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SPACE STATION AUTOMATION ASSESSMENT

MAN-MACHINE TRADEOFF STUDY

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BACKGROUND

- o APPLICATION OF ADVANCED SPACE TECHNOLOGY INVOLVED THE PRIVATE SECTOR (E.G., BIOMEDICINE, SOLAR POWER PLANTS, ALTERNATE ENERGY SOURCES, ETC.).
- o NEW TECHNOLOGY APPLICATIONS REQUIRED A BETTER UNDERSTANDING OF ACTUAL HUMAN TASKS/INTERFACES.
- o THERE WAS A NEED TO SYSTEMATICALLY DEFINE HUMAN INTERFACES.
- o FOR THOSE AREAS WHERE AUTOMATION LOOKED PROMISING, THERE WAS A NEED TO ESTABLISH A SOUND MEANS OF ASSESSING HUMAN/MACHINE TRADEOFFS (I.E., SYSTEM EFFICIENCY TRADEOFFS).
- o DOE RESEARCH RELATED TO REMOVING WORKERS FROM HAZARDOUS ENVIRONMENTS - SPECIFICALLY UNDERGROUND COAL MINING.
- o SPACE STATION EFFORT COMMENCED JANUARY 1984.

BASIC APPROACH

- 0 ESTABLISH TASK PROBLEM AREAS IN NEW TECHNOLOGY VIA INTERVIEWS OR ACTUAL INDUSTRIAL ENGINEERING STUDIES (E.G., INTERVIEWS WITH OPERATORS, OR IDENTIFYING HIGH TASK TIME DRIVERS).
- 0 DEVELOP LIST OF POTENTIAL AUTOMATION CANDIDATES.

PERFORM TASK AND SYSTEM CRITICAL PATH ANALYSES, SUPERIMPOSE POTENTIAL AUTOMATION CANDIDATES, AND ASSIGN ATTRIBUTES TO ASSESS IMPACTS FOR EACH AREA (E.G., COST, TASK EFFICIENCY IMPROVEMENT, SAFETY IMPROVEMENT, ETC.).
- 0 CONFIRM IMPACTS OF ATTRIBUTES BY TALKING TO EXPERTS.
- 0 DEVELOP CONCEPTUAL DESIGNS AND COSTS NECESSARY TO IMPLEMENT AUTOMATION CANDIDATES.
- 0 ASSESS COST BENEFITS (I.E., WEIGH THE COST OF AUTOMATING AGAINST THE BENEFITS GAINED).
- 0 RANK AUTOMATION CANDIDATES AS A FUNCTION OF MOST FAVORABLE RESPONSE TO ATTRIBUTES AND OVERALL COST BENEFITS.

PROCESS

- 0 IDENTIFY KEY SPACE STATION MODULES
- 0 DEVELOP MOVING BASELINE FOR DETERMINING SPACE STATION COMPONENT
AUTOMATION OPTIONS
- 0 PERFORM TASK ASSESSMENT
- 0 DEVELOP ATTRIBUTES FOR ASSESSING COSTS AND BENEFITS OF ASSIGNING
TASKS TO TECHNOLOGIES
- 0 PREPARE LIST OF POTENTIAL TRADEOFFS

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SELECTION OF KEY MODULES FOR FY 1984 TRADEOFF STUDY

<u>MODULE</u>	<u>LEVEL OF INTEREST</u>
UTILITY	HIGHEST
DOCKING	HIGHEST
LOGISTICS	HIGH
LABORATORY	HIGH
HABITAT	MODERATE
REMOTE ARM	MODERATE

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CRITERIA/ATTRIBUTES FOR TASKS AND TECHNOLOGY ASSIGNMENTS
(TENTATIVE)

