

220-RRC
SN-1499

Pettibone Corporation

PETTIBONE

DATE FEBRUARY 22ND 1985

PETTIBONE

MODEL 84110 RRC CARRIER SERIAL NO. 1499 CRANE SERIAL NO. _____

1. ENGINE MAKE GM 8V-71 MODEL 70877040 SERIAL NO. 8VA443715
2. TRANSMISSION MAKE ALLISON MODEL HT-750 DRD SERIAL NO. 2510088044
3. MAIN WINCH MAKE _____ MODEL _____ SERIAL NO. _____
4. HYD. MOTOR (MAIN WINCH) MAKE _____ MODEL _____ SERIAL NO. _____
5. AUX. WINCH MAKE BRADEN MODEL CH230A-36120-01 SERIAL NO. 8400-713
6. HYD. MOTOR (AUX. WINCH) MAKE _____ MODEL _____ SERIAL NO. _____
7. LIFT CYL. MAKE L.S. _____ SERIAL NO. _____
R.S. _____ SERIAL NO. _____
8. CROWD CY. MAKE UPPER _____ SERIAL NO. _____
LOWER _____ SERIAL NO. _____
9. BEAM CYL. MAKE L.F. _____ SERIAL NO. _____
L.R. _____ SERIAL NO. _____
R.F. _____ SERIAL NO. _____
R.R. _____ SERIAL NO. _____
- JACK CYL. MAKE L.F. _____ SERIAL NO. _____
L.R. _____ SERIAL NO. _____
R.F. _____ SERIAL NO. _____
R.R. _____ SERIAL NO. _____
10. FLOW DIVIDER MAKE _____ SERIAL NO. _____
11. RING GEAR MAKE _____ SERIAL NO. _____
12. SWING VALVE BANK _____ SERIAL NO. _____
- 1ST EXTENSION VALVE BANK _____ SERIAL NO. _____
- 2ND EXTENSION VALVE BANK _____ SERIAL NO. _____
- ROOM HOIST VALVE BANK _____ SERIAL NO. _____

MAIN WINCH VALVE BANK 1. _____ SERIAL NO. _____
 BANK 2. _____ SERIAL NO. _____
 AUX. WINCH VALVE BANK _____ SERIAL NO. _____
 13. HOSE REEL MAKE _____ SERIAL NO. _____
 14. COUNTERWEIGHT EXT. CYL. MAKE _____ SERIAL NO. _____
 15. HYD. PUMP L.S. MAKE _____ VICKERS SERIAL NO. 4535VQ60A-381CC20LH
 R.S. MAKE _____ VICKERS SERIAL NO. 4535VQ60A-381CC20LH
 16. SWING MOTOR MAKE _____ SERIAL NO. BSD120-8202896
 17. COLLECTOR RING MAKE _____ SERIAL NO. _____
 18. FRONT TIRE MAKE _____ GENERAL SIZE 12.00-20 PLY 16 RIM _____
 REAR TIRE MAKE _____ GENERAL SIZE 11.00-20 PLY 16 RIM _____
 #1 DRIVE AXLE _____ MODEL SHDQX198 SERIAL NO. HK8497300
 #2 DRIVE AXLE _____ MODEL SHRQX191 SERIAL NO. HK8497304
 #3 DRIVE AXLE _____ MODEL _____ SERIAL NO. _____
 19. SWING GEAR BOX MAKE _____ SERIAL NO. _____
 20. HOOK BLOCK MAKE _____ MODEL _____ SERIAL NO. _____
 21. AUX. BLOCK MAKE _____ MODEL _____ SERIAL NO. _____
 22. HEADACHE BALL MAKE _____ MODEL _____ SERIAL NO. _____
 23. O.R. VALVE BANK MAKE _____ MODEL _____ SERIAL NO. _____
 24. POWER STEERING PUMP MAKE _____ MODEL V2020F1F8 SERIAL NO. 11S1AC8E20
 25. BRAKE COMPUTER VALVE MAKE _____ MODEL _____ SERIAL NO. _____
 26. AIR COMPRESSOR MAKE _____ MODEL 5101017 SERIAL NO. _____
 27. CROWD CYL. MAKE _____ MODEL _____ SERIAL NO. _____
 28. RADIATOR MAKE _____ MODEL 38184-04 SERIAL NO. _____

INSPECTOR

TECHNICAL MANUAL

OPERATIONS, MAINTENANCE, REPAIR AND

ILLUSTRATED PARTS BREAKDOWN

MODEL 22ORRC CRANE

110 TON CRANE

PETTIBONE CORPORATION,
8430 WEST BRYN MAWR AVE.,
CHICAGO, ILLINOIS,
USA
60631

VEHICLE CHECK SHEET

PETTIBONE

ENGINE	MODEL: 84110 RRC		DATE: FEBRUARY 18, 1985		SER. NO.: 1499
	MODEL: 70877040		SER. NO.: 8VA443715		
	FUEL PUMP NO.: GMC GEAR TYPE		TURBO-CH. NO.:		
	COMPRESSOR NO.: 5101017		P/S PUMP NO.: V2020F1F8S 11S1AC8E20		
	AIR CLEANER MODEL: 17531-07		SER. NO.:		
	GENERATOR MODEL: 1117242		SER. NO.: 84K17		
STARTER MODEL: 1114896		SER. NO.: 84K15			
COOLING		RADIATOR NO.: 38184-04-4		RADIATOR SHUTTERS NO.:	
CLUTCH ASSY.		MODEL:		MASTER CYL. NO.:	SLAVE CYL. NO.:
STEERING	GEAR MODEL 503AS104		SER. NO.:		
	FLOW CONTROL VALVE		PART OF PUMP		
	P/S VALVE GB2177B	11.84	P/S CYLINDERS 2822	2 OF	11.84
TRANSMISSION		MODEL: HT750 DRD	SER. NO.: 2510088044	SHIFT CONTROL:	
AUX. TRANSMISSION		MODEL:	SER. NO.:	SHIFT CABLE LGTH.:	
RETARDER		MODEL:	SER. NO.:		
P.T.O.		MODEL:	SER. NO.:	SHIFT CONTROL:	
FRONT AXLES		MODEL: FL941RDAX25 FL941RDAX26	SER. NOS.: N759955 N761050	RATIO:	
REAR AXLES	MODEL: SHD QX 198 SHR QX 191	SER. NOS.: HK8497300 HK8497304	RATIO: 4.89		
	DIFF. LOCK-OUT: YES				
HYDRAULICS	VERTICAL CYLS.: 33171-14-1P	SIZE: 8" X 15"	SER. NOS.:		
	HORIZONTAL CYLS.: 32638-14-1P-3	SIZE: 2½" X 55½"	SER. NOS.:		
	HYDRAULIC VALVE: 33973-14-1P	SER. NO.: 8 - SPOOL	GRESEN		
	QUICK RELEASE COUPLINGS-TYPE: 30323-14-1P	SIZE: 3/8"			

PETTIBONE

LIMITED

S/N 1499

BRAKES	MGM MAN CHAMBER TYPE 13865-03-1P 4 OF	ROCKWELL 21022-03-1P 8 OF
	RESERVOIRS - TYPE 36511-03-1P	SIZE

RIMS	SIZE - FRONT ()	REAR: ()
	SPACERS - SIZE: ()	SPARE: ()

TIRES	FRONT - SIZE: 12.00 - 20	REAR - SIZE: 11.00 - 20
	SER. NOS. AB2T 7YK 384	SER. NOS. AA2L BNC 012
	5 OF	9 OF
	GENERAL 16 PLY	GENERAL 14 PLY
	SUPER ALL GRIP	SUPER ALL GRIP
	LOAD RANGE H	LOAD RANGE H
	MADE IN U.S.A.	MADE IN U.S.A.

WHEELS	FRONT NO.: 20995-24-1P	REAR NO.: 34681-24-1P
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KEYS	IGNITION KEY - NO: 702	CABIN KEY - NO: CH507
	CRANE PK560	CRANE 500
	SLING BOX KEY - NO: EM502	TACHOGRAPH KEY - NO:
	CRANE EM508	
	OTHER:	

REMARKS:

CHECKED BY: _____

Ref. 1499 - This list is of original Vendor manuals included in
CUSTOMERS MANUALS BUT NOT INCLUDED IN PETTIBONE
CANADA ENGINEERING DEPT COPY or PET. TIFFIN'S COPY.

GEARMATIC MODEL 44 HYDRAULIC WINCH, PARTS & SERVICE MAINTENANCE MANUAL

..... J379F

MODEL 44 FREE FALL, PARTS SERVICE & MAINTENANCE MANUAL J380C

INSTALLATION, MAINTENANCE & SERVICE C2H230A..... 11-8208-16

BRADEN WORM GEAR SERVICE SCHOOL No. #

MAINTENANCE & SERVICE INFORMATION, BRADEN WORM GEAR WINCHES 10-8403-5

BRADEN GASKET, O-RING & SEAL KITS, MATERIAL LIST..... 12-8310-1

MATERIAL LIST, BRADEN PD12A 11-8110-4G

INSTALLATION, MAINTENANCE & SERVICE, SERIES PD12..... 11-8103-4E

MATERIAL LIST, BRADEN AMSU10..... 12-7907-28

BRADEN WINCH CO..... 10-8003-10

SPERRY VICKERS, DOUBLE PUMPS, SERVICE PARTS INFO. I-3173-S

SPERRY VICKERS, FLEX-PLATE TYPE DOUBLE PUMPS,
OVERHAUL MANUAL..... I-3174-S

SPERRY VICKERS, DOUBLE PUMPS, SERV. PARTS INFORMATION M-2252-S

SPERRY VICKERS, VANE PUMPS, OVERHAUL MANUAL..... I-3143-S

SPERRY VICKERS, MULTIPLE UNIT VALVES, SERV. PARTS
INFORMATION..... M-2403-S

SPERRY VICKERS, MULTIPLE UNIT VALVES, OVERHAUL
MANUAL..... M-2400-S

SPERRY VICKERS, MULTIPLE UNIT VALVES, SERVICE PARTS
INFORMATION... M-2403-S

SPERRY VICKERS, MULTIPLE UNIT VALVES, SERVICE
PARTS INFORMATION. M-2404-S

SPERRY VICKERS, MULTIPLE UNIT VALVES, OVERHAUL
MANUAL..... M-2400-S

DOLE, SERVICE & INSTALLATION MANUAL, MODEL PA-181..... D-29214

KRUEGER, SYSTEM MARK H, INSTALLATION & CHECKOUT
PARTS LIST & TROUBLESHOOTING LIST..... No. #

The Inside Story of the Rockwell Inter-Axle Differential.....SP7020A 5/79
Single-Reduction Drive Unit.....F.M.M. #5
Stopmaster Brakes.....F.M.M. #4R
Rockwell, Stopmaster Wedge Brakes, Service Parts Book.....SP7915
Rockwell "Q" Series, Cam-Master Brakes.....FMM #4A
"Q" Series Cam-Master Brakes Service Parts Book,.....PB-7850-3
Williams Air Controls, Service information Bulletin,.....S-045
Front Axles, non-Driving, Rockwell-Standard Group.....F.M.M. #2
SSHD, STHD & SUHD Parts Book, Rockwell Int.....SP-7646-2
Owner's & Operator's Manual, Detroit Diesel Truck Engines....6 SE 211
Allison Automatic Transmissions, Mechanics Tips.....SA 1366E

PETTIBONE 22ORRC PARTS BOOK

CHAPTER I

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SECTION B OPERATING PROCEDURES

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Refer to the back of this book for major component manuals.

INTRODUCTION

BEFORE STARTING THIS CRANE, FAMILIARIZE YOURSELF WITH THE CONTROLS, INSTRUMENT PANEL, SHIFTING DIAGRAMS AND MOST OF ALL THE CONTENTS OF THIS MANUAL. THIS WILL HELP TO INSURE THAT PROPER OPERATING PROCEDURES ARE FOLLOWED AND THAT GOOD DRIVING HABITS ARE ACHIEVED.

THE MANNER IN WHICH THE CARRIER IS OPERATED AND CARED FOR DURING THE FIRST 100 WORKING HOURS WILL DETERMINE ITS FUTURE LIFE, ITS FREEDOM FROM UNNECESSARY TROUBLES AND ITS OVERALL OPERATION. THE DUTY OF THE OPERATOR PLACED IN CHARGE OF THIS UNIT IS TO STRICTLY ADHERE TO THE INSTRUCTIONS RECEIVED WHEN THE CRANE IS DELIVERED AND ALSO TO THE CONTENTS OF THIS MANUAL.

PROPER LUBRICATION AND MAINTENANCE ARE ESSENTIAL FOR SATISFACTORY PERFORMANCE OF THIS CRANE. FOLLOW THE LUBRICATION INFORMATION NOTED IN THIS MANUAL.

THE VEHICLE YOU ARE ABOUT TO DRIVE IS NOT JUST A TRUCK, BUT A PIECE OF CONSTRUCTION EQUIPMENT. IN ITS DESIGN THE MANUFACTURER HAS INCLUDED A POWER UNIT, BRAKING SYSTEM AND FRAME CONSTRUCTION, ALL OF WHICH ARE HEAVIER AND MORE POWERFUL THAN THE AVERAGE HIGHWAY VEHICLE AND IN ORDER TO OBTAIN SATISFACTORY RESULTS THE OPERATOR MUST UNDERSTAND THE FOLLOWING INSTRUCTIONS:

1. CHECK THE LEVEL OF THE ENGINE OIL, RADIATOR WATER, HYDRAULIC OIL AND BATTERY ELECTROLITE. IF THE ENGINE OR HYDRAULIC OIL ARE LOW, IT SHOULD BE TOPPED OFF USING THE LUBRICANT SHOWN IN THE LUBRICATION CHART.

CAUTION: THE RADIATOR HAS A 7 PSI PRESSURE CAP. IF THE RADIATOR IS HOT, USE EXTREME CAUTION IN REMOVING THE CAP.

2. CHECK THE TIGHTNESS OF THE WHEEL CLAMPS USING THE WRENCH AND LEVER SUPPLIED IN THE CAB. NUTS SHOULD BE FIRM, BUT DO NOT OVER-TIGHTEN. THIS COULD DAMAGE THE CLAMPS AND NUTS.

PRE-STARTING INSTRUCTIONS

BEFORE STARTING THE ENGINE IN THIS CRANE THE FOLLOWING PRECAUTIONS MUST BE TAKEN:

1. CHECK THE GEARSHIFT TO INSURE THAT IT IS IN THE NEUTRAL POSITION. THIS CRANE IS EQUIPPED WITH A NEUTRAL SAFETY SWITCH WHICH WILL NOT ALLOW THE ENGINE TO START UNTIL THE GEARSHIFT IS IN THE NEUTRAL POSITION.
2. THE HYDRAULIC SELECTOR VALVE SHOULD BE ON POWER STEERING.

PRE-STARTING INSTRUCTIONS...CONT'D.

3. THE PARKING BRAKES SHOULD BE IN THE "ON" POSITION.

STARTING THE ENGINE

TURN KEY AND START ENGINE. CHECK TO INSURE THAT THE OIL PRESSURE GAUGE REGISTERS NOT LESS THAN 20 PSI OIL PRESSURE. IF THE GAUGE DOES NOT SHOW A PRESSURE BUILD-UP WITHIN A FEW SECONDS, SHUT DOWN THE ENGINE IMMEDIATELY AND REQUEST SERVICE.

AFTER ENGINE HAS STARTED, RUN ENGINE AT 800/1000 RPM UNTIL THE AIR PRESSURE GAUGE REGISTERS 105 TO 120 PSI. DO NOT ATTEMPT TO MOVE CARRIER UNTIL THE CORRECT PRESSURE IS OBTAINED, BECAUSE THE EMERGENCY BRAKES CANNOT BE RELEASED.

DRIVING THE VEHICLE

DEPRESS BRAKE PEDAL AND RELEASE PARKING BRAKE. PLACE GEARSHIFT IN DESIRED GEAR POSITION (REFER TO AUTOMATIC TRANSMISSION HANDBOOK IN MANUFACTURER'S LITERATURE SECTION). RELEASE BRAKE PEDAL AND DEPRESS FOOT THROTTLE.

TO ACHIEVE BETTER TRACTION IN MUD, SNOW OR ON SLIPPERY ROADS, OR WHEN APPROACHING OR ANTICIPATING THESE CONDITIONS, ENGAGE DIFFERENTIAL LOCK CONTROL LOCATED ON DASH. THIS WILL PROVIDE MAXIMUM AXLE TRACTION. THE DIFFERENTIAL CAN BE LOCKED AT ANY VEHICLE SPEED EXCEPT IF THE WHEEL'S HAVE ALREADY LOST TRACTION AND ARE SPINNING. DISENGAGE DIFFERENTIAL LOCK AFTER PASSING ADVERSE CONDITIONS. WHEN ENGAGING OR DISENGAGING DIFFERENTIAL LOCK, LET UP ON ACCELERATOR TO PROVIDE AN INTERRUPTION IN TORQUE TO THE DRIVE CHAIN.

CAUTION: DO NOT DRIVE THE VEHICLE WITH A COLD ENGINE AS THIS WILL GREATLY REDUCE THE LIFE OF THE CYLINDER LINERS AND OTHER RECIPROCATING PARTS OF THE ENGINE.

RUNNING TEMPERATURES AND PRESSURES

FOR NORMAL OPERATION, THE ENGINE, BRAKES AND ACCESSORY READING SHOULD BE AS FOLLOWS:

1. ENGINE WATER TEMPERATURE. 175/185 DEGREES
2. ENGINE OIL PRESSURE 20/80 PSI
3. AIR PRESSURE. 100/120 PSI

AIR BRAKE SYSTEM

IMPORTANT: FOR ALL TESTS, CHECK DASH GAUGE WITH A TEST GAUGE KNOWN TO BE ACCURATE.

1. DRAIN RESERVOIRS - OPEN DRAIN COCKS ON EACH RESERVOIR AND ANY FILTER USED IN SYSTEM. CLOSE DRAIN COCKS AFTER ALL DEVICES HAVE BEEN COMPLETELY DRAINED OF ALL CONDENSATION (PREFERABLY OVERNIGHT).
2. CHECK BRAKE CHAMBER PUSH ROD TRAVEL - ADJUST AT SLACK ADJUSTER IF STROKE IS EXCESSIVE.
3. CHECK STOP LIGHT SWITCH - WITH NO AIR PRESSURE IN THE SYSTEM, START ENGINE AND APPLY BRAKE PEDAL OR TREADLE AND OBSERVE DASH GAUGE PRESSURE. STOP LIGHT SHOULD NORMALLY LIGHT WHEN DASH GAUGE REGISTERS APPROXIMATELY 5 PSI. RELEASE BRAKES.
4. CHECK LOW PRESSURE INDICATOR - RUN ENGINE, CONTINUING PRESSURE BUILD-UP. LOW PRESSURE INDICATOR BUZZER MUST SOUND OR WARNING LIGHT MUST REMAIN LIGHTED UNTIL DASH GAUGE PRESSURE REACHES APPROXIMATELY 65 PSI. THEN WARNING BUZZER MUST STOP AND WARNING LIGHT MUST GO OUT.
5. PRESSURE BUILD-UP TEST - RUN ENGINE AT FAST IDLE: TIME REQUIRED TO RAISE AIR PRESSURE FROM 50 TO 90 POUNDS WILL VARY WITH DIFFERENT VEHICLES BUT SHOULD NOT EXCEED 5 MINUTES. AVERAGE IS ABOUT $1\frac{1}{2}$ MINUTES. CHECK OPERATION OF SAFETY VALVE.
6. GOVERNOR SETTING TEST - RUN ENGINE. GOVERNOR SHOULD CUT OUT, STOPPING FURTHER COMPRESSION, AT MAXIMUM PRESSURE SETTING. REDUCE AIR PRESSURE BY SERIES OF BRAKE APPLICATIONS. GOVERNOR SHOULD CUT IN RESUMING COMPRESSION AT MINIMUM PRESSURE SETTING.
7. LEAKAGE TESTS - RUN ENGINE UNTIL GOVERNOR CUTS OUT. STOP ENGINE. WAIT UNTIL AIR PRESSURE STABILIZES. WITH BRAKES RELEASED, DASH GAUGE PRESSURE DROP SHOULD NOT EXCEED 2 POUNDS PER MINUTE FOR SINGLE VEHICLES. MAKE A FULL BRAKE APPLICATION AND ALLOW PRESSURE TO STABILIZE. PRESSURE DROP SHOULD NOT EXCEED 3 POUNDS PER MINUTE FOR SINGLE VEHICLES OR 4 POUNDS PER MINUTE FOR COMBINATION VEHICLES. CHECK SYSTEM CONNECTIONS AND APPLICABLE UNITS IF LEAKAGE IN EITHER TEST IS EXCESSIVE.
8. OPERATING TESTS - CONNECT ACCURATE TEST GAUGE IN BRAKE VALVE DELIVERY LINE OR SERVICE LINE OUTLET ON VEHICLES WITH TRAILER CONNECTIONS. FULLY CHARGE AIR BRAKE SYSTEM. DEPRESS BRAKE PEDAL OR TREADLE FULLY. TEST GAUGE PRESSURE SHOULD APPROXIMATELY EQUAL DASH GAUGE PRESSURE. (SOME VEHICLES HAVE PEDAL OR TREADLE STOP ARRANGEMENT TO PREVENT FULL BRAKE VALVE DELIVERY. PRESSURE; DO NOT ALTER THIS UNLESS HIGHER DELIVERY PRESSURE IS REQUIRED TO INCREASE BRAKE EFFECTIVENESS.)

AIR BRAKE SYSTEM...CONT'D.

HOLD PEDAL OR TREADLE AT SEVERAL DIFFERENT POSITIONS; DELIVERY SHOULD VARY RAPIDLY IN ACCORDANCE WITH CHANGES IN PEDAL OR TREADLE POSITIONS, AND AIR SHOULD RELEASE TO "0" PSI WITH SAME SPEED.

CHECK FOR QUICK APPLICATION AND RELEASE OF ALL BRAKES AT EACH WHEEL.

GENERAL

THE BEST OPERATING SPEEDS FOR HIGHWAY DRIVING ARE BETWEEN 30 AND 40 MPH. SEVERE "DOWN-SHIFTING" IS NOT RECOMMENDED AT HIGH SPEEDS. OPERATION AT HIGH SPEEDS ON THE HIGHWAY USUALLY CREATES EXCESSIVE TIRE WEAR AND HEATING. WHEN OPERATING ON LONG TRIPS IT IS SUGGESTED THAT THE TIRES BE CHECKED FOR HEAT BUILD-UP EVERY 30 TO 45 MINUTES OF TRAVEL. DO NOT OVERLOAD THE MACHINE. IT CAN ONLY RESULT IN HIGH COST AND POSSIBLE ACCIDENTS.

MACHINE SET UP

AFTER ARRIVAL AT THE JOB SITE AND TRUCK HAS BEEN SPOTTED AT IT'S LIFTING LOCATION, OUTRIGGERS MUST BE SET. DO NOT REMOVE BOOM FROM REST WITHOUT FIRST SETTING KRANE UP ON OUTRIGGERS!

SWITCHING HYDRAULIC CIRCUIT FROM POWER STEERING TO. OUTRIGGER OPERATION MAY BE DONE EITHER BY DEPRESSING PUSHBUTTON IN OUTRIGGER CONTROL BOXES ON EITHER SIDE OF CARRIER, OR BY PUSHING CONTROL KNOB ON SELECTOR VALVE BEHIND DRIVER'S SEAT. OUTRIGGERS MAY NOW BE OPERATED EITHER BY CONTROLS ON EACH SIDE OF CARRIER; BY CONTROLS IN UPPER CAB; OR BY VALVE LEVERS LOCATED IN CENTER OF CARRIER BEHIND DECK WINCH. EXTEND OUTRIGGER BEAMS ALL THE WAY OUT AND POSITION OUTRIGGER FLOATS ON VERTICAL JACK CYLINDERS. LOWER JACK CYLINDERS TO RAISE KRANE UNTIL TIRES ARE $1/2$ " OFF OF THE GROUND. FOR BEST RESULTS MAINTAIN THIS $1/2$ " CLEARANCE, AS THIS ALLOWS THE KRANE'S CENTER OF GRAVITY TO REMAIN AS LOW AS POSSIBLE AND REDUCES UNNECESSARY STRESS IN THE VERTICAL JACK CYLINDER RODS. LEVEL KRANE WITH THE CIRCULAR LEVELS MOUNTED ON FRONT OUTRIGGER HOUSING. (TO RETRACT OUTRIGGERS, REVERSE THE ABOVE STEPS.)

NOW THE TWO PUMP GEARCASE IS READY TO BE ENGAGED. SHUT OFF ENGINE AND PULL THE TWO PUMP GEARCASE ENGAGEMENT CABLE LEVER. IN ORDER FOR THE GEARS TO MESH PROPERLY, IT SOMETIMES IS NECESSARY TO "JOG" THE STARTER. WHILE JOGGING STARTER, DEPRESS ENGINE STOP BUTTON. AFTER GEARS ARE PROPERLY MESHED, THE ENGINE IS READY FOR RUNNING. THIS NOW WILL ENGAGE THE THREE HYDRAULIC PUMPS WHICH SUPPLY THE OIL TO ALL OF THE FUNCTIONS OF THE KRANE. NOTE: AT NO TIME SHOULD THIS GEARCASE BE ENGAGED WHILE TRAVELING ON THE HIGHWAY!

BEFORE LIFTING WITH THIS KRANE THE GANTRY MUST BE IN THE UP (WORK) POSITION AND PINNED. TO LIFT THE GANTRY, RELAX BOOM LIFT CABLES. THROW GANTRY DECK WINCH SWITCH TO GANTRY AND OPERATE DECK WINCH LEVER TO POSITION GANTRY. THROW SWITCH TO DECK WINCH FOR NORMAL KRANE OPERATION. BY PUSHING THE LEVER IN THE UPPER CAB MARKED "WINCH", THE HOOK BLOCK WILL LOWER SLIGHTLY ALLOWING THE HOOK TO BE DISENGAGED FROM ITS TRAVELING POSITION AND ALLOW THE BLOCK TO SWING FREE. BY PULLING THE LEVER MARKED "BOOM LIFT" THE BOOM WILL RAISE FROM ITS REST. RELEASE THE HOUSE-LOCK LEVER WHICH IS IMMEDIATELY TO THE LEFT AND REAR OF THE OPERATOR'S SEAT. THIS DISENGAGES THE AIRCRAFT TYPE BRAKE WHICH HAS HELD THE SLEWING DRIVE IN A RIGID POSITION FOR ROAD TRAVEL. (THIS LOCK SHOULD ALWAYS BE SET BEFORE THE KRANE IS ROADED FOR ANY APPRECIABLE DISTANCE.) PULL THE LEVER MARKED "SWING" AND THE KRANE WILL SWING TO THE RIGHT. THE SHORT LEVER MARKED "DECK WINCH" CONTROLS THE DECK WINCH FROM THE UPPER CAB, ALSO AS STATED ABOVE, IT CONTROLS THE GANTRY.

HYDRAULIC SERVICE INSTRUCTIONS

IT IS OF UTMOST IMPORTANCE THAT THE ENTIRE HYDRAULIC SYSTEM BE KEPT CLEAN AND FREE FROM DIRT, GRIT, WATER, AIR OR ACIDS AT ALL TIMES. PERIODIC DRAINING, CLEANING AND REFILLING WITH NEW OIL IS RECOMMENDED TO INSURE PROPER PERFORMANCE AND SERVICE.

ALL OPENINGS IN THE HYDRAULIC CIRCUIT MUST BE PROPERLY CAPPED IF COMPONENT UNITS ARE REMOVED. THESE UNITS SHOULD ALSO BE CAPPED OR PLUGGED TO PROTECT THEM FROM ENTRY OF FOREIGN MATTER.

IT IS NECESSARY TO CHANGE HYDRAULIC FLUID EVERY 500 WORKING HOURS FOR DUSTY ATMOSPHERE OPERATION. ONE THOUSAND (1,000) WORKING HOURS ARE RECOMMENDED UNDER NORMAL CONDITIONS.

SERVICE AND CLEAN THE HYDRAULIC SYSTEM OIL FILTERS AT EACH OIL CHANGE.

QUITE OFTEN A NEW OIL WILL HAVE A LINT-LIKE MATERIAL, WHICH WHEN PRESENT IN THE OIL WILL PLUG OIL FILTERS. FOR THIS REASON, THE FILTERS SHOULD BE CHECKED DURING THE FIRST 25 HOURS OF OPERATION AFTER ANY CONSIDERABLE QUANTITY OF OIL HAS BEEN ADDED TO THE HYDRAULIC SYSTEM.

WHEN HYDRAULIC FLUID IS ADDED TO REPLENISH THE SYSTEM, ALWAYS POUR IT THROUGH A MICRON FILTER. IF SUCH A FILTER IS NOT AVAILABLE, USE A FUNNEL WITH A FINE WIRE SCREEN (200 MESH OR BETTER).

IT IS IMPORTANT THAT OIL BE CLEAN AND FREE OF ALL SUBSTANCES THAT WILL CAUSE IMPROPER OPERATION OF THE PUMPS AND MOTORS AND EXCESSIVE WEAR OF THEIR PARTS. FOR THIS REASON, CLOTH SHOULD NEVER BE USED TO FILTER HYDRAULIC FLUID AS THERE IS ALWAYS DANGER OF ADDING LINT TO THE OIL.

WHEN DRAINING THE HYDRAULIC SYSTEM, ALWAYS DRAIN THE SYSTEM AFTER WORKING THE MACHINE, BECAUSE THE OIL WILL BE WARM AND FLOW FREELY, WHICH IS NEEDED TO CARRY ALL THE DIRT AND SLUDGE WITH IT.

REFER TO THE LUBRICATION CHART FOR INFORMATION PERTAINING TO THE ABOVE SUBJECT AND OTHER SPECIAL INFORMATION.

MACHINE SET UP - CONT'D.

FOR THE MOST EFFICIENT OPERATION AND IN ORDER TO MAINTAIN SUFFICIENT OIL AND PRESSURE TO PROPERLY ACTUATE THE OPERATING VALVES AND COMPONENTS, THE ENGINE SHOULD BE OPERATED AT 1200 RPM OR ABOVE. FEATHERING OF THE OPERATING VALVES IS PREFERRED RATHER THAN CONTROLLING THE VARIOUS SPEEDS BY THE FOOT THROTTLE. THIS MAKES FOR MUCH SMOOTHER OPERATING AND ASSURES THE OPERATOR THAT THERE IS SUFFICIENT POWER AVAILABLE AT HIS FINGERTIPS AT ALL TIMES. UNDER NO CONDITIONS SHOULD THE KRANE BE SUBJECTED TO EXCESSIVE SIDE LOADS. (I.E. LOCKING THE SWING BRAKE AND WINCHING FROM THE SIDE.)

RAIL PILOT UNIT OPERATION
PETTIBONE 22ORRC CRANE

DRIVE RAIL PILOT UNITS ONTO TRACK WITH PNEUMATIC TIRES CENTERED ON RAILS. THIS MAY BE EASILY ACCOMPLISHED BY DRIVING PAST THE TRACK ABOUT 35 FEET AT ANY ROAD CROSSING AND THEN BACKING RAIL PILOT UNIT ONTO RAILS. IT MAYBE NECESSARY TO GO BACK AND FORTH MORE THAN ONCE TO GET ALL FOUR WHEELS CENTERED ON RAILS.

AT FRONT OF VEHICLE ENGAGE AXLE LOCKS BY MOVING THE TWO SHORT LEVERS (ONE ON EACH SIDE) INWARD. THIS LOCKS THE AXLE IN POSITION SO WHEN GUIDE WHEELS ARE LOWERED AND LOCKED, THE FRONT PNEUMATIC WHEELS WILL BE CLEAR OF THE RAIL. IF THE AXLE LOCKS ARE NOT SECURED, THE FRONT SPRINGS WILL SAG WHEN RAIL WHEELS ARE LOWERED, CAUSING PNEUMATIC WHEELS TO HANG DOWN, TOUCHING THE RAIL SWITCHES AND TURNOUTS.

REMOVE LOCKING PINS FROM LOCKING BAR AND RELEASE PIVOT LATCH BY MOVING LOCKING BAR HANDLE. PRESS RAIL PILOT BUTTON TO LOWER UNITS TO TRACK POSITION UNTIL PIVOT LATCH ENGAGES. REPLACE LOCKING PINS TO LOCK THE PIVOT LATCH IN POSITION.

CAUTION: CHECK EACH RAIL WHEEL TO SEE THAT IT IS ON THE RAIL. IT IS GOOD PRACTICE TO DOUBLE CHECK TO BE SURE THAT ALL EIGHT GUIDE WHEELS ARE DOWN AND FLANGES ARE INSIDE THE RAILS AND THE TWO LOCKING PINS ARE IN PLACE.

AFTER GUIDE WHEELS ARE LOCKED IN THE ON RAIL POSITION, SECURE THE FRONT WHEELS IN THE STRAIGHT AHEAD POSITION WITH THE STEERING WHEEL LOCK LOCATED IN CAB.

THE RAIL PILOT UNITS ARE NOT DESIGNED FOR HIGH SPEED ON-TRACK OPERATION. THEY SHOULD NOT BE OPERATED AT SPEEDS ABOVE 25 MPH ON TANGENT MAINLINE TRACK, BUT RAILROAD RULES GOVERNING SPEEDS SHOULD BE OBSERVED AT ALL TIMES. SPEEDS SHOULD BE REDUCED ON CURVES AND BRANCH LINES DEPENDING ON CONDITIONS.

THE GUIDE WHEELS ARE NOT INSULATED. DEPENDING ON CONDITIONS, THEY MAY OR MAY NOT OPERATE TRACK SIGNALS. BE PREPARED TO STOP AT ALL HIGHWAY CROSSINGS.

TO REMOVE FROM RAILROAD TRACK FOR HIGHWAY USE APPROACH CROSSING AND STOP WITH FRONT WHEELS OVER ROAD CROSSING AND RELEASE STEERING WHEEL LOCK.

REMOVE LOCKING PINS AND RELEASE PIVOT LATCH FROM PIVOT CAM. PRESS BUTTON TO RAISE REAR RAIL PILOT UNIT UNTIL PIVOT LATCH LOCKS IN UP POSITION. REPLACE LOCKING PIN TO SECURE UP IN HIGHWAY POSITION. RELEASE, RAISE AND SECURE FRONT RAIL WHEELS. RELEASE FRONT AXLE LOCKS.

MAKE SURE THAT RAIL UNITS ARE LOCKED IN POSITION AND LOCKING PINS ARE IN PLACE.

COLD WEATHER OPERATION

VISCOSITY OF A HYDRAULIC FLUID IS THE MEASURE OF ITS INTERNAL FRICTION OR RESISTANCE TO FLOW.

THE STANDARD METHOD OF DESIGNATION IS THE SSU, SAYBOLT SECONDS UNIVERSAL, WHICH IS THE ACTUAL CLOCKED NUMBER OF SECONDS FOR A MEASURED AMOUNT OF FLUID TO DRAIN THROUGH A SMALL ORIFICE AT A GIVEN TEMPERATURE.

THE UPPER CRITICAL VISCOSITY IS 75 SSU NEEDED TO SAFELY SEAL AND LUBRICATE THE PUMP. (VICKERS VANE SAYS 60 SSU - O.K.)

THE LOWER CRITICAL VISCOSITY IS 4,000 SSU. THIS IS ALSO CALLED THE PUMP-ABILITY FACTOR. BELOW THIS TEMPERATURE OIL WILL NOT FILL THE PUMP AND SERIOUS CAVITATION (HAMMER) AND DESTRUCTIVE WEAR BEGINS.

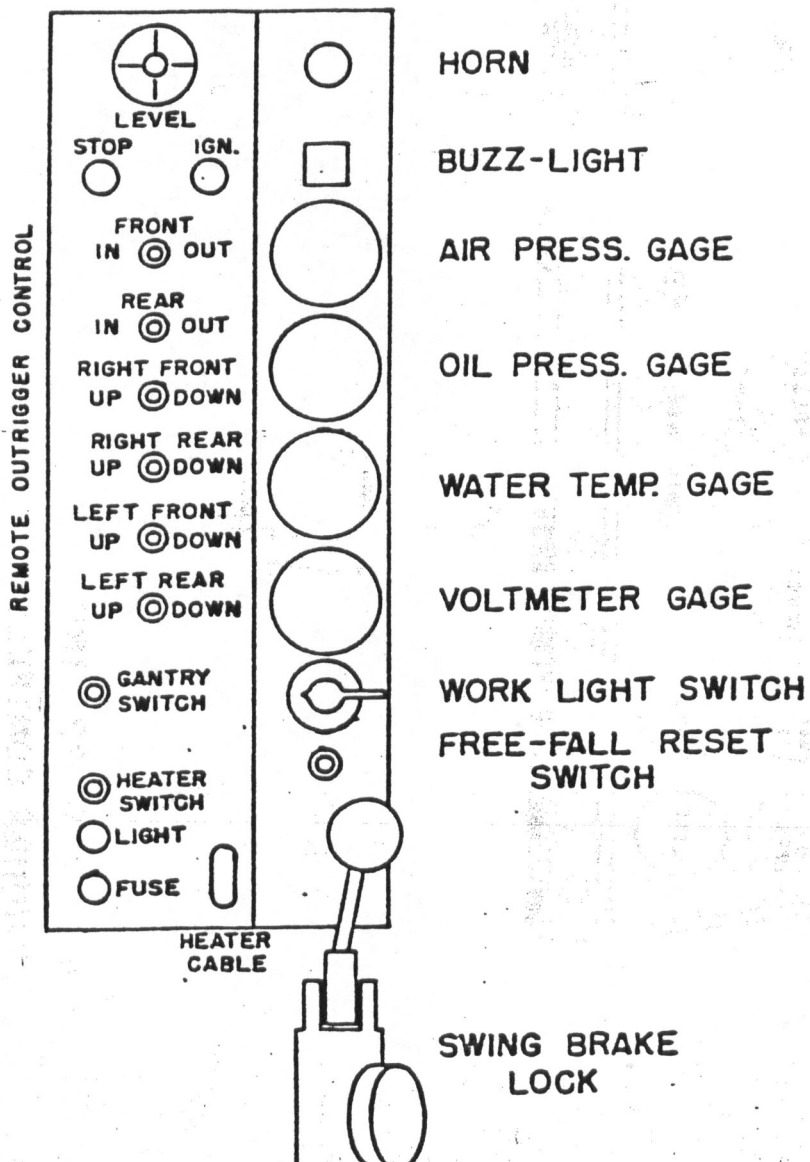
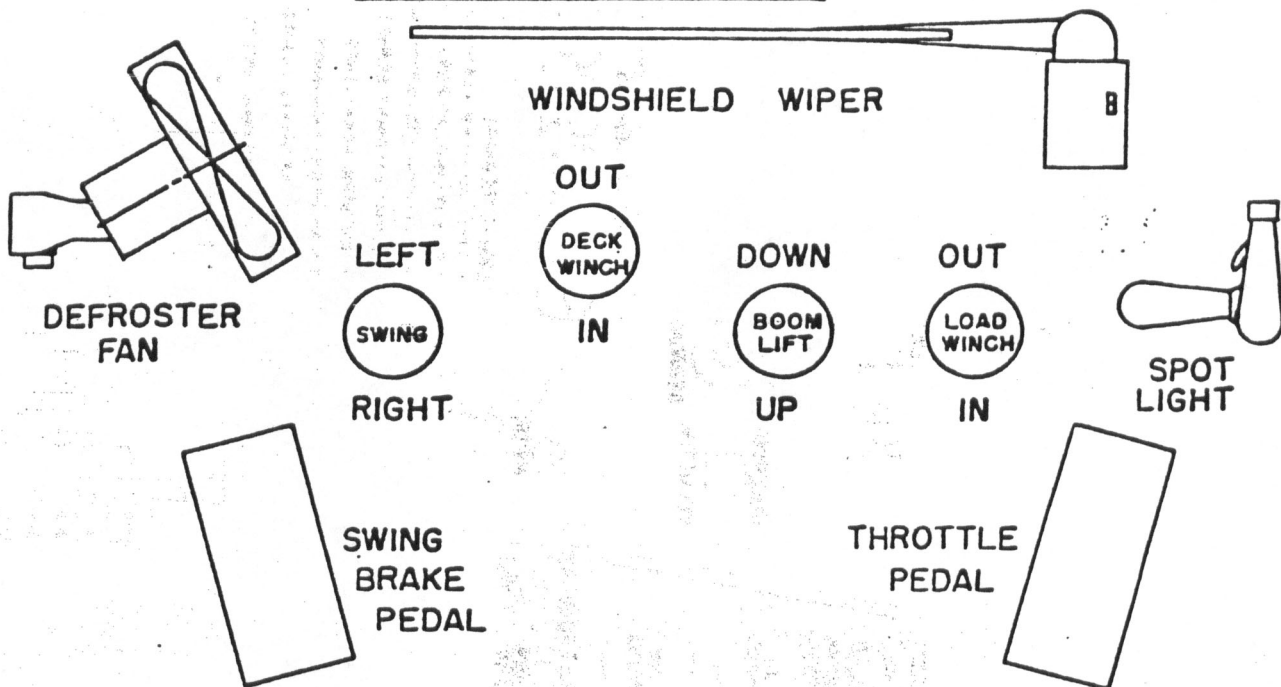
WHEN THE OIL VISCOSITY IS BELOW 4,000 SSU, EXTREME CARE SHOULD BE USED IN STARTING AND WARMING THE HYDRAULIC FLUID TO A SAFE TEMPERATURE. A METHOD (SHORT OF ACTUAL APPLICATION OF HEAT) RECOMMENDED BY MOBILE EQUIPMENT MANUFACTURERS IS AS FOLLOWS:

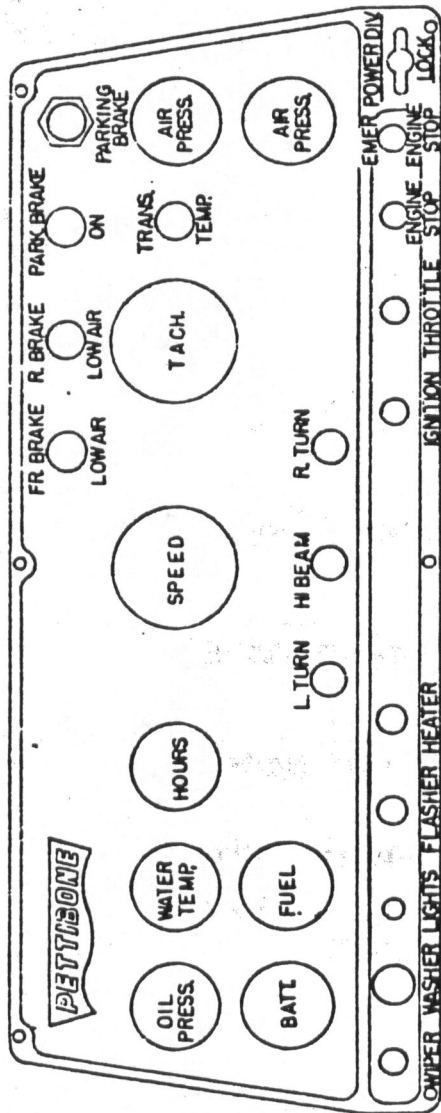
1. JOG PUMP; ON 5 SECONDS - OFF 20 SECONDS (TEN TIMES) THEN ON 20 SECONDS, OFF 20 SECONDS (ABOUT 5 TIMES). IDLE SYSTEM A FEW SECONDS.
2. RUN PUMP AT $1/2$ SPEED (ABOUT 800 TO 1000 RPM) AND WITH SWING HOUSE-LOCK SET PULL BACK ON ONE OF THE SWING CONTROL AND STALL IT THUS BLOWING OIL THRU THE PRESSURE RELIEF VALVE. RELIEVE PRESSURE 10 SECONDS OF EACH MINUTE.
3. OIL PASSING THRU THE RELIEF VALVE DOES NO USEFUL WORK AND PICKS UP $8-1/2$ DEGREES OF WARMTH PER 1000 POUNDS OF PRESSURE DROP. (APPROXIMATELY TEN MINUTES.)

WHEN THE OIL VISCOSITY IS BELOW 20,000 SSU, WARM TANK (UP ABOUT 40 DEGREES) BEFORE STARTING PUMP, THEN FOLLOW STEPS ABOVE.

THE AVERAGE LIGHT HYDRAULIC FLUID HAS ABOUT THE PROPERTIES OF A 10-W OIL (EXCEPT LITTLE OR NO DETERGENT) AND HAS A 4,000 SSU OR PUMP-ABILITY TEMPERATURE OF ABOUT ZERO TO 20 DEGREES, AND A HIGH TEMPERATURE LUBRICITY FACTOR OF ABOUT 150 TO 175 DEGREES DEPENDING ON THE VISCOSITY INDEX.

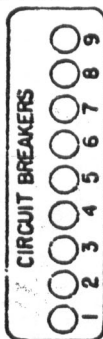
CRANE CONTROLS



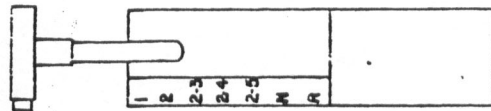
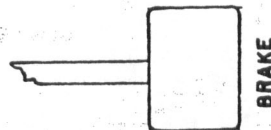
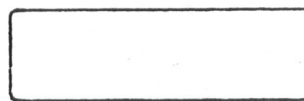


STEERING
SELECTOR

TWO-PUMP
GEARCASE



- CIRCUIT BREAKERS**
- 1- DOME LIGHTS, EM. FLASHERS & HORN
 - 2- BACKUP LIGHTS, HEATER & BRAKE LIGHTS
 - 3- TURN SIGNALS, FLASHER & WASHER
 - 4- LOW AIR & PARKING BRAKE LIGHT SWITCHES
 - 5- LOW BEAM HEADLIGHTS
 - 6- HIGH BEAM HEADLIGHTS
 - 7- FRONT CLEARANCE LIGHTS
 - 8- REAR CLEARANCE LIGHTS
 - 9- INSTRUMENT LIGHTS



PETTIBONE 22ORRC CARRIER CONTROLS

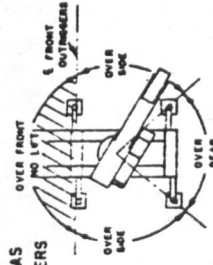
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LIFTING CAPACITY AND SAFETY INSTRUCTIONS

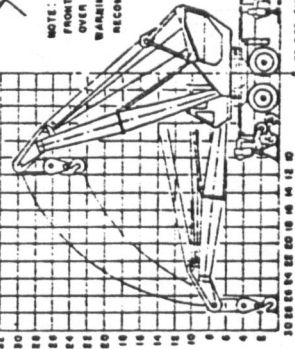
220 R.R.C.

1. RATED LIFTING CAPACITIES ARE THE MAXIMUM LOADS COVERED BY THE MANUFACTURER'S WARRANTY WITH THE MACHINE STANDING ON FIRM, UNIFORM, AND LEVEL SURFACE, WITH OUTRIGGERS FULL EXTENDED AND LOCKED DOWN, AND WITH GANTRY PINNED IN WORK POSITION.
2. RADIUS OF LOAD IS THE HORIZONTAL DISTANCE FROM A PROJECTION OF AXIS OF ROTATION BEFORE LOADING, TO THE CENTER OF VERTICAL HOIST LINE OR TACKLE WITH LOAD APPLIED.
3. THE WEIGHT OF ALL AUXILIARY HANDLING DEVICES SUCH AS HOIST BLOCKS, HOOKS, AND SLINGS ARE CONSIDERED AS PART OF THE LOAD.
4. PRACTICAL WORKING LOADS SHALL BE ESTABLISHED BY THE USER AND DEPEND ON SUPPORTING SURFACE, WIND, PROPER OPERATING SPEEDS, AND IN GENERAL, CAREFUL AND COMPETENT OPERATION.
5. THE WHOOSES ON THIS CRANE ARE EQUIPPED WITH AUTOMATIC IF RAIL SAFETY, SPRING SET HYDRAULIC RELEASED BRACKES.
6. HANDLING OF PERSONNEL FROM BOOM IS NOT AUTHORIZED.
7. LOAD HANDLING DEVICES SHOULD BE KEPT A MINIMUM OF 12" BELOW THE BOOM POINT WHEN RAISING OR LOWERING THE BOOM TO PREVENT TWO BLOCKING.
8. RAIL TIE DOWN CLAMPS SHOULD NOT BE USED ON THIS CRANE.
9. RAIL PILOT UNITS MUST BE RAISED FROM RAIL WHEN LIFTING WITH THIS CRANE.
10. THE STANDARD 110 TON B SHEAVE HOOK BLOCK WEIGHT IS 1450 POUNDS.

LIFTING AREAS ON OUTRIGGERS



BOOM REACH & HOOK HEIGHTS



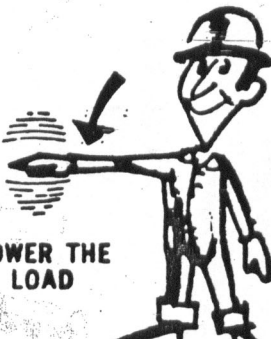
NOTE: BOOM CROSSING CENTERLINE OF FRONT OUTRIGGERS IS CONSIDERED OVER THE FRONT.

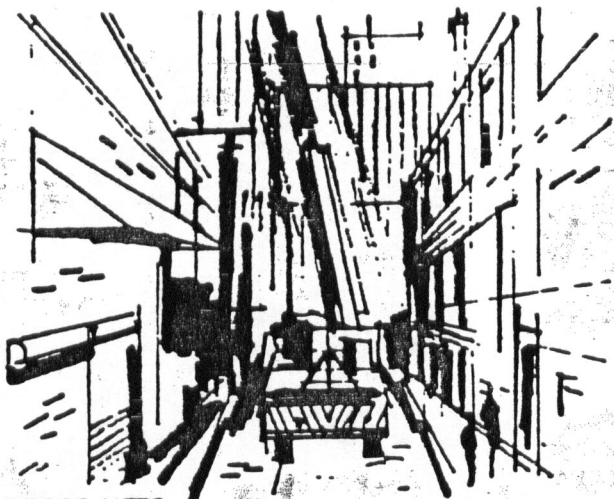
WARNING: NO OVER THE FRONT LIFTING RECOMMENDED

LIFT CAPACITIES IN POUNDS AT 85% TIPPING				LIFT CAPACITIES WITHOUT RAIL GEAR AT 85% TIPPING			
OUTRIGGERS FULLY EXTENDED		OVER SIDE		OUTRIGGERS FULLY EXTENDED		OVER SIDE	
RAD	ANGLE	OVER REAR	OVER SIDE	RAD	ANGLE	OVER REAR	OVER SIDE
11°	73°	220,000	85,000	11°	73°	218,000	155,000
12°	71°	200,000	119,000	12°	71°	199,000	102,000
13°	68°	172,000	87,500	13°	68°	165,000	82,000
14°	66°	150,000	74,800	14°	66°	144,000	69,000
15°	63°	129,000	63,400	15°	63°	136,000	59,500
16°	60°	109,000	53,600	16°	60°	109,000	52,000
17°	58°	93,000	51,000	17°	58°	89,000	45,000
18°	55°	87,000	45,500	18°	55°	78,000	40,000
19°	52°	79,000	41,600	19°	52°	70,000	36,000
20°	49°	71,000	39,200	20°	49°	62,500	32,500
21°	45°	65,500	34,800	21°	45°	56,000	29,000
22°	42°	62,000	31,800	22°	42°	52,000	27,500
23°	37°	58,000	27,700	23°	37°	47,500	25,000
24°	34°	54,500	24,200	24°	34°	45,000	23,000
25°	29°	52,000	23,500	25°	29°	43,000	22,000
26°	23°	48,000	23,000	26°	23°	41,000	21,000
27°	14°	44,000	22,000	27°	14°	39,500	19,500

CABLE SPECIFICATIONS			
CABLE FUNCTION	TYPE	LENGTH	BREAKING STRENGTH
BOOM HOIST CABLE	1/4" 6-19-1WRC	35'-5"	29.4 TONS OF 1000 LB
LOAD HOIST CABLE	1/4" 6-37-1WRC	350'	37.8 TONS OF 1000 LB
DECK WINCH CABLE	1/4" 6-19-1WRC	175'	29.4 TONS OF 1000 LB

HAND SIGNALS

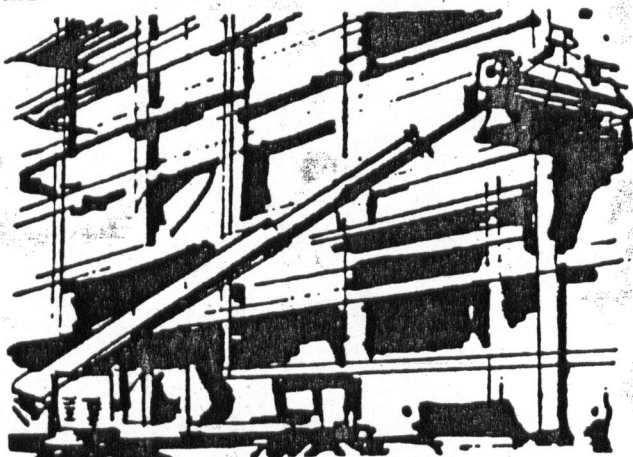
	 RAISE THE LOAD	 RAISE THE LOAD SLOWLY	 LOWER THE LOAD
 LOWER THE LOAD SLOWLY	 RAISE THE BOOM	 RAISE THE BOOM SLOWLY	 RAISE THE BOOM AND HOLD THE LOAD
 RAISE THE BOOM AND LOWER THE LOAD	 LOWER THE BOOM	 LOWER THE BOOM SLOWLY	 LOWER THE BOOM AND HOLD THE LOAD
 LOWER THE BOOM AND RAISE THE LOAD	 SWING THE LOAD IN DIRECTION FINGER POINTS	 BOOM TELESCOPING OUT	 BOOM TELESCOPING IN
 DOG EVERYTHING	 STOP	 OPEN CLAMSHELL BUCKET	 CLOSE CLAMSHELL BUCKET



INDOOR LIFTS OR WORKING IN CLOSE QUARTERS

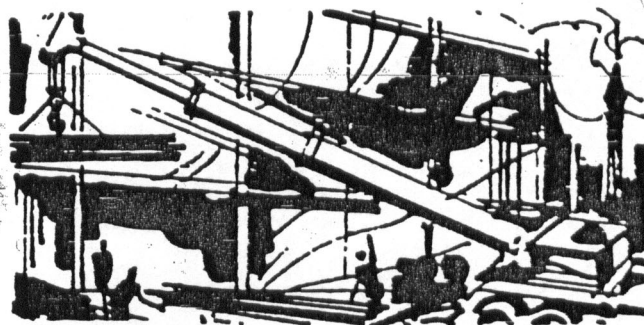
This is one of the main reasons you have a hydraulic crane. Its live boom gets into places stiff booms can't. By making good use of the boom telescoping and hoist actions, you will be able to perform your crane function anywhere your carrier can find space to stand.

1. We recommend a dry run, especially in areas where you are working which are really tight. Go through all the motions without a load, anticipating what actions you will take to make a safe pick and a smooth operation overall.
2. Check your load chart closely through all the angles and boom lengths the job requires.
3. A proper sling is essential.
4. Make maximum use of tag lines as dictated by the indoor structure or other obstructions.



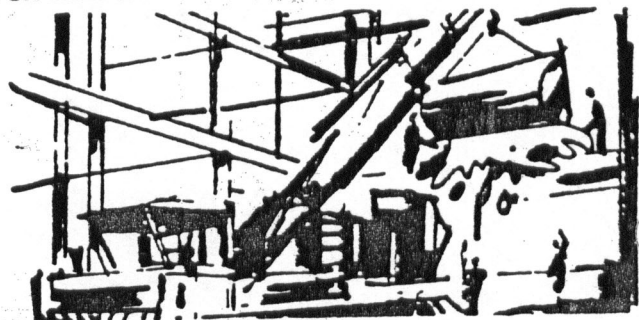
PLACING MACHINERY

1. Learn the weight of the machinery before the lift and determine its weight distribution.
2. Know how the piece of machinery will be positioned.



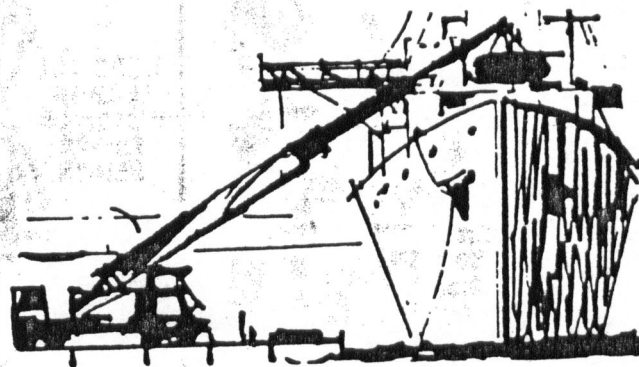
LIFTING STEEL

1. Secure proper slings and tag lines.
2. Always be sure sling is properly attached before lifting and completely released before moving boom away from the structure and personnel.
3. No matter how exciting it looks, NEVER allow personnel to ride a steel beam up to the structure.



POURING CONCRETE

1. Place machine as close to job as possible with a minimum of swing from truck to structure.
2. Take concrete bucket up to desired height after you swing to position of the lift.

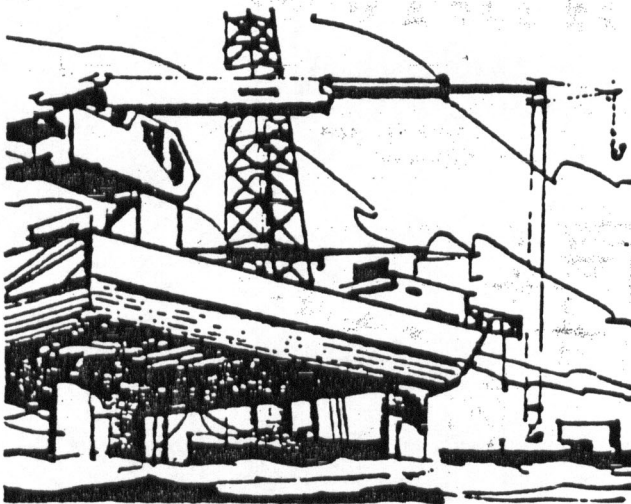


DOCK AND STEVEDORE OPERATIONS.

1. Use proper sling and place machine for minimum swing.
2. Up to 3 men may be required to act as signalmen. One in the hold, one on the deck and one on the dock.
3. Suit your machine to the type of vessel and stock moved.

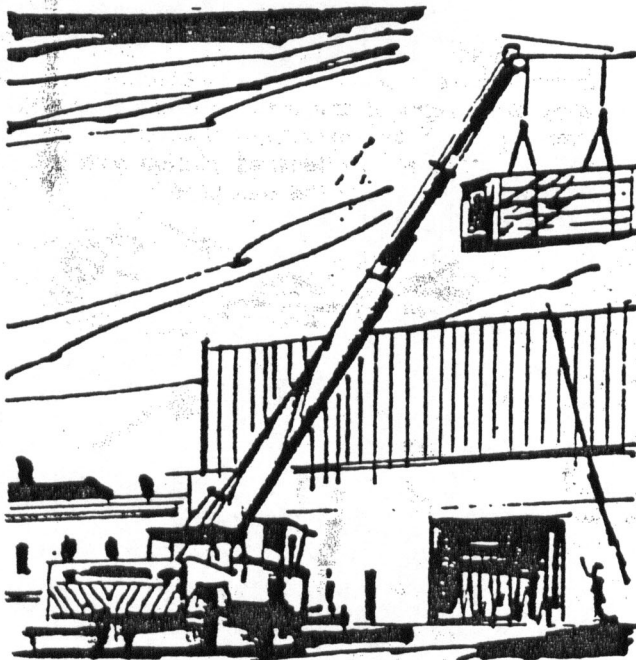
**HYDRAULIC CRANE
OPERATOR INSTRUCTIONS**

OPERATING TIPS



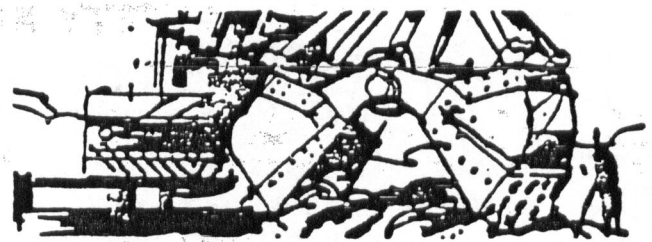
PEDESTAL CRANE

1. Always retract the boom and secure it as part of your shut down procedure.
2. If working near salt water, be sure to wash down the machine with fresh water frequently.



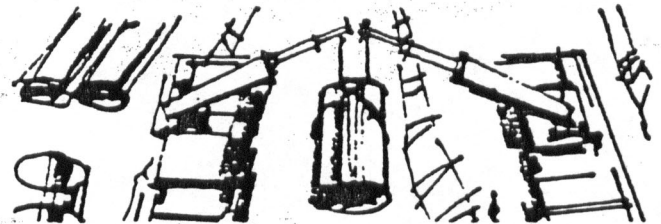
JIB AND FLY OPERATIONS

1. Both the jib and fly operations are used when added reach is required.
2. By using both winches, two kinds of production are possible. Heavy lifts can be handled by the main winch, while light ones are handled by the auxiliary winch, attached to the jib.
3. Both main winch and auxiliary winch can be used simultaneously when handling special equipment or setting pre-set concrete.



WORKING THE CLAMSHELL

1. At the start of the digging cycle the bucket rests on the material with the shells open.
2. As the closing line wire rope is wound up on the drum, the shells are drawn together causing them to dig into the material.
3. The weight of the bucket, which is the only crowding action available, helps the bucket to penetrate the material.
4. Bucket is raised by holding and closing lines.
5. Swing to dumping point where the bucket is opened by releasing tension on the closing line.
6. Clamshells are used for digging vertical shafts and ditches, dredging, loading hoppers and trucks, and unloading gondola cars. It is designed to operate above, at, or below the ground line. It can excavate loose to medium material.



TEAMING UP TWO MACHINES

1. Suggested for loads which exceed one crane's capacity and unwieldy loads is using two machines.
2. Use one signalman only.
3. Coordinate plans for lift with both operators.
4. Know distribution of load to be lifted.
5. Arrange slings so that each machine takes an equal share of the load.



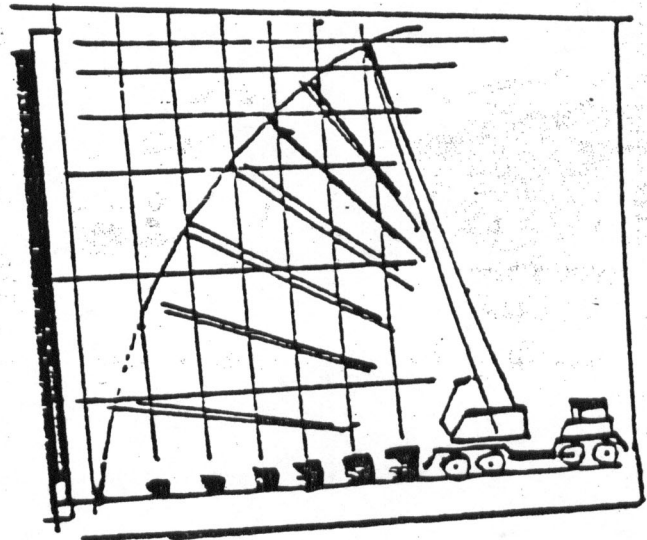
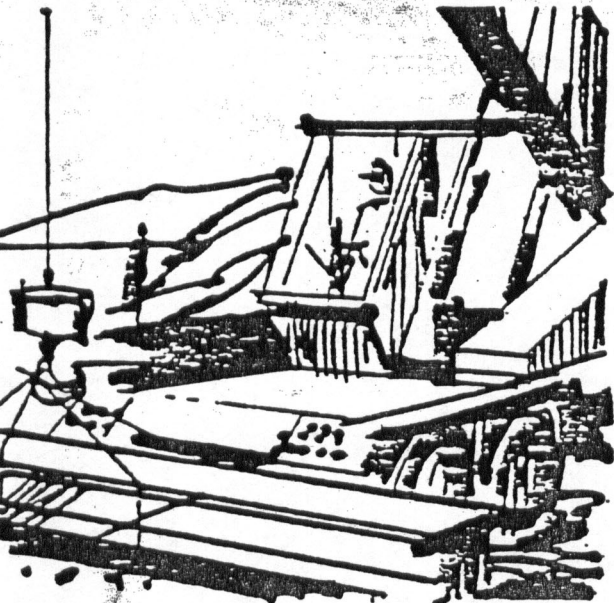
MAINTENANCE FUNCTIONS

1. Maximum utilization of the crane is often possible in the field or indoors if it is used for maintenance of fleet equipment.
2. The crane provides hoist functions you can use on such jobs as lifting engines, chassis, etc.
3. It is easy to see the rough terrain crane's application as a towing vehicle.

PART FIVE: SAFETY RULES ARE A MUST

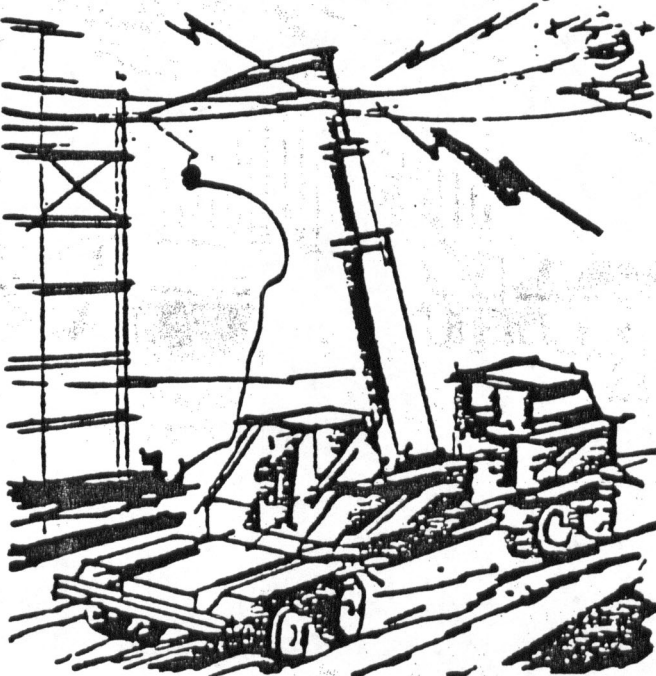
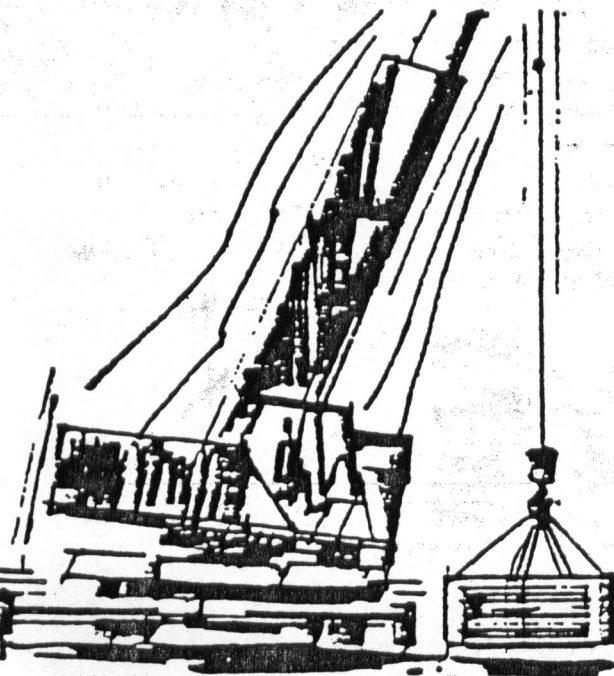
And plain common sense is the first and most important rule to follow for safe crane operation. Following are some areas of crane operation that

could be harmful to you, or to people working around you, if common sense and simple safety rules are not followed.



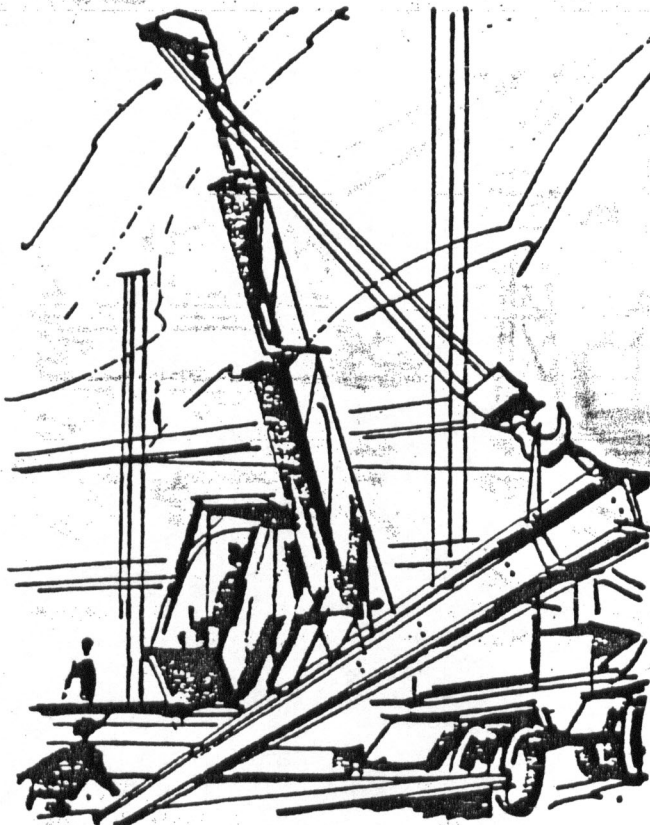
1 ALWAYS keep the load as near to the carrier and as close to the ground as possible.

2 NEVER exceed the rated lift capacities shown on the load chart. ALWAYS determine the weight of the load and check the capacity chart to determine that the load can be lifted at the desired radius within the rated capacity of the machine.

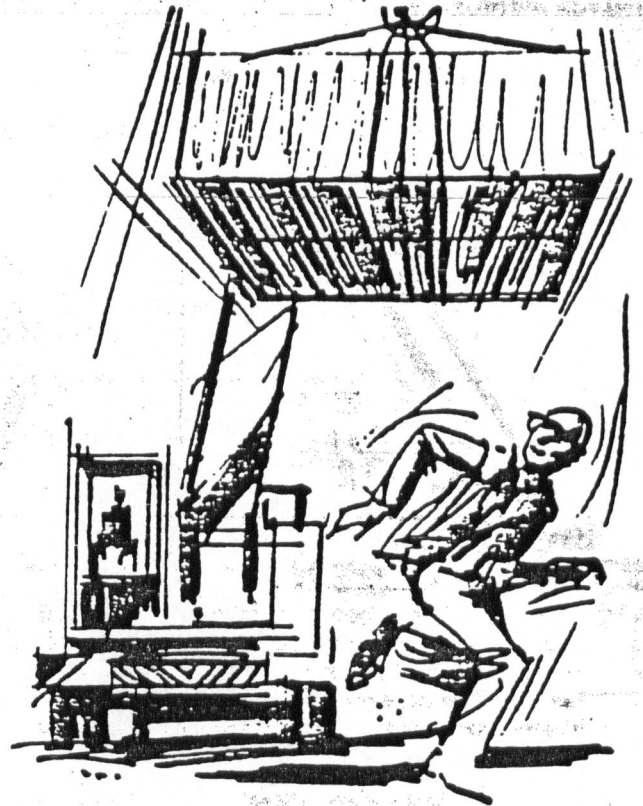


3 NEVER use stability of the machine to determine capacity. When you find out, it might be too late.

4 ALWAYS keep the boom and all parts of crane away from the electrical lines or equipment.



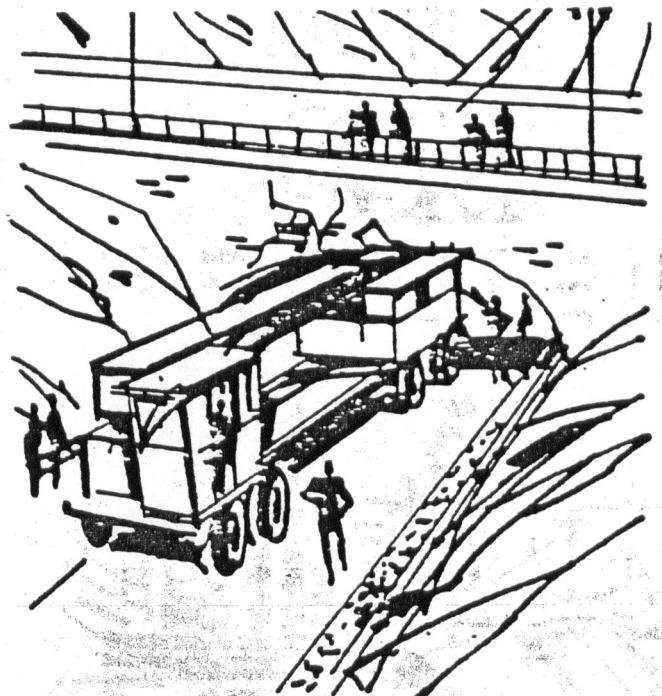
5 NEVER side-load the boom. It is for lifting only.



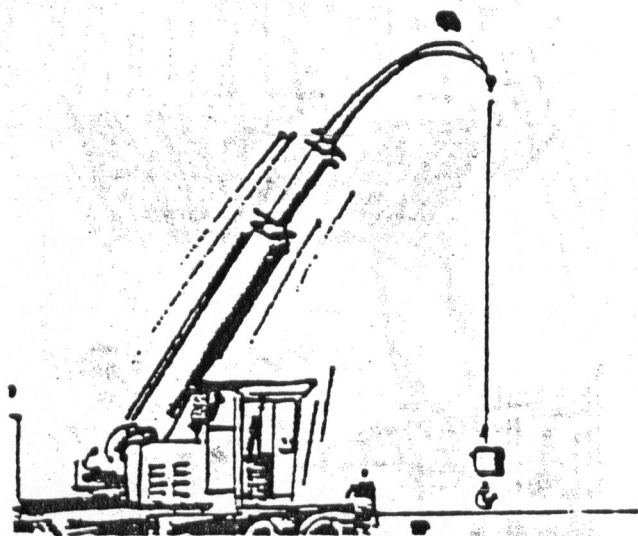
6 NEVER allow persons to stand or work under a load. Use tag lines for positioning loads.



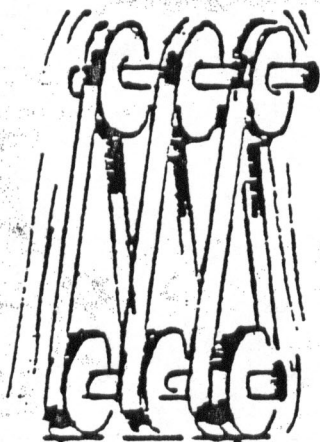
7 ALWAYS keep the machine clean and free from oil and grease at all times. Use the rule of two-hands at all times when climbing around the machine.



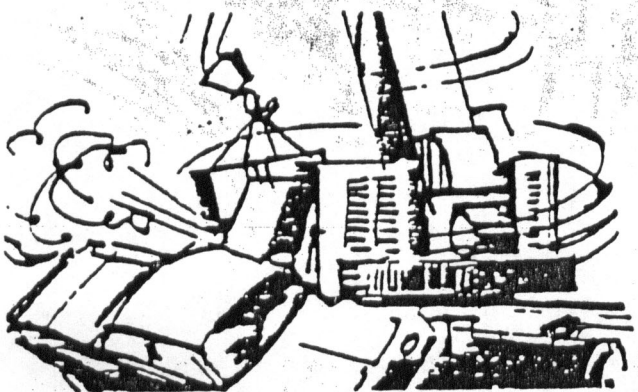
8 ALWAYS check height and width of clearances for traveling in your state. Check rated capacities of bridges. Check local restrictions covering axle weights.



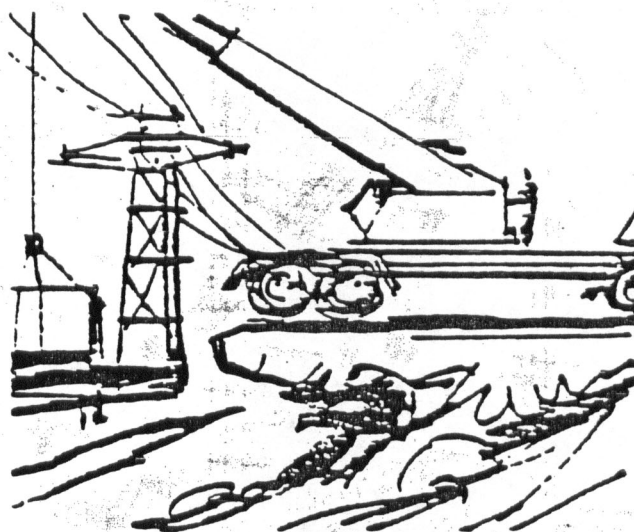
- 9 ALWAYS keep boom sections telescoped equally at all times for maximum boom strength. NEVER extend one section only leaving the other section retracted. Load charts are based on having equal boom sections.



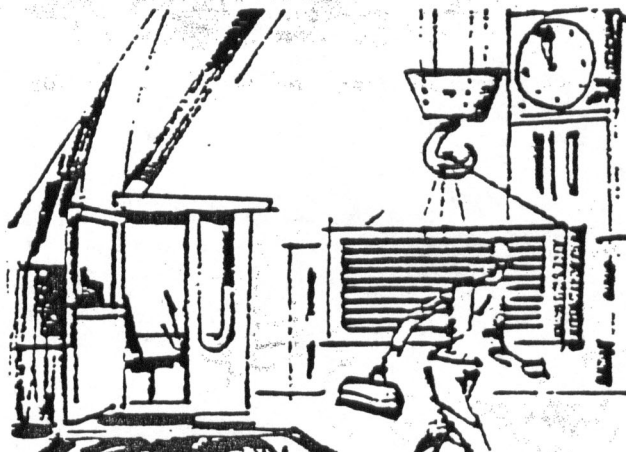
- 11 ALWAYS use sufficient parts of line for heavy lifts. DON'T take chances, use a good safety allowance.



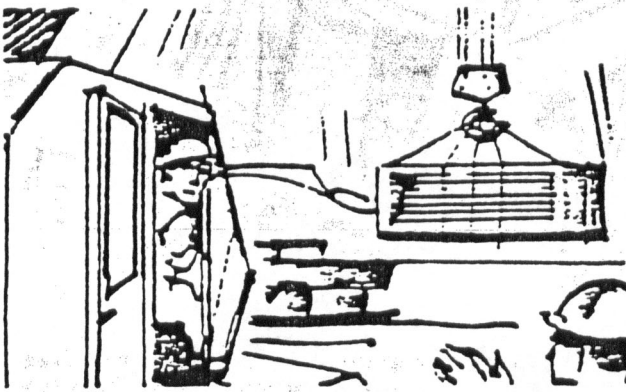
- 13 ALWAYS make sure you have enough clearance for tail swing of the upperstructure, especially if there are cars or people in the area.



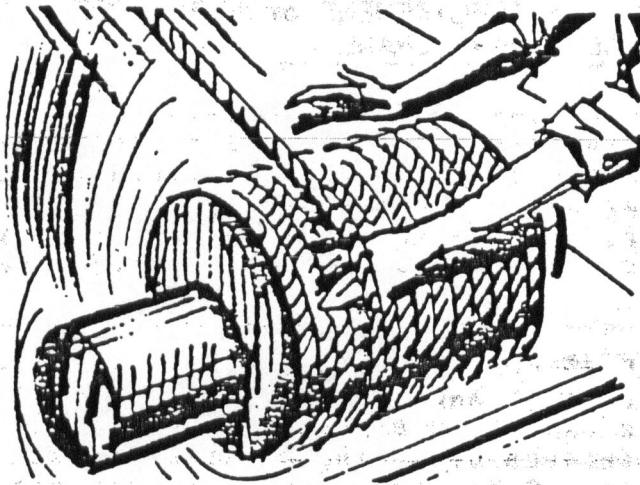
- 10 ALWAYS stay away from dangerous banks that might give away under you.



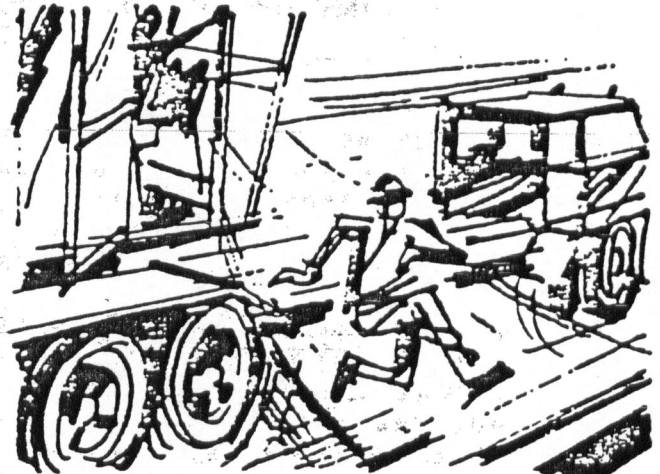
- 12 NEVER leave the machine with a load up in the air. If you must leave the crane place the load on the ground.



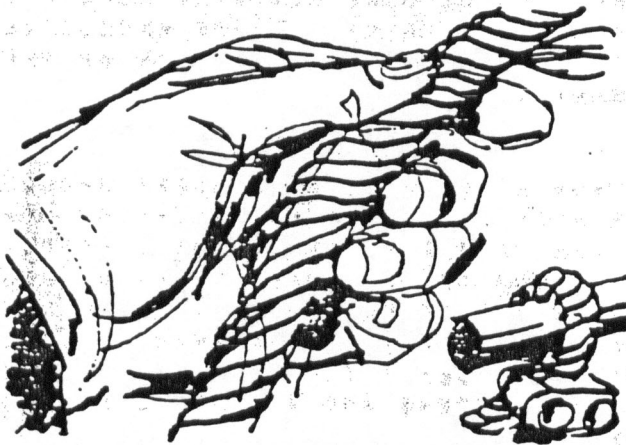
- 14 ALWAYS watch your load at all times. If you must look elsewhere, stop and hold the load still.



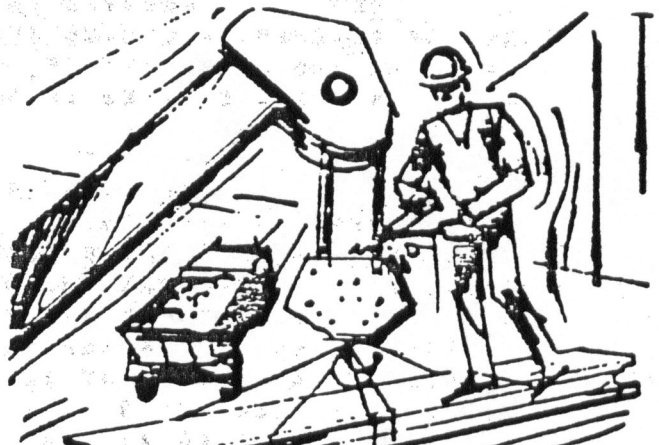
15 ALWAYS be careful to keep your hands away from cable drums, sheaves and pulleys. Replace all guards.



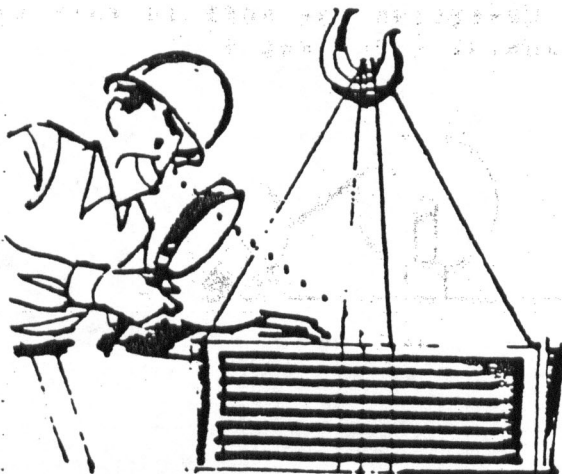
16 NEVER get on or off of a machine in motion.



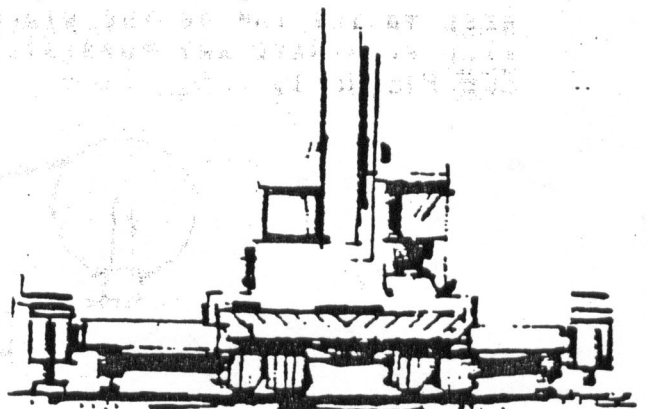
17 ALWAYS make regular inspections of the cables and replace worn, rusty or frayed cables. Inspect the cable clamps often.



18 ALWAYS stop the crane with load on the ground and boom supported while lubricating or adjusting.



19 ALWAYS have load slings checked before lifting. When in doubt, check them yourself.



20 ALWAYS set your outriggers firmly, keeping the machine level. Reset your outriggers frequently between heavy lifts.

INSTRUCTIONS FOR RIGGING AND REPLACEMENT OF WIRE ROPE PETTIBONE 22ORRC CRANE

A. GENERAL - IT IS THE PURPOSE OF THIS SECTION TO DISCUSS THE PROPER METHODS OF RIGGING AND REPLACING OF WIRE ROPE TO INCREASE THE LIFE AND RECEIVE BETTER SERVICE THROUGH PROPER HANDLING. WHEN GIVEN REASONABLE TREATMENT, WIRE ROPE IS ABOUT THE TOUGHEST AND MOST DURABLE STEEL PRODUCT MADE. THE CONTENTS OF THIS SECTION WILL BE OF HELP TO OBTAIN LONGER LIFE AND BETTER SERVICE FROM WIRE ROPE.

B. CHECKING GROOVE DIAMETER

(1) BEFORE NEW WIRE ROPE IS PLACED IN SERVICE, IT IS IMPORTANT TO INSPECT THE GROOVES IN SHEAVES AND THE SURFACES OF GUIDE ROLLERS AND DRUMS. NEW ROPE IS LARGER IN DIAMETER THAN THE OLD ROPE IT REPLACES. GROOVES IN SHEAVES WILL TEND TO WEAR TO THE SMALLER DIAMETER OF THE OLD ROPE. SURFACES OF DRUMS OF ROLLERS MAY BECOME GROOVED WITH SCORE MARKS DUE TO PICKUP OF FOREIGN PARTICLES ON THE WIRE ROPE.

(2) CHECK GROOVES IN SHEAVES TO BE SURE NEW WIRE ROPE WILL NOT BE PINCHES, AND BIND THE STRANDS, WHICH WILL CAUSE EXCESSIVE ABRASION AND ROPE FATIGUE, LEADING TO RAPID DETERIORATION OF THE ROPE. REPLACE SHEAVES IF NECESSARY.

C. UNREELING WIRE ROPE

(1) TO UNREEL WIRE ROPE FROM A HEAVY REEL, A SHAFT SHOULD BE PLACED THROUGH THE CENTER OF THE REEL AND THE REEL LIFTED BY MEANS OF JACKS, SO THAT THE REEL IS CLEAR OF THE FLOOR AND WILL REVOLVE EASILY. THEN ONE MAN, HOLDING THE END OF THE ROPE, WALKS STRAIGHT AHEAD, WHILE A SECOND MAN REGULATES THE SPEED OF THE TURNING REEL BY HOLDING A WOOD BLOCK AGAINST THE FLANGE TO ACT AS A BRAKE. CARE SHOULD BE TAKEN SO THAT SLACK WILL NOT GET INTO THE TURNS ON THE REEL AND BEND AROUND THE SHAFT. IF THIS HAPPENS AND A KINK IS FORMED, THE ROPE IS RUINED AT THAT POINT.

(2) WHEN THE ROPE IS RUN ONTO THE WINCH DRUM, IT SHOULD BEND IN THE SAME WAY IT DID WHEN COMING OFF THE REEL. OTHERWISE, A REVERSE BEND IS CAUSED. WHEN UNREELING WIRE ROPE FROM THE REEL TO REWIND ON THE WINCH DRUM, THE ROPE SHOULD BE UNWOUND FROM THE TOP OF THE FULL REEL TO THE TOP OF THE WINCH DRUM. UNREELING THE ROPE IN THIS WAY WILL ELIMINATE ANY POSSIBILITY OF CAUSING A REVERSE BEND. SEE FIGURE 1.

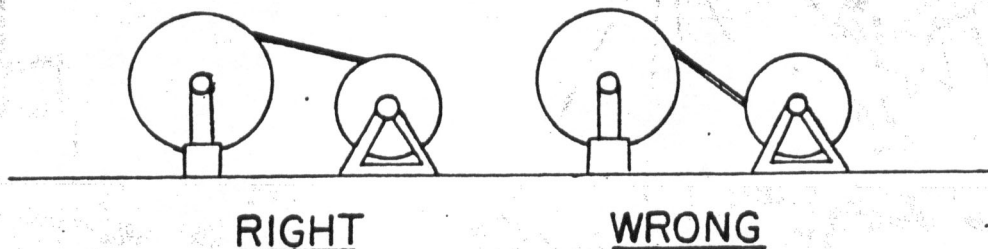
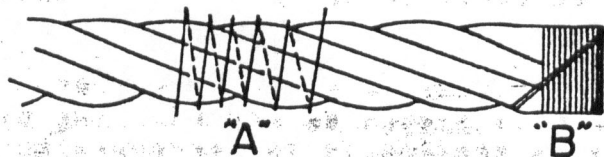


FIGURE 1. UNREELING WIRE ROPE.

D. SEIZING WIRE ROPE ENDS

(1) ONE IMPORTANT OPERATION IN HANDLING WIRE ROPE IS PROPER SEIZING OF THE ROPE ENDS. IF THIS OPERATION IS NOT HANDLED PROPERLY THE STRUCTURE OF THE ROPE IS DAMAGED. IF IMPROPERLY SEIZED THE ENDS BECOME DISTORTED AND FLATTENED, AND THE STRANDS LOOSEN, NOT ONLY AT THE ENDS BUT BACK WITHIN THE ROPE. LATER, WHEN THE ROPE IS PUT IN TENSION BY WORK, THE LOAD IS DISTRIBUTED TO THE STRAND UNEVELY, SHORTENING THE LIFE OF THE ROPE.

(2) THE APPROVED METHOD IS SHOWN IN FIGURE 2.



AT "A" THE TURNS ARE SPREAD APART TO SHOW METHOD OF APPLYING THEM. COMPLETED IS SHOWN AT "B".

FIGURE 2. SEIZING

(3) THE TWO ENDS ARE TWISTED TOGETHER IN THE APPROXIMATE CENTER OF THE SEIZING. A SOFT WIRE OF ANNEALED-IRON GRADE SHOULD BE USED. THE APPROXIMATE DIAMETER OF SEIZING SHOULD BE .080. THE LENGTH OF SEIZING SHOULD NEVER BE LESS THAN THE DIAMETER OF THE ROPE AND SHOULD PREFERABLY BE LONGER. LENGTH OF SEIZING FOR $7/8$ DIAMETER WIRE ROPE SHOULD BE ONE INCH. SEIZE ROPE BEFORE CUTTING TO DESIRED LENGTH FROM THE REEL.

(4) THREAD WIRE ROPE UP THROUGH SHEAVES IN BOOM POINT, THEN BACK TO THE WINCH DRUM. PUSH THE WIRE ROPE THROUGH THE SMALL END OF CAVITY IN THE DRUM. LOOP WIRE AROUND WEDGE AND POINT END OF ROPE BACK IN THE DIRECTION OF THE BOOM POINT. THE END OF THE ROPE SHOULD EXTEND BEYOND THE SMALL END OF THE WEDGE APPROXIMATELY TWO INCHES.

NOTE: CHECK, AFTER WEDGE AND ROPE ARE SEATED IN THE TAPERED CAVITY, THAT THE END OF THE ROPE DOES NOT PROJECT OUT OF THE SMALL END OF THE CAVITY SUFFICIENT ENOUGH TO INTERFERE WITH THE SPOOLING OF THE ROPE ON THE DRUM. THE ROPE AND WEDGE SHOULD BE TAPPED INTO THE CAVITY WITH A HARD WOOD BLOCK SHAPED TO THE CONTOUR OF THE ROPE WRAPPED AROUND THE WEDGE.

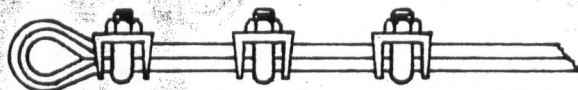
E. APPLYING WIRE ROPE CLIPS

FIGURE 3. U-BOLT WIRE CLIPS

(1) THE CORRECT METHOD OF ATTACHING U-BOLT WIRE CLIPS TO ROPE ENDS IS SHOWN IN FIGURE 3. THE BASE OF THE CLIP BEARS THE LIVE END OF THE ROPE, WHILE THE "U" OF THE BOLT PRESSES AGAINST THE DEAD END.

(2) THE CLIPS ARE USUALLY SPACED ABOUT SIX ROPE DIAMETERS APART TO GIVE ADEQUATE HOLDING POWER.

(3) BEFORE THE ROPE IS PLACED UNDER TENSION, THE NUTS ON THE CLIPS SHOULD BE TIGHTENED. IT IS ADVISABLE TO TIGHTEN THEM AGAIN AFTER THE LOAD IS ON THE ROPE TO TAKE CARE OF ANY REDUCTION IN THE ROPE'S DIAMETER CAUSED BY THE WEIGHT OR TENSION OF THE LOAD.

(4) A WIRE ROPE THIMBLE SHOULD BE USED IN THE LOOP EYE TO PREVENT KINKING WHEN WIRE ROPE CLIPS ARE USED. FOR $7/8$ DIAMETER ROPE, FOUR CLIPS SHOULD BE USED, SPACED FIVE (5) INCHES APART.

F. STANDARD REEVING

(1) THERE ARE VARIOUS WAYS TO REEVE WIRE ROPE. THE APPLICATION WOULD DICTATE THE WAY IT SHOULD BE REEVED. THE DIAGRAM AND INSTRUCTIONS LISTED IN THIS SECTION IS THE RECOMMENDED RIGGING FOR THE STANDARD SIX SHEAVE BOOM POINT AND FIVE SHEAVE HOOK BLOCK FOR STANDARD CRANE OPERATION.

(2) THE WIRE ROPE (2, FIGURE 4) LEAVES THE WINCH FROM THE TOP (1).

