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Technical Document 370

PORTABLE LIFE SUPPORT STRETCHER UNIT (PLSSU): ASSEMBLY INFORMATION

R. Kataoka

August 1980

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This Technical Document reports on work performed under NOSC work unit FA 23 between 1 October 1979 and 31 July 1980 for the Naval Medical Research and Development Command, Code 45, Bethesda, MD 20014. This Technical Document is the final version of an earlier internal NOSC document (TN 255). The principal investigator for this work was R. W. Kataoka (Code 5133), under the direction of W. T. Rasmussen, Head, Bio-engineering Branch (Code 5133).

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INTRODUCTION

The Navy has had a long-standing need for a life-support stretcher which can provide continuous, uninterrupted casualty care and monitoring during the transportation phase of MEDEVAC operations. A prototype of such a stretcher, including a number of modular life-support features, recently has been developed at the Naval Ocean Systems Center (NOSC) under the sponsorship of the Naval Medical Research and Development Command. Called the Portable Life Support Stretcher Unit (PLSSU), this stretcher, with its life-support modules, is self-contained, self-powered, and is fully compatible with military aircraft and vehicles used for patient transport.

Appendix A is a list of all PLSSU engineering drawings and a cross-reference index to the assembly figures where they are referenced. Appendix B is a summary list of commercially available parts required for assembly and a cross-reference index of the assembly figure where they are used.

BACKGROUND

The PLSSU project began in July 1974 with a feasibility study (NELC TN 3138, Interface and Design Requirements for a Portable Life Support Stretcher Unit, March 1976) for the design of the unit. The feasibility study dealt with the identification and evaluation of existing life-support systems and equipment being used in both military and civilian environments. Medical evacuation scenarios for both combat and peacetime conditions were examined, and various vehicles, litters, and life-support equipment used in military patient transfers were reviewed. From this study, a preliminary design of a portable life-support stretcher was formulated. This concept was implemented as a full-scale mockup and eventually as a prototype (NELC TN 3225, Prototype Portable Life Support Stretcher Unit: Description and Specification, September 1976). Various arrangements were studied and a preliminary examination of the unit's interface with military vehicles (such as helicopters, ambulances, and Navy ships) was begun. A test-and-evaluation phase of the first prototype is now being completed. The prototype is being evaluated as a means of transportation of patients within a hospital, as a unit that responds to the emergency transportation of patients between hospitals (via ambulance or Coast Guard helicopter), and as a unit that interfaces with all military vehicles designed to transport patients. All modifications and changes to the prototype unit that have resulted from the test and evaluation to date are incorporated in the present engineering and assembly drawings.

DESCRIPTION

The PLSSU, with modular life-support equipment, is designed to be self-contained, self-powered, and fully compatible with military aircraft and vehicles used for patient transport. It is capable of (1) supplying 2 to 4 hours of oxygen to a patient, depending on flow rates; (2) ECG monitoring for 5 hours; (3) delivering 50 defibrillation shocks; and (4) carrying other supplies and equipment needed for suction, resuscitation, and the treatment of shock.

The design of the PLSSU is modularized so that it can be reconfigured as desired to fill various types of applications of emergency MEDEVAC operations (shipboard, helicopter, or ambulance), interhospital transfers, or intrahospital use. When configured for patient transfers, either MEDEVAC or interhospital, the major components are a standard canvas or Stokes litter and an equipment carrier. The equipment carrier is designed to be similar in dimensions and weight to a standard canvas litter with a patient. It is 92 inches (233.7 cm) long by 22 inches (55.9 cm) wide by 16 inches (40.6 cm) high. It weighs from 164 pounds (74.4 kg) to 184 pounds (83.5 kg) with equipment and supplies, depending on the ECG monitor and defibrillator used. This is approximately equivalent in weight to a 170-pound (77.27 kg) patient on a standard canvas litter. [A standard canvas litter weighs 12 pounds (5.45 kg).] The handles at each end of the equipment carrier are similar to those of the standard canvas litter. This configuration (dimensions, weight, and handles) allows the equipment carrier to be handled separately as a standard canvas litter and installed in any military evacuation vehicle without modification to its standard litter rack spacings and equipment. The equipment carrier thus occupies the space of only one patient aboard the vehicle, while providing life support and/or emergency care for one or more patients. An important feature of the PLSSU is that it quickly transforms a utility helicopter or other transport vehicle into an equipped MEDEVAC unit, and just as quickly returns it to a utility status.

When configured for intrahospital use, the major components are the equipment carrier and a hospital pallet unit. The hospital pallet unit, a bedlike attachment intended for hospital use, is held in place by the same quick-release pins as the standard canvas litter at the approximate bed height of 30 inches (76.2 cm). This makes the transfer of a patient to and from the stretcher much easier. While in transit within the hospital, emergency life support can be provided to the patient in a hallway, elevator, or wherever required. The hospital pallet unit has a uniform-density top with a full-length shelf for X-ray cassettes. This will allow a patient to be X-rayed without removal from the stretcher unit. If a transfer operation between hospitals or MEDEVAC operation were required, the hospital pallet unit could be lifted off the equipment carrier by removing the four quick-release pins. A standard canvas litter or Stokes litter could then be attached, making the unit ready for patient vehicle transfers.

The equipment and supplies selected for use on the equipment carrier allow it to function as a portable, self-contained, and self-powered crash cart while transporting a patient. Four drawers for equipment and supplies are accessible from either side and are completely removable. The equipment and supplies are arranged in order of priority for emergency procedures. Airways and resuscitation equipment are located in the drawer nearest the head of the patient. Suction equipment, medicines, blood-pressure cuff and stethoscope, and intravenous supplies are located in the other drawers.

Oxygen for the PLSSU is supplied by two D cylinders, which could provide more than 3 hours of oxygen at a 4-liter-per-minute flow rate. The hospital unit has a rack for two additional D-size oxygen cylinders (360 liters each), which can be used within the hospital and thus assure the availability of the other full oxygen cylinders for transporting activities outside the hospital. The oxygen cylinders are strapped to mounts that are removable from the stretcher mainframe. The removable feature of the cylinders and mounts allows

the cylinder valve to be oriented to either side of the PLSSU. The cylinders and mounts also can be detached quickly to provide oxygen away from the stretcher.

ECG monitoring is provided by a Physio-Control Life Pak 5, which is removable from the defibrillator. The monitor has its own set of batteries, which provide power for from 2 to 5 hours of continuous monitoring from a full charge. The monitor will fit between the patient's legs, thus allowing convenient viewing. The defibrillator can deliver 25 to 50 full shocks (300 joules/s) on a full charge, and can be removed quickly from the equipment carrier to provide assistance away from the PLSSU.

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ASSEMBLY FIGURES

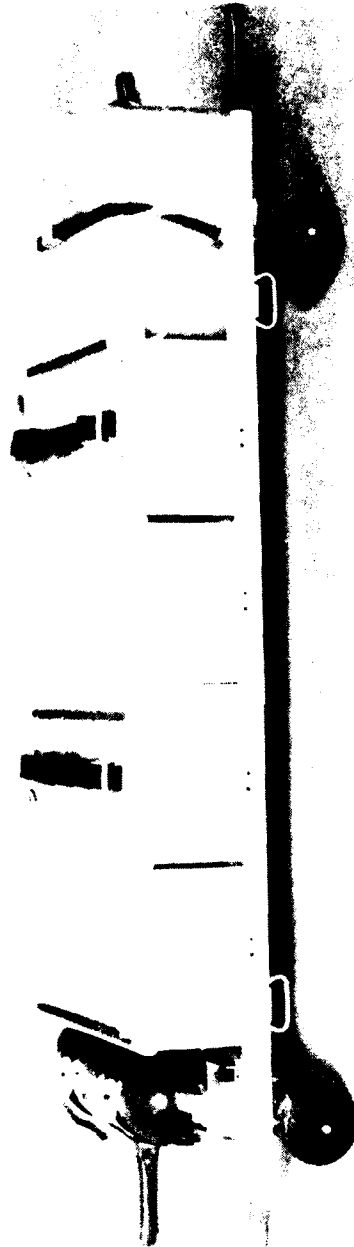


Figure 1. Prototype Portable Life Support Stretcher Unit (PLSSU).

