



# 350 SERIES OPERATIONS MANUAL

For parts and service  
(877) 227-8811



**350 SERIES MODEL** (updated 11/2019)

For parts and service, call:

(877) 227-8811

Broce Manufacturing 1460 S. 2nd Street | Dodge City, KS 67801

# WARRANTY REGISTRATION

## Purchased from (Dealership)

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Deliver Date to Dealer: \_\_\_\_\_ Unit Hours: \_\_\_\_\_

Model Number: \_\_\_\_\_ Serial Number: \_\_\_\_\_

## Purchaser

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Delivery Date to Owner: \_\_\_\_\_ Unit Hours: \_\_\_\_\_

## Purchaser - Type of Business

Construction/Highway

Municipality

Equipment Dealer

Asphalt Contractor

Rental

Other

1. The Purchaser has been instructed and/or has read the manual and understands proper preventive maintenance, operation and safety precautions.
2. The Warranty and Limitations of Liability are found in the Warranty pages enclosed in the Parts and Operators Manuals.
3. Broce Manufacturing Co. Inc., reserves the right to make design changes or modifications to Waldon products at any time without incurring any obligation to make similar changes of modifications to previously sold units.
4. If this Document is not signed and returned to Broce Manufacturing Co. Inc., the warranty begins at the date of delivery to the Dealership.

I hereby acknowledge acceptance of above and conditions in the Warranty Policy.

Purchaser/Owner: \_\_\_\_\_

Dealer Representative: \_\_\_\_\_

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## LIMITED TWELVE (12) MONTH WARRANTY

For a period of twelve (12) months or 1,000 hours whichever comes first, from the date of delivery of product to the original user, Broce Manufacturing of Dodge City, Kansas warrants each product to be free from manufacturing defects, subject to the limitations contained in this policy. This limited warranty covers parts and labor.

This warranty does not apply to defect caused, in whole or in part, by unreasonable use while in the possession of the user, including, but not limited to, failure to properly set up product, failure to provide reasonable and necessary maintenance, normal wear, routine tune ups of adjustments, improper handling, accidents, operation at speed of load conditions contrary to published specifications, improper or insufficient lubrication, or improper storage. This warranty is not a guarantee that the performance of each product will meet the expectations of the purchaser.

Broce Manufacturing shall not be liable for consequential damage of any kind, including, but not limited to: consequential labor costs or transportation charges in connection with the replacement or repair of defective parts, lost time or expense which may have accrued because of said defects. In no event shall Broce Manufacturing's total liability hereunder exceed the product purchase price.

Many components used by Broce Manufacturing are subject to the warranties of their respective manufacturers. These warranties will be considered void if the product is modified or repaired in any way not expressly authorized, or if closed components are disassembled prior to return. Closed components include, but are not limited to gearboxes, hydraulic pumps, motors, cylinders and actuators.

Our obligation under the warranty is expressly limited, at our option, to the replacement or repair at Broce Manufacturing of Dodge City, KS or at a service facility designated by us. We are not responsible for unauthorized repairs or replacements. Any implied or statutory warranties, including any warranty of merchantability or fitness for a particular purpose, are expressly limited to duration of this written warranty. We make no other express warranty. This warranty cannot be extended, broadened, or changed except in writing by an authorized officer of Broce Manufacturing.

**NOTICE: THIS VEHICLE DOES NOT CONFORM TO ALL SAFETY AND EMISSIONS STANDARDS APPLICABLE TO ON-ROAD VEHICLES IN THE UNITED STATES.**

### **OPERATOR QUALIFICATIONS**

Operation of this equipment shall be limited to competent and experienced persons. In addition, anyone who will operate or work around this equipment must use good common sense. In order to be qualified, he or she must also know and meet all other requirements, such as:

1. Some regulations specify that no one under the age of 16 may operate power machinery. It is your responsibility to know what these regulations are in your area or situation.
2. Current OSHA regulations state in part: "At the time of initial assignment and at least annually thereafter the employer shall instruct EVERY employee in the safe operation of servicing of all equipment with which the employee is or will be involved."
3. Unqualified persons are to STAY OUT of the work area.
4. A person who has not read and understood all operating and safety instructions is not qualified to operate the machinery.

**FAILURE TO READ THIS MANUAL AND ITS SAFETY INSTRUCTIONS IS A MISUSE OF THE EQUIPMENT AND WILL VOID FACTORY WARRANTY.**

### **SIGN OFF SHEET**

As a requirement of OSHA, it is necessary for the employer to train the employee in the safe operation and safety procedures with this equipment. We include this sign off sheet for your convenience and personal recordkeeping.

Date	Employer's Signature	Employee's Signature

# TABLE OF CONTENTS

DESCRIPTION	PAGE #
SAFETY PRECAUTIONS _____	6
MACHINE SPECIFICATIONS _____	8
Engine _____	8
Hydraulic _____	8
Fluid Capacities _____	9
MACHINE OPERATION _____	10
Controls _____	10
Daily Inspection _____	11
Startup Procedure _____	11
Sweeping Core _____	13
Towing _____	15
HYDRAULIC SYSTEM DETAILS _____	16
Hydrostatic Drive _____	16
Loop Flushing Circuit _____	16
Steering Circuit _____	16
Brush Control _____	17
System Description _____	18
Test Procedures _____	20
MAINTENANCE & SERVICE _____	21
Air Cleaner _____	21
Hydraulic System _____	22
Radiator & Heat Exchanger _____	22
Lubrication _____	22
Brakes _____	22
Core Drive _____	26
Engine _____	27
Tires _____	27
Storage _____	27
Air Conditioning Maintenance _____	28
Broom Wafer Replacement _____	31
SCHEMATICS _____	37
Wiring Diagrams _____	37
Hydraulics Diagrams _____	56

**350 SERIES MODEL** (updated 11/2019)

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Broce Manufacturing 1460 S. 2nd Street | Dodge City, KS 67801

## SAFETY PRECAUTIONS

### CAUTION

1. Keep all shields in place.
2. Stop machine, turn off engine and remove key to repair or clean.
3. Keep hands, feet, and clothing away from power driven parts.
4. Keep off of machinery unless a platform is provided. Do not crawl on equipment.
5. When equipment becomes disabled, shut off power before attempting repairs.
6. Check for hydraulic leaks with a piece of paper and not your hands. Hydraulic oil under pressure can cause serious injury!

**BE A SAFE OPERATOR BY THINKING BEFORE ACTING AND  
BY READING YOUR OPERATORS MANUAL.**

#### AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home, or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason, most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safe guarded against without interfering with reasonable accessibility and efficient operation.

**A careful operator is the best insurance against an accident.**

The complete observance of one simple rule would prevent many thousand serious injuries each year.

**Never attempt to clean, oil, or adjust a machine while it is in motion!**

### BEFORE OPERATING THIS MACHINE

Read this manual completely. It contains information on safety and maintenance procedures which must be followed to insure years of trouble free service.

**WARNING STATEMENTS  
READ AND UNDERSTAND THE FOLLOWING WARNING LABELS BEFORE  
OPERATING THIS MACHINE**

#### WARNING

**OPERATOR MUST BE SEATED WITH SAFETY BELT ADJUSTED PROPERLY & SECURE WHEN  
ENGINE IS RUNNING.**

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## SAFETY PRECAUTIONS

The seat belt and roll over protection structure were designed to be used together to prevent operator injury in the event of an accident. The seat belt must be worn at all times in order to hold the operator in place so that the roll bar can protect the operator. Adjust the slack out of the seat belt by pulling the unused portion of the belt to the left. The belt should fit snug over the operator's hips.

### WARNING

TRAVEL SPEED MUST BE GOVERNED BY GOOD JUDGMENT. DO NOT OVERSPEED!

Although a high travel speed is available with the Broce Broom, we caution all operators to use good judgment, especially on rough terrain.

### WARNING

DO NOT OPERATE CORE UNLESS CHAIN GUARD IS INSTALLED.

On Chain Drive cores, the chain guard must be installed and be in serviceable condition at all times when the broom is operating. This guard is designed to prevent personal injury and to protect the chain from foreign debris.

### WARNING

The operator must be aware at all times of any people, vehicles, or any other objects which might be in the path of flying debris from the sweeper. The sweeper can throw small rocks and other objects several feet. This debris can cause serious injury to people and damage to property. Always check that the area around, and in front of the broom core is free of obstructions before adjusting the broom angle or activating the core.

### WARNING - NO RIDERS!

UNDER NO CIRCUMSTANCES SHOULD PASSENGERS BE ALLOWED TO RIDE ON THIS MACHINE. THERE ARE NO SAFETY PROVISIONS ON THIS MACHINE FOR PASSENGERS. FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS INJURY OR DEATH.

### WARNING

When operating a broom without an enclosed cab, wear hearing and eye protection as well as a dust mask that covers both the mouth and eyes.

**350 SERIES MODEL** (updated 11/2019)

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Broce Manufacturing 1460 S. 2nd Street | Dodge City, KS 67801

## MACHINE SPECIFICATIONS

### Engine Specifications

See Engine Manufacturer's Manual (included) for engine specifications.

### Hydraulic System Specifications

#### PROPEL PUMP

Displacement at MAX Angle	46 cc (2.8 CU IN)
Rated Speed	4000 RPM
MAX Speed	4100 RPM
MIN Speed	500 RPM
Case Pressure - Continuous	1.7 BAR (25 PSI)
Case Pressure - MAX	5.2 BAR (75 PSI)
System Pressure - Continuous	210 BAR (3000 PSI)
System Pressure - MAX	345 BAR (5000 PSI)
Inlet Vacuum - Continuous	8 BAR (5 IN Hg)
Inlet Vacuum - MAX	7 BAR (10 IN Hg)
Charge Pressure Setting	19.5 BAR (283 PSI)
System Pressure Setting	280 BAR (4060 PSI)
Approximate flow at 2400 RPM	26 GPM

#### PROPEL MOTOR

Displacement	46 cc (2.8 CU IN)
Rated Speed	3600 RPM
MAX Speed	3600 RPM
Case Pressure - Continuous	1.7 BAR (25 PSI)
Case Pressure - MAX	5.2 BAR (75 PSI)
System Pressure - Continuous	210 BAR (3000 PSI)
System Pressure - MAX	345 BAR (5000 PSI)

#### AUXILIARY PUMP

Displacement	46 cc (2.8 CU IN)
MAX Speed	3600 RPM
MAX Continuous Pressure	3600 RPM
Approximate flow at 2400 RPM	1.7 BAR (25 PSI)
Priority (Steering and Broom)	5.2 BAR (75 PSI)
Secondary (Broom Rotation)	210 BAR (3000 PSI)
MAX Pressure Setting (Priority)	345 BAR (5000 PSI)
MAX Pressure Setting *(Secondary)	

\*Relief valve in the broom rotation valve.

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## MACHINE SPECIFICATIONS

### FLUID CAPACITIES

Component	Fluid Type	Quantity
Hydraulic Tank	DYNA-PLEX 21C Cursa Hydraulic Oil Multifunctional Medium	27 Gal.
Fuel	#2 Diesel	27 Gal
Radiator	ETHYLENE GLYCOL 50/50 MIX	2.5 Gla
Engine Crankcase	API Classification CI-4, CE or CD CCMC Specification D4 or D5	10 Qts.
Rear Axle	85/140 Gear Lube	2 Qts.*
2-Speed Gear Box	85/140 Gear Lube	2 Qts.*

\* 2 Quarts is approximate. Fill to the level of the filler plug.

<p style="text-align: center;"><b>ATTENTION</b> R-134a A/C Refrigerant Factory Charge: Kubota = 2.0 lb 10.0 oz (1.191 kg) John Deere = 2.0 lb 10.0 oz (1.191 kg) Caterpillar = 2.0 lb 12.0 oz (1.247 kg) Cummins = 2.0 lb 10.0 oz (1.191 kg) Rehlko = 2.0 lb 10.0 oz (1.191)</p> <p style="text-align: center;">Ester Oil Charge: Compressor = 8.0 oz System = 4.0 oz</p>
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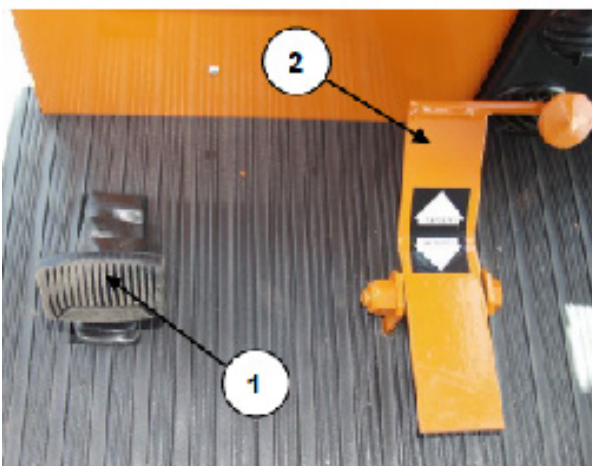
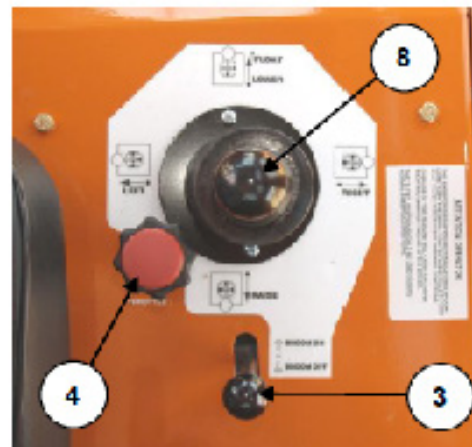
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## MACHINE OPERATION

The Broce Broom is hydrostatically driven. The directional control is achieved through the use of a control pedal, located near the operator's foot. Toe down on the pedal directs the machine forward. Heel down shifts the travel to reverse. Rate of travel is governed by the distance the pedal is depressed and the throttle position. The pedal will return to neutral when the pressure is released.

Familiarize yourself with the following controls before operating this machine.

1. Brake pedal
2. Directional Control
3. Broom on/off
4. Locking throttle
5. Parking brake (lower left side of seat)
6. Ignition switch
7. Two speed shifter
8. Broom Control Joystick
9. Broom Core Lock Switch



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# MACHINE OPERATION

## DAILY INSPECTION

Prior to initial startup of the machine each day, the following inspection checks must be performed:

1. Visually inspect the entire machine for damage and fluid leaks. Repair critical items before machine is used.
2. Check all fluid levels; engine oil, radiator, and hydraulic reservoir, etc. Fill fluid reservoirs if necessary.
3. Check wheels and tires for excessive wear or damage; also check air pressure and lug nut tightness.
4. Check pre-cleaner bowl and air cleaner service indicator and service if indicated.
5. Chain guard, seat belt, core cover, and rubber rock guard should be installed and serviceable.
6. Lights, windshield wipers, reverse alarm, etc., must be in operating condition.
7. Test brakes before operating this machine. Refer to BRAKES area in the MAINTENANCE Section in this manual for details.
8. Check water system filters, nozzles screens and cycle system.

Any defects or damage found during this inspection must be repaired before operating this machine.

## MACHINE STARTUP

### CAUTION

1. Before starting the engine, be sure the parking brake is set (pull handle up to vertical position). The brake pedal should be depressed and the right foot is not on the control pedal.
2. Turn the key switch to the starting position (all the way to the right). Add fuel as necessary using the hand operated locking throttle near the operator's right hand. Release the key switch when the engine starts.

### IMPORTANT

Do not exceed 1500 RPM until the hydraulic fluid has warmed up.

3. Choose the desired gear using the two-speed shifter located on the right-hand side of the dashboard. Low gear is normally used while sweeping in order to maintain sufficient RPM, to run the hydraulics. Leave the two-speed in Low gear until the operator is familiar with the machine. High gear is used for travel only. Optimal sweeping is normally achieved at manufacturer's recommended engine speed of 1800-2000 rpm in Low gear with forward travel speed of 2 ½ - 5 mph.
4. After gear selection, raise engine RPM to about half throttle. Release parking brake. Slowly depress control pedal in the desired direction. Engine speed may be adjusted to obtain desired travel speed.

## MACHINE OPERATION

### IMPORTANT

Do not propel this machine with the parking brake engaged. This will damage the rear brake assemblies.

5. Do not over speed! Although a high rate of travel is available with the Broce Broom, we caution all operators to use good judgment, especially on rough terrain.
6. If the control pedal is released while traveling, the machine will slow down rapidly. This is called "Dynamic Braking". Using Dynamic Braking at low speeds is fine as long as the operator is ready to use the brake pedal if needed.
7. Do not reverse the direction of travel while the broom is in motion. This could damage the drive train and cause brush distortion and imbalance.
8. The core should be in the raised position and the core switch in the "LOCK" position before stopping the engine. This prevents the core from drifting down to the ground and creating a "flat spot" in the brushes while the machine is parked. These flat spots can cause the broom to bounce or hop while sweeping.
9. To stop the engine, turn the key back to the center position. The parking brake must be set prior to leaving the operator's seat.

## REHLKO ENGINES

Rehiko engines have a build in throttle delay that varies based on fuel temperature. Delay times are as listed below.

Pedal Input Delay	
Fuel temperature [°C]	Time period [s]
-25	60
-20	50
-15	35
-10	20
-5	15
0	12
10	8
20	5
80	5

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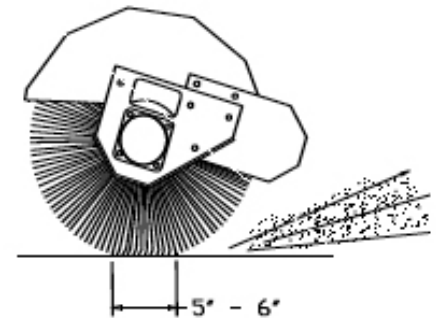
## MACHINE OPERATION

### SWEEPING CORE OPERATION

#### RAISE / LOWER / FLOAT DETENT

To raise the sweeping core, place the broom core lock switch on the dash in the "SWEEP" position and pull the joystick to the "RAISE" position until the core is raised all the way. The joystick will return to the center position and core height will be maintained.

To lower the core during normal sweeping conditions, push the joystick to the "FLOAT" position. The "FLOAT" position will allow the core to maintain the ideal contact with the surface to be swept while allowing it to float over bumps or contours. This valve is equipped with a feature called "POSITIVE DOWN PRESSURE". It should only be used under the heaviest sweeping conditions. The down pressure adjustment range is between the center position and the float detent position. To adjust the core height downward, slowly move the handle from the toward the float position. The core will begin to move downward. Release the handle when the desired height has been achieved. The figure shows the optimum broom height for most sweeping conditions. Using the proper height will also extend the life of the broom.



**Proper Sweeping Height**

#### IMPORTANT

The operator must maintain continuous adjustment on the core while the down pressure option is being used. This feature does not allow the core to float over contours in the surface to be swept. Therefore, the operator must constantly make these adjustments. Overuse of the positive down pressure feature will cause excessive wear and shorten the life of the broom. We recommend using the float detent feature during all but the heaviest sweeping conditions.

#### RIGHT/LEFT OPERATION OF BROOM

The broom core may be set at any angle from 44° left to 45° right, simply moving the handle in the corresponding direction. Release the handle when the desired angle is achieved.

#### BROOM ON/OFF

The Broom Core motor is activated when the handle is moved to the "BROOM ON" position.

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Broce Manufacturing 1460 S. 2nd Street | Dodge City, KS 67801

## MACHINE OPERATION

### SWEEPING TIPS

Optimal sweeping is normally achieved at manufacturer's recommended engine speed of 1800-2000 rpm in Low gear with forward travel of 2 ½ - 5 mph.

1. If the broom starts to "hop" or "bounce", the propelling speed is too high, reduce the forward travel speed, but maintain high engine speed. Slowing the forward travel speed of the machine down will help prevent you from having to make a second pass over the sweeping area with the broom.
2. In areas where the dirt is "caked", try to clean it by going over it a second or third time. If this doesn't clear the dirt, use the "Positive Down Pressure" feature. In most cases, the "Float" position will yield the best results.
3. When changing the direction of travel, allow the machine to come to a complete stop before moving the directional control pedal. Failure to completely stop the machine before changing direction can cause premature failure of the drive components.
4. If the dust cloud becomes so thick that it obscures your vision, use the water sprinkling system if installed, or stop the machine until the dust clears. If possible, angle the sweeper so that the dust and debris is swept downwind.
5. Ensure that the operator of the machine is properly trained and follows all safety procedures described in this manual.

# MACHINE OPERATION

## TOWING

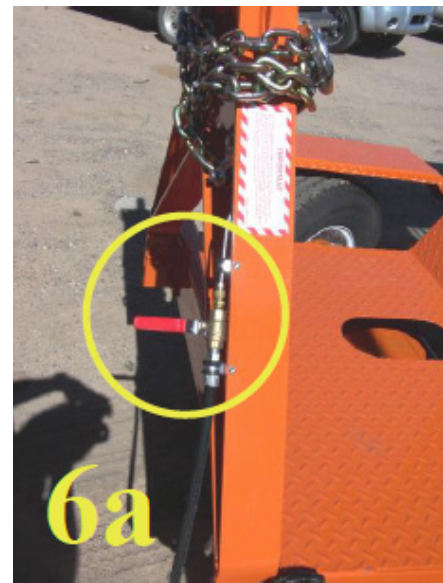
The Broce Broom may be towed without removing the drive shaft, but it is critical to ensure that the gearbox is in neutral to prevent serious damage. Use caution while towing since the broom does not have a suspension system to absorb the bumps.

1. Ensure gearbox lever on dash is in Neutral position. Start engine, shift to Neutral and carefully move control pedal forward and back slightly to ensure Neutral position.
2. Release Parking Brake.
3. Raise and Lock broom core.
4. Secure tow bar to towing vehicle and connect safety chains and lights.
5. Turn steering cylinder valve (under front bumper) to OPEN position to allow front wheels turn freely while towing.
6. If tow bar is equipped with SURGE BRAKE:
  - a. Turn valve on tow bar to OPEN.
  - b. Turn valve on master cylinder (under front, left floorboard of broom) to CLOSED position.

**DO NOT EXCEED 45 MPH WHILE TOWING.**  
**DO NOT TOW WITH WATER IN THE SPRAY TANK.**  
**RESET THE VALVES FOR BROOM OPERATION.**



Open valve for towing (valve closed in photo)

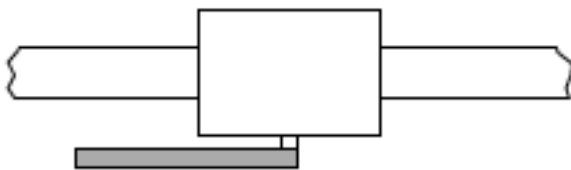


Surge brake only - open valve for towing (valve closed in photo)

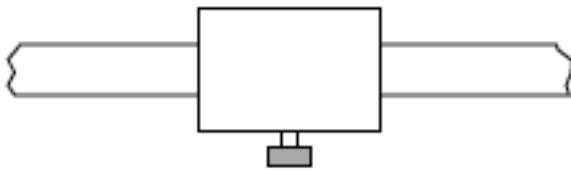


Surge brake only - close valve for towing (valve open in photo)

Valve Open



Valve Closed



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## HYDRAULIC SYSTEM DETAILS

The Hydraulic System on this machine operates the hydrostatic drive, loop flushing circuit, steering circuit, brush functions, and brush rotation. It employs two supply pumps sharing the same reservoir. In order to simplify the description of this system, it will be separated into five parts.

