TWEGEN®

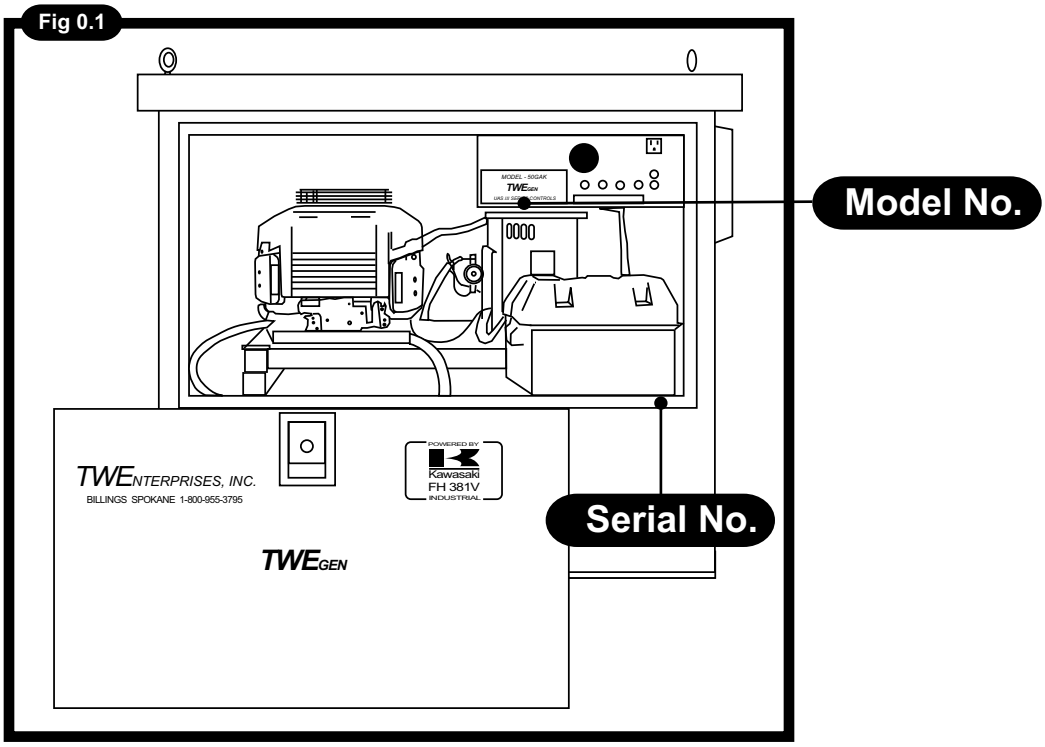
READ OWNERS MANUAL BEFORE OPERATING

OWNERS MANUAL

TWENTERPRISES, INC.

1-800-955-3795
636 Logan Lane
Billings, MT. 59105
www.twegen.com

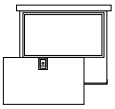
Fig 0.1



_____
(Model No.)

_____
(Serial No.)

This manual should remain with the unit



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Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

TAMPERING WITH EMISSION CONTROL SYSTEM PROHIBITED

Federal law and California State law prohibits the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new engine for the purpose of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the engine after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:
Do not tamper with the original emission related part:

- **Carburetor and internal parts**
- **Spark plugs**
- **Magneto or electronic ignition system**
- **Air cleaner elements**
- **Crankcase**
- **Cylinder heads**
- **Breather chamber and internal parts**
- **Intake pipe and tube**

! DANGER ! — **When you see this symbol it is to ensure the safety of yourself and any bystanders. Attempt safely (if possible) to remove any sources of danger to yourself or others.**

! WARNING ! — **When you see this it means there is a threat. This means to beware. This is counsel to desist from a specified undesirable course of action.**

! CAUTION ! — **Lets you know about something that may harm your equipment or data.**

! NOTE ! — **A comment or an explanation of importance or consequence.**

! DANGER !

DEADLY EXHAUST FUMES, FOR OUTDOOR USE ONLY

TWEGEN®

SECTION 1 - INTRODUCTION

Welcome to the world of the *TWEGEN*!

Thank you for purchasing your new ***TWEGEN*** generator from ***TWENTERPRISES, INC.*** ***TWENTERPRISES, INC.*** has been building well site operation generators and specialized industrial control systems since 1989. We have hundreds of units in service throughout the western United States including Canada. We are an industrial power systems company. The *TWEGEN* has been operating for years, proving its quality and design. We are proud to have…

the best agricultural-based generator on the market!

1.1 Reading This Manual

If at any time you do not understand a portion of this manual, please contact ***TWENTERPRISES, INC.*** **As seen in 1.6 Contact:**

1.2 Contents

This manual contains important information regarding these following models, including warranty, electrical diagrams, and exploded views for replacement parts.

TWE50GAK, TWE80GAK

1.3 Operation and Maintenance

Even though the ***TWEGEN*** is the best agricultural-based generator on the market it still requires periodic maintenance for reliable performance. It is the operator's responsibility to perform safety checks, to make sure that all maintenance for safe operation is performed promptly, and to have the equipment checked periodically by ***TWENTERPRISES, INC.*** Normal maintenance service and replacement of parts are the responsibility of the owner/operator and, are not considered defects in materials or workmanship within the terms of the warranty. As in all equipment, individual usage contribute to the need for this unit to be maintained and serviced. Proper care and maintenance of the generator ensures a minimum number of problems and keeps operating expenses at a minimum.

1.4 For Best Performance

Keep your generator clean by wiping it with a cloth periodically.

1.5 Service

When the generator requires servicing or repairs, simply contact ***TWENTERPRISES*** for assistance. Service technicians are factory-trained and are capable of handling all service needs. When contacting an Authorized Dealer about parts and service, always supply the complete model number and serial number of the unit as given on its data decal, which is located on the generator. See Figure 0.1 on page 2 for the location of the serial number. Write this information down inside the front cover of this manual.

1.6 Contact:

TWENTERPRISES, INC.

1-800-955-3795

636 Logan Lane
Billings, MT. 59105

www.twegen.com

! NOTE !

Before starting to service the engine, carefully read the applicable section to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations. A certain amount of basic knowledge is required for successful work. Especially note the following

1.7 Dirt

Before removal and disassembly, clean the engine. Any dirt entering the engine, carburetor, or other parts, will work as an abrasive and shorten the life of the engine. For the same reason, before installing a new part, clean off any dust or metal filings.

1.8 Battery Ground

Remove the ground (neg) lead from the battery before performing any disassembly operations on the equipment. **(fig 1.1)**

This prevents:

(a) the possibility of accidentally turning the engine over while partially disassembled.

(b) sparks at electrical connections which will occur when they are disconnected.

(c) damage to electrical parts.

1.9 Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly, in a staggered sequence. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of a turn and then remove them. Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

1.10 Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage.

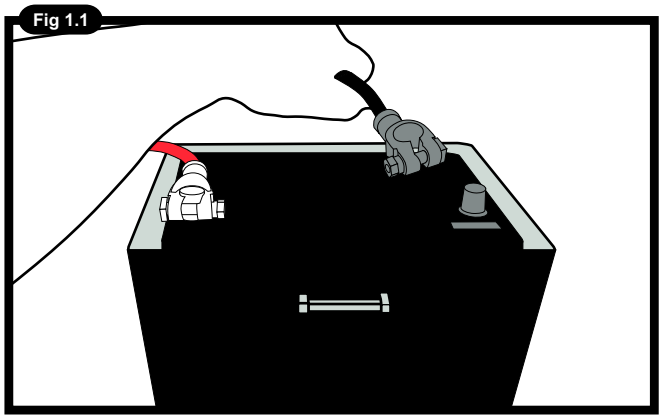
! NOTE !

Use a good quality, reliable torque wrench.

1.11 Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the heads.

Fig 1.1



! CAUTION !

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

1.12 High Flash-Point Solvent

A high flash-point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Standard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

1.13 Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

1.14 Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly.

! CAUTION !

Excessive amounts of agent may block engine oil passages and cause serious damage.

! NOTE !

An example of a nonpermanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

1.15 Press

A part installed using a press or driver, such as a journal, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

1.16 Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

1.17 Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

1.18 Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high temperature grease on the lips to reduce rubber to metal friction.

1.19 Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them.

! NOTE !

When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

1.20 Cotter Pin

Replace any cotter pins that were removed with new ones, as removal deforms and breaks them.

1.21 Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

! CAUTION !

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.

! NOTE !

This manual makes reference to molybdenum disulfide grease (MoS2) in the assembly of certain engine parts. Always check manufacturer recommendations before using such special lubricants.

1.22 Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example,a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color. **(See fig 1.2)**

fig 1.2

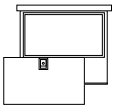
1.23 Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. The replacement parts will be damaged or lose their original function once removed.

1.24 Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

- Abrasion, Crack, Hardening, Warp.
- Bent, Dent, Scratch, Wear.
- Color change, Deterioration, Seizure.



