72185 County Rd 3
Nappanee, IN 46550

NEWMAR CORPORATION

866.290.5371
Fax 574.773.2007

PRODUCT INFORMATION BULLETIN

DATE ISSUED		PIB #
12/12/2012	***Wexco Industry*** – setting park position for windshield wipers.	**32**

YEAR / BRAND / TYPE / MODEL #

The intent of this Product Information Bulletin is to inform of the recommended procedure in setting the park position for the windshield wiper arms.

PRODUCT INFORMATION

Please review the attachment information from Wexco Industries. Page #7 notes the desired procedure to follow in setting or resetting the park position for the windshield wiper arms.

Additional troubleshooting topics noted in attachment.

- Wiper system inoperative, all switch settings.
- Wiper system inoperative on one or more setting, (but not all).
- Wiper system runs for short period, then stops and starts after delay.
- Wiper system stops immediately when the wipers are switched off.
- Wiper angles on both sides of RV are too large or small.
- Wiper angle on one side of RV is too large or small.
- One wiper arm does not function.

If you have any questions regarding this P.I.B., please contact a Warranty Service Representative at Newmar Corporation.

Troubleshooting RV Wiper systems

Mike Parmelee, Chief Engineer

EXCO Industries

Introduction

In order to successfully troubleshoot wiper systems at the customer, a basic understanding of the wiper system components and terminology is in order. The following is a short course on wipers which should be helpful.

Wipers 101

Wiper motor:

The wiper motor is the power source for the wiper system. As the load on the motor increases, it will slow down in speed but supply more torque to counter the load. Various motor "sizes" are used and are rated in torque output. Normally, the stall torque is referred to, e.g., 38 Nm (Newton meters). This is the maximum torque the motor can supply when it is locked (or "stalled" at the output shaft).

Wiper motors are not designed to run continuously at high torque outputs. Typically, a motor can run continuously at ~25% of its stall torque. At loads higher than this it should only be operated intermittently, or overheating and thermal shutdown will result. This is taken into consideration when a motor size is selected for a particular wiper system.

RV wiper motors consist of two main parts, the motor itself (contained in the "can"-shaped housing) and the gearbox, where the output shaft exits the motor. The motor armature shaft has a worm on the gearbox end which meshes with a large plastic spur gear in the gearbox. This provides a gear reduction set to lower speed and increase torque. The motor output shaft is attached to the plastic gear.

Typical RV wiper motors have 2 speeds similar to passenger cars. There is also an automatic park feature which returns the motor (and arms and blades) back to their original "park" position when the wipers are switched off. Intermittent wipe is often supplied on RV's and is accomplished by external electronics in conjunction with the wiper switch. A pigtail harness on the wiper motor connects the motor to the vehicle harness. Various connector designs are used on wiper motors and are vehicle specific. It is standard practice for the motor to be protected against overload by an internal thermoswitch. This is a bimetallic switch which senses both current and temperature and breaks the motor ground circuit if its limits are exceeded. It resets itself automatically when the current drops or temperature of the motor cools down.

RV wiper motors are all 12 volt models (as opposed to 24 volts motors used on construction equipment). In use, the motor will see vehicle charging system

voltage of 13.5 volts. The lower the voltage to the motor, the slower it will run and the less torque it will produce.

Linkage

The wiper linkage takes the rotary motion of the motor and converts it into oscillating motion to drive the wiper arms and blades. There are various linkage designs which must be adapted to fit the vehicle and provide the required wipe angles. The linkage is typically attached to a bracket which also mounts the wiper motor. This complete assembly is often referred to as a wiper module.

The linkage consists of the following basic parts:

Motor crank arm: Also referred to as a drive arm. This is a lever which attaches to the output shaft of the wiper motor. It has either a cylindrical pin or a ball stud to which the rest of the linkage connects. The motor crank rotates in a circle with the motor. There are various types of crank designs, depending on how they attach to the motor output shaft and how they connect to the linkage. The length of the crank (measured from the center of the motor shaft to the center of the pin or ball stud) determines the wipe angle of the linkage in conjunction with the pivot levers. A longer crank results in a bigger wipe angle.

