

SECTION 1

INSTRUCTION MANUAL

FOR

DECK CRANE

ON

CCGS PIERRE RADISSON

HULL NO. 221

BURRARD DRY DOCK COMPANY LIMITED

PURCHASE ORDER NO. 221-190-19

JOHN T. HEPBURN, LIMITED SALES ORDER

DECK CRANE

75-M-0525

JOHN T. HEPBURN, LIMITED
914 DUPONT STREET
TORONTO
ONTARIO M6H 1Z2

CRANE SERIAL NUMBERS

C-10075

C-10076

C-10077

C-10078

Please make reference to the above numbers in all correspondence and when ordering spare parts.

Operating Instruction 0.1.526

CCGS PIERRE RADISSONDECK CRANESI N D E X

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.0LIST OF REFERENCE DRAWINGS (FIGURES)

<u>FIGURE NO</u>	<u>DRAWING NO</u>	<u>REVISION NO</u>	<u>DRAWING TITLE</u>
1-1	45411-0-A1	1	Installation Layout of 5/8 Ton Deck Crane
1-2	45318-0-A1	6	5/8 Ton Deck Crane - Super-Structure & Base Assembly
1-3	45319-0-A1	3	5/8 Ton Deck Crane - Boom Assembly
1-4	45908-0-A1	1	Hydraulic Schematic Diagram
1-5	60020-A2 Sheet 1 of 3	0	Electrical Schematic Diagram
1-6	S0020-A2 Sheet 2 of 3	0	Electrical Cabling Layout
1-7	60020-A2 Sheet 3 of 3	0	Electrical Connection Wiring Diagram
1-8	60050-D	-	Crane Cab Heating & Ventilating Unit
1-9	45405-0-A1	5	Slewing Drive Assembly
1-10	45555-0-A1	8	Hoist Drum Assembly
1-11	45559-0-A1	1	Slack Rope Limit Switch Assembly
1-12	45633-0-A1	0	Hook Height Limit Switch
1-13	46044-0-A1	5	Hydraulic Power Unit
1-14	46057-0-A1 Sheet 1 of 2	5	Arrangement of Luffing and Articulating Cylinders
1-15	46057-0-A1 Sheet 2 of 2	3	Arrangement of Luffing and Articulating Cylinders

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.0LIST OF REFERENCE DRAWINGS (FIGURES)

<u>FIGURE NO</u>	<u>DRAWING NO</u>	<u>REVISION NO</u>	<u>DRAWING TITLE</u>
1-16	46063-0-A1	2	Slew Motor Piping Arrangement
1-17	46065-0-A1	2	Luffing Cylinder Piping
1-18	46181-0-A1	3	Articulating Cylinder Piping
1-19	47814-0-A3	0	Hose Assemblies
1-20	45414-0-A1	2	Base
1-21	46184-0-A3	0	Slew Drive Limit Switch Assembly

CCGS PIERRE RADISSONDECK CRANESSECTION 1.1RATING

RATED LIFTING CAPACITY	8 LONG TONS
MAXIMUM RADIUS AT RATED LIFTING CAPACITY	24'-0"
MAXIMUM OPERATING RADIUS	32'-0"
LIFTING CAPACITY AT MAXIMUM OPERATING RADIUS	5 LONG TONS
MINIMUM OPERATING RADIUS	14'-3"
DEAD WEIGHT OF CRANE	35,500 LB.
MAXIMUM HOISTING SPEED AT RATED LOAD	60 F.P.M.
MAXIMUM HOISTING SPEED AT LIGHT LOAD	120 F.P.M.
MAXIMUM SLEWING SPEED	1.8 R.P.M.
MAXIMUM LIST OF DECK WHILST SLEWING	7°
MAXIMUM AVERAGE LUFF-IN SPEED	10 F.P.M.
MAXIMUM AVERAGE LUFF-OUT SPEED	20 F.P.M.
ELECTRIC MOTOR	45 HP @ 1200 R.P.M.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.2DESCRIPTION

- 1.2.1 The HEPBURN deck crane is pedestal mounted and has an articulated boom, as illustrated on Figure 1-1 and 1-2.
- 1.2.2 Power to all motions of the crane is provided by a 45 H.P. electric motor, driving hydraulic arrangements. A detailed description of the hydraulic circuit is given in Section 1.3.
- 1.2.3 The electric motor starter is remote mounted and supplied by others.
- 1.2.4 The hoisting winch, mounted in the machinery compartment, incorporates a single grooved hoist drum with the hoist rope stowed in a single layer without overwind, ensuring long rope life.
- 1.2.5 The hoist drum is directly driven by a hydraulic motor which incorporates a spring applied brake, as illustrated on Figure 1-10.
- 1.2.6 The slewing motion of the crane is effected through a crossed collar slewing ring, with internal gear teeth machined in the inner race. The slewing drive pinion is supported by anti-friction bearings and is directly driven by the hydraulic motor. The slewing drive brake is incorporated in the hydraulic motor.
- The slewing drive assembly is illustrated in Figure 1-9.

