



● Manuel de l'utilisateur

Operator's manual ●

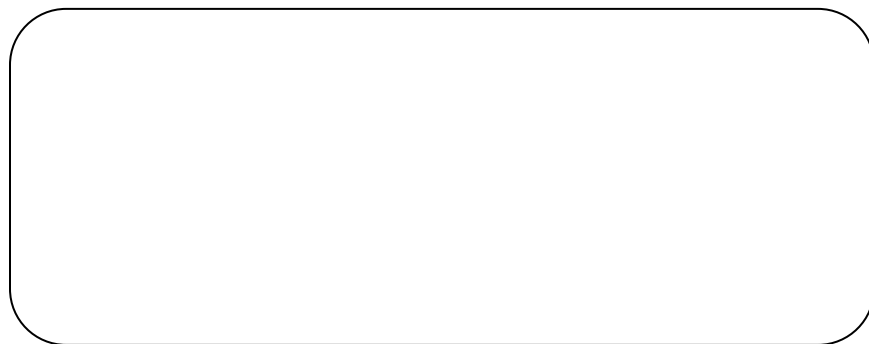
Pulvérisateur agricole

Agricultural sprayer

PORTÉE TRADITION

Modèles ● Models

P950E . P1135E . P1915E



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GARANTIE POUR PULVÉRISATEUR

GARANTIE LIMITÉE

Les pulvérisateurs fabriqués par MS Gregson Inc. sont garantis, à l'acheteur initial au détail, comme étant exempts de vices de matériaux ou de fabrication pour les délais spécifiés ci-dessous. Les conditions d'utilisation normale conformes aux instructions décrites dans le manuel de l'utilisateur s'appliquent. Cette garantie limitée est sujette aux exclusions cidessous énumérées. Elle est calculée à partir de la date de livraison à l'acheteur initial et s'applique aux composantes originales seulement. Les pièces remplacées sous cette garantie jouissent du délai restant de la garantie pour les composantes correspondantes. Le client a droit exclusivement au remplacement des pièces qui, selon l'avis du Fabricant ou de son représentant autorisé à cette fin, présentent des défauts de matériel ou de fabrication, à l'exclusion de tout droit au dédommagement des préjudices, directs ou indirects, d'une quelconque nature.

GARANTIE DE 1 AN SUR LES PIÈCES, 1 AN SUR LA MAIN-D'OEUVRE

Les composantes, excluant les accessoires mentionnés ci-dessous et les items d'entretien courant mentionnés ci-dessous, sont couvertes par une garantie de 1 an sur les pièces et la main-d'oeuvre.

GARANTIE OFFERTE PAR D'AUTRES MANUFACTURIERS

Les moteurs électriques ou à essence, batteries, pneus, jantes, produits Raven et Micro-Trak ou autres items dont le fabricant offre directement une garantie, sont réparés dans un centre de service autorisé du fabricant correspondant. MS Gregson Inc. ne peut offrir de garantie sur ces items.

EXCLUSIONS DE LA GARANTIE

- Ajustements de routine et articles d'entretien courant tels que lubrifiants, courroies, boyaux, joints toriques, tamis de filtre, fusibles, systèmes d'étanchéité de pistolets.
- Réparation requise suite à une collision, un accident, un choc, un abus, des modifications apportées à l'équipement sans autorisation, une installation inadéquate, un mauvais entretien, une utilisation contraire aux directives fournies dans le manuel de l'utilisateur ou le sens commun.
- Réparation requise suite au gel ou à l'exposition à des produits corrosifs.
- Réparation requise suite à des fluctuations de tension électrique d'alimentation.
- Réparation requise suite à l'incompatibilité entre les composantes et les produits phytosanitaires et chimiques.
- Réparation requise suite à une alimentation insuffisante en eau ou à une eau de mauvaise qualité.
- Dommage aux cultures dû à un mauvais calibrage ou usage de l'équipement.
- Dommage aux cultures par un mauvais usage, un rinçage incomplet et une contamination due à un mauvais rinçage.
- Dommage aux cultures ou déversement dus à un bris de composante et/ou un accident.
- Frais résultant de l'arrêt de l'unité durant une réparation ou pour toute autre raison.
- Frais de transport et/ou de déplacement.
- Toutes les pièces qui, durant leur emploi normal, sont sujettes à usure.
- Toutes les pièces qui se révèlent défectueuses suite à négligence pendant l'utilisation.

Pour les modèles avec une capacité de réservoir de 380 litres (100 gallons) et plus

LE DOCUMENT « INSPECTION AVANT LIVRAISON » DOIT ÊTRE REMPLI PAR LE CONCESSIONNAIRE ET SIGNÉ PAR L'ACHETEUR ORIGINAL DE L'ÉQUIPEMENT INDIQUANT QU'IL A BIEN LU ET COMPRIS TOUTES LES MISES EN GARDE, INSTRUCTIONS D'OPÉRATION, INSTRUCTIONS D'ÉCRITES DANS LE MANUEL DE L'UTILISATEUR ET EXPLICATIONS DE SON CONCESSIONNAIRE. IL DOIT ÊTRE RETOURNÉ À MS GREGSON INC. DANS LES 30 JOURS SUIVANT LA DATE DE LIVRAISON AU CLIENT. AUCUNE RÉCLAMATION DE SERVICE APRÈS VENTE NE SERA AUTORISÉE ET ÉMISE SANS LE DOCUMENT « INSPECTION AVANT LIVRAISON » DÛMENT REMPLI, SIGNÉ ET RETOURNÉ DANS LES DÉLAIS REQUIS.

EXÉCUTION DE RÉPARATION PENDANT LA PÉRIODE DE GARANTIE

Pour obtenir le service de garantie sur des pièces garanties par MS Gregson Inc. pendant la période de garantie, vous devez montrer à votre concessionnaire une preuve d'achat de votre équipement. Si l'équipement est installé de façon permanente, les réparations seront effectuées sur place par le concessionnaire. Pour obtenir le service de garantie sur les composantes garanties par d'autres fabricants, votre concessionnaire peut vous aider à obtenir ces services dans un centre local de service autorisé. Le concessionnaire a la responsabilité d'effectuer les réparations couvertes pendant la durée de la garantie. Ces réparations se feront à l'atelier du concessionnaire pour les équipements mobiles ou chez le client au choix du concessionnaire ; le client au détail a la responsabilité d'apporter son équipement chez son concessionnaire. Les pièces remplacées sous garantie deviennent la propriété de MS Gregson Inc. Les pannes ou ruptures éventuelles qui se manifestent pendant et après la période de garantie ne donnent droit ni à la suspension du paiement ni à des délais supplémentaires.

WARRANTY FOR SPRAYER

LIMITED WARRANTY

The sprayers manufactured by MS Gregson Inc. are warranted, to the original purchaser, to be free from defects in materials and workmanship for the periods specified below. Normal use conditions, according to the instructions in the operator's manual, apply. This limited warranty is subject to the exclusions listed below, is calculated from the date of delivery to the original purchaser, and applies to the original components only. Parts replaced under this warranty will assume the remainder of the corresponding part's warranty period. The purchaser has sole right to the replacement of the parts, which the Manufacturer, or his authorized representative, deems faulty as regards their material or manufacture. This does not imply any right to compensation for any type of direct or indirect damage. Any faults or failures which occur during or after the period of the guarantee do not imply the right to suspend payment or to any further extension.

1 YEAR PARTS, 1 YEAR LABOUR WARRANTY

The components, excluding accessories listed below and normal wear items listed below, are warranted for 1 year on parts and labour.

WARRANTY PROVIDED BY OTHER MANUFACTURERS

Motors, engines, batteries, tires, rims, Raven and Micro-Trak product or other items, which are warranted by their respective manufacturers, are serviced through these manufacturer's local authorized service centres. MS Gregson Inc. cannot provide warranty on these items.

EXCLUSIONS OF WARRANTY

- Routine adjustments and normal maintenance items such as lubricants, belts, hoses, O-rings, filter screens, fuses, and gun seal kits.
- Repairs required as a result of collision, accident, bumping, misuse, modifications made to the equipment without authorization, incorrect installation, lack of required maintenance, use contrary to the instructions included in the operator's manual or to the common sense.
- Repairs required as a result of freezing or exposition to corrosive products.
- Repairs required as a result of voltage fluctuations of the electric supply.
- Repairs required as a result of incompatibility between components and phytosanitary or chemical products
- Repairs required as a result of insufficient water supply or poor quality water.
- Damage to crop due to wrong calibration or incorrect use of the equipment.
- Damage to crop due by improper use, contamination or in-complete rinse of the sprayer.
- Damage to crop or spill due to components failure and/or accident.
- Additional charge resulting from stoppage for repair or other reason.
- Transportation and/or travelling.
- Any parts which are subject to wear during normal use.
- Any parts which are deemed faulty due to negligence or carelessness during use.

For model with tank capacity of 100 gallons (380 litres) and more

THE PRE-DELIVERY INSPECTION CHECKLIST MUST BE COMPLETED BY DEALER AND SIGNED BY THE ORIGINAL RETAIL PURCHASER, AND RETURNED TO MS GREGSON INC. WITHIN 30 DAYS OF PURCHASE DATE SIGNED BY THE ORIGINAL RETAIL PURCHASER, INDICATING THAT HE HAS READ AND UNDERSTOOD ALL SAFETY AND OPERATIONAL INSTRUCTIONS IN THE MANUAL, AFTER THE RETAILING DEALER HAS EXPLAINED TO THE ORIGINAL PURCHASER ALL SAFETY INSTRUCTIONS. IN NO CASE THE WARRANTY WILL BE APPLIED IF THE PRE-DELIVERY INSPECTION CHECKLIST HAVE NOT BEEN COMPLETELY FILLED AND SIGNED BY THE DEALER AND THE RETAIL PURCHASER IN PROPER DELAY.

EXECUTION OF REPAIRS WITHIN THE WARRANTY PERIOD

In order to obtain warranty service on items warranted by MS Gregson Inc. within the warranty period, you must show to your dealer a proof of purchase. If the equipment is permanently installed, the dealer will carry out repairs on the spot. For warranty service on components warranted by other manufacturers, your authorized MS Gregson dealer can help you obtain warranty service through these manufacturers' local authorized service centres. The dealer has the responsibility to carry out repairs within the warranty period. Repairs will be done at the dealer's repair-shop for mobile equipments or at your site upon dealer's choice; the purchaser has the responsibility to bring his equipment to his dealer's repair-shop. The parts replaced under warranty become the property of MS Gregson Inc.

LIMITATION OF LIABILITY

MS Gregson Inc. liability for special, incidental, or consequential damages is expressly disclaimed. In no event shall MS Gregson Inc. liability exceed the purchase price of the product in question. THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. MS Gregson Inc. does not authorize any other party, including authorized MS Gregson dealers, to make any representation or promise on behalf of MS Gregson Inc. or to modify the terms, conditions, or limitations in any way. It is the buyer's responsibility to ensure that the installation and use of MS products conforms to local codes. While MS Gregson Inc. attempts to assure that its products meet national codes, it cannot be responsible for how the customer chooses to use or install the product.

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1. mesures de sécurité

- Lire attentivement et comprendre complètement toutes les instructions d'opération avant de mettre votre pulvérisateur en marche.
- Seulement l'opérateur doit prendre place sur le tracteur lorsque ce dernier et le pulvérisateur sont en mouvement. Ne jamais accepter de passer sur le pulvérisateur.
- Ne jamais accepter quelqu'un près du pulvérisateur lors du démarrage et de l'opération normale.
- Toujours garder les mains, pieds et vêtements éloignés des pièces en mouvement.
- Ne jamais tenter de faire des ajustements ou des réparations pendant que le moteur du tracteur est en marche sauf si spécifié autrement.
- Réduire la vitesse lors de virages et lors d'opérations sur des terrains inégaux, surtout lorsque le pulvérisateur est rempli à pleine capacité.

Réduisez les risques dans le maniement des pesticides en suivant ces recommandations:

- Porter des gants de caoutchouc lorsque vous êtes en contact avec les produits chimiques et les filtres de nettoyage. (FIG.01)
- Vider le contenant dans le réservoir et laisser égoutter pendant 30 secondes.
- Remplir le contenant au quart avec de l'eau (ou autre diluant) et rincer vigoureusement. Verser le contenu dans le réservoir et égoutter. Répéter 3 fois.
- Entreposer les surplus de produits chimiques ou disposer dans un endroit hors de la portée des enfants et des animaux selon les recommandations ou lois de votre province ou région.

2. informations générales

Avant la mise en marche du pulvérisateur

1. S'assurer que le montage et le réglage sont corrects et que tous les boulons soient serrés fermement. Resserrer les boulons après quelques heures d'utilisation.
2. Placer le contrôle en un point d'accès pratique à l'opérateur.
3. Graisser entièrement la machine et vérifier le niveau des huiles des engrenages et pompes.
4. Faire fonctionner la machine lentement pendant un certain temps et vérifier que toutes les pièces travaillent librement et normalement (Ne jamais faire fonctionner la pompe sans eau).
5. Vérifier tous les risques de fuites, inspecter tous les raccords.
6. Vérifier l'étanchéité et la propreté du filtre.
7. Vérifier les buses ainsi que leurs filtres (propreté, orifice et usure).

1. safety precautions

- Read carefully and understand all operation instructions before operating your sprayer.
- Only the operator should be permitted on tractor while it is in operation. Never allow anyone else to ride on tractor or sprayer.
- Never allow anyone else to stay near the sprayer while starting or operating.
- Always keep hands, feet and loose clothing away from moving parts.
- Never leave engine running while making some adjustments or repairs, unless specified.
- Reduce speed of tractor on curves, rough ground and hillsides especially when the tank is at its full capacity.

Reduce risks in pesticides handling by following these instructions:

- Always wear protective equipment and clothing while handling chemical products and cleaning filters. (FIG.01)
- Empty the container in the tank and let it drain for 30 seconds.
- Fill the container to 1/4 with water and rinse thoroughly. Pour the content into the tank and let drain. Repeat 3 times.
- Dispose of the container in a safe place, away from children and animals according to your State or Province regulations.



2. general information

Before starting to operate the sprayer

1. Make sure that the assembling and adjustments are under control. Tighten nuts and bolts after a few hours of use.
2. Place control in a convenient position for the operator.
3. Grease and check oil level of gear boxes and pumps.
4. Let the machine run slowly for a while and make sure that everything works normally (Never let the pump run without water).
5. Check for leaks, inspect all fittings.
6. Check filter leakage and cleanliness.
7. Check nozzles and filters (proper size, wear and cleanliness).

3. longueur de l'arbre de prise de force

L'arbre de prise de force entre le tracteur et l'équipement ne doit pas être employé :

- sans les protecteurs
- avec des protecteurs partiels
- avec des protecteurs abîmés
- sans les chaînes anti-rotation correctement accrochées

Modèle porté :

1. Attacher le pulvérisateur au tracteur.
2. Toujours utiliser des points d'attaches de catégorie appropriée.
3. A l'aide de l'attelage 3 points, soulever le pulvérisateur de sorte que les deux arbres soient alignés à la même hauteur.
4. Placer ensuite le pulvérisateur au niveau grâce au 3e point en variant sa longueur.
5. Couper ensuite l'arbre de P.D.F. à la longueur appropriée, pour ce faire procéder comme suit:
 - a) S'assurer que les arbres (tracteur-pompe) soient alignés
 - b) Prendre la longueur totale de l'arbre de P.D.F. fermé en "X"
 - c) Prendre la distance entre les deux arbres (tracteur-pompe) en "Y"
 - d) Soustraire la mesure "Y" de "X" en y soustrayant 1-1/2 po ce qui vous donnera la longueur à couper en "Z".

EX : $X - Y - 1-1/2 \text{ po} = Z$
 $20 - 16 - 1-1/2 \text{ po} = 2-1/2 \text{ po, à couper}$

3. PTO shaft length

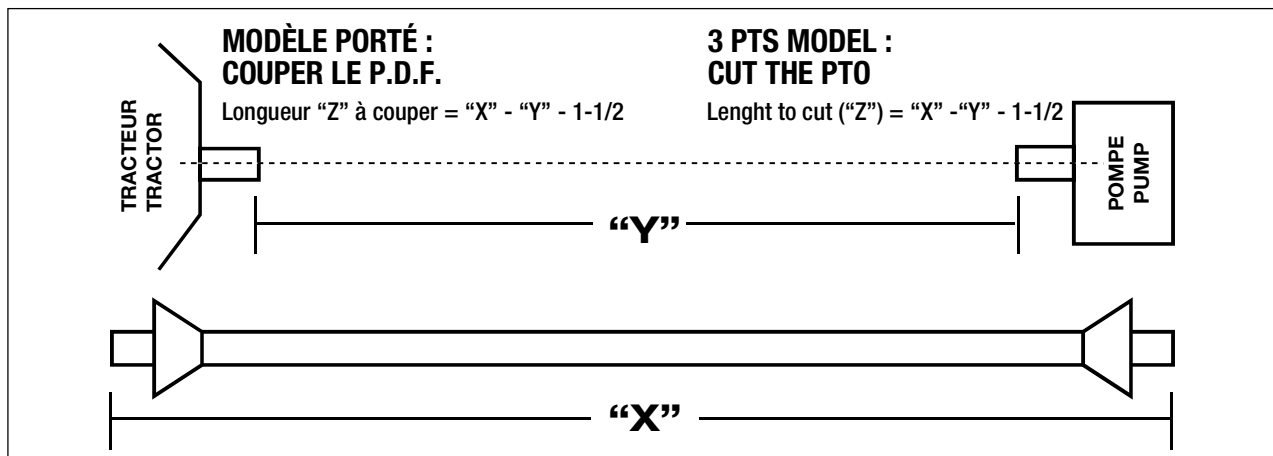
The PTO shaft between the tractor and the equipment must not be used :

- without the guard
- with partial protection
- with damaged guards
- without the anti-rotation chain correctly hooked

Rear mounted model :

1. Hook up the sprayer to the tractor.
2. Use always appropriate hitch category.
3. With the help of hydraulic, lift up the sprayer as far as both PTO shafts are aligned at the same height.
4. Level the sprayer by adjusting the 3rd point arm length.
5. Cut the PTO shaft at the appropriate dimension; proceed as follow:
 - a) Be sure that the shafts (tractor-pump) are aligned.
 - b) Measure total length of the PTO shaft in "X" when fully closed
 - c) Measure the distance between the two PTO shafts (tractor-pump) in "Y"
 - d) Subtract the measure "Y" from "X" and subtract 1-1/2", it will give you the length to cut in "Z".

EX : $X - Y - 1-1/2" = Z$
 $20 - 16 - 1-1/2" = 2-1/2", \text{ to cut}$



6. Enlever la mesure "Z" également sur les 2 parties du protecteur, ainsi que sur les 2 parties de l'arbre.
7. Installer l'arbre de P.D.F. sur la pompe et sur le tracteur, bien s'assurer que les barrures sont en place.

IMPORTANT :

Aviser l'utilisateur de l'importance de ces dimensions s'il y a changement de tracteur. Un arbre trop court ou trop long peut endommager l'engrenage ou la pompe.

6. Cut the measure "Z" equally on both protectors, and on both "PTO" shafts.
7. Install PTO shaft on the pump and on the tractor, be sure that the lock pins are in place.

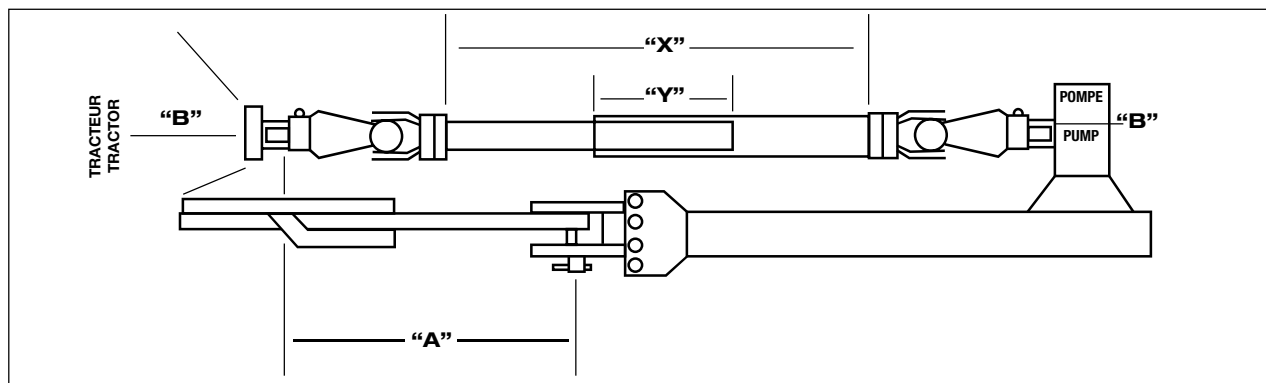
IMPORTANT :

Advise the user that these dimensions are very IMPORTANT if he changes his tractor, a too long or too short shaft may damage the gear box or the pump.

4. longueur de l'arbre de prise de force

Modèle remorqué

1. Ajuster la barre de tire du tracteur pour qu'il y ait la distance "A" de 14 po (le standard de 540 r/min) entre le bout de l'arbre de P.D.F. et le centre du trou d'attache.
2. Sur le timon du pulvérisateur, ajuster la hauteur de la main d'attache pour que le pulvérisateur soit au niveau lorsqu'il est attaché à la barre de tire du tracteur.
3. S'assurer que la longueur de pénétration "Y" de l'arbre soit équivalente à la moitié de la longueur totale "X" de la partie coulissante de l'arbre. Couper l'excédent, **sur les 2 bouts**.



5. ajustements et réglages

1. Main d'attache (Pulvérisateur remorqué seulement)

Ajustez la main afin que le pulvérisateur soit le plus parallèle au sol possible.

2. Voies des roues (Pulvérisateur remorqué seulement)

L'espacement des roues peut être facilement modifié en suivant cette procédure :

- a) Soulever le pulvérisateur avec un cric
- b) Déboulonner le serre-essieu sous le pulvérisateur
- c) Placer la roue jusqu'à la largeur désirée
- d) Serrer fermement les boulons
- e) Répéter de l'autre côté
- f) Resserrer les boulons après quelques heures d'utilisation
- g) Vérifier la pression des pneus

3. Attache du réservoir

Si une ou plusieurs des courroies d'attache sont lâches, resserrez-les avec les boulons 1/2 x 6 po sur les côtés du réservoir.

4. Contrôle manuel

Vous pouvez avancer le contrôle près de l'opérateur. Pour ce faire, dévisser le boulon avec une tête en croix qui retient le tube coulissant. Choisissez la position idéale et resserrez ce boulon.

4. PTO shaft length

Trailer model

1. Adjust the tractor drawbar to get on 14" ("A" on drawing) between the PTO shaft end and the center of the hole in the drawbar.
2. On the sprayer tongue, adjust the hitch height to get the sprayer levelled when it is attached to the tractor drawbar.
3. Be sure the penetrating distance ("Y") is equal to the half of the total length of the sliding length ("X"). Cut the exceeding length, **on both ends**.

5. adjustments

1. Spray hitch (Trailer sprayer only)

Hitch must be adjusted the way the sprayer tongue should be parallel to the ground.

2. Wheel tracking (Trailer sprayer only)

The wheel tracking may be changed by following this procedure :

- a) With a jack, lift the sprayer on one side
- b) Loose the nuts on the axle support
- c) Reposition the axle and wheel at the desired spacing
- d) Tighten nuts securely
- e) Repeat on the other side
- f) Tighten nuts after a few hours of utilization
- g) Check tire pressure

3. Tank straps

If one or more tank straps are loose, tighten it with 1/2" x 6" bolts on each side of the tank.

4. Manual control

You can place the control near of the operator. For that, unscrew the cross head bolt which holds the sliding tube. Choose the better position and tight this bolt.

5. Contrôle électrique

- connecter le fil rouge au positif de la batterie
- connecter le fil noir au négatif de la batterie

6. Pression d'air dans la pompe (pompe à membranes)

Vérifier la pression dans la cloche d'air de la pompe avec une jauge à pneus. Elle devrait être environ de 30 lb/po² pour pression de travail de 30 à 70 lb/po². (Au-delà de 70 lb/po², voir section de la pompe)

**7. Niveau d'huile de la pompe
Pompe à membranes**

Le niveau d'huile devrait être environ à la moitié de la fiole de plastique. Ajouter au besoin. (Huile SAE30 non-détergent)

Pompe centrifuge

Le carter de transfert doit contenir 6 onces d'huile "Gear Lube" SAE80W90

8. Hauteur de la rampe**8.1 Rampes fixes (sans treuil)**

La rampe doit être ajustée de façon à ce qu'il y ait 18 po. environ de distance entre la buse et le dessus des plants à pulvériser. (Pour la plupart des applications)

- Attacher le pulvérisateur au tracteur choisi.
- Relever le pulvérisateur afin qu'il y ait suffisamment de dégagement en dessous pour ne pas accrocher les plants pour avoir l'arbre de prise de force au niveau (*modèle porté*).
- Soutenir la rampe par la section centrale avec un palan.
- Démonter les 4 ou 6 boulons 3/8 po x 1-1/2 po retenant la rampe au support vertical du bâti
- Repositionner et boulonner fermement

8.2 Rampes avec treuil manuel

- Attacher le pulvérisateur au tracteur choisi.
- Relever le pulvérisateur afin qu'il y ait suffisamment de dégagement en dessous pour ne pas accrocher les plants et que l'arbre de prise de force soit au niveau (*modèle porté*).
- Enlever les goupilles (pin) de sécurité du relevage de la rampe sur les fers angles troués du bâti du pulvérisateur.
- Positionner la rampe à la hauteur désirée en tournant la manivelle du treuil.
- Remettre les goupilles (pin) de sécurité et enlever la tension du câble.

Important:

Ne jamais laisser la rampe suspendue par le câble lorsque le pulvérisateur est en mouvement.

5. Electric control

- connect the red wire to the positive of the battery
- connect the black wire to the negative of the battery

6. Air pressure of the pump (diaphragm pump)

Check the pressure in the air dampener of the pump. It must be approximately 30 PSI (use a tire gage) for working pressure from 30 to 70 PSI. (Over 70PSI, see pump section)

**7. Pump oil level
Diaphragm pump**

The oil level must be approximately to the half of the plastic glass. Add when necessary. (non-detergent oil SAE30.)

Centrifugal pump

The transfer case must contain 6 ounces gear lubrication SAE80W90 oil.

8. Boom height**8.1 Boom fixed (without winch)**

The boom must be adjusted at 18" distance between nozzle and the top of the plants to be sprayed (unless specified by nozzle manufacturer).

- Hitch-up the sprayer on the tractor.
- Raise the sprayer to have enough ground clearance, to have the PTO shaft levelled (3 pt hitch model).
- Hold the boom by the center section with a hoist.
- Remove the 4 or 6 bolts (3/8" x 1-1/2") that secure the boom to the sprayer frame and adjust at the desired height.
- Put back the bolts and tighten the nuts firmly.

8.2 Boom with manual winch

- Hitch-up the sprayer on the chosen tractor.
- Raise the sprayer to have enough ground clearance, to have the PTO shaft levelled (3 pt hitch model).
- Remove the safety pin of the sliding frame on the angles of the sprayer frame.
- Adjust the boom at the desired height.
- Put back the pins and remove tension on cable.

Important:

Never let the boom suspended by the cable, when the sprayer is moving.

9. Déclencheurs à cames (Rampes à repliage manuel)

Si la rampe ne cesse de bouger de l'avant vers l'arrière et vice versa lorsque le pulvérisateur est en mouvement, c'est qu'il n'y a pas suffisamment de tension sur les déclencheurs.

10. Il est possible d'augmenter cette tension en resserrant l'écrou 1 po sous le ressort du déclencheur. La tension doit être suffisante sans pour autant empêcher la rampe de déclencher facilement lorsqu'elle rencontre un obstacle. Lubrifier régulièrement les cames des déclencheurs.

Note :

A la fin de la saison enlever toute tension sur les ressorts.

11. Ajustement de fatigue

Pour les rampes hydrauliques de 45, 50 et 60 pi, vous ajustez la 1ère extension en ajustant l'écrou derrière le ressort sur le câble d'acier et la 2è extension par le boulon à tête carrée sur celle-ci.



MISE EN GARDE
VOUS DEVEZ TOUJOURS VOUS
IMMOBILISER POUR DÉPLIER OU
REPLIER UNE OU PLUSIEURS SECTIONS
DE LA RAMPE HYDRAULIQUE

6. mise en marche

Pour vous familiariser avec votre pulvérisateur "MS" il est préférable de faire un essai avec de l'eau seulement (sans mélanger de pesticides).

1. Remplir le réservoir (au moins 1/2 de sa capacité)
2. Enlever la tension sur le régulateur
3. Vérifier si l'eau arrive à la pompe et au filtre
4. Vérifier s'il y a des fuites
5. Placer la rampe en position de travail
6. Démarrer le tracteur et embrayer la prise de force en douceur (moteur à bas régime)
7. Régler le régime du moteur au RPM désiré.
8. Vérifier si toutes les composantes fonctionnent bien tels que: agitation, régulateur, sélecteur de rampe, etc.
9. Régler à la pression désirée
10. Vérifier l'écoulement des buses
11. Lorsque toutes ces étapes sont bien maîtrisées passez à l'étape de la calibration.

7. fonctionnement du pulvérisateur**1. Remplissage**

Après avoir effectué les ajustements et réglages nécessaires et effectué votre calibration, vous êtes prêts à faire fonctionner votre pulvérisateur sur le terrain.

- a) Remplir le réservoir à la moitié de sa capacité.

9. Breakaway hinges (cams) (Manual folding booms)

If the boom swings, when the sprayer is operating, it is because there is not enough tension on the breakaway hinges.

10. It is possible to increase this tension by tightening the 1" nut under the cam spring. Tension must be sufficient to let the boom to release easily when it meets an obstacle. Regularly, grease the cams.

Note :

At the end of the season, take off all tension on the cams.

11. Tilt adjustment

For the 45, 50 and 60 ft hydraulic booms, you adjust the 1st extension by adjusting the nut behind the spring on the cable, and the 2nd extension with the square head bolt on it.



WARNING
YOU MUST ALWAYS STOP MOVING
WHEN FOLDING OR UNFOLDING
ONE OR MORE SECTIONS OF AN
HYDRAULIC BOOM

6. starting the sprayer

To familiarize yourself with your Sprayer, it is preferable to do some tests with water only. (without mixed pesticides)

1. Fill the tank (half of its capacity)
2. Remove regulator tension
3. Check if water comes to the pump and filter
4. Check for leakage
5. Put boom in working position
6. Start the tractor and slowly engage the tractor PTO
7. Run engine at desired RPM
8. Check if all components work properly: agitation, regulator, boom selector, etc...)
9. Adjust pressure as desired
10. Check valve discharge
11. When everything is under control, you are ready for the next step: calibration

7. sprayer operation**1. Filling**

When all adjustments are done and after you made your calibration, you are ready to operate your sprayer in the field.

- a) Fill-up the tank to the half.

- b) Démarrer le tracteur, faire tourner la pompe et faire agiter.
- c) Ajouter les produits chimiques en respectant les recommandations du fabricant du produit et les consignes de sécurité.
- d) Remplir le réservoir et laisser agiter pendant quelques minutes avec une plus forte agitation.
- e) Ne jamais faire tourner la pompe sans eau.

2. Application du produit

- Ouvrir la rampe à sa pleine largeur et mettre toutes les goupilles (pin) prévues à cet effet.
- Enlever la goupille (pin) de auto-nivellant afin que la rampe puisse balancer (rampe 30 pi à 50 pi manuelle).

NOTE 1 :

Voir section "Contrôle" pour le fonctionnement de votre système de contrôle.

NOTE 2 :

La garantie ne couvre pas les bris de la rampe si vous utilisez votre pulvérisateur avec auto-nivellant en position transport (goupille en place).

8. remisage

- Rincer et drainer le réservoir, la rampe, les tubes, les boyaux ainsi que la pompe.
- Faire fonctionner le système en aspirant une solution d'antigel (prestone) de façon à ce qu'il en soit complètement rempli (boyaux et pompe). **NOTE: Ne pas utiliser de lave-vitre.**
- Enlever la base et le tamis du filtre.
- Enlever le cadran à pression et remiser au chaud (ne supporte pas le gel).
- S'assurer qu'il ne reste plus de liquide dans les filtres.
- Relâcher la tension sur les ressorts des déclencheurs à cames.
- Remplir la pompe à rouleaux avec de l'huile afin d'éviter la formation de rouille à l'intérieur.
- Avant de mettre à nouveau le pulvérisateur en marche, bien vider et laver le réservoir, les boyaux et la pompe.

9. entretien

- Inspecter visuellement tous les boulons régulièrement et resserrer au besoin.
- Nettoyer le filtre principal à tous les remplissages.
- Vérifier s'il y a des fuites et resserrer les colliers de serrage au besoin.
- Lubrifier tous les points de graissages régulièrement et au début et à la fin de la saison.
- Vidanger l'huile de la pompe à intervalles prescrits ou 1 fois par année.

- b) Start the tractor, operate the pump at low speed and make the agitation worked.
- c) Pour chemical products conform to the manufacturer recommendations and to the security instructions.
- d) Fill-up the tank and agitate for a few minutes.
- e) Never operate the pump without water.

2. Products application

- Open the boom at its full width and place all the pins on the boom to avoid bouncing.
- Take-off the pins of the self-levelling boom so that the boom swings (30 to 50 ft manual).

NOTE 1 :

See "Control" section to specified operation of your sprayer control.

NOTE 2 :

The warranty does not cover boom damages if you operate your sprayer with the self-levelling boom in lock position (pin in place).

8. storage

- Rinse the boom, the tubes, the hoses and the pump and drain the tank.
- Operate the system by sucking a prestone (anti-freeze) solution through the hoses and the pump. **(Do not use windshield washer).**
- Take-off base and filter screen.
- Take off pressure gage and put it in a warm place. (it does not support the freezing)
- Release tension on the release cam springs.
- Make sure that any liquid is left into the filter.
- Fill-up roller pump with oil to avoid the rust formation inside.
- Before starting the sprayer again, be sure that the tank, hoses and pump are well emptied and washed.

9. maintenance

- Visually inspect every bolts and tighten up if necessary.
- Clean the main filter at every filling.
- Check for leakage and tight collars if necessary.
- Regularly lubricate every greasable spots at the beginning and at the end of the season.
- Change pump oil at specified intervals or once a year, before the season.

• **Pompe centrifuge :**

Enlever le bouchon de vidange du carter du multiplicateur, lorsque bien drainé remettre le bouchon et verser 6 onces d'huile "Gear Lube" SAE80W90. À faire une fois l'an.

• **Pompe à rouleaux :**

Remplir la pompe à rouleaux avec de l'huile pour tout arrêt prolongé (3 jours ou plus). L'huile empêchera la formation de rouille à l'intérieur de la pompe et cela évitera le bris des rouleaux.

• **Pompe à membranes :**

Remplacer l'huile à toutes les 400 heures d'opération ou si vous remarquez une présence d'eau dans l'huile (couleur blanchâtre)

Utiliser une huile de grade SAE30 non détergente.

• **Arbre de P.D.F. :**

Mode d'emploi pour transmission à cardan

Lire attentivement avant l'utilisation

S'adresser au revendeur ou directement à COMER S.p.a. pour n'importe quelle intervention de démontage et de réparation des pièces en acier de la transmission à cardan (tubes, roulements, joints, etc.).

Le démontage pour réparation et le montage peuvent abîmer certaines pièces s'ils ne sont pas effectués correctement et avec les outils adéquats disponibles auprès des ateliers du revendeur ou de COMER S.p.a.

La transmission à cardan utilisée pour la transmission de puissance entre la machine automotrice (ou la tractrice) et la machine actionnée, ne doit pas être employée :

- sans les protecteurs fournis par COMER S.p.a.
- avec des protecteurs partiels
- avec des protecteurs abîmés
- sans les petites chaînes spéciales antirotation correctement accrochées, de façon à permettre l'angle maximum à la transmission sans comprimer le protecteur.

• **Centrifugal :**

Take-off the plug at the bottom and put back in place it when the oil is completely drain, pour 6 ounces gear lubrication SAE80W90 oil. Never pour more than 6 ounces. To be done once a year.

• **Roller pump :**

Fill the roller pump with oil every prolonged stop-ping. (3 days or more). The oil will prevent the rust formation inside the pump and will avoid scratched rollers.

• **Diaphragm pump :**

Replace oil every 400 hours of operation or if you detect water in crankcase (oil will be white).

Use only non-detergent oil SAE30.

• **P.T.O. shaft :**

Regulations for using the P.T.O. shaft

Please read carefully before use

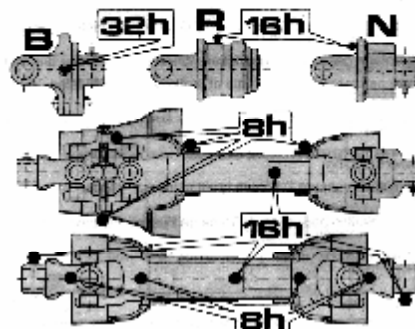
For any cardan shaft steel parts (tubes, bearings, joints, etc.), disassembly or repair operations, contact your dealer or COMER S.p.a. directly.

Removal for repairs and reassembly may damage some parts if not carried out correctly using special tools available in the dealer's workshop or at COMER S.p.a.

The P.T.O. shaft used for power transmission between the self-propelled machine (or tractor) and the machine driven must not be used:

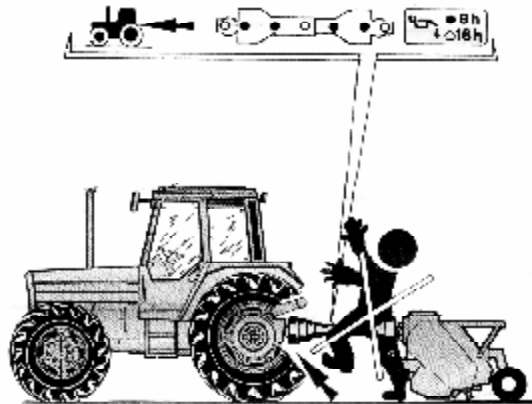
- without the guards supplied by COMER S.p.a.
- with partial protection
- with damaged guards
- without the special anti-rotation chains correctly hooked, so as to permit the attached maximum angle of the P.T.O. shaft without compressing the guard.

machine, including the P.T.O. shaft that is an integral part, according to the "Machinery Directive".



Arrêter le moteur du tracteur avant de graisser, aux endroits et aux intervalles indiqués, avec le cardan rec-tiligne.

Switch off the tractor's engine before, grease at the points and with the intervals indicated.



MÉTHODE DE CALIBRATION MS

Pulvérisateur de type à rampe

1. Établir les données recherchées

- Taux recommandé : gal/acre, L/ha
EX : 200 L/ha
- Pression de travail désirée
EX : 16 à 30 lb/po² (1 à 2 bars)
- Vitesse d'avancement désirée
EX : 8,34 km/h

La charte de buses nous indique quelle buse choisir.
Résultat théorique calculé :
Buse XR11005VK, 200 L/ha, 1.5 bars, 8,34 km/h.

2. Vérification de la vitesse d'avancement du tracteur

- Marquer une distance de 40 mètres (pour les km/h) ou 102 pi (pour les mi/h) avec des jalons, dans le champ à traiter, avec un réservoir à demi-plein.
- Partir à environ 10 pi de la borne.
- Chronométrer le temps entre 2 bornes.
- À l'aide du tableau ci-dessous, déterminer votre vitesse réel d'avancement (recommencer, si nécessaire, pour avoir la vitesse requise) ou utiliser toute autre distance précise avec la formule suivante :

- Vitesse en mi/h = $\frac{\text{distance (pi)} \times 60}{\text{Temps (sec)} \times 88}$
- Vitesse en km/h = $\frac{\text{distance (m)} \times 3.6}{\text{Temps (sec)}}$

DISTANCE = 40 M

Vitesse km/h	4	4.5	5	5.5	6	7	8	9	10	12
Temps secondes	36	32	29	26	24	20.6	18	16	14.4	12

DISTANCE = 102 PI

Vitesse mi/h	3	3.5	4	4.5	5	5.5	6	7	8
Temps secondes	23.2	20	17.4	15.5	13.9	12.6	11.6	10	8.7

Formules pratiques de calibration

Gal U.S./min (par buse) =	$\frac{\text{Gal U.S./acre} \times \text{mi/h} \times W}{5940}$
Gal U.S./acre =	$\frac{5940 \times \text{Gal U.S./min (par buse)} \times W}{\text{mi/h} \times W}$
<i>W (20 po) = écartement des jets en pouces</i>	
L/min (par buse) =	$\frac{\text{L/ha} \times \text{km/h} \times W}{60,000}$
L/ha =	$\frac{60,000 \times \text{L/min (par buse)} \times W}{\text{km/h} \times W}$
<i>W (50.8 cm) = écartement des jets en cm</i>	

3. Ajustement de la pression requise

- Cueillir le produit s'écoulant d'une buse pendant le temps chronométré, dans un récipient calibré à cet effet. Utiliser les mesures de temps de la section "40 m" du tableau pour obtenir des données métriques (L/ha) ou celles de la section "102 pi" pour obtenir les données en gal/acre.
EX : 400 ml ou 10.5 onces

- Lecture directe des résultats

$L/ha = \frac{\text{ml recueillis}}{2}$ **EX** : $\frac{400 \text{ ml}}{2} = 200 \text{ L/ha}$

Gal US/acre = onces recueillies x 2

EX : 10.5 onces x 2 = 21 gal US/acre

Recommencer la cueillette à différentes pressions jusqu'à l'obtention du taux désiré.

NOTE :

Cette formule est basée sur un espacement de 20 po entre les jets pour autre espacement :

taux réel = taux obtenu x $\frac{20}{\text{espace entre jet (en po)}}$

4. Vérification des buses

- Vérifier le débit de différentes buses pendant la même période de temps.
- Si le débit des buses varie de plus ou moins 10%, changer les buses (si le nettoyage des filtres n'a pas été suffisant).

Facteurs de conversion divers

1 acre43,560 pi ² 0.405 ha	1 gal128 oz liquide 8 pintes 4 quarts 3,79 litres 0.83 gal imp.
1 ha2.471 acres	
1 gal/acre . .9,35 L/ha	
1 mile5,280 pi 1 610 mètres 1,61 km	1 lb/po² . . .0.069 bar 6,896 kPa
	1 mi/h1,609 km/h

MS CALIBRATION METHOD
Boom type sprayer

1. Set-up of the researching facts

- Recommended rate : GPA, L/ha
EX : 20 GPA
- Desired working pressure
EX : 16 to 30 PSI (1 to 2 bars)
- Desired forward speed
EX : 5.2 MPH

The nozzle table indicates the right nozzle for your application :
Theoric calculated result :
XR11005VK nozzle, 20 GPA, 20 PSI, 5.2 MPH.

2. Verification of the tractor forward speed

- Measure a 40 meter distance (for KPH) or 102 ft (for MPH), place land mark posts in the field to be treated ; fill your tank half full.
- Start 10 ft before first post.
- Measure time needed to reach the second post.
- With the following speed table, find your real speed (repeat if necessary, to have the required speed) :
 - Speed MPH = $\frac{\text{distance (ft)} \times 60}{\text{Time (sec)} \times 88}$
 - Speed KPH = $\frac{\text{distance (m)} \times 3.6}{\text{Time (sec)}}$

DISTANCE = 40 M

Speed KPH	4	4.5	5	5.5	6	7	8	9	10	12
Time seconds	36	32	29	26	24	20.6	18	16	14.4	12

DISTANCE = 102 FT

Speed MPH	3	3.5	4	4.5	5	5.5	6	7	8
Time seconds	23.2	20	17.4	15.5	13.9	12.6	11.6	10	8.7

Useful calibration formulas

U.S. GPM (par nozzle) =	$\frac{\text{U.S. GPA} \times \text{MPH} \times \text{W}}{5940}$
U.S. GPA =	$\frac{5940 \times \text{U.S. GPM (per nozzle)}}{\text{MPH} \times \text{W}}$ <i>W (20 in) = nozzle spacing (inches)</i>
L/min (per nozzle) =	$\frac{\text{L/ha} \times \text{KPH} \times \text{W}}{60,000}$
L/ha =	$\frac{60,000 \times \text{L/min (per nozzle)}}{\text{KPH} \times \text{W}}$ <i>W (50.8 cm) = nozzle spacing (cm)</i>

3. Required pressure adjustment

- Collect the product from one nozzle during the time lap measured above, in a calibration jar for that use. Use the time datas from the “40 meters” section of the table to obtain metric units (L/ha) or time datas from the “102 ft” section to obtain GPA units.
EX : 400 ml or 10.5 ounces
- Results analyse :

L/ha = $\frac{\text{ml collected}}{2}$ **EX** : $\frac{400 \text{ ml}}{2} = 200 \text{ L/ha}$

US Gal/acre = ounces collected x 2
EX : 10.5 ounces x 2 = 21 US GPA

Repeat test at different pressure rates until you obtain the desired rate.

NOTE :

This formula is based on a 20 in nozzle spacing. For other spacing :

Real rate = above rate x $\frac{20}{\text{nozzle spacing (inches)}}$

4. Nozzle verification

- Verify flow rate from different tips during the same time period.
- If flow rate varies (about 10%), change tips.

Miscellaneous conversion factors

1 acre43,560 sq. ft	1 gal128 fluid oz
0.405 ha	8 pints
1 ha2.471 acres	4 quarts
1 gal/acre . .9,35 L/ha	3,79 liters
1 mile5,280 ft	0.83 imp. gal
1 610 meters	1 PSI0.069 bar
1,61 km	6,896 kPa
	1 MPH1,609 KPH

Buses à jet plat, large XR Extended range flat spray tips

Typical applications :

EXCELLENT: Pre-Emerge Surface Applied Herbicides-At medium pressures (20-30psi) produces medium size droplets for good surface coverage in applications such as minimum tillage.

EXCELLENT: Post-Emerge Systemic Herbicides-at lower pressures (15-20 psi) helps to control drift.

GOOD: Post-Emerge Contact Herbicides-At higher pressures (30-60 psi) produces smaller droplets for better coverage. Wide angle 110° tips produce smaller droplets than 80° tip at equal pressures.

Pre-Plant Incorporated Herbicides-At lower pressures (15-20 psi) produces larger spray droplets and reduces drift.

Features :

- Excellent spray distribution over a wide range of pressures (15-60 psi).
- Ideal for rigs equipped with sprayer controllers.
- Reduces drift at lower pressures, better coverage at higher pressures.

HOW TO ORDER

EXAMPLES

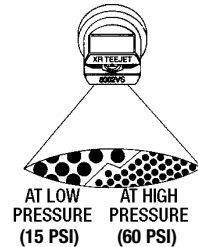
JB-XR8004VS (S.S. w/VisiFlo color-coding)

JB-XR8004VH (H.S.S. w/VisiFlo color-coding)

JB-XR11004VP (Polymer w/VisiFlo color-coding)

JB-XR11004VK (Ceramic w/VisiFlo color-coding)

JB-XR8010SS (S.S.)