(3) OVER SHEAVE (3) AND AROUND SHEAVE (9, 4, 10, 5, 11, 6, 12, 7, 13 AND 8) IN THIS ORDER AND DEAD END ON THE HOOK BLOCK AT (14).

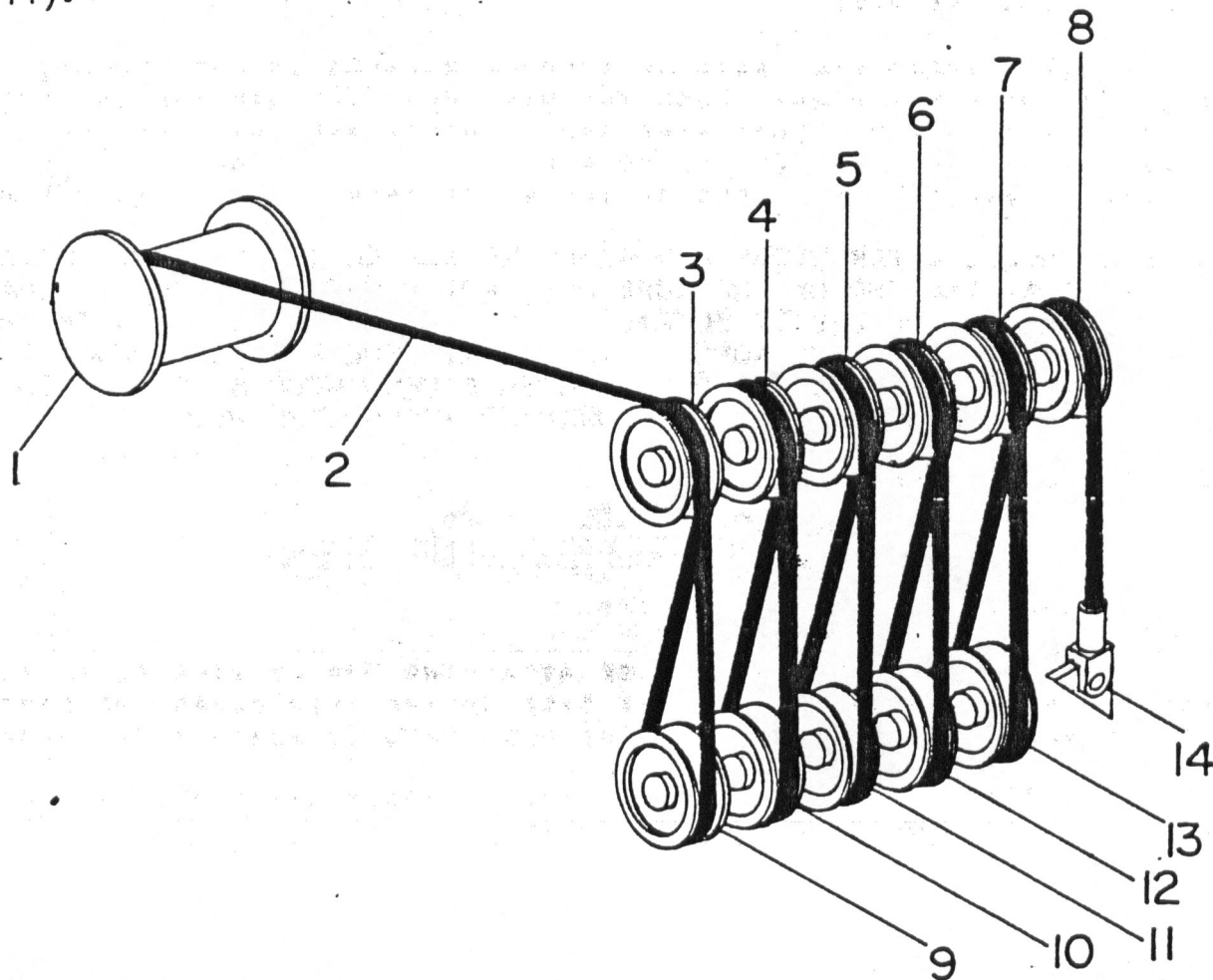


FIGURE 4. STANDARD REEVING DIAGRAM.

PETTIBONE 22ORRC PARTS BOOK

CHAPTER 2

PERIODIC SERVICE AND LUBRICATION

SECTION A	PERIODIC SERVICE
SECTION B	LUBRICATION

RECOMMENDED MOBILE CRANE PERIODIC SAFETY INSPECTION RECORD

[illegible]

MODIFICATIONS OR FIELD CHANGES

SHORTAGES

REMARKS

1. INSPECTION CODE INTERVALS

D-DAILY

W-WEEKLY

M-MONTHLY

P-PERIODICALLY-1 TO 12 MONTH INTERVALS, OR AS SPECIFICALLY RECOMMENDED BY MANUFACTURER.

2. WHEN APPROPRIATE, ENTER DIAGNOSIS IN SPACE PROVIDED FOR ANY ITEMS REQUIRING ADJUSTMENT OR REPAIR.

3. INDICATE ITEM INSPECTION RESULTS BY CHECKING IN THE SATISFACTORY, ADJUST, OR REPAIR COLUMN PROVIDED.

220 RRC

FILTER ELEMENTS

<u>FILTER</u>	<u>ELEMENT PART NO.</u>
ENGINE AIR FILTER	T-515
ENGINE AIR FILTER (TURBO)	P11-7332
ENGINE OIL FILTER	AC-5573014
TRANSMISSION OIL FILTER	AC-5573014
PRIMARY FUEL FILTER	AC-TYPE T552
SECONDARY FUEL FILTER	AC-TYPE TP540X
HYDRAULIC OIL FILTER	750-894
AIR COMPRESSOR FILTER (TURBO)	5110411

NOTE:

DUE TO SPECIAL OPTIONS AND CHANGES MADE BY ENGINE AND DRIVE TRAIN MANUFACTURERS, BE SURE TO INCLUDE CRANE SERIAL NUMBER WHEN ORDERING FILTER ELEMENTS. THIS WILL INSURE THE PROPER ONE IS DELIVERED TO YOU.

NOTICE

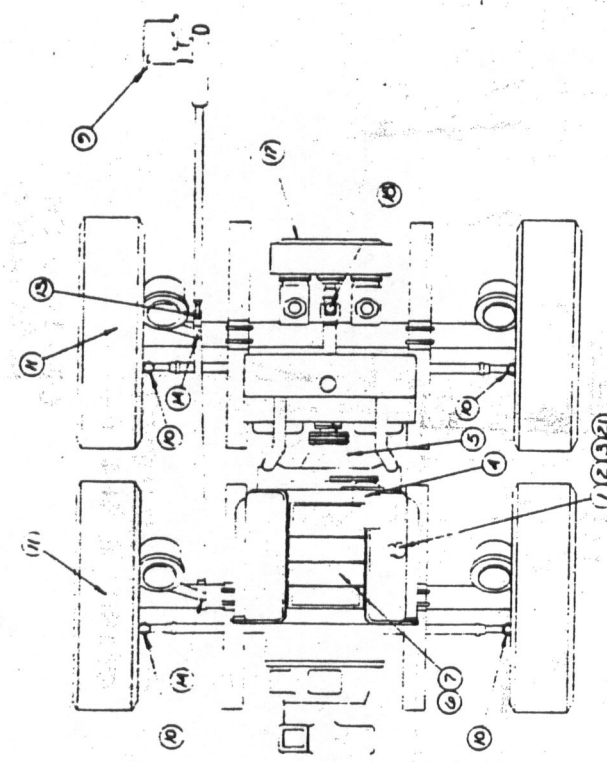
TURNTABLE BEARING BOLTS SHOULD
BE CHECKED FOR TIGHTNESS AFTER
THE FIRST 40 HOURS OF OPERATION
AND EVERY 800 HOURS THEREAFTER.

NOTE

TIGHTEN BOLTS TO 1200 FT/LBS TORQUE.

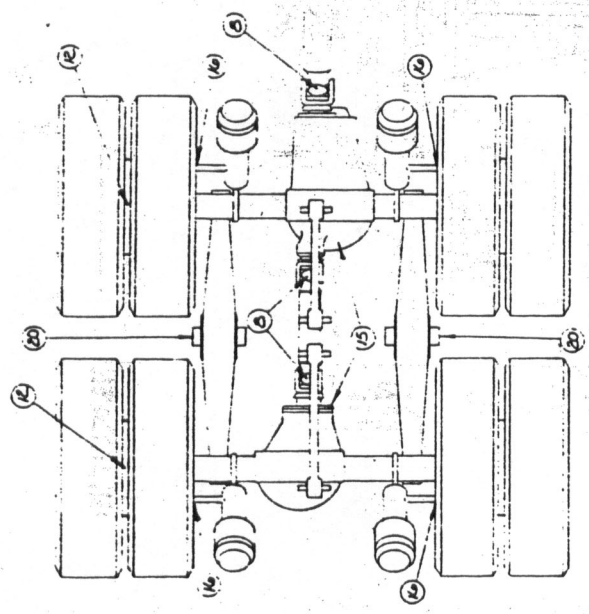
NOTICE

IT IS RECOMMENDED THIS MACHINE NOT
BE STEAM CLEANED FOR A PERIOD OF
THREE MONTHS FROM DATE OF DELIVERY.
THIS WILL ALLOW THE PAINT SUFFICIENT
TIME TO AGE.

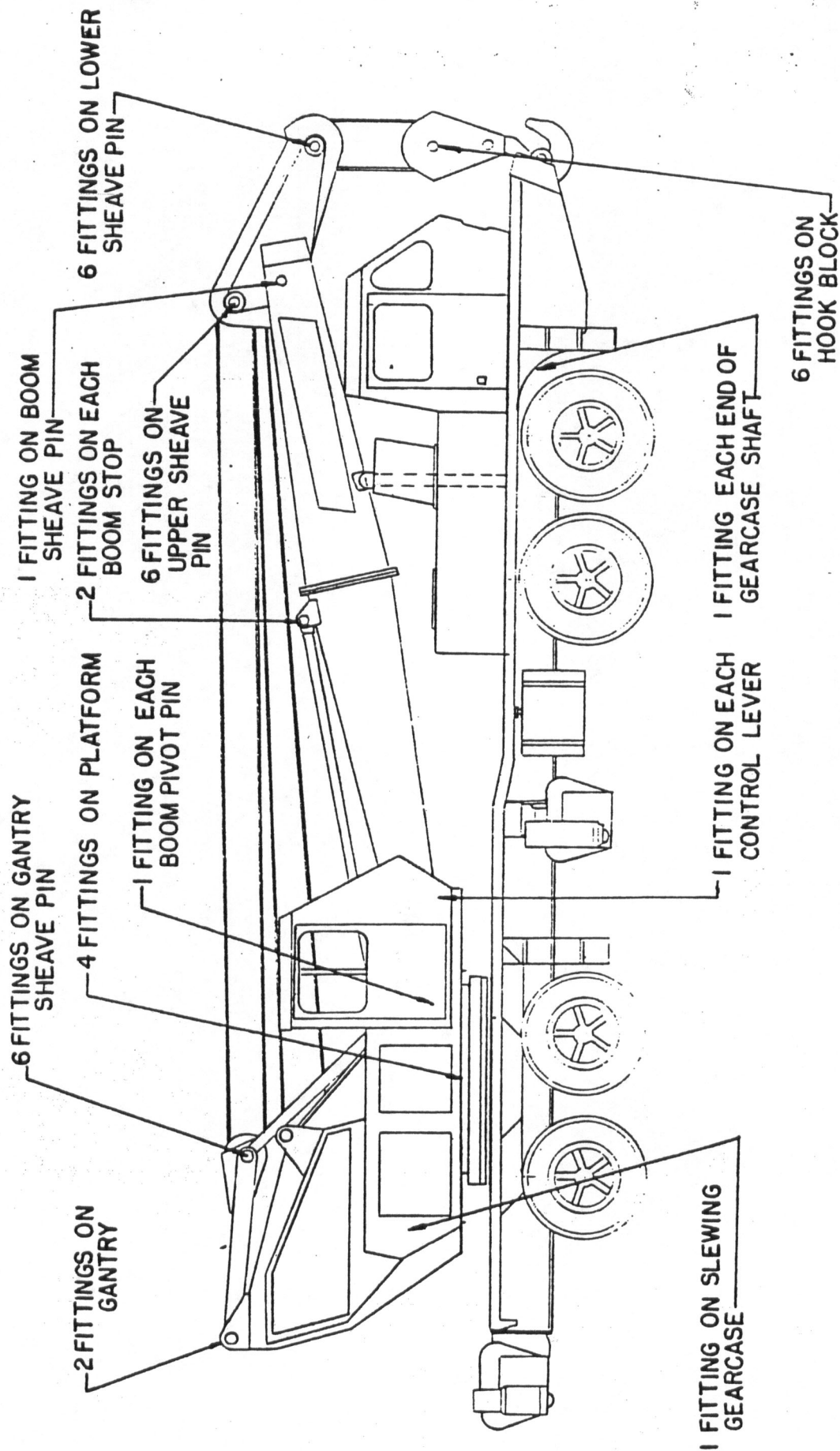


LUBRICATION SCHEDULE **D-850-479**

NOTE: REAR AXLES SHOULD BE HORIZONTAL DURING REFILL.
CHECK WHEEL HUBS FOR PROPER AND EVEN FLUID LEVEL.



ITEM	LUBRICATION POINT	LUBRICATION SCHEDULE			LUBRICANT	NOTE
		WEEKLY	MONTHLY	SEMI-ANNUALLY		
1	ENGINE CRANKCASE	CHECK	CHANGE IF NEEDED		ENGINE OIL	SAE 40 SUMMER SAE 10 WINTER
2	ENGINE OIL FILTER		REPLACE IF NEEDED			
3	CRANKCASE BREATHER			CHECK		
4	ALTERNATOR		LUBRICATE		ENGINE OIL	
5	WATER PUMP		LUBRICATE		PUMP GREASE	
6	AIR CLEANER (OIL BATH TYPE)	CHECK	CLEAN AND REFILL		ENGINE OIL SAE 10	DO NOT CLEAN WITH GASOLINE
7	AIR CLEANER (DRY TYPE)	CHECK		REPLACE ELEMENT		DO NOT CLEAN WITH GASOLINE
8	DRIVESHAFT "U" JOINT		LUBRICATE		CHASSIS GREASE	
9	STEERING GEAR HOUSING		CHECK	REFILL IF NEEDED	GEAR LUBRICANT	
10	TIE-ROD BALL JOINT		LUBRICATE	CLEAN AND REPACK	CHASSIS GREASE	
11	FRONT WHEEL BEARING			CLEAN AND REPACK	WHEEL BRG GREASE	
12	REAR WHEEL BEARING				CHASSIS GREASE	
13	DRAGLINK "U" JOINT		LUBRICATE		WHEEL BRG GREASE	
14	DRAGLINK ENDS		CHECK	REPLACE IF NEEDED	CHASSIS GREASE	
15	REAR AXLE HOUSING		LUBRICATE		GEAR LUBRICANT	
16	BRAKE CAMSHAFT		CHECK	REFILL IF NEEDED	CHASSIS GREASE	
17	TWO-PUMP GEARCASE		LUBRICATE		GEAR LUBRICANT	
18	GEARCASE SHAFT "U" JOINT		LUBRICATE	CHANGE IF NEEDED	CHASSIS GREASE	
19	TRANSMISSION	CHECK	LUBRICATE		DEXTRON II	
20	EQUALIZER BEAM CTR. PIN		LUBRICATE	REPLACE IF NEEDED	CHASSIS GREASE	
21	FUEL FILTER					
22	TRANSMISSION FILTER					



220 RRC LUBRICATION

LUBRICATION AND SPECIAL INFORMATION CHART

<u>DESCRIPTION</u>	<u>CAPACITY</u>	<u>TYPE OF LUBRICATION</u>	<u>REMARKS</u>
TRUCK CARRIER (ALL COMPONENT PARTS...SEE MFG. MANUAL)			
HYDRAULIC OIL RESERVOIR AND SYSTEM	8 x 4 CARRIER 175 GALLONS	INDUSTRIAL OIL #32 (SEE HYDRAULIC LUBRICATION SHEET)	SEE SERVICE INSTRUCTIONS FOR REQUIRED CHANGER
SLEWING GEAR ^{Motor}	42-374 4 PTS.	SAE 140 80/90 MIL-L-2105C API-GL-5	CHANGE EVERY 1000 HRS.
LINE WINCH	SEE LINE WINCH SERVICE MANUAL		
TWO PUMP GEAR CASE	4 PTS.	SAE 140 MIL-L-2105C API-GL-4 90 GEAR OIL	CHANGE EVERY 1000 HRS.
BOOM LIFT WINCH	SEE BOOM LIFT WINCH SERVICE MANUAL		
VICKERS PUMPS		SELF-LUBRICATING	
TURNTABLE ASSEMBLY		GREASE--EXTREME PRESSURE	GREASE EVERY 40 HRS.
SUMP OIL FILTERS	1000 IN. FILTERING AREA 150 GPM	FILTERS FOR HYDRAULIC CIRCUIT	SERVICE & CLEAN AT EACH HYDRAULIC OIL CHANGE
BATTERY	AS NEEDED	WATER	KEEP CONNECTIONS PROPERLY CLEAN AND TIGHT
WHEEL LUG NUTS	AS NEEDED TORQUE TO 200 FT/LB.	NONE	

PLANETARY GEAR WINCHES
WORM GEAR WINCHES, DECK

SAE 80/90 MIL-L-2105C API-GL-5 MULTI-GEAR OIL
SAE 140W MIL-L-2105 API-GL-4 GEAR OIL

LUBRICATION AND SPECIAL INFORMATION CHART

<u>DESCRIPTION</u>	<u>CAPACITY</u>	<u>TYPE OF LUBRICATION</u>	<u>REMARKS</u>
TIRE PRESSURE	REAR - 90# FRONT - 105#	NONE	KEEP TIRE PRESSURE UP TO GIVE LONGER TIRE LIFE

NOTE: ALL GREASE FITTINGS USE LUBRIPLATE #630-AA FROM FISKE BROTHERS REFINING COMPANY

THE OIL IN A HYDRAULIC SYSTEM SERVES AS THE POWER TRANSMISSION MEDIUM. IT IS ALSO THE SYSTEM'S LUBRICANT AND COOLANT. SELECTION OF THE PROPER OIL IS A REQUIREMENT FOR SATISFACTORY SYSTEM PERFORMANCE AND LIFE.

TWO IMPORTANT FACTORS IN SELECTING AN OIL FOR USE IN MOBILE HYDRAULIC SYSTEMS ARE:

1. **ANTIWEAR ADDITIVES** - The oil selected must contain the necessary additives to insure high antiwear characteristics.
2. **VISCOSITY** - The oil selected must have proper viscosity to maintain an adequate lubricating film at system operating temperature.

SUITABLE TYPES OF OIL FOR USE IN MOBILE HYDRAULIC SYSTEMS ARE:

1. **CRANKCASE OIL** meeting performance classification, letter designations, SC, SD or SE of SAE J183. Note that one oil may meet one or more of these classifications.
2. **ANTIWEAR TYPE HYDRAULIC OIL** - There is no common designation for oils of this type. However, they are produced by all major oil suppliers and provide the antiwear qualities of the above designated crankcase oils.
3. **CERTAIN OTHER TYPES OF PETROLEUM OILS** are suitable for Mobile hydraulic service if they meet the following provisions:
 - (A) Contain the type and content of antiwear additives found in the above designated crankcase oils or have passed pump tests similar to those used in developing the antiwear type hydraulic oils.
 - (B) Meet the viscosity recommendations shown in the following table.
 - (C) Have sufficient chemical stability for Mobile hydraulic system service.

THE FOLLOWING TABLE SHOWS OIL-VISCOSITY RECOMMENDATIONS FOR USE WITH VICKERS EQUIPMENT IN MOBILE HYDRAULIC SYSTEMS:

HYDRAULIC SYSTEM OPERATING TEMPERATURE RANGE (MIN.° TO MAX.)	SAE VISCOSITY DESIGNATION
*** -10° F. to 130° F. (-23° C. to 54° C.)	5W 5W-20 5W-30
0° F. to 180° F. (-18° C. to 83° C.)	10W
0° F. to 210° F. (-18° C. to 99° C.)	10W-30**
50° F. to 210° F. (10° C. to 99° C.)	20-20W

- ***Ambient Start-Up Temperature
**See Paragraph on Viscosity Index
*See Paragraph on Arctic Conditions

OPERATING TEMPERATURES - The temperatures shown in table are cold start-up to maximum operating. Suitable start-up procedures must be followed to insure adequate lubrication during system warm-up.

ARCTIC CONDITIONS - Arctic conditions represent a specialized field when extensive use is made of heating equipment before starting. If necessary, this and judicious use of the following recommendations may be used:

1. SAE 5W or SAE 5W-20 oil, in line with the viscosity guidelines shown in the table.
2. Oils especially developed for use in arctic conditions such as synthetic hydrocarbons, esters, or mixtures of the two.
3. Dilution of SAE 10W oil with maximum of 20% kerosene or low temperature diesel fuel is permissible. However, dilution of the special oils (see 2 above) should not be attempted unless the

supplier and Vickers concur. The addition of the dilutant will not necessarily improve the cold cranking and may have an adverse affect on the performance of the oils in (2) above.

During cold start-up, avoid high speed operation of hydraulic system components until the system is warmed up to provide adequate lubrication.

Operating temperature should be closely monitored to avoid exceeding a temperature of 130° F. (54° C) with any of these light weight or diluted oils.

OTHER FACTORS IN SELECTING AN OIL ARE:

1. **VISCOSITY** - Viscosity is the measure of fluidity. In addition to dynamic lubricating properties, oil must have sufficient body to provide adequate sealing effect between working parts of pumps, valves, cylinders and motors, but not enough to cause pump cavitation or sluggish valve action. Optimum operating viscosity of the oil should be between 16 cSt (80 SSU) and 40 cSt (180 SSU).
2. **VISCOSITY INDEX** - Viscosity index reflects the way viscosity changes with temperature. The smaller the viscosity change, the higher the viscosity index. The viscosity index of hydraulic system oil should not be less than 90. Multiple viscosity oils, such as SAE 10W-30, incorporate additives to improve viscosity index (polymer thickened). Oils of this type generally exhibit both temporary and permanent decrease in viscosity due to the oil shear encountered in the operating hydraulic system. The actual viscosity can, therefore, be far less in the operating hydraulic system than what is shown in normal oil data. Accordingly, when such oils are selected, it is desirable to use those with high shear stability to insure that viscosity remains within recommended limits.
3. **ADDITIVES** - Research has developed a number of additive agents which materially improve various characteristics of oil for hydraulic systems. These additives are selected to reduce wear, increase chemical stability, inhibit corrosion and depress the pour point. The most desirable oils for hydraulic service contain higher amounts of antiwear compounding.
4. **CHEMICAL STABILITY** - Oxidative and thermal stability are essential characteristics of oils for Mobile Hydraulic systems. The combination of base stocks and additives should be stable during the expected lifetime of the oil when exposed to the environment of these systems.

SPECIAL REQUIREMENTS

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers representative.

CLEANLINESS

Thorough precautions should always be observed to insure that the hydraulic system is clean:

- A. Clean (flush) entire system to remove paint, metal chips, welding shot, etc.
- B. Filter each change of oil to prevent introduction of contaminant into the system.
- C. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.
- D. Provide continuous protection of system from entry of airborne contamination, by sealing the system and/or by proper filtration of the air.
- E. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.
- F. Aeration - thorough precautions should be taken, by proper system and reservoir design, to insure that the aeration of the oil will be kept to a minimum.

MECHANICAL COMPONENTS: Periodically inspect all mechanical and fabricated components for proper alignment, wear pattern, ease of operation and secure mounting. Tighten and/or replace any defective hardware. Repair or replace any defective components.

TROUBLE SHOOTING HYDRAULICS:

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>REMEDY</u>
PUMP NOT DELIVERING OIL	Pump driven in wrong direction of rotation.	Must be reversed immediately to prevent seizure. Check direction of drive rotation against proper pump rotation.
	Pump drive shaft coupling sheared (direct drive).	Remove pump from accessory mounting pad and determine damage to pump. Replace needed parts. Check input speed to determine whether it is higher than recommended. Check relief valve setting.
	Fluid intake pipe in reservoir blocked or oil viscosity too high to pick up prime.	Drain complete system. Add new fluid of proper viscosity. Check all filters for dirt and sludge. Follow filling procedures.
	Air leaks at intake-pump not priming.	Circuit must be tested at input connection. Determine where air is being drawn into line connections and tighten. Check minimum drive speed which may be too slow to prime the pump.
	Oil below pump intake opening in reservoir.	Add oil to reservoir as required. Follow recommended filling procedures.
INSUFFICIENT PRESSURE BUILD-UP IN THE SYSTEM	System relief valve set too low.	Set relief valve properly using pressure gauge.
	Dirt in relief valve - relief valve sticking.	Remove relief valve from unit. Flush thoroughly and check for free operation.
	Sludge and dirt in unit.	Flush and clean system thoroughly. Disassemble and inspect for wedged dirt or sludge. Clean thoroughly and reassemble.
	Valving surfaces scored by abrasive matter.	Replace all scored or worn parts.
	Leak in hydraulic system connections or cylinders.	Check for source of leaks. Tighten connections as required. Replace worn seals, gaskets or parts that may be causing leakage.
PUMP MAKING NOISE	Fan Drive belt slippage.	Adjust and tighten belt for recommended tension.
	Partially clogged intake line or strainer.	Pump must receive intake oil freely or cavitation will result. Drain system and clean intake line. Replace strainer element as required.
	Air leaks at pump intake line joints or pump shaft packing.	Test by pouring oil on joints and around drive shaft. Listen for change in operation. Tighten joints affected and replace pump drive shaft packing or oil seal according to service instructions.
	Coupling misalignment	Realign. Replace oil seal if it has been damaged by the shaft misalignment.
	Tank air vent plugged.	Remove air breather cap. Flush and clean air filter.
	Sludge and dirt in pump.	Disassemble and inspect for wedged dirt or sludge. Clean thoroughly and reassemble.
	Alternator drive belt too tight.	Adjust belt for recommended tension. If necessary, replace worn bearings.
	Oil viscosity too high.	Change to specified oil.
	System tubing or rubber inlet hose pinched.	Inspect hose or tubing at pinched area to determine possible damage. Replace tubing always. Replace rubber hose if cut, torn or deformed.

EXTERNAL LEAKAGE	Shaft oil seal worn or damaged.	Replace shaft oil seal. Check pump alignment.
	Damaged gasket.	Replace damaged part.
	Valve spool oil seal worn or damaged.	Replace plunger oil seal. Check spool for scoring.
	Loose bolts.	Tighten to correct torque.
VALVE SPOOL STICKY OR SLUGGISH	Dirt between operating spool and body.	Disassemble and inspect for foreign matter. Clean and polish thoroughly or replace scored parts.
	Broken valve spring.	Replace spring.
	Mounting bolts distorting valve body.	This may occur where the mounting pad is uneven or does not offer sufficient support for the valve. Remove bolts and shim corners as necessary to relieve distortion. Re-tighten to recommended torque.
	Binding control linkage.	Adjust linkage to permit free action and to allow valve spool to center in neutral position.
EXCESSIVE OIL TEMPERATURE	Unit operated improperly.	Do not hold operating spool in the extreme "IN" or "OUT" position after the work load has reached its movement limits. Do not "exercise" the work load rapidly or continuously for a long period of time. Observe recommended limits for operating speed and pressure.
	Valve spool held off center by manual control levers and linkage.	Adjust linkage to permit valve spool to center in neutral position.
	Valve spool binding.	Disassemble and clean. Correct or replace scored parts.
CYLINDER INOPERATIVE OR SLUGGISH	Rod packing too tight.	Adjust packing nut.
	Cylinder misalignment.	Align cylinder and check connecting parts.
	Scored cylinder or piston.	Rework or replace scored parts.

TROUBLE SHOOTING POWER STEERING HARD STEERING

<u>CAUSE</u>	<u>REMEDY</u>
1. Sticky relief valve or improper setting.	Check relief valve for function and setting.
2. Improper steering valve adjustment.	Adjust thrust bearings on either side of valve.
3. Spool in steering valve sticking or spool in flow divider sticking.	Inspect valve. Clean and flush system to remove dirt.
4. Insufficient pump pressure.	Check pump.
5. Valve or cylinder lines incorrectly installed.	Check plumbing for correct installation.
7. Loss of hydraulic oil due to leaks or damaged lines.	Check oil level. If low, check for leaks or damage.
8. Broken piston or piston rings.	Replace.
9. Lack of steering gear lubricant.	Add lube to proper level.
10. Stud adjusted too tightly in cam groove.	Adjust.
11. Wheel tube bent or sprung.	Replace bent parts and correct column alignment.
12. Improper steering wheel alignment.	Align.
13. Low tire pressure.	Inflate to proper level.

LOST MOTION, SHIMMY OR WOBBLECAUSE

1. Valve out of adjustment.
2. Excessive backlash of stud in cam.
3. Steering wheel loose on wheel tube.
4. Pitman arm loose on lever-shaft.
5. Loose ball socket connections.

REMEDY

- Adjust.
Tighten wheel nut.
Tighten lever shaft nut.
Adjust.
Adjust.

NOISE

1. Low fluid level.
2. Air in system.
3. Dirt and sludge in pump.
4. Pump worn.
5. Weakened pressure relief valve spring.

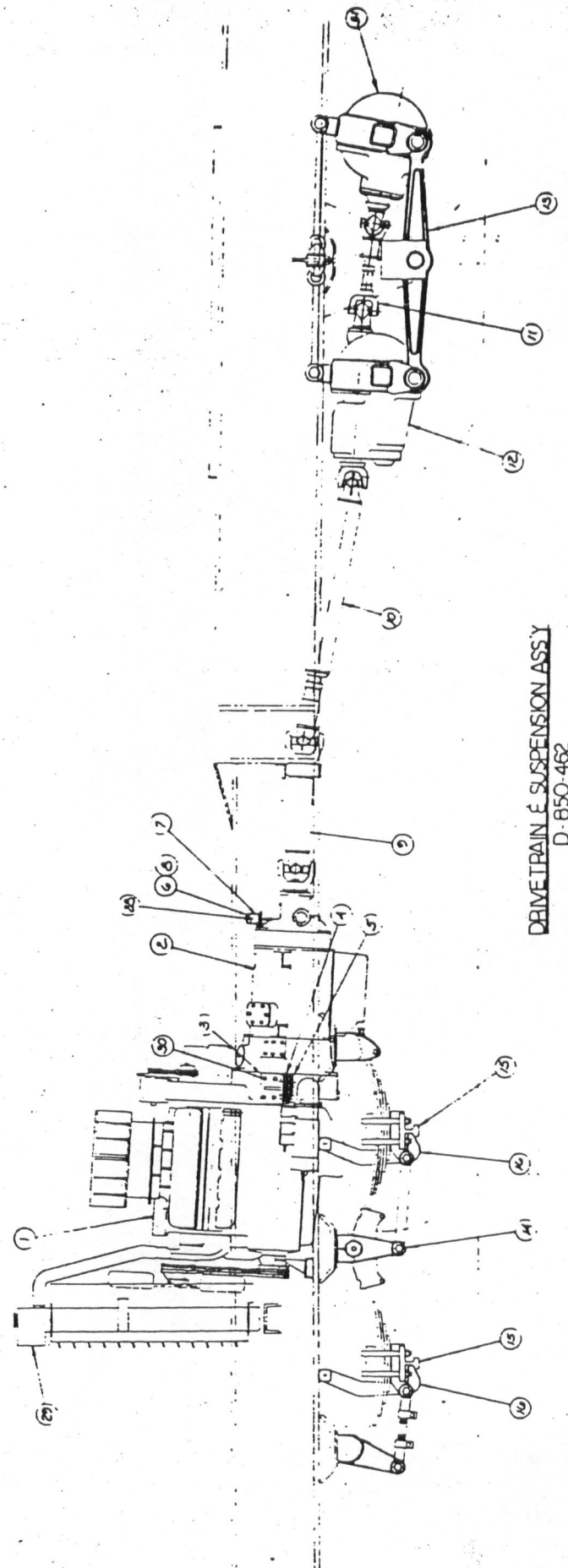
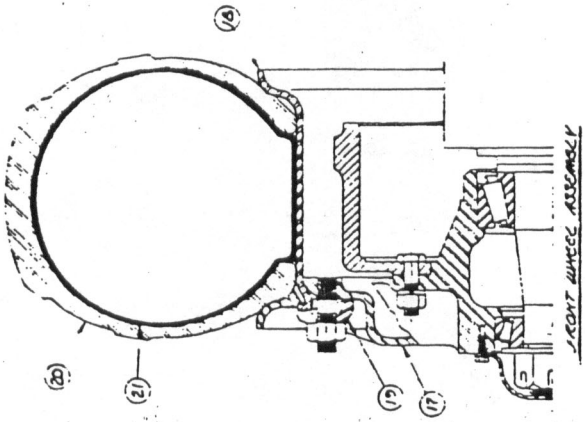
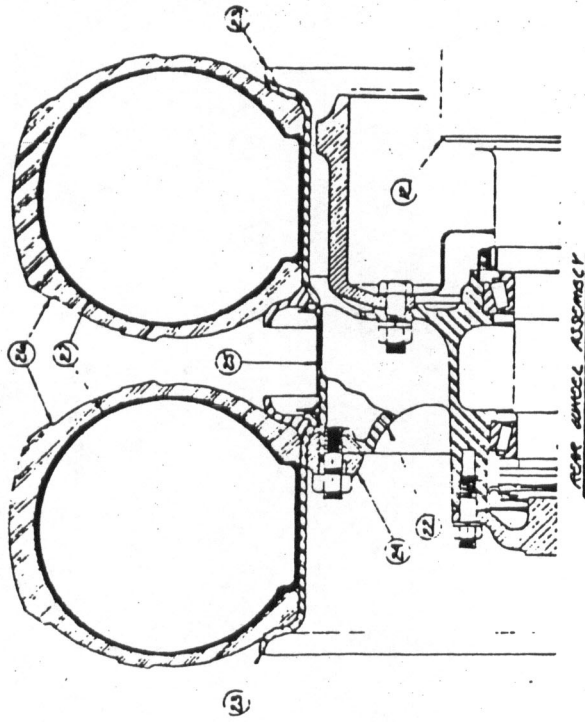
- Check for leaks, refill to level.
Check all connections and bleed systems.
Drain system and clean.
Replace.
Replace spring.

CAUTION

DISCONNECT BATTERY CABLES
FROM BATTERIES BEFORE AT-
TEMPTING TO DO ANY WELDING
ON THIS CRANE.

CHAPTER THREE,
SECTION A,

CARRIER, PARTS



DRIVE TRAIN & SUSPENSION ASS'Y
D-850-462

DRIVE TRAIN AND SUSPENSION ASSEMBLY

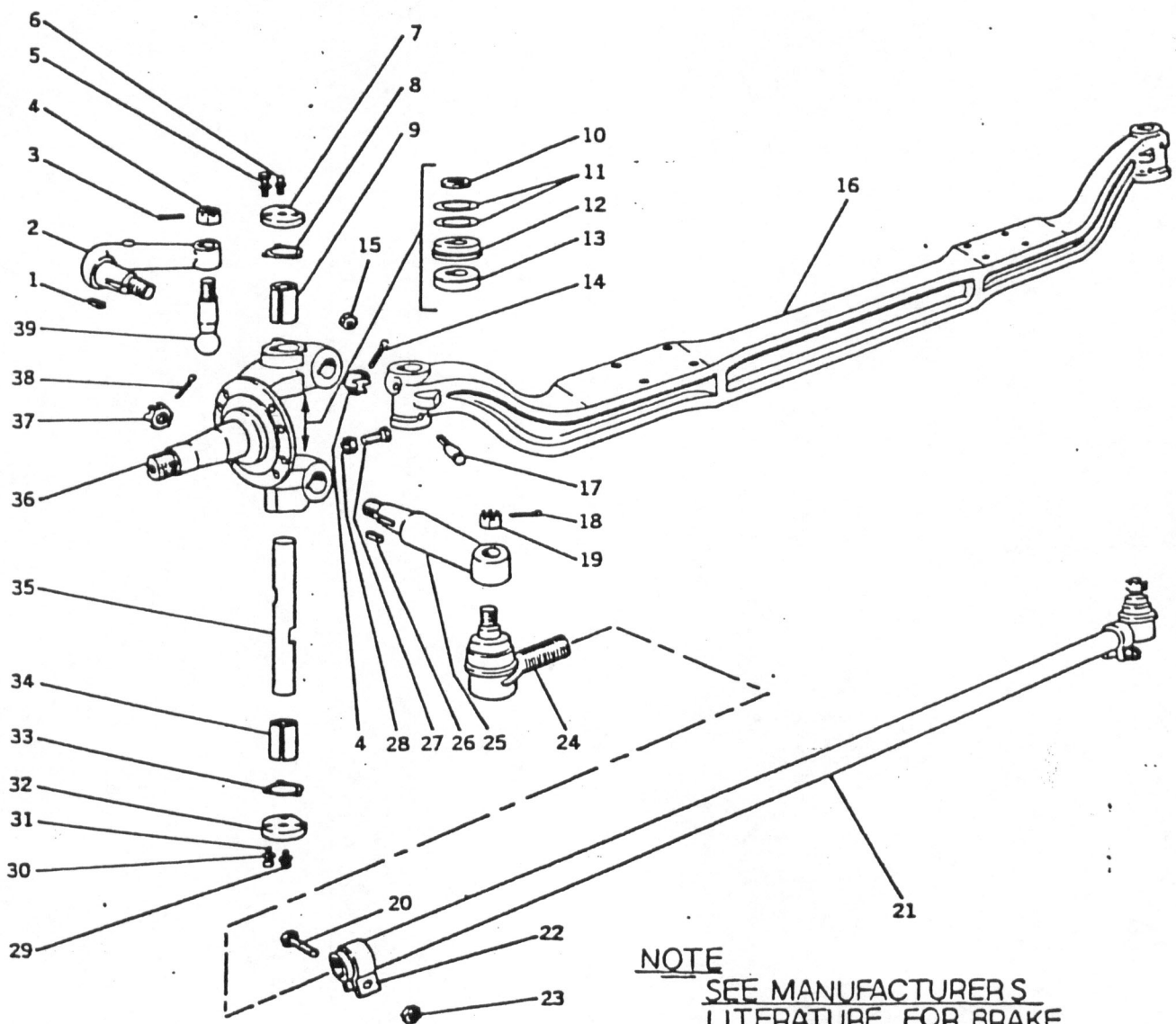
D-850-462

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	38187-07-1P	ENGINE	1
2	30876-21-1P	TRANSMISSION	1
3	31278-07-7	MOTOR MOUNTING BRACKET	2
4	10684-07-1P	VIBRATION DAMPER	4
5	10685-17-1P	VIBRATION DAMPER	4
6	34604-21-7	SPRING MOUNTING BRACKET	1
7	30917-21-4	TRANSMISSION SPRING	1
8	31022-21-1	MOUNTING BRACKET - TOP PLATE	1
9	34238-15-7+1	PRIMARY DRIVE SHAFT	1
10	34239-15-1	SECONDARY DRIVE SHAFT	1
11	34240-15-7P-1	TANDEM DRIVE SHAFT	1
12	37751-02-1P	REAR AXLE - FRONT	1
13	D-850-489	REAR SUSPENSION	1
14	D-850-337	FRONT SUSPENSION	1
15	021-133	FRONT AXLE	2
16	D-850-476	AXLE LOCK ASSEMBLY	1
17	20995-24-1P	FRONT WHEEL ASSEMBLY	4
18	37466-17-1P	FRONT RIM	4
19	20996-24-1P	FRONT WHEEL CLAMP	24
20	31456-23-1P	FRONT TIRE	4
21	W/Tire	FRONT TIRE TUBE	4
22	39681-24-1P	REAR WHEEL ASSEMBLY	4
23	10633-17-1P	REAR RIM	8
24	20996-24-1P	WHEEL CLAMP	24

DRIVE TRAIN AND SUSPENSION ASSEMBLY(CONTINUED) 2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
25	30426-17-1P	RIM SPACER	4
26	30877-23-1P	REAR TIRE	8
27	W/Tire	REAR TIRE TUBE	8
28		5/8"-11 NC x 1-1/2" LG HHCS w/NUT & LOCKWASHER	2
29	041-147	COOLING SYSTEM ASSEMBLY	1
30		5/8"-11 NC x 1-3/4" LG HHCS w/LOCKWASHER	12
31	37752-02-1P	REAR AXLE - REAR	1

FORWARD FRONT AXLE
751-012 021-133



NOTE

SEE MANUFACTURER'S
LITERATURE FOR BRAKE
INFORMATION

FORWARD FRONT AXLE

021-133

751-012

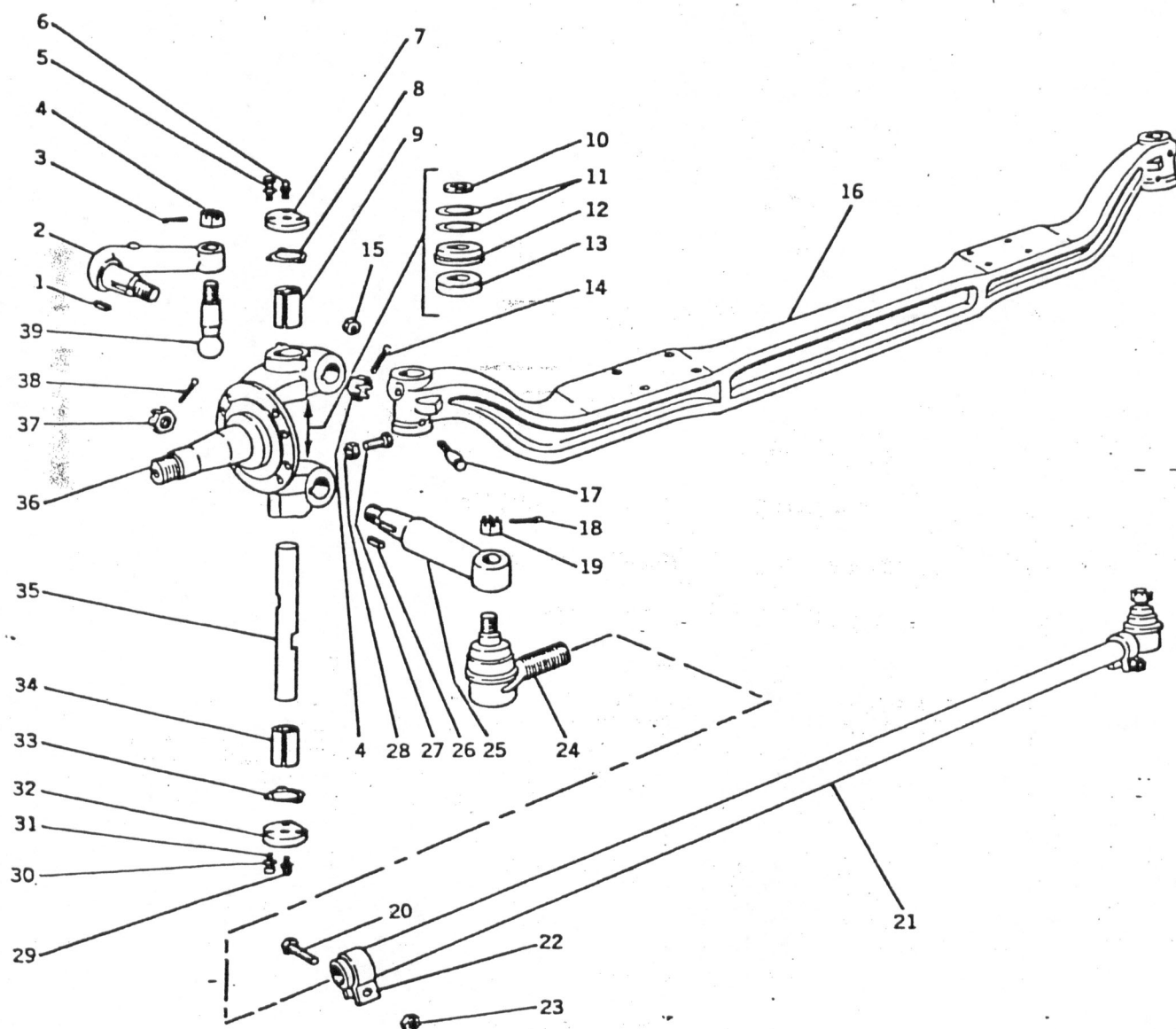
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	16-X-202	STEERING ARM KEY	1
2	3133-P-4956	STEERING ARM	1
3	K-2618	STEERING ARM COTTER PIN	2
4	1-3/4" BALL - N-214	STEERING ARM BALL NUT	2
	1-15/16" BALL - N-216	STEERING ARM BALL NUT	2
5	S-259-1	CAPSCREW	12
6	1199-N-1860	GREASE FITTING	2
7	1199-M-3237	STEERING KNUCKLE CAP	4
8	2208P-824	KNUCKLE CAP GASKET	4
9	1225-L-818	BRONZE KNUCKLE BUSHING	4
10	A-1205-2-1429	UPPER KNUCKLE PIN ASSEMBLY SEAL	4
11	2203-N-3004	STEERING KNUCKLE SHIM - .005	A/R
	2203-M-3003	STEERING KNUCKLE SHIM - .010	A/R
	2203-B-2836	STEERING KNUCKLE SHIM - .015	A/R
	2203-A-2835	STEERING KNUCKLE SHIM - .030	A/R
12	A-1205-C-1433	STEERING KNUCKLE LOWER ASSEMBLY SEAL	2
13	T-208	THRUST BEARING	2
14	K-2412	COTTER PIN	2
15	12272-780	STEERING KNUCKLE DRAW KEY NUT	4
16	3100-C-6529	CENTER AXLE	1
17	7-X-114	UPPER STEERING KNUCKLE DRAW KEY	4
	7-X-113	LOWER STEERING KNUCKLE DRAW KEY	4
18	K-2618	CROSS TUBE ARM COTTER PIN	2
19	13-X-159	TIE ROD END NUT	2
20	C/W CROSS TUBE ASSEMBLY	STEERING CROSS TUBE END BOLT	2
21	A1-3102-Y-3847	CROSS TUBE ASSEMBLY	1

FORWARD FRONT AXLE (CONTINUED)

2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
22	2257-Q-17	STEERING CROSS TUBE END CLAMP	2
23	N-710-C	CROSS TUBE END CLAMP NUT	2
24	3144-P-448	TIE ROD END ASSEMBLY - R.H.	1
	3144-G-449	TIE ROD END ASSEMBLY - L.H.	1
25	3133-X-5146	CROSS TUBE ARM - R.H.	1
	3133-W-5145	CROSS TUBE ARM - L.H.	1
26	16-X-202	CROSS TUBE ARM KEY	2
27	9-X-16	AXLE CENTER STOP SCREW	2
28	N-110-1	STOP SCREW LOCKNUT	2
29	1199-N-1860	GREASE FITTING	2
30	1229-E-1669	LOCKWASHER	12
31	S-259-1	STEERING KNUCKLE CAP CAPSCREW	12
32	1199-M-3237	STEERING KNUCKLE DUST CAP	
33	2208-P-824	KNUCKLE CAP GASKET	
34	1225-L-818	BRONZE KNUCKLE BUSHING	
35	3101-V-178	KNUCKLE PIN	2
36	3111-L-2300	STEERING ASSEMBLY KNUCKLE - R.H.	1
	3111-K-2295	STEERING ASSEMBLY KNUCKLE - L.H.	1
37	13-X-159	CROSS TUBE ARM NUT	1
38	K-2412	CROSS TUBE BASS COTTER PIN	1
39	2110-Y-103	1-3/4" STEERING ARM BALL	1
	2110-S-149	1-15/16" STEERING ARM BALL	1

REAR FRONT AXLE
751-013 021-133



REAR FRONT AXLE

021-133

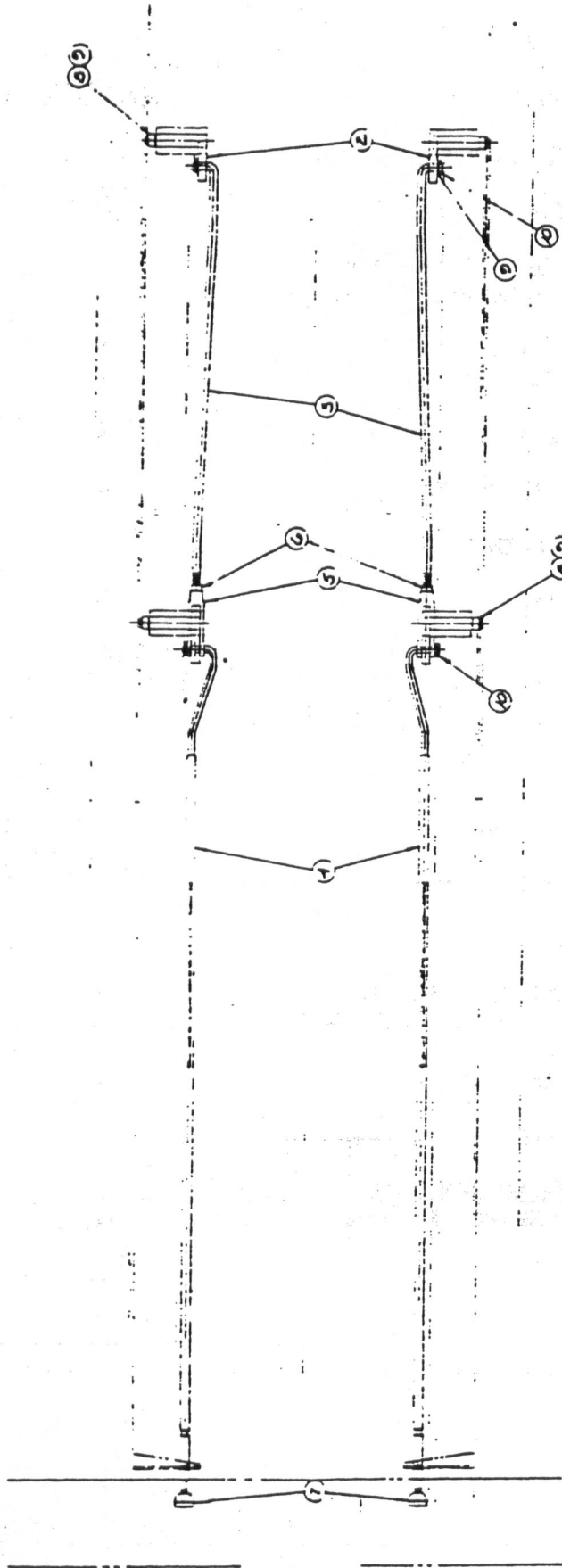
751-013

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	16-X-202	STEERING ARM KEY	2
2	3133-F-4894	STEERING ARM	2
3	K-2618	STEERING ARM COTTER PIN	2
4	1-3/4" BALL-N-214	STEERING ARM BALL NUT	2
	1-15/16" BALL-N-216	STEERING ARM BALL NUT	2
5	S-259-1	CAPSCREW	12
6	1199-N-1860	GREASE FITTING	2
7	1199-M-3237	STEERING KNUCKLE CAP	4
8	2208-P-824	KNUCKLE CAP GASKET	4
9	1225-6-818	BRONZE KNUCKLE BUSHING	4
10	A-1205-Z-1429	KNUCKLE PIN UPPER ASSEMBLY SEAL	4
11	2203-N-3004	STEERING KNUCKLE SHIM - .005	A/R
	2203-M-3003	STEERING KNUCKLE SHIM - .010	A/R
	2203-B-2836	STEERING KNUCKLE SHIM - .015	A/R
	2203-A-2835	STEERING KNUCKLE SHIM - .030	A/R
12	1205-C-1433	STEERING KNUCKLE COVER ASSEMBLY SEAL	2
13	T-208	THRUST BEARING	2
14	K-2412	COTTER PIN	2
15	12272-780	STEERING KNUCKLE DRAW KEY NUT	4
16	3100-C-6529	CENTER AXLE	1
17	7-X-114	STEERING KNUCKLE DRAW KEY UPPER	4
	7-X-113	STEERING KNUCKLE DRAW KEY LOWER	4
18	K-2618	CROSS TUBE ARM COTTER PIN	2
19	13-X-159	TIE ROD END NUT	2
20	c/w CROSS TUBE ASSEMBLY	STEERING CROSS TUBE END BOLT	2
21	A1-3102-Y-3847	CROSS TUBE ASSEMBLY	

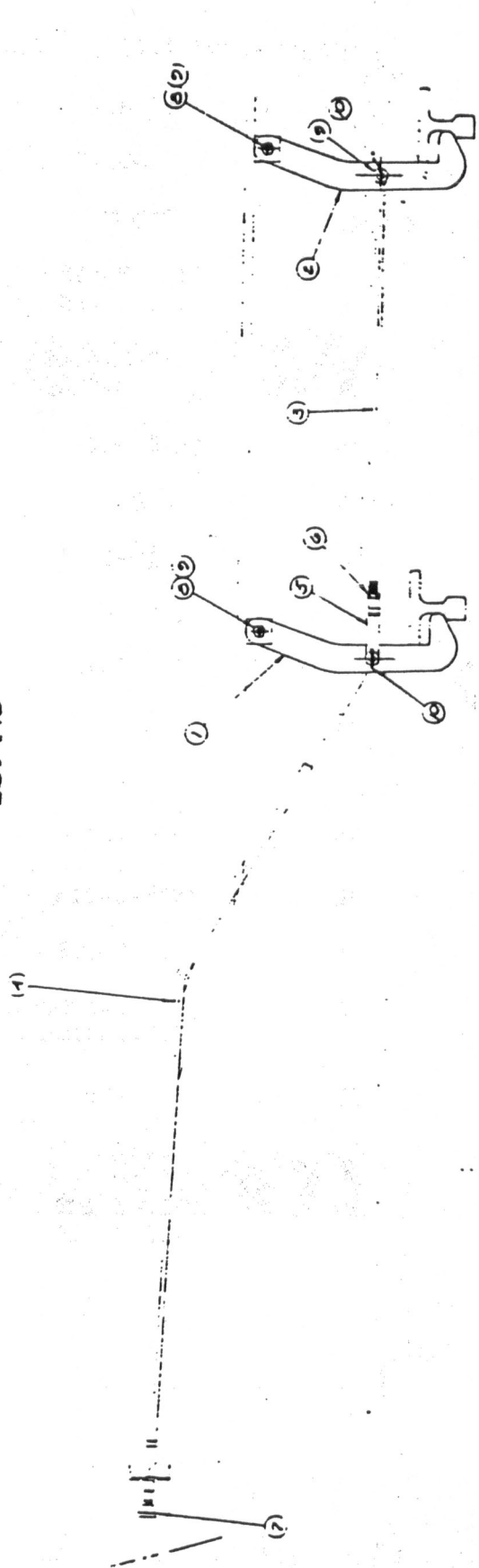
FORWARD FRONT AXLE (CONTINUED)

2

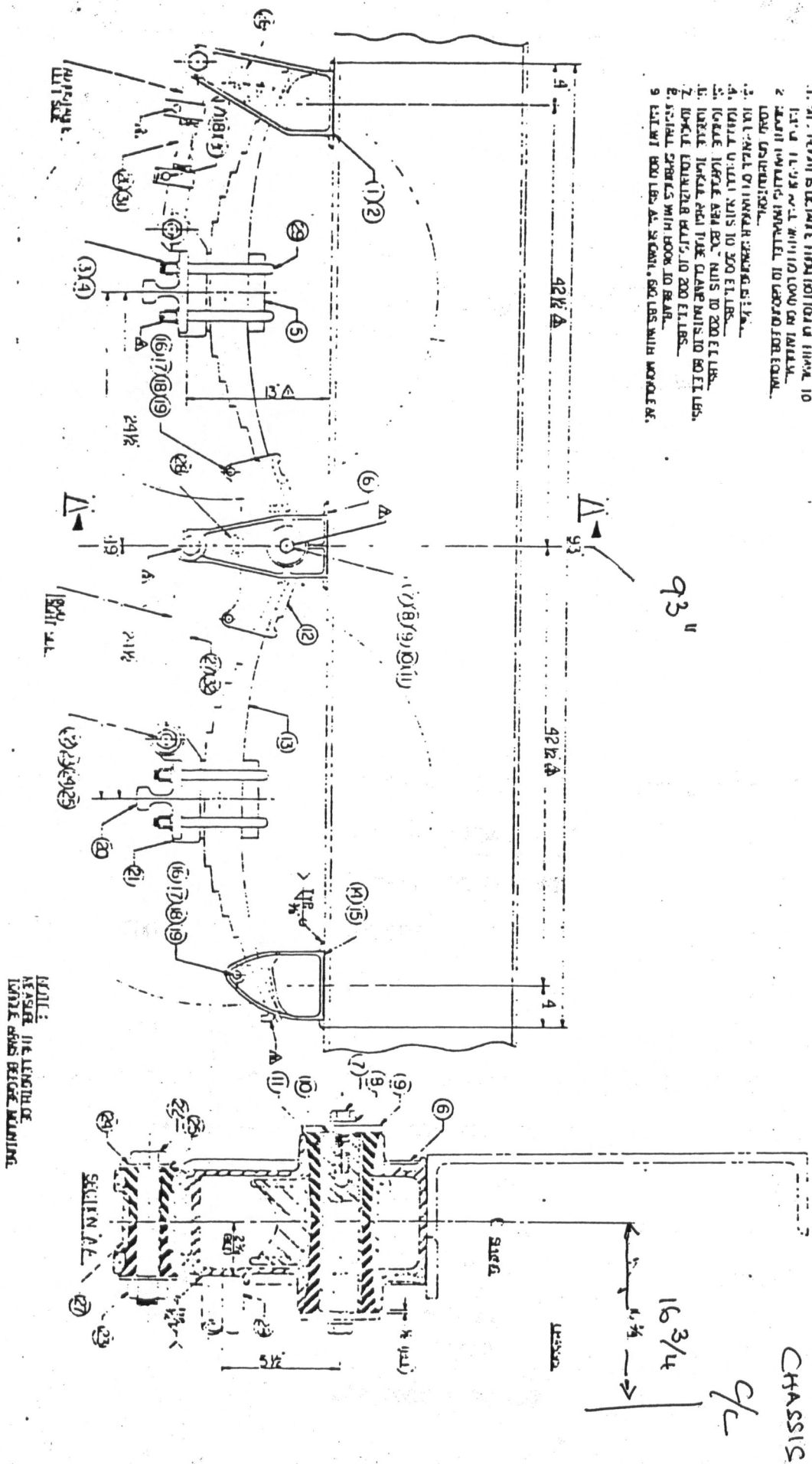
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
22	2257-Q-17	STEERING CROSS TUBE END CLAMP	2
23	N-710-C	CROSS TUBE END CLAMP NUT	2
24	3144-F-448	TIE ROD END ASSEMBLY - R.H.	1
	3144-G-449	TIE ROD END ASSEMBLY - L.H.	1
25	3133-X-5146	CROSS TUBE ARM - R.H.	1
	3133-W-5145	CROSS TUBE ARM - L.H.	1
26	16-X-202	CROSS TUBE ARM KEY	2
27	9-X-16	AXLE CENTER STOP SCREW	2
28	N-110-1	STOP SCREW LOCKNUT	2
29	1199-N-1860	GREASE FITTING	2
30	1229-E-1669	LOCKWASHER	12
31	S-259-1	STEERING KNUCKLE CAP CAPSCREW	12
32	1199-M-3237	STEERING KNUCKLE DUST CAP	
33	2208-P-824	KNUCKLE CAP GASKET	
34	1225-L-818	BRONZE KNUCKLE BUSHING	
35	3101-V-178	KNUCKLE PIN	2
36	3111-L-2300	STEERING ASSEMBLY KNUCKLE - R.H.	1
	3111-K-2295	STEERING ASSEMBLY KNUCKLE - L.H.	1
37	13-X-159	CROSS TUBE ARM NUT	1
38	K-2412	CROSS TUBE BASS COTTER PIN	1
39	2110-Y-103	1-3/4" STEERING ARM BALL	1
	2110-S-149	1-15/16" STEERING ARM BALL	1



FRONT AXLE LOCK ASS'Y
D 850-476
261-145



- NOTE:
1. ALL PARTS SHOWN FROM 101049 FROM 101049
 2. ALL PARTS SHOWN FROM 101049 FROM 101049
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FRONT SUSPENSION ASSEMBLY

D-850-337

191-133

NOTE: THE LENGTH OF THE ASSEMBLY SHOWN IS FOR THE FRONT VIEW ONLY.

AXLE LOCK ASSEMBLY

D-850-476
261-145

ITEM	PART NO.	DESCRIPTION	QUANTITY
1	D-850-476-1	FRONT AXLE HOOK	2
2	D-850-476-2	REAR AXLE HOOK	2
3	D-850-476-3	HOOK CONNECTING BAR	2
4	D-850-476-4	HOOK LOCK BAR	2
5	750-926	CLEVIS	2
6		3/4"-10 NC JAM NUT	2
7	100-558	HANDLE	2
8		3/4"-10 NC HEX NUT	4
9		3/4" Ø PLAIN WASHER	6
10		3/16" Ø x 1-1/2" LG COTTER PIN	4

FRONT SUSPENSION ASSEMBLY

D-850-337

191-133

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	T-5562	FRONT HANGER - RIGHT	1
2	T-5563	FRONT HANGER - LEFT	1
3	09352-01	SELF-LOCKING NUT	16
4	T-7292	FLATWASHER	16
5	08065-01	U BOLT TOP PLATE 11760-01	4
6	T-5427	EQUALIZER CASTING	2
7	T-5886	EQUALIZER CAPSCREW	4
8	T-3164	LOCKWASHER	4
9	T-5887	COMPRESSION WASHER	4
10	T-5888	EQUALIZER SHAFT	2
11	T-5524	EQUALIZER BEARING	4
12	T-5427	EQUALIZER	2
13	T-3086	SPRING	
14	T-5566	REAR HANGER - RIGHT	1
15	T-5565	REAR HANGER - LEFT	1
16	T-5544	CAPSCREW	6
17	T-1704	NUT	10
18	T-1705	LOCKWASHER	10
19	T-2106	SPRING ROLLER	6
20		AXLE - NOT FURNISHED	2
21	12367-01	AXLE SEAT	4
22	T-5492	TORQUE ARM BOLT	8
23	T-5495	LOCK NUT	16
24	T-2224	COMPRESSION WASHER	16
25	T-5493	BUSHING	16

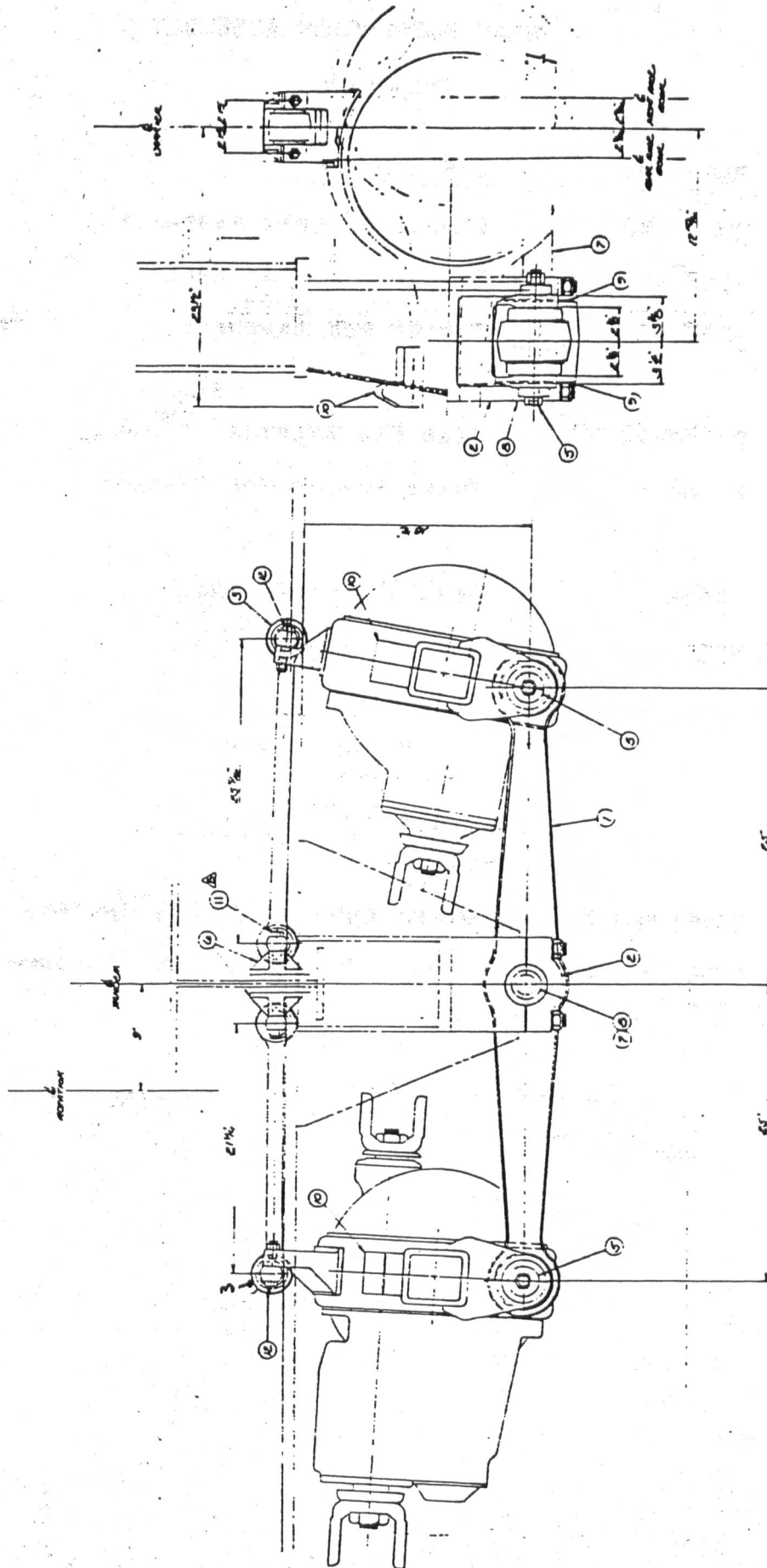
FRONT SUSPENSION ASSEMBLY

PAGE -2-

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
26	T-7635	TORQUE ARM - RIGHT FRONT 16-1/4" LONG	1
27	T-5486	TORQUE ARM - LEFT REAR 18-7/8" LONG	1
28	B-850-546	PIPE BRACE	2
29	08491-01	U BOLT	8
30	T-3206	CAPSCREW	4
31	T-5485	TORQUE ARM - LEFT FRONT 16-1/4" LONG	1
32	T-2293	TORQUE ARM - RIGHT REAR 18-7/8" LONG	1

3A-14

3A-14



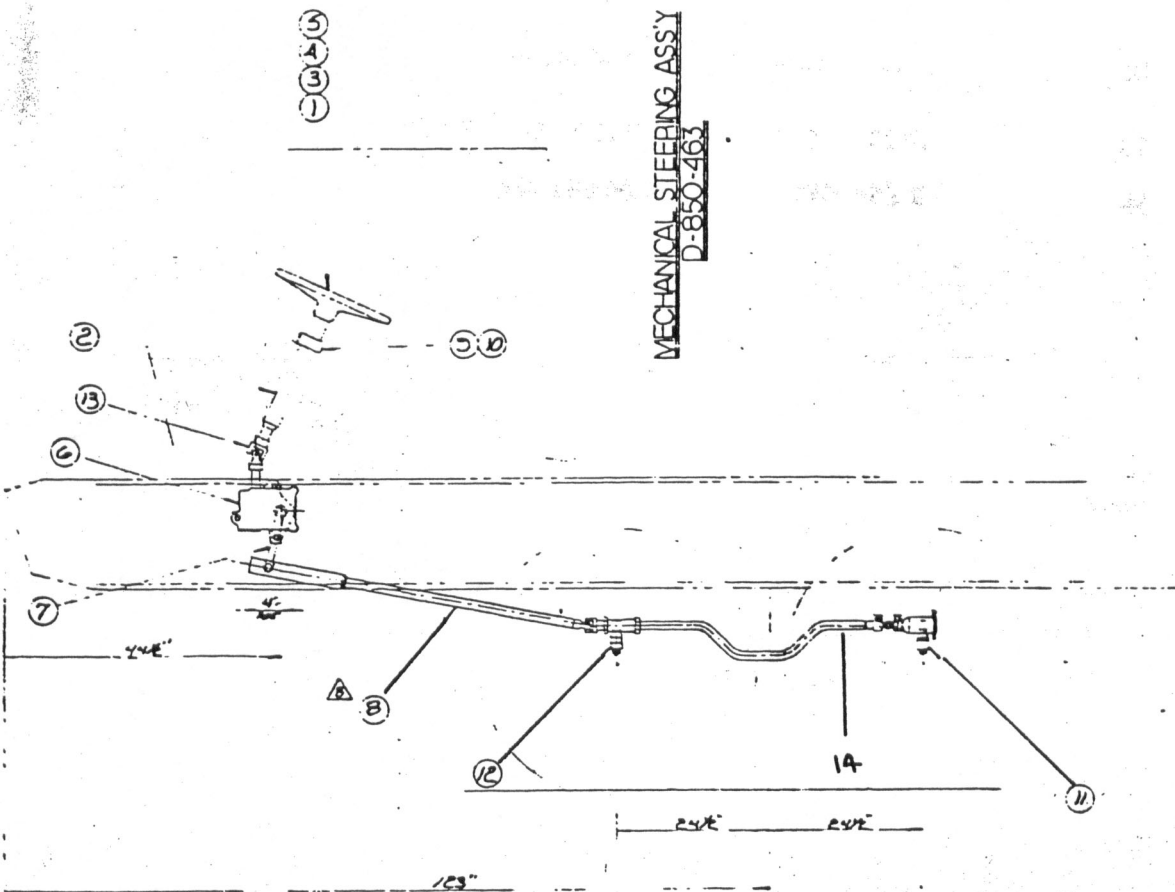
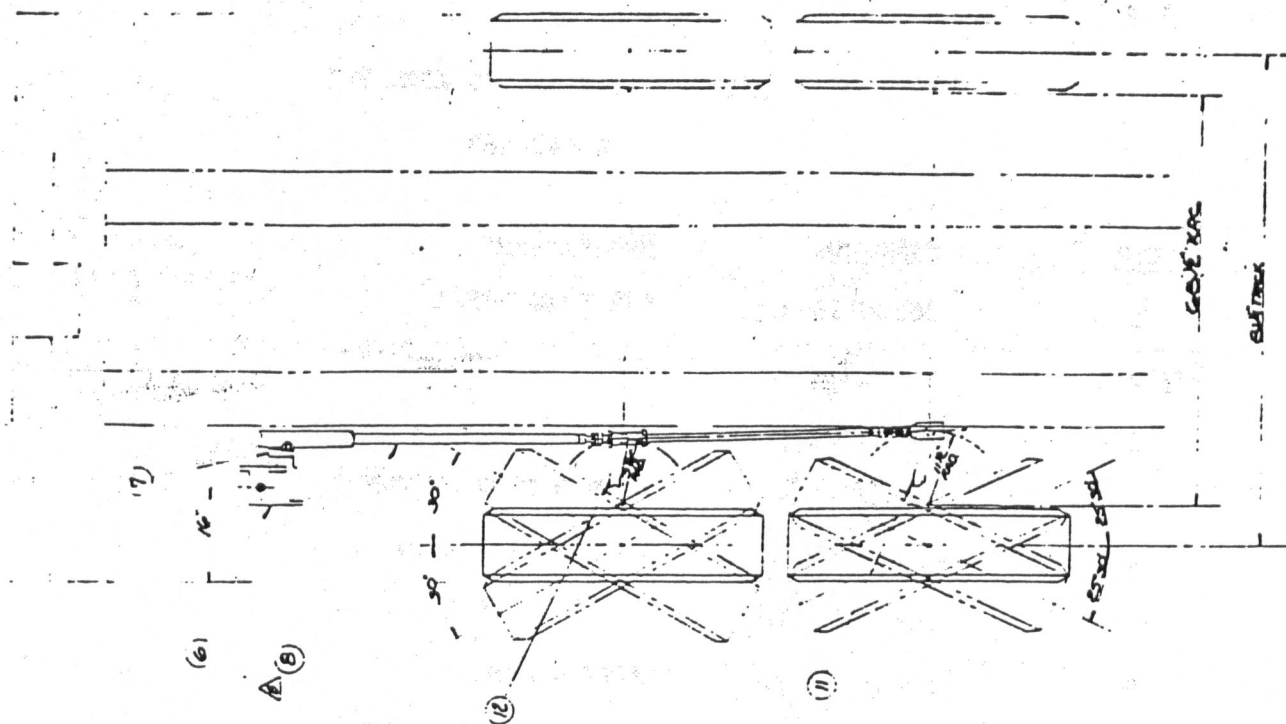
REAR SUSPENSION ASSY
D-850-469

192-133

REAR SUSPENSION ASSEMBLY

D-850-489192-133

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	30247-42	EQUALIZER BEAM ASSEMBLY	2
2	17626-4	SADDLE HUB R ASSEMBLY	4
3	32271-6	TORQUE ROD ASSEMBLY	2
5	21140-34	BEAM END ADAPTOR	4
6	22168	FRAME TORQUE ROD BRACKET	2
8	14685	BEAM CENTER SLEEVE	2
9	32365	THRUST WASHER	8
10	B-850-493	BUMP BLOCK	4
11	5/8" -18 UNF x 8-1/2" LONG H.H.C.S. AND LOCKNUT GR. 8		2
12	5/8" -18 UNF x 3-1/2" LONG H.H.C.S. AND LOCKNUT GR. 8		4
13	37782-19-1-1	SPACER TORQUE ROD 1-1/4" (NOT SHOWN)	2
14	37782-19-1-2	———— " ————— 3/4" (NOT SHOWN)	2



MECHANICAL STEERING ASSY
D-850-463

3A-17

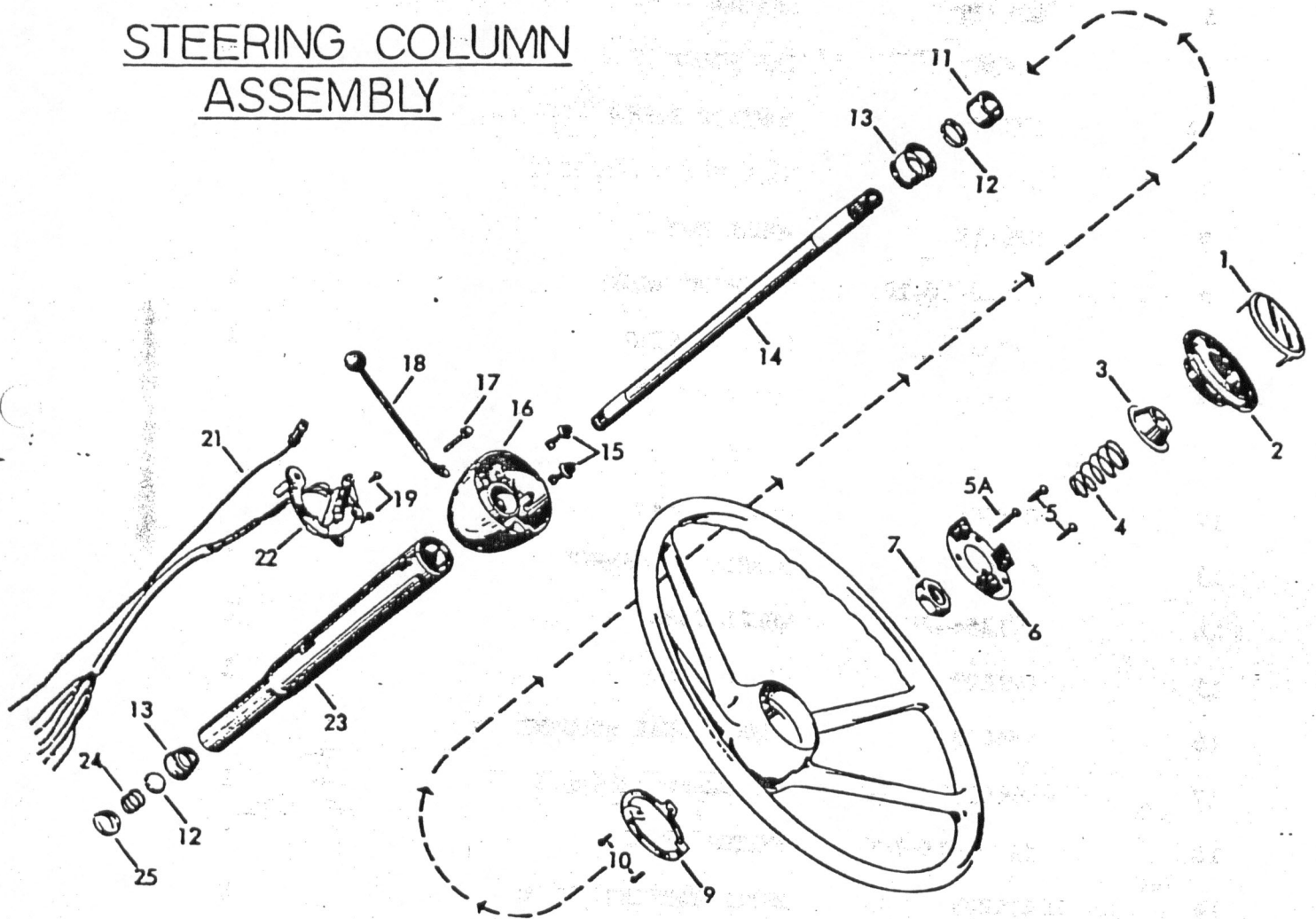
3A-17

MECHANICAL STEERING ASSEMBLY

D-850-463

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	36330-18-1P	STEERING WHEEL	1
2	37483-18-1P	UPPER COLUMN ASSEMBLY	1
3	14864-18-1P	LEVER SWITCH	1
4	14865-18-1P	HORN BOTTON SWITCH	1
5	10641-18-1P	HHCS & EXTENSION	1
6	31824-18-1P	STEERING GEAR	1
7	10645-18-1P	PITMAN ARM	1
8	D-850-405	DRAG LINK ASSEMBLY	1
9	10066-18-7	STEERING COLUMN CLAMP	1
10	10065-18-7	CLAMP BASE	1
11	21001-18-4F	STEERING ARM - Rear	1
12	21002-18-4F	STEERING ARM - FRONT	1
13	14201-18-1P	UNIVERSAL JOINT	1
14	B850-559	DRAG LINK	1

STEERING COLUMN ASSEMBLY



STEERING COLUMN ASSEMBLYPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	450141	EMBLEM PLATE	1
2	450098	HORN BUTTON	1
3	029037	CONTACT CAP	1
4	401228	SPRING	1
5	145067	TAP SCREW	2
5A	173654	CONTACT SCREW	1
6	454876	BASE PLATE ASSEMBLY	1
7	026115	WHEEL NUT	1
8	10542-18-1P	STEERING WHEEL	1
9	453087	CONTACT RING	1
10	148595	DRIVE SCREW	2
11	477113	SPACER	1
12	028104	SPRING SEAT	1
13	065985	BEARING ASSEMBLY	1
14	091356-2600	WHEEL TUBE	1
15	021193	CLAMP BOLT	1
16	456053	TURN SIGNAL HOUSING	1
17	10641-18-100	CAP SCREW ASSEMBLY	1
18	14864-18-100	SWITCH LEVER	1
19	274883	METAL TAPPING SCREW	2
20		NOT USED	
21	032245	CONTACT ROLLER ASSEMBLY	1
22	480897	DIRECTIONAL SWITCH ASSEMBLY	1
23	456053-A25-2300	JACKET TUBE ASSEMBLY	1
24	401254	SPRING	1
25	029085	DUST CAP	1

STEERING COLUMN ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE HORN BUTTON CAP AND EMBLEM ASSEMBLY (1 & 2) BY TWISTING COUNTER-CLOCKWISE. REMOVE CONTACT CUP (3), SPRING (4). EXAMINE BASE PLATE ASSEMBLY (6) FOR TORN RUBBER SEGMENTS. REPLACE BY REMOVING SCREWS (5) AND (5A). BY REMOVING WHEEL NUT (7) WHEEL (8) CAN BE REMOVED. EXAMINE CONTACT RING (9), IF NECESSARY TO REPLACE, REMOVE DRIVE SCREWS (10). REMOVE SPACER (11) AND SPRING SEAT (12).

FROM LOWER END, REMOVE DUST CAP (25), SPRING (24), SPRING SEAT (12), AND PRY OUT BEARING (13). DISCONNECT WIRES OF HORN CONTACT ROLLER ASSEMBLY (21) AND DIRECTIONAL SWITCH ASSEMBLY (22). REMOVE WHEEL TUBE (14) FROM JACKET TUBE (23) AND TURN SIGNAL HOUSING ASSEMBLY (16).

REMOVE SCREWS (19) AND SCREW ASSEMBLY (17) TO REMOVE DIRECTIONAL SWITCH ASSEMBLY (22).

TO REMOVE HORN CONTACT ROLLER ASSEMBLY (21), PULL OUT WITH PLIERS, TAKE CARE NOT TO DAMAGE BAKELITE SHELL OR CUT HORN WIRE CABLE.

REMOVE CLAMP BOLTS (15) TO REMOVE TURN SIGNAL HOUSING (16) FROM JACKET TUBE (23).

TO REMOVE UPPER BEARING (13) PRESS OUT OF TURN SIGNAL HOUSING (16).

REASSEMBLY:

PRESSING ONLY AGAINST OUTER SHELL ASSEMBLE UPPER BEARING (13) INTO POSITION IN TURN SIGNAL HOUSING (16). WITH CLAMP BOLTS (15) ASSEMBLE TURN SIGNAL HOUSING (16) TO JACKET TUBE (23), TAKING CARE TO POSITION HOUSING FOR ALIGNMENT OF DIRECTIONAL SWITCH WIRING.

ASSEMBLE DIRECTIONAL SWITCH ASSEMBLY (22) BY FEEDING WIRES AND HORN CONTACT ROLLER ASSEMBLY WIRE (21) THROUGH OPENING IN TURN SIGNAL HOUSING AND THROUGH WIRE TROUGH IN JACKET TUBE (23) TAKING CARE TO POSITION PLASTIC WIRE PROTECTOR OVER WIRES. ASSEMBLE SWITCH ASSEMBLY (22) AND SWITCH LEVER (18) USING SCREWS (19) AND (17).

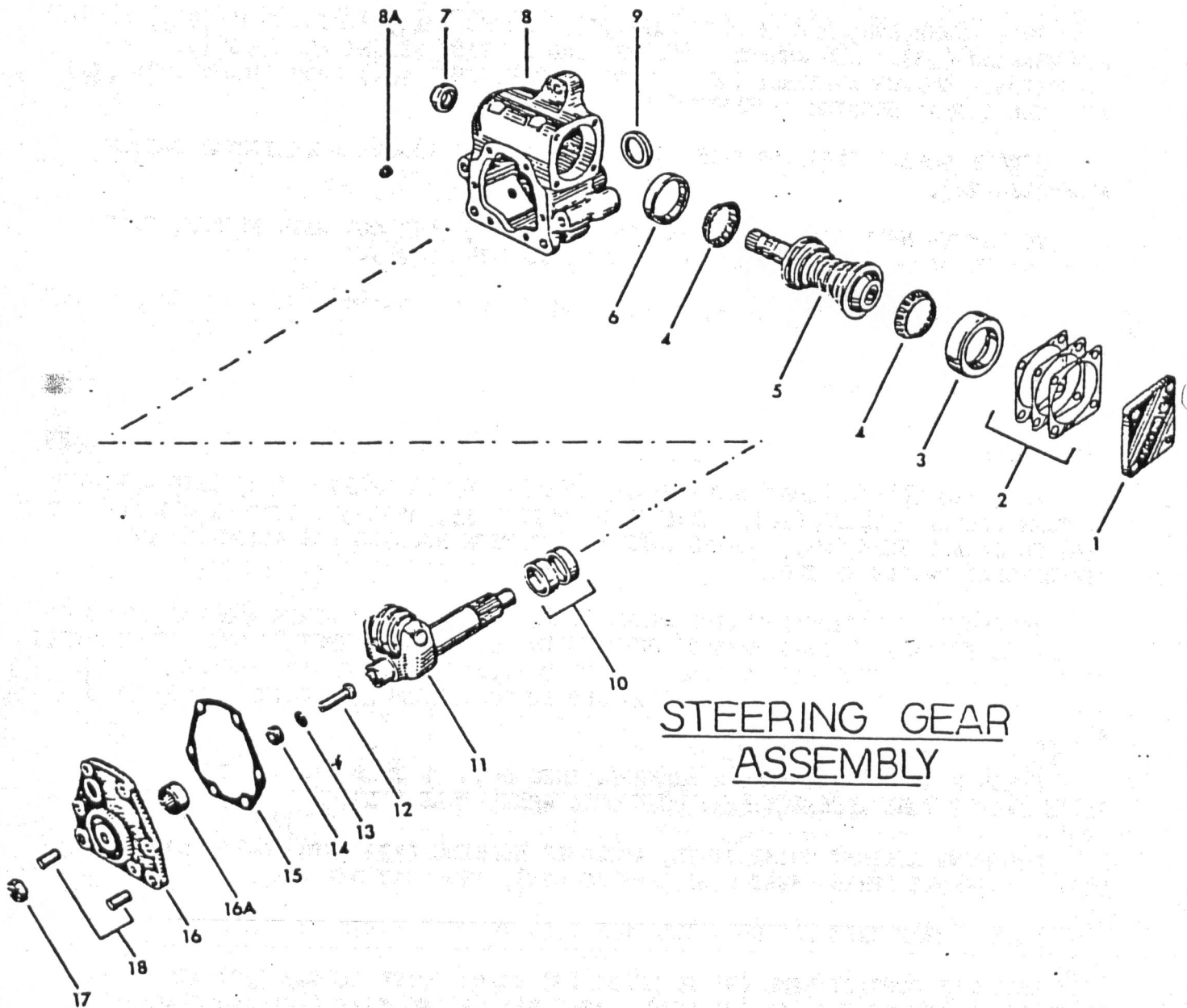
PRESS HORN CONTACT ROLLER ASSEMBLY INTO BORE OF TURN SIGNAL HOUSING (16). SLIDE JACKET TUBE ASSEMBLY (23) DOWN OVER WHEEL TUBE (14).

PRESSING AGAINST OUTER SHELL, ASSEMBLE BEARING (13) INTO LOWER END OF TUBE (23). ASSEMBLE SPRING SEAT (12), SPRING (24), AND DUST CAP (25).

NOTE: WRAP TAPE AROUND WHEEL TUBE (14) TO HOLD PARTS IN POSITION.

ASSEMBLE CONTACT RING (9) TO WHEEL (8) USING DRIVE SCREWS (10) AND BASE-PLATE (6) USING SCREWS (5) AND (5A). ASSEMBLE SPRING SEAT (12) AND SPACER (11) OVER WHEEL TUBE (14). REMOVE TAPE AND ASSEMBLE WHEEL (8) TO WHEEL TUBE (14) WITH NUT (7). (TIGHTEN TO 53.65 FOOT POUNDS)

ASSEMBLE SPRING (4), CONTACT CUP (3), AND HORN BUTTON CAP ASSEMBLY (1) AND (2) BY PUSHING DOWN AND TURNING CLOCKWISE.



STEERING GEAR
ASSEMBLY

3A-22

3A-22

STEERING GEAR ASSEMBLYPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	7DE00	WORM COVER	1
1A	3012	MOUNTING SCREW 7/16"-14 x 1" LG (NOT SHOWN)	4
2	503VMD03	WORM COVER SHIM - .003	1
2A	7DC120	WORM COVER SHIM - .002	2
2B	7DC121	WORM COVER SHIM - .005	1
2C	7DC122	WORM COVER SHIM - .010	1
2D	7DC141	WORM COVER SHIM - .0075	1
3	50074	WORM ADJUSTING CUP	5
4	50076	WORM BEARING ASSEMBLY	2
5	500JAO02	COLUMN & WORM ASSEMBLY	1
5A	50055	PITMAN ARM MOUNTING NUT (NOT SHOWN)	2
5B	50056	LOCKWASHER (NOT SHOWN)	1
6	50075	WORM BEARING CUP	1
7	032485	OIL SEAL - COLUMN & WORM ASSEMBLY	1
8	503CMD67	HOUSING ASSEMBLY	1
8A	445686	FILLER PLDG 3/8"-18 (NOT SHOWN)	1
8B	037014	VENT PLDG 3/8"-18 (NOT SHOWN)	1
9	032482	OIL SEAL - WORM SHAFT	1
10	7JC39	BEARING	1
11	503FA023	WORM SHAFT ASSEMBLY	1
12	3046	ADJUSTING SCREW	1
12A	3254	"O" RING (NOT SHOWN)	1
13	7DF37	THRUST WASHER	1
14	3047	ADJUSTABLE SCREW RETAINER	1

3A-23

3A-23

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
15	7DE372	SHAFT COVER GASKET	1
16	7DF381-J	SHAFT COVER	1
16A	3633	BEARING	1
16B	3012	MOUNTING SCREW 7/16"-14 x 1" LG (NOT SHOWN)	6
17	30693	ADJUSTMENT SCREW NUT 5/8"-18	1
18	50023	SHAFT COVER DOWEL	2

STEERING GEAR ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE MOUNTING SCREWS (1A) ALLOWING REMOVAL OF WORM COVER (1), SHIMS (2-2D), ADJUSTING CUP AND BEARING (4). REMOVE PITMAN ARM NUT (5A), LOCKWASHER (5B) AND PISTON ARM ALLOWING REMOVAL OF WORM ASSEMBLY (5), BEARING (4), BEARING CUP (6) AND OIL SEAL (7). REMOVE MOUNTING SCREWS (16B), AND ADJUSTING NUT (17) ALLOWING REMOVAL OF SHAFT COVER (16), GASKET (15), BEARING (16A), RETAINER (14), THRUST WASHER (13), ADJUSTING SCREW (12), THRUST WASHER (13), ADJUSTING SCREW (12), O-RING (12A), WORM SHAFT (11), BEARINGS (10) AND OIL SEAL (9). REMOVE FILLER PLUG (8A), VENT PLUG (8B) AND DOWEL (18).

