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Toyota electric pallet jack service manual

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.... 46027390323.pdf.. . zedge ringtones pro apk.pdf Toyota Pallet Truck Service Manual Systems Overview General System Data

General System Data

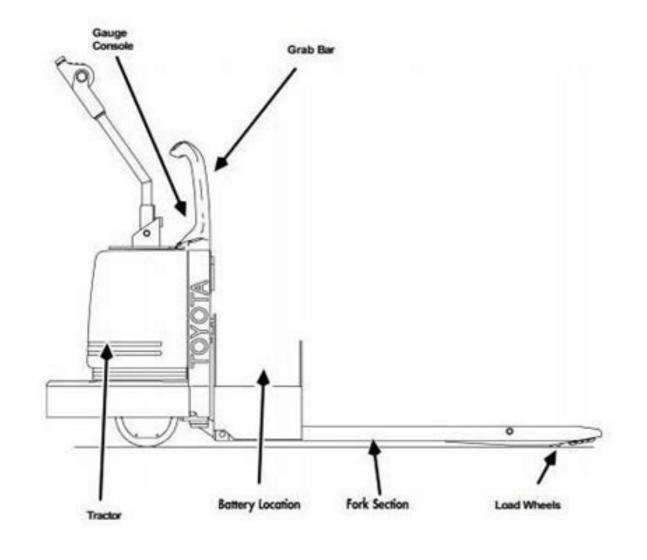
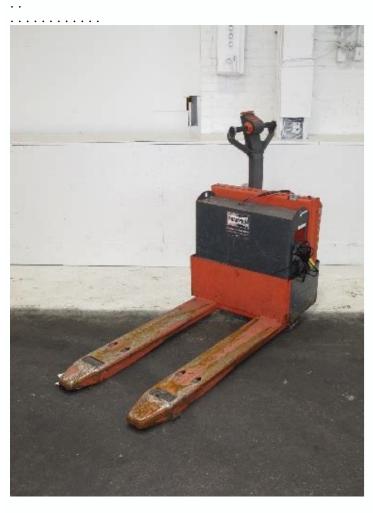


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Tiller Arm Card (See Vehicle Manager) F Fahrenheit F foot or feet ft. foot pound(s) ft. lb. Fuse FUB Battery State-of-Charge GBSOC GA gal.C Celsius or Centigrade gm gaugeC Controller Area Network Gnd gallon or gallonsCAN counterclockwise GPM gramsCCW centimeter groundcm Computer Operating Program Gallons Per MinuteCOP Cold StorageCS check valve HCV clockwise HD hours on deadmanCW I inch or inchesD in. inch pound(s)DC in. lb.DGNDdiam. Direct Current JDMM digital ground JP jack and pin connectorDOT diameter Digital Multi-Meter K thousandDVM US Department of K kilogram(s) Transportation kg kilometers per square centimeter Digital Volt-Meter km/cm2Publication: 00700-CL341, Issued: 01 Oct 2015 1-3Section 1. How To Use This Manual Model 8HBW23 Service Manual Abbreviations and Symbols Torm (Symbols Torm (Sym
ManualAbbreviations and SymbolsTerm/Symbol Definition Term/Symbol Definitionkm/h kilometers per hour RkPa kilo Pascal RAM Random Access Memory RCFP Relay Control Fuse PanelL liter(s) ROM Read Only Memoryl pound or pounds rpm revolutions per minutelb. Light Emitting Diode R/R Remove and ReplaceLED Load HoldingL/H Lift/Lower SwitchL/L S or SW Society of Automotive Engineers SAE Specific GravityM meter(s) SG Serial Number milliampere S/N SolenoidmA millimeter SOL specificationmm miles per hour spec Service Port Interfacemph millisecond(s) SPI Splicems SPL Standard StdNN newton T Traction AmplifierN/A Not Applicable or Not Available TA TemperatureNm newton meter temp Traction MotorNVM Non-Volatile Memory TM Tie Point TP Terminal StripO Operator's Display TS TroubleshootOD T/SOSHA Occupational Safety and Health Administration Uoz. UL ounce UNC UNFP pump or lift contactor USB Underwriters Laboratories, Inc.P Programmable Maintenance Tool Unified Coarse threadPMT potentiometer Unified Fine threadpot pounds per square inch Universal Serial Buspsi Pulse Width ModulationPWM Part Number V Volts Alternating Current VAC Volts Direct Current VDC
Vehicle Manager (ETAC) VM1-4 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 1. How To Use This Manual Abbreviations and SymbolsTerm/Symbol DefinitionW with respect towrtSymbol at@ trademark™ registered trademark® copyright© plus or positive+ minus or negative- plus or minus± degrees° degrees Fahrenheit°F degrees Celsius°C less than< greater than> percent% equals=Publication: 00700-CL341, Issued: 01 Oct 2015 1-5Section 1. How To Use This Manual Model 8HBW23 Service Manual Section 2. SafetyPublication: 00700-CL341, Issued: 01 Oct 2015 2-1Section 2. Safety Model 8HBW23 Service ManualDefinitionsThroughout this manual, you will see two kindsof safety reminders: Warning means a potentially hazardous
situation exists, which, if not avoided, may result in minor or moderate injury or in damage to the lift truck or nearby objects. It may also be used to alert against unsafe practices. 2-2 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 2. SafetyGeneral Safety General Safe
1864 067.tifPublication: 00700-CL341, Issued: 01 Oct 2015 2-3Section 2. Safety Model 8HBW23 Service ManualGeneral Safety Clean up any hydraulic fluid, oil, or grease that has leaked or spilled on the floor. Obey the scheduled lubrication, maintenance, and inspection steps. spills.tif schedmnt.tifObey exactly the safety and repair instructions Always

Place the Main ON/OFF Switch in the OFF position. Disconnect the 8. Block that side of the truck in position. battery connector from the truck evel with the first side. 10. Block that side of the truck in position. NOTE: After working on a vehicle, test all controls and functions to make sure operation is correct.2-8 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 2. Safety TowingTowingTo safely tow this truck: 1.

Lower the forks and remove any load. 2. If equipped with the keypad, press the red OFF (O) key. Place the Main ON/OFF Switch in the OFF position.

Disconnect the battery connector from the truck.

00700-CL341, Issued: 01 Oct 2015 2-9Section 2. Safety Model 8HBW23 Service ManualTransportTo transport your Toyota walkie truck in the center of the transport vehicle. 2. Place the control handle in the full upright position to set the

3. Using a suitable towing vehicle, lift the tractor end of the truck until the drive tire is no more than 1 in. (25.4 mm) off the floor. 4. Tow the truck slowly in the tractor-first direction.NOTE: If a suitable towing vehicle is not available, the electromagnetic brake must be disabled to move this truck. See "Electric Brake Release" on page 7-37. Publication:

SafetyBattery Safety Battery Safety Battery Safety goggles or face shield, rubber gloves (with or without arm shields), and a rubber apron. 25L6SO16.tifAs a battery is being charged, an Make sure a shower and eyewash station are explosive gas mixture forms within and nearby in case there is an accident around each cell. If the area is not correctly ventilated, this explosive gas 04G6S059.tifcan remain in or around the battery gives off explosive gases. Never sulfuric acid and water. Battery

Corrosion causes shortsto the frame and possibly sparks. 6299-013.tif Make sure the vent holes in the filler plugs are open to permit the gas to escape from the cells.2-6 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 2. SafetyDo not permit cleaning solution, dirt, or any Battery Safetyforeign matter to enter the cells. Obey the charging procedures in the Battery 6299-007.tif Instruction Manual and in the Battery Charger Instruction Manual. 25L6S014.tifMake sure you install the correct size andvoltage battery could damage thetruck's electrical system. See the truck'sspecification plate for more information. 6299-012.tifNever plug a battery connector from the battery. A smaller or lighter weightbattery connector from the battery connector from the battery connector. Plug the battery connector from the battery connector from the battery connector from the battery connector.

Position all controls in neutral. 4. Block the wheels to prevent movement of the vehicle. Use extreme care whenever the truck is 5. If equipped with the keypad, press the redjacked up. Keep hands and feet clear OFF (O) key. Place the Main ON/OFFfrom the vehicle while jacking the truck. Switch in the OFF position. Disconnect the After the truck is jacked, put solid blocks battery connector from the truck. Switch in the designated jacking position. Fork Section Figure 2-2. Tractor Jacking Points 6270-003.tif1. Park the lift truck on a level surface. Using the lift button, raise the forks to maximum height. Block

the fork section by placing a block behind the load wheels as shown in Figure 2-1. The tractor section remains on the floor. Figure 2-1. Blocking the Fork Section 27Y7S068.tif4. Lower the forks on the blocks. 7. Jack one side of the truck so that the drive tire is no more than 1 in. (25.4 mm) off the 5.

smoke, use an open flame, or use anything that electrolyte causes burns. If any gives off sparks near a battery. electrolyte comes in contact with your face or in your eyes, flush the area with cold water and get medical help immediately. Read, understand, and follow procedures, recommendations, and specifications in thebattery and battery charger manufacturer's manuals. Keep the charging area well-ventilated to avoid hydrogen gas concentration. 04G6S058.tifWear personal protective equipment to protecteyes, face, and skin when checking, handling, or filling batteries. This equipment includes Publication: 00700-CL341, Issued: 01 Oct 2015 2-5Section 2. Safety Model 8HBW23 Service Manual Battery Safety Keep plugs, terminals, cables, and receptacles in good condition to avoid shorts and sparks. If equipped with the keypad, press the red OFF(O) key and place the Main ON/OFF Switch in 27Y7S013.tifthe OFF position before disconnecting the battery from the truck at the battery connector. Do not break live circuit or explosion could when not checking the

Safety 1. Park the lift truck on a level surface. When it is necessary to jack the truck off the 2. Lower the forks completely. Remove anyfloor to perform maintenance procedures, load. observe the following safety precautions: 3.

electrolyte level, addingresult.

