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March 13/79 weigh new ones 8 1/2 tons.

DEPARTMENT OF PARKS & NORTHERN AFFAIRS

TRENT CANAL SYSTEM

CONTROL DAMS

STOP LOG LIFTING MACHINE

CANADIAN PATENT NO. 947984

SERIAL NOS. 1671/1

1671/2

1671/3

OPERATING & MAINTENANCE INSTRUCTIONS

SPARE PARTS LIST

TRENT CANAL SYSTEM

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D E S C R I P T I O N

The function of this unit is to remove stop logs from control dams, stack the logs to a minimum of three high on the downstream side of the dam cap, retrieve them from stacked position, and replace in the gains, jacking down where required.

Since the unit is able to travel under its own power along the existing rails on the dam top it is possible to transfer logs from one spillway to another whilst suspended between booms.

Log recovery is by means of two similar telescopic hydraulically operated booms (Part No. 1) carrying specially designed hook and compactor units (Part No. 2). The hooks engage in the metal U-bolts at each end of the logs.

This operation is accomplished by moving the booms, extended to the required depth, inward on travelling carriages (Part No. 4) by means of hydraulic cylinders (Part No. 13).

Logs in gains of either 22'-0" or 27'-0" length can be handled by this machine, and the sideways travel of the booms is so arranged that in the full "out" position the heel piece of the hook will clear the extremity of the gain by a half inch. The carriage operating cylinders each have a total travel of 12 inches.

Upon engagement of the hooks in the U-bolts the telescopic booms are retracted simultaneously to the extreme position, which brings the bottom of the log clear of the rail, enabling the booms to be swung forward to the stacking position by means of the boom luff cylinders (Part No. 14) at the same time extending the boom as required.

During all operations the unit is clamped firmly to the rails by means of the clamps supplied by Trent Canal System.

Log grapples for use in an emergency such as turned logs, or logs with broken or inaccessible U-bolts are also supplied (Part No. 17).

Primary power for the whole is supplied by a Wisconsin VH4D gasoline engine developing 30 H.P. at 3000 RPM and which drives a Volvo Flygmotor F10-C19 hydraulic pump delivering 7.5 GPM at 3000 PSI.

Drive for traversing the unit across dam top is provided by a Char-Lynn foot mounted type "P" hydraulic motor.

All functions of the unit are controlled by two 3-spool HIAB T20 valves (Part No. 9) with power beyond to Gresen single spool valve SP-F4-HP.

The single spool valve controls the Char-Lynn motor and its relief valve is set for 1200 PSI. The relief valves of the two 3-spool valves are set for 3000 PSI and the functions controlling the cylinders which actuate the boom carriage have cylinder port relief valves set to 300-500 PSI.

Control functions are identified by information plates mounted behind valve assemblies.

OPERATING

The boom carriages must be set to the required centre distance. This will be determined by the length of the gain at which the unit will be working.

TRAVERSING & POSITIONING

Whilst traversing unit across dam clamps must be raised clear of rail and held up by means of support brackets provided. Clearance between safety outriggers and dam top should be checked and adjusted if necessary. Booms should be in the fully retracted ("UP") and vertical ("BACK") position before unit is set in motion.

Prior to positioning over selected sluiceway boom carriages should be moved to the extreme centre distance position ("OUT"). When the unit is over sluiceway one boom should be extended ("DOWN") until the hook assembly is just below dam top and unit moved carefully until outer heel of hook is almost touching outer wall of gain.

The other boom should then be extended a similar distance to first and the unit positioned so that clearance from heel of hook to gain wall is equal in each case.

Hold down clamps should now be applied to rails as firmly as possible. As an added precaution outrigger legs may be wedged to place thus ensuring complete rigidity.

RETRIEVING LOG

Booms should be extended (Down) as simultaneously as possible with the hook assembly positioned slightly downstream in the gain to compensate for the log being pressed in that direction by the force of water.

Contact with log by the compactor plate of hook assembly will be registered by the venting of cylinder port relief at control valve, a change in engine note, and possibly a slight jolt throughout the unit frame.

After experience it should be possible to "Feel" for the log through the controls.

Upon making contact with the log each boom should be retracted (Up) by the slightest possible amount in order to provide clearance between face of compactor and log thus facilitating sideways movement of boom.

Boom carriages should now be moved to "IN" position. This should engage hooks in U-bolts.

In the case of worn or distorted logs it may be necessary to "Fish" with the boom at varying angles until hooking is achieved.

The hooked log should then be raised ("UP") taking care to maintain equal retraction speed in order to keep the log absolutely level until the top extremity of stroke is reached.

The log may now be deposited at the required position and stacking height on the downstream side of the dam cap by swinging the booms forward ("Forw'd") whilst simultaneously extending same, again at equal rates of speed in order to keep log level under control.

Log should be lowered to required stacking position by swinging booms gently back ("BACK") until top side of hook just clears underside of U-bolt. This condition may be assumed when compactor plate is resting flat on log. Hooks may then be disengaged by moving boom carriages to outer extremity of travel ("OUT").

Booms should then be retracted ("UP") and simultaneously returned to the vertical position ("BACK").

Replacement of logs in gains is carried out by an exact reversal of the procedure described.

Upon replacement in the gains of each individual log downward pressure should be exerted by means of the compactor unit on boom end (Item 2) to seal gap between logs.

Should it be found desirable to move a log from one sluiceway to another this may be accomplished by suspending the log on the hooks at the fully retracted ("UP") boom position, loosening the hold-down clamps setting same in travelling position, removing any packing at safety outriggers and traversing unit to desired sluiceway.

NOTE: Under no circumstances must it be attempted to operate the boom luff (FORWARD) or (BACK) with or without log unless the whole unit is firmly clamped to the rails.

This point can not be too strongly emphasized.

GENERAL

When controls are being operated it is desirable that this be done as smoothly and deliberately as possible.

Avoid "snatching" and jerky movements, particularly when stacking or replacing logs.

Extension and retraction of boom should match variation of boom angle in order to provide maximum balance effect.

LOG RECOVERY GRAPPLES

In the event of a log being deemed impossible to recover by normal method (e.g. turned log, log with damaged U-bolt, etc.) the log recovery grapples may be used (See AD-)

Before use the grapples (2) must be pinned to place in the bosses provided, whilst the booms are in the vertical fully retracted position.

Grapple operating lever should be in horizontal position (Spring de-compressed).

Upon boom extension downward it may be found necessary to manually guide the spring loaded lead-in pieces of each grapple through the sluice opening to allow them to pass the dam cap.

Subsequently it will only be a matter of extending the boom steadily until contact is made with the log. The lead-in equipment should ensure that log locates firmly in bosom of grapple and is gripped by tine barbs.

At the point of full retraction the locking pins must be removed in order to allow the log to swing freely while being deposited on dam cap. Grapple operating lever should then release tines by compressing spring.

MAINTENANCE

GENERAL

Grease nipples are located on all journal bearings for traverse wheel axles and boom pivots, also on shaft ends for boom carriage wheel bearing.

Roller chain should be kept greased.

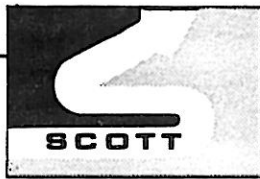
HYDRAULICS

Apart from routine inspection for leaks the other precaution to be observed is that when the unit is left idle the boom carriage cylinders and the boom luff cylinders should be in the retracted position to protect the piston rods.

The hydraulic system is charged initially with ESSO UNIVIS N-22. Gulf HVI 43 is equal to the UNVIS.

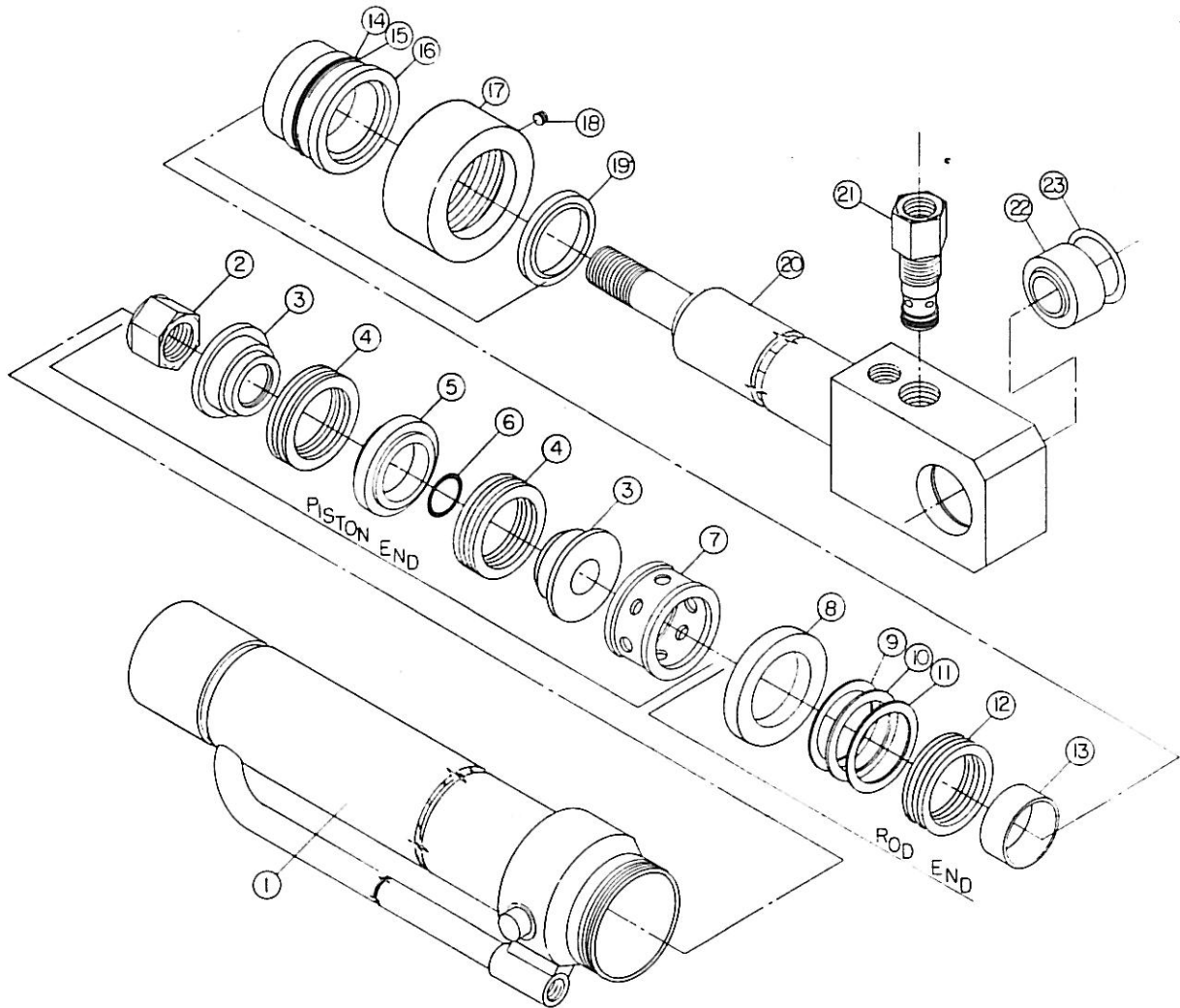
Since running times for unit are uncertain it is recommended that the entire system be drained and refilled and filters changed once per year.

See Item 17 Parts List.



**BOOM EXTENSION CYLINDER
3 x 120**

4000-4-1601-02



When ordering Spare Parts, Please Supply Model and Serial No. of Scott Crane.

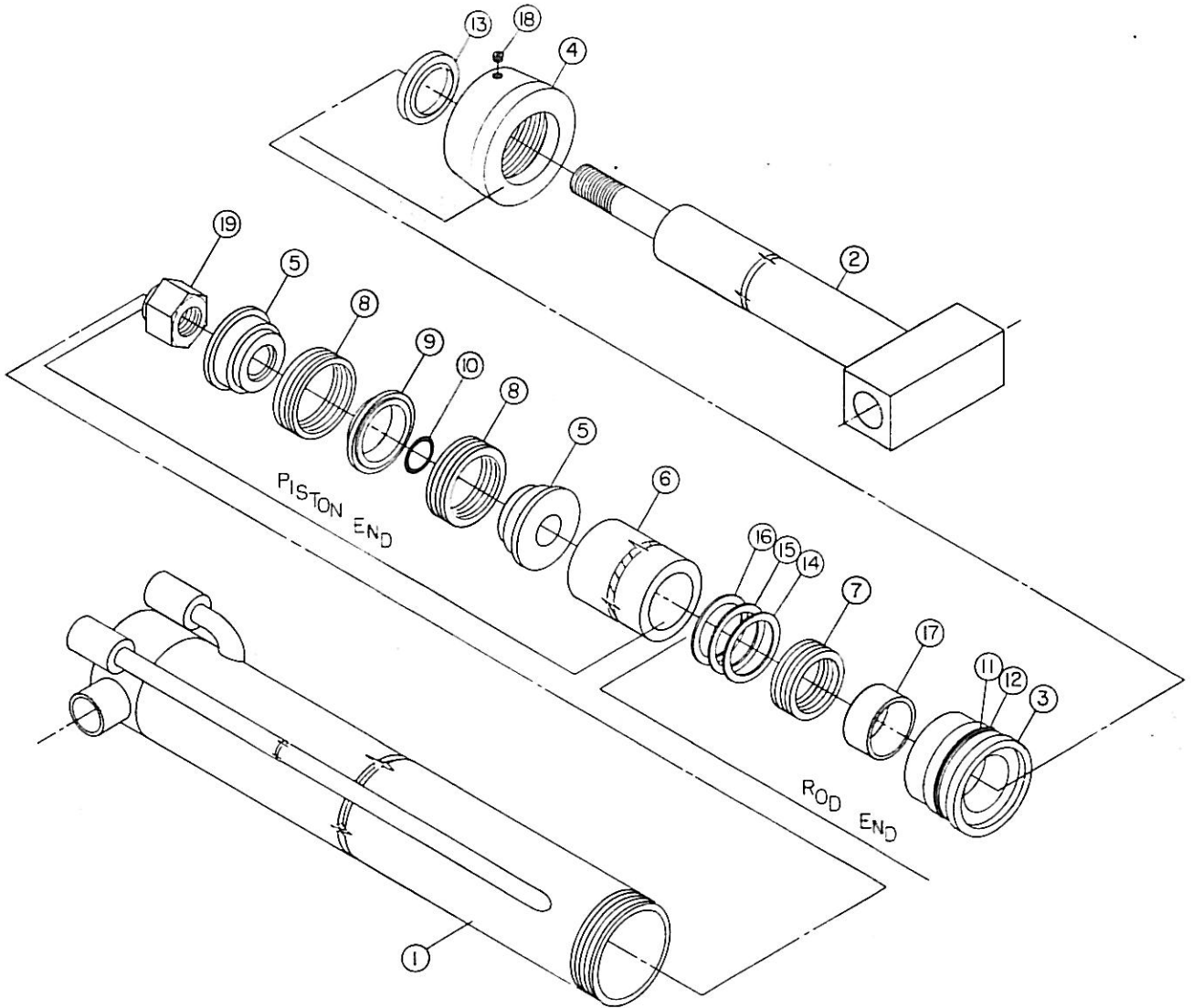
NO.	QUAN.	STOCK NO.	DESCRIPTION	NO.	QUAN.	STOCK NO.	DESCRIPTION
1	1	100-4-1587	BODY ASSEMBLY	*13	1	310-1-0179	BUSHING
2	1	530-9-0748-10	LOCKNUT	*14	1	520-9-0395-55	"O" RING
3	2	405-1-0204	PISTON	*15	1	515-9-0394-55	BACK-UP RING
* 4	2	505-9-0652-30	PISTON PACKING	16	1	305-2-0533	STUFFING BOX
5	1	415-9-0653-30	PISTON BEARING	17	1	325-2-3763	CARTRIDGE NUT
* 6	1	520-9-0395-23	"O" RING	18	1	530-9-0180-02	SET SCREW
7	1	215-1-0213	SPACER	*19	1	570-9-0972-18	WIPER
8	1	215-1-0214	STOP	20	1	200-9-1554-02	ROD ASSEMBLY
* 9	1	560-9-0515-52	RETAINER	21	1	580-1-0147	HOLDING VALVE
*10	1	540-9-0729-26	WASHER	22	1	310-9-0057-07	BEARING
*11	1	510-9-0519-13	WAVE WASHER	23	2	560-9-0515-42	RETAINING RINGS
*12	1	510-9-0011-25	ROD PACKING				

*PARTS INCLUDED IN PACKING KIT 590-1-0337
9-73



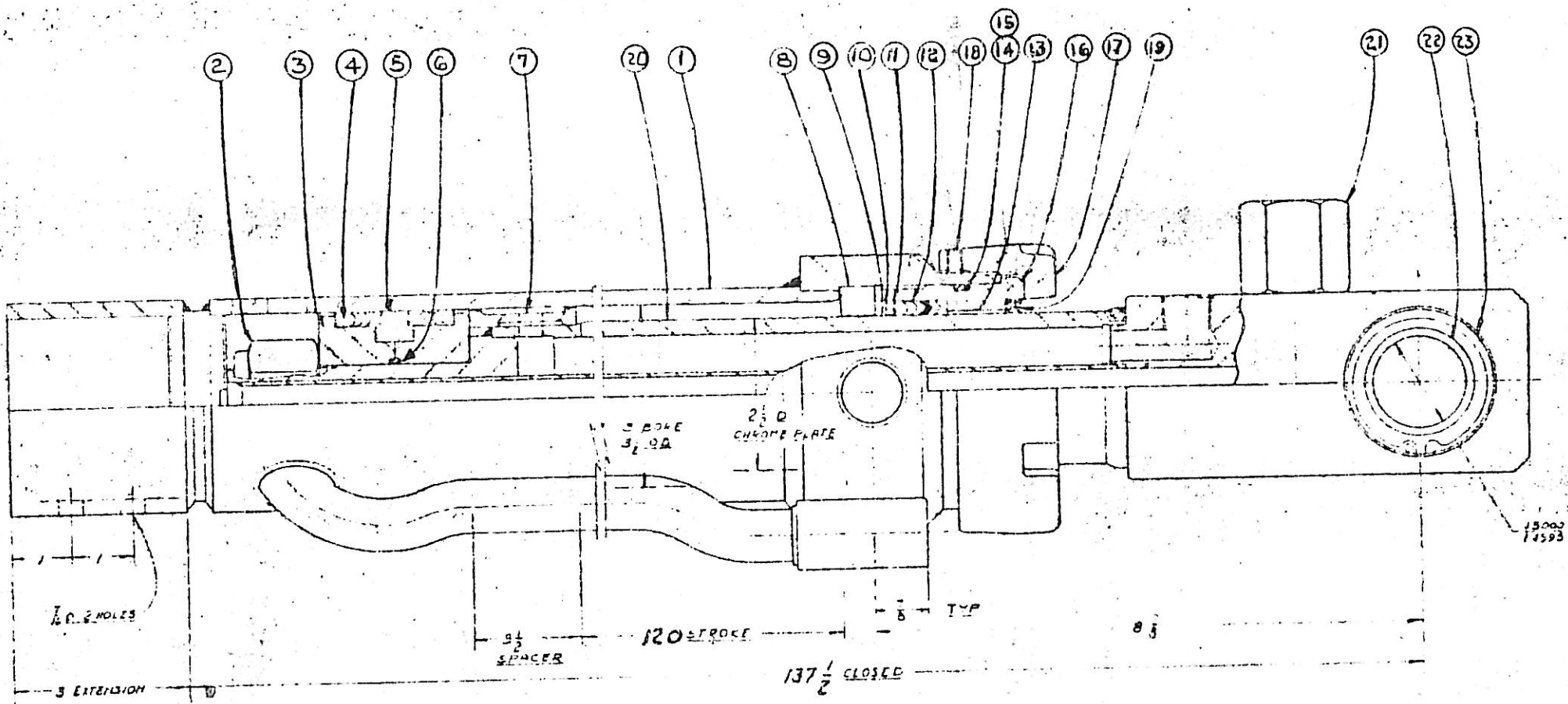
BOOM EXTENSION CYLINDER
2-1/2 x 120

4000-3-1321

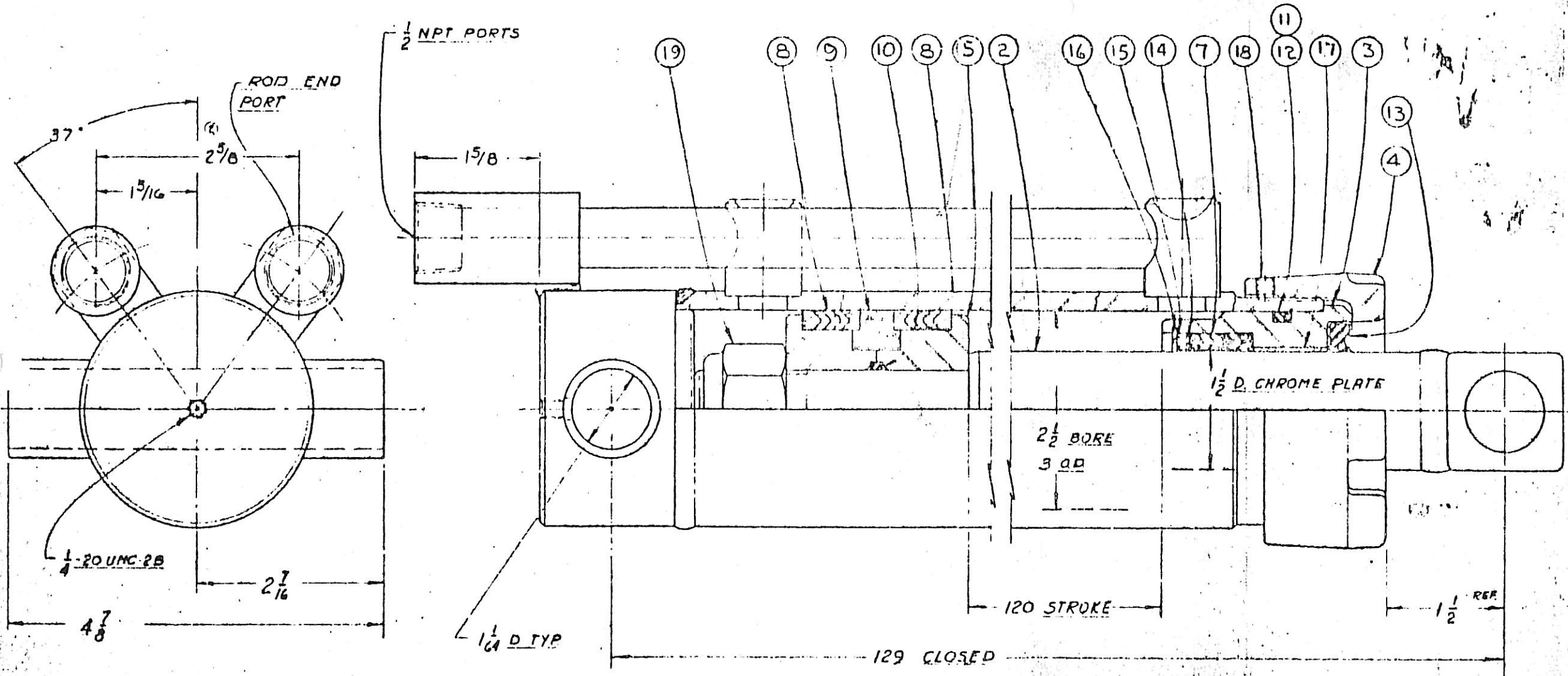


When ordering Spare Parts, Please Supply
Model and Serial No. of Scott Crane.

NO.	QUAN.	STOCK NO.	DESCRIPTION	NO.	QUAN.	STOCK NO.	DESCRIPTION
1	1	100-3-1584	BODY ASSEMBLY	*11	1	520-9-0395-39	"O" RING
2	1	200-2-1265	ROD ASSEMBLY	*12	1	515-9-0394-39	BACK-UP RING
3	1	305-1-2743	STUFFING BOX	*13	1	570-9-0015-15	WIPER
4	1	325-2-2744	CARTRIDGE NUT	*14	1	540-9-0518-11	WAVE WASHER
5	2	405-1-2548	PISTON	*15	1	540-9-0729-23	WASHER
6	0			*16	1	560-9-0515-35	RETAINER
* 7	1	510-9-0011-15	ROD PACKING	*17	1	310-1-4209	BUSHING
* 8	2	505-9-0652-25	PISTON PACKING	18	1	530-9-0180-02	SET SCREW
* 9	1	415-9-0653-25	PISTON BEARING	19	1	530-9-0748-08	LOCK NUT
*10	1	520-9-0395-19	"O" RING				



BOOM EXTENSION CYLINDER
 3 SECTION 35' BOOM
 4000-4-1601-02

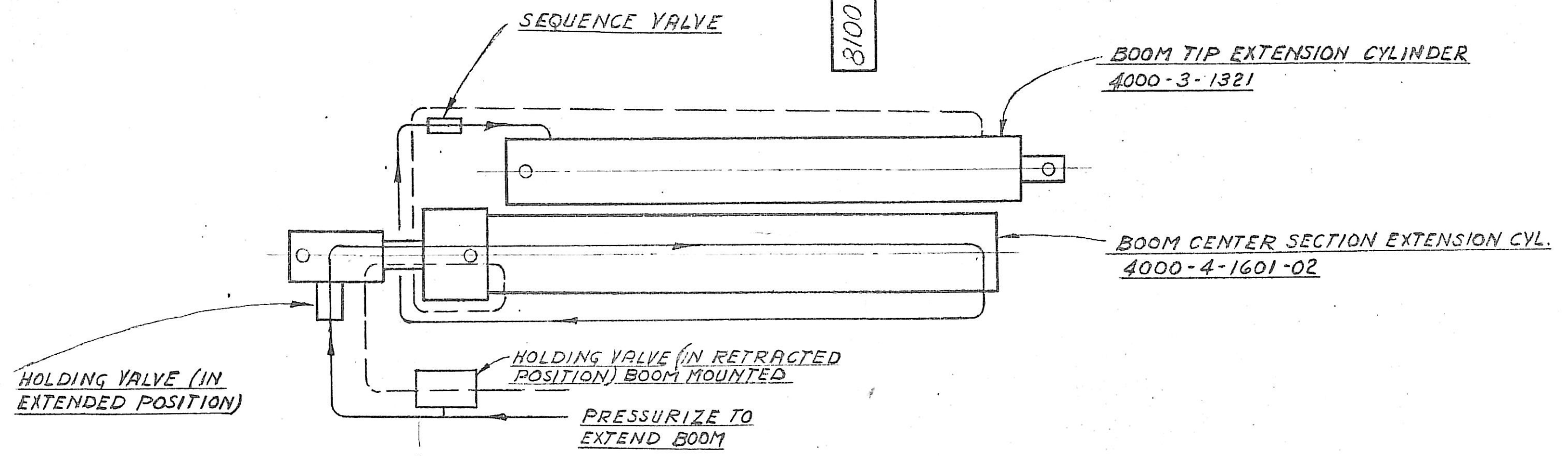



4000-3-1321
 BOOM EXTENSION CYLINDER
 3 SECTION BOOM

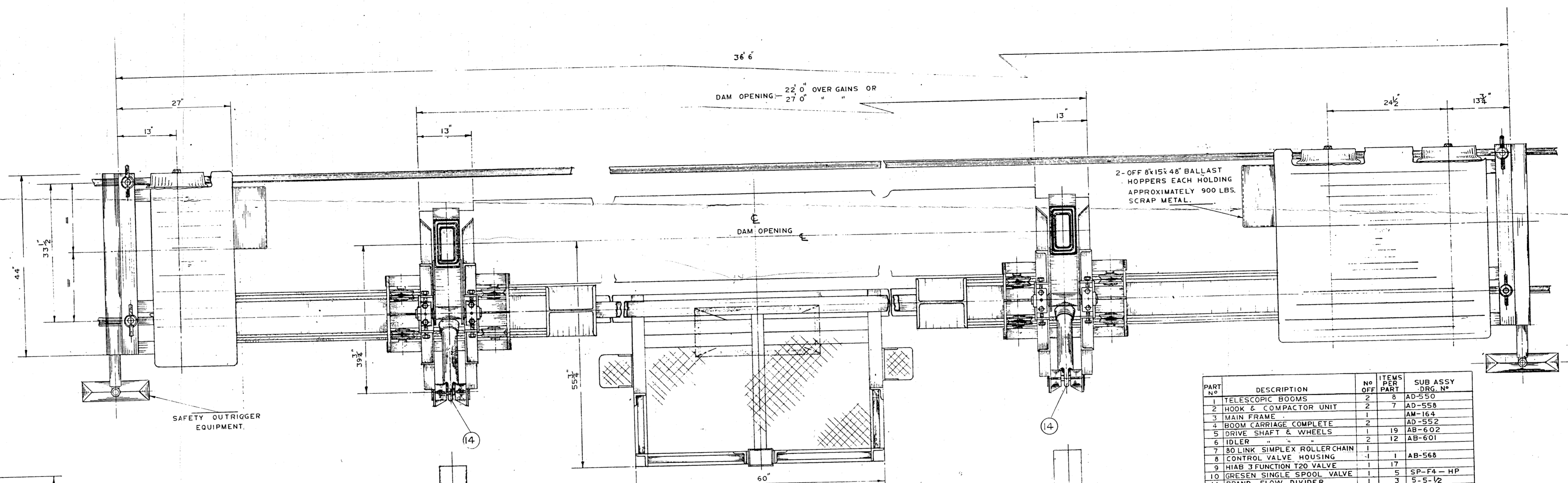
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REV.	BY	DATE	CHKR.	CHANGE

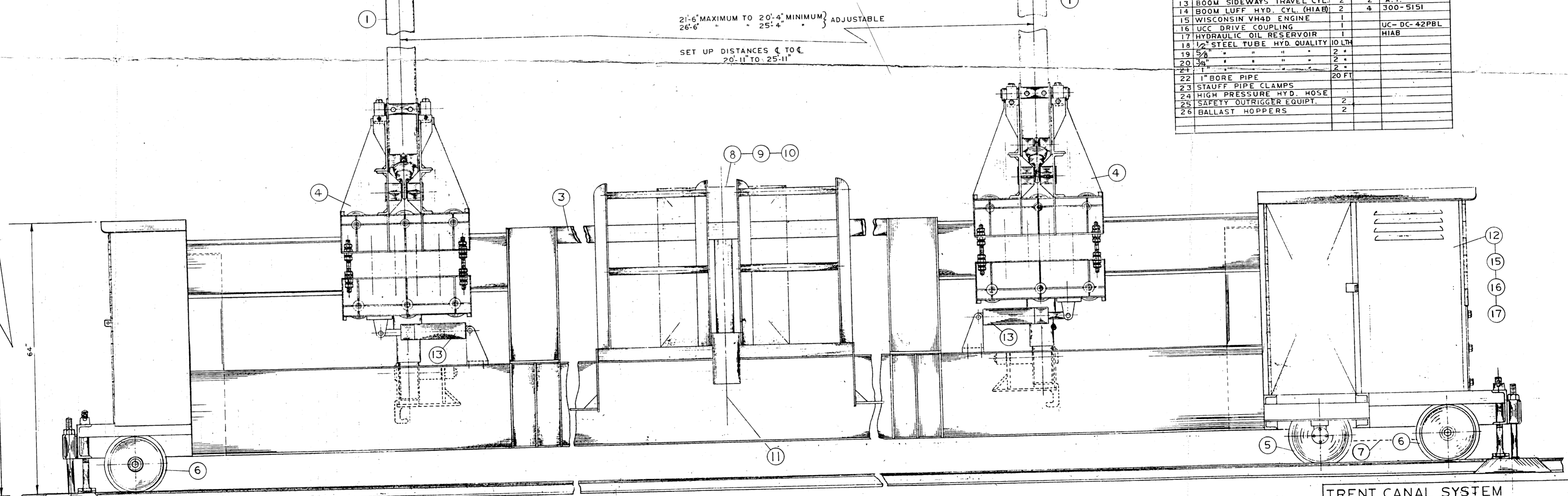
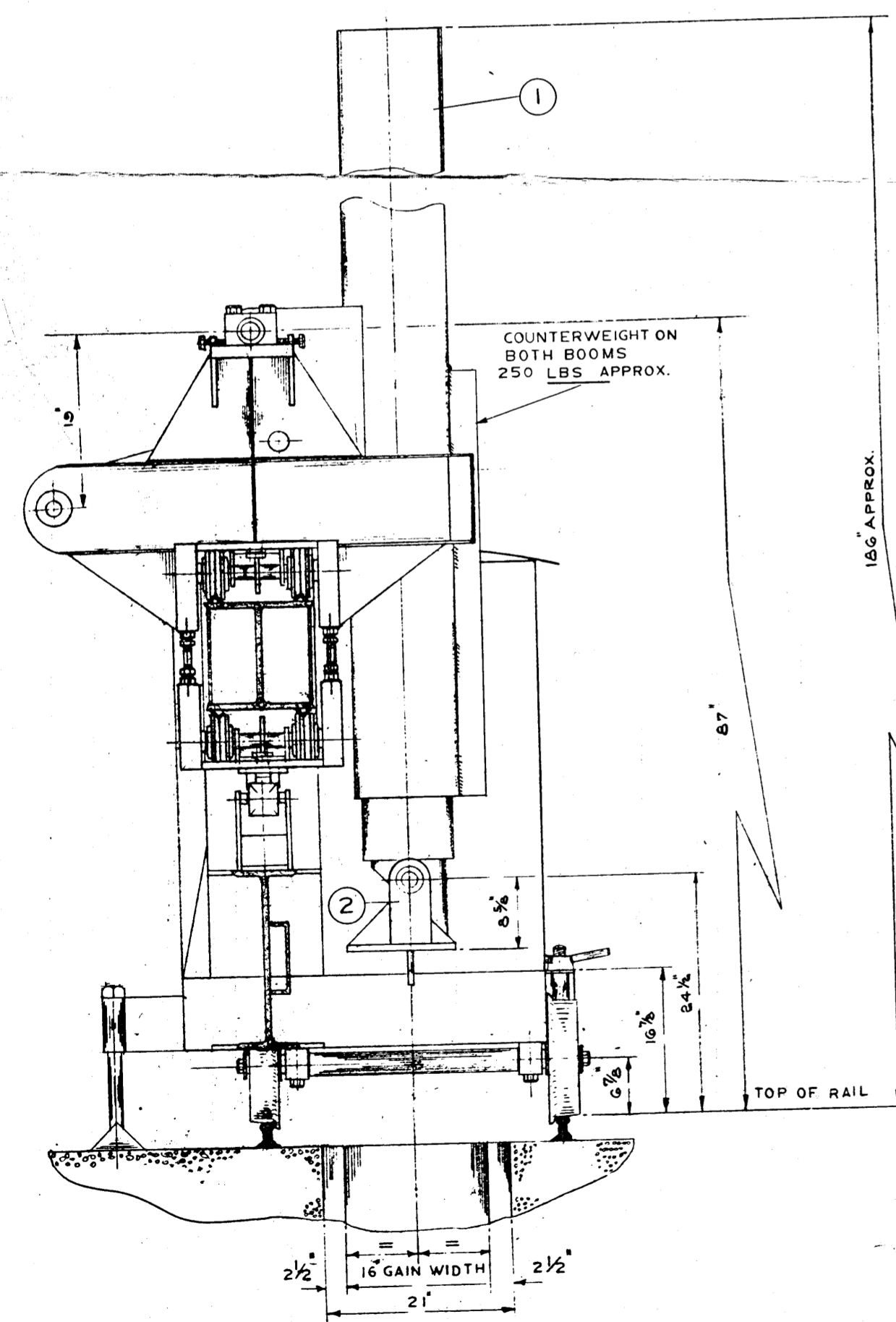
8100-2-0038



