

Lampiran 1 : Pesawat Trainer-40



Spesifikasi:

Panjang Pesawat : 1295 mm

Lebar Sayap : 1575 mm

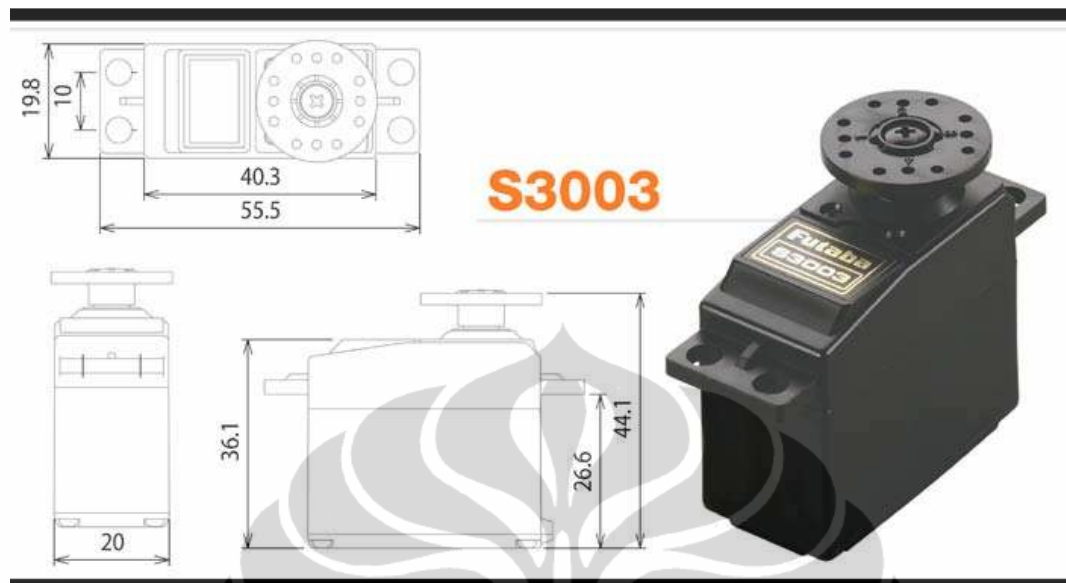
Berat : 2610 gram

Bidang Kontrol : Aileron, Elevator, Rudder

Jenis Mesin : SO-40

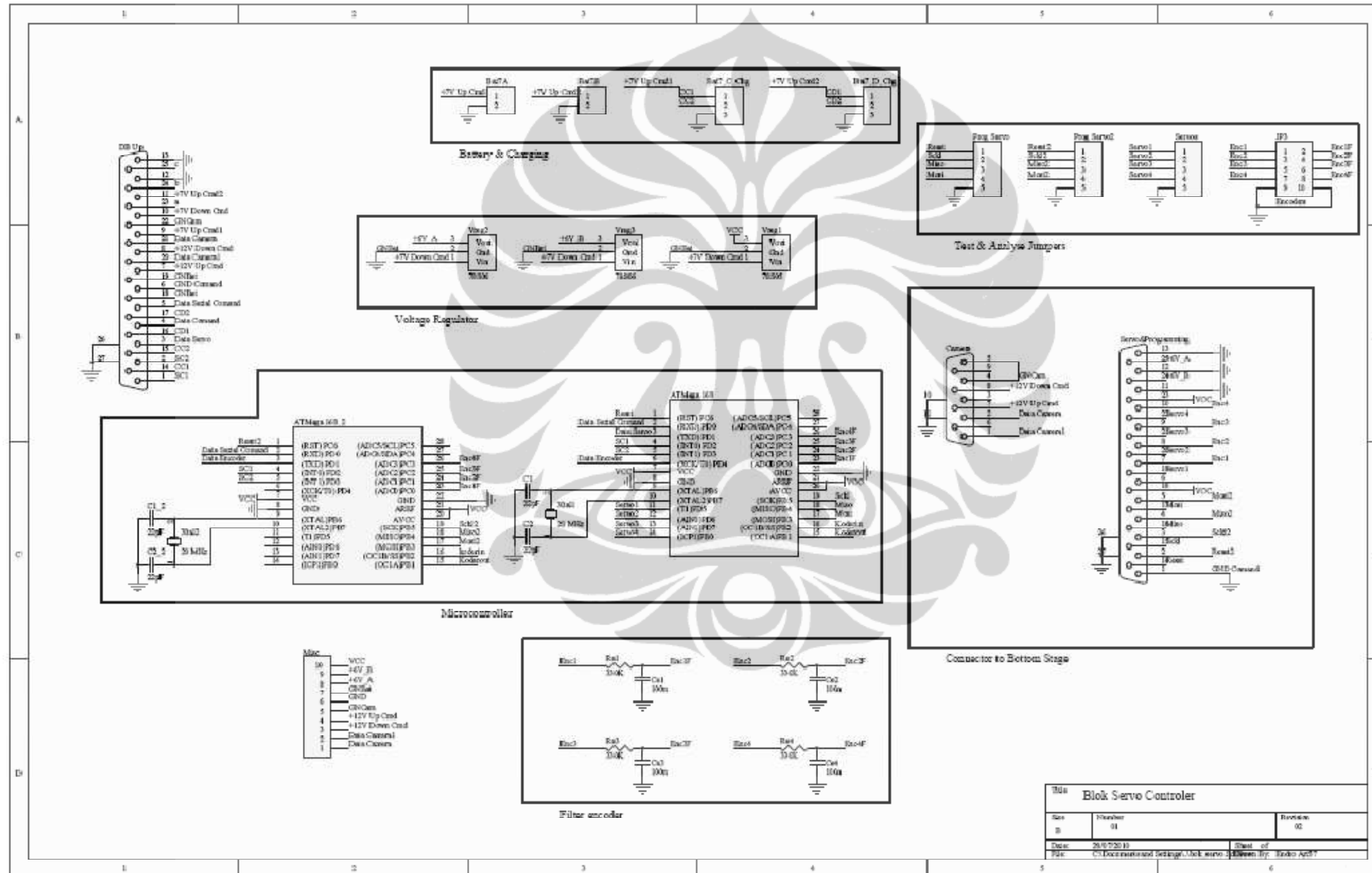
Beban tambahan maksimum (selain sistem standar): 500 gram (berdasarkan pengalaman)

