

# SERVICE MANUAL

**FR450 / FR500 / FR600 / FR700 / FR850**

**Forage Harvester**

**Part number 47812470**  
English  
February 2015  
*Replaces part number 47688004*





# **SERVICE MANUAL**

**FR**

# Link Product / Engine

---

<b>Product</b>	<b>Market Product</b>	<b>Engine</b>
FR850 FR850 TIER 2 [5803 - ]	North America	FVAE2884X*B200
FR450 FR450 TIER 3 [5803 - ]	North America	F2CE9684U*E151
FR500 FR500 TIER 4A	North America	F3BFE613E*A
FR600 FR600 TIER 3 [5803 - ]	North America	F3CE0684E*E920
FR450 FR450 TIER 4A	North America	F2CFE613A*A
FR500 FR500 TIER 3 [5803 - ]	North America	F3BE0684J*E919

# Contents

---

## INTRODUCTION

<b>Engine</b> .....	<b>10</b>
[10.001] Engine and crankcase .....	10.1
[10.218] Fuel injection system.....	10.2
[10.400] Engine cooling system .....	10.3
[10.414] Fan and drive .....	10.4
[10.418] Rotary screen .....	10.5
<b>Main gearbox and drive</b> .....	<b>14</b>
[14.100] Main gearbox and drive .....	14.1
<b>Transmission</b> .....	<b>21</b>
[21.114] Mechanical transmission .....	21.1
[21.120] Gearbox.....	21.2
[21.130] Mechanical transmission external controls.....	21.3
[21.100] Mechanical transmission lubrication system .....	21.4
[21.145] Gearbox internal components.....	21.5
[21.182] Differential.....	21.6
<b>Four-Wheel Drive (4WD) system</b> .....	<b>23</b>
[23.101] Mechanical control .....	23.1
[23.304] Four-Wheel Drive (4WD) gearbox .....	23.2
<b>Front axle system</b> .....	<b>25</b>
[25.100] Powered front axle .....	25.1
[25.102] Front bevel gear set and differential .....	25.2
[25.310] Final drives .....	25.3
<b>Rear axle system</b> .....	<b>27</b>
[27.450] Rear-powered steerable axle .....	27.1
[27.550] Non-powered rear axle.....	27.2

<b>Hydrostatic drive</b> .....	<b>29</b>
[29.100] Transmission and steering hydrostatic control .....	29.1
[29.218] Pump and motor components.....	29.2
[29.202] Hydrostatic transmission .....	29.3
<b>Brakes and controls</b> .....	<b>33</b>
[33.202] Hydraulic service brakes .....	33.1
[33.110] Parking brake or parking lock .....	33.2
<b>Hydraulic systems</b> .....	<b>35</b>
[35.000] Hydraulic systems.....	35.1
[35.106] Variable displacement pump .....	35.2
[35.204] Remote control valves .....	35.3
[35.300] Reservoir, cooler, and filters.....	35.4
[35.359] Main control valve .....	35.5
[35.350] Safety and main relief valves .....	35.6
[35.600] High flow hydraulics .....	35.7
[35.410] Header or attachment height system .....	35.8
[35.602] Header or attachment leveling system .....	35.9
[35.514] Upper feed roll gearbox system.....	35.10
[35.516] Cutterhead drive system .....	35.11
[35.530] Spout rotation circuit .....	35.12
[35.532] Spout raising system .....	35.13
[35.534] Spout deflector system.....	35.14
<b>Steering</b> .....	<b>41</b>
[41.101] Steering control .....	41.1
[41.200] Hydraulic control components.....	41.2
[41.206] Pump .....	41.3
[41.216] Cylinders .....	41.4
[41.432] Autoguidance steering .....	41.5

