PHOTOGRAPH THIS SHEET

AD-A955 191

DTIC ACCESSION NUMBER

LEVEL

INVENTORY

REPORT 856
DISASSEMBLY AND LOADING OF STANDARD ENGINEER EQUIPMENT FOR TRANSPORT IN THE C-46 CARGO PLANE
28 AUG. 44

DOCUMENT IDENTIFICATION

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

DISTRIBUTION STATEMENT

ACCESSION FOR		
NTIS	GRA&I	☑
DTIC	TAB	☐
UNANNOUNCED		☐
JUSTIFICATION		
BY		
DISTRIBUTION /		
AVAILABILITY CODES		
DIST	AVAIL AND/OR SPECIAL	
A-1	cmp 73	

DISTRIBUTION STAMP

UNANNOUNCED

DTIC
ELECTE
JAN 13 1987
S D
D

DATE ACCESSIONED

DATE RETURNED

87 1 12 002

DATE RECEIVED IN DTIC

REGISTERED OR CERTIFIED NO.

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-FDAC

DOCUMENT PROCESSING SHEET

PREVIOUS EDITION MAY BE USED UNTIL STOCK IS EXHAUSTED.

DTIC FORM 70A
MAR 86

WAR DEPARTMENT

Report 856

DISASSEMBLY AND LOADING OF STANDARD ENGINEER EQUIPMENT FOR TRANSPORT IN THE C-46 CARGO PLANE

28 August 1944

THE ENGINEER BOARD
Corps of Engineers, U. S. Army
Fort Belvoir, Virginia

UNCLASSIFIED

Report 856

DISASSEMBLY AND LOADING OF STANDARD ENGINEER EQUIPMENT FOR TRANSPORT IN THE C-46 CARGO PLANE

Project GNS 355

28 August 1944

UNCLASSIFIED

Changed to _____

Classified

Cancelled _____

Date 12/2/59

By authority of CH, ME 5/5/58

Submitted to

THE ENGINEER BOARD

Fort Belvoir, Virginia

and/or

The Chief of Engineers

U. S. Army

FOR OFFICIAL ACTION

Prepared by

The Air Transport Section
Mechanical Equipment Branch
Technical Division III
The Engineer Board

With the Cooperation of

The Air Engineer

UNCLASSIFIED

TABLE OF CONTENTS

TABLE OF CONTENTS - cont.

[redacted]

SYLLABUS

This report covers the preparation of standard Engineer equipment for air transport in the C-46 cargo plane. Similar reports on the C-47 and C-54A planes have been published previously. Further study, involving other types of cargo planes, has been transferred to the Aviation Engineers, located at Geiger Field, Washington.

The results obtained indicate that the transportation of the following items of equipment in the C-46 Cargo Plane is feasible:

The D-4 Caterpillar Tractor
The D-6 Caterpillar Tractor
The D-7 Caterpillar Tractor
The D-8 Caterpillar Tractor
The No. 12 Caterpillar Motor Grader
The No. 101-D Galion Motor Grader
The No. 512 Adams Motor Grader
The No. 124-S Adams Towed Grader
The No. M-20 LeTourneau 20 Ton Tractor Crane
The Truck Mounted Quickway Crane
The Model W-2 LeTourneau Sheepsfoot Roller
The Model 67-W William Bros Rubber-Tired Roller
The 10-Ton Galion "Chief" Roller
The 5 to 8-Ton Buffalo Springfield Tandem Roller
The 2½-Ton 6 x 6 Dump Truck
The Airborne 2½-Ton 6 x 6 Dump Truck
The Class 135 Crash Truck
The 1250-Gallon Etnyre Bituminous Distributor
The Ingersoll-Rand IK-315 Compressor
The LeTourneau 8 Cubic Yard Carryall Scraper
The Iowa Model 25 Cubic Yard Per Hour
Rock Crushing and Screening Plant (2 Unit)
The T-4 Traxcavator Mounted on the 60 inch Gauge,
Non-Oscillating, D-4 Tractor

This report recommends that in any equipment list for a unit transporting its equipment by air, provision should be made for the airborne model bituminous distributor and for the factory-supplied conversion kits for the 2½-ton dump truck.

[redacted]

[redacted]

DISASSEMBLY AND LOADING OF STANDARD ENGINEER EQUIPMENT FOR TRANSPORT IN THE C-46 CARGO PLANE

I. SUBJECT

1. Scope. This report covers the disassembly, groupings, and loading of standard items of Engineer equipment for transport in the C-46 cargo plane.

II. AUTHORITY

2. Authority. The authority for this investigation is contained in a letter from the Chief of Engineers, to the President, The Engineer Board, dated 20 April 1944, file CE (20 April 44) SPENE, subject: Air Transport of Standard Engineer Equipment (Work Order DME 3388). A copy of this letter is contained in Appendix A.

III. INVESTIGATION

3. Procedure. Twenty-three items of standard Engineer equipment were dismantled by enlisted personnel and loaded into a wooden mock-up of the C-46 plane. Procedures for the disassembly and loading of the individual items of equipment into this plane are included in Appendices B through W.

4. Items of Equipment Studied. Each item of equipment was the subject of a thorough study prior to disassembly. Certain information, pictures, and diagrams were found to be generally pertinent to all pieces of equipment and are included in the body of this report. Each piece of equipment is treated separately as an appendix. The list of the equipment studied, together with the pertinent technical manual, and the appendix in which each is discussed, is as follows:

Equipment	Technical Manual	Appendix
Tractor, Crawler Type, Diesel-engine driven, 35-40 DBHP, 44-inch Gauge, Caterpillar Model D-4, with Angledozer, LeTourneau CK 4, and Power Control Unit, LeTourneau T4.	5-3112	B

[redacted]

Equipment	Technical Manual	Appendix
Tractor, Crawler Type, Diesel-engine-driven, 55 DBHP, Caterpillar Model D-6, with Trail-builder, LaPlant-Choate R-61, and Power Control Unit, LeTourneau R678.	5-3102	C
Tractor, Crawler Type, Diesel-engine-driven, 80 DBHP, Caterpillar Model D-7, with Angledozer, LeTourneau WCK7, and Power Control Unit, R 7.	91773	D
Tractor, Crawler Type, Diesel-engine-driven, 113 DBHP, Caterpillar Model D-8 with Angledozer, LeTourneau CKD 8, and Power Control Unit, R8.	5-3054	E
Grader, Road, Motorized, Diesel-engine-driven, 12-foot Moldboard, Caterpillar Model 12.	5-1018	F
Grader, Road, Motorized, Diesel-engine-driven, 12-ft Moldboard, Galion Model 101-D.	5-1028	G
Grader, Road, Motorized, Diesel-engine-driven, 12-ft Moldboard, Adams Model 512.	Mfgr's. Manual	H
Grader, Road, Towed, Leaning Wheel, Hand Controlled, 12-ft Moldboard, Adams Model 124-S.	5-1092	I
Crane, Tractor-operated, Non-revolving, 40,000-pound Capacity at 10-Ft Radius, 20-ft Boom, LeTourneau Model M-20.	5-9060	J
Crane, Truck-mounted on Coleman Chassis, Gasoline-engine-driven, 3/8 cu yd, Quickway Converitble Unit Model E, with Crane, Dragline, Shovel, Piledriver, and Clamshell Attachments.	Mfgr'c. Manual (Quickway) 5-1174 (Coleman)	K
Brockway Truck Chassis (Alternate with Coleman)	10-1528	L
Roller, Road, Towed Type, Sheepsfoot, Two-drum-in-line, LeTourneau Type S, Model W-2 or W-3.	5-1060	M
Roller, Road, Towed, Wheeled, Rubber-tired, 13 Tires, Wm. Bros, Model 67W.	5-514-3	N
Roller, Road, Powered, Gasoline, 3-wheel, 10-ton, Galion Model "Chief."	5-1100	O
Roller, Road, Powered, Gasoline, 2 Axle Tandem, 5 to 8-ton, Buffalo Springfield Model RT-16.	5-1142	P

Equipment	Technical Manual	Appendix
Truck, Dump, 2½-ton, 6 x 6, GMC, and Truck, Dump, 2½-ton, 6 x 6, GMC, (Airborne).	10-1563 Mfgr's. Manual	Q
Truck, Fire, Powered, Crash, Class 135 Complete w/Equipment.	Mfgr's. Manual	R
Distributor, Bituminous Material, Trailer-mounted, 1250-gallon, Etnyre Model MX, Style RE.	5-519-3	S
Compressor, Air, Diesel-engine-driven, Trailer-mounted, Steel Wheels, 315 cfm, Ingersoll-Rand Model No. IK-315, with International Harvester Engine, Model UD-18.	5-5100	T
Scraper, Self-loading, Towed, Cable-operating, 8 Cu Yd (Struck), LeTourneau Model LS (Airborne)	5-1210	U
Crushing and Screening Plant, Gravel and Rock, 2 Units, Gasoline-engine-driven, Semi-trailer Mounted, with Dollies, 25 cu yd Per Hour, Iowa Mfg. Col., Model 25 Cu Yd	5-1037 Mfgr's Manual	V
Tractor, Crawler Type, Diesel-engine-driven, 35-40 DBHP, 60-inch gauge, Rigid, Caterpillar Model D-4, Complete with Loader Bucket, Cable-operated, Front-mounted, 3/4 Cu Yd, Tracksen Trax-cavator Model T-4, and Tracksen Dozer Attachment. (Note: Non-Standard Attachments.)	Mfgr's Manual	W

5. Equipment Breakdown.

a. The task of sectionalizing various items of standard Engineer equipment into sub-assemblies which will fall within the weight and dimensional limitations of the C-46 Cargo Plane is one that should present little difficulty to mechanics familiar with the equipment. It is, of course, advisable to avoid any unnecessary dismantling, that is, stripping main sub-assemblies down more than is needed to come within the weight limitations and required size for entrance through the plane door. It is emphasized, however, that dismantling, though longer in point of time, is a great deal more desirable than cutting and installing bolt plates, since the equipment is materially weakened by the latter procedure.

b. Sometimes it may expedite dismantling procedure to make minor cuts where members not requiring appreciable structural strength are involved. This may frequently be the determining factor in bringing a certain sub-assembly within required limitations of size or weight; in addition, it may facilitate the procedure by eliminating the necessity for removal of numerous bolts. In these instances, cutting and later rewelding are advisable. Owing to size or weight, some items of equipment may require cutting of major members; instructions for cutting and reassembly of the members so cut will be found in the appropriate appendix to this report. In planning plane loads, thought should be given to the sequence of reassembly, and parts or assemblies needed first for reassembly should be in the first plane.

c. A Quickway crane, or an improvised boom mounted on a 2½-ton truck and using the truck winch for power, is recommended for handling sub-assemblies while dismantling and reassembling machines. If such devices are not available, shears or gin poles may be used, but they will require slightly more time and men. Tackle arrangement is shown in Fig. 1.

d. The weights of the various sub-assemblies of equipment are given in the appropriate appendix to this report. In transporting other items by air, the sub-assemblies should, where possible, be weighted, or the weights closely estimated for purposes of proper loading inside the planes.

e. Care should be taken, when handling dismantled machinery, to prevent damage to exposed parts. Exposed threads and other working parts subject to rust or corrosion, should be covered with grease, and openings should be stuffed with clean rags to prevent entry of foreign matter. Delicate parts should be wrapped with burlap or other cloth to prevent damage. Air lines and hydraulic lines, as a general rule, should be removed from large assemblies to prevent damage in handling. This rule applies to any easily damaged parts which can be readily removed. In most cases, the engine unit may be kept intact and with careful handling, particularly in loading, should not suffer any damage.

f. With a little ingenuity, almost any piece of standard Engineer equipment may be dismantled with tools normally carried by the using unit. The need for special pullers is eliminated by expedients. It is wise to carry a supply of miscellaneous nuts, bolts, lockwashers, cotter pins, and gasket material to replace those lost or damaged during disassembly. A sufficient quantity of welding electrodes must also be carried to reweld any members which require this work.

Electric welding only should be utilized. The members to be so joined should be "V-notched" to insure that the weld has at least the same depth as the out. Reinforcing straps should be used, and welded along the side only (it is not advisable to weld the ends). Before rewelding, the two pieces to be joined should be jacked into as nearly perfect alignment as possible. In the case of dozer yokes, the two halves can be mounted on the tractor and welded while in place. (See Fig. 2.) During reassembly, proper care should be observed in making necessary adjustments to mechanical parts which may have become disturbed during handling.

g. The tools and equipment generally required for dismantling standard Engineer equipment are as follows:

(1) First echelon equipment sets

(2) Automotive mechanics set

(3) Master mechanics set

(4) Socket set - heavy duty to 2 3/8-inch

(5) Crescent wrenches, 12-inch

(6) Open-end wrench Set to 1½-inch

(7) Pipe wrenches, 18 inch

(8) Allen wrench set

(9) 40 inch pinch bar

(10) 60 inch pinch bar

(11) 8-pound sledge hammer

(12) 12-pound sledge hammer

(13) 8-ton hydraulic jack

(14) 10-ton Porto-Power hydraulic press unit

(15) Drift pins, 12 to 18 inch

(16) Electrical welding set

(17) Acetylene welding set

6. Loading and Load Limitations.

a. In order for an airplane to fly, and for its path of flight to be controlled by its tail surfaces, it is necessary for the center of gravity (normally expressed as cg) to fall within certain limits. These limits are sometimes expressed as a percentage of the mean aerodynamic chord of the wing (% MAC). However, for weight and balance purposes in this report, the limits are expressed in inches from the reference datum line.

b. The reference datum line is at or near the nose of the airplane, and the distances from it in inches are known as station numbers. Thus station number 263 (STA 263) is 263 inches from the nose of the airplane. In order to find the cg (or balance point) of a loaded airplane, it is necessary to know the cg of the airplane without pay load, and its basic weight, as well as the weight and location of the pay load. Each airplane of one type may have a separate and different basic weight and cg because of unlike modifications, repairs, and equipment. These data for a specific airplane may be obtained from the pilot or crew chief.

c. To find the cg of a loaded airplane is a simple problem involving moments about an imaginary axis, i.e., the reference datum line. The weight of the plane and of each item of cargo is multiplied by its respective moment arm or distance in inches from the reference datum line. The sum of these moments is divided by the total weight of the airplane and its load to determine the moment arm of the loaded airplane, or the station number of the cg. For example, assume the following conditions:

A C-46 plane with its crew, fuel, oil, equipment, etc., weighing 40,740 lb, with the cg falling at STA 326; a piece of freight weighing 500 lb and centered at STA 305; and a piece of freight weighing 7500 lb and centered at STA 353.

Proceed as follows:

40,740 lb	x 326 =	13,281,240 inch pounds
500 lb	x 305 =	152,500 inch pounds
7,500 lb	x 353 =	2,647,500 inch pounds

Total weight = 48,740 lb 16,081,240 inch pounds = Total moment

Resultant moment arm or STA number of the cg:

$$\frac{16,081,240}{48,740} = 330 = \text{Station number of cg}$$

Since STA 330 is within the safe limits for cg location of a C-46 plane, it is not mandatory to adjust the load. However, the flying conditions could be improved by moving the load forward, if practical, so as to bring the cg closer to the desired position of STA 323.

d. Each cargo plane is equipped with a special slide rule known as a "Load Adjuster" which may be used to determine safe loading arrangement of the plane. Proper use of the load adjuster is dependent upon knowledge of the basic weight and index of the particular plane. The basic weight and index of a particular plane are normally obtained from a card beneath a transparent window on the back of the load adjuster case or may be obtained from the pilot or crew chief. Instructions for use accompany the load adjuster.

e. To meet the need of a rapid method of estimating proper cargo location in advance of loading by personnel not having a load adjuster available, a chart for cargo cg limits was developed. (See below.) The data upon which this chart is based were furnished by the Air Transport Command and are reasonably standard for the majority of C-46 planes. For safety, loads which have been placed by using the chart should be checked with a load adjuster, using the basic data for the specific airplane. The data upon which the chart was based follow:

Basic weight - 30,690 pounds

Basic arm - 330.75 inches

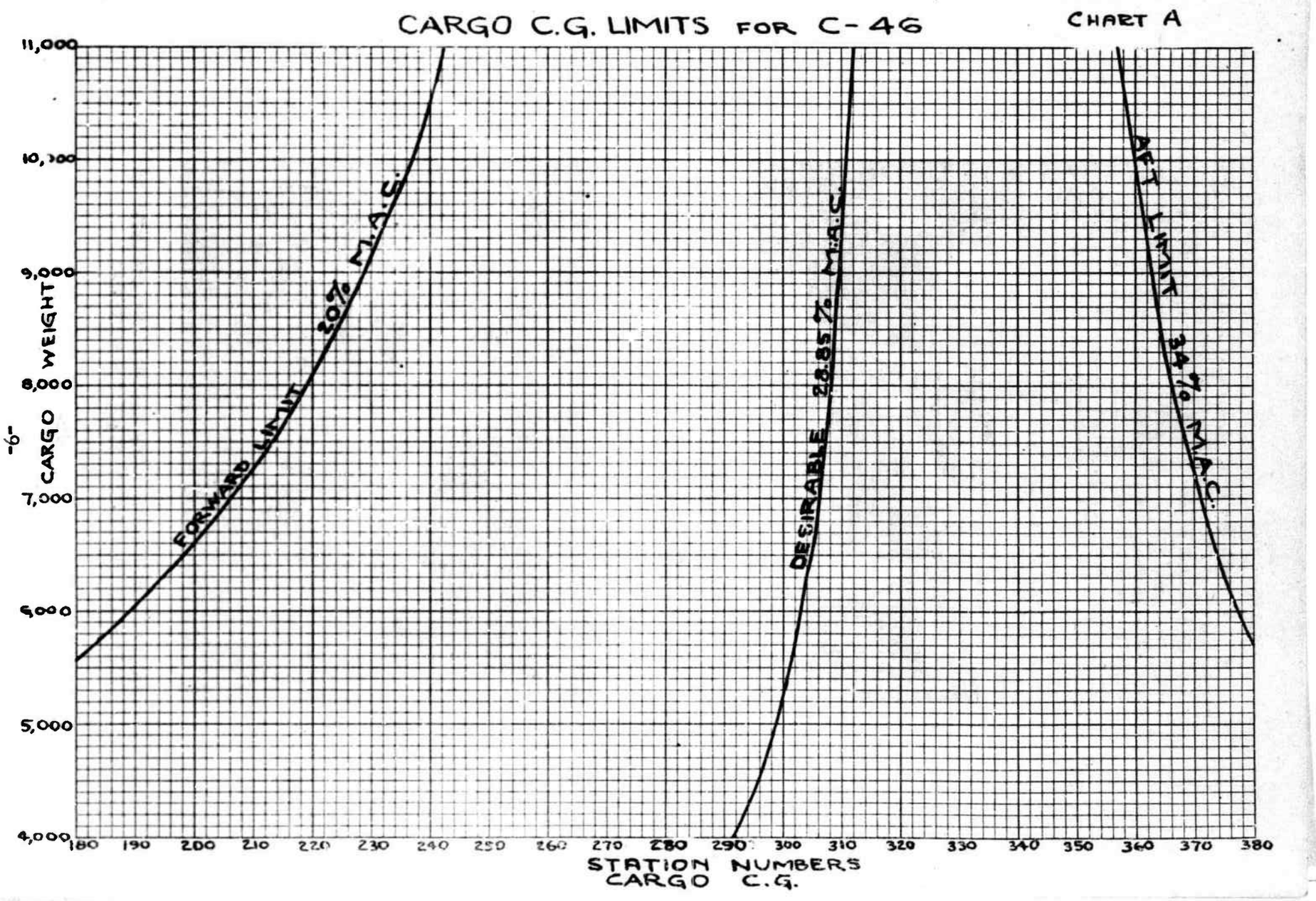
Basic index - 68

Crew - 3 members, each with 50 pounds of baggage

Gasoline - 1,400 gallons, all carried in wing tanks

Oil - 120 gallons

To use the chart, draw a horizontal line intersecting the total cargo weight as shown in the left margin. Where this line intersects the curves, draw vertical lines to the scale at the bottom of the chart. The cargo must be placed so that the cg of the cargo is between the limits thus found, and should be as near the desirable station as possible. Great care should be exercised to keep the cg of the cargo well inside of the fore and aft limits, so that the normal movement of the passengers and crew will not cause the cg to fall outside the limits; the extreme allowable limits are highly critical and it is quite dangerous to exceed them. A considerable safety factor was used in spacing the loading range on the load adjuster. (See chart on opposite page).


CARGO C.G. LIMITS FOR C-46
CHART A
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
-6- CARGO WEIGHT
FORWARD LIMIT 20% M.A.C.
DESIRABLE 28.85% M.A.C.
AFT LIMIT 34% M.A.C.
180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380
STATION NUMBERS
CARGO C.G.

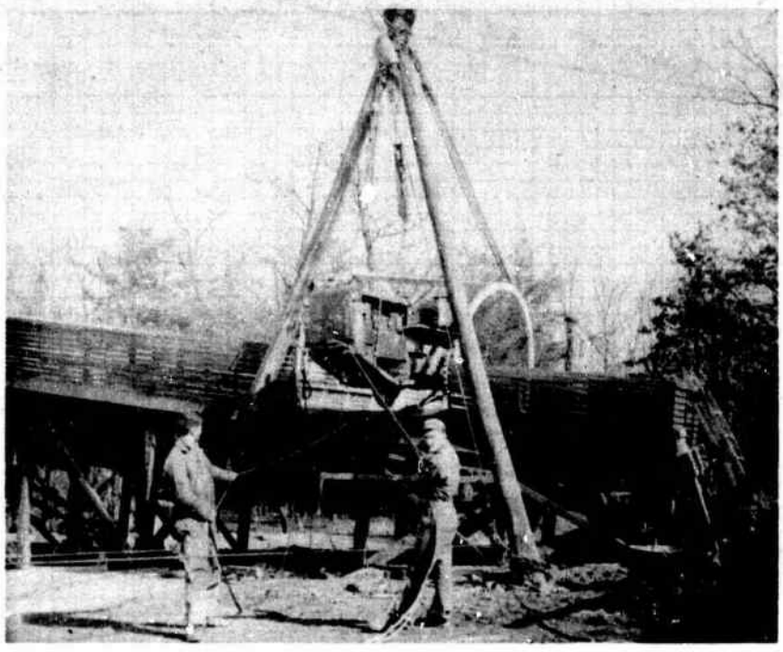


FIG. 1. TACKLE ARRANGEMENT SHOWING TYPICAL LOADING USING SHEARS.

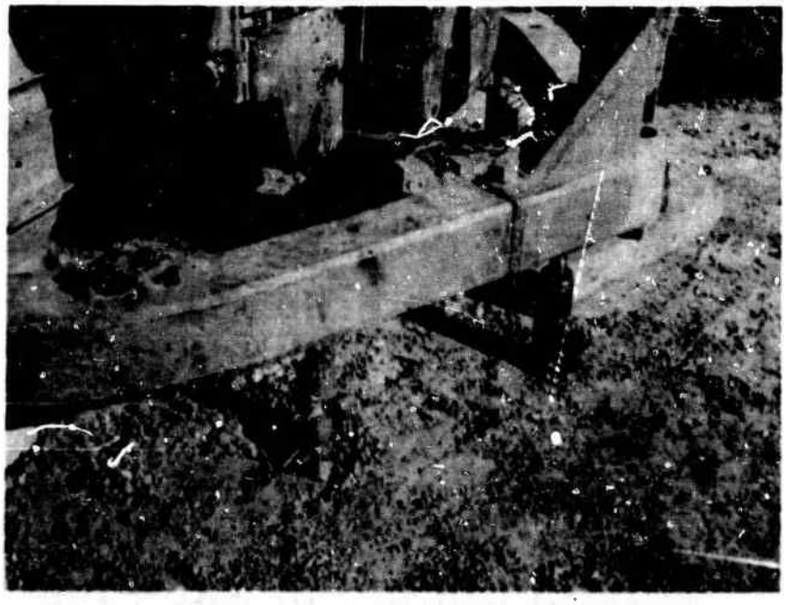


FIG. 2. DOZER YOKE, WHICH HAS BEEN CUT, REMOUNTED ON TRACTOR AND JACKED INTO PLACE FOR REWELDING.

f. In order to prevent serious damage to the plane, care must be exercised to distribute the weight of heavily concentrated loads, such as engine blocks and other large sub-assemblies of machinery. Also some means must be provided whereby large heavy pieces may be shifted fore and aft in the plane to obtain proper balance. A scheme for accomplishing both of these ends is to use sleds, as shown in Fig. 3, and the tackle arrangement, as shown in Fig. 4. For certain difficult loads, special sleds such as the ones shown in Figs. 5 and 6 are used. The floor construction of the C-46 is quite light, and for that reason most of these planes are equipped with "task force flooring". This "task force flooring" consists of panels of laminated construction. The panels are fastened to the floor of the plane and help to distribute the load properly. Heavy equipment should not be transported in a C-46 plane which is not so equipped. Even with this extra flooring, it is best to keep the loads within 500 pounds per running foot of sled. Where this figure is exceeded, it is advisable to place long boards under the sled runners to further distribute the load. Sled runners and boards should be greased to facilitate movement of the sleds.

g. The maximum permissible payload of a plane varies with the distance of flight, speed, altitude, amount of fuel, personnel, equipment carried, etc. To minimize these variables for the loadings presented in the appendices to this report, if is assumed that the oil tanks and wing fuel tanks will be filled; that there will be three crew members; and that each member will be allowed 50 pounds of baggage. The Air Transport Command was consulted for basic weight and basic arm data which will be reasonably standard for the majority of C-46 planes in service. These were given as 30,690 pounds and 330.75 inches, respectively, and result in a "less-cargo-weight" of 40,740 pounds and a "less-cargo-arm" of 326 inches. Data regarding the physical and loading characteristics of the C-46 plane follow:

(1) Physical Characteristics of C-46 Cargo Plane

Item	
Normal cargo load	8000 - 9000 pounds
Normal fuel	1400 gallons (8400 pounds)
Normal oil	120 gallons (900 pounds)
Normal crew	750 pounds *
Maximum weight at take-off	49000 pounds

Item	
Maximum landing weight	
Smooth runway	46000 pounds
Rough runway	44000 pounds
Cargo door	
Width	95½ inches
Height - front	79 inches
rear	79 inches
Maximum range	1500 miles
Approximate interior dimensions	
Maximum center height	83 inches
Width of floor (clear)	96 inches
Length	576 inches

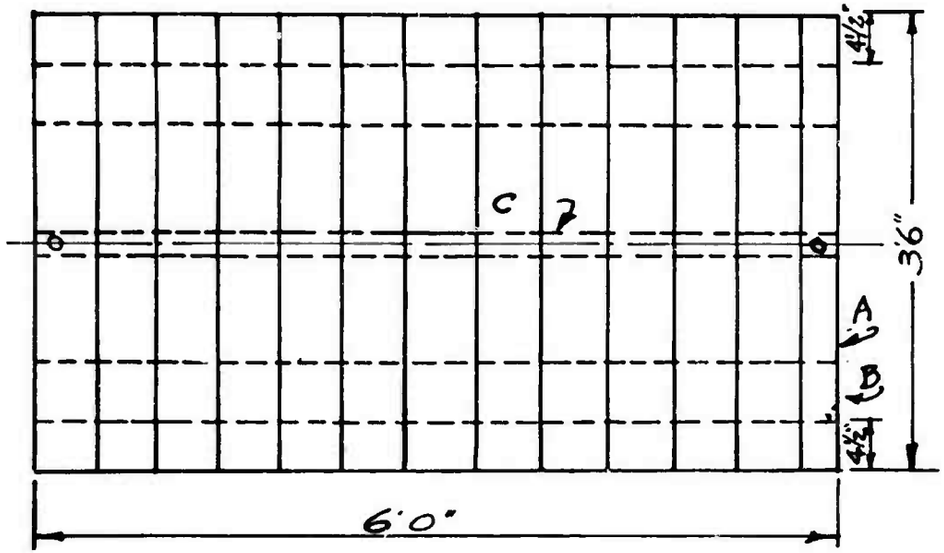
* Includes 50 pounds baggage per man

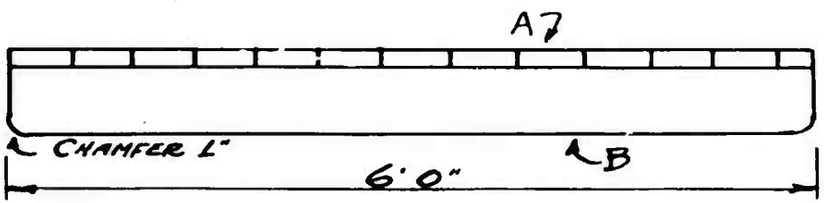
(2) Loading Characteristics of C-46 Cargo Plane

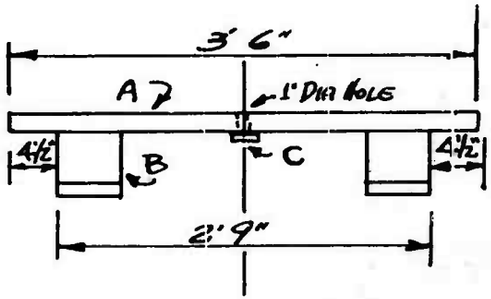
Forward Safety Limit of cg	
MAC	20%
Station number	308
Aft safety limit of cg	
MAC	28.85%
Station number	323
Desired cg (gross load)	
MAC	34%
Station number	332

h. Various methods may be used to raise pieces of equipment from the ground into the plane. Again the Quickway Crane or truck boom mentioned in paragraph 5 may be employed. The item to be loaded is held in the air close to the door of the plane, and is swung into the plane by man power or by the use of tackle rigged inside the plane. In the absence of such powered equipment, shears may be used, and are probably better for the larger and heavier pieces. The shears (Fig. 1) should be constructed of 16-inch round timbers about 35 feet long. Two sets of tackle should be used on the shears and each should be reeved with triple blocks. The fall lines should be run through single blocks lashed to the foot of the legs, and the pull made with a 1/4-ton truck, small tractor, or other powered vehicle. The shears should be set in holes 17 feet 6 inches apart (inside to inside) and on a line 3 feet from the plane. They should be guyed with tackle fore and aft

ITEM	APPROX DIMEN.	Nº REQ'D
A	2"x6" - 3'6" L.	13
B	6"x6" - 6'0" L	2
C	3/8"x2" BAND IRON	1







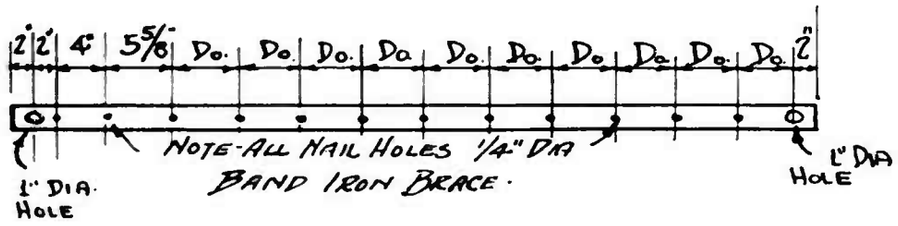
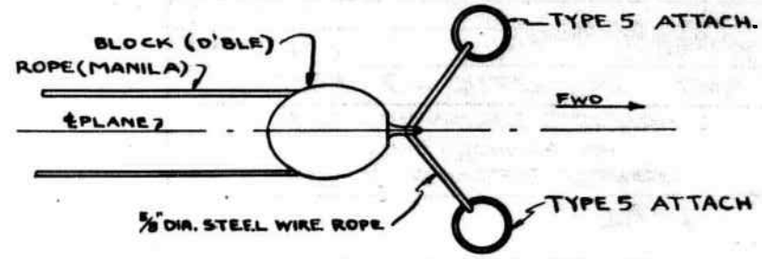
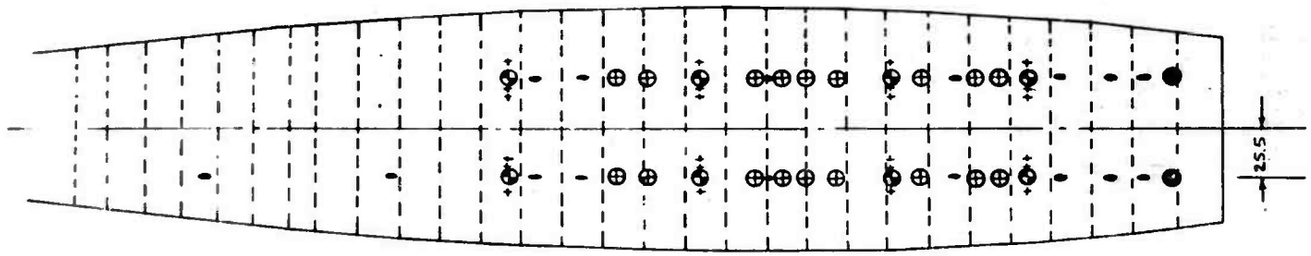


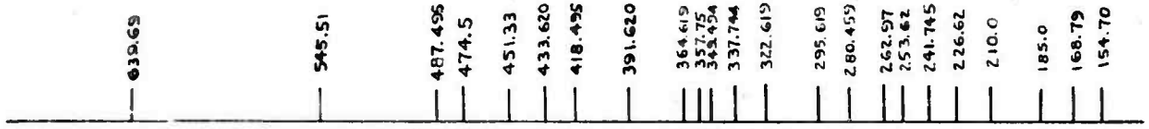
Fig. 3

THE ENGINEER BOARD FORT BELVOIR VA. AIR TRANSPORT SECTION			
SKETCH OF SLED FOR C-46			
DWG. Nº C		APP'VD BY M.J.S.	
REVISED			
DATE 1-3-44	SCALE 3/4" = 1'0"	DWN BY H.W.	CH'KD BY J.C.



INTERIOR HOLDFAST





TIEDOWN DIAGRAM

LEGEND

	ULTIMATE LOADING (LBS) INCLUDING 1.5 FACTOR OF SAFETY AND DIRECTIONS	
TYPE	UP	FW'D & AFT
1	4,500 * / 8,700	—
2	4,500 *◊ / 8,700 *◊	—
3	2,750	—
4	4,500 *◊ / 5,700 *◊	—
5	—	1,820

* ATTACHMENTS BETWEEN STA'S. 280.459 & 337.744 INCLUSIVE ARE GOOD FOR 4,500 LBS. FOR ALL OTHERS THE HIGHER VALUE IN EACH CASE WILL APPLY
◊ COMBINED UN-LOADING OF TYPE 2 & TYPE 4 ATTACHMENTS ON ANY ONE CHANNEL ASSEMBLY CANNOT EXCEED THE LOADING LISTED FOR TYPE 2 ATTACHMENT HOLDING DOWN THE CHANNEL.

FIG "4

THE ENGINEER BOARD
FORT BELVOIR, VA.
AIR TRANSPORT SECTION
C46 TIEDOWN DIAGRAM & INTERIOR HOLDFAST

Dwg. No. 1 of 1		APPVD BY	
REVISED			
DATE 7-25-44	SCALE. NONE	DWN. BY I.C.	CHK'D BY

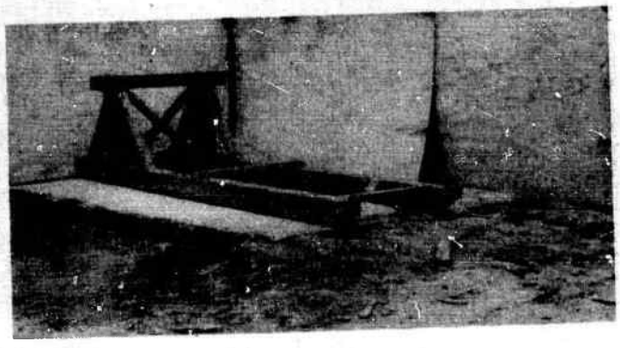


FIG. 5. MODIFICATION OF THE STANDARD SLED (SEE FIG. 3). This one is used with the frame of the Adams 512 motor grader.

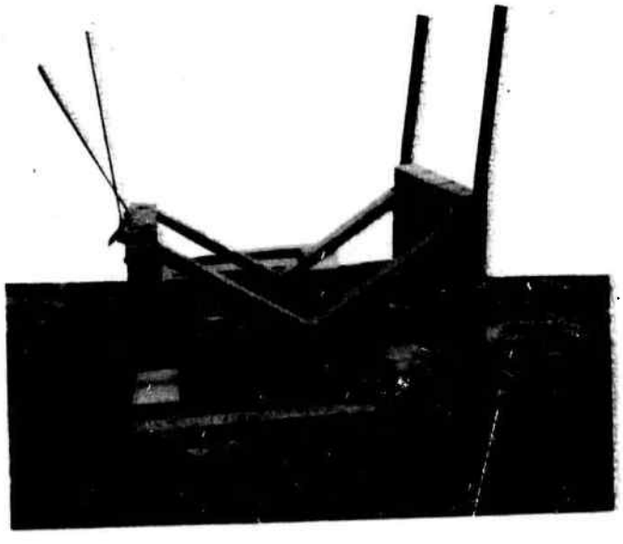


FIG. 6. ANOTHER EXAMPLE OF A MODIFIED SLED. This sled is used with the transmission of the D-8 tractor.

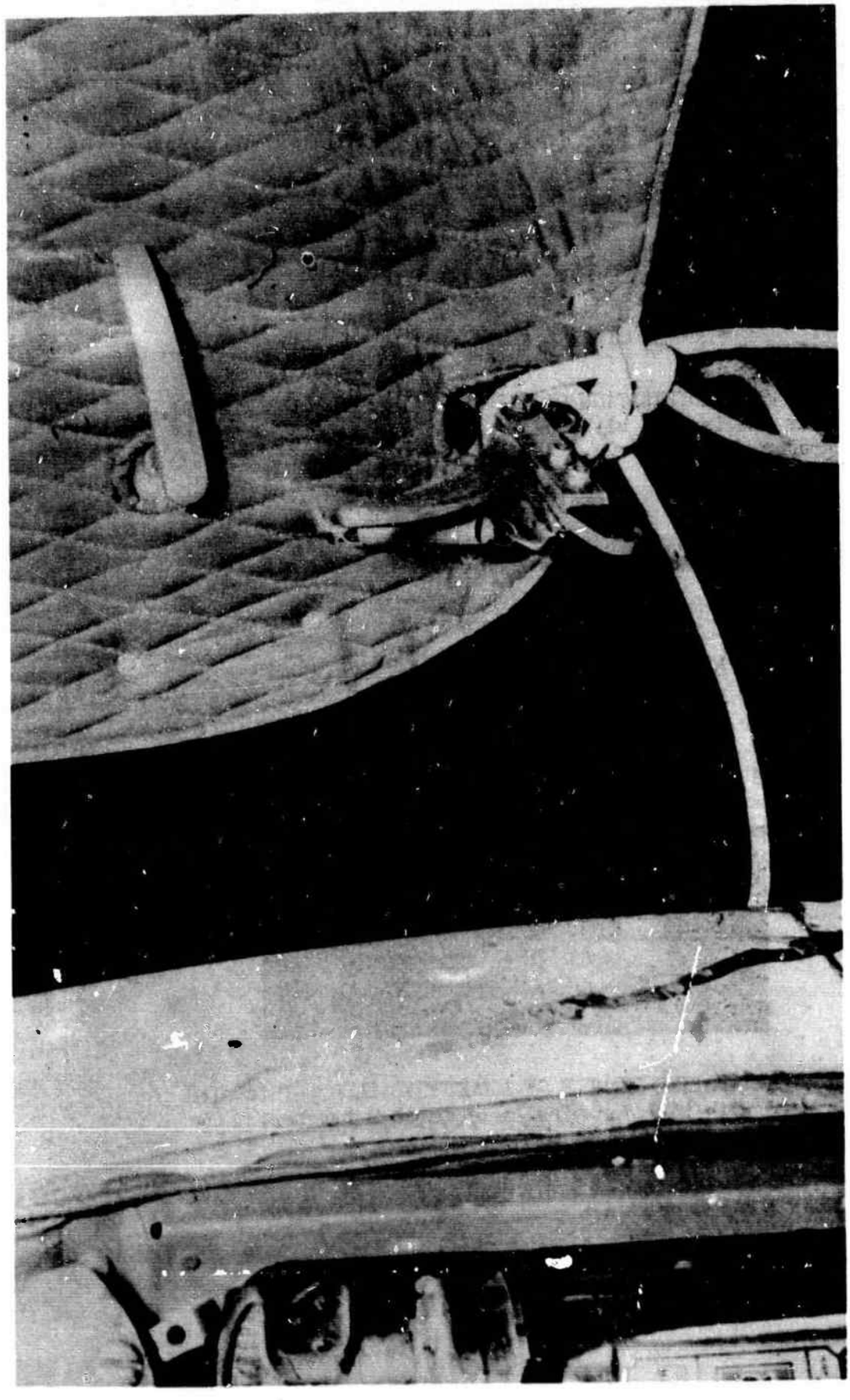


FIG. 7. METHOD OF TYING GUY LINE TO DOOR

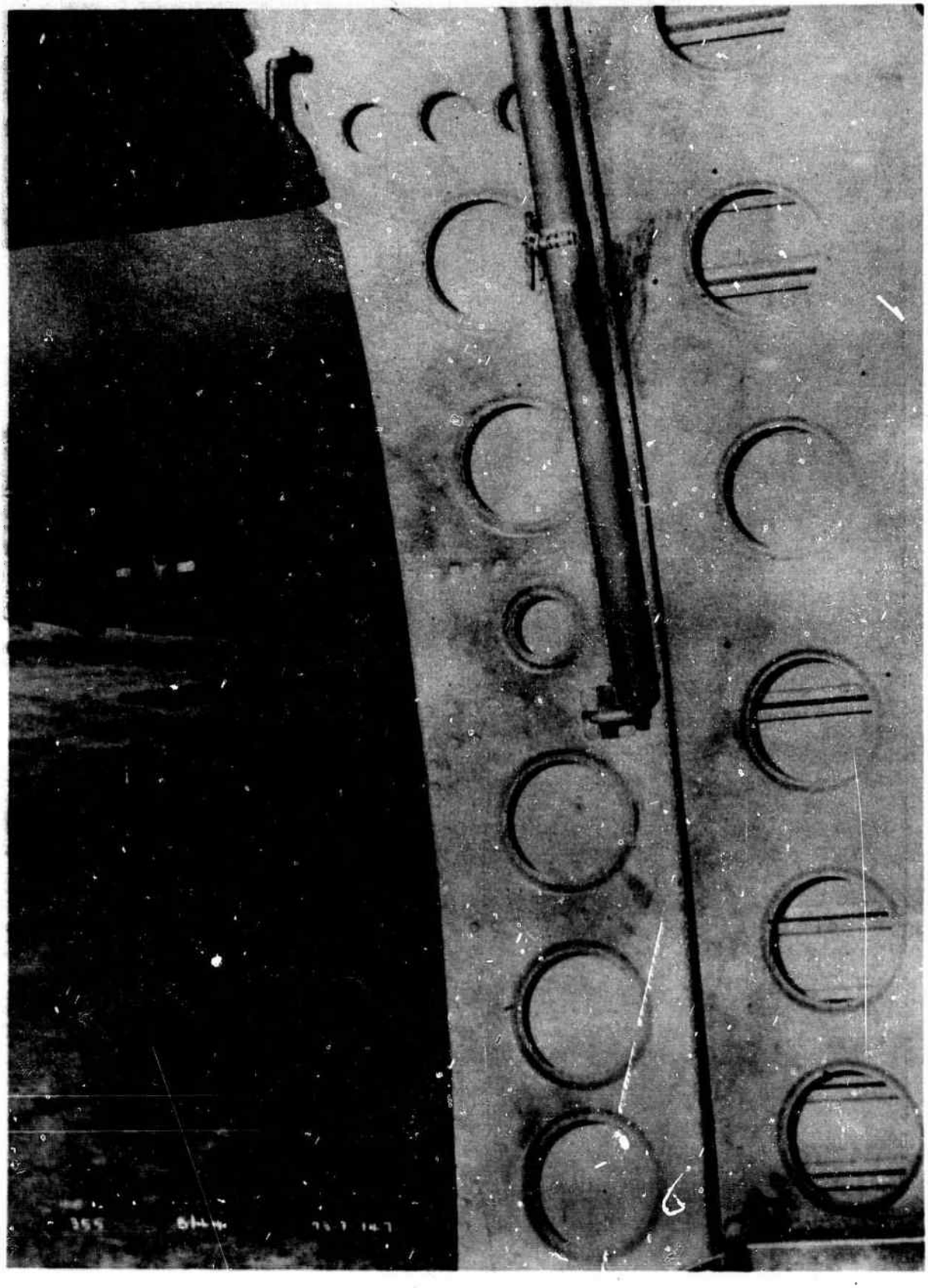


FIG. 8. DOOR STRUT WHICH MUST BE UNFASTENED

FIG. 9. ONE CARGO DOOR BEING RAISED

FIG. 10. CARGO DOOR IN POSITION FOR LOADING WITH SHEARS. Front view.

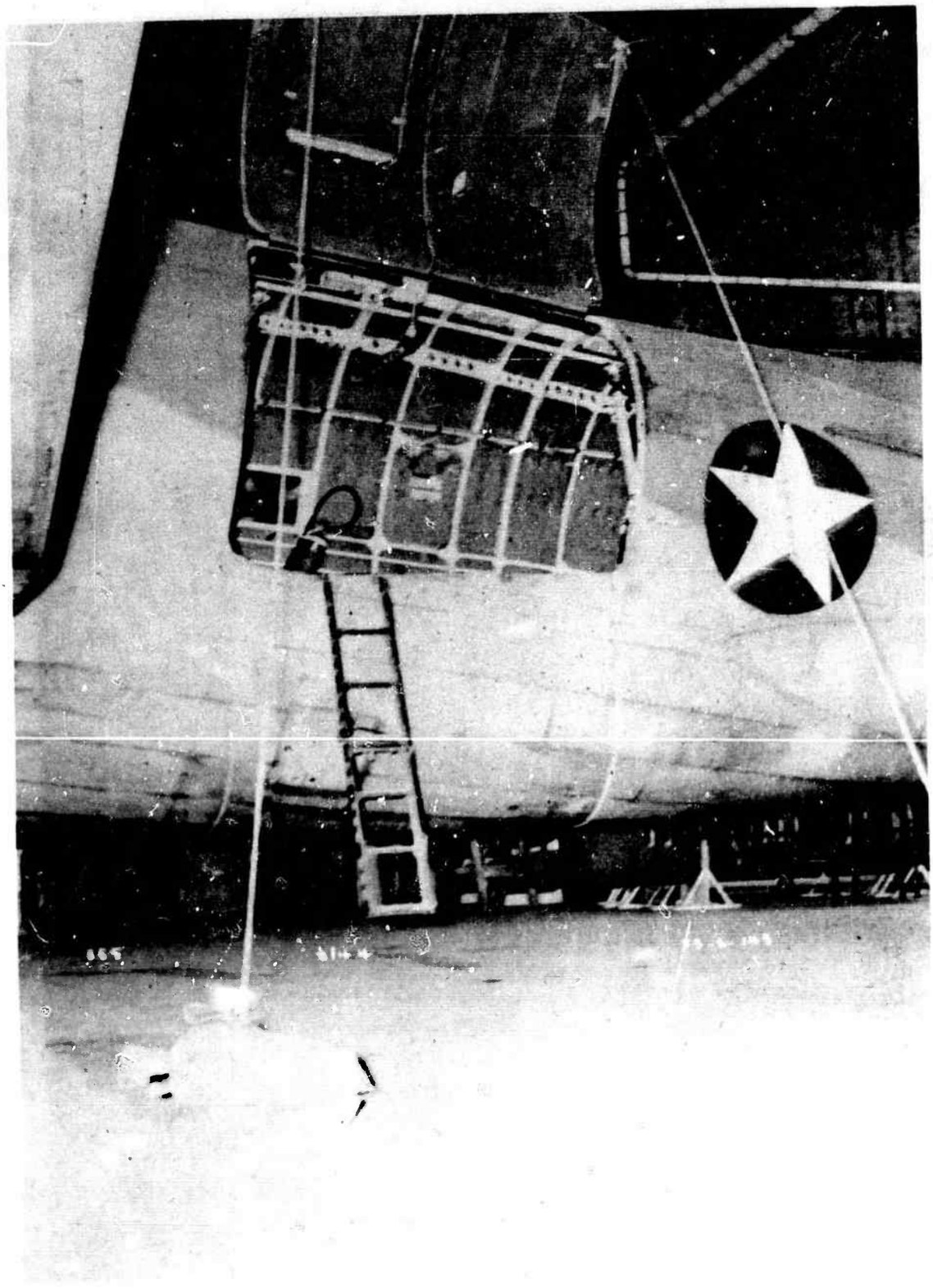


FIG. 11. CARGO DOOR IN POSITION FOR LOADING WITH SHEARS. Front view.

FIG. 12. CARGO DOOR IN POSITION FOR LOADING WITH SHEARS. Rear view.

FIG. 13. ALTERNATE METHOD OF ARRANGING REAR GUY LINES

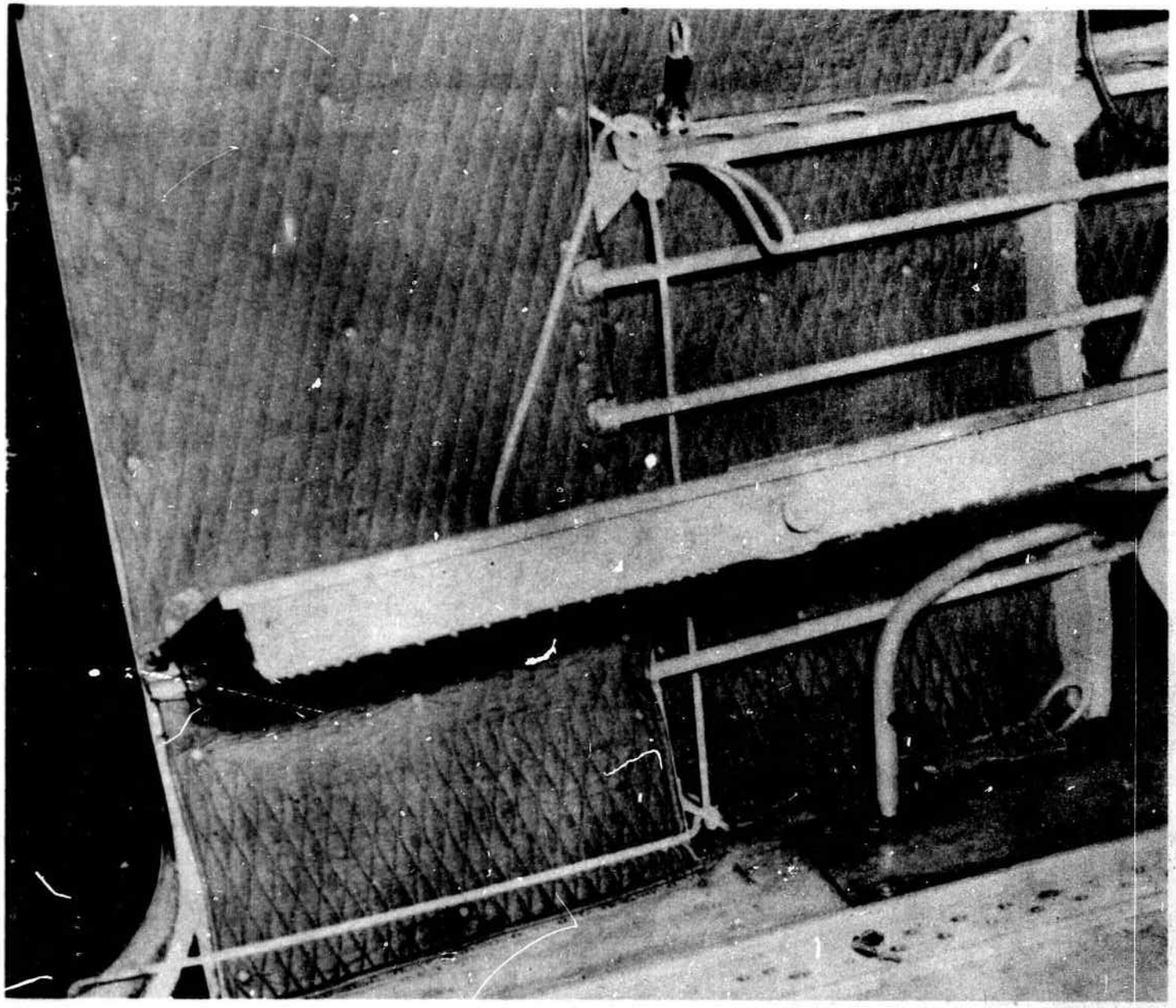


FIG. 14. ALTERNATE METHOD OF FASTENING ONE REAR GUY LINE

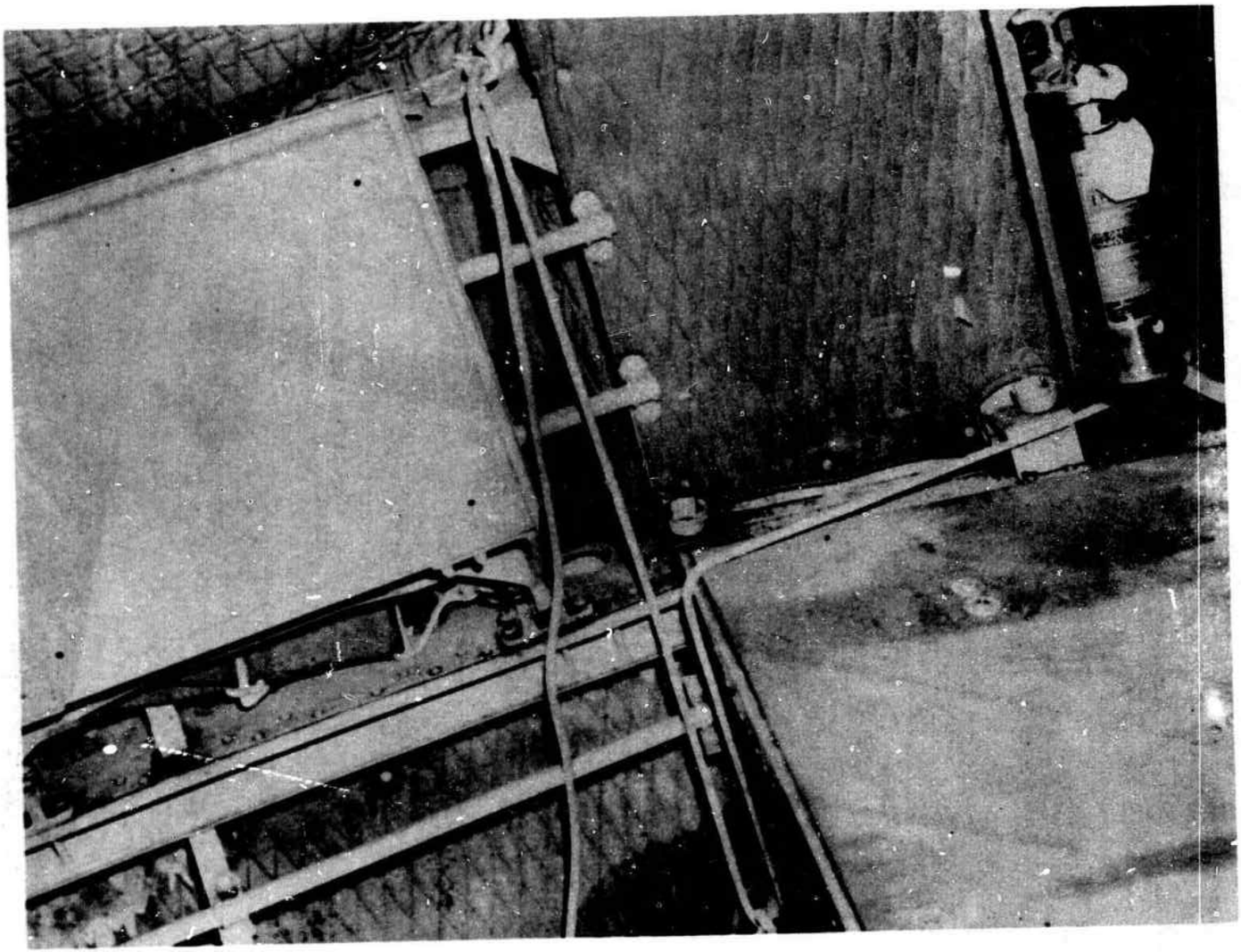


FIG. 15. ALTERNATE METHOD OF FASTENING SECOND REAR GUY LINE

so that they may be readily tilted when loading heavy assemblies through the plane door. The tackle inside the plane may be fastened to the snatch-block ring opposite the door, which is also used for pulling equipment into the plane when ramps are used (Fig. 4). Loads may be pulled forward in the loading compartment by use of the holdfast shown in Fig. 4. Heavy loads may be pulled forward in the plane much more readily if heavy grease is applied to the floor area on which they slide.

i. Fig. 1 shows a typical load being placed in a mock-up of a C-46 Cargo Plane by use of shears as described above.

j. Equipment used for loading as suggested above includes:

(1) Shears:

(a) 2 16-inch x 35-foot Timbers
(b) 4 6-inch Triple Blocks
(c) 4 6-inch Double Blocks
(d) 2 6-inch Single or Snatch Blocks
(e) 500 feet of 1-inch Rope
(f) 400 feet of 3/4-inch Rope

(2) Tackle inside plane:

(a) 4 6-inch Double Blocks
(b) 250 feet of 3/4-inch Rope

(3) Pull inside plane:

(a) 1 3 x 12 x 64-inch Lumber
(b) 1 $\frac{1}{2}$ x 6 x 6 x 12-inch Angle Iron
(c) 3 3/4 x 4-inch Cap Screws

(4) Miscellaneous slings and lashings:

(a) 100 feet of 5/8-inch Cable
(b) 50 feet of 3/4-inch Cable
(c) 24 5/8-inch Cable Clamps
(d) 12 3/4-inch Cable Clamps
(e) 200 feet of 1-inch Rope

k. Extremely long items such as the frame of a truck should be loaded with the forward end on one sled and the aft end on another. For moving the sleds forward, a piece of cable may be anchored to the front two tie-down points, as shown in Fig. 4, and tackle fastened between this fitting and the sled to be moved.

1. The following steps should be followed to raise the cargo doors to permit loading with shears:

(1) Using $\frac{1}{2}$-inch diameter manila rope or its equivalent, attach two pieces, each approximately 50 feet long, to the forward lock of the forward door, and two pieces, each approximately 50 feet long, to the aft lock of the aft door. (See Fig. 7.) Throw one rope from each door over the fuselage and allow the other to drop to the ground.

(2) Remove the cargo door struts from both doors by removing the extreme bolts. (See Fig. 8.) Caution: These struts are heavily spring-loaded and will extend when released. Damage to equipment or personnel is possible unless the struts are handled with care.

(3) In the fully extended and locked position, the struts may be used to raise the door to a position where the ropes can become effective. (See Fig. 9.) Care must be taken when raising the door to prevent damage to the hinges by allowing the door to swing too far open.

(4) When the door is raised, the four ropes should be securely tied down to the ground. (See Figs. 10 and 11.)

(5) An alternate method of holding the doors in an upright position is to pass the back ropes completely under the fuselage, bring them into the cargo compartment, and tie them down to cargo tie-down rings. (See Figs. 12 through 15.) This alternate method still requires external tying-down of the ropes on the cargo door side.

IV. DISCUSSION

7. General.

a. The problem involved was one of breaking down standard Engineer equipment into sub-assemblies that would be within the size and weight limitations of the C-46 cargo plane for transport into otherwise inaccessible areas. It was assumed that for initial preparation of landing strips the light Airborne Engineer Aviation equipment would be used, but that as soon as possible standard equipment would be flown in to develop the strips for use by all types of combat aircraft, and for general maintenance.

b. The problem was worked out on the premise that preparation for air transport would be performed by units using, wherever possible, only the equipment and tools available within the organizations. The simplest methods were used throughout, on the assumption that units not highly trained in such a transportation procedure may be suddenly called upon to perform airborne missions. Certain pieces of equipment listed herein are applicable not only to Aviation Engineer units, but also to units similarly equipped, such as Combat Engineer and General Service units. The loading principles stated apply in general to any type of equipment to be transported by air in this type of plane.

c. It should be noted that the information presented on plane weight characteristics and load position included in the appendices, is sample data only; local conditions as to load limits, condition of runways, plane characteristics, and other variables will modify the data accordingly.

8. Source of Information. Every available source of information was utilized in the study of the problem. Commercial Airlines, the Air Transport Command of the Army Air Forces, and the Curtiss-Wright Corporation were called upon for information concerning airplane loading and flight characteristics. Individual members of these organizations proved exceedingly cooperative. Full use was made of data published by the Army Air Forces. The advice of manufacturers of the various items of Engineer equipment was sought prior to breakdown of individual items.

V. CONCLUSIONS

9. Conclusions. It is concluded that:

a. For almost every piece of construction equipment standard in the Aviation Engineer Battalion the problem of air transport in the C-46 plane is feasible. The time involved in preparation both before and after the trip by air is relatively short. Methods required are simple, and allow any unit to transport its equipment by air with little or no prior training, provided it is furnished an instructional guide.

b. All items of equipment considered may be transported in the C-46, with the exception of the standard model LS Scraper, as the scraper bowl is too large to enter the plane. The scraper may be converted by the using unit to the airborne model, if sufficient time is allowed, by following the instructions in Engineer Board Report 814 Disassembly and Loading of the LeTourneau Model LS Carryall Scraper for Air Transport in the C-47 Cargo Plane, dated 12 May 1944.

c. In addition to the equipment items considered herein, many other standard Engineer items of equipment can be loaded.

VI. RECOMMENDATIONS

10. Recommendations. It is recommended that in any equipment list for a unit transporting its equipment by air, provision should be made for the airborne model of the bituminous distributor, and for the factory-supplied conversion kits for the 2½-ton dump truck.

Submitted by:

John S. Carothers
Major, Corps of Engineers
Chief, Air Transport Section

Grant E. Beverly
Lt. Col., Corps of Engineers
Chief, Mechanical Equipment Branch

Forwarded by:

Karl F. Eklund
Lt. Colonel, Corps of Engineers
Director, Technical Division III

APPENDIX A

DIRECTIVE

WAR DEPARTMENT
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON

CE(20 Apr 44)
SPENE
400.1 (GNS 355)

20 April 1944

Subject: Air Transport of Standard Engineer Equipment
(Work Order No. DME 3388)

To: The President
The Engineer Board,
FORT BELVOIR, VIRGINIA.

1. In Work Order No. DME 3025 dated 14 September 1943, and supplement No. 1 thereto, dated 1 October 1943, there was established the initial list of fourteen (14) items of equipment and five (5) types of aircraft to be considered in the study of disassembly, loading, unloading and reassembly of engineer equipment for transport by air. In compliance with various subsequent requests, additional items have been authorized in Work Orders No. DME 3167 dated 9 December 1943, DME 3183 dated 18 December 1943, DME 3275 dated 16 February 1944, DME 3336 dated 23 March 1944 and DME 3667 dated 13 April 1944, to the extent that the current list contains twenty (20) items of equipment and six (6) types of aircraft as follows:

a. Equipment

(1) Tractor, Crawler Type, Diesel, W/Angledozer, 80 DBHP Caterpillar, Model D-7.

(2) Scraper, Self-Loading, Towed Type, Cable Operating, 8 Cu. Yd. (Struck) LeTourneau Model LS.

(3) Grader, Road, Motorized, Diesel Engine Driven, 12 Ft. Moldboard, Caterpillar Model 12.

(4) Crane, Tractor Operated, Non-revolving, 40,000 Pound Capacity at 10 Foot Radius 20 Foot Boom, LeTourneau Model M-20.

(5) Crane, Truck Mounted, Gasoline Driven, 3/8 Cu. Yd., Quickway Model E.

(6) Truck, Dump, 2-1/2 Ton, 6x6.

(7) Grader, Road, Towed, Leaning Wheel, Hand Controlled, 12 Foot Moldboard, Adams Model 124-S.

(8) Roller, Road, Towed Type Sheepsfoot, Two-Drum-in-Line, LeTourneau Model W-2.

(9) Compressor, Air, Trailer Mounted, Steel Wheels, Diesel Engine Driven, 315 C.F.M., Ingersoll-Rand, Model No. 1K-315.

(10) Roller, Road, Towed Type Wheeled Rubber Tired, 13 Tires, Wm. Bros. Model 67W.

(11) Roller, Road, Gasoline, 3-Wheel, 10 Ton, Galion Model "Chief".

(12) Roller, Road, Powered, Gasoline, 2 Axle Tandem, 5-8 Ton, Buffalo Springfield, Model KT16.

(13) Distributor, Bituminous Material, Trailer Mounted, 1250 Gallon, Etnyre Model MX, Style RE.

(14) Tractor, Crawler Type, Diesel, W/Angledozer, 113 DBHP, Caterpillar Model D-8.

(15) Tractor, Crawler Type, Diesel, W/Angledozer, 55 DBHP, Caterpillar Model D-6.

(16) Truck, Fire, Powered, Crash, Class-135 Complete W/Equipment.

(17) Crushing and Screening Plant, Gravel and Rock, 2 Units, Gasoline Engine Driven, Semi-trailer Mounted, with Dollies, 25 Cu. Yd. Per Hour, Iowa Mfg. Co., Model 25 Cu.Yd.

(18) Tractor, Crawler Type, Diesel Engine Driven, 35-40 DBHP, Rigid, Complete with Loader Bucket, Cable Operated, Front Mounted, 3/4 Cu. Yd., and Dozer Attachment, Caterpillar Model D-4, 60" Gage, Trackson Trax-cavator Model T-4, and Trackson Dozer Attachment. (Note: Non-Standard Attachments).

(19) Grader, Road, Motorized, Diesel Engine Driven, 12-Ft. Moldboard, Galion Model 101-D.

(20) Grader, Road, Motorized, Diesel Engine Driven, 12-Ft. Moldboard, Adams Model 512.

b. Types of Aircraft.

(1) C-47
(2) C-54
(3) C-46
(4) C-87
(5) CG-13
(6) C-82

2. In view of the urgent need that information resulting from the study be made available for distribution, and in view of the probability of further expansion of the study, it becomes necessary that reports be prepared on the basis of the presently authorized list detailed in the preceding paragraph, and that the publication of these reports shall not be delayed by reason of consideration of items other than those now authorized.

3. Therefore, the Engineer Board is directed to:

a. Prepare and publish an addendum to the report "Disassembly and Loading of Standard Engineer Equipment for Transport in the C-47 Cargo Plane" (dated 24 January 1944) which will include the results of study of each of those items of equipment listed in paragraph 1a above, not covered by the original report.

b. Prepare and publish reports, similar in form to the report "Disassembly and Loading of Standard Engineer Equipment for Transport in the C-47 Cargo Plane" (dated 24 January 1944) covering each of the following types of aircraft: C-54, C-46, C-87, CG-13 and C-82. Each of these reports will include the results of the study of each of the items of equipment listed in paragraph 1a above, for transport in the subject types of aircraft.

c. Publish the reports and the addendum specified in the preceding sub-paragraphs at the earliest possible date without hindrance or delay due to inclusion therein of items other than those presently authorized and listed under paragraph 1 above.

4. It is requested that one hundred and fifty (150) copies of each of the reports and of the addendum required under the preceding paragraph, be furnished this office for distribution.

5. In a memo to the Chief, Training Branch, War Plans Division dated 11 February 1944, subject "Technical Bulletin on Disassembly and Loading of Standard Engineer Equipment for Transport in the C-47 Cargo Plane", this office requested that a Technical Bulletin be prepared by the Engineer School from data contained in the subject report and published in quantity, for wide distribution, and also requested that the Engineer School contact the Engineer

Board directly on all matters in connection therewith. Similar arrangements have since been made for Technical Bulletins to be prepared from data contained in the reports and addendum to be prepared in accordance with paragraph 3 above.

By order of the Chief of Engineers:

/s/William J. New
/t/WILLIAM J. NEW,
Lt. Col., Corps of Engineers,
Chief, Equipment Development Branch,
Engineering and Development Division.

APPENDIX B

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRACTOR, CRAWLER TYPE, DIESEL-ENGINE-DRIVEN, 35-40 DBHP, 44-INCH GAUGE, CATERPILLAR MODEL D-4, WITH ANGLE-DOZER, LETOURNEAU CK 4, AND POWER CONTROL UNIT, LETOURNEAU T4

1. General. The total weight of the Caterpillar D-4 is 15,987 pounds. It requires two C-46 cargo planes for transportation.

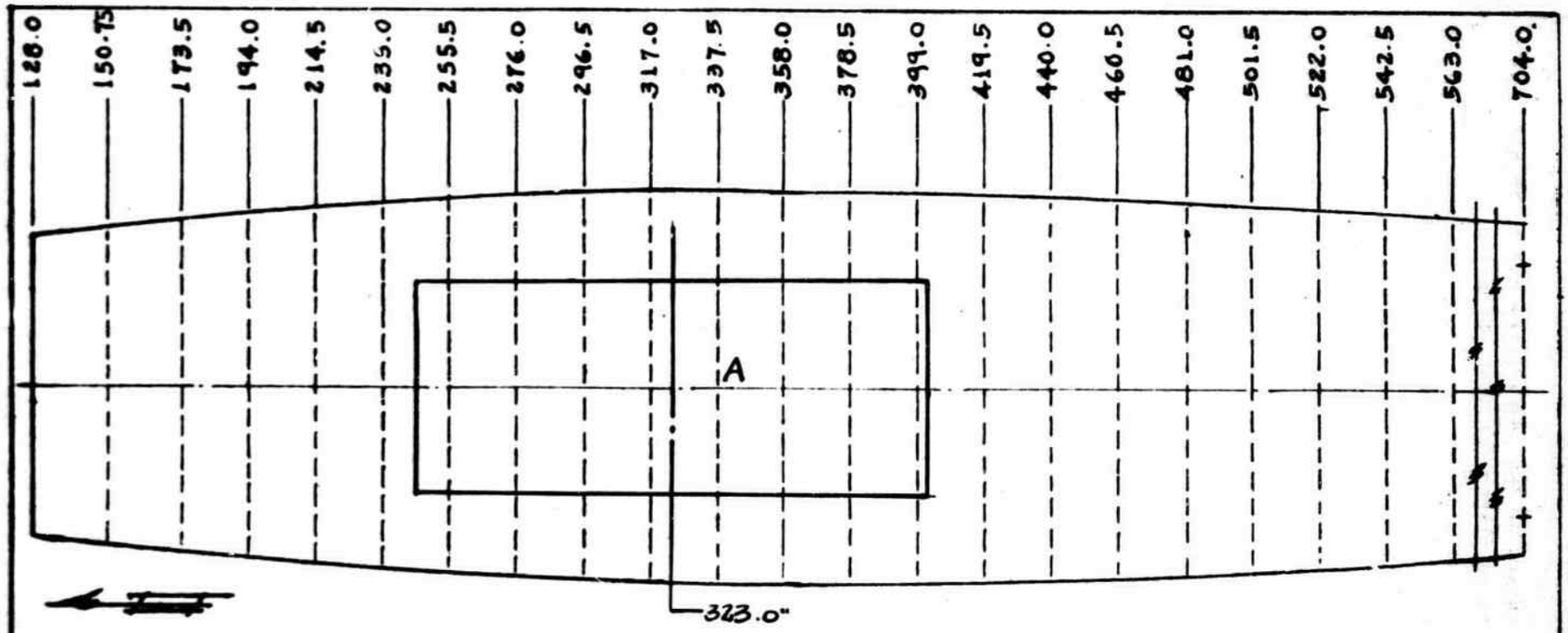
2. Dismantling. Following are the only pieces which need be removed from the D-4 in order to load it:

(1) Dozer blade
(2) Yoke and sheave
(3) Rear "A" frame
(4) Front "A" frame
(5) Box beam
(6) Two tracks
(7) Two track roller frame assembly and covers
(8) Two track roller frame assemblies.

