



**OPERATOR'S HANDBOOK AND
CALIBRATION GUIDE**

**Anti-Two Block System (A2B)
Angle Indicator System (EI-10)
Angle-Length Indicator System (EI-20)**

**Operator's Handbook
and Calibration Guide**

**PAT
ANTI-TWO-BLOCK SYSTEM (A2B)
ANGLE INDICATOR SYSTEM (EI-10)
ANGLE-LENGTH INDICATOR SYSTEM (EI-20)**

WARNING

PAT operational aids are devices which warn a crane operator of certain approaching hazardous conditions which could cause damage to equipment and property, and injury to the operator or bystanders.

These devices are not, and shall not be, a substitute for good operator judgement, experience and use of accepted safe crane operating procedures.

The responsibility for the safe operation of the crane shall remain with the crane operator who shall ensure that all warnings and instructions supplied are fully understood and observed.

Prior to operating the crane, the operator must carefully and thoroughly read and understand the information in this manual and in the crane manufacturer's manual to ensure that he knows the operation and the limitations of the operational aid and crane.

Proper functioning is dependent upon proper daily inspection and observations of the operating procedures set forth in this manual.

NOTICE

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1. INTRODUCTION AND DESCRIPTION

1.1 Introduction

PAT operational aid systems are a group of warning devices which warn the crane operator of certain approaching hazardous conditions which could occur during the operation of his crane.

The purpose of this operator's manual is to provide information to help him operate, maintain and troubleshoot PAT operational aid systems.

The manual contains the system description and operating information, as well as calibration procedures for each PAT operational aid.

1.2 Description of Systems

Anti-Two-Block System: an operational aid which warns the crane operator, by means of audible and visual signals, of an approaching two-block condition, and activates the control lever lockout system on the crane.

The term "two-block" is a crane term which refers to a condition which occurs when the hook block comes into contact with the boom head. This condition, if not prevented, will cause the wire rope to break, allowing the load to fall. Two-blocking can be caused by raising the load into the boom head, lowering the boom without paying out hoist line and, in the case of a hydraulic machine, by extending the boom without paying out hoist line.

Anti-Two-Block/Angle Indicator (EI-10): Includes the basic anti-two-block system and provides the operator with a constant indication of the boom's angle with respect to the horizontal. This system also allows the operator to preset an upper and lower boom angle for easier crane operation. If either of these limits is exceeded, the system will warn the operator by means of audible and visual signals.

Anti-Two-Block/Angle/Length Indicator (EI-20): Includes the basic anti-two-block system and provides the operator with a constant indication of the main boom's angle and length. This system also allows the operator to preset an upper and lower boom angle for easier crane operation. If either of these limits is exceeded, the system will warn the operator by means of audible and visual signals.

