JetPower

FILTER II

OPERATION AND MAINTENANCE MANUAL PN 28.04.1014

GROUND POWER UNIT - GPU

OUTPUT OF 28 VDC AND 24 VDC

SPECIAL EDITION FOR AIRCRAFT MANUFACTURER

JET POWER FILTER II - PN 28.09.1013

SUPERSOM IND. E COM. LTD.

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1 - DESCRIPTION

1.1 - GENERAL

1.1.1 - PRESENTATION

The “JET-POWER FILTER II” is a static GPU designed to provide ground power for maintenance and startup of aircraft having 28 VDC electrical systems.

The “JET-POWER FILTER II” changes alternating current at its input to a continuous current of 28V (adjustable on panel) by using its transformer and six-phase rectification. Therefore when electric energy is available to supply the GPU it can substitutes external batteries or/and GPU equipped with diesel engine.

The “JET-POWER FILTER II” provides pure output tension with extremely low ripple (0.035% at 100A), even under normal load, causing no interference with aircraft equipments.

Due to its transformer and oversized rectifier the regulation is excellent and provides protection against short circuit, over current, overvoltage and phase failure.

The “JET-POWER FILTER II” has been resized especially for MANUFACTURER to be used in extreme conditions (24 hours working) providing power to mounting equipments on an aircraft during stages of assembly and electronics testing.

It is equipped with a second output cable of 28 and 24 VDC, to substitute aircraft´s battery, being able to reduce 09 volts on its output voltage relative to the first output by setting its selector switch on position “7”.

1.1.2 - TECHNICAL INFORMATION

1.1.2.1 - INPUT:

- 220V (Brazil);
- 208V (USA);
- Three-phase, no phase sequence.

NOTE: The neutral of "JET-POWER FILTER II" is the BLUE cable.

1.1.2.2 - 1st OUTPUT (Plug for Output Source)

It is located on the left front side, coming directly from inside the source, providing 24 to 33 VDC, depending on how the seven position switch (front panel) is set.

1.1.2.3 - 2nd e 3rd OUTPUT (28 and 24V to substitute aircraft´s battery)

They are two gray connectors, placed at the front center, to be used with one cable, connected on the left to provide tension and current equal to the first output (28 V), or connected on the right to provide 09 volts less than the first output. When giving 33 volts it will provide 24 volts (up to 10A, protects against overload). The cable to be connected to these outputs is loose, with a gray connector, with length as ordered (5 or 10 m). In order to avoid accidental disconnection lock it by using the attached pin.

1.1.2.4 - MAXIMUM CURRENT:

- 2,000A at peak (supply capacity);
- 600A continuous (28V output).

NOTE: The current delivered by "JET-POWER FILTER II" at the start, or during equipment tests, depends on the turbine kind or the applied load.

1.1.2.5 - CURRENT LIMITER

- The current can be limited to 30, 50, 100, 200, 300, 400, 500, 750, 1000, 1500 e 2000A.

NOTE: The "JET-POWER FILTER II" is equipped with an electronic circuit adjustable up to 11 positions. It turns off the source when the current set at knob is reached.

1.1.2.6 - MAXIMUM POWER

- 56kVA at peak with full load.

NOTE: The Power required from installation can be much lower if not using maximum current.

EXAMPLE: With load up to 1200A in the output, the power necessary will be 37kVA maximum at peak. The rated power of the network should be above 25kVA.

1.1.2.7 - AUTOMATIC PROTECTION (for the aircraft)

It automatically shuts down the equipment in case of phase failure, over-voltage or over current (above the settled value), in order to minimize risks to the aircraft and GPU.

1.1.2.8 - RIPPLE

- 0,59% at 300A (28V output);
- With load from 0 to 100A, only 0.01 VAC - Ripple 0,035%.

1.1.2.9 - DIMENSIONS

- 111.5 cm (length) x 85 cm (width) x 88.5 cm (height).

1.1.2.10 - WEIGHT

- 528 Lbs.

1.2 - SPECIFICATIONS

1.2.1 - OUTPUT CABLES AND TRANSFORMER

1.2.1.1 - INPUT CABLE (PN 28.01.1146)

The cable is quadripolar, brand "Prysmian", model CORDPLAST, 4 x 10 mm^2 of gauge, 25 meters of length. It does not come with a plug (the plug can vary according to the local utility company).

1.2.1.2 - 1st OUTPUT CABLE 28VCD, direct plug (PN 28.01.3340)

The normal output cable line is double, extra flexible, 95 mm^2 of gauge, 5 meters of length, equipped with anti-friction protection and output socket; brand "SUPERSOM" (PN 28.01.1139).

1.2.1.3 - 2nd OUTPUT CABLE 28 and 24 VCD, gray connector (PN 28.01.4705 with 5 meters and PN 28.01.4710 with 10 meters)

This is a brand new model of cable, all detachable, equipped with anti-friction. It comes with 5 or 10 meters of length (as ordered), double gauge of 70 mm^2, in one end it comes with a gray connector and in the other end it comes with a rubber plug , 28V standard, brand "SUPERSOM" (PN 28.01.1139). Must be used to substitute the battery, can be attached to the 28VDC connector of high current or to the distinguish output connector (24 VDC).

1.2.1.4 - TRANSFORMER (208V/220V – PN 28.01.1103)

- It is designed to deliver alternated current of low voltage to the rectifier circuit;
- Comes with 09 output connections (six-phase), resulting in 28VDC after rectification;
- It has 27 input wires to provide a voltage adjustment at the equipment input.

NOTE: It can be used in 208 or 220V by only switching cables plugged into the fuse holder. These cables are marked according to its voltage

(208 or 220V). They cannot be plugged together; it could cause a short circuit. To plug in one cable the other must be removed and isolated. The three cables must have the same voltage (208V USA or 220V Brazil).

- Power : 56 kVA at peak;
- Maximum output current: 2,000 A;
- 5 seconds off peak with voltage drop of 20%.

