

SIZE ODR60A20 OFFSHORE DRILLING RIG WINCH

Form P6264
Edition 2
March, 1979

P
A
R
T
S

B
U
L
L
E
T
I
N

WARNING

**These Winches are not to be used
for lifting or lowering people**

LUBRICATION

Warning: Lubricate the motor before using the Winch. To avoid leakage during shipment, the oil was drained from the motor. A quantity of oil sufficient for one filling is contained in the can packed with the Winch. Before using the Winch, make sure the Drain Plugs (2) are screwed securely into place; then unscrew the Vent Cap (4) and pour the entire contents of the can into the opening in the top of the Motor Case (1).

Motor Lubrication

Check oil daily and maintain level with opening in the side of the Motor Case.

When the Winch is subjected to temperatures above freezing: After the Winch has been idle for several hours or overnight, loosen the Drain Plug (2) located at the bottom of the Motor Case (1) and allow the accumulated water to drain out. After draining the water, tighten the Plug in the bottom and remove the Plug (2) on the side of the Motor Case. Unscrew the Vent Cap (4) and pour a sufficient quantity of the recommended oil through this opening to bring the oil level, within the Motor Case, up to the side opening. Replace the Plug and Vent Cap.

When the Winch is subjected to freezing temperatures: Allow the Winch to remain idle long enough for the water content in the Motor Case (1) to separate from the oil, but not long enough for it to freeze. Drain the water and replenish the oil as above. Should this procedure be impractical, drain the entire contents of the Motor Case immediately after operation ceases and pour the oil back into the Motor Case before resuming operation. If not drained, a sufficient quantity of water will eventually accumulate so that the Oil Splasher (37), which is attached to the Crank (36), will freeze fast.

For Temperatures 30° to 80° F (0° to 26° C): Use Ingersoll-Rand Pneu-Lube® Medium Oil No. 50 or SAE 20 or 20W Motor Oil.

For Temperatures below 30° F (0° C): Use SAE 10 or 10W Motor Oil.

For Temperatures above 80° F (26° C): Use SAE 30 Motor Oil.

Throttle Valve Lubrication

Weekly, insert a small quantity of Ingersoll-Rand Light Grease No. 28 or a good quality No. 2 cup grease into the Grease Fittings (14) located in the Valve Chest (10). Two or three strokes from the No. P25-228 Grease Gun is ample for each Fitting.

(Continued on Page 11.)

HOW TO ORDER

Order all repair parts for your Ingersoll-Rand Tool by the **NAME** and **NUMBER** shown in the Repair Part List section. **NEVER** use the illustration numbers which appear in the first column.

For prompt service and genuine Ingersoll-Rand parts, place orders with the nearest Ingersoll-Rand Office or Authorized Distributor.

Notice: The use of other than genuine Ingersoll-Rand replacement parts may result in decreased tool performance and increased maintenance, and may, at the Company's option, invalidate all warranties.

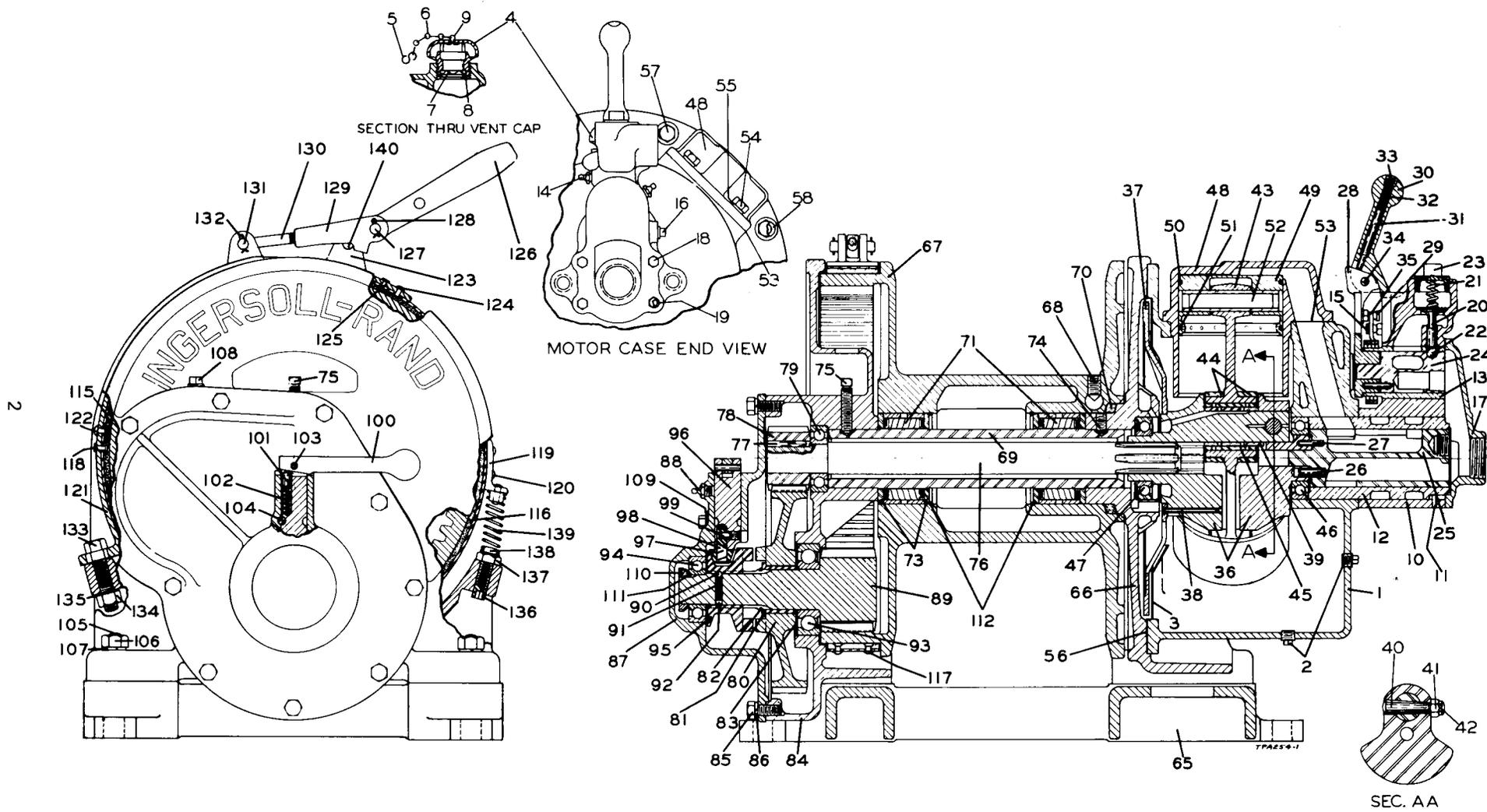
**Refer All Communications to the Nearest
Ingersoll-Rand Office or Distributor.**