Installation position of the motor crank on the motor output shaft establishes the park position of the wiper system. The wiper motor must first be parked electrically. The motor crank is then installed on the output shaft so that it lies in a straight line with the connecting links. This establishes the reversal points of the linkage correctly.

Pivot assembly: The pivot assembly consists of a shaft (which attaches to the wiper arm/blade), a lever plate at the back end of the shaft, a bearing system for the shaft, and a housing to contain the bearings and shaft and facilitate mounting. The lever plate itself also has either a cylindrical pin or ball stud (similar to the motor crank) to which the rest of the linkage connects. There are several types of attachment styles to the pivot shaft for wiper arms.

The pivot assemblies (two are needed for RV's) are typically mounted onto a bracket at an established distance apart. This distance is specific to the vehicle, as it positions where the wiper arms/blades will be located relative to the vehicle windshield.

The length of the pivot lever plate (measured from the center of the shaft to the center of the pin or ball stud) in conjunction with the length of the motor crank determines the wipe angle for that specific pivot. The longer the pivot lever plate the smaller the wipe angle.

Pivots must be located correctly in relation to the motor. This establishes the kinematics of the linkage system, meaning the wipe angles, park position and overall efficiency of the linkage. Normally, the location of pivots is controlled by the bracket to which they and the motor attach.

Pivots are offered in various lengths to accommodate the various skin thicknesses encountered on RV's. As mentioned previously, there are also several attachment styles for wiper arms to the shafts. The shaft must match the mating portion of the wiper arm.

Connecting links: Links "connect" the wiper motor crank to the pivots. They are a structural part (a beam) and also contain joints to allow for rotation motion of the crank or pivot levers. Typical design is a stamped steel "U" channel. The length of the link is not only matched to the distance between pivot and motor but is optimized for kinematic properties. The joints on most RV links are ball sockets, typically made out of molded plastic. They are designed to fit to ball studs with essentially zero clearance.

The sockets on links are also wear items and must be greased for long life. Since the link is also a structural component (it carries the push or pull from the motor to the pivot) it must be able to withstand the frictional/inertial loads imposed by the wiper system, external forces (such as wind loading) and worst case the maximum torque supplied by the motor. The most serious concern is that the link is not robust enough and will buckle under motor stall load. Longer links need to be made of heavier gauge steel as they will buckle easier than shorter links.

The rest of the parts

Wiper arms: The wiper arm is basically a lever which connects the oscillating pivot shaft to the wiper blade. The length and configuration of the wiper arm positions the wiper blade properly for the specific vehicle to generate the proper arcurate motion and thus the sweep pattern required.

The wiper arm also applies a downward force on the wiper blade in order to keep it in proper contact with the windshield. This is accomplished by a spring which connects the upper and lower portions of the wiper arm. There is a specific force necessary on on-road vehicles to both maintain sufficient contact pressure and prevent wind lift at highway speeds. This arm load or tip force as it is called must be tailored to the length of the blade. Typical tip forces used for RV's are approximately 12N - 15N of force per meter of blade length.

The wiper arm also has a joint, called the hinge pin, which not only helps apply the downward force to the blade, but permits the arm to "follow" the curvature of the glass, i.e., rise and fall as required. The wider the hinge pin, the more robust the wiper arm is. Most wiper arms also utilize this hinge pin to facilitate a "service up" position so that the wiper blade can be removed easily.

Wiper arms are typically "wet" on RV's, meaning they have washer nozzles on them fed by a hose from the washer pump/bottle. Individual jets on the nozzle are aimable by inserting a pin in the jet ball orifice and rotating it to the desired orientation.

Wiper blades: The wiper blade has a simple function – to "squeegie" water and dirt off of the windshield as it moves. This is accomplished by the rubber insert which is held in the metal framework of the blade structure and kept in proper contact with the glass surface. The blade frame is usually constructed of multiple levers which are all hinged. A tension strip or vertebrae sits on top of the rubber insert and keeps it in conformity with the glass surface. This allows the rubber insert to follow the curvature of the glass and maintain a reasonably even distribution of the load applied by the wiper arm.

Blades attach to wiper arms by various means, including a snap hook design or saddle with bolt. Blades are classified according to length and attachment type. Lengths generally run in either whole inches or 25 mm increments, e.g., 400 mm, 425 mm, etc.