1.2.2 - CONTROL PANEL (UPPER PANEL)

1.2.2.1 - SWITCH FOR ADJUSTMENT OF THE OUTPUT TENSION (PN 28.01.1150)

It sets the output tension from 24 to 33VDC.

1.2.2.2 - SWITCH FOR ADJUSTMENT OF THE OUTPUT CURRENT LIMITER (PN 28.01.1122)

Placed on the right side of the panel, it must be used to set the maximum current allowed on the aircraft in which it is connected. The accuracy of this setting is around 5%.

The current limit is taken by a complete disconnection of the output current after 1 second exceeding the set value.

Never place the current limiter knob in range below that demanded by the load necessary for maintenance or during starts to avoid cuts during the maintenance or at the start. Please check the aircraft manual to know about its maximum current demanded.

ATTENTION:

The setting above the maximum current range allowed by the aircraft does not mean that the current will come to this value in normal conditions, even at the start.

Under normal conditions the GPU will deliver only the current demanded by the aircraft.

1.2.2.3 - SWITCH ON/OFF (Level 1 and 2) - AUTOMATIC PROTECTION (PN 28.01.1121)

It´s function is to permit the use of the equipment in case off breakdown at the protection circuit or release the use with voltages over 31.5 VDC. With the switch set on position "1" it could be used normally but there will be no automatic turning down.

1.2.2.4 - KNOB "ON" (PN 28.01.1119) AND "OFF" (PN 28.01.1120)

They turn the equipment on and off. The turning off knob can also RESET the protection circuit.

When the equipment is shut down by the protection circuit the turning off knob must be used to restart. Otherwise the equipment will not turn on.

1.2.2.5 - LED INDICATOR OF EQUIPAMENT "ON": (PN 28.01.1124)

It is placed between the knobs. When the equipment is shut down by the protection circuit it will turn off and the protection circuit will remain turned on to indicate what caused the shutting down.

1.2.2.6 - BURNED FUSES INDICATORS (PN 28.01.1124)

When lighted it indicates burned or loosen fuse(s). The fuses are located inside the front cover, closed to the three-phase cable entrance. To open the front cover, unscrew the two screws on its sides.

1.2.2.7 - INDICATORS OF AUTOMATIC SHUT DOWN (PN 28.01.1126)

The three red light indicators inform the operator the cause of shutting down when occurs one or more of the following:

- Phase failure at the input power;
- Overvoltage and over current at the equipment output.

They are monitored by the "Protection Circuits II and III".

1.2.2.8 - INDICATORS OF PHASE PRESENCE (PN 28.01.1125)

- Three Green LEDs – they light only when the GPU is turned on.

If one of them is out it indicate phase failure. Before using the GPU verify and fix what caused the phase failure. If used with one phase out, it will be notice a high drop of voltage, increasing the load. The output voltage will drop to around 21V with only 50A of load causing high current at the capacitors. These LEDs are monitored by the "Protection Circuit III".

1.2.2.9 - VOLTIMETER (PN 28.01.1127)

Indicates the 28V outputs voltage, where the output cables are connected.

During start peak the voltage at the aircraft will be lower than indicated on this voltmeter due to voltage drop at the output cables and the internal aircraft cables.

1.2.2.10 - AMMETER: (PN 28.01.1128)

Indicates the current provided to the aircraft (the sum of the currents in the two output cables).

- 60mV instrument, coil, 2000A scale.

1.2.3 - LOWER PANEL

1.2.3.1 - IDENTIFICATION PLATE (PN 28.02.1216)

It indicates three-phase input voltage, range of output voltage (adjustable), maximum peak current, serial number, equipment´s part number, weight and dimensions.

1.2.3.2 - INPUT CABLE (see item 1.2.1)

Placed on the bottom left of the front cover. It comes with 25m of length (it can be ordered with other lengths). Normally brand “PRYSMIAN”, CORDPLAST type, 4x10mm^2 of gauge.

The neutral is connected internally to the BLUE cable.

After some years of use this cable may break close to the passage rubber, internally, due to a great number of flexions. This could cause phase or neutral failure. If that occurs cut the cable close to the entrance and re-connect.

1.2.4 - FRONT PANEL

1.2.4.1 - VENTILATION GRID

Provides the exit of heated air pulled out by internal fans.

NOTE: The grid must never be blocked.

1.2.4.2 - OUTPUT CABLES (see item 1.2.1)

The socket for the aircraft´s output source (28V) is located on the left side.

At the Center are placed the output connector to substitute the battery (28V) and the differentiated output of less 9V (24V).

1.2.5 - SIDES

1.2.5.1 - HOOKS TO HOLD CABLES

It comes with hooks on both sides to hank the input cable on one side and the output cables on the other side.

To prevent damage to the equipment avoid collisions with the hooks while moving it.

1.2.5.2 - VENTILATION GRID

It has four (04) lines of shutters for internal ventilation.

Do not use plastics covers that seal. They are placed to prevent the entry of water or rain splashes.

1.2.6 - UPPER PART

1.2.3.1 FRONT AND COVER

To open the GPU unscrew first the two screws (one in each side of the panel) and use the handle. To release the top cover, unscrew the screws on the bottom side and lift the cover. The cover is heavy and may be necessary more than one people to raise it.

It has a gutter under the spotlight to avoid rain water.

1.2.7 - LOWER PART

1.2.7.1 - CASTERS

Comes with 02 (two) fixed casters (PN 28.02.1203) and 02 (two) swivel (PN 28.02.1203), with 6” wheel, brand “NOVEX”, of high durability.

1.2.7.2 - CHASSIS (PN 28.02.4201)

The chassis is perfectly dimensioned for the weight to be supported. It has reduced weight and high mechanical resistance.

1.2.8 - NOTES

All pieces are manufactured following standard equality. They may be replaced at any time without the need for adjustments in drilling, etc.

