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(54) **PROTEZĂ ORTOPEDICĂ BIONICĂ MODULARĂ DE COAPSĂ
"BIO-TECH-LEG"**

(57) Rezumat:

Invenția se referă la o proteză ortopedică, destinată persoanelor ale căror membre inferioare au fost amputate. Proteza conform invenției este constituită dintr-o talpă, o piesă care face legătura între talpă și o gleznă, o tibie care conține un sistem de reglare pe înălțime și greutate, un genunchi care produce forța necesară punerii în mișcare autonomă, un sistem de reglare pe înălțime a părții superioare, dispus deasupra genunchiului, o carcasă și un sistem de atașare a acesteia.

Revendicări: 1
Figuri: 59

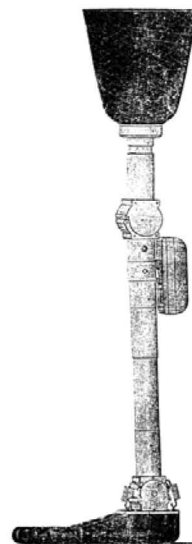
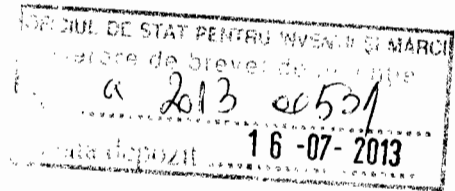


Fig. 56

Cu începere de la data publicării cererii de brevet, cererea asigură, în mod provizoriu, solicitantului, protecția conferită potrivit dispozițiilor art.32 din Legea nr.64/1991, cu excepția cazurilor în care cererea de brevet de invenție a fost respinsă, retrasă sau considerată ca fiind retrasă. Întinderea protecției conferite de cererea de brevet de invenție este determinată de revendicările conținute în cererea publicată în conformitate cu art.23 alin.(1) - (3).





Proteza ortopedica bionica modulara de coapsa “ Bio-Tech-Leg “

Inventia se refera la un aparat destinat persoanelor, care in urma unei amputari localizata deasupra genunchiului, a unui sau ambelor membrelor inferioare, necesita o proteza pentru a se putea deplasa. Inventia se aplica domeniului ortopedic continuand elemente ale domeniului tehnic electric si mechanic.

In scopul adaugarii unui membru inferior artificial, persoanelor carora le-au fost amputat membrul natural, s-au realizat aparate in domeniul ortopedic. Majoritatea protezelor ortopedice modulare de coapsa, ofera purtatorului foarte putine avantaje din cele pe care le oferea membrul natural, deoarece aparatele nu sunt capabile sa efectueze miscare autonoma si nu dezvoltă propria forta de propulsare necesara deplasarii, purtatorul fiind nevoit sa se deplaseze folosind forta membrului natural, iar proteza avand rol de sprijin, rol identic cu al unei carje. Protezele de genul mentionat prezinta insuficienta atentie cu privire la nevoile purtatorului in ceea ce privesc studiile tehnice anterioare. Ca o proteza sa fie cat mai eficienta, ea fiind inlocuitorul membrului natural, trebuie sa ofere purtatorului cat mai multe din avantajele pe care le oferea membrul natural. Sunt cunoscute aparate in scopul adaugarii unui membru inferior artificial persoanelor al carui membru natural a fost amputat din diverse motive. Aceste aparate nepermitand reglarea lor dupa inaltimea si greutatea purtatorului, ce se schimba in timp in special la persoanele minore, totodata sistemul de atasare a aparatului de copul purtatorului nu creeaza priza necesara mentinerii aparatului atasat, prin urmare siguranta purtatorului nu este realizata. Iar partea exterioara a protezei in majoritatea cazurilor este o imitatie a piciorului natural, fapt care creaza confuzie persoanelor care nu sunt purtatoare de proteze, iar persoanele care poarta sunt stanjenite si le

este ingradita integrarea in societate in special la copii iar adultilor le creaza probleme in viata de cuplu. Talpa fiind o placbanda flexibila, sau turnata in matrita fara a permite mularea ei pe suprafete neuniforme fapt care creaza dezechilibru.

Problema tehnica pe care o rezolva inventia, este de a permite atingerea avantajelor oferite de un membru natural inferior, persoanelor care necesita atasarea unui membru inferior artificial, aceste avantaje fiind, miscarea individuala a aparatului actionata de purtator, un echilibru bun datorat flexibilitatii talpii si capacitatii de a se mula pe o suprafata denivelata, reglarea protezei in functie de greutatea si inaltimea purtatorului, atasarea prin vid a aparatului de purtator, miscarea autonoma a membrului artificial, consumand propria energie permitandu-i purtatorului o utilizare indelungata cu efort minim. Oferă purtatorului capacitatea de a alerga cu viteza variabila si sprijin in actiuni precum deplasarea pe teren accidentat, urcare si coborare pe scari, ridicarea din pozitia sejut.

Modul de functionare conform inventiei, inlatura dezavantajele mentionate, prin faptul ca este prevazuta cu un ansamblu de componente (1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21, 22,23,24,25,26,27,(27,5)(27,6)28,29,30,31,32,33,34,35,36,37,38,39, 40,41, 42,43,44,45,46,47), conform desenelor explicative (49, 50, 51, 52, 53, 54, 55, 56, 57 ,58 ,59) reprezinta structura si partea mecanica ce defineste functia fiecărei componente in parte. Acestea impreuna cu componentele electrice (11),(14),(21),(27),(27,5),(27,6), (35) si schema electrica (48) alcatuiesc intreg sistemul de functionare definit ca fiind inovatie aplicabila.

Inovatia fiind proteza ortopedica bionica modulara de coapsa ” Bio-Tech-Leg ”.

Toate componentele mentionate mai sus pot fi fabricate din materiale usoare si dure precum titan sau plastic prin procedura de frezare respectiv turnare in matrita. cu exceptia (1,2,3,4,5,8,20, 46,47) care pot fi fabricate din plastic prin procedeu de turnare in matrita si apoi finisare si cu exceptia (6,7,41,42,43,44,45) ce pot fi

produse din fibra de carbon, prin procedeul de mulare a fibrei pe matrita.

Ideea inovatoare este pusa in evidenta prin faptul ca inventia este conceputa pentru a imita si reproduce cat mai multe avantaje pe care le ofera un membru inferior natural.

Se da, in continuare, un exemplu de realizare a inventiei, in legatura cu figurile de la (1) la (47) care reprezinta un ansamblu de componente ce permit asezarea si punerea in miscare corecta a fiecărei componente in parte. Si schema electrica (48)

Talpa protezei continand componente de la (1), (2), (3), (4), (5), (6), (7) si (8) ofera un bun echilibru datorita perimterii miscarii individuale a degetelor (1), (2) ,(3) si a componentelor talpii (4), (5) care permit mularea pe o suprafata denivelata. Componentele (6), (7) ofera elasticitate ce efectueaza revenirea la forma initiala in momentul in care nu mai este supusa unei forte de apasare datorita greutatii corpului purtatorului protezei in momentul pasirii .

Componenta (9) face legatura intre talpa si componentele gleznei totodata prezinta la capete doua parti metalice sub forma de semicerc cu rol in permiterea astasarii a doua capete de arcuri extensibile (17), care au ca scop aducerea la pozitia initiala a talpii dupa ce ea este actionata fie de motorul electric fie de greutatea purtatorului.

Componenta (10) face legatura intre componentele (9) si (12,13) si este limitator in ceea ce priveste miscarea de rotatie a talpii, deoarece componentele (10) si (18) la atingerea lor in procesul de deplasare a purtatorului protezei limiteaza rotirea talpii pentru ai oferi sprijin si siguranta.

Motorul electric de curent continuu cu magnet permanent de 18 V (11) permite miscare individuala a protezei in momentul in care purtatorul activeaza senzorul prin canalizarea greutatii corpului, sprijinindu-se pe proteza. Acest fapt ii ofera forta de propulsare necesara saltului sau deplasarii indiferent de viteza.

Componenta (12) sustine partea interioara a unui rulment pentru a elimina forta de frecare a gleznei si ai permite o rotatie

fluenta si centrata. Componenta (13) este conectata la motorul electric si ii transmite forta de rotatie talpii pentru a o pune in miscare, tot pe aceasta se afla doua spatii unde sunt amplasate doua componente (14) de o parte si de alta a componentei (13). Unde componenta (14) are rol in a inchide circuitul electric pentru a pune in miscare motorul electric (11), deasemenea aceasta poate fi considerata sensor.

Componenta (15) are ca rol sustinerea partii exterioare a unui rulment si este perechea componentei (12).

Motorul electric continand intre stator si rotor doi rulmenti dintre care atributia unuia este imprumutata componentei (13), iar (12) si (15) intrgesc ansamblul de rulmenti necesari eliminarii, uzurii si incetinerii miscarii.

Componenta (16) este atasata de motorul electric prin doua suruburi pentru ai mentine pozitia, tot pe aceasta sunt amplasate alte doua componente (14) pentru a intregii circuitul electric, unde cele doua componente (14) atasate pe (13) prin rotatia gleznei, creeaza contact cu una din cele doua (14) amplasate pe (16) unde inchid contactul doua cate doua si dirijeaza sensul de rotatie al motorului electric de curent continuu cu magnet permanent care pune talpa in miscare. Sensul de rotatie punand talpa in miscare spre in sus cand (14) din spre calcai se ating si inchid circuitul, iar cand (14) din spre partea cu degete a talpi se ating, sensul de rotatie misca talpa in spre in jos, fapt care ofera propulsie in pasire si saritura.

Componenta (18) fiind perechea componentei (10), impreuna au rol de limitare a miscarii rotative pentru a sprijinii purtatorul protezei si de a mentine arcurile (17) atasate de ele, ca arcurile sa isi poata indeplinii rolul de a readuce la pozitia initiala talpa in urma actionarii motorului electric. (18) prezinta si o parte a sistemului de reglare pe inaltime a protezei.

Componenta (19) reprezinta tibia al carui cap cu filet exterior este atasat de (18), care prezinta filet interior. Fixarea celor doua pe lungimea tibiei dorita si necesara pentru purtator se face prin

infiletarea a doua suruburi prin (18) care imping in (19) si o fixeaza pe aceasta mentinand-o in acea pozitie.

Componenta (20) este suportul pe care componenta (21), un buton variabil, cu rol de sensor este asezat si fixat prin arcuirea clemelor (20). Ambele componente (20) si (21) sunt introduse in interiorul tibiei (19) la capaul ce prezinta filet interior si diametru mai mare care ofera o limitare permitand fixare componentei (20) .

Partea mobila a senzorului variabil de miscare este pozitionata in interiorul componentei (22) ce permite atasarea in interiorul ei a unui arc compresor (23) cu rol in amortizarea impactului si deconectarea senzorului variabil, fapt care rezulta din canalizarea greutatii purtatorului pe celalant membru inferior.

Componenta (24) se infileteaza pe (26) si impreuna alcatuiesc un sistem de reglare a momentului de reactie a protezei in functie de greutatea purtatorului deoarece aceasta variaza.

Componenta (25) deasemenea este atasata pe (26) si se infileteaza pe (22) pozitionand (23) si (24) in interiorul (22). Iar ansamblul de componente de la (20) la (26) alcatuiesc sistemul de reglare in functie de greutatea purtatorului si de a activa miscarea individuala a protezei, aceasta fiind realizata prin apasarea senzorului variabil (21) cu ajutorul canalizarii greutatii purtatorului pe proteza in momentul in care se sprijina pe aceasta.

Componenta (27,6) este capacul de protectie si de sustinere a componentei (27,5) ce reprezinta sistemul de atasare a sursei energetice aceasta fiind un acumulator de 18 V reprezentat de componenta (27); aceste doua componente sunt atasate de (28) care este atasata de (19) si (26) iar (26) este fixata de (29) prin infiletare in (28). Componentele de la (18) la (29) alcatuiesc tibia.

Componentele (30) si (31) sunt atasate de (28), iar componenta (30) este atasata de (32), unde (33) este introdusa in (32), iar (33) si (32) sunt introduse in (34) care este atasata prin suruburi de componenta (35), aceasta fiind un motor electric de curent continuu cu magnet permanent de 18 V asemenea componentei (11). Iar impreuna componentele (32), (33) si (34) alcatuiesc un reductor cu

rol in transformarea vitezei create de componenta (35) in puterea necesara miscarii, aceasta fiind un mijloc de substituie a rolului muschiului membrului natural.

Ansamblul de componente de la (28) la (36) alcatuiesc partea genunchiului a inventiei, ce ofera mobilitate autonoma si asistenta in deplasare.

Componentele (39) si (36) alcatuiesc cea de a doua parte reglabila a protezei pe lungime a partii superioare a protezei.

Componenta (36) prezinta filet interior si este atasata prin insurubare de (39) care prezinta filet exterior.

Componentele (39) si (40) alcatuiesc un sistem de atasare in vid a protezei de corpul purtatorului pentru a evita accidente produse in urma detasarii protezei de purtator, fara intentia acestuia. Unde (39) este prevazuta cu un canal de aerisire ce creaza vid prin astuparea lui cu un dop, in momentul in care se ataseaza proteza de purtator si mansonul se muleaza pe membrul acestuia, fapt care nu permite detasarea involuntara a purtatorului de proteza.

Componenta (41) este carcasa ce acopera tibia de la jumatatea gleznei pana sub genunchi. In interiorul ei fiind lipite cu adeziv componentele (47) care se ataseaza de componenta (19) conform desenelor explicative.

Componenta (42) este partea carcasei ce acopera partea inferioara a genunchiului pana la jumatatea acestuia, ea prin lipire se ataseaza de (46), iar (46) se ataseaza pe (28) prin infiletarea a doua suruburi care creeaza presiune intre componente. Unde componenta (42) intra in interiorul componentei (41) in momentul pasirii cand greutatea purtatorului activeaza senzorul (21), iar distanta parcursa de (42) in interiorul (41) este egala cu inaltimea maxima variabila a (21), aceasta fiind specificata in desene.

Componenta (43) este perechea componentei (42), ambele acoperind partea genunchiului. (43) fiind atasata de o alta componenta (46) prin lipire cu adeziv, iar (46) fiind atasata de (36) prin infiletare a doua suruburi cae creeaza presiune intre

componente, fixandu-le pe pozitie si permitandu-le o fixare variabila, la alegerea purtatorului.

Componenta (44) reprezinta carcasa ce acopera proteza de deasupra genunchiului pana la nivelul superior al mansonului. Aceasta fiind atasata de componenta (43) prin lipire cu adeziv sau fixare prin infiletarea unor suruburi prin ambele componente. Partea superioara a componentei (43) fiind introdusa in interiorul componentei (44).

Componenta (45) reprezinta o parte a carcasei, care este pozitionata deasupra talpii pana la jumatatea gleznie si este atasata de componenta (9) prin lipire cu adeziv, iar partea superioara a (45) este pozitionata in interiorul partii inferioare a componentei (41).

Pentru activarea si punerea in miscare a articulatiei genunchiului, este necesar un impuls din partea purtatorului, impuls oferit in momentul in care purtatorul isi canalizeaza greutatea corpului pe proteza, fapt care justifica prezenta sistemului de reglare pe greutate. Activarea acesteia necesita punerea in miscare pe inaltime a protezei, fapt care impinge senzorul variabil (21) care la randul lui activeaza si dirijeaza miscarea individuala a protezei. In acelasi timp cu canalizarea greutatii purtatorului pentru activare, are loc si amortizarea impactului in momentul deplasarii, fapt necesar asigurarii confortului si eliminarii sanselor de provocare a ranilor, datorate deplasarilor in perioade indelungate de timp.

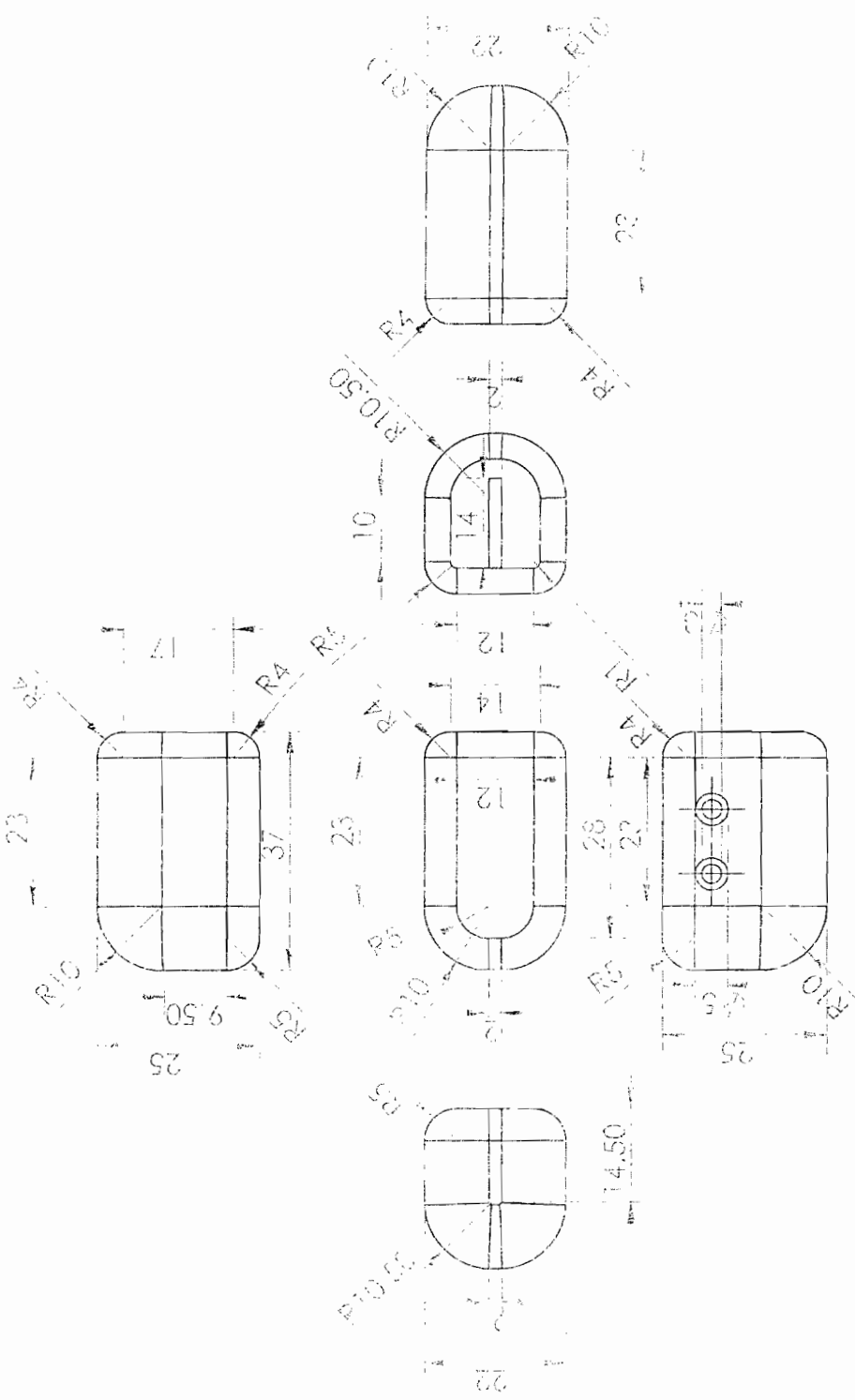
Spre deosebire de alte solutii tehnice anterioare proteza ortopedica bionica modulara de coapsa "Bio-Tech-Leg", prin ansamblul de componente de la (1) la (47), ofera propriul mijloc de creare a propulsiei necesare deplasarii, reglarea dupa inaltimea si greutatea purtatorului, daca acestea se modifica in timp. Oferă purtatorului capacitatea si sprijinul necesar la asezarea si ridicarea din pozitia sezut, alergare cu variatii de viteza, deplasarea pe teren accidentat, urcarea si coborarea pe scari, posibilitatea de a se deplasa o perioada de timp indelungata cu un efort minim, atasarea aparatului de purtator printr-o priza creata in vid, echilibru pe teren cu suprafata neuniforma.

Revendicari

Proteza ortopedica bionica modulara de coapsa "Bio-Tech-Leg" caracterizata prin aceea ca, principiile de functionare determinate de ansamblul total de componente ce definesc caracteristicile tehnice esentiale ale inovatiei sunt (1),(2),(3),(4),(5),(6),(7),(8),(9),(10),(12),(13),(14),(15), (16),(17),(18),(19),(20),(22),(23),(24),(25),(26),(27),(27,5),(27,6),(28),(29), (30),(31),(32),(33),(34),(36),(37),(38),(39),(40),(41),(42),(43),(44),(45),(46), (47), acestea fiind notate numeric deoarece sunt semne de referinta care sunt prezente si pe desene, deasemenea schema electrica (48) si desenele explicative (49),(50),(51),(52),(53),(54),(55),(56),(57),(58),(59). Ansamblul total de componente reprezentand structura si partea mecanica ce defineste functia fiecarei componente in parte, acestea impreuna alcatuind principiul de functionare si punerea in evidenta a solutiei tehnice inovatoare, caracterizata prin aceea ca, componentele (1), (2), (3), (4), (5), (6), (7), (8) reprezinta componente ale protezei care alcatuiesc talpa, (9) este piesa care face legatura intre talpa si componentele gleznei (10), (12), (13), (14), (15), (16), (17), (18). Iar ansamblul de piese (19), (20), (22), (23), (24), (25), (26), (27), (27,5), (27,6), (28), (29) alcatuiesc tibia ce contine sistemul de reglare pe inaltime si greutate, procesul de realizare al miscari autonome, amortizorul impactului si sursa de energie cu sistemul acesteia de atasare. Componentele (30), (31), (32), (33), (34), (36), (37), (38) reprezinta intregul sistem al genunchiului, fiind sursa ce produce forta necesara punerii in miscare autonoma a protezei. Componentele (39), (40) alcatuiesc sistemul de reglare pe inaltime a partii superioare, aceasta fiind localizata deasupra genunchiului si totodata permite creerea unei prize in vid a protezei de purtator. Componentele (41),(42),(43),(44),(45),(46),(47) reprezinta carcasa protezei si sistemul acesteia de atasare iar (48) reprezinta schema electrica. Modul in care componentele sunt atasate intre ele este prezentat pe desenele explicative (49),(50),(51),(52),(53),(54),(55),(56),(57),(58),(59) din care reiese solutia tehnica inovatoare.