3. Loading. A special sled should be constructed for load No. 1. This piece weighs 8,365 pounds, and must be carefully handled while loading. The runners for the sled must be at least nine feet long, and it is recommended that the runners be equipped with a metal cover order to facilitate moving the load forward into its proper position. Metal tracks on the plane floor will also help reduce the sliding friction of this load. Plenty of heavy grease must be used under the runners while pulling the sled forward.

4. Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	8 mh
Loading	4 men	28 mh
Unloading	4 men	22 mh
Reassembly	2 men	9 mh
Total		67 mh



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 326.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	ENGINE & FRAME	12'-6" x 6'-6"	8365#

FIG. 16

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP No 1 OF D-4 TRACTOR (DIESEL)			
DWG No. 1 OF 2		APPVD BY	
REVISED			
DATE 2-2-44	SCALE 1/4"=1'-0"	DWN BY H.H.W.	CHKD BY R.P.Y.

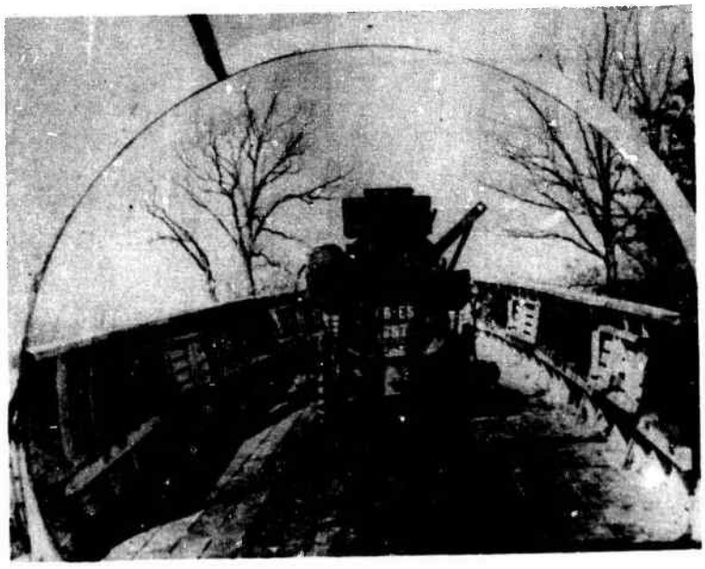
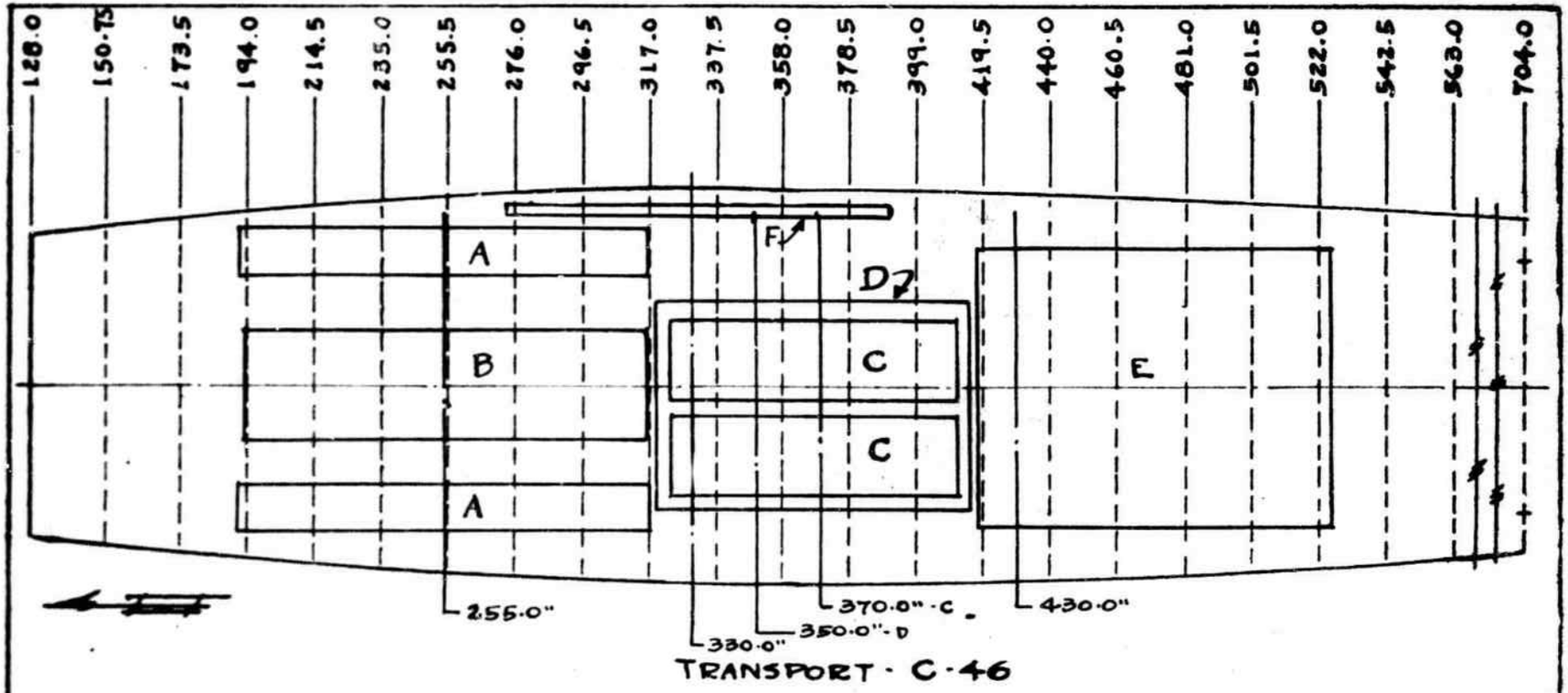


FIG. 17 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
D4 less items removed and placed in load no. 2	8365

Loading	Unloading
4 men - 12.00 man-hours	4 men - 10.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 326.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	TRACKS	10'0" x 1'2"	1060# EA
B	BLADE	9'-8" x 2'-10"	1180#
C	ROLLER FRAME	7'-6" x 2'-2"	1260# EA
D	YOKE	7'-7" x 6'-5"	950#
E	A FRAMES AND SPROCKET COVERS	8'-7 x 7'-2"	755#
F	BOX BEAM	9'-4" x 4"	77#

FIG# 18

THE ENGINEER BOARD FT BELVOIR, VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 2 OF D-4 TRACTOR (DIESEL)			
DWG Nº 2 OF 2		APP'VD BY	
REVISED			
DATE 2-2-44	SCALE 1/4"=1'-0"	DWN BY H.H.	CHK'D BY R.P.Y.

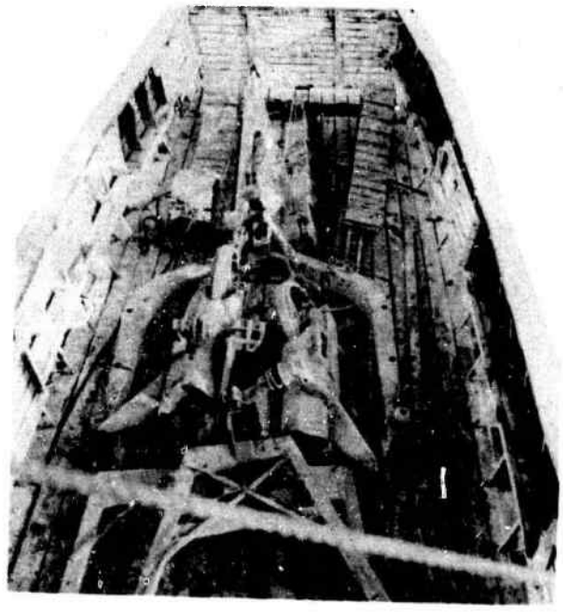


FIG. 19 MOCK-UP LOADED

PLATE NO. 2

Item	Weight
Blade	1180
Yoke and sheave	950
Rear "A" frame	345
Front "A" frame	430
Box beam	77
Two tracks	2120
Two track roller frame assembly end covers	20
Two track roller frame assemblies	2520
Total	7622

Loading	Unloading
4 men - 16.00 man-hours	4 men - 12.00 man-hours

APPENDIX C

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRACTOR, CRAWLER TYPE, DIESEL-ENGINE-DRIVEN, 55 DBHP, CATERPILLAR MODEL D-6, WITH TRAILBUILDER, LAPLANT-CHOATE R-61, AND POWER CONTROL UNIT, LETOURNEAU R678

1. General. Total weight of the D-6 Caterpillar tractor is 24,565 pounds, and it requires three C-46 cargo planes for transportation.

2. Dismantling. In disassembling the D-6, use the following sequence:

(1) Blade and yoke as one unit
  (a) Separate blade from yoke
(2) Break and lay out tracks
(3) Engine hood
(4) Bleed hydraulic system
(5) Blade lift mechanism
(6) Radiator guard plates
(7) Radiator screen
(8) Radiator
(9) Crankcase guard plates
(10) Hydraulic lines (2)
(11) Floor boards and dash board side plates (7 pieces)
(12) Remove, as one unit, seat frame, fuel tank, running boards, lights, tool box, and hydraulic oil tank and valve.
(13) Track roller frame guards (2)
(14) Power control unit
(15) Track roller frame assemblies (2)
(16) Tracks

3. Loading. A sled at least 9½ feet long is necessary to distribute properly the 8,775 pound weight of the engine and frame group. Reduce friction by metal facing the sled runners and greasing the plane floor. The yoke must be loaded, as shown in Fig. 20, by passing one yoke leg through the door toward the rear of the plane and then by bringing the second yoke leg into the plane by pulling the yoke forward into loaded position.

4. Man-Hours. A crew of 7 men worked the following periods:

Disassembly	3 men	24 mh
Loading	4 men	26 mh
Unloading	4 men	20 mh
Reassembly	3 men	30 mh
Total		100 mh

Approximate total time in preparation of equipment for flight is 9 hours and for operation after landing is 11 hours.

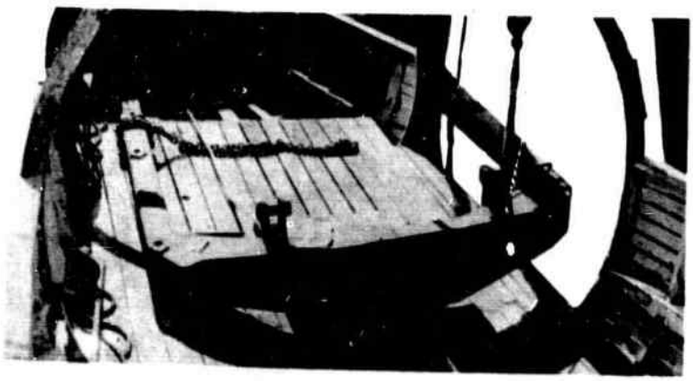
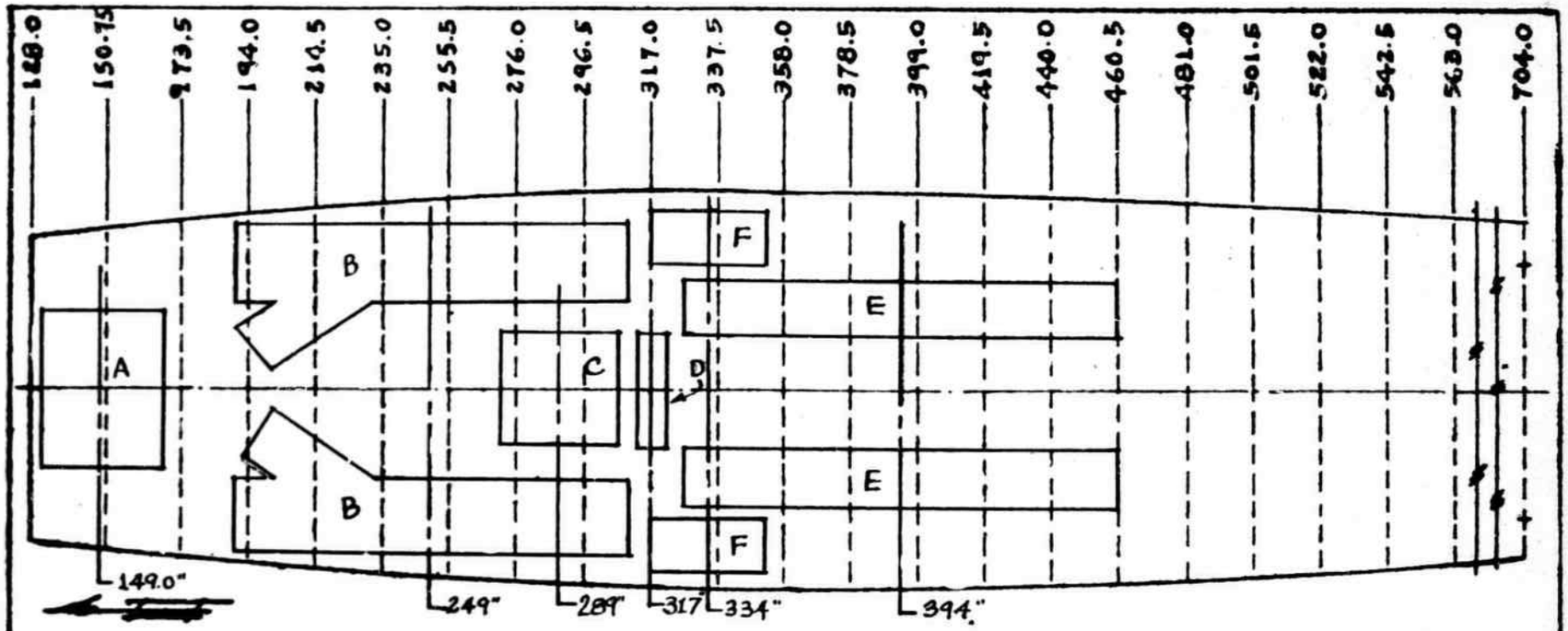


FIG. 20. LOADING THE YOKE



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY • 320.5

EQUIPMENT.		APPROX. DIMEN'S.	WEIGHT.
A	RAD GUARD PLATE	36" x 48"	133#
B	TRACY ROLLER FRAME ASS	114" x 44"	2310# EA
C	RAD SUPPT ARMS	34" x 34"	196#
D	LOWER RAD GUARD	35" x 7	47#
E	TRACK	126" x 18"	1760# EA
F	TRACK ROLLER GD PLATE	36" x 16	20# EA.

FIG# 21

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP No 1 OF D-6 TRACTOR (DIESEL)

DWG No 1 OF 3		APP'D BY.
REVISED		
DATE 3-20-44	SCALE 1/4"-1'-0"	DWN BY H.W. CHK'D BY. W.J.F.

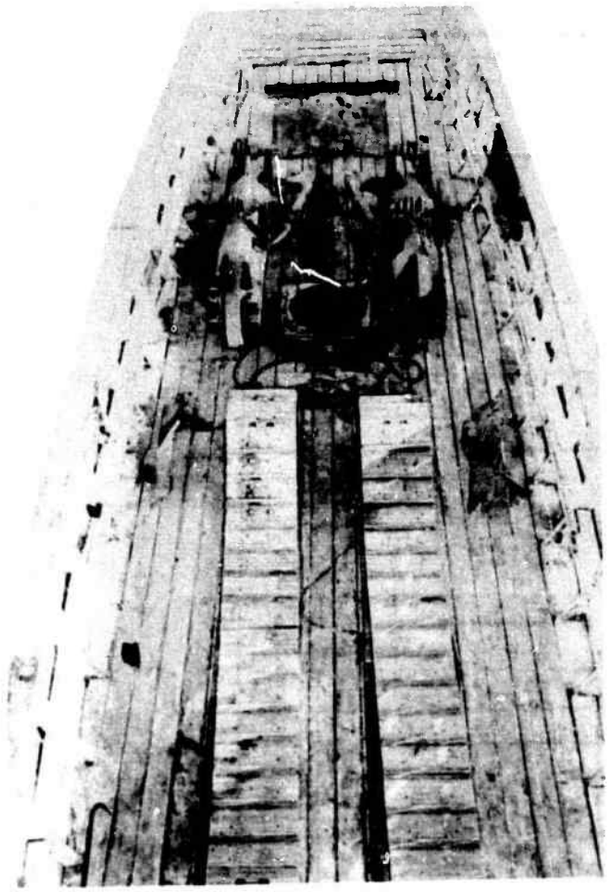
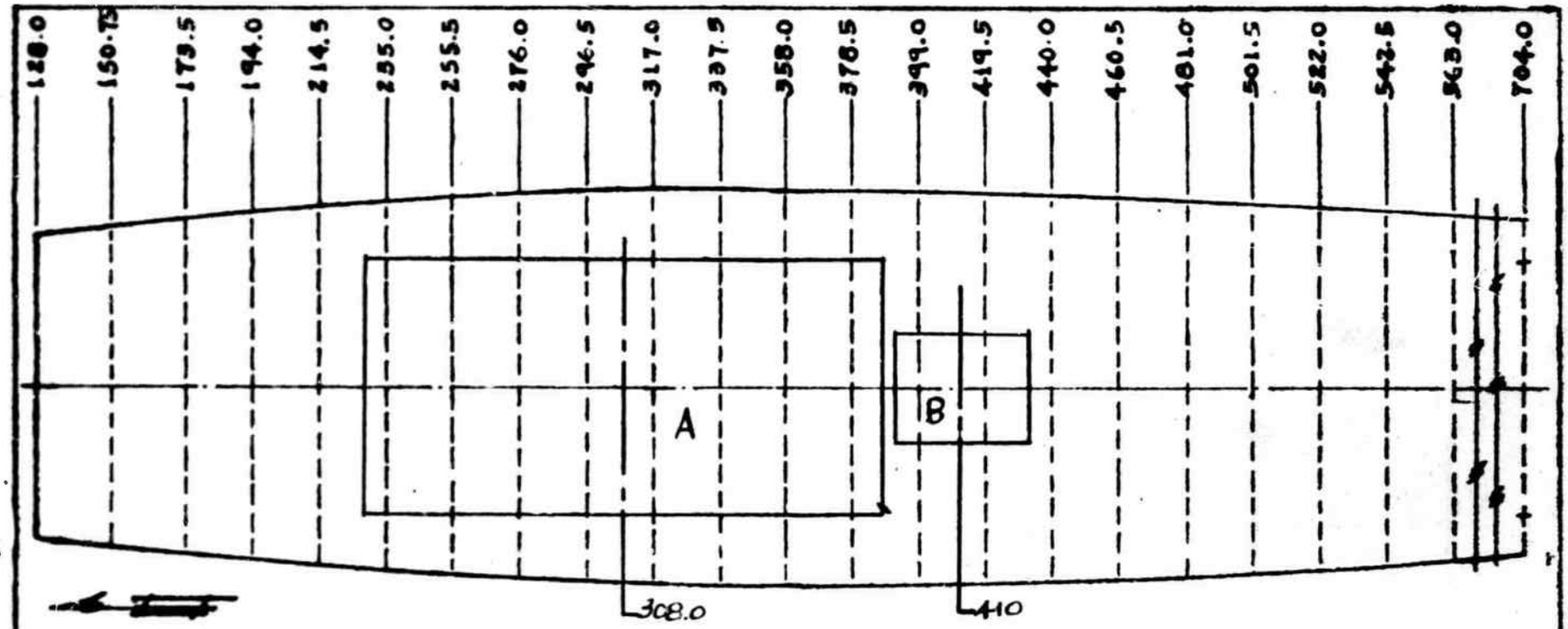


FIG. 22 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Tracks (2)	3520
Track roller frame assemblies (2)	4620
Track roller frame guards (2)	40
Radiator and supports	196
Radiator guard	133
Radiator guard plate	47
Total	8556

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 320.5

	EQUIPMENT	APPROX. DIMEN'S	WEIGHT.
A	ENGINE & TRANS	152"x80"	8775 #
B	HOOD	40"x34"	59 #

FIG # 23

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 2 OF D6 TRACTOR (DIESEL)			
DWG Nº. 2 of 3		APP'VD BY.	
REVISED			
DATE 3-20-44	SCALE 1/4"-1'0"	DWN BY. HW	CHKD BY. WLC

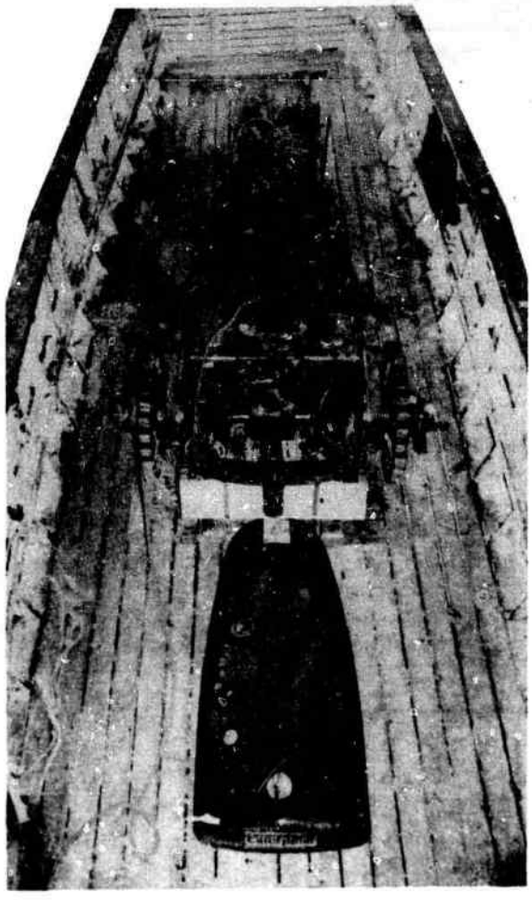
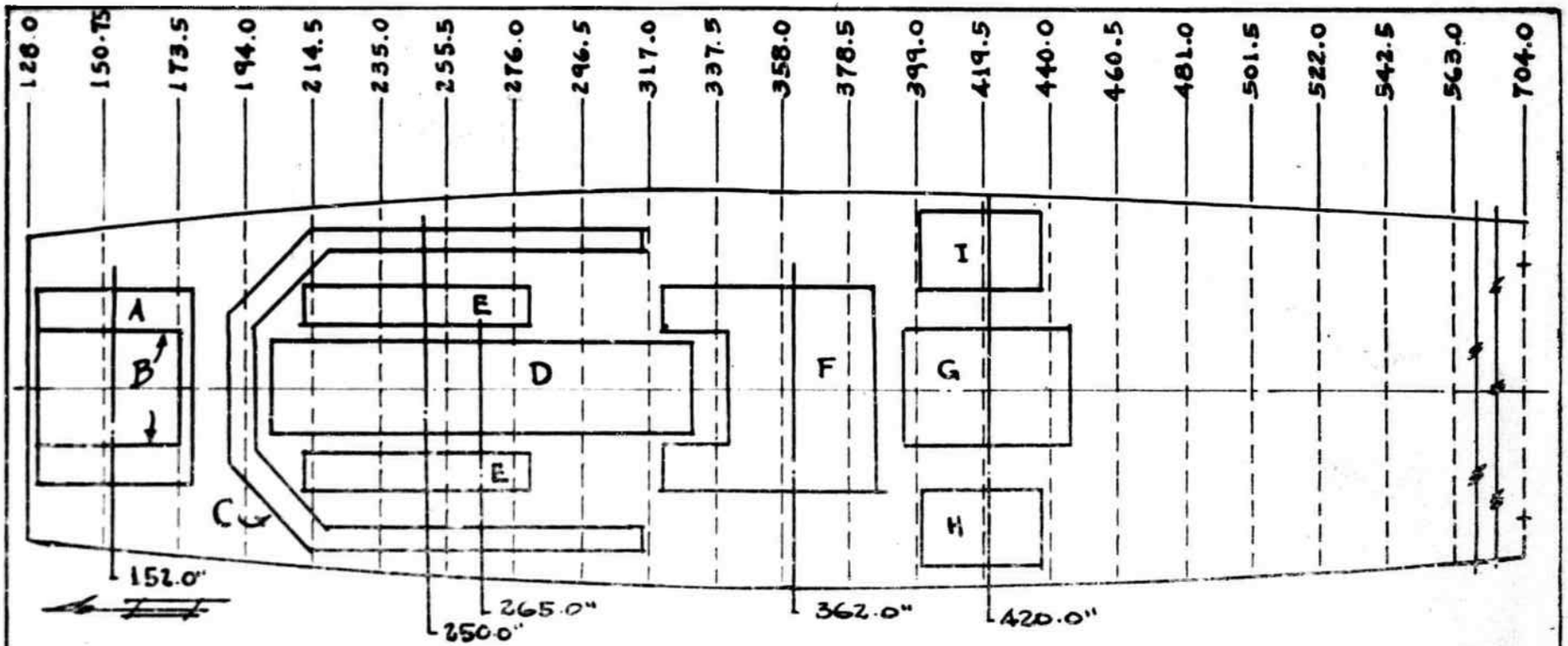


FIG. 24 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Engine and frame assembly	8775
Hood	59
Total	8834

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 317.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	POWER CONTROL UNIT	60" x 44"	1485#
B	RAD. GUARD SCREEN	40" x 36"	141#
C	YOKE	120" x 95"	1350#
D	BLADE	124" x 30"	2035#
E	BLADE LIFT ASSM.	68" x 12"	2 Pcs - 845#
F	SEAT, FUEL TANK & FENDERS	64" x 60"	834#
G	C. REINFORCE. GD. PLATES	50" x 36"	378#
H	FLOOR BOARDS	40" x 26"	40#
I	DASH PANEL	42" x 28"	48#

FIG# 25

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 3 OF D-6 TRACTOR (DIESEL)			
DWG Nº 3 OF 3		APP'VD BY	
REVISED			
DATE 7-12-44	SCALE 1/4"=1'-0"	DWN BY H.N.	CH'KD BY.

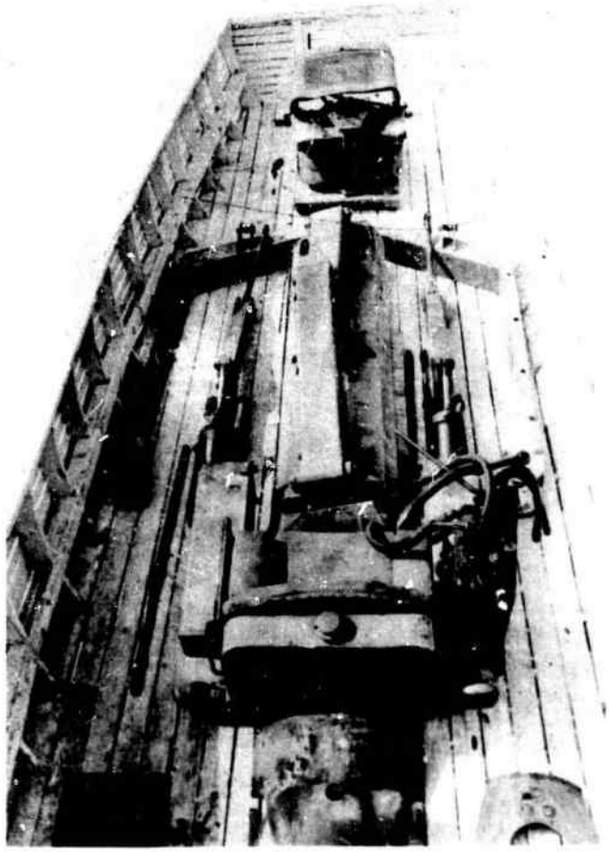


FIG. 26 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Yoke	1350
Blade and 2 side arms	2035
Crankcase guard plates (2)	378
Running boards, fuel and hydraulic tanks, headlamp assembly	853
Blade lift mechanism	945
Hydraulic lines (2)	38
Power control unit	1485
Radiator guard, screen and 2 side plates	191
Total	7175

Loading	Unloading
4 men - 10.00 man-hours	4 men - 8.00 man-hours

APPENDIX D

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRACTOR, CRAWLER TYPE, DIESEL-ENGINE-DRIVEN, 80 DBHP, CATERPILLAR MODEL D-7, WITH ANGLEDOZER, LETOURNEAU WCK7, AND POWER CONTROL UNIT, R 7

1. General. The total weight of the D-7 Tractor is 33,015 pounds, and it requires four C-46 cargo planes for transportation.

2. Dismantling. Since the engine and transmission can be loaded as a unit, and need not be dismantled, there were no difficulties encountered in disassembling the tractor in the following sequence:

(1) Blade and side arms
(2) Yoke
(3) "C" frame
(4) Rear "A" frame and ridge beam
(5) Front power control unit
(6) Crankcase guard plates
(7) Hood and side panels
(8) Radiator and guards
(9) Air Filters
(10) Starting engine
(11) Track roller frame guard plates
(12) Tracks (break and lay out)
(13) Rear power control unit
(14) Track roller frame assemblies
(15) Drawbar group
(16) Final drive housing and sprockets

3. Loading. The yoke of the angledozer is too large to load as one piece and must be cut in two (See Fig. 37). By cutting the yoke 20 inches from the center line as shown, the cut will miss both the external and internal reinforcing bars.

The loading of the engine-transmission group is shown in Figs. 27 and 28. The minimum length of the sled for this group is 10 feet.

4. Man-Hours. A crew of four men worked the following hours:

Cutting yoke	1 man	½ mh
Dismantling	2 men	56 mh
Loading	4 men	36 mh
Unloading	4 men	32 mh
Reassembly	2 men	54 mh
Welding yoke	2 men	4 mh
Total		182½ mh

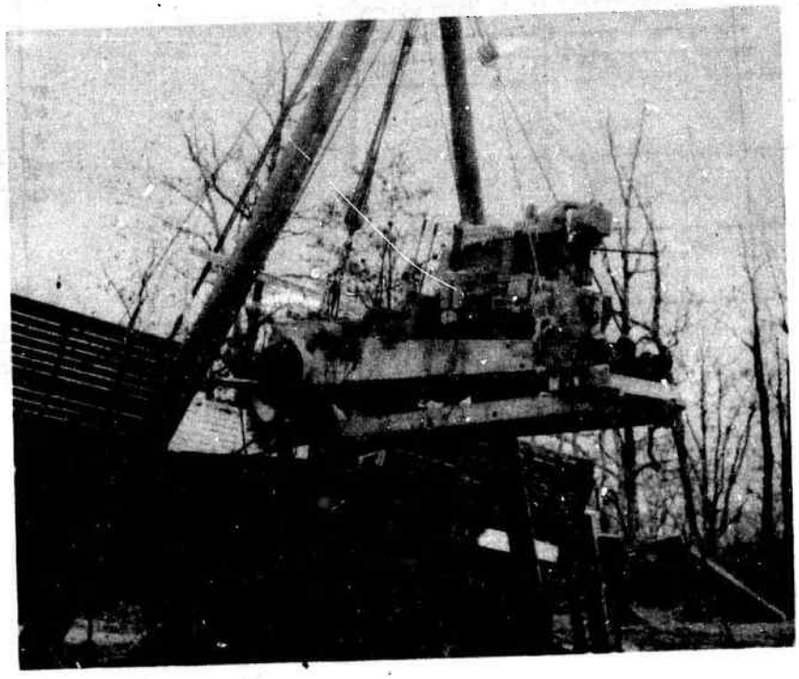


FIG. 27 ENGINE-TRANSMISSION GROUP ON SHEARS READY TO BE TILTED INTO THE DOOR

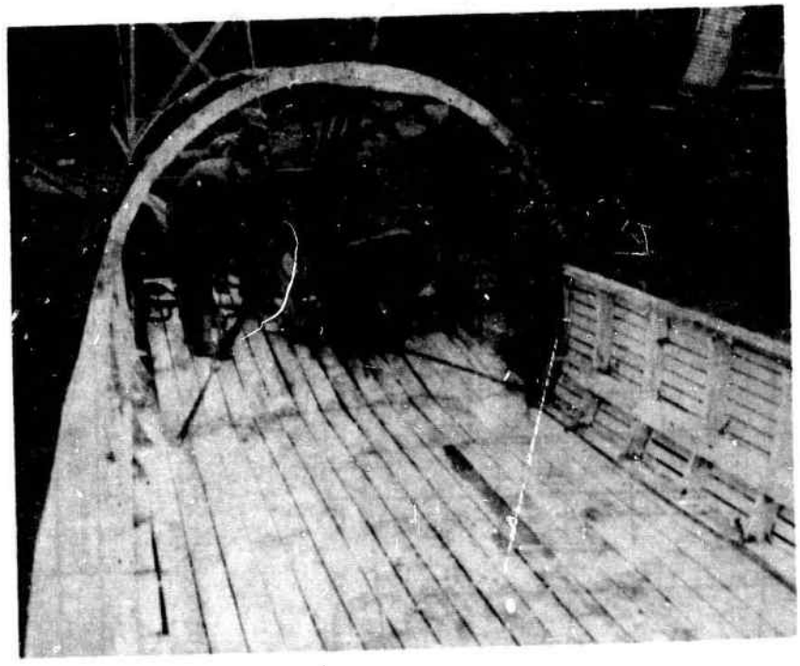
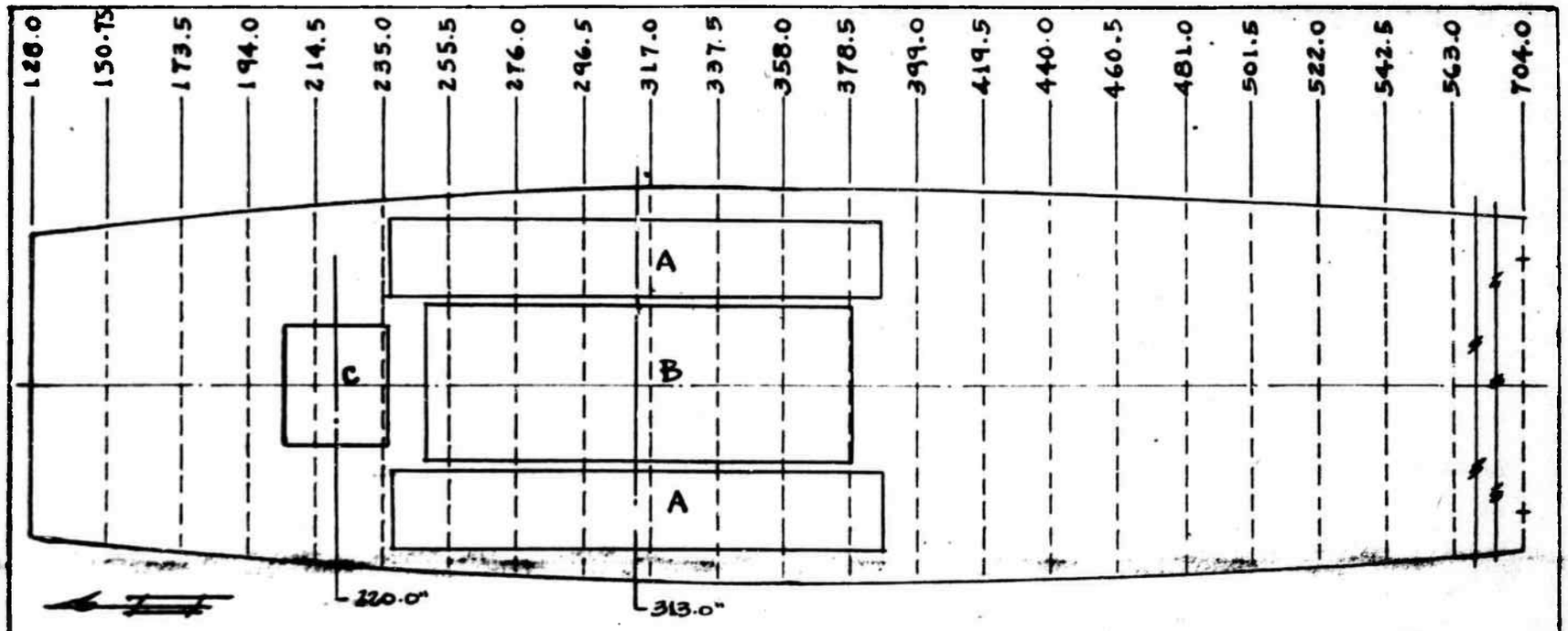


FIG. 28 ENGINE-TRANSMISSION GROUP READY TO SET DOWN INSIDE DOOR



TRANSPORT · C·46

NOTE.- APPROX. CENTER OF GRAVITY · 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	TRACKS	144" x 24"	2ins 5090#
B	FRONT ROLLER FRAME ASSY	126" x 48"	2835#
C	CRANKCASE GUARD PLATES	36" x 30"	610#

FIG # 29

THE ENGINEER BOARD
FT BELVOIR-VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 1 OF D-7 TRACTOR (DIESEL)

DWG NO 1 OF 5 — APP'VD BY.

REVISED

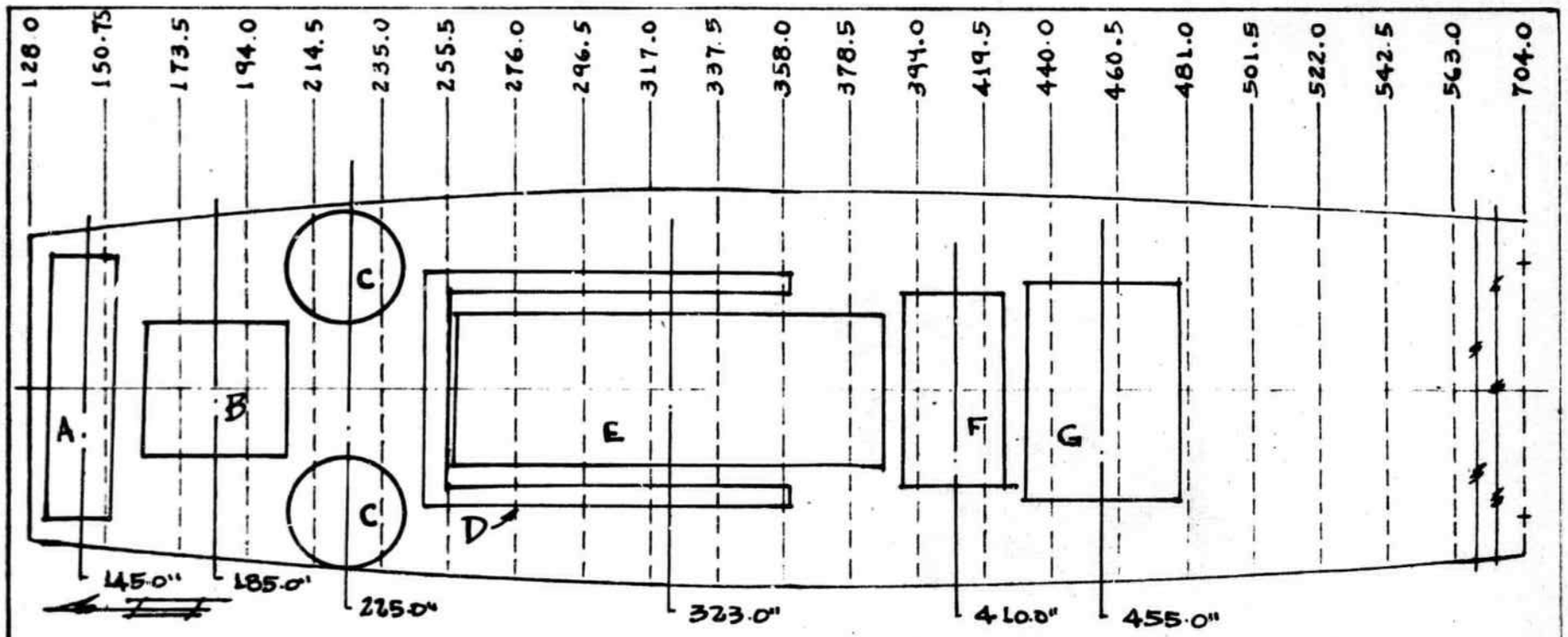
DATE 2-17-44 | SCALE 1/4"=1'0" | DWN BY H.W. | CHK'D BY.

FIG. 30 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Tracks	5050
Track roller frame assemblies	2835
Crankcase guard plates	610
Total	8495

Loading	Unloading
4 men - 8.00 man-hours	4 men - 8.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	EQUALIZER SPRING	80" x 20"	800#
B	RAD W/GRILLE GUARD	42" x 42"	575#
C	DRIVE SPROCKET & GEAR	36" DIA.	2 Rs. 1520#
D	"C" - FIRING GROUP	108" x 72"	750#
E	TRACK ROLLER FRAME ASSY.	126" x 48"	2835#
F	STARTING MOTOR	60" x 30"	340#
G	POWER CONTROL UNIT	66" x 48"	1440#

FIG # 31

THE ENGINEER BOARD
FT BELVOIR VA
AIR TRANSPORT SECTION

LOAD GROUP NR 2 OF D-7-TRACTOR (DIESEL)

DWG NO 2 OF 5 — APPVD BY

REVISED

DATE 7-17-44 | SCALE 1/4" : 1'0" | DWN BY H.W | CHKD BY

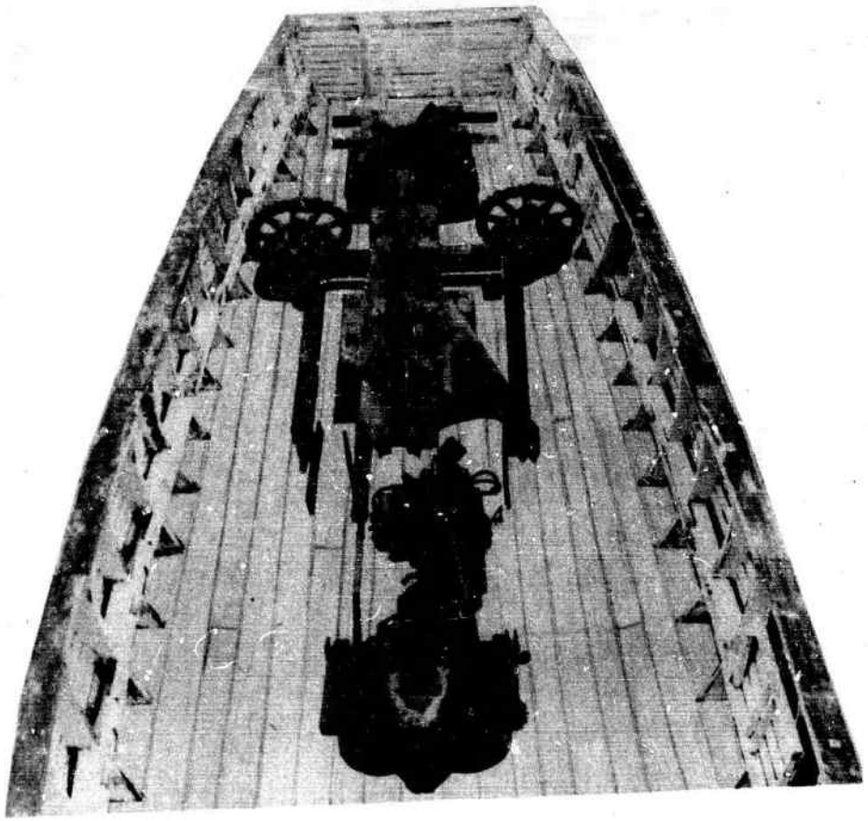


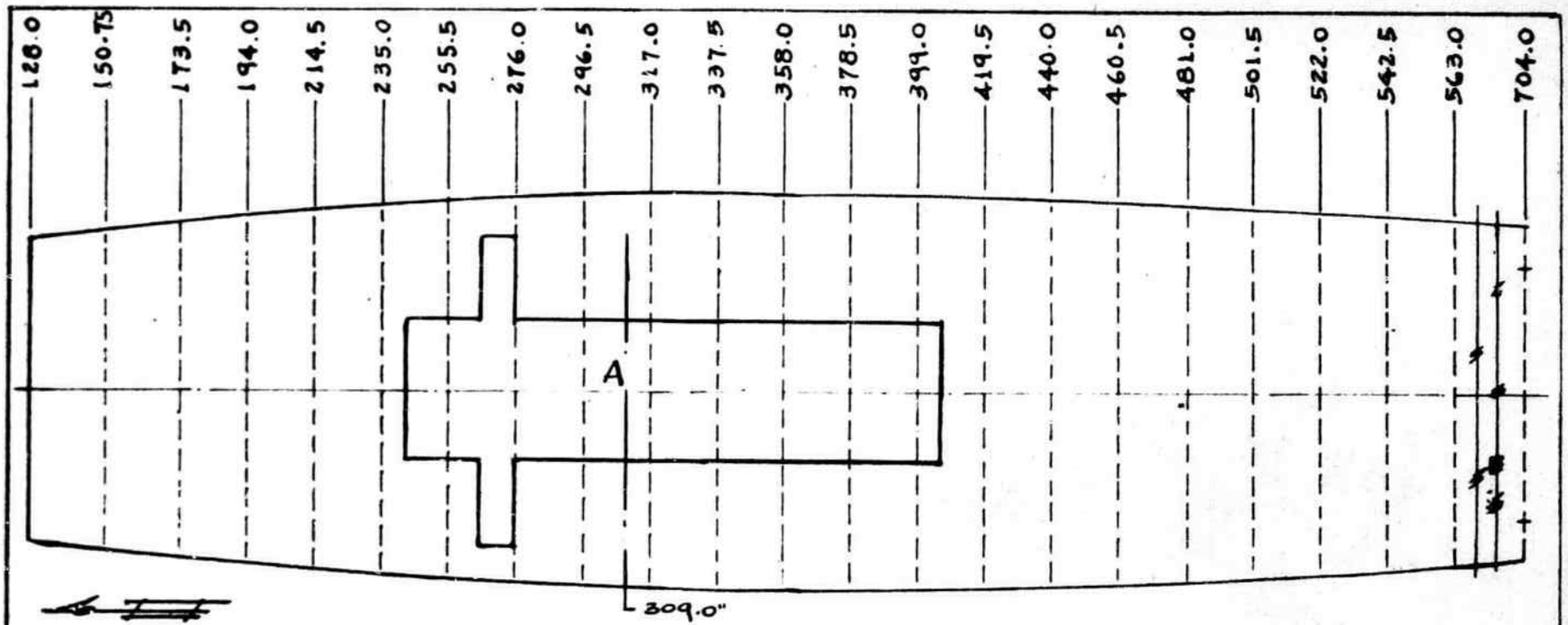
FIG. 32 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Equilizer spring	800
Radiator with grill and guard	575
Drive sprockets and final gear housing	1520
"C" frame group	750
Track roller frame assembly	2835
Starting engine	340
Power control unit	1940
Total	8760

Loading
4 men - 12.00 man-hours

Unloading
4 men - 12.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY = 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	ENGINE, TRANSMSN & REDR. END ASSM.	156" x 96"	8830#

FIG # 33

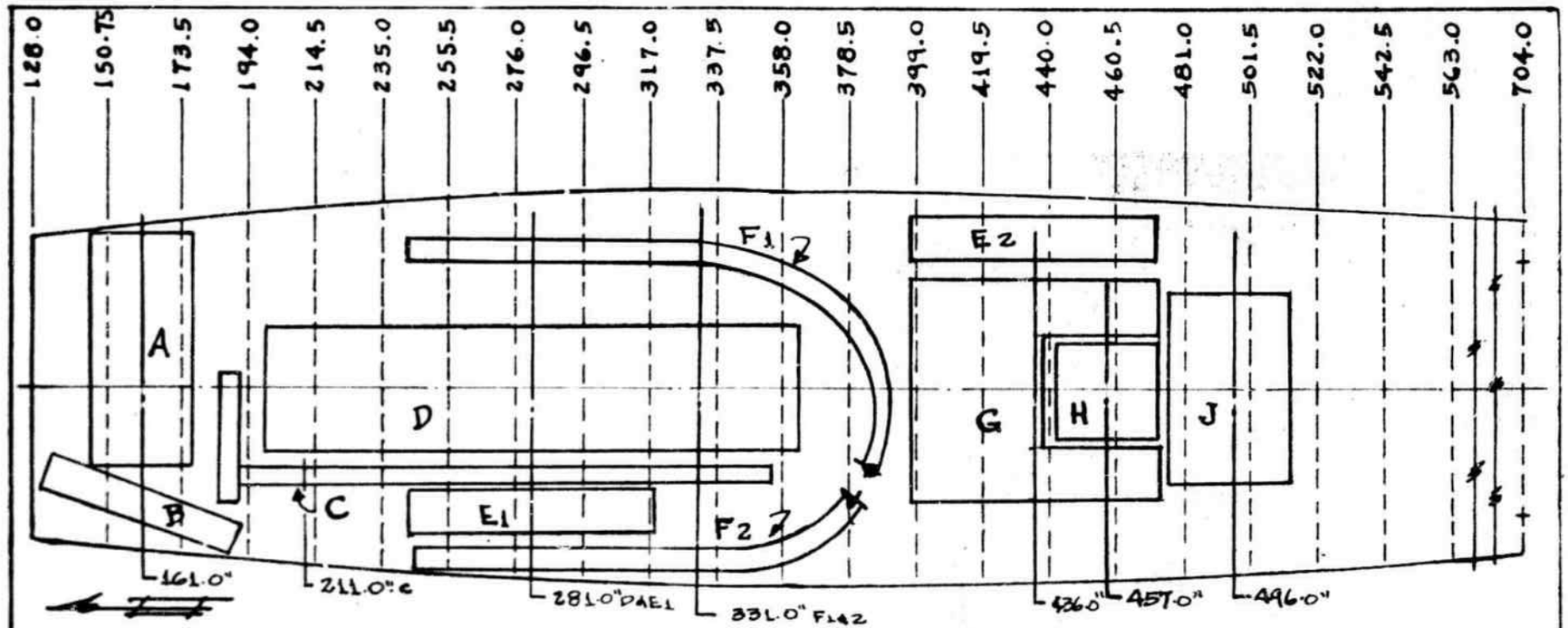
THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 3 OF D-7 TRACTOR (DIESEL)			
DWG Nº 3 OF 5 REVISED		APPVD BY	
DATE 2-9-44	SCALE 1/4"=1'-0"	DWN BY H.W.	CHKD BY

FIG. 34 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Engine and transmission assembly	8830

Loading	Unloading
4 men - 8.00 man-hours	4 men - 8.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	FRONT HITCH & COVER	72" x 30"	570#
B	DRAWBAR ASSM.	60" x 12"	430#
C	REAR "A" FRAME WITH RIDGE BEAM	162" x 40"	160#
D	BLADE	156" x 36"	2480#
E1	TRACK ROLLER FRAME GP	72" x 14"	2 PCS 120#
E2	TRACK ROLLER FRAME GP	72" x 14"	3 PCS 180#
F-1	YOKE (LARGE SECT)	144" x 72"	1000#
F-2	YOKE (SMALL SECT)	138" x 30"	670#
G	SEAT, FENDERS & FUEL TANK	72" x 68"	627#
H	BOX OF MISCELL PARTS	30" x 30"	635#
J	HOOD	60" x 36"	58#

NOTE - ITEM 'H' INCLUDES GASKETS, FAN WHEELS, FAN BELTS, BOLTS & NUTS, AIR CLEANER, SPROCKET HOLDER ASSM, FLOOR BOARDS, POWER CONTROL UNIT LEVER, & TRACK PINS.

FIG # 35

THE ENGINEER BOARD
FT BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 4 OF D-7 - TRACTOR (DIESEL)

DWG NO 4 OF 5 | APPVD BY

REVISED

DATE 2-1844 | SCALE 1/4" = 1'-0" | DWN BY H.W | CHKD BY W&J

FIG. 36 MOCK-UP LOADED

PLANE NO. 4

Item	Weight
Front winch with cover	570
Drawbar group (2 pcs)	430
Rear "A" frame with ridge beam attached	160
Dozer Blade	2480
Track roller frame cover guards	300
Yoke (2 pcs)	1670
Seat, fender, and fuel tank assembly	627
Hood	58
Box containing: Gaskets, fan wheel and belts, bolts and nuts, air cleaner, sprocket holder assembly, floor boards, power control unit lever, track pins	635
Total	6930

Loading	Unloading
4 men - 8 man-hours	4 men - 4 man-hours

NOTE ANGLEDOZER BOWL GROUP E-4311 FOR D-7 TYPE TRACTOR REQUIRES BEING CUT FOR AIR TRANSPORT. AS SHOWN. IT SHOULD BE NOTED THAT BLADE & YOKE WILL CONSTITUTE (3) THREE PIECES FOR SHIPMENT. IN REMOVING BLADE RIGHT & LEFT SIDE ARMS SHOULD BE LEFT ATTACHED BUT REMOVED FROM YOKE TO FACILITATE EASE IN HANDLING.

FOR LOAD GROUPING SEE DWG Nº 8 AND FIG. 56A & 56B

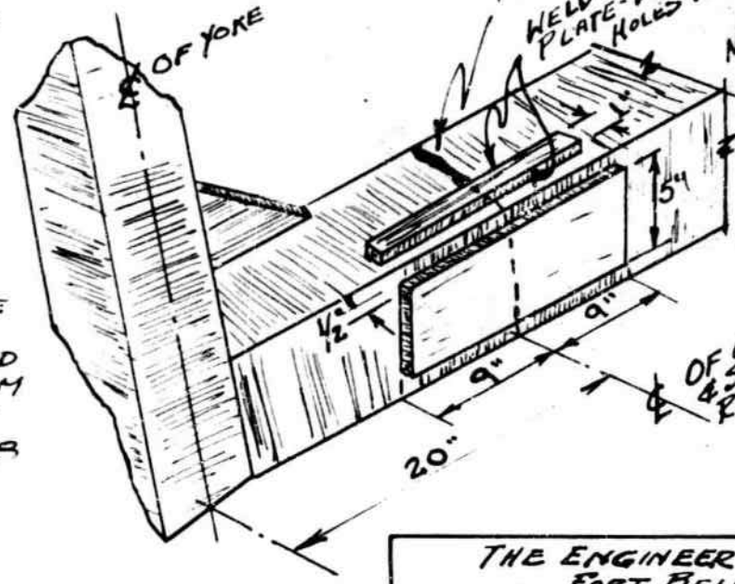


Fig. 37

THE ENGINEER BOARD FORT BELVOIR VA AIR TRANSPORT SECTION			
CUTTING SECTION FOR D-7 YOKE			
DWG Nº 1 OF 9		APPD BY M.D.S.	
REVISED			
DATE 11-15-43	SCALE NONE	DWN BY H.H.	CHCKD BY J.B.S.

APPENDIX E

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRACTOR, CRAWLER TYPE, DIESEL-ENGINE-DRIVEN, 113 DBHP, CATERPILLAR MODEL D-8 WITH ANGLE-DOZER, LETOURNEAU CKD 8, AND POWER CONTROL UNIT, R8

1. General. The total weight of the D8 is 42,048 pounds, and requires five C-46 cargo planes for transportation.

2. Dismantling. In order to load the dozer yoke it must first be cut in two pieces. Figs. 41 and 52 show the cut and subsequent weld, and Fig. 52 gives the detailed dimensions and location for the cut and weld. Following is the proper sequence of disassembly:

(1) Cables
(2) Radiator
(3) Yoke
(4) Ridge beam
(5) Front "A" frame
(6) Front winch guard support
(7) Rear "A" frame
(8) Hood
(9) Seat and fuel tank
(10) Power control unit
(11) Running boards
(12) Tracks
(13) Belly pan
(14) Radiator and support arms
(15) Clutch assembly
(16) Engine assembly
(17) Exhaust and oil cleaner extension
(18) Instrument panel
(19) Track roller frame assemblies
(20) Equalizer spring assembly
(21) Frames
(22) Sprocket covers
(23) Drawbar assembly
(24) Control levers

3. Loading. Two pieces of the D8 will require special sleds, the engine group, and the transmission group. The sled for the engine must be at least six feet long, and the sled for the transmission at least nine feet long for proper weight distribution. Fig. 39 shows the transmission mounted on a specially designed sled and fastened to it by means of strap iron anchors. As in loading any other heavy pieces, these two groups will have to be handled carefully. The transmission is especially heavy, 8373 pounds, and it is recommended that metal runners be used on the sled and metal tracks on the plane floor, lubricated with plenty of heavy grease, in order to facilitate pulling the sled forward into position. Figs. 39 and 40 show the transmission being loaded.

4. Man-Hours. A crew of eight men worked the following hours:

Dismantling	4 men	77 mh
Loading	4 men	68 mh
Unloading	4 men	56 mh
Reassembly	4 men	78 mh
Total		279 mh

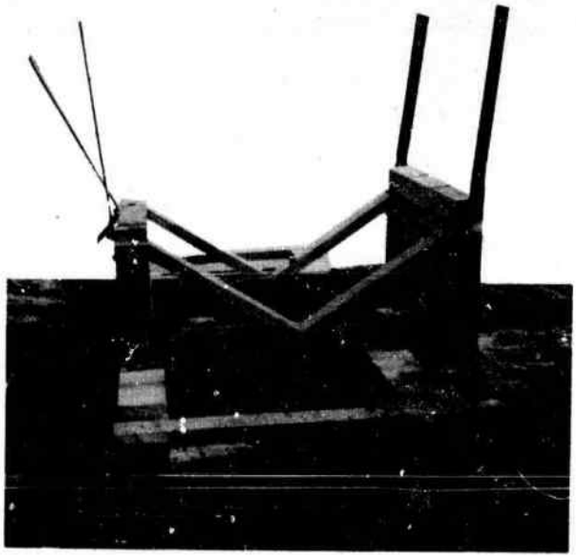


FIG. 38 SPECIAL SLED FOR D-8 TRANSMISSION

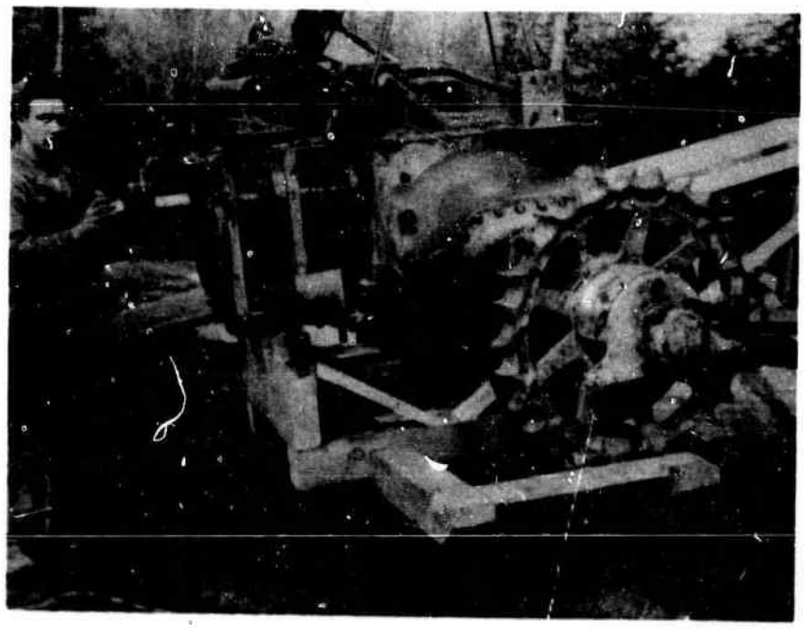


FIG. 39 TRANSMISSION MOUNTED ON SLED

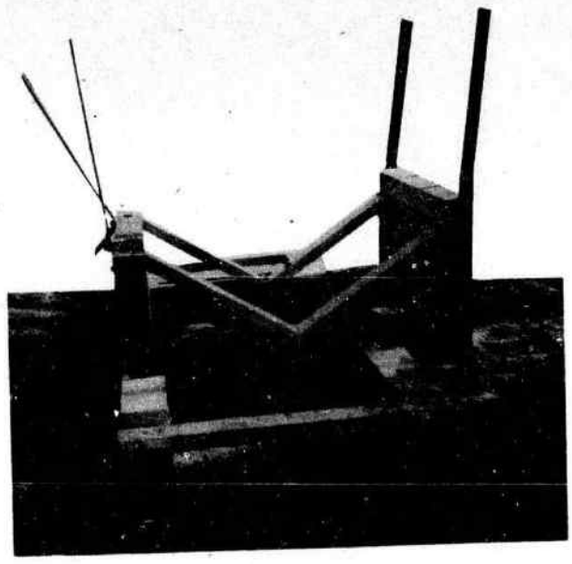


FIG. 38 SPECIAL SLED FOR D-8 TRANSMISSION

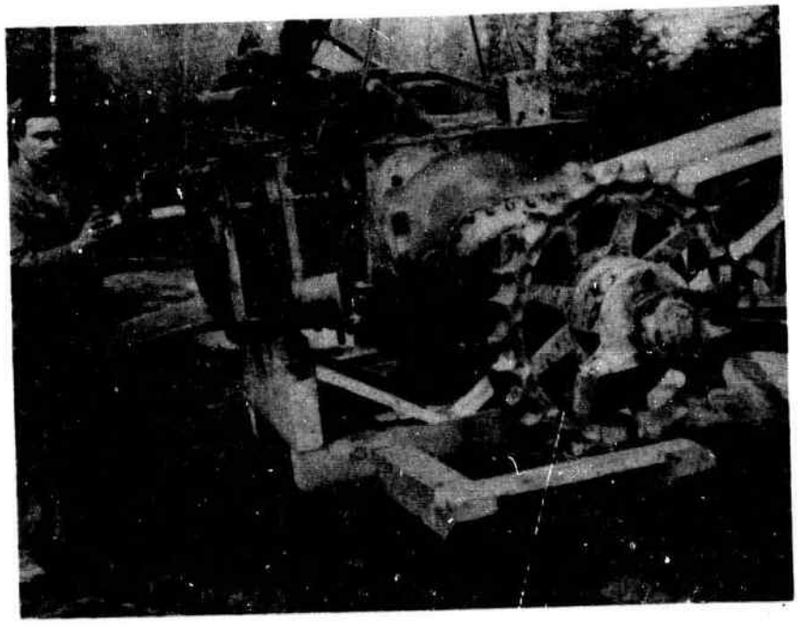


FIG. 39 TRANSMISSION MOUNTED ON SLED

FIG. 40 TRANSMISSION GROUP BEING LOADED

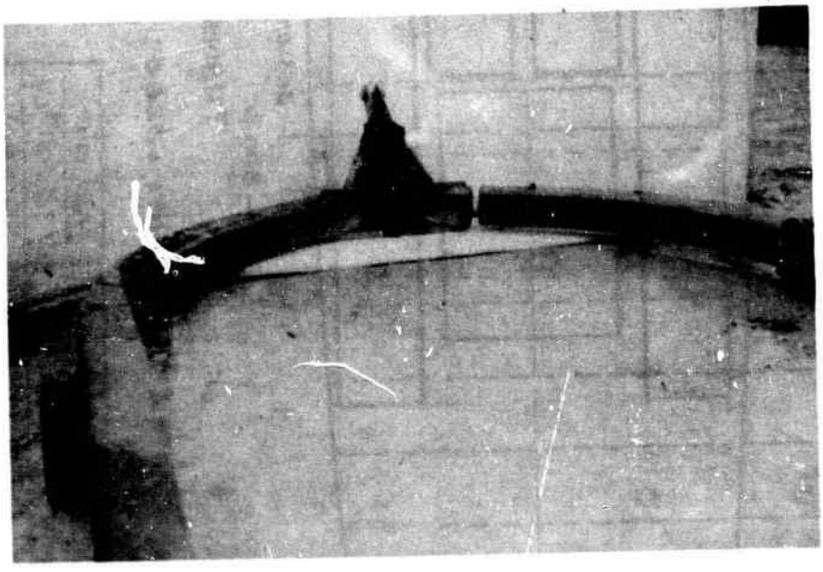
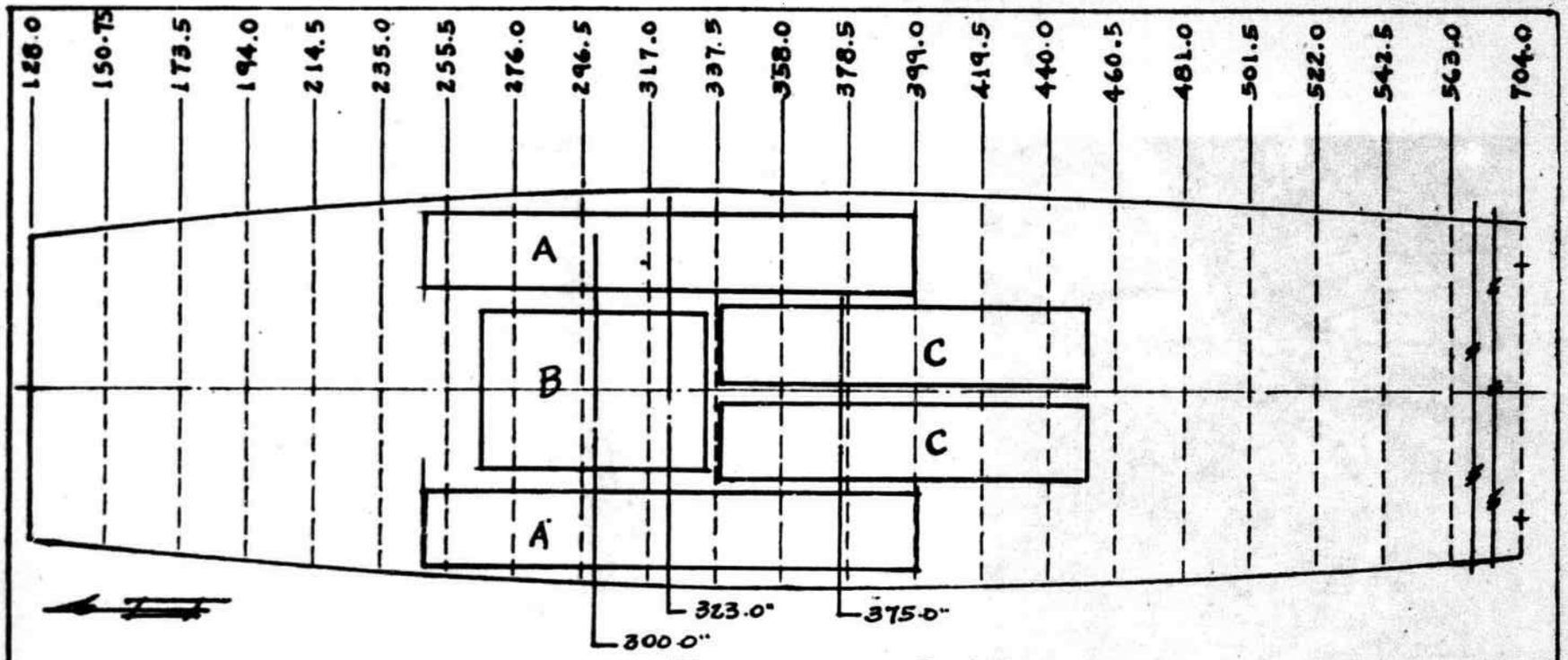


FIG. 41 CUT IN D-8 YOKE



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 324.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	TRACK	12'-0" x 2'-0"	3300# EA.
B	DRAWBAR	5'-6" x 4'-0"	780#
C	FRAME	9'-0" x 2'-0"	400# EA.

FIG.# 42.

THE ENGINEER BOARD
FT BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF D-8 TRACTOR (DIESEL)

DWG Nº 1 OF 6 — APP'VD BY

REVISED

DATE 2-2-44 | SCALE 1/4"=1'-0" | DWN BY H.W. | CHK'D BY R.P.H.

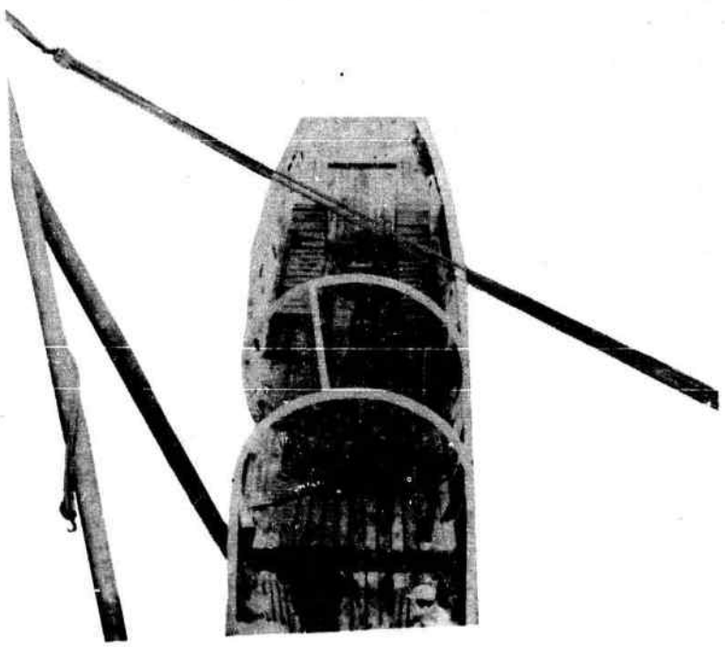
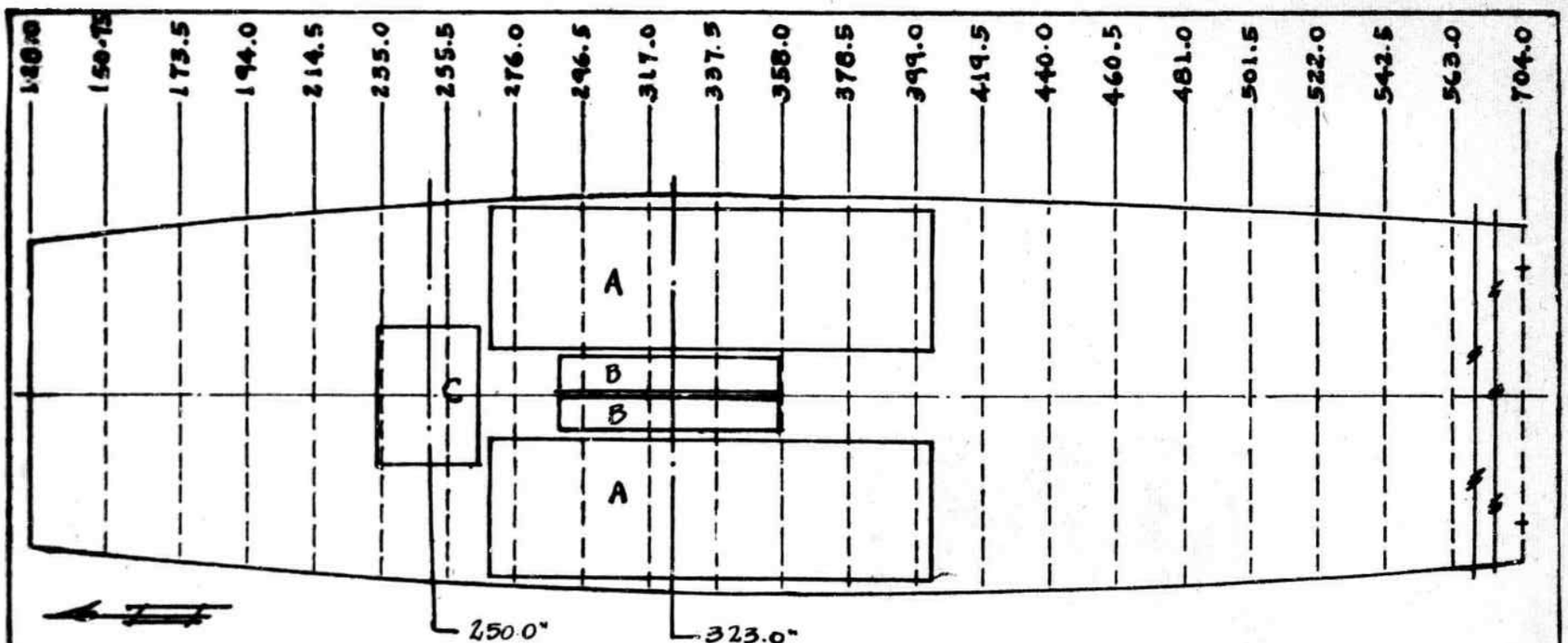


FIG. 43 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
	6600
Two tracks	780
Drawbar	800
Two frames	
Total	8180

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 324.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	TRACK ROLLER FRAME	10'-1" x 3'-9"	4060# EA.
B	RUNNING BOARDS	5'-4" x 1'-4"	2 RS. - 329#
C	BOX OF PARTS	3'-6" x 2'-6"	240#

ITEM 'C' INCLUDES BOLTS & NUTS, SPROCKET COVERS ETC.

