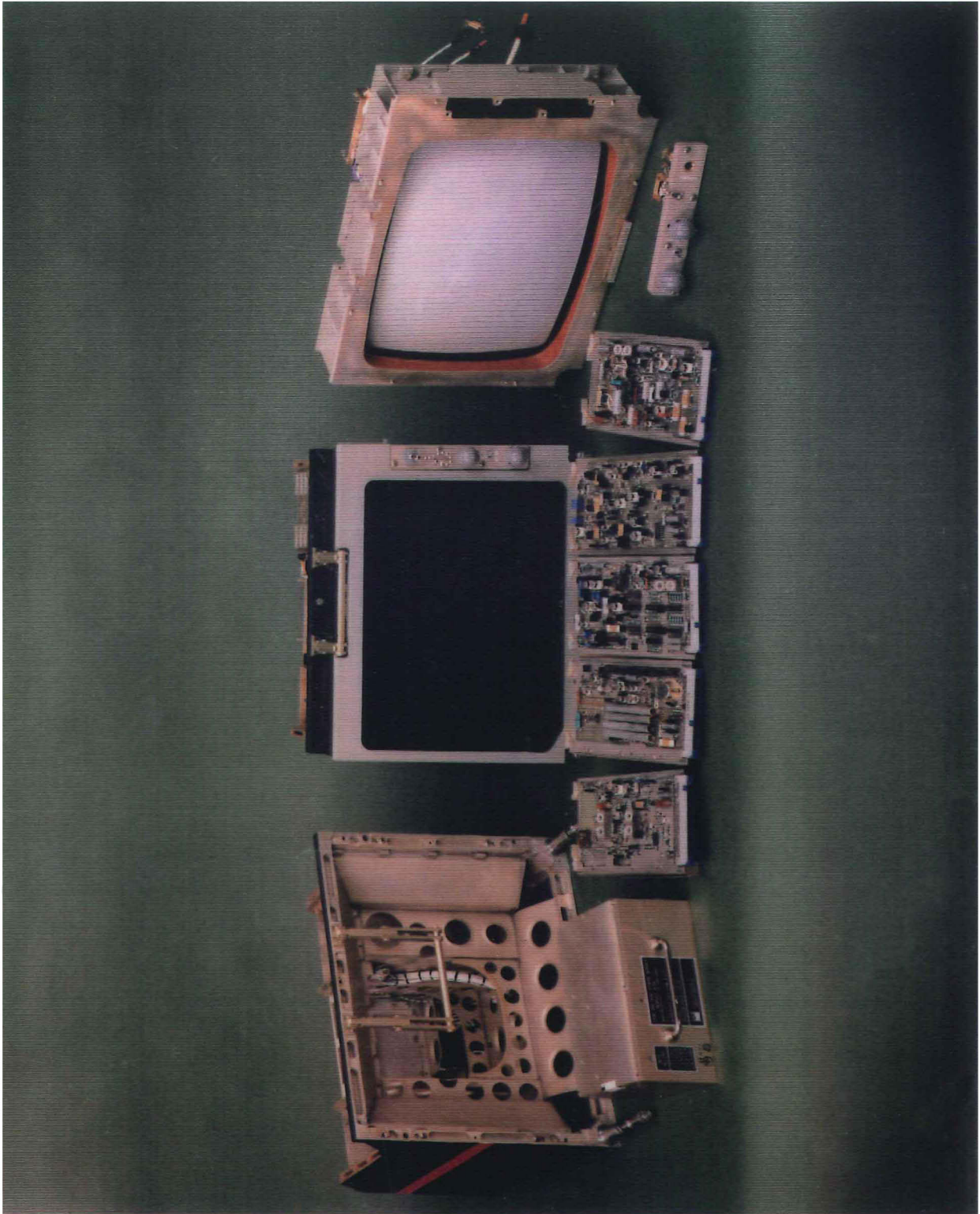
# HEAD DOWN DISPLAYS (HDD)



## HEAD DOWN DISPLAY FITTED WITH A TOUCH SENSITIVE SCREEN 'TACTILE'

A display with an X,Y matrix of Light Emitting Diodes (LEDs) across the screen. Where the finger breaks the beams, the position is calculated and the display is then modified interactively.

# HEAD DOWN DISPLAYS (HDD)



## NIMROD HDD

The display of 10" diagonal is used in the Maritime Nimrod.