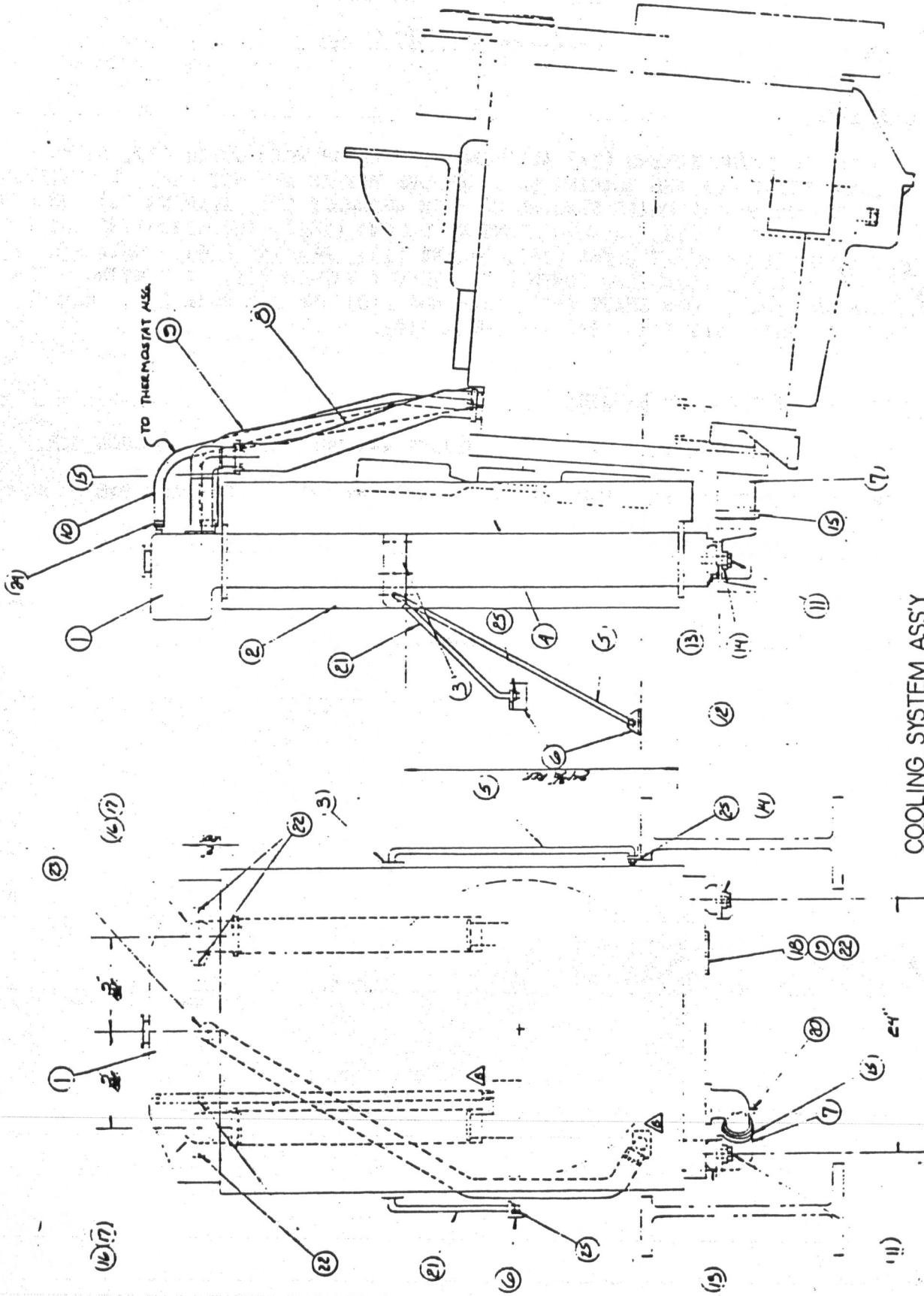
CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR WEAR, SCORING, AND BENT PARTS. REPLACE PARTS AS NEEDED.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



COOLING SYSTEM ASS'Y

D-850-46

041-147

31274-07-6-1

3A-26

3A-26

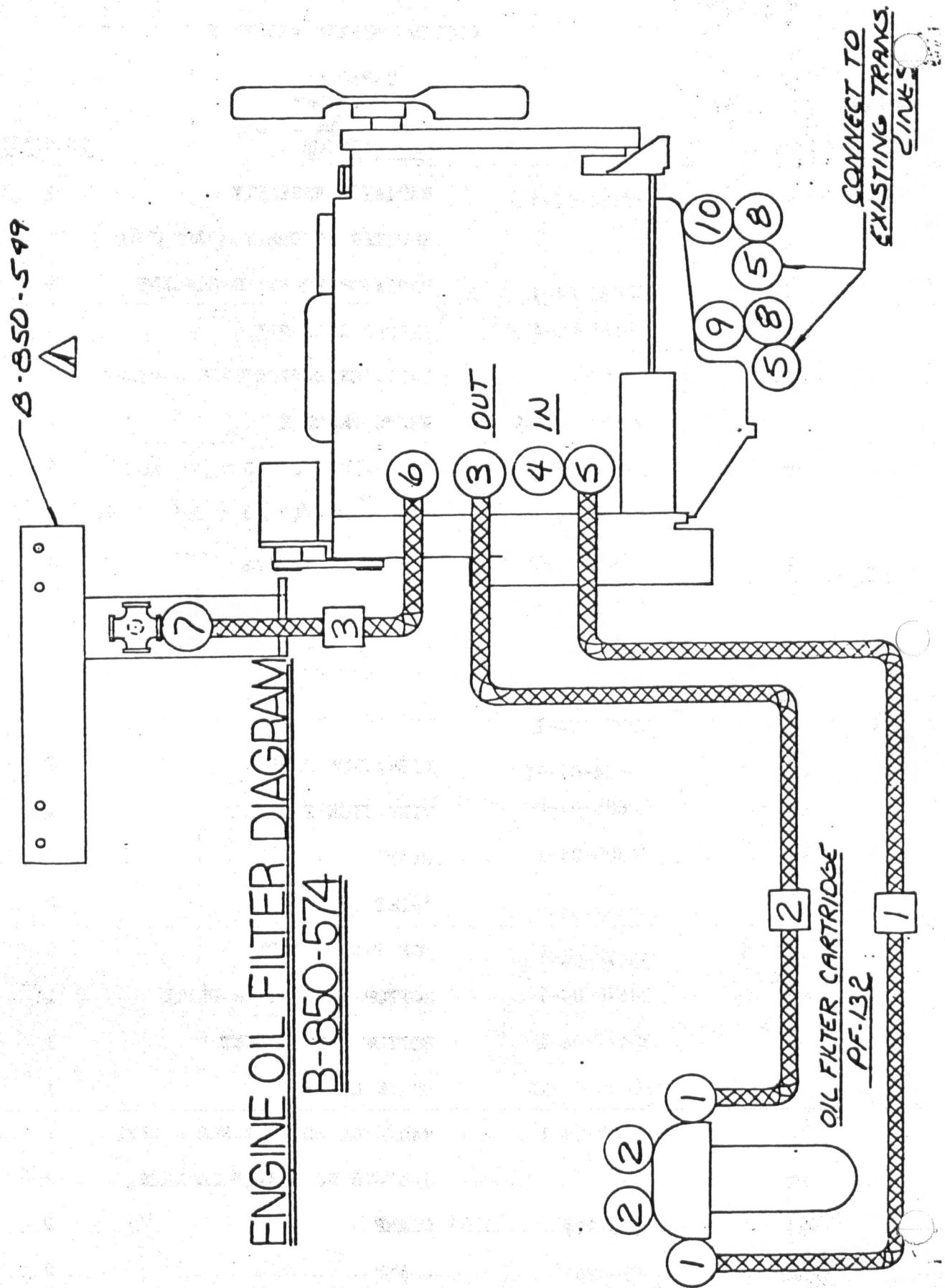
COOLING SYSTEM ASSEMBLY

D-850-461

041-147

31274-07-6-1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	38184-04-4	RADIATOR ASSEMBLY	1
2		SHUTTER ASSEMBLY (NOT USED)	1
3	16032-04-1	RADIATOR MOUNTING BRACKET	2
4	38185-04-4	SHROUD ASSEMBLY	1
5	30467-04-1	RADIATOR SUPPORT ROD - RIGHT	1
6	C-850-494-3	FRAME BRACKET	2
7	31301-04-1P	HOSE - 2-3/4" ID x 32" LG	1
8	10315-04-1P	HOSE - 2-1/4" ID x 30" LG	2
9	31302-04-1P	HOSE - 1" ID x 68" LG	1
10	10736-05-1P	HOSE - 5/8" ID x 44" LG	1
11		1/2"-13 UNC x 2-1/2" LG HEX HEAD BOLT	2
12	31304-04-1	SPACER	2
13	10684-07-1P	VIBRATION DAMPER	2
14	10685-07-P	VIBRATION DAMPER	2
15	31305-04-1P	CLAMP	6 6
16	30478-04-7	INLET TUBE	2
17	30479-04-1	TOP TANK GASKET	2
18	30476-04-1	BOTTOM TANK COVER PLATE	1
19	30477-04-1	BOTTOM TANK GASKET	1
20	30608-04-1P	DRAIN COCK	1
21	34583-04-1	RADIATOR SUPPORT ROD - LEFT	1
22		3/8"-16 NC x 3/4" LG HHCS	7
23	750-929	CLAMP	2
24	750-941	CLAMP	2
25		1/2"-13 NC HEX NUT	4



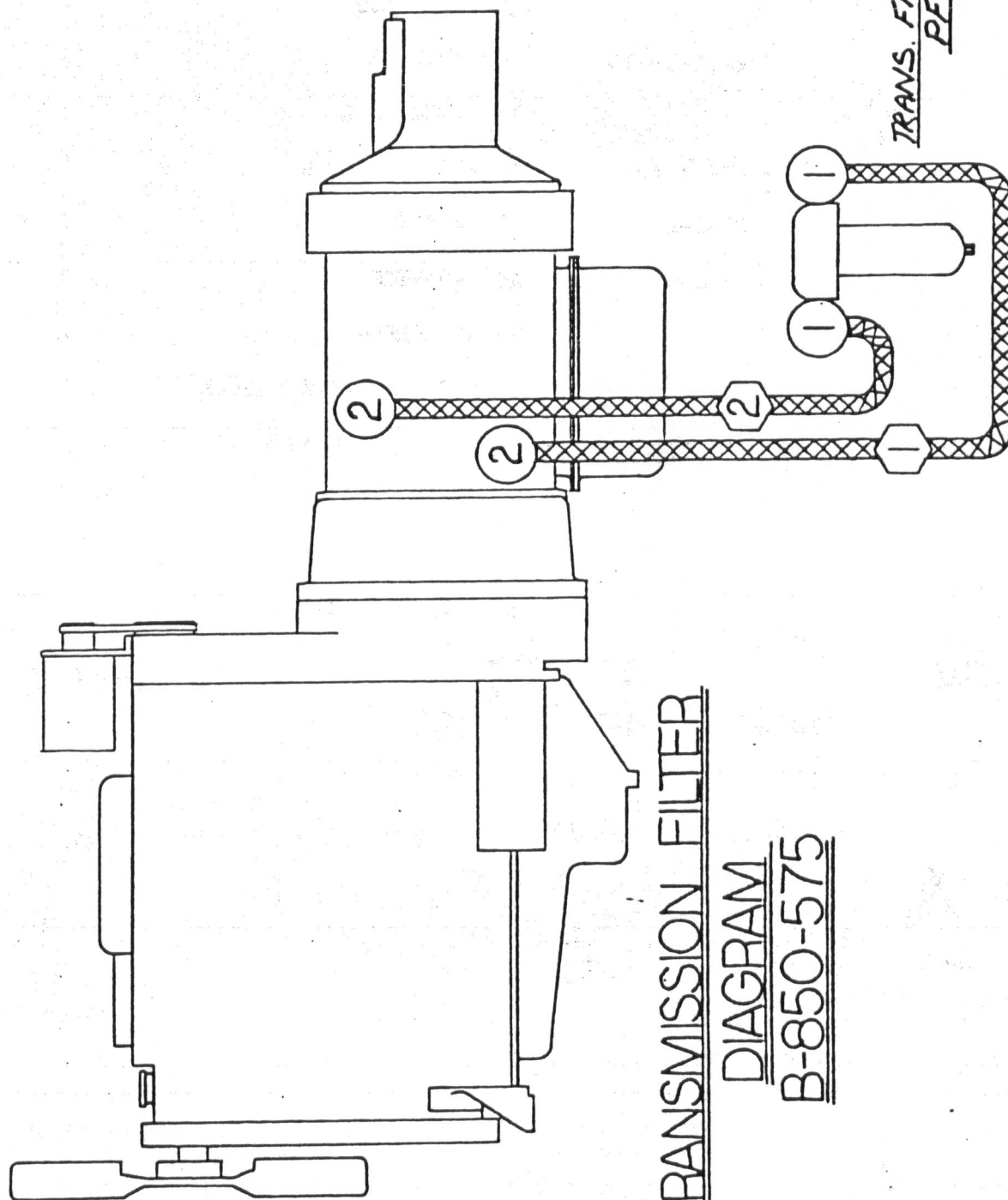
ENGINE OIL FILTER ASSEMBLY

B-850-574

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	2024-16-16	90° ADAPTOR	2
2		1" PIPE PLUG	2
3	202411-16-16	90° ADAPTOR	1
4		1" STREET ELL	1
5	2021-16-16	STRAIGHT ADAPTOR	3
6	2023-2-4	45° ADAPTOR	1
7	2023-4-4	45° ADAPTOR	1
8		1" NPT ELBOW	2
9		1" NPT x 5" PIPE NIPPLE	1
10		1" NPT x 7" LG PIPE NIPPLE	1
11		1/4" NPT CROSS	1

HOSE ASSEMBLIES

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	16C2AT-16FJX-16FJX x 36" LG	1
2	16C2AT-16FJX-16FJX x 39" LG	1
3	4LOR-4FJX-4FJX x 37" LG	1



TRANSMISSION FILTER
DIAGRAM
B-850-575

TRANS. FILTER CARTRIDGE
PF. 132

3A-30

3A-30

TRANSMISSION FILTER ASSEMBLY

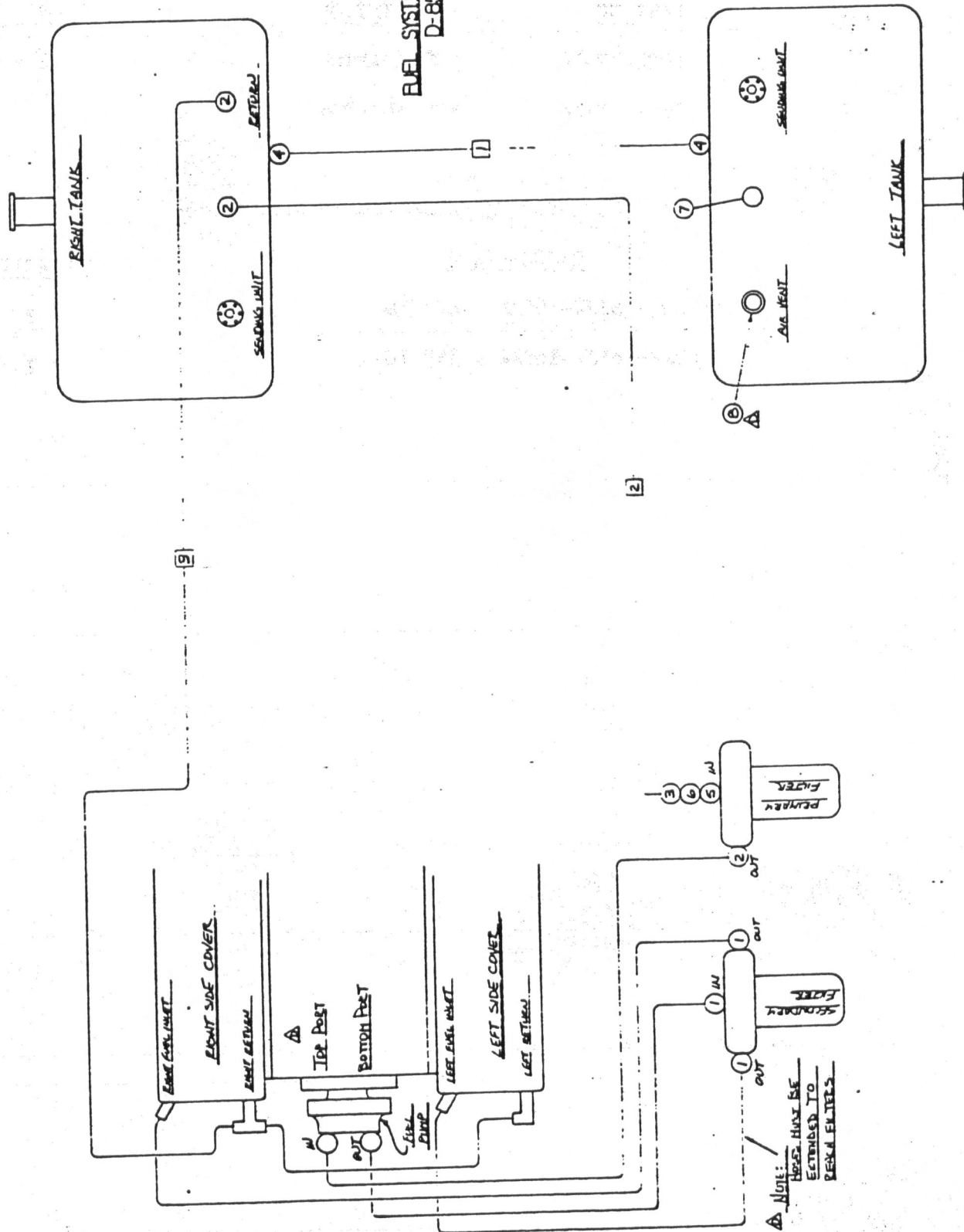
B-850-575

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	2024-12-16	90° ADAPTOR	2
2	2062-16-16	90° ADAPTOR	2

HOSE ASSEMBLIES

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QUANTITIES</u>
1	16C2AT-16FJX-16FJX x 42" LG	1
2	16C2AT-16FJX-16FJX x 58" LG	1

FUEL SYSTEM SCHEMATIC
D-850-470



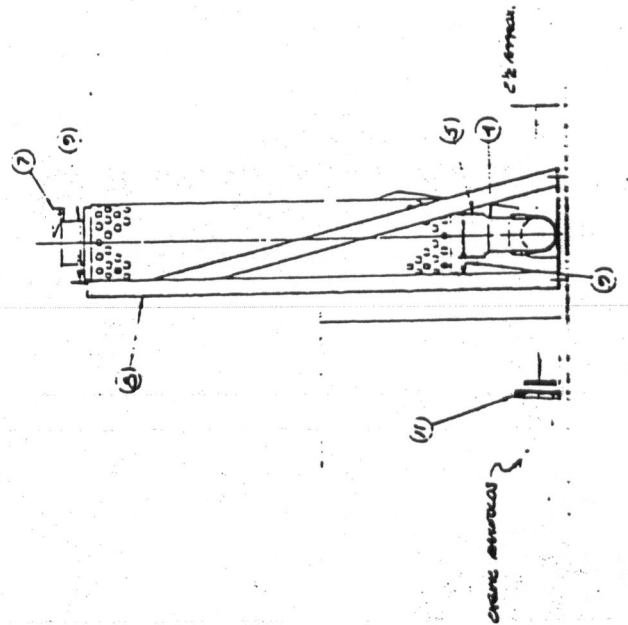
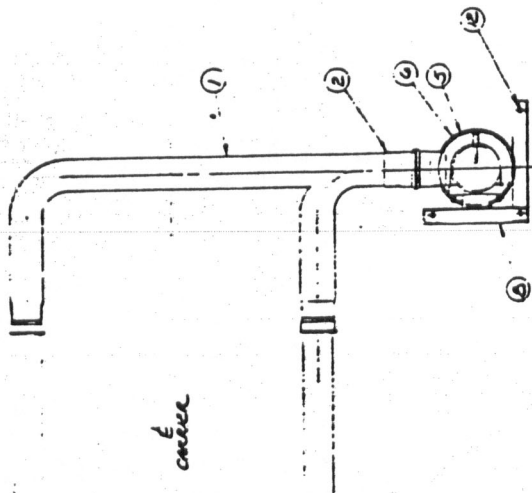
3A-32

3A-32

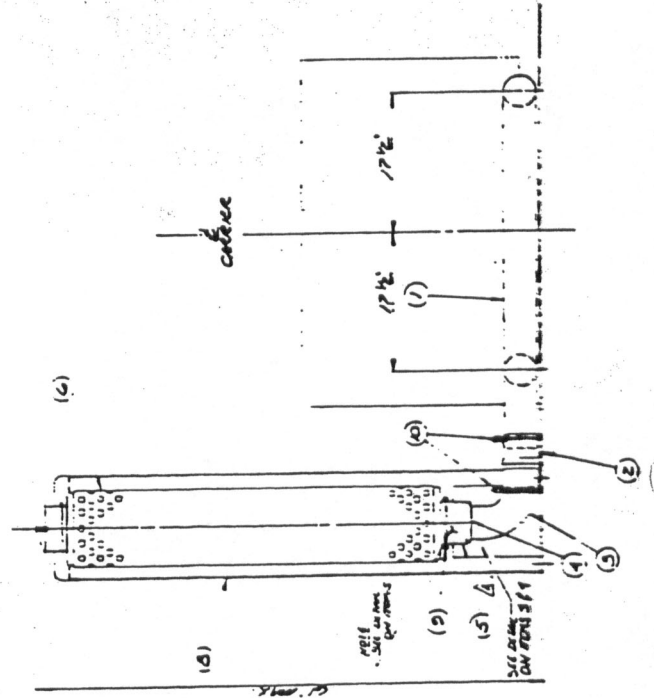
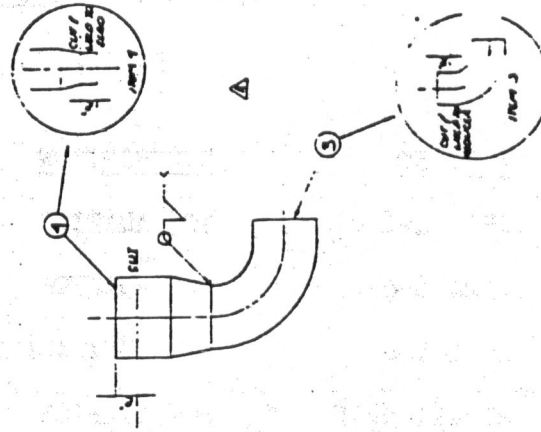
FUEL SYSTEM SCHEMATIC

D-850-470

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	2024-4-6	90° ADAPTOR	3
2	2024-6-6	90° ADAPTOR	3
3	2021-4-6	STRAIGHT ADAPTOR	1
4	202411-8-10	90° ADAPTOR	2
5	3/8"	90° STREET ELL	1
6	750-817	CHECK VALVE	1
7	3/8" NPT	PIPE PLUG	1



EXHAUST SYSTEM ASSEMBLY
D-850-472 - REF.
073-118
34281-07-4



3A-34

3A-34

EXHAUST SYSTEM ASSEMBLY

D-850-472

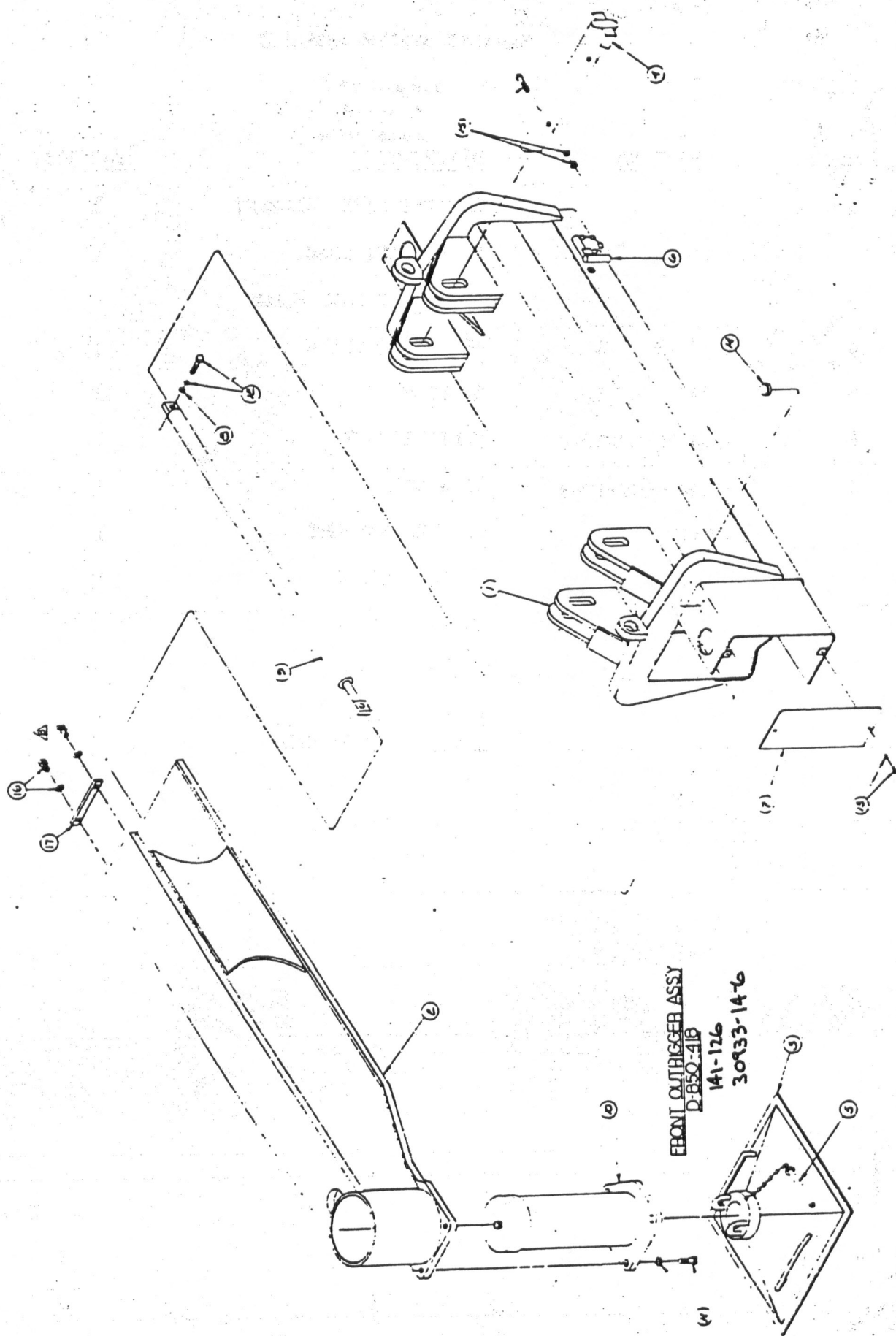
073-118

34281-07-4

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1		EXHAUST PIPE WELDMENT	1
2	30122-07-1P-3	BALL JOINT CONN.	1
3		90° SHORT BEND ELBOW	1
4	34925-07-1	REDUCER COUPLING	1
5	34103-07-1P	MUFFLER	1
6	34279-07-1P-8	MUFFLER CAGE	1
7	14414-07-1P-9	RAIN CAP	1
8	34278-07-4-2	MUFFLER SUPPORT	1
9	34480-07-1P-4	MUFFLER CLAMP	1
10	750-936	MUFFLER CLAMP	2
11	750-935	V BAND CLAMP	2
12		3/8"-16 NC x 1" LG HHCS w/NUT & LOCKWASHER	3

3A-35

3A-35



FRONT OUTRIGGER ASSEMBLY

D-850-418

141-126

30933-14-6

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	30937-14-4	OUTRIGGER HOUSING WELDMENT	1
2	32283-14-4	OUTRIGGER BEAM WELDMENT	2
3	17235-14-4	OUTRIGGER FLOAT WELDMENT	2
4	33013-14-4	HOUSING MOUNTING PIN	2
5	12354-14-7	FLOAT LOCK PIN	2
6	30987-14-1	BEAM LOCK PIN	2
7	15251-14-1	COVER	2
8	14109-14-1	SPACER	4
9	32638-14-1P-3	HORIZONTAL CYLINDER	2
10	33171-14-1P	VERTICAL CYLINDER	2
11		1"-12 NF x 3" LG HHCS w/MEDIUM LOCKWASHER	6
12		3/4"-16 NF x 2" LG HHCS w/MEDIUM LOCKWASHER	4
13		3/8"-16 NC x 3/4" LG HHCS w/MEDIUM LOCKWASHER	4
14	15056-14-1P	LEVEL	2
15		1/2"-13 NC x 2-1/4" LG HHCS w/NUT & LOCKWASHER	4
16		1/2"-13 NC x 1-1/4" LG HHCS w/LOCKWASHER	4
17	D-850-417-13	SHIM BRACKET	2

FRONT OUTRIGGER ASSEMBLYPETTIBONE 220 RRC CRANEREMOVAL:

DISCONNECT AND TAG ALL HYDRAULIC LINES. ATTACH CHAIN TO LIFTING LUGS AND SECURE TO LIFTING CRANE. REMOVE WEDGE PIN (NOT SHOWN) FROM BOTH SIDES OF OUTRIGGER ASSEMBLY. REMOVE OUTRIGGER ASSEMBLY.

DISASSEMBLY:

SECURE CHAIN AROUND VERTICAL CYLINDER ASSEMBLY (3) AND REMOVE CYLINDER HOUSING BOLTS. LIFT OUT CYLINDER AND PLACE IN CLEAN AREA FOR DISASSEMBLY.

PLACE BLOCK UNDER REAR END OF EXTENSION CYLINDER (4) AND REMOVE BOLT HOLDING CYLINDER TO OUTRIGGER BOX HOUSING (1). OUTRIGGER BEAM ASSEMBLY (2) CAN NOW BE PULLED OUT CAREFULLY TO INSURE THAT THE BACK END OF CYLINDER DOES NOT FALL DOWN AND DAMAGE THE CYLINDER. END COVERS (6) MAY BE REMOVED BY REMOVING END COVER SCREWS.

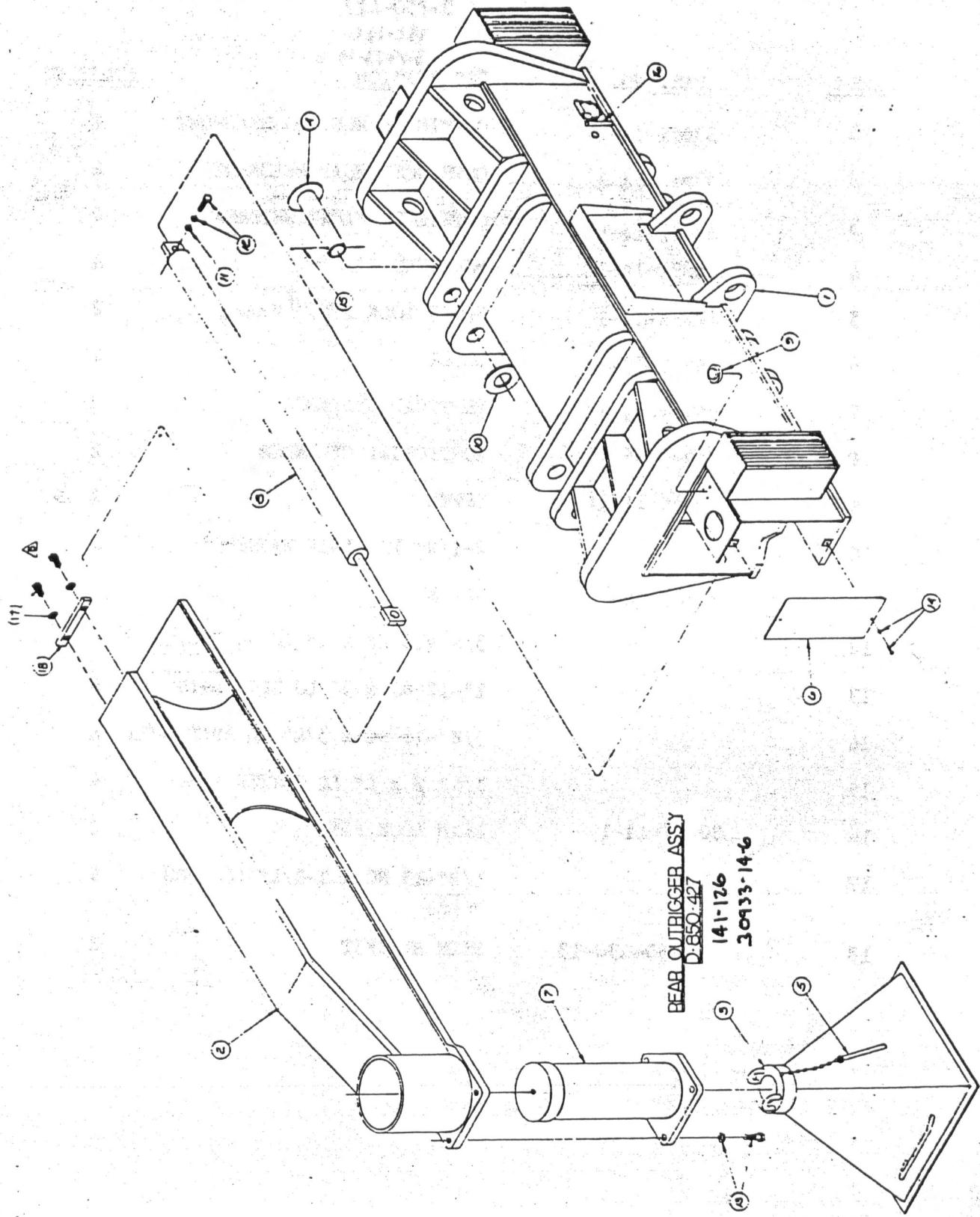
THE EXTENSION CYLINDER (4) CAN BE REMOVED FROM THE BEAM ASSEMBLY (2) BY REMOVING CYLINDER BOLT (5) FROM FRONT EYE OF CYLINDER. CARE MUST BE TAKEN TO INSURE THAT THE CYLINDER ROD END DOES NOT FALL AND CAUSE DAMAGE TO THE ROD. AFTER SETTING CYLINDER DOWN INSIDE THE BEAM, IT CAN BE PULLED OUT THE BACK END. PLACE THE CYLINDER IN A CLEAN AREA FOR DISASSEMBLY.

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS BEFORE REASSEMBLY WITH AN APPROVED SOLVENT. GREASE BOTTOM OF OUTRIGGER BEAM AND OUTRIGGER HOUSING.

ASSEMBLY:

REASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



REAR OUTRIGGER ASSY
 D-850-427
 141-126
 30933-14-6

3A-39

3A-39

REAR OUTRIGGER ASSEMBLY

D-850-427

141-126

30933-14-6

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	33971-14-4	OUTRIGGER HOUSING WELDMENT	1
2	32211-14-4	OUTRIGGER BEAM WELDMENT	2
3	33422-14-6	OUTRIGGER FLOAT WELDMENT	2
4	30997-14-1	MOUNTING PIN	4
5	12354-14-1	FLOAT LOCK PIN w/ CHAINS	2
6	15251-14-1	COVER	2
7	33171-14-1P	VERTICAL CYLINDER	2
8	32638-14-1P-3	HORIZONTAL CYLINDER	2
9	15056-14-1P	LEVEL	2
10		2-1/2" ID PLAIN WASHER	4
11	14109-14-1	SPACER	4
12		3/4"-16 NF x 2" LG HHCS w/LW	4
13		1"-12 NF x 3" LG HHCS w/LW	6
14		3/8"-16 NC x 3/4" LG HHCS w/LW	4
15		1/4" ϕ x 4" LG COTTER PIN	4
16	30987-14-1	BEAM LOCK PIN	2
17		1/2"-13 NC x 1-1/4" LG HHCS w/LW	4
18	D-850-430-13	SHIM BRACKET	2

REAR OUTRIGGER ASSEMBLYPETTIBONE 220 RRC CRANEREMOVAL:

DISCONNECT AND TAG ALL HYDRAULIC LINES. DISCONNECT ELECTRICAL WIRES. REMOVE COTTER PIN (17) ALLOWING REMOVAL OF FLAT WASHER (16) AND MOUNTING PINS (15). ATTACH CHAIN TO LIFTING LUGS AND SECURE TO LIFTING CRANE AND REMOVE OUTRIGGER ASSEMBLY FROM CARRIER.

DISASSEMBLY:

SECURE CHAIN AROUND VERTICAL CYLINDER ASSEMBLY (3) AND REMOVE BOLTS (5) WITH LOCKWASHERS (4) WHICH WILL ALLOW REMOVAL OF VERTICAL CYLINDER. REMOVE END PLATE MOUNTING SCREWS (11) AND LOCKWASHERS (12) ALLOWING REMOVAL OF END PLATES (10). PLACE BLOCK UNDER REAR END OF EXTENSION CYLINDER (6) AND REMOVE BOLT HOLDING CYLINDER TO OUTRIGGER BOX ASSEMBLY (1). THE OUTRIGGER BEAM CAN NOW BE PULLED OUT CAREFULLY TO INSURE THAT THE BACK END DOES NOT FALL DOWN AND DAMAGE THE CYLINDER.

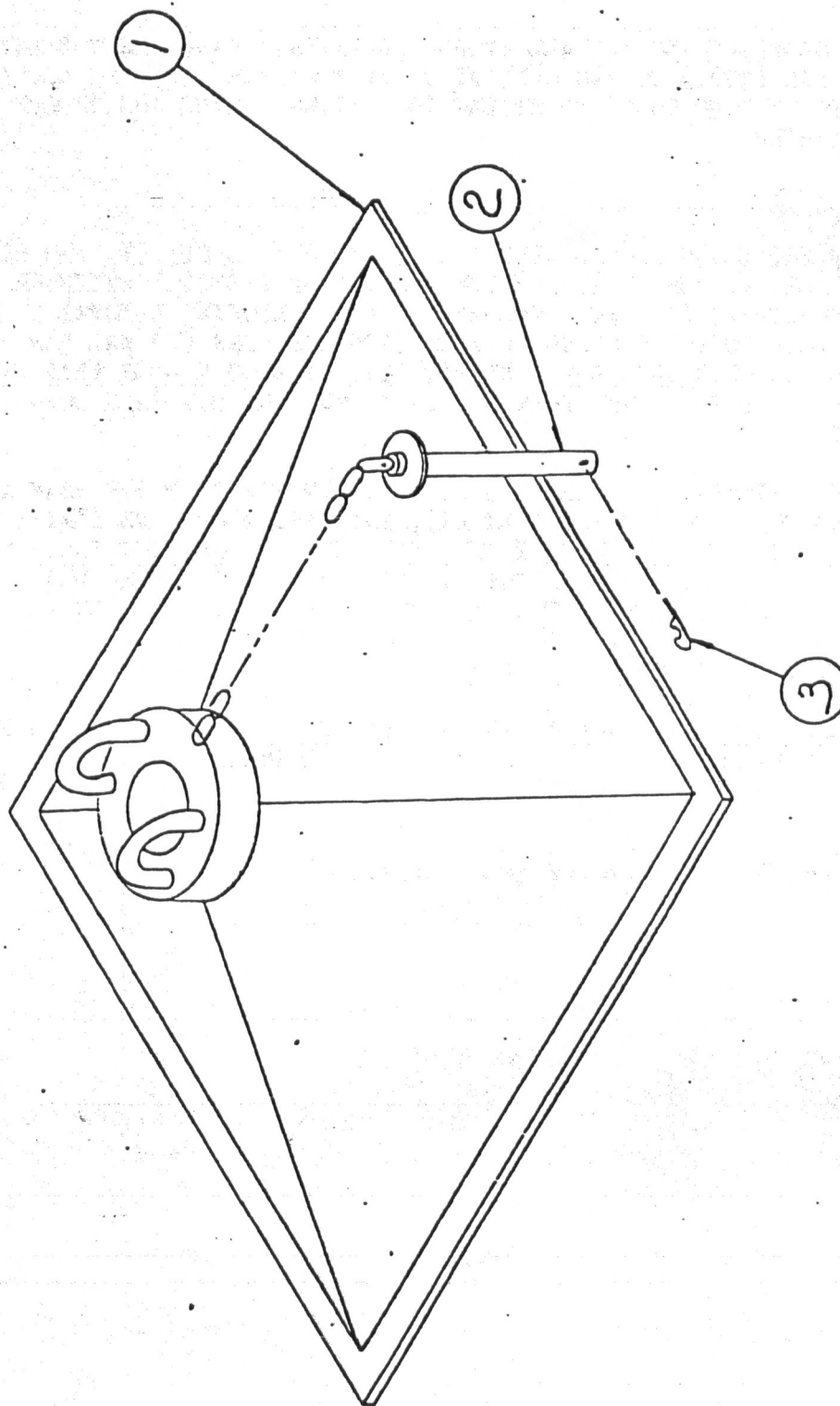
THE EXTENSION CYLINDER (6) CAN BE REMOVED FROM THE BEAM ASSEMBLY (2) BY REMOVING THE FRONT ANCHOR BOLT (9), LOCKWASHER (8) AND FLAT WASHER (9). CARE MUST BE TAKEN TO INSURE THAT THE CYLINDER ROD DOES NOT FALL AND CAUSE DAMAGE TO THE ROD. AFTER SETTING THE CYLINDER DOWN INSIDE THE BEAM, IT CAN BE PULLED OUT THE BACK END. PLACE THE CYLINDER IN A CLEAN AREA FOR DISASSEMBLY.

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS BEFORE REASSEMBLY AND GREASE THE BOTTOM SIDE OF OUTRIGGER HOUSING (INSIDE) AND BOTTOM OF OUTRIGGER BEAM ASSEMBLY.

ASSEMBLY:

REASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



FRONT OUTRIGGER FLOAT - ACTUAL FLOAT IS 30-1/2" DIA. ALUMINIUM

ASSY

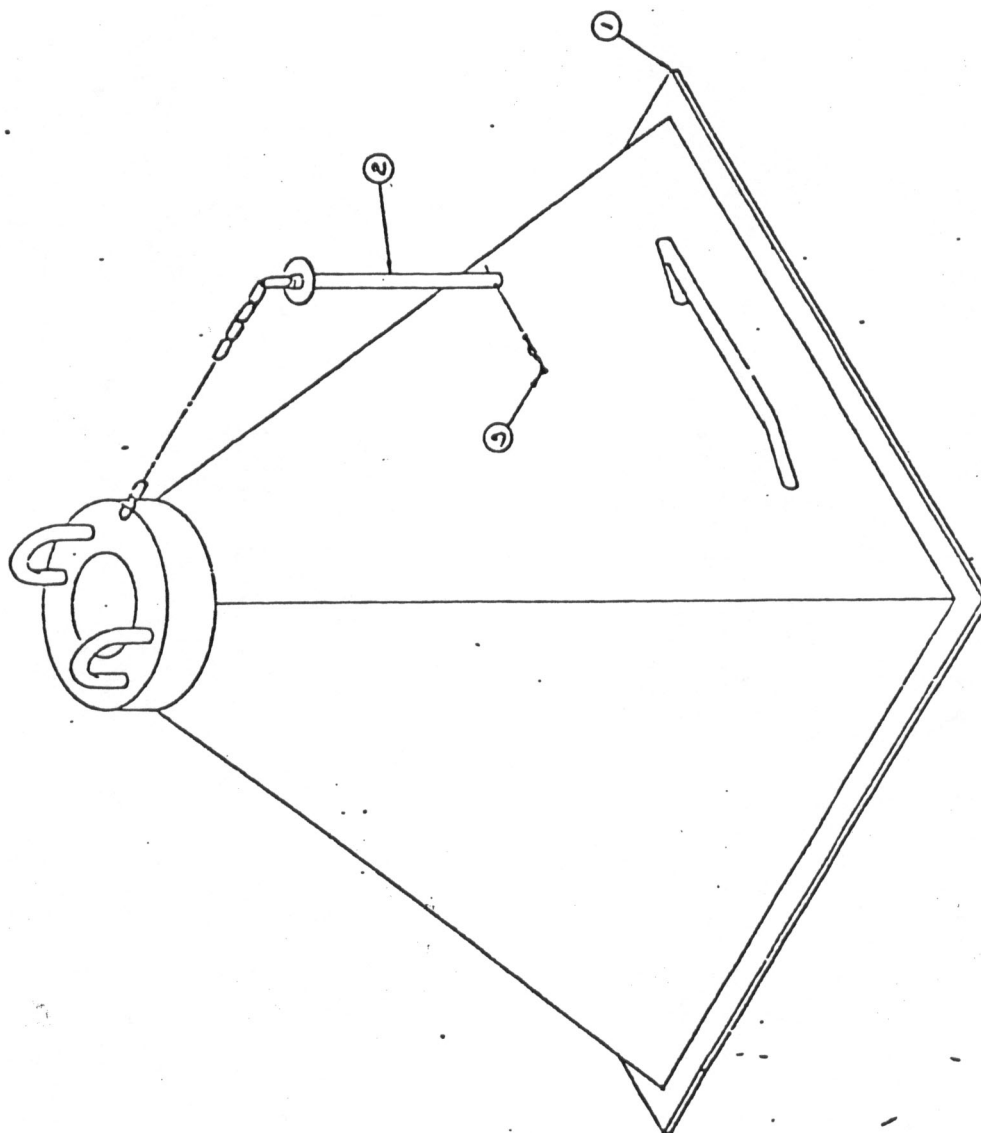
141-116

3A.42

3A.4

FRONT OUTRIGGER FLOAT ASSEMBLY · 141-116

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	17235-14-4	FLOAT WELDMENT	1
2	12354-14-7	FLOAT LOCK PIN	1
3	30506-14-1P	HITCH PIN	1



REAR OUTRIGGER FLOAT ASS'Y

141-126

3A-44

3A-44

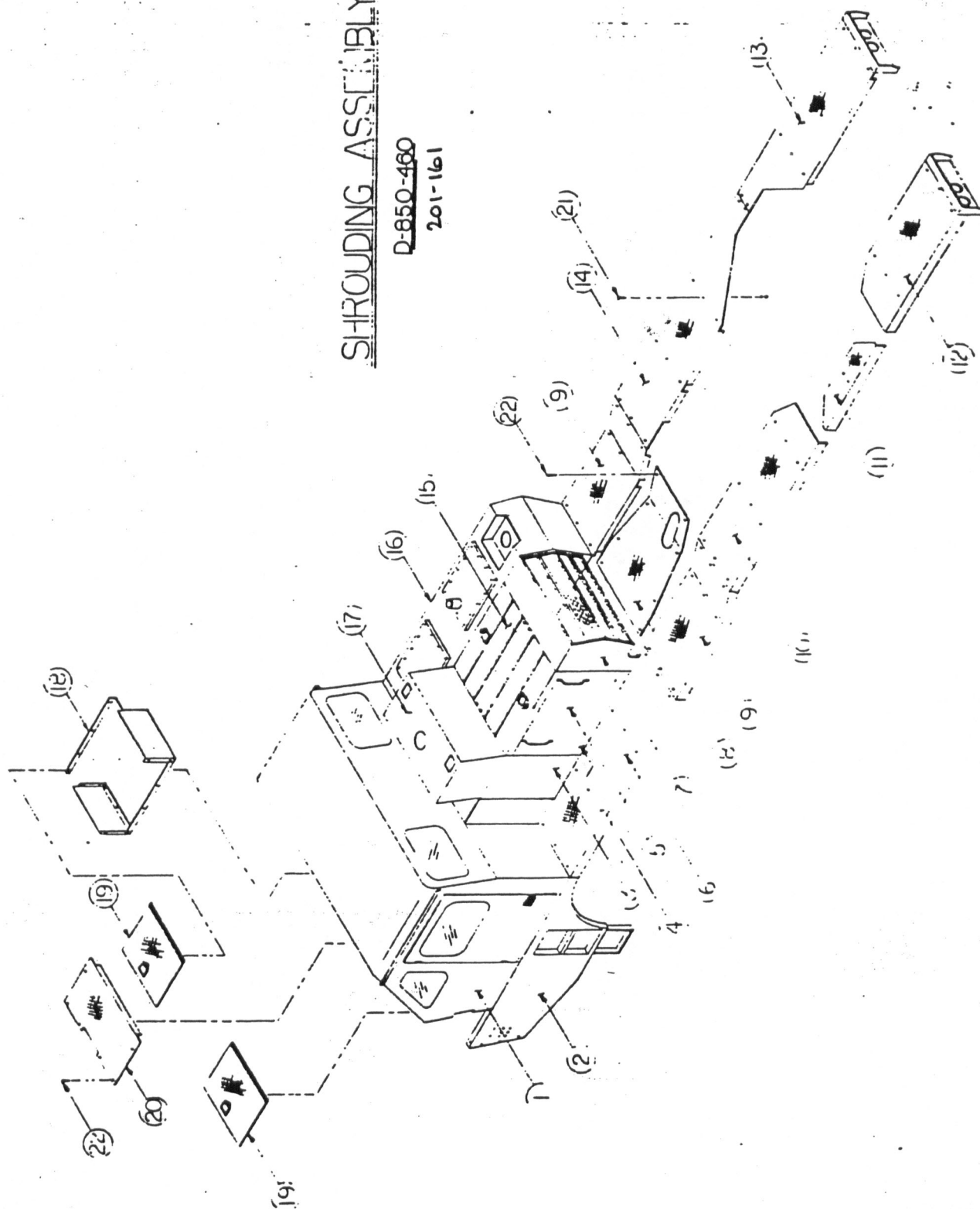
REAR OUTRIGGER FLOAT ASSEMBLY 141-126

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	33422-14-6	FLOAT WELDMENT	1
2	12354-14-1	FLOAT LOCK PIN	1
3	30506-14-1P	HITCH PIN	1

SHROUDING ASSEMBLY

D-850-460

201-161



SHROUDING ASSEMBLY

201-161
D-850-460

2

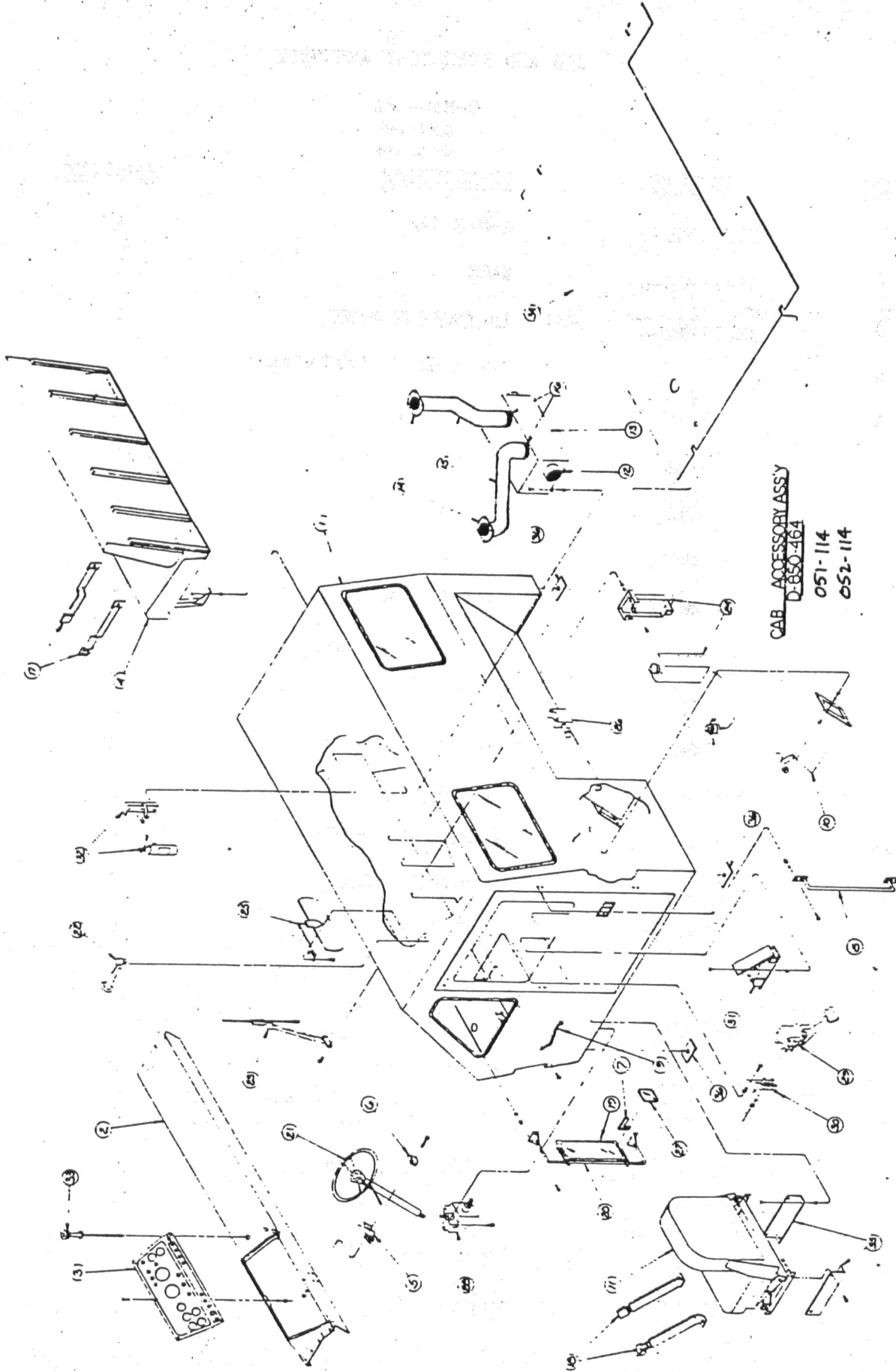
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	38173-05-0	CAB ASSEMBLY (MODIFIED)	1
2	34174-20-4 LH 34175-20-4 RH	FENDER SKIRT	2
3	C-850-454	FORWARD LEFT SIDE PANEL	1
4	B-850-451	LOWER LEFT SIDE PANEL	1
5	C-850-453	LEFT SIDE HOOD PANEL	1
6	30972-20-4	FRONT LEFT SIDE FENDER	1
7	D-850-457	REAR ENGINE SHROUDING	1
8	30964-20-4	DECK COVER	1
9	30973-20-4-RH 30974-20-4-RH	CENTER FENDER	1
10	C-850-443	REAR LEFT SIDE FENDER	1
11	31198-20-4	REAR CENTER LEFT SIDE FENDER	1
12	30977-20-4	REAR LEFT SIDE FENDER	1
13	30978-20-4	REAR RIGHT SIDE FENDER	1
14	30976-20-4	REAR FRONT RIGHT SIDE FENDER	1
15	D-850-458	ENGINE HOOD	1
16	D-850-434	HYDRAULIC OIL TANK	1
17	C-850-455	RADIATOR SHROUDING	1
18	D-201-875	FRONT RIGHT SIDE TOOL BOX	1
19	B-850-452	FRONT COVER	2
20	B-850-450	FRONT CENTER COVER	1
21		1/2"-13 NC CARRIAGE BOLTS x 1" LG w/NUT & LW FOR FENDERS & TOOL BOX	70
22		1/4" SELF TAPPING BOLTS FOR DECK & CENTER COVER	14

201-161

SHROUDING ASSEMBLY (CONTINUED)

2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
23		1/4"-20 NC HHCS x 1" LG w/NUT & LW FOR ENGINE & RADIATOR SHROUDING	15
24		7/16"-14 NC HHCS x 1-1/2" LG w/NUT & LW FOR HYDRAULIC TANK	10



CAB AND ACCESSORY ASSEMBLY

D-850-464

051-114

052-114

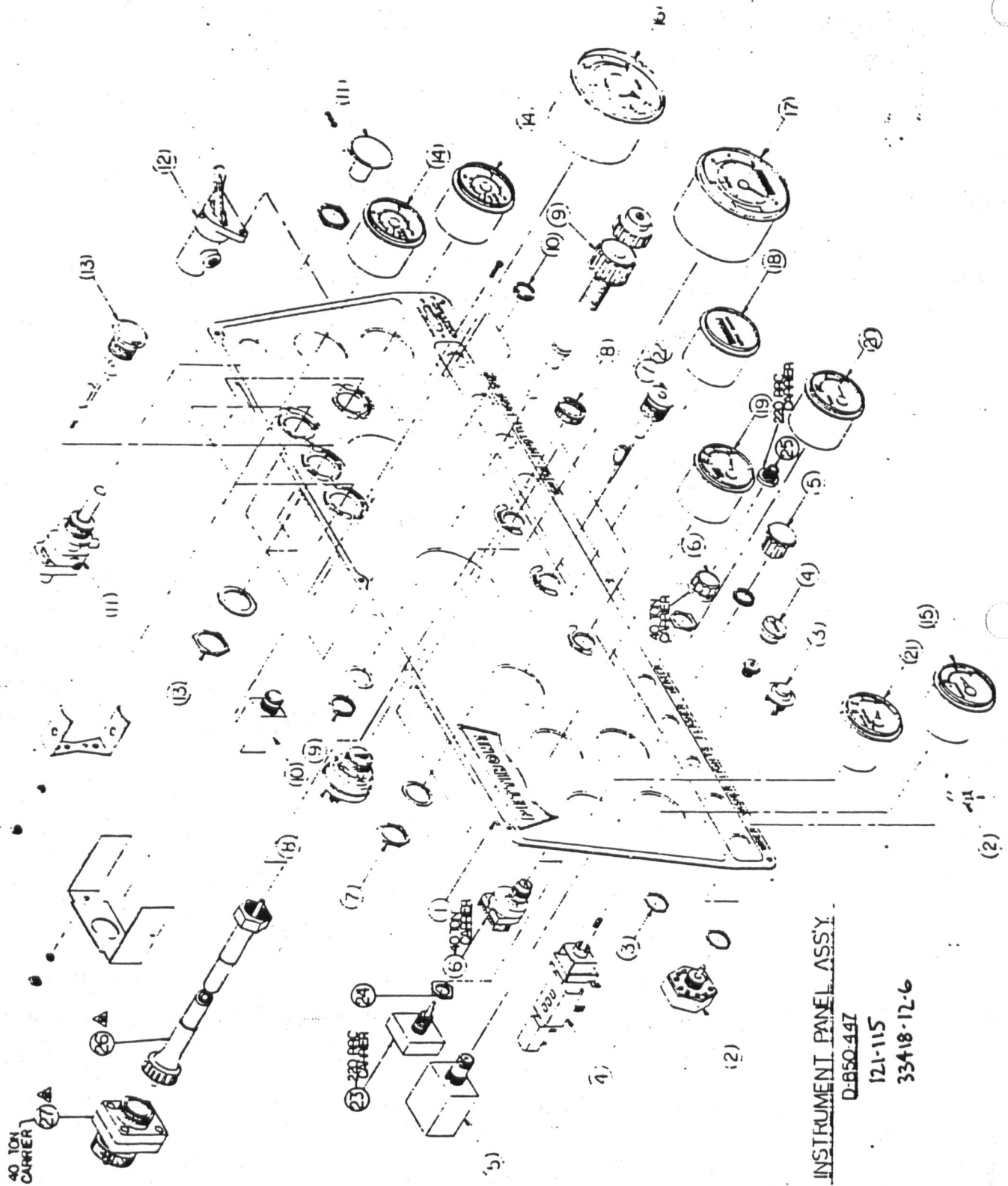
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	38173-05-0	4-MAN CAB	1
2	30871-05-6	DASH	1
3	33417-12-6	INSTRUMENT PANEL	1
4		3-MAN SEAT (NOT USED)	
5	10065-18-7	CLAMP BASE	1
6	10066-18-7	COLUMN CLAMP	1
7	A-850-566	MIRROR MOUNTING BRACKET	2
8	B-850-516	24" HANDLE	2
9	A-202-132	STEERING WHEEL LOCK	1
10	212-101	TRANSMISSION CONTROL	1
11	10517-05-1P	SEAT	1
12	750-784	AIR COVERS	2
13	31265-05-1P	HEATER	1
14	32170-05-1P	DEFROSTER LOUVER	2
15	31191-05-1P	DEFROSTER HOSE	2
16	750-793	4" Ø CLAMP	4
17		SEAT BELT (NOT USED)	3
18	17884-25-1P	SEAT BELT	1
19	10648-08-1P	MIRROR HEAD	2
20	14430-08-1P	MIRROR BRACKET	2
21	33483-18-1P	STEERING COLUMN	1
22	31701-08-1P 31702-08-1P	HORN	1
23	38191-05-1P	WIPER KIT	2
24	13869-05-1P	WASHER KIT	1

3A-50

3A-50

CAB AND ACCESSORY ASSEMBLY (CONTINUED) 2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
25	30830-05-1P	SUN VISOR	2
26	750-845	SELECTOR VALVE	1
27	750-816	CONVEX MIRROR	2
28	31824-18-1P	STEERING GEAR	1
29	16027-03-1P	BRAKE VALVE	1
30	B-850-514	VALVE MANIFOLD	1
31	31457-01-1P	THROTTLE	1
32		FIRE EXTINGUISHER (REF.)	1
33		TWO PUMP CABLE (REF.)	1
34	31267-05-7	FLOOR MAT	1
35	31726-05-1 LH 31727-05-1 RH	SEAT MOUNTING BRACKET	2
36	37739-05-1P	RUBBER CAB MOUNT	4
37	14112-05-1P	DEFROSTER FAN - DASH MOUNTED	2 (NOT SHOWN)
38	31556-05-1P	SHIFT BOOT - MODIFIED	3 — " —
39	14214-05-1P	HEATER SHUT OFF VALVE	1 — " —
40	31554-05-1	HEATER MOUNTING BRACKET	2 — " —



INSTRUMENT PANEL ASSEMBLY

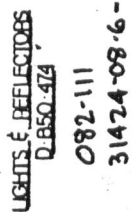
D-850-447

121-115

33418-12-6

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	33417-12-6	INSTRUMENT PANEL	1
2	15786-05-10	WIPER SWITCH	1
3	30704-12-1P	WASHER SWITCH	1
4	32315-12-1P	LIGHT SWITCH	1
5	10659-12-1P	FLASHER SWITCH	1
6	NOT USED		
7	750-828	SIGNAL LIGHT	2
8	10563-12-1P	IGNITION SWITCH	1
9	31816-01-1P	THROTTLE	1
10	30688-12-1P	STOP SWITCH	2
11	10506-03-1P	PARKING BRAKE	1
12	10507-03-1P	POWER LOCK	1
13	32314-12-1P	LIGHT	4
14	32306-12-1P	AIR PRESSURE GAUGE	2
15	32308-12-1P	AMMETER GAUGE	1
16	32302-12-1P	TACHOMETER GAUGE	1
17	32301-12-1P	SPEEDOMETER GAUGE	1
18	32312-12-1P	HOURLY METER GAUGE	1
19	32305-12-1P	WATER TEMP GAUGE	1
20	32303-12-1P	FUEL GAUGE	1
21	32304-12-1P	OIL PRESSURE GAUGE	1
22	14235-12-1P	HIGH BEAM LIGHT	1
23	15681-05-1P	HEATER SWITCH	1
24	751-020	JAM NUT	2
25	751-019	KNOB	1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
26	32321-12-1P	SENDING UNIT OIL PRESSURE GAUGE	1 (NOT SHOWN)
27	32322-12-1P	" - TEMPERATURE "	1
28	30728-12-1P	LIGHT - FRONT BRAKE	1
29	" - " -	" - REAR "	1
30	10548-12-1P	" - DIRECTIONAL	1
31	15704-12-4-5	NAME PLATE - AIR SHIFT	1
32	34284-12-1P	" - POWER LOCK	1
33	30844-12-1P	" - ENGINE STOP	1
34	30845-12-1P	" - EMERGENCY	1
35	90631-12-4-3	CABLE - SPEEDOMETER	1
36	32555-12-1P	TIP - TACH SENDER	1
37	32323-12-1P	TACH - SENDING UNIT	1
38	30728-12-1P	LIGHT - NO SHIFT	1
39	30434-12-7	I.D. PLATE	1



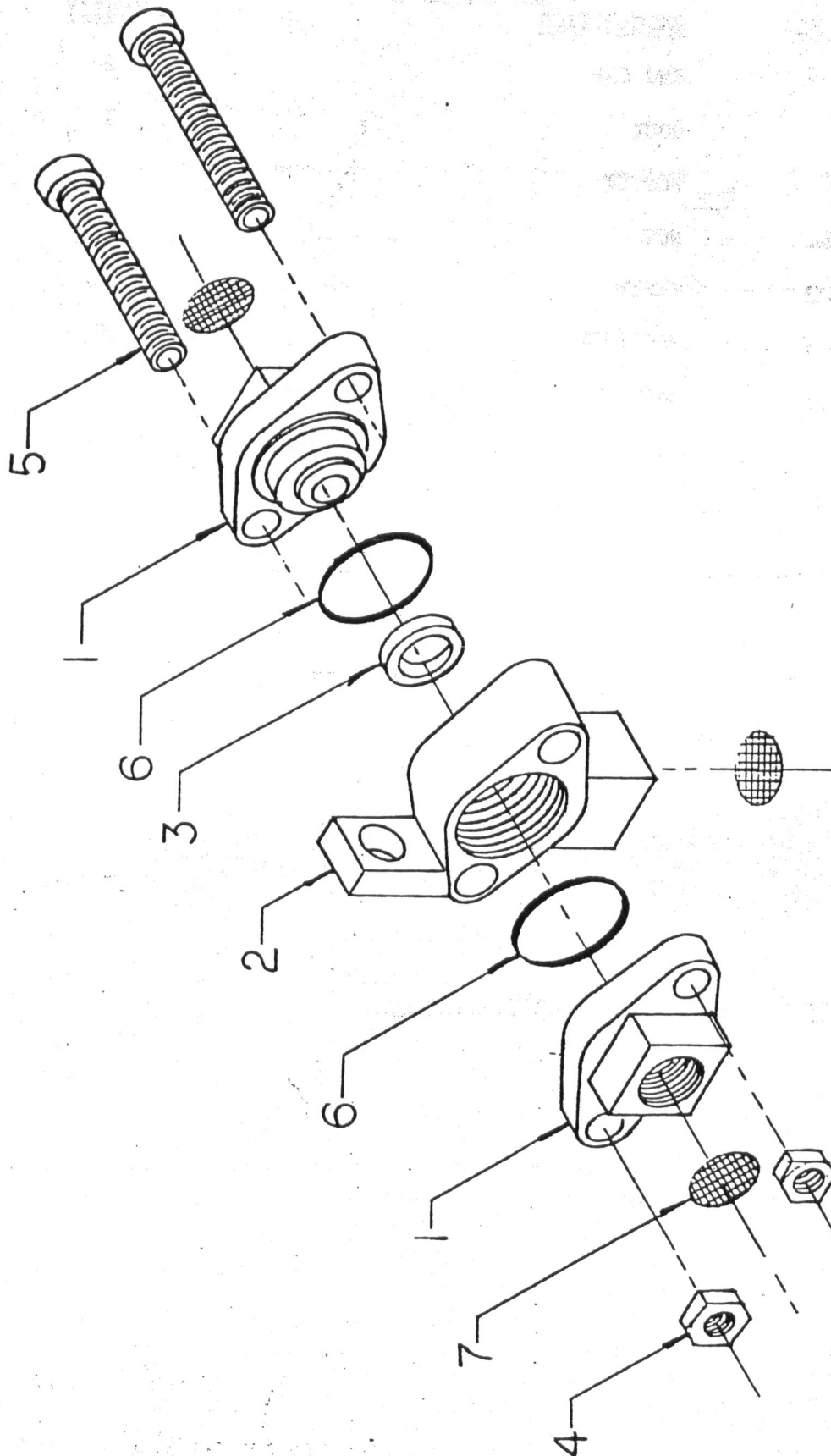
LIGHTS AND REFLECTORS

D-850-474

082-111

31424-08-6-1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	10650-08-1P	DOME LAMP SWITCH	1
2	15480-08-1P	FRONT SIGNAL LAMP	2
3	15481-08-1P	TAIL, STOP, SIGNAL LAMP	4
4			
5	15483-08-1P	CLEARANCE LAMP	6
6	15489-08-1P	CLEARANCE LAMP	6
7	15485-08-1P	HEADLAMP ASSEMBLY R.H.	1
8	15486-08-1P	HEADLAMP ASSEMBLY L.H.	1
9	15487-08-1P	HEADLAMP DOOR	2
10	15491-08-1P	CAB CLEARANCE LAMP	1
11	30721-08-1P	REAR MARKER	2
12	30722-08-1P	LICENSE PLATE LAMP	2
13	30723-08-1P	LICENSE PLATE BRACKET	2
14	15521-08-1P	AMBER REFLECTOR	4
15	15484-08-1P	RED REFLECTOR	4
16	31039-08-1P	REAR BACK-UP LAMP	2



TWO WAY CHECK VALVE

750-774

30009-01-1P

3A-64

3A-64

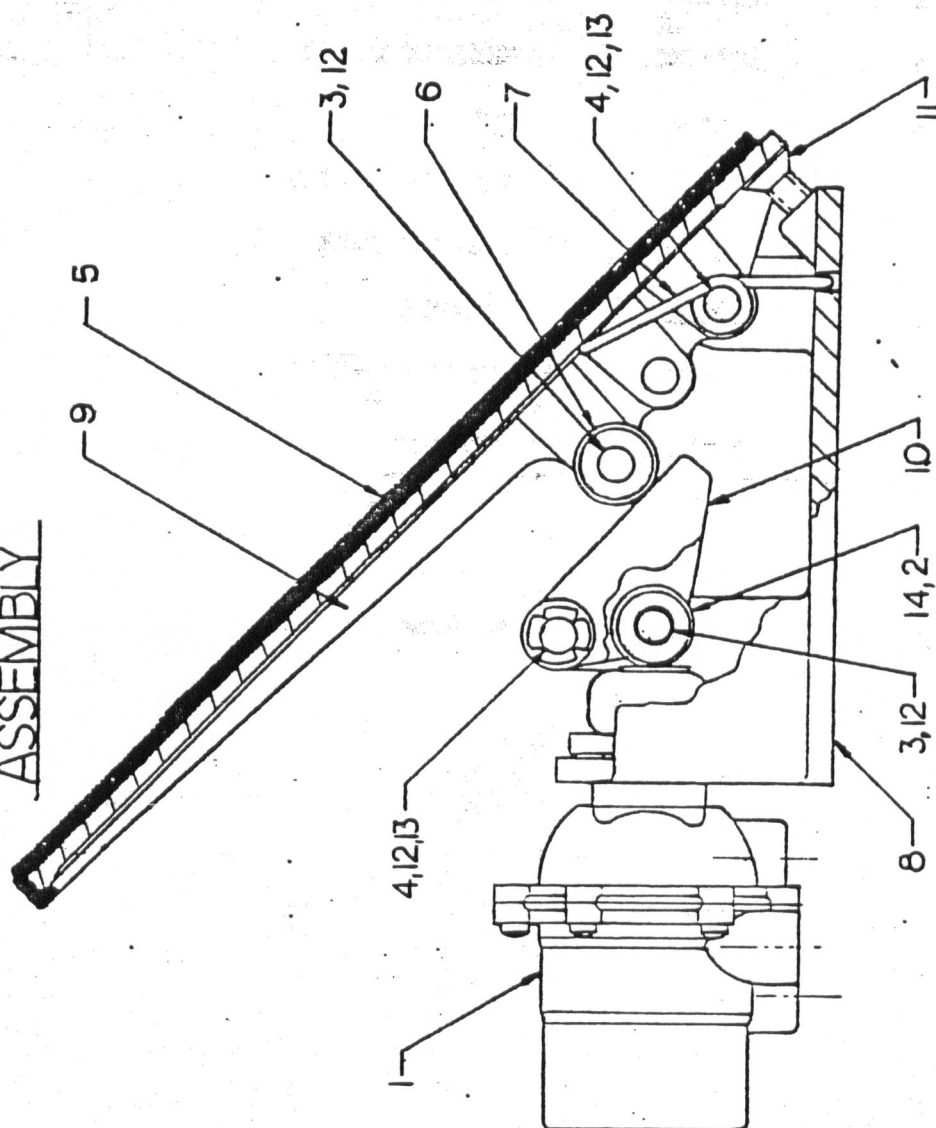
TWO WAY CHECK VALVE

750-774

30009-D1-1P

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	2923	END CAP	2
2	2924	BODY	1
3	2925	POPPET	1
4	114564	NUT	2
5	114707	SCREW	2
6	116345	"O" RING	2
7	116455	SCREEN	3

750-772 31457-01-1P
CARRIER TREADLE VALVE PEDAL
ASSEMBLY



3A-66

3A-66

CARRIER TREADLE VALVE
PEDAL ASSY.
750-772
31457-01-1P

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	116697	PRESSURE REG. VALVE 10511-011-1P	1
2	117539	ROLLER	1
3	102371	END GROOVED PIN	2
4	117216	END GROOVED PIN	2
5	103670	TREADLE COVER	1
6	104636	ROLLER	1
7	103704	TORSION SPRING	1
8	116722	TREADLE BASE	1
9	117708	TREADLE	1
10	117259	TRANSFER LEVER	1
11	106093	SCREW	1
12	106857	RETAINING RING	8
13	110370	BUSHING	4
14	117540	BUSHING	1

3A-67

3A-67

116697 10511-011-1P

CARRIER

PRESSURE REG. VALVE

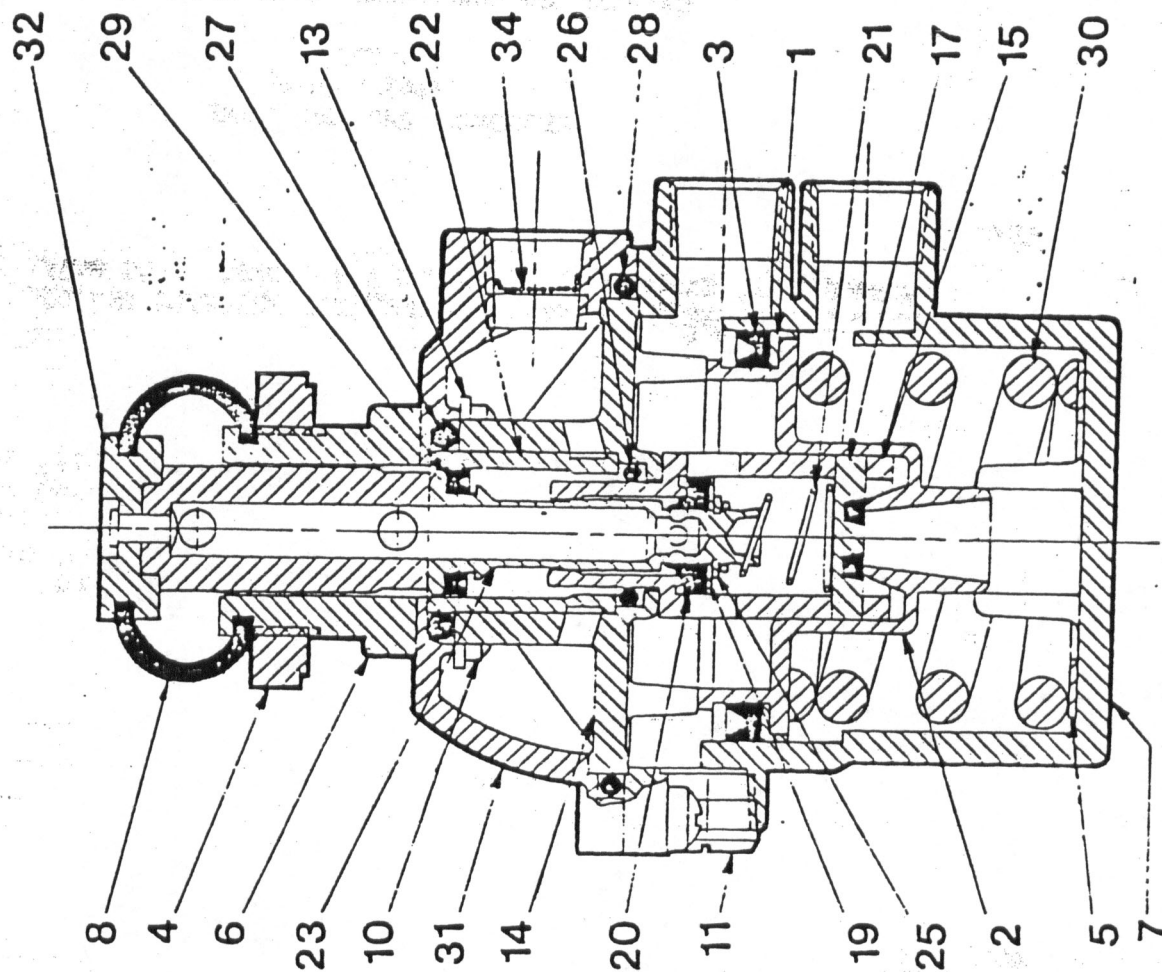
(ITEM 1 ON PREVIOUS PAGE)

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
* 1	PISTON RING	1
2	BALANCE PISTON	1
* 3	U-CUP	1
4	MOUNTING NUT	1
5	WASHER	1
6	GUIDE HOUSING	1
7	OUTLET BODY	1
* 8	DUST BOOT	1
* 10	SCREW	10
11	FITTING	1
13	WASHER	4
* 14	BARRIER PLATE	1
* 15	VALVE CAGE	1
* 17	POPET	1
* 19	INLET DISC	1
* 20	POPET	1
* 21	SPRING	1
* 22	CYLINDER SLEEVE	1
* 23	PISTON	1
* 25	RETAINING RING	1
* 26	O-RING	1
* 27	O-RING	1
* 28	O-RING	1
* 29	U-CUP	1
30	SPRING	1
31	INLET BODY	1
* 32	PUSH ROD ASSEMBLY	1
34	SCREEN	1

Service this unit with repair kit number 117103.

To replace cartridge (barrier plate) assembly, order part number 116953.

* Asterisk designates parts included in repair kit.



CARRIER TREADLE VALVE PEDAL ASSEMBLY

750-772
31457-01-1P
PETTIBONE 220 RRC CRANE

REMOVAL:

DISCONNECT AND CAP OFF ALL EXISTING AIR LINES. PLUG PORTS IN VALVE. REMOVE THE THREE MOUNTING BOLTS AND REMOVE AIR THROTTLE PEDAL.

DISASSEMBLY:

REMOVE RETAINING RINGS (12), TREADLE PIN (4), SPRING (7), AND TREADLE PEDAL (8). REMOVE RETAINING RINGS (12), PUSH ROD PIN (3), AND ROLLER (6) FROM PEDAL. TREADLE COVER (5) MAY ALSO BE REMOVED IF REPLACEMENT IS NECESSARY. VALVE ASSEMBLY (1) CAN BE REMOVED FROM THE MOUNTING PLATE (8) BY UNSCREWING THE NUT ON TOP OF THE PLATE WHICH IS UNDER A RUBBER DUST BOOT. SEE SEPARATE INSTRUCTIONS FOR VALVE (1) BREAKDOWN.

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH A SUITABLE SOLVENT AND DRY WITH COMPRESSED AIR. PLACE A LIGHT COAT OF OIL ON MOVING PARTS. REPLACE ANY PARTS WHICH APPEAR TO BE DAMAGED OR WORN.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

CARRIER TREADLE VALVE ASSEMBLY

116697

PETTIBONE 220 RRC CRANE

DISASSEMBLY:

BY REMOVING BODY SCREWS, THIS WILL ALLOW DISASSEMBLY OF OUTLET BODY (7), SHIM (5), BALANCE SPRING (30), BALANCE PISTON (2), AND PISTON RING (1). REMOVE PLUG (11) FROM OUTLET BODY.

REMOVE INLET BODY (31), O RINGS (28) AND (27) AND SCREEN (34). REMOVAL OF SCREWS (10) ALLOWS DISASSEMBLY OF ROD GUIDE (6) AND PUSH ROD (32).

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR. INSPECT ALL PARTS FOR EXCESSIVE WEAR, CRACKS, AND DAMAGE. REPLACE WORN PARTS. APPLY A LIGHT COAT OF OIL TO MOVING PARTS.

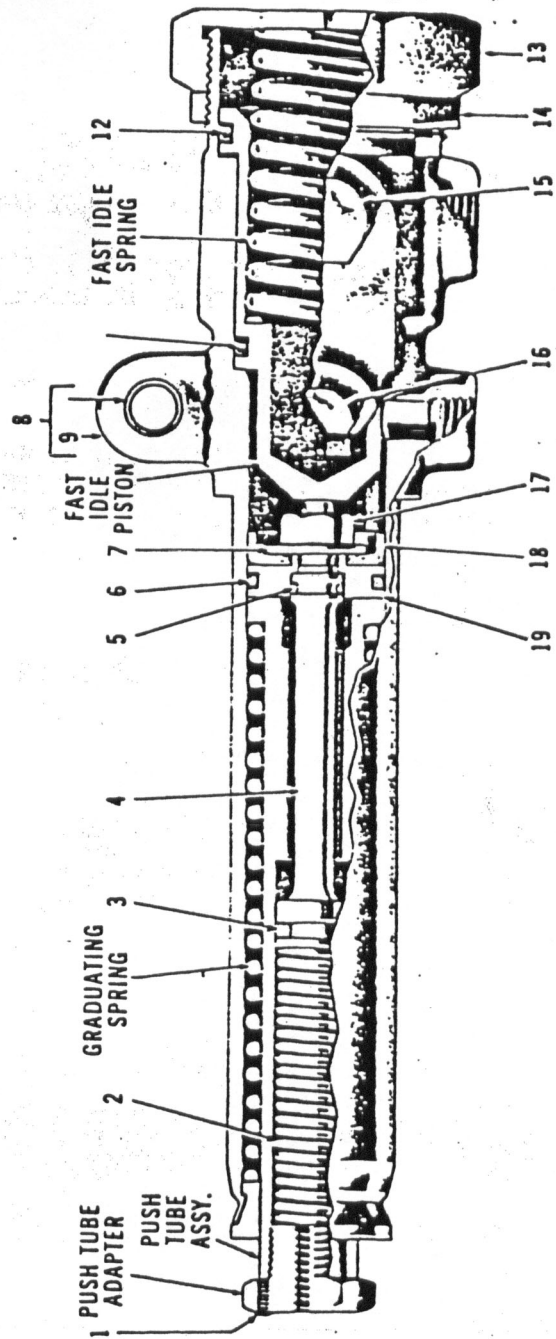
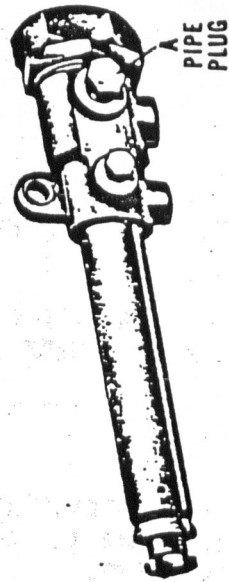
ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

220 RRC
THROTTLE CYLINDER

750-773

18668-01-1P



3A-71

3A-71

THROTTLE CYLINDER

220 RRC

750-773

18668-DI-1P

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	231249	SET SCREW	1
2	231144	TAKE-UP SPRING	1
3	231156	OIL SEAL 33/64" O.D.	1
4	231146	PISTON ROD	1
5	230392	GROMMET 3/8" O.D.	1
6	231157	OIL SEAL 1" O.D.	1
7	231161	PISTON CUP FOLLOWER	1
8	223416	CYLINDER ASSEMBLY	1
9	223417	CYLINDER	1
10	232893	BUSHING	1
11	240456	GROMMET 1-1/4" O.D.	1
12	231159	GROMMET 1-19/32" O.D.	1
13	231152	CYLINDER CAP	1
14	231150	LOCK NUT	1
15	230111	PIPE PLUG 1/4"	1
16	232999	PIPE PLUG 1/8"	1
17	233607	NUT	1
18	231160	PISTON CUP	1
19	231149	PISTON	1
	223398	PUSH TUBE ASSEMBLY	
	231139	PUSH TUBE ADAPTOR	
	231143	GRADUATING SPRING	
	231147	FAST IDLE PISTON	
	231145	FAST IDLE SPRING	

3A-73

3A-73

DUEL BRAKE VALVE ASSEMBLYPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	203788	CAPSCREW	3
2	237648	LOCKWASHER	3
3	230250	HEX NUT	1
4	247268	PEDAL MOUNTING PLATE	1
5	240445	FULCRUM PIN	1
6	210492	COTTER PIN	1
7	286773	BASIC VALVE	1
8	280381	PEDAL ASSEMBLY	1
9	244681	PEDAL	1
10	244682	PEDAL COVER	1
11	244045	ROLLER	1
12	244680	PLUNGER	1
13	243890	STOP BUTTON	1

E-7 DUAL BRAKE VALVEPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE COTTER PIN (6) AND FULCRUM PIN (5) TO REMOVE PEDAL ASSEMBLY (8).
REMOVE COTTER PIN (6), FULCRUM PIN (5) AND ROLLER (11) FROM PEDAL ASSEMBLY.
REMOVE HEX NUT (3) FOR REMOVAL OF STOP BUTTON (13). REMOVE HEX HEAD CAPSCREW
(1), LOCKWASHER (2) AND PLUNGER (12) TO SEPARATE PEDAL MOUNTING PLATE (4)
FROM BASIC VALVE (7).

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT PARTS FOR WEAR AND REPLACE ALL WORN PARTS.

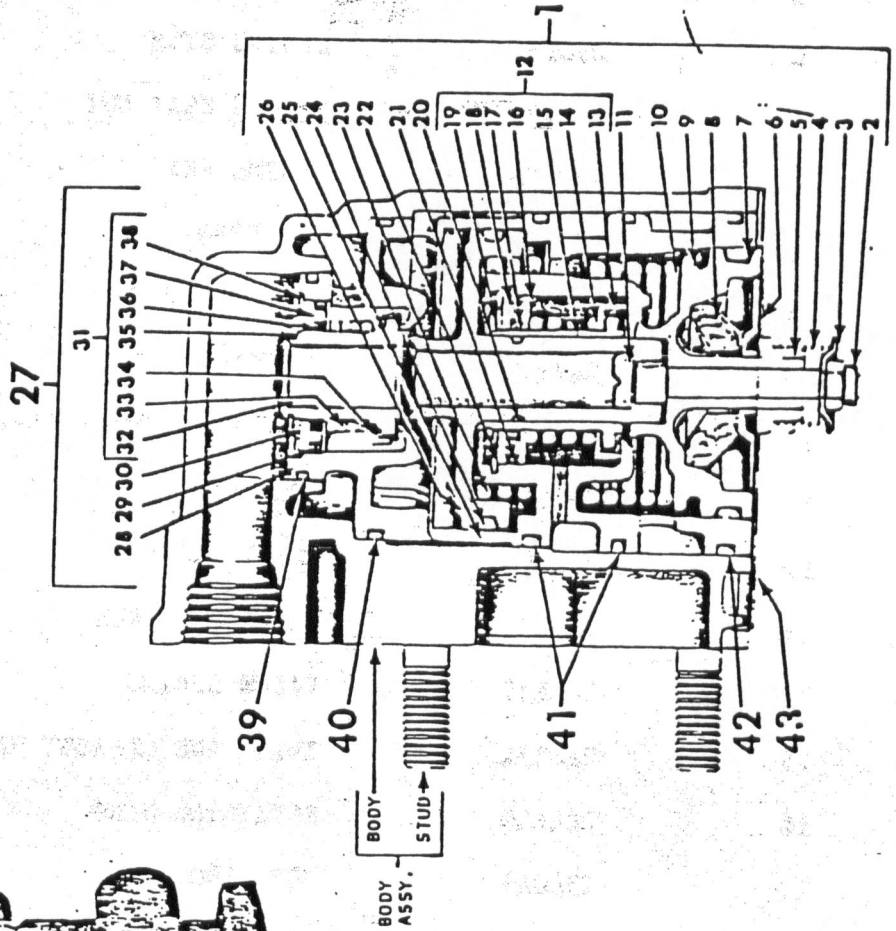
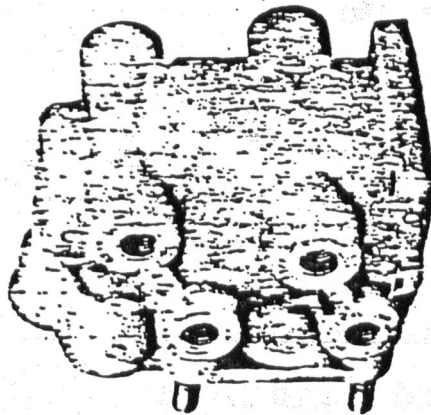
ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

BASIC BRAKE VALVE

750-760

16027-03-1P



BASIC DUEL BRAKE VALVEPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	286772	LOWER STATIC PISTON ASSEMBLY	1
2	290191	NUT	1
3	290189	SPRING GUIDE	1
4	290185	SPRING STEM	1
5	290188	SPRING SEAT NUT	1
6	290187	SPRING SEAT	1
7	239643	"O" RING	1
8	241559	RUBBER SPRING	1
9	247232	PISTON	1
10	247231	PISTON RETURN SPRING	1
11	290186	STEM	1
12	279754	INLET AND EXHAUST VALVE ASSEMBLY	1
13	244435	VALVE RETAINER	1
14	244437	VALVE SPRING	1
15	248534	INLET AND EXHAUST VALVE	1
16	244440	RETAINING RING	1
17	234045	"O" RING	1
18	244439	"O" RING RETAINER	1
19	244438	SPECIAL WASHER	1
20	239186	"O" RING	1
21	239219	"O" RING	1
22	240345	RETAINING RING	1
23	247224	RELAY PISTON SPRING	1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
24	247226	"O" RING	1
25	247222	LOWER STATIC PISTON	1
26	290202	"O" RING	1
27	283303	UPPER STATIC PISTON ASSEMBLY	1
28	247213	UPPER STATIC PISTON	1
29	239029	"O" RING	1
30	238817	RETAINING RING	1
31	283304	INLET AND EXHAUST VALVE UPPER	1
32	248536	INLET AND EXHAUST VALVE	1
33	247217	SPRING	1
34	247216	VALVE RETAINER	1
35	247220	RETAINING RING	1
36	239898	"O" RING	1
37	247219	"O" RING RETAINER	1
38	247218	SPECIAL WASHER	1
39	247221	"O" RING	1
40	247234	"O" RING	1
41	247233	"O" RING	2
42	247235	"O" RING	1
43	247236	RETAINER	1
44	283865	BODY ASSEMBLY	1
45	248114	BODY	1
46	202541	MOUNTING STUD.	3
	283862	REPAIR KIT	1

16027-03-1P750-760BRAKE VALVE ASSEMBLYPETTIBONE 22ORRC CRANEDISASSEMBLY:

REMOVE RETAINING RING (1), EXHAUST CHECK VALVE SEAT (17), VALVE SPRING (14), INLET AND EXHAUST VALVE (15), PAN HEAD SCREW (21), DIAPHRAGM WASHER (20), DIAPHRAGM (19), AND PRELOAD SPRING (22) FROM BODY. REMOVE VALVE RETAINER (13) AND VALVE "O" RING (16) FROM INLET AND EXHAUST VALVE.

BY REMOVING HEX NUT (7), WASHER (9), SPRING SEAT (10) AND RETAINER (4) YOU ARE NOW ABLE TO DISASSEMBLE RUBBER SPRING (11), PISTON (8) AND PISTON RETURN SPRING (2) FROM BODY. REMOVE "O" RING (3) FROM PISTON.

CLEANING, INSPECTION AND REPAIR:

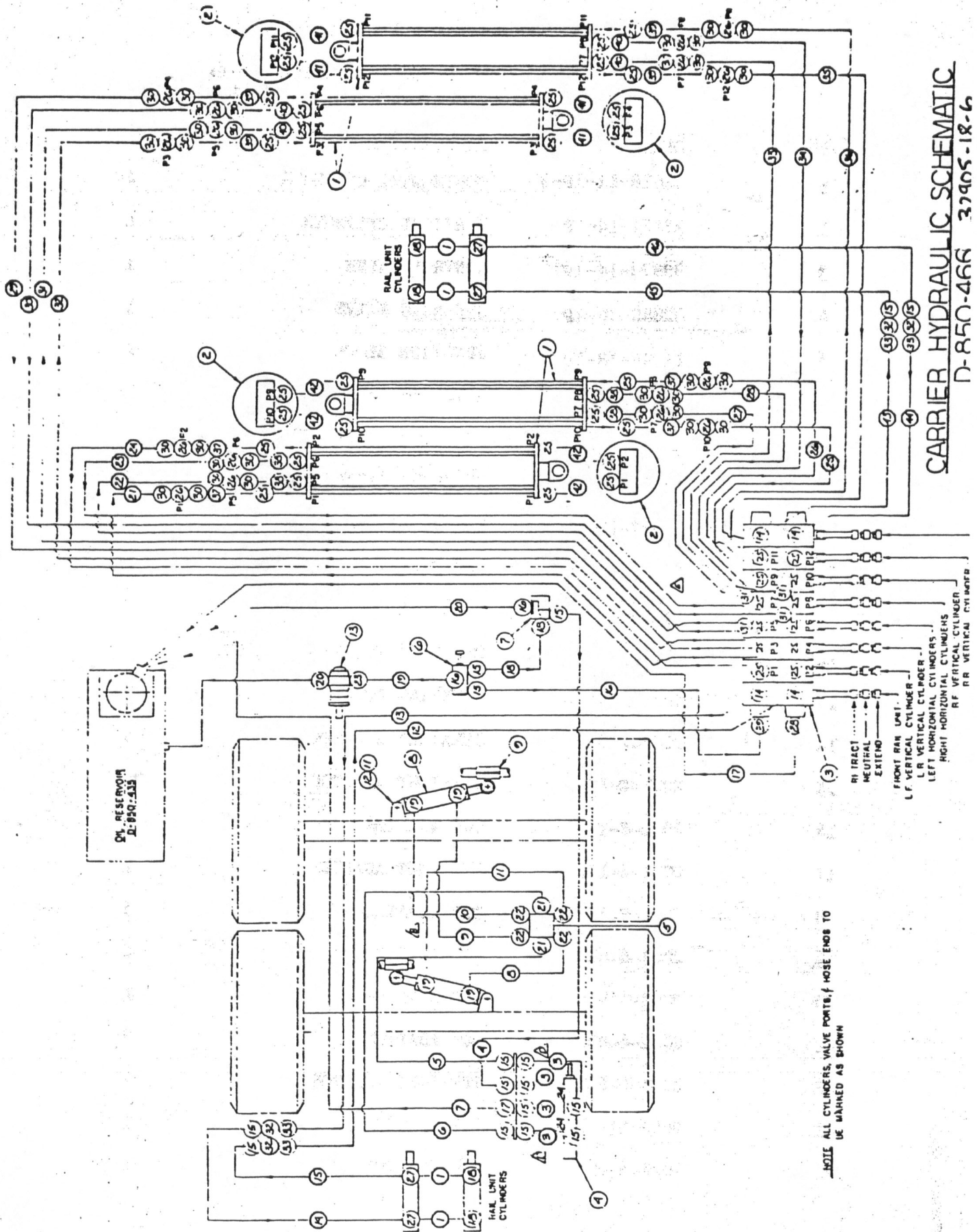
CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR EXCESSIVE WEAR, SCORING AND CRACKED PARTS.

REPLACE ALL WORN AND DAMAGED PARTS.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



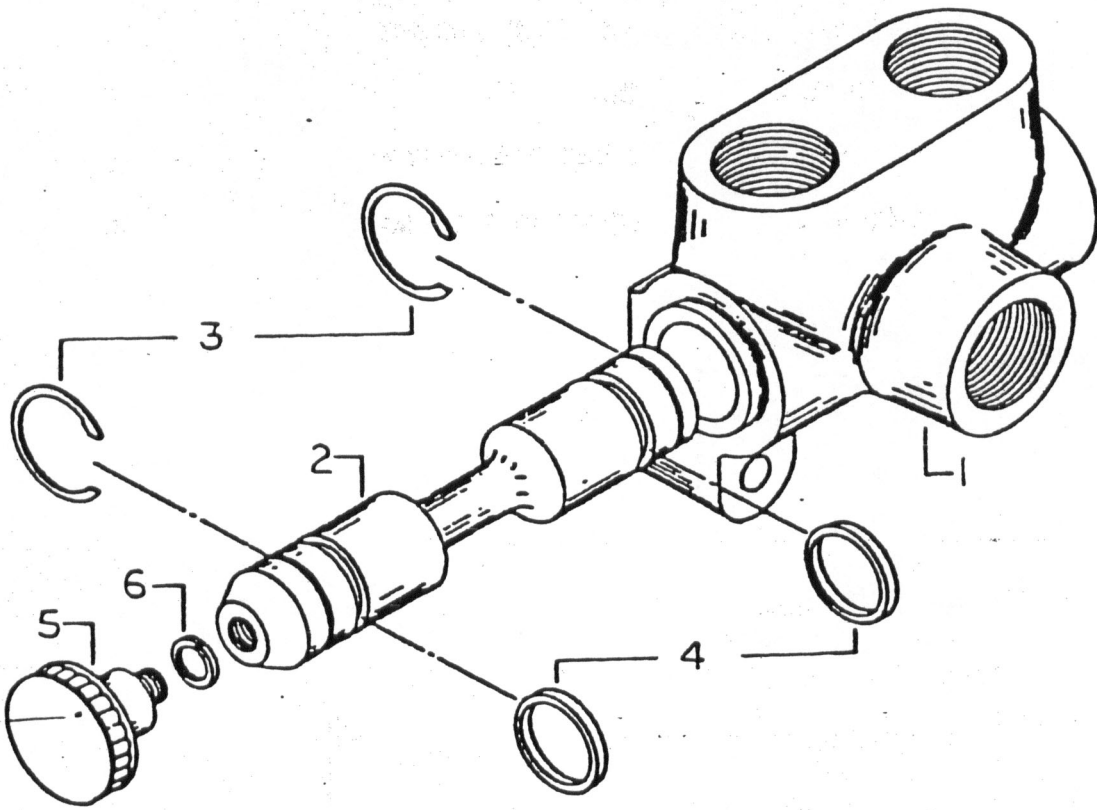
CARRIER HYDRAULIC SCHEMATIC

D-850-466 32905-18-6
31625-14-6

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	32638-14-1P-3	HORIZONTAL CYLINDER	4
2	33171-14-1P	VERTICAL CYLINDER	4
3	33973-14-1P	CONTROL VALVE	1
4	32888-18-1P	STEERING VALVE	1
5	11346-18-1P	JUNCTION BLOCK	1
6	10564-18-1P	SELECTOR VALVE	1
7	33573-18-1P	FLOW CONTROL VALVE	1
8	10530-18-1P	STEERING CYLINDER	2
9	10527-18-1P	TIE ROD CLAMP	2
10	20715-18-1P	END SOCKET	2
11	10523-18-1P	CYLINDER MOUNTING BOLT	2
12	10525-18-1P	CYLINDER MOUNTING LUG	4
13	38192-18-1P	STEERING PUMP	1
14	202702-8-8	STRAIGHT ADAPTOR	4
15	2021-8-8S	STRAIGHT ADAPTOR	16
16	2024-8-10S	90° ADAPTOR	2
17	2021-8-10S	STRAIGHT ADAPTOR	1
18	2024-8-8S	90° ADAPTOR	5
19	2023-6-6S	45° ADAPTOR	4
20	2062-16-16	90° ADAPTOR	1
21	2024-6-8S	90° ADAPTOR	2
22	2023-4-6S	STRAIGHT ADAPTOR	4
23	2062-12-10	90° ADAPTOR	1
24	2023-8-8S	45° ADAPTOR	2

CARRIER HYDRAULIC SCHEMATIC (CONTINUED) 2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
25	202702-8-6	STRAIGHT ADAPTOR	44
26	750-963	QUICK DISCONNECT COUPLING	16
27	2030-8-8S	TEE	4
28	202702-10-10	STRAIGHT ADAPTOR	1
29	202702-10-8	STRAIGHT ADAPTOR	1
30	2021-6-6	STRAIGHT ADAPTOR	32
31	203102-6-6S	TEE	4
32	750-964	QUICK DISCONNECT	4
33	2041-8-8S	BULKHEAD FITTING	4



CARRIER
SELECTOR VALVE

SELECTOR VALVE

750--84510564-18-1P

<u>ITEM</u> <u>No.</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	1140	VALVE HOUSING	1
2	1139	VALVE SPOOL	1
3	602	SNAP RING	2
4	1136	QUAD RING SEAL	2
5	081	CONTROL KNOB	1
6	1291	LOCKWASHERS	1
7	K1300-A	SEAL KIT	1

NOTE: ITEM No's. 1 AND 2 ARE NOT SUPPLIED SEPARATELY.
MUST BE ORDERED AS A MATCHED SET.