TIP COLOR	TIP NO.		Liquid Pressure PSI	Capacity 1 Nozzle GPM	Capacity 1 Nozzle OZ/MIN	GALLONS PER ACRE (20' Spacing)				Liquid Pressure Bar	L/min	L/Ha (50 cm Spacing)					
	80° Series	110° Series				5 MPH	6 MPH	7 MPH	8 MPH			4 KPH	5 KPH	6 KPH	7 KPH	8 KPH	10 KPH
ORANGE	JB-XR8001 (100 mesh)	JB-XR11001 (100 mesh)	15	.06	8	3.6	3.0	2.5	2.2	1.0	0.23	69.0	55.2	46.0	39.4	34.5	27.6
			20	.07	9	4.2	3.5	3.0	2.6	1.5	0.28	84.0	67.2	56.0	48.0	42.0	33.6
			30	.09	12	5.3	4.5	3.8	3.3	2.0	0.32	96.0	76.8	64.0	54.9	48.0	38.4
			40	.10	13	5.9	5.0	4.2	3.7	3.0	0.39	117	93.6	78.0	66.9	58.5	46.8
			60	.12	15	7.1	5.9	5.1	4.5	4.0	0.45	135	108	90.0	77.1	67.5	54.0
GREEN	JB-XR80015 (100 mesh)	JB-XR110015 (100 mesh)	15	.09	12	5.3	4.5	3.8	3.3	1.0	0.34	102	81.6	68.0	58.3	51.0	40.8
			20	.11	14	6.5	5.4	4.7	4.1	1.5	0.42	126	101	84.0	72.0	63.0	50.4
			30	.13	17	7.7	6.4	5.5	4.8	2.0	0.48	144	115	96.0	82.3	72.0	57.6
			40	.15	19	8.9	7.4	6.4	5.6	3.0	0.59	177	142	118	101	88.5	70.8
			60	.18	23	10.7	8.9	7.6	6.7	4.0	0.68	204	163	136	117	102	81.6
YELLOW	JB-XR8002 (50 mesh)	JB-XR11002 (50 mesh)	15	.12	15	7.1	5.9	5.1	4.5	1.0	0.46	138	110	92.0	78.9	69.0	55.2
			20	.14	18	8.3	6.9	5.9	5.2	1.5	0.56	168	134	112	96.0	84.0	67.2
			30	.17	22	10.1	8.4	7.2	6.3	2.0	0.65	195	156	130	111	97.5	78.0
			40	.20	26	11.9	9.9	8.5	7.4	3.0	0.79	237	190	158	135	119	94.8
			60	.24	31	14.3	11.9	10.2	8.9	4.0	0.91	273	218	182	156	137	109
BLUE	JB-XR8003 (50 mesh)	JB-XR11003 (50 mesh)	15	.18	23	10.7	8.9	7.6	6.7	1.0	0.68	204	163	136	117	102	81.6
			20	.21	27	12.5	10.4	8.9	7.8	1.5	0.83	249	199	166	142	125	100
			30	.26	33	15.4	12.9	11.0	9.7	2.0	0.96	288	230	192	165	144	115
			40	.30	38	17.8	14.9	12.7	11.1	3.0	1.18	354	283	236	202	177	142
			60	.37	47	22	18.3	15.7	13.7	4.0	1.36	408	326	272	233	204	163
RED	JB-XR8004 (50 mesh)	JB-XR11004 (50 mesh)	15	.24	31	14.3	11.9	10.2	8.9	1.0	0.91	273	218	182	156	137	109
			20	.28	36	16.6	13.9	11.9	10.4	1.5	1.12	336	269	224	192	168	134
			30	.35	45	21	17.3	14.9	13.0	2.0	1.29	387	310	258	221	194	155
			40	.40	51	24	19.8	17.0	14.9	3.0	1.58	474	379	316	271	237	190
			60	.49	63	29	24	21	18.2	4.0	1.82	546	437	364	312	273	218
BROWN	JB-XR8005 (50 mesh)	JB-XR11005 (50 mesh)	15	.31	40	18.4	15.3	13.2	11.5	1.0	1.14	342	274	228	195	171	137
			20	.35	45	21	17.3	14.9	13.0	1.5	1.39	417	334	278	238	209	167
			30	.43	55	26	21	18.2	16.0	2.0	1.61	483	386	322	276	242	193
			40	.50	64	30	25	21	18.6	3.0	1.97	591	473	394	338	296	236
			60	.61	78	36	30	26	23	4.0	2.27	681	545	454	389	341	272
GRAY	JB-XR8006 (50 mesh)	JB-XR11006 (50 mesh)	15	.37	47	22	18.3	15.7	13.7	1.0	1.37	411	329	274	235	206	164
			20	.42	54	25	21	17.8	15.6	1.5	1.68	504	403	336	288	252	202
			30	.52	67	31	26	22	19.3	2.0	1.94	582	466	388	333	291	233
			40	.60	77	36	30	25	22	3.0	2.37	711	569	474	406	356	284
			60	.73	93	43	36	31	27	4.0	2.74	822	658	548	470	411	329
WHITE	JB-XR8008 (50 mesh)	JB-XR11008 (50 mesh)	15	.49	63	29	24	21	18.2	1.0	1.82	546	437	364	312	273	218
			20	.57	73	34	28	24	21	1.5	2.23	669	535	446	382	335	268
			30	.69	88	41	34	29	26	2.0	2.58	774	619	516	442	387	310
			40	.80	102	48	40	34	30	3.0	3.16	948	758	632	542	474	379
			60	.98	125	58	49	42	36	4.0	3.65	1095	876	730	626	548	438
	JB-XR8010SS	JB-XR11010SS	15	.61	78	36	30	26	23	1.0	2.28	684	547	456	391	342	274
			20	.71	91	42	35	30	26	1.5	2.79	837	670	558	478	419	335
			30	.87	111	52	43	37	32	2.0	3.23	969	775	646	554	485	388
			40	1.00	128	59	50	42	37	3.0	3.95	1185	948	790	677	593	474
			60	1.22	156	72	60	52	45	4.0	4.56	1368	1094	912	782	684	547
	JB-XR8015SS	JB-XR11015SS	15	.92	118	55	46	39	34	1.0	3.42	1026	821	684	586	513	410
			20	1.06	136	63	52	45	39	1.5	4.19	1257	1006	838	718	629	503
			30	1.30	166	77	64	55	48	2.0	4.83	1449	1159	966	828	725	580
			40	1.50	192	89	74	64	56	3.0	5.92	1776	1421	1184	1015	888	710
			60	1.84	236	109	91	78	68	4.0	6.84	2052	1642	1368	1173	1026	821

Buse à jet conique avec pastille et divergent / Disc-core type cone spray tips

Orifice DISC NO.	CORE NO.	ORIFICE DIAM.	CAPACITY												SPRAY ANGLE		
			GPM (gallons per minute) at PSI (pounds per square inch)												20	40	80
			10 PSI	20 PSI	30 PSI	40 PSI	60 PSI	80 PSI	100 PSI	150 PSI	200 PSI	300 PSI	20 PSI	40 PSI	80 PSI		
D1	13	.031"	—	—	.059	.066	.078	.088	.097	.115	.128	.152	—	51°	62°		
D1.5	13	.036"	—	.057	.067	.075	.088	.098	.110	.127	.142	.167	38°	55°	66°		
D2	13	.041"	—	.064	.075	.08	.10	.11	.12	.14	.16	.18	49°	67°	72°		
D3	13	.047"	—	.071	.08	.09	.11	.12	.13	.16	.18	.20	53°	70°	75°		
D4	13	.063"	.070	.09	.11	.12	.14	.16	.17	.20	.23	.27	69°	79°	83°		
D1	23	.031"	—	—	.064	.072	.080	.096	.107	.124	.139	.164	—	47°	58°		
D1.5	23	.036"	—	.064	.076	.086	.103	.117	.130	.155	.175	.210	34°	51°	62°		
D2	23	.041"	—	.078	.092	.10	.13	.14	.16	.19	.21	.25	51°	63°	70°		
D3	23	.047"	.065	.087	.10	.12	.14	.16	.18	.21	.24	.28	58°	69°	75°		
D4	23	.063"	.082	.113	.14	.15	.19	.21	.23	.28	.32	.38	68°	82°	87°		
D5	23	.078"	.095	.13	.16	.18	.22	.25	.28	.34	.38	.46	79°	89°	94°		
D6	23	.094"	.112	.15	.19	.21	.26	.29	.32	.39	.45	.54	84°	93°	98°		
D1	25	.031"	—	—	.088	.101	.122	.138	.156	.185	.210	.255	—	27°	43°		
D1.5	25	.036"	—	.118	.135	.162	.185	.205	.245	.280	.33	—	38°	49°			
D2	25	.041"	—	.12	.14	.16	.19	.22	.25	.29	.34	.41	39°	51°	58°		
D3	25	.047"	.10	.14	.17	.19	.23	.26	.29	.35	.40	.48	52°	61°	67°		
D4	25	.063"	.15	.21	.25	.29	.35	.40	.45	.54	.62	.75	67°	74°	80°		
D5	25	.078"	.18	.25	.30	.35	.42	.48	.54	.65	.75	.90	73°	79°	84°		
D6	25	.094"	.23	.32	.39	.44	.54	.62	.70	.85	.97	1.19	79°	85°	89°		
D7	25	.109"	.26	.37	.45	.52	.63	.73	.81	.98	1.18	1.37	85°	91°	93°		
D8	25	.125"	.31	.43	.53	.61	.75	.89	.97	1.19	1.36	1.68	91°	96°	97°		
D10	25	.156"	.38	.54	.65	.76	.93	1.07	1.21	1.48	1.71	2.1	97°	102°	103°		
D12	25	.188"	.46	.61	.80	.93	1.15	1.32	1.47	1.81	2.09	2.55	103°	109°	112°		
D14	25	.219"	.51	.72	.88	1.03	1.26	1.47	1.65	2.02	2.34	2.89	108°	113°	114°		
D1	45	.031"	—	—	—	.125	.148	.170	.190	.225	.257	.310	—	22°	34°		
D1.5	45	.036"	—	—	.14	.16	.20	.23	.25	.31	.35	.43	—	33°	44°		
D2	45	.041"	—	.14	.18	.20	.25	.28	.32	.38	.44	.53	32°	46°	55°		
D3	45	.047"	—	.17	.20	.23	.28	.33	.36	.44	.51	.62	40°	53°	60°		
D4	45	.063"	.18	.25	.31	.36	.43	.50	.56	.68	.78	.95	62°	69°	72°		
D5	45	.078"	.23	.32	.39	.45	.55	.64	.71	.86	.99	1.22	67°	73°	76°		
D6	45	.094"	.29	.41	.50	.58	.72	.83	.93	1.15	1.33	1.64	73°	79°	81°		
D7	45	.109"	.33	.48	.59	.68	.84	.97	1.11	1.35	1.57	1.94	81°	86°	87°		
D8	45	.125"	.41	.59	.72	.84	1.04	1.21	1.35	1.68	1.94	2.40	86°	90°	90°		
D10	45	.156"	.54	.77	.94	1.10	1.35	1.57	1.77	2.18	2.50	3.10	90°	93°	93°		
D12	45	.188"	.67	.95	1.17	1.36	1.68	1.95	2.20	2.69	3.11	3.80	97°	100°	102°		
D14	45	.218"	.75	1.07	1.32	1.53	1.89	2.19	2.45	3.00	3.49	4.30	101°	104°	105°		
D16	45	.250"	.86	1.25	1.54	1.79	2.20	2.57	2.89	3.54	4.11	5.20	108°	111°	112°		
D1	46	.031"	—	—	—	.145	.178	.205	.23	.28	.32	.39	—	13°	15°		
D1.5	46	.036"	—	—	—	.213	.260	.300	.33	.41	.46	.56	—	15°	17°		
D2	46	.041"	—	—	.24	.27	.33	.37	.42	.50	.57	.68	—	18°	21°		
D3	46	.047"	—	.23	.28	.32	.39	.45	.51	.61	.70	.86	14°	20°	24°		
D4	46	.063"	.28	.39	.48	.56	.68	.78	.88	1.07	1.23	1.52	23°	29°	33°		
D5	46	.078"	.38	.54	.66	.77	.94	1.10	1.25	.50	1.73	2.13	33°	39°	42°		
D6	46	.094"	.55	.78	.95	1.10	1.35	1.58	1.73	2.16	2.50	3.06	42°	48°	50°		
D7	46	.109"	—	.98	1.22	1.39	1.72	1.97	2.22	2.73	3.15	3.85	48°	53°	56°		
D8	46	.125"	—	—	1.59	1.84	2.25	2.62	2.93	3.60	4.17	5.05	—	60°	62°		
D10	46	.156"	—	—	2.15	2.48	3.05	3.53	3.96	4.83	5.59	6.8	—	66°	68°		

COMMENT COMMANDER / HOW TO ORDER

EXEMPLES / EXAMPLES

- Orifice discs
- JB-D2 (H.S.S.)
- JB-DE2 (S.S.)
- JB-DCER2 (Ceramic)
- JB-DVP2 (Polymere)

Cores

- JB-DC23NY (Nylon)
- JB-DC23BR (Brass)
- JB-DC23HSS (H.S.S.)
- JB-DC25CER (Ceramic)

problèmes courants des pulvérisateurs et solutions

problème	cause	solution
L'appareil perd sa pression ou ne développe aucune pression	<ol style="list-style-type: none"> 1. Le filtre de la conduite d'aspiration est obstrué. 2. Le régulateur de pression est mal réglé ou coincé 3. Les buses sont trop grosses 4. Le piston ou le siège du régulateur de pression est usé, ou bien le ressort est brisé 5. La conduite d'aspiration est bloquée 6. La vitesse de la pompe est trop basse <ol style="list-style-type: none"> a) Pompe à rouleaux usée b) Pompe centrifuge non amorcée 7. Soupape de sélection endommagée 8. La valve d'ajustement est ouverte 	<ol style="list-style-type: none"> 1. Bien nettoyer le filtre 2. Faire marcher la pompe et tourner complètement la vis du régulateur de pression. Cela permet de rincer le régulateur, puis de le réajuster. 3. Vérifier la capacité des buses en consultant les tableaux, pour s'assurer que leur capacité totale n'est pas supérieure à la capacité de la pompe. 4. Démonter le régulateur et examiner ses pièces. 5. Examiner la conduite d'aspiration pour s'assurer qu'il n'y a pas d'obstructions et que le boyau n'est pas écrasé. 6. Vérifier la rotation (r/min) de la pompe. <ol style="list-style-type: none"> a) Démonter la pompe pour vérifier l'usure des rouleaux (rainures), du rotor et du corps de la pompe (dépôt de rouille). b) Voir si la pompe est noyée (sous le niveau de l'eau dans le réservoir). 7. Enlever la plaque frontale et vérifier l'état des clapets. 8. <ol style="list-style-type: none"> a) Appuyer sur «inc» ou «+» pour augmenter la pression. b) Vérifier le courant à l'entrée de la valve d'ajustement.
Pression excessive	<ol style="list-style-type: none"> 1. Le régulateur de pression est mal réglé ou coincé en position fermée 2. La conduite de dérivation est bloquée ou mal raccordée 3. Agitation obstruée 4. Pompe centrifuge à trop fort débit 5. La valve d'ajustement est fermée 	<ol style="list-style-type: none"> 1. Ajuster le régulateur et le démonter au besoin. 2. S'assurer que la conduite de dérivation retourne au réservoir. Voir s'il n'y aurait pas d'obstructions. 3. Vérifier trous sur tube ou sur Venturi. 4. <ol style="list-style-type: none"> a) Diminuer le r/min du P.D.F. b) Fermer la valve d'étranglement à la sortie de la pompe. 5. <ol style="list-style-type: none"> a) Appuyer sur «dec» ou «-» pour diminuer la pression. b) Vérifier le courant à l'entrée de la valve d'ajustement.
L'aiguille du manomètre saute	<ol style="list-style-type: none"> 1. Infiltration d'air dans le système 2. Valve de pompe coincée ou détériorée 3. Turbulence dans le réservoir 4. Pression d'air dans l'accumulateur est basse 	<ol style="list-style-type: none"> 1. Bien examiner la conduite d'aspiration et les raccords. Il arrive souvent qu'un mauvais réglage du bol du filtre soit la cause de l'infiltration d'air. 2. Vérifier l'état des valves, ressort brisé, rainures et picotements. Vérifier corps étrangers obstruant le fonctionnement des valves. 3. Réorienter le jet de l'agitation. 4. Vérifier diaphragme et remettre air (30-35 lb/po²)
Buses bouchées	<ol style="list-style-type: none"> 1. Les tamis des gicleurs et des filtres ont des trous trop grands 2. Les gicleurs sont trop petits 	<ol style="list-style-type: none"> 1. Les remplacer par des tamis à trous appropriés. 2. Les remplacer par des buses ou gicleurs appropriés pour l'agent chimique utilisé.
La pompe coule	<ol style="list-style-type: none"> 1. Diaphragme brisé 2. Fuite aux joints d'étanchéité 3. Bouchon de vidange mal serré (pompe centrifuge) 	<ol style="list-style-type: none"> 1. Remplacer les diaphragmes. 2. Les sceller avec un bon composé d'étanchéité ou les remplacer. 3. Bien serrer le bouchon de vidange sur le corps de la pompe.
Huile de pompe contaminée ou blanchâtre	<ol style="list-style-type: none"> 1. Diaphragme perforé 	<ol style="list-style-type: none"> 1. Remplacer le diaphragme et changer l'huile
Distribution inégale d'un jet à l'autre	<ol style="list-style-type: none"> 1. Boyau aplati 2. Jet usé 3. Filtres bouchés 	<ol style="list-style-type: none"> 1. Remplacer le boyau. 2. Changer le jet. 3. Nettoyer le filtre.
Distribution inégale d'une section à l'autre	<ol style="list-style-type: none"> 1. Valve n'ouvre pas pleine grandeur 2. Boyau d'alimentation aplati 3. Filtres de ligne bouchés 	<ol style="list-style-type: none"> 1. Remplacer ou ajuster la valve. 2. Remplacer le boyau. 3. Nettoyer les filtres.

trouble shooting

problem	cause	remedy
The machine loses pressure or have no pressure	<ol style="list-style-type: none"> 1. The suction filter is blocked 2. Pressure regulator is not well settled or blocked 3. Nozzles are too big 4. Pistons or seat regulator are worn out or the spring is broken 5. Suction line is blocked 6. Pump speed is too low. <ol style="list-style-type: none"> a) Roller pump is worn out b) Centrifugal pump is not primed 7. The selection valve is damaged 8. Adjustment valve is open 	<ol style="list-style-type: none"> 1. Clean the filter. 2. Operate the pump and completely turn the pressure regulator screw. It permits to rinse the regulator and then to readjust it. 3. Check nozzles capacity by consulting tables, be sure than the total capacity does not exceed the pump capacity. 4. Disassemble the regulator and examine its parts. 5. Check the suction hose to be sure there is no obstruction or that the hose is not crushed. 6. Check pump RPM. <ol style="list-style-type: none"> a) Disassemble the pump to check rollers, rotor and pump body condition (rust deposit) b) Check if the pump is flooded (under water level in the tank). 7. Take out the head-on plate and check seat condition. 8. <ol style="list-style-type: none"> a) Press on “inc” or “+” to increase the pressure. b) Check the input current of the adjustment valve.
Excessive pressure	<ol style="list-style-type: none"> 1. Pressure regulator is not settled or blocked in close position 2. Free return lines are blocked or not well connected 3. Blocked agitation 4. Centrifugal pump has surplus water 5. Adjustment valve is close 	<ol style="list-style-type: none"> 1. Adjust the regulator and disassemble it if necessary. 2. Be sure that the return lines are going back to the tank. See if there is any obstruction. 3. Check holes on tube or on Venturi. 4. <ol style="list-style-type: none"> a) Decrease the RPM of the PTO b) Close the choke valve at the exit of the pump. 5. <ol style="list-style-type: none"> a) Press on “dec” or “-” to reduce the pressure. b) Check the input current of the adjustment valve.
Gauge needle swings	<ol style="list-style-type: none"> 1. Air infiltration in the system 2. Pump valve is blocked or deteriorated 3. Turbulence in the tank 4. Air pressure in the dampener is low 	<ol style="list-style-type: none"> 1. Examine the suction hose and fittings. Often it happens that a bad settle of the filter bowl is the cause of the air infiltration. 2. Check valve condition, broken springs, grooves. Check for solid particles blocking valve functions. 3. Redirect the agitation nozzle. 4. Check diaphragm and air pressure (30-35 PSI)
Blocked nozzles	<ol style="list-style-type: none"> 1. Wrong screen size 2. Nozzles are too small 	<ol style="list-style-type: none"> 1. Replace them by screen with appropriate holes. 2. Replace them by the appropriate nozzles or jets for the chemical used.
The pump leaks	<ol style="list-style-type: none"> 1. Broken diaphragms 2. Leaks at sealing joints 3. Drain plug is not well tightened (centrifugal pump) 	<ol style="list-style-type: none"> 1. Replace diaphragms. 2. Seal them with a good sealer or replace them. 3. Tighten plug on pump body.
Pump oil is contaminated or whitish	<ol style="list-style-type: none"> 1. Diaphragm is perforated 	<ol style="list-style-type: none"> 1. Replace diaphragm and change oil.
Uneven distribution nozzle to nozzle	<ol style="list-style-type: none"> 1. Squeezed hose 2. Damaged spray tip 3. Filter is blocked 	<ol style="list-style-type: none"> 1. Replace the hose. 2. Change the nozzle. 3. Clean the filter.
Uneven distribution section to section	<ol style="list-style-type: none"> 1. Squeezed hose 2. Solenoid does not open at course 3. Filter line is blocked 	<ol style="list-style-type: none"> 1. Replace the hose. 2. Replace or adjust the solenoid. 3. Clean the filter.

Contrôle électrique

Le contrôle électrique permet à l'opérateur de contrôler son pulvérisateur de sa cabine de tracteur. Il peut fermer une ou l'autre des sections de rampe ou toutes les sections de rampe en même temps et ajuster la pression.

Procédure d'ajustement

Contrôle électrique, pompe centrifuge

- 1- Mettre de l'eau dans le réservoir, la pompe à 540 r/min, mettre les buses en opération
- 2- Ajuster la valve d'agitation pour avoir 15-20 lb/po² à l'agitateur
- 3- Sur la console, ajuster à la pression d'opération désirée (jets en opération)
- 4*- Ajuster délicatement chaque valve compensatrice* pour avoir une pression constante sur chaque valve électrique de section de rampe en position ouverte ou fermée

* Seulement pour les contrôles avec compensateurs de rampe

NOTE : *Compensateurs de rampe : lorsque vous changez de buses, refaire l'étape n° 4 à 40 lb/po²*

Electric control

Electric control allows the operator to control his sprayer from the tractor's cabin. He can close one or the other boom sections or all of them at the same time and adjust pressure.

Adjustment procedure

Electric control, centrifugal pump

- 1- Fill up the tank with water, run the pump at 540 RPM, have the nozzles spraying
- 2- Adjust the agitation valve at 15-20 PSI
- 3- On the console, adjust the pressure to the desired working pressure (nozzles spraying)
- 4*- Slowly adjust each boom constant pressure valve* to have the same pressure at each boom section, electrovalve opened or closed

* Only on boom constant pressure control

NOTE : *Boom constant pressure control : when you interchange nozzles, repeat step #4 at 40 PSI*

Contrôle électrique

Le contrôle électrique permet à l'opérateur de contrôler son pulvérisateur de sa cabine de tracteur. Il peut fermer une ou l'autre des sections de rampe ou toutes les sections de rampe en même temps et ajuster la pression.

Procédure d'ajustement

Contrôle électrique, pompe à membranes

- 1- Dévisser le régulateur manuel
- 2- Mettre l'eau dans le réservoir, la pompe à 540 r/min
- 3- Ajuster la pression à son maximum sur la console
- 4- Ajuster le régulateur manuel 100 lb/po²
- 5- Mettre les buses en opération, sur la console ajuster la pression de la rampe à la pression désirée (buses en opération)

Electric control

Electric control allows the operator to control his sprayer from the tractor's cabin. He can close one or the other boom sections or all of them at the same time and adjust pressure.

Adjustment procedure

Electric control, diaphragm pump

- 1- Unscrew the manual regulator
- 2- Fill up the tank with water, run the pump at 540 RPM
- 3- On the console, adjust the pressure at its maximum
- 4- Adjust the manual regulator at 100 PSI
- 5- Have the nozzles spraying, on the console adjust the pressure to the desired working pressure (nozzles spraying)

Contrôle électrique

Le contrôle électrique permet à l'opérateur de contrôler son pulvérisateur de sa cabine de tracteur. Il peut fermer une ou l'autre des sections de rampe ou toutes les sections de rampe en même temps et ajuster la pression.

Procédure d'ajustement

Contrôle électrique, pompe à membranes

- 1- Dévisser le régulateur manuel
- 2- Fermer la valve d'agitation
- 3- Mettre l'eau dans le réservoir, la pompe à 540 r/min
- 4- Ajuster la pression à son maximum sur la console
- 5- Ajuster le régulateur manuel 50-75 lb/po² plus haut que la pression d'opération désirée, sans excéder le maximum de 290 lb/po² de ce contrôle
- 6- Mettre les buses en opération, sur la console, ajuster la pression de la rampe à la pression désirée (buses en opération)
- 7- Ajuster la valve d'agitation pour avoir 15-20 lb/po² à l'agitateur et refaire l'étape n° 6

Electric control

Electric control allows the operator to control his sprayer from the tractor's cabin. He can close one or the other boom sections or all of them at the same time and adjust pressure.

Adjustment procedure

Electric control, diaphragm pump

- 1- Unscrew the manual regulator
- 2- Close the agitation valve
- 3- Fill up the tank with water, run the pump at 540 RPM
- 4- On the console, adjust the pressure at its maximum
- 5- Adjust the manual regulator 50-75 PSI above the desired operating pressure, without exceeding 290 PSI maximum pressure control
- 6- Have the nozzle spraying, on the console, adjust the pressure to the desired working pressure (nozzles spraying)
- 7- Adjust the agitation valve at 15-20 PSI and redo step #6

Contrôle électrique

Le contrôle électrique permet à l'opérateur de contrôler son pulvérisateur de sa cabine de tracteur. Il peut fermer une ou l'autre des sections de rampe ou toutes les sections de rampe en même temps et ajuster la pression.

Procédure d'ajustement

Contrôle électrique, pompe à membranes

- 1- Dévisser le régulateur manuel
- 2*- Ouvrir les valves compensatrices* de rampe.
- 3- Fermer la valve d'agitation.
- 4- Mettre l'eau dans le réservoir, la pompe à 540 r/min, mettre les buses en opération.
- 5- Ajuster la pression à son maximum sur la console.
- 6- Ajuster le régulateur manuel 50-75 lb/po² plus haut que la pression désirée, sans excéder le maximum de 290 lb/po² de ce contrôle.
- 7- Sur la console, abaisser la pression de la rampe à la pression désirée (buses en opération).
- 8- Ajuster la valve d'agitation pour avoir 15-20 lb/po² à l'agitateur.
- 9*- Fermer une section de rampe et ajuster délicatement la valve compensatrice* pour avoir une pression constante, une section de rampe à la fois.

* Seulement pour les contrôles avec compensateurs de rampe.

NOTE: Compensateurs de rampe: Lorsque vous changez de buses, refaire l'étape 10 à 40 lb/po².

Electric control

Electric control allows the operator to control his sprayer from the tractor's cabin. He can close one or the other boom sections or all of them at the same time and adjust pressure.

Adjustment procedure

Electric control, diaphragm pump

- 1- Unscrew the manual regulator.
- 2*- Open the boom constant pressure valves*.
- 3- Close the agitation valve.
- 4- Fill up the tank with water, run the pump at 540 RPM, have the nozzles spraying.
- 5- On the console, adjust the pressure at its maximum.
- 6- Adjust the manual regulator 50-75 PSI above the desired operating pressure, without exceeding the control maximum pressure : 290 PSI.
- 7- On the console, lower the pressure to the desired working pressure (nozzles spraying).
- 8- Adjust the agitation valve at 15-20 PSI.
- 9*- Close one boom section and slowly adjust boom constant pressure valve* to have the same pressure, one section at a time.

* Only on boom constant pressure control.

NOTE: Boom constant pressure control : when you interchange nozzles, repeat step no. 10 at 40 PSI.



INSTALLATION INSTRUCTIONS for AG LIGHTS

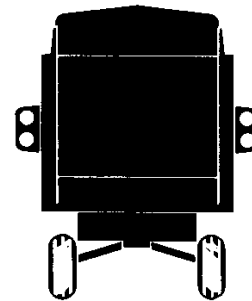
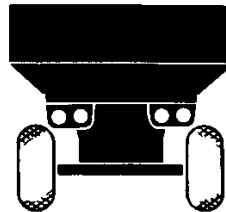
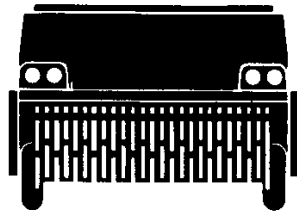
Congratulations on your purchase of the only light(s) designed for the most rigorous field conditions in the Ag industry. Installed correctly, it will provide reliable, durable, and safe lighting under adverse environmental and weather conditions.

The American Society of Agricultural Engineers, ASAE, has established minimum marking recommendations for agricultural field equipment that is towed on or across public highways. These standards include:

1. Implements which obscure the rear tractor lighting; or are more than 13 ft. wide; or extend to the left or right of the tractor center by 79 inches and beyond the left or right extremity of the tractor; or extend more than 33 ft. to the rear of the tractor hitchpoint should have the following lighting to meet minimum safety standards:
 - a. One red tail lamp mounted to the rear of the implement and as far to the left as possible. This must face rearward only.
 - b. Two amber flashing lights, visible from front and rear, and as far to the left and right as possible. These should be mounted to within 16 in. of extremities and within 39 in. to 10 ft. in height.
 - c. Non-symmetrical equipment, such as moldboard plows or windrowers, extending only to the left or right may have one amber flashing light mounted to within 16 in. of the extremity.
2. Implements extending more than 4 ft. to the left of the center of the tractor should have at least one amber reflector visible to the front, located to the extreme left of the implement.
3. Implements extending more than 10 ft. behind the hitch point should have at least two amber reflectors visible from both the left and right sides. Reflectors should be spaced no more than 5 ft. apart, starting from the hitch. The rearmost reflector should be positioned as far to the rear as possible.
4. Implements extending more than 4 ft. to the rear of the hitchpoint or more than 4 ft. to the left or right of the center of the tractor should have at least two red reflectors visible to the rear.

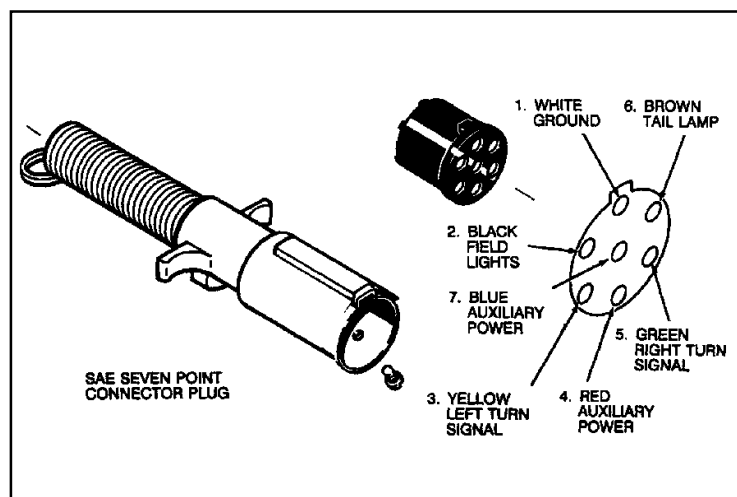
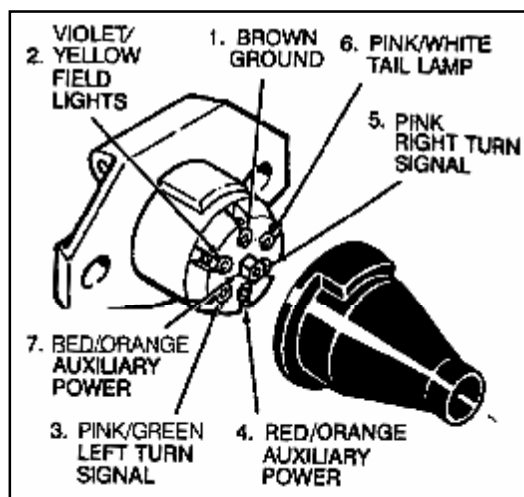
LOCATION

Dual and single lamp units can be mounted in a variety of locations and positions using the following guidelines:



1. Amber must always be mounted either the top or outer-most left or right position. It should be able to be seen from both the front or rear of the implement at all times.
2. Single lamps may be used in place of a dual lamp, if mounting is a problem.
3. If the amber lamp cannot be seen from both front and rear of the implement at the same time, a second lamp is necessary and should be positioned as far forward as possible.
4. Red is to face rearward only.

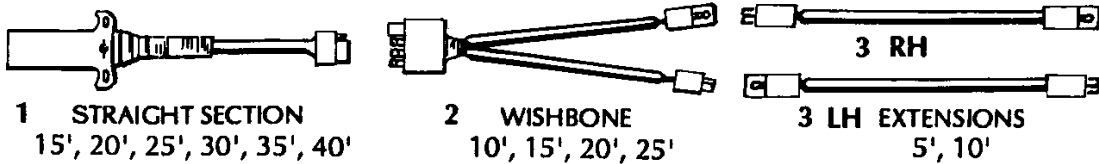
Note: All lamps can be mounted horizontally, vertically, upright or inverted. However, care should be taken to adequately protect the base from excess water buildup when inverting.



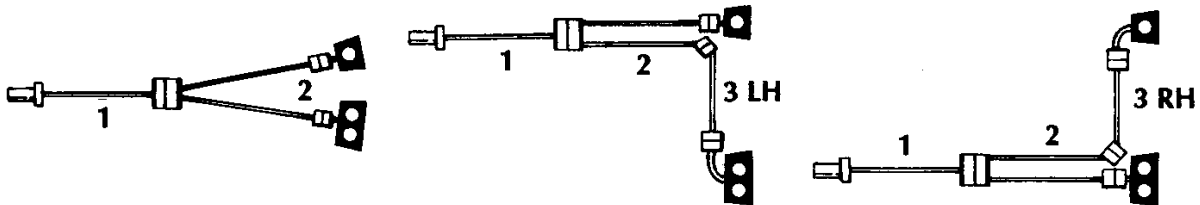
WIRING

Your lamps are provided with molded connectors which plug together for ease of assembly and maintenance.

Wesbar harness components are available in various lengths to permit a variety of wiring configurations..



The diagrams below should be used as a guide for determining the correct harness components for your application.



Note: Approximately 5' of cable should extend beyond hitch point for adequate reach to tractor connector.

For proper protection of wiring all connections should be placed in a shielded position to reduce snagging. Wesbar #2810 cable clamps spaced approximately 36" apart will protect wire from sagging.

CIRCUIT TESTING

Wire Color Code:	Wire Color	7-Pin Connector Terminal #	Circuit
	White	1	Ground
	Yellow	3	LH Turn & Flash
	Green	5	RH Turn & Flash
	Brown	6	Tail Lamps

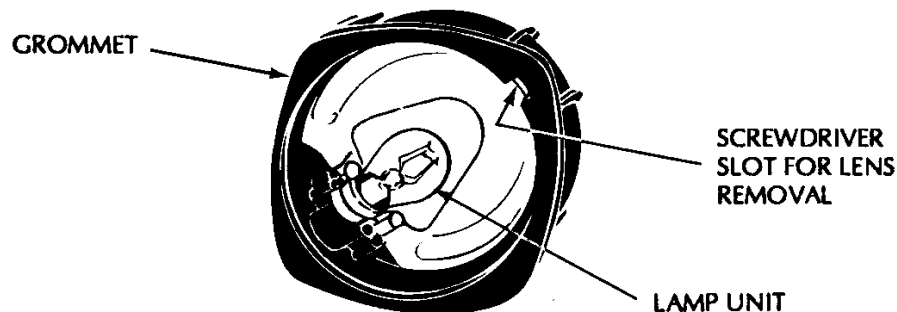
Your tractor should be previously wired for a standard 7-pin connector. If provided from the factory or dealer installed, you need only to plug your implement harness in and check operation with your tractor flashers and signals.

Should your lights not work in unison with tractor lighting, check tractor plug for correct wire code, or consult your dealer for the proper routing of connections.

If your tractor is not equipped with a 7-pin connector, please contact your local dealer for installation to your tractor manufacturer specifications.

REPLACEMENT COMPONENTS

In the event that replacement of bulbs or other components need to be removed, use the following diagram as a reference:



1. Rear of light (facing away from implement) contains #2 phillips screws.
2. If your light is mounted through the outside holes, remove the 2 rear bolts. If installed with bolts from the bottom through the center portion of the light housing, it is necessary to remove the light entirely from mounting brackets.
3. Remove the phillips screws, and pry apart housing.
4. Insert small screwdriver in slot in rubber grommet between lens and grommet. Using a circular motion, lens will lift from grommet.
5. Replace bulb with standard automotive #1157 bulb.
6. Place lens over grommet. Roll rubber away from lens in a circular motion while pushing lens into groove.
7. If grommet was removed from housing, replace by positioning into cavity with wires routed in same manner as they were removed.
8. Replace housing making sure that wires are not pinched and grommet is protruding from housing approximately 1/16" all around its periphery.
9. Reassemble with phillips screws and reattach to mounting bracket.

Wesbar® CORPORATION

P.O. Box 577 • 4201 County Highway P • West Bend, WI 53095
(414) 334-2381 • FAX (414) 677-4737



Installation:

RECEIVER: The GPS receiver may be mounted either externally (roof of the cab or other place with a clear view of the sky) or inside the vehicle cab. However, if mounted inside the cab there may be some loss of accuracy due to blockage of satellite signals. For most reliable operation, mount the GPS receiver in a location where it has an unobstructed view of the sky. The bottom plate on the receiver provides a magnetic mount, or you can use the provided dual-lock Velcro to attach the receiver. If using the dual-lock, thoroughly clean the surface, remove the backing from the dual lock, and press firmly to the surface.

WIRING: Route the 10 foot cable from the receiver into the cab (if receiver is externally mounted). Avoid sharp edges or heat sources. The rectangular module is roughly the same size as the connector and will fit through the same opening.

MODULE: The small potted module includes a power indication light and a GPS status light. The module can be attached in a visible spot using the dual-lock, or if desired may be tucked out of sight.

CONSOLE CONNECTION: Connect the short cable from the Astro to the speed sensor connector on your console. The standard Astro is available with either a 3-pin Packard Metri-Pak shroud connector or a 3-pin Weather-Pak shroud connector to mate to Micro-Trak products. Other connectors and/or adapters are available to connect to other console makes/models.



Calibration:

OUTPUT SIGNAL: The Astro will output a 50% duty cycle square wave proportional to vehicle speed. The standard output is 46.56 Hz/MPH, but the user can select the low frequency option (10.115 Hz/MPH) by cutting the wire loop on the module. The low frequency option should be used with older Micro-Trak Generation I base products or some consoles from other vendors to allow a reasonable maximum speed. See table below.

SPEED CALIBRATION: The table below provides speed calibration numbers and indicates whether or not the wire loop should be cut. If you have questions, please refer to the operator's manual for your console, or call Micro-Trak's Service Department at 1-800-328-9613.

Console Type	Speed Cal		Wire Loop	Connector Type	Part Number Astro II/Astro 5
	English	Metric			
SodPro II, ProPlant, ProSeed, GSC-1000, MT-3405D, MT-NH3 II, SprayMate II, Calc-An-Acre II, FlowTrak II, MT-2405F II, MT-3405F II, RoadMaster	0.189	0.48	Do NOT Cut	3-pin Metri-Pak shroud	01410 / 01425
MT-NH3, SprayMate, MT-403/MT-400, Calc-An-Acre, FlowTrak, MT-2405F, MT-3405F, MT-9000, SodPro, AutoTrol, Speed- O-Meter, MT84 Calc/FlowTrak	0.90	.022	Cut	3-pin Metri-Pak shroud	01410 / 01425
MT-9000	0.90	.022	Cut	3-pin Metri-Pak shroud	01410 / 01425
MT-3000	1.80	.044	Cut	3-pin Weather-Pak shroud	01411 / 01426
Raven 440, 460 etc.*	783	200	Do NOT Cut	3-pin Conxall	01415 / 01430
MT84 Calc/FlowTrak	1.7	.044	Cut	2-pin w/ Adapter	01412 / 01427
Mid-Tech ARC6000	994	1000	Do NOT Cut	4-pin Amp CPC	01413 / 01428
dickey-John Amp	6146	N/A	Do NOT Cut	4-pin Amp CPC	01413 / 01428
Tee-Jet 844	923	923	Do NOT Cut	3-pin Wedge-Lock Recept.	01417 / 01432
Tee-Jet 855	923	923	Do NOT Cut	3-pin Deutch plug	01419 / 01433
Hiniker Computer Facts Acre Commander Spray Commander	13584 27.7 389.4	N/A N/A N/A	Cut	3-pin Cannon	01420/01435

* Set Raven Console for SP2 - Radar Speed Sensor

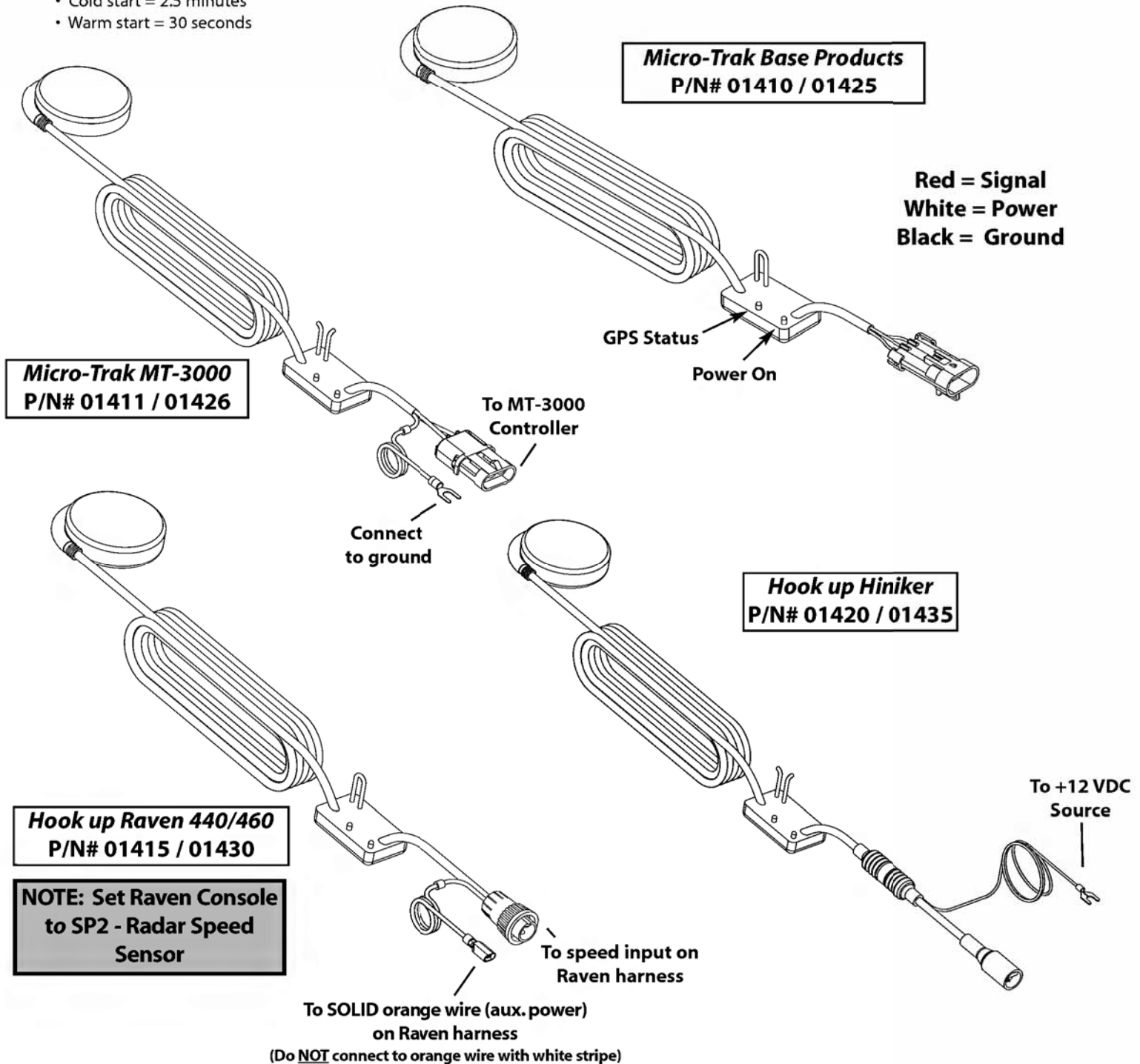
Operation:

Like all GPS receivers, the Astro requires time to acquire the satellites and stabilize before it begins to output a speed signal. The Astro includes two red lights on the interface module, (see illustration) to indicate status of power to the Astro and the status of the GPS receiver:

- Power: turns on when power is applied to the unit
- Valid GPS: blinks when the GPS receiver is working but has not yet acquired a satellite fix. Once a fix has been acquired, it will be on steadily. If the GPS system fails, the light will turn off.

Typical startup times:

- Sky search to acquire almanac = 5 minutes
- Cold start = 2.5 minutes
- Warm start = 30 seconds



INSTALLATION
&
OPERATION
MANUAL



Foam marker

Utilisation

1. Verser dans le réservoir une quantité de 0,24 à 0,3 litres de liquide moussant concentré et ajouter de l'eau propre. Verser l'eau selon des proportions de 1:80 à 1:100 en insérant le boyau jusqu'au fond du réservoir pour assurer un mélange uniforme. Sinon, bien agiter le liquide avec un baton.
2. Serrer fermement le bouchon.
3. Sélectionner le côté à traiter et régler l'espacement des monticules de mousse avec le régulateur **Min.-Max** sur le compresseur.
4. Après une période de non-utilisation de 10-15 jours, agiter le produit qui est resté dans le réservoir pour uniformiser le mélange.

Hivernement et rangement

1. Avant de ranger le marqueur pour un longue période
 - vider entièrement le réservoir et les boyaux
 - détacher les boyaux qui proviennent du compresseur et relier les boyaux blanc et bleu ensemble
2. Faire fonctionner le compresseur pendant quelques minutes pour chaque côté pour vidanger complètement les deux lignes.

Entretien

1. Pour nettoyer le compresseur, dévisser les deux (2) vis et lever le couvercle. Dépoussiérer la surface du moteur électrique et du compresseur en soufflant de l'air comprimé. Le compresseur ne nécessite pas de lubrification.
2. Pour nettoyer les éponges à l'intérieur des descentes, séparer le tube flexible (#32) du diffuseur (#29). Nettoyer l'éponge avec de l'eau pour enlever toute trace de savon.

Use

1. Pour 8 to 10 oz of foam marker into the tank and fill it up with water. Add the water in proportion of 1:80 to 1:100 with a pipe inserted to the bottom so that the product will mix well, otherwise after filling the tank shake carefully.
2. Tightly screw the plug.
3. Select right or left and adjust the liquid intermittence by the **Min.-Max** regulator on the compressor, then select the utilisation side for the working.
4. The foam liquid in the tank needs to be shaken after 10-15 days of inactivity.

Winter storage

1. Before storing the foam marker for a long period of time
 - empty out the piping and tank from liquid
 - detach tubes coming from compressor and join them the white tubes with the blue ones.
2. Turn on the compressor for a few minutes for each side to drain out completely the two sides.

Maintenance

1. For cleaning of the compressor, remove the screws and take the cover out, clean with compressed air the filter and the electric motor. The compressor does not need lubrication.
2. To clean the sponges inside the hose drops, detach the flexible tube (#32) from the mixer body (#29). Rinse the sponge with water to eliminate soap.

problèmes courants des marqueurs à mousse et solutions

problème	cause	solution
A Le compresseur ne fonctionne pas	<ol style="list-style-type: none"> 1. Le fusible a fondu. 2. Le contact ne se fait pas 	<ol style="list-style-type: none"> 1. Vérifier le fusible. 2. Vérifier les connexions électriques.
B Les voyants de l'interrupteur s'allument mais le compresseur ne fonctionne pas	<ol style="list-style-type: none"> 1. Les fils du connecteur sont oxydés 	<ol style="list-style-type: none"> 1. Vérifier le connecteur à quatre (4) fils près du compresseur et de la console, afin qu'il n'y ait pas d'oxydation
C Le liquide ne sort pas des descentes d'un côté ou de l'autre	<ol style="list-style-type: none"> 1. Il y a une fuite d'air 2. La pression est inadéquate 3. Le filtre est bloqué 	<ol style="list-style-type: none"> 1. Serrer le bouchon du réservoir Vérifier les boyaux qui relient le compresseur au bouchon et le boyau bleu à l'intérieur du réservoir. Remplacer s'ils sont fissurés. 2. Dévisser au maximum le régulateur de liquide (Min.-Max.) 3. Nettoyer le filtre au fond du réservoir
D Du liquide ou de l'air sortent des descentes lorsque le compresseur est arrêté	<ol style="list-style-type: none"> 1. Le siège de l'électrovanne n'est pas étanche 	<ol style="list-style-type: none"> 1. Détacher les boyaux qui vont du compresseur aux descentes et souffler de l'air comprimé dans les raccords reliant les électrovannes au compresseur. 2. En cas d'écoulement continu, démonter et nettoyer l'électrovanne correspondant à la descente qui fuit.
E Fuite d'air par la valve de sécurité sur le bouchon	<ol style="list-style-type: none"> 1. Les boyaux d'air sont bloqués 2. L'électrovanne est bloquée 	<ol style="list-style-type: none"> 1. Vérifier qu'il n'y ait pas d'étrangement dans les boyaux qui vont du compresseur aux descentes. 2. Démonter et nettoyer l'électrovanne.
F La quantité de mousse formée n'est pas satisfaisante	<ol style="list-style-type: none"> 1. L'éponge est sale 2. Le mélange eau-produit moussant est inadéquat ou trop vieux 3. Il y a une fuite d'air 4. De l'eau dure est utilisée 	<ol style="list-style-type: none"> 1. Nettoyer l'éponge qui se trouve dans la descente et remonter en évitant que l'éponge soit écrasée. 2. Refaire le mélange eau-produit moussant. 3. Vérifier la pression d'air des conduits reliant le compresseur aux descentes. 4. Augmenter la concentration du produit moussant
G Fuite de liquide ou d'air par les raccords	<ol style="list-style-type: none"> 1. Le boyau est défectueux 2. L'adaptateur est corrodé 	<ol style="list-style-type: none"> 1. Détacher le boyau et découper 1/2 po de son extrémité pour supprimer un éventuel défaut de fabrication. 2. Vérifier l'adaptateur
H Le compresseur fonctionne, mais pas de pression	<ol style="list-style-type: none"> 1. Le compresseur a besoin d'une mise au point 2. Du liquide ou de l'air sortent du côté opposé à celui sélectionné par le contrôle ou des deux côtés 	<ol style="list-style-type: none"> 1. Faire réviser le compresseur et remplacer la membrane et les lamelles avec l'ensemble de réparation 2. Voir le point "D"

foam marker's trouble shooting and solutions

problem	cause	remedy
A Compressor not working	<ol style="list-style-type: none"> 1. Fuse burned. 2. No contact. 	<ol style="list-style-type: none"> 1. Check the fuse 2. Check the electric conconnection
B The switch lamp is on but compressor not working	<ol style="list-style-type: none"> 1. Oxidation on wires 	<ol style="list-style-type: none"> 1. Check the 4 wires connector next to the compressor and next to the console - the should not be oxidation
C Liquid does not come out from neither right or left drops	<ol style="list-style-type: none"> 1. Air leak 2. Wrong pressure adjustment 3. Filter is obstructed 	<ol style="list-style-type: none"> 1. Close the tank plug. Check the tubes connecting compressor to plug. Check for cracks in the blue tube inside the tank. 2. Unscrew the liquid regulator (Min.-Max.) 3. Clean the filter in bottom of the tank
D Switch off and liquid or air still coming out	<ol style="list-style-type: none"> 1. Valve seats are obstructed 	<ol style="list-style-type: none"> 1. Detach tubes (from compressor to nozzles), blow in the valves' connections towards the compressor with compressed air If the leakage continues, clean the electrovalve corresponding to the leaking hose drop.
E Air coming out from the security valve on plug	<ol style="list-style-type: none"> 1. Air tube are obstructed 2. Electrovalve is obstructed 	<ol style="list-style-type: none"> 1. Check if there is any constriction in the tubes. 2. Disassemble and clean the electrovalve.
F Foam does not come out good	<ol style="list-style-type: none"> 1. The sponge is dirty 2. The foam mixture is inadequate or too old 3. There is an air leak 4. Hard water is used 	<ol style="list-style-type: none"> 1. Clean the sponge in the drop. Attention not to squeeze it when you put it back. 2. Make some new foam mixture. 3. Check if the air gets to nozzle in the same quantity as the air coming from the compressor. 4. Increase foam concentration.
G Loss of air or liquid from hose connections	<ol style="list-style-type: none"> 1. Hose is defective 2. The adaptor is corroded 	<ol style="list-style-type: none"> 1. Detach the tube and shorten it about 1/2" to eliminate defects due to tube deformation where there is the o-ring. 2. Check the adaptor.
H Compressor working but no pressure	<ol style="list-style-type: none"> 1. Compressor needs a revision 2. Liquid or air comes out on the side not selected or both sides 	<ol style="list-style-type: none"> 1. Have the compressor checked or substitute diaphragm with replacement kit 2. See "D"

INTRODUCTION

MODEL

The models of the foam marker are MS-901654...

USE OF FOAM MARKER

The foam marker is used to mark the working area with balls of foam. Eliminating the risk of overlapping and space gap during the spraying process.

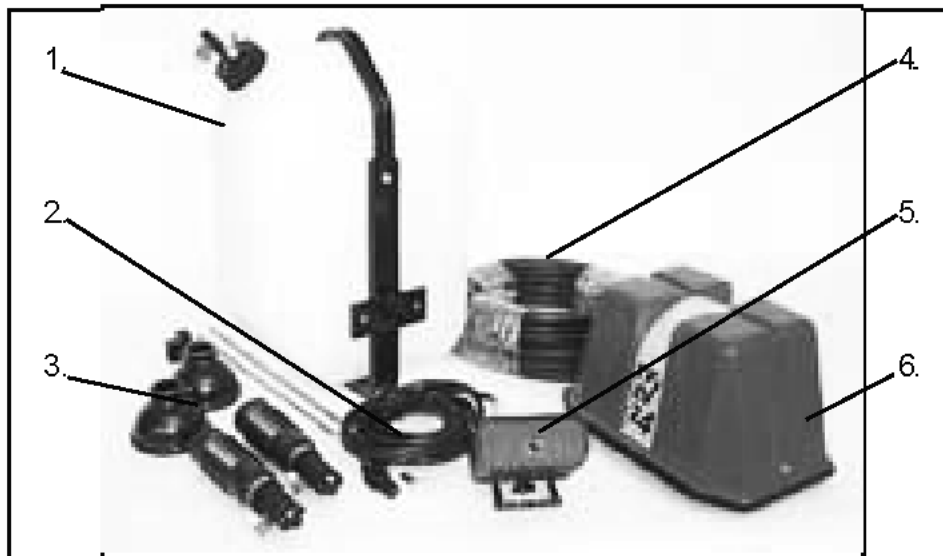
The foam marker is designed to be very easy to install, operate and maintain. The foam marker operates independently from the PTO or other sprayer components.

