⑤　その他調査事項

質問書回答

Name of Country : ガーナ共和国 (The Republic of Ghana)

Project Title : 野口記念医学研究所プロジェクト（Ⅱ）
Research and Repair of the Medical Equipment for
the NOGUCHI Memorial Institute for Medical Research

Survey Team : (株) メディサン (Medisun Co., LTD.)

1. 施設の現状 (Present Condition of the Facility)

全般的に良好

2. 技術協力関連 (Technical Co-operation)

2-1 ＪＩＣＡ派遣専門家

(Please tell us name of Expart dispatched through JICA)

2/21/87'~2/20/89' Dr. Takashi Nakano (Epidemiology)	1/27/90'~4/30/91' Dr. Kazuo Mimura (Epidemiology)	11/10/92'~11/9/94' Dr. Kiyosu Taniguchi (Epidemiology)
1/21/89'~1/20/91' Dr. Hiroyuki Sakatoku (Epidemiology)	12/13/90'~1/7/93' Dr. Hiroki Hori (Epidemiology)	3/5/92'~4/27/94' Dr. Yasukiko Kamiya (Epidemiology)
10/17/88'~10/16/89' Dr. Fujiko Shizuka (Nutrition)	4/9/90'~4/8/91' Dr. Yasuitiro Kido (Nutrition)	5/3/92'~5/2/94' Dr. Yukiko Wagatsuma (Parasitology)
10/5/89'~10/4/90' Dr. Toru Rikimaru (Nutrition)	5/3/92'~5/2/94' Dr. Toru Rikimaru (Nutrition)	5/3/93'~5/2/95' Dr. Takuro Arishima (Parasitology)
10/6/86'~3/31/89' Mr. Shunichi Tateishi (Co-ordinator JICA)	6/14/89'~10/30/92' Mr. Hideo Eguchi (Co-ordinator JICA)	11/10/92'~11/9/94' Ms. Yuko Utsumi (Co-ordinator JICA)

2-2 その他の国、および機関からの協力

Technical Co-operation from other countries and Internationl Organization (past 3 years, and future planning; except JICA)

(1) ① Country and/or Organization
WHO

② Year, Period
1992 2 years

③ Contents
Epidemiology of Malaria with special emphasis an transmission, morbidity and mortality in two ecological zones in Ghana

(2) ① Country and/or Organization
コペンハーゲン大学 (University of Copenhagen)

② Year, Period
1993 3 years

③ Contents
Immuno-epidemiological study of Malaria immunity
Traditional medical herbs as potential new anti-malarials
Cerebral malaria and immunopathology
Complicated malaria and experimental chemotherapy

(3) ① Country and/or Organization
International Fundation for Science, Sweden

② Year, Period
1992 3 years

③ Contents
Antimicrobial activity of fermented Ghanian maize dough

3. 職員構成 (Number of Staff)

	Number(s)
Clinical Pathology	10
Epidemiology	6
Nutrition	8
Virology	9
Bacteriology	6
Lab. Animals	4
Parasitology	9
Immunology	4
Electron Microscopy	6
Office worker (clerk)	19
Others	
a). Maintenance Engineer	8
b). Driver	7
c). Lab. Technician	6
d). Security	10
e). Messenger/Cleaner	12
Total	124

4. Maintenance and Repair of Medical Equipment

4-1 Could you tell us the condition of maintenance and repair for the medical equipment on N.M.I.M.R.

(1) Staff(s)
8 Engineers

(2) Parts of Spare and/or Repair for equipment
a). Measure of procurement
ＪＩＣＡからの調達(供与)、および現地調達(可能な部品)

b). Stock
なし

c). Budget
(yearly, monthly, as occasion arises ..., etc.)
特に確保なし（目　安：２００，０００セディー／年）

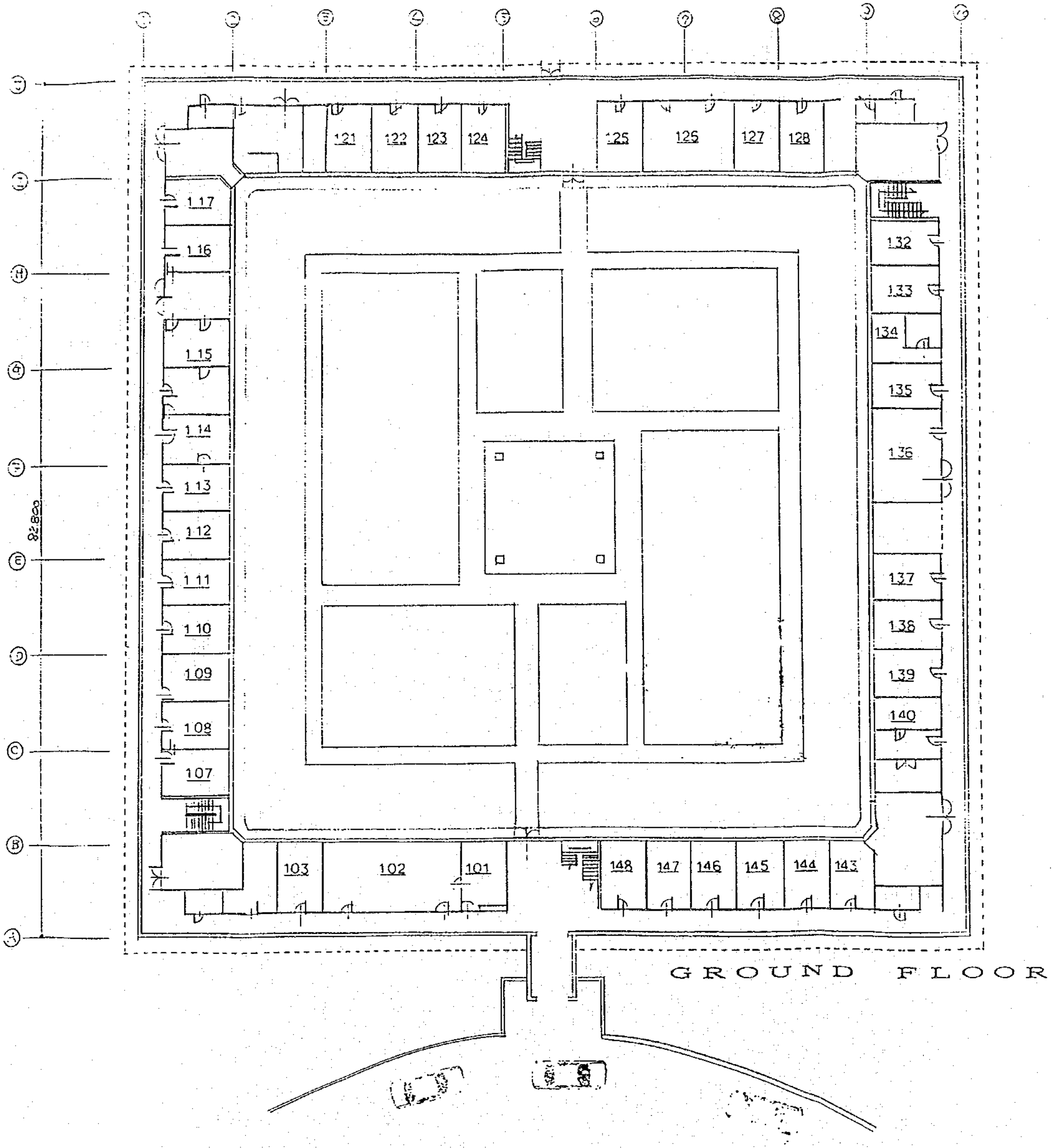
5. 予 算 (Budget for N.M.I.M.R.)

単位：セディー

Year	1989	1990	1991	1992	1993
	(~)	(~)	(~)	(~)	(Jan.~ Jun.)
Income	83,314,203	114,821,656	261,844,805	309,037,423	411,473,967
Total Income	83,314,203	114,821,656	261,844,805	309,037,423	411,473,967
Expenditure					
Personnel (Salaries)	46,742,828	64,388,067	107,153,564	140,600,372	31,932,983
Maintenance of Facilities	3,193,051	6,744,718	22,407,656	4,366,563	1,655,034
Consumables	3,819,072	6,012,114	2,364,178	20,360,076	2,427,315
Repair of Equipment	1,783,281	1,356,613	212,313	347,565	1,451,350
General Research	46,353,222	58,895,460	55,272,449	134,246,756	2,427,815
Administrative Expenses	35,872,794	50,932,223	34,785,182	24,131,456	9,401,518
Capital Expenditures	32,493,201	-	9,360	1,155,500	-
Miscellaneous Expenditures	340,410	4,817,215	50,000	171,500	5,407,367
Maintenance of Utilities	11,071,227	3,282,732	3,436,274	4,793,794	-
Total Expenditures	186,669,081	196,929,142	226,190,981	330,274,382	104,704,982
Balance	Δ 103,354,884	Δ 82,107,486	Δ 35,653,824	Δ 21,236,909	306,768,985