Bracket: A bracket is typically used to tie all the linkage components and the motor together. The bracket also facilitates easier mounting of the system in the RV. The bracket needs to be sufficiently rigid that it does not allow individual components to move or flex under varying load conditions. It must also have a robust attachment to the vehicle.

Putting it all together

We now have all the basic pieces for a complete wiper system. There is the wiper module, consisting of the wiper motor and linkage on a bracket, arms and blades. Typical installation involves installing the module into the RV cap, tightening fasteners and plugging in the connector on the motor to the vehicle harness. The wiper arms can now be installed on the pivot shafts and wiper blades attached to the wiper arms. Last, washer hoses are connected to the wiper arms.

The end result

For the customer (the RV builder), the deliverable from the wiper supplier is the quality of the sweep pattern. Does the wiper system clean the designed area consistently from vehicle to vehicle ? Most of the troubleshooting procedures in this document will address the potential problems that affect the main deliverable. For convenience, they will be grouped by symptoms (things the customer might complain about).

Troubleshooting

Note: Be sure to have the appropriate wiper system and component drawings available during troubleshooting. Unless indicated otherwise, all tests are on the vehicle.
Caution: Wiper motors produce a large amount of torque. The automatic park feature on motors can cause unexpected motor activation. Fingers may become pinched in linkage parts and suffer severe cuts or broken bones. Always disconnect the motor from power before attempting any work.

Wiper system inoperative, all switch settings

1) make sure the wiper motor is plugged in to the vehicle harness. Cycle the wiper switch through all settings and verify inop at all settings.
2) disconnect the vehicle harness from the motor harness and connect to a known good wiper motor. If the known good motor does not function, the problem is vehicle wiring, the wiper switch, or a fuse/circuit breaker
3) if the known good motor functions, check the original wiper linkage for any obstructions that could jam it or prevent movement. If there are no obstructions, the wiper motor is defective. Replace the motor and retest.

Wiper system inoperative on one or more settings (but not all)

1) make sure the wiper motor is plugged in to the vehicle harness. Cycle the wiper switch through all settings and verify which settings are inop.
2) disconnect the vehicle harness from the motor harness and connect to a known good wiper motor. If the known good motor is inop on the same switch settings as the original motor, the problem is vehicle wiring or the wiper switch
3) if the known good motor functions properly on all settings, the wiper motor is defective. Replace the motor and retest the system.

Wiper system runs for short period then stops, restarts after some delay

1) make sure wiper switch is not in intermittent position. Run the motor in either the low or high setting and verify that the motor stops unexpectedly and restarts.
2) start vehicle engine and retest motor. If motor functions properly, vehicle battery was low. Charge vehicle battery.

3) If motor does not function properly with engine running, there is either a high load on the wiper system or the system has a binding problem. Either could cause the motor thermoswitch to trip and stop the motor.
4) Check the windshield for any sticky substances which might cause the wiper blades to drag. Clean window if necessary and retest.
5) If windshield is clean, or the system fails after cleaning the window, the motor or linkage is binding. Check for obvious interference of linkage parts which might bind and correct if possible. Otherwise, replace the wiper module and retest the system.

Wiper system parks consistently but in the wrong place

1) Run wipers and then switch off and observe if they park at their reversal point. If yes, then the wiper arms were installed in the wrong position (too high or low, too far left or right, etc.). Remove and reinstall in the proper location.
2) If the wipers do not park at their reversal point, meaning they park prematurely before reversal or after reversal, the motor crank is not installed in the proper position. Remove the module from the vehicle.
3) With the module on a bench, remove the motor crank from the motor output shaft. Use an adjustable wrench to restrain the motor crank while you remove the retaining nut with another wrench.
4) Connect a power supply and wiper switch to the motor and re-park the motor. Disconnect the power supply.
5) Install the motor crank so that it lies in a straight line with the connecting links according to the wiper module drawing. Using the adjustable wrench to hold the crank, torque the crank retaining nut to 20 Nm. Connect the power supply and switch again and double check the park position by cycling the motor and switching off. Reinstall the module and wiper arms.

