

MAINTENANCE INSTRUCTIONS

AND

PARTS LIST

FOR

20 TO 40 FT. ISO/ANSI LOCKING
FORK TRUCK EXPANDABLE SPREADER

MODEL NO. 4380

SERIAL NO. 37580

PURCHASED BY

SOUTHERN EQUIPMENT COMPANY

PUBLISHED BY

RPC DIVISION
MIDLAND-ROSS CORPORATION
BOX 490
v ROXBORO, NORTH CAROLINA 27573

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RPC DIVISION - MIDLAND-ROSS CORPORATION
THE CONTAINER HANDLING SPREADER WARRANTY TO PURCHASERS

The Spreader is warranted for six (6) months or 1500 operating hours, whichever occurs first, from the date of shipment to the purchaser, to be free from latent defects in material and workmanship disclosed under normal use and service.

If the purchaser, within this period, notifies RPC, in writing, of any claimed defect in any equipment delivered by RPC and such equipment is found by RPC, after appropriate tests and inspection by RPC, not to be in conformity with this warranty, RPC will at its option and expense, either repair the same or provide a replacement therefor, F. O. B., RPC's shipping point.

The foregoing warranty does not cover and RPC makes no warranty with respect to:

- a. Failures not reported to RPC within thirty (30) days of detection of the alleged defect.
- b. Failures or damage due to negligence, other than that of RPC, accident, abuse, improper installation, improper operation, or abnormal conditions.
- c. Equipment which has been in any way tampered with, repaired or altered by anyone other than an authorized representative of RPC.
- d. Equipment damaged in shipment or otherwise without the fault of RPC.
- e. Expenses incurred by the purchaser in an attempt to correct or repair any alleged defect.
- f. Engines, tires, batteries, electrical and hydraulic cylinders, valves, pumps and similar components which are covered only by the standard warranty of the individual manufacturer of such equipment. RPC expressly disclaims any liability for defects in such equipment and for any incidental or consequential damages arising from such defects. Upon request, RPC will assign to the purchaser any rights it might have arising out of the warranties given by any manufacturer of such materials or components.

- g. Any losses, costs, expenses, liabilities and damages (including but without limitation to, loss of use or profits, damage to persons or property, all liabilities of the purchaser to its customers or third persons, and all other special or consequential damages) whether direct or indirect, and whether or not resulting from, or contributed to by the default or negligence of RPC, its agents, employees or subcontractors, which might be claimed as the result of the use or failure of the equipment delivered.

Purchaser shall not return equipment or parts thereof alleged to be defective without the approval of RPC. All parts claimed defective shall be returned properly identified to the Company's factory, charges prepaid.

RPC makes no further warranty, either express or implied or by trade usage in connection with the design, sale or use of any of its products.

RPC's liability on its warranty shall in no event exceed the cost of correcting the defects in the equipment sold or replacing the same with non-defective equipment.

THE WARRANTY STATED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR PARTICULAR USE, AND UNDER NO CIRCUMSTANCES WILL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

SECTION 2

INTRODUCTION

HANDLING OF CONTAINERS MAY BE ACCOMPLISHED EASILY AND SAFELY, PROVIDING THE FORK TRUCK OPERATOR FULLY UNDERSTANDS ALL OPERATING FUNCTIONS AND THEIR DESIGNED LIMITS.

SECTION 3

SPREADER FUNCTIONS

SPREADER EXPANSION

THE SPREADER WILL ACCOMMODATE 20 TO 40 FT. ISO/ANSI CONTAINERS. EXPANSION FROM THE 20 FT. LENGTH CAN BE ACCOMPLISHED BY DEPRESSING THE 'EXPANSION' BUTTON ON THE CONTROL BOX ASSEMBLY (DWG. C4514) AND HOLDING THE BUTTON UNTIL THE SPREADER REACHES THE DESIRED POSITION. THE STOPS AT THE 20 & 40 FT. POSITIONS ARE MECHANICAL AND THEY ARE SET TO THE PROPER LENGTH AT THE FACTORY. ANY POSITIONS BETWEEN THESE SETTINGS TO BE DONE BY SETTING THE SPREADER LENGTH TO THE CONTAINER THAT IS TO BE TRANSPORTED.

SPREADER RETRACTION

RETRACTION IS ACCOMPLISHED BY DEPRESSING THE 'RETRACT' BUTTON ON THE CONTROL BOX ASSEMBLY (DWG. C4514) AND HOLDING THE BUTTON DOWN UNTIL THE EXPANDABLE FRAMES HAVE RETRACTED TO THE DESIRED POSITION.

LOWERING

ONCE THE SPREADER HAS BEEN SET TO THE APPROPRIATE LENGTH IT MAY BE LOWERED ONTO THE CONTAINER. THE TWIST LOCKS MUST BE IN THE UNLOCKED POSITION AT THIS TIME, AS INDICATED BY THE GREEN 'UNLOCKED' LIGHT ON THE CONTROL BOX BEING LIT.

COUPLING

AFTER THE SPREADER HAS COME TO REST ON THE CONTAINER, THE FORK TRUCK OPERATOR MAY COUPLE THE SPREADER TO THE CONTAINER

THE OPERATOR MAY DEPRESS THE LOCK BUTTON ON THE CONTROL BOX. THE GREEN LIGHT WILL EXTINGUISH AND THE AMBER 'LOCKED' LIGHT WILL BE ACTIVATED WHEN THE TWIST LOCKS ROTATE TO THE LOCKED POSITION, INDICATING THAT THE SPREADER HAS BEEN COUPLED TO THE CONTAINER.

INCOMPLETE COUPLING

IF AFTER ATTEMPTING TO COUPLE THE OPERATOR DOES NOT RECEIVE AMBER 'LOCKED' LIGHT, THIS INDICATES THAT THERE HAS BEEN AN INCOMPLETE COUPLING BETWEEN SPREADER AND CONTAINER. THE OPERATOR MUST NOW DEPRESS THE UNLOCK BUTTON AND RAISE THE SPREADER TO PERMIT ANOTHER ATTEMPT AT COUPLING, AS PREVIOUSLY DESCRIBED.

LIFTING AND MOVING

AFTER THE CONTAINER HAS BEEN LIFTED, IF THE 'UNLOCK' BUTTON IS ACCIDENTALLY DEPRESSED CAUSING THE SWITCH TO MAKE CONTACT, THE ANTI-CREEP SAFETY DEVICE INCORPORATED IN EACH TWIST LOCK MECHANISM WOULD PREVENT ANY ATTEMPT AT UNCOUPLING WHILE THE CONTAINER IS SUSPENDED.

UNCOUPLING

AFTER THE CONTAINER HAS BEEN MOVED, AND THE SPREADER IS RESTING ON IT, THE OPERATOR MAY THEN DEPRESS THE 'UNLOCK' BUTTON. THE AMBER LIGHT WILL EXTINGUISH AND THE GREEN 'UNLOCKED' LIGHT WILL BE ACTIVATED WHEN THE TWIST LOCKS ROTATE TO THE UNLOCKED POSITION, INDICATING THE SPREADER HAS BEEN UNCOUPLED FROM THE CONTAINER. THE TWIST LOCKS SHOULD REMAIN IN THE UNLOCKED POSITION, READY TO ENGAGE THE NEXT CONTAINER.

INCOMPLETE UNCOUPLING

IF AFTER ATTEMPTING TO UNCOUPLE THE GREEN LIGHT FAILS TO INDICATE THAT THE TWIST LOCKS HAVE REACHED THE 'UNLOCK' POSITION, THIS INDICATES THAT THE ANTI-CREEP SAFETY DEVICES INCORPORATED ON EACH TWIST LOCK MECHANISM HAVE NOT BEEN BY-PASSED. THE SPREADER SHOULD BE LOWERED UNTIL THE TWIST LOCKS UNLOCK AND THE GREEN 'UNLOCKED' LIGHT COMES ON.

SPREADER SLEWING

BECAUSE OF THE DIFFICULTY OF POSITIONING A FORK TRUCK PERPENDICULAR TO THAT OF THE CONTAINER. THE SPREADER HAS A BUILT IN HYDRAULICALLY ACTUATED SLEWING SYSTEM. THIS SLEWING SYSTEM ALLOWS THE OPERATOR TO POSITION THE SPREADER AT ANY ANGLE UP TO AND INCLUDING 7° CLOCKWISE OR COUNTER-CLOCKWISE FROM PERPENDICULAR TO THE FORK POCKETS.

THE SLEWING OPERATION CAN BE ACCOMPLISHED BY DEPRESSING EITHER THE SLEW CCW OR SLEW CW BUTTON AND HOLDING IT DOWN UNTIL CONTAINER AND SPREADER ARE ANGULARLY ALIGNED AS DETERMINED FROM THE OPERATOR'S VISUAL STANDPOINT.

SECTION 4

HYDRAULIC SYSTEM

THE SPREADER HYDRAULIC SYSTEM IS A SYSTEM DESIGNED TO DELIVER HYDRAULIC FLUID AT A PRESCRIBED FLOW AND PRESSURE TO THE CONTROL CIRCUITS. POWER COMES FROM THE FORK TRUCK.

RELIEF VALVE - THE RELIEF VALVE (ITEM 12, DWG. D4519) IS OF THE PILOT CONTROLLED SOLENOID OPERATED TYPE. IN THE NORMAL POSITION THE HYDRAULIC FLUID COMING FROM THE FORK TRUCK AUTOMATICALLY DUMPS FLUID TO THE RETURN. WHEN ANY HYDRAULIC FUNCTION IS SELECTED THE SOLENOID VALVE PERMITS FLOW TO THE OTHER CIRCUITS. THE OVERLOAD OR SURGE SETTING FOR THE VALVE SHOULD BE 2,200 PSI @ 15 GPM.

PRESSURE GAUGE

A PRESSURE GAUGE IS INSTALLED FOR VISUAL MONITORING OF THE SYSTEM PRESSURE AND MAY ALSO BE USED TO SET THE PRESSURE OF THE RELIEF VALVE.

HYDRAULIC PRESSURE SETTINGS

<u>ITEM</u>	<u>ITEM #</u>	<u>DWG. NO.</u>	<u>SETTING</u>
RELIEF VALVE	12	D4519	2200 PSI @ 15 GPM
DUAL RELIEF VALVE	10	D4519	600 PSI @ 15 GPM
DUAL RELIEF VALVE	11	D4519	2000 PSI @ 15 GPM
PRESSURE REDUCING VALVE	7	D4519	250 PSI
DUAL FLOW CONTROL	8	D4519	2 GPM

SECTION 5

ELECTRICAL SYSTEM

GENERAL - THE SPREADER RECEIVES ITS ELECTRICAL POWER FROM THE FORK TRUCK, THROUGH A FLEXIBLE ELECTRICAL CABLE WHICH EXTENDS FROM THE FORK TRUCK TO THE MAIN JUNCTION BOX ON THE SPREADER. ALL SPREADER CONTROL SWITCHES AND INDICATING LIGHTS ARE LOCATED ON THE CONTROL BOX. POWER MUST BE OFF WHEN CONNECTING AND DISCONNECTING ELECTRICAL CONNECTORS.

CONTROL CIRCUITS -

EXPANSION - THIS CIRCUIT IS COMPOSED OF ONE SOLENOID AND A MOMENTARY CONTACT SWITCH. ENERGIZING SOL. 2 WILL EXPAND THE SPREADER MOVEABLE FRAMES.

RETRACTION - THIS CIRCUIT IS COMPOSED OF ONE SOLENOID AND A MOMENTARY CONTACT SWITCH. ENERGIZING SOLENOID 1 WILL RETRACT THE SPREADER.

LOCK - THIS CIRCUIT IS COMPOSED OF ONE SOLENOID AND 1 MOMENTARY CONTACT PUSHBUTTON SWITCH. ENERGIZING SOLENOID 3 WILL LOCK TWIST LOCKS.

UNLOCK - THIS CIRCUIT IS COMPOSED OF ONE SOLENOID AND 1 MOMENTARY CONTACT PUSHBUTTON SWITCH. ENERGIZING SOLENOID 4 WILL UNLOCK TWIST LOCKS.

INDICATION LIGHT CIRCUIT

UNLOCK - THE 'UNLOCK' POSITION IS INDICATED BY A GREEN LIGHT. THE CIRCUIT IS COMPLETED WHEN THE TWIST LOCKS ARE ROTATED TO THE UNLOCKED POSITION, CLOSING SWITCHES LS1 THRU LS4.

LOCK - THE 'LOCK' POSITION IS INDICATED BY AN AMBER LIGHT. THE CIRCUIT IS COMPLETED BY THE TWIST LOCKS BEING ROTATED TO THE LOCKED POSITION CLOSING LIMIT SWITCHES LS5 THRU LS8.

SECTION 6
TWIST LOCK ADJUSTMENTS

SECTION 7
PERIODIC MAINTENANCE

PRIOR TO EACH START-UP:

1. OPERATE TWIST LOCKS TO SEE THAT THE LIMIT SWITCHES ARE MAKING AND BREAKING CONTACT PROPERLY AND INDICATION CIRCUITS ARE IN WORKING ORDER.
2. BLOCK ONE TWIST LOCK SO AS NOT TO COMPLETE 'LOCK' OR 'UNLOCK' CIRCUIT. THIS CAN BE CHECKED BY OBSERVING THAT THERE IS NO LIGHT INDICATION.

WEEKLY:

1. CHECK SYSTEM PRESSURE
2. INSPECT HYDRAULIC TUBING & HOSES FOR LEAKAGE.

MONTHLY:

1. GREASE ALL LUBRICATION POINTS (MORE FREQUENTLY IF SERVICE CONDITIONS WARRANT.)

SECTION 8

TROUBLE SHOOTING

TROUBLE

PRESSURE BUT NO CYLINDER
MOVEMENT

OIL FOAMING

OPERATOR PUSHES BUTTON
TO ACTIVATE SOLENOID BUT
GETS NO MOVEMENT.

OPERATOR PUSHES "LOCK" OR
"UNLOCK" POSITION BUTTON
BUT GETS NO INDICATION
LIGHT.

POSSIBLE CAUSE

WORN VALVE.

PRESSURE TOO LOW.

VALVE STUCK DUE TO DIRT.

SOLENOID BURNED OUT.

DAMAGED CYLINDER BORE,
ROD OR PISTON PACKING

WRONG TYPE OF OIL.

SHAFT SEAL ALLOWING
ENTRY OF AIR.

BROKEN WIRE, BAD COIL,
BAD SWITCH, LOOSE CONNECTION

TWIST LOCKS BINDING.

KEY SHEARED.

CONNECTING PIN LOST.

LIMIT SWITCH NOT CLOSED.

BULB BURNED OUT.

BAD CONNECTION.

REMEDY

REPLACE

SET AT CORRECT PRESSURE.

CLEAN VALVE AND CHANGE
OIL.

REPLACE COIL.

REPAIR OR REPLACE
DEFECTIVE EQUIP.

CLEAN SYSTEM AND FILL
WITH PROPER OIL.

REPLACE WITH NEW SEAL.

BACK TRACK CIRCUIT FROM
COIL UNTIL TROUBLE IS
LOCATED.

REPAIR.

REPLACE.

REPLACE.

ADJUST OR REPAIR.

REPLACE.

REPAIR.

20 TO 40 FT. ISO/ANSI FORK TRUCK
EXPANDABLE SPREADER

RECOMMENDED SPARE PARTS LIST

HYDRAULIC COMPONENTS:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
1	PRESSURE REDUCING VALVE	MANATROL NO. MPR-1200-P-S-I
1	PRESSURE RELIEF VALVE, SOLENOID CONTROLLED PILOT TYPE	MANATROL NO. MRFN-20P-2-K-H-9-A-B-RPC
1	DUAL RELIEF VALVE	FLUID CONTROLS NO. 1LL23-F6-15S
1	DUAL RELIEF VALVE	FLUID CONTROLS NO. 1LL23-F6-25S
1	DIRECTIONAL CONTROL VALVE	MANATROL #111-04-C-4-1-A-K-D-RPC
1	DUAL FLOW CONTROL VALVE	MANATROL #MF-1200-S-10
1	PRESSURE GAGE	MARSHALLTOWN, NO. 186, 0-3000 PSI RANGE
1	LOCK CYLINDER,	T-J SQUARE MODEL LS3, 1 $\frac{1}{2}$ " BORE, 4" STROKE, 3/4" ROD DIA. TYPE 2 ROD END W/1/2"-20 FEMALE THDS & WRENCH FLATS, 1/4" NPT THDS. IN POSITION 2.
1	T-J CYLINDER REPAIR KIT	T-J NO. G-6332-005.
2	EXPANSION CYLINDER GLAND CARTRIDGE KIT	PARKER NO. RG 2AHL 0201
1	SLEWING CYLINDER GLAND CARTRIDGE KIT	PARKER NO. RG 2AHL 0131
3	CYLINDER PISTON SEAL KIT	PARKER NO. PK 322 HLLU1
1	SLEWING CYLINDER	HANNIFIN NO. 3 $\frac{1}{4}$ BB-2HL 14 X 8" STROKE
1	COUPLER BODY	SNAP-TITE #VPHC8-8F
1	NIPPLE BODY	SNAP-TITE #VPIN8-8F
1	DUST CAP	SNAP-TITE #PDCH-8
1	COUPLER BODY	SNAP-TITE #VPHC 12-12F
1	NIPPLE BODY	SNAP-TITE #VPIN 12-12F
1	DUST CAP	SNAP-TITE #PDCH-12
1	COUPLER PLUG	SNAP-TITE #PDPH-12

RECOMMENDED SPARE PARTS LIST

HYDRAULIC COMPONENTS CONT'd

QUANTITY

DESCRIPTION

PART NO.

2 HYDRAULIC HOSE ASSEMBLIES CONSISTING OF FOLLOWING:

1 HYDRAULIC HOSE, 30" LG.

PARKER NO. 301-6

2 SWIVEL FITTING
2 HYDRAULIC HOSE ASSEMBLIES CONSISTING OF FOLLOWING:

PARKER NO. 20630-6-6

1 HYDRAULIC HOSE, 7 FT. LG.

PARKER NO. 301-8

2 SWIVEL FITTING

PARKER NO. 20630-8-8

ELECTRICAL COMPONENTS:

1 LIMIT SWITCH

DENISON NO. C3BT-JD04T

1 PLUG, ON SPREADER END OF POWER CABLE.

PYLE-NATIONAL NO. ZPEDL-1616-312 SN

1 RECEPTACLE, ON MAIN JUNCTION BOX

PYLE-NATIONAL NO. ZREP-16-312 PN

2 INDICATING BULB

CUTLER-HAMMER NO. 6S6-18V

OTHER COMPONENTS:

4 FLUOROGOLD SLIDE BEARINGS

NO. UBS 75

4 FLUOROGOLD SLIDE BEARINGS

NO. UBSP75 MODIFIED FOR A = 18";
C = 15 3/4"

2 CYLINDER ROD SLIDE BEARING.

LINK-BELT NO. 3232F MODIFIED PER
MAIN ASS'Y. DWG. 4380.

1 TWIST LOCK ASS'Y.

SERIES 2H and H

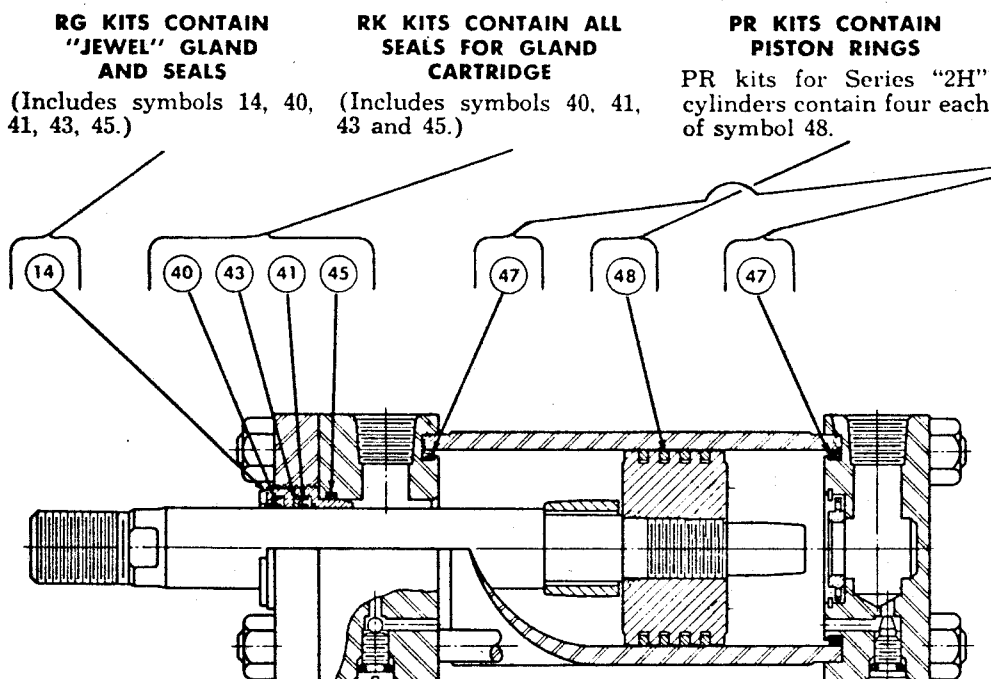
PARTS IDENTIFICATION HANNIFIN HYDRAULIC CYLINDERS (STANDARD SEALS)

BULLETIN 1110-M1

Revised August 1972

SUPERSEDES OCT. 1964

SEAL KITS: Seal Kits below cover Standard Series "2H" and "H" Cylinders, 1½" through 8" bore sizes, for Standard (Class 1) service.



**RG KITS CONTAIN
"JEWEL" GLAND
AND SEALS**

(Includes symbols 14, 40, 41, 43, 45.)

**RK KITS CONTAIN ALL
SEALS FOR GLAND
CARTRIDGE**

(Includes symbols 40, 41, 43 and 45.)

**PR KITS CONTAIN
PISTON RINGS**

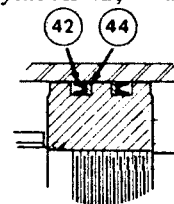
PR kits for Series "2H" cylinders contain four each of symbol 48.

