



# TWISTER

## OPERATIONS AND MAINTENANCE MANUAL



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**SECTION I**  
**GENERAL DESCRIPTION**  
***TWISTER***

The TWISTER is operated by a propane powered engine, driving a tandem hydrostatic pump system, creating a skid-steer power drive.

Surface coverings and coatings are removed by lowering a weighted blade onto the surface and moving forward under a high torque drive system. The surface coating is removed by a flexible sharpened blade conforming to the floor surface, with the weight of the machine holding the blade firmly to the floor. The weight does not allow the blade to lift or ride over well adhered surface coating material, thus lifting off the floor covering material.

**SECTION II**  
**SPECIFICATIONS**

<b>Weight</b>	<b>4200 lbs</b>
<b>Removable weight</b>	<b>2000 lbs</b>
<b>Fuel capacity</b>	<b>33 lb liquid propane</b>
<b>Hydraulic fluid capacity</b>	<b>15 gallons</b>
<b>Optional Auxiliary output</b>	<b>12 gallons @ 2250 psi</b>
<b>Travel speed</b>	<b>500 ft per minute</b>
<b>Engine</b>	<b>Hyundai 1.6L 4-Cylinder Propane</b>
<b>Maximum engine RPM</b>	<b>3200</b>
<b>Length</b>	<b>75"</b>
<b>Width</b>	<b>26"</b>

**SECTION III  
SAFETY AND PRECAUTIONS**

**SAFETY WARNING**

**CARBON MONOXIDE can cause severe nausea, fainting or death. Do not operate engine in closed or confined area without proper ventilation! A CO (Carbon Monoxide) monitor is recommended when operating scraper inside.**



Before operating the **TWISTER** please read the entire operation and safety manual with complete understanding of the safety section. If you have any questions on safety and precautions please call 800.522.2606.

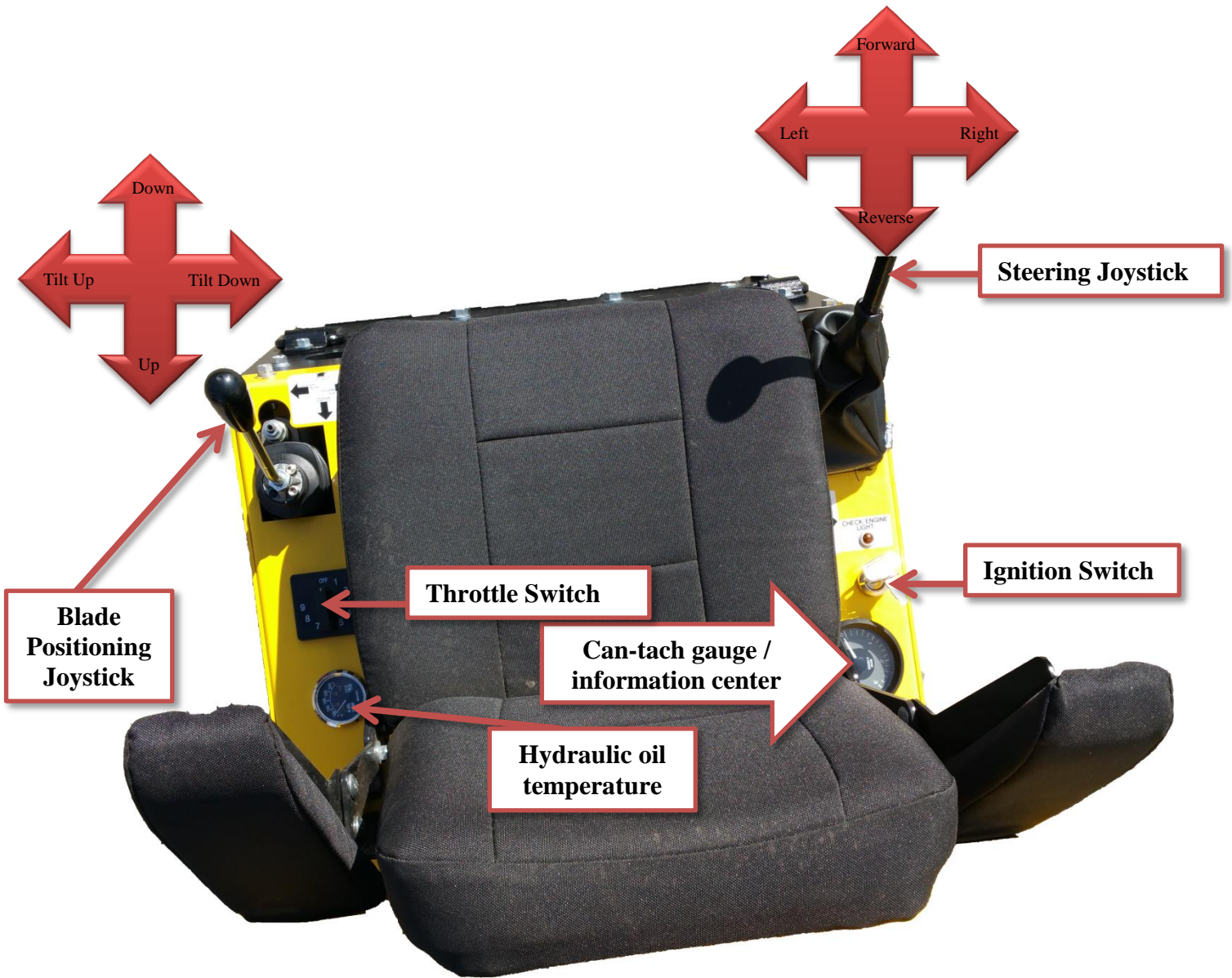
There are several advantages to an effective safety program which include: lower operating costs, lower workman compensations, less work time lost, high employee morale, and less problems. No one can work safely without knowing what precautions to take to insure personal safety. Operators must know what equipment to wear, which job practices are safe and which are not, and must be aware of what hazards are possible in the work area. A regular schedule of Preventive Maintenance on your equipment is the best protection against unpleasant surprises that slow production and sometimes result in injuries. Here are a few suggested safety tips.

