HITACHI ELECTRON TUBE

HITACHI 2M256
(H3862)
CW MAGNETRON

10 Dec. 1996
[TENTATIVE DATA]

The HITACHI 2M256 is fixed frequency continuous wave magnetron with water cooling jackets intended for use in Industrialmicrowave heating applications. The useful RF power output at 2455 MHz is 2000 watts into a matched load.

FEATURES

1. Sufficient noise suppression with the improvement of integrated filter circuit.
2. Stable performance and good reliability for use in Industrial microwave applications.
3. High power magnetron with parmanent magnets.
4. Stable performance and good reliability by water cooling jackets.

GENERAL DATA

ELECTRICAL

Filament Voltage (Stand-by)	4.6 V
Filament Voltage (Operation)	3.4 V
Filament Current	21 A
Frequency (with matched load)	2455 MHz
Recommending Operation	Continuous
Anode Potential	Earth
Filament Potential	Negative High Voltage (- 4.0 kV)
Magnet	Permanent magnet

MECHANICAL

Dimensions : See dimensional outline(Fig.5).

Width	120 mm MAX
Length	129 mm MAX
Height (antenna height is excluded.)	125 mm MAX
Antenna Height	48 mm MAX
Weight	Approx. 2.8 kg
Mounting Position	Vertical axis either end up
Cooling	Water

ABSOLUTE MAXIMUM RATINGS

	Min.	Max.	Unit
Filament Voltage(Stand-by)	4.4	4.8	V
Filament Voltage(Operation)		(Fig. 1)	
Preheating Time	5	—	s
Average Anode Current	—	750	mAdc
Peak Anode Current	—	2100	mA
Average Anode Input	—	3000	W
Load VSWR (continuous)	—	1.5	
Anode Core Temperature	—	160	℃
Storage Temperature	-30	60	℃
Antenna Temperature (metal-ceramic seal point)	—	350	℃
Case Temperature	—	100	℃
Water Temperature at outlet	—	60	℃

TYPICAL OPERATION

With anode voltage from single-phase, full-wave rectifier without filter, and a matched load. (Standard test conditions)

Frequency	2455	MHz
Filament Voltage (Stand-by)	4.6	V
Filament Voltage (Operation)	3.4	V
Peak Anode Voltage	4.0	kVp
Average Anode Current	725	mA
Average Output	2000	W
Cooling Water Flow	2.0	ℓ/min
Cooling Water Temperature at inlet	25	℃

ATTACHED REFERENCE DATA

(1) REDUCTION CHART OF FILAMENT VOLTAGE Fig.1
(2) RIEKE DIAGRAM Fig.2
(3) PERFORMANCE CHART Fig.3
(4) COOLING CHARACTERISTICS Fig.4
(5) DIMENSIONAL OUTLINE Fig.5
(6) PRECAUTIONS FOR SAFETY ..... Hitachi Engineering News Letter (No. NL73M1053)

Notes :

(1) The information contained herein is tentative and may be changed without prior notice. It is therefore advisable to contact HITACHI before proceeding with the design of equipment incorporating this product.
(2) Data are based on the Testing Methods for Continuous Wave Magnetrons ET-145A set by the Electronic Industries Association of Japan (EIAJ).

