

**PATRIOT 3230 AND 3300 SPRAYERS SERVICE MANUAL 84258776 - MASTER TABLE OF CONTENTS**

**NOTE:** Engine repair information is not contained within this Service Manual. For engine repair, refer to appropriate engine service manual as follows:

84202702 - For 6-Cylinder 6.7L NEF Engine

**BOOK 1 - 84258779**

STANDARD TORQUE SPECIFICATIONS ..... SECTION 1000  
TORQUE SPECIFICATIONS - U.S. HARDWARE ..... 1000-3  
TORQUE SPECIFICATIONS - METRIC HARDWARE ..... 1000-5  
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS ..... 1000-7

SAFETY ..... SECTION 1010  
PRECAUTIONARY STATEMENTS ..... 1010-3  
PERSONAL SAFETY ..... 1010-3  
MACHINE SAFETY AND INFORMATION ..... 1010-3  
SAFETY RULES ..... 1010-4

LUBRICATION ..... SECTION 1020  
SPECIAL TOOLS ..... 1020-3  
MAINTENANCE SCHEDULE ..... 1020-7

SPECIFICATIONS ..... SECTION 1030  
Diesel Engine ..... 1030-3  
Engine Lubrication System ..... 1030-3  
Cooling System ..... 1030-3  
Fuel System ..... 1030-3  
Fuel Tank ..... 1030-3  
Air Intake System ..... 1030-3  
Battery ..... 1030-3  
Brakes ..... 1030-3  
Gear Increaser ..... 1030-4  
Hub Lubricant ..... 1030-4  
Hubs and Tires ..... 1030-4  
Drive System ..... 1030-4  
Hydraulic System ..... 1030-4  
Hydraulic Pump Drive ..... 1030-4  
Hydraulic Pumps ..... 1030-4  
Hydraulic Motors ..... 1030-4  
Suspension ..... 1030-5  
Steering ..... 1030-5  
Turning Radius ..... 1030-5  
Wheel Adjustments ..... 1030-5  
Travel Speed ..... 1030-5  
Cab ..... 1030-5  
Air Conditioning System ..... 1030-5  
Plumbing System ..... 1030-5  
Dimensions ..... 1030-5  
Approximate Base Shipping Weights ..... 1030-5  
Maximum Operating Weight ..... 1030-6  
Engine Oil Selection ..... 1030-6  
Engine Oil Viscosity/Temperature Usage Recommendation ..... 1030-6  
Engine Coolant Solutions ..... 1030-7  
Tire Inflation ..... 1030-8

**PATRIOT 3230 AND 3300 SPRAYERS SERVICE MANUAL 84258776 - MASTER TABLE OF CONTENTS**

TOWING..... SECTION 1040  
SPECIAL TORQUE ..... 1040-3  
SPECIAL TOOLS ..... 1040-4  
PREPARING THE MACHINE FOR TOWING ..... 1040-6  
RETURNING TO SERVICE AFTER TOWING ..... 1040-9

ENGINE..... SECTION 2000  
Engine repair information is not contained within this Service Manual. For engine repair, refer to engine service manual 84202702 - 6-Cylinder 6.7L NEF Engine  
SPECIAL TORQUES ..... 2000-3  
SPECIAL TOOLS ..... 2000-4  
ENGINE REMOVAL AND INSTALLATION ..... 2000-5  
ENGINE ISOLATOR MOUNT ..... 2000-32

AIR INDUCTION SYSTEM..... SECTION 2010  
ENGINE AIR FILTER ELEMENTS ..... 2010-3  
PRIMARY AND SECONDARY FILTERS ..... 2010-4  
RESTRICTION INDICATOR SWITCH ..... 2010-8  
INTAKE AIR DUCT ..... 2010-10

ELECTRICAL SYSTEM..... SECTION 4000  
SPECIAL TOOLS ..... 4000-3  
GENERAL INFORMATION ..... 4000-4  
ELECTRICAL SYMBOLS ..... 4000-8  
DIAGNOSTICS ..... 4000-9  
BASIC TROUBLESHOOTING ..... 4000-10  
FUSE AND RELAY IDENTIFICATION ..... 4000-18  
INSTRUMENTATION AND CONTROLS ..... 4000-27  
CAB BULKHEAD CONNECTOR LOCATIONS ..... 4000-30  
GROUND POINTS ..... 4000-34  
CONTROLLER/NODE LOCATIONS ..... 4000-36  
PROPEL SYSTEM ..... 4000-41  
VEHICLE CAN BUS ..... 4000-47  
APPLICATION CAN BUS ..... 4000-49  
AUTOGUIDANCE CAN BUS (IF EQUIPPED) ..... 4000-50  
AUTOFOLD BOOM POSITION SENSORS ..... 4000-51  
CHASSIS/CAB CONNECTOR INFORMATION ..... 4000-54  
APPLICATION SYSTEM CONNECTOR INFORMATION ..... 4000-101  
CHARGING SYSTEM ..... 4000-126  
STARTING SYSTEM ..... 4000-130  
ENGINE FAULT CODES ..... 4000-136