COMPONENTS

The TJ EV-24 has the following major components:

1. 6.4 gal. tank
2. Power supply & compressor cable
3. Foam nozzle assembly

4. Air-liquid tubing
5. Right and left (on-off-on) switch box
6. 12 Vdc diaphragm air compressor

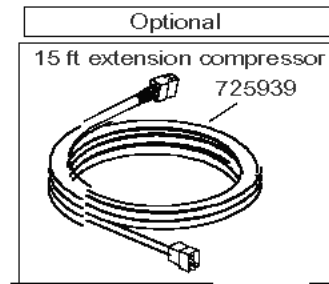


OPTIONAL KITS

The foam marker has one optional kits (not included in package):

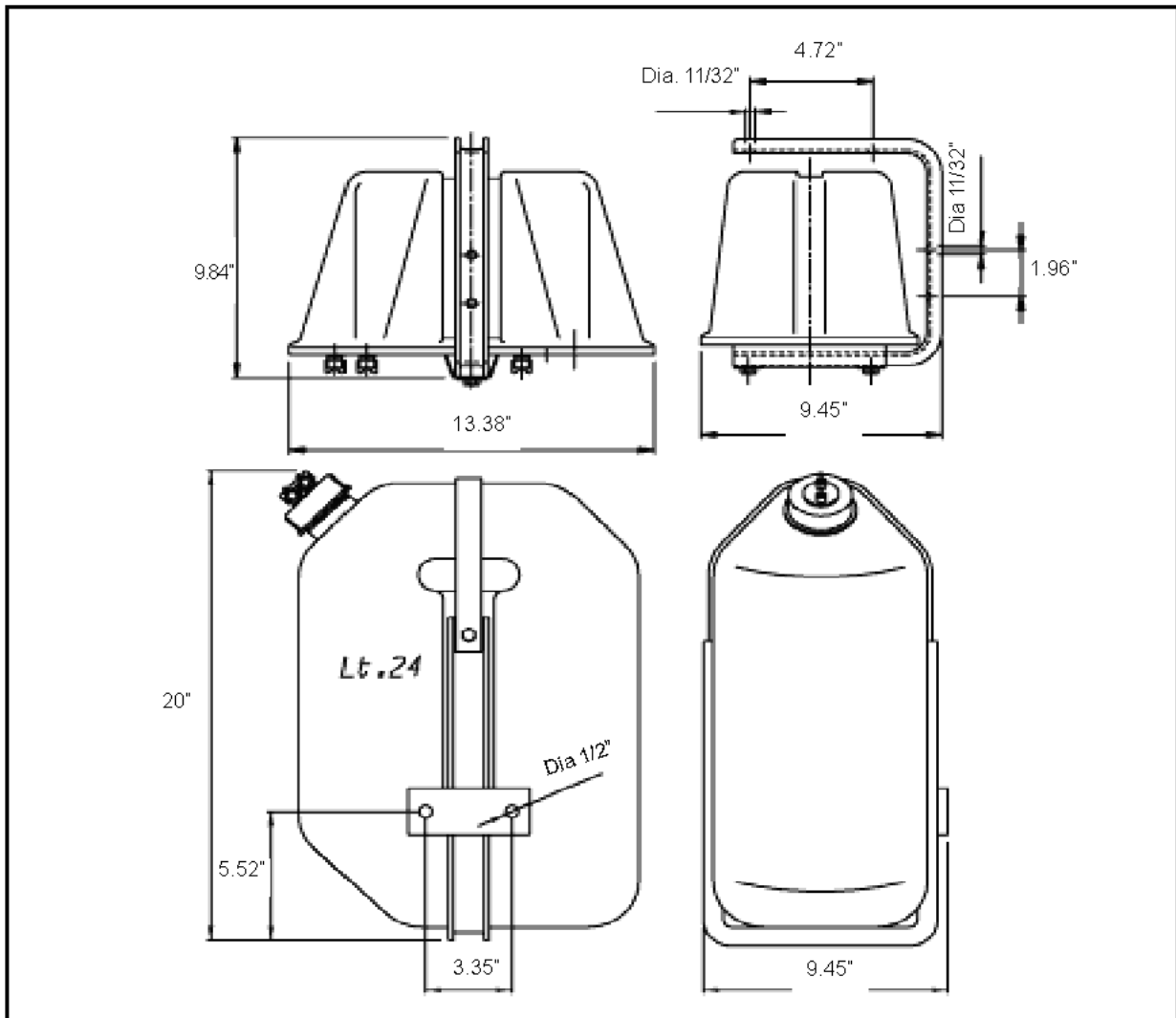
- 15 ft. extension compressor cable

Note: Please call your distributor to order the optional kits.



DIMENSION & WEIGHT

The weight of the foam marker is 42 lbs. empty. Below you will find the overall dimensions.



INSTALLATION PROCEDURES

⚠ IMPORTANT: Read all instructions before installing and operating the foam marker.

GENERAL INSTALLATION INSTRUCTIONS

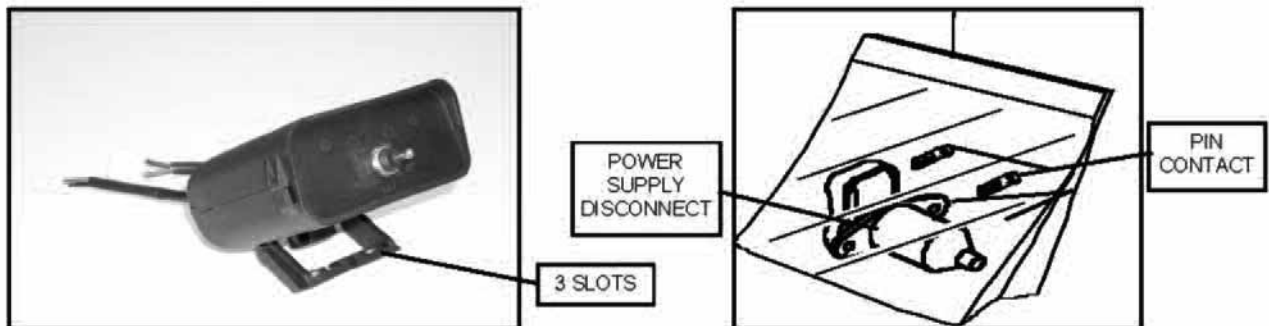
The Foam Marker can be easily installed on the sprayer. As a general rule it is important to choose a location for the compressor that shields it from exposure to chemicals during spraying operations.

The two foam drop nozzles must be fixed at the ends of the boom so that foam can fall at the edge of the end spray nozzle signaling the sprayed area.

Hoses for the air-liquid circuit must be clamped to the boom structure out of way of moving parts. Also, ensure hoses will not kink if and when booms are folded.

INSTALLATION OF SWITCH BOX AND POWER SUPPLY

- Determine the best location for the selector switch box in the tractor cab.
- Determine the best routing for the power cable. Make sure it is away from operator's movement area, away from moving parts and away from sharp objects.
- Using 3 bolts 1/4" (not included) and the provided slots, mount the switch box at the desired location.
- Mount the power supply disconnect within 6 feet, from selector switch box. First crimp one supplied pin contact to one red and one black 10 gauge wire (not included) and connect them to the proper socket. Next mount the power supply disconnect, by using the template supplied in the bag with the power supply socket, to drill a 1" hole in the center and two 1/4" bolt holes in the sides. Feed the two wires through the 1" drilled hole. Use 10-24 screws to bolt the disconnect. Finally, connect the other end of the red wire to the "+" side and the other end of the black wire to the "-" side of the 12 Volt battery. **DO NOT CONNECT THE POWER CABLE INTO THE DISCONNECT UNTIL ALL WIRING IS COMPLETED.**



INSTALLATION OF COMPRESSOR AND TANK

Compressor:

Using bracket (part# 901132), mount the foam marker on a sturdy part of the sprayer structure. Make sure to slide the U-shaped bracket in the provided slot under the compressor. The two threaded holes must go under the compressor. Using the provided bolts (kit # 901740), screw the U-shaped bracket with the compressor.

Tank:

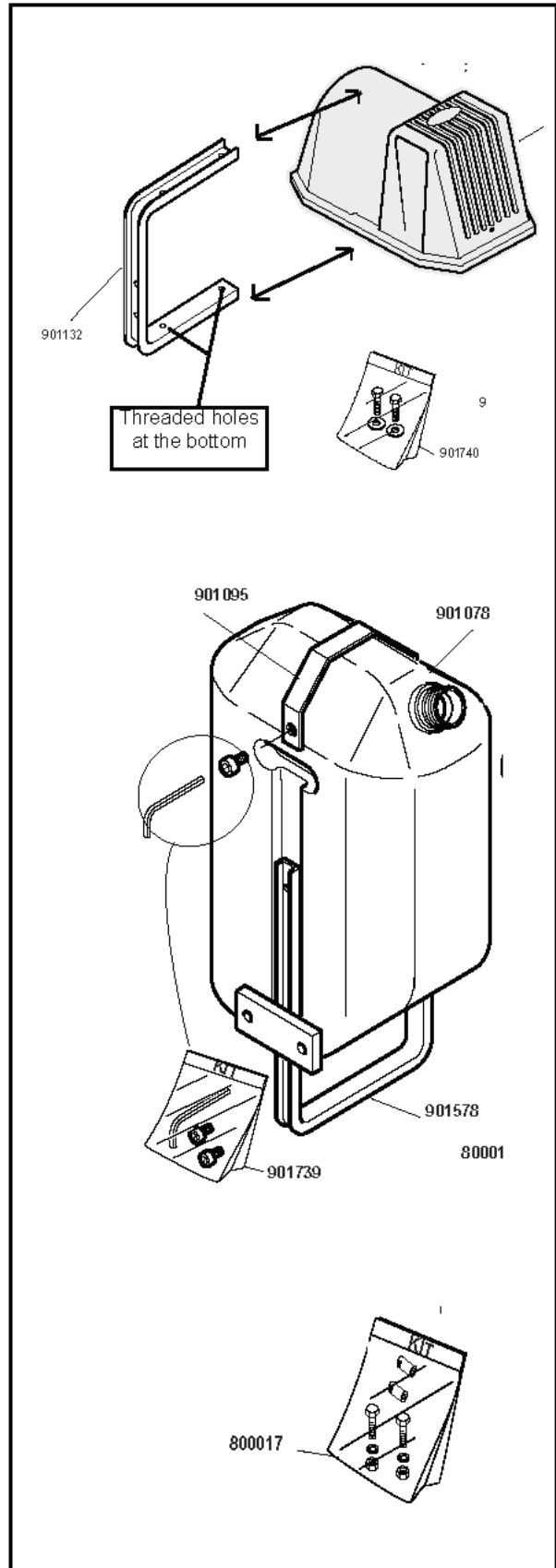
Mount tank in brackets using brackets # 901578 & # 901095 and kit # 901739. On bracket # 901578, two holes are provided to fix bracket on the sprayer.

Using Kit # 800017, one can mount compressor bracket (#901132) with tank bracket (#901578)

AIR-LIQUID CONNECTION OF CAP

Air-liquid connection to the cap of the tank is factory mounted. However if they are not, connect the clear tube (air outlet) from the compressor to the white wing nut of the cap. Next connect the blue tube (liquid outlet) from the compressor to the blue wing nut of the of the cap.

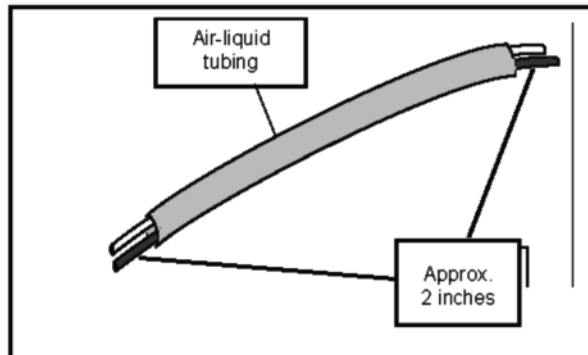
Air tube Liquid tube



INSTALLATION OF AIR-LIQUID TUBING

Before installing the air-liquid tubing on the boom, make sure to take the proper measurements by unrolling the tubing side by side the boom. **DO NOT FORGET TO CONSIDER THE DISTANCE FORM THE COMPRESSOR TO THE BOOM.**

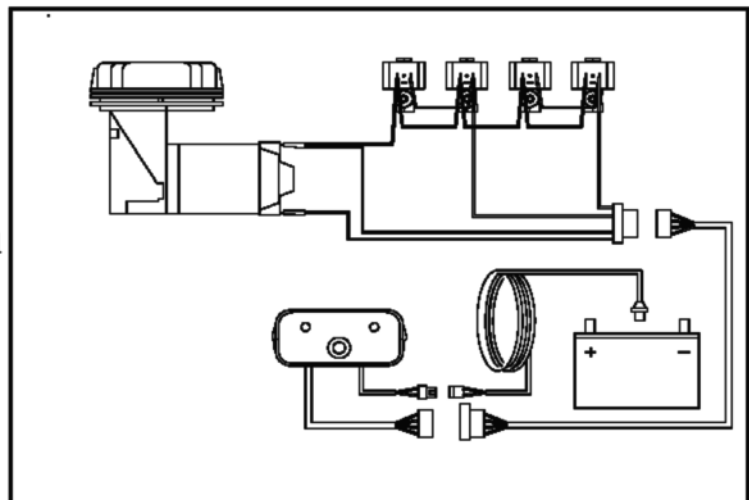
Being careful not to cut the tubing, cut the over sleeve back approximately 2" to expose the blue and clear tubing. Next, remove the blue wing nut from the foam nozzle connector and slip it on the blue tube with the thread facing away from the blue tube. Slide the blue tube all the way over the small tube on the foam nozzle. Slide the wing nut back to the thread and hand tighten. Follow the same steps for the clear tube and white tube nut. Finally install the opposite ends of the air-liquid tubes to the compressor.



Electric Diagram

CONNECTION OF POWER CABLE AND COMPRESSOR CABLE

With the compressor cable connect one end to the switch box and the other end to the compressor. The compressor cable is 23 ft. long. With the power cable connect one end to the switch box and the other end to the disconnect socket. The power cable is 6.5 ft. long.



OPERATION

SWITCH BOX

The switch box is used to start the compressor and to select the side the foam will be made. To operate simply select “ON” left or “ON” right to direct the foam to the left or right side of the boom. Selecting “OFF” will not drop foam at all.

MIXING SOAP IN TANK & CONTROLLING THE FLOW



CAUTION: CONTENTS IN TANK MAY BE UNDER PRESSURE. WHEN REMOVING CAP FROM TANK, UNSCREW CAP SLOWLY TO RELIEVE PRESSURE OR USE THE INSTALLED RELEASE VALVE.

Remove cap from tank. Fill the tank with the desired amount of water first, and then add soap to avoid making foam in the tank. Replace cap on the tank and tighten hand tight. When preparing soap mixture, one must first desire life span of the foam ball. Temperature, sun light, relative humidity, hardness of water, soap concentration and wind condition are some of the variables which effect the foam ball life span.

On the cap, there is a flow regulator to control the output of the foam liquid. By turning the knob clockwise, the foam ball output will be less frequent. By turning the knob counter clockwise, the foam ball output will be more frequent.

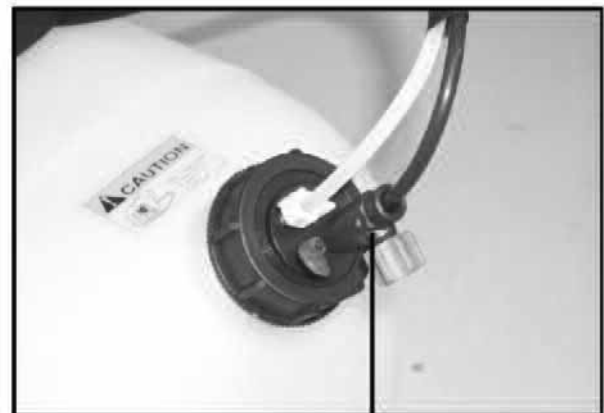


ON
Left Side

ON
Right Side



OFF
Both Sides



Flow regulator with knob

MAINTENANCE INSTRUCTIONS

CAUTION: BEFORE PERFORMING ANY MAINTENANCE, MAKE SURE THAT THE LIQUID SUPPLY LINE FROM THE TANK HAS HAD THE PRESSURE BLED FROM THE SYSTEM. TO DO THIS, UNSCREW TANK CAP ONE TURN OR UNTIL AIR IS HEARD LEAKING OUT AROUND CAP OR USE THE PRESSURE RELEASE VALVE.



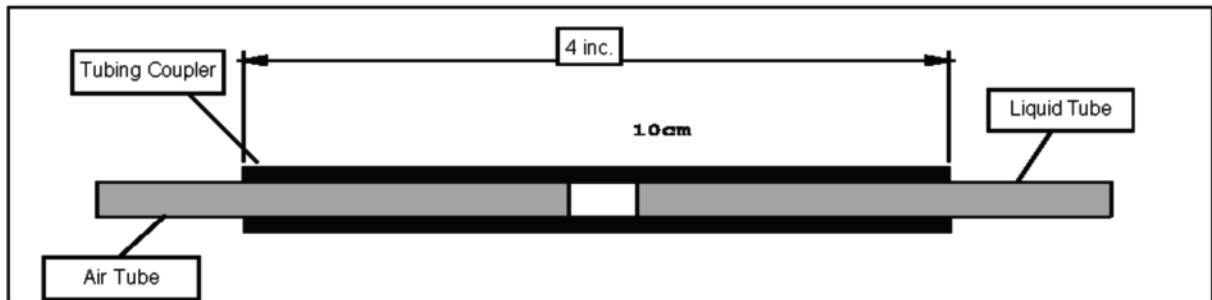
PRECAUTIONARY STEPS

Flush the system with clean water after each use, especially when hard water has been used. Do not apply lubricating oils, grease or other petroleum products to the compressor motor assembly.

WINTERIZING

Follow the steps written below for proper winterizing:

- Step 1: Relieve pressure from tank.
- Step 2: Disconnect air and liquid tubing from tank.
- Step 3: Connect air and liquid tubing together with supplied tubing coupler.
- Step 4: Disassemble foam nozzle to replace foam sponges (big and small).
- Step 5: Empty tank off all soap to avoid freezing.



TROUBLESHOOTING

The following table summarizes different troublesome conditions.

CONDITION	POSSIBLE CAUSES	SOLUTIONS
1. Compressor will not turn on	<ul style="list-style-type: none"> A. Corroded connections B. Disconnected C. Improperly wired D. Blown fuse 	<ul style="list-style-type: none"> A. Inspect and clean B. Check wiring C. Check wiring diagram D. Replace fuse
2. Foam does not come out from nozzle	<ul style="list-style-type: none"> A. No concentrate in tank B. Tank cap loose C. Compressor filter clogged D. Strainer in tank clogged 	<ul style="list-style-type: none"> A. Add concentrate in tank B. Tighten cap C. Clean or replace filter D. Clean or replace strainer
3. Foam ball does not form completely	<ul style="list-style-type: none"> A. Soap concentrate too low B. Restrictor not in place C. Water too hard 	<ul style="list-style-type: none"> A. Dump and remix higher B. See foam nozzle assembly in parts break down C. Use water softener with concentrate
4. Compressor does not start when switching side	<ul style="list-style-type: none"> A. Check valve broken on tank cap B. Switch broken 	<ul style="list-style-type: none"> A. Try cleaning cap check valve by blowing air. If problem persists change cap B. Change switch
5. Foam marker is off but air or liquid are still coming out	<ul style="list-style-type: none"> A. Valves are dirty B. Valves are broken 	<ul style="list-style-type: none"> A. Blow air in the valves B. Replace broken valves



comer industries
driveshafts



comer industries
mechatronic solutions



AVANT-PROPOS

COMER INDUSTRIES S.p.A place depuis toujours la sécurité en tête des facteurs à prendre en compte lors du développement et de la fabrication de ses produits qui sont conformes aux normes ISO et aux directives de l'U.E. en matière de sécurité.

Les informations sur la sécurité et l'utilisation sont fournies par les autocollants appliqués et par la notice qui accompagne chaque transmission fournie.

Le client est prié d'informer Comer Industries S.p.A. sur le pays de destination des transmissions afin de pouvoir les doter des étiquettes et des notices appropriées

ARBRES A CARDAN

Transmissions primaires CE

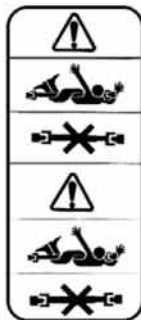
Elles relient le tracteur à la machine opératrice et sont équipées de :

- Marquage CE
- Autocollants d'instructions de sécurité
- Notice CE
- Chaînes anti-rotation



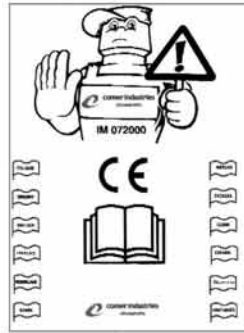
cod. 190.000.359

Autocollant d'instructions de sécurité sur le tube de protection extérieur



cod. 190.000.358

Autocollant d'instructions de sécurité sur le tube en acier extérieur



Notice CE

Transmissions primaires USA

Elles relient le tracteur à la machine opératrice et sont équipées de :

- Autocollants d'instructions de sécurité
- Notice
- Chaînes anti-rotation



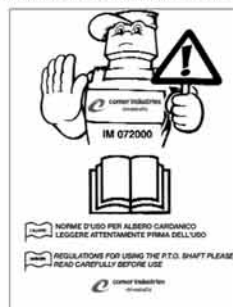
cod. 190.000.099

Autocollant d'instructions de sécurité sur le tube de protection extérieur



cod. 190.000.098

Autocollant d'instructions de sécurité sur le tube en acier extérieur



cod. 190.000.371

Notice

Transmissions primaires CANADA

Elles relient le tracteur à la machine opératrice et sont équipées de :

- Autocollants d'instructions de sécurité
- Notice
- Chaînes anti-rotation



cod. 190.000.359



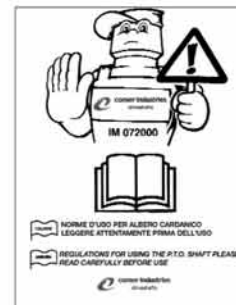
cod. 190.000.215

Autocollant d'instructions de sécurité sur le tube de protection extérieur



cod. 190.000.216

Autocollant d'instructions de sécurité sur le tube en acier extérieur



cod. 190.000.371

Notice



L'arbre à cardan est disponible en option sans les protections. Dans ce cas, c'est à l'acheteur qu'incombe la responsabilité de faire homologuer la machine complète (arbre à cardan compris) conformément à la Directive Machines et de protéger la transmission à cardan avec des protections idoines

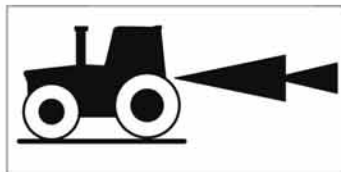
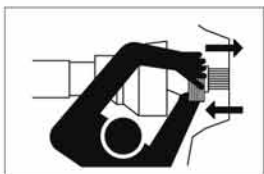
Conseils d'utilisation



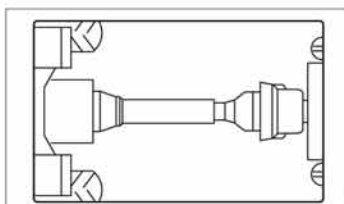
Les indications ci-dessous concernent votre sécurité



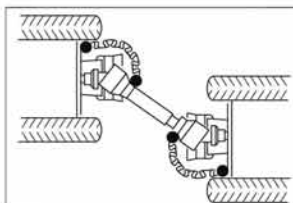
Avant de commencer à travailler, vérifiez :



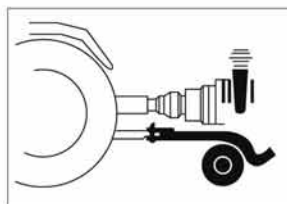
la bonne fixation de la transmission à cardan au tracteur et à la machine opératrice. (Le tracteur estampillé sur la protection indique le côté tracteur)



la présence et le fonctionnement de toutes les protections de la transmission. En cas de besoin, remplacez les éléments endommagés ou manquants par des pièces d'origine en veillant à les monter correctement



si les chaînes sont fixées de façon à permettre l'articulation de la transmission dans chaque condition d'exercice et de transport



si les machines stationnaires (pompes, générateurs, etc.) sont bien fixées au tracteur et respectent la superposition des éléments télescopiques



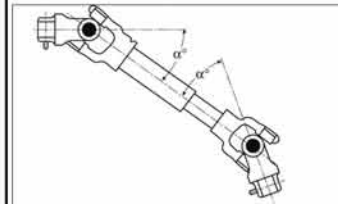
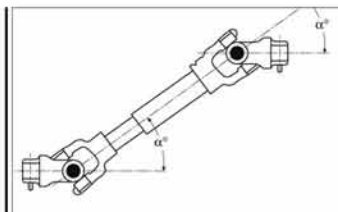
si la longueur, la dimension de la transmission à cardan ainsi que son dispositif éventuel sont adaptés à l'usage que l'on souhaite en faire (vérifiez dans la notice si la transmission doit être équipée d'un limiteur de couple ou d'une roue libre).



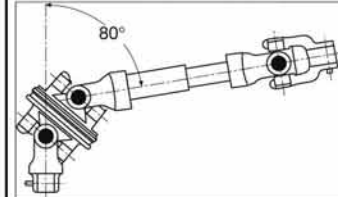
Pendant l'utilisation veillez à ce que :



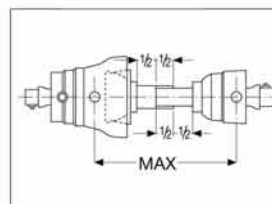
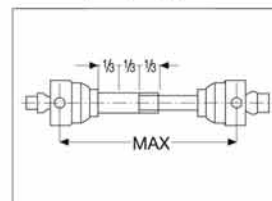
la transmission à cardan ne dépasse pas la vitesse et la puissance prévues dans le manuel de la machine.
Le dispositif de sécurité doit toujours être utilisé du côté de la machine. Toutes les pièces en mouvement sont protégées



les angles d'articulation doivent être contenus et égaux. En cas de manoeuvre de plus de 35°, débrayez la prise de force



le joint homocinétique n'opère pas en continu à un angle proche de 80°, mais seulement pour de courtes durées (braquage)



les éléments télescopiques de la transmission se superposent toujours sur 1/3 dans les transmissions STD et de 1/2 dans les transmissions à joint homocinétique

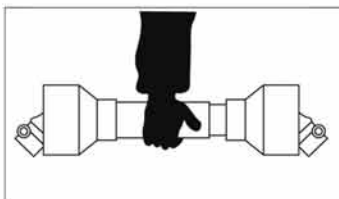


les vêtements de travail portés ne doivent pas être amples ou déboutonnés de façon à ce qu'ils ne soient pas happés par la machine et être la cause de graves accidents

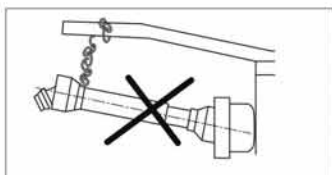




Conseils d'utilisation



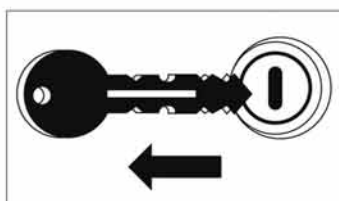
La transmission doit être maintenue horizontalement pour ne pas la faire glisser en provoquant des accidents ou un endommagement des protections. Utilisez des engins de manutention appropriés en fonction de son poids



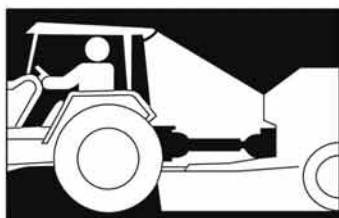
N'utilisez pas de chaînes pour manutentionner la transmission à cardan à la fin de son utilisation. Utilisez un support adéquat



N'utilisez pas la transmission comme support ou marchepied



Coupez le moteur, retirez la clé de contact et vérifiez si toutes les pièces en mouvement se sont arrêtées avant de vous approcher de la machine opératrice ou d'accomplir des opérations d'entretien



En cas de mauvaise visibilité ou de travail nocturne, la zone de travail de la transmission doit être suffisamment éclairée aussi bien pendant la phase de montage que durant l'utilisation



Le dispositif de limitation peut atteindre des températures élevées.

NE PAS TOUCHER !

La zone adjacente doit toujours être propre afin de prévenir tout risque d'incendie

BOLS DE PROTECTION

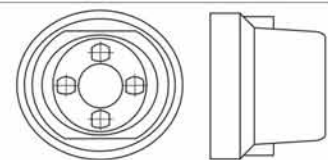
La Directive Machines (CEE 89/392, 91/368, 93/44, 93/68) prescrit que la prise de force sur la machine opératrice doit être dotée d'une protection permettant le montage et l'articulation de la transmission à cardan tout en garantissant (selon la norme prEN 1553) une superposition minimum de 50mm avec la protection de la transmission à cardan alignée.

Les bols de protection Comer Industries S.p.A. ont été conçus conformément aux normes internationales et sont accompagnés d'une notice CE contenant la déclaration de conformité.

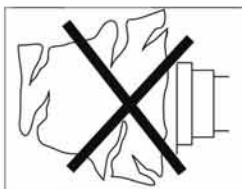
Etant donné la grande variété des machines opératrices et de leurs applications, c'est au fabricant de la machine de choisir le bol plus approprié en fonction des conditions d'exercice, des dimensions et de l'articulation de la transmission à cardan.

Comer Industries S.p.A. conseille de vérifier sur le terrain les conditions réelles d'exercice et la validité du bol

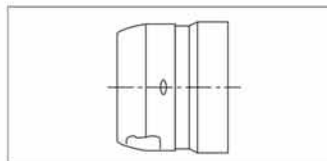
Conseils d'utilisation



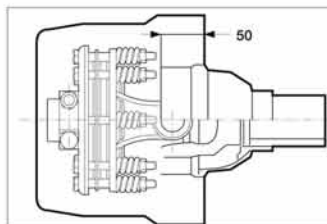
Le vis et les rondelles de fixation du bol doivent être contenus dans la superficie plane et ne doivent pas être desserrés



Les bols doivent toujours être en parfait état, remplacez-les en cas de besoin mais toujours par des pièces d'origine



N'utilisez jamais le bol comme support ou marchepied. Si un couvercle est prévu, vérifiez s'il est bien fermé



Le bol doit surmonter la protection de l'arbre à cardan de 50 mm au moins





comer industries
driveshafts



comer industries
mechatronic solutions



INTRODUCTION

COMER INDUSTRIES S.p.A has always considered safety to be one of the most important design and construction parameters for its products which are all built in full compliance with the international ISO standard and EU safety regulations. Information on safety and on correct final user's application of the PTO drive shaft are supplied in safety labels and in the "Use and Maintenance" Manual provided with all PTO drive shafts. It is the customer responsibility to inform Comer Industries S.p.A. about the Country to which the PTO drive shafts will be delivered, in order to provide them with the suitable Manuals and Labels

PTO DRIVE SHAFTS

Primary transmissions - CE

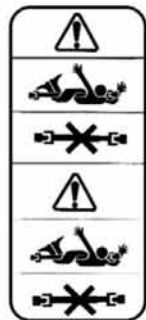
They connect the tractor to the operating machinery and are equipped with:

- CE Mark
- Safety labels
- CE instruction handbook
- anti-rotation chains



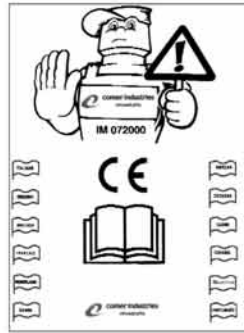
cod. 190.000.359

Label on outer protective tube



cod. 190.000.358

Label on outer steel tube



(GB)

CE "Use and Maintenance" handbook

Primary transmissions-USA

They connect the tractor to the operating machinery and are equipped with:

- Safety labels
- Instruction handbook
- Anti-rotation chains



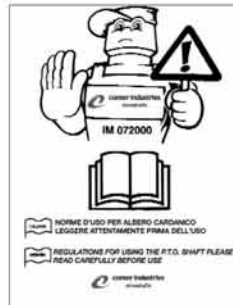
cod. 190.000.099

Label on outer protective tube



cod. 190.000.098

Label on outer steel tube



cod. 190.000.371

"Use and Maintenance" handbook

Primary transmissions - CANADA

They connect the tractor to the operating machinery and are equipped with:

- Safety labels
- Instruction handbook
- Anti-rotation chains



cod. 190.000.359



cod. 190.000.215

Label on outer protective tube



cod. 190.000.216

Label on outer steel tube



cod. 190.000.371

"Use and Maintenance" handbook





On request, the drive shaft can be supplied without safety guards. In this case, the buyer is responsible for certifying the machine (including the shaft) according to the Machine Directive and for mounting suitable safety guards for the drive shaft

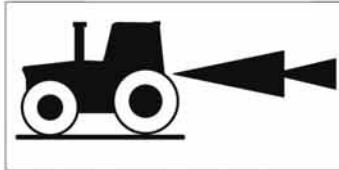
Operating instructions



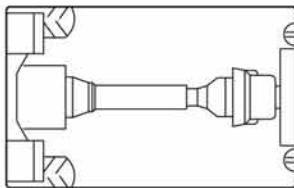
These rules concern your safety



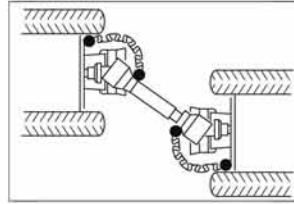
Before starting to work, make sure that:



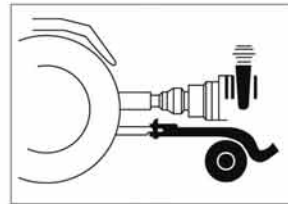
the transmission is correctly connected to the tractor and to the operating machinery (the picture of the small tractor stamped on the safety guard indicates the tractor side)



all the transmission safety guards are in position and operating efficiently. Any damaged or missing components must be replaced with original spare parts and installed correctly



the chains must be connected so that the transmission can move under all operating and transport conditions



the stationary machines (pumps, generators, etc.) are always coupled to the tractor and respect the position of the overlapping telescopic elements



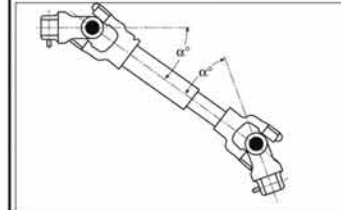
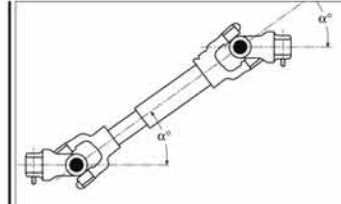
the drive shaft transmission in terms of length, size and any device (check the machine's instruction handbook if the transmission must be equipped with a torque limiter or overrunning clutch)



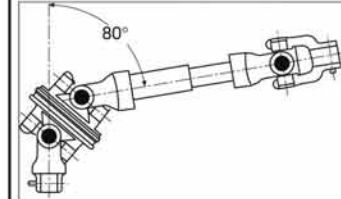
When using the transmission, make sure that:



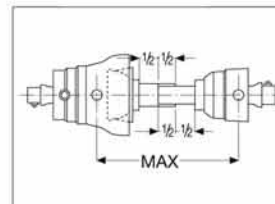
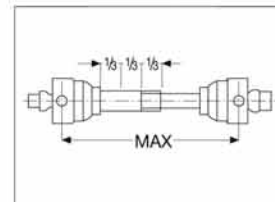
the drive shaft does not exceed the speed and power conditions defined in the machine's operating handbook. Any safety device must be engaged on the machine side. All rotating parts must be protected.



the joint angles are limited and equal; for operations that exceed 35°, disengage the power take-off



the PTO drive shaft joint does not operate continuously with an angle close to 80°, but only for brief periods (steering)



1/3 of the transmission's telescopic elements are always overlapping in the STD transmission and 1/2 in the PTO drive shaft transmissions

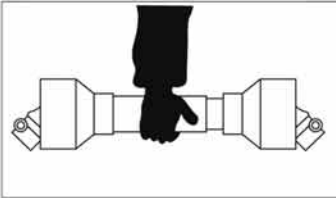


work clothes do not have belts, edges or parts that may get tangled. Any contact with rotating parts may cause serious accidents

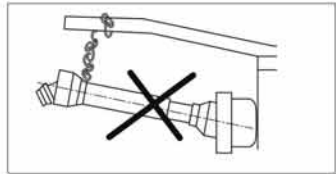




General rules



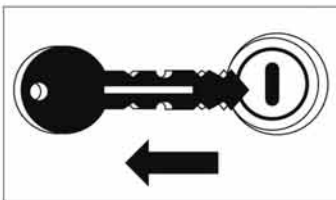
The transmission must be transported horizontally to prevent accidents (since it may slip out) or to avoid damage to safety guards. Depending on the weight, use a suitable means of transport



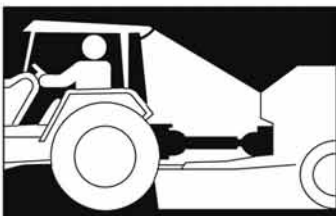
Do not use chains to transport or support the drive shaft after use. Use a special support



Do not use the transmission as a support or as a footboard



Turn off the engine, remove the key from the tractor and ensure that all rotating parts have stopped before getting close to the machinery or carrying out maintenance



The transmission work area must be illuminated during installation and use in case of poor visibility or night-time operation



Clutches may become very hot. **DO NOT TOUCH!** Keep the adjacent area clean to reduce the risk of fire

SAFETY SHROUDS

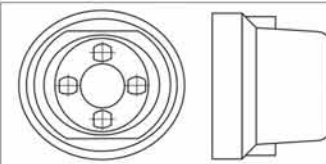
The Machine Directive (EEC 89/392, 91/368, 93/44, 93/68) states that the power take-off on operating machinery must be equipped with a safety shroud attached to it that allows the drive shaft to be assembled and to articulate and that guarantees (according to prEN 1553) overlapping of at least 50 mm with the aligned drive shaft safety guard.

The Comer Industries S.p.A. shrouds are built in compliance with international requirements and standards and are supplied with a CE instruction sheet containing the declaration of conformity.

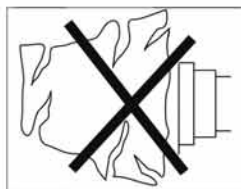
Considering the wide variety of operating machinery and applications, the machine manufacturer is responsible for selecting the shroud based on the use conditions, dimensions and articulation of the drive shaft.

Comer Industries S.p.A. recommends checking the real use conditions in the field as well as the suitability of the shroud

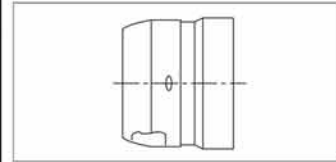
General rules



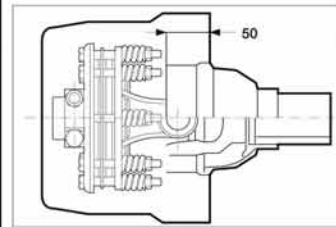
Shroud connecting screws and washers must remain within the flat surface and should not be loose.



Shrouds must not be damaged. If so, they must be replaced with original spare parts



Do not use the shroud as a support or footboard. Any opening must be closed



The shroud must overlap the drive shaft safety guard by at least 50 mm



HYPRO[®]

2006

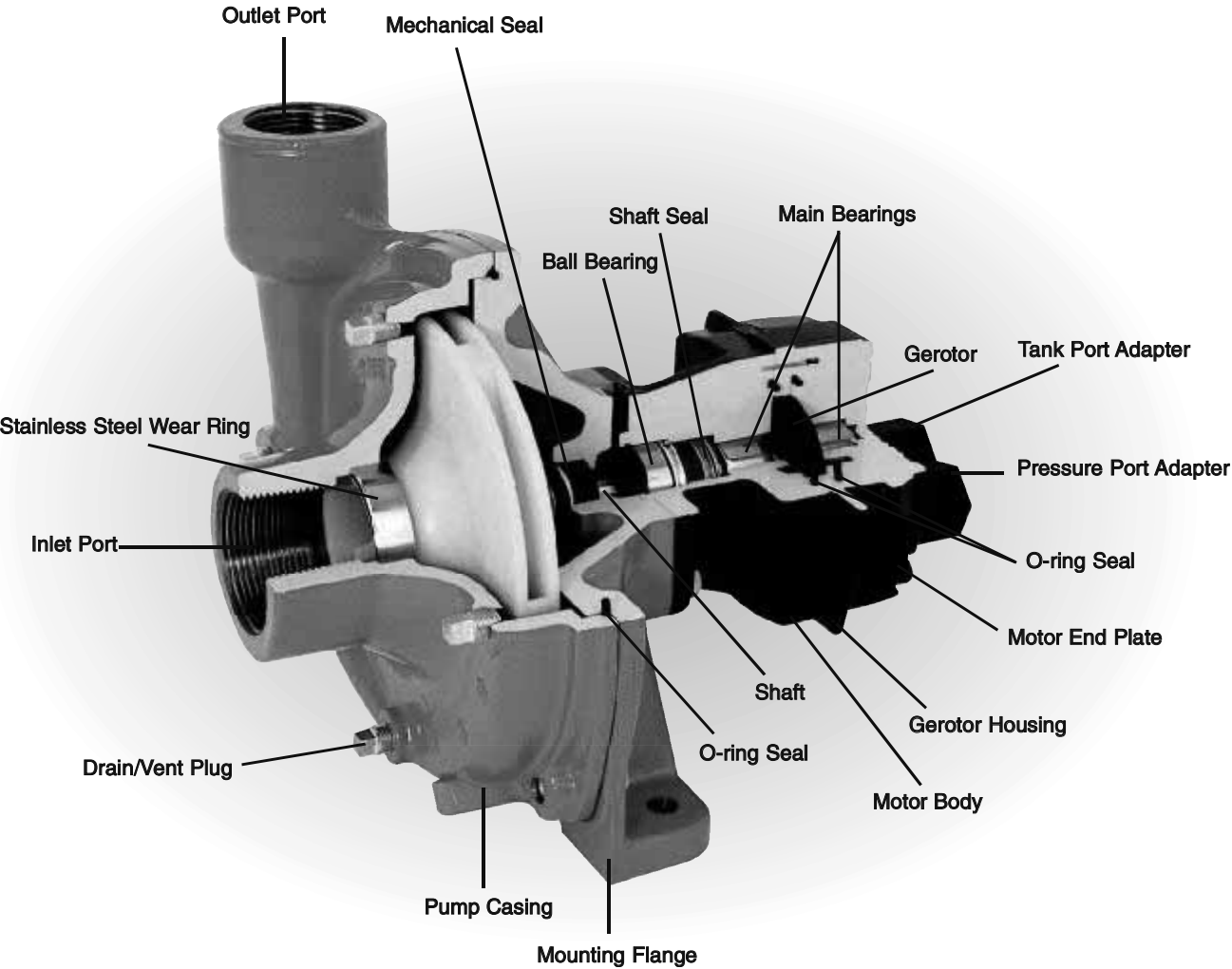
Hydraulic Pump Selection Guide



www.hypropumps.com

Hydraulic Pump Selection Guide

Hypro offers a wide variety of hydraulic-driven centrifugal pumps for use in agricultural tractor applications. This guide will help you to select the appropriate pump for your situation. Simply locate your tractor manufacturer and model number, hydraulic system type, pressure and flow rate. The guide will show you which Hypro pump is best for you.



Cutaway view of Model 9303C-HM4C centrifugal pump.

Tips for Better Performance

Best Practices for Tractor Hydraulics

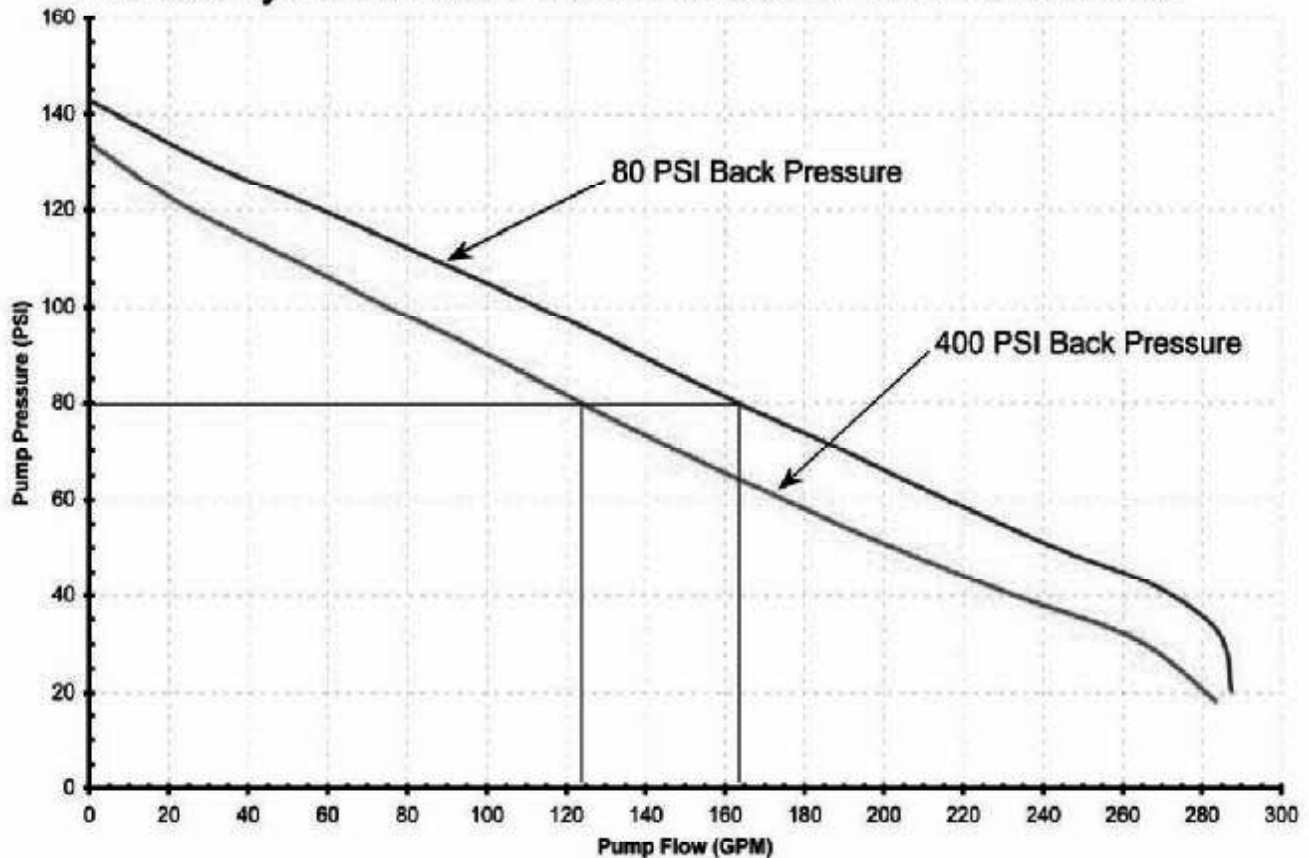
There are many tractors with a variety of hydraulic capabilities. How you get the most use of your tractor's power depends on your skill as a good operator and manager. Here are some tips to follow that will lead you to greater pump performance, and in the long run, will add to your success.



Rule #1 Minimize hydraulic motor back pressure in the return line hydraulic hose.

High hydraulic motor back pressure can rob performance from your Hypro pump. As you can see in the chart below, for the same spray pressure, there is a 40 gallon per minute loss in performance due to excessively high hydraulic back pressure in the return line of the spray pump's hydraulic hose. Those 40 gallons could be used to spray at faster ground speed, increase flow to agitation, or to reduce the required hydraulic flow necessary to do the job. Whatever your need is, reducing hydraulic back pressure saves you money!

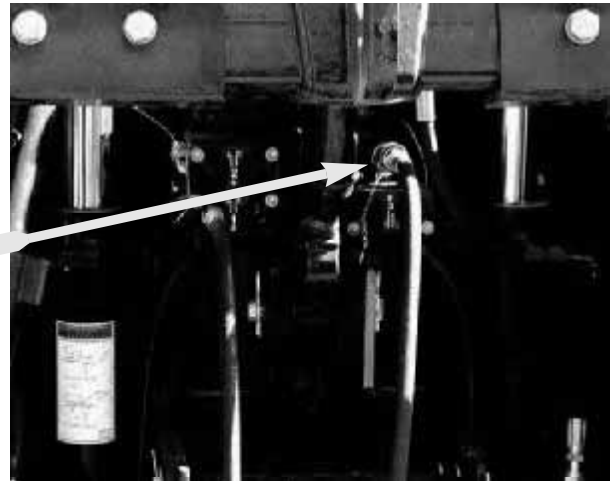
Effect of Hydraulic Back Pressure on 9306C-HM1C Performance



By reducing your motor's hydraulic back pressure, the amount of available energy to the hydraulic motor increases and that energy can be used for work. Here are some of the most common sources of high hydraulic motor back pressure.

1. Tractor Return Valve Block

A *free dump* return port is the best way to minimize return back pressure. This *free dump* return, bypasses the tractor valve block spool and greatly reduces hydraulic back pressure. *Free dump* return ports help to reduce the back pressure, but can vary for tractor models. A realistic back pressure goal is 50 – 150 PSI.



2. Quick Coupler Size

Modern tractors provide a free dump option and because this option is designed to reduce back pressure for constant operating hydraulic equipment, they usually increase the coupler size. By increasing its size, a larger cross-sectional area is provided for the hydraulic oil to flow through the coupler without greatly increasing the back pressure.

3. Return Hose Diameter

For hydraulic flows greater than 13 GPM, the standard 1/2" hose can be limiting in its capacity to carry higher hydraulic flows back to the tractor reservoir. Factors that create higher back pressures of a hose include hose diameter and hose length. If the pump is not located near the hitch, consider upsizing the hydraulic hose size to reduce motor hydraulic back pressure.



4. Tractor Hydraulic Filter Condition

Older tractors may feel the effect of neglect with their age. If you intend to get the most out of your tractor, check your maintenance records to be sure the hydraulic filter has been recently changed. The higher the hydraulic flow, the higher the pressure drop is across any restriction. This includes the filter. It is not uncommon to see a 200 PSI pressure drop across a dirty filter.

5. Secondary Circuits

Secondary circuits can be used for the spray pump hydraulic pressure supply, but free dump returns should always be used with them. Standard tractor secondary return ports are even more restrictive than primary return ports.

The best way to know your hydraulic oil back pressure is to measure it. Hypro provides a Hydraulic Test Kit (PN: 3430-0650) that can easily be inserted into the hydraulic circuit of the Hypro spray pump. You can instantly learn what your hydraulic back pressure is as well as the tractor's system pressure and hydraulic flow. This is a great diagnostic tool for those who need to improve their performance. Ask for this test kit at your sprayer dealer.

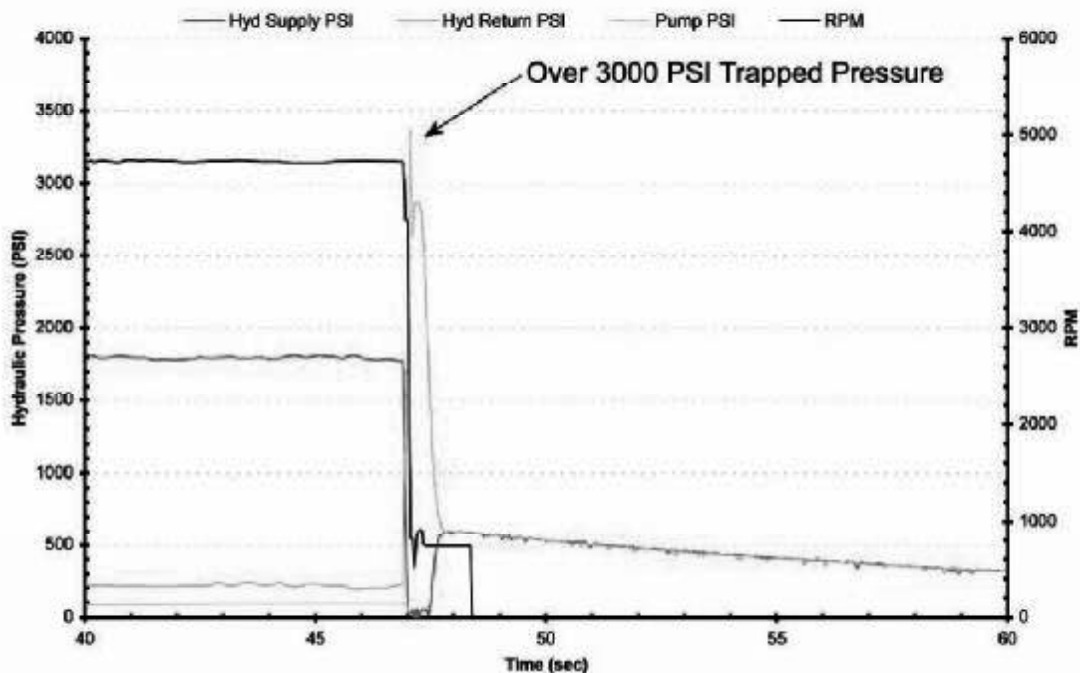


Rule #2 Know Where to Set the Bypass Screw

This Hypro hydraulic motor feature is intended solely for Open Center hydraulic systems. Follow directions for bypass screw adjustments in the owner manual. If your hydraulic system is a Closed Center pressure compensating or load sensing system, be sure bypass screw is turned in completely.

Rule #3 On/Off Operation

Whenever possible use the rate controller for On/Off control of your spray nozzles. Cycling the pump on and off does provide more opportunity to damage the hydraulic motor's oil seal, especially if the hydraulic return line is through the circuit spool valve. In the graph below, you can see that over 3000 PSI pressure is trapped in the motor until it slowly seeps down to zero PSI. That pressure is exerted directly against the hydraulic oil lip seal in the motor. Trapping high hydraulic oil pressure in the motor will lead to early seal failures. Using a free dump will avoid hydraulic oil from having to go through the circuit spool valve and will alleviate the possibility of trapped pressure in the motor as well as lower the back pressure in the motor to increase its performance.