### Hydrostatic Drive:

The basic hydrostatic drive system has evolved over the years, beginning with Sundstrand then to Eaton and now current production machines are equipped with Sauer- Danfoss drives. A current schematic and trouble-shooting guide are included in this manual.

This system utilizes a Sauer-Danfoss variable displacement piston pump and a fixed displacement piston motor. Oil, supplied from the reservoir, passes through a 10-micron filter with a bypass setting of 3 psi, before entering the pump. Pressurized oil from the pump is delivered to the motor by high pressure hoses.

Machines with serial number 90188 and higher are equipped with a Sauer-Danfoss hydrostatic drive system.

Eaton and Sauer-Danfoss components are available from the factory, including the latest revisions and recommend that customer repaired units be upgraded.

### Loop Flushing Circuit:

The fixed displacement motor is equipped with a loop flushing valve that purges hot oil and/or contaminated oil from the closed loop. This oil is routed back to the pump and joined with the case drain oil, then through the heat exchanger and returned to the tank.

If a problem develops with the pump or motor, we strongly recommend that they be taken to an authorized Sauer-Danfoss repair center or returned to Broce Manufacturing Co., Inc. for exchange of new or rebuilt components or repair authorization.

### Steering Circuit:

Oil from the reservoir supplied to the work pump is pulled through a 100 mesh replaceable screen. The pump has a built-in flow divider, which delivers priority oil to the steering circuit and the exhaust flow to the brush circuit. The priority flow is 3 gpm and the relief valve in the flow divider is set at 1600 psi. The steering unit is an orbital type metering valve that supplies oil to the steering cylinder and also has power beyond capabilities that are used to control the brush functions.



## HYDRAULIC SYSTEM DETAILS

### Brush Functions:

Forward movement of the joystick lever will lower the core. Pushing the lever all the way forward until it locks, puts the core in the preferred "float" mode.

Pulling the lever back will raise the core. Movement to the right will rotate the core to the right, and movement to the left will rotate the core to the left.

The return oil from the steering unit and the brush function valve flow to the return manifold in separate hoses. The return manifold is mounted directly on a 10- micron filter with a bypass setting of 25 psi., then the filtered oil flows back to the tank.



### Brush Rotation:

The exhaust flow from the work pump supplies oil to the rotation valve at a rate of 12-23 gpm, depending upon engine speed. The relief valve is enclosed in the rotation valve and the relief setting is 2650 psi at 21 gpm. The brush control lever is located aft of the joystick. Moving the lever forward will turn on the brush. Pull the lever back to stop brush rotation. Oil flows from a-port on the rotation valve to upper port on the core motor to receive counterclockwise rotation, b-port is plugged. The hose on the lower port of the motor returns the oil to the return manifold, filters it, and returns it to the tank. On units equipped with dual rotation, b-port on rotation valve sends oil to the lower port on the motor for clockwise rotation. The spool valve requires a change of the kit mounted on the rear of the valve to achieve dual rotation. In either case, return oil from the rotation valve flows from the outlet port on the valve to the return manifold, is filtered, and returned to the tank.

There are two types of core motors used for broom rotation, the internal drive type that is standard, and has a replaceable splined hub mounted in the core frame, the other is the external chain drive.

On machines equipped with an external drive, a-port on the rotation valve flows to the front port on the core drive motor, the rear port flows back to the return manifold, is filtered, and returned to the tank. B-port on the rotation valve is plugged.

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# HYDRAULIC SYSTEM DETAILS

## SYSTEM DESCRIPTION

**PUMP:** The hydraulic system operates on a 2.32 cubic inch gear pump that is mounted on the rear of the hydrostatic pump. This pump produces approximately 26 gpm @ 2600 RPM, with a built-in flow divider that provides the priority flow to steering at 3 gpm. The exhaust flow of approximately 23 gpm powers the brush rotation valve.

**STEERING UNIT:** The steering unit is an open center type motor that has power beyond and dead steering capabilities. The power beyond capability is used to power the brush functions and dozer blade control valve if equipped.

**STEERING CYLINDER:** 2" X 10" double acting cylinder

**BRUSH FUNCTION VALVE:** The brush function valve is a two-spool mono block design that receives its oil supply from the steering unit power beyond port.

**LIFT CYLINDER:** 2" X 8" double acting cylinder

**SHIFT CYLINDER:** 2" X 16" double acting cylinder

**BRUSH ROTATION VALVE:** The brush control valve is a single spool, two-position, mono block design valve.

**CORE MOTORS:** There are two types of motors used on Broce Brooms. The first, a magneto style mount with a keyed shaft used on chain drive units. The second, SAE styles mount with a splined shaft used on the internal drive cores.

**RETURN FILTERS:** The return filter is a 10-micron, spin-on type, with a 25 psi bypass attached to the return manifold. The manifold is ported to accept return lines from the steering unit, the brush function valve, the dozer control valve, the curb sweeper control valve, the broom rotation valve, and return line from the core motor.

**SHUT-OFF VALVES:** The ball valve mounted below the hydraulic tank closes the suction line to the work pump. There are two valves mounted on the rear of the tank, the right one closes off the suction line to the hydrostatic pump, and the left one closes off the return lines.

### CAUTION

Make sure all three valves are in the "OPEN" position before starting the engine. If the return valve is closed, the return filter housing will be destroyed.

## HYDRAULIC SYSTEM DETAILS

**RESERVOIR:** The hydraulic reservoir has a 27 US gallon capacity, with an inlet strainer (100 mesh), lockable cap, sight level indicator with thermometer, suction screen in the bottom outlet (100 mesh), and shut-off ball valves.

**HOSES AND ADAPTERS:** Starting with Serial Number 90188, all hose adapters are boss O-ring/flat face in the cylinders, valves, steering unit, pumps, and motors. The tank outlets remain piped through the shut-off valves, then change to flat-face type adapters. All the hoses are flat-face type design.

References are made in the parts manual sections to hydraulic hoses and adapters. These references are for informational purposes only. Broce Manufacturing does not normally sell hydraulic hoses or adapters through the parts department. Please source these parts locally.

**SYSTEM PLUMBING:** The system plumbing diagrams can be found in the Hydraulic Section of the parts manual.

**NOTE:** All standard machines are equipped with the positive down pressure feature. If you would like to defeat this feature, use the following procedure.

1. Disconnect the lower hose on the core lift cylinder and allow the oil to drain, then reconnect it.
2. Disconnect the hose from A-port on spool #1 on the two-spool valve and connect a breather in the end of the hose.
3. Remove the hose adapter from the spool valve and install a –6 Boss O-ring plug.
4. Secure the loose hose to the other hoses with a wire tie.

Note: Spool #1 is the spool closest to valve inlet. A-port is the closest port to the control handle.

Eliminating the positive down pressure feature will have no other effect on the rest of the operating capabilities of the system.

## HYDRAULIC SYSTEM DETAILS

### SYSTEM TEST PROCEDURES:

Run engine about 1/2 throttle when taking pressure readings.

Checking the pressure on the steering circuit can be done as described below:

1. Tee into the priority port on the work pump, then fully stroke the steering cylinder and read the pressure. It should read 1500 psi.
2. Tee into the pressure port on the steering motor, then fully stroke the steering cylinder and read the pressure. It should read 1500 psi.
3. Remove the -8 Boss O-ring plug on the inlet side, in the face of the two-spool valve, and insert a pressure gauge. Fully stroke either cylinder and check the pressure. The gauge should read 1500 psi.
4. There are pressure ports on the base of each of the cylinders. Remove the 1/4 IPT plug and insert a pressure gauge. On the Lift Cylinder, move the control lever to the raise position and hold. The gauge should read 1500 psi. On the Shift Cylinder, move the lever to the right position and hold. The gauge should read 1500 psi.

Check the pressure of the rotation valve in the following ways:

1. Tee into the exhaust port on the work pump, then move the rotation valve to the on position. If the brush is not in contact with the ground, system pressure will be about 600 psi. Putting down pressure on the brush until it stalls will raise the pressure and the gauge should read 3000 psi.
2. Remove the -10 Boss O-ring plug in the face of the brush rotation valve, in line with the relief valve. Turn the brush on and repeat above procedure.
3. Tee into A-port on the rotation valve and repeat the test procedure above.

## MAINTENANCE

The manufacturer has endeavored to build the Broce Broom as maintenance free as possible. The service points are easily accessible and are similar to those on many types of construction equipment. This section will cover many of these points in some detail and will briefly mention those which should be standard on all equipment.

### AIR CLEANER

#### IMPORTANT

The air cleaner is one of the most important components of this machine. Due to the extremely dusty conditions in which this machine operates, the air cleaner must be maintained constantly. If the air cleaner is not serviced properly, the machine's engine life will be reduced. This machine is equipped with a dry type air cleaner, bowl type pre-cleaner, and a restriction type service indicator as standard equipment.

An optional dual element air cleaner and/or a vane type pre-cleaner are also available.

Under normal conditions, the air cleaner will need to be serviced every three to four hours. When the clear ring on the Service Indicator turns red, the air cleaner must be serviced immediately. The following procedures must be followed to ensure long engine life.

#### To Service:

Remove and empty the pre-cleaner bowl. This should be done every time the level of the dirt reaches the service line marked on the bowl itself. Loosen the clamp which secures the end cover. Remove the end cover and the wing nut that secures the filter element. Carefully slide the element out of the canister.

If the machine is equipped with a dual element air cleaner, DO NOT remove the safety element until you are ready to replace it! DO NOT attempt to clean the safety element! It is strictly a disposable type element.

Clean the dirt from the inside of the canister and the end cover. Hold the element so that the opening is on top, and with your other hand, gently pat around the sides of the element to loosen the dirt. DO NOT tap the element against a hard surface as this can cause damage to the element itself. Air pressure may be used to clean dirt from the element, but the air pressure must be reduced to less than 30 PSI. Using an air nozzle, clean the element from the inside, moving the nozzle up and down in the direction of the pleats.



Service Indicator



Filter Element

Clamp

End Cover

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## MAINTENANCE

DO NOT direct the air stream against the outside surface of the element, as it will force the dirt through the element fabric, resulting in damage.

### CAUTION

When using compressed air, clear the area of bystanders, guard against flying debris, and wear personal protection equipment including eye protection.

### To Clean Element:

If the element is coated with oil or soot, wash in a solution of warm water and filter element cleaner (equal to R36571 Filter Element Cleaner). Let the element soak at least 15 minutes, then agitate gently to flush out dirt. Rinse the element thoroughly from the inside with clean water. Use an element cleaning gun or a free running hose. Keep the pressure under 40 PSI to avoid damage to the element. Allow the element to dry completely before using. This usually takes from one to three days. DO NOT oven-dry or use drying agents. Protect element from freezing until dry. The element must be inspected for damage before it is reinstalled. Hold a bright light inside the element and check carefully for holes. Discard any element that shows the slightest hole. Be sure that the outer screen is not dented. Vibration will quickly wear a hole in the filter. Make sure the filter gasket is in good condition. If gasket is damaged or missing, replace the element. Seal the element in a plastic bag and store in a shipping container to protect against dust and damage.

### Service Schedule:

**DAILY:** A restriction indicator is installed on the outside of the air cleaner. This restriction lets the operator know if the air cleaner element is dirty. Check and/or clean air intake element daily at a minimum, more often if necessary depending upon sweeping conditions.

**250 HOUR:** Replace both service element and safety element every 250 hours or sooner if needed or damaged.

## HYDRAULIC SYSTEM

Replace the disposable filter elements after the first 50 hours of service, and every 500 hours thereafter. Always maintain sufficient hydraulic oil in the reservoir as indicated in the level sight glass on the left side of the hydraulic tank. When it is time to add or replace oil in the system, refer to the Machine Specifications section for recommended hydraulic oil specifications.

Periodically check all hydraulic hoses. As a general guide, if unsure of the condition of a hose for any reason, it should be replaced before the machine is sent out on a job. This will minimize downtime and expense associated with this type of failure. Again, cleanliness must be stressed during this type of maintenance. Contamination of this system will cause pump and/or motor failure. Avoid servicing hydraulic system components in the field where cleanliness of the environment cannot be controlled.

# MAINTENANCE

## RADIATOR AND HEAT EXCHANGER

### CAUTION

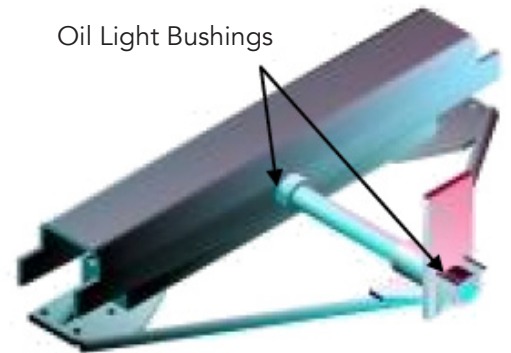
Do not attempt to clean the radiator or heat exchanger while the engine is running. If hands or equipment come in contact with spinning fan blades, serious injury will result. Engine must be completely stopped.

Due to the dusty conditions in which this machine operates, the heat exchanger and radiator must be cleaned every 4 to 8 hours of service, depending upon sweeping conditions. If either one becomes clogged with dirt, it will overload the cooling capacity of the other, causing both the engine and hydraulic system to operate at higher than acceptable temperatures. Use water or compressed air directed from the engine side of the radiator to remove dirt build up. The engine must be completely stopped while performing this maintenance. Inspect radiator and heat exchanger for dirt deposits and/or damage before resuming operation.

### LUBRICATION

#### BOLSTER ASSEMBLY

Use standard automotive type grease on each of these lubrication points. While servicing these points, inspect all ball joints and rod ends for slack. If slack is found in any part of this suspension, including the bolster pivot bushings, replace the worn parts. Refer to figure on right for lubrication points on Bolster Assembly.



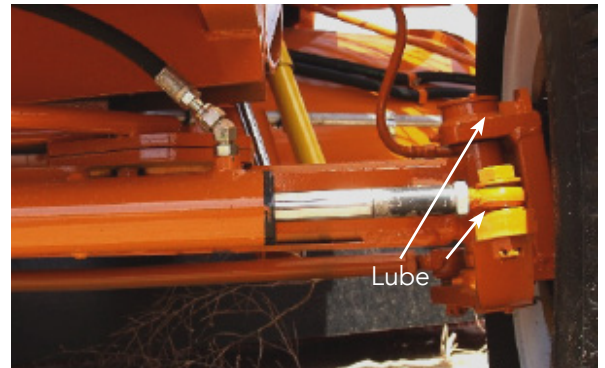
#### STEERING CYLINDER

Lube upper and lower mounts and steering shaft tie rod ends.

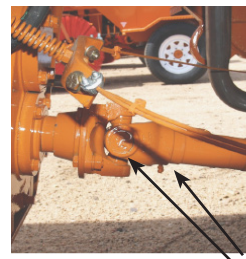
#### DRIVE SHAFT

There are three lubrication points on the drive shaft. These also require standard automotive type grease. While servicing the drive shaft, check for loose fasteners and slack in the U-joints. Replace worn parts as necessary.

Both the front suspension and the drive shaft should be serviced every time the engine is serviced. More frequent servicing of these components will extend their life.



Front Axle Assembly



Lube



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## MAINTENANCE

### TWO-SPEED GEAR BOX

Check the fluid level in the Two-Speed Gear Box and differential every 100 hours or sooner if signs of leakage appear. Change the lubricating oil after the first 25 hours and then every 1000 hours thereafter. Drain the oil while the unit is warm. Replace with SAE 80W-140W gear oil, up to the oil level plug.



Two-speed gear box

### DIFFERENTIAL

Service the axle in the same manner as the two-speed transmission. The axle bearings do not receive lubrication from the gear oil. Periodically remove the axle shafts and repack the bearings.

There is no cause for alarm if either of these components is leaking oil through their breathers after they have been serviced. The breather allows overflow if the unit was overfilled. This leakage will stop when the proper level is achieved. With proper maintenance and operation, these components will last the entire life of the machine.



### CORE/BRUSH BEARING

This is a sealed bearing and may require no lubrication throughout its service life. If lubrication is deemed necessary however, no more than "one-shot" of grease at 250 hour intervals is recommended. Seals are often destroyed by over-greasing sealed bearings.



### ENGINE LUBRICATION

Refer to the Engine Manufacturer's manual (included) for recommendation and procedures for servicing the engine.

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# ENGINE

Broce Broom Lubrication Chart									
Item	Qty	Remarks	Initial (Hours)			Thereafter (Hours)			
			25	50	100	100	250	500	1000
Engine Oil	1	Change Oil			○		○		
Two-speed gear box	1	Change Oil	○				Check		○
Differential	1	Change Oil	○				Check		○
Hydraulic Disposable Filter	1	Replace		○				○	
Hydraulic Oil	1	Replace						○	
GREASE ZERKS									
Tie Rod End	2	Lubricate				○			
Steering Cylinder Mount	1	Lubricate				○			
Knuckle	4	Lubricate				○			
U-joints	2	Lubricate				○			
Core/Brush Bearing	1	Lubricate				○			
Drive Line Assembly	1	Lubricate				○			

## BRAKES:

This machine is equipped with self-adjusting four-wheel hydraulic brakes with a mechanical parking brake. The operation of the brakes should be tested daily. If the pedal feels "spongy", there may be air in one or more of the brake lines and must be serviced prior to operating this machine.

The master cylinder is located directly in front of the brake pedal. Remove the side dashboard cover to gain access for servicing it. Check the fluid level frequently, especially if the brake lines show signs of leakage. Drain and replace brake fluid with DOT 3 fluid every two years.



Master cylinder access

Inspect brake lines every 50 hours of operation for leaks and/or damage. Replace front and rear brake hoses every two (2) years. Inspect mechanical parking brake linkage for proper adjustment, routing and/or damage ever 50 hours.

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## MAINTENANCE

### CAUTION

DO NOT ALLOW THIS MACHINE TO BE OPERATED WITH FAULTY BRAKES. THIS WILL PUT THE OPERATOR IN EXTREME DANGER AND COULD CAUSE BODILY INJURY AND PROPERTY DAMAGE.

### FASTENERS:

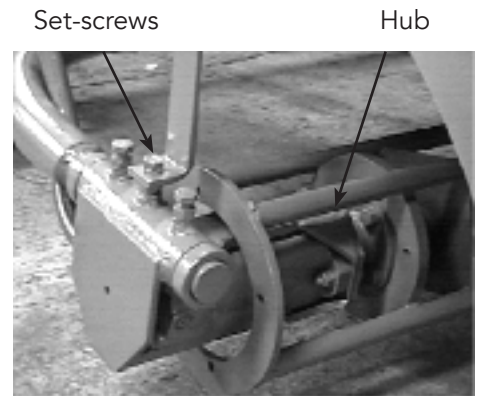
Like any construction equipment, this machine requires periodic tightening of fasteners. During normal engine service intervals, check all nuts and bolts, clevis pins, and clamps and tighten as needed.

### FRAME, GUSSETS, AND WELDS:

The frame on this machine was designed to withstand normal operating conditions, however under abuse components and welds can fail. Periodically check all frame welds and gussets for development of fatigue and stress cracks.

### CORE DRIVE:

The direct drive uses a core motor with a splined shaft that fits a hub fastened inside the broom core mandrel. The direct drive core is preset at the factory and does not normally need adjusting unless the drive hub begins to show uneven or excessive wear. To adjust, remove the broom from the machine and remove all of the wafers from the core frame (see Broom Wafer Replacement Section for details on removing the broom core and wafers). Loosen the lock bolts and lock collars slightly. Install the core mandrel and position the motor so that the core will slide on and off of the splined shaft easily. After alignment, tighten both set-screws and jam nuts as well as the lock collar on the pillow block bearing at the other end of the broom core.



Direct drive core

## MAINTENANCE

### ENGINE:

The normal engine operation and maintenance procedures are covered in a separate manual, which is furnished by the engine manufacturer.

### IMPORTANT

Due to the dusty conditions that the Broce Broom operates in, it is recommended that the engine fan inspection and replacement be done every 300 – 400 hours. The dusty operating environment will cause quicker than normal erosion of the fan blades. The fan will need to be replaced when the blades deteriorate to the point that they do not provide enough air-movement or they become operationally unsafe. This fan blade erosion is considered to be normal wear on this type of equipment.

### TIRES:

Inflate tires to manufacturer's recommended pressure as specified on the tire sidewall. This will provide the longest tire life. A lower pressure will provide a more comfortable ride, and make rough off-highway conditions easier to negotiate, but is not recommended.

### STORAGE:

If storing the Broce Broom for more than 30 days:

1. Change engine oil.
2. Charge battery and disconnect terminal leads.
3. Fill fuel tank and add fuel stabilizer.
4. Add small amount of oil into cylinders and crank engine a few times.
5. Grease all pivot pins and perform standard lubrication procedures.
6. Apply grease to all exposed cylinder rods.
7. Retract all cylinder rods.

## MAINTENANCE

### AIR CONDITIONER PREVENTATIVE MAINTENANCE:

A well maintained A/C system would save on downtime and premature component failures.

Weekly inspections or every 2 days in severe environments should include:

1. Inspect compressor clutch drive belts (tightness, wear).
2. Inspect compressor-mounting brackets (bolts, alignment).
3. Inspect mounting hardware on evaporator unit and condensers.
4. Inspect air intake filter. Clean or replace filter.
5. Inspect evaporator and condenser coils. Clean using air pressure. (DO NOT USE WATER OR PRESSURE WASHER).
6. Inspect hose and wire harness for proper routing. Leaks and wear.

### Helpful Hints

Make sure the evaporator intake area is not obstructed (i.e. toolboxes, clothing, lunch boxes, etc.)

Manual thermostat on our system, when rotated clockwise to the stop position will not allow A/C compressor clutch to cycle. The compressor will run continuously and the evaporator coil will not defrost.

REMEDY: Turn the manual thermostat knob clockwise to the stop position, and then turn the thermostat knob back counter clockwise  $\frac{1}{4}$  turn.

Broce thanks you for purchasing our unit/s. It is our endeavor to provide you with a quality A/C unit with trouble-free service.

# MAINTENANCE

## TROUBLESHOOTING THE A/C SYSTEM

### Troubleshooting Chart

The following chart lists some of the common problems that plague A/C systems and refer them to the pressure readings on your test gauges. They are referred to as "low" or "high" due to the fact that different systems and conditions have different normal readings.