# HEAD DOWN DISPLAYS (HDD)

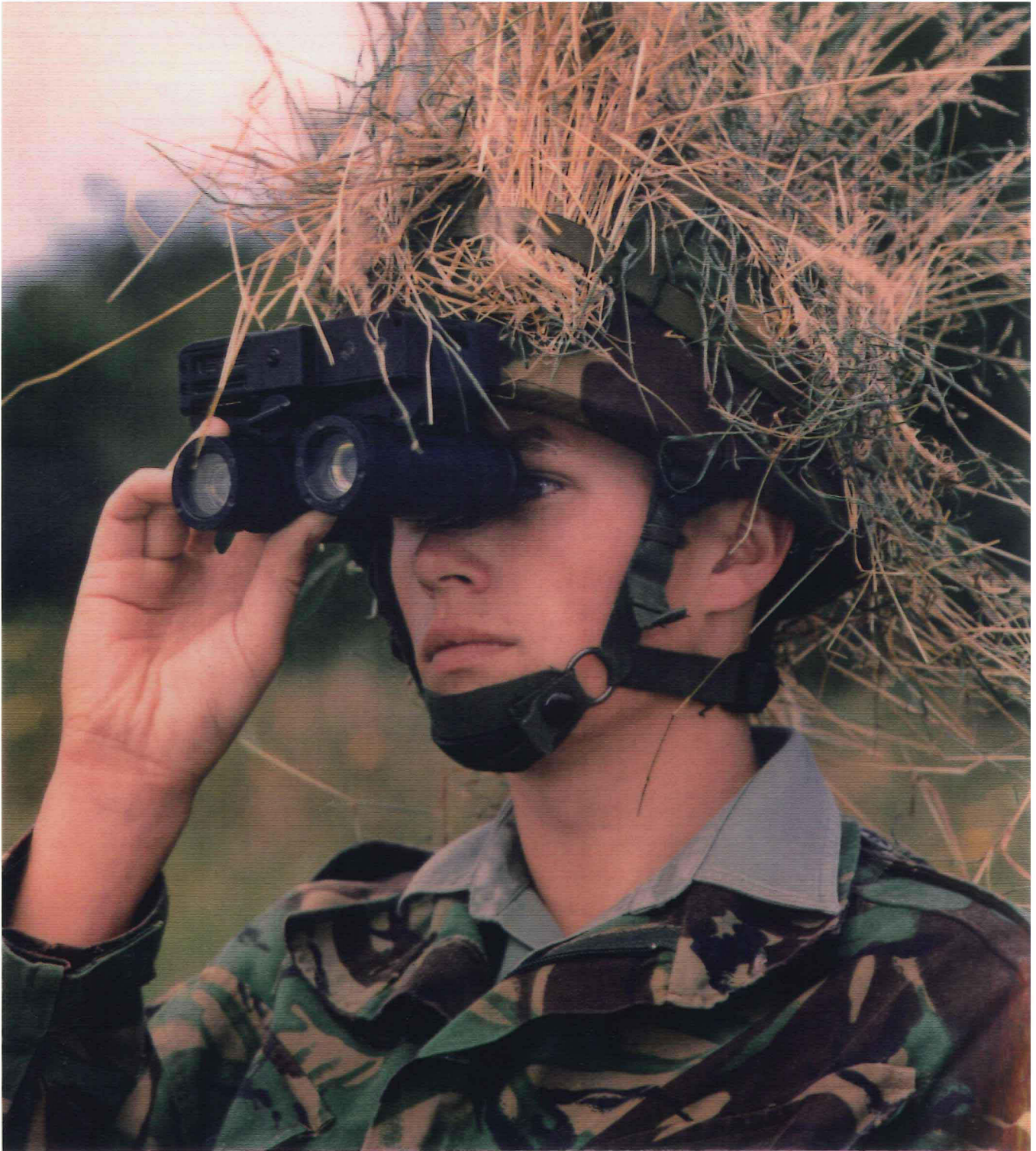


## COLOUR HEAD DOWN DISPLAY SHOWING A DIGITALLY GENERATED MAP

A prototype colour display showing a digitally generated map.



# NIGHT VISION GOGGLES



## GROUND OWL

'Straight-through' goggles for use by ground forces.



