




MAGNA GRAIN DRYERS

Models – Standard PTO drive



Updated May 2011

	Handbook for the use and maintenance of Magna Dryer
	Revision Jan 2011
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1 INTRODUCTION TO THE MANUAL

1.1 FOREWORD

This manual is provided to give you the necessary operating and maintenance instructions to obtain the best performance and working life for your dryer.

Please read this manual thoroughly. Understand what each control is for and how to use it.

Observe all safety precautions decaled on the machine and noted throughout the manual for safe operation.



DO NOT CARRY OUT MAINTENANCE WORK AND/OR REPAIRS UNTIL THE TRACTOR ENGINE IS STOPPED AND THE PTO DISCONNECTED OR IF AN ELECTRIC DRIVE UNIT THE MAIN POWER SWITCH TURNED TO OFF.



DO NOT UNDER ANY CIRCUMSTANCES ENTER THE DRYER THROUGH THE INSPECTION HATCH UNTIL THE TRACTOR IS TURNED OFF AND THE PTO SHAFT IS COMPLETELY DISCONNECTED OR IF AN ELECTRIC DRIVE UNIT THE MAIN POWER SWITCH TURNED TO OFF. FAILURE TO FOLLOW THIS INSTRUCTION MAY CAUSE SERIOUS INJURY. EXPLANATION – SHOULD THE AGITATOR ARM RECIRCULATE WHILST THE OPERATOR IS ENTERING THE DRYER OR INSIDE THE DRYER

If any assistance or additional information is needed, contact your authorized OPICO dealer.

This manual is divided into the following sections:

- 1) Introduction
- 2) General Information
- 3) Preparing The Dryer For Operation
- 4) Loading And Operation
- 5) Maintenance
- 6) Safety Warnings
- 7) Trouble Shooting
- 8) Storage
- 9) Wiring Diagrams

For safety and to obtain the performance of which these machines are capable we recommend that the operator should read this manual carefully before initial start up at the beginning of each season and when changing to a new crop type.




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ENCLOSED WITH THIS HANDBOOK

- DECLARATION OF CONFORMITY SUPPLIED BY THE MANUFACTURER
- PRODUCT REGISTRATION CARD

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1.3 DEFINITION OF SYMBOLS

Symbols are used in this handbook to highlight parts of its content, which are of special importance for safety, use and maintenance

SYMBOL	MEANING	DESCRIPTION
	ATTENTION	Section of text which includes an instruction that that requires attention
	DANGER	This symbol requires you to pay special attention because your safety is involved
	USE	Explanation of the correct use of the dryer
	MAINTENANCE	Maintenance Instructions

1.4 SAFE WORKING ENVIRONMENT



Read and understand the operators manual before operating the unit



Always disconnect the PTO shaft or if an electric drive unit turn the main power switch to off before adjusting, lubricating, servicing or cleaning



Keep all shields and safety devices in place



Keep children, visitors and untrained personnel away from the machine while in operation



Keep hands, feet and clothing away from moving parts




Keep unit level when operating



DO NOT UNDER ANY CIRCUMSTANCES ENTER THE DRYER THROUGH THE INSPECTION HATCH UNTIL THE TRACTOR IS TURNED OFF AND THE PTO SHAFT IS COMPLETELY DISCONNECTED OR IF AN ELECTRIC DRIVE UNIT THE MAIN POWER SWITCH TURNED TO OFF. FAILURE TO FOLLOW THIS INSTRUCTION MAY CAUSE SERIOUS INJURY. EXPLANATION – SHOULD THE AGITATOR ARM RECIRCULATE WHILST THE OPERATOR IS ENTERING THE DRYER OR INSIDE THE DRYER

2 GENERAL INFORMATION

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2.1 OVERVIEW

All instructions relating to position are as viewed from the front of the dryer looking toward the back of the machine.

2.2 DRYER IDENTIFICATION

The Identification Plate and CE marking of the machine is placed on the left side of the draw-bar.

The identification plate must not be tampered with, covered over or modified in any way.

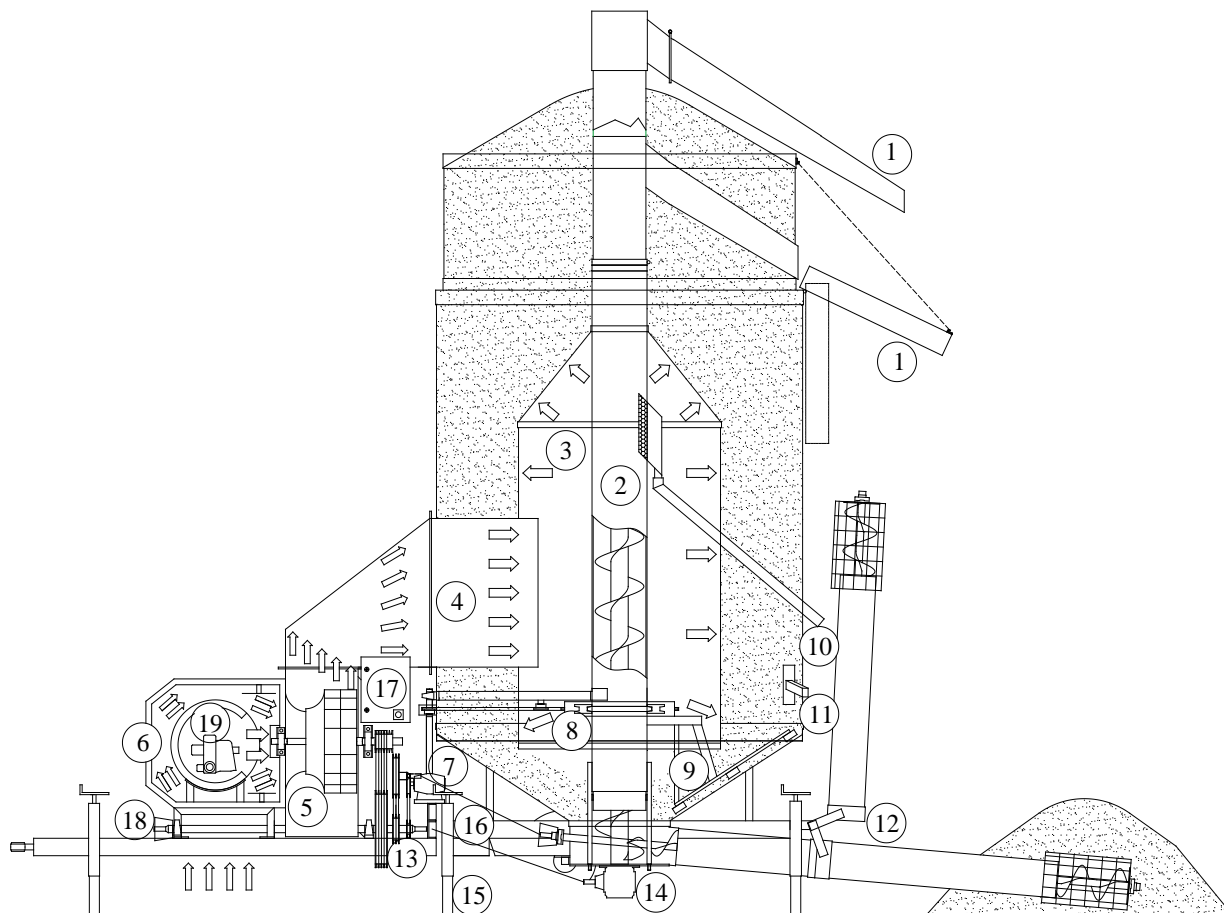
Should the plate become damaged or lost you should request a replacement as soon as reasonable possible.

Picture 2.2 IDENTIFICATION PLATE

		
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ESSICCATOIO MOD.	<input type="text"/>	
SERIE	N°	<input type="text"/>
ANNO COSTRUZIONE	<input type="text"/>	



2.3 DRYER COMPONENTS



Picture 2.3 DRYER COMPONENTS TABLE

- | | |
|-----------------------------|------------------------------|
| 1) Discharge Chute | 10) Grain Cleaner Discharge |
| 2) Vertical Auger | 11) Grain Sampler Outlet |
| 3) Plenum Chamber | 12) Loading Auger |
| 4) Air Duct | 13) Belt Drive |
| 5) Fan | 14) Centre Auger Gearbox |
| 6) Heat Unit | 15) Adjustable Support Jacks |
| 7) Agitator Gearbox | 16) PTO Drive Shafts |
| 8) Agitator Support Rollers | 17) Control Board |
| 9) Agitator Arm | 18) Main Drive Shaft |



2.4 THEORY OF DRYING

2.4.1 HEATING THE GRAIN

Combinable crop drying has two basic stages:

1. The diffusing of internal moisture to the surface of the grain, bean or seed.
Followed by:
2. The removal of the created external moisture by air flow.

The grain temperature largely establishes this rate of diffusion and must be controlled not to exceed a rate that could result in a ruptured seed.

Removal of the exterior moisture is dependant upon air flow and air temperature.