* 1993については、収入は年間のもので支出は1月~6月のもの

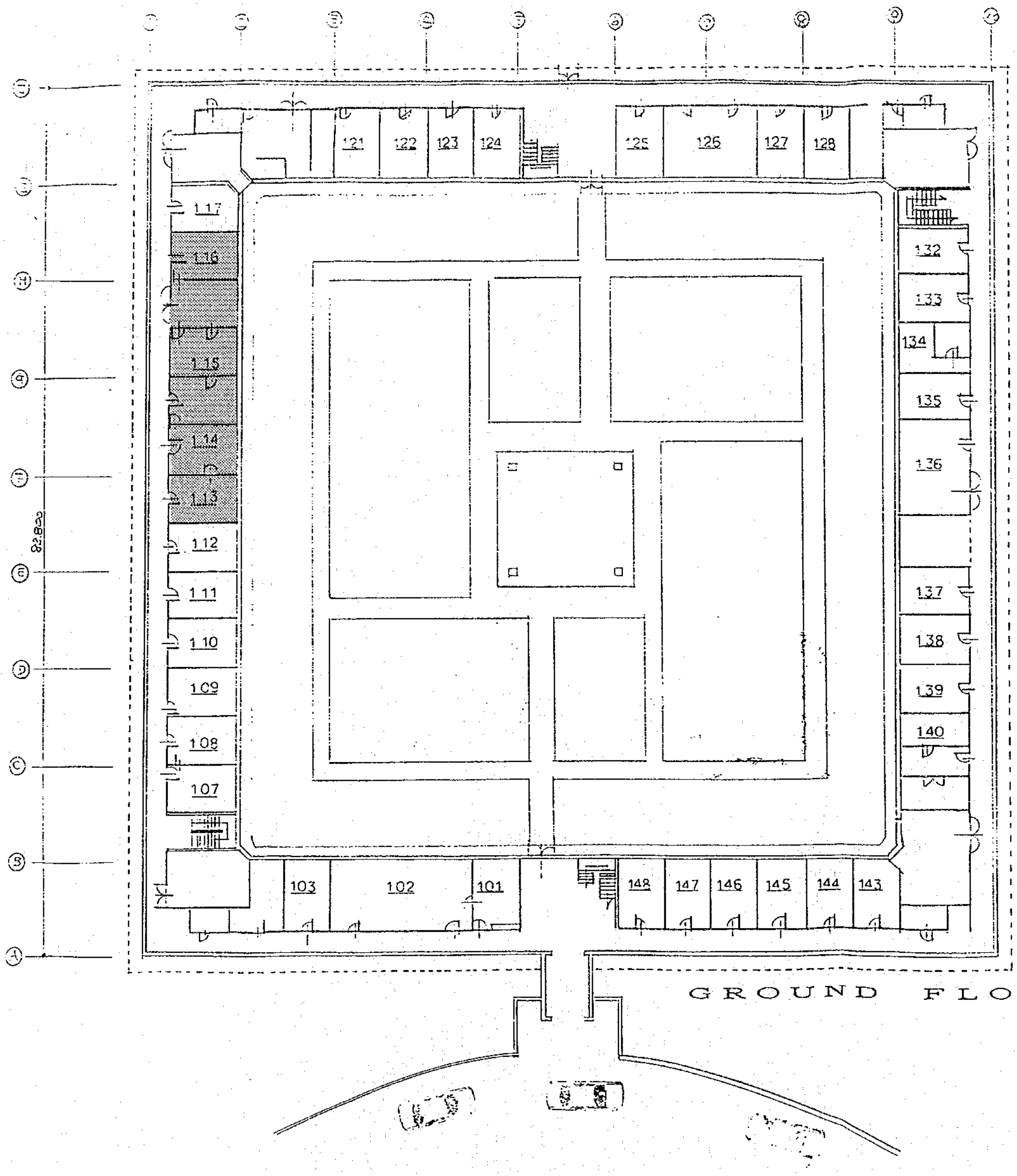
⑥　機器配置図



GROUND FLOOR

GENERATION ROOM

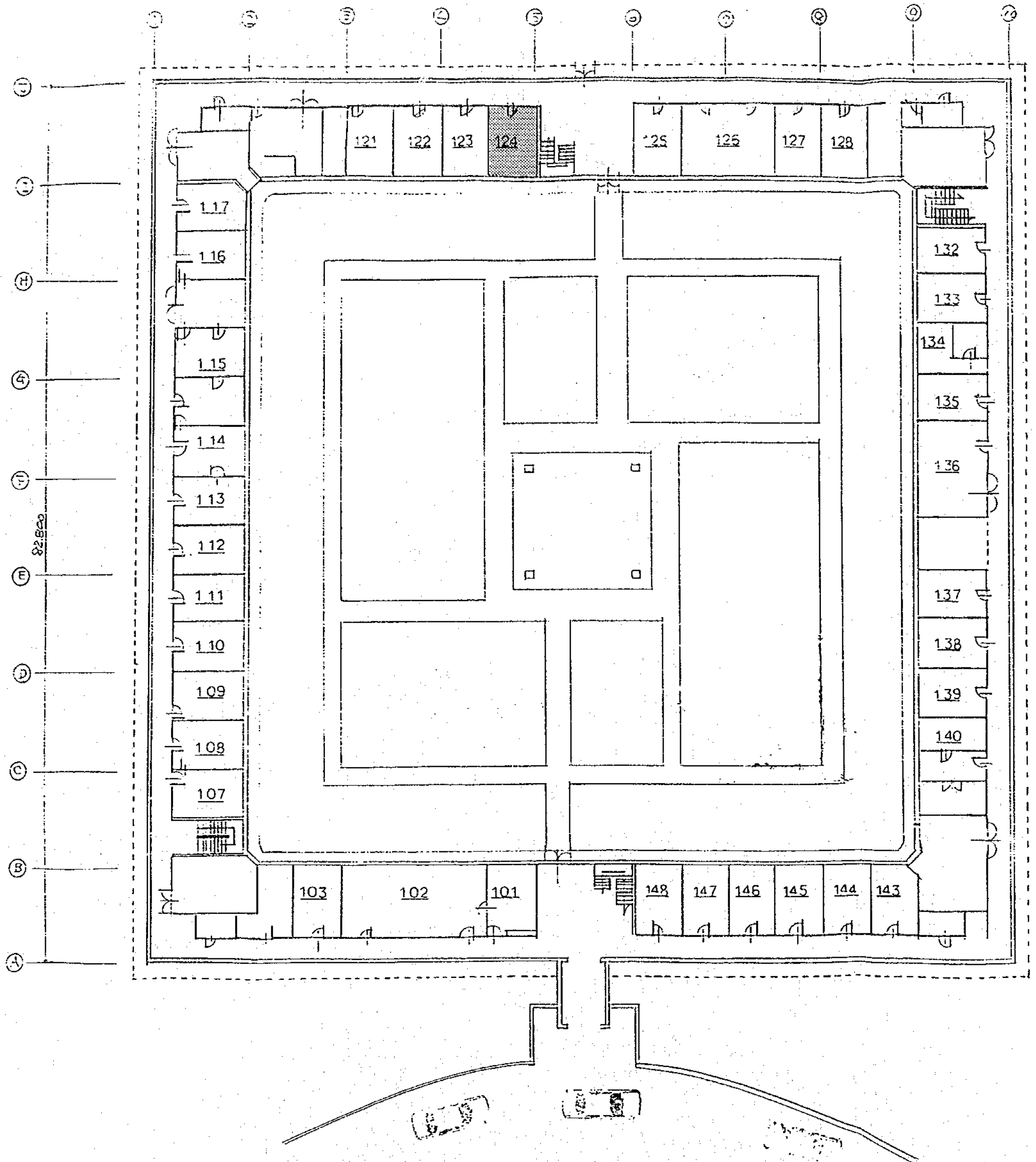
Generic title	Maker	Type	Q'ty
Generater	CHINKO DIESEL	S613SCE	1
Overhead Tank	HITACHI	20t	1
Water Tank	HITACHI	2t HCT-ZAG	1
Motor	HITACHI	0,4-2,0-415v	1
Pump	HITACHI	JC40X32L-50,4	1



GROUND FLOOR

<u>ELECTRON MICROSCOPY</u> 113 ~ 116

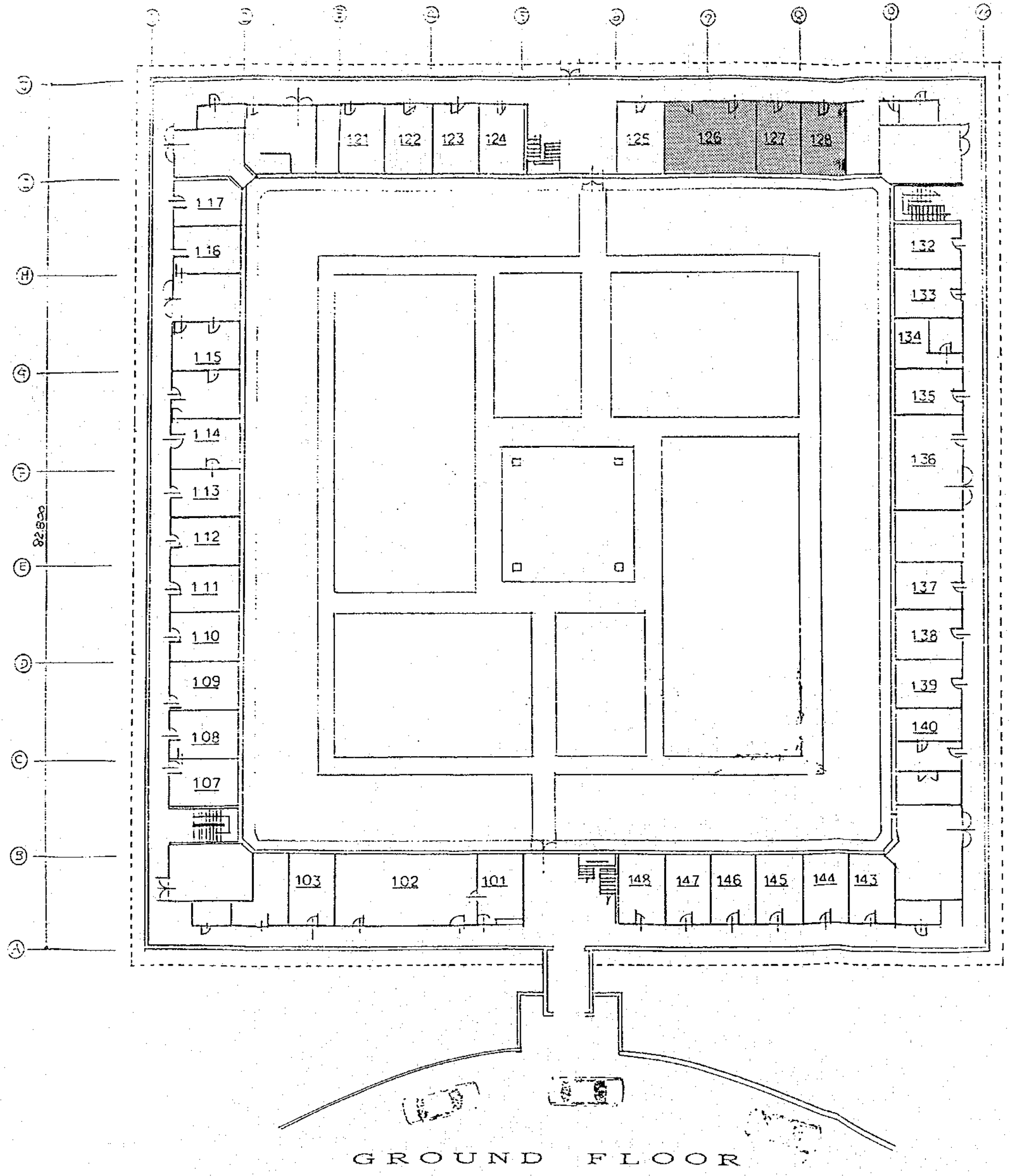
Room No.	Generic title	Meker	Type	Q'ty
113	Duplicator	FUJI	Femocap 1200 fru 45S	2
	Deep freezer	SANYO	MPR-500	1
114	Centrifuge			
	High speed refrigerated	HITACHI	30P-7	1
	Refrigerator	SANYO	GF 200ℓ	1
	Microscope	OLYMPUS	BH	1
	Photograph system	OLYMPUS	PM-10A	1
	Centrifuge			
	High speed refrigerated	HITACHI	20PR-52P	1
	Processing timer	SAKURA	EM-200T	3
115	Typewriter	OLIVETTI	ET-121	1
	Electron microscope	HITACHI	H-600	1
	Film printer	KONICA	B4C	1
116	Refrigerator	SANYO	GF 200ℓ	2



GROUND FLOOR

RADIOLOGY 121 - 124

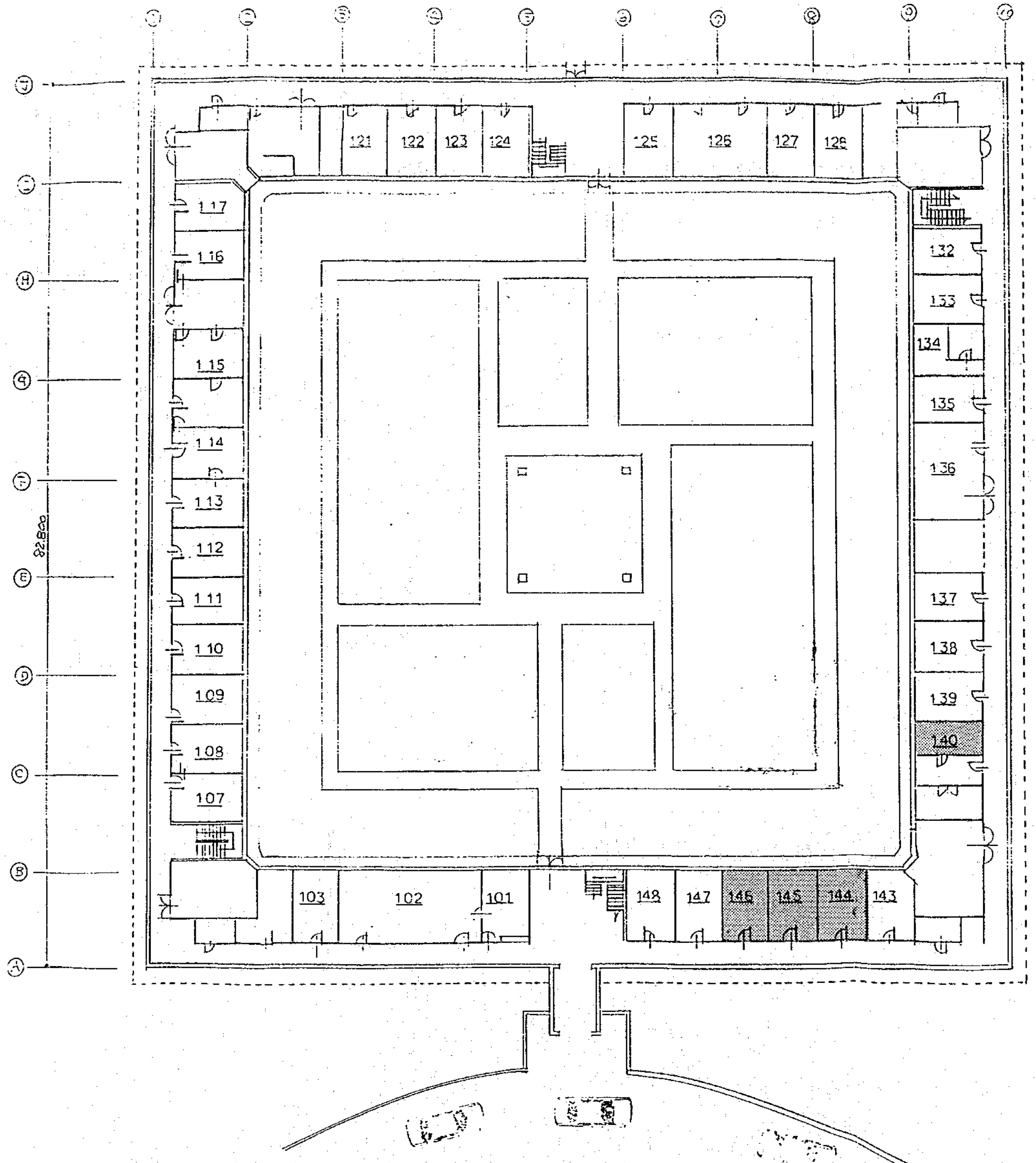
Room No.	Generic title	Meker	Type	Q'ty
124	Peret mill	CALIFORNIA	NH2394485	1
	Peret mill	MIYASAKA	NTM-01	1



