

## 1. About TIMSAC for Quick Win

Executable files of TIMSAC for Quick Win were compiled as QuickWin applications by Compaq Visual Fortran Compiler. Following subroutines for file input/output are inserted to original codes.

### FLOPN3/FLCLS3

TIMSAC72 : autcor.f fpeaut.f mulcor.f fpec.f fftcor.f auspec.f  
mulspe.f optdes.f wnoise.f

### FLOPN2/FLCLS2

TIMSAC72 : deconv.f mulnos.f raspec.f mulfrf.f sglfrf.f optsim.f  
mulrsp.f

(1) auspec.exe

>auspec.exe auspec.dat [/M:auspec.out] [/O:auspec.prn]

Input Data Format

LAGH(Format (I5))

(Power spectrum is calculated at frequency  $i \cdot (\text{Nyquist Frequency} / \text{NLAGH})$   
for  $i = 0$  to lagh)

Data length and Maximum Lag of Autocovariance(Format (2I5))

Autocovariance(Format (4D20.10))

Sample(auspec.dat)

```
-----  
 20  
114  20  
 0.3093196885D+06  0.2428701412D+06  0.1052863414D+06 -0.4086535892D+05  
-0.1526702982D+06 -0.1918584443D+06 -0.1509164825D+06 -0.4883515163D+05  
 0.7261108848D+05  0.1661620547D+06  0.1872713520D+06  0.1184335832D+06  
-0.3773289020D+04 -0.1189465566D+06 -0.1877989779D+06 -0.1887034073D+06  
-0.1258695216D+06 -0.2254331422D+05  0.7824264734D+05  0.1406693299D+06  
 0.1380691431D+06  
-----
```

This data except the first line is the intermediate output of autocor.exe.

(2) autcor.exe

```
>autcor.exe autcor.dat [/M:autcor.out] [/O:autcor.prn]
```

Input Data Format

Data length and Maximum Lag of Autocovariance(Format (2I5))

Data format(Format (20A4))

Data body(Format ('Data format defined by the second line'))

Sample(autcor.dat)

-----  
114 20

(10F10.4)

2430.0000 2506.0000 2767.0000 2940.0000 3169.0000 3450.0000 3594.0000 3774.0000  
3695.0000 3411.0000

(several lines are omitted)

2360.0000 2601.0000 3054.0000 3386.0000 3553.0000 3468.0000 3187.0000 2723.0000  
2686.0000 2821.0000  
3000.0000 3201.0000 3424.0000 3531.0000  
-----

The intermediate output(e.g. autcor.out) can be used for an input file to  
fpeaut.exe and auspec.exe.

(3) deconv.exe

>deconv.exe deconv.dat [/O:deconv.prn]

Input Data Format

Maximum length of response(ML)(Format (I5))

N, MO, IR, IL(Format (4I5))

N : Data length

MO: AR order determined by MFPE

IR: Number of controlled variables

IL: Number of manipulated variables, IL=0 for MFPE computation

Prediction error covariance matrix(OSD)(Format (4D20.0))

Coefficient matrices(A)(Format (4D20.0))

Sample(deconv.dat)

```
-----  
20  
500  4  3  0  
 0.6217151975D+01 -0.9488110670D-01 -0.1679087774D+01  
-0.9488110670D-01  0.1077570348D+02  0.2152877129D+00  
-0.1679087774D+01  0.2152877129D+00  0.9929282191D+03  
 0.1682052578D+01 -0.6741535327D-03  0.2408007008D-02  
-0.2651143957D-01  0.1090027555D+01 -0.6372213092D-02  
 0.5731420795D+00 -0.1970172161D+00  0.9112987356D+00  
-0.7511670156D+00  0.1196598218D-01 -0.5628676197D-03  
 0.1612670641D-01  0.1839752005D-01  0.9374981533D-02  
 0.1739834428D-01  0.1293845340D+00 -0.5150149989D+00  
 0.7703823053D-01 -0.9614091935D-02  0.1396011272D-02  
 0.3607695324D-01  0.3156486537D-01  0.2623146677D-02  
 0.8239249750D+00 -0.5512274206D+00 -0.2251411317D+00  
-0.3645307836D-01  0.2274511976D-02  0.1156646078D-02  
-0.2811997387D-01 -0.1533800296D+00  0.8311359798D-02  
-0.6939090921D+00  0.5358656414D+00  0.1612298575D+00  
-----
```

This data except the first line is the intermediate output of fpec.exe.