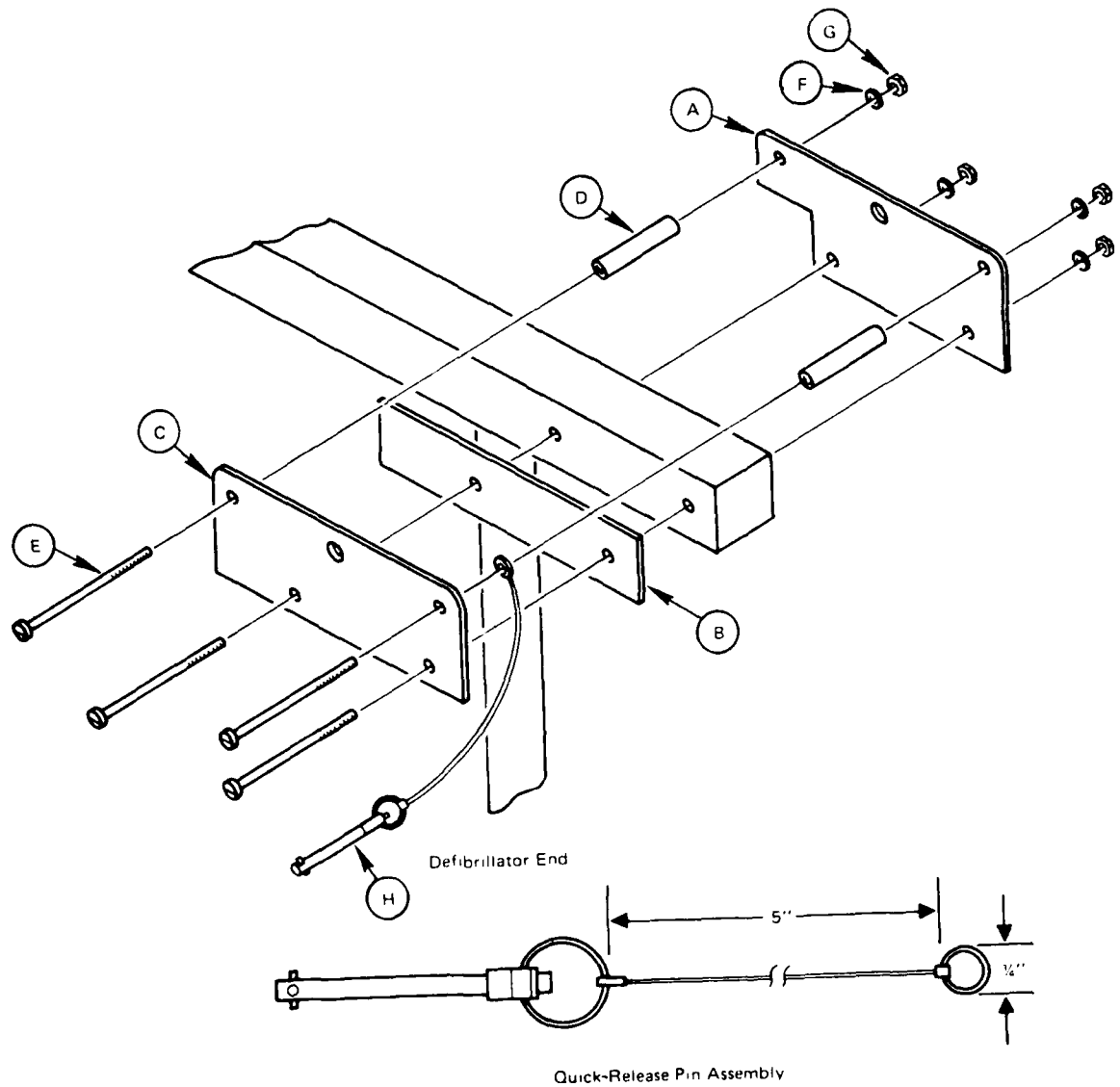


Figure 2. Foot retainer assembly: defibrillator end.

Legend for Figure 2

Item	Description	Quantity
A	Plate, foot retainer I, drawing #0010784	2
B	Spacer, foot, drawing #0010787	2
C	Plate, foot retainer II, drawing #0010785	2
D	Ferrule, type A, drawing #0010788	4
E	Screw, flathead, 10-32, 2 1/4-inch	8
F	Lockwasher, 10-32	8
G	Nut, 10-32	8
H	Pin, quick-release, drawing #0010882	2

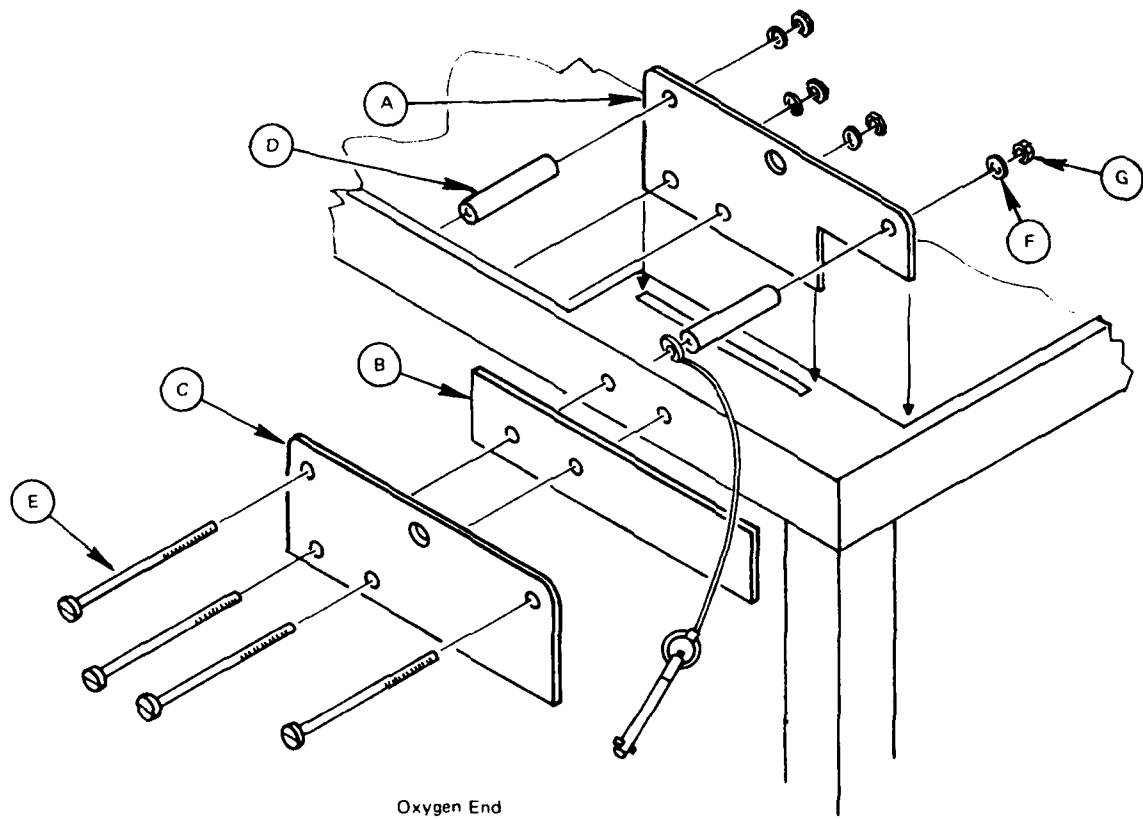


Figure 3. Foot retainer assembly: oxygen end.

Legend for Figure 3

Item	Description	Quantity
A	Plate, foot retainer 1, drawing #0010784	2
B	Space, foot, drawing #0010787	2
C	Plate, foot retainer II, drawing #0010785	2
D	Ferrule, type A, drawing #0010788	4
E	Screw, flathead, 10-32, 2 1/4-inch	8
F	Lockwasher, 10-32	8
G	Nut, 10-32	8
H	Pin, quick-release, drawing #0010882	2

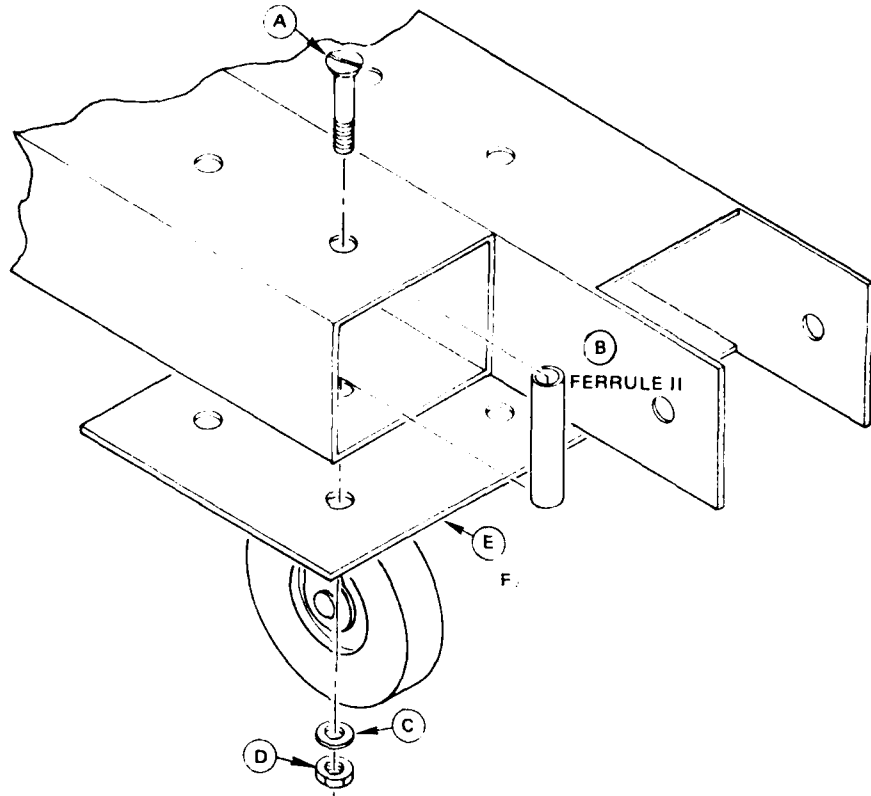
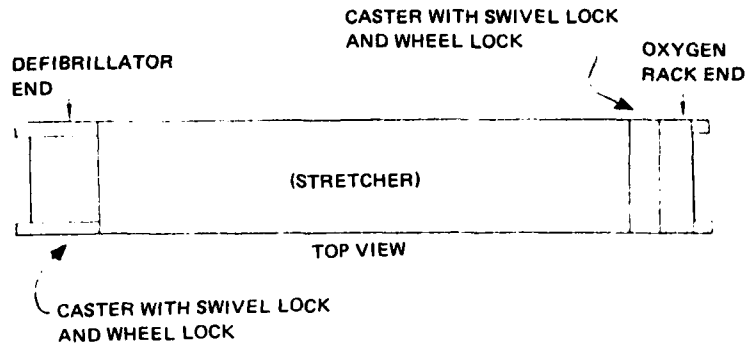


Figure 4. Caster assembly.