ELECTRICAL SCHEMATIC POSTER 84242809 ..... IN SERVICE MANUAL BINDER

BATTERY..... SECTION 4010  
SPECIFICATIONS ..... 4010-3  
ACCESS TO BATTERIES ..... 4010-4  
REMOVAL AND INSTALLATION OF BATTERIES ..... 4010-5  
BATTERY MAINTENANCE ..... 4010-6

STEERING HAND PUMP ..... SECTION 5000

CENTER CONSOLE..... SECTION 5010  
SPECIAL TORQUES ..... 5010-3  
STEERING COLUMN ..... 5010-4  
STEERING COLUMN ASSEMBLY ..... 5010-9

**BOOK 2 - 84258780**

HOW TO READ HYDRAULIC SCHEMATICS AND SYMBOLS ..... SECTION 8000  
    HOW TO READ SYMBOLS IN A HYDRAULIC SCHEMATIC ..... 8000-3  
    SIMPLE SCHEMATIC ..... 8000-19  
    COMMON SYMBOLS ..... 8000-21

HYDRAULIC SYSTEM TROUBLESHOOTING ..... SECTION 8010  
    SPECIAL TORQUES ..... 8010-3  
    HYDRAULIC SYSTEM SPECIFICATIONS ..... 8010-4  
    DRIVE CIRCUIT ..... 8010-12  
    HYDROSTATIC PUMPS ..... 8010-14  
    WHEEL MOTOR ..... 8010-29  
    NEUTRAL SHUNT VALVE ..... 8010-33  
    ACTIVE SUSPENSION ..... 8010-33  
    PARKING BRAKE SYSTEM ..... 8010-34  
    GEAR PUMP ..... 8010-36  
    PWM PRODUCT PUMP CONTROL VALVE ..... 8010-40  
    HYDRAULIC OIL COOLER ..... 8010-47  
    PRESSURE COMPENSATED PUMP ..... 8010-48  
    MANIFOLD ..... 8010-49  
    VALVE BANK (TWO SECTION) ..... 8010-50  
    BOOM VALVE BANK ..... 8010-53  
    STEERING ORBIT MOTOR ..... 8010-63  
    STEERING CYLINDER ..... 8010-63  
    SERVICE BRAKE ..... 8010-66  
    BOOM CYLINDERS 90 AND 100 FOOT BOOM ..... 8010-67  
    BOOM CYLINDERS 120 FOOT BOOM ..... 8010-68

HYDRAULIC TANK, FILTERS AND FLUID ..... SECTION 8020  
    SPECIAL TOOLS ..... 8020-3  
    HYDRAULIC FILTERS ..... 8020-4  
    HYDRAULIC MAINTENANCE SCHEDULE ..... 8020-11  
    HYDRAULIC TANK DRAINING AND FILLING ..... 8020-12  
    HYDRAULIC TANK ..... 8020-15

HYDRAULIC PUMPS ..... SECTION 8040  
    SPECIAL TORQUES ..... 8040-3  
    GEAR PUMP ..... 8040-5  
    PRESSURE COMPENSATED PUMP ..... 8040-12  
    HYDROSTATIC PUMP ..... 8040-16

PRODUCT PUMP - HYDRAULIC MOTOR ..... SECTION 8050  
    SPECIAL TORQUES ..... 8050-3  
    PRODUCT PUMP HYDRAULIC MOTOR ..... 8050-4

HYDRAULIC WHEEL MOTOR ..... SECTION 8051  
    WHEEL MOTOR ..... 8051-3

PUMP DRIVE ..... SECTION 8060  
    SPECIAL TORQUES ..... 8060-3  
    PUMP DRIVE ..... 8060-4

**PATRIOT 3230 AND 3300 SPRAYERS SERVICE MANUAL 84258776 - MASTER TABLE OF CONTENTS**

HYDRAULIC VALVES..... SECTION 8070  
SPECIAL TORQUES ..... 8070-3  
SPECIAL TOOLS ..... 8070-3  
PRODUCT PUMP CONTROL (PWM) VALVE ..... 8070-4  
NEUTRAL SHUNT VALVE ..... 8070-7  
MOTOR CONTROL VALVE ..... 8070-12  
PARK BRAKE VALVE ..... 8070-15  
TWO SECTION VALVE BANK ..... 8070-20  
BOOM VALVE BANK ..... 8070-28  
SOLENOID FUNCTION TEST ..... 8070-35  
MANIFOLD ..... 8070-36  
SERVICE BRAKE VALVE ..... 8070-42

