

MFG: SORIANI MOSER
NAME: WILD WATER TROPHY
Type: Non-Kiddie

SORIANI & MOSER S.R.L.

" WILD WATER TROPHY "

COMPUTERIZED CONTROL
SYSTEM



by DIGIPARK

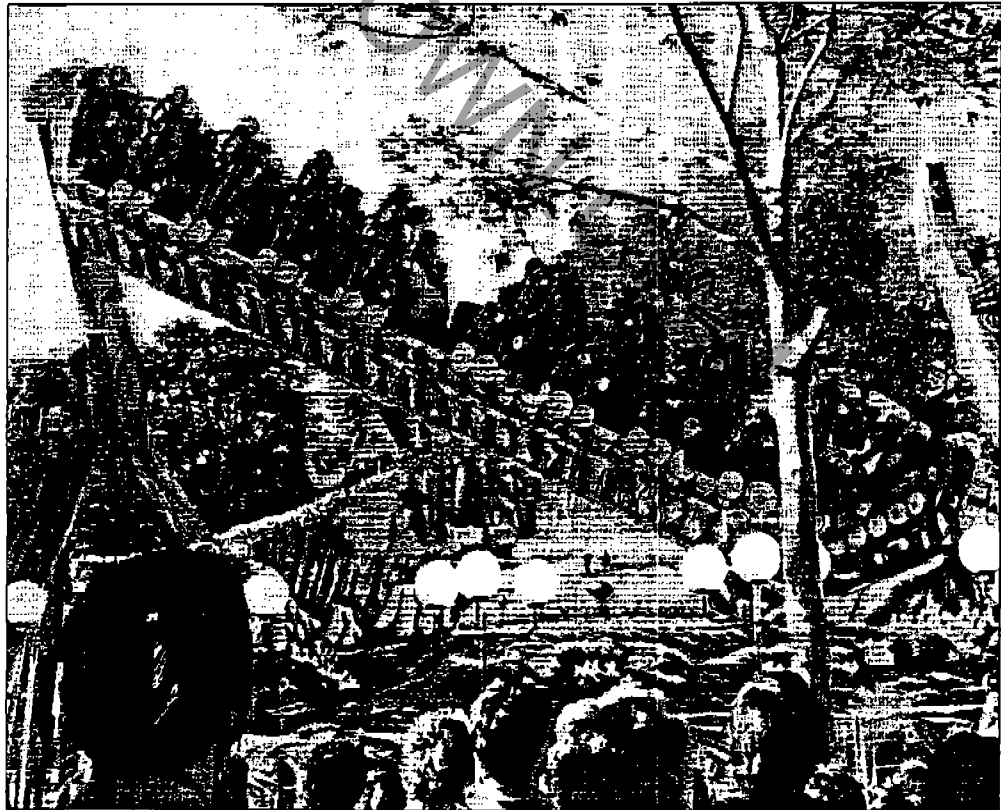


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INTRODUCTION

Computerized Control System

General Introduction

There are many advantages in the use of a Personal Computer for the control of the "Wild Water Trophy": the most obvious are the simplicity, the quickness, the safety and the flexibility of operation.

- **Simplicity:** the use of few push-buttons allows the automation of the start, turn and re-entry processes.
- **Quickness:** all the times are controlled and rationalized by the Computer which thus avoids all dead and holding times, especially during overcrowding moments.
- **Safety:** the Computer constantly controls the condition of the outer sensor and opportunely operates in case of malfunctions.
- **Flexibility:** by few modifications in the Computer it is possible to program a new working logic of the amusement ride.
- **An excellent choice of the single components and the simplification of the intervention operations guarantee for the dependability of the whole system.**

In case of breakdown it is possible to replace both the central unit of the Computer and the Control Console in few minutes by means of the disconnection of few connectors. Considering the simplicity of the system this operation can be carried out even by unskilled personnel.

Components

The complete version of the Control Console includes:

- **AT Personal Computer** with high accuracy colour Monitor, keyboard, 3¹/₂ drive, interface cards and Input/Output cards, management information system.
- **Chief Control Console:** it is composed of two sections controlling the motors and a third one for the User Computer interfacing.
- **Electrical Check:** this console is composed of many digital devices (some of them are protected) for the electric control of the attraction.
- **Two auxiliary consoles** which control the lights, the compressors, the feeding and various driving gears.
- **Direct-current motor:** it is necessary in order to avoid troubles in case of black-out or micro-interruptions of current.

- Feeder for the brake system supplied with buffer batteries and display of the state of the batteries (placed on the Electrical Check).

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INSTRUCTIONS FOR USE

Ignition

» The numbers between brackets following the names of the indicators or drives refer to the illustration at page 22.

- Make sure of the presence of voltage before starting the ignition process so as to avoid useless overloads on the unit of continuity (consult the pertinent chapter).

First of all check the two Speed levers (11-42) which must be in the central position bearing the word "Stop"; then switch on the unit of continuity (in case of troubles consult the pertinent chapter), wait a few seconds and then turn the key switches Electrical Supply (10-41) in On position.

Regulate the connecting rods maximum speed by positioning the reversers "Gain Speed" (9-40) on one of the possible four positions. *Both the reversers must be regulated in the same way so as to avoid failures when the attraction is working.*

Switch on the luminous pushbuttons Electrical Supply On (12-43); the lighting of the warning lights reveals the success of the operation. A complete clockwise rotation is advisable in order to ascertain the possible obstacles to the movement of the amusement ride.

Switch on the Monitor, ascertain the presence of the floppy disk and switch on the reverser Computer Control (20) thus giving feeding to the Computer.

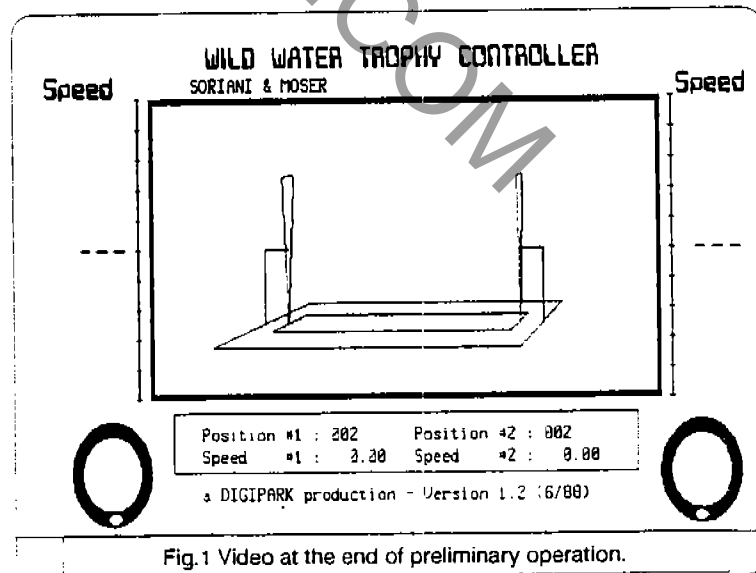


Fig.1 Video at the end of preliminary operation.

The pushbuttons which are controlled by the Computer will begin winking after a few seconds. It is thus possible to verify if there is something wrong with the warning lights. The Monitor will advise you to press the only winking pushbutton, i.e. Start/End of Cycle (18). Ascertain there are no obstacles to the movement of the machine and then press the above-mentioned pushbutton (18). The machine will be powered automatically by the Computer in order to verify the correct working of the Encoders and of the other inward circuits.

Simultaneously the monitor will display some notices about the previous controls. After a few turns the monitor will display a schematic drawing of the amusement ride (fig.1) which will be positioned at the starting-point.

After these preliminar operations it is possible to sort one of the three methods of functioning.

» Before powering the machine ascertain all the handles are closed and the warning light Opening Handle (28) is burning. If this function has been excluded (by means of the selector of the auxillary console) it will be up to the operator to control there are no hazards.

Automatic Working

The amusement ride is completely controlled by the Computer and the operator's only function is the selection of the program and the start of the machine; all the movements will be performed on the ground of the instructions which are contained in the selected program. The operator is thus freed from any intervention.

The automatic working is possible only when the machine is at the starting-point (i.e. when the warning lights Neutral (16-17) are burning). If not press the pushbutton Recovery (30) and the machine will be positioned at the point of departure. Before pressing the pushbutton Automatic (25) pay attention the warning light is not burning (the selection of this last pushbutton will be indicated by its warning light).

Select the program among the 8 possible ones (numbered from 0 till 7). The display Program (1-32) indicates the selected program. In order to change the selection (the amusement ride must always be at a stop) press the pushbuttons Program Up (21) and Program Down (22): the number corresponding with the selected program will thus be displayed on the monitor Program.

Ascertain all the handles are closed and press the pushbutton Start (23). The amusement ride will make the evolutions planned by the program and then will be positioned at the point of departure. When both the warning lights Neutral (16-17) light up the program can be considered concluded. There are two ways to conclude the program in advance:

- by pressing the pushbutton Stop: the machine will slacken and stop progressively (the stopping time depends on the speed of rotation).
- by pressing the pushbutton Recovery (30): the machine will be automatically positioned at the starting-point; the conclusion of the operation is indicated by the corresponding warning light.

To allow the passengers going out at the end of each program release the handles by pressing the pushbutton Opening Handle (28); this pushbutton works only when both the warning lights Neutral (16-17) are burning; that is to say at the end of the program or after the Recovery operation.

Semi-Automatic Working

Since the operator has full liberty it will be up to him to avoid complex movement at the maximum speed.
To select this program move the key selector Abilitation to Manual/Semi-Auto on ON position.

During the semi-automatic working the operator can control the speed and the sense of rotation of both connecting rods by the right Speed lever, and their phase by displacement by the left Speed lever.

The amusement ride must necessarily be at a stop, no matter where it is positioned. Press the pushbutton Semi-Automatic (27) (warning light burning). After controlling the closing of the handles (warning light Opening Handle burning) move the right Speed lever (42) which controls the speed and the sense of rotation of both connecting rods.

Moving the lever forward the amusement ride will turn in clockwise direction and the speed will be proportional to the shifting of the lever itself; moving the lever in the opposite direction the amusement ride will turn in anti-clockwise direction.

The left Speed Lever (11) controls the phase displacement between the two connecting rods. In the central position the phase displacement is 0, whereas when the lever is shifted the phase displacement will be proportional to the shifting of the lever. If the lever is moved forward the left connecting rod will be in advance.

Pressing the pushbutton Anti-phase (29) the two connecting rods will have opposite senses of rotation; such condition can be annulled pressing the same pushbutton again.

This option can be activated even when the machine is working.

The Speed lever can be moved frequently since a circuit constantly regulates the acceleration and the deceleration of the connecting rods (Independently of the speed of the levers). Furthermore, in case of reverse this circuit reduces the speed till the connecting rods stop. Then the rotation starts again in the opposite direction and with constant acceleration.

To conclude the turn press the pushbutton Recovery (30) and after that shift the Speed levers at the stop position (otherwise the amusement ride will begin to turn at the end of the Recovery). The Computer will now position automatically the raft at the point of departure.

The conclusion of this operation will be indicated by the lighting of the warning lights Neutral (16-17). Release the handles by the pushbutton Opening Handle (28).

Manual Working

Since the operator has full liberty it will be up to him to avoid complex movement at the maximum speed. To select this program move the key selector Abilitation to Manual/Semi-Auto on ON position.

The connecting rods are independent of each other; the operator controls the speed and the sense of rotation of each connecting rod operating on the corresponding levers.

When the amusement ride is at a stop, no matter where it is positioned, press the luminous pushbutton Manual; ascertain the handles are closed (Opening Handle warning light burning).

Moving the left Speed lever (11) the left connecting rod is set in action, with speed proportional to the shifting of the lever and clockwise direction if the lever is shifted forward or anti-clockwise rotation if the lever is shifted in the opposite direction.

Follow these instructions too for the right Speed lever (42) and the corresponding connecting rod.

The Speed levers can be moved frequently since a circuit constantly regulate the acceleration and the deceleration of the connecting rods (independently of the speed of the levers). Furthermore in case of reverse this circuit reduce the speed till the connecting rods stop. Then the rotation starts again in the opposite direction and with constant acceleration.

To conclude the turn press the pushbutton Recovery (30) and after that shift the Speed Levers in the Stop position (otherwise the amusement ride will begin to turn at the end of the Recovery).

The Computer will now position automatically the raft at the point of departure. The conclusion of this operation will be indicated by the lighting of the warning lights Neutral (16-17). Release the handles by the pushbutton Opening Handles (28).

End of the Session

The following instructions concern the processes for the power-down of the console and of the other parts used in the control of the Wild Water Trophy. The machine must be at the point of departure.

Press the luminous pushbutton Start/End of Cycle (18) which will start flashing, then press it a second time if you really intend to conclude the session, otherwise press one of the other pushbutton controlled by the Computer (ex. Automatic, Semi-Automatic etc.).

The Monitor will cancel the whole page thus confirming the conclusion of the session. Switch the Monitor off by the special pushbutton.

Bring the commutator Computer Control (20) in OFF position, switch off the current by pressing the pushbuttons Electrical Supply (10-41) in OFF position; at last switch the direct-current motor off.

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SPECIAL FUNCTION

Page Select

Through this pushbutton it is possible to change the page displayed on the monitor of the Computer. A schematic diagram of the amusement ride (5 on fig.2) is normally displayed. It also gives some pieces of information about the state of some variables.

As it is later explained in the following page the three coloured stripes on the video sides stand for:

- 1-8 (bleu) Control voltage
- 2-7 (green) Speed controlled by the console
- 3-8 (red) Ground speed measured on the connecting rods

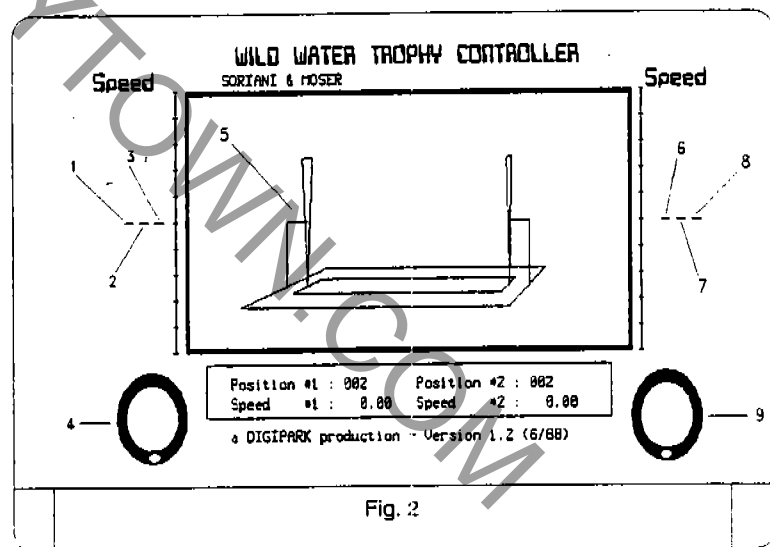
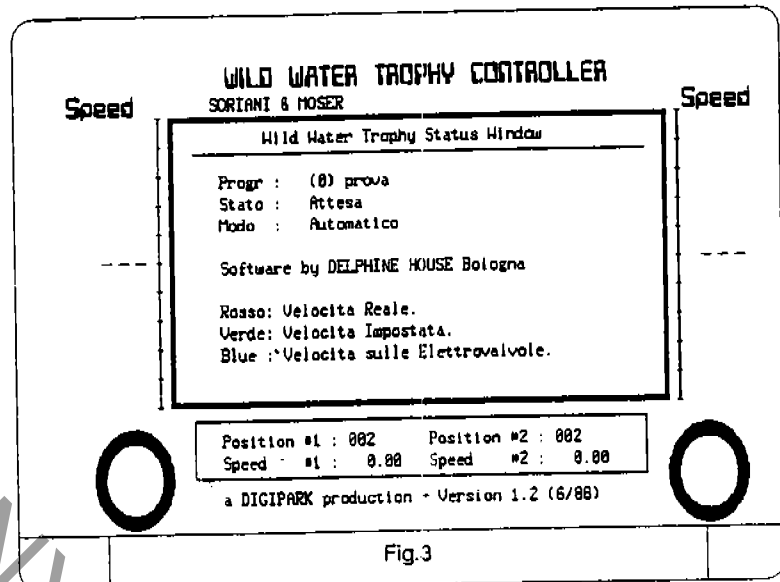


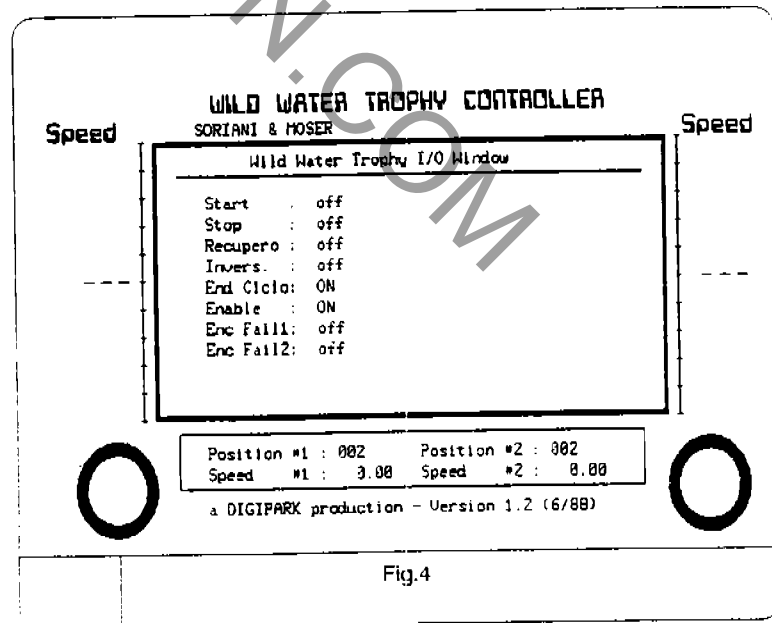
Fig. 2

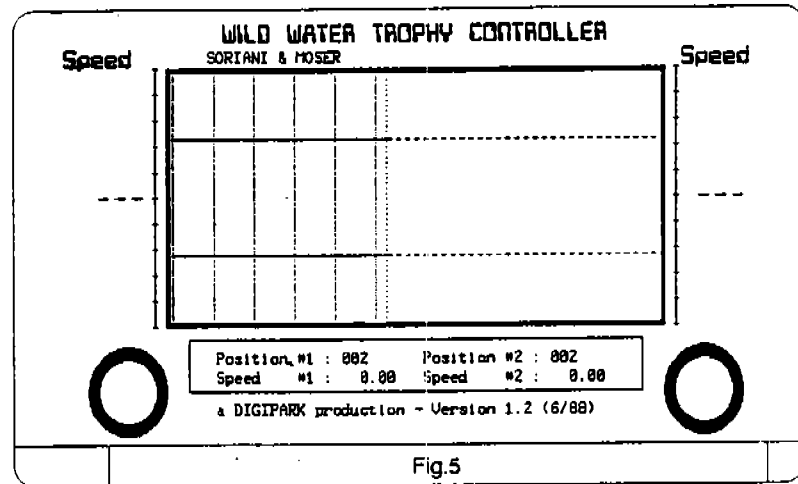
Moreover, the monitor displays the positions of the connecting rods in real time (4-9); obviously all schematic diagrams are dynamic and thus change according to the position of the amusement ride.