Selecting the Right Pump

Hypro offers several sizes as well as materials for its line of hydraulic motor-driven centrifugal pumps. Inlet port sizes from 1½" to 2" are available. Material options include Polypropylene, Cast Iron, and 316 Stainless Steel. Up to five different motor sizes are available for each combination of port size and construction material. The following is a listing of the nominal flow ranges for each motor size:

Motor	Hydraulic Flow Range (GPM)																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
GM1																								
HM2C																								
HM4C																								
HM1C																								
HM5C																								
HM3C																								

The chart above has been used to create the selection guide contained in this document. Hydraulic system types, age of equipment, and levels of performance were also taken into consideration.

IMPORTANT: The tractor hydraulic system data contained in the following tables should be used only as a guide. Consult your tractor manufacturer for more detailed information or for assurance that any continuous duty equipment, such as hydraulic motor-driven centrifugal pumps, will not overheat your hydraulic system.

Hydraulic Pumps:

Today's tractors are equipped with either Constant Displacement or Variable Displacement Hydraulic Pumps. Constant Displacement Pumps put out a constant flow, regardless of pressure (until the relief valve bypasses the flow). The only way to vary the flow on this type of pump is to change engine speed. Variable Displacement Pumps will produce only the flow required by the implement until total pump output is reached. If less than total pump output is required, an automatic stroke control mechanism decreases the pump output to maintain a constant pressure and flow. The output varies according to demand.

Hydraulic Controls:

There are two types of hydraulic control or spool valves used on tractors today. They are named after the design of the spool valves themselves. One is called OPEN CENTER because in the neutral (or center) position, it is open to allow flow back to the hydraulic reservoir. Open Center Valves are used exclusively on Constant Displacement Pumps. The other valve type is called a CLOSED CENTER because in the neutral (or center) position, all hydraulic flow is stopped on that circuit. Closed Center Valves are used exclusively on Variable Displacement Pumps.

There are four basic positions for each type of spool valve. They are Raise, Neutral, Lower and Float (in order, from back to front). The names used for these positions vary somewhat between manufacturers, but the order of the positions do not.

To properly operate a hydraulic motor-driven centrifugal pump on a tractor hydraulic circuit, only the Lower and Float positions should be used. **Use Lower for "On" and Float for "Off."** The Float position is recommended for turning the motor off because it allows the remote circuit to flow in a continuous loop, allowing the motor to free wheel to a stop and also does not trap pressure in the circuit.

Both Open and Closed Center Valves trap oil on both sides of the remote circuit when in the Neutral position. Use of this position for "Off" will cause premature failure of the hydraulic motor for two reasons. One is that using Neutral to stop the motor will do so in a fraction of a second. With both lines of the circuit closed, the motor will be forced to stop instantly from as much as 6000 RPM. This can cause damage to the motor shaft, oil seal and gerotor. The other type of failure mode caused by using the Neutral position is oil seal failure. The Neutral position of the spool valve can trap in excess of 1000 PSI in the remote circuit. While Hypro's oil seals are designed to withstand some of these pressure spikes, they are not designed to withstand them indefinitely.

Selecting the Right Pump (continued)

The Raise position is not recommended for “On” because the valve must travel through the Neutral position to get to Float.

System Types:

There are three types of hydraulic systems used on tractors. One utilizes a constant displacement pump and is called an Open Center System because of the spool valve employed. The other two use a variable displacement pump and are known as Closed Center (Pressure Compensated) Systems or Closed Center Load Sensing Systems based on the type of spool valve and system operation.

Open Center systems, while having constant displacement pumps, do change flow rates with engine RPM. It is, therefore, necessary to make adjustment to the hydraulic-driven pump with tractor engine speed as close as possible to what it will be operating at in the field. Hydraulic flow on many Open Center systems decreases when power steering is in use or when other hydraulic circuits are in use (i.e. when raising or lowering booms); consequently so does centrifugal pump flow. Typically the largest motor possible is recommended for these types of systems.

Closed Center (Pressure Compensating) systems have a variable displacement pump which will deliver flow at the necessary rate to maintain a specified pressure. It is desirable to equip implements with a motor of a low flow range that will cause the pump to operate between 1800 and 2100 PSI. Selecting a motor that is too large to operate in this pressure range may cause the generation of excess heat in the hydraulic oil, causing damage to the tractor’s transmission parts.

Closed Center Load Sensing systems are similar to pressure compensated systems, but are designed primarily for more efficient operation and the generation of less heat. They work on the principle of maintaining a constant pressure drop from the pump to the work port of the selector valve. Any variation in demand at the motor will cause a change in flow. The system senses this change in flow due to the change in pressure drop across the valve and causes the pump to compensate by varying the pump flow.

Hydraulic Plumbing:

Many tractor hydraulic systems route return lines through filters or other restrictive elements which can cause an increase in return circuit pressure. Hypro’s hydraulic motor oil seals are designed to withstand 300 PSI continuous operation and up to 600 PSI intermittently. This is well within the range of nearly every tractor’s return circuit pressure. However, whenever possible, it is recommended to utilize either a standard (or purchase an optional) low pressure return circuit. This will allow for less oil heat generation, lower horsepower consumption and longer oil seal life. Consult with your tractor manufacturer to see if your tractor is or can be equipped in this way.

The Return (or Tank) ports on Hypro hydraulic motors are equipped with an anti-reversing check valve. This is to prevent the motor from accidentally being operated backwards. Backward operation of the motor will cause almost immediate oil seal failure. **Do Not Remove Check Valve.**

HM2 and HM4 models of Hypro’s hydraulic motor-driven centrifugal pumps can be equipped with a metering orifice in the inlet port. The orifice is intended to be used on older model tractors with Closed Center systems that do not have flow control valves. Consult with your tractor manufacturer to determine if you have this type of system and require an orifice. Further information is available with your pump’s operating manual.

Hypro hydraulic motors are equipped with a bypass adjustment screw. These are only to be adjusted when used on Open Center hydraulic systems. Please see the installation instructions included with the pump for directions on how to use the bypass. Closed Center hydraulic systems do not require any bypass. Be sure that the bypass adjustment is screwed all the way in and the lock nut is tight when operating on Closed Center systems.

Installation Basics:

Open Center Systems

1. Do not use an orifice in the pressure adapter port.
2. Start the tractor. Leave the selector valve in neutral and achieve operation RPM and system temperature.
3. Open the bypass screw 4 turns.
4. With the pump inlet flooded, move the selector valve to the Lower position and allow hydraulic flow to the motor.
5. Adjust the bypass screw closed until the desired spraying pressure is achieved. Account for agitation flow.
6. Tighten the lock nut on the bypass screw.

Closed Center System-Pressure Compensating*

1. Install the #1 orifice in the pressure adapter port (HM2 and HM4 only).
2. Start the tractor. Leave the selector valve in neutral and achieve operating RPM and system temperature.
3. Close and lock the bypass screw.
4. With the pump inlet flooded, move the selector valve to the Lower position and allow hydraulic flow to the motor.
5. If spraying pressure is too low, replace the #1 orifice with the #2 orifice. Account for agitation flow.
6. If spraying pressure is still too low, replace the #2 orifice with the #3 orifice.
7. If spraying pressure is still too low, remove the orifice completely.

* Some closed center systems are equipped with flow controls (Tortoise/Hare), such as John Deere. Metering orifices are unnecessary in these systems. Follow the operation instructions for **closed center load sensing systems**.

Closed Center Load Sensing

1. Do not use an orifice in the pressure adapter port.
2. Start the tractor. Leave the selector valve in neutral and achieve operating RPM and system temperature.
3. Adjust the tractor's hydraulic flow control (Tortoise/Hare) to its lowest setting.
4. Close and lock the bypass screw.
5. With the pump inlet flooded, move the selector valve to the Lower position and allow hydraulic flow to the motor.
6. Adjust the hydraulic flow control valve (Tortoise/Hare), until the desired spraying pressure is achieved. Account for agitation flow.

IMPORTANT!

All hydraulic connectors on motor hoses and tractors must be clean. Any foreign particles can severely damage the motor and your hydraulic system. Know your hydraulic system! Hypro hydraulic motors will operate at a maximum of 2000 PSI continuously and 2200 PSI intermittently. Exceeding these pressures may seriously damage the motor.



When shutting off the pump, move the selector to the **"FLOAT"** position to allow the centrifugal pump to come to a stop gradually.



Make sure pump inlet is flooded prior to allowing hydraulic flow to the motor.

CODE KEY

- (1) Best recommendation for high performance applications.
- (2) Recommended for standard applications.
- (3) Will also work.
- (LS) Load Sensing Hydraulic System. On all closed center, load sensing hydraulic systems, run hydraulic motor on priority circuit.

Spray Mate™ II

AUTOMATIC RATE CONTROLLER



***REFERENCE
MANUAL***

MICRO-TRAK®

SprayMate™ II

AUTOMATIC RATE CONTROLLER

REFERENCE MANUAL

SprayMate II is an electronic control system that can help you achieve maximum yields and operate more cost-effectively by providing the information you need to maintain proper application rates of liquid chemicals and fertilizer. SprayMate II has been designed for easy installation and operation. However, since each installation will vary depending on your equipment, please take time to familiarize yourself with this manual and the actual components before beginning. Following the procedures described in this manual will ensure proper performance and help avoid problems or questions once you are in the field.

This manual is written for the SprayMate II, which may be used for either English, Metric or Turf measurement. Please read the manual carefully and follow the instructions as they apply to your usage.

If you do encounter a problem that cannot be corrected by reviewing this manual, consult your dealer or distributor, or contact a Micro-Trak technician for assistance.

Toll Free in U.S. or Canada: (800) 328-9613 or (507) 257-3600

Fax: 507-257-3001

E-mail: trakmail@micro-trak.com

Web: www.micro-trak.com



MICRO-TRAK®
SYSTEMS, INC.

P.O. Box 99
111 East LeRay Avenue
Eagle Lake, MN 56024-0099

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Printed in the U.S.A.

Micro-Trak® Warranty

Micro-Trak (herein "Seller") warrants to the original purchaser (herein "Buyer") that, if any product or part of the product (herein "part") proves to be defective in material or workmanship, upon inspection and examination by Seller, within one (1) year from the original date-of-purchase, and is returned to Seller with dated proof-of-purchase, transportation prepaid, within thirty (30) days after such defect is discovered, Seller will, at their option and sole discretion, either repair or replace said part, except that the warranty for expendable parts, including but not limited to, light bulbs and batteries shall be thirty (30) days from the original date-of-purchase. Said warranty is valid only when the part has been installed, operated and maintained in strict accordance with the procedures outlined in the manual. Any damage or failure to said part resulting from abuse, misuse, neglect, accidental or improper installation or maintenance, unauthorized modification, use with other products or attributable to acts of God, as determined solely by the Seller, will invalidate the warranty. Said part will not be considered defective if it substantially fulfills the performance specification. Buyer shall be responsible for all maintenance services, if any, all in strict accordance with the procedures outlined in the manual. The warranty does not include labor, installation, replacement parts or repairs, delivery of replacement parts or repairs or time and travel. Said warranty is non-transferrable.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. The Seller's liability, whether in contract, in tort, under any warranty, in negligence or otherwise, shall not exceed the return of the amount of the purchase price paid by the Buyer, and under no circumstance shall the Seller be liable for special, indirect or consequential damages. Seller neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part. No action, regardless of form, arising out of the transactions under this agreement may be brought by the Buyer more than one (1) year after the cause of action has occurred.

Seller agrees to extend the term of the foregoing warranty period should the Buyer return completed warranty registration information, with dated proof-of-purchase, to the Seller within one (1) year from the original date-of-purchase. All conditions and limitations of said foregoing warranty, except the term of said foregoing warranty, shall apply. Said term shall be extended to a total of three (3) years from the original date-of purchase on display consoles and network communication modules, as defined by Seller, and said term shall be extended to a total of two (2) years from the original date-of-purchase on all other parts, except that the warranty for expendable parts, including but not limited to, light bulbs and batteries shall be thirty (30) days from the original date-of-purchase, and except that the warranty for parts manufactured by someone other than the Seller, including but not limited to, shutoff and control valves, DGPS receivers, memory cards and drives, mapping software, flowmeters and pressure sensors shall be one (1) year from the original date-of-purchase.

Buyer accepts these terms and warranty limitations unless the product is returned to Seller, via proper distribution channels and approved return authorization, with dated proof-of-purchase, transportation prepaid, within fifteen (15) days from the date-of-purchase for refund of the purchase price.

Units under warranty should be sent prepaid, with dated proof-of-purchase, within 30 days of discovering defect, to the address below:

MAIL and UPS:

**Micro-Trak Systems, Inc.
Attn.: Service Department
P.O. Box 99
111 East LeRay Avenue
Eagle Lake, MN 56024-0099**

EXTENDED WARRANTY OPTION

It's simple! Just complete the enclosed registration card(s) for this product and mail it in and we'll extend your warranty for up to three years*, at no additional charge.

MAIL IN YOUR REGISTRATION CARD(S) TODAY!

Registration Card information is for internal use only.

* Some limitations apply. See warranty statement for details.

At Micro-Trak Systems, we believe a product that delivers quality and performance at a low cost is what is needed to help today's operator and the operator of the future compete in the world market.

It is our goal to provide operators with a line of electronic equipment that will help build and maintain an efficient and profitable operation that can be passed on to future generations.

We thank you for your purchase and hope that we can be of service to you in the future.

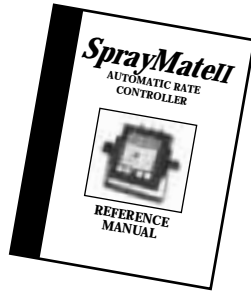
Micro-Trak Systems, Inc.

Component Parts and Assembly Hardware

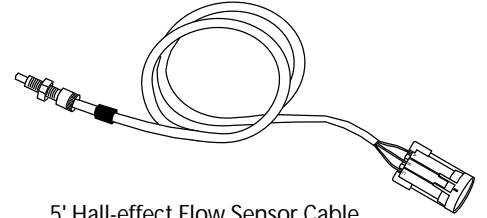
Before beginning installation, check the carton contents for the following items:



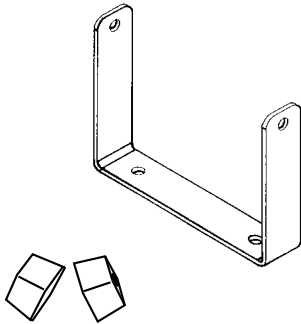
SprayMate™ II Console
P/N 14869



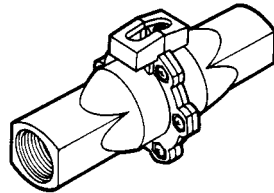
Owner's Manual
P/N 14943



5' Hall-effect Flow Sensor Cable
with threaded sensor. P/N 13096



Console Mount Kit
P/N 13181



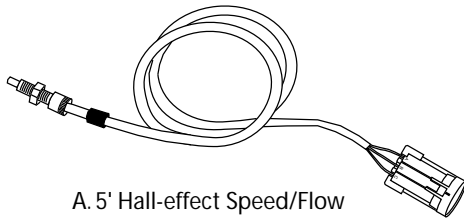
FM750 GFN (P/N 11501)
Flowmeter

M-T 1" Electric Servo Valve
P/N 14928

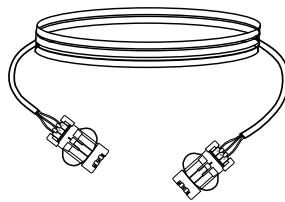


Speed Sensor Kit P/N 01531 (1)

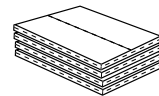
Including items A-G, below:



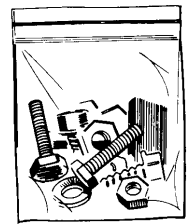
A. 5' Hall-effect Speed/Flow
Sensor Cable P/N 13096



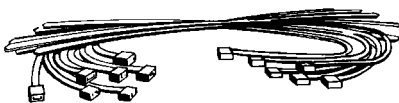
C. 15' 3-Pin Extension Cable
M/P 150 P/N 13207



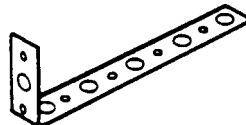
E. Magnets (6) P/N 12069
(2 in hardware bag)



F. Hardware Bag
P/N 13251



B. 14" Nylon cable ties (10)
P/N 12910

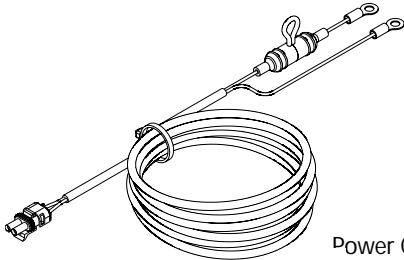


D. Speed sensor
mounting bracket
P/N 10013

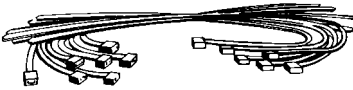
Component Parts and Assembly Hardware (Continued)



Boom/ Servo/Flow Harness
P/N 14313



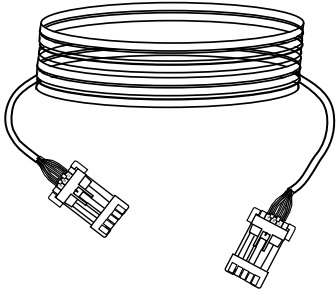
Power Cable
P/N 14315



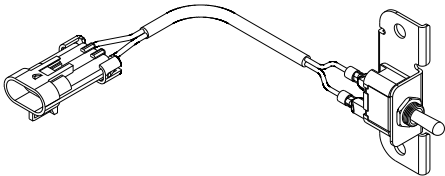
14" Nylon cable ties (10)
P/N 12910



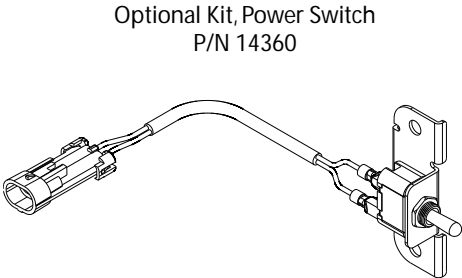
72" ignition cable
P/N 14314



120" 10-pin extension cable
P/N 14316



Kit, Run/Hold Switch
P/N 14361



Optional Kit, Power Switch
P/N 14360

Putting It All Together

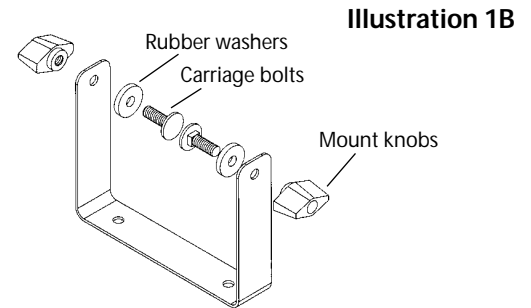
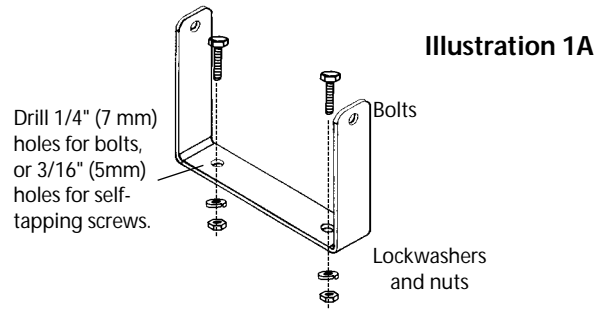
Installation

Mounting the Display Console

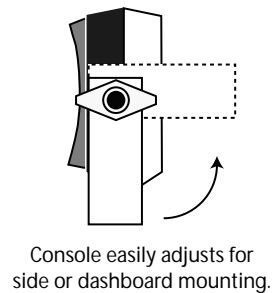
Select a mounting location which seems most workable, and that best fits your needs. It should be convenient to reach and highly visible to the operator. **DO NOT INSTALL IN A POSITION THAT OBSTRUCTS THE VIEW OF THE ROAD OR WORK AREA.** Whenever possible, avoid locations that expose the console to direct sunlight, high temperature, strong chemicals or rain.

Place the mounting bracket in selected location, mark holes, drill 1/4" (7mm) holes for bolts, or 3/16" (5mm) holes for self-tapping screws. (Use self-tapping screws if not practical to use bolts.) See *Illustration 1A*.

Put rubber washers on carriage bolts and put the bolts through the bracket holes from the inside out. Loosely attach the mount knobs onto the bolts. Place console over carriage bolt heads and tighten knobs to secure the console. See *Illustration 1B*.



CONSOLE END VIEW



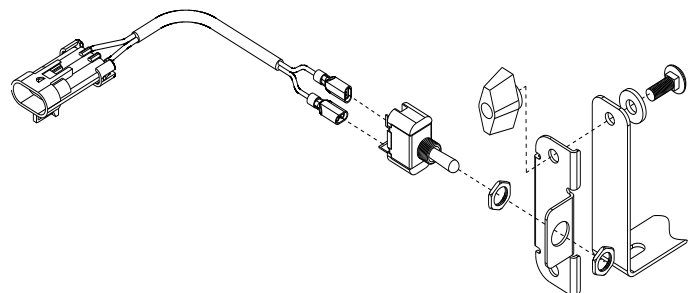
Attaching the Power and Run/Hold Control Switches

Mounting the Run/Hold Switch Kit

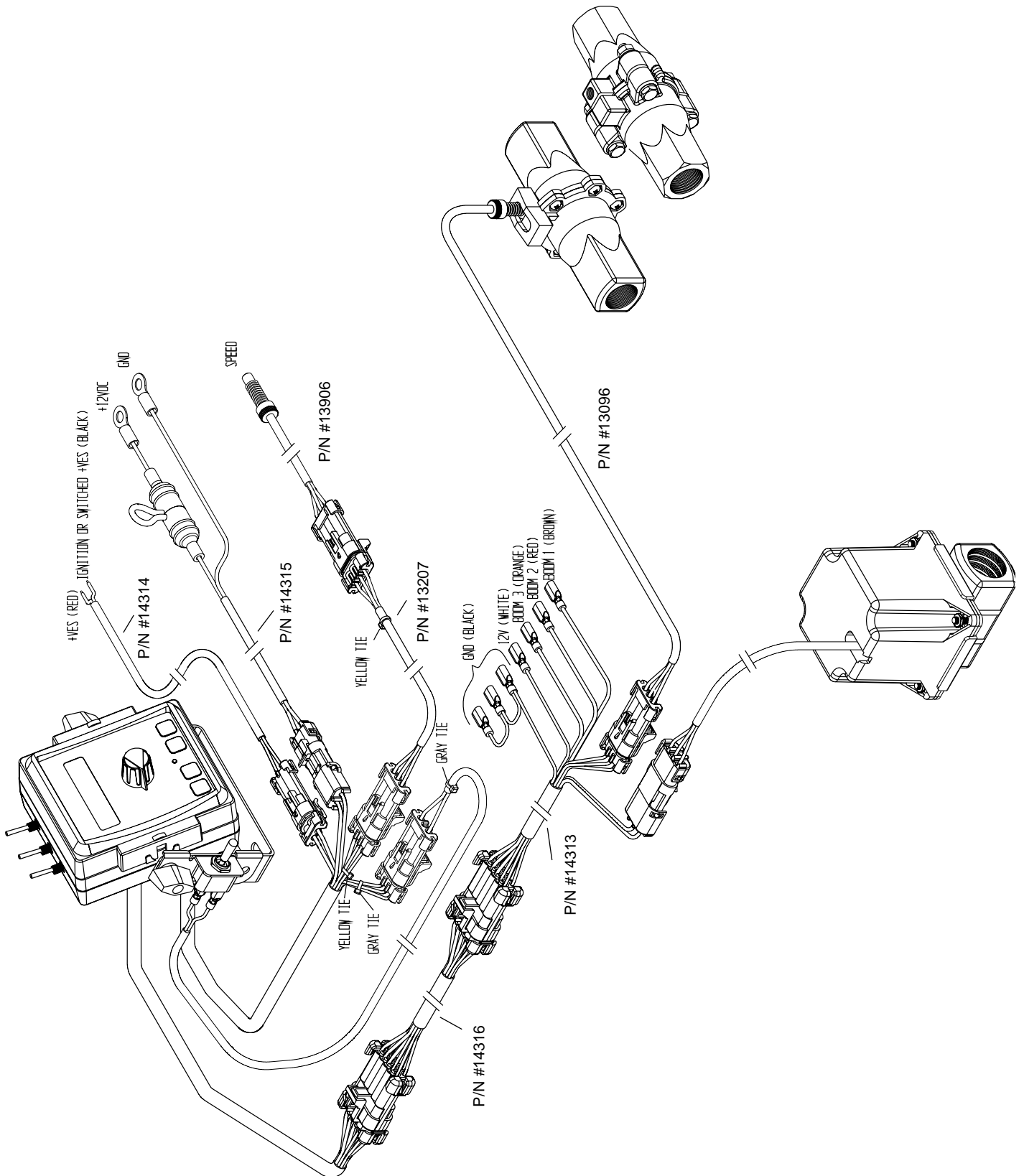
Remove the mount knob from either side of the console. Install the bracket over the carriage bolt and along side the console bracket. Install the mount knob on the carriage bolt and tighten to secure the console and run/hold switch bracket in place.

Install the switch in the bracket and attach the quick disconnects on the switch harness to the switch. Then install the switch harness connector into the mating connector (gray tie) on the console harness. An optional power (console on/off) switch kit is also available, (P/N 14360).

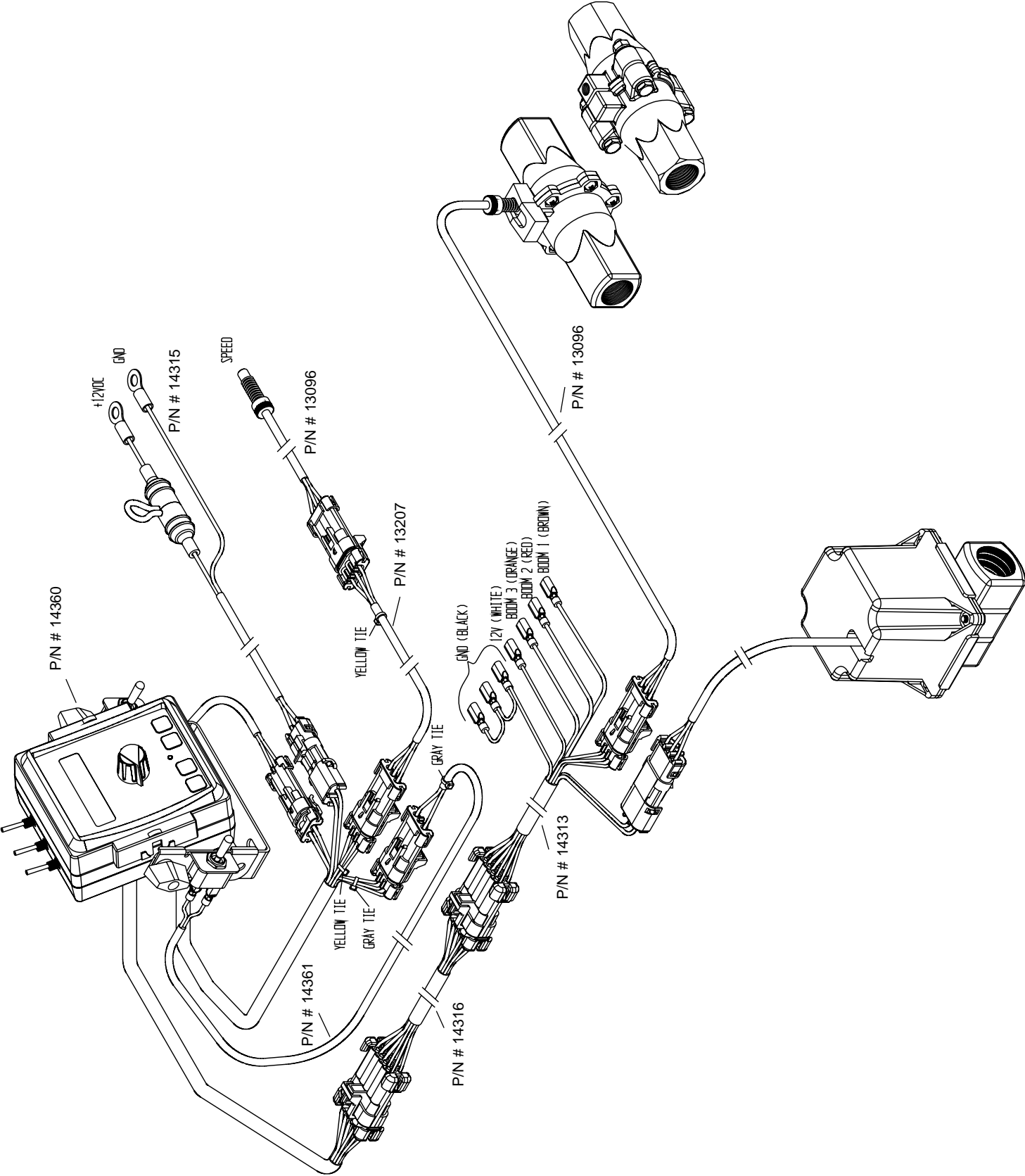
Console Run/Hold Switch Bracket



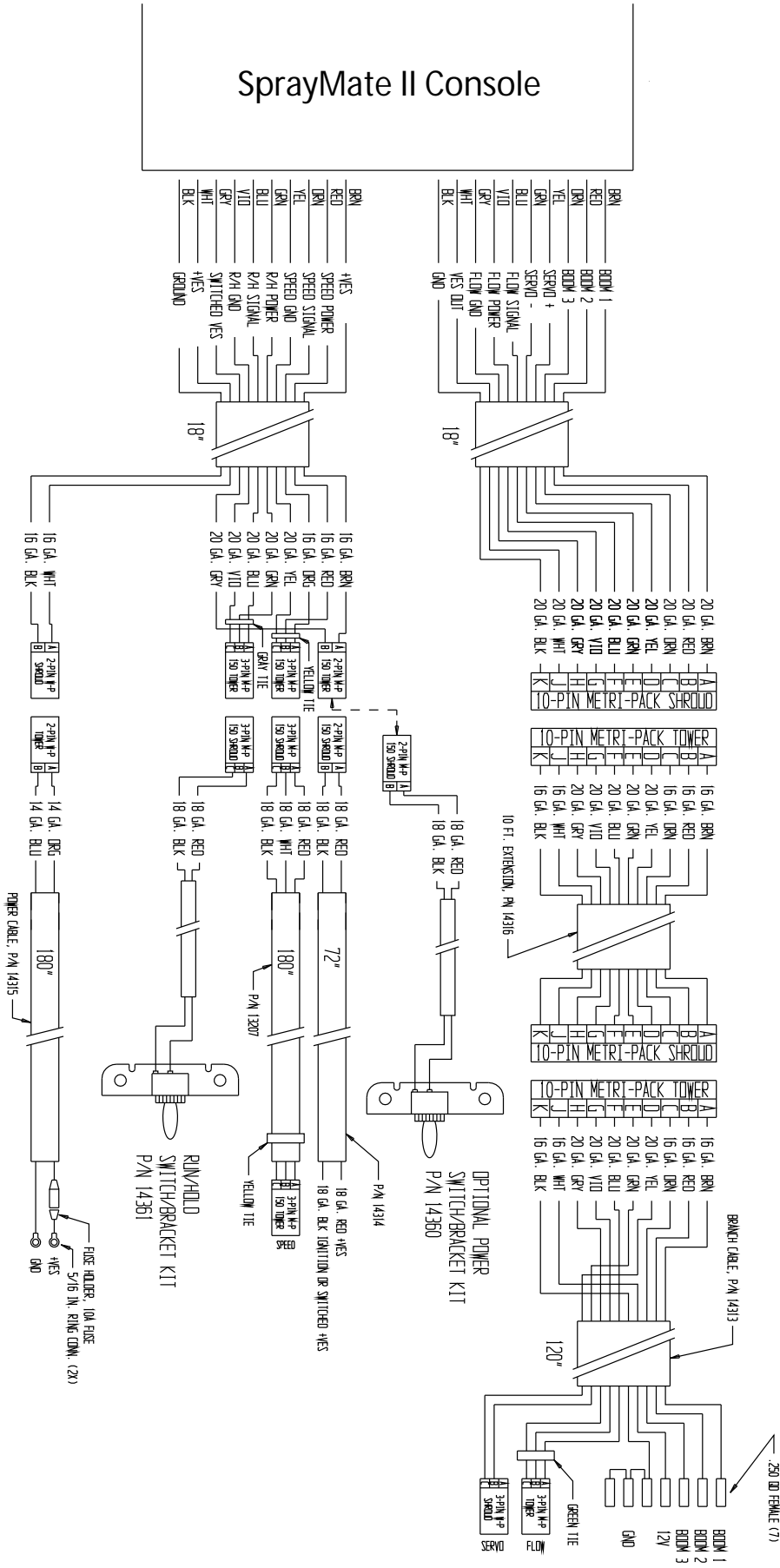
SprayMate II System Overview (with ignition switch hookup)



SprayMate II System Overview (with optional Power switch)



SprayMate II Wiring Overview



Electrical Installation

This section explains how to connect your SprayMate II to a 12-volt power source, and how to connect your boom shut-off valves.

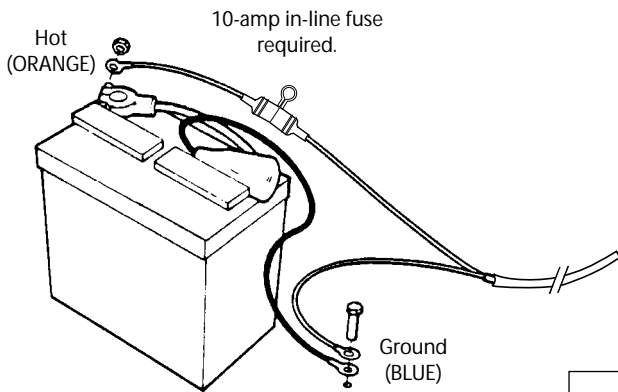
NOTE: The SprayMate II must be connected to a 12-volt DC negative ground electrical system.

POWER/BATTERY CONNECTION:

Locate the power cable for the SprayMate II and route to the battery. When routing cable to console, avoid areas where the cable may be subjected to abrasion or excessive heat. Attach the BLUE wire (ground) to a screw or bolt on the equipment frame. See *Illustration 2*. Be sure there is a good metal-to-metal contact. Connect the ORANGE wire to the positive battery terminal.

Connect the power to the SprayMate II console by plugging the 2-pin W/P tower on the power cable into the 2-pin W/P shroud of the display console.

Illustration 2



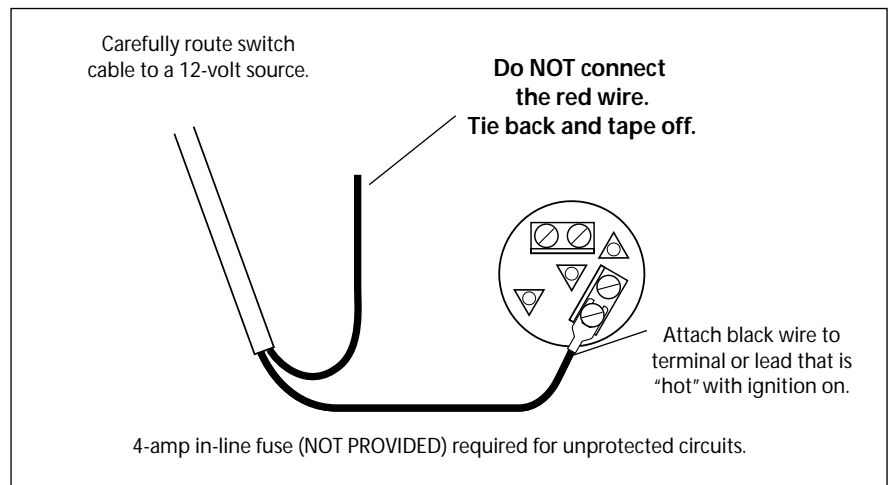
ON/OFF SWITCH CONNECTION:

The SprayMate II system includes a provision for either using a switched (ignition) source or an optional power switch to turn the system on.

If the optional power switch is used, simply mount the switch bracket as shown on page 7, and plug the connector into the mating cable from the console. If you want to use the ignition switch to turn the system on and off, route the ignition cable (P/N 14314) from the console to the switched source, plug the connector into the mating plug for the console and connect the black wire to the switched power source as shown in *Illustration 3* (terminal or wire). Do NOT connect the red wire. Use your test light to locate a terminal or wire connected to your ignition switch which is "hot" when the ignition is turned on and "dead" when the ignition is off.

Your SprayMate II is equipped with a non-volatile memory which does not require a constant supply of power to retain daily totals or calibration values. This type of memory conserves battery power and will not discharge the vehicle's battery when equipment is not in use.

Illustration 3



Connecting to ignition to turn SprayMate II system on/off.

SprayMate II Boom Connections

Illustration 4A

BOOM SHUT-OFF VALVES: Locate solenoid boom valve wires. Connect cables to appropriate booms. Apply silicone grease to solenoid terminals to avoid corrosion.

Connect ground wire tabs to ground connections on valves.

Note: 16-gauge WHITE wire is auxiliary power for use with motorized ball valves ONLY. Tie back and tape off to avoid shorting (if not used).

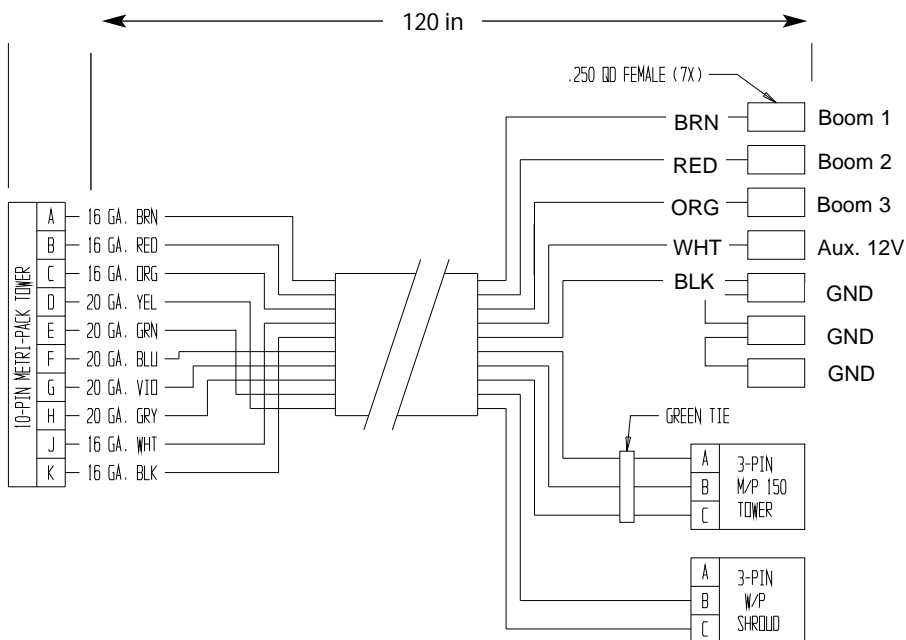
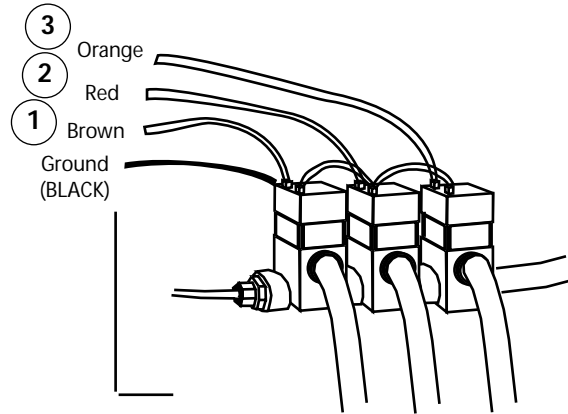
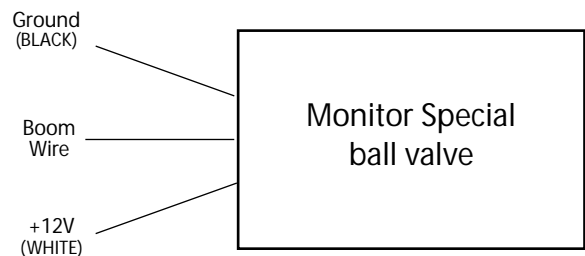


Illustration 4B

If using 2-wire ball valves, contact a Micro-Trak representative for assistance.



Speed Sensor Installation

Please Note: If you have purchased a Vansco speed sensor, disregard the following section on magnetic speed sensors and install the Vansco as described in the instructions included with the unit.

Locations where the sensor may be installed:

1. Non-driven wheel on tractor, vehicle or implement. This is less susceptible to errors resulting from wheel slip.
2. Tractor, vehicle or planter drive shaft. This type of mounting is recommended for trucks, four-wheel drive tractors or other equipment that has poor or no access to a non-driven wheel.

Locate the following parts:

- Speed sensor cable (Green body)
- Mounting "L" bracket
- Magnets
- Cable ties

Magnets

Please read the following information about magnet spacing and polarity.

The number of magnets that must be used depends on the size of your tire and where you mount the sensor. On tractor or implement wheels the general rule of thumb is one magnet for each wheel bolt (minimum of two, and *always* an even number). For drive shafts or small wheels (ATV's), two magnets are usually adequate.

Some installations may require that more than two magnets be installed. To determine the number of magnets required, measure the distance traveled of one revolution of the sensor equipped wheel in inches (centimeters).

See the following tables to find the minimum number of magnets required (always an even number) -

English or Turf (inches)

Wheel Circumference:	40	80	120	160	200
Number of Magnets:	2	4	6	8	10

Metric (cm)

Wheel Circumference:	100	200	300	400	500
Number of Magnets:	2	4	6	8	10

The magnets provided by Micro-Trak are marked with a punched dashed line on the SOUTH pole side of the magnet. See *Illustration 5A*.

Always use an even number of magnets, and always alternate the polarities of the magnets as you go around the wheel hub or drive shaft.

To install, mount the first magnet with the SOUTH pole side (dashed line) facing toward the hub or shaft. Mount the second magnet with the NORTH pole side facing toward the hub or shaft. See *Illustration 5B*.

For proper operation, the magnets must be evenly spaced around the wheel or drive shaft. The magnets must be at least 1" apart. See *Illustration 5C*.

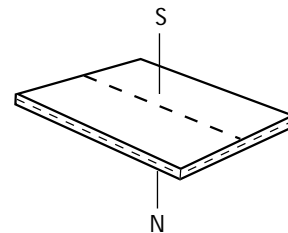


Illustration 5A

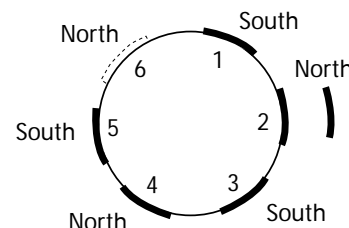
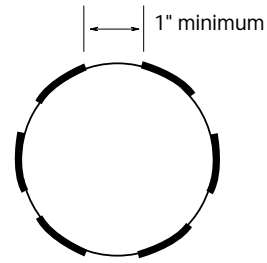


Illustration 5B

Test magnet should alternately attract and repel.

NOTE: Magnets may be attached mechanically or adhered with epoxy or other high quality adhesive. When using adhesive, thoroughly clean the area of dirt and oil.

Illustration 5C

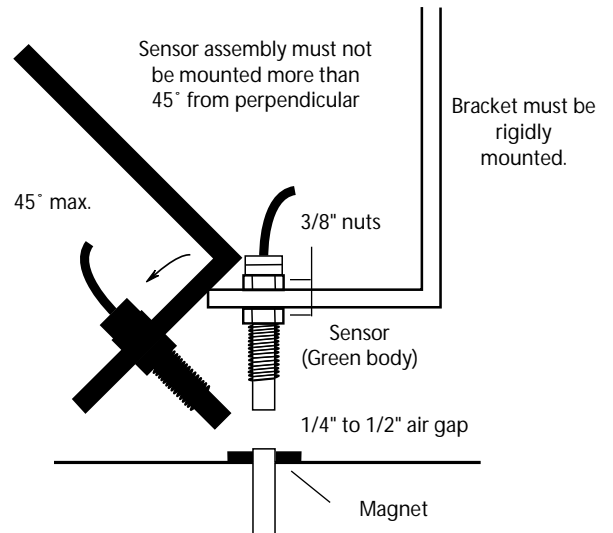


Attaching the Speed Sensor

The magnets are attached to a wheel hub or drive shaft and the speed sensor is mounted directly over the magnet. When the wheel or drive shaft begins turning, a speed impulse is sent to the SprayMate II console every time a magnet passes by the tip of the speed sensor. For the speed sensor to operate properly, the spacing between the magnets and the tip of the sensor must always remain constant. Before permanently mounting any parts, be sure that the location you have selected will meet the requirements shown in Illustration 6.

NOTE: Observe magnet polarities (see previous section).

Illustration 6



Connecting the Speed Sensor Cable

The speed sensor cable has a GREEN sensor body and mates with the 3-pin connector which is marked with a yellow cable tie. The speed sensor and the flow sensor are identical, but must be connected to the proper harness connector. The speed sensor always connects to the 3-pin M/P connector with the YELLOW tie and flow sensor always connects to the 3-pin M/P connector with the GREEN tie. See *SprayMate II Wiring Diagram on page 10*.

The optional Run/hold sensor, also uses the same type of connector as the speed and flow sensors. However, the Run/hold sensor has a GRAY tie near the 3-pin connector, the sensor body is BLACK, and it always connects to the main harness lead with the GRAY tie. See *SprayMate II Wiring Diagram on page 10*.

SENSOR IDENTIFICATION CHART

Sensor	Sensor Body Color	Main Harness Tie Color
Speed	Green	Yellow
Flow	Green	Green
Run/Hold	Black	Grey

Speed Sensor Options

In addition to the standard Hall-effect magnetic speed sensor, the SprayMate II may be interfaced with a variety of other speed sensing equipment. Several options are listed below.

Vansco™ Radar Speed Sensor

The Vansco radar speed sensor uses a microwave (radar) signal to deliver a reliable, accurate speed signal for electronic equipment. It features state-of-the-art electronic design/manufacturing, rugged aluminum housing and complete testing and certification.



Vansco Radar Speed Sensor

Radar Interface

The SprayMate II may also be interfaced with most popular radar ground speed sensors. An adapter cable is required for proper interface.

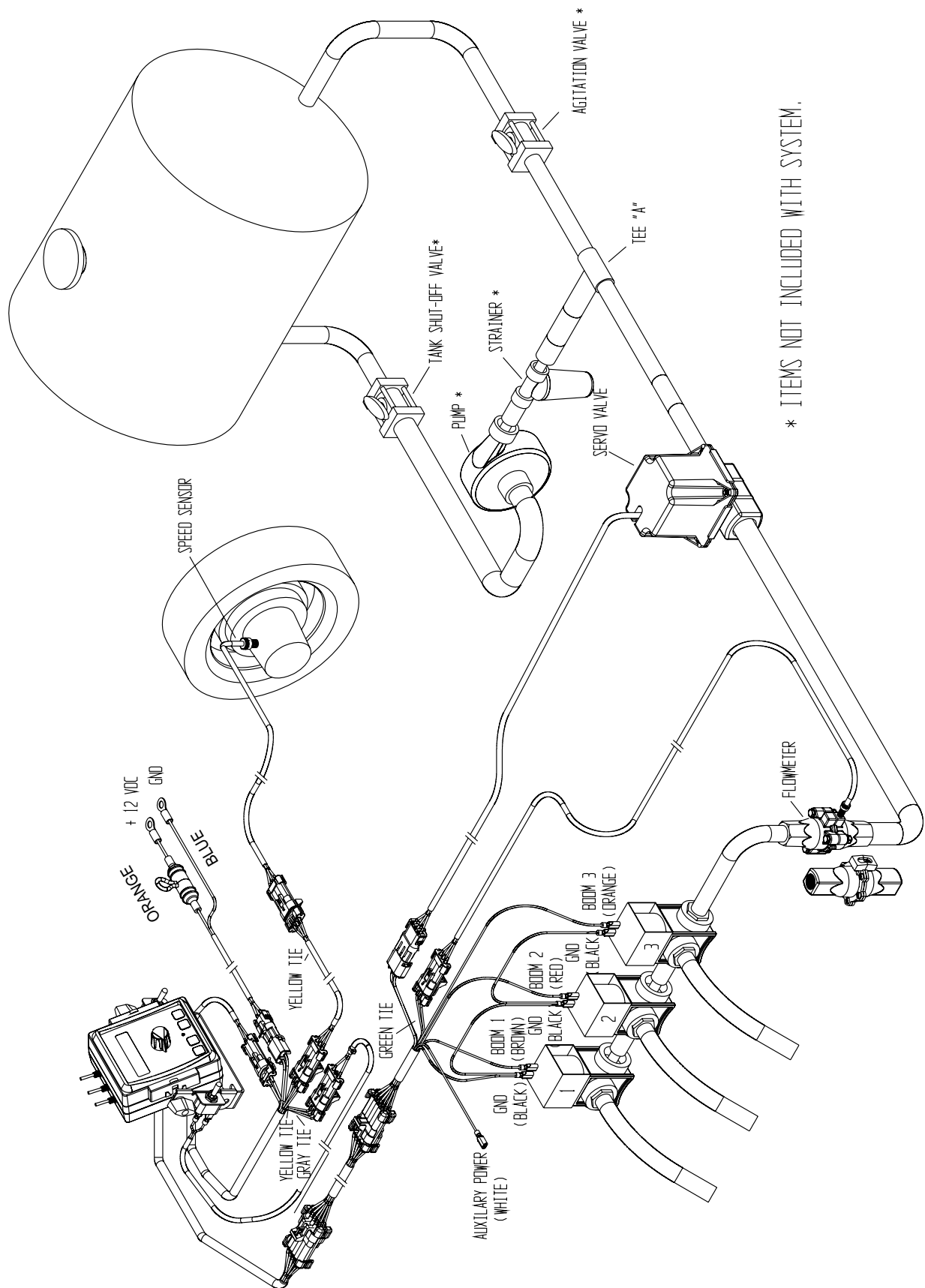
SEE APPENDIX E FOR LIST OF ADAPTER CABLES FOR RADAR.

GPS Speed Sensor Interface

The SprayMate II may also be used with most GPS speed sensors that output a pulsed signal, such as SkyTrak or Dickey-John GPS speed sensors. An adapter cable may be required.

**Contact a Micro-Trak sales representative for details on any of these products,
or call Micro-Trak Systems, Inc. at 1-800-328-9613.**

SprayMate II Plumbing Overview In-Line Configuration



* ITEMS NOT INCLUDED WITH SYSTEM.

SprayMate II Console Functions

The SprayMate II features a large, easy-to-read liquid crystal display, easy-to-use rotary dial and lighted panel for night use.

VOLUME (1) (2) (3) : Displays total gallons (liters) or lbs. (kg) of NH₃ applied. May be reset. (Note: VOLUME and AREA counters work in pairs, if VOLUME counter 1 is reset, it also resets AREA counter 1.

AREA (1) (2) (3): Keeps a running count of the total acres (hectares) worked. May be reset. (Note: VOLUME and AREA counters work in pairs, if AREA counter 1 is reset, it also resets VOLUME counter 1.

VOLUME/MINUTE: Displays total gallons (liters) of liquid applied per minute, or lbs. (kg) NH₃ per minute.

TANK: Displays gallons (liters) of liquid remaining or lbs. (kg) of NH₃ remaining.

RATE: Displays application rate GPA(LPH), or lbs. N/acre (kg of N/hec).

DISTANCE: Displays distance traveled in feet (meters). May be reset.

AREA/HOUR: Displays current work rate in acres per hour (hectares per hour).

SPEED: Displays ground speed in miles per hour (kilometers per hour).



WARNING LIGHT: Indicates over or under application of 10% of the Target Rate. Also lit when in CAL.

Calibration Positions

Calibration Positions

FLOW CAL: Used in calibration mode to enter the calibration value assigned to your flowmeter (see flowmeter tag.)

WIDTH CAL: Used in calibration mode to enter the working width of your sprayer booms or other equipment.

MIN FLOW: Used in the calibration mode to enter the minimum flow rate (GPM/LPM) of the spray boom.

SPEED CAL: Used in calibration mode to enter the speed calibration number in inches (cm) per pulse.

ADJUST RATE: Used in calibration mode to enter an amount of change for on-the-go adjustments to the target rate (GPA/LPH), or lbs/acre (kg/hec) N.

INLINE/BYPASS: For establishing servo polarity. (If servo is in the main spray line, select "Inline". If servo is installed in a return line, select "Bypass".)