GROUND FLOOR

HEMATOLOGY 125 ~ 134

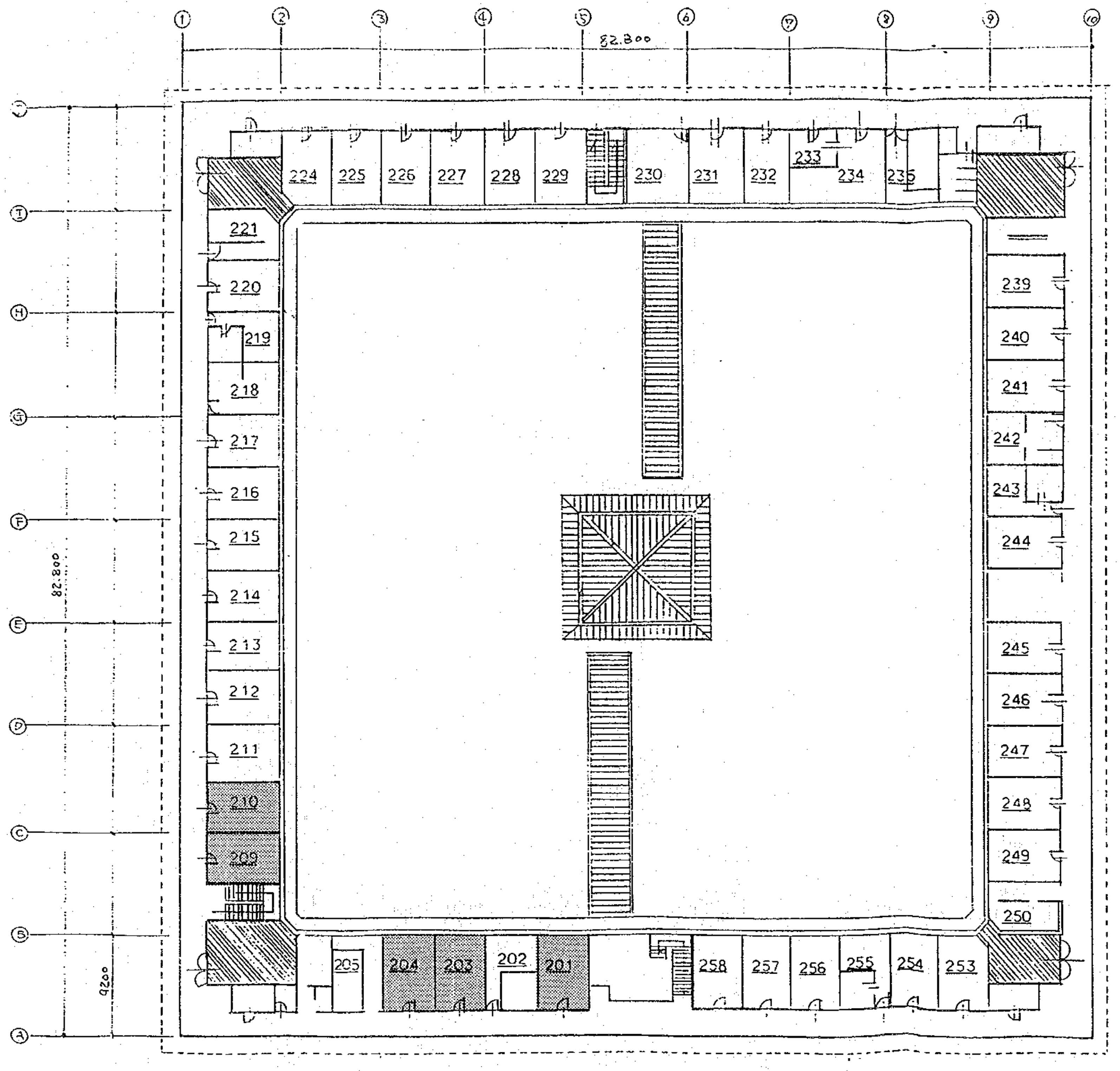
Room No.	Generic title	Maker	Type	Q'ty
126	Centrifuge	KUBOTA	NK-1200H	1
	Centrifuge	KUBOTA	KS-4000	1
	Water bath	KAYAGAKI	KTH-60	1
	Centrifuge	TOMY	HC-12FA	1
	Diluter	ELMA	AD-60	1
	Refigerator	SANYO	GF 200 A	1
	Deep freezer	SANYO	SCR-350	1
	Microscope	OLYMPUS	BH	1
127	Balance chemical	SARTORIUS	414-13	1
	Hemoglobin metar	ELMA	330A	1
128	Auto clave	HIRAYAMA	HA-24	1



GROUND FLOOR

SPECIAL EXPERMENTAL LABORATORY 107 ~ 148

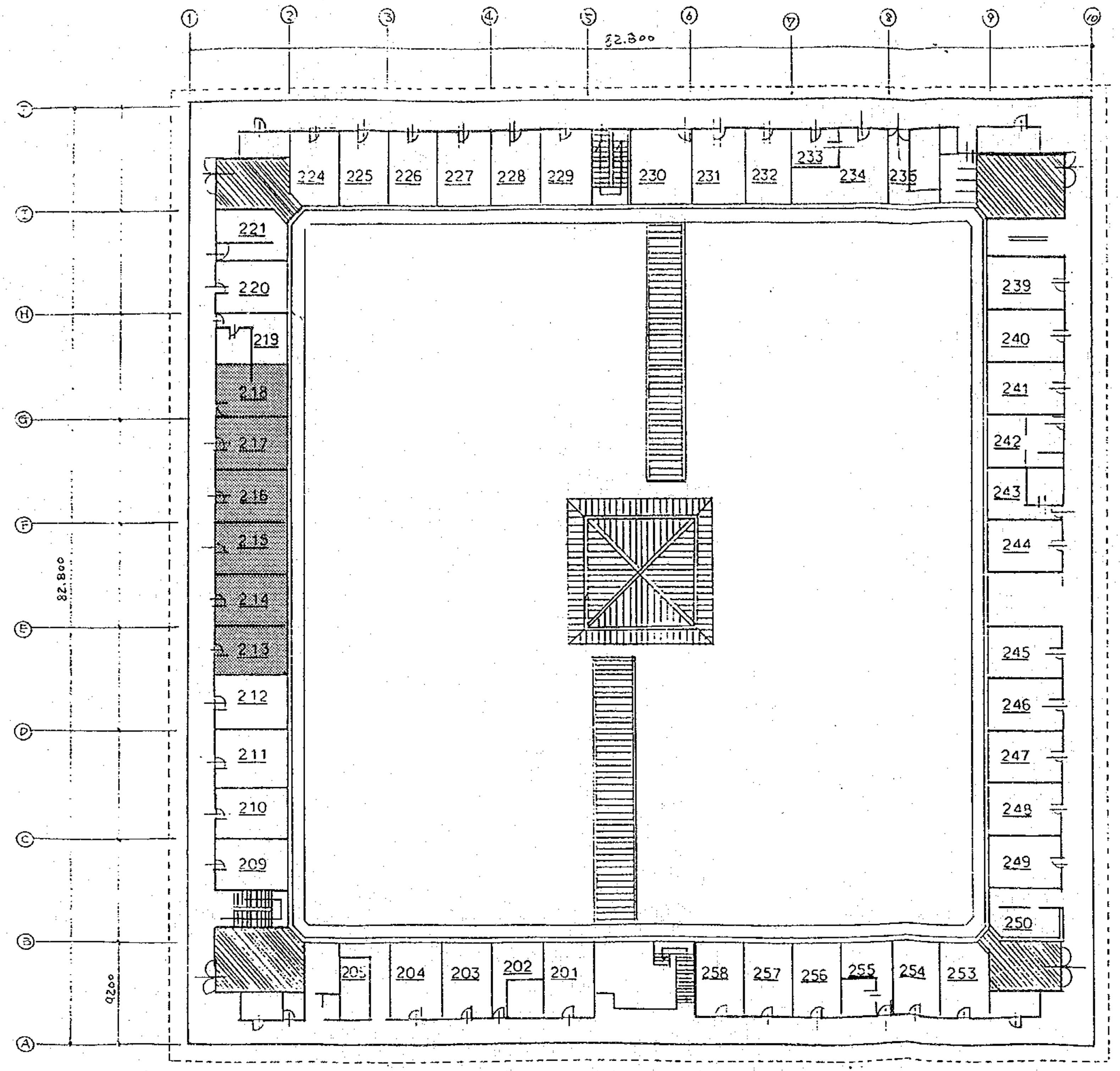
Room No.	Generic title	Meker	Type	Q'ty
140	Lathe	EGURO	LB8-4B	1
	Glider	HITACHI	[illegible]R-21	1
	Drill machine	HITACHI	DS-4300	1
	Vice			3
	Screwcutter	SONE	32	1
	Arc-welding machine	DAIDEN	B-200	1
	Compressor	MITSUBISI	SB-F	1
	Gas-welding machine			1
144	Auto clave	SAKURA	ASV-2401	1
	Hemoblobin Meter	ATAGO	DHB-3	1
	Microscope	NIKON	HB-202AN	1
	Densitometer	KOSMO	F-808	1
	pH meter	TOA	HM-5ES	1
	Microscope	OLYMPUS	BH-2	1
	Dry oven	SAKURA	TF-31	1
	Deep freezer	SANYO	MPR-500	1
	CO_2 incubator	YAMATO	IF-41	1
	CO_2 incubator	HIRAYAMA	FC-30P	?
145	Micro plate lieder	DINATEC	MR-600	1
	Balance chemical	SARTORIUS 500g	1002	1
	pH meter	HORIBA	H-700	1
	Pocket pH meter	IUCHI	PH-51	1
	Micro scope	NIKON	HB-202AN	1
	Franction collector	TOYO	SF-200H	1
	Incubator	HIRASAWA	TE-HER	1
	Refrigerator	SHARP	SJ-5255	1
146	Centrifuge	KUBOTA	KH-120A	1
	Centrifuge	KUBOTA	KS-4000	1
	Mixer	TOMY		1
	Sheicer	THOMAS	T-22S	1
	Auto still	YAMATO	WAG-23	1
	Hotplate	IUCHI	HS-5BH	1
	Deep freezer	SANYO	SR-26	1



1st FLOOR

BACTERIOLOGY 200 -210

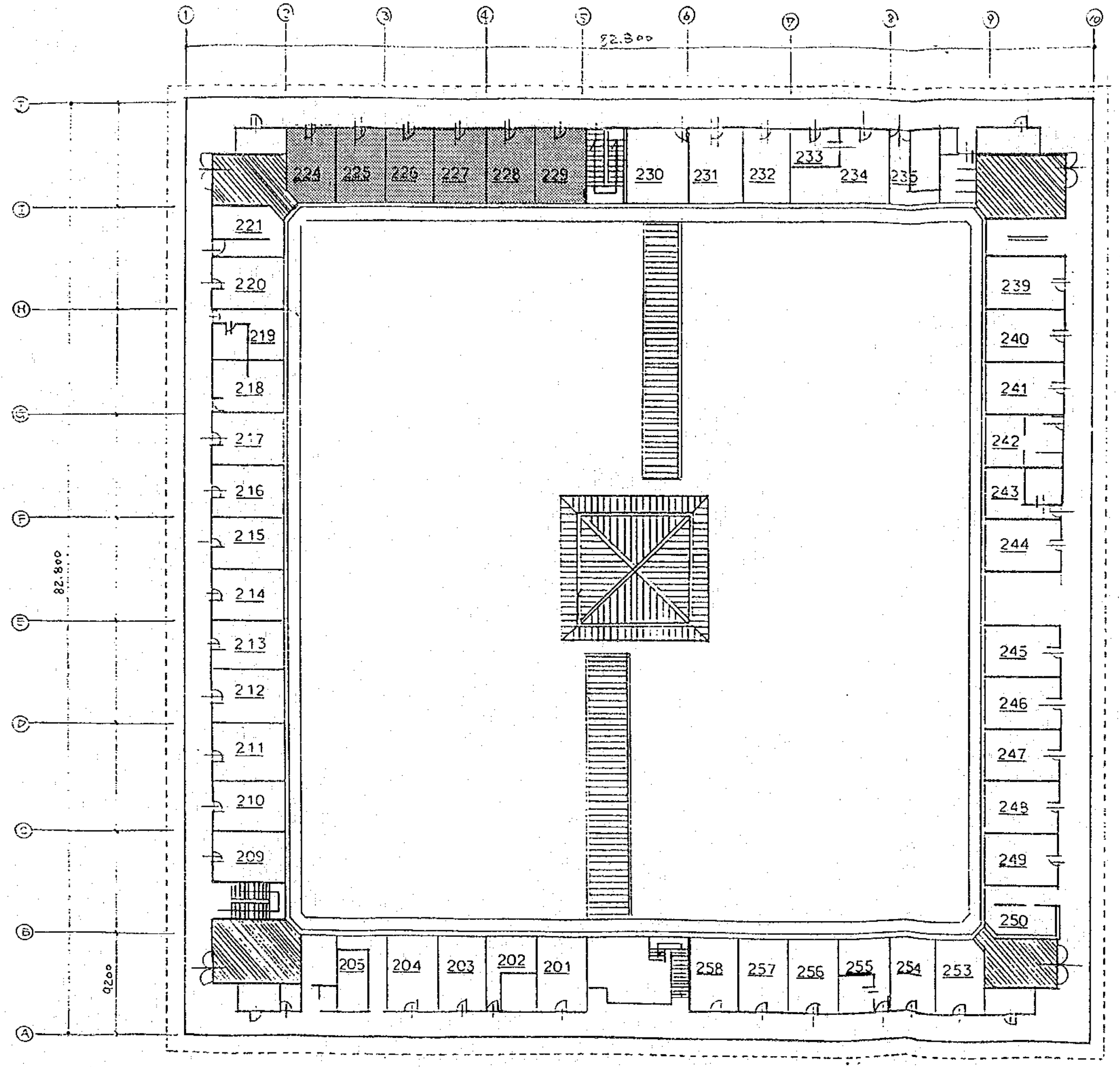
Room No.	Generic title	Maker	Type	Q'ty
200	Microscope	OLYMPUS	IM	1
	Microscope	NIKON	C	1
201	Dry oven	SAKURA	HE-2N	1
	Dry oven	IKEMOTO	BS	1
	Auto clave	SAKURA	AC-3701	1
	Auto clave	HIRASAWA	HA-24	2
203	Incubator	SAKURA	IF-4	1
	Medical freezer	TOSHIBA	SF-331J2	1
	Refrigerator	HITACHI	R-252H	1
	Centrifuge	KUBOTA	KN-70	1
	Clini bath	SAKURA	KR-3	1
204	Refrigerator	SANYO	SR-480F	1
209	Incubator	MEIBUNKAN	CP-7119	1
210	Deep freezer	SANYO	MIR-4550	1
	EYELA bath	TOKYO RIKA	T-80	1
	Microscope	OLYMPUS	CH-2	1
	Cleen bench	DALTON	BSC-1300ⅡA	1
	Incubator	YAMATO	IC-62	1