FIG #44

THE ENGINEER BOARD
FT BELVOIR - VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF D-8 TRACTOR (DIESEL)

DWG Nº. 2 OF 6		APP'D BY	
REVISED			
DATE 2-2-44	SCALE 1/4"=1'-0"	DWN BY H.W.	CHK'D BY R.P.Y.

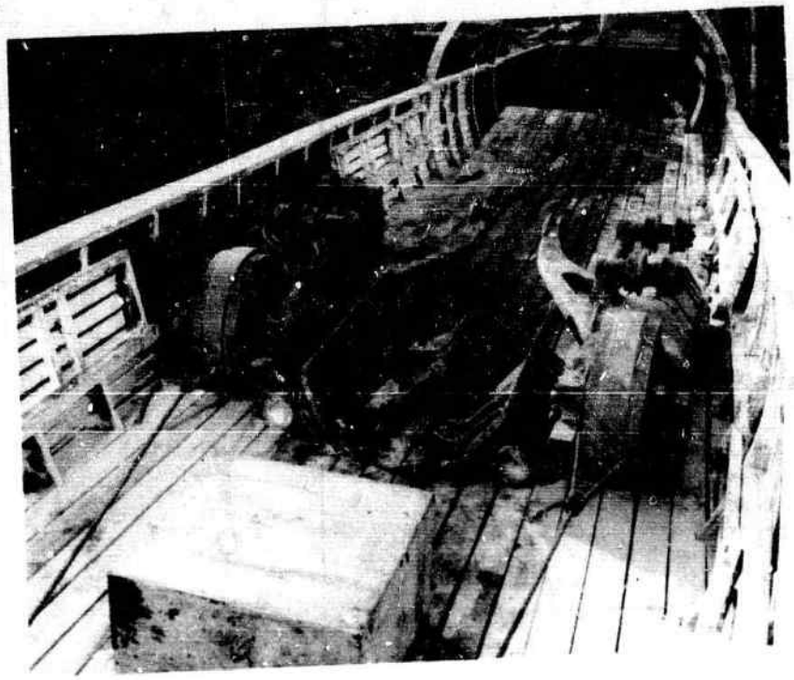
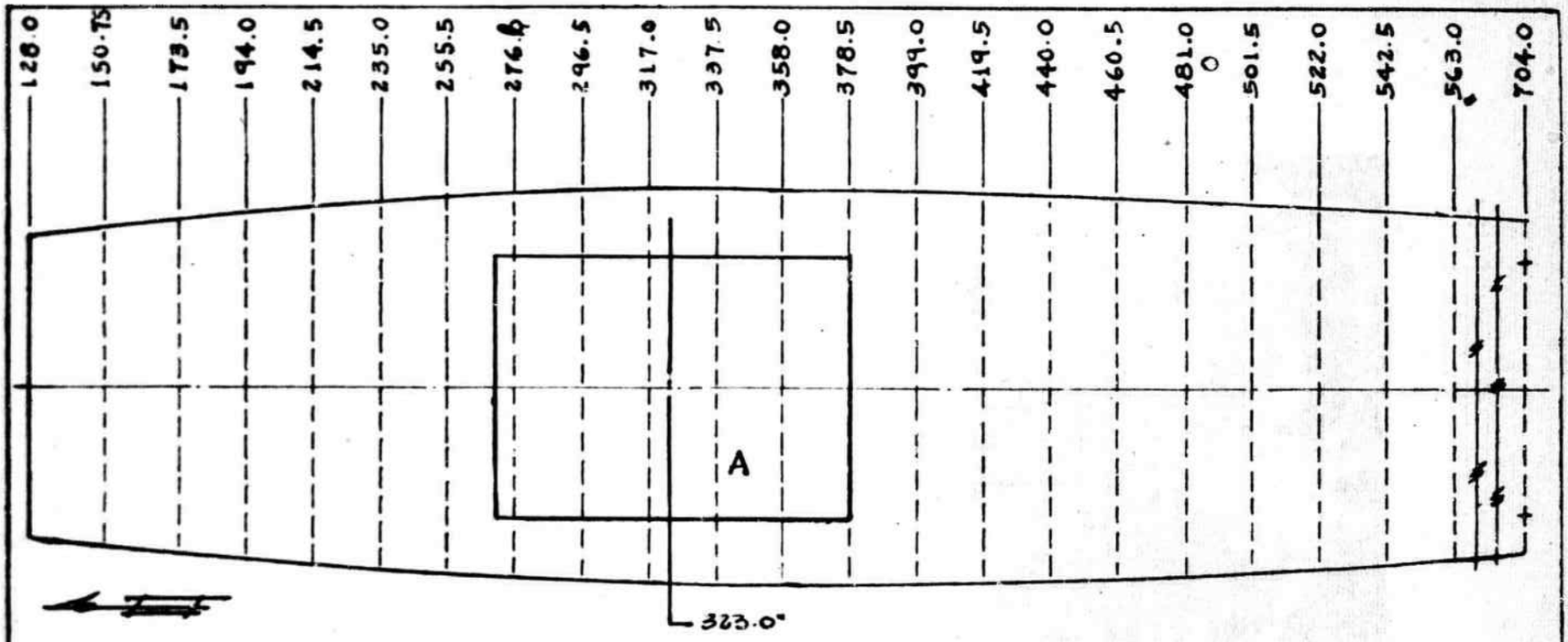


FIG. 45 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Two track roller frames	8120
Two running boards	329
Box of parts including:	
Nuts and bolts and sprocket covers	240
Total	8689

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 326.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	TRANS & REAR END	8'-8" x 6'-8"	8373*

FIG # 46

THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 3 OF D-8 TRACTOR (DIESEL)			
DWG Nº 3 OF 6		APP'VD BY	
REVISED			
DATE 2-2-44	SCALE 1/4"=1'-0"	DWN BY H.W.	CHK'D BY. R.P.Y.

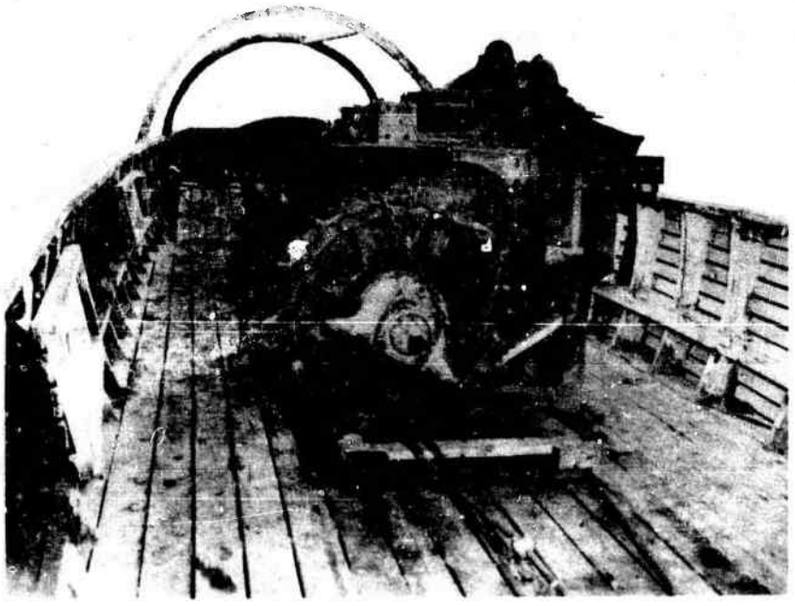
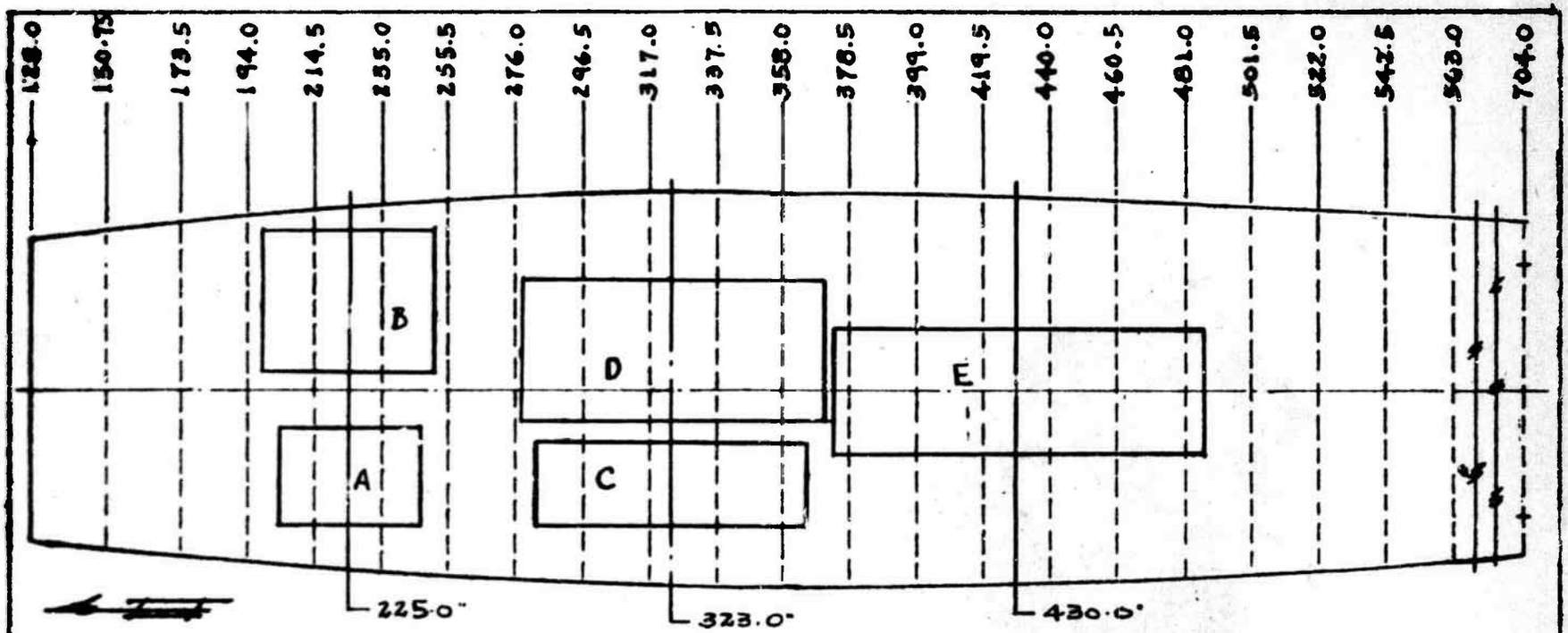


FIG. 47 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Transmission group	8648

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY .324.0"

	EQUIPMENT	APPROX. DIMENS.	WEIGHT.
A	BOX OF MISCELL PIECES	42" x 30"	454*
B	RADIATOR	52" x 44"	675*
C	EQUALIZER SPRING	81" x 26"	1440*
D	ENGINE.	90" x 45"	5110*
E	BELLY PAN.	109" x 39	810*

ITEM 'A' CONTAINS EXH. EXT, OIL CLEANER, FOOT BRAKE PEDALS, FENDER BRACKETS, REVING CLUTCH, REAR WINCH DRIVE SHAFT, INSTRUMENT PANEL.

FIG # 48

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 4 OF D-8 TRACTOR (DIESEL)

DWG Nº. 4 OF 6		APP'D BY.
REVISED		
DATE 2-5-44	SCALE 1/4"=1'0"	DWN BY H.N. CHK'D BY. RPY

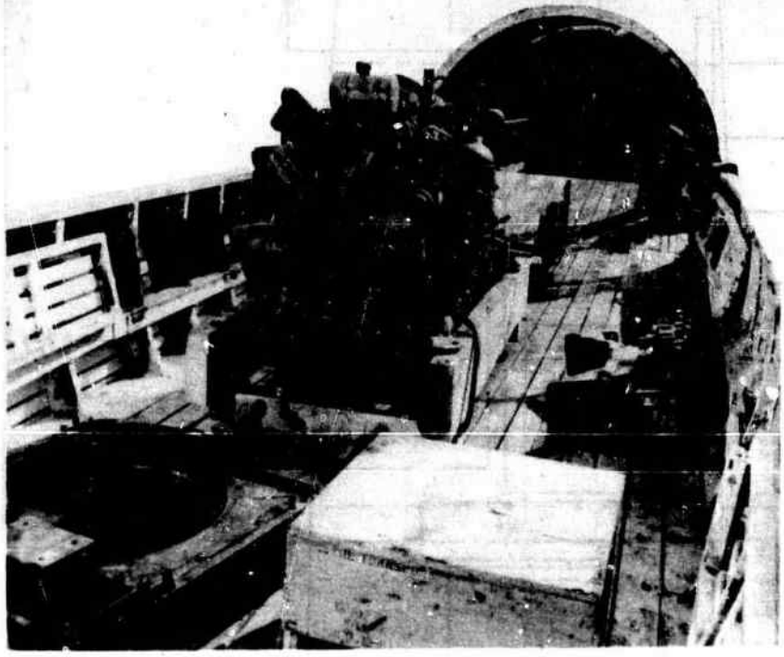
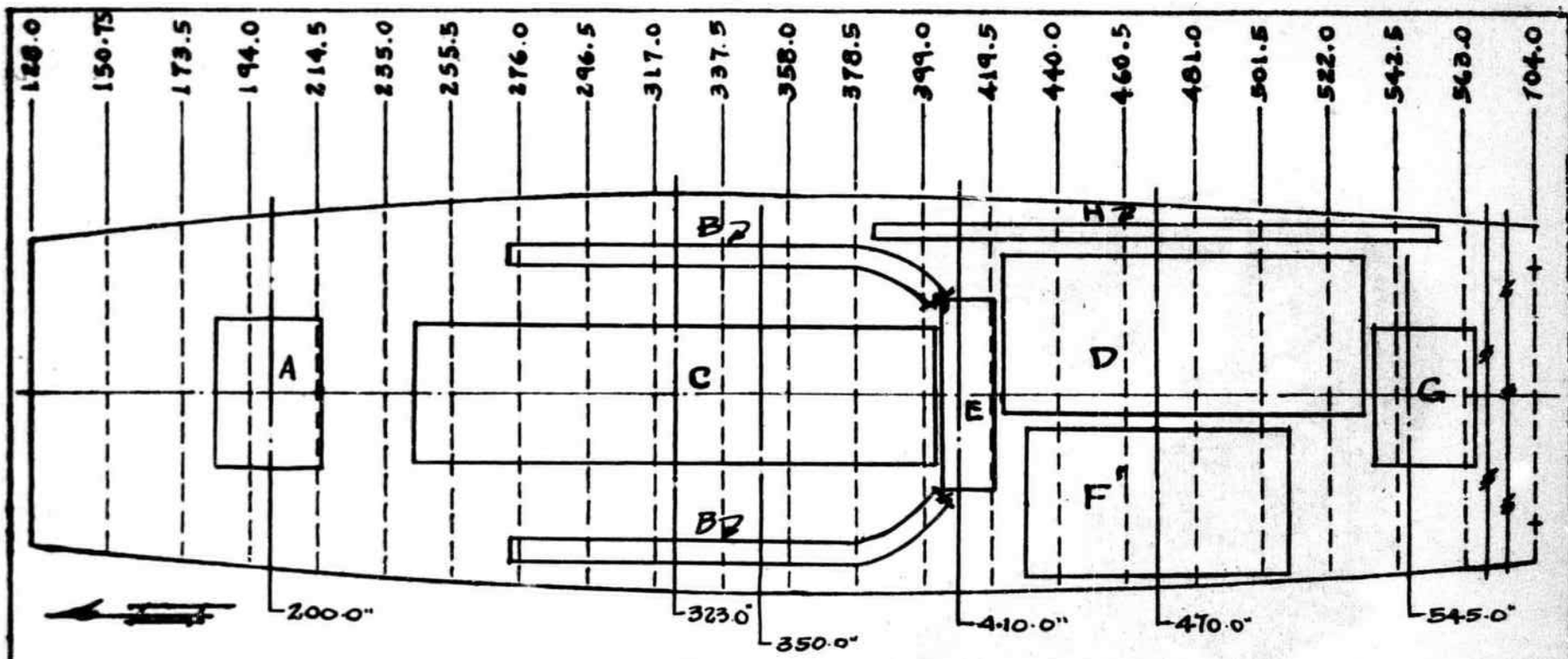


FIG. 49 MOCK-UP LOADED

PLANE NO. 4

Item	Weight
Radiator	675
Equalizer spring assembly	1440
Engine group	5110
Belly pan	810
Box containing:	
Exhaust extension	
Foot brake pedal	
Fender brackets	
Driving clutch	
Rear winch drive shaft	
Instrument panel	454
Total	8489

Loading	Unloading
4 men - 20.00 man-hours	4 men - 16.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 328.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	POWER CONTROL UNIT	44" x 31"	1540#
B	YOKE - 2 PIECES	138 x 31 129 x 53	800# 1190#
C	BLADE	152" x 42"	2830#
D	FRONT 'A' FRAME	105" x 48"	1090#
E	REAR 'A' FRAME	58" x 17"	125#
F	HOOD	76" x 44"	95#
G	BOX OF MISCELL PARTS	42" x 30"	245#
H	RIDGE BEAM	165" x 4"	127#

NOTE ITEM 'D' INCLUDES SEAT AND FUEL TANK WEIGHT 410#

FIG # 50

THE ENGINEER BOARD
FT BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GROUP No. 5 OF D-8 TRACTOR (DIESEL)

DWG No. 5 OF 6		APP'D BY.	
REVISED			
DATE 2-5-44	SCALE 1/4"=1'-0"	DWN BY H.W.	CHKD BY R.F.Y.

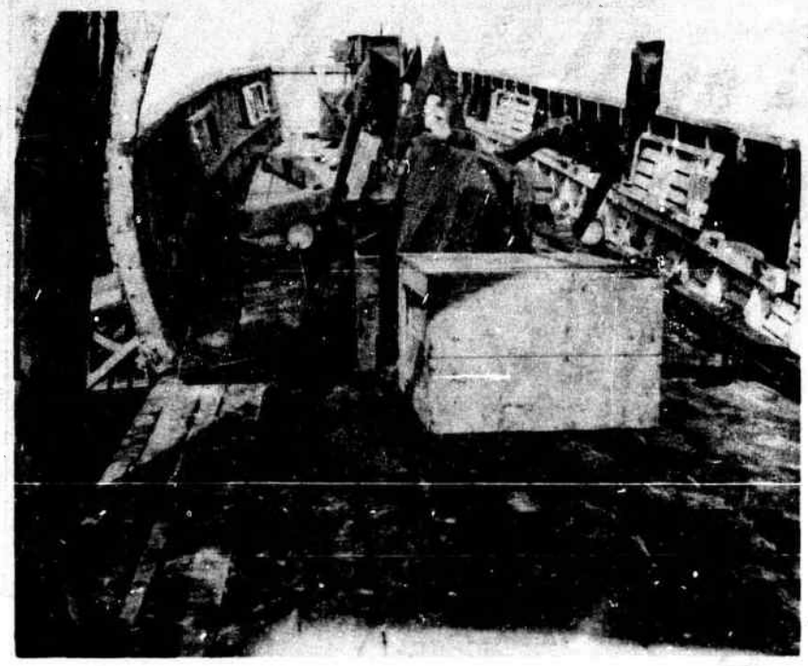
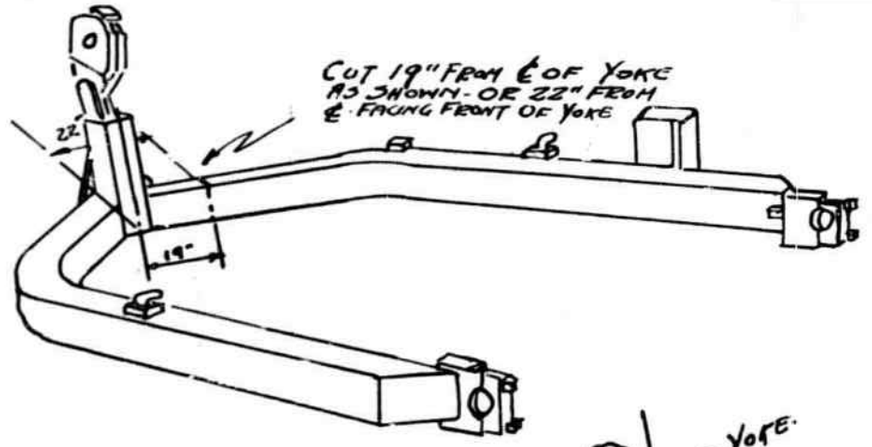


FIG. 51 MOCK-UP LOADED

PLANE NO. 5

Item	Weight
Rear winch power control	1540
Yoke (2 pieces)	1990
Dozer blade	2830
Front "A" frame	680
Seat with fuel tank	410
Rear "A" frame	125
Hood	95
Ridge beam	127
Box	245
Total	8042

Loading	Unloading
4 men - 16.00 man-hours	4 men - 12.00 man-hours



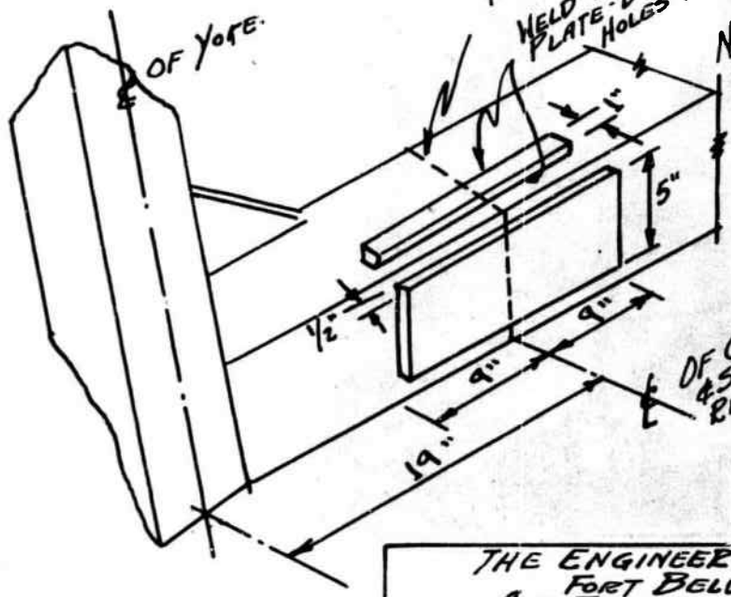


Fig. 52

THE ENGINEER BOARD FORT BELVOIR VA. AIR TRANSPORT SECTION			
WELDING & CUTTING FOR D-8 YOKE			
DWG NO 1		APPVD BY	
REVISED			
DATE 1-21-44	SCALE - NONE	DWN BY H.W.	CHKD BY

APPENDIX F

DISASSEMBLY, GROUPINGS, AND LOADING OF THE GRADER, ROAD, MOTORIZED, DIESEL-ENGINE-DRIVEN, 12-FOOT MOLDBOARD, CATERPILLAR MODEL 12

1. General. The Caterpillar No. 12 motor grader weighs 23,280 pounds, and requires three C-46 cargo planes for transportation.

2. Dismantling. A convenient sequence for disassembly follows:

(1) Moldboard, circle and blade assembly
(2) Scarifier and scarifier drawbars
(3) Scarifier gear box and arms
(4) Hood, hood door groups (2), and air cleaner
(5) Engine
(6) Cab floor boards
(7) Transfer case, differential, tandem drive group w/4 wheels
(8) Remove wheels from tandem drive group (See 7 above)
(9) Front steering mechanism, wheels and leaning wheel control box
(10) Lenaing wheel control bar
(11) Starting engine gas tank
(12) Control handles and back of seat

3. Loading. The frame must be loaded cab end first, as shown in Fig. 53. The engine should be bolted to its sled before loading. A standard sled is used at the front end.

4. Man-Hours. A crew of eight men worked the following periods:

Disassembly	4 men	30 mh
Loading	4 men	24 mh
Unloading	4 men	24 mh
Reassembly	4 men	32 mh
Total		110 mh

Eight men can prepare the grader for flight in approximately 12 hours. It will require about the same time for a similar crew to put the machine in operation after the landing.

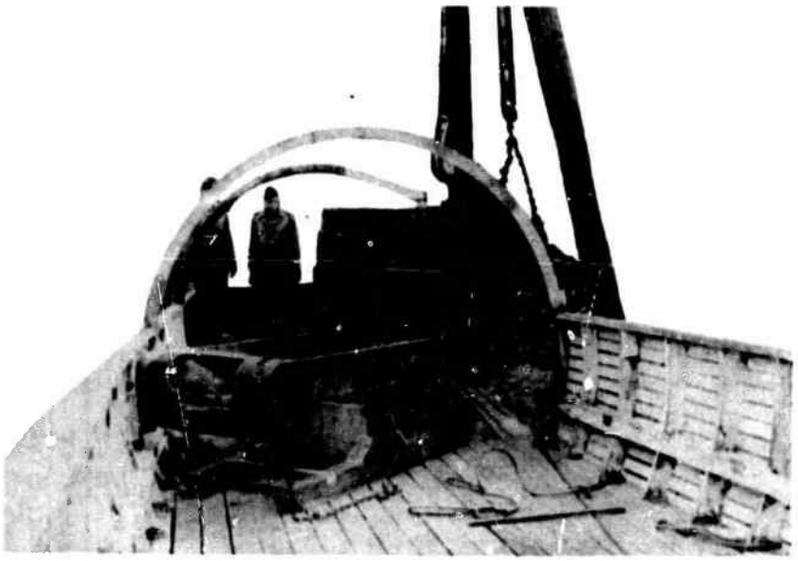
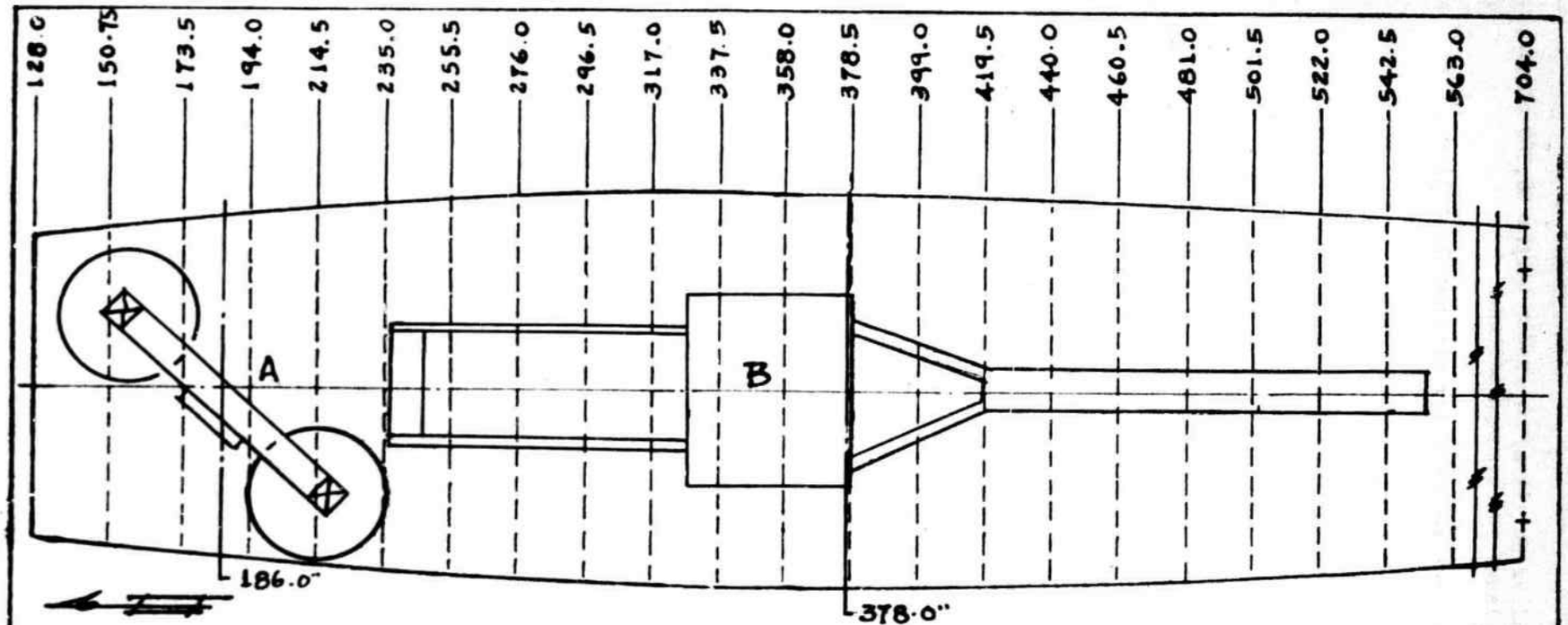


FIG. 53. FRAME BEING LOADED



TRANSPORT - C-46

NOTE:- APPROX. CENTER OF GRAVITY - 327.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	FRONT STEERING MECH. & WHEELS	120"x42"	1910#
B	CAB & FRAME	302"x60"	5675#

Fig # 54

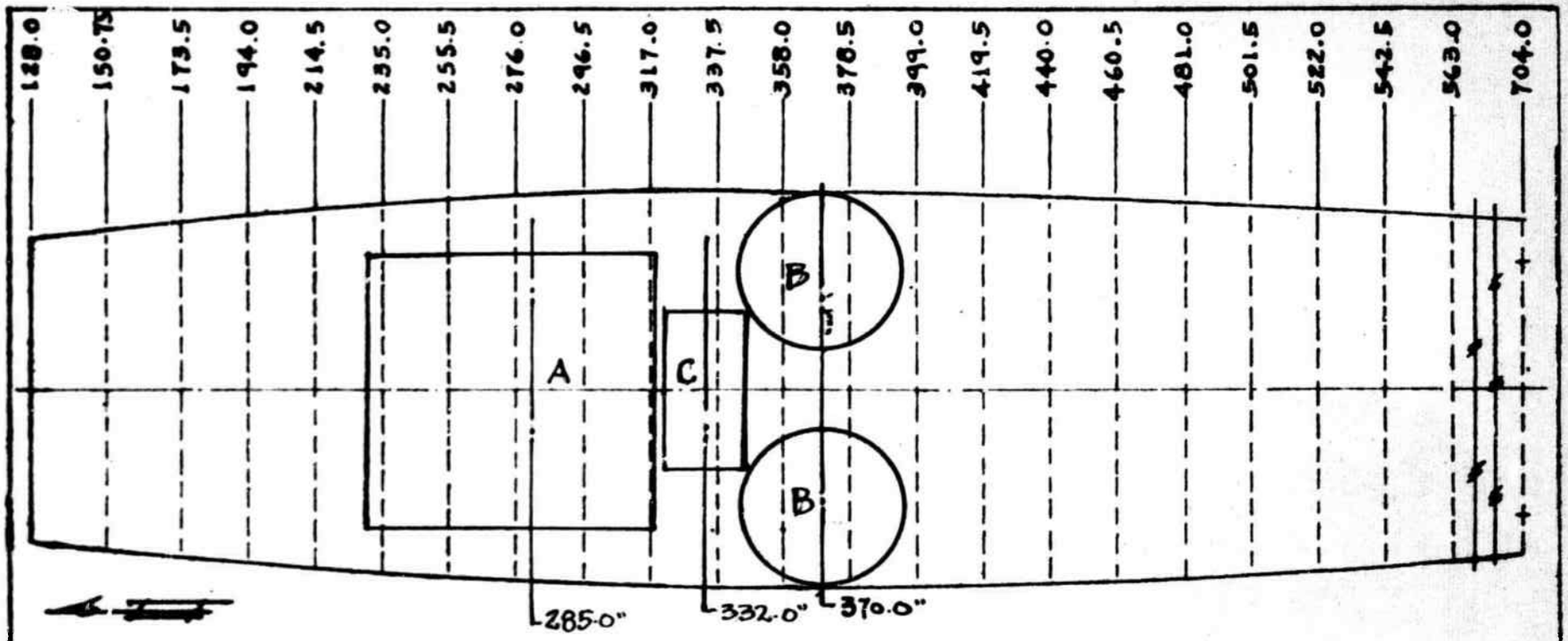
THE ENGINEER BOARD FT BELVOIR-VA. AIR TRANSPORT SECTION			
LOAD GROUP No 1 OF # 12 MOTOR GRADER (DIESEL)			
DWG No. 1 OF 3		APPVD BY.	
REVISED			
DATE 3-20-44	SCALE 1/4"=1'-0"	DWN BY H.H.	CHKD BY. W.S.

FIG. 54A MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Frame	5675
Front steering mechanism, wheels, leaning wheel control box	1720
Leaning wheel control bar	190
Total	7585

Loading	Unloading
4 men - 10.00 man-hours	4 men - 8.00 man-hours



TRANSPORT · C·46

NOTE.- APPROX. CENTER OF GRAVITY · 324.0"

	EQUIPMENT.	APPROX. DIMEN'S.	WEIGHT.
A	TANDAM DRIVE ASSM.	87 x 85	6280 #
B	REAR WHEELS	50" DIA.	4 PCS 1120 #
C	SCARIFIER GRP. BOX	48" x 24"	640 #

FIG 55

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF 12 GRADER (DIESEL)

DWG Nº. 2 OF 3		APP'VD BY.	
REVISED			
DATE 3-20-44	SCALE 1/4"-1'-0"	DWN BY. HL	CHKD BY. WSL

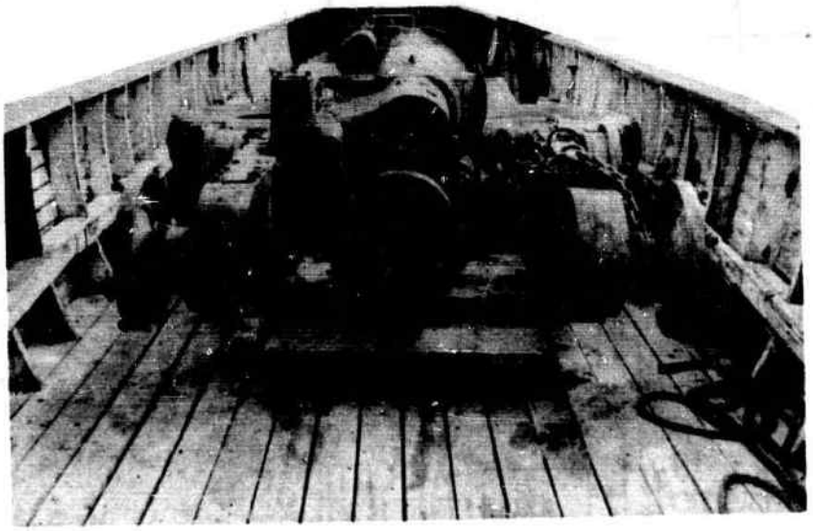
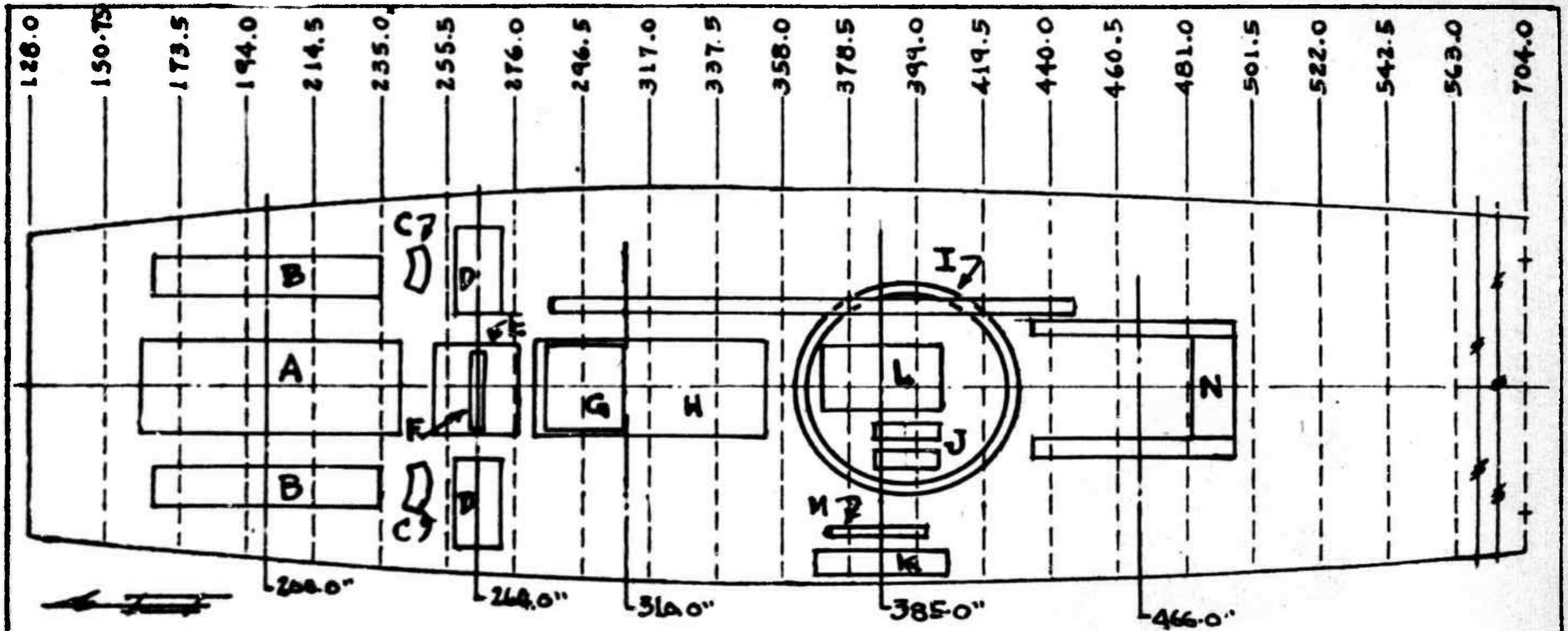


FIG. 56 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Tandem drive, transmission, transfer case and skid	6280
Scarifier gear box and arms	610
Rear wheels (4) and rim assemblies	1120
Total	8010

Loading	Unloading
4 men - 6.00 man-hours	4 men - 6.00 man-hours



TRANSPORT · C·46

NOTE:- APPROX. CENTER OF GRAVITY · 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	ENGINE	77x29	2720#
B	MOTOR-HOOD GROUP	67x12	2-Pcs.- 40# EA
C	TRUNNION BLOCKS	12x8	2-Pcs 24# EA
D	FLOOR BOARDS	27x14	2-Pcs 15# EA
E	STEERING MOTOR GAS TANK	28x25	100#
F	FRONT AXLE PIN	35x2	30#
G	FLOOR BOARD	30x24	40#
H	HOOD	68x31	140#
I	BLADE HOLD'G CIRCLE	154x66	2410#
J	STEPS	20x7	2-Pcs 15# EA
K	BACKREST	39x7	20#
L	HOOD PANELS	24x22	2-Pcs 25# EA
M	GEAR LEVER	32x4	10#
N	SCARIFIER & ARMS	60x41	630#

FIG # 57

THE ENGINEER BOARD
FT BELVOIR · VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 3 OF # 12 MOTOR GRADER (DIESEL)

DWG Nº 3 OF 3		APP'VD BY.	
REVISED			
DATE 3/20/44	SCALE 1/4"=1'-0"	DWN BY. H.H.	CHK'D BY. [illegible]

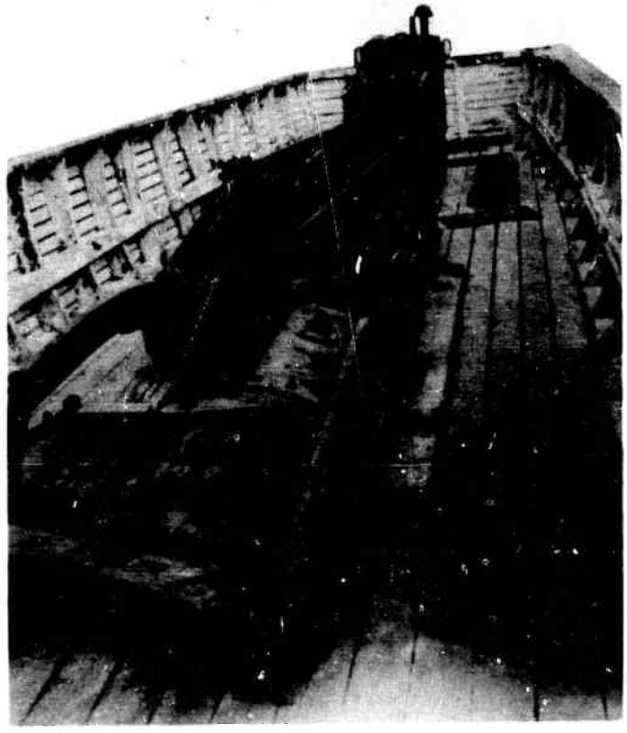


FIG. 58 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Engine	3720
Hood, hood door groups (2), air cleaner	312
Moldboard, circle and blade assembly	2910
Scarifier and scarifier drawbars	630
Starting engine gas tank	120
Total	7692

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours

APPENDIX G

THE DISASSEMBLY, GROUPINGS, AND LOADING OF THE GRADER, ROAD, MOTORIZED, DIESEL-ENGINE-DRIVEN, 12-FOOT MOLDBOARD, GALION MODEL 101-D

1. General. The Galion Model 101-D motor grader weighs approximately 22,500 pounds, and requires two and two thirds C-46 planes for transportation.

2. Dismantling. Following is the proper sequence for disassembly:

(1) Cab
(2) Moldboard
(3) Drain and disconnect hydraulic system at control manifold and pump
(4) Circle
(5) Scarifier
(6) Scarifier hang rods and lift shafts
(7) Front wheel assembly
(8) Engine
(9) Remove rear wheels from tandem
(10) Cut frame behing dashboard (See Figs. 60 and 67)

In reassembly the leaning wheel control rod, inner half, is inserted behind the king pin before mounting the front wheels. Except for this, reassembly is accomplished by reversing the above sequence. The frame is welded as shown in the sketch, Fig. 67.

3. Loading. The front part of the frame is the most difficult piece to load. Fig. 59 shows this assembly going through the door. Standard sleds are used under each end.

Since the cab is not taken along on an airborne mission, no provision is made for it in the load groupings.

4. Man-Hours. A nine-man crew worked the following periods:

Disassembly	4 men	28 mh
Cutting	1 man	½ mh
Loading	4 men	16 mh
Unloading	4 men	12 mh
Welding	1 man	2 mh
Reassembly	4 men	28 mh
Total		86½ mh

Approximate Total time in preparation of equipment:

For flight	9 men	10 hrs
For operation	9 men	9 hrs

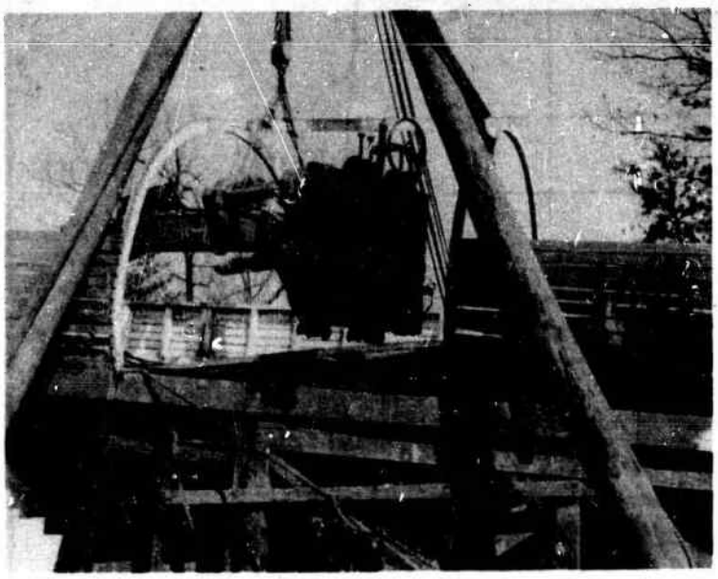


FIG. 59 FRONT FRAME BEING LOADED

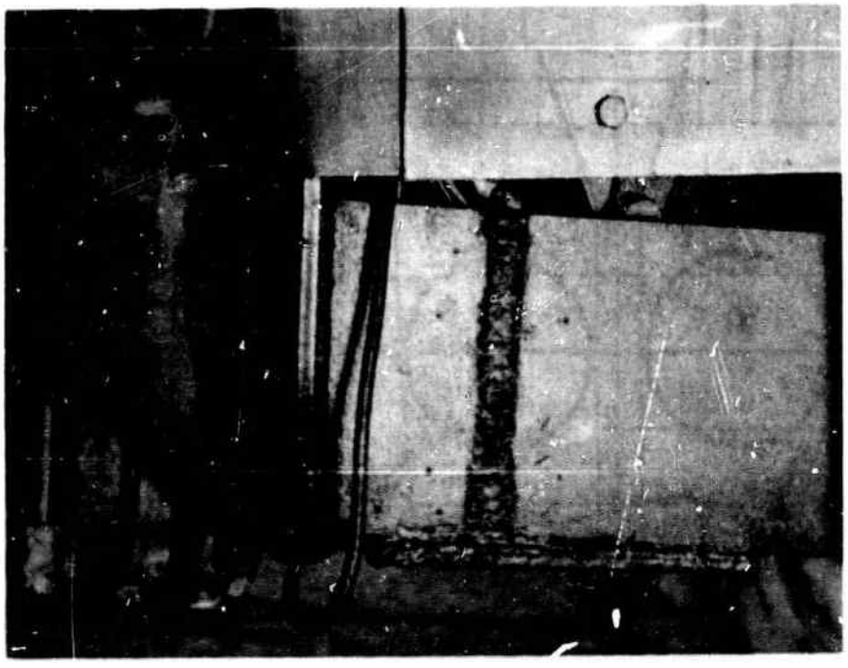
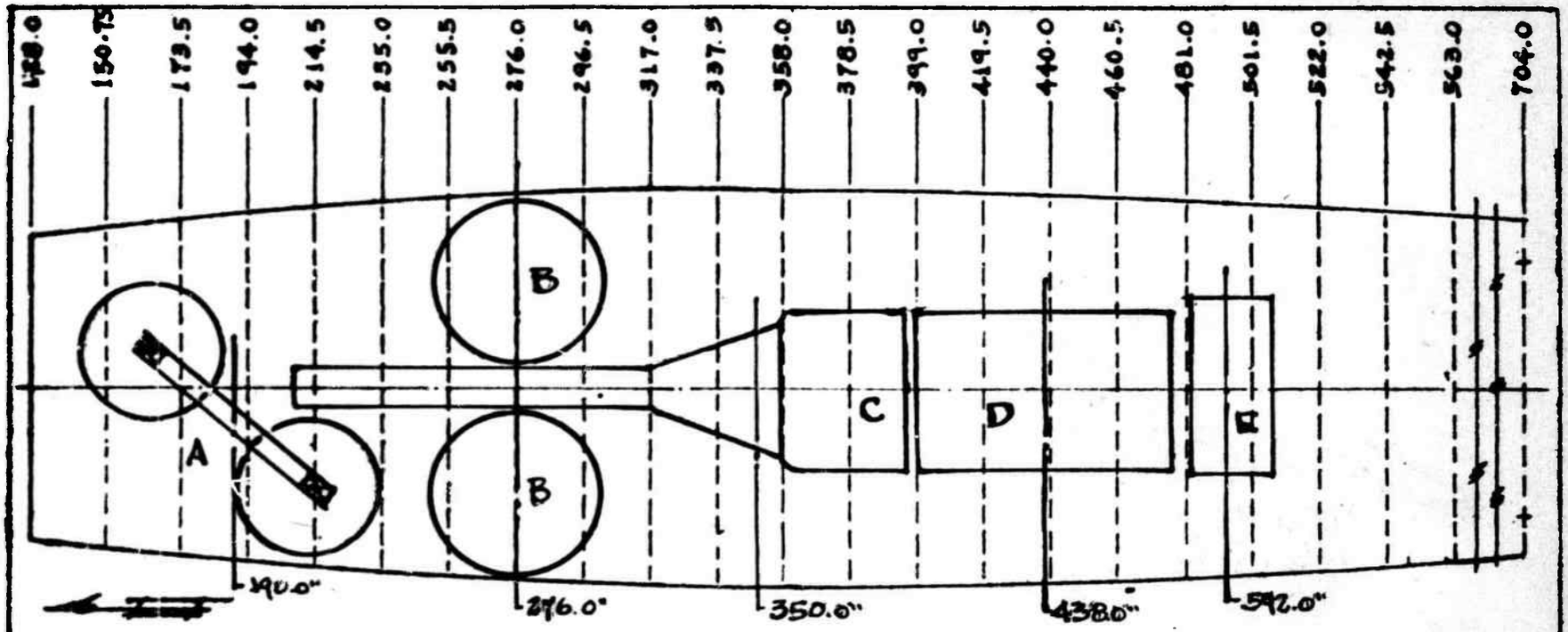


FIG. 60 WELD ON FRAME. NOTE REINFORCING FISHPLATE.



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	FRONT WHEELS	116" x 42"	1125"
B	REAR WHEELS	50" DIA	280" EA.
C	FRONT FRAME	180" x 47"	4330#
D	REAR FRAME	75" x 47"	2260#
E	FLOOR BOARDS	56" x 25"	130#

FIG #61

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP NO 1 OF GALION GRADER			
DWG NO 1 OF 4		APPVD BY	
REVISED			
DATE 5-6-44	SCALE 1/4"=1'-0"	DWN BY HW	CHKD BY WSH

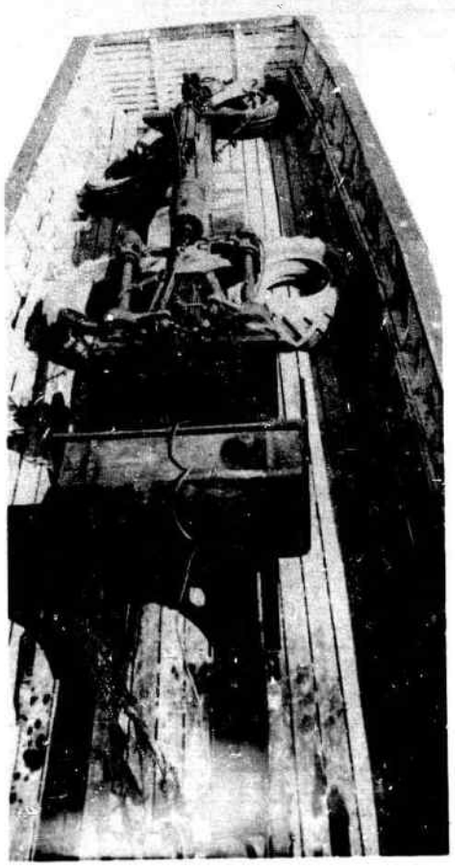
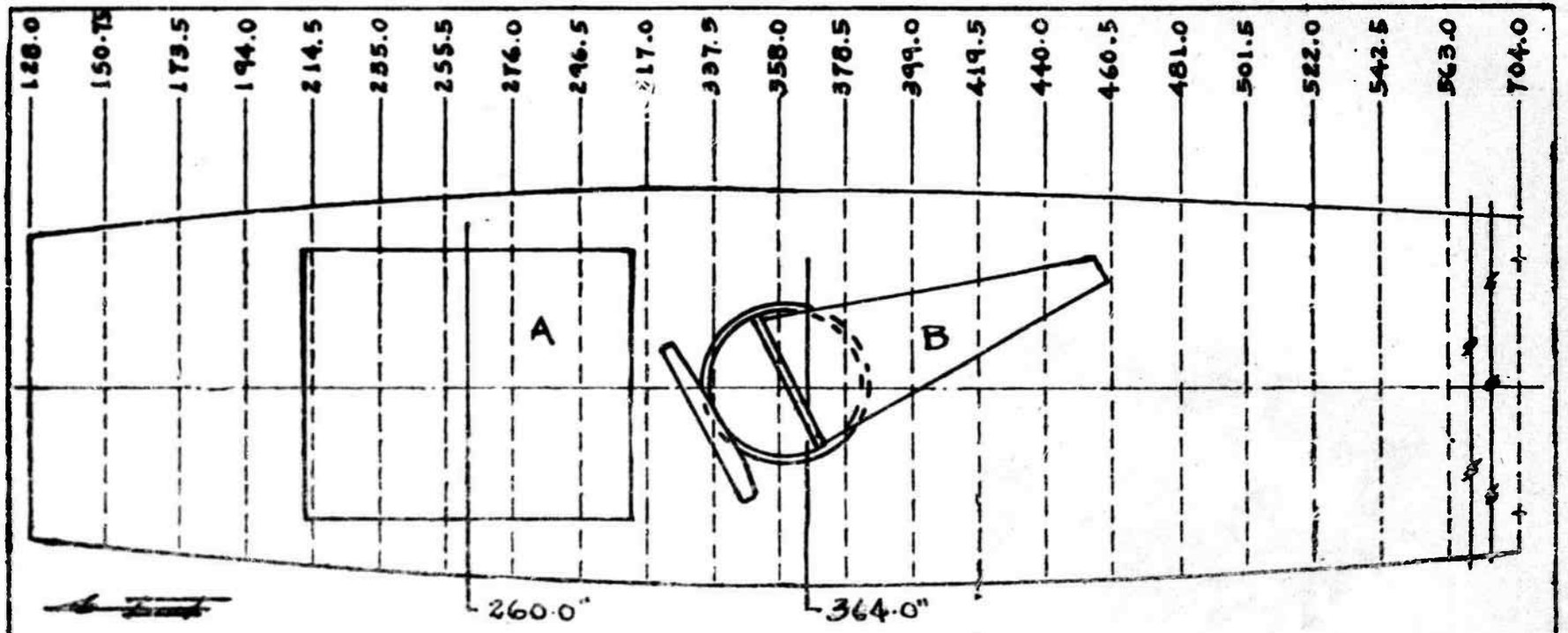


FIG. 62 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Front wheel assembly	1125
Rear wheels (2)	560
Front frame	4330
Rear frame	2260
Floor boards	130
Total	8405

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 320.0"

	EQUIPMENT	APPROX. DIMENS.	WEIGHT.
A	TANDEM & TRANS	96 x 84	6300#
B	CIRCLE ASSMBLY	132 x 61	2020#

FIG 63

THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP No 2 OF "101 GALLON GRADER			
DWG No. 2 OF 4		APP'VD BY	
REVISED			
DATE. 5-6-44	SCALE 1/4"-1'-0"	DWN BY. HH	CHKD BY.

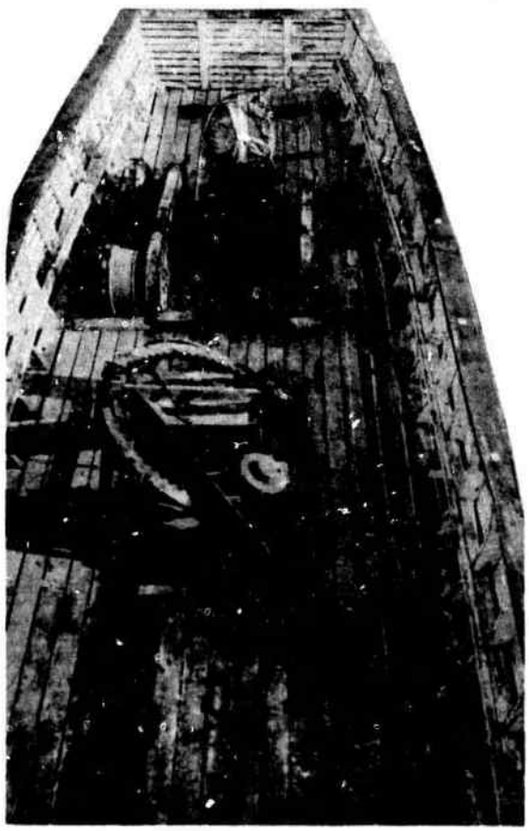
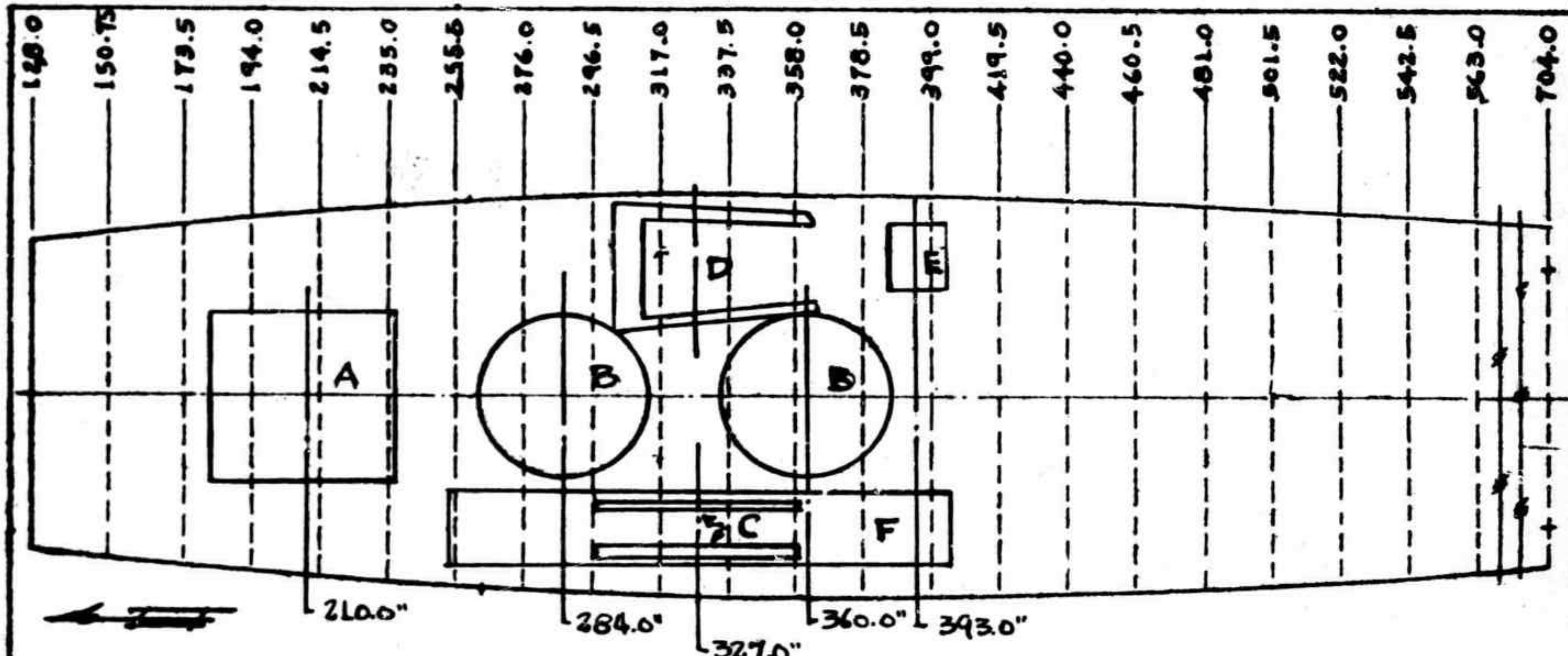


FIG. 64 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Tandem and transmission	6300
Circle	2020
Total	8320

Loading	Unloading
4 men - 4.00 man-hours	4 men - 3.00 man-hours



TRANSPORT · C-46

NOTE.- APPROX. CENTER OF GRAVITY · 322.0"

	EQUIPMENT.	APPROX. DIMENS.	WEIGHT.
A	ENGINE	54" x 52"	2880#
B	REAR WHEELS	50" DIA.	280# EA
C	TIE RODS	60" x 3"	20# EA
D	SCARIFIER	60" x 54"	742#
E	MISCELL PARTS.	20" x 18"	392#
F	HOLDBOARD.	146" x 22"	1000#

FIG #65

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 3 OF GALION #101 GRADER.

DWG NO. 3 OF 4 — APPVD BY

REVISED

DATE 5-6-44 — SCALE 1/4"=1'-0" — DWN BY H.W. — CHKD BY W.S.

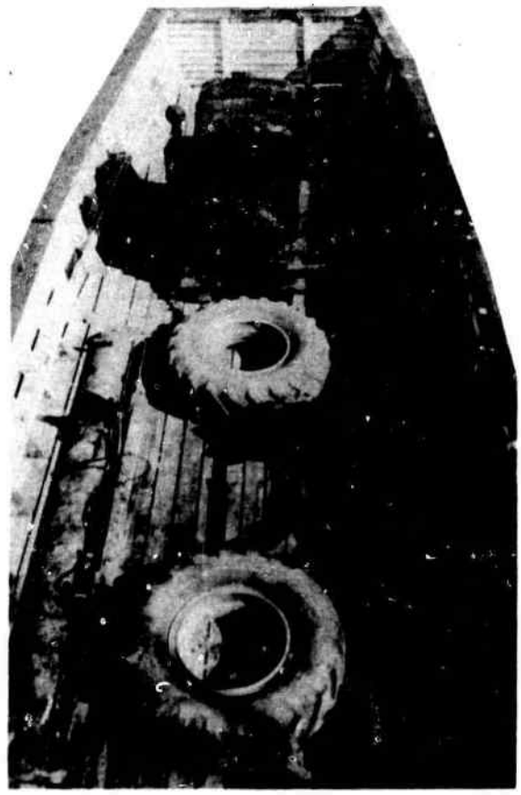


FIG. 66 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Engine	2980
Rear wheels (2)	560
Tie rods	40
Scarifier	742
Miscellaneous	392
Moldboard	1000
Total	5714

Loading	Unloading
4 men - 4.00 man-hours	4 men - 3.00 man-hours

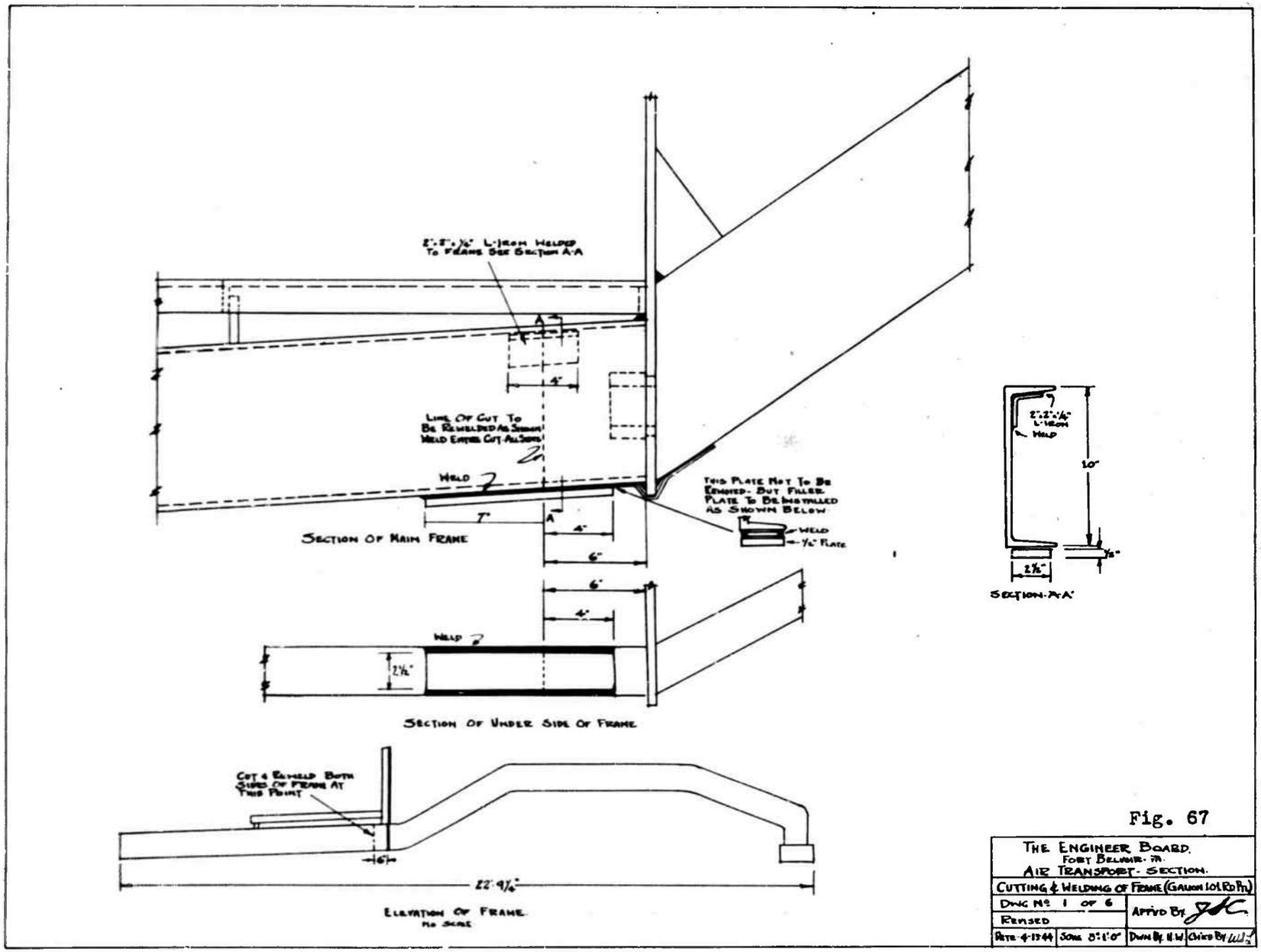


Fig. 67

THE ENGINEER BOARD. FORT BELVOIR. VA. AIR TRANSPORT - SECTION.			
CUTTING & WELDING OF FRAME (GALION 10L ROTH)			
DWG No 1 OF 6		APPVD BY	
REVISED			
DATE 4-1944	SCALE 3"=1'-0"	DWN BY H.W.	CHKD BY

APPENDIX H

THE DISASSEMBLY, GROUPINGS, AND LOADING OF THE GRADER, ROAD, MOTORIZED, DIESEL-ENGINE-DRIVEN, 12-FOOT MOLDBOARD, ADAMS MODEL 512

1. General. Total weight of the Adams 512 motor grader, as prepared for air transport, is approximately 24,410 pounds, and requires three C-46 cargo planes for transportation.

2. Dismantling. There are no difficulties in disassembly or reassembly. Proper sequence for disassembly is:

(1) Scarifier
(2) Moldboard
(3) Circle assembly
(4) Fuel tank
(5) Tool box and battery box
(6) Disconnect all universals at control boxes
(7) Remove all control rods from frame
(8) Cab
(9) Remove cross member from rear end of frame
(10) Block up frame and roll out tandem, transmission and engine as one unit.

(a) Remove engine
(b) Remove tandems (drain oil)

(11) Front wheel assembly
(12) Remove all gear boxes

3. Loading. The frame, which requires a special sled (See Fig. 5), is loaded rear end first, as shown in Fig. 68. Note that the frame is mounted upside down on the sled.

In loading the engine, the exhaust pipe must be removed before the assembly will pass through the door. To facilitate lifting this assembly into the plane, "eyes" as shown in the sketch, Fig. 76, should be attached.