©Ingersoll-Rand Company 1979

Printed in U.S.A.



Ingersoll-Rand.



Size ODR60A20 Offshore Drilling Rig Winch

PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Motor Case	K5M-501	●	30	Throttle Lever	HU-556
2	Drain Plug (2)	D02-402		31	Throttle Lever Latch	HU-869
3	Oil Baffle	KU-543	●	32	Throttle Lever Latch Spring	HU-567
*	Oil Baffle Drive Screw (8)	R4K-302		33	Throttle Lever Set Screw	HU-842
*	Motor Eye Bolt	KU-888		34	Throttle Lever Pin	HU-870
*	1-1/4" Pipe Plug	E5UD-947		*	Throttle Lever Pin Cotter (2)	D02-524
4	Vent Cap	D02-303A		35	Throttle Lever Spring	KU-412
5	S-Hook	D02-421			Crank Assembly	K5M-A516
6	Vent Cap Chain	D02-891		36	Crank Bare (consists of 2 matched parts which are not sold separately)	KU-516
7	Vent Cap Screen	D02-889		37	Oil Splasher	KU-540
8	Vent Cap Screen Retainer	6CND-233-1/2		38	Oil Splasher Long Rivet (2)	KU-541
9	Vent Cap Cotter	D02-893		*	Oil Splasher Short Rivet (2)	KU-542
10	Valve Chest	KK5UM-545		39	Crank Pin Sleeve	KU-519
11	Bushing Key (2)	HU-538	●	40	Crank Lock Pin	KU-520
12	Rotary Valve Bushing	K5M-525S		41	Crank Lock Pin Nut	D02-317
13	Reverse Valve Bushing	KU-945S		42	Crank Lock Pin Cotter	D02-330
14	Grease Fitting (2)	23-188		43	Connecting Rod (5)	K5M-509
15	Throttle Lever Spring Stop Pin	D02-553	●	44	Connecting Rod Ring (2)	KU-510
16	Brake Inlet Plug (2)	D02-402		45	Connecting Rod Bushing	KU-511
17	Valve Chest Cover	KU-546A	●	46	Crank Valve End Bearing	KU-518
18	Valve Chest Screw (4)	KU-548	●	47	Crank Pin End Bearing	KU-895
19	1/2" Lock Washer (4)	D10-322	●	48	Cylinder (5)	KU-505
20	Poppet Throttle Valve	KU-940		49	Piston Assembly (5)	K5W-A513A
●	Poppet Throttle Valve Spring	HU-942	≠	50	Piston Ring (1 for each Piston)	KU-337
22	Poppet Throttle Valve Ball	D10-280	●	51	Oil Regulating Piston Ring (1 for each Piston)	KU-338
23	Poppet Throttle Valve Cap	KU-943		*	Retaining Ring (2 for each Piston)	ILA902A9-589
24	Reverse Valve			52	Piston Wrist Pin (5)	K5W-514
	for Winch with standard brake	KU-944		●	Cylinder Gasket (5)	KU-507
	for Winch with automatic brake	KU-744		54	Cylinder Cap Screw (20)	215-13
25	Rotary Valve			55	Cylinder Cap Screw Washer (20)	KU-504
	for overwinding Winch	KU-526A		●	Motor Case Gasket	K5M-592
	for underwinding Winch	KU-526RA		57	Motor Case Screw (10)	215-36
●	26 Large Valve Drive Pin	KU-527		58	5/8" Lock Washer (10)	A-67
●	27 Small Valve Drive Pin (2)	HU-527		*	Motor Nameplate	K5W-99
28	Throttle Control Arm	KU-555A		*	Nameplate Screw (4)	R4K-302
29	Throttle Lever Spring Stop Pin	D02-553				

* Not illustrated.