Wiper system stops immediately when the wipers are switched off

1) Run the wipers several times and switch off at various positions of the wiper blades. Verify that the motor stops immediately when switched off instead of continuing to park.
2) Unplug the wiper motor from the vehicle harness. Connect the vehicle harness to a known good wiper motor. Mark a line on the output shaft of the motor. Run and park the motor, noting the position of the line you made after it parks. Run and park the motor again. The line should be in the same position as the previous park cycle. If the motor parks in a different spot, then the vehicle switch or wiring is the problem. Repair as necessary.
3) If the good motor parked consistently, then the motor installed in the RV either has a bad park switch or the motor crank is loose on the motor output shaft. With the motor still disconnected from power, grab the motor

crank and try to turn it. If the crank does not slip on the output shaft, the wiper motor park switch is defective. Replace the wiper module.

4) If the motor crank does slip on the motor output shaft, remove the module from the RV.
5) With the module on a bench, remove the motor crank from the motor output shaft. Use an adjustable wrench to restrain the motor crank while you remove the retaining nut with another wrench.
6) Connect a power supply and wiper switch to the motor and repark the motor. Disconnect the power supply.
7) Install the motor crank so that it lies in a straight line with the connecting links according to the wiper module drawing. Using the adjustable wrench to hold the crank, torque the crank retaining nut to 20 Nm. Connect the power supply and switch again and double check the park position by cycling the motor and switching off. Reinstall the module and wiper arms.

The wipe angles on both sides of the RV are too large or too small

1) With the RV engine running, activate the wiper system on low speed and hit the wash button so washer fluid is spraying continuously. Compare the sweep pattern on the windshield with the wiper system drawing. If the sweep pattern looks OK, the customer probably ran the system on dry glass and/or without the engine running. Dry glass and lower motor voltage cause reduced wipe angle.
2) If the sweep pattern is excessively large or small when run wet with the engine running, switch the wipers off and allow to park. Unplug the vehicle harness, turn the wiper switch on and measure voltage at the vehicle connector with the wiper switch on. With the engine running, there should be between 13.5 volts and 14.5 volts at the vehicle connector. If the voltage is outside this range then the charging system is bad. Repair the charging system and retest the wipers.
3) If voltage to the wipers checks out OK, remove the wiper module from the vehicle. With the module on a bench, measure the following components;
    a. Pivot shaft lever lengths from the shaft center to the stud center
    b. Motor crank length from the motor shaft center to the stud center
    c. Distance between pivots
    d. Distance from one pivot center to the motor center
    e. Length of both connecting links from socket center to center
4) If any of the components measured in 3) above are off, then an incorrect component was installed, a component is bent, or the module was built incorrectly.
5) If all linkage parts are correct and undamaged, reduced wipe angle is indicative of an internal motor problem (slow running motor, binding) or linkage binding. Replace the module.
6) Excess wipe angle indicates that there is excessive play in the linkage. Pull the links individually back and forth while you hold the pivot lever plate. There should be no play in the ball joint at the pivot. Repeat at the

motor crank end. Again, there should be no play in the ball joint. If there is play, the link socket is worn and the link needs to be replaced.

7)

The wipe angle on one side of the vehicle is too large or small

1) With the RV engine running, activate the wiper system on low speed and hit the wash button so washer fluid is spraying continuously. Compare the sweep pattern on the windshield with the wiper system drawing. Verify which wipe angle is too large or small.
2) Park the wipers and make sure that both wiper arms are parked in the proper location. An arm parked too high or low will not travel to the proper location and cause a customer complaint of incorrect wipe angle. Correct as necessary.
3) If park position is correct, remove the wiper module from the vehicle. With the module on a bench, measure the following components;
    a. Pivot shaft lever lengths from the shaft center to the stud center
    b. Distance between pivots
    c. Distance from one pivot center to the motor center
    d. Length of both connecting links from socket center to center
4) If any of the components measured in 3) above do not measure properly, then an incorrect component was installed or the module was built incorrectly.
5) If all linkage parts measure OK, reduced wipe angle is indicative of a binding pivot. Replace the pivot.
6) Excess wipe angle indicates that there is excessive wear or play in one side of the linkage. Pull the link back and forth while you hold the pivot lever plate. There should be no play in the ball joint at the pivot. Repeat at the motor crank end. Again, there should be no play in the ball joint. If there is play, the link socket is worn and the link needs to be replaced.