Pressing the pushbutton Page Select the video displays the second page (fig.3) illustrating some variables such as the method of working, the state of the amusement ride, the number and the name of the selected program, the explanation of the coloured stripes.



Pressing Page Select again the video displays some important indicators such as those signalling the Encoders out of order and the active state of some functions, ex. the Recovery (fig.4).





The last scheme (fig.5) displays the diagram of the connecting rods speeds in relation to time. Pressing the pushbutton Page Select again the first page is displayed on the video. All these operations are possible before or during the working of the amusement ride.

Emergency

In case of black-out or power failure (Computer out of use) shift the commutator Computer Control 820) to OFF position.

In this way the amusement ride will be controlled manually and will gradually stop if the Speed Lever are in a central position, otherwise it will turn according to the selected speed (without sudden speed change).

In case of impending danger press the pushbutton Emergency (19): the braking-distance will be very short and the amusement ride will remain stopped in that position.

Seconds Counter

A chronometer (min-sec) is displayed in the lowest part of the video; the duration of each turn will be thus made known to the operator. The working is completely automatic.

Working

By pressing the pushbutton Start (Automatic working) or by shifting one of the two Speed Lever from the central position (Semi-Automatic or Manual working) you reset the chronometer and make it start.

It stops in the following conditions:

- when you press the pushbutton Opening Handle (28) at the end of the turn; the time is anyway displayed till the following start;
- after 60 seconds in the case no operation takes place.

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- after 60 seconds in the case no operation takes place.

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BRAKE SYSTEM

It consists of an electromagnetic brake that is placed coaxially on the driving shaft. Its only function is to lock the machine when the speed of rotation is null or nearly null, whereas the dynamic braking is accomplished by the motors.

Regular Working

With regular working the switches Automatic Brake (45-46) must be placed on OFF position.

The brake will stop the amusement ride when it is at the starting point (condition obtained at the end of a Recovery); it is thus possible to avoid losses of balance during the load and the unloading of the passengers.

Tests and Maintenance

It is necessary to position the switches Automatic Brake (45-46) on ON, whenever you wish to lock the amusement ride on a determinate position, which is not the starting point. In this way the brake works each time that the Speed Lever are in central position. With this function the maximum speed of the connecting rods is of few revolution per minute.

ELECTRICAL CHECK

An auxiliary console (see fig. p.16) constantly controls the working of the motors, the brakes and the feedings. This is composed of electronic measuring instruments. Some of them are protected against short circuits or failure which may cause too high voltage current.

Feedings

On the upper part of the panel, left side, there are three digital voltmeters whose function is the measuring of the tension on each phase of the feeding voltage; the fourth instrument is a digital voltmeters which displays the voltage of the feeding tension. These circuits are not provided with any protective circuits.

Motors

Eight instrument, whose function is the electric check of the motors, are installed on the level panel. In the lower section there are four ammeter measuring the voltage that is absorbed by each motor, whereas in the upper section there are four voltmeters measuring the voltage at their ends.

These instruments are also equipped with a protecting circuit which acts if the values are not within the limiting values. When this circuit act the orange led, which is marked by the word "Limit", lits up.

Finet of all remove the main cause, when reset the instrument slightly pressing the pushbutton (Reset) by a screw driver tip and program the runnings again.

There are also two small shafts for trimmer (Thereshold and Delay):

- Thereshold: it regulates the intervention of the protecting circuit.
- Delay: it regulates the delay between the main cause and the intervention.

Brakes

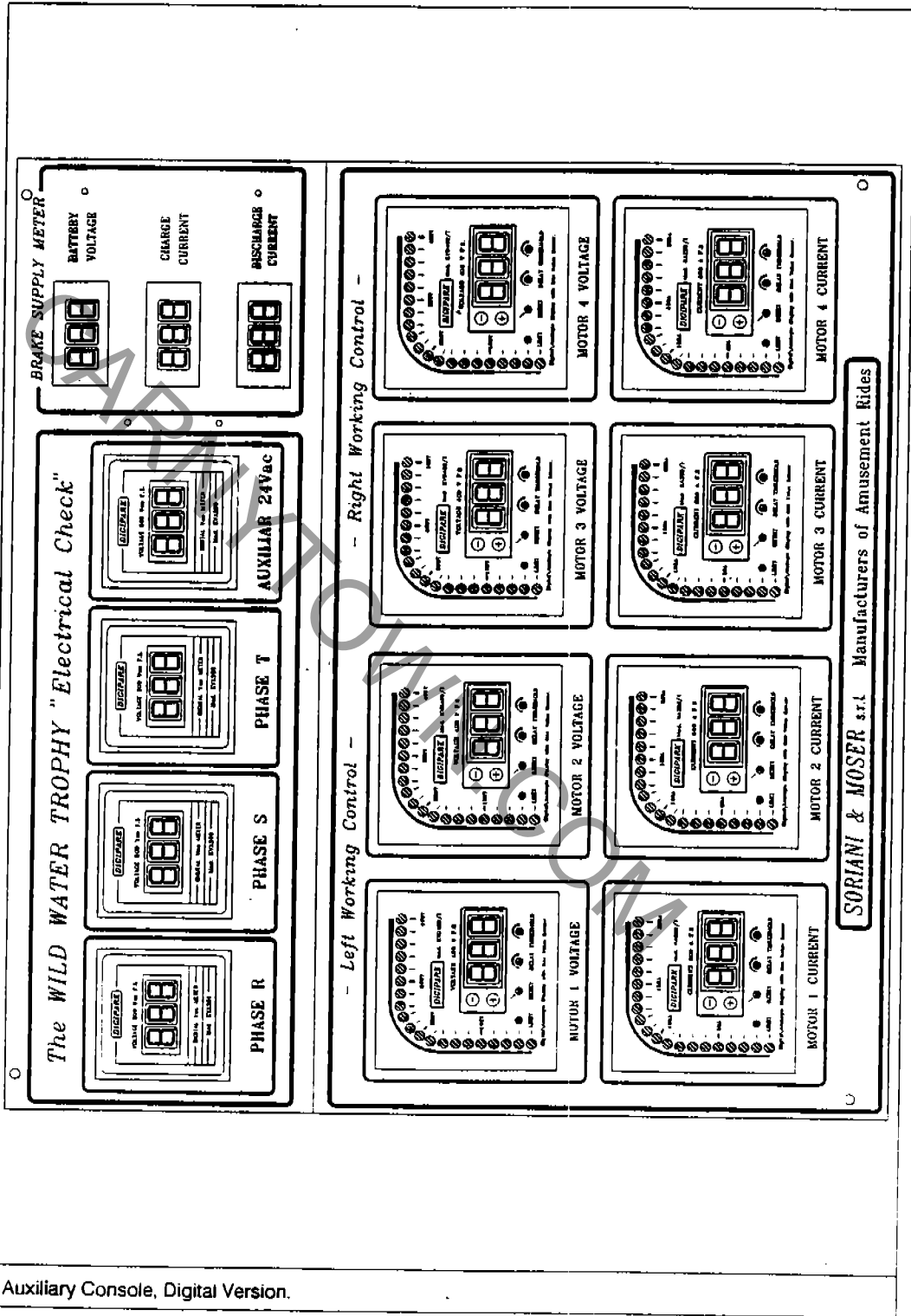
On the right side of the panel there are three displays with three figures whose function is the control of the feeding unit of the brakes.

The charge condition of the buffer batteries for the feeding of the brakes is displayed on the monitor - Battery Voltage (normally the value is 24V).

Charge Current displays the value of the batteries recharging current.

Discharge Current displays the current that is absorbed by the brakes (the value is nearly 1,5A when one brake work, 3A when both the brakes work).

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Auxiliary Console, Digital Version.

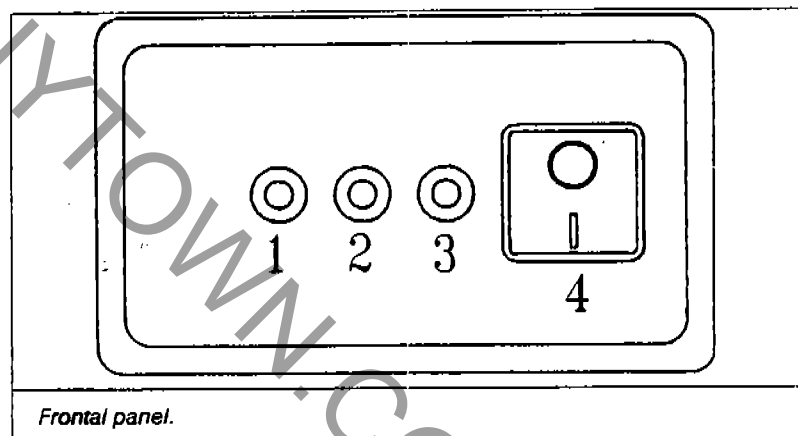
DIRECT CURRENT GENERATOR

The generating set protects the current supply of the computer from microbreakings or sudden black-out. It contains two batteries (12V) which are connected in sequence.

Instructions:

- 1) Connect the cable to the current network.
- 2) Feed the set by the switch which is placed on the frontal panel of the generator.
- 3) Wait 20/30".
- 4) Switch on the computer.

Pushbutton Controls and Indicators



Frontal panel.

- 1) Yellow Led on: battery-operated led.
- Yellow Led off : current-operated led.
- 2) Red Led on: overload or shortcircuit.
- Red Led off: correct electric input.
- 3) Green Led on: it indicates the presence of current network.
- Green Led off: it indicates the absence or an excessive fall of current.
- 4) Electric ignition switch.

When the generating set is on, the correct functioning is indicated by the green led that must be alight. If the red light should light up in a continuous way ascertain there are not short circuits or wrong connections. Short winking of the red Led do not prejudice the functioning of the generator.

Should the power fail the yellow led will lit up, a brief audiotone will be heard and the green Led will switched off.

After a few minutes an audiotone will signal the approaching of the range limit (the range with full load is 6' about).

Never discharge the batteries completely.

Anyway, after the utilisation of the generator in the absence of current it is necessary to make it operate without load in order to recharge the batteries (the recharging takes 4 hours).

Technical Details

Input Voltage	220Vac	50Hz	
Output Voltage	220Vac	50Hz	
InterventionTime	Null		
Power	350VA	600VA	750VA
Protection	Shortcircuits - Overload - Overheatings Batteries run down		
Ventilation	Temperature proportional electronic control		
Batteries	Hermetically closed batteries, without maintenance		

TABLE

Drives and Indicators

N	NAME	DESCRIPTION	FUNCTION
1	PROGARM	Display	It visualizes the selected program (active in the automatic way).
2	INSTANT SPEED	Display 3 figures	It visualizes the instant speed of the left connecting rod.
3	LEVER ON	Led Warning light	It signals the position of the of the left speed lever (when it is not at the starting point).
4	WORKING	Led Warning light	It indicates the output of the signal control from the console.
5	RUNNING	Led Warning light	It signals the movement of the left connecting rod.
6	CLOCKWISE	Led Warning light	It indicates the rotation in clockwise direction of the left connecting rod.
7	A.CLOCKWISE	Led Warning light	It indicates the rotation in anti clockwise of the left connecting rod.
8	****	Led Stairs	It signals the position of the left connecting rod in real time.
9	GAIN SPEED	Commutator rotating with 4 positions	It selects the maximum speed of the left connecting rod.
10	ELECTRICAL SUPPLY LEFT	Locking switch	It switches the left power plant on.
11	SPEED LEVER	Potentiometer	In the Manual way it controls the speed and the direction of rotation of the left connecting rod; in the Semi-Automatic way it controls the phase displacement between the two connecting rods.
12	ELECTRICAL SUPPLY ON	Luminous pushbutton	Feeding of the left power plant. The light indicates the connection has taken place.
13	ELECTRICAL SUPPLY OFF	Pushbutton	It switches the left power plant off.
14	LEFT ENCODER FAYLURE	Warning light	It indicates when the left encoder is out of order.
15	RIGHT ENCODER FAYLURE	Warning light	It indicates when the right encoder is out of order.
16	LEFT NEUTRAL	Warning light	It signals when the left power plant is loose.

TABLE

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17	RIGHT NEUTRAL	Warning light	It signals when the right power plant is loose.
18	START/END OF CYCLE	Luminous pushbutton	It starts a working section and ends it off.
19	EMERGENCY	Luminous pushbutton	The lighting of the warning light signals an emergency. The pushbutton disconnects the amusement ride from the transmission gears.
20	COMPUTER CONTROL	Commutator rotating with two position	On OFF position it excludes the control of the Computer.
21	PROGRAM UP	Pushbutton	It selects the following program (active in the Automatic way).
22	PROGRAM DOWN	Pushbutton	It selects the previous program (active in the Automatic way).
23	START	Luminous pushbutton	It starts the selected program (active in the Automatic way).
24	STOP	Luminous pushbutton	It ends the selected program off (active in the Automatic way).
25	AUTOMATIC	Luminous pushbutton	It selects the Automatic working (active when the amusement ride is at the point of departure).
26	MANUAL	Luminous pushbutton	It selects the Manual working (active when the amusement ride is at a stop).
27	SEMI-AUTOMATIC	Luminous pushbutton	It selects the Semi-Automatic working (active when the amusement ride is at stop).
28	OPENING HANDLE	Luminous pushbutton	The warning light indicates that all the handles are closed. The pushbutton unclamps them.
29	ANTI-PHASE	Luminous pushbutton	It gives an opposite direction to the rotation of the connecting rods (active when the amusement ride is at a stop).
30	RECOVERY	Luminous pushbutton	The amusement ride is positioned at the starting point.
31	PAGE SELECT	Pushbutton	It selects the following page on the video.
32	PROGRAM	Display	It displays the selected program (active in the Automatic way).
33	INSTANT SPEED	Display 3 figures	It displays the instant speed of the right connecting rod.
34	LEVER ON	Led warning light	It indicates the position of the right Speed Lever, when it is not at the starting point.
35	WORKING	Led warning light	It indicates the output of the control signal from the console.

TABLE

WILD WATER TROPHY

36	RUNNING	Led warning light	It signals when the right connecting rod is in motion.
37	CLOCKWISE	Led warning light	It indicates the clockwise rotation of the right connecting rod.
38	ANTI-CLOCKWISE	Led warning light	It indicates the anti-clockwise rotation of the right connecting rod.
39	****	Led stairs	It signals the position of the right connecting rod in real time.
40	GAIN SPEED	Commutator rotating with four positions	It selects the maximum speed of the right connecting rod.
41	RIGHT ELECTRICAL SUPPLY	Locking switch	It switches the right power plant on
42	SPEED LEVER	Potentiometer	In the Manual way it controls the speed and the direction of rotation of the right connecting rod; in the Semi-Automatic way it controls the speed of both connecting rods.
43	ELECTRICAL SUPPLY ON	Luminous pushbutton	Feeding of the right power plant; the lighting of the warning light indicates that the connection has taken place.
44	ELECTRICAL SUPPLY OFF	Pushbutton	It switches the right power plant off.
45	LEFT AUTOMATIC BRAKE	Commutator	It makes the automatic brake work (use it only when the amusement ride is empty).
46	RIGHT AUTOMATIC BRAKE	Commutator	It makes the automatic brake work (use it only when the amusement ride is empty).

The lighting of the luminous pushbutton indicates that it has been previously pressed and that the method of working has been selected.