These two stages must be balanced to produce the quality dried crop.

The balance is accomplished quite simply in the Magna Grain Dryer with its uniform circulation, regulated heat and controlled air-flow.

2.4.2 COOLING THE GRAIN



It is very important to cool grain. Grain to be stored should be cooled after drying to within 15 degrees F of atmospheric temperature or 10 degrees F of grain already in the storage bin. Moisture migration from air to grain will occur if the grain is not cooled within these limits.

**2.4.3 RECOMMENDED DRYING TEMPERATURES**

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
BARLEY				
Feed		180 - 220°F	120°F	14%
Malting/Seed	Below 21%	120 - 150°F	105°F	
	Above 22%	110 - 130°F	105°F	

If light samples are experienced Maximum Plenum Temperature should not exceed 140°F

**WARNING**

Great care should be taken with the storage of barley grown for malting or seed between the actual harvesting of the material and the drying of it. Harvested crop must only be stored before drying for the minimum amount of time. It is recommended that the crop is stored so that the maximum depth does not exceed 2 feet.

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
OILSEED RAPE				
	Up to 17%	160 - 200°F	120°F	8%

SPECIAL NOTES

1. Plenum temperatures of up to 200°F have been used without apparent oil/quality loss
2. Excessive heat gives slower drying – cooling prolonged
3. Mature crops dry relatively easily
4. Desiccated early crops may contain 30% volume of immature seeds which are less easily dried
5. With moisture content above 17% - for every 2% increase in moisture content, reduce plenum temperature by 10°F for the initial drying period

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
OILSEED RAPE				
Seed	Reduce plenum temperature by 10°F	120 - 150°F	105°F	8%



CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
HERBAGE SEEDS (SAFE DRYING AIR TEMPERATURES FOR 90% GERMINATION)				
(Grass Seed)				
PRG/IRG	Up to 25%	130°F	90°F	13%
	Between 25% – 30%	120°F	90°F	13%
	Between 30% – 35%	110°F	90°F	13%
	Between 35% – 40%	100°F	90°F	13%



NOTES

- * Always grown for seed
- * Grass seed does not flow easily over 22% moisture content
- * Polish the dryer prior to use with dried barley or other dry grain

BEANS – see Peas/Field Beans

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
LINSEED				
Oil extraction and/or seed	Up to 15%	120 - 150°F	120°F	8%
*For every 2% increase in moisture content reduce plenum temperature by 10°F				
		90 - 120°F	105°F	8%

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
OATS				
Feed		150 - 200°F	130°F	14%
Seed		110 - 150°F	105°F	14%



NOTE Oats for feed use can stand plenum temperatures up to 220°F.



CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
PEAS/FIELD BEANS				
Processing / Protein		110 - 120°F	105°F	14%
NOTE In general protein is not affected by heat but excessive heat will cause splitting damage				
Seed	Below 24%	90 - 110°F	105°F	14%
Seed	Above 24%	70 – 90°F	105°F	14%
Seed	Above 27%	No heat to 50°F	105°F	14%

DIRECT HARVESTED

1. Can experience handling problems over 25% moisture content
2. Do not use loading auger over 25% moisture content (see below)
3. Special note – clean out the centre auger bin bottom after each load. This crop carries a lot of surface dirt which in the re-circulation process will find its way to the bin bottom well and create an extremely abrasive paste. This will shorten the life of the centre auger dramatically if the recommended cleaning process is not carried out.


DRYING FROM STORE

1. This crop is susceptible to splitting if excessive heat is used
2. Increase temperature in 5°F stages and check for splits to a maximum of 110°F plenum temperature : No heat - 110°F

CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
WHEAT				
Feed		180 - 220°F	140°F	14%
Milling	Below 25%	150 - 180°F	120°F	14%
	Above 25%	140 – 170°F	120°F	14%
Seed		100 - 130°F	105°F	14%

SPECIAL NOTES

1. High gluten wheats mean slower drying
2. Wet cereals in general i.e. over 27% moisture content – dry carefully do not exceed Grain Final Safe Temperature. If this is apparent, stop the burner, allow dryer to continue circulating grain until cool, then re-light the burner and complete the drying process.
3. Seed wheat over 27% moisture content – use no heat to a maximum of 105°F plenum until moisture content is below 20%, then continue with care using a plenum temperature of 120°F maximum.

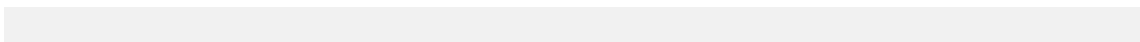
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CROP TYPE	MOISTURE CONTENT & POINTS OF INTEREST	PLENUM TEMPERATURE	MAXIMUM FINAL GRAIN TEMPERATURE	FINAL STORAGE LEVEL
LUPINS				
Drying for Seed		no heat to 120°F		

- * Furry seed – may generate fluff in handling
- * Very tough skin
- * Pre-drying treatment – pre-cleaning helpful if not essential

METHOD

1. Polish dryer with barley prior to handling
2. Be careful if moisture content 23% - 24% - augers may not handle
3. Recommended plenum temperatures no heat - 105°F - 120°F **ABSOLUTE MAXIMUM**



**2.4.4 TEMPERATURE CONVERSION CHART**

EG 120°F = 48.9°C OR 120°C = 248°F

0 ~ 90

°C		°F
-17.8	0	32.0
-15.0	5	41.0
-12.2	10	50.0
-9.4	15	59.0
-6.7	20	68.0
-3.9	25	77.0
-1.1	30	86.0
1.7	35	95.0
4.4	40	104.0
7.2	45	113.0
10.0	50	122.0
10.6	51	123.8
11.1	52	125.6
11.7	53	127.4
12.2	54	129.2
12.8	55	131.0
13.3	56	132.8
13.9	57	134.6
14.4	58	136.4
15.0	59	138.2
15.6	60	140.0
16.1	61	141.8
16.7	62	143.6
17.2	63	145.4
17.8	64	147.2
18.3	65	149.0
18.9	66	150.8
19.4	67	152.6
20.0	68	154.4
20.6	69	156.2
21.1	70	158.0
21.7	71	159.8
22.2	72	161.6
22.8	73	163.4
23.3	74	165.2
23.9	75	167.0
24.4	76	168.8
25.0	77	170.6
25.6	78	172.4
26.1	79	174.2
26.7	80	176.0
27.2	81	177.8
27.8	82	179.6
28.3	83	181.4
28.9	84	183.2
29.4	85	185.0
30.0	86	186.8
30.6	87	188.6
31.1	88	190.4
31.7	89	192.2
32.2	90	194.0

91 ~ 141

°C		°F
32.8	91	195.8
33.3	92	197.6
33.9	93	199.4
34.4	94	201.2
35.0	95	203.0
35.6	96	204.8
36.1	97	206.6
36.7	98	208.4
37.2	99	210.2
37.8	100	212.0
38.3	101	213.8
38.9	102	215.6
39.4	103	217.4
40.0	104	219.2
40.6	105	221.0
41.1	106	222.8
41.7	107	224.6
42.2	108	226.4
42.8	109	228.2
43.3	110	230.0
43.9	111	231.8
44.4	112	233.6
45.0	113	235.4
45.6	114	237.2
46.1	115	239.0
46.7	116	240.8
47.2	117	242.6
47.8	118	244.4
48.3	119	246.2
48.9	120	248.0
49.4	121	249.8
50.0	122	251.6
50.6	123	253.4
51.1	124	255.2
51.7	125	257.0
52.2	126	258.8
52.8	127	260.6
53.3	128	262.4
53.9	129	264.2
54.4	130	266.0
55.0	131	267.8
55.6	132	269.6
56.1	133	271.4
56.7	134	273.2
57.2	135	275.0
57.8	136	276.8
58.3	137	278.6
58.9	138	280.4
59.4	139	282.2
60.0	140	284.0
60.6	141	285.8

142 ~ 260

°C		°F
61.1	142	287.6
61.7	143	289.4
62.2	144	291.2
62.8	145	293.0
63.3	146	294.8
63.9	147	296.6
64.4	148	298.4
65.0	149	300.2
65.6	150	302.0
66.1	151	303.8
66.7	152	305.6
67.2	153	307.4
67.8	154	309.2
68.3	155	311.0
68.9	156	312.8
69.4	157	314.6
70.0	158	316.4
70.6	159	318.2
71.1	160	320.0
71.7	161	321.8
72.2	162	323.6
72.8	163	325.4
73.3	164	327.2
73.9	165	329.0
74.4	166	330.8
75.0	167	332.6
75.6	168	334.4
76.1	169	336.2
76.7	170	338.0
77.2	171	339.8
77.8	172	341.6
78.3	173	343.4
78.9	174	345.2
79.4	175	347.0
82.2	180	356.0
85.0	185	365.0
87.8	190	374.0
90.6	195	383.0
93.3	200	392.0
96.1	205	401.0
98.9	210	410.0
101.7	215	419.0
104.4	220	428.0
107.2	225	437.0
110.0	230	446.0
112.8	235	455.0
115.6	240	464.0
118.3	245	473.0
121.1	250	482.0
123.9	255	491.0
126.7	260	500.0



3 PREPARING THE DRYER FOR OPERATION

3.1 SITING THE DRYER



Select a site as level as possible 50 feet (15 metres) from inflammable buildings. It is preferable to set the machine with the fan facing toward the prevailing wind.