Legend for Figure 4

Item	Description	Quantity
A	Screw, flathead, 1/4-20, 2-inch	16
B	Ferrule type II, drawing #0010788	16
C	Flat washer, 1/4-20	16
D	Nut, 1/4-20	16
E	Swivel caster, Darnell model 1665 $\frac{1}{2}$ XDN, wheel size 5 $\frac{1}{2}$ -inch diameter by 1 $\frac{1}{2}$ -inch, rubber, number 16 top plate	2
F	Swivel caster, Darnell model 1665 $\frac{1}{2}$ XDNEZ, series 60, with wheel brake and swivel lock, number 16 top plate	2

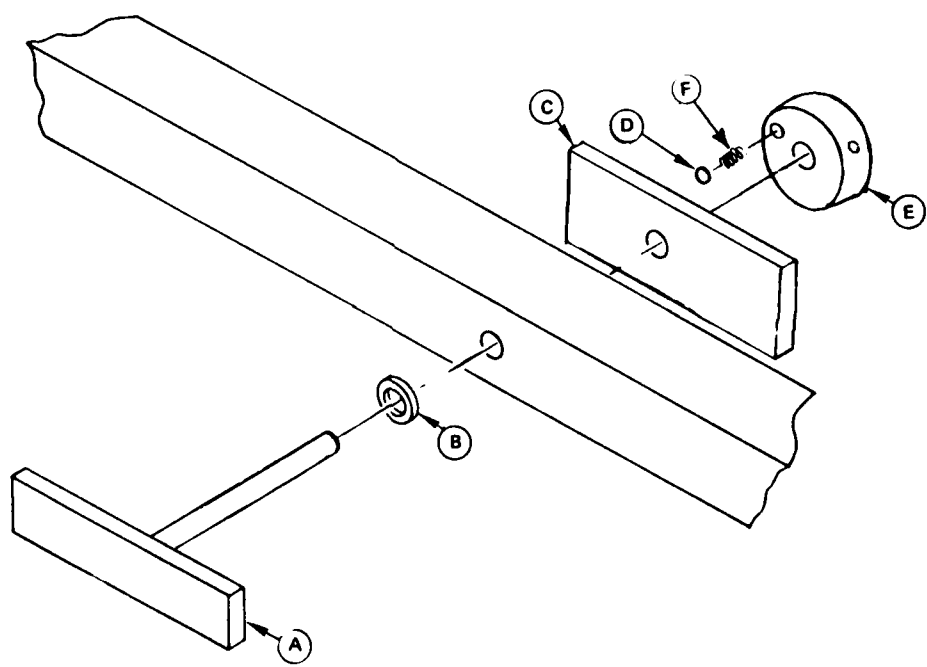
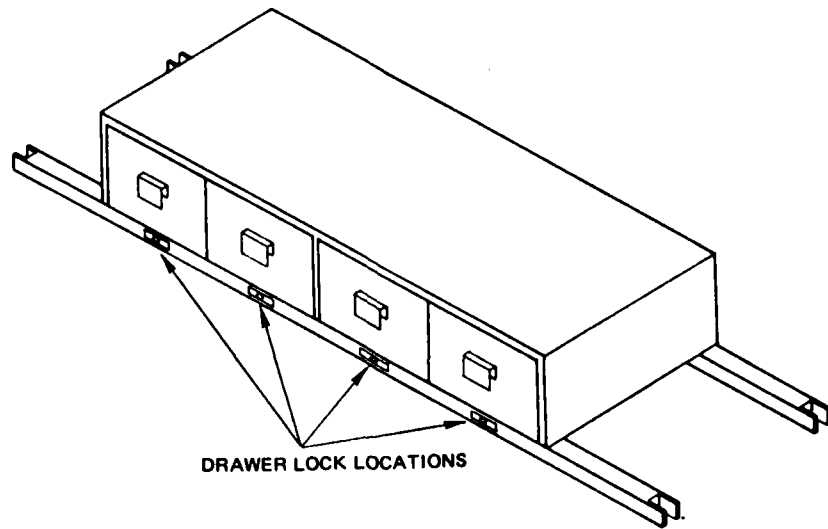


Figure 5. Drawer lock assembly.

Legend for Figure 5

Item	Description	Quantity
A	Wing lock	8
B	Bushing	8
C	Back plate	8
D	Steel ball bearing	8
E	Back retainer	8
F	Spring	8

(Ferno-Washington wing lock assembly parts)

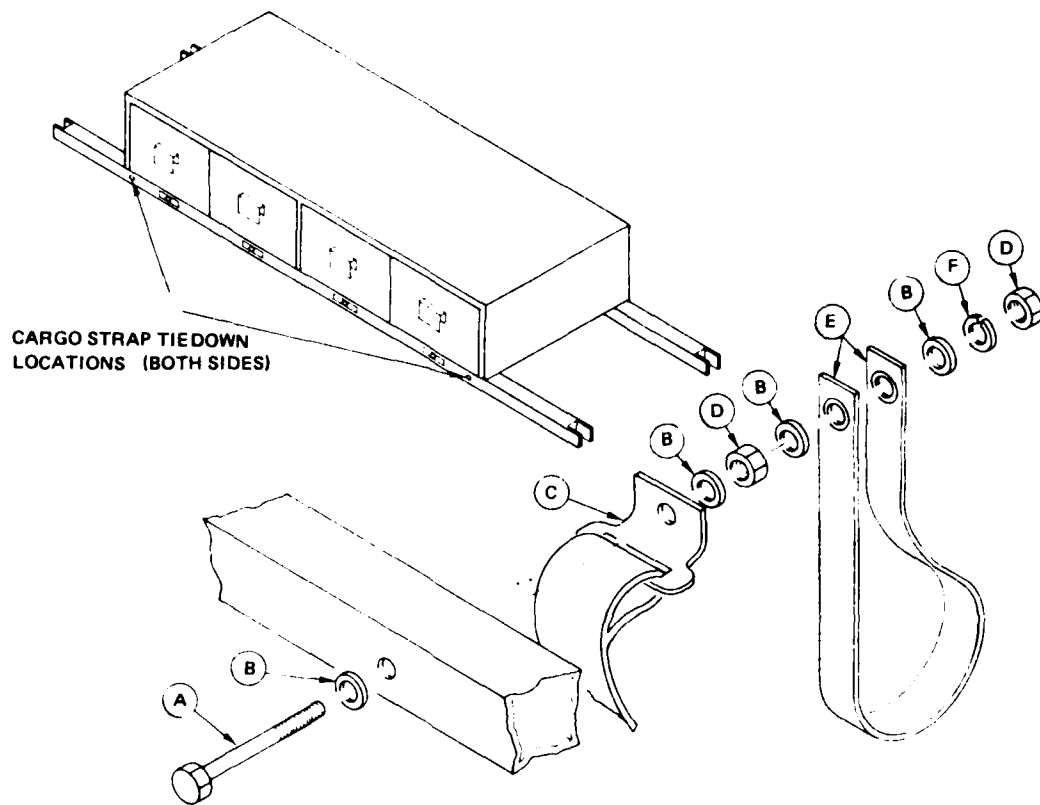


Figure 6. Cargo strap tiedown assembly.

Legend for Figure 6

Item	Description	Quantity
A	Bolt, 1/4-20, 3-inch	4
B	Flatwasher, 1/4-20	16
C	Strap, assembly cargo, strap with buckle drawing #0010799	4
D	Nut, 1/4-20	8
E	Strap, assembly cargo, storage loop, drawing #0010799	4
F	Lockwasher, 1/4-20	4

