2021 Collegiate Turf Bowl Competition Study Guide

GCSAA would like to thank Leah Brilman, Ph.D., a member of the Turfgrass Breeders Association, and Gwen Stahnke, Ph.D., facilitators of the Turf Bowl, for their work updating and modifying the exam each year.

The 2021 Turf Bowl Competition will be a virtual contest comprised of an online exam and a case study. The exam will include multiple choice, matching and ordering questions. Students will only have two and a half hours to take the exam.

A list of resources to study for this portion of the exam is included in this document. We also recommend reaching out to local superintendents, local chapters or alumni for their help in preparing for the case study.

If you have any questions about the competition, contact Diana Kern at dkern@gcsaa.org or (785) 832-3600.

Eligibility
To participate in the GCSAA Collegiate Turf Bowl Competition, students must meet all of the following eligibility criteria:

- Must be currently enrolled in a turf program or have graduated at the end of the most recent fall semester but not yet entered a graduate program
- Be an active Student member with GCSAA
- Be a registered attendee at the GCSAA Education Conference and Golf Industry Show

Important Dates

December 18, 2020: Advisors must send a list with the following information to Diana Kern at dkern@gcsaa.org.
- Students names
- GCSAA membership number
- Email address
- If there are more than one team per school, then include the team the student will be on.
  - Example: Chandler Bing, #123456, cbing@gcsaa.org, University of Kansas Team #1
• Team Photo
  o For use during the Closing Celebration, we are asking for a photo of each team from each school. Because of the pandemic, it is okay for students and advisors to have masks on; however, if you can figure out a way to take the photo while maintaining social distancing, you can do it without masks.
  o If a team photo can’t be taken, individual photos of participating students are okay. Our team at HQ will put them together into a team montage.
  o Wear appropriate attire that you want your future employers to see you in. School logo attire is okay.

January 11, 2021: Case study PowerPoint must be turned into Diana Kern at dkern@gcsaa.org. Late submittals will not be accepted. Details on the case study requirements are included in the Case Study section of the study guide. There are also two videos supporting the case study found on the Turf Bowl page of the GIS website.

January 26, 2021: Exam day. This is the only day that the exam will be available. If a student does not take the exam that day, a zero will be recorded for this member of the team’s score. Make ups will not be allowed. Students will have two and a half hours to take the exam.

February 4, 2021: The results will be announced at the Closing Celebration, 4 – 5 pm (EST).

Area of Study

Turfgrass Identification
  • Identify turf specimens by their common names or traits.
  • Know common name vs. scientific name.
  • For specific turfgrass species, please see Addendum 1.

Turfgrass Growth and Development
  • Identify parts of the grass plant.
  • Know management and environmental factors that influence growth.
  • Understand turfgrass physiology and how it is influenced by management practices.
  • Understand plant growth regulators – Use and influence on biology

Turfgrass Soils and Soil Fertility
  • Know greens construction, particle sizes, soils and fertility.
  • Know of macronutrients and micronutrients, and their influence on growth.
• Soil types and classification
• Read and interpret a soil report

Weed Identification and Control
• Identify common weeds. Note: Any turfgrasses on list can also be weeds.
• Know herbicides, what weeds they control and mode of action.
• Know the life cycle of weeds and how management influences weed growth.
• Know seed labeling for crops and weeds.
• For specific weeds, please see Addendum 2.

Turfgrass Diseases
• Identify common diseases.
• Know environmental and management conditions, and the types of diseases that the conditions favor.
• Know common fungicides.
• Know grass species corresponding to various diseases.
• For specific diseases, please see Addendum 3.

Turfgrass Mathematics
• Calculate application rates of chemicals and fertilizers.
• Know quantities of sand and seed to use.
• Know how to correctly calibrate application equipment.
• Know how to use both the Metric and English units in calculations.

Turfgrass Insects
• Identify specimens of larval and adult forms of insects that attack turf.
• Know life cycles, preferred foods, feeding methods and other characteristics important in controlling insects.
• For specific insects, please see Addendum 4.

Irrigation
• Know how to evaluate turfgrass water needs and adjust various irrigation methods and rates accordingly to ensure the efficiency and effectiveness of the irrigation system.
• Calculate water usage.
• Know the basics of using reclaimed water for irrigation.

Water Management
• Understand how turfgrasses process water, including transpiration.
• Understand water terminology
• Know the symptoms of water stress in various turfgrasses and how to remedy.
• Know the causes of pesticide and nutrient runoff and how to prevent.

**Equipment Identification Section**

Teams will be asked to answer questions on spray equipment and safety procedures. Details for this piece of equipment are included in Addendum 5, at the back of the study guide.

**Case Study**

Included on the Turf Bowl website page are two videos detailing a traffic wear problem found on a golf course located in the transition zone. The fairway turf is Zoysiagrass and Tall Fescue is growing in the rough. The first video shows the turf problem and the surrounding area. The second video shows the equipment available to correct the problem. Your challenge is to develop a plan addressing both the agronomic and human causes and solutions to this problem.

Use PowerPoint to create a presentation for the greens committee following these rules:

1. Your presentation cannot exceed 20 slides.
2. Your presentation cannot include any animations or video clips.
3. In your slides, you need to include the following items:
   a. How has golfer traffic affected the issue?
   b. How do you resolve the issue surrounding golfer traffic?
   c. One slide needs to be an example of an informational sign that would be posted in the pro shop. This sign should be designed to provide golfers with information about the issue and how you plan to resolve it.
      i. Create a replica sign – do not just type out the verbiage on the sign.
   d. How do you resolve the problem from an agronomic perspective?
      i. Identify the strategies, timing and equipment used.
   e. Discuss the negatives and positives of your various suggestions – from both a golf and agronomic aspect.
   f. Include a summary slide that shows the green committee, detailing step-by-step how you recommend solving this issue.
4. Include photographs of the recommended equipment and procedures to anchor your presentation. These can be copied from web resources or you can use photographs you take at a local facility.
   a. Be sure to site your sources in the speaker notes.
5. Each slide must include properly typed speaker notes, providing the text that explains the slide in detail.
   a. Notes should be:
Typed in full sentences.

Use correct grammar and spelling.

1. Points will be deducted if there are spelling or grammar errors.

Resources

The following resources, along with GCSAA’s monthly publication *Golf Course Management* magazine, are recommended as study resources. The textbooks may be available through your school library, local bookstore or through the GCSAA Store online at [https://www.gcsaastore.com/](https://www.gcsaastore.com/).

3. **Turfgrass Management (Fifth or Sixth Edition)** – A.J. Turgeon
4. **Fundamentals of Turfgrass Management** – Nick Christians
6. **Salt-Affected Turfgrass Sites: Assessment and Management** – R.N. Carrow and R.R. Duncan
7. **Managing Turfgrass Pests** – Thomas L. Watschke, Peter H. Dernoden and David J. Shetlar
9. **Creeping Bentgrass Management: Summer Stresses, Weeds and Selected Maladies** – Peter H. Dernoden
10. **Human Resource Management for Golf Course Superintendents, ch. 6** – Bob Milligan and Tom Maloney
11. **Superintendents Handbook of Financial Management, ch. 2, 3, 5, and 9** – Ray Schmidgall
13. **Identifying Turf and Weedy Grasses of the Northern United States** – D. Pedersen and T. Voight Illinois Pocket ID series University of Illinois Extension pubsplus.uiuc.edu

14. **Turfgrass Identification Tool** – Purdue University Turfgrass Science Department of Agronomy (vernation) - agry.purdue.edu/turf/tool/index.html

15. **Turfgrass Identification** (vernation)- David Gardner, The Ohio State University buckeyeturf.osu.edu/pdf/01_turfgrass_identification.pdf


18. Golf Course Environmental Profile eifg.org/research/golf-course-environmental-profile

### Addendum 1

#### Cool Season Grasses

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kentucky bluegrass</td>
<td><em>Poa pratensis</em></td>
</tr>
<tr>
<td>2. Perennial ryegrass</td>
<td><em>Lolium perenne</em></td>
</tr>
<tr>
<td>3. Tall fescue</td>
<td><em>Festuca arundinacea</em> = <em>Schedonorus arundinaceus</em> = <em>Lolium arundinaceum</em></td>
</tr>
<tr>
<td>4. Hard fescue</td>
<td><em>Festuca brevipila</em> (F. trachyphylla)</td>
</tr>
<tr>
<td>5. Chewings fescue</td>
<td><em>Festuca rubra</em> ssp. commutata (ssp. fallax)</td>
</tr>
<tr>
<td>6. Creeping bentgrass</td>
<td><em>Agrostis stolonifera</em></td>
</tr>
<tr>
<td>7. Colonial bentgrass</td>
<td><em>Agrostis capillaris</em></td>
</tr>
<tr>
<td>8. Strong creeping red fescue</td>
<td><em>Festuca rubra</em> ssp. rubra</td>
</tr>
<tr>
<td>9. Slender creeping red fescue</td>
<td><em>Festuca rubra</em> ssp. littoralis</td>
</tr>
<tr>
<td>10. Velvet bentgrass</td>
<td><em>Agrostis canina</em></td>
</tr>
<tr>
<td>11. Rough bluegrass</td>
<td><em>Poa trivialis</em></td>
</tr>
<tr>
<td>12. Annual bluegrass</td>
<td><em>Poa annua</em></td>
</tr>
<tr>
<td>13. Annual ryegrass</td>
<td><em>Lolium multiflorum</em></td>
</tr>
</tbody>
</table>

#### Warm Season grasses

14. Japanese / Korean lawngrass *Zoysia japonica*
15. Manilla grass
16. Hybrid bermudagrass
17. Common bermudagrass
18. Centipedegrass
19. Seashore paspalum
20. Buffalograss
21. St. Augustinegrass
22. Kikuyugrass
23. Bahiagrass

**Addendum 2**

**Weeds**

Alkaligrass

Barnyardgrass / Watergrass

Bedstraw / Catchweed

Bindweed, Field

Brassbuttons, Souther

Buttonweed, Virginia

Carpetweed

Carrot, Wild

Chess, Soft

Chickweed, Common

Chickweed, Mouseear

Chicory

Clover, White

Crabgrass, Hairy (Large)

Crabgrass, Smooth

Cudweed, purple

Dallisgrass (smooth paspalum)

Dandelion, False /spotted catsear

Dandelion

Dichondra

Dock, Curly

Downy Brome / cheatgrass

English Daisy

Foxtail, Yellow (pigeon / bristle grass)

Foxtail, Green

Garlic, Wild

Geranium, Carolina / dovefoot

Goosegrass/Silver Crab/ Crowfoot

Ground Ivy (Creeping Charlie/Jenny)

Zoysia matrella

Cynodon dactylon X C. transvaalensis

Cynodon dactylon

Eremechloa ophiuroides

Paspalum vaginatum

Buchloe dactyloides

Stenotaphrum secundatum

Pennisetum clandestinum

Paspalum notatum

Puccinella distans

Echinocloa crus-galli

Galium aparine

Convolvulus arvensis

Cotula australis

Diodia virginia

Mollugo verticillata

Daucus carota

Bromus hordeaceus

Stellaria media

Cerastium vulgatum

Cichorium intybus

Trifolium repens

Digitaria sanguinalis

Digitaria ischaemum

Gnaphalium purpureum

Paspalum dilatatum

Hypochoeris radicata

Taraxacum officinale

Dichondra repens

Rumex crispus

Bromus tectorum

Bellis perennis

Setaria glauca (pumilla ssp pumilla)

Setaria viridis

Allium vineale

Geranium ssp.