HYDRAULIC CYLINDERS ..... SECTION 8080  
SPECIAL TORQUES ..... 8080-3  
AXLE ADJUST CYLINDER ..... 8080-4  
INNER BOOM FOLD CYLINDER ..... 8080-8  
BOOM FOLD OUTER CYLINDER-60 FT. 90 FT. 100 FT. .... 8080-10  
OUTER AND MID BOOM FOLD CYLINDER-120 FT. .... 8080-12  
BOOM HEIGHT CYLINDER ..... 8080-15  
BOOM LEVEL CYLINDER ..... 8080-20  
LADDER CYLINDER ..... 8080-23  
SHOCK ABSORBER/ ACTIVE SUSPENSION CYLINDER ..... 8080-25  
STEERING CYLINDER ..... 8080-29  
CYLINDER OVERHAUL ..... 8080-32

HYDRAULIC SCHEMATIC POSTER 84242812 ..... IN SERVICE MANUAL BINDER

**BOOK 3 - 84258781**

AIR CONDITIONING SYSTEM - TROUBLESHOOTING AND FAULT CODES ..... SECTION 9000  
SPECIAL TOOLS ..... 9000-3  
A/C THERMAL OPERATION ..... 9000-5  
A/C SYSTEM COMPONENTS ..... 9000-7  
AUTOMATIC TEMPERATURE CONTROL (ATC) OPERATION ..... 9000-10  
ATC FAULT CODES ..... 9000-17  
LOCATING SYSTEM PROBLEMS WITHOUT FAULT CODES ..... 9000-26  
ATC CONTROLLER TEST (CONNECTOR J8 TEST POINTS) ..... 9000-28  
COMPRESSOR AND CLUTCH ..... 9000-32  
HIGH AND LOW PRESSURE SWITCH CLUTCH LATCHING CIRCUIT ..... 9000-37  
HEATER CONTROL VALVE ..... 9000-41  
BLOWER SPEED AND TEMPERATURE CONTROL POTENTIOMETERS ..... 9000-43  
BLOWER AND BLOWER SPEED DRIVER ..... 9000-45  
CAB AND EVAPORATOR TEMPERATURE SENSORS ..... 9000-47  
CONTROLLER POWER, GROUND, AND ATC SWITCH ..... 9000-55  
CAB PRESSURIZER BLOWER ..... 9000-58  
ACCESSING THE HVAC BOX ..... 9000-59  
STANDARD AIR CONDITIONING (STD) TROUBLESHOOTING ..... 9000-60

**PATRIOT 3230 AND 3300 SPRAYERS SERVICE MANUAL 84258776 - MASTER TABLE OF CONTENTS**

AIR CONDITIONER SYSTEM SERVICE .....	SECTION 9010
SPECIFICATIONS .....	9010-3
SPECIAL TORQUES .....	9010-3
SPECIAL TOOLS .....	9010-4
AIR CONDITIONER SYSTEM REFRIGERANT RECOVERY .....	9010-9
RECOVERING PURE 134A REFRIGERANT .....	9010-11
RECOVERING CONTAMINATED REFRIGERANT WITH OEM1691 .....	9010-15
AIR CONDITIONER SYSTEM EVACUATION AND RECHARGING .....	9010-24
AIR CONDITIONING TEMPERATURE/PRESSURE CHART .....	9010-30
LEAK DETECTION .....	9010-31
A/C SYSTEM FLUSHING PROCEDURE .....	9010-41
A/C SYSTEM COMPONENTS .....	9010-60
A/C COMPRESSOR CLUTCH .....	9010-65
CONDENSER .....	9010-76
RECEIVER/DRIER .....	9010-77
ACCESSING THE HVAC BOX .....	9010-79
THERMAL EXPANSION VALVE TESTING .....	9010-81
THERMAL EXPANSION VALVE REPLACEMENT .....	9010-82
EVAPORATOR AND CAB TEMPERATURE SENSOR LOCATION .....	9010-84
BLOWER MOTOR REPLACEMENT .....	9010-85
HEATER CONTROL VALVE REPLACEMENT .....	9010-86
EVAPORATOR/HEATER ASSEMBLY .....	9010-87
EVAPORATOR/HEATER ASSEMBLY SEALING AND CLEANING .....	9010-94
BLOWER AND EVAPORATOR REFERENCE ILLUSTRATION .....	9010-95
CONTROLLER AND BLOWER SPEED DRIVER REPLACEMENT .....	9010-96
CAB AIR FILTER SERVICE .....	9010-99
CAB RECIRCULATION AIR FILTER SERVICE .....	9010-101
CAB PRESSURIZATION TEST .....	9010-102
CAB PRESSURIZER MOTOR REPLACEMENT .....	9010-104
CAB REMOVAL AND INSTALLATION .....	SECTION 9020
SPECIAL TORQUES .....	9020-3
SPECIAL TOOLS .....	9020-3
CAB .....	9020-4
HOODS .....	SECTION 9030
FRONT HOOD .....	9030-3
ENGINE HOOD .....	9030-7
RADIATOR, COOLERS AND CONDENSER .....	SECTION 9040
GENERAL INFORMATION .....	9040-3
COOLING PACKAGE ASSEMBLY CLEANING .....	9040-4
AIR-TO-AIR COOLER .....	9040-6
AIR CONDITIONER CONDENSER .....	9040-12
HYDRAULIC OIL COOLER .....	9040-14
RADIATOR ASSEMBLY .....	9040-20
WHEELS, HUBS AND SUSPENSION .....	SECTION 9050
SPECIAL TORQUES .....	9050-3
RECOMMENDED TOOLS .....	9050-4
TIRE INFLATION .....	9050-6
WHEEL .....	9050-8
PLANETARY GEAR HUB .....	9050-13
SPRING .....	9050-17
TRAILING LINK .....	9050-23
UPPER SUSPENSION ARM .....	9050-29
STEERING ARM .....	9050-34