1.25 Specifications

Specification terms are defined as follows:
"Standards" show dimensions or performances which brand-new parts or systems have.

"Service Limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

1.26 General Safety

Please read your generator Owners Manual carefully so you understand all the precautions for safe, efficient operation. Most accidents occur from failing to follow basic safety rules.

DANGER

Exhaust gas is deadly. This generator is not intended for indoor use. Always operate the generator in well ventilated areas

DANGER

Don't store anything, especially gas, oil, rags or other flammable materials, in the generator compartment.

WARNING

Keep the exhaust and air intake free from obstructions such as clothing, furniture or other material.

DANGER

Perform all service and maintenance work with the generator engine off and the negative battery cable disconnected. Moving parts can cause severe personal injury or death, and live wires could cause fatal electrocution.

DANGER

Back feed to utility systems can create serious risks to life or property. Do not connect to building electrical system except through approved device and after building main breaker is opened.

Section 2 - Overview

TWEGEN provides easy operation with durable construction.

2.1 Features

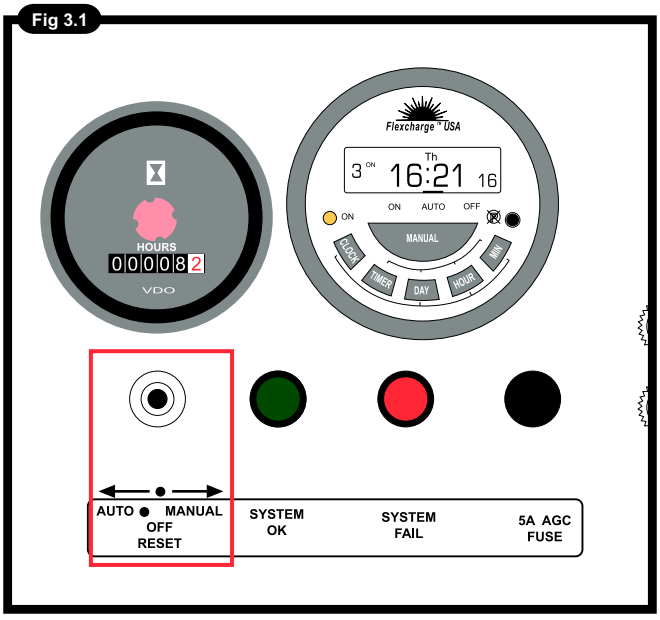
- **12-gauge steel**
- **Rodent-proof Enclosure**
- **Weatherproof Enclosure**
- **Commercial Powder Coat Finish**

Two model sizes use Kawasaki Overhead Valve air-cooled engines with hardened valves for extended life. They are emissions certified for EPA compliance. The Baldor brand generator employs a brushless voltage excitation system spinning on *40,000* hour rated sealed bearings. The engine runs at 3000 rpm transferring power through a gear tooth belt drive system. The belt never needs adjusting over its life of use. Its design provides *thousands* of hours of reliable power transmission.

A cooling fan is mounted on a machined hub to the engine crankshaft. It exchanges air through the enclosure for reliable constant cooling. The controls are fully contained in a steel compartment within the enclosure. The circuit board is seal-coated to avoid corrosion. Components on the board are industrial grade, rated for -40 Degrees!

Please read the following instructions. Familiarizing yourself *completely* with your ***TWEGEN*** will allow you to optimize its use.

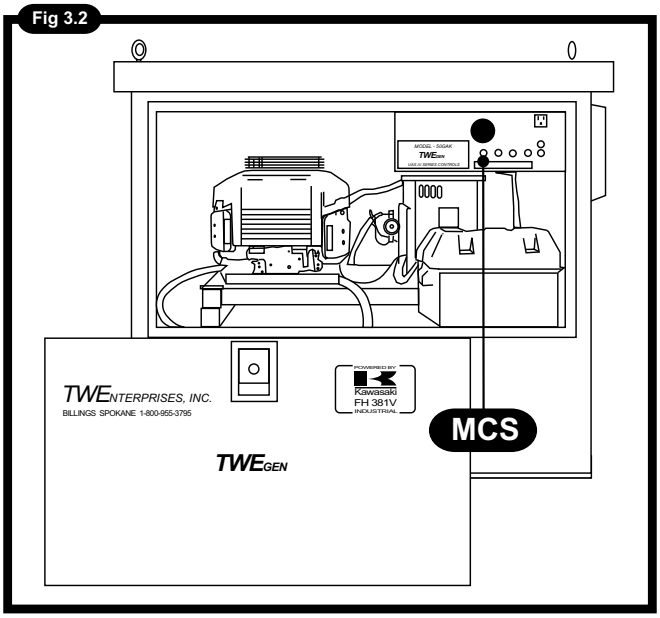
Fig 3.1



Section 3 - Operating Instructions

The ***TWEGEN*** is designed to provide simple operation. It has ONE Main Control Switch (MCS). It is labeled "AUTO - OFF/RESET - MANUAL".**(fig 3.1)** It is located on the control panel immediately inside the enclosure door.**(fig 3.2)** It moves to 3 positions: left, middle, right. Left is AUTO, middle is OFF/RESET, and right is MANUAL.

Fig 3.2



3.1 The AUTO Position

This will allow the generator to start/stop anytime a feature device (such as a Float Switch, Cycle Timer, etc.) turns on or off.

3.2 The MANUAL Position

This will instantly start the ***TWEGEN*** and it continues to run (regardless of feature devices) until the MCS is returned to the middle OFF/RESET position.

3.3 The OFF/RESET Switch

This will immediately shut off the engine, and disconnects power to the main outlet.

Section 4 - Normal Start and Operating Sequence

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

4.1 Normal Start and Operating Sequence

1. With the **MCS** in **AUTO**, and a feature device (see fig 4.1) on,
2. The engine will begin cranking.
3. Once the engine starts and speed rises, the starter will be disconnected by the Unattended Automatic Start Board (**UAS**).
4. The **UAS** begins timing for 2 minutes allowing the engine to warm up and stabilize running speed.
5. No power is available to the main outlet during this time.

! NOTE !

This warm up time cannot be by-passed. It is reintroduced each time the *TWEGEN* is stopped and started again.

6. After the warm up, the **UAS** energizes the main power contactor, connecting full power to the main outlet on the right outside of the enclosure.

! NOTE !

Any NEMA L14-30 sized plug will fit on the main outlet.

7. The pump will now be powered and water pumping begins.
8. When the feature device **(fig 4.2)** turns off, power will instantly be disconnected to the pump, and the ***TWEGEN*** will stop.
9. With the **MCS** remaining in **AUTO**, the ***TWEGEN*** will operate again each time the feature device turns on and off.
10. While in **AUTO** and not running, the green **"System OK"** light remains on, and the red **"System Fail"** light will be on, too. It's working just like a car oil light when the ignition switch is on, but the engine is not running. Once the engine is running, the oil light goes out. System Failure exists only when the red light is on *and* the green light is off. If the **System Fail light** (red) flashes during the crank and start, the low voltage monitor in the **UAS** Board is working. Making note of the red light periodically assures you that a System Failure will be illuminated in the event of occurrence.
11. The same above sequence occurs when the **MCS** is placed into the **MANUAL** position. Operation continues indefinitely until the **MCS** is returned to **OFF/RESET**. ***(Refer to Feature Devices for some exceptions on page 15)***

Fig 4.1

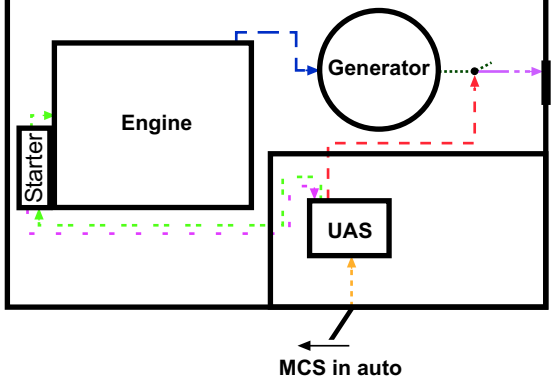
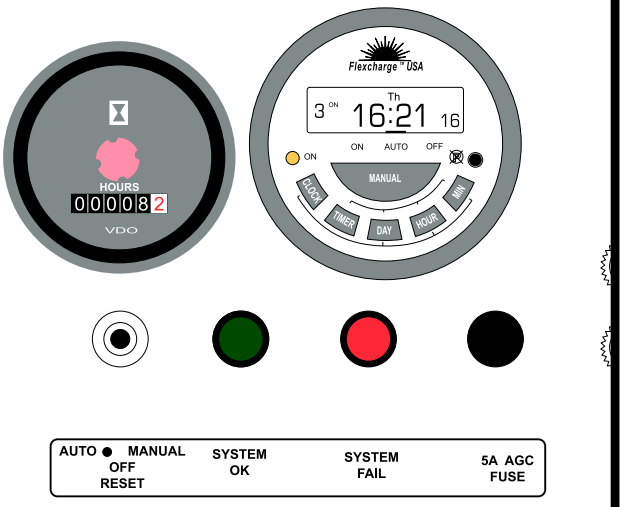


Fig 4.2



5.1 Placement

The ***TWEGEN*** should sit on a reasonably level surface. A tailgate-level platform may enable an individual to load and unload a ***TWEGEN***. (550 to 600lbs.) If the area is prone to vandalism, programming the ***TWEGEN*** to run at night, and/or placing it in a less conspicuous location can help. If shade is available, that will improve the operating condition in extremely hot weather.