**CB KITS CONTAIN
CYLINDER BODY END SEALS**

CB kits for Series "2H" cylinders contain two each of symbol 47. Note: Back-up washer for cylinder body seal on all bore size hydraulic cylinders are no longer required. When making repairs on existing Series H, 2H Hydraulic cylinders, install only the "O" ring seal, symbol 47, at each end of the cylinder.

**PK KITS CONTAIN
PISTON LIPSEALS®
AND BODY END SEALS**

PK kits for Series "2H" contain two each of symbols 42, 44 and 47.



Service kits of expendable parts for Series "2H" fluid power cylinders are stocked in principal industrial locations across the U.S.A. and other countries. For prompt delivery and complete information, contact your nearest distributor or Parker Hannifin office.

Standard Seals—Class 1 Service Kits are standard, and contain seals of Nitrile (Buna-N) elastomers for standard fluid service. These seals are suitable for use when air, hydraulic (mineral-type) oil, water-glycol fluid or water-in-oil emulsions are the operating medium.

The recommended operating temperature range for Class 1 seals is -10° F. to +165° F. These seals will function at temperatures up to 200° F. with reduced life.

Special Seals—Class 5 Service Kits contain seals of fluorocarbon elastomers (Viton) for special fluid service. These seals are especially suitable for most straight synthetic phosphate ester and phosphate ester base (fire-resistant) fluids. They can also be used when air, hydraulic oil, water glycol or water-in-oil emulsions are the operating medium.

The recommended operating temperature range for Class 5 seals is -10° F. to +350° F. These seals will function at temperatures up to +400° F. with reduced life.

To order Class 1, specify kit numbers listed in the table below. For Class 5 seal kits see bulletin 1110-M2.

ST'D. ROD DIA.	RG GLAND CARTRIDGE KIT NOS.*	RK ROD SEAL KIT NOS.*	GLAND CARTRIDGE WRENCH PART NO.	SPANNER WRENCH PART NO.	BORE SIZE	CB BODY SEALS KIT NOS.	PR PISTON RINGS KIT NOS.	PK PISTON SEALS KIT NOS.	TIE ROD NUT TORQUE SPECIFICATIONS FOOT POUNDS
	INCLUDES RK KIT	CONTAINS ROD SEALS							
½"	RG2AHL 0051	RK2AHL 0051	069590 0000	011676 0000					
5/8"	RG2AHL 0061	RK2AHL 0061	069590 0000	011676 0000	1½"	CB152H L001	PR152H 0000	PK152H LL01	18
1"	RG2AHL 0101	RK2AHL 0101	069591 0000	011676 0000	2"	CB202H L001	PR202H 0000	PK202H LL01	45
1 3/8"	RG2AHL 0131	RK2AHL 0131	069592 0000	011703 0000	2½"	CB252H L001	PR252H 0000	PK252H LL01	45
1 3/4"	RG2AHL 0171	RK2AHL 0171	069593 0000	011677 0000	3"	CB322H LU01	PR322H 0000	PK322H LLU1	120
2"	RG2AHL 0201	RK2AHL 0201	069594 0000	011677 0000	4"	CB402H LU01	PR402H 0000	PK402H LLU1	130
2½"	RG2AHL 0251	RK2AHL 0251	069595 0000	011677 0000	5"	CB502H LU01	PR502H 0000	PK502H LLU1	310
3"	RG2AHL 0301	RK2AHL 0301	069596 0000	011677 0000	6"	CB602H LU01	PR602H 0000	PK602H LLU1	525
3½"	RG2AHL 0351	RK2AHL 0351	069597 0000	011677 0000	7"	CB702H LU01	PR702H 0000	PK702H LLU1	790
4"	RG2AHL 0401	RK2AHL 0401	069598 0000	011677 0000	8"	CB802H LU01	PR802H 0000	PK802H LLU1	1160
5"	RG2AHL 0501	RK2AHL 0501	069599 0000	011678 0000					
5½"	RG2AHL 0551	RK2AHL 0551	069600 0000	011678 0000					

*Kit numbers listed above identify Class 1 seals only. To order Class 5 (Viton) seal kits, see Bulletin 1110-M2. The above kits do not apply to 10" and 12" bore size cylinders.

NOTE: Expendable parts for 10" and 12" bore sizes are also available. See bulletin 0995-M4.

HOW TO ORDER SEAL KITS: When ordering seal kits, call out kit number listed above, and if your fluid or temperature conditions differ from standard service, call out the name of the fluid and the temperature.

CYLINDER DIVISION

PARKER HANNIFIN

501 So. Wolf Road, Des Plaines, Illinois 60016

HARD PARTS AND SEALS SERIES 2H and H HYDRAULIC CYLINDERS

HEAD ASSEMBLIES

The following head assemblies, when cushioned, include symbols 69, 70, 71, 72; when non-cushioned, they include head only. NOTE — When ordering service assembly, specify assembly number and “cushioned” or “non-cushioned”.

ASS'Y NO.	DESCRIPTION
1SA	Basic head (symbol 1)
2SA	Side lug mounting head (symbol 2)
3SA	Centerline mounting head (symbol 3)
4SA	Side tapped mounting head (symbol 4)
5SA	Trunnion mounting head (symbol 5)
6SA	End lug mounting head (symbol 6)

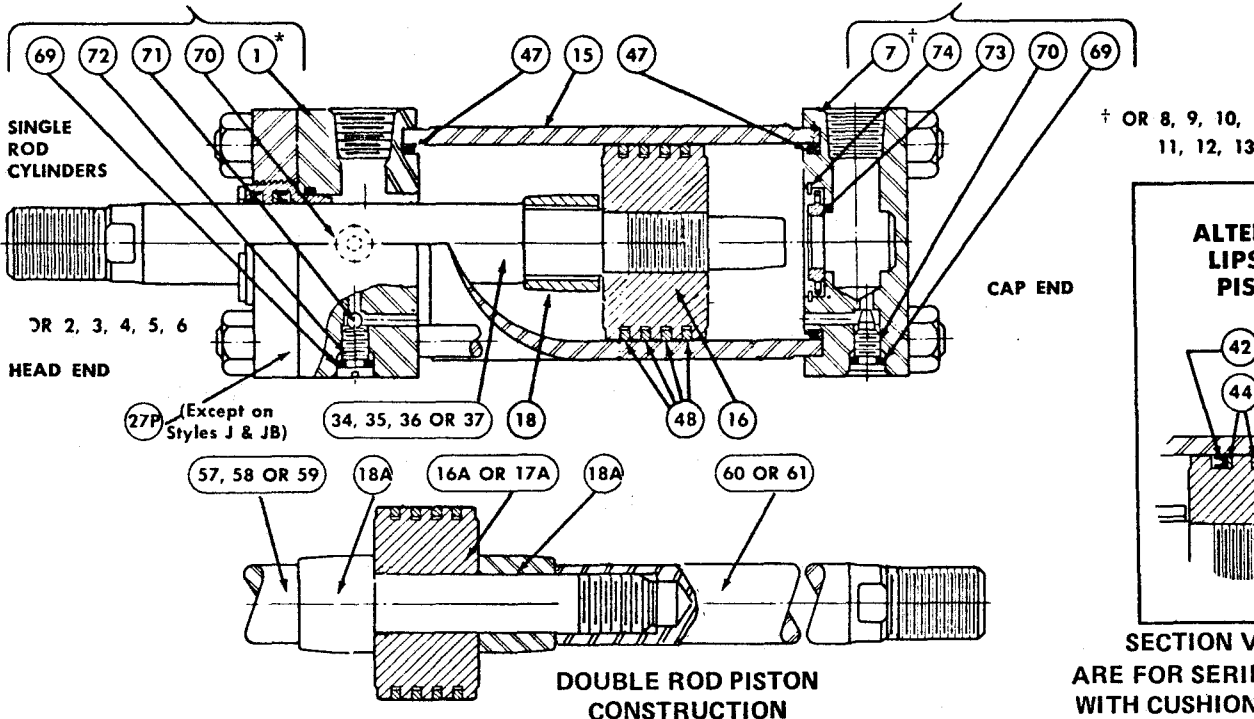
SERVICE ASSEMBLY KITS

Service assemblies for servicing “2H” cylinders reduce your maintenance time and purchasing time. By specifying service assemblies for your power cylinder, you will receive sub-assemblies ready for installation. Instructions for installation will be included. Your paper work will be reduced by avoiding the necessity of the identification of each part.

CAP ASSEMBLIES

The following cap assemblies, when cushioned, include symbols 69, 70, 73, 74; when non-cushioned, they include cap only. NOTE — When ordering service assembly, specify assembly number and “cushioned” or “non-cushioned”.

ASS'Y NO.	DESCRIPTION
7SA	Basic cap (symbol 7)
8SA	Side lug mounting cap (symbol 8)
9SA	Centerline lug mounting cap (symbol 9)
10SA	Side tapped mounting cap (symbol 10)
11SA	Trunnion mounting cap (symbol 11)
12SA	Fixed clevis mounting cap (symbol 12)
13SA	End lug mounting cap (symbol 13)



SECTION VIEWS SHOWN
ARE FOR SERIES 2H CYLINDERS
WITH CUSHIONS ON BOTH ENDS

CUSHION HARDWARE KITS

BORE SIZE	FOR HEAD ASSEMBLIES	FOR CAP ASSEMBLIES
	ORDER CH KITS BY NUMBER BELOW: (Kits Include Symbols 69, 70, 71 & 72 for One Head)	ORDER CC KITS BY NUMBER BELOW: (Kits Include Symbols 69, 70, 73 & 74 for One Cap)
	SERIES “2H”	SERIES “2H”
1"	NONE	NONE
1½"	L-6510	L-4558
2"	L-6510	L-4566
2½"	L-6511	L-4559
3¼"	L-6511	L-4560
4"	L-6511	L-4561
5"	L-6511	L-4562
6"	L-6512	L-4563
7"	L-6512	L-4564
8"	L-6512	L-4565

PISTON AND ROD ASSEMBLIES

Factory assembled piston and rod assemblies, consisting of parts listed below are recommended for cylinders 6" bore size and smaller in stroke lengths to 25". For larger bore sizes and longer stroke lengths, pistons and rods should be ordered separately, as required.

SINGLE ROD TYPES

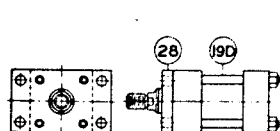
ASS'Y NO.	DESCRIPTION
34SA	Non-cushioned models; includes symbols 34, 16, 48,
35SA	Cushioned head end models; includes symbols 35, 16, 18, 48,
36SA	Cushioned cap end models; includes symbols 36, 16, 48,
37SA	Cushioned both ends models; includes symbols 37, 16, 18, 48,

DOUBLE ROD TYPES

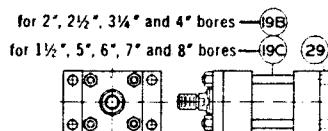
ASS'Y NO.	DESCRIPTION
57SA	Non-cushioned models; includes symbols 57, 16A, 48, 60
58SA	Cushioned one end models; includes symbols 58, 16A, 18, 48, 60
59SA	Cushioned both ends models; includes symbols 59, 16A, 18, 48, 61

INDERS - 1½" through 8" Bore Sizes

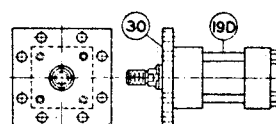
FLANGE MOUNTINGS



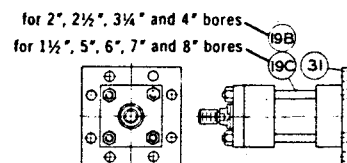
Style J, Head Rectangular Flange



Style H, Cap Rectangular Flange

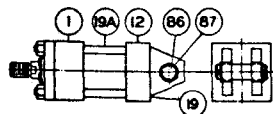


Style JB, Head Square Flange

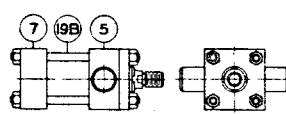


Style HB, Cap Square Flange

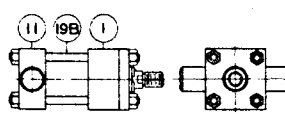
PIVOT MOUNTINGS



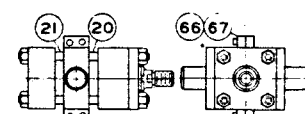
Style BB, Cap Fixed Clevis



Style D, Head Trunnion

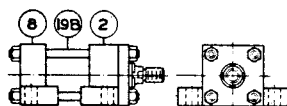


Style DB, Cap Trunnion

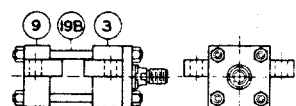


Style DD, Intermediate Fixed Trunnion

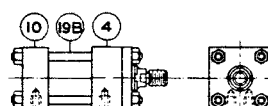
SIDE MOUNTINGS



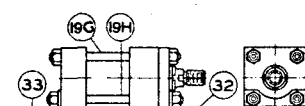
Style C, Side Lugs



Style E, Centerline Lugs

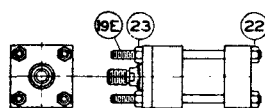


Style F, Side Tapped

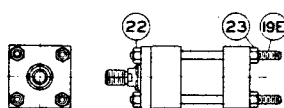


Style CB, Side End Angles

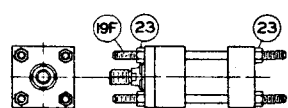
TIE RODS EXTENDED MOUNTINGS



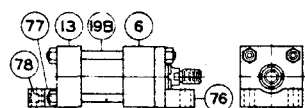
Style TB, Tie Rods Extended Head End



Style TC, Tie Rods Extended Cap End



Style TD, Tie Rods Extended Both Ends



Style G, Side End Lugs

PARTS IDENTIFICATION PREFIX AND NOMENCLATURE

Part Identification			NAME OF PART
Individual Part	Service Assemblies & Kits		
1P-	ISA- CISA-		HEAD, Basic, Styles BB, BC, DB, DD, H, HB, J, JB, T, TB, TC & TD
2P-	2SA- C2SA-		HEAD, Side Lug Mounting, Style C
3P-	3SA- C3SA-		HEAD, Centerline Lug Mounting, Style E
4P-	4SA- C4SA-		HEAD, Side Tapped Mtg., Style F
5P-	5SA- C5SA-		HEAD, Trunnion Mtg., Style D
6P-	6SA- C6SA-		HEAD, Style G
7P-	7SA- C7SA-		CAP, Basic, Styles BC, D, DD, H, HB, J, JB, T, TB, TC & TD
8P-	8SA- C8SA-		CAP, Side Lug Mounting, Style C
9P-	9SA- C9SA-		CAP, Centerline Lug Mtg., Style E
10P-	10SA- C10SA-		CAP, Side Tapped Mtg., Style F
11P-	11SA- C11SA-		CAP, Trunnion Mtg., Style D
12P-	12SA- C12SA-		CAP, Fixed Clevis Mtg., Style BB
13P-	13SA- C13SA-		CAP, End Lug Mounting, Style G
14P-	See "RG" Kits		GLAND, Threaded Cartridge Type
15P-	15P- 15P-		CYLINDER BODY, Std. Plain
15DP-	15DP- 15DP-		CYLINDER BODY, Style DD—Grooved
16P-	See Rod Assemblies 34, 35, 36 & 37		PISTON BODY, Ring Type, Single Rod
16AP-	See Rod Assemblies 57, 58 & 59		PISTON BODY, Ring Type, Double Rod
17P-	See Rod Assemblies 34, 35, 36 & 37		PISTON BODY, Lipseal Type, Single Rod
17AP-	See Rod Assemblies 57, 58 & 59		PISTON BODY, Lipseal Type, Double Rod
18P-	See Rod Assemblies 35, 36 & 37		CUSHION SLEEVE, Rod Head Cushion, Single Rod
18AP-	See Rod Assemblies 58 & 59		CUSHION SLEEVE, Rod Head Cushion, K Type, Double Rod
18BP-	See Rod Assemblies 35, 36 & 37		CUSHION SLEEVE, Sealed Type—Series "2H"
19P-	19P- 19P-		TIE ROD, One Piece, Specify 19AP, 19BP, etc., from drawings above
20P-	20P- 20P-		TIE ROD, Two Piece, Style DD, Head End (Specify)
21P-	21P- 21P-		TIE ROD, Two Piece, Style DD, Cap End (Specify)
22P-	22P- 22P-		NUT, Tie Rod, Prevailing Torque Locknut
23P-	23P- 23P-		NUT, Tie Rod, Non-locking
26P-	26P- 26P-		BACK-UP WASHER, Cylinder Body O-Ring. No longer required, on any bore size.
27P-	27P- 27P-		RETAINER, All Styles Except J, JB & P Modification
27AP-	27AP- 27AP-		RETAINER, Style CBP
27BP-	27BP- 27BP-		RETAINER, Styles CP, FP & GP
28P-	28P- 28P-		FLANGE, Rectangular Mounting, Head End, Style J

Part Identification			NAME OF PART
Individual Part	Service Assemblies & Kits		
29P-	29P- 29P-		FLANGE, Rectangular Mounting, Cap End, Style H
30P-	30P- 30P-		FLANGE, Square Mounting, Head End, Style JB
31P-	31P- 31P-		FLANGE, Square Mounting, Cap End, Style HB
32P-	32P- 32P-		MOUNTING ANGLE, Style CB—Head End
33P-	33P- 33P-		MOUNTING ANGLE, Style CB—Cap End
34P-	34SA- None		PISTON ROD, Single Rod Type—Non-Cushioned
35P-	None 35SA-		PISTON ROD, Single Rod Type—Cushioned Head End
36P-	None 36SA-		PISTON ROD, Single Rod Type—Cushioned Cap End
37P-	None 37SA-		PISTON ROD, Single Rod Type—Cushioned Both Ends
40P-	See RG & RK Kits		WIPERSEAL, Gland
41P-	See RG & RK Kits		LIPSEAL, Rod Gland
42P-	See PK Kits		LIPSEAL, Piston
43P-	See RG & RK Kits		BACK-UP WASHER, Rod Gland Lipseal
44P-	See PK Kits		BACK-UP WASHER, Piston
45P-	See RG & PK Kits		O-RING, Gland to Head Seal
47P-	See PK & CB Kits		O-RING, Cylinder Body to Head & Cap Seal
48P-	See Rod Assembly & PR Kits		PISTON RING, Iron
49P-	49P- 49P-		PLUG SCREW, Old Style—Cushion Check Valve
50P-	50P- 50P-		SEAL WASHER, Old Style—Cushion Check Valve Plug Screw
51P-	51P- 51P-		BALL, Old Style—Cushion Check Valve
52P-	52P- 52P-		PACKING WASHER, Old Style—Cushion Adjusting Screw
53P-	53P- 53P-		PACKING GLAND, Old Style—Cushion Adjusting Screw
54P-	54P- 54P-		CUSHION SCREW, Old Style—Cushion Adjusting Valve
57P-	57SA- None		PISTON ROD, Double Rod Type—Non-Cushioned

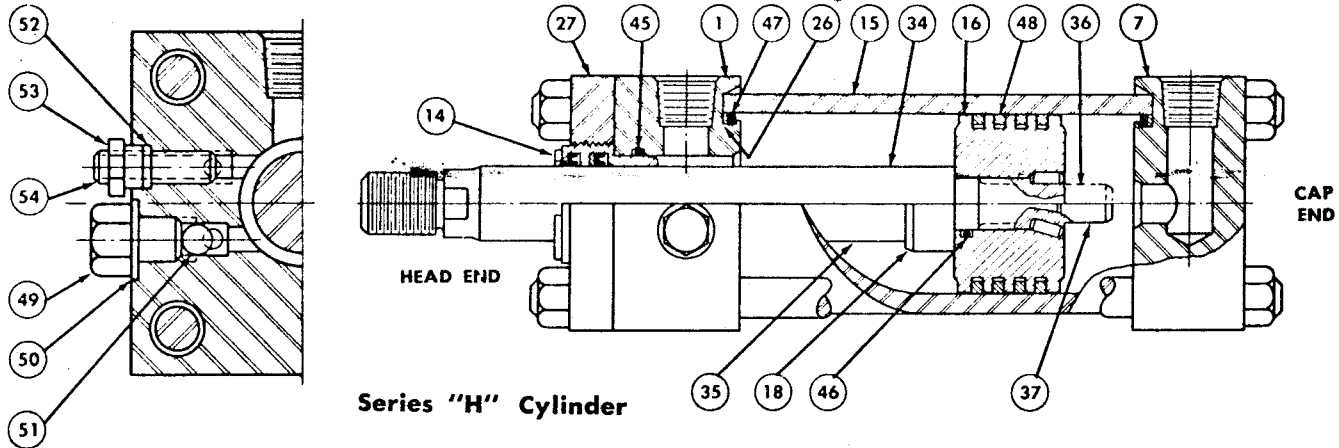
Part Identification			NAME OF PART
Individual Part	Service Assemblies & Kits		
58P-	None 58SA-		PISTON ROD, Double Rod Type—Cushioned One End
59P-	None 59SA-		PISTON ROD, Double Rod Type—Cushioned Both Ends
60P-	59SA- None		EXTENSION ROD, Double Rod Type—Non-Cushioned
61P-	None 58SA- 59SA-		EXTENSION ROD, Double Rod Type—Cushioned Both Ends
63P-	63P- 63P-		GLAND WRENCH, Threaded Cartridge Type
64P-	64P- 64P-		SPANNER WRENCH, For Gland Wrench
66P-	66P- 66P-		FIXED TRUNNION, Intermediate—Multi-Piece ("2H" Series)
67P-	67P- 67P-		SCREWS, Fixed Trunnion—Multi-Piece
69P-	See CC & CH Kits		O-RING, Cushion Adjustment and Check Valve Plug Screw, "2" Style
70P-	See CC & CH Kits		NEEDLE, Cushion Adjustment Valve, "2" Style
71P-	See CH Kits		BALL, Cushion Check Valve, "2" Style
72P-	See CH Kits		PLUG SCREW, Cushion Check Valve, "2" Style
73P-	See CC Kits		BUSHING, Float Check, Cushion on Cap End, "2" Style
74P-	See CC Kits		RETAINING RING, Float Check Cushion Bushing, "2" Style
75P-	See Rod Assemblies 35, 36 & 37		SEAL Cushion Sleeve, Series "2H", "2" Style
76P-	76P- 76P-		END MOUNT LUG, Style G—Head End
77P-	77P- 77P-		END MOUNT LUG, Style G—Cap End
78P-	78P- 78P-		SOCKET HEAD CAP SCREW, Style G—Cap End
86P-	86P- 86P-		CLEVIS PIN, Styles BB Mounting
87P-	87P- 87P-		RETAINER RING Style BB

HOW TO ORDER

- Identify assemblies or parts required from the drawings and call out the symbol number and name of part from the list above and quantity required.
- Furnish Serial Number, bore, stroke and Model Number from the cylinder nameplate.