TARGET RATE: Used in calibration mode to enter the target application rate (GPA/LPH) or lbs/acre (kg/hec) N.

TEST SPEED: Used in calibration mode to enter a test speed in miles per hour (kilometers per hour).

Key Functions:



AUTO/MAN: Key which changes operation from automatic control to manual.

CAL: This key is used to enter & exit the calibration mode.

PROGRAM KEYS: Used to increment and decrement the different calibration values.

- RESET when not in CAL, clears the selected counter when held for two seconds.
- When in CAL, the "+" key increases and the "-" decreases the value displayed.

Calibration

English or Metric?

The SprayMate II is capable of displaying information in American English or standard Metric measurement. The SprayMate II is shipped from the factory programmed for English. **Note that the following procedures will also load factory default calibration values.** To simply change units without loading defaults, see the "Special Calibration" section.

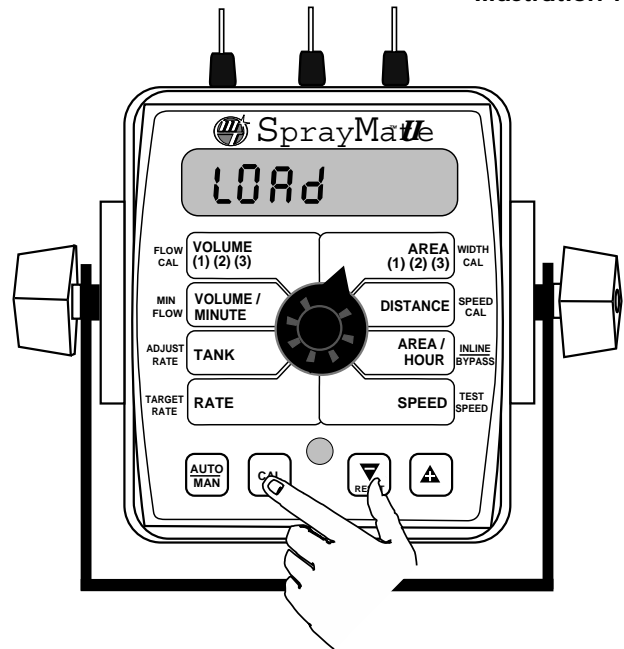
METRIC

- You must be in HOLD or have all booms OFF to enter Cal. To activate the Metric mode, turn power OFF and place the rotary switch at "AREA." Hold down both the "CAL" and "-" keys and turn power ON. See Illustration 13. The console will display LOAd for two seconds. Once LOAd is displayed, release the two keys. To "lock-in" Metric mode you must enter and exit calibration. Press and hold the CAL key until "CAL" icon appears on the display. The console is now in calibration and Metric mode is selected. Exit CAL by pressing and holding the "CAL" key until CAL disappears from the display (approximately 1 second). **NOTE: you must exit CAL to lock in Metric units.**

ENGLISH

- You must be in HOLD or have all booms OFF to enter Cal. To activate the English mode, turn power OFF and place the rotary switch in the VOLUME position. Hold down both the "CAL" and "-" keys and turn power ON. The console will display LOAd. Once LOAd is displayed, release the two keys. To "lock-in" English mode you must enter and exit calibration. Press and hold the CAL key until "CAL" lights on the display. The console is now in calibration and English mode is selected. Exit CAL by pressing and holding the "CAL" key until CAL disappears from the display (approximately 1 second). **NOTE: you must exit CAL to lock in English units.**

Illustration 13

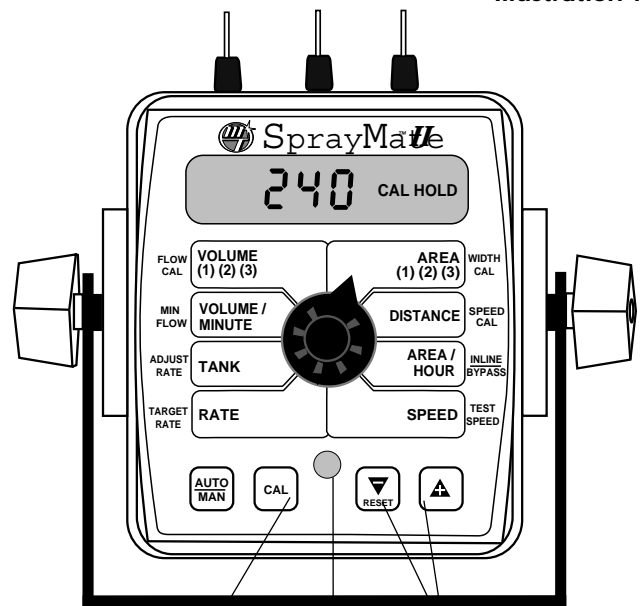


NOTE: In metric, the width will have a decimal point, in English there is no decimal point. Also, changing from English to Metric mode may change or alter any previously entered calibration values. After switching measurement modes, confirm that all calibration values are correct.

Illustration 14

In all calibration operations:

- Turn all boom switches OFF or put system in "HOLD".
- Press and hold the "CAL" key for 1 second to select the calibration mode. The console display will display the "CAL" icon, the currently selected calibration value, and the red warning light will turn on.
- Turn the rotary dial to the desired "CAL" position. Then use the "+" or "-" key to adjust the displayed value up or down as needed. Adjust ALL necessary values. See Illustration 14.
- Hold the "CAL" key again for 1 second to exit calibration. "CAL" will disappear from the display. **NOTE: You must exit CAL to save changes.**



Press to enter or exit calibration mode. Press to increase or decrease values.

Red warning light will be lit when in CAL.

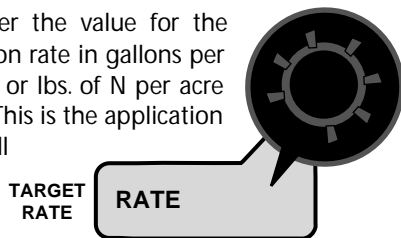
Entering Calibration Values:

To enter or change any of the system's calibration values, you must enter calibration mode. To enter calibration mode, STOP the vehicle, turn all booms OFF or put the console in HOLD and press and hold the CAL button until the "CAL" icon appears (approximately one second). (NOTE: Calibration may be entered while moving, but it is not recommended to attempt calibration while the vehicle is moving.) The console will remain in calibration mode, with the RED warning light illuminated until you exit calibration or turn power OFF.

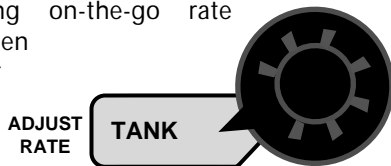
Once in calibration mode, you may change any one, all, or none of the values, in any order.* To select a calibration position, simply turn the rotary selector to the desired position. Calibration positions are identified by the WHITE labeling on each side of the rotary selector. All values are entered and adjusted using the "+" and "-" buttons on the front panel.

*Test speed must be last.

TARGET RATE: Enter the value for the desired target application rate in gallons per acre (liters per hectare) or lbs. of N per acre (kgs of N per hectare). This is the application rate that the console will lock onto when operating in AUTO.



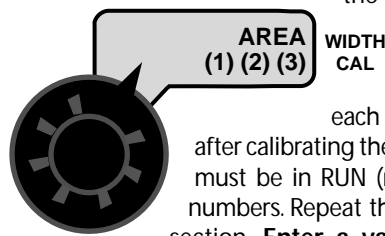
ADJUST RATE: Enter the value for the desired amount of change in gallons per acre (liters per hectare) to be used for making on-the-go rate adjustments when operating in AUTO. For example, if a value "1.0" is entered, you will be able to increase or decrease your application rate in one-gallon (liter) or lb. (kg) increments during operation in AUTO. To disable this feature, simply enter ".0" for a value.



INLINE/BYPASS: The display will show InLinE or bYPASS. Use the "+" or "-" buttons to toggle to desired selection. Inline is used when the servo is in the line going out to the booms; Bypass is used when the servo is in a return line. **NOTE: if used on an NH3 system, it must be set to Bypass.**



WIDTH: Enter the effective working width, in inches (meters) for the boom section currently shown on the display. It is simplest to start with all booms ON and then turn each boom OFF, from left to right, after calibrating the width. Note that the system must be in RUN (not HOLD) to display boom numbers. Repeat this procedure for each boom section. **Enter a value of "0" (.000) for any unused boom sections.**

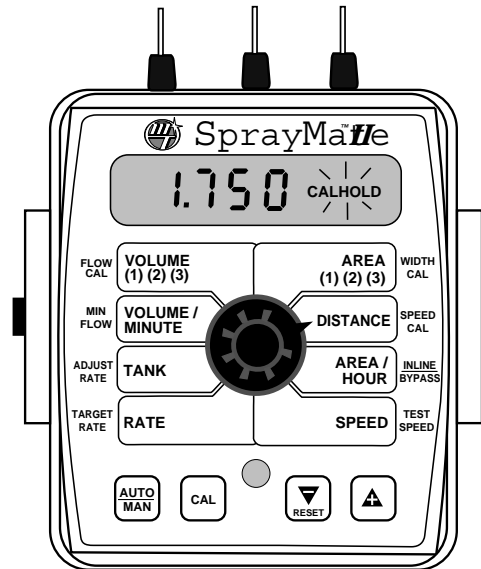
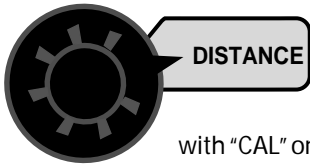


Your "working" width per boom section will be the number of nozzles on the boom section times the nozzle spacing in inches (mm). For example, if you have 7 nozzles spaced at 20 inches, the working width of the boom section is 140 inches. See Illustration below.

CAUTION: If spraylines are pressurized, nozzles may spray during this step.

Illustration 15

SPEED CAL: This position is used to calibrate the speed sensor for accurate speed and distance measurement. When this position is selected, the display will show THE SPEED CAL value. The SPEED CAL value is the number shown along with "CAL" on the display. See Illustration 15.



SPEED CAL FOR RADAR OR GPS SPEED SENSORS:
See the following table for SPEED CAL numbers to enter for various radar models or GPS speed sensors. To fine tune the SPEED CAL number, see Appendix B on page 46.

Radar or GPS Speed Sensor Calibration

Radars	Hz/MPH	English Cal # in.	Metric Cal # cm.
Vansco	58.90	.150	.38
Raven	59.80	.148	.38
Magnavox	57.40	.154	.39
Dickey-john (Radar Velocity Sensor II)	58.94	.149	.38
	44.21	.199	.51
(NOTE: Dickey-john radars may be factory calibrated for any of these four settings)	27.64	.319	.81
	17.034	.518	1.32
GPS Speed			
SkyTrak (MT)	9.82	.910	2.31
SkyTrak (Std.)	58.94	.150	.38
Dickey-john	42.00	.210	.53
John Deere (In-Cab Speed Signal)	44.70	.197	.50

Determining the SPEED CAL

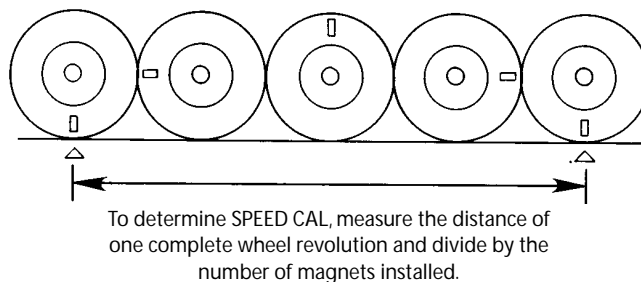
For the console to calculate the correct speed and measure distance accurately, the circumference of the sensor-equipped wheel must be entered. Determine the circumference of the sensor-mounted wheel to the nearest tenth of an inch (tenth of a centimeter) with the following method:

METHOD: Mark the tire with a piece of chalk and measure the distance traveled on the ground for one complete revolution. See *Illustration*. For improved accuracy, it is recommended that you perform this function in field conditions, measure several revolutions, and take the average.

Divide the measured revolution by the number of magnets installed to get your starting SPEED CAL calibration value. Once calibration of the system is complete, this number should be fine-tuned for optimum accuracy.

For fine-tuning the SPEED CAL value, see Appendix B on pages 45-46.

Illustration 16



Drive Shaft Speed Sensor Calibration

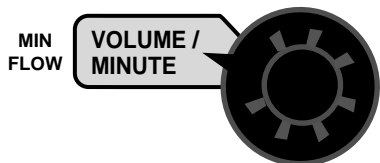
NOTE: If you have mounted the magnetic speed sensor on a wheel, skip this step and go on to Fine Tuning Speed/Distance Calibration Values.

Because of the difference in wheel-to-drive shaft ratios, it is difficult to determine a calibration value for installation on a drive shaft by measuring a wheel. You must start with an estimated calibration value and then fine-tune the calibration.

Any number between 10 and 15 (255 mm to 380 mm) is a good starting value.

NOTE: For fine-tuning the SPEED CAL value, see Appendix B on pages 45-46.

MIN FLOW: The purpose of this calibration value is to prevent the system from applying below the recommended minimum rate for the nozzles. The *minimum* flow rate in gallons per minute (liters

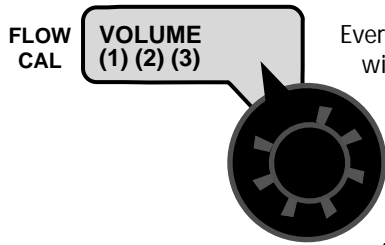


per minute) based on the nozzles being used, for the entire boom on the sprayer. **DO NOT enter the actual flow of your spray application.** For

example: If the minimum flow rate for the nozzle you are using is .22 GPM at their minimum recommended pressure and your boom has 20 nozzles, enter 4.4 as the MIN FLOW value (.22 x 20 = 4.4). The system **WILL NOT** apply at a rate lower than this value when spraying in AUTO. This value should be checked/ changed for each different nozzle that you use.

APPLICATION NOTE: Over-application may occur with MIN FLOW set if ground speed is too slow.

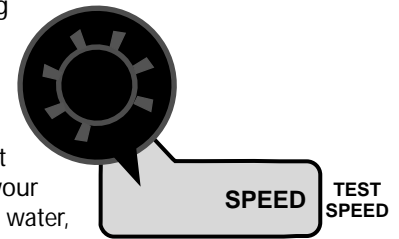
FLOW CAL: This position is used to calibrate the flowmeter for accurate liquid measurement.



Every flowmeter is calibrated with water at the factory and assigned a "FLOW CAL" value to make it operate properly with the SprayMate II console. This number is stamped on the metal tag

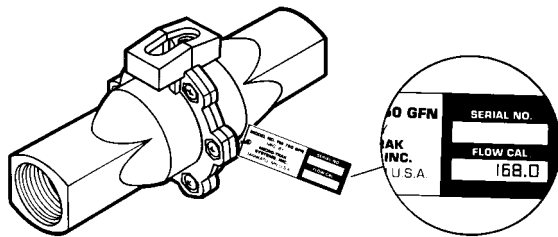
attached to the flowmeter. See *Illustration 17*. This is a starting point only. If your spray solution has a specific gravity or viscosity that is different than water, flowmeter calibration should be done for the specific solution (please refer to Fine-Tuning Flowmeter Calibration in Appendix C on page 48.)

TEST SPEED: Test speed is a built-in ground speed simulator that is used in performing pre-field checks. When a typical operating speed is entered, the SprayMate II will respond as if you were actually driving that speed. It allows you to simulate your spraying application with water, while remaining stationary, to make certain that all of the equipment is operating properly and that your sprayer can actually perform the intended application. Test speed is cancelled by exiting CAL. Test speed will not accumulate Distance or Area measurements.



EXITING CALIBRATION: Upon completion of the calibration process, exit calibration by pressing and holding the CAL button until the RED warning light turns off (approximately three seconds). Basic calibration is now complete. **BEFORE** beginning application, confirm that the system is set up to do the job that you want it to. Please refer to Pre-Field System Checkout to confirm calibration settings, nozzle selection and overall system performance. **NOTE: You must exit CAL to save any changes.**

Illustration 17

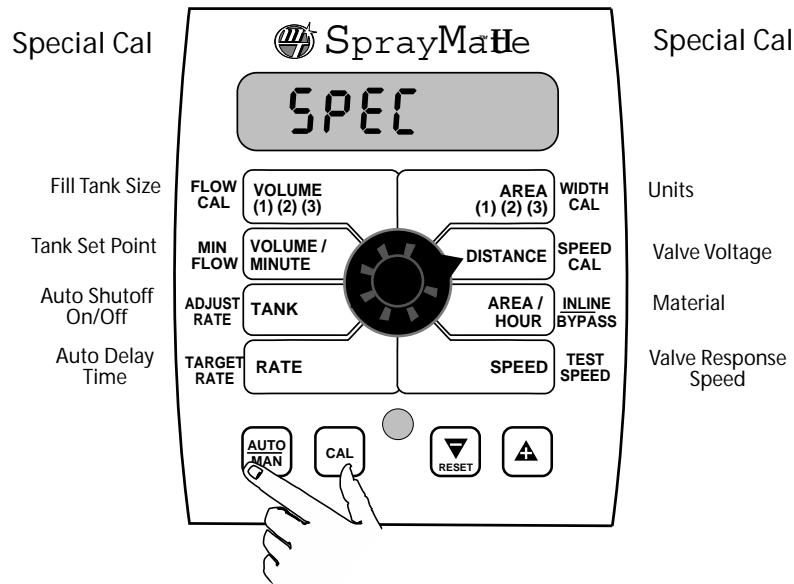


Factory-Loaded Calibration Values

Calibration Factor	Measurements Affected	Default Values	
		English	Metric
TARGET RATE	Application Rate in Auto	10.0 gallons/acre	100.0 liters/hectare
ADJUST RATE	Amount of increase or decrease per +/- press (in auto)	1.00 gallons/acre	10.00 liters/hectare
BOOMs 1- 3 WIDTH	Area, App. Rate	240 inches	6.000 meters
SPEED CAL	Distance, Area, App. Rate, Area/Hour	1.750 inches	4.44 centimeters
MINimum FLOW	App. Rate, Lowest allowable flow rate	0.0 gallons/minute	0.0 liters/minute
FLOW CALibration	Flow/App. Rates, Volume	145.0 pulses/gallon	145.0 pulses/gallon
INLINE/BYPASS	App. Rate	Bypass	Bypass

"Special" Calibration

The "Special" calibration mode is used to set up system parameters that rarely need to be changed or adjusted. To enter Special Cal, put the system in HOLD, turn the console OFF, press and hold both the AUTO/MAN button and CAL button while turning console ON. The console will display SPEC for 2 seconds to show that the console is in the Special Calibration mode. Release the AUTO/MAN and CAL buttons. The CAL icon and Warn LED will turn on. The desired Special Calibration parameter(s) can then be accessed with the rotary switch per the illustration below. To exit Special Calibration, press and hold the CAL button for 2 seconds. The console will store any changes and revert to normal operation. NOTE: you must exit Special Calibration to save changes.

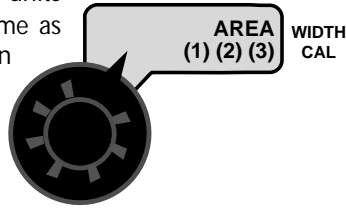


The following table describes the special cal parameters and shows the factory settings. More detailed descriptions follow the table.

Parameter	Description	Factory Setting
Units	System of units: EnG (English) / mEt (Metric) /TurF (Turf)	EnG (English)
Valve Voltage	Servo Valve Drive Voltage (8/12)	12
Material	Choose Liquid (H2O) or Anhydrous (NH3)	H2O
Valve Response Speed	Set Valve Response (-2 to 3)	0
Fill Tank Size	Size (volume) of Full Tank (Off or 1-65,535)	Off
Tank (Low) Set Point	Sets alarm point if using Tank function (Off or 1-65,535)	Off
Auto Shutoff	Runs servo toward minimum when in hold (On/Off)	Off
Auto Delay Time	Delay servo response when go from Hold to Run (Off) to 4 sec.) - Allows slow shutoff valves to open before adjusting servo	1

"Special" Calibration cont.

Units: Choose the system of units desired. Turf units are the same as English units except Area is in thousands of square feet. Use the "+" and "-" buttons to choose between EnG (American English Units), MET (Metric) and TurF (Turf units).



Valve Voltage: Selects the operating voltage for the servo valve. Factory setting is 12 volts. Use the "+" and "-" buttons to toggle between 8 and 12 on display. NOTE: if using an old style Micro-Trak servo valve, (see illustration), set to 8 volts.



1" old servo
8 volts



3/4" old servo
8 volts

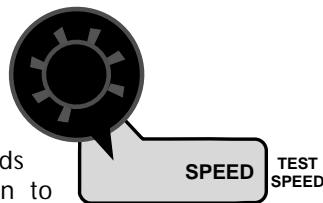


new servo
12 volts

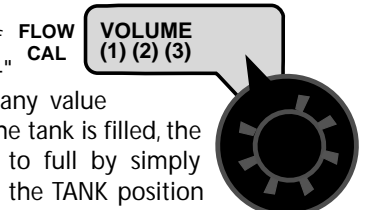
Material: Use "+" and "-" buttons to select between liquid (H2O displayed) or anhydrous ammonia (NH3 displayed). If in NH3 mode, rates will be displayed in pounds (kg) actual N and totals will be displayed in pounds (kg) anhydrous ammonia (NH3).



Valve Response Speed: Allows adjustment of response to "tune" the system for use with very fast or slow valves. For example, if using a ball valve that takes several seconds to open or close in manual mode, and the system responds sluggishly, use the "+" button to adjust the valve response number to 1 or 3. The range of adjustment is -2 to 3, factory setting is zero. NOTE: exercise caution when increasing the valve response speed. If using a relatively fast valve (1-3 seconds open-to-close), the system may become unstable with higher valve response speed numbers entered.



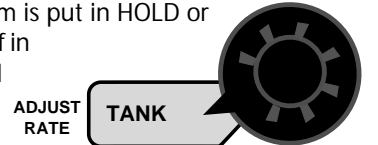
Fill Tank Size: If using the Tank feature, this setting can be used to enter the volume of the tank. Use the "+" and "-" buttons to choose OFF or any value from 1-65,535. Then when the tank is filled, the tank counter can be reset to full by simply turning the rotary switch to the TANK position and pressing the "+" button. Depending on the "UNITS" setting, the TANK SIZE units will be either gallons or liters. If "material" is set to NH3, the Tank Size will be in lbs. or kg. Anhydrous Ammonia (NH3).



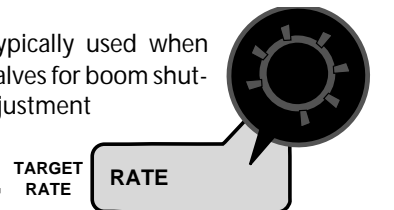
Tank Alarm Set Point: Use the "+" and "-" buttons to set the level where the Warning LED starts flashing and the word "FILL" flashes on the display. Range is OFF or 1-65,535. When the tank value drops below the set point, the alarms will notify the user that the tank level is low.



Auto Shutoff ON/OFF: When Auto Shutoff is enabled (ON) the servo will run toward minimum flow for 4 seconds any time the system is put in HOLD or all booms are turned off, or if in AUTO mode and speed goes to zero. This feature is normally used only in Dry Application systems where the HOLD condition must stop a hydraulic auger or conveyor belt.



Auto Delay Time: Typically used when using relatively slow ball valves for boom shut-off, this feature delays adjustment of the servo valve until the boom valves are open. Use "+" and "-" buttons to set from zero (OFF) to 4 seconds.

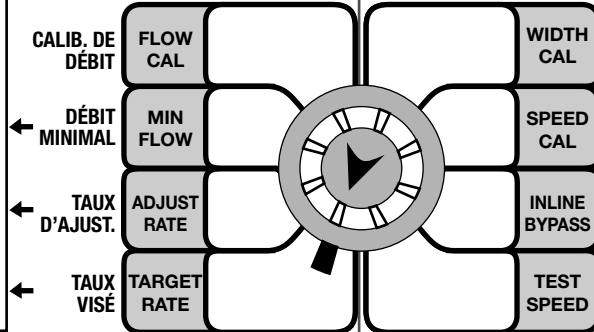


To exit Special Calibration, press and hold the CAL button for 2 seconds. The console will store any changes and revert to normal operation. NOTE: you must exit Special Calibration to save changes.

Calibration

Inscrire chacune des données et les entrer dans la console.

SI	US
4	
3 (L/min)	(gpm)
2 (L/ha)	(gpa)
1 (L/ha)	(gpa)

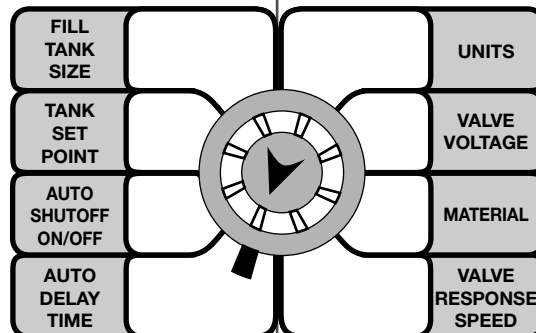


LARGEUR 5		
Section	Largeur • Width	
	SI (m)	US (po./in.)
1		
2		
3		
4		
5		

VITESSE →	6 (km/h)	(mph)
EN LIGNE RETOUR →	7	
MODE TEST →	8 (km/h)	(mph)

Calibration spéciale

OFF
OFF
OFF
1



<input type="checkbox"/> SI	<input type="checkbox"/> US
12	
H2O	
2	

Calibration

Write down each value and enter them in the console.

Special calibration



Mise en garde

L'utilisateur a la responsabilité de vérifier les données de calibration, la distance et le débit total. Il doit également s'assurer que les quantités mesurées et les distances parcourues correspondent aux valeurs réelles.



Warning

The operator have the responsibility to verify regularly the calibration value, the distance and the total flow. He must be sure that the quantities and the distance drive correspond to real value.

Operation

Make sure your system is properly calibrated before beginning to apply product. We also recommend completion of Pre-Field System Checkout described on pages 33-34 prior to beginning any field operations.

The SprayMate II system can be operated in either Manual or Automatic mode. In manual mode, the application rate (GPA or LPH) is set using the "+" and "-" buttons; the application rate will vary depending on the vehicle speed. The manual mode is useful for system set up, spot spraying, etc.

To turn on the AUTO mode, press AUTO/MAN button so the AUTO icon appears in upper right portion of display. In automatic mode, the system will control the flow rate to maintain the calibrated application rate (GPA/LPH) when the vehicle speed changes, or booms are turned on or off. To operate the system in automatic mode, simply start the pump, turn on the desired number of booms, place the RUN/HOLD switch (if used) in the RUN position and drive. NOTE: In AUTO mode, the system will not turn the booms on until it has a speed signal. Use either the RUN/HOLD switch or remote RUN/HOLD sensor to turn the system off and on when turning around or to stop spraying at any time. See the following sections for operation details.

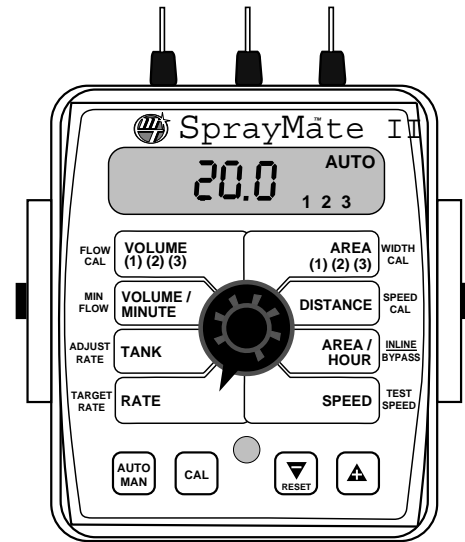
CONSOLE POWER/SYSTEM ON/OFF: The system can be turned ON and OFF by either the ignition switch, if the provided wire is connected to a power source switched by the ignition, or by using the optional ON/OFF switch and bracket kit. When the console is turned on, it will display the number of hours of operation for 2 seconds, then it will display the software version along with the "v" icon for 2 seconds before it begins normal operation.

DISPLAY: During normal operation, the console will display information selected by the rotary switch position. Typically the rotary switch will be set on RATE, as shown in illustration to the right. With RATE selected, the console will display the Application Rate in units of gallons per acre (liters per hectare). See DATA DESCRIPTION on next page for additional information about data displayed.

RUN/HOLD SWITCH: The RUN/HOLD is the master switch for turning all (active) booms on and off. This function can be done either manually with the included RUN/HOLD switch, or automatically, using the optional RUN/HOLD sensor kit.

AUTO/MAN BUTTON: This button will switch the control status of the system from fully automatic to manual control. Each press of the button will change the status. The display will show the AUTO icon when automatic control mode is active and the MAN icon when manual control mode is active. NOTE: IF IN "AUTO" MODE AND NO SPEED SIGNAL IS PRESENT, SYSTEM WILL SHUT OFF THE BOOMS AUTOMATICALLY.

"+" AND "-" BUTTONS: During normal operation, when automatic "AUTO" control mode is active and the rotary dial is set to RATE, each press of the "+" or "-" buttons will increase or decrease the target application rate by the amount of the calibrated adjust rate (Delta). See On-The-Go Delta Rate Adjustment section on the next page for more information.



During normal operation, when manual "MAN" control mode is active and the Run/Hold switch is in the RUN position, pressing the "+" or "-" buttons will increase or decrease the application rate by opening or closing the servo valve (control valve).

During normal operation, when either automatic or manual mode is active, the RUN/HOLD switch is in the HOLD position and the rotary switch is turned to VOLUME/MINUTE, pressing the "+" or "-" button will increase or decrease the flow rate without having the boom valves turned on, by opening and closing the servo valve (control valve). This can be useful for system pressure checking.

ON-THE-GO "DELTA" RATE ADJUSTMENTS (ADJUST RATE): The calibrated target rate in gallons (liters) per acre represents the amount of solution that you typically want to apply. However, under certain conditions, you may want to increase or decrease this rate. This "DELTA" feature allows you to easily make on-the-go rate adjustments by simply using the "+" or "-" buttons. Each press of a button changes the calibrated target rate by the amount of calibrated adjust rate.

To use the "DELTA" feature, the console must have automatic "AUTO" mode active and the rotary switch must be set to the RATE position.

Example: Adjust Rate = 1.0 and Target Rate = 10.0

With AUTO selected and the rotary selector turned to RATE, pressing the "+" key once will increase the target rate from 10.0 to 11.0. The display will momentarily show the new target rate of 11.0 and then show the actual application rate. Pressing the "-" key once will decrease the target from 11.0 to 10.0.

NOTE: When you "DELTA" the target rate, the display will momentarily show you the new target rate (approximately two seconds) and then resume showing the actual application rate. The new target rate is maintained until further adjustments are made using the "DELTA" feature or calibration changes occur, or if the unit is turned off.

Operation (continued)

BOOM SWITCHES: The system monitors the status of the boom switches to determine whether they are ON or OFF. The console accumulates area based on the calibrated boom widths. When an individual boom is turned OFF, the respective width is subtracted from the total width to accumulate area based on the new active application width. If the rotary switch is in the RATE or AREA/HOUR position, the numbers 1, 2, and 3 on the display will light when their respective boom is ON.

WARNING DEVICE: The console is equipped with a RED warning light. The light will automatically turn on and flash when the actual application is plus or minus 10 percent of the calibrated target rate, or if the TANK alarm feature is activated and the tank is below the set point (display will also flash "FILL" message). If the light stays on while in AUTO, refer to the troubleshooting section of this manual. The RED warning light will also be illuminated when calibration mode is active on the console.

ROTARY SWITCH: During normal operation, you can view any one of eight monitored functions by turning the rotary switch to the appropriate position. The functions that are active during normal operation are the TAN boxes. Calibration positions are identified by the WHITE labeling on each side of the rotary selector (please refer to Calibration section for details).

DATA DESCRIPTION:

RATE: Displays the actual number of gallons per acre (liters per hectare) being applied. When the SprayMate II is used in conjunction with a Micro-Trak NH3 control kit, and NH3 has been selected in "Special Calibration", the console display will read pounds (kg) of actual "N" per acre (hectare) being applied.

TANK: Displays amount remaining in the tank. When the tank is refilled, and the tank volume has been entered in Special Cal, the TANK amount can be reset to a full tank by simply pressing the "+" button for 1 second while the rotary switch is in the TANK position. The amount in the tank can be decreased by using the "-" button.

VOLUME/MINUTE: Displays the actual gallons (liters) per minute being applied. When the SprayMate II is used in conjunction with a Micro-Trak NH3 control kit, the console display will read total pounds (kg) of NH3 per minute being applied.

VOLUME: Displays the total gallons (liters) applied since the active counter was last reset to zero. When the SprayMate II is used in conjunction with a Micro-Trak NH3 control kit, the console display will read total pounds (kg) of NH3 applied since the counter was last reset. To select a pair of AREA and VOLUME counters, use the "+" button to select set 1, 2 or 3, indicated by the small numbers in the lower right on the display. Do NOT

use the "-" button to select counters because the button will clear them. (See Resetting System Counters on page 31.) This active pair of counters may be reset to zero independent of other system counters.

AREA: Displays the acres (hectares) covered since the counter was last reset to zero. The area counters do not accumulate area when the console is in HOLD or if all booms are turned OFF. To select a pair of AREA and VOLUME counters, use the "+" button to select set 1, 2 or 3, indicated by the small numbers in the lower right on the display. Do NOT use the "-" button to select counters because the button will clear them. (See Resetting System Counters on page 31.) The selected pair of counters may be reset to zero independent of other system counters.

DISTANCE: Displays the feet (meters) driven since the counter was last reset to zero. This counter does not accumulate when the console is in HOLD. This counter may be reset to zero independent of other system counters.

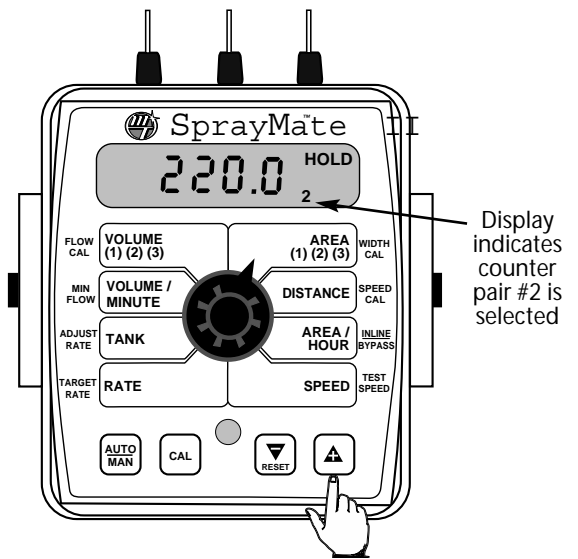
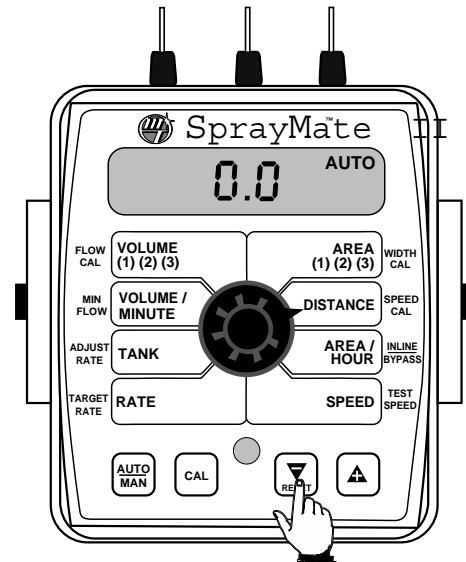
AREA/HOUR: Displays acres per hour (hectare per hour) (thousands of square feet per hour) being covered.

SPEED: Displays the ground speed in miles (kilometers) per hour. **IMPORTANT:** All booms automatically shut off if system is in "hold" or if in AUTO with NO SPEED.

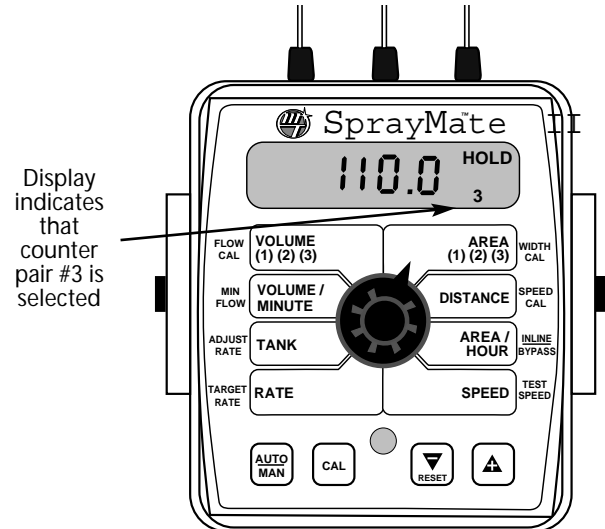
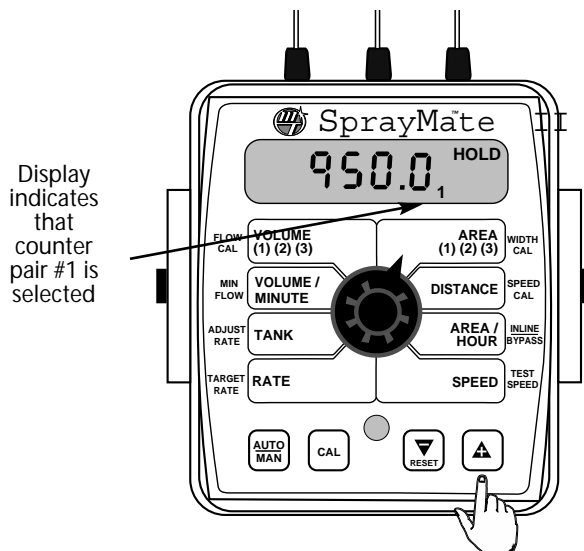
Resetting System Counters

The AREA, DISTANCE and VOLUME counters maintain a running count during operation regardless of the position of the rotary switch. When any of these counters reach their maximum capacity, or when you want to start a new count, the value may be reset to zero by performing the following routine. Counters may be reset independently of each other.

1. Turn the booms OFF or put the system in HOLD.
2. Turn the rotary switch to the counter to be reset.
3. To reset distance turn the rotary switch to DISTANCE and simply press and hold the RESET button until the display reads zero. The display will show the word "CLEAR" during this process, and will show 0.0 when reset to zero is complete.
4. To reset the volume and area counters; there are three independent AREA counters, paired with three VOLUME counters. The active pair of counters is indicated by the small numbers in the lower right area of the display (1,2, or 3) when the rotary switch is in the AREA or VOLUME position. Select the pair of counters you want to use by pressing the "+" button. The small number will increment each time the "+" button is pressed (from 1 to 3, then rolls back to 1). DO NOT attempt to select the counter number by using the "-" button, because that will clear the active pair of counters if held for 2 seconds. If the "-" button is accidentally pressed, the console will display "CLEAR" to alert the user that the counters will be cleared. If the user continues to hold the "-" button for 2 seconds "CLEAR" will disappear and be replaced by 0.0, indicating that the selected pair of counters has been cleared.



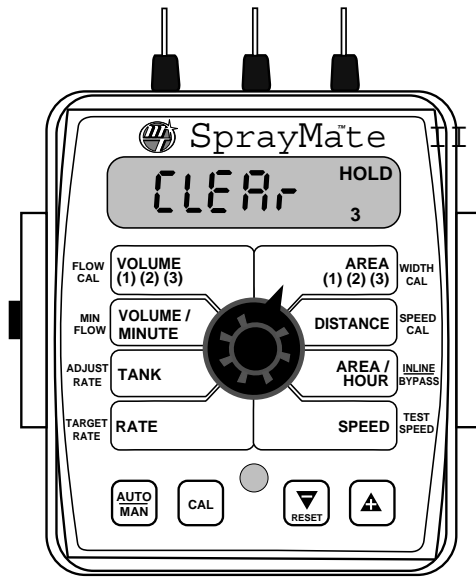
To select a pair of AREA and VOLUME counters: Verify that the desired counter pair is selected, or use the "+" button to select -



To clear counters:

When the desired counter number is displayed, press the "-" (RESET) button and "CLEAR" will be displayed. NOTE: holding the "-" (RESET) button for 2 seconds will clear both the #3 AREA counter and the #3 VOLUME counter whether the rotary switch is in the AREA or the VOLUME position. If the "-" button is released before 2 seconds have elapsed, the counters will not be cleared and the "CLEAR" message will be replaced with the previous total.

After the "-" (RESET) button has been held for 3 seconds, the "CLEAR" message will be replaced by 0.0, indicating that counter pair #3 has been cleared.



Pre-Field System Checkout

- Bypass Servo

Before beginning actual spraying, perform the following "pre-field" procedure to ensure that your valve settings, nozzle selection and desired speed range will allow the SprayMate II to provide the required application control. This procedure should be repeated for each new nozzle selection and/or application rate. By performing all of the steps listed below, you set up your system to allow the SprayMate II to perform at optimum level. Fill your sprayer tank with clean water. DO NOT use chemicals until the entire system is completely checked out and operating properly.

IMPORTANT NOTE: Most nozzles will maintain a good pattern over a maximum speed range of two to one. (For example, if your maximum speed is 12, your minimum speed shouldn't go below 6.)

NOTE: Pre-field System Checkout is a procedure performed while the console is in the CAL mode. The Red WARNING light will be lit during the procedure and "CAL" on the display will be flashing.

Completely close range adjust valve (if installed), and agitation valve (if installed). Completely open throttle valve (must be installed).

Start vehicle and pump, bring the engine up to normal operating RPM. Do NOT exceed safe system pressure.

ENTER MAXIMUM APPLICATION TEST SPEED INTO CONSOLE. With console in HOLD, enter calibration mode. Push and hold (CAL) button. The CAL icon will appear on display and red light will be on. Turn rotary switch to TEST SPEED position. Use "+" or "-" button to enter maximum application speed. Do not exit calibration mode. CAL will flash on the display indicating TEST SPEED mode.

Select manual "MAN" control mode and turn all booms ON.

Turn rotary switch to APP. RATE position and hold "+" button for approximately 30 seconds to completely close the servo valve (control valve). NOTE: assume servo is plumbed in a bypass line. (Maximum bypass allowed - minimum flow output to booms.)

CAN'T GET THERE? If you can't get to the desired application rate, you may need different nozzles, pump, or you may

need to make modifications to your plumbing configuration. Please refer to Troubleshooting Plumbing on page 39.

Adjust agitation valve for desired agitation. If range valve is installed, adjust range valve until display reads 20% higher than the desired application rate.

Slowly close the throttle valve until the display reads slightly higher (5% to 10%) than the desired application rate. If the throttle valve is more than two-thirds closed, install range valve and perform pre-field again.

- Now is a good time to confirm that GPA, GPM, MPH, WIDTH and PSI all coincide with the nozzle manufacturer's charts. PSI may be slightly higher than indicated by the charts due to pressure drop across the solenoid valves, nozzle diaphragm check valves, nozzle screens, etc.

ENTER MINIMUM APPLICATION TEST SPEED INTO CONSOLE. Turn rotary switch to TEST SPEED position. Use the "+" or "-" button to enter minimum application speed. Do not exit calibration mode. (Remember, the minimum application speed is not normally less than half of the maximum application speed.)

Turn booms ON (make certain system is in Manual mode), turn rotary switch to APP. RATE position and hold "-" button for approximately 30 seconds to completely open the servo valve (control valve). NOTE: assume servo is plumbed in a bypass line. (Maximum bypass allowed - minimum flow output to booms.) The display should now read less than the desired application rate.

- It is not normally a problem if the application rate goes all the way to zero when holding the "-" button for 30 seconds, as long as it goes back up when the "+" button is held.

CAN'T GET THERE? If holding the "-" button does not get the application rate to go below the desired application rate, please refer to Troubleshooting Plumbing.

Pre-Field System Checkout

- Inline Servo

Before beginning actual spraying, perform the following "pre-field" procedure to ensure that your valve settings, nozzle selection and desired speed range will allow the SprayMate II to provide the required application control. This procedure should be repeated for each new nozzle selection and/or application rate. By performing all of the steps listed below, you set up your system to allow the SprayMate II to perform at optimum level. Fill your sprayer tank with clean water. DO NOT use chemicals until the entire system is completely checked out and operating properly.

IMPORTANT NOTE: Most nozzles will maintain a good pattern over a maximum speed range of two to one. (For example, if your maximum speed is 12, your minimum speed shouldn't go below 6.)

NOTE: Pre-field System Checkout is a procedure performed while the console is in the CAL mode. The Red WARNING light will be lit during the procedure and "CAL" on the display will be flashing.

Completely close range adjust valve (if installed), and agitation valve (if installed).

Start vehicle and pump, bring the engine up to normal operating RPM. Do NOT exceed safe system pressure.

ENTER MAXIMUM APPLICATION TEST SPEED INTO CONSOLE. With console in HOLD, enter calibration mode. Push and hold (CAL) button. The CAL icon will appear on display and red light will be on. Turn rotary switch to TEST SPEED position. Use "+" or "-" button to enter maximum application speed. Do not exit calibration mode. CAL will flash on the display indicating TEST SPEED mode.

Select manual "MAN" control mode and turn all booms ON.

Turn rotary switch to APP. RATE position and hold "+" button for approximately 30 seconds to completely open the servo valve (control valve).

CAN'T GET THERE? If you can't get to the desired application rate, you may need different nozzles, pump, or you may need to make modifications to your plumbing configuration. Please refer to Troubleshooting Plumbing on page 39.

Adjust agitation valve for desired agitation. If range valve is installed, adjust range valve until display reads 10% higher than the desired application rate.

Now is a good time to confirm that GPA, GPM, MPH, WIDTH and PSI all coincide with the nozzle manufacturer's charts. PSI may be slightly higher than indicated by the charts due to pressure drop across the solenoid valves, nozzle diaphragm check valves, nozzle screens, etc.

ENTER MINIMUM APPLICATION TEST SPEED INTO CONSOLE. Turn rotary switch to TEST SPEED position. Use the "+" or "-" button to enter minimum application speed. Do not exit calibration mode. (Remember, the minimum application speed is not normally less than half of the maximum application speed.)

Turn booms ON (make certain system is in Manual mode), turn rotary switch to APP. RATE position and hold "-" button for approximately 30 seconds to completely close the servo valve (control valve). The display should now read less than the desired application rate.

It is not normally a problem if the application rate goes all the way to zero when holding the "-" button for 30 seconds, as long as it goes back up when the "+" button is held.

CAN'T GET THERE? If holding the "-" button does not get the application rate to go below the desired application rate, please refer to Troubleshooting Plumbing.

ENTER TARGET APPLICATION TEST SPEED INTO CONSOLE:

Turn booms OFF. Turn rotary switch to TEST SPEED position. Use the "+" or "-" button to enter target application speed. Do not exit calibration mode.

Select automatic "AUTO" control mode, turn booms ON and turn rotary switch to APP. RATE position. The console should take control and lock-on to your calibrated target application rate.

- If you calibrated your ADJUST RATE to zero (0), disregard the following steps.

Press the "+" button and release. The display will momentarily show

the new target rate (target rate + adjust rate) and then lock on to that rate.

Press the "-" button and release. The display will momentarily show the new target rate (target rate - adjust rate) and then lock on to that rate.

- If the application rate was correctly displayed during manual "MAN" control mode, but registered too high in automatic "AUTO" control mode, the calibration value for MIN FLOW is set too high.

At this point, the Pre-Field System Check-Out is complete. TEST SPEED will automatically cancel when you exit the CAL mode or when power to the console is turned OFF.

QUICK SYSTEM CHECK OUT

For any rate controller (Micro-Trak, Raven and other) of any model of sprayer or applicator, **be sure that all calibration values written in your operator's manual correspond to the one entered in your console.**

All of this comes to 3 questions:

- 1- Is there speed reading ?**
- 2- Is the flow reading ?**
- 3- Do you have the right nozzle ?**

1- Is there speed reading ?

To be sure that the console calculate the good distance (meter/feet), place the console in distance position and compare the displayed distance to the measure distance, if needed readjust calibration number.

Notes: The speed must be reading constant, forward to a normal speed. Variation of speed will give a variation on the spray rate. If speed is not accurate check the magnets in the wheel (distance between each together and polarity).

2- Is there flow reading ?

To be sure that the system calculate the good volume, place the console in volume position (liters or gallons applied) and compare the display volume to volume going out of the spray tank. If you have difference between this two value, readjust calibration value and repeat this test. If there is no flow displayed, look for the cable and the flow sensor.

Usually it is possible to check manually the speed and the flow sensor cable with a jumper between pin A and C for Micro-Trak products. Jump rapidly and the console should show reading, the faster you use that jumper the faster the reading will change.

3- Do you have the right nozzle ?

Determine your spray data:

Spray rate:
Speed: From _____ to _____
Working pressure: From _____ to _____
Nozzle: _____
Nozzle spacing: _____

Compare your datas to a nozzle chart and determine which nozzles give you the speed and the pressure desired. For easiest check out, test speed function will simulate a working speed and engage the pump and boom sections.

In manual mode you will able to increase or decrease the pressure and compare the data (speed, pressure, spray rate) to a flow chart nozzles. The variation of the rate that you're able to get in manual mode should be the same you will get in automatic mode.

If calibration have change, write down the new datas in your operator's manual for quick reference.

Troubleshooting

Messages / Warnings

bad^{CAL}

Typically indicates that defaults were entered by powering up with the CAL and "-" buttons held, but calibration mode was not entered and exited. Cycling power will not clear the bad CAL message, it can only be cleared by entering and exiting calibration mode.

Lo P

Low Power. Check all power and ground connections.

LoAd

Has loaded Default Cal factors (appears when default calibration factors are loaded by holding CAL and "-" buttons while turning the console on).

no SPEED

Will flash in display if rotary switch is in RATE position and there is no Speed signal regardless of all other conditions. Check speed sensor and connections per Troubleshooting section.

no Flo

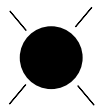
Will flash in display if rotary switch is in RATE position and should have flow (In Run, some booms on, speed greater than 0) but no flow is detected. Check flowmeter and flow harness connections per Troubleshooting section.

no boom

Will flash in display if rotary switch is in Width position, system is in Cal mode and no booms are turned on. Make sure system is in run and a boom switch is turned on, also check Run/Hold switch or sensor and connections.

FILL

Rotary switch in any position, FILL will flash if tank level is equal to or less than tank set point. Fill tank and reset TANK counter by setting the rotary switch at the TANK position and pressing the "+" button for one second. Check to make sure TANK set point is properly calibrated.



Warn LED flashes when the Rate error is over 10% or Volume/Minute is below the Minimum, or Tank is less than Tank Set Point. It is on steady when in CAL mode or SPECIAL CAL mode or Test Speed.

SPEC

Special Calibration mode is active. Appears when entering Special Calibration mode (hold AUTO/MAN and CAL buttons while turning console on).

v

The "V" icon shows that a 12v control valve (not 8v) is currently selected. On startup, the "V" is also displayed next to the software version #. (Console hours displayed first.)

CLEAR

The message alerts the user that the currently selected counter will be cleared if held for 2 seconds. Also serves as a reminder to use "+" button to select counters.

OFL

Counters (DISTANCE or AREA or VOLUME) have overflowed their maximum. RESET (see pages 34-35) to clear counters and resume counting.

Troubleshooting continued

All SprayMate II consoles, flowmeters and servo valves are tested prior to packaging, so unless there has been damage in shipment you can be confident that everything will be operational when you receive it.

However, if you do encounter a problem that appears to be related to equipment failure, PLEASE DO NOT OPEN THE CONSOLE. Your system is protected by a warranty, and Micro-Trak will gladly correct any defect.

Many problems are the result of mistakes in installation or operation. Before returning any parts for service, carefully check your installation and review the operating instructions. For easy-to-follow guidelines, refer to the troubleshooting section which follows.

Console appears dead

Using your test light, check for 12 volts at the power source. Also check for damaged power cable or reversed terminals. (Console requires 12 volts for proper operation). Check connections of ignition or power switch.

Speed is always zero or erratic

Check for properly calibrated wheel circumference.

Review speed sensor installation. Check for proper mounting, alignment and spacing of speed sensor in relationship to magnet assembly. Make sure magnet polarities are alternated. Also check cable for breaks or incomplete connection. For more suggestions on solutions to speed problems, see Hall-effect sensors and console inputs on pages 37-38.

Distance count is inaccurate

Wheel circumference was incorrectly measured or entered. Review calibration, re-adjust and test.

