AMBULATOR FOR PARAPLEGICS:
ENGINEERING DRAWINGS

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DISCUSSION

The ambulator discussed in this report is one part of a three-phase plan to develop an integrated transportation system for paraplegics. The development of the system is sponsored by the Veterans Administration Prosthetics Center (VAPC) and is being developed as a cooperative effort between the VAPC and the Naval Ocean Systems Center (NOSC).

Phase I consisted of the design and fabrication of a prototype ambulator (the drawings for this device are contained in the remainder of this report). Phase II is the design of a wheelchair which will accept the ambulator, forming the ambulator/wheelchair subsystem. Phase III will be concerned with the design of a street vehicle that will functionally accommodate the integrated ambulator/wheelchair subsystem.

The ambulator/wheelchair subsystem consists of two modules which can be separated to provide increased mobility for the paraplegic while supported in the upright position. The ambulator (figure 1) contains an erecting mechanism powered by an electric motor-driven jackscrew fixed to a small, stable platform. This provides the paraplegic with the capability to be raised into a fully erect position, and it also allows the ambulator to be detached from the wheelchair's mainframe. The occupant can then move away from the wheelchair and move about under his control.

The ambulator is self-powered and provides the user with a high degree of maneuverability. When returning to the wheelchair, an engagement mechanism on either side of the ambulator engages rollers on the wheelchair. This causes the wheelchair to return to the sitting position and raises the ambulator base several inches off the floor. The ambulator is then automatically reattached to the wheelchair's mainframe and becomes an integral part of the main wheelchair assembly.

In addition to providing the paraplegic with the capability to stand or sit at will, it is felt that the ambulator will provide the paraplegic with better general health. It will allow him to load his skeleton periodically, providing the bone stress needed to reduce calcium washout. (The latter condition can result in loss of calcium, especially in the bones of the legs and pelvic region.) Standing will also improve circulation and relieve those pressure areas which cause tissue breakdown and decubiti. The ambulator will also make it easier for the paraplegic to live in an environment where most functions are accomplished in an upright position, e.g., cooking at a range or working at a workbench or sink. However, the psychological benefit of the capability to converse at eye level may be the greatest benefit.
Figure 1. Ambulator.
DRAWINGS
MATERIAL: AL ALLOY 5052 OR 6061 AS AVAILABLE .06 THICK
FINISH: HARD ANODIZE, CLEAR

ELECTRONICS MOUNT PLATE
A0050

John Wier  Ext 7372
FOR ASSEMBLY REFERENCE
ONLY A0070

NOTE: CROSS SECTIONS SHOWN ARE NOT PER DRAWINGS.

BEARING ASSEMBLY
FOR WHEEL CARRIAGE

FULL SCALE

JOHN WIER EXT 7872
SECTION A-A

TAP FOR 8-32 MACHINE SCREW
4 PLUS .005 SPACE ON 2.110 BOLT CIRCLE

MATERIAL: AL ALLOY 2024-T4

BEARING HOUSING

A0120

JOHN WIER Ext 7372
MATERIAL: BRONZE S.R.E 660

NOTE: A) THE DESIGNATED KNURL IS TO FIX THE BUSHING IN A HARD RUBBER WHEEL. APPEARANCE IS NOT IMPORTANT AND THE KNURLED SECTIONS MAY COVER THE WHOLE BUSHING IF IT IS EASIER AND FAIRER TO PRODUCE.

MATERIAL: CRES STEEL 303

WHEEL BUSHING - AXLE ROD

JOHN WIER  EXT 7372

KING 140
MATERIAL: 303 STAINLESS STEEL

TYPE A

.25

.38

1.25 D

.SPF FACE 1.25 D DISC
SMOOTH BOTH SIDES

5.50

12 HOLES EQ SPACE
.25 DIA.

7.25

.375 D HOLE

.08

.25

 TYPE B

.25

.38

1.25 D

.SPF FACE 1.25 D DISC
SMOOTH BOTH SIDES

.585 (.005 TOO FIT LINK I.D. BOTH LIFTING AND TOP LINK)

.50

2.00

3.75

.375 D HOLE

.08

.25

ADJUSTABLE LINK ENDS

AO710

JOHN WIEB

EXT 7772
.50 FLANGE TOTAL HEIGHT FROM FARSIDE TYP 3 PLCS
SLOT .25 WIDE X 15° ARC ABOUT & OF SECTION
.25 O.

MATERIAL: 302 STAINLESS STEEL
.134 THICK

RIGHT HAND — SHOWN
LEFT HAND — FLANGES Opp SIDE

CUT OUT

BACKREST LINK PLATE
A023O

JOHN WIER  EXT 7372
RADIUS ANGLE IS PREFERRED BUT NOT REQ.

.188 HOLE 2 PLCS

.25 R TYP 4 PLCS

.316 HOLE

MATERIAL: AL ALLOY 1X1X.12 ANGLE

SPRING SUPPORT BASE
AO290
PRELIMINARY
JOHN WIER  EXT 7372
MATERIAL: AL ALLOY 6063-T5
ALCOA AL EXTRUDED SHAPE
NO. 5527 OR EQUAL

ARM REST CHANNEL
A0300

JOHN WIER EXT 7172
MATERIAL: 302 STAINLESS STEEL

.25 HOLE THRU

ARMREST ROLLER

AO340

JOHN WIER CAT 7172
NOTE: SUPPLY DOT DURABLE FASTENER
*XX-10376 STUD 7/4" LONG
FOR EACH INSTALLED SNAP

BACKREST PLATE TO BE PROVIDED FOR REFERENCE

1.0 REF TYP

5.5 REF TYP

6.5 REF TYP

SNAP FASTENER BACKSIDE OF CUSHION
3 LEFT SIDE 3 RIGHT SIDE DOT DURABLE FASTENERS.
*XX-10224 SOCKET (STIFF PADIO)

3.00 SOFT FOAM COVERED
WITH DUPONT NYLON-ZELDEL
COLOR #9674 483 "ROYAL"
FLAT STITCHED CLOSED

BACKREST PLATE UPHOLSTERY DETAIL

ROYCO

JOHN WIER  EXT 7272