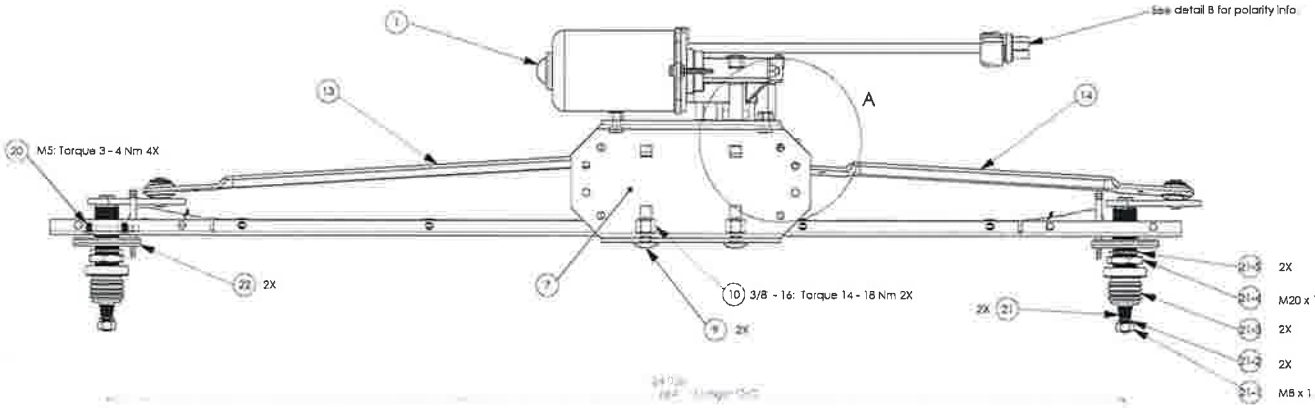
One wiper arm does not run

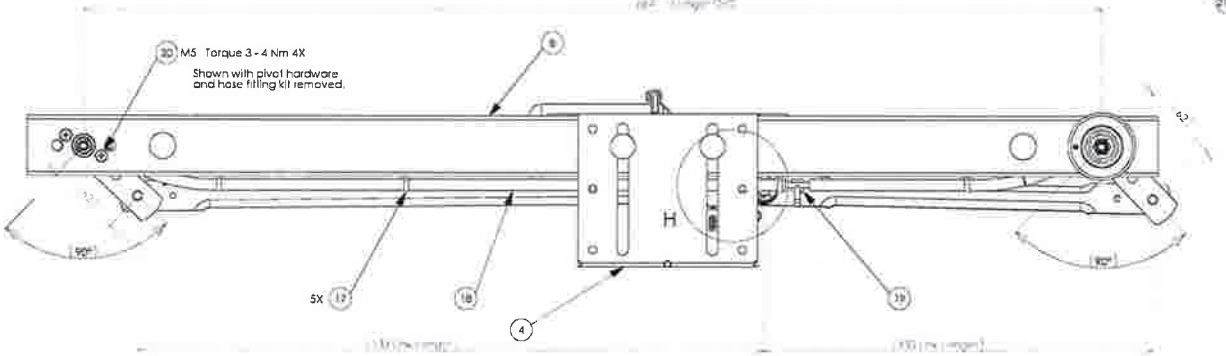
1) Make sure that both wiper arms are installed properly and the retaining nuts torqued down. Run the wiper system with the vehicle engine running and water spraying on the glass. Verify which arm is not moving.
2) With the wiper system switched off and parked, try to hand-rotate the wiper arm which is not functioning. If the arm moves freely, there is a definite linkage system problem which has caused a disconnect of the wiper arm. If the wiper arm does not move, there could be multiple problems. Remove the wiper module from the vehicle.
3) With the wiper module on a bench, do the following;
    a. Check the knurled driver for stripping/cracking if the system uses this style pivot
    b. Check the shaft end for damage, either to the flats or splines, depending on design.
    c. Twist the shaft to see if it is broken or the weld is broken