If equipped with the keypad, press the red floor. OFF (O) key.

to the cells, or checking the specific gravity. 04G6S057.tif 09G6S047.tif Vent HoleKeep batteries clean.

brakes.2-10 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 2. SafetyStatic normaloperation of the truck as well as movement or Wrist Strap Static-Dissipativecontact between non-conductive materials Work Surface(plastic bags, synthetic clothing, synthetic soleson shoes, styrofoam coffee cups, and so forth). Ground CordAccumulated static can be discharged through Replacement wrist straps are available. Contacthuman skin to a circuit board or component by your authorized Toyota Industrial Equipmenttouching the parts. Electrostatic Discharge dealer for information. (ESD) is also possible through the air when acharged object is put close to another surface at different electrical potential. Static dischargecan occur without you seeing or feeling it. Whenever working on or near static-sensitive electronics, always use static discharge precautions. 1. Put a static discharge wrist strap connect the ground cord to the wrist strap connect the ground cord to an unpainted, grounded surface on the truck frame. 3. If you are removing or installing static-sensitive components, put them on a correctly grounded static mat. 4. To transport static-sensitive components in an anti-static bag or box (available from your Toyota Industrial Equipment dealer). The wrist strap and associated accessories should be tested monthly to verify they areworking correctly. The wrist strap contains aone megohm resistor in the strap cord that acts a fuse for personal protection. If this resistoris open, the strap becomes ineffective. Figure 2-3 shows the components of the Toyotaanti-static field service kit, part number 00590-04849-71. The kit includes a wrist strap, ground cord, and static-dissipative worksurface (mat). Follow the instructions packagedwith this kit. Publication: 00700-CL341, Issued: 01 Oct 2015 2-11Section 2. Safety Model 8HBW23 Service ManualWelding Safety • You always press the red OFF key (O) on Welding Safety • Y position, and Flame cutting or welding on painted disconnect the battery connector before surfaces may produce potentially you attempt to inspect, service, or repair harmful fumes, smoke, and vapors. the lift truck. Discharge residual charge in Remove any coating in the vicinity the power amplifier by connecting a load where the operation(s) will be across the power amplifier's B+ and B- performed prior to performing flame (such as a contactor coil). cutting or welding operations. 6299-003.tif Coating removal may be by mechanical • Check for shorts to frame as identified on methods, or a page 5-5. If any shorts are found, remove combination of methods. Perform flame them before you proceed with the welding cutting and/or welding operations only operation. in well ventilated areas. Use local exhaust if necessary. • Clean the area to be welded. Before working on this truck, make sure that: • Protect all truck components from heat, weld spatter, and debris. • Fire protection equipment is nearby. • Attach the ground cable to a clean, • You know where the nearest eyewash unpainted surface as close to the weld station is located. area as possible. 04GSO59.tif • Do not perform any welding operations near the electrical components. • Do not attach the ground cable to fasteners or other removable components. • When you are finished welding, perform all ground tests and electrical inspections before operating the vehicle.2-12 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual IntroductionIn Model8HBW23 pallet trucks. This manual contains the most current and accurate procedures, drawings, and photographs available at the time of publication. Subsequent releases of this product may differ slightly from that shownhere. Accordingly, some changes in parts, layout, or procedures may not be reflected in this manual. For the latest information on your Toyota lifttruck, contact your local authorized ToyotaIndustrial Equipment dealer.3-2 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Truck Model IdentificationFruck 2015 3-3Section 3. Systems Overview Model 8HBW23 Service ManualLift Truck Specifications detailed truck and load information. See Figure 3-2.Lift Truck Specifications A battery specifications detailed truck and load weight with forks Seeelevated. Load weight includes the weight of the Figure 3-3. pallet, container, or load-holding attachment. Due to continuous product improvement, Review the specification tag located on the left specification and inside thetractor compartment near the hydraulic unit for Figure 3-2. Lift Truck Specification Plate - Model 8HBW23 Pallet Truck Specification Plate - Model Serial Number Type Approximate weightdesignation of lift truck minus 8HBW23 Truck Weight +/- 5%, lb (kg) battery and loadMaximum (Less Battery)load capacity Truck Capacity, Ib (kg) Hour rating offor this lift battery Weight for this lift voltage Battery Weight for this liftvoltage Battery Weight for this lift battery Weight Weight, lb (kg) and maximum weightfor this lift truck 200 (91) 660 (299) Drive Tire Size Drive Tire Size, in (mm)Load 10.0 X 5.0 (254.0 X 127.0)Wheel Size Load Wheel Size, in (mm) 3.25 X 4.5 (82.6 X 114.3) HORIZONTAL MOTION OF BATTERY MUST NOT EXCEED 0.5 IN (13MM). ATTACH RESTRAINT TO COMPARTMENT AS REQUIRED. THIS FORKLIFT MEETS OR EXCEEDS DESIGN SPECIFICATIONS OF ANSI/ITSDF B56.1 IN EFFECT ON THE DATE OF MANUFACTURE.3-4 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Lift Truck SpecificationsFigure 3-3. Battery SpecificationsFigure 3-3. Battery Specification Plate - Model 8HBW23 Pallet Truck Wet-Cell Flooded 175 3939-352-256.cgm 60 (27.0) 1202787/002 24 330 (150) 97 (44) 54 (24.5)Publication:00700-CL341, Issued: 01 Oct 2015 3-5Section 3. Systems Overview Model 8HBW23 Service ManualOperator Display and Programming • (E)rror codes log: the most recent error code will be displayed, followed by the Operator Display and hour meter (activity time) it occurred. Programming Use the speed control to scroll through the last 25 error codes (if no error codeThe Operator Display is installed on the top of is logged, dashes will be displayed). the control to choose, and the horn button to access a Figure 3-4.
Operator Display parameter and display. All driver parameters and drivers are B = Hour Meter cycled through before ServiceIndicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following:Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the following: Indicator • (P)art (n)umbers: use the speed controlD = Battery to scroll through the speed co (n)umberNOTE: Installation of a Service Key is required • (H)ardware (S)erial (n)umber to make some changes. See "Programming Service Parameters" on 3. Release the horn button is released at the wrong time, turn the truck OFF and To enter a Special Truck Mode: start over. 1. Press and hold the horn button (S18). At Hour Meter (H) the same time place the Main ON/OFF Switch in the ON position. If equipped with To change Hour Meter settings: the keypad, enter your PIN-key code and then press the green ON (|) key. 1. Enter the Special Truck Mode. See "Special Truck Mode" on page 3-6. 2. Continue to hold the horn button while the display (see Figure 3-4) cycles through 2. Press and hold the horn button until "H" the following functions: is displayed. The hour meter indicator (hourglass icon) is illuminated. See • (H)our meters: use the speed control to Figure 3-4. If the horn button is released choose. See parameter 20 on page 3-11 at the wrong time, turn the truck OFF and for hour meter options (hours shown start over. are rounded down, for example, 3 hours and 50 minutes will display as 3. Choose the desired time to be displayed by 3). pressing the thumb controls: • A = Key Time: number of hours the Main ON/OFF switch (and keypad if equipped) is turned ON (I). These hours include key ON and an operator logged in hours. • b = Activity Time: number of hours the truck has traveled, lifted, or lowered.3-6 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview • c = Travel Time: number of hours the Operator Display and Programming truck has traveled (hours are counted any time travel is requested). Changing Truck Parameters (P) 4. Press the thumb control to step between Modifying specific truck parameters the different functions. The display shows changes the driving characteristics of the the number of hours for each function. truck. 5. If equipped with the keypad, press the red Programming Truck Parameters OFF (O) key, and place the Main ON/OFF Switch in the OFF position to end the hour To program the truck's operating parameters, meter display. follow the directions below (also see "Setting Individual PIN-key Codes" on page 3-9):Error Codes (E) 1. Enter Special Truck Mode. See "SpecialWhen an error occurs, a code is displayed. See Truck Mode" on page 3-6. "Messages and Caution Codes" on page 6-5. 2. Press and hold the horn button is access Error Code History: released at the wrong time, turn the truck OFF and start over. 1. Enter the Special Truck Mode. See "Special Truck Mode" on page 3-6. 3. Use the thumb control to scroll to the desired truck parameter you want to 2. Press and hold the horn button until "E" is change or view. See "Truck Driver displayed. The error indicator (attention Parameters" on page 3-8. Release the icon) is illuminated. See Figure 3-4. If the thumb control to neutral when the desired horn button is released at the wrong time, parameter number is shown. turn the truck OFF and start over. 4. Press the horn button once to access the • Use the thumb control to scroll through parameter. The parameter symbol on the the last 25 error codes. The latest fault display starts flashing is shown first. The display first shows the error code and then the hour the 5. Change the parameter walue by pressing fault occurred, the thumb control up or down. Release the thumb control to neutral when the desired The error codes are divided into two parameter number is shown. groups C = caution and E = error. 6. Press the horn button again to confirm the • The C error codes are not stored. It is change. The parameter symbol on the only a caution and is highlighted on the display stops flashing and remains display as long as the fault exists. illuminated. • For example, if you only have one fault 7. End programming by pressing the red OFF registered in the memory, the second (O) key on the keypad (if equipped), and empty place is shown like this: placing the Main ON/OFF switch in the Fault: E - - - and time: - - - . OFF position. 3. End displaying the error code history by • The parameter change is complete. The pressing the red OFF (O) key on the next time the truck is started, the new keypad (if equipped), and placing the Main parameter is in effect. ON/OFF switch in the OFF position.Publication:00700-CL341, Issued: 01 Oct 2015 3-7Section 3. Systems Overview Model 8HBW23 Service ManualOperator Display and ProgrammingTable 3-1. Truck Driver Parameter Sparameter Name Unit Range Step Default Description (Step) 201 Max Speed % 40 This parameter controls the scaling of 0 to 40 the throttle request. A setting of 40% corresponds to approximately 3.6 MPH.02 Not used 03 Not used 04 Neutral % 0 to 6 15 Defines the truck's neutral braking 10 characteristic when the throttle is Braking returned to neutral. 13 A higher number results in a less (Deceleration) aggressive deceleration. 6: low reduction force 05 Truck OFF Min. 0 to 20 0: high reduction force Delay (with Sets the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If this amount of time passes keypad only) while the tiller arm is in a brake position and the truck off delay (energy saving feature). If parameter 39 is 1 or 2 (truck does not have a keypad), the truck08 Not used never powers OFF.09 Not used 0: never turns off 20: 20 minutes. Selects from a table for acceleration rate. A higher number results in a less aggressive acceleration. 1 = fastest, 5 = gentlest.3-8 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems OverviewProgramming Service Parameters Operator Display and Programming 1. Connect the service key to the service key to the service key to the service Parameter, connector J5. Make sure the Main rotate the thumb control away from the forks ON/OFF switch (SW1) is in the ON (sequence backwards through the position. See "Special Tools" on page 3-20. parameters/operators). 2. Turn the truck ON while holding the horn button at "P" to enter parameter 1. Connect the service key at J5. See "Special mode. The Parameter indicator (wheel Tools" on page 3-20. Make sure that the icon) on the display illuminates when in Main ON/OFF switch is ON. parameter mode. See "Special Truck Mode" on page 3-6. If the horn button is 2. Enter Special Truck Mode" on page 3-6. If the horn button is 2. Enter Special Truck Mode" on page 3-6. If the horn button until "P" is 3. Rotate the thumb control in the fork displayed. The parameter indicator (wheel direction to progress forward through the icon) is illuminated. If the horn button is parameter number and the driver number are displayed. Stop at parameter 4. Use the thumb control to scroll through 10 (PIN code) for the first driver; the the service parameters. While the thumb default value of "1" is displayed. See control is held and briefly after it is Figure 3-4. released, both the parameter number (on the left side of the display) and the 4. Press the horn button once to access
this operator number (on the right-this only parameter. The parameter symbol on the occurs if the service key is connected) are displayed. Stop (release the thumb control) changes to the value of the first driver's at parameter 10 (PIN-key code) for the first PIN code. See Table 3-5. operator; the default value of "1" is displayed.NOTE: All parameters can be viewed; however, not all parameters can be changed. 5. Press the horn button once to access this Driver parameters may or may not be parameter 39. changes to the value of the first operator's PIN-key code. Parameter Displays Changing the 1st operator's PIN-keyWhen parameters 1 through 5, and 10 are code alters default operation. You willviewed with the service key, both the parameter not be able to press "1" and green ONnumber (left side of display) are operator's PIN-key code is set to "1." shown. 6. Rotate the thumb control in the forkAs the parameter number display progresses direction to increase the PIN-key codethrough parameters 1 through 10, the display value, or in the operator direction torolls over to the next operator direction for a time helpsis valid only for the operator shown. After all quickly advance to larger numbers (foroperators and operator parameters are scrolled example, codes greater than 100). Thethrough, Service Parameters 11 through 49 are PIN-key code can be from one to four digitsdisplayed. Publication: 00700-CL341, Issued: 01 Oct 2015 3-9Section 3. Systems Overview Model 8HBW23 Service ManualOperator Display and Programming long. Release the thumb control when the desired value is reached. 7. Press the horn button again to confirm the new PIN-key code value. The parameter symbol on the display stops flashing. 8. To enable additional operators; rotate the thumb control in the fork direction to roll over to the second operators. of different PIN-key codes you want to set up. There are a total of ten operators. NOTE: Use unique PIN-key code values = 0) prohibits truck operators have the same PIN-key code, the higher number operator's parameters are used. For example if both the first and second operator's max speed is 80% and the second operator's max speed is 90%, when someone logs in with 1111 the max speed is 90%, when someone logs in with 1111 the max speed is 90%, when someone logs in with 1111 the max speed is 90%. 3-10 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Operator Displays and Programming Table 3-5. Service Parameters Unit Range Step Default Description 0 to 9999 1 1 Parameter Name Capability to assign up to 10 (keypad only) operators their own PIN-key code (for 10 different operators). A 10 PIN code Service Key is required to assign up to 10 (keypad only) operators their own PIN-key code (for 10 different operators). Individual PIN-key Codes" on page 3-9. NOTE: 0 disables a driver (the 2nd through 10th drivers are disabled, the truck cannot be driver with the highest settings are used for both drivers.11 Not used 20 to 80 5 50% Alters the slope of the calculated throttle request. (Plugging) Maximum speed is a chieved at full throttle for all response curves.14 Run-Time Display Selects from a table for deceleration rate. A higher number results in a less15 Not used aggressive deceleration. 1 = hardest feel 0: BSOC is the default run-time 1: Hour Meter (as selected by parameter 20) is the run-time display. At power-up the BSOC percent briefly displays, then the Hour Meter is displayed during run-time. NOTE: A setting of "1" is useful for trucks with fuel cells. Publication: 00700-CL341, Issued: 01 Oct 2015 3-11Section 3. Systems Overview Model 8HBW23 Service ManualOperator Display and ProgrammingParameter Name Unit Range Step Default Description 0 to 7 1 016 Travel Alarm 0 = No Alarm 7 = Low Battery and Forks-First Alarm 3 = All Travel Alarm 7 = Low Battery and All Travel Alarm 17 Not used 1 to 3 12 1 (A) = key time 18 Not used 1 to 3 12 2 (b) = activity time (drive, lift, or lower) 19 Not used 3 (c) = travel time 20 Hour Meter 50 to Selection 100% Defines battery type for correct BSOCClick 21 (battery state-of-charge) configuration.here for Battery Type 1 = Industrial battery and NEXSYSNexus battery packBattery Not used 2 = AGM batteryinfo Not used 3 = Wet Cell battery Battery Reset 22 Level 1 75% Reset value for BSOC function. The 23 displayed BSOC value must be below the 24 selected level at key OFF before a fully charged battery will reset BSOC to 100%25 Not used 100 to at key ON or reset to 100% when the 500 ms voltage at key OFF is above the reset26 Sequencing level. When battery BSOC level drops Delay below this level, the truck will allow the BSOC to reset once Reset Voltage (Parameter 44) is reached. 20 200 ms Creates a sequencing Delay timer is enabled when the throttle is engaged while the brake is applied. If the timer expires before the brake is released, error code 'Hpd' is generated by the VM.27 Not used33 Not used341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Operator Display and ProgrammingParameter Name Unit Range Step Default Description 34 Not used 1 to 435 Not used 1 to 435 Not used 1 Defines whether truck has a Main 36 Not used 1 to 435 Not used 1 Defines whether truck has a Main 36 Not used 1 Defines whether driver parameters are closed, 3 = keypad and driver parameters are closed, a Service Key or Toyota FlashWare is required to access driver parameters are closed. NOTE: When driver parameters are closed, a Service Key or Toyota FlashWare is required to access driver parameters are closed. Disable Creep 1: Approximately 1 MPH Activate click-to-creep by quickly rotating the thumb control two times again. Also, the mode deactivates automatically after 10 seconds or immediately if the emergency reverse (belly button) switch is pushed. 42 Not used Volts 23.16 to .01 24.84 Changing this value will always be greater than the "Full Volts" voltage by at least 45 0.24 volts. Click here 46 Not used 0 to 2 10 Enables CAN communication for Delta-Qfor Nexus charger with charger profile 2 = Trojan Wet Cell Profile 47 Not usedPublication:00700-CL341, Issued: 01 Oct 2015 3-13Section 3. Systems Overview Model 8HBW23 Service ManualOperator Display and ProgrammingParameter Name Unit Range Step Default Description 0 to 148 Not used 10 Provides a separate profile with custom default settings for seven specific49 Alternate parameters (need Service Manual Section 3. Systems Overview Display Part Numbers (Pn)Display Part Numbers (Pn) 1. Enter the Special Truck Mode. See "Special Truck Mode" on page 3-6. 2. Press and hold the horn button until "Pn" is displayed. If the horn button is released at the wrong time, turn the truck OFF and start over. 3. Use the thumb control to scroll and display the following information: • HPn = Hardware part number (of VM) • Type = Model number • PA = Curtis Power Amplifier Operating System 4. End displaying the part number by pressing the red OFF (O) key on the keypad (if equipped) and placing the Main ON/OFF switch in the OFF position. Publication: 00700-CL341, Issued: 01 Oct 2015 3-15Section 3. Systems Overview Model 8HBW23 Service ManualService Display Flashing Displayed Data Tools" on page 3-20) in connection the * See explanation following alpha-numerical field (A) and the battery indicator symbol "D" is illuminated. Battery voltage (V) at vehicle manager (VM) • Press horn button (S18) to toggle between display modes. See Table 3-1. Motor RPMFigure 3-6. Operator DisplayExplanation of ASymbols: Phase Current RMSA = Alpha-Numeric TA Temp. °CField E D CB * Digital inputs/outputs are displayed by B = Hour Meter highlighting the figure segments of four of the Indicator Traction Amplifier and VM".D = BatteryIndicator E = Error Indicator 3-16 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Service Display Modes," on D Coast Release, High Speedpage 3-16. E Enable FThe digital input/output functions are Gdisplayed by illuminating the figure segments of DPfour of the numerical field figures in theoperator display. Traction Amplifier InputsThe first