4. Man-Hours. A crew of eight men worked the following periods:

Disassembly	3 men	30 mh
Loading	4 men	30 mh
Unloading	4 men	24 mh
Reassembly	4 men	48 mh
Total		132 mh

Approximate total time in preparation of equipment:

For Flight	7 men	11 hours
For Operation after Landing	8 men	13 hours

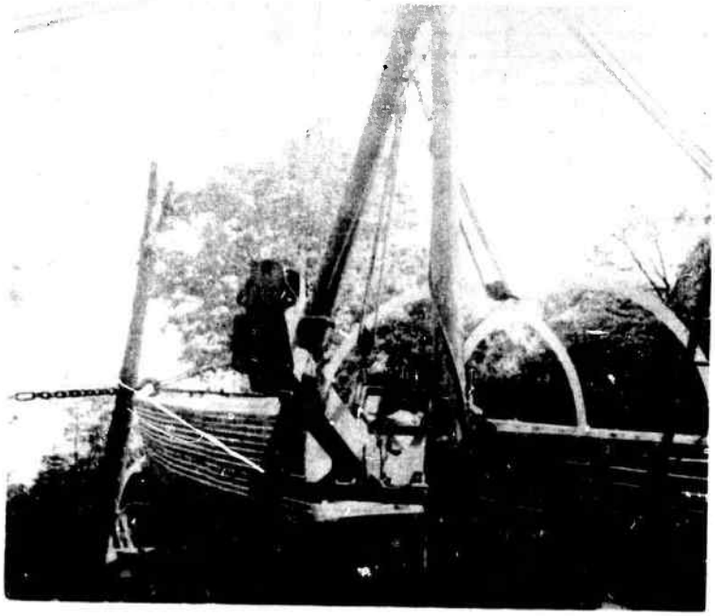
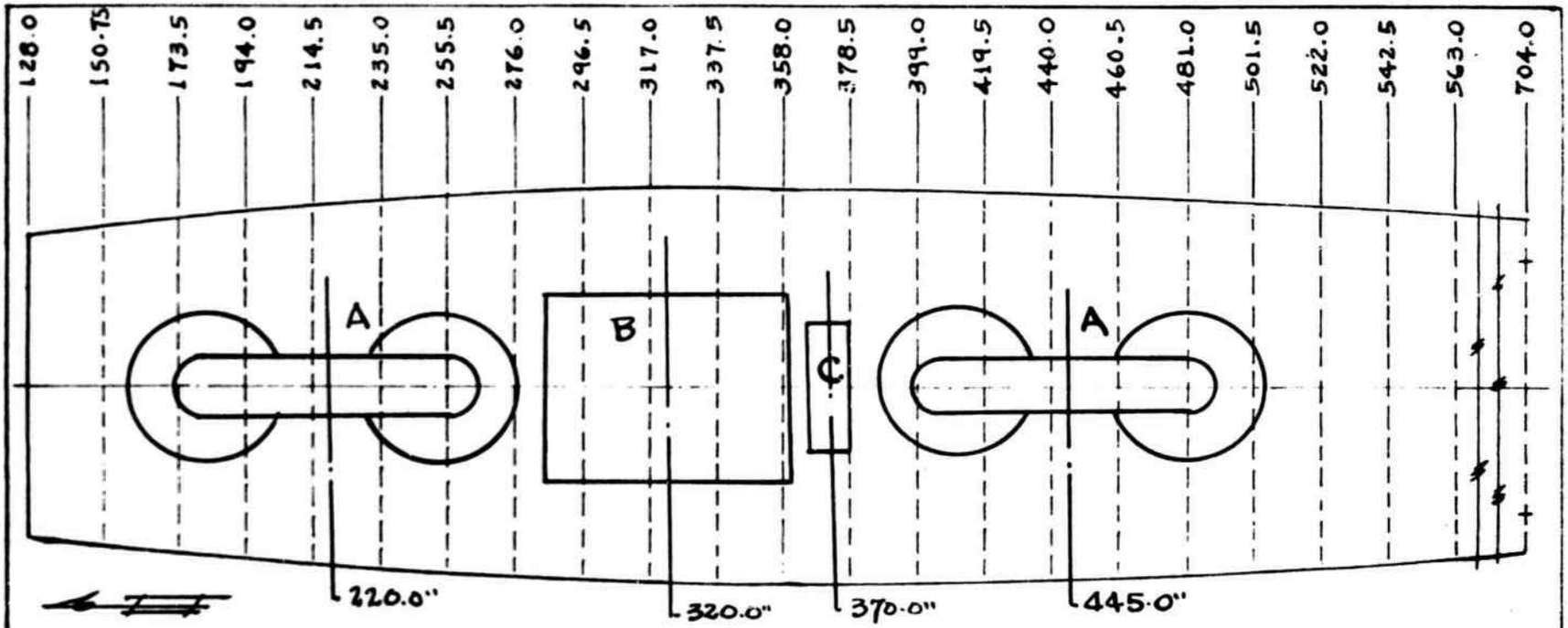


FIG. 68 FRAME BEING LOADED

FIG. 69 CONTENTS OF MISCELLANEOUS PARTS BOX



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 328.0

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	TANDEM	111"x50"	2580# EA
B	TRANSMISSION	72"x58"	3070#
C	FUEL TANK & FUEL	40"x13"	420#

FIG # 70

THE ENGINEER BOARD
FT BELVOIR VA
AIR TRANSPORT SECTION

LOAD GROUP No 1 OF ADAMS MOTOR GRADER

DWG No 1 OF 4		APPVD BY.	
REVISED			
DATE 7-18-44	SCALE 1/4"-1'0"	DWN BY H-W	CHKD BY

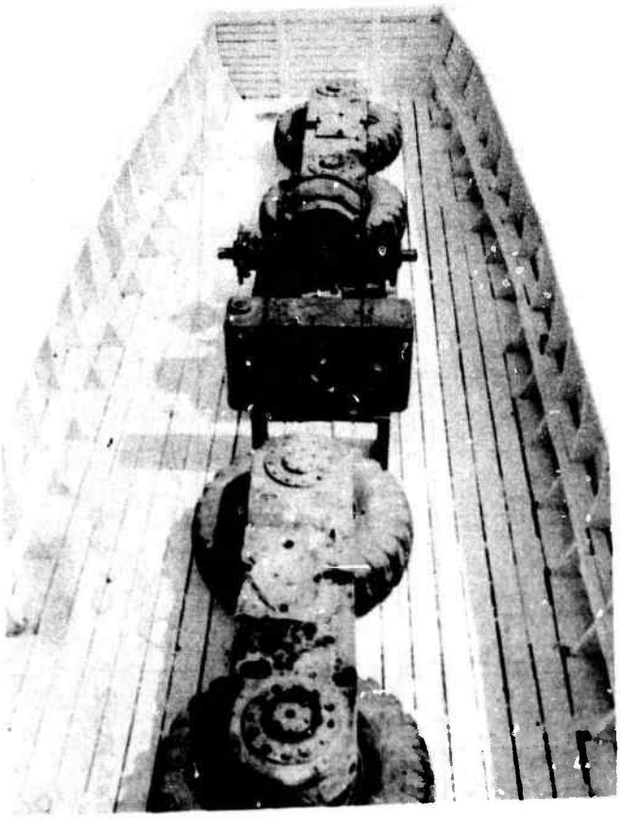
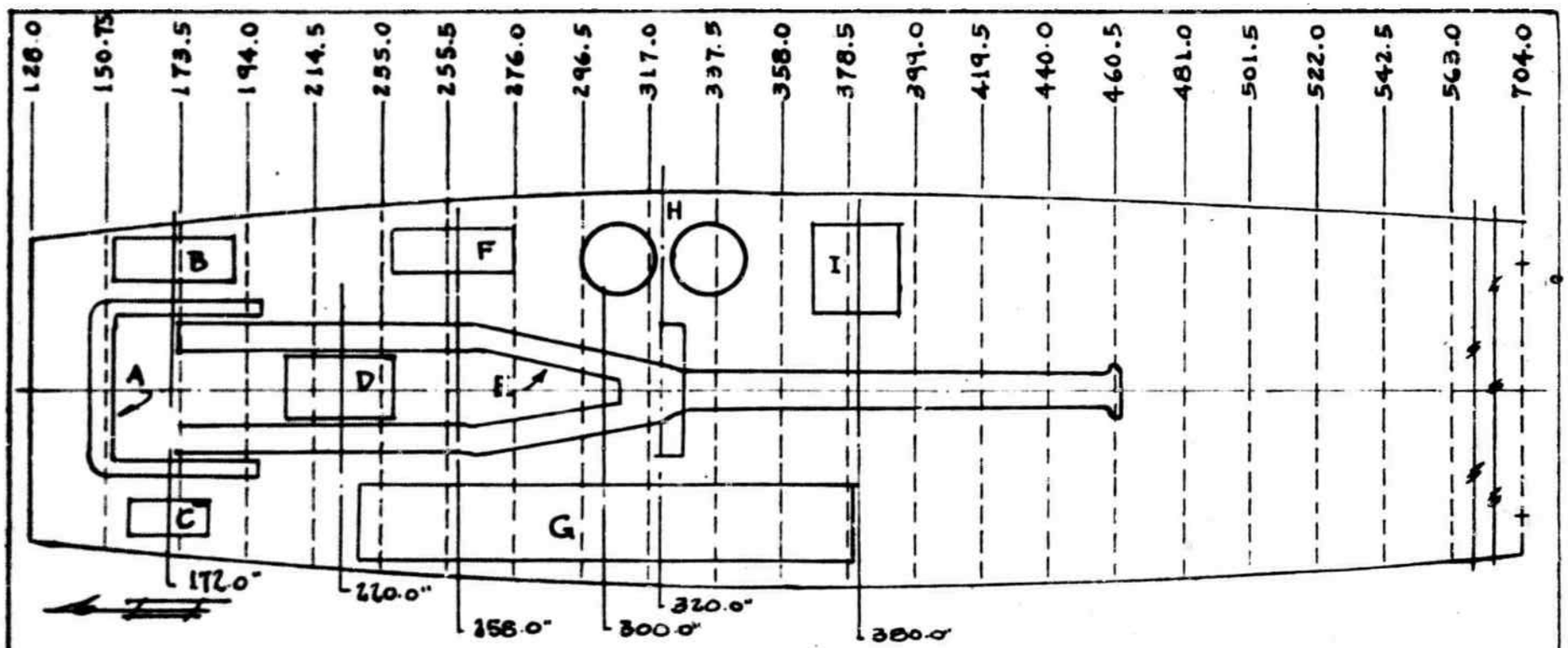


FIG. 71 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Tandem	2580
Transmission	3070
Fuel tank and fuel	420
Tandem	2580
Total	8550

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT · C-46

NOTE - APPROX. CENTER OF GRAVITY · 321.0

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	SCARIFIER	54" x 49"	530#
B	TOOL BOX	36" x 12"	140#
C	BATTERY BOX	24" x 10"	60#
D	SCARIFIER LIFT GEAR BOX	33" x 27"	490#
E	FRAME	276" x 41"	3800#
F	END OF FRAME	36" x 12"	205#
G	MOLDBOARD	144" x 24"	1060#
H	BLADE LIFT GEAR BOXES	21" DIA.	2 = 630#
I	CIRCLE SIDE SHIFT	27" x 27"	375#

FIG. 72

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF ADAMS MOTOR GRADER

DWG Nº 2 OF 4		APPVD BY	
REVISED			
DATE 7-12-44	SCALE 1/4" = 1'0"	DWN BY H.W	CH'KD BY

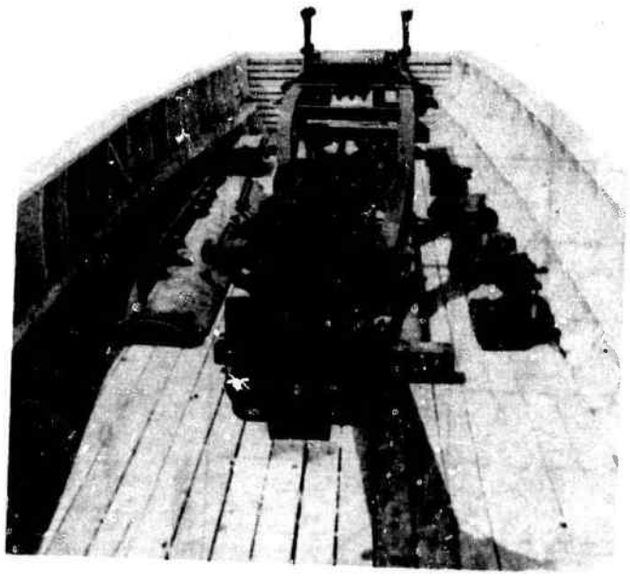
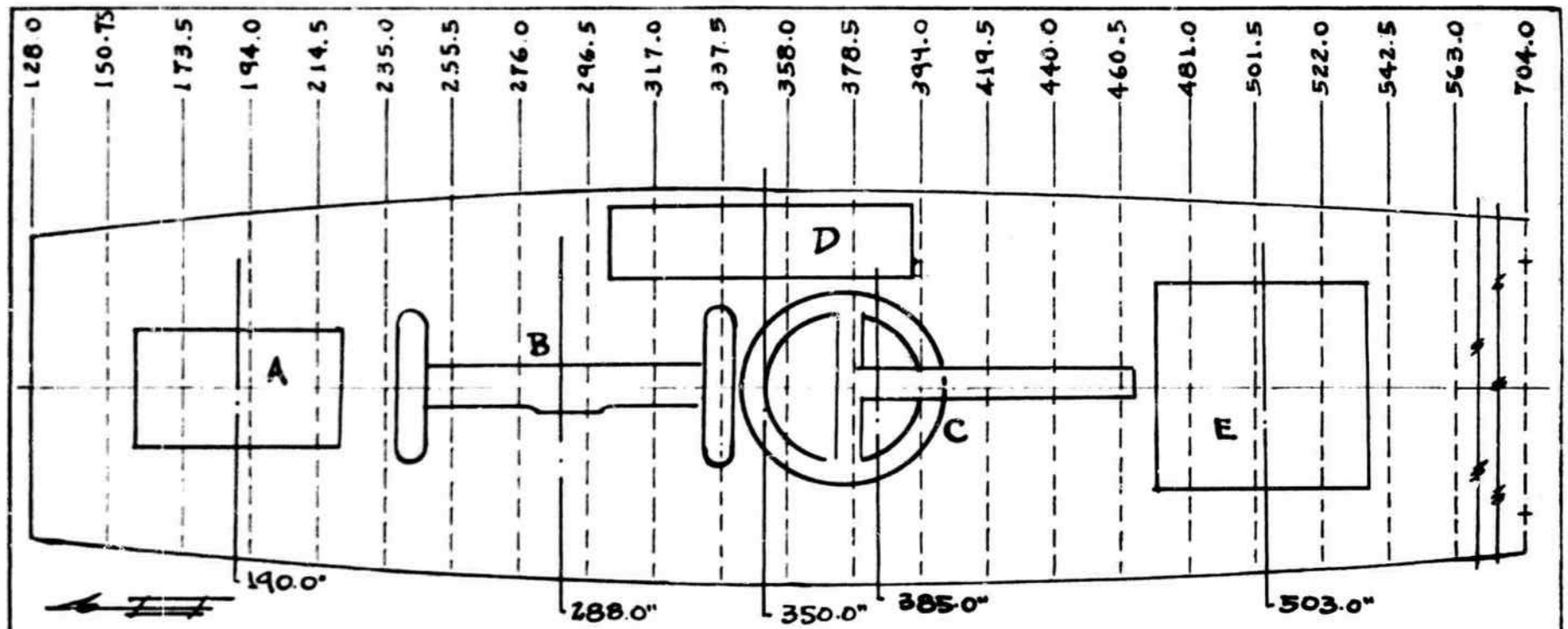


FIG. 73 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Scarifier	
Scarifier lift gear box	530
Tool box	450
Battery box	140
Frame	60
Blade	3800
End of frame	1060
Right and left blade lift gear boxes	205
Circle side shift	630
	375
Total	7250

Loading	Unloading
4 men - 10.00 man-hours	4 men - 8.00 man-hours



TRANSPORT · C·46

NOTE · APPROX. CENTER OF GRAVITY · 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	ENGINE	60" x 36"	2975#
B	FRONT WHEELS	96" x 48"	2000#
C	CIRCLE REVERSE	117" x 60"	1985#
D	MISC. PARTS BOX	80" x 24"	650#
E	CAB	64" x 64"	1000#

FIG # 74

THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 3 OF ADAMS MOTOR GRADER			
DWG Nº. 3 OF 4		APPVD BY.	
REVISED			
DATE 7-18-44	SCALE 1/4"·1'·0"	DWN BY HW	CHKD BY.

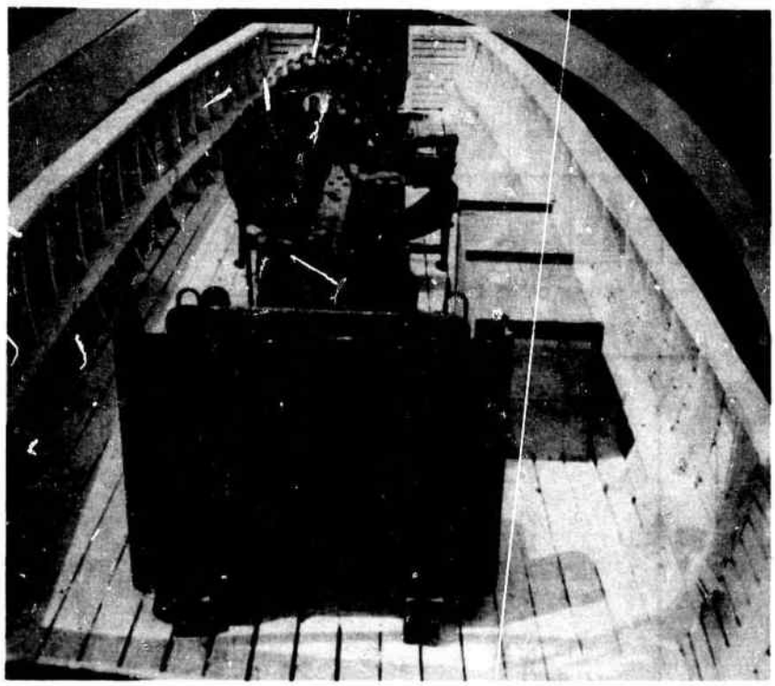
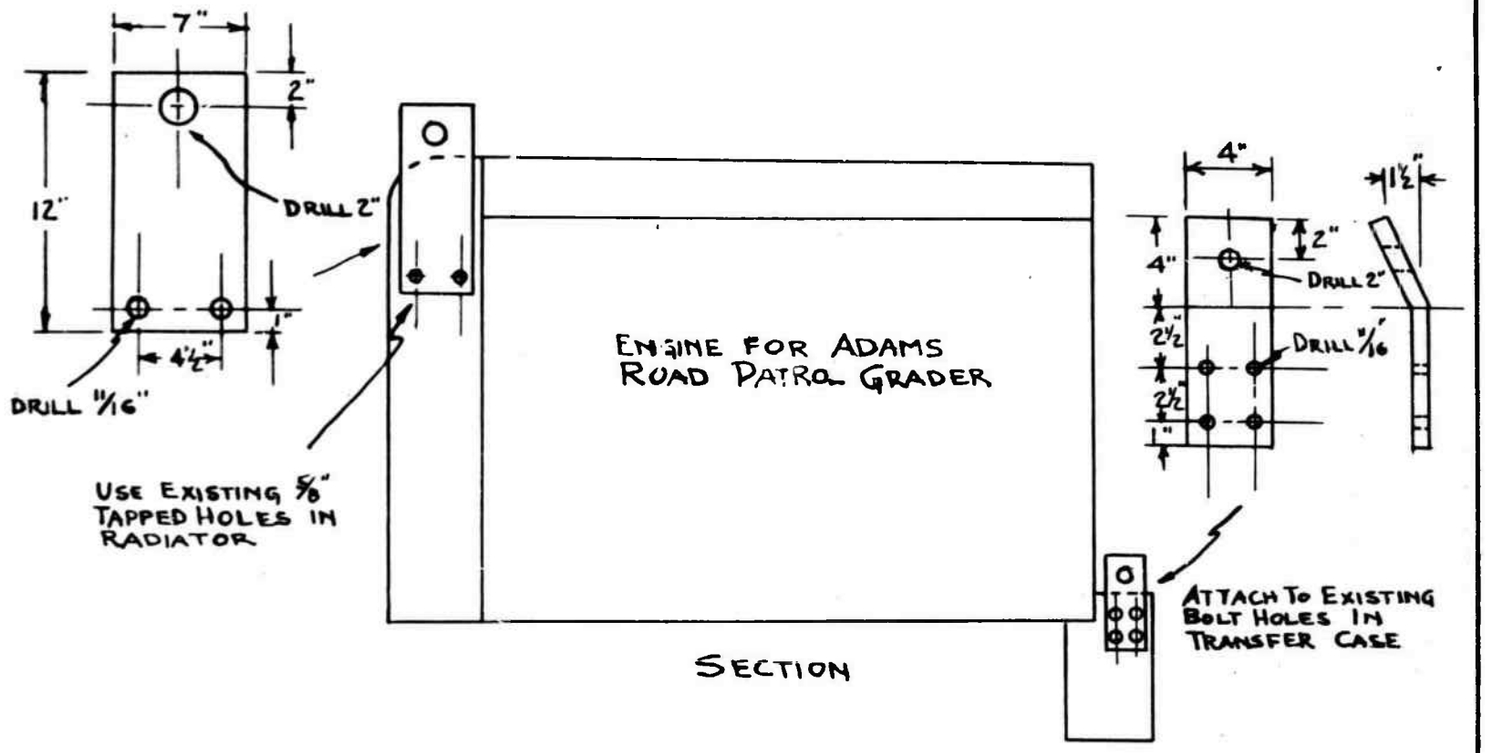


FIG. 75 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Engine	2975
Front wheel assembly	2000
Circle reverse	1985
Cab	1000
Miscellaneous box: steering wheel and control rod; throttle control cable; control rods for scarifier, circle side shift, blade lift, circle reverse, leaning wheel, gear shift; power take off shaft; brake and clutch shafts and pedals; steps; steering control gear box; cab side guards; rear hitch cover plate, and scarifier teeth (11)	650
Total	8610

Loading	Unloading
4 men - 12.00 man-hours	4 men - 10.00 man-hours



NOTE - TWO PLATES OF EACH REQ'D: USE ½" PL (20.4# PL)

Fig. 76

THE ENGINEER BOARD FORT BELVOIR, VA. AIR TRANSPORT SECTION			
LOADING PADS FOR ADAMS ROAD PATROL (ENGINE)			
DWG NR 7 OF 7		APP'VD BY	
REVISED			
DATE 5-22-44	SCALE-NONE	DWN BY H.W.	CHCK'D BY

APPENDIX I

THE DISASSEMBLY, GROUPINGS, AND LOADING OF THE GRADER, ROAD, TOWED, LEANING WHEEL, HAND CONTROLLED, 12-FOOT MOLDBOARD, ADAMS MODEL NO. 124-S

1. General. The Adams 124-S road, towed grader weighs approximately 12,000 pounds and requires one and one-half C-46 cargo planes for transporation.

2. Dismantling. There are no disassembly difficulties; use the following sequence:

(1) Scarifier assembly
(2) Disconnect blade lift arms from drawbar links
(3) Blade lift spring assembly
(4) Circle, moldboard and blade assembly
(5) Operating hand wheels (3)
(6) Front wheel and tongue assembly
(7) Operator's platform
(8) Rear wheel group

3. Loading. There are no particular loading problems. Fig. 77 shows the manner in which the frame is loaded.

4. Man-Hours. A crew of eight men worked the following periods:

Disassembly	4 men	6 mh
Loading	4 men	10 mh
Unloading	4 men	7 mh
Reassembly	4 men	8 mh
Total		31 mh

Approximate total time in preparation of equipment:

For Flight -	8 men	3 hours
For operation -	8 men	3 hours

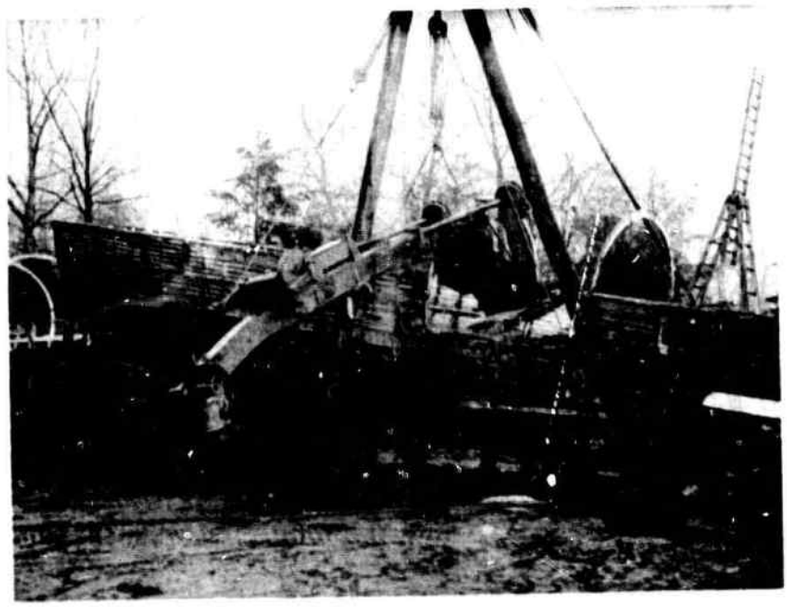
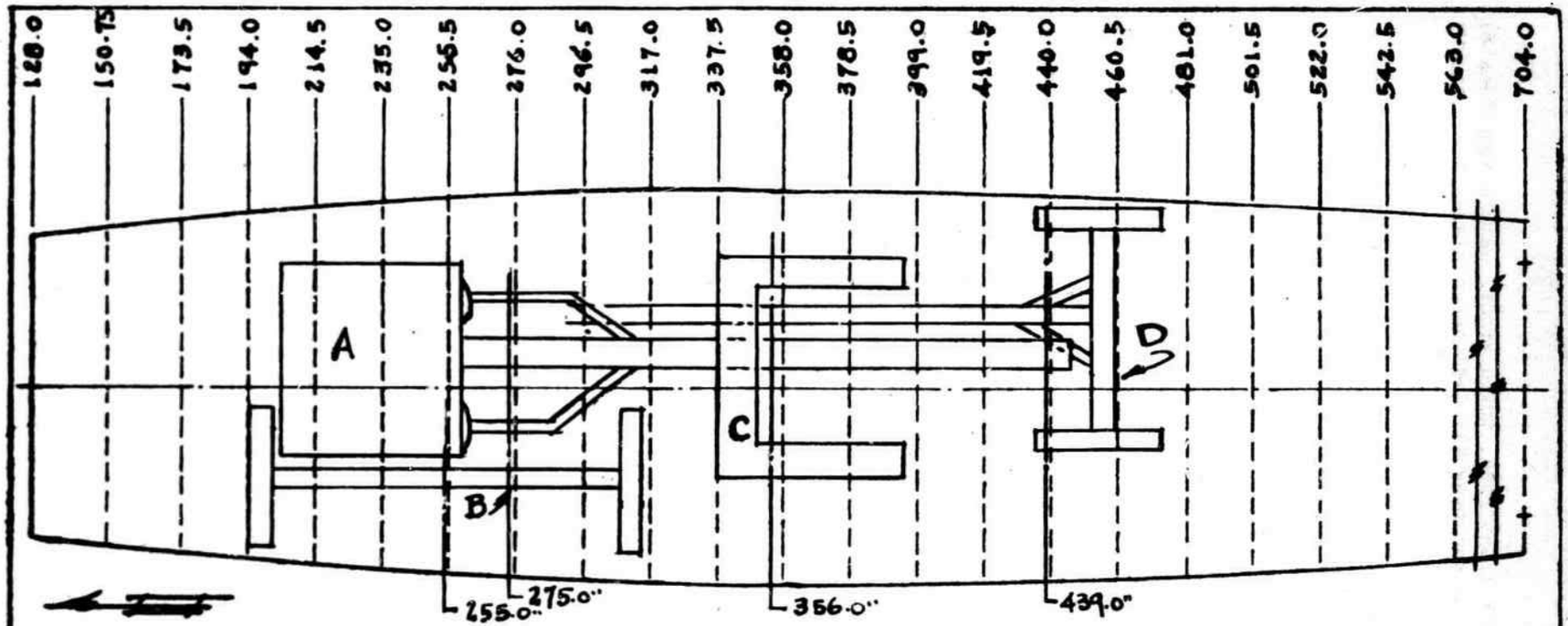


FIG. 77. FRAME BEING LOADED



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 325.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	FRAME	228"x60"	3885*
B	REAR WHEELS	116"x44"	1420*
C	SCARIFIER GROUP	72"x58"	1085*
D	FRONT WHEELS.	168"x76"	1920*

FIG" 78

THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 1 OF ADAMS LEANING WHL GRADER			
DWG Nº. 1 OF 2		APP'VD BY.	
REVISED			
DATE. 3-20-44	SCALE 1/4"=1'-0"	DWN BY. H.W.	CHKD BY.

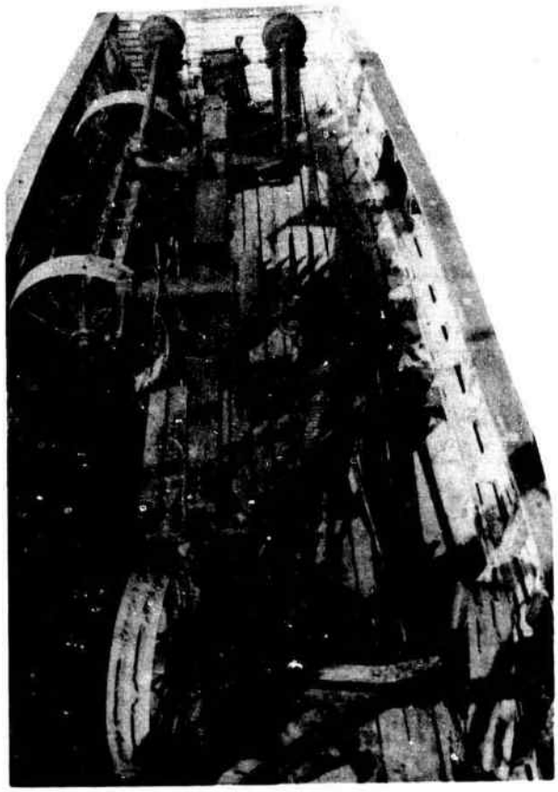
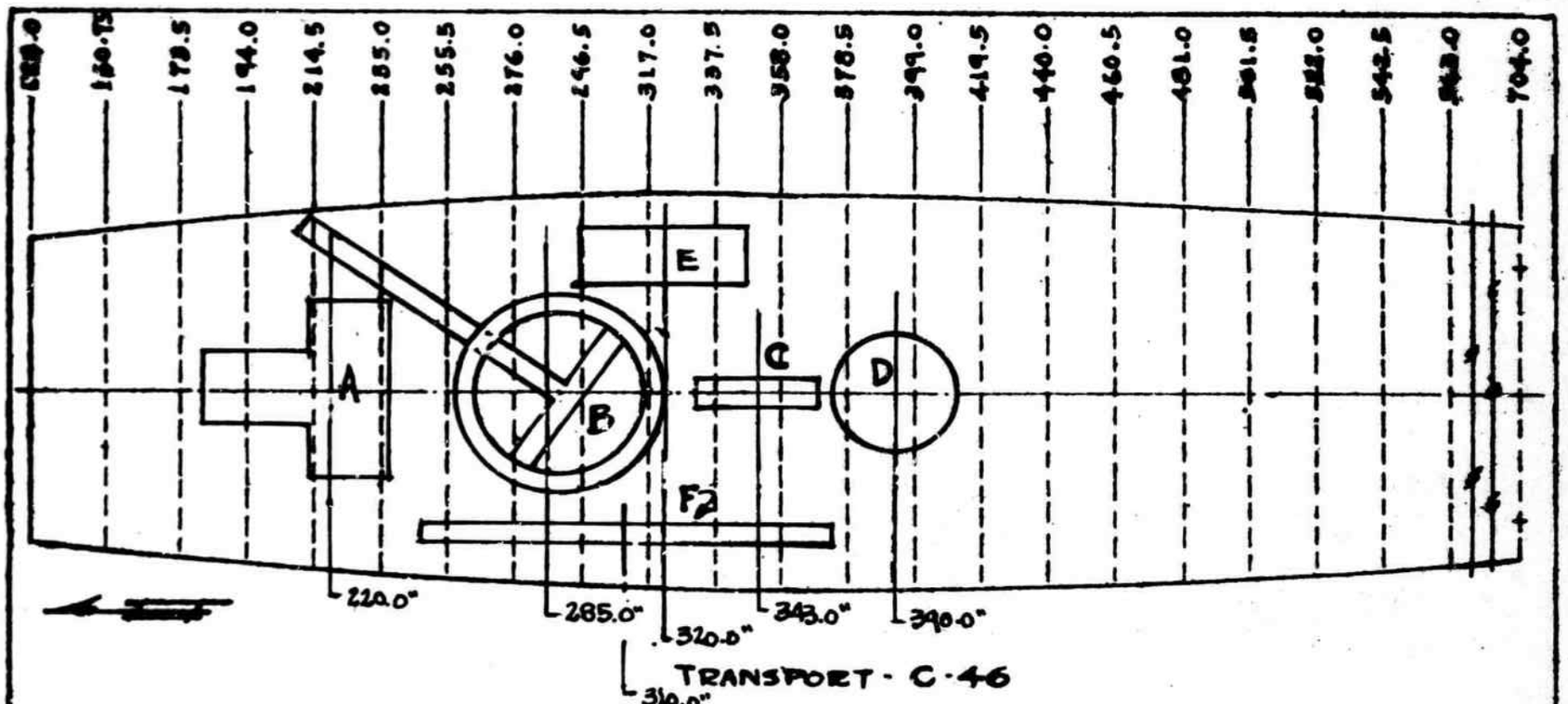


FIG. 79 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Frame assembly	3835
Rear wheel group	1420
Front wheel assembly and tongue	1920
Scarifier group	1085
Total	8260

Loading	Unloading
4 men - 6.00 man-hours	4 men - 4.00 man-hours



NOTE.-- APPROX. CENTER OF GRAVITY • 324.0"

EQUIPMENT		APPROX. DIMENS.	WEIGHT.
A	GUIDE PLATFORM	56" x 56"	120#
B	CIRCLE ASSM	132" x 63"	2060#
C	SPRING ASSM.	36" x 6"	215#
D	HAND WHEELS	36" DIA.	3 PCS 75#
E	MISCELL PARTS	48" x 18"	275#
F	SHAFTS	120" x 6"	115#

Fig # 80

THE ENGINEER BOARD
FT BELVOIR - VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF ADAMS LEANING WHL GRADER

DWG NO. 2 OF 2		APPVD BY	
REVISED			
DATE 2-20-44	SCALE 1/4"-1'-0"	DWN BY HH	CHKD BY WEL

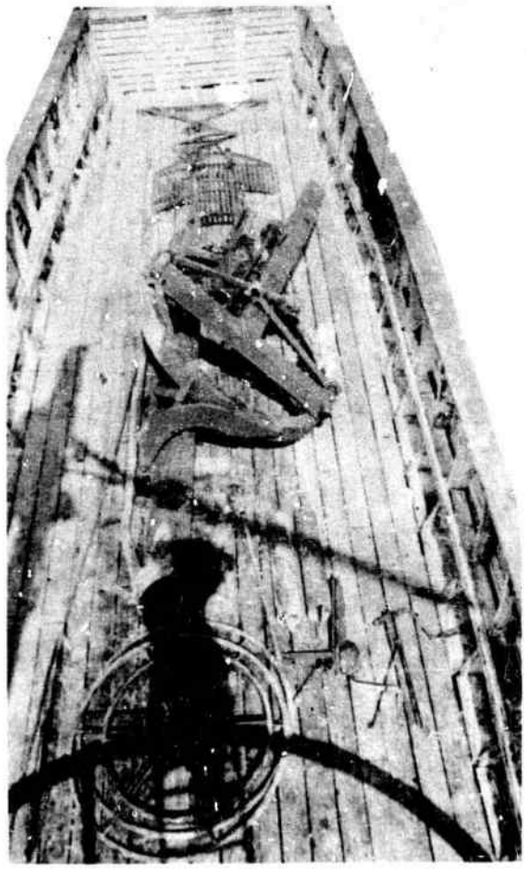


FIG. 81 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Circle, moldboard and blade assembly	2910
Operator's platform	120
Operating hand wheels	75
Blade lift spring assembly	215
Tongue steering shafts, rear leaning wheel shaft, and front leaning wheel control rods	115
Miscellaneous: circle reverse gear box, rear leaning wheel control box, universal and shift transmission assembly for 3-1 control	275
Total	3610

Loading	Unloading
4 men - 4.00 man-hours	4 men - 3.00 man-hours

APPENDIX J

DISASSEMBLY, GROUPINGS, AND LOADING OF THE CRANE, TRACTOR-OPERATED, NON-REVOLVING, 40,000-POUND CAPACITY AT 10-FOOT RADIUS, 20-FOOT BOOM, LETOURNEAU MODEL M-20

1. General. The LeTourneau 20-ton tractor crane weighs 7,730 pounds and requires one C-46 cargo plane for transportation.

2. Dismantling. The crane is prepared for loading in the following manner:

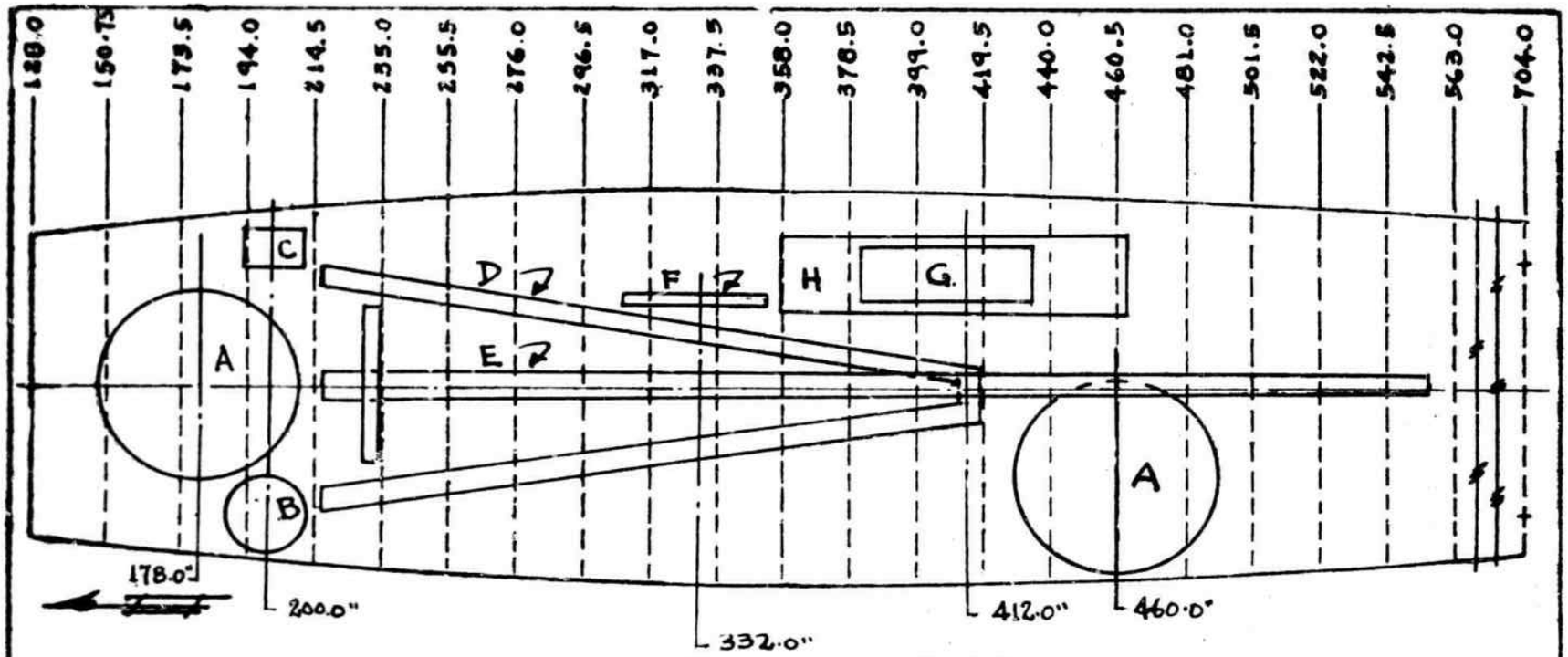
(1) Rewind all cable on tractor drums
(2) Remove left and right boom members and center spacer
(3) Remove head structure and balance beam
(4) Remove wheels
(5) Disconnect tongue from tractor

3. Loading. There are no loading difficulties. Each assembly loads into the plane in a straightforward manner.

4. Man-Hours. A crew of seven men worked the following periods:

Disassembly	3 men	6 mh
Loading	4 men	6 mh
Unloading	4 men	6 mh
Reassembly	3 men	4 mh
Total		22 mh

Seven men can prepare the crane for flight in about three hours. It will take approximately the same time to put the crane in operating order after the landing.



TRANSFORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY .326.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	WHEELS	60" DIA	2 Pcs - 925#
B	CABLE	24" DIA	235#
C	HOOK SHEAVE BLOCK	18"x12"	320#
D	BOOM GROUP.	192"x74"	2280#
E	TONGUE GROUP.	105"x26"	2180#
F	BALANCE BEAM.	48"x6"	100#
G	CENTER BRACE BOOM &	52"x16"	65#
H	HEAD GROUP.	105"x26"	700#

FIG # 82

THE ENGINEER BOARD FT BELVOIR-VA. AIR TRANSPORT SECTION			
LOAD GROUP No 1 OF 20'0"-20 TON CRANE			
DWG No. 1 OF 1		APPVD BY.	
REVISED			
DATE 3-20-44	SCALE 1/4"-1'0"	DWN BY AH	CHKD BY.

FIG. 83 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Wheels (2)	1850
Cable	235
Hook sheave block	320
Boom group	2280
Tongue group	2180
Balance beam	100
Center brace, boom group	65
Head group	700
Total	7730

Loading	Unloading
4 men - 6.00 man-hours	4 men - 4.00 man-hours

APPENDIX K

DISASSEMBLY, GROUPINGS, AND LOADING OF THE CRANE, TRUCK-MOUNTED ON COLEMAN CHASSIS, GASOLINE-ENGINE-DRIVEN, 3/8 CU YD, QUICKWAY CONVERTIBLE UNIT MODEL E, WITH CRANE, DRAGLINE, SHOVEL, PILEDRIVER, AND CLAMSHELL ATTACHMENTS

1. General. Total weight of the Coleman truck and Quickway convertible unit is approximately 33,000 pounds, and requires four C-46 planes for transportation. The trailer for the Quickway attachments was not included, since its value in an airborne mission would not warrent the difficulties of transporting it.

2. Dismantling. Since the crane is used in dismantling the truck, the Quickway is not disassembled until the Coleman is stripped down to the chassis. Support the rear end of the truck frame firmly with jacks to prevent tipping.

a. Here is the proper disassembly sequence for the Coleman truck:

(1) Drain radiator
(2) Hood and side panels
(3) Engine cover
(4) Fenders
(5) Spare tire and bracket
(6) Boom rack and radiator guard
(7) Disconnect lines and wiring to cab at junction boxes located on the frame. Do not remove the intricate wiring from the instrument panel. The cranking engine wire that runs from the 12 volt magnetic switch is disconnected at the engine itself. Battery leads are not disconnected since the battery box is an integral part of the frame.
(8) Gas tank
(9) Cab
(10) Radiator
(11) Control rods to front winch, high and low ratio, and auxilliary transmission. Only the pedal is removed from the D valve.
(12) Propeller shafts
(13) Engine
(14) Steering wheel and gear
(At this point the Quickway is dismantled. See Par. b)
(15) Front wheel group
(16) Rear wheel group
(17) Rear bumper

Air lines, front winch assembly, front bumper, and transfer case are not removed from the frame. Tape or tie air lines securely.

b. Use this sequence for dismantling the Quickway:

(1) Crane hook assembly
(2) Crane boom
(3) Cab panels
(4) Disconnect hydraulic and electrical lines
(5) Engine
(6) Gantry frame
(7) Control cabinet

(8) Scarf tack welds between hoisting unit and structural frame of Quickway platform
(9) Hoisting unit
(10) Cab platform, seat, and foot pedals

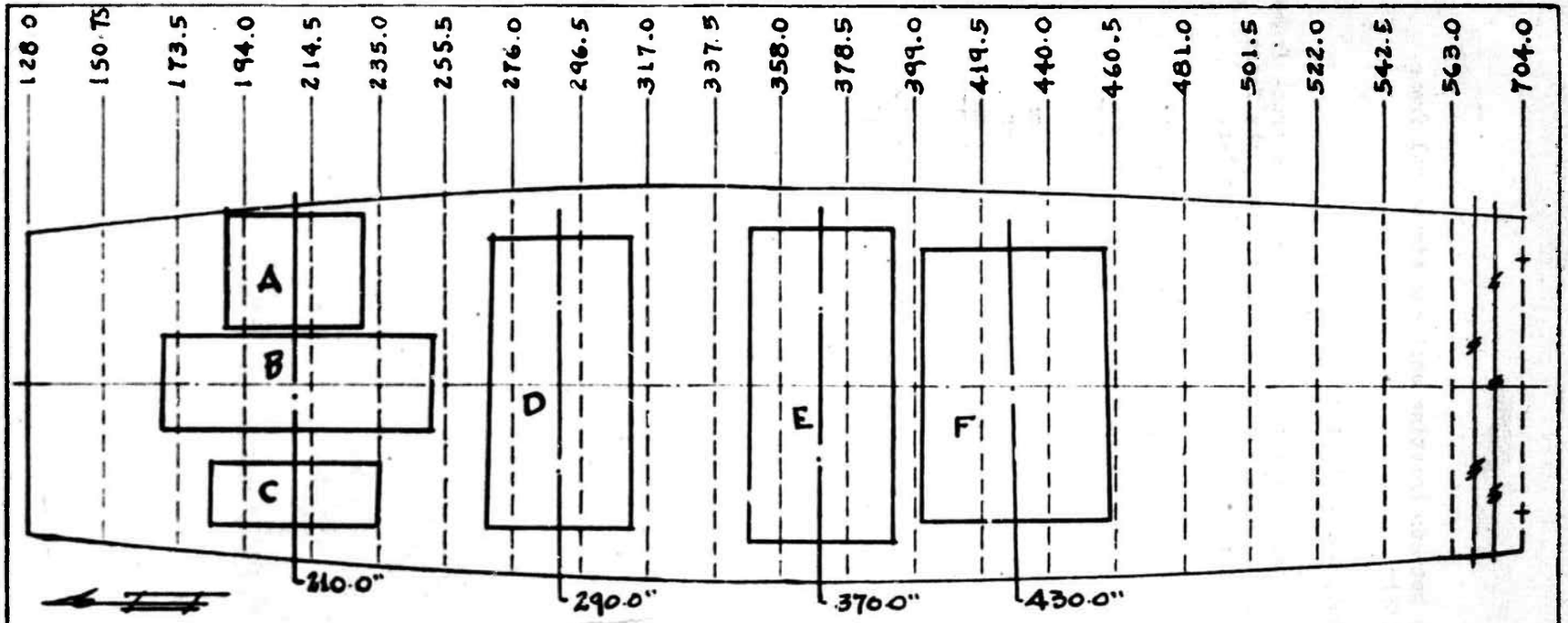
3. Loading. There are no special loading difficulties. The truck frame is loaded flat, as shown in Fig. 84. When a loading pump is used, the front end of the frame may be rolled up the ramp on the front bumper roller.

4. Man-Hours. A crew of eight men worked the following periods:

		Quickway	Coleman
Disassembly	4 men	20 mh	16 mh
Loading	4 men	18 mh	17½ mh
Unloading	4 men	12½ mh	13 mh
Reassembly	4 men	24 mh	28 mh
Totals		74½ mh	76½ mh

It will take an 8-man crew approximately 16 hours to dismantle and load this equipment, and about 19 hours to unload and reassemble it.

FIG. 34. TRUCK FRAME BEING LOADED.



TRANSPORT · C-46

NOTE - APPROX. CENTER OF GRAVITY · 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	RADIATOR	42"x35"	237*
C	BOX OF SPARE PARTS	79"x29"	875*
B	ENGINE & TRANS (TRK)	48"x28"	2080*
D	FRONT WHEEL GRP.	90"x42"	2400*
E	REAR WHEEL GRP.	96"x42"	2900*
F	CAB	84"x57"	500*

ITEM 'C' INC. BATTERIES, TOOL BOX & SPARE PARTS

FIG# 85

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF COLEMAN TRUCK

DWG Nº 1 OF 4		APP'VD BY.	
REVISED			
DATE. 7.11.44	SCALE 1/4"=1'0"	DWN BY. HN	CHK'D BY.

FIG. 86 FRONT PART OF PLANE LOAD NO. 1

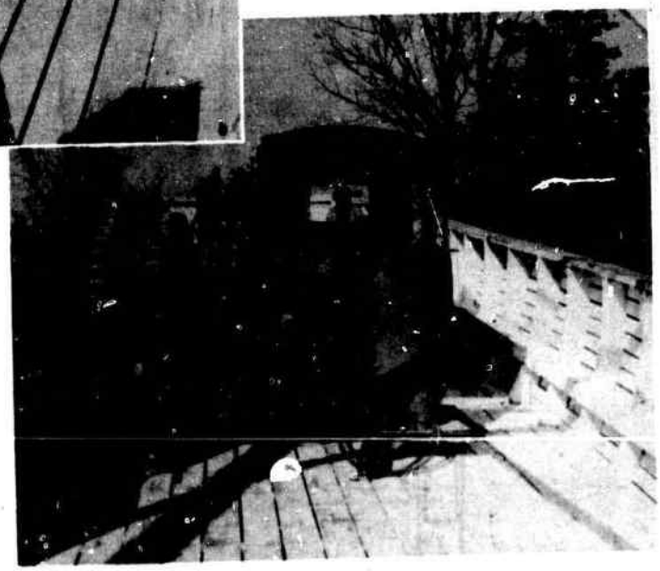
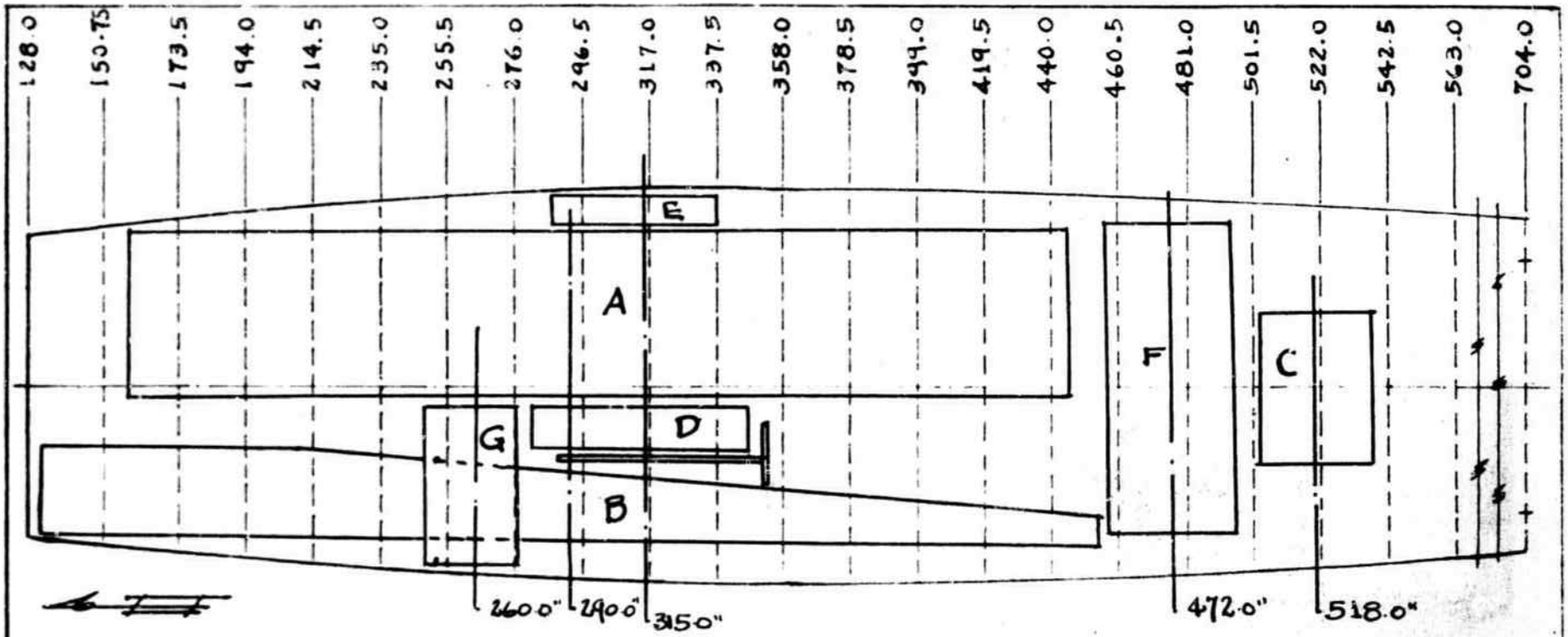


FIG. 87 REAR PART OF PLANE LOAD NO. 1

PLANE LOAD NO. 1

Item	Weight
Tool box w/batteries and spare parts	375
Truck engine and transmission	2060
Truck radiator	237
Front wheel group	2400
Rear wheel group	2960
Truck cab	500
Total	8532

Loading	Unloading
4 men - 7.00 man-hours	4 men - 5.00 man-hours



TRANSPORT · C-46

NOTE · APPROX. CENTER OF GRAVITY · 323.0"

EQUIPMENT		APPROX. DIMENS.	WEIGHT.
A	FRAME (TRUCK)	270" x 50"	5230#
B	CRANE	307" x 30"	1318"
C	MISCELL. PARTS	48" x 24	315#
D	GAS TANK & STEER GR.	72" x 21"	172"
E	CONTROL CABINET	46" x 16"	208"
F	GANTRY FRAME	89" x 38"	558"
G	RAD., HEAD LAMP, GRILL & DRIVE SHFT	48" x 34"	313"

ITEM C INC. HOOD, HEADLIGHTS AIR HORN, SMALL GEAR CASE, GDS CLUTCH PEDAL, SHAFT, AIR CLEANER & SMALL MISC. PARTS.

FIG # 88

THE ENGINEER BOARD
FT BELVOIR VA
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF COLEMAN TRUCK

DWG Nº 2 OF 4 — APPVD BY

REVISED

DATE 7-11-44 | SCALE 1/4"-1'0" | DWN BY H.W. | CHKD BY

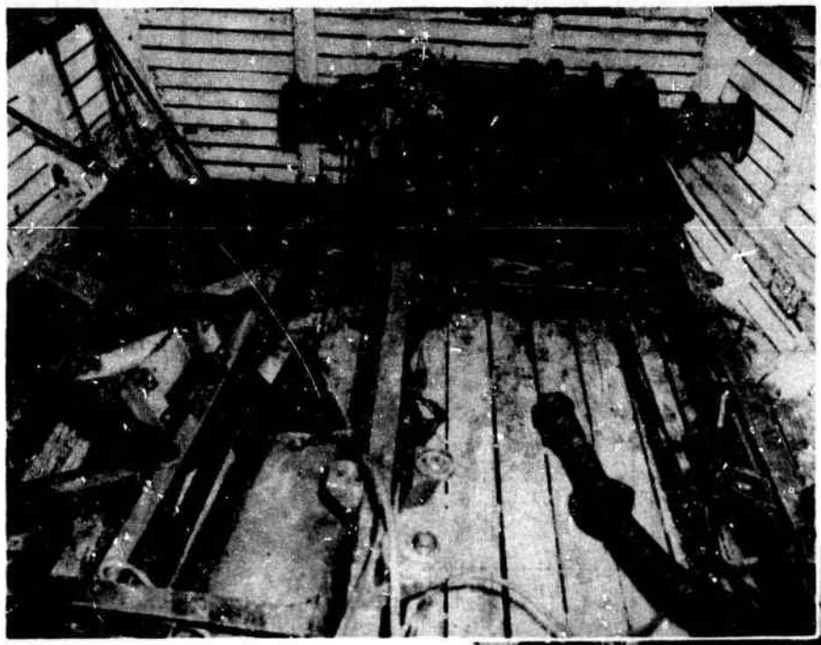


FIG. 89. FRONT PART OF PLANE LOAD NO. 2

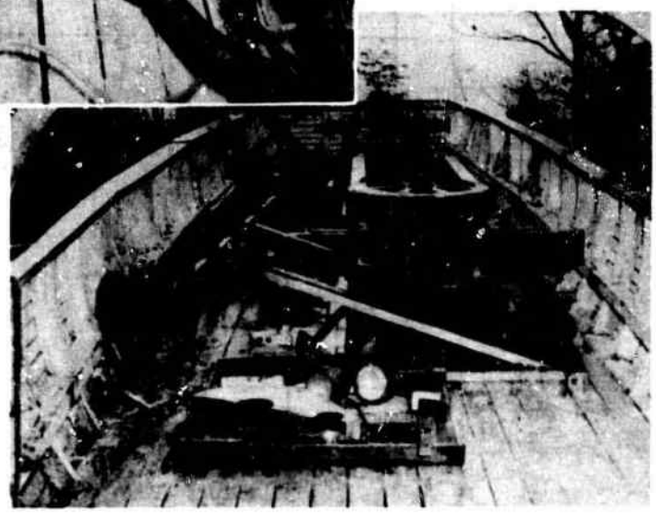
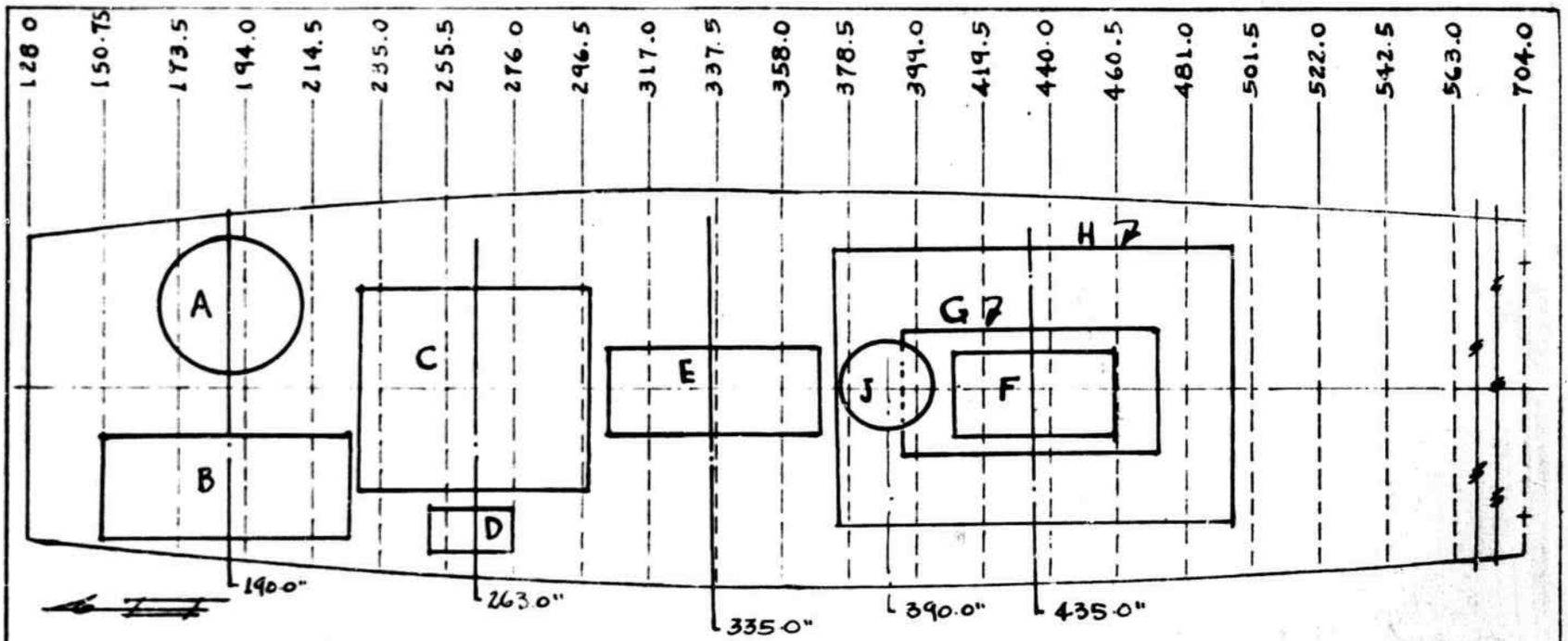


FIG. 90. REAR PART OF PLANE LOAD NO.2

PLANE LOAD NO. 2

Item	Weight
Truck frame assembly	5230
Crane boom	1360
Gantry frame and tie rods	558
Control cabinet	208
Gas tank, steering wheel and shaft	172
Propeller shafts and universals	168
Radiator grill	145
Miscellaneous: small gear cases and guards, clutch pedals and shafts, air cleaner, headlights, dash board, floor boards, spare tire bracket, air horn, battery carrier, etc.	313
Total	8154

Loading	Unloading
4 men - 6.00 man-hours	4 men - 4.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 327.0

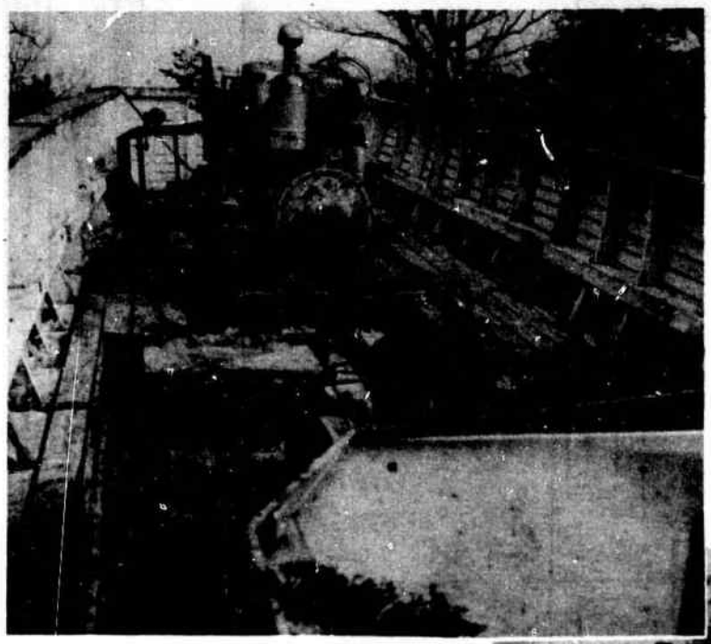
	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	SPARE WHL & TIRE	42" DIA.	250#
B	OPERATOR'S CAB	73 x 31"	185#
C	HOISTING UNIT	69" x 62"	2914#
D	HOOK	29" x 13"	75#
E	ENGINE & SLED	63" x 27"	2010#
F	FENDERS, HOOD & PANEL	48" x 26"	162#
G	CAB PANELS	73" x 31"	191#
H	PLATFORM	115" x 88"	1800#
J	CABLE	24" DIA.	200#

FIG. 91

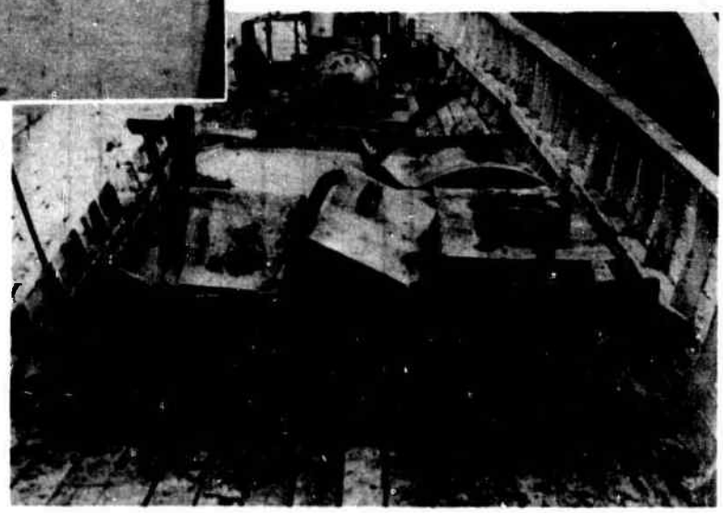
THE ENGINEER BOARD
FT BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 3 OF COLEMAN QUICKWAY TRK.

DWG NO. 3 OF 4		APPVD BY	
REVISED			
DATE 7-13-44	SCALE 1/4"-1'0"	DWN BY HW	CHKD BY



← FIG. 92 FRONT PART OF PLANE LOAD NO. 3

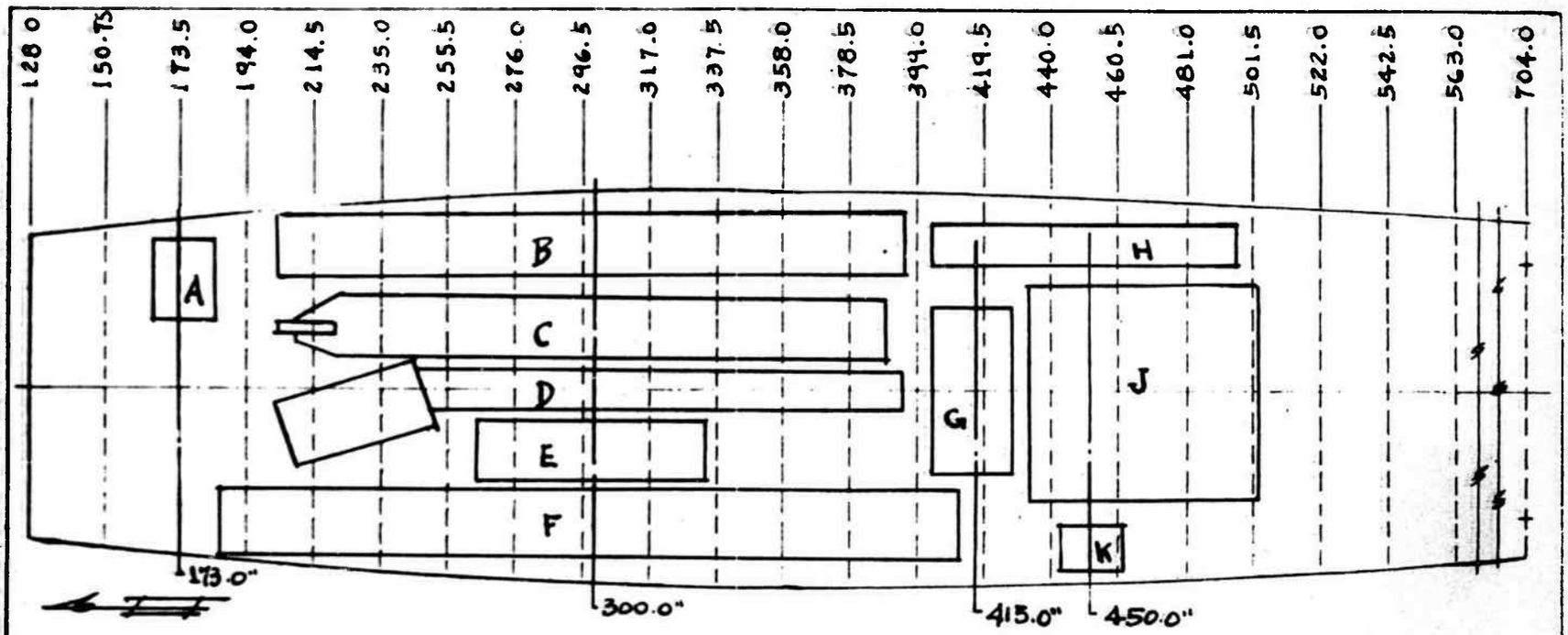


→ FIG. 93 REAR PART OF PLANE LOAD NO. 3

PLANE LOAD NO. 3

Item	Weight
Hoisting unit	2910
Quickway engine	2010
Quickway platform, seat and foot pedals	1800
Spare wheel and tire	250
Operator's cab	185
Cab panels	791
Fenders and hood panels	162
Hook	75
Cable	200
Total	8383

Loading	Unloading
4 men - 7.00 man-hours	4 men - 5.00 man-hours



TRANSPORT · C-46

NOTE - APPROX. CENTER OF GRAVITY · 327.5

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	DROP HAMMER		1,350 #
B	PILE DRIVER LOWER SECT. LEAD		531 #
C	PILE DR. UPPER SECT. LEAD		645 #
D	SHOVEL DIPPER		1,956 #
E	CRANE BOOM EXT.		110 #
F	SHOVEL BOOM	216" x 28"	1164 #
G	DRAGLINE BUCKET	52" x 24"	891 #
H	PILE DRIVER SPAT LEGS		216 #
J	CLAM SHELL BUCKET	66" x 65"	1650 #
K	FOLLOW BLOCK	19" x 14"	364 #

FIG # 94

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 4 OF COLEMAN QUICKWAY TRUCK

DWG Nº 4 OF 4		APPVD BY	
REVISED			
DATE 7-11-44	SCALE 1/4" 1'0"	DWN BY HW	CHKD BY WH

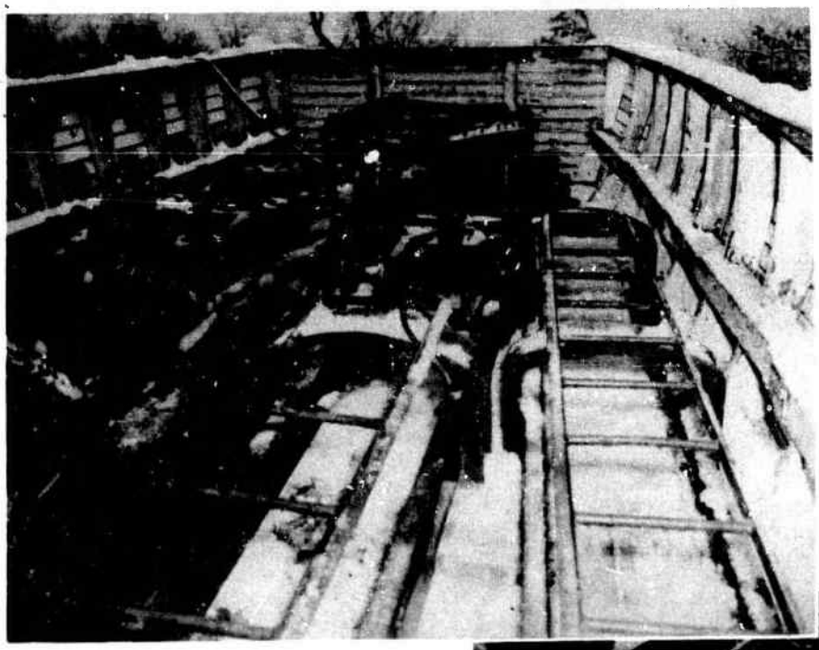


FIG. 95. FRONT PART OF PLANE LOAD NO. 4

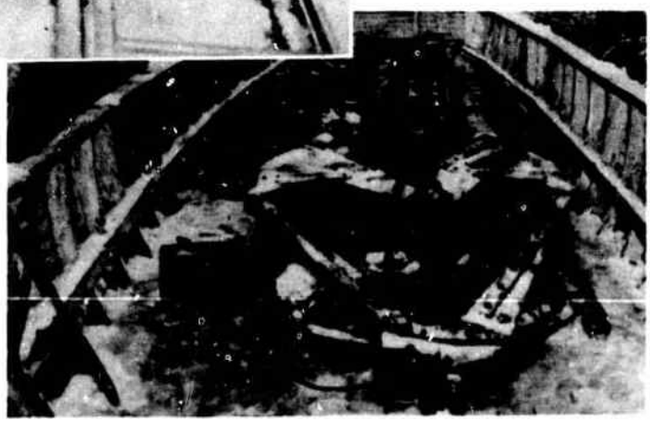


FIG. 96. REAR PART OF PLANE LOAD NO. 4

PLANE LOAD NO. 4

Item	Weight
Clamshell bucket	1650
Dragline bucket	891
Shovel dipper assembly	849
Rack crowd dipper stick and shipper shaft assembly	807
Shovel boom	1164
Drop hammer	1350
Upper section lead	645
Lower section lead	531
Crane boom extension (5 foot), pile driver stiff legs, inner and outer pile driver catwalks	316
	8203

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours

APPENDIX L

DISASSEMBLY, GROUPINGS, AND LOADING OF THE BROCKWAY TRUCK CHASSIS (MAY BE USED IN PLACE OF THE COLEMAN TRUCK CHASSIS AS A MOUNT FOR THE QUICKWAY CRANE)

1. General. The total weight of the Brockway Truck is 20,805 pounds, and it requires two and one half C-46 cargo planes for transportation.

2. Dismantling. Much time can be saved in reassembly if adequate precautions are taken during disassembly. It is not necessary to remove the intricate wiring from the instrument panel of the truck. These leads may be disconnected at junctions boxes located on the frame.

Care should be taken to prevent dirt from fouling the fitting, valves, and air lines of the compressed air system. Tagging the air lines will expedite reassembly.

It can not be over emphasized that it is extremely easy to lose or damage the many parts on this truck, and the loss of just one part may deadline the truck during the time when it is most critically needed.

