LAMPIRAN
FUNGSI M-FILE MATLAB

1. **Self Screening Jammers (SSJ)**

```
function [BR_range] = ssj_req (pt, g, freq, sigma, b, loss, pj, bj, gj, lossj)
pt=50000;
g=35;
freq=5.6e9;
sigma=10;
b=667e3;
loss=0.1;
pj=600;
bj=50e6;
gj=10;
lossj=0.1;
c = 3.0e+8;
lambda = c / freq;
lambda_db = 10*log10(lambda^2);
if (loss == 0.0)
  loss = 0.000001;
end
if (lossj == 0.0)
  lossj =0.000001;
end
sigmadb =10*log10(sigma);
pt_db = 10*log10(pt);
b_db = 10*log10(b);
bj_db = 10*log10(bj);
pj_db = 10*log10(pj);
factor = 10*log10(4.0 *pi);
BR_range = sqrt((pt * (10^(g/10)) * sigma * bj * (10^(lossj/10))) / ...
 (4.0 * pi * pj * (10^(gj/10)) * b * ...
(10^(loss/10)))) / 1000.0
```

```
s_at_br = pt_db + 2.0 * g + lambda_db + sigmadb - ...
3.0 * factor - 4.* 10*log10(BR_range) - loss
index =0;
for ran_var = .1:10:10000
 index = index + 1;
  ran_db = 10*log10(ran_var * 1000.0);
  ssj(index) = pj_db + gj + lambda_db + g + b_db - 2.0 * factor - ...
  2.0 * ran_db - bj_db - lossj + s_at_br ;
 s(index) = pt_db + 2.0 * g + lambda_db + sigmadb - ...
 3.0 * factor - 4.* ran_db - loss + s_at_br ;
end
ranvar = .1:10:10000;
ranvar = ranvar ./ BR_range;
semilogx (ranvar,s,'k',ranvar,ssj,'k-.');
axis([.1 1000 -90 40])
xlabel ('Range / Jarak (Km)');
legend('Target Sebenarnya','Setelah SSJ')
ylabel ('Nilai Relatif S/J (dB)');
grid
pj_var = 1:1:1000;
BR_pj = sqrt((pt * (10^(g/10)) * sigma * bj * (10^(lossj/10))) ...
./ (4.0 * pi .* pj_var * (10^(gj/10)) * b * (10^(loss/10)))) ./ 1000;
pt_var = 1000:100:10e6;
BR_pt = sqrt((pt_var * (10^(g/10)) * sigma * bj * (10^(lossj/10))) ...
./ (4.0 * pi .* pj * (10^(gj/10)) * b * (10^(loss/10)))) ./ 1000;
figure (2)
subplot (2,1,1)
semilogx (BR_pj,'k')
xlabel ('Daya Jammer - Watts');
ylabel ('Range / Jarak (Km)')
```

```
grid
subplot (2,1,2)
semilogx (BR_pt,'k')
xlabel ('Daya Radar - KW')
ylabel ('Range / Jarak (Km)')
grid
```

2. Burn Through Range

2.1) sir.m

```
function [SIR] = sir (pt,g,sigma,freq,tau,T0,loss,R,pj,bj,gj,lossj);
pt=50000;
g=35;
sigma=10;
freq=5.6e9;
tau=50e-6;
T0=290;
loss=5;
R=linspace(60,2400,5000);
pj=200;
bj=50e6;
gj=30;
lossj=0.3;
c = 3.0e+8;
k = 1.38e-23;
range = R .* 1000;
lambda = c / freq;
gj = 10^(gj/10);
G = 10^(g/10);
ERP1 = pj * gj / lossj;
ERP_db = 10*log10(ERP1);
```

```
Ar = lambda *lambda * G / 4 /pi;
num1 = pt * tau * G * sigma * Ar;
demo1 = 4^2 * pi^2 * loss .* range.^4;
demo2 = 4 * pi * bj .* range.^2;
num2 = ERP1 * Ar;
val11 = num1 ./ demo1;
val21 = num2 ./demo2;
sir = val11 ./ (val21 + k * T0);
SIR = 10*log10(sir);
figure (1)
plot (R, SIR,'k')
xlabel ('Jangkauan Deteksi Radar (Km)');
ylabel ('S/(J+N) (dB)')
grid
```

2.2) burn_thru.m

```
function [Range] = burn_thru (pt, g, sigma, freq, tau, T0, loss, pj, bj, gj,
lossj,sir0,ERP);
pt=50e3;
g=35;
sigma=10;
freq=5.6e9;
tau=0.5e-3;
T0=290;
loss=5;
pj=200;
bj=500e6;
gj=10;
lossj=0.3;
sir0=15;
```

```
ERP=linspace(1,1000,1000);
c = 3.0e+8;
k = 1.38e-23;
sir0 = 10^(sir0/10);
lambda = c / freq;
gj = 10^(gj/10);
G = 10^(g/10);
 Ar = lambda *lambda * G / 4 /pi;
num32 = ERP .* Ar;
demo3 = 8 *pi * bj * k * T0;
demo4 = 4^2 * pi^2 * k * T0 * sir0;
val1 = (num32 ./ demo3).^2;
val2 = (pt * tau * G * sigma * Ar)/(4^2 * pi^2 * loss * sir0 * k *T0);
val3 = sqrt(val1 + val2);
val4 = (ERP .* Ar) ./ demo3;
Range = sqrt(val3 - val4) ./ 1000;
figure (1)
plot (10*log10(ERP), Range,'k')
xlabel (' ERP Jammer (dB)')
ylabel ('Burn Through Range (Km)')
grid
```