A/C TROUBLESHOOTING CHART

SUCTION	DISCHARGE	POSSIBLE PROBLEM
LOW	HIGH	1. Restriction between the discharge of the compressor and inlet of receiver drier. Check condenser and condenser lines for a point of restriction that may create flashing. Condition indicated by an extreme differential in temperature at the point of restriction.
LOW	LOW	1. Possible restriction between drier and suction side of compressor. 2. Low refrigerant charge _ bubbles in sight glass. 3. Restriction at drier or expansion valve _ sight glass usually clear.
HIGH	HIGH	1. Air in system. 2. Overcharged system (oil or refrigerant). 3. Condenser fan not working. 4. Air flow restriction on condenser
HIGH	LOW	1. Weak compressor _ indicated by accelerating the engine and watching the suction and discharge readings. Normally, suction moves lower and discharge side should rise. 2. Expansion valve flooding or stuck open _ this would cause high and low sides to become less distinguishable.

**ATTENTION**  
 R-134a A/C Refrigerant  
 Factory Charge:  
 Kubota = 2.0 lb 10.0 oz (1.191 kg)  
 John Deere = 2.0 lb 10.0 oz (1.191 kg)  
 Caterpillar = 2.0 lb 12.0 oz (1.247 kg)  
 Cummins = 2.0 lb 10.0 oz (1.191 kg)  
 Rehlko = 2.0 lb 10.0 oz (1.191 kg)

**Ester Oil Charge:**  
 Compressor = 8.0 oz  
 System = 4.0 oz

# MAINTENANCE

## Warranty Claim Form for Broce A/C Systems and Components

Ambient temperature before repairs were made: \_\_\_\_\_

Static pressure before repair is made: High: \_\_\_\_\_ Low: \_\_\_\_\_

Running pressure before repair is made: \_\_\_\_\_

Any odd or unusual noises before repairs are made? \_\_\_\_\_

\_\_\_\_\_

How much refrigerant was recovered? \_\_\_\_\_ lbs.

Automated flush of system (by flush mechanic) Yes: \_\_\_\_\_ No: \_\_\_\_\_

Manual flush (by tech charging oil and/or drier) Yes: \_\_\_\_\_ No: \_\_\_\_\_

Repairs made and parts replaced: \_\_\_\_\_

\_\_\_\_\_

Ambient temperature after repairs are made: \_\_\_\_\_

How much refrigerant was charged? \_\_\_\_\_ lbs. \_\_\_\_\_ oz. (Virgin or Recovered)

Static pressure: High \_\_\_\_\_ Low \_\_\_\_\_

Running pressure: High \_\_\_\_\_ Low \_\_\_\_\_

Vent temperature: \_\_\_\_\_

Cab temperature: \_\_\_\_\_

Broom S/N: \_\_\_\_\_

Hr: \_\_\_\_\_

Date: \_\_\_\_\_

Company or facility who made repairs: \_\_\_\_\_

Technical initials: \_\_\_\_\_

## MAINTENANCE

### BROOM WAFER REPLACEMENT

The standard Broce Broom core uses 10" x 32" flat wafers and metal spacers. Two different lengths of cores are available. The standard eight-foot core requires approximately 54 wafers and 53 metal spacers (this will vary by wafer manufacturer and type of end-caps ordered on broom). The ten foot core requires 68 wafers and 66 spacers. Convolute wafers may be used on this core if desired. The number of wafers required as well as specific installation instructions may be obtained from the wafer manufacturer.

### DIRECT DRIVE CORES (Standard Equipment):

1. With the core resting on or near the ground, remove the bolts securing the pillow block bearing to the core support frame.
2. Pull the core to the right side of the machine until you feel the splined hub come off the shaft. At this time, the core will be close to or touching the right support arm.
3. Angle the core toward the rear of the machine and slide it out from under the sweeper.
4. Clean the spindle from the lock ring out using an emery cloth or sandpaper.
5. Loosen the setscrew and remove the lock ring and pillow block bearing.
6. Remove the spindle and install the Broce Core Service Ring in its place.
7. Remove the end cap from the drive end of the core.
8. Refer to Steps 11 through 20 of the chain drive section for core disassembly and rebuild procedures.
9. Raise the core support frame and slide the rebuilt core under the sweeper. The core will have to come in from an angle in order for it to be started over the motor mount. Once the core has been started onto the motor mount, swing the right side under the right support frame.
10. Lower the support frame slowly until the motor mount is centered in the core.
11. Using a back and forth twisting motion, pull the core onto the splined shaft.
12. Install the pillow block bearing on the right side of the core using the original mounting bolts.
13. Raise the core. Slide the core to the left as far as it will go. Using a pry bar, slide it back to the right until the bolts on the end cap will clear the hydraulic hose fittings.
14. Install the lock ring on the spindle securely. This lock ring is all that maintains core alignment.

Do not try to readjust the motor mount unless it becomes damaged or otherwise unserviceable. The alignment of this mount is preset at the factory. If it does become necessary, refer to the alignment procedures in the MAINTENANCE section of this manual.

## MAINTENANCE

### CHAIN DRIVEN CORES (Optional):

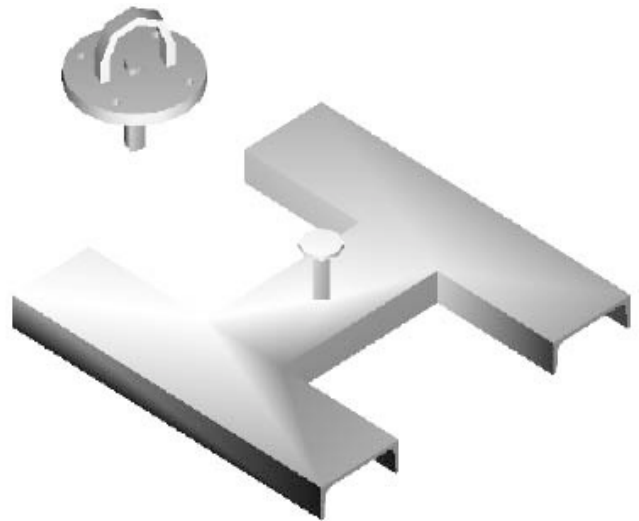
1. Remove the chain guard.
2. Loosen the idler sprocket or motor mount and adjusting screw depending on the type of chain adjustment utilized.
3. Disconnect drive chain at the master link and remove from the plate sprocket.
4. Using emery cloth, clean the broom core spindles on both ends from the locking ring out.
5. Loosen set-screws and remove lock rings (counterclockwise) from both ends.
6. Lower the core support frame until the core rests on or near the ground.
7. Remove the bolts securing the pillow block bearings to the core support frame and slide the bearings off the spindle.
8. Raise the core support frame and slide the used core out from under the sweeper.
9. Remove the plate sprocket and spindle from the end of the core and install the Broce Core Service Ring in place of the spindle.
10. Remove the end cap at the opposite end of the core.
11. Using a hoist or winch with a minimum capacity of 1,000 lbs., raise the core approximately 6 to 8 inches off the ground.
12. Using a pry bar or similar tool, start at the bottom of the core and work the wafers loose. Do not attempt to use a cutting torch to remove the wafers as this could result in a fire.
13. Lower the core and remove the service ring. Re-install the spindle. Loosen the four bolts securing the end cap until they are flush with the inside of the core end plate. This will leave approximately one inch of play in the end cap.
14. Using the Broce Core Service Stand, stand the core upright, with the end cap on the bottom. If this stand is not available, fabricate a similar device which will securely hold the core in place. *The stand is designed for use on a hard level surface. It may be easily transported using a small forklift and is ideal for storing a spare core.*
15. Locate the service stand approximately one foot from a loading dock or other similar platform that will provide stability and will enable you to reach the top of the core.
16. Begin filling the core with a wafer, and then a spacer. Keep adding poly wafers and spacers in an alternate sequence until the core is filled. If there is not enough space left at the end for both a spacer and wafer, finish out with a wafer. When assembling a half poly/half wire core or an all wire core, begin with a poly wafer and end the fill with a poly wafer. This will minimize unnecessary damage to the drive chain and will add stability to the wire wafers near the end of the core. When building a half poly/half wire core, the pattern should be; poly wafer, spacer, wire wafer, spacer, and then repeat the sequence. If this pattern ends at the top with a wire wafer, substitute a poly wafer. Each wafer has a **locking tab** located on the inside of the crimp ring. This tab will lock the wafer against the core frame tubes to keep it from spinning on the core. To ensure proper core balance, rotate this tab 90° from the previous wafer. This will ensure even weight distribution on all four sides of the core.



## MAINTENANCE

17. Install the end cap using two (2) 1/2" x 3" all thread bolts in two of the holes which are 180° apart. Slowly and evenly tighten these until the end cap is close enough to the core to install the standard mounting bolts. Start two of the standard bolts with lock washers in the two remaining holes. Remove the two long bolts and install the other two standard mounting bolts. Tighten all four bolts evenly in a diagonal fashion until the end cap is tightly secured to the core.
18. The core must now be tipped over onto the ground so that the core comes to rest laterally on the bristles. Clear an area fifteen feet in all directions of the core of personnel and property before tipping the core. Always tip the core by pushing it over. Once the core begins to fall, get away from it in case the stand falls off. Carelessness in this procedure could result in serious bodily injury and/or property damage.
19. With the core resting on the ground, slide the stand off of the spindle and tighten the end cap in the same fashion as before.
20. Using emery cloth or sandpaper, clean both spindles to remove any burrs or tar which may interfere with sprocket or bearing installation
21. Install the sprocket as using the flat washers as spacers. The sprocket must be installed in this manner in order to ensure proper chain alignment.
22. Slide the rebuilt core back under the sweeper.
23. Slide the pillow block bearings on the spindles until they roughly line up with the core support frame. With the flat part of the bearing up, slowly lower the core support frame until it is close enough to line up and secure the bearings with the original mounting bolts. When the bearings are secure, raise the core, and align the chain drive. Once the chain drive alignment has been achieved, recheck the lock rings to ensure that they are secure and reinstall the chain guard.

If you have any questions regarding these procedures or would like to obtain the core service ring and stand, please contact your nearest dealer or call us direct at (620) 227-8811.



Core Service Ring and Stand

## MAINTENANCE

### TROUBLESHOOTING

Before troubleshooting can be done, characteristics of normal operation of this machine must be understood. As discussed earlier in this manual, this system uses an open center control valve. This can lead to the belief that a problem may exist when in fact, the system is operating normally.

### NORMAL OPERATION

With the engine running approximately 1/2 throttle and the core motor turned off, the lift and shift cylinders will actuate quickly and smoothly. Once the core motor is started, the cylinder action will slow down dramatically. In fact, if the core is not contacting the ground, the shift cylinder may not move at all unless the engine is at full throttle. The lift cylinder should be able to lift the core slowly off the ground but will probably not reach its full stroke. When the brush is in "FLOAT" position, the cylinder speed will be approximately half of what it is if the brush is not spinning. When slight positive down pressure is applied to the broom core, the shift cylinder performance should improve slightly but the lift cylinder performance will remain basically unchanged. As more down pressure is added, the core will eventually stop spinning. The system will be "relieving." Move the handle to the "FLOAT" or "RAISE" position to restart the brush spinning.

Although these characteristics may sound less than adequate, in real working applications they are almost unnoticeable. Most of the time that small angle adjustments are made, the brush is in use and the cylinder operation is adequate. Most full swing left to right angle adjustments are made while turning the machine around or while lining the machine up for sweeping. It is best at these times to not have the brush spinning in order to prevent throwing debris in an unwanted direction. Approximately 95% of all sweeping is done in the float position. There is generally no reason to lift the brush while sweeping. Most lifting is done when the sweep has been completed and the sweeper is ready to be repositioned. The brush is normally turned off at this time.

# MAINTENANCE

## Common Problems

PROBLEM	PROBLEM CAUSE	SOLUTION
Brush stalls while sweeping	<ul style="list-style-type: none"> <li>• Too much positive down pressure</li> <li>• Too much material to move</li> <li>• Weak Pump</li> <li>• Relief valve stuck open</li> <li>• Worn hub or shaft (Broken key on chain drive core motor)</li> <li>• Internal leakage in motor</li> </ul>	<ul style="list-style-type: none"> <li>• Move handle to "FLOAT" position</li> <li>• Move handle to "FLOAT". Make two passes</li> <li>• Check system pressure</li> <li>• Check relief valve</li> <li>• Replace hub and/or motor</li> <li>• Follow steps 1-5. If all checks out, replace motor.</li> </ul>
Brush bounces or "hops" while sweeping	<ul style="list-style-type: none"> <li>• Worn/loose core mount pins and/or worn mount bushings</li> <li>• Loose circle bearings</li> </ul>	<ul style="list-style-type: none"> <li>• Drill out and replace bushings and pins that mount the lift cylinder and the core hanger. These must be extremely tight (zero tolerance). Any gaps whatsoever can cause bouncing.</li> <li>• Tighten circle bearings underneath the circle.</li> </ul>
Broom Core drifts from preset angle while sweeping	<ul style="list-style-type: none"> <li>• Too much material to sweep</li> <li>• Leakage in shift cylinder</li> </ul>	<ul style="list-style-type: none"> <li>• Move handle to "FLOAT" position and make two passes.</li> <li>• Test system pressure. If pressure OK, rebuild or replace cylinder.</li> </ul>
Broom will not stay in FLOAT position	<ul style="list-style-type: none"> <li>• Loose or worn Float Detent</li> </ul>	<ul style="list-style-type: none"> <li>• Check, tighten or replace detent assy.</li> </ul>
Core motor shaft seal leak	<ul style="list-style-type: none"> <li>• String line wrapped around shaft</li> <li>• Over use of positive down pressure feature (Too much side load)</li> <li>• Core misaligned</li> </ul>	<ul style="list-style-type: none"> <li>• Remove string line and reseal motor</li> <li>• Reseal motor. Instruct operator to use down pressure only when necessary.</li> <li>• Re-align motor mount. Refer to Maintenance section for procedures.</li> </ul>
Core motor shaft broken	<ul style="list-style-type: none"> <li>• Over use of positive down pressure feature (Too much side load)</li> <li>• Core misaligned</li> </ul>	<ul style="list-style-type: none"> <li>• Replace motor. Instruct operator to use down pressure feature only when necessary.</li> <li>• Replace motor. Re-align motor mount. Refer to Maintenance section for procedures.</li> </ul>

**350 SERIES MODEL** (updated 11/2019)

For parts and service, call:

(877) 227-8811

Broce Manufacturing 1460 S. 2nd Street | Dodge City, KS 67801

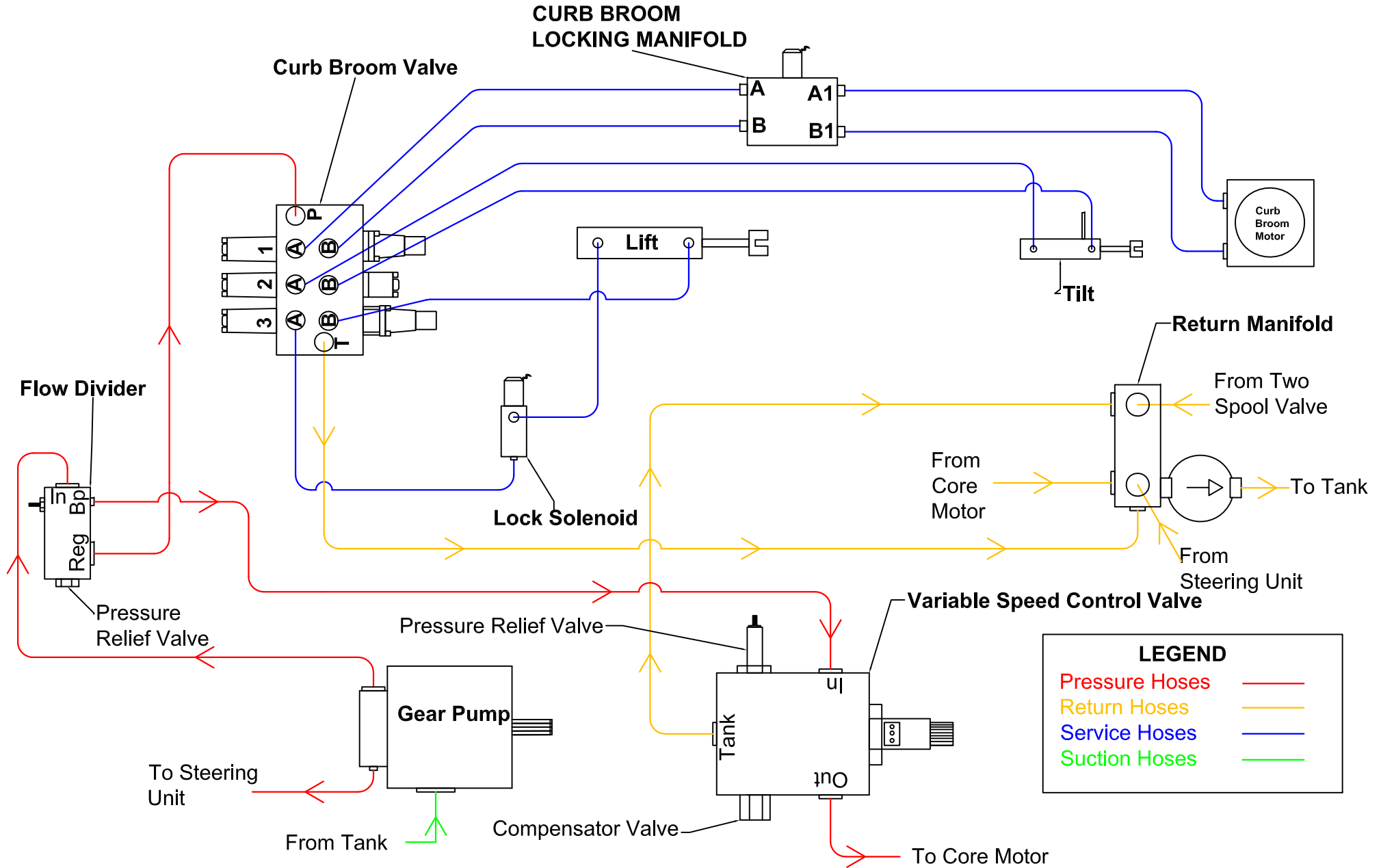
## MAINTENANCE

### Common Problems

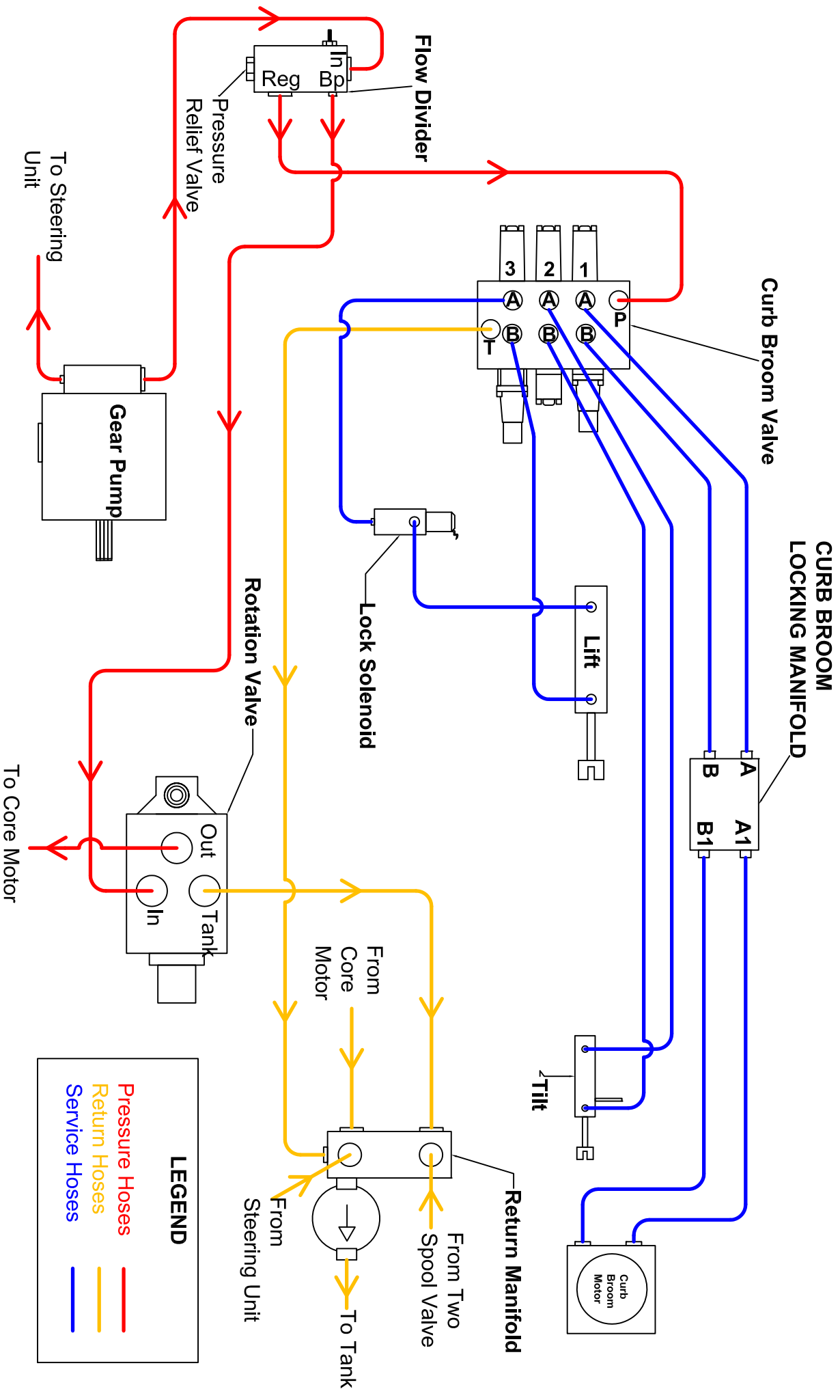
PROBLEM	PROBLEM CAUSE	SOLUTION
Return filter blown or housing broken	<ul style="list-style-type: none"> <li>Shut-off valve closed at start up.</li> <li>Core cover contacts filter while driving and/or sweeping</li> </ul>	<ul style="list-style-type: none"> <li>Replace filter and housing. Open all shut-off valves before starting engine.</li> <li>Core cover can bounce while sweeping or driving and bump filter. Adjust shift cylinder clevis 2-3 turns outward.</li> </ul>
Hydraulic System has very little power. Power steering operates OK.	<ul style="list-style-type: none"> <li>Relief valve stuck open</li> <li>Weak pump</li> </ul>	<ul style="list-style-type: none"> <li>Check relief valve.</li> <li>Check system pressure.</li> </ul>
No hydraulic power including steering but hydrostatic system seems OK.	<ul style="list-style-type: none"> <li>Bad gear pump</li> </ul>	<ul style="list-style-type: none"> <li>Replace gear pump.</li> </ul>
No hydraulic power including steering and hydrostatic drive.	<ul style="list-style-type: none"> <li>Broken shaft or coupler in hydrostatic pump</li> </ul>	<ul style="list-style-type: none"> <li>Refer to hydrostatic trouble shooting section in Sauer-Danfoss Manual.</li> </ul>