NEXT ASSY. 8100-0-0032		TOLERANCE: FRACTION ± 1/64 DECIMAL .XX ± .01 XXX ± .005 ANGLE ± 1/2°		INDICATED SURFACES TO BE $\sqrt{\quad}$ UNLESS OTHERWISE NOTED		 SCOTT MIDLAND CORP. ALDEN, N. Y. 14004 DIVISION OF A.T.O INC.	
SIZE		DRAWN BY F. WUTZ 7-16-76		BREAK EDGES .01 UNLESS OTHERWISE NOTED		HYDRAULIC SCHEMATIC - LOG LIFTER	
MATL.		DESIGN		DO NOT SCALE PRINT		8100-2-0038	
DRAWN BY		CHECK		FINISH		DRAWING NO.	
NO.		PART NAME		DATE		REV.	
QUAN.		DRAWING NO.		SCALE ~		WT.	
						SHEET OF	

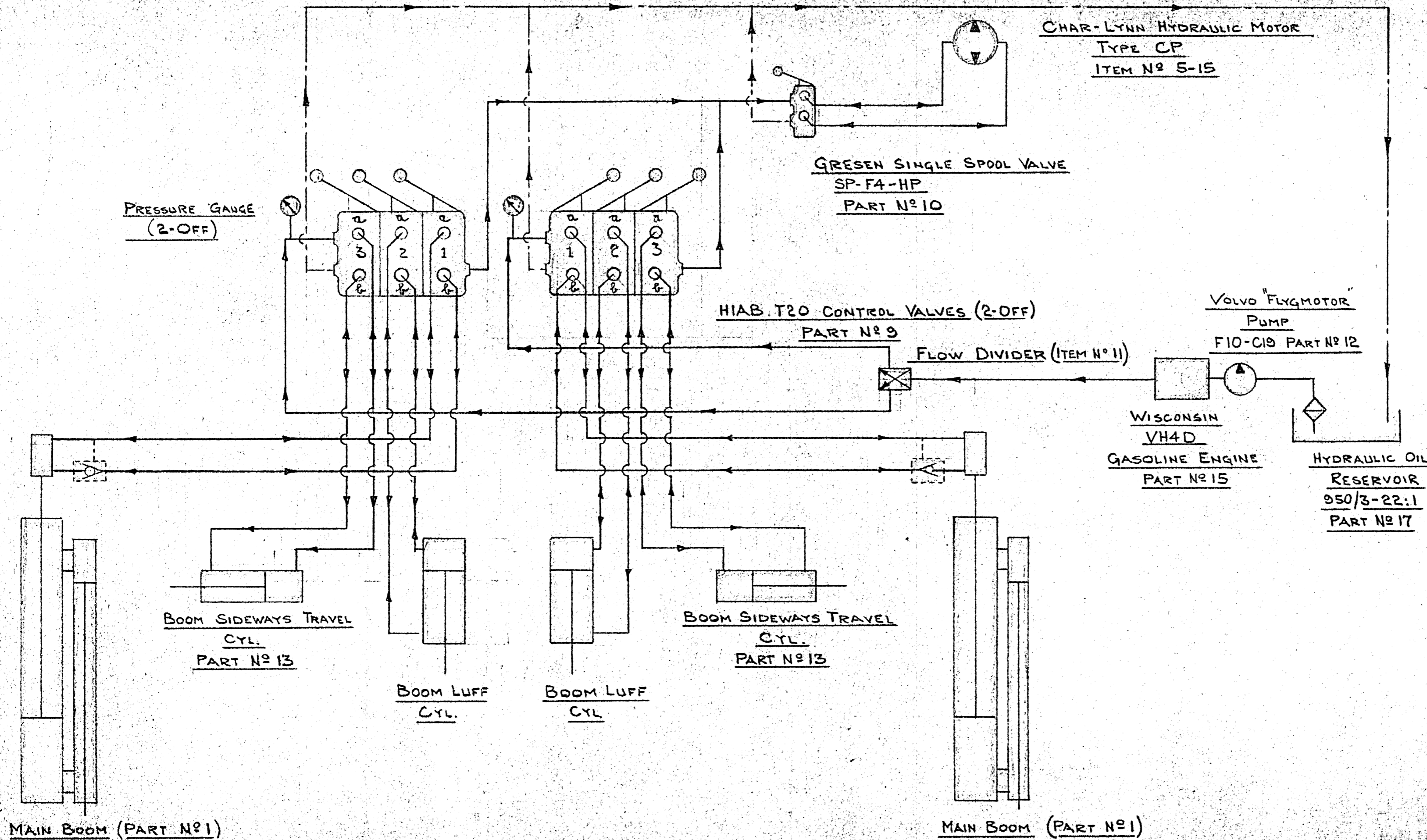


PART NO.	DESCRIPTION	NO. OFF	ITEMS PER PART	SUB ASSY DRG. NO.
1	TELESCOPIC BOOMS	2	8	AD-550
2	HOOK & COMPACTOR UNIT	2	7	AD-558
3	MAIN FRAME	1	1	AM-164
4	BOOM CARRIAGE COMPLETE	2	2	AD-552
5	DRIVE SHAFT & WHEELS	1	19	AB-602
6	IDLER	2	12	AB-601
7	BO LINK SIMPLEX ROLLER CHAIN	1	1	AB-568
8	CONTROL VALVE HOUSING	1	1	AB-568
9	HIAB 3 FUNCTION T20 VALVE	1	17	
10	GREEN SINGLE SPOOL VALVE	1	5	SP-F4-HP
11	BRAND FLOW DIVIDER	1	3	5-S-1/2
12	VOLVO "FLY MOTOR" PUMP	1	8	FIQ-C19
13	BOOM SIDEWAYS TRAVEL CYL	2	2	A-P
14	BOOM LUFF HYD. CYL (HIAB)	2	4	300-5151
15	WISCONSIN V44D ENGINE	1	1	
16	UCC DRIVE COUPLING	1	1	UC-DC-42PBL
17	HYDRAULIC OIL RESERVOIR	1	1	HIAB
18	1 1/2" STEEL TUBE HYD. QUALITY 10 LIT	1	1	
19	" " " " " " " "	2	2	
20	" " " " " " " "	2	2	
21	" " " " " " " "	2	2	
22	1" BORE PIPE	1	20 FT	
23	STAUFF PIPE CLAMPS	1	1	
24	HIGH PRESSURE HYD. HOSE	1	1	
25	SAFETY OUTRIGGER EQUIPT.	2	2	
26	BALLAST HOPPERS	2	2	



TRENT CANAL SYSTEM
CONTROL DAM STOP LOG
LIFTER
UNITS N° 1671/1/2/3

ATLAS POLAR
EJI
AM-175



NOTES:-
 OVERALL RELIEF PRESSURE SETTING AT T20 CONTROL VALVES IS 3000 P.S.I.
 PORT RELIEF SETTINGS:- 1a —
 1b —
 2a —
 2b —
 3a —
 3b —

DEPARTMENT OF INDIAN & NORTHERN AFFAIRS
 TRENT CANAL SYSTEM
 CONTROL DAM STOP LOG LIFTER
 DIAGRAM OF HYDRAULIC CONNECTIONS

ATLAS
POLAR
 COMPANY LIMITED

FEB. '76	EJI
AM-177	

DEPARTMENT OF INDIAN & NORTHERN AFFAIRSPARKS DEPARTMENTTRENT CANEL SYSTEMCONTROL DAM STOP LOG LIFTER (3-OFF)SERIES IISERIAL NO. 1671/1/2/3PARTS LIST

PAGE 1	-----	TELESCOPIC BOOM
" 2	-----	HOOK & COMPACTOR UNIT
" 3	-----	MAIN FRAME (INC. TUBING)
" 4	-----	BOOM CARRIAGE
" 5	-----	DRIVE SHAFT & WHEELS
" 6	-----	IDLER SHAFT & WHEELS
" 7	-----	DRIVE CHAIN
" 8	-----	CONTROL VALVE HOUSING
" 9	-----	CONTROL VALVE (OPERATING)
" 10	-----	CONTROL VALVE (TRAVERSE)
" 11	-----	FLOW DIVIDER
" 12	-----	HYDRAULIC PUMP
" 13	-----	BOOM SIDEWAYS TRAVEL CYL.
" 14	-----	BOOM LUFF CYL.
" 15	-----	POWER UNIT
" 16	-----	HYDRAULIC OIL RESERVOIR
" 17	-----	LOG GRAPPLE

PART
NO. 1

DESCRIPTION

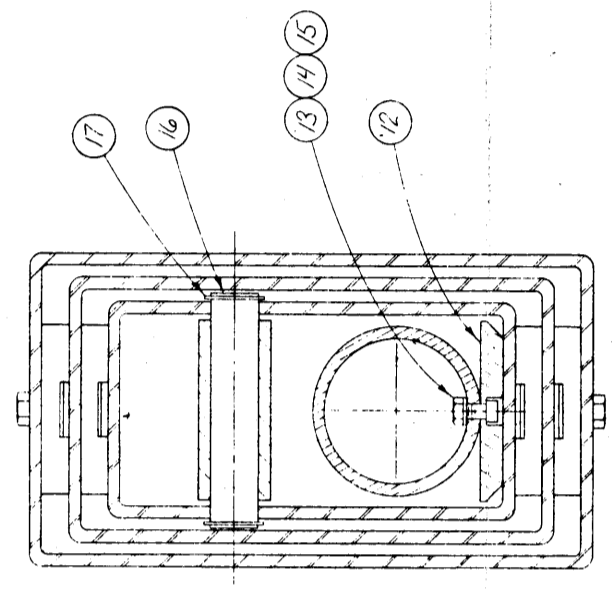
TELESCOPIC BOOM

SUB-ASSY
DRG. No.

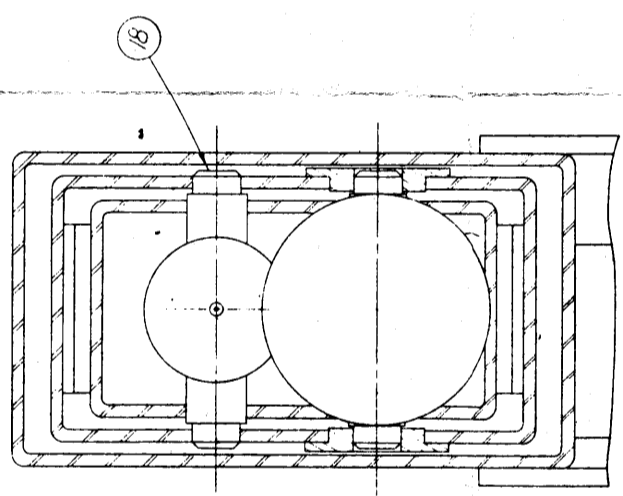
AD-550/B

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
1-1	Boom Swivel Shaft	2		
1-2	Boom Luff Shaft (Front End)	2	AB-609	
1-3	2" Bore Shaft Collar	4	STD.	
1-4	3/8" UNC Socket Head Screw 1 1/2" Long complete with Nuts	4	STD.	
1-5	3/8" UNC Socket Head Screw 2" Long complete with Nuts	4	STD.	
1-6	Mounting Sleeve	2	AA-687	
1-7	Hose 212-8 x 7'6" Long 333-8-8 Fitting Each End	2		
1-8	Hose 212-12-12 7'6" Long 333-12-12 Fitting Each End	2		
1-9	Counterweight 250 lbs approx.			

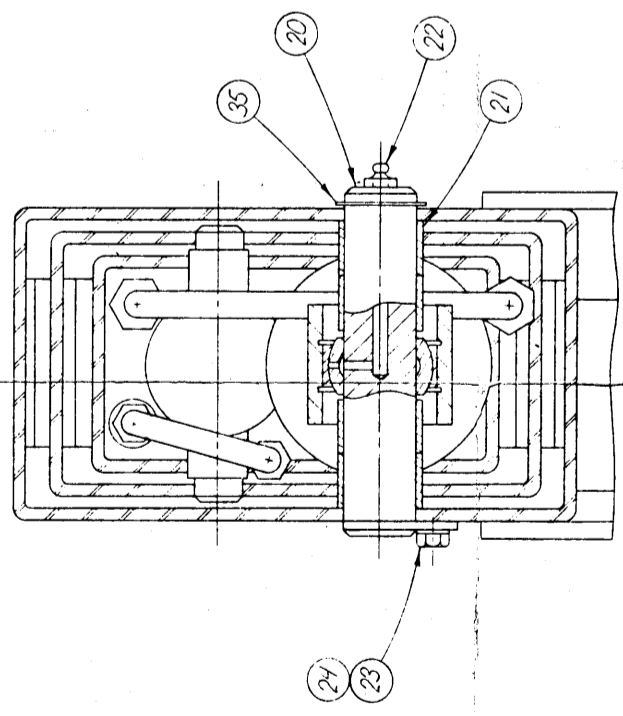
NO	PART NAME	DRAWING NO.
1	BASE SECTION	8100-9-0001
2	MID SECTION	8100-9-0002
3	TIP SECTION	8100-9-0003
4	CYLINDER ASSY	8560-9-0029
5	BEARING BLOCK	8100-7-0017
6	RETAINING STRIP	8100-7-0015
7	BEARING	8100-7-0015
8	SHIM	8100-7-0015
9	COVER	8100-7-0015
10	COVER	8100-7-0015
11	SELF TAP SCR	530-9-0099-07
12	BEARING BLOCK	8560-7-0016
13	SOC. HD. CAP SCR	530-9-0122-05
14	SWIM NUT	530-9-0195
15	SWIM NUT	530-9-0195
16	PIN-CYLINDER	8570-7-0031-08
17	SWAMP RING	850-9-0616-24
18	PIN	8560-7-0033
19	SET SCREW	530-9-0180-03
20	PIN ASSY	8560-7-0157
21	SPACER	8560-7-0082
22	HEX NUT	530-9-0188-01
23	HEX NUT	530-9-0188-01
24	LOCKWASHER	530-9-0182-01
25	HOLDING VALVE	8540-7-0032
26	MALE CONNEX	550-9-0451-09
27	PIPE BUSHING	550-9-0017-09
28	MALE CONNEX	550-9-0631-17
29	TUBE	800-9-0080
30	HEX NUT	530-9-0188-01
31	HEX NUT	530-9-0188-01
32	HEX NUT	530-9-0188-01
33	LOCKWASHER	530-9-0182-01
34	MITC BRACKET	8540-7-0189
35	SWAMP RING	850-9-0611-35
36		
37		
38		
39		
40		



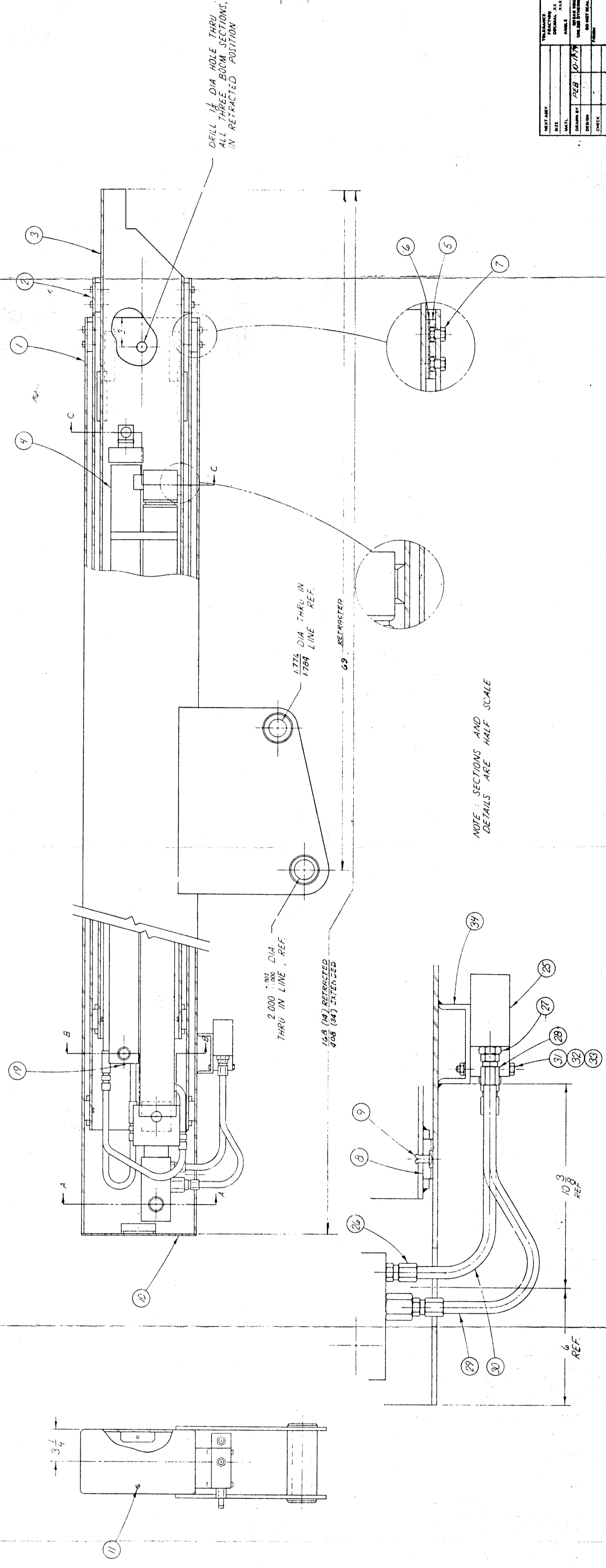
SECTION C-C



SECTION B-B



SECTION A-A



REF. ATLAS POLAR AD-550

DATE	10/15/53	BY	ECW	CHKD	LSB
REV	1	BY	ECW	CHKD	LSB
CHANGE					
PROJECT NUMBER: 8100-9-0001 DRAWING NO.: 8100-9-0001 TITLE: BOOM ASSY - ATLAS POLAR SCALE: 1/2" = 1'-0" SHEET NO.: 11 OF 12					

PART
NO.

2

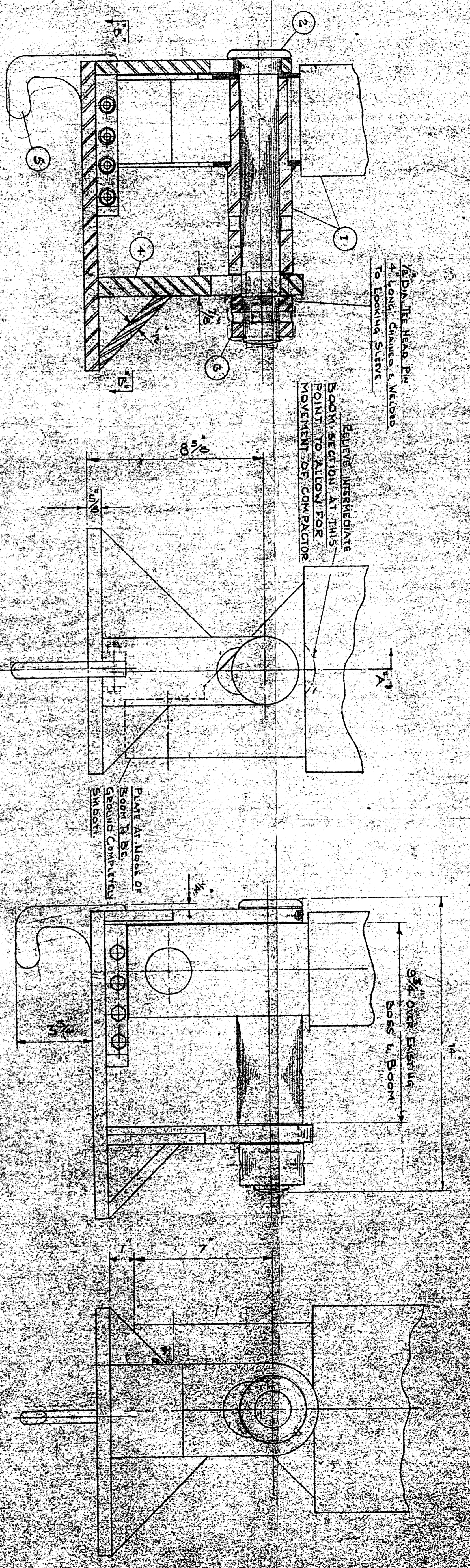
DESCRIPTION

HOOK & COMPACTOR UNIT

SUB-ASSY
DRG. No.

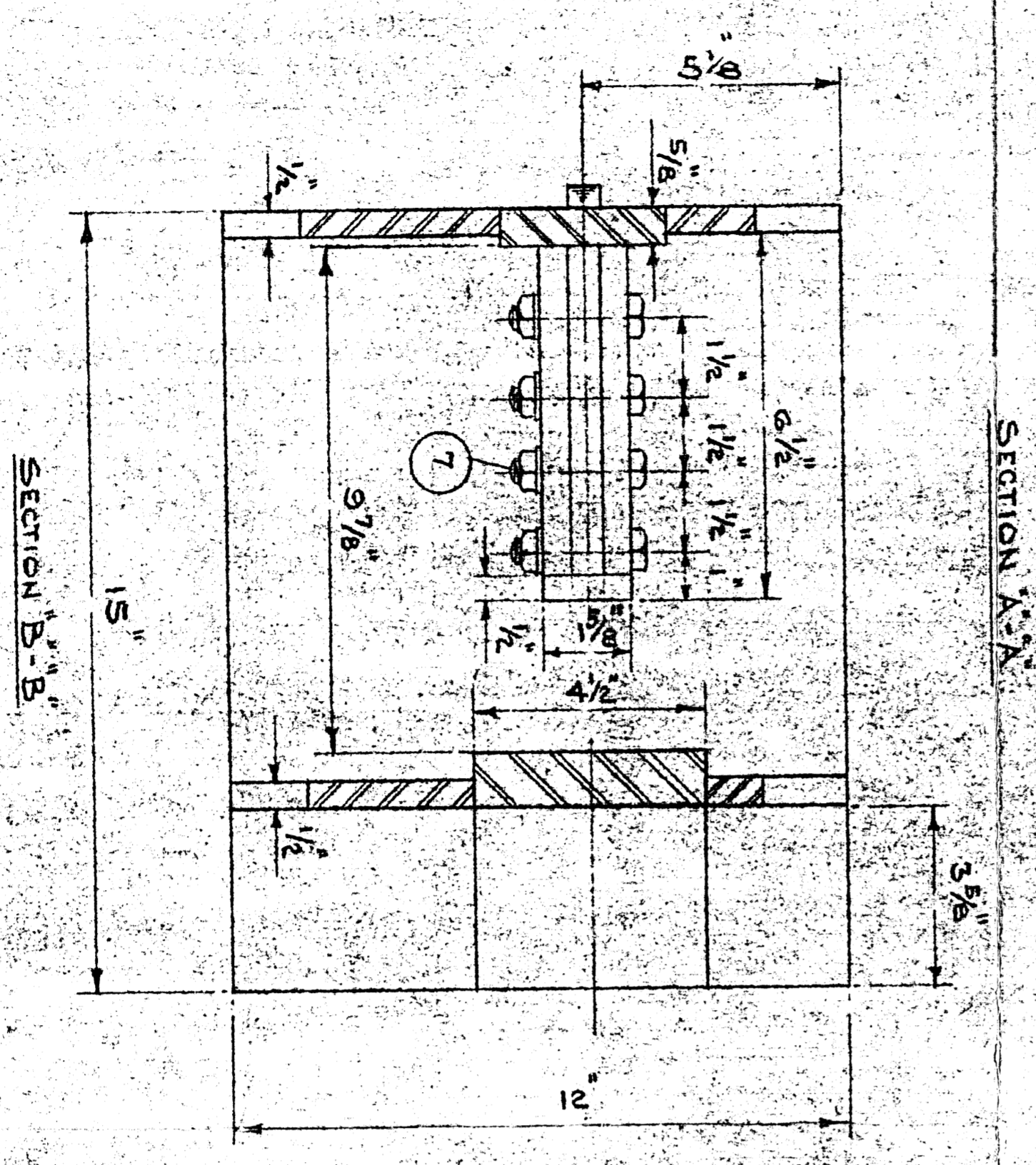
AD-558

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
2-2	Swivel Stud	2	AB-605
2-3	Locking Sleeve	2	AB-605
2-4	Swivel Plate	2	AD-557
2-5	Hook	2	AB-604
2-6	3/8" UNC H.T. Bolts With Nuts	8	



3/8" DIA. TIE HEAD PIV
AT LONG DIMENSION & WELDED
TO LOCKING SLEEVE

RELIEVE INTERMEDIATE
BOOM SECTION AT THIS
POINT TO ALLOW FOR
MOVEMENT OF COMPACTOR



SECTION A-A

SECTION B-B

PARTS LIST

PART NO.	DESCRIPTION	QTY.	UNIT
1	EXISTING BASE & BOOM	1	AS SUPPLIED
2	LOCKING SLEEVE	1	AS SUPPLIED
3	SMOOTH PLATE	1	AS SUPPLIED
4	HOOK	1	AS SUPPLIED
5	3/8 DIA. TIE ROD - GALVANIZED WELDED AT BOTH ENDS	1	AS SUPPLIED
6	1/2 UNC. HT. BEGS. WITH WASHERS AND NUTS	2	AS SUPPLIED

NOTE: TWO QTY. REQUIRED PER UNIT, ONE OFF AS SUPPLIED
ONE OFF TO CORRECT HAND

TRENT CANAL SYSTEM PART 11E2

CONTROL DAM STRIP LOG DIFIER
COMBINED HOOR & COMPACTOR PLATE
GENERAL ARRANGEMENT



ATLAS
POLAR

PART
NO.

3

DESCRIPTION

MAIN FRAME

SUB-ASSY
DRG. No.

AM-164

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
	NOTE: List Includes Hydraulic Tubing as shown on Drg. No. AD-555 For cutting list see Drg.No. AB-582			
3-1	Main Frame Complete	1	AM-164	
J	Boom Extension Tubing (R.& L.Hand)	2	AA-571	249" Hyd. Tube 3/4" %
K	Boom Extension Tubing " "	2	AA-572	143" " " 1/2" "
L	Boom Luffing Tubing " "	2	AA-573	138" " " 1/2" "
M	" " " " "	2	AA-574	134" " " 1/2" "
N	Boom Sideways Travel Tubing(R & L Hand)	2	AA-575	130" " " 1/2" "
O	Boom Sideways Travel Tubing " "	2	AA-576	124" " " 1/2" "
P	Delivery Tubing. Make to Place " "	2	AA-577	26" " " 5/8" "
Q	Boom Extension Tubing " "	2	AA-578	45" " " 3/4" "
R	Boom Extension Tubing " "	2	AA-579	45" " " 1/2" "
S	Boom Luffing Tubing " "	2	AA-580	42" " " 1/2" "
T	Boom Luffing Tubing " "	2	AA-581	40" " " 1/2" "
U	Boom Sideways Travel Tubing " "	2	AA-582	40" " " 1/2" "
V	Boom Sideways Travel Tubing " "	2	AA-583	36" " " 1/2" "
W	Traverse Motor Tubing	1	AA-584	15'0" approx. Make To Place From 1/2" % Hyd. Tube
X	Traverse Motor Tubing	1	AA-585	15'0" approx. Make To Place From 1/2" % Hyd. Tube
	NOTE: Nuts & Sleeves SF1253 & SF 1254 Supplied for each length of pipe			Lengths Shown Are For Single Pipes

PART
NO.