2. ANTI-TWO-BLOCK SYSTEM

2.1 Components of PAT A2B

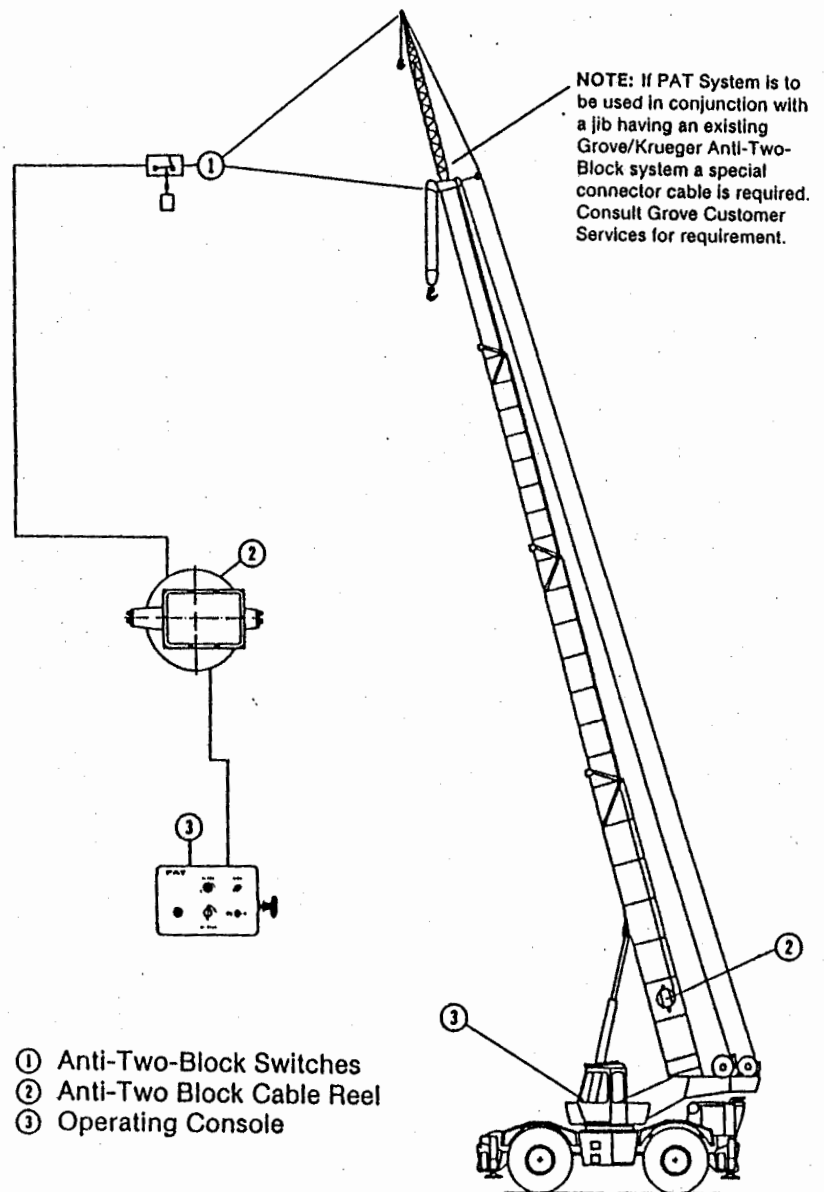


Figure 2-1

2.2 Console Description

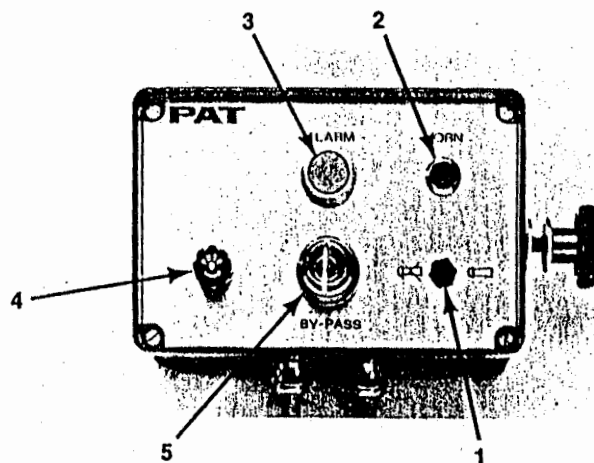


Figure 2-2

Figure 2-2 illustrates the controls and display of the Anti-Two-Block console. The numbers on the illustration correspond to the numbers in the following list, which describes the function of each control.

1. **Audible Alarm Switch.** This two-position switch energizes and de-energizes the audible alarm. Place the switch in the left position to silence the audible alarm. The right position allows the audible alarm to sound when required.

WARNING

The audible alarm must not be silenced during crane operation, as the operator may not be alerted by the red warning light only, especially in bright sunlight.

2. **Audible Alarm.** The audible alarm will sound when the limit switch contacts open, indicating that a two-blocking condition is approaching.
3. **Visual Alarm Indicator.** This red warning light will light when the limit switch contacts open, indicating that a two-blocking condition is approaching.

2.2 Console Description (continued)

4. **Fuse.** The fuse prevents damage to the Anti-Two-Block system should a short circuit occur. The system will not function with a burned out fuse. A burned fuse should be replaced.
5. **By-Pass Switch.** The by-pass switch is used to deactivate the Control Lever Lockout system when in a two-blocking condition.

NOTE

SINCE THIS SWITCH DEACTIVATES THE CUT-OFF FUNCTION OF THE ANTI-TWO-BLOCK SYSTEM, THE FOLLOWING INSTRUCTIONS MUST BE ADHERED TO. THE BY-PASS KEY SHOULD BE USED WITH DISCRETION, AS UNWARRANTED USE OF IT TO OVERRIDE THE CONTROL LEVER LOCK-OUT SYSTEM CAN RESULT IN HARM TO THE CRANE AND DANGER TO PROPERTY AND PERSONS.

2.3 Operation

The PAT Anti-Two-Block System consists essentially of weighted hoist limit switches; a cable reel; and an operator's console which contains system controls, along with visual and audible warning indicators.

Hoist limit switches are mounted on the head of the main boom, and if so equipped on the head of the boom extension/jib. A weight attached to the spring loaded limit switch and around the hoist line, hold the limit switch in the closed position. When approaching a two-block condition the crane's hook block comes into contact with the weight, lifting it, allowing the switch contacts to open.

Opening the limit switch contacts sends a signal, through the cable reel, to the operator's console. The operator is alerted to the approaching two-blocking condition by means of a red warning light and an audible alarm. Simultaneously with this warning, the crane's control lever lockout system is activated, preventing continued crane operation which can create a two-block condition. This system, when activated, will prevent booming down; telescoping out; and hoisting up.

2.4 Pre-Operation Test

Prior to operating the crane, the following electrical connections must be checked to ensure that the system is properly connected for the crane configuration.

If the crane is NOT equipped with an extension or extension remains in stowed position, the by-pass plug must be installed at the boom nose. However, be sure the weight of the Anti-Two-Block switch is properly installed on the main hoist load line. With even parts of hoisting line, the weight should be attached to the dead-end line. With odd parts of hoisting line, the weight should be attached to the line of lowest speed.

If the crane works WITH EXTENSION/JIB, the jumper cable must be installed between the junction box on the extension/jib and the boom nose junction box. The weight attached to the main hoist Anti-Two-Block switch must then be removed and reattached to the extension/jib Anti-Two-Block switch for single winch operation. For two winch operation use Anti-Two-Block weight for both switches.

WARNING

Failure to re-position the Anti-Two-Block switch weight will prevent the overhoist system from functioning properly. No weight must be on the main hoist Anti-Two-Block switch when the extension/jib is being used.

After the electrical connections have been checked to insure that the system is properly connected for the crane configuration, the following checks must be made:

1. Check the cabling connecting the various parts of the system for physical damage.
2. Check the Anti-Two-Block switches and weights for free movement.
3. Check the spring-loaded cable reel to be sure it is free to rotate, has tension and the cable is reeled properly.

2.4 Pre-Operation Test (continued)

WARNING

THE FOLLOWING TESTS MUST BE PERFORMED WITH CARE TO PREVENT DAMAGE TO THE MACHINE OR INJURY TO PERSONNEL. PROPER FUNCTIONING OF THE SYSTEM REQUIRES SUCCESSFUL COMPLETION OF THESE TESTS.

