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FOREWORD
Flight orientation.
Convenient access to hygienic compartment throughout entire
carriage.

Callhoy location which is readily accessible to space couches.

Flight deck personnel with adequate lighting for inspection.
Flight engineer provided with ability to maintain visual contact
with flight deck personnel.

Social orientation of space couches.

Reorganization of crew compartment components to improve
emergency hatch.

Provisions for adequate escape aisle (passageway) from couches to

in the mock-up for this configuration were as follows:
The design recommendations which were developed and incorporated
and full compartment model.

X-axes docking crew compartment configurations were reviewed and
described.

X-axes docking/crew compartment X-axes docking.
Compartment
A3 - Full Size Mock-Up of Food Management

In the Launch Orientation of X-Axis Docking Concept
A2 - Loevy/Shuttle Cogger Model of Couches

A1 - Loevy/Shuttle Crew Compartment Configuration

2
deck area with much more versatile hardware.

We illustrated that to accomplish this goal would require a larger flight

meat of separate leisure and sleep facilities in that area.
area we were requested to look into with the objection being the establish-

The isolation of the flight deck from the crew compartments was another

convenience during launch, recovery and zero-G flight.

A flexible crew positioning system for the compartments was suggested.

out the passenger compartment, and into space craft related activities.

With the knowledge that future space flights may include the elderly, it was

During the various flight modes.

In developing concepts aimed at solving the problems of space craft access

In the passenger compartment study, lowry's work was primarily interested

Shuttle Orbiter Passenger Compartment and Flight Deck Flexibility

DESCRIPTION

TASK

SECTION
B4 - Flight Deck Crew and Area Configuration

B3 - Space Couch and Track Detail of Modular

P4 - Private Quarters

B2 - Couches Utilizing Partitions to Create Semi-Compartment

B1 - Space Couch in Bracket-Supported Modular
might make voluntary use of a restraining device unrealistic.

For a lap belt were considered mandatory since abnormal pain from cramps
of bodily contact were necessary to achieve adequate restraint. Provisions
of bodily contact were necessary to achieve adequate restraint. It was determined that these points
possible to be explored in Phase II. Although an ethyl restraint showed interesting

Figure 3 was recognized. Although an ethyl restraint showed interesting

The design of various restraint systems was pursued after the ethylene con-

less space was utilized and component replacement was simplified.

By placing the rectal/anal collector and hand wash units on adjacent walls,

ranging in stature from a 95% male to 5% female.

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The privacy screen is in place. All are located within an arm's length of the crewman and obtainable while mental controls and emergency equipment are organized for quick retrieval.

This change allows the support planes to be designated to the maximum allowed space frame rather than being contained within it as in early concepts. The small passenger coach body support planes ride on top of the structural launch.

It adjusts from flat for sleeping, to upright, for in-flight leisure and

than the larger coach.

maneuvers into the same orientations, and contains more storage space limited to 77.5' X 77' X 14'. It performs the same functions and was originated and developed the design direction for the smaller one which was

experience and knowledge gained from the development of a large passenger.

Small Passenger Coach
concepts as explained in the final report, partition were achieved by incorporating specialized packaging and graphic 80 cubic feet, the desired goal. Reductions in food retrieval and pre-
minimalized dead air space and reduced the overall volume to less than
than retrieved U-shaped face 90s in the MSQ system. This modification
layout was that we recommended that a single flat work facade be used rather
resulting in three concept systems. A significant change in the system
preparation process. Two-dimensional sketch and layout studies conducted
a reduction in overall volume and a simplification of the food retrieval
MSC requested that Raymond Lowey/William Smith, Inc. Review
Order Food System and Cajiby

DESCRIPTION

TASK

SECTION
When not in use, and collapsible units which would totally or partially fold out of sight, Concerns for the over height clothing storage units included both fixed units and ease of access.

The clothing restrooms were organized for maximum spatial efficiency and ease of access.

Areas by order level to prevent soiling of relatively cleaner items. Recommended that the garments should be segregated into isolated placed on the prevention of odor transfer between garments. We in the development of the over height clothing storage unit, emphasis was Temporary Clothing Restroom.