SERIAL NUMBERS

Effective with serial number F-50854, during Jan. 1963, the series "2H" cylinders were supplied. Lower serial numbers were supplied in series "H" designs. Serial numbers should be called out by all customers requiring spare parts.



CUSHIONED ADJUSTMENT
AND CHECK VALVE PARTS
FOR CUSHIONED HEAD AND CAP

STYLE T BASIC CYLINDER, NO TIE RODS EXTENDED
UPPER VIEW IS NON-CUSHIONED
LOWER VIEW IS CUSHIONED

*Back-up washers, symbol 26, for all bore size hydraulic cylinders are no longer required. When making repairs on existing Series H hydraulic cylinders, install only, the "O" ring seal, symbol 47, at each end of the cylinder.

INTERCHANGEABILITY AND AVAILABILITY — REPAIR PARTS

SOFT PARTS: All seals, gaskets, gland cartridges, piston rings and seals remain interchangeable for bores 1½" through 8" in all rod diameters. See page 1, of this bulletin.

HARD PARTS: See Catalog File 1110-A49 and pages 2 and 3 of this bulletin.

HEADS, symbols # 1 through # 6, and **CAPS,** symbols # 7 through # 13, are no longer available for series "H". If both require replacement, costs may justify replacing the entire cylinder with a new series "2H".

ROD AND PISTON ASSEMBLIES — Cushioned or Non-Cushioned, can be replaced with "2H" except for 6", 7" and 8" bores. Pistons are interchangeable with "2H" except for 6", 7" and 8" bores. Old style rods and pistons for "H" are available to order for 6", 7" and 8" bores.

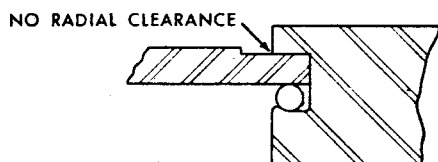
CYLINDER BODIES, symbol #15, are available in series "H" dimensions. They are longer than "2H" in most bore sizes. The "ALIGN-A-GROOVE" turn down has been furnished on series "H" for several years.

RETAINERS, FLANGES, EXTERNAL HARDWARE, MOUNTING PLATES and **ROD END ACCESSORIES** remain unchanged.

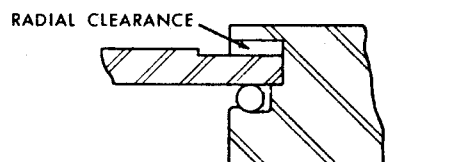
IDENTIFICATION

1. The serial number can always be identified at the factory. The future series of numbers will start with G in alphabetical sequence.
2. Should the nameplate not be available, the joint between the head or cap and the cylinder body will distinguish between "2H" versus "H" in bore sizes 1½" through 6".

"2H" LOOKS LIKE THIS



"H" LOOKS LIKE THIS



3. On 7" and 8" bores, the cap thickness can be checked with the catalog.

	7" Bore	8" Bore
"H" Cap Dimension "G".....	2¼"	2½"
"2H" Cap Dimension "J".....	2¾"	3"

4. The flush cushion valves identify the "2H" where cushions are involved.

PYLE-STAR-LINE[®]

Neptune Series

Electrical Connectors with Mod II Inserts

ASSEMBLY and TERMINATING INSTRUCTIONS

- A.** Prepare end of cable by stripping jacket and insulation per tables shown on page 2. Remove any ridges or grooves by scarfing the edges to provide a smooth surface on the cable to insure good grommet sealing.
- B.** Slide the gland nut, cable grip or anti-friction washer, grommet and cable adapter over the cable in the order named. Be sure the right grommet size has been selected to obtain a good grommet seal. If a dust cover with a ring and chain is used, ring must be placed on cable barrel before terminating.
- C.** MOD. 2 connectors are shipped with the insulations factory assembled in the barrel shell and in the specified key position, unless the insert has contacts larger than number 10. **DO NOT ATTEMPT TO REMOVE INSERTS FROM SHELLS.** The contacts are packaged separately. If the insert assemblies are of a configuration that is packaged separately, then the insulations should be inserted into the barrels and fully seated, taking care to align the insulation keyway with the barrel keys.
- D.** **CRIMPING CONTACTS.** Contacts are crimped to the wires outside of the connector with the proper tool (see page 4). Use only crimp-type contacts (identified by inspection hole in wire-well) for crimp termination. Check through the inspection hole to make certain wires are fully bottomed in well before crimping.
- E.** **SOLDERING CONTACTS.** Contacts are soldered to the wires outside of the connector. Tin conductors to within 1/16" of the insulation. Do not crimp solder-type contacts (those without inspection hole in well).
- F.** Support the barrel assembly in a vise having smooth-faced jaws; shells with female skirt have a hexagon flange for holding. Shells with male skirt but without flange should be held with dust cover or female shell as a holding fixture. The shell keys are designed to withstand the assembly torque. If dust cover with ring and chain is used, ring must be placed on barrel before applying contacts to the insulation.
- G.** Before inserting contacts into barrel assembly containing an insulation clamp nut, make sure the clamp nut is as loose as possible to release the compression of the resilient insulator. Contacts should be inserted into the proper cavity with a contact insertion tool (see page 4). **IF ALL CONTACTS IN AN INSERT CONFIGURATION ARE NOT BEING USED, PLUG-UP ANY OPEN CAVITIES TO ASSURE ENVIRONMENTAL SEALING.** The male contacts should be inserted into the red resilient insulation and fully seated. The female contacts should be inserted into the green resilient insulation and fully seated. The contacts are inserted from the back side. If a contact is inserted into a wrong cavity, loosen insulation clamp nut, if present, to relieve compression of insulator, then push out contact with removal tool.
- H.** Apply cable adapter or insulation clamp nut by hand, turning counterclockwise (left hand thread) until handtight. **APPLY WRENCH TO CABLE ADAPTER OR INSULATION CLAMP NUT AND TIGHTEN UNTIL IT SHOULDERS FULLY ON BARREL.**
- I.** Slip grommet into cable adapter and engage either cable grip or gland washer in gland nut. **DRAW UP TIGHT WITH WRENCH.** If split clamp nut is used, tighten clamp screws.

PREPARING CABLE FOR TERMINATING

Use suitable tools and strippers to remove cable sheath and conductor insulation. Be sure cable is cut square.

Refer to Tables below for wire cutting and stripping dimensions. Use applicable dimensions for whichever method of termination is used.

CABLE AND WIRE CUTTING AND STRIPPING DIMENSIONS

Dimension "A" is the maximum cable jacket stripping length recommended for maintaining effective grommet cable sealing. Dimension "B" is equal to the distance between points $\frac{1}{4}$ " minimum from the inner face of the grommet and the bottom of the contact terminal well. Dimension "C" is slightly longer than the depth of the contact terminal well.

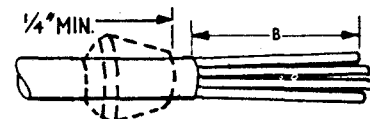
DIMENSION A

CABLE JACKET STRIPPING LENGTHS/ varies with Shell Size, and method of terminating.



DIMENSION B

INDIVIDUAL CONDUCTOR CUTTING LENGTHS/ varies with Shell Size, and Contact Size and must be measured after wires are straightened and formed parallel.



DIMENSION C

INDIVIDUAL CONDUCTOR STRIPPING LENGTHS/ varies with method of terminating and Contact Size.



Dimension "A" Table

SHELL SIZE	FOR CRIMP CONTACTS			FOR SOLDER CONTACTS		
	ADAPTER TYPE			ADAPTER TYPE		
	2000	2400	2900	2000	2400	2900
12	1 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	5 $\frac{7}{8}$ "	1 $\frac{1}{2}$ "	3 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "
16	2 $\frac{1}{4}$ "	4 $\frac{7}{8}$ "	5 $\frac{7}{8}$ "	1 $\frac{7}{8}$ "	4 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "
20	2 $\frac{3}{4}$ "	4 $\frac{1}{2}$ "	6 $\frac{1}{8}$ "	2 $\frac{1}{8}$ "	4 $\frac{7}{8}$ "	5 $\frac{7}{8}$ "
24 & C24	3 $\frac{1}{4}$ "	5 $\frac{7}{8}$ "	6 $\frac{3}{4}$ "	2 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "	6 $\frac{1}{4}$ "
28 & C28	3 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "	3 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "

Dimension "C" Table

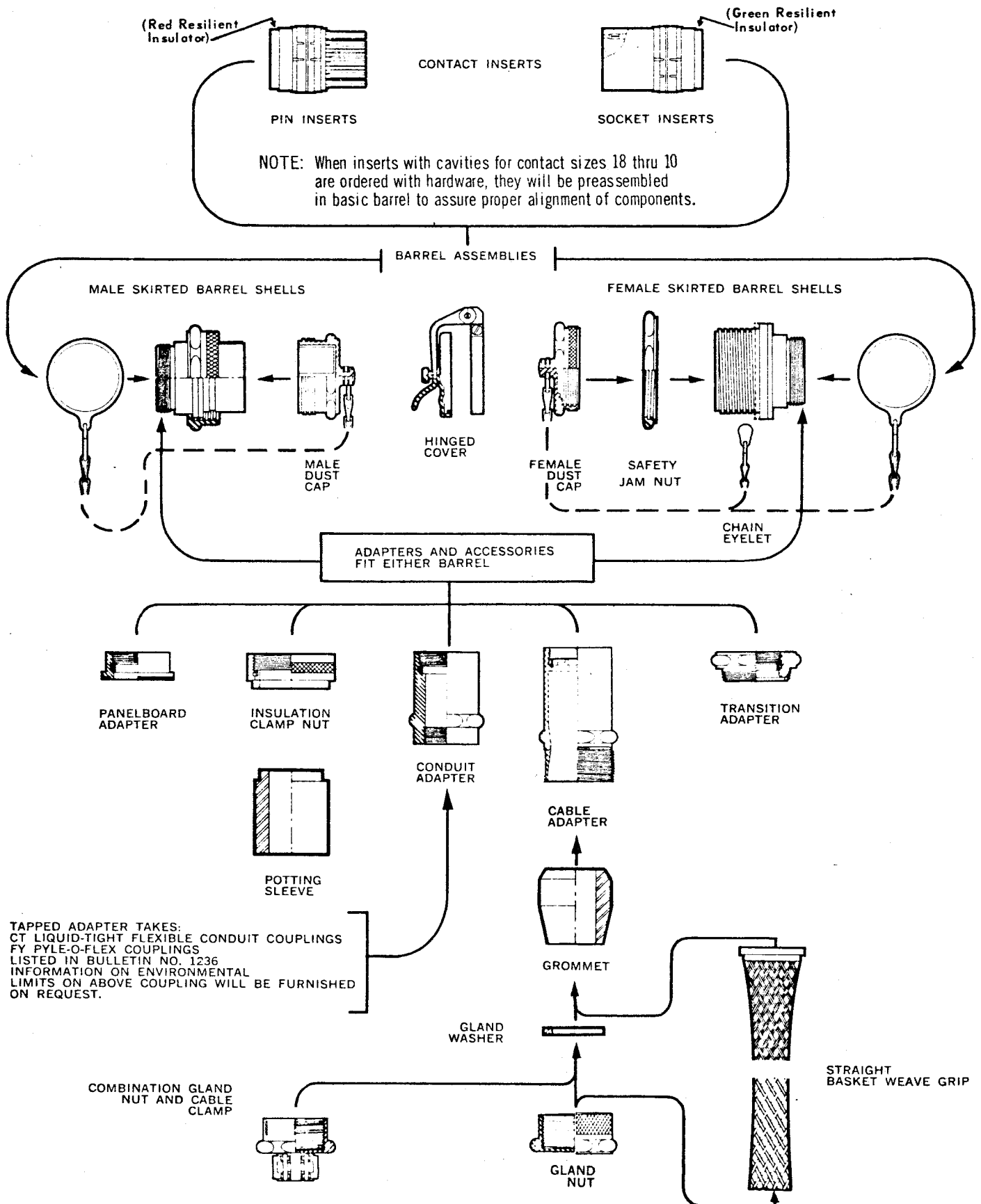
CONTACT SIZE	CRIMP CONTACTS	SOLDER CONTACTS
18	2 $\frac{1}{4}$ "	9 $\frac{1}{8}$ "
16	3 $\frac{1}{4}$ "	9 $\frac{1}{8}$ "
12	3 $\frac{3}{4}$ "	1 $\frac{1}{2}$ "
10	4 $\frac{3}{4}$ "	1 $\frac{5}{8}$ "
8	5 $\frac{3}{4}$ "	1 $\frac{9}{8}$ "
4	2 $\frac{1}{2}$ "	2 $\frac{1}{8}$ "
1/0	1 $\frac{1}{4}$ "	2 $\frac{3}{8}$ "

Dimension "B" Table

SHELL SIZE	CONTACT SIZE	FOR CRIMP CONTACTS			FOR SOLDER CONTACTS		
		ADAPTER TYPE			ADAPTER TYPE		
		2000	2400	2900	2000	2400	2900
12	18	1 $\frac{5}{8}$ "	4 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	3 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "
	16	1 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	5 $\frac{1}{8}$ "			
	12	1 $\frac{3}{4}$ "	4 $\frac{1}{8}$ "	5 $\frac{7}{8}$ "			
	10	1 $\frac{5}{8}$ "	4 $\frac{7}{8}$ "	5 $\frac{3}{4}$ "			
	8	1 $\frac{7}{8}$ "	4 $\frac{1}{8}$ "	5 $\frac{3}{8}$ "			
16	4	1 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	5 $\frac{1}{8}$ "	1 $\frac{7}{8}$ "	4 $\frac{1}{2}$ "	5 $\frac{1}{8}$ "
	18	2 $\frac{1}{4}$ "	4 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "			
	16	2 $\frac{1}{8}$ "	4 $\frac{1}{8}$ "	5 $\frac{1}{4}$ "			
	12	2 $\frac{1}{2}$ "	4 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "			
	10	2 $\frac{3}{4}$ "	4 $\frac{3}{4}$ "	5 $\frac{3}{8}$ "			
20	8	2 $\frac{1}{8}$ "	4 $\frac{3}{8}$ "	5 $\frac{5}{8}$ "	2 $\frac{1}{8}$ "	4 $\frac{1}{2}$ "	5 $\frac{7}{8}$ "
	4	2 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "			
	18	2 $\frac{3}{4}$ "	4 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "			
	16	2 $\frac{1}{2}$ "	4 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "			
	12	2 $\frac{3}{8}$ "	4 $\frac{5}{8}$ "	6 $\frac{1}{2}$ "			
24 & C24	10	2 $\frac{3}{4}$ "	4 $\frac{5}{8}$ "	6 $\frac{1}{4}$ "	2 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "	6 $\frac{1}{4}$ "
	8	2 $\frac{5}{8}$ "	4 $\frac{7}{8}$ "	6 $\frac{1}{8}$ "			
	4	2 $\frac{1}{4}$ "	4 $\frac{1}{4}$ "	6 $\frac{1}{4}$ "			
	18	3 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "	6 $\frac{3}{4}$ "			
	16	3 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	6 $\frac{1}{2}$ "			
28 & C28	12	3 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	6 $\frac{1}{4}$ "	3 $\frac{1}{8}$ "	5 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "
	10	3 $\frac{3}{8}$ "	5 $\frac{3}{8}$ "	6 $\frac{1}{8}$ "			
	8	3 $\frac{1}{4}$ "	5 $\frac{1}{4}$ "	6 $\frac{1}{8}$ "			
	4	3 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	6 $\frac{1}{4}$ "			
	1/0	*	5 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "			

* Use longer adapter.

MOD. 2 PYLE-STAR-LINE CONNECTOR SEQUENCE OF ASSEMBLY



TOOLS FOR CONTACT TERMINATING AND ASSEMBLY

INSERTION AND REMOVAL TOOLS

For Both Crimp and Solder Type Contacts

Insertion tools are used for inserting contacts after they are terminated to conductor. Pin and socket contacts have identical terminal ends; the same tool is used for both.

Expander Tools are used to facilitate insertion of larger size contacts into insert cavities.

Removal tools are used for extracting contacts from the insert assembly after contacts have been seated. Tools are color coded per contact size for quick identification.



PIN OR SOCKET INSERTION



EXPANDER BARREL

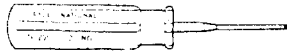


TAPERED LEAD

CONTACT SIZE	PIN	SOCKET	HANDLE COLOR	AVERAGE INSERTION FORCE — LBS.	
	CAT. NO.	CAT. NO.		PIN	SOCKET
Insertion Tools					
18	TP-201047-1	USE SAME	GREEN	10	12
16	TP-201048-1	TOOL FOR	BLUE	15	17
12	TP-201049-1	PIN OR	YELLOW	24	28
10	TP-201046-1	SOCKET	BLACK	30	34
	EXPANDER BARREL	TAPERED LEAD	T-BAR HANDLE	WOOD FRAME	
8	TP-201007-A	TP-201007-B	—	—	
4	TP-201033-A	TP-201033-B	—	—	
0	TP-201000-A	TP-201000-TL	TP-201000-TH	TP-201000-WF	

△ See termination manual for quantity and type required.

* EBS (Short) EBL (Long)



PIN REMOVAL

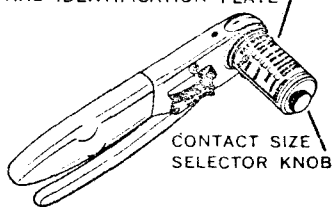


SOCKET REMOVAL

Removal Tools

18	TP-201011-2	TP-201011-3	GREEN
16	TP-201010-2	TP-201010-3	BLUE
12	TP-201009-2	TP-201009-3	YELLOW
10	TP-201008-2	TP-201008-3	BLACK
8	NON-REMOVABLE		
4			
0			

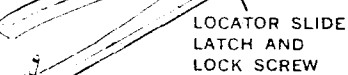
COLOR CODE SELECTOR APERTURE AND IDENTIFICATION PLATE



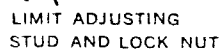
CONTACT SIZE
SELECTOR KNOB



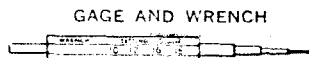
COLOR
CODED
CONTACT
LOCATOR



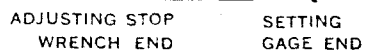
LOCATOR SLIDE
LATCH AND
LOCK SCREW



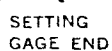
LIMIT ADJUSTING
STUD AND LOCK NUT



GAGE AND WRENCH



ADJUSTING STOP
WRENCH END



SETTING
GAGE END

Type TP-201351-AG Crimping Tool with Contact Size Selector Turret for Contacts No. 18 thru No. 10.

CONTACT SIZE	RANGE OF CONDUCTOR SIZES (AWG)	TOOL COMPLETE WITH W LENGTH CONTACT TURRET
		CAT. NO.
18	18 TO 22 INC.	TP-201351-AG
16	16 TO 20 INC.	
12	12 TO 16 INC.	
10	10 TO 14 INC.	

Type TP-201327 Crimping Tool And Accessories for Contacts #18 thru #10

CONTACT SIZE	RANGE OF CONDUCTOR SIZES (AWG)	TOOL ONLY	GAGE & WRENCH	ADJUSTING STUD	CONTACT LOCATOR		COLOR CODE
					W LENGTH	C LENGTH	
18	18 thru 22	TP201327-A	TP200935-5		TP201327-18		GREEN & BLUE
16	16 thru 20			TP200935-6	TP201327-16		
12	12 thru 16			TP200935-7	TP201327-12	TP201327-12C	YELLOW
10	10 thru 14			TP200935-7	TP201327-10	TP201327-10C	BLACK

For information on crimping contact sizes 8 to 1/0 with Power Tools, request Bulletin E43.

