TECHNOLOGY FOR SPACE STATION EVOLUTION - A WORKSHOP

EVOLVING TECHNOLOGIES FOR SPACE STATION FREEDOM COMPUTER-BASED WORKSTATIONS

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CONTENTS

INTRODUCTION

THE HCI SOFTWARE ENVIRONMENT HAS THE FOLLOWING SEVEN MODULES

- WINDOW MANAGER
  Provides and controls on-screen windows
- USER INTERFACE MANAGEMENT SYSTEM
  Provides dialog, help and information, and error message management
- CONTROL AND MONITOR DISPLAY MANAGER
  Provides the capability to define and build dynamic displays and store them in Data Definition Files (DDF), and provides the runtime environment to link dynamic displays with operational data and commands
- USER INTERFACE LANGUAGE MANAGER
  Generates and executes User Interface Language commands and procedures
- CAUTION AND WARNING ANNUNCIATION MANAGER
  Displays caution and warning events and messages and accepts crewmember acknowledgements
- VIDEO DISPLAY MANAGER
  Routes and displays video images intermixed with text and graphics
- USER SUPPORT ENVIRONMENT SESSION MANAGER
  Provides initialization, user login authorization and encryption, security logging, user profile management, and word processing

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MAN-SYSTEMS DIVISION

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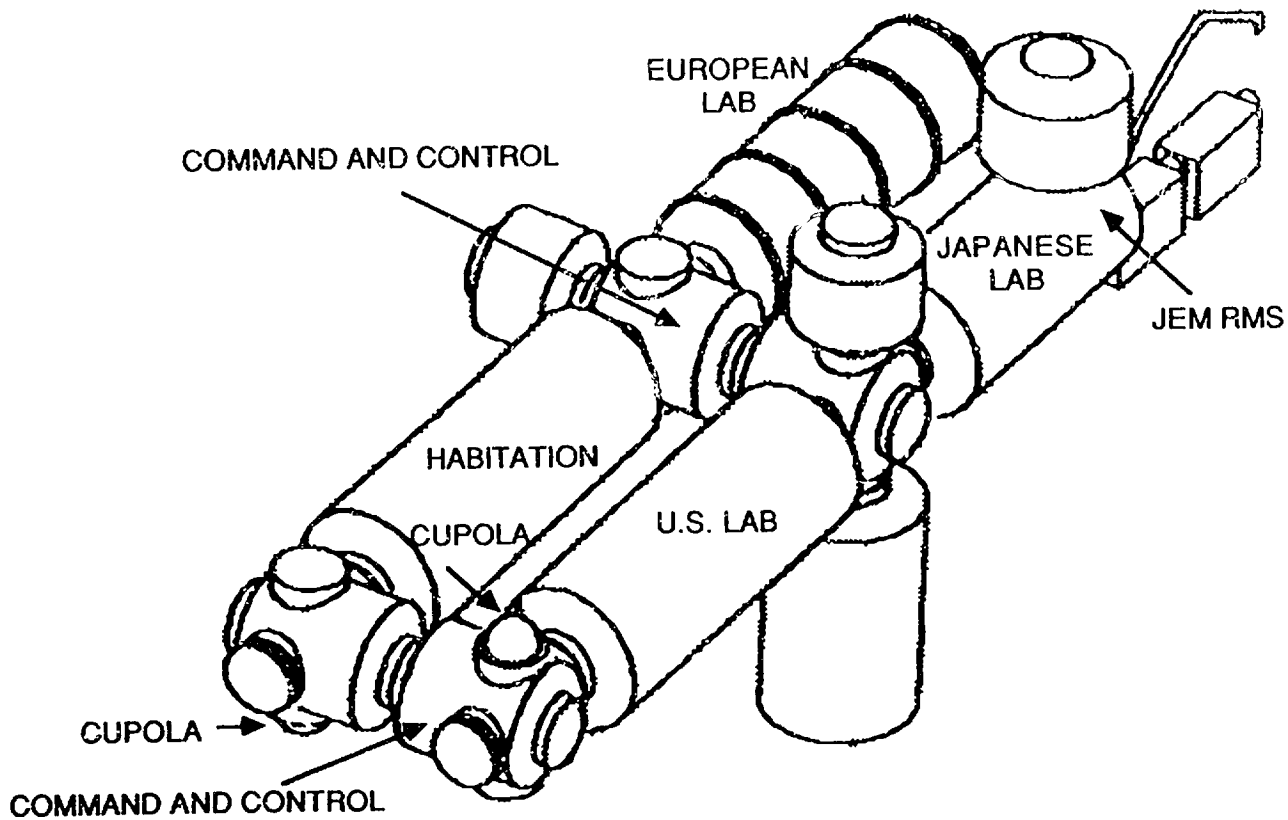
INTRODUCTION

