Technical Document

LIT2739 (PB308)

Inspection, Maintenance, Testing and Special Operating Instructions for BRADEN Planetary Hoists

This document outlines required inspection, maintenance and testing procedures for BRADEN planetary hoists utilized in **offshore applications and/or for personnel handling**, in accordance with API RP 2D, Operation and Maintenance of Offshore Cranes. For onshore applications, these procedures are highly recommended as best practices for hoist maintenance.

In addition, this document details procedures for emergency lowering of hoists to help ensure safety under unexpected conditions.

For the purposes of this document, “hoist” refers to a mechanical device used to lift a load vertically using a cable. Personnel handling includes any occurrence when a person is lifted using a hoist.

The hoist owner should establish an inspection and preventive maintenance program considering the usage category, hoist type, maintenance history and manufacturer’s recommendations.

Crane inspection records, as well as records of preventative maintenance, repairs and modifications to hoists, should be available for a minimum of four years.

Always refer to the specific hoist model number and serial number when requesting service information or parts. **Arrowhead Winch strongly recommends the use of Arrowhead Winch Authorized Service Centers for the maintenance, repair and inspection of products used in offshore applications.**

Please contact Arrowhead Winch Service Department at 918-259-3315 or service@arrowheadwinch.com for more information.

⚠ WARNING ⚠

Failure to properly operate, maintain and service a hoist may lead to loss of load control resulting in property damage, serious injury or death.

This document applies to the following BRADEN and Gearmatic planetary hoists:

BG6 (any design series)
BG8 (any design series, equal speed only)

PD5 (any design series)
PD7 (any design series, equal speed only)
PD12 (any design series)
PD15B
PD17A
PD21A
PD10-75B
PD10-77B
PD15-75B
PD15-77B

CH10B
CH12.5B
CH150A
CH165A
CH175 (any design series)
CH185A
CH210A
CH230 (any design series)
CH240A
CH280A
CH330A
CH400 (any design series)
CH500A
CH600A
CH640A

GH30/GH30B (w/external motor and brake valve)
GH50 (w/external motor and brake valve)

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PERIODIC INSPECTIONS

Inspection procedures for hoists are divided into four general categories based upon their usage or duty cycle, which in turn determines appropriate intervals for inspections. The usage categories must be assigned by the crane user on a consistent crane-by-crane basis.

The crane/hoist usage categories are as follows:

Idled – Crane/hoist has not been used for 3 months.

Infrequent – Crane/hoist is used less than 10 hours per month based on a three-month average.

Moderate – Crane/hoist is used 10–50 hours per month based on a three-month average.

Heavy – Crane/hoist is used 50–200 hours per month based on a three-month average. (If crane owner does not track usage, the crane should default to the Heavy Usage category.)

Table 1 lists the levels of inspections required for each usage category.

Table 1. Hoist Inspection Schedule

USAGE CATEGORY	PRE-USE INSPECTION	MONTHLY INSPECTION	QUARTERLY INSPECTION	ANNUAL INSPECTION	TEARDOWN INSPECTION
New	Gear oil should be changed after the first 100 hoist operating hours following a new hoist installation				
Idled (not used for 3 months or longer)	**Level 1** *see Note 1*	not applicable (n/a)	n/a	*see Note 2*	**Level 5** *see Note 3*
Infrequent (less than 10 hours per month)	**Level 1** QCI/QCO	n/a	n/a	**Level 4** QCI	**Level 5** 5 years
Moderate (10-50 hours per month)	**Level 1** QCI/QCO	n/a	**Level 2** QCI	**Level 4** QCI	**Level 5** 5 years
Heavy (50+ hours per month)	**Level 1** QCI/QCO	**Level 2** QCI/QCO	**Level 3** QCI	**Level 4** QCI	**Level 5** 3 years

QCI = Inspection performed by Qualified Crane Inspector
QCO = Inspection performed by Qualified Crane Operator

Note 1: A crane/hoist that has been idled for 6 to 12 months requires a Level 2 inspection to be performed.

Note 2: A crane/hoist removed from service for more than 12 months should have an “out-of-service” sign placed over its primary controls. Before the crane/hoist is placed back into service, a Level 4 Inspection should be performed.

Note 3: If a hoist has an unknown history of repair and/or maintenance, it is required that the hoist undergo a Level 5 inspection prior to being placed into service.

Definitions:
Qualified Crane Inspector — A person so designated by the employer who by reason of appropriate experience and training, has successfully completed classroom training on crane maintenance and troubleshooting; on hoist troubleshooting and overhaul; and on the structural aspects of offshore cranes, which gives a knowledge of structurally critical components and critical inspection areas.

Qualified Crane Operator — A person so designated by the employer who has appropriate offshore experience and training. Such appropriate experience and training must comprise minimum amounts of classroom sessions and hands-on field training on cranes specific to the type of crane to be operated by the qualifying operator.