SELECTOR VALVEPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE SNAP RING (3) FROM OUTSIDE OF SPOOL (2) ON BACK SIDE OF VALVE (1). THIS WILL ALLOW THE SPOOL (2) TO BE PULLED OUT THE FRONT OF THE VALVE (1). QUAD RING SEALS (4) CAN THEN BE TAKEN OFF IF NECESSARY. THE HANDLE (5) AND LOCKWASHER (6) CAN BE REMOVED BY UNSCREWING HANDLE (5).

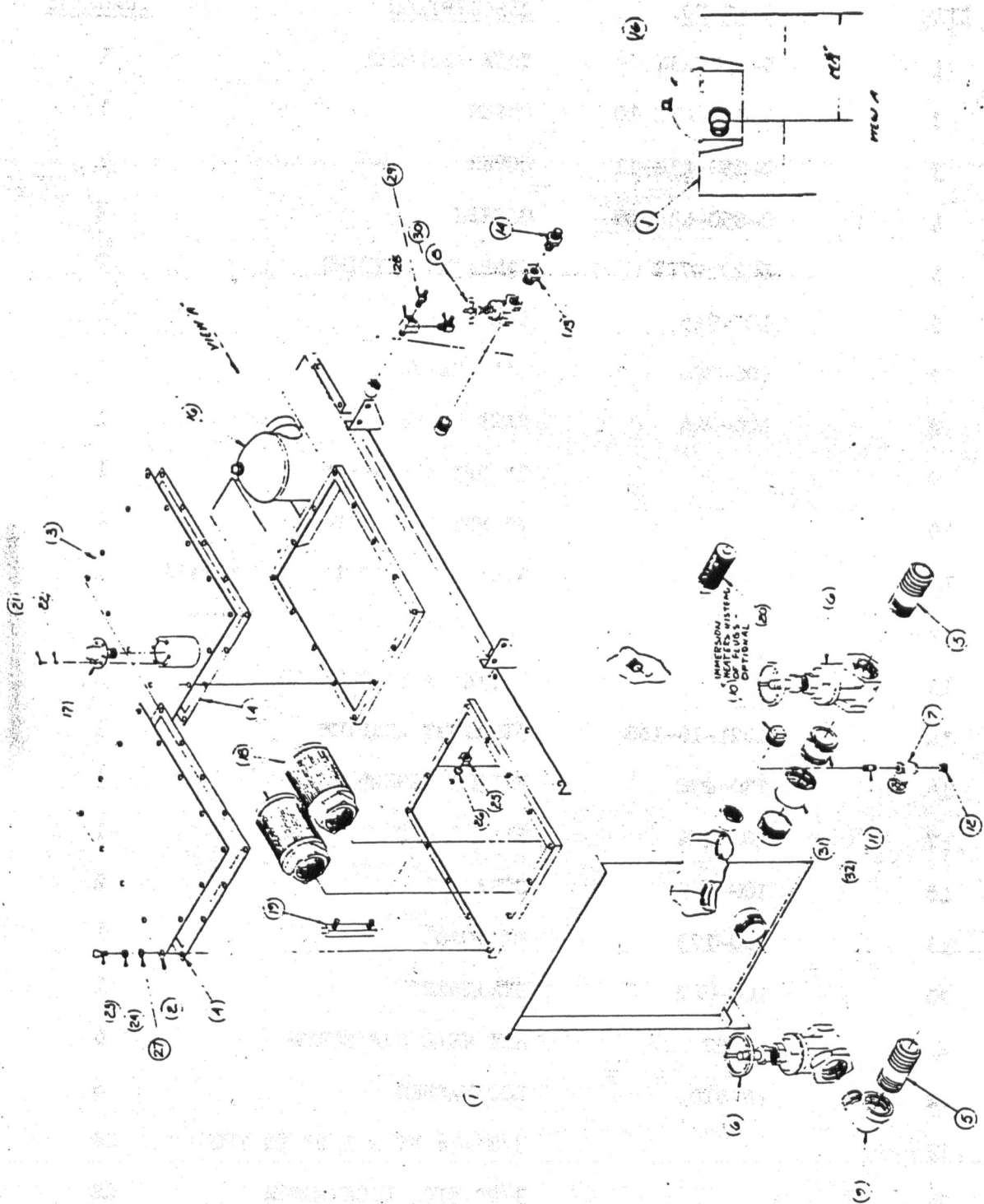
CLEANING, INSPECTION AND REPAIR:

CHECK SEALS FOR CRACKS OR BREAKS. INSPECT SPOOL AND INSIDE OF VALVE FOR SCORING AND SCRATCHING. REPLACE WORN AND DAMAGED PARTS.

CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR. PLACE A LIGHT COAT OF OIL ON PARTS PRIOR TO ASSEMBLY.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



HYDRAULIC OIL RESERVOIR ASSEMBLY

D-850-435

261-152

HYDRAULIC OIL TANK ASSEMBLY

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-850-434	TANK ASSEMBLY	1
2	D-850-434-10	COVER	1
3	D-850-434-11	COVER	1
4	D-850-434-29	GASKET	2
5	B-201-013	SARRATED FITTING	2
6	100-945	GATE VALVE	2
7	100-984	GATE VALVE	1
8	100-946	GATE VALVE	1
9		3" NPT ELBOW 90°	1
10		2" NPT PIPE PLUG	2
11		3/4" NPT x 2" LG PIPE NIPPLE	1
12		3/4" NPT PIPE PLUG	1
13		1-1/4" x 1" BUSHING	1
14	2021-16-16S	STRAIGHT ADAPTOR	1
16	750-890	FILTER ASSEMBLY	1
17	100-174	FILLER CAP	1
18	100-919	STRAINER	2
19	100-173	OIL GAGE	1
20	100-042	STRAINER	1
21	#8-32	HEX HEAD CAP SCREW	6
22	#8-STD.	LOCKWASHER	6
23		3/8"-16 NC x 1/2" LG HHCS	28
24		3/8" STD. LOCKWASHER	28

34-87

3A-87

HYDRAULIC OIL TANK ASSEMBLY (CONTINUED) 2

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
25	PART OF ITEM 19	HEX NUT	2
26	PART OF ITEM 19	LOCKWASHER	2
27		3/8" SEAL WASHER w/RUBBER	28
28	2092-8-8	ADAPTOR	1
29	2021-8-6	STRAIGHT ADAPTOR	1
30	2024-8-6	90° ADAPTOR	1
31		3" NPT COUPLING	1
32		3" CLOSE NIPPLE	1

3A-88

3A-88

HYDRAULIC OIL RESERVOIR ASSEMBLY

PETTIBONE 220 RRC CRANE

DISASSEMBLY:

UPON REMOVAL OF TANK FROM CARRIER DISASSEMBLY CAN BE COMPLETED AS FOLLOWS:

REMOVE HEX HEAD CAPSCREWS (22), LOCKWASHERS (24), COVERS (2) & (3), GASKETS (5), SCREW (23), LOCKWASHERS (25), AND FILLER CAP (9). REMOVE STRAINERS (13) & (14). REMOVAL OF HEX HEAD CAPSCREW (20) AND LOCKWASHER (21) WILL ALLOW DISASSEMBLY OF RETURN PIPES (4), GASKET (26) AND FILTERS (23) FROM TANK. FILTERS (27) CAN BE DISASSEMBLED BY REMOVING BOLT (33), WASHERS (32), BODY (31), SPRING (30), FILTER (29) AND SEAL (28). REMOVE PIPE PLUG (18), GATE VALVE (8), NIPPLE (19), CONNECTOR (17), CONNECTOR (16), ADAPTOR (15) AND GATE VALVE (7) FROM TANK. REMOVE SARRATED FITTINGS (11), ELBOW (12) AND GATE VALVES (6).

CLEANING, INSPECTION AND REPAIR:

CLEAN INSIDE OF TANK THOROUGHLY REMOVING ANY DIRT OR SLUDGE THAT MAY HAVE ACCUMULATED.

INSPECT ALL PARTS FOR CRACKS, WEAR AND DAMAGED THREADS.

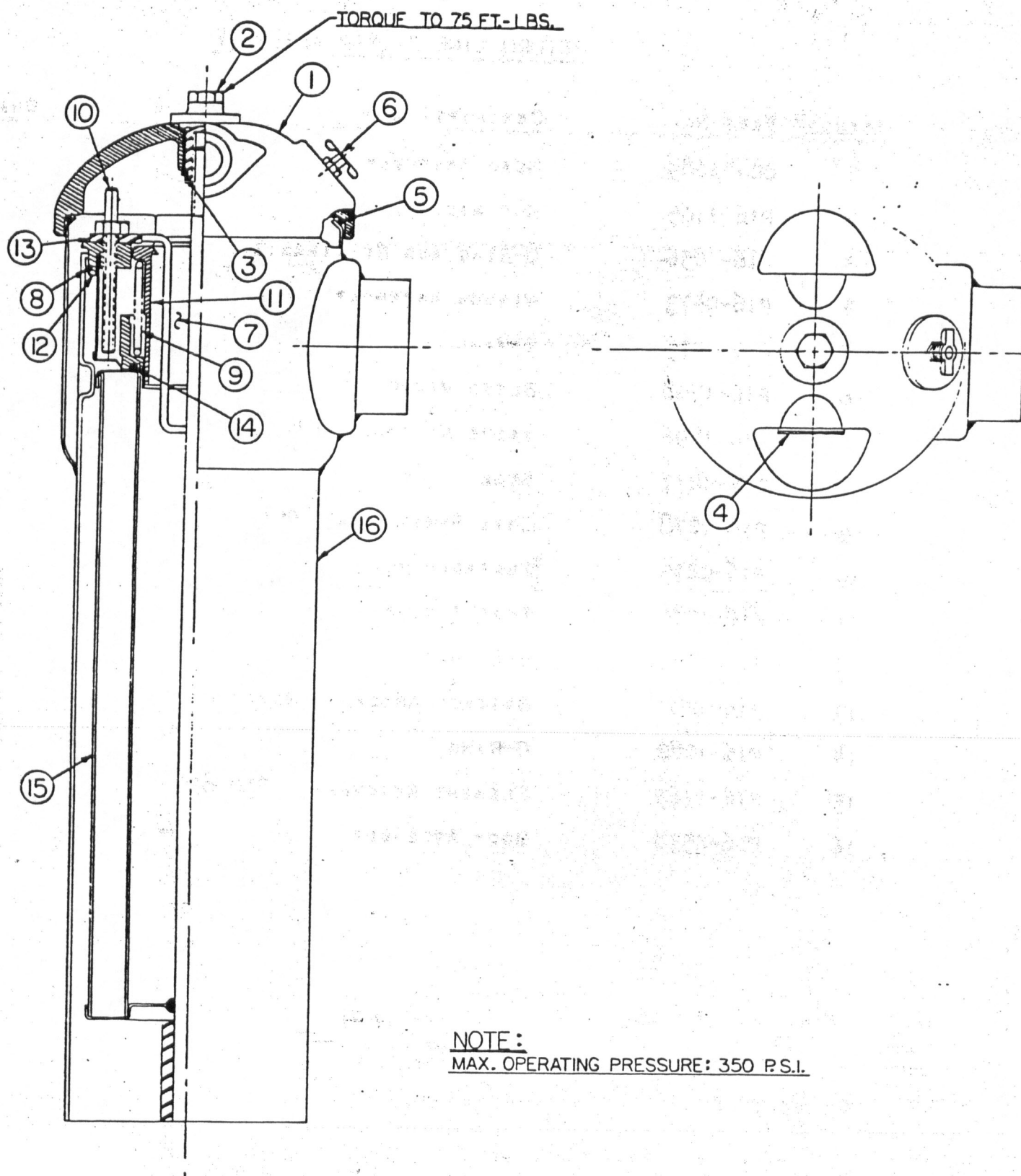
REPLACE FILTERS, STRAINERS, FILLER CAP AND DAMAGED PARTS AS NEEDED.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

3A-89

3A-89

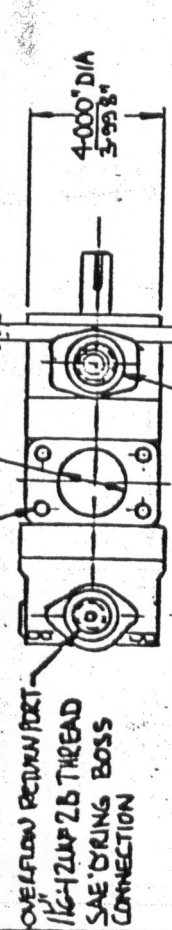


RETURN LINE FILTER ASSEMBLY
C-750-890

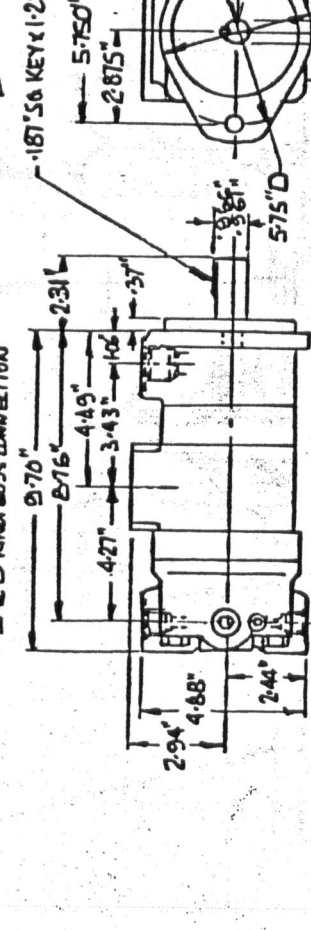
RETURN LINE FILTER ASSEMBLY

<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	0044A089	HEAD ASSEMBLY	1
2	P16-1105	NUT ASSEMBLY	1
3	P16-1056	U-RING AND RETAINER KIT	1
4	P16-0473	WINDOW ASSEMBLY	1
5	P16-1275	O-RING	1
6	P16-1598	BLEED VALVE	1
7	P16-1896	VALVE ASSEMBLY - BY PASS	1
8	P16-1277	SEAL	1
9	P16-1278	COIL SPRING - 25 PSI	1
10	P16-0235	THREADED ROD	2
11	P16-1280	TUBE ASSEMBLY INDICATOR	1
12	P16-1363	BODY ASSEMBLY VALVE	1
13	P16-1281	BRACKET ASSEMBLY RETAINER	1
14	P16-1282	O-RING	1
15	P16-1365	ELEMENT ASSEMBLY - 750-894	1
16	P16-2538	BODY ASSEMBLY	1

1/2-13 UNF 2B THREAD 4 HOLES
 2.00" DIA INLET PORT SAE 4 BOLT FLANGE
 4.000" DIA
 3.5938"



OVERFLOW RETURN PORT
 1/2-12 UNF 2B THREAD
 SAE D'RING BOSS CONNECTION
 1.50"



1/2-12 UNF 2B THREAD
 SAE D'RING BOSS CONNECTION
 2.94"
 4.68"
 2.44"
 4.27"
 8.76"
 2.31"
 4.49"
 3.43"
 1.06"



5.75" D
 5.750"
 2.875"
 10°
 10°
 .562" D 2 HOLES
 .475" D
 .875" D
 .874"

1.875" SAE KEY 1.25" LONG
 5.75" D
 5.750"
 2.875"
 10°
 10°
 .562" D 2 HOLES
 .475" D
 .875" D
 .874"

CLOCKWISE
 ROTATION
 1.50"

1.50"

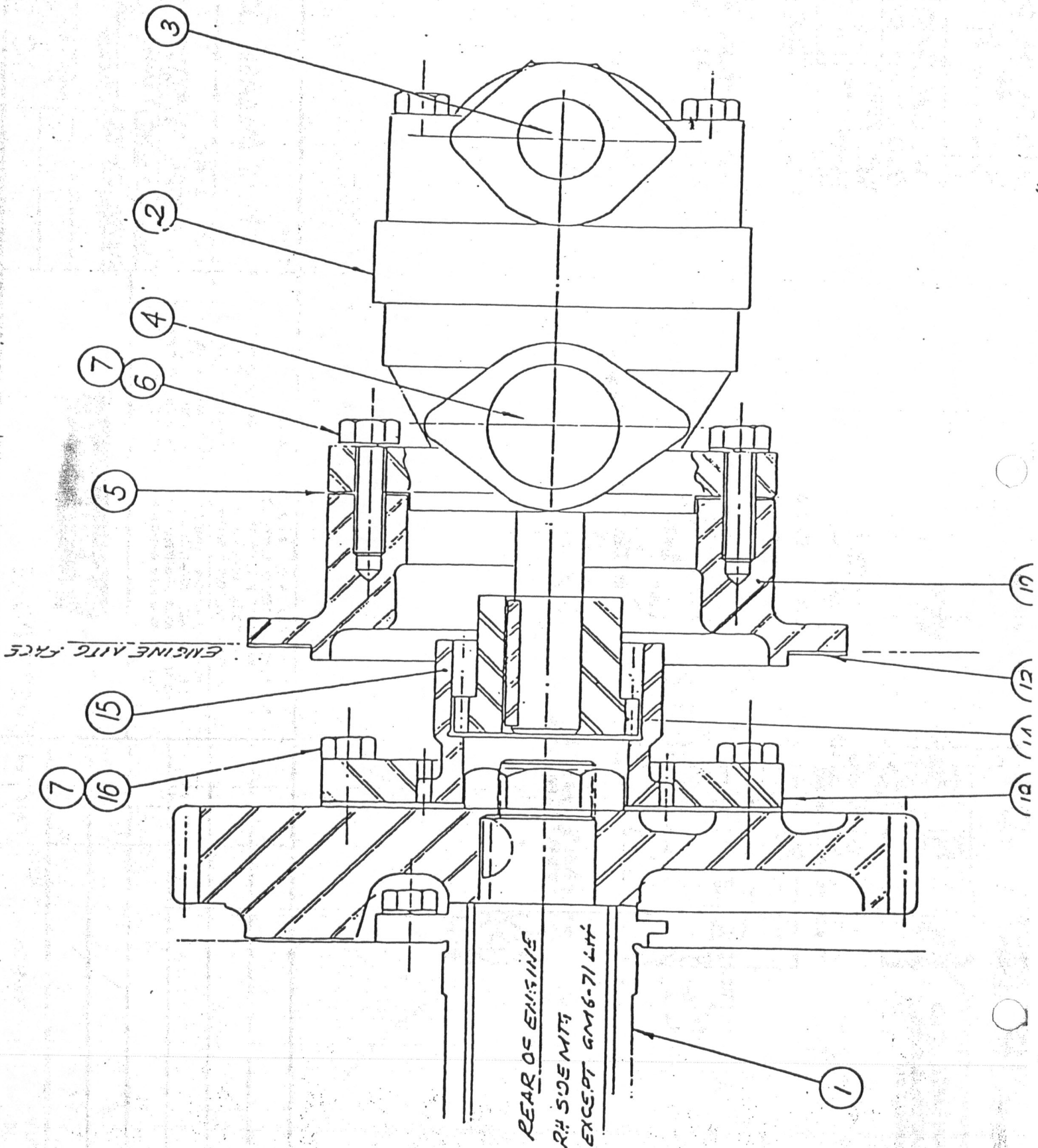
1.50"

SHAFT END PUMP SPECIFICATIONS				
DELIVERY GPM AT 1200 RPM 100 PSI	DISPLACEMENT CU IN/REV	MAX RPM	MAX PSI	APP DEL H.P. AT MAX SPEED & PRESSURE
8	1.62	2800	2500	17.5
COVER END PUMP SPECIFICATIONS				
DELIVERY GPM AT 1200 RPM 100 PSI	DISPLACEMENT CU IN/REV	MAX RPM	MAX PSI	APP DEL H.P. AT MAX SPEED & PRESSURE
11	2.22	2500	2500	23
				37.5

FOR INDIVIDUAL APPLICATIONS
 SEE VICKERS PERFORMANCE CURVES

TITLE		PUMP ASSEMBLY-DOUBLE V2020 SERIES	
MATERIAL SPEC.		VICKERS V2020F-1 F8S IIS-1AC8E-20	
MODEL	B/M NO.	DRAWN	DATE
8410-RBC	071-155		31 OCT 82
		CHECKED	SCALE
		DWG. NO.	
		38192-18-1P	

DO NOT SCALE DRAWING		TOLERANCES UNLESS OTHERWISE SPECIFIED:	
MACHINED DIMENSIONS		± .010 (0.25 mm)	
FRACTIONAL DIMENSIONS		± 1/32 (0.75 mm)	
FLAME CUT DIMENSIONS		± 1/16 (1.50 mm)	
PETTIBONE (CANADA) LIMITED RESERVES ALL PROPRIETARY RIGHTS TO THIS DRAWING AND THE DATA SHOWN THEREON. THIS DRAWING IS SUBMITTED IN CONFIDENCE AND MUST NOT BE USED OR REPRODUCED WITHOUT THE PRIOR CONSENT OF PETTIBONE.			
REV. NO.	REVISION	DATE	BY



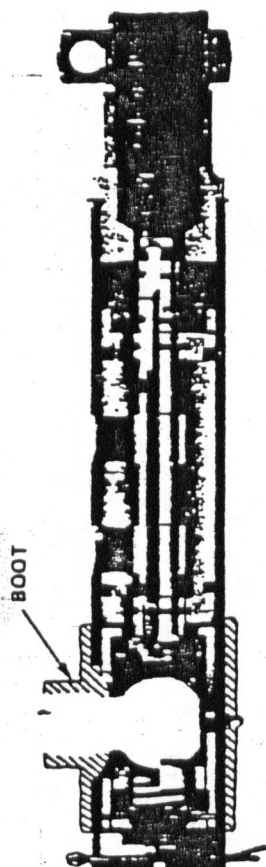
3A-93

3A-93

PUMP INSTALLATION W/ DETROIT DIESEL

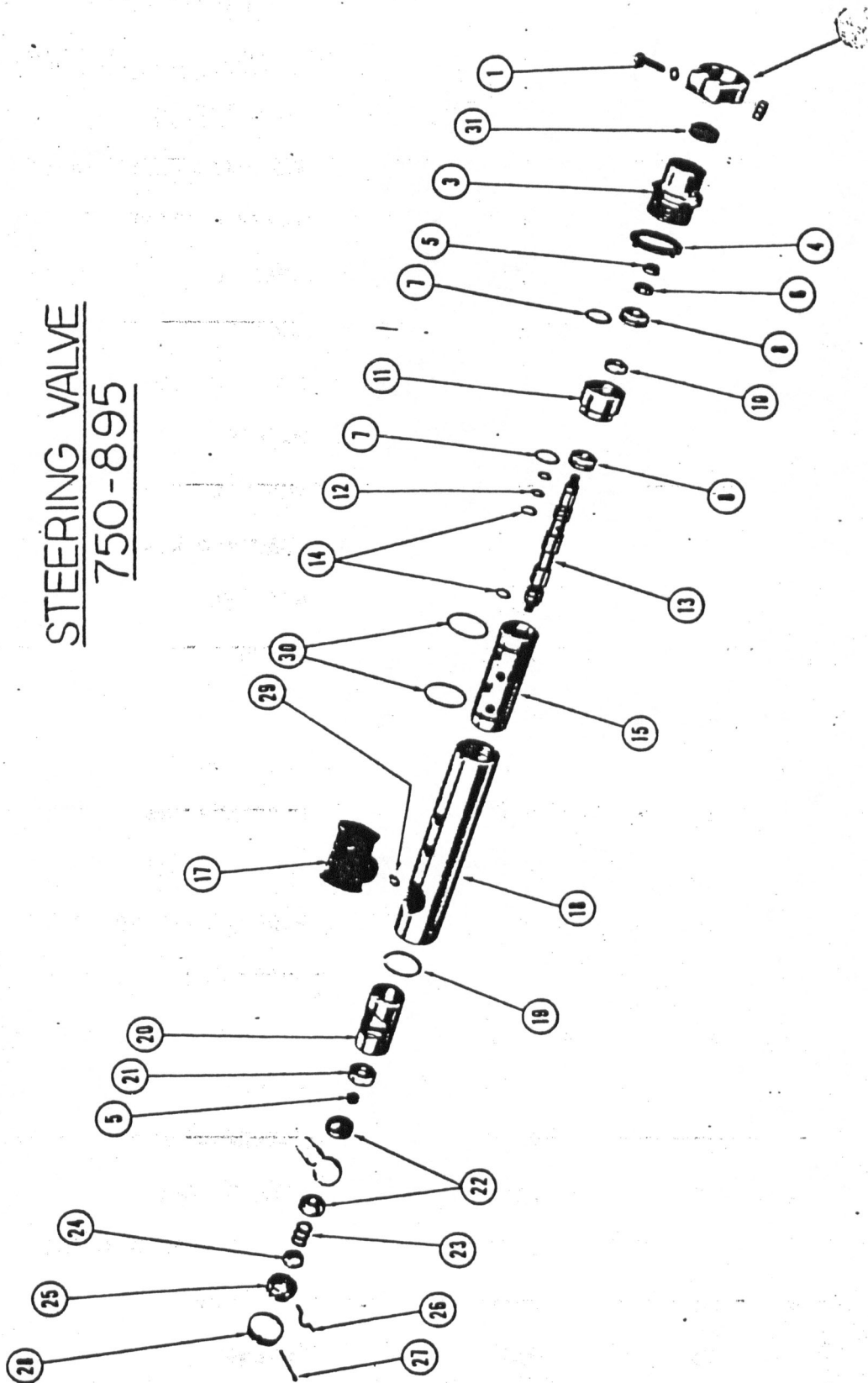
DWG # 34662 07 4

ITEM	QTY	DESCRIPTION	PART NO.
1	1	ENGINE ASSEMBLY	SEE BM
2	1	PUMP (VICKERS)	32863 18 1P
3	1	FITTING SUCTION HOSE	31989 11 1P 26
4	1	FITTING PRESSURE HOSE	32057 11 1P 19
5	1	GASKET	GM#5188755
6	2	BOLT HEX HD 3/8"-16 UNC X 1-1/4" LG	GM#181360
7	6	LOCKWASHER 3/8" I.D.	GM#103321
8	4	BOLT HEX HD 1/2" NC X 1-1/4" LG	GM#179982
9	4	LOCKWASHER 1/2" I.D.	NS
10	1	BOLT HEX HD 7/16" NC X 1"	GM#100146
11	1	WASHER FLAT BRASS 7/16" I.D.	NS
12	1	ADAPTER HYD. PUMP	GM#5137472
13	1	GASKET	GM#5104506
14	1	SPROCKET	GM#5138079
15	1	COUPLING HYD. PUMP	GM#5143616
16	4	BOLT SPECIAL	GM#5141592
17	-		
18	1	DISC HYD. PUMP DRIVE	GM#5170450



CROSS-SECTION ILLUSTRATION — G21 SERIES VALVES

STEERING VALVE 750-895



STEERING VALVEPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1		HEX HEAD CAPSCREW 1/2"-20 x 2-3/4" IG	1
2	2143	ADAPTOR CLAMP	1
3	2155	ADAPTOR	1
4	2144	LOCK RING	1
5	32394	FLEXLOC NUT	2
6	2131	WASHER	1
7	32266	"O" RING SEAL	2
8	2139	REACTION RING	2
9		NOT USED	
10	2160	SPACER	1
11	2136	GLAND	1
12	32119	"O" RING SEAL	2
13	2162	PISTON 8 GPM	1
14	32116	"O" RING SEAL	2
15	2102	BODY 3/8-18 NPT PORTS	1
16		NOT USED	
17	37335	DUST SHIELD	1
18	2130L	VALVE HOUSING	1
19	2132	RETAINING RING	1
20	2103	BALL SOCKET	1
21	2104	BALL SOCKET BEARING	1
22	2105	BALL SEAT	2
23	147	SPRING	1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
24	2107	PLUG WASHER	1
25	2106	BALL SOCKET PLUG	1
26	2108	BALL SOCKET PLUG LOCK	1
27		COTTER PIN 1/8" x 3	1
28	2135	END PLUG	1
29	32016	LUBE FITTING	1
30	2199-5	VALVE OVERHAUL KIT	1

STEERING VALVE
PETTIBONE 220 PRC CRANE

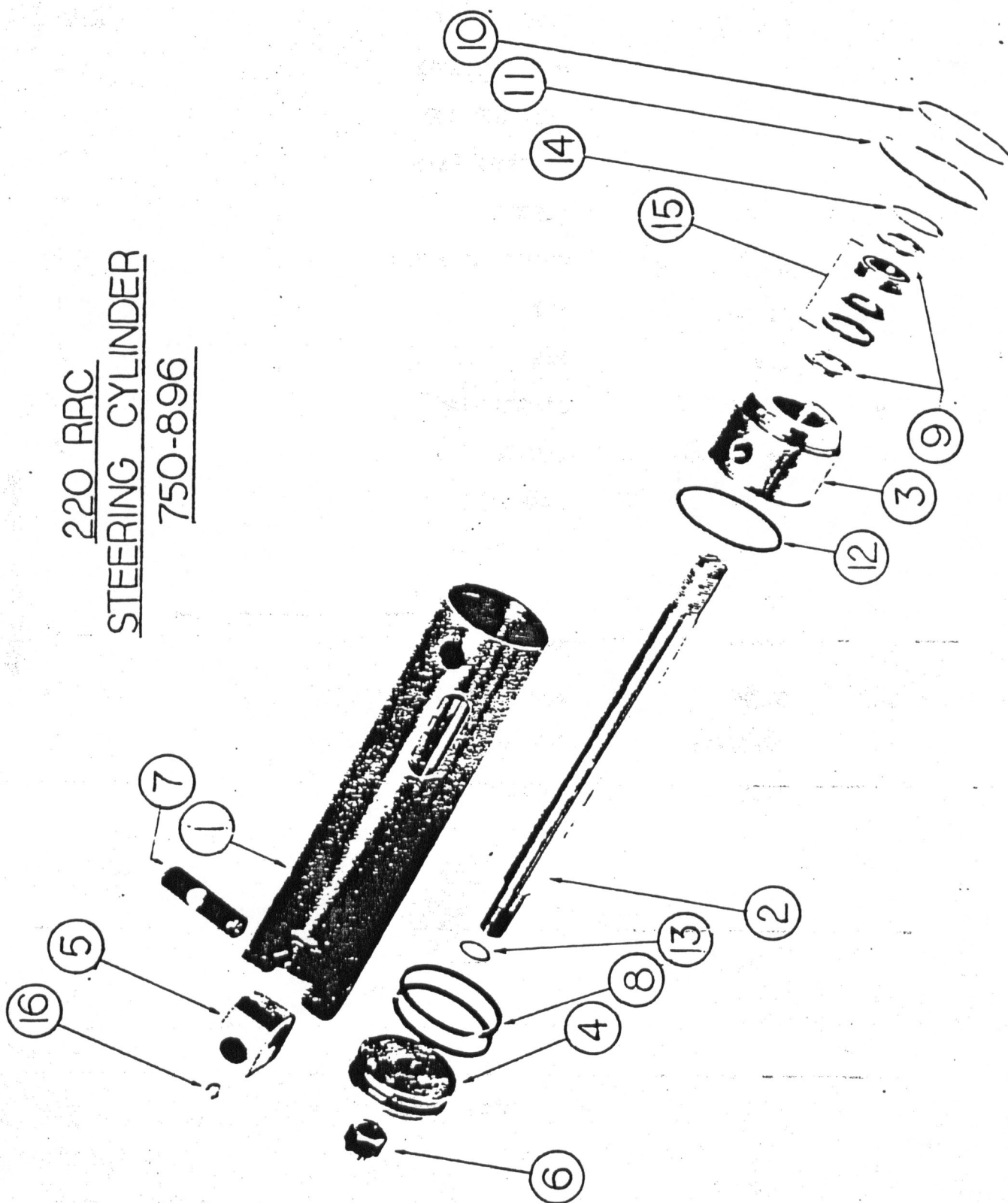
REMOVAL:

DISCONNECT ALL HYDRAULIC LINES AND CAP THEM OFF TO INSURE THAT THEY WILL STAY CLEAN. TAG LINES FOR CORRECT HOOK-UP AT ASSEMBLY.

DISASSEMBLY, CLEANING, INSPECTION AND REPAIR:

SEE SERVICE AND MAINTENANCE MANUAL IN BACK OF THIS MANUAL.

220 RRC
STEERING CYLINDER
750-896



STEERING CYLINDER

750-896

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	34828	BODY ASSEMBLY	1
2	34834	CYLINDER ROD	1
3	36522	CYLINDER HEAD	1
4	34614	PISTON	1
5	408	UNIVERSAL BLOCK	1
6	32464	NUT	1
7	407	PIN	1
8	406	PISTON RING	2
9	39192	WASHER	2
10	32726	SNAP RING	1
11	32417	SNAP RING	1
12	32077	"O" RING SEAL	1
13	32131	SEAL	1
14	32727	SNAP RING	1
15	32662-15	D-W-SEAL	1
16	32013	GREASE FITTING	1

3" Ø STEERING CYLINDER ASSEMBLYFETTIBONE 220 R4C CRANEDISASSEMBLY:

REMOVE SNAP RING (10) FROM CYLINDER HEAD (3). PUSH THE HEAD INTO THE CYLINDER ENOUGH TO PERMIT REMOVAL OF THE SNAP RING (11) FROM CYLINDER TUBE. BY PULLING THE ROD (2) OUTWARD, THE HEAD AND PISTON (4) AND ROD CAN BE REMOVED AS A UNIT. REMOVE HEAD FROM ROD. REMOVE SNAP RING (14), WASHERS (9), AND D-W SEAL (15) FROM HEAD. REMOVE NUT (6), PISTON (4), PISTON RINGS (8), AND SEAL (13). REMOVE PIN (7), UNIVERSAL BLOCK (5) AND GREASE FITTING (16).

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH SOLVENT AND DRY WITH COMPRESSED AIR.

IF PISTON IS REMOVED FROM ROD, SEAL (13) SHOULD BE REPLACED BEFORE ASSEMBLY.

INSPECT PISTON AND PISTON RINGS FOR WEAR AND SCORING, REPLACE WORN OR DAMAGED PARTS.

INSPECT INNER WALL OF THE CYLINDER BODY FOR SCORING. SLIGHT SCRATCHES ON THE WALL CAN BE REMOVED BY BUFFING WITH A CROCUS CLOTH.

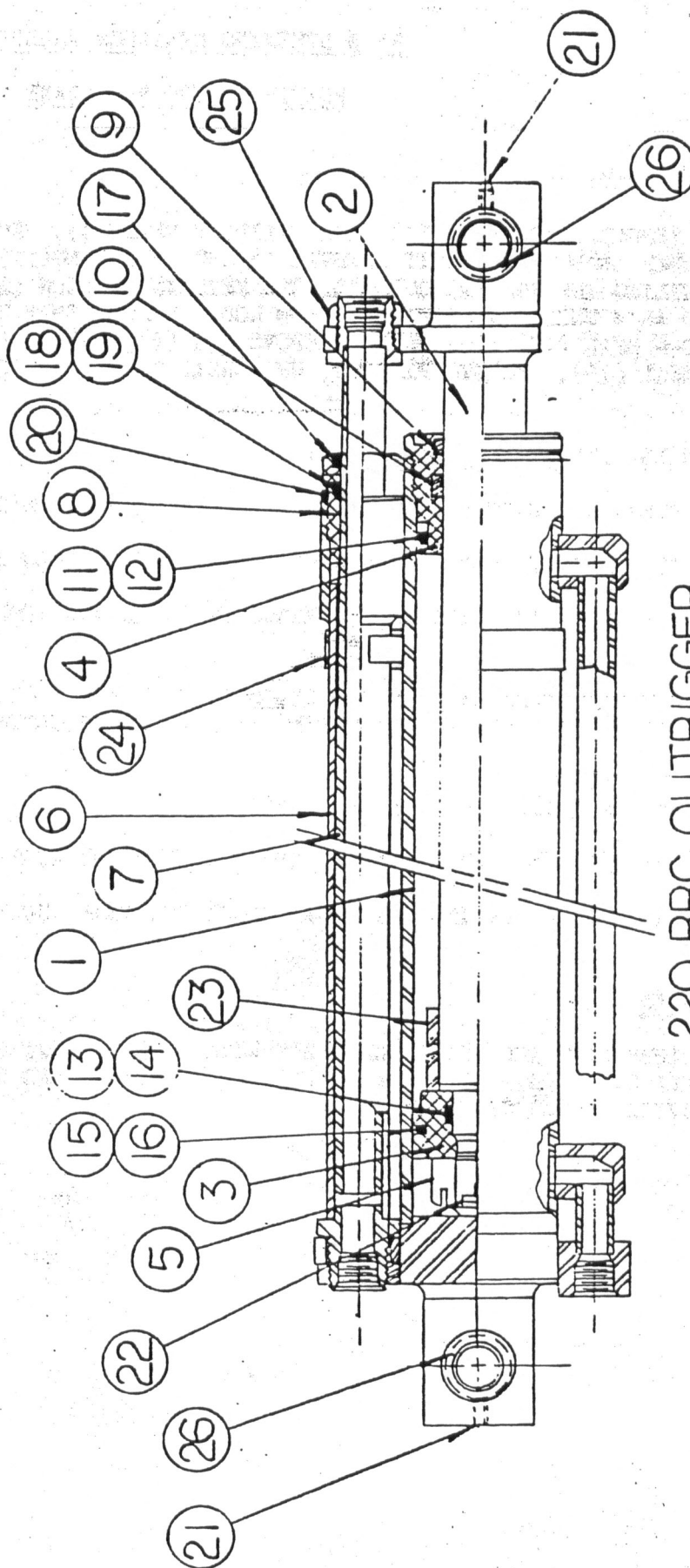
EXAMINE THE "O" RING SEAL FOR CUTS AND ABRASIONS ON THE OUTER SURFACE THAT WOULD CAUSE LEAKAGE. REPLACE IF NEEDED.

EXAMINE ROD SEAL ASSEMBLY (15) FOR WEAR AND CUTS AND REPLACE IF NEEDED.

CHECK REAR PIN AND UNIVERSAL BLOCK FOR WEAR AND REPLACE IF NEEDED.

ASSEMBLY:

LUBRICATE ALL SEALS AND PARTS WITH A LIGHT COAT OF OIL BEFORE ASSEMBLY. INSTALL RINGS ON PISTON HAVING THE JOINTS POSITIONED OPPOSITE EACH OTHER. ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



220 RRC OUTRIGGER
EXTENSION CYLINDER
750-842

32638-14-1P-3

220 RRC OUTRIGGER EXTENSION CYLINDER

750-842

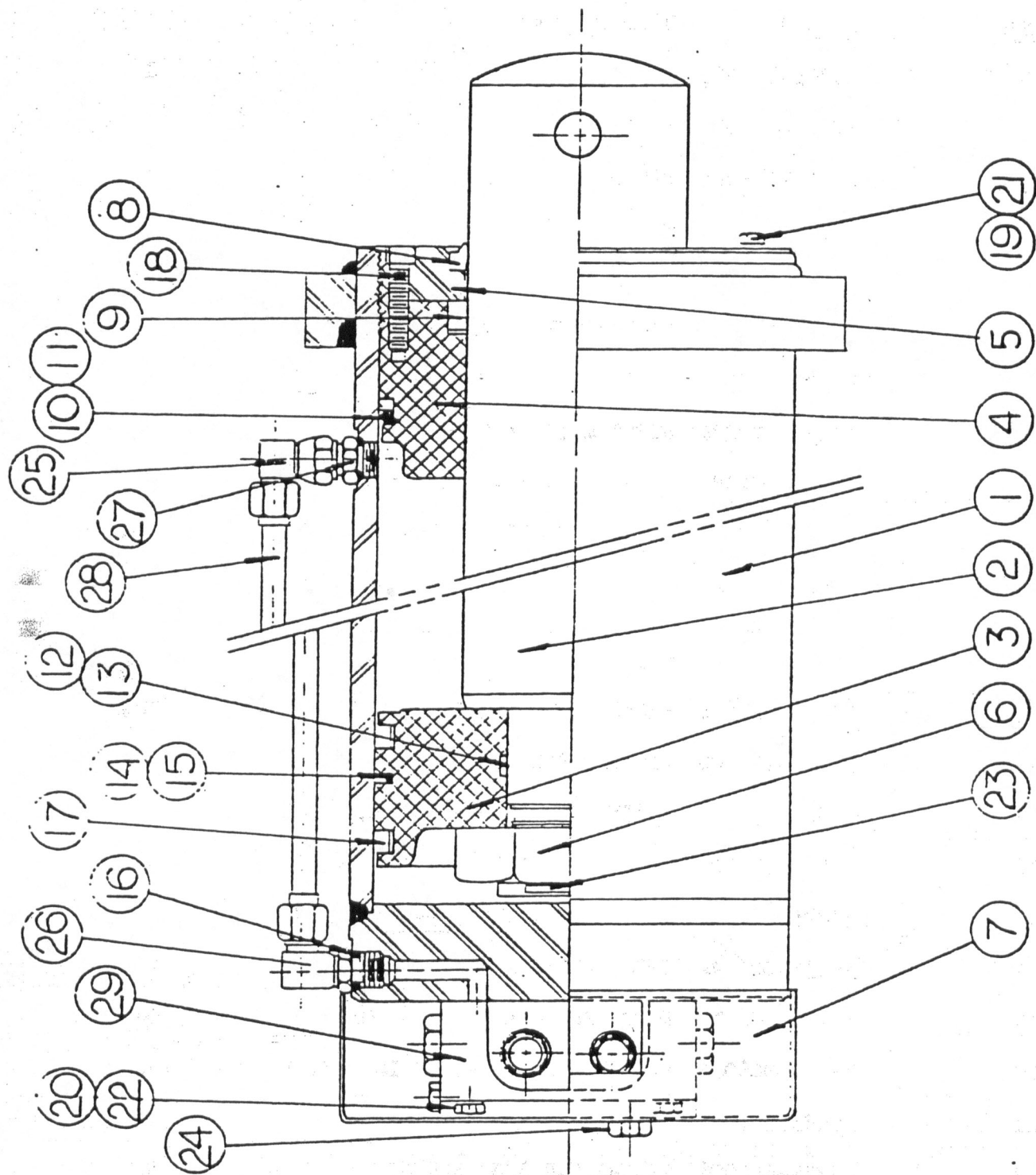
32638-14-1P.3

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	60900-040009	CASE ASSEMBLY	1
2	67725-024009	SHAFT ASSEMBLY	1
3	67050-040017	PISTON	1
4	64200-040024	HEAD GLAND	1
5	39300-003016	PISTON NUT	1
6	70295-018004	TROMBONE CASE ASSEMBLY	2
7	70245-012005	TROMBONE ROD ASSEMBLY	2
8	64485-019012	TROMBONE HEAD GLAND	2
9	59250-024030	WIPER 1-1/2" x 1-7/8"	1
10	57915-024030	U-CUP 1-1/2" x 1-7/8" x 3/8"	1
11	52500-172330	STATIC HEAD "O" RING 2-1/8" x 2-1/2" x 3/16"	1
12	38445-034040	STATIC HEAD BACKUP 2-1/8 x 2-1/2"	1
13	52500-172121	STATIC PISTON O-RING 1-1/16" x 1-1/4" x 3/32"	1
14	38445-017020	STATIC PISTON BACKUP 1-1/16" x 1-1/4"	2
15	55965-040000	SIRVON 2-1/2"	1
16	52500-172137	SIRVON LOADIN O-RING 2-1/16" x 2-1/4" x 3/32"	1
17	54015-172116	QUAD RING	2
18	52500-172116	TROMBONE O-RING 3/4" x 15/16" x 3/8"	2
19	38445-012015	TROMBONE BACK-UP 3/4" x 15/16"	2
20	52500-173914	TROMBLE HEAD GLAND O-RING	2
21	55575-004006	SHHS 1/4-20 x 3/8" LG NYLOK	2
22	53340-006032	COTTER KEY 3/16" x 2"	1

220 RRC OUTRIGGER EXTENSION CYLINDER (CONTINUED) -2-

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
23	68730-024003	SPACER	1
24	41790-012001	BAND & CLAMP ASSEMBLY	1
25	45375-000017	LOCK NUT	4
26	38655-000012	B-12L SELF-ALIGNING BALL BUSHING	2

ITEMS 9 THRU 20 SKS-NO40-UNO24-PTO17-A5 SEAL KIT A/R



220 PPC OUTRIGGER
JACK CYLINDER

750.843 3371.14-1P

220 RRC CUTTRIGGER JACK CYLINDER

750-843 33171-14-1P

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	60765-123003	CASE ASSEMBLY	1
2	67740-072003	SHAFT	1
3	66750-128041	PISTON	1
4	63750-128072	HEAD GLAND	1
5	69600-132073	THREAD RING	1
6	65250-040001	PISTON NUT 2-1/2-12 BUTT STD.	1
7	60525-000051	COVER CAP	1
8	59250-072084	WIPER 4-1/2 x 5-1/4	1
9	57945-072084	U-CUP TYPE B 4-1/2 x 5-1/4 x 5/8	1
10	52500-172443	O-RING, STATIC HEAD 7-1/2 x 8 x 1/4	1
11	38445-120128	BACKUP, STATIC HEAD 7-1/2 x 8	1
12	52500-172145	O-RING, STAIC PISTON 2-9/16" x 2-3/4" x 3/32"	1
13	38445-041044	BACKUP, STATIC PISTON 2-9/16 x 2-3/4	2
14	55965-128000	PISTON SEAL TFE-8"	1
15	52500-172263	O-RING SEMILOADING 7-1/4 x 7-1/2 x 1/8	1
16	52500-173908	O-RING FITTING .644 I.D. x .087 WALL	2
17	53775-008040	GREY IRON PISTON RING 8.040 O.D.	2
18	39135-006024	SHCS 3/8-16 x 1-1/2" LG	2
19	39180-004012	HHCS 1/4-20 x 3/4" LG GR. 5	1
20	39210-006044	HHCS 3/8-24 x 2-3/4" LG GR. 8	4
21	39285-001004	LOCKWASHER 1/2" SPRING	1
22	39285-001006	LOCKWASHER 3/8" SPRING	4
23	53340-005056	COTTER KEY 5/32 x 3-1/2" LG	1

DOUBLE PILOT CHECK LOCK VALVEPETTIBONE 220 RRC CRANE

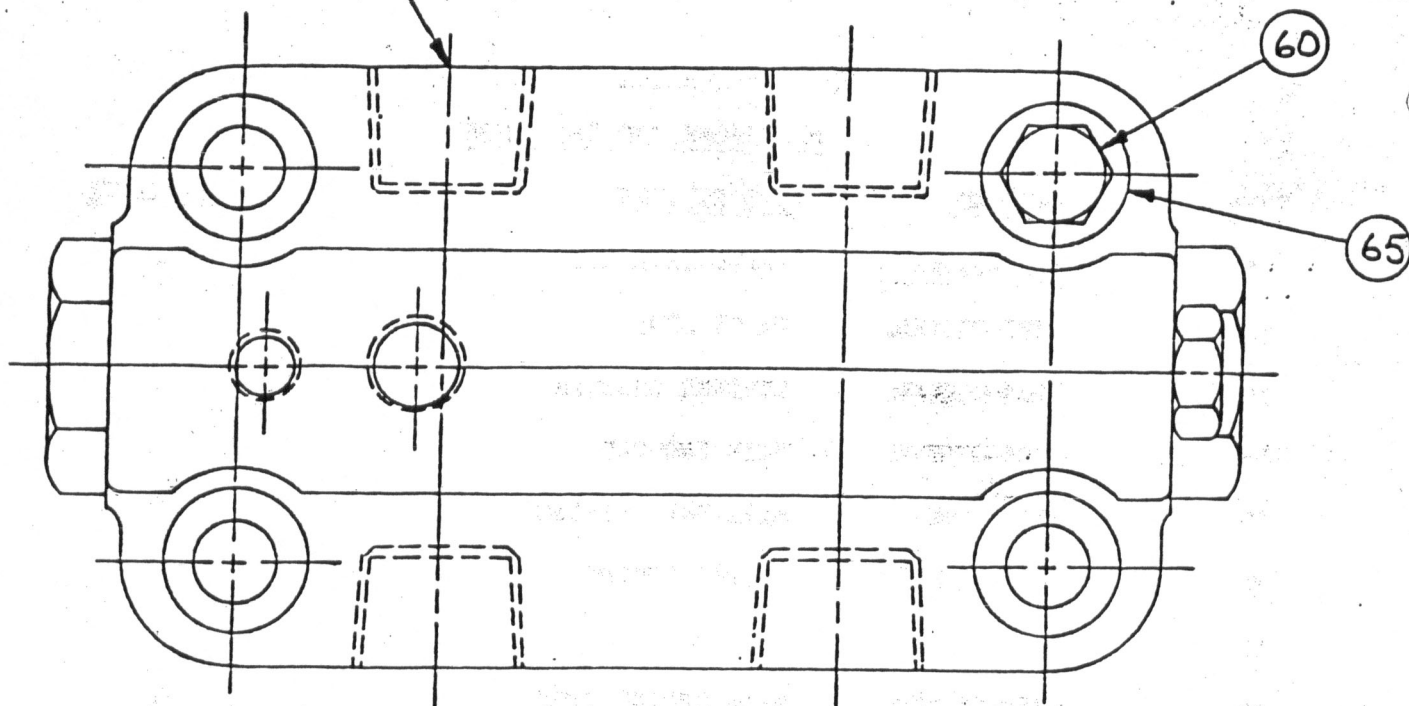
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
9	5101-012007	VALVE SEAL KIT	1
10	4890-012004	VALVE BODY	1
16	5165-012001	STRIKER SHUTTER	1
18	4985-017001	MAIN END CAP	2
20	3785-008002	MAIN BALL SPRING	2
21	3785-005-001	RELIEF SPRING	1
24	4850-009025	MAIN BALL	2
25	4850-004025	MAIN SPRING STOP	1
28	5175-000001	RELIEF BALL	2
29	5175-000002	RELIEF SPRING STOP	1
31	5095-007001	REVERSIBLE VALVE SEAT	2
33	5085-009001	RELIEF CAP AND SEAT	1
35	3500-172116	"O" RING VALVE SEAT 3/4 x 15/16 x 3/32	2
36	3500-172011	"O" RING RELIEF SEAT 5/16" x 7/16" x 1/16"	1
38	3500-170312	"O" RING MAIN END CAP .924 x .116	2
39	3500-170036	"O" RING RELIEF END CAP .468 x .078	1
40	3500-172114	"O" RING VALVE MOUNTING FACE 5/8" x 13/16" x 3/32"	2
60	2612-006044	HEX HEAD CAPSCREW GR. 5 3/8" NF x 2-3/4" LG	4
65	2619-001006	SPRING LOCKWASHER	4
66	3340-002002	ALLEN HEAD PIPE PLUG 1/8" NPT	1
67	3327-001013	SQUARE HEAD PIPE PLUG 1/8"	1
68	3341-002002	FLAT WASHER 3/8" OD x .170 ID x 1/32"	3

NOTE: ITEM #9 CONSISTS OF ITEMS 35 - 40

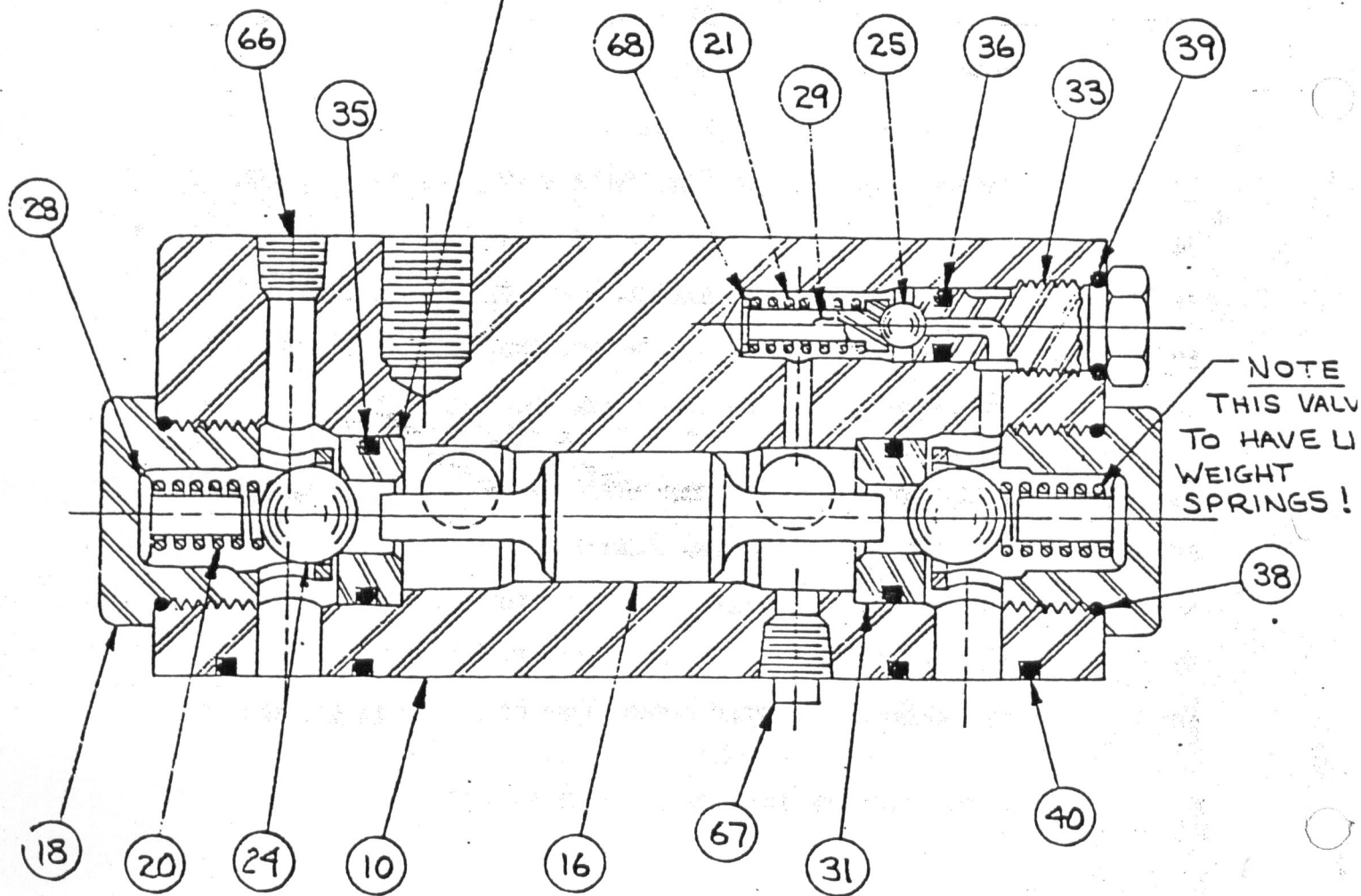
3A-107

3A-107

$\frac{1}{2}$ " NPT ~ 4 PORTS



REVERSIBLE DOUBLE SIDED VALVE SEATS (2)



DOUBLE PILOT CHECK LOCK VALVE

22 RRC OUTRIGGER JACK CYLINDER (CONTINUED -2-

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
24	39165-008012	HHCS 1/2-13 x 3/4" LG	1
25	45660-012012	SWIVEL ELBOW 90°	1
26	45675-012012	ADJUSTABLE ELBOW 90°	1
27	45900-012012	MALE ADAPTOR	1
28	66390-008005	PORT TUBE ASSEMBLY	1
29	72075-012001	VALVE	1
	V-01	VALVE SEAL KIT	A/R
	SKS-N128- UNO72-PTO41	SOFT SEAL KIT (CYLINDER ONLY)	A/R
	SKH-C128- UNO72-PTO41	HARD SEAL KIT (CYLINDER ONLY)	A/R

DOUBLE PILOT CHECK LOCK VALVEPETTIBONE 220 RRC CRANEREMOVAL:

REMOVE VALVE ASSEMBLY FROM VERTICAL CYLINDER BY REMOVING THE BOLTS (60) AND WASHERS (65) OFF THE VALVE. BE CAREFUL NOT TO LOOSE THE BOTTOM O-RINGS (40) WHEN REMOVING VALVE.

DISASSEMBLY:

UNSCREW MAIN END CAP (18) BEING CAREFUL OF THE SPRING STOP (28), SPRING (20), AND THE MAIN BALL (24) WHICH WILL COME OUT NEXT. REMOVE VALVE SEAT (31) AND SPOOL (16).

TO DISASSEMBLE THE UPPER PART OF THE VALVE, REMOVE THE RELIEF CAP (39) WHICH WILL ALLOW REMOVAL OF THE RELIEF BALL (25), SPRING STOP (29), SPRING (21) AND THE FLAT WASHER (68).

CLEANING, INSPECTION AND REPAIR:

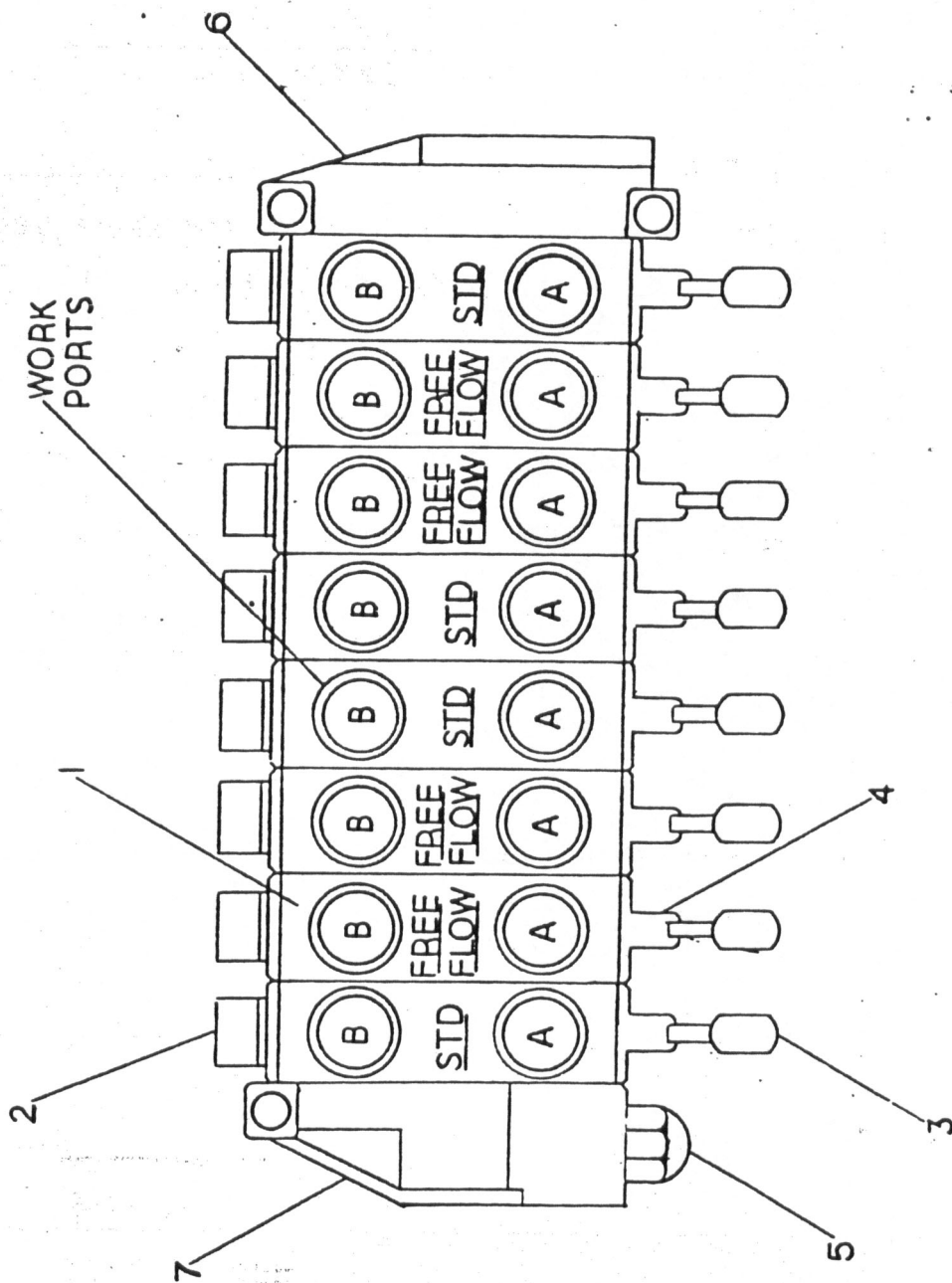
CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL SEALS TO INSURE THAT THERE ARE NO SPLITS OR CRACKS. CHECK INNER WALL OF THE TUBE TO SEE IF THERE ARE ANY SCORES OR SCRATCHES AND REPLACE WORN OR DAMAGED PARTS.

APPLY A LIGHT COAT OF OIL ON ALL PARTS BEFORE ASSEMBLING.

ASSEMBLY:

REASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



OUTRIGGER CONTROL VALVE
750-841 33973-14-1P

3A-111

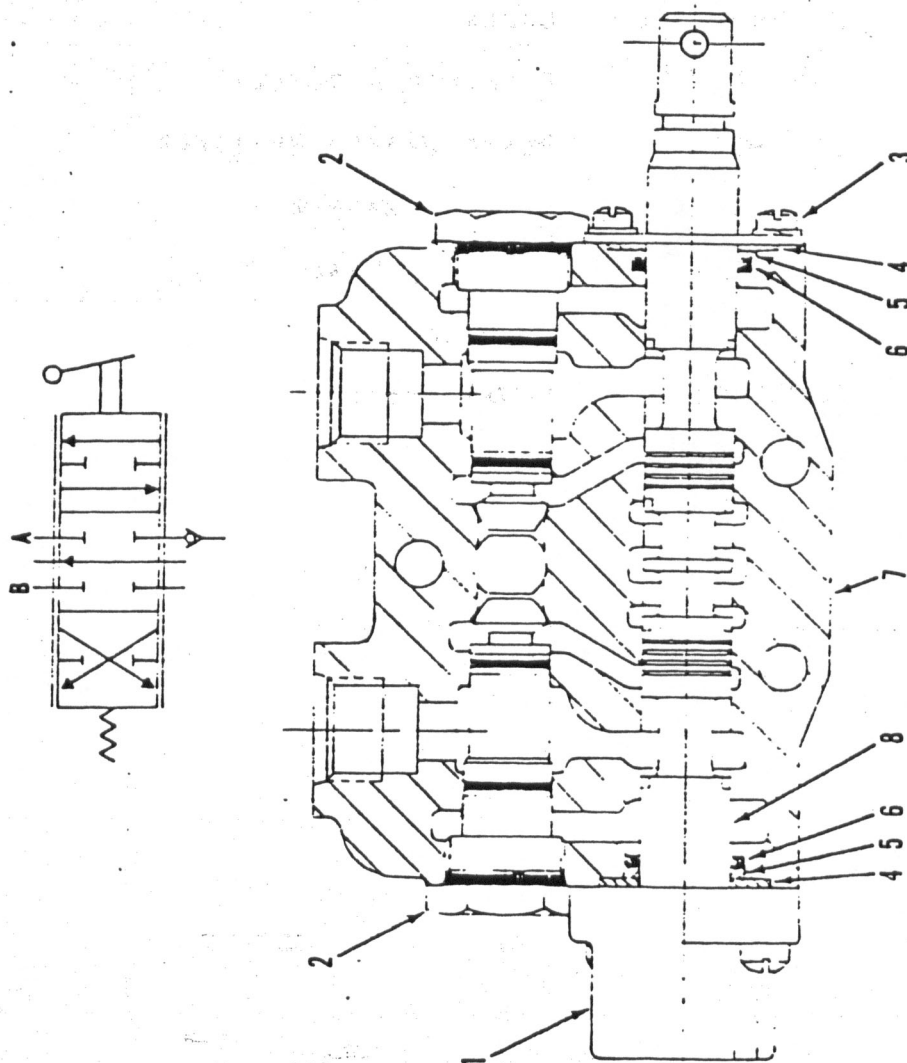
3A-111

OUTRIGGER CONTROL VALVE

750 - 84133973-14-1P

<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	8072	4-WAY, 3 POSITION VALVE SECTION	8
2	1811-001	SPOOL ACTION BONNETS	8
3	1802	HANDLE ASSEMBLY	8
4	1801	BRACKET	8
5	WC	MAIN RELIEF	1
7	8398	INLET COVER	1

NOTE: SET MAIN RELIEF AT 1550#



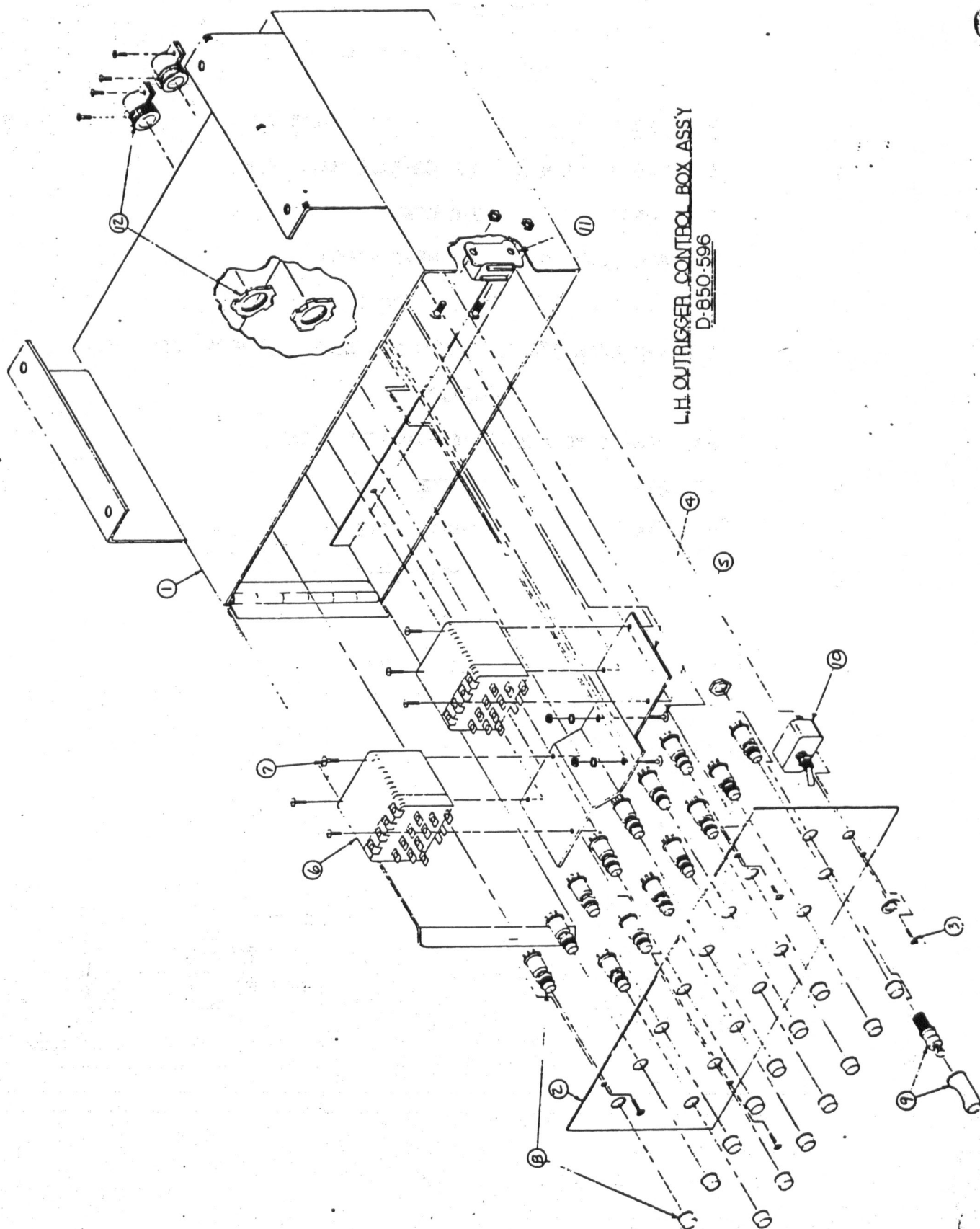
4-WAY, 3-POSITION VALVE SECTION
(ITEM-1 ON PREVIOUS PAGE)

4-WAY, 3-POSITION VALVE SECTION
(ITEM 1 FROM PREVIOUS PAGE)

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	K-6125	POSITIONER	1
2	K-6030	CHECK	2
3	K-6033	RETAINER ASSEMBLY	1
4	6752-001	PLATE WASHER RETAINER	2
5	3265-001	BACK-UP WASHER	2
6	7700-001	"O" RING SEAL	2
7	8072	HOUSING	1
8	8084-001	4-WAY SPOOL	1

3A-114

3A-114

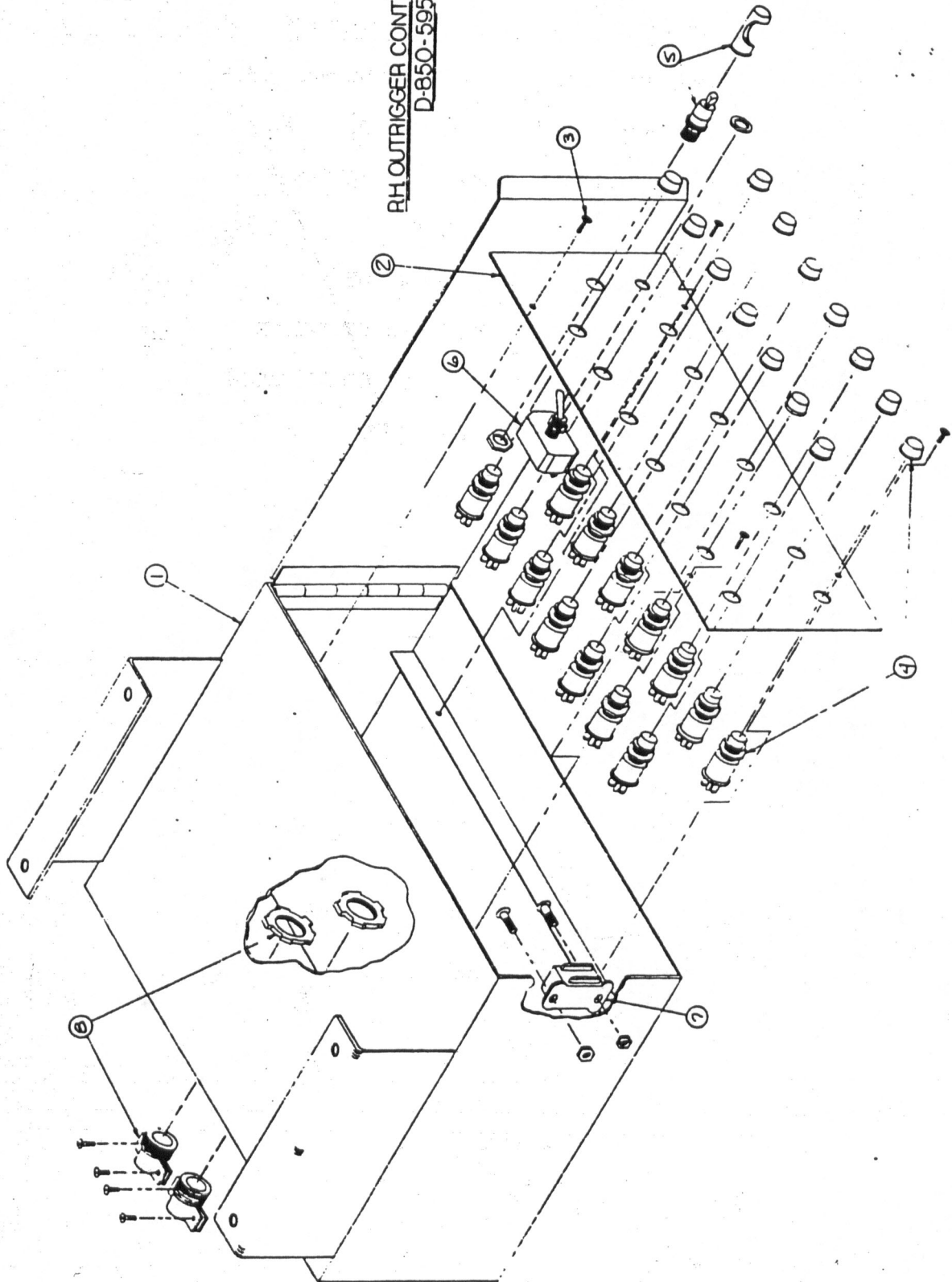


OUTRIGGER CONTROL BOX - L. H.

D-850-596

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-850-503 - L.H.	O/R CONTROL BOX - L.H.	1
2	C-850-505	O/R CONTROL PANEL	1
3	NO #8 x 1/2" LG	PAN HEAD SCREWS	4
4	D-850-503-6	RELAY MOUNTING PLATE	1
5	1/4"-20 NC x 3/4" LG	ROUND HD. SCREW w/NUT & LOCKWASHER	2
6		RELAY	2
7	NO. #10-32 NC x 1/2" LG	ROUND HD SCREW	6
8	751-033	SWITCH	14
9	751-035	PANEL LIGHT	1
10	751-036	PANEL LIGHT SWITCH	1
11	751-039	MAGNETIC COVER SWITCH	1
12	751-038	WIRE CLAMP	2

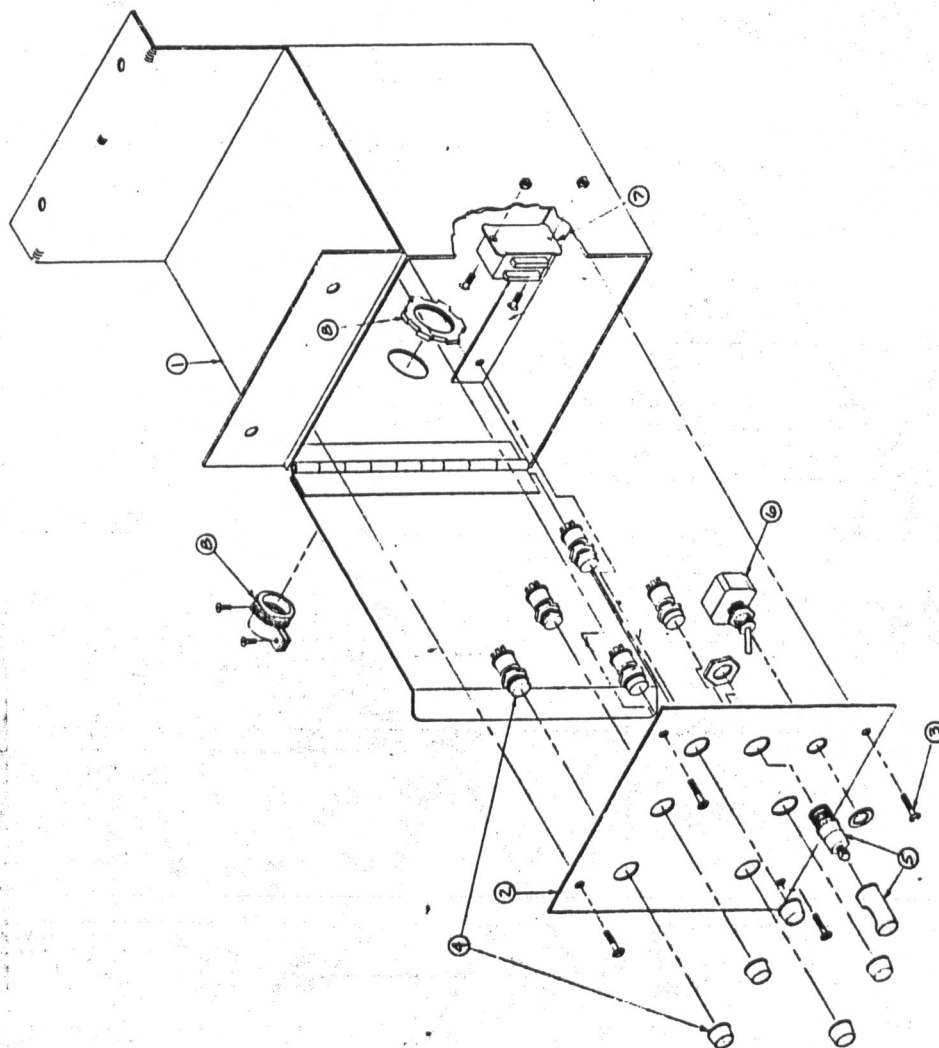
RH OUTRIGGER CONTROL BOX ASSY
D-850-595



OUTRIGGER CONTROL BOX - R. H.

D-850-595

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-850-503 - R.H.	O/R CONTROL BOX - R.H.	1
2	C-850-505	O/R CONTROL PANEL	1
3	NO. 8 x 1/2" LG	PAN HEAD SCREWS	4
4	751-033	SWITCH	14
5	751-035	PANEL LIGHT	1
6	751-036	PANEL LIGHT SWITCH	1
7	751-039	MAGNETIC COVER LATCH	1
8	751-038	WIRE CLIPS	2

[illegible][illegible]

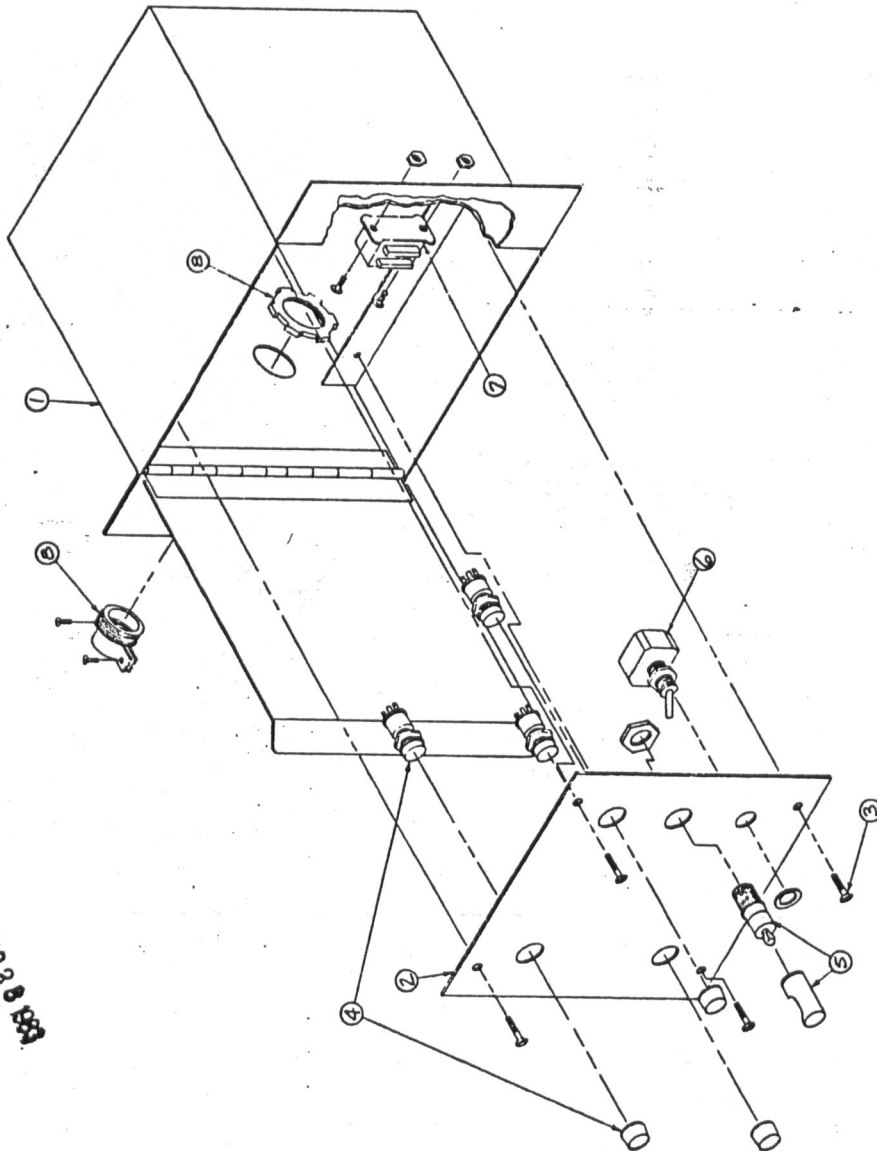
NOTE: T LEG'D WITH DOOR HINGED
ON RA SIDE

3A-119

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3A-119

NISC NATIONAL IRON COMPANY	
FRONT END PART CENTER, INC. - LEBEN	
220 PEE-CLARE	
100 12/7/77	
D-850-578	



NOTE: 1 REQ'D WITH DOOR HINGED
ON RA SIDE

MAR 28 1983



NO	WIRE	INSTALLATION	FROM	REFERENCE	CHART
45			PULLING PLANCE LIGHT SWITCH		TO
46			FROM PLANCE LIGHT SWITCH		PLANT PLANCE LOW AIR SWITCH
47			PULLING PLANCE LIGHT SWITCH		PLANT " " " "
48			LOW AIR PLANCE SWITCH		PLANT " " " "
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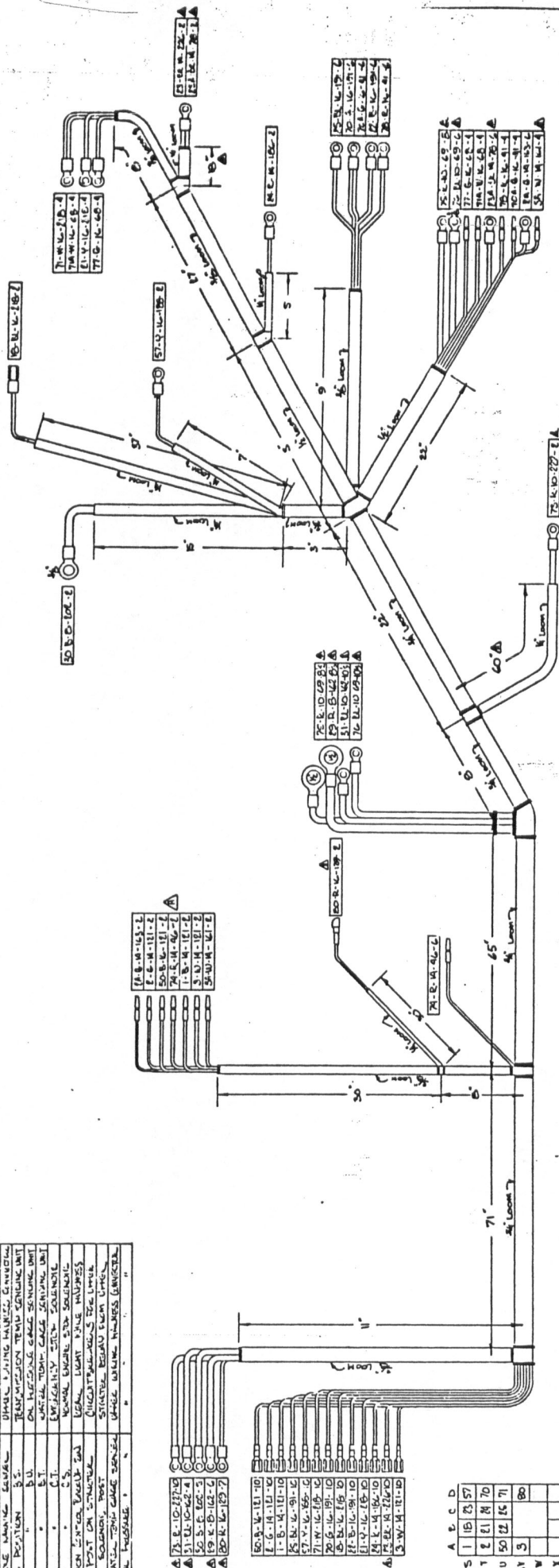
- A. Used On Hudson Automatic Transmission Equipped Machines
At High Temp Insulation
- B. Used On Summers Transmission Equipped Machines
When Air Shift As Neutral Inoperative
- C. Used As Original Foot Machine Lights For Winter
Temp And Oil Press. These Wires Will Be In Litterals
And Can Be Used As Spares When Not Used For Lights.
- D. Used On 210 EEC Machine To Provide Electric Outlets
To Run Pilot Compress. Not Used On Machines With Manual
Outlets As Common.
- E. Used On 210 EEC Machine For Synthetic Compressor Source
Vulcanization Not Used On Some Machines

NO.	WIRE	INSTALLATION	FROM	TO	REFERENCE	CHANGES
1	120V	LIGHT	WAGGAMAN NO. 1			
2	120V	LIGHT	SWITCH THE LIGHT TEAM			
3	120V	WATER	WAGGAMAN NO. 7			
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MAR 28 1963

DATE	TIME	LOCATION	REMARKS
10/10/70	17:10	General Jackson	

		NATIONAL IRON COMPANY DIVISION OF NIPPON STEEL CORP. 10000 W. 10TH AVE. DENVER, CO. 80202	
DASHA WINE BUCKLES HIGH TEE RUMORE (BUTTS) BE WE DO TELS		DATE 10/10/70 TIME 17:10 LOCATION DASHA-GRI	



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NAME	RELATION	RESIDENCE	GRADE
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WIRE IDENTIFICATION NO. WIRE GAUGE WIRE GAUGE TOTAL LENGTH AMOUNT PROTECTING FROM LOOM OR THREAD

Case Case

R	RED
W	WHITE
B	BLACK
Y	YELLOW
G	GREEN
BL	BLUE
BR	BROWN

NOTE: WREST WIKES
ON MAIN PAGE ROUNDED
ON POSITION "JUNIOR"
BY FINAL ASSAY.

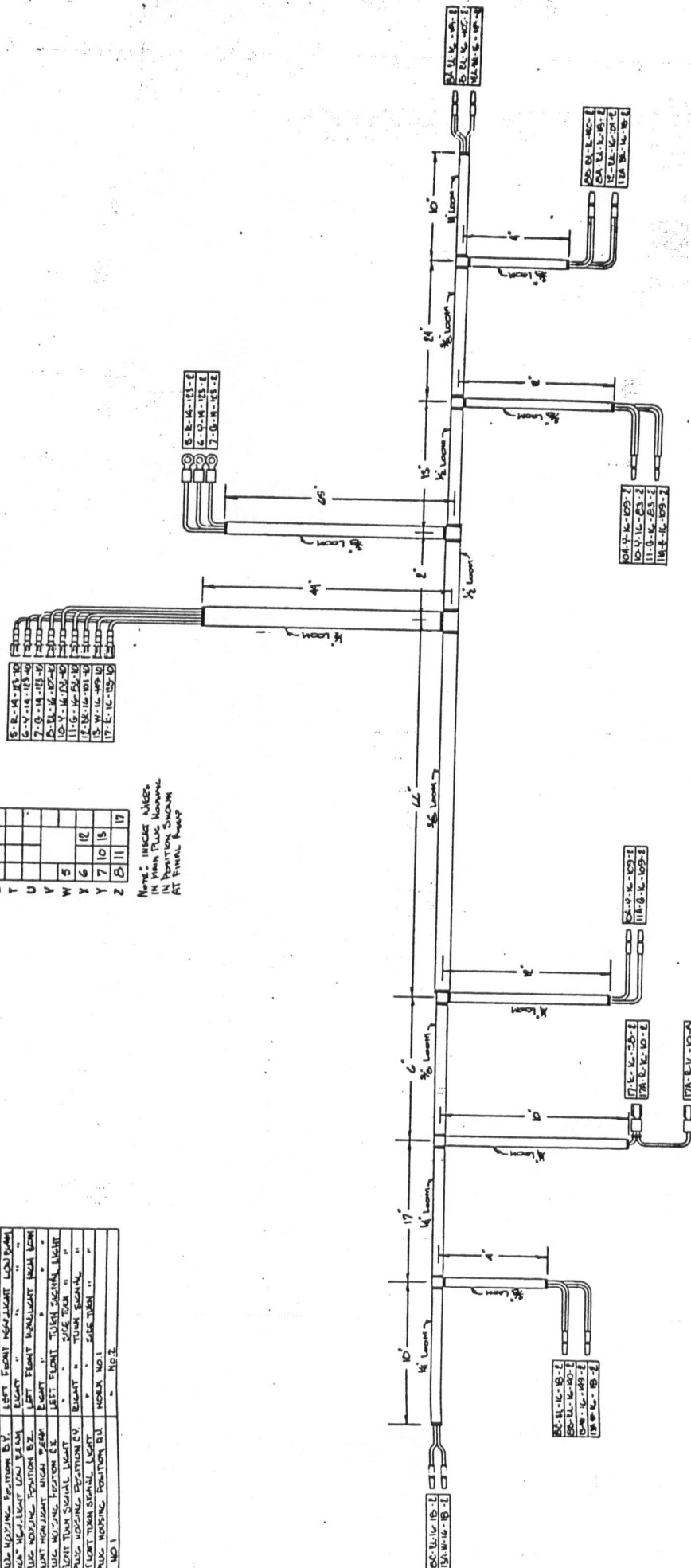
~~REAR~~ 28 1033

[illegible]

WIRE INSTALLATION	REFERENCE	WIRE
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2	MAIN PULSE NO. 2	10-16-10-2
3	MAIN PULSE NO. 3	10-16-10-3
4	MAIN PULSE NO. 4	10-16-10-4
5	MAIN PULSE NO. 5	10-16-10-5
6	MAIN PULSE NO. 6	10-16-10-6
7	MAIN PULSE NO. 7	10-16-10-7
8	MAIN PULSE NO. 8	10-16-10-8
9	MAIN PULSE NO. 9	10-16-10-9
10	MAIN PULSE NO. 10	10-16-10-10
11	MAIN PULSE NO. 11	10-16-10-11
12	MAIN PULSE NO. 12	10-16-10-12
13	MAIN PULSE NO. 13	10-16-10-13
14	MAIN PULSE NO. 14	10-16-10-14
15	MAIN PULSE NO. 15	10-16-10-15
16	MAIN PULSE NO. 16	10-16-10-16
17	MAIN PULSE NO. 17	10-16-10-17

A	B	C	D
S			
T			
U			
V			
W			
X			
Y			
Z			

Note: INSIDE WIRE IN MAIN PULSE NO. 1 IN POSITION SHOWN AT FINAL REAR



WIRE COLOR WIRE GAGE WIRE TOTAL LENGTH WIRE IDENTIFICATION NO. 7

WIRE IDENTIFICATION NO. 7	WIRE TOTAL LENGTH	WIRE GAGE	WIRE COLOR
10-16-10-1	10-16-10-1	10-16-10-1	10-16-10-1

WIRE IDENTIFICATION NO. 7	WIRE TOTAL LENGTH	WIRE GAGE	WIRE COLOR
10-16-10-1	10-16-10-1	10-16-10-1	10-16-10-1

WIRING DIAGRAM

NATIONAL IRON COMPANY

PLANT NO. 1

DATE: 10-16-10-1

BY: 10-16-10-1

FOR: 10-16-10-1

REVISION: 10-16-10-1

APPROVED: 10-16-10-1

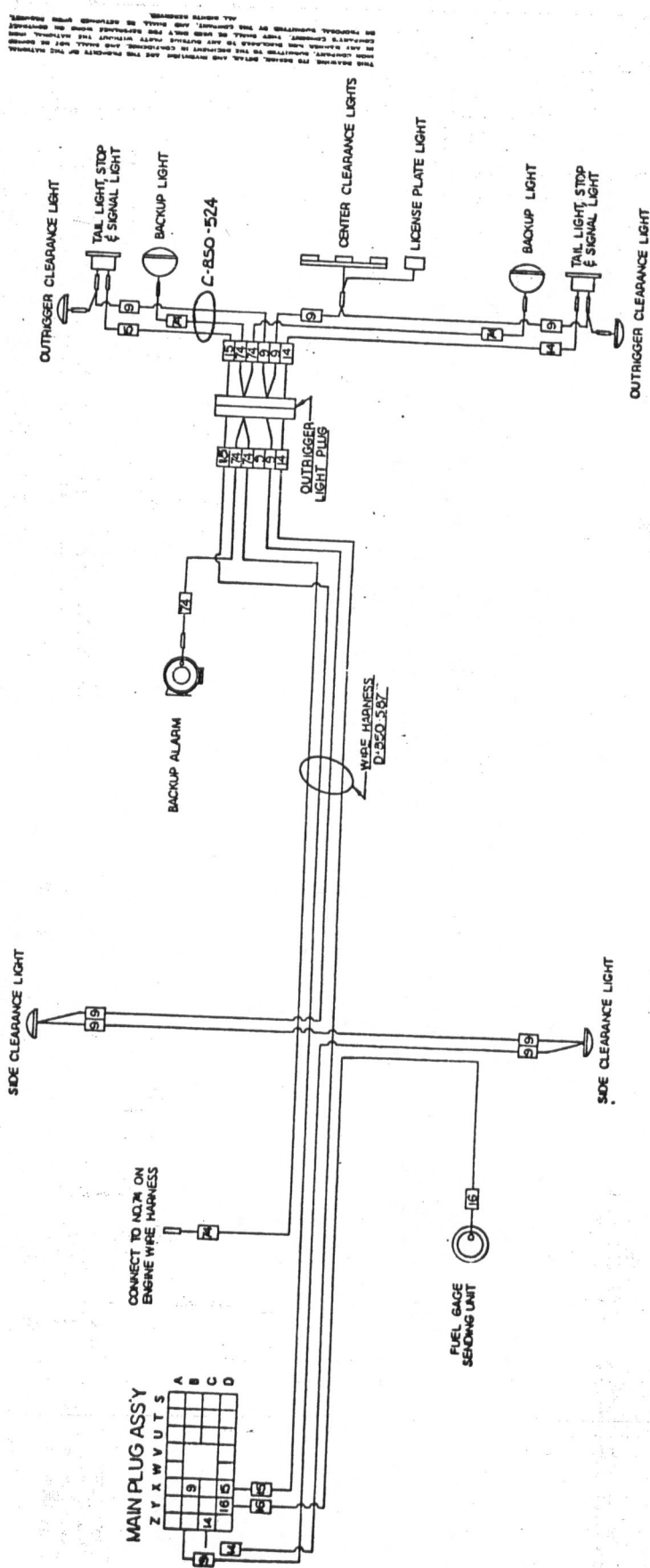
10-16-10-1

REAR LIGHTING WIRING SCHEMATIC
 NATIONAL IRON COMPANY
 DULUTH, MINNESOTA
 DIVISION OF PETERSON CORPORATION

REVISION	DATE	BY	DESCRIPTION
1	5-15-50	W.D.	W.D.