WORKSTATION LOCATIONS



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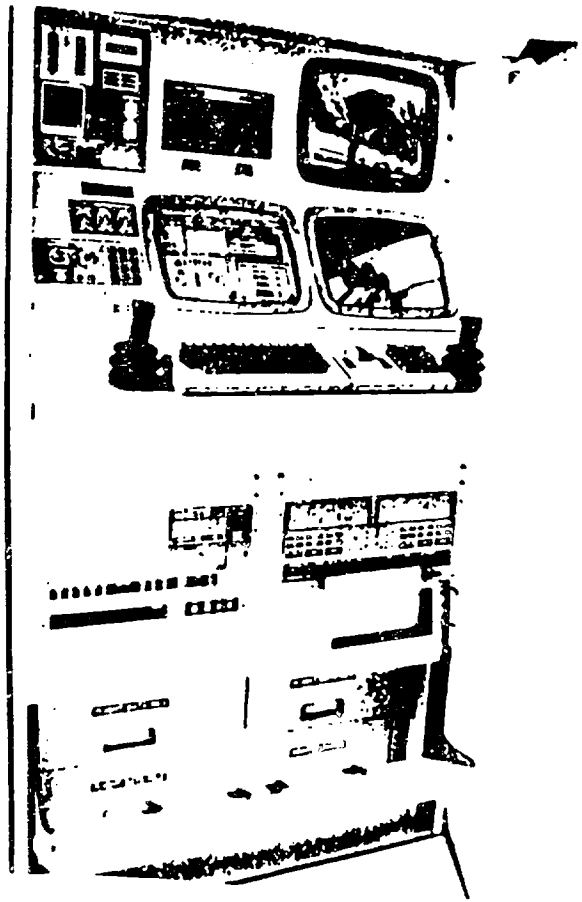
INTRODUCTION

COMMAND AND CONTROL WORKSTATION CONCEPT



Features
- Three 15" Displays
- Full Keyboard
- Trackball
- Hand Controllers
- Audio/Video Recorders
- Hard-Copy Printer/Plotter
- Safety-Critical D&C
- Lighting
- Crew Restraints

Functions
- Systems Management
- Customer Support
- Proximity Operations
- Telerobotic (MSS,FTS) Control
- External Operations Support

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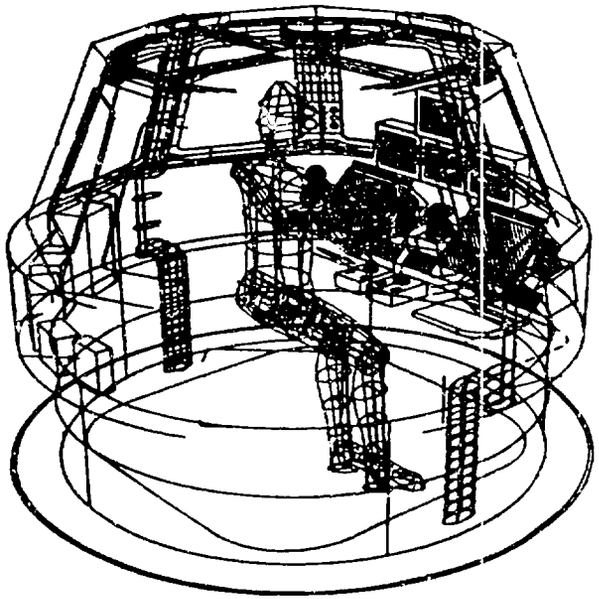
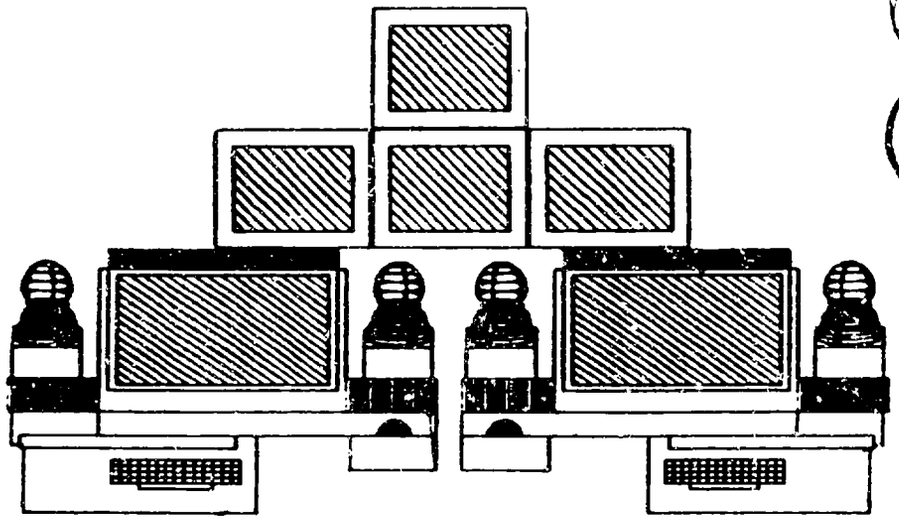
January 16, 1990