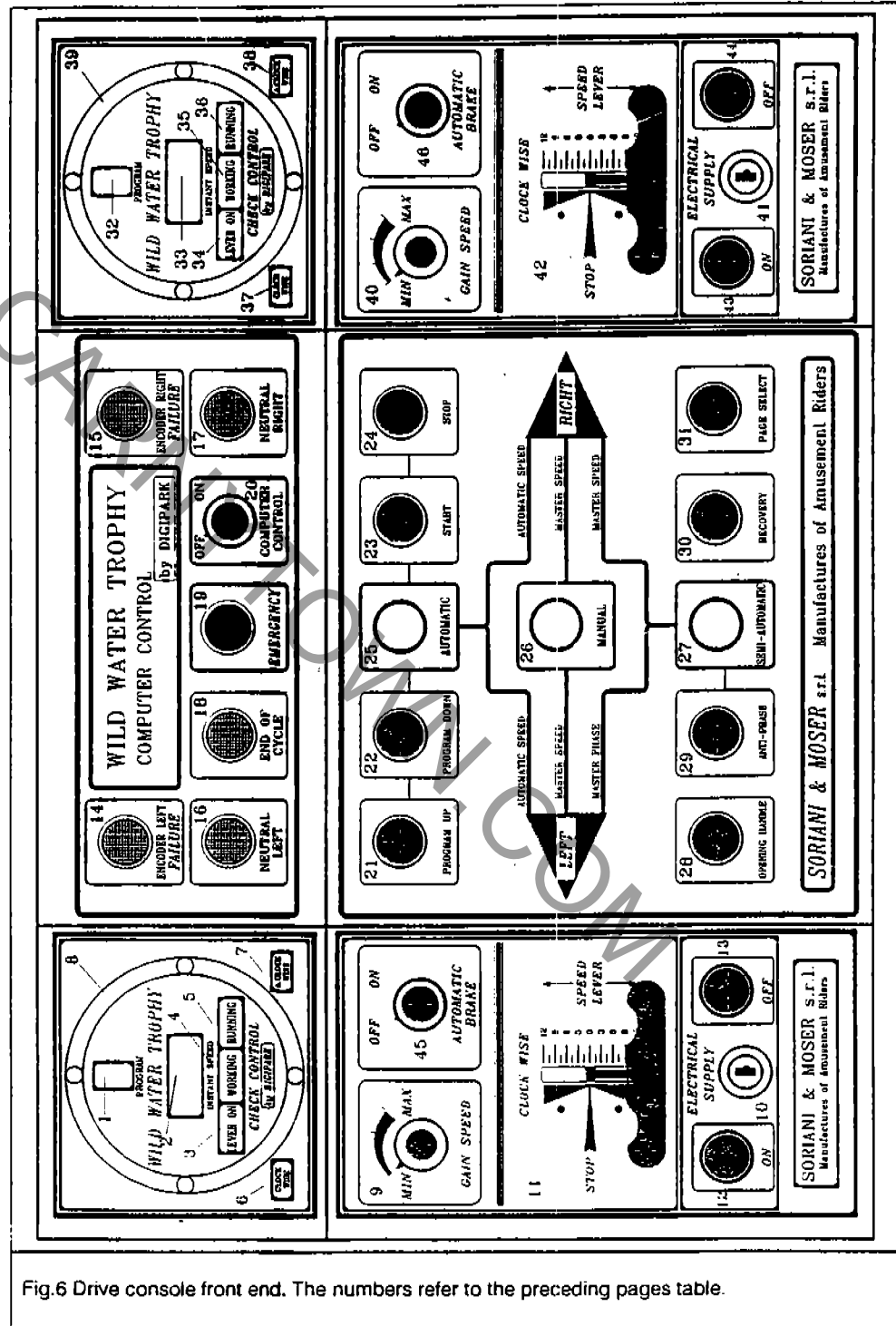


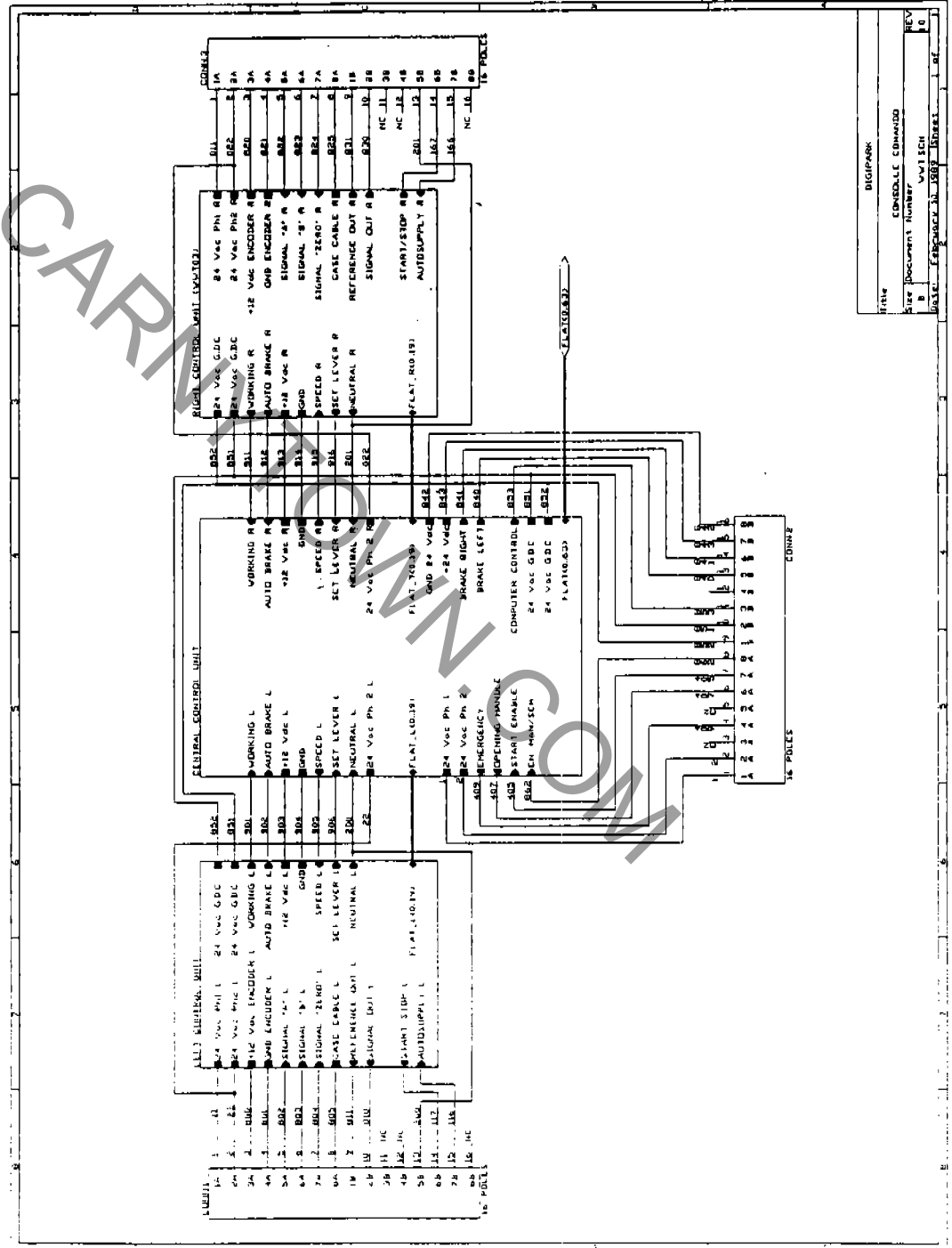
Fig.6 Drive console front end. The numbers refer to the preceding pages table.

TECHNICAL DETAILS

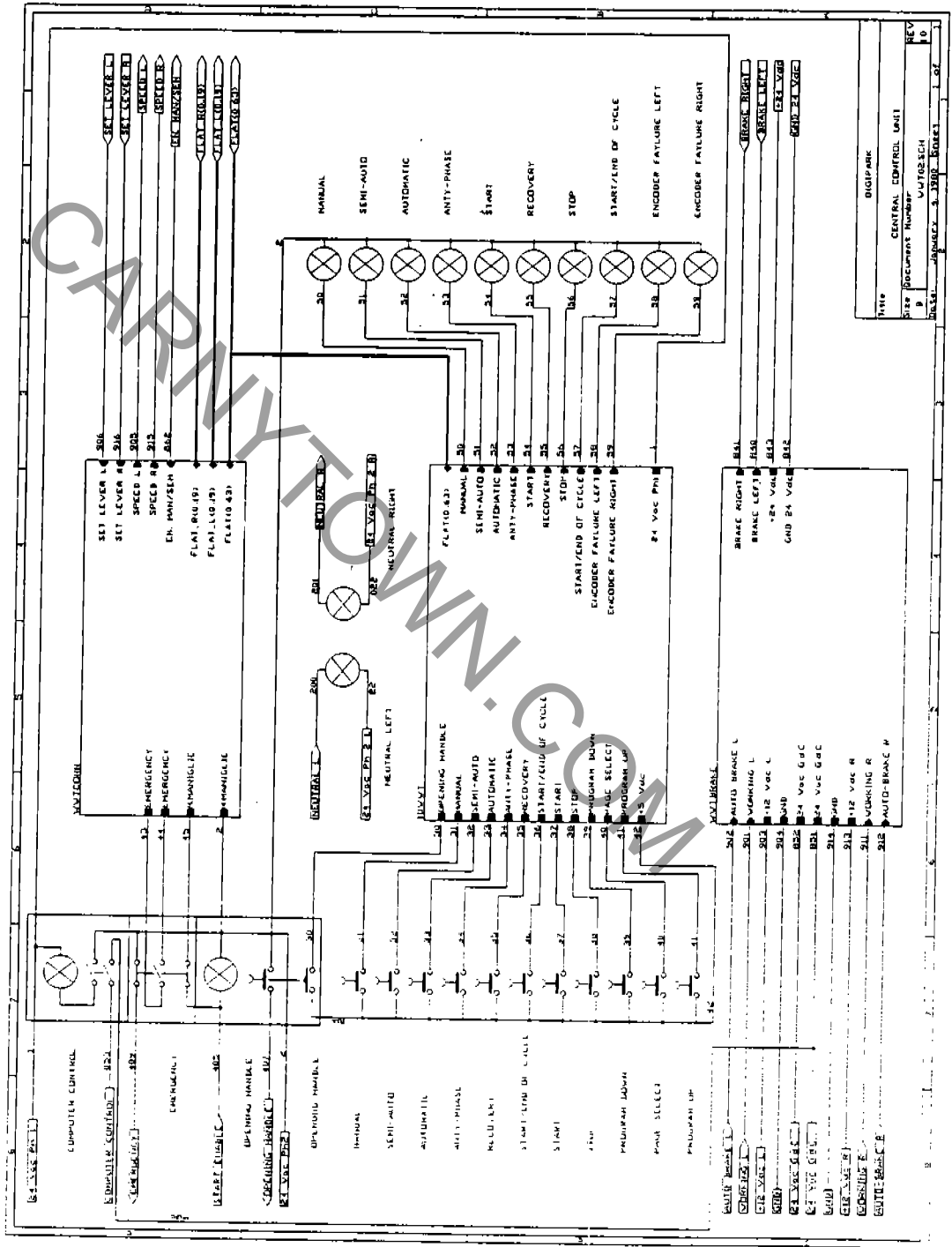
Components

Computer	TLTX AT 286 VLSI 512 Kbyte RAM
C.P.U.	Intel 80286 12MHz
Drive	Chiron 3"1/2 720Kbyte
Monitor	Philips mod. CM 9053
Graphic Adapter	DEGA CARD Ver. 2.0
Input/Output Interface	PC 8255 IO CARD
AD-DA Converter	PC ADDA 12 Card Ver. 2.0
Direct Current Generator	GPC 501

Drive Console Block Diagram

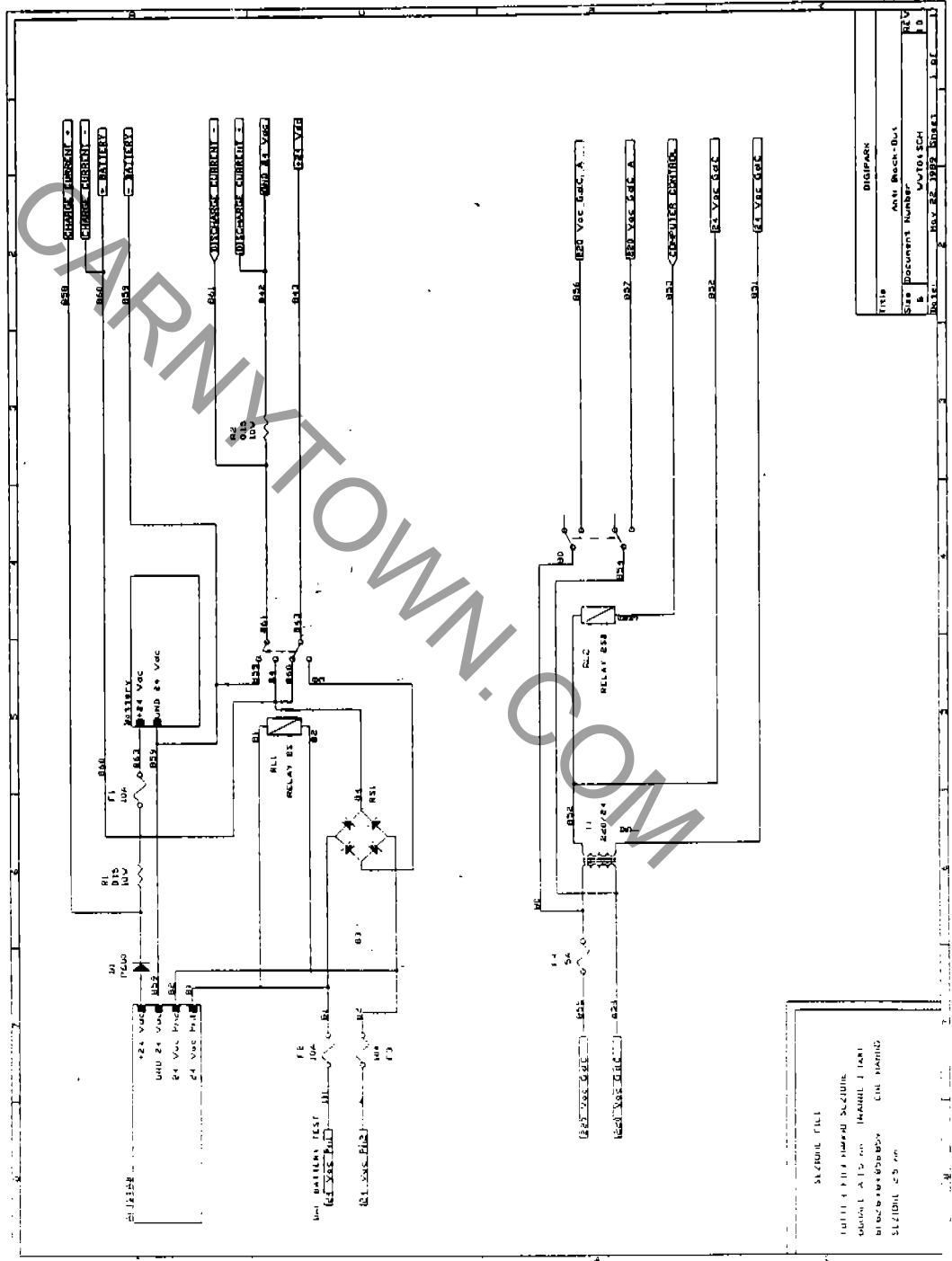


Central Control Unit

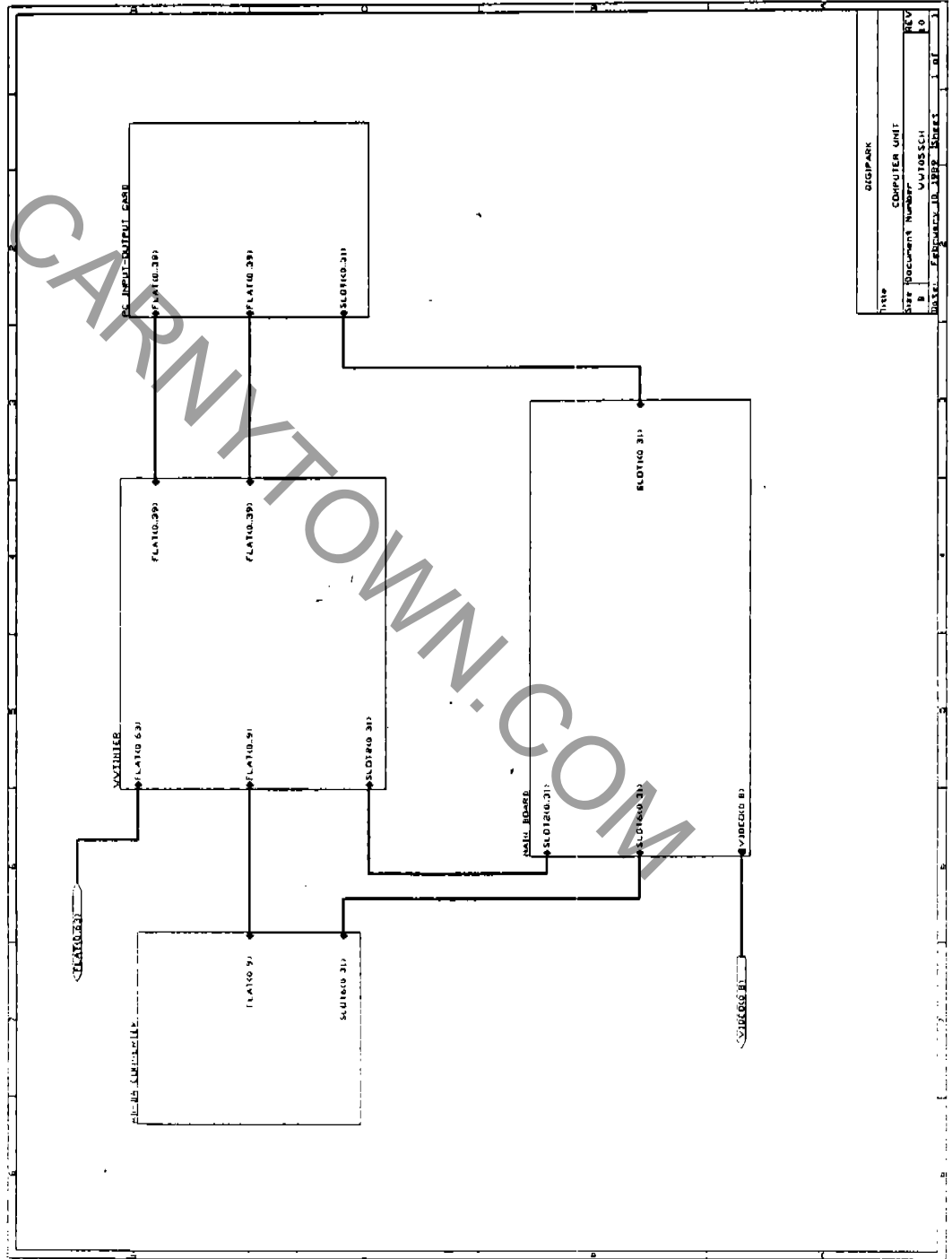


Central Control Unit

Anti Black-Out



Computer Unit



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- MELARA (RO) ITALY -

D.C. motors series TL-CP size 80 280

Instructions

Unless specifically requested at the time of ordering the motors are shipped without crating. Therefore it is advisable to inspect the condition of the motors immediately on arrival in case it is necessary to lodge a complaint against the transporters. If the motors are not put into operation at once make sure they are stored in a dry room where there is no risk of them being sprayed by water. It is advisable to lift up the brushes in their cases so as to prevent contact between the brushes and commutator.

