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GORDON RYSAVY  
NASA JOHNSON SPACE CENTER  
JUNE 22, 1982

SATELLITE SERVICES SYSTEM OVERVIEW

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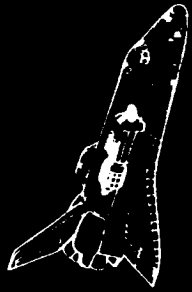
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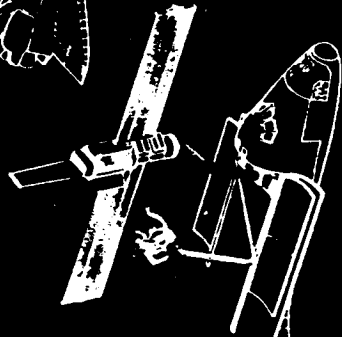
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# Near Orbiter Satellite Services Elements



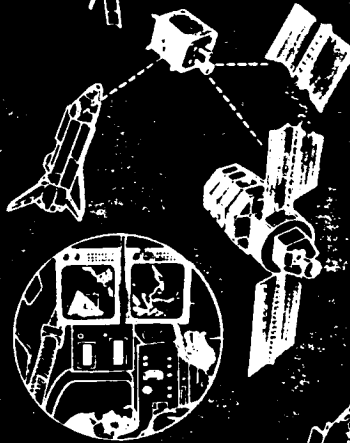
Earth Return



Support Services



Retrieval



Observation



Deployment

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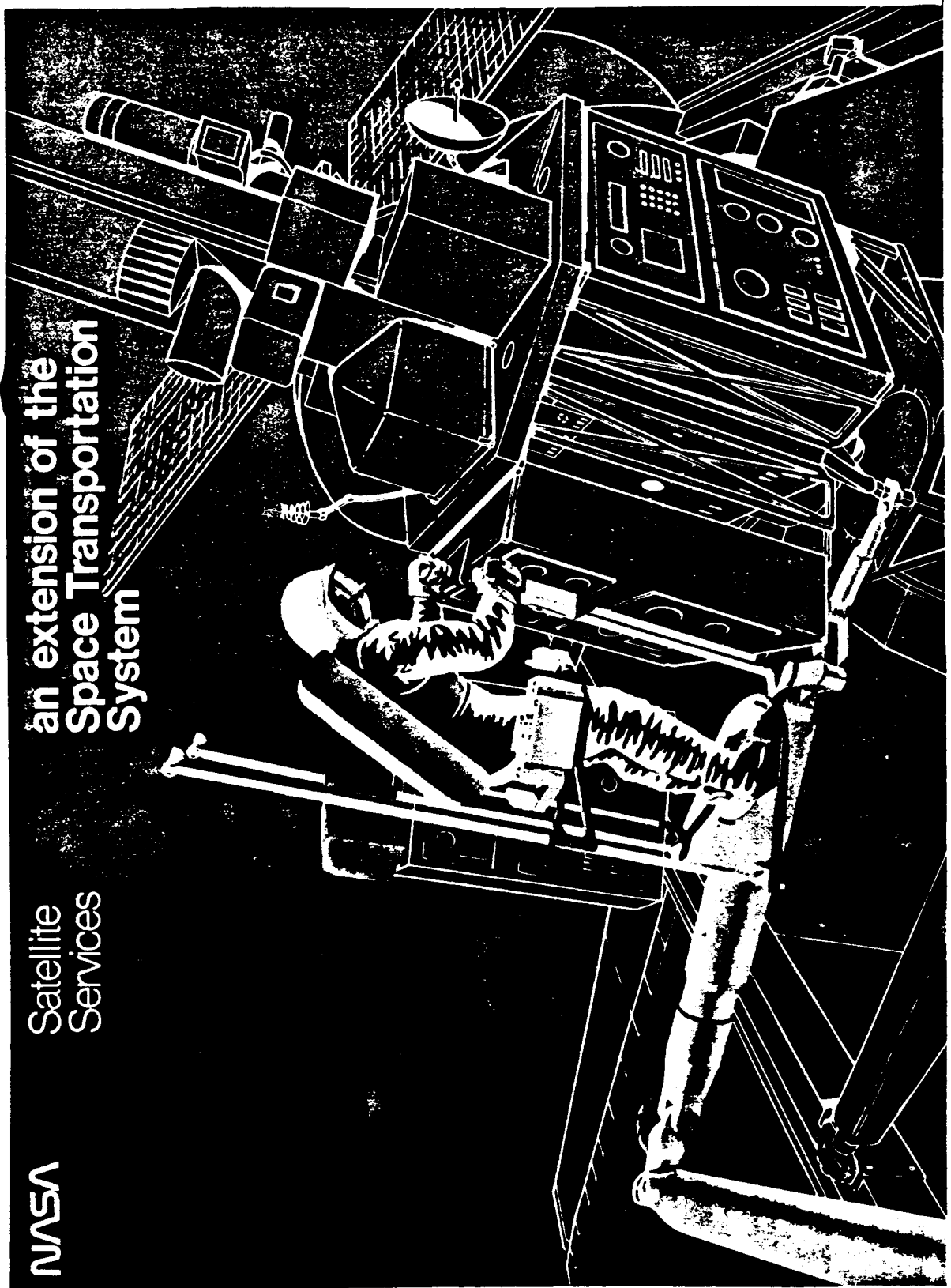
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an extension of the  
Space Transportation  
System