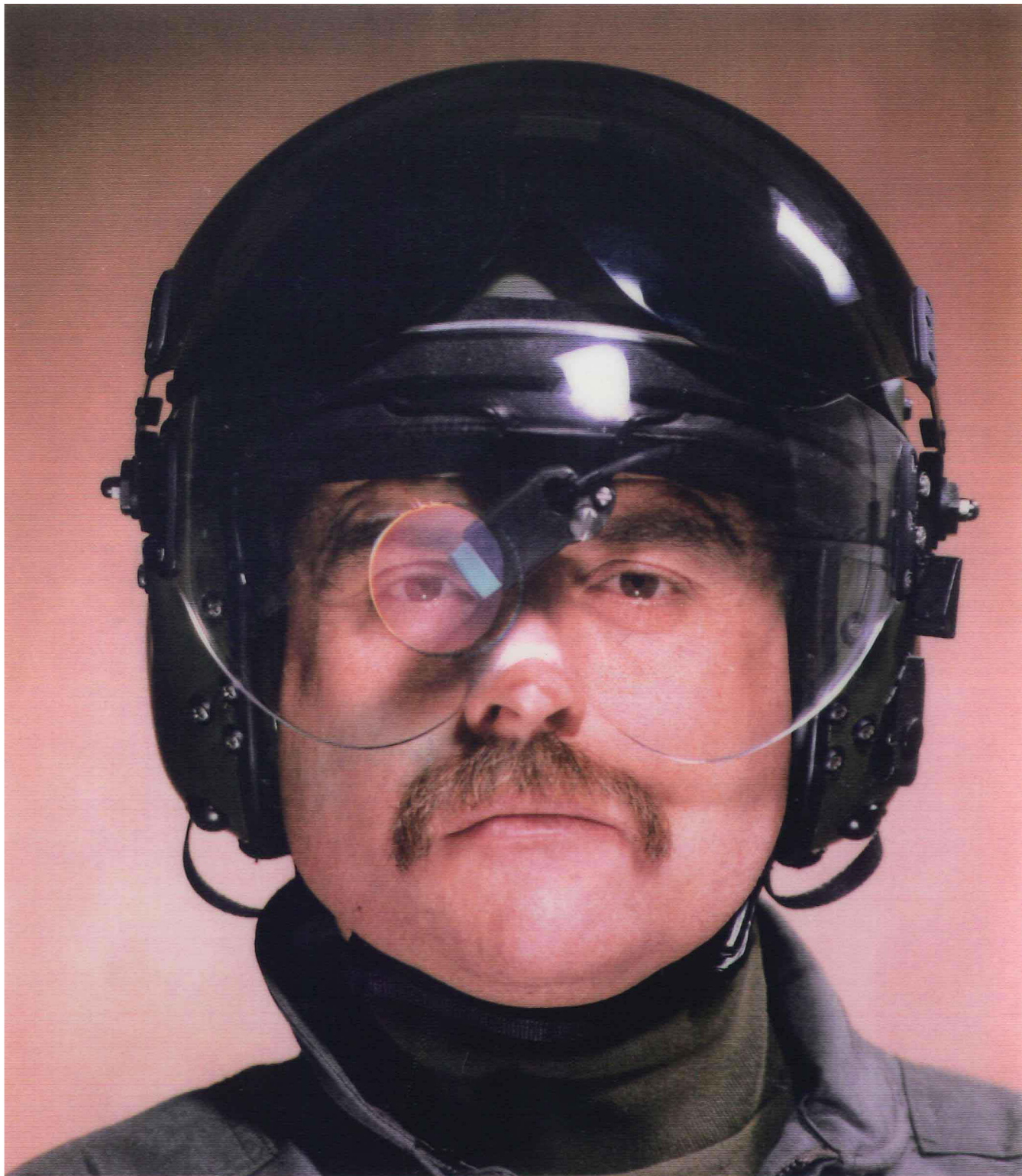
# HELMET MOUNTED DISPLAYS



## **FALCON EYE**

**A binocular display with a single Cathode Ray Tube (CRT) successfully flown on the F-16 operating with a gimballed FLIR.**

# HELMET MOUNTED DISPLAYS



## 'LOOK AND LOCK' ALPHA SIGHT SYSTEM

A single monocular reticle sight allowing off-boresight weapon and sensor aiming.