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1.2.7 The following assemblies are also located in the machinery compartment:-

Hydraulic Power Unit, Figure 1-13

Hook Height Limit Switch Assembly, Figure 1-11

Slack Rope Limit Switch Assembly, Figure 1-11

Slew Control Hydraulic Components, Figure 1-16

1.2.8 The crane boom, Figure 1-3, is luffed by two (2) hydraulic cylinders and articulated by one (1) hydraulic cylinder.

The cylinders, Figures 1-14 and 1-15, incorporate flange mounted holding valves, ensuring that the booms will not drop in the event of hydraulic hose or tubing failure.

Interconnecting piping and hoses for the Luffing Cylinders are illustrated and described in Figure 1-17 and for the Articulating Cylinder in Figure 1-18.

Specifications for all hydraulic power unit hoses are detailed in Figure 1-19.

1.2.9 All controls for the crane are located in the cab, which is furnished with an operator's seat and space heating/ventilation unit. Access to the crane cab is through a water-tight door, as illustrated in Figure 1-1.

The space heating/ventilation unit is illustrated in Figure 1-8.

CCGS PIERRE RADISSONDECK CRANESSECTION 1.3HYDRAULIC SYSTEM AND CONTROLS

- 1.3.1 The hydraulic circuit and itemized hydraulic components are detailed in Figure 1.4
- 1.3.2 The hydraulic system is open loop, closed centre arrangement with load sensing control of the pressure compensated pump.
- 1.3.3 Supercharging of the main pump is effected by an independent gear pump driven by one of the two extension shafts of the electric motor.
- 1.3.4 The hydraulic oil reservoir is provided with two (2) thermostatically controlled 2 KW heaters. Should the hydraulic oil temperature be less than 10°C , the hydraulic power unit electric motor will not start.
- 1.3.5 When the electric motor is started, the excess flow from the supercharging pump is directed through the hoist and slewing motor casings to minimize differential temperatures in their components when the crane is being operated in a sub-zero environment.

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- 1.3.6 Solenoid Valve, Figure 1-4, Item 8, activates the load sensing system. This valve is energized when:-
- (a) the crane is within its pre-determined arc of slewing (Slew limit switch, Figure 1-2, Item 26, normally closed).
 - (b) the hoist hook block is within pre-determined minimum and maximum height limits (Hook height limit switch, Figure 1-12, normally closed).
 - (c) the hoist slack rope limit switch is actuated, indicating that slack line at the hoist drum is not present (Slack limit switch, Figure 1-11, normally open).
- 1.3.7 Should any of the conditions described in Para. 1.3.6 not be satisfied, the pump compensation will be automatically vented; the pump pressure will be reduced to minimum setting and operation of all motions of the crane will be prevented.
- 1.3.8 To restore normal operation of the crane, the limit switch override push button, (refer to Figure 1-7), must be depressed and the appropriate crane motion which caused the fail-safe condition must be operated in the opposite direction until the limit switch circuits are restored.
- 1.3.9 High speed hoisting and lowering motions are provided by depressing a foot switch in the operator's cab which energises Solenoid Valve, Figure 1-4, Item 7.

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1.3.10 All motions of the crane are controlled by a 4-speed control valve mounted in the operator's cab. Shuttle valves, Figure 1-4, Item 10, are provided to connect the main pump pressure compensator vent port to the control valve outlet port, which is subjected to the highest pressure at any given time. This arrangement ensures that pressure at the pump outlet port is matched to the load requirement thereby minimizing pressure drop through the control valve and consequently power loss in the system.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.4ELECTRICAL CONTROLS

