



www.patamerica.com

PAT America, Inc.

PAT

PAT

LOAD MOMENT INDICATOR

iFLEX5



SERVICE MANUAL

9333104048

P/N 031-300-190-154 REV F 07/29/2003

NOTICE

NOTICE

PAT America, Inc. makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and/or its fitness for a particular purpose.

PAT America, Inc. will not be liable for errors contained in this manual or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual. This document contains proprietary information, which is protected by copyright, and all rights are reserved.

No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of PAT America, Inc.

PAT America, Inc. reserves proprietary rights to all drawings, photos and the data contained therein. The drawings, photos and data are confidential and cannot be used or reproduced without the written consent of PAT America, Inc. The drawings and/or photos are subject to technical modification without prior notice.

All information in this document is subject to change without notice.

MANUAL REVISIONS

REV	DATE	NAME	DESCRIPTION
-	04/10/02	CSH	ECN 02-122
A	06/03/02	MO	ECN 02-122
B	06/15/02	MO	ECN 02-122
C	06/24/02	MO	ECN 02-122
D	07/01/02	MO	ECN 02-122
E	12/04/02	CSH	ECN 02-179
F	07/29/03	CSH	ECN 03-088

TABLE OF CONTENTS

1 General Information..... 1

2 Warnings 1

3 Description Of The System..... 2

3.1 DESCRIPTION OF SYSTEM FUNCTION.....2

3.2 DESCRIPTION OF A CAN BUS SYSTEM2

3.3 DESCRIPTION OF THE SYSTEM COMPONENTS.....3

4 What’s Wrong? 4

4.1 I HAVE AN ERROR CODE INDICATED ON THE CONSOLE.....4

4.2 THE DISPLAYED ANGLE DOES NOT MATCH THE ACTUAL BOOM ANGLE.....4

4.3 THE DISPLAYED LENGTH DOES NOT MATCH THE ACTUAL BOOM LENGTH.....4

4.4 THE DISPLAYED SLEWING DOES NOT MATCH THE ACTUAL SLEWING ANGLE.....4

4.5 THE DISPLAYED LOAD DOES NOT MATCH THE ACTUAL LOAD.....4

4.6 THE CONSOLE DISPLAY IS BLANK4

4.7 I HAVE AN A2B PROBLEM4

4.8 I HAVE A CAN-BUS PROBLEM4

4.9 I NEED TO IDENTIFY A SPARE PART.....4

4.10 I HAVE NOTICED WATER IN SOME PART OF THE SYSTEM4

5 Angle Sensing 5

6 Length Sensing..... 8

7 Pressure Sensing 9

8 Slewing Sensing 9

9 Load sensing 9

10 No console display..... 9

11 A2B Problem..... 9

12 CAN-Bus Communication..... 9

12.1 E61 9

12.2 E62..... 9

12.3 E63..... 9

12.4 E64..... 9

12.5 E65..... 9

13 Troubleshooting A Sensor Problem Using The Display..... 9

14 iFLEX5 Boom Control System (BCS)..... 9

14.1 RT9000E / RT800E BASICS 9

14.1.1 Terminology: 9

14.1.2 Components:..... 9

14.1.3 Manual / Auto Mode:..... 9

14.2 TELE SEQUENCE:..... 9

14.3 iFLEX5 BCS DIGITAL INPUTS: 9

14.4 RT9000E / RT800E iFLEX5 BCS DIGITAL OUTPUTS:..... 9

14.5 iFLEX5 BCS ANALOG INPUTS AND PWM OUTPUTS: 9

14.6 iFLEX5 BCS TEST DISPLAY:..... 9

14.7 BOOM OUT OF SEQUENCE:..... 9

14.8 TELE ROD DRAIN VALVE: 9

14.9 TELE TWO STAGE RELIEF VALVE:..... 9

14.10 HYDRAULIC LUFFING BOOM EXTENSION:..... 9

15 Drawings 9

15.1 COMPONENTS OF THE LMI SYSTEM PAT iFLEX5 9

15.2 BLOCK DIAGRAM..... 9

15.3 ELECTRICAL SYSTEM DIAGRAM STANDARD SYSTEM 9

15.3.1 Central Unit to Crane and Console Wiring Diagram 9

15.3.2 Cable Reel (length/angle sensor) Wiring Diagram..... 9

15.3.3 Boom Extension Anti-two Block Wiring Diagram..... 9

15.4 MAIN CENTRAL UNIT CONNECTOR..... 9

15.5 ELECTRICAL SYSTEM DIAGRAM BOOM CONTROL SYSTEM 9

15.5.1 Central Unit to Crane Interface Wiring Diagram..... 9

15.5.2 Console and Sensor Wiring Diagram..... 9

15.5.3 Cable Reel (LWG520/0002) Wiring Diagram..... 9

15.5.4 Luffer Extension Wiring Diagram..... 9

16 Spare Part Listings..... 9

16.1 CENTRAL UNIT, iFLEX5 PART NO. 9333103866..... 9

16.2 GRAPHIC CONSOLE ASSY, VERTICAL PART NO. 9333103868 9

16.3 CABLE REEL, LWG508 PART NO. 9333103873..... 9

16.4 CABLE REEL, LWG521 PART NO. 9333103973..... 9

16.5 CABLE REEL, LWG152 PART NO. 9333103963..... 9

16.6 PRESSURE TRANSDUCER BLOCK, DAV314/0014 PART NO. 9333103870..... 9

16.7 CABLE ASSEMBLY 11M, PART NO. 9333103872 9

16.8 WIRING HARNESS STANDARD, PART NO. 9333103869 9

16.9 WIRING HARNESS BOOM CONTROL, PART NO. 9333103911..... 9

16.10 CABLE ASSEMBLY, 14M PART NO. 9333103916 9

17 Service Screen For Sensor Calibration 9

17.1 ACTIVATING THE SERVICE SCREEN FOR SENSOR CALIBRATION..... 9

17.2 ZERO-SETTING THE TRANSDUCER INPUTS..... 9

17.3 ZERO-SETTING THE SLEWING INPUTS..... 9

17.4 LENGTH SENSOR CALIBRATION PROCEDURE 9

17.4.1 Cable Reel LWG508 Adjustment Procedure 9

17.4.2 Length Sensor Adjustment Procedure 9

17.4.3 Cable Reel Length Cable Replacement Procedure..... 9

17.5 ANGLE SENSOR CALIBRATION PROCEDURE 9

17.6 ZERO-SETTING THE SLEW POTENTIOMETER..... 9

18 Error Codes..... 9

19 Troubleshooting Moisture 9

19.1 WATER INGRESS..... 9

19.2 CONDENSATION..... 9

20 Software Transfer Instructions for the Console Using the flash module..... 9