Installation

When the motors are put into place and started it is best to check some essential conditions.

- a) The motors must be installed in a place which allows the best possible circulation of air both on entry to and exit from the motor and the auxiliary ventilating fan. This is a determining factor if the capacity indicated on the plate is to be guaranteed. It is necessary to avoid that the hot outflowing air is recirculated, also keep the motors away from sources of heat which alter the temperature of the air in circulation.
- b) Check that the air in the space reserved for the motor and the location surrounding it are without grease particles or impurities. Once allowed to circulate within the machine these could cause rapid wear on the brushes and deterioration of the commutator. In these cases it is necessary to use filters or to draw air from another room or from outside by canalization in which the air capacity and pressure should at least correspond to the values listed in our table no..... page.....
- c) Make sure there is easy access to the motor for the various controls and maintenance, especially at the non driving end.

Mechanical coupling

This operation must be carried out with care and attention.

- d) When the motor is put into position both with the B3 version with base plate or the various B5 types, the surface it rests on must be well controlled so that the differences between the various points does not exceed 0.1mm. The diameter of the securing screws must be of the correct size to fit the holes prepared for this purpose.
- e) When keying gear such as pulleys, pinions or joints onto the shaft end, the coupling must be carried out with the correct tolerances and must be perfectly balanced, hammers must not be used as their reverberating would certainly damage the ball bearing track. Having cleaned and greased the two parts use a slow dowel for keying, this can be obtained using for example a bar and bolt screwed into the threaded hole at the head of the motor shaft. Remember that the motor shaft(armature) is dynamically balanced using a half-key. Likewise the coupling gear.
- f) In direct coupling use a comparator to make sure the two axes are perfectly aligned. It is advisable to use flexible joints which

can compensate for the axial alignment being out of line and for axial expansion of the shaft due to heat.

Electrical connections

- g) All the motors are usually supplied with a connection board together with a table showing diagrams of the various combinations to be referred to when connecting the motor to the power supply. (on request outgoing cables are supplied which are marked with the same letters as shown on the diagram.
- h) All our motors are charged tested indifferently in the two senses of rotation clockwise and counterclockwise to the maximum of their possibilities. From size 90 upwards a thermic circuit breaker is incorporated into the windings to safeguard the temperature in case of prolonged overloading.
- i) The excitation windings should have a minimum current protector to interrupt the power supply to the armature when the effective working current drops below the minimum. It is also advisable to install, in parallel to the circuit, a resistor of suitable value (approximate value in ohms 100 times the value of the field resistor) to limit the overvoltage (dangerous for isolation) caused by the disconnection of the circuit.

Starting

Before starting up the motor or after a long period of inactivity it is advisable to proceed as follows:

- l) Test the insulation to earth of the windings which must not be lower than 2 Mohm. If it is lower than this blow dry air through the motor in order to remove dust deposits. If the desired result is still not obtained it will be necessary to disassemble the motor and put the affected parts in a kiln drying chamber for a few hours at a temperature of approx. 100°.
- m) When there are auxiliary ventilating fans check that the voltage and the frequency of the power supply are correct, also check the sense of rotation of the fans which must correspond to the sense of the arrow positioned on the fan itself. If the ventilating fan is fitted with ventilation relay, check that as it is used there is half filter obstruction. (maximum permissible filter obstruction corresponds to approximately half the air inlet closed)
- n) Make sure that the connections to the connection board correspond with the enclosed diagram (see also our table no..... page....) and that the values in volts of the voltage supply and the relative currents in Amps. correspond to the ratings.
- o) For motors with unshielded roller bearings make sure that they are correctly lubricated.
- p) When the motor has been running for 2-3 hours check that the bearings are performing well and that their temperature does not exceed 90°, so too for the commutation, which can be considered to be operating correctly when an even coating forms on the commutator.

If possible such operations are carried out with the motor running remove the drain plug which is situated at the bottom and directed towards the base, inject grease until it is discharged from the drain hole.

BRANDS OF GREASE SUITABLE FOR THIS ARE :
Castrol SPHEEROL APT 2 - Mobilux grease 2 - SHELL Alvania 2.

6) Ball bearings

Should it be necessary to replace bearings, they must be removed using an extractor. To insert new bearings on the shaft a special cylindrical tool should be used. whose hammer or press gives a blow which hits only the inner ring of the bearing.
Types of bearings used on our series of D.C. motors.

TYPE OF MOTOR	DRIVING END BEARINGS		NON DRIVING END BEARINGS	
	Standard	Roller type		
80	6203 2z	on request		6202 2z
90	6205 "			6004
I00	6206 "			6204
II2	6207 "			6205
I32	6209 "			6206
I60	63I2 "	NU 3I2		6308
I80	63I0 "	NU 3I0		6207
225	63I3 "	NU3I3		6309
280	63I8 "	NU 3I8		63I2

COMMUTATION

7) A visual control of the commutation makes its immediate valuation possible, so too for various other malfunctions connected with it and which influence each other.

An excellent commutation (power supplied by dynamo or battery with F.F. =1) is when the degree of sparking are practically zero. Obviously when the power is supplied by a fully controlled three-phase bridge with F.F. values varying between approx 1.03 1.10, this does not permit the degree of commutation mentioned above. however results are acceptable when there is slight continuous sparking in special intermittent operations which dont last long. When power is supplied by a three-phase semicontrolled bridge or a single-phase bridge with F.F. up to approx 1.7 apply the correct impedance coil.

A good commutation is one which allows the formation of an even coating on the commutator, it tends towards a shade of brown.

BRUSHES

a) Check the brushes for wear, their height must not be less than approx. $1/3$ the height of the new brushes; make sure that the terminal of the plaits fixed in the brushes does not reach the stage where it is scoring the commutator. Check that the brushes slide freely in the brush holder case. When replacing the brushes it is as well to use the same quality as the original type, it is also advisable to replace the whole set even if the wear is only partial.

Metalgraphic brushes absolutely must not be used. Except for brush holders fitted with a spring already calibrated at a constant pressure, the pressure of the spring on the brush must be about 180 - 200 gr./cm. which can be checked using a suitable measuring instrument.

Before restarting the motor the new brushes must be adapted to the curvature of the commutator. This is done by inserting a strip of fine emery cloth of a suitable width, between the brush and the commutator, which is then turned backwards and forwards. Take care to blow away the coal dust deposits.

Characteristics of the brushes fitted on our D.C. motors:

Resistivity ohm. mm.²/cm. 5000 - 6000
Shore hardness 50 - 55
Max. Density amp./cm.² 12
Max. allowable speed m./sec. 50
Advisable pressure gr./cm. 180 - 200

COMMUTATOR

c) Check the condition of the commutator. (always accompany the replacement of the brushes with a check as to the condition of the commutator) On finding in a very obvious manner any of the following faults:

- a) a rough surface
- b) single segments blackened
the presence of small craters or scoring
- d) brushes dragging on the mica insulation between the segments
- e) eccentricity greater than the values indicated on our table no. ----
- f) broken solderings on the commutator

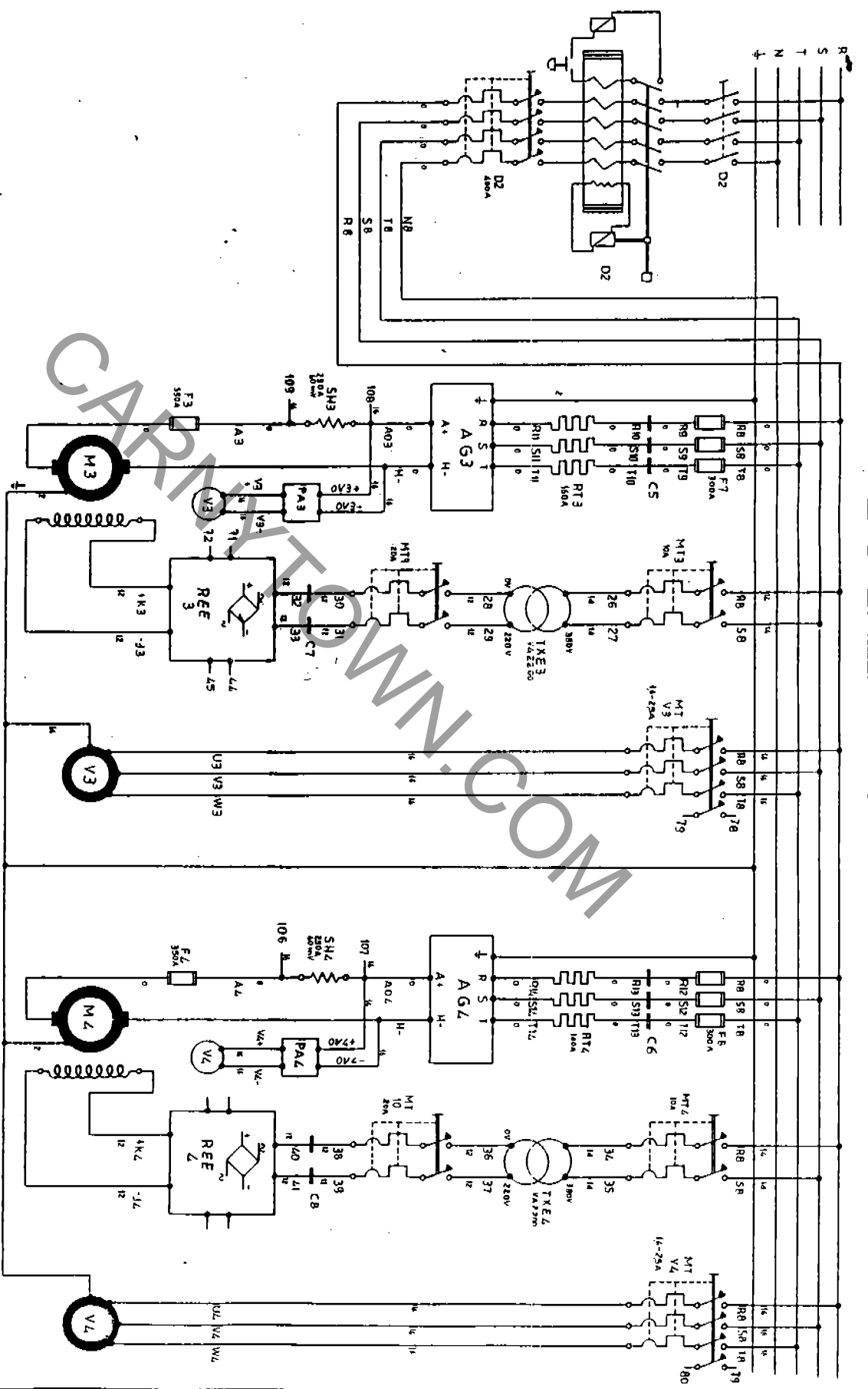
it is as well to carry out turning of the commutator. (this operation requires that the shaft is perfectly centred with the commutator resting on the ball bearing track, and the commutator diameter reduced by 0.5 ± 1 mm. using hard metal tools and with forward speed of about 0.10 mm per turn. Following this the mica insulator must be removed up to a depth of 1 ± 1.5 mm using a hack saw. After this operation it is necessary to remove the burr deposited on the edges of the segments using a scraper and then polish them perfectly with a pumice stone.

Maintenance and practical tests

In order to obtain a motor which lasts as long as possible with the minimum of inconvenience and at a reasonable cost, it is advisable to carry out the following program of operations periodically.

APPROX EVERY THREE MONTHS

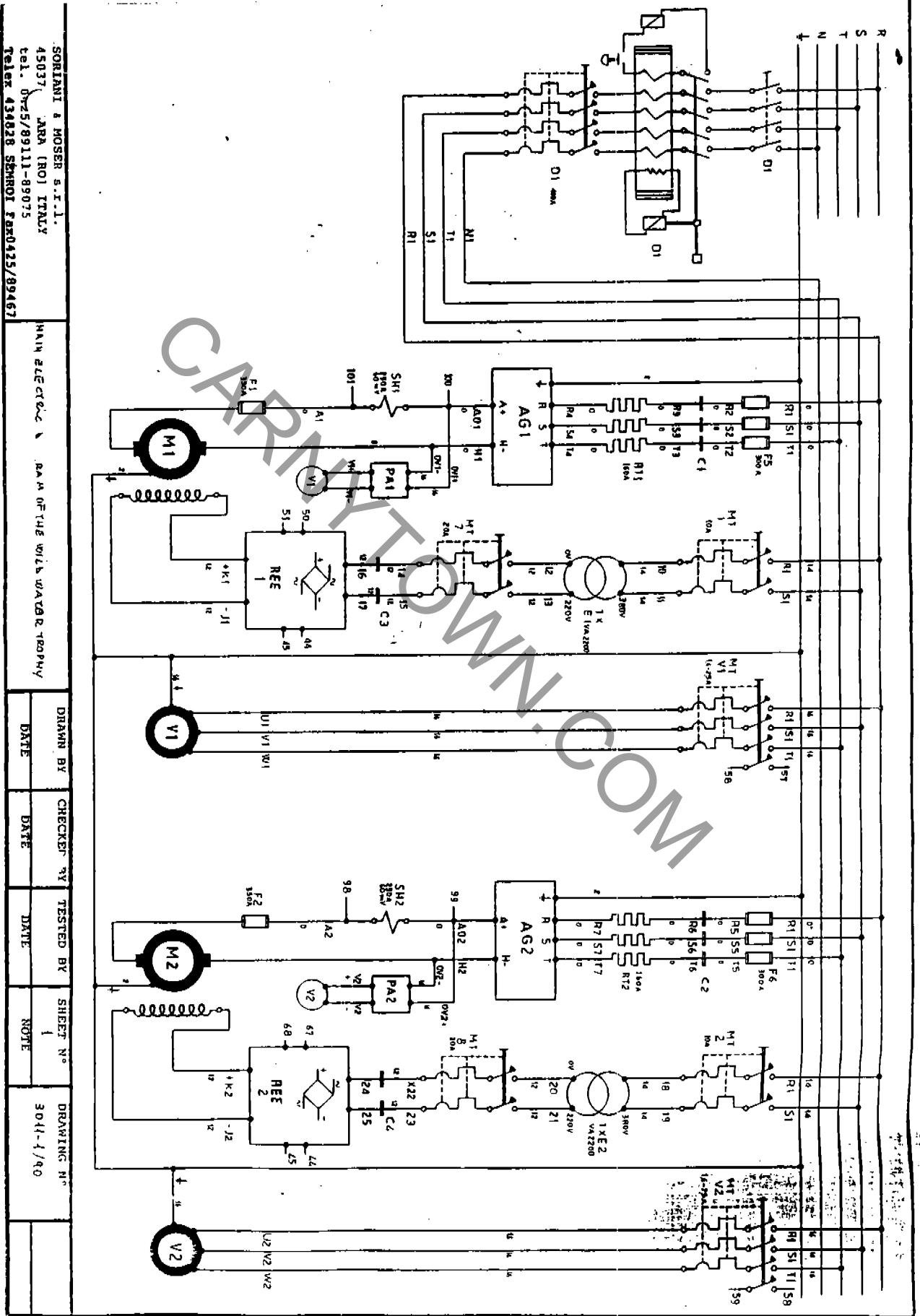
- 1) Remove the shield on the non-driving end and proceed to carefully clean the inside by blowing dry compressed air on all the accessible internal parts. This serves for removing coal dust deposited between the windings which damages the insulators, for cleaning the spaces between the segments of the commutator, make sure there is a free passage of air both between the coils and in the ventilation canals of the armature or of the outside of the frame.
 - 2) From size 132 upwards the enclosed type D.C. motors can also be supplied with AIR TO AIR HEAT EXCHANGERS which enable the realization of a closed path for the forced circulation of air inside the motor and in the heat exchanger tubes, using a ventilating fan. The tubes are cooled by a suction fan fixed above the heat exchanger. There is an extractable filter pannel (Viledon type) fitted in the internal ventilation system, for collecting the coal dust created by brush wear.
 - 3) For this series of enclosed motors with heat exchangers, clean the tube nest by blowing dry compressed air amongst the tubes, having first removed the two lateral walls. It is as well to remove the heat exchanger from the motor at least once a year, to clean its inside and to replace the seals if necessary.
 - 4) When there are fibre glass filters (Viledon type) they are cleaned with ordinary water and detergents. (where there are particular environmental conditions this should be done weekly)
 - 5) Check for noise and for overheating of the bearings, the temperature of which must not exceed approx. 90°. These factors could indicate that lubrication is lacking.
- Our D.C. motors up to size 225 are fitted with 2z bearings, serial no. NU for this type the quantity of grease already provided by the manufacturer guarantees continuous functioning for approx. 10,000 hrs. However this figure is only to give an indication, as performance depends on many factors, such as the type of work it is put to, the location of the motor, the speed.
- For the size 280 motors(driving end) and for special roller bearing motors, see that grease is occasionally added using a grease gun, the grease being injected into the grease cups positioned on the outside of the bearings support.