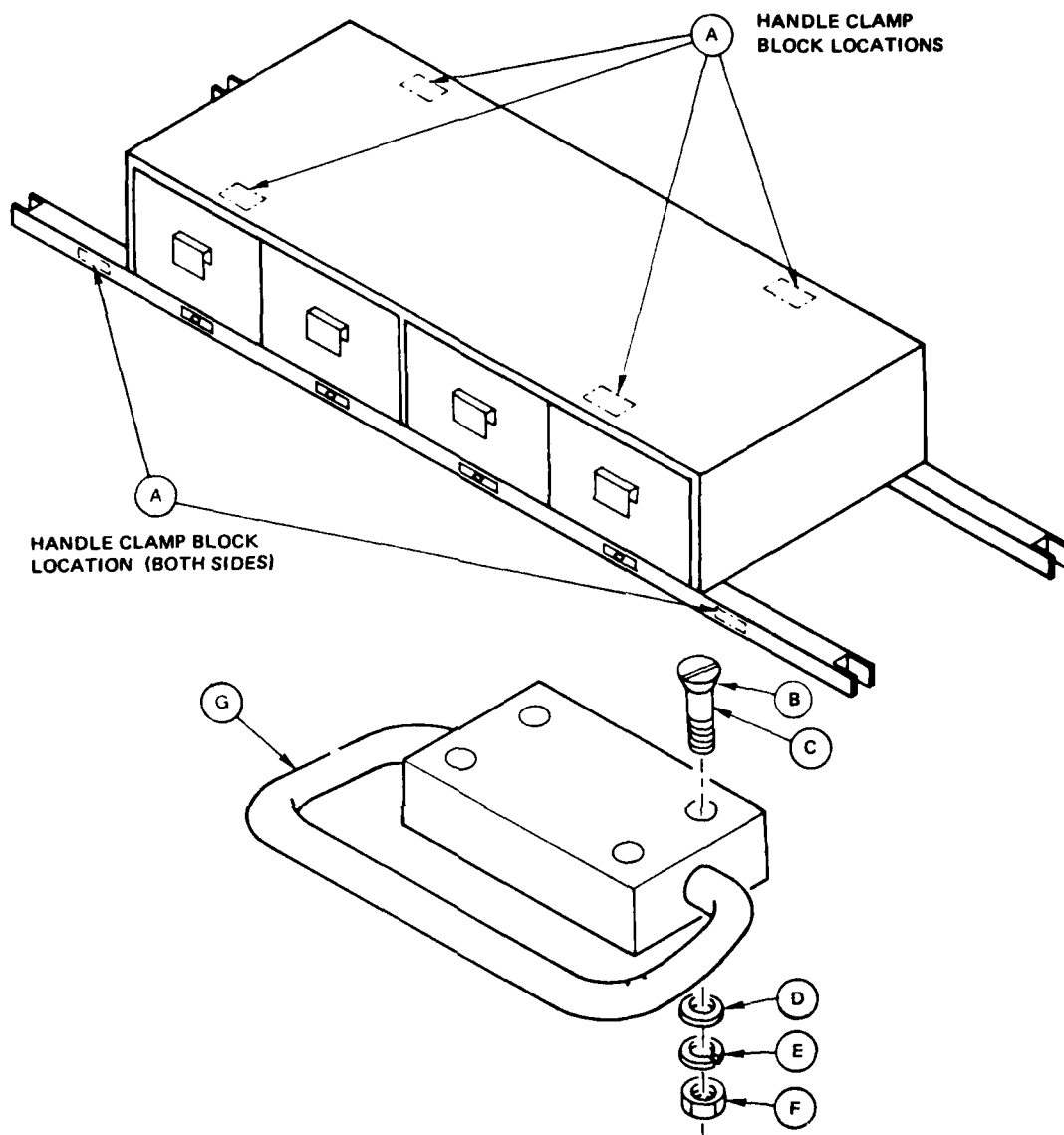


Figure 7. Cargo handle assembly.

Legend for Figure 7		
Item	Description	Quantity
A	Block, handle clamp, drawing # 0010786	8
B	Screw, flathead, 8-32, 1-inch, for top mounting	16
C	Screw, flathead, 8-32, 2¼-inch, for side mounting	16
D	Flatwasher, 8-32	32
E	Lockwasher, 8-32	32
F	Nut, 8-32	32
G	D-ring, FSC 5340 251 7971	8

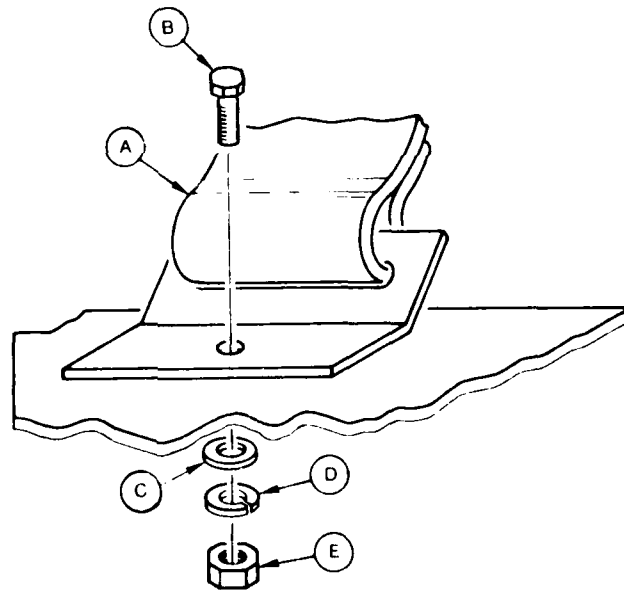
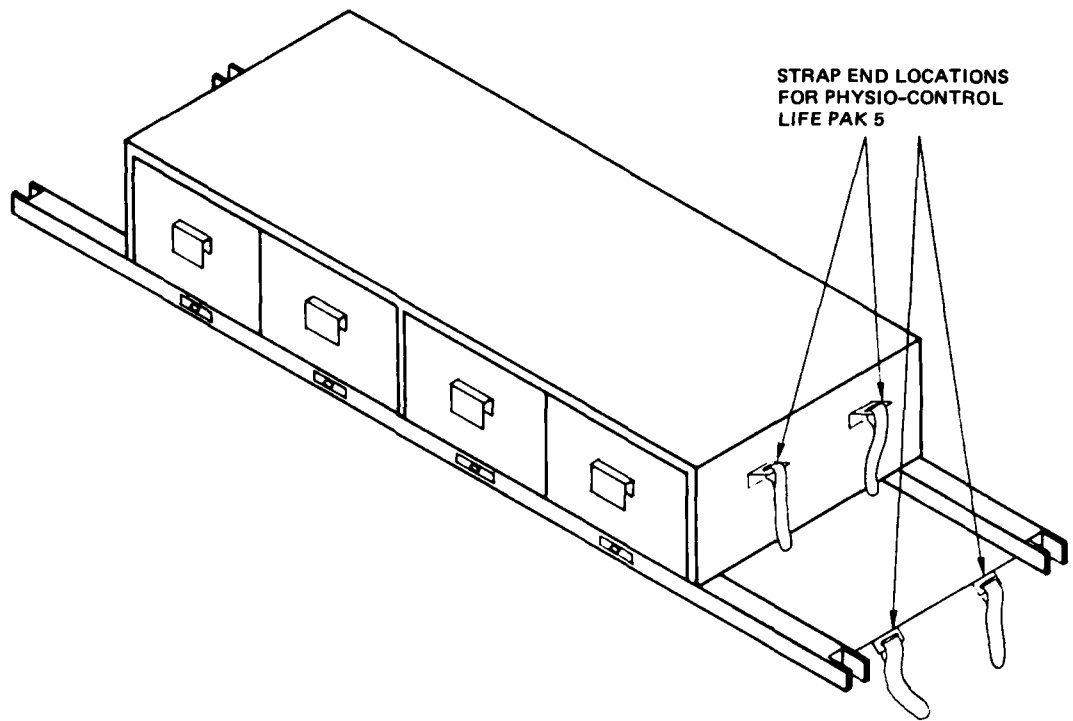


Figure 8. Physio-Control Life Pak 5 strap assembly.

Legend for Figure 8		
Item	Description	Quantity
A	Strap, Life Pak 5, drawing 0010801	2
B	Bolt, 1/4-20, 1/2-inch	4
C	Flatwasher, 1/4-20	4
D	Lockwasher, 1/4-20	4
E	Nut, 1/4-20	4

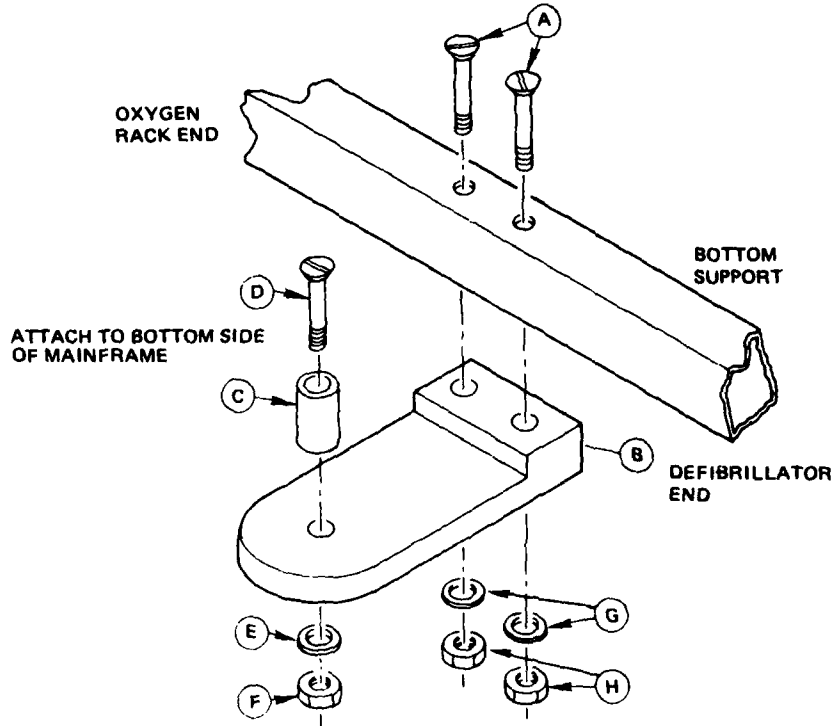
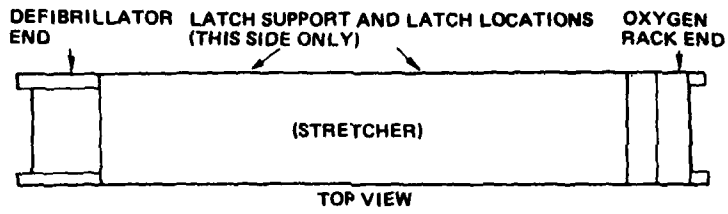


Figure 9. Latch support and latch assembly.