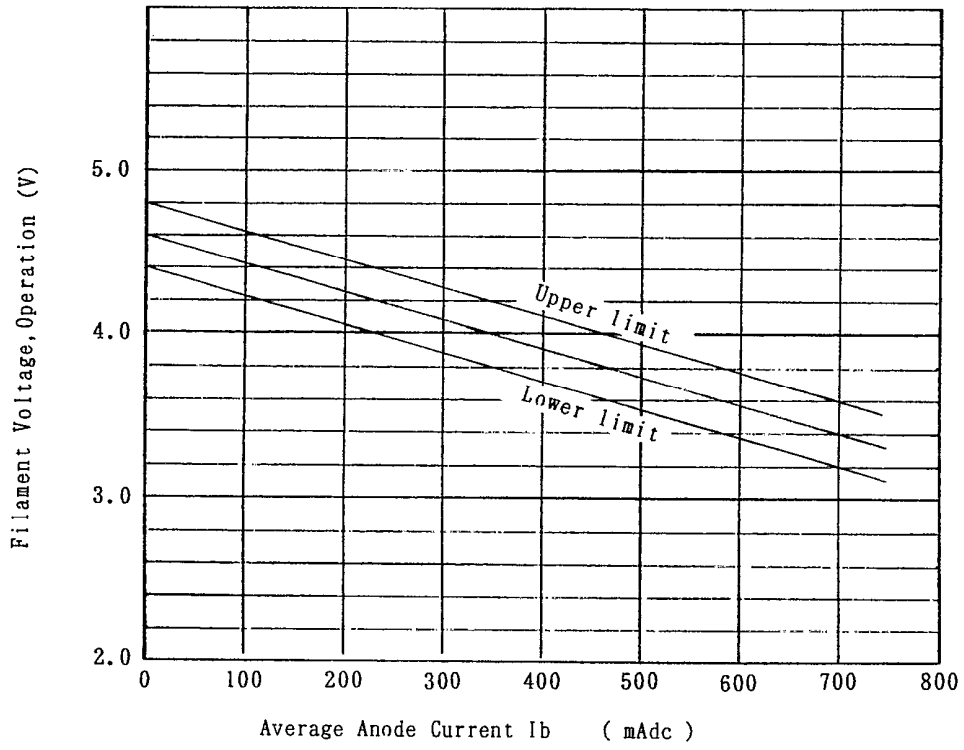
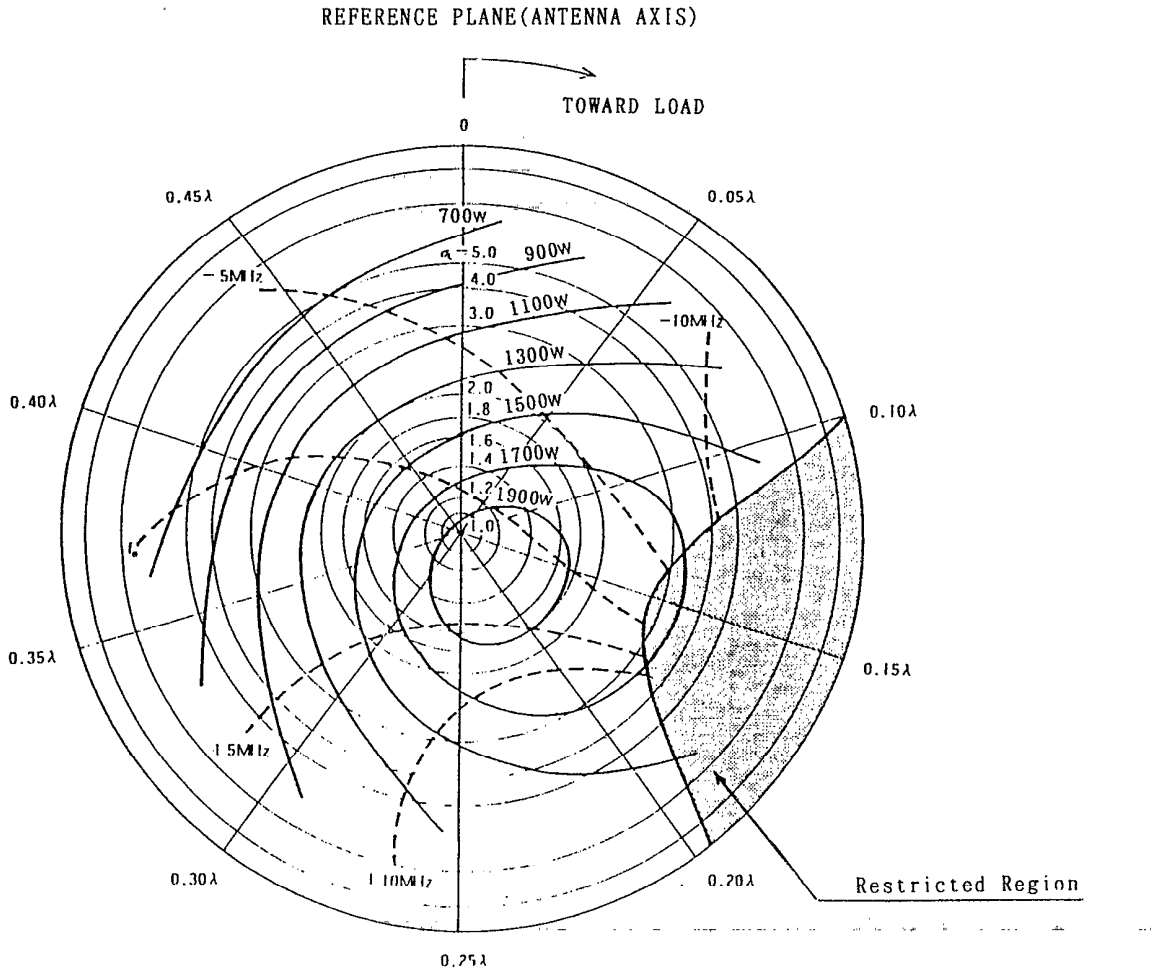