≠ Old style Pistons No. KU-513 required the use of No. KU-514 Piston Wrist Pins which included caps. The K5W-A513A Piston Assembly uses Wrist Pins which do not have caps. If any old style Piston is to be replaced, order and install five K5W-A513A Piston Assemblies and five K5W-514 Piston Wrist Pins. Individual new style parts are not interchangeable with corresponding old style parts.

● To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (●) for every four tools in service.

BASE, ROPE DRUM AND GEAR PARTS

PART NUMBER FOR ORDERING



65	Base	K4UL-564A
66	Motor Mounting Bracket	K4U-502
67	Rope Drum	K4UL-324
68	Wire Rope Set Screw (2)	215-140
69	Drum Shaft	K4UL-459
70	Drum Packing	207-136
● 71	Drum Bearing (2) (Hyatt CW99212 or its equivalent)	K4U-466
73	Drum Bearing Plate (4)	K4U-469
74	Drum Shaft Short Set Screw	HU-867
75	Drum Shaft Long Set Screw	HU-868
76	Motor Shaft	K4UL-316B
77	Motor Pinion Key	EEG-768
78	Motor Shaft Pinion	K4U-319B
● 79	Motor Shaft Bearing	K4U-589B
*	Motor Shaft Bearing Seal	R10V-310
80	Intermediate Gear	K4U-364
81	Intermediate Gear Bushing	K4U-363
82	Intermediate Gear Bushing Retainer	K4U-362
83	Fiber Washer	K4U-871
84	Gear Case	K4U-353A
85	Gear Case Screw (10)	215-148
86	Lock Washer (10)	D10-322
87	Gear Cover	K4U-352
88	Grease Fitting	23-188
89	Drive Shaft	K4U-358
90	Clutch Jaw Lock Ball	G601-65
91	Clutch Jaw Lock Spring	K4U-863
92	Clutch Jaw Lock Plug	HU-864
● 93	Drive Shaft Inner Bearing	2325-41
● 94	Drive Shaft Outer Bearing	215-63
95	Clutch Jaw	K4U-568
96	Clutch Eccentric Shaft	HU-857
97	Clutch Eccentric Roller	HU-858
98	Clutch Eccentric Pin	HU-859
99	Eccentric Pin Lock Screw	HU-860
100	Clutch Lever	HU-565
101	Clutch Latch	HU-566
102	Latch Spring	HU-567
103	Clutch Lever Pin	HU861
104	Eccentric Shaft Lock Screw	HU-865
105	Base Bolt (8)	K6U-775
106	Base Bolt Nut (8)	DU-562
107	Base Bolt Lock Washer (8)	D01-692
108	Grease Plug (2)	22SR-165
109	3/8" Lock Washer	D02-321
110	Drive Shaft Nut	215-73
111	Drive Shaft Nut Lock	215-74
112	Drum Bearing Retainer (2)	K4U-340

* Not illustrated.

● To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (●) for every four tools in service.

BRAKE PARTS

PART NUMBER FOR ORDERING

	Brake Band Assembly	K5U-A152A
● 115	Brake Band	K5U-152A
116	Brake Lining	K4U-155
117	Brake Lining Short Rivet (16)	K4U-156
118	Brake Lining Long Rivet (17)	235-98
119	Brake Support Spring Bracket	K4U-161A
120	Spring Bracket Rivet (2)	107-153
120	Brake Shoe Rivet (13)	KU-542
● 121	Brake Shoe	K5U-145
122	Brake Shoe Rivet (9)	KU-542
118	Brake Lining Long Rivet (12)	235-98
123	Brake Lever Bracket	K5U-193
124	Brake Lever Bracket Rivet (5)	107-153
125	Brake Lining Long Rivet (5)	235-98
● 126	Brake Handle	107-151
127	Brake Handle Pin	107-149
128	Brake Handle Pin Cotter (2)	107-146
129	Brake Yoke	K4U-159
130	Brake Adjusting Screw	107-158
131	Brake Shoe Long Pin	107-147
132	Brake Shoe Pin Cotter (2)	D02-330
133	Brake Anchor	K4U-206
134	Brake Anchor Nut	HU-776
135	Brake Anchor Lock Washer	A-67
136	Brake Support Screw	K4U-162
137	Brake Support Screw Jam Nut	G7-18
138	Brake Support Screw Washer	K4U-343
139	Brake Support Spring	T03-119
140	Brake Lever Bracket Pin	107-148
*	Bracket Pin Cotter	107-146