2 - OPERATION

2.1 - GENERAL

2.1.1 - SUPPLYING FOR AN AIRCRAFT IN ASSEMBLING

a) Connect the extension into the socket and take it near the JET POWER (if an extension is needed).

b) Place the "JET POWER" near the input socket for external power source of the aircraft.

c) Connect the output socket of the cable coming out of the left side of the "JET-POWER" into the aircraft output source socket.

d) Connect the output socket that comes out of the connectors at the center of the "JET-POWER" on the adapter that replaces the battery. Place the cable connector on the 28 VDC position.

e) Connect the input socket.

f) After connecting, check the lightening of the three phase indicators. Do not use if any is out. When using the automatic protection it will not turn on. With the automatic protection off it will accept to turn on, but it is highly not recommended.

g) Adjust the knob of the current limiter into the limit above the maximum current allowed on the aircraft connected.

h) Turn on the automatic protection switch (it should only be turned off in case of malfunction at the protection circuit or if a voltage above 31.5 V is necessary).

i) Before connecting check if the output voltage switch is in a position that does not cause overvoltage automatic shutdown.

j) Turn on the equipment by pressing the left green knob. It should light a signaler between the knobs and will be an indication of voltage and current, if loaded. If the equipment shuts down automatically a red LED will light to indicate the cause of the shutdown. To RESET the equipment push the OFF knob and then turn it ON.

NOTE: When everything is set simply use the ON and OFF knobs to control the "JET-POWER".

k) Adjust the output voltage to around 28V for normal use during the mounting of equipments or as the desired voltage. If the voltage set is above 31.5V the equipment will shut down due to overvoltage. Reduce one position, press the knobs OFF and then ON to RESET.

NOTE: After use the equipment must be turned off and disconnected from aircraft.

2.1.2 - TESTING AND ADUJSTING THE SURGE PROTECTOR RELAY IN OUTPUT SOURCE SOCKET

a) Do as shown in items A to C of the preceding instructions.

b) Disconnected the existing aircraft load so that only supply the surge protector relay.

c) Turn off the automatic protection switch.

d) Connect the output socket that comes out of the "JET-POWER" central connector into the adapter that substitutes the battery. Place the output cable connector at 24 VDC position (right side connector).

e) Check the lightening of the three phase indicators. Do not use if any is out. When using the automatic protection it will not turn on. With the automatic protection off it will accept to turn on, but it is highly not recommended.

f) Place the output voltage regulator switch at position 7 (output voltage around 33 V).

g) Turn on the equipment by pressing the left green knob. In this position (7) there will be a difference of 9 volts between the external source power supply and an external source which simulates the battery voltage, being able to be used to adjust the aircraft surge protection relay.

h) After use the equipment must be turned off and disconnected from aircraft. It must be removed from the output connector of 24 Volts and connected to the 28 VDC output.

2.1.3 - OPERATION AND FUNCTIONING

To operate the “JET-POWER” properly follow the steps outlined in the previous section (2.1.1). When the equipment is all set simply use the knobs ON and OFF to operate the GPU.

The operation of “JET-POWER” does not involve engines and generators being totally static and silent.

The “JET-POWER” transformer receives alternating current provided from the local utility company and transforms it to low voltage continuous current of high purity and high current capability.

3 - THEORY OF OPERATION

3.1 - POWER GENERATION SYSTEM

The power generation system transforms the alternating current provided from the local utility company to six-phase alternating current (low voltage) to be rectified and filtered.

3.2 - OPERATION DESCRIPTION

Its operation is completely static.

The transformer receives electricity from the local utility company, transforms the three-phase energy of 220V or 380V in six-phase low voltage to supply 28 V with high current capability.

The energy is rectified by six (06) diodes, filtered by a high capacity filter and delivered to the aircraft after passing through over current, overvoltage and phase failure sensors.

4 - TROUBLESHOOTING

The following is a list of symptoms and possible causes that may disturb the normal operation of your "JET-POWER". Follow the instructions properly to avoid problems in operating the equipment.

When an unconformity is detected follow the steps listed in the next pages. If the problem persists, call our technical department and ask for more detailed information or technical assistance.

4.1 - NOTES

- Do not use "DIAZED" (retarded) fuses or wired bridge. Use "FAST" or "ULTRA-FAST" fuses. In 208 or 220V, use 63A fuses.
- Keep spare fuses (at least 06).
- The "JET-POWER" uses 06 (six) SKR240/04 rectifier (brand "Semikron") for 28 VDC.
- The "JET-POWER" uses 47000µF/40V capacitors (brand "Epcos").
- Avoid opening the "JET-POWER" unnecessarily.

4.1.1 - POSSIBLE FAULTS

A) When turning the equipment on, the voltmeter does not indicate voltage.

CAUSE: Instrument defective or power failure.

CHECK: If the equipment turns on, test the instrument. If not, check the connecting to the local utility company.

B) Fuses burning immediately after power is turned on.

CAUSE: Internal or external short circuit.

CHECK: It is more likely that one or more rectifiers have been short-circuited. To test them follow the instructions below:

- Test the secondary resistance. If it indicates 8.2 Ω it is normal. If it is close to 0 Ω indicates short circuit in wires or diodes;
- Open the front cover. Disconnect the plug from the panel light (if equipped with this optional item) and remove the top cover;
- Loosen the 06 terminals of the rectifiers;
- Using a multimeter, test the rectifiers (one by one);
- Replace the ones in short-circuit;
- Use a pipe wrench with bolt hole to loosen the damaged rectifiers;
- Use original rectifiers (brand "Semikron");
- Replace blown fuses and test the equipment before closing it;
- When closing the device observe the flasher contact sides at the top cover bottom.

C) The voltmeter continues to indicate voltage when turned off.

CAUSE: With the output socket connected, the voltmeter may be indicating the aircraft battery voltage, or capacitors voltage, if the resistor load is interrupted.

CHECK: Unplug the aircraft. The voltmeter should indicate zero, if not, test the load resistor (8.2 Ω).

D) Voltage dropping below 22 volts at start peak.

CAUSE: Voltage drop on the local utility company (see note below).

