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STARCLUSTER 2
ROBOT DESIGN GUIDE

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CREATING A ROBOT

Robots are computer brains which have been placed into mobile bodies. These bodies come in many different shapes and sizes, as do the brains. If a person in the game is injured too severely for healing, the effected body part may be replaced with a robot part. This does not make the person into a robot, even if everything but his brain is replaced by robot parts. Such people are referred to as "cyborgs", for "Cybernetic Organism". There are robots which are indistinguishable from people, and people who are indistinguishable from robots, as well as a great variety in between.

The first step in creating a robot is to decide what tasks the robot will be called upon to serve. For instance, using an intelligent SP brain in a robot destined to lift heavy objects is a waste, as is forcing a robot designed for cargo handling to serve as a personal servant. Most players want robots as friends and companions, but your needs may vary. One should also determine an approximate budget. It is easy to go overboard when designing robots.

Once you have decided on your robot's role, select an appropriate brain. This is probably the most important choice you have, as the brain is the robot. Changing the robot's manipulators gives you the same robot with new manipulators. Changing its brain gives you a new robot.

ROBOT BRAINS

The thing which makes a robot a robot is the brain. There are 2 basic types of robot brain, manufactured in totally different ways. The first type is the normal brain. These types of robot brain are available at TL8 and above, and must be programmed by a person to use senses and perform skills. The second type of brain, available at TL9, is the Self-Programming or "SP" brain. Self-programming brains are programmed with an initial skill set, but can learn skills like a person.

Skills (or programs), whether programmed in or learned, take up resources in the robot's brain. Each variety of brain has a rating given as: Number of initial programs/programs learned per year/max # of programs. Thus a rating of 15/1/25 means the brain has 15 initial programs, and can learn 1 program per year, up to a maximum of 25.

There are 2 important terms anyone who deals with robots should know. These terms are "Self Aware" and "Self Programming". Self aware brains are sentient. That is, they are aware of who they are, and can think in the abstract. Non-self programming brains are not designed to be self-aware, but occasionally during the manufacturing process a glitch happens and the brain becomes self-aware. Self programming brains are always self-aware.

All self-aware robots are, by definition, sentient. Involuntary servitude of sentient beings is considered slavery in SaVaHuTa, although not in the Diasporan Community (one of several minor differences), so self-aware robots cannot be held in perpetual servitude in SaVaHuTa. Unfortunately, robots cost considerable money to create, and immediately freeing them would be unfair to the creator, so a compromise was reached whereby robots are held in indentured servitude and are "paid" by the owner of their contract in fictitious credits according to the job they perform until they pay off the cost of their creation, at which point they are "manumitted" - they become totally free. As robots live far longer than humans, this is bearable, and fair to the owners.

The type of brain also helps determine the maximum number of extensors a robot can control. Each brain is given a "slot" rating. The more slots a brain has, the more extensors it can control.

TABLE 1: ROBOT BRAINS

Brain	Slots	Limits	Abbera-tion Table & Modifier	Kg/Factor	Tech Level	Extensor-Control Slots	Price per Factor
Embedded	2/0/2	Factor 1	A+0	2 kg	7	1	10cr
Anima	3/0/3	Factor 1	A +0	1 kg	9	1	15cr
Slave	4/0/4	Factor 1	A +0	1 kg	10	2	18cr
Drone	5/0/5	Factor 1	A +0	2 kg	8	2	20cr
Helper	8/0/8	Factor 1	A +0	1 kg	10	2	25cr
Worker	10/0/10	Factor 1	A +5	5 kg	8	2	30cr
Porter	15/0/15	Factor 1	A +10	7 kg	8	3	40cr
Carter	15/0/15	Factor 1	A +15	3 kg	10	4	45cr
Servant	20/0/20	Factor 1	A +15	9 kg	8	4	50cr
Butler	30/0/30	Factor 1	A +25	5 kg	9	4	100cr
SP I	15/1/25	Factor 1	B +0	2 kg	9	2	100cr
SP II	10/2/30	Factor 1	B +5	3 kg	9	3	150cr
SP III	10/3/35	Factor 1	B +10	4 kg	10	4	200cr
SP IV	10/2/50	Factor 1	B +15	4 kg	10	5	300cr
SP V	15/2/50	Factor 1	B +20	4 kg	10	6	350cr