If the operator cannot clearly see the hook block approaching the boom head, he should have an assistant watch the hook block. The operator should be prepared to stop the machine immediately should the Anti-Two-Block system not function properly by lighting the red warning light, sounding the audible alarm and locking the dangerous crane movements.

1. Check the Anti-Two-Block alarm light and the audible alarm by manually lifting the weight attached to the Anti-Two-Block switches.
2. Slowly raise the main boom hook block to bring it into contact with the switch weight. When the hook block lifts the weight, the audible alarm should sound, the Anti-Two-Block alarm light should light and the motion of the hook block should be stopped. Lower the hook block slightly to eliminate this condition.
3. Slowly lower or extend the boom to create a potential two-block condition. When the hook block lifts the weight, the audible alarm should sound, the Anti-Two-Block alarm light should light and the boom lowering and/or boom extension function should be stopped.

If the light and audible alarm do not function as described and the crane movements are not stopped, the system is not working properly. **THE MALFUNCTION MUST BE CORRECTED BEFORE OPERATING THE CRANE.**

If the crane is equipped with an extension/jib, repeat the test procedure for the extension/jib Anti-Two-Block switch.

2.5 Service and Maintenance

Maintenance of the Anti-Two-Block System consists of inspecting:

- 1. The cabling connecting the various parts of the system.** If a cable is damaged, it should be replaced immediately.
- 2. The insulation of the two-block cable and the cable guides.** If the insulation is worn or the cable guides damaged, these parts should be replaced.
- 3. Check the Anti-Two-Block limit switches for freedom of movement.** By lifting each two-block switch weight, assure that light, alarm and level lockouts are functioning.
- 4. The cable reel must be under tension to operate properly.**

Other than replacing faulty mechanical parts and cables, no other repairs are to be performed by non-expert personnel.