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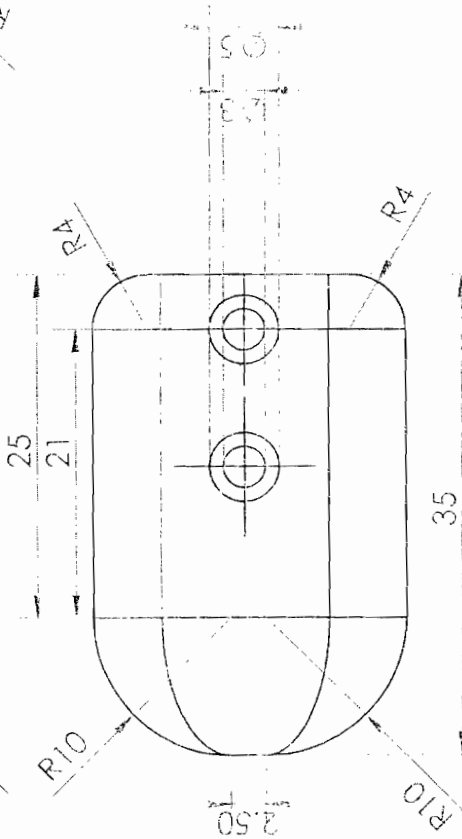
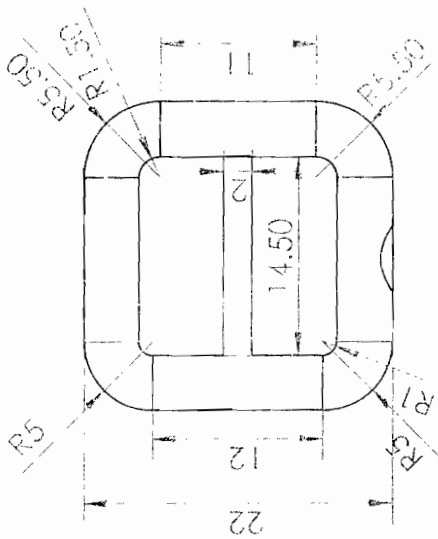
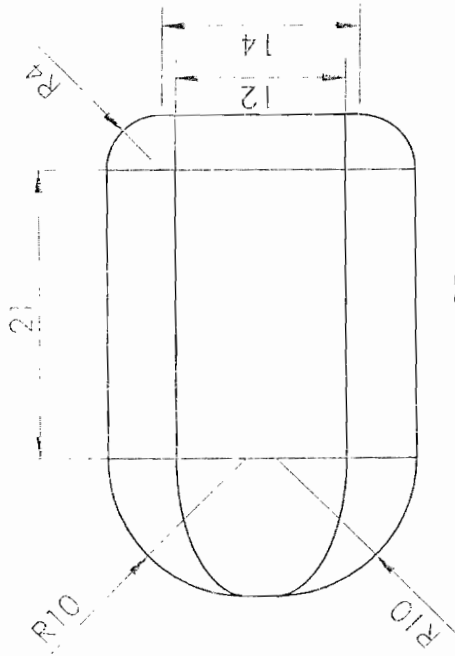
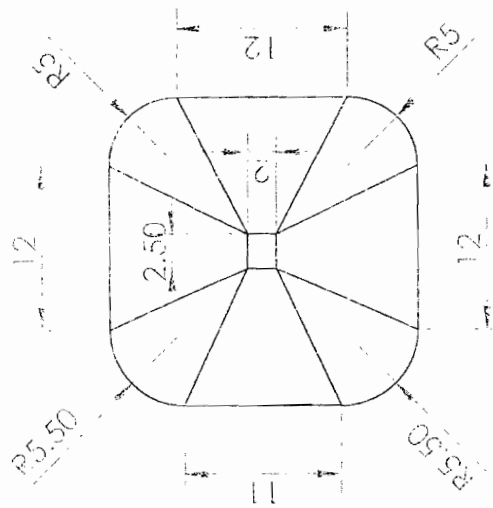
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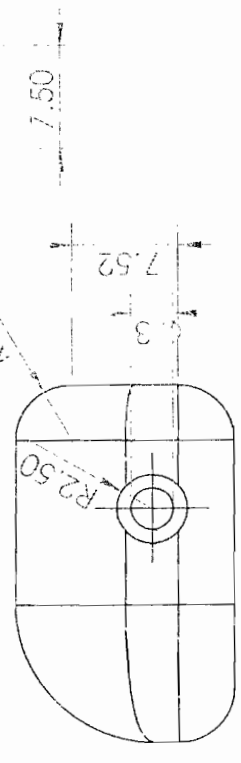
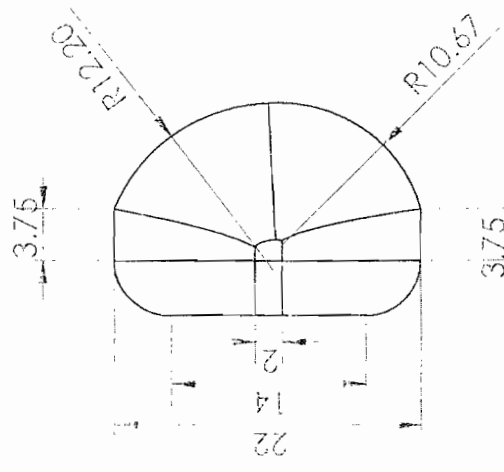
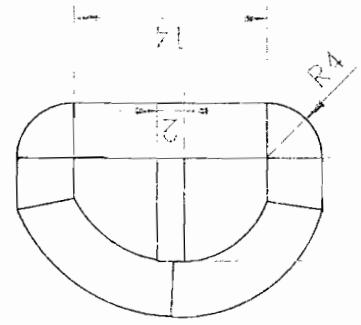
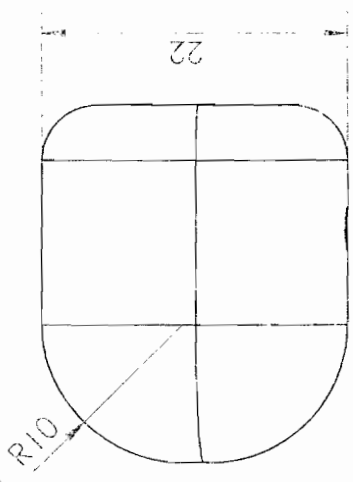
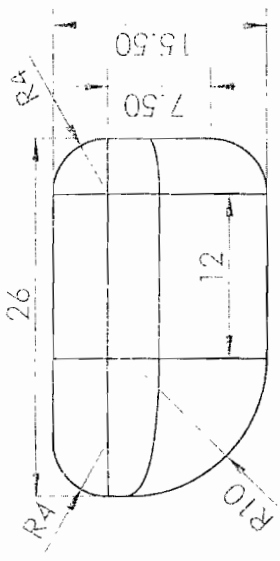
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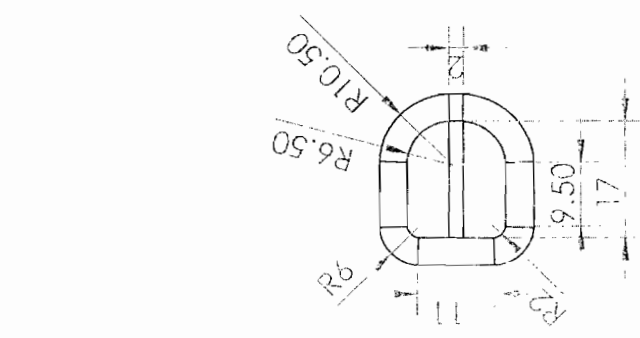
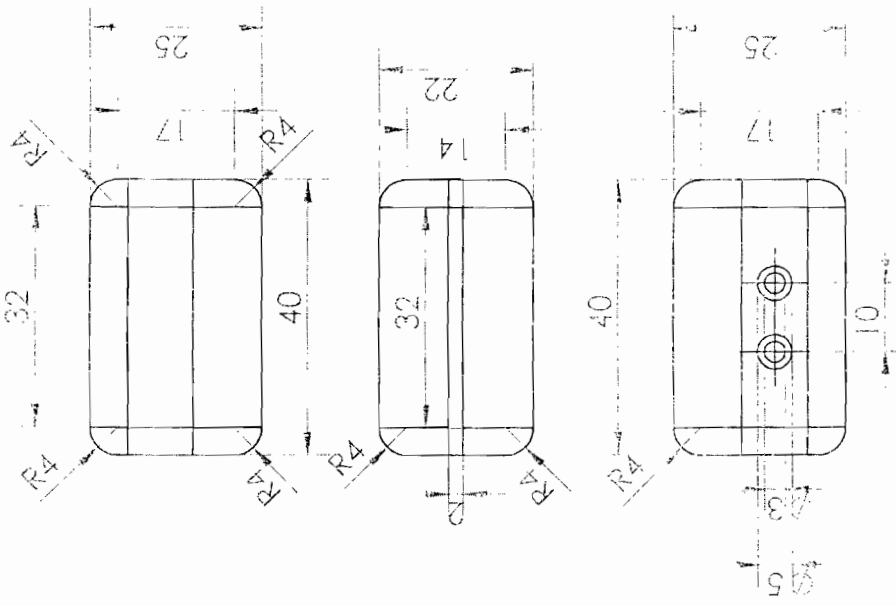
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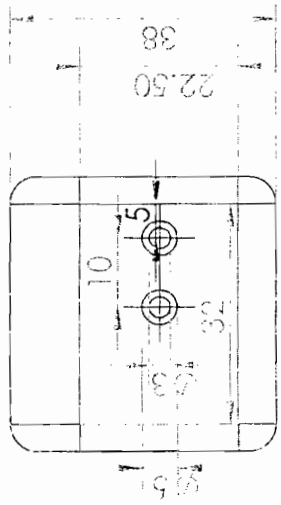
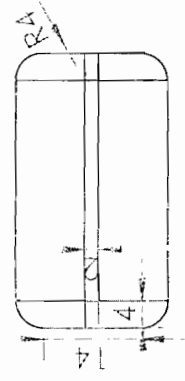
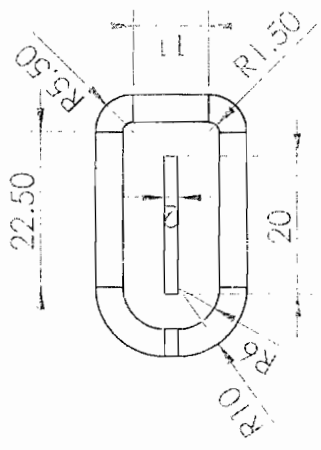
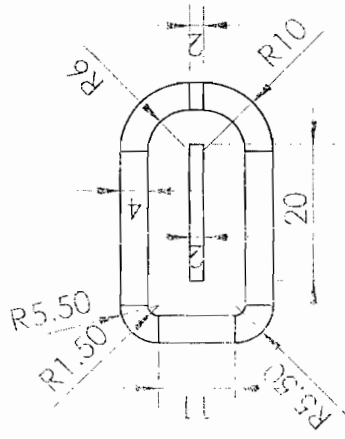
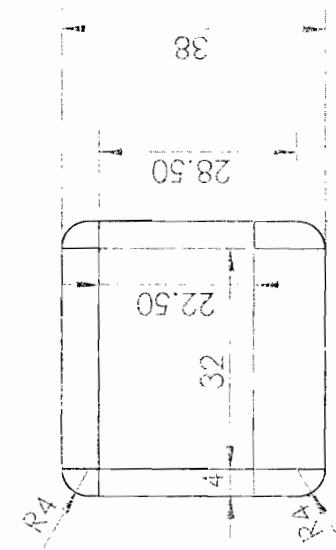
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16-07-2013

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TOLERANCES:
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NAME SIGNATURE DATE TITLE

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MATERIAL: DWG NO. 5

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WEIGHT:

SCALE: 1:1

SHEET 1 OF 1

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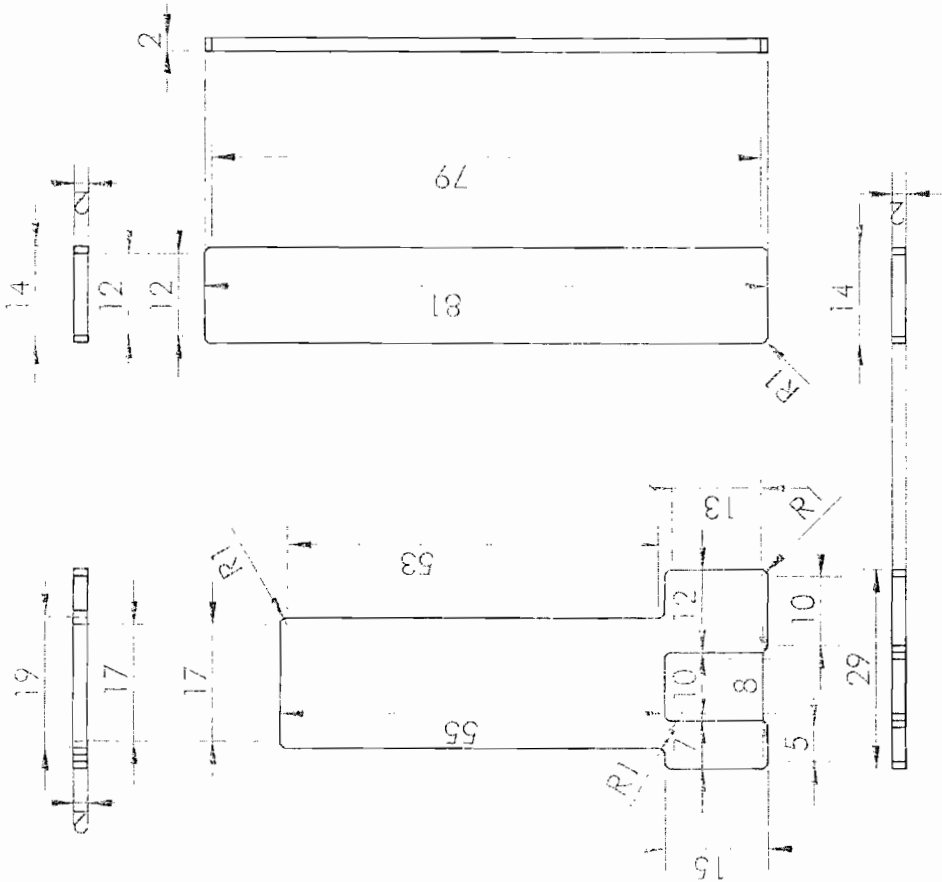
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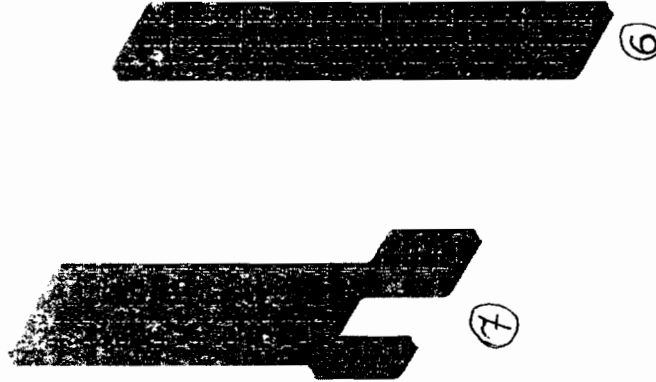
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16-07-2013



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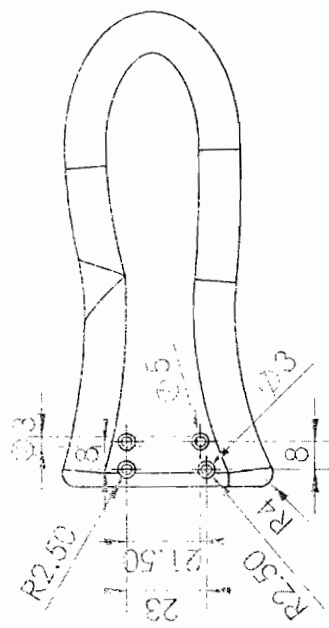
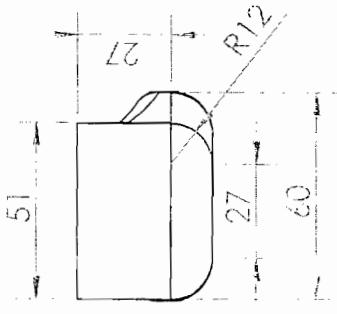
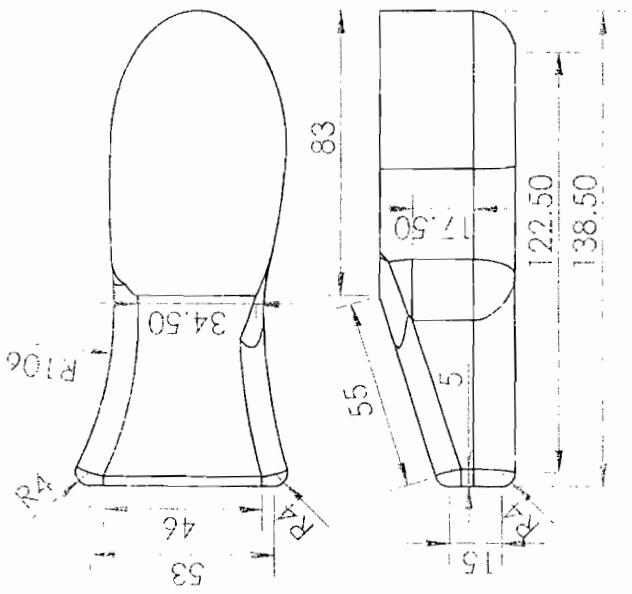
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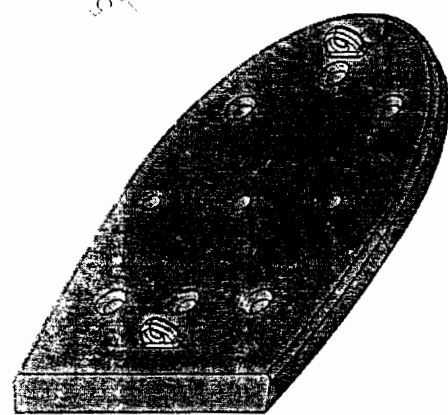
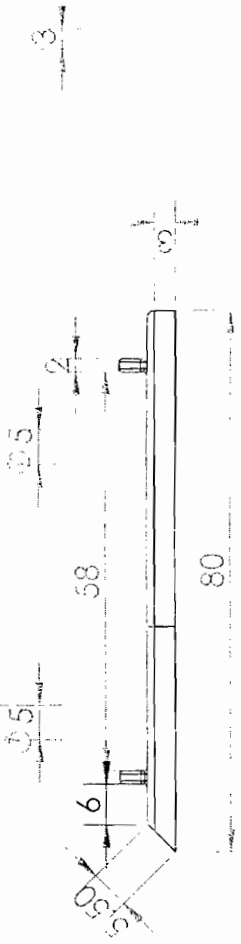
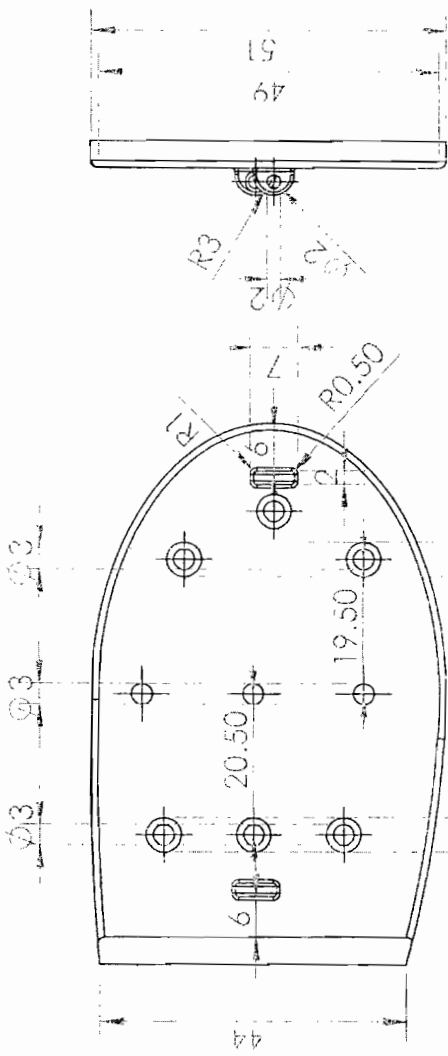
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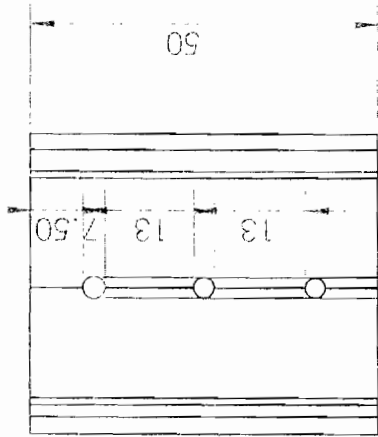
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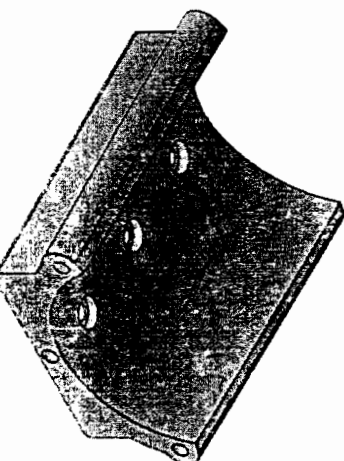
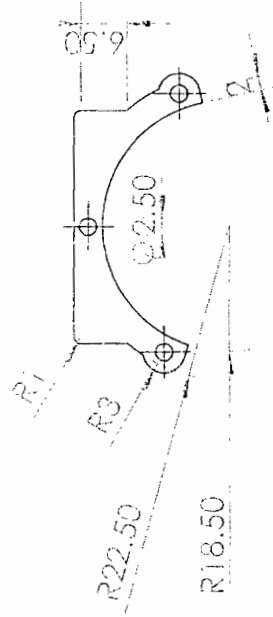


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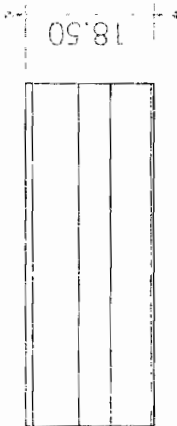
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SHEET 1 OF 1