CHECK: Measure the voltage at the output socket where the "JET-POWER" is plugged in. With no load it should be indicating at least 205 V. Ask the pilot to start the turbine. Measure the voltage during the current start peak. The voltage should drop below 185 V between phases. If the voltage measured is between those limiters do as followed:

- Set the output voltage in 30/31VDC to start turbines. This small increase compensates part of the loss on the network and improves the start;
- If the supply voltage is below the limits indicated above check the installation.

NOTE: There are internal voltage drop at the "JET-POWER" and losses at its output and input connectors. These losses were

reduced to minimum through the super dimensioning of the internal and external conductors.

E) Noise in aircraft communication radio.

CAUSE: Small ripple on the equipment output continuous current.

CHECK: Verify if the capacitor filter (47000uF) is open.

NOTE: The "JET-POWER" produces no noise on the radio or any type of interference with aircraft navigation equipment. However, this may occur in case of failure in the capacitor filter.

- The component of alternating current, with load up to 100A, is only of 10mV (0,01V), peak to peak. Ripple of 0.035% to 100A.

F) Electric shock in the equipment.

CAUSE: Leakage current from the local utility company to the equipments chassis.

CHECK:

- Wrong linking of the NEUTRAL cable;
- NEUTRAL cable with no connection with the socket or equipment;
- NEUTRAL cable broken by the entrance plate or by the fixing clamp.

NOTE: The NEUTRAL cable is BLUE.

G) Output differentiated with no voltage.

CAUSE: Open integrated circuits.

CHECK:

- Replace the two CI´s LM338K from the differentiator circuit (To replace then see the screws that must be loosening at photo gallery. Use CI brand ST.)

H) Output differentiated with the same voltage as normal output.

CAUSE: Circuits integrated in short circuit.

CHECK:

- Replace the two CI´s LM338K from the differentiator circuit.

I) Output differentiated with voltage different of 9 Volts in relation to the main output.

CAUSE: Incorrect adjustment of the potentiometer at the upper part of the differentiator circuit.

CHECK: Output voltage adjustment as bellow:

- Open the top cover;
- Use a precision voltmeter at the positive terminal in the positive output of 28VDC (left side connector) and the negative terminal in the positive output of 24VDC (right side connector);
- With the equipment ON, turn the 7 position switch to position 7 with the automatic protection circuit OFF, adjust the voltage to 9.0 Volts.

5 - INSPECTIONS, VERIFICATIONS AND LUBRICATIONS

Periodically verify the screws at the output socket to make sure they are not loosen (once a month). If necessary use a 5/32” ALLEN KEY to tighten the screws.

No inspection or lubrication is necessary inside the equipment.

To each six months lubricate the wheels with common grease.

6 - REMOVAL AND INSTALATION

6.1 - REMOVAL

To remove the unit from where it is installed, just wrap the cable on its supports and take care not to knead the equipment box, due to excessive force exerted on the supports of the cables.

When placing the equipment in containers, leave enough space so that the equipment wheels do not touch the bottom. Keep away from the sides, top and back not to knead the box in case of mistreatment.

6.2 - INSTALLATION

a) Verify if the energy provided from the local utility company is 208 or 220V three-phase and is capable to supply 90A per phase, WITH THE MINIMAL DROP OF TENSION AS POSSIBLE.

b) Verify if the equipment is compatible with the local voltage. Open the internal cover to change the voltage, if necessary. The linking of the 208 or 220V cables is in the fuses. Substitute one for the other (same color) marked with the desired voltage. Do not link both cables, it causes short-circuit. The cable not in use must be isolated. The three cables must be changed, if different of the desired.

c) Use three-phase socket of 60/63A, 208 or 220V, 4 bolts.

d) The wiring until the socket must leave directly from the power supply, after the general switch. Use 04 cables.

e) Use cables with gauges in accordance with the distance from the linking point until the three-phase socket where the "JET-POWER" will be plugged on, as the specifications below:

DISTANCE	**208 or 220 Volts**	
	PHASE	**NEUTRAL**
Until 20m	Cable 10mm^2	6mm^2
From 20 to 50m	Cable 25mm^2	10mm^2
From 50 to 75m	Cable 35mm^2	10mm^2
From 75 to 120m	Cable 50mm^2	25mm^2
From 120 to 150m	Cable 70mm^2	25mm^2

From 150 to 220m	Cable 95mm^2	35mm^2
From 220 to 300m	Cable 120mm^2	50mm^2

- **THE USE OF THE NEUTRAL CABLE IS INDISPENSABLE.**
- **THE NEUTRAL CABLE IS BLUE.**

IMPORTANT NOTES:

The gauges can seem exaggerated from the "JET-POWER" consumption of current, but it is very important that the drop of tension be as minimal as possible, not to compromise its functioning.

A great drop of tension in the exit, below of the bearable limits during the peak of starting the turbine, can cause serious consequences for the turbine (maximum drop of 10%).

DO NOT use cables with gauges below the specified, so that the installation does not come to be problematic and insufficient to the departure of the turbines.

A good installation can be the guarantee of years of services without departure problems.

If it will not be used for departures it can be considered using 40% of the real distance.

Follow correctly the specifications and avoid problems of insufficient current.

7 - ADJUSTS AND TESTS

7.1 - ADJUSTMENT OF THE CURRENT LIMITING

This adjustment makes the value indicated in the panel, at the current limiter knob, matches the exactly value that will cause a shut down.

Procedure of adjustment:

- Adjust the equipment knob on 1,000A;
- Inject a signal of 30mV in current sensor. (With the wires disconnected from the shunt);
- Adjust the Trimpot R317 to disconnect the equipment.

7.2 - ADJUSTMENT OF THE TENSION LIMITING

This adjustment allows setting the maximum tension that could be supplied, before occurs the automatic shut-down by overvoltage.

Procedure of adjustment:

- Turn on the equipment with switch of adjustment in position 5;
- Elevate the tension until the equipment shuts-down;
- Adjust the R404 Trimpot so that the equipment shuts-down at the desired tension.