**PATRIOT 3230 AND 3300 SPRAYERS SERVICE MANUAL 84258776 - MASTER TABLE OF CONTENTS**

---

BRAKES .....	SECTION 9060
GENERAL INFORMATION .....	9060-3
BRAKE CALIPER .....	9060-4
BRAKE BLEEDING PROCEDURE .....	9060-11
FRONT AND REAR AXLES AND LINERS .....	SECTION 9070
SPECIAL TORQUES .....	9070-3
RECOMMENDED TOOLS .....	9070-3
FRONT AND REAR AXLES AND LINERS .....	9070-4
BOOMS .....	SECTION 9080
SPECIAL TORQUES .....	9080-3
BREAKAWAY TIP .....	9080-4
OUTER BOOM 60, 90 AND 100 FT .....	9080-13
OUTER BOOM 120 FT. ....	9080-17
INNER BOOM .....	9080-22
MID BOOM 120 FT. ....	9080-30
BOOM 60, 90 AND 100 FT. REMOVAL (CRADLED) .....	9080-36
CENTER SECTION .....	9080-43
MAST .....	9080-52
BOOM PIVOT .....	9080-56
ASSEMBLED CENTER SECTION AND MAST REMOVAL AND INSTALLATION .....	9080-61
PRODUCT PUMP .....	SECTION 11020
Product Pump Removal .....	11020-3
Product Pump Disassembly .....	11020-6
Product Pump Assembly .....	11020-8
Product Pump Installation .....	11020-10
RELOAD STATION .....	SECTION 11030
Removal .....	11030-3
Installation .....	11030-6
PRODUCT VALVES.....	SECTION 11040
BOOM SELECTION SHUT OFF VALVE .....	11040-3
SPARGE VALVE .....	11040-7
SPRAY BAR AND NOZZLES.....	SECTION 11050
SPRAY NOZZLE .....	11050-3
SPRAY BAR .....	11050-7
FOAM MARKER SYSTEM.....	SECTION 11060
FOAM TANK .....	11060-3
MIXING CHAMBER .....	11060-6
AIR TANK .....	11060-7



# Patriot 3230 and 3330 Sprayers

## Service Manual

### Book 1

General, Engine, Electrical

84258779

Issued September, 2009

First Printing

**CASE II**  
AGRICULTURE

# **Service Manual Number 84258776**

## **Book 1 - Publication 84258779 General, Engine, Electrical**

For engine repair information, refer to the Engine Service Manual 84202702 for the 6-Cylinder 6.7L NEF Engine.

## **Book 2 - Publication 84258780 Hydraulics**

**Book 3 - Publication 84258781  
HVAC, Cab, Wheels, Brakes, Boom, Product Handling**

**Electrical Schematic - 84242809**

**Hydraulic Schematic- 84242812**

You can order Service Manual Books separately (Refer to publication numbers above) or you can order a complete Service Manual (Publication Number 84258776).



**BOOK 1 - 84258779**

STANDARD TORQUE SPECIFICATIONS .....	SECTION 1000
TORQUE SPECIFICATIONS - U.S. HARDWARE .....	1000-3
TORQUE SPECIFICATIONS - METRIC HARDWARE .....	1000-5
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS .....	1000-7
 SAFETY .....	 SECTION 1010
PRECAUTIONARY STATEMENTS .....	1010-3
PERSONAL SAFETY .....	1010-3
MACHINE SAFETY AND INFORMATION .....	1010-3
SAFETY RULES .....	1010-4
 LUBRICATION .....	 SECTION 1020
SPECIAL TOOLS .....	1020-3
MAINTENANCE SCHEDULE .....	1020-7
 SPECIFICATIONS .....	 SECTION 1030
Diesel Engine .....	1030-3
Engine Lubrication System .....	1030-3
Cooling System .....	1030-3
Fuel System .....	1030-3
Fuel Tank .....	1030-3
Air Intake System .....	1030-3
Battery .....	1030-3
Brakes .....	1030-3
Gear Increaser .....	1030-4
Hub Lubricant .....	1030-4
Hubs and Tires .....	1030-4
Drive System .....	1030-4
Hydraulic System .....	1030-4
Hydraulic Pump Drive .....	1030-4
Hydraulic Pumps .....	1030-4
Hydraulic Motors .....	1030-4
Suspension .....	1030-5
Steering .....	1030-5
Turning Radius .....	1030-5
Wheel Adjustments .....	1030-5
Travel Speed .....	1030-5
Cab .....	1030-5
Air Conditioning System .....	1030-5
Plumbing System .....	1030-5
Dimensions .....	1030-5
Approximate Base Shipping Weights .....	1030-5
Maximum Operating Weight .....	1030-6
Engine Oil Selection .....	1030-6
Engine Oil Viscosity/Temperature Usage Recommendation .....	1030-6
Engine Coolant Solutions .....	1030-7
Tire Inflation .....	1030-8
 TOWING .....	 SECTION 1040
SPECIAL TORQUE .....	1040-3
SPECIAL TOOLS .....	1040-4
PREPARING THE MACHINE FOR TOWING .....	1040-6
RETURNING TO SERVICE AFTER TOWING .....	1040-9