Satellite  
Services

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SATELLITE SERVICES SYSTEM OVERVIEW

PROGRAM DEVELOPMENT OFFICE

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SOME ADVANTAGES/BENEFITS OF A SATELLITE SERVICES SYSTEM

- WILL EXTEND AND ENHANCE STS OPERATIONAL ON-ORBIT CAPABILITY
- WILL PROVIDE STANDARDIZATION OF EQUIPMENT
- WILL DEVELOP USER RECOGNITION FOR PLANNED SERVICING
- WILL PROVIDE SOME CAPABILITY FOR DEBRIS REMOVAL
- WILL PROVIDE POTENTIAL CONTINGENCY ACTIVITIES USAGE

BASIC IDENTIFIED NEEDS FOR STS TO HAVE IMPROVED SATELLITE SERVICE CAPABILITY

- ABILITY TO HAVE A STABLE WORK PLATFORM FOR MANNED EVA ANYWHERE WITHIN THE PAYLOAD BAY.
- ABILITY, WITH THE USE OF THE MANNED MANEUVERING UNIT (MMU), TO ATTACH TO SATELLITES/STRUCTURES AND HAVE A STABLE WORK PLATFORM.
- ABILITY TO OBSERVE WITH TV REMOTE FROM ORBITER.
- ABILITY TO TEMPORARILY HOLD AND POSITION SATELLITES/STRUCTURES.
- ABILITY TO TRANSFER FLUIDS TO SATELLITES.
- ABILITY TO INCREASE MANNED EVA PRODUCTIVITY THROUGH USE OF POWER TOOLS.



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INHERENT EQUIPMENT (EQUIPMENT INHERENT WITH STS SYSTEM)		PROGRAM DEVELOPMENT OFFICE
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INHERENT SERVICING EQUIPMENT	SATELLITE SERVICE FUNCTION	STATUS
PAYLOAD RETENTION SYSTEM - PRS	<ul style="list-style-type: none"> <li>• PROVIDES ORBITER RETENTION (AND RELEASE) OF PAYLOADS.</li> </ul>	AVAILABLE
REMOTE MANIPULATOR SYSTEM - RMS	<ul style="list-style-type: none"> <li>• PRIMARILY FOR DEPLOYMENT AND RETRIEVAL OF SATELLITES; ALSO FOR OBSERVATION VIA CCTV AND SUPPORT SERVICES.</li> </ul>	AVAILABLE
EXTRAVEHICULAR MOBILITY UNIT (EMU)	<ul style="list-style-type: none"> <li>• PROVIDES MANNED EVA CAPABILITY.</li> </ul>	AVAILABLE
MANNED MANEUVERING UNIT - MMU	<ul style="list-style-type: none"> <li>• PROVIDES MANNED PROPULSIVE EVA CAPABILITY.</li> </ul>	AVAILABLE
ORBITER MANEUVERING SYSTEM KIT - OMS KIT	<ul style="list-style-type: none"> <li>• INCREASES ORBITER DELTA-V CAPABILITY.</li> </ul>	ON-HOLD
AFT FLIGHT DECK - CONTROLS AND DISPLAYS	<ul style="list-style-type: none"> <li>• PROVIDES CONTROL OF RMS, PRS AND OTHER REMOTE MECHANISMS FROM THE ORBITER AFT FLIGHT DECK.</li> </ul>	AVAILABLE
EXTRAVEHICULAR MOBILITY UNIT TV	<ul style="list-style-type: none"> <li>• PROVIDES CCTV DURING EVA.</li> </ul>	AVAILABLE
CLOSED-CIRCUIT TELEVISION - CCTV	<ul style="list-style-type: none"> <li>• PROVIDES CCTV VIEWING OF CARGO BAY.</li> </ul>	AVAILABLE
ORBITER EXTERIOR LIGHTING	<ul style="list-style-type: none"> <li>• PROVIDES LIGHTING OF CARGO BAY.</li> </ul>	AVAILABLE
EQUIPMENT STORAGE	<ul style="list-style-type: none"> <li>• PROVIDES FOR THE STORAGE OF EQUIPMENT, SPARE PARTS, TOOLS AND DEBRIS.</li> </ul>	PARTIALLY AVAILABLE