most significant figure active (markedwith arrow). P0010795.png P0010785.png Figure SegmentPublication:00700-CL341, Issued: 01 Oct 2015 3-17Section 3. Systems Overview Model 8HBW23 Service ManualService Display Digital Input from Vehicle Manager Control SensorsTraction Amplifier Outputs The third most significant figure active (markedThe second most significant figure active with arrow). (marked with arrow). P0010806.png P0012239.png P0010785.png P0010785.png Figure Figure Function Figure Fun Systems Overview Service DisplayDigital Input from Vehicle ManagerControl Sensors Typical Power Amplifier Status Comments (marked with arrow). 1 Motor drive, plug, or active P0010806.png 4 neutral braking 6 P0010785.png Field reversal (transitional) 10 Figure 11 Disable (major fault, such as Segments 13 severe overvoltage) Figure Function 16 RegenSegment 17A Regen taper (transitional) Emergency reverse (drive) Activity: Main contactor openD 74 because no output requested for E 129 30 seconds or an error occurred. FG 144 Passive restraint while driving (overspeed) Passive restraint (transitional) Emergency reverse (drive) Emergency reverse (regen) Emergency shutdown while in passive restraint 1. The system mode shows details of traction amplifier activity, including during normal operation. It is different than, and does not correspond to, the code from the traction amplifier activity, including during normal operation. It is different than, and does not correspond to, the code from the traction amplifier activity, including during normal operation. It is different than, and does not correspond to, the code from the traction amplifier activity, including during normal operation. It is different than, and does not correspond to, the code from the traction amplifier activity, including during normal operation. system mode status of 32 and over. 3. Truck is in an emergency shutdown for any system system mode status of 128 and over. Publication:00700-CL341, Issued: 01 Oct 2015 3-19Section 3. Systems Overview Model 8HBW23 Service ManualSpecial ToolsThe following tools are available from your localauthorized Toyota Industrial Equipment Special ToolsTool Part Number PurposeAnti-static Field Kit 00590-4849-71 ESD ProtectionAnti-static Wrist Strap 00590-4848-71Anti-static Wrist Strap 00590-48592-71 ESD/voltage surge protection for serial type Toyota FlashWare connectionsUSB/CAN Interface 00590-49164-71 Toyota FlashWare connection to truck. See "Toyota FlashWare" on page 3-24 for details. Service Key Programmable Maintenance ToolUse the optional Service Key (P/N 00590-42683-71) directly on the truck to NOTE: A serial breakout harness is required totroubleshoot and programmable maintenance toolparameter settings. See "Programmable Maintenance Tool (PMT) (P/N 00590-49981-71) permits you to test and diagnose the power amplifier in the truck. See Figure 3-8. Figure 3-8. Programmable Maintenance Tool3-20 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems OverviewThe PMT is powered by the power amplifier Special Toolsthrough a four-pin connector at the bottom ofthe power amplifier. If there are no entries within a Menu, then the Menu title is not displayed. The Menu Navigation Key moves the screencursor up or down through the Menu list (top or Monitor Modebottom arrow), and opens or Real-time status information is displayed in the Figure 3-9. Programmable Maintenance Tool Monitor Mode for various inputs, outputs, temperature, and so forth. This information can Data Inc/Dec be helpful in troubleshooting many problems Key and is useful for checking out the operation of the controller during initial installation. Bookmark Keys 1 If equipped with the keypad, press the red OFF (O) key. Place the Main ON/OFF Menu Switch in the OFF position. Navigation Key 2. Remove the tractor covers. The Data Inc/Dec Key changes the value of the 3. Connect the PMT to "boot up" before proceeding to the next step. The Bookmark Keys allow you to quickly goback to your favorite selections without having 4. Place the Main ON/OFF Switch in the ONto navigate back through the Menu. If equipped with the keypad, enter your PIN-key code and then press • To select a position in the menu, hold a the green ON (|) key. Bookmark Key down for three seconds until the bookmark position, 6. Press the right arrow on the Menu press the appropriate Bookmark Key. Navigation Key to enter the sub-menu.NOTE: The Bookmarks are not permanently 7. Use the Up and Down arrows on the Menu stored in the PMT. They are cleared Navigation Key to scroll through the when the PMT is unplugged. sub-menu list of monitor variables. The Main Menu is the starting point for the 8. Use the right arrow to select and view aPMT. The main menu displays menu titles: single variables. The Main Menu is the starting point for the 8. Use the right arrow Menu Navigation Key • Functions (not used) once more and enter the detail screen. A • Information bar graph appears as well as minimum • Programmer Setup and maximum data points. Change the parameter value by pressing the Data Inc/Dec Key. The new value is set as soon as the Data Inc/Dec Key is released. To close a Monitor Menu, sub-menu, or detail screen, press the left arrow on the Navigation Key. Faults Mode In System Faults mode, currently active faults detected by the controller's The Information Menu provides access todiagnostic history file is displayed. This field product information describing the basicincludes a list of all faults observed and revision level of the PMT.recorded by the controller since the history waslast cleared. To view, use the Menu Navigation Key to select Information in the Main Menu. Remember to NOTE: Each fault is listed only once, regardless press the right arrow to select a Menu. Press of the number of times it occurred, the left arrow to exit. 1. If equipped with the keypad, press the red Programmer Mode OFF (O) key. Place the Main ON/OFF Switch in the OFF position. Programmer mode permits you to perform a variety of tasks. 2. Remove the tractor covers. 1. If equipped with the keypad, press the red 3. Connect the PMT to the power amplifier. OFF (O) key. Place the Main ON/OFF Switch in the ON 3. Connect the PMT to the power amplifier. position. If equipped with the keypad, enter your PIN-key code and then press Wait for the PMT to "boot up" before the green ON (|) key, proceeding to the next step. 4. Place the Main ON/OFF Switch in the ON 5. To view the present status of the unit, use position. If equipped with the keypad, the Menu Navigation Key to select enter your PIN-key code and then press Faults -> System Faults the green ON (|) key. 5. Use the Menu Navigation Key to select 6. To access the log, use the Menu Navigation Key to select 6. To access the log the log the log to select 6. To access the log t Down arrows on the Menu 7. Use the Up and Down arrows on the Menu Navigation Key to scroll through the list of Navigation Key to scroll through the multiple faults. sub-menu list of Programmer displays. Use the right arrow to select and view aClear single variable. 9. Change the parameter value by pressingAfter you have diagnosed and corrected the the Data Inc/Dec Key ispermits the power amplifier to accumulate a released new file of faults. By checking the new historyfile at a later date, you can easily determinewhether the problem was completely fixed. 1. To clear the fault history. 2. Press the increment arrow (+) for yes and the decrement arrow (-) to cancel and not clear the fault history. "Test Mode Menu" on page 3-23 lists possiblemessages you may see displayed when the PMTis operating in either System Faults or FaultHistory mode.3-22 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 3. Systems Overview Special Tools Table 3-3. Test Mode Menu Explanation Throttle reading, in % of full throttle Display Motor armature current, in amps THROTTLE% Motor field current, in amps ARM CURRENT Armature duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) -
applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT Motor field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field duty cycle (PWM) - applied as % FIELD CURRENT MOTOR field field field field field field field field fiel temperature - °C CAP VOLTAGE Forward switch: ON/OFF HEAT SINK TEMP Reverse switch: ON/OFF MODE (not used) INTRLCK INPUT Emergency reverse button: ON/OFF PEDAL INPUT (not used) EMR REV INPUT Main contactor: ON/OFF MOTOR RPM (not used) MAIN CONT (not used) BRAKE OUTPUT (not used) BRAKE OUTPUT (not used) BRAKE OUTPUT (not used) FAULT 2 OUTPUT (not used) BRAKE OUTPUT (no 23Section 3. Systems Overview Model 8HBW23 Service ManualToyota FlashWare on the PC, double-click the installation file and follow the Toyota FlashWare package for the latest detailed installation instructions. Toyota FlashWare allows you to interface withthe truck software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software on the OFF • Update Vehicle Manager software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software on the OFF • Update Vehicle Manager software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software and update and change Connecting PC to Trucksettings through the following features: 1. Turn the Main ON/OFF Switch to the OFF • Update Vehicle Manager software and update and upda tractor covers. • Update Power Amplifier Software • Diagnostics 3. Connect cable (P/N 00590-42684-71) to • Display Error Log the USB/CAN Interface (dongle P/N 00590-42684-71). For more detailed Toyota FlashWareinformation, click on Help and select Help 4. Connect the dongle to the PC with a Topics from the menu bar. standard USB cable.Requirements 5. Connect cable (P/N 00590-42684-71) to the J5 CAN Service Port connector.Toyota FlashWare Can be installed on any IBM-compatible PC with Windows XP, Vista, or Starting Toyota FlashWare Windows 7 operating system. The PCcommunicates with the lift truck software 1. Make sure the Main ON/OFF switch isthrough a 4-pin serial cable, standard USB ON.cable, and dongle (USB to CAN translator)(P/N 00590-49164-71). 2. Double-click the Toyota FlashWare on PC Start > Programs > Toyota FlashWare icon on the main desktop screen appears. Toyota dealer technicians may obtain Toyota FlashWare on PC Start > Programs > Toyota FlashWare icon on the main desktop screen appears. Toyota dealer technicians may obtain Toyota FlashWare icon on the main desktop screen appears. through normal distribution 3. From the menu bar, click "Connect tochannels. Toyota Truck", then select "Pallet", then click "All Other Pallet Trucks". If the PC is Figure 3-10. Truck Opening Screen with Menu connected to a correctly functioning Vehicle Manager, the Truck Setup screen is displayed. See Figure 3-10. 4. For detailed instruction on how to use Toyota FlashWare, follow the on-screen instructions in Toyota FlashWare Help.3-24 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 4. Planned Maintenance Section 4. Planned Maintenance Guidelines Perform all of the scheduled inspections and maintenance during the suggested intervals. Maintenance Guidelines The time intervals given in this guide are based on Deadman Hours (HD) under normalFollowing a regularly scheduled maintenance operating conditions, perform these services more often • Prolongs maximum truck life as indicated in Table 4-1. • Reduces costly down time • Prevents unnecessary repairs Refer to the "Lubrication Equivalents. Refer to the manufacturer's • Lubrication Scheduled maintenance includes: equivalents. Refer to the manufacturer's • Lubrication Equivalents for components not identified in • Cleaning this manual. • Inspection • ServiceTable 4-1. Maintenance Frequency TableOperating Working Environment Service FrequencyConditionsLight to An eight hour shift of basic material handling First inspection at 90Moderate days or 250 hours and • Extended heavy duty operation then every 180 days or Severe • Freezer operation 500 hours, whichever • Sudden temperature changes such as going from freezer to comes firstExtreme 60 days or 250 hours, room temperature whichever comes first • All UL Type EE rated lift trucks • Dusty or sandy conditions such as in steel mills. foundries. enclosed (Type EE) applications • Corrosive chemical atmosphere, such as: • fish, meat or poultry processing plants, tanneries, or any other similar applications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • Adverse high humidity, wet, damp, or moist conditions4-2 Publications • chlorine or salt-sea air environments • chlorine or salt-se Maintenance Initial 90 Day/250 Deadman Hours (HD) MaintenanceInitial 90 Day/250 Deadman Hours (HD) Maintenance Task 90 days after the truck was put into service or at 250 HD, whichever comes first. Component Task Drive Unit Change fluid. Clean magnet on drain plug. See "Drive Unit Housing Lubrication" on page 7-33. Hydraulic Reservoir Change hydraulic fluid. Clean screen and magnet. See "Filter Screen and Inlet Tube" on page 7-83. Forks, Pull Rod, Check for wear on the pull rod. Check all lift linkage bushings for wear. Whenand Lift Linkage replacing bushings, inspect the pins for wear. Replace the pins if any wear is evident. Check for wear at the lower link or fork heel. Replace any broken or missing roll pins. Adjust downstops as necessary. See "Downstop Adjustment" on page 7-98. Electrical Cables Inspect all cables for nicks or cuts (including battery pack and charger cables). traction motor. Replace any cable that is damaged or shows signs of excessive heat. Failure to do so may cause intermittent system shutdowns and/or electronic failures. Arm Angle Proximity Switch Adjustment" on page 7-63. Publication: 00700-CL341, Issued: 01 Oct 2015 4-3Section 4. Planned Maintenance Model 8HBW23 Service Manual Every 180 Days or 500 Deadman Hours (HD)Every 180 Days or 500 Deadman Hours (HD)For Severe or Extreme operating conditionservice intervals, see Table 4-1 on page 4-2. Perform the following maintenance tasks every 180 days or 500 HD, whichever comes first. Component TaskBattery Check the weight stamped on the battery in the pallet truck against the minimum and maximum allowable weights on the spec tag for the pallet truck. Report any pallet trucks that are running with batteries below the minimum or over the maximum allowable weight. Inspect all battery connectors and leads for damage and cuts in protective coatings. Make sure the battery has no more than 0.5 inch (13 mm) free play in any direction. Brakes During normal operation, with a rated load and traveling at top speed, the pallet truck should stop within approximately six feet. Stopping distance depends on the load, floor, and tire condition. Examine for signs of oil on the friction disc and mating surfaces. If oil is present, disassemble the brake and replace the friction disc. Clean the mating surfaces. Measure for
correct gap between the coil housing and pressure plate. When applied, the gap should be between 0.008 and 0.010 in. (0.20 to 0.25 mm). Failure to keep the brakes adjusted causes premature pad and rotor wear and excessive motor heat. Control Handle Make sure steering function is smooth and controllable. Verify travel function is smooth and responsive, without binding or excessAssembly play. Verify lift/lower function is smooth and responsive through full range of acceleration and plugging. Verify no codes on display. Verify function of all switches. Verify tiller arm returns to neutral when released. Arm Angle Switch Adjustment. See "Arm Angle Proximity Switch Adjustment" on page 7-63. Drive Unit Inspect for leaks. Check fluid level. Check drive unit axle for play. Electrical Cables Inspect all power cables for nicks or cuts (including battery pack and charger cables). Give special attention to those cables that are not stationary, for example, cables to the traction motor. Replace any cable that is damaged or shows signs of excessive heat. Failure to do so may cause intermittent system shutdowns and/or electronic failures. Forks, Pull Rod, Check for wear on the pull rod. Check all lift linkage bushings for wear. Whenaud Lift Linkage replacing bushings, inspect the pins if any wear is evident. Check for wear at the lower link or fork heel. Replace any broken or missing roll pins. Adjust downstops as necessary. See "Downstop Adjustment" on page 7-98. Frame and Tractor General visual inspection of structural members for cracks, including but not limitedChecks to the tractor and forks. Hardware Check bolt torque of major components (motors, brake, drive unit, and hydraulic unit). Tighten any loose hardware. See "Appendix" on page A-1. Horn Check that the horn operates when you press the horn button.4-4 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 4. Planned Maintenance Every 180 days or 500 HD, whichever comes first. Component TaskHydraulic Hoses Inspect all hydraulic hoses for leaks, nicks, cut, chafing, and bulges. Replace damaged hoses as soon as possible. Inspect all fittings for leaks. Repair any leaks immediately. Hydraulic Reservoir Check fluid level. See "Hydraulic Fluid" on page 7-77. Add fluid if necessary. Lubricate all pivoting shafts on the control handle with spray lube. See "Grease Fittings" on page 4-7. Motors AC (traction) - Check the cable lugs to make sure they are tight to the The outside nut should be torqued to the values listed on page 7-66. Replace any cable that shows signs of excessive heat (discoloration of the pigtails). If excessive heat is evident, inspect the armature circuit for loose connections. Check condition of commutator per photos on page 5-9. Find the shortest brush in the holder. Remove the brush and check overall dimension as per the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface, replace the brush is not contacting the complete surface. brush holders. Make sure that the connections on the brush leads are tight. Check brush spring tension per the chart on page 7-65. Blow out the inside and outside nut should be torqued to the values listed on page 7-66. Replace any cable that shows signs of excessive heat. See "Motors, General" on page 7-64. Shorts to Frame Check for electrical shorts to Frame Check all switches for correct operation and adjust as needed. Ventilation Slots Make sure ventilation slots in the tractor grille cover are clear of obstructions and debris. Warning Decals Replace any unreadable or damaged decals. Load Wheels and Examine for bond failure, chunking, and excessive or uneven wear. Inspect the loadDrive Tires wheel bearings for binding or excessive play. Apply grease, Casters (Optional) Examine tire for condition, Verify that tires rotate freely, Publication: 00700-CL341, Issued: 01 Oct 2015 4-5Section 4, Planned Maintenance Model 8HBW23 Service Manual Every 360 Days or 2000 Deadman Hours (HD)Perform all 180 day/500 deadman hour maintenance tasks plus the following every 360 days/2000HD.Component TaskDrive Unit Change fluid. Clean magnet on drain plug. See "Drive Unit Housing Lubrication" on page 7-33.4-6 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 4. Planned Maintenance Grease FittingsGrease Fittin Maintenance Model 8HBW23 Service ManualGrease Fittings4-8 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. TroubleshootingPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. TroubleshootingPublication: 00700-CL341, Issued: 01 Oct 2015 5-1Section 5. Troubleshooting Model 8HBW23 Service ManualList of Troubleshooting Charts and TablesList of Troubleshooting Charts and TablesElectrical Troubleshooting Guidelines . 5-5 General. 5-5 Shorts to Frame5-5 Shorts to Frame Test 5-6DC Electric Motors 5-8 DC Motor Types 5-8 Shunt-Wound Motor Circuits 5-8 Compound Wound Motor Circuits 5-8 Inspection . 5-8 Mica Inspection 5-8 Servicing... 5-9 Open Circuit Motor Test