Area count is inaccurate

Implement width or wheel circumference was measured incorrectly or programmed incorrectly. Go back through the original procedures, make changes, and test for acre (hectare) count again. (Make sure no width is entered for unused booms.) Verify accuracy with formula:

$$\begin{aligned} \text{Acres} &= \text{Distance} \times \text{Width in feet} / 43560 \\ \text{Hectares} &= \text{Distance} \times \text{Width in meters} / 10,000 \end{aligned}$$

No readout of gallons (liters), or gallons (liters) per minute

Check to see that the sprayer pump and equipment are operating properly. If liquid is moving through the line, check the flow sensor to be sure it is screwed all the way into the flowmeter.

Check to see that a FLOW CAL number has been entered. Also check cable for breaks or incomplete connection.

If the flowmeter is new or has not been used for a long period of time, the turbine may be sticky. Flushing the system out with water should make the turbine spin freely.

Flow rate may be too low to register a reading, or foreign material may be lodged in the flowmeter.

Booms shut-off

If you are in AUTO with no speed, the booms will shut-off.

Total liquid used is inaccurate

This may result from an incorrectly-entered "FLOW CAL" value. Check the number stamped on the flowmeter tag, and be sure this is entered in the console's "FLOW CAL" position. If the meter has been used for some time, wear may have changed the Flow Cal value. See Fine-Tuning Flowmeter Calibration in Appendix C.

Check the mounting position of the flowmeter. With lower flow rates, the meter should be mounted vertically. Also check to see that the flow sensor is screwed all the way into the flowmeter.

Other causes may be inaccurate sprayer tank markings, a flow rate too low to register, or foreign material lodged in the flowmeter.

Console is erratic in operation

If you have a two-way radio, it may be mounted too close to the console. Keep all SprayMate II cables away from the radio, its antenna and power cable.

Ignition wires may be causing the console to malfunction. Keep SprayMate II cables away from ignition wires, or install ignition suppressor.

Reroute all cable away from electric solenoids, air conditioning clutches and similar equipment.

Check the VALVE SPEED calibration number in Special Calibration. If the RATE tends to overshoot or oscillate, the VALVE SPEED setting may be too high for the control valve being used; reduce the VALVE SPEED setting by 1 (range is -2 to +3).

Displayed measurements do not make sense

The console may be in the incorrect measurement mode (English or metric). See page 22 for instructions.

Display reads "OFL"

DISTANCE, AREA, and VOLUME counters read OFL when they have exceeded their maximum count. Reset to zero to resume counting.

System operation (control) is sluggish in AUTOMATIC mode

Check the VALVE SPEED setting in Special Calibration. If using a slow valve (4 seconds or more, close to open) increase the VALVE SPEED setting.

Troubleshooting continued

Checking Individual Components

CONSOLE:

The only way to field test a console is to connect it to a harness on a vehicle with a known working console or install it on an E-POP (Electronic Point of Purchase) display stand.

HARNESS:

The harness can be checked using an ohmmeter or continuity tester. The main wiring diagram shows the pin out of all connectors. See page 10.

ELECTRICAL INTERFERENCE:

Erratic operation of the system may be the result of electrical interference from ignition wires or inductive loads (electrical clutch, fan, solenoid, etc.). Always try to route wires as far away from suspect areas as possible. If problems occur, you may need to relocate the console and/or wiring harness, or install a noise suppressor.

POWER:

Check power source with the MT-101 or a test light. If there is no power, trace cable toward battery looking for breaks. Also check any fuses or circuit breakers that supply power to the console.

ACCESSORY POWER:

The speed, flow and run/hold cables all have an accessory power wire. Check for 12 volts between B (usually white) and C (usually black) of these connectors. If power is not present, make sure the accessory power wire is not open or shorted to ground or to another wire. If this wire has a problem, the console may exhibit erratic behavior or not function at all.

RUN/HOLD HALL-EFFECT SENSOR:

Caution: Improper connection or voltage could damage the Hall-Effect sensor. The Hall-effect sensor works similar to a reed switch, but requires power in order to function. This particular type of Hall-effect sensor "closes" when near the south pole of a magnet and is otherwise "open".

Ground pin C (black) and connect clean 12 volts to pin B (white) of the Hall-effect sensor cable. Connect the positive lead (red) of an ohmmeter or continuity tester to pin A (red) and the negative lead (black) of the ohmmeter or continuity tester to pin C (black) of the Hall-effect sensor cable.

Holding the tip of the sensor up to the south pole of a magnet should result in a very low resistance (around 300 ohms). Taking the sensor away from the magnet should result in a very high resistance (infinite).

RUN/HOLD JUMPER DUST COVER:

To test for proper continuity on the jumper wire, connect the ohmmeter to the pins of the dust cover with the jumper wire. There should be continuity – near zero ohms.

MAGNETIC HALL-EFFECT SPEED AND FLOW SENSORS:

Caution: Improper connection or voltage could damage the Hall-effect sensor. The Hall-effect sensor works similar to a reed switch, but requires power in order to function. Also, this particular type of Hall-effect sensor requires alternating magnetic polarities in order to switch. This means that the north pole of a magnet will "open" the Hall effect and the south pole of a magnet will "close" the Hall effect.

Ground pin C (black) and connect clean 12 volts to pin B (white) of the Hall-effect sensor cable. Connect the positive lead (red) of an ohmmeter or continuity tester to pin A (red) and the negative lead (black) of the ohmmeter or continuity tester to pin C of the Hall-effect sensor cable.

Holding the tip of the sensor up to the north pole of a magnet should result in a very high resistance (infinite), while holding the tip of the sensor up to the south pole of a magnet should result in a very low resistance (around 300 ohms).

VANSCO RADAR SPEED SENSOR:

Carefully check your installation and operating instructions. The following are tips for troubleshooting:

1. Disconnect the radar adapter cable from the console harness
2. Check for 12 VDC between pins B and C of the main harness connector (yellow tie). If not present, console or harness may be defective.
3. Using a jumper wire (paper clip bent into a "U"), rapidly short together positions A and C of the main harness speed connector (yellow tie) several times. The console should respond with some speed reading. If not, the console or harness may be defective.
4. Reconnect the radar adapter cable to the main harness speed connection (yellow tie).
5. Disconnect the radar from the radar adapter cable.
6. Check for 12 VDC between pins 1 and 3 of the radar adapter connector. If it is not present but was present in step 2, the radar adapter cable may be defective.
7. Using a jumper wire (paper clip bent into a "U"), rapidly short together positions 2 and 3 of the radar connector (round 4-pin) several times. The console should respond with some speed reading. If not but had a reading in step 3, the radar adapter cable may be defective.
8. If system passes all above tests, the radar may be defective.

Troubleshooting (Continued)

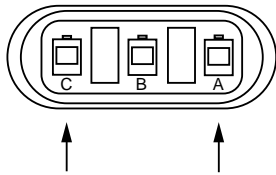
CONSOLE INPUTS:

If there is no response from any of the following tests, refer to the main wiring diagram to locate the next connector in line toward the console and repeat the test at that connector. If there is a response at that connector, the problem may be in the cable between the two connectors (or the connectors themselves).

SPEED INPUT: Turn rotary switch to speed position and disconnect the speed sensor (yellow tie) from the main harness. Check for 12 volts between pins B (white) and C (black) of the main harness speed cable (yellow tie). Using a clip lead or other jumper wire (such as a paper clip bent in a "U"), several times rapidly short together pins A (red) and C (black) of the 3-pin connector (See Illustration 18). The console should respond with some speed reading.

FLOW INPUT: Turn rotary switch to VOLUME/MINUTE and disconnect the flow sensor (green tie) from the main harness. Check for 12 volts between pins B (white) and C (black) of the main harness flow cable (green tie). Using a clip lead or other jumper wire (paper clip bent in a "U"), several times rapidly short together pins A (red) and C (black) of the 3-pin connector. The console should respond with some flow rate reading.

Illustration 18
Three-Pin Connector



REMOTE RUN/HOLD INPUT: Disconnect the remote run/hold sensor (or jumper cover) from the main harness.

Check for 12 volts between pins B (green) and C (violet) of the main harness remote run/hold cable (grey tie). Placing a clip lead or other jumper wire (such as a paper clip bent in a "U") between pins A (blue) and C (violet) of the main harness run/hold connector (grey tie) should turn off the "HOLD" icon on the console display. Removing the jumper should turn on the "HOLD" icon on the console display.

FLOWMETER:

Shaking the Flowmeter end to end should produce a "rattling" sound (shaft end play). Blowing in the meter from either end should spin the turbine freely. If the turbine spins freely but the meter will not register flow with a known working sensor, the turbine may be defective. See Flowmeter Assembly and cleaning on page 49 for details.

SERVO VALVE CONTROL SIGNAL:

With the console turned ON, put the console in MANUAL mode, place the remote Run/Hold switch in the RUN position and turn at least one boom switch to ON. Using a voltmeter or simple test light, check from a good frame ground to each of the servo wires on the main harness connector. You should get 0 volts on each wire. Holding the "+" button should cause the RED wire to pulse toward 12 volts (light will pulse). Holding the "-" button should cause the BLACK wire to pulse toward 12 volts (light will pulse).

SERVO VALVE:

The best way to test the servo valve is with a known working console. Turn console ON, put the console in MANUAL mode, place the remote Run/Hold in the RUN position, turn the rotary switch to RATE and turn at least one boom switch to ON. With the servo valve connected to the servo valve lead on the main harness, holding the "+" button should close the servo valve and holding the "-" button should open the servo valve NOTE: assuming you are in bypass configuration (provided the console has passed the Servo Valve Control Signal test). The servo valve should operate smoothly in both directions, from fully open to fully closed.

You may also use a 9-volt transistor battery. Connecting the battery to each terminal on the servo valve should cause the servo valve to run in one direction. Reversing the battery connections should cause the servo valve to run the other direction. The servo valve should operate smoothly in both directions, from fully open to fully closed.

PLUMBING:

Proper plumbing is a very important factor in obtaining optimal performance from your SprayMate II system. The chart on the next page will help you determine what area of the plumbing may be causing your problem. At this point, it is assumed that your plumbing basically matches that of the system diagram and that the servo valve and flowmeter are known to be installed correctly and functioning properly. In addition, make certain that you have selected and installed the correct spray tips for the application, speed and spray rate that you intend to maintain. Don't forget the obvious such as leaky fittings and hoses, pinched hoses and plugged or worn nozzles. If you need more detail than the chart provides, please refer to Plumbing Guidelines on pages 39 - 41.

Plumbing Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Loses pressure in MAN	Pump Airlock	Clean strainer Larger hoses
Little or no pressure adjustment in MAN	Too much restriction in servo loop	Larger hoses and fittings No sharp bends
Pressure won't go high enough in MAN	Pump starved or too small Too much agitation Throttle, range adjust or pressure relief valves	Larger hoses Reduce agitation Adjust
Pressure, speed and spray rate don't check out according to tip charts	Inaccurate pressure reading Dirty or worn tips	Use a different gauge and check each boom Clean or replace
Pressure always goes too high in AUTO	Minimum flow rate too high Online/bypass setting	Recalibrate Set appropriately
Pressure fluctuates greatly in AUTO	Sagging or kinked hoses Throttle valve too far closed Pump starved or too small Valve response speed set too high (Special Cal)	Support or replace hoses Adjust throttle and range valves Larger hoses Larger pump Clean strainer Reduce valve speed setting

Plumbing Guidelines

GENERAL

In order for your sprayer to function properly, it must be correctly plumbed. The system diagrams (on pages 16 and 17) show the plumbing configuration that works best with the SprayMate II Sprayer Controller. This section will explain the purpose of each component, list some problems it can cause and recommend some possible solutions to those problems.

A word about pressure drops: All hose, valves and fittings (especially elbows) cause undesirable pressure losses. Keep hoses as large as practical. Don't use longer hoses than necessary. Avoid bends whenever possible. Use as few fittings as possible. Use full port valves or the next larger size valve. Long hoses should be supported to avoid sagging and kinking. Many spray tip manufacturers have charts showing pressure drop for various fittings and hose sizes.

Now let's break the system diagram into five sections and cover each one separately. The five sections are the pump inlet line, the agitation line, the flowmeter (boom) line, the servo line and the pump itself.

PUMP INLET

The hose connecting the tank to the pump should be at least as large as the pump inlet port. In most cases 1 1/4" is a good size. The valve in this line is for complete tank shut-off only and should always be fully open during operation. If this hose is too small or the valve is partially closed, you may not be able to reach your high end goals and pump damage could occur.

AGITATION

The size of the agitation line is dependent upon the amount of agitation required which is determined by the size of the tank and the type of chemical being used. In most cases a 1" hose is large enough.

SERVO

On the system diagram, the hose between tee "B" and the servo can usually be 3/4" but 1" will also work. The hose between the servo and tee "C" should be at least as large as the servo. If these lines are too small, you may experience little or no pressure adjustment.

FLOWMETER

The line feeding the flowmeter and the boom shut-off valves should be at least as large as the flowmeter. The size of lines going from the shut-off valves to each boom section depends on the flow rate of each boom.

PUMP

The pump must have enough capacity to satisfy the agitation, servo and flowmeter sections of the plumbing. To determine if your pump is large enough you must add up the gallons per minute of all three sections. The following example will take you through the steps involved.

Example: Let's say our example sprayer has a 300-gallon tank with a Spraying Systems 6290 SC-8 Jet Agitator. The agitator uses 10.2 GPM at 40 PSI.

The sprayer has a 40', three-section boom. Each section is 160" with four tips at 40" for a total of 12 tips. We plan to put on a 25 GPA at 5 MPH and in some areas of the fields we may want to use the Delta feature and increase our rate to 30 GPA and in other areas decrease to 15 GPA. After checking the tip charts we find that a TK-5 Floodjet has a range of 14.9 to 30 GPA at 5 MPH. According to the charts, to get 30 GPA at 5 MPH with a TK-5, the pressure must be 40 PSI. At 40 PSI a TK-5 will spray 1.0 GPM. So, 12 tips at 1.0 GPM each is a total of 12 GPM.

Now let's add everything together.

Agitation	10.2
Spray tips	12.0
Servo	<u>5.0</u>
	27.2 Total GPM

The above addition shows that the system needs 27.2 GPM at 40 PSI. If we add a 10% margin ($27.2 \times 1 = 2.72$ and $27.2 + 2.72 = 29.92$), we have about 30 GPM. To be sure we have enough volume, the pump should be able to deliver 30 GPM or more at 40 PSI.

VALVE PURPOSE AND ADJUSTMENTS

Tank Shut-Off Valve

The tank shut-off valve is for convenience only. It allows you to work on the plumbing without draining the tank. It should always be fully open during operation.

Agitation Shut-Off Valve

The agitation shut-off valve is mostly for convenience. It allows you to work on the plumbing without draining the tank. It should normally be fully open during operation.

Pressure Relief Valve

The pressure relief valve is used to avoid excessive pressure when the booms are turned off. Start with the handle screwed mostly out. Slowly bring pump up to operating RPM (make sure pressure does not go too high). Put the SprayMate II in MAN and turn boom on. Hold adjust switch to "+" for about 30 seconds to fully close servo valve. Turn booms OFF. Now slowly screw handle in until maximum desired pressure is reached. Lock handle in place with locking nut or collar.

Note: Spraying Systems 144H DirectoValve has a maximum pressure rating of 100 PSI (7 bar).

Range Adjust Valve

The range adjust valve is required when the pump is much larger than necessary. When the range valve is opened, some of the liquid will be bypassed around the pump to avoid "overloading" the rest of the system. The setting of the range adjust valve is determined by the throttle valve. Start with the range valve fully closed and perform the Prefield System Checkout on pages 33 and 34. If the throttle valve needs to be more than two thirds closed, open the Range valve slightly and perform the Prefield System Checkout again.

Plumbing Guidelines (cont.)

Throttle Valve

The throttle valve limits your high end to maximize servo performance. Start with throttle valve fully open and perform the Prefield System Checkout on page 33-34.

Example: With the throttle fully open and servo fully closed, you may be able to get 50 GPA at 5 MPH when you only want 25 GPA. If you were to simply open the servo you may be able to get down to 25 GPA, but if your speed should drop to 3 MPH, the servo can't open any farther and won't be able to maintain 25 GPA. Therefore, if you leave the servo closed and close the throttle until your high end has dropped from 50 GPA to about 30 GPA, the servo has a greater operating range.

The throttle valve pictured in the system diagram is a needle valve (Spraying Systems Type 12690 or 12795). A ball valve may be used but is more difficult to adjust and keep adjusted. Do not install a pressure regulator or relief as a throttle valve.

If the throttle valve is closed too much, PSI may fluctuate greatly in AUTO.

Appendices

Appendix A

12-Volt Servo Valve (Control Valve) Calibration

Your SprayMate is calibrated to operate the standard M-T Electric Servo Valve (fig. 1) with no "V" display. The system is also capable of using standard 12-volt control valves in place of the M-T Electric Servo Valve. However, the factory setting will not allow standard 12-volt control valves to function at peak performance. You need to activate the special 12-volt control driver to ensure optimal performance with diaphragm pump and Arag Servo Valve, (fig. 2) with "V" display.

When the system will be used in English mode, the rotary selector MUST be turned to TOTAL AREA when activating the 12-volt servo mode. When the system will be used in Metric mode, the rotary selector MUST be turned to SUB AREA when activating the 12-volt servo mode.

Activating the 12-volt servo mode also defaults all of your calibration settings to the factory settings. BEFORE activating the 12-volt servo mode, write down ALL of your calibration settings. Then you can simply re-enter them after activating the 12-volt servo mode.

To activate the 12-volt control driver, turn the power to the console OFF. Turn the rotary selector to the appropriate position (TOTAL AREA for English mode or SUB AREA for Metric mode). Press and hold the CAL, RESET and "+" buttons on the front panel and while continuing to hold the three buttons switch power ON. Once powered up, release the three buttons. A "V" will be illuminated on the display to indicate that the special control driver mode is active. To "lock-in" the special 12-volt control driver mode you must enter calibration. Press and hold the CAL button until "CAL" lights on the display and the RED warning light is illuminated (approximately three seconds). The console is now in calibration mode and the 12-volt control driver mode is "locked-in." Because this procedure also restores factory calibration values, you must re-calibrate the system for your application. Adjust all necessary calibration values and exit calibration by pressing and holding the CAL button until the RED light turns off (approximately three seconds). The console will remain in the special 12-volt control driver mode, even when power is turned off.

NOTE: Do not operate this system with Micro-Trak's Electric Servo Valve installed when the 12-volt control driver mode is activated. Damage to the servo valve will result.

OPERATIONAL NOTE: Many of the 12-volt control valves on the market operate very slowly from fully closed to fully open. The SprayMate may operate sluggishly or be slow in control response time. For optimal performance, the control valve should be installed in a return line with a throttling valve installed.

To deactivate the 12-volt servo mode, turn power to the console OFF. Turn the rotary selector to the appropriate position (TOTAL AREA for English mode or SUB AREA for Metric mode). Press and hold the CAL and reset "-" buttons on the front panel and while continuing to hold these two buttons switch power ON. Enter and exit calibration to "lock-in" 8-volt mode. Because this procedure also restores factory calibration values, you must re-calibrate the system for your application. Adjust all necessary calibration values and exit calibration by pressing and holding the CAL button until the RED light turns off (approximately three seconds). The console will remain in the 8-volt control driver mode, even when power is turned off.

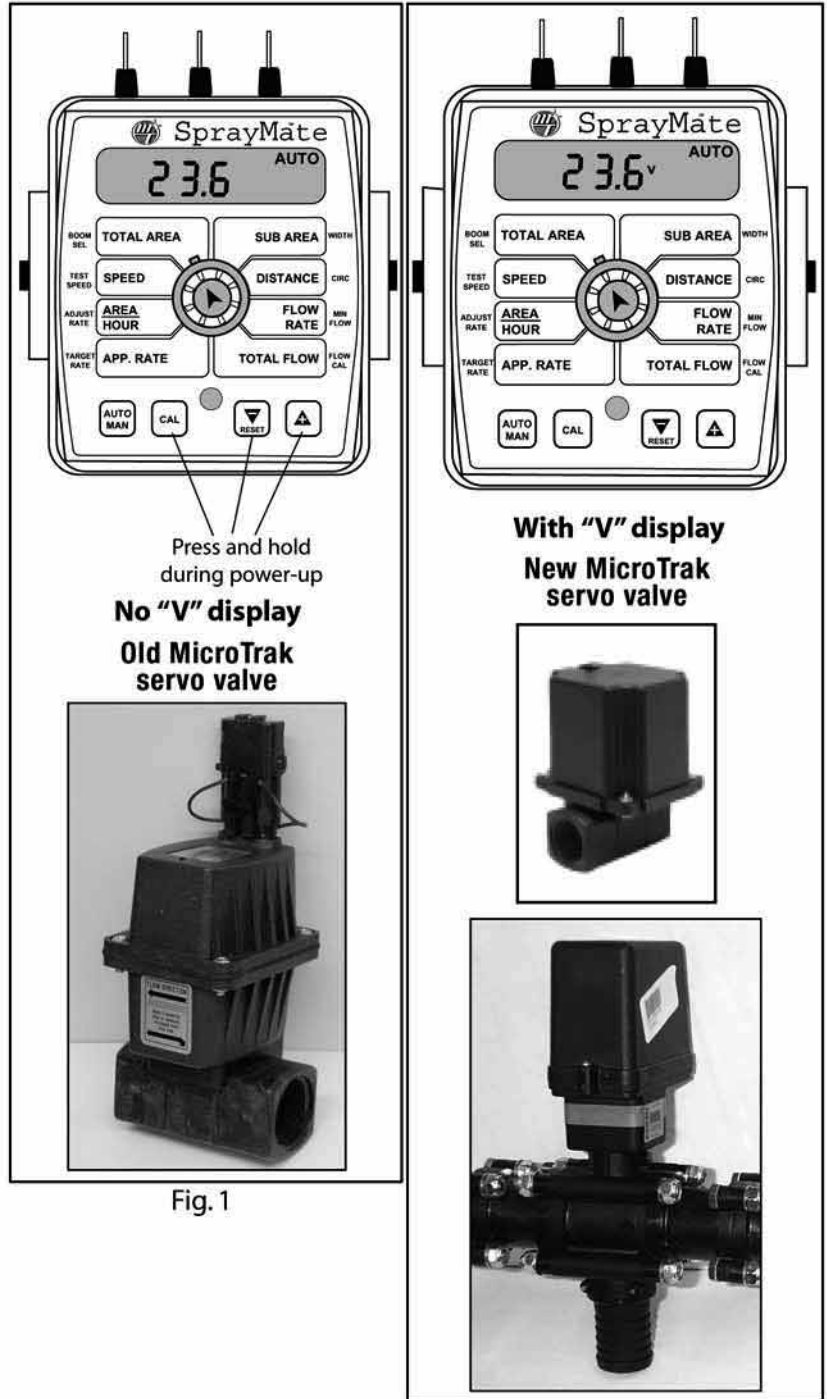


Fig. 1

Fig. 2

Appendix B:

Fine Tuning Speed/Distance Calibration Value (With Run/Hold Switch Kit Installed)

This procedure is used to verify the calibration of systems WITH the Run/Hold Switch Kit or an optional remote run/hold kit installed. In order to achieve accurate measurements, each step in this fine tuning procedure should be performed as precisely as possible.

Note: If your system does not have a run/hold switch kit or remote Run/Hold sensor installed, refer to next page for instructions.

Preparation:

- Once the system is fully installed and calibrated, select a straight tract of ground that is similar to your actual field conditions and as level as possible.

NOTE: Using a course with a different ground surface, such as a hard-surface road, will result in different readings than exact field conditions.
- Measure a distance of 1000 feet (500 meters). Clearly mark the beginning and end points with flags or something highly visible to the operator.

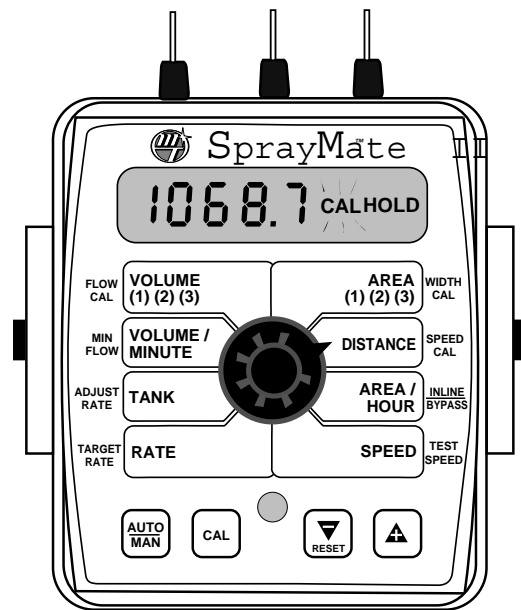
Procedure:

- With the console turned ON, place the Run/Hold switch in the HOLD position. The HOLD icon will be displayed. Turn the rotary dial to the "DISTANCE" position. Be sure the display shows 0. If not, reset the distance counter by pressing and holding "RESET" until the display returns to 0 (approximately one second). The word CLEAR will be displayed when reset is pressed.
- You are now ready to drive the measured course. Pick a location on the vehicle to use as a marker for starting and stopping the distance counting function (door handle, mirror, step, etc.). You should begin driving the course well ahead of the starting flag and drive past the ending flag, using the Run/Hold switch to start and stop the counting function. It is not recommended to start from a dead stop at the starting flag and stop at the ending flag.
- Place the Run/Hold switch in RUN when the marker on the vehicle passes the starting flag to activate the distance counting function. The console display numbers will increase, adding to the distance total as you drive. Drive the pre-measured course and place the Run/Hold switch in HOLD, when the marker on the vehicle passes the ending flag, to stop the distance counting function. The console display should read "HOLD". See illustration to the right. Stop the vehicle in a level and safe area and continue with this procedure.
- With the rotary dial still at DISTANCE (SPEED CAL), press and hold the "CAL" key for one second. Once the console is in "CAL," CAL and the speed calibration value will be displayed.

Momentarily press CAL and the word CAL will begin to flash and the distance travelled will be displayed. See illustration below.

- When the display shows distance ("CAL" is flashing), verify whether the number displayed is the exact distance you drove (within +/- 1 - 2 %). If not, press the "+" or "-" key to adjust the figure to match the distance you actually drove. If the display reads too high, use the "-" key to lower the displayed value. If the display reads too low, use the "+" key to raise the displayed value.
- When the number shown on the display matches (as closely as possible) the actual distance driven, you have arrived at the correct calibration value. If you cannot adjust the displayed distance to exactly match the actual distance driven, adjust the figure as close as possible to the actual distance. You may check the calibration number by momentarily pressing CAL. The word CAL and the SPEED CAL number will appear. Exit "CAL" by pressing "CAL" for one second.

The speed sensor is now calibrated. To verify proper calibration, repeat the procedure a second time. Write down the new speed calibration number and keep it in a safe place. If the calibration values are ever accidentally changed, you can simply re-enter this number.



Appendix B: cont.

Fine Tuning Speed/Distance Calibration Value (Without Run/Hold Switch Kit Installed)

This procedure is used to verify the calibration of systems WITHOUT run/hold switch kit installed. In order to achieve accurate measurements, each step in this fine tuning procedure should be performed as precisely as possible.

Note: If your system does have an optional run/hold switch kit installed, refer to page 46 for instructions.

Preparation:

- Once the system is fully installed and calibrated, select a straight tract of ground that is similar to your actual field conditions and as level as possible.

NOTE: Using a course with a different ground surface, such as a hard-surface road, will result in different readings than exact field conditions.

- Measure a distance of 1000 feet (500 meters). Clearly mark the beginning and end points with flags or something highly visible to the operator.

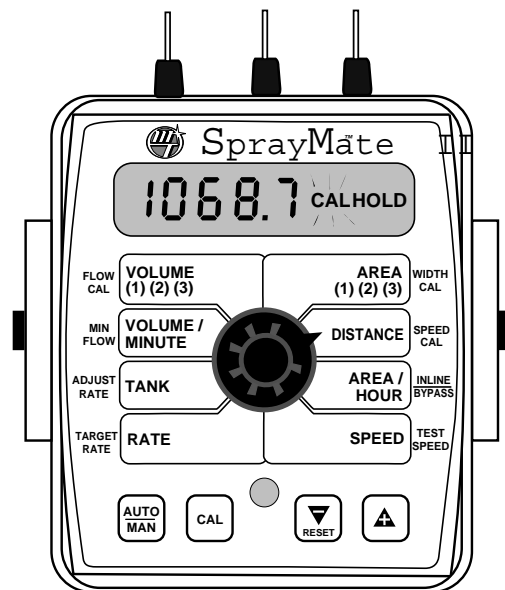
Procedure:

- You are now ready to drive the measured course. Pick a location on the vehicle to use as a marker for starting and stopping (door handle, mirror, step, etc.). Position the vehicle at the beginning of the measured course with the marker adjacent to the starting flag and STOP the vehicle. Turn all booms OFF.
- With the console turned ON, turn the rotary dial to the "DISTANCE" position. Be sure the display shows 0. If not, reset the distance counter by pressing and holding "RESET" until the display returns to 0 (approximately one second). Booms must be OFF. The word CLEAR will be displayed when reset is pressed.
- Begin driving the pre-measured course. The console display numbers will increase, adding to the distance total as you drive. STOP the vehicle when the marker is adjacent to the ending flag. The vehicle MUST not move until the remaining steps of this procedure have been completed.
- With the rotary dial still at DISTANCE (SPEED CAL), press and hold the "CAL" key for one second. When the CAL icon appears, the number displayed is the speed calibration value. Press and release the CAL button. The CAL icon will begin flashing and the display will show distance travelled.
- When the display shows distance ("CAL" is flashing), verify whether the number displayed is the exact distance you drove (within + or - 2 %). If not, while the display shows distance,

press the "+" or "-" key to adjust the figure to match the distance you actually drove. If the display reads too high, use the "-" key to lower the displayed value. If the display reads too low, use the "+" key to raise the displayed value.

- When the number shown on the display matches (as closely as possible) the actual distance driven, you have arrived at the correct calibration value. If you cannot adjust the displayed distance to exactly match the actual distance driven, adjust the figure as close as possible to the actual distance. Exit "CAL" by pressing "CAL" for one second.

The speed sensor is now calibrated. To verify proper calibration, repeat the procedure a second time. Write down the new speed calibration number and keep it in a safe place. If the calibration values are ever accidentally changed, you can simply re-enter this number.



Appendix C:

Fine Tuning Flowmeter Calibration Value

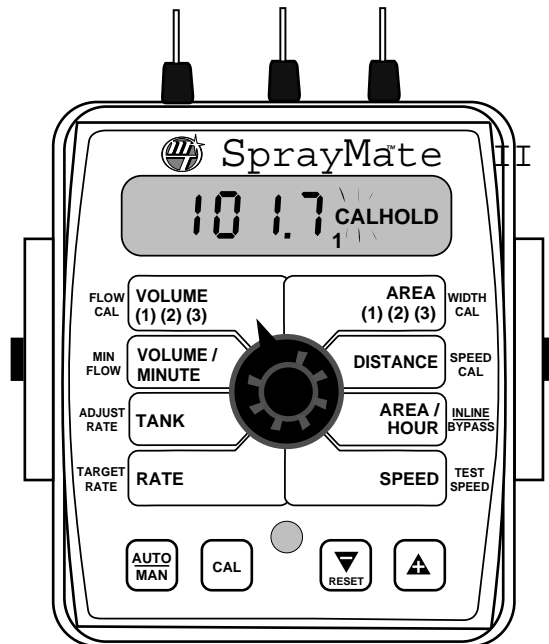
This procedure is used to verify and fine-tune the flowmeter calibration. Every flowmeter is calibrated with water at the factory and stamped with a calibration value. Enter that value as a starting point and use this procedure to fine-tune that value for your specific installation and spraying application. This procedure should be repeated each time a new solution is being applied (differing solutions will have a different specific gravities and different flow characteristics) or when the flowmeter installation has been altered.

Procedure:

1. Put enough water in the sprayer tank to perform this test. (Preferably 100 gallons or more. The larger the volume of water used, the more accurate will be the calibration.)
2. Start sprayer pump and turn on booms. Run enough water to purge all air from lines. Turn off booms but leave pump running.
3. Turn console rotary selector to the VOLUME position. Select the counter (1-3) that you want to use. Press and hold the RESET button until the display reads 0 (about 2 seconds).
4. Turn on all booms, and run a known amount of water (preferably 100 gallons or more).*
5. Turn off all booms. Compare the console's VOLUME reading with the known amount of water run. See Illustration. If the two amounts are within one or two percent, no fine tuning is required. If the two amounts are more than two or three percent different, continue with the next step.
6. With the console still in the VOLUME position, enter calibration (boom switches OFF, hold the CAL button until red warning light comes on; about one second). The display will show the flowmeter calibration value and the CAL icon.
7. Momentarily press the CAL button. The CAL icon will begin to flash and the total volume will be displayed.
8. When the TOTAL FLOW value is displayed, use the "+" or "-" button to adjust the value to match the amount of water run.
9. Momentarily press the CAL button. The word CAL and the flowmeter calibration number will be displayed. You will notice that the flowmeter calibration value has changed. Write down the new flowmeter calibration value. This is your "fine tuned" calibration value, keep it for future reference.

10. Exit calibration by holding the "CAL" button until the red warning light goes out (about one second).

*The most accurate method to measure the volume of water run is to place a container under EVERY nozzle and add together the amount from each nozzle. This assures that 100 percent of the water is collected and that all nozzles are spraying equally. It is important to perform this procedure at a flow rate similar to that which will be used in the field. It is also possible to disconnect the main boom line and run it to a large measuring container but a valve must be installed and properly adjusted to simulate actual field conditions.



Appendix D: Flowmeter Assembly

IMPORTANT: Opening the flowmeter will void the Flowmeter Calibration value assigned to your unit. However, you may need to take the flowmeter apart for periodic cleaning or to remove an obstruction.

If you can shake the flowmeter from end-to-end to produce a “rattling” sound (shaft-end play), or if you can blow into the meter from either end and cause the turbine to spin freely, your flowmeter does not need cleaning. If you cannot hear the “rattling” sound or get the turbine to spin freely, your flowmeter needs to be cleaned. See Illustrations below for reassembly instructions.

OPENING THE FLOWMETER:

Cut the calibration tag retaining wire. Remove the screws and disassemble the flowmeter. Do not attempt to remove the sleeve bearings from the flowmeter housing.

Use warm water and if necessary, a mild detergent and a soft bristle brush to clean all parts. Do not use solvents or diesel fuel to clean the flowmeter. A magnet works well for removing fine metallic particles from the turbine.

Inspect all parts. Check for excessive bearing or shaft wear. The shaft will wear shorter until the turbine drags on the housing. Illustration 19 shows you what a new shaft looks like. When the shaft is worn to the point of drag, the turbine must be replaced.

On a flat surface, place each housing half on end. Set and spin the turbine in each half. It should spin freely. If it does not spin

freely, remove the turbine, wipe the shaft and try again. If it still does not spin freely, the shaft or bearings may have excessive wear. (Service may be necessary.)

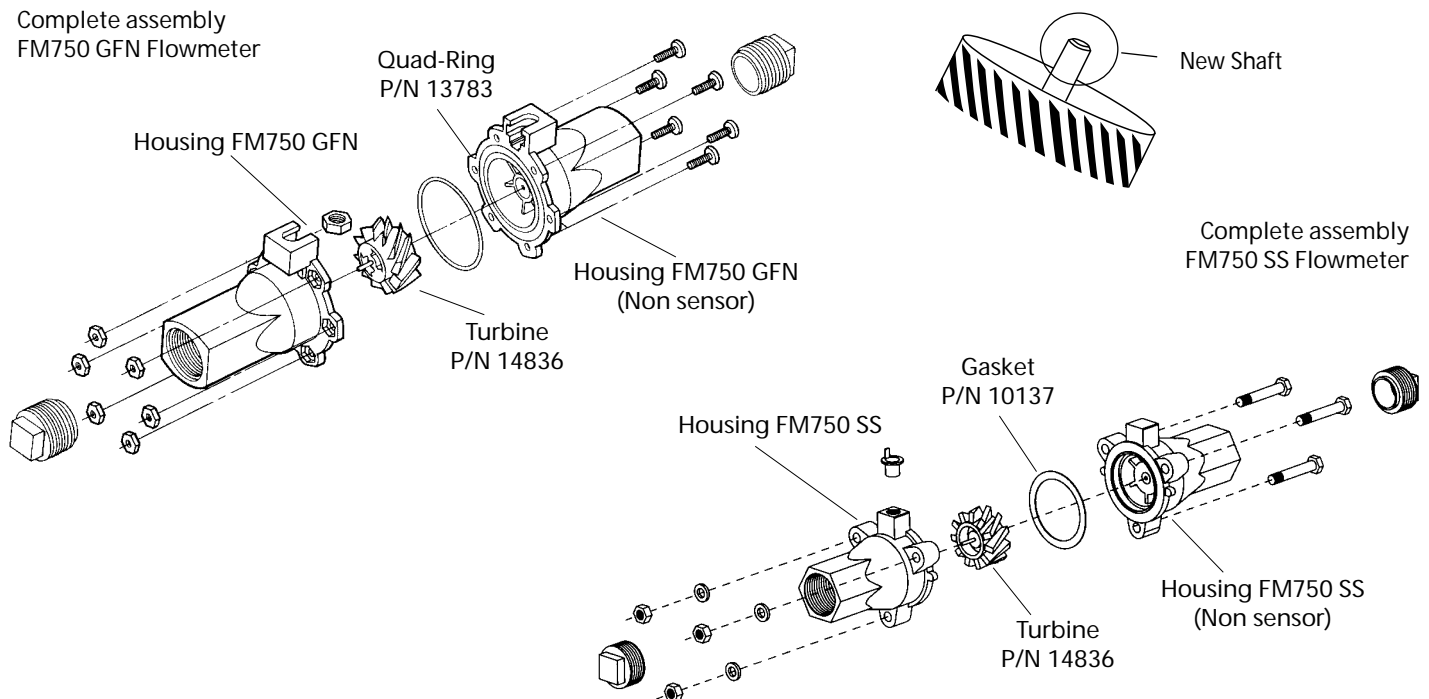
ASSEMBLING THE FLOWMETER:

Stainless steel meters use a Teflon gasket. Sealants are normally not required. Plastic meters use an o-ring (Quad-ring). Apply a small amount of silicon grease for lubrication. Gaskets and o-rings may be reused several times but eventually may need replacement.

Place the turbine in the non-sensor housing. Position gasket / o-ring; carefully place sensor housing over turbine. Drop all screws into holes. Hold nuts (and lock washers on stainless meters) in place and finger-tighten screws. Ensure proper placement of gasket / o-ring and evenly tighten all screws. Attach tag.

After assembly, shaking flowmeter end-to-end should produce a “rattling” sound (shaft end play). Blowing into the meter from either end should cause the turbine to spin freely. If the turbine only spins from one direction, install the flowmeter so that the liquid flows in that direction (service may be required).

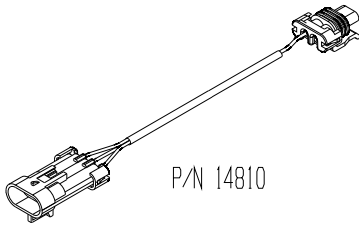
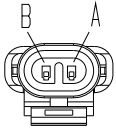
For maximum accuracy the flowmeter should be mounted in a vertical position. Recalibration is required before field operation.



Appendix E: Radar Adapter Cables

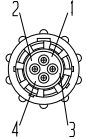
In-Cab John Deere Metri-Pak Connector 8000/9000 Series

Ground Common Signal

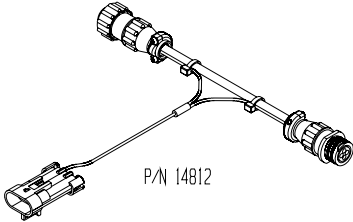


P/N 14810

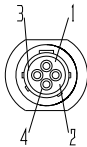
DICKEY-john Radar Amp Connector



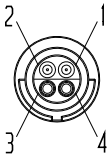
1. Ground
2. Signal
3. +12 Volts
4. N/C



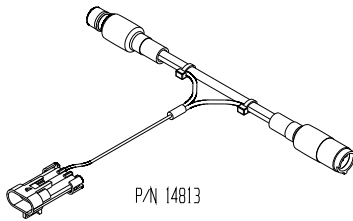
P/N 14812



DICKEY-john Radar Cannon Connector



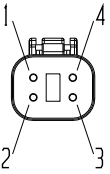
1. +12 Volts
2. Ground
3. Signal
4. Enable



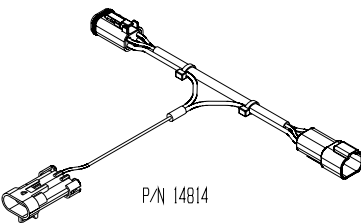
P/N 14813



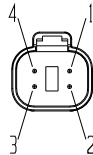
DICKEY-john Radar Deutsch Connector



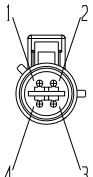
1. 12 Volts
2. +12 Volts
3. Signal
4. Ground



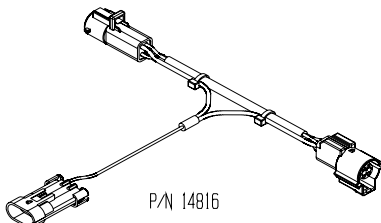
P/N 14814



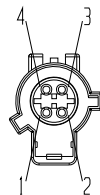
DICKEY-john Radar Ford Connector



1. Ground
2. Signal
3. +12 Volts
4. Enable



P/N 14816



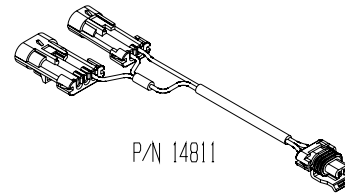
Vansco Radar Amp Connector



P/N 14926

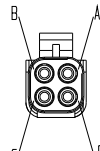
RADAR	CONNECTOR	SIGNAL PIN
DICKEY-john	Amp	2
DICKEY-john	Cannon	3
DICKEY-john	Deutsch	3
DICKEY-john	Ford	2
DICKEY-john	Packard	B
In-Cab JD (8000 & 9000's)	Metri-Pak	A
Magnavox & Phillips	Packard	C
Raven	Conxall	3
Vansco	Amp	2

In-Cab John Deere "Y" Cable

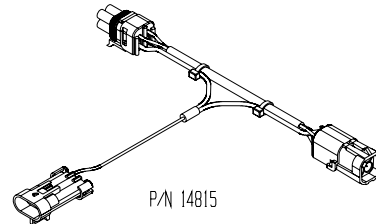


P/N 14811

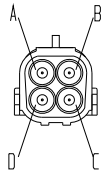
DICKEY-john Radar Packard Connector



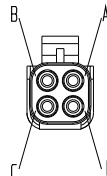
- A. Ground
- B. Signal
- C. 12 Volts
- D. 12 Volts



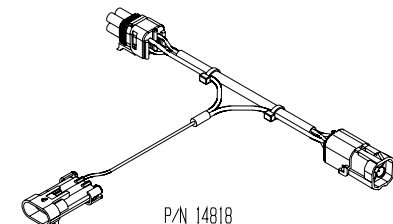
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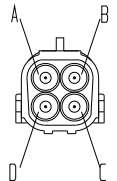
Magnavox & Phillips Radar Packard Connector



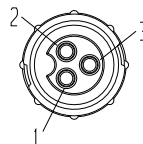
- A. 12 Volts
- B. 12 Volts
- C. Signal
- D. Ground



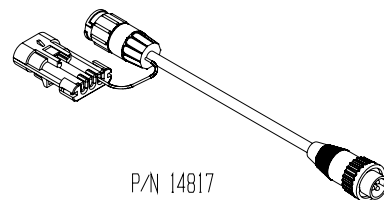
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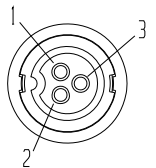
Raven Radar Conxall Connector



1. Ground
2. 12 Volts
3. Signal



P/N 14817



Appendix I: Conversion Chart

English to Metric

Linear Measurement	1 inch	=	2.54 centimeters
	1 foot	=	30.48 centimeters or .305 meters
	1 yard	=	0.914 meters
	1 mile	=	1.609 kilometers

Land Measurement	1 acre	=	0.405 hectares
	1 square mile	=	2.59 square kilometers or 259 hectares

Liquid Measurement	1 pint	=	0.473 liters
	1 quart	=	0.946 liters
	1 gallon	=	3.785 liters

Dry Measurement	1 quart	=	1.101 liters
	1 peck	=	8.810 liters
	1 bushel	=	35.239 liters

Fuel Consumption	10 miles per gallon	=	4.25 kilometers per liter
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Metric to English

Linear Measurement	1 millimeter	=	0.039 inches
	1 centimeter	=	0.394 inches
	1 meter	=	3.281 feet or 39.37 inches
	1 kilometer	=	0.621 miles

Land Measurement	1 hectare	=	2.471 acres
	1 square kilometer	=	0.386 square miles or 247.1 acres

Liquid Measurement	1 liter	=	1.057 quarts
	1 decaliter (10 liters)	=	2.64 gallons

Dry Measurement	1 liter	=	0.908 quarts
	1 decaliter (10 liters)	=	0.284 bushels

Fuel Consumption	10 kilometers per liter	=	23.5 miles per gallon
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Appendix J: Replacement Parts List

The following replacement parts are available from your dealer or distributor or from:

Micro-Trak Systems, Inc.
P.O. Box 99, 111 East LeRay Avenue
Eagle Lake, MN 56024-0099

When ordering parts, please list the model number of your console, and the description and part number of each part that you want to order.

<u>Part Number</u>	<u>Description</u>
12069	Magnet kit (6 magnets per kit)
10013	Speed sensor mount bracket
12910	14" Black plastic cable ties (bag of 10)
13181	Console mount kit*
12888	Console mount knob
12889	Console mount washer
13096	5-foot Hall-effect Speed/Flow Sensor Cable with threaded sensor, nut and female connector
13226	5-foot remote run/hold sensor cable
01531	Speed sensor kit
01535	Remote run/hold sensor kit
14928	1" Micro-Trak electric servo valve
11501	FM750 GFN Flowmeter
10131	FN750 SS Flowmeter
14315	Power cable
14313	Flow, servo, boom harness
14314	6-foot Ignition Cable
14311	SprayMate II NH3 Adapter Cable
14360	SprayMate II Power (On/Off) Switch Kit
14361	SprayMate II Run/Hold Switch Kit
10899	FM750N Flowmeter - NH3 ONLY
14348	FM1500N Flowmeter - NH3/Liquifier
14958	NH3500 Servo
14959	Liquifier Servo
21353	NH3 Servo Gearhead Assembly

Optional 2-Pin, 3-Pin and 10-Pin Metri-Pack 150 extension cables:

<u>Part No.</u>	<u>M/P 2-Pin</u>	<u>Part No.</u>	<u>M/P 3-Pin</u>	<u>Part No.</u>	<u>M/P 5/5 10-Pin</u>	<u>Part No.</u>	<u>W/P 3-pin</u>
13200	5-foot	13205	5-Foot	14363	5-Foot	10450	5-Foot
13201	10-foot	13206	10-Foot	14316	10-Foot	10449	10-Foot
13202	15-foot	13207	15-Foot	14317	15-Foot	10876	15-Foot
13203	20-foot	13208	20-Foot	14364	20-Foot	10829	20-Foot
13204	25-foot	13209	25-Foot	14365	25-Foot	11462	25-Foot

*The Console Mount Kit is available only as a kit, some parts are not available in individual components.
Parts and design specifications subject to change without notice.

Notes

Manufactured in U.S. A. by



111 East LeRay Ave., Box 99, Eagle Lake, MN 56024-0099

Toll-Free: 800-328-9613

507-257-3600 • Fax 507-257-3001

www.micro-trak.com • Email: trakmail@micro-trak.com

Printed in U.S.A.

744A Sprayer Control

U S E R M A N U A L



TeeJet
TECHNOLOGIES


A Subsidiary of  Spraying Systems Co.®

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744A Sprayer Control

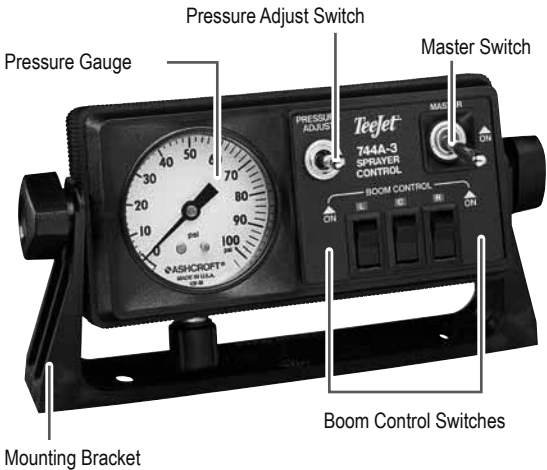
744A Sprayer Control

CHAPTER 1 - INTRODUCTION

The 744A Sprayer Control provides manual spray control in a compact package. The 744A allows for the choice of liquid-filled 100 PSI (7 bar) or 300 PSI (20 bar). The console features a lighted pressure gauge for night use and heavy-duty switches with LED indicators. The 744A is available in a variety of kit forms using solenoid or ball type control valves.

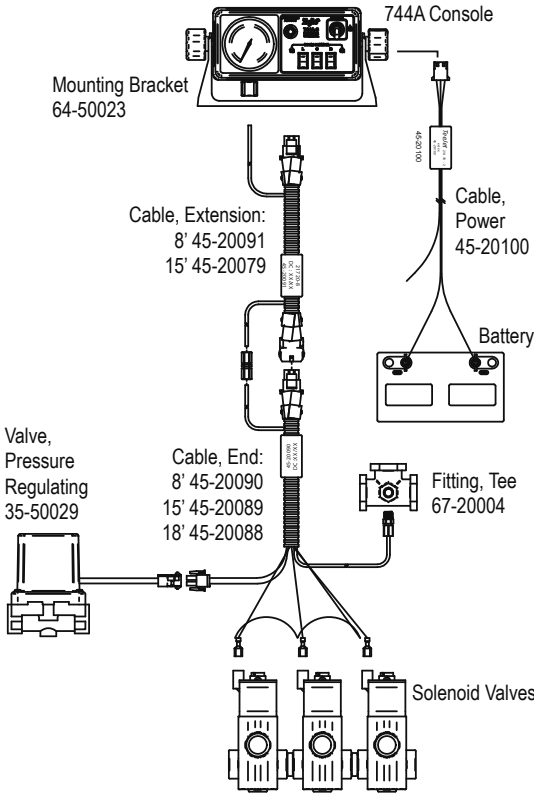
TeeJet 744A manual Sprayer Control for use with Solenoid or Ball Valves

- Manual spray controller in a compact package.
- Liquid filled 100 PSI or 300 PSI pressure gauge.
- Lighted pressure gauge for night use.
- Heavy-duty switches with LED indicators.
- Available in a variety of kit forms using solenoid or ball type control valves.
- DirectoValve shutoff ball valves are ordered separately for 744A ball valve kits.
- Kits include wiring harness.