! NOTE !

Your *TWEGEN* must be protected from livestock.

! NOTE !

Consult an electrician for proper wire type and sizing.

5.2 Grounding

A grounding lug is located on the outside of the ***TWEGEN*** enclosure. For protection, properly connect to an 8' grounding rod or attach to a steel well casing with at least a 14awg gauge copper wire.

5.3 Fuel

The ***TWEGEN*** operates on *direct* propane vapor pressure from the tank.

! NOTE !

No regulator should be installed between the propane tank and the 3/8" male flare fuel inlet on the upper right hand outside of the generator enclosure.

If code does not allow a full tank pressure to be used a high-pressure regulator may be used if its rated output pressure is *over* 10 psi.

The fuel line must be rated for propane fuel and high-pressure capability (at least 250psi). A standard 15' long hose is included with each ***TWEGEN***. Check for leaks before starting. The propane tank valve should be opened all the way.

5.4 Fuel Filter

The ***TWEGEN*** is equipped with an inline propane filter. These filters open and have a removable, cleanable, replaceable filter cylinder and magnet. They filter only particles. Impurities common in propane that are gaseous will not be filtered out. These filters may be added to a ***TWEGEN*** if an earlier model does not have one.

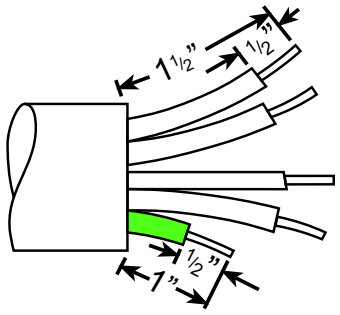
5.5 Pipe Line Pressure Switch

The Pressure Switch is adjustable up to 250psi. (A higher pressure switch, 15 to 640psi, is available for greater lift elevations.) This industrial 3R NEMA rated (outdoor) switch must be plumbed (1/4" NPT Female) to the water delivery line, near the ***TWEGEN***. Contact a well/plumbing service for design advice, or call TWE for assistance. The Pressure Switch comes with a standard 15' cord and NEMA L5-15 plug. The plug fits in an outlet on the right outside of the ***TWEGEN*** enclosure. (Note: The outlet for the Float Switch and the Pressure Switch is the same. The Main Control Board (UAS) discerns the difference when either of these devices is plugged in).

5.6 Wiring the Pump

The ***TWEGEN*** comes standard with 120/240vac single-phase power. (Three-phase units are available on special order. Call TWE Sales Department for specifics.) Refer to the pump manufacturer's literature for specific identification of voltage and wire hook up. The ***TWEGEN*** has a main power outlet on the right hand side of the enclosure. This outlet is a standard National Electrical Manufacturers Association (NEMA) configuration number L14-30 (four prong twist lock). Each ***TWEGEN*** comes with one L14-30 Plug. This plug will need to be wired to the pump. The plug has 4 screw -on terminals labeled as follows. **(fig 4.4)**

Fig 4.3



STRIP LENGTH FOR GROUND CONDUCTOR ON 5-WIRE UNITS ONLY

If a single 120 volt circuit is involved, a full 4000 watts on model 50GAK is available on the "X" connection.

Fig 4.4

TERMINAL IDENT.	CONDUCTOR IDENT.
GROUND OR GREEN COLOR	Green insulation for equipment ground only.
W	White or gray insulation for neutral only.
X, Y OR Z	Red, black, etc. insulation for hot conductor only.

5.7 Float Switch

The Float Switch has a standard 15' cord. It is fitted with a NEMA L5-15 (three prong twist-lock plug). This fits in a corresponding outlet on the right outside of the ***TWEGEN*** enclosure. (Refer also to the manufacturer's literature on installing and setting the float switch).

5.8 Mounting the Switch

1. Determine the required cord tether length according to product specifications on the front page and as shown in **(fig 5.1)**

2. Place the cord into the clamp as shown in **(fig 5.2)**

3. Locate clamp at desired activation level and secure the clamp to the discharge pipe as shown in **(fig 5.1)**

! NOTE !

Do not install cord under hose clamp

4. Tighten the hose clamp using a screwdriver. Over tightening may result in damage to the plastic clamp. Make sure the float cable is not allowed to touch the excess hose clamp band during operation.

5. Follow direct wire or piggy-back instructions for further installation.

5.10 Direct Wire Install

1. Follow steps 1 through 4 of "Mounting The Switch."

2. Wire switch as shown below.

3. Check installation. Allow system to cycle to insure proper operation.

Fig 5.1

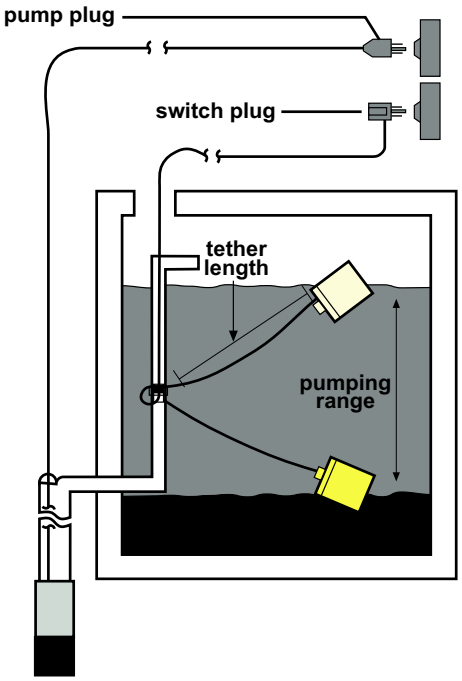
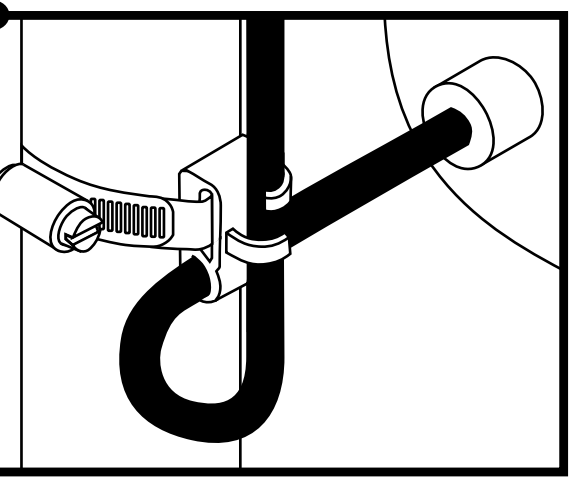


Fig 5.2



5.11 Programmable Cycle Timer

This Timer operates on a 7-day cycle It operates on the12 volt DC power from the main engine battery through the fuse on the main control panel.

! NOTE !

The Timer must be programmed in order to operate.

Desired times and days-of-the-week must be set up. If you have a programmable timer it is one of the following:

5.12 Flexcharge Timer

This timer is mounted on the inside control panel (fig. 5.3). This timer has 7 days overall program base. Each day and various combinations of days can be selected. there are a total of 8 timers to program a start and 8 times to program stops. An internal lithium battery (3 year life), enables the programmed memory to be retained. Refer to specific manufacturer's instructions for proper use. Note - to remove battery lid insert a coin and turn 1/8 turn clockwise to open. See fig. 5.5

! CAUTION !

<u>DO NOT OPERATE</u> a closed pipeline system without the pressure switch installed and properly adjusted! Do not allow the system to operate unattended till it has been observed operating in a complete cycle. Refer to the pressure switch manufacturer's adjustment instructions for proper setting.

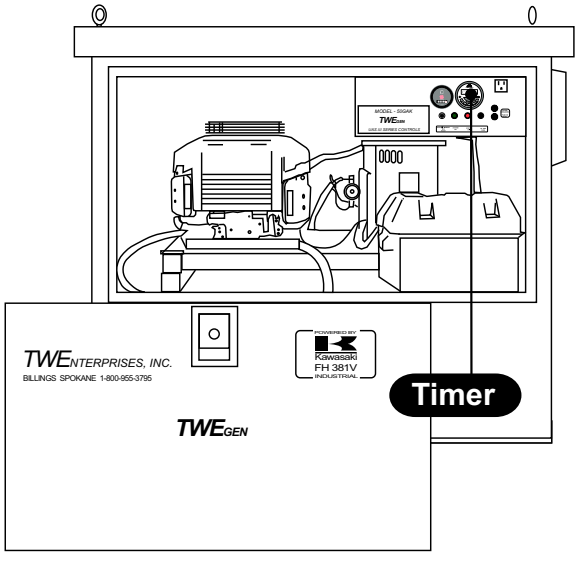
! WARNING !