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3-12 Grounded Motor Test
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5-12 Short-Circuited Winding
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5-14 AC Traction Motor circuit - Phase A
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5-14 Shorted Winding
5-14Hydraulic Troubleshooting Guidelines
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5-16 BDI does not Reset to 100%
5-16 Green/Red LED on Keypad Not Illuminated When Key Pressed 5-17Symptom Tables: Lift/Lower System
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5-19 No Lower, Lift and Travel OK
5-19 Unable to Pick Up a Load
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 .5-21Symptom Tables: Travel (Forward/Reverse) System
5-22 Slow Travel, Lift/Lower OK. No Fault Codes
5-22 No Travel or Slow Travel. TA Flash Code 2,2, (Thermal Cutback) Heatsink Temperature Exceeded 185°F (85°C). Operator Display May Indicate Hot2 (C45)
5-23 No Travel, Main Contactor Does Not Close. TA Flash Code 3,9. Operator Display Indicates Error Code E107
Operator Display Indicates Error Code E201
5-24No Truck Functions Active. TA Flash Code 1,8, (Excessive Battery Voltage). Operator Display May Indicate E222 5-24Publication:00700-CL341, Issued: 01 Oct 2015 5-3Section 5. Troubleshooting Model 8HBW23 Service ManualList of Troubleshooting Charts and Tables5-4 Publication:00700-CL341, Issued: 01 Oct 2015 Model 8HBW23 Service Manual Section 5. Troubleshooting Electrical Section 5. Troubleshooting Electrical Troubleshooting Guidelines on that are close to metalGeneral edges or surfaces) Block the lift truck so that the drive tire Use an ohmmeter to check for wiring continuity
is off the floor whenever a and shorts. troubleshooting procedure requires turning the truck ON. This prevents Use a Digital MultiMeter (DMM), such as a accidents caused by unexpected lift Fluke meter, for all measurements. Analog truck travel. meters can give inaccurate readings and load down sensitive electronic circuits enough to Use extrements the truck is cause failure. Make sure meter cables are jacked up for any reason. Keep hands connected to the correct function and scale are selected. truck. After the lift truck is jacked, place solid blocks or jack stands beneath it to When measuring voltage, connect the positive support it. Do not rely on the jack alone. meter lead to the connector or probe point See "Jacking Safety" on page 2-8. marked (+) in the test.
Connect the negative meter lead to the connector or probe point Unless otherwise directed, disconnect marked (-). the battery connector when you check electrical circuits or components with an Whenever measuring resistance, turn the truck ohmmeter. Electrical current can cause OFF and disconnect the battery connector. damage to the ohmmeter.
Battery current can damage an ohmmeter. Isolate the component from the circuit. Many problems are caused by a faulty or dirtybattery. Make sure the battery is clean. Check For troubleshooting DC electric motors, see "DCthe electriclyte level and state-of-charge. See Electric Motors" on page 5-8. "Battery" on page 7-40. For troubleshooting AC electric motors, see "Wiring Harness" oncomponents for: page 7-51. • Loose connections or connectors Shorts to Frame • Loose or broken terminals • Damaged terminals, blocks, or strips Shorts to frame is an industry term for unintentional current leakage paths between normally isolated electrical circuits and their metal enclosures. Shorts to frame may be metallic connections, such as a wire conductor contacting terminals.
metal through worn insulation. More often, shorts to frame are resistive "leakage" paths caused by contamination and/or moisture. These leakage paths can result in unwanted electrical noise on the metallic pallet truck structure and can cause incorrect operation. Publication:00700-CL341, Issued: 01 Oct 2015 5-5Section 5. Troubleshooting Model 8HBW23 Service Manual Electrical Troubleshooting Guidelines 3. Use a DMM set on the ampere function to measure the current leakage from the Shorts to frame are caused by: battery electrolyte leakage and B-). Begin measuring at the high • Motor brush dust ampere scale and work toward the lowest. • Motor brush leads touching the housing A reading of more than 0.001A (1mA) • Breakdown in insulation indicates a serious short. Do not continue • Bare wires until this condition is corrected. The meter • Pinched wiring harness may be damaged if you proceed before • Incorrect
mounting of circuit cards correcting this condition. Shorts to frame can occur at numerous a. Install another battery in the palletlocations on a pallet truck, including: truck and repeat this procedure from Step 1. • Batteries • Motors b. If the current is less than 0.0002A • Cables, wiring, and harnesses (0.2mÅ), go to Step 4. If the current is essential truck, including: truck and repeat this procedure from Step 1. • Batteries • Motors b. If the current is less than 0.0002A (0.2mÅ) and less • Bus bars than 0.001A (1mÅ), remove the battery essential truck, then continue with Step • Contactors 4. Make sure the battery case does not • Terminal strips touch the truck frame during the • Switches remaining tests. • Power panel insulation • Circuit card mounts 4. With the battery case does not • Terminal strips touch the truck frame during the • Switches remaining tests. • Power panel insulation • Circuit card mounts 4. With the battery case does not • Terminal strips touch the truck frame during the • Switches remaining tests.
disconnected (or removed and disconnected) from the truck, use a Shorts to Frame Test DMM to measure the resistance from truck frame to truck B+, to truck B- (notTo test for shorts to frame: battery B+ and B-), and to all fuses and 1. Turn the Main ON/OFF switch OFF and motors. A reading of less than 1000 ohms disconnect the battery connector. indicates a serious short. Do not continue 2. To test the battery for shorts to case, until this condition is corrected. The meter connect a 12V test light to the battery correcting this condition. To correct the case from battery B If the light condition, follow steps a through e. illuminates at a serious shorts.
even momentarily, there is a serious problem with the battery, a. To identify the cause of the short to either external contamination or internal frame, disconnect circuit components damage. Do not continue until this until the low resistance condition condition is corrected. The meter may be disappears. Do not reconnect damaged if you proceed before correcting components one at a time, but leave this condition, them disconnected until the low a. Install another battery in the truck and resistance reading disappears. Prevent repeat this procedure from Step 1. disconnected terminals or connectors from touching the truck frame or other b. If the test light does not light, continue conductive surfaces, to the next step, b. The most likely areas to check are: Motors Heatsinks Power cables Power circuit components Grant Control circuit components Gran
Repair or replace the component Electrical Troubleshooting Guidelines causing the low resistance condition. Repeat Step 4. b. The most likely areas to check are: d. Reconnect all other components • Motors previously disconnected, one at a time, measuring resistance between steps. If • Heatsinks a reading is less than 1000 ohms when reconnected accomponent, that • Power cables component or its wiring is faulty; repair or replace as appropriate. • Power circuit components econnected, and you get readings greater than 1000 ohms, continue with c. Repair or replace the component(s) the next step. causing the leakage current
Repeat Step 6. 5. Reconnect the battery connector and turn the Main ON/OFF switch ON. If the d. Reconnect all other components battery was previously removed, make previously disconnected, measuring sure the battery case does not touch the current between steps. If a reading is truck frame. more than 0.001A (1mA) when reconnecting a component, that NOTE: The functions being checked must be component or its wiring is faulty.
energized. Example: to check for shorts Repair or replace as appropriate. to frame in the travel circuit, travel must be requested. 7. When, after all components are reconnected, you get a reading less than 6. Use a DMM set to the current function to 0.001A (1mA) there is no short to frame measure current leakage to the truck condition with the truck or the battery.
If frame from truck $B+$, $B-$ (not battery $B+$ you previously removed the battery from and $B-$), and all fuses and DC motor the truck, re-install the battery. If the current is less than 0.001A (1mA), go to step 7. If the current is more than 0.001A (1mA), continue with following steps. a. To identify the cause of the short to frame, disconnected current reads less than 0.001A (1mA). Do not reconnect components one at a time, but leave them disconnected until the leakage current reads less than 0.001A (1mA). Prevent disconnected terminals or connectors from touching the truck frame or other conductive surfaces. Publication: 00700-CL341, Issued: 01 Oct 2015 5-7Section 5. Troubleshooting Model 8HBW23 Service ManualDC Electric Motors Inspection for surface condition and high mica. Most armatures have the mica \bullet A shunt-wound motor has four external
undercut. If the armature on your motor does connections: two armature (A) and two not, do not attempt to cut it. See Figure 5-3. field (E). See Figure 5-1. Figure 5-3. Mica Inspection 1881_003.tifFigure 5-1. Shunt-Wound Motor Circuits Mica Segments motor-shunt.tifA2 E2 NORMAL High Mica UNDERCUTA1 E1• A compound motor, such as the motor, HIGH MICA has only two external connections because the armature and field windings are The commutator must be smooth and clean to connected internally. See Figure 5-2. provide maximum brush life. When commutators are not correctly maintained, Figure 5-2. Compound Wound Motor Circuits carbon dust can collect in the grooves between the segments. This can lead to a short circuit in motor-compound.tif the armature.
Remove the brushes from their box. Inspect the contact surface and brush length. If the brush surface has groove(s) or pit marks, it indicates the presence of a burr on the commutator surface. Good commutation is indicated by a dark brown polished brush wearing surface. See Table 5-1, "Commutator Surfaces." If the commutator appears rough, pitted, or has signs of burning or heavy arcing
between the commutator bars, remove the motor for servicing.5-8 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting DC Electric MotorsServicing Some conditions can be resolved by recutting the commutator on a lathe. This requiresSome conditions, identified in Table 5-1, may special equipment and training and should onlybe resolved by cleaning the commutator with a be attempted at a qualified DC motor repairspecial polishing stone. Polishing the facility.commutator should only be attempted for thespecified conditions. Refer to "Polishing theCommutator" on page 7-67 for instructions. Table 5-1. Commutator SurfacesCondition Probable Cause Commutator SurfaceGood Condition and probable film color may vary from light to dark due to film thickness. Satisfactory This condition can appear in
alternating bars as Brushwea03.tifCondition-Light and Dark shown or every 3rd or 4th bar. This is caused by Brushwear04.tifPattern imbalances in the windings or other motor Brushwear06.tif problems. The motor should have no issues running, but the condition may indicate a need for more frequent inspections. Unsatisfactory Threading or streaked film on the commutator Wear operation. This condition is frequently due to incorrect brush grade. Environmental conditions, such as freezer or low humidity, can be a contributing factor. This condition may be repaired with a polishing stone if caught soon enough. Refer to "Polishing the Commutator" on page 7-67. Unsatisfactory Patchy colors of varying densities and shape. Condition-Uneven Film This condition is generally due to unclean
operating conditions and does not indicate damage to the commutator. Clean the commutator with a polishing stone and compressed air (see "Polishing the Commutator" on page 7-67). Consider more frequent scheduled maintenance intervals. Unsatisfactory Condition- Dark areas can be isolated or regular. This Film With Dark Areas condition indicates a commutator is out-of-round. Continued use may result in failure and damage to other systems. The motor should be replaced or recut at a qualified repair facility. Publication: 00700-CL341, Issued: 01 Oct 2015 5-9Section 5.
Troubleshooting Model 8HBW23 Service ManualDC Electric MotorsCondition Probable Cause Commutator SurfaceUnsatisfactory Bars are low on entry and leaving edges causing Brushwear07.tifCondition-Example of the brushes to ride on the middle of the bars. Incorrect Commutator Continued use may result in failure and damageMachining to other systems. The motor should be replaced or recut at a qualified repair facility. Consider more frequent scheduled maintenance intervals. Unsatisfactory Bars are low in the entry and leaving bar edges. Incorrect Commutator Continued use may result in failure and damageMachinic