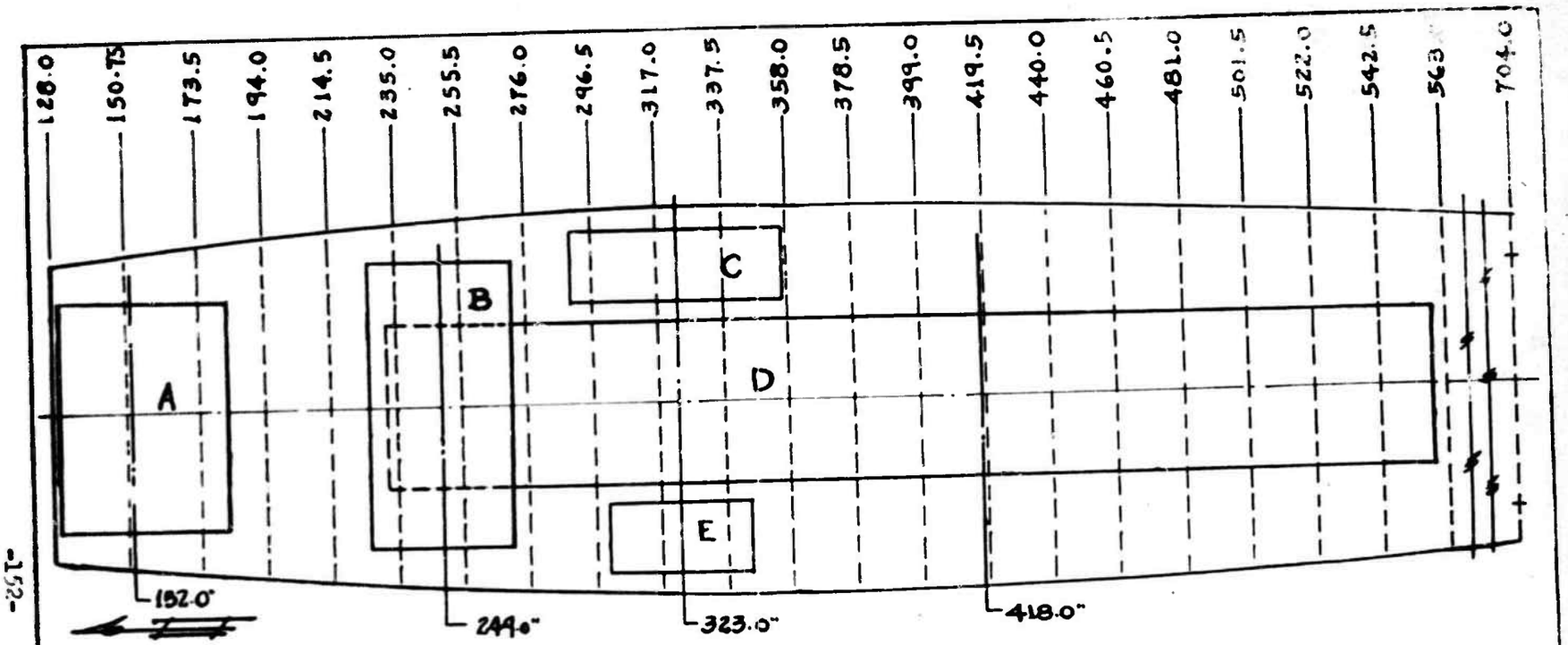
Following is a convenient sequence of disassembly:

(1) Boom rest frame
(2) Winch drive with universal
(3) Front winch assembly
(4) Front winch support
(5) Quickway crane unbolted and removed
(6) Upper and lower support tables for crane
(7) Rear bumpers
(8) Spare tire and carrier assembly
(9) Fuel tank guard panel
(10) Hood and two side panels
(11) Radiator shelf and guard
(12) Air cleaner
(13) Left fender and running board
(14) Right fender and running board with batteries (2)
(15) Floor boards
(16) Fuel tanks and fuel lines
(17) Disconnect wires and air lines
(18) Steering assembly
(19) Cab
(20) Radiator
(21) Operating levers, foot and clutch pedals
(22) Hand brake assembly
(23) Air tanks and air lines
(24) Muffler and exhaust pipe
(25) Emergency brake assembly
(26) Universal joints and drive shafts
(27) Transfer case
(28) Engine
(29) Two rear wheel assemblies
(30) Front bumper
(31) Front wheel assembly

3. Loading. The only piece which will offer loading idfficulty is the truck frame. The easiest method found is to load it lying on its side. By placing the front end inside the door on a standard sled, and suspending the rear end with the shears or quickway crane, it will slide forward all the way into the plane. After the rear end clears the door the frame should be laid flat, with a second sled under the rear end, and then pulled into position.

4. Man-Hours. A crew of eight men worked the following hours:

Dismantling	4 men	72 mh
Loading	4 men	44 mh
Unloading	4 men	44 mh
Reassembly	4 men	72 mh
Total		232 mh



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 328.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	CAB W/AIR LINES	74" x 52"	860#
B	FRONT WHEELS	90" x 43"	2590#
C	FRONT WINCH ASSM.	64" x 22"	750#
D	FRAME	311" x 50"	3560#
E	TRANSFER CASE	43" x 22"	510#

FIG# 97

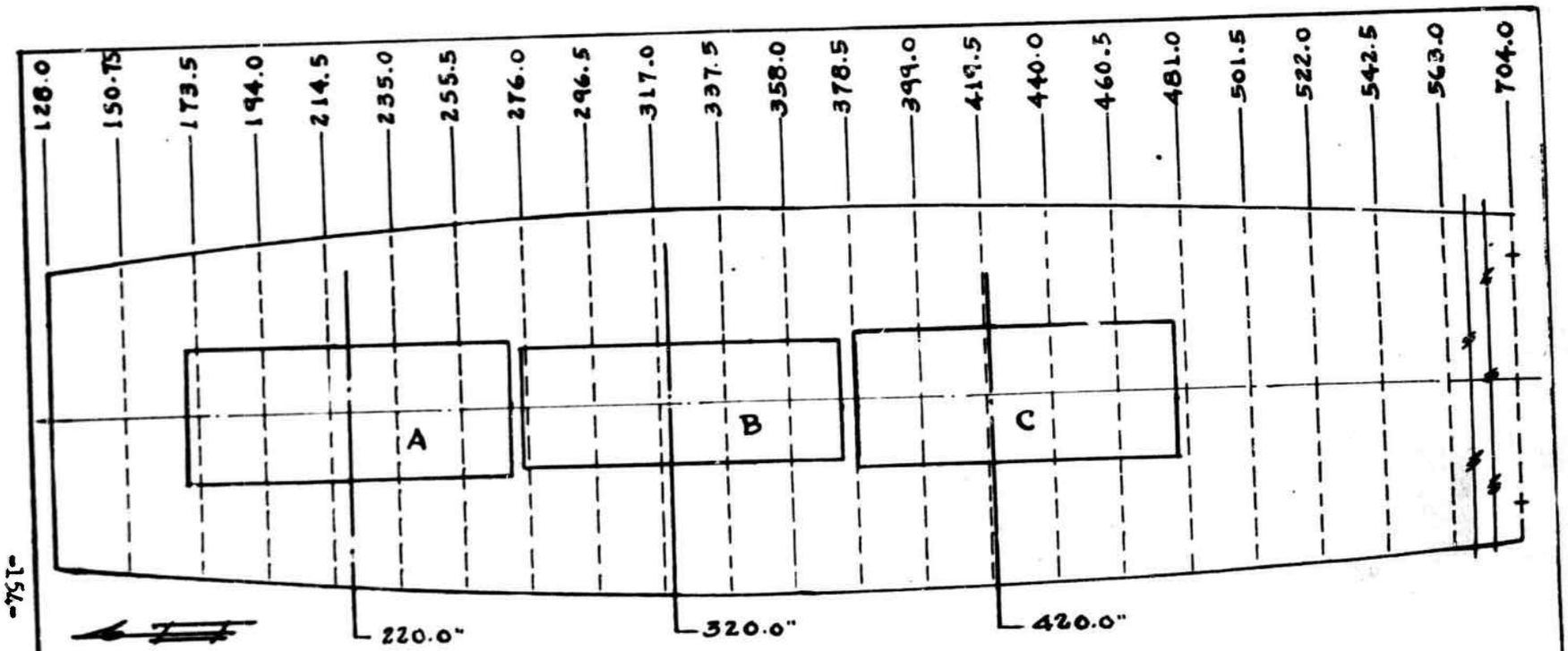
THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 1 OF BROCKWAY TRUCK.			
DWG Nº 1 OF 3		APP'VD BY	
REVISED			
DATE 1-29-44	SCALE 1/4"=1'-0"	DWN BY. H.W.	CHK'D BY. R.F.Y

FIG. 98 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Cab with air lines	860
Front wheel assembly	2590
Frame	3560
Transfer case	510
Front winch assembly	750
Total	8270

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 321.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	REAR AXLE W/4 WHL'S	96" x 43"	2785#
B	ENGINE W/ TRANS.	97"; 39"	3210#
C	REAR AXLE W/4 WHL'S	96" x 43"	2785#

FIG# 99

THE ENGINEER BOARD FT BELVOIR-VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 2 OF BROCKWAY TRUCK			
DWG Nº. 2 OF 3		APPVD BY	
REVISED			
DATE 1-29-44	SCALE 1/4"=1'-0"	DWN BY. M.W.	CHKD BY. RPY

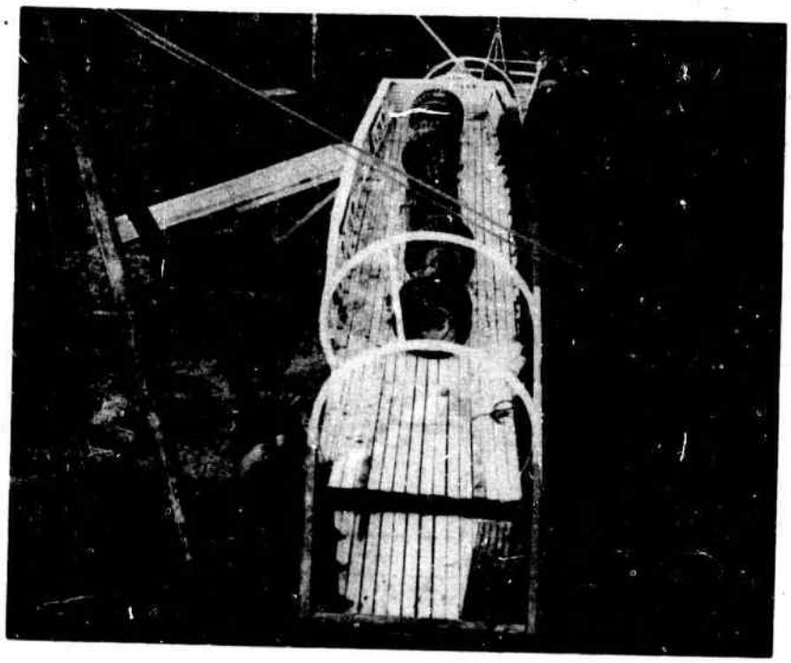
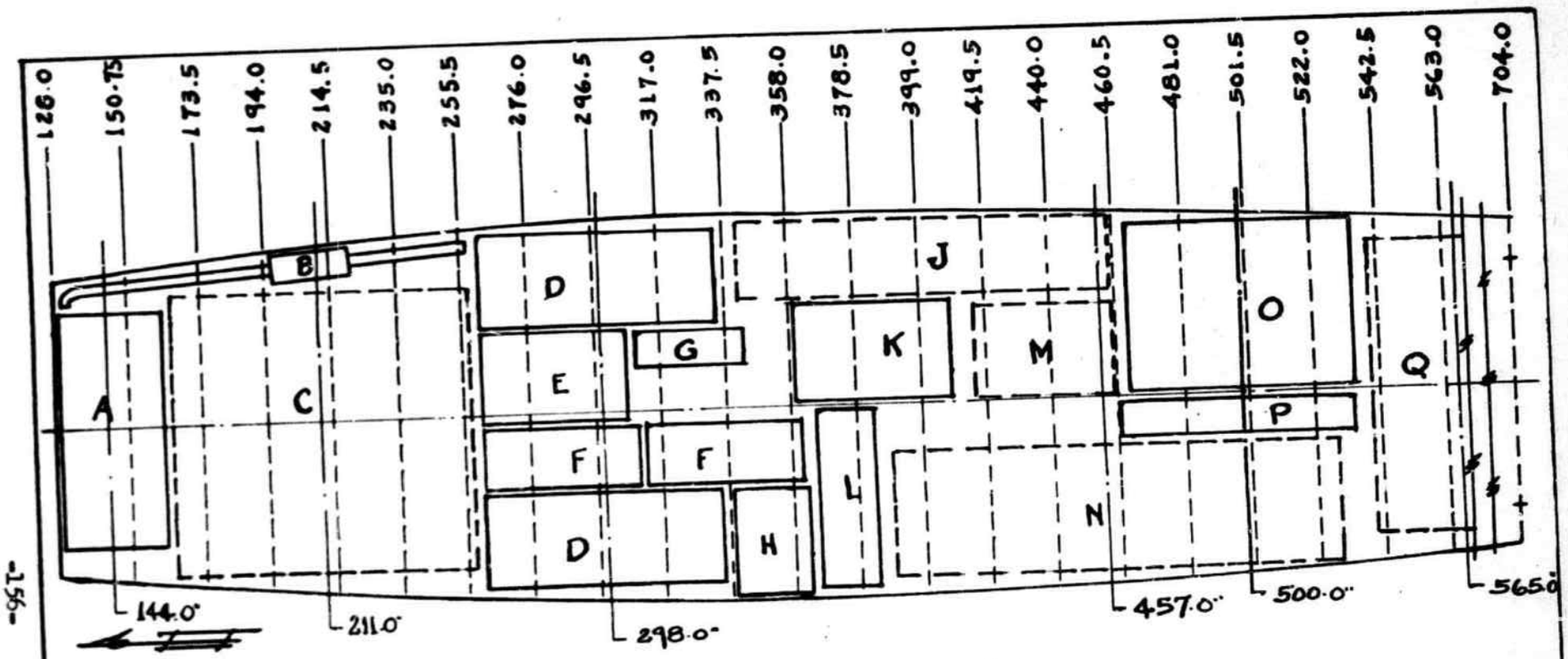


FIG. 100 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Rear wheel assembly	2735
Engine and transmission	3210
Rear wheel assembly	2735
Total	8680

Loading	Unloading
4 men - 12.00 man-hours	4 men - 12.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY = 324.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	RAD. GRILLE	74" x 32"	108#
B	MUFFLER W/EXH PIPE	123" x 8"	40#
C	MISCELL PARTS	90" x 90"	1016#
D	FENDER	72" x 30"	2 Pcs 210#
E	AUX. GAS TANK	44 x 28"	130#
F	RUNNING BOARDS	47" x 28"	2 Pcs 308#
G	RAD. GUARD	34" x 11"	36#
H	HAND LEVER ASSM.	37" x 22"	85#
J	MISCELL PARTS	100" x 24"	215#
K	MAIN GAS TANK	46" x 31"	235#
L	SIDE PANELS	54" x 17"	34#
M	PEDAL ASSM & BATTERY	42" x 30"	180#
N	MISCELL PARTS	132" x 39"	274#
O	HOOD	68" x 54"	100#
P	FRONT BUMPER	70" x 12"	148#
Q	MISCELL PARTS	110" x 93"	711#

ITEM 'C' CONTAINS BONFIRETTES, WINCH SUPPORTS, SCR BASE BRACKETS, RADIATOR & BOOM RACK.

ITEM 'J' CONTAINS WINCH DRIVE W/UNIV, TOOL BOX, FLOOR BOARDS & PEDAL SHAFTS.

ITEM 'N' CONTAINS AIR CLEANER, UNIV, AIR TANKS, STEERING GEAR & COLUMN, & EMERG. BRAKE PEDAL

ITEM 'Q' CONTAINS SPARE WHEEL ASSM, SUB BASE, GAS TANK SUPPORT, CONTROL ROD, WIRE & AIRLINES

FIG# 101

THE ENGINEER BOARD
FT. BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 3 OF BROCKWAY TRUCK

DWG NO. 3 OF 3		APP'VD BY.	
REVISED			
DATE 1-31-44	SCALE 1/4"=1'-0"	DWN BY. HW	CHK'D BY. RPY

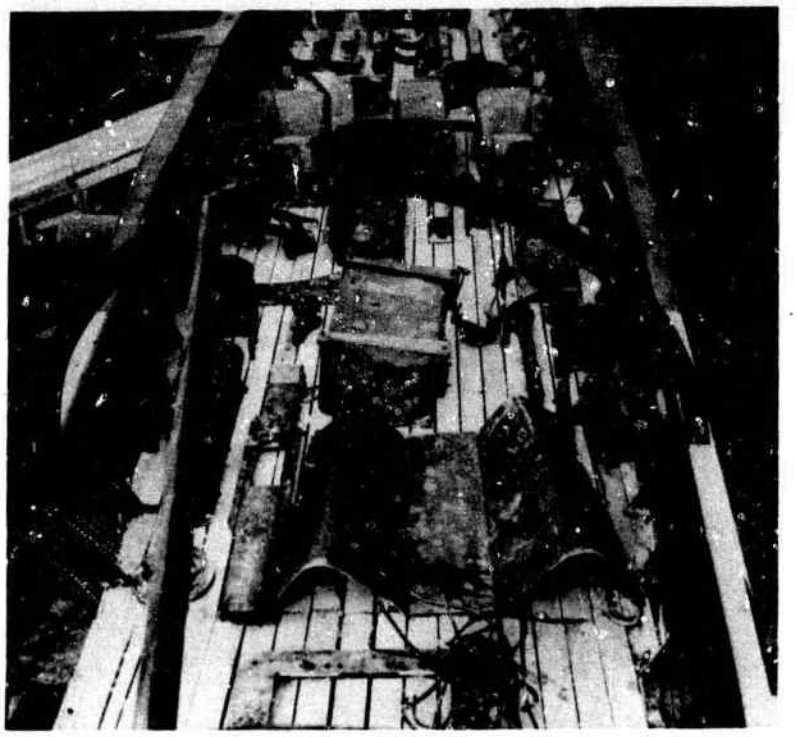


FIG. 102 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Air Tanks w/air hose	81
Steering column	108
Winch drive w/universal	55
Foot pedal w/miscellaneous winch parts	50
Lower ra tor guard and front winch support	313
Main and ciliary gas tank	365
Radiator and battery	255
Muffler w/exhaust and spare wheel bracket	181
Radiator guard	108
Fenders (2) and boom rack	340
Control rods w/electric wires and air lines	75
Spare wheel assembly	250
Tool kit with tools	26
Running boards (2)	308
Floor boards and cab side panels	90
Propeller shafts and universal joint	106
Hand lever assembly and air cleaner and bracket	122
Hood and rear bumperettes	274
Crane sub-base support brackets	310
Crane sub-base support	200
Front bumper and gas tank support	193
Emergency brake drum	25
Total	3835

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours

APPENDIX M

DISASSEMBLY, GROUPINGS, AND LOADING OF THE ROLLER, ROAD, TOWED, SHEEPSFOOT, 2-DRUM-IN-LINE, LETOURNEAU TYPE S, MODEL W2 OR W3

1. General. The total weight of the Sheepsfoot Roller is 6400 pounds, and it requires approximately three-fourths of the payload of one C-46 cargo plane. When additional cargo is included to complete the full payload, it must be located so that the resultant cg of the whole plane is between Stations 308 and 325.

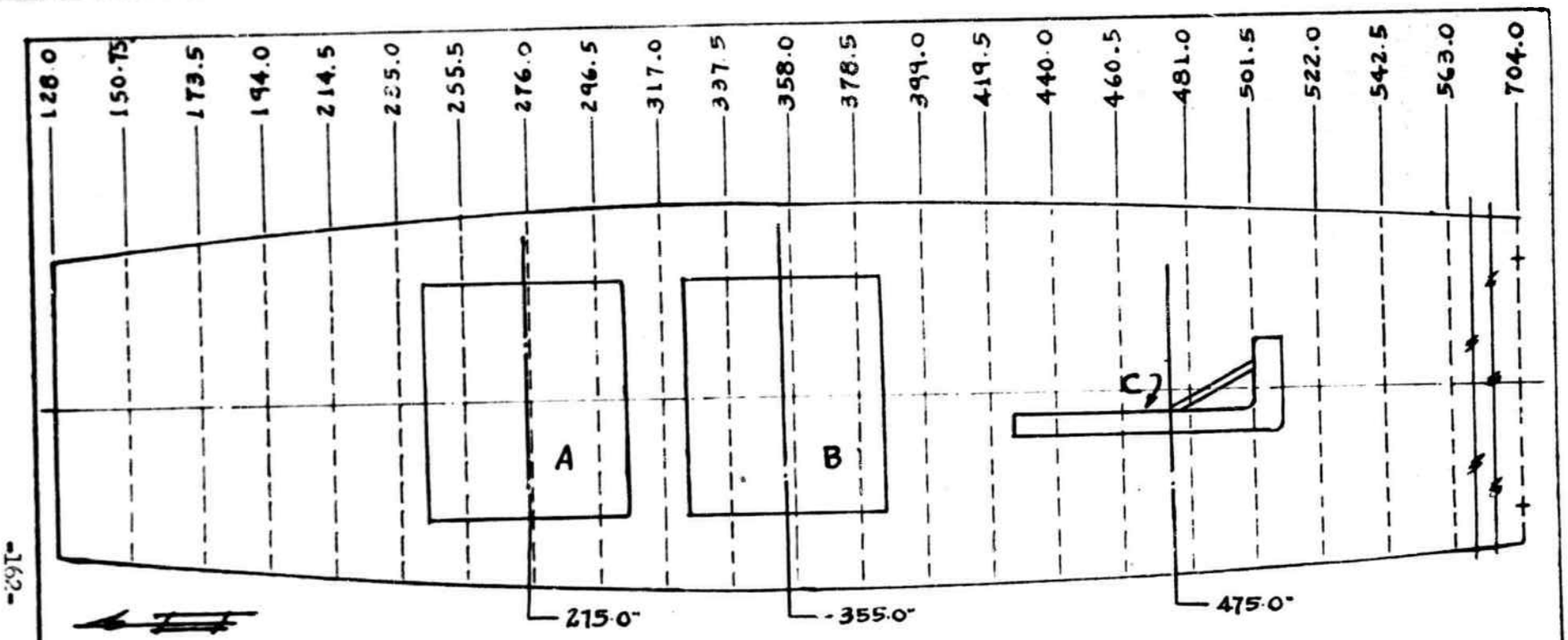
2. Dismantling. For convenient loading only the tongue need be removed, and the two sections separated. Both drums should be emptied.

3. Loading. Each section must be loaded on a standard type sled.

4. Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	1 mh
Loading	4 men	12 mh
Unloading	4 men	12 mh
Reassembly	2 men	1 mh
Total		26 mh

FIG. 1C3. DRUM SECTION ON SLED



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 324.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	DRUM W/FEET	74" x 60"	4000#
B	DRUM W/FEET.	74" x 60"	4000#
C	TONGUE	81" x 29"	400#

Fig# 104

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP No 1 OF SHEEPSFOOT ROLLER

DWG No 1 OF 1		APP'VD BY.	
REVISED			
DATE 1-26-44	SCALE 1/4"=1'-0"	DWN BY H.W	CHK'D BY.

FIG. 105 MOCK-UP LOADED

PLANE LOAD

Item	Weight
Drum w/feet and frame	3000
Drum w/feet and frame	3000
Tongue group	400
Total	6400

Loading	Unloading
4 men - 12.00 man-hours	4 men - 12.00 man-hours

APPENDIX N

DISASSEMBLY, GROUPINGS, AND LOADING OF THE ROLLER, ROAD, TOWED, WHEELED, RUBBER-TIRED, 13 TIRES, WILLIAM BROS MODEL 67-W "WOBBLE WHEEL"

1. General. The total weight of the Wobble-Wheel Roller is 3510 pounds, and it requires one third the payload of one C-46 cargo plane for transportation.

2. Dismantling. In order to load the roller, the front wheel assembly with the bolster and drawbar must be removed, and the roller body must be cut. Figs. 106, 107, 108 and 109 show pictures of the cut and subsequent weld. Fig. 112 shows the detailed dimensions of the cut and weld. It is not necessary to remove the rear wheels for the cut, however, care should be taken to protect the rubber from the molten metal.

For reassembly, the following procedure is recommended:

(1) Turn the two sections of the body upside down and carefully align them.

(2) Tack them together all along the cut at 6 inch intervals.

(3) Weld in place the seven outside straps.

(4) Turn the two sections over, and weld the three inside straps in place.

(5) Complete by welding the entire cut inside and out.

3. Loading. No difficulty is encountered in loading.

4.- Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	1 mh
Cutting	1 man	1 mh
Loading	3 men	7½ mh
Unloading	3 men	4½ mh
Welding	1 man	4 mh
Reassembly	2 men	1 mh
Total		19 mh

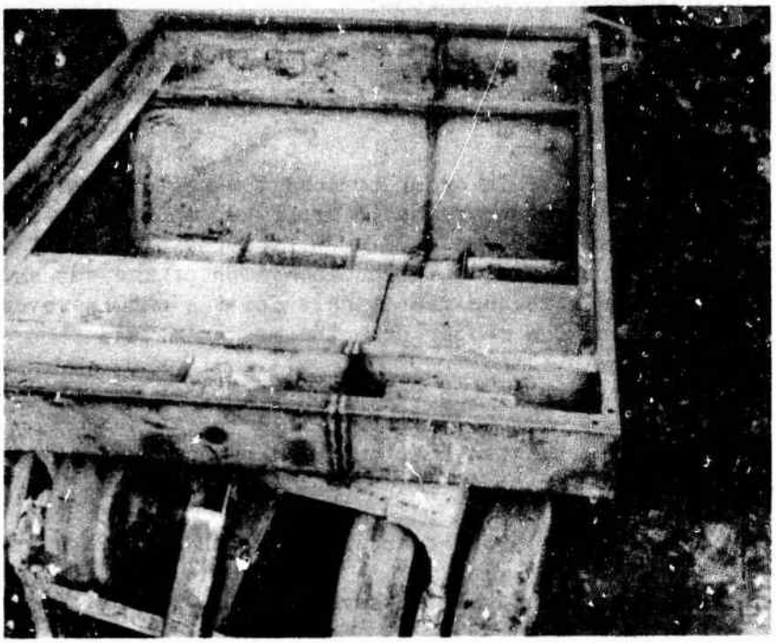


FIG. 106 CUT OF ROLLER BODY NECESSARY FOR LOADING

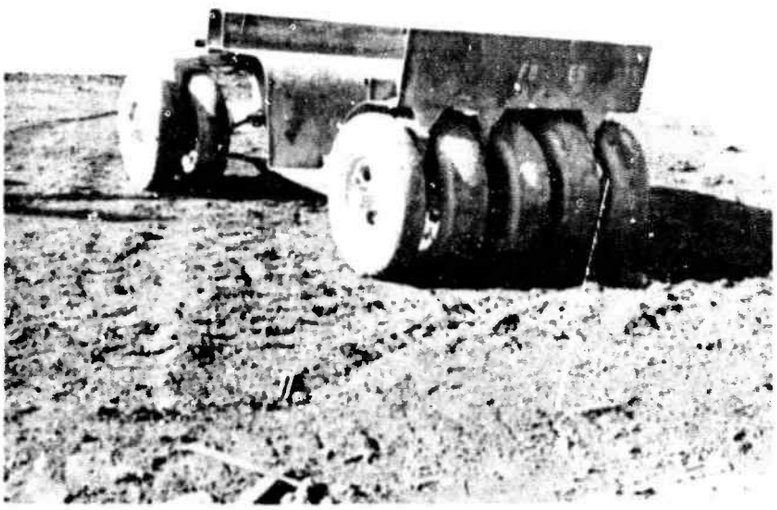


FIG. 107 ROLLER BODY WITH SMALL SECTION REMOVED

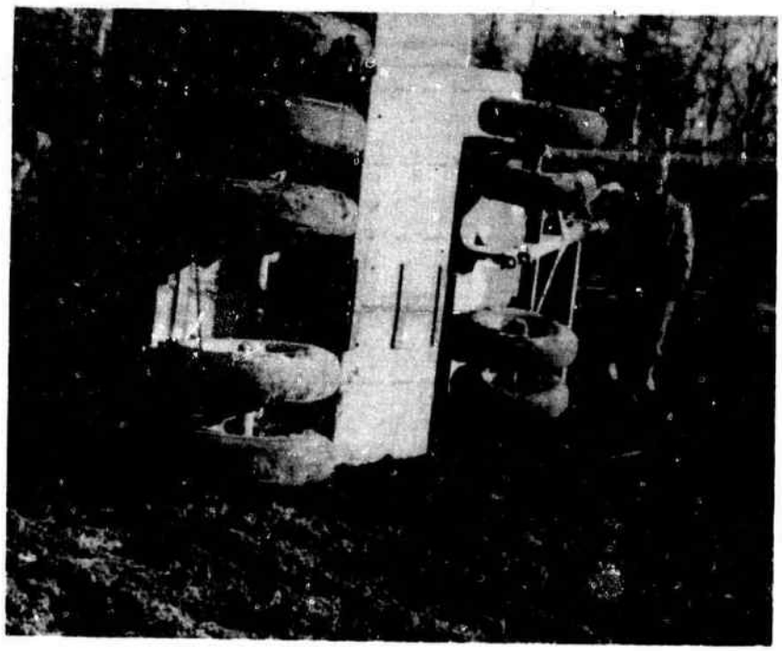


FIG. 108 ROLLER BODY WELDED AND REASSEMBLED

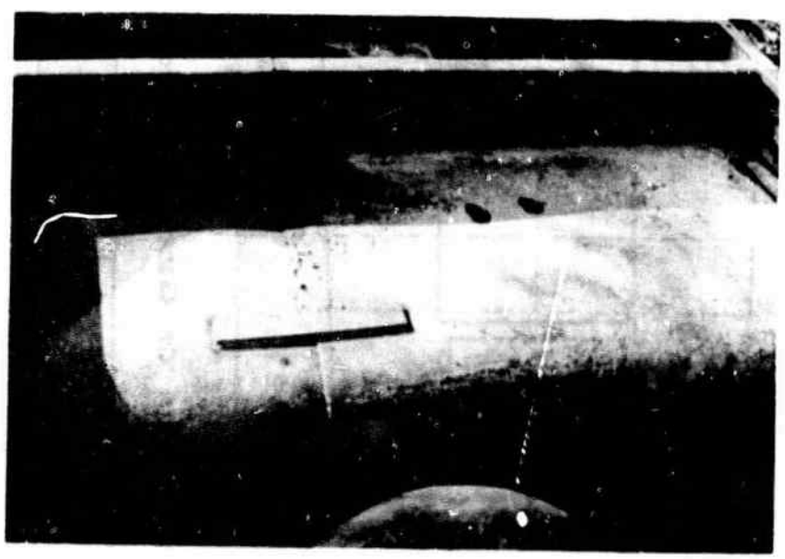
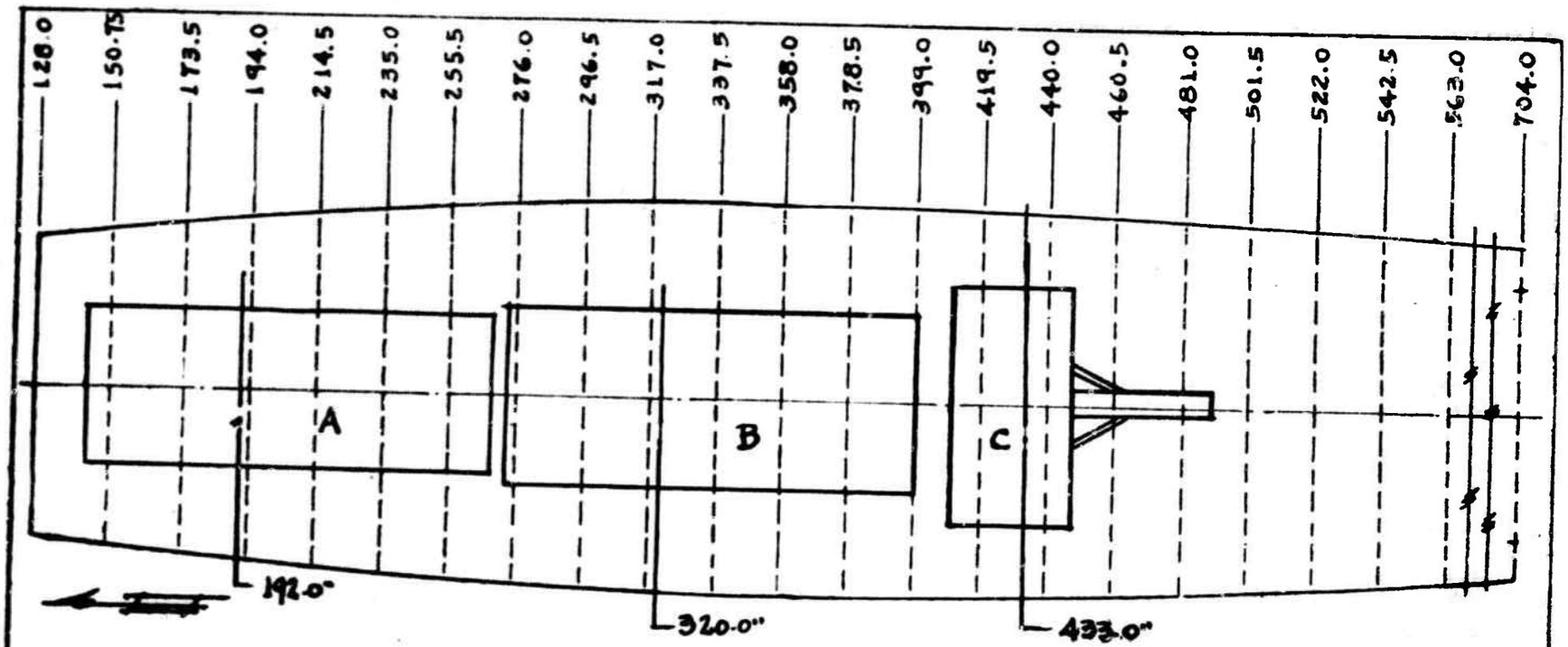


FIG. 109 CLOSE-UP OF REINFORCING STRAP



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 326.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	SMALL HALF OF BODY	120" x 48"	1140#
B	LARGE HALF OF BODY	120" x 58"	1610#
C	FRONT WHEEL & FORK	76" x 72"	760#

FIG" 110

THE ENGINEER BOARD
FT BELVOIR-VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF WOBBLE WHL ROLLER

DWG Nº 1 OF 2 — APP'VD BY.

REVISED

DATE 3-20-44 | SCALE 1/4"=1'-0" | DWN BY H-W | CHK'D BY. WLP

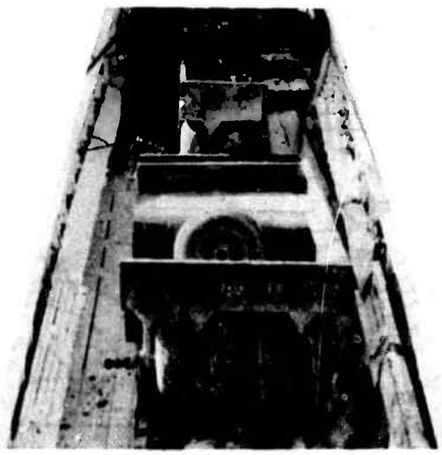
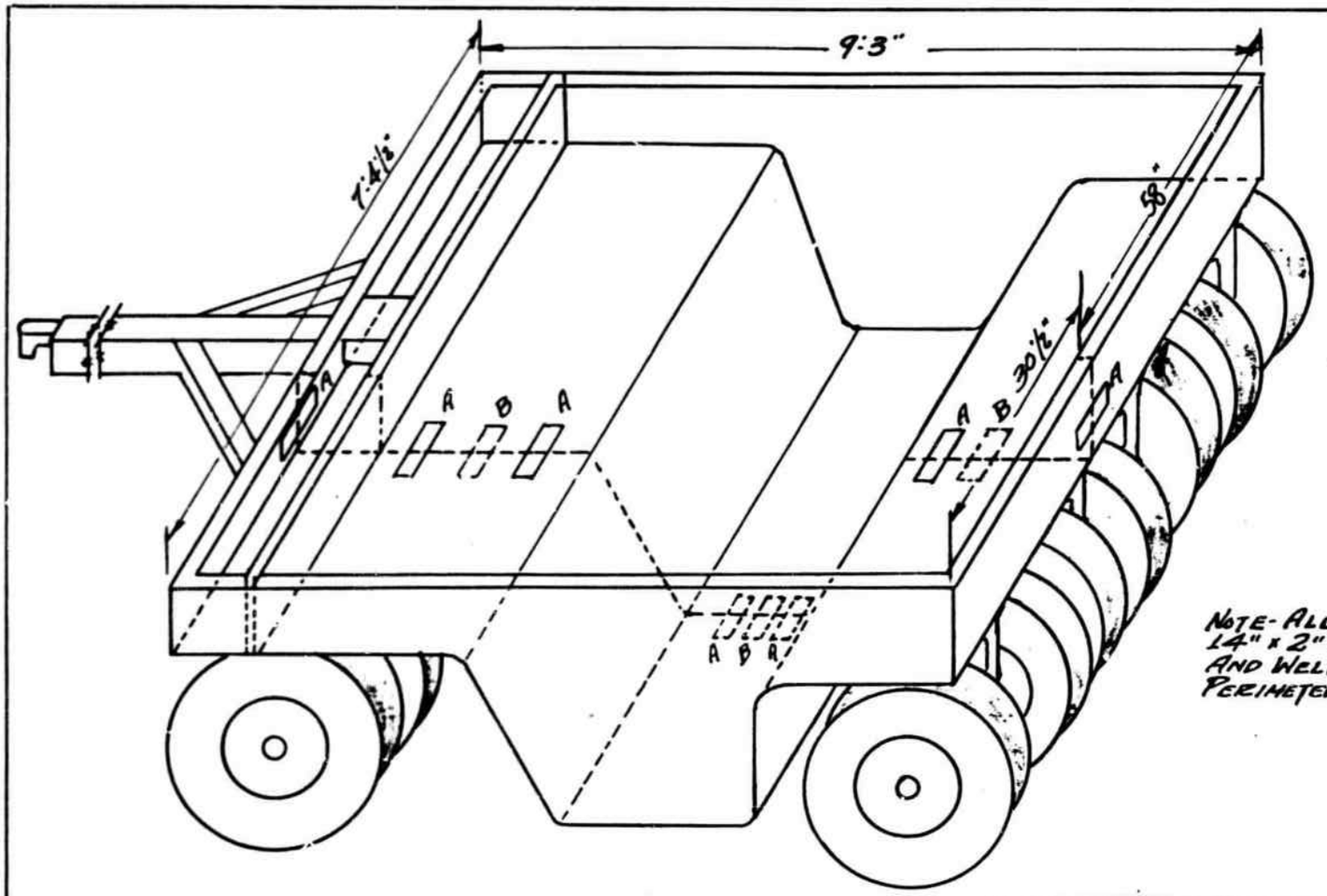


FIG. 111 MOCK-UP LOADED

Item	Weight
Bolster with front wheels	1140
Large section of body with 5 rear wheels	1610
Small section of body with 2 rear wheels	760
Total	3510

Loading	Unloading
3 men - 7.50 man-hours	3 men - 4.50 man-hours



NOTE- ALL STRAPS SHALL BE 14" x 2" x ½" STSEL PLATE AND WELDED ALONG ENTIRE PERIMETER

NOTE- CUT ROLLER ALONG LINE SHOWN & REWELD BOTH SIDES OF CUT ALL REINFORCING STRAPS SHOWN WITH DESIGNATION 'A' WELD INSIDE OF ROLLER ALL SHOWN 'B' ON OUTER SIDE OF ROLLER

FIG 112

THE ENGINEER BOARD FORT BELVOIR VA. AIR TRANSPORT SECTION			
CUTTING & WELDING OF WOBBLE WHEEL ROLLER			
DWG Nº 2 OF 2 REVISED		APPVD BY	
DATE-1-10-44	SCALE- ½" = 1'0"	DWN BY H.W.	CHKD BY

APPENDIX O

DISASSEMBLY, GROUPINGS, AND LOADING OF THE ROLLER, ROAD, GASOLINE-POWERED, 3-WHEEL, 10-TON, GALION MODEL "CHIEF"

1. General. The total weight of the Galion Roller is 19935 pounds, and it requires two and one half C-46 cargo planes for transportation.

2. Dismantling. Only the following pieces must be removed for loading:

(1) Cab
(2) Front roller and yoke
(3) Rear gear covers (4)
(4) Rear scraper bars (4)
(5) Rear wheels and ring gear

3. Loading. In handling load No. 1, great care must be used, because the unit is bulky and very heavy (8265 pounds). The great weight of this item makes it difficult to pull forward into position after it has cleared the door. Therefore, it is recommended that the sled runners be plated with metal and that a metal track be laid on the plane floor for the sled. In addition, plenty of grease must be used under the runners. The sled for this load must be at least nine feet long in order to comply with floor loading limits. Figs. 113 and 114 show this heavy piece loaded.

Load number three which consists of the two rear wheels weighing a total of 7390 pounds must be loaded on a sled at least 10 feet long in order to distribute the weight properly. As shown in the mock-up load, Fig. 120, the two wheels are loaded one on top of the other. This method was preferred to loading them one at a time on separate sleds because it resulted in a considerable saving of time in loading and unloading.

4. Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	8 mh
Loading	4 men	31 mh
Unloading	4 men	30 mh
Reassembly	2 men	8 mh
Total		77 mh

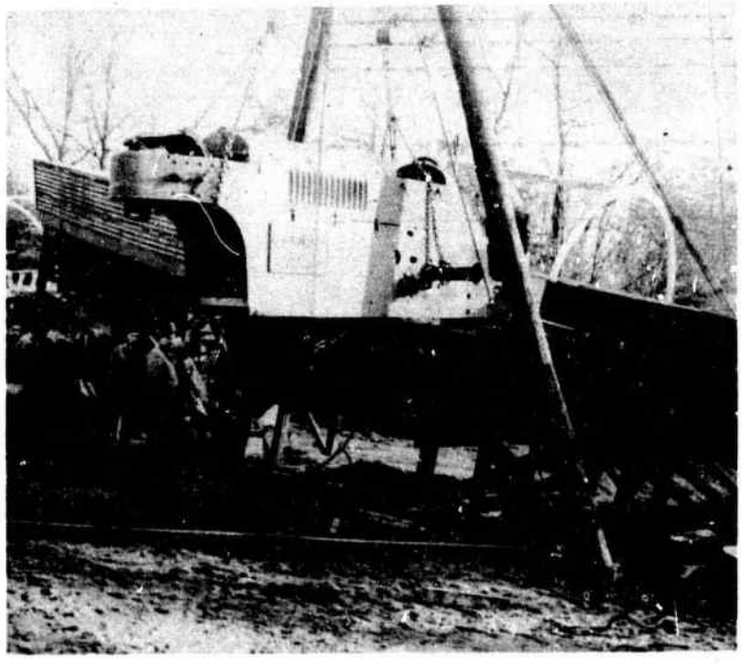


FIG. 113 ENGINE AND FRAME GROUP OF GALION ROLLER BEING LOADED

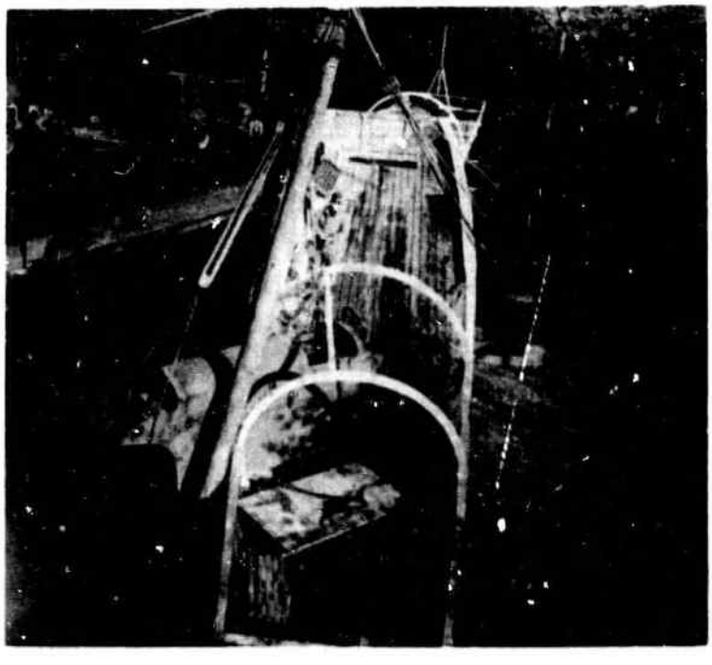
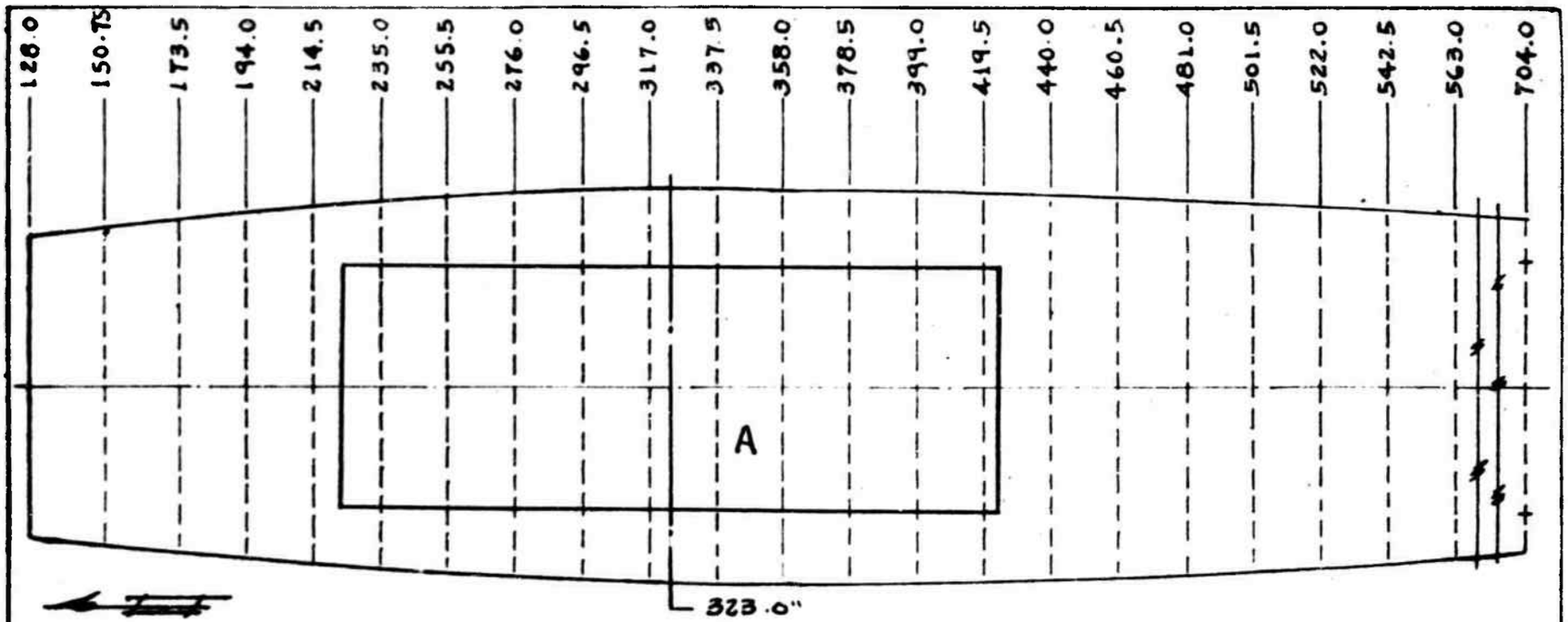


FIG. 114 ENGINE AND FRAME GROUP READY TO BE PULLED INTO PLACE



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 327.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	FRAME & ENGINE	16'-0" x 6'-3"	8265#

FIG# 115

THE ENGINEER BOARD FT BELVOIR. VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 1 OF GALION 3 WHL LOT. ROLLER			
DWG Nº 1 OF 3		APPVD. BY.	
REVISED			
DATE.	SCALE 1/4"=1'-0"	DWN BY. H.H.W	CHKD BY.

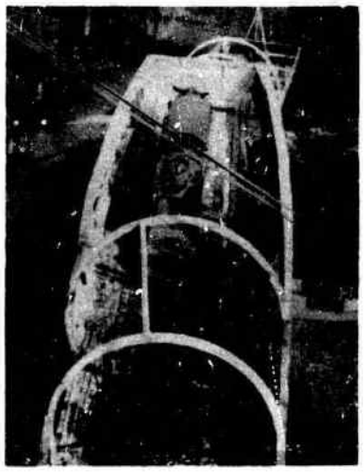
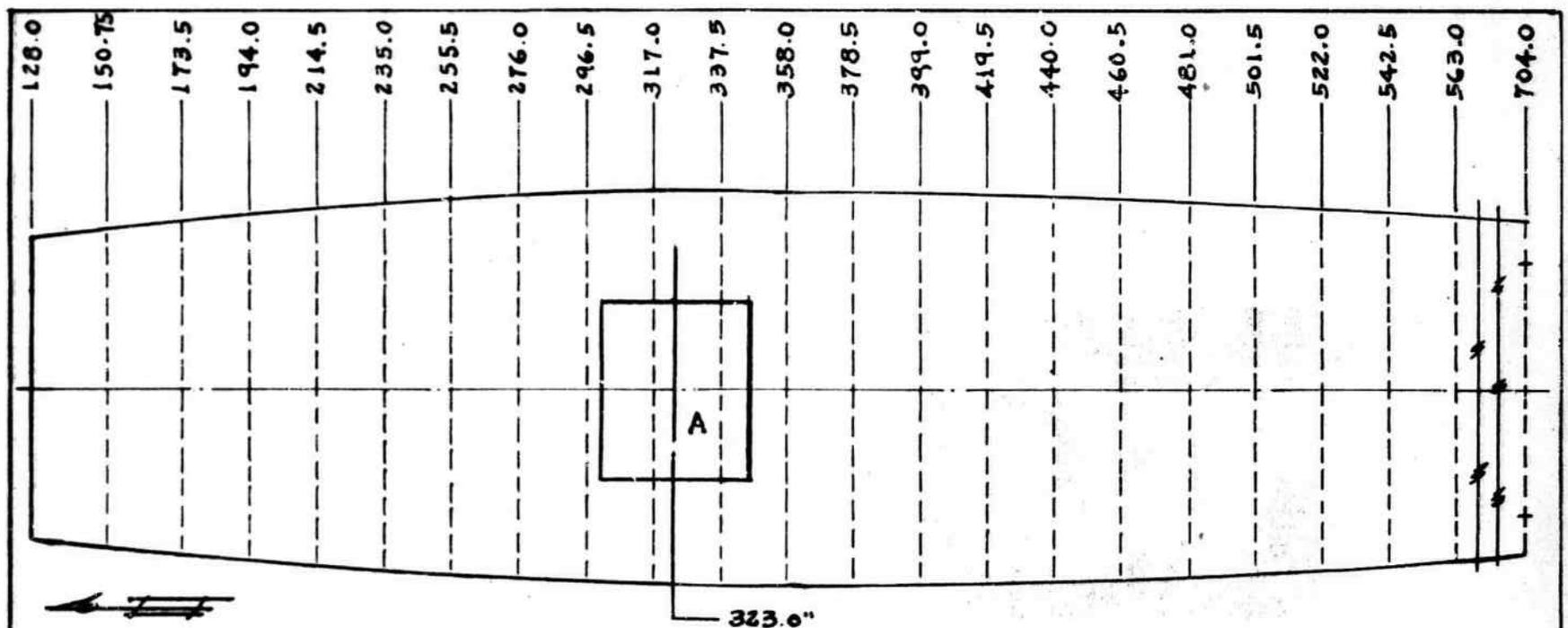


FIG. 116 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Frame and engine assembly with scraper bars and gear covers	8265

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 325.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	FRONT ROLL & YOKE	4'-7" x 3'-7"	4280#

Fig # 117

THE ENGINEER BOARD FT BELVOIR - VA. AIR TRANSPORT SECTION			
LOAD GROUP No 2 OF GALION 3 WHL 10T. ROLLER			
DWG No. 2 OF 3		APPVD BY.	
REVISED			
DATE. 1-27-44	SCALE 1/4" = 1'-0"	DWN BY. H.H	CHKD BY.

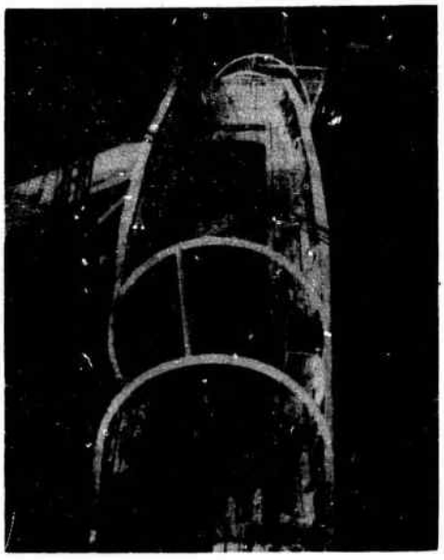
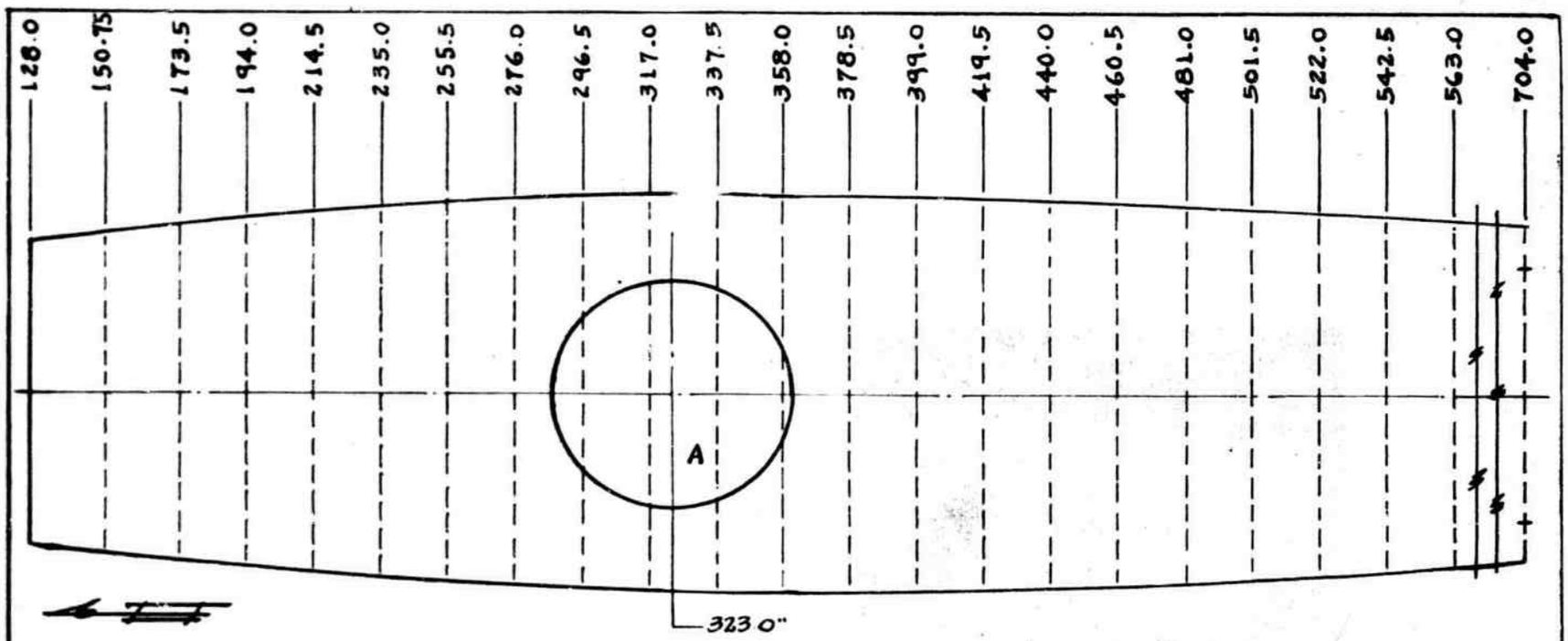


FIG. 118 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Front Roller and yoke	4280

Loading	Unloading
4 men - 12.00 man-hours	4 men - 12.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 327.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	REAR WHEELS & RING GR	5'-9" DIA.	2 PCS 7390#

FIG#119

THE ENGINEER BOARD
FT BELVOIR - VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 3 OF GALION 3 WHL LOT ROLLER

DWG Nº 3 OF 3		APP'VD BY.	
REVISED			
DATE 1-27-44	SCALE 1/4"=1'-0"	DWN BY H.W	CHKD BY

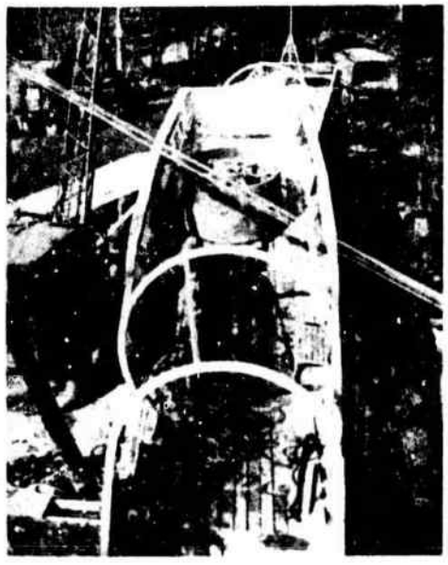


FIG. 120 MOCK-UP LOADED

PLANE NO. 3

Item	Weight
Rear wheel	3660
Rear wheel and ring gear	3730
Total	7390

Loading	Unloading
3 men - 3.00 man-hours	3 men - 2.50 man-hours

APPENDIX P

DISASSEMBLY, GROUPINGS, AND LOADING OF THE ROLLER, ROAD, POWERED, GASOLINE, 2 AXLE TANDEM, 5 TO 8-TON BUFFALO SPRINGFIELD MODEL KT-16

1. General. The total weight of the Buffalo Springfield Roller is 12,231 pounds, and it requires one and one third C-46 cargo planes for transportation.

2. Dismantling. Following is a convenient sequence of disassembly:

(1) Operator's seat
(2) Engine covers and side panels
(3) Engine cover supports
(4) Disconnect wires from control board
(5) Motor control board
(6) Drive roll side covers
(7) Guide roll cover
(8) Drive roll
(9) Guide roll
(10) Frame and engine are left as one group

3. Loading. The frame and engine group must be placed on a standard type sled, with the sled under the heavy end. Plenty of grease must be used to slide this group into position. Fig. 121 and 122 show the frame and engine being loaded.

4. Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	12 mh
Loading	4 men	17 mh
Unloading	4 men	10½mh
Reassembly	2 men	12 mh
Total		51½mh

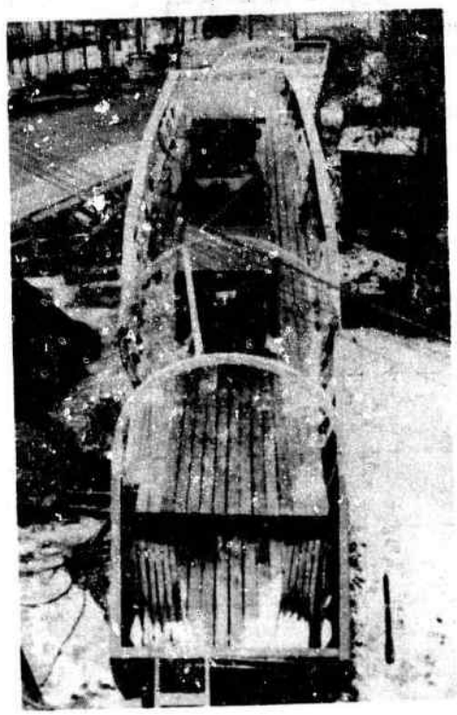
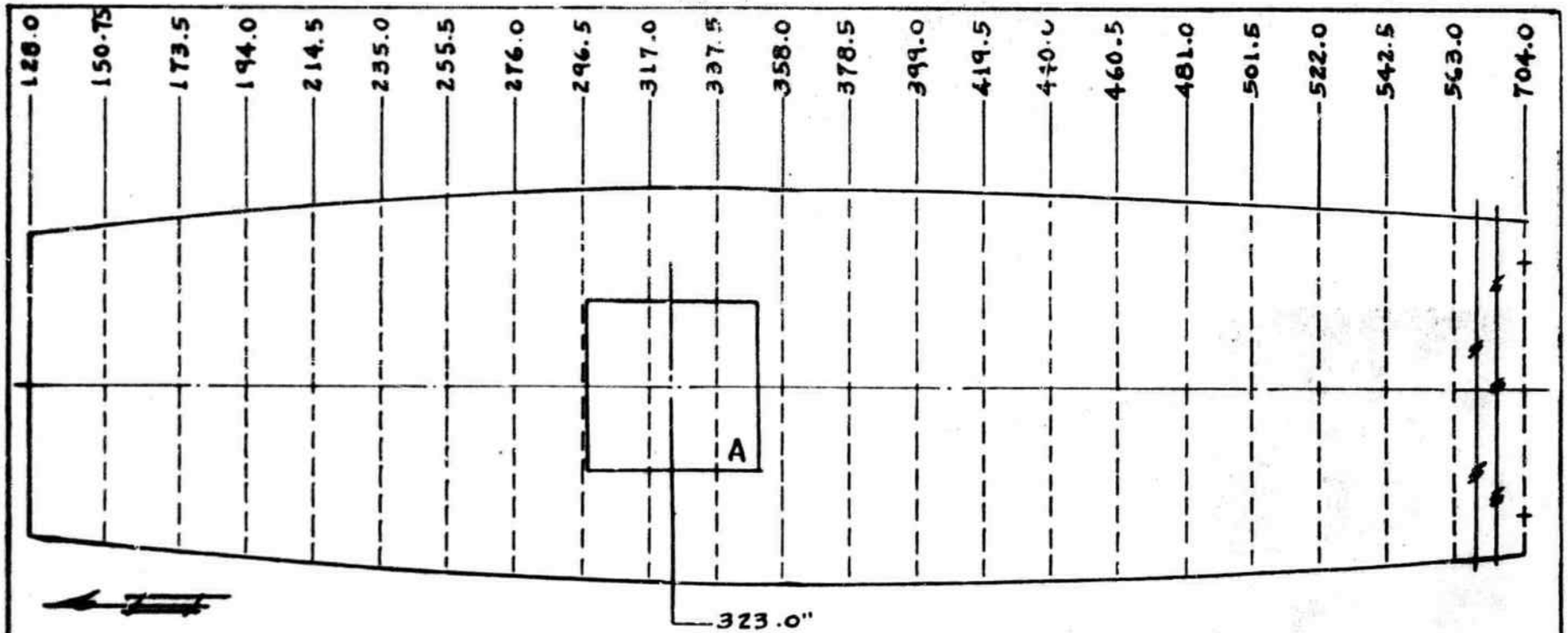


FIG. 124 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Guide roll	2650
Frame and engine	4092
Motor control board	225
Drive roll cover	1200
Small parts (under guide roll cover)	
Operator's seat	
Drive roll side covers	
Side panels (2)	
Engine covers (2)	
Engine cover supports (2)	
Box of bolts and nuts	
Scraper bars	424
Total	8591

Loading	Unloading
6 men - 11.00 man-hours	6 men - 8.50 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 325 0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	DRIVE ROLL	51" x 53"	3640#

Fig# 125

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF BUFFALO SPRINGFLD ROLLER

DWG NO. 2 OF 2		APP'VD BY.	
REVISED			
DATE 1-26-44	SCALE 1/4"-1'-0"	DWN BY H.W	CHKD BY.

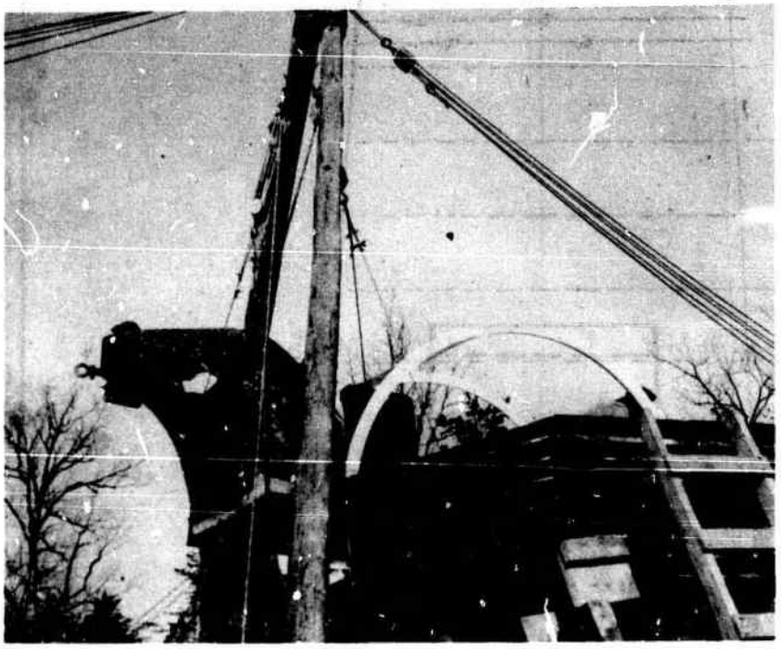


FIG. 121 FRAME AND ENGINE ON SHEARS

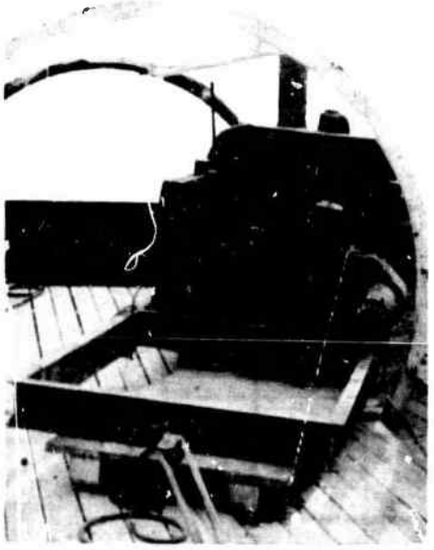
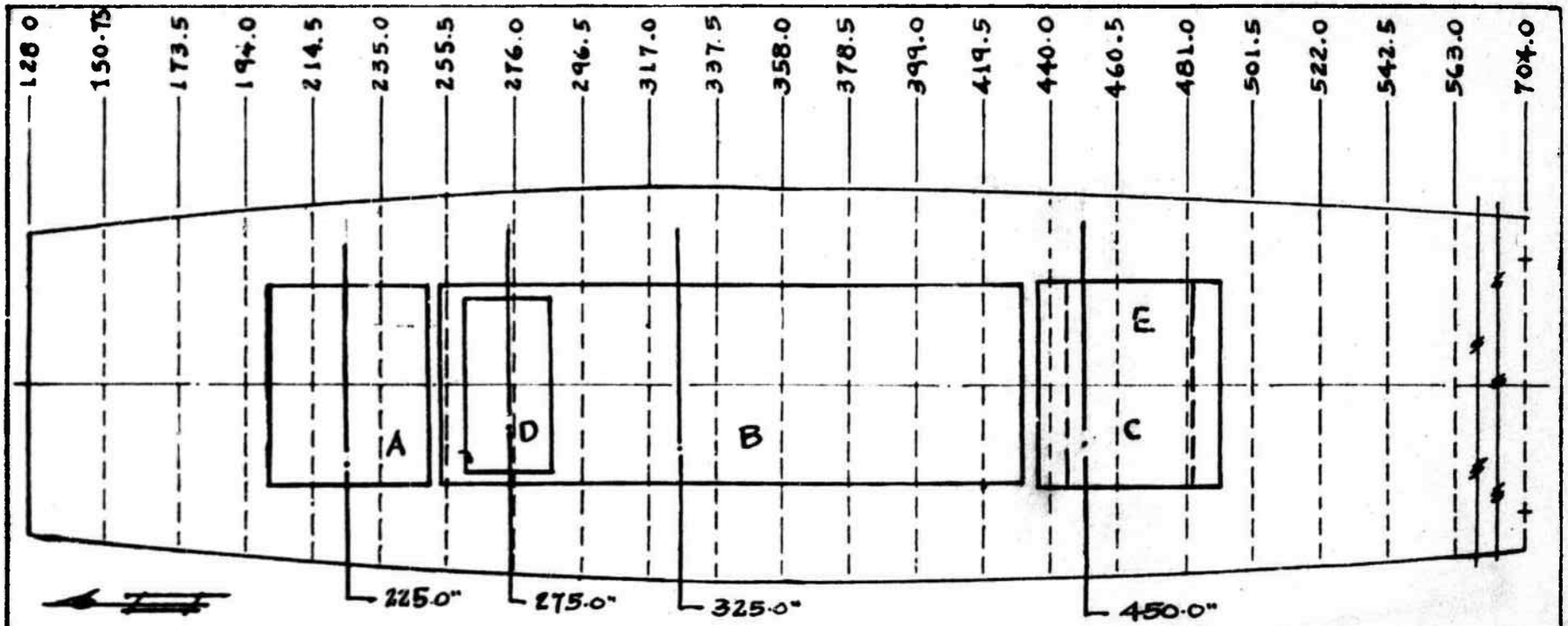


FIG. 122 FRAME AND ENGINE BEING PULLED INTO POSITION



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 325.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	GUIDE ROLL	5'-1" x 4'-0"	2650#
B	FRAME & ENGINE	14'-3" x 5'-0"	4092#
C	DRIVE ROLL COVER	5'-2" x 4'-7"	1200#
D	CONTROL BOARD	4'-6" x 2'-2"	225#
E	MISCELL PART	4'-0" x 4'-0"	424#

NOTE- ITEM 'E' MISCELL PARTS LOCATED UNDER 'C' INCLUDE. DRIVE ROLL SEAT COVER, 2 SIDE PANELS, 2-MOTOR COVERS, SCRAPER BARS, 2-ENGINE COVER SUPPORTS, & BOX OF BOLTS & NUTS, OPERATOR'S SEAT.

FIG 123

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF BUFFALO SPRINGFIELD ROLLER

DWG Nº 1 OF 2		APP'VD BY.
REVISED		
DATE 1-26-44	SCALE 1/4"=1'-0"	DWN BY H.W. CHK'D BY.