- 1.4.1 The Hydraulic pump is driven by a 45 H.P. squirrel cage motor, power to which is turned on and off, via a slip-ring assembly, by a reduced voltage starter, supplied by the shipyard.
- 1.4.2 An AC ammeter, located in the control station, is incorporated in the motor circuit to sense the current drawn by the motor.
- 1.4.3 When the pump motor is switched on, a light on the control station is illuminated, indicating that power is on.
- 1.4.4 A 30 KVA transformer provides the 115-volt and 230-volt supplies for all the controls, lighting, heating, receptacles, solenoid valves and other auxiliary circuits.
- 1.4.5 A separate 750 KVA transformer provides power to the cab heating controls.
- 1.4.6 A 16-circuit panel board located in the crane cab provides over-circuit protection for the individual devices mentioned in Para. 1.4.4 above.
- 1.4.7 The heating control circuits are protected by two (2) 20 amp. fuses. The entire heating and lighting circuit is protected by two (2) 100 amp fuses located in the disconnect switch ADS.

NOTE: Only two outers of the transformer 'TRF' secondary are fused. The neutral is neither fused nor grounded.

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- 1.4.8 Selector switches are supplied for the cab fan and heater controls. The low-speed fan setting is for air circulation only. When heating is required, select "HIGH" on "FAN CONTROL" selector switch and the desired heating magnitude can be selected on the "HEATER CONTROL" selector switch.
- 1.4.9 The operator's cab is equipped with two (2) separately speed-controlled window wipers.
- 1.4.10 All electrical components of the crane are described on the following pages of Unit Parts List 8804-A-4 through 8804-D-4.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.5OPERATING INSTRUCTIONS

- 1.5.1 Start the electric motor and allow it to run for 5 minutes.

NOTE: The motor will not start if the hydraulic oil temperature is 10⁰ C or less.

- 1.5.2 All crane movements are operated by the control valve located on the operators right hand side of the cab.

NOTE: Should it not be possible to raise the crane boom from the stowage cradle, the probable cause is that the slack rope limit switch is energised due to the hook block resting on the deck. Depress the limit switch over-ride button and luff the crane boom until the weight of the hook block is supported by the hoist rope. Releasing the limit switch over-ride button should now permit the crane to function in all motions.

- 1.5.3 Two (2) foot switches are located on the floor of the operator's cab.

- 1.5.4 The foot switch nearer the operator activates the alarm bell.

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1.5.5 The second foot switch, when depressed, provides high speed raising and lowering of the crane hook block.

NOTE: THE HOIST OPERATING CONTROL VALVE LEVER MUST BE IN THE CENTRE (NEUTRAL) POSITION BEFORE EITHER DEPRESSING THE FOOT SWITCH OR ALLOWING IT TO RESET.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.6INSTALLATION INSTRUCTIONS AND START-UP PROCEDURES

- 1.6.1 The cranes are to be installed in the appropriate locations, on reinforced seatings to the approval of the Classification Society.
- 1.6.2 Locate the crane base, Figure 1-2, Item 1 and Figure 1-20; trim the bottom edge of the base to ensure the crane mounting surface is horizontal; weld in place.
- 1.6.3 Lubricate the slewing gear, Figure 1-2, Item 2 and pinion, Figure 1-9, Item 6.
- 1.6.4 Mount the crane superstructure on the crane base and bolt together, using the 36 cap screws and plain washers, Figure 1-2, Item 4. The tightening torque on the cap screw is to be 784 lb/ft nominal.
- 1.6.5 Install the boom and boom extension, Figure 1-3, Items 1 & 2, complete with the hydraulic luffing and articulating cylinders, Figure 1-3, Item 14 and 15.

NOTE: Do not install the hoist rope and hook block at this step.

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- 1.6.6 Connect the four hydraulic hoses, Figure 1-17, Items 8 and 16 to the luffing cylinders.
- 1.6.7 Connect the pressure gauge hose, Figure 1-17, Item 20 to the luffing cylinder
- 1.6.8 Connect the hoses, Figure 1-18, Item 2 from the crane superstructure to the boom.
- 1.6.9 Connect the hoses, Figure 1-18, Item 3 from the boom to the articulating cylinder.
- 1.6.10 Install in place the slew limit switch, Figure 1-2, Item 26 and Figure 1-21.
- 1.6.11 Install the collector ring support, Figure 1-2, Item 39.
- 1.6.12 Install the collector ring assembly, Figure 1-2, Item 27.
- 1.6.13 Make electrical connections to the slip ring brush assemblies, Figure 1-6.
- 1.6.14 Complete the external electrical connections to the slip ring collector rings, Figure 1-5.
- 1.6.15 Activate the slack rope limit switch, Figure 1-11, Item 14, by tying back the limit switch roller, Figure 1-11, Item 4
- 1.6.16 Remove the roller chain, Figure 1-12, Item 16, between the hoist drum and the hook height limit switch assembly.