<b>Wheels</b> .....	<b>44</b>
[44.511] Front wheels .....	44.1
[44.520] Rear wheels .....	44.2
<b>Cab climate control</b> .....	<b>50</b>
[50.100] Heating .....	50.1
[50.200] Air conditioning .....	50.2
<b>Electrical systems</b> .....	<b>55</b>
[55.000] Electrical system .....	55.1
[55.100] Harnesses and connectors .....	55.2
[55.015] Engine control system .....	55.3
[55.010] Fuel injection system .....	55.4
[55.014] Engine intake and exhaust system .....	55.5
[55.988] Selective Catalytic Reduction (SCR) electrical system .....	55.6
[55.012] Engine cooling system .....	55.7
[55.013] Engine oil system .....	55.8
[55.512] Cab controls .....	55.9
[55.640] Electronic modules .....	55.10
[55.610] Ground speed control .....	55.11
[55.019] Hydrostatic drive control system .....	55.12
[55.051] Cab Heating, Ventilation, and Air-Conditioning (HVAC) controls .....	55.13
[55.050] Heating, Ventilation, and Air-Conditioning (HVAC) control system .....	55.14
[55.421] Feeding control system .....	55.15
[55.800] Metal detector .....	55.16
[55.820] Chopping and cutting control systems .....	55.17
[55.830] Rotary screen drive and cleaning .....	55.18
[55.680] Autopilot/Autoguidance .....	55.19
[55.450] Ejecting control system .....	55.20
[55.408] Warning indicators, alarms, and instruments .....	55.21

[55.DTC] FAULT CODES .....	55.22
<b>Attachments/Headers .....</b>	<b>58</b>
[58.900] Belt feeding .....	58.1
<b>Product feeding .....</b>	<b>60</b>
[60.103] Lower feed rolls .....	60.1
[60.107] Upper feed rolls .....	60.2
[60.155] Metal detector .....	60.3
<b>Chopping .....</b>	<b>64</b>
[64.100] Cutterhead .....	64.1
[64.106] Drum .....	64.2
[64.130] Drum gearbox .....	64.3
[64.140] Sharpening system .....	64.4
[64.150] Shearbar .....	64.5
[64.160] Crop processor .....	64.6
[64.170] Transition channel/concave and lever .....	64.7
<b>Ejection .....</b>	<b>70</b>
[70.120] Blower .....	70.1
[70.140] Spout .....	70.2
<b>Platform, cab, bodywork, and decals .....</b>	<b>90</b>
[90.105] Machine shields and guards .....	90.1
[90.150] Cab .....	90.2



# INTRODUCTION



# Contents

---

## INTRODUCTION

Basic instructions - How to use and navigate through this Manual .....	3
Advice .....	10
Note to the Owner (*) .....	11
Safety rules .....	12
Safety rules - Ecology and the environment .....	13
Safety rules .....	14
Personal safety .....	17
Basic instructions - Shop and assembly .....	18
Torque .....	20
Basic instructions - Chain Wear Tables - Roller Chains .....	22
Conversion factors .....	24
General specification System protection data .....	25
Product identification .....	28

(\*) See content for specific models

---

## Basic instructions - How to use and navigate through this Manual

### Technical information

This manual has been produced by a new technical information system. This new system is designed to deliver technical information electronically through Web delivery (eTim), DVD and in paper manuals. A coding system called SAP has been developed to link the technical information to other Product Support functions, e.g., Warranty.

Technical information is written to support the maintenance and service of the functions or systems on a customer's machine. When a customer has a concern on his machine it is usually because a function or system on his machine is not working at all, is not working efficiently, or is not responding correctly to his commands. When you refer to the technical information in this manual to resolve that customer's concern, you will find all the information classified using the SAP coding, according to the functions or systems on that machine. Once you have located the technical information for that function or system then you will find all the mechanical, electrical or hydraulic devices, components, assemblies and sub assemblies for that function or system. You will also find all the types of information that have been written for that function or system, the technical data (specifications), the functional data (how it works), the diagnostic data (fault codes and troubleshooting) and the service data (remove, install adjust, etc.).

By integrating SAP coding into technical information, you will be able to search and retrieve just the right piece of technical information you need to resolve that customer's concern on his machine. This is made possible by attaching 3 categories to each piece of technical information during the authoring process.