# HELMET MOUNTED DISPLAYS



## **KNIGHT HELM MODULAR HELMET MOUNTED MULTI-MISSION SYSTEM**

Latest version of the modular helmet for helicopter use (PAH1/PAH2 programmes). This incorporates twin Image Intensifier Tubes (IIT) and CRT.

# DISPLAY GENERATOR UNITS (DGU)

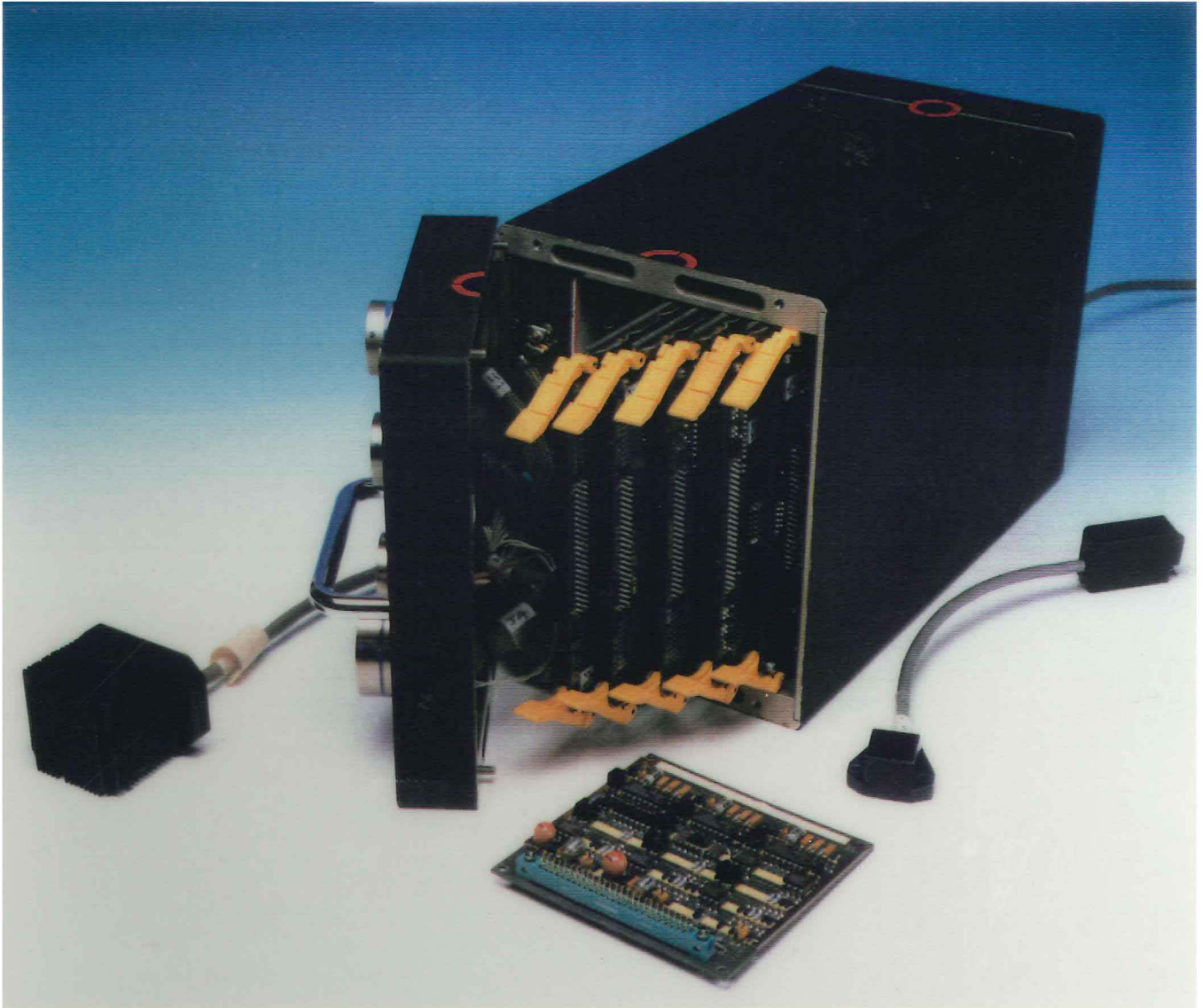


## COMPONENTS OF AN AC-130H DGU

The AC-130H DGU is a stretched version of the F-16 HUD EU which drives a HUD and four raster displays. The DGU uses Application Specific Integrated Circuits (ASICs) designed and laid out by ADD Engineers.