# HYDRAULIC SCHEMATIC'S

# Curb Broom With Variable Speed Brush



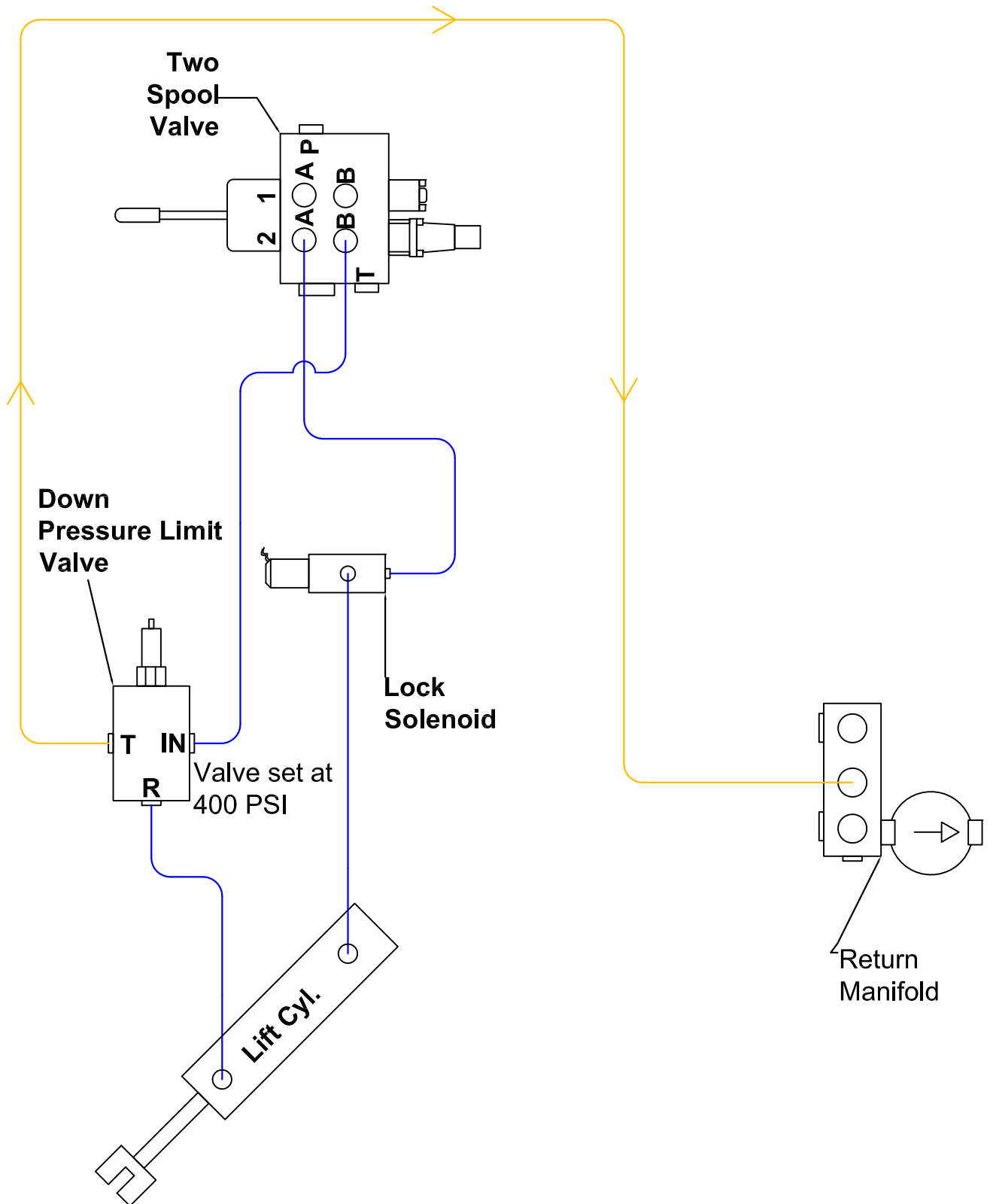
# Curb Broom Hyd.



**LEGEND**

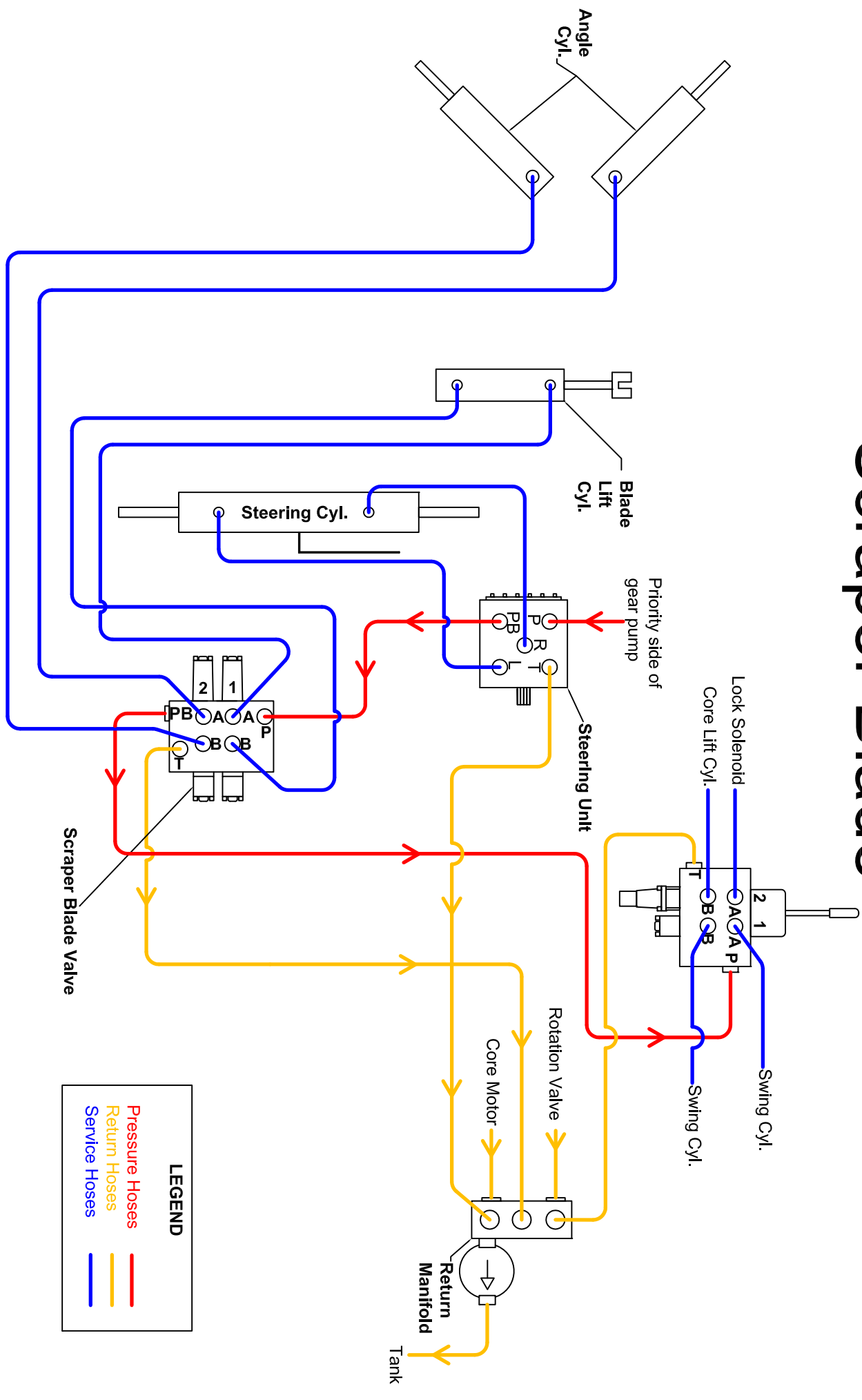
Pressure Hoses	Red
Return Hoses	Yellow
Service Hoses	Blue

# Down Pressure Limit





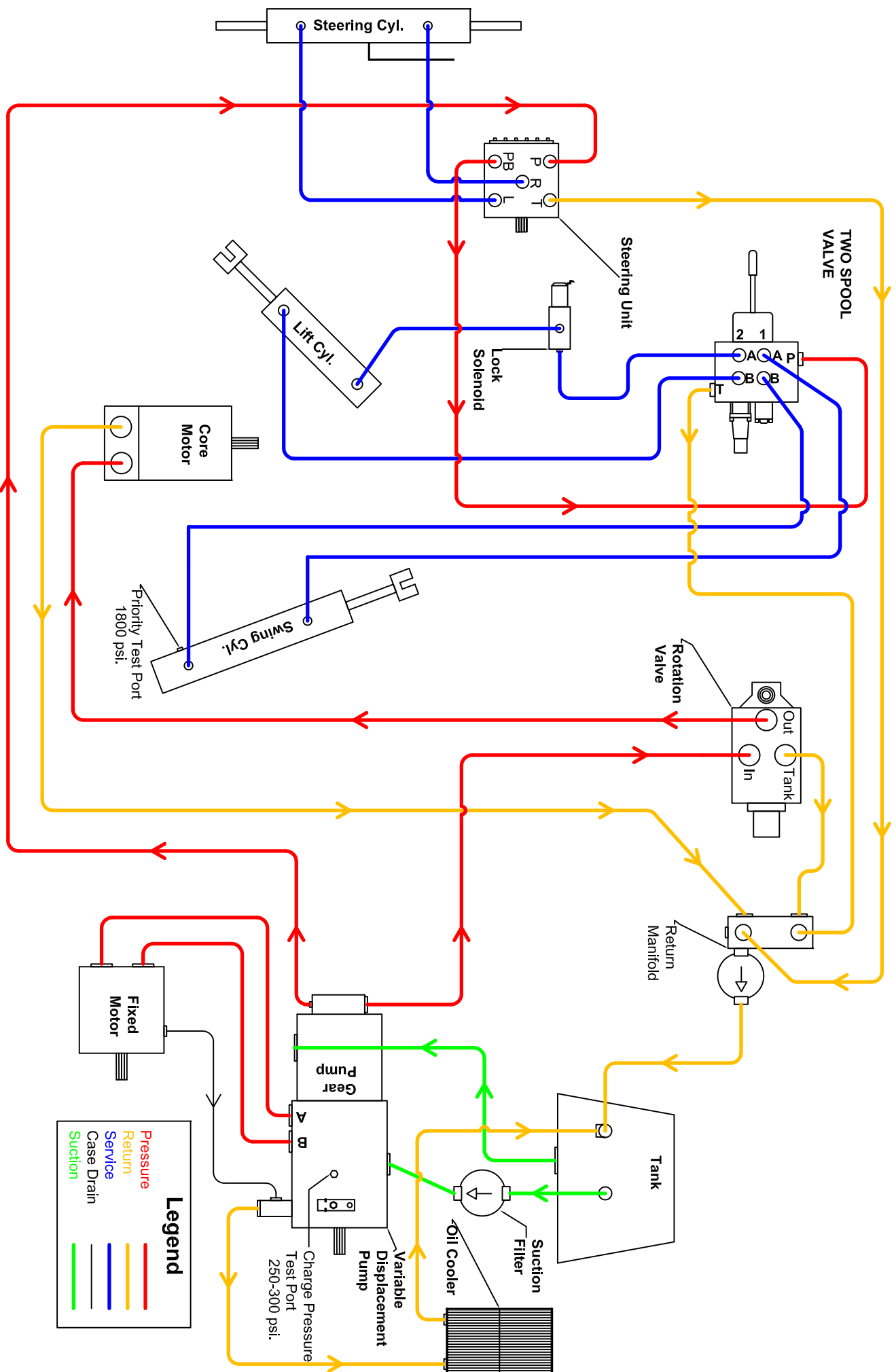
# Scraper Blade



**LEGEND**

Pressure Hoses	Red
Return Hoses	Yellow
Service Hoses	Blue

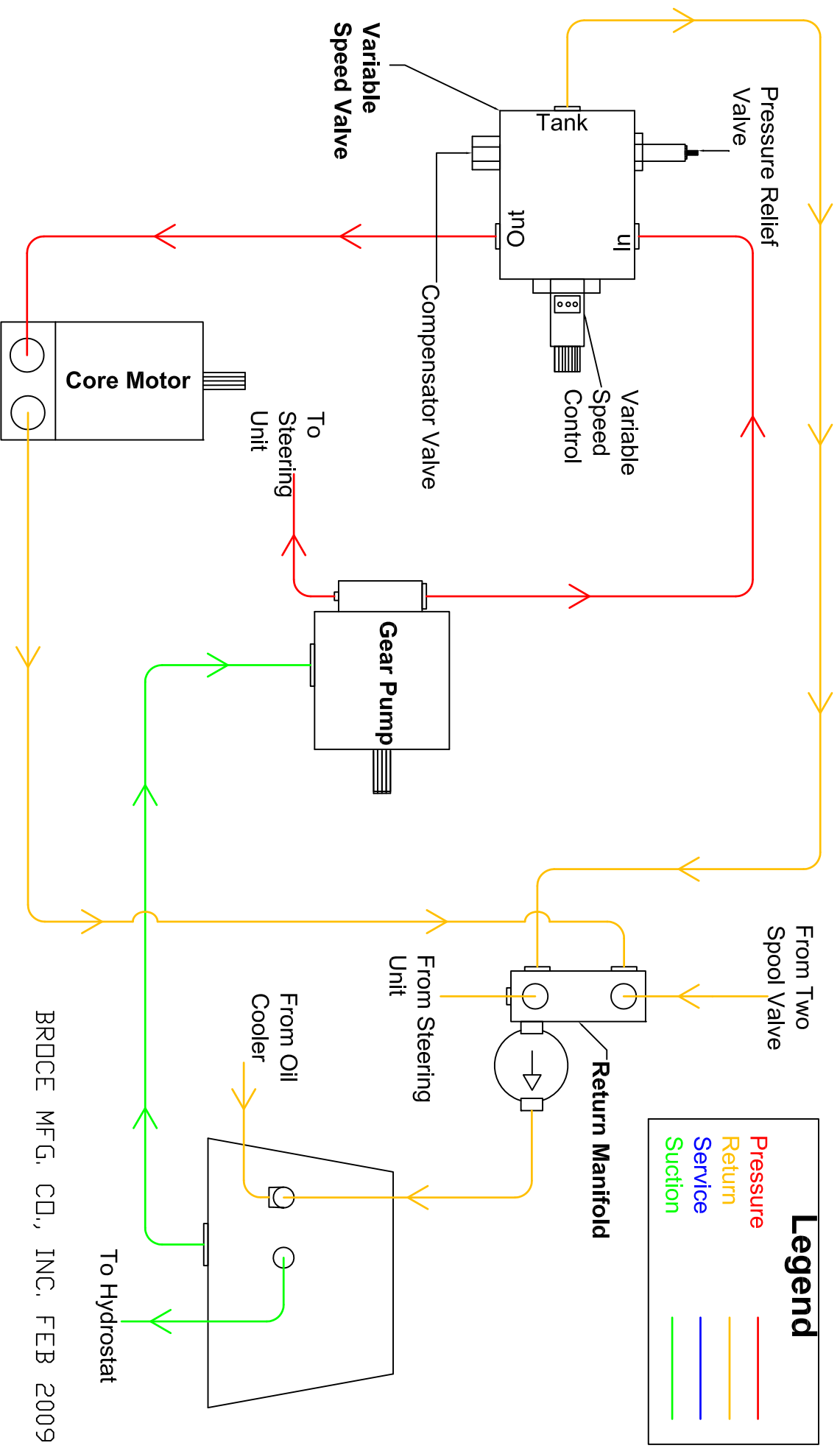
# Standard 4whl Hyd.



**Legend**

Red	Pressure
Blue	Return
Yellow	Service
Green	Case Drain
Black	Suction

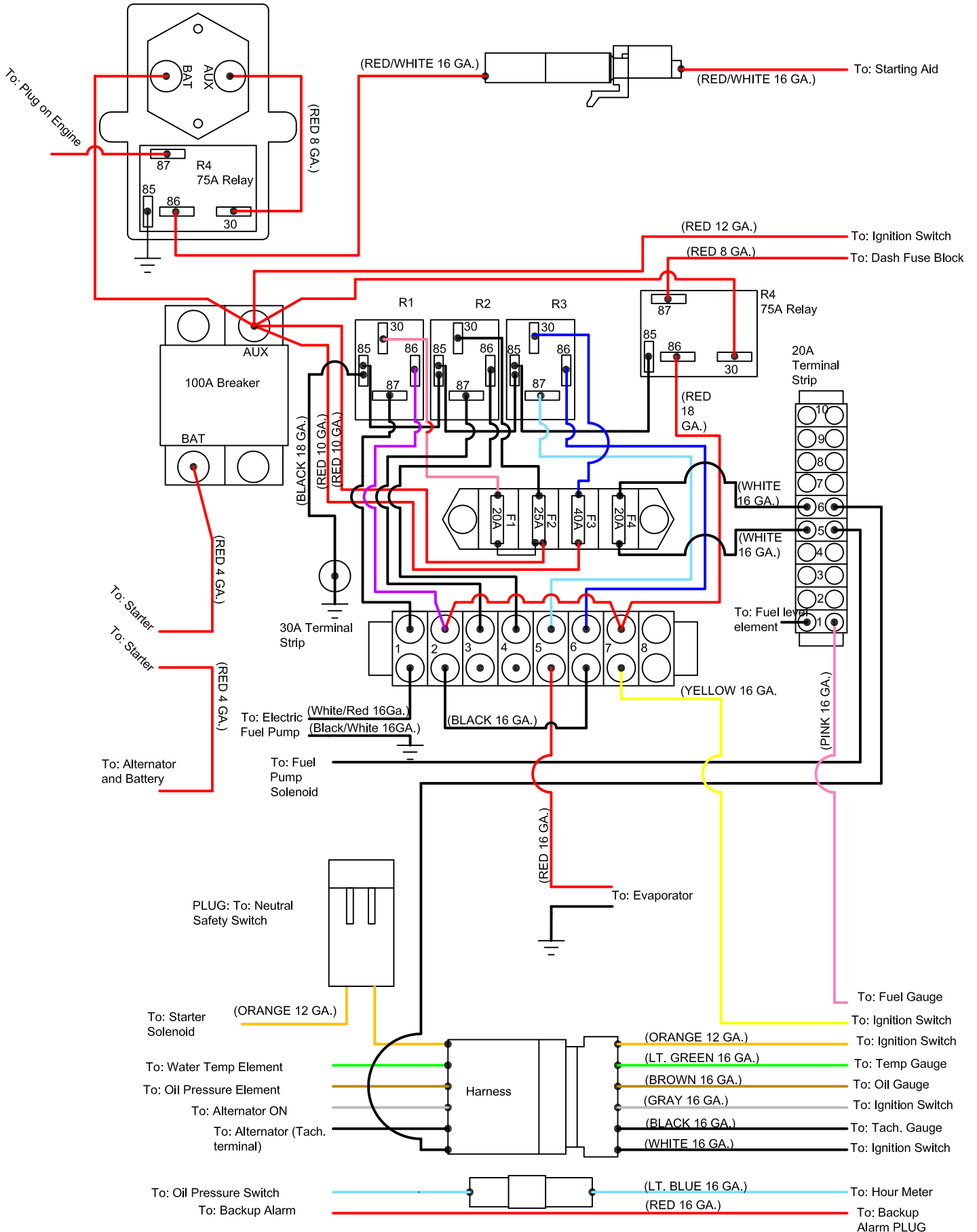
# 350 Series Hydraulics with optional Variable Brush Speed