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MAIN ELECTRICAL W/ AM OF THE W/LB W/A T&R topology

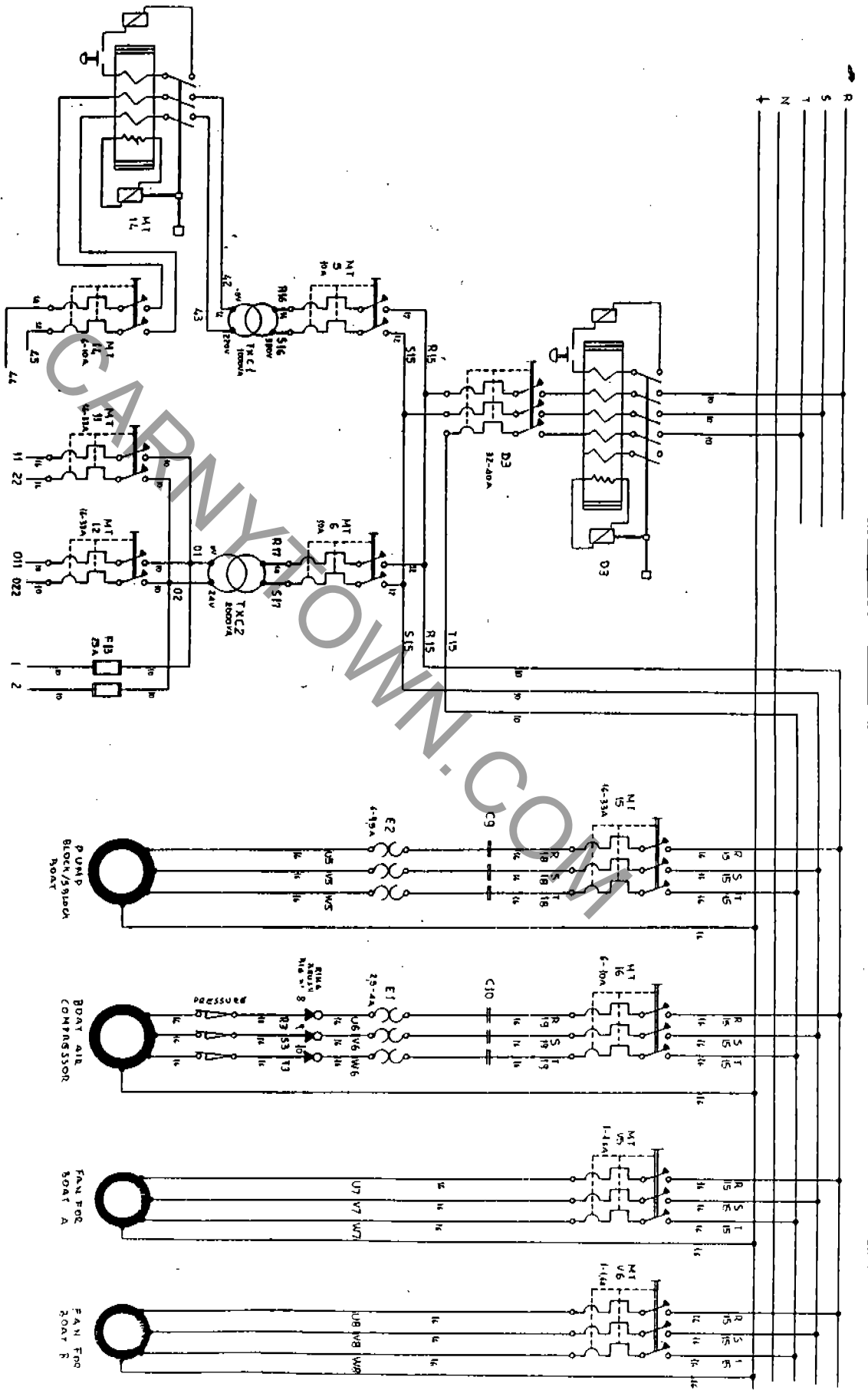
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MAIN electrical diagram of the WILB WABAR 200PHV

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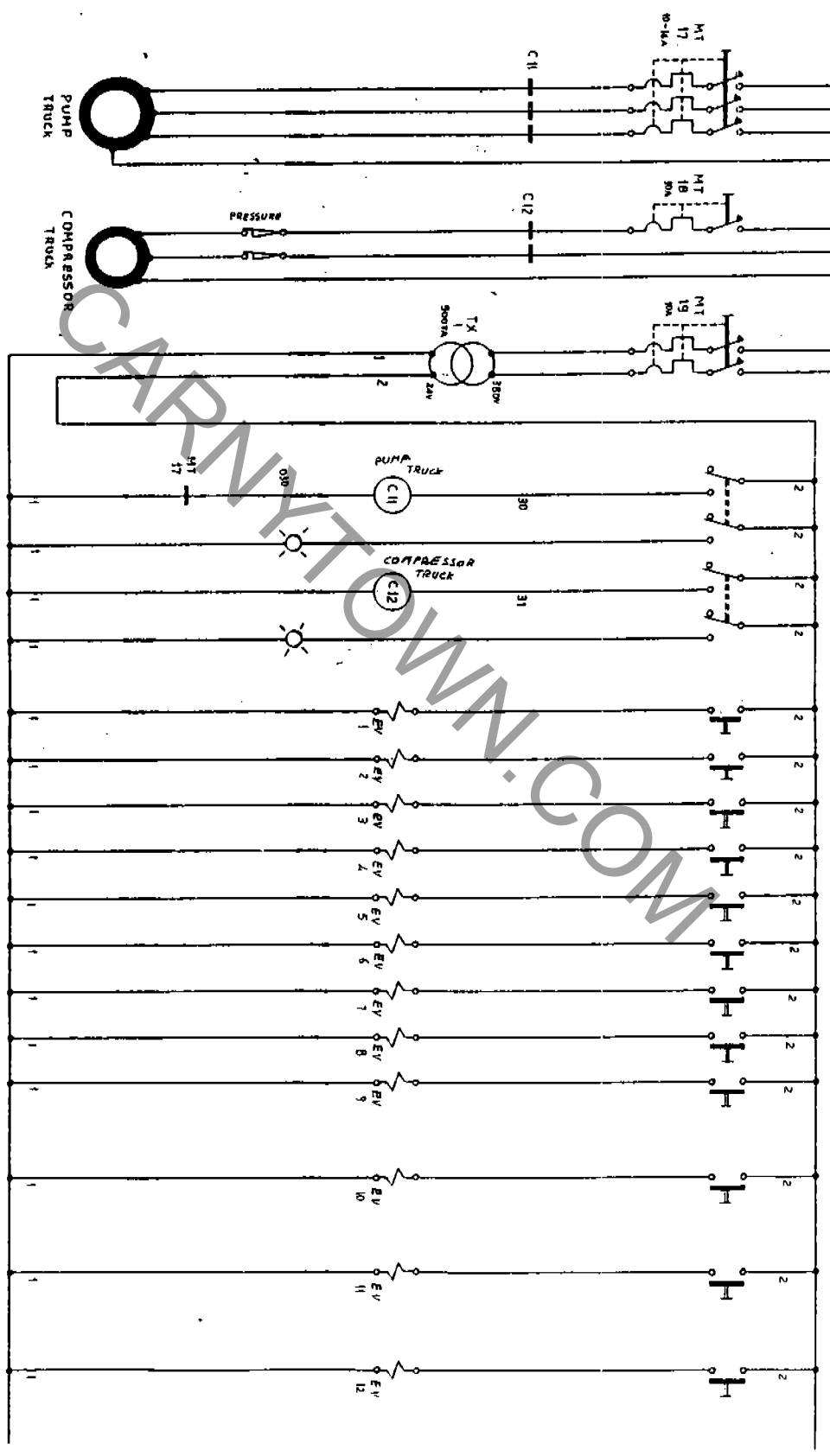


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MAIN ELECTRIC BY WM OF THE WILB WATER TROPHY

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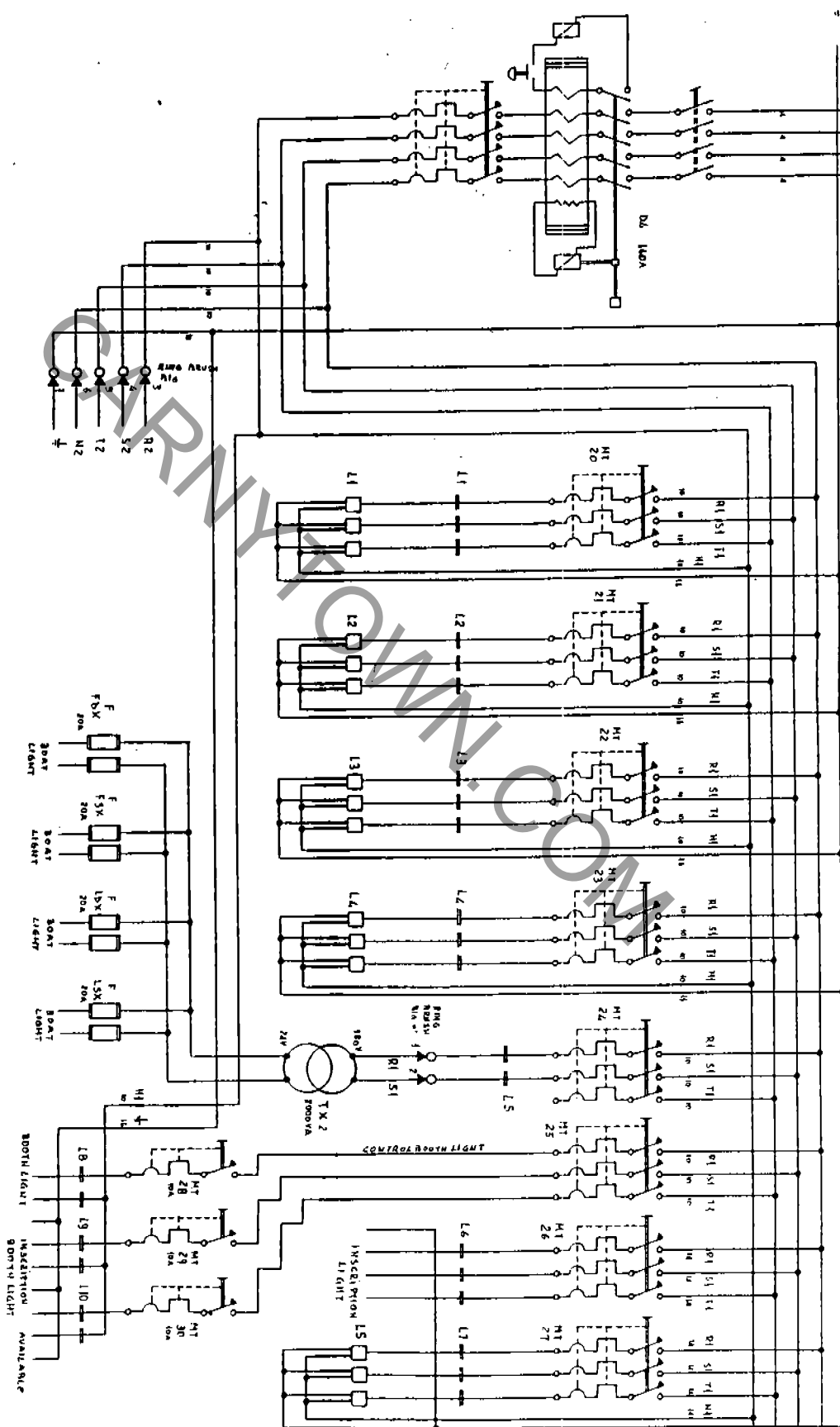


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MAIN ELECTRIC & JRAM OF THE OIL & WATER TOWER

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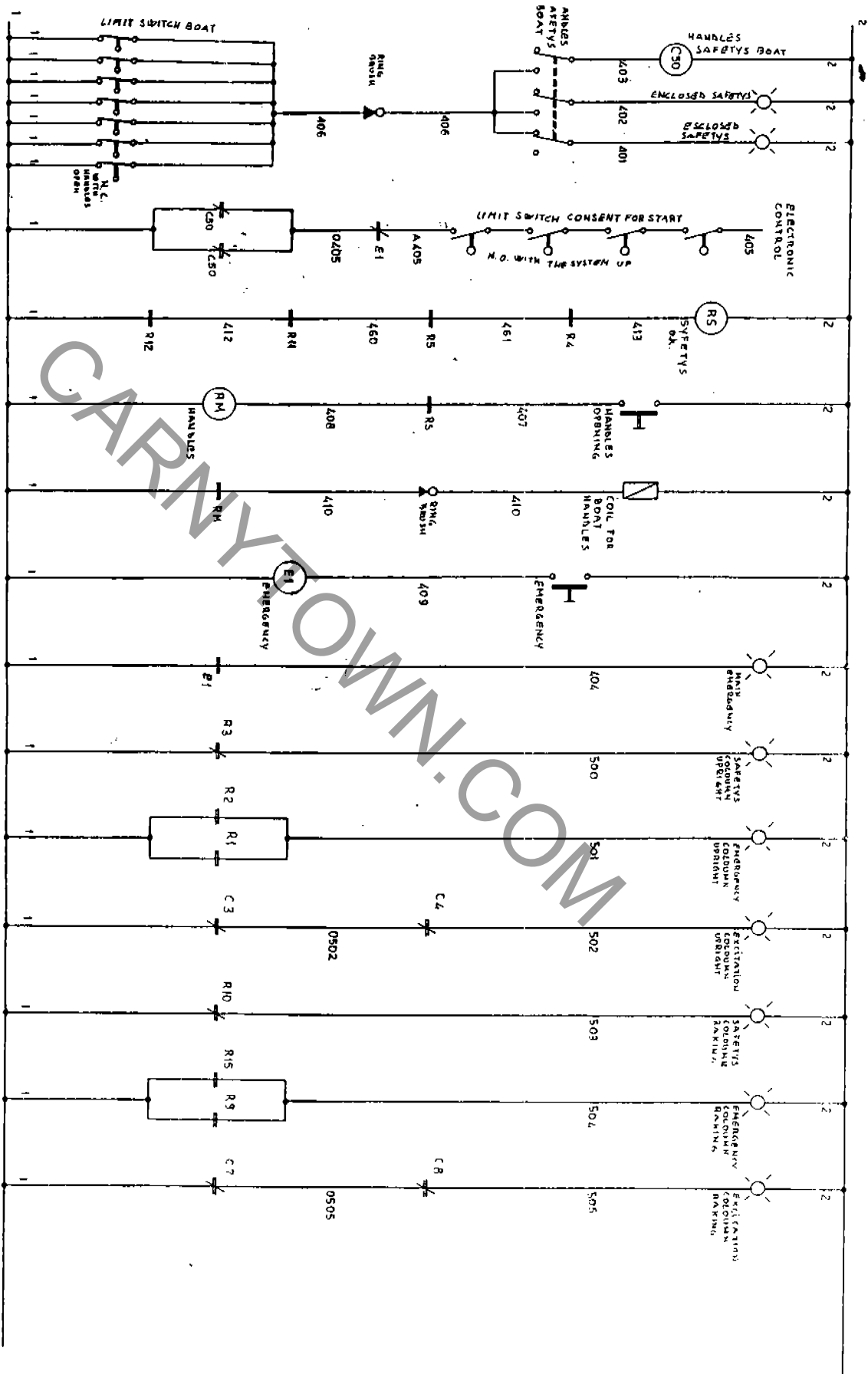