Description

Task

Section
s

and disposable tissue underneath between the belt structure and the user’s

Conceps presented included the use of non-porous, easily cleaned belts

physical contact and minimum body contact.

area of the restraint across the chest area for optimum visual and

were established and emphasis was placed on minimizing the surface

parameters for an efficient seat belt to be used in the hygiene facility

the system which was maximum simplicity.

an adjustable restraint device which we feel defined the objective of

variations in their elbow and shoulder widths necessarily the design of

system was to accommodate a full range of body sizes. The dimension

additional study demonstrated that the concept was unrealistic if the

95% make crew personnel when a seat belt restraint was not required,

an elbow and shoulder restraint usable by 5% female through and including

As a result of the Phase I study, interest was developed in investigating

Restraint System for Hygiene Facility (Phase II)
C1 - Clothing Coupler to Side Wall of Head

C2 - Dimensions of Seated Personnel - 50% and 95%

C3 - Semi-Rigid Belt Restraint with Velcro Fastener

C4 - Loewy/Snanth Hygiene Compartment Showing

Male

Female

Below/Shoulder Variations in Locations
Reconfiguration

needed to their fullest extent because of present requirements placed on adequate relationship between components. Special volumes have not been

Lowery/Smith does not feel that this solution adequately produces a work-

Orbiter, if proven effective on the available spacecraft volume.

useable space in the compartment. Positioned adjacent the center of the

Orbiter was constructed to analyze the impact of the skewed Z-axis in

A 1/20 scale model of an MSC layout of the Z-axis docking airlock shuttle

DESCRIPTION

TASK

SECTION

15
Foot and waist rests.

Parallel to a work bench utilizing various moveable or random access

The concepts developed were to allow the restrained individual to walk

stretch points selected, therefore, were the waist and both feet.

natural bending and limit the reach of a restrained individual. The re-

and that any rigid restraining device above the waist would inhibit

It was decided that a three point restraint was necessary for stability

both areas are required to adequately produce a positive restraint.

Although individual illustrations centered on either the foot or waist area,

as necessary for complete a particular task.

It was necessary to complete a particular task.

was one which would allow him to have both hands free while maneuvering.

It was necessary for a correct position to be maintained in order to allow

a limited amount of controlled movement was produced in order to allow

The development of a flexible positive restraint which will allow a crewman

Flexible Positive Work Station Restraint (Phase I)

DESCRIPTION

TASK

SECTION
slope configuration of the crewman's shoe.

and reverse movement along a track. The foam covered bar conforms to

An adjustable toe bar located near the base of the unit allows forward

bench.

Length adjustment allows the crewman to adjust his distance from the

The track allows the arms to slide the length of the bench while the arm

in use, the arms fold out of a recess and couple into the crewman's belt.

sliding track with couplers located on adjustable fold away arms. When

from the bench, the front surface of the bench also incorporated a

free lateral movement with slack adjustment to enable movement away

belt system was located on the front surface of the bench which allowed

was constructed incorporating all of the selected concepts. A closed loop

To better evaluate the effectiveness of each system, a presentation model

selected location.

revolving belt and an adjustable toe bar restraint to restrain feet in a

including a wrist belt which interacts with fold away arms, continuous

positive restraint (Phase II)

DESCRIPTION

TASK

SECTION
out screen which folds away when not in use.

house garments and personal effects. Privacy is provided for by a roll
visions, which are accessible while on the space couch are included to
support for crew members during launch and reentry. Storage pro-
during leisure, sleeping, eating periods in zero-G and provide proper

The couch is designed to provide all immediate needs of the crewman
neutral buoyancy testing.

in the original couch concept and was constructed for compatibility with

The purpose of this model was to demonstrate and evaluate the features

Shuttle Orbiter Passenger Couch - Full Scale Mock-Up

DESCRIPTION

TASK

SECTION
K3 - Full Size Demonstration Model in Sleep Mode

K1 - Full Size Demonstration Model in Leisure Mode
The data format card is designed to serve as a guide to SkyLab astronauts.
A lightweight scale model of the selected concept was fabricated and pre-tested.

The design of the unit was developed with the aid of full-scale human build prototypes, and the use of dispersion of cleaning agents and wipes have been addressed according to the storage units within the caddy. The caddy and vacuum unit were designed as two interlocking units which accommodate activities.

The housekeeping equipment stored in the galley facility consists of three basic parts: a master storage unit for central supply, a portable vacuum unit, and a portable "caddy" equipped with a limited supply of wipes, disinfectants, etc. to support general housekeeping.

The housekeeping equipment stored in the galley facility consists of...
Threaded fittings are arranged in a matrix in the structure.

The system developed utilizes standard storage locker which would be available in various sizes based on a set modular growth pattern, i.e., 24" X 24" X 24", etc. The object of the master locker size 24" X 24" is to provide the largest storage unit possible for each storage option would be to provide the largest storage unit possible for each storage item in a location based on the physical constraints of that location. The outer cases.

The means of restack are interchangeable.

The components on the trays are restricted using various techniques. The unit to a location within the space that.

Single tray or several as a unit, if necessary, to transport that particular (transferred horizontally and vertically as a unit or individually) inside the storage lockers is a system of trays (stilts into "C" shaped ex-

not designed as a single component.

is that a flexible storage system will reduce requirements for custom transporting a variety of equipments, equipment and mission supplies.

Mission storage requirements may vary from one mission to another.

DESCRIPTION

TASK

SECTION
...