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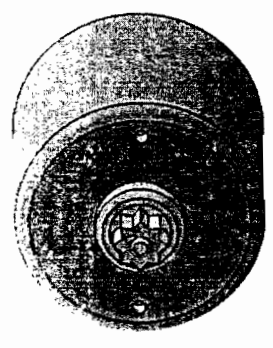
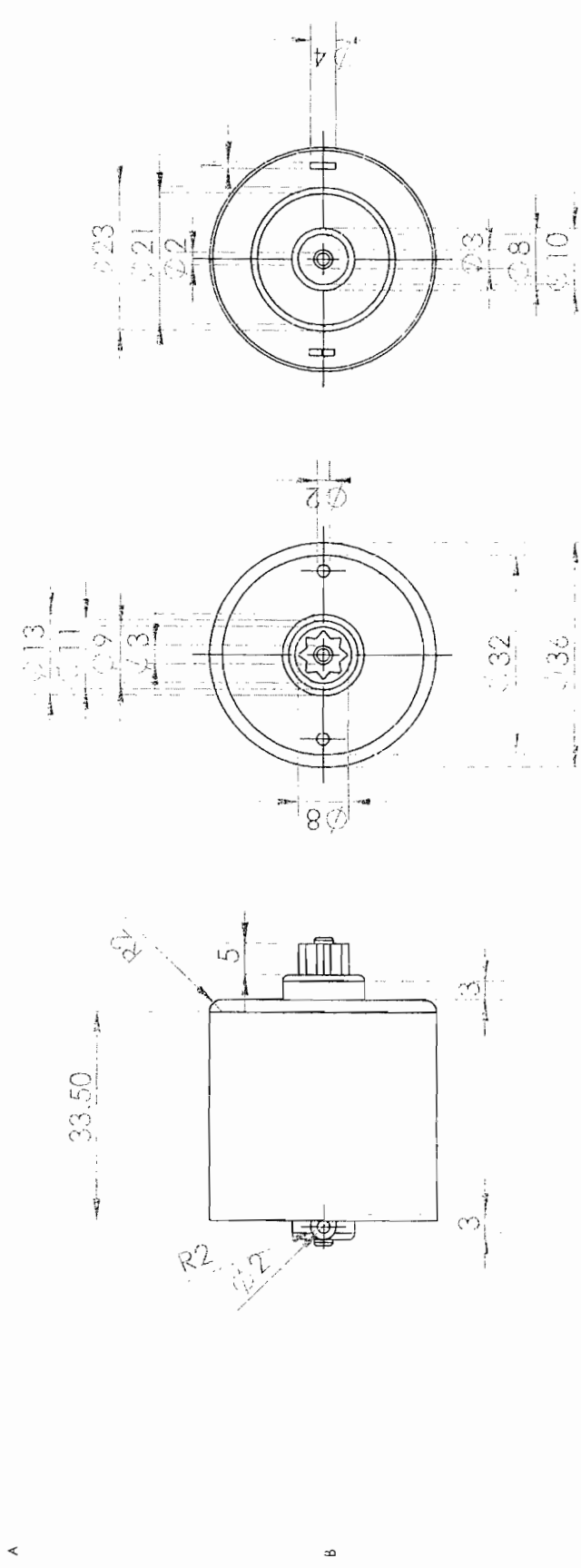
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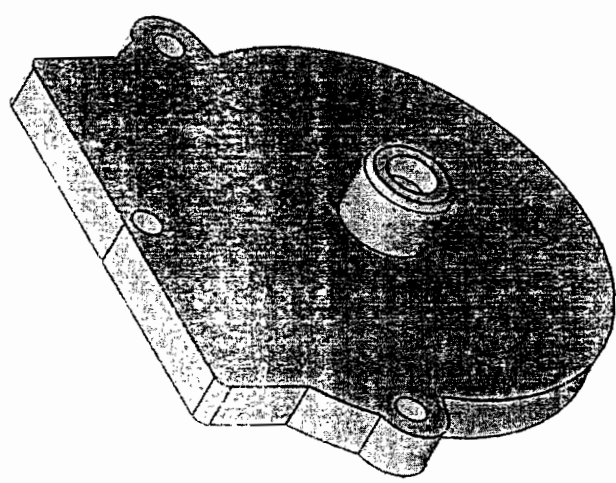
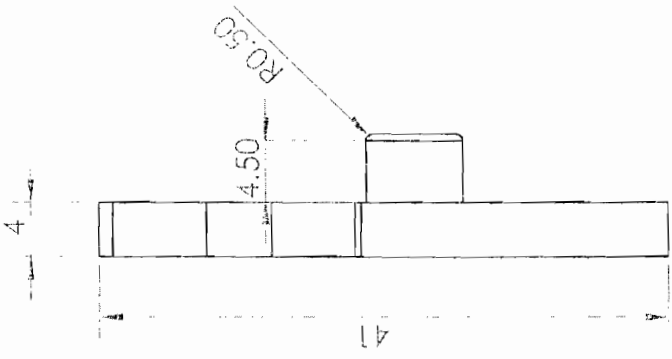
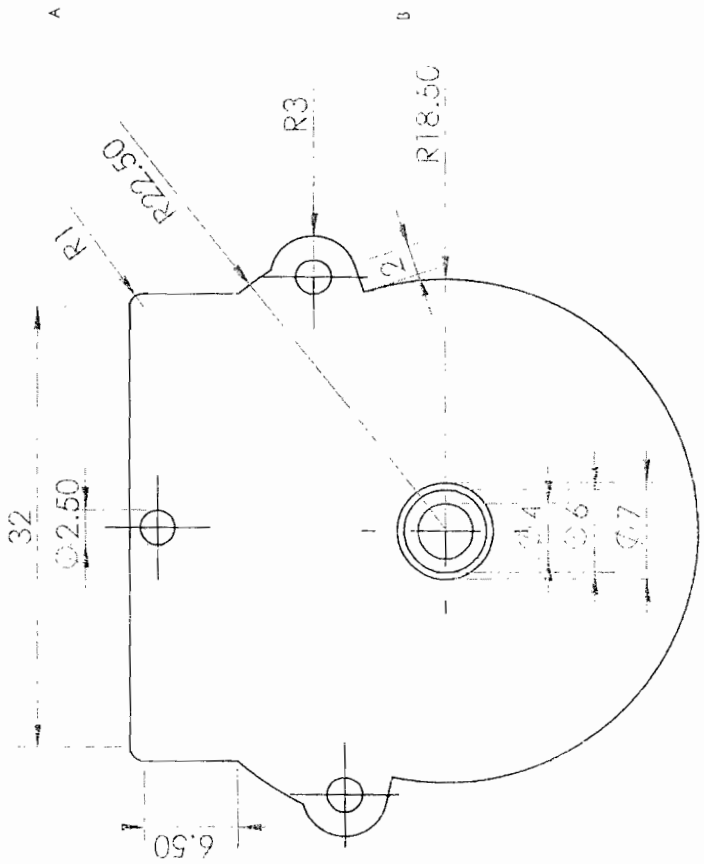
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16-07-2013

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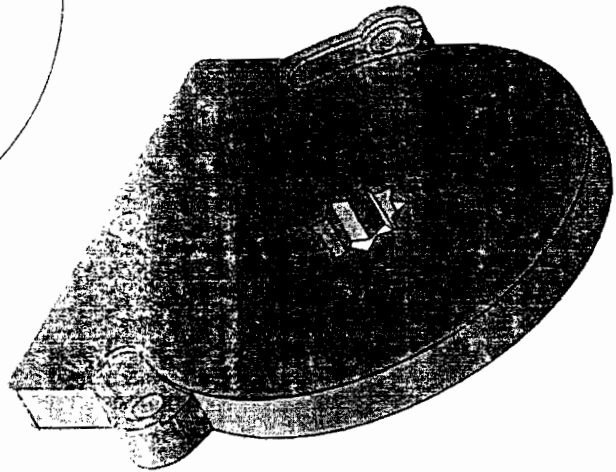
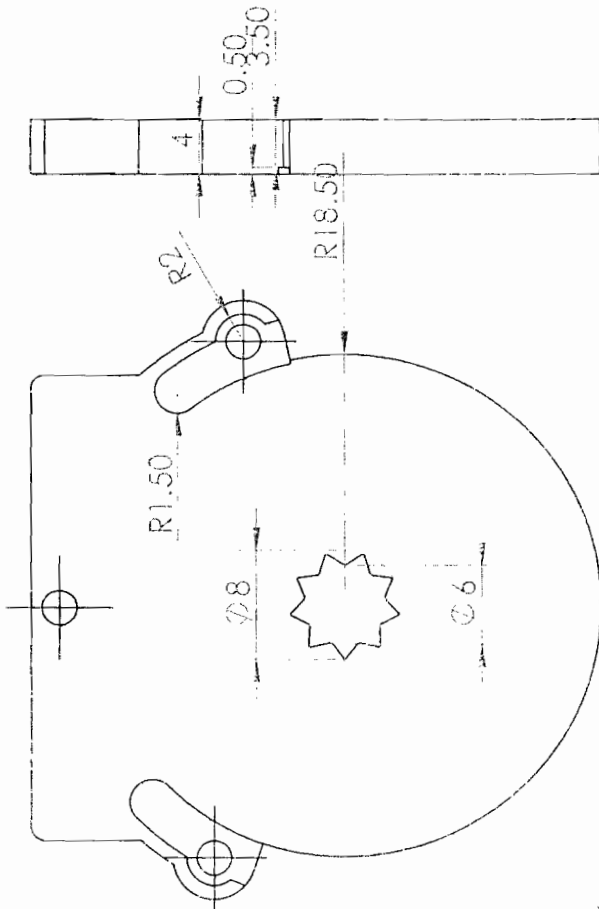
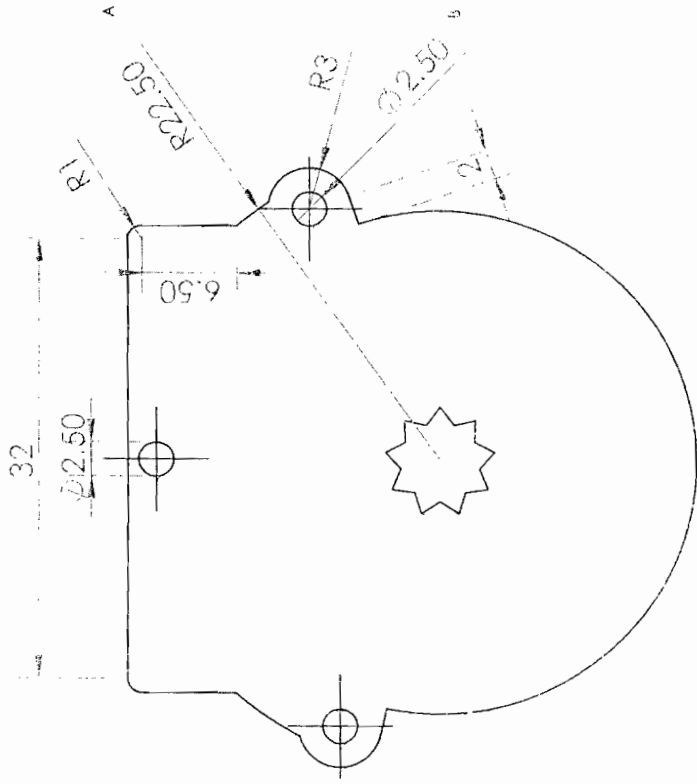
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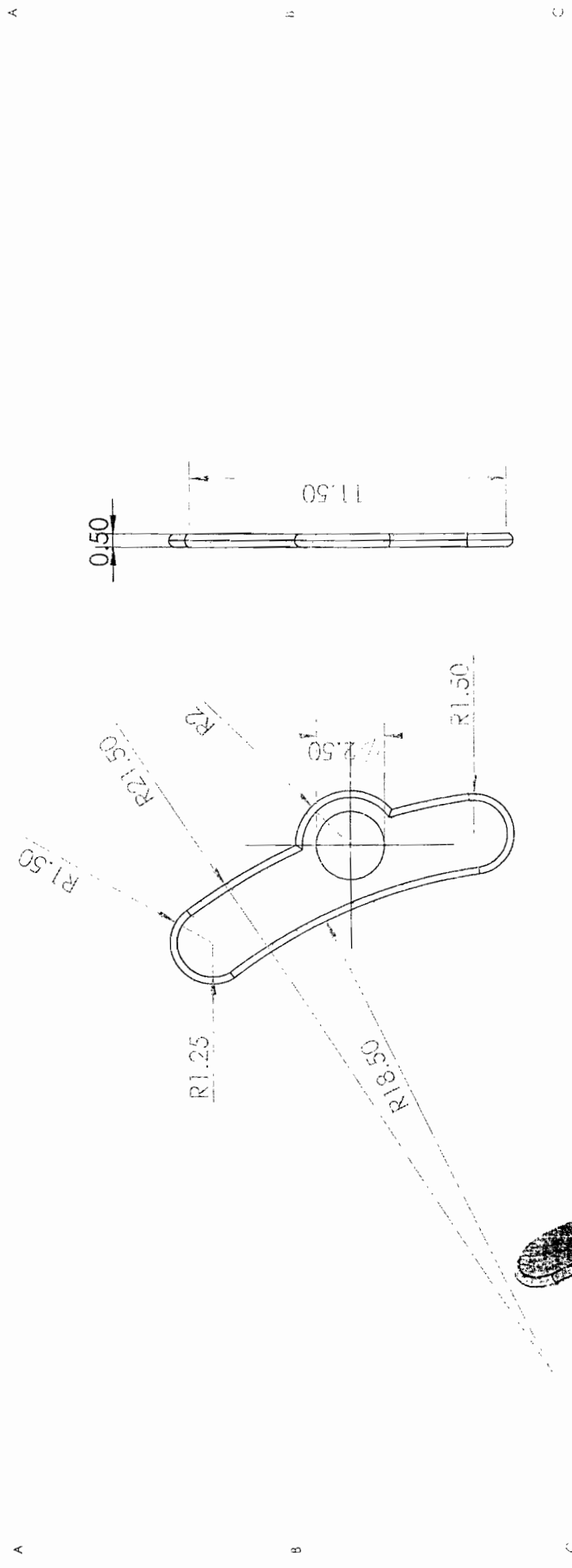
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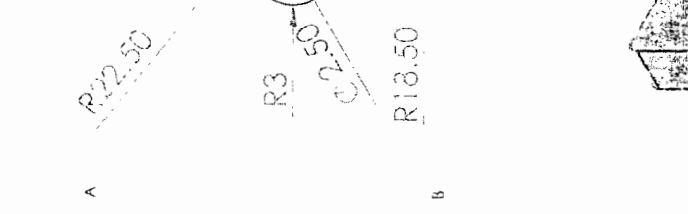
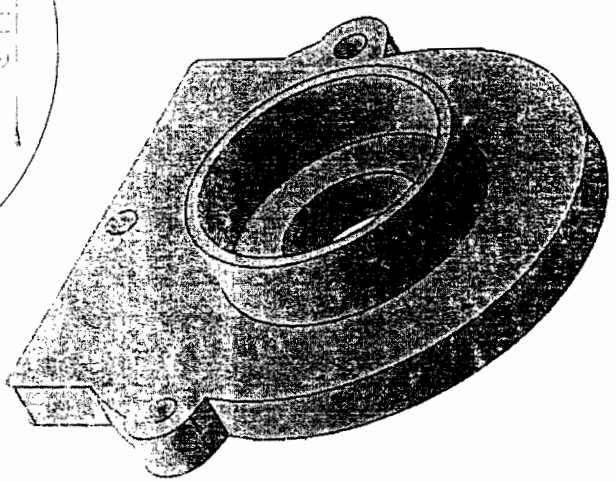
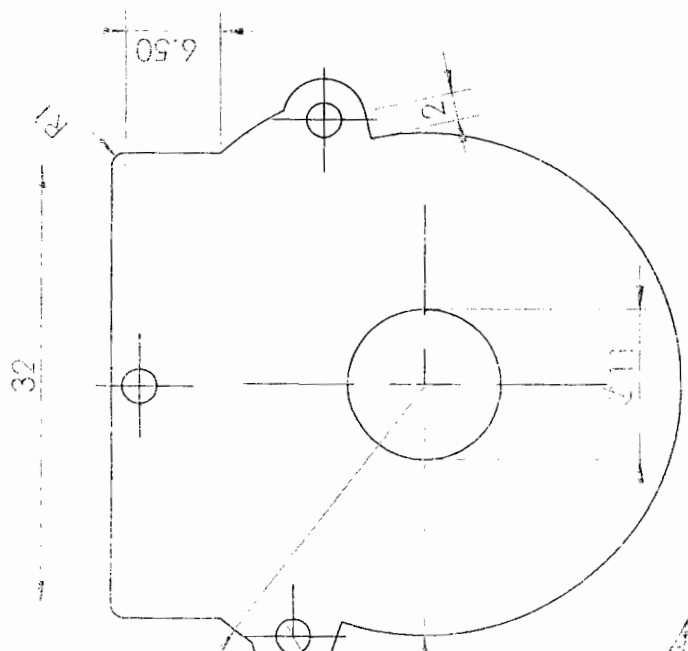
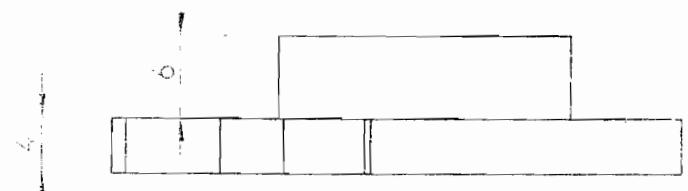
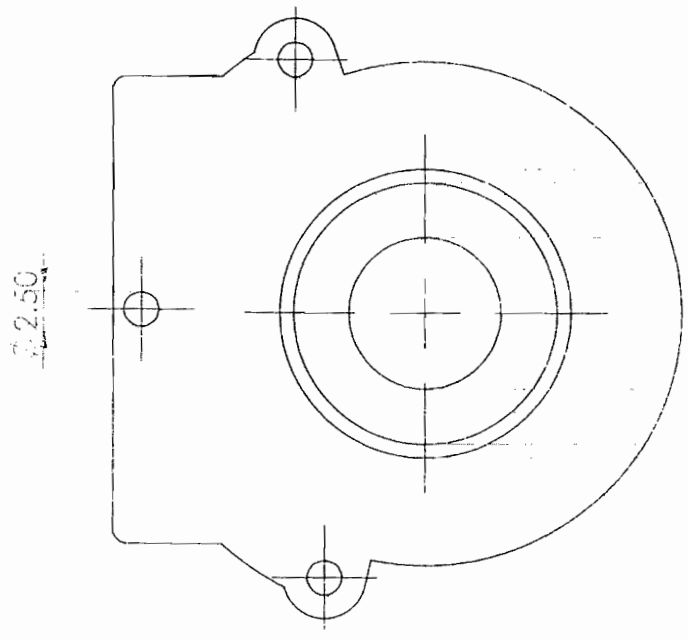
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SHEET 1 OF 1

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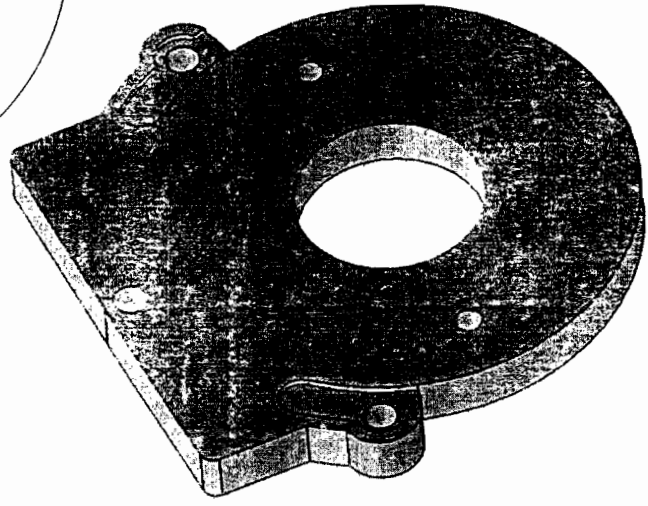
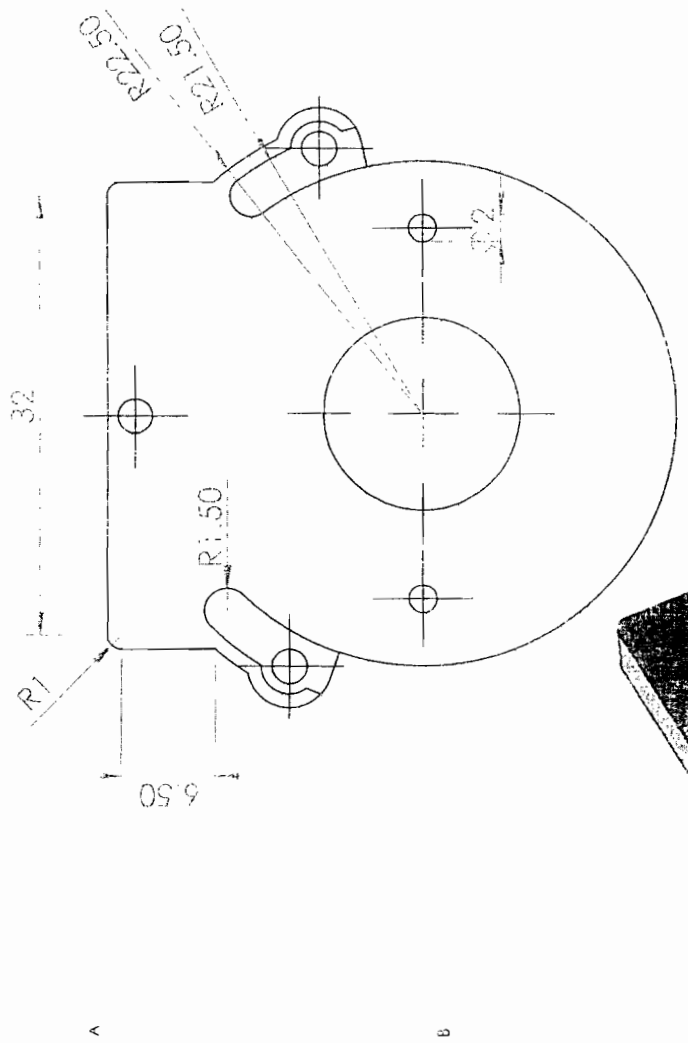
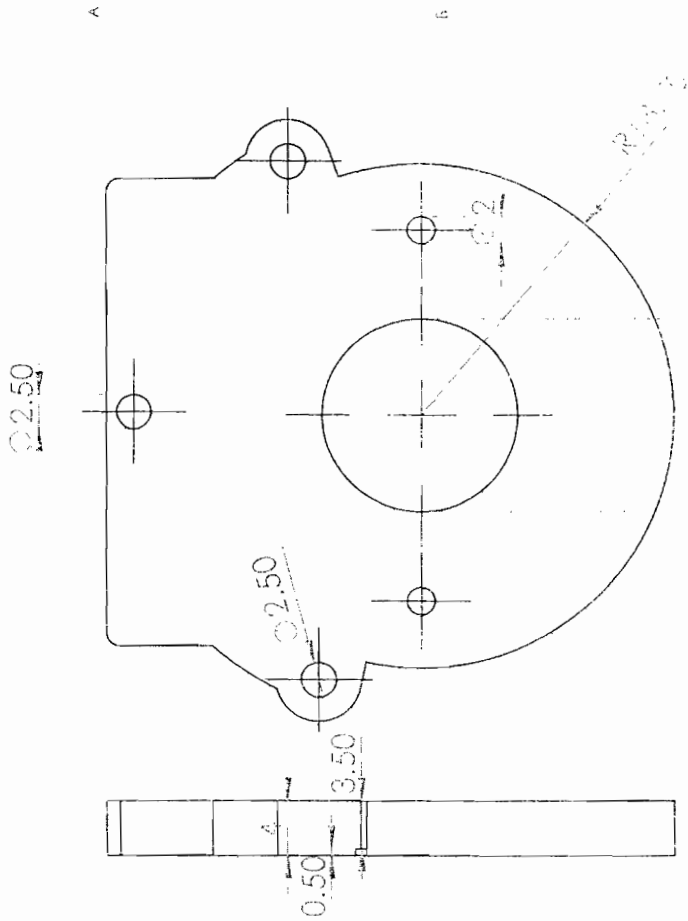
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 WEIGHT: **179**