ENGINE.....	SECTION 2000
SPECIAL TORQUES .....	2000-3
SPECIAL TOOLS .....	2000-4
ENGINE REMOVAL AND INSTALLATION .....	2000-5
ENGINE ISOLATOR MOUNT .....	2000-32
AIR INDUCTION SYSTEM.....	SECTION 2010
ENGINE AIR FILTER ELEMENTS .....	2010-3
PRIMARY AND SECONDARY FILTERS .....	2010-4
RESTRICTION INDICATOR SWITCH .....	2010-8
INTAKE AIR DUCT .....	2010-10
ELECTRICAL SYSTEM.....	SECTION 4000
SPECIAL TOOLS .....	4000-3
GENERAL INFORMATION .....	4000-4
ELECTRICAL SYMBOLS .....	4000-8
DIAGNOSTICS .....	4000-9
BASIC TROUBLESHOOTING .....	4000-10
FUSE AND RELAY IDENTIFICATION .....	4000-18
INSTRUMENTATION AND CONTROLS .....	4000-27
CAB BULKHEAD CONNECTOR LOCATIONS .....	4000-30
GROUND POINTS .....	4000-34
CONTROLLER/NODE LOCATIONS .....	4000-36
PROPEL SYSTEM .....	4000-41
VEHICLE CAN BUS .....	4000-47
APPLICATION CAN BUS .....	4000-49
AUTOGUIDANCE CAN BUS (IF EQUIPPED) .....	4000-50
AUTOFOLD BOOM POSITION SENSORS .....	4000-51
CHASSIS/CAB CONNECTOR INFORMATION .....	4000-54
APPLICATION SYSTEM CONNECTOR INFORMATION .....	4000-101
CHARGING SYSTEM .....	4000-126
STARTING SYSTEM .....	4000-130
ENGINE FAULT CODES .....	4000-136
BATTERY.....	SECTION 4010
SPECIFICATIONS .....	4010-3
ACCESS TO BATTERIES .....	4010-4
REMOVAL AND INSTALLATION OF BATTERIES .....	4010-5
BATTERY MAINTENANCE .....	4010-6
STEERING HAND PUMP .....	SECTION 5000
Removal .....	5000-3
Installation .....	5000-5
CENTER CONSOLE.....	SECTION 5010
SPECIAL TORQUES .....	5010-3
STEERING COLUMN .....	5010-4
STEERING COLUMN ASSEMBLY .....	5010-9

# Section 1000

**STANDARD TORQUE**

## TABLE OF CONTENTS

TORQUE SPECIFICATIONS - U.S. HARDWARE .....	1000-3
U.S. Hardware With A ZND Finish On The Nuts, Bolts And Studs .....	1000-3
U.S. Hardware With A DOR Finish On The Nuts, Bolts And Studs .....	1000-4
TORQUE SPECIFICATIONS - METRIC HARDWARE .....	1000-5
Metric Hardware With A ZND Finish On The Nuts, Bolts And Studs .....	1000-5
Metric Hardware With A DOR Finish On The Nuts, Bolts And Studs .....	1000-6
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS .....	1000-7

## TORQUE SPECIFICATIONS - U.S. HARDWARE

**NOTICE:** If replacing hardware must use the hardware noted in this machine's parts manual.

**NOTICE:** The torque specifications listed in this section are for original fasteners and fasteners listed in the parts manual for this machine.

**NOTICE:** For all engine hardware see the Agricultural Products Service Manual Torque Specifications for the engine installed on this machine.


Use the torques in these charts when special torques are not given.


These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphites, moly disulfide greases, or other extreme pressure lubricants are used.

### U.S. Hardware With A ZND Finish On The Nuts, Bolts And Studs

**NOTICE:** The ZND finish has a silver-yellow coloring.

The ZND finish has a zinc dichromate finish. This coating is for corrosion protection.