4

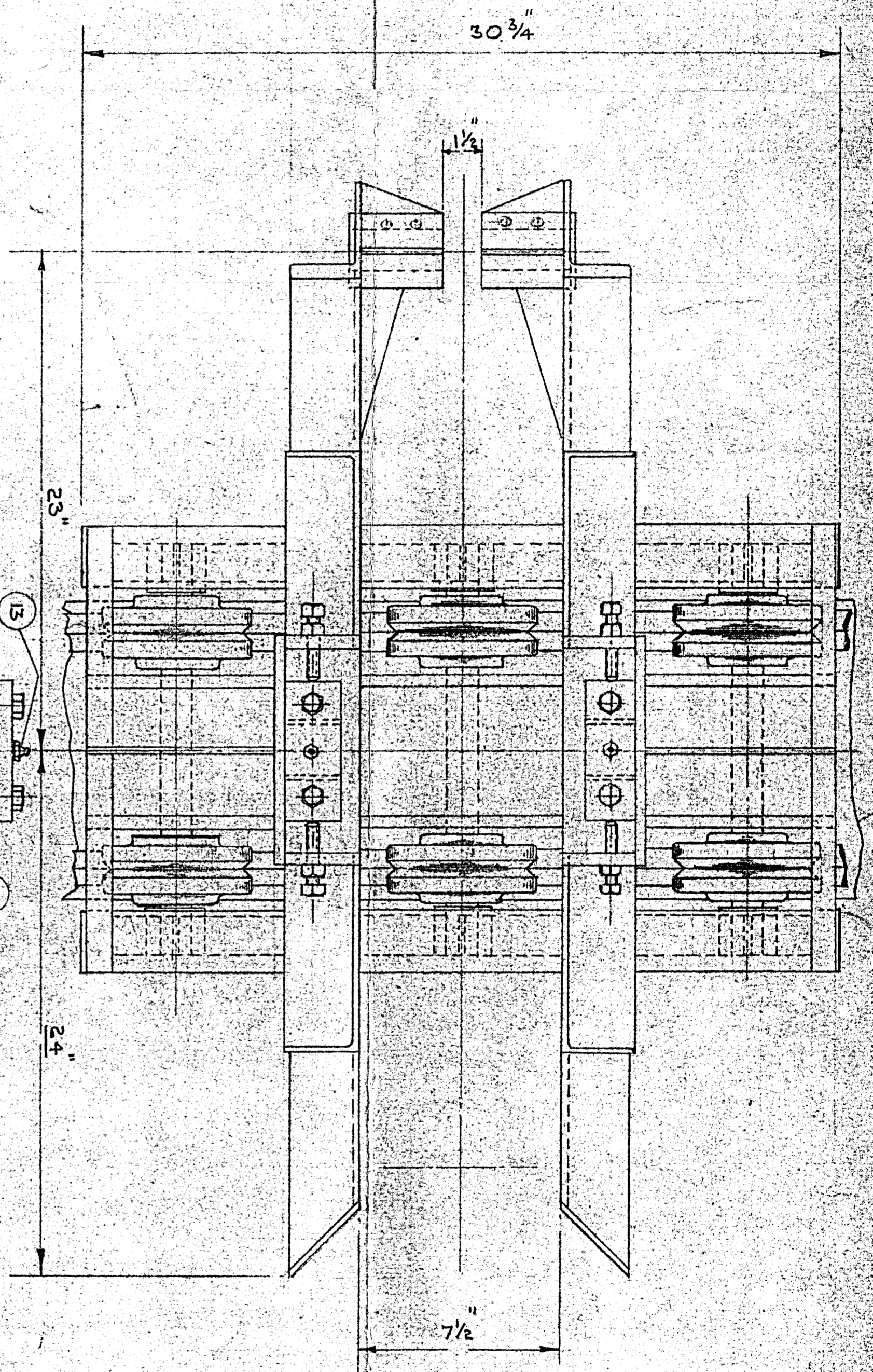
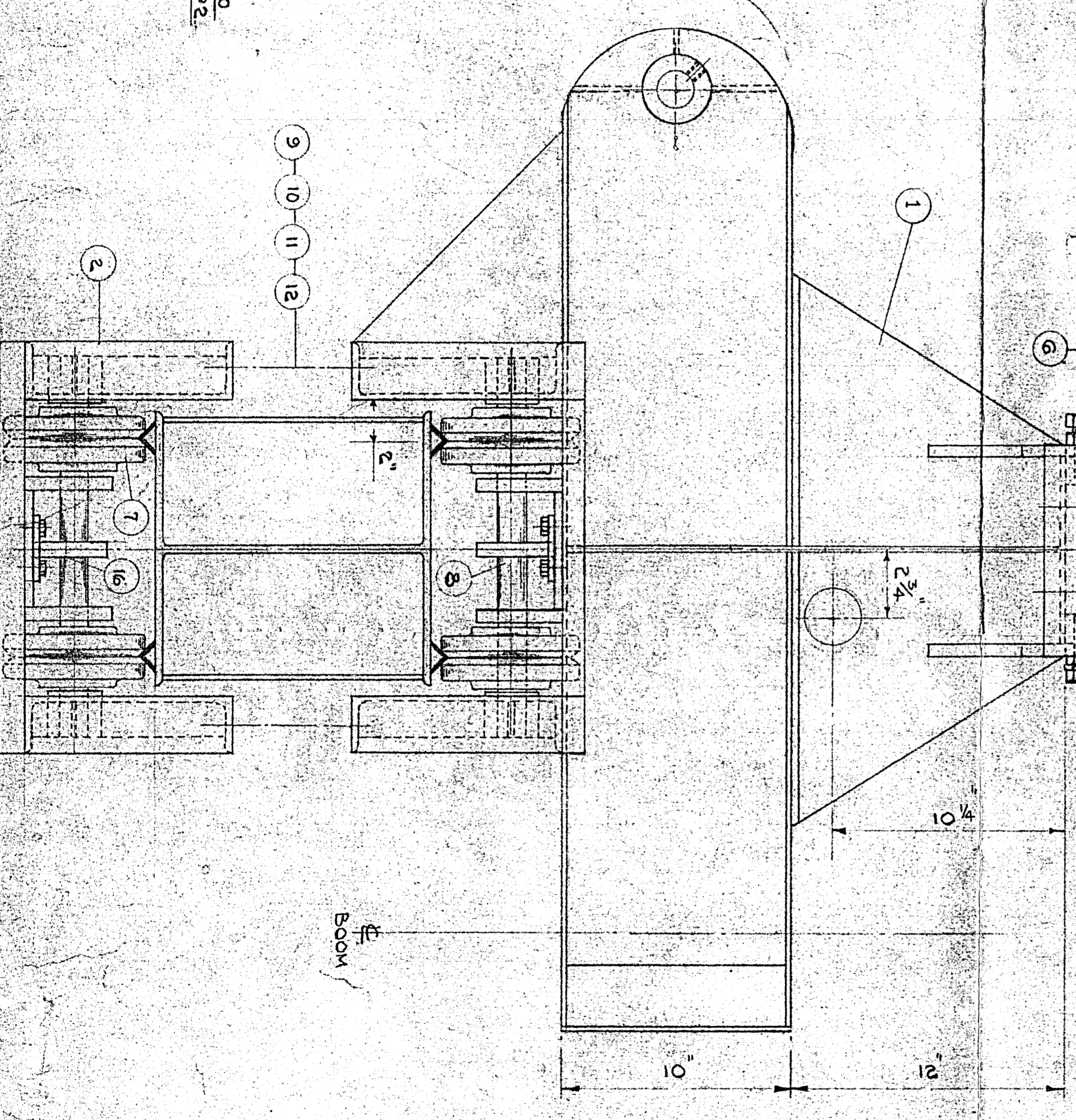
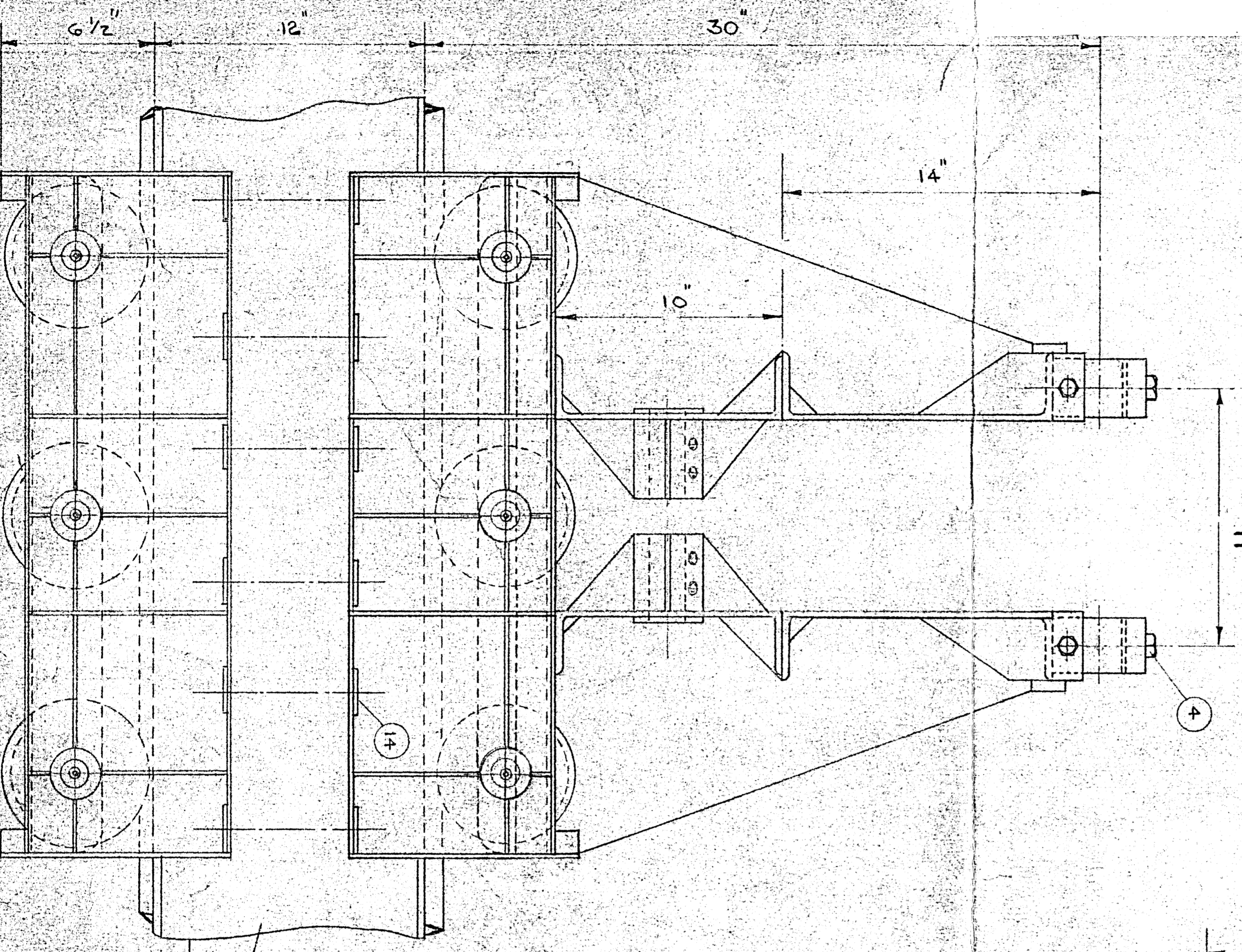
DESCRIPTION

BOOM CARRIAGE (COMPLETE)

SUB-ASSY
DRG. No.

AD-552

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
4-1	Boom Carriage (Top)	2	AD-553
4-2	Boom Carriage (Bottom)	2	AD-554
4-3	Bearings	4	AB-584
4-4	Bolts 3/4" UNC 6" Lg. Grade 9 c/w Nuts & Washers	8	
4-5	Hex. Head Set Bolts 5/8" UNC x 3" Lg.	4	
4-6	Hex. Nuts 5/8" UNC	4	
4-7	Grooved Wheels	24	AB-580
4-8	1 1/4" dia shaft	12	AB-585
4-9	Studs 7/8" UNC x 10"	24	AA-743
4-10	Nuts Hex. 7/8" UNC	96	
4-11	Nuts Jamb 7/8" UNC	96	
4-12	Flat Washers 7/8" Bore	96	
4-13	Straight Grease Nipples 1/8" NPT	28	
4-14	Taper Washers 7/8" Bore	48	
4-15	Thrust Washers 7/8" Bore	48	
4-16	Shaft Locking Bar	4	AB-586
4-17	Rear Pin Hyd Luff Cyl	2	AB-587
4-18	Actuating Bracket	2	AB-588
4-19	Anchor Bkt.	2	AB-589



ITEM No.	QTY	DESCRIPTION	DRG. No.	REMARKS
1	1	TOP HALF BOOM CARRIAGE	AD-553	
2	1	BOTTOM HALF BOOM CARRIAGE	AD-554	
3	2	BEARINGS	AB-584	
4	4	BOLTS H.T. 3/4" UNC X 5 1/2" LG. GR. 9 AD-552		CLW NUTS & WASHERS
5	4	SET SCREWS 5/8" UNC X 3" LG.		
6	4	NUTS 5/8" UNC		
7	12	GROOVED WHEELS	AB-580	
8	6	1/4" DIA. SHAFT	AB-586	
9	12	STUDS 7/8" UNC X 10" LG.	AM-743	
10	48	NUTS STD 7/8" UNC	AD-552	
11	48	NUTS TAMB 7/8" UNC		
12	4B	WASHER 7/8" FLAT		
13	14	STRAIGHT GREASE NIPPLE		
14	24	TAPER WASHER 7/8" BORE		TACK WELD TO PLATE
15	12	THRUST WASHER 1/4" BORE		
16	2	LOCKING BAR FOR SHAFT	AB-586	

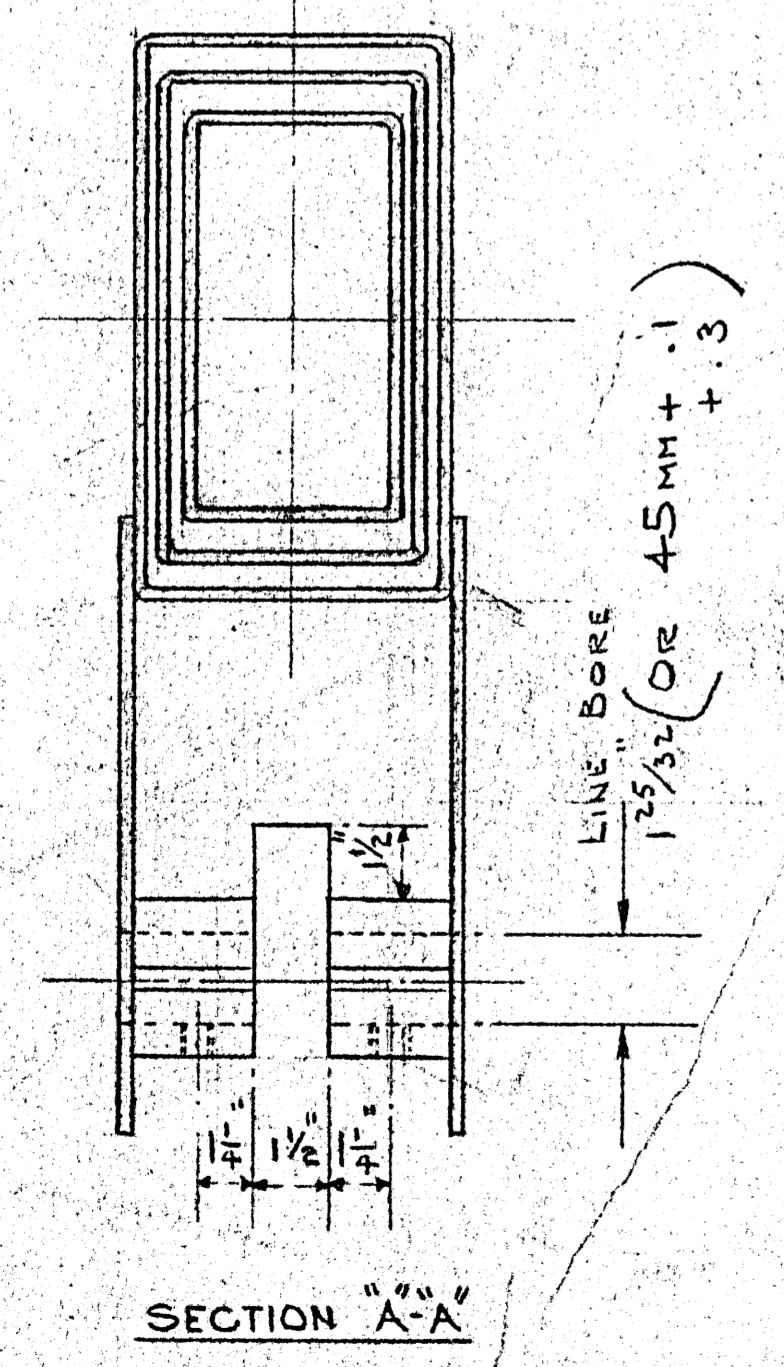
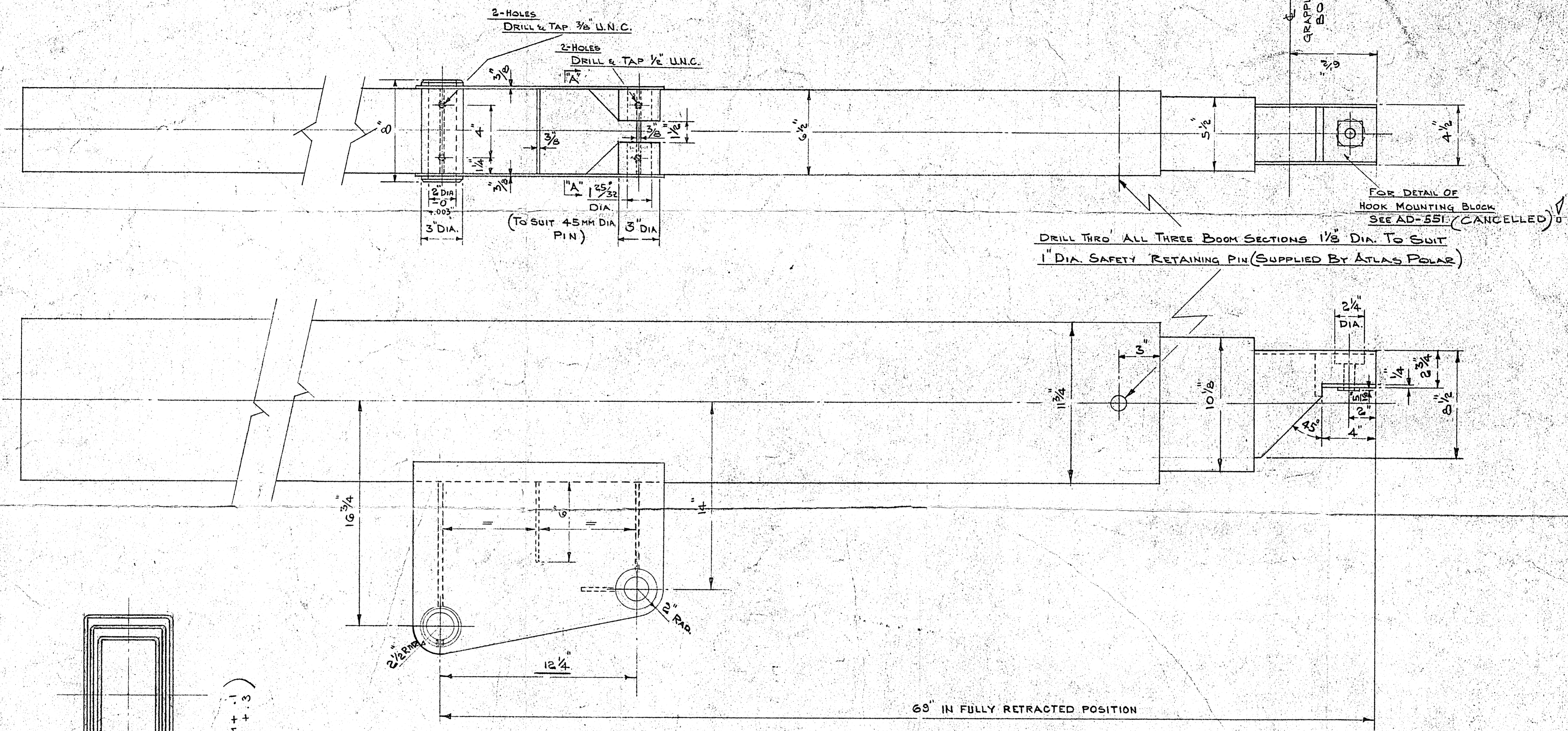
DAM STOP LOG LIFTER (SERIES II)
 BOOM CARRIAGE - 2-OFF PER UNIT
 ARRANGEMENT & PARTS LIST
 PART No. 4

ATLAS
 POLAR
 COMPANY LIMITED

ETI

AD-553

AMENDMENT 'A' - HOLE CENTRES NOW 12 3/4 FROM 14 1/2
 AMENDMENT 'B' - HOLE CENTRES NOW 12 1/4 FROM ABOVE



NOTE: ALL MACHINING DIMENSIONS MUST BE STRICTLY ADHERED TO.

LOG LIFTER (SERIES II)
 MODIFICATION TO SCOTT MIDLAND HYDRAULIC BOOM
 APPROXIMATE WEIGHT :- 1700 LBS.
 TWO OFF REQUIRED PER UNIT.

PART NO:- 1
 ASSEMBLY DRG. NSAM-162

	E.S.I
	AD-550/B

PART
NO. 5

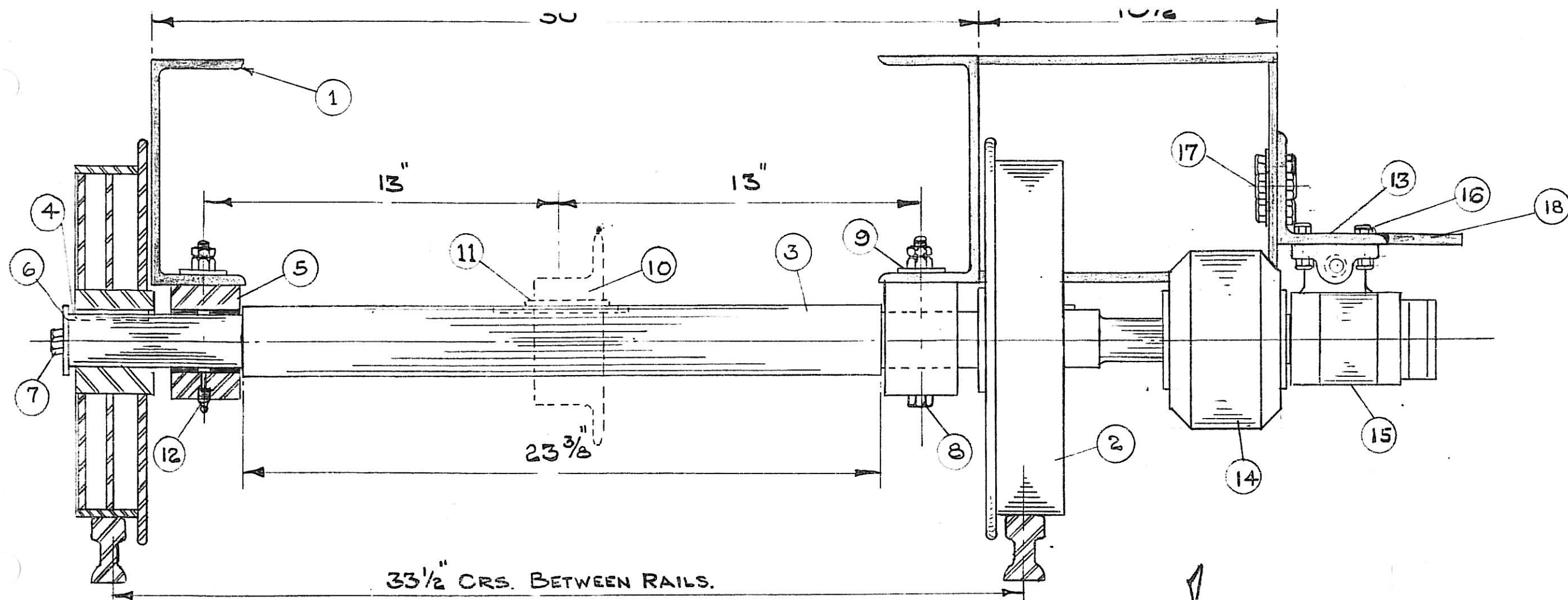
DESCRIPTION

DRIVE SHAFT & WHEELS

SUB-ASSY
DRG. No.

AB-602

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
5-2	Driver Wheel	2	AC-428
5-3	Drive Axle	1	AB-600
5-4	Std. Key 1/2" SQ.	2	
5-5	Bearings	2	AB-584
5-6	Stop Washer	1	AA-748
5-7	Set Screw 1" UNC x 1 1/2" Lg.	1	
5-8	Hex Head 3/4" UNC Grade 9 Bolts x 6" Lg. with nuts & washers	4	
5-9	Cancelled		
5-10	Renold Pinion 19T Simple	1	214 0111
5-11	STD Key 5/8" Sq.		
5-12	Angled Grease Nipple 1/8" NPT	2	
5-13	Mounting Angle for Motor	1	AB-603
5-14	Renold Chain Coupling	1	642 604
5-15	Char-Lynn Hydraulic Motor Type GP	1	
5-16	Bolts Complete With Nuts & Washers 3/8" UNC x 1 1/2" Lg.	4	
5-17	Bolts Complete With Nuts & Washers 1/2" UNC x 2" Lg.	6	
5-18	Guard Plate (Make To Place)	1	
5-19	Stratoflex Connections	2	1012-8-8



NOTE: QUANTITIES SHOWN ARE TOTALS ON THIS VIEW
 WHEELS TO HAVE FREE END FLOAT OVER KEYS.
 ITEM (13) MARK TO PLACE & DRILL ON ASSEMBLY.

PART NO	DESCRIPTION	DRG. NO	NO OFF
1	MAIN MEMBER	AM-160	1
2	TRAVERSE WHEEL DRIVER	AC-426	2
3	DRIVE AXLE	AB-600	1
4	1/2" SQ. STD. KEY	AB-602	2
5	BEARING COMPLETE	AB-584	2
6	STOP WASHER	AA-748	2
7	1" UNC SET SCREWS x 1/2" LG.	AB-602	2
8	GRADE 9 BOLTS 9/16" W NUTS & WASHERS 5/8" UNC x 5 1/2" LG.	AB-602	4
9	TAPER WASHERS 5/8" BORE	AB-602	4
10	RENOLD SIMPLE PINION 19T 2 1/4 O.D.	AB-602	1
11	5/8" SQ. STD KEY	AB-602	1
12	1/8" NPT ANGLED GREASE NIPPLE	AB-602	2
13	MOUNTING ANGLE FOR CHAR-LYNN MOTOR	AB-603	1
14	RENOLD COUPLING 642 604	AB-602	1
15	CHAR-LYNN HYDRAULIC MOTOR TYPE CP/BASE BLOCK	AB-602	1
16	BOLTS 3/8" UNC x 1 1/2" LG. 9/16" W NUTS & WASHERS	AB-602	4
17	BOLTS 1/2" UNC x 2" LG. " " " "	AB-602	6
18	GUARD PLATE FOR MOTOR - FIT TO PLACE	AB-602	

CONTROL DAM STOP LOG LIFTER
 ARRANGEMENT OF DRIVE SHAFT & WHEELS
 ONE OFF PER UNIT
 PART NO 5

ATLAS
POLAR
 COMPANY LIMITED

EJI

1ST AUG '75

AB-602

PART

NO. 6

DESCRIPTION

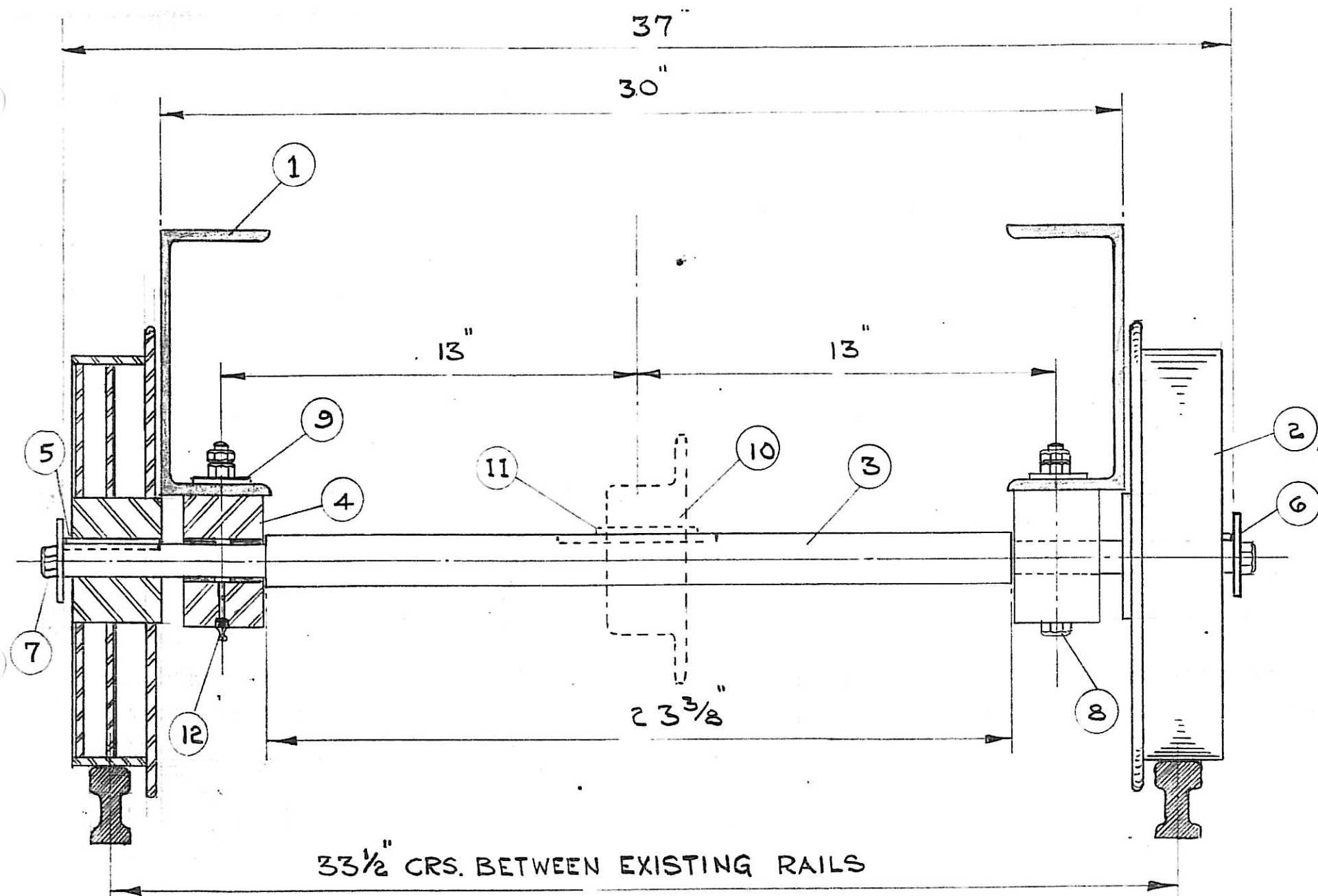
IDLER SHAFTS & WHEELS

SUB-ASSY

DRG. No.

AB-601

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
6-2	Idler Wheel	4	AC-428
6-3	Idler Axle	2	AB-590
6-4	Bearing	4	AB-584
6-5	STD Key 1/2" Sq.	4	
6-6	Stop Washer	4	AA-784
6-7	Hex Head Set Screws 1" UNC x 1 1/2" Lg.	4	
6-8	Hex Head Bolts Grade 9 3/4" UNC c/w Nuts & Washers	8	
6-9	Cancelled		
6-10	Renold Pinion 19T Simple	1	214-0111
6-11	STD Key 5/8" Sq. STD	1	
6-12	Angled Grease Nipple 1/8" NPT	4	



NOTE ✓ WHEELS TO BE HAVE FREE END FLOAT OVER KEYS

PART No	DESCRIPTION	DRG No	No OFF	REMARKS
1	MAIN MEMBER	AM-160	1	
2	TRAVERSE WHEELS (IDLER)	AC-426	4	
3	IDLER AXLE	AB-590	2	
4	BEARINGS COMPLETE	AB-584	10	TOTAL FOR 1 UNIT
5	1/2" SQ. STD. KEY	AB-601	6	" " " "
6	STOP WASHER	AA-748	6	" " " "
7	1" UNC SET SCREWS x 1/2" Lg	AB-601	6	" " " "
8	GRADE 9 BOLTS w/ NUTS & WASHERS 5/8" UNCL x 5/2"		20	" " " "
9	TAPER WASHERS 5/8" BORE		20	" " " "
10	RENOLD SIMPLE PINION 1ST 214 011		2	" " " "
11	5/8" STD. SQ. KEY		2	" " " "
12	1/8" NPT ANGLED GREASE NIPPLE		6	

CONTROL DAM STOP LOG LIFTER (SERIES II)
 ARRANGEMENT OF IDLER SHAFT & WHEELS
 TWO OFF PER UNIT
 PART NO 6

ATLAS
POLAR
 COMPANY LIMITED

EJI
 17TH JULY '75
 AB-601

PART
NO. 7

DESCRIPTION

DRIVE CHAIN

SUB-ASSY
DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
7-1	80 Pitches 1" Simple Renold Chain	1	110 088
7-2	1" Pitch Renold Connecting Link	1	No. 26
7-3	1" Pitch Cranked Double Link	1	No. 30

PART
NO.

8

DESCRIPTION

CONTROL VALVE HOUSING

SUB-ASSY
DRG. No.