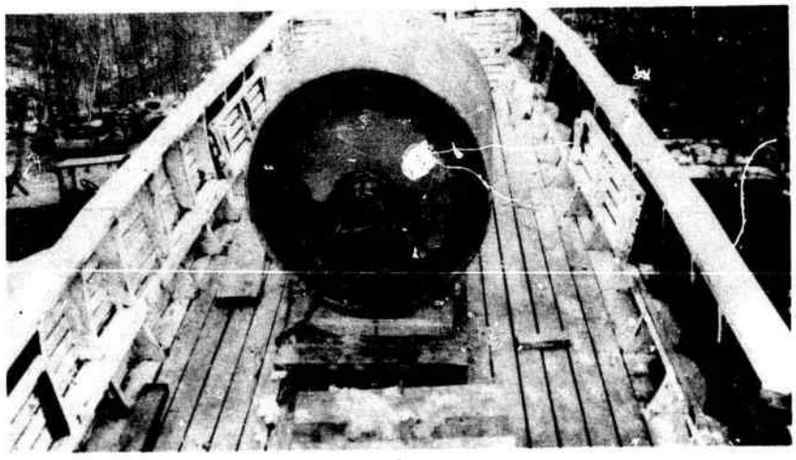


FIG. 126 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Drive Roll	3640

Loading	Unloading
6 men - 6.00 man-hours	6 men - 2.00 man-hours

APPENDIX Q

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRUCK, DUMP, 2½-TON, 6 X 6, GMC; AND TRUCK, DUMP, 2½-TON, 6 X 6, GMC, (AIRBORNE)

I. Truck, Dump, 2½ Ton, 6 x 6, GMC

1. General. The GMC 2½ ton 6 x 6 dump truck weighs 10.087 pounds, and utilizes the cargo space of one and one third C-46 planes. Additional cargo should be loaded in the second plane, but it must be remembered that the CG must then be recomputed.

2. Dismantling.

a. Use the following disassembly sequence:

(1) Tail gate
(2) Remove dump body and cut in half lengthwise (See Figs. 128 and 135).
(3) Hood and engine side panels
(4) Steering wheel and column
(5) Cab
(6) Remove emergency brake, battery and box, exhaust pipe and muffler, tool box, gas tank and supports.
(7) Running boards and floor boards
(8) Disconnect rods and gas lines and remove engine
(9) Front wheel assembly
(10) Rear wheel assembly

b. In welding the body at reassembly, some difficulty may be encountered due to the thinness of the bottom of the dump. To prevent burning, the following procedure should be followed:

(1) Align the two sections by placing the body upside down on a flat even surface and carefully block in place.

(2) Tack the two sections together at the bottom channels, being careful not to touch the bottom plates.

(3) The channels themselves are welded and then a 3/8 x 6 x 1 inch strap is welded to reinforce each channel.

(4) A long strip is welded along the entire length of the cut (See Fig. 127).

(5) The body is turned rightside up and the bottom welded on the top side.

If, because of warping, difficulty occurs in aligning the body for welding, a simple expedient for pulling it in place is to tack an ordinary stove bolt (about one inch longer than the height of the bottom channels) to the bottom near the point of warping. Next a piece of scrap steel long enough to reach across the channels is drilled to receive the bolt. By placing this piece across the floor channels and placing a nut on the bolt, the floor can be drawn into alignment by tightening. If the floor is badly warped, several such expedients might be employed simultaneously. (See Sketch, Fig. 135).

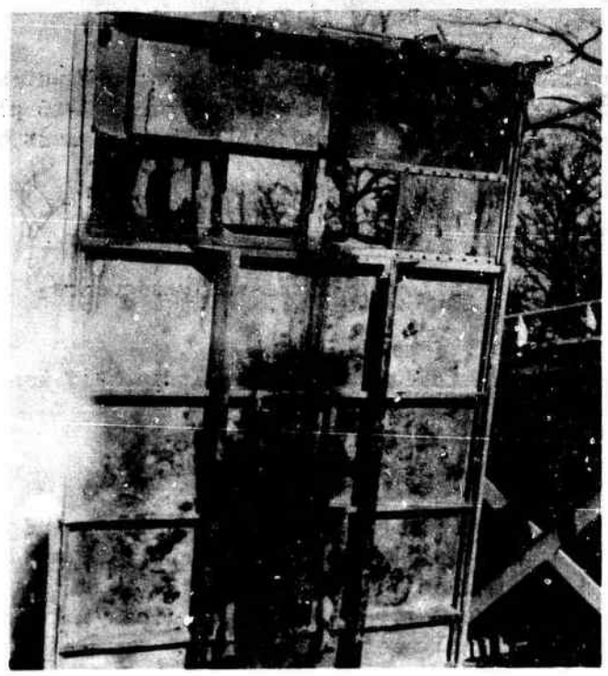


FIG. 127 TRUCK BED REWELDED
Note iron strap welded along entire length of cut.

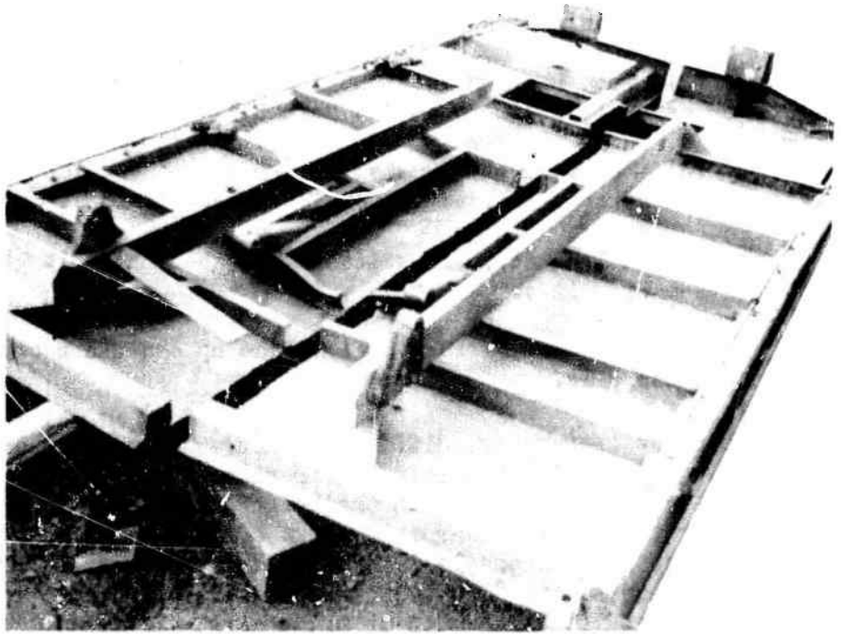


FIG. 128 SHOWING CUT ON TRUCK BED.

3. Loading. Tip the frame on its side to load it into the plane (See Figs. 129 and 130). The two halves of the dump body are placed on their sides once inside the plane. Note this position in the picture of the plane load, Fig. 132.

4. Man-Hours. A crew of nine men worked the following periods:

Disassembly	2 men	11 mh
Cutting	1 man	1½ mh
Loading	6 men	5½ mh
Unloading	6 men	4½ mh
Welding	1 man	2 mh
Reassembly	2 men	14 mh
Total		35 mh

Approximate total time in preparation of equipment:

For Flight	9 men	6 hours
For Operation	9 men	8 hours

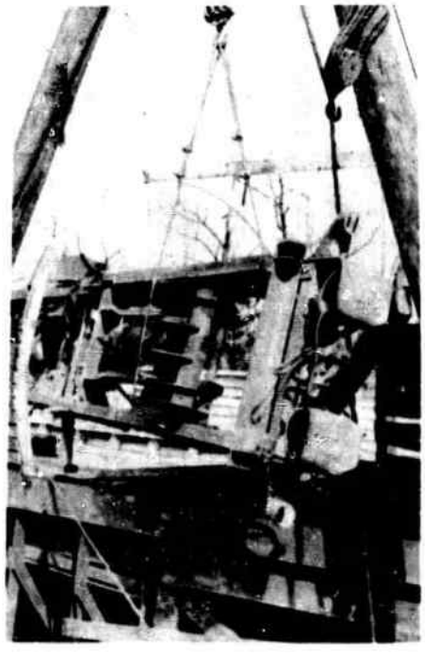
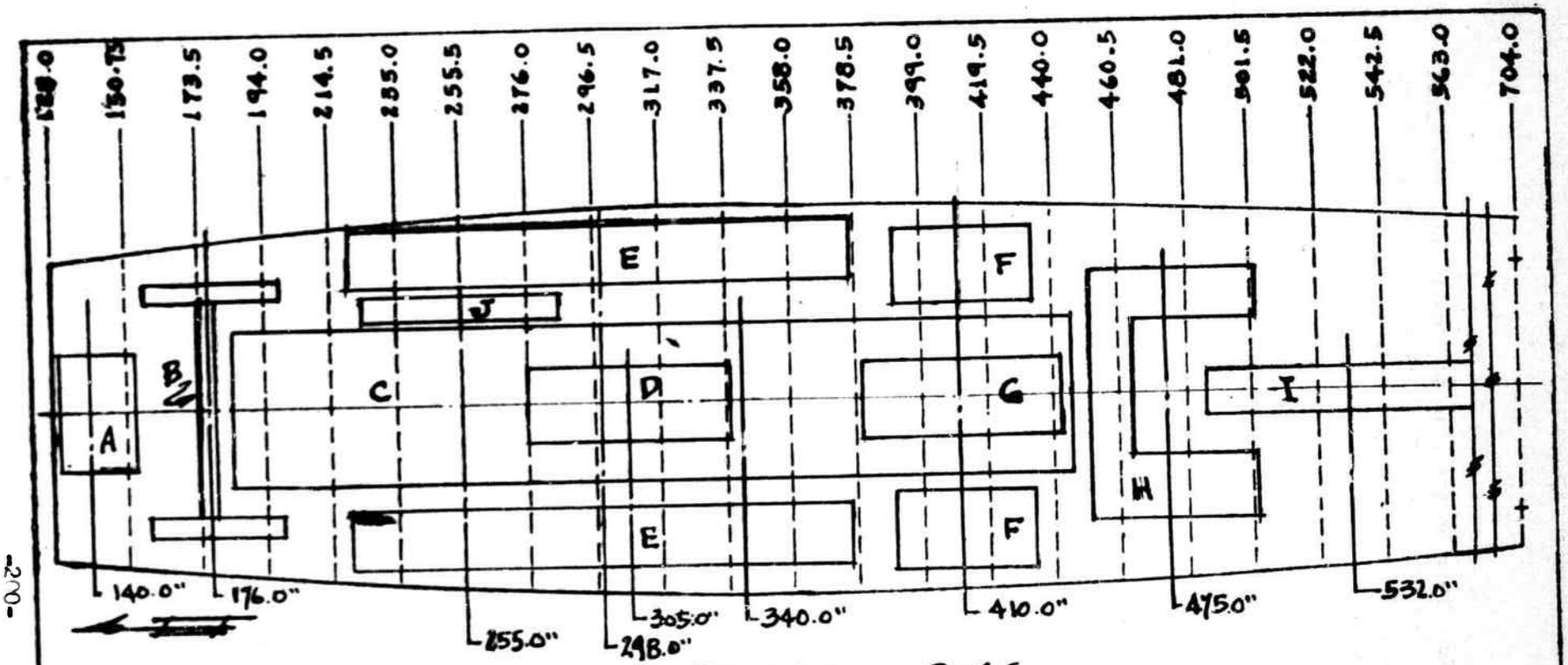


FIG. 129. FRAME BEING LOADED.

FIG. 130. FRAME INSIDE PLANE.



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	GAS TANK	36" x 24"	65#
B	FRONT WHEEL ASSM	80" x 42"	1040#
C	FRAME	250" x 48"	2435#
D E	MISCELL. PARTS DUMP BODY.	60" x 24" 150" x 20"	2 TO# 2 PCS 1490#
F I	RUNNING BOARDS ENGINE.	42" x 24" 60" x 24"	2 PCS 54# 940#
H G	FENDER & RAD ASSM TAILGATE	80" x 50" 84" x 14"	190# 100#
J	HOIST DRIVE SHAFT PROP. DRIVE SHAFT	60" x 12"	93#

ITEM 'D' CONTAINS MUFFLER, EXH PIPE, STEERING WHEEL, STEERING COL, EMER BRAKE LEVER, BATTERY - HOOP, MOTOR SIDE PANELS, FLOOR BOARDS, & GAS TANK SUPPT.

FIG# 131

THE ENGINEER BOARD
FT BELVOIR - VA.
AIR TRANSPORT SECTION

LOAD GROUP No 1 OF 6x6 DUMP TRUCK

DWG NO. 1 OF 3		APP'D BY.	
REVISED			
DATE 3-21-44	SCALE 1/4" = 1'-0"	DWN BY. H.W.	CHK'D BY.

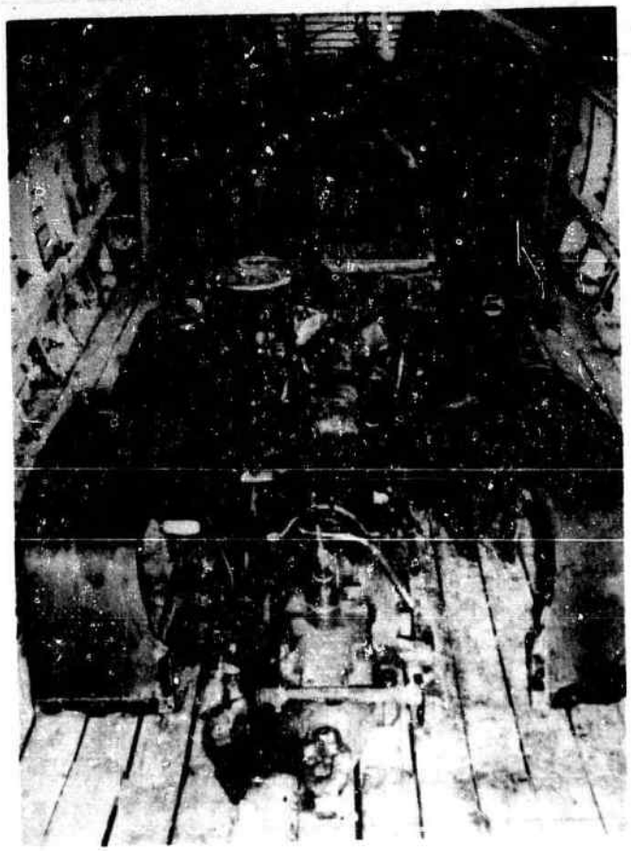
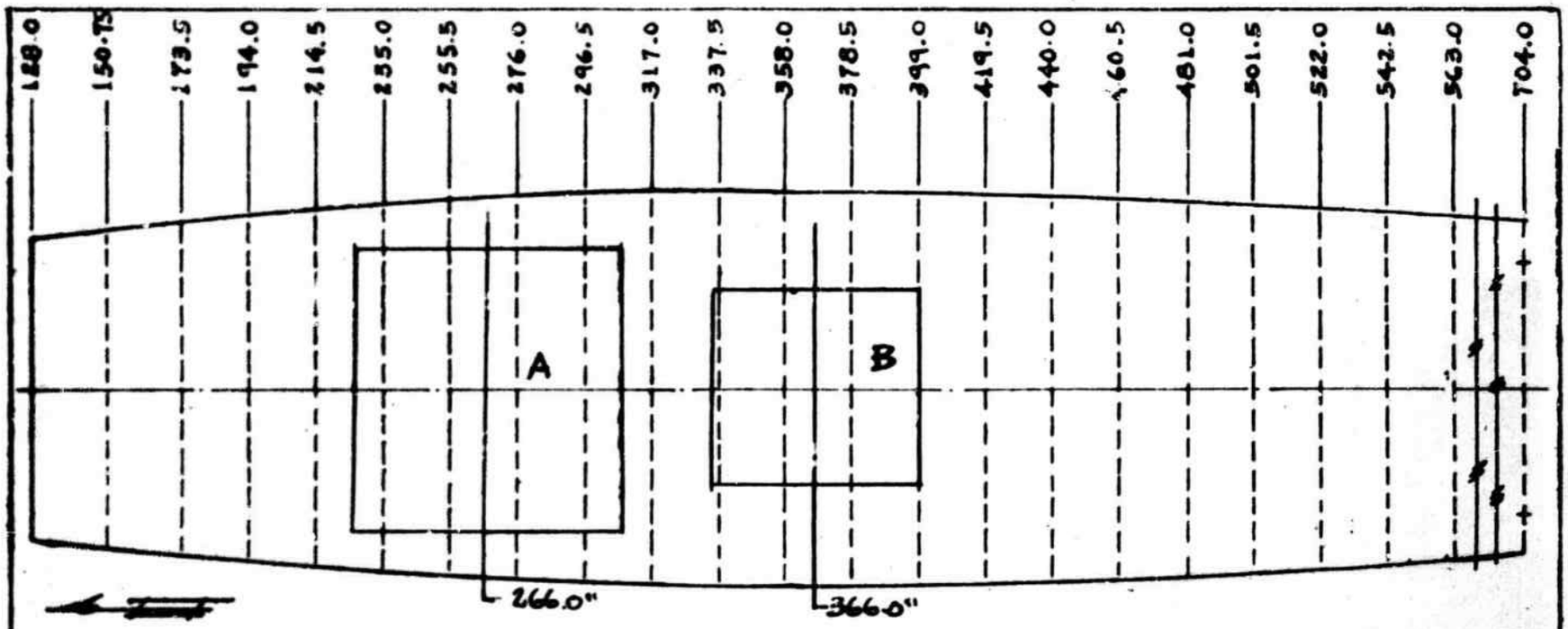


FIG. 132 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Frame	2435
Front wheel assembly	1040
Gas tank	65
Dump body (2 pieces)	1490
Running boards	54
Engine and transmission	940
Fenders and radiator assembly	190
Tailgate	100
Hoist drive shaft and propeller drive shaft	93
Miscellaneous: exhaust pipe and muffler, steering wheel and column, emergency brake lever, battery, hood and side panels, floor boards, gas tank supports	270
Total	6677

Loading	Unloading
6 men - 3.50 man-hours	6 men - 3.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 322.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	REAR BOGEY WHL ASSY	87" x 80"	2760#
B	CAB	60" x 60"	650#

FIG# 133

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP Nº 2 OF 6x6 DUMP TRUCK			
DWG Nº. 2 OF 3		APP'VD BY	
REVISED			
DATE 3-21-44	SCALE 1/4"=1'-0"	DWN BY HH	CHKD BY

-20-

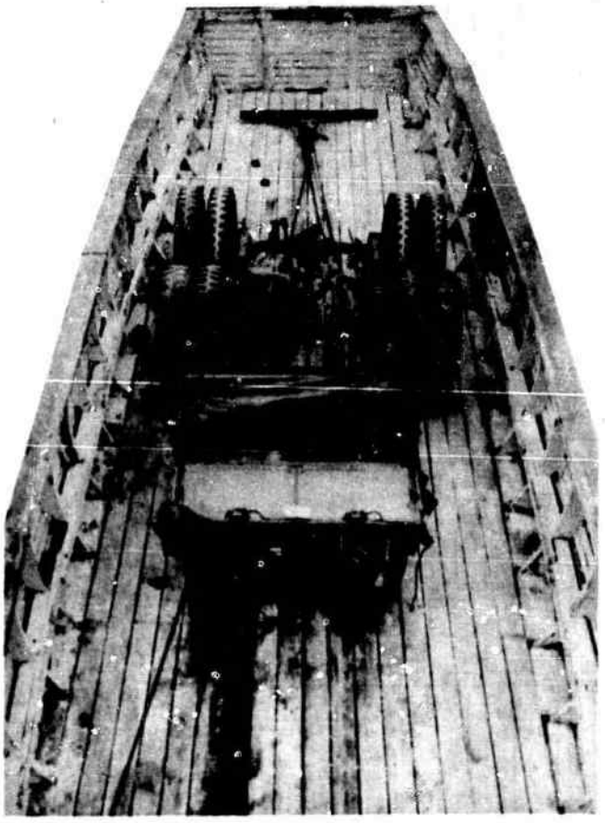
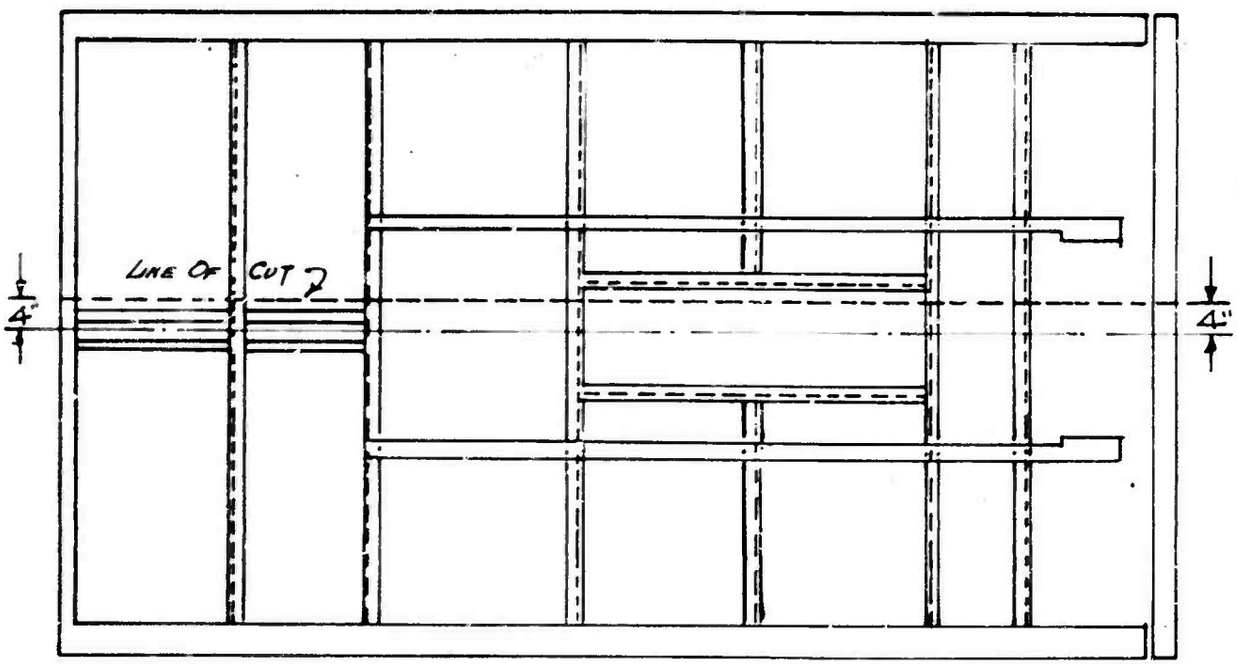


FIG. 134 MOCK-UP LOADED

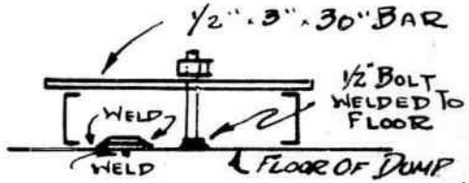
PLANE NO. 2

Item	Weight
Cab and dash assembly	650
Rear wheel assembly	2760
Total	3410

Loading	Unloading
6 men - 2.00 man-hours	6 men - 1.50 man-hours

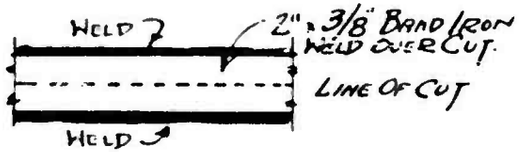


PLAN OF DUMP CHASSIS (UNDERSIDE)



NOTE-IN ORDER TO WELD FLOOR OF DUMP AND ALIGN PROPERLY INSTALL BOLT AS SHOWN. WHEN WELD IS COMPLETED REMOVE BOLT

NOTE - STRAP SHALL BE WELDED IN PLACE AT EACH CHANNEL



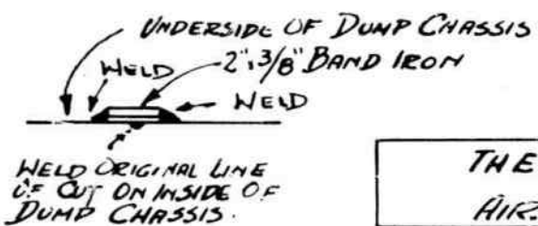


Fig. 135

THE ENGINEER BOARD FORT BELVOIR VA. AIR TRANSPORT SECTION			
CUTTING & WELDING OF DUMP CHASSIS			
DWG Nº 1 OF 2.		APPVD BY [illegible]	
REVISED			
DATE 1-3-44	SCALE 1/2"-1'0"	DWN BY H.W.	CHKD BY [illegible]

II. Truck, Dump, 2½ Ton, 6 x 6, GMC (Airborne)

1. General. The Airborne model of the 2½ ton, 6 x 6 dump truck is made with a butt-plate type frame joint which allows the truck chassis to be separated into two large sections. By attaching a dolly (which Ordnance has developed, and which will be issued with the trucks or may, in some cases, be carried in the cargo planes) to the butt-plates of the front section, this section may be loaded under its own power when a ramp is used. The dump box is also provided with a joint so that it may be divided into two sections.

2. Disassembly. Following is the proper sequence of disassembly:

(1) Front bumper and windshield
(2) Truck side panels and front panel
(3) Disconnect dump box from dumping mechanism and remove dump box.
(4) Separate two sections of dump box
(5) Remove tailgate
(6) Remove gasoline tank, fenders and runningboards
(7) Remove spare tire

3. Loading. There are no loading difficulties. Follow the procedure outlined for the Class 135 Crash Truck (See Appendix R).

4. Man-Hours. A crew of 8 men worked the following periods:

		Ramp	Shears
Disassembly	4 men	8 mh	8 mh
Loading			
With ramp	4 men	10 mh	
With shears	4 men		14 mh
Unloading			
With ramp	4 men	7 mh	
With shears	4 men		10 mh
Reassembly	4 men	10 mh	10 mh
Total		35 mh	42 mh

Approximate total time in preparation of equipment for flight using ramp is 5 hours and using shears is 6 hours. Preparation of equipment for operation after the landing takes approximately 4½ hours using a ramp and 5 hours using shears.

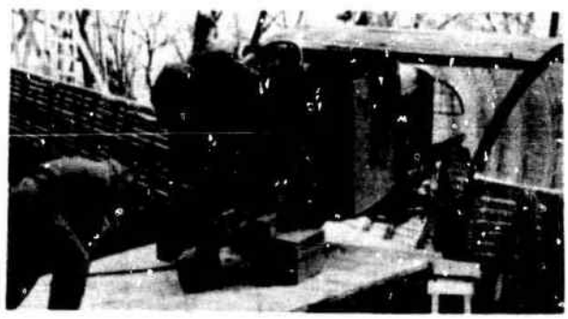
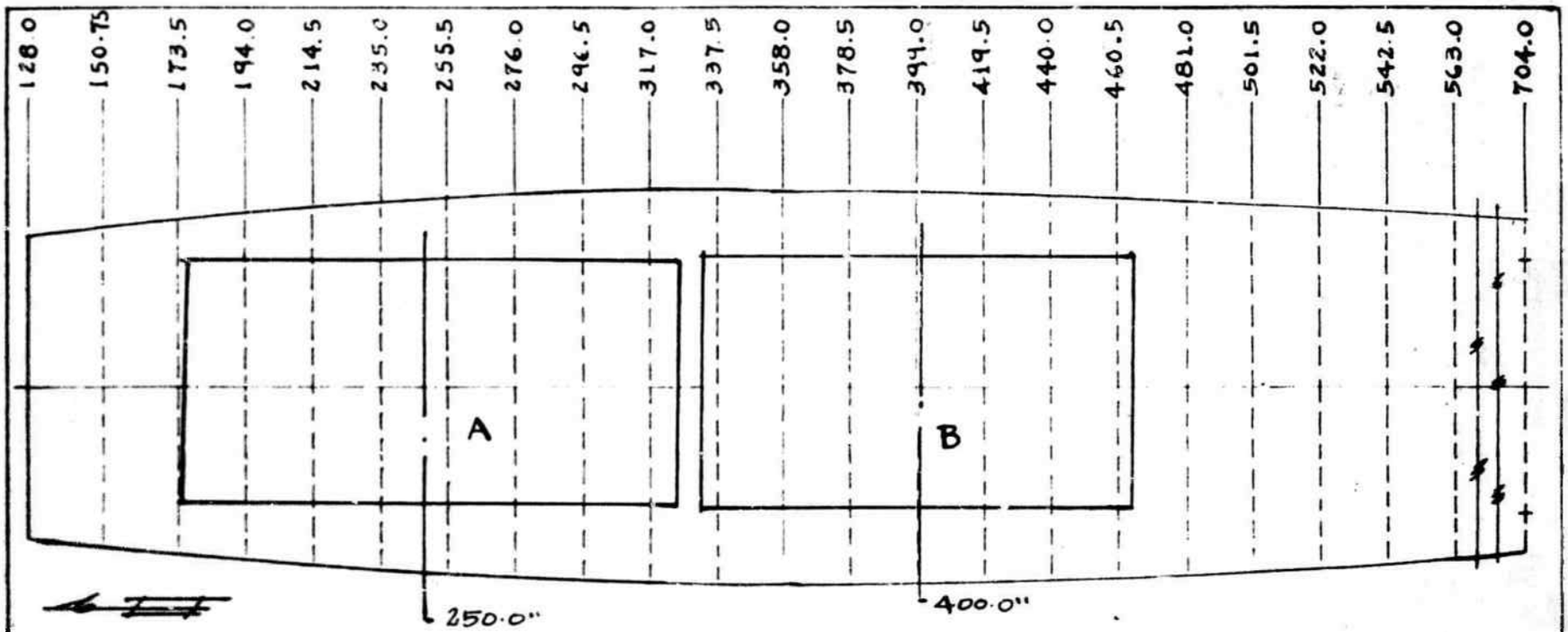


FIG. 136. FRONT SECTION BEING LOADED



TRANSPORT · C·4/6

NOTE · APPROX. CENTER OF GRAVITY · 323.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	CAB & FRONT SECT.	144" x 77"	4868#
B	TANDEM.	123" x 79"	3770#

Fig# 137

THE ENGINEER BOARD
FT BELVOIR · VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF 6x6 DUMP TRUCK (AIRBORNE)

DWG Nº 1 OF 2		APPVD BY.	
REVISED			
DATE 7-19-44	SCALE 1/4"=1'0"	DWN BY HN.	CHKD BY.

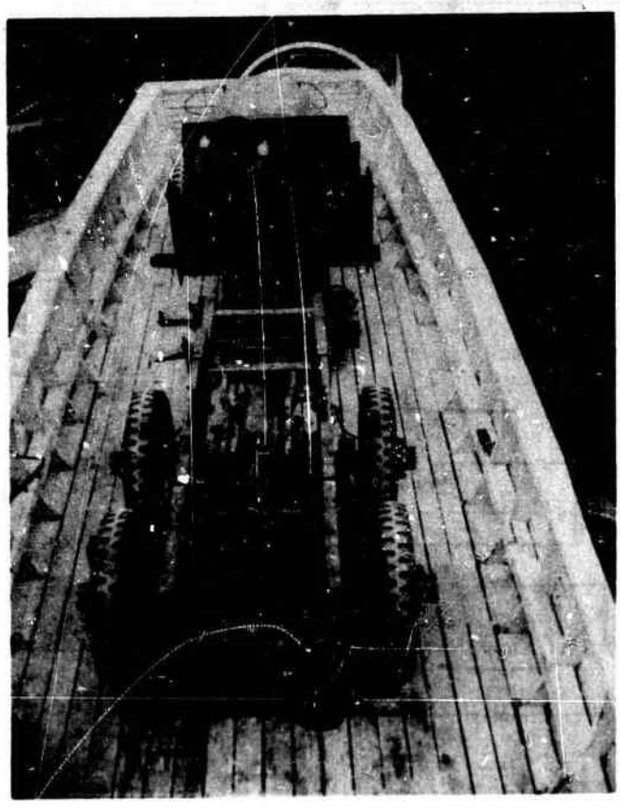
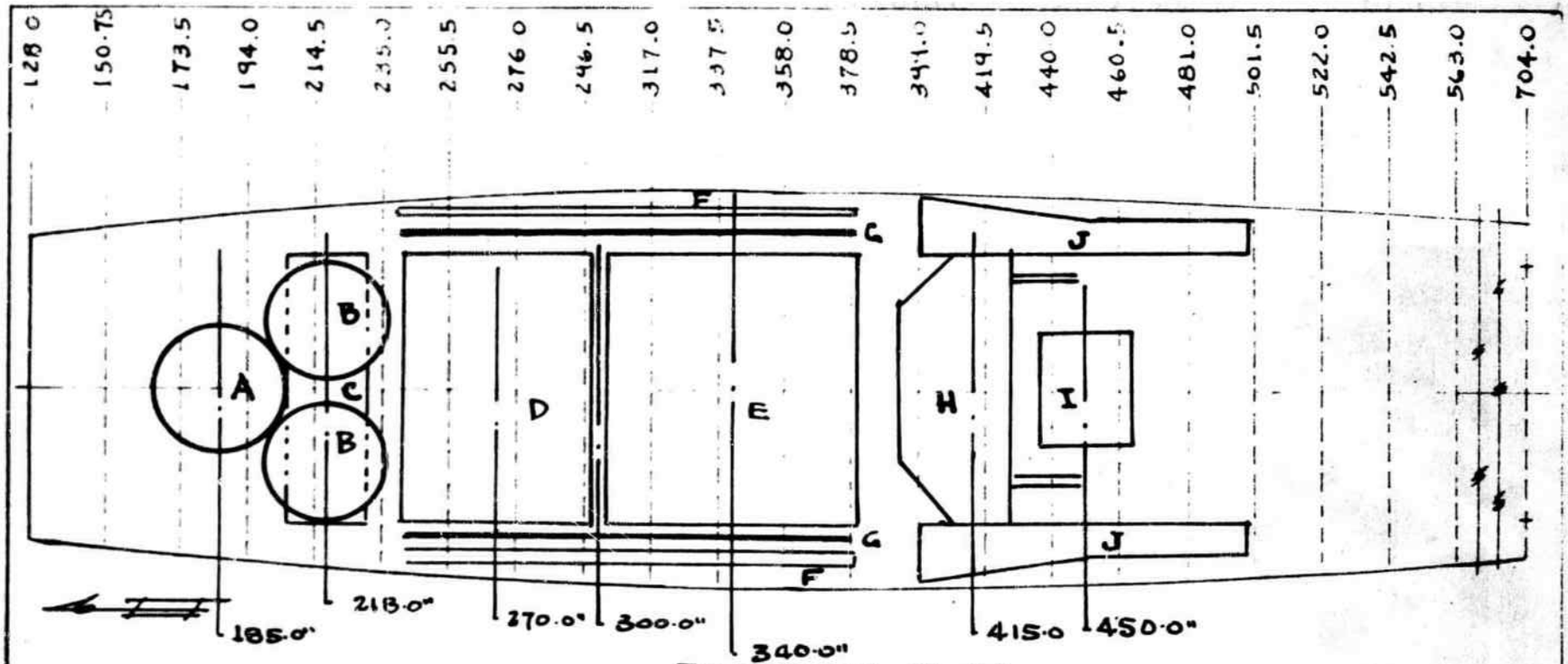


FIG. 138 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Front section of truck including winch	4868
Tandem section of truck	3770
Total	8638

Loading	Unloading
With Ramp - 4 men - 4.00 mh	With Ramp - 4 men - 3.00 mh
With Shears - 4 men - 8.00 mh	With Shears - 4 men - 6.00 mh



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT
A	3-TIRES	36" DIA.	408 #
B	2-TIRES.	36" DIA.	272#
C	TAIL GATE	84x20	100#
D	FWD PART TRUCK BED	84x56	804#
E	AFT PART OF TRK BED	84x72	1050#
F	SIDE PANELS	144x6	250#
G	DUMP RODS	144x4	161#
H	END TRUCK PANEL	70x18	196#
I	GAS TANK	36x26	175#
J	2-FENDERS	96x18	146

MISC. PARTS IN 'D'
DRIVE SHAFTS, BOWS, CRANKSHAFT, SMALLSHAFTS RIFLE HOLDER-CAR ROD.

MISC. PARTS IN 'E'
BUMPER, FIRE EXT, WINDSHIELD TRUCK TARP, CHAINS, MUFFLER TAIL PIPE, SNATCH BLOCK. CAB. FIR.

FIG # 139

THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP #2-6x6 DUMP TRUCK (AIRBORNE)			
DWG NO 2 OF 2		APPVD BY.	
REVISED			
DATE 7-19-44	SCALE 1/4" 1'0"	DWN BY H-W	CHKD BY

FIG. 140 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Wheels (3)	408
Wheels (2)	272
Tailgate	100
Forward section of truck bed	504
Aft section of truck bed	1050
Side panels	250
Dump rods	16
Forward truck panel	196
Gas tank	175
Fenders (2)	146
Total	3117

Loading	Unloading
4 men - 6.00 man-hours	4 men - 4.00 man-hours

APPENDIX R

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRUCK, FIRE, POWERED, CRASH, CLASS 135, COMPLETE WITH EQUIPMENT

1. General. Total weight of the Class 135 crash truck as prepared for air transport is 10,446 pounds and requires one and one-quarter C-46 cargo planes for transportation. This piece of equipment is mounted on a chassis provided with butt plate bolted frame joints which enable the chassis to be separated into two large sections.

A dolly (See Fig. 144) which was developed by Ordnance and will be issued on the basis of one for every three trucks or may in some cases be carried in the cargo planes, is bolted to the butt plates of the front section allowing this section to be driven into the plane under its own power when a loading ramp is used.

2. Dismantling. Front brackets on the left and right hose reel enclosures must be modified as shown in the sketch, Fig. 147, so as to leave room for the frame joint butt plates. The flat bed must be cut in two at the position shown in Fig. 148. The flat bed floor boards should be cut along the centerline of the wooden cross member so that they may be nailed back in reassembly (See Figs. 142 and 143).

The top of the cab must be removed in order for the truck front section to pass through the plane door. Bolt plate flanges are installed to provide a convenient method of rejoining the two cab sections. The sketches in Fig. 149 show details of these flanges.

Proper disassembly sequence is as follows:

(1) All accessories (lights, axes, nozzles, etc.)
(2) Front bumper
(3) Doors
(4) Top of cab (See Fig. 149)
(5) Front fenders and running boards
(6) Left and right hose reels and hose reel enclosures
(7) Rear step
(8) Left and right tool boxes
(9) Remove water tank from tank frame
(10) Remove tank frame from flat bed
(11) Remove and cut flat bed (See Fig. 148)
(12) Disconnect hydraulic and fuel lines
(13) Separate two sections of chassis and attach dolly to front section

3. Loading. The Ordnance dolly is modified by the addition of a Porto-Power hydraulic jack and the parts shown in Fig. 144 and 150. It is advantageous to keep the rear end of the front chassis section as low as possible during loading with a ramp, in order that the section may clear the plane door. There is danger, however, of damage to the plane floor if the modification is not used, since it allows the rear end of the section to be raised or lowered at will. The auxilliary gasoline tank shown in Figs. 145 and 146 must be attached to the fuel line to provide gasoline for the engine.

The front chassis section is driven up the ramp, with one man steering the dolly by means of its handle, until the hub of the left front

wheel is as close as possible to the front edge of the plane door. The dolly is raised so that the section will clear the plane floor. Then the wheels are cramped to the left and the section driven into the plane as far as it will go without scraping the fuselage. The dolly wheel is then turned perpendicular to the line of the plane and the rear end of the section rolled into the plane by manpower. Drive the section forward to its loaded position.

The loading ramp should be so constructed that its top platform is some six to eight inches below the bottom of the door in the unloaded plane, since the plane settles as it is loaded. Men standing on the edge of the door will bring it down into line with the ramp as the chassis section moves from the ramp into the plane.

Miscellaneous parts box No. 1, plane load No. 1, is placed inside the tank frame, and one end of the tank itself rests on top of the box. This is done to make it easier to remove the tank by manpower in unloading. In the same plane load the rear chassis section is kept upright by resting one end on the tank frame and the other on miscellaneous parts box No. 2.

4. Man-Hours. A crew of 8 men worked the following hours:

		Ramp	Shears
Disassembly	3 men	18 mh	18 mh
Cutting	1 man	2 mh	2 mh
Loading			
With ramp	4 men	12 mh	
With shears	4 men		16 mh
Unloading			
With ramp	4 men	8 mh	
With shears	4 men		12 mh
Reassembly	3 men	24 mh	24 mh
Total		64 mh	72 mh

Approximate total time in preparation of equipment for flight is 9 hours using a ramp and 10 hours using shears for loading. Approximate time in preparation of equipment for operation after landing is 10 hours when a ramp is used and 11 hours using shears.

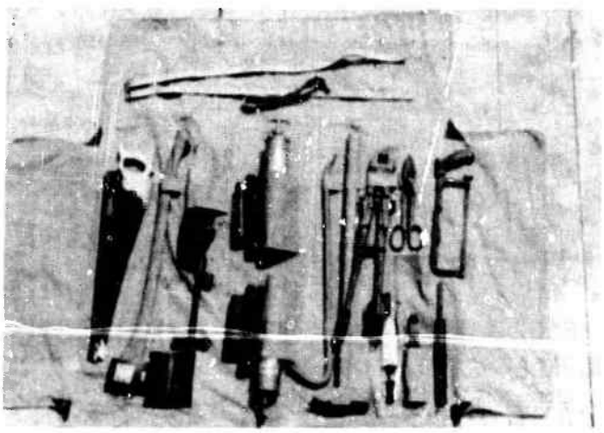


FIG. 141. THIS CRASH KIT IS CARRIED IN THE TRUCK CAB DURING FLIGHT.

FIG. 142 TOP VIEW OF FLAT BED WITH WHITE LINE SHOWING POSITION OF CUT

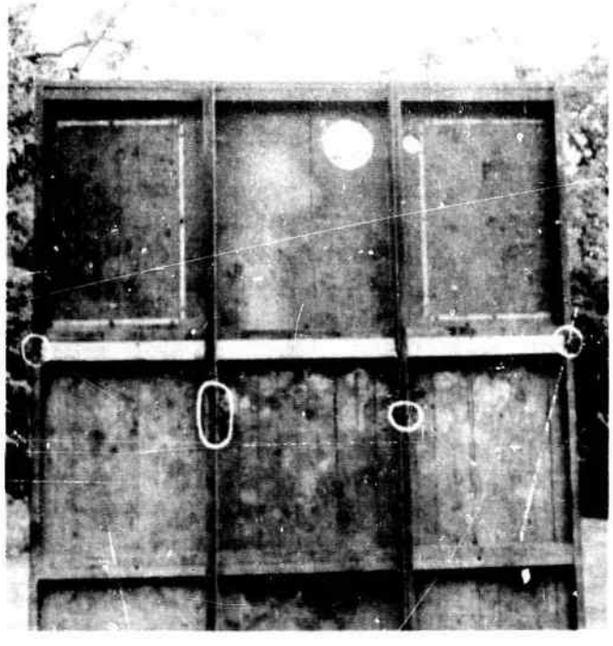


FIG. 143 BOTTOM VIEW OF FLAT BED. WHITE CIRCLES SHOW CUTS ON METAL BED FRAME

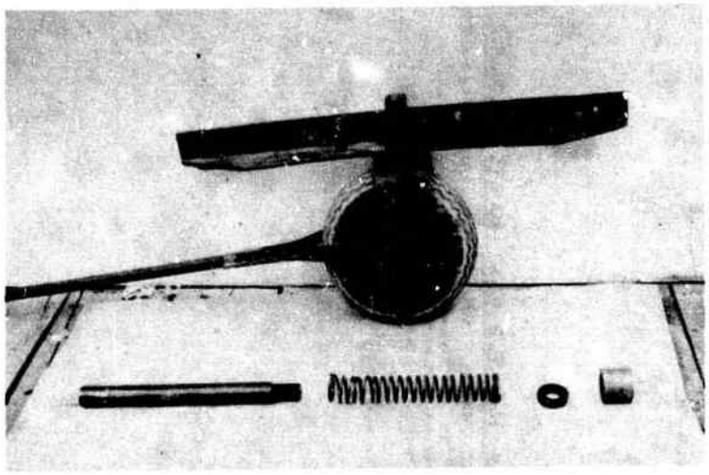
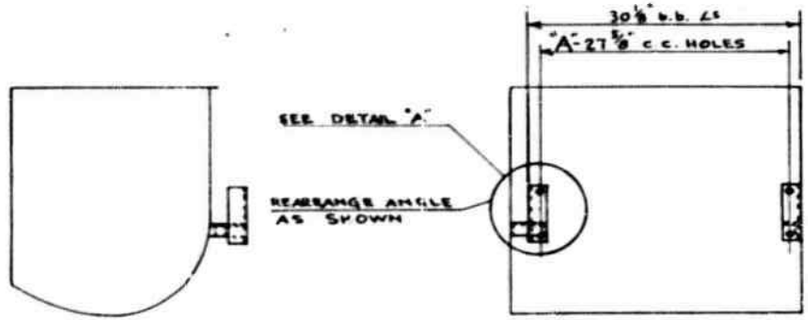


FIG. 144 THE ORDNANCE DOLLY AS ISSUED (BACKGROUND), AND THE PARTS TO BE MADE FOR MODIFICATION.

FIG. 145 FRONT SECTION WITH MODIFIED DOLLY IN LOWERED POSITION.

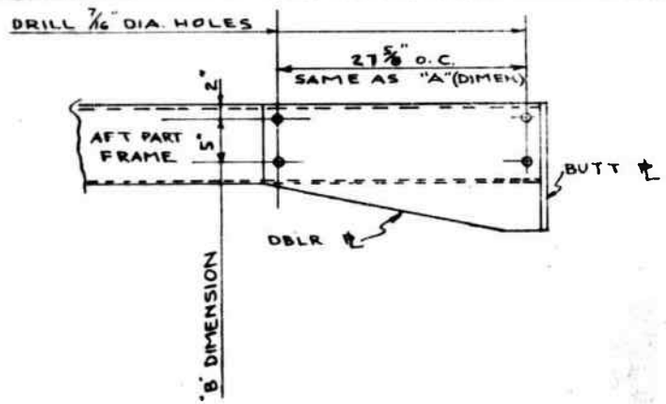
FIG. 146 FRONT SECTION WITH MODIFIED DOLLY IN RAISED POSITION.



END VIEW REAR VIEW

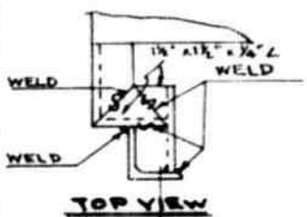
HOSE REEL CASING

REARRANGE BRACKET ON RIGHT REEL AS SHOWN
LEFT REEL SIMILAR BUT TO OPP. HAND

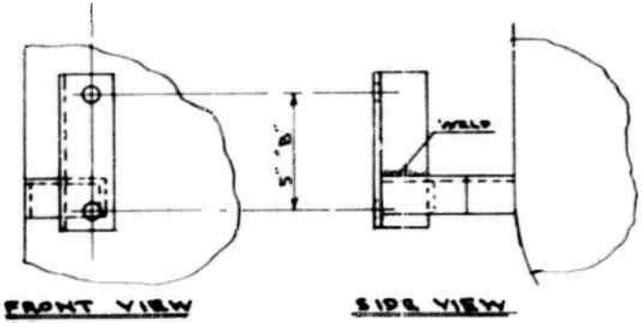


LOCATION OF HOLES FOR HOSE REELS

ASCERTAIN THAT REEL WILL FIT - CLEARANCES ARE VERY SMALL
RIGHT SIDE OF FRAME AS SHOWN
LEFT SIDE SIMILAR BUT TO OPP. HAND



TOP VIEW

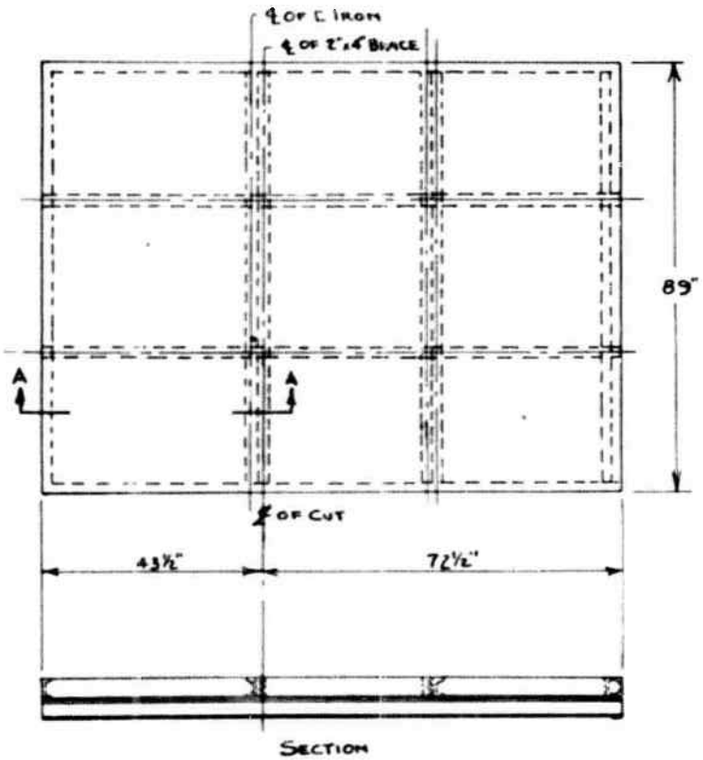


FRONT VIEW SIDE VIEW

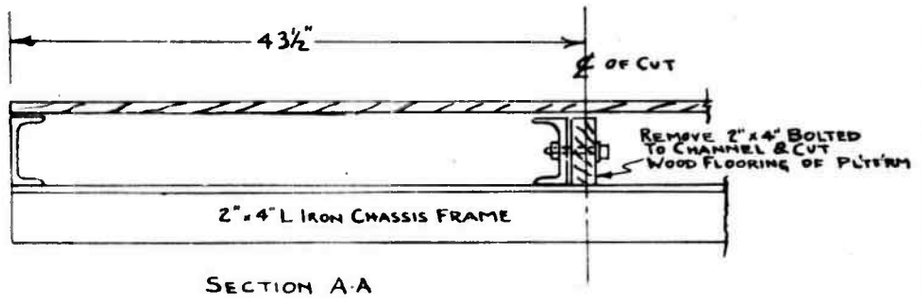
DETAIL "A"

Fig. 147

THE ENGINEER BOARD FT. BELVOIR, VA. AIR TRANSPORT SECTION			
MODIFICATION OF NOSE REELS OF CRASH TRUCK			
DWG No. 1 OF 7		APPD BY	
REVISED			
DRAWN BY	SCALE: NONE	DATE: 8-1944	CHKD BY



SECTION

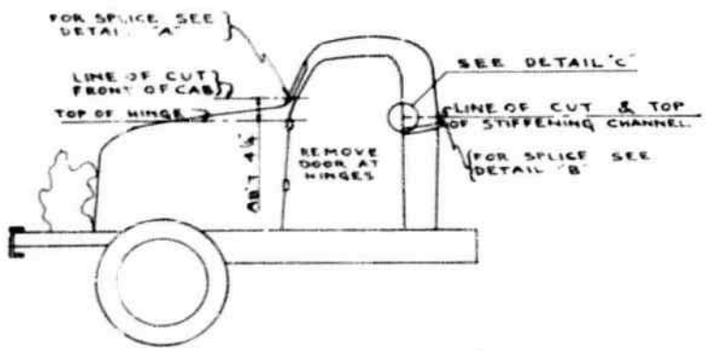


SECTION A-A
NO SCALE

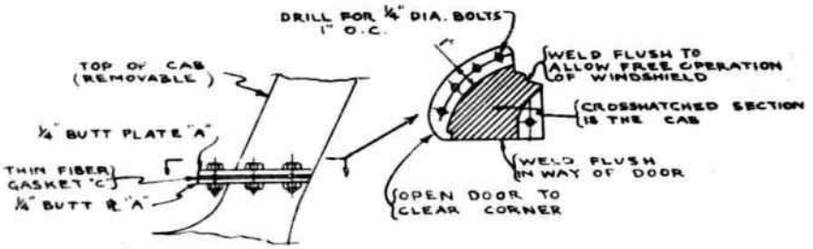
NOTE- CUT FRAME AS SHOWN. WHERE CHANNEL FRAME IS CUT REWELD ALL SIDES OF CUT

Fig. 148

THE ENGINEER BOARD PT. BELVOIR VA. AIR TRANSPORT SECTION			
CUTTING OF WOODEN PLATFORM FOR CRASH TRUCK			
DWG Nº 2 OF 7 REVISED		APPVD BY	
DATE 5-20-44	SCALE: ½"=1'-0"	DWN BY. H.E.W	CHK'D BY

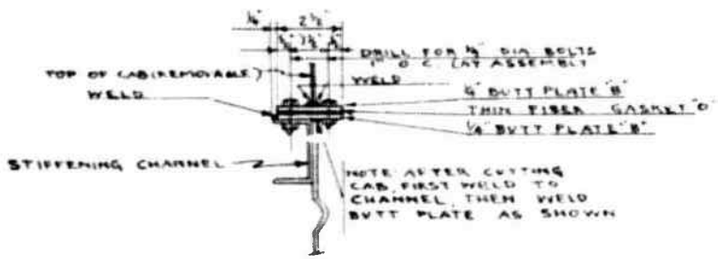


ELEVATION FRONT PART OF TRUCK
SHOWING THE CUTS IN CAB

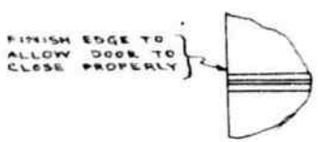


NOTE:
WELD PLATES TO RESPECTIVE PARTS OF CAB. DRILL HOLES AT ASSEMBLY TO INSURE PROPER ALIGNMENT

DETAIL "A"
SCALE: 6" = 1'-0"



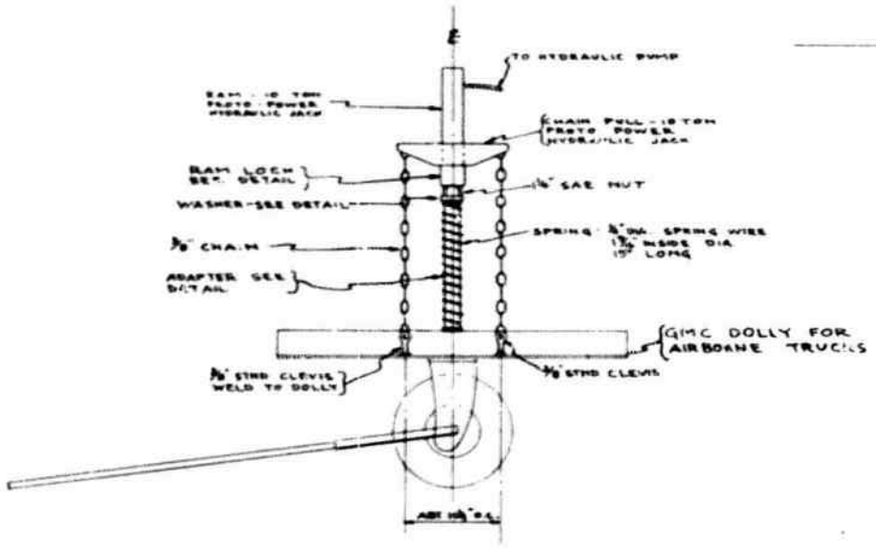
DETAIL "B"
SCALE: 3" = 1'-0"



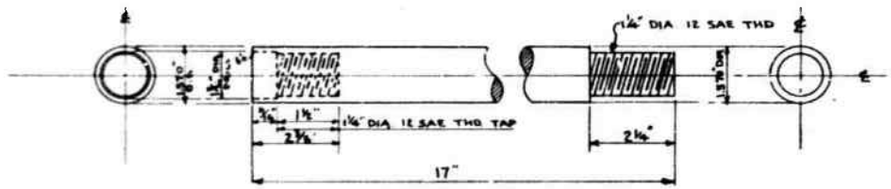
DETAIL "C"
SCALE: 3" = 1'-0"

Fig. 149

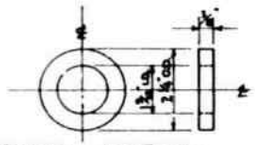
THE ENGINEER BOARD FORT BELVOIR, VA AIR TRANSPORT SECTION			
CUT AND SPLICE ON CAB OF CRASH TRUCK			
CWG No. 7 OF 7		Appv'd By	
REVISED			
DATE 5-8-44	Scale As Shown	Dwn By J.C.	Ch'k'd By



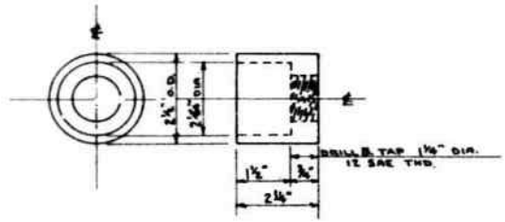
SINGLE WHEEL HYDRAULIC JACK ARRANGEMENT
SCALE: 3"=1'-0"



ADAPTER DETAIL
SCALE: HALF SIZE



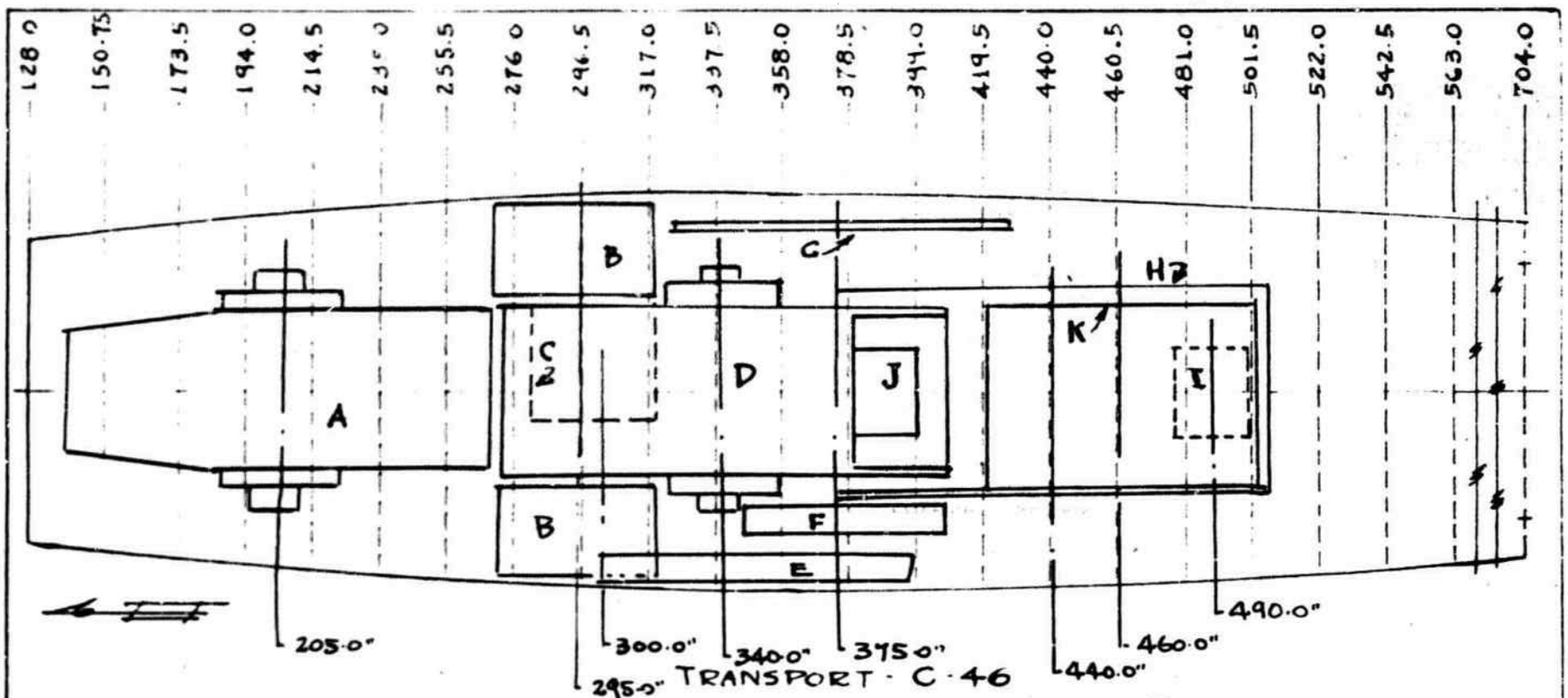
WASHER DETAIL
SCALE: HALF SIZE



RAM LOCK
SCALE: HALF SIZE

Fig. 150

THE ENGINEER BOARD FT. BELVOIR, VA. AIR TRANSPORT SECTION		
SINGLE WHEEL HYDRAULICALLY OPERATED JACK		
DWG. No. 5 OF 7		
REVISED	Appd. By	
Date 5-26-44	Drawn By	Chkd. By



NOTE - APPROX. CENTER OF GRAVITY - 326.0"

	EQUIPMENT	APPROX DIMENS	WEIGHT
A	FRONT SECT *	76" x 126"	4100#
B	2 HOSE REEL & HOSE	28" x 47"	250# EA
C	BOX #2 MISC PARTS	36" x 36"	330#
D	REAR SECT FRAME	75" x 132"	2070#
E	LADDER	10" x 90"	65#
F	BUMPER	13" x 61"	85#
G	REAR PLATFORM	6" x 86"	100#
H	TANK FRAME	63" x 124"	550#
I	BOX #1 MISC. PARTS	24" x 28"	465#
J	METAL CHEST	19" x 27"	115#
K	TANK	57" x 78"	255#

* PC 'A' INCLUDES
CRASH KIT
AXE
CRANK
WRECKING BAR
LAMP

MISC PARTS BOX NO 1
CHAINS 2 BAGS
EXTINGUSHER FOAM
" PYRENE
" CARBON TET. (2)

FIG # 151

THE ENGINEER BOARD
FT BELVOIR VA
AIR TRANSPORT SECTION

LOAD GROUP NO 1 OF CRASH TRUCK

DWG NO 5 OF 6 — APPVD BY.

REVISED

DATE 7-19-44 | SCALE 1/4"-1'0" | DWN BY I.C | CHKD BY.

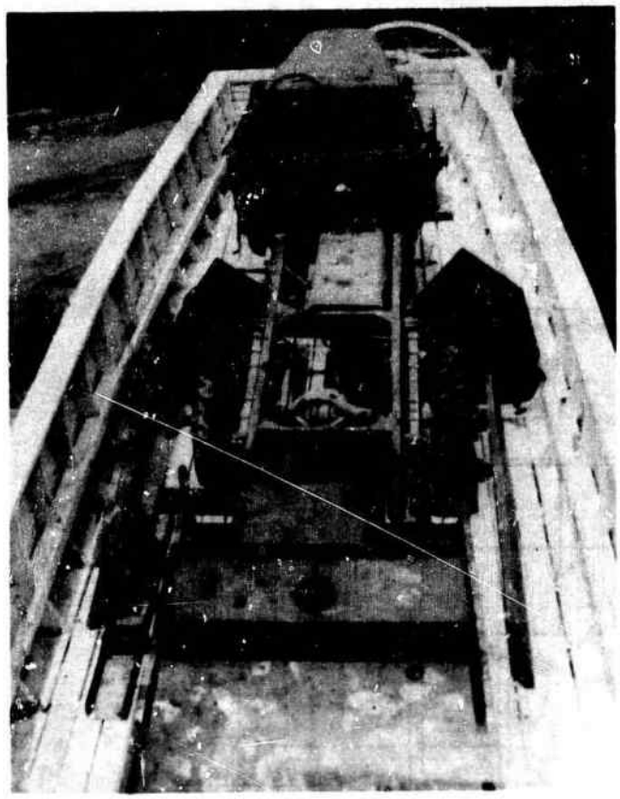
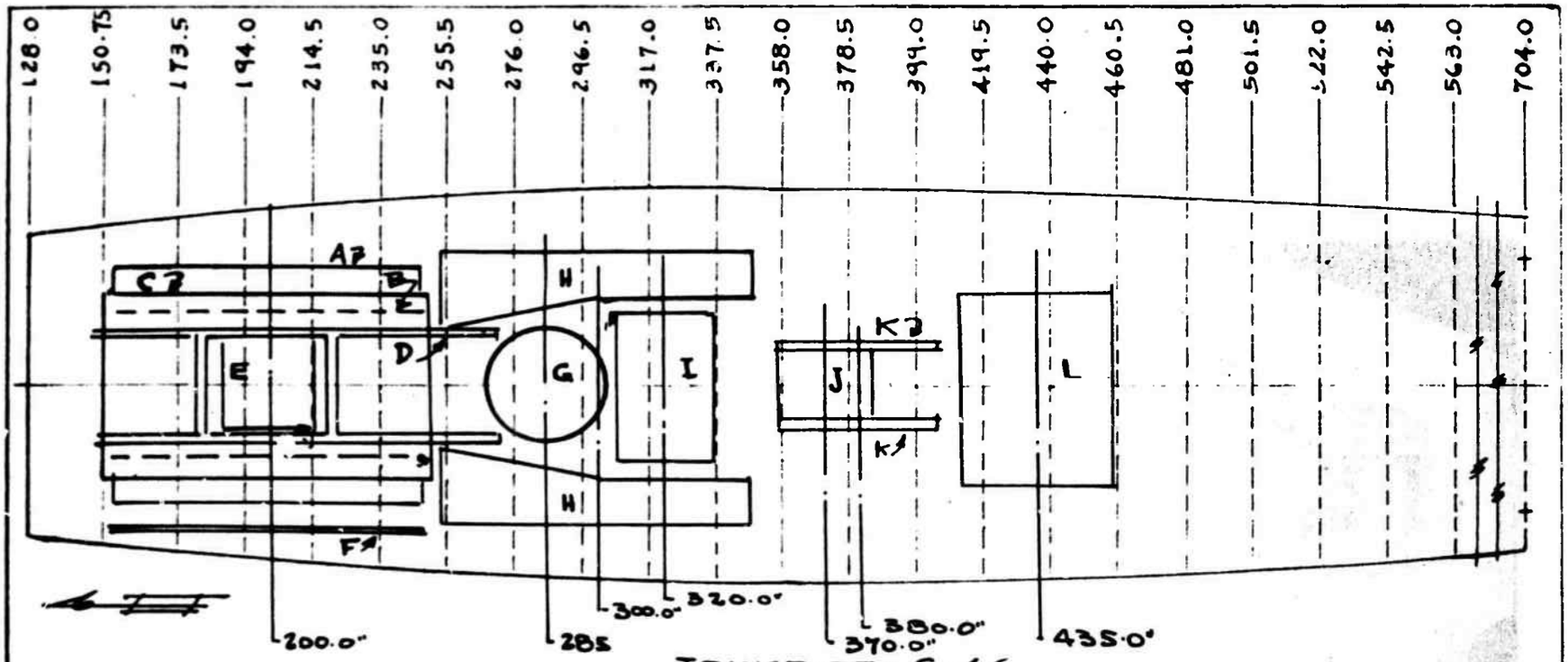


FIG. 152 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Front chassis section (crash kit is stowed on the seat)	4100
Hose reels (2)	500
Miscellaneous parts box No. 2 (See Fig. 155)	250
Rear chassis section	2070
Ladder	65
Bumper	85
Rear step	100
Tank frame	550
Miscellaneous parts box No. 1 (See Fig. 156)	355
Metal chest (empty)	115
Tank	255
Total	8445

Loading	Unloading
With Ramp - 4 men - 6.00 mh	With Ramp - 4 men - 4.00 mh
With shears - 4 men - 10.00 mh	With Shears - 4 men - 8.00 mh



TRANSPORT · C-46

NOTE · APPROX. CENTER OF GRAVITY · 324.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	LG. PL BED PLATE	73 x 90	395#
B	SM PL BED PLATE	44 x 90	240#
C	TANK BOARDS	54 x 97	125#
D	WOODEN FRAME	24 x 116	95#
E	HOSE GUARD	27 x 29	45#
F	FIRE POLE	31 x 97	10#
G	2 WHEELS	36 DIA	264#
H	2 FENDERS	24 x 96	45# EA
I	HOSE REEL & HOSE	28 x 47	250#
J	METAL CHEST (FILLED)	19 x 27	360#
K	2 DOORS	4 x 49	54#
L	CAB COVER	46 x 59	119#

FIG# 153

THE ENGINEER BOARD FT BELVOIR · VA. AIR TRANSPORT SECTION			
LOAD GROUP #2 OF GEASH TRUCK			
DWG NO 6 OF 6		APPVD BY.	
REVISED			
DATE 7-19-40	SCALE 1/4" 1'0"	DWN BY HH	CHKD BY.

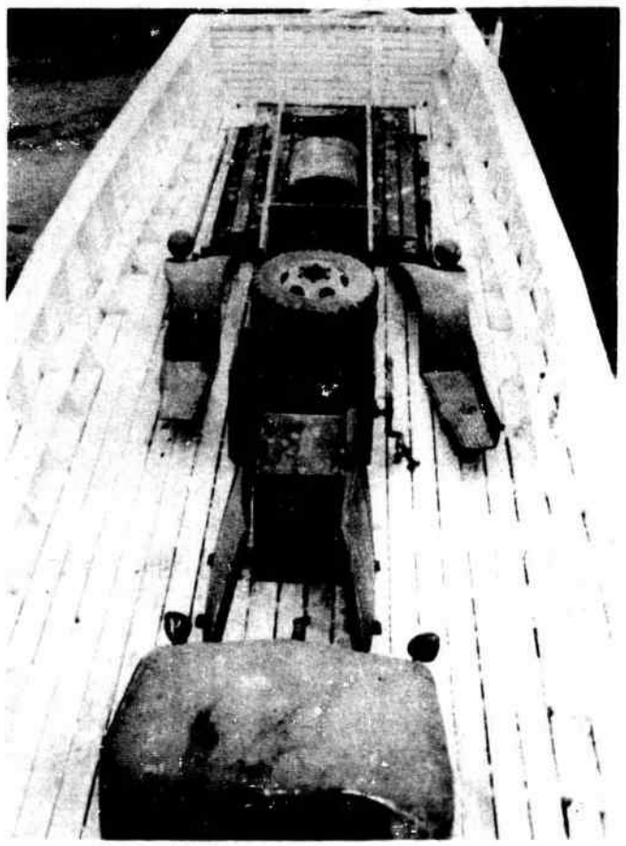


FIG. 154 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Flat bed, large section	345
Flat bed, small section	240
Hose rack	125
Wooden frame	95
Hose guard	45
Pike pole	10
Wheels (2)	264
Fenders (2)	90
Hose reel	250
Metal chest (filled)	260
Doors (2)	108
Cab top	119
Total	2001

Loading	Unloading
Either ramp or shears	Either ramp or shears
4 men - 6.00 man-hours	4 men - 4.00 man-hours

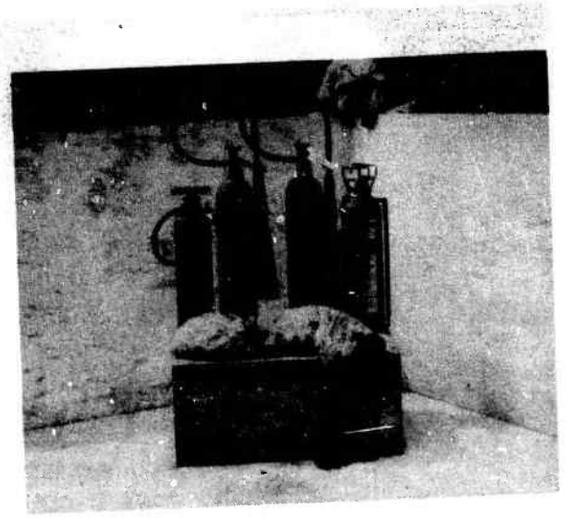


FIG. 155 CONTENTS OF MISCELLANEOUS PARTS BOX NO. 1

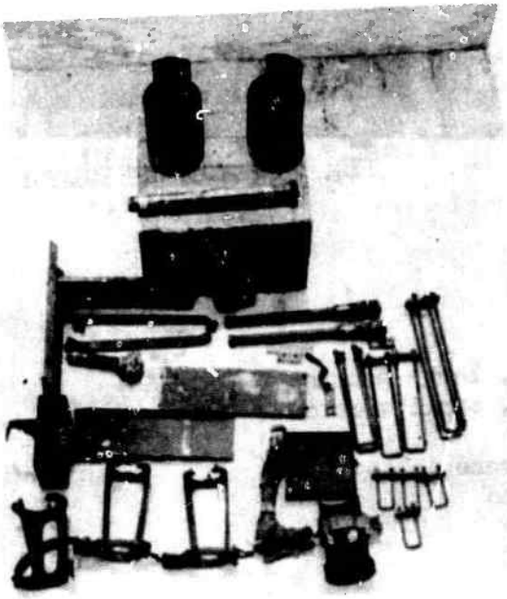


FIG. 156 CONTENTS OF MISCELLANEOUS PARTS BOX NO. 2

APPENDIX S

DISASSEMBLY, GROUPINGS. AND LOADING OF THE DISTRIBUTOR, BITUMINOUS MATERIAL, TRAILER-MOUNTED, 1250-GALLON, TYRE MODEL MX, STYLE RE

1. General. The total weight of the Etnyre Distributor is 11,609 pounds, and it requires one and one half C-46 cargo planes for transportation.