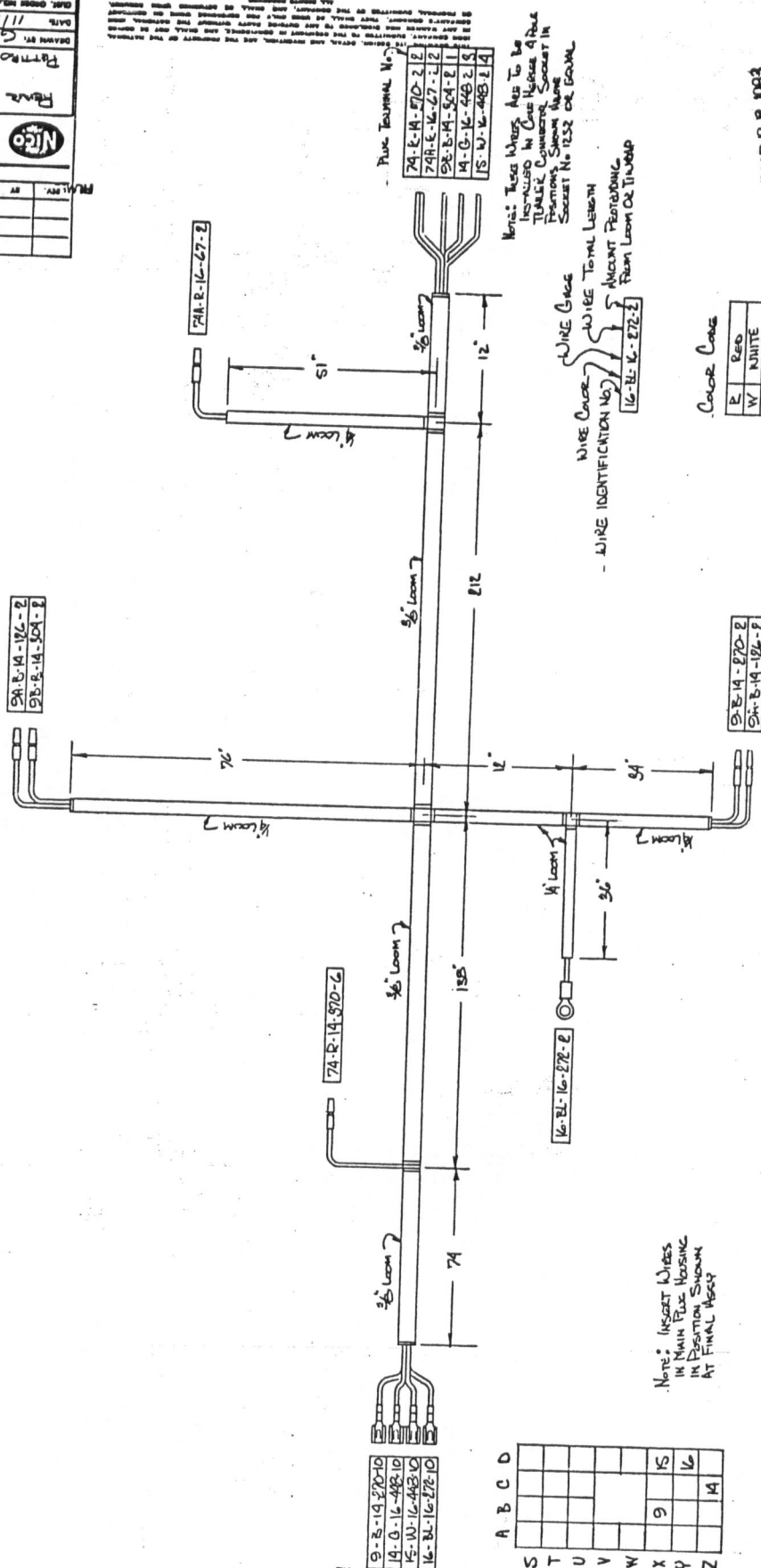
DATE: 5-15-50
 DRAWN BY: W.D.
 C-850-588

REAR LIGHTING WIRING SCHEMATIC
 C-850-588



MAR 28 1950

NO	DESCRIPTION	TO
1	MAIN FUEL POSITION	LEFT MIXTURE CURENCE LIGHT
2	MAIN FUEL POSITION	RIGHT "
3	MAIN FUEL POSITION	BEING OUTSIDE LIGHT COMMODE
4	MAIN FUEL POSITION	" "
5	"	"
6	"	"
7	"	"
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95	"	"
96	"	"
97	"	"
98	"	"
99	"	"
100	"	"

[illegible]

Note: INSERT WIRES
IN MAIN FLEX HOUSING
IN POSITION SHOWN
AT FINAL Assy

S	T	U	V	W	X	Y	Z
A	B	C	D				
						K	L
							M
						N	

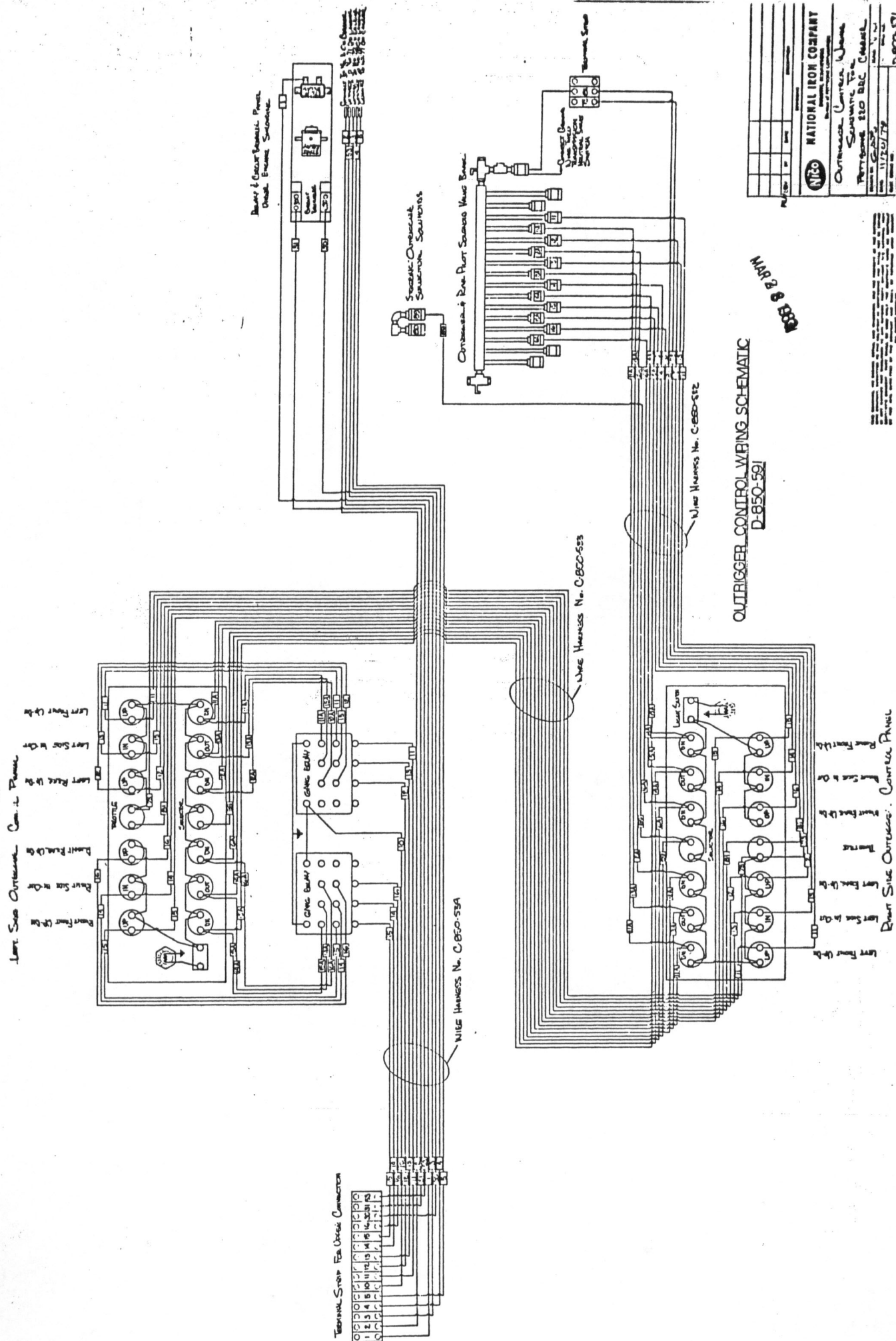
P	RED
W	WHITE
B	BLACK
Y	YELLOW
G	GREEN
BL	BLUE
BR	BROWN

MAR 28 1983

74- E-14- 570-2 2
 74A- E-14- 47- 2 2
 98- B-14- 54-1 1
 14- G-14- 408-2 3
 15- W- W- 408-1 4

PINE TERNAL No. 1

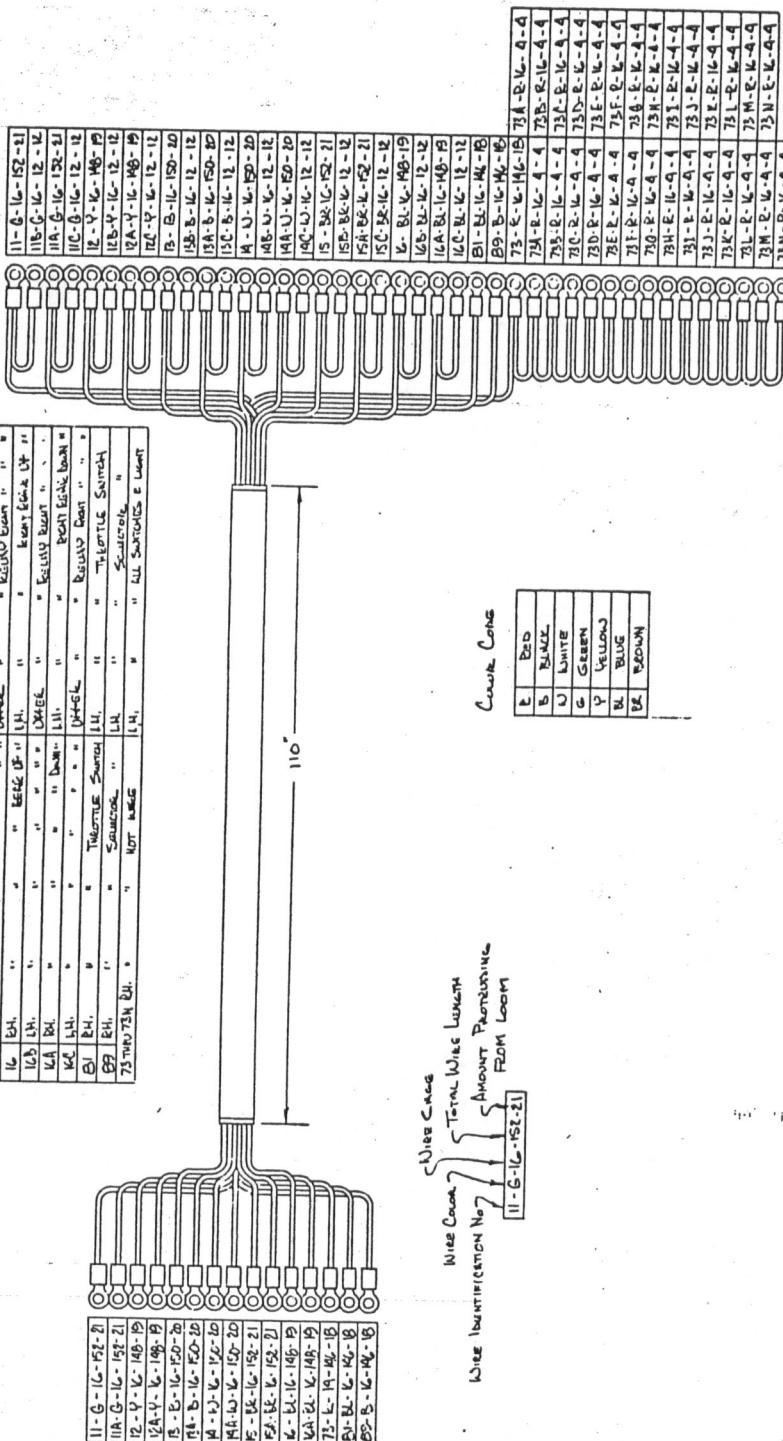
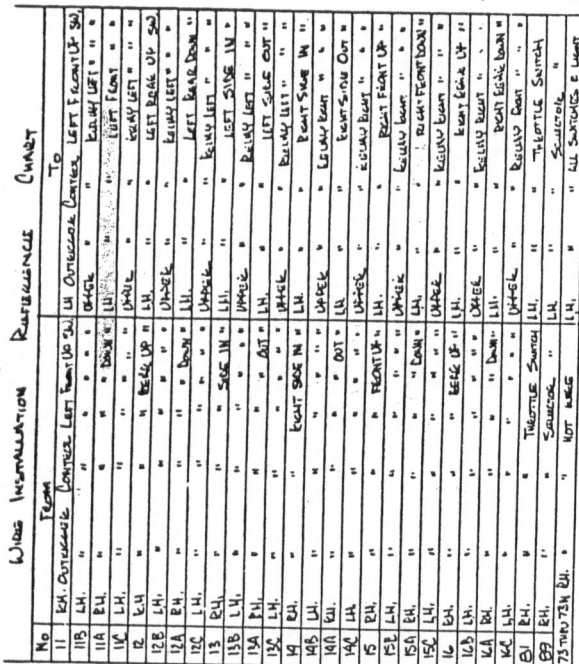
MON: TUES WEDS AUG TO BE
 INCREASED IN ONE HUNDRED A FOUR
 THOUSAND C HUNDREDS



[illegible]

UNRECORDED COPY OF THE RECORDS OF THE BOARD OF DIRECTORS OF THE
ATLANTA-CLARK COUNTY AIRPORT AUTHORITY FOR THE YEAR ENDING DECEMBER
THIRTYONE LAST IS BEING MAINTAINED IN THE OFFICE OF THE CLERK OF
THE BOARD OF DIRECTORS AND IS AVAILABLE TO THE PUBLIC UPON REQUEST.

MAR 28 1963



Crack Cons

R	RED
B	BLACK
W	WHITE
G	GREEN
Y	YELLOW
BL	BLUE
BR	BROWN

WIRE CAGE
WIRE CAGE
WIRE IDENTIFICATION No. 7
TOTAL WIRE LENGTH
AMOUNT PAID FROM LOOM

11-6-16-152-21

NATIONAL IRON COMPANY DULUTH, MINNESOTA Division of RITONCO CORPORATION	
TO: SCIENTIFIC VALUE BANK FOR PETERSON LTD EST. Chicago	FROM: HINDS FROM E.H. DULUTH, MINN.
DATE: 5-15-74	CLERK: DICKSON
REMARKS: C.B.S.O. 532	

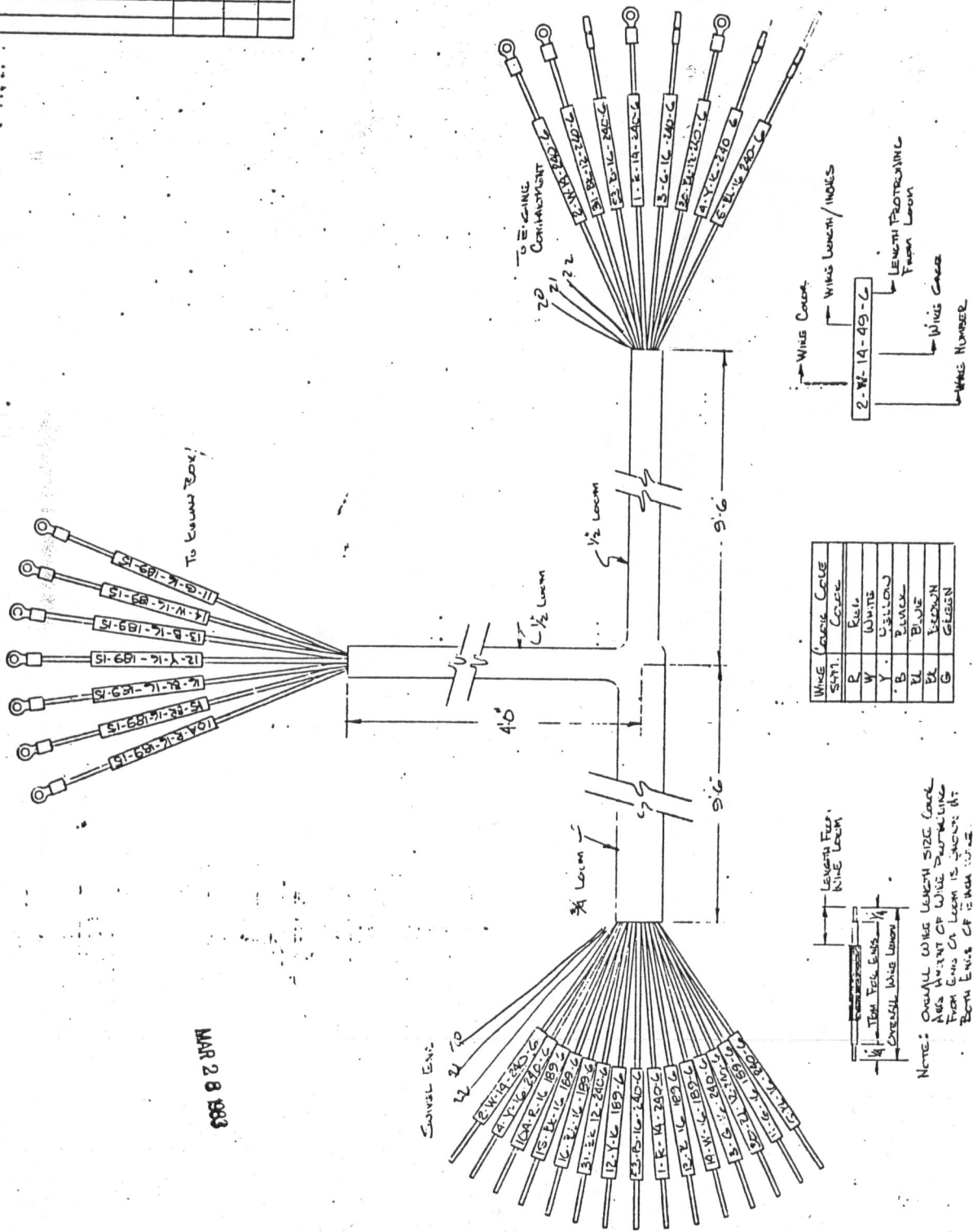
THIS DRAWING IS THE PROPERTY OF THE NATIONAL IRON COMPANY. IT IS TO BE USED ONLY FOR THE PURPOSES SPECIFIED HEREON. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE NATIONAL IRON COMPANY.

WATER INSTALLATION		REFERENCE CHARGE	
NO.	FROM	TO	
11	E.H. CANTON, CANTON, LEFT FRONT DE. S.D.	LEFT FRONT OF SCIENTIFIC VALUE	
11A	"	"	" DOWN "
11B	"	"	" BESE UP "
11C	"	"	" DOWN "
11D	"	"	" SIDE IN "
11E	"	"	" OUT "
11F	"	"	" OUT "
11G	"	"	" IN "
11H	"	"	" OUT "
11I	"	"	" FRONT UP "
11J	"	"	" DOWN "
11K	"	"	" BESE UP "
11L	"	"	" BESE UP "
11M	"	"	" DOWN "
11N	"	"	" THROTTLE SURGE "
11O	"	"	" SALLERD "
11P	"	"	" THROTTLE TERMINAL "
11Q	"	"	" CANTON & SCIENTIFIC VALUE SCIENTIFIC
11R	"	"	" ALL PUMP BOTTOM SURVIVES & LEFT S.D.

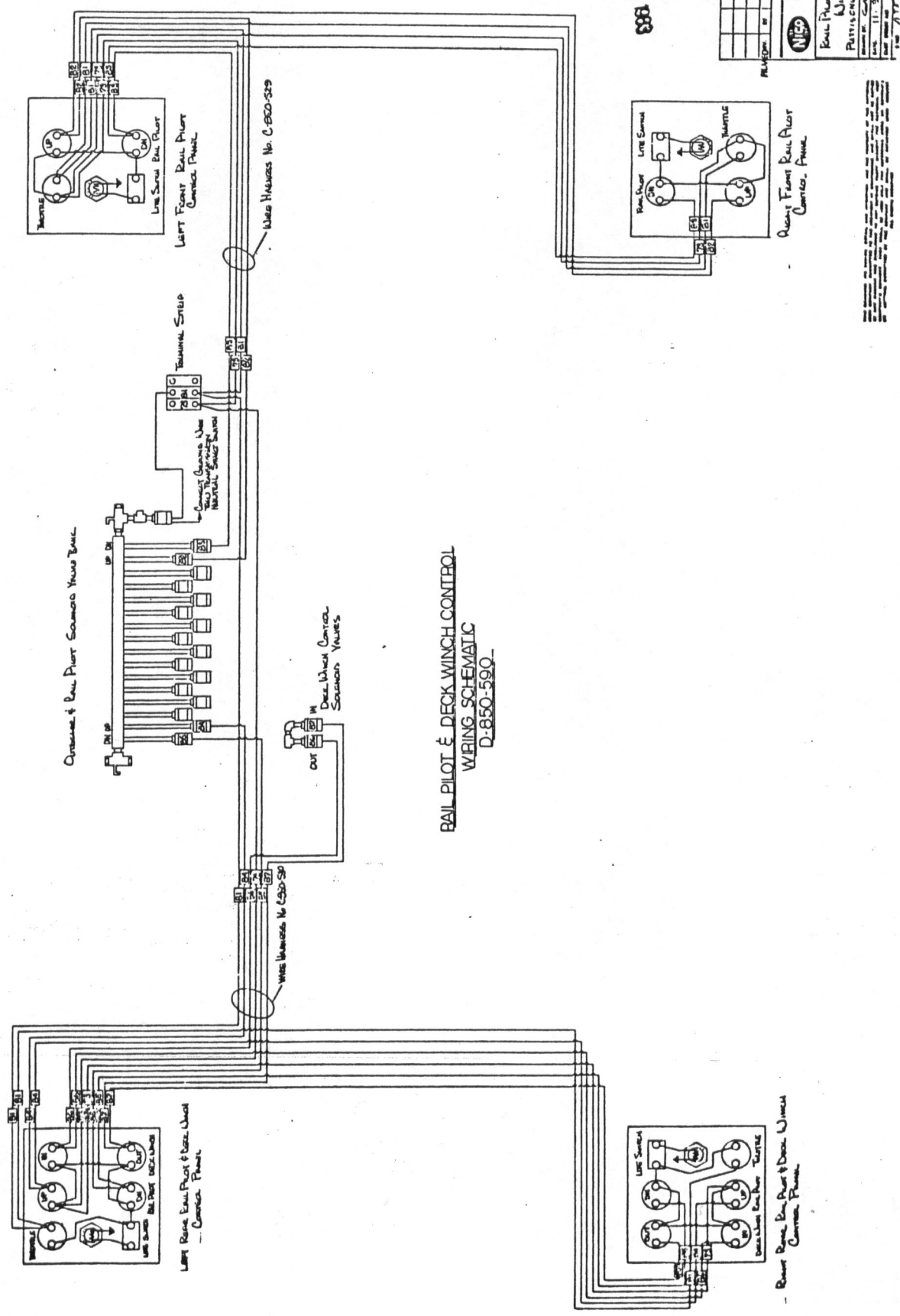
NATIONAL IRON COMPANY SALES & MARKETING DIVISION Bureau of Mining Operations	
Customer: For FAIRFAX 220 EIC	
Drawing by: CAT	
Date: 2-28-78	
Sheet No. C-690-554	

REV.	DATE	DESCRIPTION

THIS DRAWING IS THE PROPERTY OF NATIONAL IRON COMPANY. IT IS TO BE USED ONLY FOR THE PURPOSES SPECIFIED HEREIN. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF NATIONAL IRON COMPANY.



MAR 28 1983



8 7 19 4

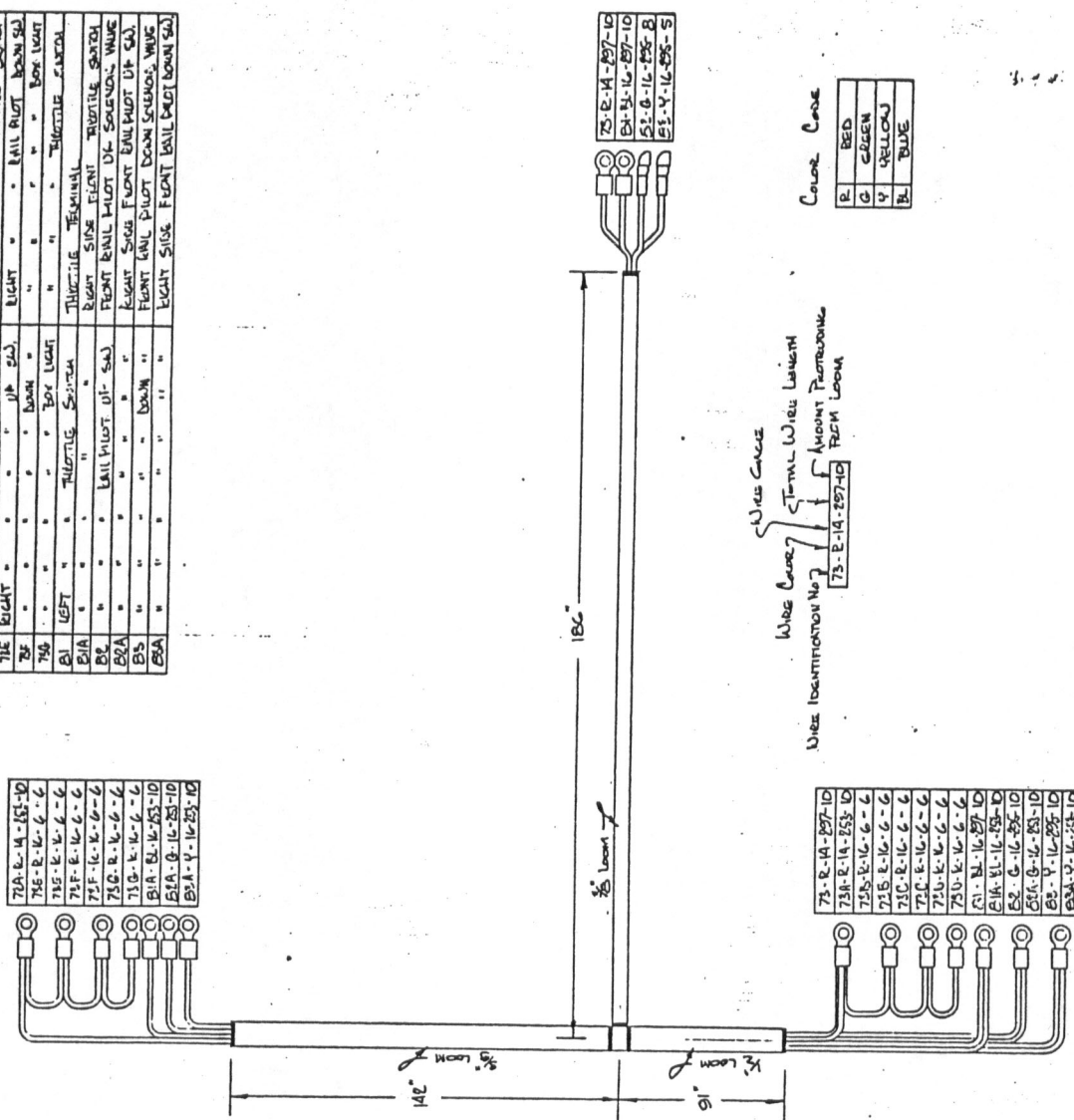
NATIONAL IRON COMPANY	
Rail Pilot & Deck Winch Control	
Wiring Schematic	
PATENT NO. 2,500,000	
DATE: 11/1/54	
DRAWN BY: J. J.	
CHECKED BY: J. J.	
APPROVED BY: J. J.	
D-850-590	

MAR 28 1983

DATE	5-8-77	DATE	5-8-77
TIME	10:00 AM	TIME	10:00 AM
BY	W. J. H. H.	BY	W. J. H. H.
TO	W. J. H. H.	TO	W. J. H. H.
FROM	W. J. H. H.	FROM	W. J. H. H.
REMARKS	W. J. H. H.	REMARKS	W. J. H. H.
DATE	5-8-77	DATE	5-8-77
TIME	10:00 AM	TIME	10:00 AM
BY	W. J. H. H.	BY	W. J. H. H.
TO	W. J. H. H.	TO	W. J. H. H.
FROM	W. J. H. H.	FROM	W. J. H. H.
REMARKS	W. J. H. H.	REMARKS	W. J. H. H.

[illegible]

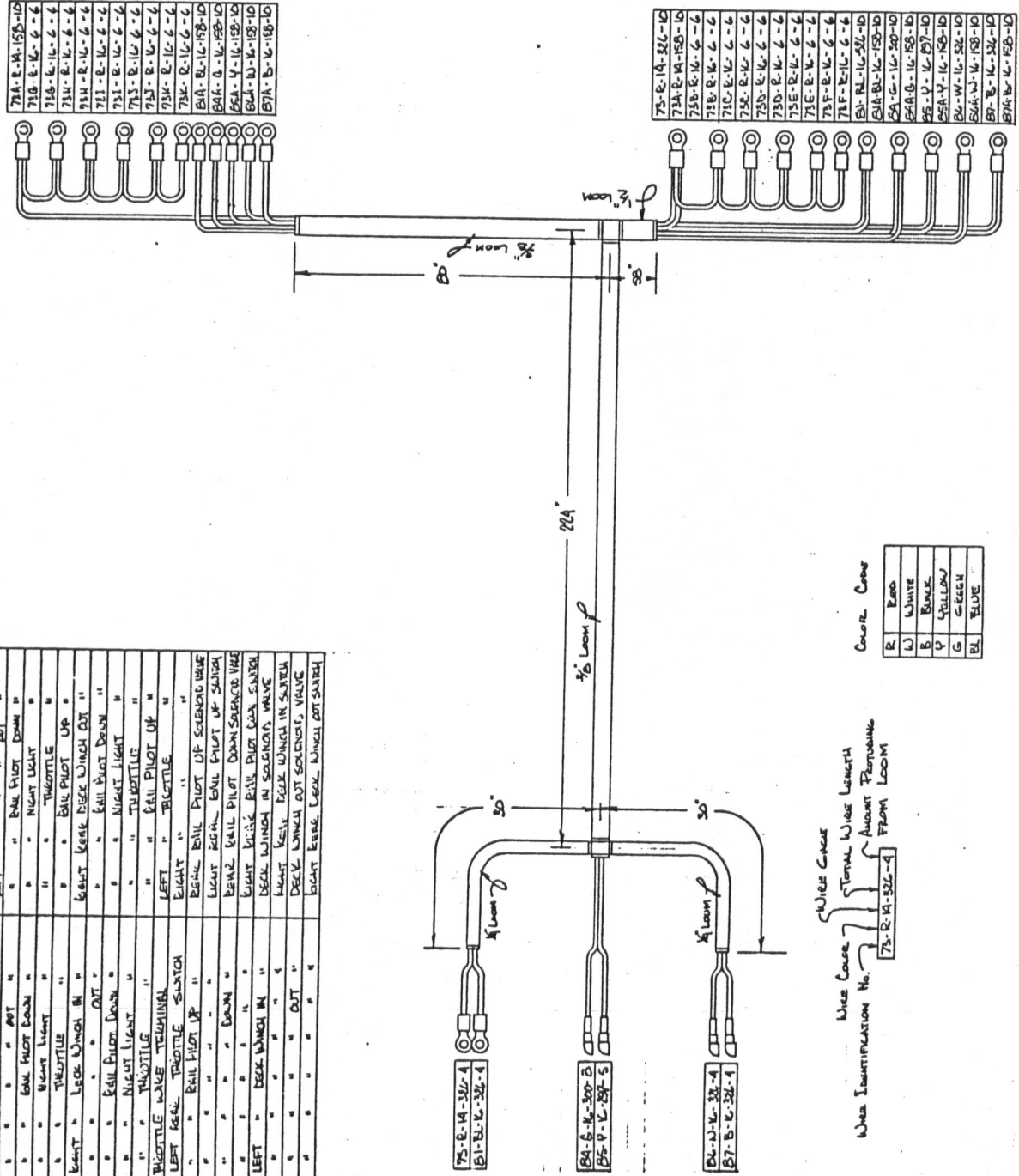
No.	WIRE INSTALLATION		REFERENCE CHART	
	FROM	TO		
701	WHT WIRE	TELEPHONE	LEFT SIDE	FRONT RAIL PILOT UP SW
704	LEFT SIDE FRONT PILOT UP SW		PILOT	"
705	"	"	LEFT	"
706	"	"	"	"
707	"	"	"	"
708	"	"	"	"
709	"	"	"	"
710	"	"	"	"
711	"	"	"	"
712	"	"	"	"
713	"	"	"	"
714	"	"	"	"
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718	"	"	"	"
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746	"	"	"	"
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787	"	"	"	"
788	"	"	"	"
789	"	"	"	"
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796	"	"	"	"
797	"	"	"	"
798	"	"	"	"
799	"	"	"	"
800	"	"	"	"



MAR 28 1983

DRAWN BY: CAS		DATE: 5-27-75	REVISION: 1
CHECKED BY: [Signature]		DATE: [Blank]	REVISION: [Blank]
TITLE: Rail Pilot & Deck Winch Control			
SUBTITLE: Flatbone 220 KHz Cuckoo			
PROJECT: [Blank]			
DRAWING NO: C-80-530			

THIS DRAWING IS THE PROPERTY OF THE NATIONAL RAILROAD TRANSPORTATION BOARD. IT IS TO BE USED ONLY FOR THE PURPOSES AND LIMITS SPECIFIED HEREIN. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE NATIONAL RAILROAD TRANSPORTATION BOARD.



Color	Code
Red	R
White	W
Black	B
Yellow	Y
Green	G
Blue	BL

Wire Case 7
Wire Identification No. 73-E-14-326-4
Terminal Wire Length
Amount Payable
FROM LOOM

Wire	From	Reference	Notes
73	LEFT RAIL PILOT	73	LEFT RAIL PILOT DECK WINCH IN SWITCH
74	LEFT RAIL PILOT	74	LEFT RAIL PILOT DECK WINCH IN SWITCH
75	LEFT RAIL PILOT	75	LEFT RAIL PILOT DECK WINCH IN SWITCH
76	LEFT RAIL PILOT	76	LEFT RAIL PILOT DECK WINCH IN SWITCH
77	LEFT RAIL PILOT	77	LEFT RAIL PILOT DECK WINCH IN SWITCH
78	LEFT RAIL PILOT	78	LEFT RAIL PILOT DECK WINCH IN SWITCH
79	LEFT RAIL PILOT	79	LEFT RAIL PILOT DECK WINCH IN SWITCH
80	LEFT RAIL PILOT	80	LEFT RAIL PILOT DECK WINCH IN SWITCH
81	LEFT RAIL PILOT	81	LEFT RAIL PILOT DECK WINCH IN SWITCH
82	LEFT RAIL PILOT	82	LEFT RAIL PILOT DECK WINCH IN SWITCH
83	LEFT RAIL PILOT	83	LEFT RAIL PILOT DECK WINCH IN SWITCH
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94	LEFT RAIL PILOT	94	LEFT RAIL PILOT DECK WINCH IN SWITCH
95	LEFT RAIL PILOT	95	LEFT RAIL PILOT DECK WINCH IN SWITCH
96	LEFT RAIL PILOT	96	LEFT RAIL PILOT DECK WINCH IN SWITCH
97	LEFT RAIL PILOT	97	LEFT RAIL PILOT DECK WINCH IN SWITCH
98	LEFT RAIL PILOT	98	LEFT RAIL PILOT DECK WINCH IN SWITCH
99	LEFT RAIL PILOT	99	LEFT RAIL PILOT DECK WINCH IN SWITCH
100	LEFT RAIL PILOT	100	LEFT RAIL PILOT DECK WINCH IN SWITCH

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	081-122 SUPPLIER
1	1	10551-08-1P	SWITCH DIMMER				
2	1	10550-08-1P	CONNECTOR FLASHER				
3	2	18806-08-1P	BATTERY 12 VOLTS				
4	1	10790-08-1P	FLASHER DIT 4 WAY ENG. 12 VOLTS				
5	4	10339-08-1P	LUG BATTERY CABLE				
6	1	31701-08-1P	HORN				
7	1	31702-08-1P	HORN				
8	A/R	30869-08-1P	BATTERY CABLE				
9	1	14237-08-1P	BLOCK STUD TERMINAL 7 GANG				
10	2	31702-08-1P	BATTERY CABLE TERM POS.				
11	2	30703-08-1P	BATTERY CABLE TERM NEG.				
12	12	31443-08-1P	CIRCUIT BREAKER 30A				
13	1	30706-08-1P	TAB HOUSING				
14	1	30707-08-1P	BULK HEAD CONNECTOR BODIES				
15	1	30708-08-1P	BULK HEAD CONNECTOR BODIES				
16	1	30709-08-1P	BULK HEAD CONNECTOR BODIES				
17	1	31706-08-1P	RELAY - HORN 12 VOLTS				
MODEL 84110-RRC			TITLE				
ASSEMBLY DWG.			CAB & FRAME ELECTRICAL WIRING 12 VOLTS, FOR DETROIT DIESEL ENGINES - ADDITIONAL REAR LIGHTS, WITH FULL REMOTE CONTROLS				
WRITTEN BY S.C.		DATE Feb. 85		PETTIBONE (CANADA) LIMITED			
				SHEET 1 OF 2 GROUP NO. 081-122			

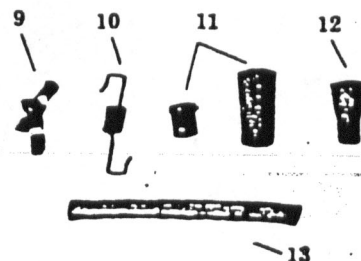
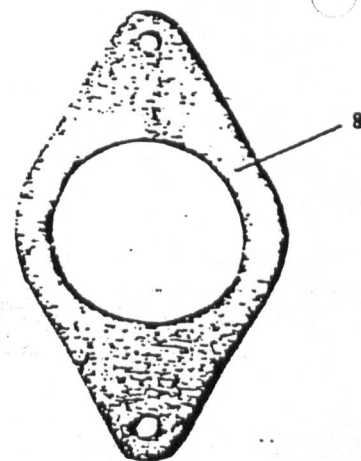
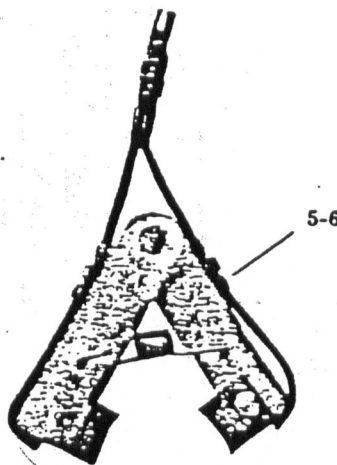
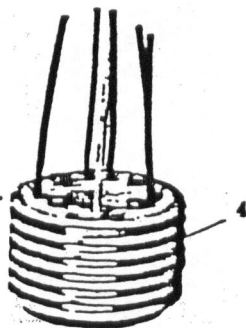
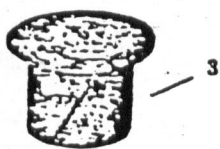
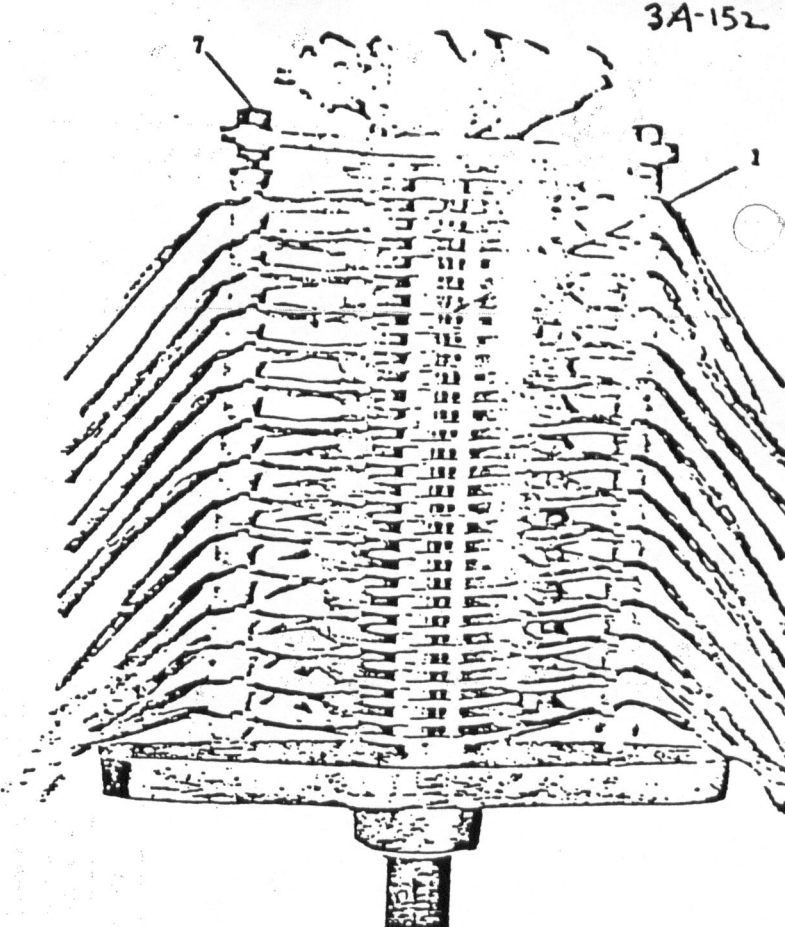
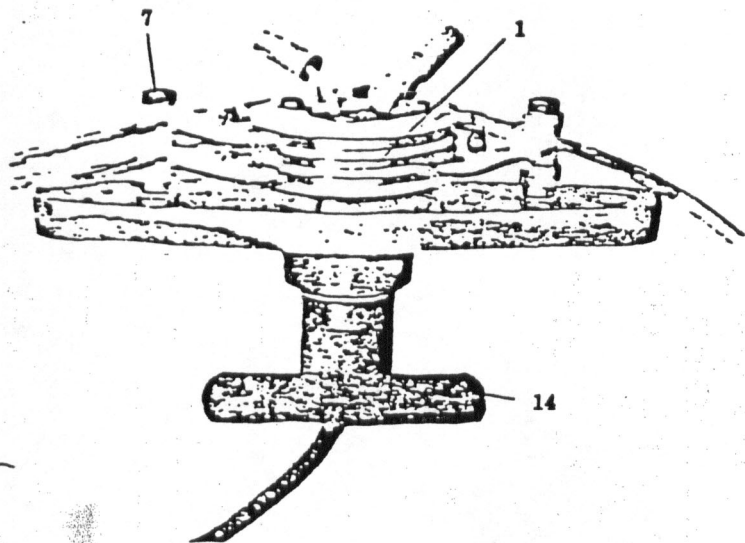
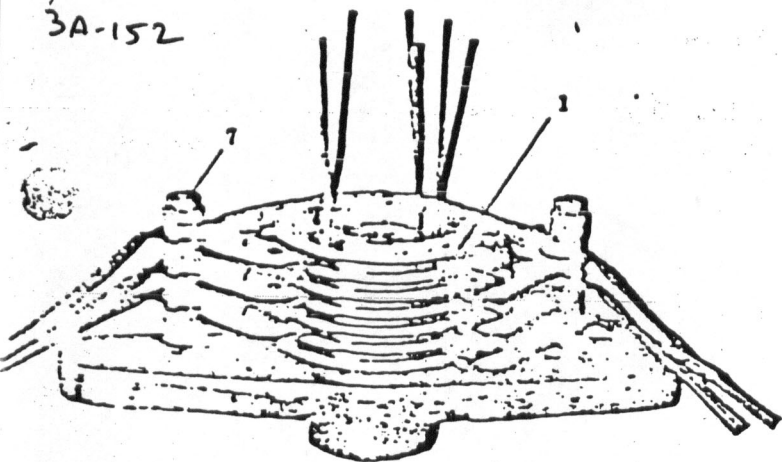
ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO. 081-122	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
18 1		30710-08-1P	TERMINAL BLOCK				
19 1		30711-08-1P	BACK UP LAMP SWITCH				
20 1		31420-08-1	TOP TIE DOWN CLAMP - BATT.				
21 2		30616-08-1	BOLT HOOK - BATT.				
		D850-535 ✓	INSTRUMENT PANEL, WIRING SCHEMATIC				
22 1		D850-513 ✓	INSTRUMENT PANEL, WIRING HARNESS				
		D850-537 ✓	ENGINE COMPARTMENT, WIRING SCHEMATIC				
23 1		D850-520 ✓	ENGINE COMPARTMENT, WIRING HARNESS				
		C850-536 ✓	FRONT LIGHT, WIRING SCHEMATIC				
24 1		D850-518 ✓	FRONT LIGHT, WIRING HARNESS				
		C850-588 ✓	REAR LIGHT, WIRING SCHEMATIC				
25 1		C850-584 ✓	REAR LIGHT, WIRING HARNESS				
26 1		C850-524 ✓	REAR OUTRIGGER, WIRING HARNESS				
		D850-591 ✓	OUTRIGGER CONTROL, WIRING SCHEMATIC				
27 1		C850-534 ✓	COLLECTOR-RELAY, WIRING HARNESS				
28 1		C850-533	L.H. OR TO R.H. OR, WIRING HARNESS				
29 1		C850-532	R.H. OR CONTR. TO SOLEN. VALVES, HARNESS				
MODEL 84110-RRC			TITLE CAB & FRAME ELECTRICAL WIRING				
ASSEMBLY DWG.			12 VOLTS, FOR DETROIT DIESEL				
WRITTEN BY S.C.			ENGINES - ADDITIONAL REAR LIGHTS,				
DATE FEB. 85			WITH FULL REMOTE CONTROLS				
			PETTIBONE (CANADA) LIMITED				
			SHEET 2 OF 3				
			GROUP NO. 081-122				

3A-151

[illegible]

3A-152

3A-152



COLLECTOR RING ASS'Y
101-535

COLLECTOR RING ASSEMBLY

101-535

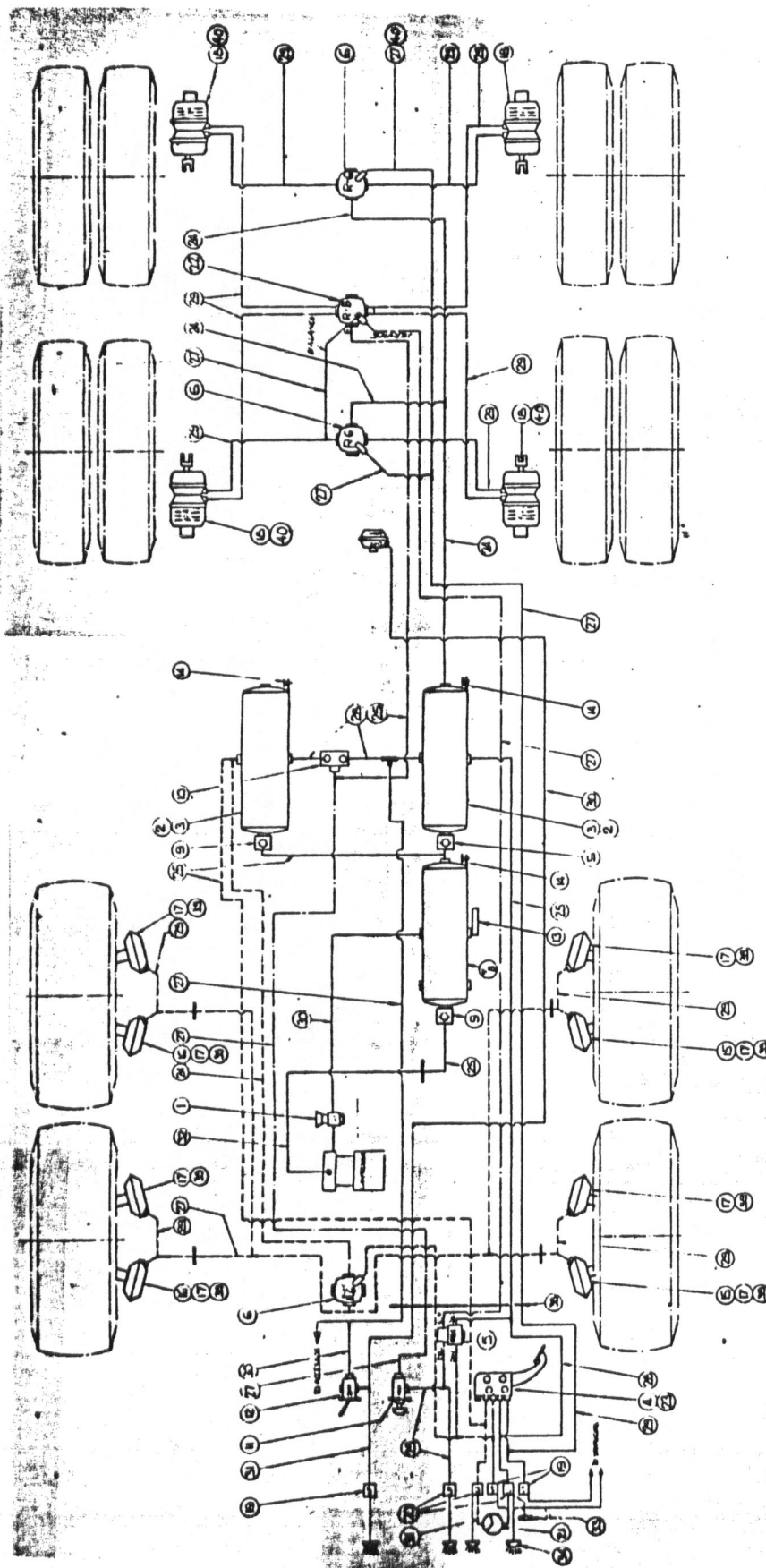
<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	RC-800	COLLECTOR RING ASSEMBLY	1
2	RC-8094	BRUSH TURNTABLE BRACKET	1
3	RC-8084	NYLON BEARING	1
4	RC-861	CORE ASSEMBLY	1
5	RC-8004	BRUSH & ARM ASSEMBLY (10 - 12 GA.)	A/R
6	RC-8005	BRUSH & ARM ASSEMBLY (14 - 16 GA.)	A/R
7	RC-8010	BRUSH HOLDING STUD	2
8	RC-8066	OUTBOARD BEARING	1
9	RC-8021	LG. KNIFE DISCONNECT TERMINAL (10 - 12 GA.)	A/R
9	RC-8022	SM. KNIFE DISCONNECT TERMINAL (14 - 16 GA.)	A/R
10	RC-8082	BRUSH SPRING	A/R
11	RC-8139	SOLDERLESS CONNECTOR (12 - 14 GA.)	A/R
11	RC-8140	SOLDERLESS CONNECTOR (10 GA.)	A/R
12	RC-8130	CRIMP TYPE CONNECTOR (12 - 14 GA)	A/R
12	RC-8131	CRIMP TYPE CONNECTOR (10 GA.)	A/R
13	RC-8023	LG. PLASTIC SLEEVE 1/4" I.D.	A/R
13	RC-8024	SM. PLASTIC SLEEVE 3/16" I.D.	A/R
14		COLLECTOR RING MOUNTING TUBE ASSEMBLY	

SOLENOID VALVE-BANK ASS'Y
 & UNITS, INCLUDING MANIFOLD AND AIR REGULATOR
 "UNITED EQUIPMENT", PART NO. RC-10154-8 (A)(B)

DO NOT SCALE DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED: • MACHINED DIMENSIONS ± .010 (0.25 mm) • HOLE DIMENSIONS ± .015 (0.38 mm) • FLAME CUT DIMENSIONS ± 1/16 (1.56 mm)		TITLE (OUTTRIGGERS)	
		SOLENOID VALVEBANK ASSY	
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UNITED EQUIPMENT PART NO. RC-10154-8 HAS CHANGED TO 10150-8/16/77 4/8-CP		MODEL	DATE
		18/H NO.	OCT. 77
ADDED PART NO.		DRAWN	CHECKED
		RC	SCALE
REV. NO.		DWG. NO.	
A		31033	26-17

PETTIBONE

PETTIBONE LIMITED



NOTES:

- SERVICE BRAKES REAR AXLES
- - - SERVICE BRAKES FRONT AXLE
- · - · - PARKING BRAKES

The difference between compressor control and the unit of front axle is 4.142. See 4.142. See 4.142.

AIR BRAKE SYSTEM DUAL SPLIT (4 AXLES)
DWG # 30891-03-6

3A-157

3A-157

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP N	
ITEM	REC'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	031-104	
1	1	13860 03 1P	GOVERNOR				BW	SUPPLIER
2	3	36511 03 1P	AIR RESERVOIR			3282	3320	
3	6	10236 03 1P	BRKTS AIR RESERVOIR			3282	3320	
4	1	16027 03 1P	VALVE - FOOT CONTROL				BW	
5	1	30873 03 1P	VALVE - SPRING BRAKE				BW	
6	3	13777-03 1P	VALVE - RELAY R-6 12-14				BW	
7	NR					3282	3320	
8	NR					3282	3320	
9	3	10511 03 1P	VALVE - ONE WAY CHECK				BW	
10	1	30879 03 1P	VALVE - DOUBLE CHECK				BW	
11	1	10506 03 1P	VALVE - PARKING CONTROL				BW	
12	1	10507 03 1P	VALVE - DIFFERENTIAL CONTROL				BW	
13	1	10513 03 1P	VALVE - PRESSURE SAFETY				BW	
14	3	30951 03 1P	VALVE - DRAIN				BW	
15	REF	21018 03 1P	BRAKE ASS'Y FRONT L.H.				ROCKWELL	
16	REF	21019 03 1P	BRAKE ASS'Y FRONT R.H.				ROCKWELL	
17	REF	21022 03 1P	BRAKE CHAMBERS - FRONT				ROCKWELL	
MODEL				TITLE				
ASSEMBLY DWG. 30881 03 6				AIR BRAKE SYSTEM DUAL SPLIT 4 - AXLES				
WRITTEN BY CM				DATE June 20/82				
				 PETTIBONE (CANADA) LIMITED				
				SHEET 1 OF 3 GROUP NO. 031-104				

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP N 031-104	
ITEM	REC'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
18 4		13865 03 1P	BRAKE CHAMBER REAR				MGM	
19 3		10600 03 1P	HIGH PRESSURE SWITCH				BW	
20 3		10504 03 1P	LOW PRESSURE SWITCH				BW	
21 REF			DUAL AIR PRESSURE GAUGE					
22 1		30874 03 1P	VALVE, RELAY R-8					
23 1		16026 03 7	BRACKET, BRAKE PEDAL MTG.					
24 A/R		30908 03 1P	COPPER TUBE 3/4" OD					
25 A/R		30907 03 1P	COPPER TUBE 5/8" OD					
26 A/R		30905 03 1P	COPPER TUBE 1/4" OD					
27 A/R		30906 03 1P	COPPER TUBE 3/8" OD					
28 A/R		30921 03 1P	HOSE 1/2" ID				P.H.	
29 A/R		30920 03 1P	HOSE 3/8" ID				P.H.	
30 A/R		30919 03 1P	HOSE 1/4" ID				P.H.	
31 A/R		30952 03 1P	NYLON TUBE					
32 1		30953 03 1P	HOSE COMPRESSOR DISCHARGE					
33 1		10505 03 1P	LOW PRESSURE BUZZER					
34 REF			WARNING LIGHT RED					
MODEL			TITLE					
ASSEMBLY DWG. 30881 03 6			AIR BRAKE SYSTEM DUAL SPLIT 4-AXLES					
WRITTEN BY			DATE					
			PETTIBONE (CANADA) LIMITED					
			GROUP NO.					

3A-159

PETTIBONE

PETTIBONE (CANADA) LIMITED

SECRET

YOU'VE MADE THE BEST INVESTMENT IN AIR BRAKES

protect it with

PROPER MAINTENANCE

CAUTION NOTES FOR MAINTAINING AIR BRAKE SYSTEMS

Before attempting to work on an air brake system, certain precautions should be observed since the compression and storage of air may be compared to the energy in a coiled spring and, when released, may present a hazard if not properly recognized. The wheels of the vehicle should always be blocked by some means other than the air brake system so that depletion of air will not permit the vehicle to roll.

In draining the system, do not look into the air jets or direct them toward a person as dirt or sludge particles may be entrained in the air stream. Hoses which contain air pressure should not be disconnected under pressure since they will whip as air escapes from the line. Follow manufacturers' recommended procedures in working on any air device so as to avoid injury or damage from parts which, when released, are subject to mechanical (spring) or pneumatic propulsion. As system pres-

sure is drained and the emergency brakes apply, hands should be away from brake chamber push rods and spring actuators which will apply automatically with the loss of pressure. This also applies when checking service brake system.

Reservoirs which are closest to the sources of compressed air (compressors or auxiliary sources) should contain a safety valve in known working order and sufficient capacity to limit the reservoir pressure to a safe maximum level. Old, used reservoirs should not be used as replacements. The safety valves should not be reset higher than specified by the reservoir manufacturer, vehicle manufacturer, or code to which the reservoir had been manufactured. Various actuators contain large internal steel springs that require special disassembly procedures. Note and be guided by the warning tags on such units.

AIR BRAKE SYSTEM

TESTING FOR SERVICEABILITY

IMPORTANT: For all tests, check dash gauge with a test gauge known to be accurate.

1. **Drain Reservoirs**—Open drain cocks on each reservoir and any filter used in system. Close drain cocks after all devices have been completely drained of all condensation (preferably overnight).
2. **Check Brake Chamber Push Rod Travel**—Adjust at slack adjuster if stroke is excessive.
3. **Check Stop Light Switch**—With no air pressure in the system, start engine and apply brake pedal or treadle and observe dash gauge pressure when stop light lights. Stop light should normally light when dash gauge registers approximately 5 psi. Release brakes.
4. **Check Low Pressure Indicator**—Run engine, continuing pressure build-up. Low pressure indicator buzzer must sound or warning light must remain lighted until dash gauge pressure reached approximately 65 psi when warning buzzer must stop sounding or warning light must go out.
5. **Pressure Build-up Test**—Run engine at fast idle: Time required to raise air pressure from 50 to 90 pounds will vary with different vehicles but should not exceed 5 minutes. Average is about 1½ minutes. Check operation of safety valve.
6. **Governor Setting Test**—Run engine. Governor should cut out, stopping further compression, at maximum pressure setting. Reduce air pressure by series of brake applications. Governor should cut in resuming compression at minimum pressure setting.
7. **Leakage Tests**—Run engine until governor cuts out. Stop engine. Wait until air pressure stabilizes. With brakes released, dash gauge pressure drop should not exceed 2 pounds per minute for single vehicle or 3 pounds per minute for combination vehicles. Make a full brake application and allow pressure to stabilize. Pressure drop should not exceed 3 pounds per minute for single vehicles or 4 pounds per minute for combination vehicles. Check system connections and applicable units if leakage in either test is excessive.
8. **Operating Tests**—Connect accurate test gauge in brake valve delivery line or service line outlet on vehicles with trailer connections. Fully charge air brake system. Depress brake pedal or treadle fully. Test gauge pressure should approximately equal

dash gauge pressure. (Some vehicles have pedal or treadle stop arrangement to prevent full brake valve delivery pressure; do not alter this unless higher delivery pressure is required to increase brake effectiveness). Hold pedal or treadle at several different positions; delivery should vary rapidly in accordance with changes in pedal or treadle positions, and air should release to 0 psi with same speed.

Check for quick application and release of all brakes at each wheel.

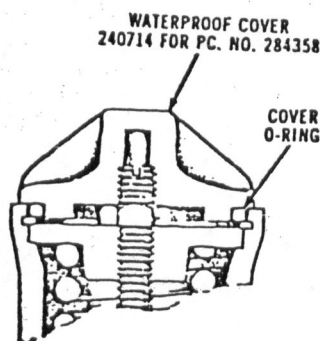
D-2 GOVERNOR

The governor operates in conjunction with the compressor unloading mechanism and controls system air pressure between a predetermined maximum and minimum pressure.

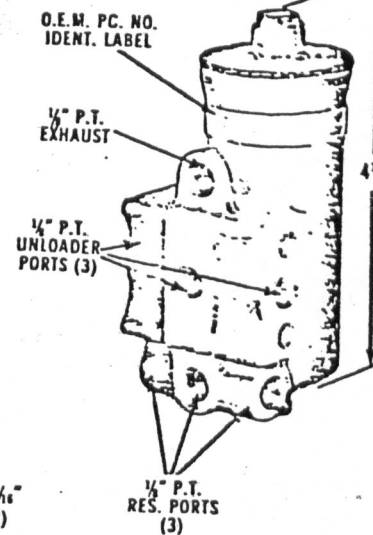
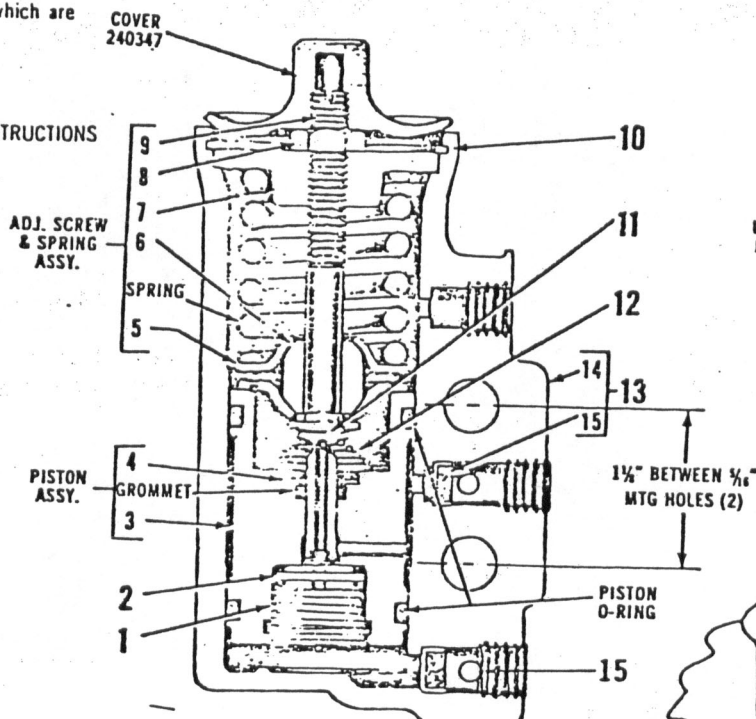
The D-2 governor is an adjustable piston type valve available in different preset pressure settings. A psi non-adjustable range between specified cut-in and cut-out pressures is designed into the D-2. Three reservoir and unloader ports and two mounting holes permit the D-2 to be attached to the compressor or mounted remotely. Companion models of the standard D-2 are the weatherproof and high temperature governors which are used in special installations.

The weight of the D-2 Governor is 1 lb.

FOR COMPLETE INSTALLATION & MAINTENANCE INSTRUCTIONS REFER TO SERVICE DATA SHEET SD-36.



PARTIAL VIEW



PARTIAL VIEW

SPECIAL CLEARANCE BODY FOR PC. No. 285097

SEE BACK OF PAGE FOR MAINTENANCE KITS

SERVICE GOVERNORS*

AVAILABLE NEW OR REMANUFACTURED-SEE CONV. LIST BACK OF PAGE

TYPE D-2 GOVERNOR PC. NO.	PRESSURE RANGE P.S.I.	ADJUSTING SCREW AND SPRING ASSY. PC. NO.	SPRING PC. NO.	PISTON ASSY. PC. NO.	EXHAUST STEM GROMMET PC. NO.	PISTON O-RING 2 REQ'D. PC. NO.	COVER PC. NO.	COVER O-RING PC. NO.
275491	100 to 120	275202	240343	275201	230175	239658	240347	NONE
277485	70 to 85	276235	241265	275201	230175	239658	240347	NONE
277487	140 to 165	277499	242200	275201	230175	239658	240347	NONE
A284358	105 to 125	275202	240343	276283	241271	241288	240714	239219
B285097	95 to 110	275202	240343	275201	230175	239658	240347	NONE

*EACH SERVICE/REM GOVERNOR INCLUDES FOUR PIPE PLUGS 233410 IN A BAG, PACKAGED WITH GOVERNOR

A—THIS GOVERNOR HAS HIGH TEMPERATURE O-RINGS AND WATERPROOF COVER

B—THIS GOVERNOR HAS SPECIAL CLEARANCE BODY

REFERENCE DETAILS

No.	Pc. No.	Quan.	Description
1	240336	1	Valve Spring
2	240334	1	Valve
See Schedule		1	PISTON ASSY.
3	240331	1	Piston
See Schedule		1	Grommet
4	240333	1	Washer
See Schedule		1	ADJUSTING SCREW & SPRING ASSY.
5	240341	2	Lower Spring Seat
See Schedule		1	Spring
6	240342	1	Spring Guide
7	240344	1	Upper Spring Seat
8	202961	1	Nut
9	240340	1	Adjusting Screw

No.	Pc. No.	Quan.	Description
10	240345	1	Retaining Ring
11	240339	1	Exhaust Stem
12	240338	1	Exhaust Stem Spring
13	275230	1	BODY ASSEMBLY
14	240330	1	Body
15	240346	2	Filter

TO CONVERT FROM ORIGINAL EQUIP. PC. NO. TO SERVICE REPLACEMENT PC. NO., SEE CONVERSION LIST ON BACK OF PAGE.

D-2 GOVERNOR

D-2 GOVERNOR SERVICE/REMANUFACTURED PIECE NUMBER CONVERSION LIST

ORIGINAL EQUIPMENT PC. NO.	SERVICE/ REMFR. REPLACEMENT PC. NO.
275200	275491
275491	275491
275508	275491
275530	275491
275707	275491
275933	275491
276048	284358
276049	284358
276100	275491
276101	275491
276102	275491
276103	275491
276104	275491
276105	275491
276106	275491
276107	275491
276108	275491
276176	275491
276226	275491
276232	284358
276234	277485
276263	284358
276336	275491
276380	275491
276558	284358
276947	275491
277115	275491
277131	275491
277192	275491
277240	275491
277244	275491
277284	275491
277484	275491
277485	277485

ORIGINAL EQUIPMENT PC. NO.	SERVICE/ REMFR. REPLACEMENT PC. NO.
277486	275491
277487	277487
277504	275491
277506	277485
277507	275491
277508	275491
277509	275491
277618	275491
277620	275491
277648	275491
277811	275491
277812	275491
278440	284358
278814	284358
278846	284358
279160	275491
279476	275491
279650	275491
279870	284358
279937	284358
279982	284358
280240	275491
280376	275491
281058	275491
281137	284358
281205	275491
281215	275491
281375	275491
281884	275491
282043	284358
282051	284358
282128	284358*
282343	284358
282423	284358

ORIGINAL EQUIPMENT PC. NO.	SERVICE/ REMFR. REPLACEMENT PC. NO.
282436	284358
282512	275491
282978	285097
283277	277485
283349	275491
283593	284358
283594	284358
283595	284358
283596	284358
283657	275491
284276	275491
284312	275491
284358	284358
284667	284358
284713	275491
285097	285097
285098	285097
285443	275491
285561	275491
285562	275491
285691	275491
285999	284358
287307	275491
287308	275491
287309	275491
287425	275491
287426	275491
287427	275491
287428	285097
287790	284355
287794	284358
288047	275491
288296	275491

*INSTALL 222797 BREATHER
IN EXHAUST PORT

MAINTENANCE KITS FOR D-2 GOVERNOR

MAINTENANCE KIT PC. NO. 276121
(FOR STANDARD GOVERNOR)
CONSISTS OF THE FOLLOWING:

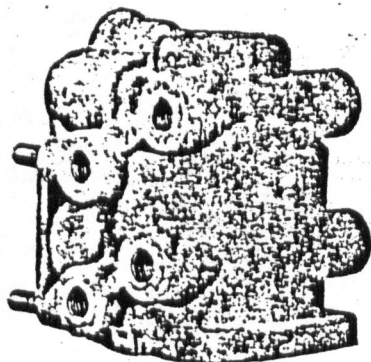
Quan.	Pc. No.	Description
1	230175	Exhaust Stem Grommet
1	240334	Inlet & Exhaust Valve
1	240336	Valve Spring
2	239658	Piston Grommet
1	240347	Cover
2	240346	Filter
1	246671	Lubricant BW-204-M

MAINTENANCE KIT PC. NO. 280915
(FOR HI-TEMP & WATERPROOF GOVERNORS)
CONSISTS OF THE FOLLOWING:

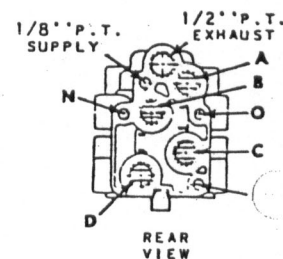
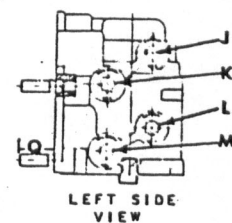
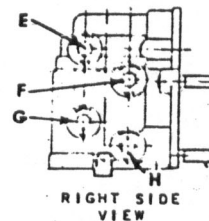
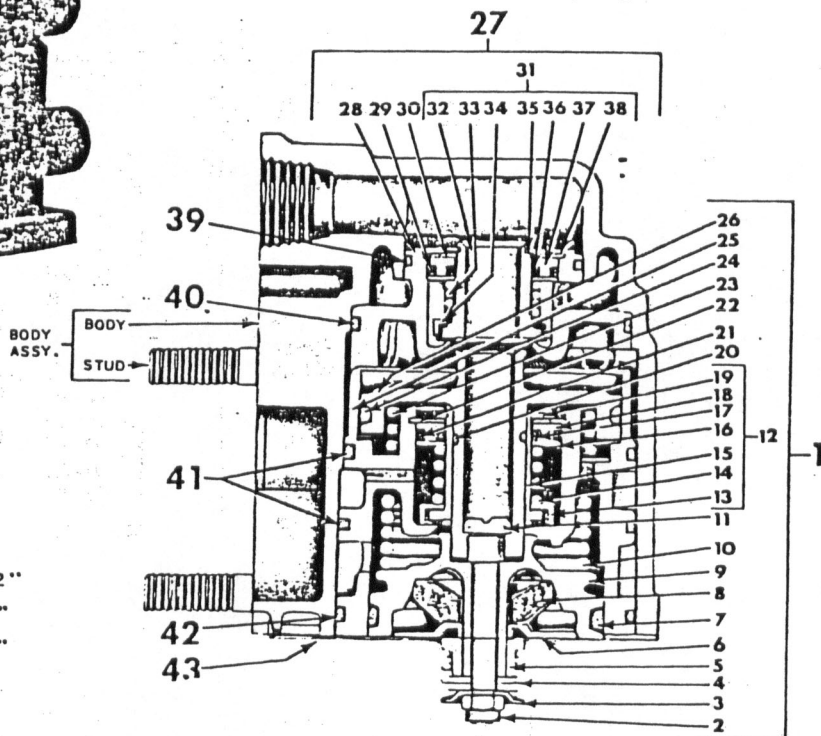
Quan.	Pc. No.	Description
1	240334	Inlet & Exhaust Valve
1	240336	Valve Spring
2	240346	Filter
1	240714	Cover
1	241271	Exhaust Stem Grommet
2	241288	Piston Grommet
1	239219	Cover O-Ring
1	246671	Lubricant BW-204-M

E-7 DUAL BRAKE VALVE(BASIC)

16027-03-100



HEIGHT - 4.82"
WIDTH - 4.36"
DEPTH - 4.05"



BASIC E-7 DUAL BRAKE VALVE Pc. No.	Body Assy. Pc. No.	Body Pc. No.	PORT SIZES													Mounting Studs Pc. No.			Q DIM.	STUD THD. SIZE	FOR SERVICE OR RENFG. EXCH. USE Pc. No.
			A	B	C	D	E	F	G	H	J	K	L	M	N	O	P				
286773	283865	248114	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	202541	202541	202541	1.50	3/8-24	286773	
286774	..	248114	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	NONE	NONE	NONE	..	..	286774	
286775	286717	248114	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	290664	290664	290664	.75	3/8-16	286775	
286888*	286902	248114	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	NONE	NONE	202541	1.50	3/8-24	286773	
287073	287074	290662	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	3/8	3/8	3/8	210936	210936	210936	.62	3/8-24	287073	
287254*	287299	290662	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	3/8	3/8	3/8	202541	202541	202541	1.50	3/8-24	287411*	
287411	..	290662	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	3/8	3/8	3/8	NONE	NONE	NONE	..	..	287411	
287440	287439	248114	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	291211	291211	291211	1.08	3/8-16	287440	
287584	287585	291235	1/2	1/2	1/2	1/2	1/4	3/8	1/4	3/8	1/4	1/4	1/4	1/4	291236	291236	291236	.88	3/8-16	287584	

*Customer Identified-see last column.

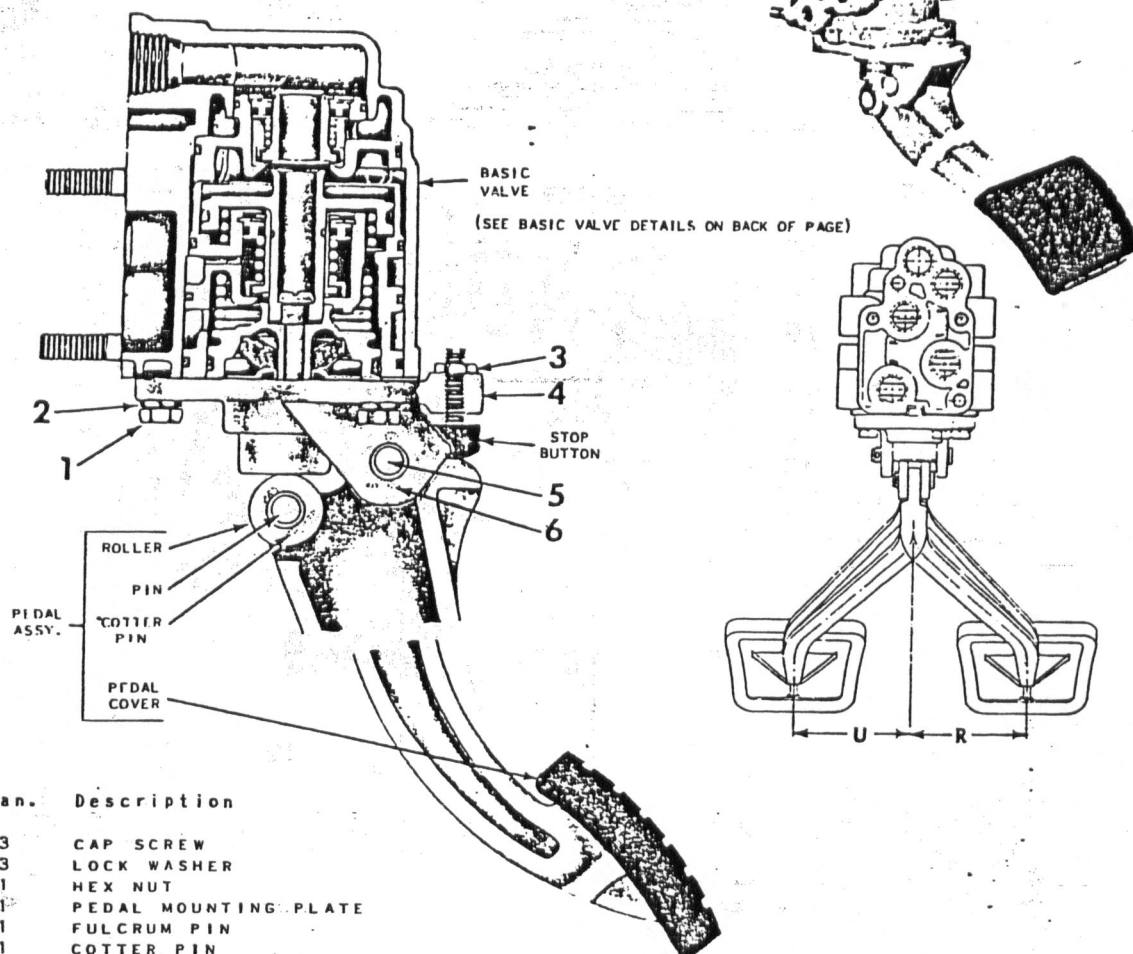
*SAME AS 287254 EXCEPT STUDS (202541)

Repair kit 283862

No.	Pc.No.	Quan.	Description	No.	Pc.No.	Quan.	Description
1	286772	1	LOWER STATIC PISTON ASSY.	27	283303	1	UPPER STATIC PISTON ASSY.
2	290191	1	NUT	28	247213	1	UPPER STATIC PISTON
3	290189	1	SPRING GUIDE	29	239029	1	O-RING
4	290185	1	STEM SPRING	30	238817	1	RETAINING RING
5	290188	1	SPRING SEAT NUT	31	283304	1	INLET & EXHAUST VALVE ASSY. (UPPER)
6	290187	1	SPRING SEAT	32	248536	1	INLET & EXHAUST VALVE
7	239643	1	O-RING	33	247217	1	SPRING
8	241559	1	RUBBER SPRING	34	247216	1	VALVE RETAINER
9	247232	1	PISTON	35	247220	1	RETAINING RING
10	247231	1	PISTON RETURN SPRING	36	239898	1	O-RING
11	290186	1	STEM	37	247219	1	O-RING RETAINER
12	279754	1	INLET & EXHAUST VALVE ASSY. (LOWER)	38	247218	1	SPECIAL WASHER
13	244435	1	VALVE RETAINER	39	247221	1	O-RING
14	244437	1	VALVE SPRING	40	247234	1	O-RING
15	248534	1	INLET & EXHAUST VALVE	41	247233	2	O-RING
16	244440	1	RETAINING RING	42	247235	1	O-RING
17	234045	1	O-RING	43	247236	1	RETAINER
18	244439	1	O-RING RETAINER				
19	244438	1	SPECIAL WASHER				
20	239136	1	O-RING				
21	239219	1	O-RING				
22	240345	1	RETAINING RING				
23	247224	1	RELAY PISTON SPRING				
24	247226	1	O-RING				
25	247222	1	LOWER STATIC PISTON				
26	290702	1	RELAY PISTON				

E-7 DUAL BRAKE VALVE WITH SUSPENDED PEDAL

16027-03-100



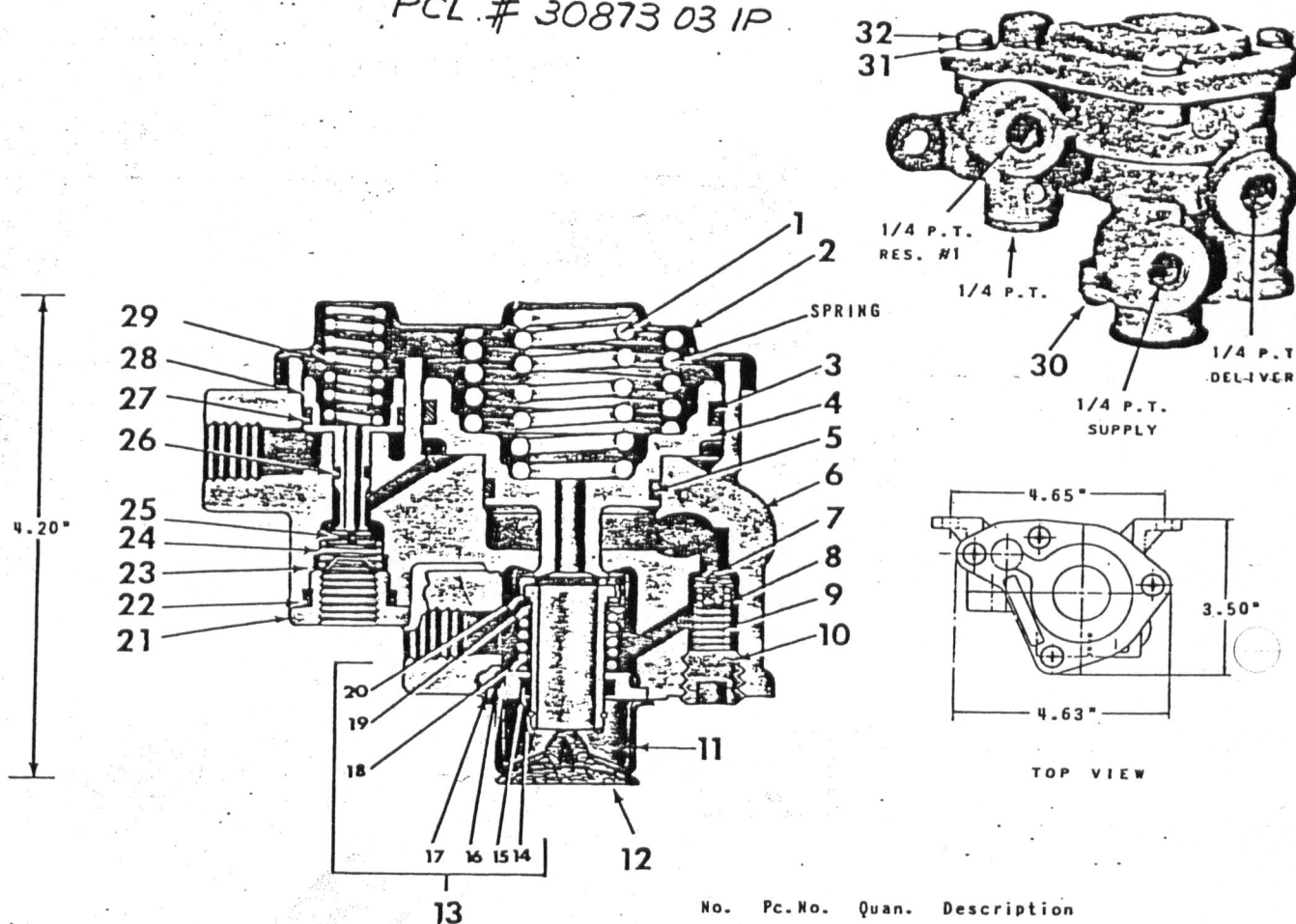
No.	Pc. No.	Quan.	Description
1	203788	3	CAP SCREW
2	237648	3	LOCK WASHER
3	230250	1	HEX NUT
4	247268	1	PEDAL MOUNTING PLATE
5	240445	1	FULCRUM PIN
6	210492	1	COTTER PIN

E-7 DUAL BRAKE VALVE WITH SUSPENDED PEDAL	Basic Valve	Pedal Assy.	Pedal	Pedal Cover	Roller	U DIMN.	R DIMN.	REMARKS	Plunger	Stop Button
Pc. No.	Pc. No.	Pc. No.	Pc. No.	Pc. No.	Pc. No.				Pc. No.	Pc. No.
283866	286774	280382	244776	244682	246045	--	3.25	OFFSET RIGHT	244680	243890
283298	286774	NONE	NONE	NONE	NONE	--	--	--	244680	247241
284815	286773	280381	244681	244682	246045	--	--	--	244680	243890
286669	286774	286705	245134	244682	245118	--	--	--	244680	247241
286711	286775	286720	245127	244682	246045	--	.94	OFFSET RIGHT	249776	243890
286712	286775	286721	245127	244682	244954	--	.94	OFFSET RIGHT	244680	243890
286713	286775	286722	290688	244682	246045	.94	--	OFFSET LEFT	244680	243890
286714	286775	286723	245134	244682	246045	--	--	--	244680	243890
286899	286901	281172	245550	244682	245118	--	.88	OFFSET RIGHT	244680	243890
286900	286901	281829	246204	244682	245118	--	.50	OFFSET RIGHT	244680	243890
287291	286773	286203	244681	244682	245118	--	--	--	290204	239512
287407	287411	287409	291152	246279	244954	--	3.25	OFFSET RIGHT	244680	239512
287408	287411	287410	291152	246279	246045	--	3.25	OFFSET RIGHT	244680	243890
287395	287440	287086	291018	244682	244954	--	2.00	OFFSET RIGHT	291218	243890
287396	287440	287514	246156	246279	244954	--	--	--	291218	243890
287501	287440	287566	291237	244682	244954	2.00	--	OFFSET LEFT	291218	243890

*CUSTOMER IDENTIFIED FOR SERVICE OR REMFG. EXCH. ON BASIC VALVE, SEE SCHEDULE ON BACK OF PAGE.

SR-1 SPRING BRAKE VALVE

PCL.# 30873 03 1P



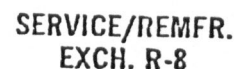
MAINTENANCE KIT FOR SR-1 -
IS PC.NO. 287072

SR-1 SPRING BRAKE VALVE	Spring	LIMITING PRESS. P.S.I.	*FOR SERVICE OR REMFG. EXCH. USE
Pc. No.	Pc. No.		Pc. No.
286364	290407	95	286364
286365	NONE	60	286365
286834*	290407	95	286364
286893*	290407	95	286364
287252*	290407	95	286364
287278*	290407	95	286364

*Customer Identified-See last Column.

No.	Pc. No.	Quan.	Description
1	290406	1	PISTON SPRING
2	290404	1	COVER
3	235899	1	O-RING (LARGE)
4	290405	1	PISTON
5	239219	1	O-RING (SMALL)
6	230399	1	BODY
7	247253	1	CHECK VALVE
8	247252	1	CHECK VALVE SPRING GUIDE
9	247208	1	CHECK VALVE SPRING
10	230576	1	PIPE PLUG
11	243968	1	EXHAUST COVER
12	243969	1	DIAPHRAGM
13	286363	1	INLET & EXHAUST VALVE
14	243967	1	RETAINING RING
15	214747	1	O-RING
16	240337	1	O-RING
17	243966	1	VALVE GUIDE
18	290532	1	VALVE SPRING
19	243964	1	VALVE RETAINER
20	290409	1	INLET & EXHAUST VALVE
21	202620	1	CAP NUT
22	214747	1	O-RING
23	243646	1	VALVE STOP
24	241205	1	VALVE SPRING
25	249534	1	VALVE
26	240540	1	PISTON O-RING (SMALL)
27	235063	1	PISTON O-RING (LARGE)
28	245257	1	PISTON
29	290818	1	PISTON SPRING
30	240161	2	MACH. SCREW & L.W.
31	202981	4	LOCK WASHER
32	290410	4	PAN HEAD SCREW

For installation and maintenance information, see Instruction and Service Data Sheet SD-69.

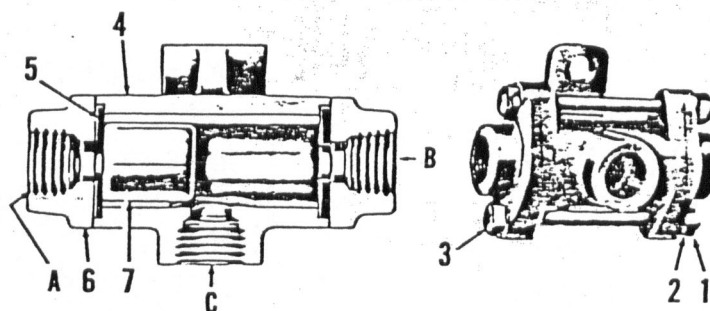


NO.	PC. NO.	QUAN.	DESCRIPTION	NO.	PC. NO.	QUAN.	DESCRIPTION
1	245756	1	Screw	15	285153	1	Relay Piston Assy.
2	239943	1	Diaphragm Washer	16	249318	1	Exhaust Valve Seat
3	249371	1	Diaphragm	17	249319	1	Relay Piston
4	249313	1	Exhaust Cover	18	285152	1	Cover Complete
5	285151	1	Inlet & Exh. Valve Assy.	19	249315	1	Cover
6	239712	1	Retaining Ring	20	249317	1	Cap Nut
7	249311	1	Washer	21	239658	1	O-Ring
8	234045	1	Valve O-Ring	22	249316	1	Diaphragm
9	249312	1	O-Ring Retainer	23	242775	1	O-Ring
10	248535	1	Inlet & Exh. Valve	24	249361	2	Screw
11	244437	1	Valve Spring	25	290216	4	Screw
13	245290	1	Sealing Ring	26	230412	4	Lock Washer
14	243973	1	Relay Piston O-Ring	27	202982	4	Lock Washer
				28	232431	2	Screw

[illegible]

DOUBLE CHECK VALVES

PCL # 30879 03 IP



DOUBLE CHECK VALVE Pc. No.	PIPE THREAD DIMENSIONS		
	A	B	C
217698	3/8"	3/8"	3/8"

No.	Pc. No.	Quan.	Description
1	203147	2	HEX NUT
2	202981	2	LOCK WASHER
3	212207	2	HEX HEAD BOLT
4	217697	1	BODY
5	235562	2	SEAL GASKET
6	212206	2	END CAP
7	235561	1	SHUTTLE VALVE

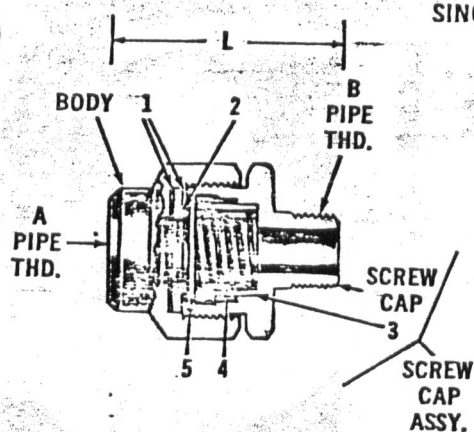
3A-169

3A-169

10511-03-1P

Heavy Vehicle
Systems Group

SINGLE CHECK VALVES



SC-2 SINGLE CHECK VALVE (STEEL SEAT) PC. NO.	BODY PC. NO.	SCREW CAP ASSY. PC. NO.	SCREW CAP PC. NO.	A PIPE THD.	B PIPE THD.	L DIM'N.	FOR SERVICE USE PC. NO.
227856	238160	227867	238158	3/4	3/4	2 1/2	227856
227866	238161	227868	238159	1/2	1/2	2 1/4	227966
A284976	238161	227868	238159	1/2	1/2	2 1/4	227866
A285530	238160	227867	238158	3/4	3/4	2 1/2	227856

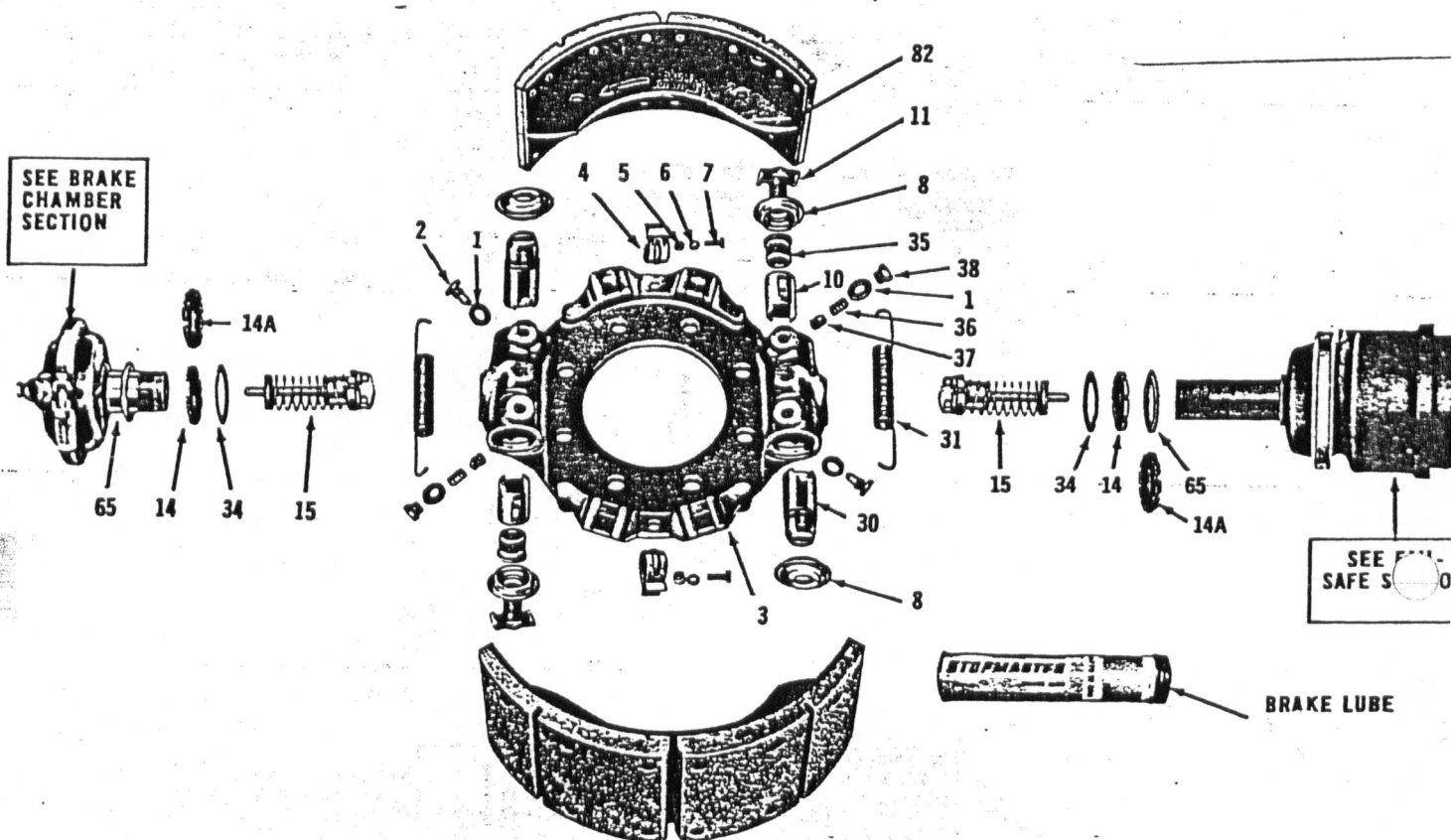
A—Customer Identified—See Last Column.

NO.	PC. NO.	QUAN.	DESCRIPTION
1	238179	2	Shim Washer
2	237992	1	Valve Seat
See Schedule		1	Screw Cap Assy.
See Schedule		1	Screw Cap
3	237989	1	Valve Stop Bushing
4	239223	1	Spring
5	203102	1	Disc Valve

PARTS & SERVICE DATA



STOPMASTER BRAKE



1 1/4" STROKE WEDGE ASSEMBLY—CURRENT PRODUCTION



Identify 1 1/4" stroke
wedges by groove at
this location.