NOTE: The equipment leaves the manufactures adjusted to shut-down with 31.5V.

7.3 - ADJUSTMENT OF THE OUTPUT TENSION

It is done at the equipment panel using the switch PN 28.01.1118.

7.4 - ADJUSTMENT OF THE CURRENT LIMITING

It is done at the equipment panel using the knob PN 28.01.1123, activating the switch PN 28.01.1112.

7.5 - CALIBRATE THE INSTRUMENTS

- Must be made to each six months of functioning;
- Adjust the instruments pointer at "zero" by the screw in the plastic view and the measuring of the Trimpot with external access, at the bottom of the instrument, comparing it with an instrument of knowing precision.

7.6 - RIPPLE TEST

- Connect the equipment with a resistive load of 100A;
- Using an oscilloscope or a multimeter of precision make the measurement of the AC component at the 28 VDC output;
- The measure must not be higher than 0.15 VAC. The normal measure is 0.01 VAC, 0.035% of ripple at 100A and 0.17 VAC at 300A, 0.59% of ripple;
- In case of superior measures:
  - verify if the load is resistive;
  - check if the capacitor is open;
  - check if the filter shock is in short-circuit between spires.

7.7 - OUTPUT TENSION TEST

The table below verifies the range of tension in the equipment output:

POSITION OF THE SWITCH OF TENSION ADJUSTMENT	OUTPUT TENSION
01	24,2 VDC
02	25,7 VDC
03	27,4 VDC
04	28,6 VDC
05	29,8 VDC
06	31,2 VDC
07	33,2 VDC

NOTE: It could be able to have a variation for greater or minor, according to the variation of the tension supplied by the local utility company.

7.8 - ADJUSTMENT OF THE DIFFERENTIATOR CIRCUIT

Set the output tension as below:

- Open the front cover (cover with panel). Just above the transforming, it has a small heat sink of heat with a visible potentiometer;

- With a voltmeter of known precision make the measure of the tension at the gray connectors, with the protection switch at the left (1) and the switch of adjustment of tension at position 7. First measure the 28V output (it must be of 33V approximately). Than place the voltmeter at the 24V output and set in this potentiometer a tension 9V less than the 28V output.

- Or bind to the positive terminal of the voltmeter in the positive of the 28V output and the negative terminal in the positive of the 24V output. Adjust to indicate a difference of 9Volts.

- The capacity of this circuit is of 10A and must be used to adjust the relay of the aircraft that triggers with the difference of tension of the battery for external source in 9Volts. If the aircraft demands different tension adjust as indicated above.

8 - CLEANING AND PAINTING

8.1 - CLEANING

- Always keep clean your “JET-POWER” and avoid placing tools on the device. Do not use plastic layers that covers the lateral grids and/or the front grids for ventilation;

- To remove strange deposits from the equipment, such as grease, oil and water, luster it with a fine wax for burnishing.

8.2 - PAINTING

- To draw out the useful life of the painting avoid leaving the “JET-POWER” under sun and rain;

- The original painting is electrostatic, “dust”, in the white color;

- In case of necessary retouching or new painting, use ink enameled synthetic extra-fast of equal color

9 - REPAIRS

The repairs to be done in this power unit must be done according to the appearance of the defects symptoms described in session 04 of this manual.

To prevent greater problems in the operation of the device it is necessary to correctly follow the instructions that had been passed and in case of persistence of the problem to enter in contact with the manufacturer technical department.

10 - LIST OF GENERAL PARTS

ÍTEM	PART NUMBER / APS	DESCRIÇÃO (Drawn. 0014)
1	28.01.4008/01	Chassis of Protection Circuit and p. phases
2	28.01.4103/01	Three-phase transforming 208/220V
3	28.01.1107/01	Filter reactor
4	28.01.1109/01	"Epcos" Capacitor 47000µF x 40V
5	28.01.1111/01	Heat sink of 28VDC
6	28.01.1113/01	"VENTISILVA" fan E11AL 115/230V
7	28.01.1136/01	"WEG" Contactor CW50
8	28.01.1139/02	28V Output Socket
9	28.01.3340/01	28 VDC Output Cable – left side
10	28.01.4705/01	5m Output Cable with gray connector.
11	28.01.4710/01	10m Output Cable with gray connector.
12	28.01.4146/01	Quadrupole Input Cable.
13	28.01.1149/01	Power Resistor 8R2, 200W
14	28.01.1130/01	Tripolar Base for fuses "Eaton" DZ63A
15	28.02.4201/01	Source Chassis
16	28.02.4204/01	Chassis monobloc (bottom of box)
17	28.02.4205/01	Box Cover
18	28.02.4206/01	Box Front
19	28.02.4207/01	Output Panel
20	28.02.4211/02	Cable Holder (panels side)
21	28.02.1212/02	Cable Holder (grating side - front)
22	28.02.4213/01	Handle to handle
23	28.02.1202/02	Rotatory Caster – "NOVEX" GM62BL
24	28.02.1203/02	Fixed Caster – "NOVEX" FM62BL

11 - DESCRIPTION

11.1 - PRESENTATION

EXAMPLE: D1 to D6 PN 28.01.1116/06 – "SEMIKRONS" KR240/04 Drawn. The termination of the PN…./06 indicate that it uses 6 parts.

- The group before the PN (D1 to D6) indicates its position at the schematical diagram.
- The first group of the PN, formed by 02 (two) numbers, identifies the "SUPERSOM" product (28 for "JET-POWER").
- The second group, formed by 02 (two) numbers identifies the type of part according to the relation bellow:
  - 01 - Part or component of electric-electronic circuit;
  - 02 – Mechanical part;
  - 03 – Part of the assembly of the box and complement;
  - 04 – Technical publication;
  - 09 – Complete equipment.
- The next 04 (four) numbers indicates the part numeration.
- The last 02 (two) numbers indicates the AMOUNT PER SET (APS).
- It is followed by its description, manufacturer and manufacturer's code.