1. The first step before any maintenance or inspection takes place should be to stop the engine and disconnect the battery terminals.
2. Wear proper eye and ear protection and heavy duty work gloves at all times.
3. Practice good Preventive Maintenance.
4. Practice good housekeeping.
5. Allow the TWISTER to come to a complete stop, turn off engine, and chock rear wheels before performing any maintenance procedures.
6. Replace worn parts when necessary.
7. Do not reach into blade or control arm areas while machine is in operation.
8. Do not attempt to open any access door until the machine has come to a complete stop and the engine and propane is turned off.
9. Be sure all electrical inspections or changes are done by a qualified electrician.
10. Loose surface coating can cause dangerous footing. Always be alert and careful.
11. After replacing parts, be sure all tools used are removed from the machine. Be sure all bolts and nuts are tightened. The loose connection of a rotating part could cause the part to fly off with explosive force, causing serious damage to the equipment and possible injury to the operator.
12. Always lower blade to the ground when the machine is unoccupied by the operator. Serious bodily injury may result if arms are not in the lowered position when not occupied.
13. Never allow unauthorized personnel or the general public into the work area.
14. The work area should be barricaded off to adequately keep all untrained persons out of the work site. If an unauthorized person enters the work area, stop the machine immediately and do not restart the machinery until they have left the work area.
15. Always allow a 200 foot buffer safety zone around all surface preparation activity.
16. Always run the TWISTER in a well ventilated area, with an approved OSHA air monitoring system in place at all times.
17. Read and obey all safety labels placed on the machinery at all times. If safety labels have been destroyed or removed call 800.522.2606 for free replacement prior to operating the machinery.
18. The TWISTER is **not a toy**. All operators must be over 18 years of age and must have read and reviewed the safety and procedures manual before operating the machinery.
19. The TWISTER is designed for surface preparation *ONLY*. It is not intended for towing, pushing or any other procedure not described in this manual.

20. Propane systems should be checked and documented twice yearly by a certified propane professional for leaks or damaged parts. If a propane leak is detected, turn off propane tank valve and leave the machine immediately and seek assistance from propane professional. Do not use or restart machinery until it is determined safe.
21. Horseplay and or high speed cornering is not allowed with this machine and could cause rollover resulting in injury or death.
22. No smoking or open flame is allowed while machinery is running or within 50 feet of the machine.
23. Operator must be sober and not under the influence of drugs or medication and under full control of all bodily senses while operating this or any machinery.
24. When transporting the TWISTER, it is recommended to use a low bed tilt trailer. This procedure insures the wheels do not leave a stable surface.
25. All TWISTER operators must receive safety training before performing any functions with the machine.

# SECTION IV

## TWISTER INSTRUMENTS AND CONTROLS TOP VIEW OF CONTROL AREA



## **SECTION V**

### **START-UP AND BREAK-IN**

The **TWISTER** has been safety tested and run at our factory prior to shipping. All fluid levels have been topped off; however, no propane has been added to the tanks for safety shipment purposes. Before running the TWISTER please check the following items that may have shifted or changed during shipping.

1. Raise engine covers and check oil level.
2. Check air cleaner filter element for snug fit.
3. All battery cable connections are snug.
4. Inspect for major hydraulic oil leaks. Snug hydraulic fittings using two wrenches. Use caution not to over tighten.
5. Fill propane tank.
6. Mount propane bottle in brackets, be sure bracket alignment pin corresponds with alignment slot on bottle.
7. Attach propane hose to liquid side of bottle by attaching to the handle valve. Snug fit the female connector attached to hose and slowly turn valve on. You should hear gas briefly enter the propane hose. Immediately check for propane leaks with soapy water solution. If leak persists after retightening the knurled female connector: **STOP**, turn off the bottle at valve and seek assistance from certified propane professional. Serious damage and or an explosion could occur.
8. Check lug bolts for tightness, torque 85-100 lbs.
9. Return all engine guards to proper position.
10. You are now ready to start the engine.
11. Once the engine is warming and running, and the operator is safely in the seat, the machine can be driven.

### **NEW MACHINE BREAK-IN**

Since the TWISTER is a very low maintenance and user friendly machine, the only break-in is for the HYUNDAI engine. Change break-in oil at 50 hrs as recommended by the engine manufacturer.