NOTE: It is not a requirement for a Qualified Crane Inspector to also be a Qualified Crane Operator. However, a Qualified Crane Inspector is not a Qualified Crane Operator unless he or she has also completed requirements of a Qualified Crane Operator, including the physical exam.

Source: Above definitions of QCI/QCO are from API RP 2D, Operation and Maintenance of Offshore Cranes.

PERIODIC INSPECTIONS

⚠ WARNING ⚠

Any time a hoist exhibits erratic operation and/or unusual noise, the hoist must be taken out of service until it is inspected and serviced by a qualified technician. Continued operation of a hoist with a defect in a critical component may lead to loss of load control, property damage, serious injury or death. This warning applies to every level of inspection.

Level 1 Inspection — Pre-Use

This inspection must be performed by a Qualified Crane Inspector (QCI) or Qualified Crane Operator (QCO). The pre-use inspection must include, but is not limited to, the following actions to be performed prior to placing the crane into service and then as necessary during extended operation:

1. Check for external oil leaks and repair as necessary. **This is extremely important due to accelerated wear that will result from insufficient lubrication.** For hoists with a sight glass, ensure that the sight glass is clear and functional, then visually check oil level daily. For hoists without a sight glass, check oil level monthly if no external oil leaks are detected. Lubricant level must be maintained between the minimum and maximum levels, midway up the sight glass or at the bottom of the level plug port as equipped. Use only the recommended type of lubricant. Refer to the applicable hoist service manual and/or Arrowhead Winch LIT503 (Recommended Planetary Gear Oil).
2. Visually inspect the ratchet and pawl mechanism (if equipped) for proper operation and full, spring-force engagement of the pawl with the ratchet wheel. Adjust or repair as necessary.

   Lubricate all pins and pivot surfaces on the ratchet assembly with a moisture resistant grease to deter corrosion and extend service life.

   Reference the following documents for more information:

   - LIT2137 for PD12C, PD15B, PD10-75B, PD10-77B, PD15-75B and PD15-77B
   - LIT2326 for CH units with a cast iron drum
   - LIT2135 for CH units with a steel fabricated drum
3. Check hydraulic fittings and hoses for chaffing, deterioration or corrosion. Replace as necessary.
4. Visually inspect for corroded, loose or missing bolts, pins or other fasteners and replace or tighten as necessary.
5. Visually inspect rotation indicator transmitters, anti-two-blocking switches and other safety equipment. Repair as necessary.

Level 2 Inspection — Brake Test

This inspection must be performed by a Qualified Crane Inspector (QCI) or Qualified Crane Operator (QCO) and must include, but is not limited to, the following:

1. Perform the Level 1 inspection.
2. On hoists used for personnel handling, the internal spring-applied brake must be tested in accordance with the Brake Test Procedure section included in these instructions.
3. The periodic brake test requirement can be substituted with a heavy-lift inspection program that includes a brake test.
4. Inspect for corrosion of fasteners, hoist base, drum, etc. Repair or replace as required to maintain the structural integrity of the hoist.

Level 3 Inspection — Oil Sampling

This inspection must be performed by a Qualified Crane Inspector (QCI) and must include, but is not limited to, the following:

1. Perform Level 1 and 2 inspections.
2. Take a sample of the lubricant from the hoist gear cavity (as described in the Oil Sampling section of these instructions) and analyze it for wear metals content, correct viscosity, lubricant deterioration, moisture and other contaminants. Refer to the guidelines for iron contaminant level, also found in the Oil Sampling section of these instructions.
3. Look for obvious visual contamination.

NOTE: Oil analysis can neither detect nor warn against a fatigue failure. Fatigue is the weakening of a material caused by repeatedly applied loads. It is the progressive and localized structural damage that occurs when a material is subjected to cyclic loading.

Level 4 Inspection — Oil Change

This inspection must be performed by a Qualified Crane Inspector (QCI). The annual inspection must include, but is not limited to, the following:

1. Perform the Level 1, 2 and 3 inspections.
2. Change the lubricating oil in the hoist gear cavity after an oil sample has been taken (see Oil Sampling section of these instructions). Refill the hoist to the proper level with recommended lubricant. Refer to the Arrowhead Winch LIT503 (Recommended Planetary Gear Oil).

Level 5 Inspection — Teardown

Teardown inspections of BRADEN hoists should be completed according to the usage schedule defined below.

Magnetic Particle Inspection (MPI) of the internal ring gear and reduction gears must be performed during Level 5 inspections to aid in the detection of cracks in the ring gears due to fatigue. The preferred method is the Fluorescent Wet Magnetic Particle Inspection using ultraviolet light consistent with ASTM E709.