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GENERIC EQUIPMENT WHICH INTEGRATES WITH THE INHERENT EQUIPMENT AND HAS GROWTH POTENTIAL)		PROGRAM DEVELOPMENT OFFICE
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GENERIC SERVICING EQUIPMENT	SATELLITE SERVICE FUNCTION	STATUS
MANIPULATOR FOOT RESTRAINT - MFR	<ul style="list-style-type: none"> <li>• PROVIDES A STABLE PLATFORM FOR MANNED ACTIVITY WITHIN OPERATING RANGE OF RMS.</li> </ul>	DEVELOPMENT COMPLETED. FUNDING FOR FLIGHT HARDWARE PENDING.
WORK RESTRAINT UNIT - WRU	<ul style="list-style-type: none"> <li>• PROVIDES A METHOD OF SATELLITE ATTACHMENT AND A STABLE WORK RESTRAINT DURING MMU ACTIVITY.</li> </ul>	DEVELOPMENT PARTIALLY COMPLETE.
MANEUVERABLE TELEVISION - MTV	<ul style="list-style-type: none"> <li>• PROVIDES REMOTE SATELLITE (AND ORBITER) OBSERVATION CAPABILITY.</li> </ul>	LIMITED DEVELOPMENT ACTIVITY UNDERWAY.
HOLDING AND POSITIONING AID - HPA	<ul style="list-style-type: none"> <li>• PROVIDES TEMPORARY HOLDING AND POSITIONING OF A SATELLITE WHILE BEING SERVICED</li> </ul>	FABRICATION OF TEST MODEL FOR 1-G TESTING UNDERWAY.
FLUID TRANSFER EQUIPMENT/TECHNIQUES	<ul style="list-style-type: none"> <li>• PROVIDES CAPABILITY TO TRANSFER FLUIDS BETWEEN THE ORBITER AND SATELLITES.</li> </ul>	CONCEPT ONLY
POWER AND HAND TOOLS	<ul style="list-style-type: none"> <li>• ENHANCES MANNED ACTIVITY DURING EVA.</li> </ul>	PARTIALLY AVAILABLE

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UNIQUE EQUIPMENT (EQUIPMENT UNIQUE TO SPECIAL MISSION REQUIREMENT)		PROGRAM DEVELOPMENT OFFICE
UNIQUE SERVICING EQUIPMENT	SATELLITE SERVICE FUNCTION	STATUS
PAYLOAD INSTALLATION AND DEPLOYMENT AID	<ul style="list-style-type: none"> <li>● ALLOWS CONTROLLED DEPLOYMENT AND STOWAGE OF MAXIMUM SIZED PAYLOADS WITH MINIMAL RISK OF DAMAGE TO THE ORBITER AND PAYLOAD.</li> </ul>	1-G TEST MODEL EVALUATED.
PAYLOAD HANDLING DEVICES	<ul style="list-style-type: none"> <li>● PROVIDES CAPABILITY TO GRAPPLE AND HANDLE UNATTACHED PAYLOADS.</li> </ul>	STUDY UNDERWAY FOR SOLAR MAX REPAIR MISSION.
RMS SPECIAL PURPOSE END EFFECTORS	<ul style="list-style-type: none"> <li>● ENHANCES THE CAPABILITY OF THE RMS.</li> </ul>	CONCEPT ONLY
TILT TABLE	<ul style="list-style-type: none"> <li>● PROVIDES THE PROPER ORIENTATION OF PAYLOADS FOR DEPLOYMENT, BERTHING AND/OR SERVICING.</li> </ul>	CONCEPT ONLY
SPIN TABLE	<ul style="list-style-type: none"> <li>● PROVIDES THE CAPABILITY TO "SPIN-UP" SATELLITE PRIOR TO DEPLOYMENT.</li> </ul>	CONCEPT ONLY

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ADVANCED EQUIPMENT (EQUIPMENT POTENTIALLY NEEDED TO FULFILL FUTURE MISSION MODEL REQUIREMENTS)