Grade 5 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
1/4 inch	12 to 15	106 to 132
5/16 inch	23 to 28	204 to 252
3/8 inch	48 to 57	420 to 504
Size	Newton Meter	Pound Foot
7/16 inch	73 to 87	54 to 64
1/2 inch	109 to 130	80 to 96
9/16 inch	149 to 179	110 to 132
5/8 inch	203 to 244	150 to 180
3/4 inch	366 to 439	270 to 324
7/8 inch	542 to 651	400 to 480
1.0 inch	787 to 944	580 to 696
1-1/8 inch	1085 to 1193	800 to 880
1-1/4 inch	1519 to 1681	1120 to 1240
1-3/8 inch	1980 to 2278	1460 to 1680
1-1/2 inch	2631 to 2983	1940 to 2200


Grade 8 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
1/4 inch	16 to 20	144 to 180
5/16 inch	33 to 39	288 to 348
3/8 inch	61 to 73	540 to 648
Size	Newton Meter	Pound Foot
7/16 inch	95 to 114	70 to 84
1/2 inch	149 to 179	110 to 132
9/16 inch	217 to 260	160 to 192
5/8 inch	298 to 358	220 to 264
3/4 inch	515 to 618	380 to 456
7/8 inch	814 to 976	600 to 720
1.0 inch	1220 to 1465	900 to 1080
1-1/8 inch	1736 to 1953	1280 to 1440
1-1/4 inch	2468 to 2712	1820 to 2000
1-3/8 inch	3227 to 3688	2380 to 2720
1-1/2 inch	4285 to 4827	3160 to 3560


**NOTE:** Use thick nuts with Grade 8 bolts.

## U.S. Hardware With A DOR Finish On The Nuts, Bolts And Studs

**NOTICE:** The DOR finish has an aluminum (silver-gray) coloring.

The DOR finish is a zinc plate with an aluminum coating and than a PTFE (teflon) top coat. This coating is for corrosion protection.

Grade 5 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
1/4 inch	8 to 10	70 to 85
5/16 inch	15 to 18	132 to 163
3/8 inch	31 to 37	273 to 327
Size	Newton Meter	Pound Foot
7/16 inch	47 to 56	35 to 41
1/2 inch	71 to 84	52 to 62
9/16 inch	97 to 116	72 to 85
5/8 inch	132 to 158	98 to 117
3/4 inch	238 to 285	176 to 210
7/8 inch	353 to 423	260 to 312
1.0 inch	512 to 613	377 to 452
1-1/8 inch	706 to 775	520 to 572
1-1/4 inch	988 to 1092	728 to 806
1-3/8 inch	1287 to 1486	949 to 1092
1-1/2 inch	1710 to 1938	1261 to 1430

Grade 8 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
1/4 inch	11 to 13	94 to 117
5/16 inch	22 to 25	188 to 226
3/8 inch	40 to 47	351 to 421
Size	Newton Meter	Pound Foot
7/16 inch	62 to 74	46 to 54
1/2 inch	97 to 116	72 to 85
9/16 inch	142 to 169	104 to 124
5/8 inch	194 to 232	143 to 171
3/4 inch	335 to 401	248 to 296
7/8 inch	530 to 634	390 to 468
1.0 inch	793 to 952	585 to 702
1-1/8 inch	1129 to 1296	832 to 936
1-1/4 inch	1605 to 1762	1183 to 1300
1-3/8 inch	2098 to 2397	1547 to 1768
1-1/2 inch	4285 to 4827	2054 to 2314

**NOTE:** Use thick nuts with Grade 8 bolts.

## TORQUE SPECIFICATIONS - METRIC HARDWARE

**NOTICE:** If replacing hardware must use the hardware noted in this machine's parts manual.

**NOTICE:** The torque specifications listed in this section are for original fasteners and fasteners listed in the parts manual for this machine.

**NOTICE:** For all engine hardware see the Agricultural Products Service Manual Torque Specifications for the engine installed on this machine.


Use the torques in these charts when special torques are not given.


These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphites, moly disulfide greases, or other extreme pressure lubricants are used.

### Metric Hardware With A ZND Finish On The Nuts, Bolts And Studs

**NOTICE:** The ZND finish has a silver-yellow coloring.

The ZND finish is a zinc dichromate finish. This coating is for corrosion protection.