Elusine indica

Glechoma hederacea
Hawkweed Hieracium pratense
Henbit Lamium amplexicaule
Johnsongrass Sorghum halapense
Kikuyugrass Pennisetum clandestinum
Knotweed, Prostrate / Common Polygonum aviculare
Kochia Kochia scoparia
Kyllinga, Annual / Fragrant Kyllinga odorata
Kyllinga, Green / Perennial Kyllinga brevifolia
Lambsquarter Chenopodium album
Lettuce, Prickly Lactuca serriola
Mallow, Common Malva neglecta
Medic, Black Medicago lupulina
Moss, silvery thread Bryum argenteum
Mullein, Common Verbascum thapsus
Nimblewill Muhlenbergia schreberi
Nutsedge, Purple Cyperus rotundus
Nutsedge, Yellow Cyperus esculentus
Oats, Wild Avena fatua
Orchardgrass Dactylis glomerata
Pearlwort Sagina apetala (procumbens)
Pennywort / dollarweed Hydrocotyle umbellate
Peppergrass / pepperweed Lepidium virginicum
Pigweed, Prostrate Amaranthus blitoides
Pineapple Weed / wild chamomile Matricaria discoidea
Plantain, Broadleaf Plantago major
Plantain, Buckhorn / Narrowleaf Plantago lanceolata
Puncture Vine / goatshead Tribulus terrestris
Purslane, common Portulaca oleracea
Quackgrass Elytrigia repens
Rattail fescue Vulpia myuros
Redtop Agrostis gigantean (alba)
Salsify, Western Tragopogon dubius
Sandbur/ grassbur Cenchrus incertus
Sedge, Annual Cyperus compressus
Shepherd’s Purse Capsella bursa-pastoris
Signalgrass Urochloa subquadripara
Smartweed, Spotted (Ladysthumb) Polygonum persicaria
Smutgrass Sporobolus indicus
Sorrell, Red / Sheeps Rumex acetosella
Speedwell, creeping Veronica filiformis
Spurge, Prostrate / Spotted Chamaesyce maculata (Euphorbia)
Star of Bethlehem  
Ornithogalum umbellatum
Strawberry, Wild  
Fragaria virginiana
Swinecress  
Coronopus didymus
Thistle, Bull  
Cirsium vulgare
Thistle, Canada  
Cirsium arvense
Thistle, Musk  
Carduus nutans
Torpedogras  
Panicum repens
Velvetgrass, German  
Holcus mollis
Violet  
Viola ssp.
Wood sorrel, Creeping  
Oxalis corniculata
Wood sorrel, Yellow (Oxalis)  
Oxalis stricta
Yarrow  
Achillea millefolium
Yellowcress  
Rorippa palustris

Addendum 3

Bacterial Diseases

Bacterial wilt  
Xanthomonas translucens
Bacterial etiolation and decline  
Acidovorax avenae

Fungal Diseases

Anthracnose  
Colletotrichum cereale, C. eremochloae
Ascochyta leaf blight  
Ascochyta avenae
Bermudagrass decline  
See Root decline of warm-season grasses
Blister smut  
Jamesdicksonia dactylidis
Brown patch (C3) & large patch (C4)  
Rhizoctonia solani
Brown ring path  
Waitea circinata var. circinata
Brown stripe  
Mycosphaerella recutita
Cladosporium eyespot  
Cladosporium phlei
Copper spot  
Gloeocercospora sorghi
Coprinus snow mold  
Coprinopsis psychromorbida
Crown rust  
Puccinia coronata
Curvularia blight  
multiple Curvularia sp.
Dead spot  
Ophiophaerella agrostis
Dollar spot  
Clarireedia  is new genus
Clarireedia homeocarpa  on Festuca rubra, UK only
Clarireedia bennettii on mostly cool season grasses, UK, Netherlands, USA
Clarireedia monteithiana on Warm-season grasses; found worldwide
Clarireedia jacksonii on cool-season grasses; found worldwide
<table>
<thead>
<tr>
<th>Disease / Fungi Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drechslera leaf spots and melting-out</td>
<td>multiple <em>Drechslera</em> and <em>Marielliottia</em> sp.</td>
</tr>
<tr>
<td>Endophytic fungi</td>
<td><em>Neotyphodium coenophialum</em>, <em>N. lollii</em>, <em>Epichloe typhina</em></td>
</tr>
<tr>
<td>Fairy ring</td>
<td>Species of Agraricales and Gastromycetales, mostly in the genera <em>Agaricus</em>, <em>Calvatia</em>, <em>Chlorophyllum</em>, <em>Clitocybe</em>, <em>Lepiota</em>, <em>Lycoperdon</em>, <em>Marasmius</em>, <em>Scleroderma</em>, and <em>Tricholoma</em>.</td>
</tr>
<tr>
<td>Flag smut</td>
<td><em>Urocystis agropyri</em></td>
</tr>
<tr>
<td>Gray leaf spot</td>
<td><em>Pyricularia grisea</em></td>
</tr>
<tr>
<td>Gray snow mold</td>
<td><em>Typhula incarnata</em></td>
</tr>
<tr>
<td>Leaf and sheath spot</td>
<td><em>Waitea circinata var. zeae</em>, <em>W. circinata var. oryzae</em></td>
</tr>
<tr>
<td>Leaf rust</td>
<td><em>Puccinia brachypodii</em></td>
</tr>
<tr>
<td>Leptosphaerulina leaf blight</td>
<td><em>Leptosphaerulina trifolii</em></td>
</tr>
<tr>
<td>Mastigosporium leaf spot (leaf fleck)</td>
<td><em>Mastigosporium rubricosum</em></td>
</tr>
<tr>
<td>Microdochium patch</td>
<td><em>Microdochium nivale</em></td>
</tr>
<tr>
<td>Necrotic ring spot</td>
<td><em>Ophiosphaerella korrae</em></td>
</tr>
<tr>
<td>Phyllosticta leaf blight</td>
<td>Multiple species of <em>Phyllosticta</em> and <em>Guignardia</em></td>
</tr>
<tr>
<td>Physoderma leaf spot and leaf streak</td>
<td><em>Physoderma graminis</em></td>
</tr>
<tr>
<td>Pink patch and cream leaf blight</td>
<td><em>Limonomyces roseipellis</em></td>
</tr>
<tr>
<td>Pink snow mold</td>
<td>See Microdochium patch</td>
</tr>
<tr>
<td>Powdery mildew</td>
<td><em>Blumeria graminis</em></td>
</tr>
<tr>
<td>Pythium foliar blight</td>
<td><em>Pythium aphanidermatum</em>, <em>P. graminicola</em>, <em>P. ultimum</em>, Several other Pythium species</td>
</tr>
<tr>
<td>Pythium root and crown rot</td>
<td><em>Pythium aristosporum</em>, <em>P. arrhenomanes</em>, <em>Pythium volutum</em>, several other Pythium species</td>
</tr>
<tr>
<td>Pythium root dysfunction:</td>
<td><em>Pythium volutum</em>, <em>P. arrhenomanes</em>, <em>P. aristosporum</em>, several other Pythium species</td>
</tr>
<tr>
<td>Rapid blight</td>
<td><em>Labyrinthula terrestris</em></td>
</tr>
<tr>
<td>Red thread</td>
<td><em>Laetisaria fuciformis</em></td>
</tr>
<tr>
<td>Root decline of warm-season grasses</td>
<td><em>Gaeumannomyces graminis</em> var. <em>graminis</em>, <em>Magnaporthiopsis incrustans</em>, <em>G. wongoonoo</em></td>
</tr>
<tr>
<td>Septoria leaf spot</td>
<td>several <em>Septoria</em> species</td>
</tr>
<tr>
<td>Snow scald</td>
<td><em>Sclerotinia borealis</em></td>
</tr>
<tr>
<td>Southern blight</td>
<td><em>Athelia rolfsii</em></td>
</tr>
<tr>
<td>Speckled snow mold</td>
<td><em>Typhula ishikariensis</em></td>
</tr>
<tr>
<td>Spring dead spot</td>
<td><em>Ophiosphaerella narmari</em>, <em>O. korrae</em>, <em>O. herpotricha</em></td>
</tr>
<tr>
<td>Stem rust</td>
<td><em>Puccinia graminis</em></td>
</tr>
<tr>
<td>Stripe rust</td>
<td><em>Puccinia striiformis</em></td>
</tr>
<tr>
<td>Stripe smut</td>
<td><em>Ustilago striiformis</em></td>
</tr>
<tr>
<td>Summer patch</td>
<td><em>Magnaporthiopsis poae</em></td>
</tr>
<tr>
<td>Take-all patch</td>
<td><em>Gaeumannomyces graminis</em></td>
</tr>
</tbody>
</table>
Tar spot: *Phyllachora* spp.
Thatch collapse: *Sphaerobollus stellatus*
Yellow patch: *Rhizoctonia cerealis*
Yellow tuft: *Sclerophthora macrospora*
Yellow ring: *Trechispora alnicola*

**Nematodes, Parasitic**

Awl: *Dolichodorus* spp. Cobb
Cyst: *Heterodera* spp. Schmidt
Dagger: *Xiphinema* spp. Cobb
Lance: *Hoploaimus* spp. Daday
Lesion: *Pratylenchus* spp. Filipjev
Needle: *Longidorus* spp. (Micoletzky) Thorne & Swanger
Pin: *Paratylenchus* spp.
Pseudo-root knot: *Hypsoperine* spp. Sledge & Golden
Ring: *Criconemella, Criconemoides, Macroposthonia,* and *Mesocriconema* spp.
Root gall: *Subanguina* spp.
Root knot: *Meloidogyne* spp. Goeldi
Sheath: *Hemicycliophora* spp.
Sheathoid: *Hemicriconemoides* spp.
Spiral: *Helicotylenchus* spp. Steiner
Sting: *Belonolaimus* spp. Steiner
Stubby root: *Paratrichodorus* and *Trichodorus* spp.