Loose articles such as extra oil, filters and tools should not be stored in the enclosure while in use. <u>Fire and damage</u> to the drive train CAN occur.

Other

A notebook and pencil is advisable to keep in the door pouch holster. Visits should be documented with hour meter readings and other observations noted. This information can often be used to understand what may be happening or changing between visits.

Fig 5.3



5.13 Setting The Time

Set the clock to your local time and the day of the week.
1) Press and hold the CLOCK button.
2) Set the day of the week by pressing the DAY key until the correct day appears.
3) Set the HOUR by pressing the HOUR key until the proper hour appears. (24 hour time)
4) Set MINUTE by pressing the MIN key until the proper minute appears. When the time and day is set, release the CLOCK key.

5.16 Programming Your Timer

It is not necessary to use all 8 event pairs but you will need to set both an ON time and an OFF time for each event.

1) Pressing the TIMER key will enter the Program mode. Pressing the TIMER key will scroll through the events. Stop on the event you want to set. There are 8 events and an ON and OFF time for each event.

2) Press DAY key to select the day or group of days. Press the HOUR key to set the hour and the MIN key to set the minute. To clear the event, press the DAY key until the setting clears. Always set an OFF time for each ON time. It is possible to have one OFF event for several ON events. For example, if you have a light that comes on at different times each day but is to be OFF at the same time every day. One OFF event is all that is needed as long as it covers all of the ON days.

3) When the programming is complete, press the CLOCK key.

The MANUAL key will select ON, AUTO, and OFF. For Automatic operation it must be set to AUTO. You can manually turn on the load ON and OFF by selecting ON or OFF.

All programming and time can be reset to NO settings by pushing the RESET button with a pencil or pen. Use caution, all programming will be lost when this button is pushed.

5.17 Changing Your Timer Battery

Your Timer Battery is located in the back of the timer. In order to open the battery compartment insert a coin or one word and give the lid a 1/8 clockwise turn. If the lid does not come off easily just give it a couple of light taps and it should come off. The (+) side of the battery always faces the outside of the timer.

! NOTE !

Replace your battery every three years with a Lithium Battery CR 2032

Fig 5.4

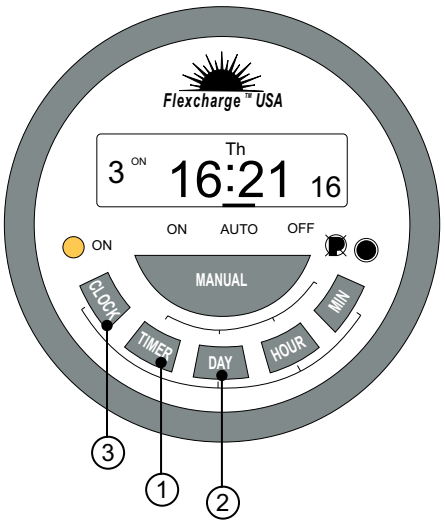


Fig 5.5

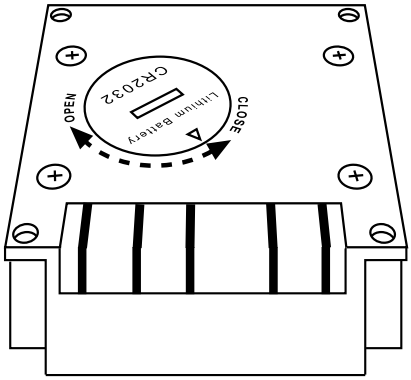
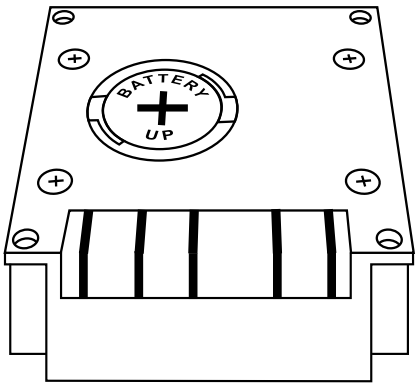


Fig 5.6



6.1 Float Switch

The float switch operates over a 90-degree swing: 45 degrees upward (on) and 45 degrees downward (off). With the Main Control Switch (MCS) on the control panel in the "AUTO" position, the ***TWEGEN*** will start when the float switch is down, and turn off when the float switch is up. This particular float switch is immune to turbulence from inflowing water and livestock activity. It has a definite angle of repose that prevents the internal switch from oscillating on and off. The cord is tied to a secure point inside the trough or tank. The tethered bulb will now operate at a depth based on the distance from which the bulb is tied.

6.2 Cycle Timer

The Timer is a 7-day 8 event pairs cycle timer. It turns on and off at specific times of day. With the Main Control Switch (MCS) in the "AUTO" position, the Timer will start and stop the ***TWEGEN*** each day at the times programmed ON and OFF.

6.3 Pipeline/Pressure Switch

This feature uses a Cycle Timer (see 6.2) together with an adjustable pressure switch. The timer determines *how often* the well will be pumped to refill the pipeline system. The pressure switch will shut the ***TWEGEN*** off when the pipeline system fills before the scheduled time **OFF** is reached. If the system does not fill up before the stop time is reached, the ***TWEGEN*** will simply shut off. When a pipeline system is nearly filled, the float valves in the various troughs and tanks are closed with the last one (usually the highest) still gradually closing. This increases back pressure on the water lines above normal delivery pressures causing the pressure switch to turn off the ***TWEGEN***. The green "System OK" light will now flash at a slow, every-other-second rhythm. This indicates that the ***TWEGEN*** has shut off due to the pipeline system having filled sometime during the current programmed run cycle. When the Cycle Timer reaches the "OFF" time, the "System OK" lamp will stop flashing and remain on. The ***TWEGEN*** is now in standby, ready to start when the next "ON" time arrives in the Cycle Timer.

This feature will also work with the MCS in "MANUAL". Once the system is full, it will not run again until the ***TWEGEN*** is manually reset. This arrangement can be used to fill a pipeline system that may be annually drained and require a number of days to completely refill at the beginning of a grazing season. The Cycle Timer will have to be programmed and the MCS placed in the "AUTO" position to provide automatic refills thereafter.

Example: A pipeline system has 5 water troughs located in a surrounding grazing area that are gravity fed from a 10,000 gallon storage tank 1 mile from the well. Float valves open on demand when the cattle drink, promptly filling each trough from the 10,000-gallon reservoir. The system has enough water for two days therefore the ***TWEGEN*** is programmed only to run once every 24 hours. In order to minimize vandalism, and promote cooler operating conditions, the Cycle Timer is programmed to turn on each evening at 10:01 p.m. Water pumps out at 10 gallons a minute (GPM) to the main tank. Assuming 200 cow-calf pairs will consume an average of 25 gallons per day, the ***TWEGEN*** will run about 8.3 hours per day. By 6:30 a.m. each morning the system is full and ready to deliver water all day. Because the ***TWEGEN*** Pipeline System is being used, the Timer is set to turn *off* at 10:00 p.m. Why? Because the Pressure Switch will turn the system off *whenever* it is full! If more water is used out of the system one day than the next, the system will simply run the amount of time necessary to fill the system. Because the daily cycle is set to include an entire 24 hours (short one minute), pumping is allowed to continue virtually non-stop to fill the system. New times never need to be programmed to compensate for changes in daily water demands. Even a breach in the water system such as a float valve leaking will be responded to with extra pumping to keep the system as full as possible. If a system's capacity does not hold enough water for a day, the Timer must be programmed to cycle more frequently. Specific times of day can be selected to afford aggressive refilling during peak watering times.

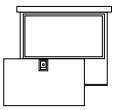
6.4 Low Well Sensor

This feature is an option that is installed by ***TWENTERPRISES*** or an authorized ***TWEGEN*** dealer. It is located in the main control panel. This feature has a labeled control knob on the control panel. This feature protects the pump from running dry in case a well draws down. When less or no water is being pumped, the Low Well Sensor (LWS) interrupts the ***TWEGEN*** operation by turning it off temporarily. The green "System OK" light begins to rapidly flash indicating that the ***TWEGEN*** is now in a timed out stop to allow the well to recover. Once the timed-out delay is over, the ***TWEGEN*** will start over again. The LWS will continue to protect the pump until the operating feature (i.e. Float Switch, Cycle Timer) is completed.

This feature can greatly economize operation costs. If a well has a large capacity, but a slow recovery rate, the LWS reduces the running time by allowing the pump to extract water as fast as it can, then stopping to wait for the well to recover before pumping again.