- **Idled** – Rebuild hoist after five years
- **Infrequent Usage** – Perform Level 5 Teardown Inspection/MPI at least every five years
- **Moderate Usage** – Perform Level 5 Teardown Inspection/MPI at least every five years
- **Heavy Usage** – Perform Level 5 Teardown Inspection inspection/MPI at least every three years

NOTE: Oil analysis alone can neither detect nor warn against component fatigue failure.

A Level 5 Teardown Inspection includes the hoist being completely disassembled, cleaned, inspected and repaired as required. Replacement of all worn, cracked, corroded or distorted parts such as pins, bearings, shafts, gears, brake rotors, brake plates, drum and base should occur as required. All seals and O-rings must be replaced at this time.

If the hoist is used in an offshore application, replace the sprag-style brake clutch (sprag).

If the hoist is equipped with a ratchet and pawl system, replace the pawl.

Replacement of internal components shall be performed at an Arrowhead Winch Authorized Service Center, Original Equipment Manufacturer (OEM) or distributor.

Arrowhead Winch does not authorize modifications to the hoist which are recommended by other manufacturers or service providers and cannot verify or support the quality of service provided by organizations who are not Authorized Service Centers, OEMs or distributors for Arrowhead Winch.

Any deficiencies including, but not limited to, those discussed here, shall be corrected immediately.

Post-Teardown Testing

The following operations MUST be performed BEFORE rebuilt hoists are placed back into service after a Level 5 Teardown Inspection:

1. Load test the rebuilt hoist at 95-100% of the maximum rated load of the hoist configuration using one of the methods detailed below (hoist rating will vary with gear ratio, hydraulic motor, and drum options):
   - **Dynamic Suspended Weight Test:** Lift the maximum rated load vertically and allow the hoist brake to engage with the load suspended to check for drum rotation. Arrowhead Winch recommends this method.
   - **Static Dynamometer Test:** Pull against the hoist vertically or horizontally against a fixed tie down or anchor and use a dynamometer or equivalent load measurement device to verify the maximum rated load.

   Maximum Rated Load Testing Requirements:
   - The test load shall be 95-100% of the maximum rated load of the hoist, NOT the reduced rating used for personnel lifts.
   - The ASC shall maintain accuracy of test weights and basket (dynamic tests) and calibration of dynamometer or equivalent load measurement device (static tests).
   - If rated operating pressure for a specific hoist is not known, consult the Arrowhead Winch NetServices Choose Program or contact Arrowhead Winch Service Department with the hoist serial number to obtain information prior to load testing.

2. Perform a dynamic load test by completing several drum rotations in both directions while under a load of at least 30% of the maximum rated load while evaluating for smooth operation.

   NOTE: The dynamic rated load test method detailed above may also satisfy the dynamic load test providing the hoist demonstrates smooth operation.

3. Test the internal friction brake per the procedures described in the Brake Test section of this document.

4. After testing, issue a new certificate for personnel handling, effective on the date the hoist is placed back in service. A sample certificate is shown below and shall include, at a minimum, all the information shown:

NAME OF SERVICE COMPANY

As an Arrowhead Winch Authorized Service Center, **SERVICE COMPANY** certifies that this hoist is suitable for personnel handling, providing it is used and maintained in accordance with Arrowhead Winch recommendations and requirements for personnel-handling hoists.

Hoist Model No.: _____

Hoist Serial No.: _____

Date of Inspection: _____

Work Order/Job No.: _____

5. Sample and analyze gear case oil after the first 50 operating hours after rebuild to confirm acceptable wear metal levels.

BRAKE TEST PROCEDURES

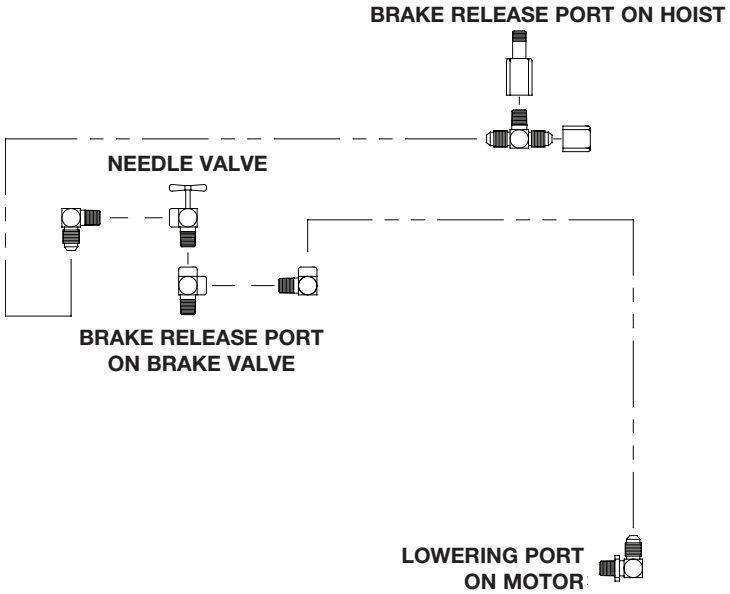
All Arrowhead Winch planetary hoists have a spring-applied, hydraulically released, multiple disc brake inside the hoist housing. This brake holds a suspended load when the directional control valve is in neutral, or when hydraulic power is lost.