1 s t FLOOR

VIOROLOGY 213 - 219

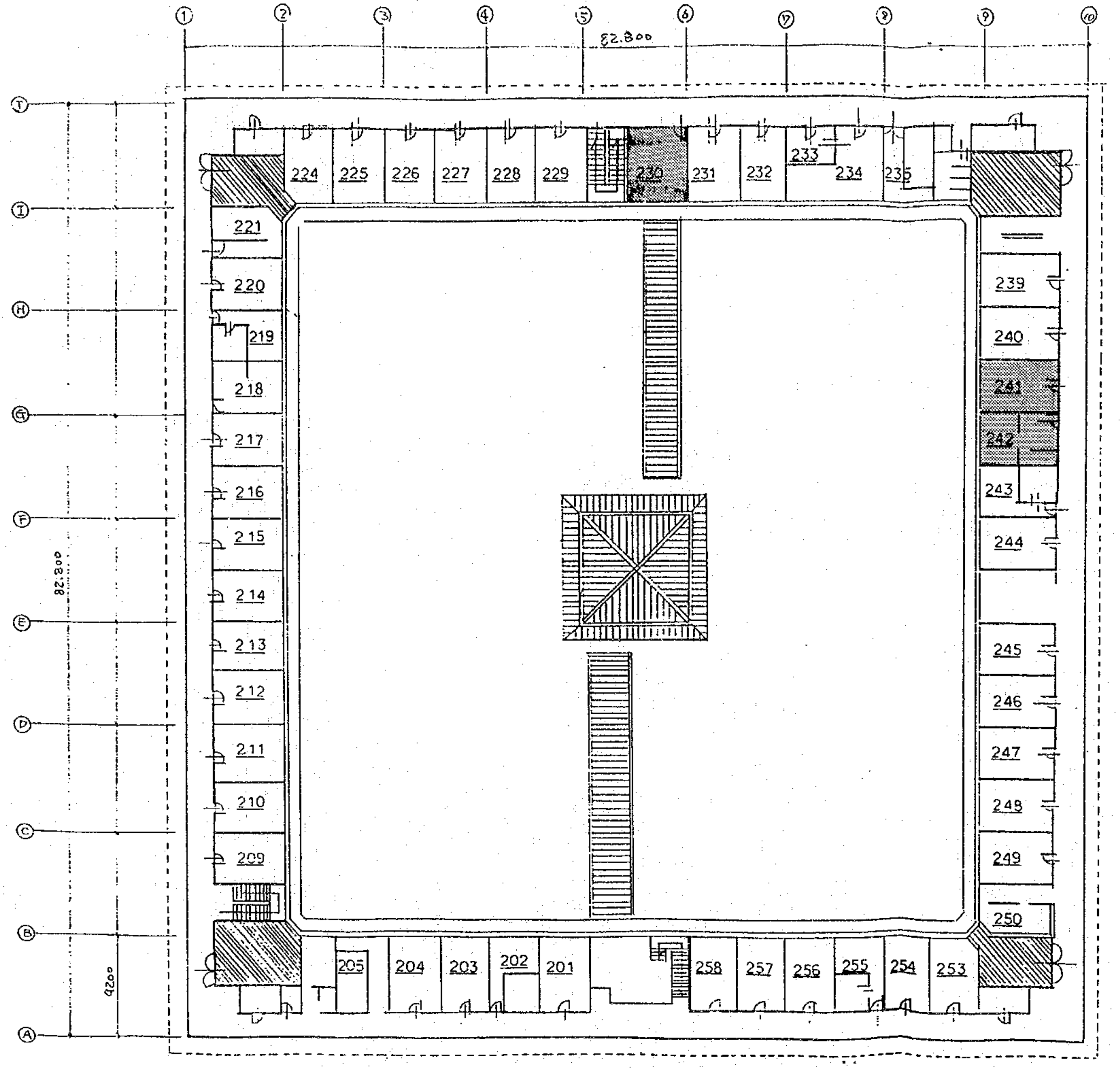
Room No.	Generic title	Maker	Type	Q'ty
213	Autostill	YAMATO	WA-550	1
	Auto clave	TOMY	S-90N	1
	Incubator	IKEDA RIKA	AHS-6	1
214	Refrigerator	SANYO	SR-480F	1
	Deep freezer	EBARA	ESL-260A	1
	Freezer	SANYO	SCR-350	1
	Sterilizer filter	TOYO work	SF-145S	1
215	Refrigerator	SANYO	SR-480F	1
	Micro scope	OLYMPUS	IM	1
	Centrifuge	KUBOTA	KN-70	1
	Woter bath	YAMATO	BZ-21	1
	Cleen bench	DALTON	BSC-1300ⅡA	1
	Cleen bench	BIO. LABO	NS-13B	1
	Incubator	SAKURA	IF-4	1
	CO_2 Incubator	NAPCO	5300	1
	Freezer	SANYO	MDF-230	1
	Centrifuge			
	High speed refrigerated	HITACHI	20PR-52D	1
216	Refrigerator	SANYO	SR-480F	1
	Cleen bench	SHOWA		1
	Micro scope	OLYMPUS	CK	1
	Anachical balance	SARTORIUS	2842	1
	Thermometer	YAMATO	BF-21	1
	Stirrer	IKEMOTO		3
217	Micro pleat	PASTER	LP-300	1
	Incubator	HIRASWA	H-12-B	1
218	Deep freezer	SANYO	ULTRA	1
	CO_2 Incubator	IKEMOTO	17510	1
	Auto clave	SAKURA	ASV-2401	1
	Centrifige	KUBOTA	KR-40	1
	Cleen bench	BIO. LABO	NS-13B	1
	Refrigerator	HITACHI	R486TD	1



1st FLOOR

CHEMICAL PATHOLOGY 220 ~ 229

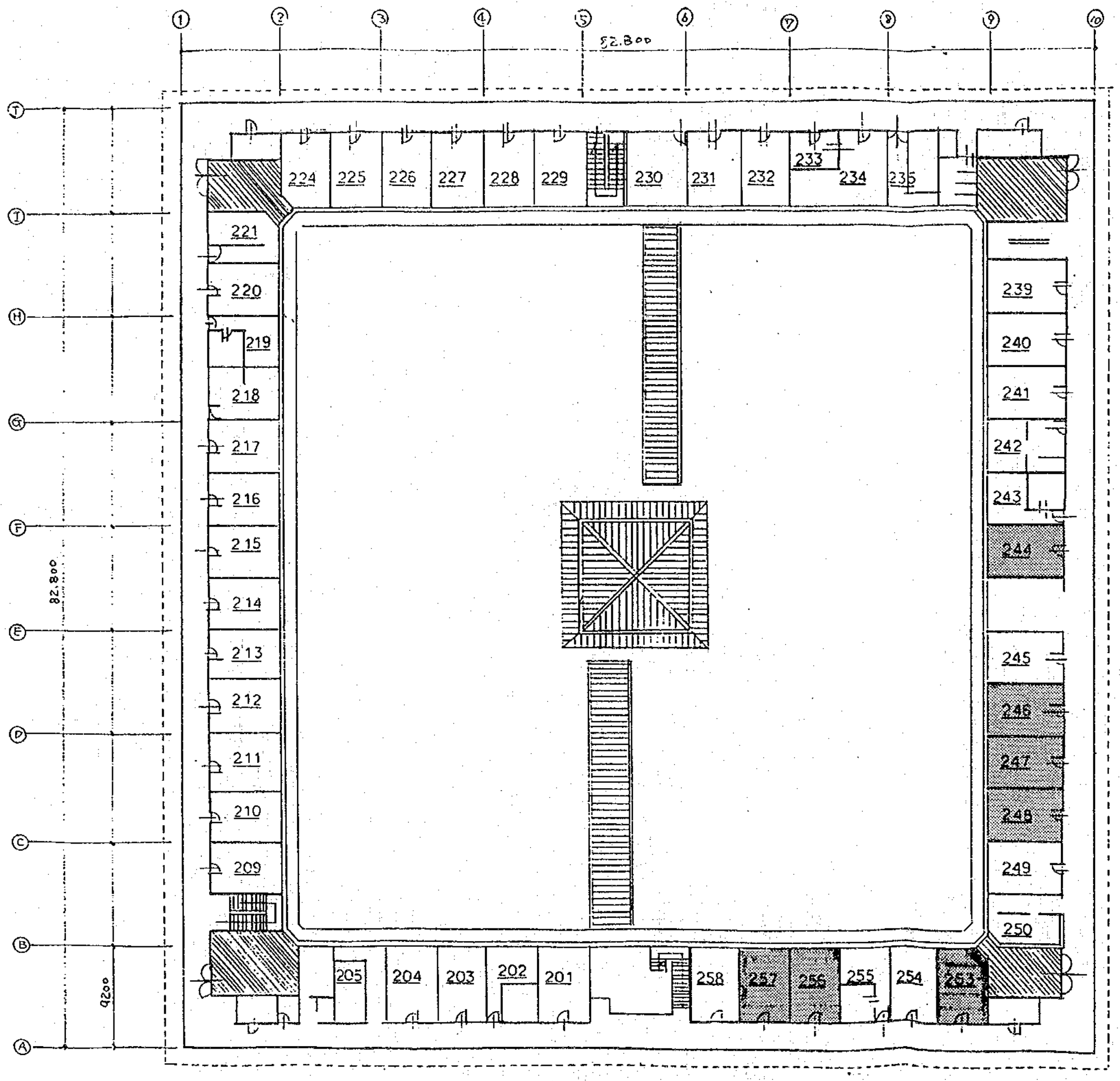
Room No.	Generic title	Maker	Type	Q'ty
224	Centrifuge	MARUSUN	[illegible]	1
	Woter bath	THERMONICS	F22S	1
	Shaker	YAMATO	SA-31	2
225	Dry oven		DS-61	1
	Atomic Spectro Photometer	SHIMAZU	AA-630-12	1
226	pH meter	HORIBA	M-8	
	Spertro Photometer	SHIMAZU	UV-120-02	
	Spectro Scopic	JEOL	SFM-25	
	Mixer	TIYO	S-5F	
	Deep freezer	SANYO		
	W-Wave Spectro Photometer	SHIMAZU	SPD-6AV LC-6A CR-6A	
227	Refrigerator	SANYO	SR-26VB(w)	
	Anachical balance	SARTORIUS	A-200S	
	Anachical balance	SHIMAZU	L-DTP	
228	Anachical balance(LIBROR)	SHIMAZU	LU-T110	1
	Deep freezer	SANYO	MDF-230	1
	Refrigerator	SANYO	SR-480F	
229	Fraction collector	ADBANTIC	3F-160	1
	Denshito meter	HIRAYAMA	HAD-501	1
	Deep freezer	SANYO	SCR-350	1
	Power Source unit	ATTO	SJ-1065	1



1st FLOOR

HISTO PATHOLOGY 230 ~ 243

Room No.	Generic title	Maker	Type	Q'ty
230	Micro film Reader	FUJI		1
	Refrigerator	SHAP	ST-5255	1
	Cleen bench	YAMATO		1
	Centrifuge refrigerated	HITACHI	SCR-20B	1
	Toto-Calculating calorimeter	SHIMAZU	CA-4P	1
	Dry oven	YAMATO	1C-42	
241	Dry oven	YAMATO	DX-41	1
	Step Down transformer	MITAMURA	MRK. FATEX-P	1
	Deep freezer	SANYO	SCR-350	1
	Auto still	YAMATO	WA-550	1
	Atomic Absorption Spectroscopy	MISUZU	AA-610	1
	Hot Air Sterilizer	YAMATO	DS- 42	1
	Auto still	YAMATO	WG-25	1
242	Freezer Dryer	TOKY RIKA	FD-1	1
	Refrigerated storage of Pharmaceuticals	SANYO	MDF-230	1
	pH meter	HORIBA	M-8E	1
	Anatical balance	METRAR	H-10	1
	Anatical balance	SAUTRIEWS	1002MP9	2
	Spectrophotometer	HITACHI	F-1300	1
	Spectrophotometer	HITACHI	320	1
	Ice Maker	MIREHI EQUIPMENT	ICE-O-MATIG	1
	Spectrophotometer	MISUZU	UV-120-02	1
	Respiration Monitor	SANEI	1H21A	1



1st FLOOR

PHYSIOLOGY 245 ~ 257

Room No.	Generic title	Maker	Type	Q'ty
244	Amino Acid Analyzer	IRIKA	A-3300	1
	Gas Chromatography	SHIMADZU	SPD-6AD	
		-ditto-	SPD-6A	1
	Gas Chromatography	-ditto-	LC-6A	
	Recorder	-ditto-	CR-6A	
	Water Bath	IKEMOTO	30Liter	1
	Refrigerater	SANYO	SR-26VA	1
	Refrigerated Storage of Pharmaceuticals	SANYO	MDF-330	1
	Rotary Evaporator	YAMATO	RE-46	1
	Evaporator	YAZAYA	YR-2	1
246	Deep Freezer	SANYO	SCR-350	1
247	Refrigerator	-ditto-	SR-220/FP(A)	1
248	-ditto-	-ditto-	-ditto-	1
	Refrigerated Storage of Pharmaceuticals	-ditto-	MDF-230	1
253	Refrigerator	-ditto-	SR-220/FP(A)	1
256	Power Source Unit	KAYAGAKI	PS-100	1
	Microscope	OLYMPUS	SZ	1
	-ditto-	-ditto-	SZH	1
	-ditto-	-ditto-	BH	1
	Suction Pump	YAMATO	WP-11	1
	Dryer	SAKURA	TK-21	1
	pH Meter	TOKAI DENSHI	TD-10	1
	Balance	ALSEP	EX-200A	1
	Water Bath	SAKURA	KR-3	1
	Refrigerator	SANYO	SR484TBG	1
	Hot Air Sterilizer	YAMATO	IC-62	1
257	Deep Freezer	SANYO	SCR-350	1
	Microscope	OLYMPUS	CH	1
	Centrifuge	TOMY	LC06-SP	1
	-ditto-	-ditto-	C-40	1
	Neoccol Unit	YAMATO	221420	1

⑦　高圧滅菌器修理説明書

SAKURA HIGH PRESSURE STEAM STERILIZER

(FOA FVA FRA type)

TROUBLE SHOOTING & REQUIRED MEASURES

Q & A

CONTENT

SAKURA

SAKURA HIGH PRESSURE STEAM STERILIZER

(FOA FVA FRA type)

TROUBLE SHOOTING & REQUIRED MEASURES

Q & A

CONTENT

TROUBLES IN THE PREPARATORY PROCESS:

Q: The outer pipe pressure doesn't rise to the specified pressure, or doesn't rise at all.