3. ANTI-TWO BLOCK/ANGLE INDICATOR SYSTEM — EI-10

3.1 Components of PAT Anti-Two-Block/Angle System

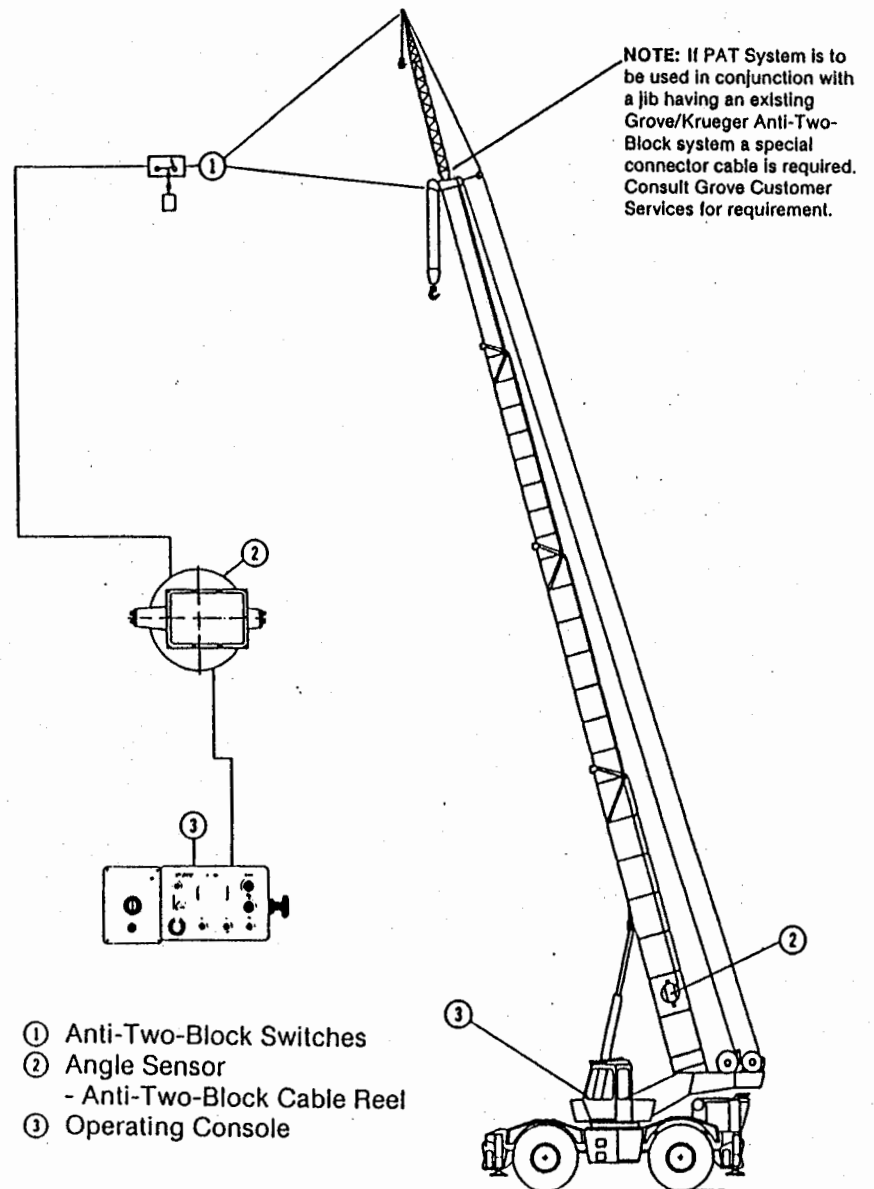


Figure 3-1

3.2 Console Description

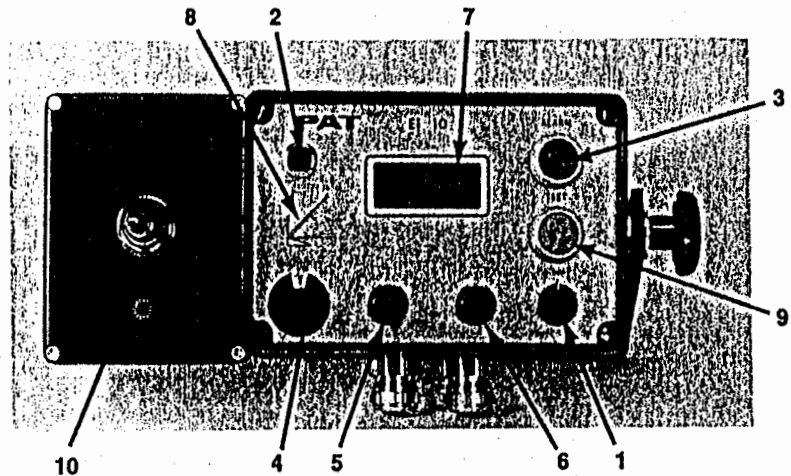


Figure 3-2

Figure 3-2 illustrates the controls and display of the Anti-Two-Block Angle Indicator. The numbers on the illustration correspond to the numbers in the following list, which describes the function of each control.

1. **On-Off Switch.** The on-off switch is a three-position rotary switch which energizes and de-energizes the angle indicator and audible alarm.

If the switch is turned to the far left "ON" position, the angle indicator is energized, however, the audible alarm is disconnected. In this position, the audible alarm will not sound when a two-block condition occurs or the preset upper and lower boom angles are exceeded.

WARNING

The audible alarm must not be silenced during crane operation, as the operator may not be alerted by the red warning light, especially in bright sunlight.

3.2 Console Description (continued)

If the switch is placed in the center "OFF" position, the angle indicator and audible alarm are de-energized and will not function.

If the switch is turned to the far right "ON" position, the angle indicator and audible alarm are energized. In this position, the audible alarm will sound when a two-block condition occurs or the preset upper and lower boom angles are exceeded. (NOTE: For normal operation the switch should be in this position.)

2. **Audible Alarm.** The audible alarm will sound when an approaching two-blocking condition occurs and/or the main boom angle exceeds the preset upper or lower boom angle limits. The audible alarm will only sound when the ON-OFF switch is to the right, or audible alarm on position.
3. **Visual Alarm Indicator.** This red warning light will light when an approaching two-blocking condition occurs and/or the main boom angle exceeds the preset upper or lower boom angle limit.
4. **Mode Selector Switch.** The mode selector switch determines the information which will be displayed on the operator's console. Each mode is identified by a number (1 to 3) displayed under the window of the control knob. The function of each position is as follows.

NOTE

Control lever lockouts should function in a two-block condition with mode selector switch in any position. Also, control lever lockouts **are not activated** by boom angle preset limits.

Position 1. With the mode selector switch in this position, the digital display will indicate the main boom angle in degrees with reference to the horizontal.

Position 2. With the mode selector switch in this position, the digital display will indicate the preset upper boom angle limit which has been set using upper limit control (5).

Position 3. With the mode selector switch in this position, the digital display will indicate the preset lower boom angle limit which has been set using lower limit control (6).

3.2 Console Description (continued)

5. **Upper Limit Control.** This control is used to preset an upper boom limit, so that the angle indicator will warn the operator when this angle is reached or exceeded.

Turn the knob clockwise to increase the boom angle setting; counter-clockwise reduces the setting. The settings are displayed on the digital display of the console when the Mode Selector switch is in position 2.

6. **Lower Limit Control.** This control is used to preset a lower boom limit, so that the angle indicator will warn the operator when this angle is reached or exceeded.

Turn the knob clockwise to increase the boom angle setting; counter-clockwise reduces the setting. The settings are displayed on the digital display of the console when the Mode Selector switch is in position 3.

7. **Digital Display.** The digital display provides the operator with information regarding the angle of the main boom. The information which is displayed is dependent upon the position of the Mode Selector switch.

When the Mode Selector switch is in position 1, the digital display will indicate the angle of the main boom.

When the Mode Selector switch is in position 2, the digital display will indicate the preset upper boom limit.

When the Mode Selector switch is in position 3, the digital display will indicate the preset lower boom limit.

8. **Crane Symbol.** The crane symbol symbolizes a telescopic crane and serves as a reminder of the relationship between the Mode Selector switch and the resulting digital displays. The numbers in the symbol refer to the Mode Selector switch numbers and the arrows refer to the digital display indications.

The crane symbol also indicates that the horizontal position of the main boom is at zero degrees and the vertical position of the main boom is at 90 degrees.

3.2 Console Description (continued)

9. **Test Pushbutton.** The blue "TEST" pushbutton allows the operator to test the functions of the angle indicator.

CAUTION

The test pushbutton must not be held depressed for extended periods of time. Doing so will damage the digital LCD display.

10. **By-Pass Switch.** The by-pass switch is used to by pass the Control Lever Lockout System when in a two-blocking condition.

NOTE

SINCE THIS SWITCH BY PASSES THE LEVER LOCKOUT SYSTEM THE FOLLOWING INSTRUCTIONS MUST BE ADHERED TO: THE BY-PASS KEY SHOULD BE USED WITH DISCRETION, AS UNWARRANTED USE OF IT TO OVERRIDE THE CONTROL LEVER LOCKOUT SYSTEM CAN RESULT IN HARM TO THE CRANE AND DANGER TO PROPERTY AND PERSONS.