to other systems. The motor should be replaced or recut at a qualified repair facility. Consider more frequent scheduled maintenance intervals. Unsatisfactory This is a further development of the third Brushwear09.tifCondition-Streaky Film example. Earlier corrective action should haveWith Commutator Wear been taken. Continued use may result in failure and damage to other systems. The motor should be replaced or recut at a qualified repair facility. Consider more frequent scheduled maintenance intervals. Unsatisfactory Darkening of commutator in sequences two pole Brushwear 10. tifCondition-Double Pole pitches apart. This condition may result from an Pitch armature fault or some other fault. Continued use may result in failure and damage to other systems. The motor should be replaced or recut at a qualified repair facility. Unsatisfactory This condition may result from operation in prolonged stall conditions. Storage marks are easily removed with a polishing stone, see "Polishing the Commutator" on page 7-67. Stall marks should be cleaned and inspected for damage or shorts. The motor should be replaced if damage has occurred. Unsatisfactory This condition is caused by high mica in every Brushwear 12. tifCondition-Bar Edge slot and can be caused by incorrect or excessive Burning-Cause High Mica stoning. The same effect can occur on one bar only. Chattering or loud operation may also be noticed. Continued operation will result in increased brush wear and may result in commutator damage. The motor should be replaced or recut at a qualified repair facility.5-10 Publication: 00700-

CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting DC Electric MotorsCondition Probable Cause Commutator SurfaceUnsatisfactory This condition is due to sparking under the Brushwear13.tifCondition-Small Bright brush. This is caused by overloaded machines or Spots low brush pressure. Check the brush spring tension, see "Motor Brush Spring Tension" on page 7-65. If not corrected, this condition may be repaired with a polishing stone if caught early and no scoring has occurred, see "Polishing the Commutator" on page 7-67. If damaged, the motor should be replaced or recut at a qualified repair facility. Publication: 00700-CL341, Issued: 01 Oct 2015 5-11Section 5. Troubleshooting Model 8HBW23 Service ManualDC ElectricalAn open circuit is an electrical circuit within

the connection exists between the current-carryingmotor that is broken. This can be caused by: conductors and the motor housing. This can be caused either by direct contact or through • bad brushes or brush leads touching the motor housing • a loose or bad connection •

build-up of carbon dust or other materialsTo test a motor for an open circuit: To test a motor for grounds: 1. Isolate the motor from the truck circuit by 1. Isolate the motor from the truck circuit by removing the power cables. Use two removing the power cables. Use two removing the power cables are to a motor terminal and 2. With the motor at room temperature, the other lead to an unpainted surface of connect the leads of a digital ohmmeter the motor housing. Set the ohmmeter to between the individual circuits in the the highest scale.

If the ohmmeter reads resistance of less than 100,000 ohms, the motor is 3. Observe the measurements given in grounded. Clean, repair, or replace the Table 5-2. Lift Motor Resistance Readings Short-Circuited Armature Terminals Acceptable Unacceptable A short circuit in the armature causes heating, Resistance

Resistance and can result in burning of: Readings • Armature coilA to S 0.020 to 0.030 Greater than • Brush wires • Commutator segments ohms 0.1 ohms Visual inspection may reveal this condition. Measure all readings at room temperature. See Figure 5-2 on page 5-8. Positive determination of a short-circuited armature requires special equipment at a motor4. If the meter indicates high resistance in rebuilding facility, the armature circuit is found in a motor, the motor must be disassembled by a motor rebuilding facility to isolate the problem to the field or armature circuit.5-12 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting DC Electric MotorsShort-Circuited Winding A short-circuited winding is one where theinsulation on the field or armature has brokendown at two or more points. The breakdowncreates a low resistance path, permitting current to flow from one turn of the coil toanother adjacent coil turn, without actually flowing through the coil wire.