3. Stand Off Jammers (SOJ)

```
function [BR_range] = soj_req (pt, g, sigma, b, freq, loss, range, pj, bj,gj, lossj,
gprime, rangej)
pt = 5.0e+3;
g = 35.0;
freq = 5.6e+9;
sigma = 10 ;
b = 667.0e+3;
```

```
range = 60;
gprime = 10.0;
loss = 0.01;
rangej = 20;
pj = 5.0e+3;
bj = 50.0e+6;
gj = 40;
lossj = 0.1;
c = 3.0e+8;
lambda = c / freq;
lambda_db = 10*log10(lambda^2)
if (loss == 0.0)
  loss = 0.000001;
end
if (lossj == 0.0)
  lossj =0.000001;
end
sigmadb = 10*log10(sigma);
range_db = 10*log10(range * 1000.);
rangej_db = 10*log10(rangej * 1000.)
pt_db = 10*log10(pt);
b_db = 10*log10(b);
bj_db = 10*log10(bj);
pj_db = 10*log10(pj);
factor = 10*log10(4.0 *pi);
BR_range = ((pt * 10^(2.0*g/10) * sigma * bj * 10^(lossj/10) * ...
  (rangej)^2) / (4.0 * pi * pj * 10^(gj/10) * 10^(gprime/10) * ...
  b * 10^(loss/10)))^.25 / 1000.
s_at_br = pt_db + 2.0 * g + lambda_db + sigmadb - ...
  3.0 * factor - 4.0 * 10*log10(BR_range) - loss
```

```
index =0;
for ran_var = .1:1:1000;
  index = index + 1;
  ran_db = 10*log10(ran_var * 1000.0);
  s(index) = pt_db + 2.0 * g + lambda_db + sigmadb - ...
    3.0 * factor - 4.0 * ran_db - loss + s_at_br;
  soj(index) = s_at_br - s_at_br;
end
ranvar = .1:1:1000;
semilogx (ranvar,s,'k',ranvar,soj,'k-.');
xlabel ('Range / Jarak (Km)');
legend('Target Sebenarnya','Setelah SOJ')
ylabel ('Nilai Relatif S/J (dB)');
grid;
```

4. Range Reduction Factor

```
function RRF = range_red_factor (te, pj, gj, g, freq, bj, rangej, lossj)
te = 500.0;
pj       = 500e3;
gj = 3.0;
g = 45.0;
freq = 10.0e+9;
bj       = 10e+6;
rangej = 750.0;
lossj = 1.0;
c = 3.0e+8;
k = 1.38e-23;
lambda = c / freq;
gj_10 = 10^( gj/10);
```

```
g_10 = 10^( g/10);
lossj_10 = 10^(lossj/10);
index = 0;
for wavelength = .01:.001:1
  index = index +1;
  jamer_temp = (pj * gj_10 * g_10 *wavelength^2) / ...
    (4.0^2 * pi^2 * k * bj * lossj_10 * (rangej * 1000.0)^2);
  delta = 10.0 * log10(1.0 + (jamer_temp / te));
  rrf(index) = 10^(-delta /40.0);
end
w = 0.01:.001:1;
figure (1)
semilogx(w,rrf,'k')
grid
xlabel ('Panjang Gelombang (meter)')
ylabel ('Faktor Pengurangan Jarak Jangkauan Radar (Km)')
index = 0;
for ran =rangej*.3:10:rangej*2
  index = index + 1;
  jamer_temp = (pj * gj_10 * g_10 *lambda^2) / ...
    (4.0^2 * pi^2 * k * bj * lossj_10 * (ran * 1000.0)^2);
  delta = 10.0 * log10(1.0 + (jamer_temp / te));
  rrf1(index) = 10^(-delta /40.0);
end
figure(2)
ranvar = rangej*.3:10:rangej*2 ;
plot(ranvar,rrf1,'k')
grid
xlabel ('Jarak Antara Radar Dan Jammer (Km)')
ylabel ('Faktor Pengurangan Jarak Jangkauan Radar (Km)')
```

```
index = 0;
for pjvar = pj*.01:100:pj*2
  index = index + 1;
  jamer_temp = (pjvar * gj_10 * g_10 *lambda^2) / ...
    (4.0^2 * pi^2 * k * bj * lossj_10 * (rangej * 1000.0)^2);
  delta = 10.0 * log10(1.0 + (jamer_temp / te));
  rrf2(index) = 10^(-delta /40.0);
end
```