11.2 - CIRCUIT OF ELECTRONIC PROTECTION II (PN 28.01.1018)

This circuit has the function to detect the elevation of the output tension above the value admitted by the aircraft and the elevations of tension above the level specified, as well as shut down the equipment and inform which anomaly occurred. It has two adjustment Trimpots (one for adjustment of the current limiter and one for adjustment of the tension limiter). It is a drawn resin circuit, with better protection against humidity. It must be completely substituted if any defect is presented. It is located above of the filter inductor.

11.3 - CIRCUIT OF ELECTRONIC PROTECTION III (PN 28.00.3717)

This circuit has the function to detect the fault of phase in the power provided from the local utility company for the equipment, monitoring the three-phase transforming secondary tension. The tension level is adjusted by zener diodes and indicates the fault of phase by tension drop below values preset in assays. For acting in the secondary this circuit is isolated from the net and it works with low tensions, increasing the security and durability.

11.4 - POWER CIRCUIT (PRIMARY)

This is the main circuit of the source, receiving the alternating tension from the local utility company, to be transformed into low rectified tension.

It makes possible to be configured to function with 208 or 220 Volts in the entrance just by modifying the cables in the tripolar fuse holder.

It has a double ventilation system to guarantee temperature in the acceptable limits, switching switch of the protection circuit, pointers of burnt fuses, and a power transforming, three-phase equalized with capacity to supply current up to 600A continuously.

ITEM	PART NUMBER / APS	DESCRIPTION (Drawn. 0002)
T1	28.01.1103/01	Transforming with output of 28V, 600A.
CH1	28.01.1121/01	Switch ON/OFF, CG4A720600-EF
CH2	28.01.1118/01	Switch “KRAUS & NAIMER” 7 POSITIONS.
BT1	28.01.1120/01	Knob ON ACE.
BT2	28.01.1119/01	Knob OFF ACE
CT1	28.01.4336/01	Contactor “WEG” CW50, 208/220V
M1	28.01.1113/02	Fan “VENTISILVA” E11AL, 208/220V
M2	28.01.4113/02	Fan “QUALITAS” Q 180 A3, 208/220V
N1 a N3	28.01.3324/04	Neon Signaler 208/220V.
F1 a F3	28.01.1131/03	Fast Fuse “ELETROMEC” 63A.
	28.01.4132/03	Tripolar Base “Bussmann” 63A.
RSTN	28.01.1146/01	Input Cable 4 x 10mm^2 x 25m

The diagram with the equipment

11.5 - POWER CIRCUIT (SECONDARY)

This circuit is derived from the drawing PN 28.04.4011, showing the parts of low tension and high current, in the output of the transforming (T1).

Its construction allows the simultaneous functioning of the two outputs.

The maximum current is of 600 Amperes for the two 28V outputs and of 10 Amperes for 24V differentiated output.

It has high index of filtering, due to special construction of the reactor of filter and the use of capacitor of high value in the output.

ITEM	PART NUMBER / APS	DESCRIPTION (Drawn. 0002)
T1	28.01.4103/01	Transforming w/ output of 28V
D1 a D6	28.01.4116/06	Diode “Semikron” SKR240/04
R1	28.01.149/01	Power Resistor 8R2, 200W
C1	28.01.1165/01	“Epcos” Capacitor 47000 µF x 40V
SH1	28.01.1129/01	Shunt “Supersom” 0-2000A / 60 mV
I1	28.01.1128/01	Ammeter 0-2000A, brand “Kron”
I2	28.01.1127/01	Voltmeter 0-40V, brand “Kron”
TM1, TM2	28.01.1139/02	Output Socket standard of 28 VDC
R302	28.01.3302/01	Precision Resistor 200R
R303	28.01.3303/01	Precision Resistor 499R
R304 a R307	28.01.3304/04	Precision Resistor 1K00
R308, R309	28.01.3305/02	Precision Resistor 2K43
R310, R311	28.01.3306/02	Precision Resistor 5K10
CN1 e CN2	28.01.3747/02	GRAY Connector SL350.
J3	28.01.3313/01	Female Connector 4 poles
CQ1	28.01.3333/01	Filter shock special for Manufacturer
CB1	28.01.3340/01	Output Cable, directly connected
CB2	28.01.3749/01	Output Cable with Gray connector.
S1 PL1 PL2 PL3 PL4 BL1	28.01.1122/01 28.01.4008/01 28.01.3018/01 28.01.3017/01 28.01.7000/01 28.01.1955/01	Switch “EVETRON” 501/206 1 x 11 Protection Circuit II LED´s plaque Protection Circuit III Differentiator Circuit. Bar of LED – panel illumination.

The diagram with the equipment

The diagram with the equipment

11.6 - DIFFERENTIATOR CIRCUIT (PN 28.01.7000)

12 - SPECIAL TOOLS, ADAPTERS AND EQUIPMENTS

12.1 - SPECIAL KEY TO WITHDRAWAL DIODES (PN 28.01.1191)

It is a long pipe key to accommodate the diode´s terminals. (PN 28.01.1116).

12.2 - SUPPORT TO HOIST THE EQUIPMENT (PN 28.01.1192)

It is a support that fixes in the chassis with an eyelet at the top part to allow the HOISTING the equipment by pulley. (It is dispensable with the use of a forklift).