A brake clutch assembly permits the power train and drum to rotate in the hoisting direction to lift a load, while the brake remains fully applied. A load cannot be lowered, however, without applying hydraulic pressure to the release port and releasing the brake.

Hoists ordered for personnel-handling cranes will have a needle valve in the brake release line. They will also have a tee in the brake release line between the needle valve and the brake release port on the hoist. One branch of the tee is capped.

With the valve closed and the cap removed from the tee, the brake is isolated from system pressure and vented to atmosphere. The brake cannot be released under these conditions by actuating the directional control valve.

One purpose of the valve/tee combination is to provide a means to test the brake; the other is to provide a means to lower a suspended load when hydraulic power is lost.



Relative location of needle valve to other components and fittings on the hoist motor and brake valve

Brake Test — Hoists Equipped with Needle Valve (for Brake Testing)

Test to be performed with no load on the hoist.

1. Remove the lockwire on the needle valve handle and close the valve tightly.
2. Remove the cap on the tee located in the brake release circuit.
3. With the hydraulic power unit running, move the directional control valve handle slowly to the full open, lowering position.
4. Increase the engine speed, if necessary, to bring system pressure up to the relief valve setting. The hoist drum should remain stationary.
5. Rotate the drum in the hoisting direction slightly and repeat the test 7 more times.
6. If the drum rotates, disassemble the hoist and examine the brake components for wear. In addition, measure the brake springs for correct free length in hoists using helical compression springs.
7. Replace any parts showing excessive wear. If any spring is shorter than the minimum shown in the applicable hoist service manual, replace all springs.
8. Reassemble brake and hoist and repeat steps above.
9. When testing is complete, be sure to reinstall the plug or cap in the tee, fully open the needle valve and install lockwire to secure the valve in position.

The procedure above utilizes the hoist hydraulic motor to test the brake's ability to resist approximately 115% of the rated hoist load.

Brake Test — Standard Hoists not Equipped with Needle Valve

Test to be performed with no load on the hoist.

1. Remove the brake release line from the fitting, then cap or plug the port.
2. With the hydraulic power unit running, move the directional control valve handle slowly to the full open, lowering position.
3. Increase the engine speed, if necessary, to bring system pressure up to the relief valve setting. The hoist drum should remain stationary.
4. Rotate the drum in the hoisting direction slightly and repeat step 3 above 7 more times.
5. If the hoist drum rotates, disassemble the hoist and examine the brake components for wear. In addition, measure the brake springs for the correct free length in those hoists using helical compression springs.
6. Replace any parts showing excessive wear. If any spring is shorter than the minimum shown in the applicable hoist service manual, replace all springs.
7. Reassemble the brake and hoist and repeat the steps above.
8. When testing is complete, reattach the brake release line to the brake release port fitting.

The procedure above utilizes the hoist hydraulic motor to test the brake's ability to resist approximately 115% of the rated hoist load.

Brake Test — Hoists with Auxiliary Brake

On hoists with auxiliary brakes, both the standard parking brake and the auxiliary brake must be tested.

A. Main Brake Test

Conduct test for the standard (nonauxiliary brake) hoist as described in the section above. The auxiliary brake will release when the joystick is moved to the lowering position, so only the main static brake will be holding the hoist drum.

B. Auxiliary Brake Test

NOTE: The auxiliary brake test is to be performed with no load on the hoist. The weight of the wire rope, hook block and overhaul ball or hook is acceptable.

⚠ WARNING ⚠

Hoist must be securely bolted to mounting structure before conducting test. Gear train torque is transmitted to the auxiliary brake. Failure to secure the hoist before conducting the Auxiliary Brake Test may result in property damage, serious injury or death.

1. If the hoist has an isolation valve in the auxiliary brake release line, close the valve to isolate the auxiliary brake and go to Step 3 of this procedure. If there is no isolation valve in the auxiliary brake release line, continue to Step 2 of this procedure.
2. Remove the hose that runs from the pressure reducing block to the auxiliary brake at the fitting on the auxiliary brake reducing valve block. Cap the fitting on the reducing valve block and leave the brake release hose connected to the auxiliary brake housing and vented to atmosphere.
3. With the hydraulic power unit (HPU) running, move the directional control valve handle slowly to the full open, hoisting position.
4. Increase the engine speed, if necessary, to bring the system pressure up to the relief valve setting. The hoist drum should remain stationary.
5. This procedure utilizes the hoist hydraulic motor to test the brake's ability to resist at least 100% of the hoist rated capacity.
6. When the brake test is completed, reinstall the hose at the auxiliary brake reducing valve fitting and test for leaks.