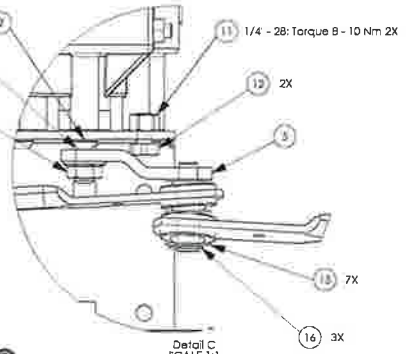
d. Make sure the link is connected to the pivot lever stud and is not bent or buckled.
e. Make sure that the link is connected at the other end to the motor crank stud
f. Make sure the pivot housing is tightened securely to the module bracket.
g. Remove the pivot from the bracket and make sure that the shaft rotates freely in the housing.

4) Unless the problem is a disconnected link which can be connected again, or a loose pivot, the wiper module will need to be replaced.

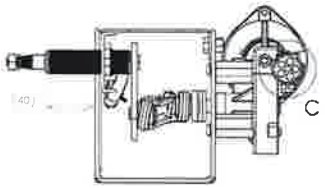
REV	DATE	DESCRIPTION
A	4-13-12	Initial Release





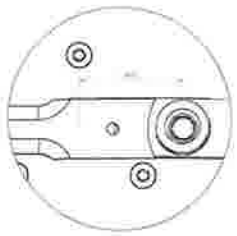


Detail C
SCALE 1:1
Shown without top bracket



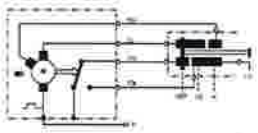
Shown with pivot hardware and washer hose removed.

POS	QTY	PART NO.	DESCRIPTION
22	2	200247	20mm Hose Fitting Kit
21-5	2	300931	M20 Washer
21-4	2	300932	M20 X 1 Hex Nut
21-3	2	CA01127001	Rubber Cap
21-2	2	WA40805001	M8 Wavy Washer
21-1	2	NT00800001	M8 X 1.25 Hex Nut
21	2	PV11625001	Pivot Assembly, 1.5", R = 62 mm
20	4	300930	M5 Flathead Screw
19	1	19482	T Connector, hose
18	3'	19481	Washer Hose
17	5	19490	Hose Clip
16	3	RC19517001	E-Clip
15	7	WA01008001	M10 Washer
14	1	LK23306001	Link Assembly, 330 mm
13	1	LK25336001	Link Assembly, 533 mm
12	2	400236	1/4" - 28 x 1/2 UNF Hex Bolt
11	2	400238	1/4" - 28 UNF Elastic Hex Nut
10	2	400224	3/8" - 16 Hex Nut
9	2	400220	3/8" - Carriage Bolt
8	1	400515	34" Stringer Bracket
7	1	400504	Top Bracket
6	1	400200	M8 x 1.25 Flange Hex Nut
5	1	CR12044001	Crank Arm, R=44 mm
4	1	400506	Motor Bracket
3	3	106800	M6 Button Head Screw
2	3	WA10655001	M6 Internal Tooth Lock Washer
1	1	400 01100 S012WP	Motor, 12V .33 HP, Dynamic Park w/ Package



DETAIL H
SCALE 1 : 1
Motor Bracket and Stringer Hidden

CIRCUIT DIAGRAM



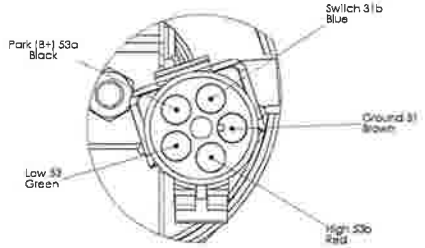
NOTES:

Wipe Angle: 90° Driver, 90° Passenger, No-load.

Park Position: As shown, no load, cold motor @ 13.5V.

Motor is thermoswitch protected.

Motor rotation: CCW.



CONNECTOR
DETAIL C
SCALE 2 : 1

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF WEXCO INDUSTRIES. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF WEXCO INDUSTRIES IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM
TOLERANCES: FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

DRAWN: DNA
CHECKED: DNA

WEXCO Industries

TITLE:

Wiper Module

SIZE: D | PART NO: 1000-3110070 | REV: A

SCALE: | WEIGHT: | SHEET 1 OF 1

D 1000-3110070 A