AB-568

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
	AS ABOVE			

PART
NO. 9

DESCRIPTION

CONTROL VALVE

SUB-ASSY
DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
9-1	HIAB T20 Control Valve 3-spool Main Relief Valve 21 Atmos (3000 lbs/sq in. approx) Serial Connector 390-0398 Complete with Operating Handles See Manual Inserts M-1 to M-5 Inclusive	2		See Insertions 550/3 - 11:1 1560 - 6:2
9-2	Instruction Plate	1		
9-3	Hose 212-8 x 21 1/2" Lg Fittings	2	(333-8-8 (30007-8-8)	Side Travel
9-4	Hose 212 - 8 x 26" Lg. Fittings	2	(333-8-8 (30008-8-8)	Side Travel
9-5	Hose 212 - 8 x 21" Lg.	2	(333-8-8 (30007-8-8)	Boom Luff Cyl.
9-6	Hose 212 - 8 x 24 1/2" Lg Fittings	2	(333-8-8 (30008-8-8)	Boom Luff Cyl.
9-7	Hose 212 - 8 x 22" Lg. Fittings	2	(333-8-8 (30007-8-8)	Boom Extn
9-8	Hose 212 - 8 x 22" Lg. Fittings	2	(30008-10-8 (320-10-8)	Boom Extn
9-9	Hose 212 - 8 x 23" Lg.	2	(320-10-10 (30007-10-8)	Inlet
9-10	Male Connector Pipe To JIC	2	1012-12-10	Inlet
9-11	Male Elbow Pipe to JIC	2	1025-12-10	Serial Connection
9-12	Male Connector Pipe to JIC	2	1012-12-12	Return to Tank
9-13	Male JIC Swivel Elbow	2	1005-12-12	" "
9-14	Male Connector Pipe to JIC	10	1012-12-8	Functions
9-15	" " " " "	2	1012-12-10	"
9-16	" " " " "	2	1012-8-10	Boom Extension
9-17	Female Connector	2	1015-8-12	" "

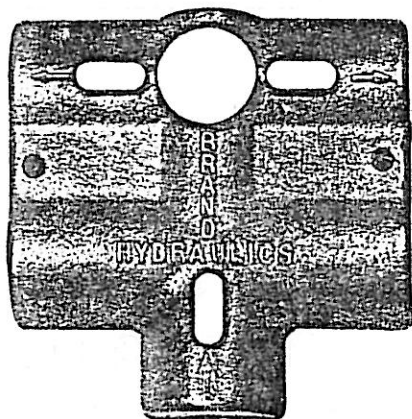
= BRAND HYDRAULICS, INC. =

2332 SOUTH 25TH STREET
OMAHA, NEBRASKA 68105
PHONE (402) 344-4434

B50—B100—FP—

The =Brand= Flow Equalizer receives a single stream of fluid and divides it into two equal streams even though the work being done by one of the streams is much greater than the work being done by the other. If the input flow increases the ratio out the outlets remains constant. In the B-Series Equalizers the orifices are fixed and are not adjustable. In the FP-Series the orifices are externally adjustable. Most applications use equalizers that divide evenly. The B-Series can be made to divide a stream into two streams of unequal size up to 85:15 ratio. By using the FP-Series with one adjustable orifice it is possible to control the flow out one outlet up to 60% of input. By using adjustable orifices on both sides it is possible to control the flow out either outlet up to 95% of the input and also vary the pressure drop through the valve to suit circuit requirements. The valves are compensated for both outlets hence each line can be used.

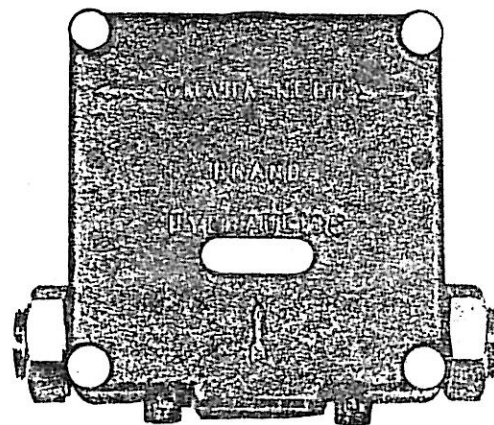
Maximum recommended pressure is 3000 Psi. For satisfactory operation we recommend 40 micron filtration or better. Accuracy normally is better than $\pm 5\%$.



B-Series

Recommended Flow Rate

Ports	GPM
3/8" NPT	2-8
1/2" NPT	8-16
3/4" NPT	16-30
1" NPT	30-50
1 1/4" NPT	50-80
1 1/2" NPT	80-120



FP-Series

B50—Non-Adjustable Divider—Flow from inlet to outlet only, 3/8 - 1 1/2 NPT available.

B100—Non-Adjustable Divider, free reverse flow for both outlets, 3/8 - 1 1/2 NPT available.

B100AB—Non-Adjustable Divider, free reverse flow for both outlets, automatic adjustable bypass for each outlet. If one cylinder ends up slightly behind, the bypass to that cylinder will automatically open and allow it to finish its stroke and thus prevent any accumulation of errors. 3/8 - 1 1/2 NPT available.

FP51—Adjustable Divider, one adjustable orifice, one fixed orifice, flow from inlet to outlet only, 3/8 - 1 1/2 NPT available.

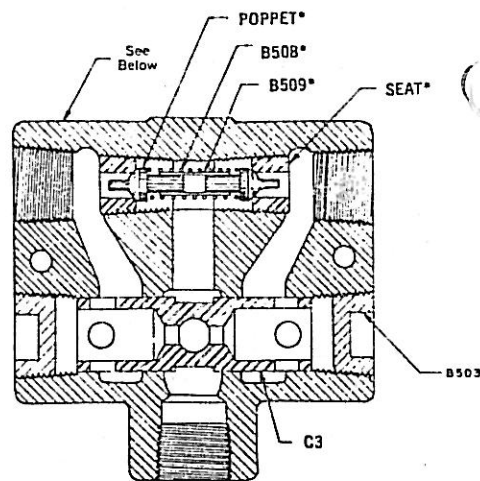
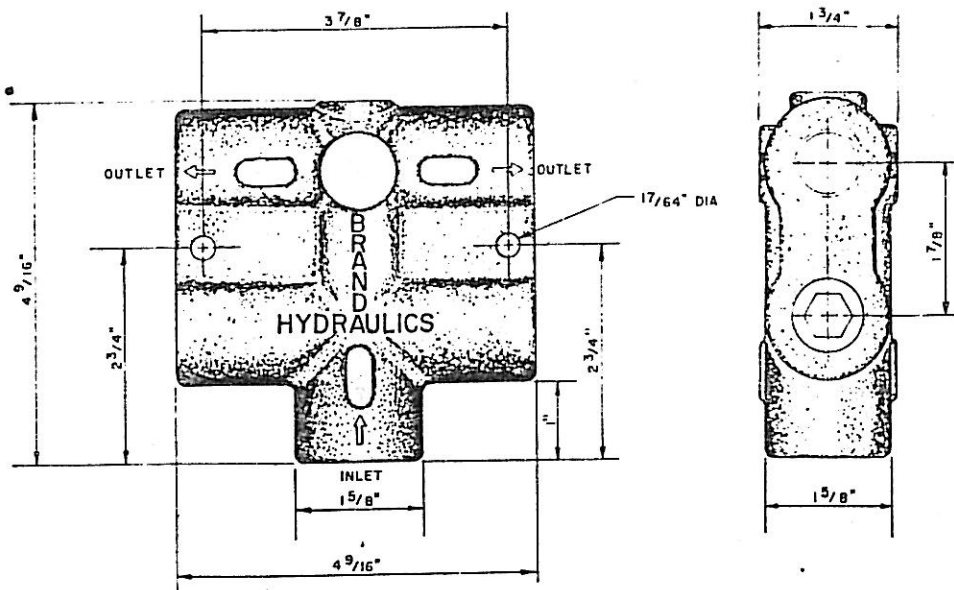
FP52—Adjustable Divider, both orifices adjustable, flow from inlet to outlet only, 3/8 - 1 1/2 available.

FP53—Adjustable Divider, one adjustable orifice, one fixed orifice, flow from inlet to outlet only, adjustable relief on adjustable flow side, 3/8 - 3/4 NPT available.

FP55—Adjustable Divider, one adjustable orifice, one fixed orifice, free reverse flow for both outlets, 3/8 - 3/4 NPT available.

FP56—Adjustable Divider, both orifices adjustable, free reverse flow for both outlets, 3/8 - 3/4 NPT available.

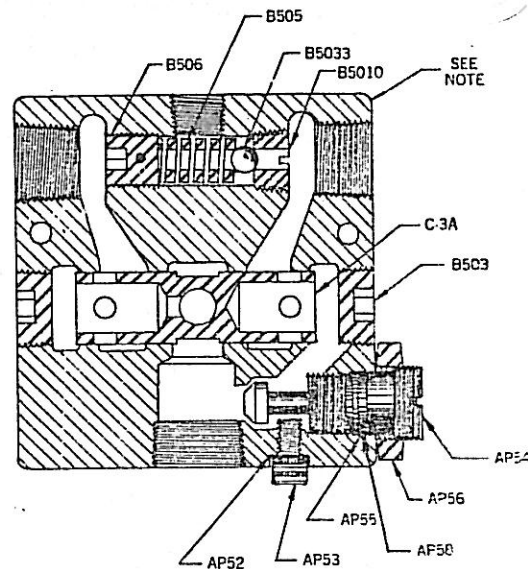
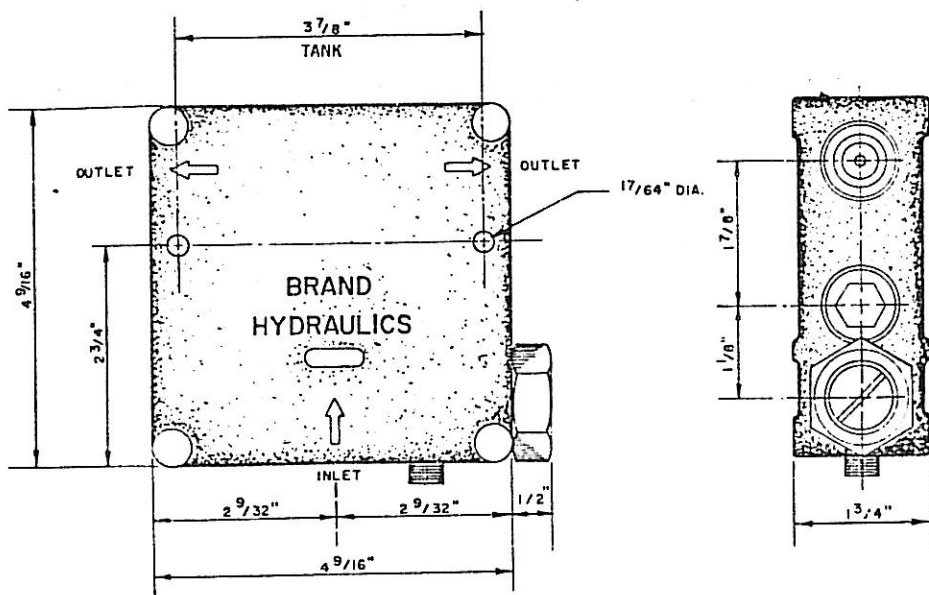
B50—B100



*For B50 Omit Check Assembly

Port	Poppet	Seat
3/8	B507	B5010
1/2	B5013	B5011
3/4	B5014	B5012

FP-



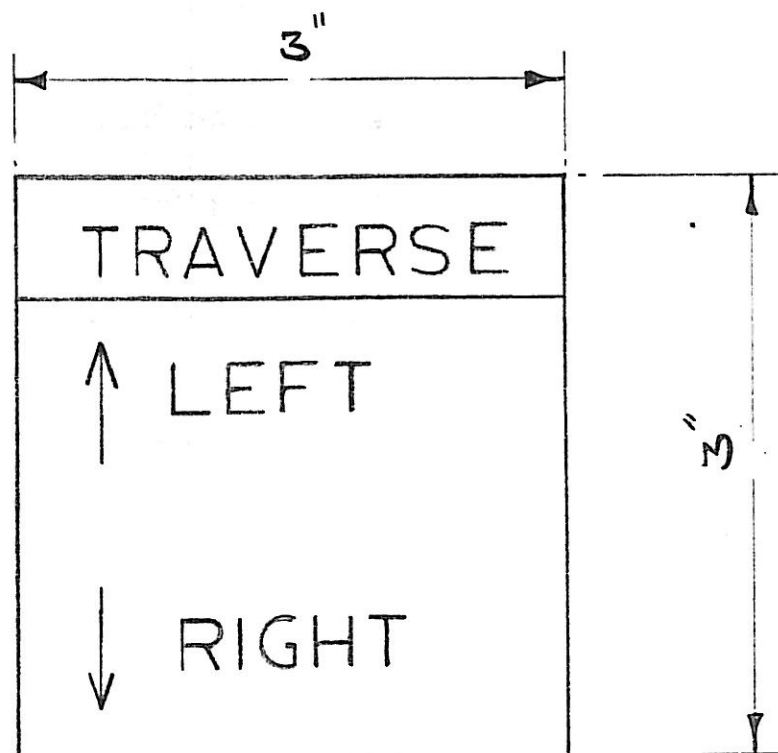
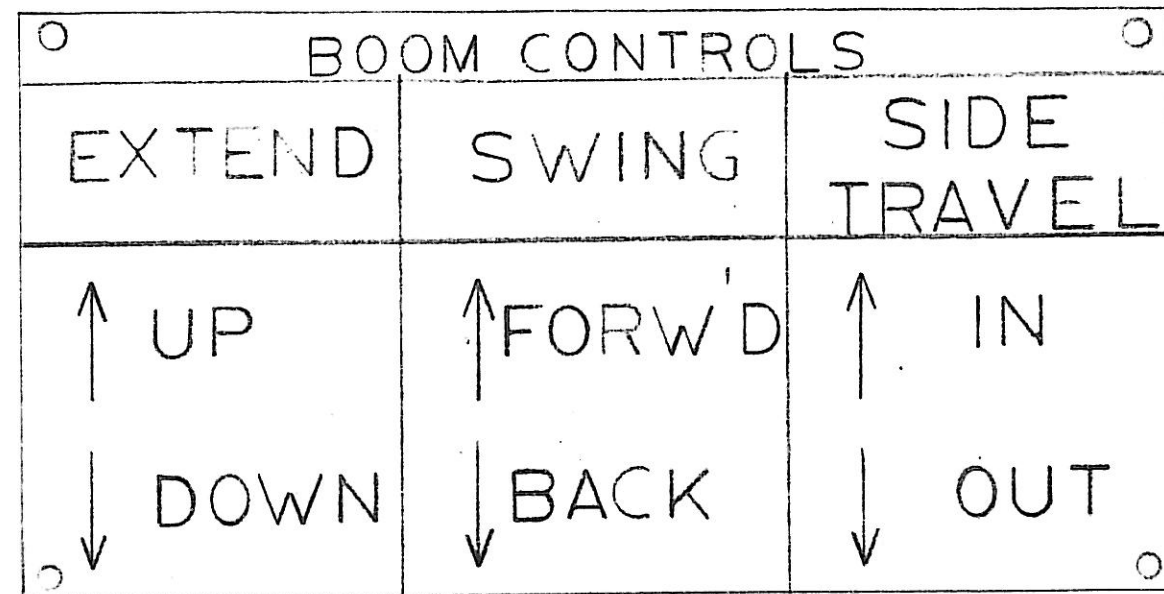
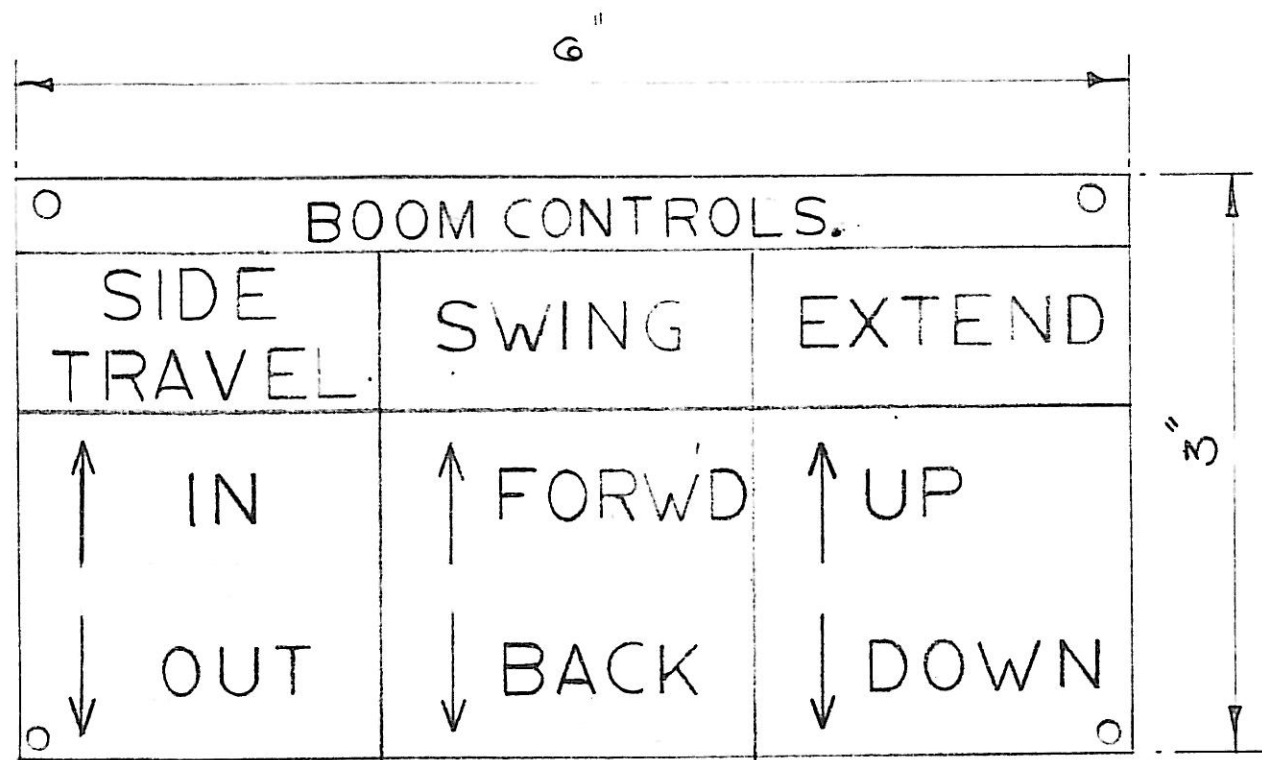
*For valves with check assembly use above part drawing.

3/8-3/4
B50—B100—FP

- | | |
|------------------------------|--|
| AP52 Alum Washer | B509 Check Spacer |
| AP53 Cap Screw | B5010 Check Seat 3/8" Valve |
| AP54 Adjusting Screw | B5011 Check Seat 1/2" Valve |
| AP55 "O" Ring—113 | B5012 Check Seat 3/4" Valve |
| AP56 Jam Nut 7/8-14 | B5013 Check Poppet 1/2" Valve |
| AP58 Seal | B5014 Check Poppet 3/4" Valve |
| B503 Pipe Plug 3/4" NPT | B5033 Ball 3/8" |
| B505 Relief Spring | C-3 Metering Spool 2 Orifices State Flow |
| B506 Adjusting Screw | C-3A Metering Spool 1 Orifice State Flow |
| B507 Check Poppet 3/8" Valve | C-3B Metering Spool No Orifices State Flow |
| B508 Check Spring | |

C3 Spool used in B-50, B100 and B100AB only.
C3A Spool used in FP-51, FP53 and FP55 only.
C3B Spool used in FP-52 and FP-56 only.

Note: Casting Not Sold Without Spool.
Replace with New Valve.



CONTROL DAM STOP LOG LIFTER (SERIES II).
 INSTRUCTION PLATES.
 LAMACOID WHITE LETTERS ON BLACK GROUND
 ONE OFF EACH PLATE PER UNIT

ATLAS
POLAR
 COMPANY LIMITED

EJI

8TH Oct. '75

AB-610

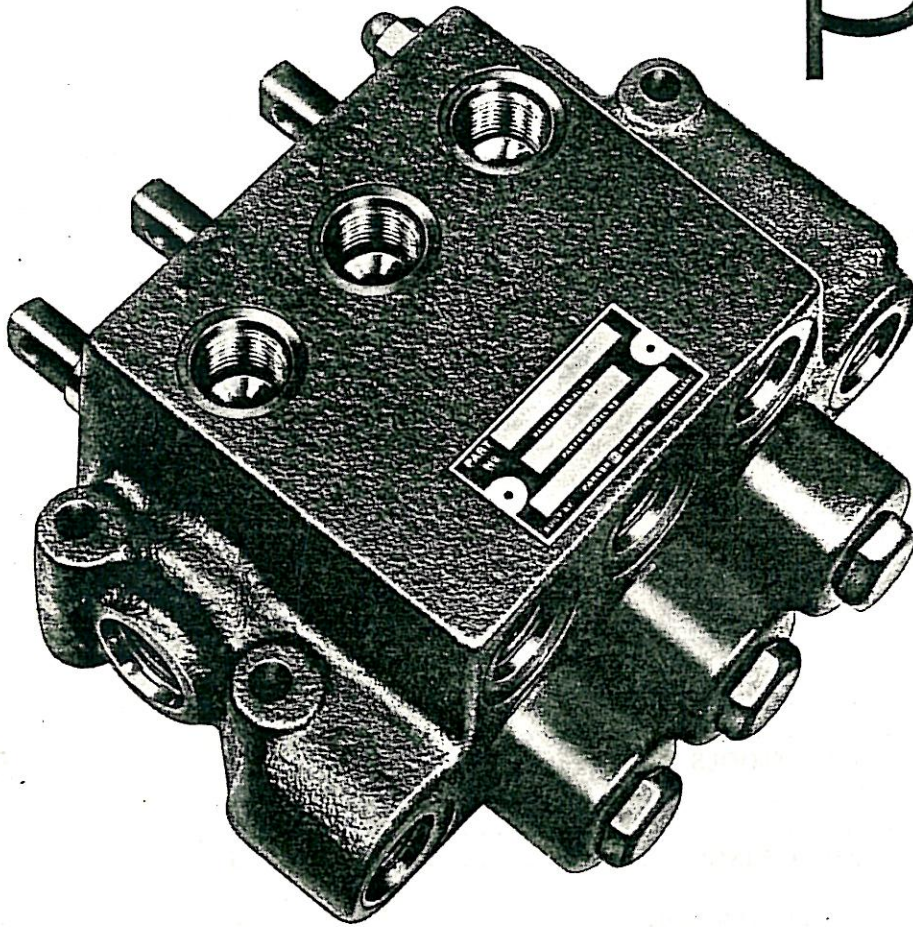
Mike Munro. Sales Rep. & Engineer.

Phone 416-491-5446 Lucas Kiehlwite - John Conroy

BULLETIN 1553-B17

416-945-2274 Lyn Allen - Joe Harris

Parker



*Frankford Dam #3
Lakefield Dam #2
Fanelon Falls Dam #37*

MAINTENANCE INSTRUCTIONS

VDSP20

Series Parallel Circuit Hydraulic Control Valves

Special model - not standard

MOBILE HYDRAULICS DIVISION

PARKER  HANNIFIN

17325 Euclid Avenue, Cleveland, Ohio 44112

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DESCRIPTION

This Parker Control Valve consists of a one piece body, 1 to 4 operating spools, two check valves for each spool, an adjustable relief valve, and the necessary seals and plugs.

The body is constructed of a one piece casting, cored to contain passages for a series parallel circuit. Body ports are tapped with S.A.E. straight thread o-ring connections for leakproof connections and to prevent possible distortion of the body when tightening fittings.

The spools are plated for corrosion resistance and contain notches to obtain metering control of the load. Spools are balanced, radially and axially.

Check valves, provided in each spool, prevent back flow from cylinder ports to inlet port.

An adjustable relief valve is incorporated in the valve to prevent excessive oil pressure in the hydraulic system.

OPERATION

(See Figure 1)

A source of oil is supplied to the "Inlet Port". With the spools in the neutral position, the flow of oil is through the bypass or open center side of the circuit to the "Outlet Port". When a spool is operated to a power position, the open center side of the circuit is closed and the oil flows through the spool check valve to the cylinder port. At the same time the other cylinder port is opened to the "Outlet Port".

The check valve functions as a load check to prevent the flow of oil back from the cylinder port as a spool is moved into a power position.

When the inlet oil pressure is in excess of the relief valve setting, with the open center side of the circuit shut off, the relief valve plunger is forced off the seat, bypassing the oil to the "Outlet Port". When the inlet oil pressure drops to less than the relief valve setting, the spring forces the plunger back against the seat.

GENERAL

VALVE BODY. All component parts of the valve are available for service replacement except the valve body. If the valve body contains damaged threads, cracks, or deep score marks in the spool bore, the valve is not reparable and should be replaced. Control valves with minor damage to the body may be reparable; factory inspection will determine if repairs are feasible.

VALVE SPOOLS. Valve spools may be replaced if there is no damage to the valve body. When replacement spools are ordered from the factory, the same Color Code, Type Code, Valve Model Number and serial number should be included with the order. Spring centered spools are shipped from the factory with the springs assembled.

SPOOL CODE CHART

CODE	SPOOL TYPE
D	Double Acting Spool
P	Single Acting - Pull to Power
C	Double Acting - Cylinders open to tank in neutral

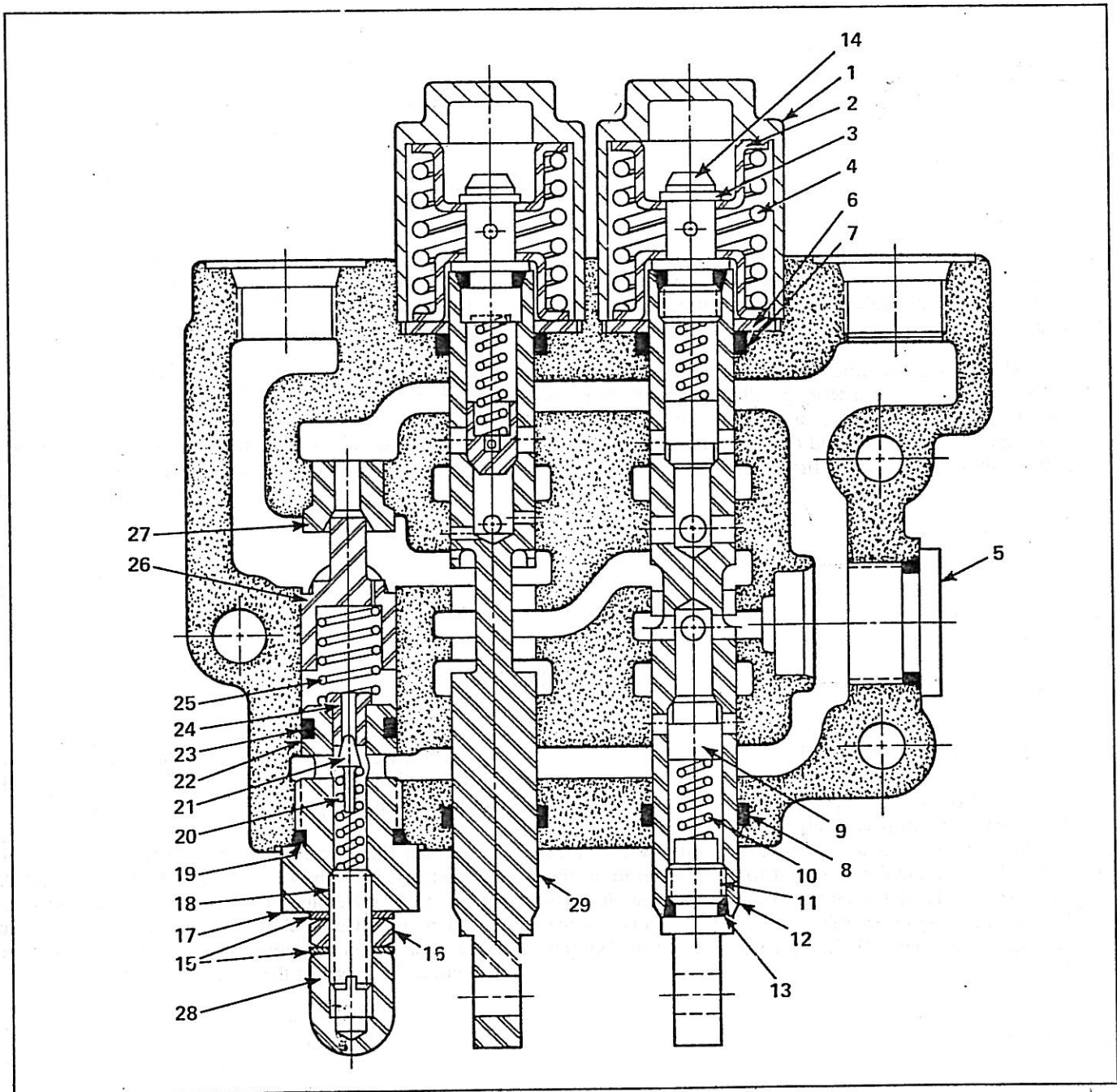


Figure 1. Typical VDSP20 Control Valve

NOTE

Replacement valve spools are identified by the use of type and color code markings. The color code indicates the spool size. See Figure 2 for location of markings indicating color code.

Limits of spool travel are charted to aid in determining if the spool is traveling its required distance to a power or float position.

SPOOL TRAVEL CHART

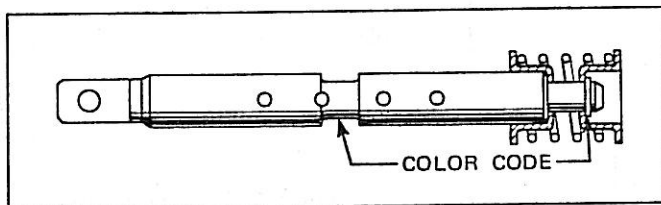


Figure 2. Spool Type and Color Code Location

Neutral to Power	
D, P Spool	C Spool
5/16 in.	5/16 in.

DISASSEMBLY

1. GENERAL.

Disassembly instructions are given for the relief valve, check valves and the various styles of spools which may be used with this series. Disassembly instructions are supported by illustrations complete with descriptive nomenclature.

To disassemble control valve for a thorough cleaning and inspection, or repair purposes, the valve should be removed from the equipment, and the operation performed on a bench. Thoroughly clean the exterior of the valve before beginning disassembly procedures.

Make certain that spools and check valve poppets are clearly tagged so that when used in reassembly, they can be returned to their respective bores. Switching of the parts may cause improper seating and spools to stick or excessive leakage due to increased side clearance.

2. TOOLS.

(a.) No special tools are required for disassembling or assembling the control valve, although those described below may be of help.

(b.) For compressing the spring on spring-centered spools, two (2) retainer plates with bolts and nuts, as shown on Figure 3, may be used. To operate spring compressor; place one retainer plate over the eye end of the spool and against the bottom spring spacer and the other retainer plate against the top spring spacer. Line up holes and install bolts and nuts. Tighten nuts evenly to compress spring sufficiently to allow removal of snap ring. Caution should be exercised as spring is compressed. Unscrew bolts slowly until all spring pressure has been released.

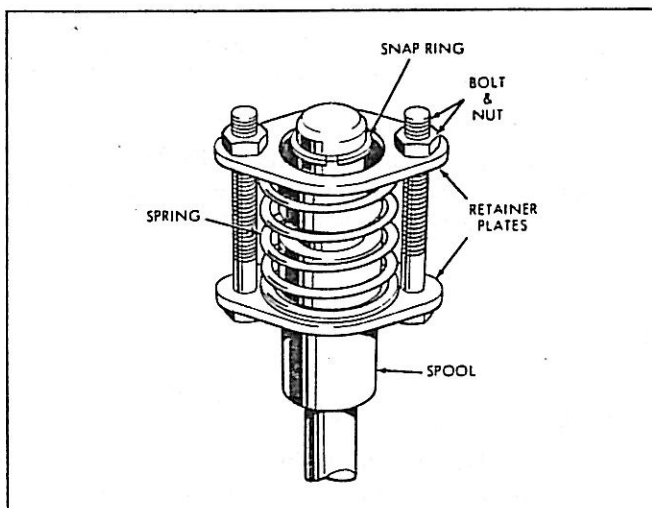


Figure 3. Compressing Spring for Snap Ring Removal

(c.) A sleeve type tool, see Figure 4, can be made for ease in snap ring installation on spring-centered type spools. Select a piece of round bar stock approximately 5 inches in length and slightly larger in diameter than the snap ring

being installed. Drill a hole in the stock slightly larger than the stud end of the spool. Remove any sharp edges. To use sleeve type tool when ready to install snap ring, compress spring (see Figure 3), then position snap ring on stud end of spool. Position tool against snap ring and tap rather sharply, with a rawhide mallet, until snap ring is seated in groove.

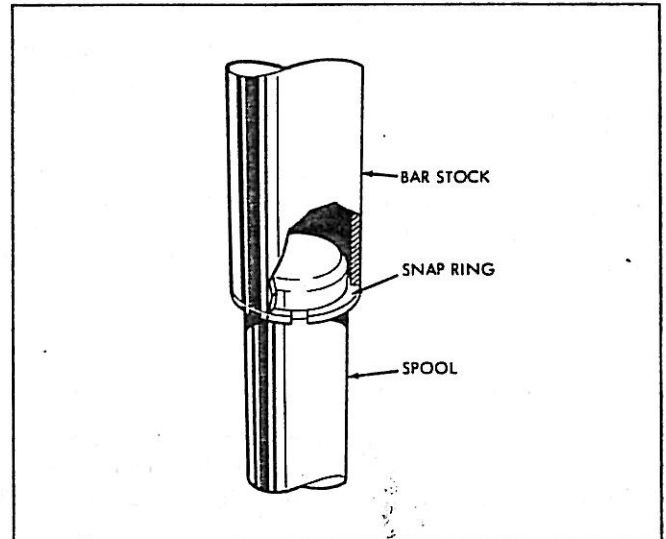


Figure 4. Snap Ring Installing Tool

3. REMOVE AND DISASSEMBLE SPOOLS. On Spring-Centered "D", "P" and "C" Type (see Figure 1), unscrew and remove spool cap. Then grasp spring end of spool and withdraw from valve body. Clamp spool in a soft-jawed vise, compress spring (see Paragraph 2b and Figure 3), then remove snap ring, outer spring spacer, spring and inner spring spacer from spool.