2. Dismantling. In order that the tank of the distributor may be lifted from the frame, carrying hooks must be welded onto the upper side of the tank. See Figs. 161 and 162 for photos of these hooks. All new distributors now coming from the Etnyre factory are equipped with carrying hooks prior to shipment. The new airborne model also is provided with a tank that may be divided in to two parts by removing a number of bolts.

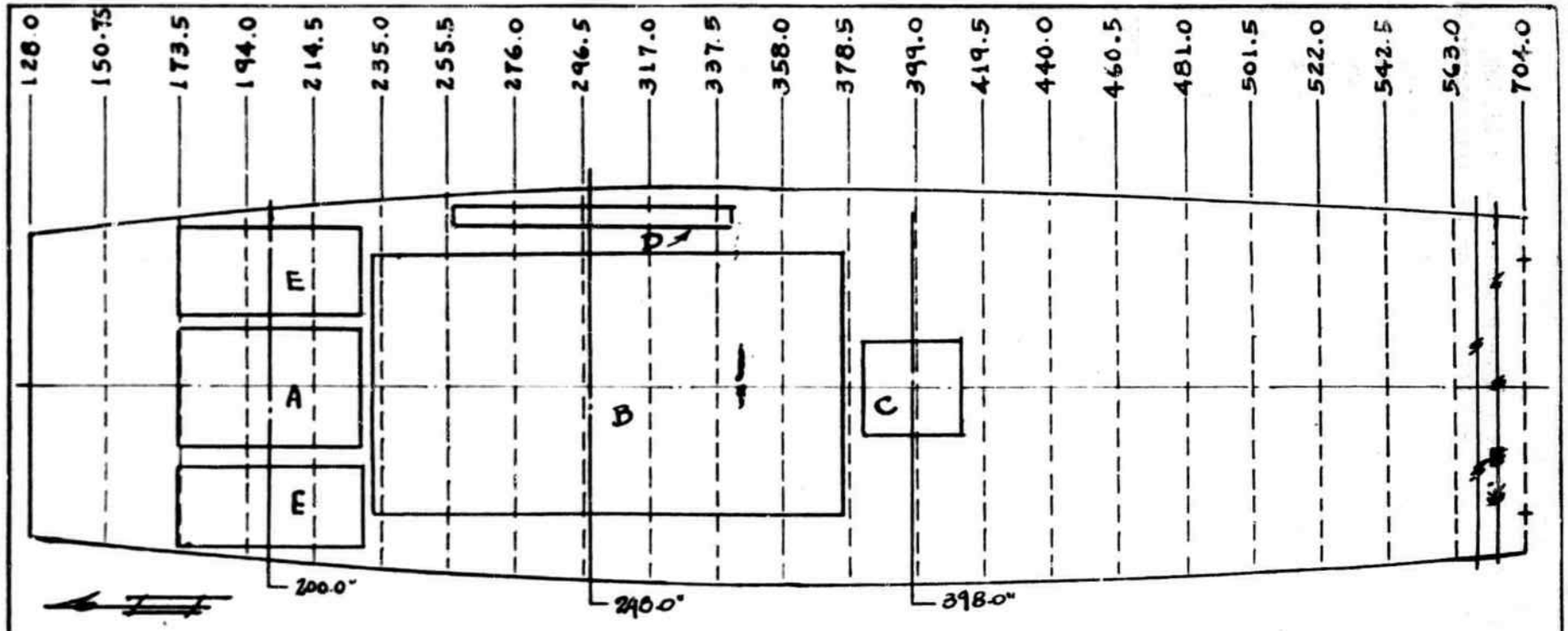
The overflow dome on the tank must be removed before loading. Following is a convenient sequence of disassembly.

(1) Accessories (hose, portable burner, fire extinguisher, spray bar extension, pouring, 3 quart measure).
(2) Disconnect blower, flexible tube, fuel lines, drive chain
(3) Platform and spray bar assembly
(4) Right and left fender and brace (brace must be cut from frame)
(5) Clearance wires and lights
(6) Running board assemblies
(7) Distributor frame and bumper
(8) Pump housing and control assembly
(9) Tank
(10) Bitumeter with 5th wheel assembly
(11) Rear axle, spring, and wheel assembly
(12) Front axle, spring, and wheel assembly

3. Loading. Although the tank is a close fit in passing through the door, it is not difficult to load. After the tank has been set down inside the door, it must be rotated 45 degrees in a counter-clockwise direction. From this tilted position, it can readily be maneuvered into the plane.

4. Man-Hours. A crew of eight men worked the following hours.

Dismantling	2 men	12 mh
Loading	4 men	32 mh
Unloading	4 men	30 mh
Reassembly	4 men	14 mh
Total		88 mh



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	BOX OF MISCELL PARTS	54"x36"	246#
B	TANK	137"x82"	3699#
C	HEATING UNIT	30"x29"	350#
D	BUMPER	81"x4"	39#
E	FENDERS	54"x26"	2 PCS- 90#

ITEM-'A' INCLUDES PORTABLE BURNER, VALVE LEVER & BRACKET HANDBRAKE LEVER, FILLER ASSM, POWER ASSM, PARTS FROM CIRCUL SYSTEM, NUTS & BOLTS, SIDE PANELS FOR RENT, PUMP COND, & INTOMETER & FIFTH WHEELS.

FIG# 157

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP No 1 OF ETNYRE ASPHALT DISTRUB.

DWG No. 1 OF 2 — APP'VD BY.

REVISED

DATE 2-18-44 | SCALE 1/4"=1'-0" | DWN BY H.W. | CH'KD BY.

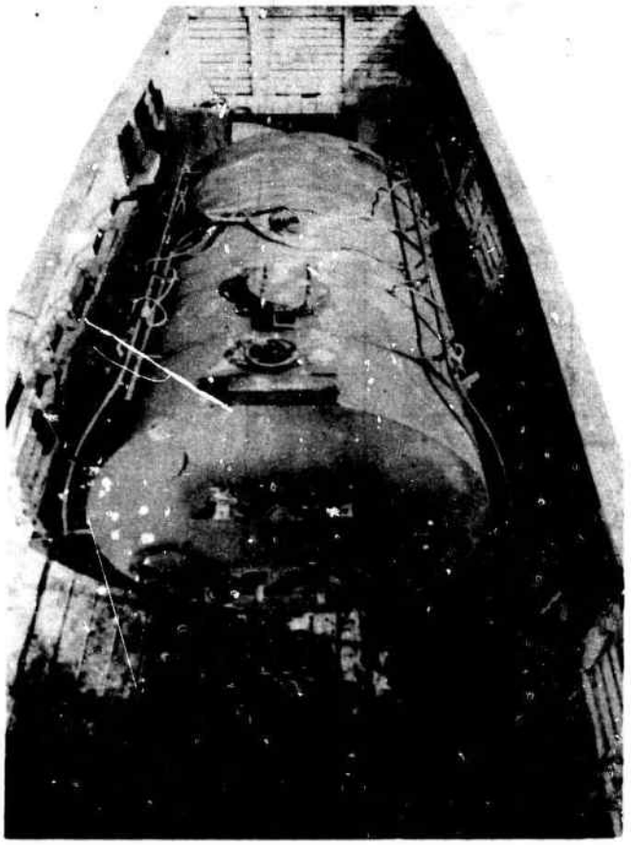
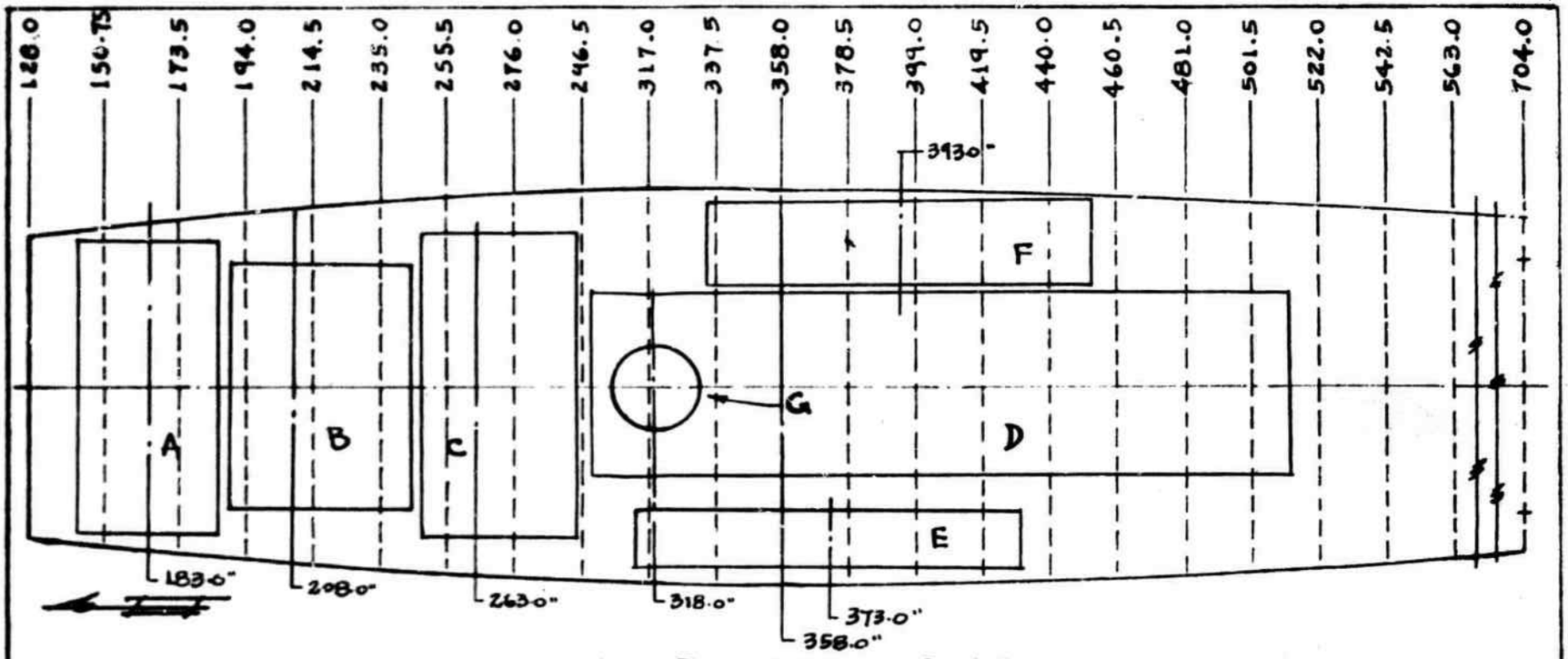


FIG. 158 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Box containing: Portable burner, valve lever and bracket, handbrake lever, tank filler assembly, priming can, miscellaneous parts from circulating system, pump engine side panels, pump control connections, nuts and bolts, bitumeter with fifth wheel	296
Tank	3699
Heating unit	350
Bumper	39
Fenders	90
Total	4474

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 320.0

	EQUIPMENT	APPROX DIMEN'S.	WEIGHT.
A	REAR WHEEL ASSM.	96" x 42"	1650#
B	FRONT WHL ASSM. & TOW BAR	76" x 57"	1515#
C	OPER. PLATFORM & FRAME	92" x 48"	605#
D	FRAME & ENGINE	204" x 56"	2515#
E	RIGHT PLATFORM W/TOOL BOX	113" x 18"	445#
F	LEFT PLATFORM W/TANK	113" x 32"	265#
G	FILLER HOSE	24" DIA.	140#

FIG # 159

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF ETNYRE ASPHALT DISTRIB.

DWG Nº 2 OF 2		APPVD BY.	
REVISED			
DATE 2-17-44	SCALE 1/4"=1'0"	DWN BY H.W.	CHKD BY.

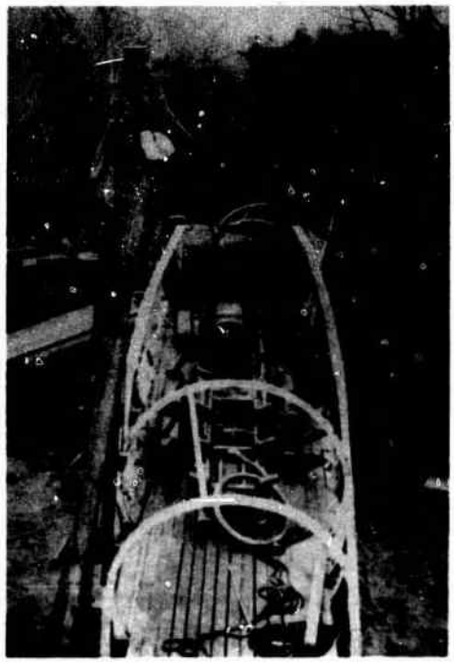


FIG. 160 MOCK-UP LOADED

PLATE NO. 2

Item	Weight
Rear wheel assembly	1650
Front wheel assembly with tow bar	1515
Operator's platform	605
Frame and engine	2515
Right side platform with tool chamber	445
Left side platform with fuel tanks	265
Total	7135

Loading	Unloading
4 men - 16.00 man-hours	4 men - 14.00 man-hours

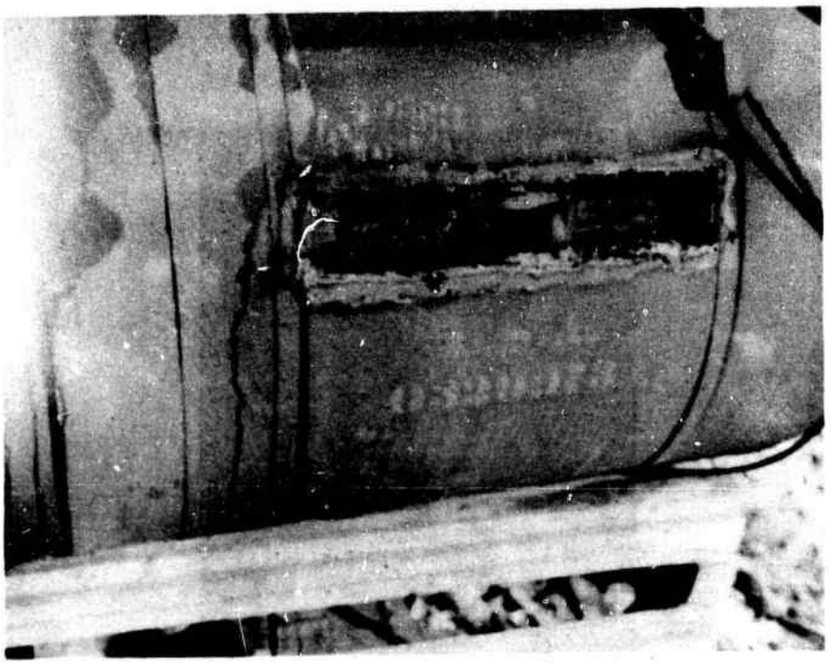


FIG. 161 JACKET AND ASBESTOS INSULATION CUT AWAY AND HOOK EYE WELDED TO TANK PROPER

FIG. 162 TWO HOOK EYES WELDED TO EACH SIDE OF TANK TO FACILITATE LIFTING

APPENDIX T

DISASSEMBLY, GROUPINGS, AND LOADING OF THE COMPRESSOR, AIR, DIESEL-ENGINE-DRIVEN, TRAILER-MOUNTED, STEEL WHEELS, 315 CFM, INGERSOLL RAND MODEL IK 315, WITH INTERNATIONAL HARVESTER ENGINE, MODEL UD-18

1. General. The total weight of the Air Compressor is 8075 pounds, and it requires one C-46 cargo plane for transportation.

2. Dismantling. Following is a list of the only parts which must be removed for safe and convenient loading:

(1) Air intake pipe
(2) Muffler pipe
(3) Hood
(4) Air cleaner
(5) Wheels, axles, and springs (each set as a group).

3. Loading. Since the compressor is loaded almost as a unit, it results in an unusually heavy single piece (6730 pounds). Therefore, if possible, the sled should be equipped with metal covered runners and metal tracks should be laid in the plane to facilitate the loading. Plenty of heavy grease must be used. The sled upon which this unit is loaded, must be at least eight feet long. Figs. 163 and 174 show a method of loading this heavy engine group.

4. Man-Hours. A crew of six men worked the following hours:

Dismantling	2 men	2 mh
Loading	4 men	16 mh
Unloading	4 men	16 mh
Reassembly	2 men	2 mh
Total		36 mh

FIG. 163 ENGINE GROUP ON SHEARS

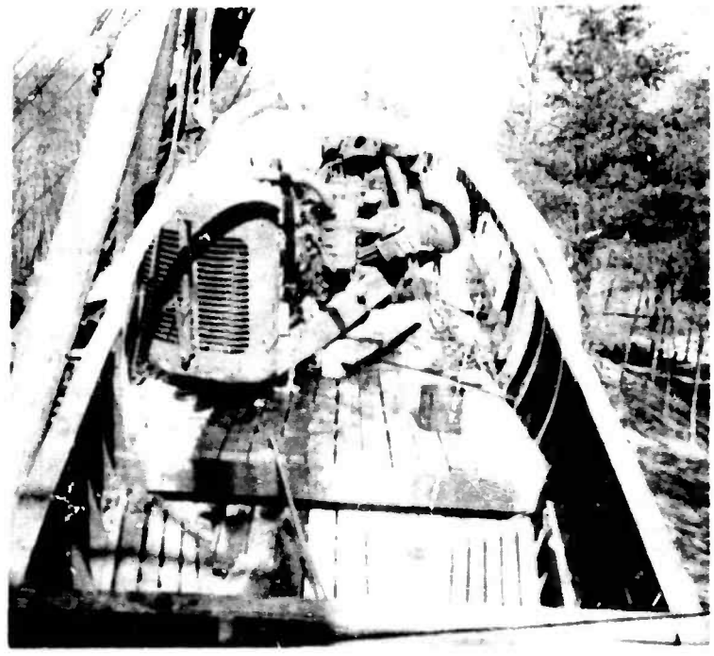
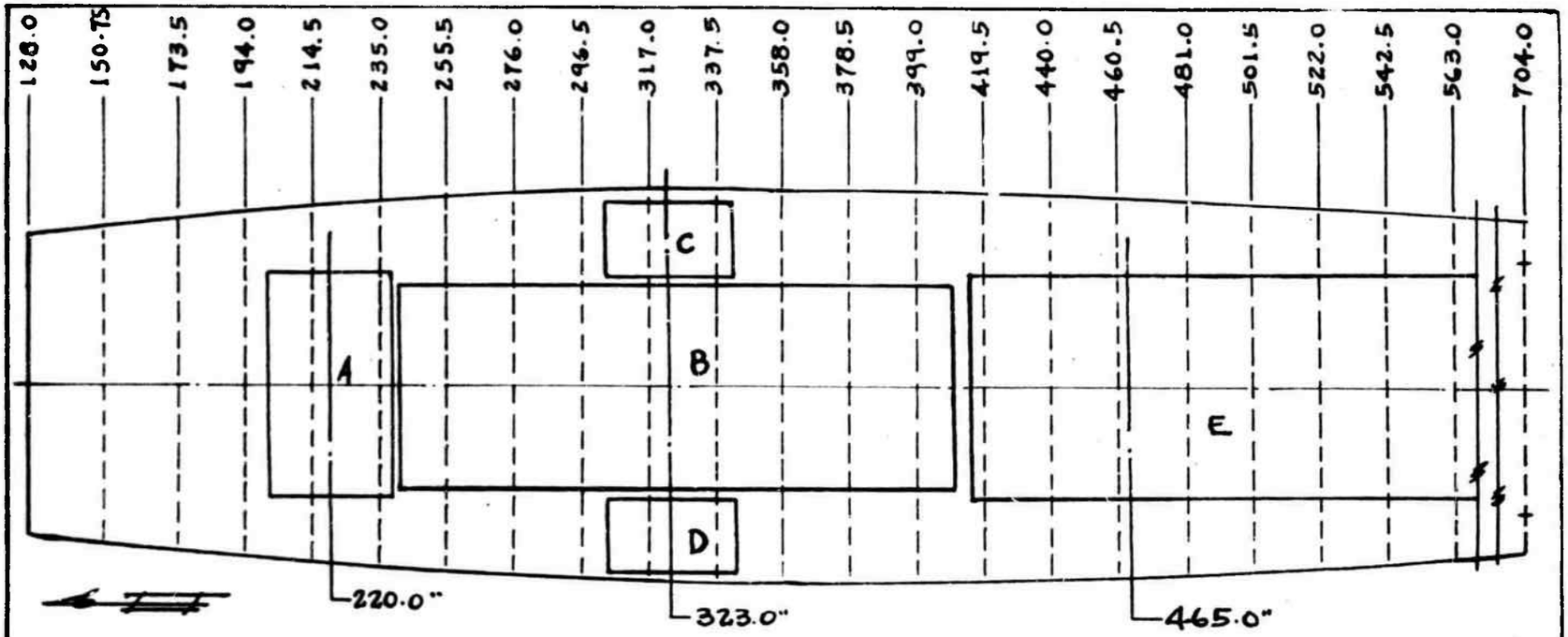


FIG. 164 ENGINE GROUP BEING PULLED INTO POSITION



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 325.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	REAR AXLE GROUP	5'-10" x 3'-0"	478#
B	COMPRESSOR	13'-5" x 5'-4"	6730#
C	MUFFLER PIPES	3'-0" x 2'-0"	2 Pcs - 15#
D	AIR CLNR & INTAKE	3'-0" x 2'-0"	20#
E	FRNT AXLE GRP, CVERTL	13'-0" x 5'-10"	832#

FIG #165

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 - OF I.K. 315 - AIR COMP.

DWG Nº 1 OF 1		APP'D BY.	
REVISED			
DATE 1-26-44	SCALE 1/4"=1'0"	DWN BY H.W.	CHKD BY R.-y

FIG. 166 MOCK-UP LOADED

PLANE LOAD

Item	Weight
Air intake pipe	3
Muffler pipes	15
Air cleaner	17
Engine group	6730
Front wheel group (wheels, springs, and axle)	522
Rear wheel group (wheels, springs, and axle)	478
Cover and side plates	310
Total	8075

Loading	Unloading
4 men - 16.00 man-hours	4 men - 16.00 man-hours

APPENDIX U

DISASSEMBLY, GROUPINGS, AND LOADING OF THE SCRAPER, SELF-LOADING, TOWED, CABLE-OPERATED, 8 CU YD, LETOURNEAU MODEL LS (AIRBORNE)

1. General. The LeTourneau Model LS, 8 cubic yard scraper (airborne) weighs approximately 17,125 pounds, and requires two C-46 cargo planes for transportation. It is fitted with butt-plate and flange joints in order that it may be easily disassembled and loaded into the transport.

2. Dismantling. There are no difficult disassemoly problems. Use the following sequence:

(1) Rewind all cable onto spool
(2) Rear wheels
(3) Spiral sheave
(4) Rear hitch
(5) Push beam
(6) Push beam housing
(7) Spring pipe
(8) Apron
(9) Tailgate
(10) Rear cross section
(11) Left and right sides of bowl
(12) Separate two sections of yoke
(13) Front wheels

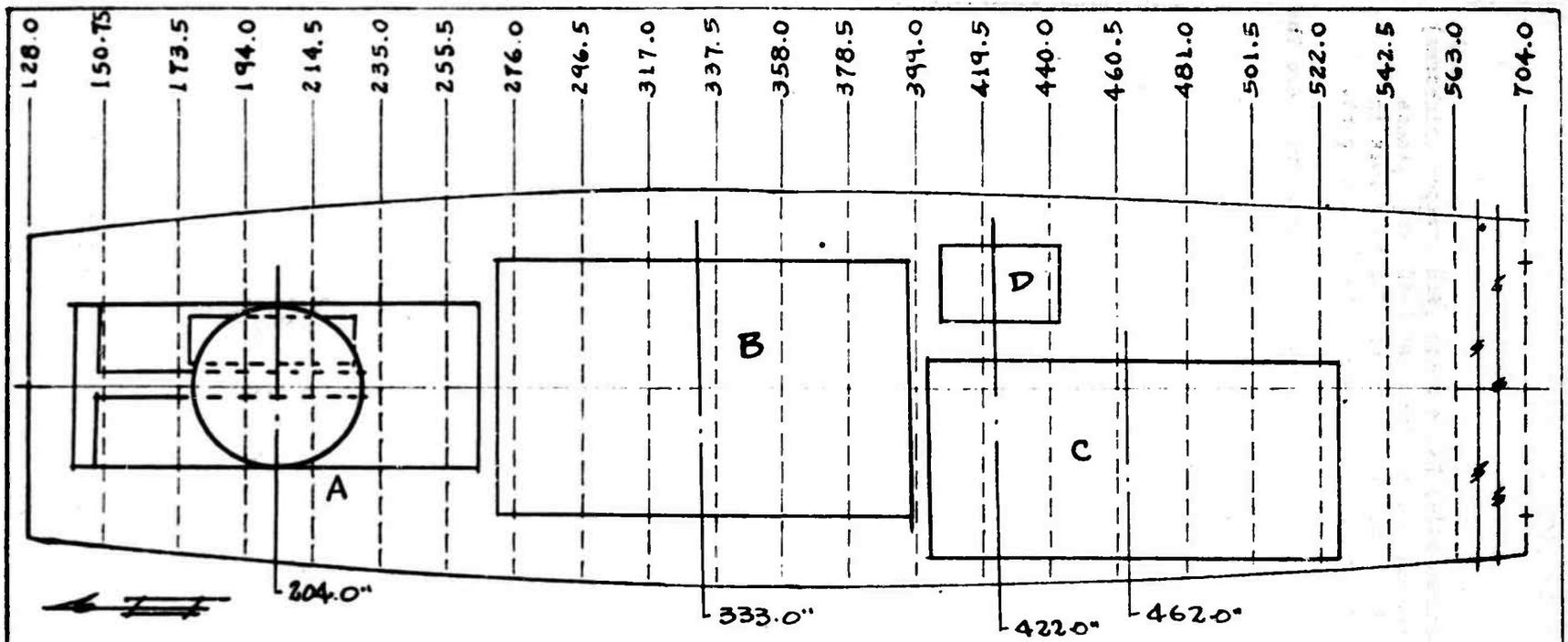
3. Loading. There are no loading difficulties.

4. Man-Hours. A crew of 8 men worked the following periods:

Disassembly	4 men	16 mh
Loading	4 men	23 mh
Unloading	4 men	18 mh
Reassembly	4 men	20 mh
Total		77 mh

Approximate total time in preparation of equipment for flight is 7 hours, and for operation after the landing is 6 hours.

FIG. 167. CONTENTS OF MISCELLANEOUS PARTS BOX



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 826.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	APRON, FRONT AXLE SHALL SPLIT OF YOKE & WHL	118"x52"	3375#
B	LEFT SIDE OF BOWL & PAN	124"x80"	2900#
C	YOKE	123"x62"	1500#
D	BOX OF PARTS	36"x24"	450#

Fig #168

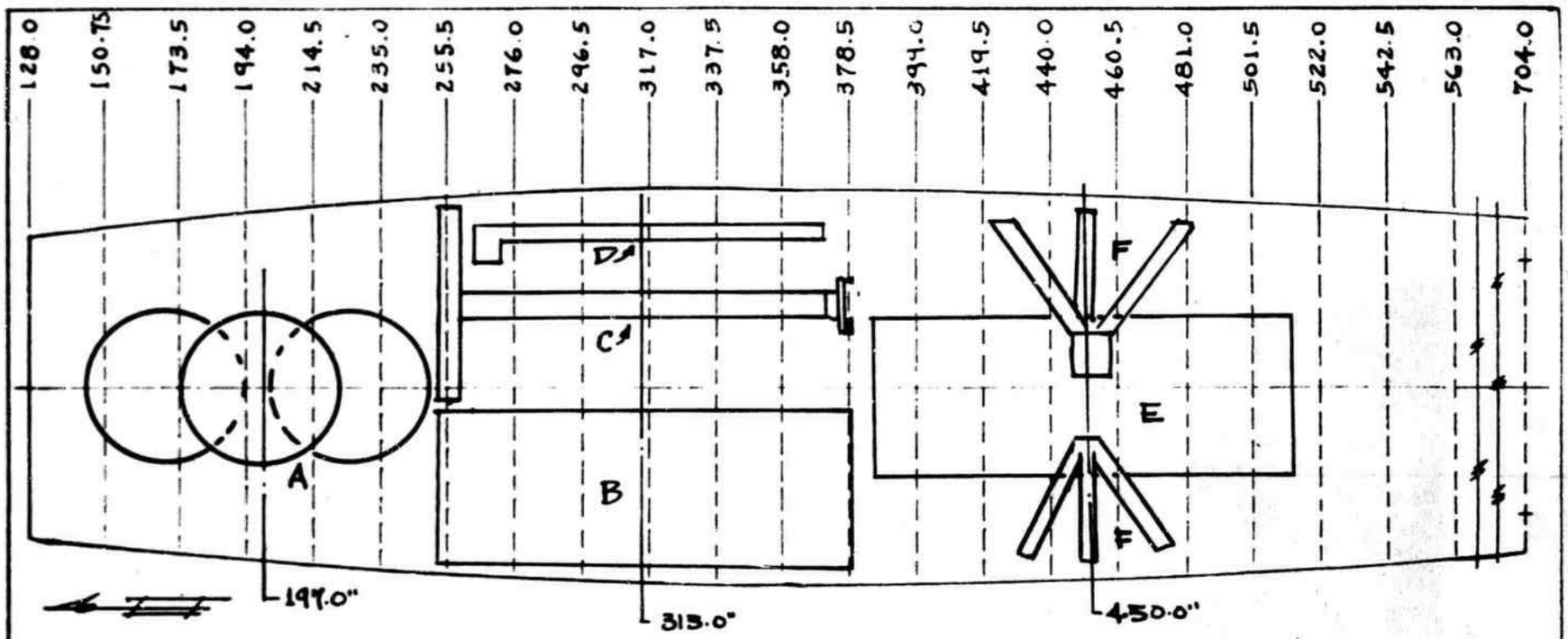
THE ENGINEER BOARD FT BELVOIR VA. AIR TRANSPORT SECTION			
LOAD GROUP No 1 OF L.S. 8 CU.YD SCRAPER.			
DWG No 1 OF 2		APP'VD BY.	
REVISED			
DATE 7-18-44	SCALE 1/4"=1'0"	DWN BY. HW	CH'KD BY.

FIG. 169 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Apron, front axle and drawbar	2040
Small yoke section	400
Rear wheel (1)	935
Pan and left side of bowl	2900
Large yoke section	1500
Miscellaneous parts box (see Fig. 167)	750
Total	8525

Loading	Unloading
4 men - 12.00 man-hours	4 men - 9.00 man-hours



TRANSPORT · C-46

NOTE.- APPROX. CENTER OF GRAVITY · 326.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	3 WHEELS	46x42	2400*
B	TAILGATE	120x51	1455*
C	SPRING PIPE	118x78	1580*
D	PUSHBEAM	110x16	345*
E	BY SIDE OF BOWL REAR CROSS SECTION	124x50	1920*
F	PUSHBEAM HOUSING & REAR HITCH ASSM	50x54	2 Pcs 950*

FIG# 170

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 2 OF L.S. 8 CU YD SCRAPER

DWG Nº 2 OF 2		APPVD BY.	
REVISED			
DATE 7-18-44	SCALE 1/4"-1'0"	DWN BY H-W	CHKD BY.

FIG. 171 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Wheels (3)	2400
Tailgate	1455
Spring pipe	1580
Pushbeam	345
Right side of bowl, and rear cross section	1920
Pushbeam housing assembly	550
Rear hitch assembly	400
Total	8650

Loading	Unloading
4 men - 11.00 man-hours	4 men - 9.00 man-hours

APPENDIX V

DISASSEMBLY, GROUPINGS, AND LOADING OF THE CRUSHING AND SCREENING PLANT, GRAVEL AND ROCK, 2 UNITS, GASOLINE-ENGINE-DRIVEN, SEMI-TRAILER MOUNTED, WITH DOLLIES, 25 CU YD PER HOUR, IOWA MANUFACTURING COMPANY, MODEL 25 CUBIC YARD

1. General. As prepared for transportation by air, the total weight of the Cedar Rapids rock crushing and screening plant is 76,299 pounds. The primary unit weighs 32,120 pounds, and the secondard unit 34,965 pounds; there are 6,560 pounds of spare parts, and 2,654 pounds are utilized in sleds, boxes and crates. Nine C-46 cargo planes are required for transportation.

2. Dismantling. Chief problem in dismantling both the primary and secondary units is the breakdown of the frame. Length of the frame prohibits its being loaded into the plane in one piece.

a. Primary Unit Frame Joint. The Primary Unit frame is converted to airborne loads in the following manner:

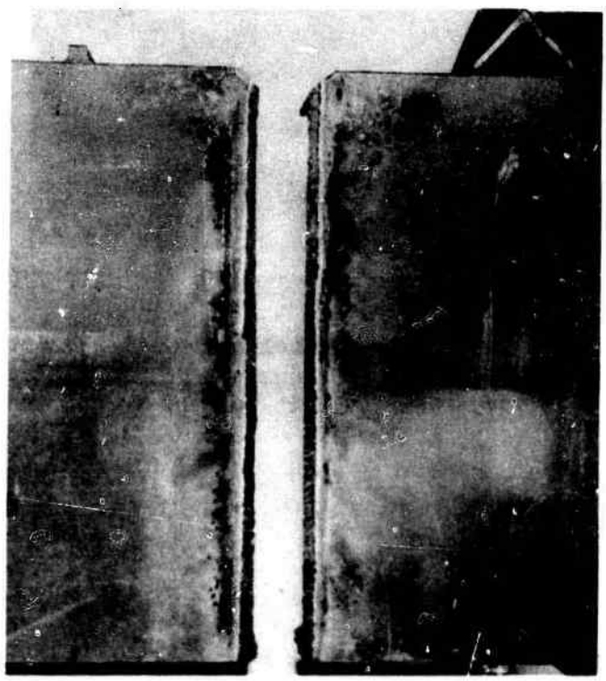


FIG. 172. CUT IN FRAME, PRIMARY UNIT

(1) The frame is cut at the position indicated in the sketch, Fig. 17?. The cuts are V-notches as shown above for a stronger bond in the subsequent welding. Lengths of angle iron are tack welded between the frame channels at the top outside and bottom inside on each side of the point to be cut to prevent warping of the frame while the joint is being fabricated. One of the irons may be seen in the upper right of Fig. 172. It is advisable, also, in order to forestall warping, to complete the work on one frame channel before starting on the other.

FIG. 173. BUTT-PLATES INSTALLED (PRIMARY UNIT)

(2) The two butt-plates are bolted together and welded into the frame cut as shown above. Dimensions of the plates (Plate D) are shown in Fig. 177. Dowels in the plates to aid in aligning the frame.

FIG. 174. TENSION-COMPRESSION UNIT (PRIMARY UNIT)

(3) Plates A and B, as shown in Fig. 177, are joined together to form the above tension-compression unit. Note that the upright plate (A) is a right triangle; note also the V-notching.

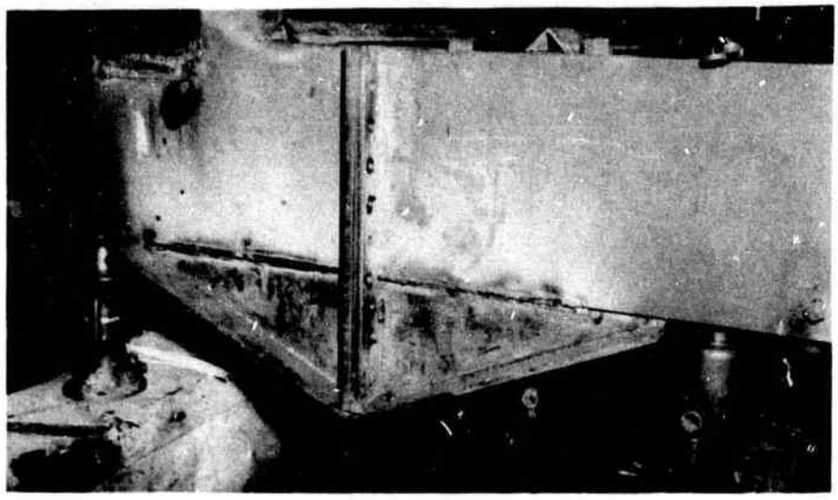


FIG. 175. TENSION-COMPRESSION UNITS INSTALLED (PRIMARY UNIT)

(4) Two of the tension-compression units are welded to the underside of the frame channel and to the plates, as shown above. Note that the bolts have been removed for the convenience of the welder, and that jacks hold the frame in alignment.

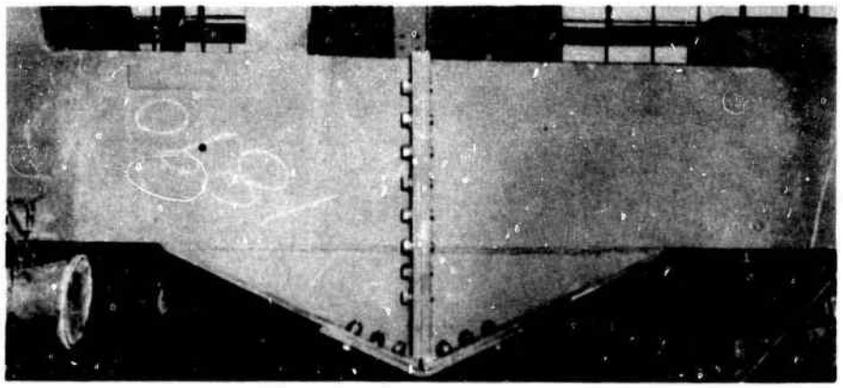


FIG. 176. FINISHED JOINT (PRIMARY UNIT)

(5) The bolts are replaced in the butt-plates, and the tension plate (Plate C in Fig. 177) is bolted to the bottom of the joint. The butt-plates were originally drilled and tapped, as can be seen above. It was found, however, that use of bolts and nuts would prove more satisfactory. This latter method is recommended.

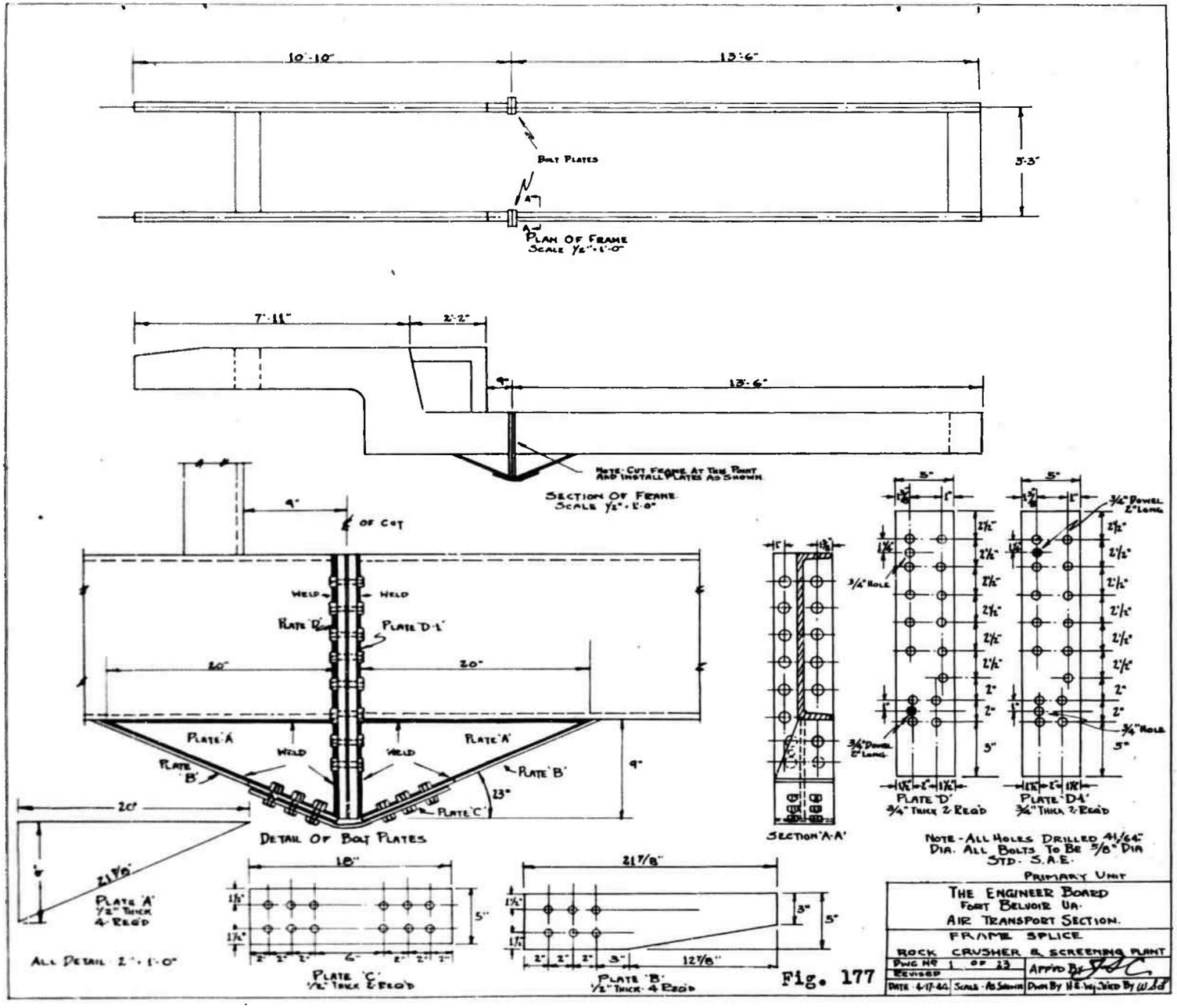
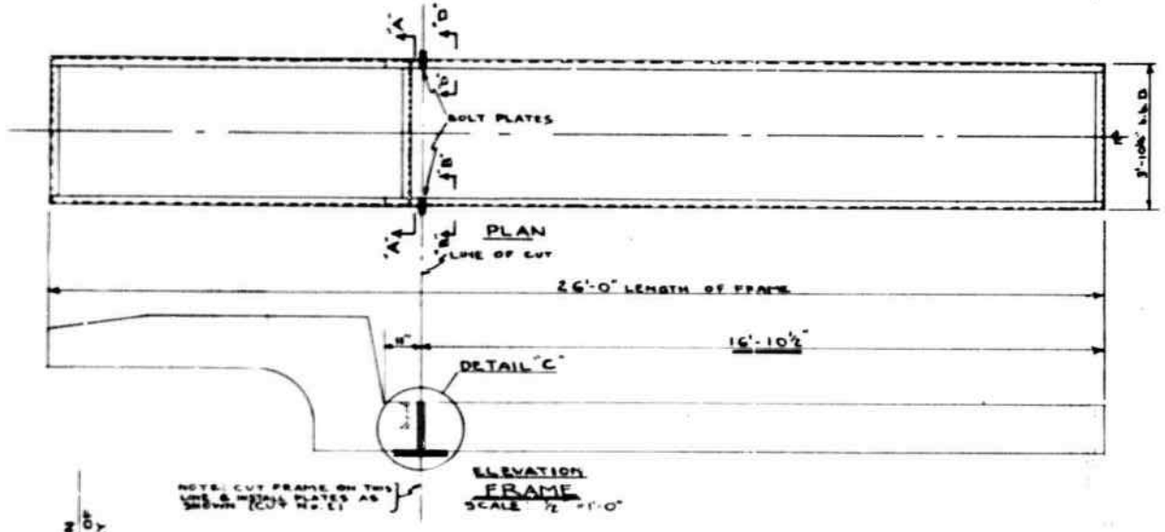
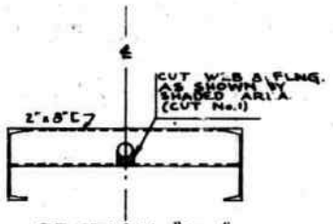
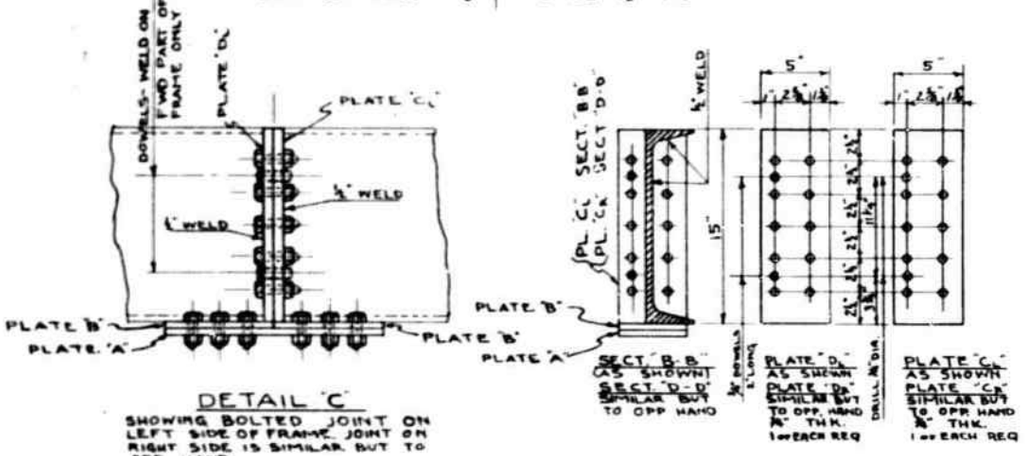

10'-10"
13'-6"
Bolt Plates
5'-3"
A
A
Plan of Frame
Scale ½"=1'-0"
7'-11"
2'-2"
9"
13'-6"
Note: Cut Frame at This Point and Install Plates as Shown
Section of Frame
Scale ½"=1'-0"
9"
℄ of Cut
Weld
Weld
Plate 'D'
Plate 'D-1'
20"
20"
Plate 'A'
Plate 'B'
Weld
Weld
Plate 'A'
Plate 'B'
Plate 'C'
9"
23°
20"
21 7/8"
Plate 'A'
½" Thick
4 Req'd
Detail of Bolt Plates
All Detail 2"=1'-0"
18"
1½"
1½"
5"
2" 2" 2" 6" 2" 2" 2"
Plate 'C'
½" Thick 2 Req'd
21 7/8"
1½"
1½"
3"
5"
2" 2" 2" 3" 12 7/8"
Plate 'B'
½" Thick 4 Req'd
Section 'A-A'
5"
¾" Rolls
¾" Dowel 2" Long
2½"
2½"
2½"
2½"
2½"
2"
2"
3"
Plate 'D'
¾" Thick 2 Req'd
5"
¾" Dowel 2" Long
¾" Rolls
Plate 'D-1'
¾" Thick 2 Req'd
Note - All Holes Drilled 41/64" Dia. All Bolts To Be ⅝" Dia Std. S.A.E.
Primary Unit
The Engineer Board
Fort Belvoir Va.
Air Transport Section.
Frame Splice
Rock Crusher & Screening Plant
Dwg No 1 of 23
Revised
Date 6-17-44
Scale - As Shown
Approved By
Drawn By H.E.W. Jr.
Traced By W.J.S.

Fig. 177





SECTION "A-A"
SHOWING CUT No.1
SCALE: ¾" = 1'-0"



DETAIL 'C'
SHOWING BOLTED JOINT ON LEFT SIDE OF FRAME. JOINT ON RIGHT SIDE IS SIMILAR BUT TO OPP. HAND.

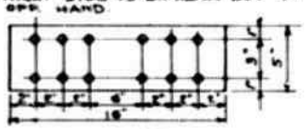


PLATE 'A'
½ THK 2 REQ

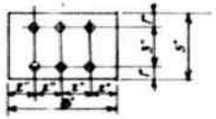
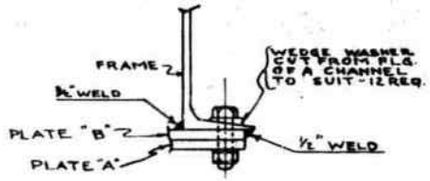


PLATE 'B'
½ THK 4 REQ



DETAIL OF LOWER FLN'G
SHOWING BOLTING & WELDING

NOTES: FOLLOW THE SEQUENCE OF CUTS AS NUMBERED.
ALL HOLES DRILLED 21/64" DIA.
ALL BOLTS TO BE ¾" DIA. STD SAE., LENGTHS TO SUIT

SECONDARY UNIT

THE ENGINEER BOARD FORT BELVOIR, VA. AIR TRANSPORT SECTION	
FRAME SPLICE ROCK CRUSHER & SCREENING PLANT	
Dwg No 2 OF 25	Appv'd By
Revised	
Date 5-5-44 Scale As Shown	Dwn By J.C. Ck'd By

Fig. 178

b. Secondary Unit. Because the load on the secondary unit frame is less concentrated, the joint for this unit is not so complex as that of the primary unit. Then, too, the number of attachments to the former make a small joint desirable. The secondary unit frame is processed in this manner:

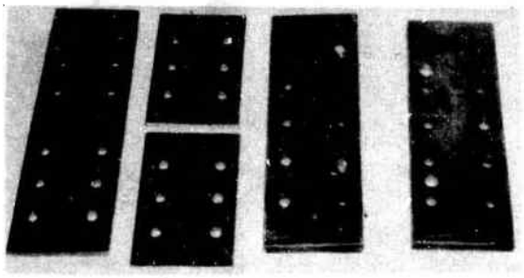


FIG. 179. PLATES USED IN JOINT (SECONDARY UNIT)

(1) The plates used in processing the secondary unit joint are shown in Fig. 179. Note the dowels and dowel holes in the butt-plates (on the right). The tension plates (on the left) are made by obtaining two plates of the proper size (see Fig. 178), drilling them at the same time to be sure the bolt holes line up, and then cutting one of the plates in half.

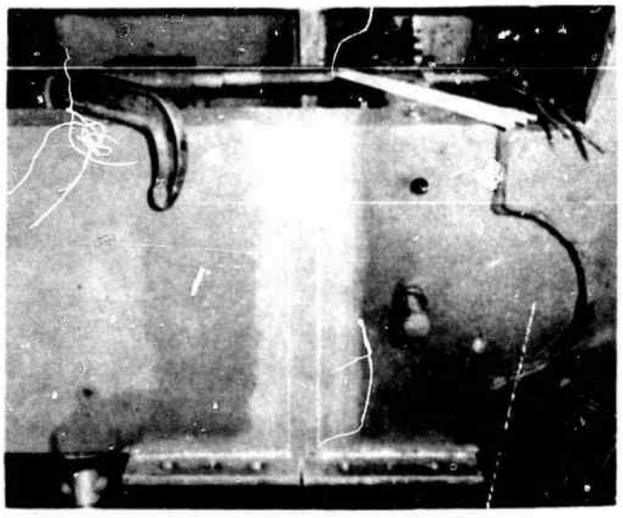


FIG. 180. SMALL TENSION PLATES IN PLACE (SECONDARY UNIT)

(2) The three tension plates are bolted together, the two smaller ones on the same side of the largest one. The two small plates are welded to the underside of the frame channel with the point where the two small plates meet directly under the center of the proposed cut. When the weld is completed, the large plate is unbolted and removed, its purpose thus far being merely to hold the small plates in position.

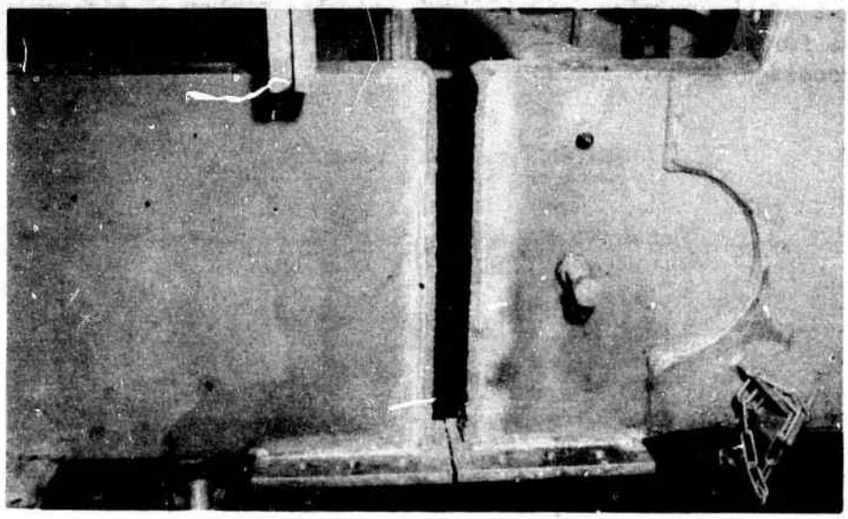


FIG. 181. CUT READY FOR BUTT-PLATE (SECONDARY UNIT)

(3) The frame is cut as shown above. The cut must be wide enough to accommodate the two butt-plates, and should be V-notched. The frame is kept from warping by its cross members; thus the necessity for the angle irons used on the primary unit is eliminated.

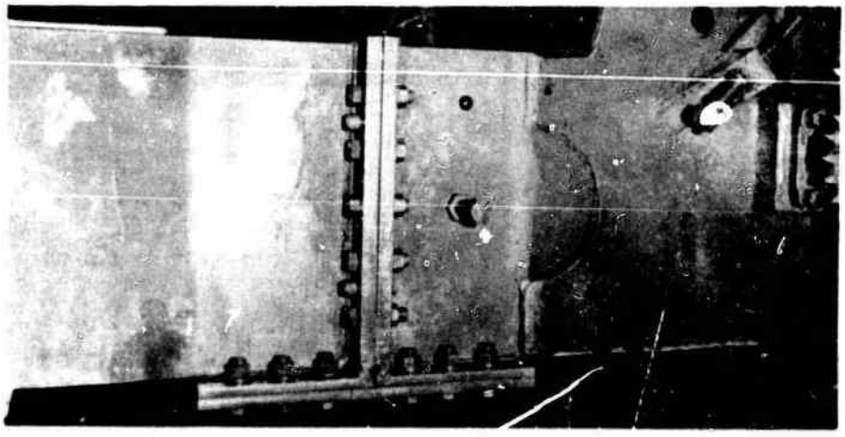


FIG. 182. FINISHED JOINT (SECONDARY UNIT)

(4) The butt-plates are welded into position as shown above and the large tension plate is bolted back into its place.

c. Position of the primary unit frame joint makes it necessary to move the brackets for the stone hook up to a spot forward of the gooseneck, as shown in Fig. 184. It also necessitates a change in the way the walk-way ladder fastens to the frame. A coupon is welded to the flange of the frame joint, the end of the front ladder leg is flattened and is bolted to the coupon (see sketch, Fig. 184).

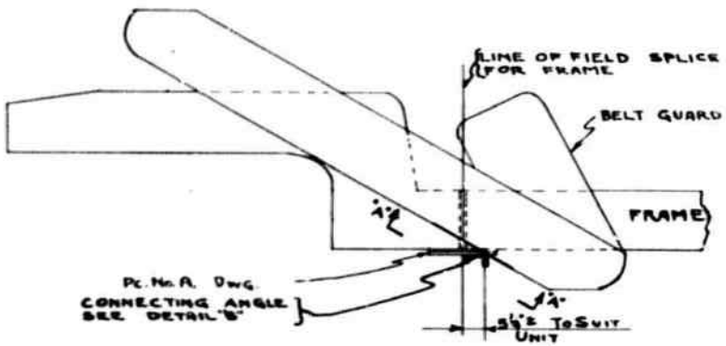
d. Sequence for Disassembling The Primary Unit. To disassemble the primary unit, remove parts and units in the following order:

(1) Remove all drive belt guards, and drive belts and chains
(2) Feeder hopper and shaker assembly
(3) Hopper support frame assembly
(4) Operator's walk way and ladder
(5) By-pass chute
(6) Engine, with mounting skids
(7) Jaw crusher unit (complete)
  (a) Remove both flywheels
  (b) Toggle plate tension rod and spring
  (c) Four key plates
  (d) Stationary jaw
  (e) Eccentric shaft bearing caps (these must be removed before the next step)
  (f) Movable jaw, pitman and eccentric shaft assembly
  (g) Toggle plate, adjusting bolts and wedges
(8) Delivery conveyor, upper section
(9) Delivery conveyor, tail section and hopper
(10) Remove light cables and cut air lines (fittings must be placed on the air lines to facilitate reassembly
(11) Disconnect frame at joint (see Figs. 172 thru 176 for fabrication of frame joint)
(12) Remove dolly from frame
  (a) Remove pull tongue assembly
  (b) Wheels
(13) Rear axle and oscillating beam assembly (To hold the oscillating beams rigid during handling, metal straps are used. At each end of the axle two straps connecting the axle frame support flange and the top of the oscillating beam are fastened, one in front of the axle and one behind it. See sketch, Fig. 183)
  (a) Remove wheels

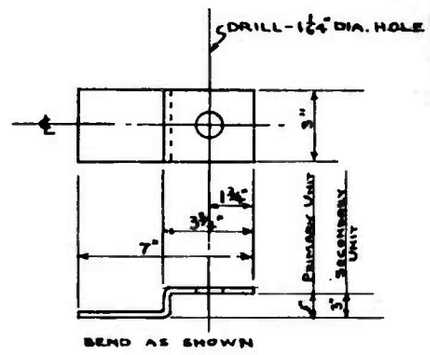
e. Sequence for Disassembling The Secondary Unit. The secondary unit is disassembled in the following order:

(1) Feed conveyor hopper
(2) Feed conveyor tail section
(3) Feed conveyor intermediate section
(4) Spare wheel and tire
(5) Carrier for spare wheel and tire

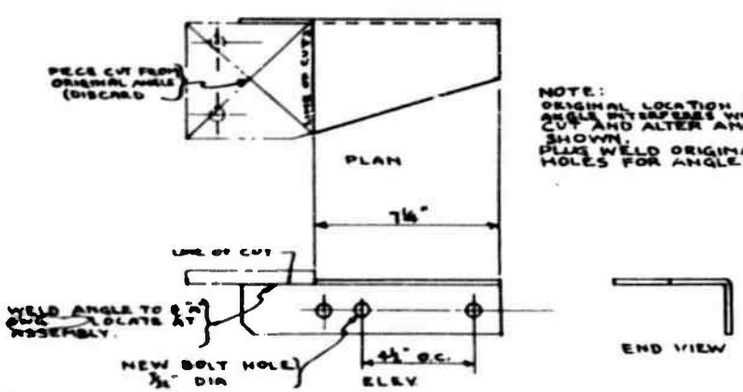
(6) All drive belt guards, drive belts, and chains. (The lower bracket attaching the main drive belt guard to the frame must be modified as shown in the sketch, Fig. 183. A section of the bracket is cut out and the remainder is welded to the side edge of the bottom frame joint tension plate. A small section of the guard itself must be cut out to accommodate the vertical frame joint flange, see Fig. 183.)
(7) Engine
(8) Feed conveyor head section
(9) Delivery conveyor
(10) Walk way, ladder and hand rails
(11) Main drive countershaft assembly
(12) Sand conveyor
(13) Shaker and vibrating screen assembly
(14) Screen hopper
(15) Front screen frame supports
(16) Roll crusher extension
(17) Roll crusher assembly (complete)
(18) Roll conveyor
(19) Roll crusher rear support frame
(20) Elevating wheel (to remove, loosen front adjusting rollers)
(21) Elevating wheel supports and support rollers
(22) Cut out a small section of the frame cross member, remove the bearing attaching bolts, and allowing the sand conveyor drive pulley shaft to pass down out of the cross member through the new cut, remove the sand conveyor drive pulley assembly. See Fig. 185.
(23) Cut air lines and disconnect electric lines at front junction box. (Fittings must be placed on the air lines to facilitate reassembly)
(24) Disconnect frame at joint (See Figs. 178 through 182 for fabrication of the frame joint)
(25) Oscillating beam and rear axle assembly (To hold the oscillating beams rigid during handling, metal straps are used. Two straps connecting the axle frame support flange and the top of the oscillating beam are fastened at each end of the axle, one front of the axle and one behind it. See sketch, Fig. 183.)
(26) Dolly
(a) Remove tongue and wheels
(27) Screw jacks (4)



ARRANGEMENT & LOCATION OF BELT GUARD & CONNECTING ANGLE (SECONDARY UNIT)
SCALE: ½" = 1'-0"

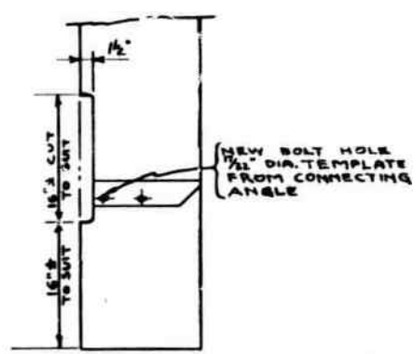


CLAMP FOR OSCILLATING BEAM ASSEMBLY
½" PLATE
4 REQ. PRIMARY UNIT
4 REQ. SECONDARY UNIT
SCALE: 3" = 1'-0"



NOTE:
ORIGINAL LOCATION OF ANGLE INTERFERES WITH SPLICE. CUT AND ALTER ANGLE AS SHOWN.
PLUG WELD ORIGINAL BOLT HOLES FOR ANGLE IN FRAME.

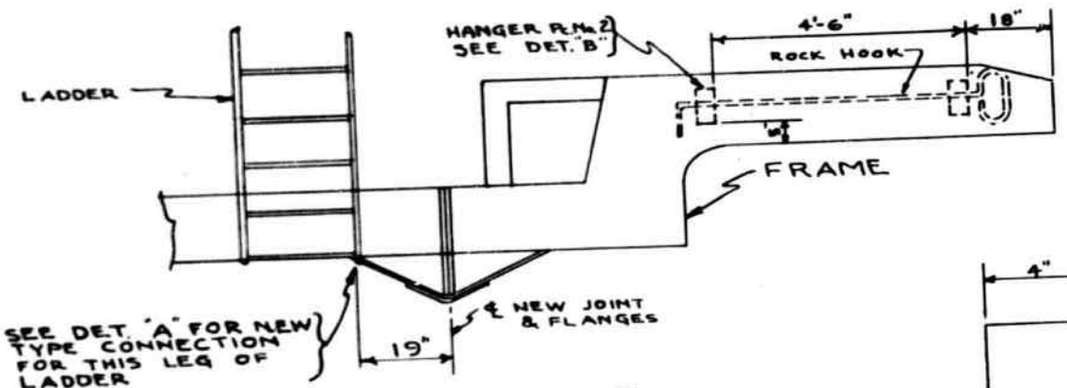
DETAIL "B"
SHOWING ALTERATIONS ON CONNECTING ANGLE
SCALE: 3" = 1'-0"



SECTION "A-A"
SHOWING ALTERATIONS ON BELT GUARD
SCALE: 1" = 1'-0"

Fig. 183

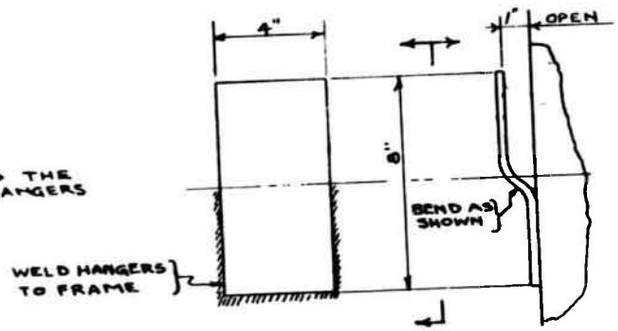
THE ENGINEER BOARD FORT BELVOIR, VA. AIR TRANSPORT SECTION			
ALTERATIONS FOR BELT GUARD & ANGLE CLAMPS FOR OSCILLATING BEAM ASSEMBLY ROCK CRUSHER & SCREENING PLANT			
DWG NO 5 OF 23		Appv'd By	
REVISED			
DATE 5-8-44	Scale As Shown	Drwn By I.C.	Ck'd By



NOTE:
DUE TO INTERFERENCE CAUSED BY NEW JOINT, ROCK HOOK HANGERS ARE RELOCATED AS SHOWN

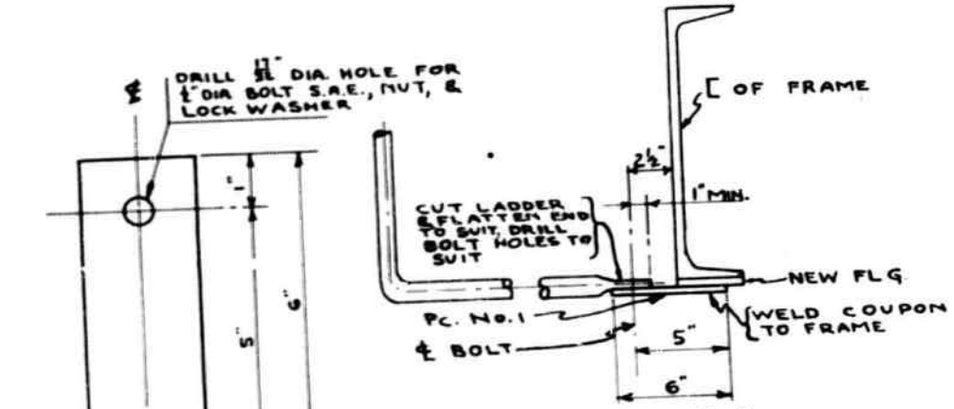
FRAME

SHOWING LOCATION OF LADDER AND THE NEW LOCATION OF ROCK HOOK HANGERS
SCALE: ½" = 1'-0"



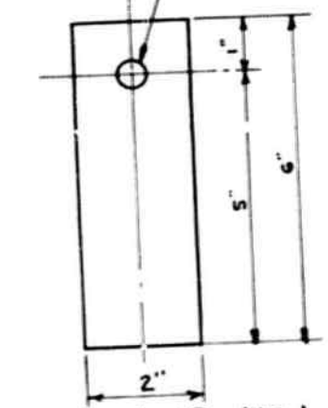
DETAIL "B"

HANGER Pc. No. 2 - ¼" ℄ 2 REQ
SCALE: 3" = 1'-0"



DETAIL "A"

LADDER CONNECTION
SCALE: 2" = 1'-0"



COUPON Pc. No. 1

⅜ THK 1 REQ
SCALE: HALF SIZE

Fig. 184

PRIMARY UNIT

THE ENGINEER BOARD FORT BELVOIR, VA. AIR TRANSPORT SECTION			
LADDER CONNECTION & ROCK HOOK HANGERS ROCK CRUSHER & SCREENING PLANT			
DWG. No. 3 OF 23		APP'V'D BY JAC	
REVISED			
DATE 5-8-44	SCALE: AS SHOWN	DWN. BY I.C.	CH'K'D BY WLC

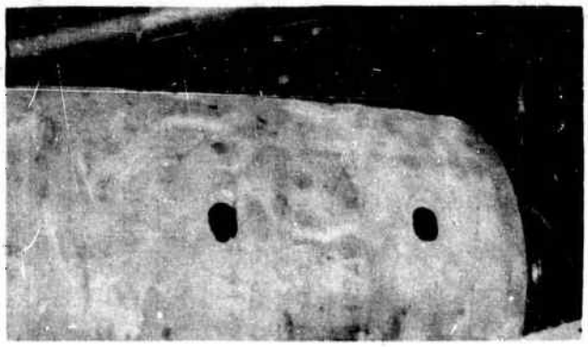


FIG. 185. CUT IN FRAME CROSS MEMBER TO ALLOW REMOVAL OF SAND CONVEYOR DRIVE PULLEY.

FIG. 186. SLED FOR ROLL CRUSHER ASSEMBLY.

3. Loading. Although there are a number of bulky sub-assemblies, loading is comparatively simple. The standard sled must be modified as shown in Fig. 186 to accommodate the roll crusher assembly, which weighs 7,200 pounds. In loading this group, two 2 x 12 inch planks 10 feet long are placed under the sled runners for further distribution of weight. Similar planks may be used instead of sleds for loading all four of the frame sections.

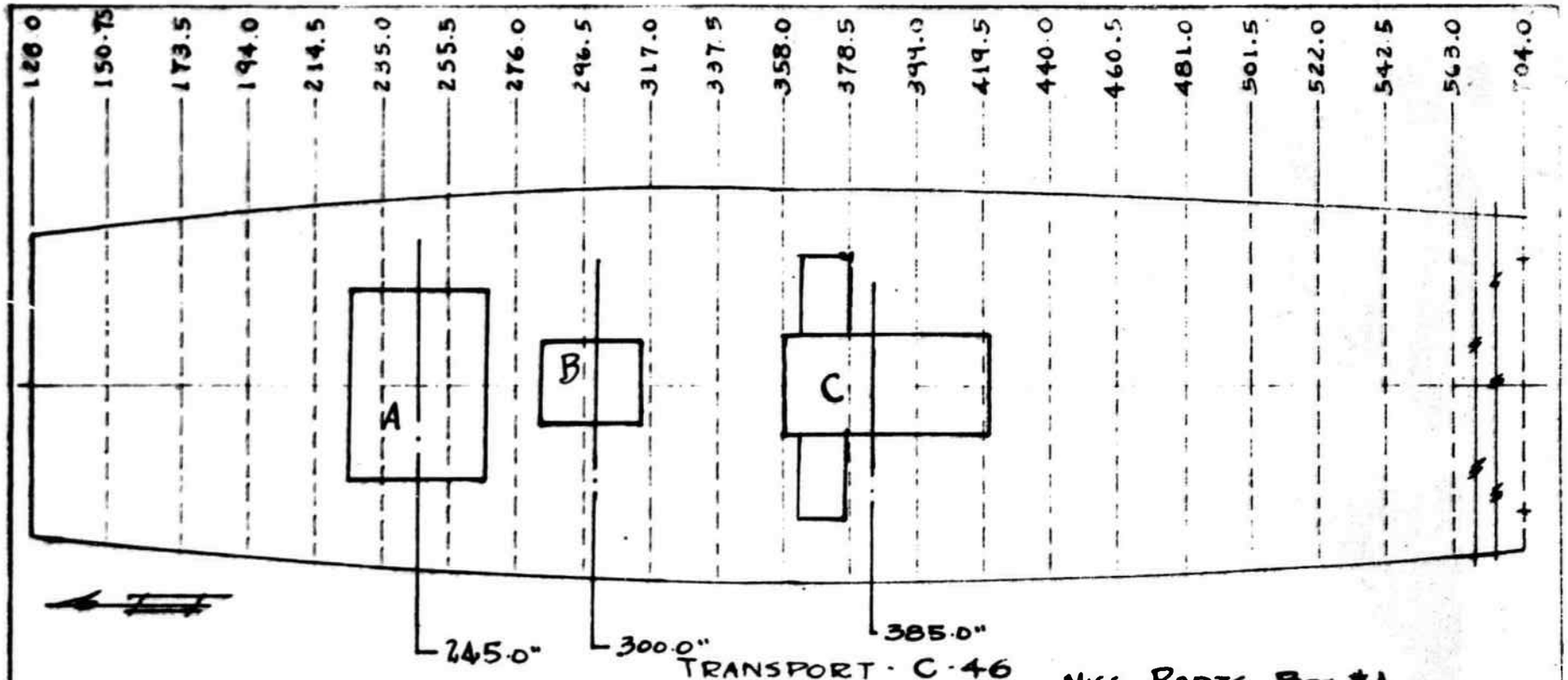
In loading the engines of both units, the air cleaner must be removed before the assembly will clear the door. Once the engine is inside the plane the air cleaner may be replaced.