INTRODUCTION

CUPOLA WORKSTATION CONCEPT





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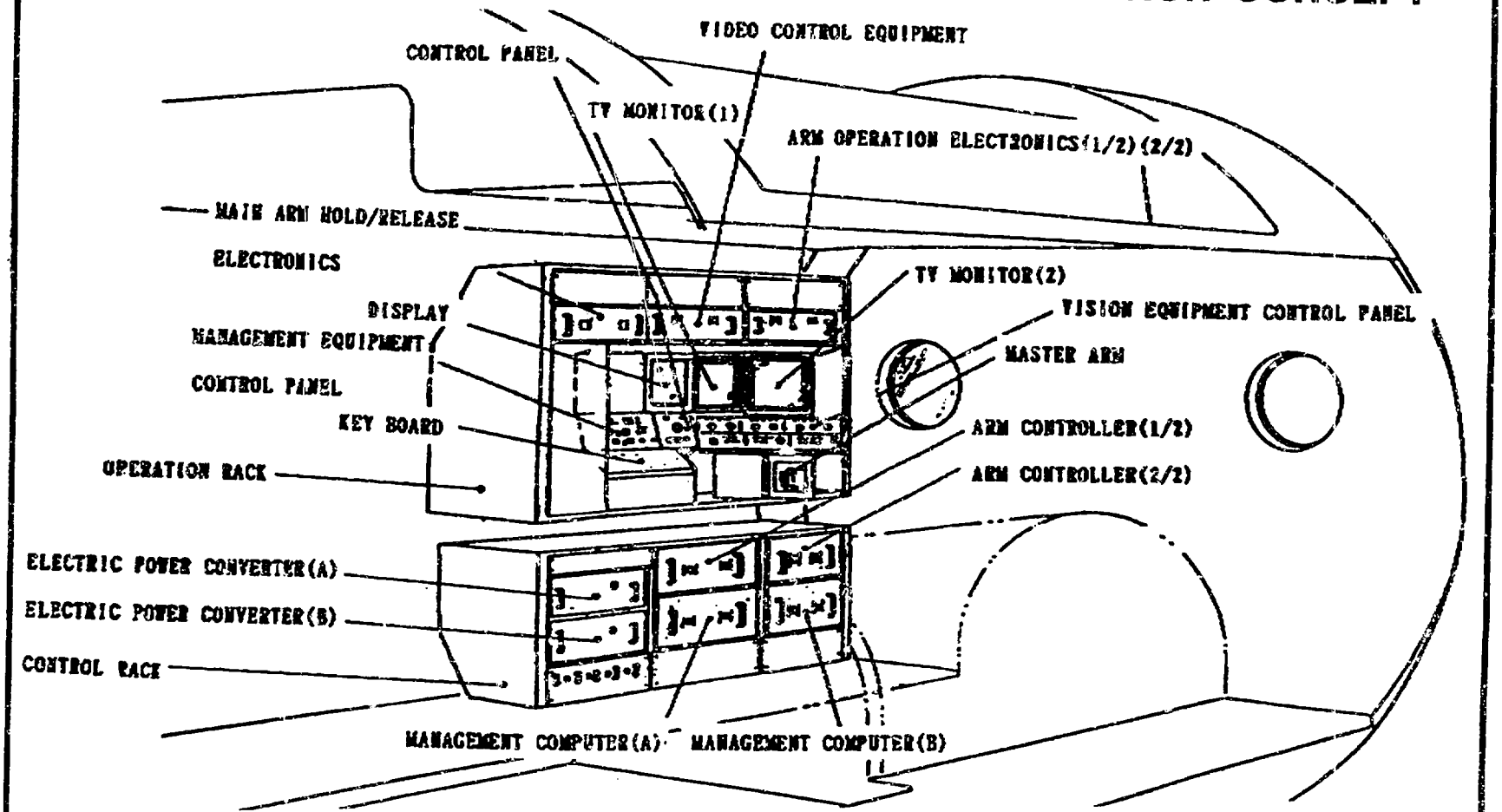
INTRODUCTION