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MAIN ELECTRICAL PLAN OF THE VIBRATORY TABLE

DATE	DATE	DATE	NOTE	DRAWING N°
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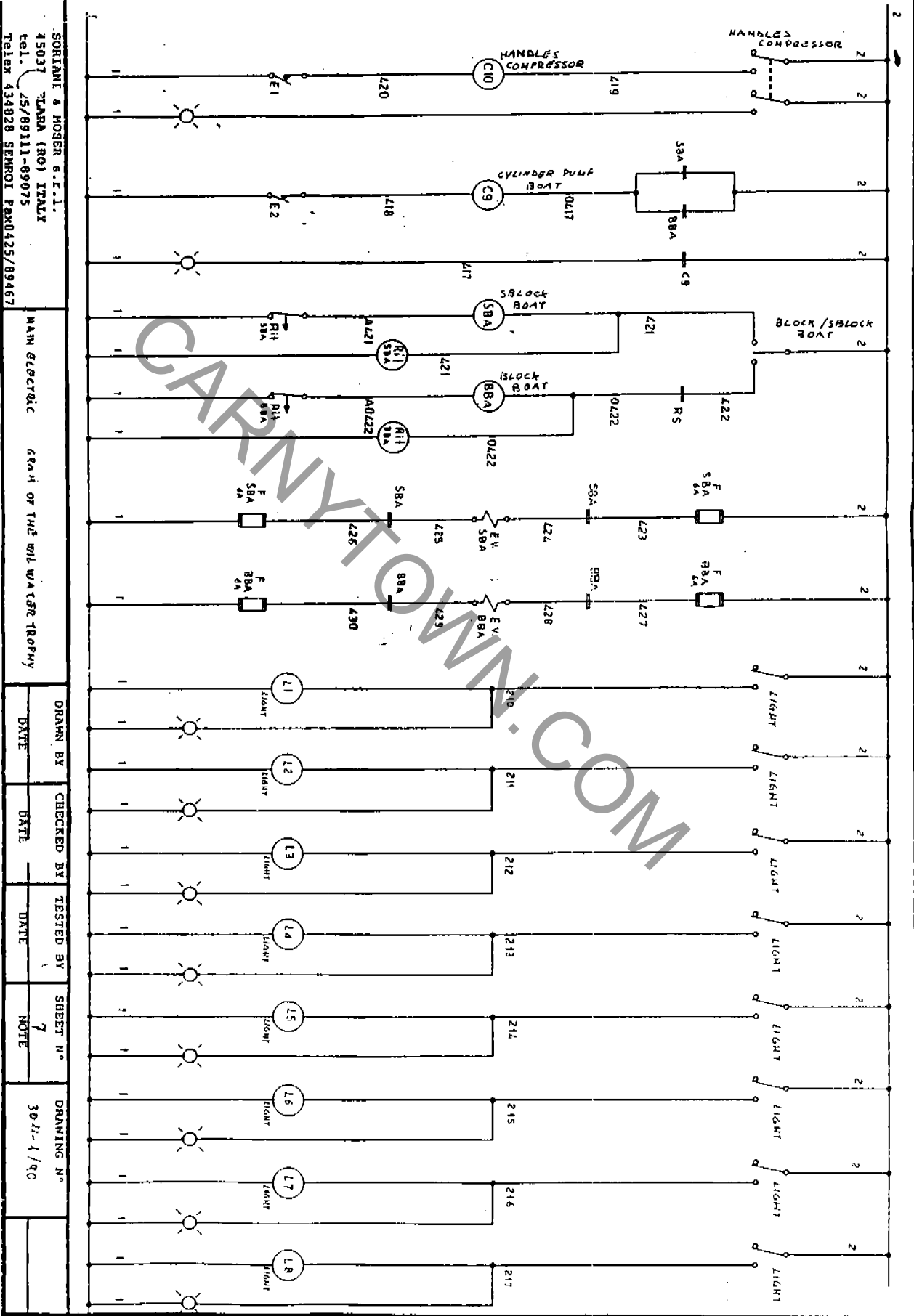
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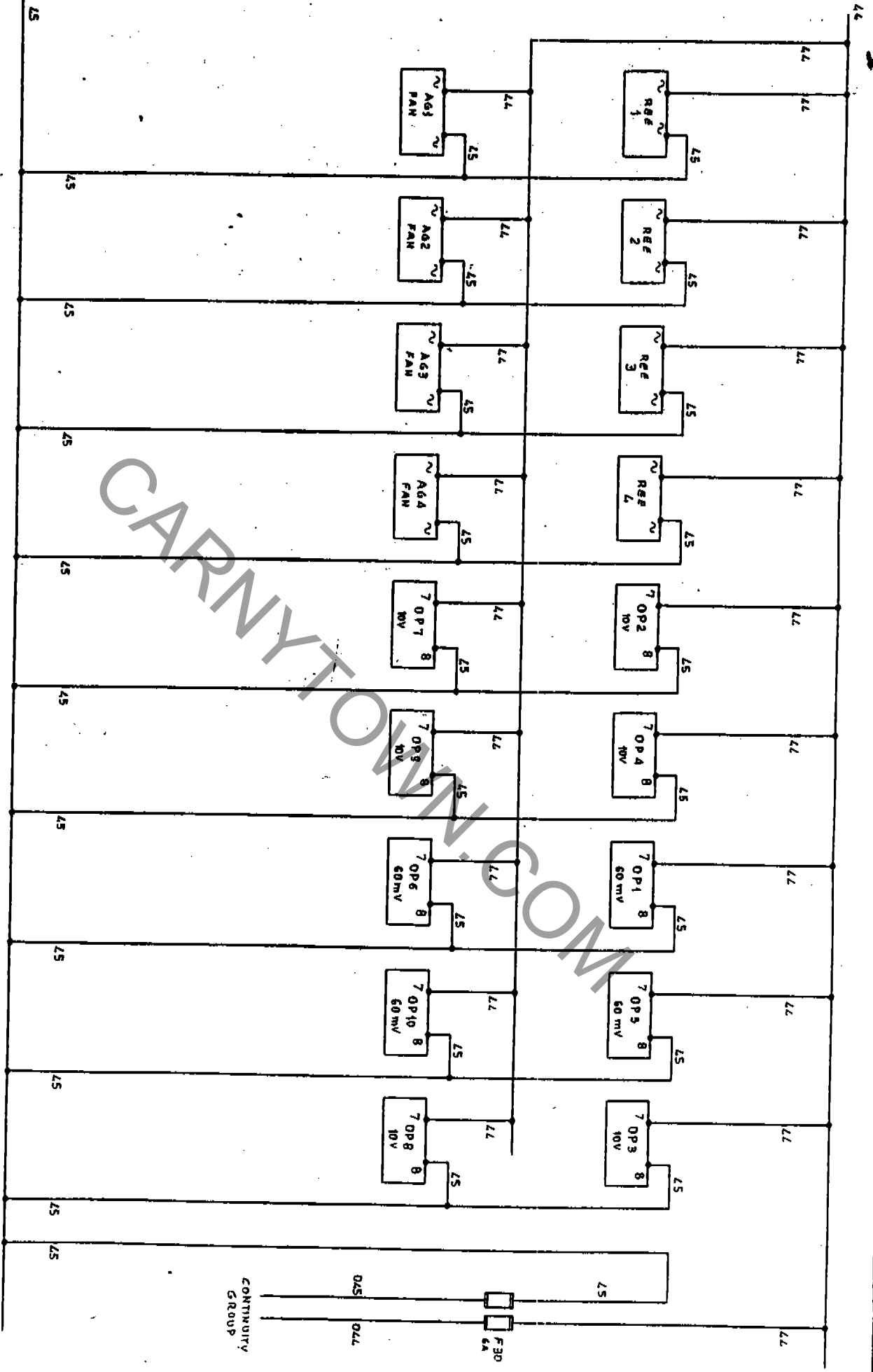
MAIN ELECTRIC & JAW OF THE WILD WATER TROPHY



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MAIN ELECTRIC DRAW OF THE WIL WATER TROPHY

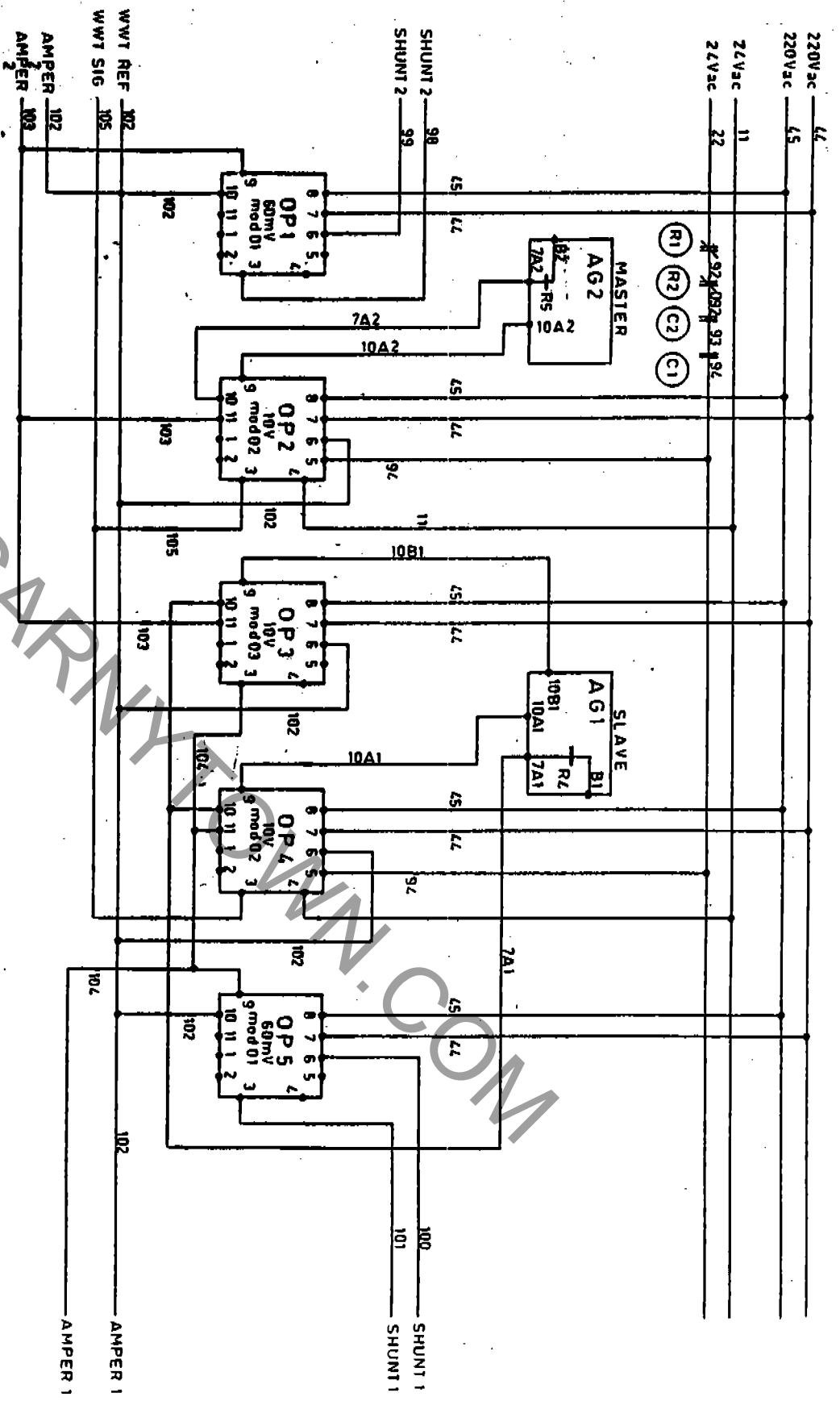
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DATE	DATE	DATE	7	3041-1/9C
			NOTE	



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MAIN ELECTRICAL SCHEMATIC OF THE WILD WATER TOWER

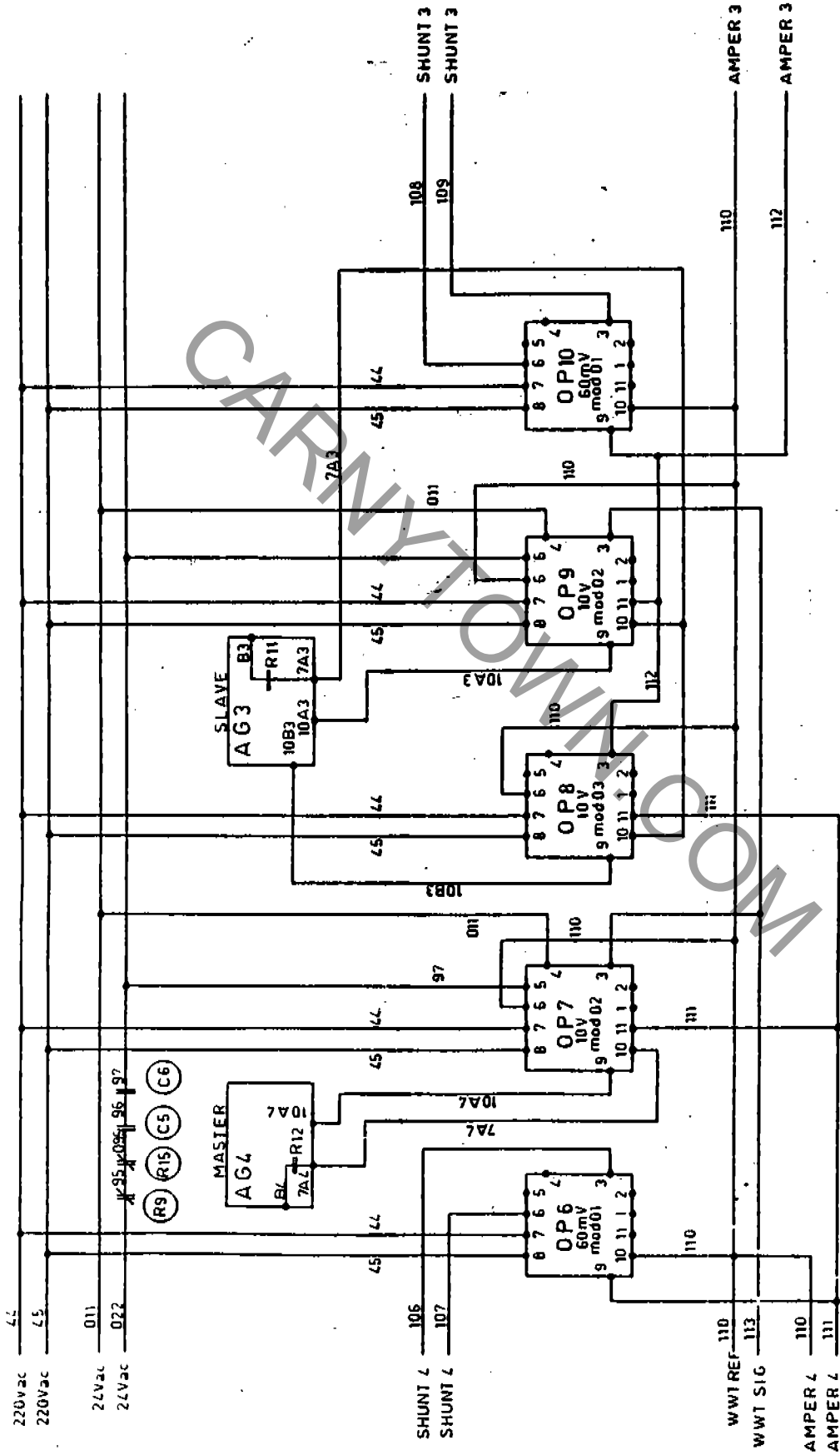
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DATE	DATE	DATE	10	30/1-1/80
			NONE	



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 telex 434828 SEMROIT Fax0425/89467

SCHEMA ELETTRICO GENERALE WIND WATER TROPHY

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DATE	DATE	DATE	11	3044-1/q
			NOTE	



SORIANI & MOSER S.F.L. 43017 M ^o RA (RO) ITALY tel. 04 89111-89075 Telex 434828 SEMROIT Fax0425/89467		SCHEMA ELETTRICO GENARLE WILD WATER TROPHY		DRAWN BY DATE 02/06/89		CHECKED BY DATE		TESTED BY DATE		SHEET N° 12 NOTE		DRAWING N° 304-4/90	
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esavar rr

caratteristiche tecniche e istruzioni per l'installatore technical features and directions for the technician

Variatori elettronici di velocità con convertitore a doppio ponte totalcontrollato in antiparallelo per allacciamento a rete trifase. Regolazioni a coppia costante per motori a corrente continua ad eccitazione separata.

Electronic speed variators with totally controlled double bridge converter set in antiparallel for triphase circuits. Constant pair regulation for separate field D.C. motors.

CARATTERISTICHE GENERALI

La sezione di potenza di questa serie è costituita da un doppio ponte trifase totalcontrollato connesso in antiparallelo. Esso consente il comando bidirezionale del motore con l'esplorazione dei quattro quadranti del diagramma coppia - velocità; è possibile l'inversione rapida del senso di moto e delle coppie in modo completamente statico senza l'ausilio di contattori e con recupero in rete dell'energia inerziale dell'intero sistema senza alcuna dissipazione durante le fasi di frenatura e/o arresto.

È possibile controllare in ogni istante la coppia accelerante e frenante. Circuiti di rampa (opzionali) indipendenti, consentono la realizzazione rigorosa di diagrammi di lavoro prestabiliti.

Alimentazione

Da rete trifase 380 V. $\pm 10\%$ - 50 + 60 Hz. Altre tensioni a richiesta.

Umidità relativa ambiente: < 90%.

Temperatura di funzionamento: 0 + 45°C.

Temperatura di stoccaggio: - 20 + + 45°C.

Tipi e potenze:

GENERAL SPECIFICATIONS

The power section for this range comprises a totally-controlled triphase double bridge connected in anti-parallel. This arrangement gives total control of the motor by adjusting the four dials on the couple-speed diagram: direction of motor and pairs can be inverted rapidly in static mode without using switches. It also has a feature so that during braking and/or when machine is stopped, inert energy produced by the entire mechanical system is recycled without any fall in power levels.

There is instantaneous control over the acceleration and braking pairs. Independent range circuits (optional) can be fitted so that various specific programmable work diagrams can be created.

Power supply

Triphase circuits 380 V. $\pm 10\%$ - Frequency: 50 + 60 Hz.
Other voltage types available on request.