# SECTION VI

## MACHINERY OPERATION

Before reading the machinery operation section, new operators should familiarize themselves with the all diagram views of machine. These drawings show the activation of all moving parts of the TWISTER.

Even though the TWISTER surface prep machine is very easy to drive and operate, it is recommended that all operators familiarize themselves with this equipment before attempting to use machine in a jobsite or removal situation. This machine has certain steering characteristics that should be noted and practiced prior to operating in a confined space or restrictive environment.

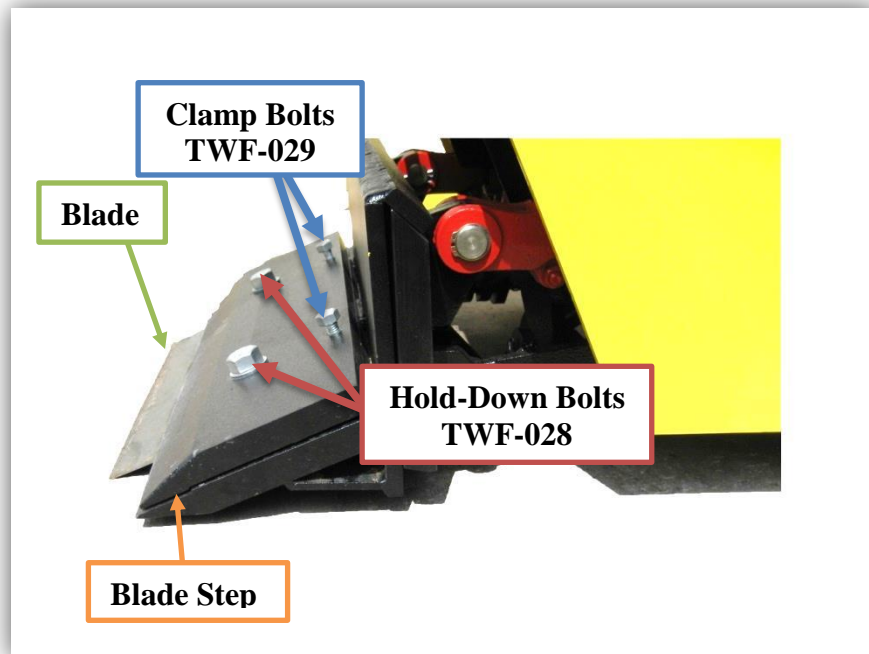
1. **TO MOVE THE MACHINE:** Using the right hand, slowly move the shifter lever in the desired direction of travel. Forward and left moves the machine to the left, backward and right reverses the machine to the right. It is just that simple to drive. Speed is controlled by amount of movement on the joy stick and or engine RPM. The higher the RPM'S the faster the machine will travel.
2. **TO ENGAGE BLADE TO SURFACE:** Move left joystick lever forward to lower blade bar assembly down. Move lever back to raise blade bar assembly off floor. Left and right movement adjusts the blade pitch.
3. Throttle control is on the left side of the seat, taking the unit from idle to 3200 RPM. The most optimum speed is 2600 to 3000 RPM. To change RPM of engine move throttle lever forward to increase engine RPM and backward to decrease engine RPM.
4. To change scraping blades: Lift blade to full UP position. Place a block under blade bar assembly for safety purposes. Stop engine. Loosen the set bolt at the rear of the Blade holder block using a 3/4" open-end wrench. Slide the dull blade out and Insert a new blade up against the shoulder stop. Retighten the set bolt and resume scraping. The large 1 1/8" blade holder bolt should not need to be more that hand tight. With a little practice you should be able to change blades in 15 seconds. Dull blades can be resharpened and reused many times.

### **SEE DRAWING OF BLADE CHANGE PROCEDURE**

5. Operators should lower the blade by pressing the left hand lever forward each time they get off the machine. This safety practice eliminates possible bodily injury from lowering the blade by unauthorized operators.
6. The transport caster should not be in contact with the floor while scraping. It will lift off the floor when blade is lowered. Caster contact with the floor while scraping will negatively affect scraper productivity and steering.
7. Do not transport machine with front of machine off the surface of floor higher than 1/2".

## BLADE CHANGE PROCEDURE

To change scraping blades:  
Stop Engine.  
Loosen the smaller **Clamp Bolts** at the rear of the blade holder using a  $\frac{3}{4}$ " open-end wrench. Slide the dull blade out.  
Loosen the **Hold-Down Bolts** if necessary to fit the replacement blade against the **Blade Step**. Retighten the **Hold-Down Bolts** by hand and then retighten the **Clamp Bolts** with your wrench. Lower the blade and resume scraping. With a little practice, you should be able to change the blades in 15 seconds. Dull blades may be sharpened and reused many times.



Operators should lower the blade by pressing the left hand lever forward each time they get off the machine. This safety practice eliminates possible bodily injury from running into the blade or lowering of the blade by unauthorized operators.