Legend for Figure 9		
Item	Description	Quantity
A	Screw, flathead, 10-32, 2¼-inch	4
B	Support, latch post, drawing #0010789	2
C	Post, latch, drawing #0010790	2
D	Screw, flathead, 1/4-20, 2¼-inch	2
E	Flatwasher, 1/4-20	2
F	Nut, 1/4-20	2
G	Flatwasher, 10-32	4
H	Nut, 10-32	4

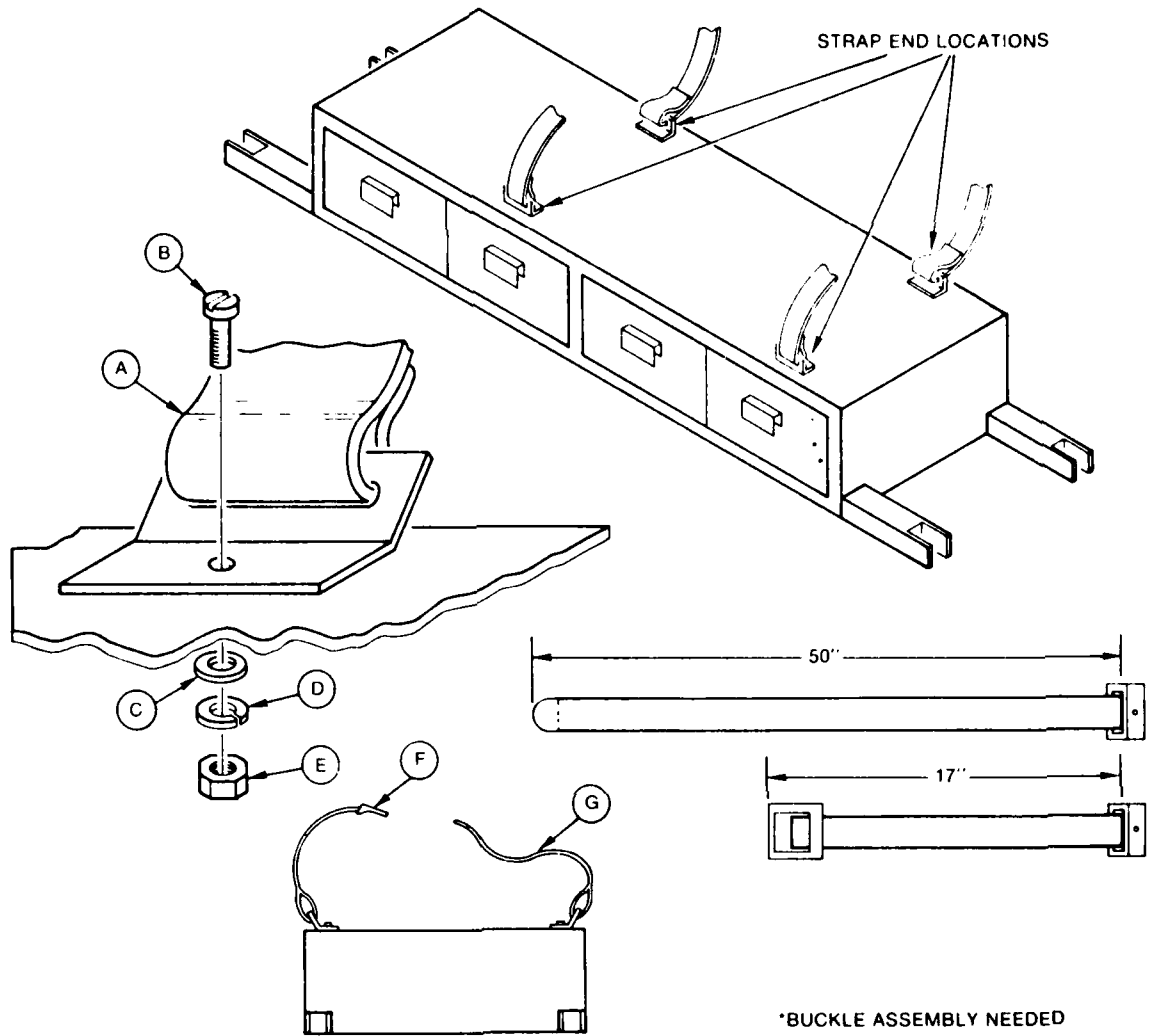


Figure 10. Stokes litter strap assembly.

Legend for Figure 10		
Item	Description	Quantity
A	Strap, Stokes litter, see (F) and (G)	2
B	Bolt, 1/4-20, 1/2-inch	4
C	Flatwasher, 1/4-20	4
D	Lockwasher, 1/4-20	4
E	Nut, 1/4-20	4
F	Strap, Stokes litter, strap with buckle, drawing #0010802	2
G	Strap, Stokes litter, strap with end clip, drawing #0010802	2

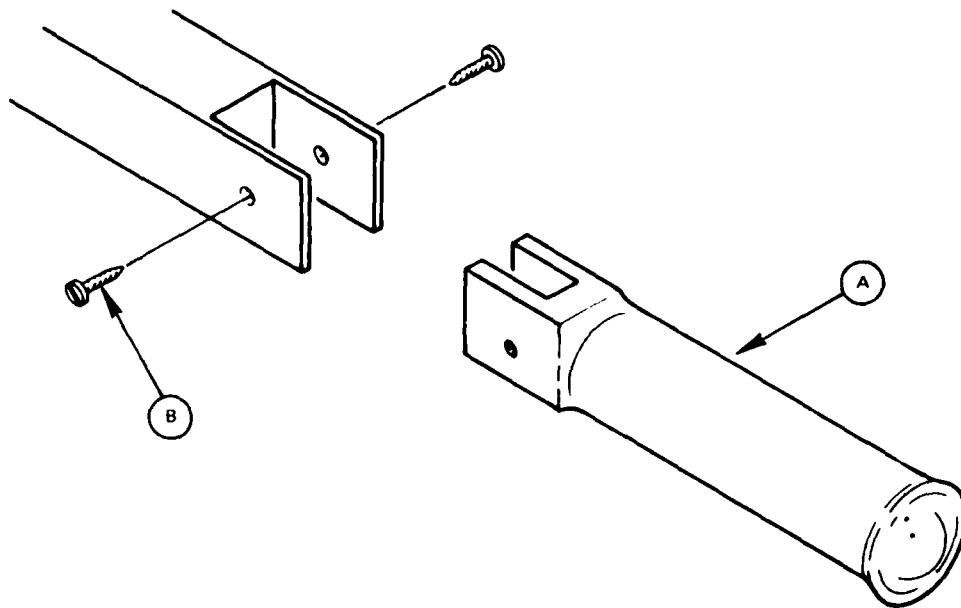


Figure 11. Carrying handle assembly.

Legend for Figure 11

Item	Description	Quantity
A	Handle, drawing #0010791	4
B	Screw, wood roundhead, #8 tap, 1 1/2-inch	8

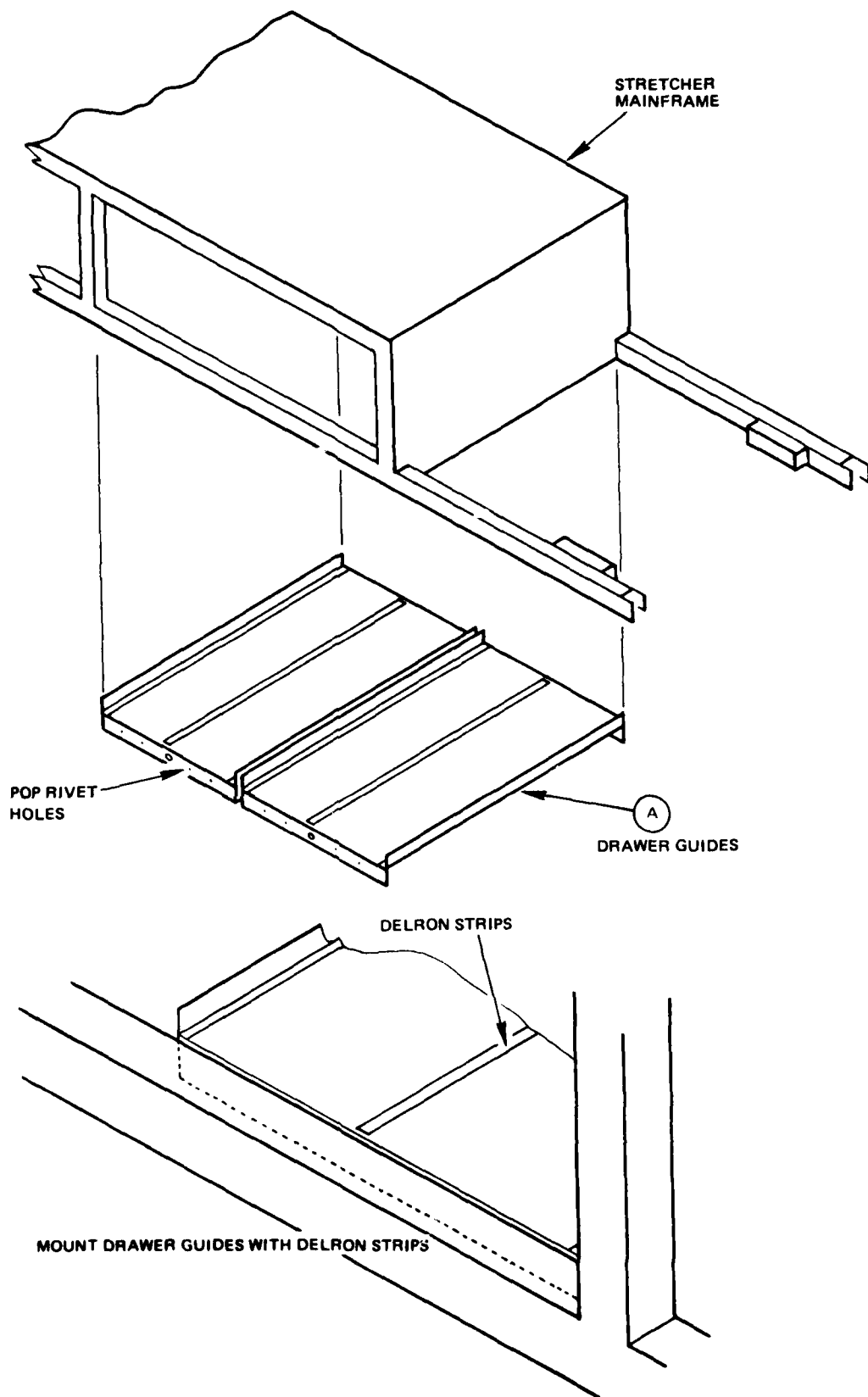
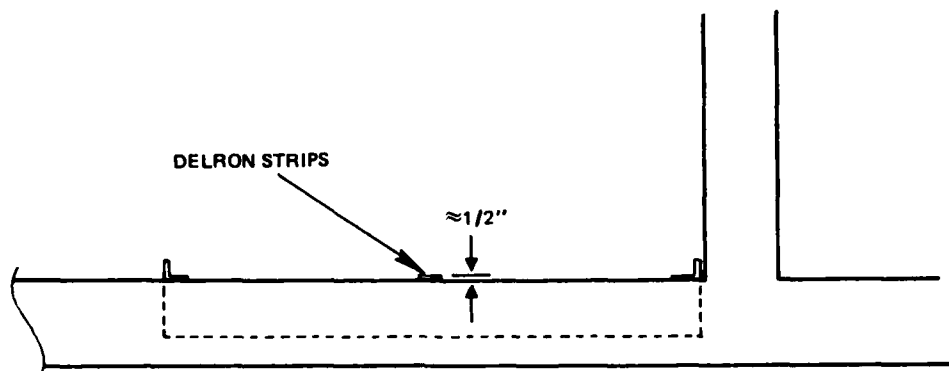


Figure 12. Drawer guide assembly.