# WIRING

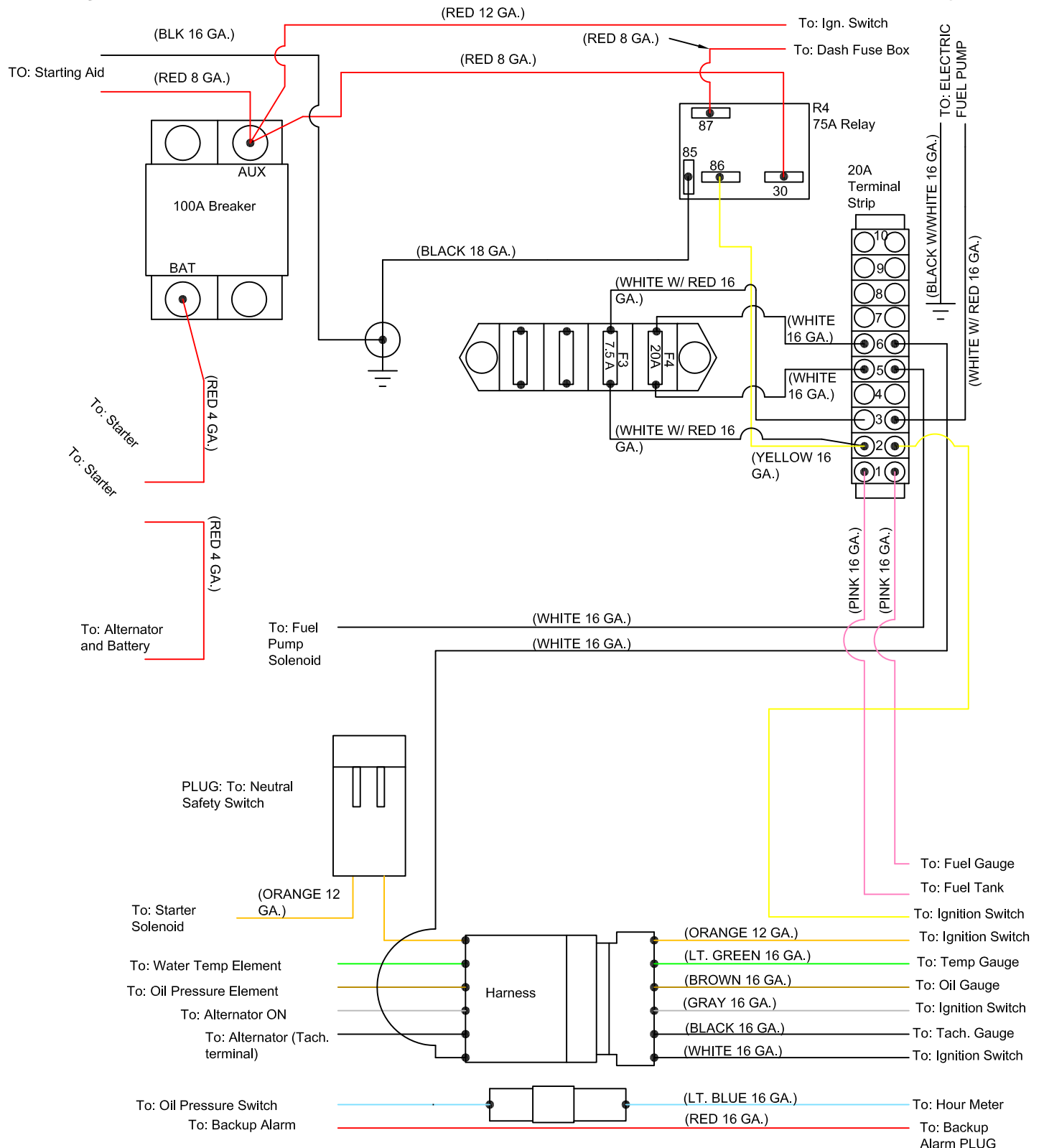
# Broce Broom Wiring Diagram

## Engine Control Panel - CR Model With Cab



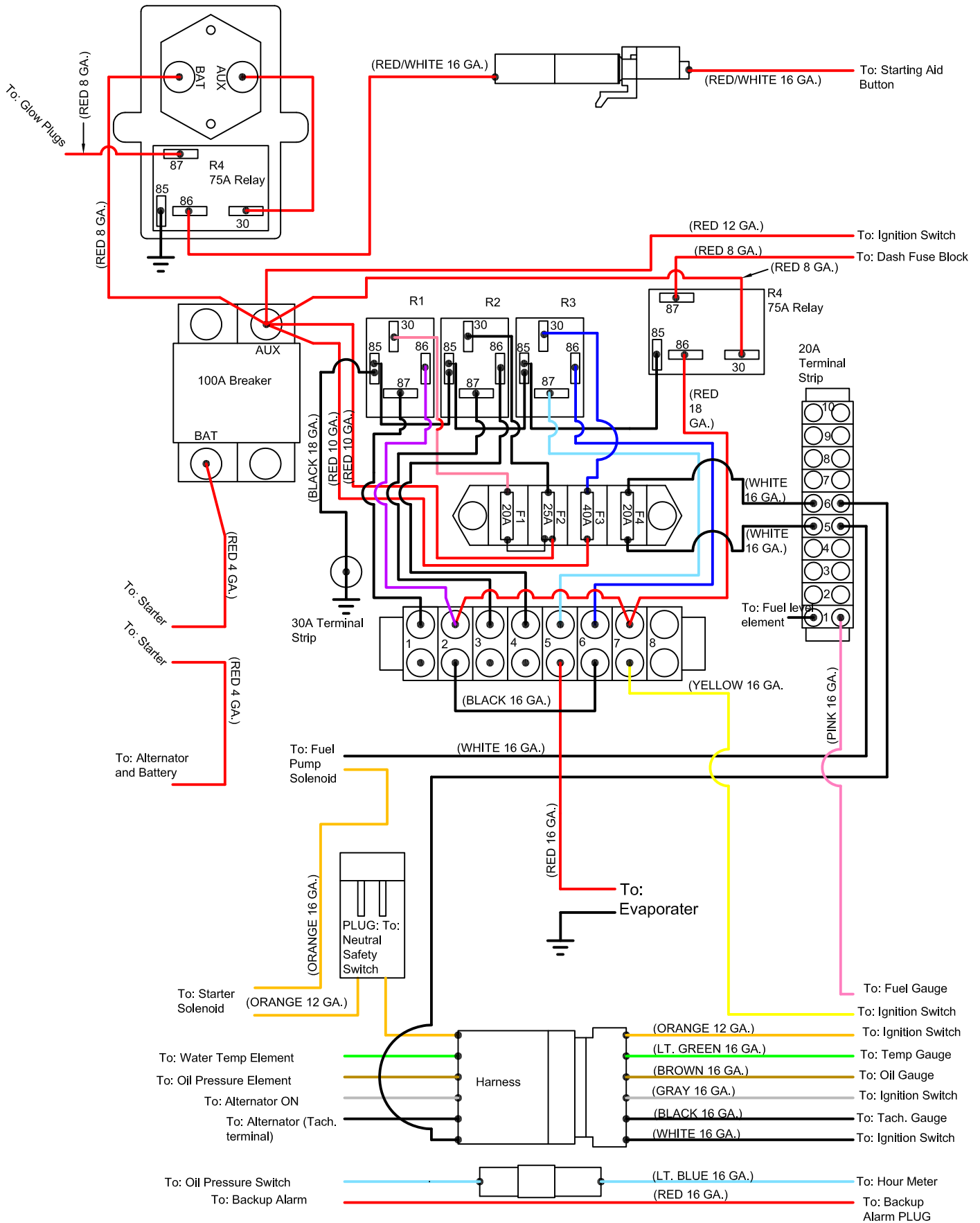
# Broce Broom Wiring Diagram

## Engine Control Panel - CR Model With Canopy



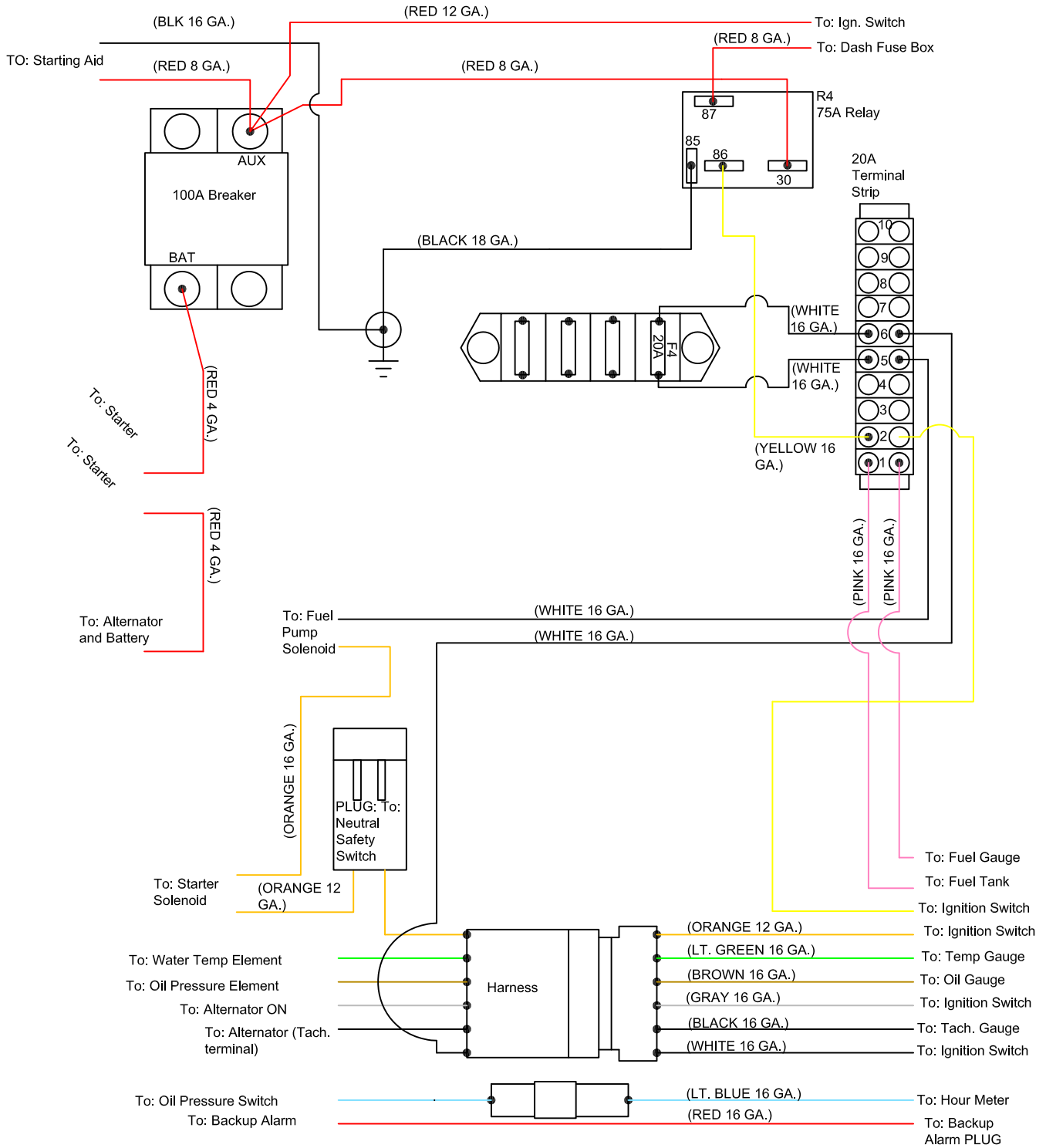
# Broce Broom Wiring Diagram

## Engine Control Panel - KR Model With Cab



# Broce Broom Wiring Diagram

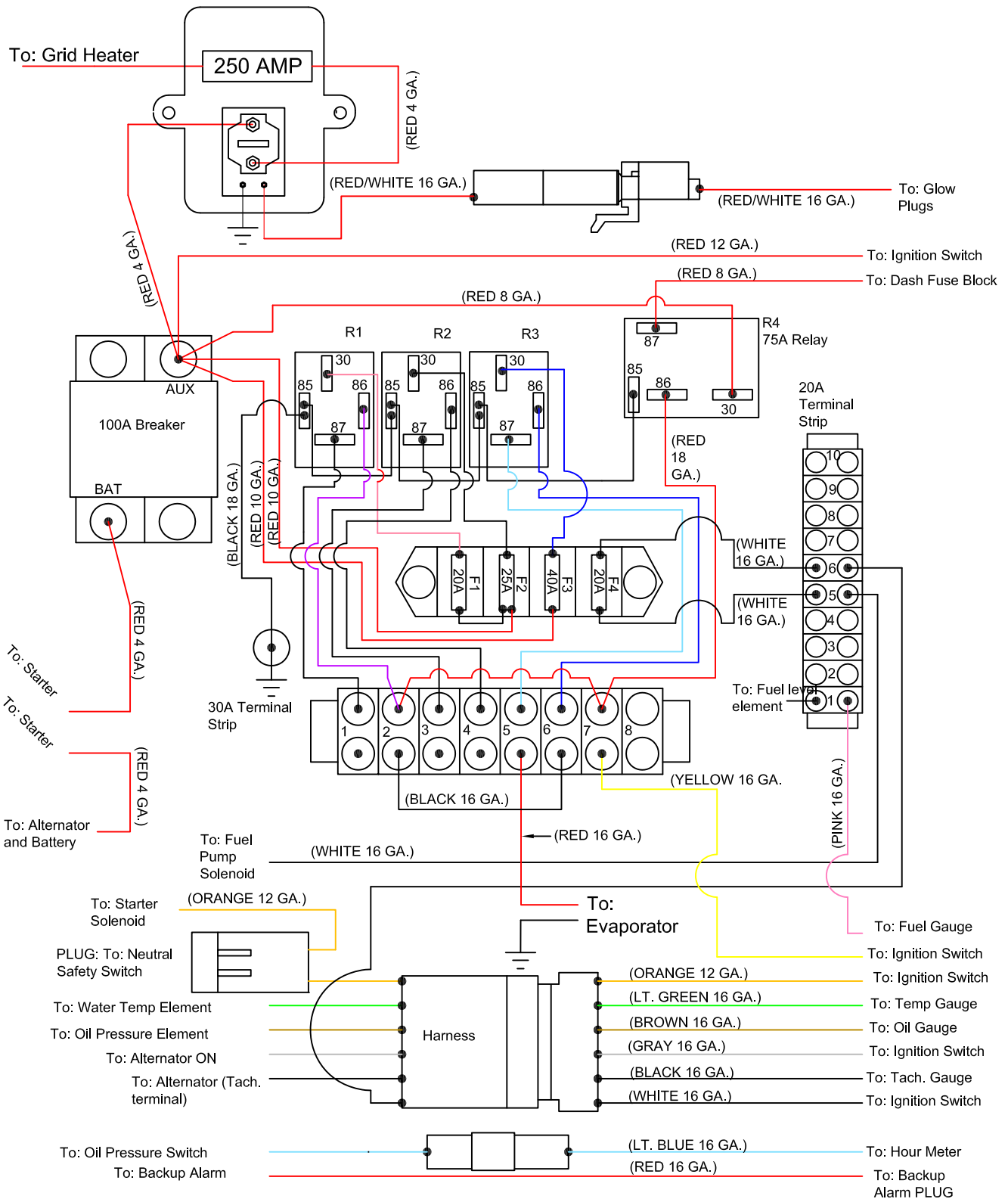
## Engine Control Panel - KR Model With Canopy