## **SECTION VII**

# **MAINTENANCE SCHEDULES**

### **DAILY MAINTENANCE BEFORE STARTING**

1. CHECK THAT THE OIL LEVEL ON THE DIPSTICK IS BETWEEN “Add” and “Full”
2. CHECK THAT THE ENGINE COOLANT LEVEL IN THE RADIATOR OVERFLOW BOTTLE IS BETWEEN “Add” and “Full”
3. CHECK HYDRAULIC OIL LEVEL
4. INSPECT ENGINE RADIATOR COOLING FINS FOR OBSTRUCTIONS (DUST, DIRT, GREASE)
5. INSPECT HYDRAULIC OIL COOLER FOR OBSTRUCTIONS (DUST, DIRT, GREASE)
6. TORQUE WHEEL LUG BOLTS TO 125 FT LBS
7. INSPECT ALL HYDRAULIC COMPONENTS AND HOSES FOR LEAKS AND CORRECT LEAKS IMMEDIATELY
8. INSPECT PROPANE COMPONENTS, HOSES, AND FITTINGS FOR LEAKS AND CORRECT ANY PROBLEMS IMMEDIATELY

### **EVERY 50 HOUR MAINTENANCE:**

1. “TOP OFF” HYDRAULIC OIL TANK
2. GREASE BLADE ARM PIVOTS AT BASE OF BLADE ARMS (near tires)
3. GREASE FRONT CASTER WHEEL AND INSPECT FOR DAMAGE TO TREAD
4. USE COMPRESSED AIR OR WATER PRESSURE TO REMOVE DIRT AND DUST FROM ENGINE COOLING RADIATOR AND HYDRAULIC OIL HEAT EXCHANGER
5. CHECK AND TIGHTEN ALL HYDRAULIC FITTINGS
6. INSPECT HYDRAULIC HOSES FOR DAMAGE
7. CHECK ENGINE COOLANT LEVEL AND ASSURE COOLANT MIXTURE IS 50-70%
8. INSPECT ENGINE COOLING FAN BELT
9. USE COMPRESSED AIR TO CLEAN DEBRIS FROM ALTERNATOR
10. INSPECT AND TIGHTEN ALL JOYSTICK STEERING LINKAGES

### **EVERY 100 HOUR MAINTENANCE:** (in addition to 50 hr maintenance requirements)

1. DRAIN AND REPLACE HYDRAULIC OIL AND FILTER
2. REPLACE ENGINE AIR FILTER
3. INSPECT ALL PROPANE FITTINGS AND HOSES FOR LEAKS USING SOAPY WATER
4. CHANGE ENGINE OIL AND FILTER WITH SAE 10W-30. IF OPERATING IN TEMPERATURES BELOW 32 DEGREES FAHRENHEIT USE 5W-30