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 16-07-2013

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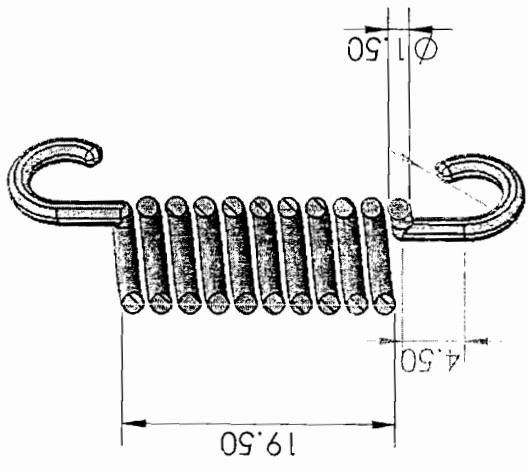
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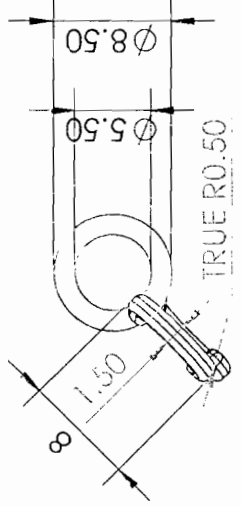
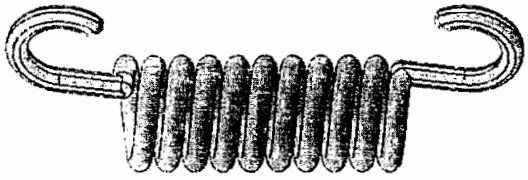
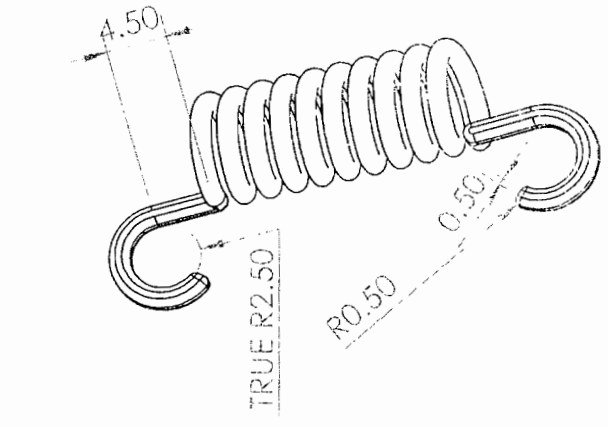
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SECTION A-A



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16-07-2013

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SHEET 1 OF 1

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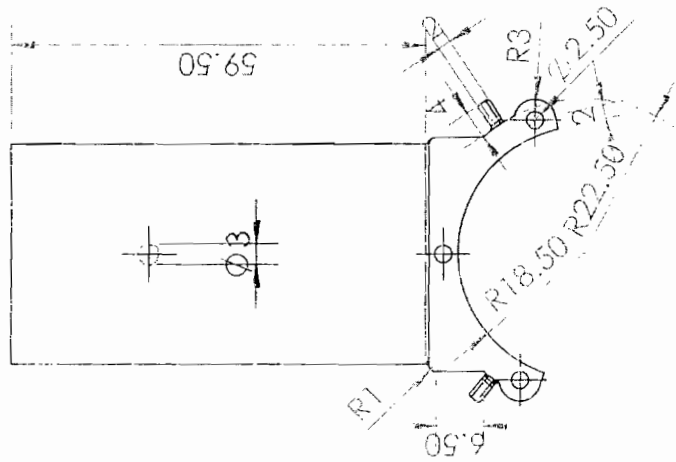
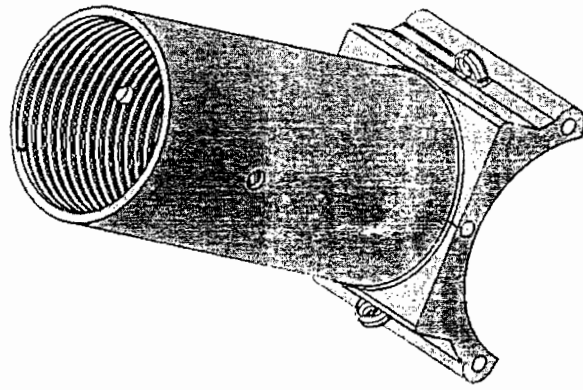
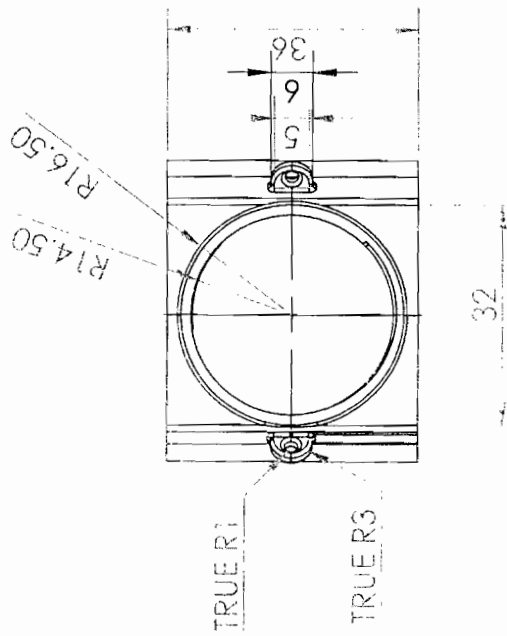
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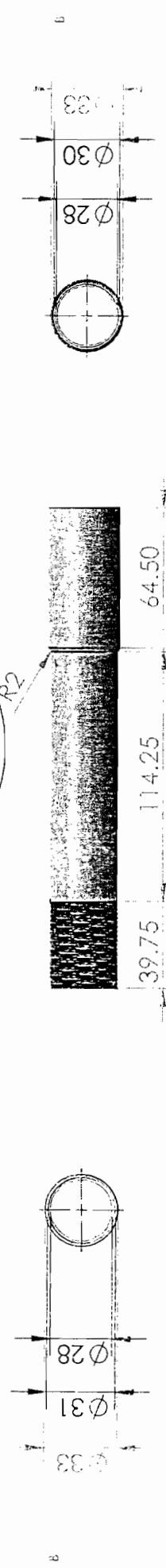
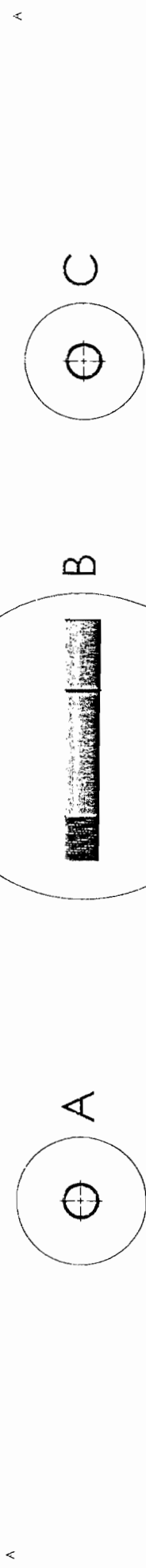
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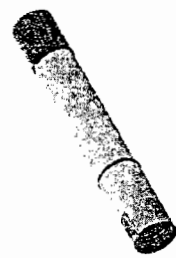


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DETAIL B
SCALE 2 : 5

DETAIL C
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16-07-2013



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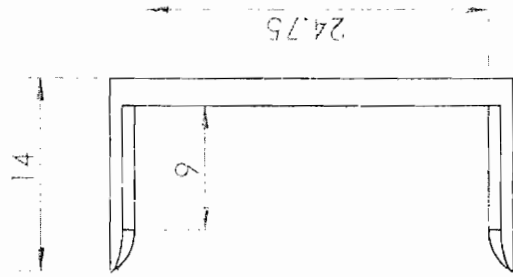
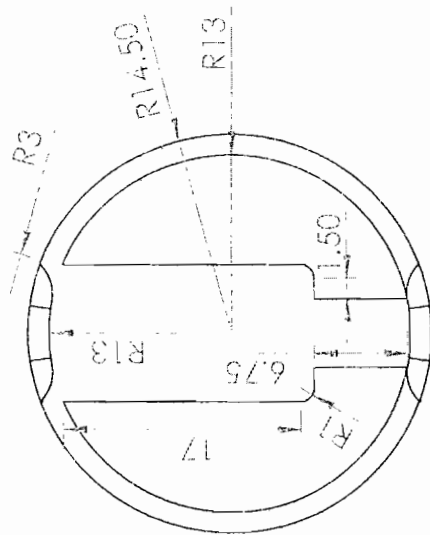
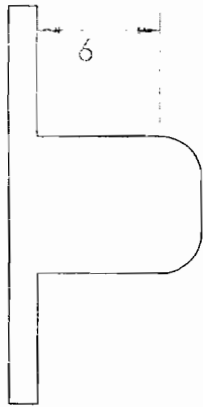
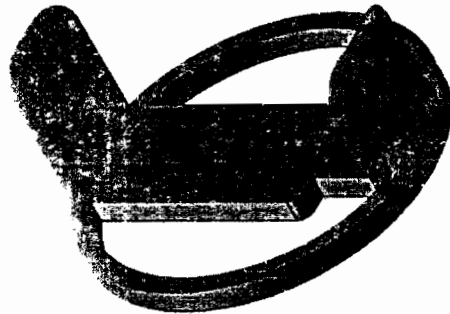
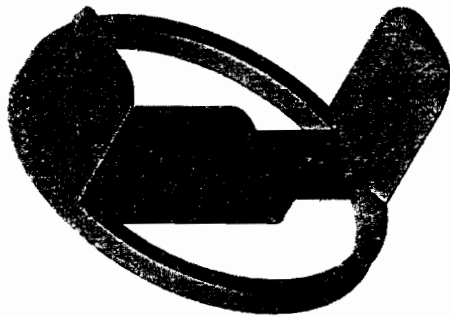
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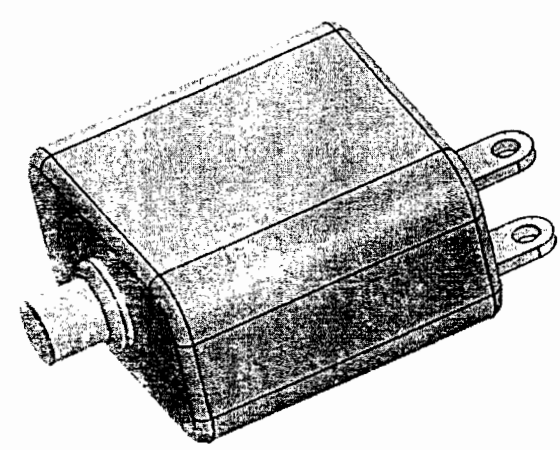
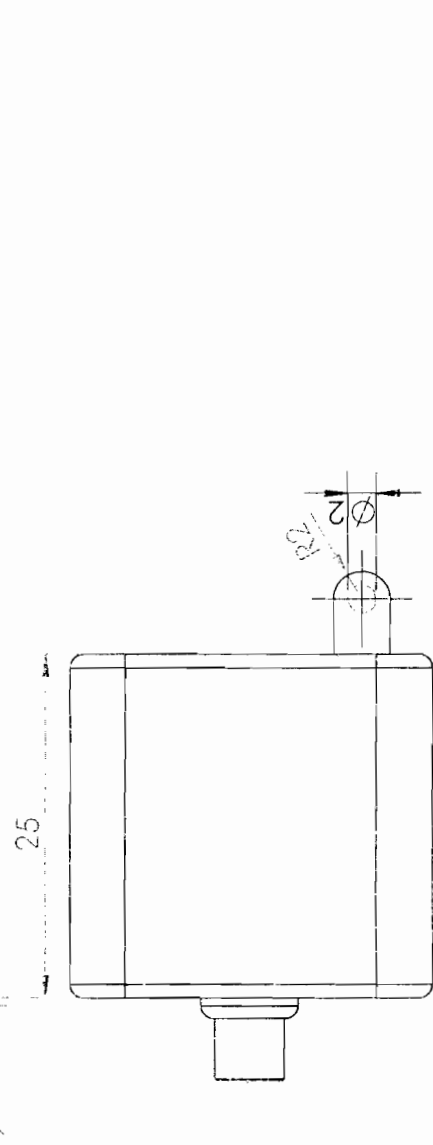
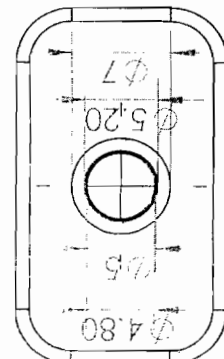
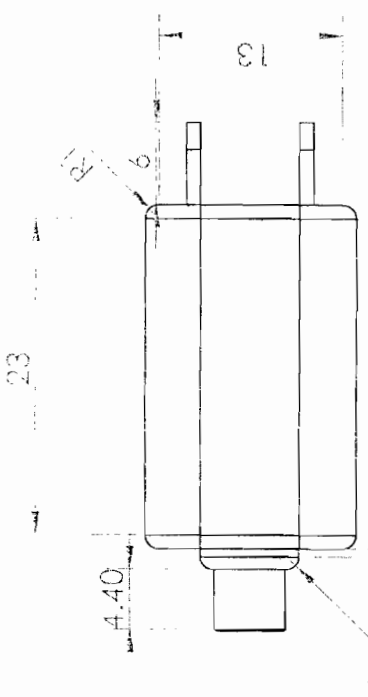
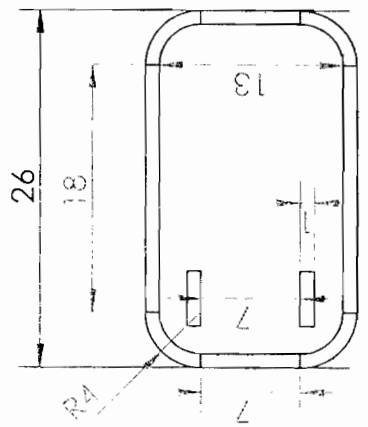
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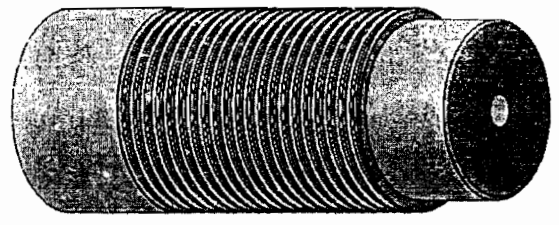
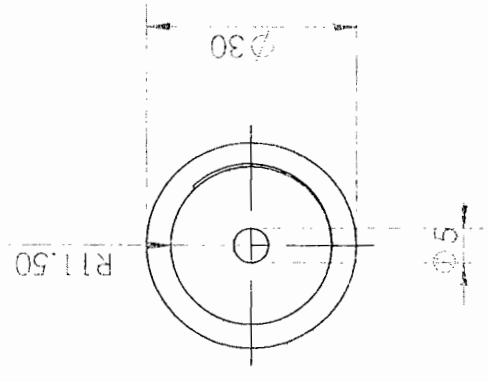
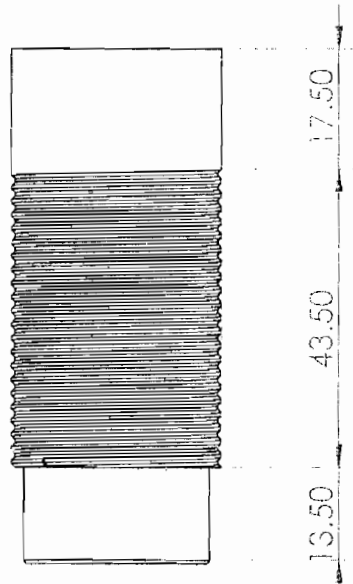
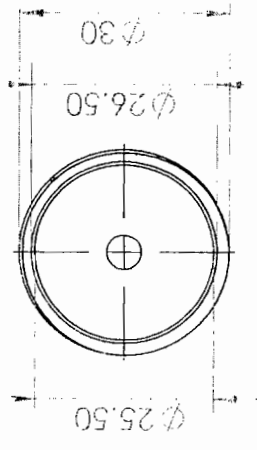
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16-07-2013

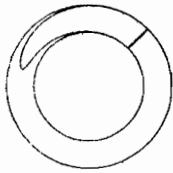
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BREAK SHARP
EDGES

DO NOT SCALE DRAWING
REVISION
TITLE:
DWG NO
SCALE: 1:1
SHEET 1 OF 1

A4
22

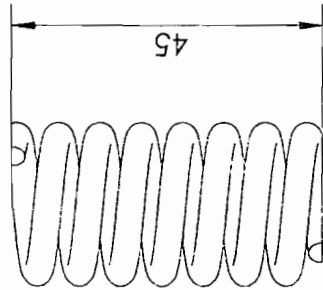
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173



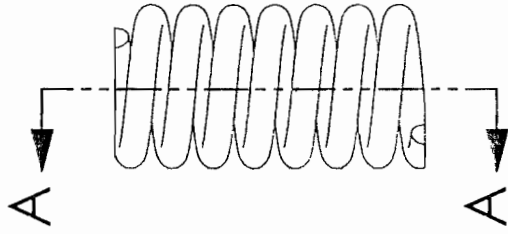
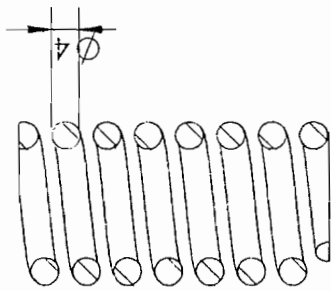
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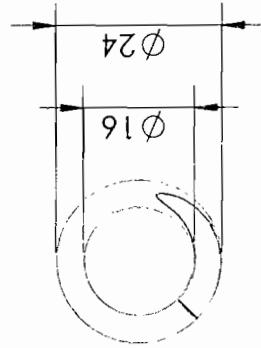
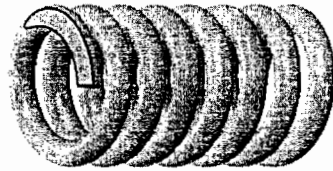
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SECTION A-A



Q2013-00531--
16-07-2013

REVISION

DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

FINISH:

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS

SURFACE FINISH:

TOLERANCES:

LINEAR:

ANGULAR:

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C.A.

DATE

TITLE:

REVISION

MATERIAL:

DWG NO.

A4

23

WEIGHT:

SCALE: 1:1

SHEET 1 OF 1

24

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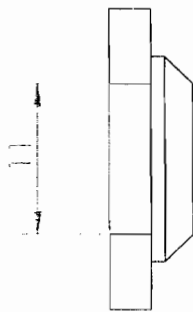
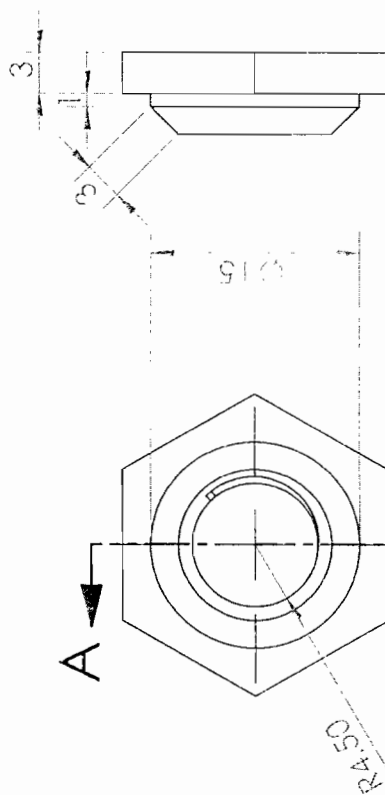
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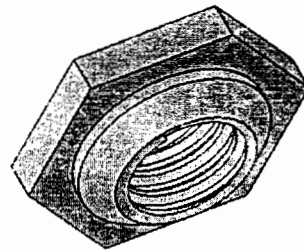
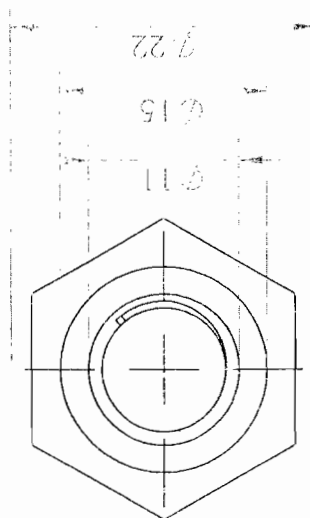
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SECTION A-A



UNLESS OTHERWISE SPECIFIED: FINISH: SURFACE FINISH: DIMENSIONS ARE IN MILLIMETERS

TOOLERANCES: LINEAR: ANGULAR:

DEBUR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING

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TITLE:

DATE

SIGNATURE

NAME

DATE

DRAWN

CHKD

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MATERIAL:

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SCALE 2:1

SHEET 1 OF 1

2013-00531--
16-07-2013

24

25

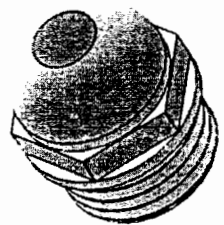
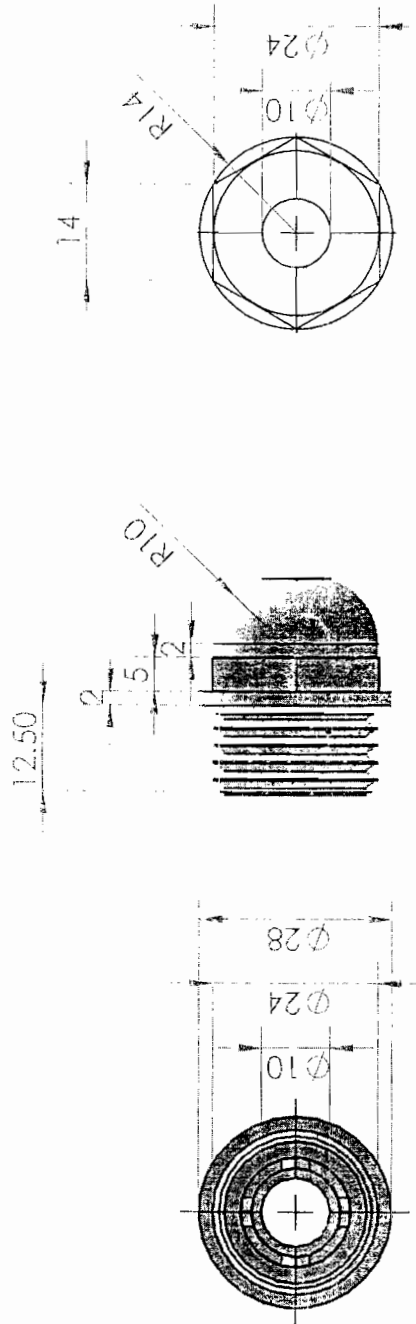
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UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH
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FINISH

DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING

REVISION

NAME SIGNATURE DATE

TITLE

DWG NO.