NOTE:

1 1/4" wedge assembly may be
substituted as a complete assembly
in place of 1 1/2" wedge assembly.



STOPMASTER BRAKE ASSEMBLY

RDA-1560-1883 LH (21018-03-P)
 RDA-1560-1884 RH (21019-03-P)

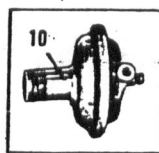
<u>Item</u>	<u>Description</u>	<u>Part No.</u>	<u>Qty.</u>
1	Washer	1729-B-262	4
2	Plunger guide	1779-M-195	4
3	Spider assy. (LH & RH)	A13-3211-S-2879	2
4	Clip - shoe hold down	1718-D-134	4
5	Nut	N-14	4
6	Lockwasher	WA-14	4
7	Bolt	S-146	4
8	Seal assy,	A1705-K-219	4
9	Not used		
10	Adjusting plunger - automatic	2297-J-2376	4
11	Adjusting bolt	A2297-F-2372	4
12-13	Nut used		
14	Spanner nut	1727-N-40	4
15	Wedge assy. 12 ⁰ 1.75" stroke	A2747-H-112	4
16	Roller wedge	1779-F-162	8
17-22	Not used		
23	Cage, wedge roller	1718-P-198	4
24	Not used		
25	Cotter pin	K-235	4
26	Washer, wedge spring	1729-W-335	4
27	Wedge seal	1705-W-231	4
28	Spring, wedge	2758-Y-181	4
29	Wedge 12 ⁰ (use item 15)	2747-H-112	4
30	Plunger, anchor LH	2797-C-419	2
	Plunger anchor RH	2797-B-418	2
31	Return spring	2758-W-127	4
32-33	Not used		
34	Spanner nut retainer	1779-C-419	4
35	Actuator assy.	2297-F-2372	4
36-37	Not used		
65	Not used		
82	Brake shoe & lining assy.	A12-3722-U-359	4
-	Dust shield (not shown)	3236-E-1799	2
-	Guide assy. (not shown)	A1199-Z-3432	4

Service Kits

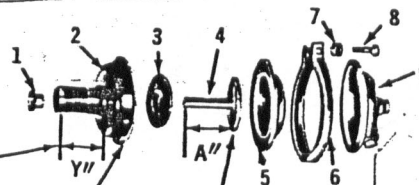
Brake lining kit	2000-R-772	1
Brake lubricant (1 lb. cartridge)	A1779-W-283	1
Routine maintenance kit	Kit-1100	1
Complt. parts replacement kit	Kit-1105	1

Quantity shown per axle

SERVICE AIR CHAMBERS



All "Y" measurements should be taken from where the threads begin up to the bottom of the dish as shown. Very early model housings are threaded to the very end of the tube—measure these from end of the tube.



NON-PRESSURE
HOUSING (2)
(see chart)

PUSH ROD (4)
(see chart)
"A" measurement is from
the bottom of the plate to
the end of push rod.

BRAKE CHAMBER ASSEMBLY TYPE 12

21022-03-P

<u>Item</u>	<u>Description</u>	<u>Part No.</u>	<u>Qty.</u>
1	Wedge guide	1779-Q-433	1
2	Non-pressure housing	A2-3780-R-122	1
3	Boot	MPS-2003	1
4	Pushrod 1-3/4"	A1-1779-V-230	1
5	Diaphragm	2797-D-56	1
6	Clamp ring	2797-V-100	1
7	Nut - clamp bolt	1727-R-18	1
8	Bolt - clamp	15X-725	1
9	Pressure housing	A3780-J-62	1
10	Chamber assy. complete	B46-3775-L-12	1

3A173

3A173

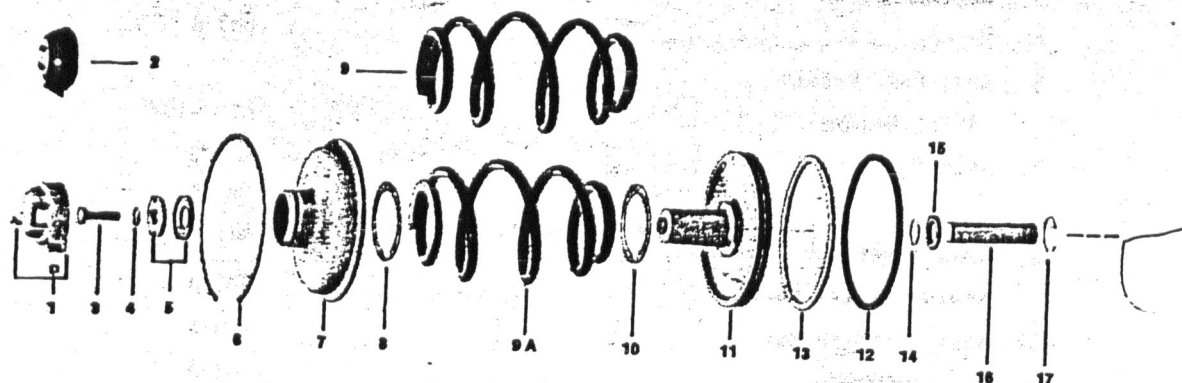
PARTS & SERVICE DATA

031

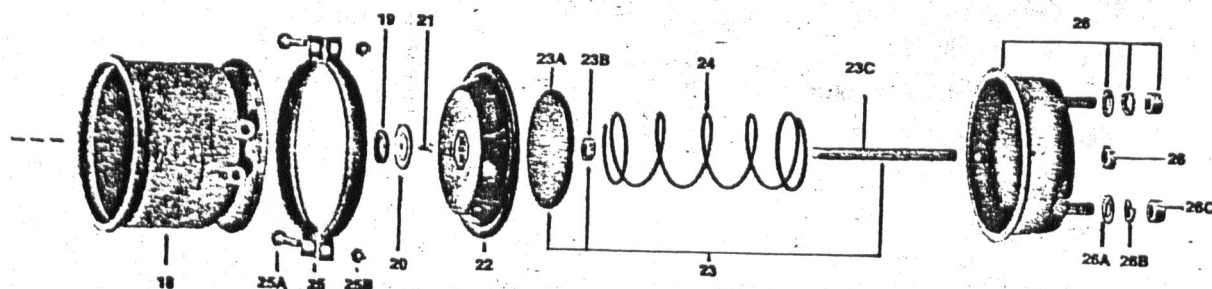
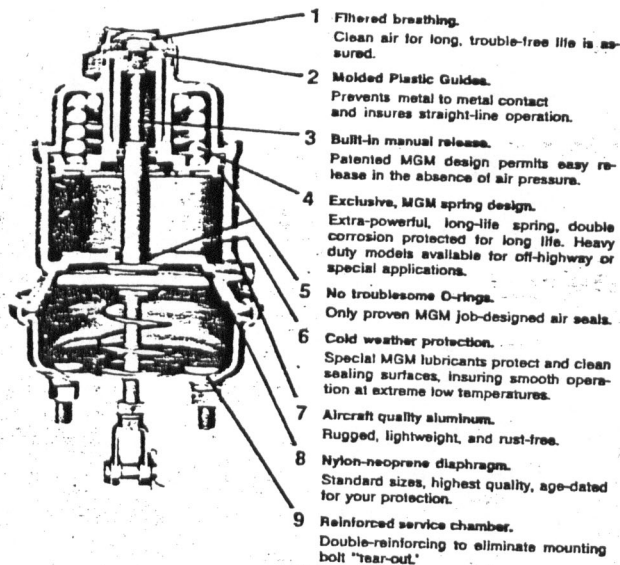
5d

13865-D3-1P

PARTS LIST FOR MODEL MGM no. 30B-23 and MGM 365-15



The finest piston type spring brake model



BM 03.1

PARTS & SERVICE DATA



13865-03-100

SAFETY BRAKES MGM TYPE 30

031

5P

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>	<u>QUANTITY</u>
1	ALUM. BREATHER CAP	A1-722-B	
2	RUBBER BREATHER CAP	A1-722-A	
3	RELEASE BOLT	655-A	
4	WASHER	664-A	
5	ANTI-EXP. WASHER GUIDE WASHER	Kit 4108	
6	SNAP RING	721-B	
7	HEAD	720-A	
8	THRUST WASHER	741-A	
9	SPRING (HEAVY DUTY)	940-A	
9A	SPRING (STANDARD)	740-A	
10	THRUST WASHER	741-A	
11	PISTON	750-B	
12	SEAL MAIN	751-B	
13	FELT WIPER	752-A	
14	SNAP RING	760-A	
15	COLLAR ASSEMBLY	A1-663-A	
16	PUSH ROD	756-A	
17	SNAP RING	659-A	
18	CYLINDER CASE	730-C2	
19	SEAL	731-A	
20	PUSH ROD PLATE	657-A	
21	SCREW	758-A	
22	DIAPHRAGM	N-774-A2	
23	PISTON & ROD ASSEMBLY	B4-771-A	
23A	SERVICE PISTON	771-A	
23B	JAM NUT	777-A	
23C	ROD	772-A-1200	
24	RETURN SPRING	673-A	
25	CLAMP RING ASSEMBLY	780-A	
25A	CLAMP RING BOLTS	1481-A	

BM 031

3A-175

3A-175

PARTS & SERVICE DATA

13865-03-100

SAFETY BRAKES MGM TYPE 30

031

SP 1

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>	<u>QUANTITY</u>
25B	CLAMP RING NUTS	1377-A	
26	NON-PRESSURE HOUSING ASSEMBLY	A2-770-A	
26A	FLAT WASHERS	793-A	
26B	LOCK WASHERS	790-A	
26C	FULL NUTS	777-B	
26	JAM NUT	777-A	

BM 031

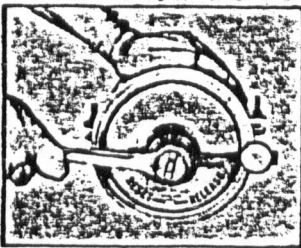


FIG. 1

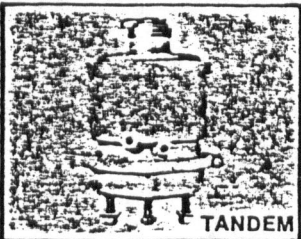


FIG. 2

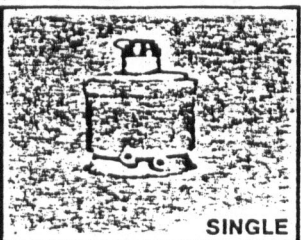


FIG. 3

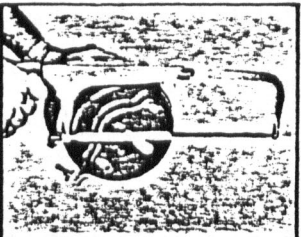


FIG. 4

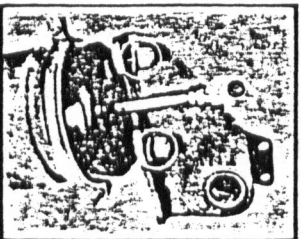


FIG. 5

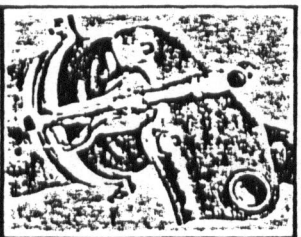


FIG. 6

INSTRUCTIONS FOR REMOVAL AND INSTALLATION OF MGM MAGNUM (PISTON) CAM SPRING BRAKES

Before removing any camshaft actuator, attempting to release spring parking brakes, or removing a clamp band, block the wheels of the vehicle to prevent a runaway. Instructions are as follows:

(1) MANUAL RELEASE (Fig. 1)

Manually release (power deactivate) the spring brake by turning the release bolt counterclockwise (using a $\frac{1}{4}$ " deep socket wrench), until release bolt comes out completely.

Unlike the "Stopgard" (double-diaphragm brake), the release bolt does not capture the spring. It positions the piston shaft within the piston, and the spring power is transmitted by force on the piston through release bolt to piston shaft.

(2) REMOVE AND REPLACE "TANDEM" UNITS (Fig. 2)

- Follow procedure in (1) above.
- Remove air lines and yoke pins.
- Remove mounting stud nuts.
- Before installing new tandem, make sure service push rod and clevis are the correct length. Field service units are furnished with an 8" rod. Cut rod same length as old unit (with spring brake power completely released) (Fig. 4). New service unit should have release bolt screwed out to check comparable lengths.
- Remove and replace yoke assembly from old unit to new unit. Tighten jam nut to yoke.
- Install tandem on bracket making sure washers (if furnished) are on outside of bracket and not against the N.P. housing (Fig. 5). Connect yoke to slack adjuster. Torque nuts, using a torque wrench, 115-150 lbs. ft.

DO NOT USE AN IMPACT WRENCH.

- Align ports — install air base fittings, hoses and tighten.
- Check for air leaks.
- With air pressure applied to the spring brake section, turn release bolt clockwise to bottom. Torque to 50 lbs. ft.
- DO NOT USE AN IMPACT WRENCH (Fig. 1).
- Snap breather cap in place. NOTE: Brakes can be adjusted with parking brake released.

(3) REMOVE AND REPLACE "SINGLE" UNITS (Fig. 3)

- Follow procedure in (1).
- To facilitate easier installation, service brake push rod should be extended (either by service air pressure or manually by pushing slack adjuster). Use vise-grip pliers to lock service rod in place (Fig. 6).
- Remove air lines.
- Remove clamp band.
- New unit should have release bolt screwed out.
- Install new single unit — aligning ports. (Check and replace diaphragm if needed).
- Install clamp band and torque as follows:
One-piece clamp band — 15-20 lbs. ft.
Two-piece clamp band — 20-30 lbs. ft.
- Install fittings and hoses and tighten.
- Release vise-grip pliers from service push rod.
- Check for air leaks.
- With air pressure applied to spring brake section, turn release bolt clockwise to bottom — torque to 50 lbs. ft.
- DO NOT USE AN IMPACT WRENCH (Fig. 1).
- Snap breather cap in place.

CAUTION: Do not attempt to remove the top spring brake section or overhaul the brake unless you are familiar with overhaul procedures. Refer to MGM Service Manual.



MGM Brakes



An Indian Head Company
21800 Greenfield Road
Detroit, Michigan 48237
Phone: (313) 968-2200
TWX: 810-232-1514



MGM Brakes



An Indian Head Company
21800 Greenfield Road
Detroit, Michigan 48237

TRUBLE SHOOTING SPRING PARKING BRAKES

Certain points are covered in the Trouble Shooting Chart which apply to service brakes and spring parking brakes. No effort is made to completely cover the entire air brake system, only the points which relate to spring parking brakes.

(A) INSUFFICIENT SERVICE BRAKE APPLICATION WHEN SERVICE PEDAL IS DEPRESSED

1. Restricted air flow or low air pressure to service chamber.
2. Worn Brake Lining or drums worn excessively.
3. Improper adjustment on slack adjuster and chamber push rod (cam brakes).
4. Automatic adjusters not operating properly on wedge foundation brakes.
5. Improper angle for slack adjuster and service push rod (cam brakes).
6. Bent or broken cam brackets or chamber mounting brackets (cam brakes).
7. Bent or broken chamber tubes (wedge brakes).
8. Broken non-pressure halves.
9. Mounting tube loose on wedge chamber to foundation brake.
10. Improper size actuators.
11. Ruptured diaphragm.
12. Air leaks in lines, fittings or valves, and at clamp ring.
13. Wrong wedge angle (wedge brakes).

(B) INSUFFICIENT SPRING BRAKE APPLICATION

While most of the causes listed for insufficient service brake applications will apply here, there are a few more which we should cover.

1. Spring brake not properly reset for full stroke.
2. Ruptured diaphragm or seal in spring brake section.
3. Broken spring.
4. Insufficient size of spring brake or proper output force.

(C) EXCESSIVE LEAKAGE — SERVICE BRAKES APPLIED

1. Leaking brake chamber diaphragm.
2. Leaking hose — tube — fittings.
3. Faulty valves.
4. Clamp ring improperly installed.

(D) EXCESSIVE LEAKAGE — SPRING BRAKES RELEASED BY AIR

1. Leaking diaphragm or main seal in spring section.
2. Leaking push rod seal.
3. Leaking hose — tube — fittings.

(E) DRAGGING BRAKES (Service)

1. Broken return spring in service section.
2. Service application air not exhausting properly or fast enough — clogged ports.
3. Restricted or collapsed hose or tubing.
4. Broken brake shoe retracting spring.
5. Camshaft linkage binding.

(Spring Brakes)

1. Leaking diaphragm or seal in spring brake section.
2. High hold-off pressure in spring brake section.
3. Spring brake not properly released manually.
4. Reduction of service system pressure causing spring brakes to partially apply.
5. Broken return spring in spring brake section (double diaphragm type).

(F) SERVICE BRAKES APPLY WHEN SPRING BRAKES ARE RELEASED BY AIR

1. Leaking push rod seal between spring brake and service section.
2. Improper plumbing.

(G) LEAK THRU SERVICE EXHAUST PORTS — SPRING BRAKES RELEASED BY AIR

1. Leaking push rod seal between spring brake and service section.

(H) SPRING BRAKE WILL NOT RELEASE (NORMAL OPERATION)

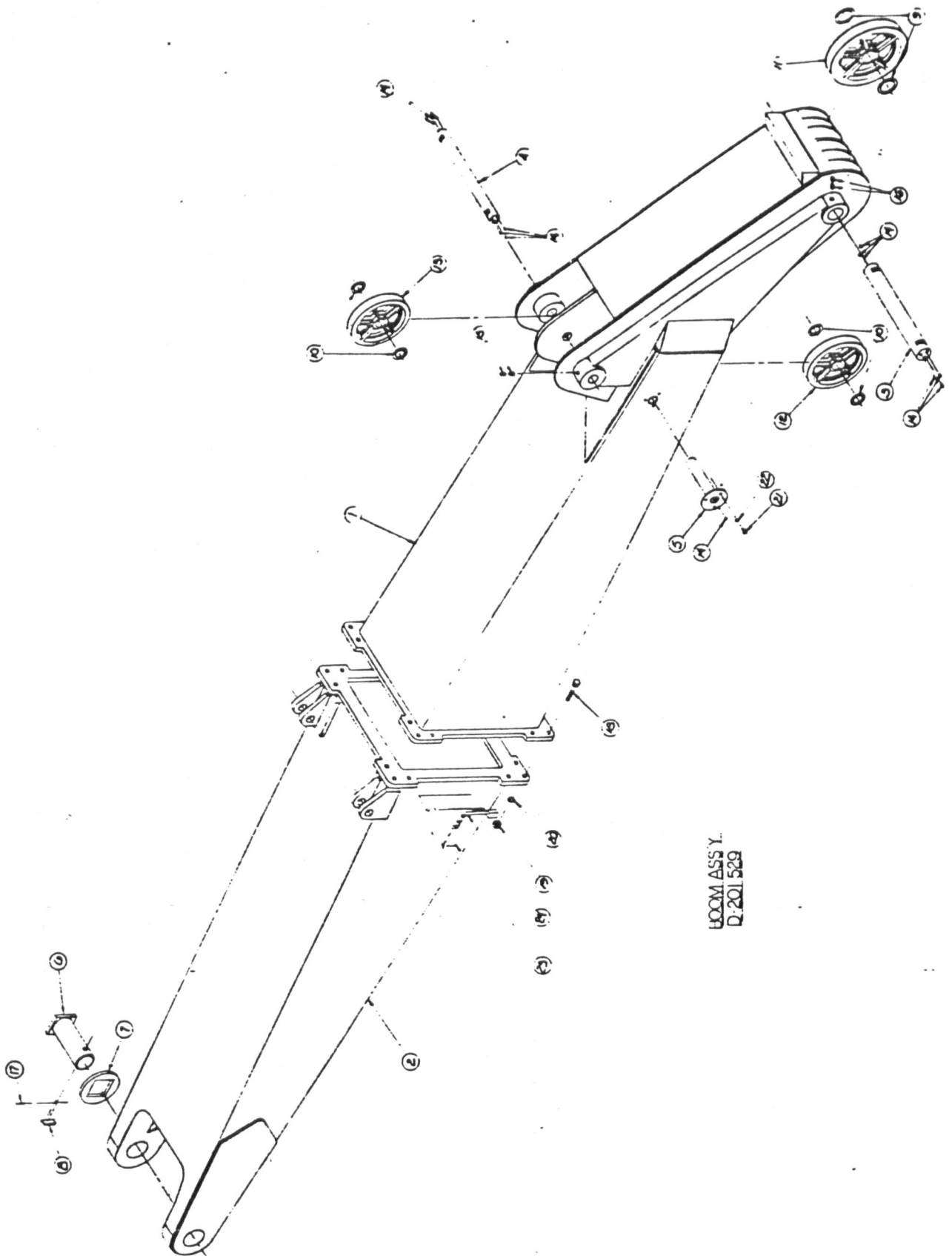
1. Insufficient air pressure.
2. Air leaks in spring brake air system.
3. Restrictions in spring brake air system.
4. Ruptured diaphragm and/or seal in spring brake section.
5. Broken spring causing malfunction.

(I) SPRING BRAKES CANNOT BE MECHANICALLY RELEASED

1. Release bolt stripped or broken.
2. Release bolt and swedged nut locked together.

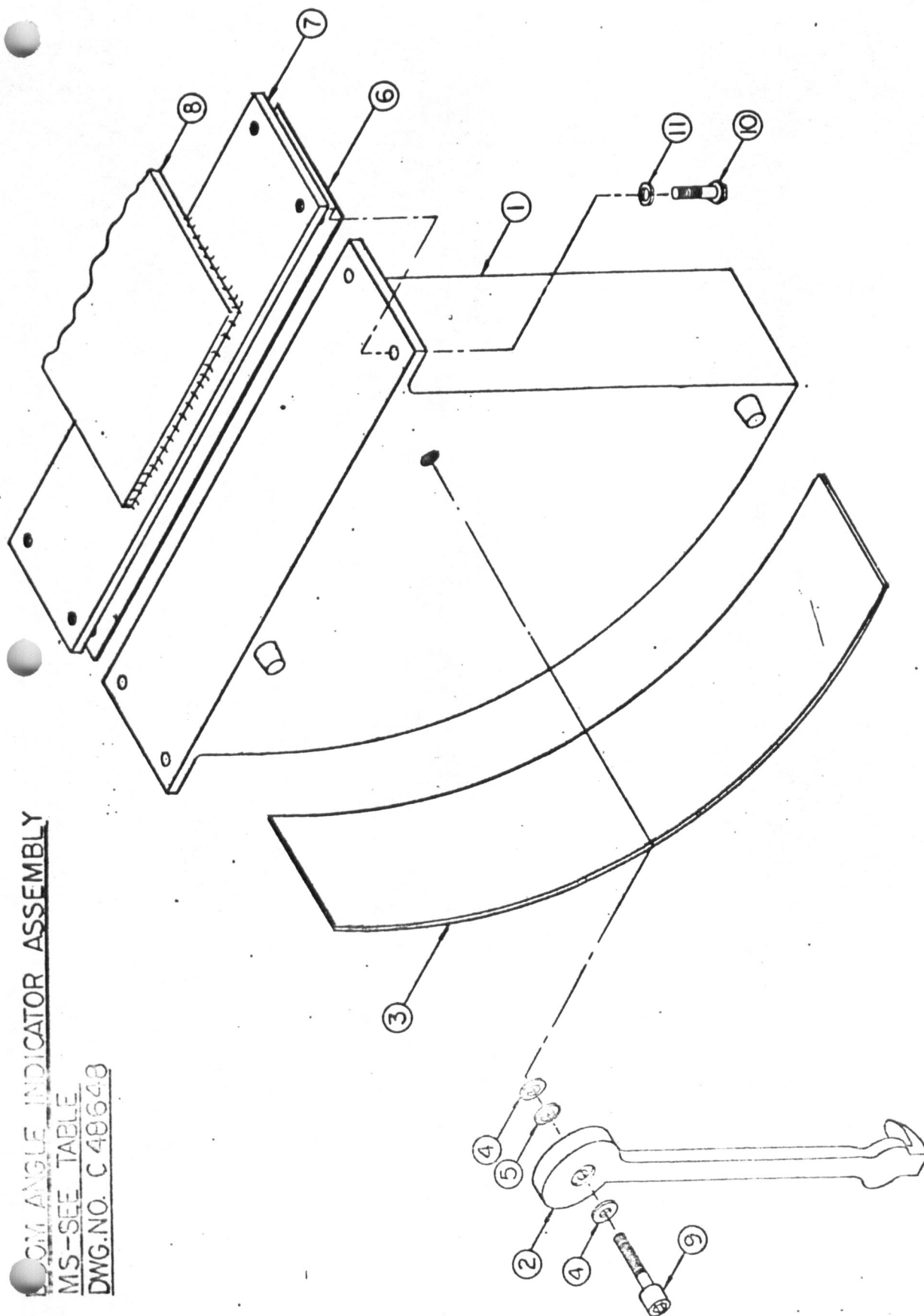
CHAPTER THREE,
SECTION B,

CRANE PARTS



LOCOM ASS Y.
D-201 529

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
						201 - 529	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1	D 201 - 503	Upper Boom Weldment				
2	1	D 201 - 531	Lower Boom Weldment				
3	1	B 101 - 052	Lower Sheave Pin				
4	1	B 101 - 053	Upper Sheave Pin				
5	1	A 101 - 051	Boom Sheave Pin				
6	2	B 100 - 771	Boom Pivot Pin				
7	2	B 200 - 917-3	Pivot Pin Keeper				
8	2	B 200 - 917-1	Retaining Pin				
9	12	Nico 101 - 022	Lower Thrust Washer, 5 1/4" O.D. x 3 9/16" I.D. x #12 GA				
10	14	A 101 - 050	Upper Thrust Washer, 4 1/2" O.D. x 2 9/16" I.D. x #12 GA				
11	6	Nico 100 - 795	Lower Sheave "D.R.H. Johnson" #18 - 250				
12	1	Nico 101 - 049	Boom Sheave "D.R.H. Johnson" #14 - 100, 7/8" cable				
13	6	Nico 101 - 115	Upper Sheave "D.R.H. Johnson" #14 - 100, 3/4" cable				
14	13	Nico 100 - 003	Grease Fitting "Alemite" #1610				
15	4	-- --	Upper Setscrew 3/4 - 10 NC x 7/8" long				
16	4	-- --	Lower Setscrew 3/4 - 10 NC x 5/8" long				
17	2	Nico 100 - 638	Hair Pin				
MODEL 220 - RPC				TITLE			
ASSEMBLY DWG.				BOOM ASSEMBLY			
D 201 - 529				PETTIBONE LIMITED			
WRITTEN BY PL				SHEET 1 OF 2			
DATE Oct. 4/84				GROUP NO. 201-529			



60° ANGLE INDICATOR ASSEMBLY

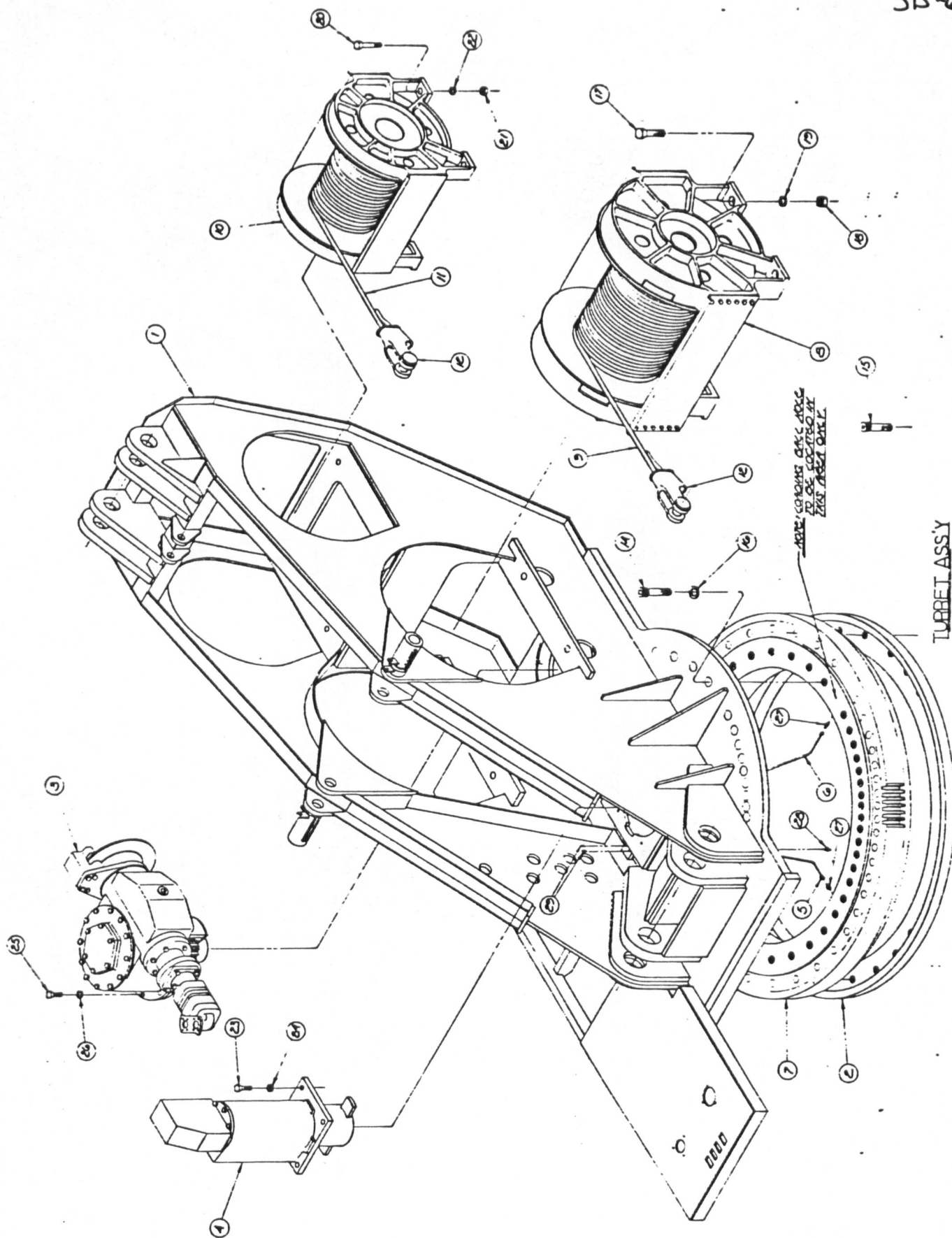
MS-SEE TABLE

DWG.NO. C 40648

BOOM ANGLE INDICATOR ASSEMBLY
MS - SEE TABLE DWG. NO. C-48648

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>REQ'D</u>
1	See Table	Indicator Housing (Mach.) - Anadized	1
2	See Table	Indicator Arm (Mach.) - Anadized	1
3	C-45945-1	Indicator Plate	1
4	A-45946-1	Washer	2
5	A-45947-1	Washer	1
6	See Table	Barrier (Vellumoid Gasket)	1
7	A-37740-22	Mounting Plate	1
8	A-45952-1	Support Plate	1
9	A-45948-1	Socket Hd. Shoulder Screw	1
10		1/4-20 UNC Hex Hd. Capscrew (Stainless Steel - 3/4 Lg.	4
11		1/4 Lockwasher (Stainless Steel)	4

<u>MS</u>	<u>ITEM 1</u>	<u>ITEM 2</u>	<u>ITEM 6</u>
7162	D-45874-1	B-45875-1	OMIT
7162-1	A-48374-2	A-48374-1	A-48376-1



ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
						201-526A	
ITEM	REC'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1		Turret Weldment				
1A	1	TIF-00000-990	Platform Weldment				
2	See page 3	D200-869	Cable Roller Ass't. - NOT SHOWN				
3	See page 3		Swing Drive Unit				
4	Ref.	D200-918	Hydr. Swivel Unit				
5	2	B101-414	Grease Hose				
6	2	B101-415	Grease Hose				
7	1	N100	Turntable Bearing "Kaydon" #11729-001				
8	1	N100	Line Hoist Winch W. Energy-Free Fall (Gearmatic Model) 44-12-11-11-10/4406				
9	1	N100	Load winch cable 7/8" Dia. 6x37 1WRC, Extra Improved type.				
			"Purple Plus" 350' long (Bethlehem Steel)				
10	1	N100	Boom Hoist Winch "Braden" #CH -230				
11	1	N100	Boom Hoist Cable 3/4" Dia. 6x19 1WRC, Extra Improved Type.				
			"Purple Plus" 395' long (Bethlehem Steel)				
12	1	N100	Open Wedge Socket for 3/4" cable, Crosby S-421-3/4				
13	1		" " " 7/8" cable, Crosby S-421-7/8				
14	40		Upper Bearing Bolt 1 1/2-7NC x 4 1/2" long (Stock.HD. CapScr. (R.8)				
MODEL 220-PRC				TITLE			
ASSEMBLY DWG. D201-526A/D-12243				TURRET & PLATFORM ASS'Y.			
WRITTEN BY				DATE			
PL				Oct. 4/84.			
				SHEET 1 OF 3			
				GROUP NO. 201-526A			

PETTIBONE LIMITED

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
						201-526A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
3	1	Tiffin D-12243	Swing Drive Ass'y.				
302	1	Tiffin A-10004-21	Swing Drive Unit w.Brake				
303	1	Tiffin A-11109-3	Motor "Commercial" #M76A 978 BE OL 25 7		COT		Braden #BSD-120
304	1	Tiffin C-12214-1	Pinion Gear				Commercial
305	1	Tiffin A-10144-2	Snap Ring 3.75 "Walde-Truarc #5100-375-Ext.				
306	4	A-10123-4	Cap Screw, Hex. HD. 1-13NC x 1 3/4" LG., GR. 5				
307	4	A-10070-3	Lockwasher 1/2" Std.				
308	8	A-10174-2	Capscrew, Hex. HD. 5/8-11 UNC x 2" long, GR. 5				
309	8	A-10029-7	Hardened Steel Flat Washer 5/8"				
2	1	Tiffin 00001-015	Cable Roller Ass'y.				
201	1	00001-017	Roller				W.O.
201	1	00001-018	Shaft				W.O.
203	2	00A-10063-004	Bushing, Bronze 2 1/2" O.D. x 2" I.D. x 3 1/2" long				W.O.
204	2	00001-067	Clamp				W.O.
205	4	00A-13031-005	Hex, HD. Capscrew 1-13 NC x 2 1/2" long				
206	4	00A-10070-003	Lockwasher 1/2"				
MODEL D-12243			TITLE				
ASSEMBLY DWG.			TURRET & PLATFORM ASS'Y.				
WRITTEN BY			DATE				

7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	4
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BILL OF MATERIAL

BRADEN WINCH COMPANY		BILL OF MATERIAL		ENGINEERING CHANGES		DATE	QUANTITY	ORDER NUMBER
-0029	77-0381	77-933	77-417	77-0087	77-0408	77-0200	77-0084	CO-0194

[illegible]

TURRET ASSEMBLY
PETTIBONE 22ORRC CRANE

REMOVAL:

FOLLOWING REMOVAL OF BOOM ASSEMBLY, MOVABLE GANTRY AND BOOM STOPS, THE TURRET ASSEMBLY CAN BE REMOVED. DISCONNECT ALL HYDRAULIC COUPLINGS LEADING TO THE TURRET AND THE ELECTRICAL LEADS TO THE COLLECTOR RING. ATTACH WIRE ROPE SLING TO THE SUPERSTRUCTURE.

TURNTABLE BEARING AND GEAR (7) IS ANCHORED TO CARRIER THRU CARRIER BASE PLATE AND BEARING BASE PLATE (2) BY SOCKET HEAD CAPSCREWS (15) AND LOCKWASHERS (16). REMOVAL OF THESE CAPSCREWS AND LOCKWASHERS WILL ALLOW THE TURRET TO BE REMOVED FROM THE CARRIER. THE BEARING AND GEAR (7) CAN BE REMOVED FROM THE TURRET BY REMOVING SOCKET HEAD CAPSCREWS (14) AND LOCKWASHERS (16).

DISASSEMBLY:

THE LINE HOIST WINCH (8) MAY BE REMOVED BY A SEPARATE CRANE AFTER HEX HEAD CAPSCREWS (17), LOCKWASHERS (19) AND HEX NUT (18) ARE REMOVED. THE BOOM HOIST WINCH (10) MAY BE REMOVED IN SAME MANNER AFTER REMOVAL OF HEX HEAD CAPSCREW (20), LOCKWASHER (22) AND HEX NUT (21). REMOVAL OF SLEWING DRIVE UNIT (3) CAN BE ACCOMPLISHED BY REMOVING HEX HEAD CAPSCREW (25) AND LOCKWASHERS (26). BY REMOVING HEX HEAD CAPSCREWS (23) AND LOCKWASHERS (24) THE HYDRAULIC SWIVEL UNIT CAN NOW BE TAKEN OUT.

CLEANING, INSPECTION AND REPAIR:

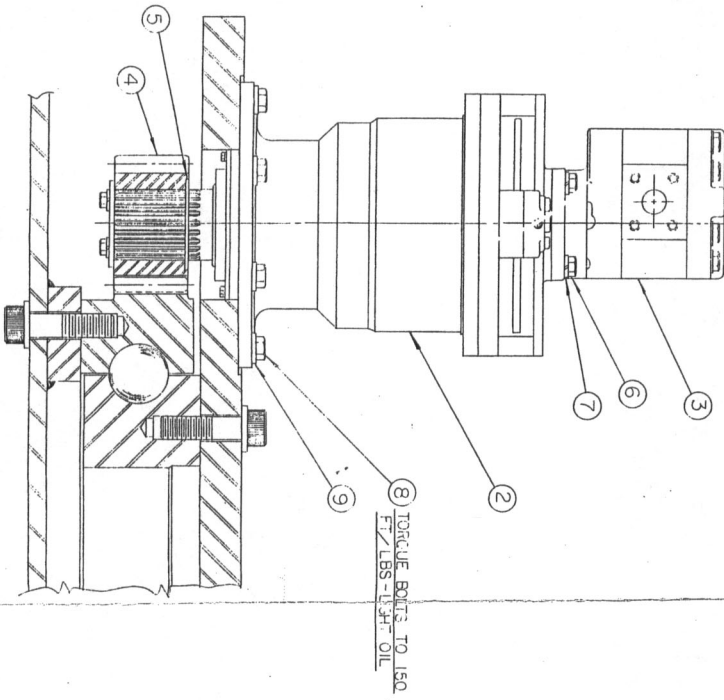
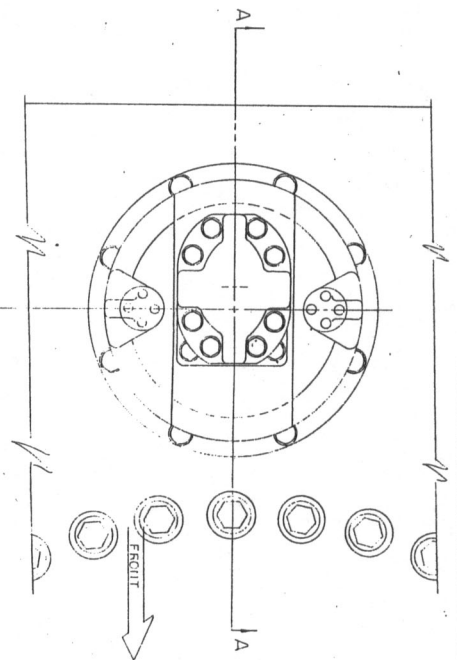
CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

ALL PARTS SHOULD BE INSPECTED FOR CRACKS AND WEAR.

REPLACE ALL WORN PARTS.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

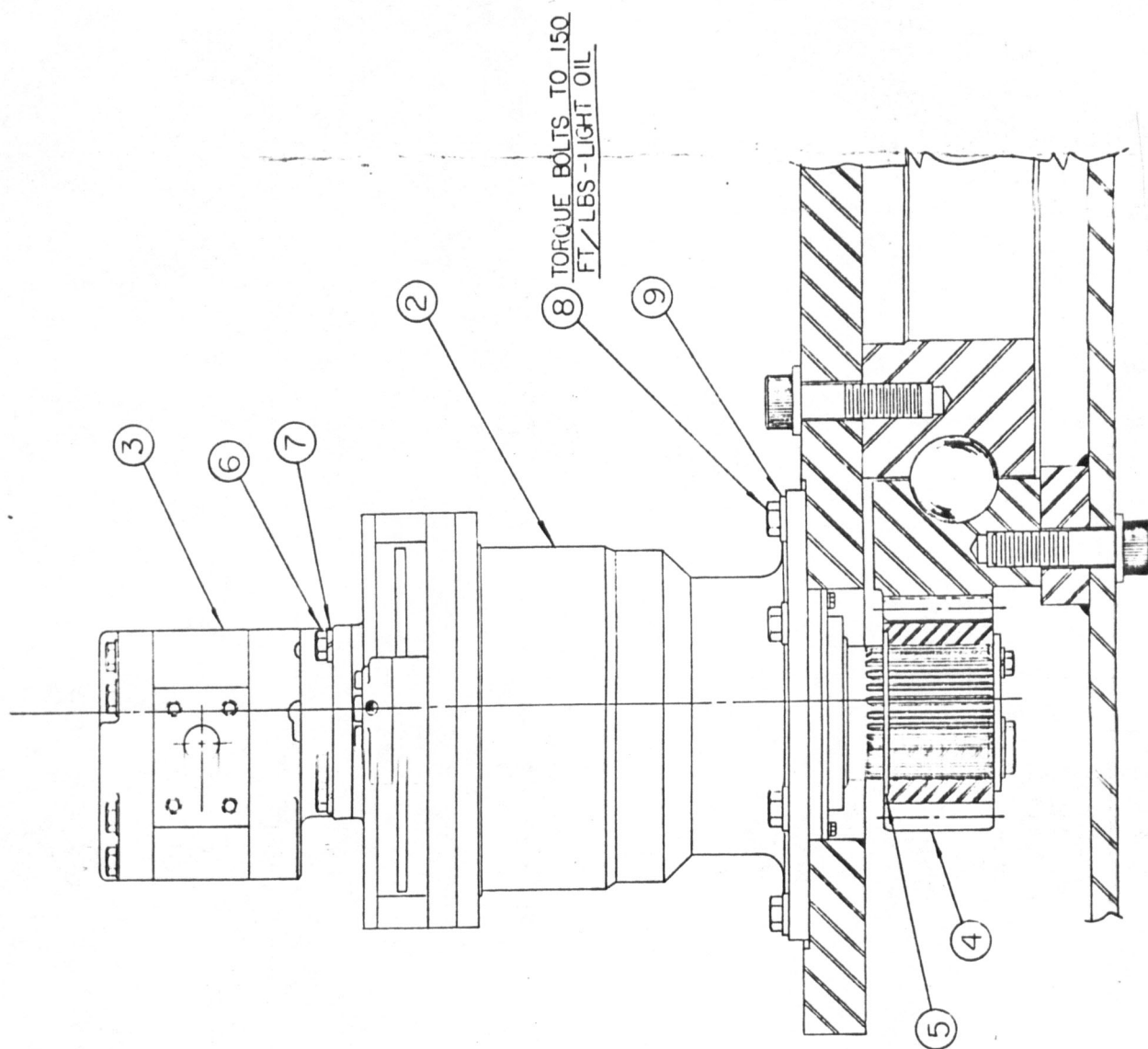


8 TORQUE BOLTS TO 150,
FT/LBS - 1 SH- OIL

1 SWING DRIVE ASSEMBLY

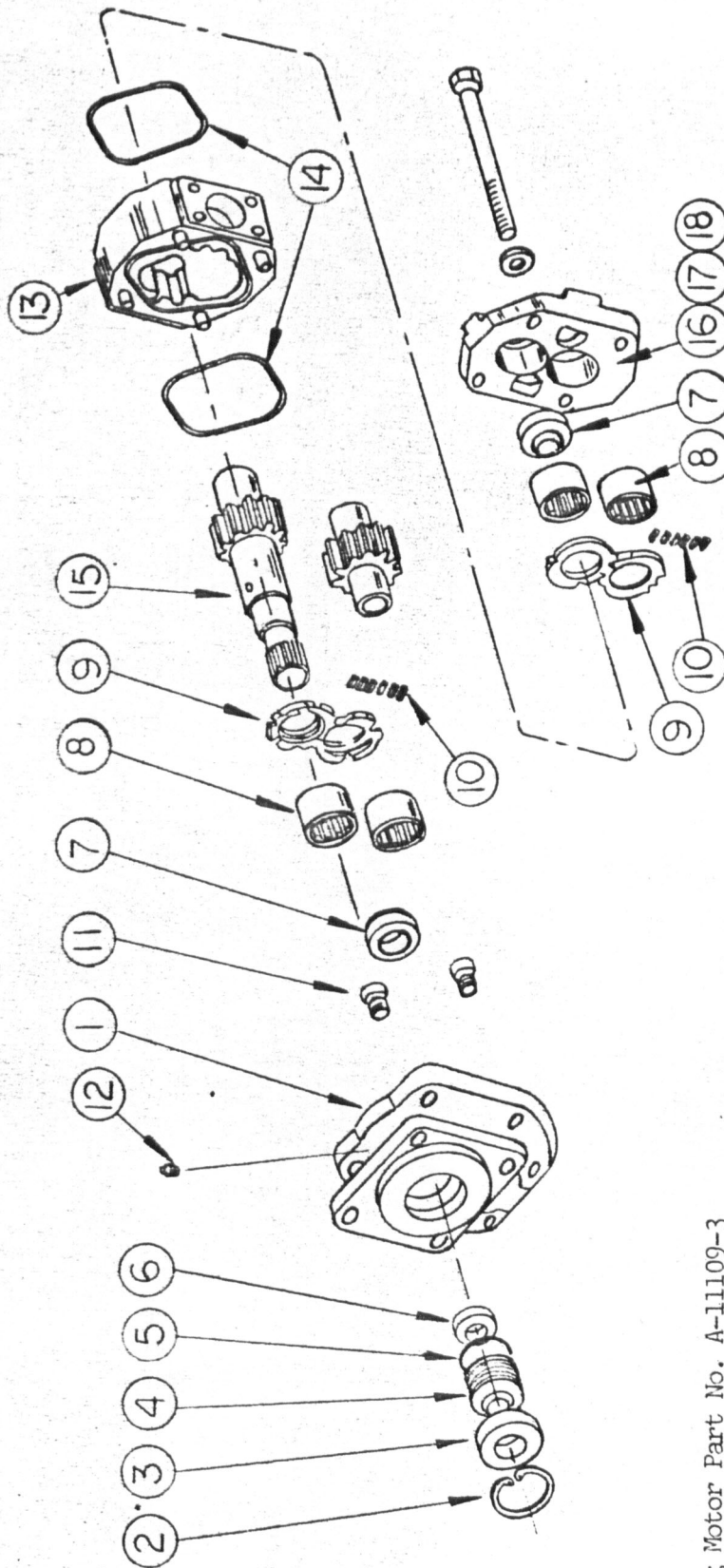
BILL OF MATERIAL		
ITEM	PART NO.	DESCRIPTION
1	D-12243-1	SWING DRIVE ASSY. C/O
2	A-10004-2	1/2" SWING DRIVE UNIT W/ BRAKE
3	A-1109-3	MOTOR
4	C-1214-1	PISTON GEAR
5	A-10133-2	2" SWING
6	A-10133-2	2" SWING
7	A-10020-3	LOCKWASHER
8	A-10174-2	CAP SCREW
9	A-10023-2	HAIRPIN

PETTIBONE CORPORATION ASSUMES NO RESPONSIBILITY FOR THE DATA SHOWN HEREIN, WHICH IS SUBMITTED FOR INFORMATION AND A SHOT TO BE TAKEN BY THE USER. THE COMPANY OF PETTIBONE CORPORATION, OHIO, OHIO.	
PART NO. D-12243-1 PART NO. NIS 1230160TK PETTIBONE CORPORATION TIPPIN OHIO	DATE 12/11/78 SCALE 1" = 1"
REVISIONS 1. 12/11/78 2. 12/11/78 3. 12/11/78 4. 12/11/78 5. 12/11/78 6. 12/11/78 7. 12/11/78 8. 12/11/78 9. 12/11/78 10. 12/11/78 11. 12/11/78 12. 12/11/78 13. 12/11/78 14. 12/11/78 15. 12/11/78 16. 12/11/78 17. 12/11/78 18. 12/11/78 19. 12/11/78 20. 12/11/78 21. 12/11/78 22. 12/11/78 23. 12/11/78 24. 12/11/78 25. 12/11/78 26. 12/11/78 27. 12/11/78 28. 12/11/78 29. 12/11/78 30. 12/11/78 31. 12/11/78 32. 12/11/78 33. 12/11/78 34. 12/11/78 35. 12/11/78 36. 12/11/78 37. 12/11/78 38. 12/11/78 39. 12/11/78 40. 12/11/78 41. 12/11/78 42. 12/11/78 43. 12/11/78 44. 12/11/78 45. 12/11/78 46. 12/11/78 47. 12/11/78 48. 12/11/78 49. 12/11/78 50. 12/11/78 51. 12/11/78 52. 12/11/78 53. 12/11/78 54. 12/11/78 55. 12/11/78 56. 12/11/78 57. 12/11/78 58. 12/11/78 59. 12/11/78 60. 12/11/78 61. 12/11/78 62. 12/11/78 63. 12/11/78 64. 12/11/78 65. 12/11/78 66. 12/11/78 67. 12/11/78 68. 12/11/78 69. 12/11/78 70. 12/11/78 71. 12/11/78 72. 12/11/78 73. 12/11/78 74. 12/11/78 75. 12/11/78 76. 12/11/78 77. 12/11/78 78. 12/11/78 79. 12/11/78 80. 12/11/78 81. 12/11/78 82. 12/11/78 83. 12/11/78 84. 12/11/78 85. 12/11/78 86. 12/11/78 87. 12/11/78 88. 12/11/78 89. 12/11/78 90. 12/11/78 91. 12/11/78 92. 12/11/78 93. 12/11/78 94. 12/11/78 95. 12/11/78 96. 12/11/78 97. 12/11/78 98. 12/11/78 99. 12/11/78 100. 12/11/78	SWING DRIVE ASSY DATE 12/11/78 SCALE 1" = 1"



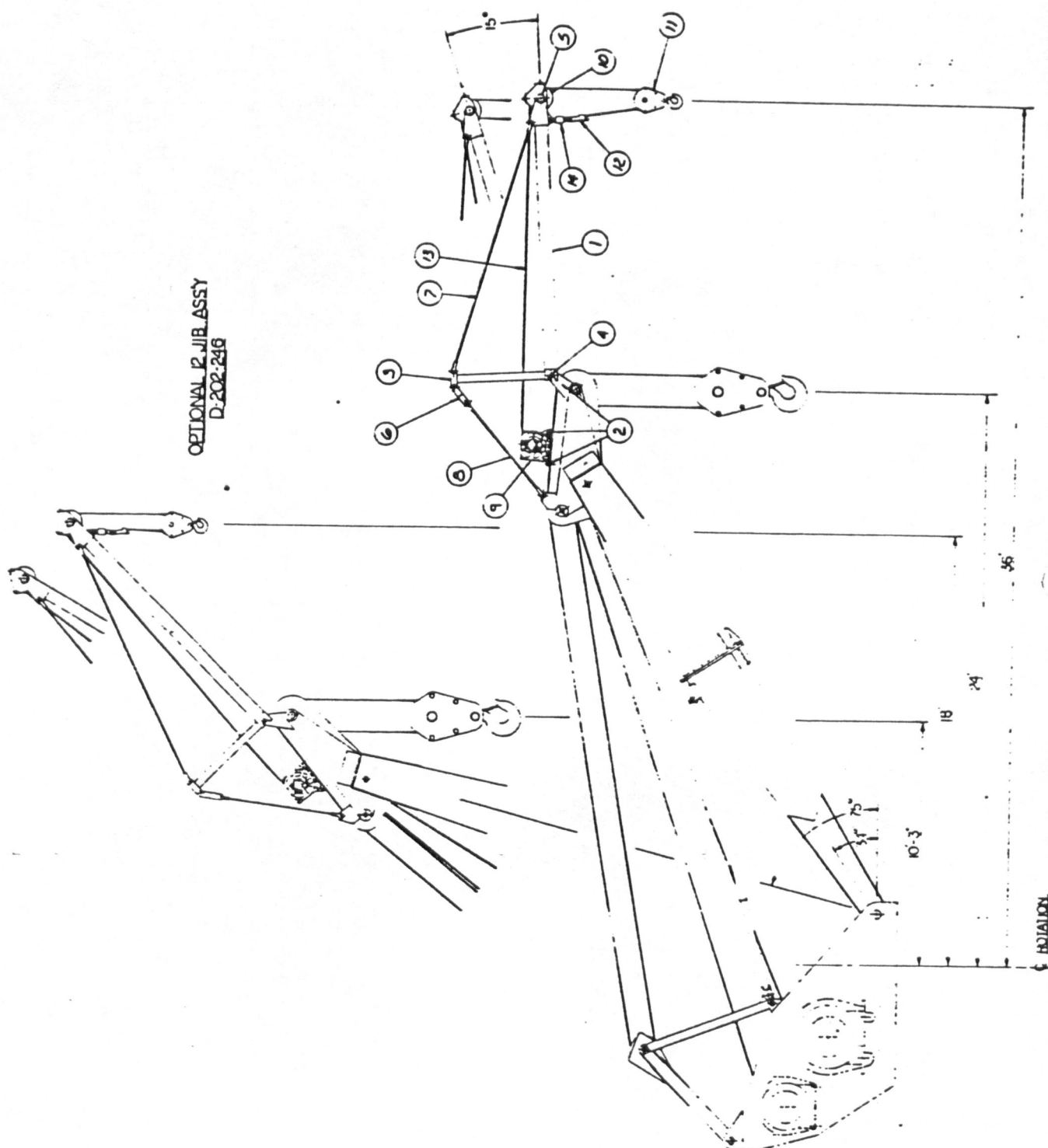
① SWIIG DRIVE ASSEMBLY D-12243

PA-11109-3



Swing Motor Part No. A-11109-3

ITEM	PART NO.	QTY.	DESCRIPTION	ITEM	PART NO.	QTY.	DESCRIPTION
1	A-11298-17	1	Shaft End Cover	11	A-11298-3	2	Check Assembly
2	A-11298-18	1	Snap Ring	12	A-11298-27	1	Pipe Plug
3	A-11298-19	1	Spacer	13	A-11298-28	1	Gear Housing - Complete
4	A-11298-20	1	Seal Retainer	14	A-11298-29	2	Gasket Seal
5	A-11298-21	1	"O" Ring	15	A-11298-30	1	Drive Shaft & Gear Set
6	A-11298-22	1	Lip Seal	16	A-11298-31	1	Port End Cover
7	A-11298-23	2	Ring Seal	17	A-11298-32	1	Name Plate
8	A-11298-24	4	Roller Bearing	18	A-11298-33	2	Drive Screw
9	A-11298-25	2	Thrust Plate				
10	A-11298-26	12	Pocket Seal				



OPTIONAL 12' JIB ASSEMBLY

3B-17

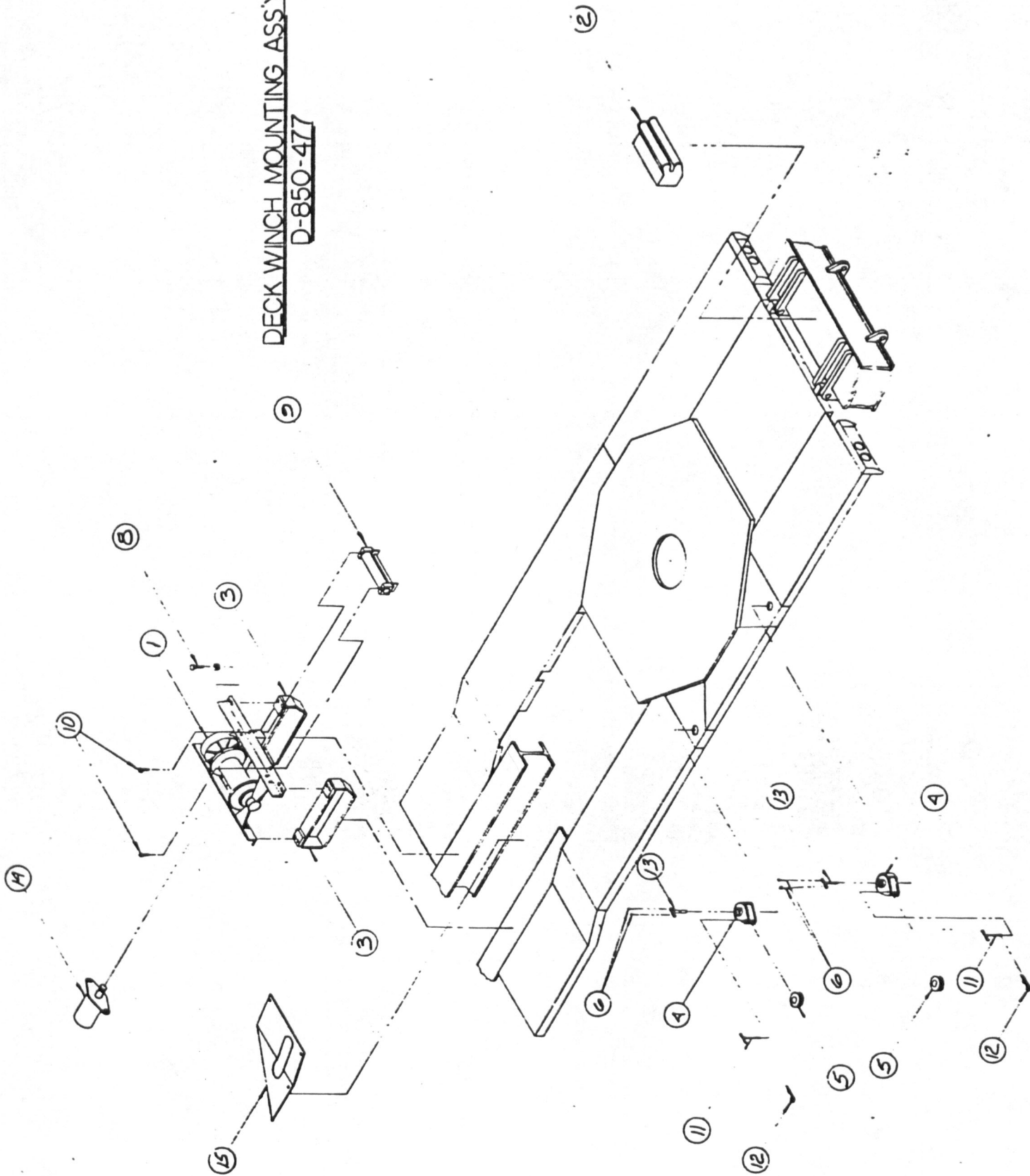
D-202-246

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-202-257	12' JIB WELDMENT	1
2	D-202-256	JIB AND WINCH MOUNTING BRACKETS	2
3	C-202-258	PORTAL WELDMENT	1
4	B-202-259	JIB AND PIVOT PIN ASSEMBLY	1
5	B-202-260	JIB SHEAVE PIN	1
6	B-202-261	PENDANT LINK WELDMENT	2
7	B-202-262-1	JIB SUPPORT PENDANT CABLE	2
8	B-202-262-2	PORTAL SUPPORT PENDANT CABLE	2
9	100-479	AUXILIARY WINCH	1
10	100-497	SHEAVE	1
11	100-533	SINGLE SHEAVE HOOK BLOCK	1
12	101-534	OPEN WEDGE SOCKET	1
13	101-531	AUXILIARY WINCH CABLE	1
14	101-563	SWIVEL JAW AND EYE	1

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
				MAT'L	LOC	C/N	SUPPLIER
ITEM	REQ'D	PART NO.	DESCRIPTION				
1	1	DJV-42756-000	25 ft. Jib Weldment				
2	1	DJV-42778-000	Jib & Winch Mtg. Brkt.				
3	1	CJV-42779-000	Portal Weldment				
4	1	B-202-259	Jib Pivot Pin Ass'y.				
5	1	B-202-260	Jib Sheave Pin				
6	2	BJV-42780-000	Pendant Link Weldment				
7	2	BJJ-42757-000	Jib Support Pendant Cable, Extra Improved Type.				
			7/8" dia. 6 x 19 Purple Plus INRC w/2 Open Swaged sockets, Pins Parallel x 277 1/2" long				
8	2	BJJ-42777-000	Portal Support Pendant Cable, Extra Improved Type.				
			7/8" dia. 6 x 19 Purple plus INRC w/2 Open Swaged Sockets, Pins Parallel x 168 3/4" long.				
9	REF	Tlif11r A-10004-29	Auxiliary Winch "Braden" #PD-12A-36064-02				
10	1	100-497	Sheave -"DRH Johnson" #12-5A				
			Grooved for 9/16" Cable				
11	REF	100-533	Single Sheave Hook Block				
			"DRH Johnson" #10S12 RFA Grooved for 9/16" Cable				
MODEL 220-RPC				TITLE			
ASSEMBLY DWG DJX-42749-000				OPTIONAL 25 FT. JIB ASSEMBLY			
WRITTEN BY				DATE			
				PETTIBONE			
				PETTIBONE (CANADA) LIMITED			
				SHEET 1 OF 2			
				GROUP NO 201-168B			

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1	D 202-257	12 Ft. Jib Welding				
2	1	D 202-256	Jib & Winch Mtg. Brkt.				
3	1	C 202-258	Portal Weldm't.				
4	1	B 202-259	Jib Pivot Pin Ass'y.				
5	1	B 202-260	Jib Sheave Pin				
6	2	B 202-261	Pendant Link Element				
7	2	B 202-262-1	Jib Support Pendant Cable, Extra Improved Type.				
			7/8" DIA 6 x 19 Purple Plus IMRC w/2 Open Swaged.				
			sockets, Pins Parallel, 126 3/4" long				
8	2	B 202-262-2	Portal Support Pendant cable, Extra Improved type.				
			7/8" Dia. 6 x 19 Purple Plus IMRC w/2 Open swaged				
			Sockets, Pins Parallel 60 1/2" long.				
9	1	Tiffin #A-10004-29	Auxiliary Winch "Braden" #PD-12A-36064-02				
10	1	Nico 100-497	Sheave -" DRH Johnson" 12-5A				
			Grooved for 9/16" cable.				
MODEL 220-RRC				TITLE			
ASSEMBLY DWG. D202-246				12 FT. JIB ASS'Y. W. AUX. WINCH			
WRITTEN BY				DATE			
				Oct. 9/84			
				SHEET 1 OF 2			
				GROUP NO. 202-246			
				PETTIBONE (CANADA) LIMITED			
				PETTIBONE			

DECK WINCH MOUNTING ASSY
D-850-477

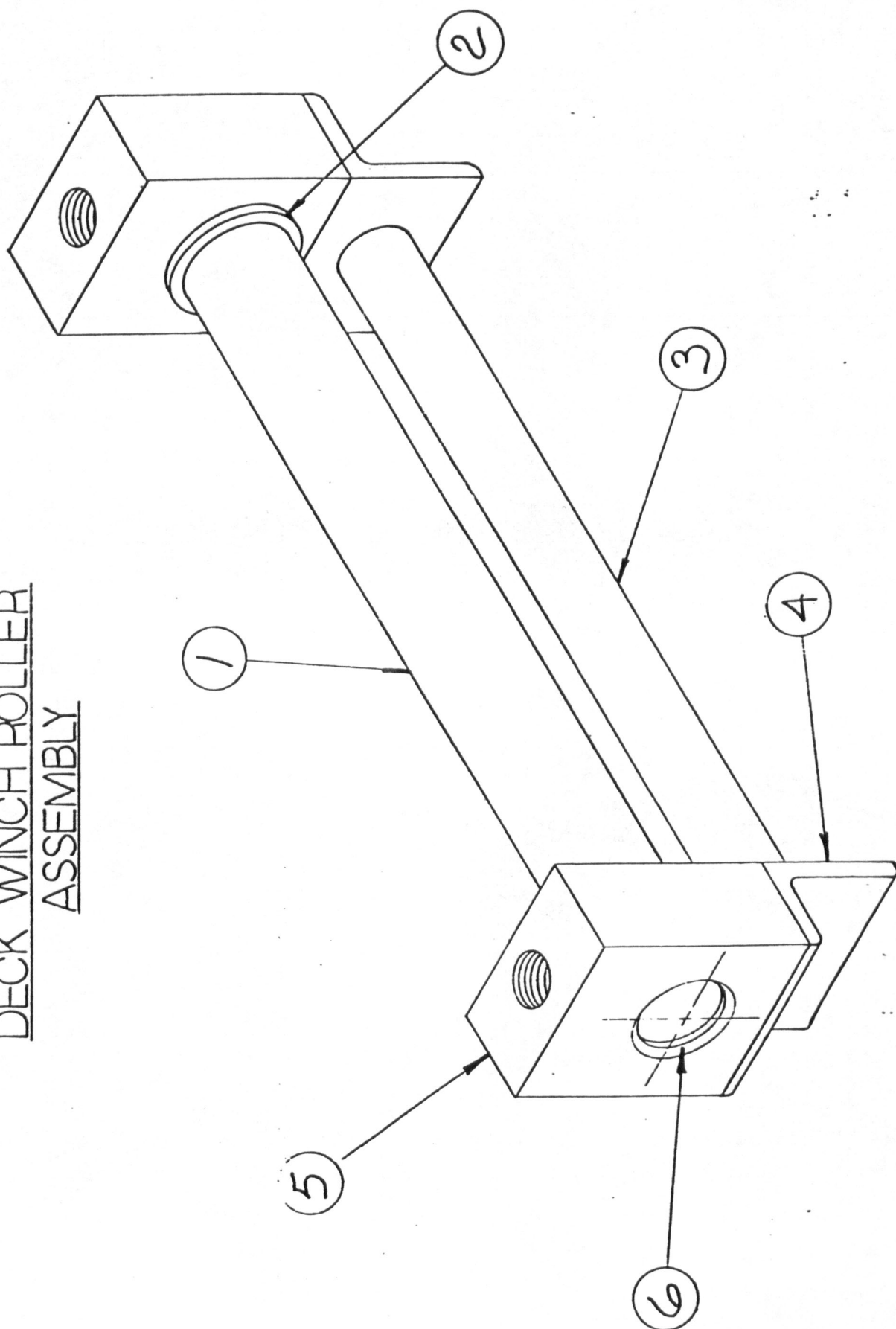


ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	850-477	SUPPLIER
1	1	100-820 NICO	Deckwinch Assy. "Braden" #AMSU 10-12F					
			30000 lbs. Line Pull					
2	1	C201-775	Fairlead Assy.					
	1	C201-775	Fairlead Weldment					
	2	C201-775-6	Roller Shaft					
	2	C201-775-7	Roller					
	2	C201-775-8	Sheave Pin					
	2	100-700 NICO	Sheave - DRH Johnson #6-5A					
	4	101-040	Flanged Bearing "Oilite" #FF-1704-4					
	4	-	Sock. Hd. Setscrew - 3/8-16 NC X 3/4" long					
	4	-	Hex Hd. Capscrew - 3/8-16 NC X 1" long					
	4	-	Lockwasher 3/8 Std.					
	6	100-003	Grease Fitting "Alemite" #1610 B					
3	2	C201-614	Deckwinch Mounting Bracket					
4	2	C201-611-1	Sheave Bracket Weldment					
5	2	100-700 NICO	Sheave - DRH Johnson #6-5A					
6	4	-	Hex Hd. Capscrew - 3/8-16 NC X 1 1/4" long					
MODEL 220-RRC				TITLE				
ASSEMBLY DWG. 8201-224 / C101-G13				DECKWINCH MOUNTING ASSEMBLY				
WRITTEN BY PL				DATE Oct. 9, 1984				
				PETTIBONE LIMITED				
				SHEET 1 OF 3				
				GROUP NO. 850-477				

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
							850-477	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
7	1	NICO 100-962	DECKWINCH CABLE - 60' LENGTH STEEL, EXTRA IMPROVED TYPE 2/4" DIA. WIRE ROPE, PURPLE PLUS 6-191 WRC, REGUL LAY - 175 FT				STRENGTH 23.6 TONS	
8	8	-	Hex Bolt - 5/8-11 NC X 3 1/4" lg. with Nut & LW					
9	1	C201-103	Deckwinch Roller Assembly					
10	2	-	Hex Hd. Capscrew - 3/4-10 NC X 2" lg. with LW					
11	2	C201-611-2	Tip Pin					
12	2	100-865 NICO	Hitch Pin "Western Wire" #13					
13	2	C201-611-3	Sheave Pin					
14	1	100-821 NICO	Winch Motor "Commercial" #M75-A942BEOL25-11					
15	REF.	B850-531	Winch Deckplate (Modified on Frame)					
16	1	C202-021	Deckwinch Valve Mtg. Bracket & Assembly					
1601	REF.	C202-021-1	Valve Bracket					
1602	REF.	100-835 NICO	Valve					
1603	1	2062-16-20	90° "G" Ring Boss Conn.					
1604	2	202702-16-16	" " " " " "					
1605	1	2062-20-20	" " " " " "					
1606	1	2062-16-16	" " " " " "					
1607	1	101-529	Adjustable Clevis w/Pin "CLEVELAND" # 2706 - 76					
MODEL 220-RR				TITLE				
ASSEMBLY DWG. B201-224 / C201-613				DECKWINCH MOUNTING ASSEMBLY				
WRITTEN BY PL				DATE Oct. 9, 1984				
				PETTIBONE LIMITED				
				SHEET 2 OF 3				
				GROUP NO. 850-477				

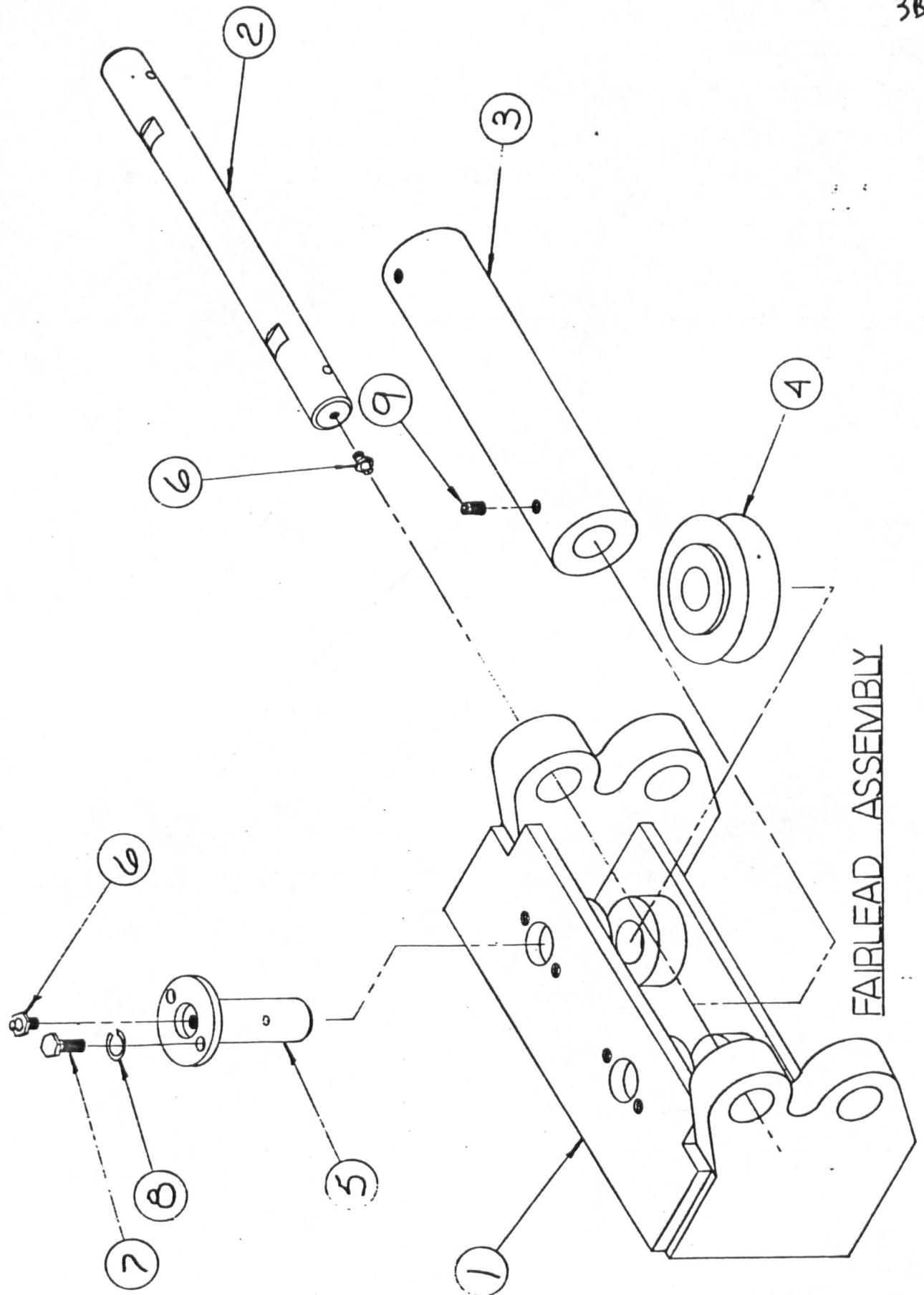
ENGINEERING BILL OF MATERIAL					ISSUE NO.		GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
1608	REF.	100-959	Air Cylinder, UNITED EQUIP., # RC-1003-3					
1609	1		Jam Nut					
1610	1		Adjustable Clevis w/Pin					
1611	REF.	100-144	Solenoid Valve, UNITED EQUIP., # RC-1016					
1612	2	1/4" SCH. 40	Nipple 1/4" lg.					
1613	1	1/4" SCH. 40	Elbow 90°					
1614	1	1/4" SCH. 40	Tee					
1615	1	1/4" SCH. 40	Nipple 3" lg.					
1616	1	43F 3/8" X 1/4"	Male Connector					
1617	2	269P 1/4" X 1/8"	Plastic Tube Fitting 90°					
1618	AR		1/4" O.D. Plastic Air Line					
1619	2	269P 1/4" X 1/4"	Plastic Tube Fitting 90°					
1620	3	7/16"-14NC X						
		2 1/2" long	Valve Mounting Bolts					
1621	1	100-988	Vickers, Handle Assembly # 261768					
			LINK # 261342, RING # 122546					
17	1	100-581	3/4" OPEN WEDGE SOCKET, CLOSBY LAUGHLIN # S-421					
MODEL 220-RRC					PETTIBONE			
ASSEMBLY DWG. B201-224 / C 201-613					PETTIBONE LIMITED			
WRITTEN BY PL					SHEET 3 OF 3			
DATE Oct. 9, 1984					GROUP NO. 850-477			

DECK WINCH ROLLER
ASSEMBLY



DECK WINCH ROLLER ASSEMBLY

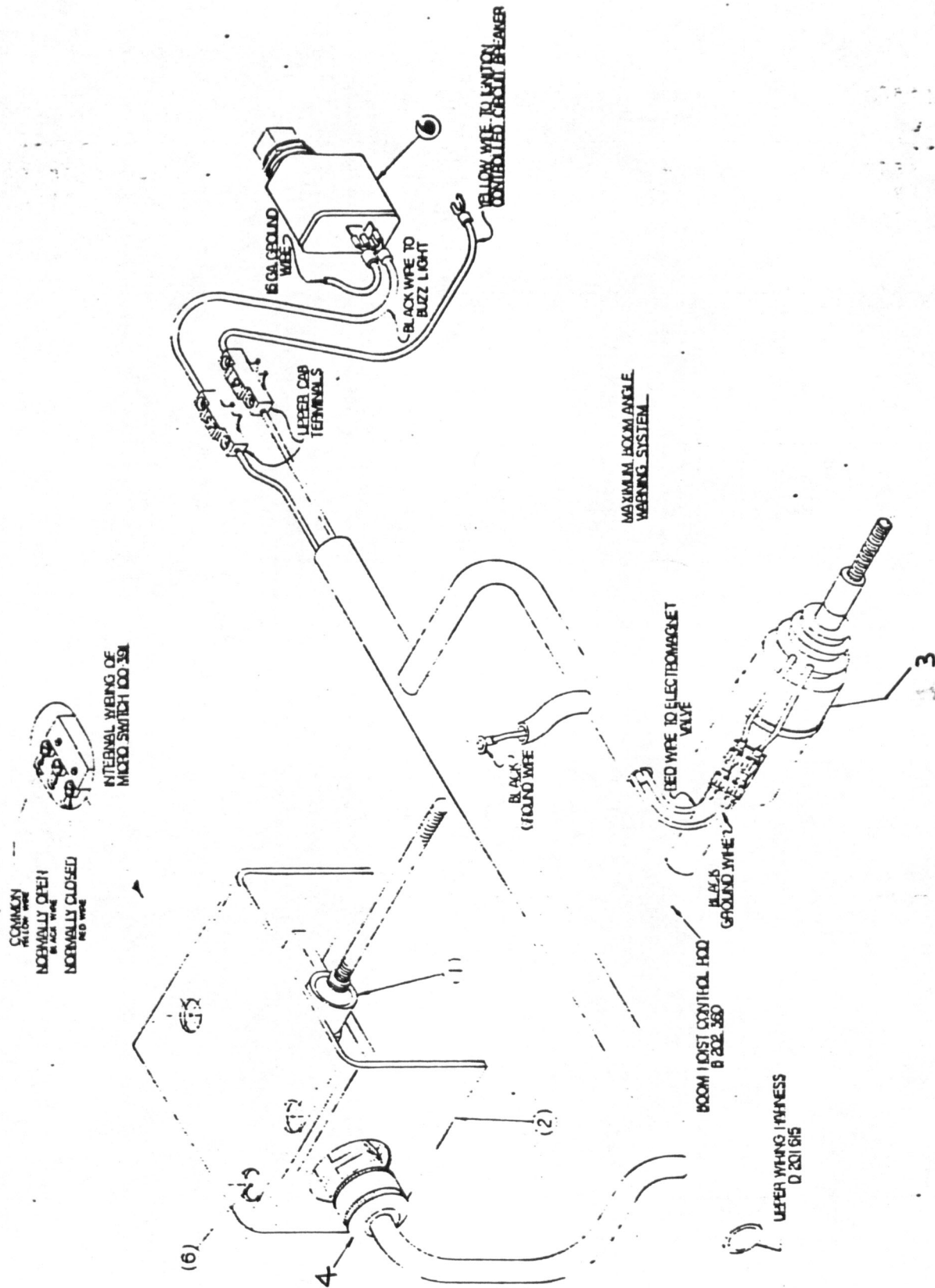
<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	C-201-103-1	UPPER ROLLER	1
2	1-1/4"	STANDARD FLAT WASHER	2
3	C-201-103-7	LOWER ROLLER	1
4	C-201-103-6	LOWER ROLLER MOUNTING ANGLE	2
5	C-201-103-2	UPPER ROLLER MOUNTING BLOCK	2
6	100-930	OILITE BUSHING	2

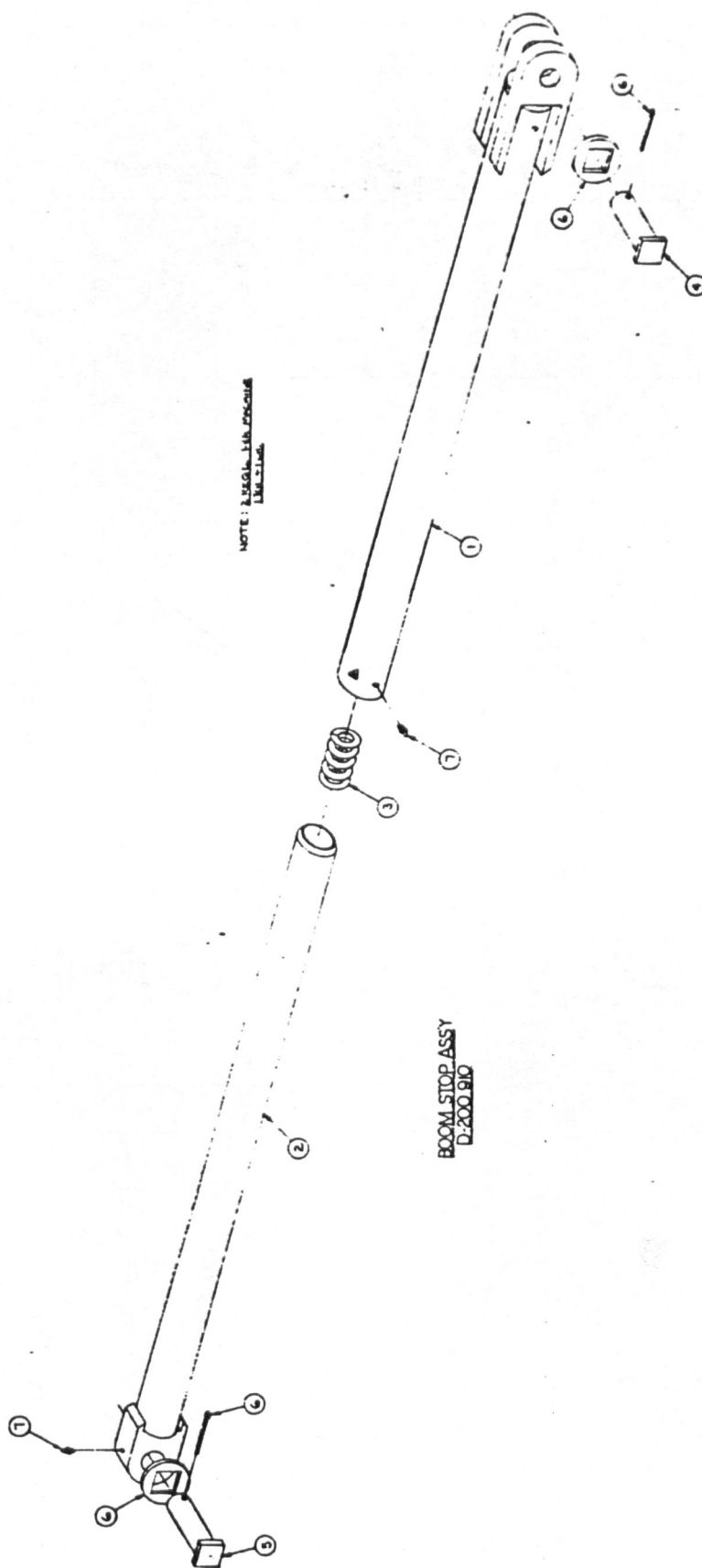


FAIRLEAD ASSEMBLY

FAIRLEAD ASSEMBLY

<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	C-201-775	FRAME WELDMENT	1
2	C-201-775-6	ROLLER AXLE	2
3	C-201-775-7	ROLLER	2
4	100-700	SHEAVE	2
5	C-201-775-8	SHEAVE PIN	2
6	100-003	GREASE FITTING	6
7	3/8" -16 NC	x 1" LONG HEXHEAD CAPSCREW	4
8	1/4"	STANDARD LOCKWASHER	4
9	3/8" -16 NC	x 3/4" LONG SOCKETHEAD SETSCREW	4



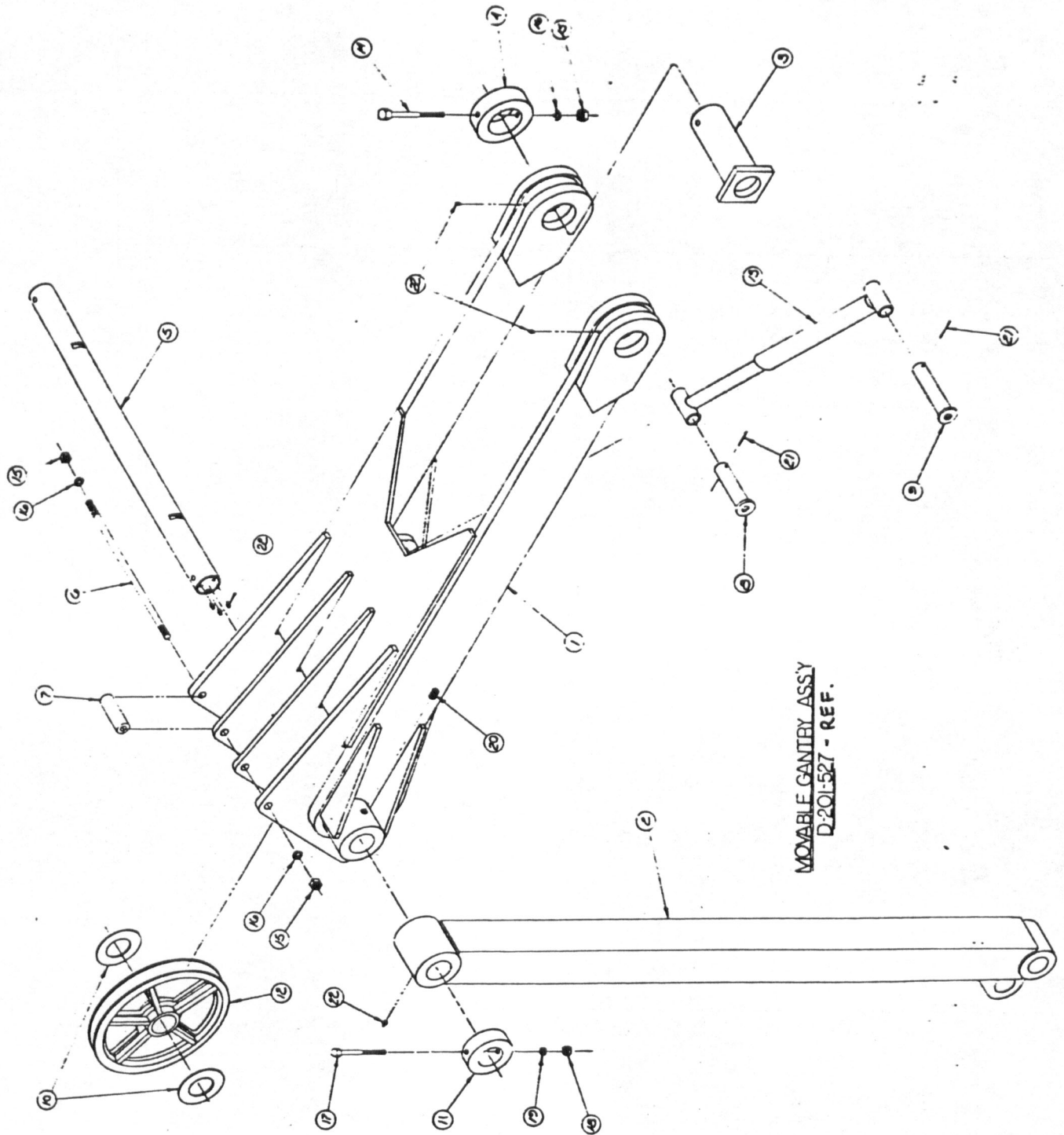


NOTE: REGULAR LINE DRAWING

BOOM STOP ASSY
D-200-810

38-32

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
ITEM	REQ'D		PART NO.	DESCRIPTION	MAT'L	LOC	C/N
	2	Nico	D200-910	Boom Stop Ass'y			
1	1		D200-879	Boom Stop Weldment			
	1		D200-879-1	Round Mech. Tubing 3 5/8" O.D. x 3 1/8" I.D. x 103" long			
	1		-2	Round Mech. Tubing 3" O.D. x 2 1/2" I.D. x 103" long			
	1		-3	Plate 4" x 2" x 4 1/2"	A-572		
	2		-4	Plate 4" x 1" x 6 1/2"	A-572		
	2		-5	Plug 2 3/16" DIA x 1" long	A-36		
	1		-7	Plate 1" x 3 1/2" DIA.	A-36		
3	1		#9622K13	Boom Stop Spring 2 1/2" O.D. x 4" free			McMaster-Carr
4	1	Nico	B 200-923	Boom Stop Base End Pin			
5	1	Nico	B 200-924	Boom Stop Rod End Pin			
6A	2	Nico	B200-925-1	Boom Stop Pin Keeper			
6B	2		B 200-925-2	Cotter Pin 3/8" x 3"			
7	2	Nico	100-003	Grease Fitting Alemite #1610			
MODEL 220-RR Crane				TITLE			
ASSEMBLY DWG.				BOOM STOP ASS'Y.			
NICO D 200-910				PETTIBONE LIMITED			
WRITTEN BY P L				SHEET 1 OF 1			
DATE Oct. 3, 84				GROUP NO. 200-910			



MOVABLE GANTRY ASSY
D201-527 - REF.

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	201-527A	SUPPLIER
1	1	TIF-11111-989	Gantry Weldment (less items 9 & 10)					
2A	1	TIF-00000-013	Gantry Leg Weldment L.H.					
2B	1	TIF 00000-993	Gantry Leg Weldment R.H.					
3	2	B100-772	Gantry Pivot Pin					
4	2	A 200-921	Pivot Pin Keeper					
5	1	B 101-118	Gantry Sheave Pin					
6	2	D 201-429-10	Stud					
7	6	D 201-429-9	Spacer					
8	1	B 201-100-1	Upper Cyl Pin					
9	1	B 201-100-2	Lower Cyl Pin					
10	12	A 101-050	Thrust Washer 4 1/2" O.D. x 12 GA x 2 9/16" I.D.					
11	2	A 201-528	Sheave Pin Keeper					
12	6	N100 101-115	Sheave "DRN Johnson" #14-10D, 3/4" cable					
13	1	N100 100-931	Gantry Lift Cyl. "Aurelius" #3809					
14	2	-	Hex. HD. Capscr. 3/4-10 NC x 6 1/2" long					
15	6	-	Hex. Nut 3/4 -10 NC					
16	6	-	Lockwasher 3/4" std.					
MODEL 220-RRC				TITLE				
ASSEMBLY DWG. D 201-527A				MOVABLE GANTRY ASS'Y.				
WRITTEN BY PL				DATE Oct. 4, 84				
				PETTIBONE LIMITED				
				SHEET 1 OF 2				
				GROUP NO. 201-527A				

MOVABLE GANTRY ASSEMBLY
PETTIBONE 22ORRC CRANE

DISASSEMBLY:

AFTER REMOVAL OF THE BOOM STOPS, REMOVE HOSES AND PLUG PORTS ON GANTRY CYLINDER. REMOVE COTTER PIN (21), UPPER CYLINDER PIN (8), LOWER CYLINDER PIN (9) AND REMOVE CYLINDER.

REMOVAL OF HEXHEAD CAPSCREW (14), HEX NUT (15), LOCKWASHER (16), PIVOT PIN KEEPER (4) AND PIVOT PIN (3) WILL ALLOW THE GANTRY TO BE REMOVED FROM TURRET.

REMOVE HEX NUTS (15), LOCKWASHERS (16), STUD (6) AND SPACERS (7). BY REMOVING HEXHEAD CAPSCREW (17), HEX NUT (18), LOCKWASHER (19), SHEAVE PIN KEEPER (11) AND SETSCREW (20), YOU ARE NOW ABLE TO REMOVE SHEAVE PIN (5), SHEAVES (12) AND THRUST WASHERS (10).

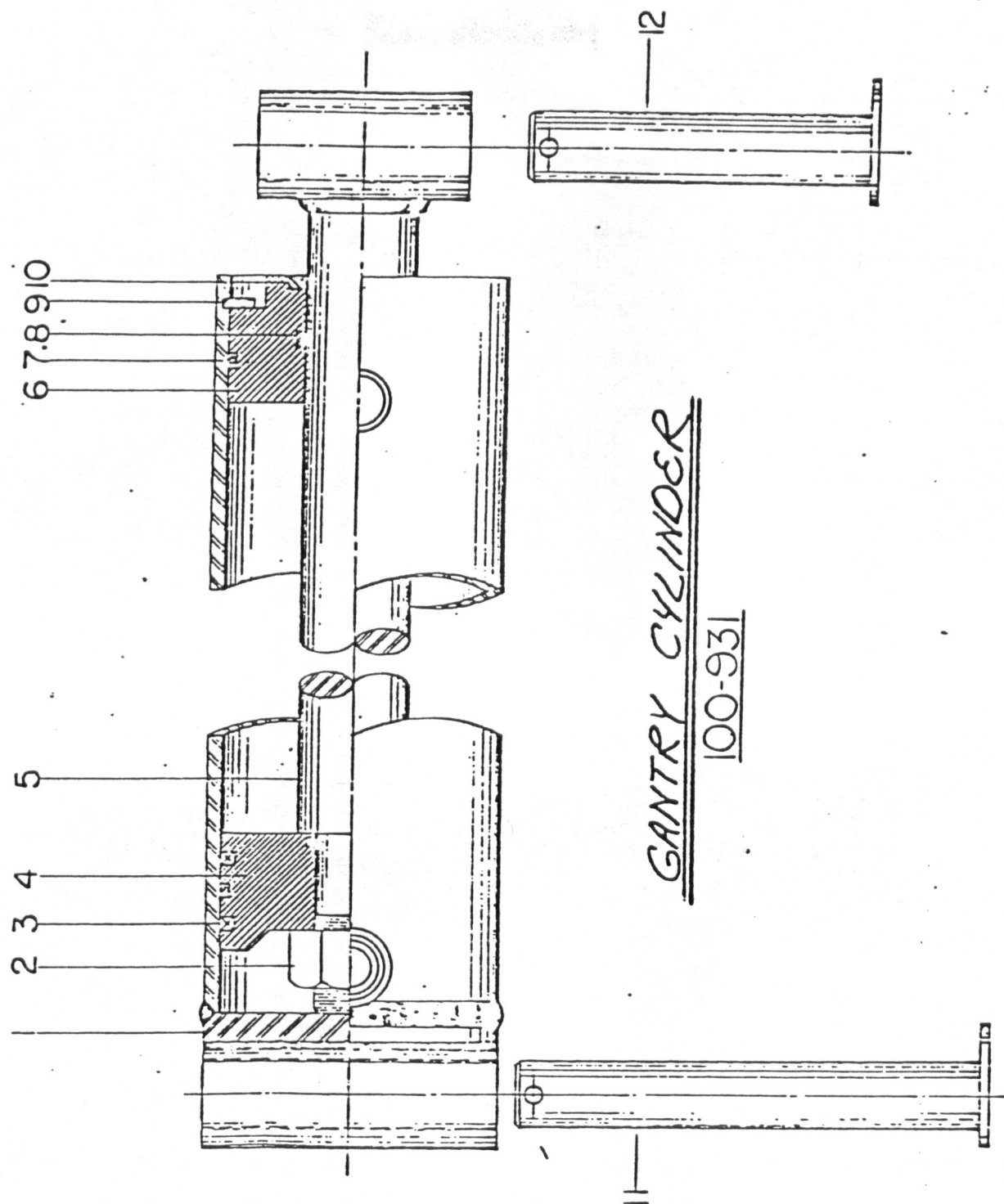
CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR WEAR, SCORING AND BENDS. REPLACE NEEDED PARTS.