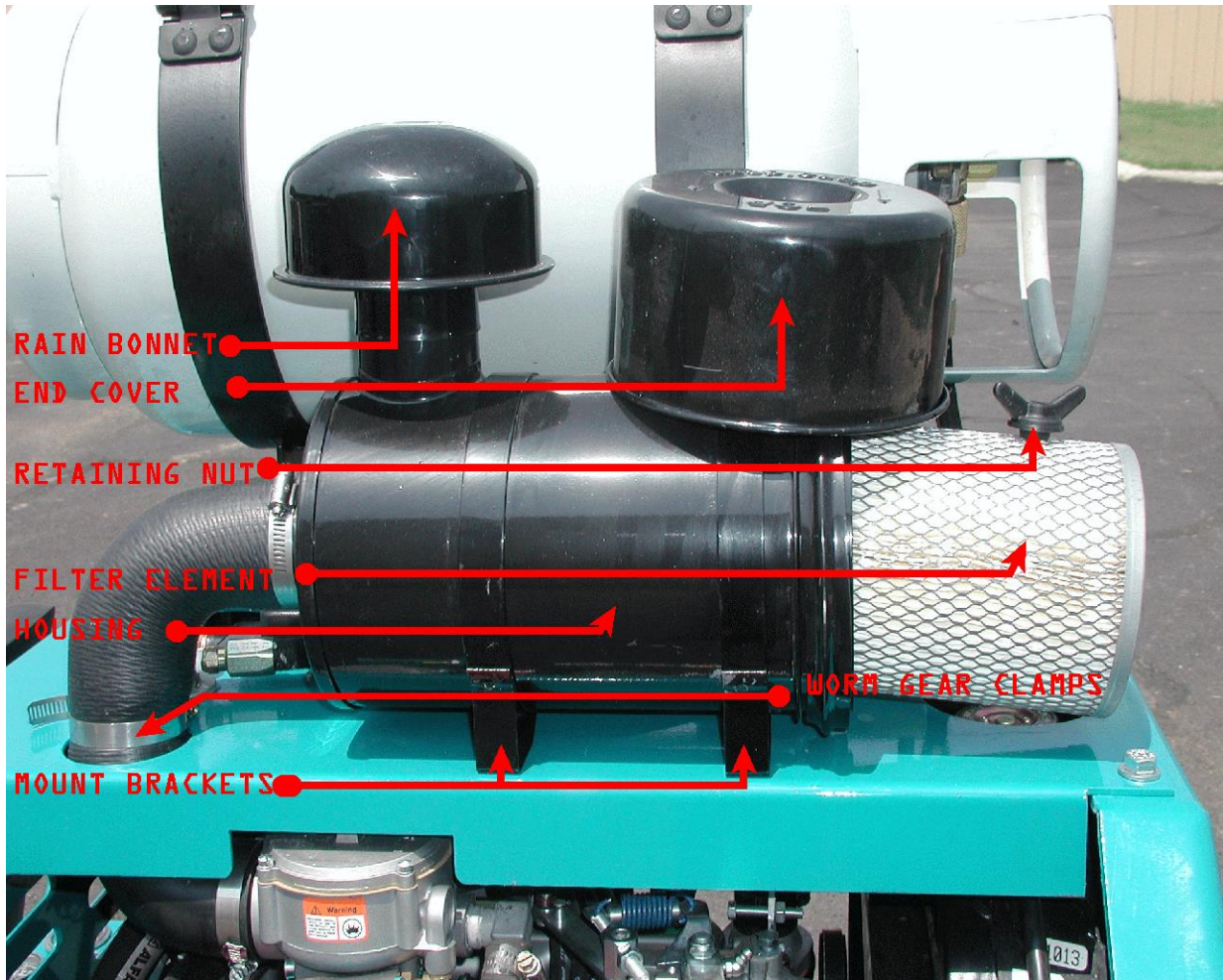
SEE ZPP 416 OWNERS MANUAL FOR FURTHER ENGINE MAINTENANCE SCHEDULES

## **BE AWARE OF THE EFFECTS OF HARSH ENVIRONMENTS TO THE SCRAPER EQUIPMENT.**

- A. The constant and continuous impacts of ceramic tile removal could cause premature loosening of bolts and nuts over entire machine
- B. While operating machine with a hydraulic attachment, monitor oil temperature closely
- C. When operating in dusty “demolition” type work, monitor the engine temperature, as the dust can cause the cooling fins of radiator to become obstructed causing engine overheating. Dust accumulating on engine air cleaner will cause improper fuel mixture, resulting in excessive exhaust emissions. Monitor the warning light on instrument panel for indications.
- D. Use of non-marking (white) tires on ceramic tile, marble, or sharp edged debris will result in extreme tire damage. Black tires are recommended.
- E. Carpet removal will generally result in front transport caster being wrapped with stray carpet strings. Remove debris from wheel daily to prevent irreparable damage to wheel bearing.