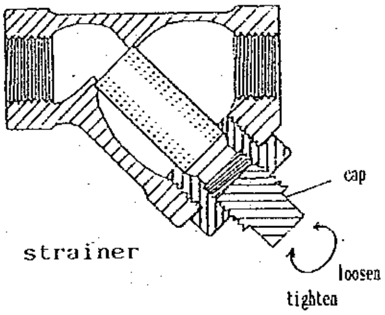
A: Is the main steam valve fully open?

A: Is the setting pressure sent from the boiler?

Check the main steam pressure gauge; 3~4kg/㎠

If the pressure is low, maintain the pressure mentioned above.

A: Is the strainer clogged?



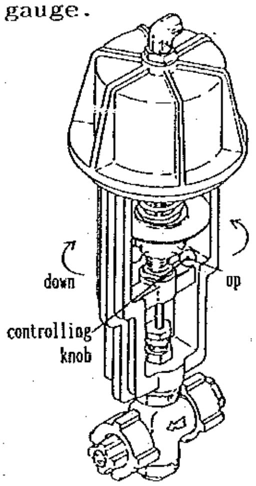
strainer

*Take out the cap to clean the inner net.

FOA-S1,S2 type

A: Is the setting pressure of the decompression valve too low?

Check the outer pipe pressure gauge.



controlling the decompression valve;

When you want to increase pressure,
turn the controlling knob to the right.

When you want to decrease pressure,
turn the controlling knob to the left.

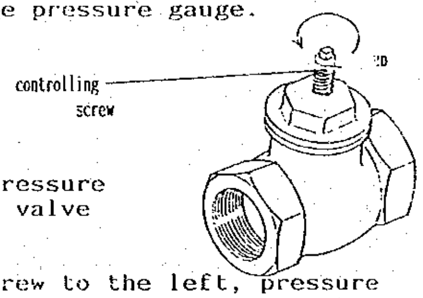
FOA - 12	RD - 1	15A
- 18		20A
- 24		20A

*FOA-S1,S2 type 2.0kg/㎠ set

FOA-S3 type, FVA type

A: Is the pressure setting of the differential pressure regulating valve too low?

Check the outer pipe pressure gauge.



differential pressure regulating valve

*If you turn the screw to the left, pressure increases. Turning the screw to the right decreases pressure.

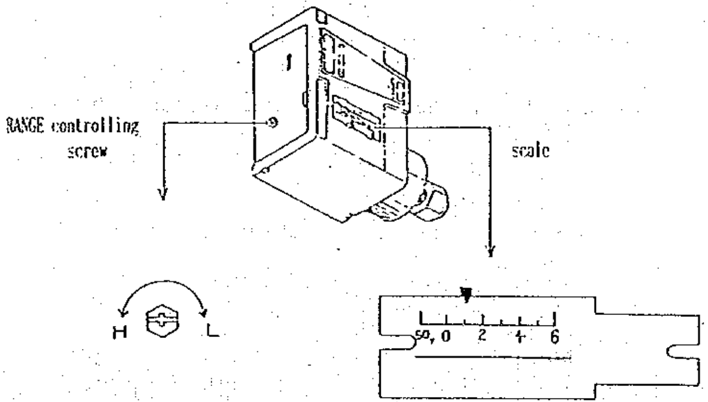
*FOA-S3, FVA type 1.2kg/cm^2 set

FRA type

A: Is the setting of the outer pipe pressure switch too low?

Check the outer pipe pressure gauge.

pressure switch FPS-C106



*If you turn the controlling screw to the H side, pressure increases. Turning to the L side decreases pressure.

*FRA type 1.2kg/cm^2 set

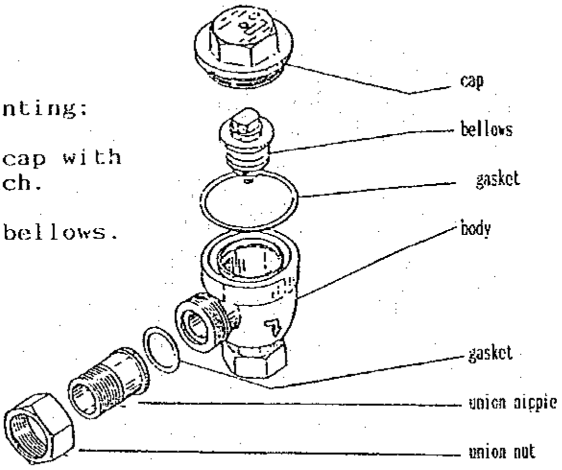
A: Is the outer pipe trap blowing off too strong?

Check the steam outlet in the exhaust circuit or at the end of the circuit.

trap

trap dismounting:

1. Take off the cap with a monkey wrench.
2. Take off the bellows.



FHA-2	RB-2	15A
FBA-4		15A
-6		15A
FOA-12		20A
-18		20A
-24		20A

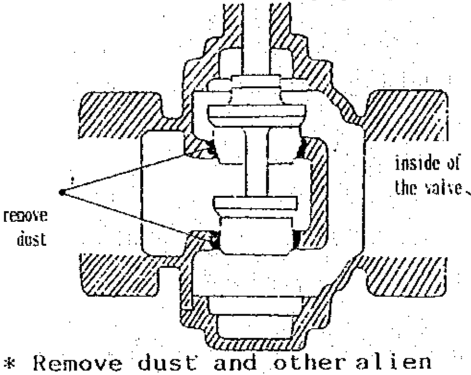
* Check the dust between the valve and valve seat to keep the area clean.

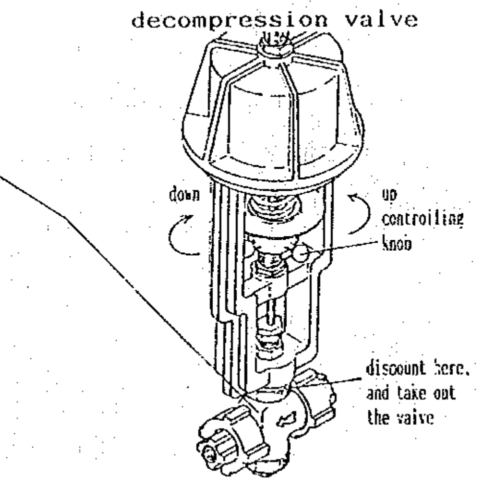
* If corrosion of the valve or valve seat causes live steam to blow too strong, replace the trap.

Q: The outer pipe safety valve blows off during the preparatory process. (The blowing pressure is the same as the setting pressure.)

A: Is the setting pressure of the decompression valve too high? Is there dust between the valve and valve seat? Is the valve or valve seat is defective.

Check the blowing pressure by means of the outer pipe pressure gauge.





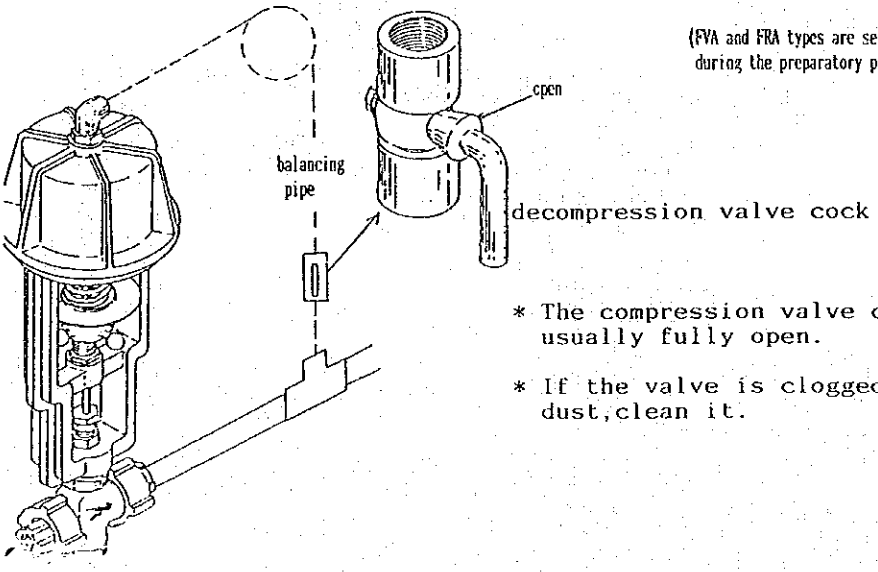
* Remove dust and other alien substances.
* If the valve or valve seat is defective, use abrasives to polish.

* decompression valve pressure setting

F O A type	2.0kg/cm²set
F V A type	2.2kg/cm²set
F R A type	2.2kg/cm²set

(FVA and FRA types are set 2.2kg/cm² during the preparatory process.)

A: Is the cock of the decompression balancing pipe closed or clogged?



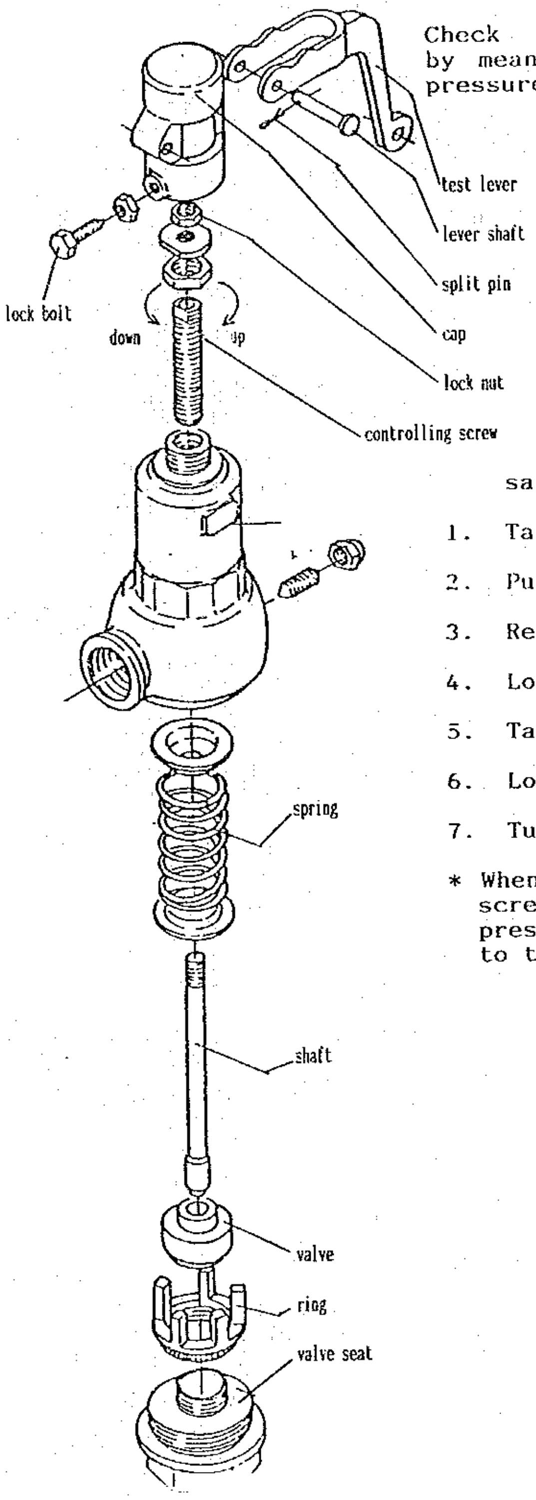
* The compression valve cock is usually fully open.

* If the valve is clogged with dust, clean it.

Q: The security valve blows off below the specified pressure.

A: Is the safety valve pressure setting too low?

Check the blowing pressure by means of the outer pipe pressure gauge.



* blowing pressure

F O A type	2.4kg/cm²
F V A type	2.5kg/cm²
F R A type	2.5kg/cm²

safety valve controlling;

1. Take off the pin.
2. Pull out the lever shaft.
3. Remove the test lever.
4. Loosen the lock bolt.
5. Take off the cap.
6. Loosen the lock nut.
7. Turn the controlling screw.

* When you turn the controlling screw to the right, the blowing pressure increases. Turning to the left decreases pressure.

Q: Steam or drainage goes into the inner pipe during the preparatory process.

A: When the power is supplied with the door closed,

check dust and other alien substances that cause the sterilizing packless valve to leak.

dismount the valve to check the valve and valve seat.

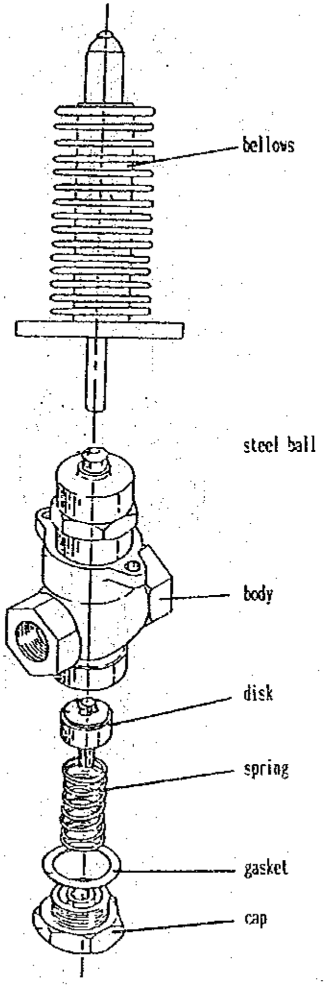
* If any leakage is found at the end of the bellows with the liquid flowing, that means the bellows is broken.

* remove dust from the valve and valve seat.