Grade 8.8 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
M4	3 to 4	24 to 36
M5	7 to 8	60 to 72
M6	11 to 12	96 to 108
M8	26 to 31	228 to 276
M10	52 to 61	456 to 540
Size	Newton Meter	Pound Foot
M12	90 to 107	66 to 79
M14	144 to 172	106 to 127
M16	217 to 271	160 to 200
M20	434 to 515	320 to 380
M24	675 to 815	500 to 600
M30	1250 to 920	920 to 1100
M36	2175 to 2600	1600 to 1950


Grade 10.9 and 12.9 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
M4	4 to 5	36 to 48
M5	9 to 11	84 to 96
M6	15 to 18	132 to 156
M8	37 to 43	324 to 384
Size	Newton Meter	Pound Foot
M10	73 to 87	54 to 64
M12	125 to 150	93 to 112
M14	200 to 245	149 to 179
M16	310 to 380	230 to 280
M20	610 to 730	450 to 540
M24	1050 to 1275	780 to 940
M30	2000 to 2400	1470 to 1770
M36	3500 to 4200	2580 to 3090

## Metric Hardware With A DOR Finish On The Nuts, Bolts And Studs

**NOTICE:** The DOR finish has an aluminum (silver-gray) coloring.

The DOR finish is a zinc plate with an aluminum coating and than a PTFE (teflon) top coat. This coating is for corrosion protection.

Grade 8.8 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
M4	2	19
M5	5	43
M6	7	66
M8	17 to 20	148 to 179
M10	34 to 39	297 to 351
Size	Newton Meter	Pound Foot
M12	59 to 69	43 to 53
M14	94 to 111	69 to 82
M16	142 to 176	104 to 130
M20	283 to 334	208 to 247
M24	439 to 529	325 to 390
M30	813 to 975	598 to 715
M36	1414 to 1690	1040 to 1267

Grade 10.9 and 12.9 Bolts, Nuts, and Studs		
		
Size	Newton Meter	Pound Inch
M4	3	27
M5	7	59
M6	10 to 11	86 to 101
M8	25 to 27	211 to 249
Size	Newton Meter	Pound Foot
M10	48 to 56	36 to 41
M12	82 to 97	61 to 72
M14	130 to 159	97 to 116
M16	202 to 247	150 to 182
M20	397 to 474	293 to 351
M24	683 to 828	507 to 611
M30	1300 to 1560	956 to 1150
M36	2275 to 2730	1677 to 2008



## TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Newton Meter	Pound Inch
<b>37 Degree Flare Fitting</b>			
1/4 inch 6.4 mm	7/16-20	8 to 16	72 to 144
5/16 inch 7.9 mm	1/2-20	11 to 22	96 to 192
3/8 inch 9.5 mm	9/16-18	14 to 34	120 to 300
1/2 inch 12.7 mm	3/4-16	20 to 57	180 to 504
5/8 inch 15.9 mm	7/8-14	34 to 79	300 to 696
Tube OD Hose ID	Thread Size	Newton Meter	Pound Foot
3/4 inch 19.0 mm	1-1/16-12	54 to 108	40 to 80
7/8 inch 22.2 mm	1-3/16-12	81 to 135	60 to 100
1.0 inch 25.4 mm	1-5/16-12	102 to 158	75 to 117
1-1/4 inch 31.8 mm	1-5/8-12	169 to 223	125 to 165
1-1/2 inch 38.1 mm	1-7/8-12	285 to 338	210 to 250

Tube OD Hose ID	Thread Size	Newton Meter	Pound Inch
<b>Straight Threads with O-ring</b>			
1/4 inch 6.4 mm	7/16-20	16 to 26	144 to 228
5/16 inch 7.9 mm	1/2-20	22 to 34	192 to 300
3/8 inch 9.5 mm	9/16-18	34 to 54	300 to 480
1/2 inch 12.7 mm	3/4-16	57 to 91	540 to 804
Tube OD Hose ID	Thread Size	Newton Meter	Pound Foot
5/8 inch 15.9 mm	7/8-14	79 to 124	58 to 92
3/4 inch 19.0 mm	1-1/16-12	108 to 174	80 to 128
7/8 inch 22.2 mm	1-3/16-12	136 to 216	100 to 160
1.0 inch 25.4 mm	1-5/16-12	159 to 253	117 to 187
1-1/4 inch 31.8 mm	1-5/8-12	224 to 357	165 to 264
1-1/2 inch 38.1 mm	1-7/8-12	339 to 542	250 to 400

<b>Split Flange Mounting Bolts</b>		
Size	Newton Meter	Pound Inch
5/16-18	20 to 27	180 to 240
3/8-16	27 to 34	240 to 300
7/16-14	47 to 61	420 to 540
Size	Newton Meter	Pound Foot
1/2-13	74 to 88	55 to 65
5/8-11	190 to 203	140 to 150

## TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Nom. SAE Dash Size	Tube OD	Thread Size	Newton Meter	Pound Inch	Thread Size	Newton Meter	Pound Inch
<b>O-ring Face Seal End</b>					<b>O-ring Boss End Fitting or Lock Nut</b>		
-4	1/4 inch 6.4 mm	9/16-18	14 to 16	120 to 144	7/16-20	23 to 27	204 to 240
-6	3/8 inch 9.5 mm	11/16-16	24 to 27	216 to 240	9/16-18	34 to 41	300 to 360
-8	1/2 inch 12.7 mm	13/16-16	43 to 54	384 to 480	3/4-16	61 to 68	540 to 600
					Thread Size	Newton Meter	Pound Foot
-10	5/8 inch 15.9 mm	1-14	62 to 76	552 to 672	7/8-14	81 to 88	60 to 65
Nom. SAE Dash Size	Tube OD	Thread Size	Newton Meter	Pound Foot	1-1/16-12	115 to 122	85 to 90
					1-3/16-12	129 to 136	95 to 100
-12	3/4 inch 19.0 mm	1-3/16-12	90 to 110	65 to 80	1-5/16-12	156 to 169	115 to 125
-14	7/8 inch 22.2 mm	1-3/16-12	90 to 110	65 to 80	1-5/8-12	203 to 217	150 to 160
-16	1.0 inch 25.4 mm	1-7/16-12	125 to 140	92 to 105	1-7/8-12	258 to 271	190 to 200
-20	1-1/4 inch 31.8 mm	1-11/16-12	170 to 190	125 to 140			
-24	1-1/2 inch 38.1 mm	2-12	200 to 254	150 to 180			

# Section 1010

SAFETY

## TABLE OF CONTENTS

PRECAUTIONARY STATEMENTS .....	1010-3
PERSONAL SAFETY .....	1010-3
MACHINE SAFETY AND INFORMATION .....	1010-3
SAFETY RULES .....	1010-4
Maintenance Safety .....	1010-4
Battery Safety .....	1010-5
Noise Level Safety .....	1010-5
Hazardous Chemicals Safety .....	1010-5
Tire Repair/Inflation Safety .....	1010-6
Do Not Operate Tag .....	1010-6
First Aid Kit .....	1010-6
Fire Extinguisher .....	1010-6

# PRECAUTIONARY STATEMENTS

## 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 injury or death.

Throughout this manual and on machine decals, you will find signal words **DANGER**, **WARNING**, and **CAUTION** followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.

---

### **DANGER**

---

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury. The color associated with Danger is RED.

M1169A

---

### **WARNING**

---

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.

M1170A

---

### **CAUTION**

---

**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. The color associated with Caution is YELLOW.

M1171A

---

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

## MACHINE SAFETY AND INFORMATION

**NOTICE** is used to address practices not related to personal injury.

**NOTICE:** *The signal word **NOTICE** is used throughout this manual followed by specific instructions. These messages are intended for machine safety, or to identify and present supplementary information.*

# SAFETY RULES



Read and understand the following safety rules and precautions before operating or servicing the machine. Failure to comply could result in death or serious injury.

## Maintenance Safety

- Always put the controls in neutral, shut the engine off, apply the parking brake, and remove the key before exiting the machine.
- Service machine on a firm, level surface.
- Before starting the machine, be sure all operating controls are in neutral or park position. This will eliminate accidental movement of the machine or startup of power-driven equipment.
- Never operate engine in enclosed spaces as harmful exhaust gases may build up.
- Keep area used for servicing the machine clean and dry. Clean up spilled fluids. Fuel or oil leaked or spills on hot surfaces or electrical components can cause a fire.
- Do not smoke while servicing the machine.
- Do not operate the machine while under the influence of alcohol or drugs.
- Keep clear of moving parts. Loose clothing, jewelry, watches, long hair and other loose or hanging items can become entangled in moving parts.
- Wear personal protective equipment such as a hard hat, safety glasses or goggles, heavy gloves, hearing protection, protective clothing, etc.
- Scalding can result from incorrect removal of coolant caps. Cooling system operates under pressure. Hot coolant can spray out if cap is removed while the system is hot. Allow system to cool before removing cap. When removing a cap, turn it slowly to allow pressure to escape before completely removing the cap.
- Hydraulic oil or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To Prevent Personal Injury: Relieve all pressure, before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately.
- Do not attempt to clean, lubricate, clear obstructions or make adjustments to the machine while it is in motion or while the engine is running.
- Engine, transmission, exhaust components and hydraulic lines may become hot during operation. Take care when servicing such components. Allow surfaces to cool before handling or disconnecting hot components. Wear protective equipment when appropriate.
- Install guards and shields after servicing the machine.
- Close all access doors and install all panels after servicing machine.
- Beware of all pinch points on the machine and keep clear.
- Keep bolts tight at all times. Always replace worn or broken parts immediately after they are discovered. Do not use the vehicle if any parts are not functioning properly.
- Do not replace parts with other than genuine factory parts. Doing so could decrease the effectiveness of safety features or the accuracy of the machine.

**NOTICE:** *Install new decals if the old decals are destroyed, lost, painted over or cannot be read. When parts are replaced that have decals, make sure you install a new decal with each new part.*

- Do not jump start the machine at the starter.

Thank you so much for reading.  
Please click the “Buy Now!”  
button below to download the  
complete manual.



After you pay.

You can download the most  
perfect and complete manual in  
the world immediately.

Our support email:

[ebooklibonline@outlook.com](mailto:ebooklibonline@outlook.com)