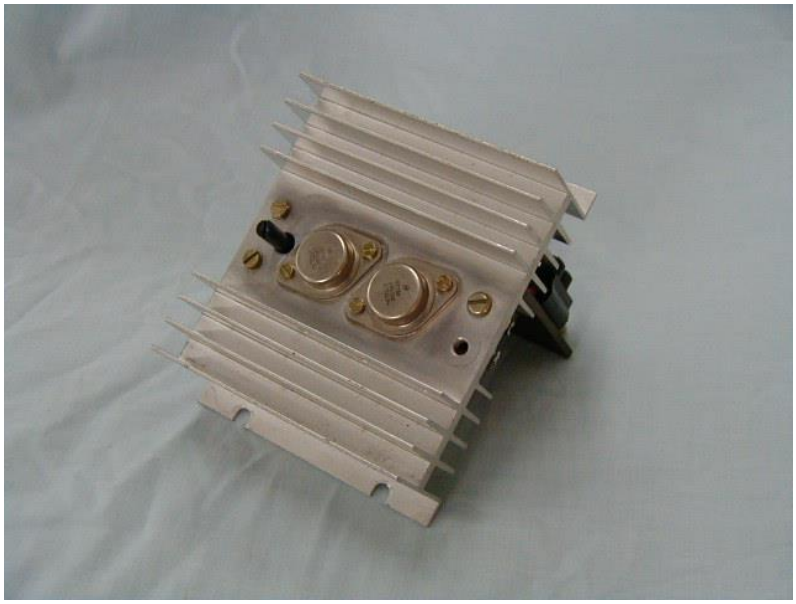
12.3 - SOURCE OF 0-60mV FOR CALIBRATION OF THE PROTECTION CIRCUIT (PN 28.01.1193)

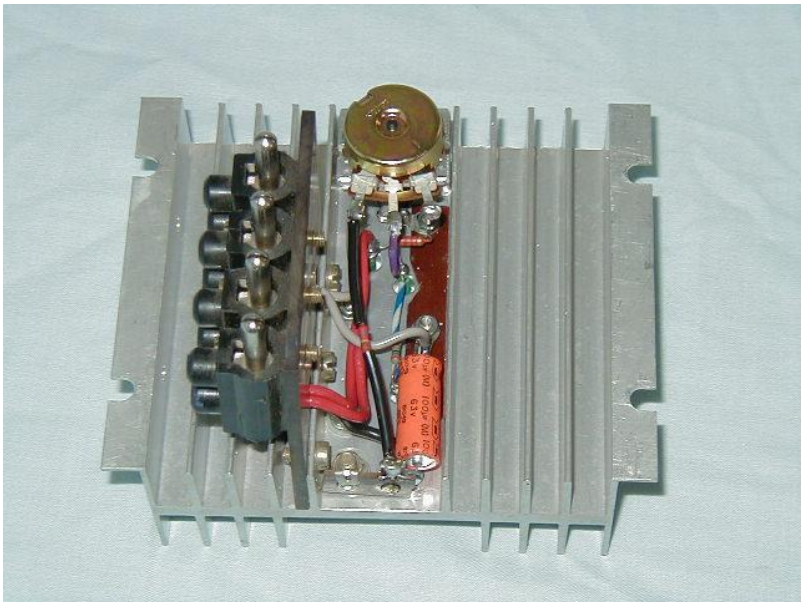
It is a source able to supply up to 60mV, simulating the tension supplied by the shunt, to be used in the calibration of the point of disconnection by over current.