ROBOT TORSOS

Next select a torso - the torso name is a terse and very general description of its appearance. The torso is the robot's body without its limbs. An "anthro" torso is humanoid in shape. A "sastra" torso is humanoid with a tail. If you wish to create a robot which looked like a Human or Tagris, select "anthro". If you wish to create one which looks like a Sastra or Vantor, select "sastra". The torso determines the maximum number of extensors (arms) the robot can have, along with the number of extensors the robot brain can control.

In any torso type, increasing the factor increases the number of attachment points for extensors, the mass, and the cost. For example, a factor 3 spherical torso would have 3 attachment points for extensors, weigh 30kg, and cost 210cr. A "plastic" torso is a torso made out of active plasteel, which can change its shape to be whatever the robot brain wants. This is really useful only with self-aware robot brains.

TABLE 2: ROBOT TORSOS

Torso	Extensor Points per-Factor	Limits	Kg/Factor	Tech Level	Price per Factor
Box	1		40 kg	7	40cr
Barrel	1		30 kg	7	90cr
Cylinder	1		20 kg	7	100cr
Sphere	1		10 kg	7	70cr
Faceted	2		15 kg	8	150cr
Skeletal	2		5 kg	9	200cr
Anthro	2	Factor 1	35 kg	8	350cr
Sastra	3	Factor 1	20 kg	8	260cr
Mantid	3		10 kg	9	200cr
Animal	3		30 KG	8	150cr
Plastic*	2		10 kg	10	350cr

* These components can change to be whatever shape is needed. The mass remains the same. They are made out of Active Plasteel.

ROBOT EXTENSORS

Next select the type of extensor you want at each attachment point on the torso. "Anthro" extensors are humanoid, while "telescoping" do not bend but extend like a telescope. "Jointed" extensors bend at joints, and "tentacle/tail" extensors bend anywhere along their length. "Deforming" extensors are made of active plasteel and can change shape. Increasing the factor increases the extensor's strength, mass, and the cost. For instance a jointed extensor has a strength of 15 per factor, so a factor 3 jointed extensor would have a strength of 45, a mass of 15 kg, and a cost of 30cr. The lower of the 2 numbers which control extensors - brain "slots" and attachment points - determines the actual number of extensors the robot can have.

TABLE 3: ROBOT EXTENSORS

Extensor	STR per Factor	Mass Supported per Factor	Limits	Kg/Factor	Tech Level	Price per Factor
Jointed	15	80 kg	Factor 3	5 kg	7	10cr
Telescoping	25	175 kg	Factor 3	5 kg	7	30cr
Tentacle/ Tail	8	50 kg	Factor 3	5 kg	8	125cr
Anthro	8	50 kg	Factor 3	5 kg	8	75cr
Deforming*	8	50 kg	Factor 3	5 kg	10	200cr

* These components can change to be whatever shape is needed. The mass remains the same. They are made out of Active Plasteel.

ROBOT MANIPULATORS

Each extensor has at its end a manipulator or (hand). Manipulators are how a robot affects the world, just as humanoids use hands. Manuipulators are divided into simple and complex types. Simple manipulators have basic grip pressure sensitivity. "Hook" manipulators are open hooks, while "pincers" are two jointed opposed clamping fingers. "Clamp" manipulators use opposed pressure pads to grip items. "Claw" manipulators are jointed fingers with no opposable thumb.

Complex manipulators have true touch feedback built in. This is separate from the "touch" senses, as they effect the whole body, while this touch sensitivity affects only the manipulator. "Hand" manipulators work like a humanoid hand. "Socket" type manipulators are designed to hold a variety of specially shaped components. "Computer" sockets are direct interfaces to computers. "Tool" sockets are designed to hold various non-power tools. "Power tool" sockets are designed to hold and provide power to specially designed power tools, while "weapon" sockets do the same for specially designed weapons, and in addition are used as "computer" sockets when accessing military computers - and only military computers. "Malleable" manipulators change shape to reflect the robot's needs, being made of active plasteel. "Tentacle/Tail" manipulators are equivalent to a Sastra's prehensile tail, able to grip things by wrapping around them.