If the dryer is being set on a level concrete slab simply lower the adjustable jacks, raising the wheels slightly off the ground, bringing the machine to a level position. It is important that the central auger is vertical. Use the spirit levels that are positioned on the dryer transport chassis.

If the dryer has been placed straight on to soil then a board of at least 2" x 8" x 12" should be placed under each leg.



3.2A POSITIONING THE TOP FOLD DOWN AUGER



THERE IS A CORRECT METHOD THAT MUST BE FOLLOWED:

Step One: At the rear of the dryer there is a 4mtr long round bar mounted vertically that controls the unloading plate. This is locked in transport position by a large lock screw on the second ring. This screw must be loosened off to allow the bar to float up with the extending sheets.

Step Two: Raise the external extending sheets by approximately 7-8cm, using the top extension winch (the chain supporting the top section tube should be tense, supporting the tube).

Step Three: First examine the illustration (Fig 3A) Climb the external ladder and stand on the plenum. Using the lever marked 1, pull the over-centre mechanism bringing the folding auger toward the centre of the dryer. Lock the lever in position using the wing nut item number 2.



FAILURE TO FOLLOW STEP TWO WILL RESULT IN MATERIAL DAMAGE TO THE SIDE SHEETS OF THE DRYER.

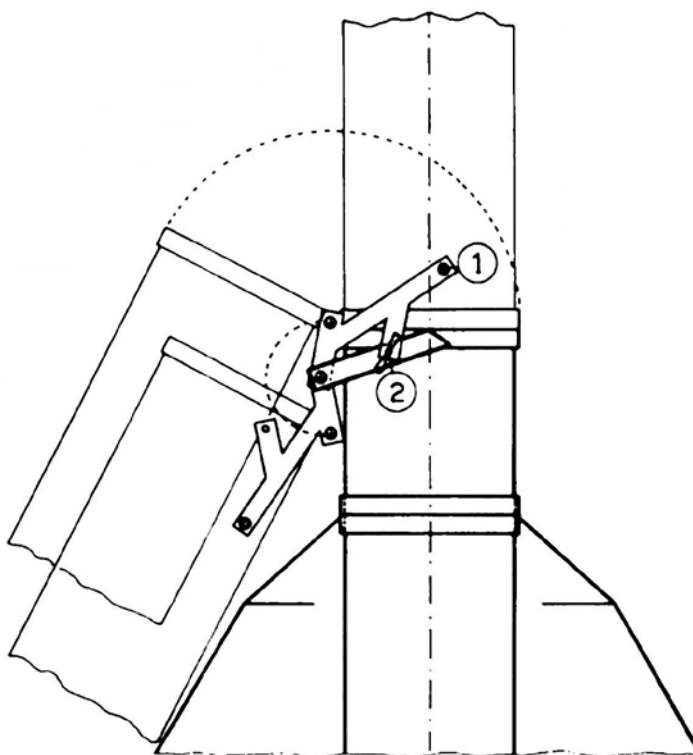


FIG 3A - VERTICAL AUGER HINGE OVER-CENTRE MECHANISM



3.2A POSITIONING THE TOP FOLD DOWN AUGER

Step Four: Continue to raise the side sheets that will carry the folding part of the vertical auger with them until the side sheets are 6-10cm from the top of their movement range.

Step Five: Raise completely the unloading plate/guillotine to its discharge position.

Step Six: Using the vertical auger winch (beside the control cabinet) **raise** the folding auger into its vertical position. Once the auger is correctly positioned climb the ladder and tighten up the wing nut item 3 in Fig 3B.

Step Seven: Continue to raise the external extending sheets fully. Taking care not to apply excessive force. Mount the four safety pins below the extension support bars.

Step Eight: Check that the vertical rod controlling the unloading gate as mentioned in step one is in the correct position and opens/closes freely.

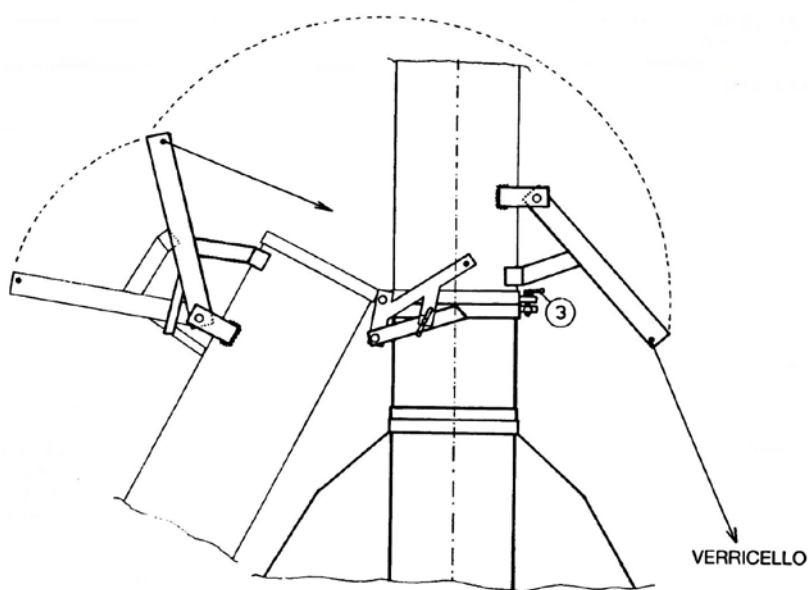


FIG 3B - VERTICAL AUGER FOLDING



DURING WORK THE WINCH WIRE TO THE TOP AUGER SHOULD NOT BE UNDER TENSION.



3.2B POSITIONING THE TOP SWIVEL DISCHARGE AUGER



THERE IS A CORRECT METHOD THAT MUST BE FOLLOWED:

Step One: Move the top auger winch from the lower transport position on the drawbar to the upper winching position on top of the burner chamber.




Step Two: Raise the top swivel discharge, using winch, fully into working position.

Step Three: Raise the external extending sheets, fully. Mount the four safety pins below the extension support bars and lower the extending sheets onto the pins.

Step Four: Finally climb the ladder and tighten up the wing nut item 3 in Fig 3B, check the position of the swivel discharge on the top rim – it may be necessary to adjust the guide rollers to support the weight of the chute.

Step Four: Check guillotine operation of the discharge using the wire ropes at the rear of the grain dryer.



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3.3 PREPARING FOR TRANSPORT



TO PREPARE THE DRYER FOR TRANSPORT FOLLOW ALL THE STEPS ABOVE IN REVERSE ORDER WITH **ONE ADDITIONAL STEP**:

First Step: To start the lowering of the top auger extension pull the wire that is positioned at the rear of the dryer and has at its end a round steel ring. First you need to undo the wing nut item 3 in Fig 3B.

3.4 LOADING AUGER HOPPER

Using the appropriate winch gently lower the loading auger into the horizontal position. In the process checking that the driving lugs do not directly hit each other. adjust the support feet at the end of the hopper and check the inner/outer auger sections fit properly and are sealed to prevent grain loss.

3.5 DIESEL FUEL SUPPLY

The diesel tank is located on the left hand side of the dryer. The fuel supply to the burner has a filter on the suction side. There is a second filter inside the fuel pump and each nozzle has a filter on it. All filters should be checked / cleaned or replaced as required, depending on usage and cleanliness of diesel supply, but at least once per year.

The fuel pump is factory set at 12 bar pressure for Diesel fuel.

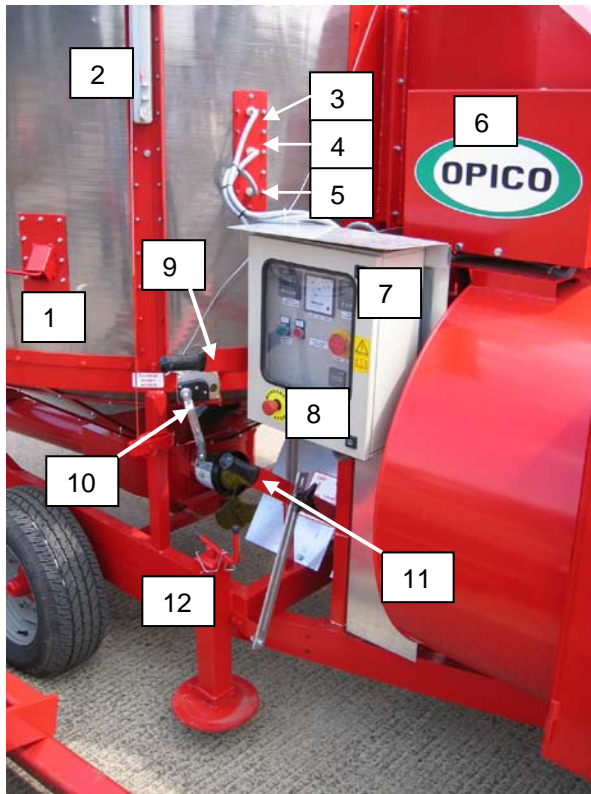
3.6 PTO DRIVE SHAFT

Connect the pto shaft to the tractor. Check that the angle between the pto of the tractor and the input pto of the dryer is as level as possible to minimise pto shaft vibration. **The tractor pto should be running at approx 450rpm to give 380-400v on the control panel from the generator.**

NOTE; the tractor should not be connected to the drawbar of the dryer during dryer operation.