4. REMOVE CHECK VALVES. (See Figure 1.) Clamp spool in a soft-jawed vise. Insert a pin thru the hole in spool end (14) and unscrew, then remove spring and check poppet. Reverse the spool in the vise and unscrew eye (11) and remove spring and poppet.

"P" spools have a check at the spring end only.

5. REMOVE RELIEF VALVE. (See Figure 1.) Unscrew cap (17). Remove spring (25) and poppet (26). Do not remove seat (27). Disassemble parts in cap (17) but do not remove seat (24). Remove o-rings from cap.

6. REMOVE BODY PLUGS AND O-RINGS. After spools, relief valve and check valves have been removed, remove all plugs and o-rings from valve body.

CLEANING, INSPECTION, REPAIR, AND REPLACEMENT

Wash all parts thoroughly in kerosene or similar solvent. Inspect the valve body bores and spools for grooves, deep scratches or excessive wear. See that spools fit their respective body bores with a slight hand pressure and without perceptible side clearance. Valve spools may be replaced if there is no damage to the valve body. Replacement spools may be ordered from the factory if the proper Color Code, Type Code, Valve Model Number and Serial Number are included with the order. If the spools are loose, scored or damaged or the valve body has damaged threads, cracks, or scored bores, the control valve should be replaced with a new unit, or if the body damage is minor, it may be returned for factory inspection and repair.

Inspect the check valve poppet and its seating face in the spool for grooves or defects which may cause leakage. Check the poppet for free movement in the bore. If the poppet appears to be faulty replace with a new one. Small

nicks and grooves can be removed from the poppet seating face in the spool, by lapping poppet in seat using a fine grain grinding compound. Wash seat sufficiently to remove all traces of grinding compound.

Inspect relief valve plunger (26) for wear on seating end. Inspect pilot plunger (21) for wear on cone diameter. If either shows wear remove its seat and inspect for ridges, scoring or excessive wear. Replace parts if worn or damaged.

Discard all o-rings, gaskets and wipers and replace with new parts when reassembling the control valve.

NOTE

After parts have been inspected and valve is not to be re-assembled immediately, coat reusable parts with hydraulic oil.

ASSEMBLY

1. GENERAL

Prior to reassembly of the valve, make certain that bench, tools, and all valve parts are thoroughly clean and free from dust and foreign matter. If necessary thoroughly rewash the parts.

Coat all valve component parts and body bores with good grade of hydraulic oil.

2. ASSEMBLE AND INSTALL SPOOLS AND CHECKS

(See Figure 1) To assemble spring centered spool, clamp the spool in a soft-jawed vise, eye end up. Be sure to get correct end as the spool is not symmetrical. Drop in the check poppet; if new parts are not used be sure that poppets are installed in their respective bores. Place spring into poppet. Install new o-ring on spool eye and screw into spool and tighten using loctite thread lock and 30 to 40 inch pounds of torque. Allow loctite to cure before applying hydraulic pressure.

Reverse the spool in the vise and assemble check in this end in the same way. Then place spring spacers and spring on spool. Compress the spring and install new snap ring per paragraphs 2b and 2c and Figure 3 and 4 under Tools.

Place o-ring retainer and new o-ring on spool assembly. Place new o-ring (8) in valve body. Install spool into body being careful not to cut the o-ring. With the spool fully inserted in the valve body bore, install the spool cap.

3. INSTALL RELIEF VALVE

(See Figure 1) Install relief seat in the bottom of the bore. Install poppet assembly with small end towards the seat. Install large spring in inner diameter of the plunger. Assemble parts on cap (17). If new seat (24) is required press into cap till head is flush with small end of cap. Install screw (18) finger tight against its spring. Screw cap into body and tighten.

NOTE

Do not attempt to adjust relief valve to its proper setting at this point. See instructions on Relief Valve Adjustment.

4. INSTALL BODY PLUGS AND O-RINGS. With spools, check valves and relief valve installed in the body, place new o-rings on all body plugs and install in valve body.

TESTING

After overhaul, the control valve should be tested.

If a test stand is not available, the valve should be installed on the equipment for test.

RELIEF VALVE ADJUSTMENT.

1. Provide a means for connecting a .3000 PSI gage at the inlet side of the valve. A tee at the inlet port may be used.

2. Remove acorn nut from relief valve. Loosen

jam nut and hold while backing off adjusting screw until no tension is felt on relief valve.

3. With pump running at maximum speed, operate one spool to a power position. Turn adjusting screw clockwise until correct pressure setting is obtained. Correct pressure setting should be obtained from the Equipment Manufacturers' Service Manual.

4. After correct pressure setting has been obtained, hold screw and tighten jam nut. Install and tighten acorn nut.

External Leakage Test.

If the repaired valve has two or more spools, operate the spool farthest from the relief valve to a power position and hold against the relief valve. Check all external port connections and seals for possible leakage.

Spool Operation.

Operate each spool on the valve to its power position. Spools equipped with spring return should move from the power position to neutral without any hesitancy.

Check Valve Leakage Test.

Operate each spool in its power position under load, until about half the stroke of the cylinder is reached. Return the spool to neutral position and again apply load to cylinder. There should be no cylinder drop when the load is again applied. With the cylinder port still under load, stop pump flow to the control valve by either turning off the test stand pump motor or the vehicle engine, and carefully move the valve spool from the neutral to the power position. In the power position the load should remain stationary. If the load does not remain stationary, the check valve should be repaired per instructions.

SPECIAL FEATURES

1. **EXTERNAL HIGH PRESSURE CARRY-OVER.** (See Figure 5) This valve is available with a special high-pressure carry-over port which provides an outlet for full flow pressure to an additional valve connected in series.

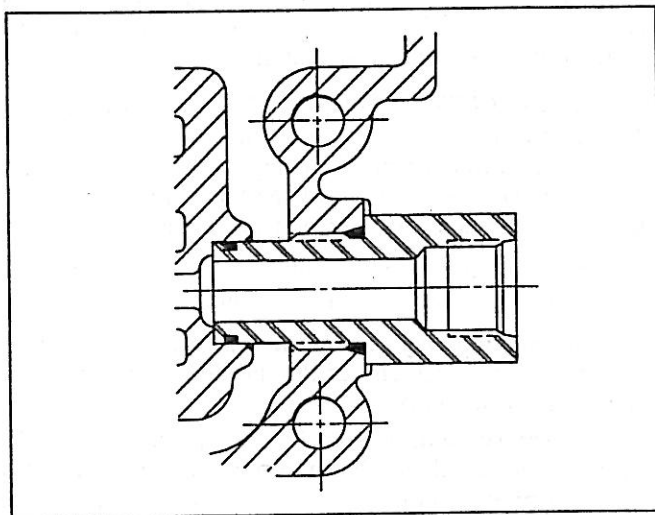


Figure 5. High-Pressure Carry-Over Ports

NOTE

Outlet ports of all valves must be connected to tank.

2. **CLOSED CENTER.** (See Figure 5) This control valve is available with closed center circuit which eliminates the bypass side of the circuit. The construction is similar to the High Pressure carry-over. On this model a solid adapter plug is used in place of the high-pressure side carry-over.

3. **TAMPER PROOF RELIEF VALVE.** (See Figure 6) A special tamper proof relief valve cover is available for installation on this control valve series. To prevent personnel from tampering with a "factory relief valve psi setting" a special cover has been designed to eliminate undetectable tampering.

To install the tamper proof cover over a standard relief valve proceed as follows: Unscrew and remove the acorn nut covering the adjusting screw. Install the tamper proof cover over the relief valve. Install the special nut

through the cover opening and thread onto the adjusting screw and against the stat-o-seal loosely. Adjust the relief valve setting as recommended, then tighten special nut with hexagon key. Install the welch plug in the end of the cover. Tap plug with 5/16 inch diameter flat nosed punch and hammer sufficiently to flatten out plug. The cover spins freely and cannot be removed unless plug and special nut are removed. Unauthorized personnel tampering with the relief valve setting must remove the plug to reach the adjusting screw. With the plug missing or badly mutilated there is evidence that the valve has been tampered with and corrective measures should be taken to recheck the valve setting and install a new plug. Refer to parts lists for part numbers.

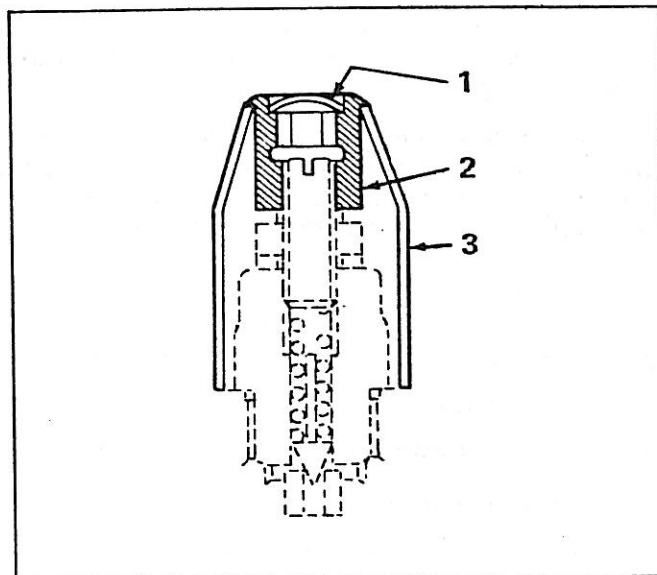


Figure 6. Tamper Proof Relief Valve

4. **ELECTRIC SWITCH.** (See Figure 7) A special electric switch is available for installation on the control valve. The switch is a single pole, double throw, double break type. The switch plunger contacts the end of the valve spool and electrical contact is made by pushing or pulling the spool to a power position. Refer to parts list for part numbers.

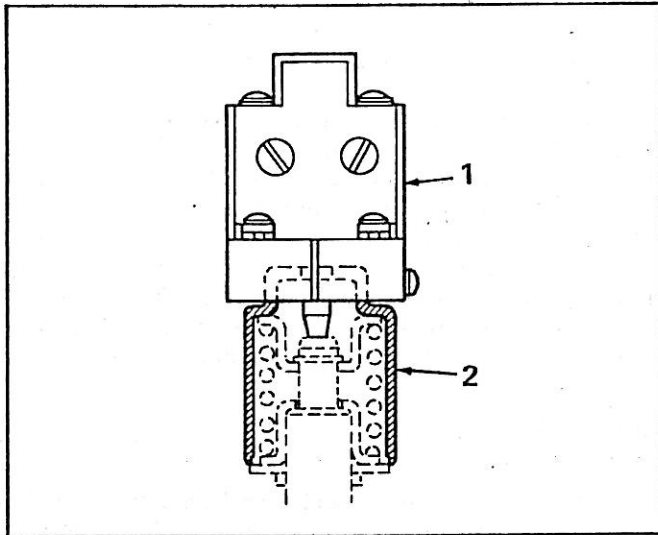


Figure 7. Electric Switch Installation

INSTALL AND ADJUST SWITCH. To install the electric switch, on a standard control valve, proceed as follows: Unscrew and remove the standard spring centered spool cap and replace with special switch cap.

Loosen switch clamping screw and place switch over machined end of special switch cap, then observing switch contact plunger through clear plastic cover, position switch until moving contact is mid-way between stationary contacts. Tighten clamping screws securely to insure holding at this adjustment.

Test switch action by operating spool in each direction and visually observing plunger contacting the stationary contacts. Readjust if necessary.

If switch is suspected of being faulty, a continuity check can be made between terminals 1 and 3, and 2 and 4. Connect a test lamp, in series, to each set of terminals. Lamp should light when moving switch plunger 0.040 -

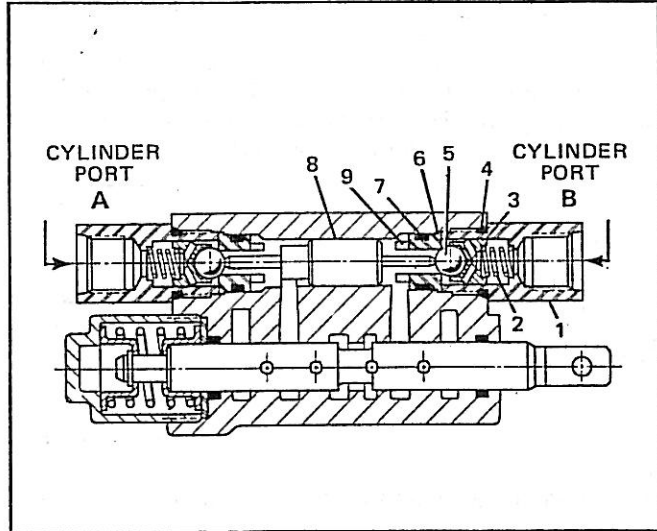


Figure 8. Pilot Operated Check Valve

0.050 inch in either direction from the mid position. Maximum plunger travel into switch is 0.500 inch. Replace switch if there is evidence of malfunction.

5. PILOT OPERATED CHECK VALVE. (See Figure 8) To remove unscrew caps at both ends of body. Take out springs, balls, and ball guides. Using a 1/4 wood dowel push shuttle (8) and seats (6) out of the body. Identify parts so they are returned to the same spot when reused.

Inspect parts for wear and replace all bad parts. Discard all o-rings and replace with new ones.

When rebuilding be sure the shuttle is in the body as shown with the small end of the shuttle towards the spring end of the main spools.

A special control spool is used with this lock check. There are no checks in the spool and flats are provided to bleed off pressure in neutral so shuttle will not function in neutral.

TROUBLE SHOOTING

TROUBLES	PROBABLE CAUSE	REMEDY
Oil leaks at either end of spool.	Defective o-rings in valve body.	Replace o-rings.
Unable to push spool in.	Oil leakage past spool seal into spool cap.	Remove cap, if it contains oil, replace spool seal o-rings. Check o-ring retainer to see if it is flat. If it has been "belled" check for restriction from outlet to tank of valve which would cause excessive back pressure.

TROUBLES	PROBABLE CAUSE	REMEDY
Spring-centered spools do not return to neutral.	Broken springs. Bent spool.	Replace springs. Return for FACTORY repair, or replace with new spool of same size and type.
	Excessive back pressure.	Relieve condition. May be either restriction from outlet to tank or if another valve is operated in series from the outlet of the valve. Either change system to work separately or use high-pressure carry-over.
	Foreign particles. Misalignment of operating linkage.	Clean system and valve. Check linkage for binding condition.
No motion, slow or jerky action of hydraulic system.	Defective pump.	Check pressure.
	Defective cylinder.	Repair or replace.
	Load larger than capacity.	Refer to Equipment Manufacturer's Service Manual.
	Relief valves not properly set.	Check pressure settings.
	Relief valves do not function properly.	Repair and readjust.
	Dirt or foreign particles lodged between relief valve plunger and seats.	Disassemble, clean and reassemble.
	Weak or broken relief valve springs.	Replace springs.
	Scored relief valve plungers.	Replace plungers.
	Valve body cracked inside.	Replace valve.
	Spool not moved to full stroke.	Check travel. Refer to Spool Travel Chart
Electric Motor Driving Pump will not shut off when spool is in neutral.	Control Switch not breaking contact.	Re-adjust or replace switch.

PARTS LIST

NOTE: Standard Control Valves use standard o-ring rubber compounds. If special o-ring compounds are required, consult Parker Hydraulic Division for recommended types.

FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE
1 - - 1 - 5 - 8	VDSP20**1 592644 656533 656522 108 x 10 <u>104 x 114A</u> 656535 108 x 8 655238 39 x 4	VALVE, TWO SPOOL ASSEMBLY . SUB. P. L. RELIEF VALVE . SUB. P. L. "D" SPOOL ASSEMBLY . CAP . PLUG . O-RING . SUB. P. L. "P" SPOOL ASSEMBLY . PLUG . NAMEPLATE . DRIVE SCREW

FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE
1 - - 2 - 3 - 4 - 6 - 7 - 9 - 10 - 11 - 12 - 13 - 14	656534 592449 656862 592451 <u>592450</u> <u>104 x 114A</u> 592456 656526 614027 656525 105 x 4L 656523	SUB. P. L. "D" SPOOL SPRING CENTERED . RETAINER, SPRING . SNAP RING . SPRING . RETAINER, O-RING . O-RING . CHECK POPPET . CHECK SPRING . EYE . SPOOL . O-RING . STEM

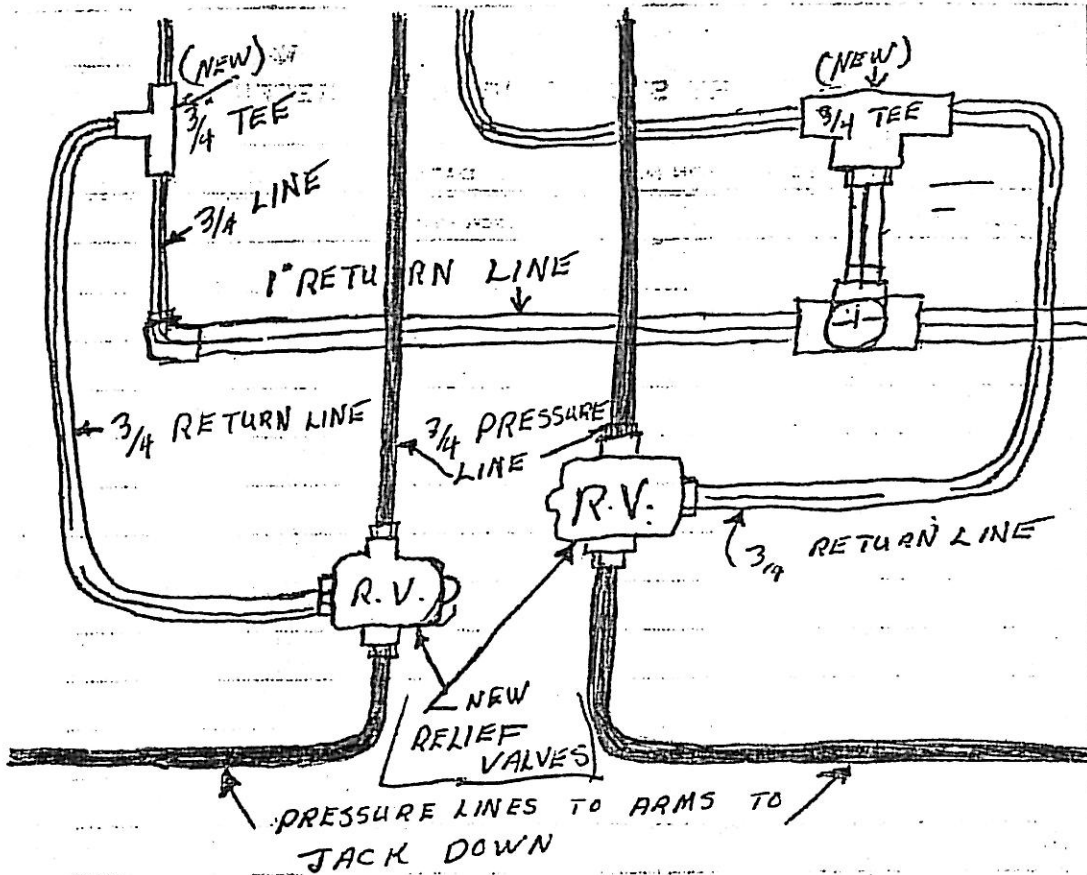
FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE
1 - - 15 - 16 - 17 - 18 - 19 - 20 - 21 - 22 - 23 - 24 - 25 - 26 - 27 - 28	VDSP20 103 x 4 17 x 36 592096 27 x 53 105 x 8L 582007 562392 109 x 14.1T 104 x 14.1A 582515 592099 655361 592098 37 x 5	PILOT OPERATED RELIEF VALVE . STAT-O-SEAL . JAM NUT . CAP . SETSCREW . O-RING . SPRING, PILOT . PLUNGER, PILOT . BACKUP RING . O-RING . SEAT, PILOT . SPRING . SUB. P. L. POPPET ASSEMBLY . SEAT . ACORN NUT

FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE	
1 - - 29	656536 656524	SUB P. L. "P" SPOOL FINE METERING . SPOOL P	

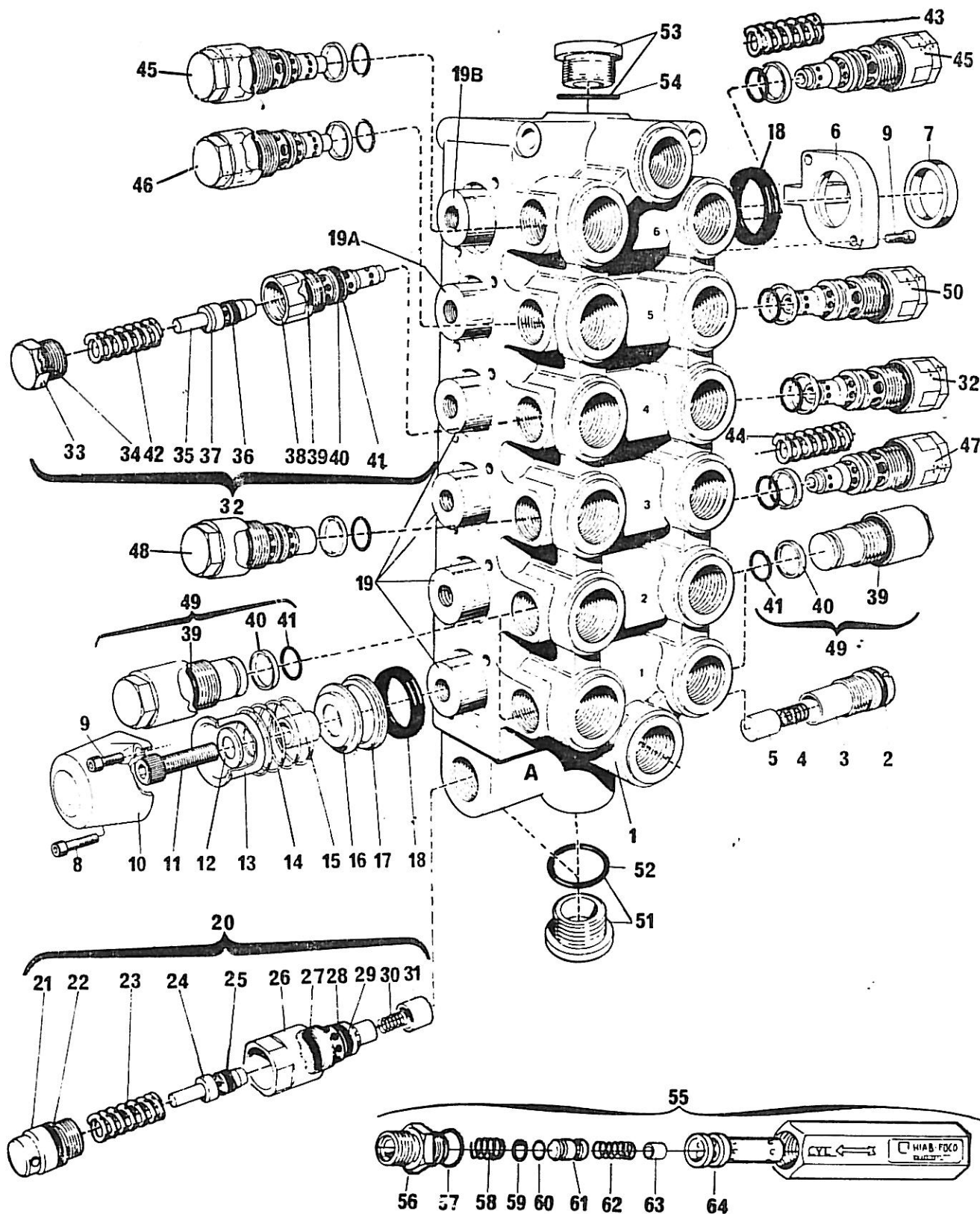
FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE	
6 - - 1 - 2 - 3	622400 41X5 622409 622410	TAMPER PROOF RELIEF VALVE . PLUG . NUT, sleeve retaining . SLEEVE	

FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE	
7 - - 1 - 1 - 1 - 2	665340 665341 665342 675802	ELECTRIC SWITCH . (With screw type terminals) . (With quick-disconnect type tabs) . (With crimp type connectors) . SPECIAL SWITCH SPOOL CAP	

FIGURE & INDEX NO.	PARKER PART NO.	NOMENCLATURE	
8 - - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9	675864X 675867 675865X 675866 105 x 10L 98 x 24 675005X 104 x 113A 675017X 109 x 113T	LOCK CHECK, DOUBLE ACTING . CAP . SPRING . GUIDE . O-RING . BALL 3/8 DIA. . SEAT . O-RING . SHUTTLE ASSEMBLY . PAR BAK	



HOW TO INSTALL NEW ADJUSTABLE RELIEF VALVES
IN JACK DOWN CIRCUITS ON LOG LIFTER WITH
PARKER HANNIFIN CONTROL VALVES.





RIKTNINGSVENTIL
CONTROL VALVE
STEUERVENTIL

550/3-11:1

4.75

Pos. Fig. Teil	Best. nr Order No. Best. Nr	Benämning	Description	Benennung	Antal Qty. Anzahl	Anm. Notes Anm.
1	390 3991	Grundventil, kompl. för enkelverkande lyftcylinder	Basic Valve, compl. for simple acting inner boom cylinder	Grundventil, kompl. för einfachwirkenden Hubzylinder	1	
1	390 4016	Grundventil, kompl. för dubbelverkande lyftcylinder	Basic Valve, compl. for double acting inner boom cylinder	Grundventil, kompl. för doppeltwirkenden Hubzylinder	1	
2	993 3336	. O-ring	. O-ring	. O-Ring	1	1
3	390 0363	. Styrning	. Guide	. Führung	1	1
4	390 0355	. Fjäder	. Spring	. Feder	1	1
5	390 0347	. Kägla	. Cone	. Kegel	1	1
6	390 0631	. Konsol	. Support	. Konsole	6	6
7	995 0974	. Skrapning	. Scraper	. Schleifring	6	6
8	992 2229	. Skruv	. Screw	. Schraube	6	6
9	990 2384	. Skruv	. Screw	. Schraube	18	18
10	390 0541	. Fjäderhus	. Spring Cover	. Federgehäuse	6	6
11	992 2342	. Skruv	. Screw	. Schraube	6	6
12	990 3861	. Bricka	. Washer	. Scheibe	6	6
13	390 0576	. Fjäderstyrning, hög	. Spring Guide, outer	. Federführung, hoch	6	6
14	390 0550	. Fjäder	. Spring	. Feder	6	6
15	390 0568	. Styrhylsa	. Spacer Sleeve	. Führungshülse	6	6
16	390 0584	. Fjäderstyrning, låg	. Spring Guide, inner	. Federführung, tief	6	6
17	390 0592	. Bricka	. Washer	. Scheibe	6	6
18	390 1084	. Tätning	. Sealing Ring	. Dichtring	12	12
19	390 2498	. Kolv D	. Plunger D	. Schieber D	4	4
19	390 3150	. Kolv D överdim. A	. Plunger D oversize A	. Schieber D övergrösse A	Erf. Erf.	0,05 mm
19	390 3168	. Kolv D överdim. B	. Plunger D oversize B	. Schieber D övergrösse B	Erf. Erf.	0,10 mm
19A	390 2501	. Kolv E	. Plunger E	. Schieber E	1	—
19A	390 3176	. Kolv E överdim. A	. Plunger E oversize A	. Schieber E övergrösse A	Erf. —	0,05 mm
19A	390 3184	. Kolv E överdim. B	. Plunger E oversize B	. Schieber E övergrösse B	Erf. —	0,10 mm
19A	390 2498	. Kolv D	. Plunger D	. Schieber D	—	1
19B	390 3613	. Kolv Ds	. Plunger Ds	. Schieber Ds	1	1
19B	390 3630	. Kolv Ds överdim. A	. Plunger Ds oversize A	. Schieber Ds övergrösse A	Erf. Erf.	0,05 mm
19B	390 3621	. Kolv Ds överdim. B	. Plunger Ds oversize B	. Schieber Ds övergrösse B	Erf. Erf.	0,10 mm
20	390 2374	Tryckbegränsningsventil, kompl. (21-31)	Relief Valve, Assy (21-31)	Druckbegrenzungsventil, kompl. (21-31)	1	1 (16,5 MPa)
21	390 0193	. Ställskruv	. Adjusting Screw	. Einstellschraube	1	1
22	993 3344	. O-ring	. O-ring	. O-Ring	1	1
23	390 0126	. Fjäder	. Spring	. Feder	1	1
24	390 1173	. Kägla, kompl. (24-25)	. Cone, Assy (24-25)	. Kegel, kompl. (24-25)	1	1
25	390 1165	.. Tätningsring	.. Sealing Ring	.. Dichtring	1	1
26	390 0207	. Hylsa	. Sleeve	. Hülse	1	1
27	993 3361	. O-ring	. O-ring	. O-Ring	1	1
28	390 0649	. Stödning	. Support Ring	. Stützring	1	1
29	993 3336	. O-ring	. O-ring	. O-Ring	1	1
30	390 0231	. Fjäder	. Spring	. Feder	1	1
31	390 0240	. Backventilkägla	. Check Valve Cone	. Rückschlagkegel	1	1
32	390 0045	Tryckbegränsningsventil, kompl. (32-42)	Relief Valve, Assy (32-42)	Druckbegrenzungsventil, kompl. (32-42)	2	2 (17,5 MPa)
33	390 0088	. Propp	. Plug	. Pfropfen	6	7
34	993 3336	. O-ring	. O-ring	. O-Ring	6	7
35	390 1173	. Kägla, kompl. (35-36)	. Cone, Assy (35-36)	. Kegel, kompl. (35-36)	6	7
36	390 1165	.. Tätningsring	.. Sealing Ring	.. Dichtring	6	7
37	390 0053	. Schims	. Schims	. Schims	Erf. Erf.	0,25 mm
37	390 0061	. Schims	. Schims	. Schims	Erf. Erf.	0,50 mm
37	390 0070	. Schims	. Schims	. Schims	Erf. Erf.	1,0 mm
38	390 0096	. Hylsa	. Sleeve	. Hülse	6	7