Fig. 1 REDUCTION CHART OF FILAMENT VOLTAGE



------ Frequency (MHz)

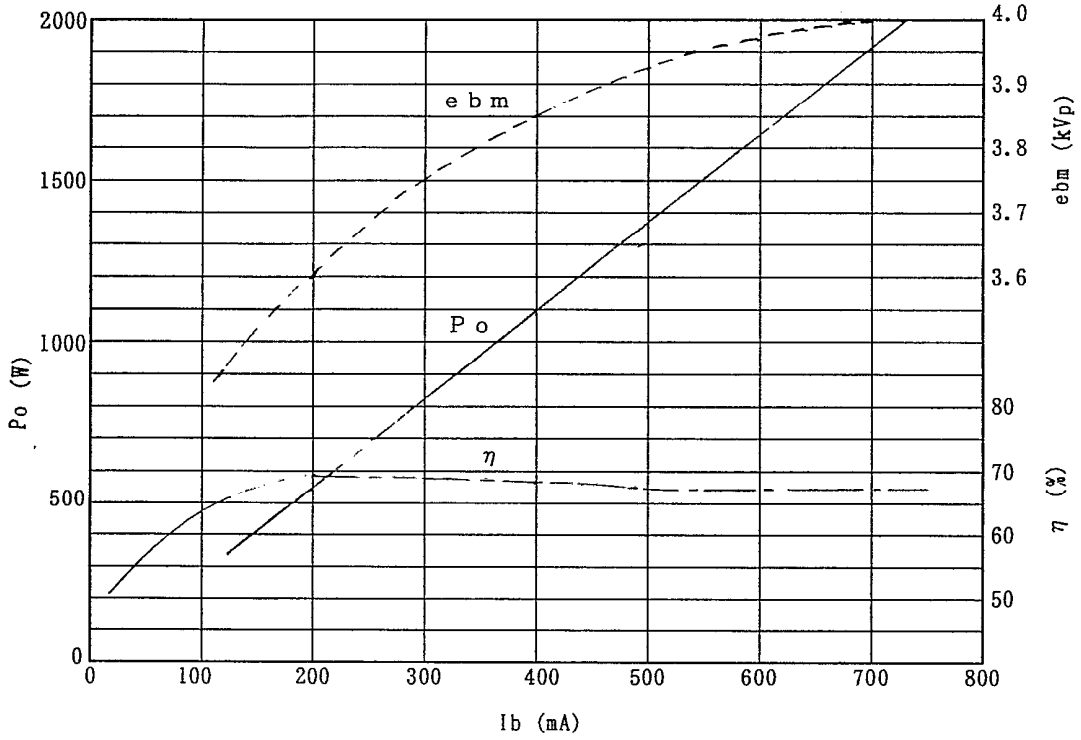
——— Output power (W)

fo=2455 MHz

Test conditions

1. Average anode current : 725 mA
2. Anode supply : Single phase, full wave rectifier without filter
3. Filament Voltage : 3.4 V