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- 1.6.17 Fill the hydraulic power unit reservoir, Figure 1-13, Item 17, with the specified grade of hydraulic fluid to the level indicated on the level gauge, Figure 1-13, Item 23.
- 1.6.18 Check the rotation of the electric motor, Figure 1-13, Item 3, as indicated by the arrow on the main pump casing, Figure 1-13, Item 10.
- 1.6.19 Start the electric motor and allow to run for 10 minutes to permit circulation of the hydraulic fluid.
- 1.6.20 Operate the hoist drum in each direction (hoisting and lowering modes) for 5 minutes.
- 1.6.21 Operate the luffing motion of the crane boom through the full cylinder stroke until all air is purged from the luffing cylinders.
- 1.6.22 Operate the articulating motion of the boom extension through the full cylinder stroke until all air is purged from the articulating cylinder.
- 1.6.23 With the crane boom fully raised, operate the slewing motion through the approximate normal arc of operation until all air is purged from the circuit.
- 1.6.24 Install the hoist rope, Figure 1-2, Item 23 on the hoist drum, Figure 1-10, Item 1 clamping the bitter end of the rope to the hoist drum with the three (3) rope clamps, Figure 1-10, Item 7. Reeve the rope through the sheaves, Figure 1-3, Items 7, 23 and 31, and the hook block, Figure 1-3, Item 33 and secure the socketed end of the rope to the articulating boom.

1.6.25 Remove the tie from the slack rope limit switch roller.

(See para. 1.6.15)

1.6.26 Raise and lower the hook block through its full range of travel.

1.6.27 Synchronize the hook height limit switch assembly, Figure 1-12, with the winch drum.

1.6.28 Replace the hook height limit switch roller chain, Figure 1-12, Item 16.

1.6.29 Make final adjustment to hook height limit switch adjusting screws, Figure 1-12, Item 13.

NOTE: With the hoist hook in its lowest operating position from the maximum operating height of 46'-6", three (3) complete laps of wire rope must remain on the drum, measured from the point of tangency to the first rope clamp.

1.6.30 Replace the cartridges in filters, Figure 1-13, Items 15 and 27.

1.6.31 Elevate the crane boom to a position with the boom extension in a horizontal position, as illustrated on Figure 1-1.

1.6.32 Attach an 8-long ton load to the hoist hook.

1.6.33 Hoist the load 2'-0" above deck level.

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1.6.34 On the face of the pressure gauge, Figure 1-17, Item 24, paint a red line corresponding to the position of the pressure gauge needle with the load suspended from the hook. This procedure establishes the maximum radius at which the rated capacity (8 long tons) of the crane can be handled and providing the pressure gauge needle does not pass beyond the marked red line, any load/radius combination less than 8-long tons and up to the maximum radius of 32'-0" can be handled.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.7MAINTENANCE INSTRUCTIONS1.7.0 LUBRICATION

1.7.1 Before and after using the crane, apply grease to the hoist lead-in sheave axle, Figure 1-3, Item 4.

1.7.2 WEEKLY:

1.7.2.1 Check the level of the hydraulic fuel in the reservoir, Figure 1-13, Item 17 and replenish with the specified hydraulic fluid, as required.

1.7.2.2 Apply grease by hand gun to the following locations:-

<u>Assembly</u>	<u>Figure No.</u>	<u>No. of Location</u>
Crane Boom	1-3	13
Slewing Ring	1-2	6
Slewing Drive Bearings	1-9	2
Hoist Bearing	1-10	1
Hook Height Limit Switch	1-12	3

1.7.3 MONTHLY:

1.7.3.1 Apply grease to the hoist brake pivot points, Figure 1-10 Item 4 at two (2) locations.

1.7.3.2 Apply grease to the slewing brake pivot points, Figure 1-9 Item 20 at two (2) locations.

1.7.3.4 Apply specified external gear lubricant to the slewing ring gear teeth, Figure 1-2, Item 2.

1.7.3.5 Apply oil to the slack rope limit switch pivot points, Figure 1-11.

1.7.4 SIX MONTHS:

1.7.4.1 Replace filter elements, in the hydraulic power unit, Figure 1-13, Items 15 and 27.

1.7.5 Instructions for the repair of hydraulic components are found in the respective manufacturers repair and maintenance manuals in Section 8 of this manual.