21 Software Transfer Instructions for the iFLASH Palm and Central Unit..... 9

21.1 INTRODUCTION 9

21.2 INSTALLING iFLASH DESKTOP 9

21.3 INSTALLING iFLASH..... 9

21.4 DATA TRANSFER FROM THE PC TO THE PALM 9

21.5 DATA TRANSFER FROM THE PALM TO THE PC 9

21.6 TRANSFERRING SYSTEM, DATA OR TLK FILES FROM THE PALM TO THE IFLEX59
21.7 TRANSFERRING SYSTEM, DATA OR TLK FILES FROM THE IFLEX5 TO THE PALM “9
21.8 PARAMETER FILES.....9

1 GENERAL INFORMATION

This service manual is designed to assist a service or maintenance person in identifying system problem areas or malfunctions. A digital voltmeter with the capability to measure current will be required, along with standard maintenance and service tools. NOTE: Knowledge of how to use a voltmeter to measure both voltage and current is assumed.

REFERENCE:

For system operation, refer to the consoles operator's manual 9333101047 REV. B.

2 WARNINGS

The LMI is an operational aid that warns a crane operator of approaching overload conditions and over hoist conditions that could cause damage to equipment and personnel.

The device is not, and shall not be, a substitute for good operator judgment, experience and use of accepted safe crane operating procedures.

The responsibility for the safe crane operation 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 to ensure that he knows the operation and limitations of indicator and crane.

Proper functioning depends upon proper daily inspection and observance of the operating instructions set forth in this manual. Refer to Section 6. *Pre-Operation Inspection and Calibration Verification* of the operator's manual.



The LMI can only work correctly, if all adjustments have been properly set. For correct adjustment, the operator has to answer thoroughly and correctly all questions asked during the setup procedure in accordance with the real rigging state of the crane. To prevent material damage and serious or even fatal accidents, the correct adjustment of the LMI has to be ensured before starting the crane operation.

3 DESCRIPTION OF THE SYSTEM

3.1 DESCRIPTION OF SYSTEM FUNCTION

The iFLEX5 system is a CAN bus system made up of a central microprocessor unit, operating console, length/angle sensor, pressure transducers, and anti-two block switches. All components and sensors are equipped with CAN bus controllers.

The PAT Load Moment Indicator system operates on the principle of reference/real comparison. The real value, resulting from the pressure measurement is compared with the reference data, stored in the central processor memory and evaluated in the microprocessor. When limits are reached, an overload warning signal is generated at the operator's console. At the same time, the aggravating crane movements, such as hoist up, telescope out and boom down, will be stopped.

The fixed data regarding the crane, such as capacity charts, boom weights, centers of gravity and dimensions are stored in memory chips in the central processor unit. This data is the reference information used to calculate the operating conditions.

Boom length and boom angle are registered by the length/angle sensor, mounted inside the cable reel, which is mounted on the boom. The boom length is measured by the cable reel cable, which also serves as an electrical conductor for the anti two-block switches.

The crane load is measured by pressure transducer block attached to the piston and rod side of the hoist cylinders.

The interactive user guidance considerably simplifies the input of operating modes as well as the setting of geometry limit values.

3.2 DESCRIPTION OF A CAN BUS SYSTEM

CAN stands for "Controller Area Network". Its intended use is as a serial bus system for a network of controllers. Each controller connected through a CAN chip is called a "node" and is mostly used to acquire data from a sensor. All nodes are connected to a common bus and all nodes are able to simultaneously read the data on that bus. Also, all nodes are able to transmit data on that bus however only one node at a given time has write access to the bus. If the message is relevant, it will be processed; otherwise it is ignored. The unique identifier also determines the priority of the message. The lower the numerical value of the identifier, the higher the priority.

The cable bus is a twisted pair of shielded wire. Data can be transmitted in blocks from 0-8 bytes at a maximum transfer rate of 1 Mbit/s for networks up to 40 mtrs. For longer network distances the maximum transfer rate must be reduced to 50 Kbit/s for a 1 km network distance. CAN will operate in extremely harsh environments and the extensive error checking mechanisms ensure that any transmission errors are detected.