The sockets are not standard cluster-wide, except for weapon sockets, which are standard in all SaVaHuTa worlds because of the military - there is a different weapon socket standard in the Diasporan Community. Most sockets are standard over a certain trade route, or set of systems that trade with a particular robotic supplier. As an example, there are a dozen major robotic manufacturers on Glorianna in the Gloria system alone, and they trade over an area of about 4-6 jumps in any given direction. Within that area, the Glorianna sphere, sockets are pretty much uniform. They are very different in the trading sphere around Mickey's Birthday, or Faren, or Brass, or any of the other major robotic suppliers.

TABLE 4: ROBOT MANIPULATORS

Manipulator	COOR per Factor	Limits	Kg/Factor	Tech Level	Price per Factor
Hook	1	Factor 3	1 kg	7	5cr
Pincer	3	Factor 3	2 kg	7	10cr
Claw	6	Factor 3	3 kg	7	15cr
Computer Socket	8	Factor 3	1 kg	7	15cr
Tool Socket	8	Factor 3	1 kg	7	5cr
Power Tool Socket	8	Factor 3	1 kg	7	25cr
Weapon Socket	8	Factor 3	1 kg	8	30cr
Hand	8	Factor 3	1 kg	8	30cr
Malleable*	8	Factor 3	1 kg	10	50cr
Tentacle/ Tail	3	Factor 3	1 kg	8	5cr

* These components can change to be whatever shape is needed. The mass remains the same. They are made out of Active Plasteel.

ROBOT LOCOMOTORS

The next component to select is the locomotor (or mover). Locomotors are how the robot moves around in the world. Robots have one set of locomotors at most, although a robot does not need locomotors. The types of locomotors are pretty self-descriptive, but remember "air cushion" needs an atmosphere, while "tracks" and "wheels" need gravity in order to operate, and "A-Grav" is a TL9 technology. "Anthro" locomotors are a pair of humanoid legs with hips and buttocks. "Deforming" locomotors are constructed of active plasteel, and change shape in accordance with the robot's needs. The factor of locomotor determines the mass it can move, it's own mass, and the cost. The factor does not affect agility. In selecting the locomotor factor, remember to estimate the robots finished mass along with likely loads it might be carrying, otherwise, you will find you have created a robot which cannot do the work it was designed to do.

TABLE 5: ROBOT LOCOMOTORS

Locomot-tor	AGY	Mass Sup-ported per Factor	Kg/Factor	Tech Level	Price per Factor
Tracks	2	50 kg	10 kg	7	10cr
Wheels	4	40 kg	10 kg	7	15cr
Air Cush-ion	6	40 kg	10 kg	7	25cr
A-Grav 1**	12	5000 kg	5 kg	9	100cr
A-Grav 2**	12	50 kg	0.05 kg	10	1cr
Jumpers	6	40 kg	10 kg	8	50cr
Spider Leg	8	25 kg	5 kg	8	10cr
Anthro Leg	8	60 kg	10 kg	8	200cr
Sastra Leg	10	50 kg	7 kg	8	200cr
Deform-ing*	8	30 kg	10 kg	10	200cr

* These components can change to be whatever shape is needed. The mass remains the same. They are made out of Active Plasteel.

** At Tech Level 9, this must be in the form of a flat plate one square meter in area. At Tech Level 10, the plates can be made smaller, and be stacked. The shape of the robot is no longer limited by the shape of the plate.

ROBOT SURFACES

Next, the robot's surfaces are selected. The surface is the robot's skin, and affects its appearance and its integrity as regards air or water, as well as it's rating as armor. Surfaces can be layered with the lightest surface outward, that is chromskin can be layered over sheet steel which can be layered over armor. Chromskin and pseudoskin are differentiated only by their outward appearance, that is pseudoskin looks like flesh and hair while chromskin is a glossy mirror finish.