3.7 CONTROLS



1. Grain sampler
2. Top extension support
3. Grain Temp Probe
4. Plenum Temp Probe
5. Plenum High Limit Probe
6. Generator
7. Control Board
8. Emergency Stop
9. Fan clutch
10. Vertical auger winch
11. Intake auger clutch
12. Jack stand

Picture 3.7 CONTROLS



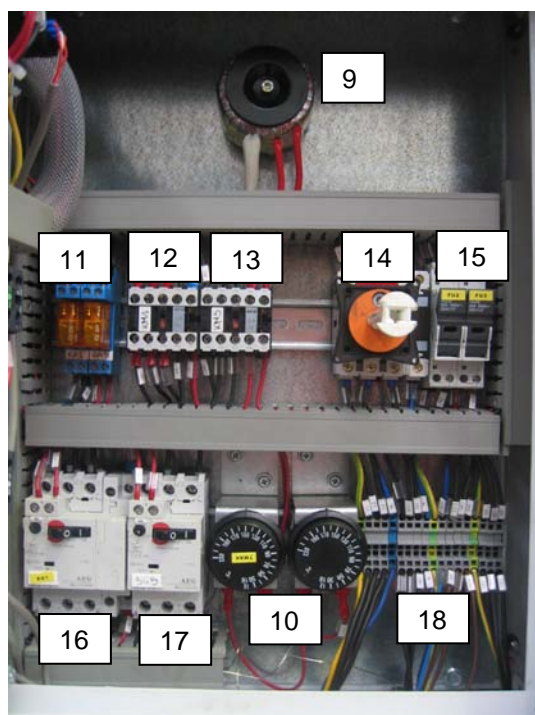
4 DRYER OPERATION

4.1 CONTROL BOARD




1. Plenum Temp Thermostat
2. Volt meter
3. Grain Temp Thermostat
4. Ignition Start/Stop
5. Power indicator
6. Isolator switch
7. Hour clock
8. Aspirator start/stop (optional)

Picture 4.1 CONTROL BOARD OUTER



9. Transformer
10. Plenum safety thermostats
11. Relays
12. Burner contactor
13. Aspirator contactor (optional)
14. Isolator switch
15. Fuses
16. Burner overload
17. Aspirator overload (optional)
18. Terminal block

Picture 4.2 CONTROL BOARD INNER

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4.2 PLENUM & GRAIN TEMPERATURE THERMOSTATS

Recommended operating temperatures - Section 2.4.3



Plenum & Grain thermostats are factory set to operate in °F and have one temp setting. When powered, the display normally shows the measured temperature.

Press 'SET' – the last temperature set point used will appear on the display, using the '↑' key to raise or '↓' key to lower the temperature setting °F. The change will appear on the display, when the desired temperature appears on the display, press 'SET' this will save the new setting and return to the current temperature reading on the probe.

4.3 PLENUM SAFETY CONTROL


The plenum safety control thermostat is mounted inside the control panel, it safeguards against excessive plenum temperatures, it's temperature probe is positioned in the plenum chamber. During operation, the dryer checks the safety thermostat to make certain the plenum temperature falls within the safe operating range. If so, operation continues. Should the thermostat open at any time during operation, power to the control board will be interrupted, halting operation of the dryer.

The safety thermostat operates in °C and should be set approx 30°C above the running Plenum Air Temperature setting (Note; Plenum temperature is °F, see temp conversion chart)

ie Plenum temperature set at 180°F – set safety thermostat at 112°C

4.4 THERMIC SAFETY

The thermic safety indicates if any of the electric motor circuit breakers have tripped. This protects the motor from over loading, ie if an auger was to jam. Check all the circuit breakers and reset any which have tripped – checking the driveline and motor in question.

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4.5 LOADING AND OPERATION



Start the tractor and set pto speed at approximately 460 rpm. Check the diesel tank has sufficient fuel.

Engage the 'loading auger' using the marked lever and proceed to fill the dryer.

Fill the grain bin until the grain is approx 150 - 250mm below the top rim. This amount depends on initial grain moisture, as wet grain is heated it will expand. Leaving space at the top of the dryer provides the additional room needed and prevents the dryer from spilling over. **Disengage** the intake when the dryer is full.

DO NOT LEAVE GRAIN IN THE DRYER OVERNIGHT. Grain that remains in the dryer overnight will absorb moisture and swell. This swelling can cause the vertical auger to jam.

NOTE; The agitator will automatically disengage on Magna 2000 models during loading, this is to reduce the grain recirculation during loading and minimise the loading time.

Engage the 'fan' using the marked lever. To prolong belt life it is recommended that the tractor pto speed is reduced by approximately 40% before engaging the fan drive, engage the lever slowly.

When the belt drive to the fan is engaged, turn the control board power isolator to the 'ON' position and speed-up the pto until 380V is showing on the volt meter. The power indicator lights will illuminate, confirming all three phases are operating.

Set 'Grain & Plenum thermostats' to the required temperatures. Ensure the plenum safety thermostat is set to the correct temperature. These temperature settings can be adjusted at any time during dryer operation.

Start the 'Burner motor', the ignition should complete in 5-10 seconds. It may be necessary to do this two or three times to ensure the burner has started. Allow 30 seconds between each starting attempt. The green start button will illuminate when it is operating.

When the grain has reached the pre-set grain temperature, the burner will shut off automatically. The fan will start cooling the crop.

When the grain has cooled sufficiently, **disengage** the 'Fan' drive.

Open the 'Discharge guillotine' to empty the grain bin.



There is an emergency stop button mounted on the control board.



4.6 HOW TO GET THE BEST PERFORMANCE OUT OF YOUR DRYER

ON THE FIRST DRYING OF EACH DIFFERENT CROP TYPE ON YOUR FARM PROCEED AS FOLLOWS:

Set the finished grain temperature to 125 degrees F that is well above the setting that you will finally use.

Check the finished grain temperature gauge reading from time to time. When the grain temperature has achieved 100 degrees F take your first sample to check for actual grain moisture.

Depending upon altitude, outside air temperature and if it is a dry or wet day you will record approximately between 17% and 20% moisture.

Continue to run the dryer and take a further sample of grain at 102 degrees F. Continue in this fashion until the grain is half a percent above finished moisture content required. So if you are looking for 14% moisture content and you achieve 14½% at 108 degrees F press the button marked 'SET', press the down arrow to bring the temperature from 125 degrees down to 108 degrees. The burner will cut off and the cooling cycle will begin, press 'SET' to save this new setting.

When all the grain is cooled take a further sample before emptying the dryer to check the finished moisture content.

If the finished moisture content is below 14% then you can fine-tune the finished grain temperature by decreasing the value locked into the finished grain temperature gauge by 1 degree.

After two or three loads you will achieve the right balance for the particular crop type. At this point write down the plenum temperature you have used and the finishing grain temperature for that particular type as a future record.

The major variable to consider is not moisture content, outside air temperature etc., but rather the plenum temperature used. There is a balance between extra heat and therefore extra fuel usage against time of drying.

The recommendations given in our Crop Drying Recommendations are a good starting point. (Section 2.4.3)

NOTE: WHEN DRYING ANY CROPS FOR SEED OR MALTING YOU MUST NOT USE PLENUM AIR TEMPERATURES HIGHER THAN OUR RECOMMENDATION.

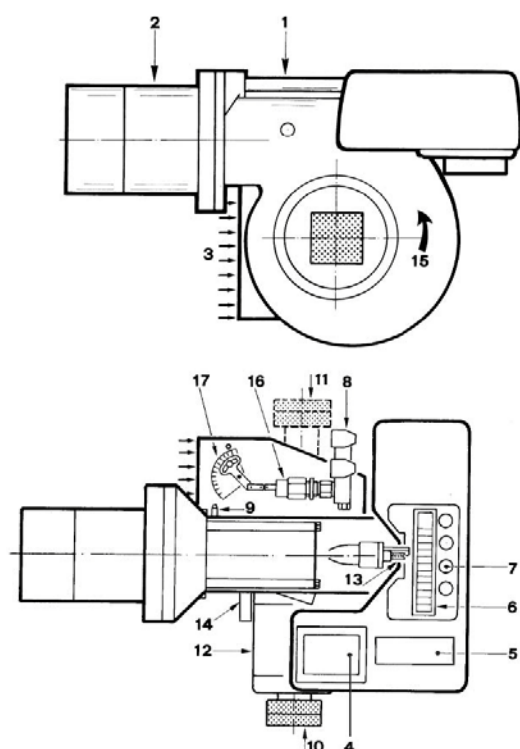


4.7 BURNER - RIELLO

For full details on the Riello burner please refer to the separate Riello burner manual. There are occasions when drying temperatures required will vary significantly from the norm. For example when drying seed crops you may need to use smaller nozzles to achieve the correct plenum temperatures.