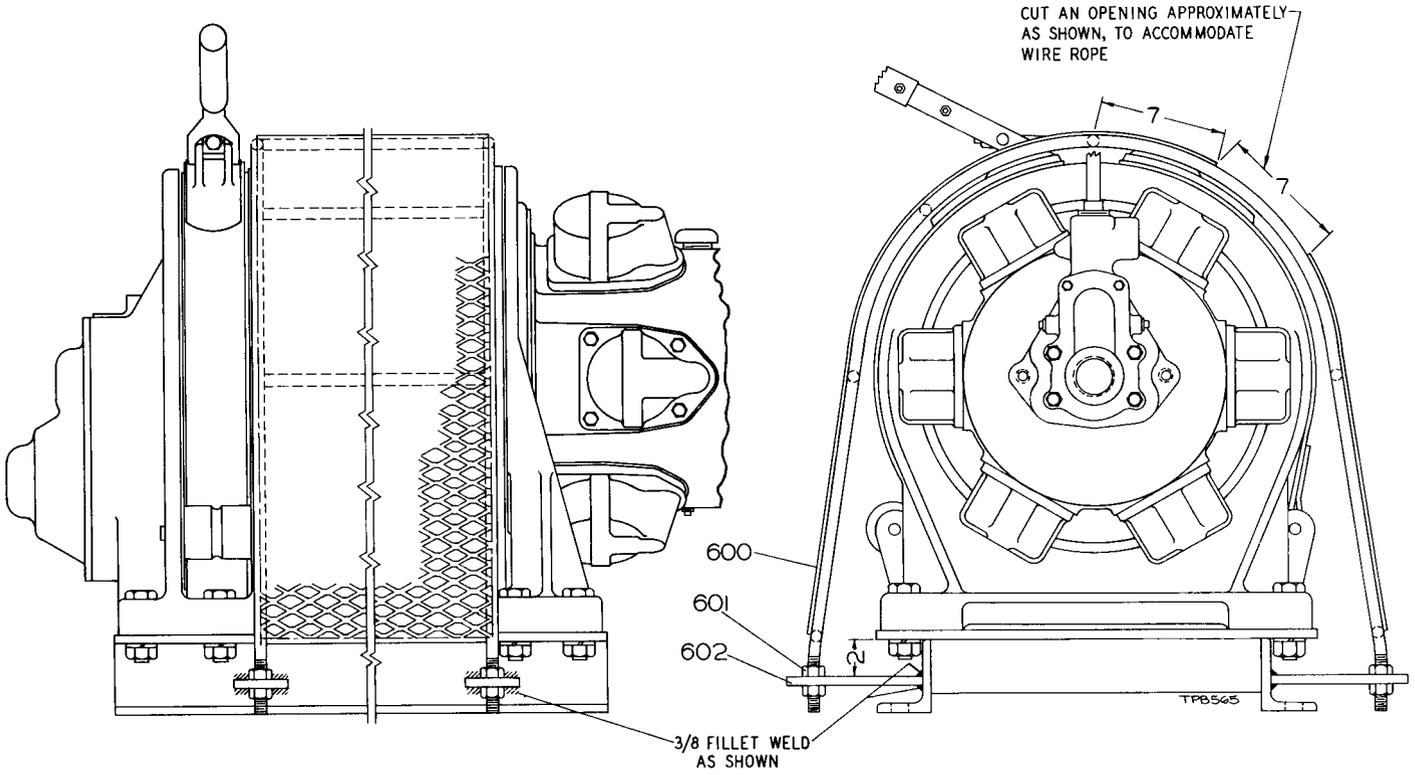
* Not illustrated.

● To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (●) for every four tools in service.

PARTS WITH PROTECTIVE COATING

All exposed parts originally furnished on your ODR Winch were given a special protective coating to help prevent rust and corrosion. If you are replacing a part that originally had this protective coating, and want the new part to be specially coated, it must be so specified on the order. Unless so specified on the order, parts furnished as repair items will not have the special protective coating.

DRUM GUARDS



PART NUMBER FOR ORDERING →

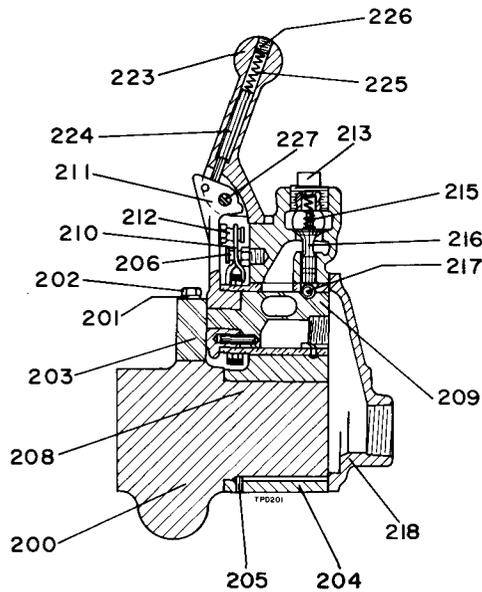
600	Drum Guard	K4UL-298
601	5/8" -11 thd Nut (8)	K6U-8
602	Plate (4)	K6U-299

REMOTE CONTROL AND AUTOMATIC BRAKE

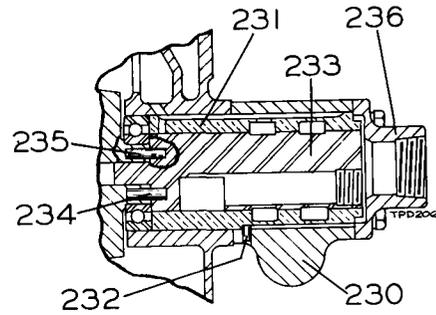
Remote Control and Automatic Brake Conversion Kits are available for Winches not so equipped. Contact your nearest Ingersoll-Rand Office or Authorized Distributor. For installation instructions, order Form 6466.

The following listings of parts apply to those Winches originally equipped with Remote Control and/or Automatic Brake.