The first category is the Location, the second category is the Information Type and the third category is the Product:

- LOCATION - is the component or function on the machine, that the piece of technical information is going to describe e.g. Fuel tank.
- INFORMATION TYPE - is the piece of technical information that has been written for a particular component or function on the machine e.g. Capacity would be a type of Technical Data that would describe the amount of fuel held by the Fuel tank.
- PRODUCT - is the model for which the piece of technical information is written.

Every piece of technical information will have those 3 categories attached to it. You will be able to use any combination of those categories to find the right piece of technical information you need to resolve that customer's concern on his machine.

That information could be:

- the description of how to remove the cylinder head
- a table of specifications for a hydraulic pump
- a fault code
- a troubleshooting table
- a special tool

## How to use this manual

This manual is divided into Sections. Each Section is then divided into Chapters. Contents pages are included at the beginning of the manual, then inside every Section and inside every Chapter. An alphabetical Index is included at the end of a Chapter. Page number references are included for every piece of technical information listed in the Chapter Contents or Chapter Index.

Each Chapter is divided into four Information types:

- Technical Data (specifications) for all the mechanical, electrical or hydraulic devices, components and, assemblies.
- Functional Data (how it works) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Diagnostic Data (fault codes, electrical and hydraulic troubleshooting) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Service Data (remove disassembly, assemble, install) for all the mechanical, electrical or hydraulic devices, components and assemblies.

## Sections

Sections are grouped according to the main functions or a systems on the machine. Each Section is identified by a number 00, 35, 55, etc. The amount of Sections included in the manual will depend on the type and function of the machine that the manual is written for. Each Section has a Contents page listed in alphabetic/numeric order. This table illustrates which Sections could be included in a manual for a particular product.

	PRODUCT				
	Tractors				
	Vehicles with working arms: backhoes, excavators, skid steers, ....				
	Combines, forage harvesters, balers, ....				
	Seeding, planting, floating, spraying equipment, ....				
	Mounted equipment and tools, ....				
SECTION					
00 - Maintenance					
05 - Machine completion and equipment					
10 - Engine					
14 - Main gearbox and drive					
18 - Clutch					
21 - Transmission					
23 - Four wheel drive system					
25 - Front axle system					
27 - Rear axle system					
29 - Hydrostatic drive					
31 - Implement power take-off					
33 - Brakes and controls					
35 - Hydraulic systems					
36 - Pneumatic system					
37 - Hitches, drawbars and implement couplings					
39 - Frames and ballasting					
41 - Steering					
44 - Wheels					
46 - Steering clutches					
48 - Tracks and track suspension					
50 - Cab climate control					
55 - Electrical systems					
56 - Grape harvester shaking					
58 - Attachments/headers					
60 - Product feeding					
61 - Metering system					
62 - Pressing - Bale formation					

## INTRODUCTION

63 - Chemical applicators					
64 - Chopping					
66 - Threshing					
68 - Tying/Wrapping/Twisting					
69 - Bale wagons					
70 - Ejection					
71 - Lubrication system					
72 - Separation					
73 - Residue handling					
74 - Cleaning					
75 - Soil preparation/Finishing					
76 - Secondary cleaning / Destemmer					
77 - Seeding					
78 - Spraying					
79 - Planting					
80 - Crop storage / Unloading					
82 - Front loader and bucket					
83 - Telescopic single arm					
84 - Booms, dippers and buckets					
86 - Dozer blade and arm					
88 - Accessories					
89 - Tools					
90 - Platform, cab, bodywork and decals					