Stylet or stunt: *Tylenchorhynchus* spp. Cobb

**Miscellaneous Diseases or Disorders**

Black Layer: A
   Anaerobic soil plus blue-green algae and/or sulfate-reducing bacteria
Slime Molds (superficial, not pathogenic):
   *Mucilago crustacea*
   : *Didymium squamulosum*
   : *Physarum cinereum.*
   : Species of *Physarum* and *Fuligo*

**Addendum 4:**

**Insects**

annual bluegrass weevil
billbugs
- bluegrass billbug
- hunting billbug

black turfgrass ataenius

chinchbugs
- hairy chinchbug
- southern chinchbug

craneflies
- European cranefly (Tipula paludosa)
- "common" cranefly (Tipula oleracea)

Caterpillars and adults
- armyworm
- black cutworm
- fall armyworm
- winter cutworm

mole crickets
- southern mole cricket
- tawny mole cricket

red imported fire ant

turfgrass ant

white grubs
- Asiatic garden beetle
- European chafer
- Japanese beetle
- masked chafer (southern)
- masked chafer (northern)
- oriental beetle

Wasps
- Scoliid
- Cicada Killers
- yellow jacket
- Paper wasp

**Beneficials**
Honey bees
Assassin bugs
Ground beetle
Lacewing
Praying Mantis
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The SelectSpray Series offers more choices and versatility than any other line of specialized turf sprayers. Customers can choose between two different types of spray solution pumps, two types of spray controllers, two boom sizes, and a wide range of safety and convenience accessories. The SelectSpray Series also gives the choice to use the ProGator™ Heavy Duty Utility Vehicle for more than spraying. In minutes, and without tools, the sprayer can be removed from the ProGator™, allowing the ability to install a cargo box or other attachment to complete more daily tasks with the same vehicle.

Standard features on SelectSpray Sprayers include electro-hydraulic boom lift, triple nozzle bodies, high pressure strainer with cleanout, easy set boom valves, and convenient electrical component panel.

A complete line of spray nozzles as well as other sprayer parts can be found in the sprayer products section of JohnDeere.com.

» Special Turf Sprayer Components

A - X1 to Switched Machine Power  
B - X16 to Control Console  
C - Foam Marker Tank  
D - Main Tank Fill Quick Connect  
E - Return Hose  
F - Pressure Regulator Valve  
G - Jet Agitator Valve  
H - Pressure Regulator Valve  
I - Pressure Gauge  
J - Boom Regulator Valve  
K - X15 to Pressure Switch  
L - Hose Reel Option Connector  
M - Outlets to Boom Spray Hoses  
N - Drain Hose and Valve  
O - Screen Strainer  
P - Three-way Ball Valve  
Q - Electrical Ground Connection  
R - Battery Connection  
S - Right Boom Solenoid  
T - Left Boom Solenoid  
U - Relays  
V - Fuse Block
Product Overview

**Tank Options**
The HD200/300 SelectSpray Turf Sprayers are available with two tank options:
- The HD200 is 757 liters (200 gallons).
- The HD300 is 1135 liters (300 gallons).

The HD300 SelectSpray requires:
- 4-Post ROPS Conversion Kit
- Heavy Duty Front Spring Kit
- Heavy Duty Rear Spring Kit
- Wide Rear Tires and Wheels
- Rear Tire Pressure set at 110 kilopascal (16 psi).

**Pump Options**

**Centrifugal Pumps**
- High Flow, Lower Pressure Applications
- **Cast Iron**
  - Good general purpose sprayer pump, used in all HD200 / HD300 sprayers since 1999
- **Stainless Steel**
  - All the benefits of the cast iron pump with the ability to handle more corrosive chemicals, such as chelated iron
- Powered by a hydraulic motor
- Standard bleed line to help maintain pump priming by purging air from pump
- LifeGuard™ silicon-carbide seals allow pumps to intermittently run dry without failing seal

**Jet Agitator Valve:**
The agitator valve allows operator to adjust the flow of product to the Jet Agitator.

**Strainer:**
The strainer has a self cleaning feature, the red knob on the bottom when open allows debris to return to the tank giving the Jet Agitator another chance to dissolve or break up particles in the product mix.

LifeGuard™ is a trademark of
Turf Sprayer Guide

Product Overview (cont’d)

- **Pressure Regulator Valve:**
  The pressure Regulator valve allows the operator to control the amount of product flow through the system. As flow increases the pressure also increases, as flow decreases the pressure decreases. With an automatic rate controller as ground speed increases or decreases this valve adjusts to maintain application rate.

- **Flow Meter:**
  The Flow meter measures the amount of product passing through it. This is done by means of a paddle wheel and an inductive pick-up. Flow meter is used only when an Auto Rate system is installed.

- **Pressure Sensor:**
  The automatic rate controller or digital manual rate controller are equipped with a digital pressure sensor and readout. Analog manual rate controller is equipped with and analog gauge and isolator.

- **Boom Valve:**
  The Boom Valves are motorized flow control valves. These valves regulate the flow to the spray nozzles.

**Diaphragm Pump**

- Low Flow, Higher Pressure Applications
- Powered by a hydraulic motor
- Effectively handles paint and other tough spray solutions
- Positive displacement pump that requires pressure relief valve as part of pressure regulator valve assembly
- Pistons operate in oil bath for long life and optimal lubrication
- Excellent for providing plenty of pressure for walking spray booms
- Mounting location allows for easy servicing of diaphragms

- **Pressure Relief Valve:**
  The pressure relief valve protects the spray system by providing a path for fluid to the tank once a specific pressure is obtained. This valve is only used on the Diaphragm pumps.

- **Jet Agitator Valve:**
  The agitator valve allows operator to adjust the flow of product to the Jet Agitator in the tank.
Turf Sprayer Guide

Product Overview (cont’d)

- **Strainers:**
  Suction strainer collects any large particles coming out of the tank before it gets to the diaphragm pump. Pressure strainer has a self cleaning feature. When the red knob on the bottom is open it allows debris to return to the tank giving the Jet Agitator another chance to dissolve or break up particles in the product mix.

- **Pressure Regulator Valve:**
  The pressure regulator valve allows the operator to control the amount of product flow through the system. As flow increases the pressure also increases, as flow decreases the pressure decreases. With an automatic rate controller, as ground speed increases or decreases this valve adjusts to maintain application rate.

- **Flow Meter:**
  The Flow meter measures the amount of product passing through it. This is done by means of a paddle wheel and an inductive pick-up. Flow Meter is used only when an Auto Rate system is installed.

- **Pressure Sensor:**
  The automatic rate controller or digital manual rate controller are equipped with a digital pressure sensor and readout. Analog manual rate controller is equipped with and analog gauge and isolator.

- **Boom Valve:**
  The Boom Valves are motorized flow control valves. These valves regulate the flow to each section of spray nozzles.

» Controller Options

**Analog Manual Rate Controller**

- Traditional pressure based spraying
- Operator sets pressure and controls speed
  » Flow rate is not monitored
- Weatherproof control box includes all switches for spraying function
  » Master switch, individual boom control switches, foam marker switch, boom lift / lower switches, pressure increase / decrease switch
- Manual controller for centrifugal pump features 6.9 bar (100 psi) liquid-filled pressure gauge (analog)
- Manual controller for diaphragm pump features 20.7 bar (300 psi) liquid-filled pressure gauge (analog)
- Gauge isolator system allows the gauge to read pressure without chemical entering operator area (analog)

**Digital Manual Rate Controller**

The digital manual rate controller allows the operator to see the pressure produced by the sprayer. A digital pressure sensor electronically relays the system pressure to the controller’s digital gauge. Simple, dependable and accurate, with no hoses or lines to bleed or leak.
Foam marker (A): Controls the right and left boom foam marker. With the switch in the center position, no marker foam is released. With the switch in the right position, foam is released from the foam head at the end of the right spray boom. With the switch in the left position, foam is released from the foam head at the end of the left spray boom.

Left boom switch (B): This switch controls the left boom wing lift. Move the switch UP to raise the left boom wing. Move the switch DOWN to lower the left boom wing.

Right boom switch (C): This switch controls the right boom wing lift. Move the switch UP to raise the right boom wing. Move the switch DOWN to lower the right boom wing.

Master boom switch (D): This switch “M” controls the flow to all the boom section valves. To allow flow to all individual boom section valves, move the switch to the UP position. To shut off flow to all individual boom section valves, move the switch to the DOWN position.

Left boom switch (E): Switch “1” controls the left boom section valve. To allow flow to the left boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the left boom section spray nozzles, move the switch to the DOWN position.

Center boom switch (F): Switch “2” controls the center boom section valve. To allow flow to the center boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the center boom section spray nozzles, move the switch to the DOWN position.

Right boom switch (G): Switch “3” controls the right boom section valve. To allow flow to the right boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the right boom section spray nozzles, move the switch to the DOWN position.