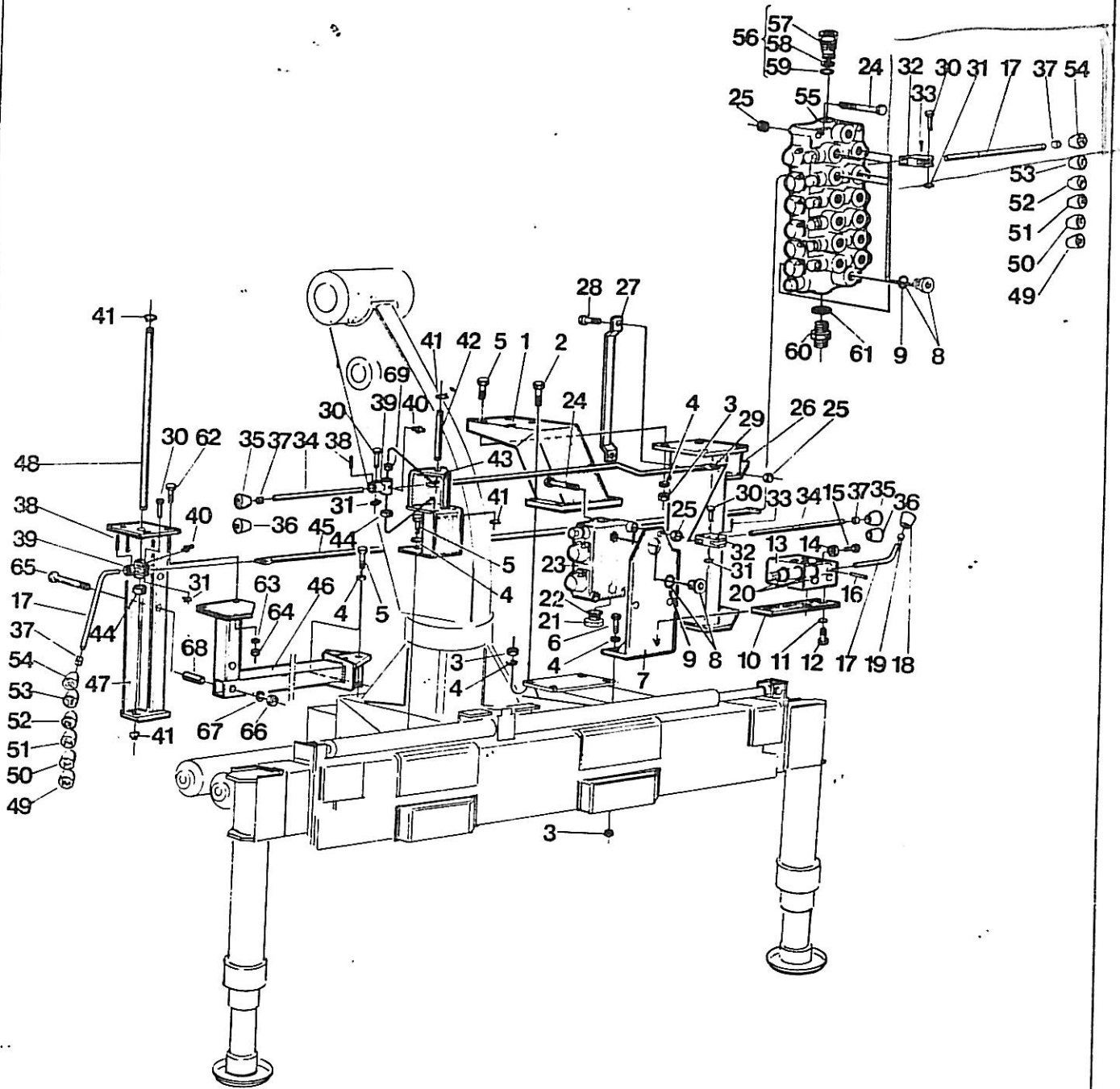


RIKTNINGSVENTIL
CONTROL VALVE
STEUERVENTIL

550/3-11:1

4.75

Pos. Fig. Teil	Best. nr Order No. Best. Nr	Benämning	Description	Benennung	Antal Qty. Anzahl	Anm. Notes Anm.
39	995 0940	. O-ring	. O-ring	. O-Ring	12 12	
40	390 0649	. Stödring	. Support Ring	. Stützring	12 12	
41	993 3336	. O-ring	. O-ring	. O-Ring	12 12	
42	390 0126	. Fjäder	. Spring	. Feder	3 3	155-210atö
43	390 0118	. Fjäder	. Spring	. Feder	2 2	120-155atö
44	390 0100	. Fjäder	. Spring	. Feder	1 2	35-95 atö
45	390 0029	Tryckbegränsningsventil, kompl. (45,33-41,43)	Relief Valve, Assy (45,33-41,43)	Druckbegrenzungsventil, kompl. (45,33-41,43)	2 2	130 kp/cm ²
46	390 2382	Tryckbegränsningsventil, kompl. (46,33-42)	Relief Valve, Assy (46,33-42)	Druckbegrenzungsventil, kompl. (46,33-42)	2 2	(13 MPa) 185 kp/cm ²
47	390 0002	Tryckbegränsningsventil, kompl. (47,33-41,44)	Relief Valve, Assy (47,33-41,44)	Druckbegrenzungsventil, kompl. (47,33-41,44)	1 1	(18,5 MPa) 50 kp/cm ²
48	390 0258	Sugventil, kompl. (48,39-41)	Suction Valve, Assy (48,39-41)	Nachsaugventil, kompl. (48,39-41)	1 1	(5,0 MPa)
49	390 0371	Plugg, kompl. (49,39-41)	Plug, Assy (49,39-41)	Pfropfen, kompl. (49,39-41)	4 4	
50	390 0002	Tryckbegränsningsventil, kompl. (50,33-41,44)	Relief Valve, Assy (50,33-41,44)	Druckbegrenzungsventil, kompl. (50,33-41,44)	— 1	
50	390 0371	Plugg, kompl. (50,39-41)	Plug, Assy (50,39-41)	Pfropfen, kompl. (50,39-41)	1 —	
51	390 0665	Propp, kompl. (51-52)	Plug, Assy (51-52)	Pfropfen, kompl. (51-52)	3 2	
52	995 0940	O-ring	. O-ring	. O-Ring	3 2	
53	311 8151	Propp, kompl. (53-54)	Plug, Assy (53-54)	Pfropfen, kompl. (53-54)	1 1	
54	990 9931	. O-ring	. O-ring	. O-Ring	1 1	
55	390 2552	Konstantventil, kompl. (56-64)	Constant Flow Valve, Assy (56-64)	Konstantventil, kompl. (56-64)	1 1	
56	390 2781	. Nippel	. Nipple	. Nippel	1 1	
57	995 0940	. O-ring	. O-ring	. O-Ring	1 1	
58	390 2803	. Fjäder	. Spring	. Feder	1 †	
59	996 1852	. Spärring	. Retaining Ring	. Nutring	1 1	
60	992 1249	. O-ring	. O-ring	. O-Ring	1 1	
61	390 4067	. Kägla Ø 4,8	. Cone Ø 4,8	. Kegel Ø 4,8	1 1	
62	390 4032	. Fjäder	. Spring	. Feder	1 1	
63	390 4024	. Distansrör	. Spacer	. Distanzrohr	1 1	
64	390 2820	. Backventilkägla	. Check Valve Cone	. Rückschalventilkegel	1 1	
		1)För enkelverkande lyftcylinder	1)For simple acting inner boom cylinder	1)Für einfachwirkenden Hubzylinder		
		2)För dubbelverkande lyftcylinder	2)For double acting inner boom cylinder	2)Für doppeltwirkenden Hubzylinder		





MANÖVERANORDNING
HYDRAULIC CONTROL
STEUERVORRICHTUNG

1560-6:2

9.74

Pos. Fig. Teil	Best. nr Order No. Best. Nr	Benämning	Description	Benennung	Antal Qty. Anzahl	Anm. Notes Anm.
1	808 0933	Konsol	Support	Halterung	1	
2	992 4353	Skruv	Screw	Schraube	4	
3	990 8480	Mutter	Nut	Mutter	12	
4	990 8498	Fjäderbricka	Spring Washer	Federscheibe	18	
5	992 4345	Skruv	Screw	Schraube	10	
6	992 4434	Skruv	Screw	Schraube	4	
7	301 9764	Ventilhållare	Valve Support	Ventilhalter	1	
8	390 0665	Propp, kompl. (8-9)	Plug, Assy (8-9)	Pfropfen, kompl. (8-9)	7	
9	995 0940	. O-ring	. O-ring	. O-Ring	7	
10	808 0984	Plattjärn	Plate	Flacheisen	1	
11	990 4140	Fjäderbricka	Spring Washer	Federscheibe	2	
12	990 7173	Skruv	Screw	Schraube	2	
13	306 8498	Väljarventil, kompl. (13-20)	Selector Valve, Assy (13-20)	Wählerventil, kompl. (13-20)	1	
14	617 6640	. Bricka	. Washer	. Scheibe	1	
15	990 7521	. Skruv	. Screw	. Schraube	1	
16	994 9241	. Pinne	. Pin	. Stift	1	
17	303 7878	. Spak	. Lever	. Hebel		
18	302 2269	. Handtagskula, kompl. (18-19)	. Knob, Assy (18-19)	. Hebelkugel, kompl. (18-19)	1	
19	992 9371	.. Klämring	.. Clamping Ring	.. Klemmring	1	
20	996 1259	. O-ring	. O-ring	. O-Ring	3	
21	311 8151	Propp, kompl. (21-22)	Plug, Assy (21-22)	Pfropfen, kompl. (21-22)	1	
22	990 9931	. O-ring	. O-ring	. O-Ring	1	
23	-	Grundventil, se sida 8:2	Basic Valve, see page 8:2	Grundventil, siehe Seite 8:2	1	
24	990 7271	Skruv	Screw	Schraube	6	
25	990 6967	Mutter	Nut	Mutter	8	
26	305 5701	Konsol	Support	Konsole	1	
27	301 8636	Hållare	Bracket	Halter	1	
28	990 7521	Skruv	Screw	Schraube	2	
29	301 9837	Manöverstäng	Control Rod	Steuerstange	2	
30	301 0767	Bult	Bolt	Bolzen		
31	994 9305	Spärryttare	Retaining Ring	Nutring		
32	301 8521	Länk	Link	Gelenke	8	
33	990 3097	Pinne	Pin	Stift	8	
34	303 7924	Spak	Lever	Hebel	4	
35	301 8652	Handtagskula, kompl. (35,37)	Knob, Assy (35,37)	Hebelkugel, kompl. (35,37)	2	
36	304 4009	Handtagskula, kompl. (36-37)	Knob Assy (36-37)	Hebelkugel, kompl. (36-37)	2	
37	992 9371	. Klämring	. Clamping Ring	. Klemmring		
38	992 6488	Pinne	Pin	Stift	8	
39	303 3112	Länk, kompl. (39,40,69)	Link, Assy (39,40,69)	Gelenke, kompl. (39,40,69)	8	
40	990 7921	. Smörjnippel	. Lubricator	. Schmiernippel	8	
41	995 0711	Spårring	Retaining Ring	Nutring	4	
42	301 1828	Axel	Spindle	Achse	1	
43	808 1514	Spakställ	Lever Support	Hebelhalter	1	
44	300 2985	Distansring	Distance Ring	Distanzring	6	
45	301 8563	Manöverstäng	Control Rod	Steuerstange	6	
46	808 0941	Konsol	Support	Halterung	1	
47	305 8913	Spakhållare	Lever Support	Hebelhalter	1	
48	301 2531	Axel	Spindle	Achse	1	
49	301 3146	Handtagskula, sväng, kompl. (49,37)	Knob, Slewing, Assy (49,37)	Hebelkugel, Schwenkel, kompl. (49,37)	2	
50	301 0163	Handtagskula, lyft, kompl. (50,37)	Knob, Inner Boom, Assy (50,37)	Hebelkugel, Hubarm, kompl. (50,37)	2	

PART NO. 10 DESCRIPTION TRAVERSE CONTROL SUB-ASSY DRG. No. AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
10-1	Gresen Single Spool Valve	1	SP-F4-HP
10-2	Function Port Conns (Stratoflex)	2	1012-8-8
10-3	Inlet " " "	1	1025-12-10
10-4	Return " " "	1	1025-12-12
10-5	Hose 212-8 x 21 1/2" Long " Fittings	1	(3007-8-8 (333-8-8)
10-6	Hose 212-8 x 23" Long " Fittings	1	(3008-8-8 (333-8-8)

PART

NO.

11

DESCRIPTION

FLOW DIVIDER

SUB-ASSY

DRG. No.

AD-555

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
11-1	Brand Flow Divider	1	5-5 1/2	See Insertion
11-2	Port Fitting (Stratoflex)	1	1025-8-10	
11-3	" " "	2	1012-8-10	

PART
NO. 12

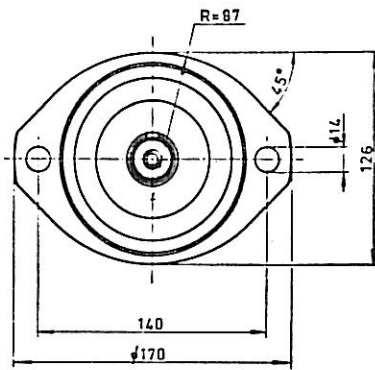
DESCRIPTION

HYDRAULIC PUMP

SUB-ASSY
DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	See Insertion
12-1	Volvo "Flymotor" Pump	1	F10-C19	See Insertion
12-2	Weep Port Connection (Keelaring)	1	HAB6/8	
12-3	Suction Port Connection "	1	HAB12/16	
12-4	Delivery " " "	1	HAB12/8	
12-5	Pressure Hose 212-8 x 14" Lg. Pump Delivery To Tubing At Main Frame Fittings (Stratoflex)	1	(320-10-8 (333-10-8	
12-6	Suction Hose 211-16 x 14" Lg. Hudraulic Oil Reservoir To Pump Fittings (Stratoflex)	1	(417-16-16 (30001-16-16	
12-7	Weep Hose 211-8 x 45" Pump To Oil Reservoir Fittings (Stratoflex)	1	(416-8-8 (30001-10-8	



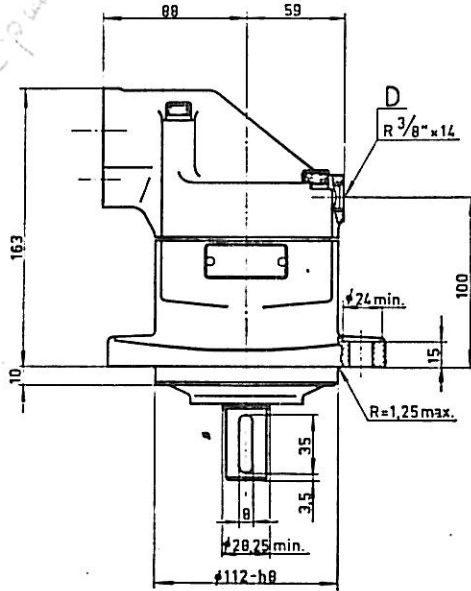
SHF 32 gear pumps outdoor

A and B

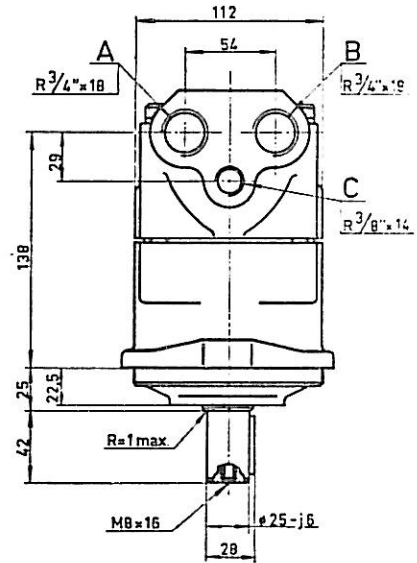
Oil connections. For clockwise rotation A is the outlet and B is the inlet. For anticlockwise rotation B is the outlet and A the inlet.

C and D

Alternative connections for draining. The connection, which is positioned uppermost in the installation should be used.



*SHF 15 to right
SHF 22 150
SHF 15 150
UNIDIVIS 150
Piston pumps*



OPERATING TEMPERATURE

The oil temperature during running should not exceed 80° C (176° F).

HYDRAULIC OIL

Hydraulic oils of good quality should be used. At running temperature the oil should have a viscosity of about 20 cSt (3° E).

PUMP INLET PRESSURE

When the machine is operating as a pump the following inlet pressures are required:

Pump r.p.m.	0—2300	3 000	4 000	5 000
Lowest inlet pressure kg/cm ²	0	0,3	0,7	2,0

These values apply with a hydraulic oil having a viscosity of 20 cSt (3° E).

FILTER

The fluid in the system should be filtered to 30 microns.

DRAINING

The drain connections should be such that pressure within the housing does not exceed the values given in the table.

Pump r.p.m.	0—1500	3 000	4 000
Max pressure in housing kg/cm ²	1,0	0,6	0,3

The drain line ought to be dimensioned for a flow of about 1 lit/min.

PRESSURIZED OIL VOLUME

The pressurized oil volume of the hydraulic unit up to the plane of connections averages 28 cm³.

MOMENT OF INERTIA

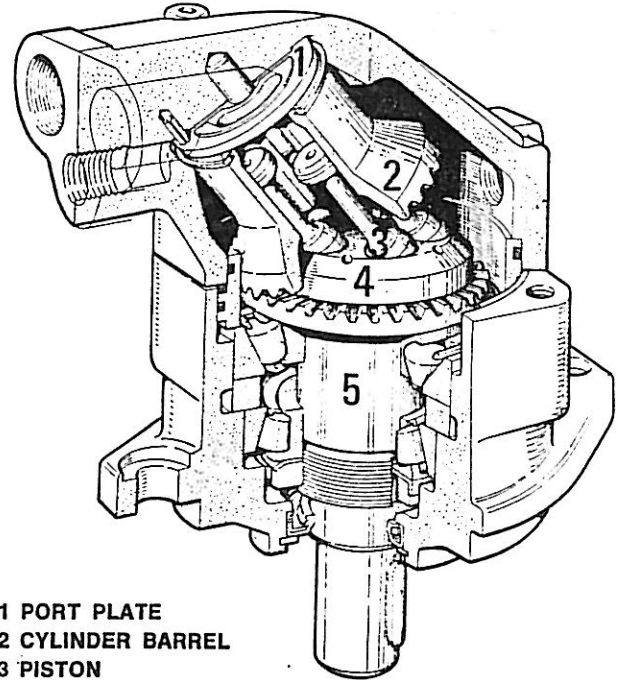
The moment of inertia of the rotating parts of size F10C-19 is 12.3·10⁻⁴ kg.m².

VOLVO FLYGMOTOR AB

HYDRAULICS DEPARTMENT S-461 01 TROLLHÄTTAN, SWEDEN TEL. 0520-301 00 TELEX 420 40

PUMP/MOTOR F10C-19

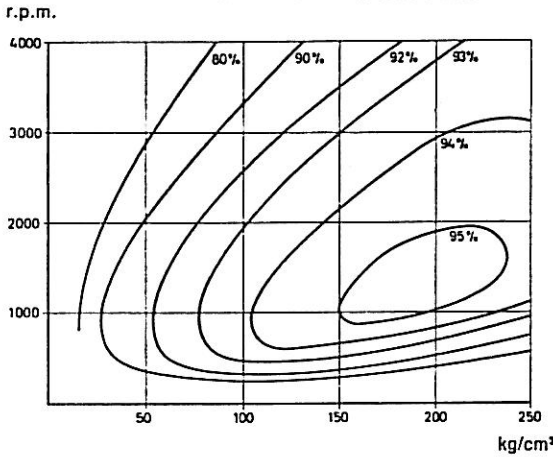
DISPLACEMENT	19,0 cm ³ /rev.
OPERATING PRESSURE	
max continuous	250 kg/cm ²
peak pressure	320 kg/cm ²
OPERATING SPEED	
max continuous	4000 r.p.m.
momentary as pump	5000 r.p.m.
momentary as motor	5700 r.p.m.
POWER (hydraulic)	
max continuous	34 H.P.
FLOW at 1000 r.p.m.*	19,0 l/min
TORQUE at 100 kg/cm ² *	3,02 kg.m
WEIGHT	11,2 kg



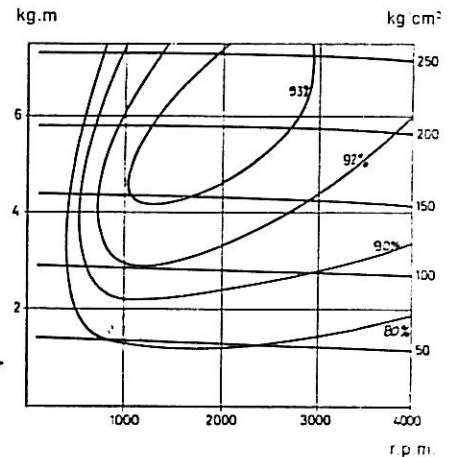
- 1 PORT PLATE
- 2 CYLINDER BARREL
- 3 PISTON
- 4 DRIVING FLANGE
- 5 MAIN SHAFT

* Theoretical figure

OVERALL EFFICIENCY CURVES



◀ PUMP



MOTOR ▶

Pump

Flow, torque and power at various pressures and speeds

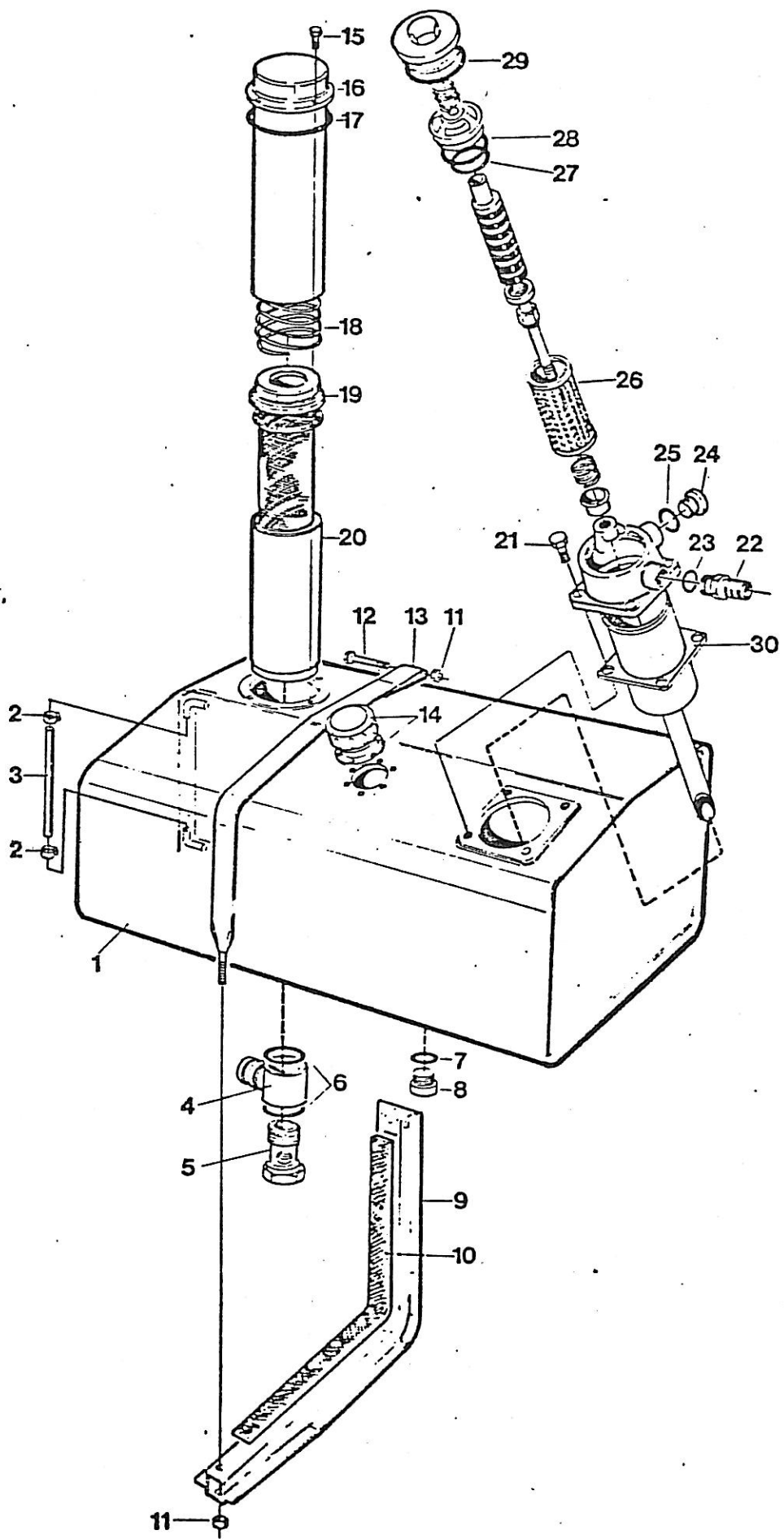
Pressure kg/cm ²	r.p.m.																							
	350			500			750			1 000			1 500			2 000			3 000			4 000		
	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.
100	6,4	3,13	1,53	9,2	3,14	2,19	14,0	3,16	3,31	18,7	3,18	4,44	28,2	3,20	6,71	37,7	3,21	8,97	56,4	3,27	13,7	75,0	3,37	18,8
150	6,4	4,70	2,30	9,1	4,71	3,29	13,9	4,71	4,94	18,6	4,71	6,57	28,1	4,72	9,88	37,5	4,75	13,3	56,1	4,80	20,1	74,8	4,90	27,4
200	6,3	6,27	3,06	9,0	6,27	4,37	13,8	6,27	6,57	18,5	6,27	8,75	28,0	6,27	13,1	37,4	6,28	17,5	56,0	6,30	26,4	74,6	6,33	35,4
250	6,2	7,80	3,81	8,9	7,80	5,45	13,6	7,80	8,18	18,4	7,80	10,9	27,8	7,81	16,4	37,1	7,82	21,8	55,7	7,83	32,8	74,0	7,92	44,2

Motor

Flow, torque and power at various pressures and speeds

Pressure kg/cm ²	r.p.m.																							
	350			500			750			1 000			1 500			2 000			3 000			4 000		
	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.	l/min	kg.m	H.P.
100	7,0	2,90	1,42	9,9	2,88	2,01	14,7	2,86	3,00	19,4	2,84	3,97	28,9	2,83	5,93	38,5	2,82	7,88	57,5	2,77	11,6	76,6	2,68	15,0
150	7,1	4,34	2,12	10,1	4,34	3,03	14,9	4,33	4,54	19,6	4,33	6,06	29,1	4,32	9,05	38,6	4,30	12,0	57,7	4,24	17,8	77,0	4,15	23,2
200	7,4	5,80	2,84	10,4	5,79	4,04	15,2	5,79	6,06	19,9	5,78	8,08	29,3	5,78	12,1	39,0	5,76	16,1	58,3	5,74	24,1	77,5	5,65	31,6
250	7,6	7,27	3,55	10,7	7,27	5,07	15,4	7,27	7,61	20,2	7,26	10,1	29,8	7,26	15,2	39,5	7,25	20,3	58,6	7,23	30,3	77,9	7,16	40,0

Figures in bold type ought to be avoided at continuous work. When hesitating Volvo Flygmotors department should be consulted.



Pos. Fig. Teil	Best. nr Order No. Best. Nr	Benämning	Description	Benennung	Antal Qty. Anzahl	Anm. Notes Anm.
1	304 5811 1)	Behållare	Tank	Behålder	1	
2	992 5171	Slangklamma	Hose clamp	Schlauchschelle	2	
3	996 2620	Slang	Hose	Schlauch	1	
4	304 5633	Banjonippel	Banjo nipple	Banjonippel	1	
5	304 5641	Banjoskruv	Banjo screw	Hohlschraube	1	
6	993 3441	O-ring	O-ring	O-Ring	2	
7	991 3301	O-ring	O-ring	O-Ring	1	
8	304 5773	Plugg	Plug	Pfropfen	1	
9	992 3519	Konsol	Bracket	Konsole	2	
10	316 8492	Filtband	Felt band	Filtband	2	
11	991 4358	Mutter	Nut	Mutter	4	
12	990 6959	Skruv	Screw	Schraube	2	
13	992 3527	Band	Band	Band	2	
14	993 8541	Tanklock	Cover	Deckel	1	
15	990 0349	Skruv	Screw	Schraube	4	
16	305 1838	Filterhus, kompl. (16-17)	Filter housing, compl. (16-17)	Filtergehåuse, kompl. (16-17)	1	
17	993 3638	. O-ring	. O-ring	. O-Ring	1	
18	314 3864	Fjåder	Spring	Feder	1	
19	305 1781	Filterinsats	Filter insert	Filtereinsatz	1	
20	304 5668	Innerdel	Filter holder	Innenteil	1	
21	990 0420	Skruv	Screw	Schraube	4	
22	307 0638	Slangnippel	Hose nipple	Schlauchnippel	1	
23	993 3395	O-ring	O-ring	O-Ring	1	
24	995 0800	Rrpropp	Plug	Pfropfen	1	
25	993 3387	O-ring	O-ring	O-Ring	1	
-	996 2735	Filter, kompl. (26-30)	Filter, compl. (26-30)	Filter, kompl. (26-30)	1	
26	996 1941	. Filterinsats	. Filter insert	. Filtereinsatz	1	Q=90l/min.
27	992 1443	. O-ring	. O-ring	. O-Ring	1	
28	993 3450	. O-ring	. O-ring	. O-Ring	1	
29	991 0948	. O-ring	. O-ring	. O-Ring	1	
30	305 2826	. Packning	. Gasket	. Dichtung	1	
		1) Lagerfres ej	1) No stock item	1) Nicht an lager erhåltlich		

PART

NO.

13

DESCRIPTION

BOOM SIDEWAYS TRAVEL CYL.

SUB-ASSY

DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
13-1	Sideways Travel Cyl Atlas Polar	2	
13-2	Port Fittings (Stratoflex)		1012-8-8
13-3	Hose 212-8 x 36" Lg Cylinder To Frame Tubing Fittings (Stratoflex)	2	(333-8-8 333-8-8
13-4	Hose 212-8 x 36" Lg Cylinder To Frame Tubing Fittings (Stratoflex)	2	(320-8-8 333-8-8

PART
NO.

14

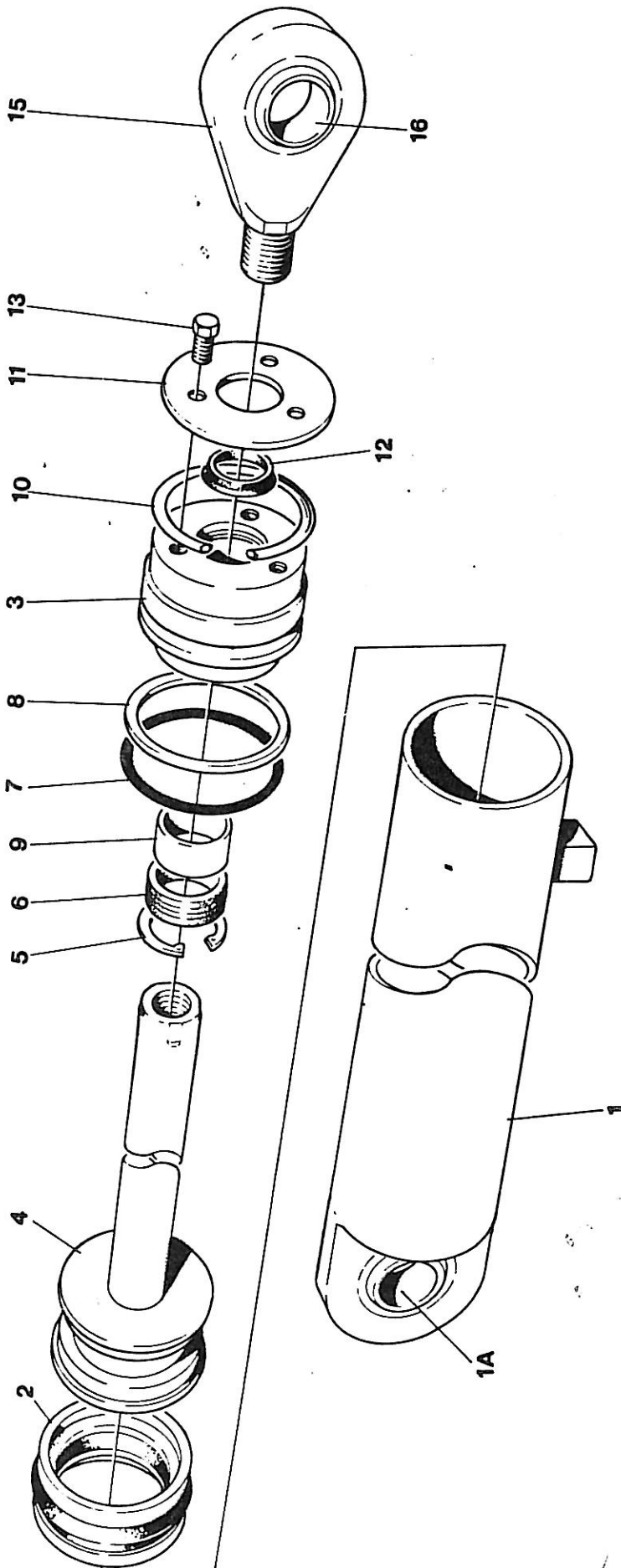
DESCRIPTION

BOOM LUFF CYLINDER

SUB-ASSY
DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.
14-1	HIAB STD Cylinder	2	300 5151
14-2	Port Fittings (Stratoflex)	4	1012-8-8
14-3	Hose 212-8 x 45" Cylinder To Frame Tubing Fittings (Stratoflex)	2	(320-8-8 (30007-8-8
14-4	See 14-3 x 48" Long	2	



VIPPCYLINDER
OUTER BOOM CYLINDER
WIPPZYLINDER

245 - 3:3
4.73

Pos. Fig. Teil	Best. nr Order No. Best. Nr	Benämning	Description	Benennung	Antal Qty. Anzahl	Anm. Notes Anm.
- 1	300 5151 300 5160	Vippcylander, kompl. (1-16) . Cylinderrör	Outer boom cylinder, compl.(1-16) . Cylinder shell	Wippzyylinder, kompl. (1-16) . Zylinderrohr	1 1	
1 A	993 8486	.. Lagring	.. Bearing bushing	.. Lagerbuchse	1	
2	993 9148 ^{x)}	. Tätningsring	. Sealing ring	. Dichtring	1	
3	300 3183	. Toppmutter	. Top nut	. Kopfverschraubung	1	
4	300 5143	. Kolvstång	. Piston rod	. Kolbenstange	1	
5	992 9053	. Spärring	. Retaining ring	. Nutring	1	
6	993 9156 ^{x)}	. Tätningsring	. Sealing ring	. Dichtring	1	
7	991 0719 ^{x)}	. O-ring	. O-ring	. O-Ring	1	
8	993 5746 ^{x)}	. Stödring	. Support ring	. Stützring	1	
9	991 4528	. Bussning	. Bushing	. Buchse	1	
10	300 5178	. Låstråd	. Lock ring	. Sicherungsdraht	1	
11	300 5101	. Lock	. Cover	. Deckel	1	
12	993 5215 ^{x)}	. Skrapring	. Scraper	. Abstreifer	1	
13	990 8609	. Skruv	. Screw	. Schraube	3	
15	301 0694	. Kolvstångshuvud, kompl. (15-16)	. Piston rod head, compl. (15-16)	. Kolbenstangekopf, kompl. (15-16)	1	
16	993 8486	.. Lagring	.. Bearing bushing	.. Lagerbuchse	1	
-	330 0285	Packningssats	Packing set	Dichtungssatz	1	
		x) Ingår i packningssatsen	x) Included in packing set	x) Gehören zum Dichtungssatz		

PART
NO. 15 & 16 DESCRIPTION

POWER UNIT

SUB-ASSY
DRG. No.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
15-1	Wisconsin VH4D Gasoline Engine With Electric Start Side Mounting Fuel Tank and Pump Mounting Bracket	1		
16-1	UCC Drive Coupling	1	UC-DC - 42PBL	

PART

NO.