SYSTEM CONFIGURATIONS

Figure 1-1: Solenoid Valves



744A Sprayer Control

Figure 1-2: Ball Valves

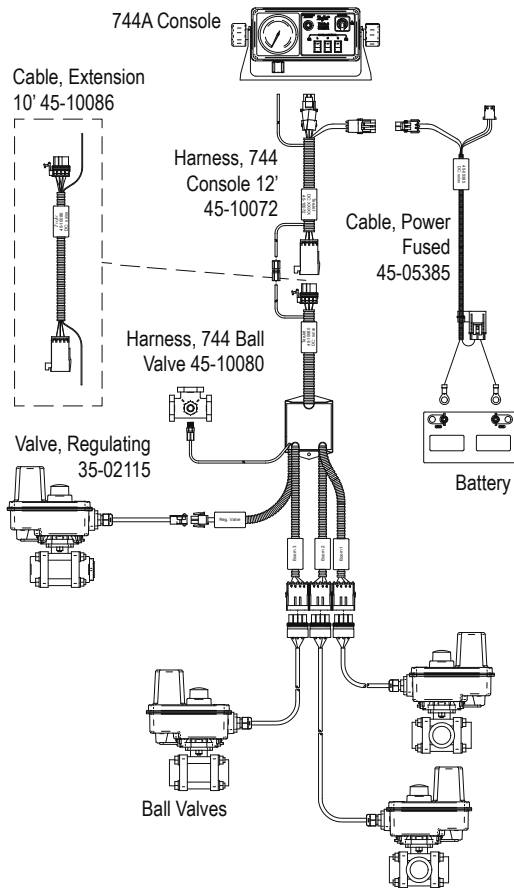


Figure 1-3: Plumbing Diagram - Diaphragm Pump

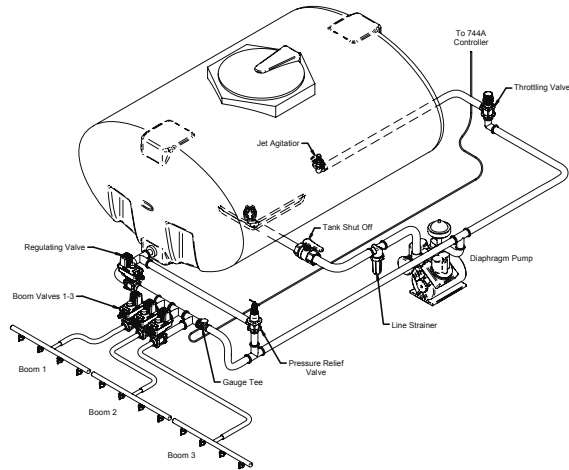
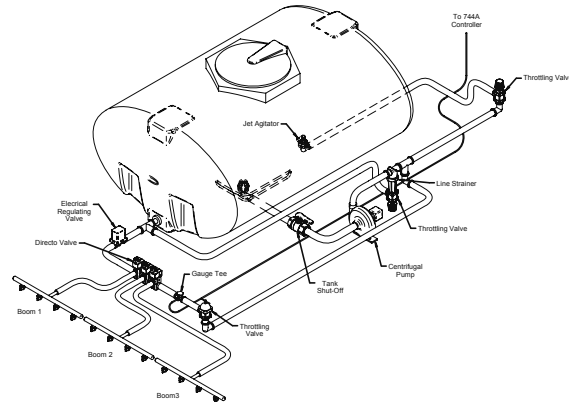


Figure 1-4: Plumbing Diagram - Centrifugal Pump and Self-Cleaning Strainer



744A Sprayer Control

KIT CONTENTS


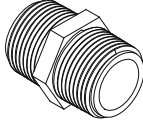

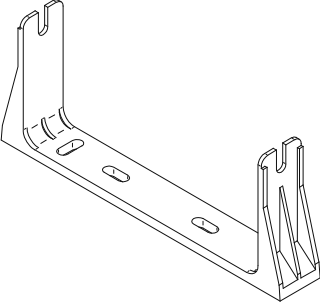
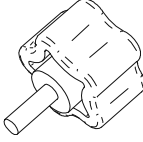

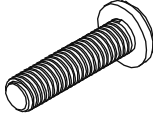


Unpack the installation kit and identify the required parts.

Item	Part Number	Description	Quantity
1	67-20004	Tee Fitting, Nylon (Black).....	1
2	67-20003	Male Connector, Nylon	1
3	67-20002	Tubing Nut, Nylon	3
4	67-20005	Close Nipple, Nylon (Black).....	1
5	65-50005	Tubing Insert, Brass.....	4
6	64-50023	Mounting Bracket, Nylon.....	1
7	60-10026	Lock Knob.....	2
8	60-50000	1/4" External Tooth Lock Washer	2
9	60-50003	1" Bolt, Steel, Zinc Plated	2
10	60-50001	Flat Washer, Steel, Zinc Plated.....	2
11	60-50009	Lock Washer, Steel, Zinc Plated.....	2
12	350-0062	Hex Nut, Steel, Zinc Plated.....	2
13	67-20001	Male Coupling, Nylon.....	1
14	90-50141	Accessory Bag - Items 2,3,5, & 7-13	1
15	75-50033	Control Housing 100 psi Liquid.....	1
16	75-50035	Control Housing 300 psi Liquid.....	1
17	98-70025	744A Manual.....	1


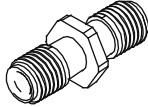

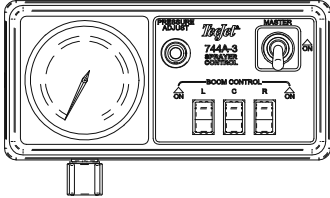
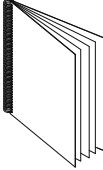
Figure 1-5: Item Illustrations

Item	Part #	Description	Illustration
1	67-20004	Tee Fitting, Nylon (Black)	
2	67-20003	Male Connector, Nylon	

744A Sprayer Control

Item	Part #	Description	Illustration
3	67-20002	Tubing Nut, Nylon	
4	67-20005	Close Nipple, Nylon (Black)	
5	65-50005	Tubing Insert, Brass	
6	64-50023	Mounting Bracket, Nylon	
7	60-10026	Lock Knob	
8	60-50000	1/4" External Tooth Lock Washer	
9	60-50003	1" Bolt, Steel, Zinc Plated	
10	60-50001	Flat Washer, Steel, Zinc Plated	
11	60-50009	Lock Washer, Steel, Zinc Plated	

744A Sprayer Control

Item	Part #	Description	Illustration
12	350-0062	Hex Nut, Steel, Zinc Plated	
13	67-20001	Male Coupling, Nylon	
14	90-50141	Accessory Bag - Items 2,3,5, & 7-13	
15	75-50033	Control Housing 100 psi Liquid	
16	75-50035	Control Housing 300 psi Liquid	
17	98-70025	744A Manual	

CONTROL HOUSING ASSEMBLY

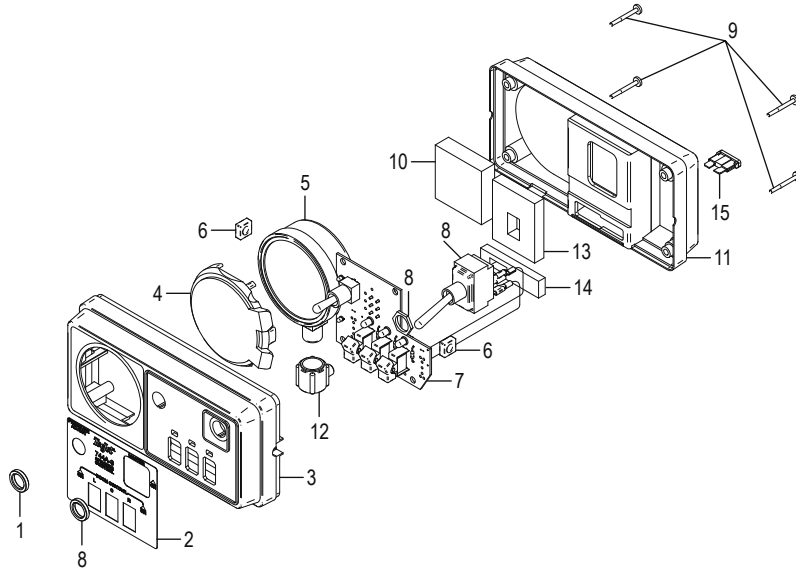
New consoles have boom switches, gauge lamps/LEDs and boom LED soldered to the circuit board.

Item	Part Number	Description
1	60-50020	Knurled Nut, Brass Nickel Plated
2	84-20002	Graphic Panel
3	64-50024	Front Housing
4	64-50031	Lens Gauge
5	51-20008	100 psi Liquid Gauge
5	51-20002	300 psi Liquid Gauge
6	60-50019	Square Nut (2 Req'd)
7	01-50007	Circuit Board—Includes 1, 9, & 10

744A Sprayer Control

Item	Part Number	Description <i>(continued)</i>
8	32-50010	Toggle Switch
9	350-2610	Plastic Screw
10	64-50030	Foam Spacer
11	64-50025	Back Housing
12	64-50029	Elbow, Nylon (Black)
13	64-50032	Output Cable Shield, Neoprene
14	64-50026	Receptacle Fuse Shield, Neoprene
15	604-0014	Fuse, 15A

Figure 1-6: Assembly



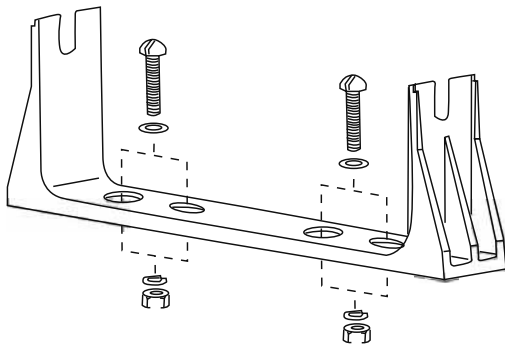
744A Sprayer Control

CHAPTER 2 - INSTALLATION

MOUNTING BRACKET

1. Make sure all switches on the 744A Sprayer Control are turned to the "Off" position.
2. Determine the best location for the 744A Sprayer Control in the vehicle cab according to the following guidelines:
 - pressure gauge should be readily visible
 - switches should be within easy reach
 - controller bracket should rest on a flat surface
 - 12 volt DC power source must be accessible (maximum draw 10 amps)
3. Determine the proper routing for power cables and pressure tube:
 - away from operators' movement area
 - away from moving parts
 - away from sharp objects
4. Install the mounting bracket using 1/4" (6.4mm) drill, machine screws, nut, washers, and lock washers as illustrated below. Attach the control housing assembly to the mounting bracket using the console adjusting knobs and washers.

Figure 2-1: Mounting Bracket



OUTPUT CONTROL CABLE

Cut a 1.0" (3.0 cm) diameter opening used to feed the output control cable from the interior of the tractor cab to the boom control valves. Make sure the hole has no burrs or sharp edges that could damage the wires.

744A-3 Unit

6 wires from the output cable are used to control a three-section boom.

- Orange (Right) Yellow (Center) Green (Left) – connect to 144A Valves. When using a *344AEC Ball Valve, connect to the white wire.
- **Black – connect to other terminal on 144A Valves. When using the *344AEC Ball Valve, black is not connected.
- Red and Brown – connect to red and black wires on the Regulator Valve (244, 344AE-PR, or 344AE-RL).

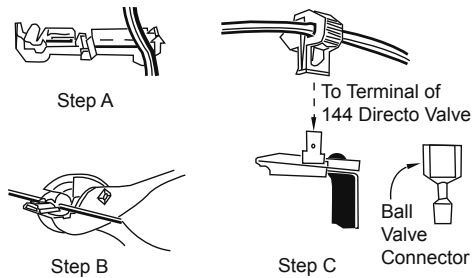
**When using 344AEC DirectoValve® Ball Valves, connect black wire(s) and red wire(s) using the Valve End and Battery End Cables (supplied only when Ball Valve Kits are purchased) to an uninterrupted power supply such as the battery.*

***The black ground wire for the control cable is not supplied with connectors attached. The T-Tap connectors are supplied separately and should be attached as per Figure 2-2.*

WARNING!: Do not plug the control cable into the control box until it has been fully connected to the control valves. Doing so may allow the unconnected leads to short out.

744A Sprayer Control

Figure 2-2: Figure 2-2: T-Tap Connector Assembly



Input Power Cable

The Input Power Cable consists of three wires. The red wire should be connected to a 12 Volt power supply within the cab of the vehicle (i.e., ignition switch). If the power source is located outside of the cab, the power cable should exit the cab through the same 1.0" (3.0 cm) diameter hole as the output control cable. The blue wire should be connected to the headlight system of the tractor. This can be accomplished by connecting the blue wire to the auxiliary terminal of the headlight switch or by splicing into the wire connected to the headlight. The black wire is the negative lead and should be connected to a good chassis ground.

Plug the input power cable into the power cable socket on the back of the 744A console. Turn the vehicle ignition switch to the "Run" position. If the wiring has been connected properly, the boom section indicator lights should illuminate when the boom section switches are toggled. The gauge light should appear when the headlights are illuminated.

Pressure Gauge

The tubing for the pressure gauge is supplied as part of the wiring harness. To avoid chemical leakage into the vehicle cab, the tube coupler should be installed outside of the vehicle cab. If a gauge isolator is used with the system, it should be installed in place of the coupler, also outside of the vehicle cab.

The pressure gauge should be checked for accuracy each season. If the unit is equipped with a liquid-filled gauge and it does not read accurately, the gauge may need to be vented. To vent the gauge, remove the four screws in the back of the sprayer control housing and lift off the back. The rear of the gauge will be exposed. To vent the gauge, clip off the nib of the rubber plug in the back of the gauge or puncture it with a needle. Once the gauge has been vented, do not store the sprayer control on its back as this may cause a loss of fluid from within the gauge. If further inaccuracy is suspected at 0 PSI and a gauge isolator is being used, the isolator line may need to be bled according to the instructions furnished with the gauge isolator.

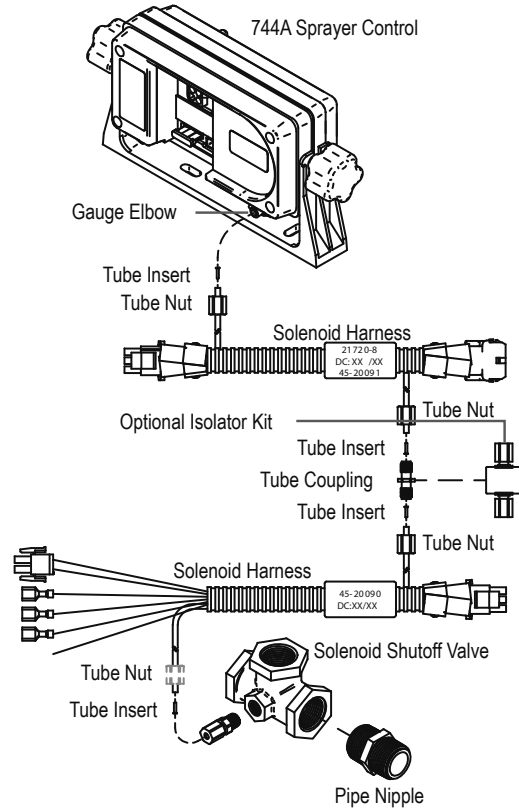
744A Sprayer Control

Pressure Gauge Tube Assembly

1. Determine the location at which the coupler is to be installed. Cut the tubing at that point.
2. Remove the tube nuts from the 3 couplers and slide the tubing through the nuts. The threaded portion of the nut should face their respective couplings. The tube should protrude approximately $\frac{1}{2}$ " beyond the nut.
3. One brass tube insert is provided. This must be used with the gauge coupling assembly.
4. A $\frac{3}{4}$ " x $\frac{3}{4}$ " nylon close nipple is provided if a male connected is needed with the gauge tee fitting.
5. Fluid leakage around the gauge indicates a poor connection or a defective gauge.

NOTE: All cables and tubes should be out of the way of the operator's feet and path so that they cannot be snagged or pulled. These tubes should be routed around sharp metal objects, edges, and moving parts with enough slack that they will not be pulled apart when sharp turns are made.

Figure 2-3: Pressure Gauge Tube Assembly



744A Sprayer Control

CHAPTER 3 - MAINTENANCE

Routine Procedures

Several routine procedures should be followed to help maintain the 744A Sprayer Control system.

1. Check all wires and connections for wear, damage, and frayed ends to prevent shorting out of the system.
2. Make sure that the mounting bracket for the 744A Sprayer Control is mounted securely.
3. All connections and terminals should be free of corrosion.
4. The control unit is designed so that it may be removed, cleaned, and stored during periods of non-use to protect it from extreme heat or cold.
5. The 744A Sprayer Control is NOT WATERPROOF. Do not immerse the unit when cleaning.
6. Periodic flushing of the sprayer will help prevent clogging due to residue buildup.

Removal of Control Unit

1. De-pressurize the system.
2. Uncouple the nylon pressure tube from outside the vehicle cab and allow the liquid to drain. Uncouple the tube from the bottom of the unit.
3. Disconnect the input power cable from the back of the unit.
4. Disconnect the output control cable from the back of the unit.
5. Loosen the triangular knobs on both sides of the unit and slide the unit off of the bracket.

744A Sprayer Control

U S E R M A N U A L

TeeJet 744A manual Sprayer Control for use with Solenoid or Ball Valves

- Manual spray controller in a compact package.
- Liquid filled 100 PSI or 300 PSI pressure gauge.
- Lighted pressure gauge for night use.
- Heavy-duty switches with LED indicators.
- Available in a variety of kit forms using solenoid or ball type control valves.
- DirectoValve shutoff ball valves are ordered separately for 744A ball valve kits.
- Kits include wiring harness.



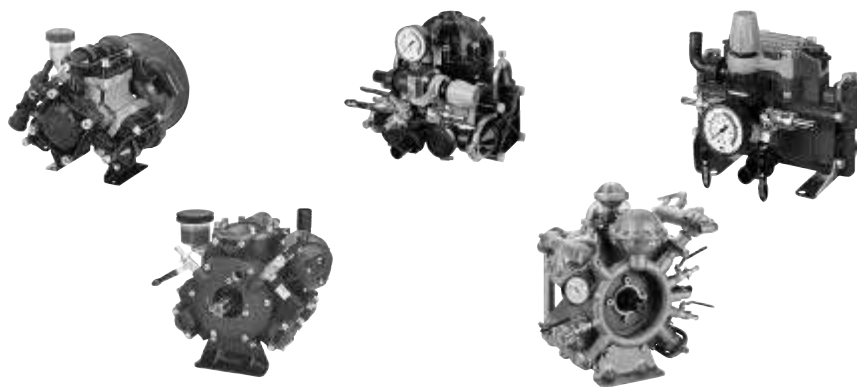
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POMPES A MEMBRANE

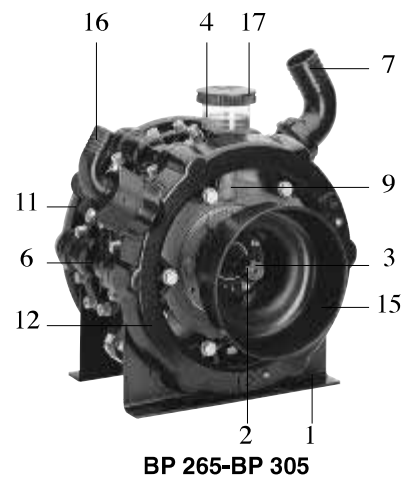
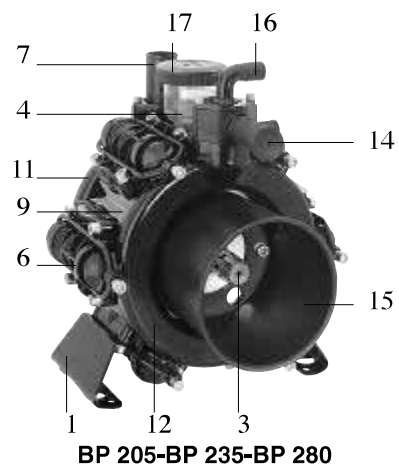
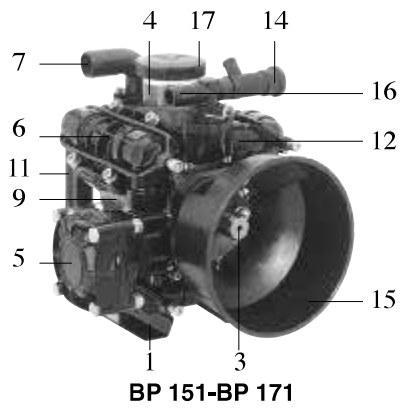
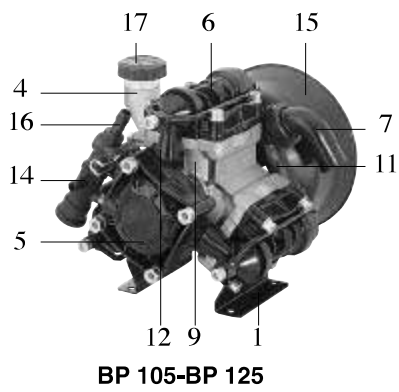
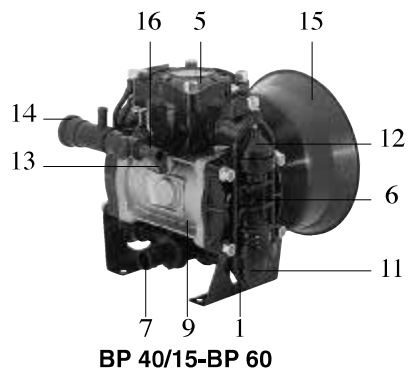
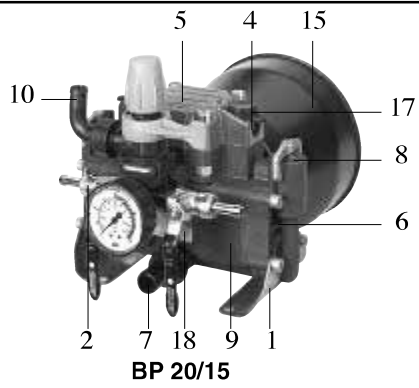


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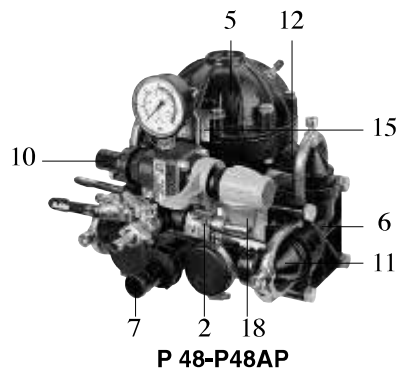
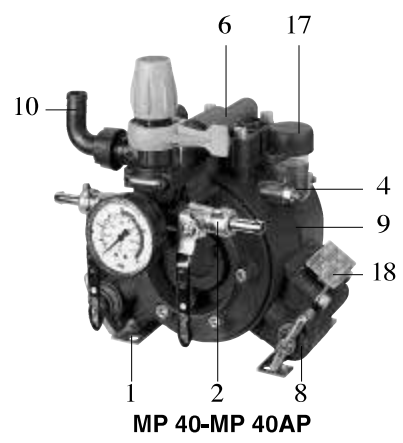
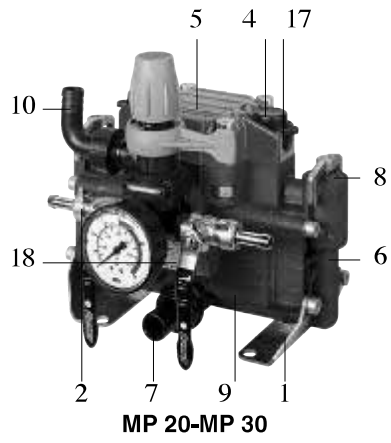


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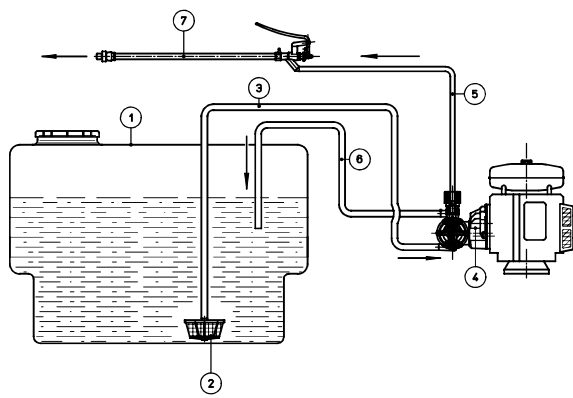


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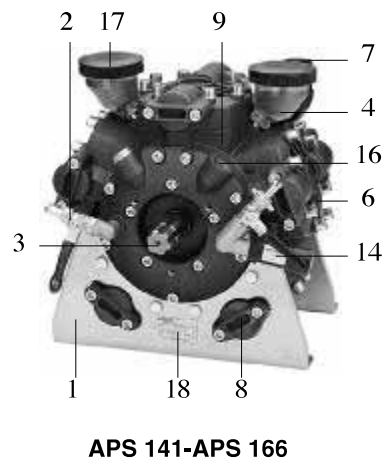
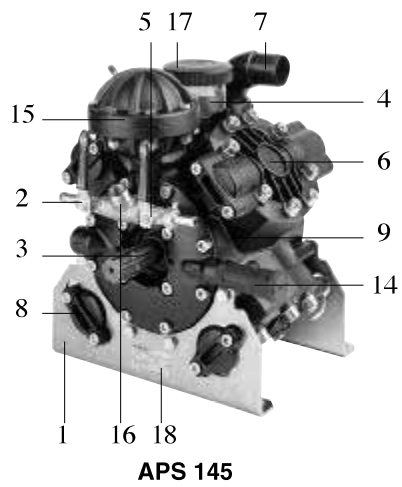
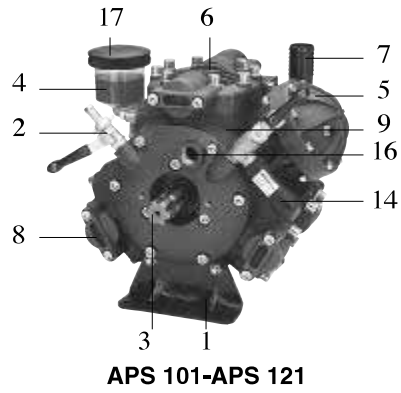
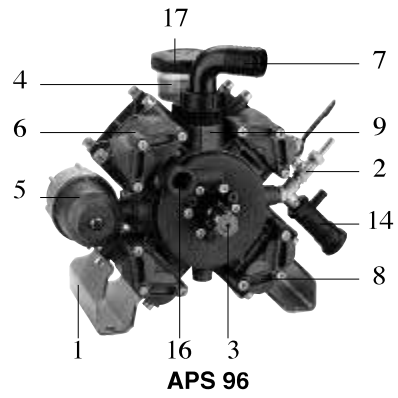
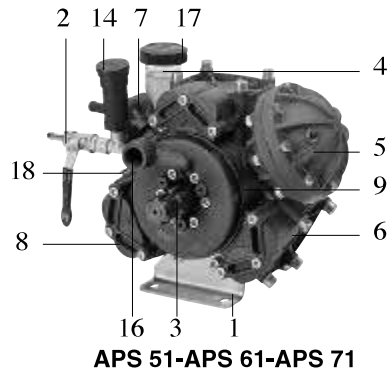
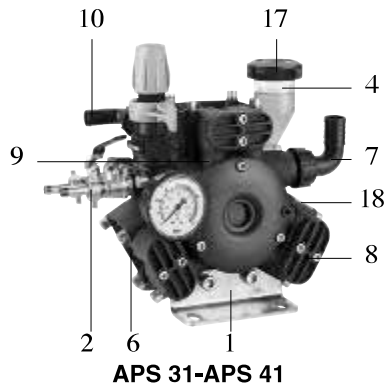


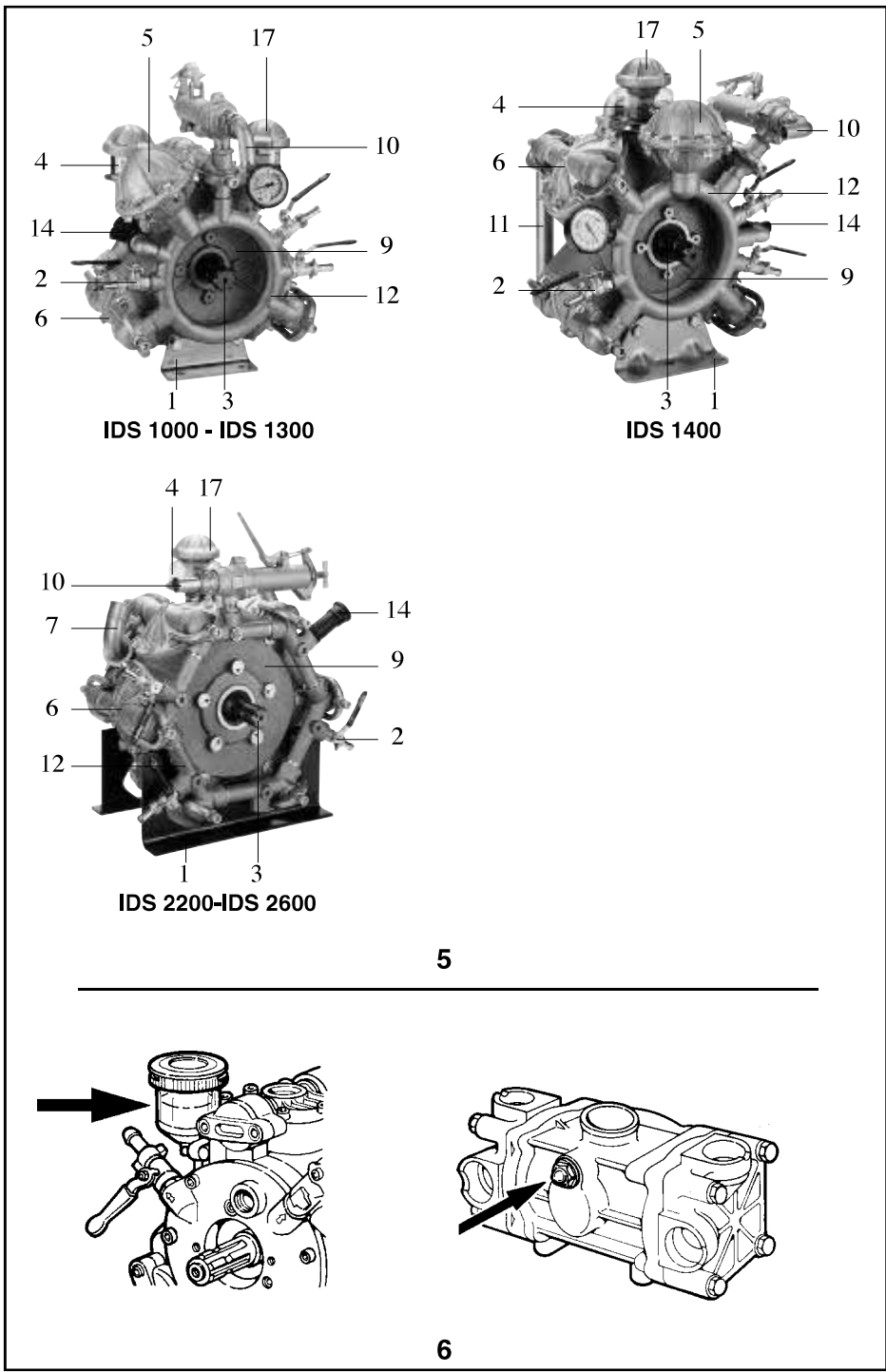
2



3

3

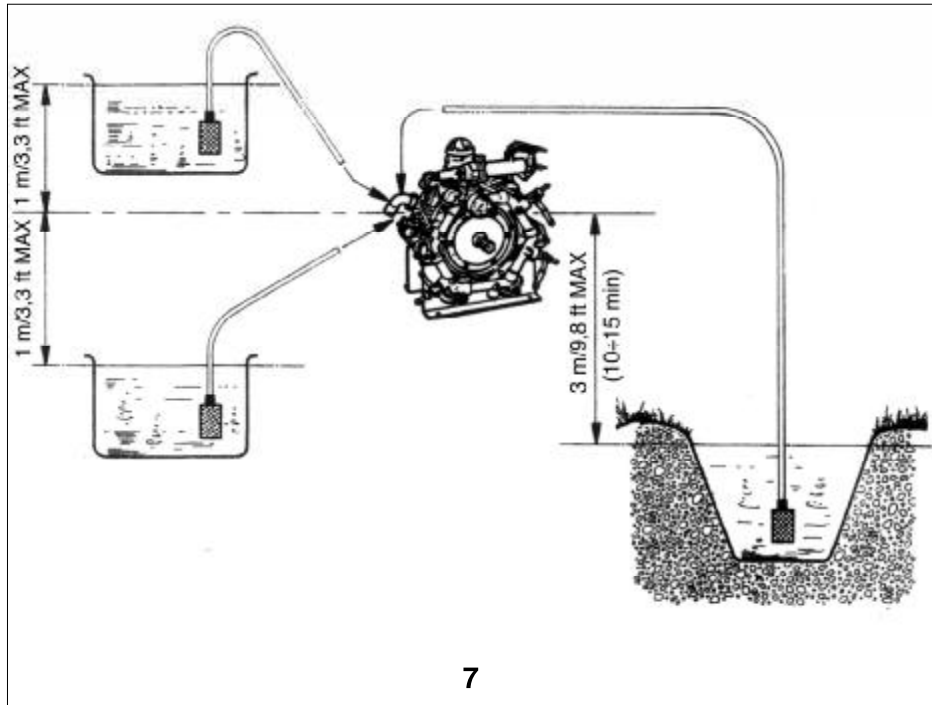




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6

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AVANT-PROPOS

Le présent manuel se compose de deux parties distinctes.

La première s'adresse à l'utilisateur final et au **Technicien Spécialisé** ; la deuxième s'adresse exclusivement au **Technicien Spécialisé**.

On entend par **Technicien Spécialisé** :

- le fabricant de la machine (par exemple motopompe) qui incorpore la pompe (dorénavant lorsque l'on parle de " machine qui incorpore la pompe ", il peut également s'agir d'une " installation qui incorpore la pompe ", comme par exemple dans le cas d'une station de pompage) ;
- une personne, en général du centre d'assistance, spécialement formée et autorisée pour effectuer sur la pompe et sur la machine qui incorpore la pompe des interventions d'entretien extraordinaire et des réparations. Il est rappelé que les interventions sur les parties électriques doivent être effectuées par un **Technicien Spécialisé**, étant également un **Electricien Qualifié**, c'est-à-dire une personne habilitée et qualifiée professionnellement pour le contrôle, l'installation et la réparation d'appareils électriques, selon les " règles de l'art " et conformément aux réglementations en vigueur dans le pays où la machine qui incorpore la pompe est installée.

PREMIERE PARTIE

1. INFORMATIONS GENERALES

Vous félicitant d'avoir choisi un de nos produits, nous vous rappelons qu'il a été conçu et fabriqué en prêtant la plus grande attention à la sécurité de l'opérateur, à l'efficacité de son travail et à la protection de l'environnement.

Afin de préserver ces caractéristiques dans le temps, nous recommandons la lecture attentive de ce manuel et nous vous invitons à respecter scrupuleusement les indications qu'il contient.

Prêter une attention particulière à la lecture des parties de texte signalées par le symbole :



car elles contiennent des consignes de sécurité importantes pour l'utilisation de la pompe.

Le Fabricant décline toute responsabilité quant aux dommages découlant de :

- inobservation du contenu du présent manuel et du manuel de la machine qui incorpore la pompe
- usages de la pompe différents de ceux exposés dans le paragraphe "**DESTINATION D'USAGE**"
- utilisations contraires aux réglementations en vigueur en matière de sécurité et de prévention des accidents du travail
- installation incorrecte
- négligences dans l'entretien prévu
- modifications ou interventions non autorisées par le Fabricant
- emploi de pièces de rechange non originales ou inadaptées au modèle de pompe
- réparations non effectuées par un **Technicien Spécialisé**.

1.1 CONDITIONS DE GARANTIE

La garantie a une validité de 12 mois, à compter de la date indiquée sur le document fiscal de vente (ticket de caisse, facture, etc.), à condition que le certificat de garantie joint à la documentation de la pompe soit retourné au Fabricant, entièrement rempli, sous 10 jours à partir de la date d'achat. Le client a droit exclusivement au remplacement des pièces qui, selon l'avis du Fabricant ou de son représentant autorisé à cette fin, présentent des défauts de matériel ou de fabrication, à l'exclusion de tout droit au dédommagement des préjudices, directs ou indirects, d'une quelconque nature.

Les frais de main-d'œuvre, emballage et transport restent à la charge du client.

Le produit remis au Fabricant pour réparations sous garantie doit parvenir avec tous ses éléments d'origine et sans être altéré. Dans le cas contraire, toute demande de garantie sera rejetée.

Les pièces remplacées deviennent propriété du Fabricant.

Les pannes ou ruptures éventuelles qui se manifestent pendant et après la période de garantie ne donnent droit ni à la suspension du paiement ni à des délais supplémentaires.

La garantie ne prévoit pas le remplacement de la pompe et cesse automatiquement dès que les délais de paiement convenus ne sont pas respectés.

Sont exclus de la garantie :

- les dommages directs ou indirects, de toute nature, découlant de chutes, d'utilisation incorrecte de la pompe et de l'inobservation des normes de sécurité, d'installation, d'utilisation et d'entretien contenues dans le présent manuel et dans celui de la machine qui incorpore la pompe ;
- les préjudices consécutifs à l'immobilisation de la pompe pour réparations ;
- toutes les pièces qui, durant leur emploi normal, sont sujettes à usure ;
- toutes les pièces qui se révèlent défectueuses suite à négligence pendant l'utilisation
- les dommages dérivant de l'utilisation de pièces détachées ou d'accessoires non originaux ou non approuvés expressément par le Fabricant et de réparations n'étant pas effectuées par un **Technicien Spécialisé**.

Toute modification de la pompe, notamment des dispositifs de sécurité, fait cesser la garantie et exonère le Fabricant de toute responsabilité.

Le Fabricant se réserve le droit d'apporter, à tout moment, toutes les modifications considérées nécessaires pour améliorer le produit, sans être obligé d'appliquer ces modifications aux appareils produits précédemment, livrés ou en cours de livraison.

Le contenu du présent paragraphe exclut toute condition préexistante, expresse ou implicite.

1.2 UTILISATION ET CONSERVATION DE CE MANUEL

Le manuel d'utilisation et d'entretien fait partie intégrante de la pompe et doit être conservé, pour des consultations futures, dans un lieu protégé, permettant sa consultation rapide en cas de nécessité.

Sur le manuel d'utilisation et d'entretien, figurent des avertissements importants pour la sécurité de l'opérateur et de ceux qui l'entourent, ainsi que pour le respect de l'environnement.

En cas de détérioration ou de perte, en demander un nouvel exemplaire à votre revendeur ou à un centre d'assistance autorisé.

En cas de cession de la pompe à un autre utilisateur, veuillez également joindre le manuel d'utilisation et d'entretien.

Nous avons porté une grande attention à la rédaction du présent manuel, si toutefois vous remarquez des erreurs, veuillez les signaler au Fabricant ou à un centre d'assistance autorisé.

Le Fabricant se réserve en outre le droit d'apporter, sans préavis, toutes les modifications nécessaires pour la mise à jour et la correction de ce manuel.

Toute reproduction, même partielle, du présent manuel, est interdite sans l'autorisation écrite du Fabricant.

1.3 SYMBOLES

Le symbole :



qui distingue certaines parties de texte, indique le risque important de dommages à la personne si les prescriptions et indications relatives ne sont pas respectées.

Le symbole :

AVERTISSEMENT

qui distingue certaines parties de texte, indique le risque d'endommager la pompe, si les instructions relatives ne sont pas respectées.

2. CARACTÉRISTIQUES ET DONNÉES TECHNIQUES

Pompe	# membrane	Débit		Pression		Puissance CV (HP)	T/min	Poids	
		L/min	US gal/min	Bar	psi			Kg	lb
BP 20/15	2	18.7	4.9	15	217.5	0.83	550	7.3	16.1
BP 40/15	2	39.9	10.5	15	217.5	1.8	550	10	22
BP 60	2	58	15.3	20	290	3.3	550	10	17.2
BP 105	3	104	27.5	20	290	5.5	550	12.3	27.1
BP 125	3	117	30.9	20	290	6.8	550	12.5	27.6
BP 151	4	138	36.5	20	290	7.8	550	24	52.9
BP 171	4	162	42.8	20	290	9.6	550	24	52.9
BP 205	6	193	51	20	290	10.2	550	32	70.5
BP 235	6	222	59	20	290	11.7	550	32	70.5
BP 265	6	252	67	20	290	14.3	550	43	95
B9 280	6	248	66	20	290	13.3	550	32	70.5
BP 305	6	296	78	20	290	15.8	550	43	95
MP 20	2	19.5	5.2	30	435	1.6	550	6	13.2
MP 30	2	29.2	7.7	30	435	2.3	550	6	13.2
MP 40 – MP 40 AP	3	39.5	10.4	30	435	3.2	550	9	19.8
P48 – P48 AP	2	51.7	13.7	30	435	4.1	550	13.7 - 14.1	30.2 - 31.1
APS 51	3	50.7	13.4	40	580	5.2	550	15.5	34.2
APS 61	3	62.3	16.5	40	580	6.4	550	16.5	36.4
APS 71	3	67.8	17.9	40	580	7.3	550	16.5	36.4
APS 96	4	89	23.5	40	580	9.5	550	21.5	47.4
APS 101	3	103	25.6	50	725	12.3	550	36	79.4
APS 121	3	115	30.4	50	725	14.5	550	36	79.4
APS 141	5	141	37.2	50	725	17.8	550	51	112.5
APS 145	4	142	37.5	50	725	18	550	48	106
APS 166	5	163	43.1	50	725	20.5	550	51	112.5
IDS 1000	3	99	26.2	50	725	12.5	550	44	97
IDS 1400	4	136	35.7	50	725	17	550	58	127.9
IDS 2000	6	208	55	50	725	26.2	550	77	170
IDS 2200	6	208	55	50	725	26.2	550	76	168
IDS 2600	6	249	65.9	50	725	32.1	550	76	168

2.1 IDENTIFICATION DES ELEMENTS

Se reporter aux figures 1, 2, 4 et 5 au début du manuel d'utilisation et d'entretien.

1	Pied de la pompe	10	Raccord de by-pass
2	Robinet	11	Collecteur d'aspiration
3	Arbre de la pompe	12	Collecteur de refoulement
4	Compensateur volumétrique d'huile	13	Témoin niveau d'huile
5	Accumulateur de pression	14	Soupape de sûreté
6	Tête de pompe	15	Protection de l'arbre de la pompe
7	Raccord aspiration	16	Raccord refoulement
8	Bouchon clapet aspiration/refoulement	17	Bouchon remplissage
9	Carter pompe	18	Plaque signalétique

2.2 DISPOSITIFS DE SECURITE

ATTENTION

- La machine qui incorpore la pompe doit toujours être dotée des dispositifs de sécurité mentionnés ci-après.
- En cas d'intervention répétée de la soupape de sûreté, interrompre immédiatement l'utilisation de la machine qui incorpore la pompe et la faire contrôler par un **Technicien Spécialisé**.
- La décharge éventuelle de la soupape de sûreté ne doit pas être déversée dans l'environnement.
- En cas de rupture ou d'endommagement de la protection de l'arbre de la pompe, n'utiliser en aucun cas la machine qui incorpore la pompe, sans l'avoir fait au préalable contrôler par un **Technicien Spécialisé**.
- Pendant l'utilisation, ne pas poser les pieds ou les mains sur la protection de l'arbre de la pompe.

a) Soupape de sûreté

Elle est de série sur certains modèles et disponible comme accessoire en option sur d'autres.

Il s'agit d'une soupape de pression maximale, convenablement étalonnée, qui décharge la surpression en excès si une anomalie devait se présenter dans le système de régulation de la pression.

b) Protection de l'arbre de la pompe

Elle est de série sur certains modèles et disponible comme accessoire en option sur d'autres.

Il s'agit d'un dispositif qui empêche à l'opérateur d'accéder aux parties tournantes de l'arbre de la pompe.

c) Clapet de limitation/régulation de la pression

Il est de série sur certains modèles et disponible comme accessoire en option sur d'autres.

Il s'agit d'un clapet qui permet de régler la pression d'utilisation et qui permet au fluide pompé de refluer vers la conduite de by-pass, empêchant l'apparition de pressions dangereuses lorsque l'on ferme le refoulement ou lorsque l'on cherche à définir des valeurs de pression supérieures aux valeurs maximales admises.

Un clapet de limitation/régulation de la pression, doté de dispositifs d'interception/distribution du liquide pompé (par exemple robinets), est généralement appelé **groupe de commande de la pompe**.

Dans le présent manuel, par simplicité, nous indiquerons par l'expression **groupe de commande**, tant le clapet de limitation/régulation de la pression que le groupe de commande de la pompe.

2.3 PLAQUE SIGNALÉTIQUE

La plaque signalétique (18) contient le numéro de série et les principales caractéristiques techniques de la pompe : modèle, débit maximal (à 0 bar/0 psi), débit à la pression maximale, pression maximale, vitesse de rotation maximale.

La plaque signalétique est installée : sur la partie avant du carter pour les pompes BP20/15, MP20 et MP30 ; sur un porte-plaque spécial fixé sur une vis de l'accumulateur de pression pour les pompes BP40/15, BP60, P48 et P48AP ; sur une tête (avec plaque adhésive) pour les pompes APS31 et APS41 ; sur le compensateur d'huile pour les pompes APS101 et APS121 ; sur le pied avant pour les pompes APS145, APS141 et APS166 ; sur un porte-plaque spécial fixé sur une vis d'une tête pour toutes les autres pompes.



ATTENTION

- Si au cours de l'utilisation, la plaque signalétique devait se détériorer, s'adresser au revendeur ou à un centre d'assistance autorisé pour sa réparation.

3. DESTINATION D'USAGE



ATTENTION

- *La pompe est exclusivement destinée aux usages suivants :*
 - *traitements de protection des cultures en agriculture et jardinage ;*
 - *pompage de détergents et de couleurs en solution aqueuse ;*
 - *pompage d'eau destinée à un usage non alimentaire.*
- *La pompe n'est pas destinée au pompage de :*
 - *solutions aqueuses avec une densité et une viscosité supérieures à celles de l'eau ;*
 - *solutions de produits chimiques dont vous n'êtes pas sûr de la compatibilité avec les matériaux constituant la pompe ;*
 - *eau de mer ou à forte concentration saline ;*
 - *combustibles et lubrifiants de tout type ;*
 - *liquides inflammables ou gaz liquéfiés ;*
 - *liquides à usage alimentaire ;*
 - *solvants et diluants de tout type ;*
 - *peintures de tout type ;*
 - *liquides à des températures supérieures à 40° C ou inférieures à 5° C ;*
 - *liquides contenant des granules ou parties solides en suspension.*
- *La pompe ne doit pas être utilisée pour laver : personnes, animaux, appareillages électriques sous tension, objets délicats, la pompe elle-même ou la machine dont elle fait partie.*
- *Les accessoires (standards et en option) utilisés avec la pompe doivent être du type approuvé par le Fabricant.*
- *La pompe n'est pas adaptée à une utilisation en environnements présentant des conditions particulières comme, par exemple, des atmosphères corrosives ou explosives.*
- *Pour l'emploi à bord de véhicules, bateaux ou avions, s'adresser au service d'assistance technique du Fabricant, car des prescriptions supplémentaires peuvent être nécessaires.*

Un tout autre usage est considéré impropre.

Le Fabricant décline toute responsabilité quant aux éventuels dommages découlant d'usages impropres ou erronés.

4. ACCESSOIRES EN OPTION

ATTENTION

- *Les accessoires en option inadaptés compromettent le fonctionnement de la pompe et peuvent la rendre dangereuse. Utiliser exclusivement des accessoires en option originaux, recommandés par le Fabricant.*
- *En ce qui concerne les prescriptions générales, les consignes de sécurité, l'installation et l'entretien des accessoires en option, se reporter à la documentation qui les accompagne.*

Il est possible de compléter l'équipement standard de la pompe avec la gamme suivante d'accessoires :

- soupape de sûreté ;
- protection de l'arbre de la pompe ;
- groupe de commande ;
- filtre d'aspiration (crépine de fond) ;
- raccord d'aspiration de différentes formes et dimensions ;
- manomètre ;
- tuyaux de refoulement haute pression ;
- dévidoir ;
- lances de pulvérisation de différents types ;
- dispositif de signalisation de la rupture de membrane.

Pour plus d'informations, s'adresser au revendeur.

5. FONCTIONNEMENT

ATTENTION

- *La pompe ne peut pas être mise en service si la machine, dans laquelle elle est incorporée, n'est pas conforme aux exigences de sécurité établies par les Directives européennes. Ce fait est garanti par la présence du label CE et par la Déclaration de Conformité du fabricant de la machine qui incorpore la pompe.*
- *Avant de mettre en marche la pompe, lire attentivement les indications présentes dans ce manuel et dans le manuel de la machine qui incorpore la pompe. S'assurer notamment d'avoir bien compris le fonctionnement de la pompe et de la machine qui incorpore la pompe en ce qui concerne les opérations d'interception du liquide.*
- *L'utilisation de la pompe exige attention et prudence. Ne pas confier à d'autres personnes la pompe sans s'être assuré, sous la propre responsabilité, que l'utilisateur occasionnel a lu attentivement ce manuel et connaît l'utilisation de la pompe. La pompe ne doit pas être utilisée par des enfants ou par un personnel non qualifié.*
- *Respecter les consignes de sécurité contenues dans le manuel d'utilisation et d'entretien de la machine qui incorpore la pompe, avec une attention particulière à l'utilisation éventuelle de dispositifs de protection individuelle (lunettes de protection, casques, masques, etc.).*
- *Respecter les consignes de sécurité contenues dans le manuel d'utilisation et d'entretien des accessoires en option éventuellement utilisés.*
- *Ne pas utiliser la pompe si :*
 - *elle a subi d'importants chocs ;*
 - *il y a d'évidentes fuites d'huile ;*

- il y a d'évidentes fuites d'eau.

Dans ces cas, faire contrôler la pompe par un **Technicien Spécialisé**.

- Etre particulièrement attentif lorsque la pompe est utilisée en présence de véhicules en mouvement, pouvant écraser ou abîmer le tuyau de refoulement et la lance de pulvérisation.
- Pendant le fonctionnement, maintenir toujours la pompe sous surveillance et hors de la portée des enfants et animaux. Faire particulièrement attention lors d'utilisation dans des crèches, maisons de santé et maisons de repos, car des enfants, des personnes âgées ou handicapées sans surveillance peuvent être présents dans ces lieux.
- Avant d'utiliser la pompe, mettre des vêtements garantissant une protection adéquate contre les manœuvres erronées avec le jet de fluide sous pression. Ne pas utiliser la pompe à proximité de personnes ne portant pas de vêtements de protection.
- Les jets à haute pression peuvent être dangereux s'ils sont utilisés de manière incorrecte. Ne pas diriger le jet vers des personnes, animaux, appareillages électriques sous tension ou vers la machine qui incorpore la pompe.
- Pendant l'utilisation, empoigner solidement la lance de pulvérisation, car lorsque vous agissez sur le levier de commande pour pulvériser le produit, vous êtes soumis à la force de réaction du jet à haute pression.
- Ne pas diriger le jet contre soi-même ou d'autres personnes pour nettoyer vêtements ou chaussures.
- Ne pas diriger le jet à haute pression vers des matériels contenant de l'amiante ou d'autres substances nuisibles à la santé.
- S'assurer que les parties en mouvement de la pompe sont correctement protégées et qu'elles ne sont pas accessibles au personnel non préposé à l'utilisation.
- Ne pas s'approcher des parties en mouvement de la pompe, même si elles sont convenablement protégées.
- Ne pas retirer les protections des parties en mouvement.
- Ne pas effectuer d'opérations d'entretien sur la pompe si celle-ci est en marche.
- Respecter les indications du paragraphe " **DESTINATION D'USAGE** ".
- Ne modifier en aucun cas les conditions d'installation de la pompe, notamment ne pas en modifier la fixation et les raccordements hydrauliques.
- Ne pas actionner d'éventuels robinets montés sur la pompe, s'ils ne sont pas raccordés à une utilisation empêchant la sortie accidentelle du liquide pompé.
- Ne pas dérégler les commandes et dispositifs de sécurité.
- Le branchement au secteur de la machine qui incorpore la pompe doit être effectué par un **Electricien Qualifié**, conformément aux normes en vigueur dans le pays d'utilisation.
- Le fonctionnement de la machine qui incorpore la pompe est interdit en environnements fermés, si celle-ci est entraînée par un moteur à explosion.

5.1 OPERATIONS PRELIMINAIRES



ATTENTION

- Effectuer les opérations préliminaires recommandées par le fabricant de la machine qui incorpore la pompe.
- Vérifier que tous les refoulements sont fermés ou raccordés à des utilisations en position fermée (par exemple, robinet fermé ou lance de pulvérisation en position fermée).
- Ne dépasser en aucun cas la valeur maximale de pression de gonflage de l'accumulateur (si présent), indiquée dans le tableau ci-après.

- Faire effectuer par un **Technicien Spécialisé** les contrôles prévus par l'entretien extraordinaire.
- a) Vérifier que, avec la pompe arrêtée, le niveau d'huile, en fonction du modèle de pompe, correspond au signe de référence présent sur le compensateur volumétrique (4) ou est visible à partir du bouchon de niveau (voir également la figure 6).
Se rappeler que le niveau d'huile doit toujours être contrôlé avec la pompe à l'arrêt et complètement refroidie.
Pour les remises à niveau éventuelles, se reporter aux types de lubrifiant indiqués au paragraphe "**CARACTERISTIQUES ET DONNEES TECHNIQUES**". Utiliser de l'huile de type SAE 30 non-détergente.