REMOTE CONTROL PARTS



Remote Control Block Assembly



Remote Control Valve Chest Assembly

PART NUMBER FOR ORDERING

	Remote Control Block Assembly	
	for Winch with Standard Brake	KU-A685
	for Winch with Automatic Brake	KU-B685
200	Remote Control Block	KU-685
201	$\frac{3}{8}$ " Lock Washer (2)	D02-321
202	Control Arm Retainer Screw (2)	HU-865
203	Control Arm Retainer	HU-687
204	Control Block Valve Chest	KU-876A
205	Bushing Key	HU-538
*	Brake Inlet Plug	D02-402
206	Throttle Lever Spring Stop Pin	D02-553
208	Control Block Reverse Valve Bushing	KU-945
*	Grease Fitting (2)	23-188
209	Control Block Reverse Valve	
	for Winch with Standard Brake	KU-944
	for Winch with Automatic Brake	KU-744
210	Control Block Throttle Lever Spring	KU-412
211	Control Block Throttle Arm	KU-555A
212	Throttle Lever Spring Stop Pin	D02-553
213	Control Block Throttle Valve Cap	KU-943
215	Control Block Throttle Valve Spring	HU-942
216	Control Block Poppet Throttle Valve	KU-940
217	Control Block Throttle Valve Ball	D10-280
218	Control Block Valve Chest Cover	KU-546A
223	Control Block Throttle Lever	HU-556
224	Throttle Lever Latch	HU-869
225	Latch Spring	HU-567
226	Throttle Lever Set Screw	HU-842
227	Throttle Lever Pin	HU-870
*	Throttle Lever Pin Cotter (2)	D02-524

* Not illustrated.

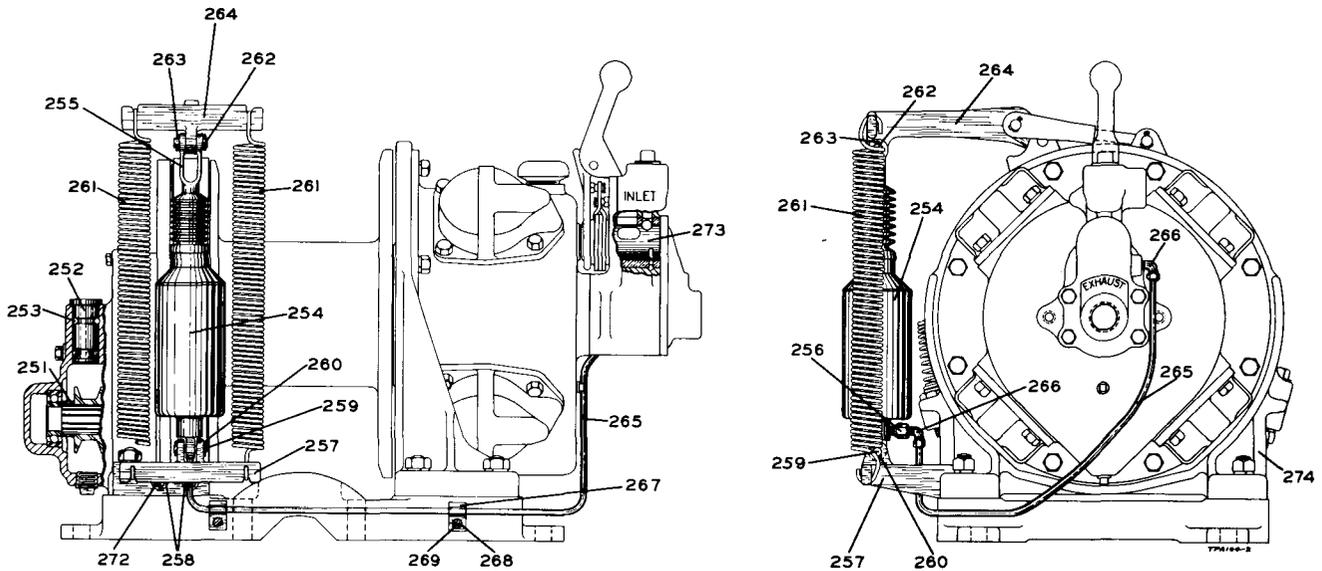
REMOTE CONTROL PARTS (Continued)

PART NUMBER FOR ORDERING

230	Remote Control Valve Chest	K5M-545
231	Rotary Valve Bushing	K5M-525S
232	Bushing Key	HU-538
233	Rotary Valve for Overwinding Winch	KU-526A
	for Underwinding Winch	KU-526RA
234	Large Valve Drive Pin	KU-527
235	Small Valve Drive Pin (2)	HU-527
236	Remote Control Valve Chest Cover	KX-546
*	Valve Chest Screw (4)	KU-548
*	1/2" Lock Washer (4)	D10-322

* Not illustrated.