In Oil Seed Rape because of crop density overall air flow can be reduced, heat retention is increased and again it may be necessary to use smaller nozzles.

BURNER DESCRIPTION



- 1 Guides for opening the burner and inspecting the combustion head
- 2 Combustion head
- 3 Fan air inlet
- 4 Ignition transformer
- 5 10 pole socket
- 6 Terminal strip
- 7 Fairleads for wiring carried out by the installer
- 8 Valve assembly
- 9 Fan pressure test point
- 10 Pump PRESS GW-1G-2G-3G
- 11 Pump PRESS 4G
- 12 Electrical motor
- 13 Screw for combustion head adjustment
- 14 Photocell for flame presence control
- 15 Fan rotation direction
- 16 Variable stroke hydraulic cylinder. Opens the fan gate valve to the value necessary at the 2nd stage of operation.
- 17 Indexed selector.

This selector adjusts the opening of the fan gate to the value necessary at the 1st stage of functioning.

CHOICE OF NOZZLES FOR 1ST AND 2ND STAGE

Both nozzles must be chosen from among those listed in Table (H). The first nozzle determines the delivery of the burner in the 1st stage. The second nozzle works together with the 1st nozzle to determine the delivery of the burner in the 2nd stage.

The deliveries of the 1st and 2nd stages must be contained within the value range indicated on Page 11. Use nozzles with atomization angles of 60° and, if possible, at a pressure of 12 bar.

The two nozzles usually have equal deliveries, but the 1st stage nozzle may have the following specifications if required: - a delivery less than 50% of the total delivery whenever the back-pressure peak must be reduced at the moment of firing; - a delivery higher than 50% of the total delivery whenever the combustion during the 1st stage must be improved.



Burner	Nozzles	delivery kg/h (1)			kW
		60°-GPH	10 bar	12 bar	
PRESS 1G	2,00	7,7	8,5	9,2	100,8
	2,25	8,6	9,5	10,4	112,7
	2,50	9,6	10,6	11,5	125,7
	3,00	11,5	12,7	13,6	150,6
	3,50	13,5	14,8	16,1	175,5
	4,00	15,4	17,0	18,4	201,6
	4,50	17,3	19,1	20,7	226,5
	5,00	19,2	21,2	23,0	251,4
	5,50	21,1	23,3	25,3	276,3
PRESS 2G	4,00	15,4	17,0	18,4	201,6
	4,50	17,3	19,1	20,7	226,5
	5,00	19,2	21,2	23,0	251,4
	5,50	21,1	23,3	25,3	276,3
	6,00	23,1	25,5	27,7	302,4
	6,50	25,0	27,6	30,0	327,3
PRESS 3G	7,00	26,9	29,7	32,3	352,3
	6,00	23,1	25,5	27,7	302,4
	6,50	25,0	27,6	30,0	327,3
	7,00	26,9	29,7	32,3	352,3
	7,50	28,8	31,8	34,6	377,2
	8,30	31,9	35,2	38,3	417,5
PRESS 4G	9,50	36,5	40,3	43,6	478,0
	10,50	40,4	44,5	48,4	527,8
	12,00	46,1	50,9	55,3	603,7
	9,50	36,5	40,3	43,8	478,0
	10,50	40,4	44,5	48,4	527,8
	12,00	46,1	50,9	55,3	603,7
	13,80	53,1	58,5	63,6	693,8
	15,30	58,2	64,9	70,5	769,7
	17,50	67,3	74,2	80,7	880,0

Tab. H

Example with the Press 1G Model:

Boiler output = 270 kW - efficiency 90 %

Output required by the burner =

$270 : 0.9 = 300 \text{ kW};$

$300 : 2 = 150 \text{ kW per nozzle};$

therefore, two equal, 60°, 12 bar nozzles are required: 1° = 3.00 GPH - 2° = 3.00 GPH,

or the following two different nozzles:

1° = 2.50 GPH - 2° = 3.50 GPH,

or 1° = 3.50 GPH - 2° = 2.50 GPH.

Model	Burner	1°	2°	Total	Spare
120E	2G	5	7	12	4
1200	2G	6.5	6.5	13	4
2000	3G	8	11	19	6.5
2910	4G	11	16	27	9
3810	4G	16	16	32	9
4810	4G	16	16	32	9

NOZZLE ASSEMBLY

Factory standard nozzles

The nozzle for the 1st stage of operation is the one lying beneath the firing electrodes Fig. (14). With the burner open on the slide bars, the two nozzles (1, Fig 13) are removed using a 16 mm wrench. When refitting do not use any sealing products such as gaskets, sealing compound, or tape. The nozzles must be screwed into place tightly but not to the maximum torque value provided by the wrench.

Be careful to avoid damaging the nozzle sealing seat. Make sure that the electrodes are positioned as shown in Figure (14). Lastly, close the burner by screwing in the two screws.

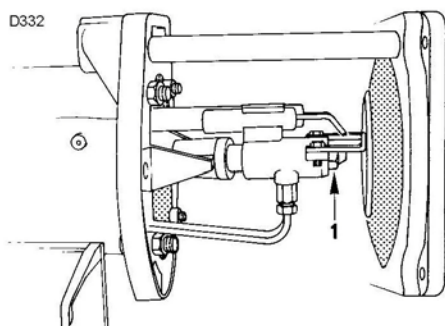


Fig. 13

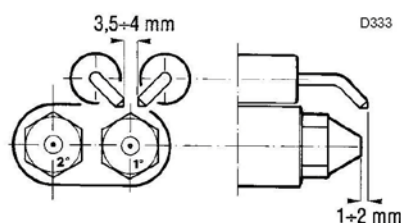


Fig. 14



CALIBRATIONS BEFORE FIRING

Combustion head setting

The setting of the combustion head depends exclusively on the delivery of the burner in the 2nd stage - in other words, the combined delivery of the two nozzles selected (Tab H).

Set the screw 1)(Fig 16) in such way that its rear surface corresponds to the notch number shown in (Fig 17).

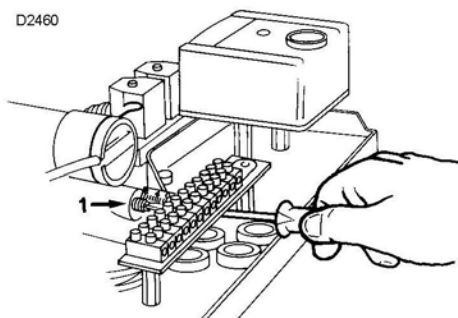
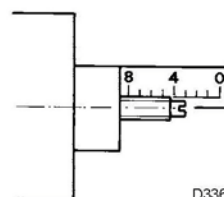


Fig. 16



D336

Fig. 17

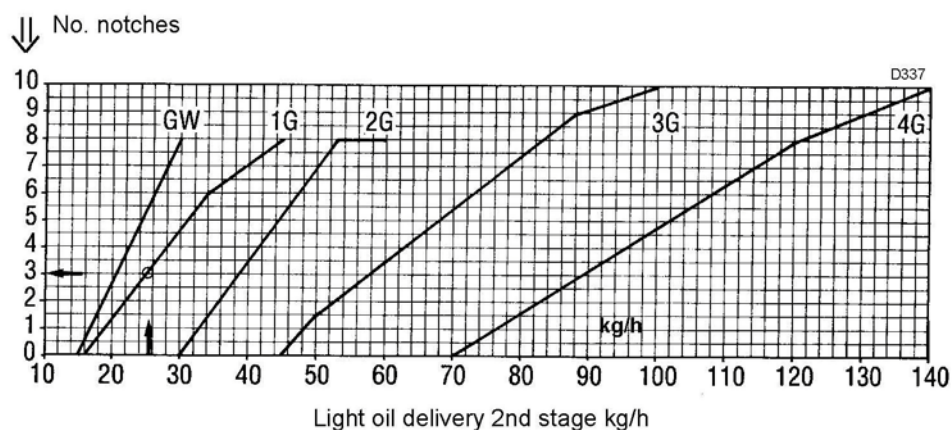


Fig. 18

Example:

The PRESS 1G Model with two 3.00 GPH nozzles and 12 bar pump pressure.

Find the delivery of the two 3.00 GPH nozzles in Table (H), Page 23: $12.7 + 12.7 = 25.4$ kg/h.

Diagram (G) indicates that for a delivery of 25.4 kg/h the PRESS 1G Model requires the combustion head to be set to approx. three notches, as shown in Figure (17).