Chromskin, pseudoskin, and active plasteel are flexible, while the others are rigid. Active plasteel surfaces are actively colored as well, being whatever color and texture the robot brain wishes at the time. Surface factor affects the robot's "protect points" which is the robotic equivalent of constitution, mass, and cost. In layered surfaces, the outermost layer affects what chance the robot can be hit - in other words, the category of "armor" opponents are shooting at - but all surface protect points are added.

TABLE 6: ROBOT SURFACES

Surface	Protect Points per Factor	Hit Table	Limits	Kg/Factor	Tech Level	Price per Factor
Sheet Metal	100	Steel	Factor 2	5 kg	7	25cr
Ceramic	150	Ceramic	Factor 3	7 kg	8	50cr
Plasteel	200	Plasteel	Factor 3	10 kg	9	75cr
Active Plasteel*	200	Plasteel	Factor 2	10 kg	10	150cr
Armor	250	Plate	Factor 3	15 kg	7	100cr
Chromskin	75	Chromskin	Factor 2	1 kg	10	50cr
Pseudoskin	75	Skin	Factor 2	1 kg	8	60cr
Pseudofur	75	Skin	Factor 2	2 kg	8	50cr
Jewelled	200	Ceramic	Factor 3	7 kg	8	75cr
Plastic	50	Hide	Factor 2	1 kg	7	10cr

* These components can change to be whatever shape is needed. The mass remains the same. They are made out of Active Plasteel.

ROBOT POWER SUPPLIES

Power supplies affect how the computer is powered. "Direct" power is supplied from elsewhere when the robot is plugged in. "Capacitor" power works like direct power, but the robot can function on stored energy for a short while. "Batteries" and "PowerPaks" are modular replaceable power supplies. Usually 2 sets of batteries or PowerPaks are purchased with a robot using this power source so that one may be recharged while the other is in use. The robot's mass must be totaled at this point and a power supply sufficient to power it selected.

TABLE 7: ROBOT POWER SUPPLIES

Power Supplu	Description	Mass Powered per Factor	Kg/Factor	Tech Level	Price per Factor
Direct	Plug in to current	20 kg	0.1 kg	7	0 cr
Capacitor	Plug in with 30 minute unplugged running time	20 kg	10 kg	7	5 cr
Batteries 7	Replace Daily	20 kg	1 kg	7	25 cr
Batteries 8	Replace Weekly	20 kg	1 kg	8	10 cr
Power Pak 8	Replace Weekly	30 kg	1 kg	8	25 cr
Batteries 9	Replace Monthly	20 kg	1 kg	9	5 cr
Power Pak 9	Replace Yearly	500 kg	1 kg	9	10 cr
Power Pak 10	Never Replace	50 kg	1 kg	10	10 cr

ROBOT SENSES AND SKILLS

Finally, one chooses the robots senses and initial skills, called programs. Programs have different resource requirements, and the usual amount of resources required is called a "slot". Most programs use one slot, but some use two. A program with two slots is the same to the robot as two programs using one slot each. Any sensory program which is called "Extended" subsumes the basic sense. In other words, Extended Vision I includes Basic Vision. Do not exceed the robot's initial number of programs (slots).

SP brains will learn skills at the rate given from that point forward, and if the maximum number of slots is exceeded, a skill is "forgotten" and the new skill replaces it, but the initial program set must be reprogrammed by a programmer and cannot be forgotten.

TABLE 8: ROBOT SENSES

Sense or Program	Description	Slots Used	Tech Level	Price
Basic Vision	Normal Human Vision	1	7	10cr
Extended Vision 1	Basic with IR and UV	1	7	15cr
Extended Vision 2	Basic with Light Enhancing	1	7	15cr
Extended Vision 3	Basic with 60 X Distance Vision	1	7	15cr
Night Vision	Extended Vision 1 and 2	1	8	25cr
Super Vision	Night Vision and Extended Vision 3	1	9	40cr
Basic Hearing	Normal Human Hearing	1	7	5cr
Extended Hearing 1	Basic with Ultrahigh Frequency	1	8	15cr
Extended Hearing 2	Basic with Ultralow Frequency	1	8	15cr
Extended Hearing 3	Basic with Long Range X5	1	8	15cr
Full Range Hearing	Extended Hearing 1 and 2	1	9	25cr
Super Hearing	Full Range plus Extended Hearing 3	1	10	40cr
Basic Smell	Normal Human Smell	1	8	25cr
Extended Smell	Extremely Sensitive Smell	1	10	100cr
Basic Taste	Normal Human Taste	1	8	50cr
Extended Taste	Extremely Sensitive taste	1	10	300cr
Poor Touch	Half Normal Human Touch	1	7	50cr
Basic Touch	Normal Human Touch	1	8	150cr
Extended Touch	Extremely Sensitive Touch	1	10	300cr