3.3 Operation

The PAT Anti-Two-Block/Angle Indicator system includes the basic Anti-Two-Block system described in this manual with a different operator's console and a pendulum driven angle potentiometer, which is mounted in an oil filled aluminum box. The oil in the box provides a dampening action which provides a smooth reading at the operator's console.

The angle indicator is mounted in the cable reel housing so that it can sense the movement of the boom as it is raised and lowered. As the boom is raised or lowered, the pendulum rotates the potentiometer which sends a signal to the operator's console through the cable reel.

NOTE

The angle indicator is not a serviceable part. Therefore, if the angle indicator does not function properly, it must be replaced.

3.3 Operation (continued)

The operation of the angle indicator system is fully automated when the machine is in operation. When a two-blocking condition occurs or an upper or lower preset angle limit is exceeded, the operator will be warned by means of a red warning light and audible alarm.

WARNING

The audible alarm can be silenced by placing the ON-OFF switch in far left position. While it may be desirable, it is not recommended as the operator may not see the red warning light when a two-blocking condition occurs or a preset angle limit is exceeded. The audible alarm switch should always be in the far right position during crane operation.

3.4 Pre-Operation Test

1. Energize the crane's electrical system.
2. Energize the angle indicator electrical system by turning the ON-OFF switch clockwise to the right hand position.
3. Perform anti-two-block pre-operation tests described in Anti-Two-Block Section of this manual.
4. Press the blue "TEST" button (9) momentarily. If the operator's console is operating properly, the red warning light should light, the audible alarm should sound and the digital display should read 1888. This will last approximately 3 to 4 seconds.

Verify proper operation of control lever lockouts by checking the crane motion "hoist-up" (for main and auxiliary hoists), "boom lowering" and "boom extension" functions cease while the red warning light is on and the audible alarm sounds.

5. Turn the Mode Selector switch (4) to position 2. The digital display now indicates the upper boom limit in degrees.

WARNING

Once the correct angle limits are set, do not turn the limit controls as this will change the limit settings.

3.4 Pre-Operation Test (continued)

If the upper boom limit is set to the desired angle, proceed to step 6. If not, set the upper limit by means of the upper limit control; clockwise to increase the boom angle or counter-clockwise to decrease the boom angle.

6. Turn the Mode Selector switch (4) to position 3. The digital display now indicates the lower boom limit in degrees.

If the lower boom limit is set to the desired angle, proceed to step 7. If not, set the lower limit by means of the lower limit control; clockwise to increase the boom angle or counter-clockwise to decrease the boom angle.

7. Turn the Mode Selector switch to position 1. The angle indicator is now set to provide a continuous digital display of the main boom angle.
8. Raise the boom until the preset upper limit is reached. At that moment, the red warning light should light and the audible alarm should sound. Verify that the boom is at the angle indicated on the digital display.
9. Lower the boom until the preset lower limit is reached. At that moment, the red warning light should light and the audible alarm should sound. Verify that the boom is at the angle indicated on the digital display.

The angle indicator and Anti-Two-Block system have now been tested and adjusted, and are ready for operation.

3.5 Calibration

Before placing the angle indicator in service, the system must be calibrated as follows.

1. Remove cover from cable reel. Check level of angle sensor to level of boom. Loosen socket head capscrews and adjust angle sensor to the same level as the main boom. Tighten capscrews and reinstall cover.

3.5 Calibration (continued)

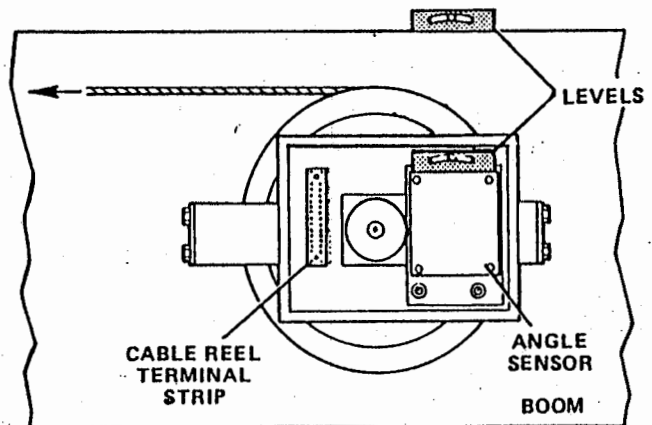
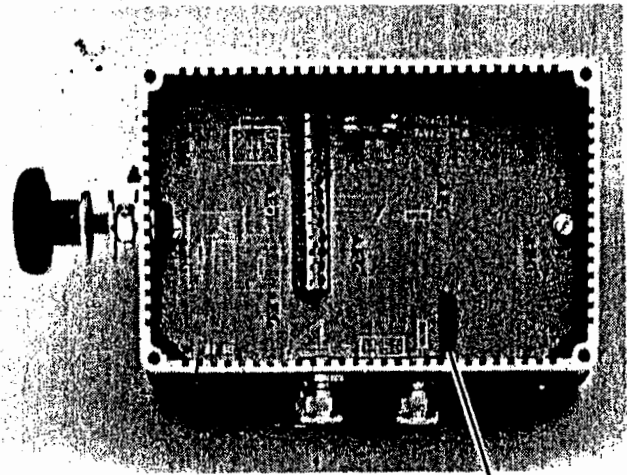


Figure 3-3. Angle Sensor Adjustment

2. Remove the front panel of the operator's console.
3. Energize the crane's electrical system.
4. Turn the console ON/OFF switch to the right-hand position to energize the angle indicator system.
5. Lower the hook block to make sure the Anti-Two-Block limit switch is not activated during calibration.
6. Set the Mode Selector switch to position 1 (boom angle). Raise the boom to an angle of 45 degrees. Check the angle of the boom with a combination angle meter/level to be sure the boom is exactly 45 degrees.
7. The digital display on the console should read 45. If the console reading is not 45, adjust potentiometer P1 with a small screwdriver until the reading is 45. The potentiometer is located on the back of the console (see Figure 3-4).