CRIMP RETENTION

CONTACT SIZE	18	16	12	10	8	4	1/0	4/0
WIRE SIZE AWG	18 20 22	16 18 20	12 14 16	10 12 14	8 10 12	4 6 8	1/0 2 4	4/0 3/0 2/0
MIN. LBS. PULL OUT FORCE	38 19 15	50 38 19	100 70 50	180 110 70	225 160 110	400 300 225	700 550 400	875 825 750

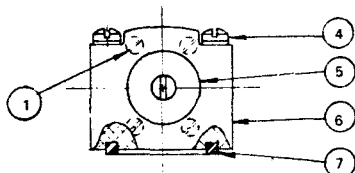


pyle-national division

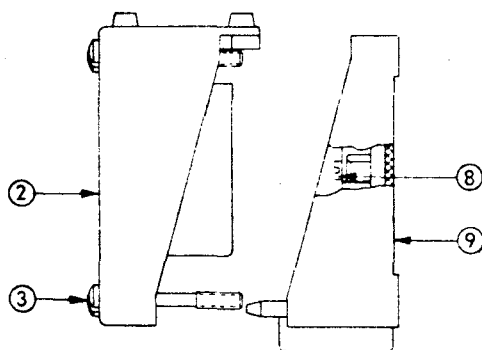
Pyle-National Division
HARVEY HUBBELL INCORPORATED
1334 N. Kostner Avenue
Chicago, Illinois 60651

INSTRUCTIONS FOR INSTALLING & SERVICING TYPE C PLUG-IN & NON PLUG-IN LIMIT SWITCHES

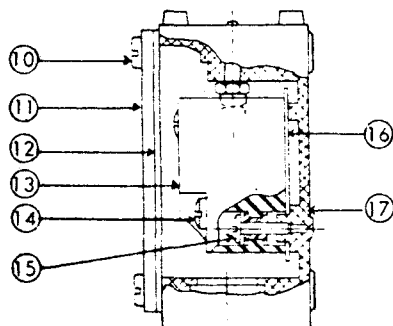
OPERATING HEAD



PLUG-IN BASE ASSEMBLY C2B, C3B, C4B



NON PLUG-IN BASE ASSEMBLY C2, C3, C4



REPLACEMENT PARTS LIST

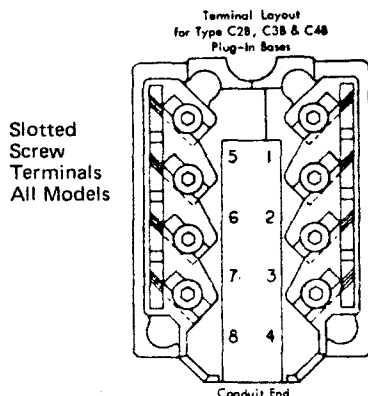
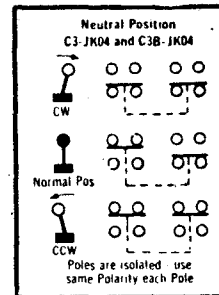
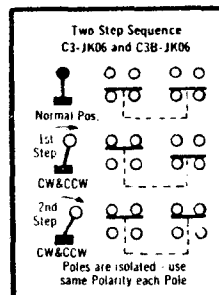
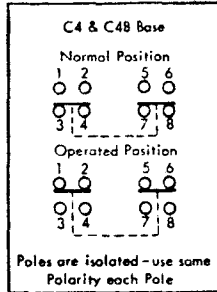
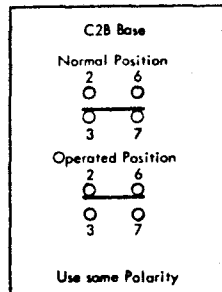
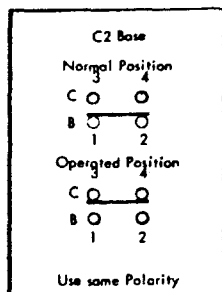
REF. NO.	DESCRIPTION	PART NO.	QTY. REQD.	PRICE EACH
1	Screw, Head Plate	C5064	4	\$.10
2	C2B Plug-In Top Assembly (inc. 3)	C5690	1	24.00
2	C3B Plug-In Top Assembly (inc. 3)	C5691	1	28.00
2	C4B Plug-In Top Assembly (inc. 3)	C5692	1	28.00
3	Screw, Housing Top (C2B, C3B, C4B)	C5660	2	.20
4	Screw, Mounting for (JD & JK-01, 012, 013, 04, 05, 053, 06, 09, C5605)	C5569	4	.10
4	Screw, Mounting for (JD1, 2, 3, 4, 5)	C5567	4	.10
5	Boot Seal (JK heads only)	C5783	1	.50
6	Hd., Rot. Lev. CW&CCW Std. Trav. (inc.4)	JD01-JK01	1	10.00
6	" " " CW&CCW Low Force (inc.4)	JD012-JK012	1	12.00
6	" " " CW&CCW Short Travel (inc.4)	JD013-JK013	1	12.00
6	" " " Neutral Position (inc.4)	JD04-JK04	1	12.00
6	" " " CWorCCW Std. Trav. (inc.4)	JD05-JK05	1	10.00
6	" " " CWorCCW Low Force (inc.4)	JD052-JK052	1	12.00
6	" " " CWorCCW Short Travel (inc.4)	JD053-JK053	1	10.00
6	" " " Two Step CW&CCW (inc.4)	JD06-JK06	1	12.00
6	" " " Maintained (inc.4)	JD09-JK09	1	15.00
6	Head, Linear-Top Push Rod (inc.4)	JD1	1	13.00
6	" " " Top Push Roller (inc.4)	JD2	1	15.00
6	" " " Side Push Rod (inc.4)	JD3	1	15.00
6	" " " Side Push Roller (Horizontal) (inc.4)	JD4	1	19.00
6	" " " Side Push Roller (Vertical) (inc.4)	JD5	1	19.00
6	" " " Omni-directional, nylon (inc.4)	C5218	1	10.00
6	" " " Omni-directional, steel (inc.4)	C5217	1	10.00
6	Head, Lo-Torque (inc.4)	JD08-JK08	1	14.00
6	Head, Air Operated (inc.4)	C5605	1	19.00
7	Seal	C5566	1	.50
8	Screw & Clamp Assembly C2B	C5644	4	.30
8	" " " " C3B, C4B	C5644	8	.30
9	C2B Terminal Base Assembly	C5685	1	6.00
9	C3B & C4B Terminal Base Assembly	C5686	1	8.00
10	Screw, Top Cover (C2, C3, C4)	C5004	2	.10
11	Top Cover (C2)	C5005	1	1.50
11	Top Cover & Gasket Assembly (C3 & C4)	C5510	1	4.00
12	Gasket, Top Cover (C2)	C5003	1	.50
13	Switch, Snap (inc. 14) C2	C5197	1	10.00
13	Switch, Snap (inc. 14) C3	C5480	1	17.00
13	Switch, Snap (inc. 14) C4	C5483	1	17.00
14	Screw, Terminal C2	C5472	4	.10
14	Terminal Clamp Assembly C3 & C4	C5489	8	.30
15	Screw, Snap Switch Mounting C2	C5380	1	.10
15	Screw, Snap Switch Mounting C3 & C4	C5470	1	.10
16	Insulator C2 only	C5012	1	.50
17	C2 Base complete — less operating head	C5260	1	24.00
17	C3 Base complete — less operating head	C5275	1	30.00
17	C4 Base complete — less operating head	C5276	1	30.00

- For complete plug-in replacement assembly — use Ref. No. 2 plus appropriate head. (Ref. No. 6) — Price is equal to comparable non plug-in model. (ie C5690-JD05, \$28.50)
- Shaft replacement kits for Ref. No. 6 may be ordered by part number. Add suffix letter K to part number for model JK style heads. (ie 5581K for JK01 head). List Price \$5.00.

PART NO.	HEAD NO.	PART NO.	HEAD NO.
5581	JD01	5585	JD04
5581	JD012	5587	JD06
5582	JD013	5586	JD09
5683	JD05	5588	JD528
5584	JD053		

DISCOUNTS ON PARTS APPLY TO EACH ITEM SEPARATELY
 INDUSTRIAL USER CLASS DISCOUNT: SCHEDULE C
 1-9 46% 10-99 53% 100 and up 55%
 FOR OTHER CLASS DISCOUNTS, CONTACT THE FACTORY
 PRICES SUBJECT TO CHANGE WITHOUT NOTICE MINIMUM ORDER \$5.00 NET

WIRING INSTRUCTIONS



ELECTRICAL CHARACTERISTICS

MAXIMUM AMPERE RATINGS

Volts	AC		DC	
	Break	Make	1 Circuit	2 Circuits
115	15	40	2.0	0.5
220	10	20	0.5	0.2
440	6	10		
600	5	8	0.1	0.02

FOR PRACTICAL INDUSTRIAL USE THE FOLLOWING ELECTRIC LIFE CAN BE EXPECTED

Min. Number of Operations	115V. AC	220V. AC	440V. AC	600V. AC
2,000,000	4.3 Amps	3.5 Amps	1.4 Amps	0.85 Amps
5,000,000	3.5 Amps	1.8 Amps	0.7 Amps	0.4 Amps
10,000,000	2.2 Amps	1.0 Amps	0.35 Amps	0.2 Amps
20,000,000	1.3 Amps	0.7 Amps	0.14 Amps	0.08 Amps
	115V. DC	220V. DC		600V. DC
1,000,000	0.6 Amps	0.3 Amps		0.1 Amps

These figures are based upon maximum of 200 cycles per min., 1 live circuit per pole. For 2 live circuits, per pole, divide the current values by 2. The above AC values are based upon the current of a contactor or solenoid in the sealed state and allow for an inrush current of 6 times the sealed current.

TEMPERATURE RANGE: 0°F to +185°F, except 052/012 heads / 32°F to 185°F

DIRECTIONS FOR REVERSING

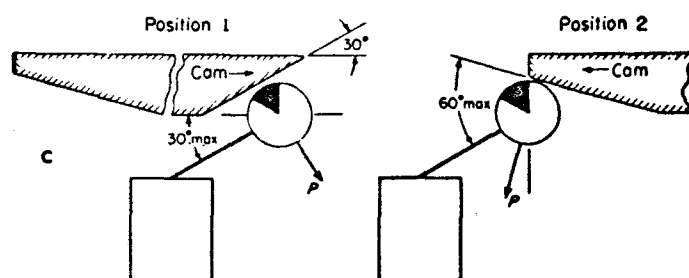
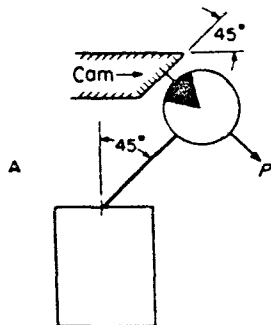
TO REVERSE DIRECTION OF OPERATION

JD05/JK05, JD052/JK052 and JD053/JK053 Heads only.

Loosen 4 back plate screws. Allow spring pressure to push plate away from head. When gap is approximately 3/32" - rotate shaft 180°. DO NOT DEPRESS SHAFT. DO NOT FORCE. Tighten screws.

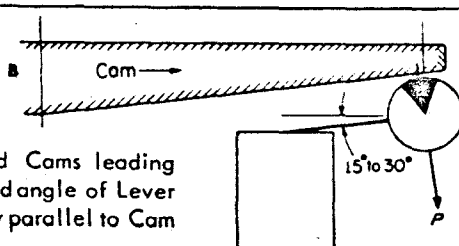
CAMMING INFORMATION

ALWAYS Mount Lever parallel to leading edge of Cam.

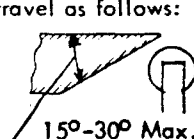


To prevent Lever Flyback an overriding Cam should have trailing edge. If Cam overrides and returns, it will operate switch on return unless a one way lever is used. Lever Angle and Cam Angle are very important in application of this type.

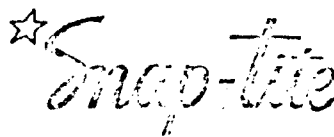
For High Speed Cams leading edge of Cam and angle of Lever should be nearly parallel to Cam travel.



Cam Angle for use with Push Roller Heads to be 15°-30° max. with travel as follows:



	MIN	MAX
JD2	.060	.200
JD4	.105	.200
JD5	.105	.200



PH SERIES COUPLINGS WITH END FITTINGS

Ordering Information

Select the proper coupling—consisting of PH or H Series coupler and PH or H Series nipple—from the table.

ANTI-EXTRUSION SEAL SET. This seal set can be supplied as standard instead of the U-Packer seal. See H Series Catalog for details. If it is desired, please suffix the part number with -9. Example: VPHC6-6F-9.

SLEEVE LOCK. To order, add W/SL to part number. Example: VPHC6-6F W/SL.

STEEL COUPLINGS WITH END FITTINGS

Part Numbers by Size

PH Series Valved Couplers

End Fitting	3/4"	1/2"	3/8"	1"
Female NPT	VPHC6-6F	VPHC8-8F	VPHC12-12F	VPHC16-16F
Male NPT	VPHC6-6M	VPHC8-8M	VPHC12-12M	VPHC16-16M
Hose Shank	VPHC6-6H	VPHC8-8H	VPHC12-12H	VPHC16-16H
AND10050	VPHC6-6-50	VPHC8-8-50	VPHC12-12-50	VPHC16-16-50
MS33556	VPHC6-6-56	VPHC8-8-56	VPHC12-12-56	VPHC16-16-56
MS33657	VPHC6-6-57	VPHC8-8-57	VPHC12-12-57	VPHC16-16-57
SAE Female	VPHC6-6-EF	VPHC8-8-EF	VPHC12-12-EF	VPHC16-16-EF
SAE Male	VPHC6-6-EM	VPHC8-8-EM	VPHC12-12-EM	VPHC16-16-EM

H Series Valved Couplers

End Fitting	3/4"	1/2"	3/8"	1"
Female NPT	VHC6-6F	VHC8-8F	VHC12-12F	VHC16-16F
Male NPT	VHC6-6M	VHC8-8M	VHC12-12M	VHC16-16M
Hose Shank	VHC6-6H	VHC8-8H	VHC12-12H	VHC16-16H
AND10050	VHC6-6-50	VHC8-8-50	VHC12-12-50	VHC16-16-50
MS33655	VHC6-6-55	VHC8-8-55	VHC12-12-55	VHC16-16-55
MS33657	VHC6-6-57	VHC8-8-57	VHC12-12-57	VHC16-16-57
SAE Female	VHC6-6-EF	VHC8-8-EF	VHC12-12-EF	VHC16-16-EF
SAE Male	VHC6-6-EM	VHC8-8-EM	VHC12-12-EM	VHC16-16-EM

PH Series Valved Nipples

End Fitting	3/4"	1/2"	3/8"	1"
Female NPT	VPHN6-6F	VPHN8-8F	VPHN12-12F	VPHN16-16F
Male NPT	VPHN6-6M	VPHN8-8M	VPHN12-12M	VPHN16-16M
Hose Shank	VPHN6-6H	VPHN8-8H	VPHN12-12H	VPHN16-16H
AND10050	VPHN6-6-50	VPHN8-8-50	VPHN12-12-50	VPHN16-16-50
MS33656	VPHN6-6-56	VPHN8-8-56	VPHN12-12-56	VPHN16-16-56
MS33657	VPHN6-6-57	VPHN8-8-57	VPHN12-12-57	VPHN16-16-57
SAE Female	VPHN6-6-EF	VPHN8-8-EF	VPHN12-12-EF	VPHN16-16-EF
SAE Male	VPHN6-6-EM	VPHN8-8-EM	VPHN12-12-EM	VPHN16-16-EM

H Series Valved Nipples

End Fitting	3/4"	1/2"	3/8"	1"
Female NPT	VHN6-6F	VHN8-8F	VHN12-12F	VHN16-16F
Male NPT	VHN6-6M	VHN8-8M	VHN12-12M	VHN16-16M
Hose Shank	VHN6-6H	VHN8-8H	VHN12-12H	VHN16-16H
AND10050	VHN6-6-50	VHN8-8-50	VHN12-12-50	VHN16-16-50
MS33656	VHN6-6-56	VHN8-8-56	VHN12-12-56	VHN16-16-56
MS33657	VHN6-6-57	VHN8-8-57	VHN12-12-57	VHN16-16-57
SAE Female	VHN6-6-EF	VHN8-8-EF	VHN12-12-EF	VHN16-16-EF
SAE Male	VHN6-6-EM	VHN8-8-EM	VHN12-12-EM	VHN16-16-EM

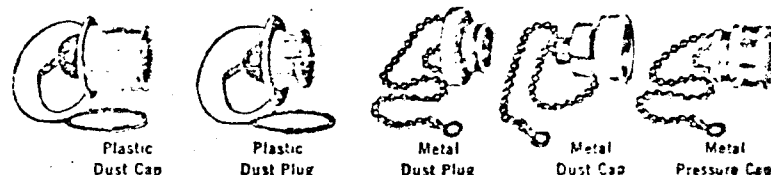
Dust Caps, Pressure Caps, Dust Plugs

PLASTIC. Dust Caps for nipples and Dust Plugs for couplers are supplied complete with corrosion-resistant steel cable.

METAL: Pressure-tight Pressure Caps for nipples and Dust Plugs for couplers are available in cadmium chromate plated steel and clear anodized aluminum. Dust Caps for nipples are also available in aluminum. On sizes through 3/4", a 10-inch long brass chrome-plated bead chain is supplied. On 1" size, a 10-inch long cadmium-plated steel sash chain is supplied.

Special lengths of chains are available on request. Ordering designations are: W/BC for bead chain, W/SC for sash chain.

TO ORDER: For standard caps and plugs, use the part numbers given in table. For special lengths, add chain designation and length in inches to the part number. Example: MCH-6 W/C-8.



PLASTIC

	3/4"	1/2"	3/8"	1"
DUST CAP	POCH-6	POCH-8	POCH-12	POCH-16
DUST PLUG	PDPH-6	PDPH-8	PDPH-12	PDPH-16
STEEL				
PRESSURE CAP	MCH-6	MCH-8	MCH-12	MCH-16
DUST PLUG	MPH-6	MPH-8	MPH-12	MPH-16
ALUMINUM				
PRESSURE CAP	AMCH-6	AMCH-8	AMCH-12	AMCH-16
DUST CAP	ADCH-6	ADCH-8	ADCH-12	ADCH-16
DUST PLUG	AMPH-6	AMPH-8	AMPH-12	AMPH-16

Spare Parts

Valve assembly, valved coupler body and valved nipple body for PH Series are shown. To order, specify (1) coupling series, (2) size of coupling and (3) spare part number.

Example: You wish to order a valve as-

sembly for a 1/2" PH Series coupler or nipple. Your order would read: PH8-42.

All other PH Series spare parts are the same as for H Series quick-disconnects. Please refer to H Series Catalog for ordering information.

Valved coupler body



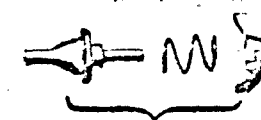
03

Valved nipple body



06

Valve assembly, coupler or nipple



42



PARTS LIST						
BASIC VALVE —						
ITEM NO.	DESCRIPTION	PART NO.	QTY.	PART NO.	QTY.	PART NO.
1	BODY ASSY	SEE CHART A	1	SEE CHART A	1	SEE CHART A
2	PILOT RETAINER	MA679047	1	MA679047	1	MA679047
3	PILOT PLUG	102X4	2	102X4	2	102X4
4	PILOT PLUG	102X4	2	102X4	2	102X4
5	NAME PLATE	MA679047	1	MA679047	1	MA679047
6	SPRING	MA679047	1	MA679047	1	MA679047
7	PILOT PLUG	MA679047	1	MA679047	1	MA679047
8	PILOT PLUG	MA679047	1	MA679047	1	MA679047
9	PILOT PLUG	MA679047	1	MA679047	1	MA679047
10	PILOT PLUG	MA679047	1	MA679047	1	MA679047
11	PILOT PLUG	MA679047	1	MA679047	1	MA679047
12	PILOT PLUG	MA679047	1	MA679047	1	MA679047
13	PILOT PLUG	MA679047	1	MA679047	1	MA679047
14	PILOT PLUG	MA679047	1	MA679047	1	MA679047
15	PILOT PLUG	MA679047	1	MA679047	1	MA679047
16	PILOT PLUG	MA679047	1	MA679047	1	MA679047
17	PILOT PLUG	MA679047	1	MA679047	1	MA679047
18	PILOT PLUG	MA679047	1	MA679047	1	MA679047
19	PILOT PLUG	MA679047	1	MA679047	1	MA679047
20	PILOT PLUG	MA679047	1	MA679047	1	MA679047
21	PILOT PLUG	MA679047	1	MA679047	1	MA679047
22	PILOT PLUG	MA679047	1	MA679047	1	MA679047
23	PILOT PLUG	MA679047	1	MA679047	1	MA679047
24	PILOT PLUG	MA679047	1	MA679047	1	MA679047
25	PILOT PLUG	MA679047	1	MA679047	1	MA679047
26	PILOT PLUG	MA679047	1	MA679047	1	MA679047
27	PILOT PLUG	MA679047	1	MA679047	1	MA679047

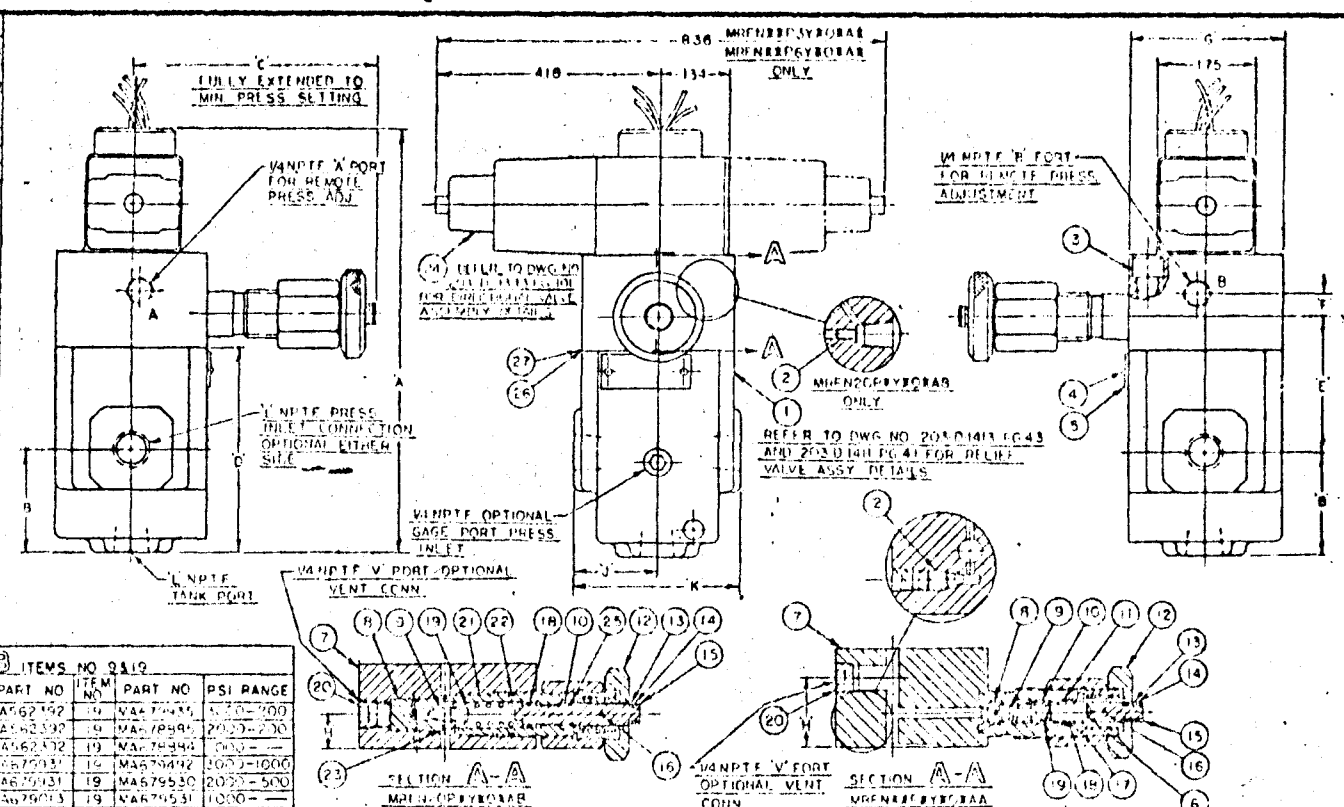
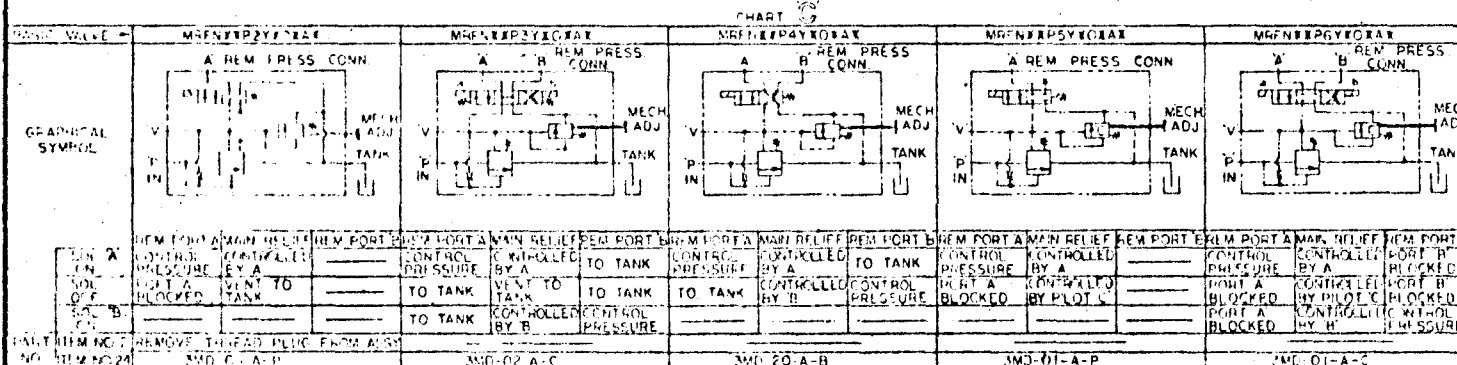