Relative humidity: less than 90%.

Operating temperature: from 0 to 45 degrees centigrade.

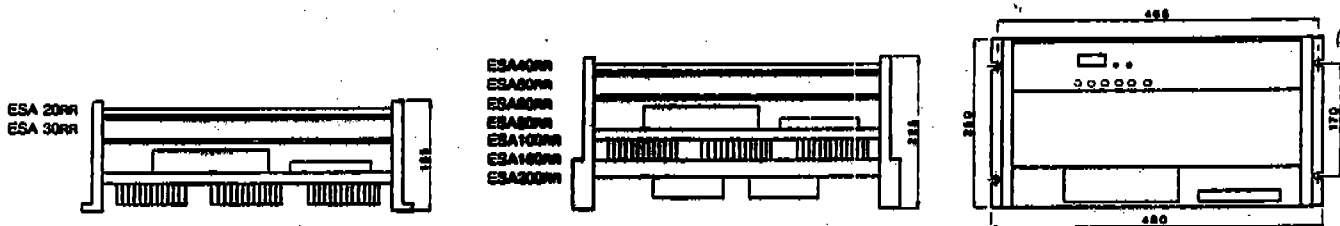
Storage temperature: from - 20 to + 45 degrees centigrade.

Versions and power types:

TIPO MODEL	CORRENTE D'USCITA OUTPUT CURRENT		POTENZE MECCANICHE MECHANICAL POWER	
	I OUT (A)	I MAX (A)		
ESAVAR 20 RR	20	26	10 HP	7.4 KW
ESAVAR 30 RR	30	39	15 HP	11 KW
ESAVAR 40 RR	40	52	20 HP	14.7 KW
ESAVAR 50 RR	50	65	25 HP	18.4 KW
ESAVAR 60 RR	60	78	30 HP	22 KW
ESAVAR 80 RR	80	104	40 HP	29.4 KW
ESAVAR 100 RR	100	130	55 HP	40.4 KW
ESAVAR 160 RR	160	208	85 HP	62.5 KW
ESAVAR 200 RR	200	260	110 HP	80.9 KW

Tutti per rete 380 V. Armatura 400 V. eccitazione 330 V - All for 380 V circuits, Armature 400 V. ex. 330 V.

Fig. 1



Pesi:

ESA 20/30	8.600 Kg. ca.
ESA 40/50	9.400 Kg. ca.
ESA 60/80/100	10.000 Kg. ca.
ESA 160	10.800 Kg. ca.
ESA 200	11.400 Kg. ca.
Imballo g. 600 c.a.	

Weights:

ESA 20/30	8.600 Kg. net
ESA 40/50	9.400 Kg. net
ESA 60/80/100	10.000 Kg. ca.
ESA 160	10.800 Kg. ca.
ESA 200	11.400 Kg. ca.
Packaging: approx. gr. 600	

Lo strumento indicatore applicato sul frontale permette di visualizzare in ogni istante le condizioni di carico del motore. L'indice dello strumento in zona rossa indica sovraccarico: il funzionamento in questa condizione è tollerato solo per brevi periodi in fase di avviamento o di frenatura rigenerativa. Sono inoltre presenti una spia luminosa verde indicante la presenza e l'esatta sequenza delle tre fasi ed una spia luminosa rossa indicante il blocco dell'apparecchio per sovraccarico o sovratemperatura. L'installatore può inoltre agire sulle seguenti calibrazioni:

Massima velocità: Calibra il max valore di velocità ottenibile mediante il potenziometro di regolazione.

Stabilità: Permette di adattare la costante di tempo del sistema alle caratteristiche della macchina.

Coppia max avanti: Calibra il max valore di coppia avanti che il motore può erogare in ogni momento.

Coppia max indietro: Calibra il max valore di coppia indietro che il motore può erogare in ogni momento.

Accelerazione (opzionale): Calibra il tempo di raggiungimento della velocità di regime (rampa di accelerazione).

Decelerazione (opzionale): Calibra il tempo di decelerazione in fase di arresto (rampe di decelerazione).

Tutti gli altri trimmer di calibrazione vengono sigillati in fase di collaudo e non devono in nessun caso venire manomessi dall'operatore.

N.B. L'apparecchio deve essere dotato a cura dell'installatore di una terna di fusibili ultra rapidi di portate adeguate:

The indicator on the front panel displays motor load conditions at any time. If the instrument indicates a value in the red area of the dial, the motor is overloaded: it can only function in these conditions for very short periods of time during start-up and regenerative braking. A green indicator light shows function and exact sequence of three phases and a red indicator light signals machine cut-out for overload or overheating.

Maximum speed: Calibrates maximum speed level by means of external potentiometer.

Stability: Easy adaptation of system time constant to machine characteristics.

Max forwards pair: Calibrates max. forwards pair values machine can produce at any time.

Max backwards pair: Calibrates max. backwards pair values machine can produce at any time.

Acceleration (optional): Calibrates time needed to reach optimum running speed (acceleration range).

Deceleration (optional): Calibrates deceleration time during stop phase (deceleration range).

All other calibration trimmers are sealed during test phase and must never under any circumstances be altered by operator.

Warning: During installation, machine must be fitted with two "ultrarapid" type on line fuses with appropriate load levels.

APPARECCHIO DEVICE	20 RR	30 RR	40 RR	50 RR	60 RR	80 RR	100 RR	160 RR	200 RR
Fusibile (I) Fuse (I)	16 A	25 A	35 A	50 A	50 A	63 A	100 A	200 A	250 A

DESCRIZIONE DEI SOTTOGRUPPI

Sulla struttura di base dell'apparecchio sono presenti: i due gruppi convertitori di potenza con relative capsule termiche di protezione, i due trasformatori di corrente TA1 e TA2, il ponte di GRAETZ per l'eccitazione (GECC ESA), la morsettiera principale e la basetta portafusibili ESA M/RR.

ESA-B

Fissata sul corpo dell'azionamento, alimenta i circuiti di comando e genera i segnali di sincronismo. È presente anche il partitore di reazione della velocità del sistema che, tramite un ponticello può essere commutato a seconda che si tratti di reazione di armatura, o di dinamo tachimetrica.

N.B. Per mantenere la separazione galvanica dei circuiti di comando dalla rete non si può impiegare la reazione di armatura a meno di non disporre di un opportuno trasduttore esterno.

ESA-D ed ESA-S-RR

Sono dei semplici circuiti di interconnessione tra gli elementi del sistema. Lo strumento indicatore AM è direttamente collegato al circuito ESA-S-RR.

SUB-UNITS

The equipment's basic structure also has two power conversion units with their own thermal protection capsules, two current transformers TA1 and TA2, the Graetz exciter bridge (GECC ESA), the main clamps and the fuse holders ESA M/RR.

ESA-B

This is situated into the drive unit: it supplies power to the command circuits and generates the synchronism signals. The system speed reaction control which can be commuted via a junction depending on whether an armature reaction or tachimetric dynamo is required.

N.B. In order to maintain galvanic separation of the circuit command circuits armature reaction cannot be used without having an external transducer.

ESA-D and ESA-S-RR

These are the simple interconnection circuits between the various parts of the system. The AM instrument indicator is directly linked to the ESA-S-RR circuit.

ESA-G-RR ed ESA-G-RR-B

Sono le due schede estraibili inferiori che svolgono le seguenti funzioni:

- Stadio amplificatori per il controllo automatico (velocità coppia).
- Circuiti modulatori e controllo di fase.
- Circuiti di protezione.
- Trimmer di calibrazione.

ESA-A-RR

È la scheda estraibile superiore ed incorpora le seguenti funzioni:

- Stadio amplificatori per il controllo automatico (velocità coppia).
- Circuiti modulatori e controllo di fase.
- Circuiti di protezione.
- Trimmer di calibrazione.

ESA-01-RR

Scheda di comando estraibile superiore che incorpora le regolazioni di sensibilità e max velocità utilizzabili dall'installatore.

ESA-02-RR (opzionale)

Oltre alle funzioni della precedente, permette l'uso di quattro rampe che rendono possibile la realizzazione dei diagrammi cinematici programmati. La durata delle rampe è regolabile tramite i trimmer P1, P2, P3 e P4.

ESA-03-RR (opzionale)

Permetta il controllo di quattro velocità del motore predisponibili agendo sui trimmer V1, L1, V2 ed L2 (veloce-lenta avanti e veloce-lenta indietro).

ESA-04-RR (opzionale)

Permetta l'uso di quattro rampe ed il controllo di quattro velocità del motore predisponibili tramite trimmer presenti sulla scheda.

POSA IN OPERA

Prima di procedere all'installazione verificare lo stato dell'imballaggio e assicurarsi che l'apparecchio non abbia subito danni durante il trasporto.

L'installatore dovrà attenersi scrupolosamente allo schema allegato per effettuare i collegamenti esterni rispettando, dove sono indicate, le polarità.

Le sezioni dei conduttori da impiegare per i circuiti di potenza, linea ed armatura del motore, devono essere adeguate alla corrente di targa del motore stesso. Per tutti gli altri conduttori usare la sezione minima di 1 mm².

Le schermature indicate, in particolare quelle del potenziometro di velocità, sono da impiegarsi per sviluppi superiori a qualche metro e nei casi in cui questi conduttori passino in prossimità di altri che possano introdurre disturbi. Lo schermo va collegato a terra ad una sola estremità, mentre l'altra deve rimanere isolata. Il cavo schermato deve essere del tipo con guaina esterna isolante.

È consigliabile installare l'apparecchio il più vicino possibile al motore comando, evitando comunque ambienti inquinanti aggressivi o polverosi.

Collegare a terra il supporto metallico dell'apparecchio, usando l'apposito morsetto.

Assicurarsi che nessuna parte elettrica venga a contatto con la terra.

Data la natura dei componenti impiegati, qualsiasi controllo d'isolamento e rigidità nell'impianto, motore compreso, deve effettuarsi ad apparecchio completamente scollegato.

Prima di mettere l'apparecchio sotto tensione verificare che la tensione di linea sia quella prevista, che tutti i collegamenti siano stati eseguiti esattamente secondo lo schema, che i morsetti siano ben stretti e che non vi siano difetti d'isolamento sia fra conduttori che fra questi e la terra.

Eseguito quanto sopra, portare il potenziometro di velocità a zero ed applicare la tensione di linea.

Il motore deve rimanere fermo. Se gira alla massima velocità e ruotando il potenziometro in senso orario il motore si ferma gradualmente, occorre invertire i collegamenti ai terminali estremi del potenziometro di velocità 7A e 8A.

Se il motore è già applicato alla macchina, osservare l'indicatore amperometrico di carico. La sua lancetta deve, a tutte le velocità d'impiego e nelle più gravose condizioni di lavoro della macchina, mantenersi al disotto della zona rossa, tranne che nelle fasi transitorie di accelerazione.

Se viene impiegata la Dinamo Tachimetrica, per definirne la polarità, basta applicare un tester, con portata di bassa tensione continua, ai suoi terminali e ruotare a mano il motore nel senso richiesto dalla macchina. Il terminale positivo andrà collegato al +D.T. della morsettiera dell'ESAVAR e l'altro al -D.T.

Se tutto non avvenisse come sopra descritto, consultare per eventuali avarie o difetti, la "Guida per la ricerca dei guasti".

MANUTENZIONE

Trattandosi di una macchina elettrica statica, l'ESAVAR non necessita di particolari cure. Pur tuttavia un minimo di manutenzione preventiva assicura all'apparecchio una più lunga vita. Si raccomanda pertanto di eseguire, periodicamente, la pulizia dell'apparecchio mediante getto di aria compressa a bassa pressione e di verificare il buon serraggio dei morsetti d'allacciamento.

ESA-G-RR and ESA-G-RR-B

These are the two extractable cards below which have the following functions:

- Control and trip of the three phases in the appropriate cyclical direction.
- Filtering and function of the synchronism signals.
- Protection circuits.
- Calibration trimmer.

ESA-A-RR

This is the extractable card below which has the following functions:

- Stage amplification for automatic control (pairspeed).
- Modulator and phase control circuits.
- Protection circuits.
- Calibration trimmer.

ESA-01-RR

Extractable command card below incorporating the regulation of sensitivity and maximum speed usable by installation expert.

ESA-02-RR (optional)

In addition to the functions described above, this also provides use of the 4 ranges so that programmed cinematic diagrams can be created. Range duration can be set using the P1, P2, P3 and P4 trimmers.

ESA-03-RR (optional)

Gives use of four pre-set motor speed by adjusting V1, L1, V2 and L2 trimmers (fast-slow forwards and fast-slow backwards).

ESA-04-RR (optional)

Gives use of 4 ranges with control of 4 pre-set motor speeds using trimmers on the card.

INSTALLATION

Before proceeding with the installation check the packaging and make sure that the equipment has not been damaged during transport.

The installer must closely follow the enclosed scheme to realize the outside connections following the polarities, where specified.

The conductor sections used for the power circuit, motor line and armature, must be in compliance to rating-plate current of the motor itself. For all the others conductors use the minimum section of 1 mm².

The shown shields, particularly those of the speed potentiometer must be used for lengths greater than some meters or in cases in which these conductors run near other ones which can cause some interferences. The screen must be connected to ground at only one end, while the other one must be insulated. The screened cable must be with insulating outside sleeve.

It is advisable to set up the equipment as near as possible to the driven engine, avoiding however polluted, aggressive and dusty environments.

It is necessary to connect to ground the metallic support of the equipment using the suitable terminal block.

Make sure that no electric part is in contact with ground.

Because of the used components each insulation control and equipment rigidity, the engine included, must be done with the equipment completely disconnected.

Before connecting equipment to line it is necessary to verify that the line voltage is the scheduled one, that all the connections have been made exactly following the scheme, that the terminal blocks are well right and that there are no insulation defects either among conductors or between these ones and the ground. When you have accomplished all the above mentioned place the speed potentiometer at position zero and connect the line voltage.

The motor must remain stopped. If the motor runs to the maximum speed and turning the potentiometer in clock-wise direction the motor gradually stops, it is necessary to reverse the connections at the end terminals of the 7A and 8A speed potentiometer.

If the motor is already mounted on the machine, check the load meter. Its hand must remain under the red area at all working speeds and in the most hard working conditions of the machine, with exception of the transitory acceleration phases.

If the tachodynamo is used, to define polarity apply a low voltage d.c. tester to its terminal blocks and hand-rotate the motor in the required direction of the machine. The positive end will be connected to the +D.T. of the ESAVAR terminal board and the other to the -D.T.

If such conditions are not satisfied, check for eventual failures or defects the "Direction for troubleshooting".

MANUTENZIONE

Being a static electric machine, the ESAVAR does not require any particular care. However a minimum prior maintenance ensures the equipment a longer life. It is therefore recommended to effect periodical cleaning by low pressure air jet and to check the tightness of the terminal board.

Attenzione:

Togliere tensione ai morsetti di linea RL-SL-TL prima di intervenire sull'apparecchio. Scollegare tutti i conduttori dalla morsettiera prima di eseguire prove di isolamento sull'impianto.

Caution:

Cut off RL-SL-TL line terminal voltage before touching the device. Disconnect all wires from the terminal board before performing the insulation tests.

Difetto	Causa probabile	Rimedio
Varistori VDR1-2-3 e/o condensatori C1-C2-C3 oppure trasformatori TR1-2-3 fuori servizio (ESA-B). Intervento fusibili F-RST, 0,5 A.	Allacciamento a rete con tensione più elevata di quella prescritta. Trasitori di linea troppo elevati.	Sostituire il componente fuori servizio.
Intervento fusibili ausiliari FE.	Corto circuito o difetti d'isolamento fra i conduttori di eccitazione o fra questi e terra.	Scollegare i conduttori del circuito d'eccitazione dalla morsettiera, sostituire i fusibili e alimentarlo l'apparecchio. Se i fusibili non intervengono e si misura tensione tra i morsetti J e K, ricercare la causa nell'impianto esterno, motore compreso. Se intervengono o manca la tensione fra J e K, sostituire il ponte di eccitazione GEC-ESA.
La macchina non si avvia e l'azionamento è in limitazione (la lancetta dell'indicatore di carico è in fondo nella scala rossa).	Ostacolo meccanico. Errore nel dimensionamento del motore o nei rapporti di macchina. Avvolgimento di campo interrotto. Circuito d'alimentazione o avvolgimento di campo interrotto.	Rimuovere l'ostacolo. Verificare e provvedere in merito. Riparare il motore. Sostituire eventualmente il fusibile FR, il raddrizzatore GEC-ESA e controllare la continuità di tutte le connessioni.
La macchina non raggiunge la velocità nominale con potenziometro di velocità in posizione max.	Azionamento in sovraccarico: indice amperometro di carico in prossimità del valore di limitazione (zona rossa). Scarso dimensionamento. Macchina operante a coppia notevolmente crescente con la velocità. Apparecchio non correttamente calibrato. Un diodo controllato non si accende (il motore si surriscalda e diventa fortemente rumoroso).	Verificare i calcoli di potenza e gli esatti rapporti meccanici. Assicurarsi della buona scorrevolezza e della buona lubrificazione di tutti gli organi mossi: cuscinetti, catene, cinghie, riduttori, etc. Agire sul potenziometro di max velocità fino a raggiungere i giri targa del motore, assicurandosi che anche la tensione d'armatura sia quella di targa. Assicurarsi con l'oscilloscopio che tra i morsetti -H e +A siano presenti le sei semionde. Sostituire il blocco SCR difettoso. Verificare l'efficienza delle schede ESA-A e ESA-G.
La macchina si porta rapidamente alla massima velocità anche per posizioni intermedie del potenziometro di velocità.	Generatore tachimetrico interrotto. Dinamo tachimetrica con polarità invertita. Scorrimento nell'accoppiamento meccanico fra motore e generatore tachimetrico. Tranciatura di uno dei due semialberi che tramite il giunto danno il moto al generatore. Potenziometro di velocità interrotto sul terminale 7A. Un diodo controllato è sempre in conduzione (il motore gira anche con potenziometro di velocità scollegato). Corto circuito fra i due conduttori +D.T. e -D.T. o fra questi e massa.	Sostituire. Capovolgere i conduttori ai morsetti -D.T. e +D.T.. Stringere a fondo i grani dei due semigiunti. Sostituire il pezzo avanzato controllando nel montaggio il buon allineamento. Sostituire il potenziometro oppure ripristinare l'eventuale interruzione sul conduttore esterno 7A. Provvedere alla sostituzione del blocco SCR difettoso. Localizzare e isolare i conduttori.