Pressure gauge (H): Displays the sprayer operating pressure, and can be used as an indicator of system performance. While the sprayer is in operation, system should be constant. Any significant change in indicated pressure when in operation is an indication of a system fault to be investigated. For example: If one or more nozzles were to become plugged, there would be an increase in pressure normally indicated. If a significant leak occurred, or if a nozzle were lost, there would be a decrease from the pressure normally indicated.

Pressure control switch (I): Increases and decreases the pressure delivered to the nozzles. The plus and minus switch controls fluid pressure delivered to the nozzles.

On-Off Button (J): Turns the controller on and off

Automatic Rate Controller
- TeeJet® controller designed specifically for John Deere
  - Weatherproof
  - Pre-programmed with Deere specs
- Pressure or Flow based spraying
- Operator sets rate, controller automatically adjusts flow or pressure based on speed to obtain rate
- Control box includes all switches for spraying functions
- Digital pressure gauge with digital readout
Manual override in case auto system fails
Digital sight gauge tells operator how many gallons are left in tank and sounds alarm when 95 liters (25 gallons) remain
Display shows total applied, total area applied, target rate, speed, pressure, and nozzle type
  » Nozzle size display helps make sure you are using right nozzle for right application

Pro button (A): Is used to turn on and off the controller and is used to store information

Auto/Manual control (B): The “Auto” and “Man” touch pad switches change controller operation between automatic and manual control of sprayer functions.

Digital display (C): Displays the controller information

Pressure control (D): Increases and decreases the pressure delivered to the nozzles. The plus and minus buttons control fluid pressure delivered to the nozzles. Pressing the plus button will increase system pressure within system limits. Pressing the minus button will decrease system pressure within system limits. It is also used to adjust settings. In the auto operating mode, the controller automatically maintains a uniform application rate with changes in operating conditions. In the auto operating mode, rate can be temporarily increased or decreased to suit application requirements by increasing or decreasing system pressure.

Foam marker (E): Controls the right and left boom foam marker. With the switch in the center position, no marker foam is released. With the switch in the right position, foam is released from the foam head at the end of the right spray boom. With the switch in the left position, foam is released from the foam head at the end of the left spray boom.

Master boom switch (F): Switch “M” controls the flow to all the boom section valves. To allow flow to all individual boom section valves, move the switch to the UP position. To shut off flow to all individual boom section valves, move the switch to the DOWN position.

Left boom switch (G): Switch “1” controls the left boom section valve. To allow flow to the left boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the left boom section spray nozzles, move the switch to the DOWN position.

Center boom switch (H): Switch “2” controls the center boom section valve. To allow flow to the center boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the center boom section spray nozzles, move the switch to the DOWN position.

Right boom switch (I): Switch “3” controls the right boom section valve. To allow flow to the right boom section spray nozzles, move the switch to the UP position. The master boom switch must be in the UP position as well. To shut off flow to the right boom section spray nozzles, move the switch to the DOWN position.

Left boom switch (J): This switch controls the left boom wing lift. Move the switch UP to raise the left boom wing. Move the switch DOWN to lower the left boom wing.

Right boom switch (K): This switch controls the right boom wing lift. Move the switch UP to raise the right boom wing. Move the switch DOWN to lower the right boom wing.
Product Overview (cont’d)

A - Pressure - shows the operator the pressure in bar or psi.

B - Application rate – this is the target rate the operator has set the controller to spray. The default setting is US gallons per acre.

- Other unit setting options are:
  » US gallons per 1000 square feet
  » Imperial gallons per acre
  » Liters per meter squared
  » Liters per hectare

C - This display shows the speed the ProGator™ is traveling. If this number on the automatic rate controller does not match the speed on the ProGator™ dash then the speed sensor will need to be recalibrated. The default is in miles per hour. The other unit setting option is kilometers per hour.

D - This display on the controller alternates between the total tank volume and total area applied. The automatic rate controller will measure both the total area and the total volume applied when the master boom switch is on. These are running totals; the controller will track and store this information until it is manually reset by the operator.

E - The nozzle selection chart - The automatic rate controller is pre-configured to industry standard color coding; identifying the nozzle sizes. If the operator desires to use a nozzle that is not listed in the pre-configured chart it can be programmed using the P box on the nozzle chart.

- Boom Options
  5.5 m (18 ft), 4.6 m / 6.4 m (15 ft/21 ft) MultiSize or less boom option
    - 14 gauge steel tubing for lightweight, yet heavy duty boom construction
    - Folding wings with ball valves for 4.6/6.4 m (15/21 ft) boom option to allow for spraying either 4.6 m (15 ft) or 6.4 m (21 ft) width with same boom
    - Standard electro-hydraulic lift system
      » Self-contained electric pump / hydraulic cylinder for each boom allows for lifting / lowering booms without engine running
      » Retrofittable to 2008 and earlier units
    - Bi-directional breakaway protects boom if object is struck while moving forward or backward
    - Easy leveling of left and right booms
    - Adjustable boom height for proper spray angles and overlap
Turf Sprayer Guide

Product Overview (cont’d)

» ProGator™ Tire Options

A. Standard Multi Trac 26x12-12 (4PR) rear tires are designed to provide maximum traction when spraying in conditions like the rough areas where turf damage is less important than traction.

B. Optional Wide Multi Trac 26x14-12 (4PR) rear tires are designed to provide maximum traction when spraying in conditions like the rough areas where turf damage is less important than traction.

C. Available Smooth 26x14-12 (4PR) rear tires will virtually eliminate turf damage when spraying greens but will have limited traction performance in some conditions.

Note: Traction will be limited with smooth tires.

D. Available Fairway 26x14-12 (4PR) rear tires have a less aggressive tread pattern to reduce turf damage when spraying areas like fairways and tees while still providing good traction performance.

Note: B., C., or D. tire options are required for Use on HD300 Sprayer.

Sprayer Operation

» Spray System Plumbing

Efficient Valve Design: 2 primary valve bank assemblies

- Pressure regulator assembly which includes jet agitator, self-cleaning line strainer, and pressure regulator valve
  - Pressure relief valve (A) is only required for Diaphragm Pump and is set to 13.8 bar (200 PSI) using Pressure Gauge (B) on the back of the machine.
- Boom valve assembly (C) includes 3 electric boom valves with throttling valves and one manual valve (D) for hose reel or walking boom
- Efficient hose routing / simple plumbing
  - Flow leaves pump and goes immediately to left side of pressure regulator assembly
  - Flow goes from the pressure regulator assembly to the boom valve assembly and then out to individual boom booms

» Jet Agitation

Jet agitation provides continuous agitation to prevent separation of the spray tank mixture. It is recommended to use this agitator whenever operating the sprayer.

The operator can adjust the amount of flow through the jet agitator:

- To increase agitation turn jet agitation valve counterclockwise
- To decrease agitation turn the jet agitation valve clockwise.
- To turn off agitation, turn the valve completely clockwise to the closed position.
Sprayer Operation (cont’d)

» Throttling Valves

Standard Equipment
Maintains system pressure when individual booms are turned off and on for more efficient spray applications.

Adjusting Throttling Valves:
1. Turn all three throttling valve knobs: left (A), center (B), and right (C) clockwise to “0” (off position).

   Note: If you have an automatic rate controller, you must set the controller to manual control mode in order to do this procedure.

2. Go to front of machine and turn all three boom valves on (using the manual control box or automatic rate control box in manual mode).
3. Turn the master control switch on (using the manual control box or automatic rate control box).
4. Adjust operating spray pressure at the control box to the desired spray pressure
5. At the sprayer controller in front, turn off right boom section.

   Note: At this point, when a boom section is turned off, the operating spray pressure will now increase.

6. Adjust right throttle valve knob (C) to obtain operating spray pressure noted earlier. Turning the knob clockwise will increase pressure, counterclockwise will decrease pressure.

   Note: Read operating pressure at the controller, not on the pressure gauge at the back of the sprayer.

7. At the sprayer controller in front, turn on right boom section, and turn off the center section.
8. Adjust the center throttle valve knob (B) to obtain operating spray pressure noted earlier.
9. At the sprayer controller in front, turn on center boom section, and turn off the left section
10. Adjust the left throttle valve knob (A) to obtain the operating spray pressure noted earlier.
11. After all three boom sections have been turned off and on, you should be able to quickly check each throttling valve setting by turning off any of the three boom sections. When properly set the operating spray pressure should remain the same.

» Nozzle Bodies/Electrical System

Triple Nozzle Bodies
- Standard Equipment
- Allows customer to install three different style nozzles at the same time
- Simply rotate to select desired nozzle configuration
- Enhances productivity by saving time changing nozzles
- Triple Nozzles can be fitted to previous HD200/300 models
SprayMaster Catalog

- John Deere offers a wide range of nozzle sizes and types for turf and agricultural applications. Listed below are sources for these catalogs.


  Region 2: Order online: http://r2pathways.deere.com/ag/r2/JDUK/Parts/M_Catalogues/SprayPartner\n  spraypartner2009.pdf

Electrical System
Common Wiring Harness HD200 / HD300

The electrical systems for the HD200 and HD300 share a common wire harness. This wiring is the same whether you install an automatic rate controller or a manual rate controller.

The innovative electrical system design locates key electrical components in one location on the machine. All fuses, relays, and lift/lower solenoids are located in one convenient component box on the left-hand side of the sprayer frame. Because this component box is mounted to the sprayer frame, the sprayer can be quickly disconnected from the ProGator™, making removal easy and effortless.

No tools are required to open the electrical control box, leading to quick troubleshooting and component replacement.

A 50 Amp manual reset Circuit Breaker is located at the back of the machine and protects the sprayer’s electrical system.
Optional ProGator™ Throttle Governor Kits

Electronic Multi-Mode Throttle/Governor Control Kit
(Only for 2020A EFI Gas engine model year 2012 and newer)

Electronically controls engine RPM’s for stationary operation.
- Used to set the throttling valves, pressure relief valve, manual catching the nozzle flow, agitation, clean load eductor, test mode on the automatic rate controller, walking boom or spray gun, 75.7 liters (20 gallon) rinse tank, and winterizing the sprayer.