ASSEMBLY:

REASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



GANTRY CYLINDER
100-931

GANTRY CYLINDERPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	EW-8012	BUTT & TUBE ASSEMBLY	1
2	EW-830	HEX NUT	1
3	EW-842	PISTON SEAL KIT	1
4	EW-853	PISTON	1
5	EW-8312	PISTON SHAFT	1
6	EW-865	SHAFT END GLAND	1
7	EW-874	"O" RING & GLAND SEAL	1
8	EW-880	WASHER & "O" RING	1
9	EW-891	SNAP RING	1
10	EW-895	WIPER	1
11	B-201-100	PIN	1
12	B-201-100	PIN	1
	6526 A	SEAL KIT	

GANTRY CYLINDER ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE SNAP RING (9), PISTON SHAFT (5), HEX NUT (2), PISTON (4) AND SHAFT END GLAND (6) FROM TUBE ASSEMBLY (1). REMOVE PISTON SEAL KIT (3), "O" RING AND GLAND SEAL (7) AND WASHER (8).

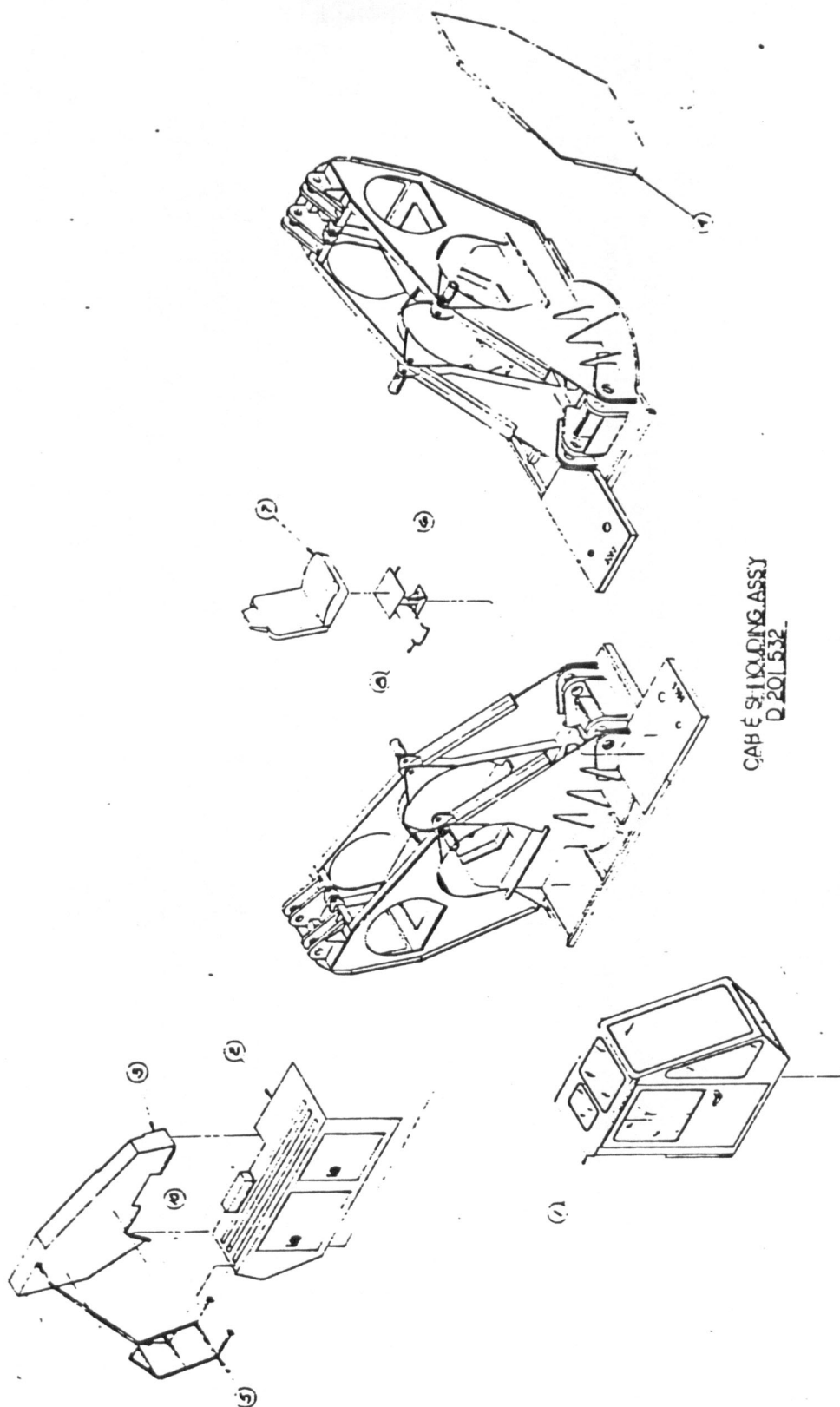
CLEANING, INSPECTION AND REPAIR:

CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR BENT, WORN, AND SCORED PARTS AND REPLACE AS NEEDED.

ASSEMBLY:

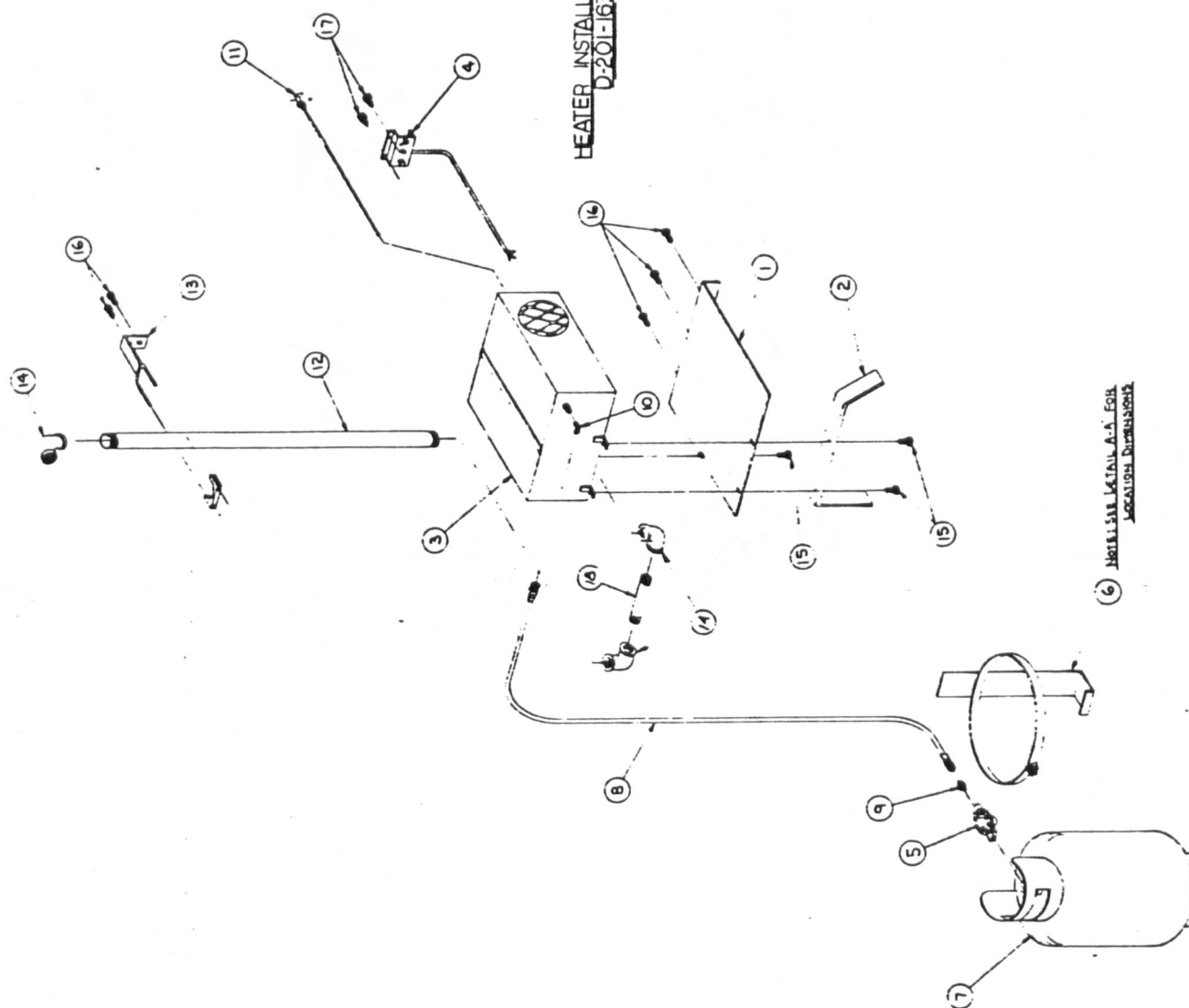
ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



CAB & SHIELDING ASSY
D 201532

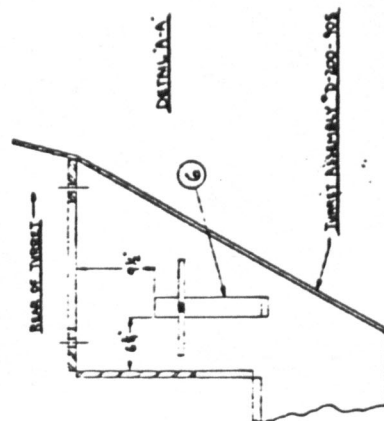
3841

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
ITEM	REC'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
1	1	D 200-875	CAB - Upper Modified from D 200-052				Iberia Cab Co.	
2	1	D 201-570	Right Side Shrouding Ass'y.					
3	1	B 201-569	Upper Right Side Shrouding					
4	1	B 201-568	Left Side Shrouding					
5	1	C 201-573	Rear Shrouding Stairway					
6	1	100-559	Seat Pedestal, Milisco #E-5269-2				Tiff. #A-10254-2	
7	1	100-605	Seat, ORR & ORR H8963				Tiff. #A-10254-1	
8	1	A 201-145	Grab Handle					
9								
10								
11								
12	1	D 201-579	Instrument Panel Shroud Not Shown					
13	1	B 200-948	Brake Lock Mtg. Brkt. Ass'y.					
14	1	C 201-617	Miscell. Mtg. Brkts.					
15	1	D 500-130	Decal, Instrument Panel					
MODEL 220-RRC				PETTIBONE LIMITED				
ASSEMBLY DWG. D 201-577				PETTIBONE LIMITED				
D 201-532				SHEET 1 OF 1				
WRITTEN BY PL				GROUP NO. 201-532				
				DATE Oct. 4, 85				
TITLE				CAB & SHROUDING ASS'Y.				



HEATER INSTALLATION ASSY
D-201-163

(6) INSTALL LATEL A-A FOR
LOCATION PURPOSES



HEATER INSTALLATION ASSEMBLY
PETTIBONE 22ORRC CRANE

D201-163

<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	C-200-302	HEATER MOUNTING PLATE	1
2	B-200-994	HEATER MOUNTING PLATE BRACKET	1
3	100-517	HEATER	1
4	PART OF 100-517	HEATER CONTROL	1
5	PART OF 100-517	REGULATOR	1
6	100-548	L. P. GAS BOTTLE BRACKET	1
7	100-549	L. P. GAS BOTTLE	1
8	100-972	HOSE ASSEMBLY	1
9	2021-4-6S	STRAIGHT MALE CONNECTION	1
10	2024-2-6S	90° MALE CONNECTION	1
11	PART OF 100-517	REMOTE HOOK-UP	1
12	1" SCH 40	PIPE NIPPLE X 59" LONG	1
13	B-200-336	EXHAUST PIPE MOUNTING BRACKET	1
14	1" SCH 40	90° PIPE ELBOW	3
15	1/4" -20 NC x 3/4"	HEX HEAD CAPSCREW	3
16	5/16" -18 NC x 3/4"	HEX HEAD CAPSCREW	5
17	#10 - 24 NC x 1/2"	HEX HEAD CAPSCREW	2
18	1"	PIPE NIPPLE X 4" LONG	1

HEATER INSTALLATION ASSEMBLY

PETTIBONE 22ORRC CRANEDISASSEMBLY:

AFTER SHUTTING OFF GAS SUPPLY DISCONNECT HOSE (8) FROM HEATER (3) AND REGULATOR (5). REMOVE REGULATOR FROM GAS BOTTLE (7) AND REMOVE BOTTLE FROM BRACKET (6). REMOVE EXHAUST PIPE MOUNTING BRACKET (13), EXHAUST PIPE (12) AND ELBOW (14).

DISCONNECT HEATER CONTROL (4) AND REMOTE HOOK-UP (11), REMOVAL OF HEXHEAD CAPSCREW (15) ALLOWING REMOVAL OF HEATER.

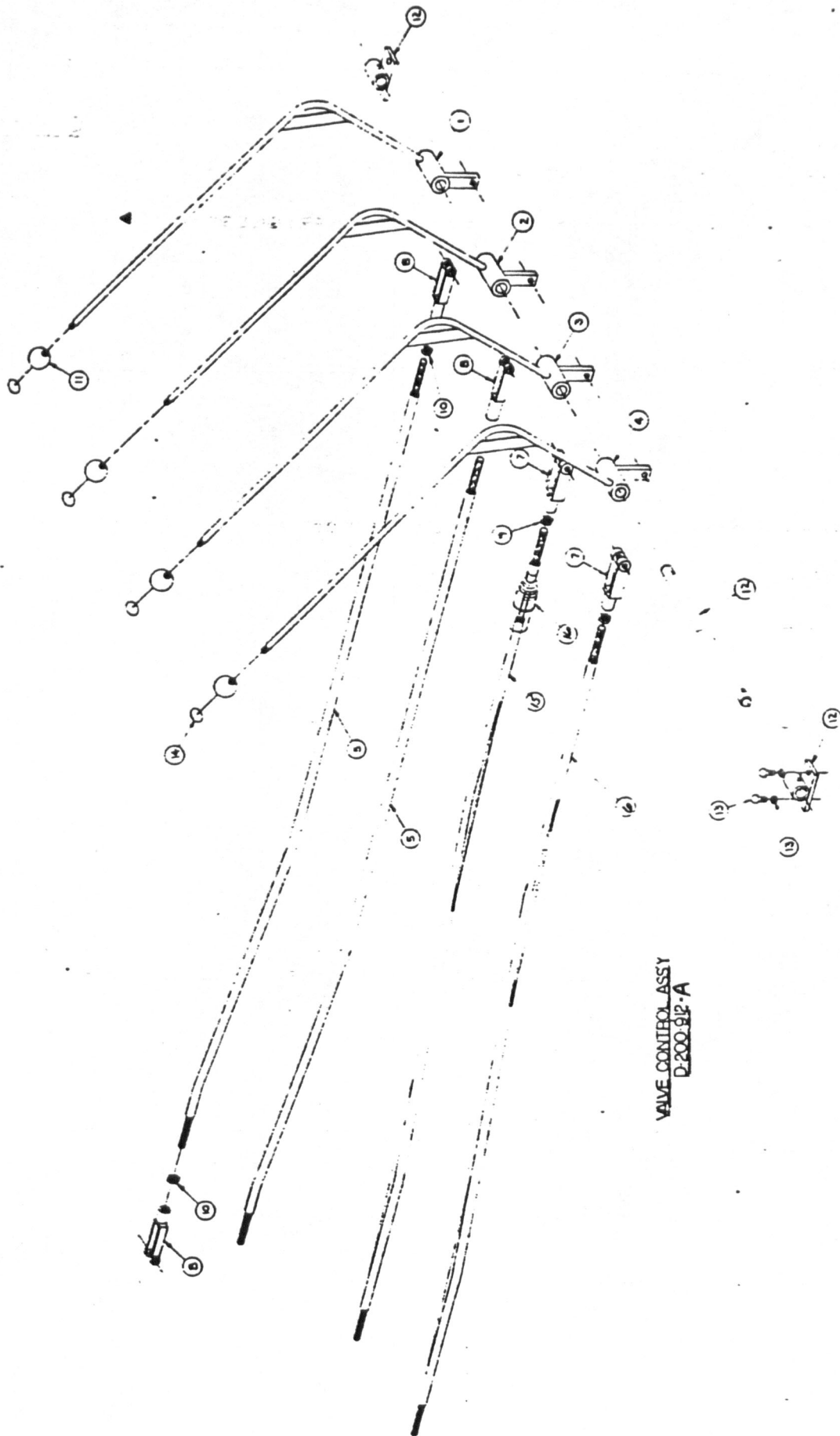
CLEANING, INSPECTION AND REPAIR:

CONSULT MANUFACTURER'S SERVICE MANUAL IN BACK OF BOOK.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

3B-45



VALVE CONTROL ASSY
D-200 912-A

3B-46

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549		GROUP NO. 200-912A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1	D200-892-2	Control Lever Weldment				
2	1	D 200-892-1	" " "				
3	1	D 200-892-3	" " "				
4	1	D 200-892-4	" " "				
5	1	B 200-868	Swing & Deckwinch Valve Control Rod				
6	2	B 200-873	Lift Winch Control Rod				
7	2	Cleveland #2708-7A	ADJ. Clevis, 5/8 -18 NF with Pin				
8	6	Cleveland #2708-GA	ADJ. Clevis - 13 NC with Pin				
9	2	-	Nut 5/8 - 18 UNF				
10	6	-	Nut - 13 UNC				
11	4	Pett, Rome. #A-34044-1	Control Lever Knob (Nico # 100-558)				
12	1	B 200-903	Valve Control Lever, Pivot Shaft				
13	2	-	Hex. Head Bolt 3/8-16 NC x 3/4" long				
14	1	A 200-650	Control Handle Decals				Chroma-Glo
15	1	B 202-360	Boom Holst Control Rod				
16	1	101-380	Electromagnetic Valve				Kruger #20 MM/s
17	1	D 201-560	Freefall Winch Control Ass'y. Not shown				
MODEL 220-RRC				PETTIBONE CAN LIMITED			
ASSEMBLY DWG. D 200-912A				SHEET 1 OF 2			
WRITTEN BY PL				DATE Oct. 3, 84			
				G. OUP NO. 200-912A			

VALVE CONTROL ASSEMBLY - PETTIBONE 22ORRC CRANE..CONTINUED

DISASSEMBLY:

DISCONNECT CONTROL ROD CLEVIS (8) AND (7) FROM VALVES AND CONTROL LEVERS (1), (2), (3) AND (4). REMOVE HEXHEAD CAPSCREWS AND LOCKWASHERS (13) AND REMOVE VALVE CONTROL ASSEMBLY FROM CAB. REMOVE SHAFT CAPSCREWS, NUTS AND LOCKWASHERS (NOT SHOWN) FROM LEVER PIVOT SHAFT ASSEMBLY (12) ALLOWING REMOVAL OF PIVOT SHAFT FROM CONTROL LEVERS.

CLEANING, INSPECTION AND REPAIR:

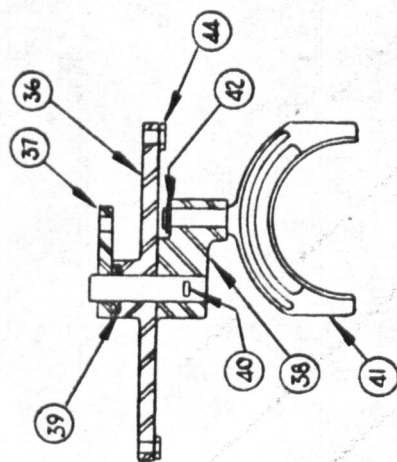
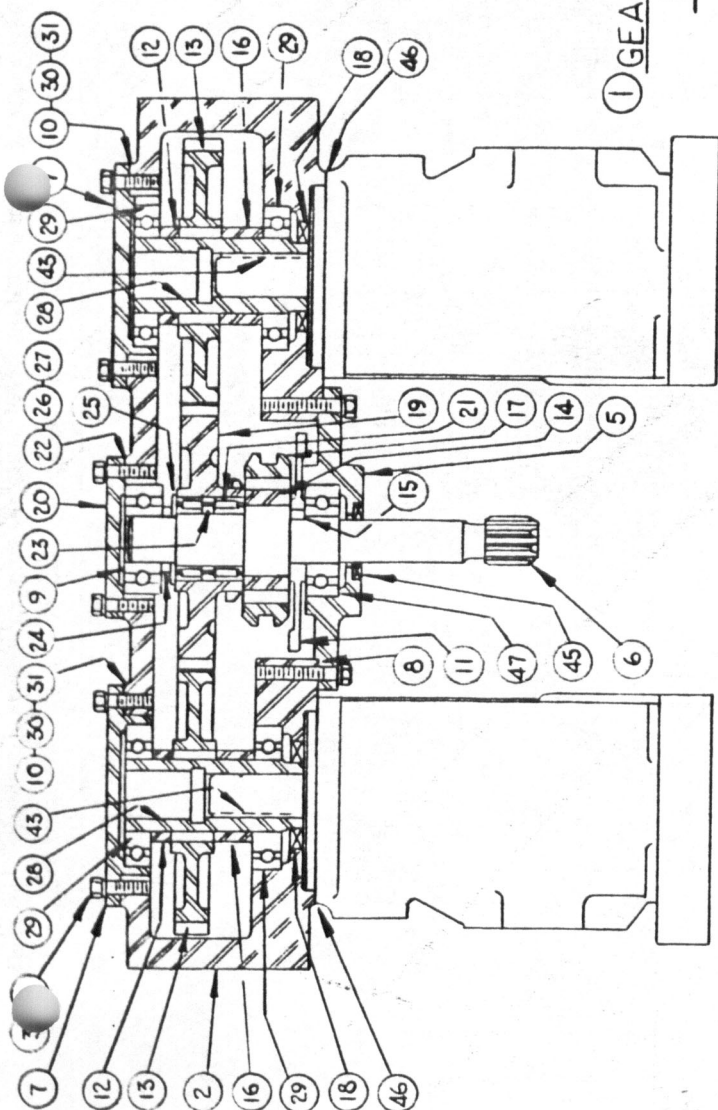
CLEAN ALL PARTS WITH AN APPROVED CLEANING SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR WEAR AND REPLACE WORN PARTS.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

PA-10571-18



③ COVER AND SHIFT FORK ASS'Y.

① GEAR CASE ASSEMBLY LESS PUMPS

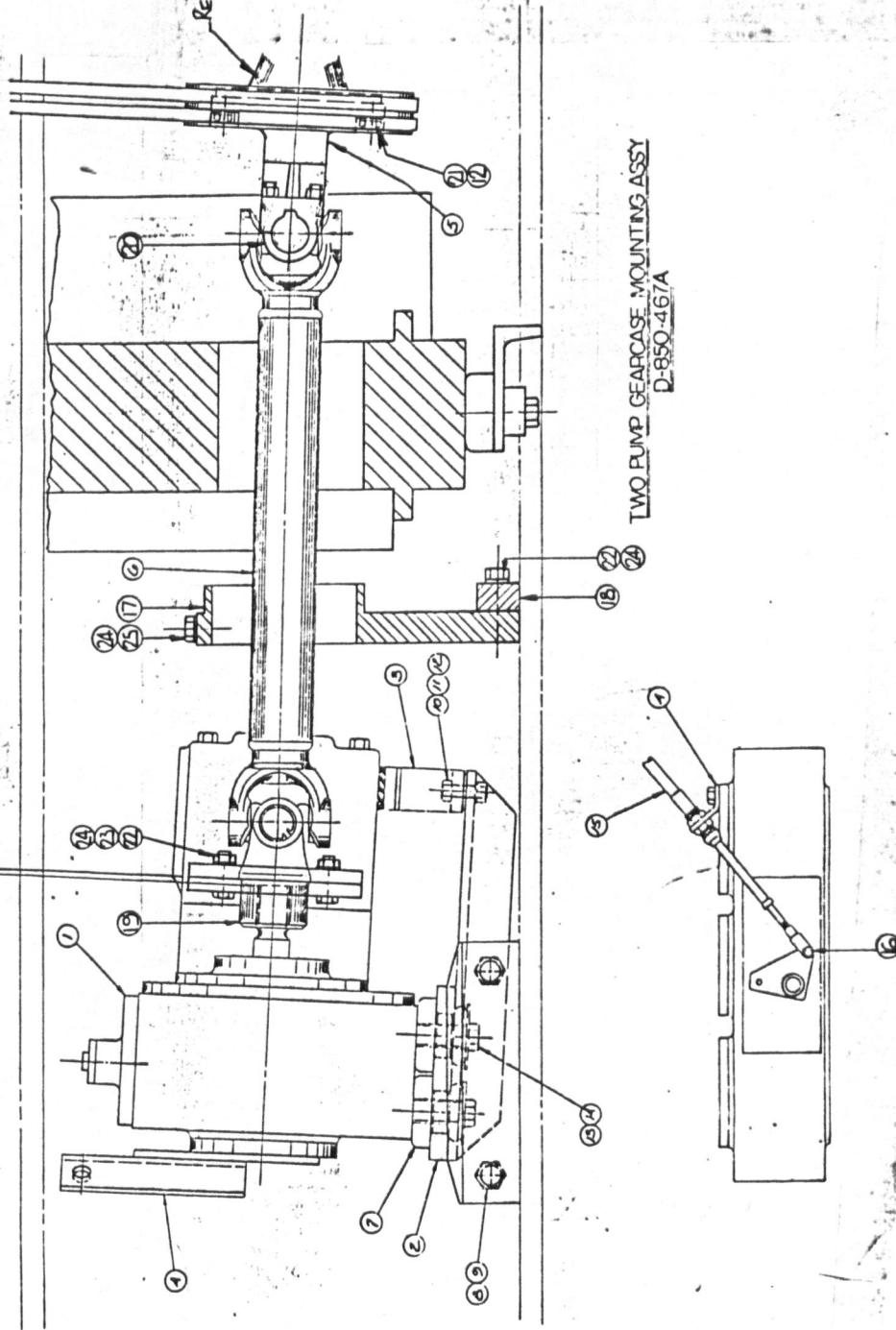
* No. as Req'd.

ITEM	PART NO.	QTY	DESCRIPTION	ITEM	PART NO.	QTY	DESCRIPTION	ITEM	PART NO.	QTY	DESCRIPTION
1	A-10571-18	1	Gear Case Assy. (Less Pumps)	17	A-10834-14	1	Shift Collar	33	A-10172-1	2	1/2 Sq.Hd.P.Plug
2	A-10834-1	1	Gear Case	18	A-10834-15	2	Oil Seal	34	A-10171-1	1	1/2 to 3/8 Bush.
3	A-10070-1	24	Lockwasher	19	A-10834-16	1	Gear-41 Tooth	35	A-10834-30	1	Cov.&Shift Fork A
4	A-10063-1	24	Capscrew	20	A-10834-17	1	Bearing Cover	36	A-10834-31	1	Cover
5	A-10834-105	1	Input Shaft Cover	21	A-10834-18	2	Bearing	37	A-10834-32	1	Disconn. Fork
6	A-10834-104	1	Input Shaft	22	A-10834-19	1	Brg. Cover Gask.	38	A-10834-33	1	Shifter Selector
7	A-10834-4	2	Bearing Cap	23	A-10834-20	1	Bearing Sleeve	39	A-10834-34	1	Oil Seal
8	A-10834-5	1	Cover Gasket	24	A-10834-21	1	Bearing Spacer	40	A-10834-35	1	Pin
9	A-10834-6	1	Bearing	25	A-10834-22	1	Hardened Washer	41	A-10834-36	1	Shifter Fork
10	A-10834-7	2	Bearing Cap Gask.	26	A-10834-23	*	Shim - 1/64	42	A-10834-37	1	Snap Ring
11	A-10834-106	1	Oil Slinger	27	A-10834-24	*	Shim - 1/32	43	A-10834-38	2	Pump Shaft Key
12	A-10834-9	2	Bearing Spacer	28	A-10834-25	2	Pump Shaft	44	A-10834-39	1	Gasket
13	A-10834-10	2	Gear - 50 Tooth	29	A-10834-26	4	Bearings	45	A-10149-3	1	Oil Seal
14	A-10834-11	1	Shift Collar Hub	30	A-10834-27	*	Shim 1/64	46	A-10178-2	2	Pump Gasket
15	A-10834-12	1	Input Shaft Key	31	A-10834-28	*	Shim 1/32	47	A-11098-1	1	Bearing
16	A-10834-13	2*	Bearing Spacer	32	A-10834-29	1	Air Vent				

ALLOW $\frac{1}{8}$ " SPACING BETWEEN FACE OF DRIVESHAFT ADAPTER
AND END OF SPLINE SHAFT WHEN LOCATING PUMP GEAR CASE

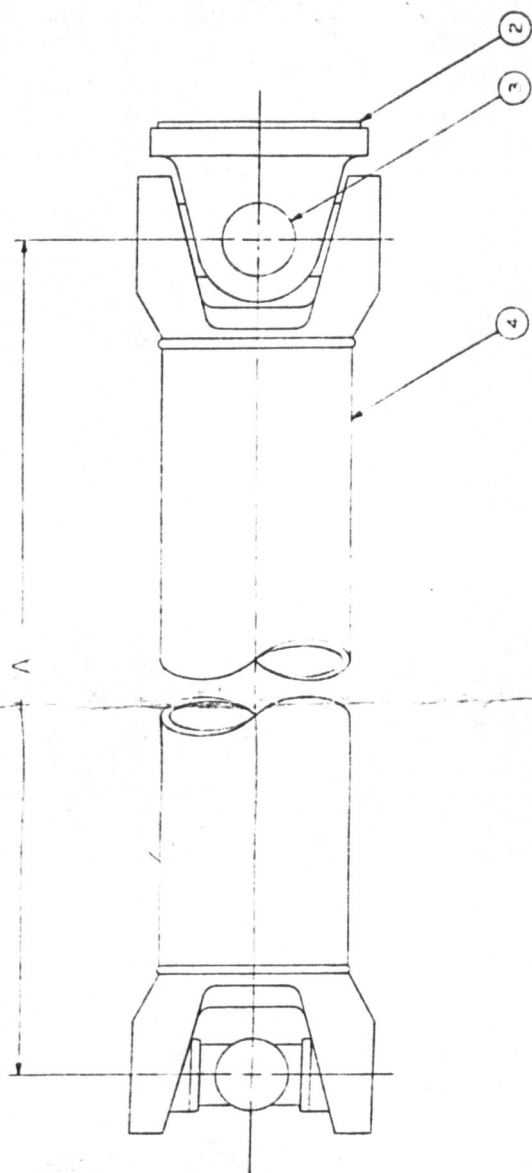
REF CRANKSHAFT PULLEY D.D.A. # 5122211

TWO PUMP GEARCASE MOUNTING ASSY
D-850-467A



ENGINEERING BILL OF MATERIAL					ISSUE NO. A			GROUP NO. 850-467A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MATERIAL	LOC	C/N	SUPPLIER		
1	REF	Tiffin A-10571-18	Two Pump Gearcase						
2	1	C 850-508A	Two Pump Gearcase Mtg. Brkt.			A			
3	1	B 201-604	Rear Support						
4	1	B 201-118	Cable Mtg. Brkt.						
5	1	38197-07-7	Drive Shaft Adapter			A			
6	1	Tiffin C-12431-2	U - Joint Shaft				Dana Spicer		
7	4	Nico 100-379	Center Bonded Mountings "Lord MFG. CO." # J8006-6						
8	4	-	Hex. HD Capscrew 5/8-11 NC x 1 1/2" long GR. 5						
9	4	-	Lockwasher 5/8" Std.						
10	2	-	Hex. HD. Capscrew 3/8-16 NC x 1" long GR 5						
11	2	-	Hex. Nut 3/8-16 NC						
12	12	-	Lockwasher 3/8" Std.			A			
13	4	-	Hex. HD. Capscrew 5/8-11 NC x 2 3/4" long GR 5						
14	4	-	Flat Washer 1 1/16" I.D. x 2 3/8" O.D.						
15	1	Nico 100-156	Control Cable "American Chain & Cable" #37700-5 NL -126-A-96						
16	1	100-157	Yoke "Cleveland" #2708-2A, W. Pin						
17	1	38201-07-7	Guard			A			
MODEL 220-RRC					PETTIBONE LIMITED				
ASSEMBLY DWG: D 850-467A					PETTIBONE LIMITED				
WRITTEN BY PL DATE Oct. 4, 84					SHEET 1 OF 2				
TITLE TWO PUMP GEARCASE MTG.					GROUP NO. 850-467A				

ITEM	PART NO.	DESCRIPTION	QTY.
1	3-25-72	DRIVE SHAFT ASSEMBLY	1
2	A-1074-2	FLANGED YOKE	1
3	A-1074-2	JOURNAL & HUB KIT	2
4	1-P SHFT	DRIVE SHAFT SUB-ASSEMBLY	1



1 DRIVE SHAFT ASSEMBLY

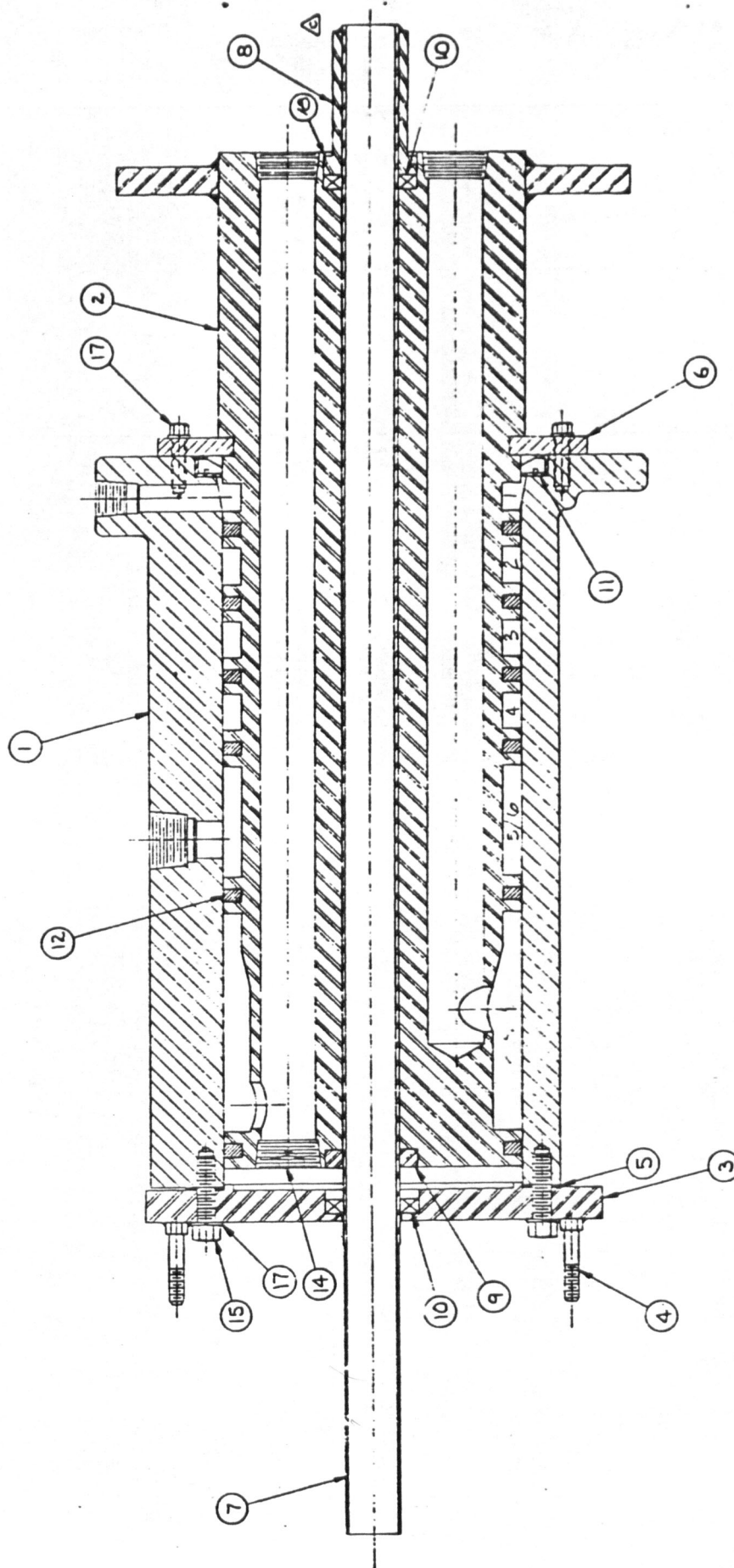
PART NO.	1	REV	BYN	ITEM	2
C-12431-1	19	1/2	B-11076-2		
C-12431-2	1	1/2	B-11076-3		

DRIVE SHAFT ASSEMBLY	
DATE	3-25-72
DRN BY	PK
SCALE	9" = 1'-0"
	C-12431

3B-55

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3543			GROUP NO. 201-576 A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
1	1	D200-922	Swivel Assembly					
2	2	2021-20-205	Straight Mate Connector					
3	2		1" NPT Pipe Plug					
4	2	2021-16-165	Straight Mate Connector					
5	1	2023-12-12	45° Mate Connector					
6	5	44164-16-10	1" 560, 80 Pipe Nipple - 10" 1g.					
7	1	44164-200-10	1 1/4" 560, 40 Pipe Nipple - 10" 1g.					
8	1	44164-200-20	1" 560, 40 Pipe Nipple - 20" 1g.					
9	1	44164-200-15	1" 560, 40 Pipe Nipple - 15" 1g.					
10	1	44164-6-15	3/8" 560, 40 Pipe Nipple - 15" 1g.					
11	3	2025-16-165	90° Female Connector					
12	2		1" 560, 80 Coupling					
13	1		1" 560, 40 Coupling					
14	2	2025-20-205	90° Female Connector					
15	2	2023-16-205	45° Mate Connector					
16	1	2023-16-165	45° " "					
17	1		3/8" 560, 40 Coupling					
MODEL 220-RRC			TITLE					
ASSEMBLY DWG. D201-576 A			SWIVEL & FITTINGS ASSEMBLY WITH GEARMATIC WINCH					
WRITTEN BY PL			DATE Oct. 30, 1984					
			PETTIBONE LIMITED PETTIBONE SHEET 1 OF 2 GROUP NO. 201-576 A					

[illegible]



SWIVEL ASSEMBLY
D-200-922

9 PORT SWIVEL ASSEMBLY

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-25154-2	SWIVEL BODY	1
2	D-200-112-1	SWIVEL SPOOL WLDMT	1
3	C-27162-1	SWIVEL BODY COVER	1
4		7/16-20 NF x 2" LG HEX HD CPSCR.	4
5	A-2556B-1	COVER GASKET	1
6	B-24012-1	SWIVEL SUPP'T RING ASS'Y	1
7	A-200-144	1-1/2" O.D. x .065 WALL CDSMT x 41-1/8" LG	1
8	D-200-112-4	COLLAR	1
9	D-200-112-5	COLLAR	1
10	100-043	OIL SEAL	4
11	100-044	OIL SEAL	1
12	100-169	PISTON RING	9
13		3/8-16 x 7/16" LG SOC HD SET SCREW	3
14	100-243	PRESSURE PLUG -1-1/4 NPTF	1
16		1/2-13 NC x 1-3/4 LG HEX HD CPS	8
17		1/2-13 NC x 1-1/4 LG HEX HD CPS	8
18		1/2" STD LOCKWASHER	16
19		1/4"-28 x 3/8" LG HEX SOC SET SCR	2

SWIVEL ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE SOCKET HEAD SET SCREW (13), COLLAR (8), AND OIL SEAL (10). CAREFULLY SLIDE TUBE (7) FROM SWIVEL ASSEMBLY. REMOVE HEX HEAD CAPSCREW (17), LOCKWASHER (18), SWIVEL SUPPORT RING ASSEMBLY (6), OIL SEAL (11) AND REMOVE SPOOL (2) FROM BODY (1). REMOVE PRESSURE PLUG (14), COLLAR (9) AND PISTON RINGS (12) FROM SPOOL.

REMOVE HEX HEAD CAPSCREW (15), LOCKWASHERS (17), SWIVEL BODY COVER (3) AND OIL SEAL (10).

CLEANING, INSPECTION AND REPAIR:

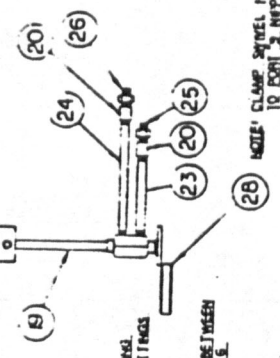
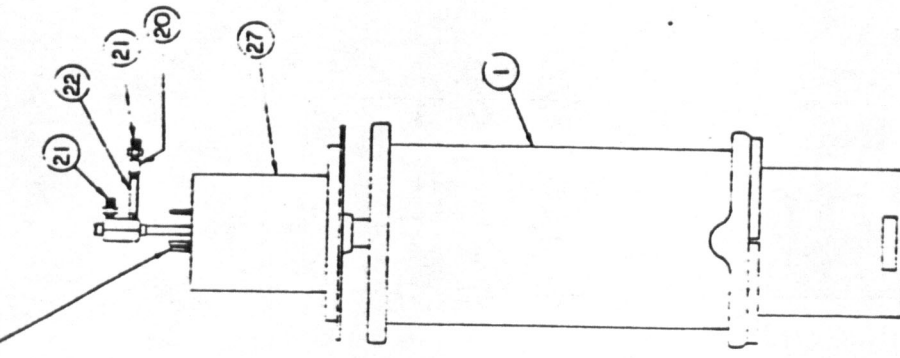
CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

CHECK PARTS FOR DAMAGED THREADS, SCORING, EXCESSIVE WEAR AND CRACKS. REPLACE DAMAGED PARTS AS REQUIRED.

ASSEMBLY:

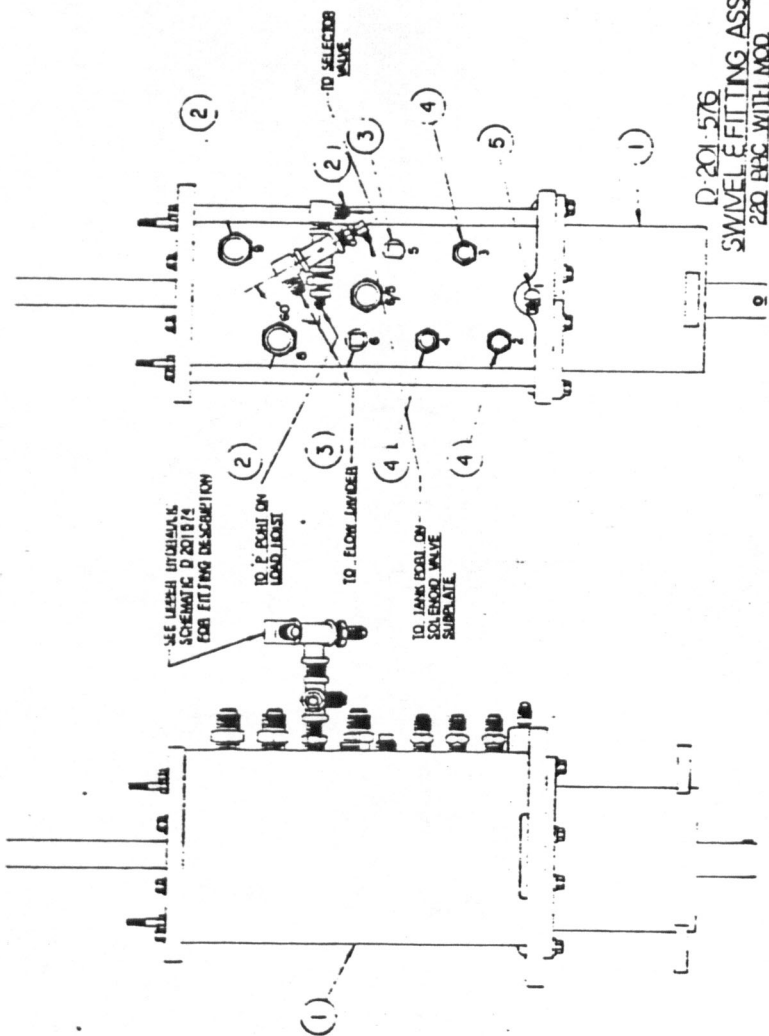
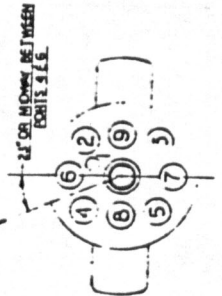
ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

NOTE: CUT ALL TIEAS IN ABOVE COLLECTION
RING ASSEMBLY TOP PLATE

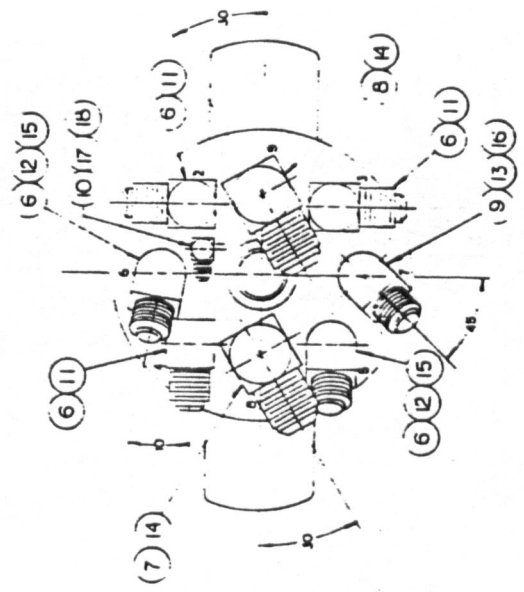


NOTE: CLAMP SWIVEL FROM ASST.
TO PORT 2 AFTER FITTING ASST.

NOTE: LOCATE SWIVEL FROM
ASST. DIAPHRAGM & FITTINGS
AT ASST.



D 201-576
SWIVEL & FITTING ASSY.
220 BPC WITH MOD.
44 GEAROMATIC W/INCH.



BOTTOM VIEW

SWIVEL AND FITTING ASSEMBLY

3B-61

PETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-200-922	SWIVEL ASSEMBLY	1
2	2021-20-20S	STRAIGHT MALE CONNECTOR	3
3	1" N.P.T.	PIPE PLUG	3
4	2021-16-16S	STRAIGHT MALE CONNECTOR	3
5	3/4" N.P.T.	PIPE PLUG	1
6	1" SCH 80 x 13-5/8"	PIPE NIPPLE	5
7	1-1/4" SCH 40 x 18-13/16"	PIPE NIPPLE	1
8	1" SCH 80 x 12-3/8"	PIPE NIPPLE	1
9	1" SCH 80 x 11-7/8"	PIPE NIPPLE	1
10	3/8" SCH 40 x 22-1/4"	PIPE NIPPLE	1
11	1" SCH 80 x 11-5/8"	PIPE NIPPLE	3
12	1" SCH 80	COUPLING	2
13	1" SCH 80 x 19-1/4"	PIPE NIPPLE	1
14	2025-20-20S	90° FEMALE CONNECTOR	2
15	2023-16-20S	45° MALE CONNECTOR	2
16	2023-16-16S	45° MALE CONNECTOR	1
17	3/8" SCH 40	COUPLING	1
18	2024-6-6S	90° MALE CONNECTOR	1
19	100-819	SWIVEL PIPING ASSEMBLY	1
20	1/8" NPT SCH 40	COUPLING	3
21	2021-4-6S	STRAIGHT MALE CONNECTOR	1
22	1/8" NPT SCH 40 x 2" LG	NIPPLE	2
23	1/8" NPT SCH 40 x 4" LG	NIPPLE	1
24	1/8" NPT SCH 40 x 6" LG	NIPPLE	1

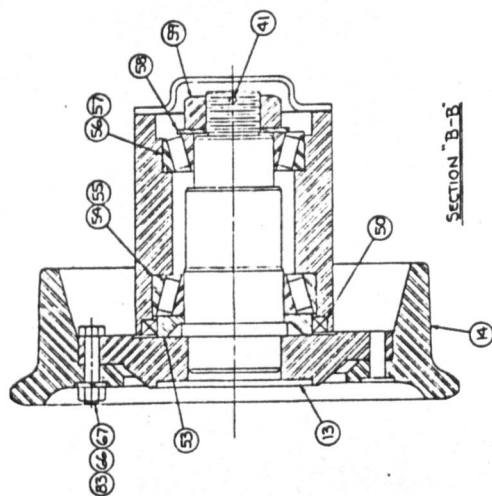
SWIVEL AND FITTING ASSEMBLYPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
25	2021-2-6S	STRAIGHT MALE CONNECTOR	1
26	2021-2-4S	STRAIGHT MALE CONNECTOR	1
27	100-966	COLLECTOR RING	1
28	A-200-790	SWIVEL PIPING CLAMP	1
29	2024-16-20S	90° MALE CONNECTOR	1

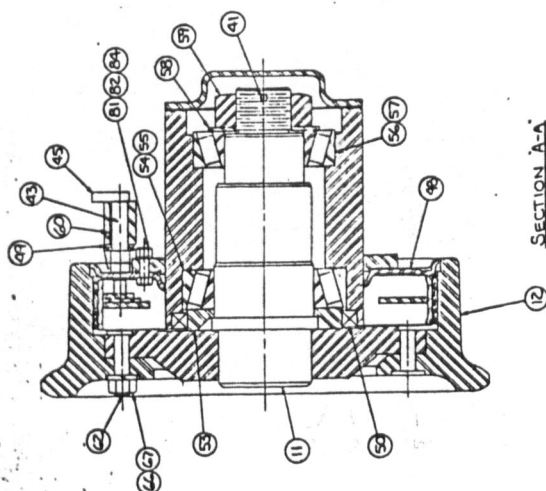
38-63

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MATT'L	LOC	C/N	SUPPLIER
1	1	TIF-00000-810	Front Narrow GA. HI-RAIL Ass'y				Pett. Tiffin
2	1	TIF-00000-811	Rear Narrow GA. HI-RAIL Ass'y.				Pett. Tiffin
3		CJV -42843-000	Wheel Stops Front (Installation)				
	2	-1	Plate				
	2	-2	Spring Rubber				McMaster Carr #8630R22
	2	-3	Plate				
4		CJV-42850-000	Wheel Stops Rear (Installation)				
	2	-1	Channel				
	4	-2	Spring Rubber				McMaster Carr #8630 R22
	2	-3	Plate				
	4	-4	Plate				
5	1	DJV-42851-000	OR. Box Modification				
6	1	DJV-42842-000	Frame Modification, Mtg. Holes				
MODEL 220-RRG				TITLE			PETTIBONE PETTIBONE LIMITED
ASSEMBLY DWG.				HI-RAIL ASSEMBLY, NARROW GAUGE			
WRITTEN BY PL				DATE Oct. 16, 84			
				SHEET 1 OF 1			GROUP NO. 201-1001

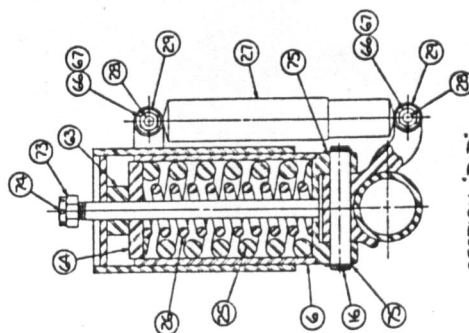
DATE	TIME	NAME	REMARKS
12	15	1	SA - 10 MC 1000 MPT
13	15	2	SA - STD. LOCATIONS
14	16	3	SA - 10 MC 1000 MPT
15	16	4	SA - STD. LOCATIONS
16	17	5	SA - 10 MC 1000 MPT
17	17	6	SA - STD. LOCATIONS
18	18	7	SA - 10 MC 1000 MPT
19	18	8	SA - STD. LOCATIONS
20	19	9	SA - 10 MC 1000 MPT
21	19	10	SA - STD. LOCATIONS
22	20	11	SA - 10 MC 1000 MPT
23	20	12	SA - STD. LOCATIONS
24	21	13	SA - 10 MC 1000 MPT
25	21	14	SA - STD. LOCATIONS
26	22	15	SA - 10 MC 1000 MPT
27	22	16	SA - STD. LOCATIONS
28	23	17	SA - 10 MC 1000 MPT
29	23	18	SA - STD. LOCATIONS
30	24	19	SA - 10 MC 1000 MPT
31	24	20	SA - STD. LOCATIONS
32	25	21	SA - 10 MC 1000 MPT
33	25	22	SA - STD. LOCATIONS
34	26	23	SA - 10 MC 1000 MPT
35	26	24	SA - STD. LOCATIONS
36	27	25	SA - 10 MC 1000 MPT
37	27	26	SA - STD. LOCATIONS
38	28	27	SA - 10 MC 1000 MPT
39	28	28	SA - STD. LOCATIONS
40	29	29	SA - 10 MC 1000 MPT
41	29	30	SA - STD. LOCATIONS
42	30	31	SA - 10 MC 1000 MPT
43	30	32	SA - STD. LOCATIONS
44	31	33	SA - 10 MC 1000 MPT
45	31	34	SA - STD. LOCATIONS
46	32	35	SA - 10 MC 1000 MPT
47	32	36	SA - STD. LOCATIONS
48	33	37	SA - 10 MC 1000 MPT
49	33	38	SA - STD. LOCATIONS
50	34	39	SA - 10 MC 1000 MPT
51	34	40	SA - STD. LOCATIONS
52	35	41	SA - 10 MC 1000 MPT
53	35	42	SA - STD. LOCATIONS
54	36	43	SA - 10 MC 1000 MPT
55	36	44	SA - STD. LOCATIONS
56	37	45	SA - 10 MC 1000 MPT
57	37	46	SA - STD. LOCATIONS
58	38	47	SA - 10 MC 1000 MPT
59	38	48	SA - STD. LOCATIONS
60	39	49	SA - 10 MC 1000 MPT
61	39	50	SA - STD. LOCATIONS
62	40	51	SA - 10 MC 1000 MPT
63	40	52	SA - STD. LOCATIONS
64	41	53	SA - 10 MC 1000 MPT
65	41	54	SA - STD. LOCATIONS
66	42	55	SA - 10 MC 1000 MPT
67	42	56	SA - STD. LOCATIONS
68	43	57	SA - 10 MC 1000 MPT
69	43	58	SA - STD. LOCATIONS
70	44	59	SA - 10 MC 1000 MPT
71	44	60	SA - STD. LOCATIONS
72	45	61	SA - 10 MC 1000 MPT
73	45	62	SA - STD. LOCATIONS
74	46	63	SA - 10 MC 1000 MPT
75	46	64	SA - STD. LOCATIONS
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84	51	73	SA - 10 MC 1000 MPT
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86	52	75	SA - 10 MC 1000 MPT
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88	53	77	SA - 10 MC 1000 MPT
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92	55	81	SA - 10 MC 1000 MPT
93	55	82	SA - STD. LOCATIONS
94	56	83	SA - 10 MC 1000 MPT
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96	57	85	SA - 10 MC 1000 MPT
97	57	86	SA - STD. LOCATIONS
98	58	87	SA - 10 MC 1000 MPT



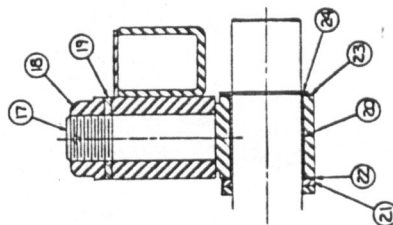
SECTION "B-B"



SECTION 'A-A'



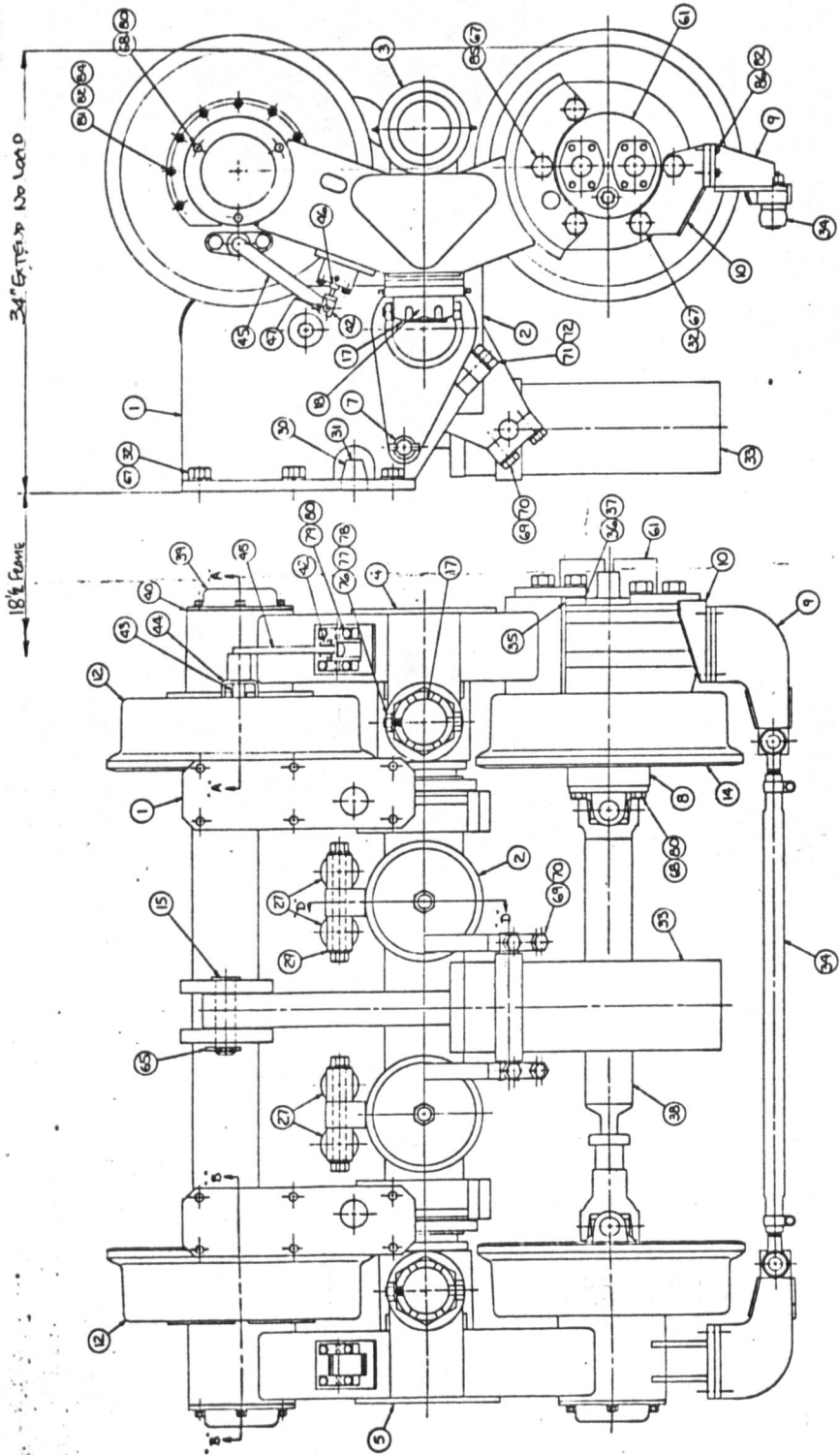
SECTION 'D-D'



SECTION 'C-C':

[illegible]

3B-65



Bill of Materials

Item	Part No.	Description	Qty
1	100-1000-000	100-1000-000	1
2	100-1000-000	100-1000-000	1
3	100-1000-000	100-1000-000	1
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99	100-1000-000	100-1000-000	1
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Form with fields for company name, part number, and other details.

NATIONAL IRON COMPANY

Part No. 100-1000-000

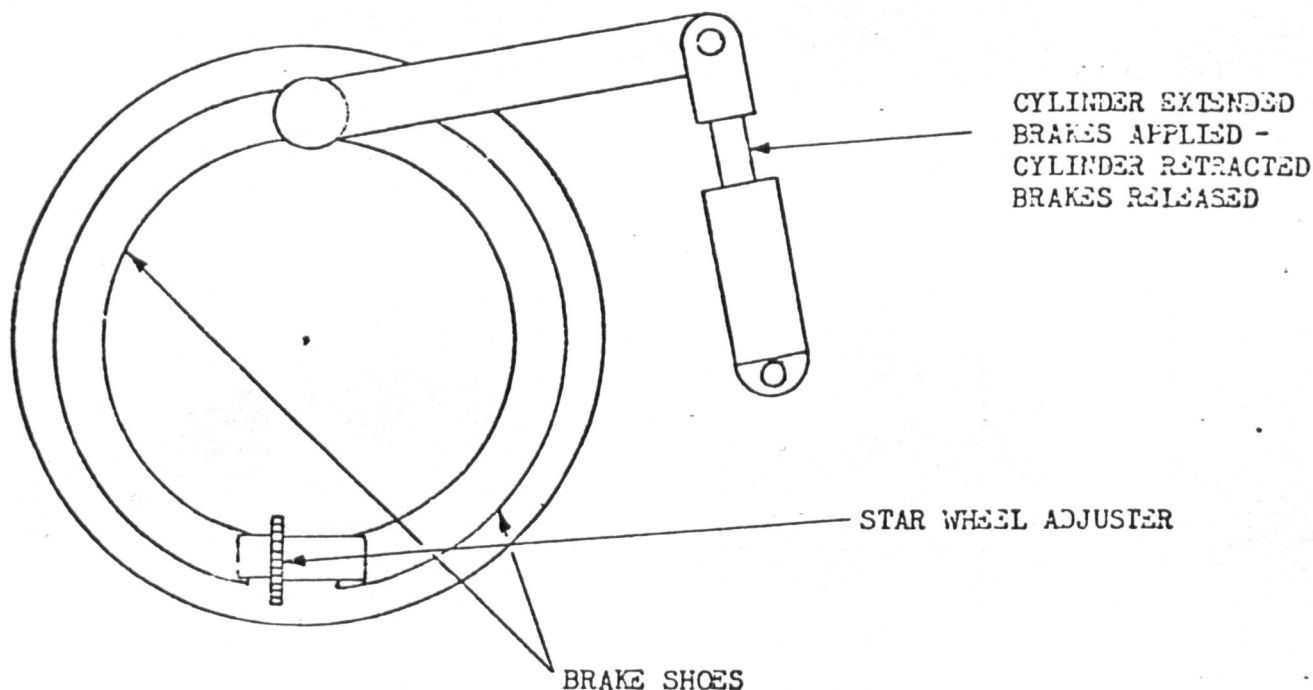
Rev. 1

100-1000-000

OVERHEATING OF STEEL RAIL PILOT WHEELS ON 220RRC

THERE ARE THREE THINGS THAT COULD CAUSE THIS CONDITION:

1. THE MOST PROBABLE CAUSE WOULD BE STUCK OR FROZEN BRAKE CYLINDERS. IF THEY WERE STUCK IN THE "ON" POSITION DUE TO AN ACCUMULATION OF DIRT OR CORROSION IN THE CYLINDER THE BRAKES WOULD DRAG AND HEAT UP THE WHEEL. TO REMEDY THIS THE CYLINDERS MUST BE REMOVED AND CLEANED OR REPLACED. NOTE: MOST OFTEN THE CYLINDER CAN BE RETRACTED MANUALLY BY PUSHING DOWN ON THE ROD THUS RELEASING THE BRAKES.
2. IF ITEM #1 IS NOT THE CAUSE AND CYLINDERS ARE FULLY RETRACTED AND BRAKES ARE DRAGGING, THEY MUST BE ADJUSTED BY MEANS OF THE STAR WHEEL ADJUSTER SIMILAR TO MOST AUTOMOBILE BRAKES. ADJUST UP TIGHT AND BACK OFF UNTIL THERE IS NO DRAG.
3. IF NEITHER #1 OR #2 IS THE CAUSE, AND THE CYLINDERS ARE EXTENDED WITH AIR PRESSURE ON THEM, THEN SOMEONE MUST HAVE BEEN DOING SOMETHING WITH THE AIR BRAKE SYSTEM AND CROSSED SOME LINES. CHECK AIR BRAKE SCHEMATIC.





Lower Hydraulic Schematic, with Hydrostatic Rail Attachment
D-202-238A

38-70

ENGINEERING BILL OF MATERIAL										GROUP NO. 202-283A	
ITEM	REQ'D		PART NO.	DESCRIPTION	ISSUE NO. 3549			MAT'L	LOC	C/N	SUPPLIER
	1	2									
1	REF.		NICO 100-945	GATE VALVE - 3" NPT WITH NON-RISEING STEM							HAMMOND
2	REF.			90° STREET ELBOW - 3" NPT SCH. 40							
3	REF.		B201-013	SERRATED FITTING - 3" STD. PIPE NIPPLE X 10" LG.							
4	REF.		100-174	FILLER CAP							VICKERS #SP-113-C
5	REF.		100-173	OIL LEVEL SIGHT GAUGE							RACINE #725-196
6	REF.		100-946	GATE VALVE - 1½" NPT WITH NON-RISEING STEM							HAMMOND
7	1			90° MALE CONNECTOR							AEROQUIP 2024-16-20S
8	2			90° MALE CONNECTOR							" 2024-20-20S
9	1		C850-578	SUCTION FLANGE							
	1			3½" SCH 40 PIPE X 3" LG							
	2			3½" LONG RADIUS 90° WELD ELBOW							
	1			6" X 1" PLATE X 6-3/8" LONG							
	1			3½" SCH 40 PIPE X 1½" LONG							
10	1		C202-144	WINCH PUMP SUCTION FITTING							
	1			6" X 1" PLATE X 6-3/8" LG.							
	1			3½" SCH 40 PIPE X 3" LG.							
	1			3½" LONG RADIUS 90° WELD ELBOW							
MODEL 220-RRC										PETTIBONE	
TITLE										PETTIBONE LIMITED	
HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE										SHEET 1 OF 9	
ASSEMBLY DWG. D202-028										GROUP NO. 202-283A	
D202-283A											
WRITTEN BY S.C.											
DATE Dec. 20/84											

3B-71

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549			GROUP NO. 202-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
	1		3" SCH. 40 PIPE X 3" LG.					
11	8	33941-1P-5	SAE 4 BOLT SPLIT FLANGE				AEROQUIP FF593-24	
12	6	33941-1P-4	SAE 4 BOLT SPLIT FLANGE				" FF593-20	
13	1		STRAIGHT "0" RING BOSS CONNECTOR				" 2062-16-20	
14	2		" " " " "				" 202702-16-16S	
15	1		90° "0" RING BOSS CONNECTOR				" 2062-20-20S	
16	1		90° " " " "				" 2062-16-16S	
17	1		1" SCH. 80 PIPE NIPPLE X 11-7/8" LG.					
18	1		1" " " " 12-3/8" LG					
19	6		1" SCH. 80 PIPE COUPLING					
20	1		45° MALE CONNECTOR				AEROQUIP 2023-16-20S	
21	1		1" SCH 80 PIPE NIPPLE X 13 1/4 LG					
22	1		1" SCH. 80 PIPE NIPPLE X 11-5/8" LG					
23	3		45° MALE CONNECTOR				AEROQUIP 2023-16-16S	
24	2		1" SCH. 80 PIPE NIPPLE X 13-5/8" LG					
25	2		90° FEMALE CONNECTOR				AEROQUIP 2025-20-20S	
26	2		1 1/4" SCH. 40 PIPE NIPPLE X 18-13/16" LG					
MODEL 220-RRC			TITLE					
ASSEMBLY DWG. D202-028 D202-283A			HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE					
WRITTEN BY S.C.			DATE			Dec. 20, 84		
						GROUP NO. 202-283A		

3B-72

ENGINEERING BILL OF MATERIAL				ISSUE NO. 5579			GROUP NO. 202-283A	
ITEM	PART NO.		DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
	REQ'D							
27	2		STRAIGHT MALE CONNECTOR				AEROQUIP 2021-16-16S	
28	5		45° MALE CONNECTOR				" 2023-20-20S	
29	4		3/4" NPT CROSS				" 2020-16-16S	
30	3		90° MALE CONNECTOR				" 2024-128S	
31	1		3/8" SCH. 40 PIPE NIPPLE X 22 1/2" LG					
32	1		3/8" SCH. 40 COUPLING					
33	1		90° MALE CONNECTOR				AEROQUIP 2024-6-6S	
34	REF.		MALE TEE				" 2028-6-6S	
35	1		3/4" SUCTION HOSE X 16" LG				GATES 56 RLC	
36	1		3/4" SUCTION HOSE X 18" LG				" 56 RLC	
37	REF.	100-984	GATE VALVE 3/4" NPT				HAMMOND	
38	REF.		PIPE PLUG 3/4" NPT					
39	1		3/4" SUCTION HOSE X 23" LG				GATES 56 RLC	
40	1		45° MALE CONNECTOR				AEROQUIP 2023-16-20S	
41	1		90° MALE CONNECTOR				" 2024-4-6S	
42	6	101-031	BAND CLAMPS				" 57120-10	
43	1		START CONNECTOR				" 2021-26-32S	
MODEL 220-RRC			TITLE					
ASSEMBLY DWG. 0202-028 0202-283A			HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE					
WRITTEN BY S.C.			DATE Dec. 20/84					
			PETTIBONE LIMITED					
			SHEET 3 OF 9					
			GROUP NO. 202-283A					

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3593		GROUP NO. 202-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
44	4	31984-1P-3	"0" RING BOSS PAD				ANCHOR
45	1	B202-282A	SERRATED FITTING				
	1		3" SCH. 40 PIPE				
	4		3" LONG-RAD 90° WELD ELBOW				
46	REF.		RED BUSHING 1/2" X 3/8"				
47	2		"0" RING X JIC STRT CONNECTOR				AEROQUIP 202702-24-20S
48	1		"0" RING X JIC TEE CONNECTOR				" 203003-B-8S
49	2		HYD HOSE HI-IMPULSE # 20 X LG				" 2781-20
50	1		" " " 20 X LG				" "
51	1		" " " 20 X LG				" "
52	1		" " " 20 X LG				" "
53	1		" " " 20 X LG				" "
54	2		VALVE-PILOT OPERATED, MOTOR SPOOL, POWER BEYOND				HUSCO
			MODEL 7130 P/N FD1938-7130A				
55	1		FOOT PEDAL CONTROL VALVE				MUNSON HVP-032-2-F-JL-E-C-110
56	REF		PUMP-DUAL P/N V2020F1F8S115-1AC8E				VICKERS
57	1		"0" RING X JIC STRT CONNECTOR				AEROQUIP 202702-12-8S
MODEL 220-RRC			TITLE	PETTIBONE LIMITED			
			HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE				
ASSEMBLY DWG. D202-028 D202-283A							
WRITTEN BY S.C. DATE Dec. 20/84			SHEET 4 OF 9		GROUP NO. 202-283A		

3B-74

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549		GROUP NO. 202-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	CN	SUPPLIER
58	1		HYD. HOSE MED. PRESS #8 X LG				AERO 2651-8
59	1		FLOW CONTROL VALVE				VICKERS FH3-125-040-050-10
60	2		"0" RING X JIC STRT CONNECTOR				AERO 202702-8-BS
61	6		" " " " "				" 202702-6-4S
62	1		HYD. HOSE MED. PRESS #8 X LG				" 2651-8
63	1		" " " " #8 X LG				" 2651-8
64	1		" " " " #8 X LG				" 2651-8
65	2		" " " " #4 X LG				" 2651-4
66	2		" " " " #4 X LG				" 2651-4
67	2		" " " " #4 X LG				" 2651-4
68	2		UNION TEE JIC				" 2033-4-4S
69	4	32554-1P-3	CAP SCREW KIT				ANCHOR
70	4		PIPE X JIC 90° CONNECTOR				AERO 2024-16-20S
71	2		"0" RING X JIC 90° CONNECTOR				" 2062-6-4S
72	4	31985-1P-3	"0" RING				ANCHOR
73	2		TEE JIC CONNECTOR				AERO 203102-20-20S
74	1		TEE JIC CONNECTOR				" 203102-D-MS
MODEL 220-RRC				PETTIBONE LIMITED			
ASSEMBLY DWG. D202-028 D202-283A				PETTIBONE LIMITED			
WRITTEN BY S. C.				SHEET 5 OF 9			
DATE Dec. 20/84				GROUP NO. 202-283A			
TITLE HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE							

ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549		GROUP NO. 202-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
75 2			"0" RING X JIC STRT CONNECTOR				AERO 202702-10-6S
76 1			TEE JIC				" 203102-6-6S
77 1			TEE JIC				" 203101-6-6S
78 1			HYD HOSE MED. PRESS #8 X LG				" 2651-8
79 1			" " " #8 X LG				" 2651-8
80 1			" " " #8 X LG				" 2651-8
81 1			" " " #20 X LG				" 2651-20
82 1			" " " #20 X LG				" 2651-20
83 1		33941-1P-6	FLANGE KIT				" FF-593-32"
84 1			HYD. HOSE HI-IMPULSE #16 X LG				" 2781-16
85 1			HYD. HOSE MED. PRESS #6 X LG				" 2651-6
86 1			" " " #6 X LG				" 2651-6
87 1			HYD. HOSE HI-IMPULSE #20 X LG				" 2781-20
88 1			HYD. HOSE MED. PRESS #20 X LG				" 2651-20
89 1			HYD. HOSE HI-IMPULSE #20 X LG				" 2781-20
90 1			HYD. HOSE MED. PRESS #20 X LG				" 2651-20
91 1			HYD. HOSE HI-IMPULSE #20 X LG				" 2781-20
MODEL 220-RRC				PETTIBONE			
ASSEMBLY DWG. D202-028				PETTIBONE LIMITED			
D202-283A				SHEET 6 OF 9			
WRITTEN BY S.C.				GROUP NO. 202-283A			
DATE Dec. 20/84							
TITLE							
HYDRAULIC SYSTEM LOWER							
WITH HYDROSTATIC RAIL							
ATTACHMENT DRIVE							

ENGINEERING BILL OF MATERIAL				GROUP NO. 202-283A			
ITEM	PART NO.		DESCRIPTION	ISSUE NO. 3548			
	REQ'D			MAT'L	LOC	C/N	SUPPLIER
92	1			HYD. HOSE HI-IMPULSE #20 X LG			AERO 2781-20
93	1			HYD HOSE MED. PRESS. #16 X LG			" 2651-16
94	1			" " " #20 X LG			" 2651-20
95	1			" " " #16 X LG			" 2651-16
96	1			HYD HOSE HI-IMPULSE #20 X LG			" 2781-20
97	1			" " " #16 X LG			" 2781-16
98	1	100-835		DECK WINCH VALVE			VICKERS
99	2	A201-165		FLANGE GASKET 4" SAE 4 BOLT			CP2-M02-R25-D5-E-30-01
100							
101	1	C201-645A		CARRIER RETURN MANIFOLD ASSEMBLY			✓
	1			3" STANDARD PIPE X100" LG			
	1	30225-07-1P-3		90° EXHAUST ELBOW 3/4" DIA. MODIFY			
	5			1 1/2" NPT 1/2 COUPLING			
	2			1" NPT 1/2 COUPLING			
	1			3" SCH. 40 PIPE X 4" LG			
	1			3" SCH. 40 PIPE X 12 1/4" LG			
	1			3 1/8" DIA X 1/2" PLATE			
MODEL 220-RRC				TITLE			
ASSEMBLY DWG. D202-028				HYDRAULIC SYSTEM, LOWER			
D202-283A				WITH HYDROSTATIC RAIL			
WRITTEN BY S.C.				DATE			
				Dec. 20/84			

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ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549			GROUP NO. 202-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
	3		3/4" NPT HALF COUPLING					
	2	34914-07-1	CLAMP BRACKET 3 1/2"					
	1	34914-07-1-1	2" II 3 1/2"					
102	1		HYD. HOSE MED PRESS #32 X LG				AERO 2651-32	
103	1		" " FITTING MED. PRESS 45°				" 4777-32S	
104	1		" " " " STRT				" 411-32S	
105	8		" " " " "				" 411-8S	
106	5		" " " " 90° SHORT				" 190296-8S	
107	2		" " " " STRT				" 411-6S	
108	2		" " " " 90° SHORT				" 190261-6S	
109	6		" " " " "				" 190296-4S	
110	6		" " " " STRT				" 411-4S	
111	6		" " " " "				" 411-20S	
112	4		" " " " 90° SHORT				" 190261-20S	
113	4		" " " " STRT				" 411-16S	
114	8		" " " HI-IMPULSE 90°				" 4790-24-20S	
115	4		" " " " "				" 4790-20S	
MODEL 220-RRC			TITLE HYDRAULIC SYSTEM, LOWER WITH HYDROSTATIC RAIL ATTACHMENT DRIVE	PETTIBONE				
ASSEMBLY DWG. D202-028 D202-283A				PETTIBONE (CANADA) LIMITED				
WRITTEN BY S.C. DATE Dec. 20/84				SHEET 8 OF 9 GROUP NO. 202-283A				

[illegible]

PETTIBONE

PETTIBONE (CANADA) LIMITED

SHEET	OF	GROUP NO.
1	1	1

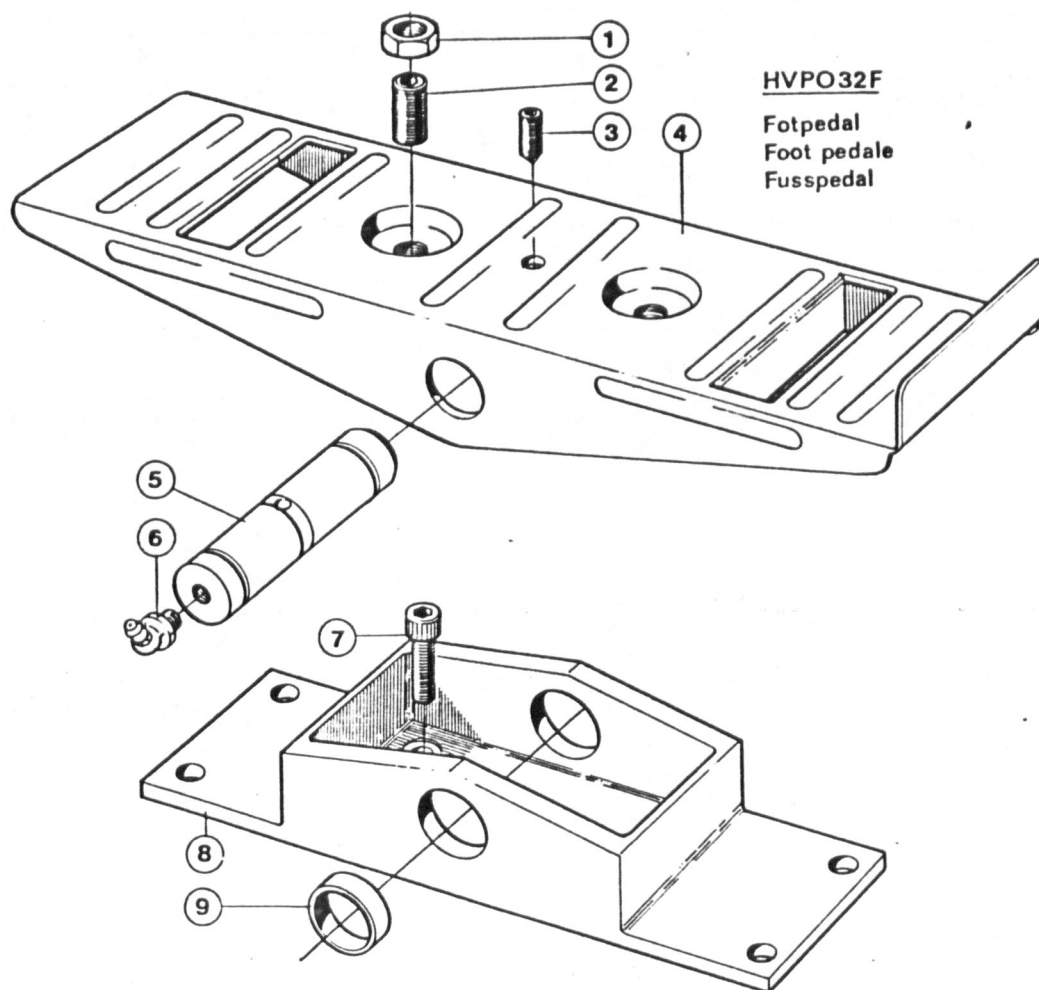


hydraulic
components

RESERVDELSLISTA
SPARE PARTS LIST
ERSATZTEILLISTE

HVP03
010 16 (23)

36-79



Pos	Antal Quant. Anzahl	Benämning Part Name Benennung	Beteckning Part No. Bezeichnung	Anmärkning Remarks Bemerkung
1	2	Mutter Nut/Mutter	9125 7469	ML6 M8
2	2	Skruv Screw/Schraube	9128 8645	PSS 8x18 Hårdad *
3	1	Skruv Screw/Schraube	9125 7277	S6SS 6x14
6	1	Smörjnippel Grease nipple/Schmiernippel	0544 2440	M6 67°
7	4	Skruv Screw/Schraube	9125 7042	MC6S 5x16
9	2	Bussning Bushing/Buchse	9128 8641	
		<u>Pedal, kpl</u> Pedal, assy/Pedal, kpl	9120 0590-62	
1	2	Mutter Nut/Mutter		
2	2	Skruv Screw/Schraube		
3	1	Skruv Screw/Schraube		
4	1	Fotplatta Foot pedal/Fusspedal		
		<u>Fästplatta, kpl</u> Mounting plate, assy Befestigungsplatte, kpl	9120 0590-63	
5	1	Axel Pin/Achse		
6	1	Smörjnippel Grease nipple/Schmiernippel		
7	4	Skruv Screw/Schraube		
8	1	Fästplatta Mounting plate/Befestigungsplatte		
9	2	Bussning Bushing/Buchse		
		* Hardened/Gehärtet		



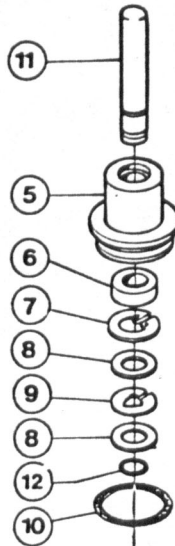
hydraulic
components

RESERVDELSLISTA
SPARE PARTS LIST
ERSATZTEILLISTE

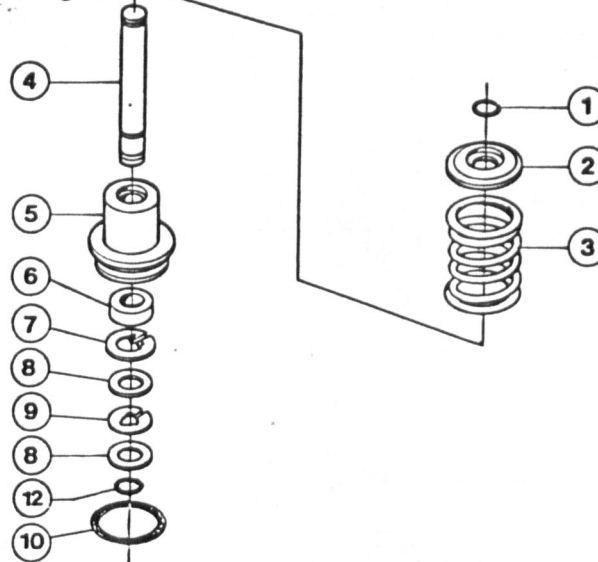
HVP03
010 17 (23)

36-80

H1 (HVP034) E1 - E4
Design X



H1 (HVP032) H2, F
Design C



Pos	Antal Quant. Anzahl	Benämning Part name Benennung	Beteckning Part No. Bezeichnung	Anmärkning Remark Bemerkung
1	1	Trådring	Wire coil/Sprengring	9126 7060
3	1	Fjäder	Spring/Feder	9128 6972
3	1	Fjäder	Spring/Feder	9128 8061
3	1	Fjäder	Spring/Feder	9128 8062
3	1	Fjäder	Spring/Feder	9128 6975
6	1	U-manschett	U-ring/U-Dichtung	9128 7470
7	1	Spärring	Circlip/Sicherungsring	9126 7056
8	-	Distansring	Spacer/Abstandring	9126 7069
8	-	Distansring	Spacer/Abstandring	9126 7070
9	1	Spärryttare	Retaining ring/Sicherungsscheibe	9125 7797
10	1	O-ring	O-ring/O-Ring	9125 6055
12	1	O-ring	O-ring/O-Ring	0663 9287
		<u>Tryckpinnsats, utförande X</u>	9122 2200-82	
		<u>Pressure pin set, design. X</u>		
		<u>Stösselsatz, Ausführung X</u>		
5	1	Styrhylsa	Guide bushing/Führungshülse	
6	1	U-manschett	U-ring/U-Dichtung	
7	1	Spärring	Circlip/Sicherungsring	
8	-	Distansring	Spacer/Abstandring	
9	1	Spärryttare	Retaining ring/Sicherungsscheibe	
10	1	O-ring	O-ring/O-Ring	
11	1	Tryckpinne	Pressure pin/Stößel	
12	1	O-ring	O-ring/O-Ring	



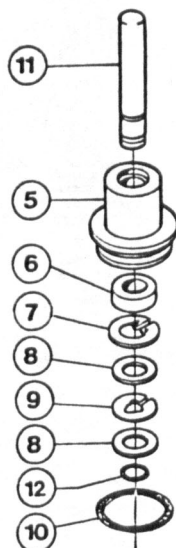
hydraulic
components

RESERVDELSLISTA
SPARE PARTS LIST
ERSATZTEILLISTE

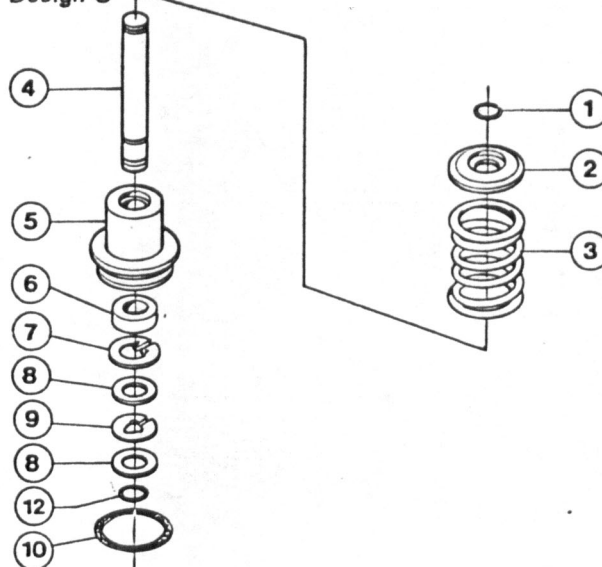
HVP03
010 18 (23)

3B-81

H1 (HVP034) E1 - E4
Design X



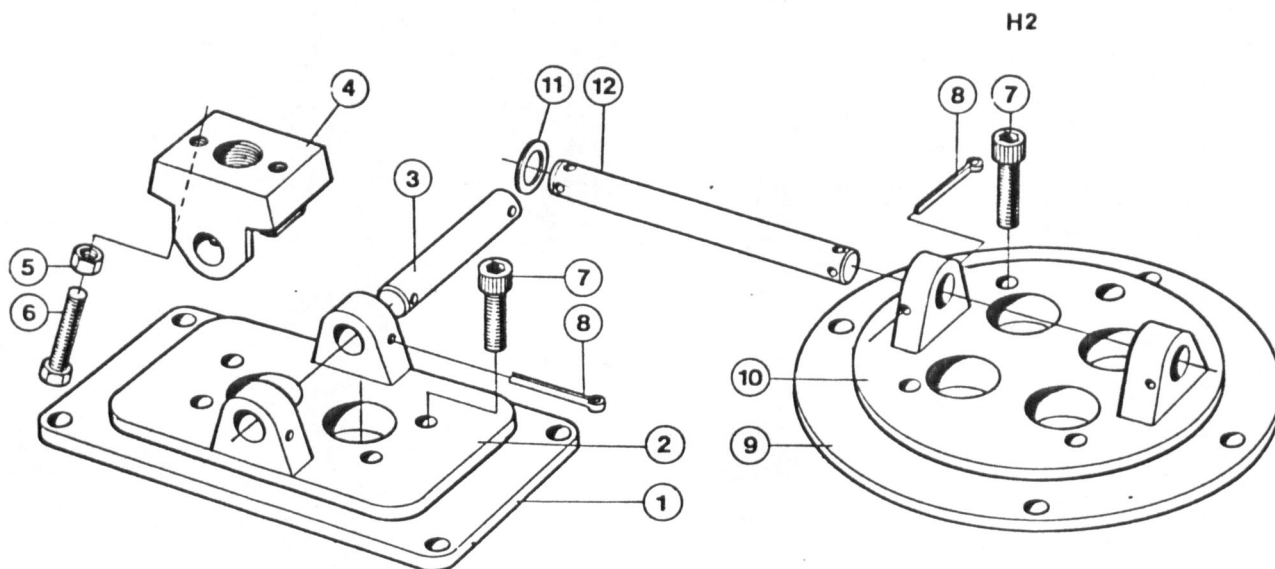
H1 (HVP032) H2, F
Design C



Pos	Antal Quant. Anzahl	Benämning Part name Benennung	Beteckning Part No. Bezeichnung	Anmärkning Remark Bemerkung
		<u>Tryckpinnsats, utförande C</u> <u>Pressure pin set, design. C</u> <u>Stösselsatz, Ausführung C</u>	9122 2200-81 9123 6688-01 9123 6688-02 9123 6688-03	C = 0,65 (std) C = 1,61 C = 0,24 C = 0,38
1	1	Trådring	Wire coil/Sprengring	
2	1	Bricka	Washer/Scheibe	
3	1	Fjäder	Spring/Feder	
4	1	Tryckpinne	Pressure pin/Stössel	
5	1	Styrhylsa	Guide bushing/Führungshülse	
6	1	U-manschett	U-ring/U-Dichtung	
7	1	Spärring	Circlip/Sicherungsring	
8	-	Distansring	Spacer/Abstandring	
9	1	Spärryttare	Retaining ring/Sicherungsscheibe	
10	1	O-ring	O-ring/O-Ring	
12	1	O-ring	O-ring/O-Ring	
		<u>Tätningssats</u>	<u>Seal kit/Dichtungssatz</u>	9120 0590-99
6	4	U-manschett	U-ring/U-Dichtung	
7	4	Spärring	Circlip/Sicherungsring	
10	4	O-ring	O-ring/O-Ring	

3B-82

Fästplatta
Mounting plate
Befestigungsplatte



H1 (HVP032)

H2 (HVP034)

Pos	Antal Quant. Anzahl	Benämning Part Name Benennung	Beteckning Part No. Bezeichn.	Anmärkning Remarks Bemerkung
		<u>Fästplatta H2, kpl</u> <u>Mounting plate H2, assy</u> <u>Befestigungsplatte H2, kpl</u>	9120 0590-60	HVP034
4	2	Tryckplatta Pressure plate/Druckplatte		
5	4	Mutter Nut/Mutter		
6	4	Ställskruv Adjusting screw/Stellschraube		
7	4	Skruv Screw/Schraube		
8	1	Saxpinne Split pin/Splint		
9	1	Fästplatta Mounting plate/Befestigungsplatte		
10	1	Överplatta Bracket plate/Platte		
11	1	Bricka Washer/Scheibe		
12	1	Axel Pin/Achse		

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ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549			GROUP NO. 201-283A	
ITEM	REQ'D		PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	2			Adapter-Straight NPT x JIC				Aero #2021-16-16S
2	3			" " " "				" #2021-20-20S
3	6			" " " O-Ring x JIC				" #202702-16-16S
4	2			" " " " "				" #202702-20-20S
5	1			" " " NPT x JIC				" #2021-16-20S
6	5		33941-1P-3	Split Flange Kit				" #FF593-16
7	3		33941-1P-4	" " " "				" #FF593-20
8	1			Adapter - Straight NPT x JIC				" #1021-12-12S
9	2			" " " O-Ring x JIC				" #202702-24-20S
10	1		31857-1P-4	Close Nipple 1 NPT				
11	2			Adapter- Straight NPT x JIC				Aero #2021-12-16S
12	2			" 45° NPT x JIC				#2023-12-10S
13	1		LL-4164-12-21	Pipe 3/4" x 21" LG.				
14	1			Adapter-Tee NPT				Aero #2255-12-12S
15	1			" -45° NPT x JIC				" #2023-8-10S
16	1			Adapter - Straight				" #2021-12-6S
17	1			" -90° NPT x JIC				" #2024-12-16S
MODEL 220-RRC				TITLE HYDRAULIC SYSTEM, UPPER WITH FREEFALL AND AUX WINCH				
ASSEMBLY DWG. D-201-283A				PETTIBONE J LIMITED				
WRITTEN BY " S.C.				SHEET 1 OF 6				
DATE 85-j-14				GROUP NO. 201-283A				

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ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549			GROUP NO. 201-283A	
ITEM	REV'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
18 1			Adapter - 90° Long NPT x JIC				Petro #202413-12-16S	
19 2			" -45° O Ring x JIC				" #2061-16-16S	
20 1			" -90° NPT x JIC				" #2024-12-10S	
21 1			" -Reducer NPT x NPT				" #2081-16-12S	
22 1			" -Straight NPT x JIC				" #2021-8-4S	
23 3			" -90° NPT x JIC				" #2024-8-6S	
24 1			" -90° NPT x NPT				" #2047-12-12S	
25 3			" -Reducer NPT x NPT				" #2081-12-8S	
26 2			" -Tee NPT x NPT				" #2254-12-12S	
27 1			" -Tee NPT x NPT				" #2255-8-8S	
28 2			" -Straight O-Ring x JIC				" #202702-20-16S	
29 1			" -45° O-Ring x JIC				" #2061-10-10S	
30 1			" -Straight O-Ring x JIC				" #202702-10-6S	
31 1			" -Plug NPT				" #2082-4S	
32 3			" -90° NPT x JIC				" #2024-4-6S	
33 2			" -Straight NPT x JIC				" #2021-4-6S	
34 1			" -90° NPT x JIC				" #2024-12-12S	
MODEL 220-RRC			TITLE					
ASSEMBLY DWG. D-201-283A			HYDRAULIC SYSTEM, UPPER WITH FREEFALL AND AUX WINCH					
WRITTEN BY S.C.			DATE 85-1-14			PETTIBONE (CANADA) LIMITED		
						SHEET 2 OF 6		
						GROUP NO. 201-283A		

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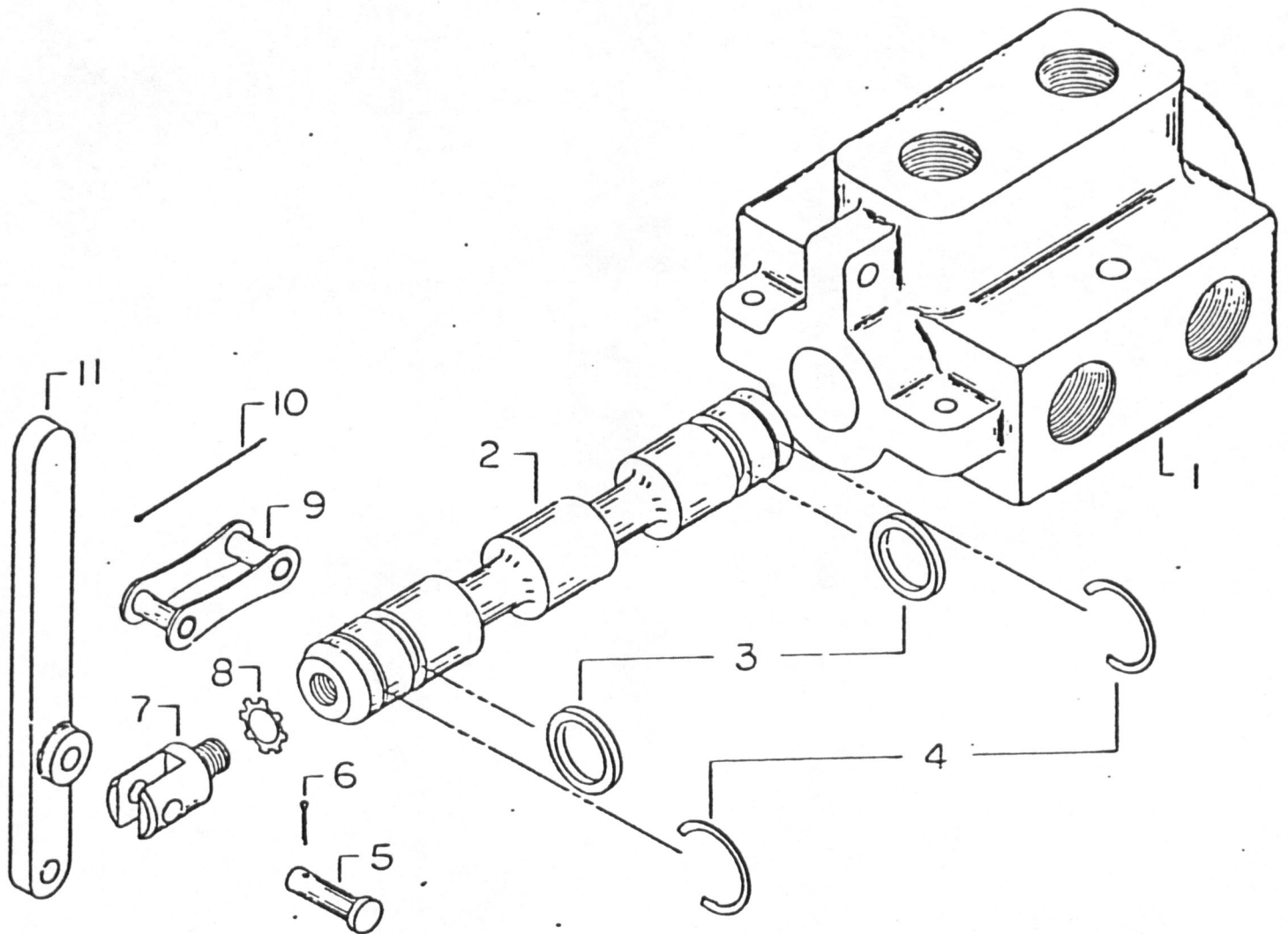
ENGINEERING BILL OF MATERIAL				ISSUE NO. 3549		GROUP NO. 201-283A	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
35 1			Adapter - 90° NPT X JIC				Aero #2024-8-45
36 2			" -Straight Split Flange X JIC				" #500025-32-20S
37 5			" -90° Split Flange X JIC				" #FF5162-16-20S
38 2			O - Ring				" #FF9446-228
39 2			Adapter - Tee NPT X JIC				" #203103-20-20S
40 1	Nico	100-609	Valve - Selector				Green #DS - 75
41 2	Nico	100-641	" -Swing and Aux Winch				Vickers #QO-N02-R25-B5-L30-Q13
42 1	Nico	100-834	Valve - Winch				Vickers #QO-N01-R25-B6-B6-L10-01
43 1	Nico	101-071	" - Flow Divider				Webster #FV 1126
44 1			Hyd Hose Hi-Impulse #20 x LG				Aero #2781-20
45 1			" " " #20 x LG				" "
46 1			" " " #20 x LG				" "
47 1			" " " #20 x LG				" "
48 1			" " " #20 x LG				" "
49 1			" " " #20 x LG				" "
50 1			" " " #16 x LG				" #2781-16
51 1			" " " #20 x LG				" #2781-20
MODEL 220-RRC				TITLE			
ASSEMBLY DWG. D-201-283A				HYDRAULIC SYSTEM, UPPER WITH FREEFALL AND AUX WINCH			
WRITTEN BY S.C.				DATE 85-1-14			
176-76				SHEET 3 OF 6			
				GROUP NO. 201-283A			



PETTIBONE LIMITED

ENGINEERING BILL OF MATERIAL									
ITEM	REQ'D			PART NO.	DESCRIPTION	ISSUE NO. 3549			GROUP NO.
						MAT'L	LOC	CN	
52	1				Hyd Hose HI-Impulse #16 x IG				201-283A
53	1				"				SUPPLIER
54	1				"				Aero #2781-16
55	1				"				"
56	1				"				"
57	1				"				"
58	1				"				"
59	1				"				"
60	1				"				#2781-20
61	1				"				#2781-10
62	1				"				"
63	1				"				#2781-16
64	1				"				"
65	1				"				#2781-20
66	1				"				#2781-12
67	1				"				#2781-6
68	1				"				#2781-4
					"				#2781-6
					"				#2781-10
TITLE									
HYDRAULIC SYSTEM, UPPER									
WITH FREEFALL AND AUX WINCH									
MODEL 220-RRG									
ASSEMBLY DWG. D 201-283A									
WRITTEN BY S.C. DATE 85-1-14									
						PETTIBONE		LIMITED	
						SHEET 4 OF 6		GROUP NO. 201-283A	

ENGINEERING BILL OF MATERIAL									
ITEM	REQ'D		PART NO.	DESCRIPTION	ISSUE NO. 3549			GROUP NO. 201-283A	
					MAT'L	LOC	C/N	SUPPLIER	
69 1				Hyd Hose Hi-Impulse #6 x 1G				Aero #2781-6	
70 1	Nicb		100-500	Winch Solenoid Controlled 4 Way Valve with				Facine	
				#994420 1/2"NPT Subplate & Bolts				#DOZENS M12 VDC	
71 1	Nicb		B 200-581	Mounting Bracket - Winch Valve					
72 1	Nicb		100-999	Check Valve				Brand Hydraulic Inc.	
73 1				Hyd Hose Hi-Impulse #6 x 1G				#PC-50	
74 2				Adapter - Reducer NPT X NPT				Aero #2781-6	
75 2				Plug 3/4"				#2081-4S	
76 1				" 1"				#2082-12S	
77 1			38206-04-1P	Oil Cooler				#2082-16S	
78 1			38207-04-1P	Thermostatic Switch Kit				Hayden	
79 5				Hyd Hose Fitting Hi-Impulse Strt				Electric Fan Engineering	
80 14				" " " " " "				Aero #4721-20S	
81 2				" " " " " "				#4721-16S	
82 6				" " " " " "				#4721-12S	
83 6				" " " " " "				#4721-10S	
84 2				" " " " " "				#4721-6S	
MODEL	220-PBC		TITLE					#4721-4S	
ASSEMBLY DWG. D-201-283A			HYDRAULIC SYSTEM, UPPER WITH FREEFALL AND AUX WINCH						
WRITTEN BY S.C.			DATE 85-1-14		PETTIBONE LIMITED				
					SHEET 5 OF 6				
					GROUP NO. 201-283A				



100-609
SELECTOR VALVE

DOUBLE SELECTOR VALVE

PARTS LIST

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	* 1475	VALVE HOUSING	1
2	* 1477	VALVE SPOOL	1
3	1129	SPOOL SEAL	2
4	1127	SNAP RING	2
5	085	HANDLE PIN	1
6	086	COTTER PIN	1
7	1478	HANDLE ADAPTOR	1
8	603	LOCK WASHER	1
9	1479	HANDLE LINK	1
10	1474	LINK COTTER PIN	1
11	1476	HANDLE	1
	KL3001 A	SEAL KIT	

* ITEM 1 & 2 NOT SOLD AS SEPARATE ITEMS. SPOOLS ARE FACTORY HONED TO INDIVIDUAL HOUSING AND ARE NOT INTERCHANGABLE. REPAIR SERVICE AVAILABLE AT FACTORY.