AUTOMATIC BRAKE PARTS

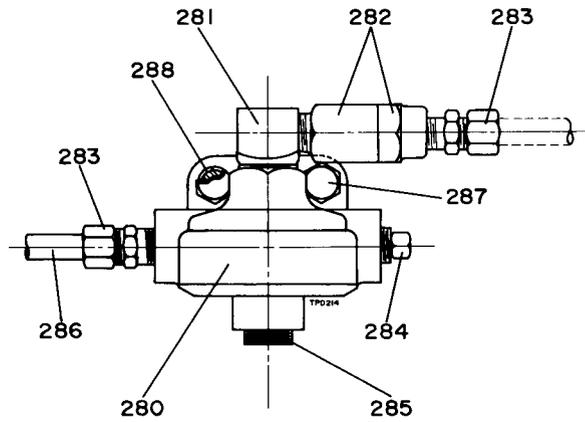


PART NUMBER FOR ORDERING

251	Clutch Jaw Spacer	K4U-712
252	Gear Cover Plug	HU-728
253	Gear Cover Plug Seal	HU-730
254	Brake Cylinder	HU-720
255	Brake Cylinder Yoke	HU-719A
256	Brake Connection Bushing	HU-547
*	Brake Cylinder Bushing	HU-771
257	Brake Cylinder Bracket	K4U-721
258	Brake Cylinder Bracket Cap Screw (2)	HU-723
259	Brake Cylinder Bracket Pin	HU-870
260	Bracket Pin Cotter (2)	D02-524
261	Brake Spring (2)	K4U-726
262	Yoke Pin	22-720
263	Yoke Pin Cotter	D02-330
264	Automatic Brake Lever	K4U-718
265	Brake Pipe	K4UL-401
266	Brake Pipe Elbow (2)	K4U-400
267	Brake Pipe Strap (2)	HU-727
268	Strap Screw (2)	J-376
269	1/4" Lock Washer (2)	L01-67
272	1/2" Lock Washer	D10-322
273	Automatic Brake Reverse Valve	KU-744
274	Motor Mounting Bracket	K4U-502
*	Brake Cylinder Bracket Bolt (3/4"-10 thd. x 4" long)	K6U-775

* Not illustrated.

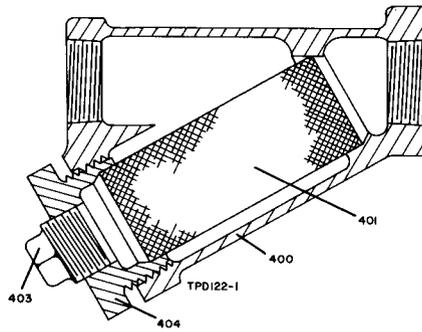
BRAKE EXHAUST VALVE PARTS



PART NUMBER FOR ORDERING

	Brake Exhaust Valve Assembly	K4U-A733
280	Brake Exhaust Valve	HU-733
281	Exhaust Valve Elbow	HU-745
282	Brake Air Strainer Assembly	ROB2-A565
283	Brake Connection	K4U-711
284	1/4" Pipe Plug	D02-402
285	Orifice Plug	HU-732
286	Exhaust Valve Pipe	K4U-731
287	Exhaust Valve Cap Screw (2)	R55H-473
288	5/16" Lock Washer (2)	T11-58
266	Brake Pipe Elbow	K4U-400

AIR STRAINER

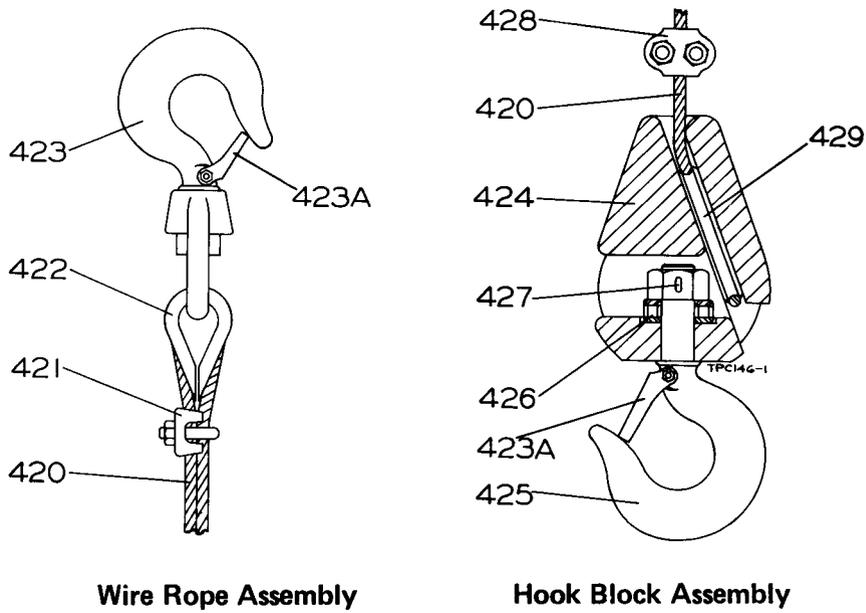


PART NUMBER FOR ORDERING

	Air Strainer Assembly	K4U-A267AT
400	Air Strainer Screen	K4U-61AT
401	Air Strainer Plug	22SR-165
403	Air Strainer Cap	K4U-268AT
404	Air Strainer Nipple (1-1/4" x 2-1/2")	KKM-286
*		

* Not illustrated.