JAPANESE EXPERIMENT MODULE RMS WORKSTATION CONCEPT



INTRODUCTION

REMOTE DEVICES CONTROLLED FROM WORKSTATIONS

FREE FLYERS

- EUROPEAN SPACE AGENCY MAN-TENDED FREE FLYER
- CREW AND EQUIPMENT RETRIEVAL SYSTEM
- ORBITAL MANEUVERING VEHICLE

LARGE MANIPULATORS

- SPACE STATION REMOTE MANIPULATOR SYSTEM (RMS)
- JAPANESE EXPERIMENT MODULE RMS

DEXTEROUS MANIPULATORS

- JAPANESE SMALL FINE ARM
- FLIGHT TELEROBOTIC SERVICER
- SPECIAL PURPOSE DEXTEROUS MANIPULATOR

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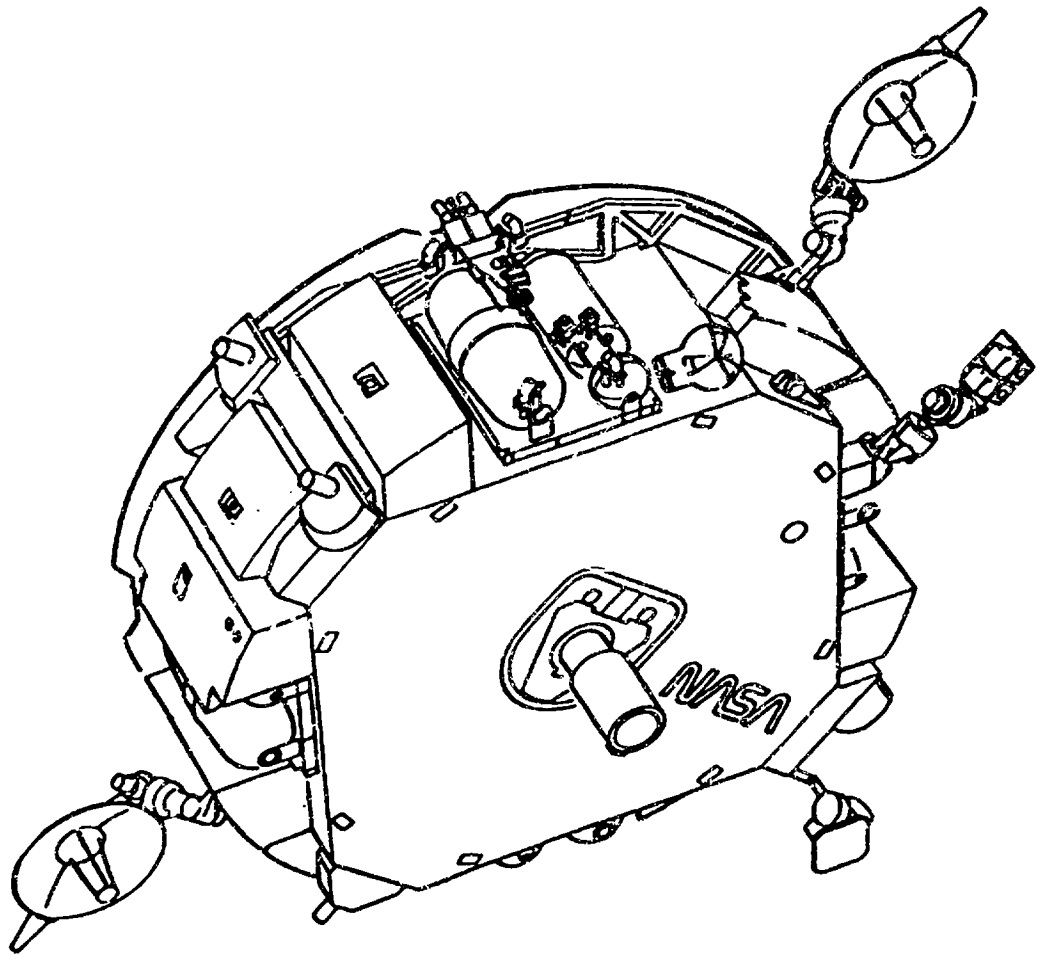
ORBITAL MANEUVERING VEHICLE FREE FLYER