SCALE: 1:1

25

A4

MATERIAL

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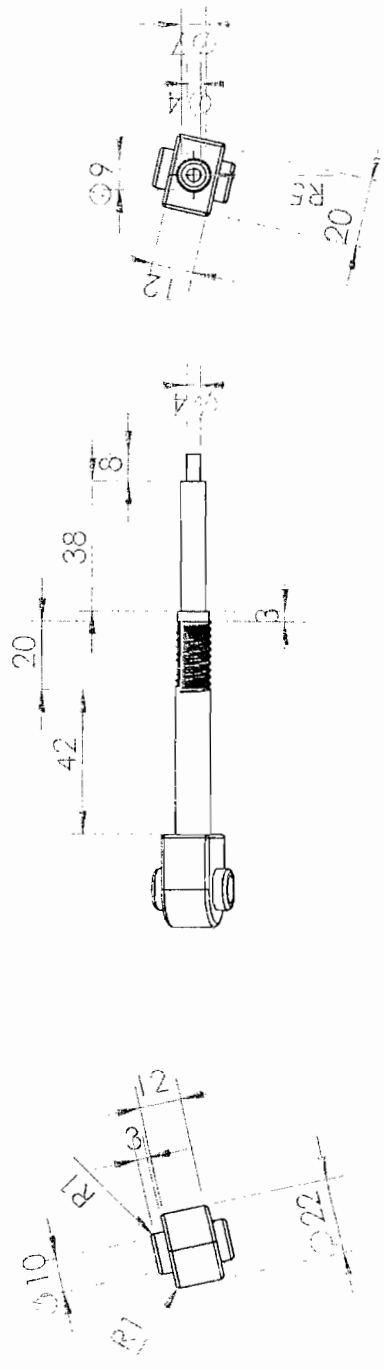
SHEET 1 OF 1

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 16-07-2013

26

1 2 3 4 5 6

A A



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16-07-2013

UNLESS OTHERWISE SPECIFIED: FINISH: SURFACE FINISH: DIMENSIONS ARE IN MILLIMETERS TOLERANCES: LINEAR: ANGULAR: DO NOT SCALE DRAWING

DEBUR AND BREAK SHARP EDGES REVISION

NAME SIGNATURE DATE TITLE: DWG NO

MATERIAL SCALE: 1:2

26

A4

SHEET 1 OF 1

WEIGHT:

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169

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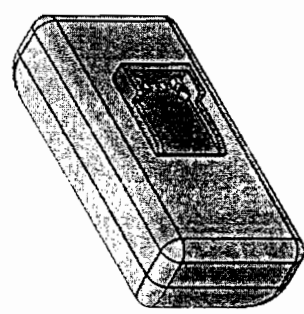
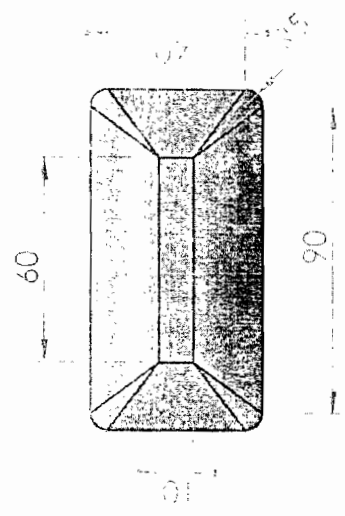
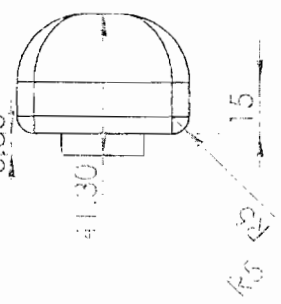
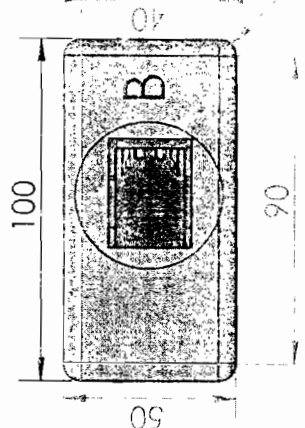
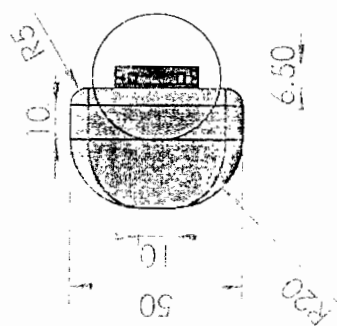
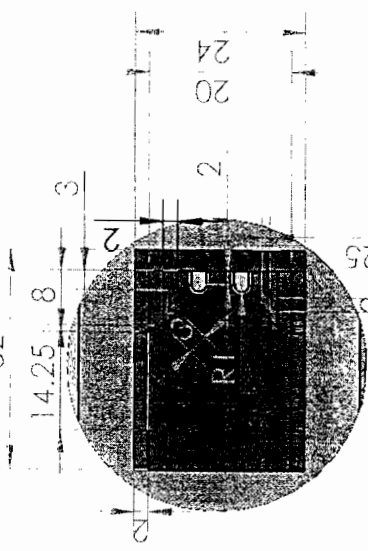
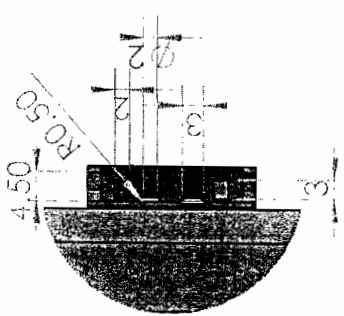
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DETAIL A SCALE 1:1

DETAIL B SCALE 1:1



2013-00531--
16-07-2013

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	FINISH	DRIBBL AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION
SURFACE FINISH:				
TOLERANCES:				
LINEAR:				
ANGULAR:				
NAME	SIGNATURE	DATE	TITLE	
DRAWN				
CHK'D				
APP'VD				
ENG				
Q.A.				
MATERIAL:				
JWG NO.				

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SCALE: 1:2

SHEET 1 OF 1

168

275

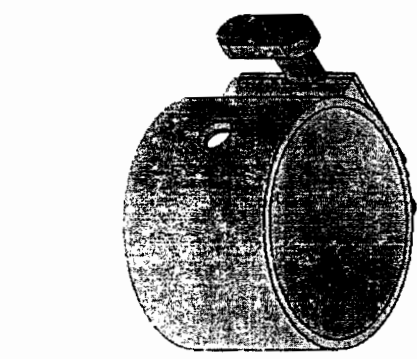
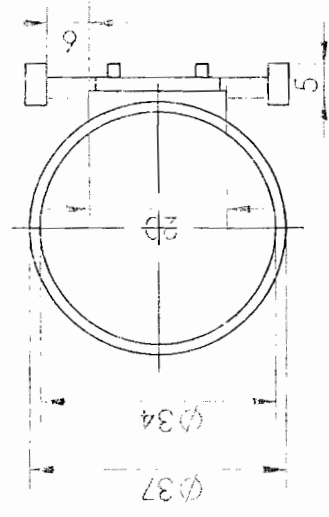
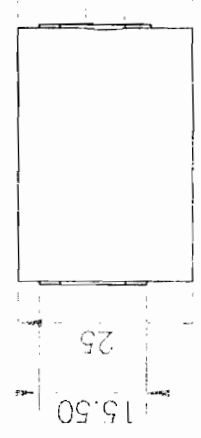
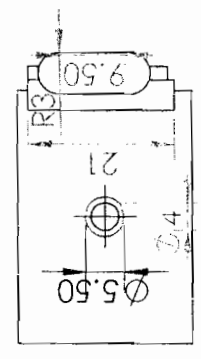
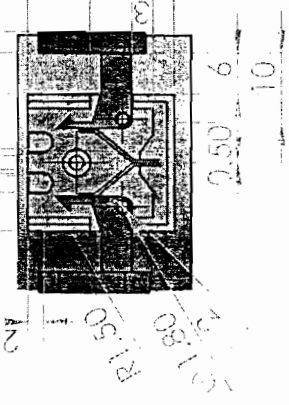
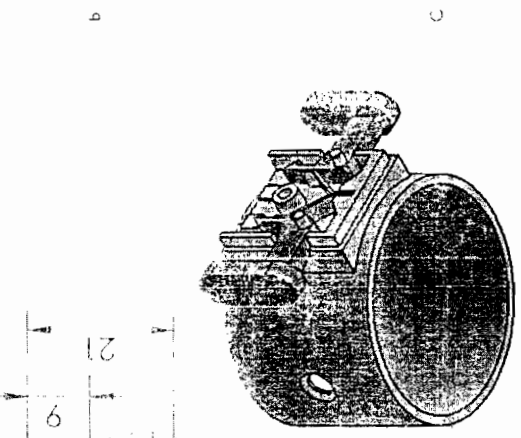
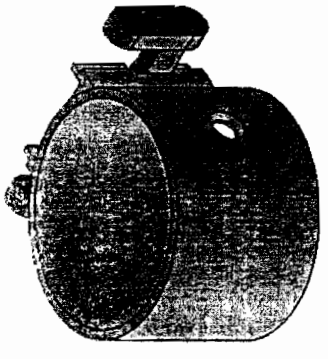
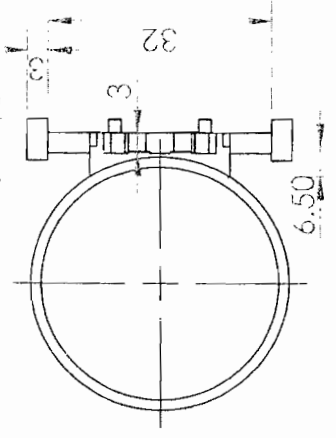
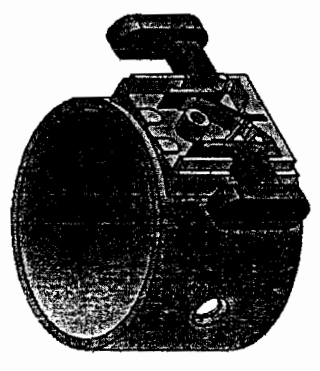
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DEBUR AND
BREAK SHARP
EDGES

DO NOT SCALE DRAWING

REVISION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
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ANGULAR:

DRAWN
CHK'D
APP'D
MVG
Q.A

NAME
SIGNATURE
DATE

MATERIAL:

DWG NO
27,5

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WEIGHT:

SHEET 1 OF 1

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167

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DWG NO.

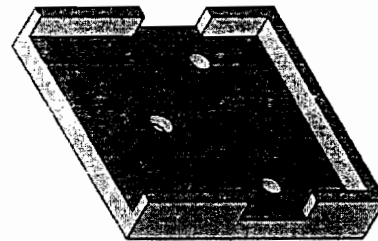
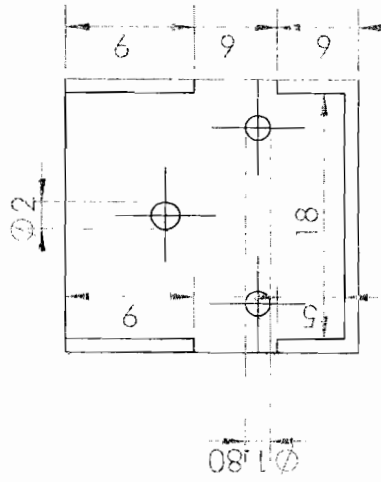
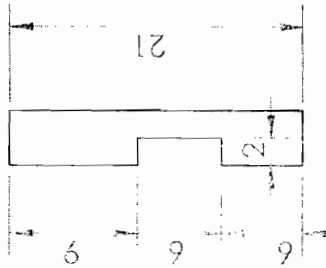
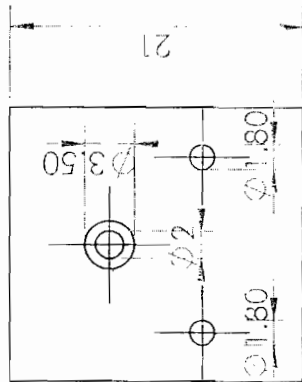
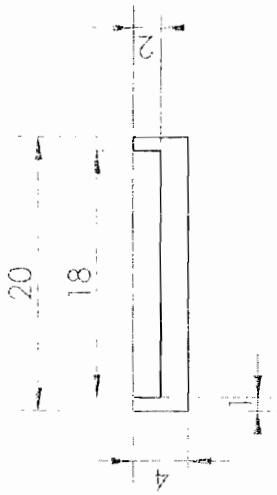
SHEET 1 OF 1

SCALE:2:1

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166



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16-07-2013

DEBUR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING

REVISION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
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SIGNATURE

DRAWN
CHK'D
APP'VD
MFG
C.A.

MATERIAL:

DWG NO.

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SCALE:2:1

WEIGHT:

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SHEET 1 OF 1

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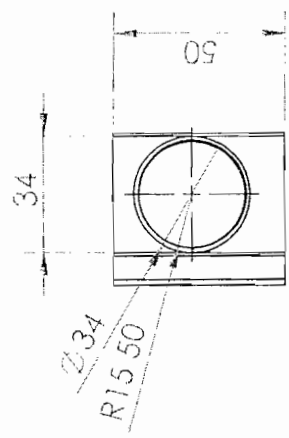
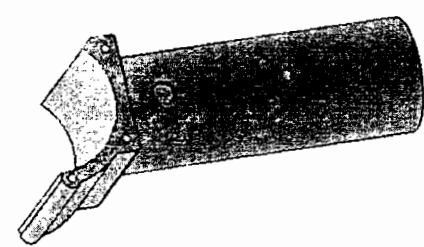
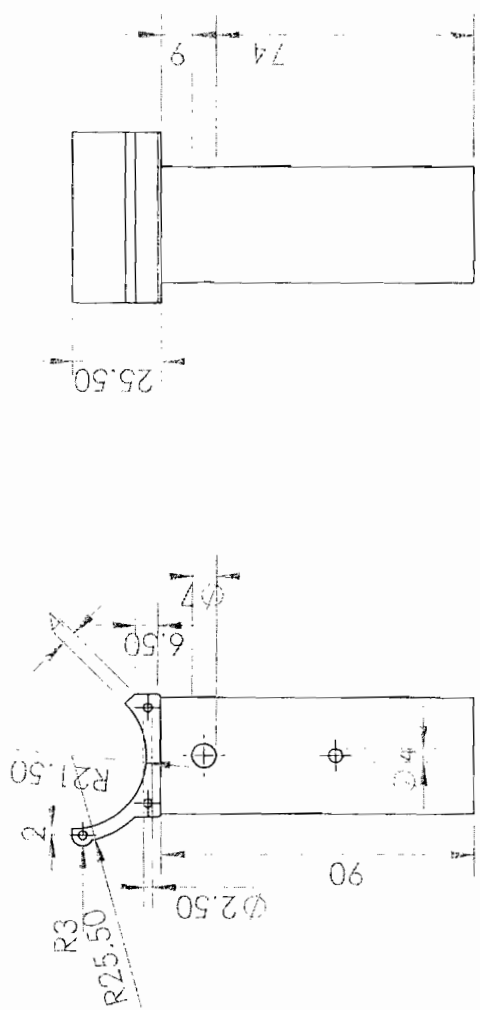
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UNLESS OTHERWISE SPECIFIED: FINISH: DO NOT SCALE DRAWING REVISION
 DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: DEBUR AND BREAK SHARP EDGES
 TOLERANCES: LINEAR: ANGLUAR: BREAK SHARP EDGES

NAME SIGNATURE DATE
 DRAWN
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MATERIAL

DWG NO.

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28

SHEET 1 OF 1

WEIGHT

SCALE: 1:2

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 16-07-2013

Handwritten signature or initials.

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DWG NO.

MATERIAL:

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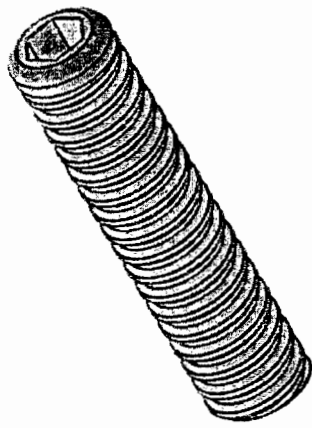
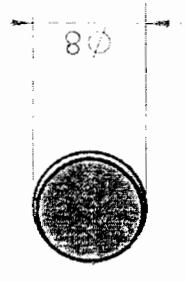
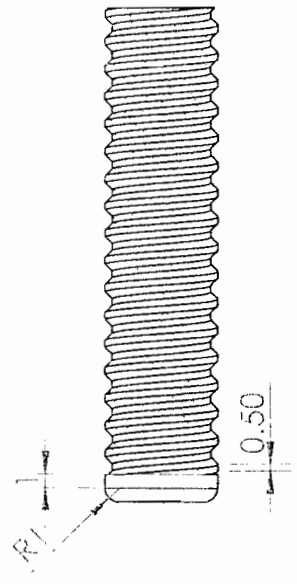
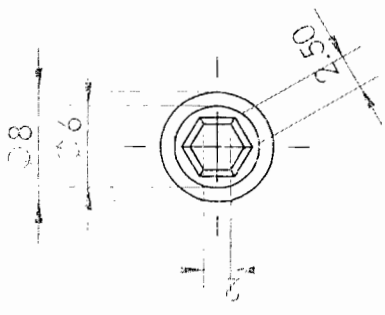
SHEET 1 OF 1

SCALE(2:1)

WEIGHT:

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169



REVISION

DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

FINISH

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
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DATE

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2013-00531-1
16-07-2013

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DWG NO.

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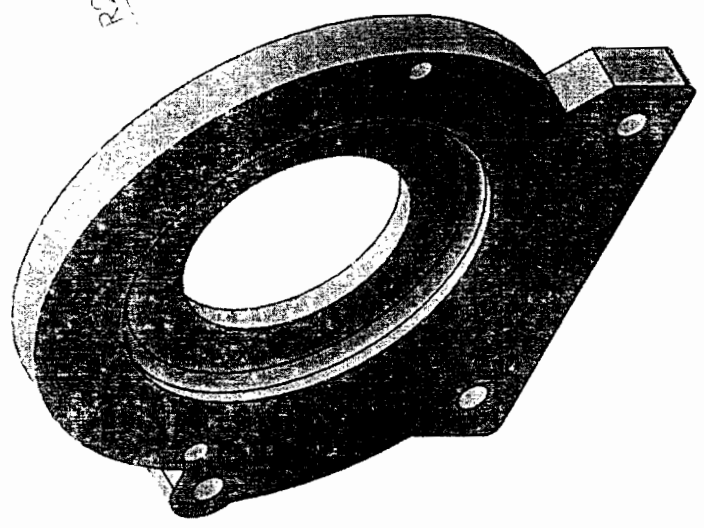
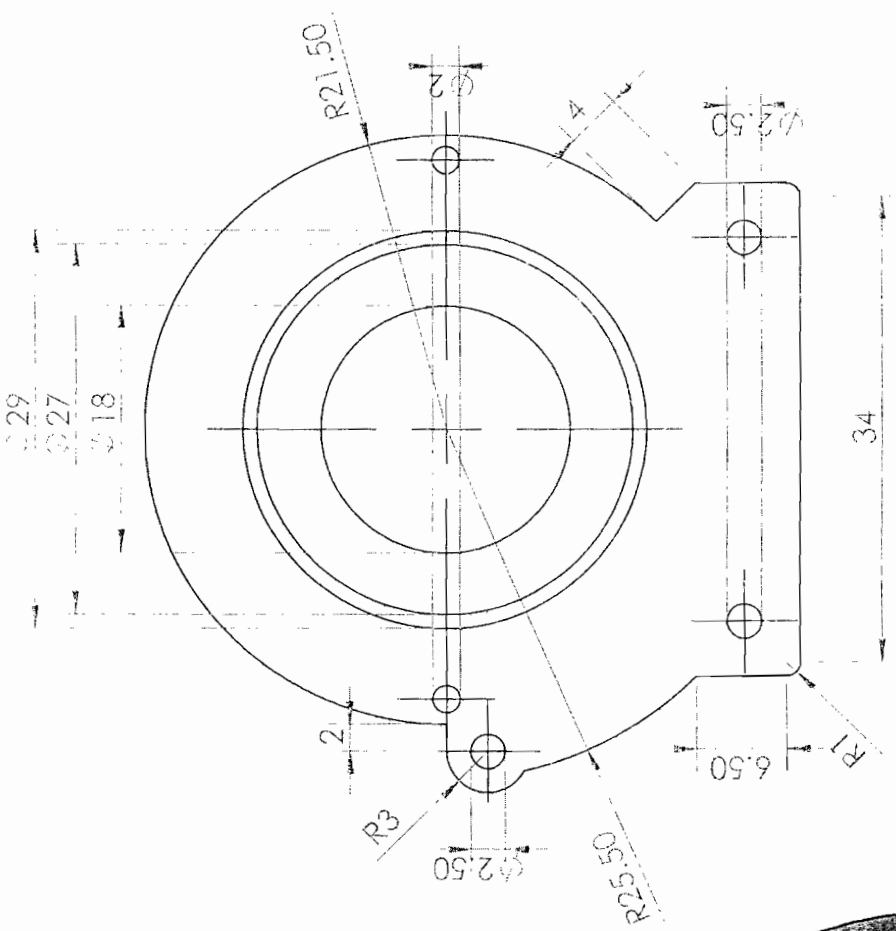
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SHEET 1 OF 1

SCALE: 2:1

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REVISION

DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

FINISH:

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
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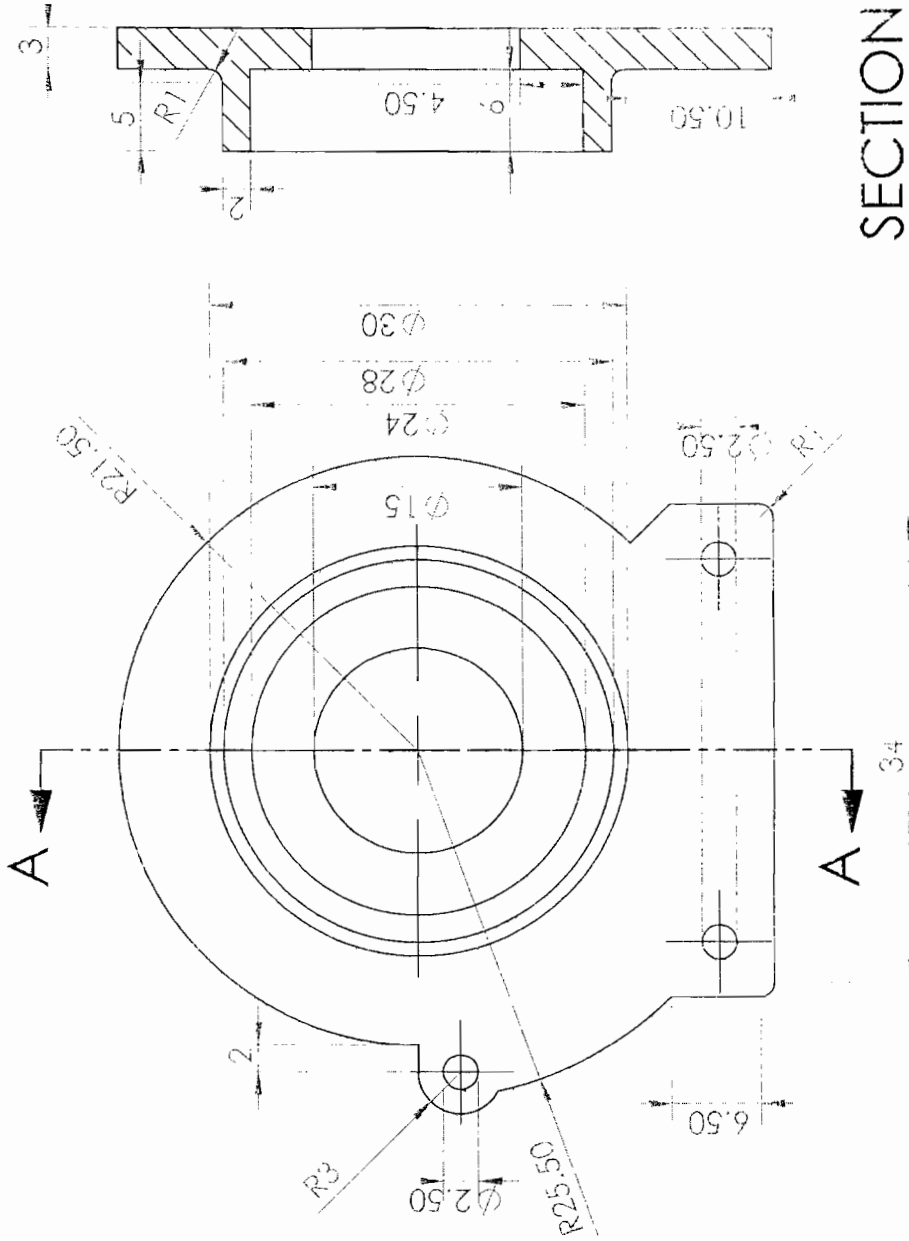
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16-07-2013

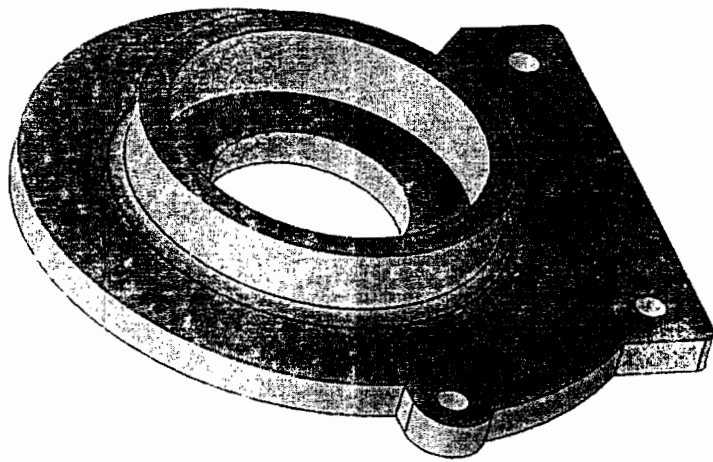
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SECTION A-A



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
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FINISH:
 DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING

REVISION

TITLE

NAME SIGNATURE DATE

DRAWN
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 APPYD
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 Q.A.