17

DESCRIPTION

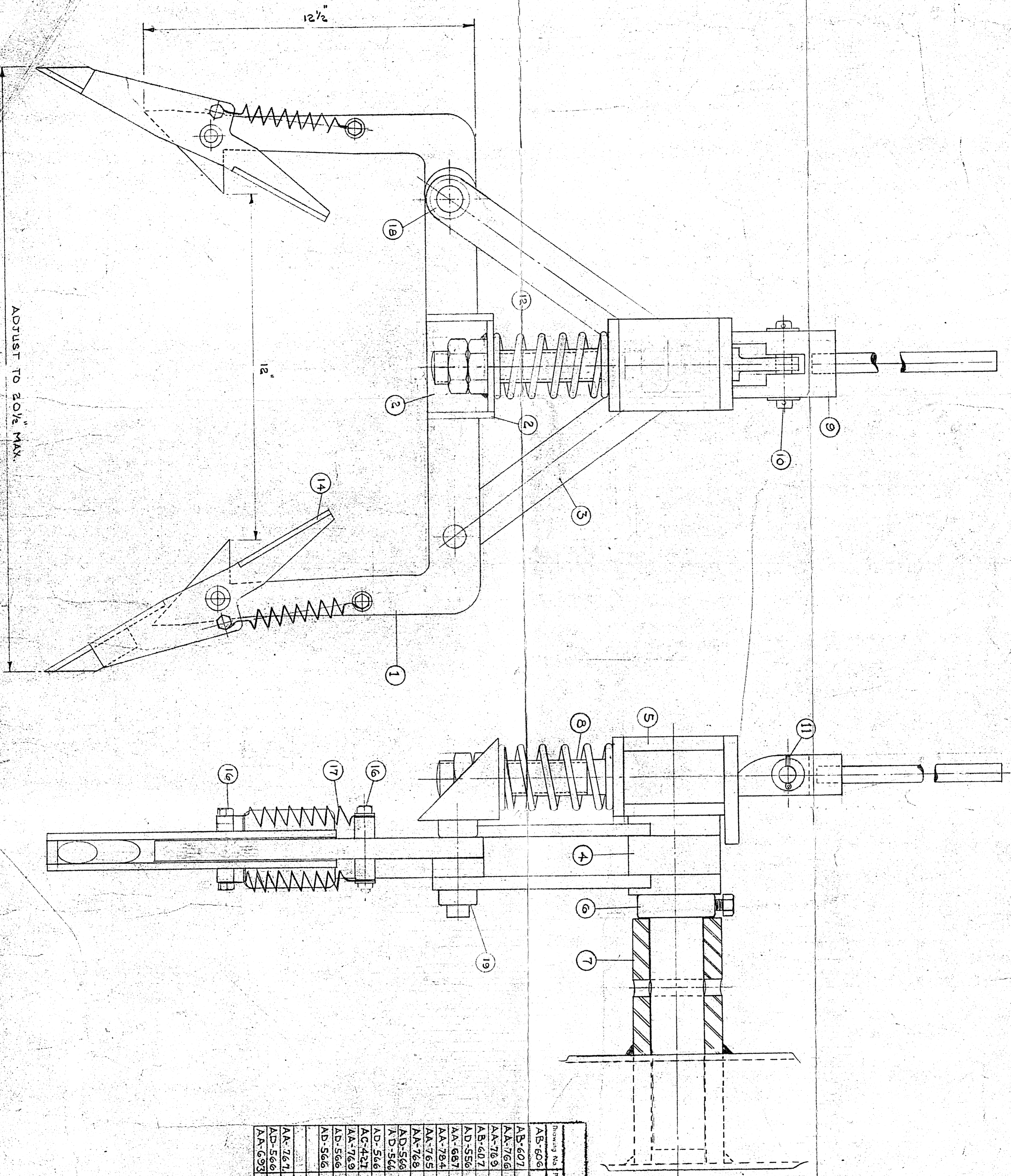
HYDRAULIC OIL RESERVOIR

SUB-ASSY

DRG. NO.

AM-175

ITEM No.	DESCRIPTION	No. OFF	DETAIL DRG. No.	
17-1	Hydraulic Oil Reservoir		950/3-22:1	
17-2	Main Return Hose 211-16 x 57" Lg. Frame Piping To Tank Fittings (Stratoflex)	1	(417-16-16 (30001-16-16	



ATLAS POLAR CO. LTD.

Drawing No.	Part No.	Mat.	By description	No. Qty	Remarks
AB-606	-1	M.S.	TINE	2	
AB-607	-2	M.S.	SWIVEL PIN	1	
AA-766	-3	M.S.	LINKAGE	2	
AA-769	-4	M.S.	DISTANCE PIECE	1	
AB-607	-5	M.S.	MOUNTING SHAFT	1	
AD-556	-6	M.S.	STD. SHAFT COLLARS	1	2 BORE
AA-667	-7	M.S.	MOUNTING SLEEVE	1	
AA-784	-8	M.S.	TENSIONING SPINDLE	1	
AA-765	-9	M.S.	OPERATING LEVER	1	
AA-769	-10	M.S.	SWIVEL PIN	1	
AD-566	-11	M.S.	COTTER PIN 3/8" DIA.	1	
AD-566	-12		SPRING	1	
AD-566	-13	M.S.	1/4 UNC. JAWB NUT	1	
AG-421	-14	M.S.	LEAD-IN ATTACHMENT	2	
AA-769	-15	M.S.	DISTANCE PIECES	4	
AD-566	-16	M.S.	3/8 UNC. Bolts 7/16	4	3/4 UNITS
AD-566	-17		SPRING	4	
AA-767	-18	M.S.	SWIVEL PIN	2	
AD-566	-19	M.S.	STD. SHAFT COLLAR	1	3/8 BORE
AA-693	-20	M.S.	SWIVEL PIN	2	

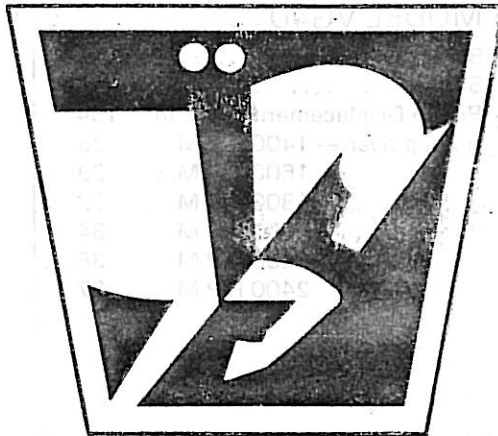
TRENT CANAL SYSTEM.
 DAM LOG LIFTER
 LOG RECOVERY GRAPPLE
 ARRANGEMENT

STARTING and OPERATING INSTRUCTIONS

ISSUE MM-357

W I S C O N S I N

Air-Cooled Engines



Four Cylinder Engine
Models

VH4D • VG4D • V-465D

 TELEDYNE WISCONSIN MOTOR

WORLD'S FOREMOST SOURCE FOR HEAVY DUTY AIR COOLED ENGINES

INTRODUCTION

WISCONSIN heavy duty air cooled engines are of the most advanced design and are built in a modern factory, equipped with the latest machinery available. Only the best materials, most suitable for the particular part, are used. During production, every part is subjected to rigid inspection, as are also the completely assembled engines. After assembly, every engine is operated on its own power and all adjustments are carefully made so that each engine will be in perfect operating condition when it leaves the factory.

Teledyne Wisconsin Motor is backed by over 65 years of engineering experience in the design of internal-combustion engines for every conceivable type of service. The performance of these engines is proof of the long satisfactory service you too can expect from your engine.

Like all fine machinery, the engine must be given regular care and be operated in accordance with the instructions.

SPECIFICATIONS

MODEL VH4D

Bore	3¼"
Stroke	3¼"
Piston Displacement — cu. in.	107.7
Horsepower — 1400 R.P.M. ...	17.2
1600 R.P.M. ...	20.0
1800 R.P.M. ...	22.5
2000 R.P.M. ...	24.7
2200 R.P.M. ...	26.5
2400 R.P.M. ...	28.0
2600 R.P.M. ...	29.2
2800 R.P.M. ...	30.0

MODEL VG4D

Bore	3½"
Stroke	4 "
Piston Displacement — cu. in.	154
Horsepower — 1400 R.P.M. ...	25
1600 R.P.M. ...	29
1800 R.P.M. ...	32
2000 R.P.M. ...	34
2200 R.P.M. ...	36
2400 R.P.M. ...	37

MODEL V-465D

Bore	3¾"
Stroke	4 "
Piston Displacement — cu. in.	177
Horsepower — 1600 R.P.M. ...	41.6
1800 R.P.M. ...	47.5
2000 R.P.M. ...	52.4
2200 R.P.M. ...	56.7
2400 R.P.M. ...	60.0
2600 R.P.M. ...	63.0
2800 R.P.M. ...	64.5
3000 R.P.M. ...	65.0

Note: For continuous operation, allow 20% of horsepower shown, as a safety factor.

SAFETY PRECAUTIONS

- Never fill fuel tank while engine is running or hot; avoid the possibility of spilled fuel causing a fire.
- Always refuel slowly to avoid spillage.
- When starting engine, maintain a safe distance from moving parts of equipment.
- Do not start engine with clutch engaged.
- Do not spin hand crank when starting. Keep cranking components clean and free from conditions which might cause the crank jaw to bind and not release properly. Oil periodically to prevent rust.
- Never run engine with governor disconnected, or operate at load speeds in excess of: 2800 R.P.M. for model VH4D, 2400 R.P.M. for model VG4D and 3000 R.P.M. for model V-465D.
- Do not operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed causes serious illness and possible death.
- Never make adjustments on machinery while it is connected to the engine without first removing the ignition cables from the spark plugs. Turning the machinery over by hand during adjusting or cleaning might start the engine and machinery with it, causing serious injury to the operator.
- Precaution is the best insurance against accidents.

NEW ENGINE Instructions

- **LUBRICATION** Operating without oil will ruin engine.

IMPORTANT

There is **NO OIL** in this unit.
Fill crankcase to proper oil level, also clutch or gear box if furnished, and oil bath air cleaner.

Refer to *GRADE OF OIL* chart (page 2) and fill with proper oil before starting engine.

- **AIR CLEANER**

Oil bath type — Add same grade oil as used in crankcase to the level line indicated on cleaner bowl. Maintain oil level or dirt will be drawn in and damage engine.

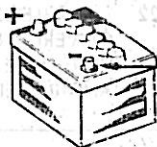
Dry element type, optional equipment — **DO NOT OIL** — Follow instructions on cleaner body.

- **FUEL**

Use 'REGULAR' grade gasoline. Engines built to operate on FUEL OIL, KEROSENE, L.P.G. or NATURAL GAS are so identified in the model designation. Refer to 'FUEL' paragraphs of instructions. Buy fresh fuel. Do not use *out-of-season* gasoline.

- **NEGATIVE GROUND CIRCUIT**

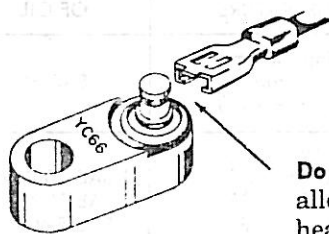
, if engine is equipped with STARTING MOTOR, DISTRIBUTOR IGNITION and FLYWHEEL ALTERNATOR, or GENERATOR.



GROUND ENGINE TO NEGATIVE TERMINAL ON BATTERY.

CAUTION: Be absolutely sure of proper connection or damage to the Alternator or Generator circuits will result.

- **PREVENT OVERHEATING**



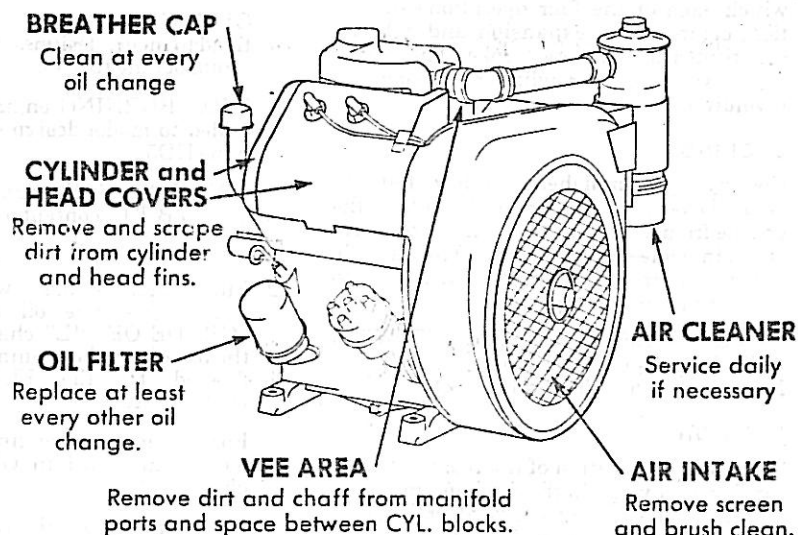
Temperature Safety Switch

Do not disconnect wire or allow terminal to touch head fins or shrouding.

Optional accessory mounted to cylinder head bolt near spark plug — **TO PROTECT ENGINE AGAINST OVERHEATING.** If engine stops, check first to see if engine is overheated. Other conditions may have caused the engine to stop. Clean air cleaner, air intake screen, fins, and check oil level, spark plugs and wiring. Let engine cool at least 10 minutes before restarting.

Keep Engine Clean

External dirt restricts cooling and internal dirt causes wear.



- **NEW ENGINE BREAK-IN**

Proper *break-in* will lead to trouble-free operation and increased engine life. The factory test given to a new engine is not sufficient to establish the polished bearing surfaces which are so necessary for good performance and long engine life. There is no quick way to force the establishment of good bearing surfaces, and these can only be obtained by running a new engine carefully and under reduced

speeds and loads for a short period of time. Run the engine for a half hour without load at low idle speed (1000 to 1200 R.P.M.). The speed should then be increased gradually, to engine operating r.p.m. still without load, for an additional two hours. If at all possible, operate the engine at light loads for a period totaling about eight hours, before maximum load is applied.

STARTING AND OPERATING INSTRUCTIONS

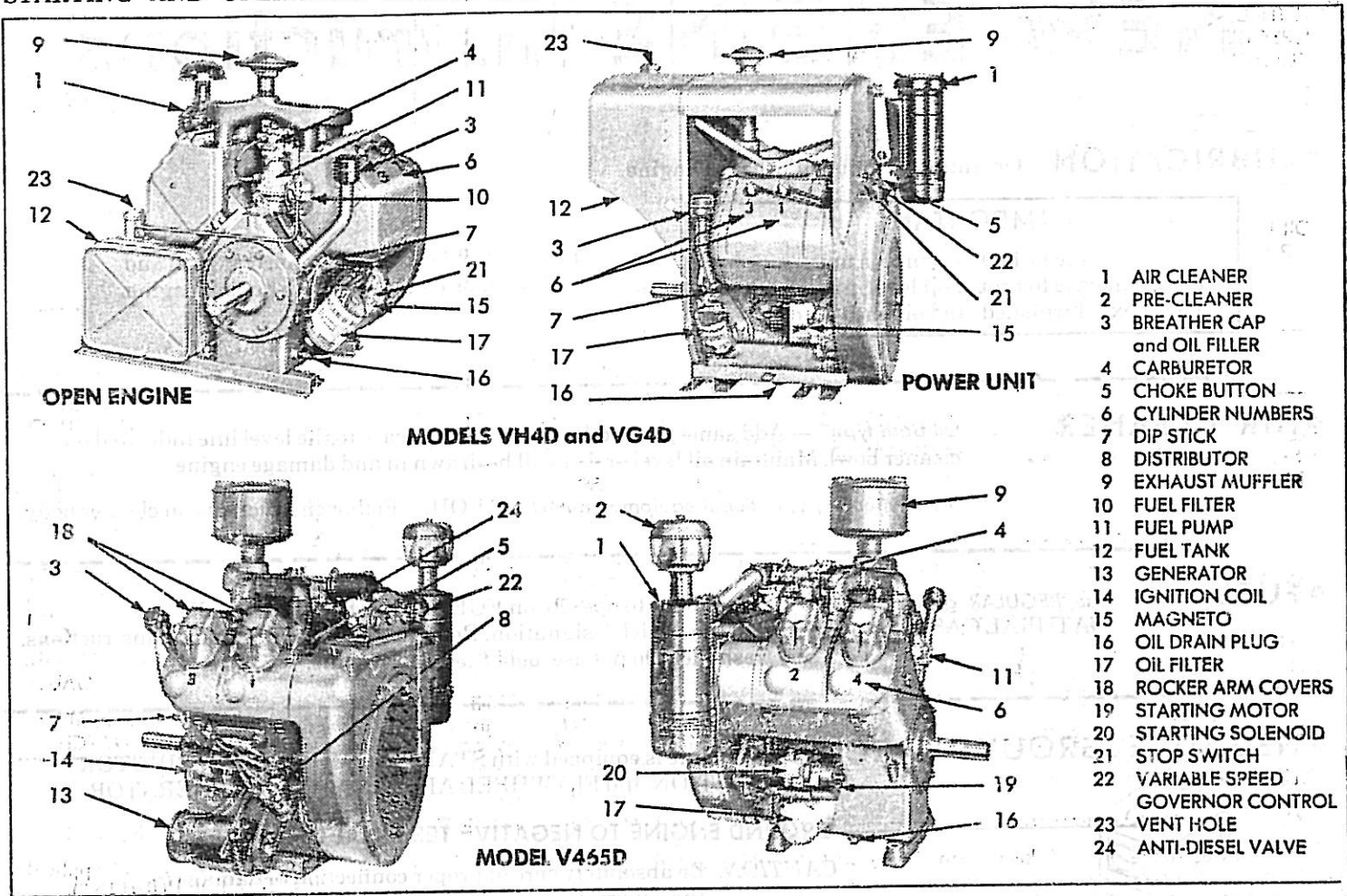


Fig. 1, REFERENCE VIEWS

GENERAL INFORMATION

These engines are of the four cycle type, in which each of the four operations of suction, compression, expansion and exhaust constitutes a complete stroke. This gives one power stroke per cylinder for each two revolutions of the crankshaft.

COOLING

Cooling is accomplished by a flow of air circulated over the cylinders and heads of the engine from a combination fan-flywheel encased in a sheet metal shroud. The air is divided and directed by ducts and baffles to insure uniform cooling of all parts.

NEVER OPERATE AN ENGINE WITH ANY PART OF THE SHROUDING REMOVED — this will retard air cooling.

IGNITION

The spark for ignition of the fuel mixture is furnished by a high tension magneto driven by the timing gears at crankshaft speed (models VH4D and VG4D).

Battery ignition (12 volt) distributor, is furnished in place of magneto on engines equipped with flywheel alternator, or as optional ignition (Std. on model V-465D).

ROTATION

The rotation of the crankshaft is clockwise when viewing from the flywheel or front end of the engine, and counterclockwise rotation of the power takeoff or rear end of the engine.

BEFORE STARTING NEW ENGINE

1. Fill tank with Regular grade gasoline.

OIL BURNING engine has letter 'O' suffixed to model designation — use 35 minimum octane fuel oil.

L.P.G. BURNING engine has letter 'G' added to model designation — use propane HD5.

NATURAL GAS burning engines require a B.T.U. content of at least 1000.

2. Fill crankcase base with the proper grade of engine oil as specified in "GRADE OF OIL" chart. Fill through the breather tube opening to the level indicated by the FULL mark on DIPSTICK.

For run-in of new engines, use same oil as recommended in GRADE OF OIL chart.

Check crankcase oil level every 8 hours, change oil every 50 hours of operation.

To change oil, remove drain plug from oil pan. Oil should be drained while engine is hot; it will flow more freely.

3. Clutch and gear reduction unit lubrication differs between the various engine models. All units operating in oil are furnished with oil filler, level and drain plugs, suitable for any take-off shaft position.

GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL
Spring, Summer or Autumn +120°F to +40°F	SAE 30
Winter +40°F to +15°F +15°F to 0°F Below 0°F	SAE 20-20W SAE 10W SAE 5W-20
Use oils classified as Service MS, SD or SE	
Crankcase Capacity	VH4D VG4D V465D
New Engine	3½ qts. 4½ qts. 6 qts.
Oil and filter change	4 qts. 5 qts. 7qts.
Less — oil filter or filter change	3½ qts. 4½ qts. 6 qts.

Model VH4D, Fig 2 and Fig. 3:

Fill clutch and gear reduction units to the height of the oil level plug opening - Use same grade oil as used in engine crankcase. Add sufficient oil between changes to keep oil up to the level plug opening.

Change oil in clutch and reduction units at least every 500 hours of operation.

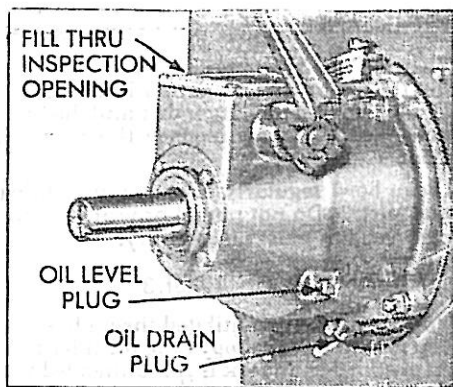


Fig. 2, VH4D
CLUTCH LUBRICATION

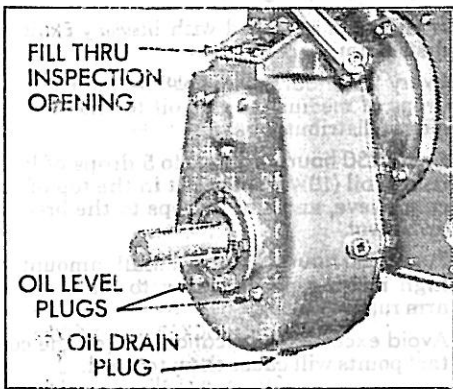


Fig. 3, VH4D
CLUTCH REDUCTION LUBRICATION

Models VG4D and V465, Fig. 4 and Fig. 5:

The clutch in both the power take-off and clutch reduction units is of the dry disc type, therefore NO OIL should be put into the clutch housing. Grease fittings are provided for periodic lubrication of the bearings. The HOUSING BEARING should be greased every 50 hours of operation, and the THROWOUT BEARING every day before starting. Use Mobil Gargoyle grease BRB No. 3, Sinclair AF-1 grease, or equal.

The PILOT BEARING is sealed and requires no external lubrication.

The SHIFTER SHAFT should be lubricated periodically if external oil fittings are provided.

THE REDUCTION UNIT IS OPERATED IN OIL and the gear case oil level must be maintained to the oil DIPSTICK mark or PLUG opening, which ever is applicable. In ROCKFORD units use No. 30 S.A.E. crankcase oil, for TWIN DISC units use

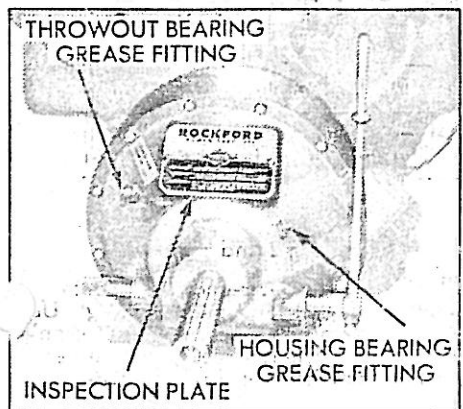


Fig. 4, VG4D, V465D
CLUTCH LUBRICATION

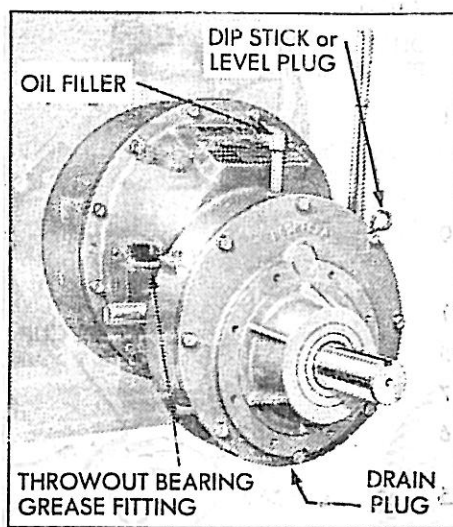


Fig. 5, VG4D, V465D
CLUTCH REDUCTION LUBRICATION

high grade transmission oil, S.A.E. No. 90 to No. 110 viscosity. Change oil every 500 hours of service, while unit is warm.

STARTING

With reference to Fig. 1: Engines enclosed in a sheet metal house are referred to as Power Units, whereas those without a house are called Open Engines.

Power Unit side doors should always be removed when operating.

STARTING PROCEDURE Fig.'s 6,7,8

1. Check crankcase oil level and gasoline supply. Open shut-off valve in fuel strainer.

OIL BURNING engines must be started on gasoline and run for 2 or 3 minutes before switching to oil. Special instructions are available for starting L.P.G. and NATURAL GAS burning engines.

2. Disengage clutch, if furnished.

3. Prime new engine — if necessary, see Fig. 6. Hand primer lever at fuel pump (available option), should be worked back and forth until strainer bowl is full — then an additional 5 or 10 strokes to fill carburetor bowl. If primer does not function — turn crankshaft one complete revolution.

Gravity feed (power units), and electric start engines do not require priming.

4. Set throttle about 1/2 open if variable speed governor control is furnished. With a two speed control, start in full load position — idle after engine starts.

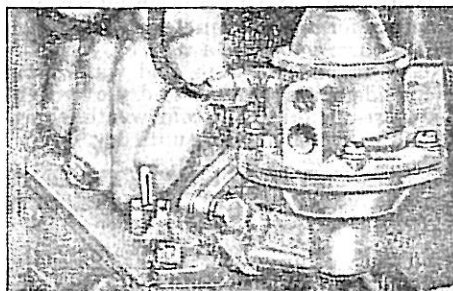


Fig. 6, FUEL PUMP PRIMER

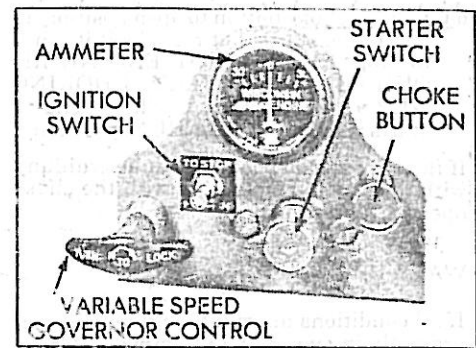


Fig. 7, VH4D, VG4D
CONTROL PANEL

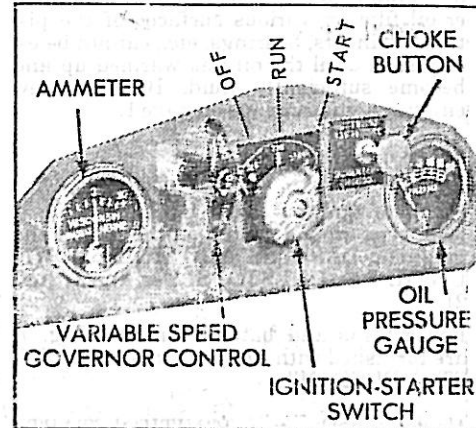


Fig. 8, V465D
CONTROL PANEL

Models VH4D and VG4D only, Fig. 7

5. Pull out ignition switch, if applicable (tag reads "TO STOP PUSH IN").

Magneto ignition engines (less ignition switch), have a lever type ground switch on side of magneto which is always in the ON or running position; except when depressed for stopping.

5a. Close choke by pulling choke button to extreme out position.

5b. Turn engine over slowly one or two revolutions. CAUTION: Be sure that crank does not bind — apply oil to the crank jaw and crank nut extension for ease of engagement and release.

Push choke control button in about half-way and then pull up rapidly on the starting crank. Do not attempt to spin the engine with the starting crank. If engine does not start on the first pull up of the crank, re-engage the crank and repeat the operation.

With electric starting motor; depress starter switch button in place of hand cranking. See Fig. 7.

5c. After engine starts, push choke button in as required for smooth running. Choke should be completely open (button in), when engine is warmed up.

Less choking is necessary in warm weather or when engine is warm, than when cold. Should flooding occur, open choke fully and continue cranking.

Model V465D only, Fig. 8

6. After setting throttle as per paragraph 4. Turn IGNITION-STARTING SWITCH to 'Start' position and at the same time pull out choke button only sufficient to start the engine.

6a. Release choke button to open position. After engine starts, but rechoke if it tends to stop. **EVEN A HOT ENGINE REQUIRES MOMENTARY CHOKING WHEN STARTING.** When engine starts release switch to 'RUN' position.

If flooding should occur, continue cranking with the starting motor, but with the choke open (choke button in).

WARM-UP

If all conditions are right, engine will start promptly in one or two attempts. After engine starts, allow it to warm up a few minutes before applying load. Do not race or gun engine to hurry **WARM-UP.** The proper oil film on various surfaces of the pistons, cylinders, bearings, etc., cannot be established until the oil has warmed up and become sufficiently fluid. Break-in new engine per instructions on page 1.

TO STOP ENGINE

Magneto ignition (open engines) have a lever type ground switch on the side of the magneto. **DEPRESS AND HOLD DOWN UNTIL ENGINE STOPS.** See Fig. 1, Ref. 21.

Power units and battery ignition, Fig. 7; are furnished with an ignition switch, "TO STOP PUSH IN".

Model V465D; turn **IGNITION-STARTING SWITCH** to OFF position. See Fig. 5.

If engine has been running hard and is hot, do not stop it abruptly from full load. Remove the load and allow the engine to run idle (1000 to 1200 R.P.M.), for 3 to 5 minutes. Air circulation from the flywheel will reduce the temperature of the engine much faster and minimize valve warping.

MAINTENANCE

AIR CLEANERS

The air cleaner is an essential accessory, filtering the air entering the carburetor and preventing abrasive dirt from entering the engine and wearing out valves and piston rings in a very short time.

The air cleaner must be serviced frequently, depending on the dust conditions in which the engine is operated. Check hose connections for leaks or breaks and replace all broken or damaged hose clamps.

Excessive smoke or loss of power are good indications that the air cleaner requires attention.

OIL BATH AIR CLEANER, Fig. 9

Service daily; or twice a day if engine is operating in very dusty conditions. Once each week; in comparatively clean conditions.

Remove oil cup from bottom of air cleaner and clean thoroughly. Add the same grade of oil, as used in the engine crankcase, to the **LEVEL LINE** indicated on the oil cup.

Operating the engine under dusty conditions without oil in the air cleaner or with dirty oil, may wear out cylinders, pistons, rings and bearings in just a few days time.