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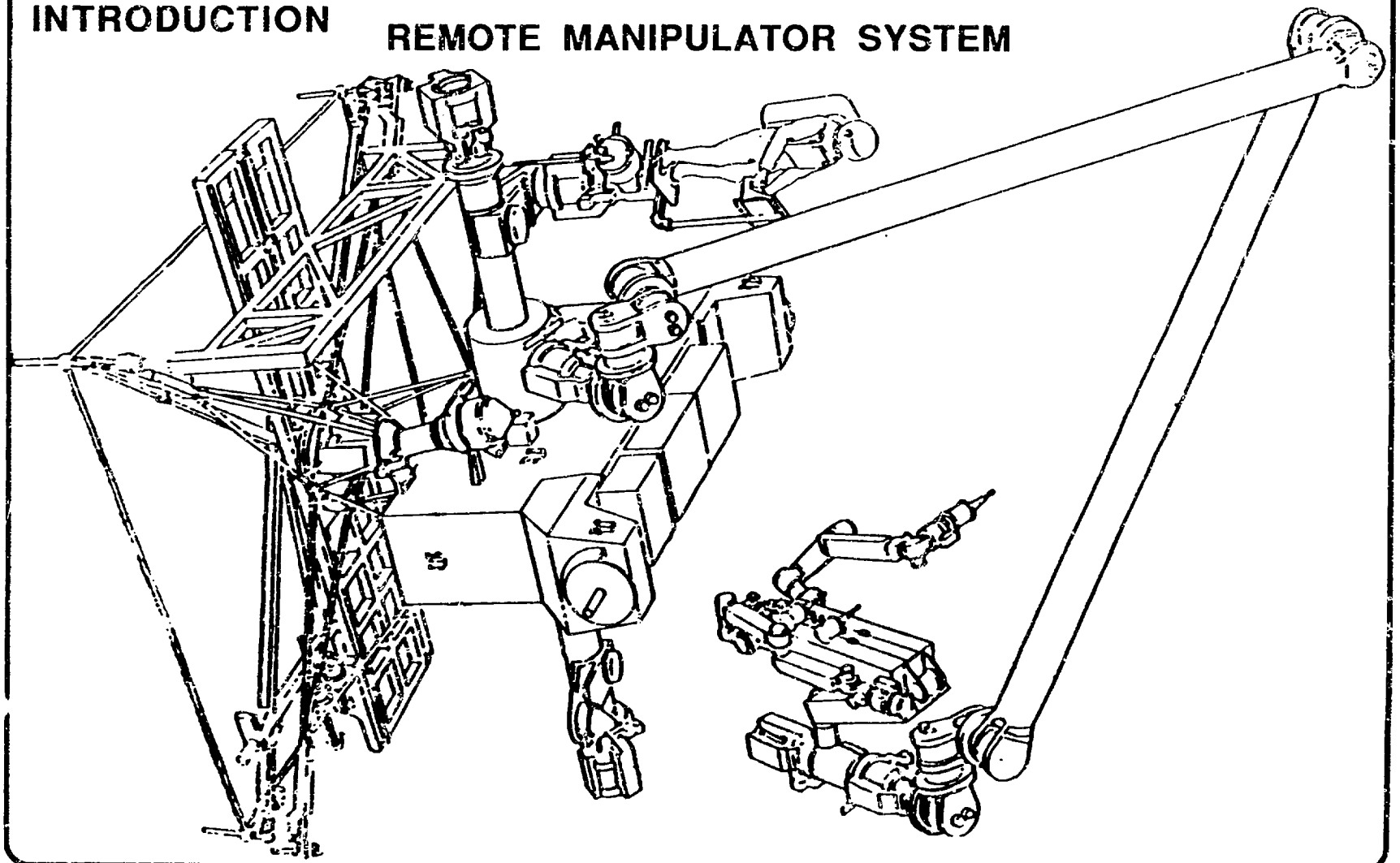
INTRODUCTION