* when the disk is defective, replace it with a new one.

disk size

15 A	50,4B	1/2
20 A		3/4
25 A		1
32 A		1 1/4



A: When the power supply is cut off,

check not only the sterilizing packless valve but the sterilizing magnetic valve, which should be free of dust.

see TROUBLES IN THE STERILIZING PROCESS on p.18 for how to dismount the magnetic valve.

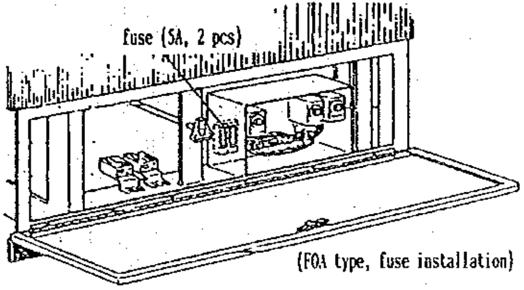
Q: When you push the starting switch, the next vacuum process does not work.

A: Is the power supply connected?

Check the indoor outlets.
Is the plug properly connected?

A: Is the fuse blown out?

Open the lower door to check. (FOA type)

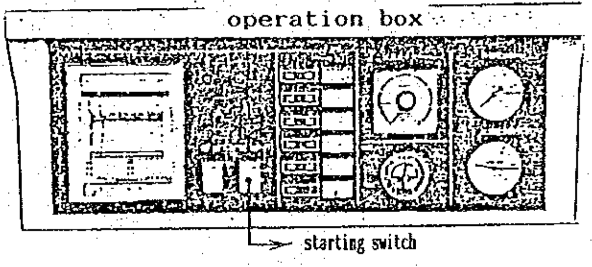


(FOA type, fuse installation)

- * Use the tester to check the voltage.
- * When the preparatory lamp is on, there is no problem.

A: Check the door knob.

Since the door switch doesn't work when the knob is not perfectly tightened, the starting switch doesn't work either. (FOA,FBA,FHA type)



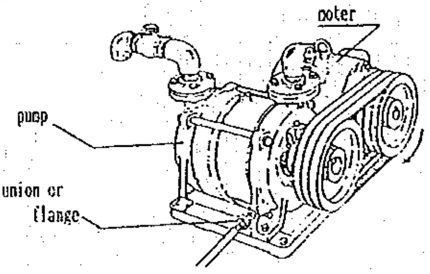
* As for FOA type, the knob is turned around nearly 6 times before the sarting switch lamp is on.
Tighten until the lamp is lit and no leakage is expected.

Q: When you opened the door in the morning, you found water at the bottom of the inner pipe.

A: Does the vacuum pipe supply water magnetic valve leak?

Cut the power supply off and remove the union or flange from the vacuum pump to check the magnetic valve.

vacuum pump

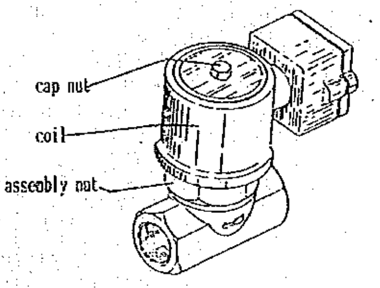


* If you find any leak. dismount the magnetic valve to clean.

magnetic valve dismounting;

1. loosen the cap nut and remove.
2. take off the coil.
3. remove the assembly nut with a monkey wrench.
4. take out the main bulb.

magnetic valve (for water supply)



FOA-12 S・3-03 (12A)
-18
-24

* When the valve or valve seat is substantially damaged, replace it with a new one.

* When replacement is not available, close the main water supply bulb before you go home. Open it when you start operating.

TROUBLES IN THE VACUUM PROCESS:

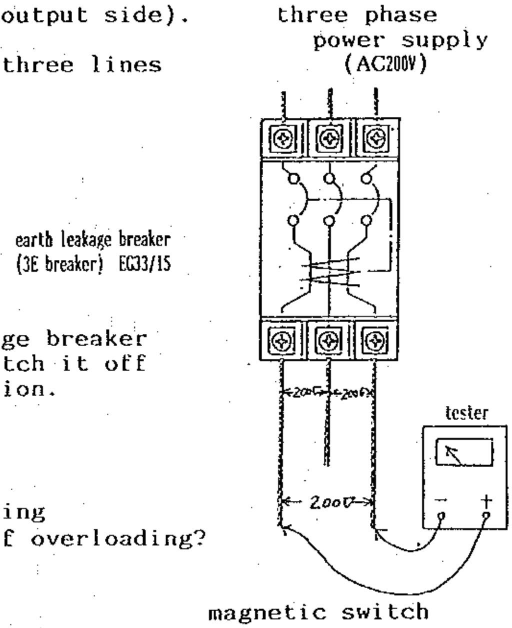
Q: Since the vacuum pump doesn't revolve, a vacuum isn't formed in the can.

A: Check the 200V three phase power supply breaker and fuse in the building.

Check the voltage (output side).

The voltage of the three lines is all 200V.

⇩

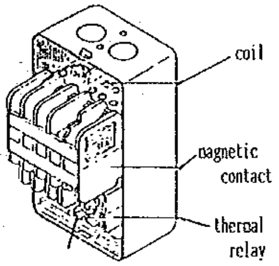


- * If the fuse is blown, replace it.
- * As for the earth leakage breaker (no fuse breaker), switch it off before starting operation.

A: Is the thermal relay working because of overloading?

Check the thermal relay.

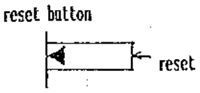
(The thermal relay cuts the magnetic contact coil circuit to prevent the motor from burning when overloaded, serving automatically to shut the current to be sent to the motor.)



* the main factors that cause the thermal relay to work;

- wear of the pump shaft impeller
- loose terminals
- contact failure
- the pump has been kept revolving long without any water supply.
- cavitation caused by an extreme vacuum
- the thermal current setting is too low.

* The thermal current setting is 1.4 times the motor current capacity.



* When the thermal works, ◀ mark appears. If the mark appears, check the possible factors before you push the button. ◀mark doesn't appear during normal operation.

Q: Though the vacuum pump revolves, a vacuum is not formed, or vacuum degree is low (-200~-500mmHg.)

A: Does the vacuum pump revolve in the correct direction?

Looking from the load side (pulley side), does it keep revolving in the correct direction?

* If it revolves reversely, change phases by reshuffling two of the three lines at the second side of the magnetic switch.

A: Is the main water supply valve fully open?

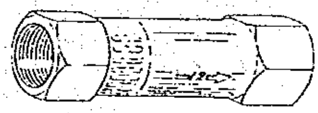
Check the main water supply valve.

A: Is the water supply strainer clogged?

See TROUBLES IN THE PREPARATORY PROCESS on p.1 for strainer cleaning.

A: Is the water supply magnetic valve open?

A: Is the constant flow valve clogged?



constant flow valve

to check the above four answers;

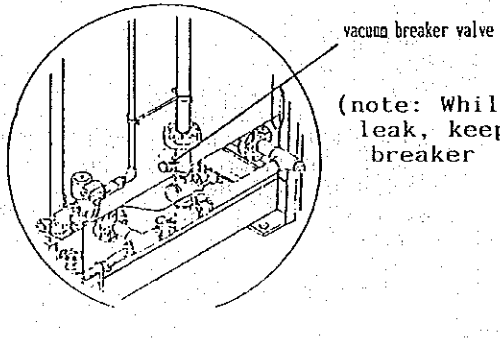
Take off the union fixed at the vacuum pump side of the water supply circuit, and then it will automatically switch to the vacuum process. If water rushes from the union, it is all right. If water doesn't come out at all, or only a little, one of the above devices is defective.

* In dismounting and cleaning the inside of the valve, take away either the IN or OUT snap ring first.

A: Does a substantial amount of air come from the door or tubes?

In checking air leakage, form a vacuum in the can to some extent and cut off the power supply. If there is a leak, the indicator of the sterilizing compound gauge moves toward 0. If not, it doesn't move at all.

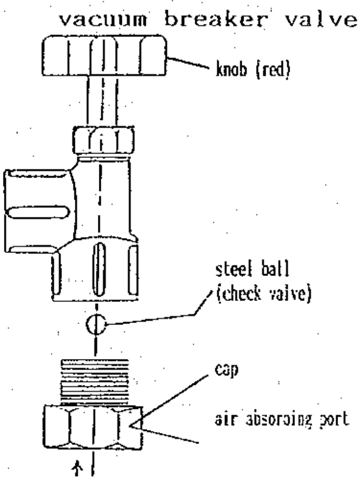
(FOA type vacuum breaker valve installation)



(note: While checking a leak, keep the vacuum breaker valve closed.)

Q: The vacuum pump revolves with a loud sound or large oscillation.

A: Is the vacuum valve closed or clogged?

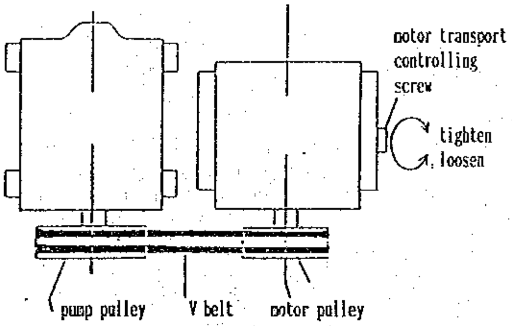


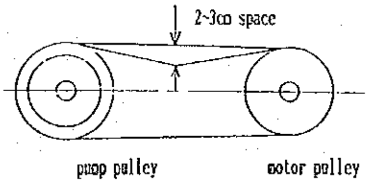
* The valve knob revolves only to the half-way point.
* If the valve is clogged, take off the cap and clean.

note: Don't open the knob too much. If so, the steel ball will shut the vlave, which results in closing the valve.

A: Is the V belt between the vacuum pump and motor over-tightened or loosen?

It is ideal for the belt to sink 2~3cm when pushed down.





* controlling V belt tightening;
Loosen the four nuts holding the motor. If you turn the screw to the right, the belt tightens. Turning to the left loosens the belt.

Q: The vacuum process does not automatically switch to the sterilizing process.

A: Does the sterilizing compound gauge stand at -720~-740mmHg?

Normally the vacuum pump circuit gauge stands at -720~-740mmHg 3 minutes after the pump begins operation.

* If the gauge doesn't stand at the specified degree, see TROUBLES IN THE VACUUM PROCESS on p.8~9.

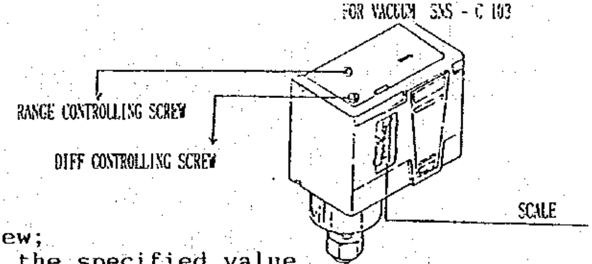
* If the vacuum degree is under -500mmHg, it does not automatically switch to the sterilizing process.

A: When the compound gauge stands at -720~-740mmHg,

is the vacuum pressure switch properly set?

RANGE DIFF specified value:
(-150mmHg ON, -500mmHg OFF)

pressure switch

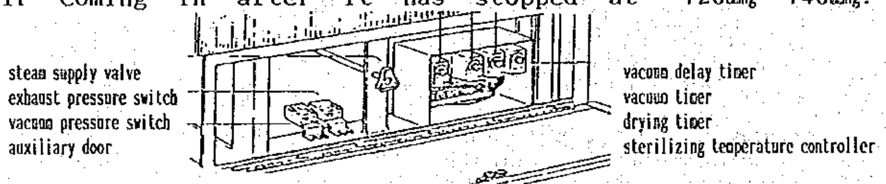


* RANGE controlling screw;
(The screw controls the specified value.
After setting the value at -500mmHg, and turning the screw to the right evacuation becomes H (highly vaccumed).
Turning it to the left results in L (low vacuumed).

* DIFF controlling screw;
(The screw controls a contact interval between ON and OFF.
After adjusting the interval to 0.5kg/㎠, when you turn the screw to the right, the interval gets longer(H).
Turning it to the left results in a shorter (L) interval.

* Check the RANGE specified value not by means of the scale, but by the compound gauge and the vaccum delay timer lamp which is lit at the value -500mmHg.

* Check the DIFF specified value using the compound gauge at the point when the the vacuum pump starts working again with air coming in after it has stopped at -720mmHg~-740mmHg.



(FOA type vacuum pressure switch & delay timer installation)

TROUBLES IN THE STERILIZING PROCESS:

Q: The sterilizing pressure doesn't rise to the specific level, or it takes time to rise.

A: Is the main steam pressure low?

⇩ Check the pressure by the main steam pressure gauge; 3~4kg/㎠

A: Is the sterilizing packless valve fully open?

⇩ Is the valve closed or half open because the single shaft wire is stretched to its full length.

* See p.19 for controlling the wire.

A: Is the sterilizing magnetic valve open?

⇩ Check the lamps for the magnetic valve and the terminals to make sure that electric current is being sent.

* See p.18 for magnetic valve dismounting.

A: Does the exhaust packless valve leak?

Dismount and check the valve and valve seat.

* See p.6 for dismounting.

* Remove the dust and other alien substances from the valve and valve seat.

* If the disk is defective, replacement is required.

Q: Steam leaks from the door.

A: FOA type:
Is the door knob fully tightened?

⇩ Tighten again.

A: FVA, FRA type:
Is the floating seal pressure too low?

⇩ Check the floating seal pressure.
The normal pressure should be 3.5kg/㎠ ± 0.5.

A: Is the packing old? Or is there any dust or are there any defects?

If you can find the packing obviously old or any defect, replace it with new packing.

* See p.20 for packing replacement.

Q: The sterilizing timer doesn't work.
(The sterilizing compound gauge pressure rises to the specified level.)