Fuel pump adjustment

No pre settings are required for the pump, which is set to 12 bar by the manufacturer. This pressure must be checked and adjusted (if required) after the burner has been ignited.

The only operation required in this phase is the application of a pressure gauge to check pressure setting (Fig 27.28.29).



PRESS 1G - 2G:
SUNTEC AN77

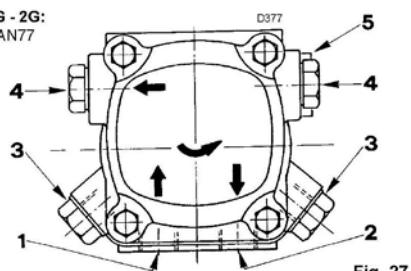


Fig. 27

PRESS 3G:
SUNTEC J6

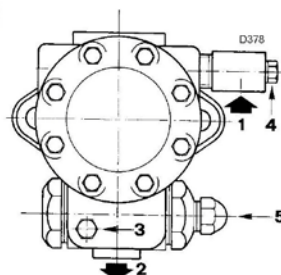


Fig. 28

PRESS 4G:
SUNTEC J7

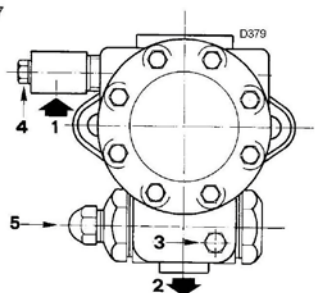


Fig. 29

Pump

- 1 Suction line
- 2 Return line
- 3 Pressure gauge attachment
- 4 Suction gauge connection
- 5 Pressure adjustment screw:
Right rotation = pressure increases
Left rotation = pressure decreases

AN

- G1/4"
- G1/4"
- G1/8"
- G1/8"

J

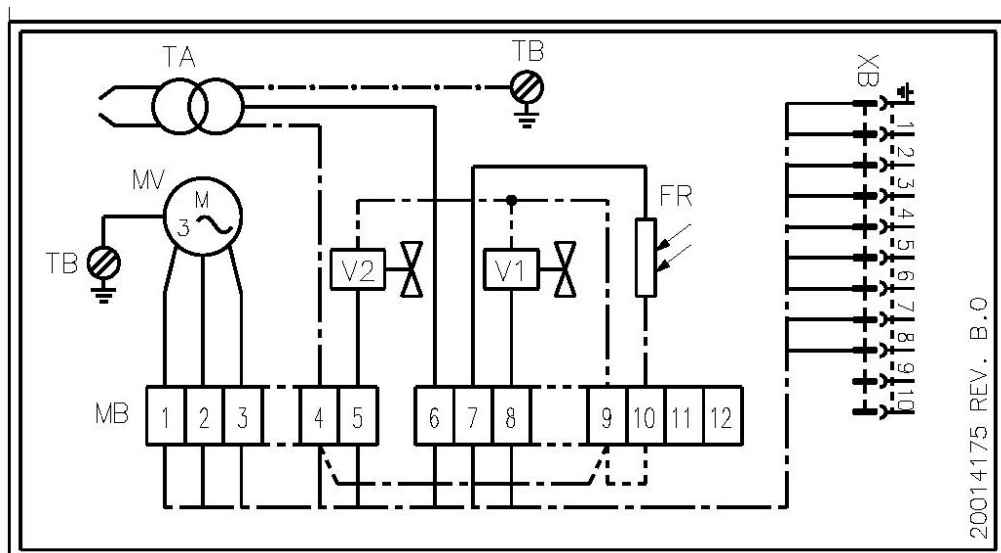
- G1/2"
- G1/2"
- G1/8"
- G1/2"

G = cylindrical thread

The connector to be screwed into the cylindrical thread G must be equipped with a sealing washer.

Do not screw a connector with a conical thread (NPTF) into the cylindrical thread G.

BURNER ELECTRICAL CONNECTION



Key to Layout

- MB- Burner terminal strip
- MV- Fan motor
- V1- 1st stage solenoid valve
- FR- Photocell

- TB- Burner ground (earth) connection
- TA- Ignition transformer
- V2- 2nd stage solenoid valve
- XB- 10 pole socket



BURNER AIR SETTING

GPH nozzle 1st stage -N° Set-point

PRESS 1G		PRESS 2G		PRESS 3G		PRESS 4G	
GPH	No.	GPH	No.	GPH	No.	GPH	No.
2,00	1	4,00	1	6,00	1,5	9,5	1,5
2,25	1	4,50	1	6,50	2	10,50	2
2,50	1,5	5,00	1,5	7,00	2	12,00	2
3,00	2	5,50	2	7,50	2,5	13,80	2,5
3,50	2,5	6,00	2	8,30	2,5	15,30	2,5
4,00	2,5	6,50	2,5	9,50	3	17,30	3
4,50	2,5	7,00	3	10,50	3,5		
5,00	3			12,00	4		
5,50	3						

Tab. I

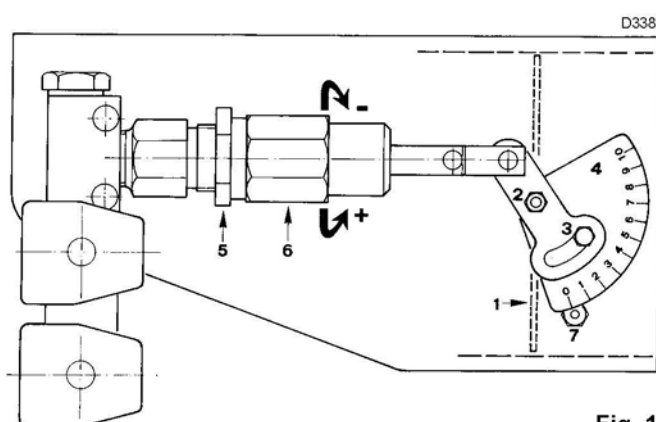


Fig. 19

Fan gate adjustment – NOTE; make any adjustment to stage 1 settings before stage 2

1st stage:

The air gate valve 1)(Fig 19) is set using the indexed selector 4)(Fig 19). Loosen the screw 3)(Fig 19) and the nut 2)(Fig 19) and shift the indexed selector 4) so that the index finger 7)(Fig 19) corresponds to the required notch setting indicated in Table (I) according to the 1st stage nozzle's delivery.

Example

The PRESS 1G Model burner - 3.00 GPH nozzle.

The indexed selector must be set to notch 2.

2nd stage:

The air gate valve 1)(Fig 19) must be set using the cylinder 6)(Fig 19). This setting must be adapted case by case to the burner's delivery and combustion chamber pressure. The first time the burner is fired, the hydraulic cylinder setting should be left as originally set by the manufacturer: at approximately half of its full stroke.

In summary, the operations and settings that must be performed prior to firing the burner for the first time are as follows:

- choice of the two nozzles;
- setting of the combustion head;
- setting of the fan's air gate valve for the 1st stage.

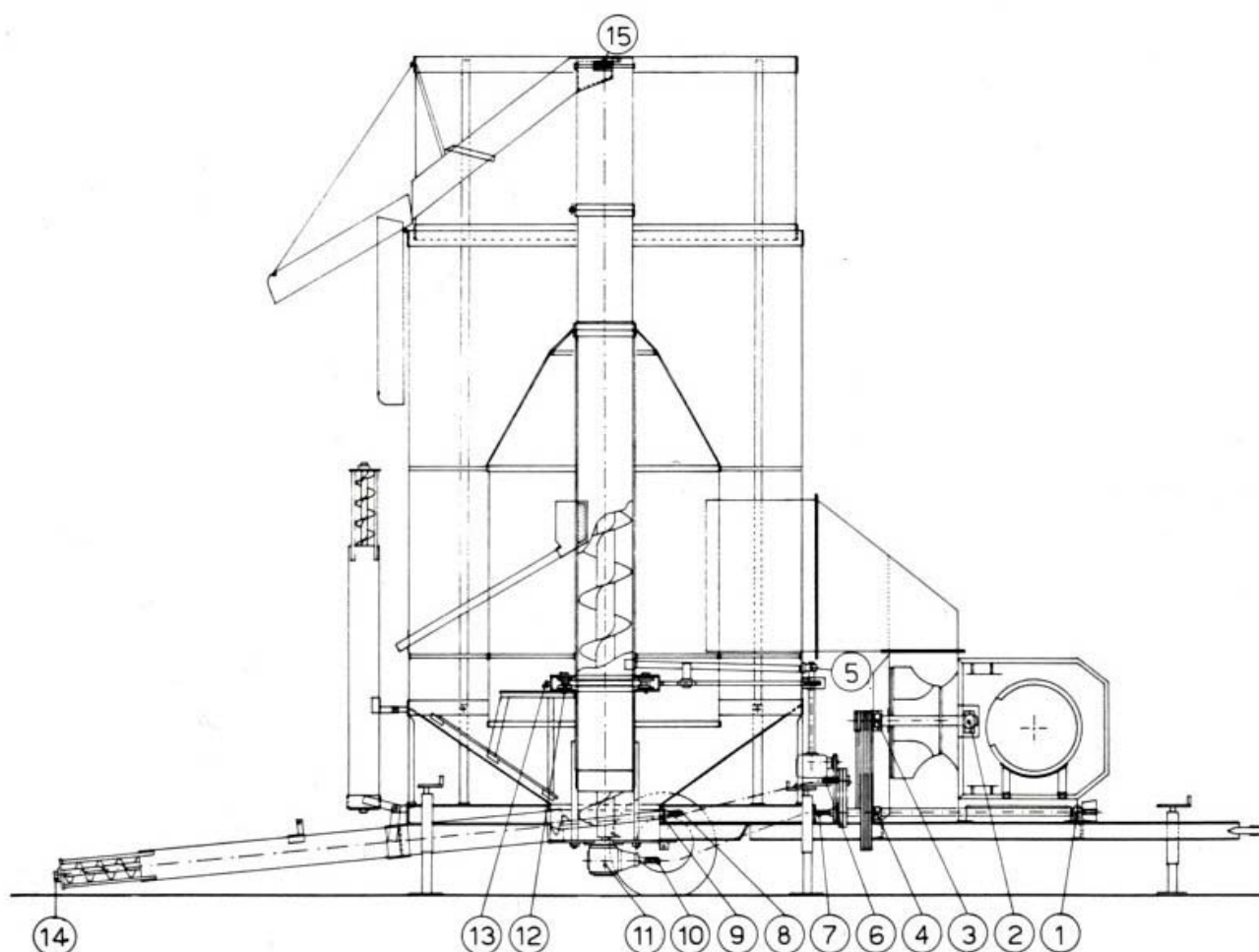
The following require no adjustment operations and may remain as they are provided:

- pump pressure;
- setting of the fan's air gate valve for the 2nd stage.












5 MAINTENANCE

Please take care not to over grease. Many of the bearings and rollers on this dryer require greasing only once per season. More harm will be done by over enthusiastic application than benefit.















Picture 5.1 POINTS TO LUBRICATE

-  1,2,3,4 - MAIN SHAFT SUPPORT AND FAN (GREASE LIGHTLY AT THE END OF EACH SEASON)
-  5,9,14 - OTHER SUPPORTS (GREASE LIGHTLY AT 1 MONTH INTERVALS AND/OR AT THE END OF EACH SEASON)
-  7,8,10 - PTO SHAFTS (GREASE ON DAILY BASIS)
-  12 – AGITATOR ROLLER BEARINGS (GREASE LIGHTLY EVERY 20 DAYS)
-  13 – AGITATOR CHAIN (GREASE AT THE END OF EACH SEASON)
-  11 – VERTICAL AUGER GEARBOX 11 (CHECK OIL AT END OF EACH SEASON, SAE 90EP, QUANTITY 1.7LTR)
-  6 - AGITATOR GEARBOX MAINTENANCE FREE (SHELL SYNTHETIC OIL, TIVELA OIL SC 320cSt)
-  15 - TOP AUGER SUPPORT (GREASE LIGHTLY EVERY 15 DAYS.)

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5.2 END OF THE SEASON OPERATIONS

-  CHECK CHAIN AND CHAIN TIGHTENER TENSION
-  COVER AND PROTECT ALL THE ELECTRIC COMPONENTS FROM HUMIDITY
-  REPLACE THE ROLLER BEARINGS OF THE TIMING BEARING RING, IF NECESSARY
-  CLEAN THE FAN OF THE BURNER 5 (REFER TO THE DRAWING OF THE BURNER)
-  CHECK THE VERTICAL AUGER AND THE VERTICAL TUBE FOR WEAR
-  CHECK THE BELTS' TENSION
-  CHECK THE CONDITION OF THE FURNACE'S REFRACTORY MATERIAL
-  CHECK THE CONDITION OF THE STEEL BOTTOM OF THE FURNACE
-  CHECK THE CONDITION OF THE PROTECTION GUARD OF THE FAN SUPPORT, PLACED AT THE EXIT OF THE FURNACE FIRE MOUTH BETWEEN FURNACE AND FAN
-  CHECK THE CONDITION OF CABLES AND WINCHES
-  CHECK THE CONDITION OF THE PTO SHAFTS AND THEIR SAFETY GUARDS

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6 **SAFETY WARNINGS**

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel in the operation, transport, maintenance and storage of equipment. Lack of attention to safety can result in accident, personal injury, reduction of efficiency and worst of all – loss of life.

Watch for safety hazards and correct deficiencies promptly.

Use the following safety precautions as a general guide to safe operations when using the machine.


Additional safety precautions are used throughout this manual for specific operating and maintenance procedures. Read this manual and review the safety precautions often until you know the limitations.

6.1 **SAFETY PRINCIPLE**

The following are general rules for the users of the machine:



BEFORE USING THE MACHINE CAREFULLY READ ALL PARTS OF THIS MANUAL. REFRAIN FROM USING THE DRYER UNTIL THE ENTIRE MANUAL (AND ALL ITS ATTACHMENTS) ARE UNDERSTOOD.

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6.2 WARNINGS AND DANGERS



DO NOT ALLOW ANYONE TO OPERATE THE MACHINE WHO IS NOT IN GOOD PHYSICAL AND MENTAL HEALTH.



KEEP CHILDREN, VISITORS AND ALL UNTRAINED PERSONNEL AWAY FROM THE MACHINE WHILE IN OPERATION.



DO NOT USE THE DRYER WITHOUT ALL THE SAFETY GUARDS IN THE CORRECT POSITION.



DO NOT CARRY OUT MAINTENANCE WORK AND/OR REPAIRS UNTIL THE TRACTOR ENGINE IS STOPPED AND THE PTO DISCONNECTED OR IF AN ELECTRIC DRIVE UNIT THE MAIN POWER SWITCH TURNED TO OFF.



DO NOT UNDER ANY CIRCUMSTANCES ENTER THE DRYER THROUGH THE INSPECTION HATCH UNTIL THE TRACTOR IS TURNED OFF AND THE PTO SHAFT IS COMPLETELY DISCONNECTED OR IF AN ELECTRIC DRIVE UNIT THE MAIN SWITCH TURNED TO OFF. FAILURE TO FOLLOW THIS INSTRUCTION MAY CAUSE SERIOUS INJURY. EXPLANATION – SHOULD THE AGITATOR ARM RECIRCULATE WHILST THE OPERATOR IS ENTERING THE DRYER OR INSIDE THE DRYER



DO NOT ALTER THE DIMENSIONS OR SHAPE OF THE ADJUSTABLE JACK FEET.



DO NOT MOVE THE DRYER WITH TYRES THAT ARE DEFLATED OR NOT SUITABLE FOR SERVICE.



DO NOT MOVE THE MACHINE UNLESS IT IS FULLY IN THE TRANSPORT MODE I.E. WITH THE LOADING AUGER FULLY RAISED FOLD DOWN AUGER FULLY LOWERED AND THE EXTENDING SIDE SHEETS FULLY CLOSED.



DO NOT ALLOW ANY OBSTRUCTION TO THE AIR INLET.



DO NOT THROW ANY TYPE OF OBJECT INTO THE DRYER, THE BURNER UNIT AND THE INLET AIR DUCT.




DO NOT TOUCH THE INSIDE OF THE BURNER BOX ASSEMBLY WHEN IT IS WORKING OR FOR A PERIOD OF AT LEAST ONE HOUR AFTER WORK.



DO NOT CLIMB OR USE THE LADDER WITHOUT FIRST STOPPING THE TRACTOR ENGINE AND DISENGAGING THE PTO SHAFT.



DO NOT ALLOW MORE THAN ONE PERSON TO BE ON THE LADDER AT ANY ONE TIME.

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6.3 SAFETY GUARDS AND WARNING LOGOS

For safety the dryer is supplied with the necessary safety guards and warning logos.



SHOULD THE SAFETY GUARDS BE REMOVED TO CARRY OUT MAINTENANCE OR CLEANING IT IS THE OPERATORS RESPONSIBILITY TO ENSURE THAT THEY ARE REPLACED IN THEIR ORIGINAL POSITION PRIOR TO OPERATING THE DRYER.

6.3.1 EMERGENCY STOP BUTTON

The red emergency button is positioned on the front of the main control panel: if pushed it instantly stops all electrical power to the machine. It is shown in picture 3.7

Note; Burner motor overload will need to be reset if emergency stop has been activated.