MATERIAL

DWG NO.

31

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WEIGHT:

SCALE: 2:1

SHEET 1 OF 1

2013-00531-1
 16-07-2013

162

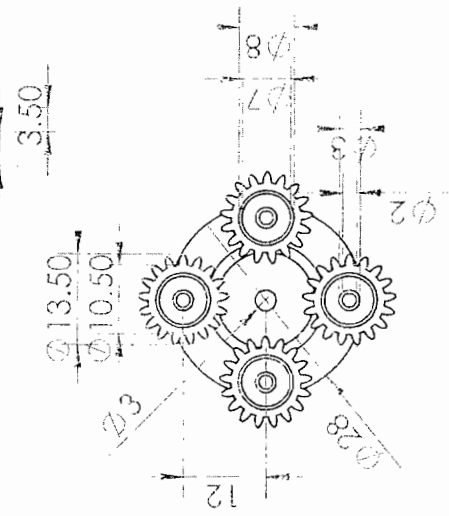
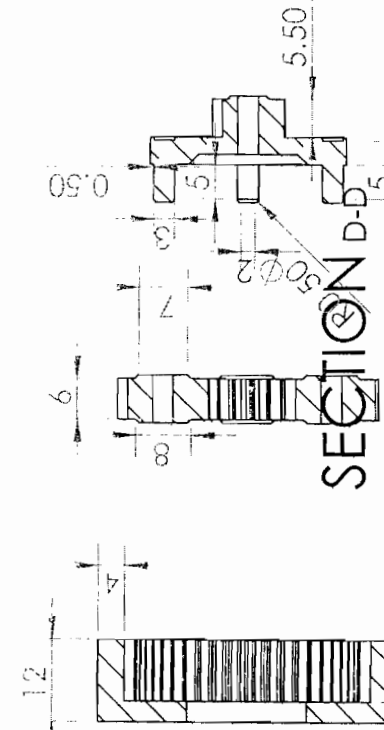
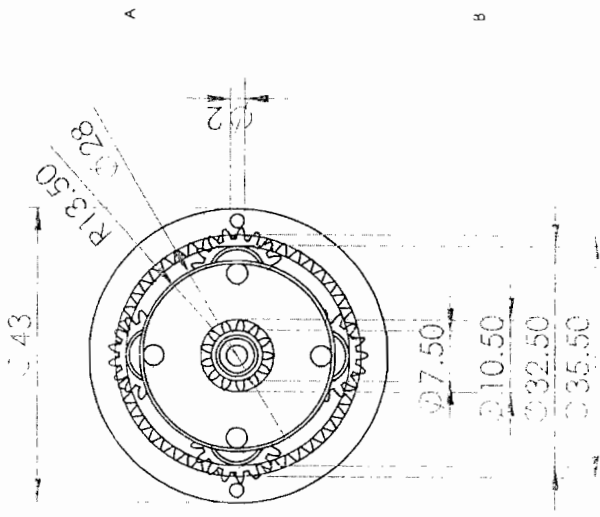
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SECTION A-A

DEBUR AND
BREAK SHARP
EDGES

UNLESS OTHERWISE SPECIFIED:
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SURFACE FINISH:
TOLERANCES:
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DO NOT SCALE DRAWING

REVISION

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SIGNATURE _____
DATE _____

TITLE

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DWG NO.

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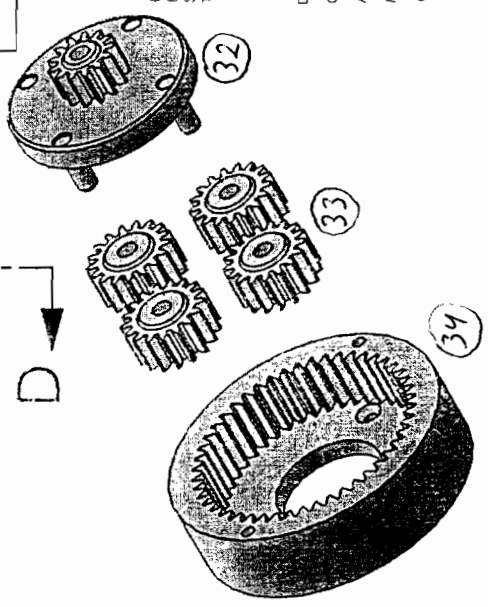
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SHEET 1 OF 1

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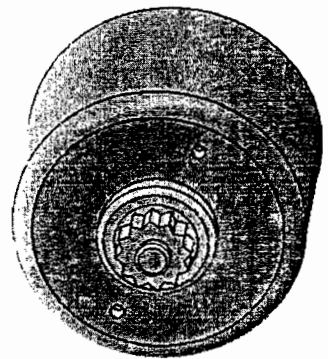
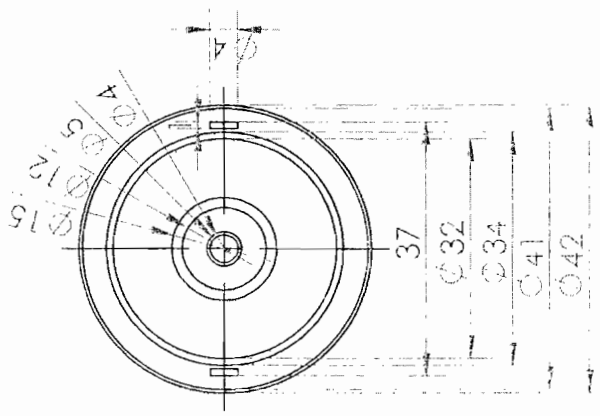
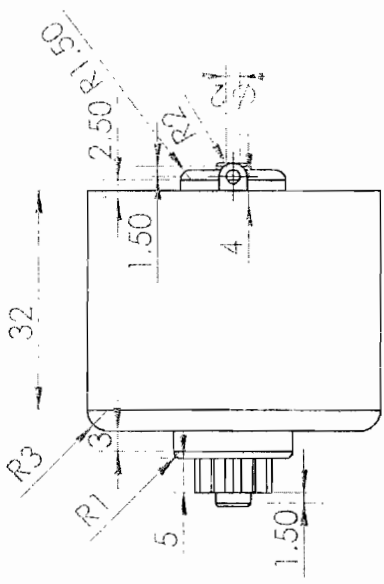
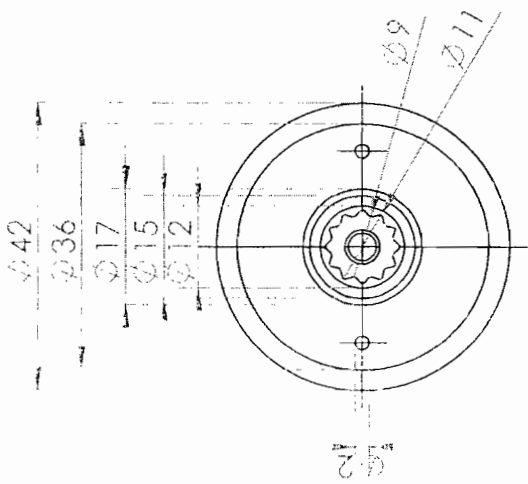


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16-07-2013

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UNLESS OTHERWISE SPECIFIED:
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 SURFACE FINISH:
 TOLERANCES:
 LINEAR
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FINISH:
 DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING

REVISION

NAME SIGNATURE DATE

TITLE

DRAWN
 CHKD
 APPVD
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MATERIAL

DWG NO

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WEIGHT

SCALE: 1:1

SHEET 1 OF 1

160

92013-00531--
 16-07-2013

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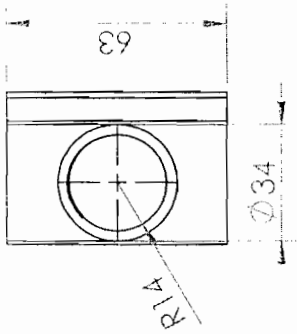
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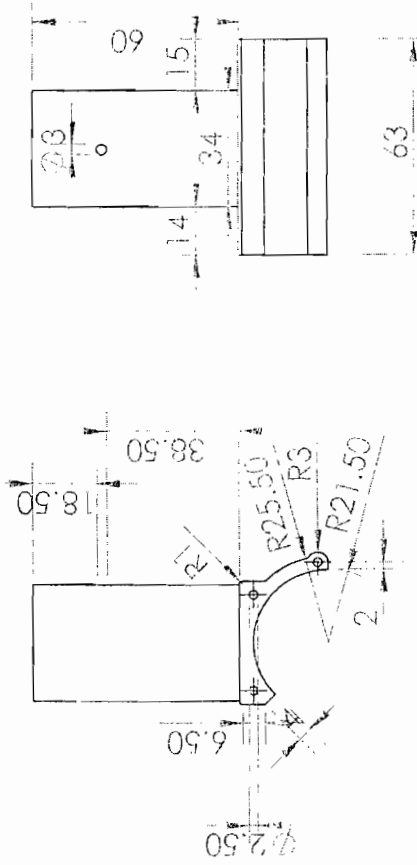
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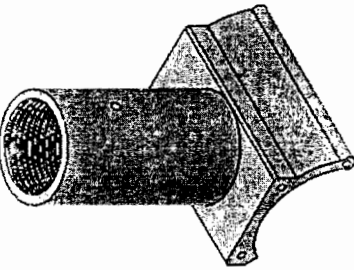


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REVISION

DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS

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APPROVED

MFG

Q.A.

NAME

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TITLE:

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SHEET 1 OF 1

SCALE: 1:2

WEIGHT:

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92013-00531--
16-07-2013

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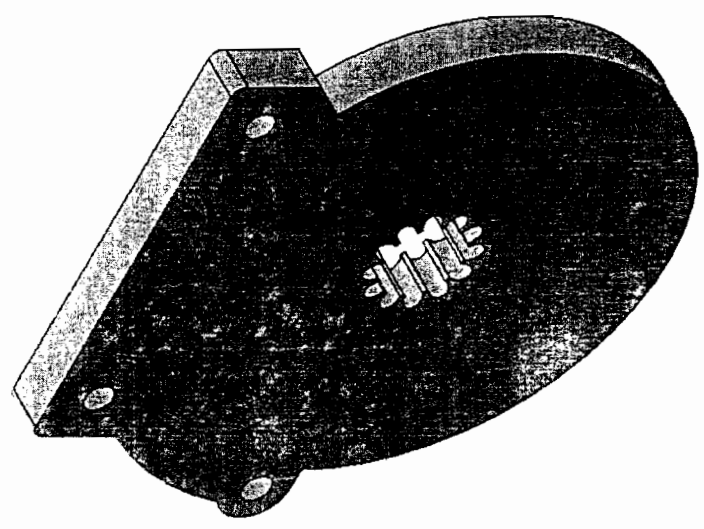
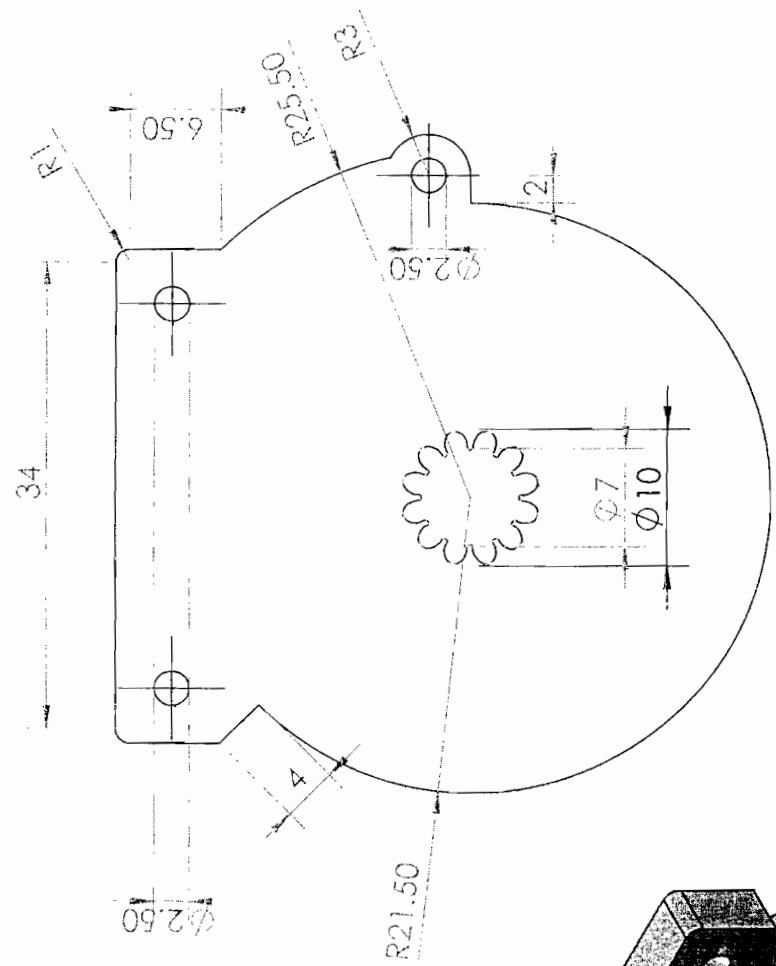
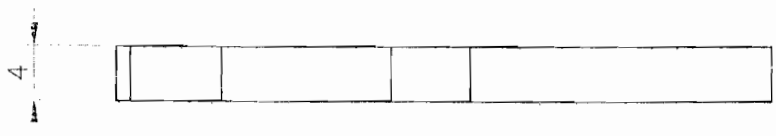
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DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
 TOLERANCES:
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TITLE

NAME

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DATE

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APP'VD

MFG

Q.A

MATERIAL:

DWG NO

37

A4

WEIGHT:

SCALE:2:1

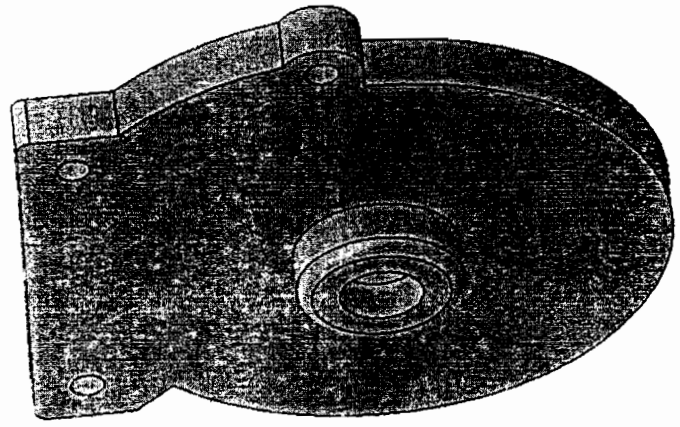
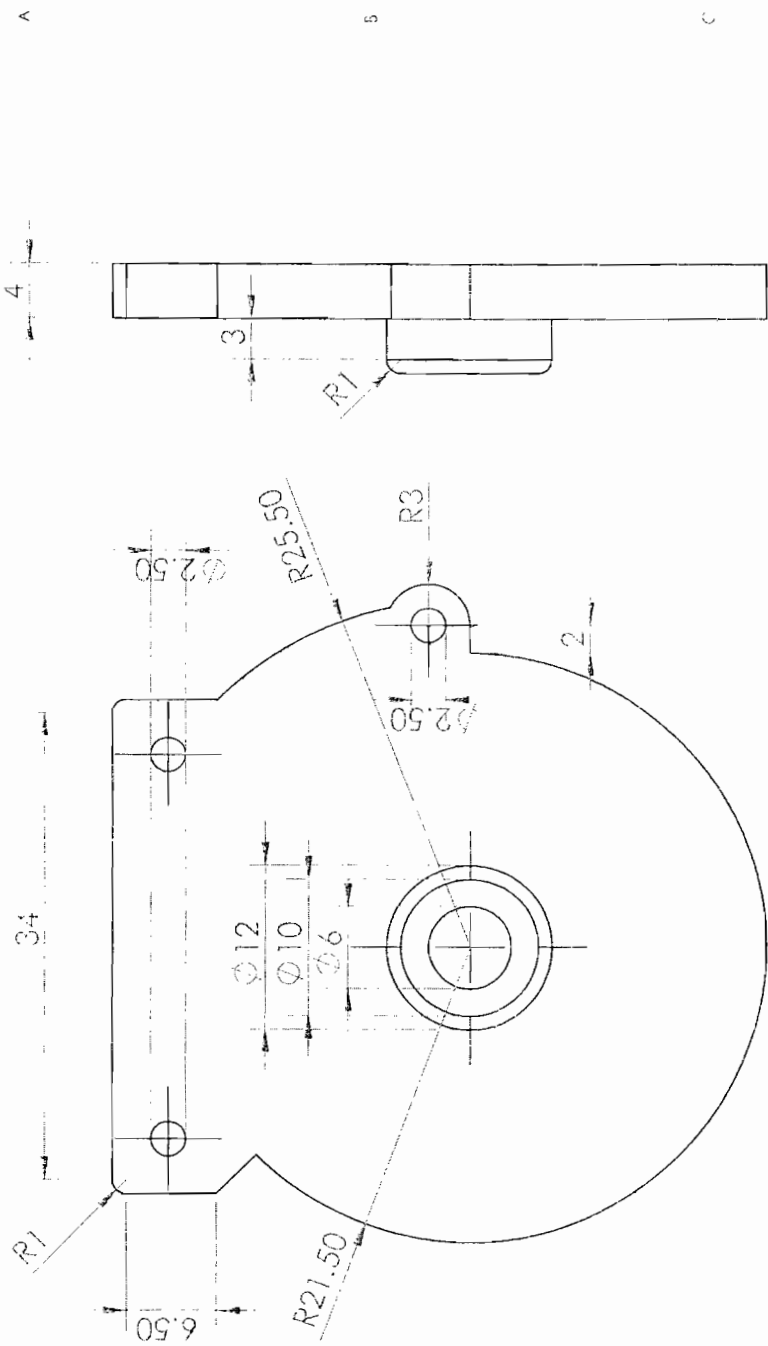
SHEET 1 OF 1

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38

1 2 3 4 5 6



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
 TOLERANCES:
 LINEAR:
 ANGULAR:

FINISH:
 DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING
 REVISION

NAME	SIGNATURE	DATE	TITLE:
DRAWN			
CHKD			
APP'VD			
MFC			
Q.A.			

MATERIAL:

DWG NO.

38

A4

SHEET 1 OF 1

WEIGHT:

SCALE: 2:1

2

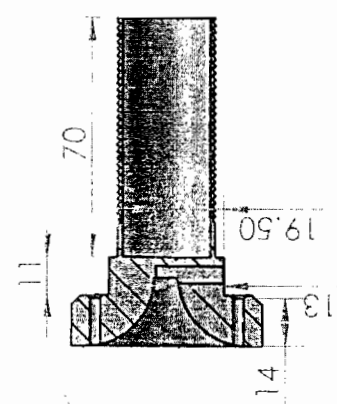
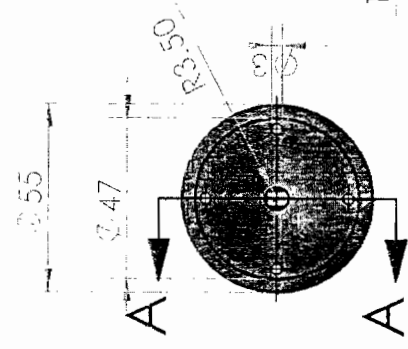
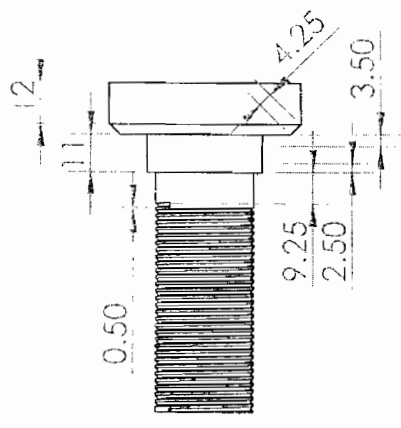
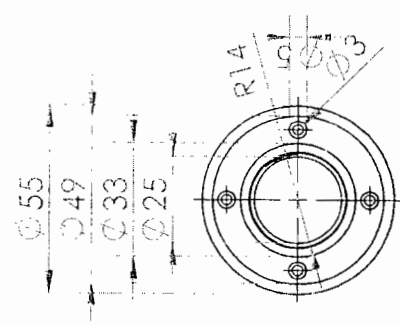
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 16-07-2013

157

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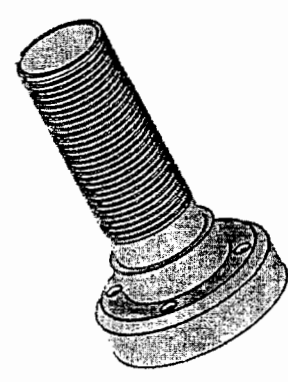
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A A



SECTION A-A

C C



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
 TOLERANCES:
 LINEAR:
 ANGULAR:

DEBUR AND
 BREAK SHARP
 EDGES

FINISH:
 DO NOT SCALE DRAWING
 REVISION

NAME SIGNATURE DATE TITLE

DRAWN
 CHKD
 APPVD
 MFG
 Q.A

MATERIAL:

DWG NO.