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CCGS PIERRE RADISSONDECK CRANESSECTION 1.8MECHANICAL AND ELECTRICAL SPARES

<u>MECHANICAL QUANTITY</u>	<u>HEPBURN PART NO</u>	<u>MANUFACTURERS PART NO</u>	<u>DESCRIPTION</u>
2	5-006-G	18-2	BRONZE BUSHING FOR 18-2 18" SHEAVE
4	5-008-G	18-2	ROLLER BEARING FOR 18-2 18" SHEAVE
2	5-010-G	18-311	ROLLER BEARING FOR 18-311 HOOK BLOCK
4	5-012-G	J10	ELEMENT FOR FILTER FLF12-055-10
4	5-014-G	UC2108	ELEMENT FOR FILTER UC4715
<u>SEALS FOR PUMP NO. 3P3180-AP-SS-P, CONSISTING OF:</u>			
2	5-018-G	DH71A-20	BODY SEAL
2	5-020-G	PB7113-16	LUBE SEAL
1	5-022-G	PD79-MK13	OIL SHAFT SEAL
<u>SPARES FOR SINGLE SOLENOID VALVE, D2002, CONSISTING OF:</u>			
1	5-026-G	S16-65025	SEAL KIT
1	5-028-G	-	SOLENOID
<u>GASKET KIT FOR VALVE NO. 6001-A1-A15-A15-A4 CONSISTING OF:</u>			
5	5-032-G	1343	PLUNGER SEALS
8	5-034-G	571	PLUNGER SEALS
8	5-036-G	4137	'O' RING

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QUANTITY	HEPBURN PART NO	MANUFACTURERS PART NO	DESCRIPTION
<u>GASKET KIT FOR VALVE 1E16-P8-16E-305-491 CONSISTING OF:</u>			
4	5-040-G	132113	'O' RING
8	5-042-G	134101	'O' RING
4	5-044-G	139101	'O' RING
8	5-046-G	142011	BACK-UP RING
4	5-048-G	132107	'O' RING
4	5-050-G	141012	'O' RING
4	5-052-G	201028	'O' RING GASKET SEAL
1	5-054-G	4872886801	GASKET KIT FOR HAGGLUND
2	5-072-G	130120	'O' RING
2	5-074-G	139116	'O' RING
2	5-076-G	132113	'O' RING
2	5-078-G	142115	BACK-UP RING
2	5-080-G	134129	'O' RING
2	5-082-G	142129	BACK-UP RING
2	5-084-G	133131	'O' RING
2	5-086-G	201020	GASKET
1	5-088-G	FP-1126-SK	BRONZE BUSHING FOR CYLINDER FP-1126-00
<u>MISCELLANEOUS SEALS CONSISTING OF:</u>			
6	5-092-G	2-026	'O' RING 2026
6	5-094-G	2-212	'O' RING 2-212
1	5-096-G	V-100-A	'V' RING V-100-A
1	5-100-G	2-031	'O' RING 2-031
2	5-102-G	2-222	'O' RING 2-222
1	5-104-G	V-1505	'V' RING V-1505

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QUANTITY	HEPBURN PART NO	MANUFACTURERS PART NO	DESCRIPTION
<u>MISCELLANEOUS SEALS (Cont'd)</u>			
2	5-106-G	2-222	'O' RING 2-222
2	5-108-G	7254-13	'O' RING 7254-13
1	5-110-G	7254-11	'O' RING 7254-11
1	5-112-G	7254-9	'O' RING 7254-9
1	5-114-G	7254-13	'O' RING 7254-13
1	5-116-G	7254-11	'O' RING 7254-11
<u>ELECTRICAL</u>			
<u>5-218G 45 HP ELECTRIC MOTOR REPAIR KIT CONSISTING OF:</u>			
1	-	31552-46	FRONT BEARING
1	-	31552-46	REAR BEARING
1	-	99-2994-76	SLOT INSULATION
1	-	99-2995-76	PHASE INSULATION
1	-	99-2996-76	STATOR COIL
1	5-200-G	76A86	RELAY COIL
1	5-222-G	71A86	CONTACTOR COIL
1	5-224-G	C-915-2500SC-SPEC	SLIP RING ASSEMBLY
1	5-226-G	KS-83621-1(A)	PENDULUM WINDER WIPER WITH HEATED ARG, 20" BLADE, 115 VAC, 60 HZ

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