(4) fftcor.exe

```
>fftcor.exe fftcor.dat [/M:fftcor.out] [/O:fftcor.prn]
```

Input Data Format

ISW, Data length(LD) and Maximum Lag of Autocovariance(LAGH)(Format (315))

ISW=1...AUTO CORRELATION OF X (ONE-CHANNEL)

ISW=2...AUTO CORRELATIONS OF X AND Y (TWO-CHANNEL)

ISW=4...AUTO,CROSS CORRELATIONS OF X AND Y (TWO-CHANNEL)

Data format(Format (20A4))

Data body(Format ('Data format defined by the second line'))

Sample(fftcor.dat)

```
-----  
      1  114  20  
(10F10.4)  
2430.0000 2506.0000 2767.0000 2940.0000 3169.0000 3450.0000 3594.0000 3774.0000  
3695.0000 3411.0000
```

(several lines are omitted)

```
2360.0000 2601.0000 3054.0000 3386.0000 3553.0000 3468.0000 3187.0000 2723.0000  
2686.0000 2821.0000  
3000.0000 3201.0000 3424.0000 3531.0000  
-----
```

If you edit several lines of the intermediate output(e.g. fftcor.out),  
edited file can be used for an input file to fpeaut.exe and auspec.exe.

(5) fpeaut.exe

```
>fpeaut.exe fpeaut.dat [/M:fpeaut.out] [/O:fpeaut.prn]
```

Input Data Format

Upper limit of AR model order(LAGH)(Format (15))

Data length and Maximum Lag of Autocovariance(Format (215))

Autocovariance(Format (4D20.10))

Sample(fpeaut.dat)

```
-----  
20  
114 20  
0.3093196885D+06 0.2428701412D+06 0.1052863414D+06 -0.4086535892D+05  
-0.1526702982D+06 -0.1918584443D+06 -0.1509164825D+06 -0.4883515163D+05  
0.7261108848D+05 0.1661620547D+06 0.1872713520D+06 0.1184335832D+06  
-0.3773289020D+04 -0.1189465566D+06 -0.1877989779D+06 -0.1887034073D+06  
-0.1258695216D+06 -0.2254331422D+05 0.7824264734D+05 0.1406693299D+06  
0.1380691431D+06  
-----
```

This data except the first line is the intermediate output of autocor.exe.  
The intermediate output(e.g. fpeaut.out) can be used for an input file to raspec.exe.

(6) fpec.exe

```
>fpec.exe fpec.dat [/M:fpec.out] [/O:fpec.prn]
```

Input Data Format

L, IR, IL(Format (3I5))

L: UPPER LIMIT OF MODEL ORDER M (LESS THAN 30)

IR: NUMBER OF CONTROLLED VARIABLES

IL: NUMBER OF MANIPULATED VARIABLES, IL=0 FOR MFPE COMPUTATION

ISW(I), I = 1, IR+IL(Format(16I5))

INW(I): INDICATOR; FIRST IR INDICATE THE CONTROLLED VARIABLES

N, LAGH, IPO(Format(3I5))

N: Data length

LAGH: Maximum Lag of Autocovariance

IPO: Dimension o data

Do i = 1 to IPO

Do j = 1 to IPO

I(ID of X), J(ID of Y)(Format (2I5))

Autocovariance or Crosscovariance(Format (4D20.10))

(Crosscovariance : Time of X is later than time of Y)

End do

End do

Sample(fpec.dat)

```
-----  
10  3  0  
 1  2  3  
500 20  3  
 1  1  
0.4543687840D+03  0.4483745776D+03  0.4342487551D+03  0.4149777007D+03  
0.3924902223D+03  0.3685055118D+03  0.3447791854D+03  0.3220428190D+03  
0.3003288365D+03  0.2796980861D+03  0.2603217597D+03  0.2425878572D+03
```

(several lines are skipped)

```
2  3  
0.3308204800D+02  0.1945187610D+02  0.3790708419D+02  0.8049483629D+02  
0.1254377524D+03  0.1495573205D+03  0.1505497206D+03  0.1427445367D+03  
0.1507989368D+03  0.1702300889D+03  0.1921139930D+03  0.2033290651D+03  
0.2144521372D+03  0.2233272092D+03  0.2422342813D+03  0.2664656094D+03  
0.2856077695D+03  0.2992630976D+03  0.3071060097D+03  0.3174100898D+03  
0.3296177539D+03  
-----
```

This data except the first two lines is the intermediate output of autocor.exe.  
The intermediate output(e.g. fpec.out) can be used for an input file to  
mulrsp.exe, deconv.exe, mulnos.exe (to use the intermediate file for input of  
deconv.exe or mulnos.exe IL must be put 0) and optdes.dat.

(7) mulcor.exe

```
>mulcor.exe mulcor.dat [/M:mulcor.out] [/O:mulcor.prn]
```

Input Data Format

N, K, LAGH, ISW(Format (4I5))

N: Length of data

K: Dimension of the observation vector

LAGH: Maximum lag

ISW: ISW=1...Rowwise data input

ISW=2...Columnwise data input

Data format(Format (20A4))

Data body(Format ('Data format defined by the second line'))

Sample(mulcor.dat)

-----  
500 20 3 2

(20F10.4)

```
749.0000 752.0000 755.0000 757.0000 758.0000 757.0000 757.0000 755.0000  
751.0000 749.0000 746.0000 748.0000 749.0000 748.0000 748.0000 749.0000  
750.0000 754.0000 758.0000 762.0000
```

(several lines are skipped)

```
749.0000 749.0000 749.0000 749.0000 749.0000 749.0000 749.0000 749.0000  
749.0000 749.0000 749.0000 749.0000 749.0000 749.0000 749.0000 749.0000  
742.0000 731.0000 719.0000 718.0000
```

-----  
The intermediate output(e.g. mulcor.out) can be used for an input file to  
fpec.exe and mulspe.exe.