39

A4

WEIGHT:

SCALE: 1:2

SHEET 1 OF 1

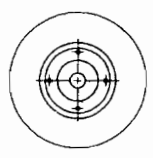
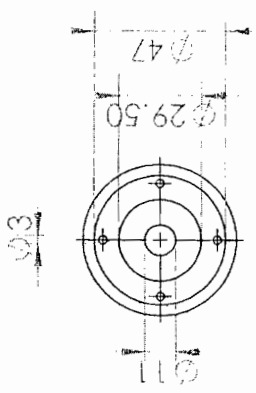
92013-00531--
 16-07-2013

156

90

1 2 3 4 5 6

A A



DETAIL A

SCALE 2:5



B C

UNLESS OTHERWISE SPECIFIED:
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 TOLERANCES: LINEAR: ANGULAR:

DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING

REVISION

NAME SIGNATURE DATE

TITLE:

DRAWN
 CHKD
 APPVD
 MFG
 Q.A

MATERIAL:

DWG NO.

A4

40

WEIGHT:

SCALE: 1:5

SHEET 1 OF 1

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150

47

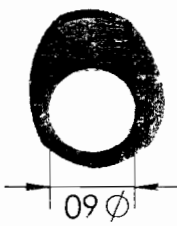
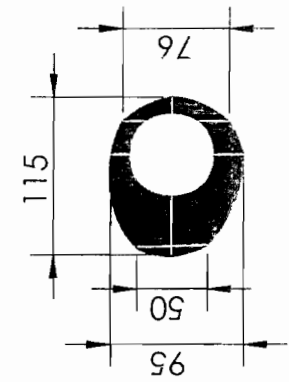
1 2 3 4 5 6

A A

B B

C C

D



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

FINISH:
DEBUR AND
BREAK SHARP
EDGES

DO NOT SCALE DRAWING
REVISION

NAME	SIGNATURE	DATE	TITLE:
DRAWN			
CHKD			
APPVD			
MFG			
Q.A			

DWG NO.	41
MATERIAL:	
SCALE: 1:5	
WEIGHT:	
SHEET 1 OF 1	

A4

154

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16-07-2013

42

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A

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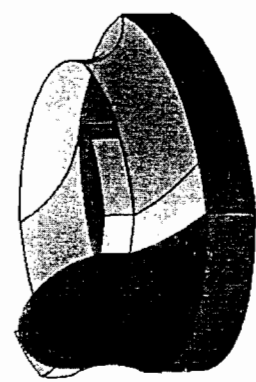
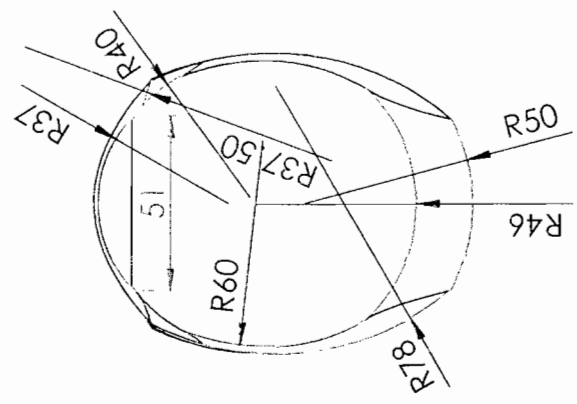
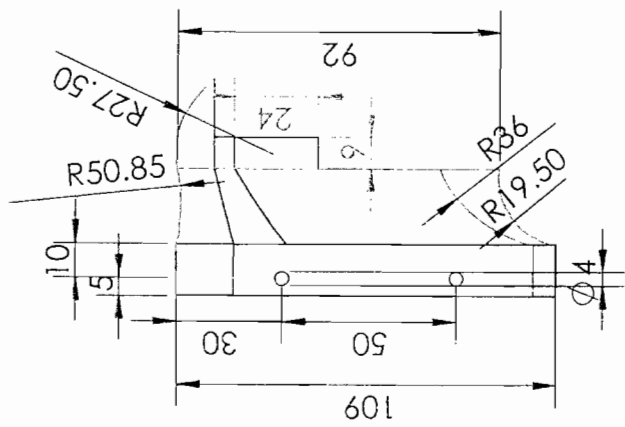
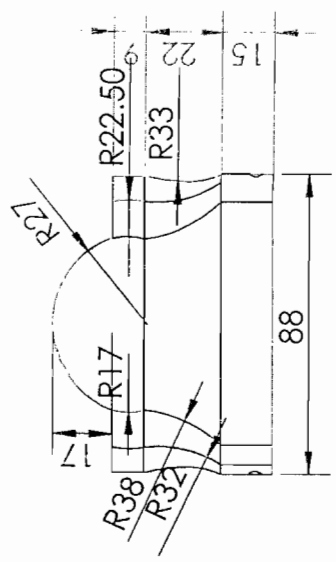
C

A

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UNLESS OTHERWISE SPECIFIED: FINISH: DO NOT SCALE DRAWING REVISION
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 TOLERANCES: LINEAR: ANGULAR: DEBUR AND BREAK SHARP EDGES

DRAWN: TITLE: DWG NO. A4
 CHK'D: APPYD: SCALE:1:2 SHEET 1 OF 1
 MFG: MATERIAL: WEIGHT:
 Q.A. DATE: SIGNATURE: NAME: 42

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 16-07-2013

153

43

6

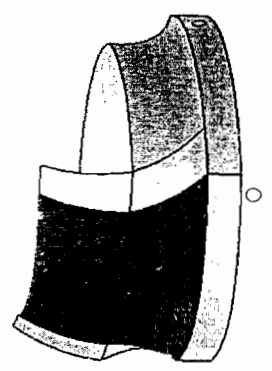
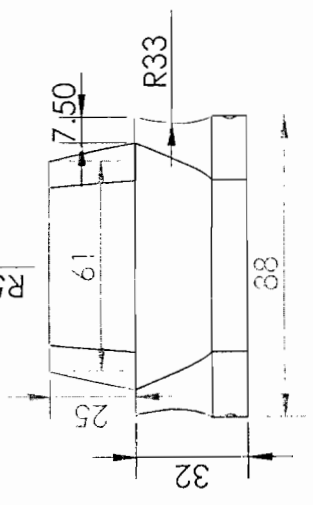
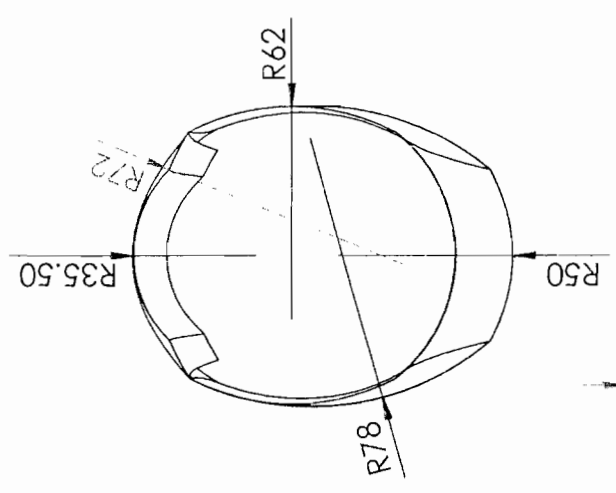
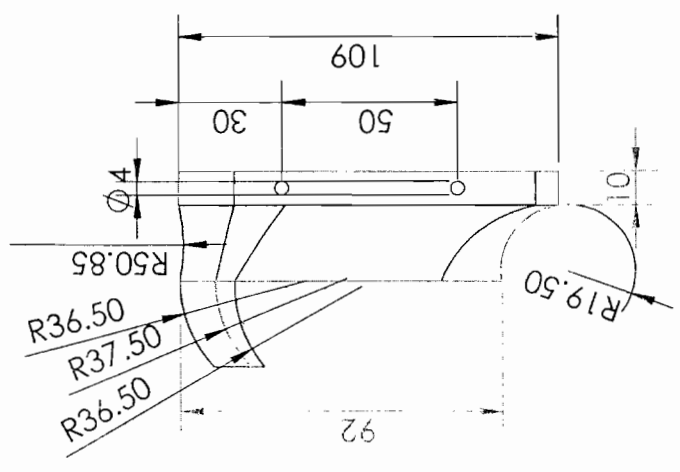
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16-07-2013

DEBUR AND BREAK SHARP EDGES DO NOT SCALE DRAWING REVISION

UNLESS OTHERWISE SPECIFIED: FINISH: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:

TITLE:

NAME SIGNATURE DATE

DRAWN
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MFG
Q.A.

MATERIAL

DWG NO

43

A4

WEIGHT:

SHEET 1 OF 1

152

44

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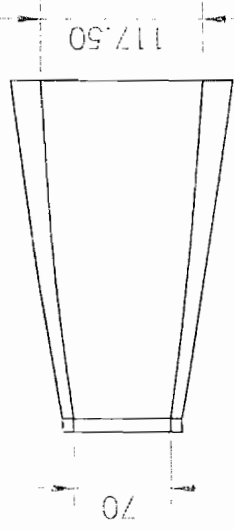
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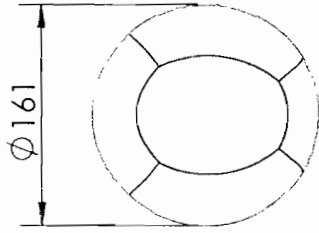
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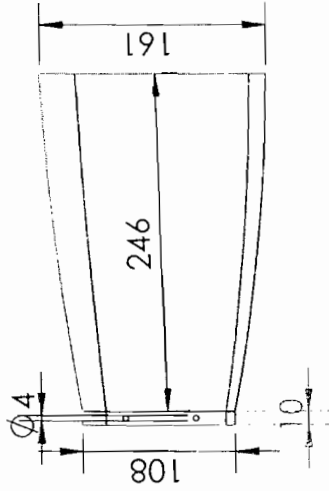
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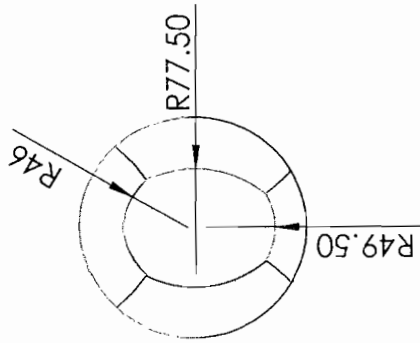


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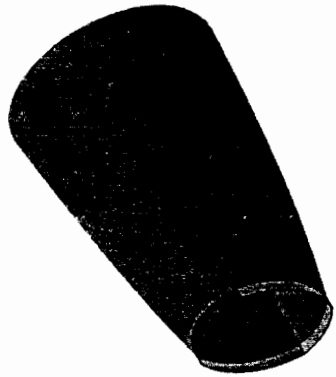
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UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
 TOLERANCES:
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DEBUR AND
 BREAK SHARP
 EDGES

DO NOT SCALE DRAWING

REVISION

TITLE:

DATE

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SIGNATURE

DRAWN

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MATERIAL:

DWG NO.

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WEIGHT:

SCALE:1:1

SHEET 1 OF 1

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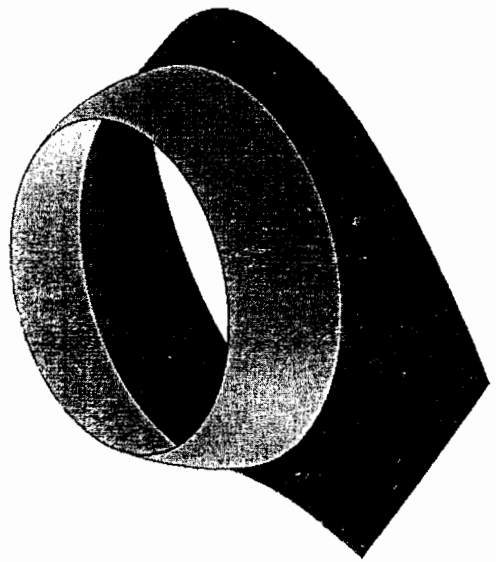
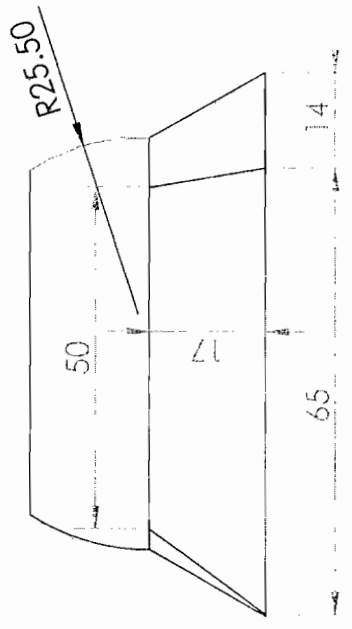
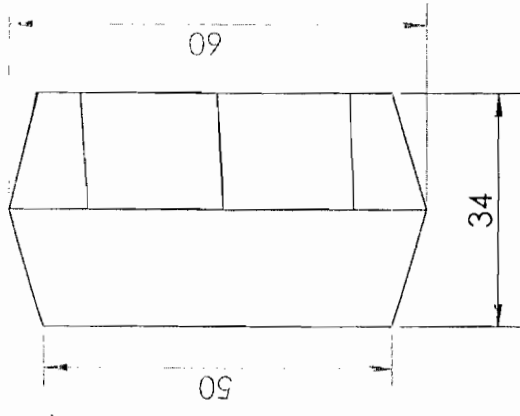
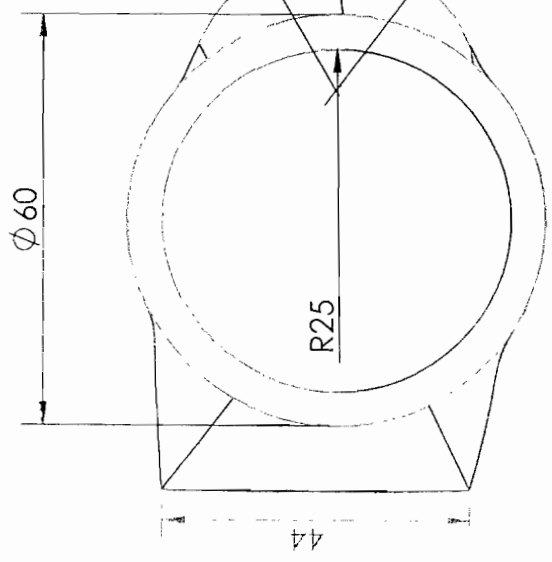
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16-07-2013

UNLESS OTHERWISE SPECIFIED:
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NAME SIGNATURE DATE TITLE

DEBUR AND
BREAK SHARP
EDGES

DO NOT SCALE DRAWING

REVISION

MATERIAL:

DWG NO.

A4

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WEIGHT:

SCALE: 1:1

SHEET 1 OF 1

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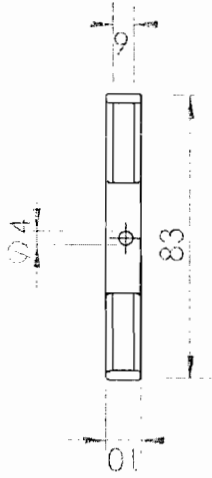
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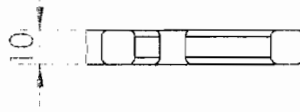
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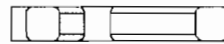
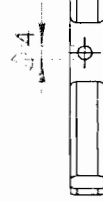
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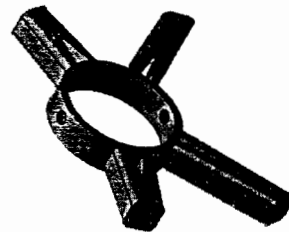


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UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
 SURFACE FINISH:
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DO NOT SCALE DRAWING

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SHEET 1 OF 1

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 16-07-2013

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47

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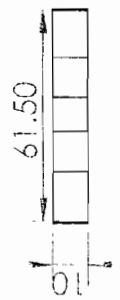
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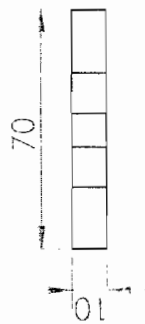
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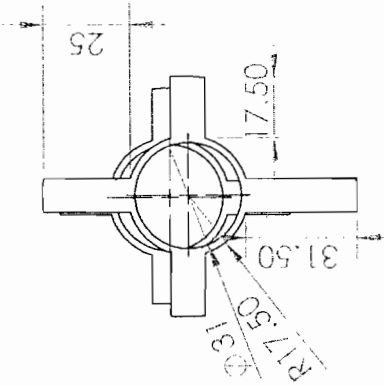
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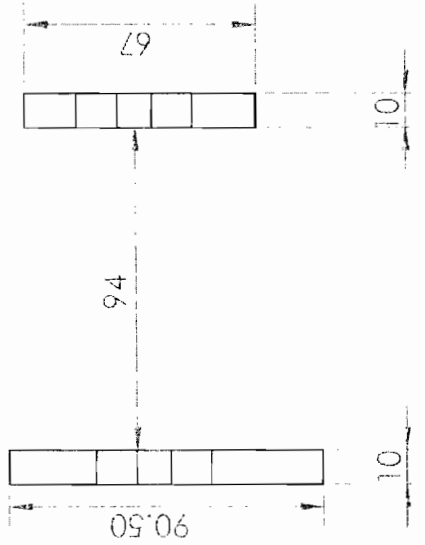
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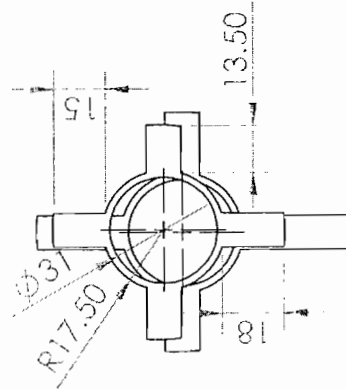
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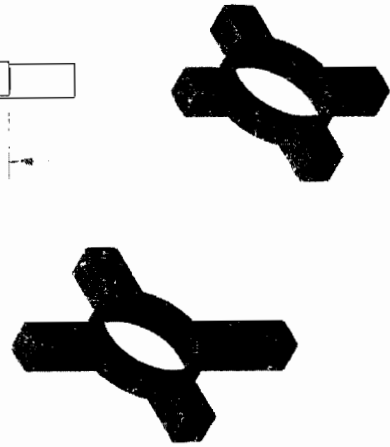
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UNLESS OTHERWISE SPECIFIED:
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 EDGES

DO NOT SCALE DRAWING

REVISION

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47

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 16-07-2013

148

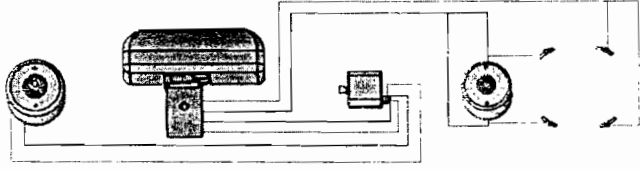
48

1 2 3 4 5 6

A A

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16-07-2013

DO NOT SCALE DRAWING

DEBUR AND
BREAK SHARP
EDGES

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
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MATERIAL

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SHEET 1 OF 1

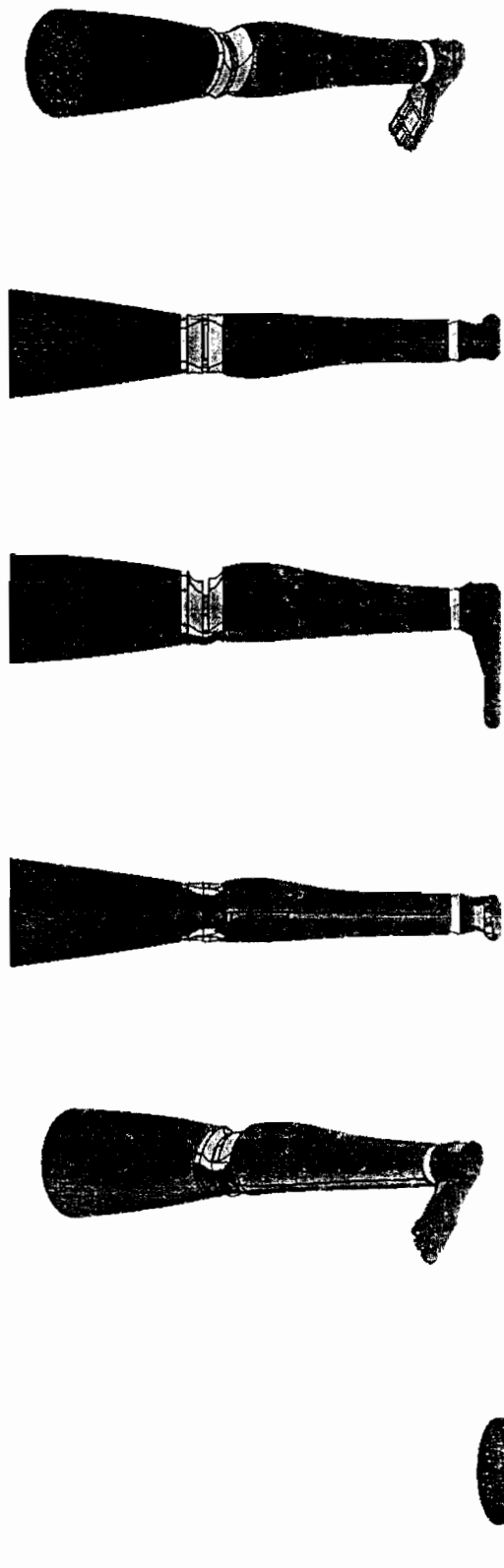
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1 2 3 4 5 6



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 LINEAR
 ANGULAR

FINISH:

DEBUR AND
BREAK SHARP
EDGES

DO NOT SCALE DRAWING

REVISION

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A4

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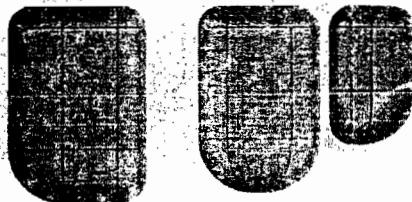
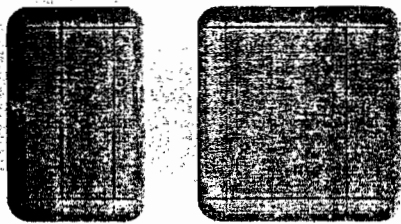
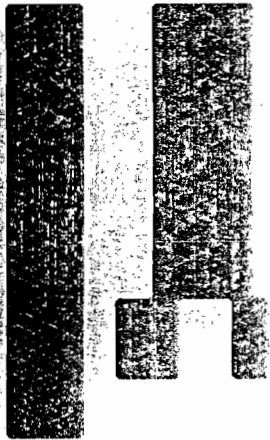
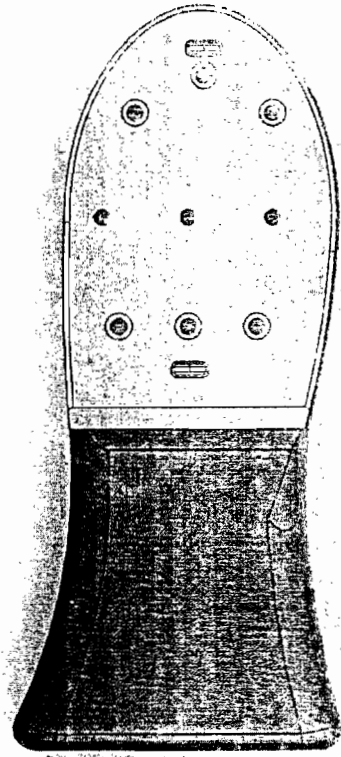
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SHEET 1 OF 1