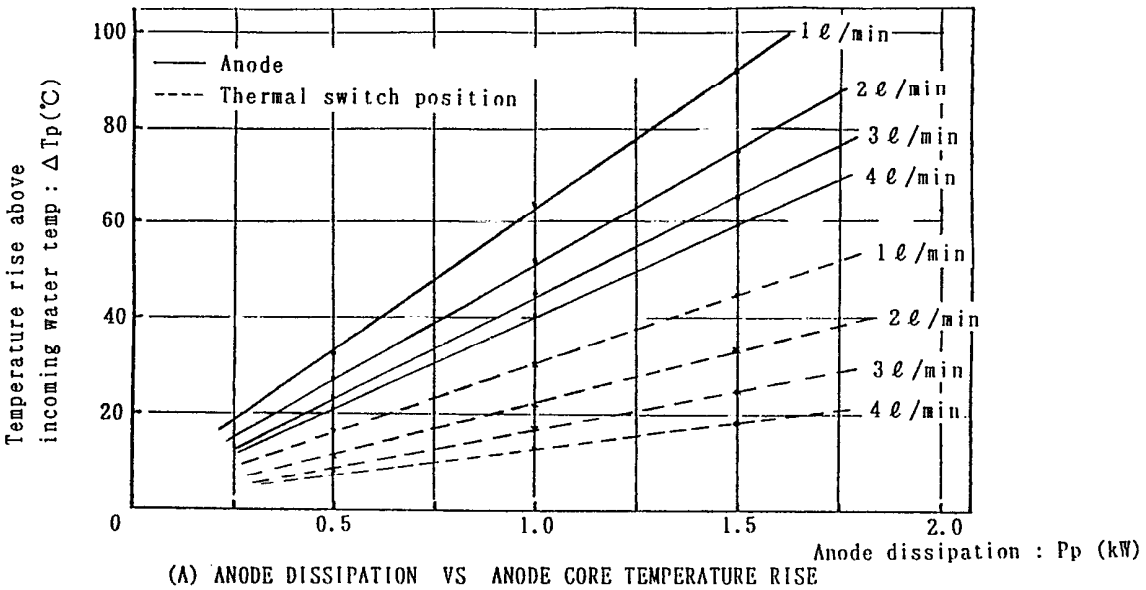
Fig. 2 2M256 RIEKE DIAGRAM



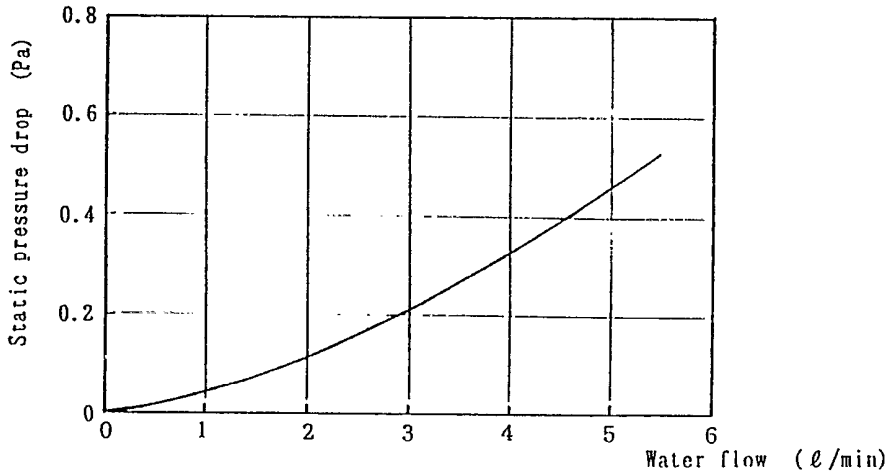
Test conditions

1. Load VSWR : $\sigma L \leq 1.1$
2. Anode supply : Single phase, full wave rectifier without filter
3. Filament voltage : 3.4 V