If the drum rotates or slips during the test, disassemble the hoist and carefully examine all components of the auxiliary brake for wear and damage. See the applicable hoist service manual and replace any defective parts. Retest the hoist before placing back in service.

⚠ CAUTION ⚠

If the hoist is equipped with a ratchet and pawl mechanism, the pawl lever MUST be disengaged from the ratchet wheel by disconnecting the cylinder and rotating the pawl lever CLEAR of the drum and ratchet wheel. The procedure may not test the brake if the pawl lever is engaged on the hoist drum.

Oil Change

The hoist gear oil must be changed at regular intervals for maximum performance. Refer to the applicable hoist service manual or the latest Arrowhead Winch LIT503 (Recommended Planetary Gear Oil) for recommended lubricants.

⚠ WARNING ⚠

Hot oil may cause personal injury and/or burns to unprotected skin. Make certain the oil has cooled to a safe temperature (typically less than 110°F or 43°C) before taking an oil sample, changing oil or servicing the hoist.

Gear Oil Sampling and Analysis

Proper gear oil sampling and analysis is a vital part of a comprehensive preventive maintenance program. Information obtained from the oil analysis allows the maintenance technician to substitute preventive maintenance for more costly unscheduled downtime or a far more dangerous failure. Early detection of accelerated component wear allows the scheduling of corrective maintenance.

1. Prepare the hoist by cleaning the drain plug area and drain extension tube to obtain an uncontaminated sample.
2. Operate the hoist in both directions for two minutes to thoroughly mix the gear oil then take the sample from the midstream flow of the oil to obtain an accurate representation of the oil condition.
3. After taking the oil sample continue with the oil change or refill the hoist gear cavity to the proper level with recommended lubricant.

General Guidelines for Iron Contaminant Levels

100–500 PPM	**Normal**
500–800 PPM	**Caution — Abnormal Sample** Change oil and retake sample after 50 hours of operation. If second sample is more than 500 PPM, remove hoist from service and perform Level 5 inspection to determine source of contamination.
800+ PPM	**Unacceptable** Remove hoist from service and perform Level 5 inspection to determine source of contamination.

Iron contaminant levels will be on the high side of normal during break-in.

A change in the level of contamination is equally as important as the actual level of contamination. An effective oil analysis program should provide the technician with a view of the progression of wear or a trend.

If a sample shows a sudden increase in contaminant level, action should be taken to determine what has changed.

NOTE: Oil analysis can neither detect nor warn against a fatigue failure. Component fatigue is addressed under Level 5 inspection.

⚠ WARNING ⚠

Failure to use the proper type and viscosity of planetary gear oil may contribute to intermittent brake clutch slippage which could result in property damage, severe personal injury or death. Some gear lubricants contain large amounts of extreme-pressure (EP) and anti-friction additives which may contribute to brake clutch slippage or damage to brake friction discs or seals. Oil viscosity with regard to ambient temperature is also critical to reliable brake clutch operation. Our tests indicate that excessively heavy or thick gear oil may contribute to intermittent brake clutch slippage. Make certain that the gear oil viscosity used in your hoist is correct for your prevailing ambient temperature.

STANDARD PROCEDURE FOR HOIST OVERLOAD

If a hoist is overloaded during testing or operation by exceeding the maximum rated line pull of the hoist configuration, Arrowhead Winch has identified the following overload scenarios and established procedures to ensure the integrity of the hoist is maintained:

1. Hoists subjected to an overload of up to 10% over the maximum rated load may be permitted under the following conditions:
    - The overload occurrence is well documented, including recording of overload event, and details are retained with the service records of the hoist.
    - The number of overloads between Level 5 Teardown Inspections is less than three. After the third overload occurrence, it is necessary to perform a Level 5 Teardown Inspection.
2. Hoists subjected to an overload where an accurate measurement of the load is not available should be immediately removed from service and a Level 5 Teardown Inspection performed.
3. Hoists subjected to an overload where the service and testing history of the unit is not known should be immediately removed from service and a Level 5 Teardown Inspection performed.

Emergency Lowering — Hoists with Gear Motors

⚠ CAUTION ⚠

This procedure is for use specifically on hoists equipped with gear-type hydraulic motors. For hoists equipped with other hydraulic motors (piston, vane, etc.), contact Arrowhead Winch Service Department at 918-259-3315 or service@arrowheadwinch.com for assistance BEFORE attempting this procedure.

The following procedures release the multiple disc brake while leaving the brake valve closed.

Gear-type hydraulic motors are not zero-leakage devices. Internal motor leakage permits the load to slowly rotate the motor although its outlet is blocked by the closed brake valve.

This procedure will NOT work if there is little or no oil in the motor.