A: Does the sterilizing temperature stay at the specified degree?

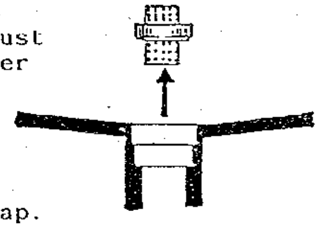
Use a recording thermometer or a thermometer to make sure.

* sterilizing temperature and pressure	FOA type	132°c	2 kg/㎠
	FVA type	135°c	2.2 kg/㎠
	FRA type	135°c	2.2 kg/㎠

Q: The sterilizing temperature doesn't stay at the specified degree.

A: Is the steam exhaust strainer clogged at the bottom of the inner pipe?

Check and clean the steam exhaust strainer net.



A: Does the inner pipe trap work well?

Dismount and clean the trap.

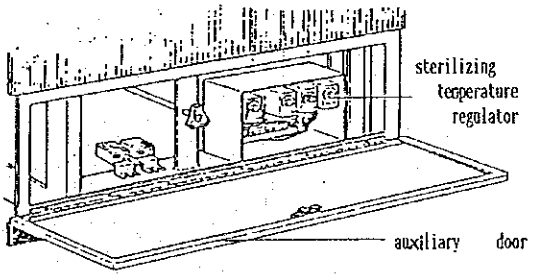
* See p.21 for dismounting.

Q: The sterilizing temperature stays at the specified degree.

A: Is the sterilizing temperature regulator set properly?

Reset the regulator.

FOA type regulator installation



* temperatures for the regulators;

FOA type	129~130° c
FVA type	132~133° c
FRA type	132~133° c

note: set the temperature regulator 2~3°c degrees lower than the average.

Q: Once started, the sterilizing timer resets during the operation.

A: Has the main steam pressure dropped?

Check the pressure by the main steam pressure gauge; 3~4 kg/cm^2.

* If the temperature marks a lower degree than that set by the sterilizing temperature regulator:

FOA-S1, S2 type sterilizers are instantaneously reset.

FOA-S3, FVA, FRA type sterilizers are reset two minutes after.

A: Does the inner pipe trap work well?

Check and clean the trap.

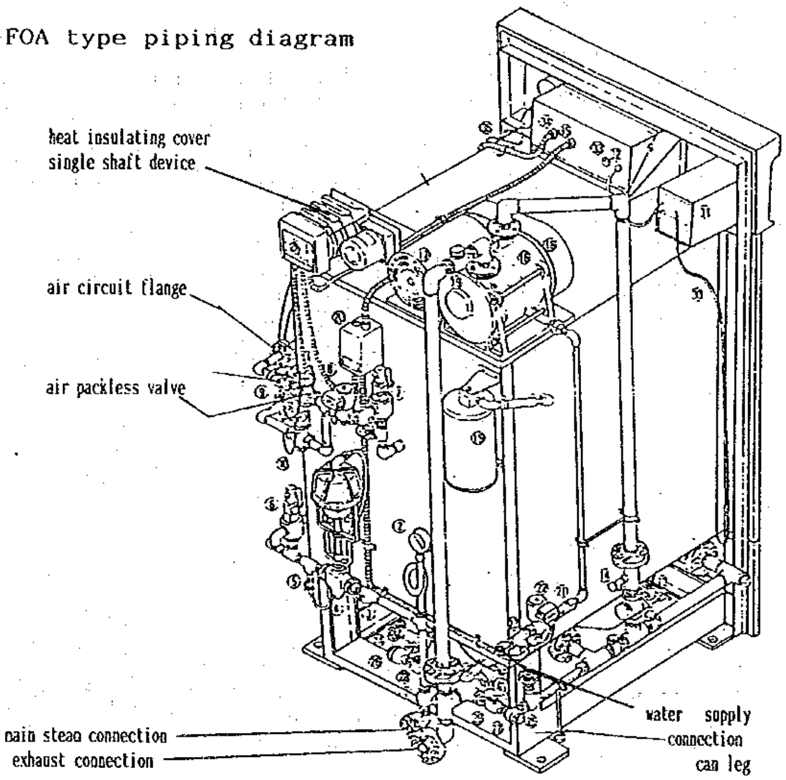
* See p.21 for dismounting.

Q: Water (drain or steam) leaks from the air filter during sterilization.

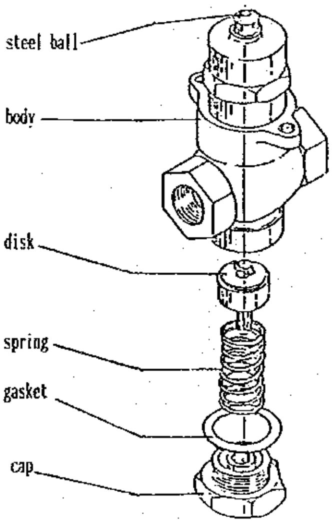
A: Does the air packless valve or check valve leak?

Before checking, take off the air circuit flange.

FOA type piping diagram



FOA type piping diagram

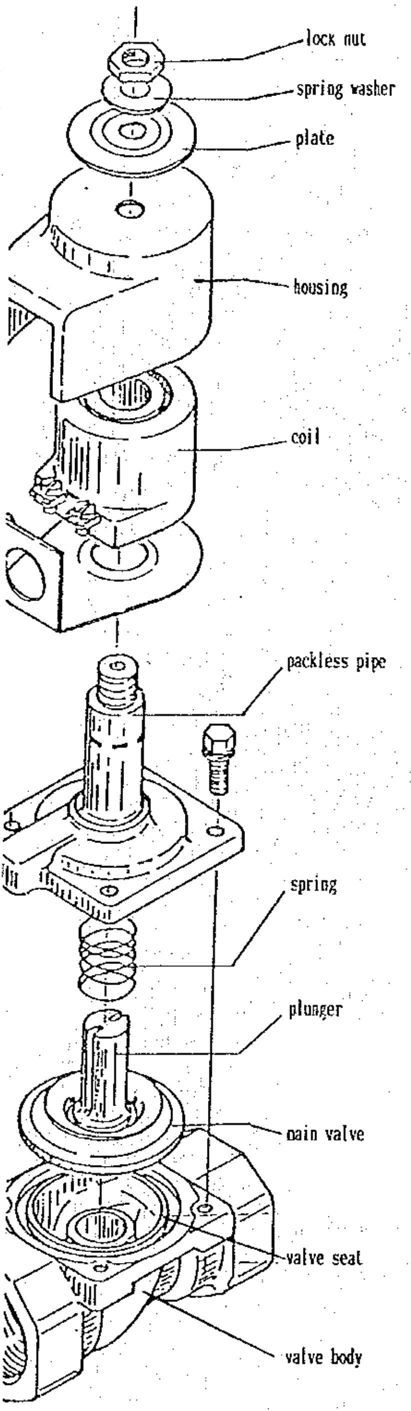


* packless valve disk replacement;

1. Loosen and remove the bottom cap.
2. First remove the gasket, then the spring and then the disk.
3. Take off the disk fixing split pin.
4. Remove the disk fixing nut.
5. Replace the disk with a new one.

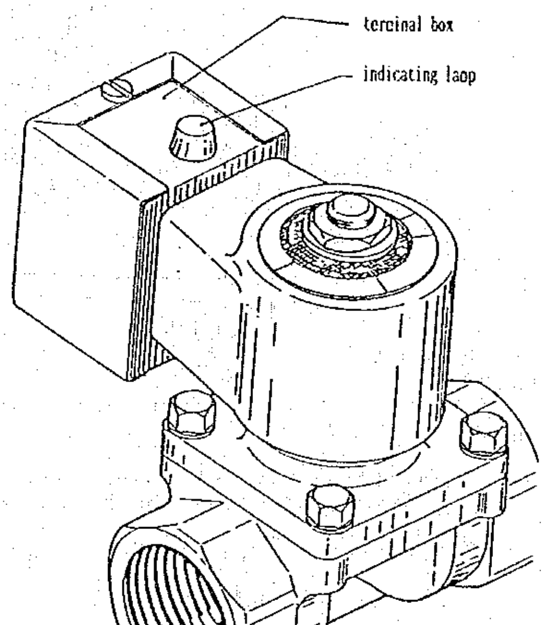
magnetic valve dismounting:

The magnetic valve maker is Rushipher.

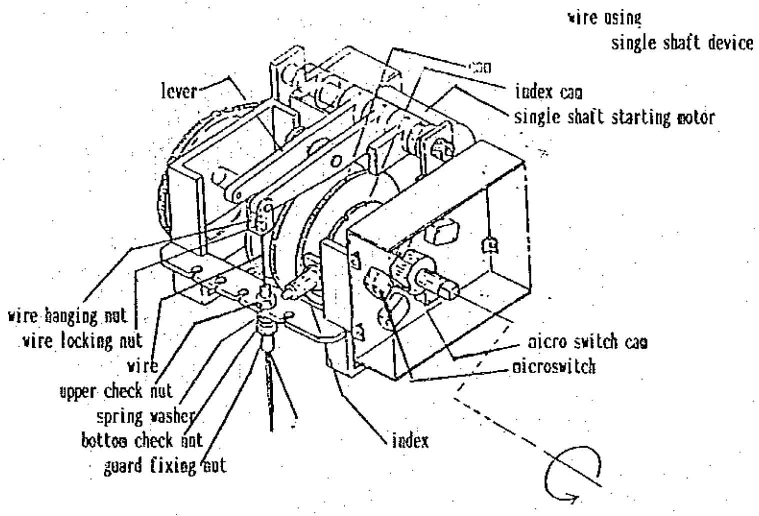


dismounting;

1. Remove the upper lock nut.
2. First pull out the spring, then the housing, and then the coil.
3. Remove the four packless pipe fixing bolts.
4. Take out the spring and the main valve.



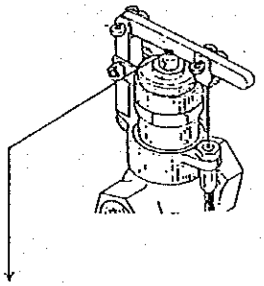
SINGLE SHAFT WIRE CONTROLLING:

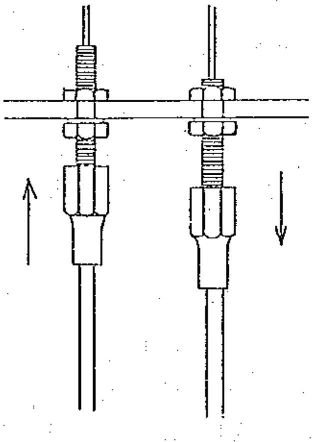


Is the wire tube
set correctly?

Turn the knob to the left
when hand-operated.

wire stretch controlling:





(loose) (stretched)

* the opening between the lever
and bellows should be 3mm in
length.

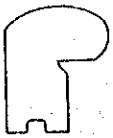
DOOR PACKING REPLACEMENT:

packings in use;

shape

FHA·FBA type

FOA type



(L type packing)

FVA·FRA type

(W type packing Z 79)

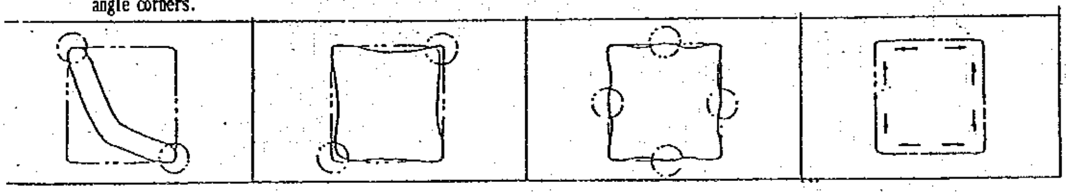
REPLACEMENT;

1. Check the shape and length of new packing.
2. New packing should not have any defects, dust or dirt. If you find any dust or dirt, wipe it off with waste.
3. Remove the old packing from the packing groove.
4. Clean the groove.
5. Put the new packing into the groove evenly.

  * Replacement can be carried out more smoothly, when the can has cooled down.

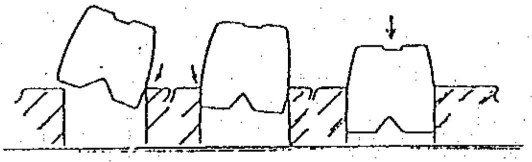
* See the drawings.

1. halve the packing, and put it into the opposite angle corners.
2. put it into the other two corners.
3. put it into the center of each corner.
4. put it into each corner from the side center.



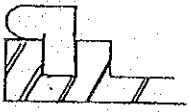
FVA
FRA type

note: packing is bigger than the groove. don't stretch it out, but soak it in water and insert it as shown below.