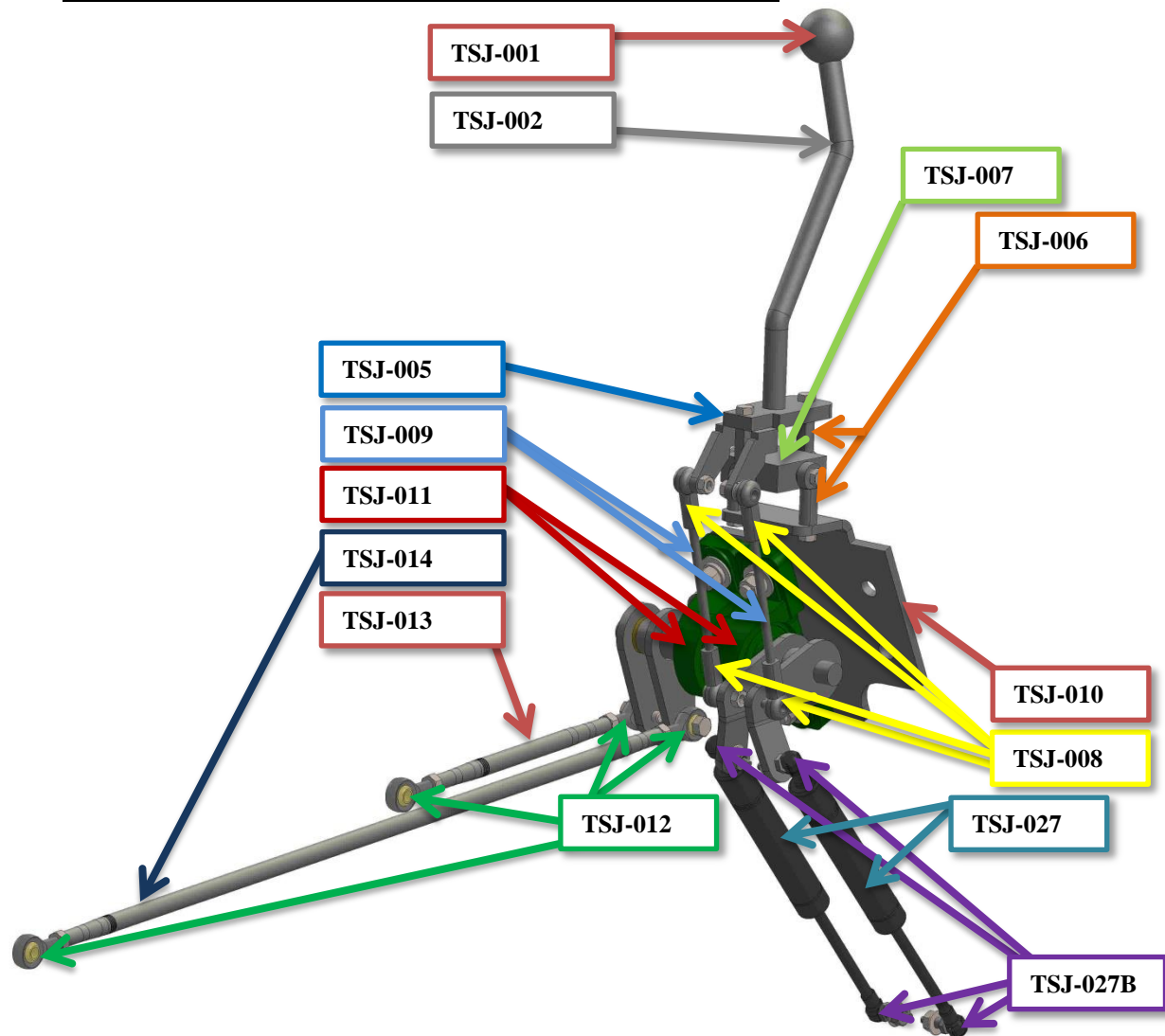
## TWISTER AIR FILTER ASSEMBLY



<u>DESCRIPTION</u>	<u>QTY</u>	<u>PART NUMBER</u>
End Cover	1	TWE-027
Retaining Nut	1	TWE-029
Housing	1	TWE-028
Mount Bracket	2	TWE-030
Complete Assembly	1	TWE-026
Air filter Element	1	TWE-033
Rain Bonnet	1	TWE-035



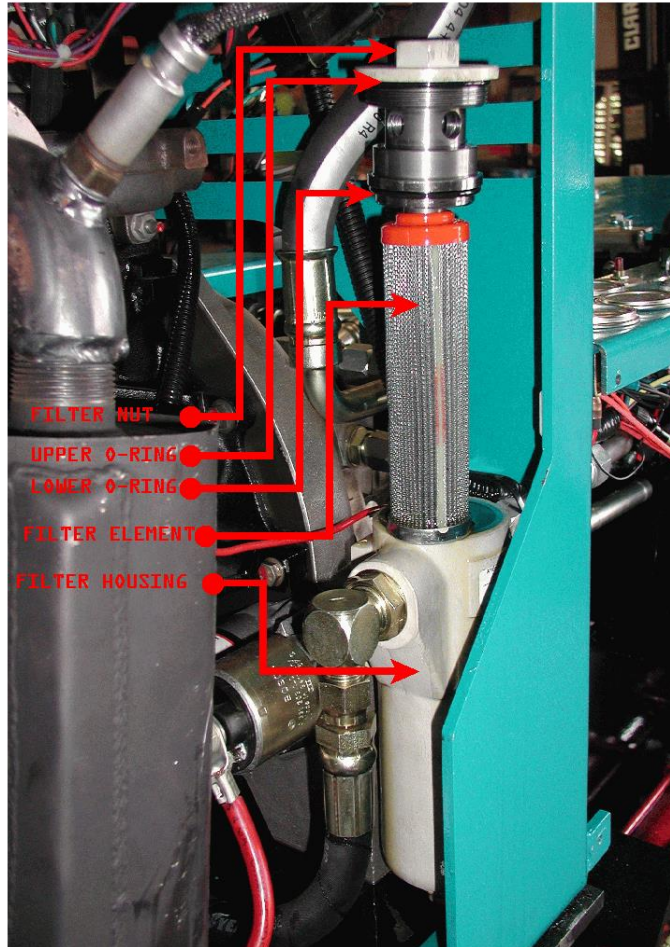
## TWISTER JOYSTICK ASSEMBLY (TSJ-028)