The result is adecrease in the total resistance of the motorwinding and an increase in the current flow. The severity of the short circuit depends on its location. A shorted motor may be indicated by: • Slow or sluggish operation • Running faster than normal • Overheating • Blowing a power fuse • On DC motors, severe burning or discoloring on one or two commutator segments every 90° of rotationThese symptoms can also be caused byproblems other than the motor itself, such as: • Brake too tight or dragging • Wheel bearings facility.Publication:00700-CL341, Issued: 01 Oct 2015 5-13Section 5. Troubleshooting Model 8HBW23 Service ManualAC Electric Motors If the AC motor fails with a shorted winding AC Electric Motors Shorted Winding AC Electric Motors If the AC motor fails with a shorted winding, the AC motor Type motor speed fluctuates up and down, as if hunting/searching, and there is a high-pitchedThe traction motor is a brushless, 3-phase, sound variable speed AC motor, Using a clamping ammeter, measure current in The AC motor has a rotor (in place of the DC field), phase reads significantly higher than the other There is no electrical connection to the rotor; two phases current is induced in the rotor. The stator hasthree windings staggered 120° apart, and threeexternal connections labeled U, V, and W. SeeFigure 5-4 and Figure 5-5. Figure 5-4. AC Traction Motor circuit - Phase A MOTOR AC3PHASEA.tifFigure 5-5. AC Traction Motor circuit - Phase B MOTOR AC3PHASEB.tifOpen WindingIf the AC motor fails with an open winding, themotor moves erratically, as ifhunting/searching, and there is a tickingsound. Rotation is much slower than normal. Using a clamping ammeter, measure

current ineach of the motor power cables. The open phasereads significantly lower than the other twophases. 5-14 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting Guidelines Hydraulic the hydraulic lines and components are fully installed. Use an ohmmeter to measure wiring continuity to solenoids. Use an ammeter to measure forthe correct current to the solenoids and components with an ohmmeter. Electrical current can damage to the ohmmeter. Visually inspect all hydraulic lines and components for: • Leaking connections or connectors • Loose or broken fittings • Damaged tubing, hoses, vents, or seals Inspect the hydraulic system for the correct pressure and that the relief valve is functioning correctly. See "Hydraulic Pump Pressure ReliefValve Adjustment" on page 7-85. Check the hydraulic reservoir fluid level. Ifnecessary, add fluid; fill until fluid is visible towithin 1 in. (25.4 mm) below the fill port elbow. The usable reservoir capacity is 0.9 qt. (0.85 L). See "Lubrication Equivalency Chart" onpage A-2. NOTE: Always check hydraulic fluid is cold. Cap any open hydraulic fluid level with forks fully lowered and when hydraulic fluid is cold. Cap any open hydraulic f

Troubleshooting Model 8HBW23 Service ManualSymptom Table: Electrical System troubleshooting ETAC Loses PowerNOTE: Reference electric Verify parameter 21 setting. Incorrect wiring Verify that the wire from the battery connects to the left MPC terminal, and the Lift Motor Fuse (FU2) connect the left MPC terminal to the right LPC terminal, and that the wire from the right terminal of the Traction System Fuse (FU1) is attached to the Traction Amplifier at the B+ terminal.Low static voltage is below 25.2 volts after a charging cycle, charge the battery pack 5 times consecutively.NOTE: The voltage must be at or above 25.2 volts for the truck to reset and stay at 100%. Parameter settings can also be a factor here. Verify parameter 24 (battery reset voltage) is set higher than 75%. Low voltage during travel Make sure that the voltage is above 25.2 volts at key ON. Main contactor (MPC), that the Traction System Fuse (FU1) cable connects to the left MPC terminal, and the Lift Motor Fuse (FU2) connect the left MPC terminal to the right terminal and that the wire from the right terminal. Low voltage at key ON If voltage is below 25.2 volts at key ON after charging the battery. troubleshoot the battery and charger. Poor wiring connection or bad 1. Check the battery voltage displayed on the VM using the "ServiceVM Display" on page 3-16. 2. Compare the displayed voltage at the VM, J11-1 with respect to J11-3. 4. If the voltage is the same as what was read at the battery, replace the VM. 5. If the voltage is different, troubleshoot the wiring between the VM. Horn Does Not Sound When Horn Button Pushed. No Fault Codes. Possible Cause Action Repair or replace as necessary. Faulty horn switch/wiring in the handle head Replace the horn. Faulty Horn Replace if necessary. Faulty traction amplifier 5-16 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting Symptom Table: Electrical SystemGreen/Red LED on Keypad NotIlluminated When Key Pressed. Possible Cause ActionNo power supplied to the vehicle Check the control wires in the control handle arm harness.manager (JPX3), and connector J1 to the motor controller). Key switch jumper not connected Make sure the control fuse has not opened. Faulty LED(s) Connect the key switch jumper. Check the LED(s) if the truck functions normally but the LED(s) are not lighting correctly. Publication: 00700-CL341, Issued: 01 Oct 2015 5-17 Section 5. Troubleshooting Model 8 HBW23 Service Manual Symptom Tables: Lift/Lower System Symptom Tables: Lift/Lower Symptom Tables: Lift/Lower Symptom Symptom Tables: Lift/Lower Symptom Symptom Symptom Symptom Symptom Symptom SystemNOTE: If it is determined that a component failed as a result of hydraulic fluid contamination, replace the failed component and flush, fill, and bleed the hydraulic system. See "Hydraulic system. See

Travel is OKPossible Cause ActionBad lift pump contactor (MPC) and the pump contactor (MPC) energize? Bad wiring continuity or wiring shorts If not, measure the voltage between the pump contactor coilBad lift pump motor brushes terminals. If B voltage is present, replace the pump contactoror bad lift pump motor With the main ON/OFF switch ON, the PIN-key code entered, the green ON () key on the keypad pressed, and the lift switch depressed, does the pump contactor (LPC) energize? If not, check for lift input at the CAN (see "Service Display" on page 3-16). If no input is detailed to the pump contactor (LPC) energize? If not, check for lift input at the CAN (see "Service Display" on page 3-16). If no input is detailed to the pump contactor (LPC) energize? If not, check for lift input at the CAN (see "Service Display" on page 3-16). If no input is detailed to the pump contactor (LPC) energize? If not, check for lift input at the CAN (see "Service Display" on page 3-16).	ectea,
replace the VM. NOTE: Check for mechanical problems in the handle head before replacing the VM. With the main ON/OFF switch OFF and the battery disconnected, check for continuity and wiring shorts in the wiring harness or cables. With the main ON/OFF switch ON, the PIN-key code entered, the green ON () key on the keypad pressed, and the lift switch depressed, does the pump contactor (LPC) energize? If YES, measure the voltage between B- and the lift pump motor terminal. If OK, check the lift motor brushesif the brushes are OK, test the pump motor.5-18	
Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting Symptom Tables: Lift/Lower SystemNo Lift or Slow Lift, Lift MotorDoes RunPossible Cause ActionBattery problems Replace the battery with a fully-charged battery. Mechanical binding in the lift Repair the lift mechanism. mechanism. mechanism Low hydraulic pressure or relief valve Check the hydraulic pressure setting and adjust if necessary. Seesetting "Hydraulic Pump Pressure Relief Valve Adjustment" on page 7-85. Relief valve contamination. Replace the valve or flush the system and replace the hydraulic fluid.	
See "Hydraulic Fluid" on page 7-77.Bad lift pump motor or brushes Check the lift pump motor brushes. If OK, replace the pump motor. Contamination found in the pump If the lift motor is OK, remove the motor from the pump and rotate the pump by hand. Replace the pump if not OK.N Lower, Lift and Travel OKPossible Cause ActionBad lower solenoid valve With the main ON/OFF switch ON, cycle the lower solenoid valve energize? If YES, disconnect the battery, mechanical binding in the lift cylinder then slowly loosen, but DO NOT REMOVE, the hydraulic line at theor the forks to slowly lower. Haveif the forks lower, remove and rags and a drain pan ready to catch the fluid.inspect the solenoid valve Replace the lift of the lift cylinder then slowly lower.	
cylinder or repair the lift mechanismcheck for a bad VM Inspect for free movement and for signs of contamination. Clean the solenoid valve or flush the system, clean the filter, and replace the hydraulic fluid. See "Hydraulic Fluid" on page 7-77. If no contamination is found, repair or replace the solenoid valve or the pump assembly. With main ON/OFF switch ON, the PIN-key code entered, the green ON () key on the keypad pressed, and the lower button depressed, check for lower signal input at the CAN (see "Service Display" on page 3-16). If no signal is detected, replace the VM. NOTE: Check for mechanical problems in the handle head before replacing the VM.Publication:00700 CL341, Issued: 01 Oct 2015 5-19Section 5. Troubleshooting Model 8HBW23 Service ManualSymptom Tables: Lift/Lower SystemUnable to Pick Up a LoadPossible Cause ActionLoad too large for the lift truck Check the load weight. Check the lift pressure setting capacityBattery problems Replace the battery with a fully-charged good battery. Inc.	-
lift pressure adjustment Check and adjust the lift pump or motor. Slow LowerPossible Cause ActionBad lift/lower solenoid valve. Fluid. See "Hydraulic fluid.control valve. Fluid.	lace
Release the lower button momentarily, then continue to lower. Normal lower speed should resume. Load Drifting/Settling Action Possible Cause Check for contamination in the hydraulic fluid. Contamination in the hydraulic fluid. Contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large for the lift truck If contamination in the hydraulic fluid. Load too large fluid.	n is
found, replace the solenoid valve. Check the load weight. Check the lift pressure setting.5-20 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 5. Troubleshooting Symptom Tables: Lift/Lower SystemNo Lift or Lower. No FaultCodes.Possible Cause ActionThrottle magnet-actuator arm (in the control handle) of adjustment Check with the service display and repair as needed. Bad VM. If no other problems are noted but the VM does not detectIncorrect VM software installed, the presence of the magnet, replaced. Lowering may not occur if the incorrect software was inadvertently installed (the drive function will also not function correctly). Check for the correct software was inadvertently installed.	
software part number and replace the VM if not correct. Publication:00700-CL341, Issued: 01 Oct 2015 5-21 Section 5. Troubleshooting Model 8HBW23 Service Manual Symptom Tables: Travel (Forward/Reverse) System Symptom Table	ics
full brake release. Repair or replace the traction motor. Check for correct operation of the arm angle proximity switch (SW2) and correct if necessary. Check the wiring, the traction amplifier, and the switch adjustment. The arm angle proximity switch (SW2) is open-circuited. See "Arm Angle Proximity Switch" on page 8-2. Truck Does Not Accelerate Correctly Possible Cause Action Truck configured for	slow
Check the truck configuration acceleration Battery problem Verify a correct, fully-charged, good battery (24V) is installed in the Binding or mechanical problem. Repair or replace. Bad traction amplifier With the main ON/OFF switch OFF and the battery disconnected, check the traction motor. See "Motor Brush Inspection" on page 7-64. Repair or replace the traction amplifier. Symptom Tables: Travel (Forward/Reverse) SystemNo Travel Mode. No Fault Codes. Possible Cause ActionArm Angle Proximity Switch adjustment, wiring, and the Throttle magnet-actuator arm (in traction amplifier. See "Arm Angle Proximity Switch" on page 8-2.the control handle)	5.
ofadjustment Check with the service display and repair as needed. Bad VM. If no other problems are noted but the VM does not detect the presence of the magnet, replace the VM.No Travel. TA Flash Code 2,2, (Thermal Cutback)Heatsink Temperature Exceeded 185°F (85°C). Operator DisplayMay Indicate Hot2 (C45)Possible Caracterion Action Battery Problem Binding drive unit or dragging brake Verify the correct, (24V) fully-charged, battery is installed in truck. Bad TA Measure current draw on U, V, and W cables.	se
Traveling at about 1 mph (1.6 km/h) with no load, current should be about 35 to 50 AmpsTruck does not respond to Keypad and the drive unit for binding. If both are OK, replace traction motor. Examine mounting of TA. It must be mounted securely and in contact the truck frame (that acts as a heatsink). If TA is mounted correctly, replace TA. Enter Parameter 39 Access code. Use FlashWare and change value to either 3 or 4. Refer to "Programming Service Parameters" on page 3-9.No Travel, No Lift/Lower. TA Flash Code 3,1. Operator DisplayMay Indicate Error Code E106Possible Cause ActionShort in coil or wiring With the truck OFF and the battery disconnected, remove connector JP1 from the TA. Measure resistance between JP1-6 and JP1-13. Resistance is OK, replace TA.No Travel, Main Contactor Does Not Close. TA Flash Code 3,9.Operator Display	M1
Indicates Error Code E107Possible Cause ActionLoss of B+ at the TA Troubleshoot B+ from the battery to B+ at the TA. Check the wiring, Open in M1 coil or wiring connections, and fuses. With the truck OFF and the battery disconnected, remove connector JP1 from the TA. Measure resistance between JP1-6 and JP1-13. Resistance should be ap 40 ohms. If not, troubleshoot wires and coil for opens. If resistance is OK, replace TA. Publication:00700-CL341, Issued: 01 Oct 2015 5-23Section 5. Troubleshooting Model 8HBW23 Service Manual Symptom Tables: Travel (Forward/Reverse) SystemNo Travel, No Lift/Lower. TA Flash Code 1,3.	prox.
Operator DisplayIndicates Error Code E202Possible Cause ActionBad wiring between TA and traction motor. Check for continuity andBad TA shorts between cables and truck frame. With the truck OFF and the battery disconnected, disconnect the cables at the TA. Reconnect the battery and turn the truck ON. If code 1,3 is still displayed, replace the traction motor. With the truck OFF and the battery disconnected, disconnect motor cables at TA. Reconnect the battery and turn the truck ON and traction motor. With the truck OFF and the battery disconnected, disconnect motor cables at TA. Reconnect the battery and turn the truck ON and turn the turn the truck ON and turn the tu	ring
If code is still displayed, replace the TA. If code goes away, replace the traction motor. No Truck Functions Active. TA Flash Code 1,7, (Low BatteryVoltage). Operator Display May Indicate E221Possible Cause ActionBattery ProblemBad traction amplifier Verify the correct, (24V) fully-charged, battery is installed in truck. Verify battery voltage at key switch input.	
Measure voltage at JP1-1 wire with JP1 disconnected. If 24V, replace TA.No Truck Functions Active. TA Flash Code 1,8, (Excessive BatteryVoltage). Operator Display May Indicate E22Possible Cause ActionBattery is installed in truck. Verify battery voltage at key switch input. Measure voltage at JP1-1 wire with JP1 disconnected. If 24V, replace TA.5-24 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and CodesPublication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Ser	
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..... 6-31 Charger Error Codes