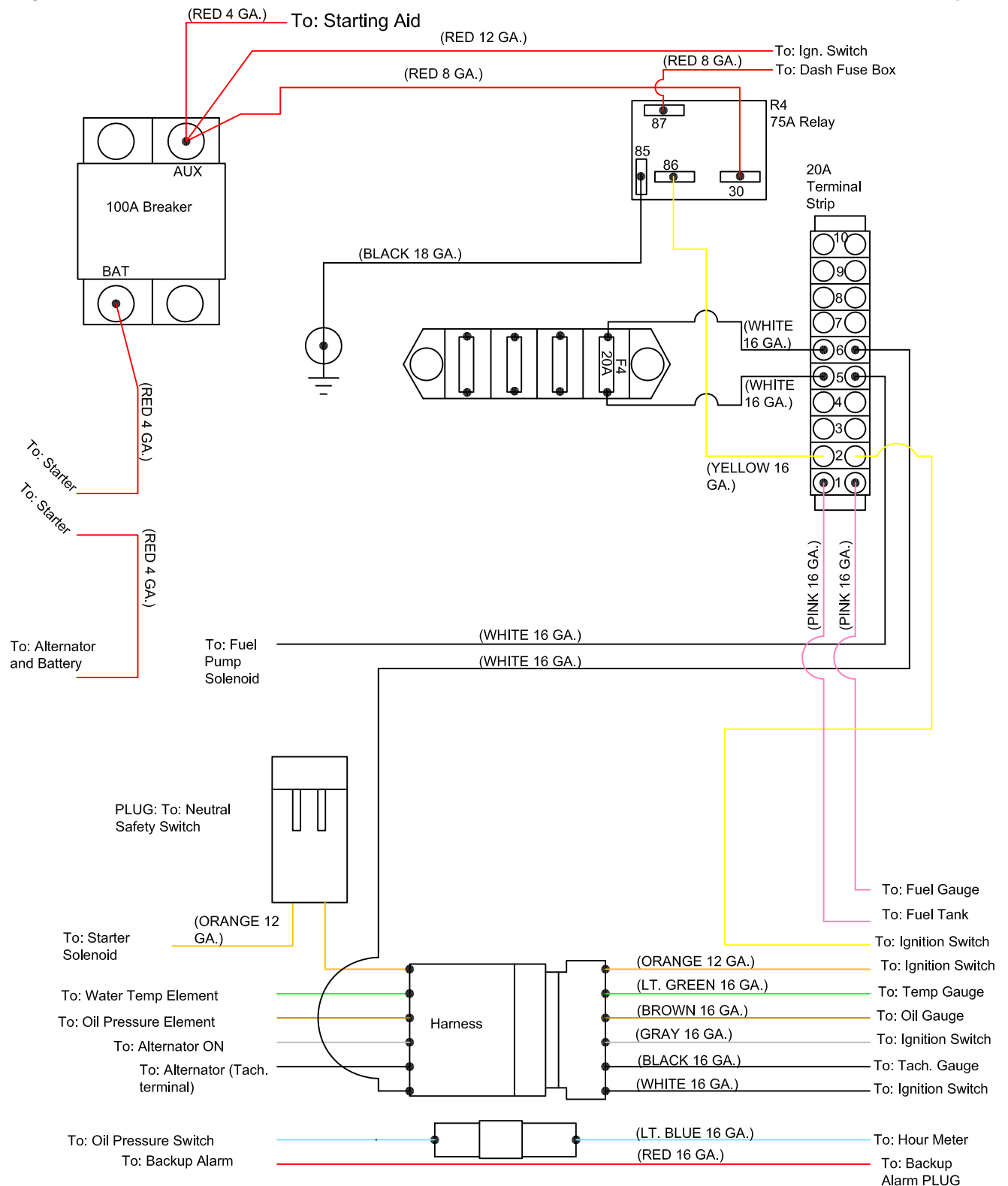
# Broce Broom Wiring Diagram

## Engine Control Panel - RCT Model With Cab



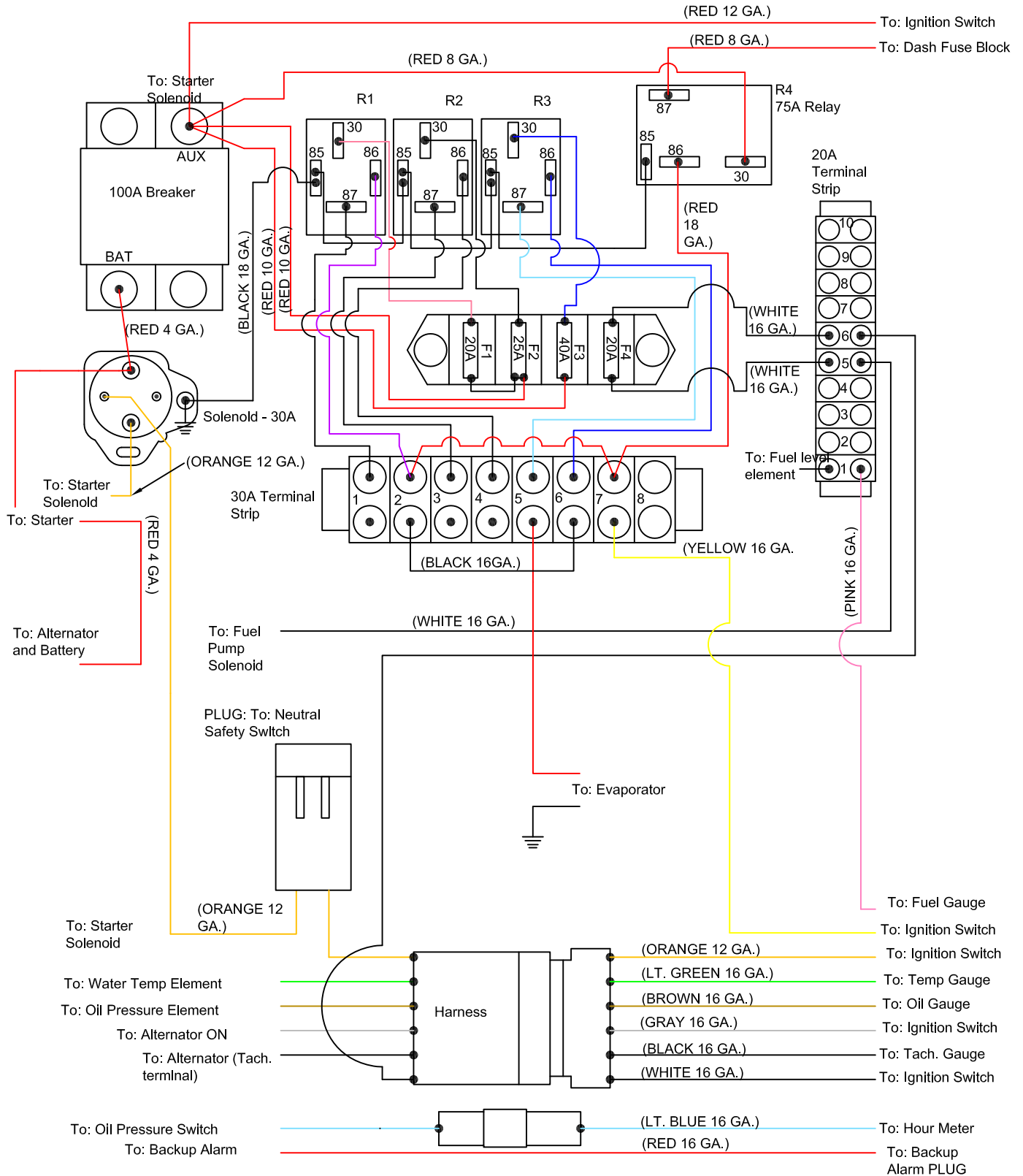
# Broce Broom Wiring Diagram

## Engine Control Panel - RCT Model With Canopy



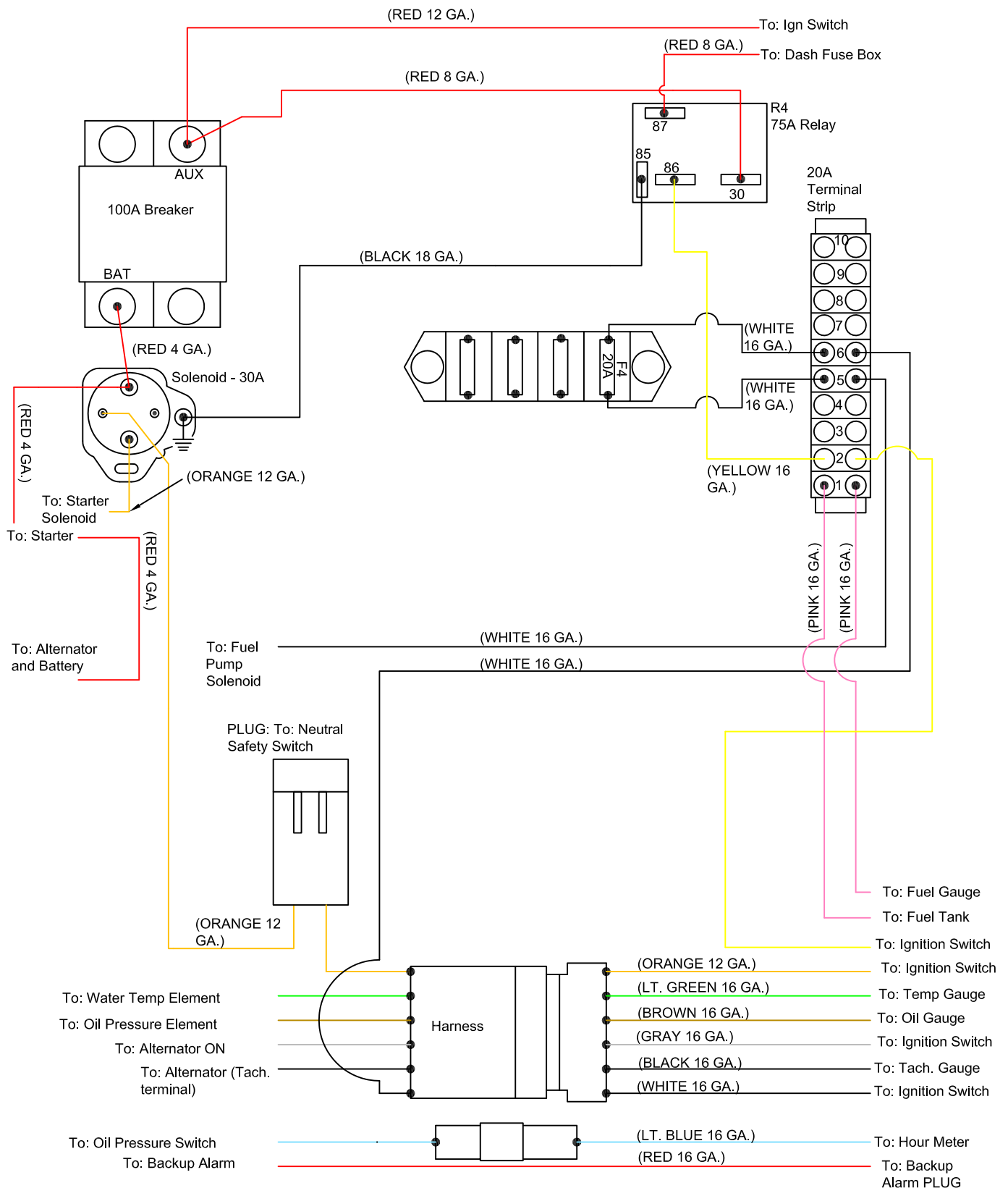
# Broce Broom Wiring Diagram

## Engine Control Panel - RJ Model With Cab



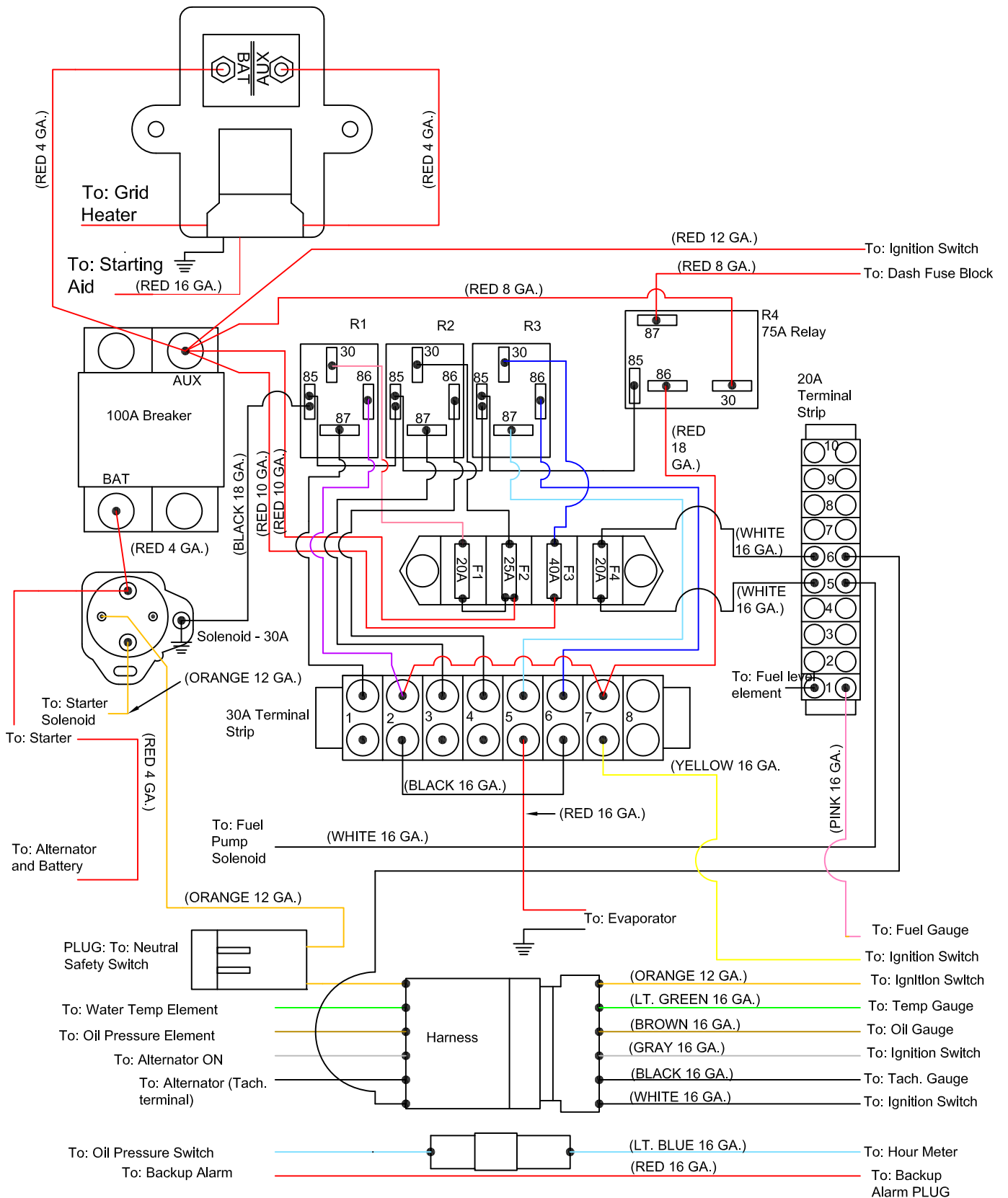
# Broce Broom Wiring Diagram

## Engine Control Panel - RJ Model With Canopy



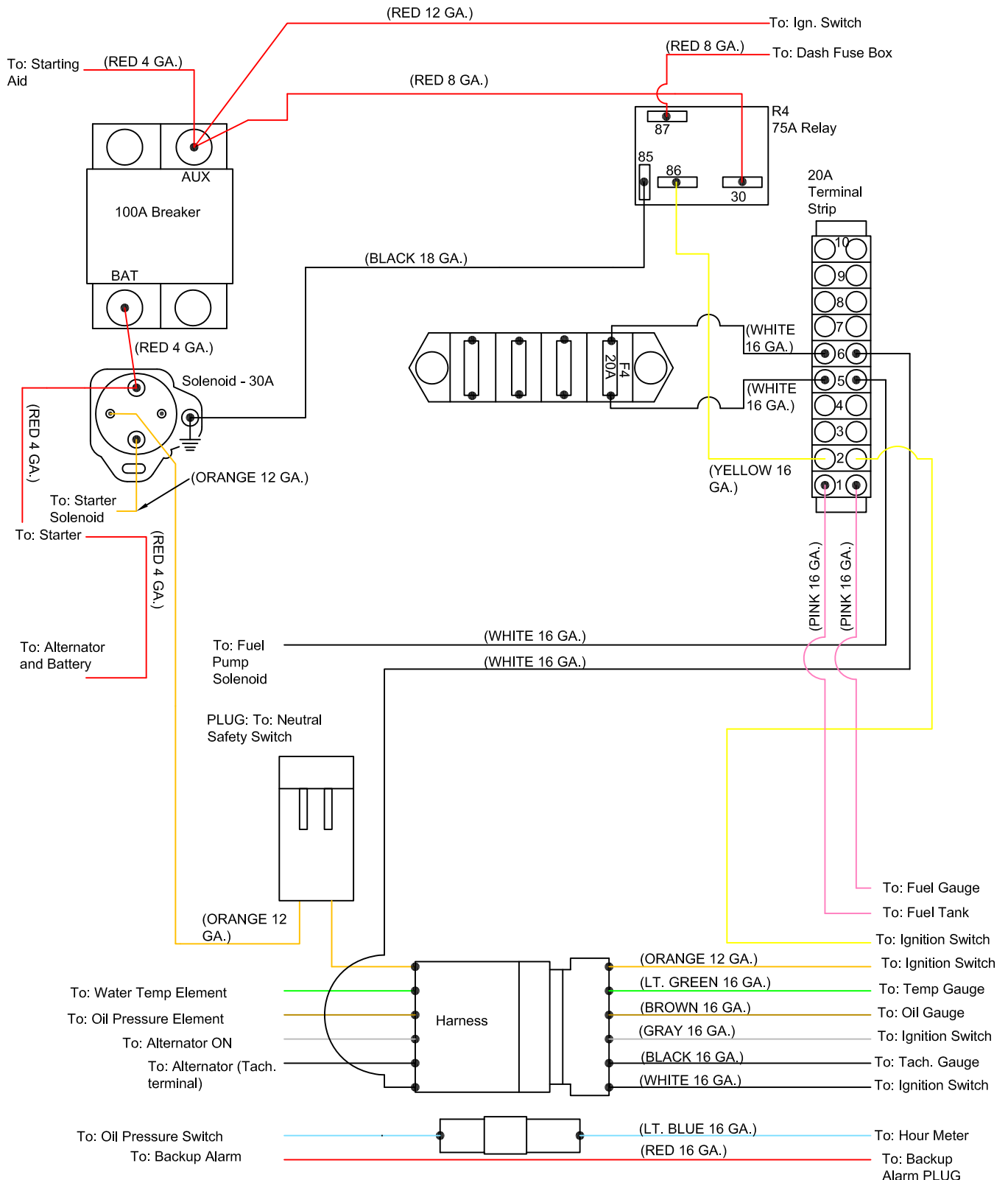
# Broce Broom Wiring Diagram

## Engine Control Panel - RJT Model With Cab



# Broce Broom Wiring Diagram

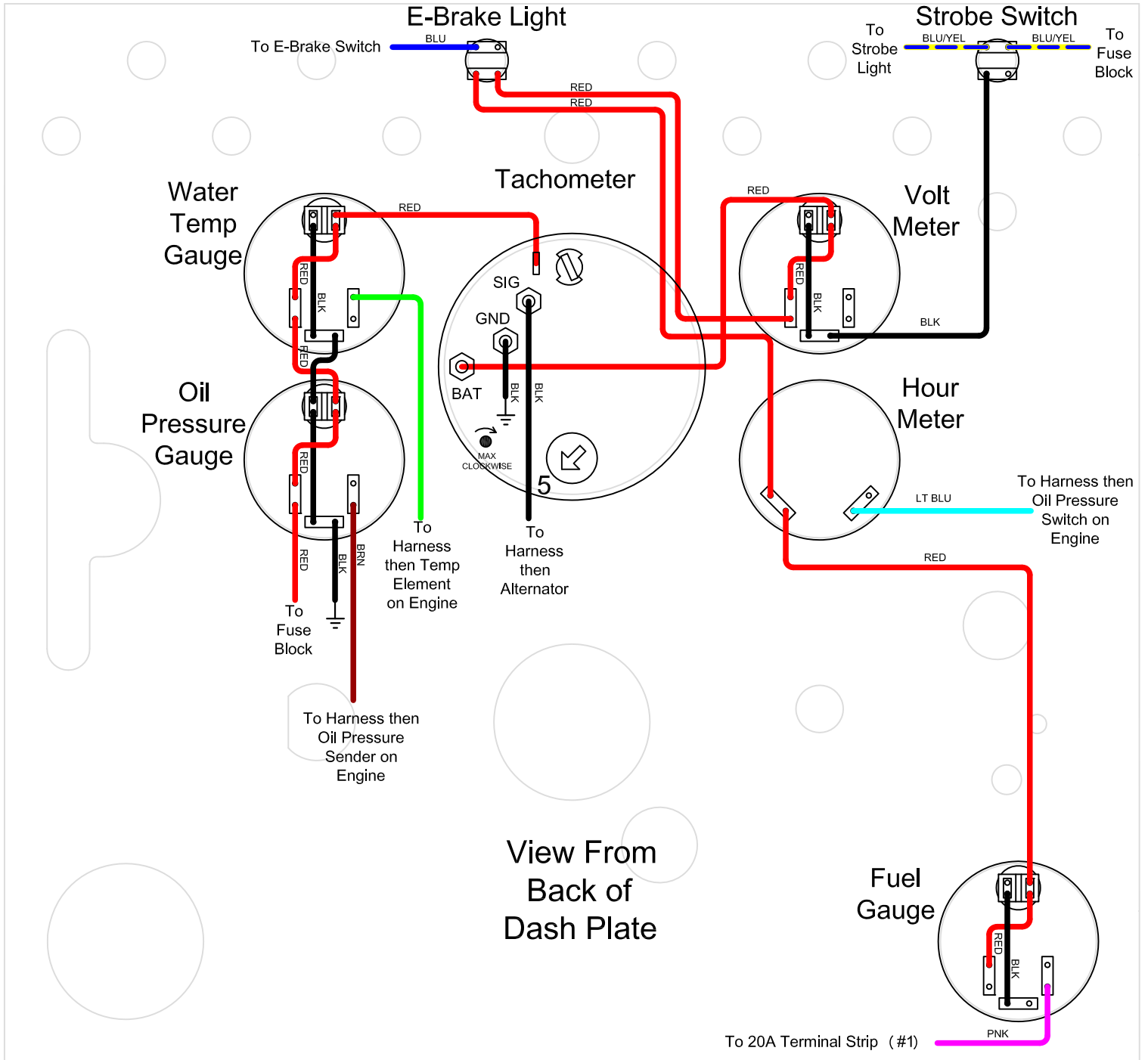
## Engine Control Panel - RJT Model With Canopy



# 350 Series Dashboard Gauges Wiring Diagram

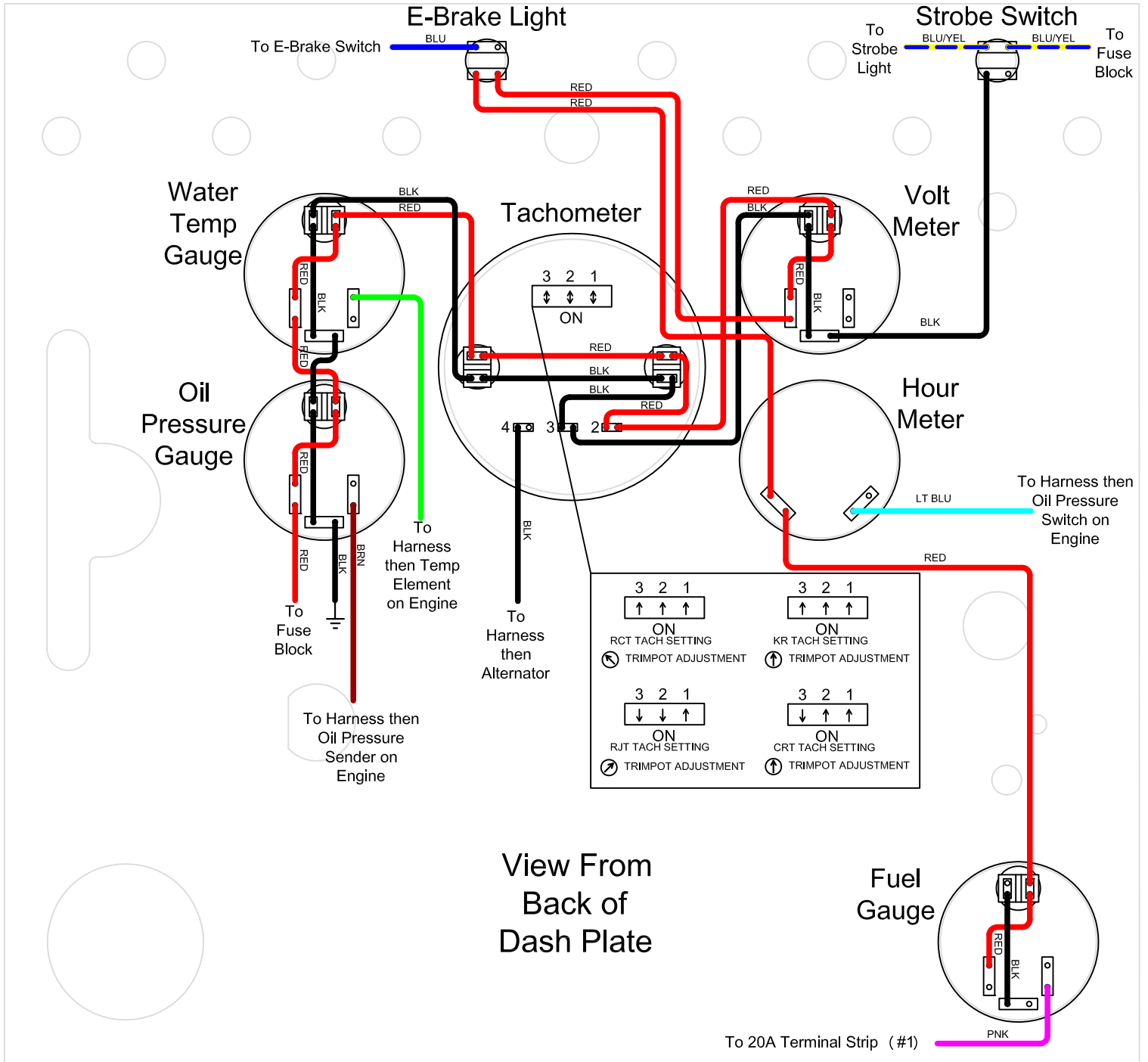
Broce Manufacturing Co., Inc., April 2007

## RCT-350 Model Only



# 350 Series Dashboard Gauges Wiring Diagram

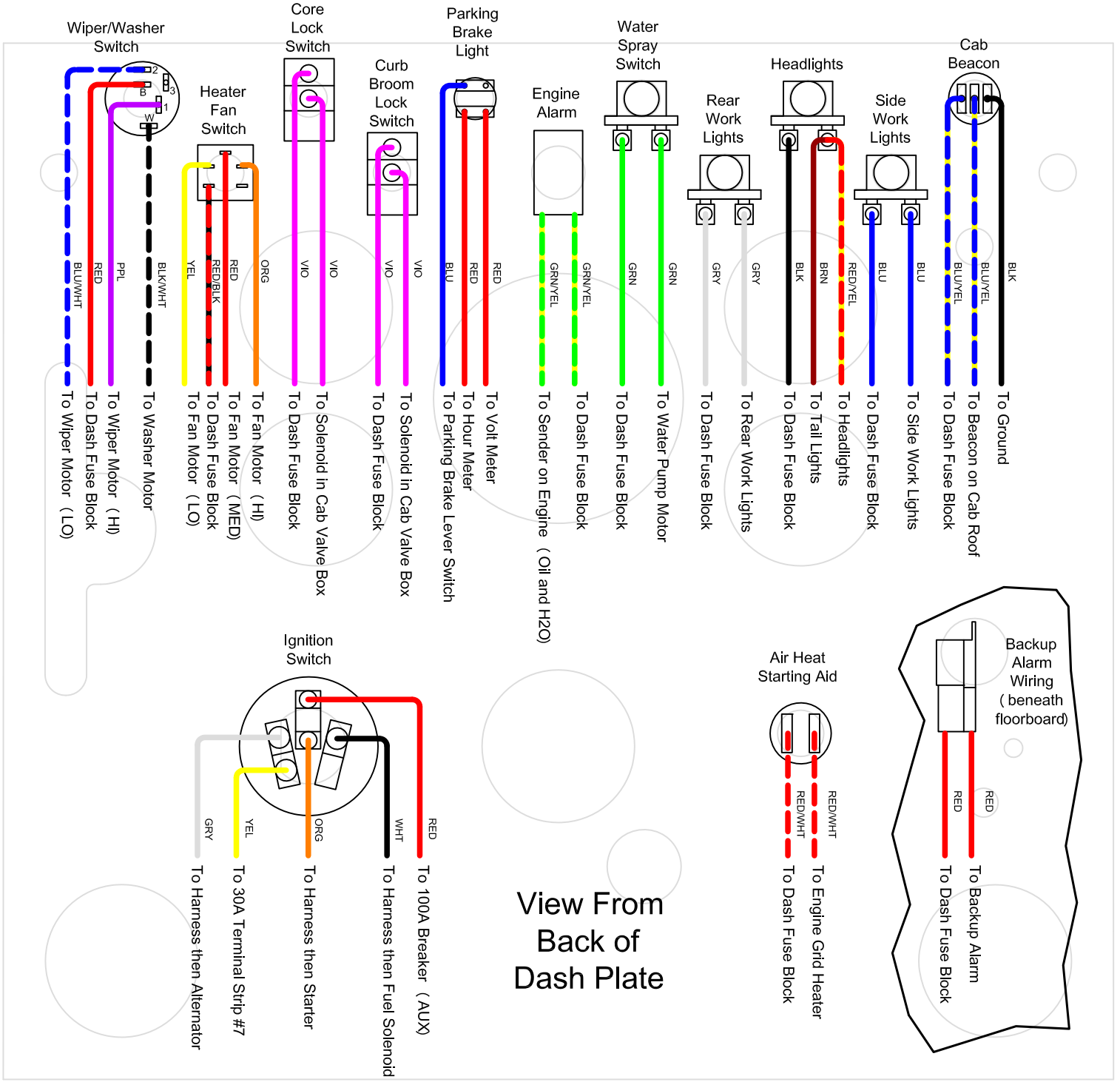
Broce Manufacturing Co., Inc.