⚠ WARNING ⚠

Emergency Lowering Standpipe Group (PN 65359) or equivalent must be used. Attempting this procedure with no oil in the motor will cause the load to free-fall, which could result in property damage, serious injury or death.

Emergency Lowering Standpipe Group (PN 65359) or equivalent with properly rated pipe and fittings must be used (see page 11).

1. Remove the lockwire on the needle valve handle and close the valve tightly.
2. Remove cap on brake cylinder tee.
3. Remove both main hoses from the motor. Attach the standpipe to the lowering motor port (opposite side of the motor from the brake valve). Install a plug into the hoisting port in the brake valve.

⚠ WARNING ⚠

Attempting this procedure with the brake valve stuck in the open position will cause the load to free-fall, which could result in property damage, serious injury or death. Install a plug in the hoisting port of the brake valve.

4. Fill the standpipe with hydraulic oil, making certain that oil is not leaking from the brake valve plug. If oil is running out of the brake valve plug, stop the emergency lowering procedure and repair the leak.
5. Connect a hand pump to the open port in the tee.

⚠ WARNING ⚠

Do not touch the motor, brake valve or standpipe while lowering a load. They may become hot enough to cause burns.

6. Slowly operate the hand pump up to 1,000 PSI (68.9 bar). A suspended load will come down slowly when the static brake is released. Releasing the pressure on the hand pump will cause the load to stop. If a chattering noise is heard while the load is coming down, pump the hand pump to a slightly higher pressure until the noise stops. Do not exceed 1,500 PSI (103.4 bar) to the brake release port.
7. After completion of an emergency load lowering procedure, the hoist MUST be removed from service to inspect all brake components and hydraulic motor(s) for signs of heat and wear. Replace all worn parts as described in the applicable Arrowhead Winch service manual.
8. If this procedure was performed due to a malfunction of the hoist, remove the hoist from service and perform a complete Level 5 inspection to correct the cause of the malfunction before returning the hoist to service.

⚠ WARNING ⚠

Performing this procedure will create heat and may cause accelerated wear of hoist brake system and hydraulic components. Inspection and replacement of damaged brake assembly, hydraulic motor or brake valve components is critical to the safe operation of the hoist braking system. Failure to replace damaged components may result in loss of load control, property damage, serious injury or death.

Emergency Lowering — Hoists with Dual Input Gear Motors

⚠ CAUTION ⚠

This procedure is for use specifically on hoists equipped with gear-type hydraulic motors. For hoists equipped with other hydraulic motors (piston, vane, etc.), contact Arrowhead Winch Service Department at 918-259-3315 or service@arrowheadwinch.com for assistance BEFORE attempting this procedure.

On hoists with two motors, each motor has a separate mechanical brake that must be released to lower a load using the emergency lowering procedure.

The following procedure releases the multiple disc brakes while leaving the brake valves closed.

Gear-type motors are not zero-leakage devices. Internal motor leakage permits the load to slowly rotate the motor although its outlet is blocked by the closed brake valve.

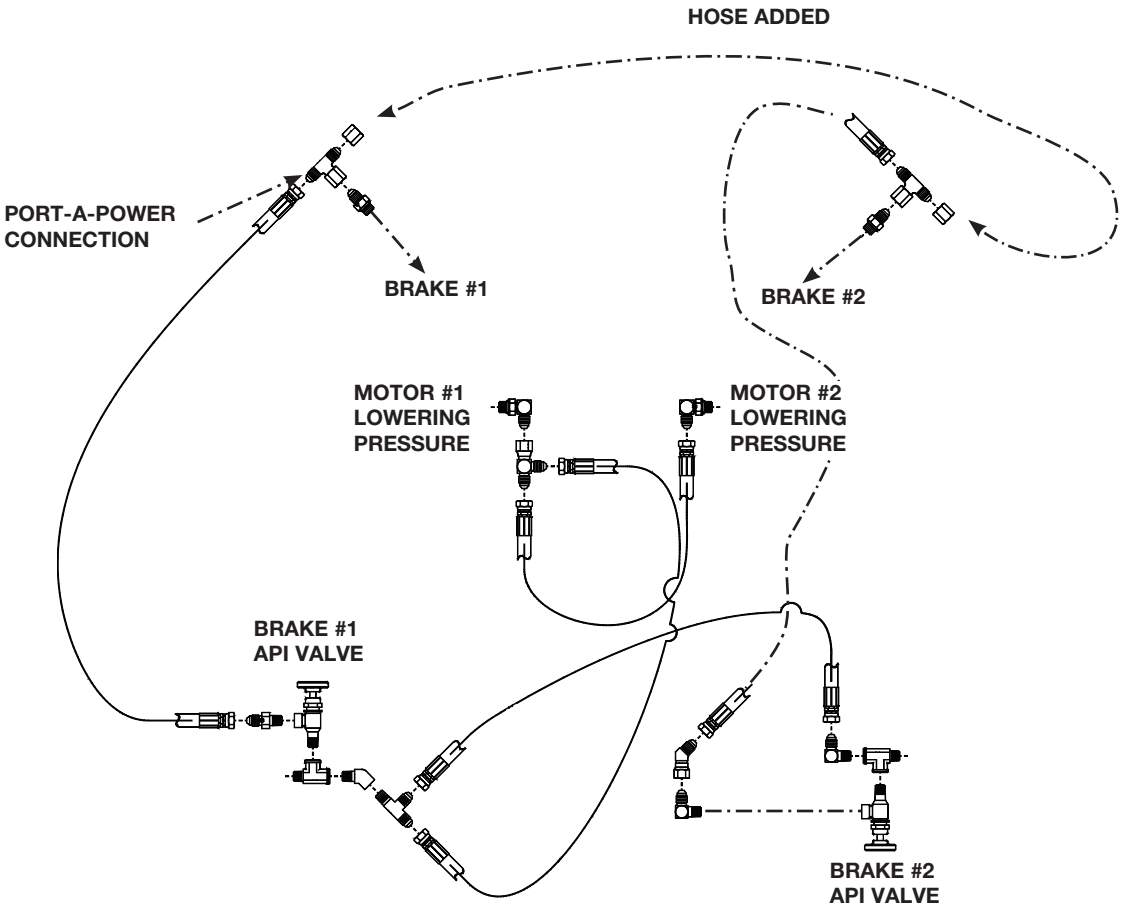
This procedure will NOT work if there is little or no oil in the motor.