Stuck switch is disabled. If truck is equipped with an alternate switch, the alternate switch is prevented from lifting (jammed or too heavy a load) to a point of activating the lift cut-out time out. Examine for stuck switch or shorted wiring harness. See "Pinout Matrix" on page 8-9. Release the Lift switch.Code C27 Lower Switch is disabled. If truck is equipped with an alternate switch, the alternate switch is still active. Lower Reason solenoid. Stuck switch is disabled. If truck is equipped with an alternate switch, the alternate switch is still active. Lower Reason solenoid responds to input from alternate switch is disabled. If truck is equipped with an alternate switch, the alternate switch is still active. Lower season solenoid responds to input from alternate switch is disabled. If truck is equipped with an alternate switch, the alternate switch is disabled. If truck is equipped with an alternate switch is still active. Lower See "Pinout Matrix" on page 8-9. Release the Lower request to Run How to Clear Lower request to Run How to Clear Lower request on page 8-9. Release the Lower switch. Solen the Lower switch. Solen the truck responds only to activated C30 Code Title Normal travel controls are disabled. The truck responds only to activated C30 Code Title Normal travel is disabled. The truck responds only to activated C30 Code Title Normal travel is disabled. The truck responds only to activated C30 Code Title Normal travel is disabled. The truck responds only to activate the brake is applied. Tests to Run How to Clear Publication:00700-CL341, Issued: 01 Oct 2015 6-7Section 6. Messages and Codes Model 8HBW23 Service ManualMessages and Caution CodesCode C31 Code Title Lost Brake Pot VR1 Input (Brake Pot Out-of-Range)Operator Display Calculated (depressed) prior to the Brake Release C32 Code Title Travel is disabled Operator Display The emergency Reverse Before Reason Examine for stuck emergency reverse switch is released. Tests to Run How to ClearCode C33 Horn Switch Stuck Code Title C33 Operator Displ

switch on the control handle).

Reason Horn request ON longer than time out value (10 seconds). Stuck switch is disabled; Tests to Run if equipped with an alternate switch, the alternate switch is still active. How to Clear Examine horn switch and related wiring. See "Pinout Matrix" on page 8-9. Release or repair Horn switch.6-8 Publication: 00700-CL341, Issued: 01 Oct 2015Model 8HBW23 Service Manual Section 6. Messages and Codes Messages and Codes Code C35Code Title Brake Switch (Arm Angle Proximity Switch) ErrorOperator DisplaySystem Response C35Alarm Sounds Normal travel controls are disabled. The truck responds only to activations of theReason Emergency Reverse switch if the traction motor is rotating in the tractor-first direction. Tests to RunHow to Clear Yes (3 beeps, once, when error code is generated) The brake is engaged. At the same time, the traction motor is detected rotating. Test the brake switch (arm angle proximity switch) and wires. Apply the brake and have the switch adjusted or replaced. Code Lo (C41)Code Title Battery Undervoltage WarningOperator Display 'Lo'System Response Battery () Indicator Blinking Rarm Sounds TA Flash Code "2,3" Reason Travel performance may be limited due to low voltage. Tests to Run NoHow to Clear Battery

voltage is below approximately 17V. The battery is discharged or there is excessive load on the battery voltage at JT1-1. Use the service key to read the voltage. See "Service Display" on page 3-16. The battery must be charged.

Examine the battery and battery and battery connections. The fault is cleared when the battery voltage increases above 17V. Publication:00700-CL341, Issued: 01 Oct 2015 6-9Section 6. Messages and Codes Model 8HBW23 Service ManualMessages and Codes Code Hi (C42)Code Title Battery Overvoltage WarningOperator Display 'Hi'System Response Battery () Indicator BlinkingAlarm Sounds TA Flash Code "2,4"Reason Travel performance may be limited. Tests to RunHow to Clear No Battery voltage is over approximately 32V.

This can be caused by the wrong type of battery installed in the truck, bad battery connections/cables, or an overcharged battery voltage at JPT1-1. See "Service Display" on page 3-16. See also "Code Lo (C41)". Check battery and battery connections.

Make sure that the correct size battery is installed in the truck. The fault is cleared when the battery voltage drops below 32V. Code Cold (C43)Code Title Traction Amplifier Cold Thermal CutbackOperator Display ColdSystem Response TA Flash Code "2,1" Hash Code "2,1" and the control of the cont

Click-to-Creep travel disabled, Input from Click-to-Creep button is stuck closed by Input from Click-to-Creep button is stuck closed on the RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Release the Click-to-Creep button. PlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Release the Click-to-Creep button. PlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Release the Click-to-Creep button. PlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Release the Click-to-Creep button. PlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Release the Click-to-Creep button. PlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service port. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service Puttor. Test wiring to RDP-T module. Run FlashWare RDP Communication Test at the service Puttor. Puttor. Run FlashWare RDP Communication Test at the service Puttor. Run FlashWare RDP Communication Test at the service Puttor. Run FlashWare RDP Communication Test at the service Puttor. Run FlashWare RDP Communication Test at the service Puttor. Run FlashWare RDP Communication Test at the Run FlashWare RDP Communication T

Resistance of coil should be approximately 22-23 ohms. See "Pin Out Matrix" on How to Clear page 8-9. Repair shorts or opens as needed and re-key. Code C61 Code Title Lower Solenoid Coil (Sol 1) Driver Shorted or OpenOperator Display C61 TA Flash Code "3,5" System Response Lower function not available. Lift functions normally. Reason Lower coil driver open or shorted. Tests to Run Examine for a short or open for lower coil, or related wiring. Resistance of coil should be approximately 39 Ohms. See "Pinout Matrix" on page 8-9. How to Clear Investigate cause of open or short and repair or replace as needed. 6-12 Publication: 00700-CL341, Revised 31 Aug 2016