6.4 RESIDUAL RISKS

Some residual risks cannot be avoided in the natural process of grain drying. The following list is indicative not exhaustive



DO NOT PLACE YOUR HANDS OR ANY OTHER PART OF THE BODY THROUGH THE SAFETY MESH POSITIONED OVER THE LOADING AUGER



BE AWARE OF POSSIBLE DANGER WHILE LOWERING THE LOADING AUGER INTO ITS WORKING POSITION



BE AWARE OF POSSIBLE DANGER WHEN POSITIONING THE DRYER USING THE ADJUSTABLE JACKS



BE AWARE OF POSSIBLE DANGER WHEN ATTACHING THE PTO SHAFT TO THE POWER TAKE OFF OF THE TRACTOR

6.5 NOISE LEVELS

The level of acoustic pressure of the Magna mobile dryers has been measured with the machine loaded while working in a open field on the 4 compass points at 1,5 meters distance and at 1,6 meters height from ground. The level is between 77dB(A) and 88 dB(A).



7 TROUBLE SHOOTING

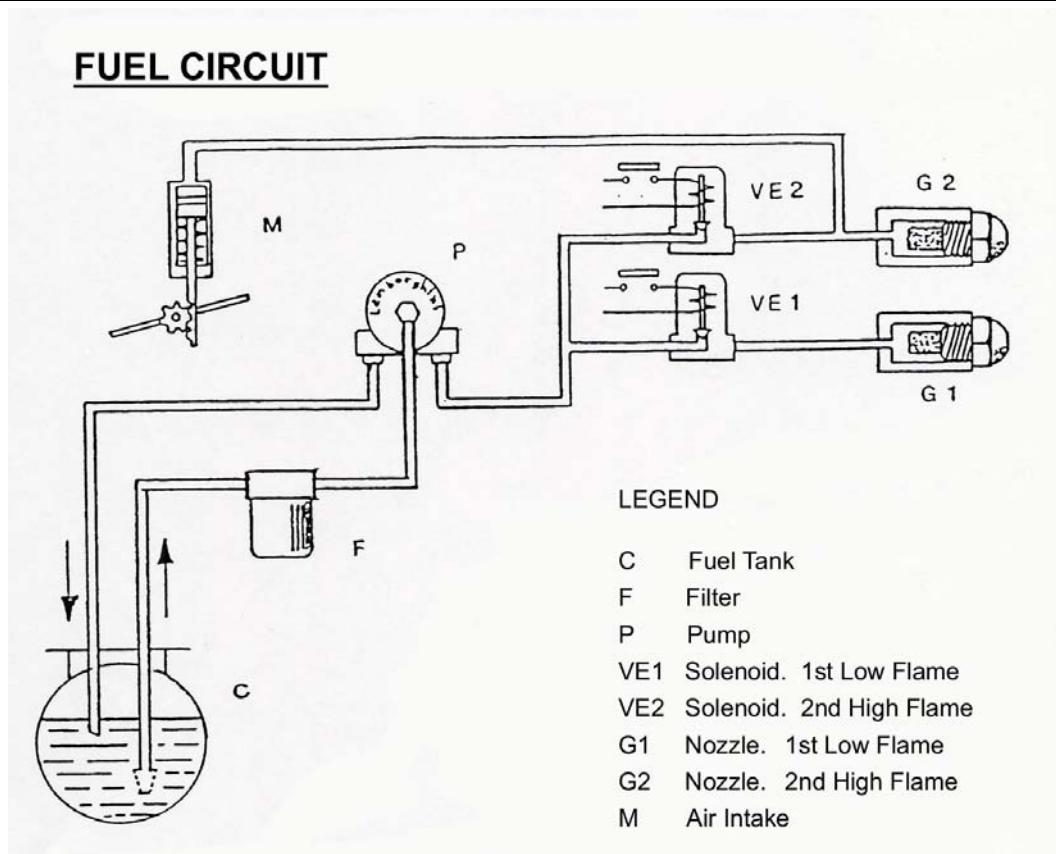
7.1 THE BURNER

FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
The burner does not start	<ul style="list-style-type: none"> No electrical power supply A limit or safety control device is open Motor lock-out Pump is jammed Erroneous electrical connections Defective motor command control device Defective electrical motor Photocell short-circuit Light is entering or flame is simulated 	<ul style="list-style-type: none"> Close all switches - Check fuses Adjust or replace Reset thermal cutout Replace Check connections Replace Replace Replace photocell Eliminate light or replace control box
The burner starts but stops almost immediately	<ul style="list-style-type: none"> Missing phase thermal cutout triggers 	<ul style="list-style-type: none"> Reset thermal cutout when third phase returns
After pre-purge the burner goes to lock-out and the flame does not appear	<ul style="list-style-type: none"> No fuel in tank; water on tank bottom Inappropriate head and air damper adjustments Light solenoid valve fails to open Nozzle clogged, dirty, or deformed Dirty or poorly adjusted firing electrodes Grounded electrode due to broken insulation High voltage cable defective or grounded High voltage cable deformed by high temperature Ignition transformer defective Erroneous valve or transformer electrical connections Pump unprimed Pump/motor coupling broken Pump suction line connected to return line Valves up-line from pump closed Filters dirty: line - pump - nozzle Incorrect motor rotation direction 	<ul style="list-style-type: none"> Top up fuel level or suck up water Consult manual Check connections; replace coil Replace Adjust or clean Replace Replace Replace or protect Replace Check connections Prime pump and see "Pump unprimed" Replace Correct connection Open Clean Change motor electrical connections
The burner goes to lock-out right after flame appearance	<ul style="list-style-type: none"> Delayed firing by electrodes or poorly adjusted head Defective photocell Dirty photocell 	<ul style="list-style-type: none"> Adjust Replace Clean
Firing with pulsations or flame detachment	<ul style="list-style-type: none"> Poorly adjusted head Poorly adjusted firing electrodes Poorly adjusted fan air gate: too much air Nozzle unsuited for burner or boiler Defective nozzle Inappropriate pump pressure 	<ul style="list-style-type: none"> Adjust according to Manual Adjust according to Manual Adjust See Nozzle Table; reduce 1st stage Replace Adjust according to Manual
The burner does not pass to 2nd stage	<ul style="list-style-type: none"> Control device TR does not close 2nd stage sol. valve coil defective Piston jammed in valve unit 	<ul style="list-style-type: none"> Adjust or replace Replace Replace entire unit
or fuel passes to 2nd stage but air remains in 1st	<ul style="list-style-type: none"> Low pump pressure Defective cylinder 	<ul style="list-style-type: none"> Increase Replace
Uneven fuel supply	<ul style="list-style-type: none"> Check if cause is in pump or in the fuel power supply system 	<ul style="list-style-type: none"> Feed burner from tank fuel supply system located near burner
Intermittently rusted pump	<ul style="list-style-type: none"> Water in tank 	<ul style="list-style-type: none"> Suck water from tank bottom with separate pump
Noisy pump, instable pressure	<ul style="list-style-type: none"> Air has entered the suction line Depression value too high (higher than 35 cm Hg): <ul style="list-style-type: none"> Tank/burner height difference too great Piping diameter too small Suction filters clogged Suction valves closed Paraffin solidified due to low temperature 	<ul style="list-style-type: none"> Tighten connectors Feed burner with loop circuit Increase Clean Open Add additive to light oil
Pump unprimed after prolonged pause	<ul style="list-style-type: none"> Return pipe not immersed in fuel Air enters suction piping 	<ul style="list-style-type: none"> Bring to same height as suction pipe Tighten connectors
Pump leaks light oil	<ul style="list-style-type: none"> Leakage from sealing organ 	<ul style="list-style-type: none"> Replace pump
Smoke in flame - dark Bacharach	<ul style="list-style-type: none"> Not enough air Nozzle worn or dirty Nozzle filter clogged Erroneous pump pressure Dirty fan Flame stability disk dirty, loose, or deformed Boiler room air vents insufficient 	<ul style="list-style-type: none"> Adjust head and fan gate according to Manual Replace Clean or replace Adjust to between 10 - 14 bar Clean Clean, tighten in place, or replace Increase
- yellow Bacharach	<ul style="list-style-type: none"> Too much air 	<ul style="list-style-type: none"> Adjust head and fan gate according to Manual



FAULT	PROBABLE CAUSE	SUGGESTED REMEDY
Dirty combustion head	- Nozzle or filter dirty	Replace
	- Unsuitable nozzle delivery or angle	See recommended nozzles
	- Loose nozzle	Tighten
	- Impurities on flame stability spiral	Clean
	- Erroneous head adjustment or not enough air	Adjust as per Manual instructions; open gate valve
	- Blast tube length unsuited to boiler	Contact boiler manufacturer

7.2 FUEL CIRCUIT



8 STORAGE



FOR OVER WINTER STORAGE IT IS ADVISABLE TO KEEP THE DRYER IN A COVERED AND DRY PLACE. SUITABLY PROTECT THE CONTROL PANEL AND THE DIESEL BURNER UNIT.



WHETHER THE MACHINE IS IN TRANSPORT MODE OR FULLY EXTENDED REMOVE THE WEIGHT FROM THE TYRES USING THE ADJUSTABLE JACKS.

9 WIRING DIAGRAMS

WIRING DIAGRAMS - PLEASE REFER TO SEPARATE ATTACHMENT WHICH WILL REFER TO PARTICULAR MODEL, YEAR BUILD ETC.