3.5 Calibration (continued)

8. Lower the boom to an exact horizontal position. The digital display should read zero. If the console reading is not zero, adjust the angle sensor in the cable reel until the reading is zero. Then repeat steps 6 and 7.
9. De-energize the angle indicator and crane electrical systems.
10. Install the front panel with four mounting screws.
11. This completes the calibration of the angle indicator.



ANGLE CALIBRATION
POTENTIOMETER P1

Figure 3-4. Angle Indicator Adjustment

3.6 Maintenance

The angle indicator system is an electro-mechanical system which does not require any periodic maintenance other than that shown for the Anti-Two-Block system in the Anti-Two-Block section of this manual.

4. ANTI-TWO BLOCK/ANGLE-LENGTH INDICATOR SYSTEM — EI-20

4.1 Components of PAT Anti-Two-Block/Length-Angle System

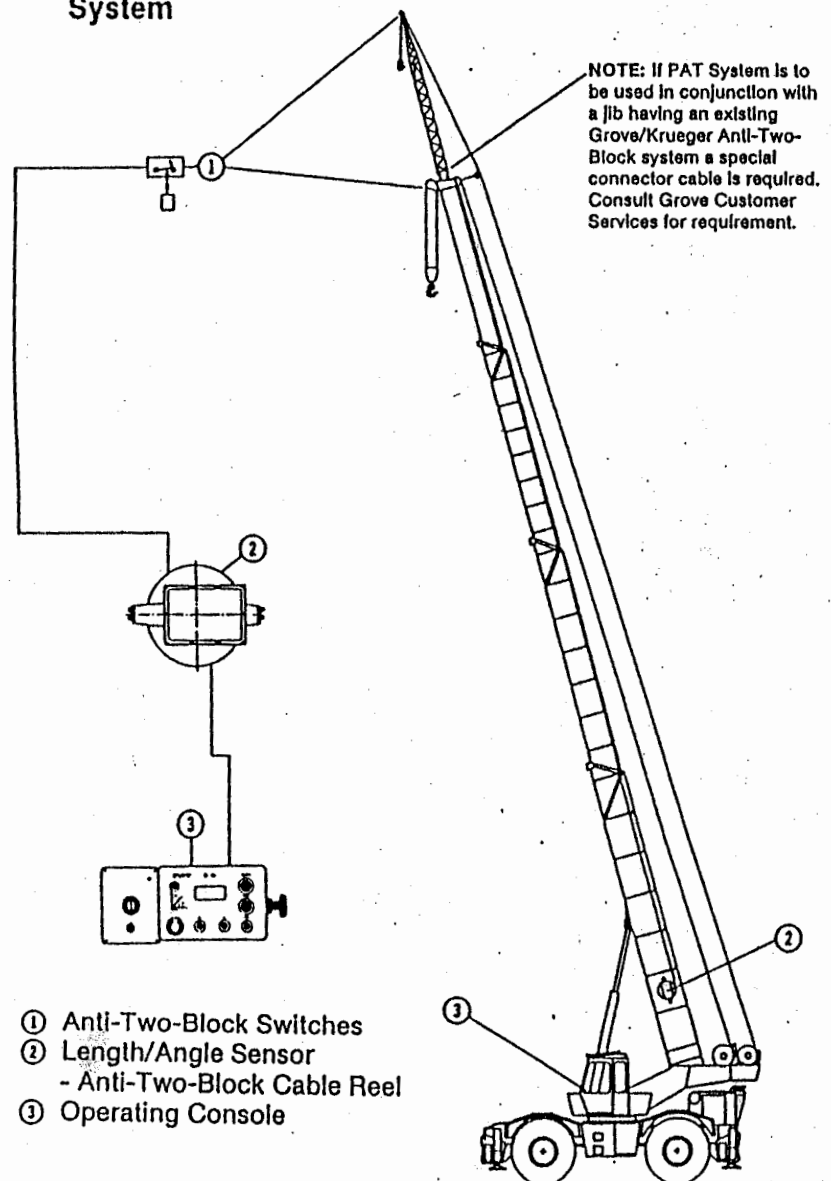


Figure 4-1

4.2 Console Description

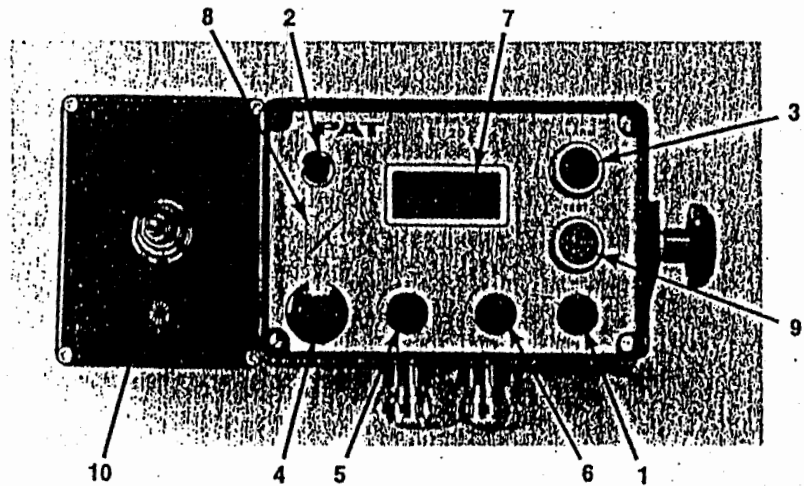


Figure 4-2

Figure 4-2 illustrates the controls and display of the Anti-Two-Block Length-Angle Indicator. The numbers on the illustration correspond to the numbers in the following list, which describes the function of each control.