CHART A ITEM NO. 1			
BASIC VALVE	PART NO.	MIN. ADJ. PRESSURE SET AT MAX. FLOW	PSI RANGE
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200
MA679047	MA679047	150	150-200

CHART B ITEMS NO. 2 & 19				
BASIC VALVE	ITEM NO.	PART NO.	ITEM NO.	PSI RANGE
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200
MA679047	2	MA679047	19	150-200



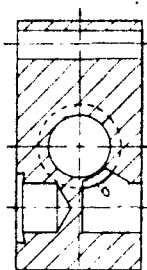
DIMENSION TABLE									
LETTER									
BASIC VALVE	A	B	C	D	E	F	G	H	J
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25
MA679047	1.34	1.28	1.75	1.41	1.52	1.25	1.25	1.25	1.25

PARTS LIST			
REVISION	REFERENCE	PART NO.	QTY. REQ'D
1	BOOY SUB-ASSY.	10-C-817-2	1
2	O-RING	0-918-2	1
3	END PLUG SUB-ASSY.	10-B-620-2	1
4	PISTON	10-B-624-2	1
5	SPRING	10-A-564-10	1
6	O-RING	0-118-1	1
7	BACK-UP RING	BU-118	1
8	BACK-UP RING	BU-120	1
9	O-RING	0-20-1	1
10	RETAINER SPRING	10-B-618-2	1
11	PILOT VALVE SUB-ASSY.	10-B-144	1
12	O-RING	0-112-1	2
13	O-RING	0-214-1	4
14	END PLUG SCREEN	SEE CHART 'A'	1

CHART 'B' ITEM NO. 11		
VALVE	PRESSURE RANGE	PILOT VALVE (PDRK. P/N)
10-B-120-2	10-150 PSI	10-A-445-10
10-B-120-5	10-150 PSI	10-A-131-10

SEE CHART 'B'

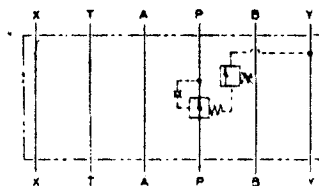
CHART 'A' MOUNTING BOLTS ITEM NO. 14			
CONTROL FUNCTION	BOLT DESCRIPTION	MANATROL PART NO.	QTY. REQ'D
DIRECT ON-VALVE	1/2-13 UNC X 2-3/4	10-A-552-2	6
DIRECT ON-VALVE & ONE MANAPAK CONTROL VALVE	1/2-13 UNC X 5	10-A-553-2	6
DIRECT ON-VALVE & TWO MANAPAK CONTROL VALVES	1/2-13 UNC X 7-1/4	10-A-554-2	6
DIRECT ON-VALVE & THREE MANAPAK CONTROL VALVES	1/2-13 UNC X 9-1/2	10-A-555-2	6



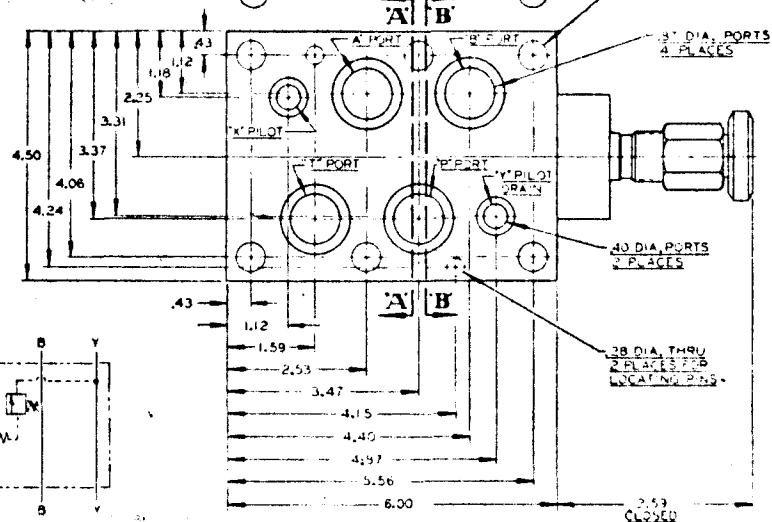
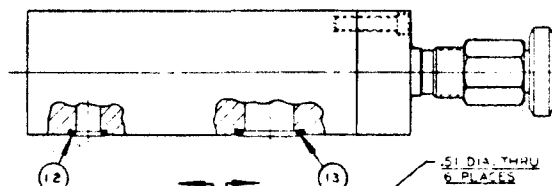
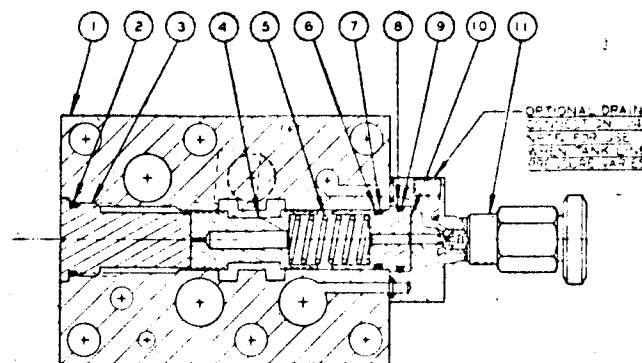
SECTION A-A

NOTES:

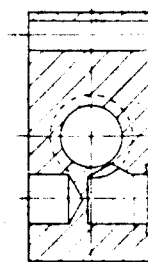
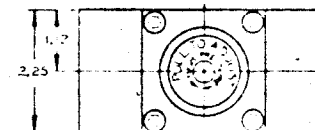
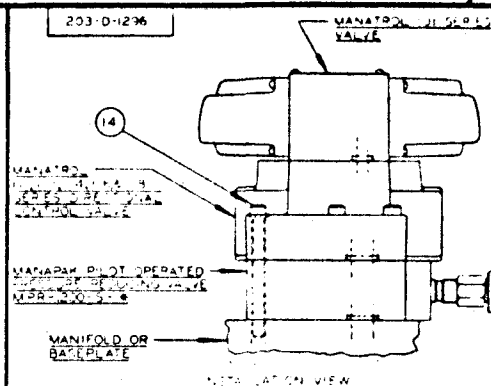
- MATERIAL:
BODY: STEEL
O-RINGS: BUNA-N
BACK-UP RINGS: TEFLON
- RECOMMENDED MAXIMUM WORKING PRESSURE: 150 PSI
- SEALING O-RINGS SUPPLIED WITH VALVE MUST BE OILERED SEPARATELY
- VALVE MUST BE OILERED SEPARATELY
- MAX. RECOMMENDED FLOW RATE:
40 GPM
- PISTON TO TANK APPROX:
10-15 PSI @ 3000 PSI



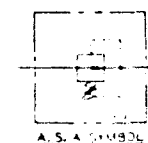
GRAPHIC SYMBOL



CLOSED OPEN



SECTION B-B

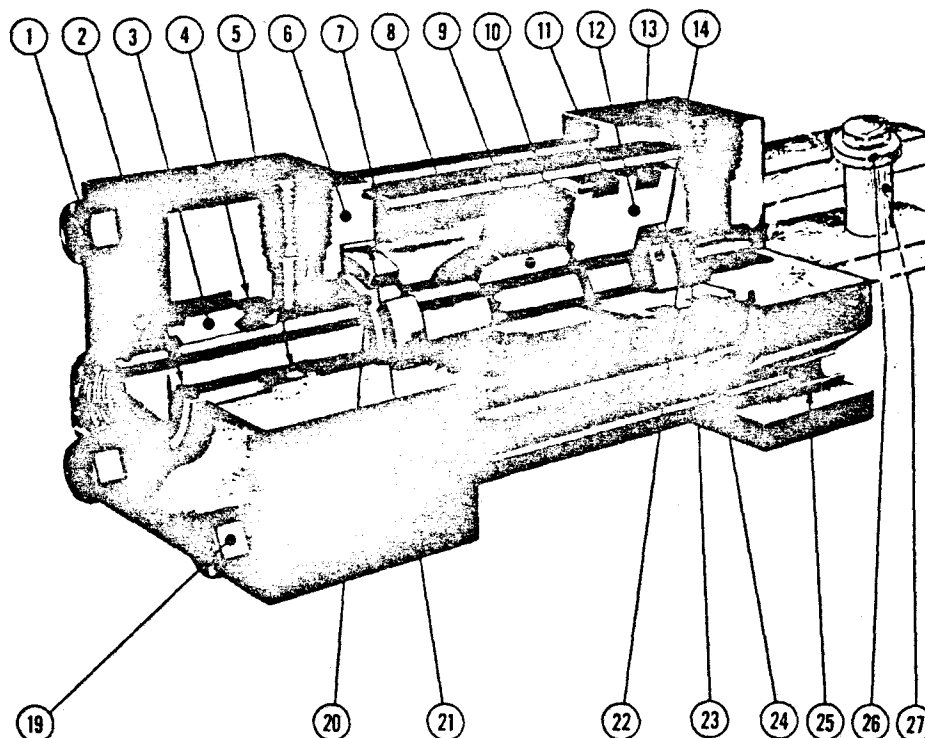


A.S.A. SYMBOL

FOR OIL HYD . . . TO 1000 P.S.I.

MODEL LS-3

NON-CUSHIONED



PARTS LIST FOR BORE SIZE 1½" x ¾" ROD DIAMETER

KEY NO.	PART NAME	NO. REQ'D.	PART NO.	
1	Rod-Piston	1	S-282-075-5	Repair kit #G-6332-005.
2	Scraper-Rod	1	5030-3/4	Seals with packing nut
3	Nut-Packing	1	S-81A-075	and scraper. Contains
4	Packing-Rod	3	5070-16	items 2, 3, 4, 7, 10
5	Adaptor-Packing	1	SM-77-3-B	and 11.
6	Head-Rod Non-Cushioned	1	S-I-551E-075	
7	"O" Ring-Body Seal	2	5145-029-A	Repair kit #6332-005.
8	Body (Specify cylinder stroke)	1	S-1-557	Seals only. Contains
9	Collar-Cushion	1	S-1-593	items 4, 7, 10 and 11.
10	"O" Ring-Piston to Rod Seal	1	5245-8	
11	Packing-Piston	2	5120-15	
12	Piston	1	S-1-553-U	
13	Head-Blind Non-Cushioned	1	S-1-552E-3	
14	Locknut-Piston Rod	1	364	
19	Nut-Hex	4	5063-4	
20	Not Required			
21	Not Required			
22	Not Required			
23	Not Required			
24	Rod-Tie (Specify cylinder stroke)	4	S-1-556-1	
25	Nut-Tie Rod	4	5185-F-¼	
26	Ring-Pin Retainer	2	5195-50	
27	Pin-Swivel	1	S-1-583	

Double AC and DC Solenoid Controlled Pilot Operated Directional Valves

111**C**00D 111**P**00D

SERVICE PARTS INFORMATION **BULLETIN 2510-B1**

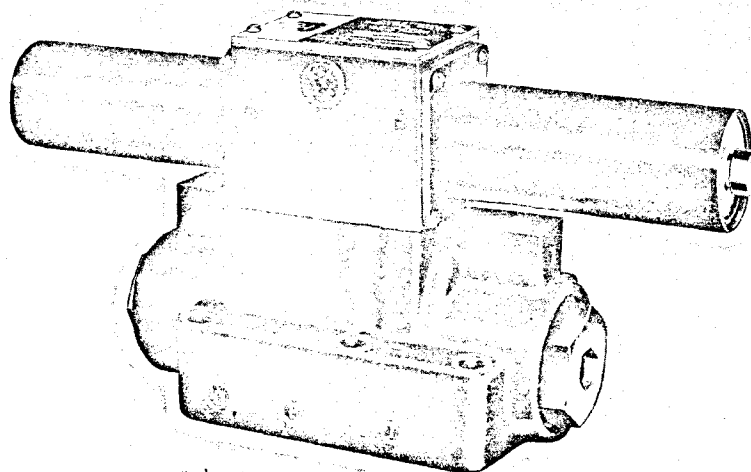
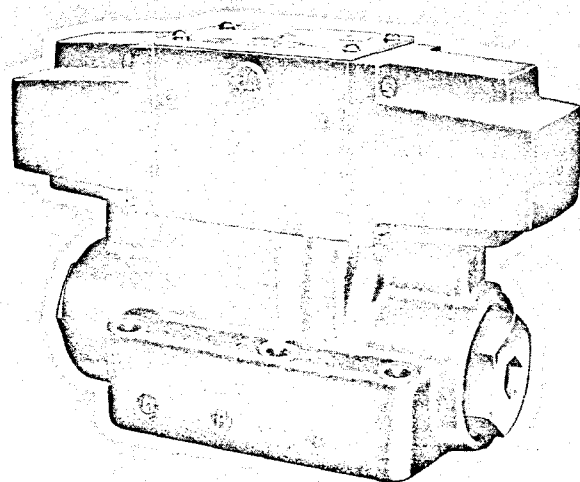


CHART B – SOLENOID ASSEMBLY AND COIL

CODE	VOLTAGE A.C.	SOLENOID NO. ASSEMBLY	COIL NO.
Y	115V - 60HZ	MB679377	MA679511
T	230V - 60HZ	MB679649	MA679513
R	460V - 60HZ	MB679650	MA679523
P	115V - 50HZ	MB679651	MA679514
N	230V - 50HZ	MB679652	MA679512
M	115V - 50/60HZ	MB690252	MA690251
B	208V - 60HZ	MB690735	MA690737
E	24V - 60HZ	MB679653	MA679524
L	6V DC	MB679645	MA679388
K	12V DC	MB679646	MA679389
J	24V DC	MB679647	MA679390
D	120V DC	MB679648	MA679968

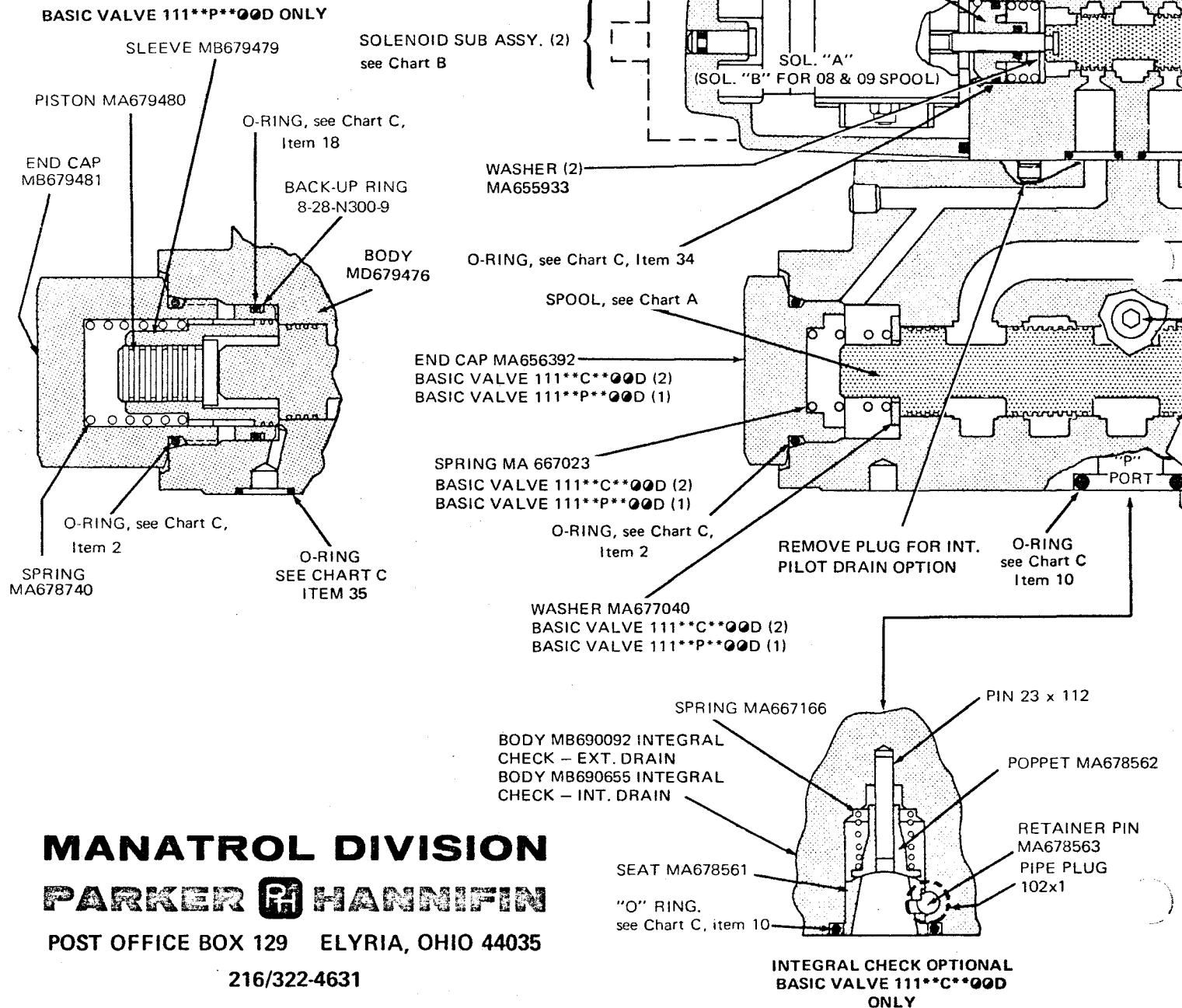
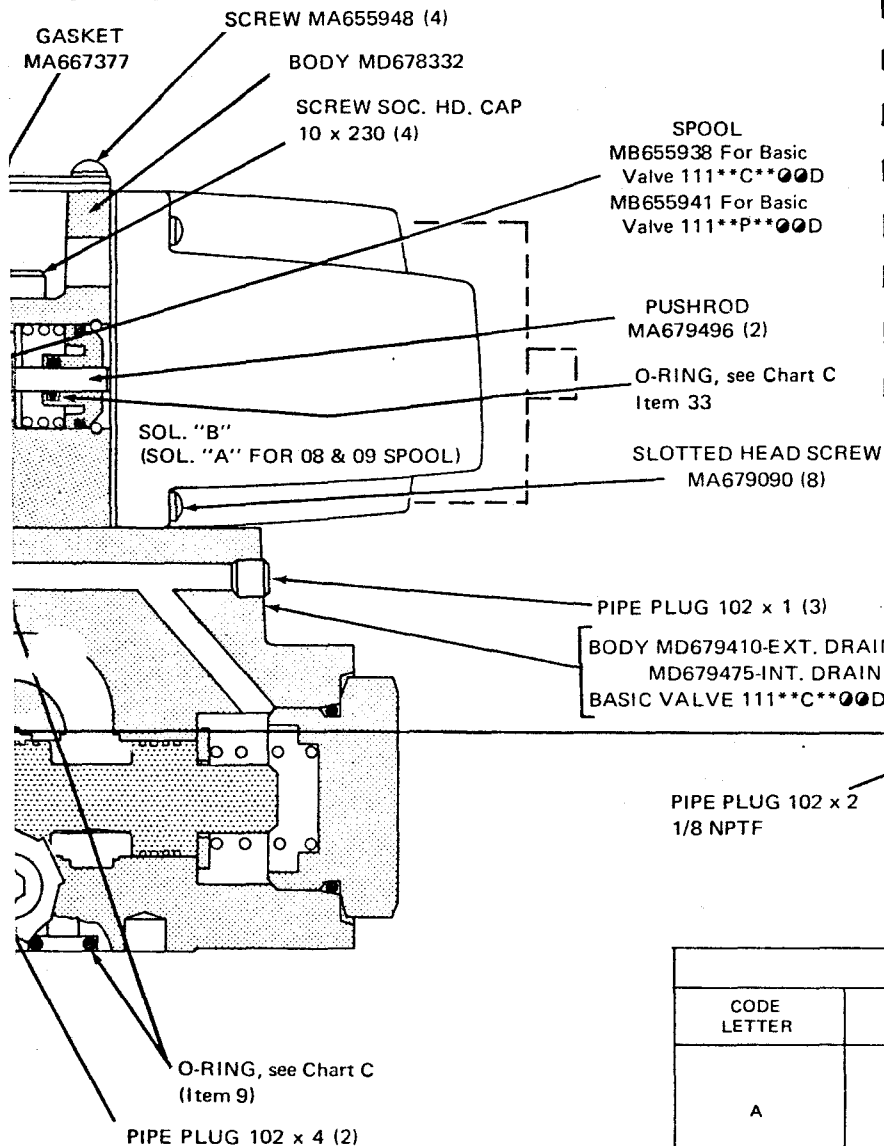