REMOTE MANIPULATOR SYSTEM



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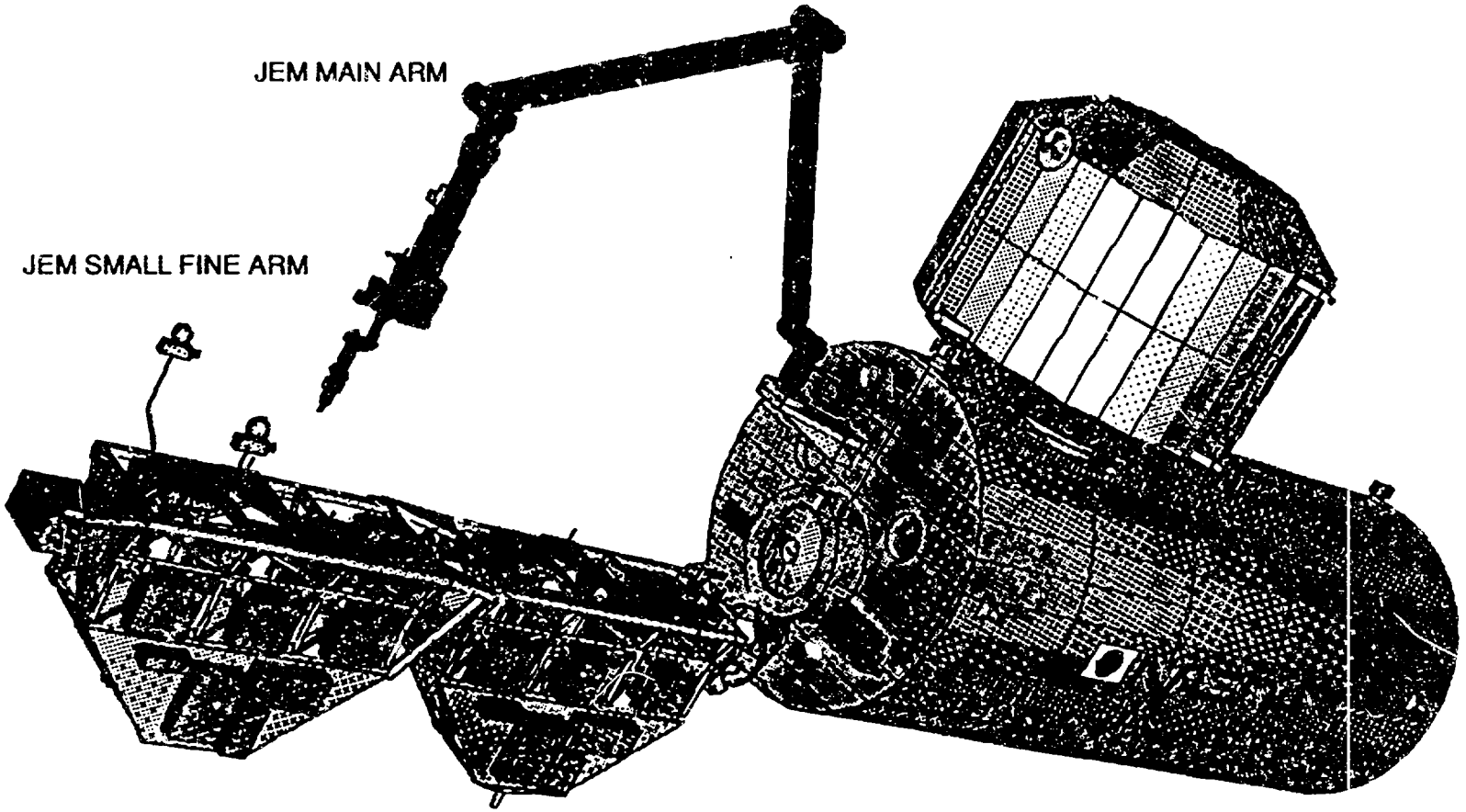
JAPANESE EXPERIMENT MODULE EXPOSED FACILITY