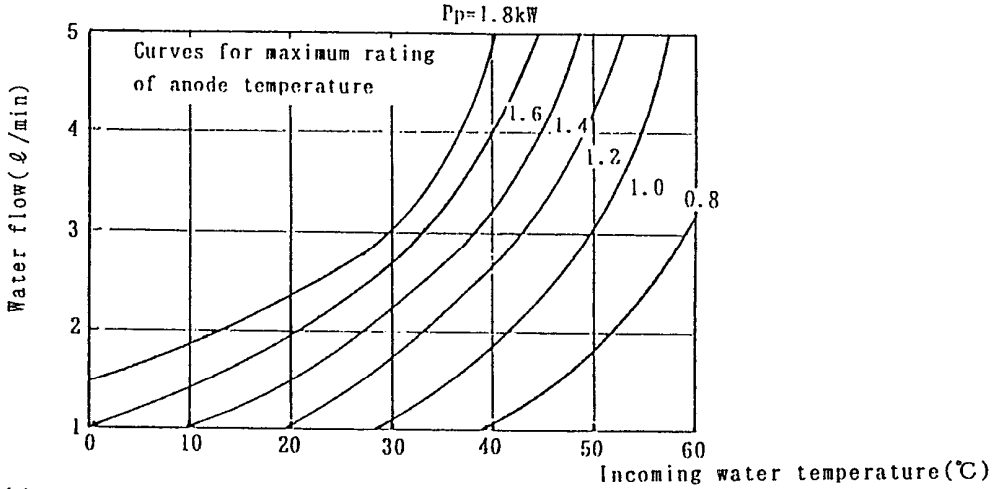
Fig. 3 2M256 PERFORMANCE CHART



(A) ANODE DISSIPATION VS ANODE CORE TEMPERATURE RISE



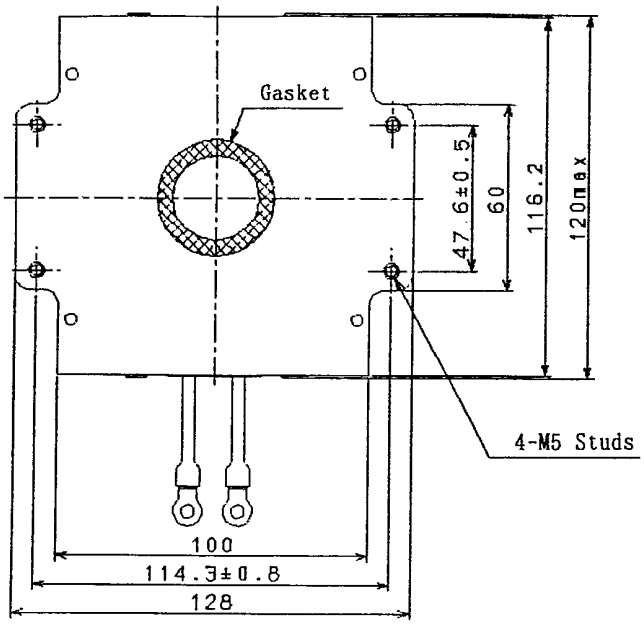
(B) WATER FLOW VS STATIC PRESSURE DROP



(C) WATER TEMPERATURE VS WATER FLOW (ABSOLUTE MAXIMUM RATING)

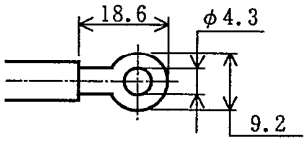
Fig.4 2M256 COOLING CHARACTERISTICS

Dimensions in millimeters



Note :

(1) Detailed drowing of the filament terminal :



(2) Filament terminal near this mark(three serial holes) shall be connected with filament transformer so as to be positive polarity when anode current flows.