Section 7 - System Failure

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK



7.1 System Failure

The ***TWEGEN*** monitors and protects itself against several conditions. The UAS Main Control Board protects the following:

- Low Oil Level/Pressure
- High Temperature (150deg F Enclosure Ambient)
- Un der speed shutdown
- Failure to Start (Attempts to start 4 times)
- No starter engagement with too low battery voltage
- Over Speed - Over Voltage
  149 or 298 volts
- Under Speed - Under Voltage
  95 or 190 volts
- Belt Breakage
- Auxiliary: Other Customer Required Mode(s) of Protection

When any of the above conditions occur outside normal limits, the UAS Control Board permanently shuts down operation. The ***TWEGEN*** will not attempt to start again until the Main Control Switch (MCS) is placed into OFF/RESET and returned to MANUAL or AUTOMATIC.

When a System Failure occurs, the green “System Ok” light will be off and the red “System Failure” light will be on. There are two ways, at the time failure occurs, that the indicator lights will change. If a signal from outside the UAS Board (low oil level/pressure, high temperature or low propane tank pressure) occurs, the red System Fail light will come on for 5 seconds before the green “System OK” light goes out and the ***TWEGEN*** shuts off. If a problem is detected within the UAS Board itself, the red “System Fail” Light and green “System OK” light will instantly switch at the same time the generator stops. Being careful to observe the difference will reduce the time and effort needed to identify the probable source of failure.

! NOTE !

Whenever a System Failure occurs (red light ON, green light OFF), check the following items first:

1. Check the oil level

If low, add. Be sure *not* to screw in the dipstick when taking a reading. Only seat the cap and stick for proper measurement. Start system. If ok, problem may be corrected. If weather is extremely hot, change oil weight to SAE 40W.

! NOTE !

If failure continues to occur, check the following.

2. Check the fuel

Pressure must be 10psi or greater going into the fuel hook up. If any measurable or detectable liquid propane is available in the tank, the pressure should be adequate. Propane will produce as much as 200 psi gas pressure on a warm day as long as liquid is available in the tank. If a tank has pressure less than 10psi, the tank will only contain compressed vapor, which is virtually zero fuel remaining, the the unit will shut down with an under speed 50 hz and “system fail” light will be on. Be sure the tank valve is open all the way. Also, some tank valves have an “excess flow valve” that shuts off fuel if the flow surges too quickly out of the tank. These devices are designed to shut off fuel in case of a line break. These valves can activate if the fuel is turned on too fast. If this happens, the valve must be turned off, then slowly opened.

3. Check the Temperature Switch.

If the unit has over-heated, a temperature switch under the bottom of the control panel will shut the unit off. If this occurred, the surface temperature of the temperature switch would have to reach 150 deg F. If it is uncomfortably warm to touch the temperature switch, it may well have tripped. If so, it should shortly reset once it cools. A watered rag placed on the temp switch will expedite its reset. If so, it will make an audible “click” when it does. Should this happen, it will definitely verify that it was activated. If the unit is too hot, examine the exhaust fan and hub. Ensure they are intact to the engine drive shaft. Be sure that air can freely move through the enclosure. Check the engine to be sure the top screening and fins on the cylinder head(s) are clear and air can freely flow. Sometimes a ***TWEGEN*** is placed in a building or shed for added protection. Air must be able to freely flow into the building. The exhaust flange on the back lower side of the enclosure must be connected directly to the outdoors through a duct. This forces all the heated air and exhaust fumes outdoors ensuring a constant exchange of new, cool air.

If steps 1,2, and 3 are okay

Turn the ***TWEGEN*** off to reset and try to start it again. Does the system start? (If not, go to step 4). Watch carefully. If System Failure happens again, does the red light come on (or remains on) and 5 seconds after it’s started, System Failure happens again? (Does System Failure immediately occur? Go to step 7). Check steps 1,2 and 3 again. The problem is likely still there.

If unable to find any problem, call TWE. 1-800-955-3795.

4. Engine cranks, but won't start?

(If not, go to step 5.) Check for spark. Pull off the spark plug wire, stick a screwdriver in the wire boot, hold the shank of the screwdriver near clean metal on the engine as you crank the engine. If the spark is good, take the spark plug out and see if it's fouled or broken. Clean or replace the spark plug and try starting again. Be sure fuel is getting to the engine by pushing the primer button on top of the propane regulator while the engine is cranking (located inside on the upper right hand side of the enclosure). If spark and fuel are both getting to the engine.

Call TWE for further assistance.
1-800-955-3795.

5. Does Green System OK Lamp come on?

(If not, go to step 6.) Is there any "clicking" sound by the starter solenoid mounted on the generator next to the engine? Yes? The solenoid may be faulty. A rap on it while it is suppose to be engaged may cause it to work till it can be replaced. If the clicking is a constant "chatter", the battery is too low. Charge the battery and try again.. If there is no audible click on the solenoid.

Call TWE for further assistance.
1-800-955-3795

6. Check fuse. Check battery voltage.

The lamp is a long-lived LED (life expectancy of 60,000 hours). It is more often than not a trustworthy indicator (unless broken). Check battery voltage. It may be too low.

7. Likely is the engine is running too fast.

To test, pull throttle down while starting. Move throttle up till engine just starts. If the system will continue running as long as you hold it, but immediately shuts down when you let go, the problem sounds like governor control.

Call TWE for further assistance.
1-800-955-3795

8. Unit starts and runs for 75 seconds, then shuts down?

Generator voltage is likely missing.

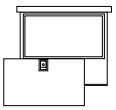
Call TWE for further assistance.
1-800-955-3795

9. Nothing here describes the problem I am having.

Call TWE for further assistance.
1-800-955-3795

Section 8 - Maintenance

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK



! DANGER !

Remove the negative (—) lead from the battery before performing any disassembly operations on the equipment.

The ***TWEGEN*** is designed to work over a lifetime of ownership. Unlike modern manufacturing that typically builds-in limited life expectancies, ***TWEGEN*** is designed and quality assessed continually to make them the longest running system available on the market. The products we use are selected from proven manufacturers such as:

- **Kawasaki**
- **Baldor**
- **Cutler-Hammer**
- **Browning Manufacturing**

All equipment will eventually need repair. But, careful maintenance will repay giant dividends in minimizing repairs and extending life.

! NOTE !

The following maintenance is *essential* to enable the *TWEGEN* to operate reliably for a long time.

8.1 Battery

Keep terminals clean. Check each time the oil is changed. Look at the water level in the cells. Keep full by adding distilled water as necessary.

! NOTE !

Checking the water level is critical.

8.2 Air Filter

Examine the air filter each time the oil is changed. Wash the outer foam/sponge wrap with effective detergent and water whenever dirty. Hand cleaners work well, too. Regular attention will add long life to the paper filter.

8.3 Drive Belt

Check tension at each oil change. Reach underneath the power deck (while unit is not running) and twist the belt. If a lot of resistance is met by the time a ¼ turn is achieved, the belt is still under proper tension. More than ¼ turn? Too loose. Less than a ¼ turn? Too tight. Adjust the tension accordingly. Also feel the edges and teeth. Make sure there is no fraying, splits, tears or ribbons. It should also be pliable and clean.

8.4 Inspect…..

Examine bolts, nuts, screws, etc. Everything should be intact and secure. Finding a loosening component can prevent failure and avoid needless damage. Look for oil leaks/stains. Also, if propane leaks it will often make slimy deposits at its point of leakage. Take nothing for granted. While the oil is draining during an oil change, the entire unit should be scrupulously examined.

8.5 Oil & Filter

Check the oil level often. The dipstick must only be seated when reading. Do not screw in to verify the oil level.

! NOTE !

On new engines, DO NOT use synthetic oils before engine has been used 200 hours or more. Avoid the Use of Mobile 1 brand synthetic oil.

8.6 Periodic Maintenance

Change Oil and Filter after first 8 hours of operation on new engine.

Change oil thereafter every 100 hours.

Change oil filter every 200 hours.

Oil Capacity : 1.6 Qt when Filter not Changed
1.8 Qt When Filter changed

Oil Filter: 49065-7007

Clean/Check Air Filter every 100 hours. Change annually.

Use SAE5W-30 weight oil when weather 32Deg F or colder.

Use SAE30 oil when 32deg F to 100deg F.

Use SAE40 oil when 90deg F or higher.

Spark Plug NGK 7222

Spark plug gap TWE50GAK .028 - 030”
TWE80GAK .028 - 030”

Valve Lash: Check every 300 hours (check cold)
See Section 8.11

! CAUTION !

Engine operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure and accident.

Before starting the engine for the first time, add oil: The engine is shipped dry. Pre oil the engine to force all air from the internal oil passages and the oil filter.

- Fill fresh engine oil to the specified level (see Oil Level Inspection).
- Run the engine at slow speed 2 minutes.
- Stop the engine and check the oil level.