Chart A

G MA678800

P PLUG 120 x 21



A END

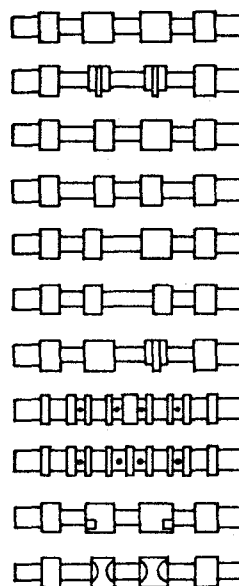
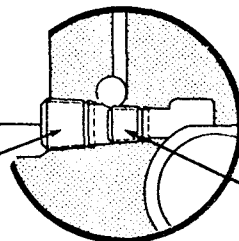


CHART A VALVE III		
SPOOL		NAME PLATE
CODE NO.	PART NO.	PART NO.
01	MB667015	MB679851
02	MB667013	MB679852
03	MB667016	MB679804
04	MB667018	MB679854
05	MB667020	MB679855
06	MB667019	MB679856
07	MB667017	MB679804
08	MC678698	MB679858
09	MC678701	MB679858
11	MB678683	MB679854
12	MB679406	MB679852

OPTIONAL
EXTERNAL
PILOT
PRESSURE
PORT



INSERT 1/16 NPTF. PIPE PLUG
TO CONVERT FROM INTERNAL
PILOT TO EXTERNAL PILOT.
1/16 PIPE PLUG USED WITH
INTEGRAL CHECK VALVE
OPTION ON 02, 08 & 09 SPOOLS

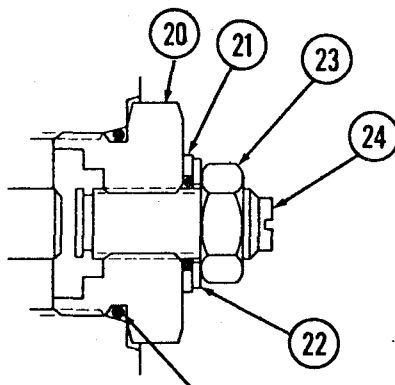
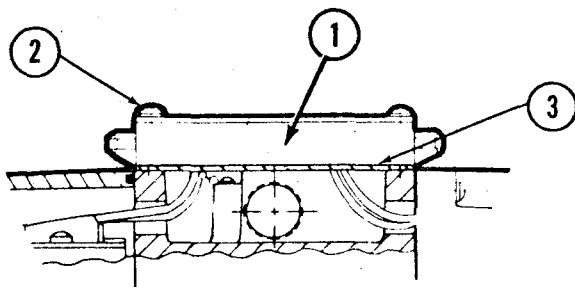
CHART C O-RINGS

CODE LETTER	O-RING COMPOUND	ITEM NO.	PART NO.	QTY. REQ.
A	BUNA - N	2	3-20N552-9	2
		9	2-14N552-9	7*
		10	2-214N552-9	4
		18	2-28N552-9	#
		33	2-9N219-7	2
		34	2-18N219-7	2
		35	2-210N552-9	3**
D	ETHYLENE PROPYLENE	2	3-20E515-8	2
		9	2-14E515-8	7*
		10	2-214E515-8	4
		18	2-28E515-8	#
		33	2-9E515-8	2
		34	2-18E515-8	2
		35	2-210E515-8	3**
E	VITON	2	3-20V377-9	2
		9	2-14V377-9	7*
		10	2-214V377-9	4
		18	2-28V377-9	#
		33	2-977545	2
		34	2-1877545	2
		35	2-210V377-9	3**

(*) 5 Required for Basic Valve 111**P**00D

(**) 111**P**00D only

(#) BASIC VALVE 111**P**00D only - one required



O-RING, see Chart C Item 2

115V - 60HZ ONLY - SIGNAL LIGHT ASSEMBLY

ITEM NO.	DESCRIPTION	DOUBLE		SINGLE	
		PART NO.	QTY. REQ.	PART NO.	QTY. REQ.
1	SIG. LIGHT ASSY.	MB678622	1	MB678623	1
2	SCREW	4 x 269	4	4 x 269	4
3	GASKET	MA678439	1	MA678439	1

STROKE ADJUSTMENT VARIATIONS

VARIATION NO.	ITEM NO.	DESCRIPTION	PART NO.	QTY. REQ'D.
No. 7 STROKE ADJUST. BOTH ENDS	20	End Cap	MA667153	2
	21	Threadseal	MA667152	2
	22	Washer	34 x 21	2
	23	Jam Nut	17 x 41	2
	24	Adj. Screw	MA667151	2
NO. 8 STROKE ADJ. "B" END ONLY OR NO. 9 STROKE ADJ. "A" END ONLY	20	End Cap	MA667153	1
	21	Threadseal	MA667152	1
	22	Washer	34 x 21	1
	23	Jam Nut	17 x 41	1
	24	Adj. Screw	MA667151	1

1 1 1

DESIGN SERIES

SPOOL	
01	
02*	
03	
04	
05	
06	
07	
08*	
09*	
11	
12	

	PILOT SUPPLY	PILOT DRAIN
1	INTERNAL	EXT.
2	EXTERNAL	EXT.
3	INT. CHECK	EXT.
*4	INT.	INT.
5	EXT.	INT.
6	INT. CHECK	INT.

SEALS	
A	NITRILE
D	EPR
E	VITON

BASIC VALVE	
C	3/4 DCV - 2 SOL, 3 POS. SPRING CENTERED
P	3/4 DCV - 2 SOL, PRESS. CENTERED

* BASIC VALVE 111**P***00D
AVAILABLE WITH
PILOT DRAIN AND
SUPPLY OPTIONS
1 & 2 ONLY

VARIATION	
1	STD.
7	STROKE ADJ. - BOTH ENDS
8	STROKE ADJ. - "B" PORT END ONLY
9	STROKE ADJ. - "A" PORT END ONLY

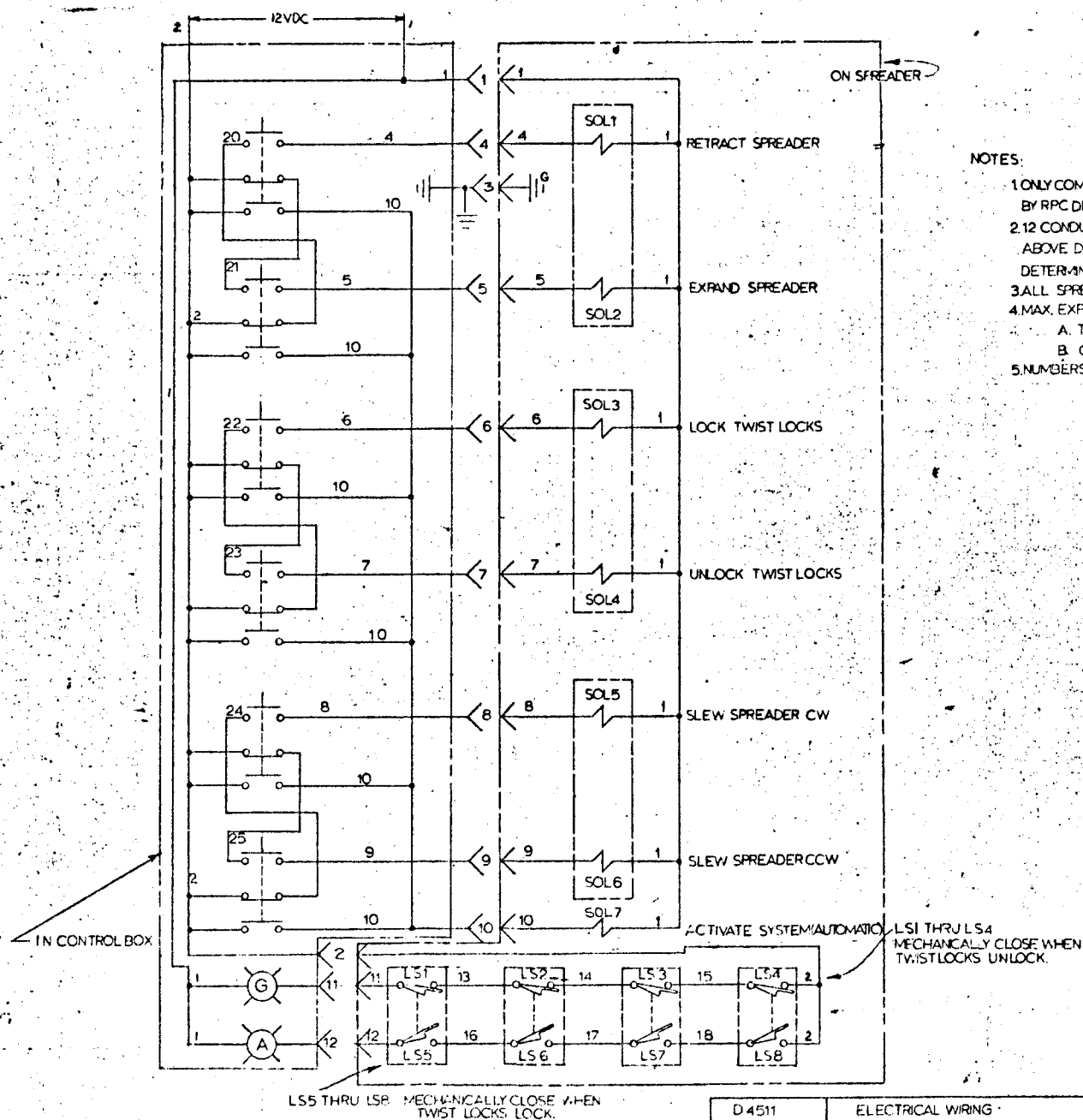
VARIATIONS 7, 8, & 9 NOT AVAILABLE
WITH BASIC VALVE 111**P***00D

SOLENOID	
Y	115V - 60HZ
T	230V - 60HZ
R	460V - 60HZ
P	115V - 50HZ
N	230V - 50HZ
M	115V - 50/60HZ
B	208V - 60HZ
E	24V - 60HZ
L	6V DC
K	12V DC
J	24V DC
D	120V DC

* VARIATION 4 NOT
AVAILABLE WITH 02, 08, 09
SPOOL AND BASIC VALVE
111**C***00D

MANATROL DIVISION
PARKER HANNIFIN

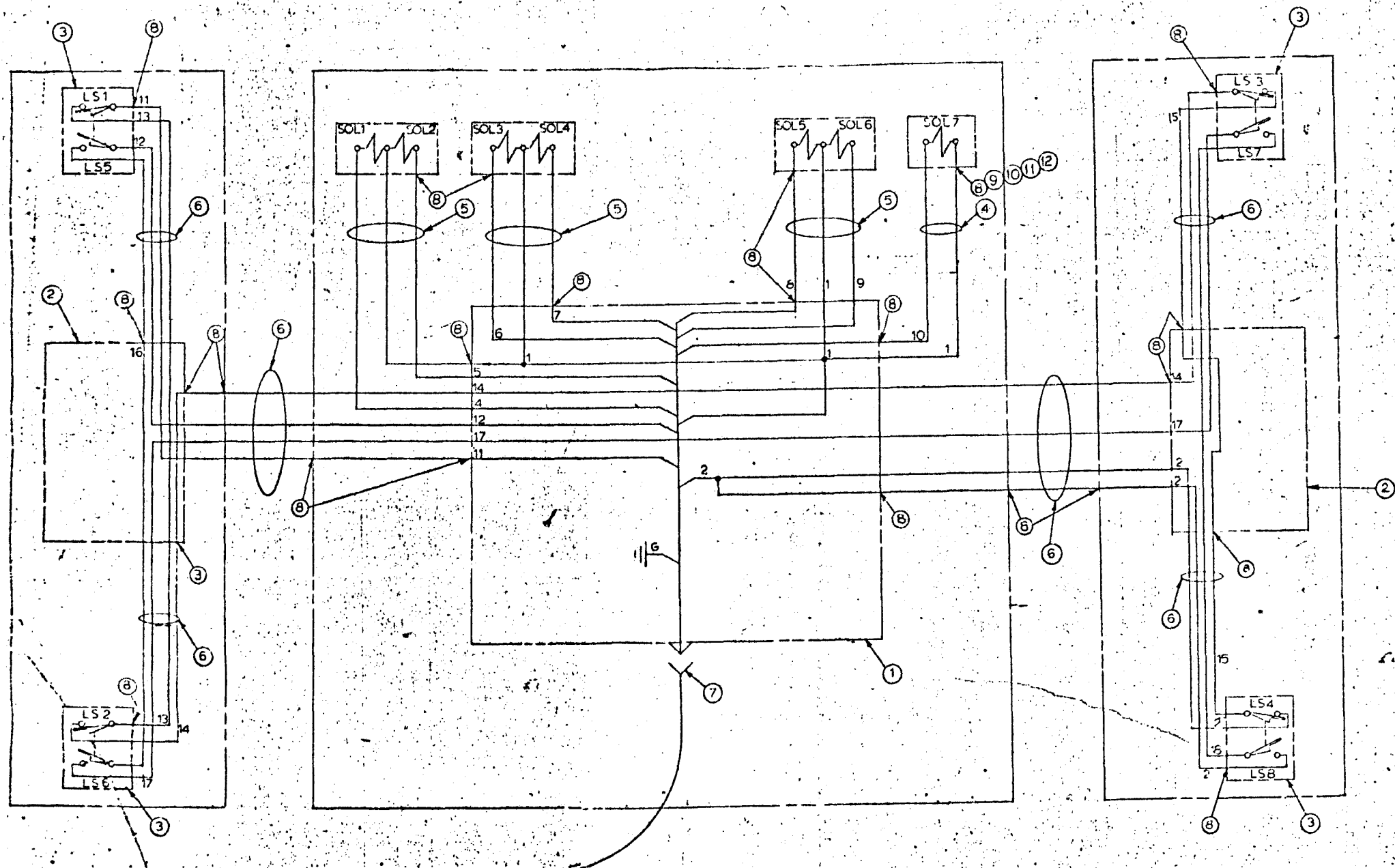
POST OFFICE BOX 129
ELYRIA, OHIO 44035
216/322-4631



NOTES:

1. ONLY COMPONENTS ON SPREADER ARE PURCHASED & SUPPLIED BY RPC DIV. WITH EXCEPTION OF CONTROL BOX ASSY.
2. 12 CONDUCTOR CABLE (SUPPLIED BY CUSTOMER) REQ'D FOR ABOVE DESIGN BETWEEN CARRIER & SPREADER. WIRE GAGE TO BE DETERMINED BY VOLTAGE DROP.
3. ALL SPREADER WIRING WILL BE 14AWG.
4. MAX. EXPECTED CURRENT AT ONE TIME:
 - A. TWO SOLENOIDS 64 AMPS AT 12VDC.
 - B. ONE CAB LIGHT, EST. 4 AMPS.
5. NUMBERS WITHIN CONNECTOR SYMBOLS ARE PIN NOS.

ISSUE	DATE	REVISION	ZONE
RPC DIVISION Midland-Ross Corporation P. O. Box 490 South, North Carolina 27173			
This drawing is the property of Midland-Ross Corporation and is subject to return upon request. It is to be used only for the purpose for which it was expressly loaned and is not to be used in any way detrimental to the interest of this corporation.			
20 TO 40 FT. ISO/ANSI LOCKING HYDRAULICALLY OPERATED EXPANDABLE FORK TRUCK SPREADER ELECTRICAL SCHEMATIC			
DR. JRO	SIZE	DWG. NO. C4505	
CRD. 4/18/75	C	DATE APR 16, 1975	

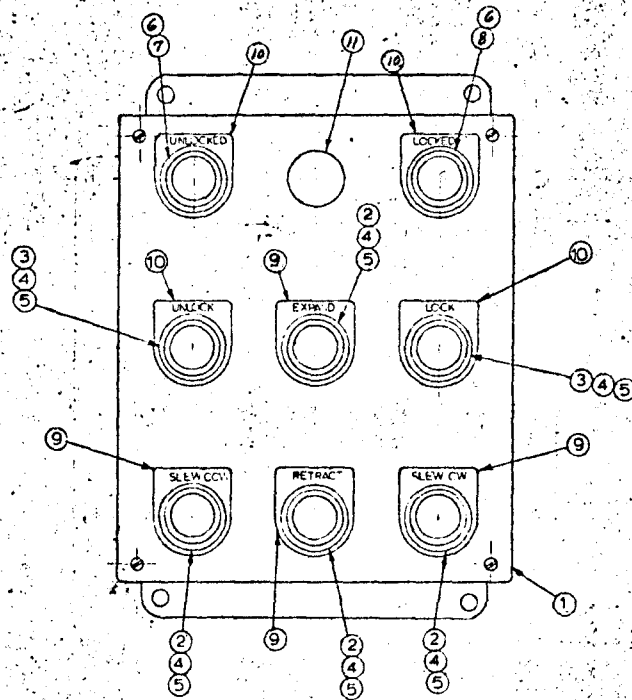


MOVEABLE FRAME 4382-1

STATIONARY FRAME 4381-1

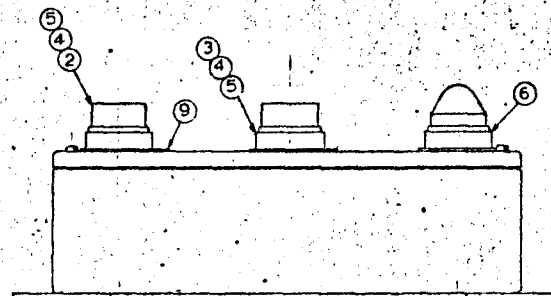
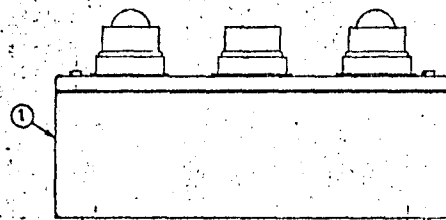
MOVEABLE FRAME 4382-2

ITEM	DWG NO.	PART NO.	DESCRIPTION	NO. REQ'D	MATERIAL
1	C4514		ENCLOSURE, CUTLER-HAMMER N°10250TH26	1	COMM.
2			PUSH-BUTTON OPERATOR CUTLER-HAMMER N°10250T01	4	"
3			" " " " " " N°10250T1C2	2	"
4			CONTACT BLOCK " " " " N°10250T1	6	"
5			" " " " " " N°10250T53	6	"
6			INDICATING LIGHT " " " " N°10250T404	2	"
7			LENS " " " " N°10250T2	1	"
8			" " " " " " N°10250T3	1	"
9			LEGEND PLATE " " " " N°10250T436	4	"
10			" " " " " " N°10250T437	4	"
11			PLUG " " " " N°10250TA7	1	"



NOTE: ALL LETTERS STAMPED ON LEGEND PLATE TO BE $\frac{1}{8}$ " HIGH MIN.

PART N°4514-1



28-141

RPC DIVISION RESERVES THE RIGHT TO MODIFY DETAILS NOT AFFECTING STRENGTH OR APPLICATION AS MAY BE NECESSARY TO FACILITATE MANUFACTURE OR IMPROVE DESIGN.

C 4505 ELEC. SCHEMATIC

DWG. NO.

TITLE

REFERENCE DRAWINGS

DR. JRO

SIZE

DWG. NO.

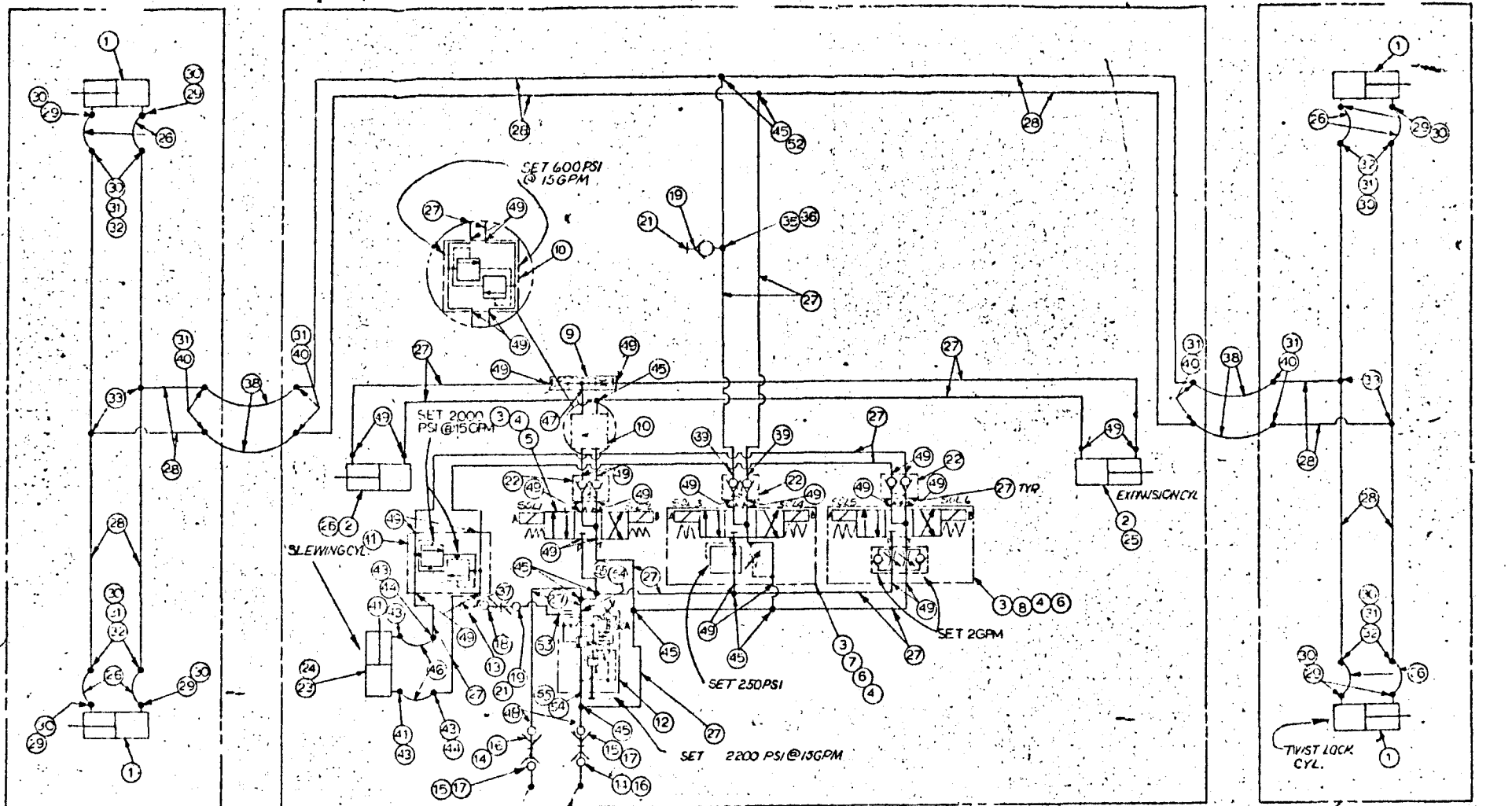
C4514

CHKD. 4/18/73

C

DATE APRIL 17, 1973

REVISE	DATE	REVISION	BY
RPC DIVISION Midland-Ross Corporation P. O. Box 490 Auburn, North Carolina 27217			
This drawing is the property of Midland-Ross Corporation and is subject to return upon request. It is to be used only for the purpose for which it was expressly loaned and is not to be used in any way detrimental to the interest of this corporation.			
CONTROL BOX ASSEMBLY			



MOVEABLE FRAME #1382-1
APPROX. TIMING

- A) SLEW CW - 10 SEC @ 2 GPM
(7" TOTAL ARC) (ADJUSTABLE)
- B) SLEW CCW - 9 SEC @ 2 GPM
(7" TOTAL) (ADJUSTABLE)
- C) EXTEND SFR 20 TO 40 FT - 45 SEC.
- D) RETRACT SFR 40 TO 20 FT - 31 SEC.
- E) LOCK TWIST LOCKS - 1 SEC
- F) UNLOCK - LESS THAN 1 SEC.