Once a year; or oftener if conditions are severe, the air cleaner should be removed

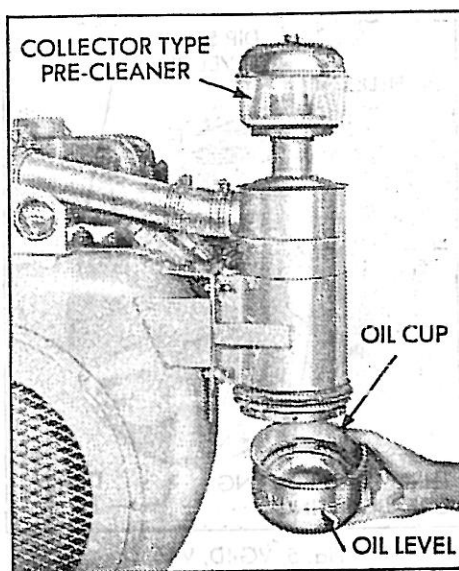


Fig. 9 OIL BATH AIR CLEANER

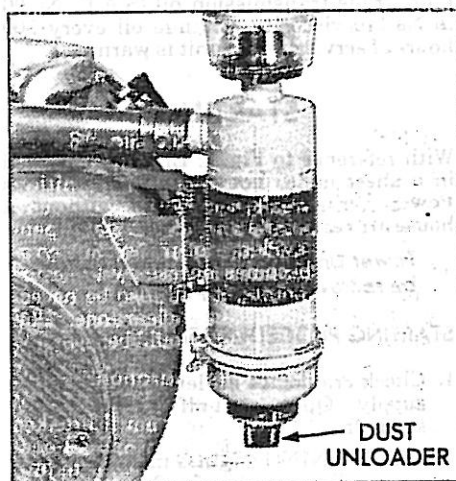


Fig. 10, DRY TYPE AIR CLEANER

from the engine and the element, which is not removable, should be washed in a solvent to clean out accumulated dust and dirt.

DRY TYPE AIR CLEANER, Fig. 10

Service daily; squeeze rubber dust unloader once or twice a day to check for possible obstruction. If engine is operating in very dusty conditions, remove cartridge and shake out the accumulated dirt (do not tap or strike element — it may become damaged). Wipe out dirt from inside cover and bowl, after removing baffle and dumping out dust.

Once each week; the filtering cartridge should be taken out and rinsed under a faucet with cold water, then wash by repeated dippings for several minutes in a solution of lukewarm water and a mild, **NON-SUDSING** detergent. Rinse in cold water from the inside out, and allow to dry overnight before re-installing. In cold weather, protect element from freezing until dry.

DO NOT USE GASOLINE, KEROSENE OR SOLVENT — DO NOT OIL ELEMENT.

After ten washings or one year of service, replace cartridge. New cartridges are available at your **TELEDYNE WISCONSIN MOTOR** Service Center.

PRE-CLEANER

The collector type pre-cleaner, mounted to the top of the air cleaner as illustrated in Fig. 9, removes the larger dirt and dust particles before the air reaches the main air cleaner.

Clean bowl regularly of accumulated dust and dirt. Do not put oil or water in pre-cleaner, this must be kept dry.

BREATHER CAP, Fig. 1, Ref. 3

The crankcase is ventilated thru a breather cap mounted at the top of the oil filler tube. At every oil change, it is recommended that the cap be cleaned by washing in kerosene.

DISTRIBUTOR, Fig. 1, Ref. 8

If engine is equipped with battery ignition distributor:

Every 250 hours of operation; add 3 to 5 drops of medium engine oil to the oiler on side of distributor base.

Every 250 hours, apply 3 to 5 drops of light engine oil (10W), to the felt in the top of the cam sleeve, and 1 or 2 drops to the breaker arm pivot.

Every 250 hours, add a small amount of high melting point grease to the breaker arm rubbing block.

Avoid excessive lubrication. Oil on the contact points will cause them to burn.

GENERATOR - Belt Driver, Fig. 1, Ref. 13

Every 50 hours of operation; add 3 to 5 drops of medium engine oil into the oil cups at both ends of the generator.

FUEL FILTER, Fig. 11

It is very important that the fuel be filtered to prevent sediment, dirt and water from entering the carburetor and causing trouble or even complete stoppage of the engine. The glass filter bowl should be inspected frequently, and cleaned if dirt or water are present.

To remove sediment bowl, loosen nut below bowl, swing bail to one side and twist bowl as it is being removed. Clean screen and bowl thoroughly — replace gasket if it is damaged or hardened.

OIL FILTER, Fig. 1, Ref. 17

A **BY-PASS** type oil filter is furnished on all Model VH4D and VG4D engines, except where the use of other accessories prevent mounting an oil filter.

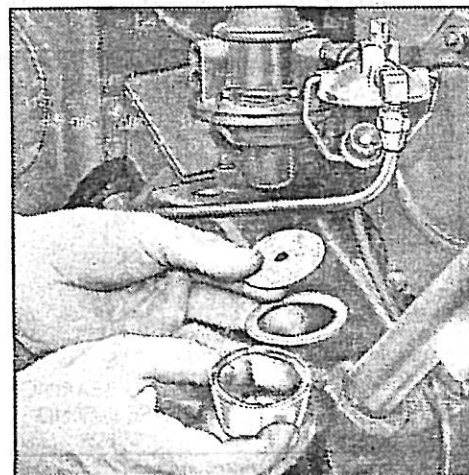


Fig. 11, FUEL FILTER

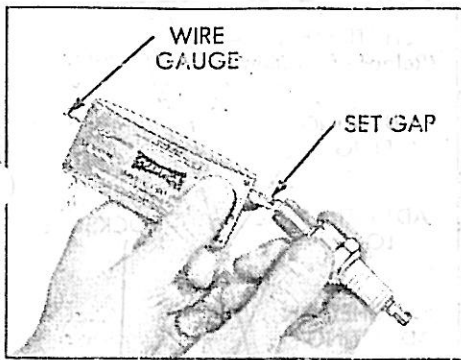


Fig. 12

A FULL-FLOW oil filter is furnished on model V465D engines as standard equipment. Since all of the circulated oil passes thru the filter, it is very important that it be serviced regularly.

The oil filtering cartridge should be replaced after EVERY OTHER OIL CHANGE. If operating conditions are extremely dusty, replace cartridge after every oil change. Use only Wisconsin Micro-Fine or Full-Flo oil filter cartridges from your nearby Teledyne Wisconsin Motor Service Center.

SPARK PLUGS, Fig. 12

Incorrect gap, fouled or worn spark plug electrodes, will have an adverse affect on engine operation. Remove spark plugs periodically — clean, regap or replace if necessary.

Spark plug gap - .030 inch.

Use new spark plugs at the beginning of a new season. Replacement plug must be of the correct heat range, equal to:

Model	Thread Size	Make
VH4D	18mm	Champion D-16J
VG4D		(Wisconsin YD-6)
V465D	14mm	Champion N-12Y
		Wisconsin YD-301

Torque spark plugs 25 to 30 foot pounds for Models VH4D, VG4D, and to 22 foot pounds for Model V465D.

STARTING MOTOR, Fig. 1, Ref. 19

No maintenance is required other than keeping the outside of the starting motor clean, and periodic inspection for insecure mounting and loose or corroded cable connections.

In extreme dust and dirt conditions it may be necessary to occasionally remove the starter from the engine and clean the Bendix by brushing with Kerosene. Do not oil Bendix.

ADJUSTMENTS

CARBURETOR

The carburetor MAIN METERING JET is the fixed type and therefore no adjustment is necessary.

The correct amount of throttle plate opening for the proper low idle speed is obtained by means of the THROTTLE STOP SCREW. However, this is set at the factory

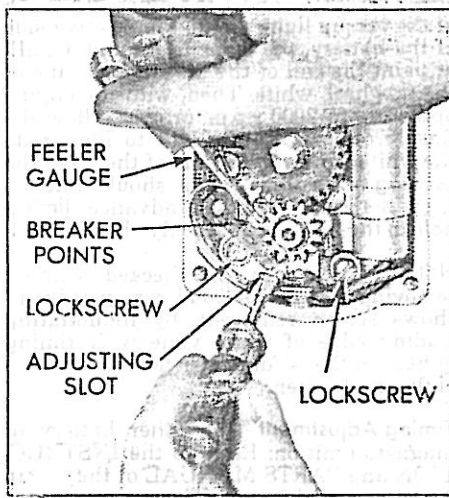


Fig. 13

so that no immediate adjustment is necessary. The IDLE ADJUSTMENT is for smooth low speed operation and this adjustment, if necessary, must be made with the carburetor throttle lever closed. Initial setting is approximately 1 1/2 turns open.

MAGNETO BREAKER POINTS, Fig. 13

At least once each season or when ignition spark becomes weak, remove magneto end cover, inspect points and check gap opening. If there is evidence of pitting or pyramiding and it becomes necessary to resurface or replace points, it will also be necessary to readjust the gap clearance. The BREAKER POINT GAP should be:

.015 inch at full separation.

Turn engine crankshaft over until breaker points are at their maximum opening. Loosen the two lockscrows on breaker plate just enough so that plate can be moved. Place a .015 inch feeler gauge between points. Insert end of small screw driver into adjusting slot at bottom of breaker plate and open or close the contacts by moving plate until a slight drag is felt when sliding the feeler gauge from between the points. Tighten lockscrows and recheck point gap.

Before placing end cover on frame, clean contact surfaces, coat with gasket cement and mount new gasket. Assemble cover, rotor and end cap.

DISTRIBUTOR (Battery Ignition), Fig. 14

The breaker point gap should be:

.020 inch at full separation.

To readjust point gap, turn engine over by means of the hand crank until the distrib-

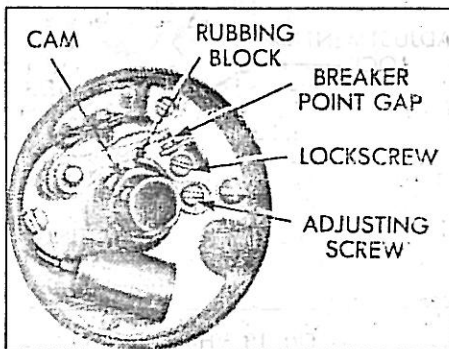


Fig. 14

utor breaker arm RUBBING BLOCK is on a high point of the CAM. Loosen the stationary contact LOCKSCREW slightly and insert a feeler gauge between the points. By means of a screw driver, turn ADJUSTING SCREW until correct gap is obtained. Tighten lockscrow and recheck gap.

Points that are badly pitted or worn should be replaced.

VALVE TAPPET ADJUSTMENT

Models VH4D, VG4D, Fig. 15

With the tappets in their lowest position (valves completely closed) and engine cold, the clearance between valve stem and tappet adjusting screw should be:

Inlet - .008" Exhaust - .016"

The inlet valves are to the inside of the cylinder block, the exhaust valves are toward the outside. Place feeler gauge between valve stem and tappet screw, and adjust clearance by means of two 1/2 inch tappet wrenches.

Model V465D, Fig. 16

The clearance between the valve and rocker arm, with the tappet in its lowest position (valve completely closed) and the engine cold.

Inlet - .008" Exhaust - .014"

The rocker arms can be identified as follows: When facing toward the side of the engine, the Exhaust Rocker Arm is to the right in the cylinder head and the inlet rocker arm to the left.

Measure clearance between the top of the valve and nose of rocker arm with a feeler

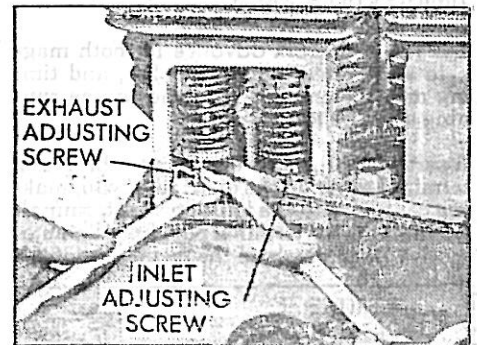


Fig. 15, VH4D, VG4D
VALVE TAPPET ADJUSTMENT

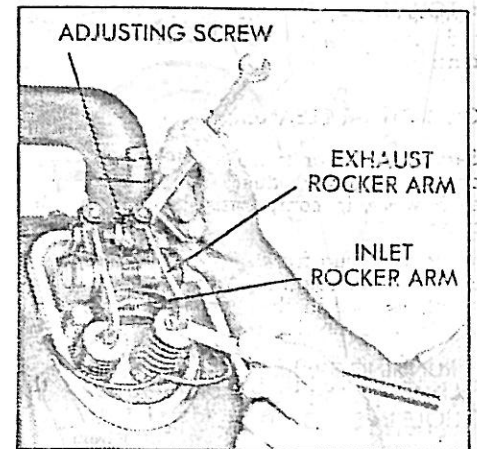


Fig. 16, V465D
VALVE TAPPET ADJUSTMENT

gauge as shown. By means of a 1/2 inch tap-pet wrench, turn the adjusting screw clockwise to decrease valve clearance and counter-clockwise to increase the clearance.

The sequence in which the tappets are adjusted is determined by the 1-3-4-2 firing order. Start by adjusting No. 1 inlet valve clearance first, then by just a short turn of the crank, No. 3 inlet can be adjusted. Return to No. 1 cylinder and adjust the exhaust clearance, then adjust the No. 3 exhaust.

The same procedure applies to the No. 2 and No. 4 bank of cylinders, starting with No. 4 inlet valve. Mark each rocker arm with chalk as adjustment is completed, to prevent repetition.

TIMING

FIRING ORDER

The firing order of the cylinders is 1-3-4-2, and the magneto or distributor rotor turns at one-half engine speed, as is the case with conventional 'In Line' engines.

The intervals between the firing of the cylinders is 180°. No. 1 cylinder is the one nearest to the flywheel in the left bank of cylinders, when viewed from the flywheel end of the engine. No. 3 cylinder is the other cylinder in this bank. No. 2 cylinder is the one nearest to the flywheel in the right bank of cylinders and No. 4 is the other cylinder in this bank. The cylinders are numbered on the head covers.

Note: When disconnecting ignition wires, mark cap, and tag wires for correct re-assembly.

TIMING CHECK, Fig. 17

The running spark advance for both magneto and battery ignition, is 23°, and timing must be checked with the engine running at 2000 R.P.M. or over.

Insert a small screw driver into the No. 1 terminal tower on the distributor cap, making contact with the ignition wire terminal. Connect the red terminal clip, from an automotive Timing Light to the metal part of the

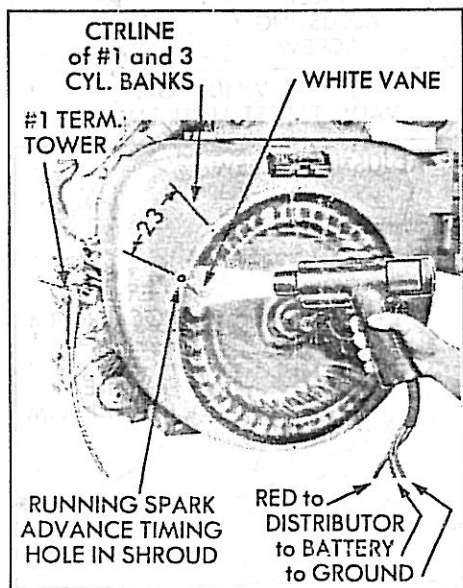


Fig. 17

screw driver. Connect the other two wires of the timing light; one to the positive side of the battery, the other to ground. Chalk or paint the end of the 'X' marked vane of the flywheel, white. Then, with the engine operating at 2000 r.p.m. or over, allow the flash from the timing light to illuminate the white vane. At the time of the flash the leading edge of the vane should line up with the running spark advance timing hole in the front face of the flywheel shroud.

Note: Timing can be checked without removing flywheel shroud screen (Fig. 17 shows screen removed), by illuminating leading edge of white vane with timing light thru the 3/8" diameter hole in rim face of flywheel screen.

Timing Adjustment for either battery or magneto ignition: Refer to the INSTRUCTION and PARTS MANUAL of the specific engine model for adjustment procedure.

CLUTCH ADJUSTMENT

If the clutch begins to slip, it should be readjusted to prevent it from becoming overheated and damaged. First, remove inspection plate to expose the adjusting ring. Release clutch by pushing shifter lever forward (toward engine).

VH4D Clutch, Fig. 18

Turn engine over by means of the starting crank until clutch adjustment lock is visible thru the inspection opening. Loosen adjustment lock screw one full turn. Keep clutch from turning by securing the crankshaft at cranking end. Then, by means of a screw driver, turn adjusting ring one notch at a time in a clockwise direction, until a very firm pressure is required when engaging the clutch shifter lever, and as the clutch snaps into engaged position. Securely tighten adjustment lock screw.

VH4D CLUTCH REDUCTION, Fig. 19

The clutch in the clutch reduction unit is the same as used in the power take-off unit and is adjusted thru two pipe tap openings; one for the adjustment lock screw and the other for turning the adjusting ring. If one of the taps is inaccessible, adjustment can be made thru just one opening by rotating clutch slightly after adjustment lock screw

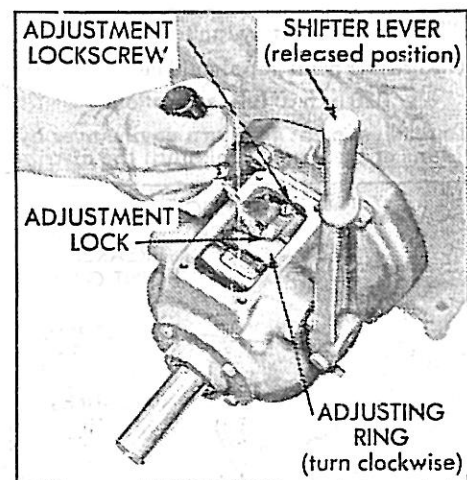


Fig. 18, VH4D CLUTCH ADJUSTMENT

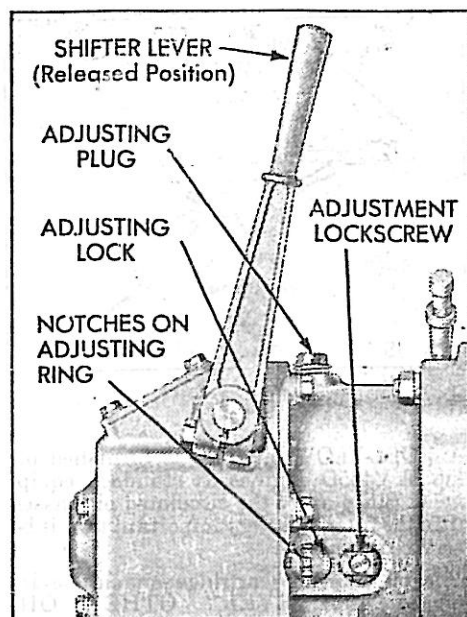


Fig. 19, VH4D CLUTCH REDUCTION ADJUSTMENT

is loosened. Follow adjustment procedures as outlined in preceding paragraph.

VG4D, V465D CLUTCH ADJUSTMENT

Rockford Clutch Fig. 20: After removing the inspection cover and disengaging clutch with the shifter lever, turn engine over by means of the hand crank, until the clutch adjustment lock is visible thru the inspection opening in the clutch housing. Prevent take-off shaft from turning by means of a drift punch wedged in place as shown. Then, loosen the lock screw holding the adjustment lock in place. Insert a screwdriver in one of the notches and turn the adjusting ring, in a counter-clockwise direction, one notch at a time, until a very firm pressure is required to engage the clutch with the shifter lever. Tighten adjusting lock screw and mount inspection cover.

TWIN DISC CLUTCH, Fig. 21: Pull adjusting lockpin out and insert a piece of 1/16" diameter wire into the hole on the side of the lockpin to keep pin in outer position. Turn the adjusting yoke in a clockwise direction

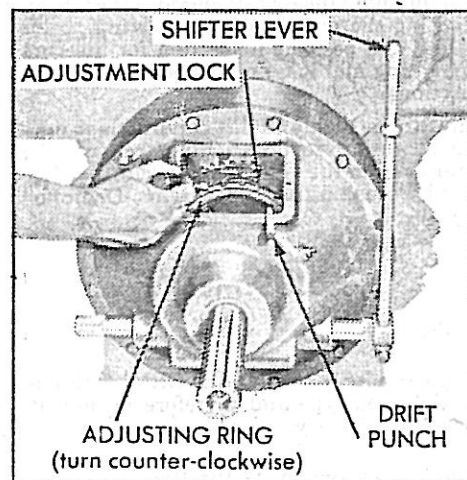


Fig. 20, VG4D, V465D ROCKFORD CLUTCH ADJUSTMENT

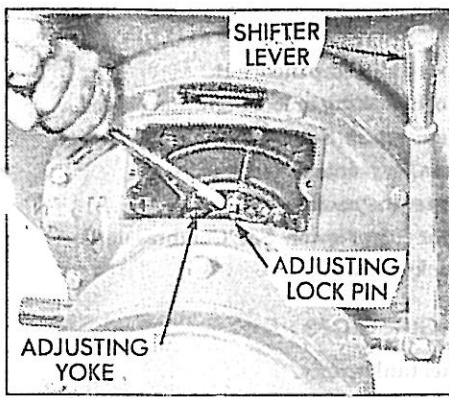


Fig. 21, VG4D, V465D
TWIN DISC CLUTCH ADJUSTMENT

as shown, or wedge a screw driver into the adjusting yoke and against the side of the inspection hole openings to keep the yoke from turning, then turn the take-off shaft counter-clockwise to adjust yoke enough so that the shifter lever requires a distinct pressure to engage. Remove wire from lock-pin and turn adjusting yokes slightly, to allow lockpin to snap into hole in floating plate.

A new clutch generally requires several adjustments until the friction surfaces are worn in. Do Not let a new clutch slip, this will ruin the friction surfaces.

FLYWHEEL ALTERNATOR

Fig. 22 and Fig. 23

12 Volt - 10 Amp or 25 Amp Flywheel Alternator, consisting of a flywheel with Magnetic Rotor, Stator and Rectifier-Regulator modules, is optional equipment on models VH4D and VG4D-furnished when battery ignition is required. There are no brushes, commutator or belts to contend with and no adjustments are necessary.

Since the physical appearance of both 10 amp and 25 amp alternator systems are very similar, they can be distinguished from each other by the ammeter calibrations; 0 to 15 amps for the 10 amp circuit and 0 to 30 amps for the 25 amp circuit.

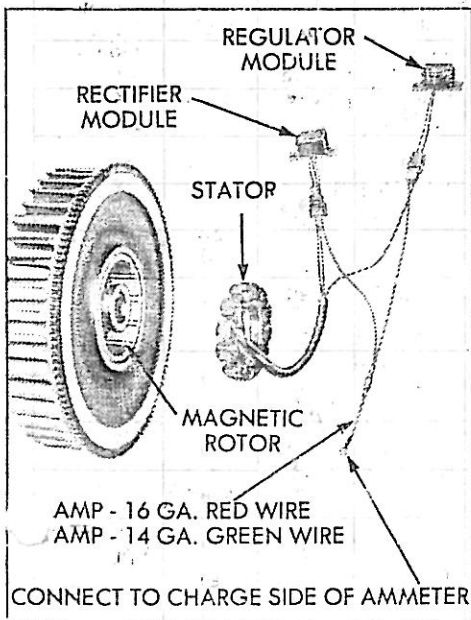


Fig. 22, FLYWHEEL ALTERNATOR

PRECAUTIONS to be exercised in the use of this flywheel alternator:

1. Do not reverse battery connections. This is a negative ground system only.
2. Connect booster batteries — positive to positive and negative to negative.
3. Do not polarize the alternator.
4. Do not ground any wires from stator or modules which terminate at connectors.
5. Do not operate engine with battery disconnected from system.

6. Disconnect at least one battery lead if a battery charger is used.

GENERATOR — WIRING CIRCUIT, Fig. 24

The model V465D engine is equipped with a 12 volt-17 amp generator in a negative ground electrical system. Do not reverse polarity-damage to both generator and regulator will occur. Engine will not operate with carburetor anti-diesel solenoid wire disconnected.

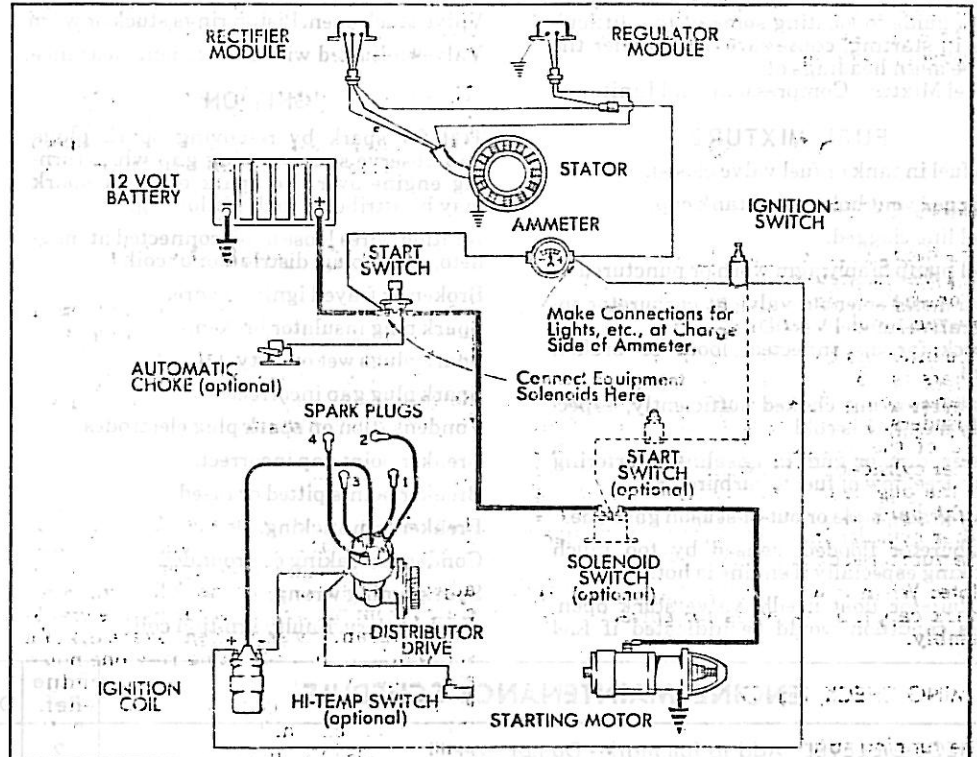


Fig. 23, WIRING DIAGRAM, Flywheel Alternator and Battery Ignition, Models VH4D, VG4D

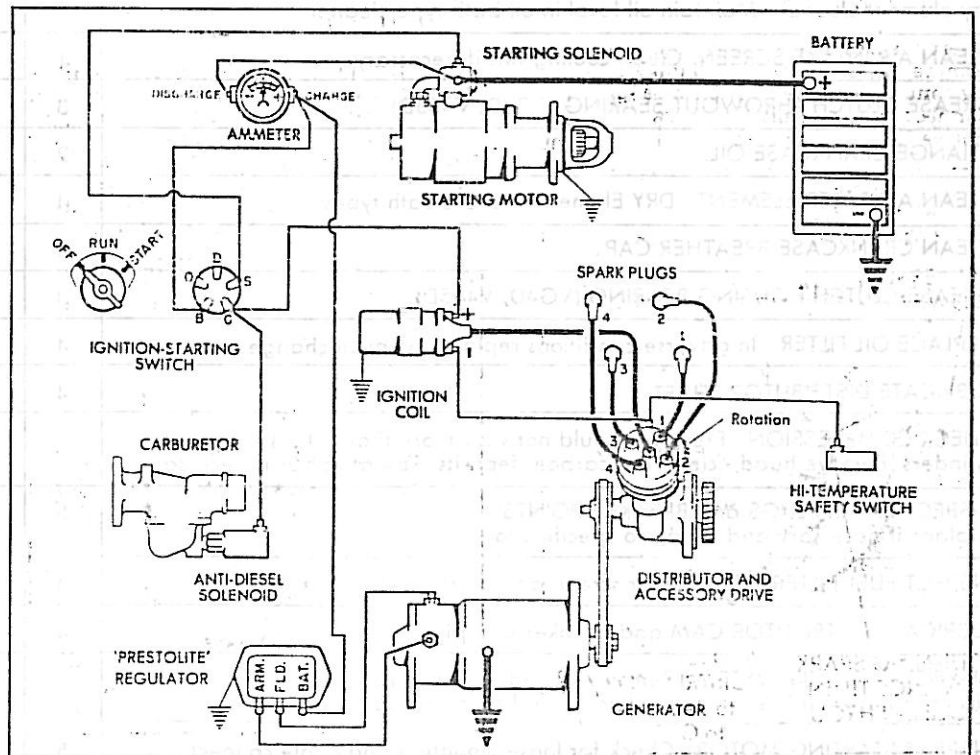


Fig. 24, WIRING DIAGRAM, Generator and Battery Ignition, Model V465D

TROUBLE SHOOTING

The three prime requisites essential to starting and maintaining satisfactory operation of internal combustion engines are:

1. A proper fuel mixture in the cylinder.
2. Good compression in the cylinder.
3. Good spark, properly timed, to ignite the mixture.

If all three of these conditions do not exist the engine cannot be started.

As a guide to locating some of the difficulties in starting, causes are listed under the three main headings of:

Fuel Mixture, Compression, and Ignition.

FUEL MIXTURE

No fuel in tank or fuel valve closed.

Plugged vent hole in fuel tank cap.

Fuel line clogged.

Fuel pump diaphragm worn or punctured.

Anti-diesel solenoid valve at carburetor inoperative (model V465D).

Check for disconnected, loose or broken wire.

Carburetor not choked sufficiently, especially if engine is cold.

Water, dirt, or gum in gasoline interfering with free flow of fuel to carburetor.

Poor grade, stale or out-of-season gasoline.

Carburetor flooded, caused by too much choking especially if engine is hot.

Carburetor float needle valve stuck open. This condition would be indicated if fuel

continues to drip from carburetor with engine standing idle.

COMPRESSION

Cylinders dry due to engine having been out of use. Pour one fluid ounce of crankcase oil through spark plug holes.

Loose or broken spark plug. A hissing noise will be heard in cranking due to escaping gas mixture on compression stroke.

Damaged cylinder head gasket or loose cylinder head. This will likewise cause hissing noise on compression stroke.

Valve stuck open. Piston rings stuck or worn.

Valves adjusted with insufficient clearance.

IGNITION

Test for spark by removing spark plugs and observe spark at plug gap while turning engine over. No spark or weak spark may be attributed to the following:

Ignition wires loose or disconnected at magneto, spark plug, distributor or coil.

Broken or frayed ignition wires.

Spark plug insulator broken.

Spark plugs wet or dirty.

Spark plug gap incorrect.

Condensation on spark plug electrodes.

Breaker point gap incorrect.

Breaker points pitted or fused.

Breaker arm sticking.

Condenser leaking or grounded.

Spark timing wrong.

Weak battery. Faulty ignition coil.

ENGINE MISSES

Spark plug gap incorrect.

Worn, leaking or loose ignition cables.

Weak spark. See 'Ignition' test for spark.

Breaker points pitted or worn.

Water in gasoline.

Poor compression. See 'Compression'.

Sticky valves.

ENGINE STOPS

Fuel tank empty.

Water, dirt or gum in gasoline.

Gasoline vaporized in fuel lines, due to excessive heat around engine (Vapor Lock). See 'Stopping Engine'.

Vapor lock in fuel lines due to using winter gas (too volatile) in hot weather.

Air vent hole in fuel tank cap plugged.

Ignition troubles. See 'Ignition'.

OVERHEATING

Crankcase oil supply low.

Ignition timing wrong.

Low grade of gasoline.

Engine overloaded.

Restricted cooling air circulation.

Part of air shroud removed from engine.

Dirt between cooling fins.

Intake or rotating screen clogged with dirt.

Restricted exhaust.

ENGINE MAINTENANCE SCHEDULE

	Page Ref.	Daily	Weekly or 50 hrs.	100 hrs.	250 hrs.	Seasonally or 500 hrs.
CHECK OIL LEVEL. Add to full mark - Do not overfill.	2	●				
CHECK AIR CLEANER. Shake out accumulated dirt from dry element cleaner - Maintain oil level in oil bath type cleaner.	4	●				
CLEAN AIR INTAKE SCREEN. Clean cooling fins if necessary.	1	●				
GREASE CLUTCH THROWOUT BEARING (VG4D, V465D).	3	●				
CHANGE CRANKCASE OIL.	2		●			
CLEAN AIR FILTER ELEMENT. DRY Element and OIL Bath types.	4		●			
CLEAN CRANKCASE BREATHER CAP.	4		●			
GREASE CLUTCH HOUSING BEARING (VG4D, V465D).	3		●			
REPLACE OIL FILTER. In adverse conditions replace every oil change.	4			●		
LUBRICATE DISTRIBUTOR SHAFT.	4				●	
CHECK COMPRESSION. Pressure should not vary more than 10 p.s.i. between cylinders. Remove head - clean out carbon deposits. Reseat valves if necessary.	-				●	
INSPECT SPARK PLUGS and BREAKER POINTS. Replace if necessary and regap to specification.	5				●	
INSPECT FUEL FILTER. Clean filter screen and glass bowl.	4				●	
LUBRICATE DISTRIBUTOR CAM and breaker arm pivot.	4				●	
INSPECT COOLING SYSTEM. Remove shrouding and scrape off dirt from between fins, around cylinders and from shrouding.	1				●	
INSPECT STARTING MOTOR. Check for loose mounting and cable connections.	5				●	
CHANGE OIL IN CLUTCH and REDUCTION GEAR HOUSINGS.	2					●