The multi-mode throttle control can also be used to set the maximum engine RPM’s for product applications. The operator can then push the accelerator pedal to the floor, and the engine RPM’s will not exceed the maximum RPM’s that has been set.

Throttle/Governor Control Kit
(Diesel ProGator™ 2030A and 2020A model year 2011 and older)

Note: This throttle control is for stationary operation only and should not be operated as a cruise control. Use only when the vehicle is in NEUTRAL position and the parking brake is set.

- Used to set the throttling valves, pressure relief valve, manual catching the nozzle flow, agitation, clean load eductor, test mode on the automatic rate controller, walking boom or spray gun, 75.7 liters (20 gallon) rinse tank, and winterizing the sprayer.

The governor mode allows the vehicle to be set at a specific engine RPM to control the top ground speed. If the accelerator pedal is released, it will return engine RPM’s to idle. When the accelerator pedal is depressed, the engine will be restricted to the set RPM’s.
Turf Sprayer Guide

Accessories

» Foam Marker
Contains both an air pump and a liquid pump to mix air and liquid at the foamer head.
- No tools required to access foam marker components
- Foamer head ensures round and accurate foam droplets
  » Air line and liquid line to each foamer head
  » No mixing in marker itself
- Needle valve adjusts rate of foam
  » Turn clockwise to increase rate, counter-clockwise to decrease rate
  » No tools needed to adjust rate
- Foam Marker uses dual U-bolt mounting system to easily mount to center boom for simple installation. This kit can be retrofitted to previous HD200/300 sprayer units.

» Storage Stands
No Tools needed for Sprayer Removal
- Removing sprayer requires
  » Remove 3 mounting pins
  » Disconnect 2 hydraulic lines
  » Disconnect 3 electrical connectors
- Increases versatility of ProGator™ by allowing customer to use machine for other applications and quickly return to sprayer use.
- Optional storage stands for storing sprayer when not in use
  (Never use storage stands with any fluid in the tank)
  » Front legs have a right and left orientation, trailer jacks in rear
  » Both have wheels so that a technician can easily move sprayer around in the shop, or reposition for re-installation on ProGator™
  » Before inserting the front support stands into the brackets verify that the angle on the wheel bracket (A) is pointing towards the rear of the machine.
  » Remove and install in minutes!
- Stands can be retrofitted to previous HD200/300 models

Note: Once the sprayer is installed on the ProGator™ prior to sprayer operation, the front storage legs and the rear jacks should be removed from the sprayer.

» Hose Reel
The electric and manual hose reel comes with a rubber hose that is 61 meters (200 feet) in length and 12.7 mm (1/2 inch) in diameter. Hose comes less spray gun. The spray gun has its own order code that needs to be ordered separately.

Note: A diaphragm pump is recommended if user requires a lot of hose reel application.
Rinse Tank System
The 75.7-L (20-gal.) rinse tank simplifies cleaning out the sprayer system at the end of the day. Because sprayers are used to apply many different types of chemicals, the rinse tank provides the operator an opportunity to flush the lines with clean water so there is no contamination the next time the sprayer is used.

The operator can rinse the sprayer in the field at the end of spraying operation. The sprayer can then be safely stored and will be ready for the next operation. The 75.7-L (20-gal.) rinse tank kit also includes the rinse deflector kit. This can also be used to run fresh water through the chemical eductor.

Chemical Eductor
Uses pump flow to create a water jet to help mix and transfer chemical into tank
- Allows you to load chemical at waist level rather than loading through top of tank
- Integrated bottle rinse allows for maximizing chemical usage by leaving no chemical in bottle
- CleanLoad hopper rinse ensures no chemical left behind in CleanLoad
- Spring-loaded mounting system allows for easy conversion into loading position or transport position
  - Locking rod secures CleanLoad in transport and while spraying
- Durable ball valve system controls flow into and out of CleanLoad

Chemical Eductor

Boom Ground Plane Wheel
- Keeps the boom from contacting the ground when spraying in rough terrain or on slopes.
- For 4.6/6.4 m (15/21 ft) Multi-Sizeboom only
- Tension to the break away springs may need to be increased if ground plane wheels are installed on the booms.

Note: If spray is contacting the Ground Plane Wheel, bend the outside nozzle hanger up until spray pattern clears wheel.
**Controller Guide (Metric)**

### Application Setup Mode

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning Controller ON</td>
<td>Press Pro key</td>
</tr>
<tr>
<td>Turn Controller OFF</td>
<td>Press Pro and - keys simultaneously</td>
</tr>
<tr>
<td>Enter Application Setup Mode</td>
<td>Press Pro key twice</td>
</tr>
<tr>
<td>Enter System Setup Mode</td>
<td>Press and Hold Pro key for 3 seconds</td>
</tr>
<tr>
<td>Change between manual and auto spraying</td>
<td>Press Auto/Man key until selection is lit</td>
</tr>
<tr>
<td>Zero Area and Total Volume Counter</td>
<td>Press and Hold Auto/Man key for 3 seconds, Press Pro to confirm</td>
</tr>
<tr>
<td>Reset Tank Volume</td>
<td>Press + and - keys simultaneously, use + or - to select desired tank volume or press Auto/Man key to reset a full tank, Pro to store</td>
</tr>
<tr>
<td>Turn All Booms OFF</td>
<td>Toggle master switch to OFF position (down)</td>
</tr>
</tbody>
</table>

**Note:** Flow meter will count flow at all times with master switch in ON position

### Application Setup Mode

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter application setup mode</td>
<td>Press Pro key two times</td>
</tr>
<tr>
<td>Change Application Rate</td>
<td>Press + or - key to change rate, then press Pro key</td>
</tr>
<tr>
<td>Using Calculator feature steps below allows operator to determine impact of speed, pressure, and nozzle type on application rate. This feature allows the operator to find a desirable speed, pressure, and nozzle type for spraying.</td>
<td></td>
</tr>
<tr>
<td>Toggle between pressure, speed, and nozzle type</td>
<td>Press Pro key. Values can be changed when flashing.</td>
</tr>
<tr>
<td>Change pressure to see impact on recommended speed</td>
<td>Press + or - key to change values</td>
</tr>
<tr>
<td>Change speed to see impact on recommended pressure</td>
<td>Press + or - key to change values</td>
</tr>
<tr>
<td>Change nozzle to see impact on recommended pressure</td>
<td>Press + or - key to move triangle over color bar. GPM of nozzle will display in box to lower right of controller, just above nozzle color bar.</td>
</tr>
</tbody>
</table>

### Store Application Rate and Nozzle Type

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set User Programmable Tip - Enter a nozzle with a rating that does not appear in the color bar at the bottom of the controller screen</td>
<td>Press Pro key until triangle above nozzle bar is flashing. Use + or - key to toggle triangle over P box to far right of color bar. Press Pro to toggle until numerical box above P is flashing. Use + or - key to change value.</td>
</tr>
</tbody>
</table>

### Exit Application Setup Mode and Return to Operating

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press and Hold Pro key for 3 seconds. Application Rate and Nozzle Type are stored.</td>
<td></td>
</tr>
</tbody>
</table>

### System Setup Mode

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>US</td>
<td>Other options include Trf, IMP, SI, and LM2</td>
</tr>
<tr>
<td>Speed Calibration</td>
<td>1070</td>
<td>Speed Sensor Pulses can be calibrated</td>
</tr>
<tr>
<td>Distance Counter</td>
<td>0</td>
<td>Turn master on to count while driving</td>
</tr>
<tr>
<td>Pressure Sensor</td>
<td>YES</td>
<td>Pressure sensor installed</td>
</tr>
<tr>
<td>Pressure Sensor Reference</td>
<td>4.00</td>
<td>Milli-amps for 0 bar reading; can be calibrated</td>
</tr>
<tr>
<td>Pressure Sensor High</td>
<td>25</td>
<td>Pressure sensor max pressure (bar)</td>
</tr>
<tr>
<td>Flow Meter Installed</td>
<td>YES</td>
<td>Flowmeter installed</td>
</tr>
<tr>
<td>Flow Meter Calibration</td>
<td>79.0</td>
<td>Liters per Minute; can be calibrated</td>
</tr>
<tr>
<td>Low Flow Sensor</td>
<td>9.5</td>
<td>Liters per Minute</td>
</tr>
<tr>
<td>Regulation Type</td>
<td>FLO</td>
<td>Automatic flow-based regulation. Other option is PRS for automatic pressure-based regulation.</td>
</tr>
<tr>
<td>Nozzle Spacing</td>
<td>50</td>
<td>Centimeters, adjustable using + and - keys</td>
</tr>
</tbody>
</table>
Turf Sprayer Guide

Automatic Rate Controller (cont’d)

| Boom Section 1 | 4 | Change to 2 if 4.6 m boom; adjustable using + and - keys |
| Boom Section 2 | 3 | Change to 5 if 4.6/6.4 m boom; adjustable using + and - keys |
| Boom Section 3 | 4 | Change to 2 if 4.6 m boom; adjustable using + and - keys |

**System Setup Mode**

| Density | NO | Change to YES if different density; density chart in operator manual |
| Regulation Mode | THR | Throttling |
| Regulating Valve Capacity | 151 | Liters per Minute |
| Regulating Speed Coarse | 5 | Adjustable - 0=slowest, 19=fastest |
| Regulating Speed Fine | 2 | Adjustable - 0=slowest, 19=fastest |
| Tank Capacity | 757 | Liters, change to 1135 for HD300 using + and - keys |
| Tank Volume Low Warning | 95 | Liters; value of 0 disables; adjustable using + and - keys |
| Communication | NO |
| Simulation Speed Low | 9.7 | km/h; adjustable using + and - keys |
| Simulation Speed High | 14.5 | km/h; adjustable using + and - keys |
| Minimum Speed | 2 | Adjustable using + and - keys; booms shut off below this speed |
| Regulation High Pressure | 10 | Bar |
| Memory Reload | NO | YES restores controller to factory defaults |