15 GPM, 2200 PSI AVAILABLE
AT SPREADER
HOSES SUPPLIED BY
CUSTOMER

OPERATOR'S SIDE

STATIONARY FRAME #438-1

SPREADER TANK RETURN LINE SHOULD
BE OF ADEQUATE SIZE AND SEPARATE
FROM ANY OTHER RETURN LINES. THE
LINE IS TO BE WITHOUT OBSTRUCTIONS
IN ORDER TO REDUCE BACK PRESSURE.

MOVEABLE FRAME #4392-2

A 6-6-73		ITEMS 54 & 55 ADDED.	
ISSUE	DATE	REVISION	WORK
RPC DIVISION Midland-Ross Corporation P. O. Box 700, Warren, North Carolina 27579			
This drawing is the property of Midland-Ross Corporation and is subject to return upon request. It is to be used only for the purpose for which it was expressly loaned and is not to be used in any way detrimental to the interest of this corporation.			
20 TO 40 FT IS GANTRY LOCKING HYDRAULICALLY OPERATED FORK LOCK EXPANDABLE SPREADER HYDRAULIC SCHEMATIC			

C.4505	ELECTRICAL SCHEMATIC
DWG. NO.	TITLE
DR. JPD	SIZE
CHKD. 4/15/73	D
DATE	APRIL 20, 1973
REFERENCE DRAWINGS	

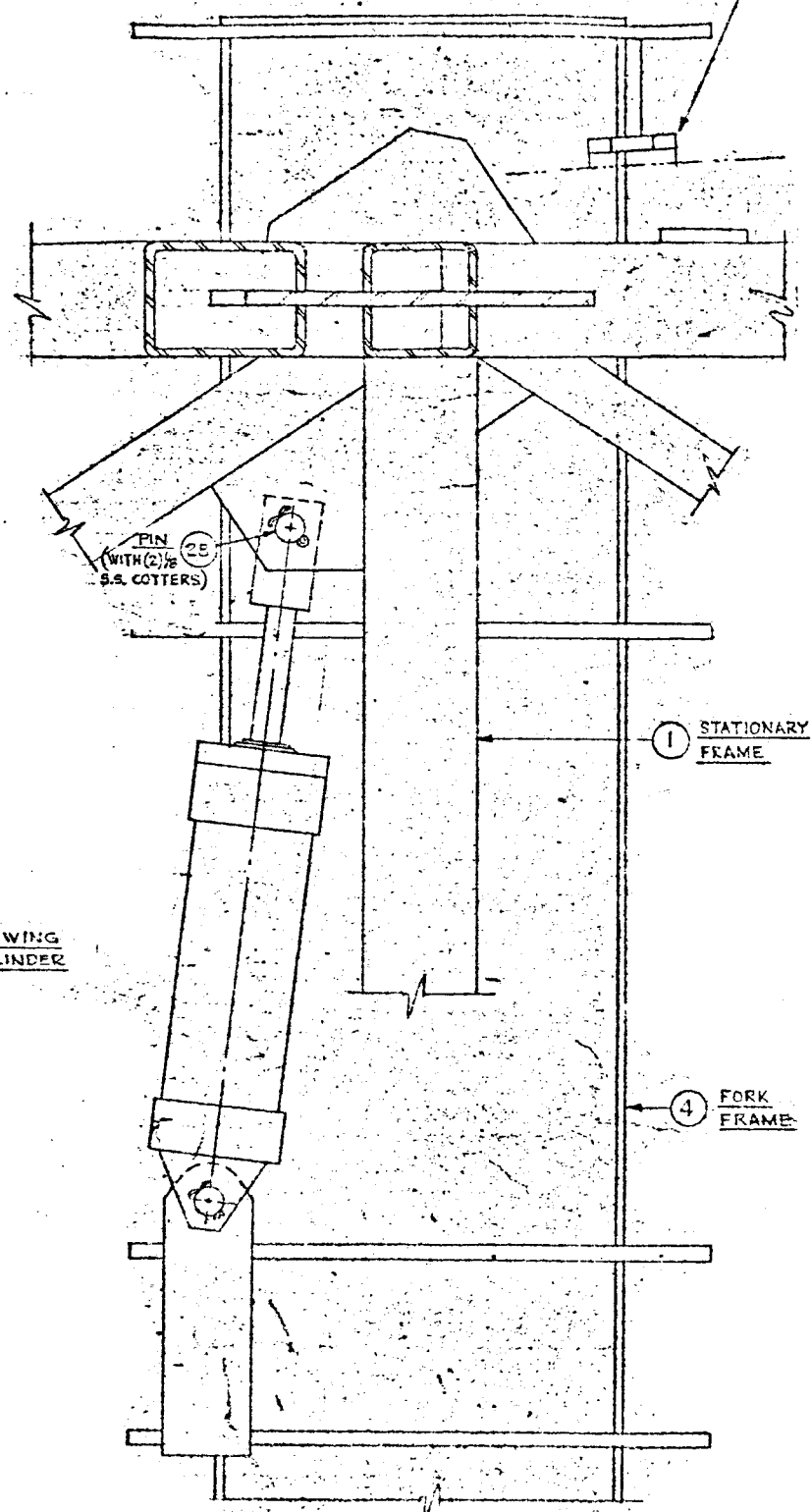
ITEM	QTY	DESCRIPTION	UNIT	PRICE
1	D-519	LOCK CYLINDER, T.J. RANNEY MFG. 1/2" BORE 1/2" STROKE, 1/2" TYPE 3020 END 1/2" 2017 VALVE THIN		
2		HYD CYLINDER, HANNIFIN N° 36CB-2HMS 23N124 1/2" BORE EXTENSIVE, STROKE 4" END 1/2" 2017 VALVE THIN	4	"
3		DIRECTIONAL CONTROL VALVE, MANATROL N° 111-04-041-AKD-02	3	"
4		SUBPLATE, MANATROL N° 515A12PB	3	"
5		BOLT KIT, " N° 512K1113	1	"
6		" " " N° 10-A-653-2-BK	2	"
7		PRESSURE REDUCING VALVE, " N° MPR-1200-P-S-1	1	"
8		DUAL FLOW CONTROL, " N° MF-1200-S-10	1	"
9		FLOW DIVIDER-COMBINER, WATERMAN N° 1429-8-1	1	"
10		DUAL RELIEF VALVE, FLUID CONTROLS N° ILL23-F6-155	1	"
11		" " " N° ILL23-F6-255	1	"
12		SOLENOID CONTROLLED PILOT RELIEF VALVE, MANATROL N° MRFN-20P-2-K-H-9-A-B-RFC	1	"
13		PRESSURE GAGE, MARSHALLTOWN N° 136 0-3000 PSI	1	"
14		COUPLING, COUPLER BODY, SNAPE TITLE N° VPHC12-12F	2	"
15		" NIPPLE " " N° VPHN-12-12F	2	"
16		COUPLER PLUG, " " N° PDPH-12	2	PLASTIC
17		NIPPLE CAP, " " N° PDCH-12	2	"
18		COUPLING, COUPLER BODY, " " N° VPHC 9-SF	1	COMM'L
19		NIPPLE BODY, " " N° VPHN 8-SF	2	"
20				
21		NIPPLE CAP, " " N° PDPH-8	2	PLASTIC
22		LOAD LOCK VALVE, WATERMAN N° 271-6	3	COMM'L
23		HYDRAULIC CYLINDER, HANNIFIN N° 34BB-2HL 1/2" BORE 1/2" STROKE	1	"
24		CYL. KNUCKLE, HANNIFIN N° 69093	1	"
25		" " " N° 69095	2	"
26		HYD HOSE, PARKER N° 301-6, 30" LG	8	"
27		FLUID LINE TUBING, 3/4 O.D. X .049 WALL	ADDITIONAL 150 FT	ST STL
28		" " " 1/2 O.D. X " "	ADDITIONAL 120 FT	"
29		MALE ELBOW, PARKER N° 6-CTX-S	8	COMM'L
30		SWIVEL HOSE FITTING, PARKER N° 20630-6-6	16	"
31		BULKHEAD UNION, " N° 8WBTX-S	12	"
32		TUBE END REDUCER, " N° 8-TRTX-S	4	"
33		UNION TEE, " N° 8-JBTK-S	4	"
34				
35		REDUCING CONNECTOR, " N° 3/4 x 1/2	1	"
36		MALE BRANCH TEE, " N° 12JBTK-S	1	"
37		PIPE THD REDUCER, " N° 1/2 x 1/4 FTR	1	"
38		HYD HOSE, " N° 301-8, 7 FT LG	4	"
39		MALE CONN., " N° 8-12 FBTK-S	2	"
40				
41		MALE ELBOW, " N° 12-CBTK-S	4	"
42				
43		SWIVEL FITTING, " N° 20630-8-8	8	"
44		UNION, " N° 12HBTK-S	2	"
45		UNION TEE, " N° 12JBTK-S	5	"
46		HYD. HOSE, " N° 301-12 3/8" 26	2	"
47		MALE CONN., " N° 12-16 FBTK-S	2	"
48		BULKHEAD UNION, " N° 12-WBTK-S	2	"
49		MALE CONN., " N° 12-12 FBTK-S	26	"
50	Not shown	CHABLE HANGER, NELSON N° 101-101 125	ADDITIONAL 250	"
51		" " STUDS " " 101-C10-110 3/4 LG		"
52	D4519	TUBE END REDUCER, PARKER N° 12-8-TRTX-S	2	"
53	"	PIPE NIPPLE, " " 1/2 x 1/4 FF	1	"
54	"	MALE CONN., " " 12-16 FBTK-S	2	"
55	"	PIPE REDUCER, " " 1/4 x 1/8 R-S	2	"

BILL OF MATERIAL

ITEM	PART NO.	NO. REQ'D	DESCRIPTION
1	4381-1	1	STATIONARY FRAME
2	4382-1	1	MOVEABLE FRAME
3	4382-2	1	MOVEABLE FRAME
4	4383-1	1	FORK FRAME
5	4384-1	1	EXTENSION CYL. SUPPORT
6	4385-1	4	BEARING PLATE
7	4387-1	4	BEARING PLATE
8	4388-1	4	BEARING COVER
9	4388-2	8	BEARING COVER
10	4389-1	4	BEARING PAD
11	4389-2	4	BEARING PAD
12	4389-3	8	BEARING PAD
13	4392-1	1	PIN ASSEMBLY (DWG C4612)
14			
15			
16	—	4	FLUOROGOLD SLIDE BEARINGS UBS75
17	—	4	FLUOROGOLD SLIDE BEARINGS UBSPT5 (MODIFIED FOR A=18" & C=15 3/4")
18	—	24	BOLT, NUT & WASHER - 1" DIA. x 5 1/4 (ASTM A325)
19	—	8	BOLT, NUT & WASHER - 1" DIA. x 3 1/2 (ASTM A325)
20	—	2	BEARING - LINK BELT 3232 F. MODIFIED F&B DETAIL
21	—	8	HEX BOLT, NUT & LOCKWASHER 5/8 DIA. x 2"
22	—	12	HEX BOLT, NUT & LOCKWASHER 3/4 DIA. x 2 3/4"
23			
24			
25	2019-10	2	EXTENSION CYLINDER PIN
26			
27			
28			
29		32	HEX HD. CAP. SCREW 1/2-13 UNC-2A x 1" LG. WITH LOCKWASHER

B	REV. 7/73	ITEM 13 CHG'D, ITEMS 14&15 DELETED	
A	REV. 7/73	ITEMS 23 & 24 AND 26 THRU 28 REMOVED	
ISSUE	DATE	REVISION	ZONE
 RPC DIVISION Midland-Ross Corporation P. O. Box 498 Rarobas, North Carolina 27573			
This drawing is the property of Midland-Ross Corporation and is subject to return upon request. It is to be used only for the purpose for which it was expressly loaned and is not to be used in any way detrimental to the interest of this corporation.			
MAIN ASSEMBLY			
DR. L.W.R.	SIZE	DWG. NO. 4380	
CKD. R.B.B.	C	DATE	

SET STOP PLATE ON FORK FRAME (2 PLACES)
FOR STATIONARY FRAME TO SLEW 30°-50°
IN EACH DIRECTION. INSURE UNIFORM
BEARING WITH CORRESPONDING STOP
PLATE ON STATIONARY FRAME.



PIN (25)
WITH (2) 1/8
S.S. COTTERS

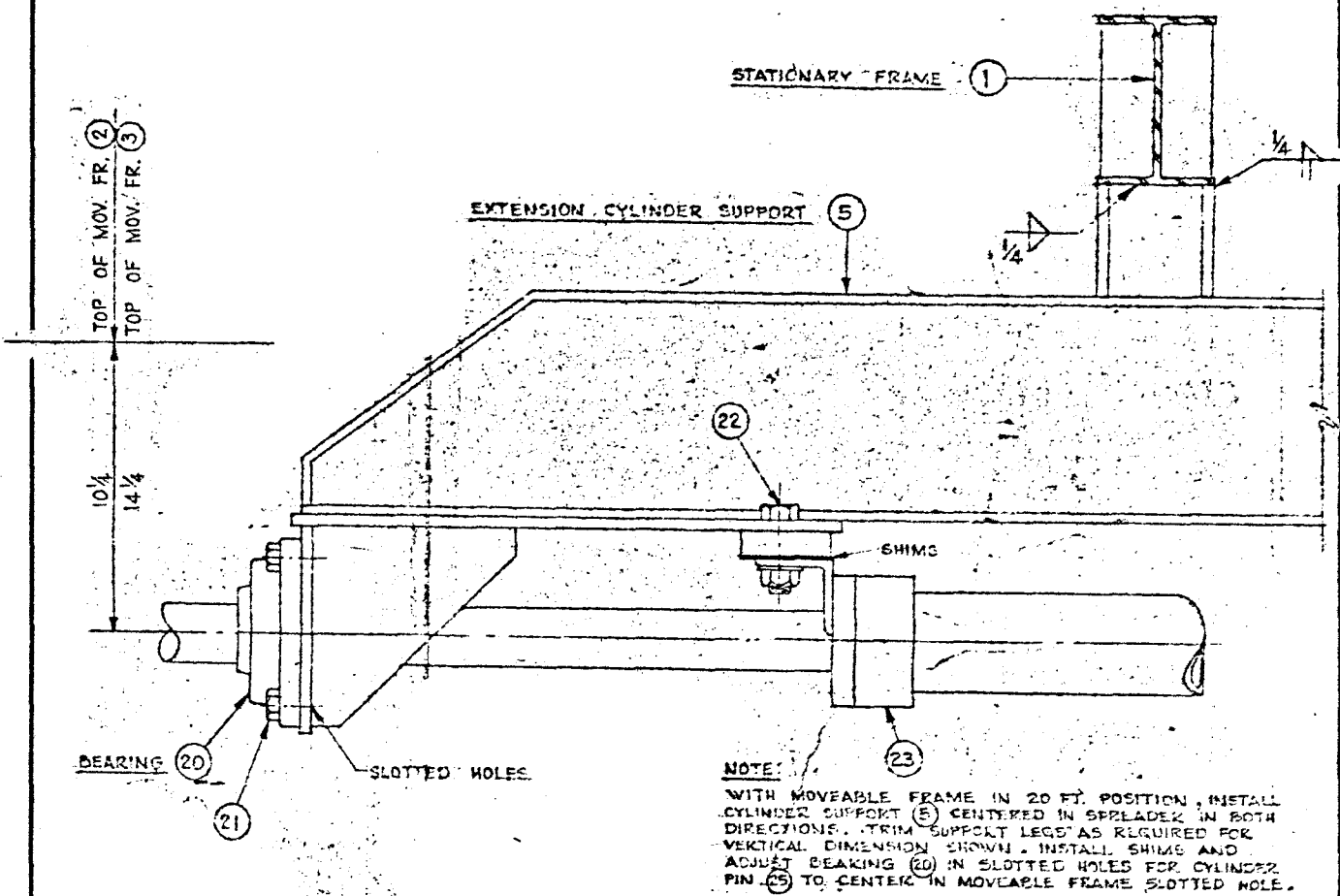
① STATIONARY
FRAME

④ FORK
FRAME

SLEWING
CYLINDER

SLEWING CYLINDER DETAIL

3/4" = 1'-0"

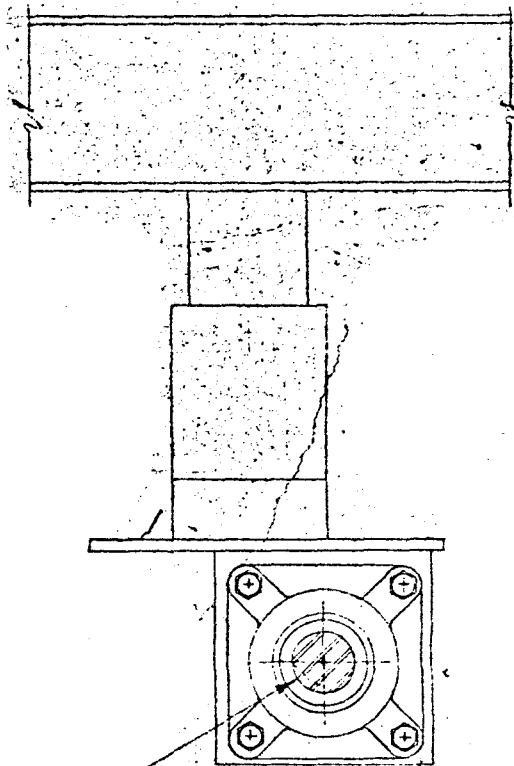


EXTENSION CYLINDER DETAIL

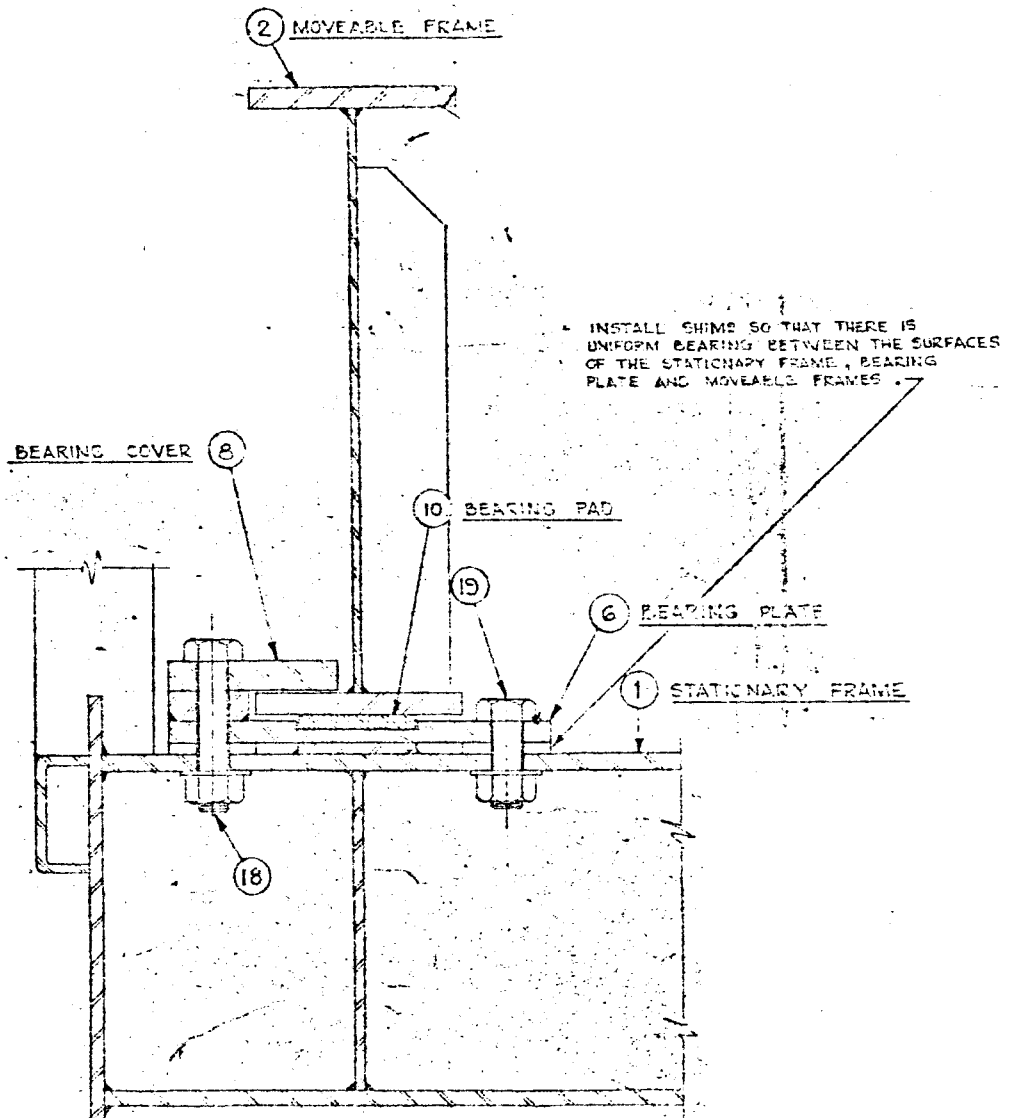
3" = 1'-0"