TABLE 9: ROBOT SKILL PROGRAMS

Sense or Program	Description	Slots Used	Tech Level	Price
Basic Language	Single Human Language	2	8	50cr
Speech Set I	All SaVaHuTa Languages	4	9	150cr
Speech Set II	All Diasporan Comm. Languages	4	9	150cr
Interface	Direct Computer Connection	5	7	50cr
Program	Any Non-Psionic Skill level	1	7	30cr

REPAIRING ROBOTS

Normal brains require a cybernetics skill of at least +3 to reprogram, and SP brains need a cybernetics skill of at least +5 to reprogram. Mechanics and Electronics can be used to repair the robot's body, depending upon the type of damage. A successful skill check will repair the robot, the number of protect points repaired is equal to the Quality of Success roll.

POINTS TO REMEMBER

When making a humanoid robot, remember that excessive factors make the robot seem inhuman. For instance, a robot with extensors higher than factor 2 would have arms inhumanly large. Generally speaking, factor 2 is the highest one can go while still seeming to be within the humanoid norm, factor 1 for Sastras and Vantors. Also, layers of armor make the robot seem stiff and artificial. They also make the robot heavy. A well designed robot from TL 8 and up can be indistinguishable from a human to casual inspection. A heavily modified Humanoid can be indistinguishable from a robot. It can be tricky indeed to know whether your fellow citizen is a robot or not.

ROBOT PERSONALITIES

Roll or choose one Basic personality, one Sense of Humor, and as many Others as you feel necessary. It is more difficult to play a robot with character traits which contradict each other, such as "Brilliant" and "Slow", than to play one with neutral traits, such as "Furtive" and "Cutting", or complementary traits, such as "Bluff" and "Hearty". Basic and humor traits which are complementary are listed next to each other.

Non-self-aware Robots have no personality. They exist only to serve their master.

Self-aware Robots have definite personalities. Roll or choose personality traits from the following table:

TABLE 10: ROBOT PERSSONALITIES

%d roll	Basic	Sense of Humor	Other
01-08	Gentle	Quiet	Habitual Gestures
09-11	Furtive	Sly	Impatient
12-16	Studious	Nonexistent	Twitchy
17-20	Sullen	Sarcastic	Bashful
21-30	Cheerful	Irreverent	Forceful
31-38	Skittish	Nervous	Brave
39-43	Romantic	Playful	Dreamy
44-50	Shy	Imaginative	Earnest
51-54	Condescending	Cutting	Loves Riddles
55-62	Brilliant	Witty	Artist
63-68	Dogged	Slow	Open, Trusting
69-78	Bluff	Hearty	Bold
79-85	Serene	Appreciative	Timid
86-90	Angry	Practical Joker	Ponderous
91-00	Bubbly	Silly	Talker

ABERRATION TABLES

TABLE 11: ABBERATION TABLE A

%dice	Abberation	Details
001-100	**No Abberation**	**Nothing**
101-103	Self Aware	Roll on Aberration Table B +0
104-105	Self Aware	Roll on Aberration Table B +5
105-107	Self Aware	Roll on Aberration Table B +10
107-110	Self Aware	Roll on Aberration Table B +15
110-112	Self Aware	Roll on Aberration Table B +20
113-115	Self Aware	Roll on Aberration Table B. If result is 50 or less, continue rolling until result of greater than 50 occurs