**Section contents**

<b>Section</b>	<b>Number</b>	<b>Description</b>
Maintenance	00	
Machine completion and equipment	05	
Engine	10	
Main gearbox and drive	14	
Clutch	18	
Transmission	21	
Four wheel drive system	23	
Front axle system	25	
Rear axle system	27	
Hydrostatic drive	29	
Implement power take-off	31	
Brakes and controls	33	
Hydraulic systems	35	This Section covers the central parts of the hydraulic system. The components that are dedicated to a specific function are listed in the Chapter where all the technical information for that function is included.
Pneumatic system	36	This Section covers the pneumatic system. The components that are dedicated to a specific function are listed in the Chapter where all the technical information for that function is included.
Hitches, drawbars and implement couplings	37	
Frames and ballasting	39	
Steering	41	
Wheels	44	
Steering clutches	46	
Tracks and track suspension	48	
Cab climate control	50	
Electrical systems	55	The Section covers the central parts of the electrical, electronic, and lighting systems. The components that are dedicated to a specific function are listed in the Chapter where all the technical information for that function is included.
Grape harvester shaking	56	
Attachments/headers	58	
Product feeding	60	
Metering system	61	
Pressing - Bale formation	62	
Chemical applicators	63	
Chopping	64	
Threshing	66	
Tying/Wrapping/Twisting	68	
Bale wagons	69	
Ejection	70	
Lubrication system	71	
Separation	72	
Residue handling	73	
Cleaning	74	
Soil preparation/Finishing	75	
Secondary cleaning / Destemmer	76	
Seeding	77	
Spraying	78	
Planting	79	
Crop storage / Unloading	80	
Front loader and bucket	82	

## INTRODUCTION

<b>Section</b>	<b>Number</b>	<b>Description</b>
Telescopic single arm	83	
Booms, dippers and buckets	84	
Dozer blade and arm	86	
Accessories	88	
Tools	89	
Platform, cab, bodywork and decals	90	This Section covers all the main functions and systems related to the body of the machine, including the operators cab and the platform.

## Chapters

Each Chapter is identified by a number e.g. Hydraulic Systems - Main check valve- 35.359. The first number is identical to the Section number i.e. Chapter 35.359 is inside Section 35, Hydraulic Systems. The second number is representative of the Chapter contained within the Section.

### CONTENTS

The Chapter Contents lists all the technical data (specifications), functional data (how it works), service data (remove, install adjust, etc..) and diagnostic data (fault codes and troubleshooting) that have been written in that Chapter for that function or system on the machine.

### Contents

HYDRAULIC SYSTEMS - 35  
Main control valve - 359

#### FUNCTIONAL DATA

Main control valve - Sectional view (35.359 - C.10.A.30)

#### TECHNICAL DATA

Main control valve - General specifications (35.359 - D.40.A.10)

#### SERVICE

Main control valve - Remove (35.359 - F.10.A.10)

### INDEX

The Chapter Index lists in alphabetical order all the types of information (called Information Units) that have been written in that Chapter for that function or system on the machine.

## Information units and information search

Each chapter is composed of information units. Each information unit has a page reference within that Chapter. The information units provide a quick and easy way to find just the right piece of technical information you are looking for.

Example information unit                      Main control valve - Sectional View (35.359)

Information Unit SAP code	35	Hydraulic systems
SAP code classification	359	Main control valve

## Page header and footer

The page header will contain the following references:

- Section and Chapter description

The page footer will contain the following references:

- Publication number for that Manual, Section or Chapter.
- Version reference for that publication.
- Publication date
- Section, chapter and page reference e.g.35.359 / 9



## **Advice**

All repair and maintenance works listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given; and using, whenever appropriate, the special tools.

Anyone who carries out the above operations without complying with the instructions shall be responsible for the subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages due to the anomalous behavior of parts and/or components not approved by the manufacturer himself, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages due to an anomalous behavior of parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information may not be updated due to modifications of a technical or commercial type, as well as to suit the laws and regulations of different countries.

In case of questions, refer to your Sales and Service Networks.

---

## Note to the Owner

FR450	NA
FR500	NA
FR600	NA
FR850	NA

### Engine repair information:

The engine repair information is not contained within this manual.

For engine repair information, please refer to the respective Service Manual for the engine type used in your vehicle.

### Fault Code Resolution (FCR) information:

For FCR information, please refer to the Electronic Service Tool (EST) or to the information given in the paper or electronic version of this manual.

### Electronic Service Tool (EST) information:

The EST information and how to handle Control Modules (CM) (e.g.: resetting of the CM, etc.) is not contained within this manual.