DETAIL (A)

3" x 1'-0"

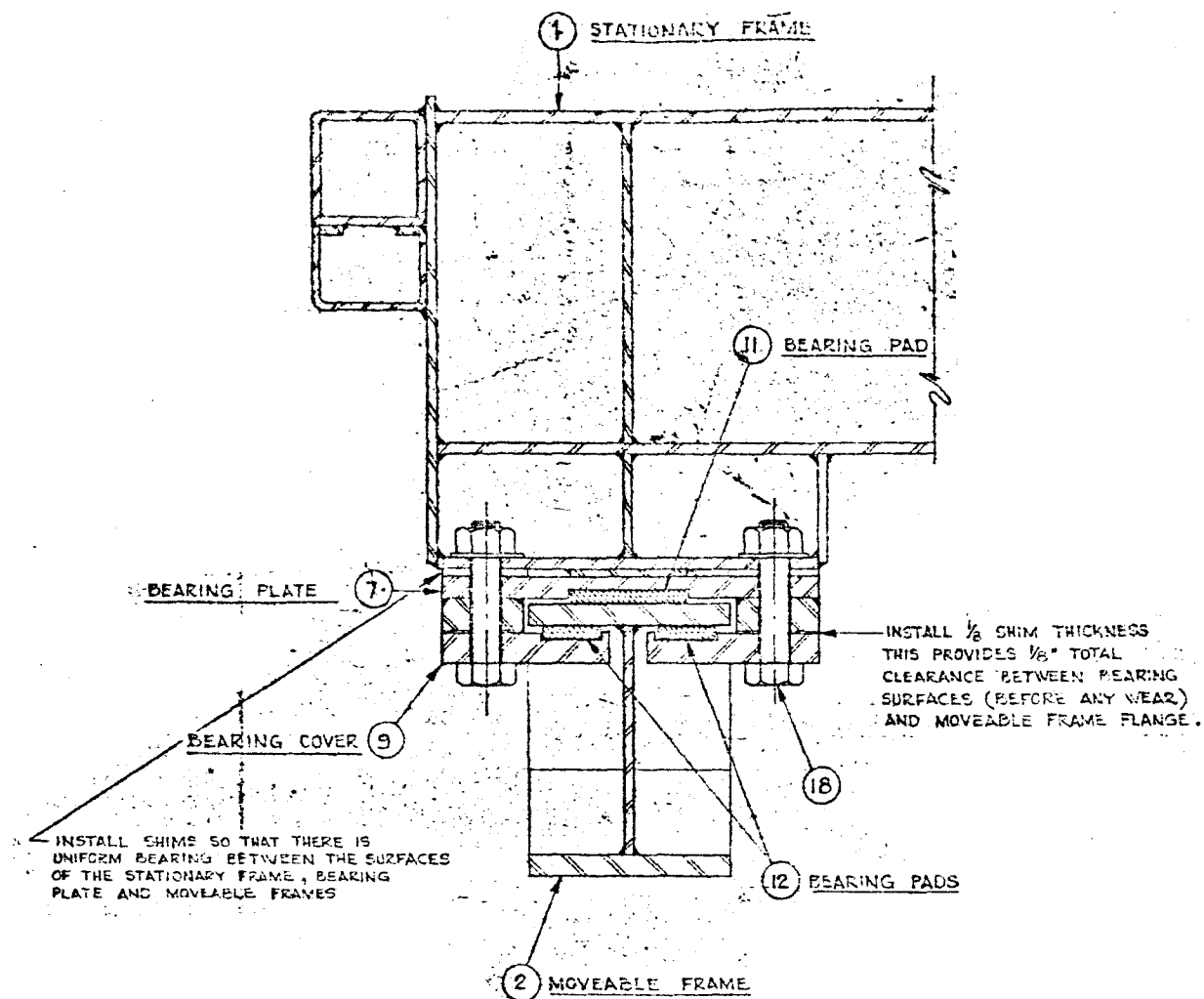


REAM BEARING SLEEVE TO CYLINDER
ROD DIA. $+.010$. BEARING SLEEVE
TO BE OF MATERIAL SATISFACTORY
FOR THIS SERVICE AND TO PREVENT
GALLING.



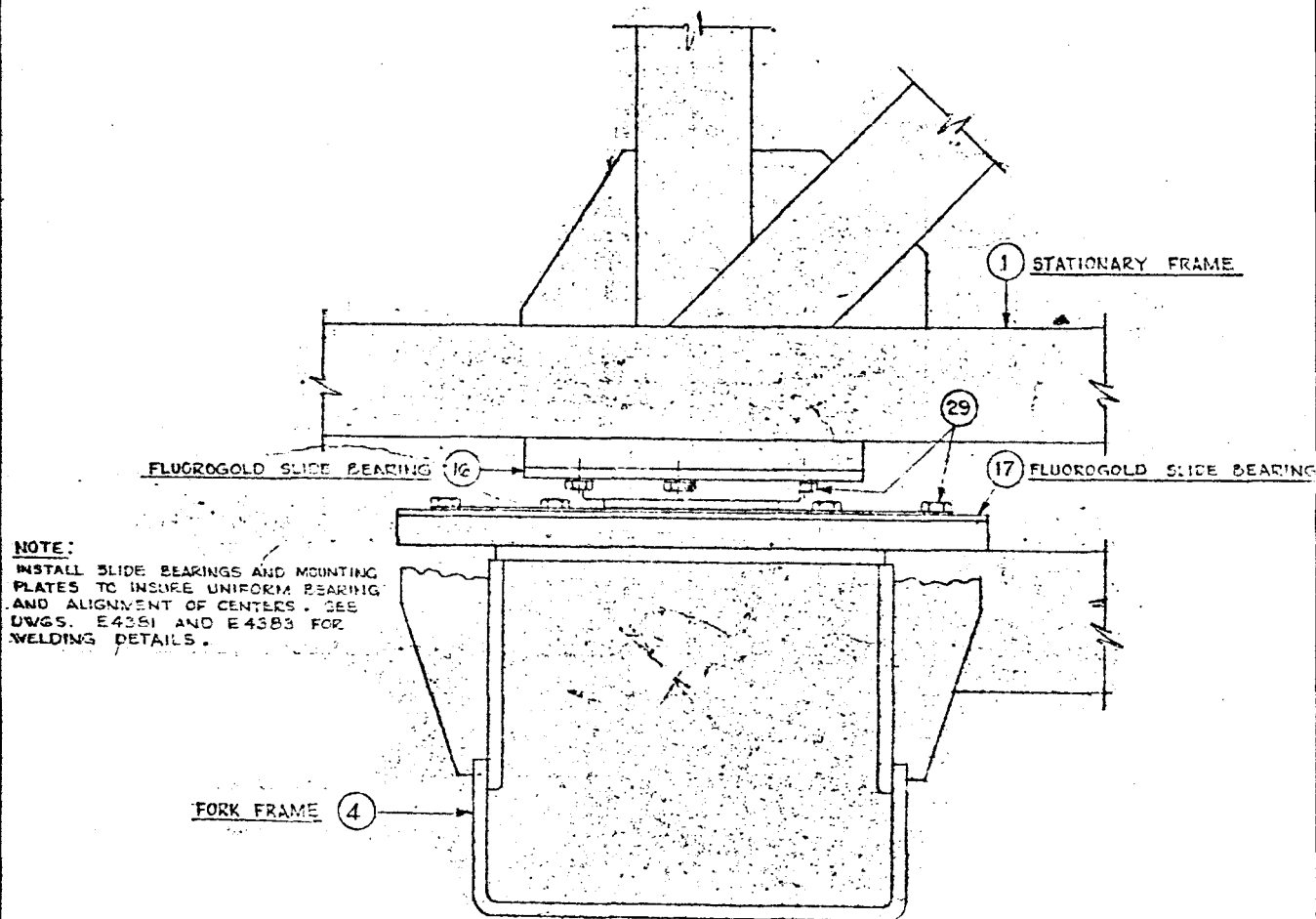
DETAIL (B)

3" = 1'-0"



DETAIL (B)

3\"

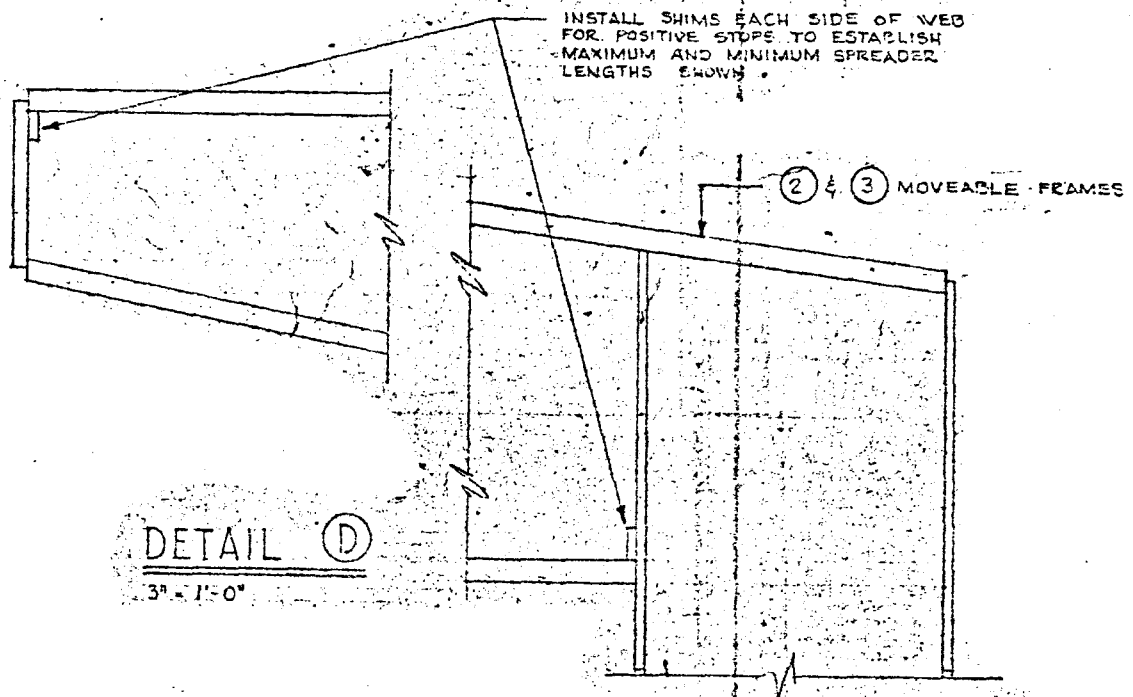


DETAIL (C)

3" = 1'-0"

EXTENSION CYLINDER DETAIL

3" = 1'-0"



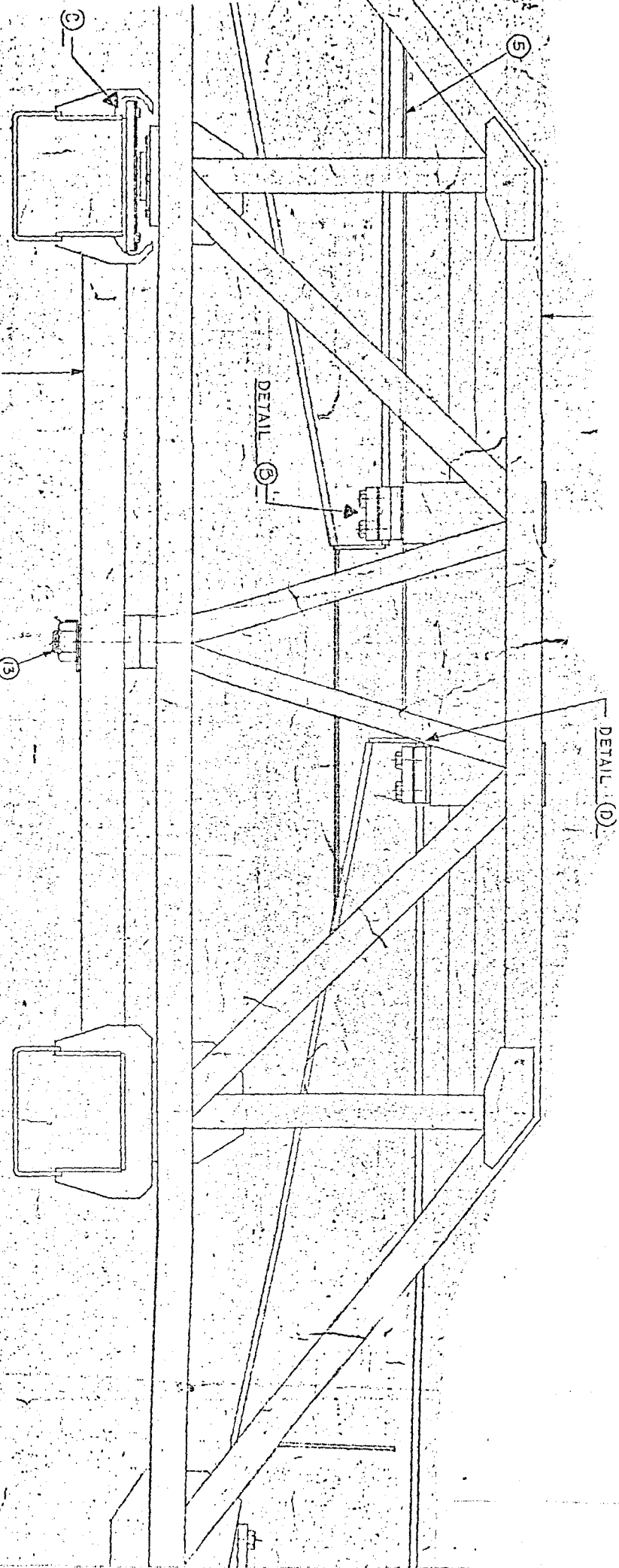
DETAIL ①

3" = 1'-0"



EXTENSION C
SUPPORT

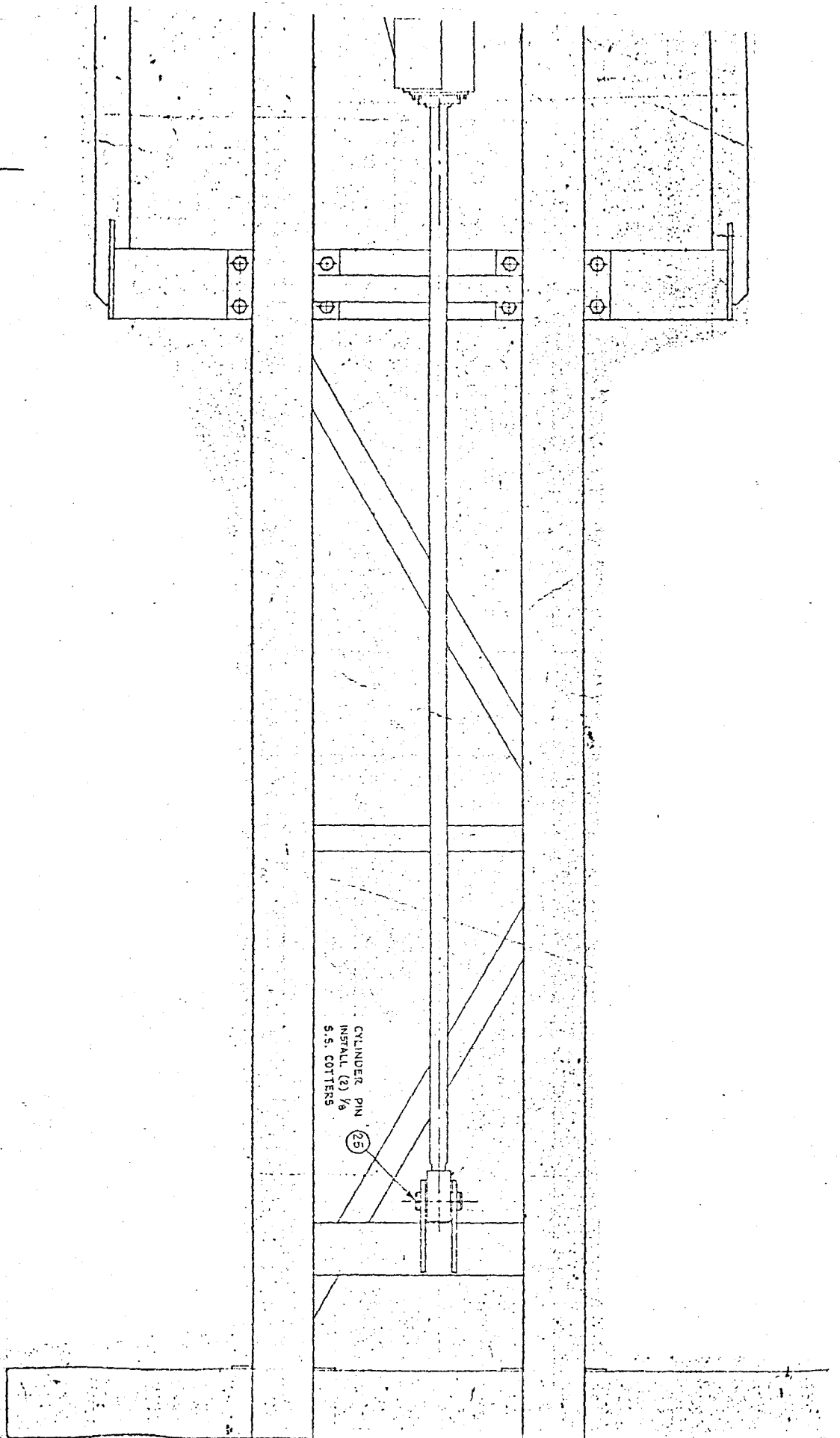
DET

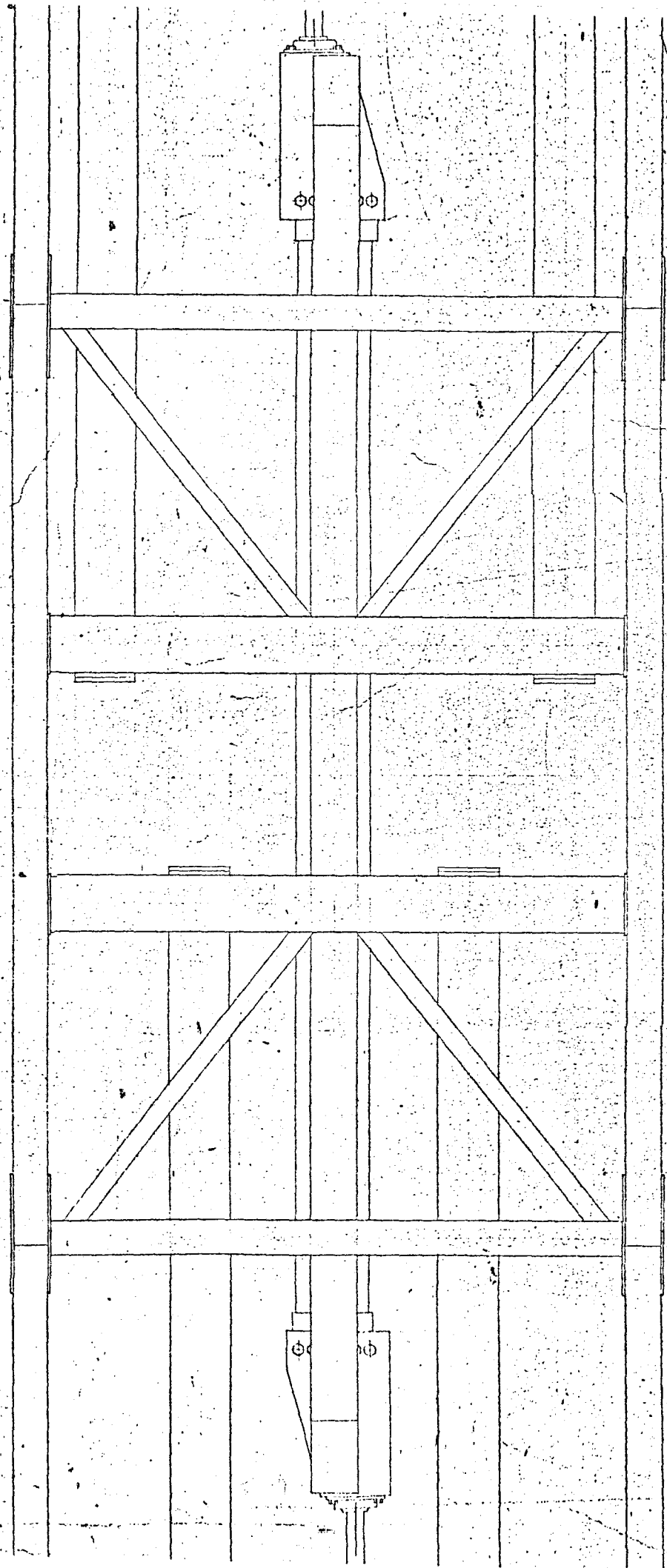


238 (19'-10") 20 FT. CONTAINER SETTING
 47 1/2 (39'-11 1/2") 40 FT. CONTAINER SETTING

③ MOVEABLE FRAME







95½

FACE TO FACE OF HOUSING