**Controller Guide (English)**

**Application Setup Mode**

| Turning Controller ON | Press Pro key |
| Turn Controller OFF | Press Pro and - keys simultaneously |
| Enter Application Setup Mode | Press Pro key twice |
| Enter System Setup Mode | Press and Hold Pro key for 3 seconds |
| Change between manual and auto spraying | Press Auto/Man key until selection is lit |
| Zero Area and Total Volume Counter | Press and Hold Auto/Man key for 3 seconds, Press Pro to confirm |
| Reset Tank Volume | Press + and - keys simultaneously, use + or - to select desired tank volume or press Auto/Man key to reset a full tank, Pro to store |
| Turn All Booms OFF | Toggle master switch to OFF position (down) |

**Note:** Flow meter will count flow at all times with master switch in ON position.

**Application Setup Mode**

| Enter application setup mode | Press Pro key two times |
| Change Application Rate | Press + or - key to change rate, then press Pro key |
| Using Calculator feature steps below allows operator to determine impact of speed, pressure, and nozzle type on application rate. This feature allows the operator to find a desirable speed, pressure, and nozzle type for spraying. |
| Toggle between pressure, speed, and nozzle type | Press Pro key. Values can be changed when flashing. |
| Change pressure to see impact on recommended speed | Press + or - key to change values |
| Change speed to see impact on recommended pressure | Press + or - key to change values |
| Change nozzle to see impact on recommended pressure | Press + or - key to move triangle over color bar. GPM of nozzle will display in box to lower right of controller, just above nozzle color bar. |
| Store Application Rate and Nozzle Type | Press and Hold Pro key for 3 seconds |
### Automatic Rate Controller (cont’d)

<table>
<thead>
<tr>
<th>Task</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set User Programmable Tip</td>
<td>Enter a nozzle with a rating that does not appear in the color bar at the bottom of the controller screen.</td>
</tr>
<tr>
<td>Exit Application Setup Mode and Return to Operating</td>
<td>Press Pro key until triangle above nozzle bar is flashing. Use + or - key to toggle triangle over P box to far right of color bar. Press Pro to toggle until numerical box above P is flashing. Use + or - key to change value.</td>
</tr>
</tbody>
</table>

### System Setup Mode

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>US</td>
<td>Other options include Trf, IMP, SI, and LM2</td>
</tr>
<tr>
<td>Speed Calibration</td>
<td>980</td>
<td>Speed Sensor Pulses; can be calibrated</td>
</tr>
<tr>
<td>Distance Counter</td>
<td>0</td>
<td>Turn master on to count while driving</td>
</tr>
<tr>
<td>Pressure Sensor</td>
<td>YES</td>
<td>Pressure sensor installed</td>
</tr>
<tr>
<td>Pressure Sensor Reference</td>
<td>4.00</td>
<td>Milli-amps for 0 PSI reading; can be calibrated</td>
</tr>
<tr>
<td>Pressure Sensor High</td>
<td>363</td>
<td>Pressure sensor max pressure</td>
</tr>
<tr>
<td>Flow Meter Installed</td>
<td>YES</td>
<td>Flowmeter installed</td>
</tr>
<tr>
<td>Flow Meter Calibration</td>
<td>79.0</td>
<td>Liters per Minute; can be calibrated</td>
</tr>
<tr>
<td>Low Flow Sensor</td>
<td>2.5</td>
<td>Gallons per Minute</td>
</tr>
<tr>
<td>Regulation Type</td>
<td>FLO</td>
<td>Automatic flow-based regulation. Other option is PRS for automatic pressure-based regulation.</td>
</tr>
<tr>
<td>Nozzle Spacing</td>
<td>20</td>
<td>Inches, adjustable using + and - keys</td>
</tr>
<tr>
<td>Boom Section 1</td>
<td>4</td>
<td>Change to 2 if 15 ft boom; adjustable using + and - keys</td>
</tr>
<tr>
<td>Boom Section 2</td>
<td>3</td>
<td>Change to 5 if 15/21 ft boom; adjustable using + and - keys</td>
</tr>
<tr>
<td>Boom Section 3</td>
<td>4</td>
<td>Change to 2 if 15 ft boom; adjustable using + and - keys</td>
</tr>
<tr>
<td>Tank Capacity</td>
<td>200</td>
<td>Gallons, change to 300 for HD300 using + and - keys</td>
</tr>
<tr>
<td>Tank Volume Low Warning</td>
<td>25</td>
<td>Gallons; value of 0 disables; adjustable using + and - keys</td>
</tr>
<tr>
<td>Communication</td>
<td>NO</td>
<td>Change to YES if different density; density chart in operator manual</td>
</tr>
<tr>
<td>Regulation Mode</td>
<td>THR</td>
<td>Throttling</td>
</tr>
<tr>
<td>Regulating Valve Capacity</td>
<td>40</td>
<td>Gallons per Minute</td>
</tr>
<tr>
<td>Regulating Speed Coarse</td>
<td>5</td>
<td>Adjustable - 0=slowest, 19=fastest</td>
</tr>
<tr>
<td>Regulating Speed Fine</td>
<td>2</td>
<td>Adjustable - 0=slowest, 19=fastest</td>
</tr>
<tr>
<td>Tank Capacity</td>
<td>200</td>
<td>Gallons, change to 300 for HD300 using + and - keys</td>
</tr>
<tr>
<td>Membrane Reload</td>
<td>NO</td>
<td>YES restores controller to factory defaults</td>
</tr>
<tr>
<td>Simulation Speed Low</td>
<td>6</td>
<td>MPH; adjustable using + and - keys</td>
</tr>
<tr>
<td>Simulation Speed High</td>
<td>9</td>
<td>MPH; adjustable using + and - keys</td>
</tr>
<tr>
<td>Minimum Speed</td>
<td>2</td>
<td>Adjustable using + and - keys; booms shut off below this speed</td>
</tr>
<tr>
<td>Regulation High Pressure</td>
<td>150</td>
<td>PSI</td>
</tr>
<tr>
<td>Communication</td>
<td>NO</td>
<td>Change to YES if different density; density chart in operator manual</td>
</tr>
</tbody>
</table>
User Programmable Tip
The automatic rate controller is pre-configured to accommodate the following nozzles (see Automatic Rate Controller picture highlighted in red):

<table>
<thead>
<tr>
<th>Color</th>
<th>Liter per Minute @ 2.0 - 2.5 bar</th>
<th>Gallon per Minute @ 40 PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>0.32</td>
<td>0.10</td>
</tr>
<tr>
<td>Green</td>
<td>0.48</td>
<td>0.15</td>
</tr>
<tr>
<td>Yellow</td>
<td>0.64</td>
<td>0.20</td>
</tr>
<tr>
<td>Blue</td>
<td>0.97</td>
<td>0.30</td>
</tr>
<tr>
<td>Red</td>
<td>1.29</td>
<td>0.40</td>
</tr>
<tr>
<td>Brown</td>
<td>1.61</td>
<td>0.50</td>
</tr>
<tr>
<td>Gray</td>
<td>1.93</td>
<td>0.60</td>
</tr>
<tr>
<td>White</td>
<td>2.58</td>
<td>0.80</td>
</tr>
<tr>
<td>Light Blue</td>
<td>3.22</td>
<td>1.00</td>
</tr>
<tr>
<td>Light Green</td>
<td>3.79</td>
<td>1.50</td>
</tr>
<tr>
<td>Black</td>
<td>6.45</td>
<td>2.00</td>
</tr>
</tbody>
</table>

- There are nozzles available for use that may not match these pre-sets. For example a nozzle rated at 4.7 lpm (1.25 gpm). This type of nozzle can be entered into the controller and used with the User Programmable Tip feature.
- To enter a User Programmable Tip, enter the Application Setup mode. Press the Pro key 3 times until the triangle above the nozzle color bar starts flashing. Use the + or – keys to move the triangle over “P” at the far right hand side of the color bar. Then press the Pro key 4 times until the number in the lower right hand corner of the controller screen just above “P” starts to flash. Use the + or minus keys to enter the lpm or gpm rating of the nozzle that you desire to use. Press and hold the Pro key for 3 seconds to store.
- The new nozzle rating has been stored and is ready for use.

Automatic Rate Controller Calibration
In most cases, the Automatic Rate Controller will be accurate using factory defaults and not require further calibration. If further calibration is required, there are three components that can be calibrated:

**Speed Sensor**
Calibrate the speed sensor only if the speed on the ProGator™ dash and rate controller do not match. This auto speed calibration process should take place when the spray tank is half full on a flat hard surface area. To calibrate:
1. First mark off a course of exactly 100 m (300 ft).
2. Position the ProGator™ near the beginning of the course.
3. Then enter System Setup Mode, and press Pro key until arriving at Speed Sensor Calibration screen (default 1070 for Metric or 980 for English).
4. Press and hold + and - keys simultaneously for 3 seconds and begin driving. As the starting point of the course is crossed, press + key to start calibration. As the ending point is crossed, press the + key. The new speed sensor calibration number is displayed.
5. Press Pro key to accept new value.
Automatic Rate Controller (cont’d)

It is recommended to perform the automatic speed calibration process at least twice and use the average of the calibration numbers. Once the calibration number has been determined, it must be entered into the console.

Pressure Sensor

Calibrate the pressure sensor only if the pressure on the controller does not read zero when the sprayer PTO is turned off.

*Note: In some cases it may be best to remove the pressure sensor from the plumbing system to complete calibration.*

To calibrate, make sure that the sprayer PTO is turned off and that there is no pressure in system. Then enter System Setup mode and press Pro key until arriving at Pressure Sensor Reference screen (default 4.00). Press and hold + and - keys simultaneously for 3 seconds to begin calibrating. The lower left of the controller screen will count 1 - 10. Once the counter reaches 10, the new calibration number will be displayed, and should be 4.00 +/- 0.20. Press Pro key to accept new value.

Flow Meter

Calibrate the flowmeter only if the total volume applied shown on the controller does not match the actual volume applied.

*Note: The controller will count flow any time the master switch is on. If all three booms are off, if master switch is still on, flow will continue to be counted. When turning all three booms off especially for transporting, turn off the master switch to stop counting flow pulses.*

- Be sure to compensate for different densities of solution.