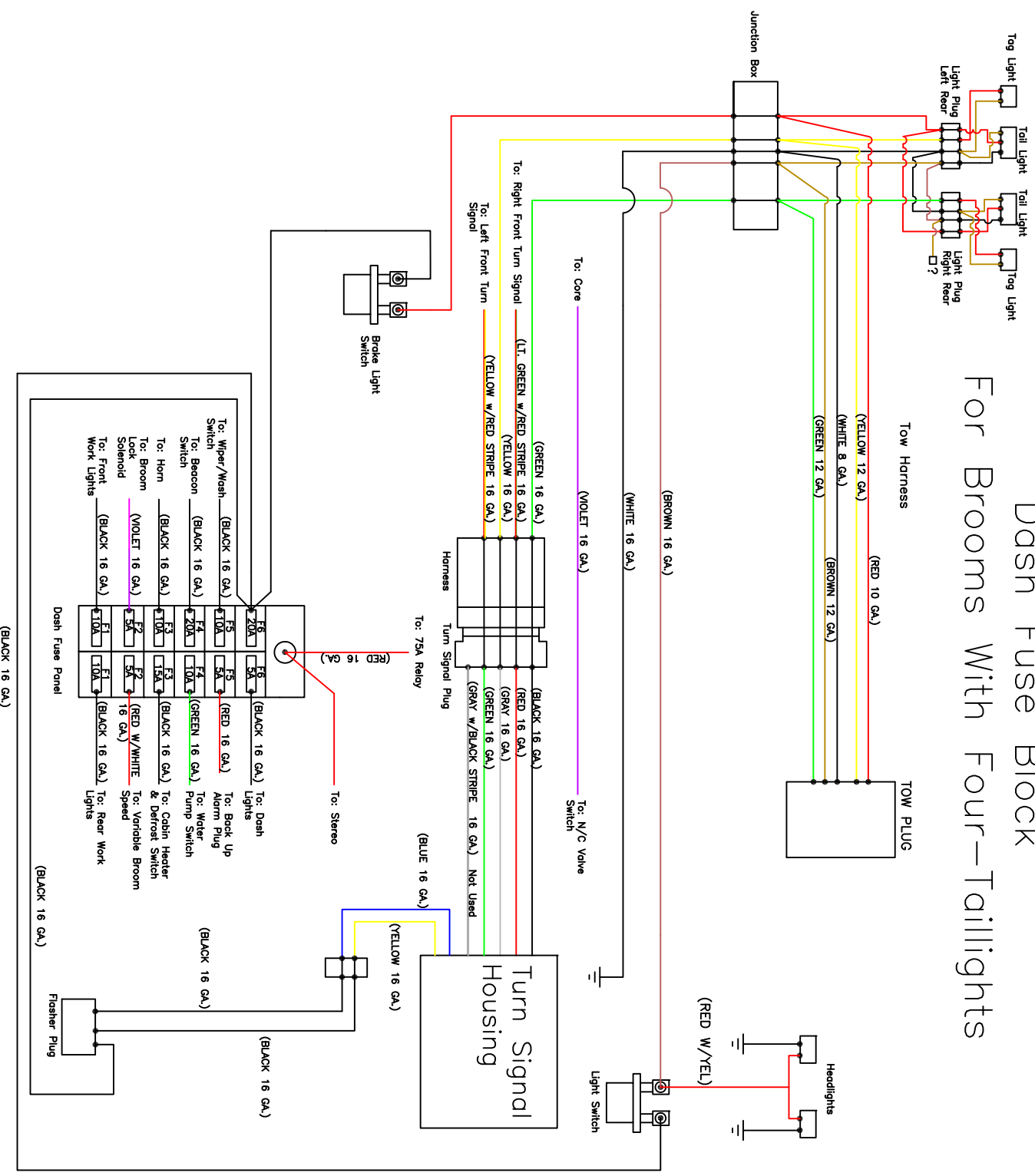


# 350 Series Dashboard Switches Wiring Diagram

Broce Manufacturing Co., Inc., April 2007

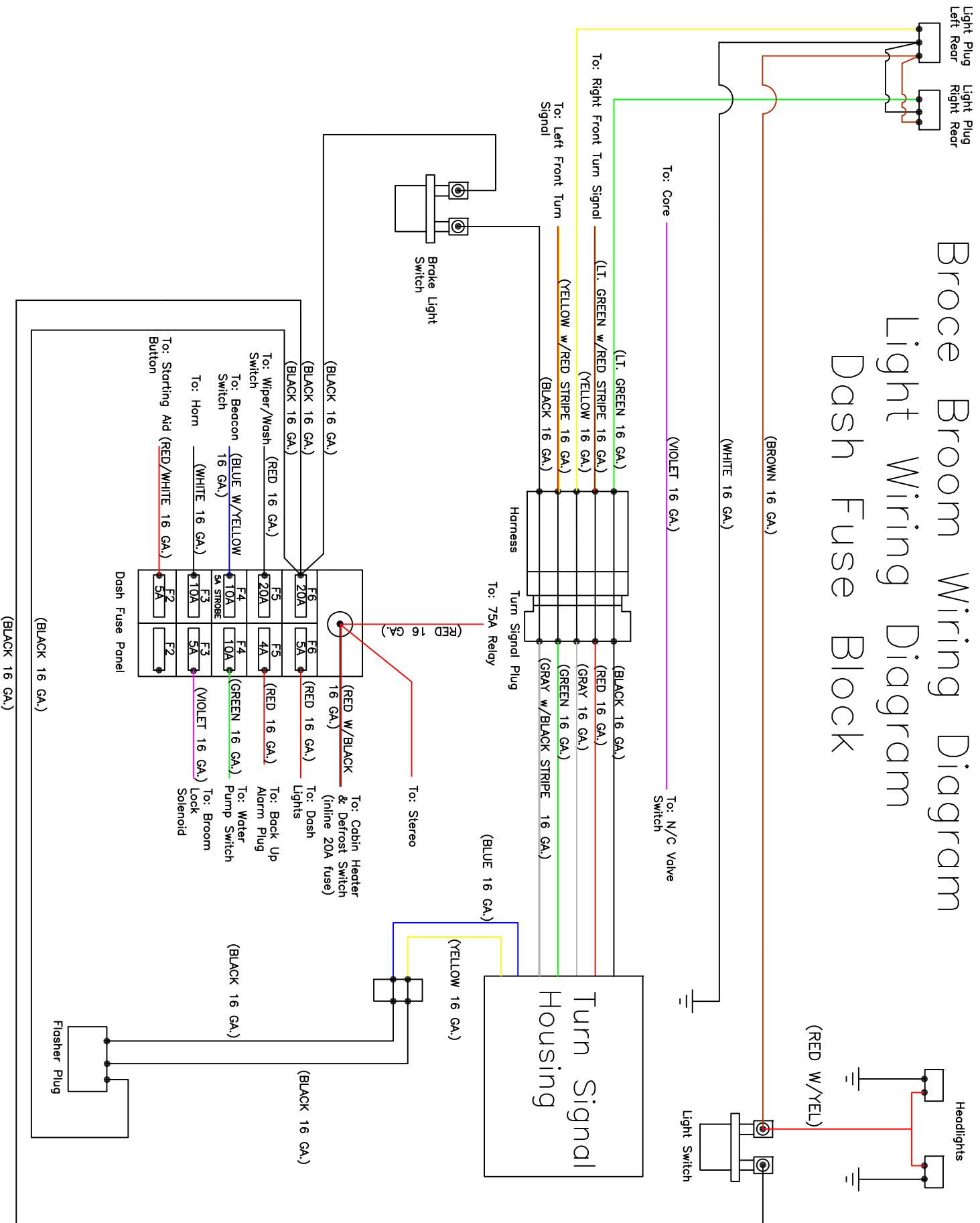


# Broce Broom Wiring Diagram Light Wiring Diagram Dash Fuse Block For Brooms With Four-Tailights



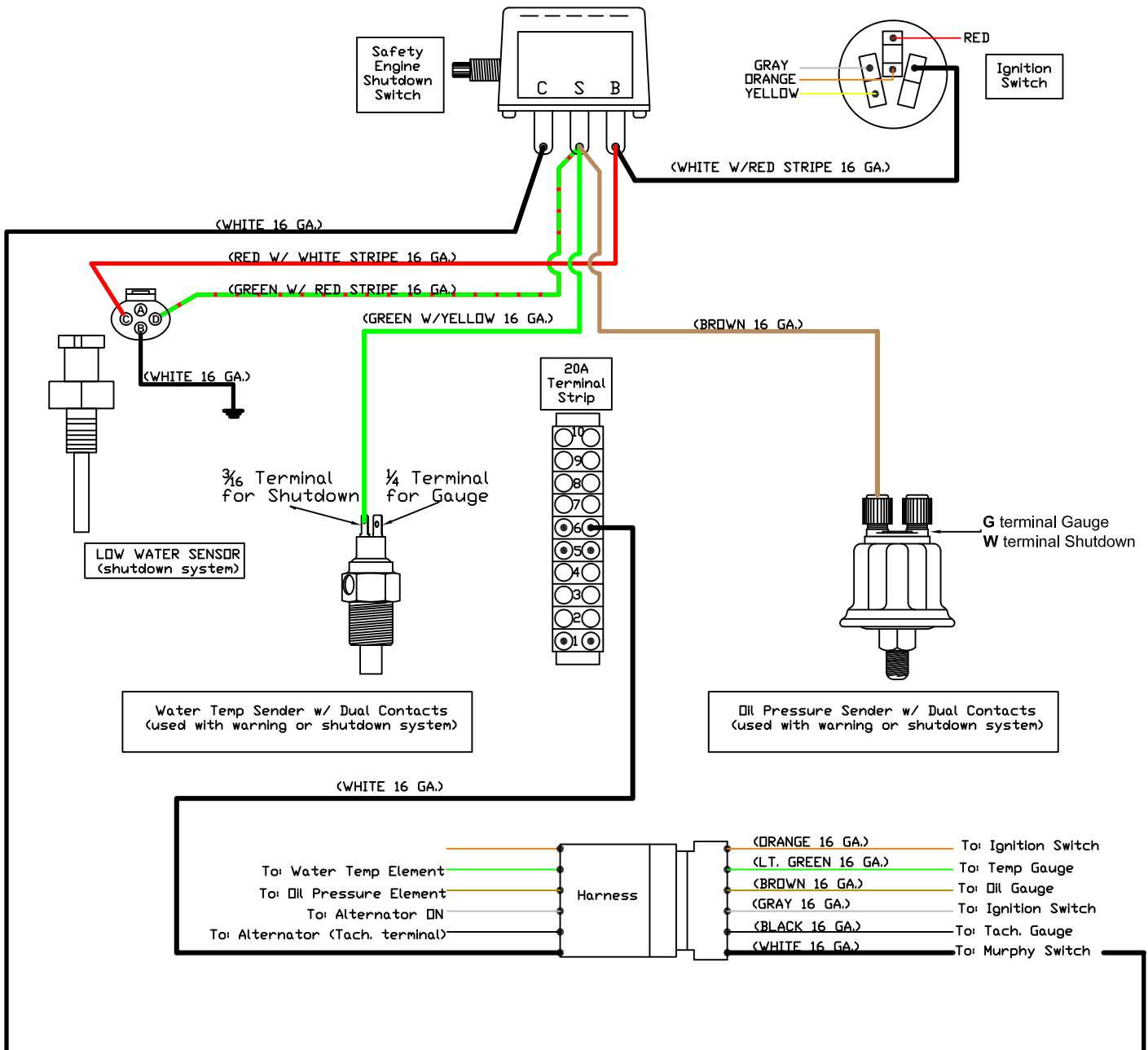
(BLACK 16 GA.)