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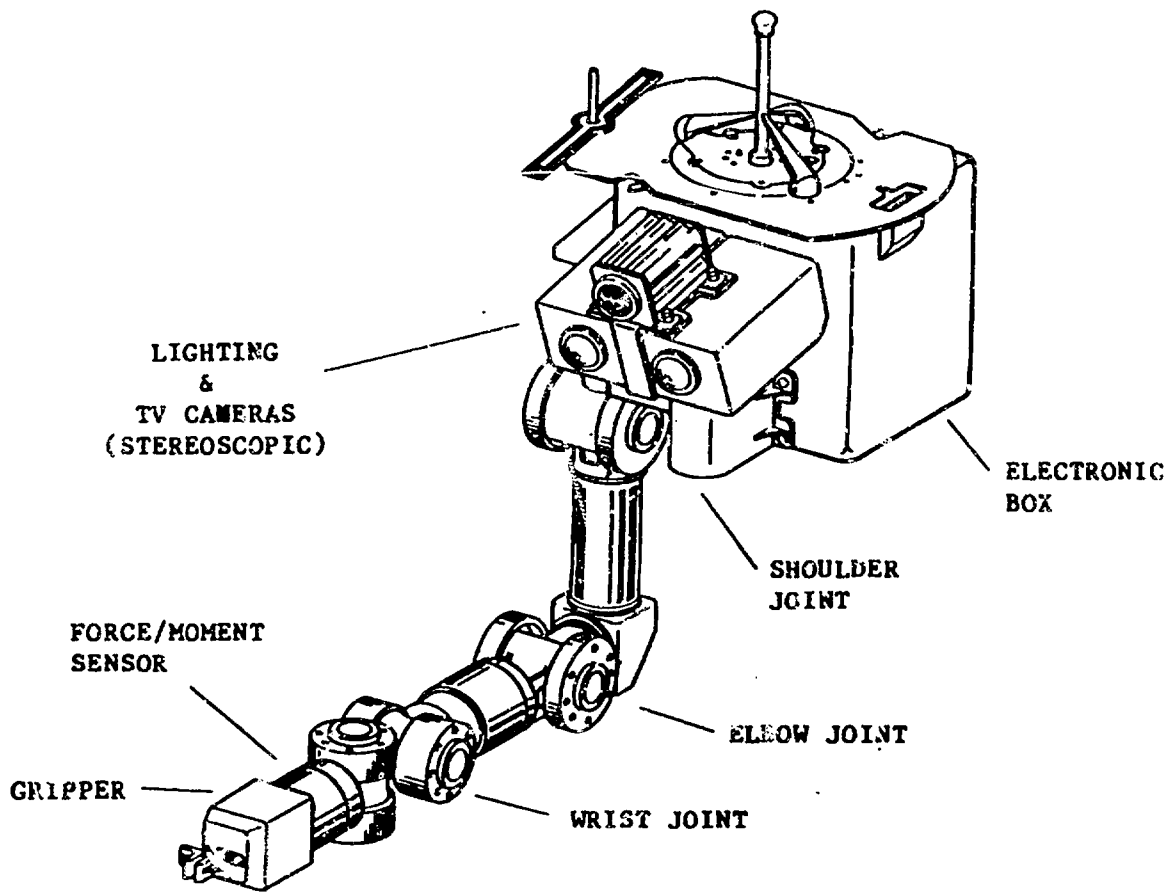
INTRODUCTION