⚠ WARNING ⚠

Emergency Lowering Standpipe Group (PN 65359) or equivalent must be used. Attempting this procedure with no oil in the motor will cause the load to free-fall, which could result in property damage, serious injury or death.

Install Emergency Lowering Standpipe Group (PN 65359) or equivalent with properly rated pipe and fittings (see page 11) onto the motor lowering ports.

1. Remove the lockwire and close the API needle valves in the lines to each brake. Remove the caps from the tee fittings at each brake release port.
2. Connect a hose with the proper fittings (typically –4 JIC flared fittings) between the two tee fittings on the brake release ports where the caps were removed.
3. On one of the brakes, disconnect the hose from the API needle valve to the brake at the brake



tee fitting, and connect a hydraulic hand pump to this tee fitting.

⚠ WARNING ⚠

Attempting this procedure with the brake valve stuck in the open position will cause the load to free-fall, which could result in property damage, serious injury or death. Install a plug in the hoisting port of the brake valve.

4. Install the standpipe on the lowering port of both motors and install a plug in the hoisting port in the brake valves.
5. Fill each standpipe with hydraulic oil, making certain that oil is not leaking out of the brake valve plug. If oil is leaking out of the brake valve plug, stop the emergency lowering procedure and repair the leak.

⚠ WARNING ⚠

Do not touch the motor, brake valve or standpipe while lowering a load. They may become hot enough to cause burns.

6. Slowly operate the hand pump up to 1,000 PSI (68.9 bar). A suspended load will slowly come down when the static brakes are released. Releasing the pressure on the hand pump will apply the brakes and stop the load. If a chattering noise is heard while the load is coming down, pump the hand pump to a slightly higher pressure until the noise stops. Do not exceed 1,500 PSI (103.4 bar) to the brake release port.
7. After completion of an emergency load lowering procedure, the hoist MUST be removed from service to inspect all brake components and hydraulic motor(s) for signs of heat and wear. Replace all worn parts as described in the applicable Arrowhead Winch service manual.
8. If this procedure was performed due to a malfunction of the hoist, remove the hoist from service and perform a complete Level 5 inspection to correct the cause of the malfunction before returning the hoist to service.

⚠ WARNING ⚠

Performing this procedure will create heat and may cause accelerated wear of hoist brake system and hydraulic components. Inspection and replacement of damaged brake assembly, hydraulic motor or brake valve components is critical to the safe operation of the hoist braking system. Failure to replace damaged components may result in loss of load control, property damage, serious injury or death.

Emergency Lowering — Hoists with Dual Brake Valves on a Single Motor

On Arrowhead Winch hoists with dual inputs and dual brake valves on a single motor, the two hoist ports share common porting and the two lowering ports share common porting. Therefore, the standpipe on the lowering side of the motor can be connected to just one flange so long as the hydraulic makeup oil is prevented from draining through the other flange.

Connect the standpipe and follow the standard procedure explained in Emergency Lowering – Hoists with Gear Motors section of this document.