ATTENTION

- Dans les pompes BP40/15, BP60, P48 et P48AP, s'adresser à un **Technicien Spécialisé** pour les remises à niveau éventuelles de l'huile, le compensateur volumétrique n'étant pas présent.
- b) Vérifier, si présent, le gonflage correct de l'accumulateur de pression, au moyen d'un pistolet normal à air comprimé avec manomètre, du genre de ceux utilisés pour vérifier la pression de gonflage des pneus.

PRESSION DE FONCTIONNEMENT DE LA POMPE		PRESSION DE GONFLAGE DE L'ACCUMULATEUR	
bar	psi	bar	psi
2-5	29-73	2	29
5-10	73-145	2-5	29-73
10-20	145-290	5-7	73-102
20-50	290-725	7	102

Le gonflage dépend du champ de pression dans lequel la pompe œuvrera, selon les indications du tableau suivant :

AVERTISSEMENT

- Pour les accouplements dans lesquels la pompe est entraînée par un arbre cardan, éviter les poussées sur l'arbre de la pompe dues à un emploi incorrect du cardan (faible graissage des pièces coulissantes, rayons de braquage incompatibles avec le type de cardan employé).
- En cas d'utilisation à des températures très basses, s'assurer de l'absence de glace à l'intérieur de la pompe.
- Effectuer les contrôles prévus par l'entretien ordinaire, notamment ceux relatifs à l'huile.

5.2 RACCORDEMENT HYDRAULIQUE

ATTENTION

- Ne pas se raccorder au réseau de distribution de l'eau potable.
- Tous les tuyaux doivent être fixés solidement aux raccords respectifs à l'aide de colliers.

AVERTISSEMENT

- La pompe doit aspirer à partir d'un réservoir à pression atmosphérique et le niveau du liquide doit être compris entre 1 m/3,3 ft au-dessus et 1 m/3,3 ft au-dessous du raccord d'aspiration (voir également la figure 8); ne jamais raccorder la pompe à des conduites hydrauliques sous pression.
- La pompe peut aspirer occasionnellement, pour des périodes de 10-15 minutes, à partir de dénivelés jusqu'à 3 m/9,8 ft ; elle ne doit pas aspirer à partir de dénivelés supérieurs.
- Prévoir un filtre de dimensions adéquates au niveau de l'aspiration de la pompe. En cas de doutes, s'adresser à un **Technicien Spécialisé**. Vérifier que le filtre est toujours parfaitement propre.
- Les tuyaux d'aspiration et de by-pass doivent avoir un diamètre interne égal, respectivement, au diamètre externe des raccords d'aspiration et de by-pass, et doivent avoir une pression nominale égale à 10 bars/145 psi.
- Les tuyaux de refoulement doivent avoir un diamètre interne égal au diamètre externe des raccords de refoulement et doivent avoir une pression nominale non inférieure à celle maximale de la pompe.
- Ne pas alimenter la pompe avec de l'eau à une température supérieure à 40° C/104° F ou inférieure à 5° C/41° F.
- Ne pas faire fonctionner longtemps la pompe sans alimentation en eau.
- Ne pas alimenter la pompe avec de l'eau saumâtre ou contenant des impuretés. Si cela devait se produire, faire fonctionner la pompe pendant quelques minutes avec de l'eau propre.

5.3 MISE EN MARCHE



ATTENTION

- *Effectuer les opérations relatives à la mise en marche recommandées par le fabricant de la machine qui incorpore la pompe.*
- *Lire attentivement les prescriptions et les avertissements indiqués sur l'étiquette des produits chimiques distribués avec la pompe, afin d'adopter les mesures opportunes pour ne pas provoquer de dangers vis-à-vis de soi-même ou de l'environnement.*
- *Conservier les produits chimiques dans un lieu sûr et hors de la portée des enfants.*
- *En cas de contact avec les yeux, rincer immédiatement avec de l'eau et s'adresser sans plus attendre à un médecin, en apportant l'emballage du produit chimique.*
- *En cas d'ingestion, ne pas provoquer de vomissement et s'adresser immédiatement à un médecin en apportant l'emballage du produit chimique.*
- *La pression d'utilisation ne doit jamais dépasser la valeur maximale prévue pour la pompe (voir également le paragraphe " **CARACTERISTIQUES ET DONNEES TECHNIQUES** ").*

Pour ce qui suit, se reporter à la documentation qui accompagne le groupe de commande.

- a) Mettre à zéro la pression de refoulement en agissant sur le groupe de commande en sorte de l'amener en position de " by-pass ".
- b) Mettre en marche la pompe pour permettre l'amorçage.
- c) Agir sur le groupe de commande, en sorte de l'amener en position " pression ".
- d) Tourner convenablement le bouton de réglage de la pression du groupe de commande, afin d'atteindre la valeur désirée de pression.

AVERTISSEMENT

- Pour permettre un amorçage rapide de la pompe, opérer comme indiqué au point a), à chaque fois que la pompe est vidée du fluide.
- Dans les premières heures de fonctionnement, contrôler le niveau d'huile et, si nécessaire, effectuer une mise à niveau, en suivant les indications du paragraphe " **OPERATIONS PRELIMINAIRES** ".

6. ARRET ET MISE AU REPOS

6.1 ARRET

ATTENTION

- *Effectuer les opérations relatives à l'arrêt recommandées par le fabricant de la machine qui incorpore la pompe.
Aucune partie de la pompe ne devra être en mouvement et aucun tuyau ne devra contenir du liquide sous pression.*
- a) Mettre à zéro la pression de refoulement comme décrit au point a) du paragraphe “ **MISE EN MARCHÉ** ”.
 - b) Arrêter la pompe.

6.2 MISE AU REPOS

ATTENTION

- *Effectuer les opérations relatives à la mise au repos recommandées par le fabricant de la machine qui incorpore la pompe.*

AVERTISSEMENT

- En se reportant au manuel d'utilisation et d'entretien de la machine qui incorpore la pompe, après l'utilisation, effectuer un cycle de nettoyage, en faisant aspirer à la pompe de l'eau propre. Ne jamais laisser la pompe au repos avec le liquide pompé à l'intérieur de celle-ci.
- **La pompe craint le gel.**
En climat rigide, avant de remiser la pompe, afin d'éviter la formation de glace à l'intérieur, il est conseillé de faire aspirer à la pompe un produit antigel pour automobile (dans les dilutions prévues pour les températures minimales auxquelles la pompe sera exposée) et de procéder ensuite à son vidage total, en la faisant fonctionner pendant quelques minutes sans aspirer aucun liquide.

ATTENTION

- *Le liquide antigel doit être éliminé correctement et non pas jeté dans l'environnement.*

7. NETTOYAGE ET ENTRETIEN

ATTENTION

- *Chaque intervention de nettoyage et d'entretien doit être effectuée seulement après avoir exécuté les opérations décrites au paragraphe “ **ARRET** ”, c'est-à-dire sans aucune partie de la pompe en mouvement et sans aucun tuyau rempli de liquide sous pression.
Il ne faut surtout pas oublier de débrancher toujours l'alimentation électrique, si présente.*

7.1 ENTRETIEN ORDINAIRE

Effectuer les opérations décrites au paragraphe “ **ARRET** ” et respecter les indications contenues dans le tableau suivant.

INTERVALLE D'ENTRATIEN	INTERVENTION
A chaque utilisation.	Contrôle niveau et état de l'huile. Contrôle et éventuellement nettoyage du filtre d'aspiration.
Toutes les 50 heures.	Contrôle pression de gonflage de l'accumulateur (si présent). Contrôle de l'intégrité du circuit d'aspiration. Contrôle de la fixation de la pompe sur la structure de la machine qui l'incorpore. Si la fixation de la pompe est précaire, n'utiliser en aucun cas la machine et s'adresser à un Technicien Spécialisé (1).

(1) Le contrôle doit être plus fréquent si la pompe fonctionne en présence de fortes vibrations (tracteurs à chenilles, moteurs à explosion, etc.).

AVERTISSEMENT

- Pendant le fonctionnement, la pompe ne doit pas être trop bruyante et il ne doit pas y avoir de suintements évidents de fluide ou d'huile en dessous d'elle.
Si tel devait être le cas, faire contrôler la machine par un **Technicien Spécialisé**.

7.1.1 Rupture des membranes

La rupture d'une ou de plusieurs membranes peut provoquer l'agression de l'appareil mécanique de la pompe de la part des liquides pompés.

Les signes d'une rupture possible des membranes sont les suivants :

- coloration blanchâtre de l'huile (signe de présence d'eau dans l'huile) ;
- consommation excessive d'huile ;
- disparition soudaine de l'huile dans le compensateur volumétrique.

AVERTISSEMENT

- Pour éviter les conséquences négatives de cette panne, interrompre immédiatement l'utilisation de la pompe et s'adresser au plus vite (dans les 24 heures) à un **Technicien Spécialisé**, qui effectuera les contrôles nécessaires.
Si, en cas de rupture évidente des membranes, il est impossible de s'adresser à un **Technicien Spécialisé** dans les délais susdits, il convient de vider le carter de la pompe du mélange d'huile et de liquide pompé, et de le remplir avec de l'huile ou gazole, afin de prévenir les phénomènes d'oxydation.
- Les causes fréquentes de rupture des membranes sont
 - étranglements dans le circuit d'aspiration (tuyaux au diamètre inadapté, filtre excessivement sale, pompage de liquides très denses, etc.)
 - utilisation de produits chimiques hautement agressifs.

7.2 ENTRETIEN EXTRAORDINAIRE

INTERVALLE D'ENTRETIEN	INTERVENTION
Toutes les 300 heures.	Contrôle des clapets d'aspiration et de refoulement (1).
A chaque fin de saison ou une fois par an.	Contrôle et éventuellement remplacement des membranes (2). Vidange de l'huile (3). Contrôle du serrage des vis de la pompe (4).

(1) Le contrôle doit être plus fréquent en cas d'emploi de liquides avec des particules abrasives en suspension.

(2) Si des produits chimiques particulièrement agressifs sont utilisés, il est conseillé d'effectuer le remplacement des membranes indépendamment de leur état.

(3) Vidange de l'huile à effectuer en même temps que le remplacement des membranes ; la première vidange doit toutefois être effectuée après 300 heures.

(4) Le contrôle doit être plus fréquent si la pompe fonctionne en présence de fortes vibrations.



ATTENTION

- *Les interventions d'entretien extraordinaire ne doivent être effectuées que par un **Technicien Spécialisé**.*
- *L'huile usée doit être convenablement éliminée et non pas jetée dans l'environnement.*

Pour l'entretien extraordinaire, respecter les indications du tableau suivant.

AVERTISSEMENT

- Les données figurant dans le tableau sont fournies à titre indicatif. Des interventions plus fréquentes peuvent être nécessaires en cas de plus grandes sollicitations.

8. RÉPARATION

La démolition de la pompe ne doit être effectuée que par un personnel qualifié et conformément à la législation en vigueur dans le pays où elle est installée.

PROBLEMES	CAUSES	SOLUTIONS
La pompe n'amorce pas.	Aspiration d'air. Clapet de régulation positionné en pression.	Contrôler l'intégrité du circuit d'aspiration. Mettre à zéro la pression, en mettant la pompe en by-pass.
La pompe n'atteint pas la pression maximale.	Vitesse de rotation de la pompe insuffisante. Utilisation inadaptée (par exemple, buse usée ou trop grande).	Rétablir la vitesse correcte de rotation Rétablir l'utilisation.
Pression et débit irréguliers (pulsatoires).	Aspiration d'air.	Contrôler l'intégrité du circuit d'aspiration.
Vibrations excessives dans le circuit de refoulement.	Accumulateur de pression gonflé incorrectement.	Rétablir le gonflage correct.
Bruit excessif, associé à un abaissement du niveau d'huile.	Circuit d'aspiration avec étranglements.	Contrôler le circuit d'aspiration.
Consommation excessive d'huile et/ou huile de couleur blanchâtre (présence d'eau dans l'huile).	Rupture d'une ou de plusieurs membranes.	Se reporter au paragraphe 7.1.1.

9. PROBLEMES, CAUSES ET SOLUTIONS

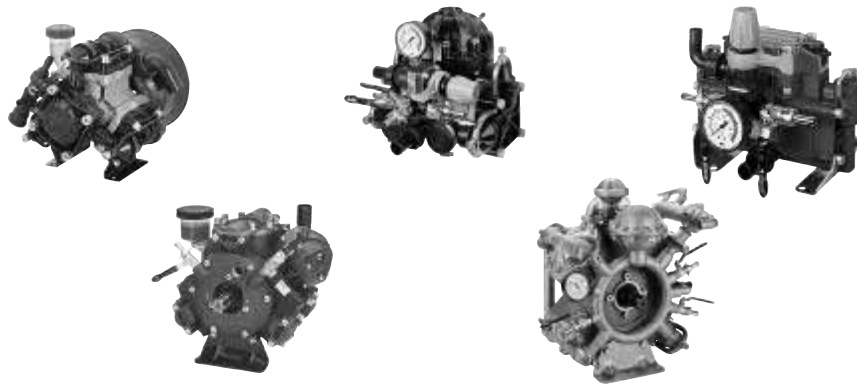


ATTENTION

- Avant d'effectuer toute intervention, exécuter les opérations décrites au paragraphe "ARRET". S'il est impossible de rétablir le fonctionnement correct de la pompe à l'aide des informations contenues dans le tableau suivant, s'adresser à un **Technicien Spécialisé**.



DIAPHRAGM PUMPS

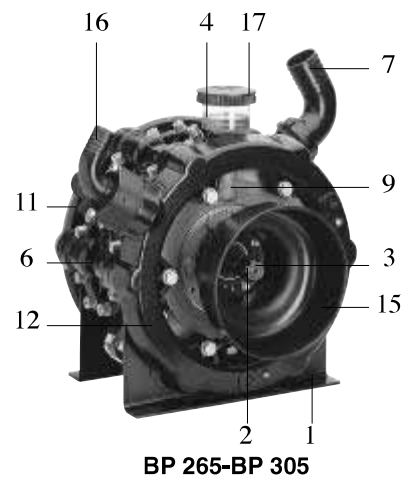
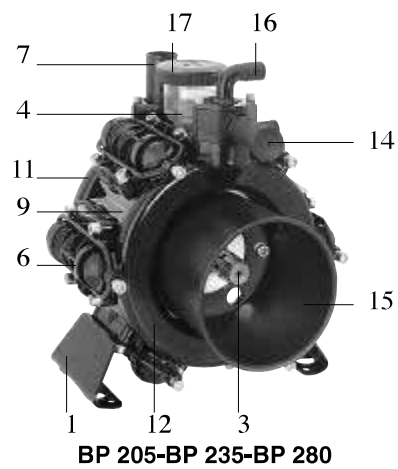
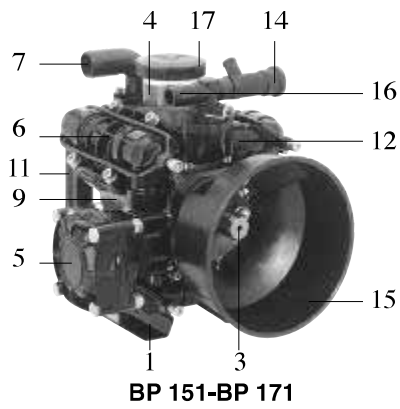
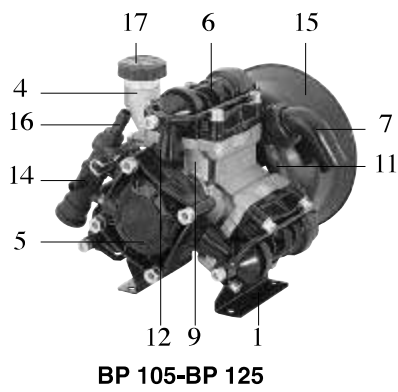
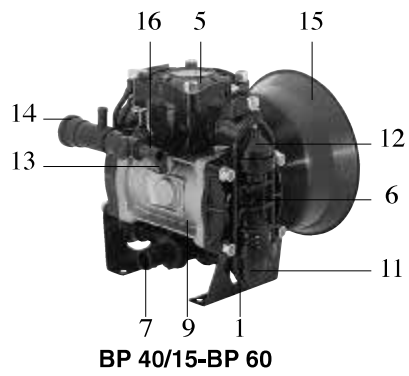
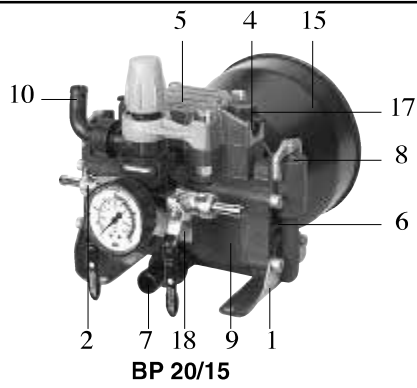


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USE AND MAINTENANCE MANUAL

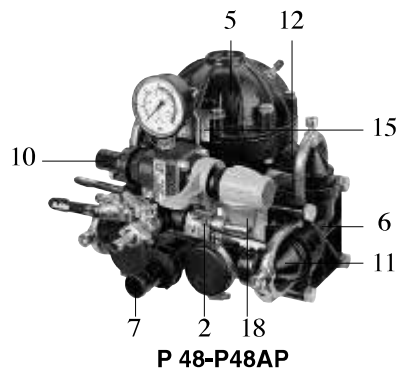
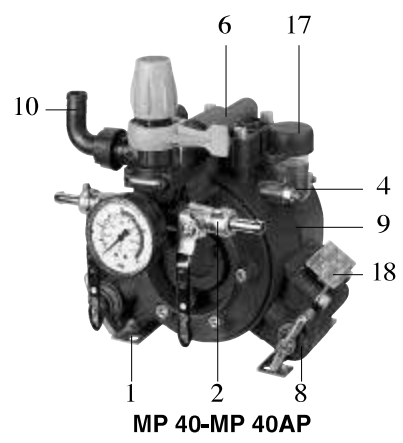
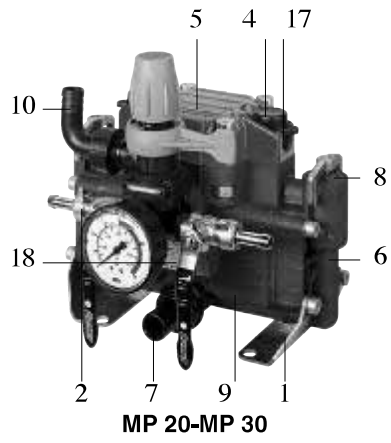


Carefully read this instruction booklet before using

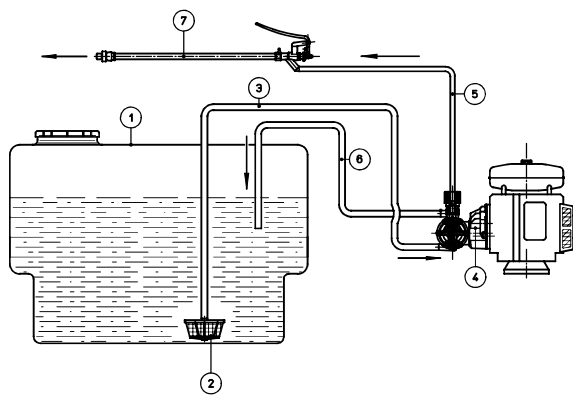


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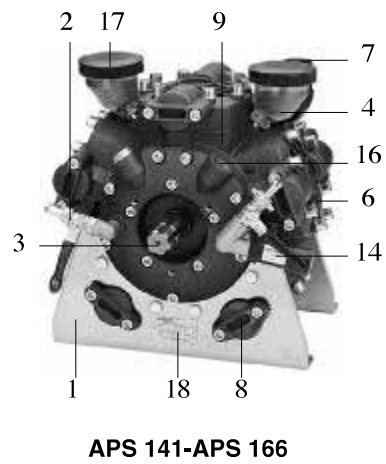
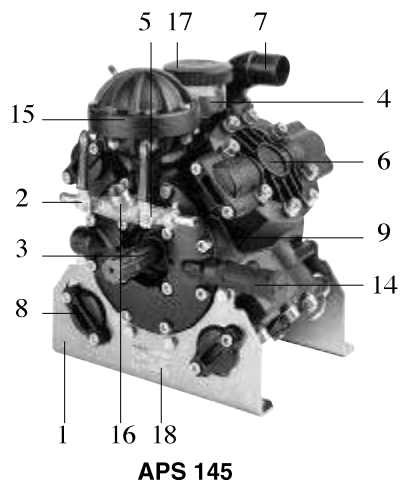
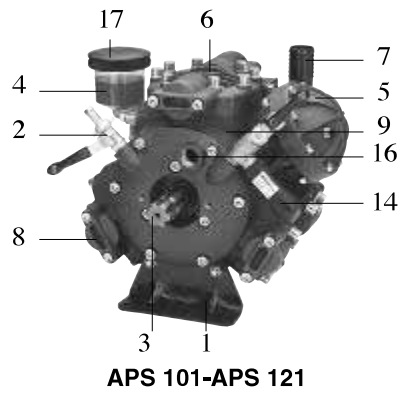
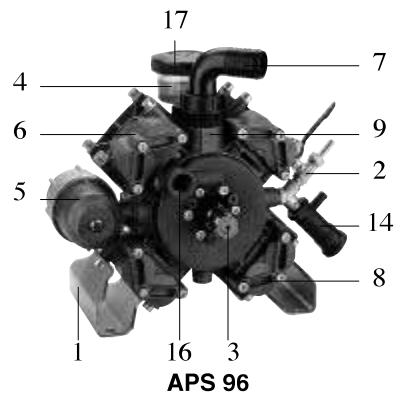
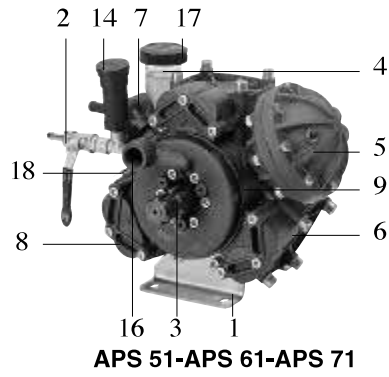
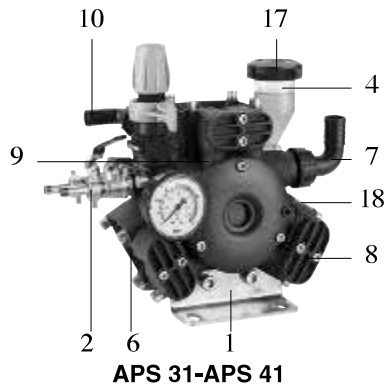


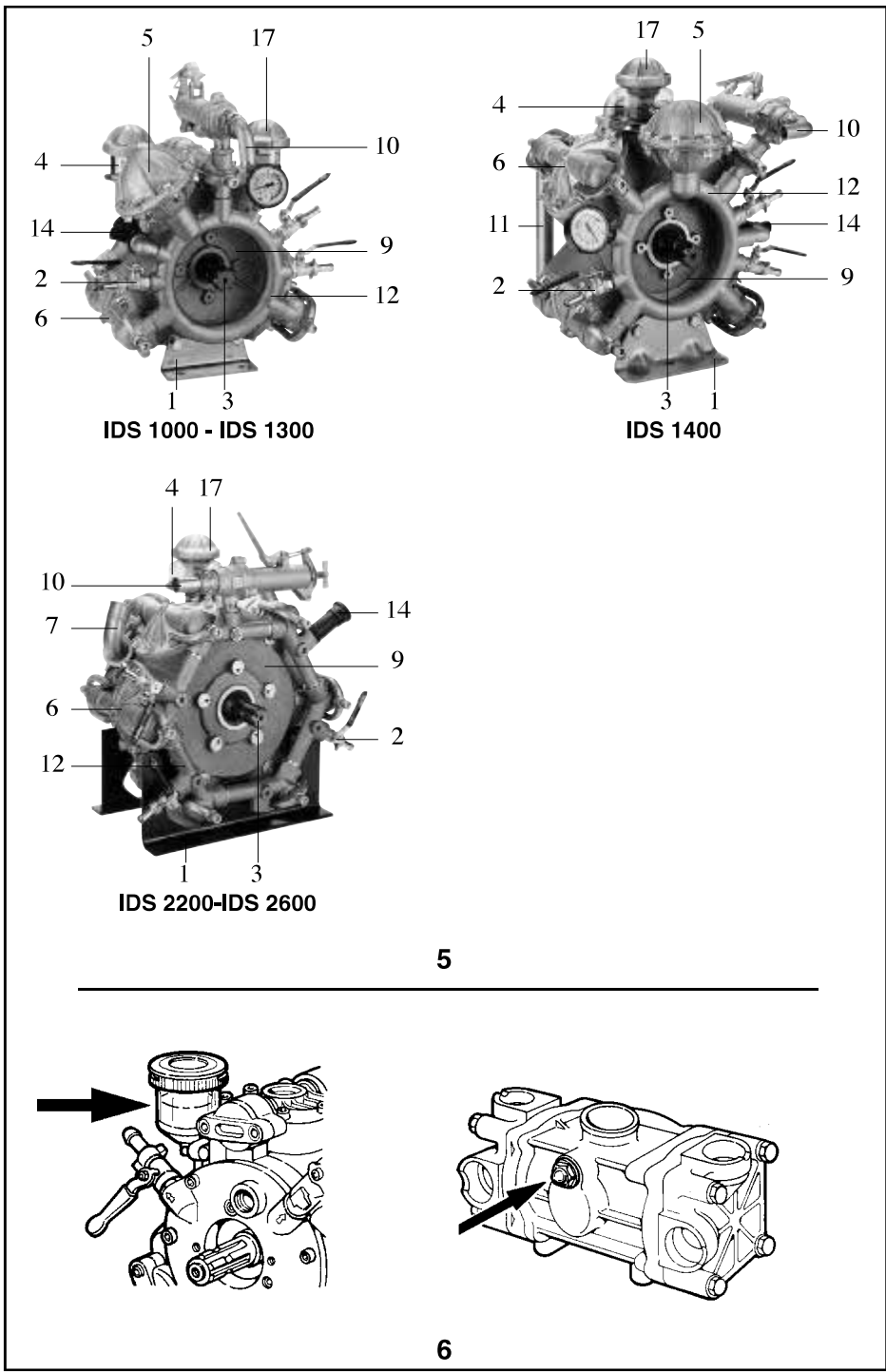
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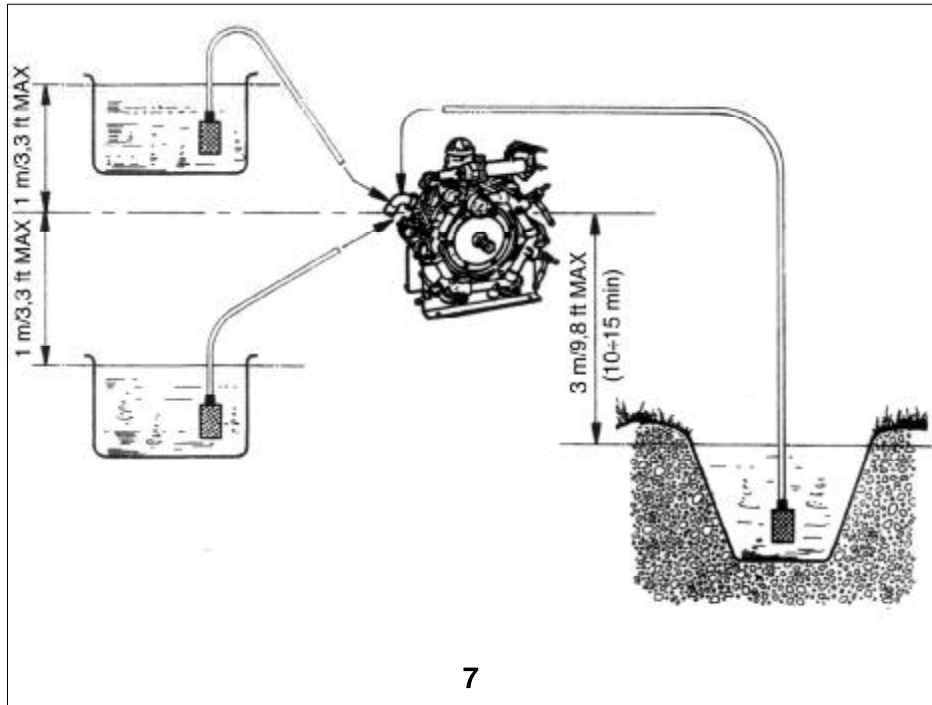




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SUMMARY

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INTRODUCTION

This manual is divided into two separate parts.

The first part is for use by both the end user and the Skilled Technician; the second part is only for use by the Skilled Technician.

The Skilled Technician can be:

- The manufacturer of the machine (e.g. motor driven pump) which incorporates the pump (from here on, “machine which incorporates the pump” may also stand for “system which incorporates the pump”, as in the case of a pumping station, for example);
- a person, generally from the service centre, who has received appropriate training and is authorised to carry out special maintenance and repairs on the pump and on the machine which incorporates the pump. Any work on its electrical parts must be carried out by a Skilled Technician who is also a Qualified Electrician, i.e. a person with professional training who is authorised to check, install and repair electrical equipment correctly and according to current regulations in the country where the pump is installed.

PART ONE

1. GENERAL INFORMATION

Congratulations for choosing one of our products! We would like to remind you that we took the safety of the operator, the efficiency of its use and the protection of the environment into great consideration when designing and manufacturing this product.

In order to preserve its features over time, please read and follow this manual carefully.

Particular attention must be awarded to the parts with the following symbol:



as they contain important instructions regarding safety when using the pump.

The Manufacturer is not liable for damage caused by:

- failure to comply with these instructions and the instructions for the machine which incorporates the pump;
- use of the pump not included in the list in the “DESIGNATED USE” section;
- failure to comply with current safety regulations and regulations for the prevention of accidents in the workplace when using the pump;
- incorrect installation
- failure to carry out the anticipated maintenance;
- modifications or actions without prior authorisation by the Manufacturer;
- use of non-original or non-specific spare parts for this model of pump;
- repairs which were not completed by a Skilled Technician.

1.1 TERMS OF THE GUARANTEE

The guarantee is valid for a period of 12 months from the date on the sales document (receipt, invoice etc.) provided the guarantee certificate included with the documents for the pump was sent back to the Manufacturer within 10 days of the purchase date with all its parts filled in.

The purchaser has sole right to the replacement of the parts which the Manufacturer, or his authorised representative, deems faulty as regards their material or manufacture. This does not imply any right to compensation for any type of direct or indirect damage. Any costs for labour, packing and transportation are at the purchaser's expense.

Should the product be sent to the Manufacturer for repairs under this guarantee, it must be complete with all its original parts and not be tampered with upon arrival. Any request under this guarantee will be denied if this is not the case.

All replaced parts become the exclusive property of the Manufacturer.

Any faults or failures which occur during or after the period of the guarantee do not imply the right to suspend payment or to any further extension.

This guarantee does not cover the replacement of the pump and automatically becomes void should the agreed terms of payment not be abided by.

The following are not covered by the guarantee:

- direct or indirect damage, of any type, caused by falls, incorrect use of the pump and failure to observe regulations regarding safety, installation, operation and maintenance which are contained in this manual and in the manual for the machine which incorporates the pump;
- damage caused by the inactivity of the pump for repairs;
- any parts which are subject to wear during normal use;
- any parts which are deemed faulty due to negligence or carelessness during use;
- damage caused by the use of non-original spare parts or accessories or not expressly authorised by the Manufacturer, and by repairs not completed by a Skilled Technician

The guarantee becomes void should the pump, and especially its safety devices, be tampered with and the Manufacturer is no longer liable.

The Manufacturer reserves the right to make any modification at any time which it deems necessary to improve the product and is not liable to make these modifications to previously manufactured products, be they delivered or under delivery.

The conditions in this section exclude any previous explicit or implicit condition.

1.2 USE AND CONSERVATION OF THIS OPERATING AND MAINTENANCE MANUAL

The operating and maintenance manual is an integral part of the pump and must be kept in a safe place for future reference so that it may be readily consulted in case of need.

The operating and maintenance manual contains important information for the safety of the operator and of any people near him and for the protection of the environment.

In case of deterioration or loss, a new copy should be requested from the dealer or from an authorised service centre.

If the pump is passed on to a third party, please make sure this operating and maintenance manual is also given to the new owner.

We take great care when drawing up our manual. If you note any mistakes, please do inform the Manufacturer or an authorised service centre.

The Manufacturer reserves the right to modify, update and correct this manual without notice.

It is illegal to copy this manual, even partially, without prior authorisation by the Manufacturer.

1.3 SYMBOLS

The symbol:



next to certain parts of the text, is to indicate that there is the firm possibility of injury to persons if the relative instructions and indications are not followed.

The symbol:



next to certain parts of the text, is to indicate that there is the possibility of damaging the pump if the relative instructions are not followed.

2 FEATURES AND TECHNICAL SPECIFICATIONS

Type	N° of diaphragm	Delivery		Pressure		Power CV (HP)	R/min	Weight	
		L/min	US gal/min	Bar	psi			Kg	lb
BP 20/15	2	18.7	4.9	15	217.5	0.83	550	7.3	16.1
BP 40/15	2	39.9	10.5	15	217.5	1.8	550	10	22
BP 60	2	58	15.3	20	290	3.3	550	10	17.2
BP 105	3	104	27.5	20	290	5.5	550	12.3	27.1
BP 125	3	117	30.9	20	290	6.8	550	12.5	27.6
BP 151	4	138	36.5	20	290	7.8	550	24	52.9
BP 171	4	162	42.8	20	290	9.6	550	24	52.9
BP 205	6	193	51	20	290	10.2	550	32	70.5
BP 235	6	222	59	20	290	11.7	550	32	70.5
BP 265	6	252	67	20	290	14.3	550	43	95
B9 280	6	248	66	20	290	13.3	550	32	70.5
BP 305	6	296	78	20	290	15.8	550	43	95
MP 20	2	19.5	5.2	30	435	1.6	550	6	13.2
MP 30	2	29.2	7.7	30	435	2.3	550	6	13.2
MP 40 – MP 40 AP	3	39.5	10.4	30	435	3.2	550	9	19.8
P48 – P48 AP	2	51.7	13.7	30	435	4.1	550	13.7 - 14.1	30.2 - 31.1
APS 51	3	50.7	13.4	40	580	5.2	550	15.5	34.2
APS 61	3	62.3	16.5	40	580	6.4	550	16.5	36.4
APS 71	3	67.8	17.9	40	580	7.3	550	16.5	36.4
APS 96	4	89	23.5	40	580	9.5	550	21.5	47.4
APS 101	3	103	25.6	50	725	12.3	550	36	79.4
APS 121	3	115	30.4	50	725	14.5	550	36	79.4
APS 141	5	141	37.2	50	725	17.8	550	51	112.5
APS 145	4	142	37.5	50	725	18	550	48	106
APS 166	5	163	43.1	50	725	20.5	550	51	112.5
IDS 1000	3	99	26.2	50	725	12.5	550	44	97
IDS 1400	4	136	35.7	50	725	17	550	58	127.9
IDS 2000	6	208	55	50	725	26.2	550	77	170
IDS 2200	6	208	55	50	725	26.2	550	76	168
IDS 2600	6	249	65.9	50	725	32.1	550	76	168

2.1 IDENTIFICATION OF COMPONENTS

Please also refer to figures 1, 2, 4, and 5 which are located at the start of this operating and maintenance manual.

2.2 SAFETY DEVICES

1	Pump support	10	Bypass coupling
2	Valve	11	Intake manifold
3	Pump shaft	12	Delivery manifold
4	Volumetric oil compensator	13	Oil level indicator
5	Pressure accumulator	14	Safety valve
6	Pump head	15	Pump shaft protection
7	Intake coupling	16	Delivery coupling
8	Intake /delivery valve cap	17	Oil cap
9	Pump crankcase	18	Identification label



CAUTION

- *The machine which incorporates the pump must always be provided with the safety devices described below.*
- *If the safety valve cuts in repeatedly, immediately stop operation of the machine, which incorporates the pump, and have it tested by a **Skilled Technician**.*
- *Any drainage from the safety valve must not leak into the environment.*
- *Should the protection of the pump shaft break or be damaged, the machine which incorporates the pump must not be used until it has been tested by a **Skilled Technician**.*
- *Do not place hands or feet on the pump shaft protection.*

a) Safety valve

This is standard for certain versions and is available as an optional accessory for others. It is an appropriately calibrated, maximum pressure valve that discharges excess pressure should any anomaly occur in the pressure adjustment system.

b) Pump shaft protection

This is standard for certain versions and is available as an optional accessory for others. It is to prevent the operator from coming into contact with the moving parts of the pump shaft.

c) Pressure limit/adjustment valve

This is standard for certain versions and is available as an optional accessory for others. This valve enables the adjustment of the operating pressure and permits the pumped fluid to return to the by-pass duct, thus preventing the creation of dangerous levels of pressure when delivery is closed or should pressure be set that is above permitted levels.

If a pressure limit/adjustment valve has devices to intercept/distribute the pumped liquid (e.g. taps), it is usually called a **pump control unit**. In this manual, the term **control unit** stands for both the pressure limit/adjustment valve and the pump control unit.

2.3 IDENTIFICATION LABEL

The identification label (18) contains the serial number and the main technical specifications for the pump: version, maximum delivery (at 0 bar/0 psi), delivery at maximum pressure, maximum pressure, and maximum speed of rotation.

The identification label is located: on the front part of the crankcase for pumps BP20/15, MP20 and MP 30; on a label support plate fastened on a screw of the pressure accumulator for pumps BP40/15, BP 60, P48 and P48AP; on a pump head (with adhesive label) for pumps APS 31 and APS 41; on the oil compensator for pumps APS 101 and APS 121; on the front support for pumps

APS 145, APS 141 and APS166; on a label support plate fastened on a screw of the head of all other pumps.



CAUTION

- *If the identification label deteriorates during use, contact your dealer or an authorised service centre so they can be replaced.*

3. DESIGNATED USE



CAUTION

- *This pump is to be used exclusively for:*
 - *treating crops in agricultural and gardening applications;*
 - *pumping water-based detergents and dyes;*
 - *pumping water which is not for human consumption.*
- *The pump must not be used for:*
 - *water based solutions whose density and viscosity is greater than those of water;*
 - *solutions of chemical products if it is not known that they are compatible with the construction materials of the pump;*
 - *seawater or water with a high concentration of salt;*
 - *all fuels and lubricants;*
 - *inflammable liquids or liquid gas;*
 - *liquids for human consumption;*
 - *all solvents and diluents;*
 - *all paints;*
 - *liquids at a temperature in excess of 40°C or less than 5°C;*
 - *liquids containing granules or solid, suspended parts.*
- *The pump must not be used to wash people, animals, energized electrical appliances, delicate objects, the pump itself or the machine that it is part of.*
- *The accessories (standard and optional) used with the pump must be those endorsed by the Manufacturer.*
- *The pump is not suitable for use in certain situations such as in corrosive or explosive atmospheres.*
- *Contact the Manufacturer's service centre before use on board vehicles, ships or airplanes, as there may be additional instructions for use.*

Any other use is considered improper.

The Manufacturer is not liable for any damage caused by improper or incorrect use.

4 OPTIONAL ACCESSORIES



CAUTION

- *The operation of the pump may be impaired if unsuitable accessories are used and they may even make it dangerous. Only use original accessories endorsed by the Manufacturer.*
- *Refer to the documents provided with the optional accessories for information regarding their general use, safety warnings, installation and maintenance.*

The standard accessories for the pump can be integrated with the following range of accessories:

- safety valve

- protection for pump shaft
 - control unit
 - intake filter (deep filter)
 - various shapes and sizes of intake couplings
 - pressure gauge
 - high pressure delivery pipe
 - pipe reel
 - various types of sprinkler lances
 - indicator of ruptured diaphragm
- Please contact your dealer for further information.

5. OPERATION

CAUTION

- ***The pump must not be put into operation if the machine in which it is incorporated does not comply with the safety requirements defined by European Directives. Their compliance is guaranteed if the CE mark is present together with the manufacturer's Declaration of Conformity for the machine that incorporates the pump.***
 - *Before starting to use the pump, read both this manual and the manual for the machine that incorporates the pump carefully. It is important to be sure that you have fully understood how both the pump and the machine that incorporates the pump work concerning the interception of the liquids.*
 - *The pump must be used with care and attention. It is your responsibility to make sure that any infrequent users have read this manual and are acquainted with the operation of the pump; otherwise do not allow others to use the pump. Pumps must not be used by children or by unauthorised personnel.*
 - *Comply with the safety warnings in the operating and maintenance manual of the machine that incorporates the pump especially as regards the use of personal protection (protective glasses, headphones, facemasks etc).*
 - *Do not use the pump if:*
 - *the pump has been bumped*
 - *there are obvious leaks of oil.*
 - *there are obvious leaks of water.*
- In these circumstances, the pump should be tested by a **Skilled Technician**.*
- *It is especially important to pay great attention when the pump is used in areas where there are moving vehicles as these can crush or damage the delivery pipe and the sprinkler lance.*
 - *During operation, never leave the pump unattended and make sure it is out of reach of children and animals. Pay particular attention when using it in kindergartens, nursing homes and old people's homes, as unsupervised children, elderly people and disabled people may be present in such places.*
 - *Before starting to use the pump, put on clothing which guarantees adequate protection against the possibility of incorrect manoeuvres of the jet of pressurised water. Do not operate the pump near people unless they are also wearing protective clothing.*
 - *High-pressure jets of water can be dangerous if they are not used properly. Do not point the jet in the direction of people, animals, and energized electrical appliances or towards the machine which incorporates the pump.*
 - *Hold the sprinkler lance firmly during use: when operating its control lever, the operator is subjected to the backlash of the high pressure.*

- *Do not point the jet towards oneself or other people in order to clean off clothing or footwear.*
- *Do not point the high-pressure jet towards materials, which contain asbestos or other harmful substances.*
- *Make sure that the pump's moving parts are adequately protected and that they are not accessible to unauthorised personnel.*
- *Do not come within reach of the pump's moving parts, even if they are adequately protected.*
- *Do not remove the protective devices of the pump's moving parts.*
- *Do not carry out any maintenance on the pump if it is in use.*
- *Follow the instructions in the "Designated Uses" section.*
- *Do not modify the conditions of the installation of the pump, especially its attachment and its hydraulic connections.*
- *Do not operate any taps installed on the pump if they are not connected to an application that prevents the accidental leakage of the liquid being pumped.*
- *Do not tamper with controls and safety devices.*
- *The connection of the machine that incorporates the pump to the mains electric supply must be carried out by a Qualified Electrician according to the current regulations in the country where it is to be used.*
- *If the machine that incorporates the pump operates with a combustion engine, it must not be used in enclosed spaces.*

5.1 PRELIMINARY PROCEDURES



CAUTION

- *Complete the Manufacturer's recommended preliminary procedures for the machine that incorporates the pump.*
- *Check that all the delivery parts are closed or connected to applications, which are closed (for example, closed tap or closed sprinkler lance).*
- *Do not exceed the maximum level of accumulator inflation pressure (when present), indicated in the following table, at any time.*
- *A **Skilled Technician** must complete the special maintenance procedures.*

a) When the pump is not in use, check that the oil level either corresponds to the reference notch on the volumetric compensator (4) or is visible from the level cap (also see fig. 6), according to the type of pump.

Remember that the level of the oil must always be checked when the pump is not in use and has cooled down completely.

Refer to the types of lubricants listed in the "**FEATURES AND TECHNICAL SPECIFICATIONS**" section if it is necessary to top up the oil. Use SAE 30 non-detergent oil type.



CAUTION

- *Pumps BP 40/15, BP 60, P48 and P48 AP do not have a volumetric compensator therefore, contact a Skilled Technician if a top up is necessary*

b) Check that the inflation of the pressure accumulator, if present, is correct using a common compressed air gun with a pressure gauge, i.e. the type used to check the pressure of motor vehicle tyres.

Inflation depends on the range of pressure that the pump must operate in, according to the following

table:

WARNING

- For applications where the pump uses a cardan shaft, strain on the pump shaft must be avoided caused by incorrect use of the cardan shaft (poor lubrication of moving parts, incompatible

PUMP OPERATING PRESSURE		INFLATION PRESSURE OF ACCUMULATOR	
bar	psi	bar	psi
2-5	29-73	2	29
5-10	73-145	2-5	29-73
10-20	145-290	5-7	73-102
20-50	290-725	7	102

turning radius for type of cardan shaft used).

- In case of use at very low temperatures, check that ice does not form inside the pump.
- Complete all routine maintenance, especially concerning the oil.

5.2 HYDRAULIC CONNECTIONS

 **CAUTION**

- *Do not connect up to the mains supply of drinking water.*
- *All pipes must be securely fixed to the relative coupling with grips.*

WARNING

- The intake of the pump must use a tank at atmospheric pressure and the level of the liquid must be between 1m / 3.3ft above and 1 m /3.3 ft below the intake coupling (see fig. 8); never connect the pipe to pressurized water pipes.
- For periods of 10÷15 min, the intake of the pump can operate at drops of up to 3m/ 9.8 ft: it must not operate at drops in excess of this.
- The pump must be provided with an adequate intake filter. In case of doubt, contact a **Skilled Technician**. Check that the filter is perfectly clean at all times.
- The internal diameter of the intake and bypass pipes must be equal to the external diameter of the intake and bypass couplings respectively. They must have a nominal pressure of 10 bar /145 psi
- The internal diameter of the delivery pipes must be equal to the external diameter of the delivery couplings. Their nominal pressure must not below the maximum pressure of the pump.
- Do not supply the pump with water at a temperature in excess of 40°C/104°F or below 5°C/ 41°F.
- Do not operate the pump for a long time if it is not connected to a water supply.
- Do not supply the pump with salt water or water containing impurities. In this event, run the pump for a few minutes with clean water.

5.3 START UP

CAUTION

- Complete any operations required to start up the machine that incorporates the pump as recommended by its manufacturer.
- Read the instructions and warnings on the label of chemicals to be distributed by the pump to take the appropriate steps in order to avoid danger for the operator or for the environment.
- Store all chemicals in a safe place out of children's reach.
- Should any chemicals come into contact with your eyes, wash immediately with water. Contact a doctor without delay and remember to take the container of chemicals with you.
- If any chemicals are swallowed, do not provoke vomiting. Contact a doctor without delay and remember to take the container of chemicals with you.
- Operating pressure must never exceed the maximum toleration level of the pump (refer to the **"FEATURES AND TECHNICAL SPECIFICATIONS"**

For the following points, please also refer to the documentation which is provided with the control unit.

- a) Set the delivery pressure to zero on the control unit so that it enters its "bypass" status.
- b) Start up the pump so that it can prime.
- c) Set the control unit to its "pressure" position. *section).*
- d) Turn the pressure adjustment knob on the control unit until the required amount of pressure is reached.

WARNING

- To allow the pump to prime quickly, follow the instructions at point (a) every time the pump is drained of liquid.
- We recommend checking the level of the oil during the initial hours of its operation and to top up the liquid if necessary as instructed in the **"PRELIMINARY PROCEDURES"** section.

6. SWITCHING OFF AND STORAGE

6.1 SWITCHING OFF

CAUTION

- Complete any operations required to switch off the machine that incorporates the pump as recommended by its manufacturer.

No part of the pump must be in motion and no pipe must contain liquid under pressure.

- a) Set the delivery pressure to zero as described in the **"START UP"** section.
- b) Switch the pump off.

6.2 STORAGE

CAUTION

- Complete any operations required to store the machine that incorporates the pump as recommended by its manufacturer.

WARNING

- Refer to the use and maintenance manual for the machine that incorporates the pump. After use, complete a cleaning cycle, making the pump take up clean water. Never store the pump with pumped liquid inside it.

- **The pump is not frost proof.**

In order to prevent the formation of ice inside the pump in cold areas, we recommend making the pump take up a motor vehicle grade anti-freeze before starting the “storage” procedures (diluted as instructed for the minimum temperature that the pump will be exposed to) and then drain it completely, making it operate for a few minutes without taking up any liquid.

CAUTION

- *dispose of anti-freeze liquid correctly; do not throw it away in the environment.*

7. CLEANING AND MAINTENANCE

CAUTION

- *Only start cleaning and maintenance once the instructions in the ‘Switching off’ section have been completed, i.e. no part of the pump must be in motion and no pipe must contain liquid under pressure..
It is particularly important to always disconnect the electricity supply, if present.*

7.1 ROUTINE MAINTENANCE

Follow the instructions in the ‘**SWITCHING OFF**’ section and abide by the recommendations in the table below.

WARNING

INTERVAL FOR MAINTENANCE	ACTION
Each time used	<p>Check the level and the status of the oil.</p> <p>Check the water intake filter and clean if necessary</p>
Every 50 hours	<p>Check the accumulator inflation pressure (when present).</p> <p>Check the water intake circuit is intact.</p> <p>Check the pump is securely fastened to the structure of the machine that incorporates the pump. Should the pump not be fastened securely, do not use the machine under any circumstance and contact a Skilled Technician (1)</p>

(1) This must be controlled more frequently if the pump operates in circumstances with heavy vibrations (crawl tractors, combustion engines, etc.).

- During use, the pump should not be too noisy and large amounts of water or oil should not drip from underneath it.

In this event, a Skilled Technician should test the appliance.

7.1.1 DIAPHRAGM RUPTURE

The rupture of one or more diaphragms can result in the mechanical parts of the pump being damaged by the liquids being pumped.

The following are symptoms of possible diaphragm rupture:

- oil takes on a whitish appearance (symptom of water in the oil)
- excessive consumption of oil
- sudden lack of oil in the volumetric compensator

WARNING

- To avoid the negative consequences of this malfunction, stop operation of the pump immediately and contact a **Skilled Technician** without delay (within 24 hours) who will take the necessary action.

If it is not possible to contact a **Skilled Technician** within the above time in case of diaphragm rupture, we recommend you drain the pump crankcase of the mixed oil and pumped liquid and then fill it with oil or diesel to prevent the formation of rust.

- The following are frequently the causes of diaphragm rupture:
 - bottlenecks in the intake circuit (inadequate pipe section, dirty filter, very dense liquid being pumped, etc)
 - the use of very aggressive chemicals

7.2 SPECIAL MAINTENANCE



CAUTION

- Only Skilled Technicians are authorised to carry out special maintenance.
- Dispose of waste oil correctly; do not throw it away in the environment

Follow the instructions in the table below for special maintenance.

INTERVAL FOR MAINTENANCE	ACTION
Every 300 hours	Check the intake and delivery valves (1)
At the end of every season or once a year	Check diaphragms and replace if necessary (2) Replace the oil (3) Check the pump screws are tight (4)

- 1) check more frequently if liquids are used with suspended abrasive particles.
- 2) we recommend replacing diaphragms regardless of their condition if particularly aggressive chemicals are used.
- 3) Oil must be changed when diaphragms are replaced; first oil change must take place after 300 hours
- 4) check more frequently if the pump operates in conditions of heavy vibration.

WARNING

- The data in the table are indications. Maintenance may be required more frequently in cause of particularly heavy use.

8 REPARATION

Only trained personnel are allowed to dismantle the pump in accordance with the current regulations in the country where it is installed.

9 PROBLEMS, CAUSES AND SOLUTIONS



CAUTION

- Before undertaking any action, follow the instructions in the “**SWITCHING OFF**” section. If it is not possible to restore correct operation of the pump using the information in the table below, contact a **Skilled Technician**.

PROBLEM	CAUSE	SOLUTION
The pump does not prime	Water intake	Check the intake circuit is intact
	Adjustment valve positioned under pressure	Set pressure to zero and put pump in bypass
The pump does not reach maximum pressure.	Speed of pump rotation is inadequate	Restore correct rotation speed
	Unsuitable application (for example: worn nozzle or too large nozzle)	Replace application
Irregular pressure and water flow (pulsating)	Water intake	Check the intake circuit is intact
Excessive vibration in delivery circuit	Pressure accumulator not correctly inflated	Restore correct inflation
Excessive noise associated with drop in the oil level	Bottlenecks in intake circuit	Check intake circuit
Excessive consumption of oil and/or oil is whitish colour (presence of water in oil)	Rupture of one or more diaphragms	Refer to instructions in section 7.1.1.