1. **On-Off Switch.** The on-off switch is a three-position rotary switch which energizes and de-energizes the angle indicator and audible alarm.

If the switch is turned to the far left "ON" position, the angle indicator is energized, however, the audible alarm is disconnected. In this position, the audible alarm will not sound when a two-block condition occurs or the preset upper and lower boom angles are exceeded.

WARNING

The audible alarm must not be silenced during crane operation, as the operator may not be alerted by the red warning light, especially in bright sunlight.

2 Console Description (continued)

If the switch is placed in the center "OFF" position, the angle indicator and audible alarm are de-energized and will not function.

If the switch is turned to the far right "ON" position, the angle indicator and audible alarm are energized. In this position, the audible alarm will sound when a two-block condition occurs or the preset upper and lower boom angles are exceeded. (NOTE: For normal operation the switch should be in this position.)

2. **Audible Alarm.** The audible alarm will sound when an approaching two-blocking condition occurs and/or the main boom angle exceeds the preset upper or lower boom angle limits. The audible alarm will only sound when the ON-OFF switch is to the right, or audible alarm on position.
3. **Visual Alarm Indicator.** This red warning light will light when an approaching two-blocking condition occurs and/or the main boom angle exceeds the preset upper or lower boom angle limit.
4. **Mode Selector Switch.** The mode selector switch determines the information which will be displayed on the operator's console. Each mode is identified by a number (1 to 4) displayed under the window of the control knob. The function of each position is as follows (position 5 is not used):

NOTE

Control lever lockouts should function in a two-block condition with mode selector switch in any position. Also, control lever lockouts are not activated by boom angle preset limits.

Position 1. With the mode selector switch in this position, the digital display will indicate the length of the main boom in feet or meters (depending on calibration).

Position 2. With the mode selector switch in this position, the digital display will indicate the main boom angle in degrees with reference to the horizontal.

Position 3. With the mode selector switch in this position, the digital display will indicate the preset upper boom angle limit which has been set using upper limit control (5).

4.2 Console Description (continued)

Position 4. With the mode selector switch in this position, the digital display will indicate the preset lower boom angle limit which has been set using lower limit control (6).

5. **Upper Limit Control.** This control is used to preset an upper boom limit, so that the angle indicator will warn the operator when this angle is reached or exceeded.

Turn the knob clockwise to increase the boom angle setting; counter-clockwise reduces the setting. The settings are displayed on the digital display of the console when the Mode Selector switch is in position 2.

6. **Lower Limit Control.** This control is used to preset a lower boom limit, so that the angle indicator will warn the operator when this angle is reached or exceeded.

Turn the knob clockwise to increase the boom angle setting; counter-clockwise reduces the setting. The settings are displayed on the digital display of the console when the Mode Selector switch is in position 3.

7. **Digital Display.** The digital display provides the operator with information regarding the angle of the main boom. The information which is displayed is dependent upon the position of the Mode Selector switch.

When the Mode Selector switch is in position 1, the digital display will indicate the main boom length.

When the Mode Selector switch is in position 2, the digital display will indicate the angle of the main boom.

When the Mode Selector switch is in position 3, the digital display will indicate the preset upper boom limit.

When the Mode Selector switch is in position 4, the digital display will indicate the preset lower boom limit.

8. **Crane Symbol.** The crane symbol symbolizes a telescopic crane and serves as a reminder of the relationship between the Mode Selector switch and the resulting digital displays. The numbers in the symbol refer to the Mode Selector switch numbers and the arrows refer to the digital display indications.

4.3 Operation (continued)

WARNING

The audible alarm can be silenced by placing the ON-OFF switch in far left position. While it may be desirable, it is not recommended as the operator may not see the red warning light when a two-blocking condition occurs or a preset angle limit is exceeded. The audible alarm switch should always be in the far right position during crane operation.

4.4 Pre-Operation Test

1. Energize the crane's electrical system.
2. Energize the Angle/Length Indicator electrical system by turning the ON-OFF switch clockwise to the right hand position.
3. Perform anti-two-block pre-operation tests described in Anti-Two-Block Section of this manual.
4. Press the blue "TEST" button (9) momentarily. If the operator's console is operating properly, the red warning light should light, the audible alarm should sound and the digital display should read 1888. This will last approximately 3 to 4 seconds.

Verify proper operation of control lever lockouts by checking the crane motions "hoist-up" (for main and auxiliary hoists), "boom lowering" and "boom extension" functions cease while the red warning light is on and the audible alarm sounds.

5. Turn the Mode Selector switch (4) to position 3. The digital display now indicates the upper boom limit in degrees.

WARNING

Once the correct angle limits are set, do not turn the limit controls as this will change the limit settings.

If the upper boom limit is set to the desired angle, proceed to step 6. If not, set the upper limit by means of the upper limit control: clockwise to increase the boom angle or counter-clockwise to decrease the boom angle.