MOUNT DRAWER GUIDES WITH DELRON STRIPS ELEVATED APPROXIMATELY 1/32" ABOVE MAINFRAME CROSS BRACE; DRILL HOLES AND POP RIVET

Figure 13. Drawer guide assembly detail.

Legend for Figures 12 and 13

Item	Description	Quantity
A	Tray, drawer guide, drawing #0010796	4
B	Pop rivets, 1/8 x 1/8-inch, buttonhead, 8 per drawer guide	32

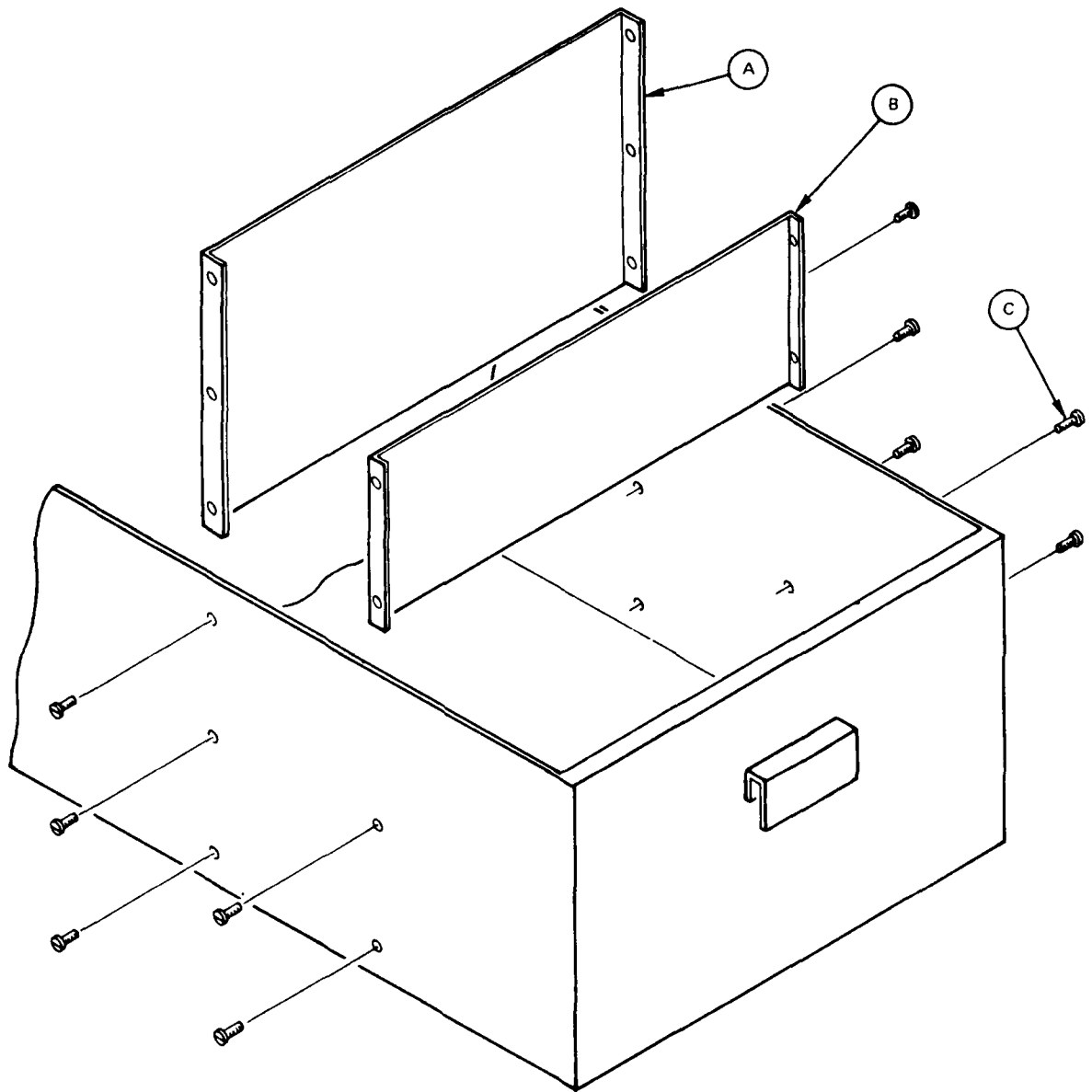


Figure 14. Drawer partition assembly.

Legend for Figure 14		
Item	Description	Quantity
A	Divider, drawer, full height, drawing #0010794	12
B	Divider, drawer, half height, drawing #0010794	4
C	Screw, 4-40, 3/16, 100-degree	80

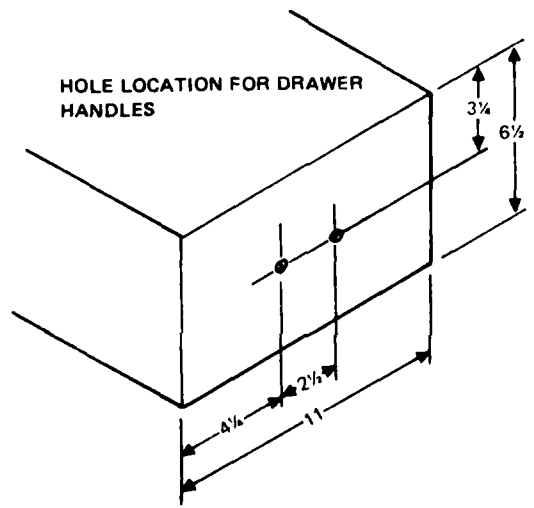
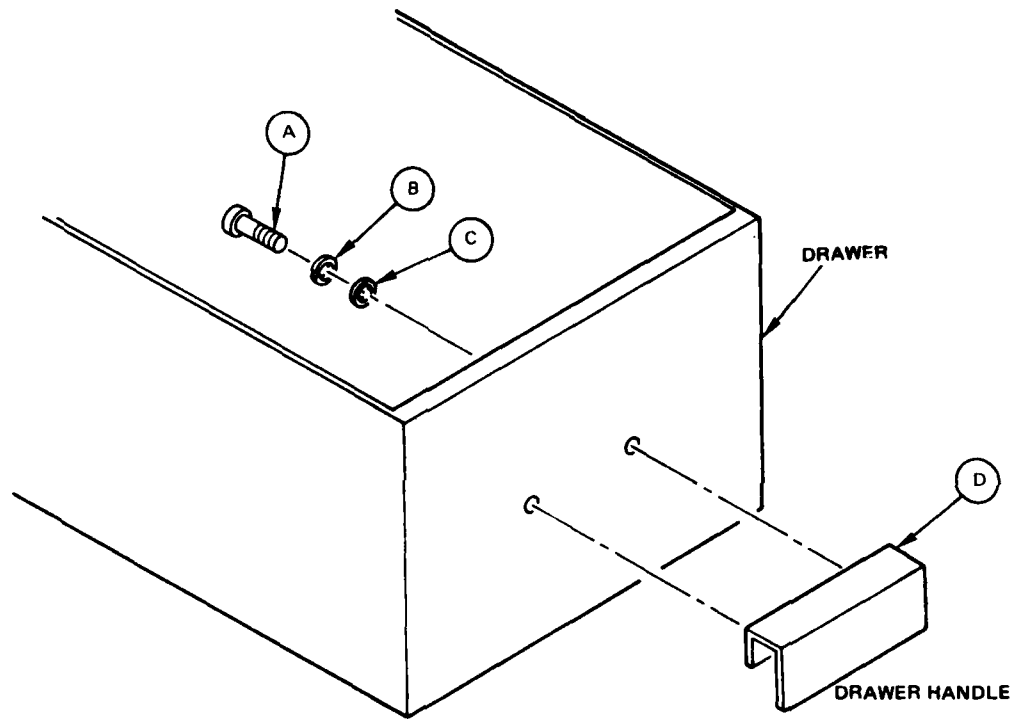


Figure 15. Drawer handle assembly.