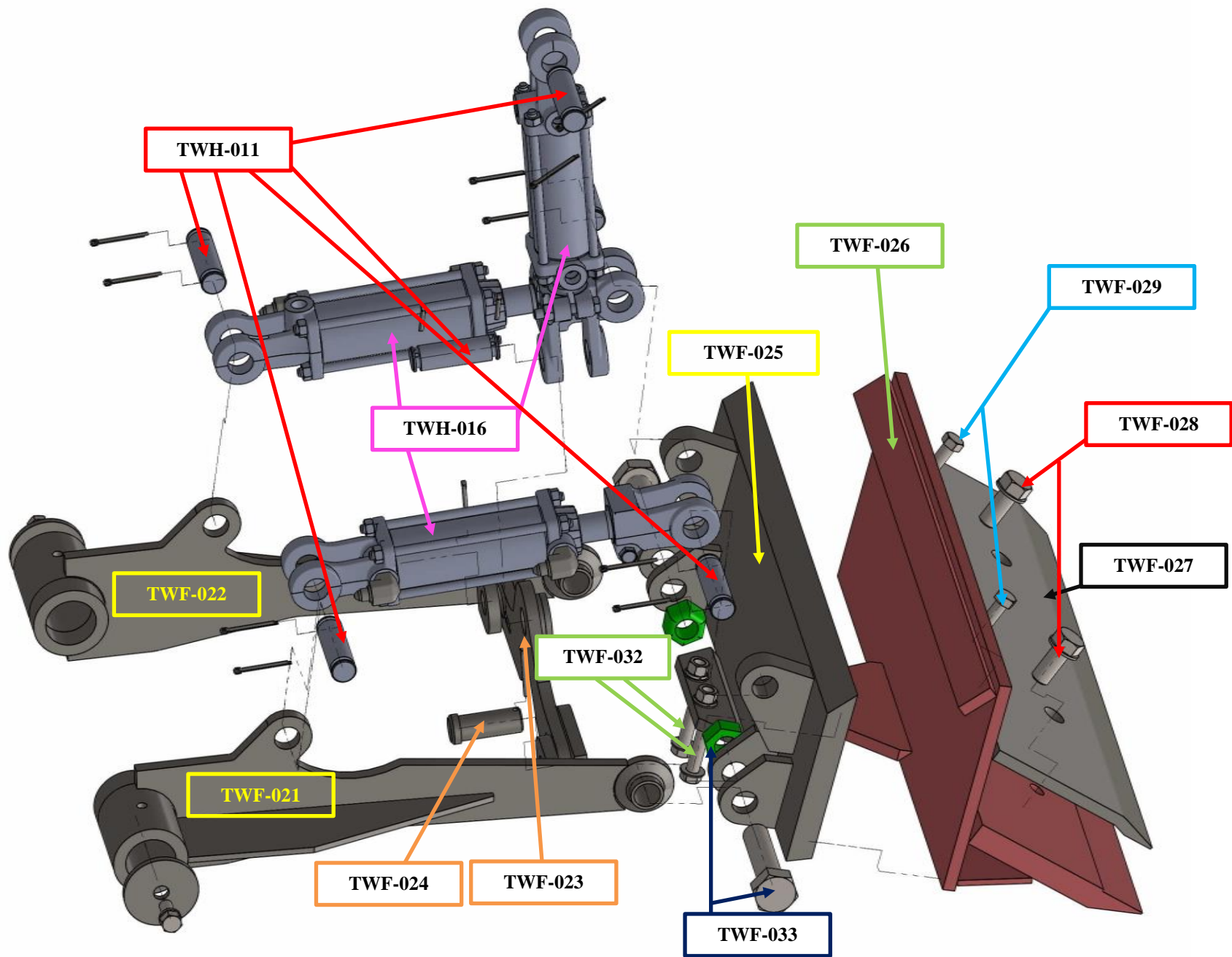
<u>DESCRIPTION</u>	<u>QTY</u>	<u>PART NUMBER</u>
Whole shifter assembly (pictured)	1	TSJ-028
Ball knob	1	TSJ-001
Shifter handle	1	TSJ-002
Shifter boot	1	TSJ-003
Boot clamp	1	TSJ-004
Pivot bracket	1	TSJ-005
1/4" rod end no/stud	4	TSJ-006
4-way pivot	1	TSJ-007
1/4" rod end w/stud	4	TSJ-008
1/4" linkage rod	2	TSJ-009
Shifter mount Plate	1	TSJ-010
Bearing Assembly	2	TSJ-011
5/16 rod end no/stud	4	TSJ-012
Trunion linkage "A"	1	TSJ-013

Trunion linkage "B"	1	TSJ-014
Trunion mount	2	TSJ-015
Crossover tube	1	TSJ-021
Crossover shaft	1	TSJ-022
Crossover tube bushing	2	TSJ-023
Black Damper	2	TSJ-027
Ball stud for damper	4	TSJ-027B

### **TWISTER HYDRAULIC FILTER ASSEMBLY**



<b><u>DESCRIPTION</u></b>	<b><u>QTY</u></b>	<b><u>PART NUMBER</u></b>
Filter Cap Nut	1	TWH-021
Upper O-Ring Seal	1	TWH-022
Lower O-Ring Seal	1	TWH-023
Filter Element	1	TWH-024
Filter Housing	1	TWH-025



**TWISTER FRAME AND COWLING PARTS**

<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NUMBER</b>
Front Caster	1	TWF-001
Front caster wheel only	1	TWF-002
Frame	1	TWF-003
Rear Plate	1	TWF-004
Front Plate	1	TWF-005
Foot Step	1	TWF-006
Left Instrument Panel	1	TWF-007
Right Instrument Panel	1	TWF-008
Front Cowling	1	TWF-009
Rear Cowling	1	TWF-010
Top Cowling	1	TWF-011
Propane Tank Brackets	1	TWF-012
Rear Weight Hanger	2	TWF-015
Wheel Scraper	2	TWF-016
Pivot Bar	1	TWF-017
Pivot Bar Retainer Ring	2	TWF-018
Pivot Bar Inner Spacer	2	TWF-019
Pivot Bar Outer Spacer	2	TWF-020
Right Arm	1	TWF-021
Left Arm	1	TWF-022
Crossover Arm	1	TWF-023
Crossover Arm Pin	2	TWF-024
Blade bar Mount Plate	1	TWF-025
Blade Bar Bottom 24"	1	TWF-026
Blade Bar Top 24"	1	TWF-027
Blade Bar Top "middle hold down bolts"	2	TWF-028
Blade Bar Top "clamp bolts"	2	TWF-029
Blade Bar Bottom 8"	1	TWF-030
Blade Bar Top 8"	1	TWF-031
Blade Bar Mounting Bolts 1/2-13 x 2	2	TWF-032
Blade Bar Pivot Pins	2	TWF-033
Rear Weights	14	TWF-034
Side Rear Weights	14	TWF-035
Side Front Weights	14	TWF-036
Engine Mount Plate	1	TWF-037
Side Cowling	2	TWF-038
Blade Positioning Valve Mount	1	TWF-039
Accessory Valve Mount	1	TWF-040
Hydraulic Tank Assembly	1	TWF-041-P
Seat Mount Plate	1	TWF-042
Bumper, Seat Mount Plate	2	TWF-042-B
Battery Tie Down Plate	1	TWF-044-P
Right Side Weight Cover	1	TWF-045
Left Side Weight Cover	1	TWF-046
Right side Panel	1	TWF-047