Lampiran 2 : Servo Futaba S3003

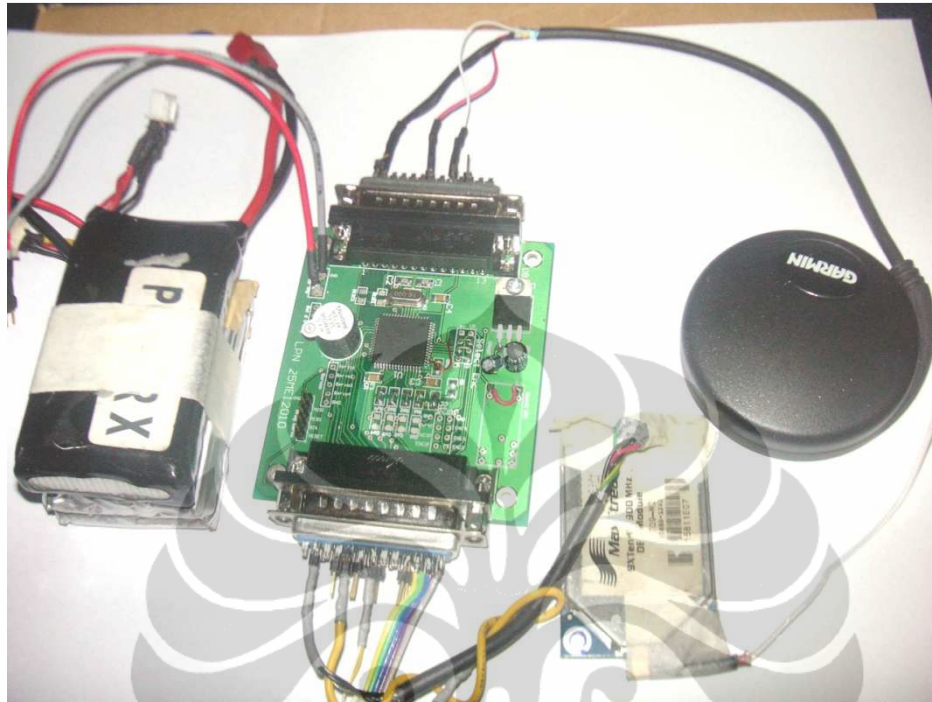


FUTM0031		
Volts	Torque	Speed
4.8V	44 oz-in.	0.23 sec/60°
6.0V	57 oz-in.	0.19 sec/60°
Dimensions		Weight
1.6 x 0.8 x 1.4 in.		1.3 oz.