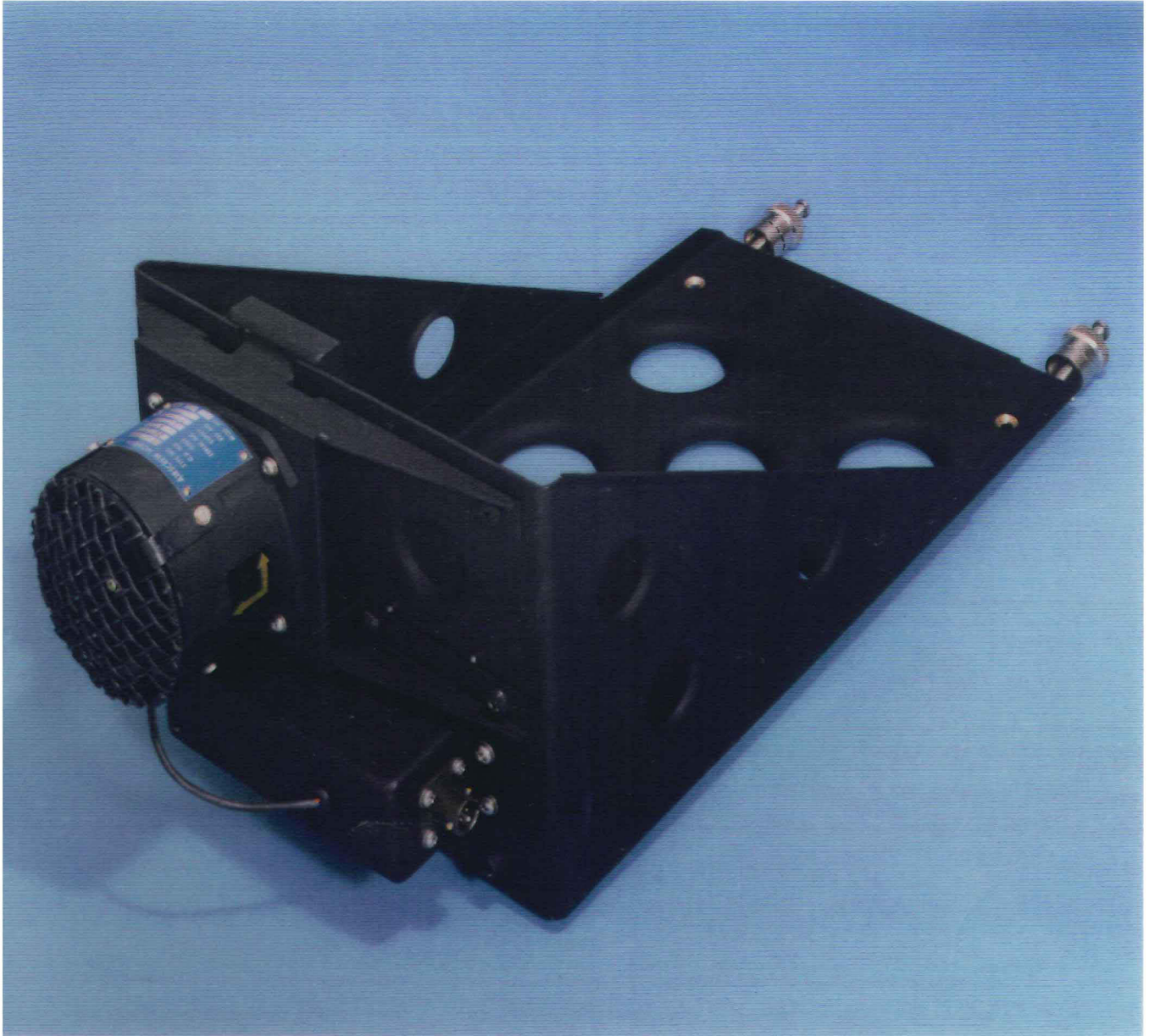
# ELECTRONICS UNITS (EU)



## COMPONENTS OF A TRACKER ELECTRONICS UNIT

This is a system using DC magnetic impulses to determine the direction in which a pilot's helmet is pointing

# MOUNTING STRUCTURES



## EU TRAY

This unit is used to locate the Display Computer Unit in the aircraft. The fan unit provides cooling air.