8.7 Oil Level Inspection (fig 8.1)

- Place the engine on a level surface.
- Remove the oil filler cap (A) and wipe its dipstick (B) with a clean cloth.
- Insert the dipstick into tube (C) without screwing it in, then check the oil Level.
- The oil level should be in the operating range (D) (grid area) on the dipstick.

If the oil level is in the “ADD” range (E), add enough engine oil to bring oil level to the operating range. (fig 8.2)

! CAUTION !

Do not add more oil above the operating range. Excess oil will cause a smoking condition.

Use the same type and make of oil that is already in the engine.

! NOTE !

If the engine oil type and make are unknown, use any brand of the specified oil to top up the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.

If the oil level is over the “FULL” range [F], drain the excess oil by loosening the drain plug.

! NOTE !

If at the time of purchase you use Kawasaki oil your warranty on your engine will be extended an extra two years for a total of four years. By NOT using Kawasaki oil it will mark the inside of the engine thereby voiding the manufactures extended warranty.

Fig 8.1

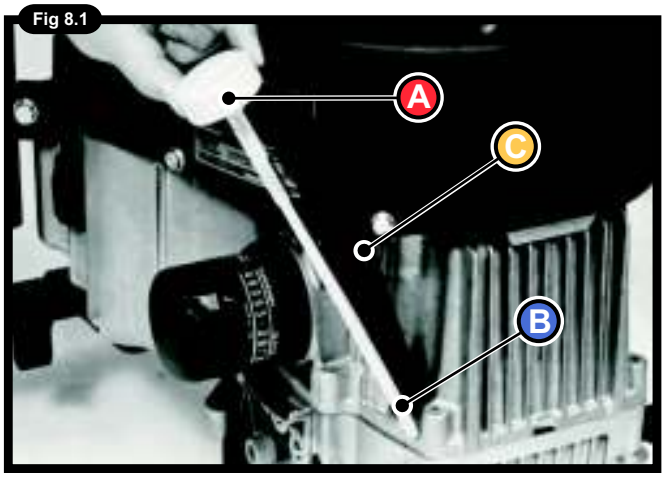
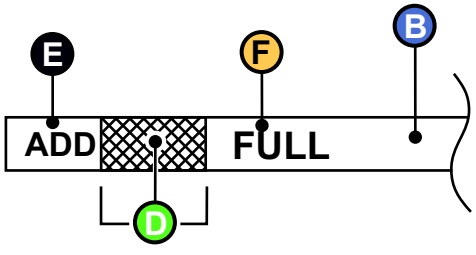


Fig 8.2



! NOTE !

If at the time of purchase you use Kawasaki oil your warranty on your engine will be extended an extra two years for a total of four years. By NOT using Kawasaki oil it will mark the inside of the engine thereby voiding the manufactures extended warranty.

8.8 Oil Change

- Change the oil and filterafter first 8 hours of operation. Thereafter change oil every 100 hours.
- Start and warm up the engine so the oil will drain easily. Stop the engine.
- Take oil drain hose from inside the eclosure and place in container at the end of the hose and release cap screw and drain. (Fig 8.3)

! WARNING !

Be careful of hot oil when drained. It may be hot enough to burn you severely.

8.9 Oil Filter Removal (Fig 8.4)

1. Using a strap wrench or oil filter wrench (A), remove the oil filter (B). Part# 49065-7007

When unscrewing the oil filter, place a suitable container beneath the oil drip tray to receive oil from the oil filter and oil passages in the engine. Turn the filter counterclockwise to remove it.

! NOTE !

When you remove your oil filter, place a paper towel below the filter. A small amount of oil will come out of the engine. (Fig 8.5)

Fig 8.3

Fig 8.4

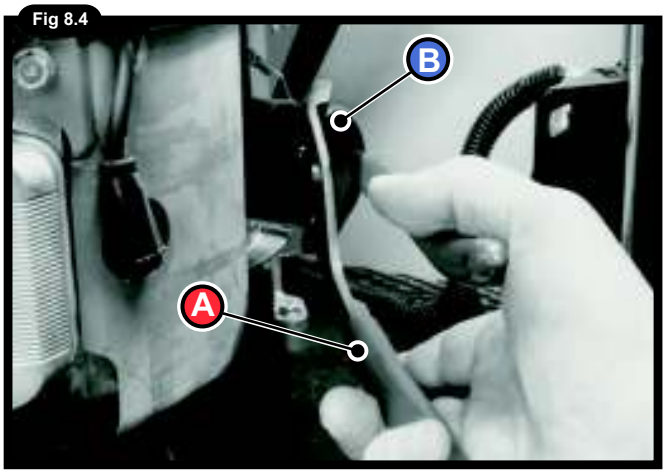


Fig 8.5

8.10 Oil Filter Installation (Fig 8.6)

- Apply light film of engine oil to the seal (A)
- Install new filter. Turn the filter until the seal contacts mounting surface (B) of the engine and then turn the filter BY HAND 3/4 turn more.
- Run the engine at normal speed 2 minutes. Check for leaks around the engine.
- Stop the engine. Check the oil level (see Oil Level Inspection)

8.11 Valve Clearance Adjustment

- Turn the crankshaft in proper direction until the piston is at the TDC of the compression stroke.
- Loosen the locknut (A) and adjusting bolt (B).
- Insert a 0.152 - 0.203 mm (0.006 -0.008 in.) thickness gauge (C) between the rocker arm and valve stem end,and turn the adjusting bolt until the thickness gauge begins to bind between the rocker arm and valve stem end. Sweep the thickness gauge during this adjustment/

Valve Clearance (when cold)
Inlet, Exhaust: 0.006 ~ 0.008 in.

- Holding the adjusting bolt with a spanner (A), tighten the adjusting locknut (B) to the specified torque.

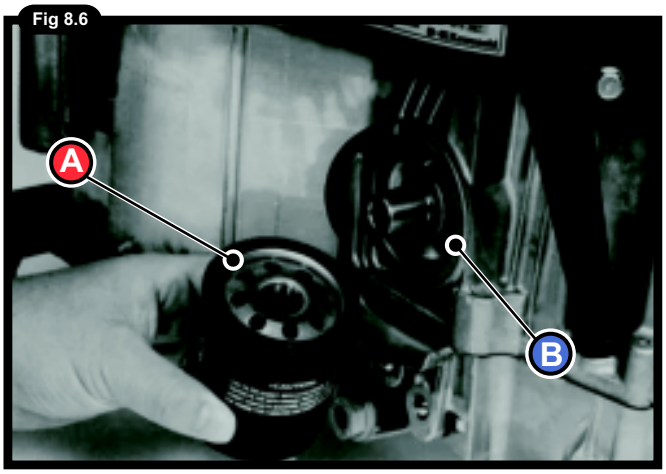
Torque – Valve Clearance Adjusting Locknuts:
11 N-m (1.1 kgf-m, 87 in-lb

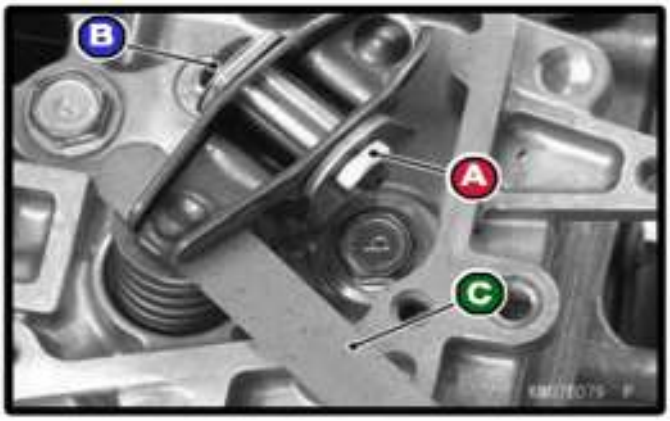
- Do not over tighten the valve clearance adjusting locknuts
- After the valce clearance adjustment, measure the valve clearance again. Readjust the valve clearance if necessary.

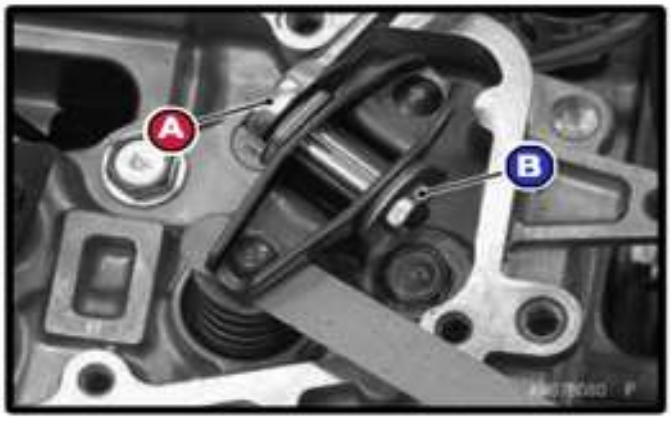
8.12 Engine Oil, Oil Filter, and Oil Cooler

- Remove the dipstick and pour in the specified type and amount of oil.