Legend for Figure 15

Item	Description	Quantity
A	Screw, roundhead, 8-32, 3/8-inch	16
B	Lockwasher, 8-32	16
C	Flatwasher, 8-32	16
D	Drawer handle, Southco no 25 pulls, P/N 25-11-101-11	8

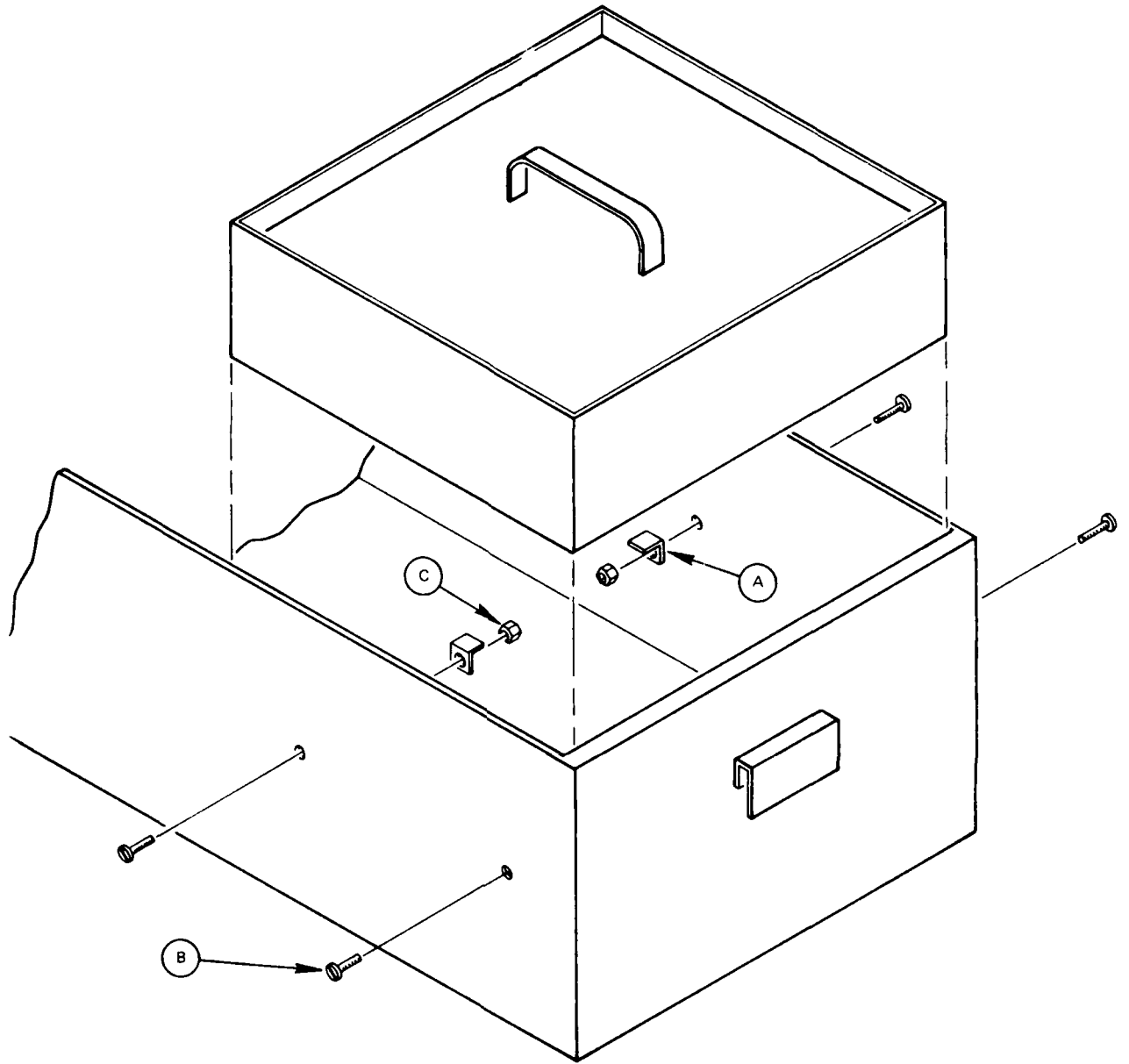


Figure 16. Drawer tray support assembly.

Legend for Figure 16		
Item	Description	Quantity
A	Brace angle, drawing #0010793	8
B	Screw, flathead, 4-40, 1/2-inch	8
C	Nut, 4-40	8

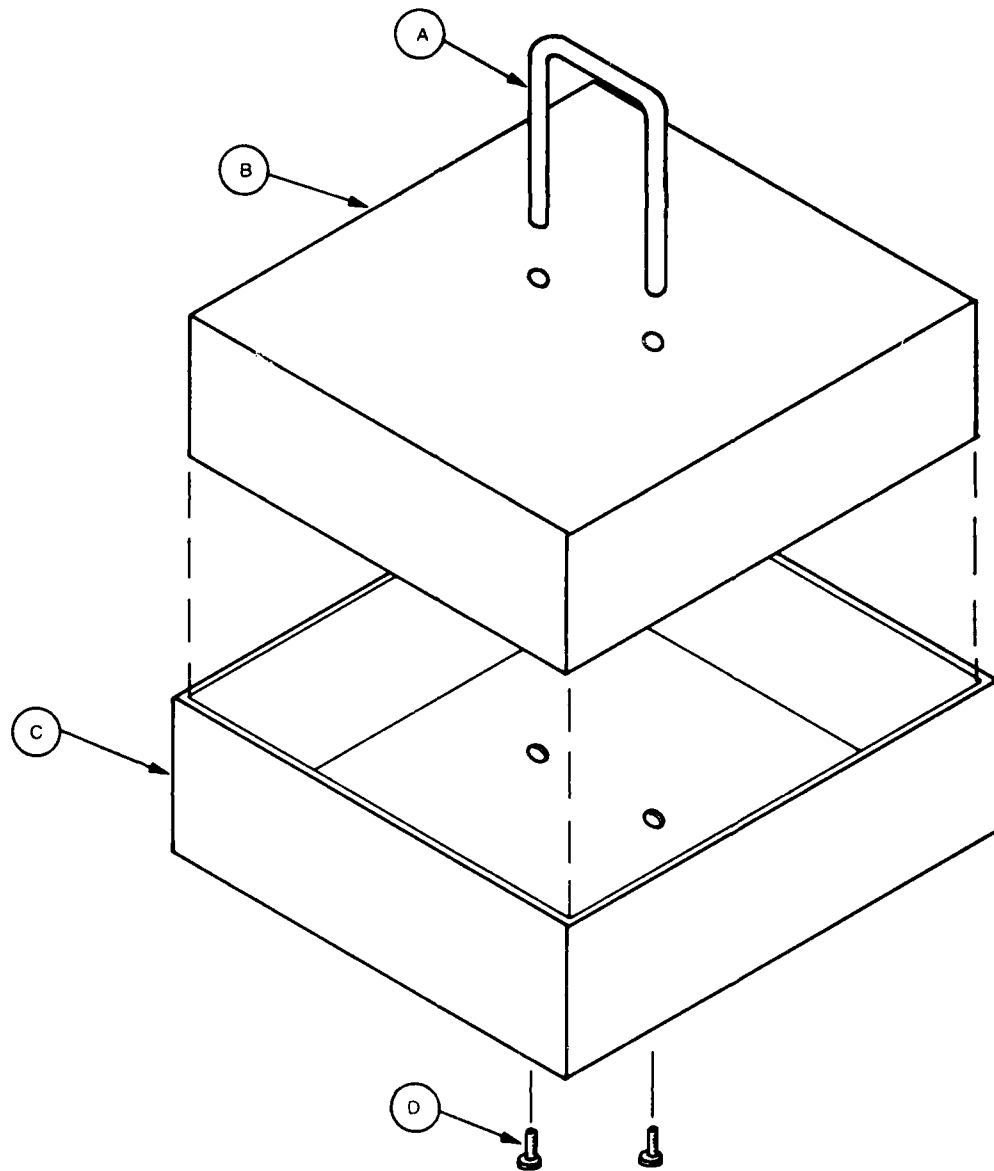


Figure 17. Drawer tray assembly.

Legend for Figure 17

Item	Description	Quantity
A	Tray handle, drawing # 0010795	2
B	White Ethafoam insert	2
C	Tray, drawer, drawing #0010795	2
D	Screws, panhead, 6-32, 3/8-inch	4