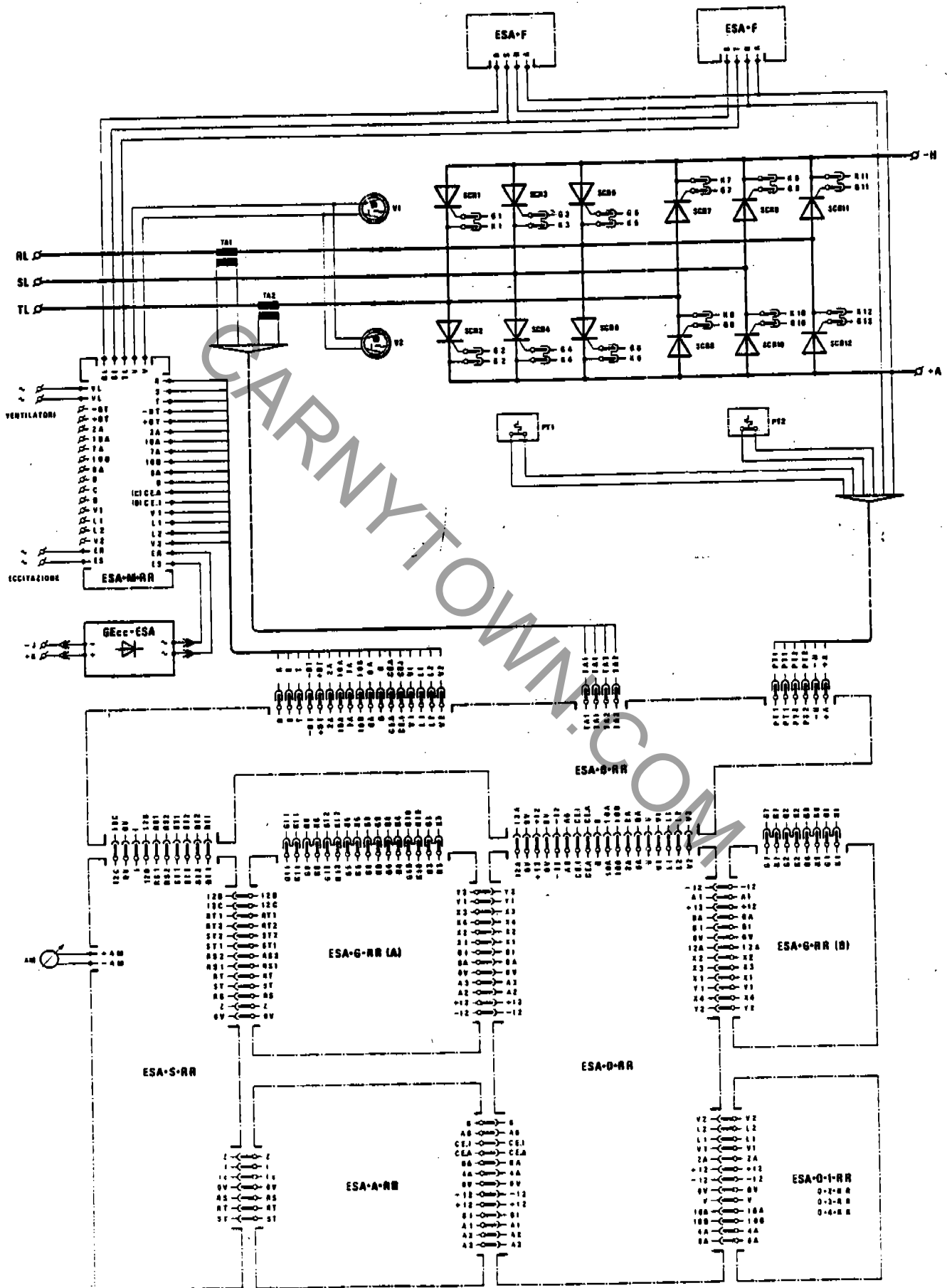
Failure	Probable cause	Remedy
Varistors VDR1 - VDR2 - VDR3 or C1 - C2 - C3 capacitors, or TR1 - TR2 - TR3 transformers (ESA-B) are out of order.	Excessive line voltage. Excessive line transients.	Replace the damaged component.
Auxiliary fuses FE are burnt out.	Short circuit, or insulation lack between field wire or between these ones and the ground.	Disconnect the field circuit wires from the terminal board, replace the fuses and supply power to the device. If the fuses are not involved and there is voltage between the terminal J and K, the cause must be looked for in the external system, including the motor. If they burnt out or there is not voltage between J and K, it is necessary to replace the field bridge GEC-ESA.
The machines does not start and the drive is clamped. (The load meter hand is at top value, in the red region).	Mechanical obstacle. Wrong rating of the motor or wrong gear ratio. Field winding interrupted. Power supply circuit of field winding disconnected.	Remove the obstacle. Check and take the appropriate measures. If necessary, change the FR fuse, the GEC-ESA rectifier and check the continuity of all the connections.
The machine does not reach the nominal speed when the speed potentiometer indicates MAX.	Overloaded device. The load meter hand is near the top value (red region). Scarce rating. The machine works with a torque which increases too much when speed increases. The device is not correctly calibrated.	Check the power calculation and the right mechanical ratio. Check the smoothness and the lubrication of all the machine operating partes: bearings, chain, belts, reduction gears, etc. Operate the maximum speed potentiometer until it reaches the rated number of revolutions. Make sure that also the armature voltage is the rated one.
The machine quickly reaches the maximum speed even when the speed potentiometer is at intermediate positions.	A controlled diode is not switched on (the motor is overheated and becomes very noisy). The tachogenerator is disconnected. The tachodynamo has a reverse polarity. Sliding in the mechanical coupling between the motor and the tachogenerator. One of the two half-joints which, by the joint, drive the generator, is sheared. The speed potentiometer is disconnected on terminal 7A. A controlled diode is always conducting (the motor runs also with speed potentiometer disconnected). Short circuit between the +D.T. and -D.T. wires or between these ones and the ground.	Make sure, using the oscilloscope, that between the terminals -H and +A the six half-waves are present. Replace the faulty SCR block. Check ESA-A and ESA-R cards again. Replace it. Exchange the wires at terminals -D.T. and +D.T.. Tighten the screws of the two half-joints. Replace the damaged component and check the right alignment in the assembling. Replace the potentiometer or restore the possibly interrupted external wire 7A. Replace the damaged controlled diode. Located and insulated the wires.

Difetto	Causa probabile	Rimedio
La macchina sotto carico non rimane stabile alla velocità programmata.	<p>Generatore tachimetrico non ben calibrato.</p> <p>Potenzimetro di velocità sporco o difettoso.</p> <p>Costanti di tempo non appropriate per quel tipo di carico meccanico. Eccessiva instabilità del rullo ballerino in asserimenti di questo tipo.</p> <p>Brusche variazioni di carico nel funzionamento.</p> <p>Compound del motore E-F rovesciata (instabilità più evidente ad alti giri del motore).</p>	<p>Controllare l'accoppiamento meccanico tra generatore e motore.</p> <p>Sostituirlo.</p> <p>Intervenire sul potenziometro di stabilità P10 (Stabilità). Qualora non si ottenessero i risultati desiderati si rende necessario un esame del sistema "acchiunamento".</p> <p>Controllare collegamenti e polarità del motore.</p>
La macchina non si avvia (tensione di eccitazione presente ed amperometro di carico con indice sullo zero).	<p>Potenzimetro di velocità interrotto sul cursore 10A e/o terminale 8A e/o 2A.</p> <p>Corto circuito tra 8A e massa o fra 10A e massa. Probabile interruzione delle piste relative a 8A e 10A. Fuori servizio di uno o più diodi Zener (Z1 + Z2) o del circuito integrato A-V.</p>	<p>Sostituirlo previa verifica delle connessioni.</p> <p>Sostituire la scheda ESA-A RR oppure ESA-G RR.</p>
La macchina accelera troppo lentamente.	<p>Manomessa la taratura di coppia max. (se durante le brusche accelerazioni l'indice dell'amperometro di carico non raggiunge la corrente di limitazione prescritta).</p> <p>Rampa di avviamento con tempo troppo lungo.</p> <p>Momento dinamico di inerzia della macchina troppo elevato (l'indice dell'amperometro di carico rimane in posizione di limitazione per tutto il tempo di accelerazione).</p>	<p>Riportare il potenziometro di coppia P11 in posizione max come previsto in fase di taratura dal costruttore.</p> <p>Intervenire sul potenziometro P17 (accel.) sino a raggiungere il tempo d'avviamento desiderato.</p> <p>Ridimensionare la potenza installata tenendo conto dei sovraccarichi di avviamento necessari.</p>
La macchina accelera troppo bruscamente.	<p>Rampa di avviamento con tempo troppo breve.</p> <p>Azionamento sovradimensionato per l'impiego richiesto.</p> <p>Basso momento di inerzia della macchina.</p>	<p>Intervenire sul potenziometro P17 sino a raggiungere il tempo di avviamento desiderato.</p> <p>Ridurre la coppia max d'avviamento agendo sul potenziometro P11. Oppure ridimensionare l'azionamento.</p> <p>Inserire la rampa di avviamento (vedi fig.).</p>
Il motore si surriscalda.	<p>Scarso dimensionamento.</p> <p>Grippaggio meccanico.</p> <p>Eccessiva temperatura ambiente.</p>	<p>Sostituire il motore oppure applicare la ventilazione forzata.</p> <p>Rimuovere l'ostacolo meccanico.</p> <p>Ventilare il motore con aria fredda prelevata dall'esterno.</p>
Eccessivo scintillio alle spazzole motore.	<p>Spazzole consumate o che non scorrono liberamente nella loro sede.</p> <p>Collettore sporco, consumato od ovalizzato.</p> <p>Arco portaspazzole non in zona neutra.</p>	<p>Sostituirle o verificarne la scorrevolezza nel cassetto di guida.</p> <p>Interpellare il costruttore del motore o un'officina specializzata.</p> <p>Idem c.s.</p>
Macchina ferma. LED rosso DL2 di sovraccarico acceso.	<p>Sovratemperatura al regolatore.</p> <p>Ventilatore dell'ESA-VAR fermo.</p>	<p>Controllare fusibili FV-1A.</p> <p>Ventilare il quadro.</p>

Failure	Probable cause	Remedy
The machine, when loaded, is not stable at the planned speed.	<p>The tachogenerator is not well keyed.</p> <p>Speed potentiometer dirty or damaged.</p> <p>The time constants are not suitable to the specific mechanical load.</p> <p>Excessive instability of the dandy roll for such system.</p> <p>There are abrupt variations of load during the functioning.</p> <p>The E-F motor compound is reversed (Instability is more evident at higher speed).</p>	<p>Check line mechanical coupling between the generator and the motor.</p> <p>Replace it.</p> <p>Operate the stability potentiometer P10 (Stability).</p> <p>If the operation is not successful, it will be necessary to check the "machine and drive" system.</p> <p>Check motor connections and polarity.</p>
The machine does not start (field voltage is present and the loadmeter is indicating the zero).	<p>The speed potentiometer is disconnected on slider 10A and/or terminal 8A.</p> <p>Short circuit between 8A and the ground and between 10A and the ground.</p> <p>Break of the tracks concerning 8A and 10A. One or more Z1 + Z2 Zener diodes or the A-V integrate circuit is out of order.</p>	<p>Replace the potentiometer after having checked the connections.</p> <p>Replace ESA-A or ESA-G-RR card.</p>
The machine accelerates too slowly.	<p>The calibration of maximum torque is altered (if during fast accelerations the ammeter hand does not reach the current limit that is fixed).</p> <p>The starting ramp has too long a response time.</p> <p>The machine has a too high a dynamical moment of inertia (the loadmeter hand indicates the top value during all the acceleration time).</p>	<p>Reset the P11 potentiometer of torque with the index indicating MAX, as planned by the manufacturer during the calibration stage.</p> <p>Operate on potentiometer P17 (accel.) in order to reach right response time.</p> <p>Recalculate the power taking into account the necessary starting overloads.</p>
The machine accelerates too quickly.	<p>The response time of the starting ramp is too short.</p> <p>Excessive power compared with the demanded utilization.</p> <p>The machine has a too low a dynamical moment of inertia.</p>	<p>Operate on potentiometer P17 in order to reach the right response time.</p> <p>Reduce the maximum starting torque by operating on potentiometer P11 or re-rate the device.</p> <p>Insert the starting ramp (see figure).</p>
The motor becomes overheated.	<p>Scarce rating.</p> <p>Mechanical seizure.</p> <p>Room temperature is too high.</p>	<p>Replace the motor or use forced ventilation.</p> <p>Remove the mechanical obstacle.</p> <p>Fan the motor with cold air coming from outside.</p>
The motor brush sparking is excessive.	<p>Brushes are worn out or they do not slide freely in their slots.</p> <p>The collector is dirty, worn out or ovalized.</p> <p>The brush holder is not in neutral zone.</p>	<p>Replace the brushes or check their smoothness in the slots.</p> <p>Consult the manufacturer of the motor or a specialized shop.</p> <p>See above.</p>
The machine is stopped. Red LED DL2 (overload) is on.	<p>Drive unit is overheated.</p> <p>ESA-VAR fan blocked.</p>	<p>Check FV-1A.</p> <p>Fan the cubicle.</p>

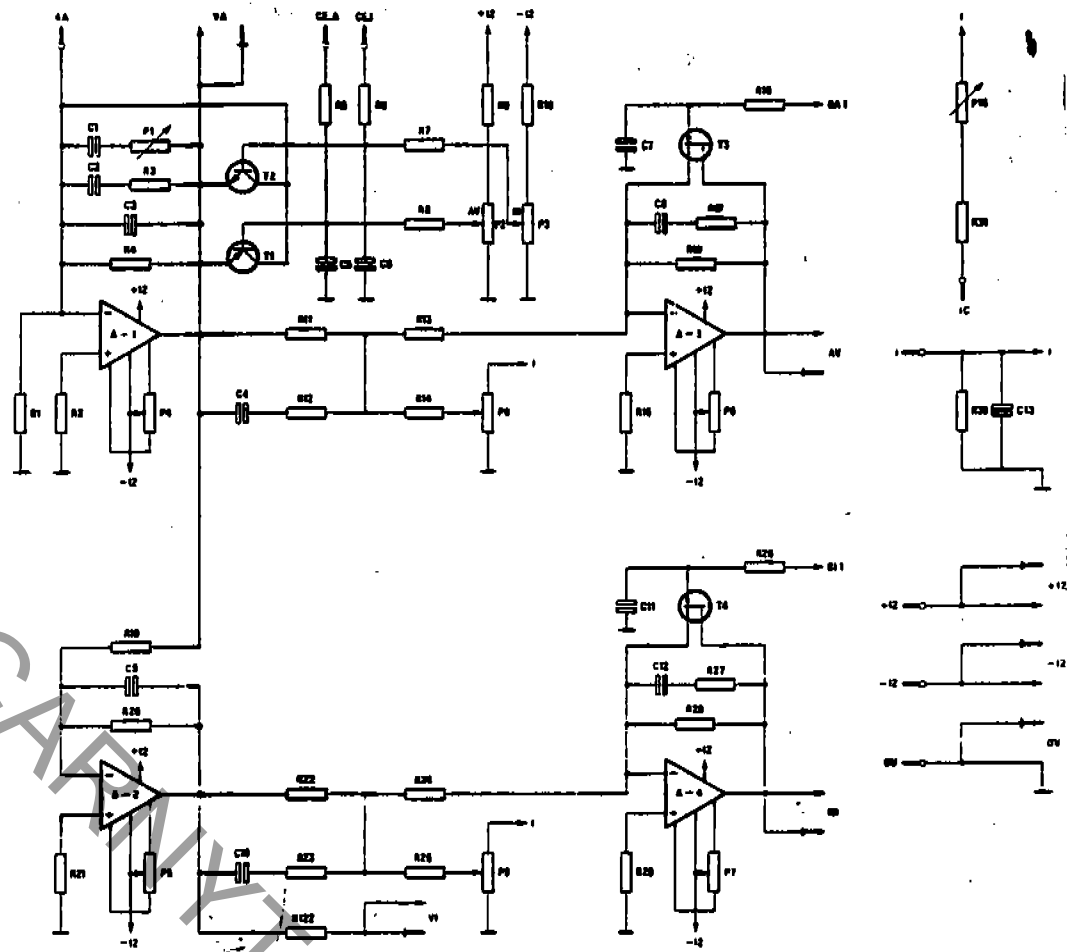
Schema funzionale e blocchi

Fig. 2



ESA-A-RR

Fig. 3



ESA-A-RR

Fig. 4