WIRE ROPE AND FITTINGS



PART NUMBER FOR ORDERING

		For Use With 3/8" Dia. Wire Rope	For Use With 1/2" Dia. Wire Rope	For Use With 9/16" Dia. Wire Rope	For Use With 5/8" Dia. Wire Rope
420	Wire Rope (specify length)	EU-372	215-372	K4U-372	235-372
	Wire Rope Fitting Assembly with Latch Hook	DU-AS601	K4U-AS601-1/2	K4U-AS601-9/16	K4U-AS601-5/8
421	Wire Rope Clamp (3)	D04-464	D20-375	D20-375	235-375
422	Rope Thimble	D10-721	215-602	K4U-602	K4U-602
423	Swivel Latch Type	D01C-S377	K4U-S601	K4U-S601	K4U-S601
*	Hook Latch Kit (individual parts not sold separately) (for Latch Hook)	D01-S4055	D02-S4055	-----	-----
	Hook Block Assembly	D02-A463A	D04-A463A	-----	-----
424	Hook Block	D02-463A	D04-463A	-----	-----
425	Hook and Nut	D02-304B	D04-304B	-----	-----
426	Hook Bearing	D02-379A	D04-379A	-----	-----
427	Hook Cotter	107-146	D02-438	-----	-----
428	Wire Rope Clamp	D04-464	D20-375	-----	-----
429	Wire Rope Wedge	D02-373	D02-373	-----	-----

* Not illustrated.

MUFFLER

PART NUMBER FOR ORDERING

Muffler	KU-674
† Muffler Nipple	KKM-286
† Reducing Coupling	HU-677

† Not required except when Winch is equipped for Remote Control.

MAINTENANCE TOOLS

TOOL NUMBER FOR ORDERING	TOOL NAME FOR ORDERING	OPERATION
P25-228 K-27	Grease Gun Wire Rope Set Screw Wrench	Lubrication. Removing or installing the Wire Rope Set Screws (68) in the Rope Drum (67).
HU-932 KU-933	Valve Chest Jack Bolt (2 required) Piston Ring Compressor	Removing the Valve Chest (10 or 230) from the Motor Case (1). Compressing the Piston Rings (50 and 51) when installing the Cylinder (48).
23470	Throttle Valve Stem Reamer	Reaming the throttle valve stem hole in the Reverse Valve Bushing (13 or 208) after installing a new Bushing.
25670	Throttle Valve Seat Reamer	Refacing the seat for the Throttle Valve (20 or 216) in the Valve Chest (10 or 204).

Gearing Lubrication

Every sixty to ninety days, remove the Grease Plug (108) from the Gear Case (84) and note if the visible portion of the gears are coated with grease. If the gears appear to lack lubrication, add a small amount (about ½ pint) of the recommended grease. When reassembling a Winch, three pounds of grease are required.

Use Ingersoll-Rand Heavy Gear Grease No. 70. As a substitute, Ingersoll-Rand Light Grease No. 28 or a good quality No. 2 cup grease may be used.

For extremely low temperatures, Ingersoll-Rand Medium Gear Grease No. 75, low temperature grease or a heavy gear oil may be used. **Note:** Leakage will probably be experienced if heavy gear oil is used for normal temperatures.

Lubricate the Drum Gear occasionally by pushing a piece of hard stick or block grease ¾" to 1" (19mm to 25mm) long through the hole above the Drum Shaft Long Set Screw (75).

An Air Line Lubricator is recommended for use with this Winch. It will improve the efficiency of the Winch and prolong the life of the motor.

HOSE AND HOSE CONNECTIONS

Use 1-½" (38 mm) hose with a suitable hose fitting for attaching it to the inlet. Use of smaller hose and fittings will reduce the efficiency of the Winch.

MOUNTING

Mount the Winch so that the axis of the Rope Drum (67) is horizontal. Operation of the Winch with the axis of the Drum more than 10° from horizontal will result in lubrication difficulties, and the Wire Rope will tend to pile up on the low end of the Drum.

The Motor Case (1) can be rotated on the Motor Mounting Bracket (66) to any one of five different positions. When a Winch is shipped from the factory, the Motor Case is positioned for operation when the Winch is mounted upright on its base. Therefore, the Motor Case must be repositioned if the Winch is to be mounted with the Drain Plug (2) more than 25° off bottom vertical center. To change the position of the Motor Case:

1. Drain the oil.
2. Unscrew the Motor Case Screws (57).
3. Rotate the Motor Case to bring the Drain Plug as near bottom vertical center as possible.
4. Replace the Cap Screws.
5. Fill with oil.

The Winch should not be operated with one of the Cylinders (48) at bottom vertical center.

MAINTENANCE INSTRUCTIONS

Apply the Wire Rope to wind on the Rope Drum in the direction indicated by the instruction plate on the Winch.

Adjust the brake so that considerable pressure is required to push the Brake Handle (126) past center for locking. Make adjustment by removing the Brake Shoe Long Pin (131) and rotating the Brake Adjusting Screw (130).

Remove the Throttle Valve Spring (21), Poppet Throttle Valve (20) and Throttle Valve Ball (22) from the Valve Chest (10) before attempting to withdraw the Reverse Valve (24) from the Reverse Valve Bushing (13).