# Broce Broom Wiring Diagram Light Wiring Diagram Dash Fuse Block



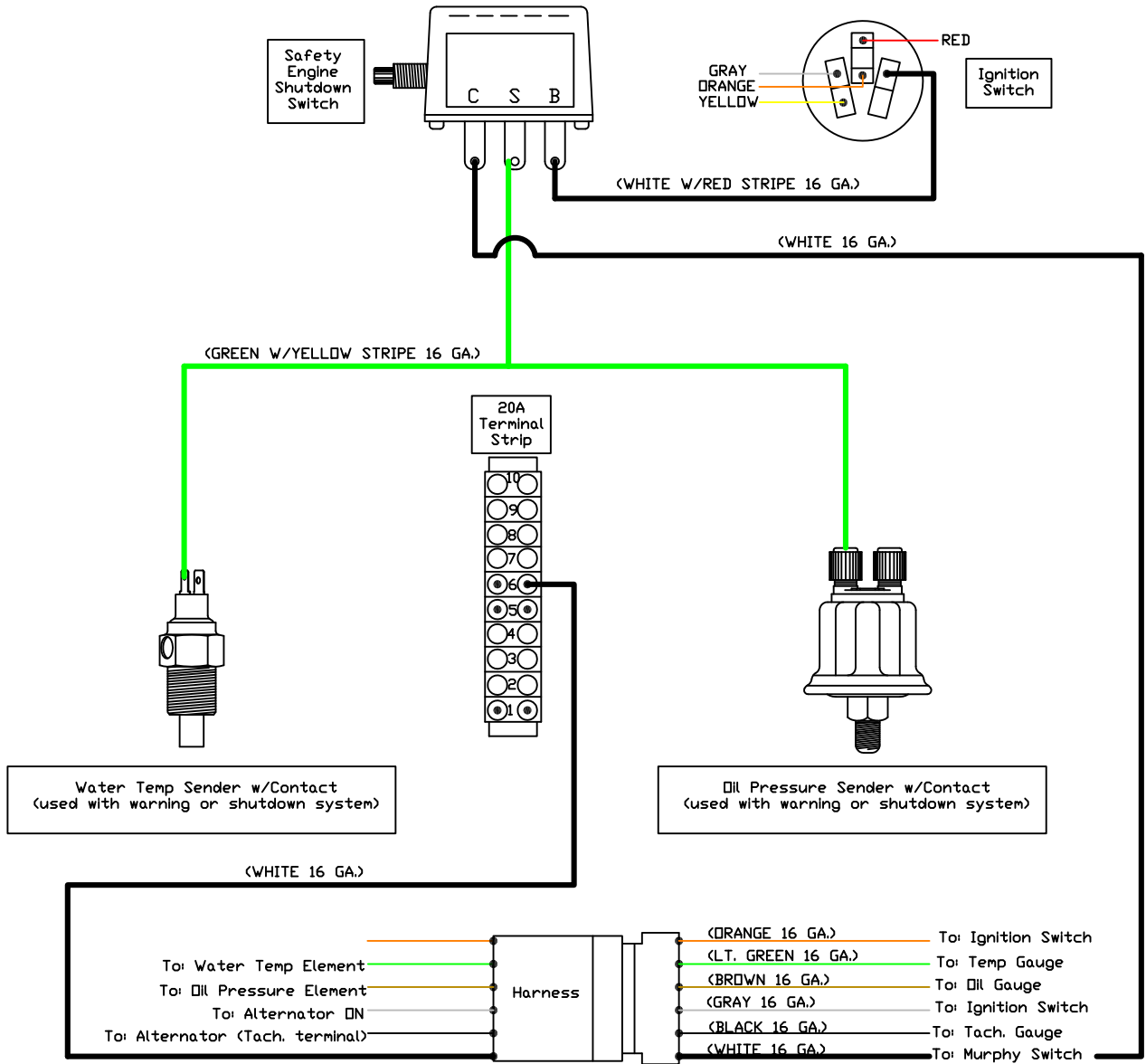
# 4-Wheel Broce Broom Wiring Diagram

## Optional Safety Engine Shutdown System with Low Water Shutdown



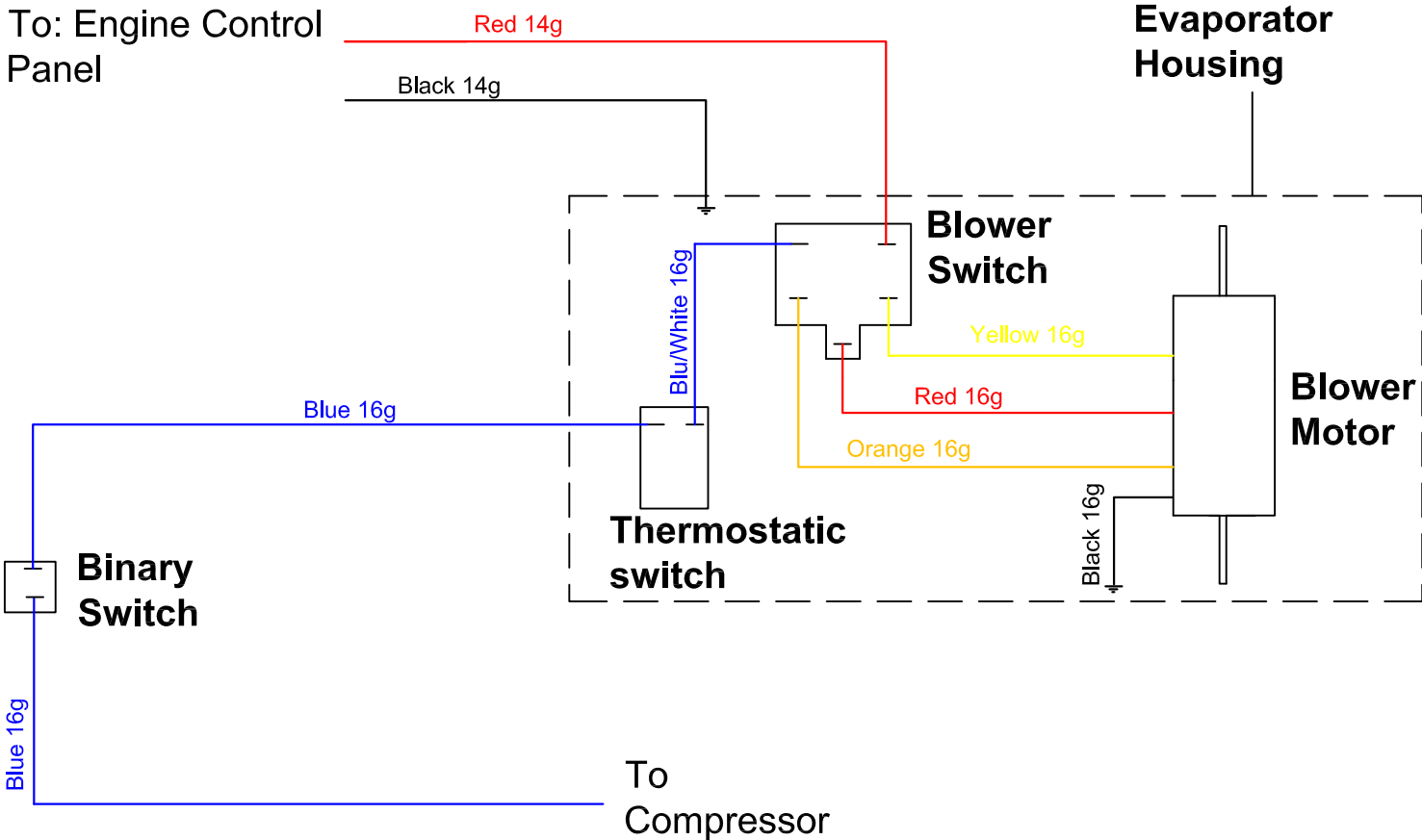
# 4-Wheel Broce Broom Wiring Diagram

## Optional Safety Engine Shutdown System

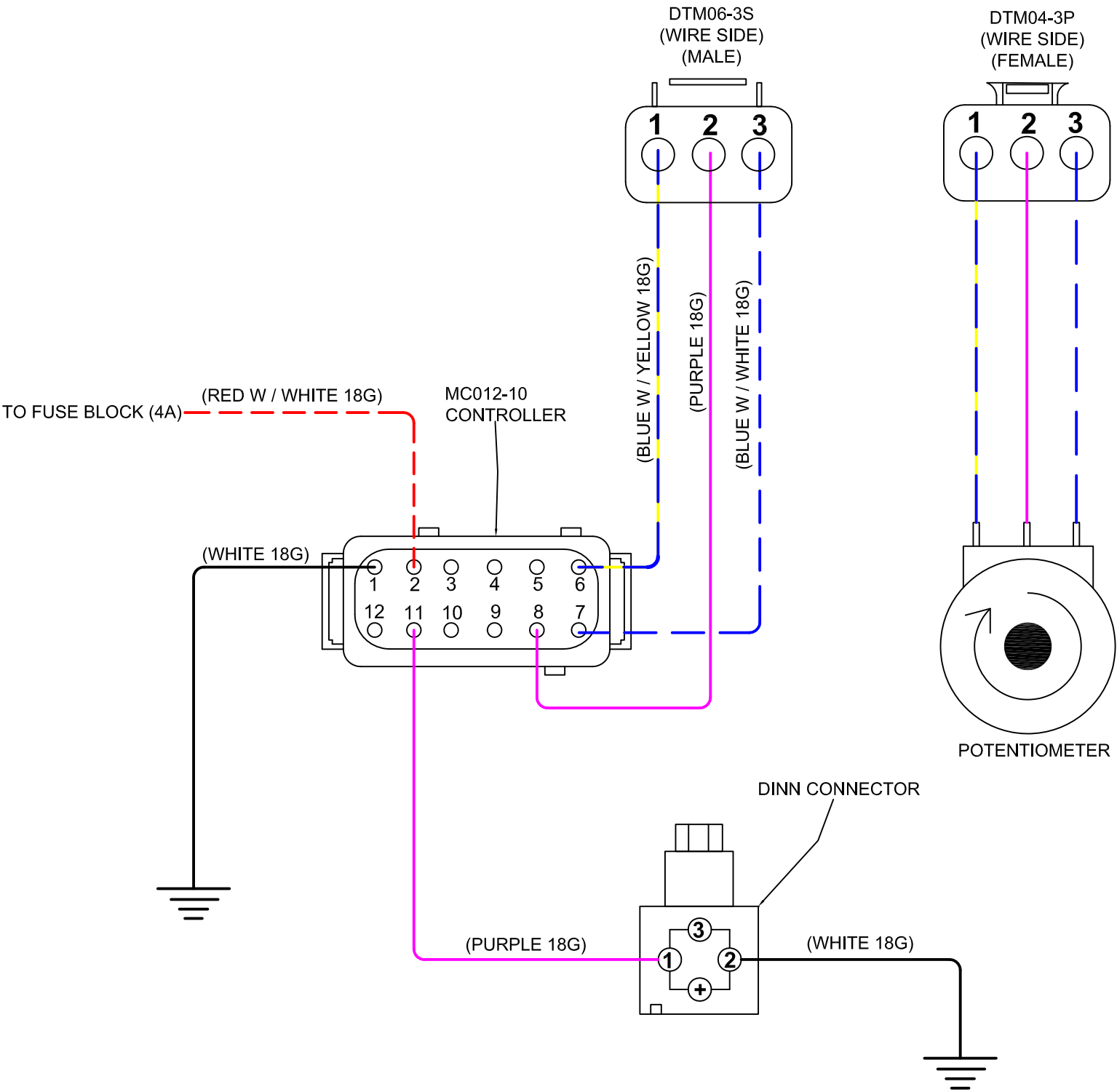


# Broce Broom Wiring Diagram

## Air Conditioner Wiring



# VARIABLE SPEED W / SAUER CONTROLLER

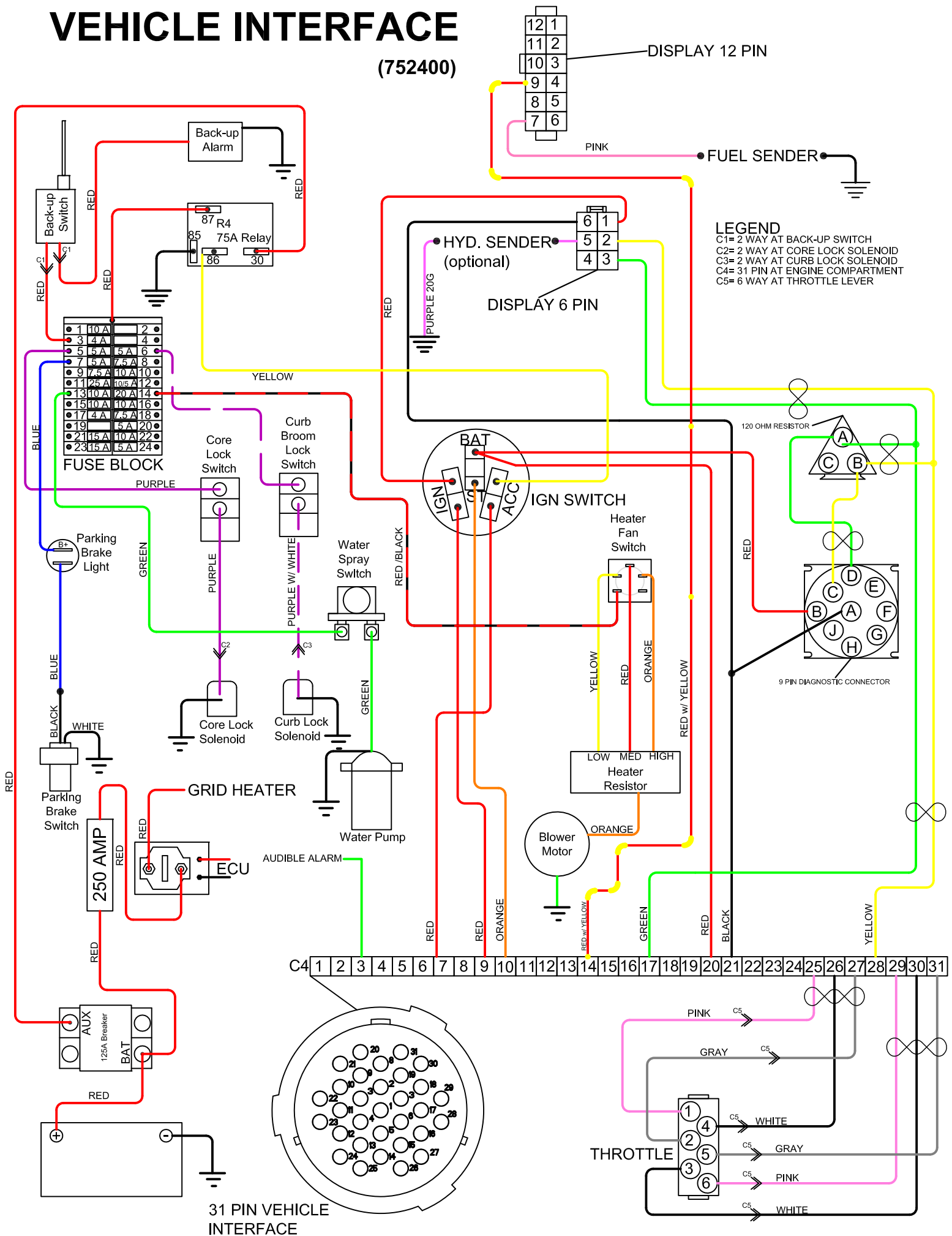


WIRING  
TIER 4 FINAL  
ENGINE



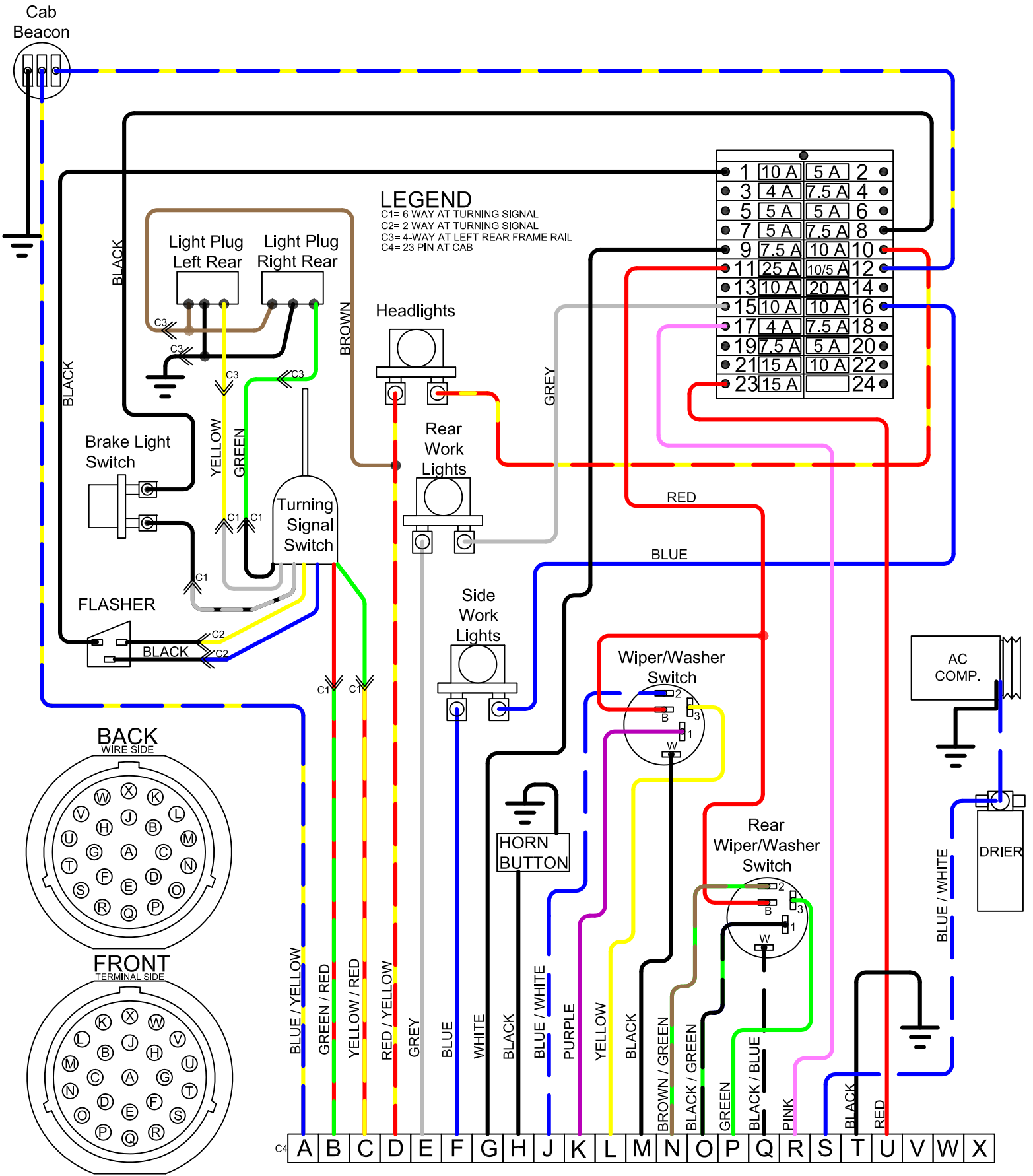
# VEHICLE INTERFACE

(752400)



# BROCE DASH WIRING DIAGRAM

## TIER 4 FINAL (752401)



## BACK OF FUSE PANEL

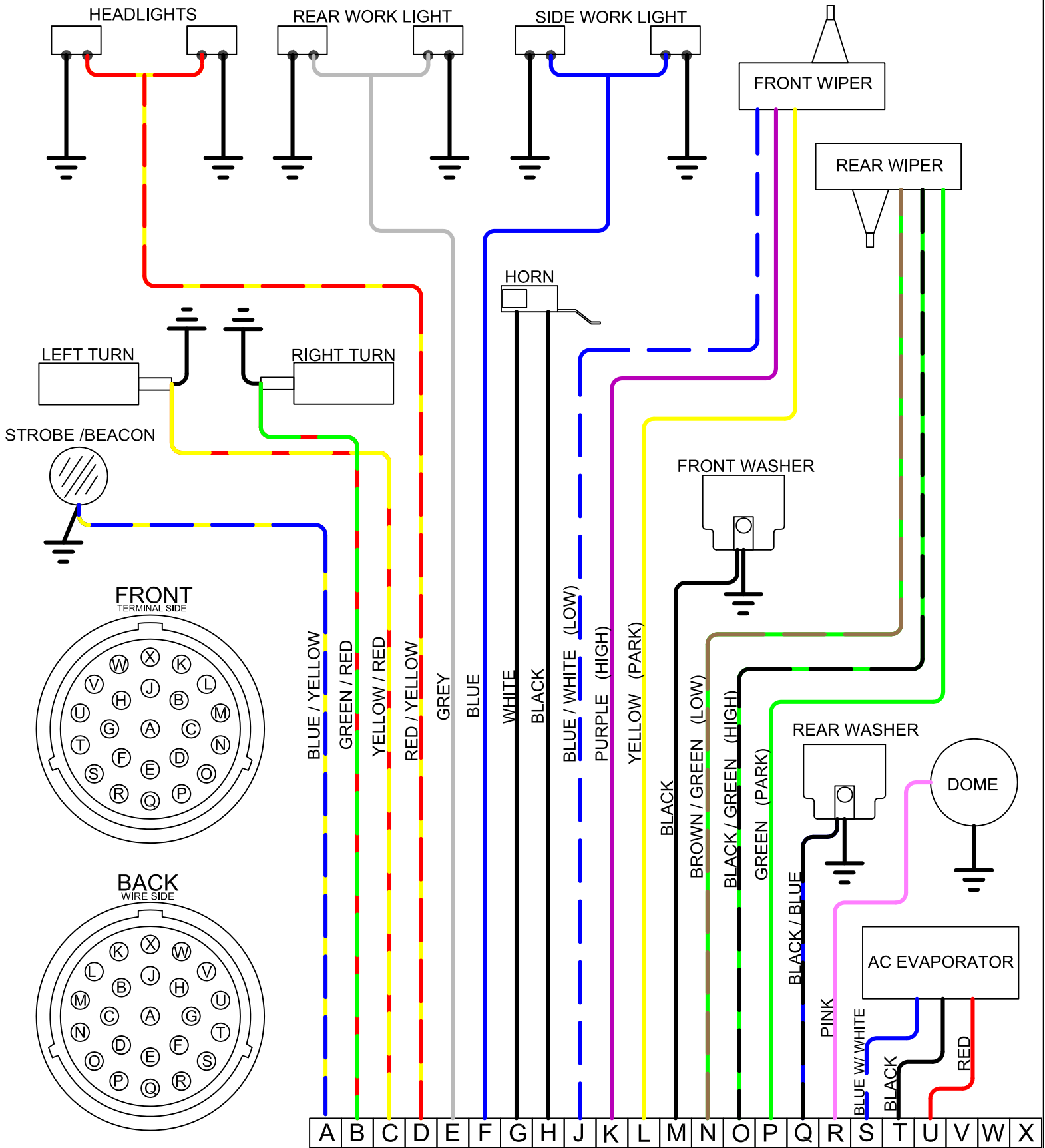
	● 2	5A	10A	1	FLASHER (BLACK)
	● 4	7.5A	4A	3	BACK UP (RED)
	● 6	5A	5A	5	CORE LOCK (PURPLE)
	● 8	7.5A	5A	7	E-BRAKE LIGHT (BLUE / WHITE)
	● 10	10A	7.5A	9	HORN (WHITE)
	● 12	10/5A	25A	11	WIPER WASHER (RED)
	● 14	20A	10A	13	WATER PUMP (GREEN)
	● 16	10A	10A	15	REAR WORK LIGHTS (GRAY)
	● 18	7.5A	4A	17	DOME LIGHT (PINK)
	● 20	5A	7.5A	19	STEREO (RED)
	● 22	10A	15A	21	AC EVAPARATOR (RED)
	● 24	[ ]	15A	23	

CURB LOCK (PURPLE / WHITE)  
 BRAKE LIGHT SWITCH (BLACK)  
 HEAD LIGHT SWITCH (RED W/ YELLOW)  
 STROBE/BEACON (BLUE /YELLOW)  
 HEATER (RED /BLACK)  
 SIDE WORK LIGHTS (BLUE)  
 VARIABLE SPEED (RED)  
 RESTRICTION LIGHTS ( RED/BLACK)  
 12 VOLT SUPPLY (RED)

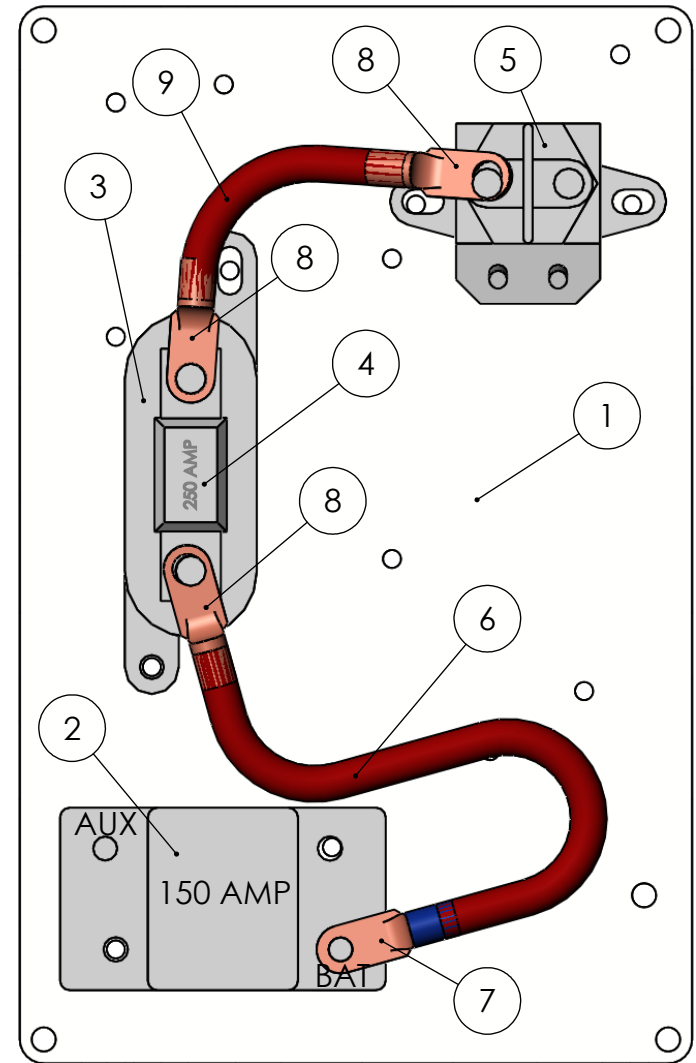
MAIN	FUSE BLOCK POWER	FUSE	COLOR	AMPERAGE
1	FLASHER		BLACK	10
2	BLANK			
3	BACK UP		RED	4
4	BLANK			
5	CORE LOCK		PURPLE	5
6	CURB LOCK		VIOLET	5
7	E-BRAKE LIGHT		RED	5
8	BRAKE LIGHT SWITCH		BLACK	7.5
9	HORN		WHITE	7.5
9	HORN W/ TILT WHEEL		WHITE	7.5
10	HEAD LIGHT SWITCH		RED / YELLOW	10
11	WIPER / WASHER		RED	25
11	REAR WIPER W/ WASHER		RED	25
11	REAR WIPER WO/ WASHER		BROWN / YELLOW	25
12	BEACON		BLUE / YELLOW	10
12	STROBE		BLUE / YELLOW	5
13	WATER PUMP		GREEN	10
14	HEATER		RED	20

OPTIONS	FUSE BLOCK POWER	FUSE	COLOR	AMPERAGE
15	REAR WORK LIGHTS		GRAY	10
16	SIDE WORK LIGHTS		BLUE	10
17	DOME LIGHT		PINK	4
18	VARIABLE SPEED		RED	7.5
19	BLANK			
20	AIR RESTRICTION LIGHT		RED / BLACK	5
20	HYD RESTRICTION LIGHT		RED / BLACK	5
21	STEREO (SWITCHED BAT+)		RED	15
22	12 VOLT POWER SOURCE (CIG LTR)		RED	10
23	AC EVAPARATOR		RED	15
24	BLANK			

# BROCE BROOM CAB WIRING DIAGRAM TIER 4 FINAL

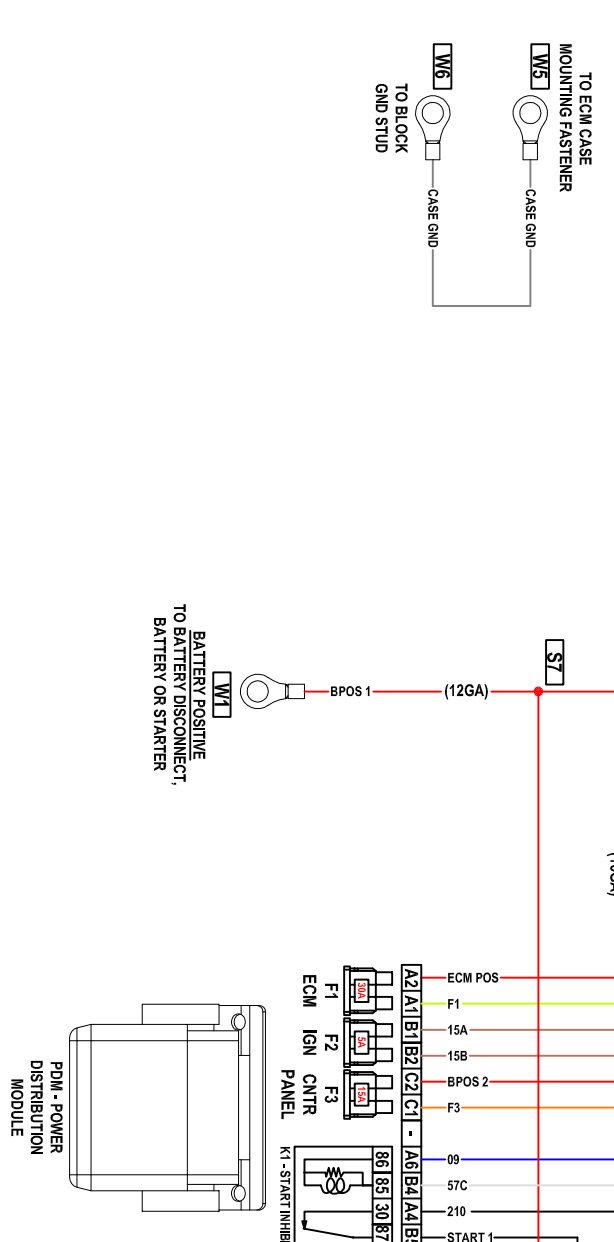
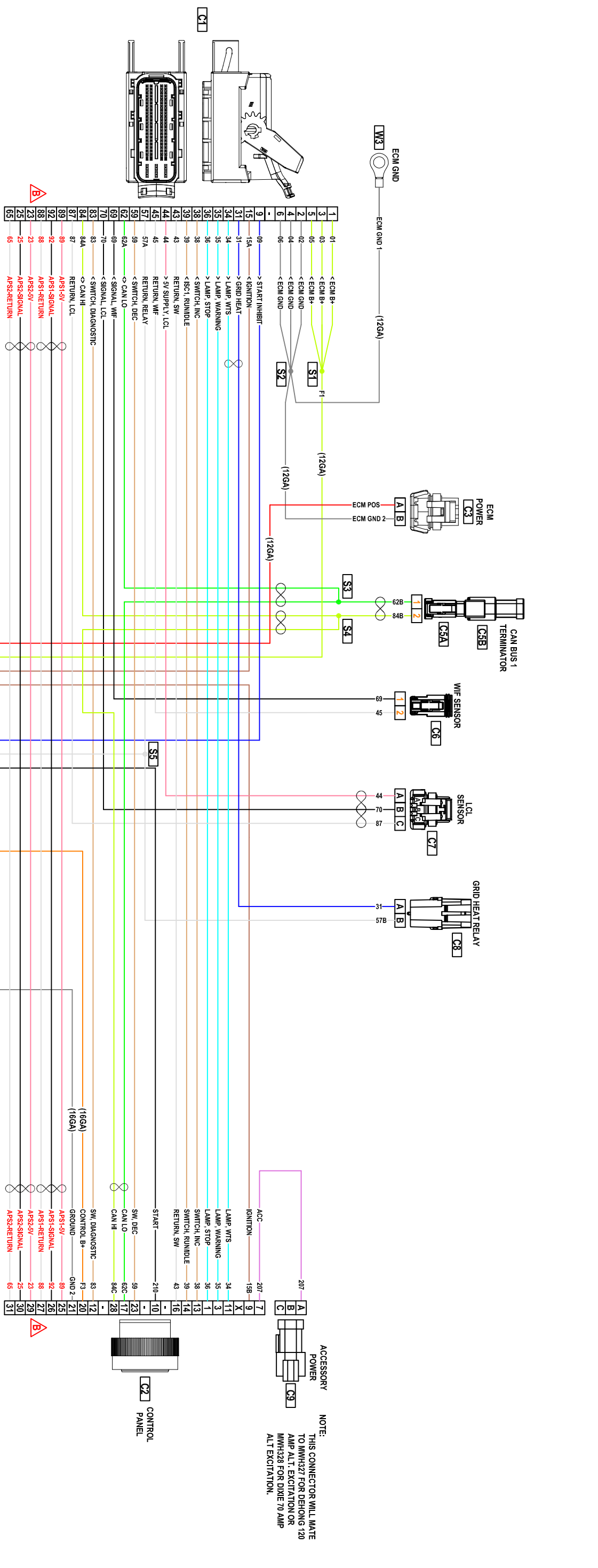


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	203150	PANEL ELECTRIC	1
2	307900	BREAKER 150 AMP	1
3	203669	FUSE HOLDER	1
4	203668	250 AMP FUSE	1
5	203670	SOLENOID CONTROL	1
6	307804	5" 4G WIRE	5
7	307353	4 g 1/4" Eyelet	1
8	307352	4 g 5/16" Eyelet	3
9	307804	4" 4G WIRE	4



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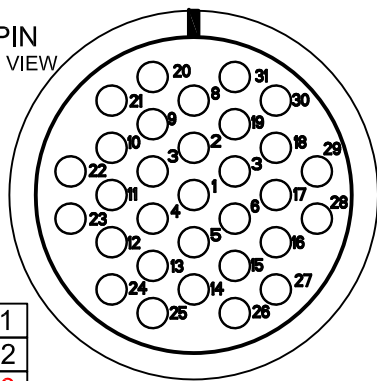
		UNLESS OTHERWISE SPECIFIED:	NAME	DATE	BROCE MANUFACTURING 1460 S 2ND AVE DODGE CITY KS, 67801	
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±	DRAWN	CG	7/7/16	TITLE:
		INTERPRET GEOMETRIC TOLERANCING PER:	CHECKED			ELECTRICAL PANEL TIER 4F
		MATERIAL	ENG APPR.			
NEXT ASSY	USED ON	FINISH	MFG APPR.			SIZE DWG. NO. REV
APPLICATION		DO NOT SCALE DRAWING	Q.A.			<b>A</b> 752407
			COMMENTS:			SCALE: 1:4 SHEET 1 OF 1



**NOTE:**  
 ECM PARAMETER STARTER  
 LOCKOUT/STARTER  
 LOCKOUT RELAY TYPE WILL  
 NEED TO BE SET TO  
 NORMALLY CLOSED FOR  
 PROPER STARTER INHIBIT  
 RELAY OPERATION.

**NOTE:**  
 THIS CONNECTOR WILL MATE  
 TO MMH327 FOR DEHONG-120  
 AMP ALT. EXCITATION OR  
 MMH328 FOR DIME 70 AMP  
 ALT EXCITATION.

31 PIN  
BACK VIEW



# 350 SERIES KOHLER / REHLKO 2504 T4F