SAFETY

MISSION AND OPERATIONS TIME

PAYLOAD

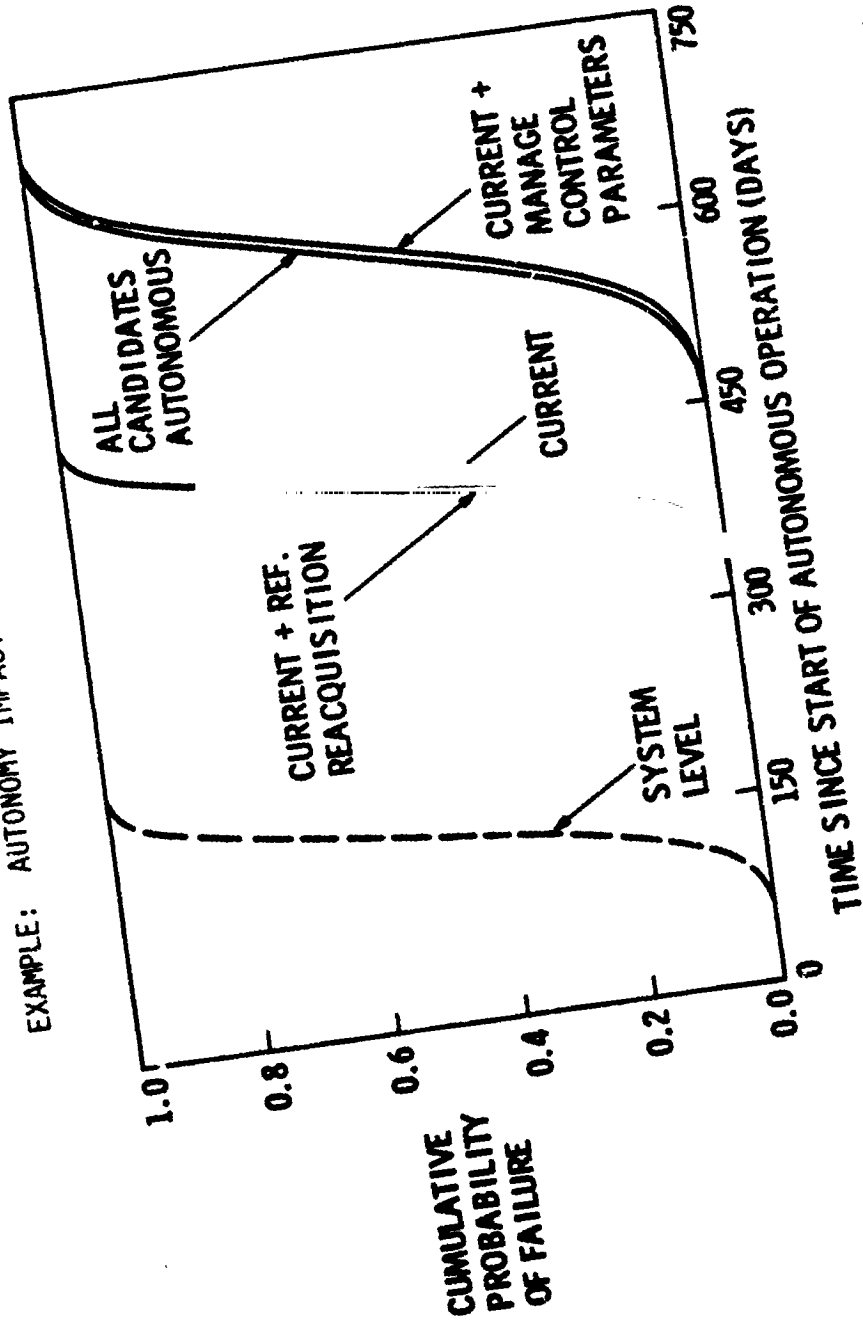
POWER

RELIABILITY

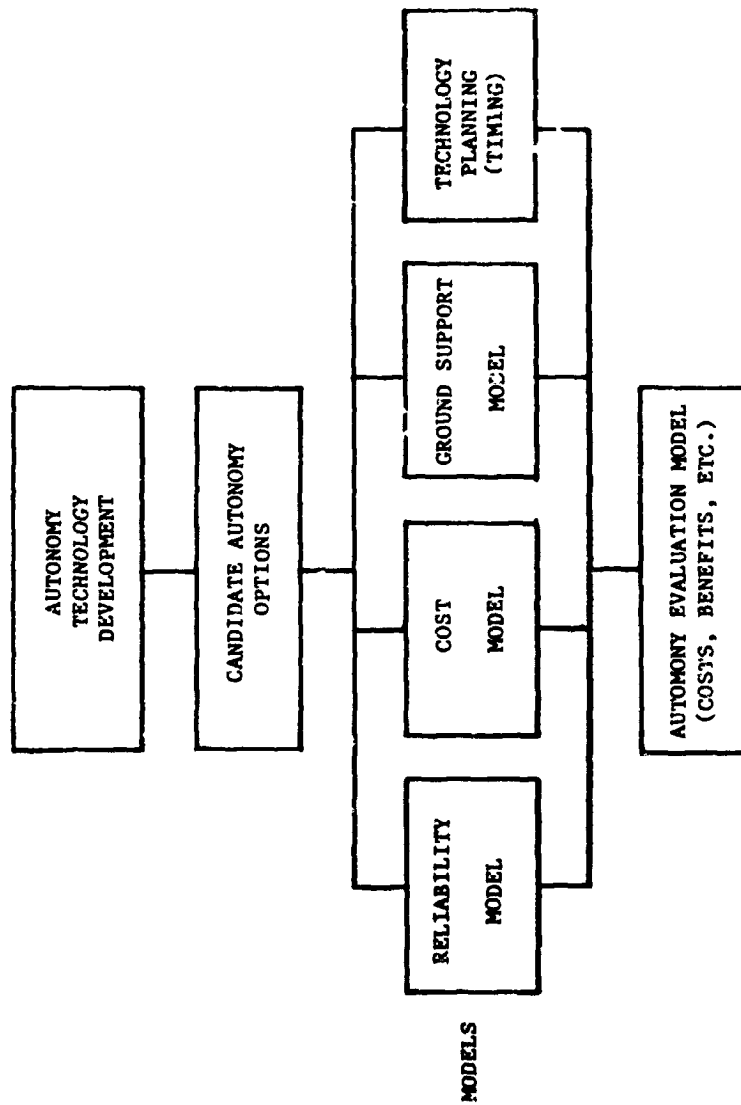
R&D TIME

COST

EXAMPLE: AUTONOMY IMPACT ON RELIABILITY



AUTONOMY EVALUATION



SCHEDULE

<u>TASK</u>	<u>SCHEDULED COMPLETION</u>
IDENTIFY KEY MODULES	COMPLETED
MOVING BASELINE	3/31/84
TASK ASSESSMENT	4/30/84
DEVELOP ATTRIBUTES	5/31/84
LIST POTENTIAL MAN/MACHINE TRADEOFFS	7/31/84
PREPARE REPORT	9/30/84