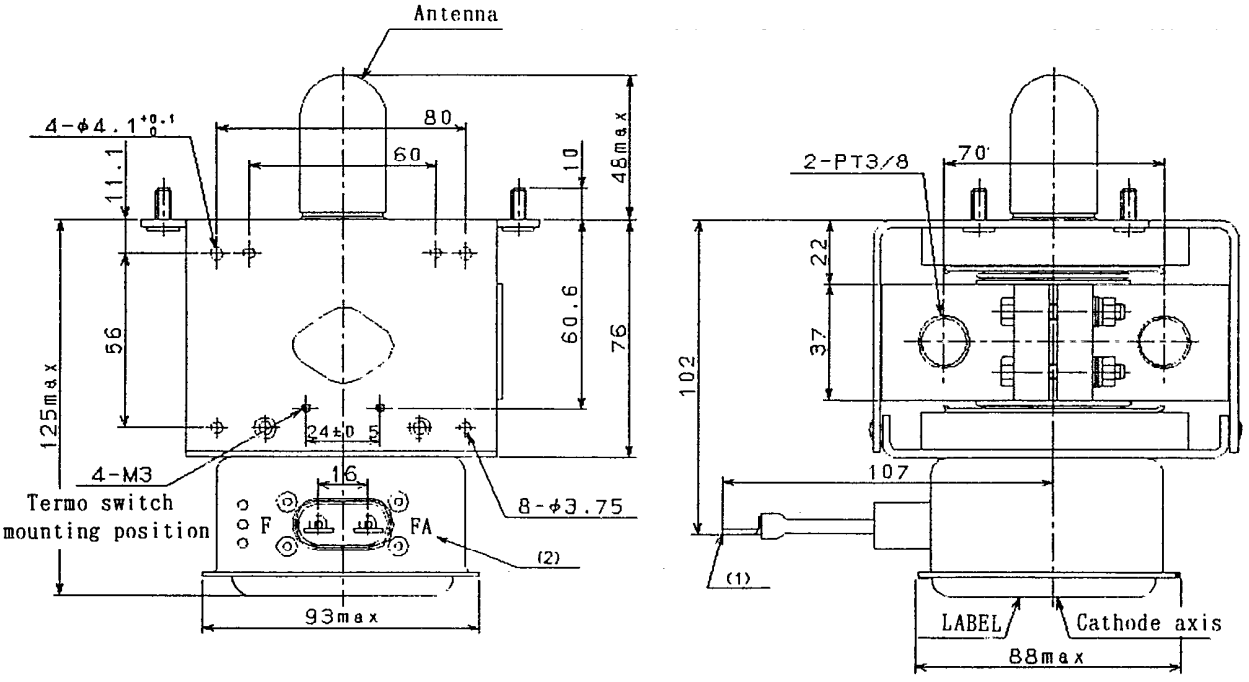


Fig.5 DIMENSIONAL OUTLINE OF 2M256

HITACHI ENGINEERING NEWS LETTER

Magnetron Application Engineering Service

No. NL73M1053
Rev. —
Apr.20,1993

PRECAUTIONS FOR SAFETY

Carefully take the following precautions for safety in using the magnetrons for microwave ovens or for other applications.

Magnetrons must be handled by individuals possessing adequate backgrounds of electrical, electronic, microwave and mechanical experience.

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1. Radiation Leakage

Care should be taken for radiation leaked from the magnetron, although the leakage from the input part of magnetron is restricted to a level which human body is not adversely affected.

1-1 Properly install and tightly fasten the magnetron in the oven or in the waveguide launcher.

1-2 Do not deform the gasket or do not operate the magnetron with the gasket removed, to avoid hazardous conditions such as radiation leakage and arcing.

1-3 Never operate the magnetron without installing it in the oven or with the output antenna exposed.

1-4 Do not remove the lid of filter box nor deform the filter box.

1-5 Always keep your eyes apart from the operating magnetron in consideration of the unexpected hazardous conditions.

1-6 Do not use a dropped magnetron because the microwave sealing might be damaged.

2. Temperature

Although the magnetron is subjected to forced air cooling during operation, high temperature is observed on the enclosure of magnetron :

Portion	Temperature at normal operating conditions
Anode Core	up to 160℃
Yoke	up to 80℃

Temperature will abnormally rise at abnormal operation, such as fan stop or continuous moding :

Portion	Temperature at abnormal operation
Anode Core	more than 300℃
Yoke	more than 150℃

M3W-I6-063

Care should be taken as follows :

2-1 Do not touch the magnetron immediately after turning power off. Allow the magnetron to cool before handling.

2-2 Putting on cotton gloves or the equivalents is recommended for safe handling.

2-3 Install a thermo-protector on the enclosure of magnetron to avoid abnormal temperature rize.

3. High Voltage Shock

Since the magnetron is operated with negative high potential at the filament terminals, a special care must be taken as follows :

3-1 Do not touch nor come close to the filament terminals or their surroundings during operation.

3-2 To avoid shock hazards, never insert metallic wire or line into the filter box, and never operate the magnetron with the lid of filter box open.

3-3 Before removing the magnetron fron the oven, carefully check that power is turned off, and discharge the filament terminal or the capacitor in the power supply circuit by using the discharging rod adequately designed safety.

4. High Voltage Break Down

4.1 Contact resistance at connecting point for filament terminals :

Care should be taken for loose connection between filament terminal and receptacle. Because higher contact resistance at connecting point causes both larger ohmic loss and higher temperature, magnetron cannot adequately be operated due to low filament voltage, insulating materials by terminal leads(in a feed through capacitor) can easily be burned, and insulatio may be broken down due to burned insulator.

Special care must be taken as follows :

4-1-1 To avoid loose contact, do not use economy type receptacle. Premier line receptacle is recommended for tight connection.

4-1-2 Properly install receptacle to terminals.

4-1-3 Properly and tightly connect the flying lead to receptacle.

4.2 Surface of insulator of feed through capacitor :

Since the surface of insulator of the feed through capacitor is eventually contaminated by dirty materials which mainly comes from cooked food-stuff and dust in the room, proper care should be taken for the insulator from dirty smudge.

The dirty smudge on the insulator at high humidity conditions may cause the insulator burn due to high voltage.

Special care must be taken as follows :

4-2-1 Do not touch surface of insulator with bare hand or with dirty gloves when you install magnetron in the oven.

4-2-2 Protect the surface of insulator from the polluted air with soot, dust, vapored oil, moisture, and so on.
Do not blow the insulator with polluted cooling air.

4-2-3 Protect the surface of insulator from the contamination by insects, such as cockroach.

4-2-4 Do not place a combustible material near the surface of insulator.
One of solutions is to add an incombustible insulator to cover terminals and capacitor.