FHA
FBA type

FOA type



6. Tighten and loosen several times as usual to check for leaks.

TRAP DISMOUNTING & CONTROLLING:

traps in use;

type: RB-2

FHA·FBA type	15A
FOA type	20A
FVA-B M O type	15A
FRA type	15A(2 pcs)

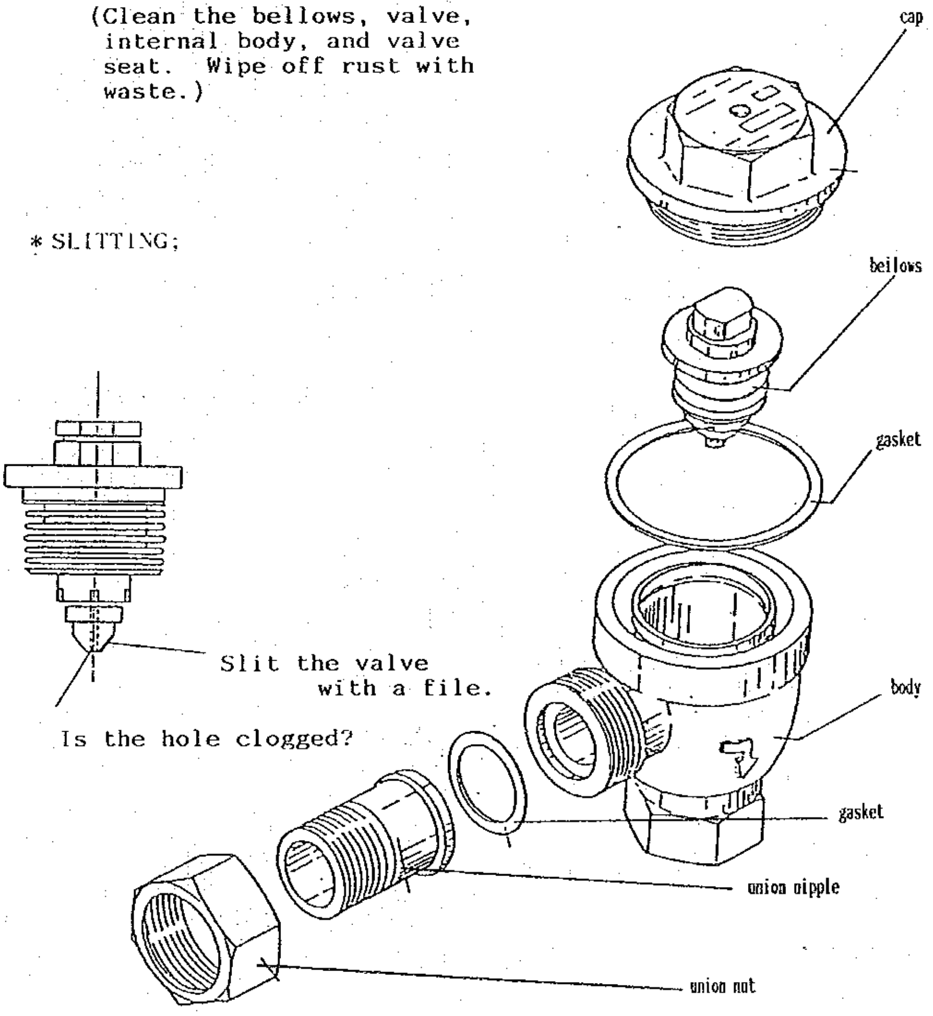
* TRAP DISMOUNTING;

trap (inner and outer pipe)

1. Remove the upper cap.
2. Take out the bellows.

(Clean the bellows, valve, internal body, and valve seat. Wipe off rust with waste.)

* SLITTING;



Slit the valve with a file.

Is the hole clogged?

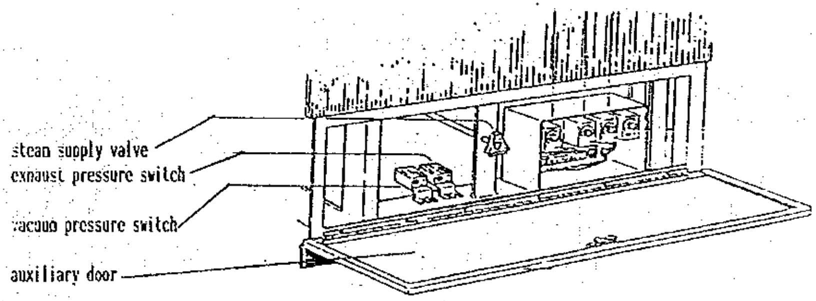
(trap dismounting)

TROUBLES IN THE EXHAUST PROCESS

Q: The process doesn't automatically switch from the exhaust process to the drying process.

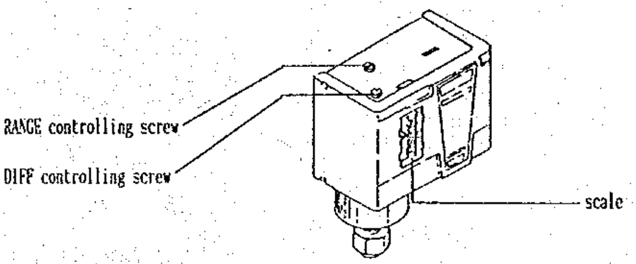
A: Is the exhaust pressure switch properly set?

Reset the exhaust pressure switch to 0.2kg/㎠.



(FOA type exhaust pressure switch installation)

- pressure switch exhaust SNS-C103 0.2kg/㎠



* RANGE controlling screw;

The screw controls the setting. With the setting adjusted to 0.2kg/㎠, if you turn the screw to the left, the device works with high pressure (H), to the right with low pressure (L).

* DIFF controlling screw;

The screw controls a contact interval between ON and OFF. Adjust the DIFF interval to 0.5kg/㎠. If you turn the screw to the right, the interval gets longer (H). Turning it to the left results in a shorter (L) interval.

TROUBLES IN THE DRYING PROCESS:

Q: The drying function doesn't work at all.

A: Does the vacuum pump revolve normally?

Check the vacuum pump.

* The pump revolves to the right from the pulley side.

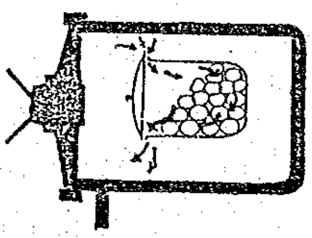
If the vacuum pump doesn't revolve, see p.9 for TROUBLES IN THE VACUUM PROCESS.

Q: Drying function doesn't work well.

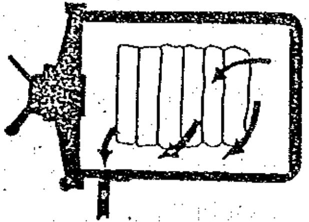
A: Did you put too much material in the sterilizer?

Putting too much material in at a time will cause malfunction.

examples:



(a holeless container should be laid on the bottom.)



(a packed stuff should be put lengthwise.)

* A bottle or can should be put on the shelf side.

A: Is the vaccum degree too low?

. Check the sterilizing compound gauge.
The average value is around -720~740mmHg marked three minutes after the vacuum pump begins operation.

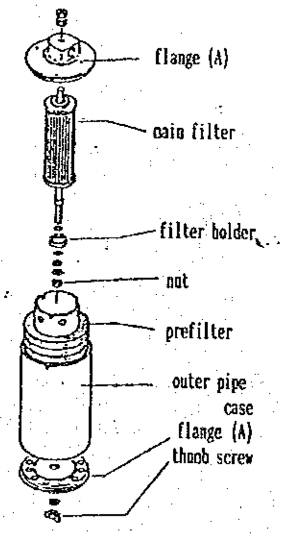
* If the value is below that, see p.10 for TROUBLES IN THE VACUUM PROCESS.

A: Is the air filter clogged?

Check air sending time by means of the sterilizing compound gauge.
(Average time for -720mmHg~-150mmHg is 1.0~1.5 minutes.)

* FILTER REPLACEMENT;

1. Take off the bottom thumb screw.
2. Take out the flange(A).
3. Take out 11 prefilters.
   (You can reuse them after washing. Dry them before use.)
4. Remove the nut.
5. Take off the filter holder.
6. Take out the main filter.
   (The main filter cannot be reused. Replace it with a new one.)



filter clogging and time for replacement; This differs with room conditions, however, the average span for a prefilter replacement is 6 months to 1 year; for a main filter -- 2~3 years.

A: Does steam leak into the inner pipe because of leakage of the sterilizing packless valve during drying operation?

⇩

You cannot check while drying is in process. After switching to the preparatory process, see p.6 for TROUBLES IN THE PREPARATORY PROCESS.

A. Does the outer pipe trap work well?

⇩

Dismount and clean the trap.
* See p.21 for trap dismounting.

A: Did you set the sterilizing time longer than is required?

⇩

An excess exposure to steam is one of the main factors of malfunction. Time should be adjusted to each item.

* It is desirable to set time by means of a biological indicator.

A: Are the materials in the sterilizer wet?

If you put wet materials in the sterilizer, drying doesn't work. Those to be sterilized must be dried adequately before getting sterilized.

Metal containers should be of good breathability.

TROUBLES IN THE COMPLETION PROCESS:

Q: The completion buzzer doesn't work.

A: Is the sterilizing process operating automatically?

⇩ When switched manually from the sterilizing process to the exhaust process, neither the completion lamp nor the buzzer will work.

A: After sterilizing, did you cut off the power supply during either the exhaust or drying process?

⇩ If you cut off the power supply after the exhaust process, the completion circuit is electrically released, and the completion lamp and buzzer won't work.

A: Is the buzzer inferior?

⇩ Check the voltage of the buzzer circuit. If it is 100V, the buzzer is inferior. Replace it with a new one.

A: Is the vacuum degree in the inner pipe still over -150mmHg?

Wait until the sterilizing compound gauge marks -150mmHg.

* 1~1.5 minutes after the lamp lit, the gauge stands at -150mmHg, and the buzzer works.

If it doesn't rise to -150mmHg after that, the air filter is clogged. See p.24 for TROUBLES IN THE DRYING PROCESS.

Q: The door doesn't open even after the process is completed.

A: Does the sterilizing compound gauge stand at 0?

Wait until the gauge stands at 0.

* The gauge points to 0 in 2~3 minutes after the completion lamp lit.

note: Don't forget to keep the power supply on. Especially as for FOA type, leave the knob tightened.
(Turn on the starting lamp.)

When the air filter is clogged , the gauge doesn't come back to 0 even after 4 minutes after the lamp lit. Then see p.24 for TROUBLES IN THE COMPLETION PROCESS.

A: FVA type only

Is the magnetic switch for the door, thermal relay operating?

Check the thermal relay recovery button.
If you see ◀ mark, check the possible causes before restarting.

A: Are the pressure switches for detecting pumping and

residual pressures working?

setting value of the pumping pressure detecting pressure switch: 0.5kg/㎠ ON, 0.2kg/㎠ OFF, DIFF 0.3kg/㎠

setting value of the residual pressure detecting pressure switch:
0.3kg/㎠ ON, 0.2kg/㎠ OFF, DIFF 0.1kg/㎠

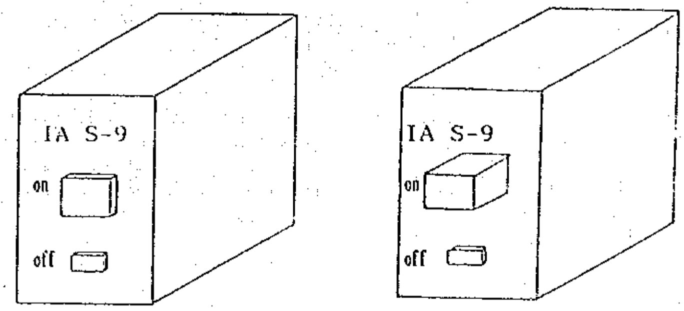
* See TROUBLES IN THE EXHAUST PROCESS on p.22 for pressure switch controlling.

A: FRA type only

Is the door circuit protector operating (Is it switched off)?

circuit protector:

type IAS-9



normal condition (ON is pushed in.)

operating (ON is protruded.)

* If the protector is working (switched off), push in ON button.

A: Is the pumping pressure detecting pressure switch working?

setting value of the pumping pressure detecting pressure switch: 0.4kg/cm^2ON, 0.1kg/cm^2 OFF, DIFF 0.3kg/cm^2

* See TROUBLES IN THE EXHAUST PROCESS on p.22 for pressure switch controlling.

Q: How can I open the automatic door manually?

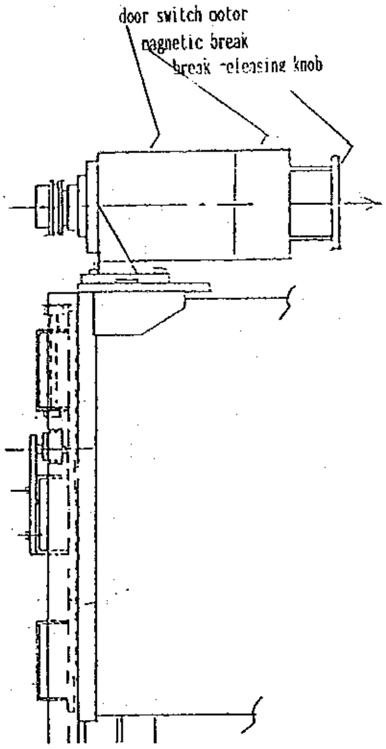
A: FVA-B M type

manual door operating;

The magnetic break releasing knob is directly connected to the motor. Pull the knob out as shown in the drawing, and the door will slowly descend to open.

note: Cut the power supply off.

note: Pull the knob straight.



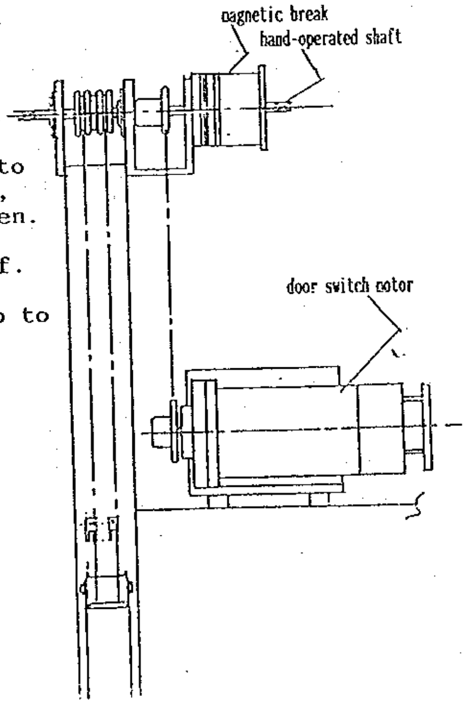
A: FVA-O type

manual door operating;

Turn the hand-operated shaft to the right from the shaft side, and the door will go up to open.

note: Cut the power supply off.

note: You cannot turn the knob to the left manually.

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