To calibrate the flowmeter:
1. Enter System Setup mode and press Pro key until arriving at Flow Meter calibration screen (default 79.0).
2. Press and hold the + and - keys simultaneously for 3 seconds to begin calibrating. The cal number will zero out and CAL will show on the controller.
3. Engage the PTO, press the + key to begin calibration, and turn the boom sections on.
4. Spray a known quantity of fluid (ie – 379 liters or 100 gallons). As the known quantity is sprayed, the console will count pulses. As soon as the known quantity has been sprayed, turn off the master switch.
5. Press the Pro key. Use the + and - keys to adjust value to the known quantity sprayed.
6. Then press the Pro key, and the new calibration number will be displayed.
7. Press Pro key for 3 seconds to accept new value.

It is recommended to perform the automatic flow meter calibration process at least twice and use the average of the calibration numbers. Once the calibration number has been determined, it must be entered into the console.

» Flow and Pressure Based Regulation

The TeeJet® automatic rate controller has the capability to achieve the target application rate in two ways – flow-based (FLO) or pressure-based (PRS) regulation. Both regulating modes accomplish the same task, maintaining application rate. They only utilize different sensors to accomplish the task.

In FLO regulation mode, the controller receives input signals from the flow meter. The controller then adjusts the pressure regulating valve accordingly to achieve the application rate based on the flow meter pulses. As the ProGator™ speeds up and slows down, the regulating valve adjusts to maintain proper flow meter pulses. The pressure and application rate displayed on the controller are the actual pressure and application rate.
In PRS regulating mode, the controller receives signals from the pressure sensor, and ignores any signal from the flow meter. From the application setup mode, the controller knows what pressure it is supposed to achieve for a given ground speed and nozzle. The controller receives signal from the pressure sensor, and adjusts the pressure regulating valve to achieve the proper pressure to maintain the target application rate. As the ProGator™ speeds up and slows down, the regulating valve adjusts to maintain proper nozzle pressure. The pressure displayed on the controller is the actual operating pressure, but the application rate is a calculated application rate based on speed and pressure.

When spraying chemicals with a specific gravity close to that of water, either FLO or PRS will be accurate. However, when spraying chemicals with a specific gravity that is different from that of water, product density must be taken into consideration in order to maintain accuracy in FLO mode. For FLO-based regulation to be successful, the specific gravity of the solution must be entered into the controller by following step 17 in the “Configuring Auto Rate Control Box” section. In PRS mode, the specific gravity does not need to be entered into the controller to maintain the application rate.

» Compensation for different Densities of Solutions

In the system Setup Mode press the Pro key to toggle through until you get to the density screen
Default = NO
1. Change default to YES if entering density
2. If yes is selected, after pressing Pro key, a density screen will appear. A “D” will flash at top of console display.
3. The default value of 1.00 corresponds with the specific gravity of water and is correct for most pesticide applications. Occasionally, some spray solutions, such as fertilizer, have different densities. If using such a material, a new value should replace default value. Use the following chart to determine specific gravity of other solutions:
4. Use the “+” or “-” key to change value in display. Press Pro key to accept value and move to next step.

<table>
<thead>
<tr>
<th>Weight of Solution</th>
<th>Example</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg/l</td>
<td>lb./gal.</td>
<td></td>
</tr>
<tr>
<td>0.84</td>
<td>7.00</td>
<td>0.84</td>
</tr>
<tr>
<td>0.96</td>
<td>8.00</td>
<td>0.96</td>
</tr>
<tr>
<td>1.00</td>
<td>8.34</td>
<td>Water</td>
</tr>
<tr>
<td>1.20</td>
<td>10.00</td>
<td>1.20</td>
</tr>
<tr>
<td>1.28</td>
<td>10.65</td>
<td>28% Nitrogen solution</td>
</tr>
<tr>
<td>1.30</td>
<td>10.85</td>
<td>30% Nitrogen solution</td>
</tr>
<tr>
<td>1.32</td>
<td>11.00</td>
<td>1.32</td>
</tr>
<tr>
<td>1.44</td>
<td>12.00</td>
<td>1.44</td>
</tr>
<tr>
<td>1.68</td>
<td>14.00</td>
<td>1.68</td>
</tr>
</tbody>
</table>

If solution being used is not listed in the chart, calculate specific gravity as follows:
- Specific gravity = weight of solution / weight of water (1kg/l)
- Specific gravity = weight of solution / weight of water (8.34 lb./gal.)
SelectSpray™ Attachment for ProGator™ (Serial number HD200: 110001-, HD300: 090001-)

(Serial No. HD200: 110001- )
(Serial No. HD300: 090001- )

OPERATOR’S MANUAL

SelectSpray™ Attachment for ProGator™

OMUC23286 ISSUE A0  (ENGLISH)

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

If this product contains a gasoline engine:

⚠️ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

The State of California requires the above two warnings.

Additional Proposition 65 Warnings can be found in this manual.

John Deere Turf Care
North American Edition
Printed in U.S.A.
Product Compatibility
The HD200 and HD300 Sprayer Attachments are compatible with ProGator™ Utility Vehicles.

Record Identification Numbers

HD200 Serial Number (110001-)
HD300 Serial Number (090001-)

For information on servicing, contact an Authorized Service Center. Always provide the product model and serial number.

Locate the model and serial number for the attachment and record the information in the following spaces.

DATE OF PURCHASE:

_________________________________________
DEALER NAME:

_________________________________________
DEALER PHONE:

_________________________________________
PRODUCT SERIAL NUMBER (A):

_________________________________________

MK71445,000024D-19-20NOV19
Understanding the Machine Safety Labels

The machine safety labels shown in this section are placed in important areas on your machine to draw attention to potential safety hazards. DANGER or WARNING safety labels are located near specific hazards.

The operator’s manual also explains any potential safety hazards whenever necessary in special safety messages that are identified with the word, CAUTION, and the safety-alert symbol.

On your machine safety labels, the words DANGER, WARNING, and CAUTION are used with this safety-alert symbol. DANGER identifies the most serious hazards:

- **DANGER:** The signal word DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING:** The signal word WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION:** The signal word CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events which could lead to personal injury.

Replace missing or damaged safety labels. Use this operator’s manual for correct safety label placement.

There can be more safety information contained on parts and components sourced from suppliers that is not reproduced in this operator’s manual.

**French or Spanish Safety Labels and Operator’s Manual**

Operator’s manuals and safety labels with content in French or Spanish are available for this machine through authorized John Deere dealers. See your John Deere dealer.

**NOTE:** Both text and no-text labels are shown. Your machine is only equipped with one of these types of labels.

---

**DANGER**

To avoid injury, do not drink water from this container. It may be contaminated. Use for rinse/wash purposes only.

---

**WARNING**

To avoid injury from chemical hazards, wear protective clothing. Read and follow chemical manufacturer’s labels and instructions.
WARNING

- To avoid injury, read operator’s manual.
- Ballast power unit per operator’s manual.
- Know location and function of all controls.
- Keep all shields in place.
- Stay clear of power driven parts.
- Never carry riders.
- Keep children and pets a safe distance away from machine.
- Remove attachment from power unit on a level, flat, hard surface.
- Before leaving machine:
  - Stop engine.
  - Set park brake.
  - Lower or block up machine.

CAUTION

- Remove key.

CAUTION

Empty tank before removing attachment.
Winterize system when finished each day when operating in near freezing conditions.
Check system is at 0 PSI (0 kPa) before starting.

ATENCION

Vaciar el tanque antes de quitar el accesorio.
Proteger el sistema contra el invierno cuando se termina cada jornada si se trabaja a temperaturas cercanas a la de congelación.
Revisar que el sistema tiene una presión de 0 psi (0 kPa) antes de arrancar.

WARNING

To avoid injury, keep hands and fingers away from this area.

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CAUTION

Moving parts can crush and cut. Keep hands clear. Do not operate with guard removed.

WARNING

To avoid injury, keep hands and fingers away from this area.
Safety Labels No-Text

Safety Label Location—Sprayer Tank

A—Avoid Injury From Drinking Water MT4295
B—Avoid Injury From Chemical Hazards MT4072
C—Do Not Enter Tank MT6073
D—Read Operators Manual MT4074
E—Avoid Injury From Crushing TCU14021
F—Avoid Injury From Moving Parts TCU14019
G—Read Operators Manual, Avoid Moving Parts, Keep Bystanders Away TCU28908
Understanding the Machine Safety Labels without Text

At several important places on this machine, safety signs are affixed which signify potential danger. The hazard is identified by a pictorial in a warning triangle. An adjacent pictorial provides information on how to avoid personal injury. These safety signs, their
placement on the machine, and a brief explanatory text are shown in this Safety section.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator’s manual.

Avoid Injury From Drinking Water

To avoid injury, do not drink water from this container. It may be contaminated. Use for rinse/wash purposes only.

Avoid Injury From Chemical Hazards

To avoid injury from chemical hazards, wear protective clothing. Read and follow chemical manufacturer’s labels and instructions.

Do Not Enter Tank

To avoid injury from chemical hazards, do not enter tank.

Read Operators Manual

Empty tank before removing attachment. Winterize system when finished each day when operating in near freezing conditions. Check system is at 0 PSI (0 kPa) before starting.

Avoid Injury From Crushing

To avoid injury, keep hands and fingers away from this area.

Avoid Injury From Moving Parts

Installed on optional electric hose reel.
Moving parts can crush and cut. Keep hands clear. Do not operate with guards removed.

Read Operators Manual, Avoid Moving Parts, Keep Bystanders Away

- To avoid injury, read operator’s manual.
- Ballast power unit per operator’s manual.
- Know location and function of all controls.
- Keep all shields in place.
- Stay clear of power driving parts.
- Never carry riders.
- Keep children and pets a safe distance away from machine.
- Remove attachment from power unit on a level, flat, hard surface.
- Before leaving machine:
  - Stop engine.
  - Set park brake.
  - Lower or block up machine.
  - Remove key.

Avoid Injury From Moving Boom

To avoid injury, keep clear of moving boom.