TABLE 12: ABBERATION TABLE 3

%dice	Aberration
01-50	**Relatively Normal**
51-53	Passionately devoted to owner
54-56	Tendency to wander off unsupervised
57-59	Collects things - Roll again
60-63	Prone to mild psychosomatic illness
64-67	Periodically Amnesiac
68-70	Pacifist - Roll again
74-77	Champion of Robot's Rights
78-80	Believes self to be human
81-85	Believes in a Robot God
86-90	Believes in a Robot God. Wants to become a Priest.
91-98	Superiority Complex - Roll again
99-105	Inferiority Complex - Roll again
106-115	Depressed
116+	Manic-depressive

STANDARD ROBOTS

SASTRA BOT

Component Type Cost Kg
Brain SPIII 200 4
Torso Sastra 260 20
Extensor Tentacle Factor I 125 5
Anthro Factor I 150 5
Anthro Factor I 150 5
Manipulator Tentacle/Tail 5 1
Hand 30 1
Hand 30 1
Surface Pseudoskin 60 1
Locomotor Anthro 100 10
Power Supply Power Pak 4 10 1
Senses Basic Vision 10
Hearing 5
Basic Speech 2
Price 900cr Totals 1087cr 54kg

BOX BOT

Component Type Cost Kg
Brain Servant 50 9
Torso Box Factor 1 40 40
Extensor Tentacle Factor 1 125 5
Manipulator Socket 15 1
Surface Sheet Steel 100 4
Locomotor Wheels 45 30
Power Supply Batteries 1 75 6
Senses Interface 150 0
Price 350cr Totals 600cr 95kg

FLOATER BOT

Component Type Cost Kg
Brain SP III 150 3
Torso Sphere Factor III 210 30
Extensor Tentacle Factor I 125 5
Tentacle Factor I 125 5
Tentacle Factor I 125 5
Manipulator Hand 30 1
Hand 30 1
Socket 15 1
Surface Ceramic 150 5
Chromskin 150 0
Locomotor A-Grav 2 Factor 4 4 0.2
Power Supply PowerPak 4 10 1
Senses Basic Vision 10
Hearing 5
Speech 50
Price 1000cr Totals 1255cr 57.2 Kg

SPIDER BOT

Component Type Cost Kg
Brain Porter 40 7
Torso Cylinder Factor I 90 30
Extensor Jointed Factor I 10 5
Manipulator Hand 30 1
Surface Sheet Steel 75 3
Locomotor 6 Spider Legs 60 30
Power Supply Batteries 1 75 3
Senses Basic Vision 10
Price 320cr Total 375cr 79 Kg

BARREL BOT

Component Type Cost Kg
Brain Servant 50 9
Torso Barrel 200 40
Extensor Telescoping Factor I 50 5
Telescoping Factor I 50 5
Manipulator Pincer 15 2
Socket 15 1
Surface Sheet Metal 100 4
Locomotor Wheels Factor IV 60 40
Power Supply Batteries 1 125 5
Senses Extended Vision 1 15
Hearing 5
Interface 150
Price 625cr Total 870cr 111 Kg

ANTHRO BOT

Component Type Cost Kg
Brain SP III 200 4
Torso Anthro 350 35
Extensor Anthro Factor I 150 5
Anthro Factor I 150 5
Manipulator Hand 30 1
Hand 30 1
Surface Sheet Steel 50 4
Chromskin 12 0
Locomotor Anthro Factor I 100 7
Power Supply PowerPak 4 10 1
Senses Basic Vision 10
Hearing 5
Basic Speech 50
Price 1000cr Totals 1255cr 67 Kg

ROBOT CONSTRUCTION SHEET

Component	Feature/Factor	kg/Factor	Factor	Mass	Cost
Brain					
----------	----------	----------	----------	-------kg	------cr
Torso					
----------	----------	----------	----------	-------kg	------cr
Extensors					
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
Manipulators					
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
Locomotors					
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
Surfaces					
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
----------	----------	----------	----------	-------kg	------cr
Power Supply					
----------	----------	----------	----------	-------kg	------cr
Total					
----------	----------	----------	----------	-------kg	------cr

Installed Senses/Programs

_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____