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146

145

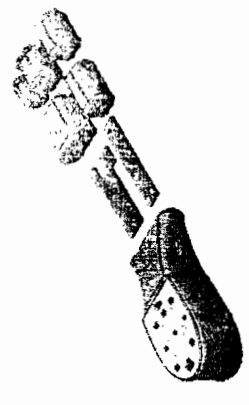
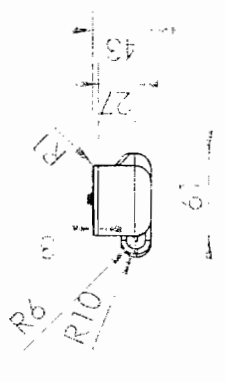
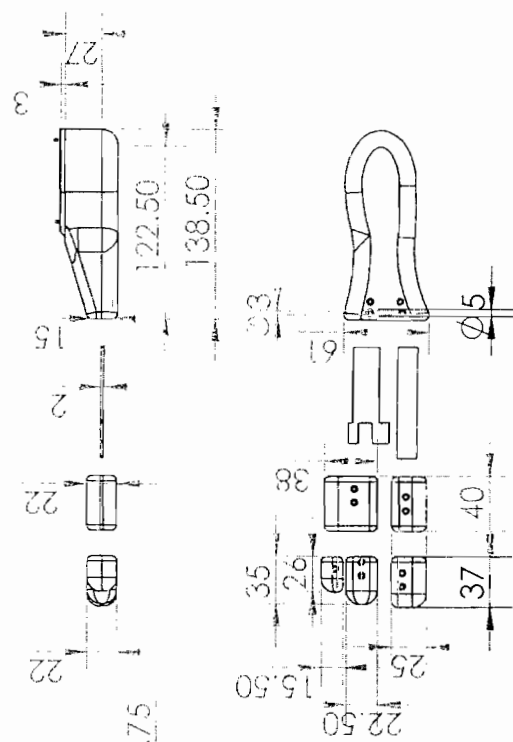
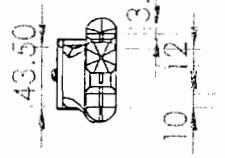
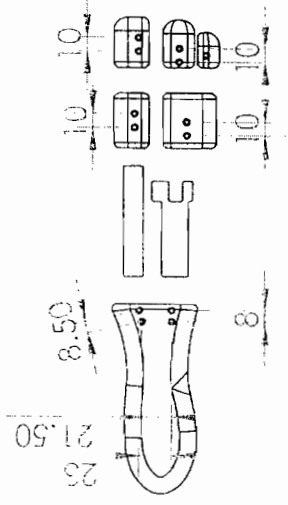
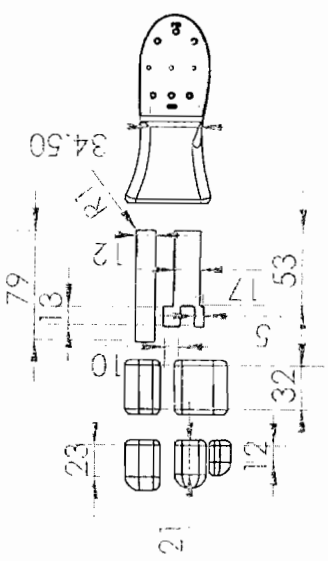
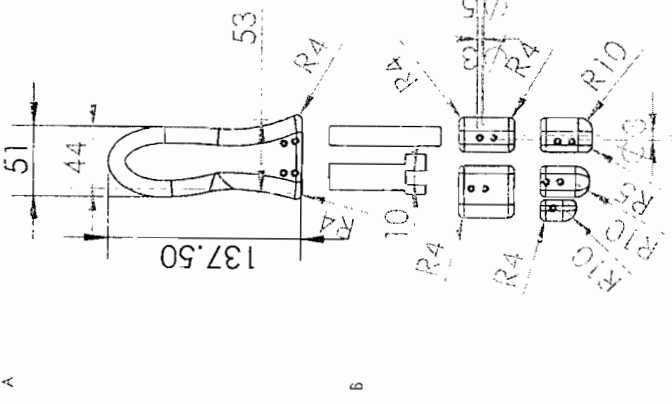


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16-07-2013



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN MILLIMETERS
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DO NOT SCALE DRAWING

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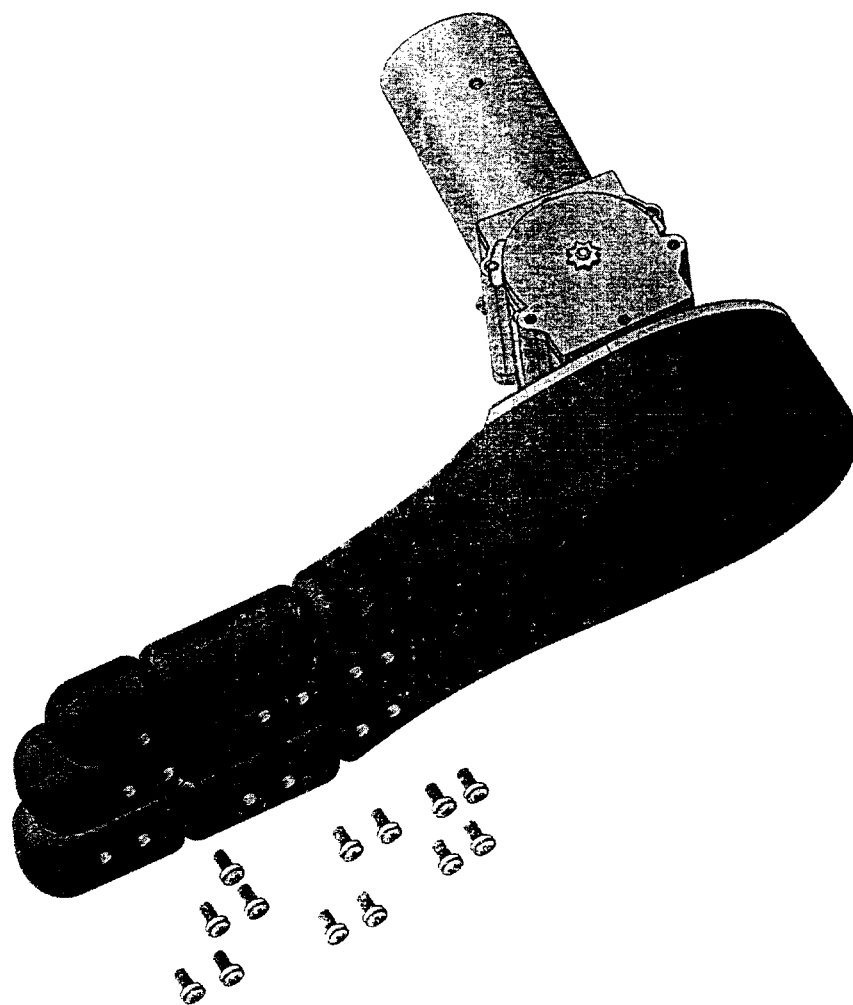
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WEIGHT

SCALE 1:1

SHEET 1 OF 1



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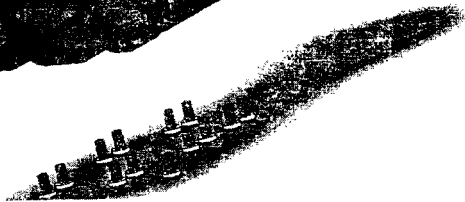
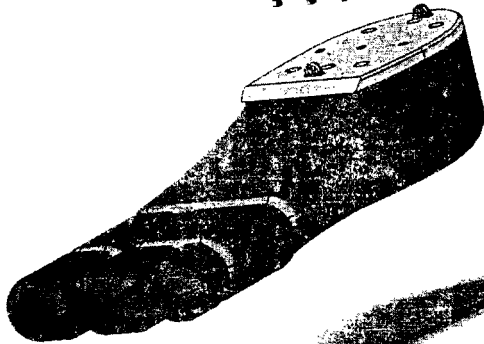
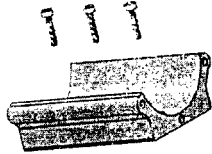
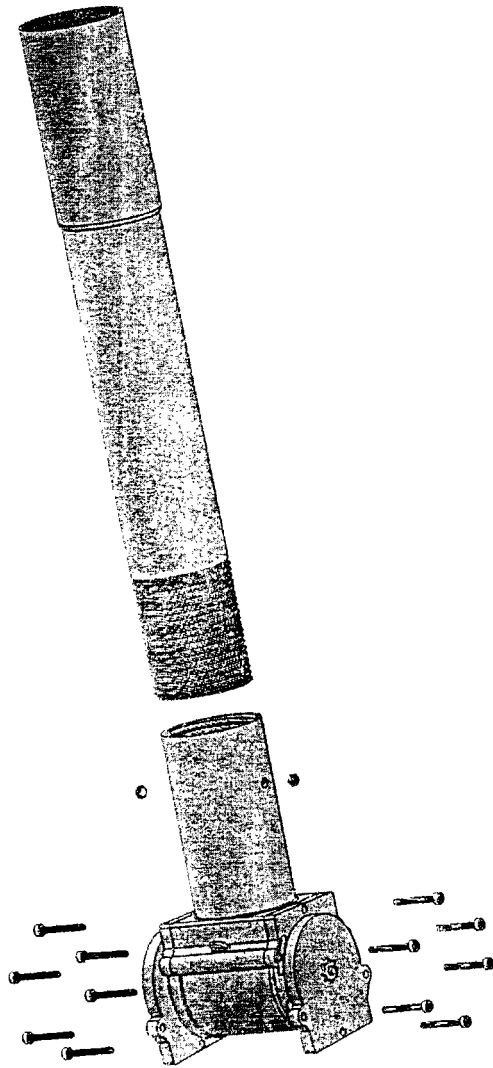
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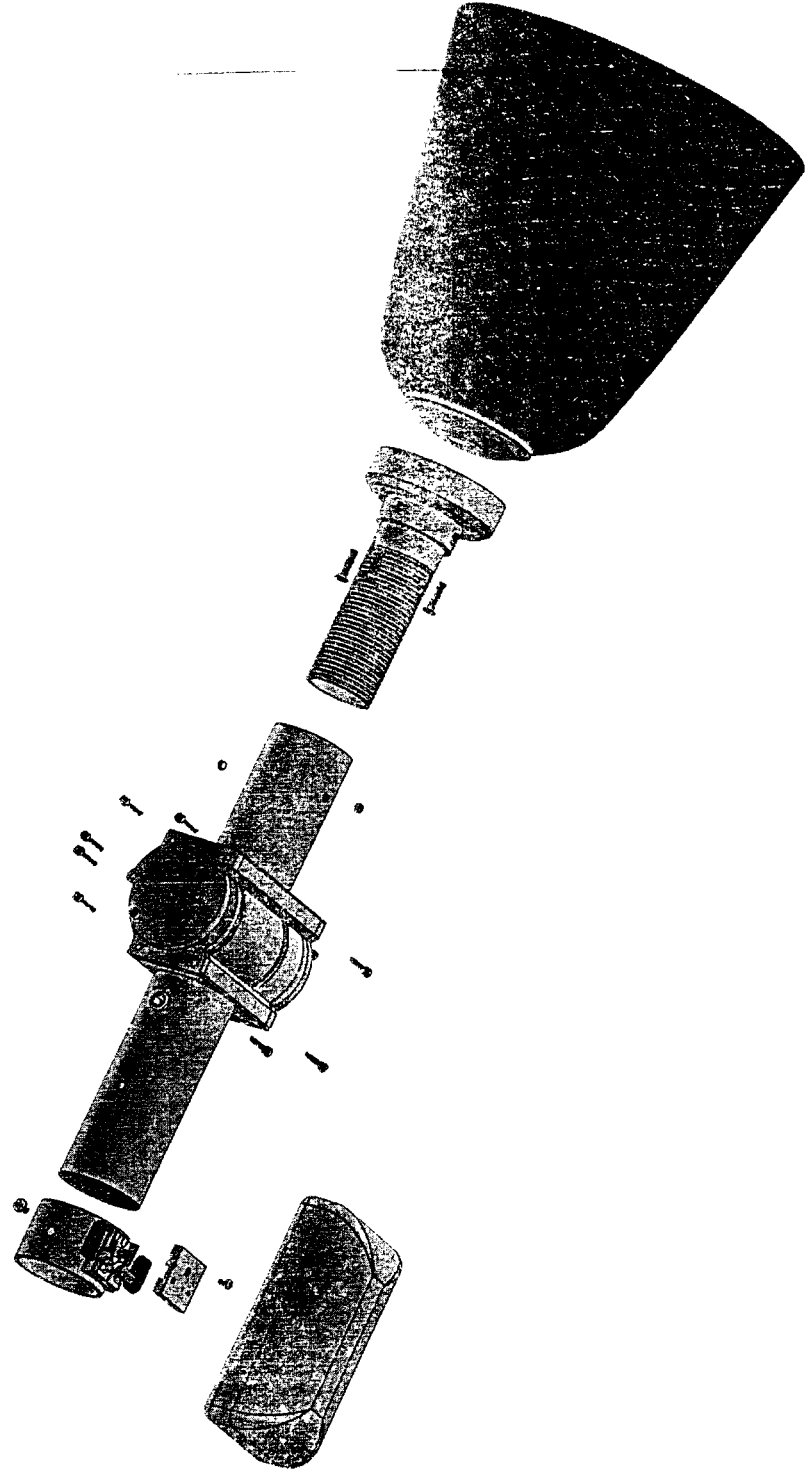
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16/-07-2013

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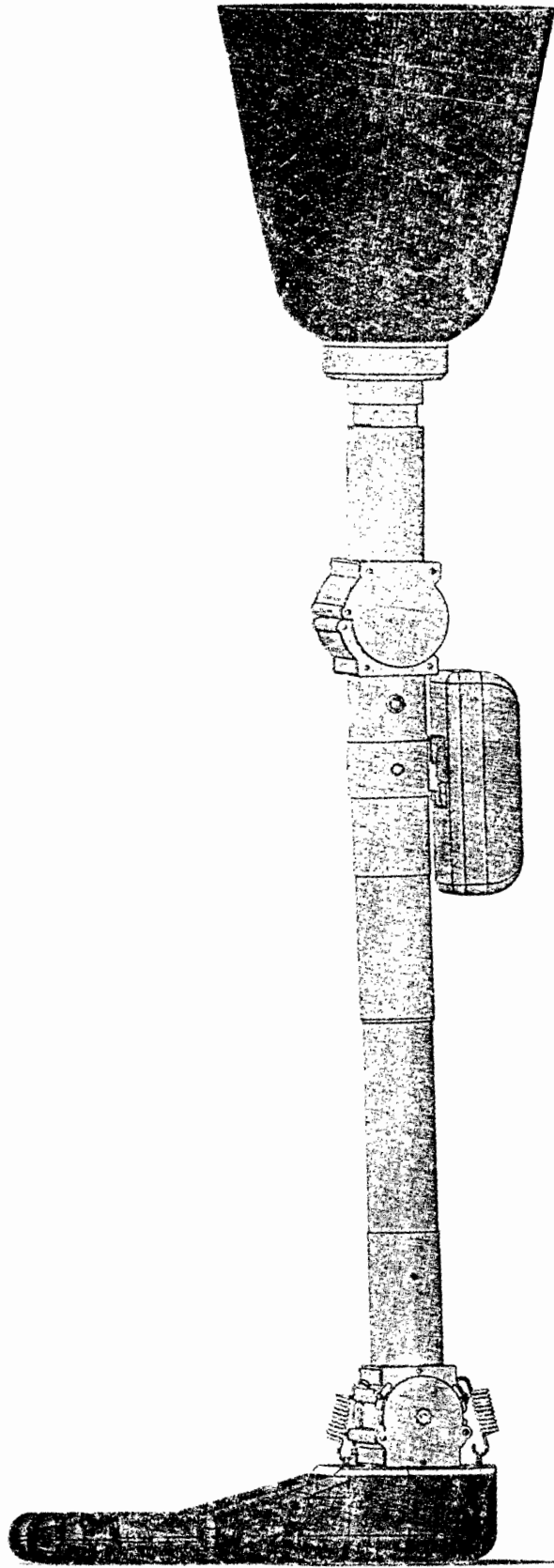




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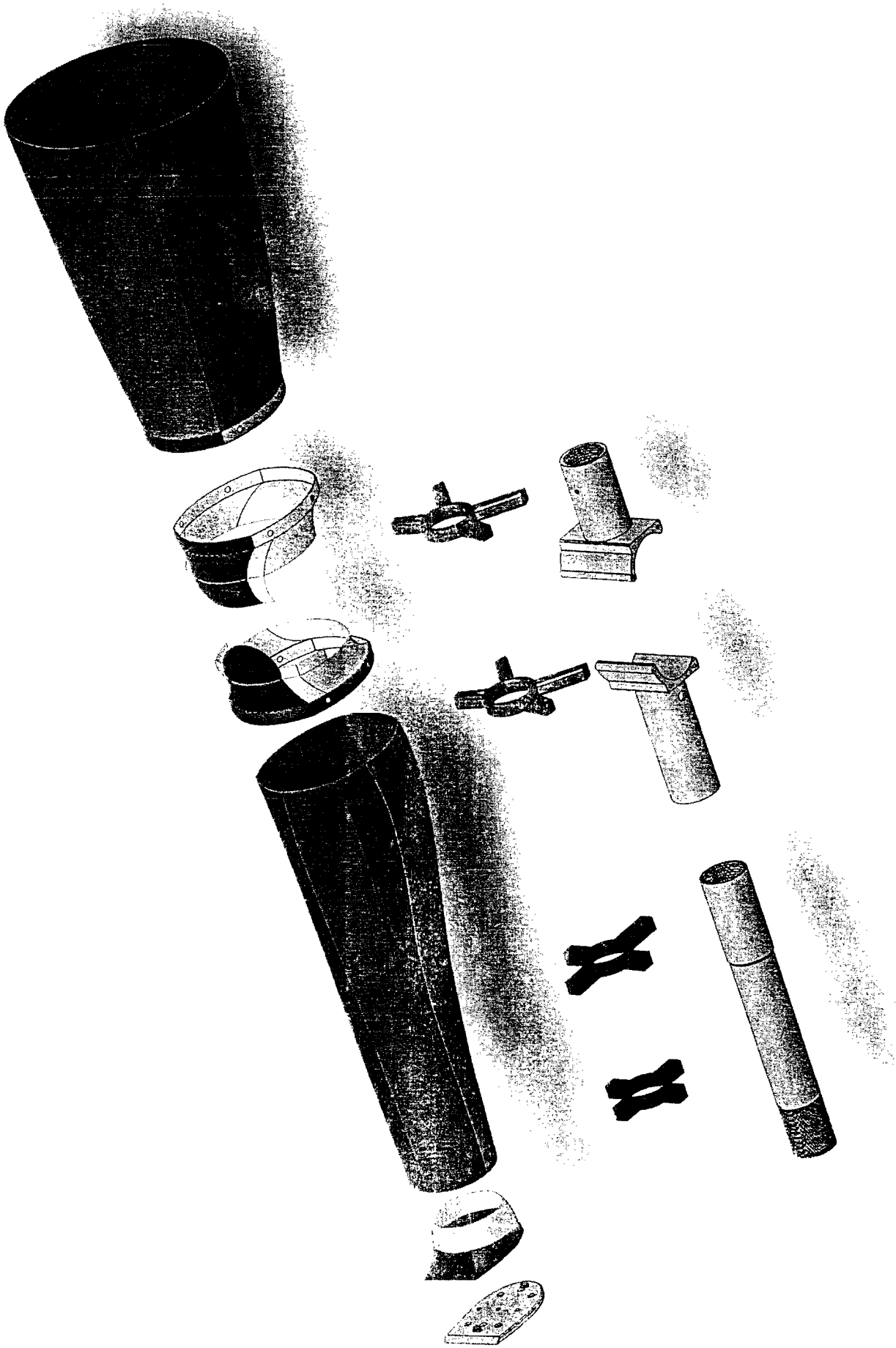


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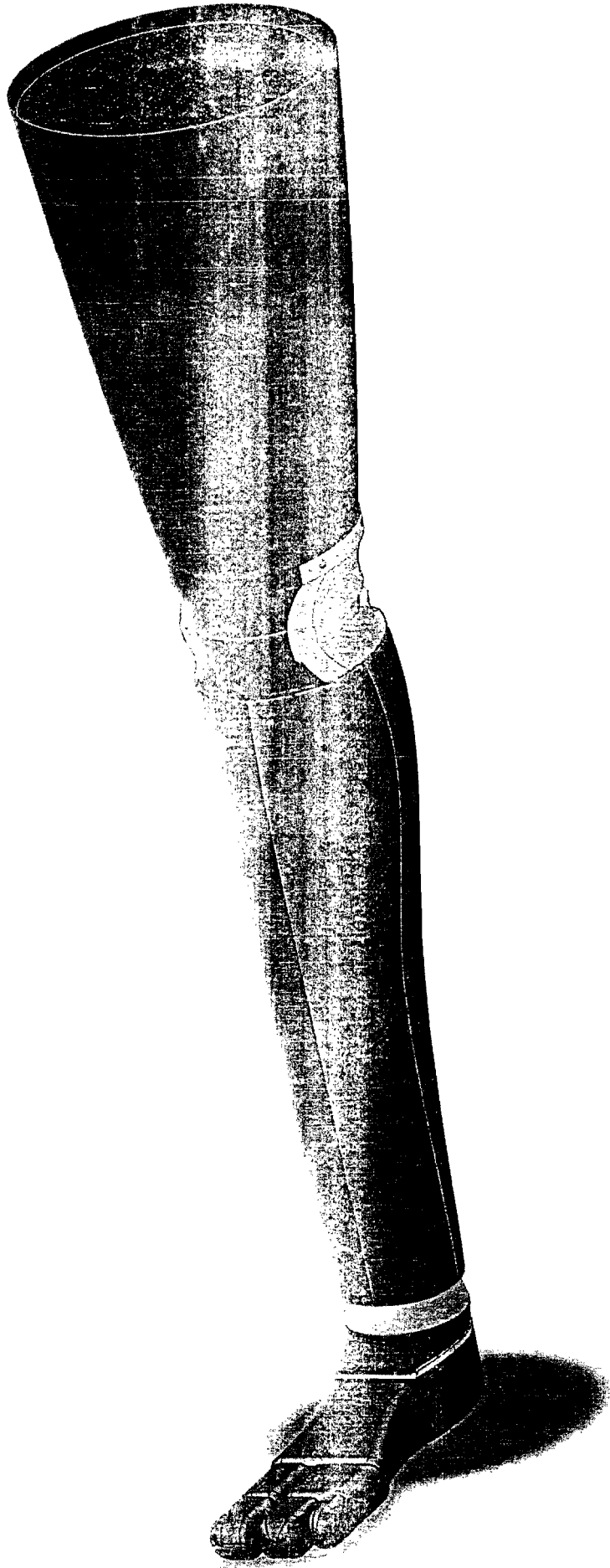


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