Fig 8.6







8.13 Spark Plug Cleaning and Inspection (fig 8.8)

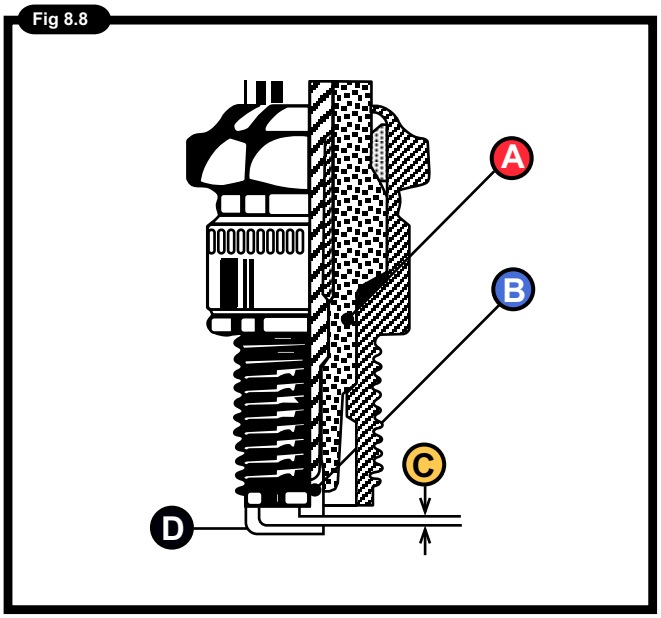
- Carefully pull the plug cap from the spark plug, and remove the spark plug.

★ If the plug is oily or has carbon built up on it, clean the plug using a high flash-point solvent and a wire brush or other suitable tool.

★ If the spark plug electrodes are corroded or damaged, or if the insulator is cracked replace the plug. Use an NGK spark plug or its equivalent.

(A) Insulator
(B) Center Electrode
(C) Plug Gap .028 - .030 in.
(D) Side Electrode

Fig 8.8

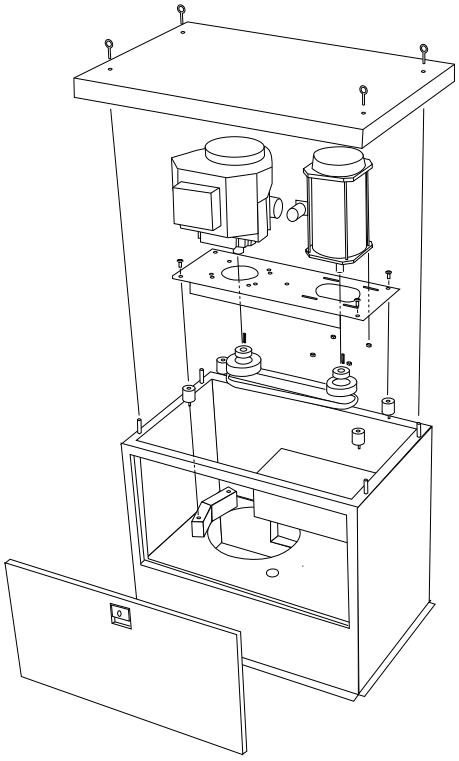


8.14 Periodic Mainenance Chart

OPERATION	INTERVAL					
	First 8 hr.	Every 50 hr	Every 100 hr.	Every 200 hr.	Every 300 hr.	Reference
Check or clean air intake screen			●			
Check and add engine oil		●				pg 19
Check for fuel and oil leakage			●			
Check for loose or lost nuts and screws			●			
Check battery electrolyte level		●				
Clean air cleaner foam element (1)		●	●			pg 18
Clean air cleaner paper element (1)		●	●			
Clean dust and dirt from cylinder and cylinder head fins (1)			●			
Tighten nuts and screws			●			
Change engine oil	●		●			
Clean and re-gap spark plugs			●			pg 18.22
Change Oil filter	●			●		pg 21
Change air cleaner paper element (1)				●		
Check and adjust valve clearance					●	

SECTION 9

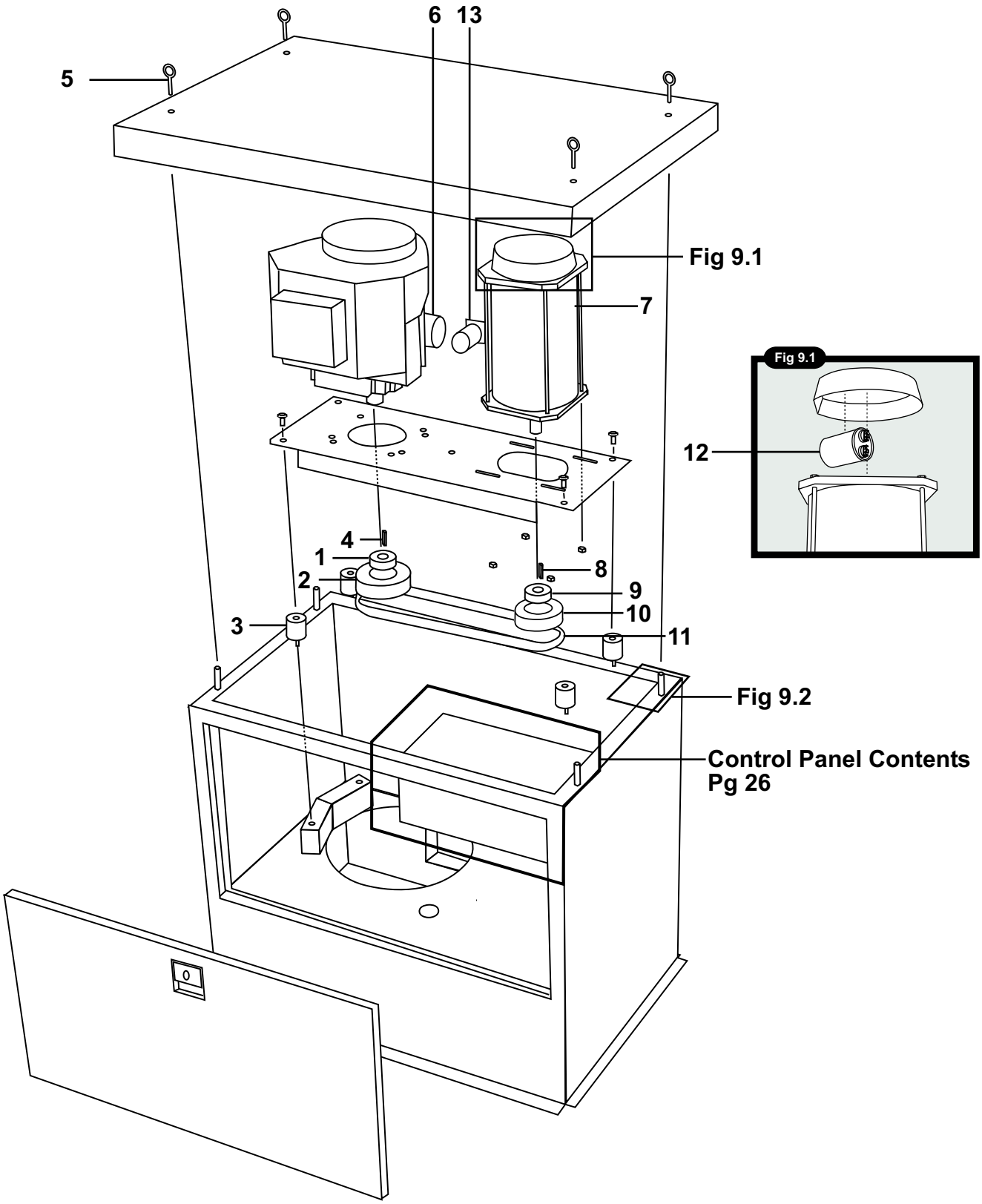
TWEGEN
Exploded View

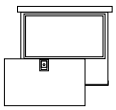


Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

Section 9 - *TWEGEN* Exploded View

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK





Section 9 - *TWEGEN* Exploded View

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

Ref #	Part Number	Description	Quantity
1	117164	Bushing, Eng Pulley	1
2	P48-8MGT-30-2012	Pulley, Engine Drive	1
3	MR-200-8923	Vibration Mounts	4
4	KEYWAY01	Keyway, Engine Pulley	4
5	EYEBOLT	Eyebolt, Powder Coat	4
6	49065-7007	Oil Filter	1
7	1560800G6	Generator End for TWE50GAK	1
	1560800G10	Generator End for TWE80GAK	1
8	KEYWAY02	Keyway, Alternator Pulley	1
9	117090	Bushing, Alternator Pulley	1
10	P40-8MGT-30-2012	Pulley, Alternator Drive	1
11	12248MGT30	Belt, Drive	1
12	C6030F11SP	Capacitor	1
13	C.Q. 25.1526	Starter Solenoid	1