For EST information, please refer to the Electronic Service Tool User's Guide.

## Safety rules


### Personal safety





This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

**FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.**

### Machine safety

**NOTICE:** Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

### Information

**NOTE:** Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

---

## Safety rules - Ecology and the environment

Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the relative legislation applicable to your country, and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances.

### Helpful hints

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- The air-conditioning system contains gases that should not be released into the atmosphere. Consult an air-conditioning specialist or use a special extractor to recharge the system properly.
- Repair any leaks or defects in the engine cooling system or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

### Battery recycling

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. NEW HOLLAND strongly recommends that you return all used batteries to a NEW HOLLAND dealer, who will dispose of the used batteries or recycle the used batteries properly. In some countries, this is a legal requirement.



### Mandatory battery recycling

**NOTE:** The following requirements are mandatory in Brazil.

Batteries are made of lead plates and a sulfuric acid solution. Because batteries contain heavy metals such as lead, CONAMA Resolution 401/2008 requires you to return all used batteries to the battery dealer when you replace any batteries. Do not dispose of batteries in your household garbage.

Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

---

## Safety rules

### LEGAL OBLIGATIONS

This machine may be equipped with special guarding or other devices in compliance with local legislation. Some of these require active use by the operator. Therefore, check local legislations on the usage of this machine.

### ACCIDENT PREVENTION

Most accidents or injuries that occur in workshops are the result of non compliance to simple and fundamental safety principles. For this reason, **IN MOST CASES THESE ACCIDENTS CAN BE AVOIDED** by applying the fundamental safety principles, acting with the necessary caution and care.

Accidents may occur with all types of machine, regardless of how well the machine in question was designed and built.

#### **⚠ CAUTION**

##### **Unexpected machine movement!**

- 1. Disengage all drives.**
- 2. Engage parking brake.**
- 3. Lower all attachments to the ground, or raise and engage all safety locks.**
- 4. Shut off engine.**
- 5. Remove key from key switch.**
- 6. Switch off battery key, if installed.**
- 7. Wait for all machine movement to stop.**

**Failure to comply could result in minor or moderate injury.**

C0038A

### SAFETY REQUIREMENTS FOR FLUID POWER SYSTEMS AND COMPONENTS - HYDRAULICS

- Flexible hose assemblies must not be constructed from hoses which have been previously used as part of a hose assembly.
- Do not weld hydraulic pipes: when flexible hoses or piping are damaged, replace them immediately.
- It is forbidden to modify a hydraulic accumulator by machining, welding or any other way.
- Before removing hydraulic accumulators for servicing, the liquid pressure in the accumulators must be reduced to zero.
- Pressure check on hydraulic accumulators must be carried out by a method recommended by the accumulator manufacturer.
- Take care not to exceed the maximum allowed pressure of the accumulator. After any check or adjustment, check for leakages or gas in the hoses or tubes.

### SAFETY RULES

#### General guidelines

- Carefully follow specified repair and maintenance procedures.
- When appropriate, use P.P.E (Personal Protective Equipment)
- Do not wear rings, wristwatches, jewellery, unbuttoned or loose articles of clothing such as: ties, torn clothing, scarves, open jackets or shirts with open zips that may remain entangled in moving parts. It is advised to wear approved safety clothing, e.g.: non-slip footwear, gloves, safety goggles, helmets, etc.
- Do not carry out repair operations with someone sitting in the driver's seat, unless the person is a trained technician who is assisting with the operation in question.
- Do not operate the machine or use any of the implements from different positions, other than the driver's seat.
- Do not carry out operations on the machine with the engine running, unless specifically indicated.

**Thanks very much for your reading,  
Want to get more information,  
Please click here, Then get the complete  
manual**

**JustClickHere** 

**NOTE:**

**If there is no response to click on the link above,  
please download the PDF document first, and then  
click on it.**

**Have any questions please write to me:  
[admin@servicemanualperfect.com](mailto:admin@servicemanualperfect.com)**