Emergency Lowering — Auxiliary Brake Hoists

Equipment required for this procedure includes:

- Two hand pumps: one pump equipped with adapters for the main brake, the other equipped with adapters for the auxiliary brake.
- Emergency Lowering Standpipe Group (PN 65359) or equivalent with properly rated pipe and fittings as described on page 11 of this document.
- Hand tools to tighten standpipe and hoses
- Approximately 10 gallons of oil that can be poured into the standpipe and used for makeup oil in the hand pumps
- Drain pans and absorbent material to contain any spilled oil

1. Remove the pilot hose from the release port of the auxiliary brake housing.

2. Install the hydraulic hand pump to the release port of the auxiliary brake housing.
3. Slowly apply pressure to the auxiliary brake while watching the hoist drum to ensure there is no drum movement. Stop the emergency lowering procedure if there is any movement of the hoist drum. After verifying no drum movement, apply 800 PSI (55.2 bar) to the auxiliary brake release port and operate the hand pump as needed to maintain pressure and keep the auxiliary brake released.

⚠ WARNING ⚠

Do not exceed 800 PSI (55.2 bar) in the auxiliary brake when using the hand pump. Overpressure of the auxiliary brake may cause property damage, serious injury or death.

Refer to the Emergency Lowering – Hoists with Gear Motors section of this document. After the auxiliary brake is released with the hand pump, the standard procedure applies.

It is recommended to place an emergency load lowering kit close to the hoist. Kit should be easily accessible and should include a printed copy of the emergency lowering procedure.

Emergency Lowering Standpipe

During emergency lowering procedures, Emergency Lowering Standpipe Group (PN 65359) or equivalent must be used.

The standpipe is simply a length of pipe, approximately 12” (305 mm) long, attached to a 90° elbow. The other end of the elbow is attached to the lowering motor port or manifold.

The standpipe is installed with the long open end pointing up in a vertical position to serve as a small reservoir.

While the load is being lowered, hydraulic oil MUST be added to the standpipe as necessary to prevent the motor from running dry.

PERSONNEL HANDLING

Arrowhead Winch recognizes that most hoists and cranes are designed and intended for handling materials and not personnel. **A hoist or crane is to be used to handle personnel ONLY if it can be shown there is no less-hazardous way of performing the job.**

In these situations, all safety precautions must be strictly adhered to. Arrowhead Winch recommends adherence to the latest revision of the following:

- API 2C (RP 2D)
- ANSI/ASME standard B30.5
- OSHA and/or other applicable standards for your application

It is important that you obtain a copy of all applicable safety standards, and that you read and understand them prior to using the hoist.

In addition to the applicable standards, Arrowhead Winch requires the following for hoists utilized for personnel handling:

- The hoist must be maintained in accordance with the recommendations in this document and the service procedures in the Installation, Maintenance and Service Manual for your specific hoist.
- When handling personnel, the allowable line pull will be limited to 50% of the hoist rated line pull for the respective layer of wire rope on the drum.
- Personnel are permitted to ride in an approved personnel platform only as described in API, OSHA or ANSI/ASME standards.
- The crane must be in good working order and equipped with all required safety equipment, including an anti two-blocking device or warning signal, a boom angle and length indicator. Two-blocking occurs when the load block or hook assembly comes in contact with the upper block or point sheave assembly and often results in damage to wire rope, rigging, crane and/or hoist.
- Personnel being lifted or supported shall wear safety belts with lanyards attached to designated points unless lifting over water. If lifting over water, provide approved personal flotation devices (PFD).
- The lift shall be made under controlled conditions and under the direction of an appointed qualified signal person.
- The operator and signal person shall conduct a test lift, without personnel on the personnel platform, to verify adequacy of the crane footing or support. The crane outriggers, if so equipped, must be fully extended and properly set.
- Cranes shall not travel (move locations) while personnel are on the personnel platform.
- The platform must be landed or tied off, and all brakes set before personnel enter or exit.

For questions, concerns or conflicts regarding safety standards, contact Arrowhead Winch Service Department at 918-259-3315, Monday through Friday, 8:00 a.m. to 4:30 p.m. (Central Time); or by email at service@arrowheadwinch.com.

Additional information is available from the following organizations:

- “Hoisting Personnel Field Guide,” Crane Institute of America Inc., 3880 St. Johns Parkway, Sanford, FL 32771 USA; 800-832-2726; www.craneinstitute.org
- OSHA Standard 29 CFR 1926.550 – Cranes, Derricks, Hoists, Elevators, and Conveyors, Occupational Safety and Health Administration (OSHA), 200 Constitution Ave. NW, Washington D.C. 20210 USA; 800-321-6742; www.osha.gov
- ANSI/ASME Standard B30.5, American National Standards Institute (ANSI), 25 W. 43rd St., 4th floor, New York, NY 10036 USA; 212-642-4900; www.ansi.org
- API Specification 2C and RP 2D, American Petroleum Institute (API), 1220 L Street, NW, Washington, D.C. 20005 USA; 202-682-8000; www.api.org
- American Bureau of Shipping (ABS), 16855 Northchase Drive, Houston, TX 77060; 281-877-6000; https://ww2.eagle.org