DOUBLE SELECTOR VALVE ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVE LINK COTTER PIN (10) AND HANDLE LINK (9). REMOVE SMALL COTTER PIN (6), HANDLE PIN (5), AND HANDLE (11). IF NEEDED REMOVE HANDLE ADAPTOR (7) AND LOCKWASHER (8). REMOVE SNAP RING (4) FROM REAR END OF SPOOL AND SLIDE SPOOL (2) FORWARD OUT OF THE VALVE HOUSING (1). REMOVE SPOOL SEALS (3) FROM SPOOL.

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR SCORING, CRACKS AND WEAR. REPLACE ALL WORN AND DAMAGED PARTS. NOTE THAT SPOOL AND HOUSING ARE MATCHED MACHINED AND ARE NOT SOLD AS SEPARATE ITEMS.

REASSEMBLY:

REASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

HAYDEN INC

MODEL: T.T. 308 DC ONE PASS

PART # 003292

WIDTH 23 1/4"

HEIGHT 19 7/8"

DEPTH 20 1/4"

PORT 1 1/4" FNPT

MOTOR 12 VOLT D.C. 22 AMP 1/4 H.P.

WT 56.5 LBS

REV.	REVISION	DATE	BY	TOLERANCES UNLESS OTHERWISE SPECIFIED: • MACHINED DIMENSIONS ± .010 (0.25 mm) • FRACTIONAL DIMENSIONS ± 1/32 (0.75 mm) • FLAME CUT DIMENSIONS ± 1/16 (1.50 mm)	DO NOT SCALE DRAWING	TITLE
				PETTIBONE (CANADA) LIMITED RESERVES ALL PROPRIETARY RIGHTS TO THIS DRAWING AND THE DATA SHOWN THEREON. THIS DRAWING IS SUBMITTED IN CONFIDENCE AND MUST NOT BE USED OR REPRODUCED WITHOUT THE PRIOR CONSENT OF PETTIBONE (CANADA) LIMITED, MISSISSAUGA, ONTARIO, CANADA.		TEMP-TROLLER ELECTRA COOLER
						MATERIAL SPEC.
						MODEL B/M NO. DRAWN DATE
						220-REC 201-283A 8- 20 DEC 84
						CHECKED SCALE 1/1
						DWG. NO. 38206-04-1

PETTIBONE

PETTIBONE (CANADA) LIMITED

3B-94

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.		
ITEM		REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1		D201-600	Instrument Panel Wiring Harness				
2	1		D201-615	Upper Wiring Harness				
3	1		C202-056	Collector Ring - Engine Harness				
4	1		100-120	Terminal Box Strip Square "D" #BA-24P				
5	1		101-476	Terminal Box Strip Square "D" #BA-18P				
6	1		38194 26 1P	Remote Control Kit				
7	1		D201-957	Instrument Panel Assembly				United Equip.
701	REF.		D201-579	Instrument Panel				
702	1		RC1025-W	Toggle Switch, Outrigger L.R.				
703	1		RC1025-W	" " " L.F.				
704	1		RC1025-W	" " " R.R.				
705	1		RC1025-W	" " " R.F.				
706	1		RC1025-W	" " " Rear IN-our				
707	1		RC1025-W	" " " Front IN-our				
708	1		30680 12 1P RC915-W	Engine Stop Switch				
709	1		750-095	Buzzlight				
710	REF.		100-810	Horn Valve (on A & S system)				
MODEL 220-RRC				TITLE				
ASSEMBLY DWG. 220-RRC D201-586				UPPER ELECTRICAL SYSTEM				
WRITTEN BY PL		DATE Oct. 4, 1984						
				PETTIBONE LIMITED				
				SHEET 1 OF 3				
				GROUP NO. 201-586				

3B-95

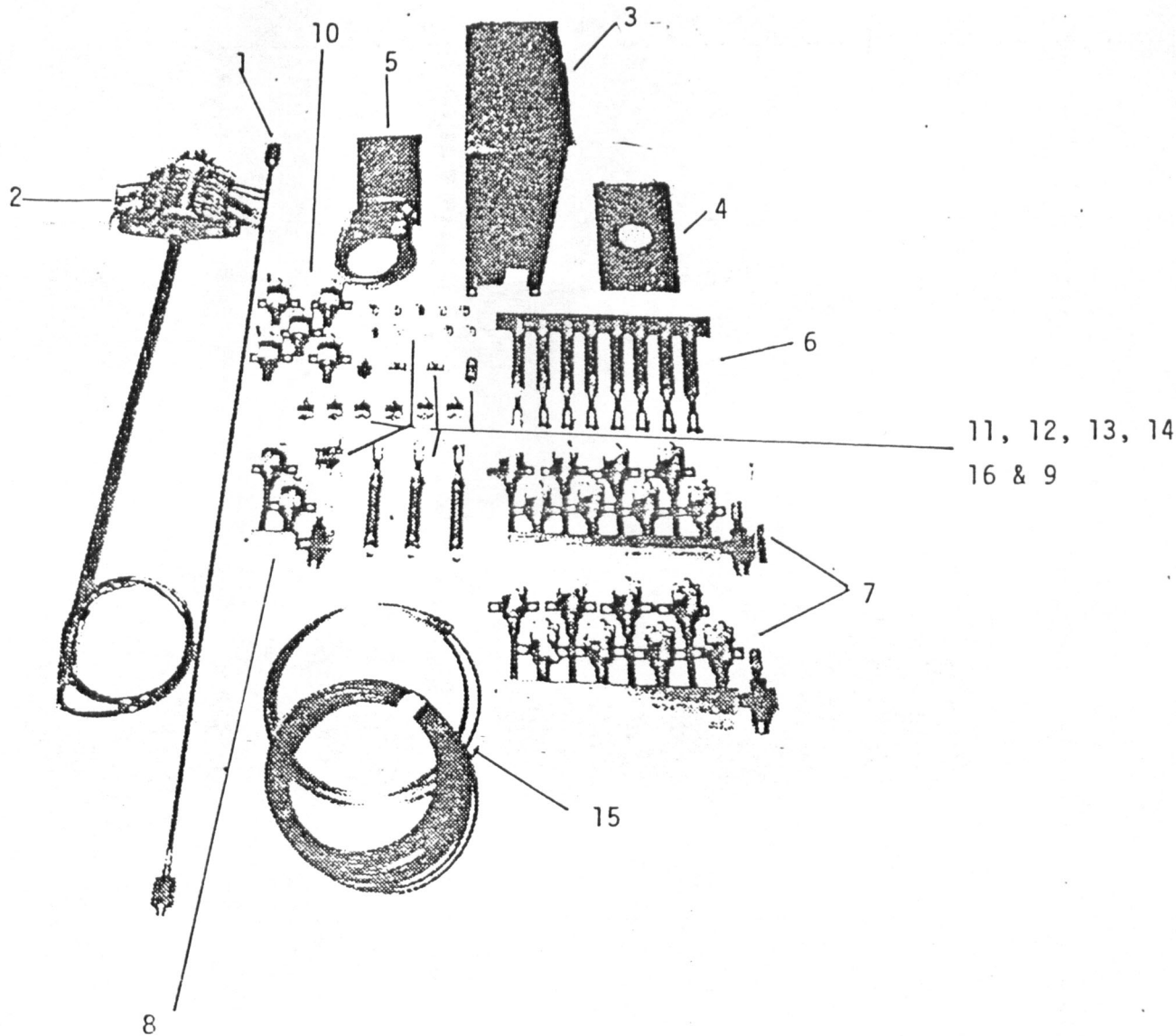
ENGINEERING BILL OF MATERIAL				ISSUE NO.	GROUP NO.		
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
711	1	10523 12 1P 750-458	Ignition Switch				
712	1	32306 12 1P 100-811	Air Pressure Gauge				
713	1	32308 12 1P 750-506	Water Temp. Gauge				
714	1	32304 12 1P 100-149	Oil Pressure Gauge				
715	1	32309 12 1P 101-032	Voltmeter				
716	4	—	Gauge Clamps (WITH GAUGES)				
717	1	100-968	Work Light Switch, Delco # 1994565				
718	REF	100-517	Heater Toggle Switch				
719	REF.	100-517 { PART OF KIT	Heater Cable				
720	REF.	100-517	Fuse				
721	1	100-967 (QC-914)	Gantry Toggle Switch, SPDT TYPE, MAKEUP. GANTRY W. SHUNT RETURN TO NEUTRAL				
722	1	101-132	Free-Fall Reset Switch				
8	3	NICO 100-645	Circuit Breaker				C.H. #30055-25
9	REF.	100-049 (WITH CAB)	Defroster Fan				Perfection #9214
10	1	100-767	Windshield Wiper Motor				Bosch - WVF-12A 19-710
11	1	100-970	" " Arm				Diesel Service LF 72-1156
12	1	100-971	" " Blade				Diesel Service BD 72-1020-14
MODEL	220-RRC		TITLE				 PETTIBONE LIMITED
ASSEMBLY DWG.	D201-586		UPPER ELECTRICAL SYSTEM				
WRITTEN BY	PL		DATE				
			Oct. 4, 1984				
				SHEET 2 OF 3		GROUP NO. 201-586	

REMOTE CONTROL KIT

38-97

NICO # 101-535

RCK 10 N1 8



36-98

INDEX TO REMOTE OUTRIGGER CONTROL
COMPONENTS ILLUSTRATED IN PHOTOGRAPH

- ✓ (1) Two Circuit Pneumatic Swivel (See RC 300).
- ✓ (2) Electrical Slip Ring Assembly (See RC 800).
- ✓ (3) Slip Ring Sheet Metal (See RC 800).
- ✓ (4) Slip Ring Turntable Base Bracket (See RC 800).
- ✓ (5) Outrigger Relay Box Ass'y. (See RC 1000).
- ✓ (6) Outrigger Cylinders (See RC 1000).
- ✓ (7) Outrigger Solenoid Valve Assemblies (See RC 1000).
- ✓ (8) Two Bank Solenoid Valve Assembly (See Miscellaneous).
- ✓ (9) Air Cylinder Only (See Miscellaneous).
- ✓ (10) Solenoid Valves Only (See Miscellaneous).
- ✓ (11) Outrigger Control Switches (See RC 1000).
- (12) Fittings Only (See Miscellaneous).
- (13) Circuit Breakers (See Miscellaneous).
- (14) Push Button Switch Only (See Miscellaneous).
- (15) Copper & Plastic Tubing (See Miscellaneous).
- (16) 12 Volt Relay Only (See Miscellaneous).

RC 300 ACCELERATOR

Assembly Quantity	Consists Of	Part Number	Name and Description
1		RC 3035-54	Two Circuit Air Swivel for Foot Operated Air Accelerator Ass'y.
		RC 3021	Repair Kit for RC 3035-54 Swivel Ass'y.
			(Air Accelerator Assembly Supplied By National Iron.)

RC 800 SLIP RING ASSEMBLY

Assembly Quantity	Consists Of	Part Number	Name and Description
1		RC 850-15NI1	Slip Ring Assembly, 15 Circuit Per Print. (See Attached Sheet for Slip Ring Component Parts List.)
1		RC 8759	Slip Ring Mounting Base Plate, Include RC 13131 Greenfield Connector.
1		RC 841E-13	Slip Ring Sheet Metal Cover, 13" High with End Mounting Ears.

Assembly Quantity	Consists Of	Part Number	Name and Description
----------------------	----------------	----------------	----------------------

31033 26 IP	2	RC 10150-8	Solenoid Valve Manifold Ass'y. Consists of: (8) 12 Volt N.C. Solenoid Valves Mounted On Manifold with Air Regulator.
	16	RC 1016B	Solenoid Valve, 12 Volt N.C. Stamped RC 1016, Includes (2) RC 8021 & (1) RC 8023.
	AR	RC 8021	Knife Disconnect Terminal for RC 1016 Solenoid.
	AR	RC 8023	Plastic Sleeve for RC 8021.
	16	RC 13000	1/4" O.D. Tube - 1/4" IPT 90° Elbow Fitting for RC 1016.
	8	RC 13003	1/4" x 1 1/4" Pipe Nipples, Solenoid Valve to Manifold.
	8	RC 13004	1/4" x 4" Pipe Nipples, Solenoid Valve to Manifold.
	2	RC 1007-8	8 Bank Manifold Only.
	1	RC 1015	Air Regulator Only.
31034 26 IP	1	*	Outrigger Cylinder Bank Assembly. Consists of: (8) 1-1/16" Bore x 3" Stroke Air Cylinders on RC 10028 Bracket, Including Fittings & Clevises.
	8	RC 1003-3A	Air Cylinder Only for Above Assembly. 1-1/16" Bore x 3" Stroke. Includes Clevis, Pin & Fittings.
	8	RC 10024	Clevis Only for RC 1003-3A Cylinder. 5/16" Female Type.
	8	RC 13009	5/16" Std. Clevis Pin.
	8	RC 13010	Hair Pin Clip for RC 13009.

*When Ordering This Part, List Specification No. Shown At
Top of Page.

RC 1000 OUTRIGGER CONTROLS (CONTD.)

Assembly Quantity	Consists Of	Part Number	Name and Description
	8	RC 13011	5/16" NF Hex Jam Nut.
	16	RC 13005	1/4" O.D. Tube - 1/8" IPT 90° Elbow Fitting.
	1	RC 10028	Mounting Bracket Only for (8) RC 1003-3A Cylinders.
	1		Pin for Mounting Cylinders to Bracket.
38195 26 12 1		RC 12047A-N11	Relay Box Assembly for 12 Wire 7 Circuit Outrigger Controls. Includes (2) Relays Mounted In Box With Prewired Harness.
	1	RC 12047	Sheet Metal Box Only for RC 12047A-N11.
	2	RC 9013	Relays Only for Above.
	1	*	70" Wire Harness for Above.
8		RC 1025-W-A	Toggle Switch with Terminal Straps for Outrigger Controls.
	8	RC 1025-W	Toggle Switch Only. Stamped 2TL1-7 or 8511K2.
	8	RC 13023	Long Terminal Strap Only for RC 1025-W-A. (See Dwg.)
	8	RC 13042	Short Terminal Strap Only for RC 1025-W-A. (See Dwg.)

*When Ordering This Part, List Specification No. Shown
At Top of Page.

MISCELLANEOUS

Assembly Quantity	Consists Of	Part Number	Name and Description
50 Ft.		RC 1014	1/4" O.D. Black Poly Tubing x .035 Wall.
1		RC 914-W	Toggle Switch, SPDT Type With Spring Return to Neutral. Stamped 1TL1-7 or 8510K2. (Shipped Loose).
1		RC 915-W	Push Button Momentary Contact N.O. Switch. (Shipped Loose).
5		RC 1016B	12 Volt Normally Closed Solenoid Valve. Stamped RC 1016. Includes Terminals. (Shipped Loose).
10		RC 13000	Elbow Fitting, 1/4" Tube - 1/4" IPT for RC 1016B. (Shipped Loose).
3		RC 1003-3A	1-1/16" Bore x 3" Stroke Air Cylinder Including Clevis & Fittings. (Shipped Loose).
1		RC 101-12B	12 Volt N.O. Relay. Stamped RC 101-12B. Note: Old Style Was RC 101-12. Stamped 969. Replaced By RC 101-12B. (Shipped Loose).
2		RC 970	25 Amp Circuit Breaker. (Shipped Loose).
1		RC 1015	Air Regulator. Stamped N15779F or N15817F.
1		RC 10150-2	Solenoid Bank Assembly with (2) RC 1016B Solenoids & (1) Regulator.
	2	RC 1016B	12 Volt Normally Closed Solenoid Valve. Stamped RC 1016. Includes Terminals.
	2	RC 13003	1/2 x 1 1/2 Pipe Nipples for RC 10150-2.
	2	RC 13004	1/2 x 4 Pipe Nipples for RC 10150-2.
	1	RC 10043	Aluminum Manifold Only for RC 10150-
	1	RC 1015	Air Regulator for RC 10150-2. Stamped N15817F.

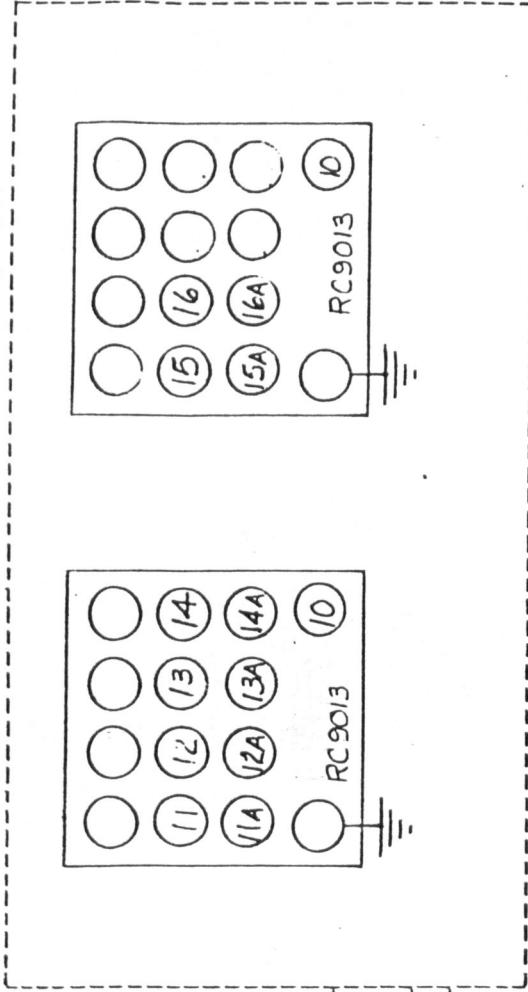
OUTPUT HARNESS

CKT. #	COLOR	FUNCTION
11	YEL	L.F. UP
11A	YEL	L.F. DOWN
12	GRN	L.R. UP
12A	GRN	L.R. DOWN
13	BLU	LEFT IN
13A	BLU	LEFT OUT
14	BRN	RIGHT IN
14A	BRN	RIGHT OUT
15	WHT	R.F. UP
15A	WHT	R.F. DOWN
16	BLK	RR UP
16A	BLK	RR DOWN

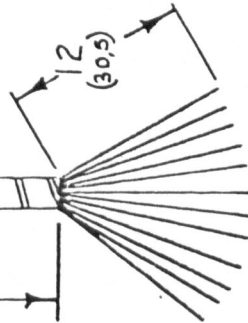
ALL WIRES 14 GA.

ALL WIRES CUT TO" (177.8)

RC12047 Box



48
(121.9)



ATTACH (2) RC8021 LGE. KNIFE
DISCONNECTS & (1) RC8023 LGE.
SLEEVES PER WIRE.

UNITED EQUIPMENT ACCESSORIES INC.
WAVERLY, IOWA

SCALE: N.T.S.

DATE: 27 AUG. 79

APPROVED BY:

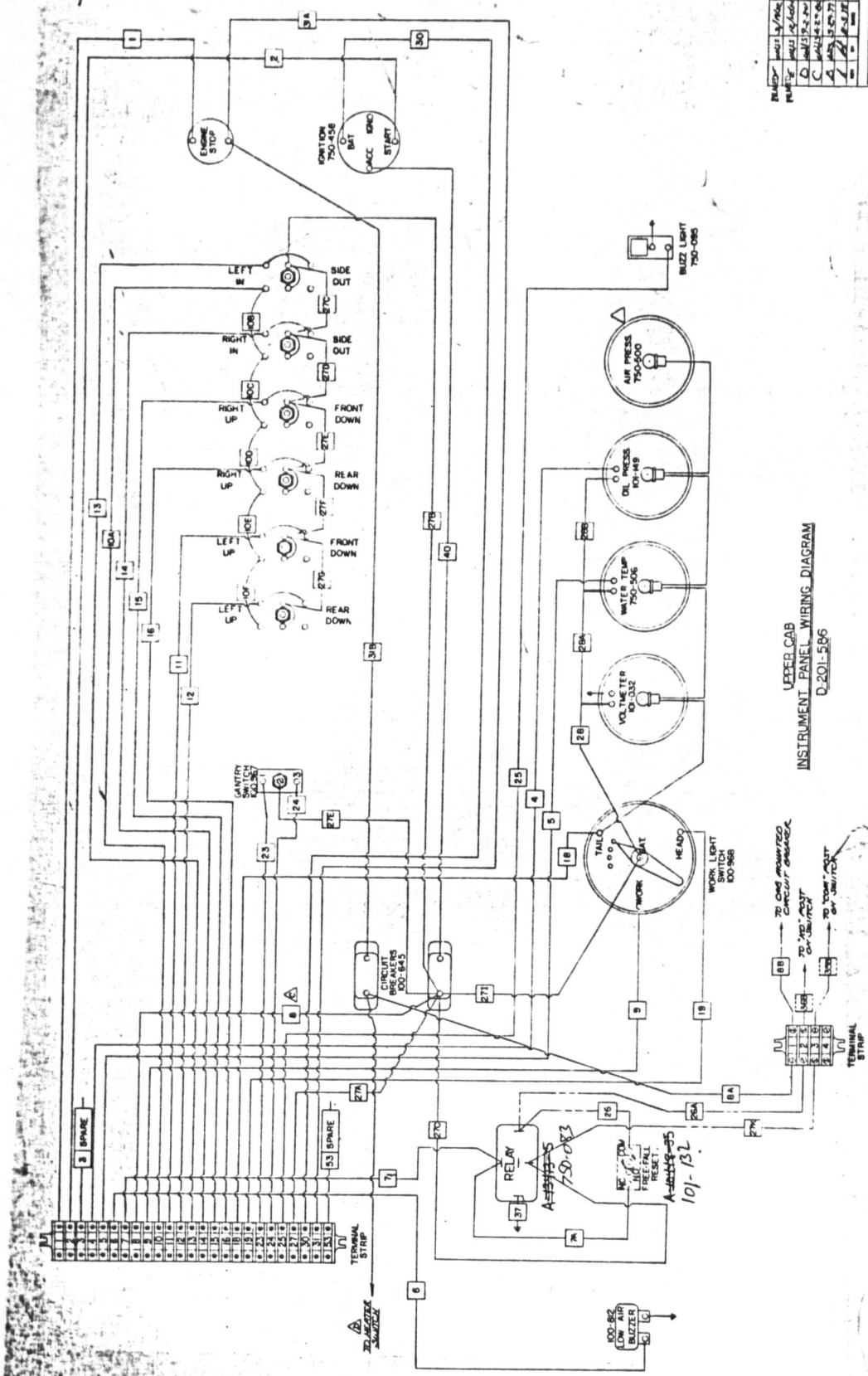
DRAWN BY B. JENSEN

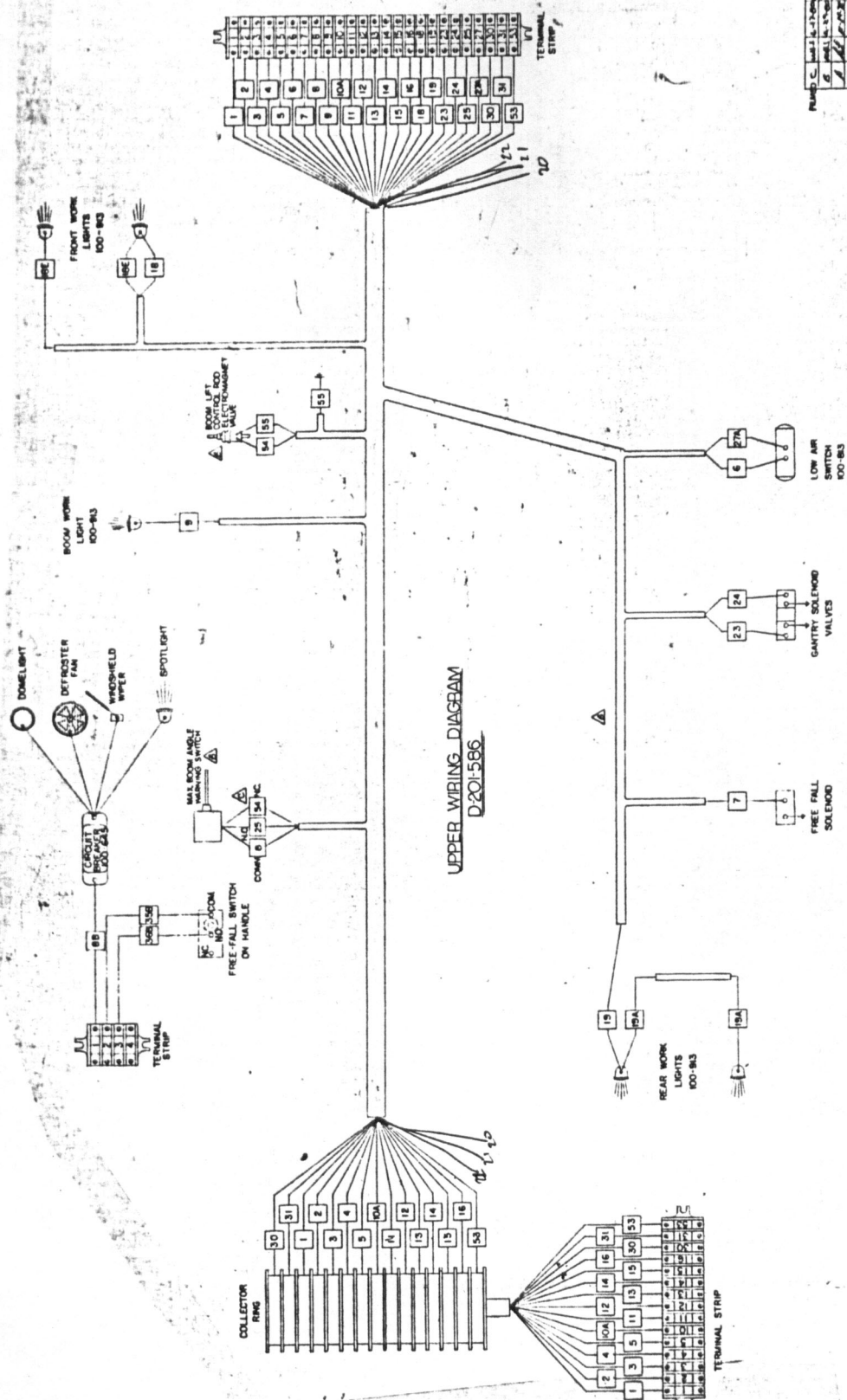
REVISED

RELAY & OUTRIGGER CONTROL BOX ASSEMBLY FOR

RCK10N18 (N.I. # 101-535)

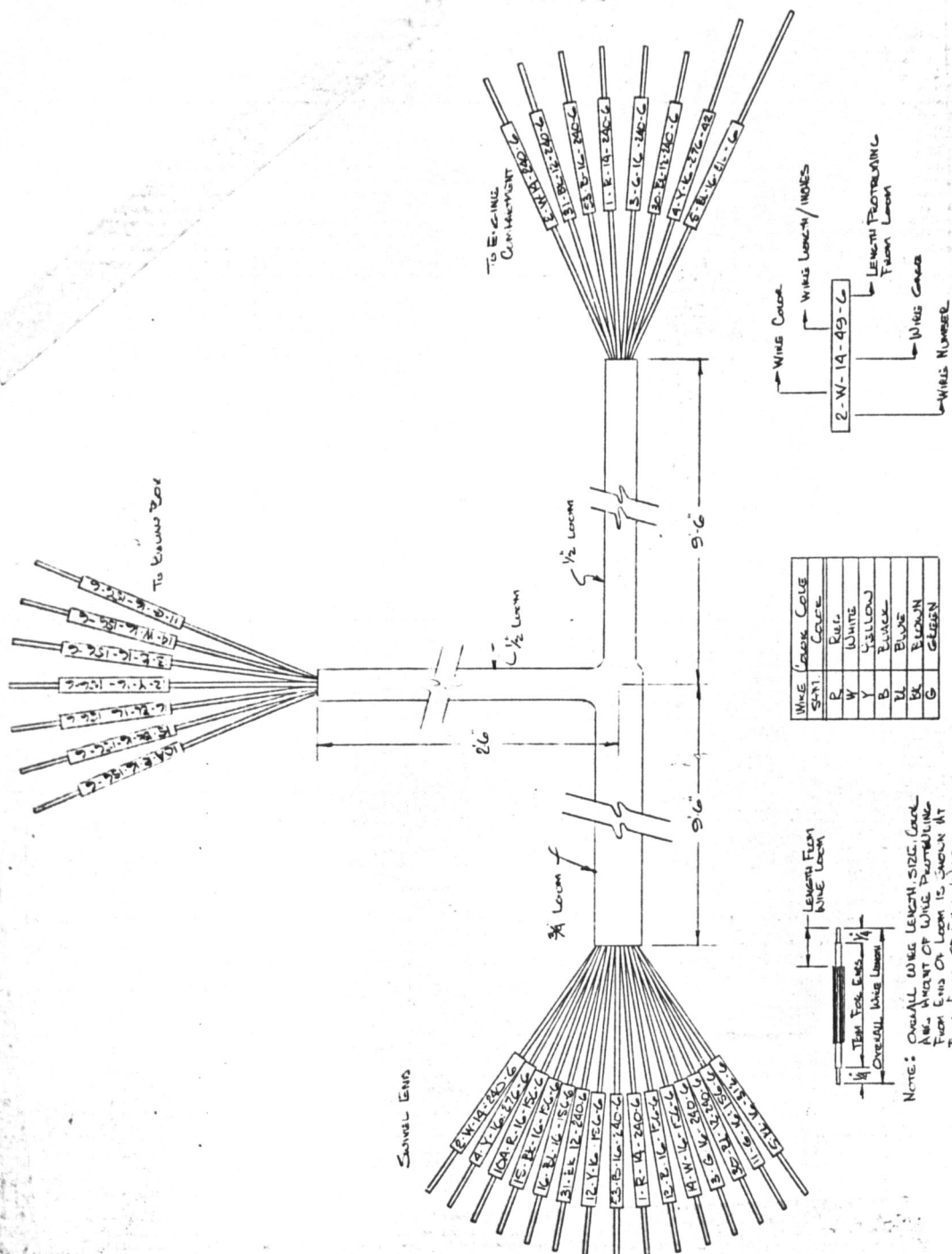
DRAWING NUMBER
RC12047ANI1

[illegible]



UPPER WIRING DIAGRAM

[illegible]



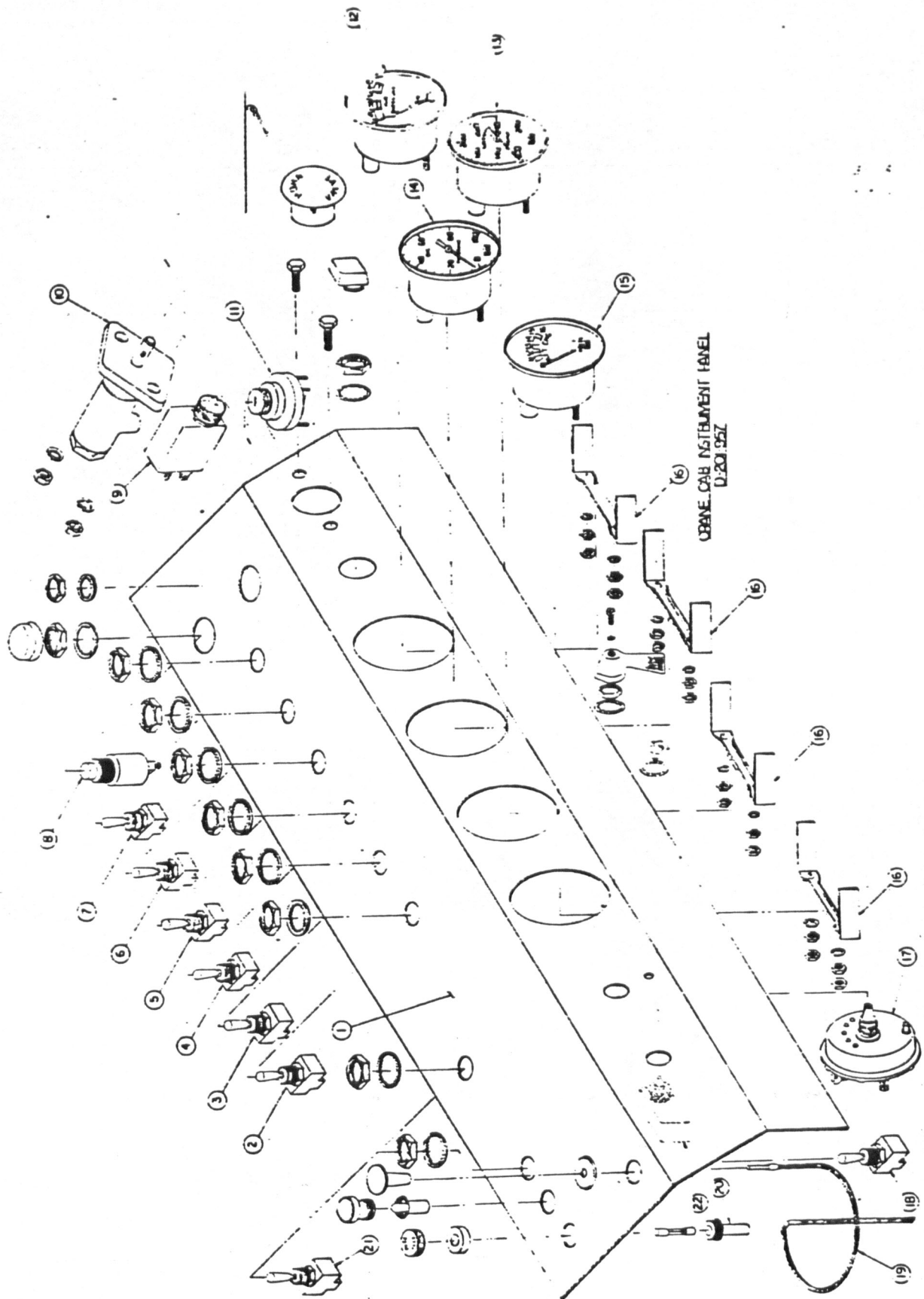
WINE STYL.	WINE COLOR
R	Red
W	White
Y	Yellow
B	Black
U	Blue
BR	Brown
C	Green

NOTE: OVERALL WIRE LENGTH, SIZE, GAGE, AMT. AMOUNT OF WIRE PERMUTING FROM ENDS OF LOOM IS SHOWN AT FRONT FACE OF FRAME WIRE.

Nico **NATIONAL IRON COMPANY**
 DULUTH, MINNESOTA
 DIVISION OF HYDROCARBON CORP.

ORDER TO BUY TO ORDER & CREDIT
 FROM
 TURNER 220 ETC COMPANY

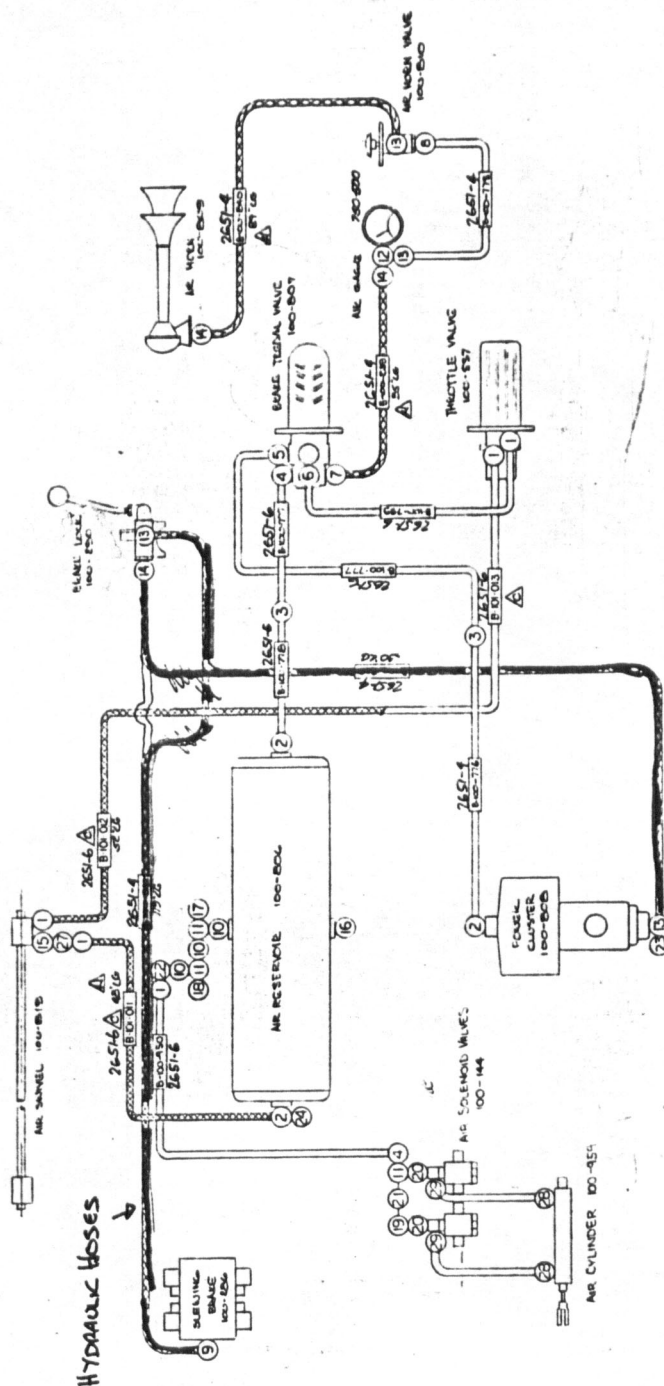
ORDER BY CASH
 DATE 6-22-78
 CREDIT ORDER NO.
 ORDER NO. C-102-056



CRANE CAB INSTRUMENT PANEL
PETTIBONE 22ORRC CRANE

<u>ITEM</u>	<u>PART No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	D-201-579-1	INSTRUMENT PANEL	1
2	RC-1025-W	TOGGLE SWITCH, OUTRIGGER	1
3	"	" " "	1
4	"	" " "	1
5	"	" " "	1
6	"	" " "	1
7	"	" " "	1
8	RC-915-W	ENGINE STOP BUTTON	1
9	750-095	BUZZ LIGHT	1
10	100-810	HORN VALVE	1
11	750-458	IGNITION SWITCH	1
12	100-811	AIR PRESSURE GAUGE	1
13	750-506	WATER TEMPERATURE GAUGE	1
14	100-149	OIL PRESSURE GAUGE	1
15	101-032	VOLTMETER	1
16	NA	GAUGE CLAMP	4
17	100-938	WORK LIGHT SWITCH	1
18	100-517	HEATER TOGGLE SWITCH	1
19	100-517	HEATER CABLE	1
20	100-517	HEATER FUSE	1
21	100-967	GANTRY TOGGLE SWITCH	1
22	101-132	FREE-FALL RESET SWITCH (OPTIONAL)	1

3B-110



SWING BRAKE & THROTTLE
AIR LINE SCHEMATIC
D-200-93!

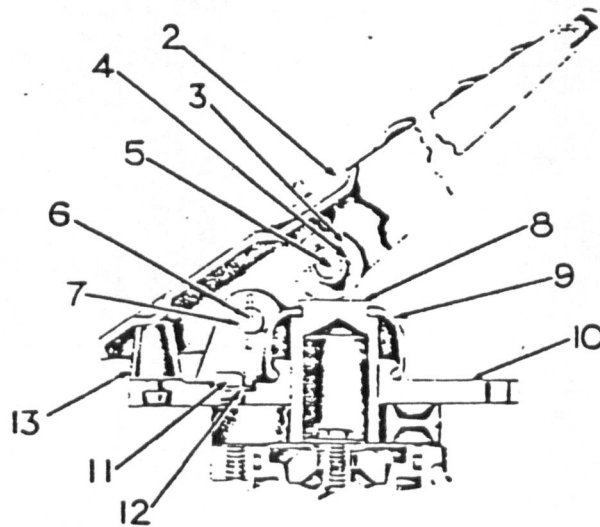
38-111

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	200-931
1	5	Aeroquip 2021-4-6S	Straight Male Connector					
2	3	2024-6-6S	90° Male Connector					
3	2	2027-6-6S	JIC Male Union					
4	2	2024-4-6S	90° Male Connector					
5	1	2024-8-6S	90° Male Connector					
6	1	2021-8-6S	Straight Male Connector					
7	1	2024-8-4S	90° Male Connector					
8	1	2023-4-4S	45° Male Connector					
9	1	2062-4-4S	90° "O" Ring Boss Connector					
10	3		Close Nipple 1/4" NPT SCD 40					
11	3		Tee 1/4" NPT SCD 40					
12	1		Tee 1/8" NPT SCD 40					
13	4	2024-2-4S	90° Male Connector					
14	3	2023-2-4S	45° Male Connector					
15	1		1/8" SCD 40 Nipple 2" lg.					
16	1	2051-031P 101-525	Drain Cock				Bendix - 221121	
17	1	10513-031P 100-814	Air Pressure Relief Valve				Bendix - 205105	
MODEL 220-RRC				PETTIBONE LIMITED				
ASSEMBLY DWG. D200-931				PETTIBONE LIMITED				
WRITTEN BY PL				SHEET 1 OF 4				
DATE Oct. 3, 1984				GROUP NO. 200-931				
TITLE				UPPER AIR SYSTEM ASSEMBLY				

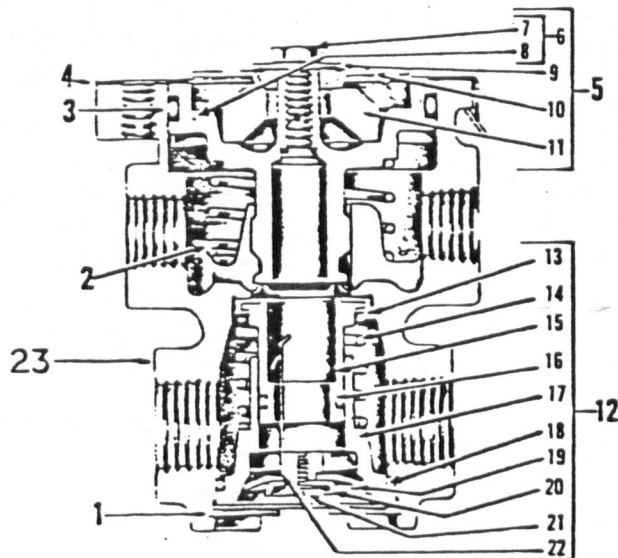
3B-112

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
18	1	10504-031P 100-813	Air Low Pressure Switch				Bendix - 228750	
19	1	D200-931	90° Elbow - 1/4" NPT SCD 40					
20	2		Pipe Nipple - 1/4" NPT X 1 1/2" lg. SCD 40					
21	1		Pipe Nipple - 1/4" NPT X 3" lg. SCD 40					
22	1	100-955	Air Regulator (Part of 100-966)				United Equip. 15817F	
23	3	100-956	Cyl. Outlet Plug w/Copper Gasket				Wagner-Lockheed FC996 w/FC1242	
24	1	10511-031P 100-958	Check Valve				Bendix West. 227856	
25	3		Pipe Plug 1/2" NPT SCD 40					
26	1		Pipe Plug 1/4" NPT SCD 40					
27	1		Coupling 1/8" NPT SCD 40					
28	2		90° Plastic Tube Connector				Imperial 269P-1/4 X 1/8	
29	2		90° Plastic Tube Connector				Imperial 269P-1/4 X 1/4	
30	1	B-101-013	Tube Assy. - Linfor					
31	1	B-100-778	" " " "					
32	2	B-100-777	" " " "					
33	1	B-100-776	" " " "					
34	1	B-100-799	" " " "					
MODEL 220-RRC				TITLE				
ASSEMBLY DWG. D200-931				UPPER AIR SYSTEM ASSEMBLY				
WRITTEN BY PL				DATE Oct. 3, 1984				
				PETTIBONE LIMITED				
				SHEET 2 OF 4				
				GROUP NO. 200-931				

UPPER BRAKE TREADLE ASS'Y
100-807



BRAKE VALVE ASS'Y



AIR BRAKE TREADLE VALVE ASSEMBLYPETTIBONE 220 RRC CRANETREADLE & MOUNTING PLATE ASSEMBLY

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	226834	TREADLE ASSEMBLY	1
2	226835	TREADLE	1
3	236288	ROLLER	1
4	210492	COTTER PIN	1
5	238474	ROLLER PIN	1
6	235212	ROLL PIN	1
7	238888	FULCRUM PIN	1
8	236981	PLUNGER	1
9	236982	BOOT	1
10	236979	MOUNTING PLATE	1
11	202979	CAPSCREW	3
12	202982	LOCKWASHER	3
13	236980	STOP BUTTON	1

BRAKE VALVE ASSEMBLY

1	239476	RETAINING RING	1
2	235829	PISTON RETURN SPRING	1
3	239643	PISTON "O" RING	1
4	239668	RETAINER	1
5	277854	PISTON ASSEMBLY	1
6	279146	PISTON COMPLETE	1
7	243412	HEX WASHER HEAD SCREW	1
8	243011	PISTON	1
9	279713	WASHER	1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
10	243019	SPRING SEAT	1
11	241559	RUBBER SPRING	1
12	229502	INLET EXHAUST VALVE ASSEMBLY	1
13	240960	VALVE RETAINER	1
14	239627	VALVE SPRING	1
15	239979	INLET EXHAUST VALVE	1
16	239136	VALVE "O" RING	1
17	243709	EXHAUST CHECK VALVE SEAT	1
18	239645	EXHAUST CHECK VALVE "O" RING	1
19	239615	DIAPHRAGM	1
20	239708	DIAPHRAGM WASHER	1
21	242106	SCREW PAN HEAD	1
22	239737	INLET VALVE PRELOAD SPRING	1
23	239633	BODY	1

TREADLE AND MOUNTING PLATEPETTIBONE 220 RRC CRANEDISASSEMBLY:

TO REMOVE TREADLE ASSEMBLY (1) DISCONNECT ROLL PIN (6) AND REMOVE FULCRUM PIN (7) ALLOWING REMOVAL OF TREADLE ASSEMBLY (1). REMOVE COTTER PIN (4), ROLL PIN (5), AND ROLLER (3) FROM TREADLE. REMOVE BOOT (9) AND PLUNGER (8). REMOVE CAPSCREW (11) AND LOCKWASHERS (12) TO SEPARATE VALVE FROM MOUNTING PLATE (10). REMOVE STOP BUTTON (13) FROM MOUNTING PLATE.

CLEANING, INSPECTION AND REPAIR:

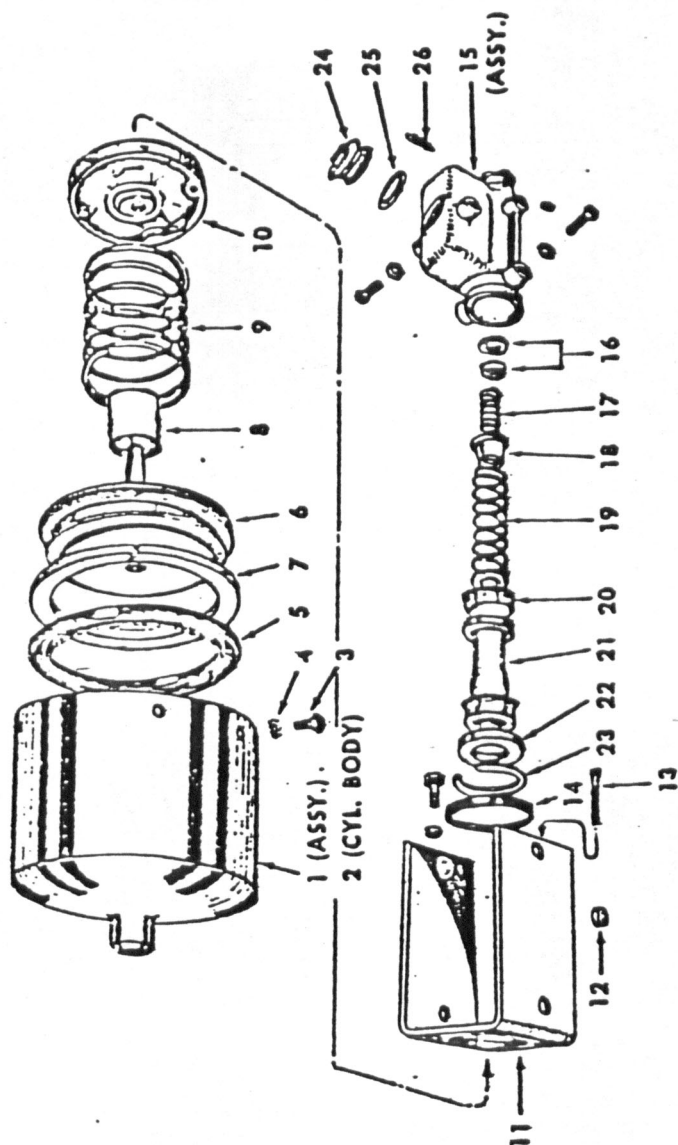
CLEAN ALL METAL PARTS WITH AND APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR WEAR AND DAMAGED PARTS AND REPLACE AS NEEDED.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

POWER CLUSTER



ASS'Y. NO. 100-808

POWER CLUSTERPETTIBONE 220 RRC CRANE

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	AE-836	AIR CYLINDER ASSEMBLY	1
2	AD-1513	AIR CYLINDER SHELL	1
3		CAPSCREW, 5/16"-18 NC x 5/8" LONG	8
4		LOCKWASHER, 5/16"	8
5	AD-1777	PISTON CUP	1
6	AG-2832	PISTON ROD	1
7	AC-2838	CYLINDER WIPER	1
8	AC-2034	PISTON ROD BOOT	1
9	AD-1920	PISTON RETURN SPRING	1
10	AC-2036	CYLINDER HEAD	1
11	AD-1514	MOUNTING BRACKET	1
12	AC-2191	MOUNTING SPACER	1
13	AC-2149	PISTON STROKE INDICATOR	1
14	AC-2196	CYLINDER SEALING RING	1
15	F-1701	HYDRAULIC CYLINDER ASSEMBLY	1
16	F-14902	CHECK VALVE	1
17	F-8789	VALVE RETAINER SPRING	1
18	F-8788	CHECK VALVE RETAINER	1
19	F-6431	PISTON RETAINER SPRING	1
20	F-951	PRIMARY CUP	1
21	F-6433	PISTON ASSEMBLY	1
22	F-6434	STOP PLATE	1
23	F-6435	LOCK RING	1

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
24	F-12103	FILLER CAP	1
25	F-12103	CAP GASKET	1
26	F-0858	BLEEDER SCREW	1
	AC-3077 SER	SERVICE KIT	

POWER CLUSTERPETTIBONE 220 RRC CRANEDISASSEMBLY:

REMOVAL OF CYLINDER MOUNTING SCREWS FROM MOUNTING BRACKET (11) WILL ALLOW REMOVAL OF HYDRAULIC CYLINDER ASSEMBLY (15). REMOVE AIR CYLINDER MOUNTING SCREWS AND REMOVE AIR CYLINDER.

REMOVE CYLINDER SEALING RING (14), LOCK RING (23), STOP PLATE (22), PISTON ASSEMBLY (21), PRIMARY CUP (20), PISTON RETAINING SPRING (19), CHECK RETAINER (18), VALVE RETAINER SPRING (17), AND CHECK VALVE (16). DISASSEMBLE FILLER CAP (24), FILLER CAP GASKET (25), AND BLEEDER SCREW (26).

REMOVE HEX HEAD CAPSCREW (13), LOCKWASHER (4), ALLOWING REMOVAL OF CYLINDER HEAD (10), PISTON RETURN SPRING (9), PISTON ROD BOLT (8), PISTON ROD (6), CYLINDER WIPER (7), AND PISTON CUP (5) FROM CYLINDER SHELL (2).

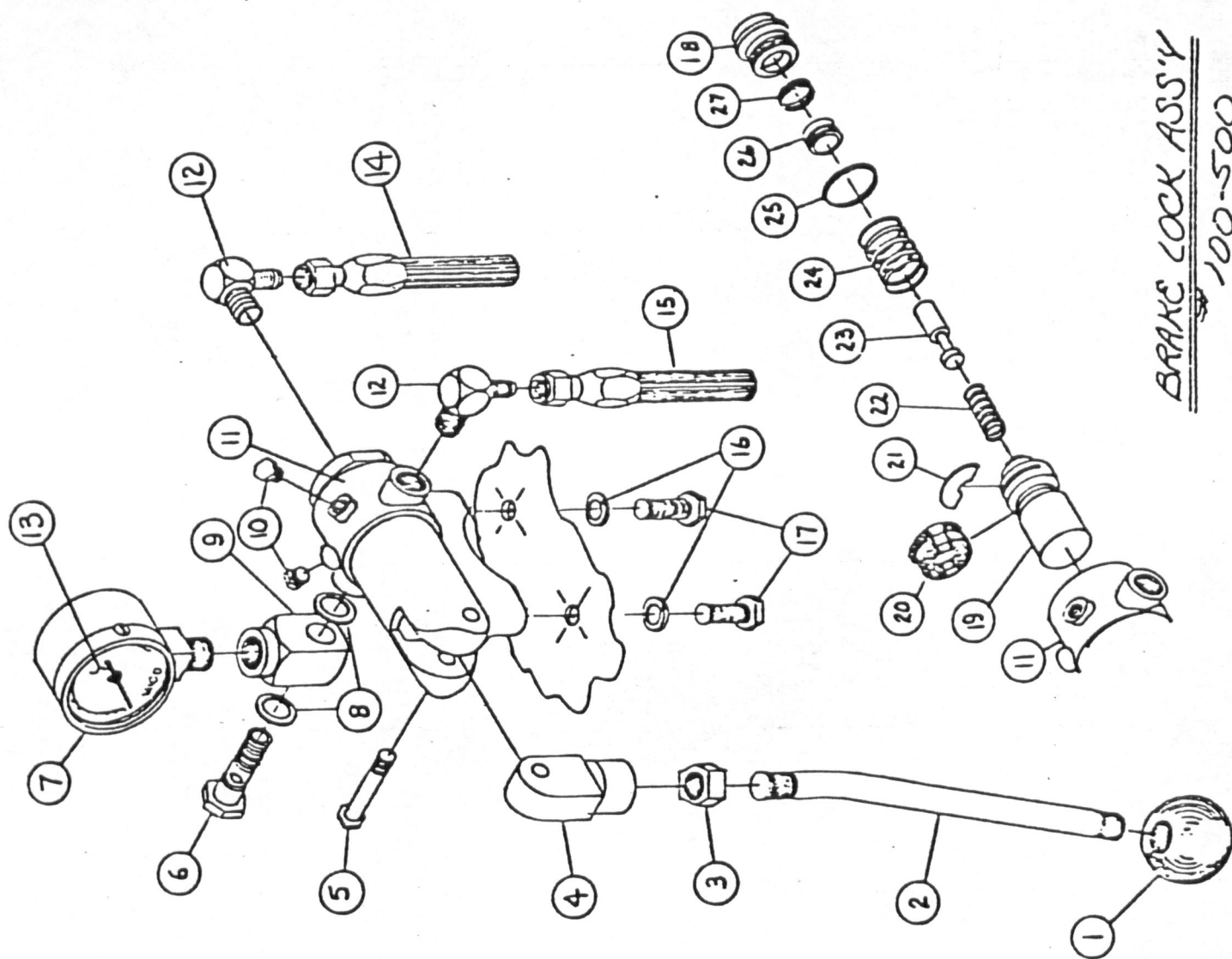
CLEANING, INSPECTION AND REPAIR:

CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR CRACKS, EXCESSIVE WEAR, AND SCORING AND REPLACE PARTS WITH SERVICE KIT.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



BRAKE LOCK ASS'Y
100-500

BRAKE LOCK ASSEMBLY

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
1	6751	GRIP BALL	1
2	7344	HANDLE	1
3	6753	NUT	1
4	7343	CAM	1
5	6755	PIN	1
6	6756	BOLT	1
7	6757	GAUGE	1
8	6758	GASKET	2
9	6759	FITTING	1
10	6760	BLEEDER SCREW	2
11	6761	CYLINDER	1
12		ELBOW 2024-2-4	2
13	AG-20	GLASS	1
14		1503-4 HOSE ASSEMBLY 142" LG	1
15		1503-4 HOSE ASSEMBLY 62" LG	1
16	*	5/16 LOCKWASHER	2
17	*	5/16 x 1" NC CAPSCREW	2
18	6765	CYLINDER HEAD	1
19	*	PISTON	1
20	*	CUP	1
21	6762	LOCK	1
22	*	SPRING	1
23	6763	STEM	1
24	*	SPRING	1
25	*	"O" RING SEAL	1

BRAYE LOCK ASSEMBLY (CONTINUED)

2 3B-125

<u>ITEM</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
26	6764	RETAINER	1
27	*	VALVE SEAT	1

* THESE PARTS ARE INCLUDED IN SERVICE KIT NO. 6766

BRAKE LOCK ASSEMBLYPETTIBONE 220 RRC CRANEDISASSEMBLY:

FOLLOWING REMOVAL OF HOSE ASSEMBLIES (14) AND (15), CAPSCREWS (17) FROM BRAKE LOCK, DISASSEMBLY CAN BE DONE AS FOLLOWS:

REMOVE GRIP BALL (1), HANDLE (2), NUT (3), PIN (5), AND CAM (4) FROM CYLINDER. REMOVE GAUGE (7) FROM FITTING (9), BOLT (6), GASKETS (8), AND FITTING (9). REMOVE BLEEDER SCREWS (10), AND ELBOWS (12) FROM CYLINDER (11).

REMOVE CYLINDER HEAD (18) ALLOWING REMOVAL OF VALVE SEAT (27), RETAINER (26), "O" RING SEAL (25), SPRING (24), SHIM (23), SPRING (22), AND PISTON (19). REMOVE LOCK (21), AND CUP (20) FROM PISTON.

CLEANING, INSPECTION AND REPAIR:

CLEAN ALL METAL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR.

INSPECT ALL PARTS FOR CRACKS, DISTORTION, DAMAGED THREADS, SCORING, AND SIGNS OF WEAR.

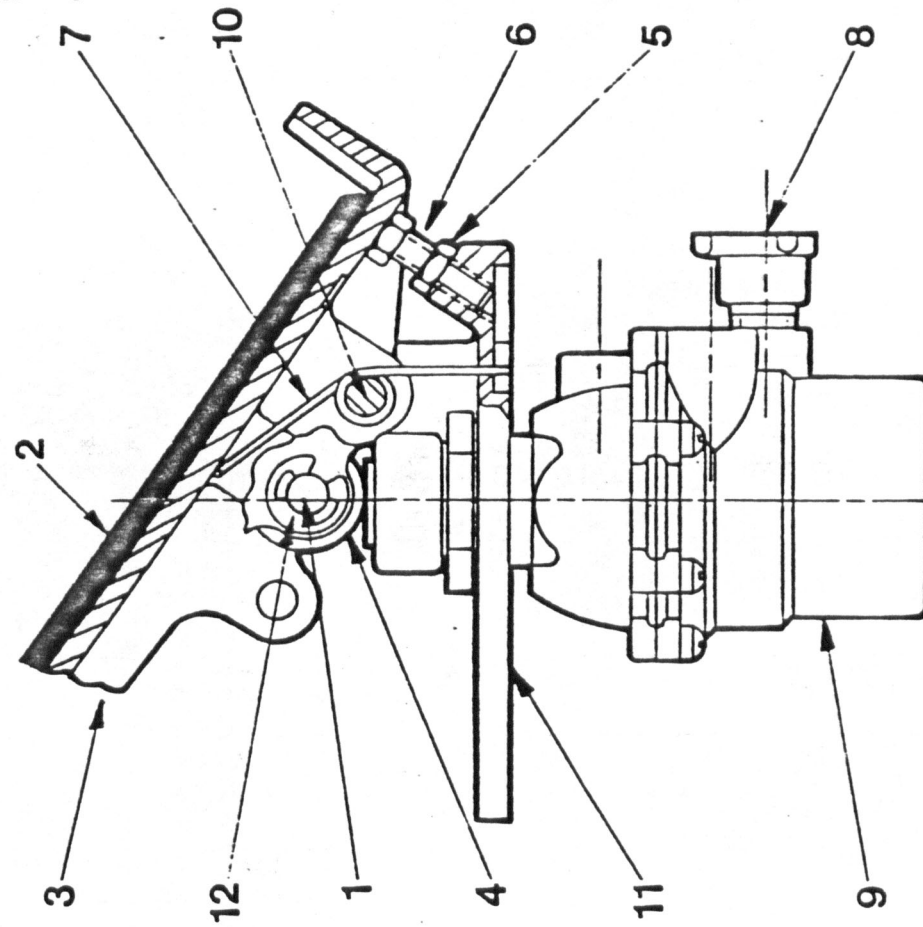
REPLACE WORN PARTS WITH REPAIR KIT #101-129.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

UPPER TREADLE VALVE PEDAL ASSY

100-537



ITEM	DESCRIPTION	QUAN
1	PIN	1
2	TREADLE COVER #D3670	1
3	TREADLE	1
4	ROLLER	1
5	JAM NUT	1
6	SCREW	1
7	SPRING	1
8	EXHAUST BREATHER	1
9	CONT. VALVE #WM90D	1
10	TREADLE PIN	1
11	MOUNTING PLATE	1
12	RETAINING RING	4
	REPAIR KIT #114378	1

UPPER THROTTLE TREADLE VALVE PEDAL ASSEMBLY

100-537

PETTIBONE 220 RRC CRANE

REMOVAL:

DISCONNECT AND CAP OFF ALL EXISTING AIR LINES. PLUG PORTS IN VALVE.
REMOVE THE THREE MOUNTING BOLTS AND REMOVE AIR THROTTLE PEDAL.

DISASSEMBLY:

REMOVE RETAINING RINGS (12), TREADLE PIN (10), SPRING (7), AND TREADLE PEDAL (3). REMOVE RETAINING RINGS (12), PUSH ROD PIN (1), AND ROLLER (4) FROM PEDAL. TREADLE COVER (2) MAY ALSO BE REMOVED IF REPLACEMENT IS NECESSARY. VALVE ASSEMBLY (9) CAN BE REMOVED FROM THE MOUNTING PLATE (11) BY UNSCREWING THE NUT ON TOP OF THE PLATE WHICH IS UNDER A RUBBER DUST BOOT. SEE SEPARATE INSTRUCTIONS FOR VALVE (9) BREAKDOWN.

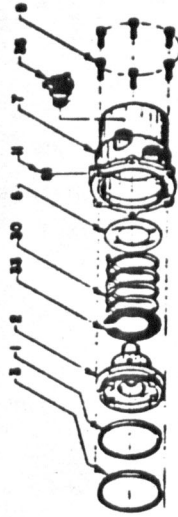
CLEANING, INSPECTION AND REPAIR:

CLEAN ALL PARTS WITH A SUITABLE SOLVENT AND DRY WITH COMPRESSED AIR. PLACE A LIGHT COAT OIL ON MOVING PARTS. REPLACE ANY PARTS WHICH APPEAR TO BE DAMAGE OR WORN.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.

WM90D
UPPER THROTTLE CONTROL VALVE
 (ITEM 9 FROM PREVIOUS PAGE)



ITEM NO.	DESCRIPTION	QTY.	WM 90 D [111300]
1	THRUST RING	1	101369
2	BALANCE PISTON	1	106190
3	NUT	1	101114
4	SHIM	1	101371
5	ROD GUIDE	1	105332
6	OUTLET BODY	1	100055
7	DUST BOOT	1	103039
8	SCREW	1	114721
9	PLUG	4	114721
10	U-CUP	1	115182
11	SEAL WASHER	1	116335
12	BARRIER PLATE ASSY.	4	116488
13	O RING	1	101365
14	O RING	1	116318
15	BALANCE SPRING	1	116342
16	INLET BODY	1	101367
17	PUSH ROD	1	103221
18	SPRING BOOSTER	1	103112
19	SCREEN	1	116456

UPPER THROTTLE CONTROL VALVE ASSEMBLY

PETTIBONE 220 RRC CRANE

DISASSEMBLY:

BY REMOVING SCREWS (9), THIS WILL ALLOW DISASSEMBLY OF OUTLET BODY (7), SHIM (5), BALANCE SPRING (30), SPRING BOOSTER (33), BALANCE PISTON (2), AND THRUST RING (1). REMOVE PLUG (11) AND BREATHER (35) FROM OUTLET BODY.

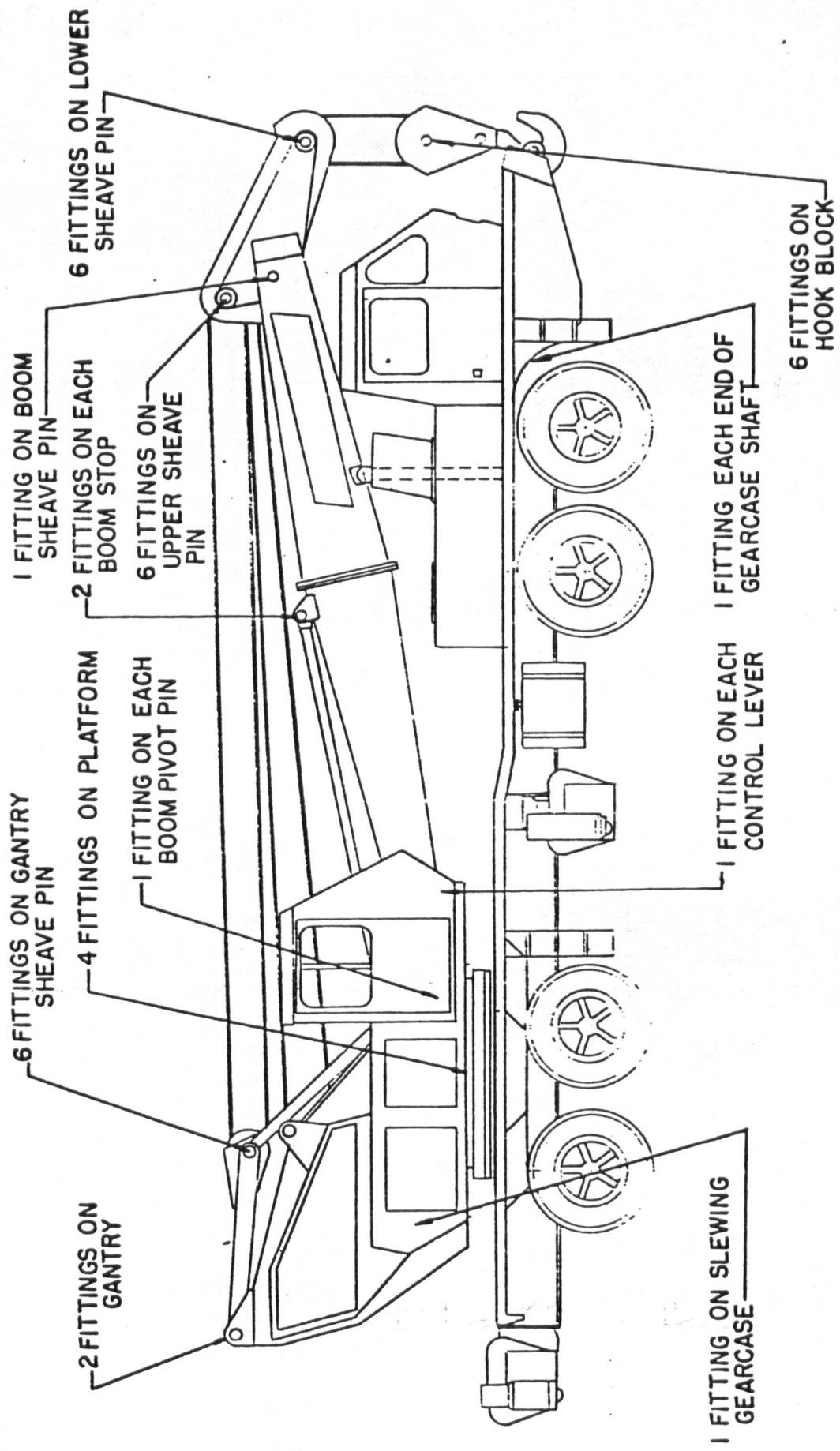
REMOVE INLET BODY (31), O RINGS (28) AND (27) AND SCREEN (34). REMOVAL OF SCREWS (10) ALLOWS DISASSEMBLY OF ROD GUIDE (6) AND PUSH ROD (32).

CLEANING, INSPECTION AND REPAIR:

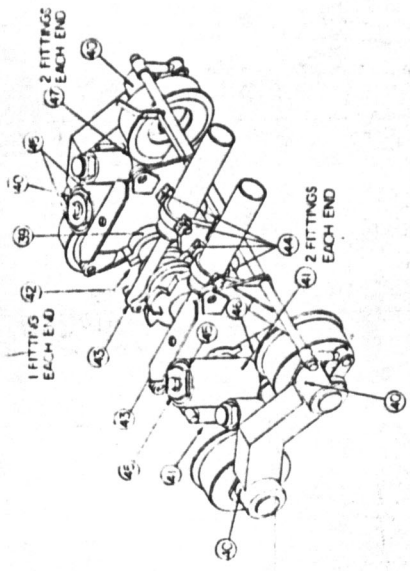
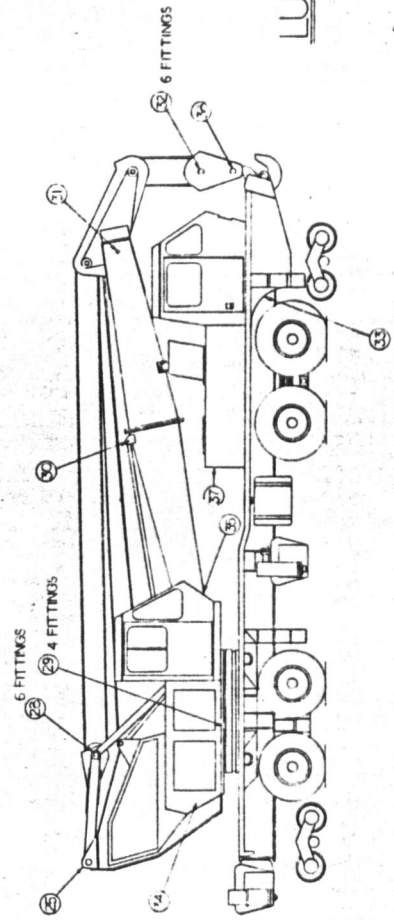
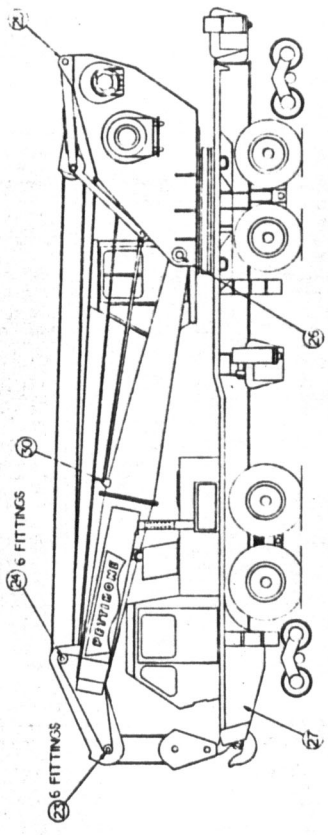
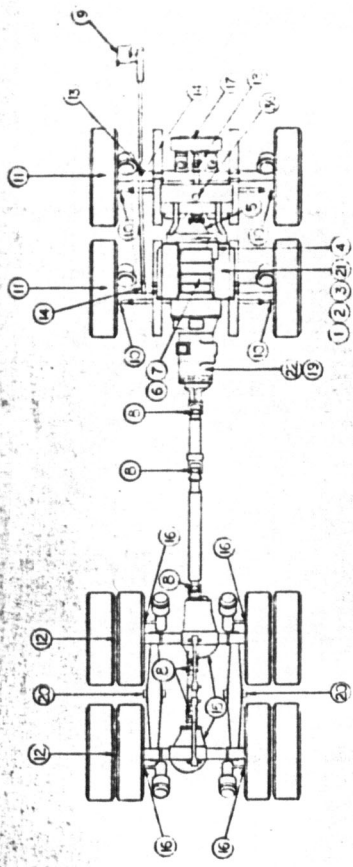
CLEAN ALL PARTS WITH AN APPROVED SOLVENT AND DRY WITH COMPRESSED AIR. INSPECT ALL PARTS FOR EXCESSIVE WEAR, CRACKS, AND DAMAGE. REPLACE WORN PARTS. APPLY A LIGHT COAT OF OIL TO MOVING PARTS.

ASSEMBLY:

ASSEMBLE IN REVERSE ORDER OF DISASSEMBLY.



220 RRC LUBRICATION



LUBRICATION SCHEDULE

NISC		NATIONAL IRON COMPANY	220 REC	LUBRICATION SCHEDULE	D-220-439
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84
85	86	87	88	89	90
91	92	93	94	95	96
97	98	99	100		

ITEM	PART NO.	QTY	DESCRIPTION
1	5-500-051	5	BLK-WHITE
2	5-500-051	4	WHITE
3	5-500-025	4	CLOR-WHTE
4	5-500-051	2	BLK-YELLOW
5	5-500-051	2	BLK-YELLOW
6	5-500-051	2	BLK-YELLOW
7	5-500-051	2	BLK-YELLOW
8	5-500-051	2	BLK-YELLOW
9	5-500-051	2	BLK-YELLOW
10	5-500-051	2	BLK-YELLOW
11	5-500-051	2	BLK-YELLOW
12	5-500-051	2	BLK-YELLOW
13	5-500-051	2	BLK-YELLOW
14	5-500-051	2	BLK-YELLOW
15	5-500-051	2	BLK-YELLOW
16	5-500-051	2	BLK-YELLOW
17	5-500-051	2	BLK-YELLOW
18	5-500-051	2	BLK-YELLOW
19	5-500-051	2	BLK-YELLOW
20	5-500-051	2	BLK-YELLOW
21	5-500-051	2	BLK-YELLOW
22	5-500-051	2	BLK-YELLOW
23	5-500-051	2	BLK-YELLOW
24	5-500-051	2	BLK-YELLOW
25	5-500-051	2	BLK-YELLOW
26	5-500-051	2	BLK-YELLOW
27	5-500-051	2	BLK-YELLOW
28	5-500-051	2	BLK-YELLOW
29	5-500-051	2	BLK-YELLOW
30	5-500-051	2	BLK-YELLOW
31	5-500-051	2	BLK-YELLOW
32	5-500-051	2	BLK-YELLOW
33	5-500-051	2	BLK-YELLOW
34	5-500-051	2	BLK-YELLOW
35	5-500-051	2	BLK-YELLOW
36	5-500-051	2	BLK-YELLOW
37	5-500-051	2	BLK-YELLOW
38	5-500-051	2	BLK-YELLOW
39	5-500-051	2	BLK-YELLOW
40	5-500-051	2	BLK-YELLOW
41	5-500-051	2	BLK-YELLOW
42	5-500-051	2	BLK-YELLOW
43	5-500-051	2	BLK-YELLOW
44	5-500-051	2	BLK-YELLOW
45	5-500-051	2	BLK-YELLOW
46	5-500-051	2	BLK-YELLOW
47	5-500-051	2	BLK-YELLOW
48	5-500-051	2	BLK-YELLOW
49	5-500-051	2	BLK-YELLOW
50	5-500-051	2	BLK-YELLOW

NATIONAL IRON COMPANY

DECAL LOCATIONS

Product

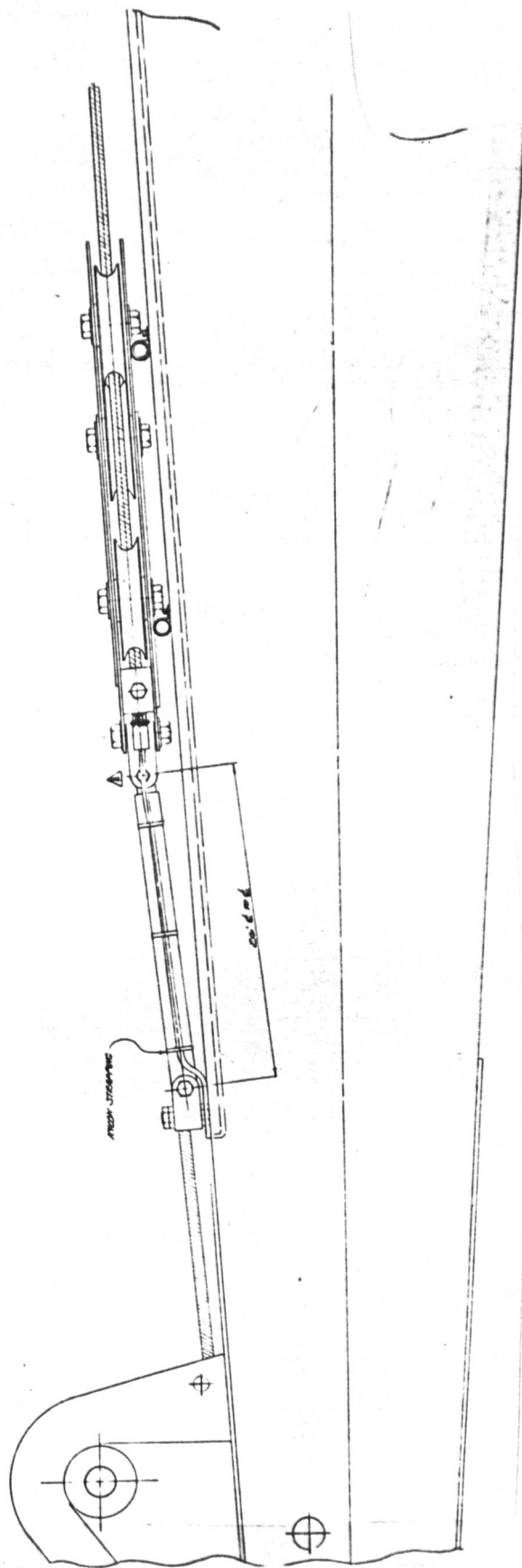
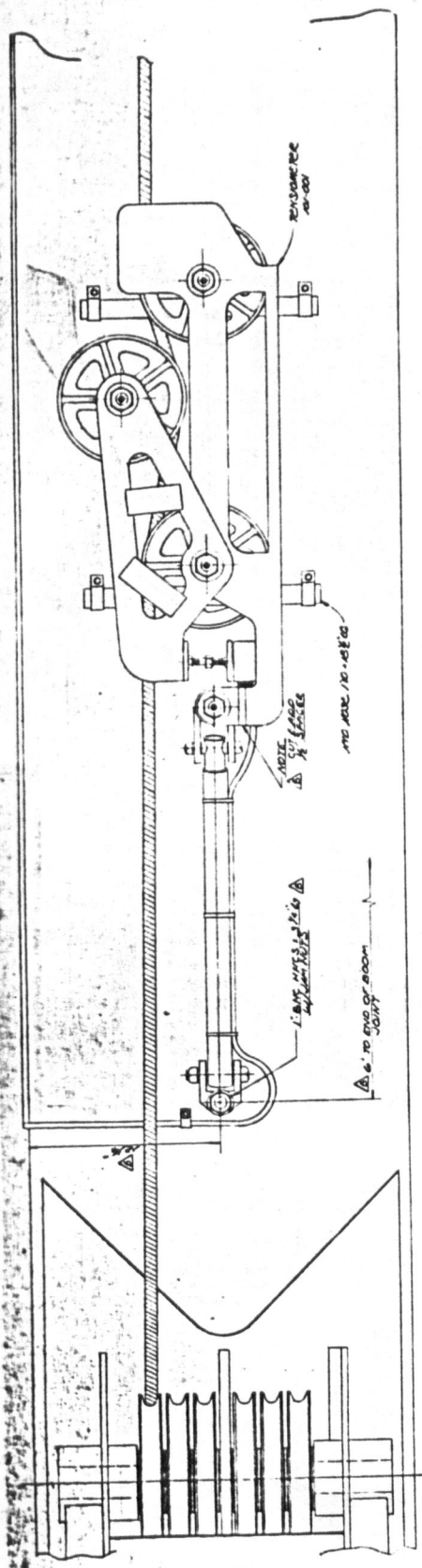
3B-135

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO. 202-629	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	5	D500-051	Decal				
2	4	D500-157	"				
3	4	C500-028	"				
4	2	C201-575	"				
5	2	A500-262	"				
6	2	A500-261	"				
7	2	A500-265	"				
8	1	A500-264	"				
9	4	A500-275	"				
10	4	A500-271	"				
11	2	A500-267	"				
12	1	A500-270	"				
13	2	A500-025	"				
14	1	A500-273	"				
15	1	101-067	"				
16	1	A500-089-2	"				
17	1	A500-089-1	"				
MODEL 220-RRC				TITLE			
ASSEMBLY DWG. D201-577				DECALS			
WRITTEN BY PL				DATE			
				Oct. 4, 1984			
				PETTIBONE LIMITED			
				SHEET 1 OF 3			
				GROUP NO. 202-629			

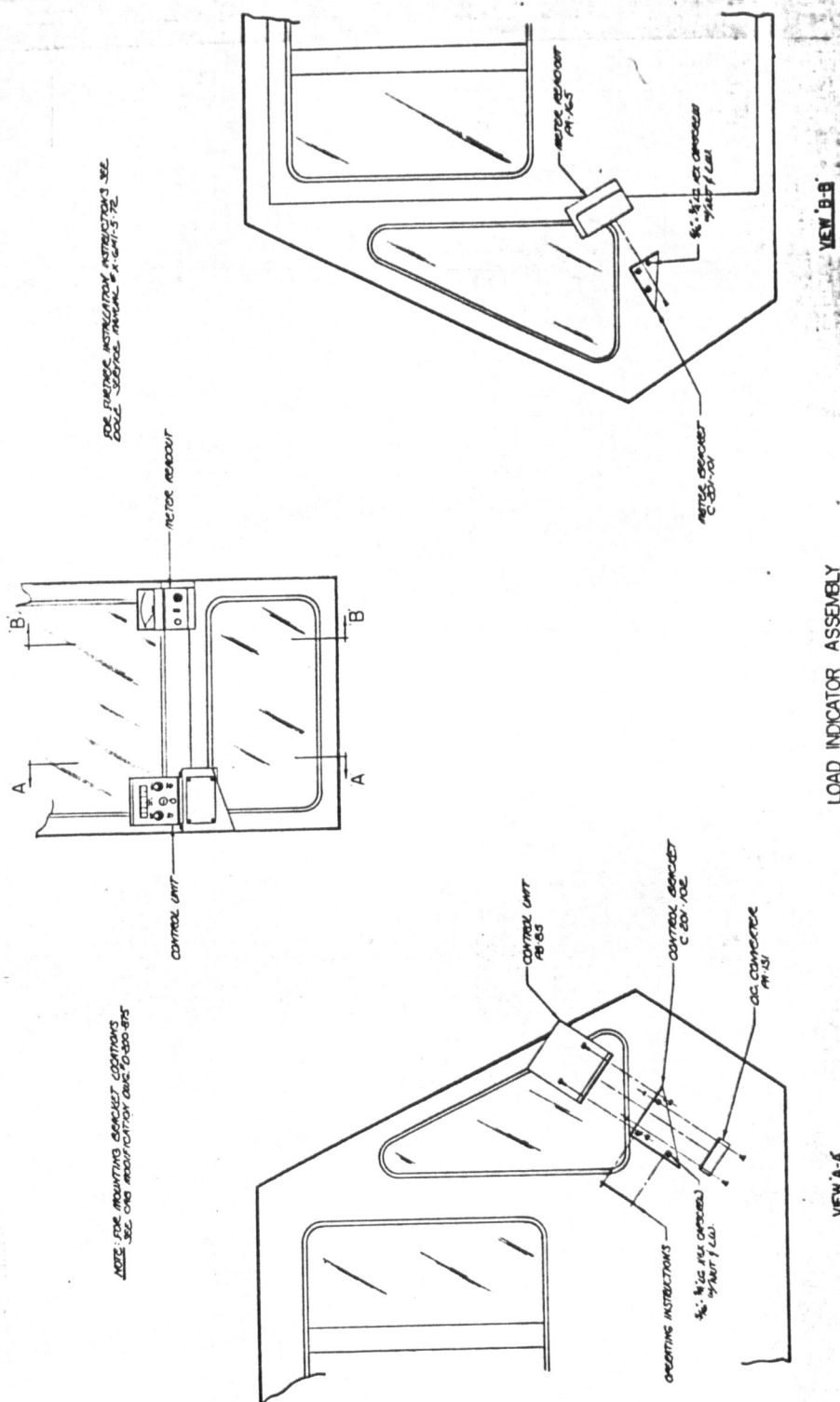
3B-136

ENGINEERING BILL OF MATERIAL				ISSUE NO.			GROUP NO.	
							202-629	
ITEM	REQ'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER	
18 2		B500-091	Decal					
19 1		A500-019	"					
20 1		A500-191	"					
21 1		A500-192	"					
22 1		A500-092	"					
23 1		A500-283	"					
24 1		A500-193	"					
25 1		A500-110	"					
26 1		A500-012	"					
27 1		A500-011	"					
28 2		A500-032	"					
29 1		B500-203	"					
30 2		30434-127	"					
31 1		B500-151	"					
32 1		500-153	"					
33 1		A500-004	"					
34 1		A500-088	"					
MODEL 220-RRC							PETTIBONE	
ASSEMBLY DWG. D201-577							PETTIBONE	
DATE							SHEET 2 OF 3	
DATE							GROUP NO. 202-629	
TITLE							PETTIBONE	
DECALS							PETTIBONE	
							LIMITED	

ENGINEERING BILL OF MATERIAL				ISSUE NO.		GROUP NO.	
ITEM	REC'D	PART NO.	DESCRIPTION	MAT'L	LOC	C/N	SUPPLIER
1	1	D201-635	Tensionometer & Mtg. Ass'y				301-168A
	1	Nico 101-001	Electronic Load Indic. System "Dole Corp" P.A. 181-4				
	2	-	Hydr. Hose 1" I.D. x 181" long				
	4	Aero 900729-27	Support Clamp				
	8	Aero 900729-1	" "				
	1	C201-101	Mounting Brkt. For Dole PA-165 Meter Readout				
	1	C201-102	" " For PB-85 Contr. & PA-131 Converter				
2	1	B202-309	Anti-Two Block Device Installation				
	1	101-562	" " " W. Counterweight				
			"Krueger" #6000002				
3	1	C201-817	Rear Mounted Spare Tire Rack				
4	1	C202-157	Side Mounted Spare Tire Rack				
5	1	B201-816A	Rotating Light Mta. Brkt.				
MODEL 220-RRC				TITLE			
ASSEMBLY DWG.				OPTIONAL EQUIPMENT			
WRITTEN BY P.L.				DATE Oct. 26, 84			
PETTIBONE LIMITED				SHEET 1 OF 1			
GROUP NO. 201-168A				GROUP NO. 201-168A			



LOAD INDICATOR SYSTEM
101-001



LOAD INDICATOR ASSEMBLY

0-201-635

21336

VIEW 'A-A'

NEW