The following procedure is recommended when replacement of the Rotary Valve Bushing (12) or Reverse Valve Bushing (13) is necessary:

1. Unscrew the Valve Chest Screws (18) and remove the Valve Chest Cover (17).
2. Screw a No. HU-932 Jack Bolt into each tapped lug on the Valve Chest (10) until the Jack Bolts contact the Motor Case (1). Turn each Bolt a little at a time to jack the Chest with assembled parts from the Motor Case.
3. Unscrew the Throttle Valve Cap (23) and remove the Spring (21), Poppet Throttle Valve (20) and Ball (22) from the Valve Chest (10).
4. Withdraw the Rotary Valve (25) and Reverse Valve (24), and remove the Throttle Lever Spring (35).
5. Support the face of the Valve Chest (10) that contacts the Motor Case (1), and press out the old Bushings with an arbor that will clear the Bushing Keys (11). **Caution:** Failure to use an arbor that will clear the Bushing Keys, or pressing the Bushings in the opposite direction than instructed, will destroy the Keys.
6. Support the face of the Valve Chest (10) that contacts the Valve Chest Cover (17); align the keyslot in the new Reverse Valve Bushing with the Bushing Key (11), and press the Bushing into the Chest until the leading face of the Bushing is flush with the supported face of the Chest. Align the keyslot in the new Rotary Valve Bushing with the Bushing Key, and press the Bushing into the Chest until the bushing shoulder is flush with the supported face of the Chest.
7. Insert the No. 23470 Throttle Valve Stem Reamer or a .505" (12.8mm) hand reamer through the throttle valve chamber in the Valve Chest, and ream the hole through the wall of the new Reverse Valve Bushing.
8. Check the fit of the Rotary Valve (25) in the new Rotary Valve Bushing. If the Valve is tighter than a good running fit in the Bushing, lap in the Valve, using a fine grain lapping compound whose abrasive agent will break up rapidly. Remove all trace of the compound with kerosene after obtaining the desired fit.
9. Check the fit of the Reverse Valve (24) in the new Reverse Valve Bushing. If the fit is too tight, ream the Bushing 1.875" (47.625mm). **Caution:** The Reverse Valve is chrome-plated; do not lap.
10. Rotate the Reverse Valve in the Reverse Valve Bushing until the arrows on the two parts align, and install the Throttle Valve Ball, Poppet Throttle Valve, Spring and Cap.
11. Install the Throttle Lever Spring (35) and Throttle Control Arm (28).
12. Align the holes through the Valve Chest (10) with those in the face of the Motor Case (1) and squarely start the protruding end of the Rotary Valve Bushing into the Case. Place a hardwood block on the chest face and press or drive in the Bushing until the Valve Chest contacts the Motor Case.

The two sections of the Crank (36) are matched before final machining, and the web of each section is stamped with an identification mark as AA17, CC21, XX19, etc. Only sections bearing identical marking can be used together. If more than one Crank is disassembled at one time, be sure only matched parts are assembled together.

Slide the Crank Pin Sleeve (39), plain end first, onto the crank pin when assembling the Crank (36).

Install the Connecting Rod Rings (44) so that the internally beveled ends are toward the Connecting Rods (43) when assembling the Crank (36).

● **Atlanta, Ga.**
111 Ingersoll-Rand Drive
Chamblee, Georgia 30341

★ **Baton Rouge, La.** 70816
4252 Rhoda Drive

★ **Birmingham, Ala.** 35233
1308 4th Ave. South

★ **Boston, Mass.**
2 Kuniholm Dr.
Holliston, Mass. 01746

● **Charlotte, N. C.** 28208
4840 Wilmont Rd.

★ **Chattanooga, Tenn.** 37408
1936 Central Ave.

● **Chicago, Ill.**
888 Industrial Drive
Elmhurst, Illinois 60126

★ **Cleveland, Ohio** 44125
9257 Midwest Ave.

● **Dallas, Texas** 75247
8901 Directors Row

★ **Denver, Colo.** 80207
5805 E. 39th Ave.

● **Detroit, Mich.**
22122 Telegraph Road
Southfield, Mich. 48075

Ingersoll-Rand

Tool & Hoist Division
28 Kennedy Blvd.
East Brunswick, N. J. 08816

★ **Freeport, Texas** 77541
211 Park Place

● **Hartford, Conn.**
60 Progress Drive
Manchester, Conn. 06040

● **Houston, Texas** 77001
6800 Sands Point, P.O. 1455

★ **Indianapolis, Ind.** 46268
5315 West 86th St.

● **Los Angeles, Calif.** 90022
5533 East Olympic Blvd.

● **Milwaukee, Wis.**
N84 W13540 Leon Rd.
Menomonee Falls, Wis.
53051

★ **Minneapolis, Minn.** 55404
Corner Franklin & Cedar

★ **Newark, N. J.**
28 Kennedy Blvd.
East Brunswick, N. J. 08816

● **New Orleans, La.** 70005
939 Lake Ave. Metairie

★ **Norfolk, Va.**
1431C Air Rail Ave.
Virginia Beach, Va. 23455

● **Philadelphia, Pa.**
651 Park Ave.
King of Prussia, Pa. 19406

● **Pittsburgh, Pa.** 15220
6 Parkway Ctr.

★ **Portland, Oregon** 97214
240 S. E. Clay St.

★ **San Francisco, Calif.**
14299 Wicks Blvd.
San Leandro, Calif. 94577

● **Seattle, Wash.** 98188
345 Andover Park East

★ **Shreveport, La.** 71106
454 W. 61st St.

★ **Syracuse, N. Y.** 13208
505 Factory Ave.

● **St. Louis, Mo.** 63132
1515 Page Industrial Blvd.

★ **Tampa, Fla.** 33609
3316 South Westshore Blvd.

★ **Washington, D. C.** 20006
1666 K. St., N. W.

● Branch and All-Star Servicerter.
★ All-Star Servicerter only.