Section 9 - *TWEGEN* Exploded View

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

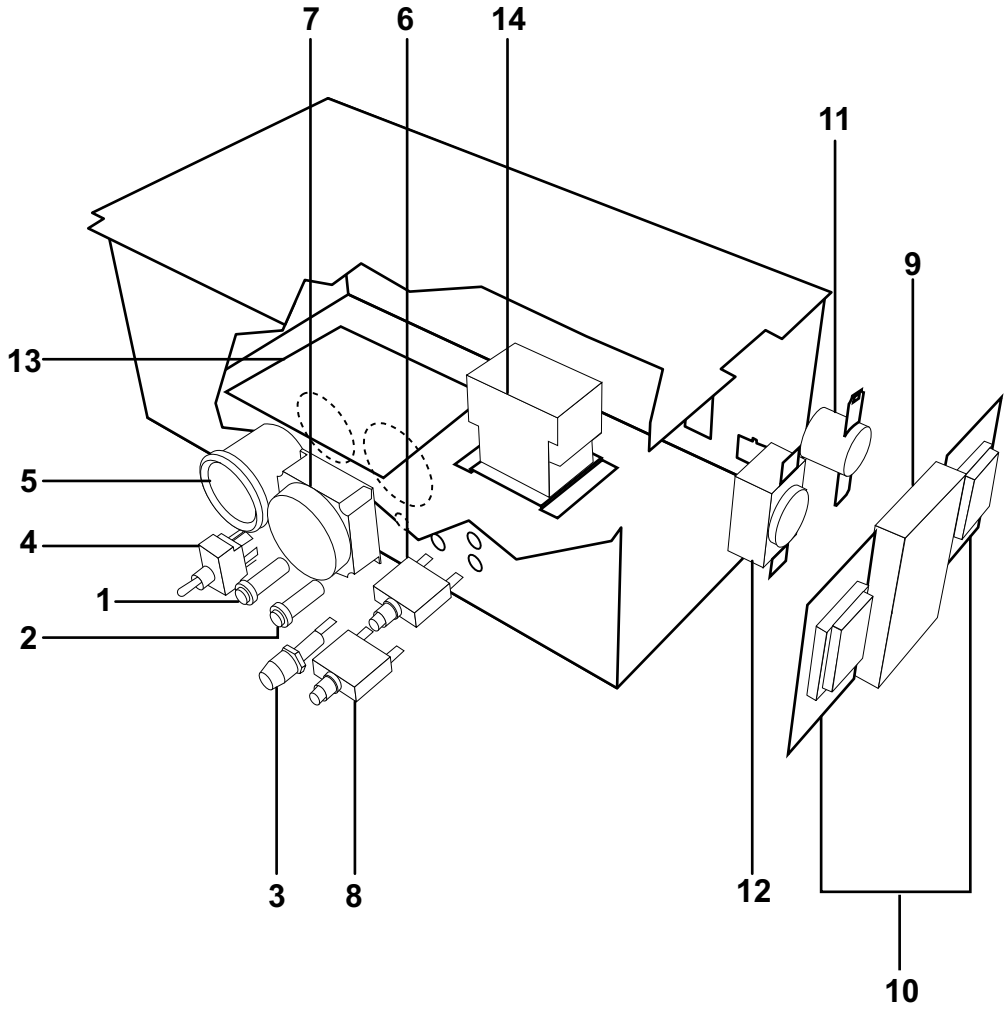
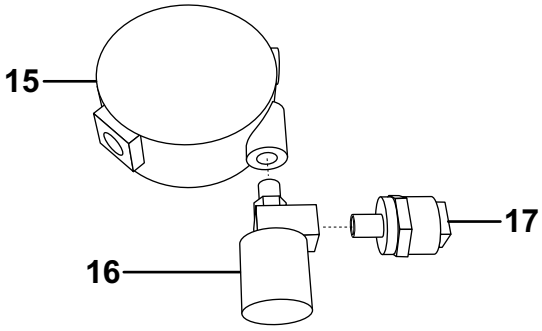
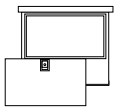


Fig 9.2





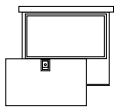
Section 9 - *TWEGEN* Exploded View

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

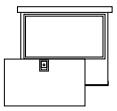
Ref #	Part Number	Description	Quantity
1	2653082G	Green LED	1
2	2653081R	Red LED	1
3	740-5274	Fuse Holder	1
4	G31-437	Toggle Switch	1
5	331-810	Hour Meter	1
6	075207A	Circuit Breaker	1
7	SM-20TM619	Flexcharge Timer	1
8	075207	30A Circuit Breaker	1
9	WR50-C	Power Outlet Cover	1
10	WR104	Single Outlet Cover	2
11	L515R	Receptacle, Bryant Float	1
12	L1430R	Receptacle	1
13	TWE11	UAS Board	1
14	• L36-899	Contactor 120V System	1
	• L36-818	Contactor 240V System	1
15	T60-G	Regulator	1
16	601005	Solenoid Shut-off Valve 12vdc	1
17	F108	LP Gas Filter	1

Section 10 - Common *TWEGEN* Parts List

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK



Description	Part Number	Quantity
Precleaner, Air Filter	11013-7046	1
Air Filter	11013-7049	1
Regulator	T60G	1
Fuel Filter	F108	1
Fuel Pressure Switch	0A8584	1

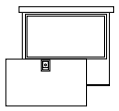


Section 11 - Generator Maintenance History

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK

Section 12 - Notes

Air Cooled, Remote Well Site Generator TWE50GAK, TWE80GAK



TWEGEN Warranty

MANUFACTURED BY: ***TWENTERPRISES, INC.***

FOR REFERENCE PURPOSE ONLY

TWENTERPRISES, INCORPORATED **WILL REPAIR OR REPLACE, AT ITS OPTION, ANY PART THAT IS PROVEN TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP UNDER NAORMAL AND PROPER SUER FOR A PERIOD OF ONE (1) YEAR OR 1500 HOURS, WHICHEVER COMES FIRST.** This warranty time period begins on the date of purchase. Warranty repairs and replacements will be made without charge for parts or labor. Anything replaced under warranty becomes the property ***TWENTERPRISES, INC.*** All parts replaced under warranty will be considered as a part of the original product and any warranty on those parts will expire coincident with the original product warranty. Major components, such as engines and generator that are not manufactured by ***TWENTERPRISES, INC.*** are specifically excluded from ***TWENTERPRISES, INC.*** Coverage and are separately covered by their respective manufacturers. Those manufacturers' warranties are included in the owner's information package supplied with each ***TWEGEN***.

EXCLUSIONS AND LIMITATIONS: This warranty does not extend to parts affected or damaged by other products used in association with a ***TWEGEN***, or by accident and/or collision, misuse, neglect, tampering, improper storage, improper installation, parts worn beyond service limits due to normal wear/normal service life, parts affected or damaged by the conversion to or use of fuel other than the fuel which the ***TWEGEN*** was originally manufactured to use, poor operation due to contaminated or poor fuel quality, damage due to fuel contamination, the incorporation of, or use of, unsuitable attachments, unauthorized alteration, or any causes other than defects in material or workmanship of the ***TWEGEN***.

This warranty is effective for the time periods described and subject to the conditions provided for in this policy to the original purchaser and is not transferable.

TWENTERPRISES, INC. reserves the right to improve the design of any model ***TWEGEN*** without obligation to modify any model previously manufactured.

LIMITED LIABILITY AND DISCLAIMER: The liability of ***TWENTERPRISES, INC.*** under this warranty is limited solely to the remedy of defects in the materials or workmanship. There is no other express warranty, implied warranties, including those of merchantability and fitness for a particular job. The foregoing statements of warranty are exclusive and in lieu of all other remedies. ***TWENTERPRISES, INC.*** disclaims any responsibility for loss of time or use of the ***TWEGEN***, or the equipment used in association with the ***TWEGEN***, transportation, commercial loss, or any other incidental or consequential damage or loss.

LEGAL RIGHTS AND WARRANTY: This warranty gives you specific legal rights, and you may also have other rights. Other warranties may be available through other specific manufactures' warranties.

OWNER'S RESPONSIBILITY: ALL TRANSPORTATION, COMMUNICATION AND/OR SHIPPING COSTS OF ANY KIND INVOLVED IN THE COURSE OF WARRANTY SERVICE MUST BE BORNE BY THE OWNER. The owner is responsible to perform the maintenance required in the owner's manual. All claims for warranty must be brought to the attention of ***TWENTERPRISES, INC.*** within 30 days of failure, or before the end of the warranty period.

I have read and accept the terms of the above warranty.

Purchaser Signature_____

Model No._____

Serial No. _____ **Date of Purchase:** _____/_____/_____

FOR REFERENCE PURPOSE ONLY

TWENTERPRISES, INC.
Publish Date 2/28/2013