4. Man-Hours. A crew of 10 men worked the following periods:

		Primary Unit	Secondary Unit
Disassembly	4 men	70 mh	84 mh
Frame Joint	2 men	30 mh	16 mh
Loading	4 men	28 mh	36 mh
Unloading	4 men	21 mh	28 mh
Reassembly	4 men	86 mh	100 mh
Total		235 mh	264 mh

Approximate total time in preparation of equipment:

		Primary Unit	Secondary Unit
For Flight	10 men	27 hours	29 hours
For Operation	10 men	24 hours	28 hours



NOTE - APPROX. CENTER OF GRAVITY · 333.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	CRUSHER BASE	40" x 58"	4660#
B	BOX #1 MISC. PARTS	25" x 30"	385#
C	PITMAN MOVABLE JAW ASSEMBLY	60" x 79"	4000#

MISC PARTS BOX #1
ADJ. SPROCKETS
MAIN SHAFT BEARING CAPS
SIDE TOGGLE PLATES ADJ. WEDGES
END TOGGLE PLATE ADJ. WEDGES
BOLTS & NUTS.

FIG 187 PRIMARY UNIT.

THE ENGINEER BOARD
FT BELVOIR · VA
AIR TRANSPORT SECTION

LOAD GRP #1 ROCK CRUSHER & SCREENING PLANT

DWG NO 5 OF 13		APPVD BY
REVISED		
DATE 7-17-44	SCALE 1/4" · 1'0"	DWN BY HW CHKD BY

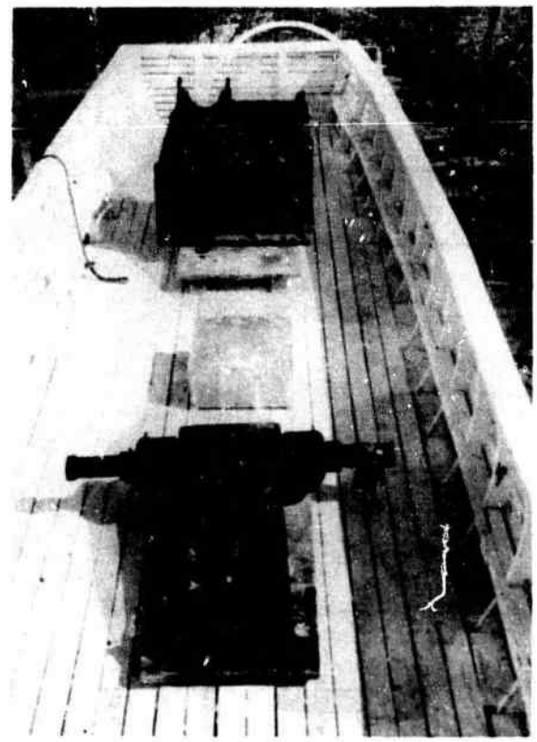
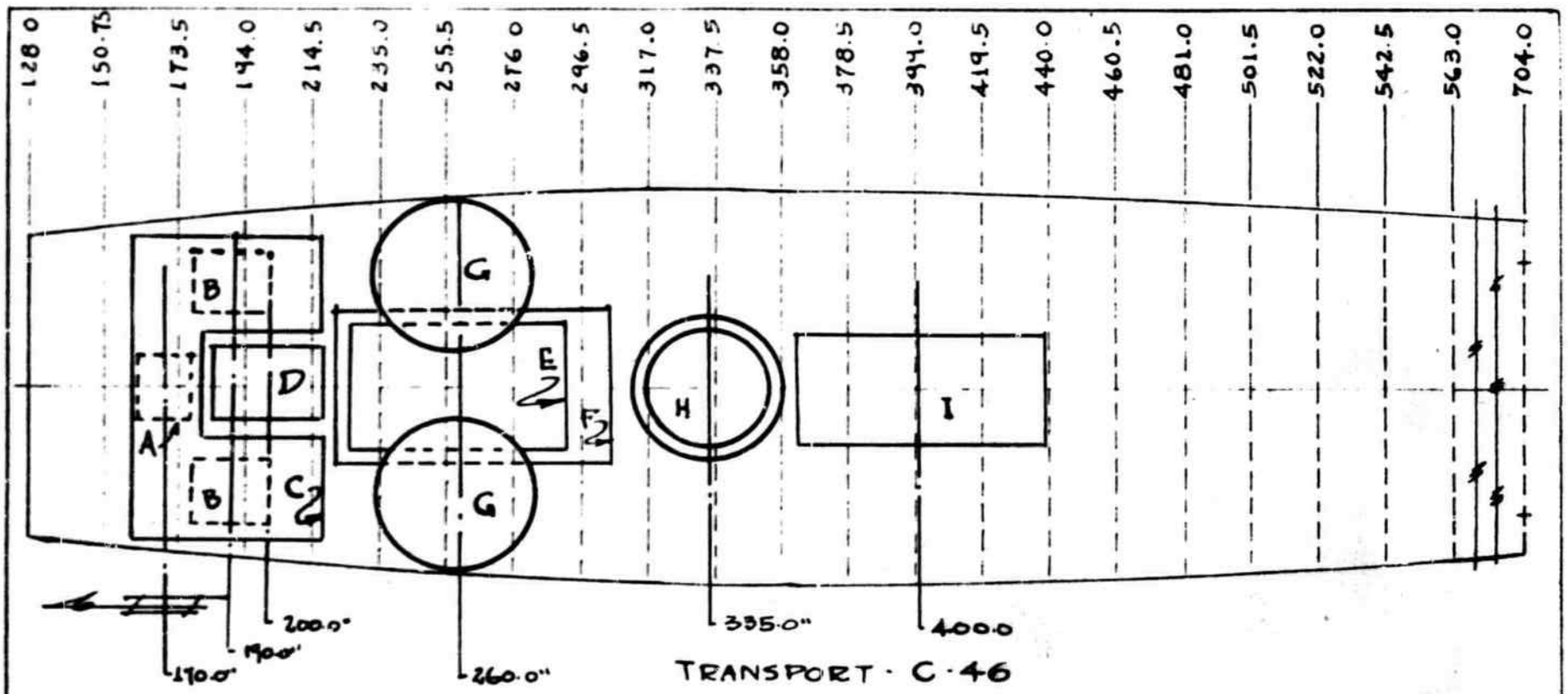


FIG. 188 MOCK-UP LOADED

PLANE NO. 1

Item (Primary Unit)	Weight
Crusher base	4660
Pitman and movable jaw assembly	4000
Miscellaneous, box #1: Adjusting sprockets (2), main shaft bearing caps (2), end and side toggle plate adjusting wedges (4), toggle plate bolts and nuts, empty box	385
Total	9045

Loading	Unloading
4 men - 4.00 man-hours	4 men - 3.00 man-hours



TRANSPORT · C·46

NOTE · APPROX. CENTER OF GRAVITY · 324.0"

EQUIPMENT		APPROX. DIMEN'S	WEIGHT.
A	TOGGLE PLATE	20" x 20"	170#
B	2 KEY PLATES	20" x 23"	236#
C	BY-PASS CHUTE & WALKWAY	54" x 94"	630#
D	MOVABLE JAW PLATES	26" x 38"	560#
E	SCREENS	38" x 63"	395#
F	HOPPER SUPPT FRME	48" x 80"	520#
G	2-WHEELS	44" DIA.	600#
H	JAWCRUSHER FUNNEL	34" DIA & 42" DIA	2785#
I	ENGINE	33" x 73"	2335#

FIG# 189 PRIMARY UNIT

THE ENGINEER BOARD
FT BELVOIR VA
AIR TRANSPORT SECTION

LOAD GRP #2 ROCK CRUSHER & SCREENING PLANT

DWG NO 6 OF 13		APPVD BY.	
REVISED			
DATE 9-17-44	SCALE 1/4" = 1'0"	DWN BY HW	CHKD BY.

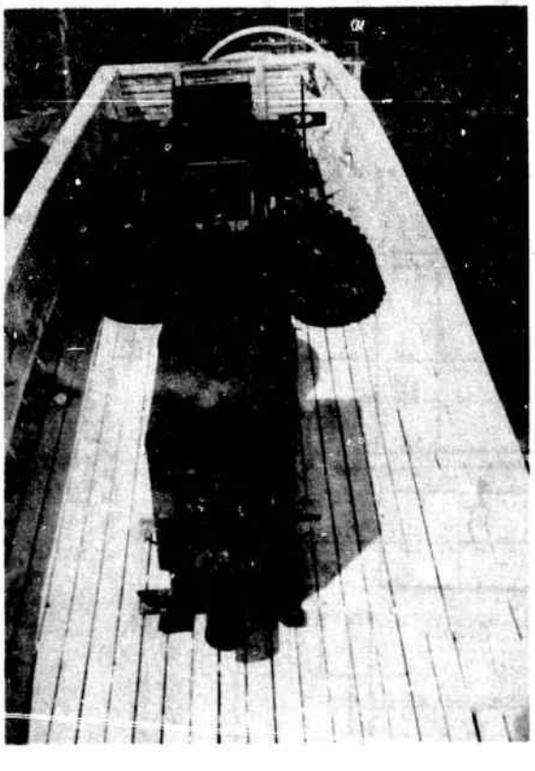
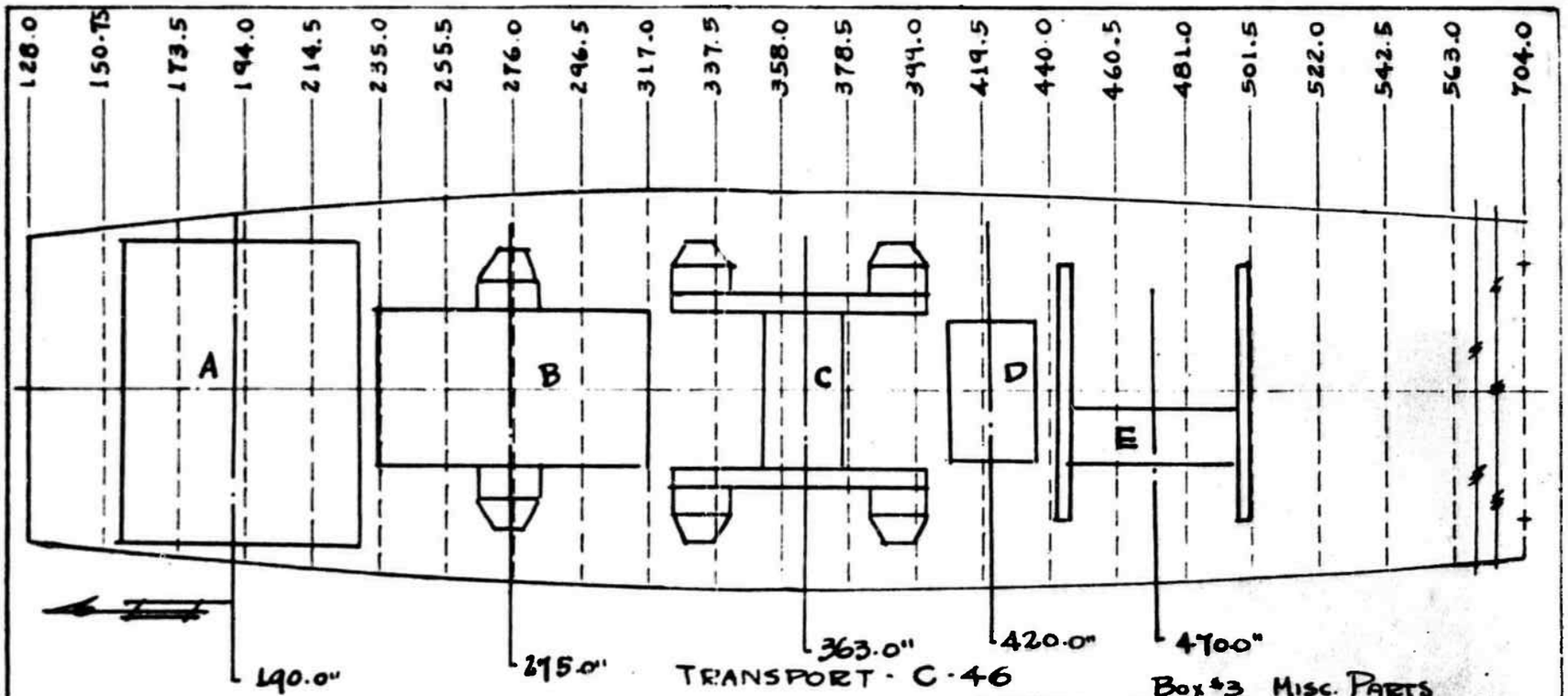


FIG. 190 MOCK-UP LOADED

PLANE NO. 2

Item (Primary Unit)	Weight
Toggle plate	170
Key plates (2)	236
By-pass chute and walk way	630
Movable jaw plate	560
Sized screens for vibrating screen (secondary unit)(12)	395
Hopper support frame, top section	520
Wheels (2)	600
Large jaw crusher flywheel	1815
Small jaw crusher flywheel	970
Engine	2335
Total	8231

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 328.0"

EQUIPMENT		APPROX. DIMEN'S.	WEIGHT.
A	HOPPER	72" x 91"	1790#
B	DOLLY	84" x 84"	2440#
C	REAR AXLE OSCILL BEAM ASSM.	76" x 91"	3470#
D	BOX #3 MISC. PARTS	25" x 42"	465#
E	HOPPER SUPP'T FRAME (UPPER SECT)	37" x 74"	430#

Box #3 Misc. Parts

AIR RESEVOIR
CRUSHING CHAMBER SHAFT
SHKR ASSM. DRIVE CHAIN
DISCH CONV DRIVE SHAFT GRP
MAIN DRIVE CHAIN.
FRONT BRACKETS (2)
DISCH. CONV. CHUTE
RT WHL KEYS
LT " "
TIRE CARRIER.
HALT PLATES
TANDEM GUIDE

FIG #191 PRIMARY UNIT

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GRP #3 ROCK CRUSHER & SCREENING PLANT

DWG No 7 OF 13		APP'D BY.	
REVISED			
DATE 7-17-44	SCALE 1/4" : 1'-0"	DWN BY H.W.	CHK'D BY.

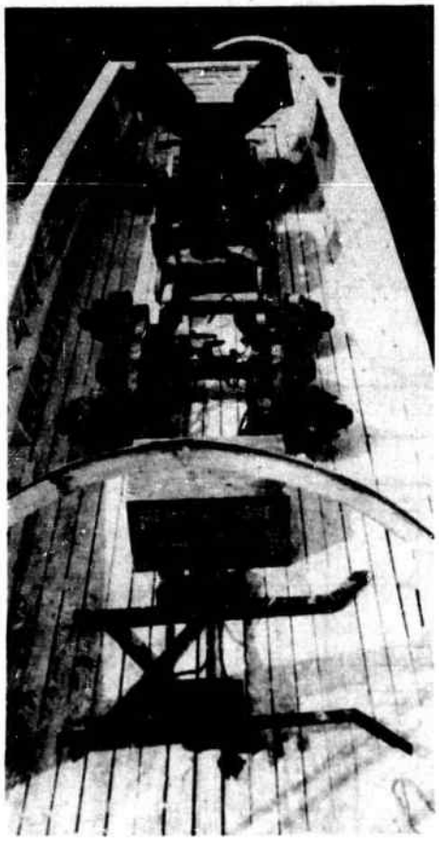
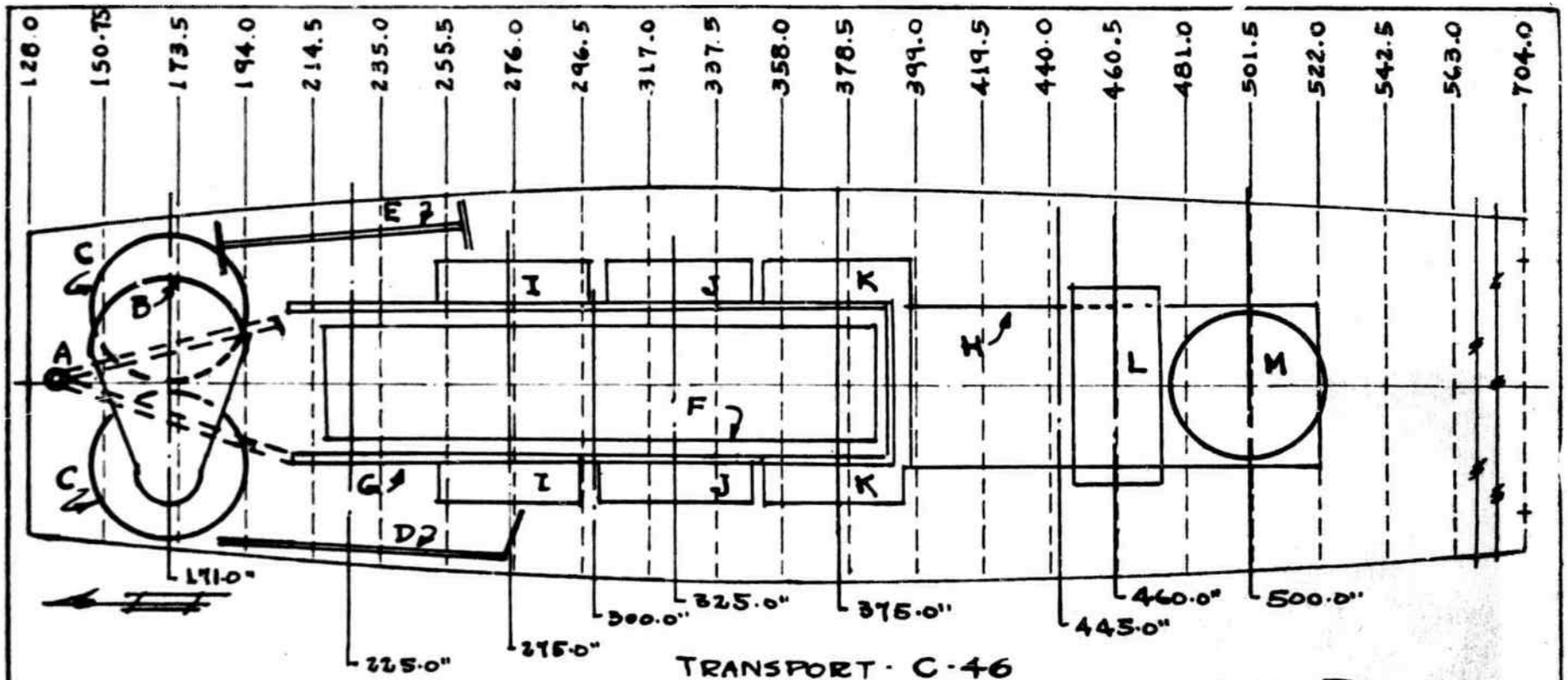


FIG. 192 MOCK-UP LOADED

PLANE NO. 3

Item (Primary Unit)	Weight
Hopper	1790
Dolly	2440
Rear axle oscillating beam assembly	3770
Hopper support frame, bottom section	430
Miscellaneous, box #2: Air reservoir; crushing chamber shaft; shaker assembly drive chains and lubricator; discharge conveyor brackets, drive chain, guard and lubricator; main drive chain and lubricator; discharge conveyor chute; tire carrier; bolt plates	465
Total	8895

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT · C-46

NOTE.- APPROX. CENTER OF GRAVITY · 326.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	DOLLY TONGUE.	41 x 80	330#
B	DRIVE BELT GUARD	44 x 72	100#
C	2 WHEELS	44" DIA.	600#
D	LADDER	28 x 99	50#
E	BRAKE CONTROL.	18 x 72	70#
F	PRI. DEL. CONV FRME	33 x 161	636#
G	REAR SECT FRAME	46 x 179	2300#
H	FRONT SECT FRAME	46 x 121	1950#
I	2- WHEELS	44" DIA	600#
J	2- WHEELS	44" DIA	600#
K	2- WHEELS	44" DIA	600#
L	BOX #2 MISC PARTS	24" x 60	590#
M	2- WHEELS	44" DIA.	600#

FIG# 193

Box #2. MISC. PARTS
SPILL PLATE SIDES (2)
DISCH CONV DR. CHN GD.
SPILL PL.
HOPPER GRATE FR. LT DIAG. BR.
V-BELTS FOR FLYWHEEL PT " "

PRIMARY UNIT

THE ENGINEER BOARD
FT BELVOIR, VA.
AIR TRANSPORT SECTION

LOAD GRP. No 4. ROCK CRUSHER & SCREENING PLANT

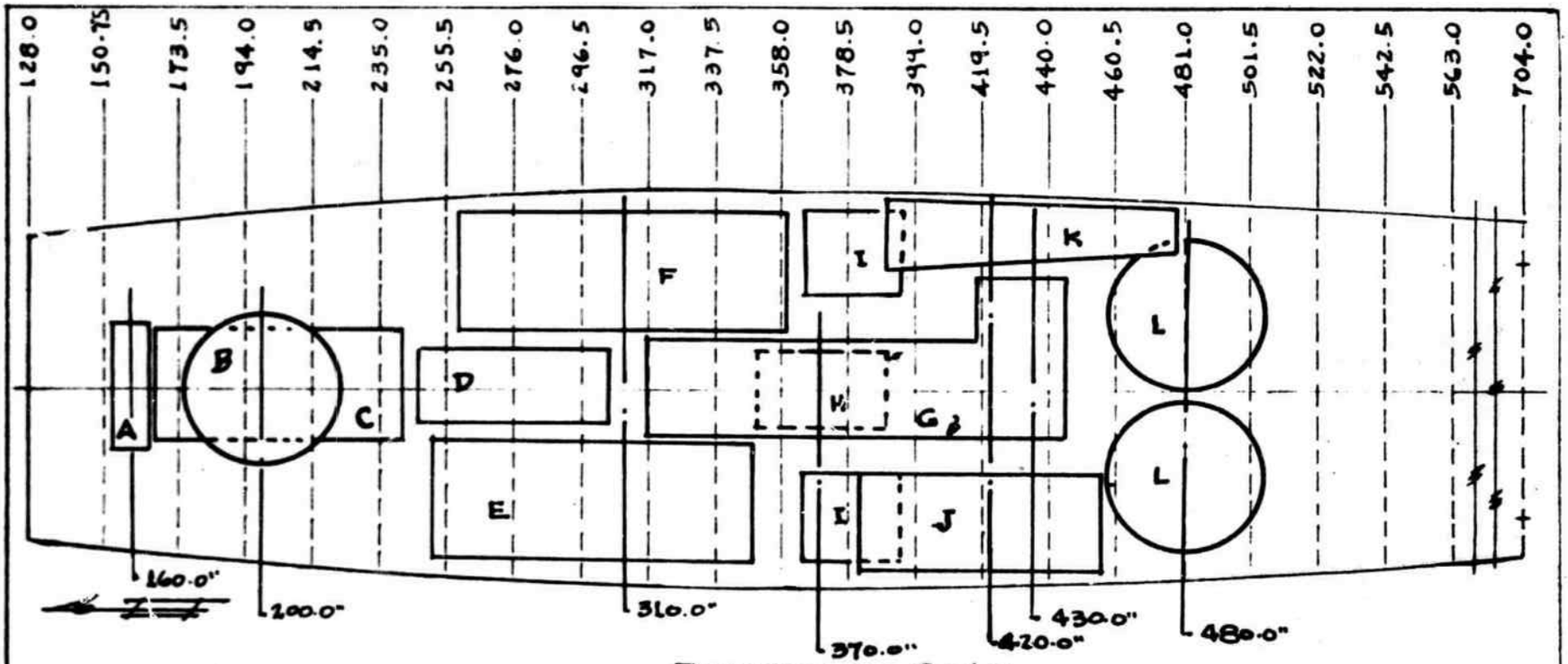
DWG No 8 OF 13		APPVD BY.	
REVISED			
DATE 7-18-44	SCALE 1/4"=1'-0"	DWN BY. HW.	CHKD BY.

FIG. 194 MOCK-UP LOADED

PLANE NO. 4

Item (Primary Unit)	Weight
Dolly tongue	230
Drive belt guard	100
Wheels (10)	3000
Ladder	50
Brake control	70
Primary delivery conveyor, main and tail sections	636
Rear frame section	2300
Front frame section	1950
Miscellaneous, box #3: Spill plate sides (2), spill plate, discharge conveyor drive chain guard, left and right hopper drag braces, conveyor spill plates (4), V-belts (11), shaker assembly drive chain guard, battery box w/bolts and nuts, stone hook	590
Total	8926

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	Tool Box	12" x 34"	80#
B	2 Wheels	44" Dia	600#
C	Box #4 Misc Parts	72" x 33"	1280#
D	" #5 " "	87" x 34"	2610#
E	Feed Conv. Tail Sect	94" x 36"	510#
F	Delivery Conv.	96" x 43"	585#
G	Feed Conv. Hd Sect	122" x 55"	580#
H	Sta. Jaw & Spares	24" x 40"	650#
I	Mov. Jaw & 2 Spares	26" x 38"	1120#
J	Feed Conv. Sect	72" x 24"	175#
K	Feed Conv. Hopper	86" x 24"	290#
L	2 - Wheels	44" Dia.	600#

Box #4 Spare Parts

Tools
Shims
Belt Fl
Belt Fluits
Wedges
High Speed
Roller Chain
Removable Nut
Crank
Bolts, Lockes
Nuts
Zerks
Couplings
Sta. Roller Shell
Mov " "
Toggle Plates.

Box #5 Spare Parts

Instruction Book
Tools
Keys (Taper & Streght)
Friction Discs
Spring Shear Washers
Belt Stretcher Rod
Straps
Electric Cables
Hose Assembly
Padlocks
Belt Conveyor
Belt Roll
Gates Vulco
Rope

FIG # 195 PRIMARY UNIT

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP #5 - ROCK CRUSHER & SCREENING PLANT

DWG No 9 OF 13		APPVD BY	
REVISED			
DATE 7-19-44	SCALE 1/4" = 1'-0"	DWN BY HM	CHKD BY

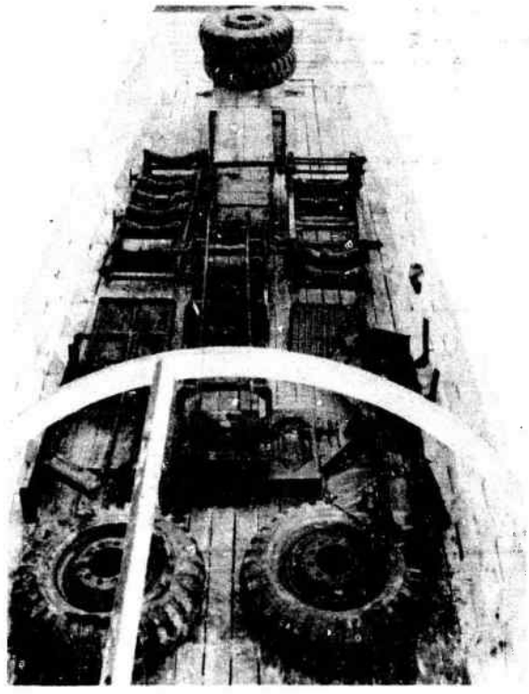
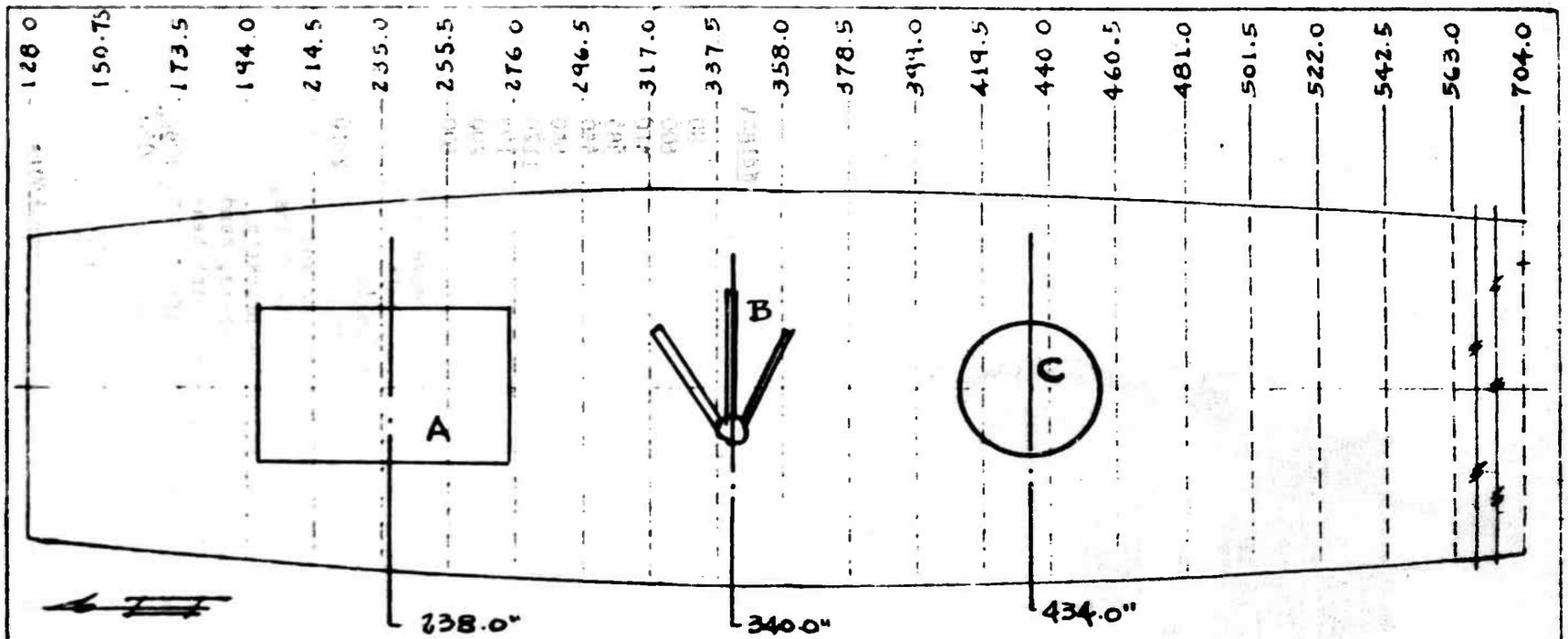


FIG. 196 MOCK-UP LOADED

PLANE NO. 5

Item (Secondary Unit)	Weight
Toolbox (primary unit)	80
Wheels (2) (primary unit)	600
Feed conveyor, tail section	510
Delivery conveyor	585
Feed conveyor, head section	550
Stationary jaw plate (spare)	650
Movable jaw plates (2)(Spare)	1120
Feed conveyor, intermediate section	175
Feed conveyor hopper	290
Wheels (2)	600
Spare parts, box #4: Stationary roll shell, movable roll shell, toggle plates, tools, shims, belt plates and rivets, wedges, chains, hydraulic jacks, bolts, zerks, couplings, sprockets	2610
Spare parts, box #5: Screw jacks, battery box and 2 batteries, oscillating beam guides, drive chains, oilers and guides, power unit adjusting brackets, roll crusher countershaft adjusting brackets, sand conveyor drive chain idler shaft, frame joint tension plates, handrails, brake control shaft	1280
Total	9050

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 315.0

	EQUIPMENT	APPROX DIMEN'S.	WEIGHT
A	ROLL CRUSHER	72" x 48"	9200#
B	SPRETTER CARRIER	48" x 42"	200#
C	WHEELS	42" DIA.	(2) = 600#

Fig. 197

SECONDARY UNIT

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LOAD GROUP No 6 OF ROCK CRUSHER & SCREENING PLANT

DWG No 10 OF 13		APPVD BY.
REVISED		
DATE 7-17-44	SCALE 1/4" 1'0"	DWN BY AW CHKD BY.

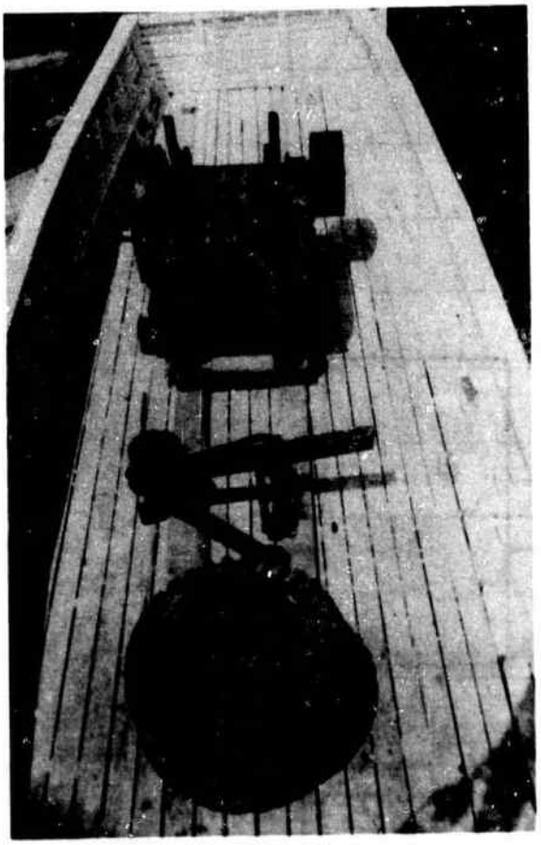
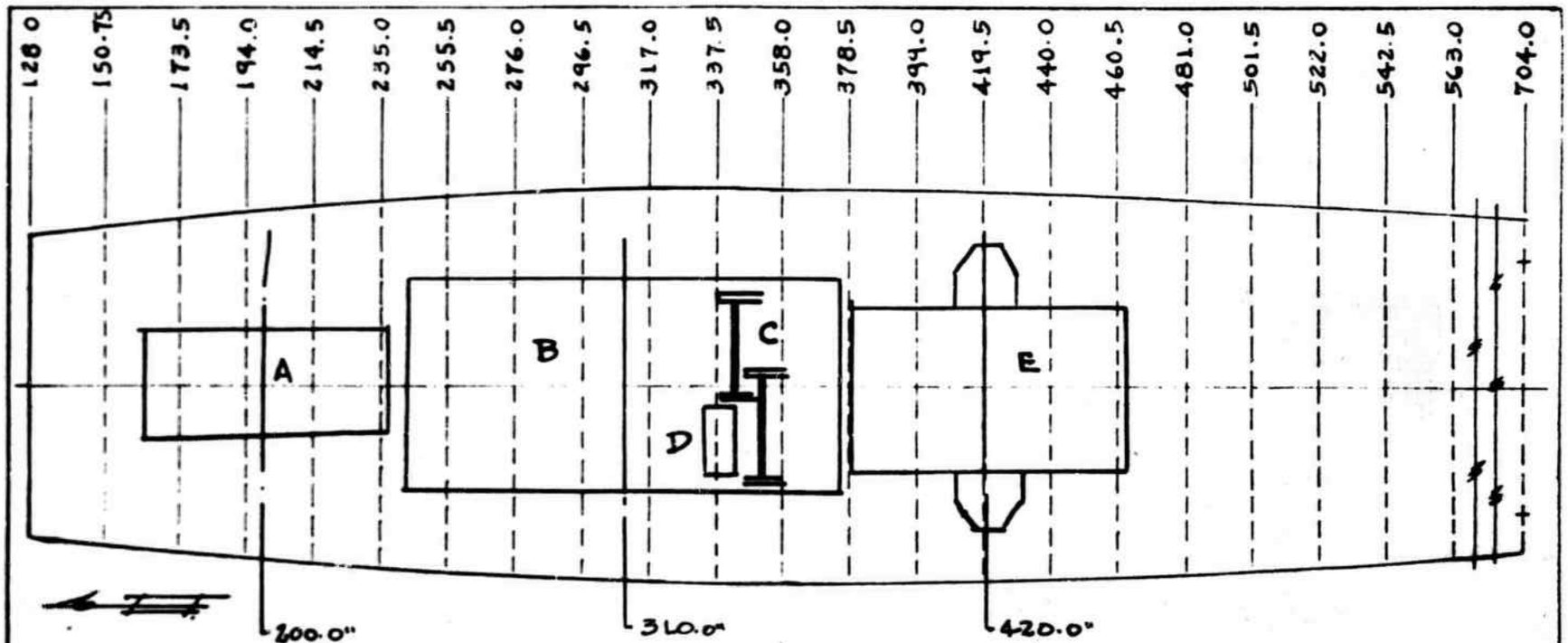


FIG. 198 MOCK-UP LOADED

PLANE NO. 6

Item (Secondary Unit)	Weight
Roll crusher	7200
Spare tire carrier	200
Wheels (2)	600
Total	8000

Loading	Unloading
4 men - 6.00 man-hours	4 men - 5.00 man-hours



TRANSPORT - C-46

NOTE - APPROX. CENTER OF GRAVITY - 323.2"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	ENGINE	33" x 93"	2335#
B	SHALER & VIBRATING SCREEN ASS'M.	64" x 124"	4020#
C	2 ELEV. WHEEL ROLLERS	14" x 34"	260#
D	V-BELT IDLER FOR ROLL CRUSHER DRIVE	11" x 34"	145#
E	DOLLY.	81" x 86"	2290#

FIG# 199 SECONDARY UNIT

THE ENGINEER BOARD
FT BELVOIR-VA.
AIR TRANSPORT SECTION

LOADING #7 ROCK CRUSHER & SCREENING PLANT

DWG No 11 OF 13 APP'VD BY.

REVISED

DATE 7-17-44 SCALE 1/4"=1'-0" DWN BY. H.W CHK'D BY. W.

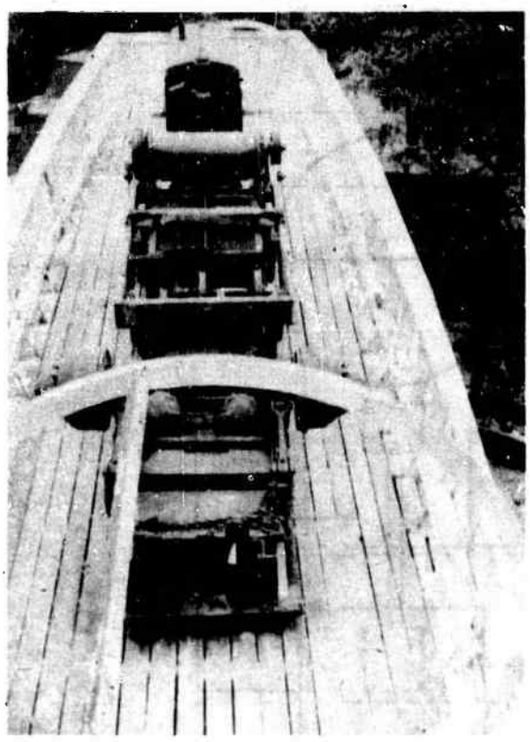
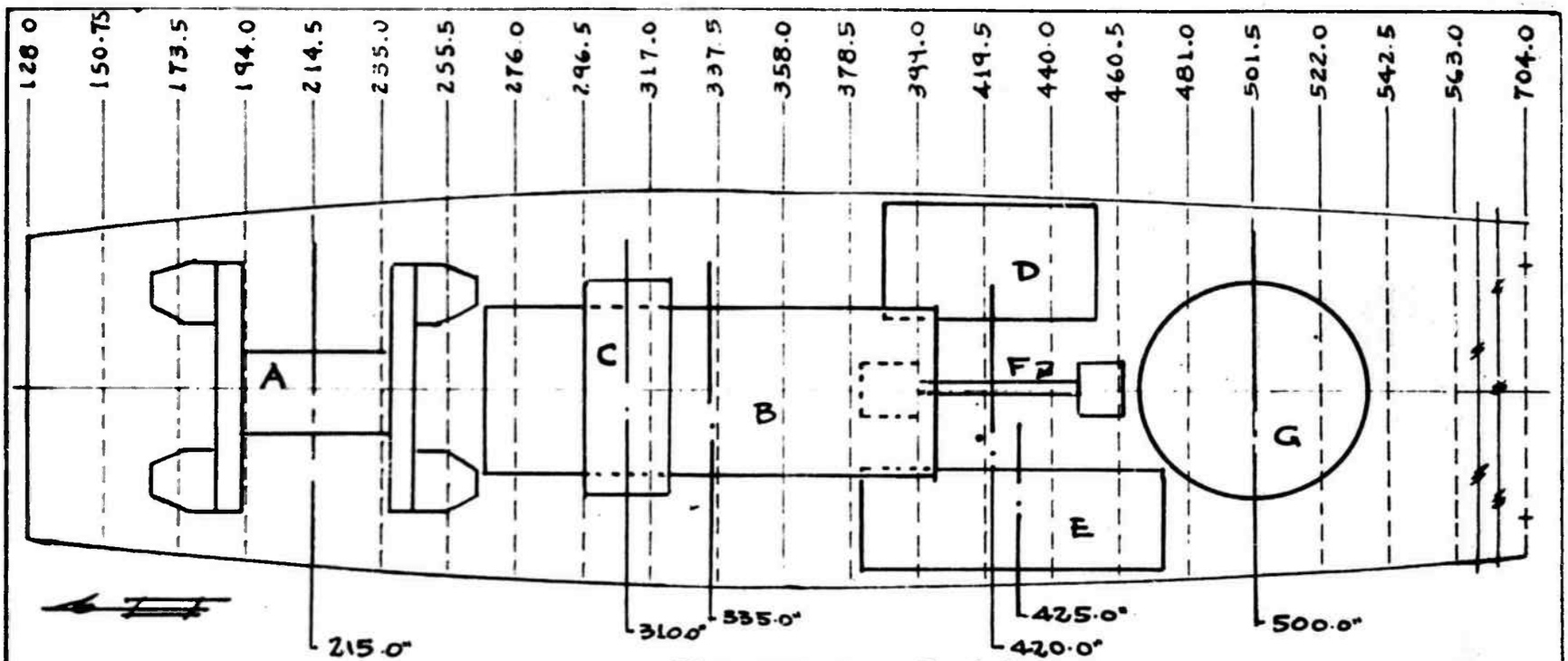


FIG. 200 MOCK-UP LOADED

PLANE NO. 7

Item (Secondary Unit)	Weight
Engine	2335
Shaker and vibrating screen assembly	4020
Elevating wheel rollers (2)	260
V-belt idler for roll crusher and drive	145
Dolly	2290
Total	9050

Loading	Unloading
4 men - 6.00 man-hours	4 men - 5.00 man-hours



TRANSPORT · C-46

NOTE · APPROX. CENTER OF GRAVITY · 324.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	REAR AXLE OSCILL BEAM ASSM	76" x 91"	3770#
B	FRNT SECT. OF FRME	51" x 130"	1915#
C	BOX #6 MISC. PARTS	24" x 68"	930#
D	SAND CONVEYOR	44" x 60"	570#
E	ROLL CONVEYOR	37" x 90"	510#
F	MN DRIVE CNTR SHFT.	16" x 76"	520#
G	ELEVATING WHL.	70" DIA.	780#

FIG # 201 SECONDARY UNIT

THE ENGINEER BOARD
FT BELVOIR VA.
AIR TRANSPORT SECTION

LD GRP #8 ROCK CRUSHER & SCREENING PLANT

DWG No 12 OF 13 | APPVD BY

REVISED

DATE 7-1844 | SCALE 1/4" = 1'-0" | DWN BY HW | CHKD BY

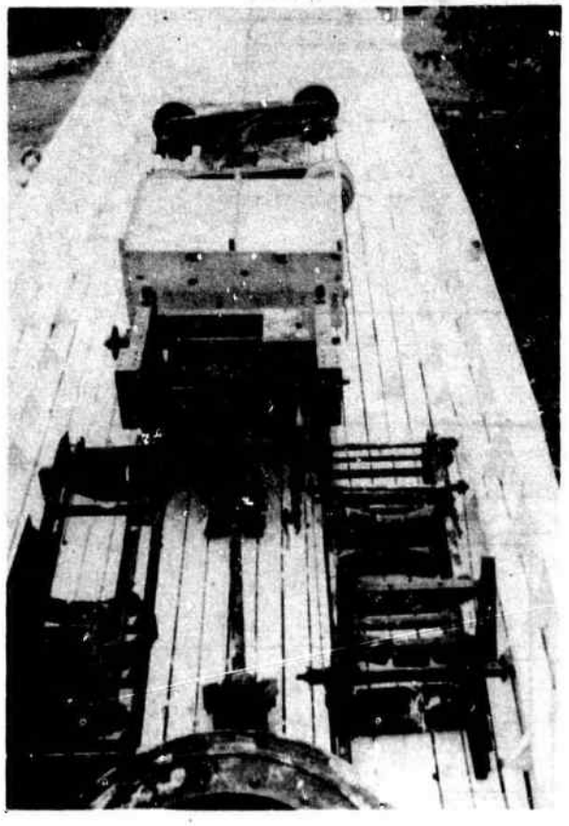
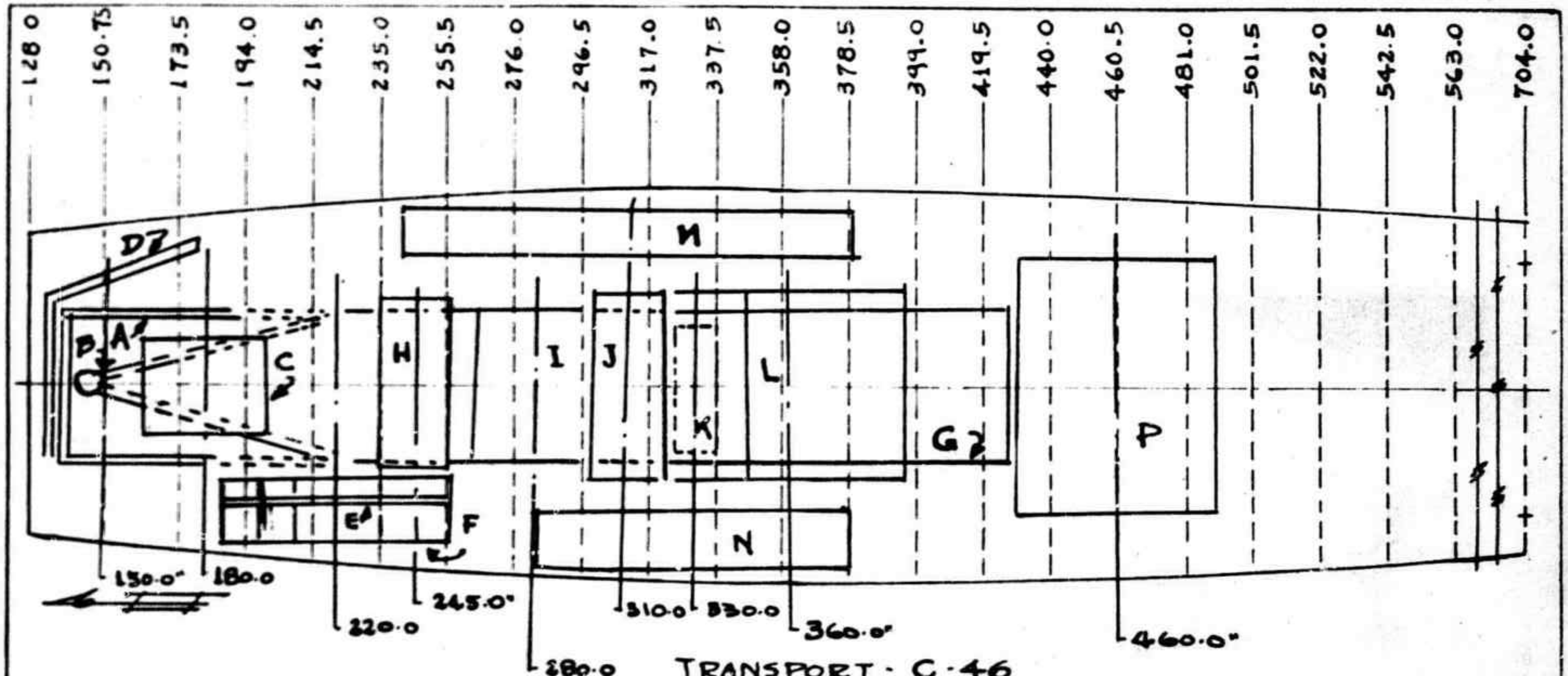


FIG. 202 MOCK-UP LOADED

PLANE NO. 8

Item (Secondary Unit)	Weight
Rear axle and oscillating beam assembly	3770
Front frame section	1915
Sand conveyor	570
Roll conveyor	510
Main drive countershaft	520
Elevating wheel	780
Miscellaneous, box #6: Screw jacks, battery box and 2 batteries, oscillating beam guides, drive chains, oilers and guides, power unit adjusting brackets, roll crusher countershaft adjusting brackets, sand conveyor drive chain idler shaft, frame joint tension plates, handrails, brake control shaft	930
Total	8995

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT · C-46

NOTE · APPROX. CENTER OF GRAVITY · 323.0"

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	ELEV. WHL. REAR SUPPT	[illegible]	[illegible]
B	DOLLY TONGUE	[illegible]	[illegible]
C	ROLL CRUSHER EXT	[illegible]	[illegible]
D	DIAG. SCRN FRAME [illegible]	30 x 84	110#
E	BRAKE CONTROL	16 x 72	70#
F	WALKWAY LADDER	18 x 70	60#
G	REAR SECT FRAME	62 x 220	3330#
H	WALKWAY	21 x 52	115#
I	REAR ROLL CR. FRAME	35 x 46	200#
J	FRONT SCREEN SUPPT	24 x 57	125#
K	SAND CONV ASS'M	12 x 40	195#
L	FRONT SUPPT ELEV WHL	59 x 68	155#
M	MAIN DR. GD. & BELT	15 x 131	306#
N	ROLL CRUSHER DR.	18 x 93	171#
P	SCREEN HOPPER	57 x 79	565#

FIG# 203

SECONDARY UNIT

THE ENGINEER BOARD FT BELVOIR · VA. AIR TRANSPORT SECTION			
LOAD GRP #9 ROCK CRUSHER & SCREENING PLANT			
DWG Nº 13 OF 13		APP'VD BY	
REVISED			
DATE 7-19-44	SCALE 1/4" = 1'0"	DWN BY H.W.	CHKD BY

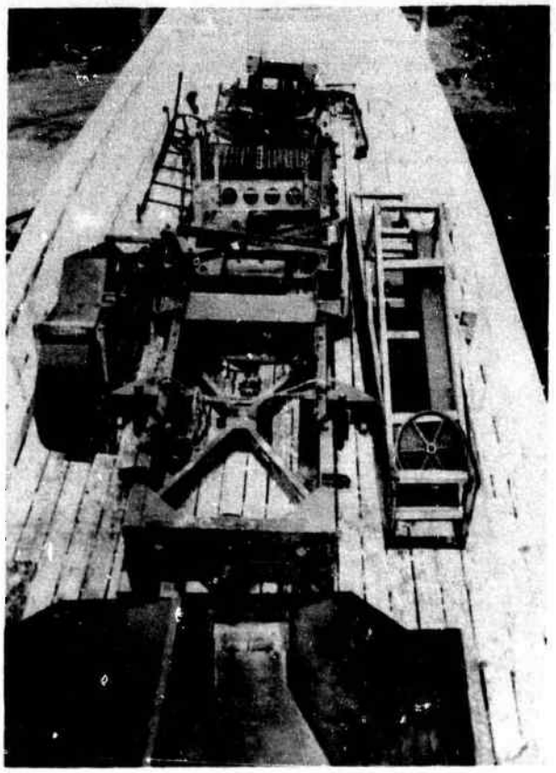


FIG. 204 MOCK-UP LOADED

PLANE NO. 9

Item (Secondary Unit)	Weight
Elevating wheel rear support	255
Dolly tongue	275
Roll crusher extension	175
Screen frame diagonal brace	110
Brake control	70
Walk way ladder with control rods	60
Rear frame section	3330
Walk-way	115
Roll crusher rear support frame	200
Front screen support	125
Sand conveyor belt drive assembly	195
Elevating wheel front support	155
Main drive guard, belts and crate	306
Roll crusher drive guard, belts and crate	171
Screen hopper	565
Total	6107

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours

APPENDIX W

DISASSEMBLY, GROUPINGS, AND LOADING OF THE TRACTOR, CRAWLER TYPE, DIESEL-ENGINE-DRIVEN, 35-40 DBHP, RIGID, 60-INCH GAUGE, CATERPILLAR MODEL D-4, COMPLETE WITH LOADER BUCKET, CABLE-OPERATED, FRONT-MOUNTED, 3/4 CU YD, TRACKSON TRAX-CAVATOR MODEL T-4, AND TRACKSON DOZER ATTACHMENT (NON-STANDARD ATTACHMENTS)

1. General. The traxcavator and its tractor weigh approximately 16,612 pounds and require cargo space of two C-46 planes for transportation.

2. Dismantling. Following is the proper sequence for disassembly:

(1) Remove V-drive belts and rewind cables on drums
(2) Remove bucket, and universal and shaft unit
(3) Break and lay out track (necessary in order to provide ample room for removal of traxcavator from tractor)
(4) Remove traxcavator truss rod assembly and control levers and rods
(5) Remove lower bolts on traxcavator lower frame
(6) Separate traxcavator frame from tractor
(7) Remove lifting arm assembly from traxcavator frame
(8) Separate hoist unit and lower traxcavator frame by burning the weld free
(9) Remove inner bearing caps and front idlers (necessary in order to remove cross member, since idler bolts run through it)
(10) Remove cross member
(11) Remove roller frame assemblies
(12) Remove fenders, seat, fuel tanks and drawbar assembly

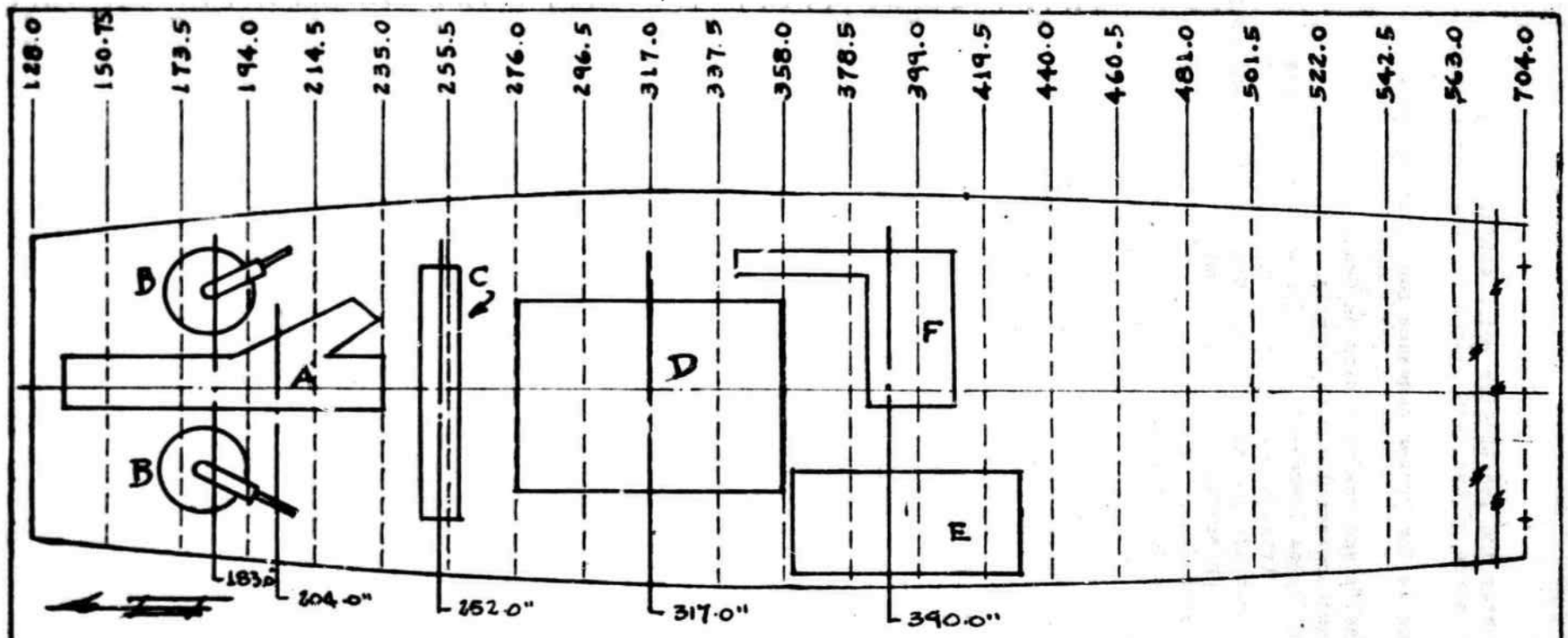
In reassembly, the forward junction of the hoist unit and lower traxcavator frame is bolted with countersunk plow bolts instead of rewelded. This eliminates the necessity for cutting and welding in subsequent disassembly and assembly. Fig. 209 shows the hoist unit with bolts installed.

3. Loading. The engine and transmission group weighs 5,905 pounds and will require a sled at least six and one-half feet long.

4. Man-Hours. A crew of 8 men worked the following periods:

Disassembly	4 men	28 mh
Loading	4 men	16 mh
Unloading	4 men	12 mh
Reassembly	4 men	32 mh
Total		88 mh

An 8-man crew can prepare the traxcavator for flight in about 7 hours, and can have the machine ready for operation approximately 9 hours after the landing.



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY.

	EQUIPMENT	APPROX. DIMEN'S.	WEIGHT.
A	TRACK ROLLER ASSY	95"x34"	1260#
B	IDLERS	43"x25	170# EA
C	DRAWBAR	76"x10"	268#
D	ENGINE & TRANS.	116"x79"	5905#
E	FENDER & TANK	65"x32"	120#
F	SEAT & FENDER	66"x48"	190#

FIG # 205

THE ENGINEER BOARD
FT BELVOIR. VA.
AIR TRANSPORT SECTION

LOAD GROUP Nº 1 OF T-4 TRANSCAVATOR

DWG Nº 1 OF 2		APP'VD BY.	
REVISED			
DATE 7/12/44	SCALE 1/4"=1'-0"	DWN BY. HW	CHK'D BY.

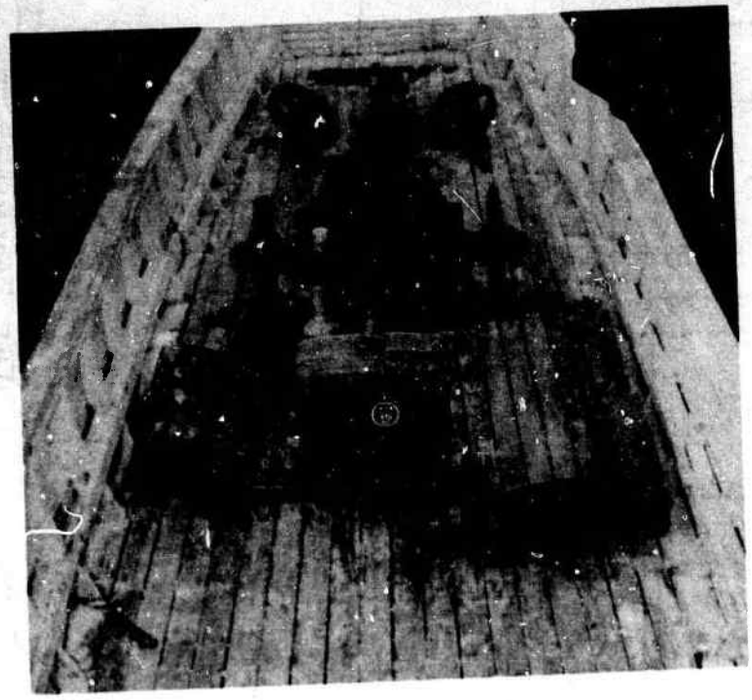
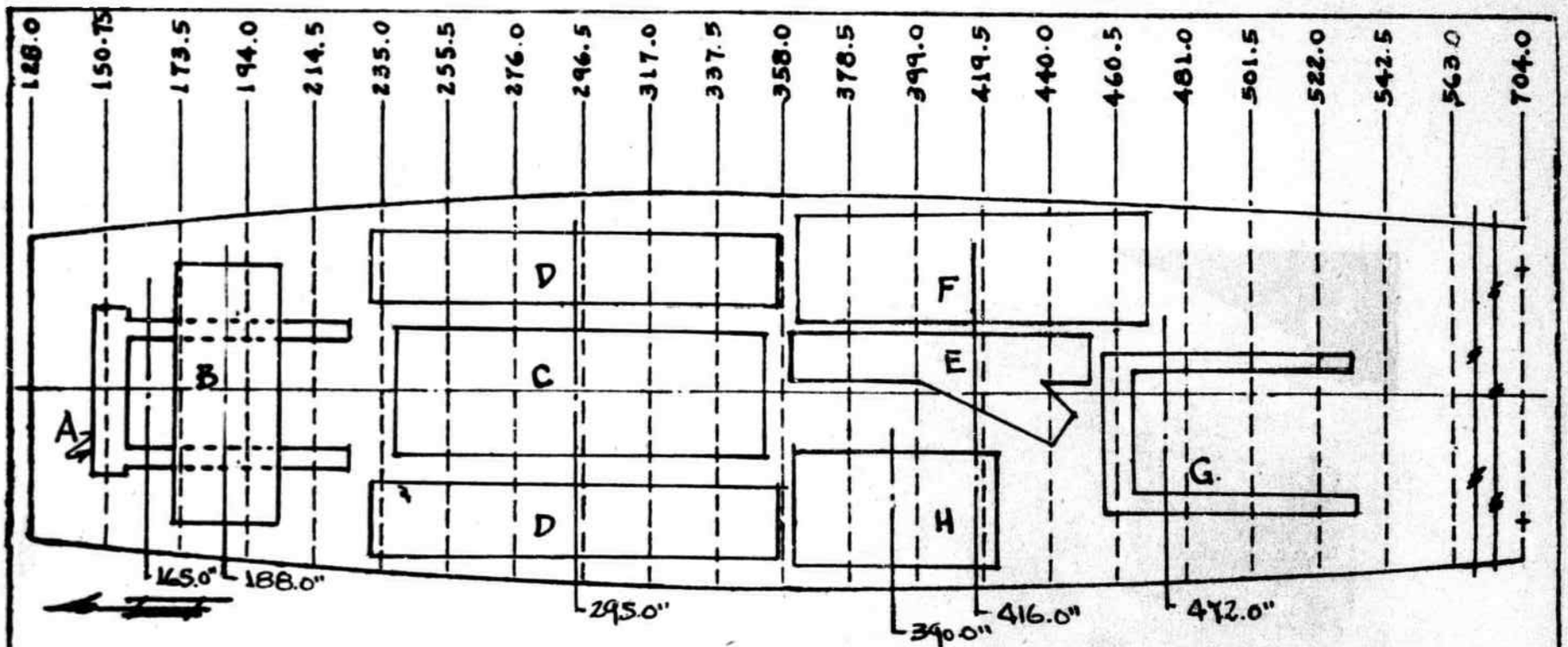


FIG. 206 MOCK-UP LOADED

PLANE NO. 1

Item	Weight
Track roller assembly	1260
Idlers	340
Cross member	218
Engine and transmission	5905
Fender and tank	120
Fender and seat	190
Total	8033

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours



TRANSPORT - C-46

NOTE.- APPROX. CENTER OF GRAVITY - 326.0"

	EQUIPMENT.	APPROX. DIMEN'S.	WEIGHT.
A	LIFT BLADE ARMS	73" x 45"	620#
B	BLADE	79" x 34"	635#
C	HOIST UNIT	108" x 38"	2180#
D	TRACKS	120" x 22"	1060# EA
E	TRACK ROLLER ASSY.	95" x 34"	1260#
F	BUCKET	102" x 49"	560#
G	LOWER TRAK-PRIME	76" x 48"	449#
H	BOX OF MISCELL PARTS.	60" x 36"	925#

ITEM 'H' CONTAINS HOOD, BELLY PAN, DRAWBAR ASSEMBLY, DASHBOARD, RAD. GRILL GUARD, MISCELL. NUTS, BOLTS & PINS.

FIG # 207

THE ENGINEER BOARD
FT BELVOIR - VA.
AIR TRANSPORT SECTION

LOAD GROUP NO 2 OF T-4 - TRAKCAVATOR

DWG NO. 2 OF 2 — APP'VD BY.

REVISED

DATE 5-6-44 | SCALE 1/4" - 1'-0" | DWN BY. H.H | CHKD BY.

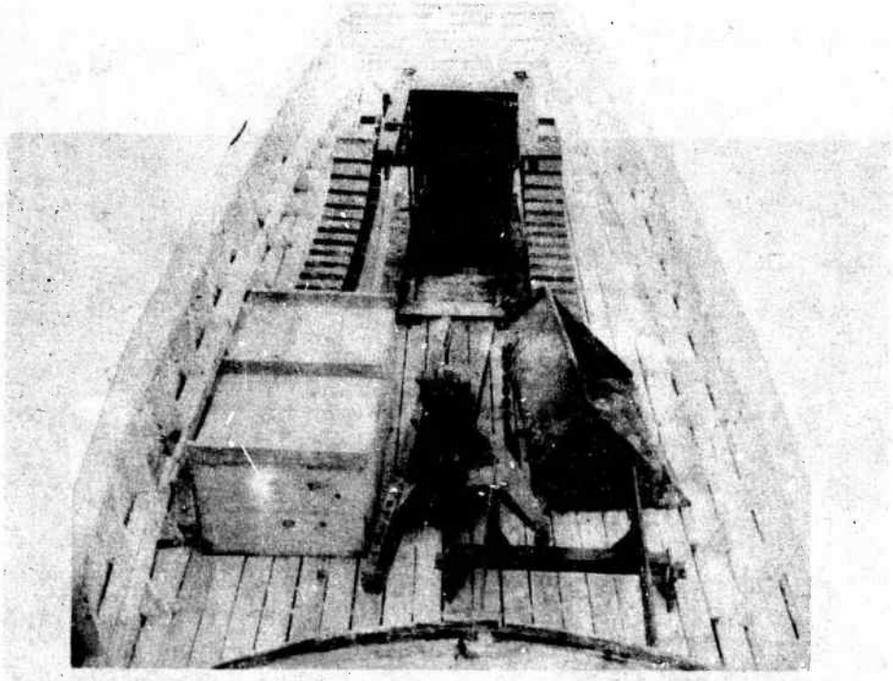


FIG. 208 MOCK-UP LOADED

PLANE NO. 2

Item	Weight
Lift arms	620
Blade	635
Hoist unit	2180
Tracks	2120
Track roller assembly	1260
Bucket	560
Lower traxcavator frame	449
Miscellaneous: hood, belly pan, drawbar assembly, dashboard, radiator grill guard, nuts and bolts	925
	8749

Loading	Unloading
4 men - 8.00 man-hours	4 men - 6.00 man-hours

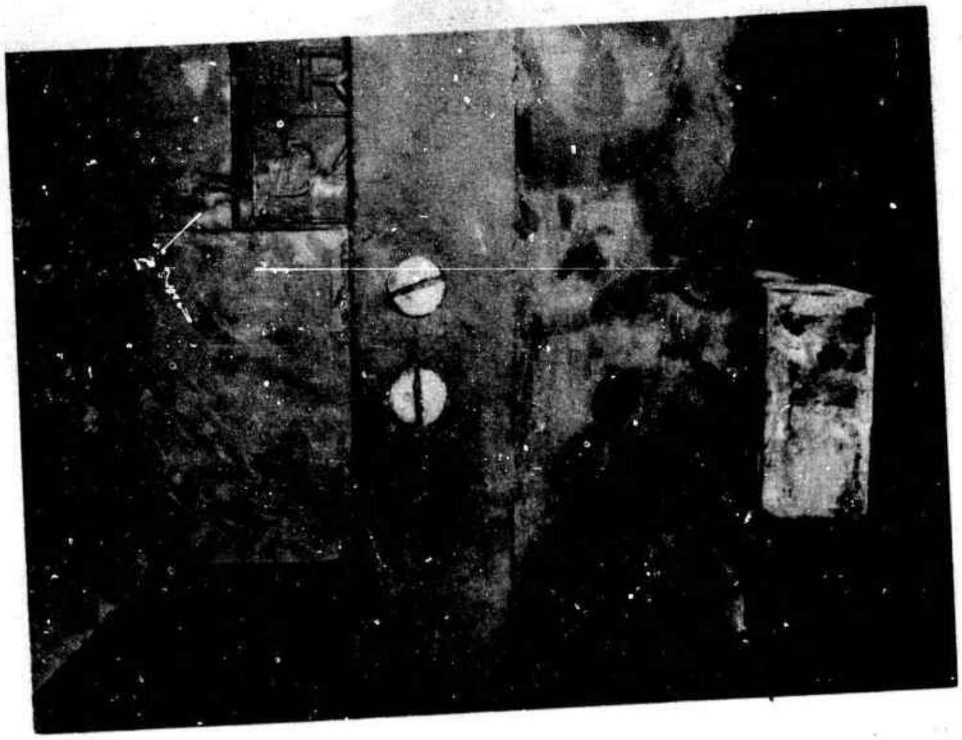


FIG. 209 BOLTS INSTALLED AT FORWARD JUNCTION OF HOIST UNIT AND LOWER TRAX-CAVATOR FRAME

J (UNPUBLISHED CARD) ~~RESTRICTED~~

ATI 97 950 (COPIES OBTAINABLE FROM CADO BY U.S. MILITARY ORGANIZATIONS ONLY)

U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT LABS., FORT BELVOIR, VA. (REPORT 856)

DISASSEMBLY AND LOADING OF STANDARD ENGINEER EQUIPMENT FOR TRANSPORT IN THE C-46 CARGO PLANE - AND APPENDIXES A - W

JOHN S. CAROTHERS; GRANT E. BEVERLY (SUBMITTERS)
28 AUG '44 292PP PHOTOS, DIAGRS, DRWGS

MILITARY OPERATIONS (21) AIRPLANES, CARGO - LOADING
LOGISTICS (5) C-46

~~RESTRICTED~~