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ADVANCED SERVICING EQUIPMENT	SATELLITE SERVICE FUNCTION	STATUS
TELEOPERATOR MANEUVERING SYSTEM	<ul style="list-style-type: none"> <li>● PROVIDES FOR PAYLOAD DELIVERY/RETRIEVAL TO/FROM SATELLITE OPERATIONAL ORBIT WHEN DIFFERENT FROM ORBITER ORBIT.</li> </ul>	STUDIES UNDERWAY
NON-CONTAMINATING ATTITUDE CONTROL SYSTEM	<ul style="list-style-type: none"> <li>● ALLOWS SERVICING OF CONTAMINATION SENSITIVE SATELLITES.</li> </ul>	CONCEPT ONLY
SUN SHIELD	<ul style="list-style-type: none"> <li>● PROVIDES PROTECTION TO SUN SENSITIVE PAYLOAD.</li> </ul>	CONCEPT ONLY
ORBITAL STORAGE	<ul style="list-style-type: none"> <li>● PROVIDES ENVIRONMENTAL PROTECTION FOR ON-ORBIT QUIESCIENT "STORAGE" OF SATELLITES.</li> </ul>	CONCEPT ONLY
OPTICAL ATTITUDE TRANSFER SYSTEM	<ul style="list-style-type: none"> <li>● MEASURES PAYLOAD BAY DISTORTION RELATIVE TO THE INERTIAL MEASUREMENT UNIT (IUM) PLATFORM, HENCE TRANSFERRING ATTITUDE REFERENCE TO SATELLITES MORE ACCURATELY.</li> </ul>	CONCEPT ONLY
LIGHTING ENHANCEMENT	<ul style="list-style-type: none"> <li>● ENHANCES LIGHTING CAPABILITY.</li> </ul>	CONCEPT ONLY
DEXTEROUS MANIPULATOR	<ul style="list-style-type: none"> <li>● ENHANCES REMOTE "TELEOPERATOR" SERVICE CAPABILITY.</li> </ul>	LIMITED STUDY UNDERWAY
DE-ORBIT PROPULSION PACKAGE	<ul style="list-style-type: none"> <li>● PROVIDES THE CAPABILITY TO DE-ORBIT AND PROPEL EXPENDABLE SATELLITES TO EARTH.</li> </ul>	CONCEPT ONLY





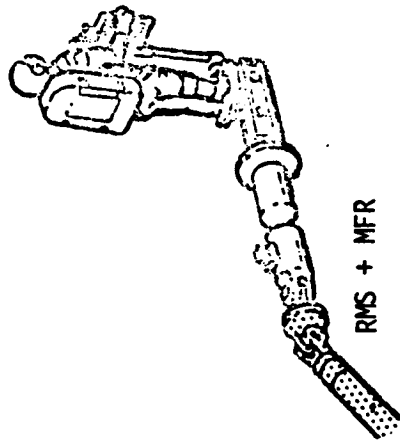
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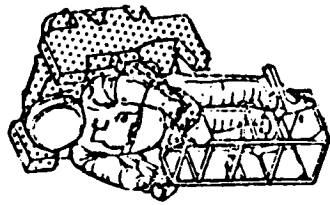
SATELLITE SERVICES SYSTEM OVERVIEW  
EVOLUTIONARY GROWTH POTENTIAL

PROGRAM DEVELOPMENT OFFICE

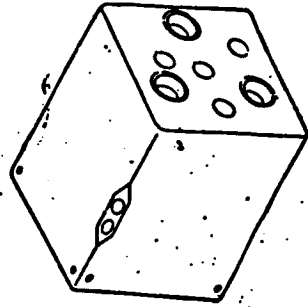
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RMS + MFR

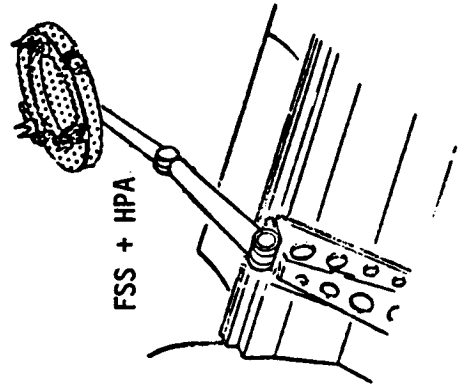


MMU + WRU

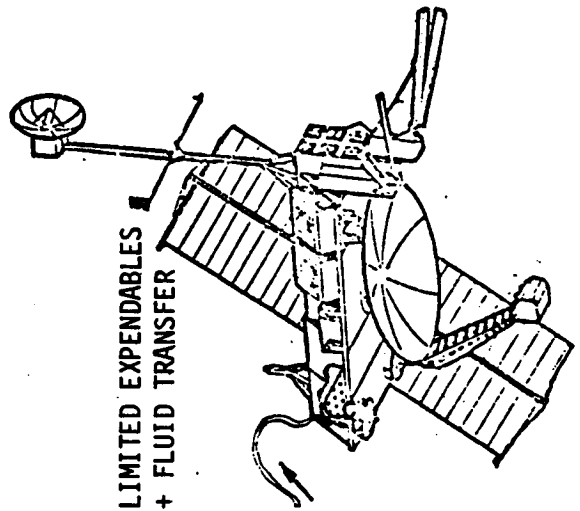


CCTV + MTV

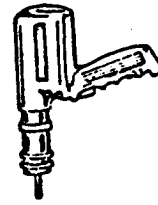
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FSS + HPA



LIMITED EXPENDABLES  
+ FLUID TRANSFER



HAND TOOLS +  
POWER TOOLS