The diagram with the equipment

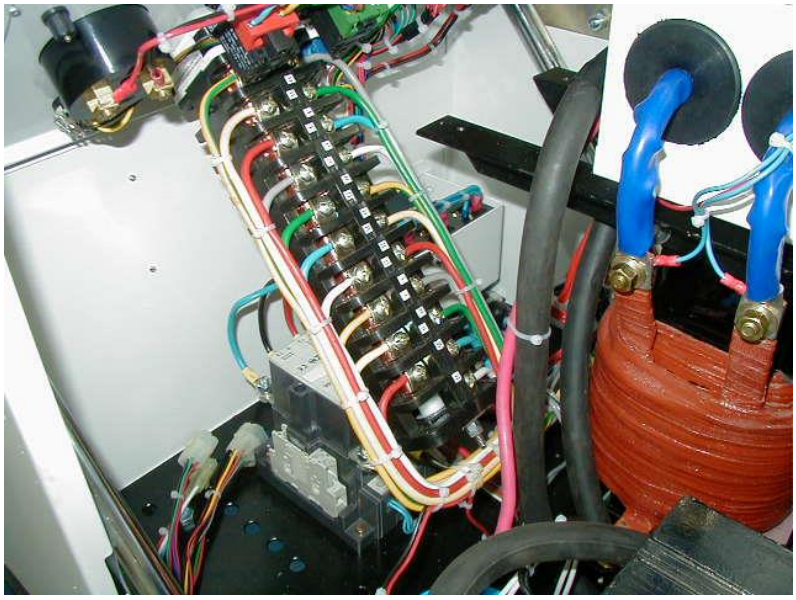
13 - GALLERY OF PHOTOS

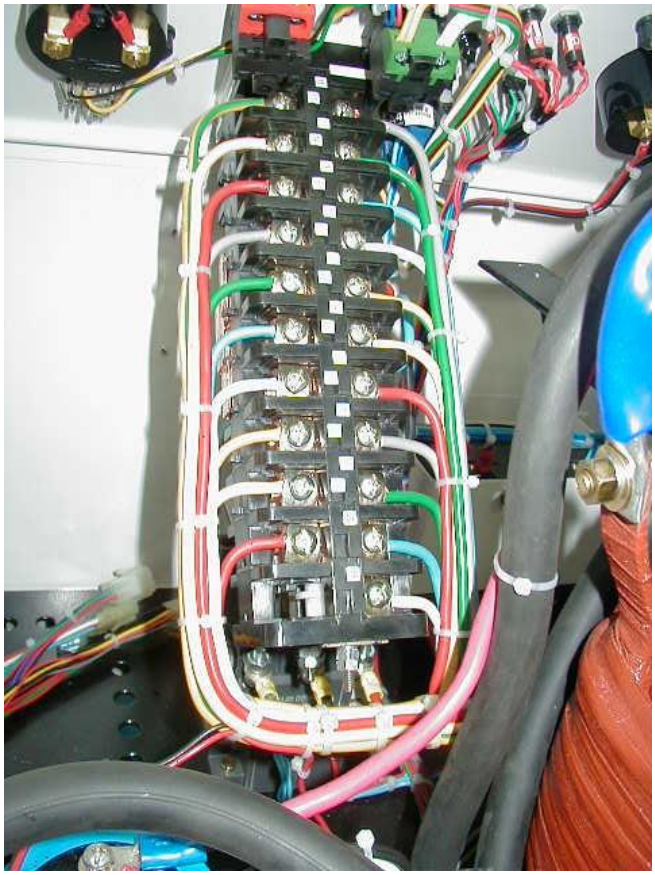
13.1 - DIFFERENTIATOR CIRCUIT



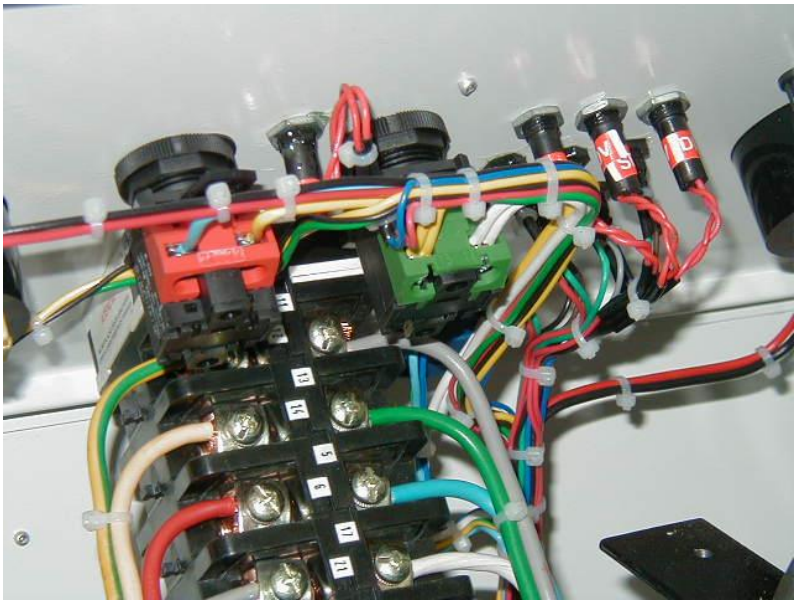


13.2 - LINKING OF THE AJUSTMENT SWITCH OF 7 POSITIONS

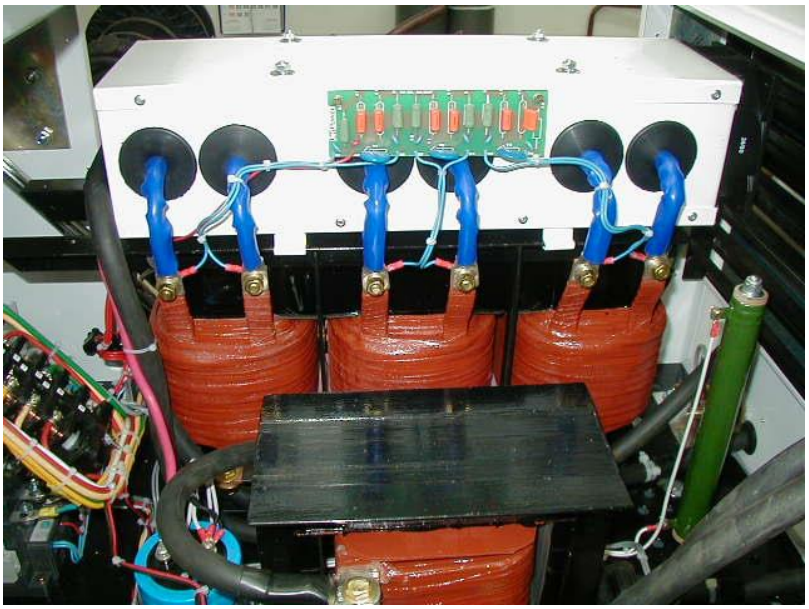




13.3 - KNOBS LINKING



13.4 - SECONDARY CIRCUIT

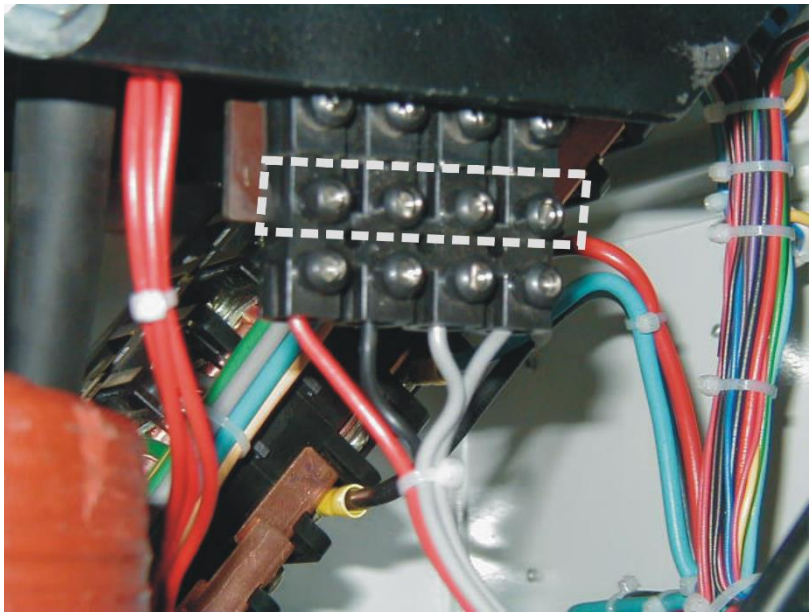


13.5 - LINKING OF THE INPUT CABLE

13.6 - PANEL OF INSTRUMENTS

13.7 - IDENTIFICATION PLATE

13.8 - BLOCK OF CONNECTORS OF THE DIFFERENTIATOR CIRCUIT



Note: To withdrawal the differentiator circuit loosen the screws of the career indicated by the dotted rectangle on the figure.

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