Left Side Panel	1	TWF-048
Accessory Control Handle	1	TWF-049
Wheel Lug Stud	10	TWF-050-PS
Wheel Stud Nut	10	TWF-050-PN
Side Cowling Latch	4	TWF-052
Latch, Rubber for Side Cowling	4	TWF-052-A
Tie Down D-Ring	2	TWF-053
Seat	1	TWF-054
Transport Dolly	1	TWF-056
Caster, Transport Dolly	2	TD-C
Bolt, Front Caster Wheel Axle	1	TWF-057
Fork, Axle & Seal for Front Caster	1	TWF-058
Rear Tire/wheel, all purpose Black	2	TWD-001-POC
Rear Tire/wheel, non-marking White	2	TWD-002-POC

### **TWISTER HYDRAULIC COMPONENTS**

<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NUMBER</b>
Hydrostat Assembly, self centering with gear pump 1		TWH-001N
Accessory Valve	1	TWH-003
Hydraulic Filter Assembly	See Detailed List on PAGE 15	
Wheel Motor	2	TWH-005-POC
Wheel Motor Hub	2	TWH-006-POC
Hydraulic Oil Heat Exchanger	1	TWH-007-E
Joystick Valve	1	TWH-008
Handle, Joystick Valve	1	TWH-008-H
Cylinder Clevis for tilt or lift cylinder	1	TWH-009
Pin, Lift/Tilt Cylinder	6	TWH-011
Hydraulic Heat Exchanger (fan)	1	TWH-015
Twister Lift and Tilt Cylinder	3	TWH-016
Hydraulic Oil Thermostat Kit - Emmige	1	TWH-017-E
Cap, Hydraulic Filler	1	TWH-020
Hydraulic Filter Housing	1	TWH-025
Hydraulic Hose Kit	1	TWH-029-H
Hose, left wheel motor front	1	TWH-050-F
Hose, left wheel motor rear	1	TWH-051-F
Hose, right wheel motor front	1	TWH-052-F
Hose, right wheel motor rear	1	TWH-053-F
Hose, valve to tank	1	TWH-057
Hose, cooler to tank	1	TWH-066-E60
Hose, pump to valve	1	TWH-067
Hose, block out to cooler in	1	TWH-068-E
Hose, valve to tilt cylinder tee	2	TWH-069
Hose, right tilt cylinder front	1	TWH-071
Hose, right tilt cylinder rear	1	TWH-072
Hose, left tilt cylinder front	1	TWH-073
Hose, left tilt cylinder rear	1	TWH-074

Hose, relief to filter in	1	TWH-075-P-H
Hose, filter out to pump	1	TWH-076-P
Hose, gear pump to block w/cartridge	1	TWH-077
Hose, lift cylinder upper	1	TWH-078
Hose, lift cylinder lower	1	TWH-079
Hose, case drain to block tee	1	TWH-080
Hose, case drain – short	1	TWH-082
Hose, case drain – long	1	TWH-083

### **TWISTER ELECTRICAL COMPONENTS**

<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NUMBER</b>
Hydraulic Temperature Gauge	1	TWE-002
Ignition Switch	1	TWE-003
Ignition key	1	TWE-003Key
Hydraulic Oil Temp Sender	1	TWE-007
Engine Light	1	TWE-014
Battery	1	TSG-003

### **Twister Hyundai 1.6L (H416) Engine Parts**

<b>DESCRIPTION</b>	<b>QTY</b>	<b>PART NUMBER</b>
Filter, Engine Oil	1	Z416-001
Regulator, Propane	1	Z416-002
Lock-off, Fuel Solenoid	1	Z416-004
Spark Plug	4	Z416-006
Plug wires	4	Z416-007
Water Pump	1	Z416-008
Gasket, Water Pump	1	Z416-009
O2 Sensor	1	Z416-010
Starter	1	Z416-013
Ignition Coil	2	Z416-014
Belt	1	Z416-020
Timing Belt	1	Z416-021
3 Way Muffler / Catalytic Converter	1	Z416-040
Alternator	1	Z416-041
Battery Hold Down Bracket (Top)	1	Z416-042
Radiator	1	Z416-043
Fan, Engine cooling	1	Z416-044
LPG Filter	1	Z416-047
CAN-TACH gauge readout	1	Z416-049

## Twister Propane Parts

<u>DESCRIPTION</u>	<u>QTY</u>	<u>PART NUMBER</u>
Propane Tank	1	TWP-001
Propane Tank Mount	1	TWP-002
Propane Bulkhead	1	TWP-003
Propane Filter	1	TWP-004
Propane Hose Assembly	1	TWP-005