# TEST EQUIPMENT



## ALIGNMENT JIG WITH PHOTOMETER AND METER

Every unit requires test equipment and display equipment is particularly complex mechanically. This jig is used to measure display luminance and accuracy.

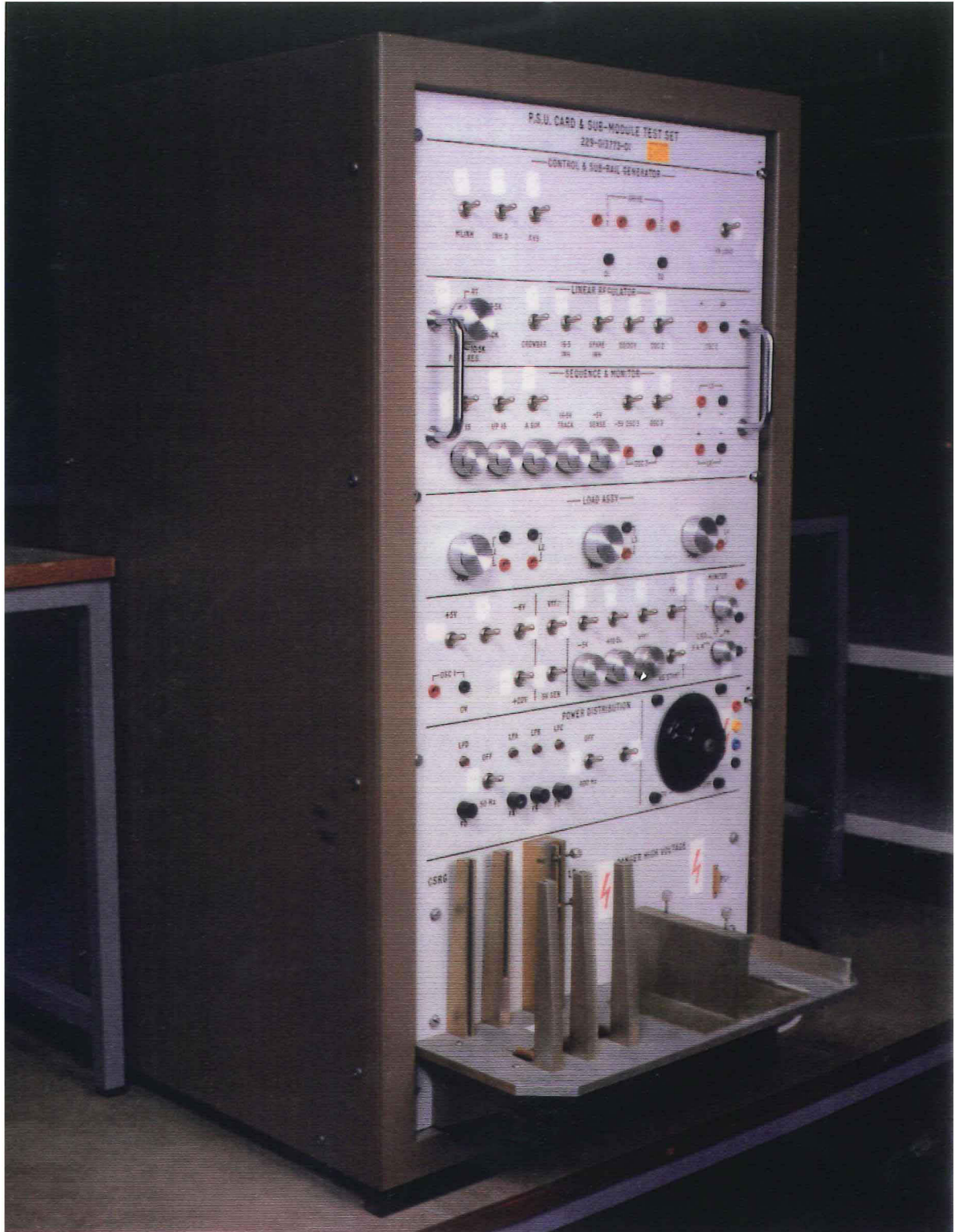
# TEST EQUIPMENT



# TEST STATION



# TEST EQUIPMENT



**POWER SUPPLY UNIT &  
SUB-MODULE TEST SET**