Avoid Injury From Boom Swing Area

To avoid injury, keep clear of boom swing area.
Safety

Read Safety in Machine Operator’s Manual
Read the general safety operating precautions in your machine operator’s manual for additional safety information.

Operate Sprayer Safely
• Read the machine and attachment operator’s manual carefully. Be thoroughly familiar with the controls and the proper use of the equipment. Know how to stop the machine and disengage the controls quickly.
• Do not let children or an untrained person operate machine.
• Make any necessary adjustments before you operate. Never attempt to make any adjustments while the engine is running, unless if recommended in adjustment procedure.
• Take all possible precautions when leaving the machine unattended. Shut off the engine before making any repairs, adjustments, or inspections. Lower the attachment, lock the parking brake, stop the engine, and remove the key.
• Look behind machine before you back up. Back up carefully.
• Do not let anyone, especially children, ride on machine or attachment. Riders are subject to injury such as being struck by foreign objects and being thrown off. Riders may also obstruct the operator’s view, resulting in the machine being operated in an unsafe manner.
• Use only attachments and accessories approved by the manufacturer of this product.
• If the machine vibrates abnormally, stop the engine and check immediately for the cause. Vibration is generally a warning of trouble.
• Always refer to the Storage section of the operator’s manual for important details if storing this product for a long period of time.
• Keep people and pets out of the work area. Stop machine if anyone enters the area.
• If you hit an object, stop the machine and inspect it. Make repairs before you operate. Keep machine properly maintained and in good working order. Keep all shields and guards in place.
• Always inspect the sprayer completely before and after each use. Before pressurizing the system, check to be sure all fittings and hoses are tightly installed. Be sure guards and shields are in good condition and fastened in place. Make any necessary adjustments before you operate.
• Never use the sprayer during windy conditions.
• Always release pressure in the system before filling, cleaning or servicing the sprayer.
• Do not put nozzle tip or other sprayer parts to your lips to blow out dirt. Use compressed air.

Parking Safely
1. Stop vehicle on a level surface, not on a slope.
2. Fully lower the cargo box and any attachments on the machine that can be lowered.
3. Lock park brake.
4. Stop engine.
5. Remove key.
6. Before you leave the operator’s seat, wait for engine and all moving parts to stop.
7. Disconnect the negative battery cable or remove the spark plug wires (for gasoline engines) before servicing the machine.

Mix and Handle Chemicals Safely
• It is best to wear full cover clothing and always wear protective goggles and rubber gloves to protect yourself while handling chemicals.
• Follow instructions on chemical container labels.
• Open all chemical containers carefully, using proper tools.
• Open, pour, weigh and mix chemicals in a well-ventilated area.
• Reserve all equipment used for the application of chemicals exclusively for that purpose.
• Prohibit all smoking, drinking and eating food in chemical-handling area.
• It is a good practice to take a soapy shower immediately after the using the sprayer to apply chemicals.
• Wash all clothing worn when using chemicals separately in the laundry after spraying is completed.

Read Chemical Container Label
• Chemicals can be dangerous. Improper selection or use can injure persons, animals, plants, soils or other property. Select the right chemical for the job and handle and apply with care.
• Read the instructions, precautions, and warnings on the container label before opening. Use the product strictly according to label directions for specific
applications, in the amounts specified, at the times specified and only when needed.

- Keep the container closed tightly except when preparing the mix.
- Do not remove labels from chemical containers. Store all chemicals in their original containers.
- Do not mix chemicals unless stated on the container label.
- Store chemicals when not in use according to the container label.

Handle Chemical Products Safely

- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include pesticides, herbicides and fungicides.
- A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.
- The MSDS should be obtained from the chemical dealer at the time of the chemical purchase.
- Check the MSDS before beginning any job using a hazardous chemical. Know exactly what the risks are and how to do the job safely. Always wear recommended personal protection equipment.

Practice Safe Maintenance

- Only qualified, trained adults should service this machine.
- Understand service procedure before doing work. Keep area clean and dry.
- Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.
- Never lubricate, service or adjust the machine or attachment while it is moving. Keep safety devices in place and in working condition. Keep hardware tight.
- Keep hands, feet, clothing, jewelry, and long hair away from any moving parts, to prevent them from getting caught.
- Lower any attachment completely to the ground or to an existing attachment mechanical stop before servicing the attachment. Disengage all power and stop the engine. Lock park brake and remove the key. Let machine cool.
- Disconnect battery or remove spark plug wire (for gasoline engines) before making any repairs.
- Before servicing machine or attachment, carefully release pressure from any components with stored energy, such as hydraulic components and springs.
- Release hydraulic pressure by lowering attachment or cutting units to the ground or to a mechanical stop and move hydraulic control levers.
- Securely support any machine or attachment elements that must be raised for service work. Use jack stands or lock service latches to support components when needed.
- Never run engine unless park brake is locked.
- Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Replace all worn or damaged safety and instruction decals.
- Check all hardware at frequent intervals to be sure the equipment is in safe working condition.
- Do not modify machine or safety devices. Unauthorized modifications to the machine or attachment may impair its function and safety.

Wear Appropriate Clothing

- Wear close fitting clothing and safety equipment appropriate for the job.
- Certain operating conditions may dictate that the operator and any passenger wear appropriate safety equipment while operating the vehicle. Be prepared for any existing and potential conditions before operating machine.
- Local safety or insurance regulations may require additional safety equipment such as eye protection or a hard hat.
- Always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.
- Wear proper clothing and safety equipment while handling chemicals or using the sprayer. Refer to the MSDS for the chemicals being used to be sure the proper personal protection equipment is being used.
Avoid High Pressure Fluids

- Hydraulic hoses and lines can fail due to physical damage, kinks, age, and exposure. Check hoses and lines regularly. Replace damaged hoses and lines.
- Hydraulic fluid connections can loosen due to physical damage and vibration. Check connections regularly. Tighten loose connections.
- Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.
- Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
- If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A. Information may be obtained in the United States and Canada only by calling 1-800-822-8262.

Dispose of Chemicals Properly

- Proper disposal of excess spray material is very important. If you have excess tank solution, it is best to dilute it with water and apply it to the area you previously treated.
- Never dump solution into a drain or near a lake or stream.
- Chemicals containers should be triple-rinsed, with the rinse water added to the sprayer tank. Do not burn empty chemical containers. Dispose of containers at recycling centers.

Handling Waste Product and Chemicals

Waste products, such as, used oil, fuel, coolant, brake fluid, and batteries, can harm the environment and people:
- Do not use beverage containers for waste fluids - someone may drink from them.
- See your local Recycling Center or authorized dealer to learn how to recycle or get rid of waste products.
- A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. The seller of the chemical products used with your machine is responsible for providing the SDS for that product.
Preparing the Machine

Machine Requirements
Your machine must be equipped with the auxiliary hydraulic kit for operation of the sprayer pump. If your machine is equipped with a PTO control lever, two quick-couplers at the rear of the machine, an auxiliary tank and oil cooler, the auxiliary hydraulic kit is installed.

Additional parts and/or modifications are required when using the HD300 PrecisionSprayer attachment:

- Four post ROPS
- Adjust tire pressure to 110 kPa (16 psi)

Prepare for Assembly

1. Park machine safely.
2. Follow instructions in your machine operator’s manual to remove the cargo box.
3. Remove any attachment that uses the hydraulic lift or rear pivots.

Controller Mount Bracket Kit Components

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bracket, Control Box Mount</td>
</tr>
<tr>
<td>1</td>
<td>Bracket, Ram Mount</td>
</tr>
<tr>
<td>1</td>
<td>Bracket, Arm, Ram Double Socket</td>
</tr>
<tr>
<td>1</td>
<td>Mount, Ram U-Bolt</td>
</tr>
<tr>
<td>2</td>
<td>Washer, Round</td>
</tr>
<tr>
<td>2</td>
<td>Nut, Hex M6 Nylock</td>
</tr>
<tr>
<td>2</td>
<td>Screw, Flanged M6</td>
</tr>
</tbody>
</table>

Tank Components

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assembly, Filler (A)</td>
</tr>
<tr>
<td>1</td>
<td>Fitting, Barbed Hose, 1/4 in. (B)</td>
</tr>
<tr>
<td>1</td>
<td>Tank Assembly, Sprayer (C)</td>
</tr>
<tr>
<td>2</td>
<td>Down Stops (55 mm) (D)</td>
</tr>
<tr>
<td>1</td>
<td>Hose Assembly, Tank Drain (E)</td>
</tr>
<tr>
<td>2</td>
<td>Clamp, Frame (F)</td>
</tr>
<tr>
<td>1</td>
<td>Fitting, Barbed, 1/2 MPT x 3/8 HB (G)</td>
</tr>
<tr>
<td>1</td>
<td>Valve (H)</td>
</tr>
<tr>
<td>1</td>
<td>Cap, Dust (I)</td>
</tr>
<tr>
<td>1</td>
<td>Bracket, Support*</td>
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<tr>
<td>6</td>
<td>Nut, Nylock, M10</td>
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<tr>
<td>1</td>
<td>CapscREW, Hex Head, M10x35</td>
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<tr>
<td>1</td>
<td>WASher, Flat, M26</td>
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<tr>
<td>1</td>
<td>Clamp, Hose, 1/2 in.</td>
</tr>
<tr>
<td>1</td>
<td>Elbow, 1/2 FTP x 1/2 MPT</td>
</tr>
<tr>
<td>1</td>
<td>Hose, 3/8 in. x 12 in.</td>
</tr>
<tr>
<td>1</td>
<td>Hose, Clear</td>
</tr>
<tr>
<td>4</td>
<td>Clamp, Hose, 3/8 in.</td>
</tr>
<tr>
<td>2</td>
<td>Screw, M6x60*</td>
</tr>
<tr>
<td>2</td>
<td>Locknut, M6*</td>
</tr>
<tr>
<td>3</td>
<td>J Clips</td>
</tr>
<tr>
<td>1</td>
<td>Elbow, Threaded, 90 Degree</td>
</tr>
<tr>
<td>1</td>
<td>Elbow, Hose Barb, 90 Degree</td>
</tr>
</tbody>
</table>

*Parts for model HD300 only.