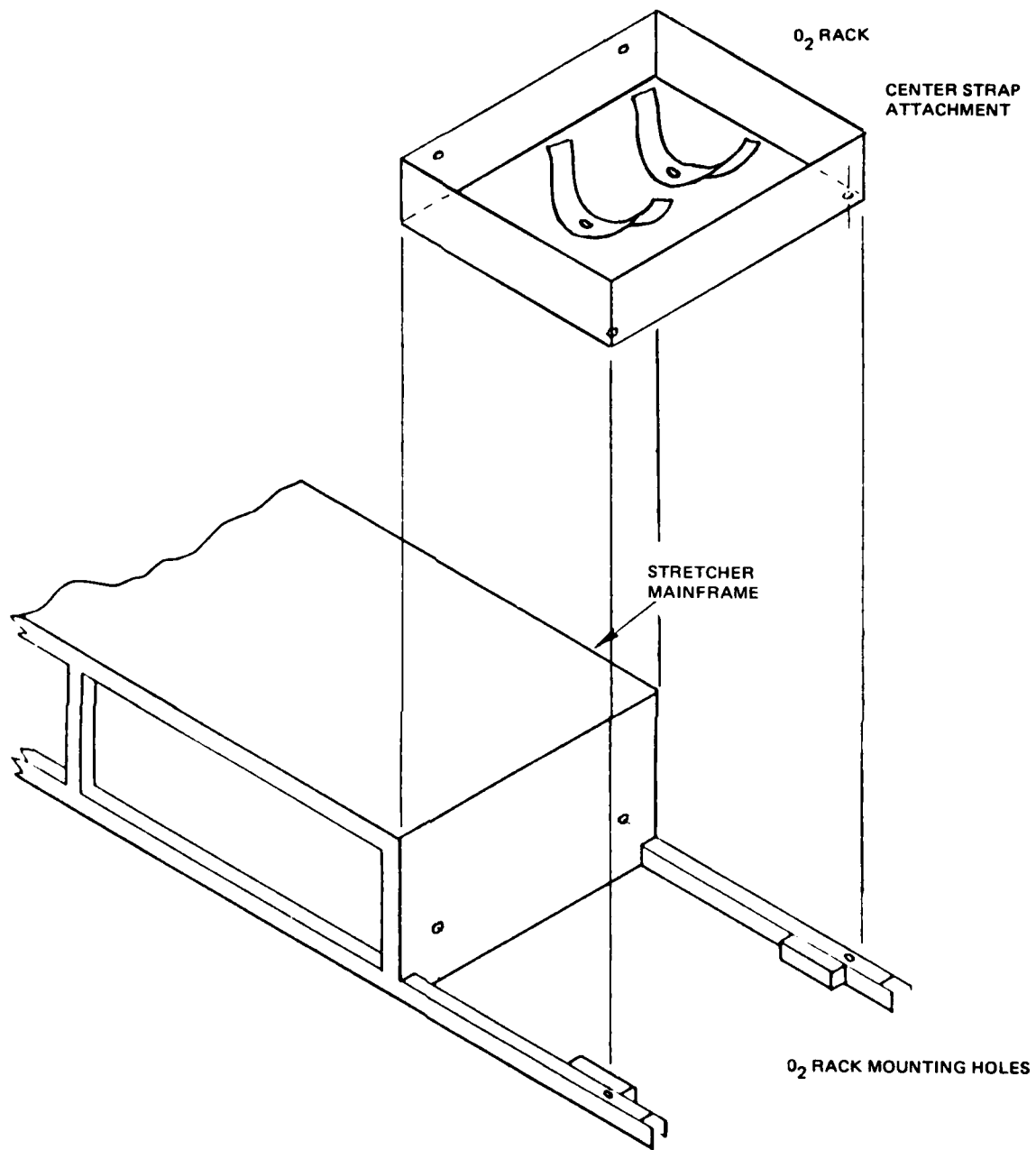


Figure 18. Oxygen rack assembly.

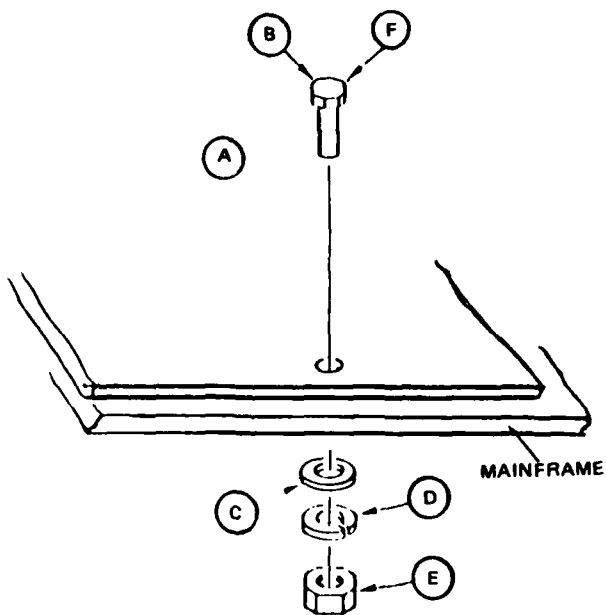


Figure 19. O₂ rack attachment detail.

Legend for Figures 18 and 19

Item	Description	Quantity
A	O ₂ rack	1
B	Bolt, 1/4-20, 1/2-inch	2
C	Flatwasher, 1/4-20	4
D	Lockwasher, 1/4-20	4
E	Nut, 1/4-20	4
F	Bolt, 1/4-20, 3-inch	2

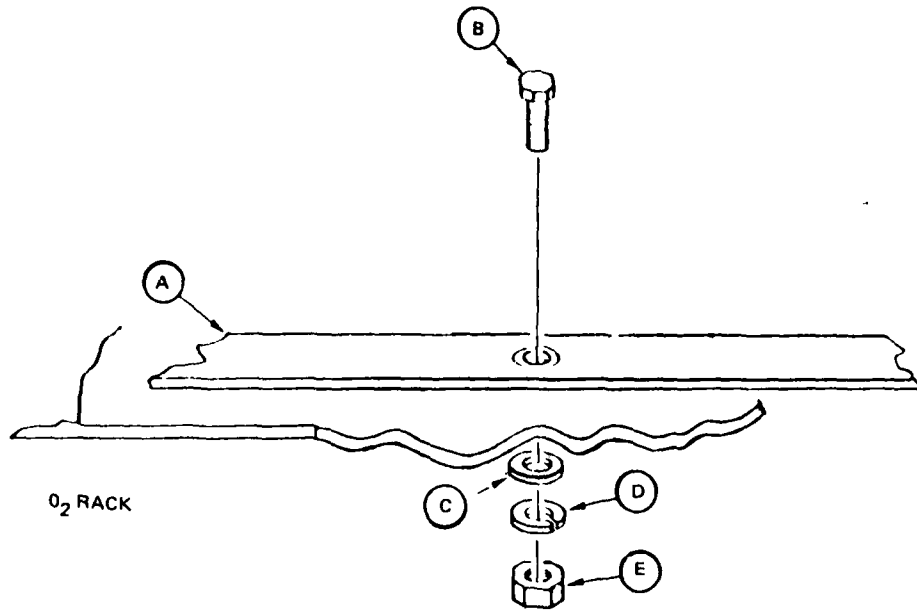


Figure 20. Oxygen center strap assembly detail.

Legend for Figure 20		
Item	Description	Quantity
A	Center strap	1
B	Bolt, 1/4-20, 1/2-inch	2
C	Flatwasher, 1/4-20	2
D	Lockwasher, 1/4-20	2
E	Nut, 1/4-20	2

APPENDIX A

LIST OF ENGINEERING DRAWINGS

The following is a list of all NOSC engineering drawings for the Portable Life Support Stretcher Unit, the quantity of each part required per unit, and a cross-reference index to the assembly figure where each drawing is referenced.

<u>Item</u>	<u>NOSC Drawing</u>	<u>Quantity of Parts Required Per Assembly</u>	<u>Reference Assembly Figure</u>
Frame, main	0010702	1	--
Plate, foot retainer I	0010784	4	2, 3
Plate, foot retainer II	0010785	4	2, 3
Block, handle clamp	0010786	8	7
Spacer, foot	0010787	4	2, 3
Ferrule	0010788	8 Type I 16 Type II	2, 3 4
Support, latch post	0010789	2	9
Post, latch	0010790	2	9
Handle	0010791	4	11
Drawer	0010792	4	--
Brace, angle	0010793	8	16
Divider, drawer	0010794	12 Type I 4 Type II	14 14
Tray assembly, drawer	0010795	2	17
Tray, drawer guide	0010796	4	12, 13
Rack, O ₂ bottle D size	0010797	1	--
Strap assembly, cargo	0010799	4	6
Strap assembly, O ₂ bottle, detail	0010800	2	--
Strap assembly, Life Pak 5	0010801	2	8
Strap assembly, Stokes litter	0010802	2	10
Pin, quick-release	0010882	4	2, 3
	A-1		

APPENDIX B

LIST OF COMMERCIALY AVAILABLE PARTS REQUIRED FOR ASSEMBLY

The following is a list of commercially available parts required in the assembly of the Portable Life Support Stretcher Unit, the quantity of each part required per unit, and a cross-reference index to the assembly figure where each part is required.

<u>Item</u>	<u>Quantity Required Per Assembly</u>	<u>Assembly Figure</u>
Bolt, 1/4-20, 1/2-inch	12	8, 10, 19, 20
Bolt, 1/4-20, 3-inch	6	6, 19
D-ring	8	7
Drawer, handles, Southco no 25 pulls, P/N 25-11-101-11	8	15
Flatwasher, 8-32	48	7, 15
Flatwasher, 10-32	4	9
Flatwasher, 1/4-20	48	4, 6, 8, 9 10, 11, 19, 20
Lockwasher, 8-32	48	7, 15
Lockwasher, 10-32	16	2, 3
Lockwasher, 1/4-20	18	6, 8, 10, 19, 20
Nut, 4-40	8	16
Nut, 8-32	32	7
Nut, 10-32	20	2, 3, 9
Nut, 1/4-20	40	4, 6, 8 10, 19, 20
Pop rivets, 1/8-inch, button- head, 8 per drawer guide	32	13
Screw, flathead, 4-40 3/16-inch 100-degree	80	14
Screw, flathead, 4-40, 1/4-inch	8	16
Screw, flathead, 8-32, 1-inch	16	7

Screw, flathead, 8-32, 2 1/4-inch	16	7
Screw, flathead, 10-32, 2 1/4-inch	16	2, 3
Screw, flathead, 10-32 2 3/4-inch	4	9
Screw, flathead, 1/4-20, 2 1/4-inch	2	4, 9
Screw, flathead, 1/4-20, 2-inch	16	4
Screw, panhead, 6-32, 3/8-inch	4	17
Screw, roundhead, 8-32, 3/8-inch	16	15
Screw, wood, roundhead, #8 tap	8	11
Swivel caster, Darnell model 1665-1/2 XDN, wheel size 5 1/2-inch diameter by 1 1/2-inch width, rubber, number 16 top plate	2	4
Swivel caster, Darnell model 1665-1/2 XDNEZ, series 60, with wheel brake and swivel lock, number 16 top plate	2	4
Ferno-Washington wing lock assembly	8	5
Ethafoam	2	17

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