4.4 Pre-Operation Test (continued)

6. Turn the Mode Selector switch (4) to position 4. The digital display now indicates the lower boom limit in degrees.

If the lower boom limit is set to the desired angle, proceed to step 7. If not, set the lower limit by means of the lower limit control; clockwise to increase the boom angle or counter-clockwise to decrease the boom angle.

7. Turn the Mode Selector switch to position 2. The angle indicator is now set to provide a continuous digital display of the main boom angle.
8. Raise the boom until the preset upper limit is reached. At that moment, the red warning light should light and the audible alarm should sound. Verify that the boom is at the angle indicated on the digital display.
9. Lower the boom until the preset lower limit is reached. At that moment, the red warning light should light and the audible alarm should sound. Verify that the boom is at the angle indicated on the digital display.
10. Turn Mode Selector switch to position 1. Check length indication with boom fully retracted and extended and assure readings agree with actual boom lengths.

The angle/length indicator and Anti-Two-Block system have now been tested and adjusted, and are ready for operation.

4.5 Calibration

Before placing the angle/length indicator in service, the system must be calibrated as follows.

1. Remove cover from cable reel. Check level of angle sensor. Loosen socket head capscrews and adjust angle sensor to same level as boom.

4.5 Calibration (continued)

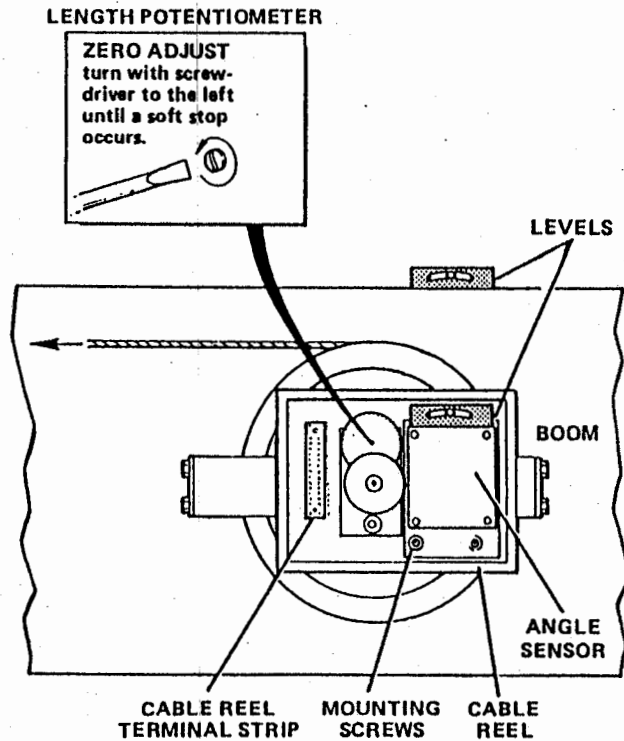


Figure 4-3. Angle/Length Sensor Adjustment

2. With boom fully retracted and boom stops disengaged (if applicable), turn the screw in the center of the large nylon gear on the length sensor counter-clockwise until it just stops. Reinstall cover on cable reel.
3. Remove the front panel of the operator's console.
4. Energize the crane's electrical system.
5. Turn the console ON/OFF switch to the right-hand position to energize the angle/length indicator system.
6. Lower the hook block to make sure the Anti-Two-Block limit switch is not activated during calibration.

4.5 Calibration (continued)

7. Set the mode selector switch to position 1 (boom length).

The digital display on the console should read the length of the retracted boom. If the console reading is not correct, adjust potentiometer P2 with a small screwdriver until the reading is the length of the retracted boom. The potentiometer is located on the back of the console (see Figure 4-4).

8. Extend the boom to its maximum length. The digital display on the console should read the length of the extended boom. If the console reading is not correct, adjust potentiometer P3 with a small screwdriver until the reading is the length of the extended boom. The potentiometer is located on the back of the console (see Figure 4-4).
9. Set the Mode Selector Switch to position 2 (boom angle). Raise the boom to an angle of 45 degrees. Check the angle of the boom with a combination angle level indicator to be sure the boom is exactly 45 degrees.
10. The digital display on the console should read 45. If the console reading is not 45, adjust potentiometer P1 with a small screwdriver until the reading is 45. The potentiometer is located on the back of the console (see Figure 4-4).

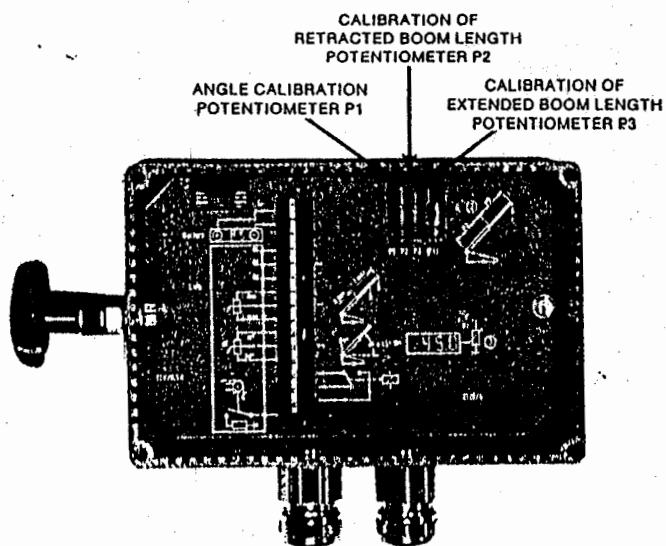


Figure 4-4. Angle Indicator Adjustment