JAPANESE EXPERIMENT MODULE SMALL FINE ARM



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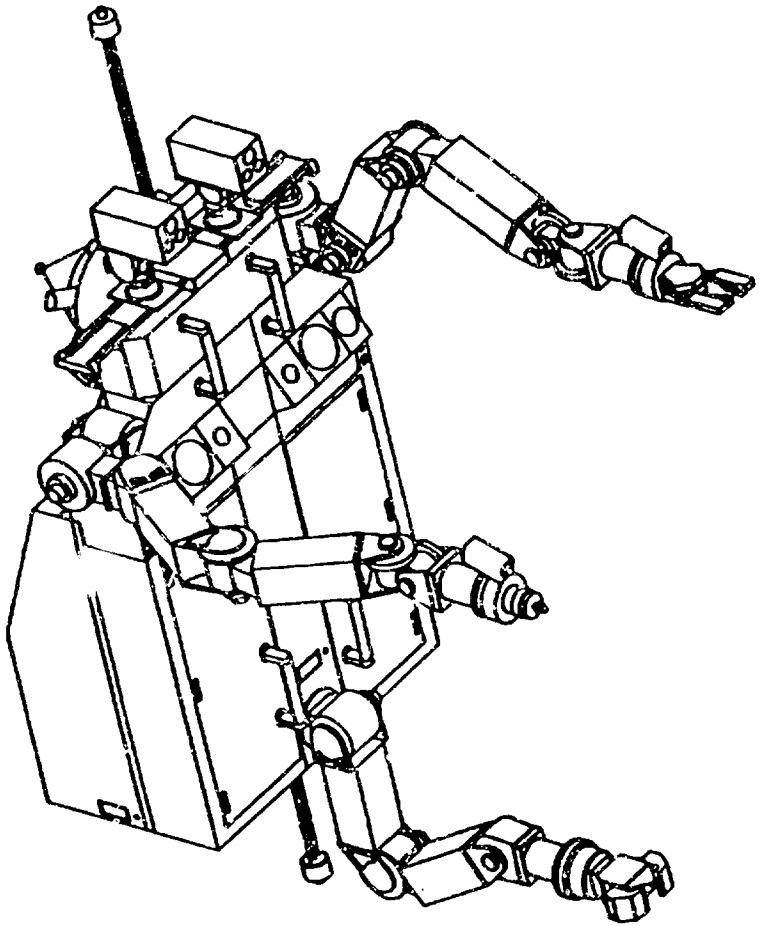
FLIGHT TELEROBOTIC SERVICER



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EVOLVING TECHNOLOGIES

HUMAN-COMPUTER INTERACTION

VOICE RECOGNITION AND PRODUCTION

- FACILITATE "HANDS-FULL" TASKS (CAMERA CONTROL DURING TELEROBOTIC MANIPULATIONS)

DIRECT MANIPULATION

- TOUCH SCREENS
- 3-D DISPLAY MANIPULATION
- ZERO-G CURSOR CONTROL DEVICES

ENHANCED INFORMATION DISPLAY

- 3-D COMPUTER-ENHANCED IMAGES
- VIDEO MANIPULATION (OBJECT ENHANCEMENT & TRACKING)
- VIDEO WITH TEXT AND GRAPHICS OVERLAYS
- VIDEO STEREO VIEWING TECHNIQUES
- MULTI-TASKING MANAGEMENT

SOFTWARE AUTOMATION
KNOWLEGE-BASED OR INTELLIGENT SYSTEMS
USER MODELING METHODS AND TOOLS
HCI PROTOTYPING TECHNOLOGY

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EVOLVING TECHNOLOGIES

WORKSTATION/ROBOTICS RELATED ACTIVITIES

VIRTUAL WORKSTATIONS

MACHINE VISION SYSTEMS

- OPTICAL SYSTEMS - e.g. TRACKING - EARTH'S RAD. BUDGET SAT.
- LASER SYSTEMS - e.g. MODEL-BASED SYSTEMS FOR RECOGNITION
- SUPERVISED AND AUTONOMOUS MODES
- PROVIDING OPERATOR AIDS (e.g. RANGE / RATE)
- EDGE DETECTION

ANIMATION

- REPRESENT RANGE/RATE INFORMATION
- PRODUCE "SYNTHETIC" VIDEO VIEWS (FROM CDA DATABASE)

FORCE REFLECTION (HAND CONTROLLER)

SYNTHESIZED FORCE REFLECTION

- AUDIO
- VISUAL