Lampiran 3. Skematik Rangkaian kontroler Sirip Elevator



Lampiran 4. Rangkaian kontroler Sirip Elevator



Rangkaian kontroler Sirip Elevator + GPS dan Radio Tranceiver



Radio transmitter kontrol pesawat dan sistem receiver data

Lampiran 5. List pemrograman kontrol sirip pesawat

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$regfile = "m8def.dat"
$crystal = 2000000
$baud = 38400

Config Timer2 = Timer , Prescale = 1
'Config Servos = 1 , Servo1 = Portb.0 , Reload = 7
Config Int0 = Falling
On Ovf2 Int_servo
'On Int0 Setpoint
'Initialise the INT0 Interrupt
Tcnt2 = &H60
Ocr2 = &HA0

Enable Timer2
'Enable Int0
'Enable Timer1
On Urxc Terima
'define serial receive ISR
Enable Urxc
Enable Interrupts

Config Portd.5 = Output , Portd.6 = Output , Portd.7 = Output ,
Portb.0 = Output
Config Pind.2 = Input
Config Adc = Single , Prescaler = Auto
Start Adc

Dim Sp_a As Long , Spa As Single , Cv As Long , Cvr As Single ,
Cv1 As Single , Cvr1 As Single , Mv As Single , Mvmax As Single
Dim Kc As Single , Ti As Single , Td As Single , Er As Single ,
Mvr As Single , Mvd As Long , Cvr3 As Single , Cvr4 As Single
Dim I As Single , Dt As Single , Pv As Single , Iv As Single , Iv1
As Single , Dv As Single , Steps As Long
Dim Kci As Single , Kcd As Single , Er_sum As Single , Er_sum1 As
Single , Flag As Bit , Cntr As Integer

Dim Pot As Integer , Pot1 As Integer , Pot2 As Integer , Pot3 As
Single
Dim Potb As Integer , Pot1b As Integer , Pot2b As Integer , Pot3b
As Integer

Dim Tm As Integer
Dim Cnt As Integer , Putar As Long , F As Integer
Dim Sa As Byte , Sb As Long , Sc As Byte , Sd As Byte , Cc As Bit
, Dd As Bit
Dim A As String * 80 , B As Integer

Sa = 99
F = 0
Spa = 0
Dt = 0.01
'0.02016 ' maksimum waktu sampling =0.05(teta x tho)= 0.0171452
Flag = 0
Mvmax = 16

'Default value of PID A
Kc = 1.58715

```

```

Ti = 0.378
'0.29104
Kci = Kc * Dt
Kci = Kci / Ti
Kcd = Kc * Td

Cv1 = 0
Cvr = 0

Er = 0
Cvr1 = 0
Iv1 = 0
Er_sum1 = 0
Er_sum = 0
Mvd = 98
Do
' baca setpoint
Spa = Sp_a - 98      'rubah ke sudut
Spa = Spa / 1.17

If F = 1 Then

    Pot = Getadc(0)
    Pot3 = Pot - 567
    Pot3 = Pot3 / 27.4

    ' Cv = Pot3
    Cvr1 = Pot3      'rubah satuan ke tegangan
    Cvr = Cvr1

    Er = Spa - Cvr
    If Er > 5 Then Er = 5
    If Er < -5 Then Er = -5

    ' If Er > -10 And Er < 10 Then Er = 0

    'proporsional:
    Pv = Kc * Er

    'Integral:
    Er_sum = Er_sum + Er
    Iv = Kci * Er_sum

    Cvr4 = Cvr3
    ' Cvr3 = Cv1
    Cv1 = Cvr1

    'PI:
    Mv = Pv + Iv
    Cvr3 = Cvr
    Mv = Mv + Cvr3

    'Mv = Mv + 2500
    If Mv >= Mvmax Then
        Mv = Mvmax
        Iv = Iv1
        Er_sum = Er_sum1
    End If

```

```

If Mv <= -18 Then
    Mv = -18
    Iv = Iv1
    Er_sum = Er_sum1
End If

Er_sum1 = Er_sum
Iv1 = Iv

Mvr = Mv * 1
Mvr = Mvr + 98
Mvd = Mvr

Print "$3," ; Sp_a ; "," ; Fusing( spa , "#.#" ) ; "," ;
Fusing( pot3 , "#.#" ) ; "," ; Mvd ; "," ;
'( Print Fusing( mv , "#.#" ) ; "," ; Fusing( er , "#.#" ) ; "," ;
Fusing( er_sum , "#.#" )
')
If Dd = 1 Then
    Print A
    Dd = 0
End If

F = 0
' Portd.6 = 1
End If
Loop

Int_servo:
    Tcnt2 = &H60
    Incr Cnt
    If Pind.2 = 1 Then
        Incr Sb
        B = 1
    End If
    If Cnt >= Sc Then Portd.5 = 0
    'If Cnt >= 1000 Then F = 1
    If Pind.2 = 0 Then
        If B = 1 Then
            Sp_a = Sb
            B = 0
        End If
        Sb = 0
    End If
    If Cnt >= 1000 Then
        Cnt = 0
        Portd.5 = 1
        F = 1
    End If
Return

Terima:
    If Udr = "*" Then
        Cc = 0
        Dd = 1
    End If
    If Cc = 1 Then
        A = A + Chr( udr )
    End If

```

```
End If
If Udr = "$" Then
  Cc = 1
  A = ""
End If
Return

Setpoin:
  Sp_a = Sb
  Sb = 0
Return
```