(8) mulfrf.exe

>mulfrf.exe mulfrf.dat [/O:mulfrf.prn]

Input Data Format

The number of input variables(K)(Format (I5))

ISW(I), I =1, K+1(Format (16I5))

ISW(1), ISW(2),, ..., ISW(K) : input varibales

ISW(K+1) : output varibale

N, LAGH, IPO(Format (3I5))

N : Data Length

LAGH : Power and cross spectrum is calculated at frequency

$i \cdot (\text{Nyquist Frequency} / \text{NLAGH})$  for  $i = 0$  to  $\text{lagh}$

IPO : Dimension of of the observation vector

Power spectrum or cross spectrum

Sample(mulfrf.dat)

-----

2			
1	2	3	
500	20	3	
0.6976681545D+04	0.0000000000D+00	0.0000000000D+00	
0.2967691002D+04	0.1305355146D+05	0.0000000000D+00	
0.7031307937D+04	0.1863090044D+04	0.9127019854D+04	
0.4298865871D+04	-0.4663336938D+03	0.4561509902D+03	

(several lines are skipped)

0.5278074850D+00	-0.2130675163D-05	0.4083569075D-05	
-0.4932331920D-01	0.2324152750D+01	0.8871356709D-05	
-0.1932995653D+01	0.6640654577D+01	0.2713229862D+03	

-----

This data except the first two lines is the intermediate ouput of mulspe.exe.

(9) mulnos.exe

>mulnos.exe mulnos.dat [/O:mulnos.prn]

Input Data Format

Maximum length of response(ML)(Format (I5))

N, MO, IR, IL(Format (4I5))

N : Data length

MO: AR order determined by MFPE

IR: Number of controlled variables

IL: Number of manipulated variables, IL=0 for MFPE computation

Prediction error covariance matrix(OSD)(Format (4D20.0))

Coefficient matrices(A)(Format (4D20.0))

Sample(mulnos.dat)

```
-----  
20  
500  4  3  0  
0.6217151975D+01 -0.9488110670D-01 -0.1679087774D+01  
-0.9488110670D-01 0.1077570348D+02 0.2152877129D+00  
-0.1679087774D+01 0.2152877129D+00 0.9929282191D+03  
0.1682052578D+01 -0.6741535327D-03 0.2408007008D-02  
-0.2651143957D-01 0.1090027555D+01 -0.6372213092D-02  
0.5731420795D+00 -0.1970172161D+00 0.9112987356D+00  
-0.7511670156D+00 0.1196598218D-01 -0.5628676197D-03  
0.1612670641D-01 0.1839752005D-01 0.9374981533D-02  
0.1739834428D-01 0.1293845340D+00 -0.5150149989D+00  
0.7703823053D-01 -0.9614091935D-02 0.1396011272D-02  
0.3607695324D-01 0.3156486537D-01 0.2623146677D-02  
0.8239249750D+00 -0.5512274206D+00 -0.2251411317D+00  
-0.3645307836D-01 0.2274511976D-02 0.1156646078D-02  
-0.2811997387D-01 -0.1533800296D+00 0.8311359798D-02  
-0.6939090921D+00 0.5358656414D+00 0.1612298575D+00  
-----
```

This data except the first line is the intermediate output of fpec.exe.

(10) mulrsp.exe

>mulrsp.exe mulrsp.dat [/O:mulrsp.prn]

Input Data Format

LAGH(Format (I5))

(Power spectrum is calculated at frequency  $i \cdot (\text{Nyquist Frequency} / \text{NLAGH})$   
for  $i = 0$  to lagh)

N, MO, IP(Format (3I5))

N : Data lenght

MO: AR order determined by FPEC

IP: Number of variables

Prediction error covariance matrix(OSD)(Format (4D20.0))

Coefficient matrices(AR Coefficeints)(Format (4D20.0))

K(Format (I5))

K : MA order

If  $K \geq 0$  then

Coefficeints matrices(MA Coefficients)(Format (4D20.0))

else

end if

Sample(mulrsp.dat)

```
-----  
20  
500  4  3  0  
 0.6217151975D+01 -0.9488110670D-01 -0.1679087774D+01  
-0.9488110670D-01  0.1077570348D+02  0.2152877129D+00  
-0.1679087774D+01  0.2152877129D+00  0.9929282191D+03  
 0.1682052578D+01 -0.6741535327D-03  0.2408007008D-02  
-0.2651143957D-01  0.1090027555D+01 -0.6372213092D-02  
 0.5731420795D+00 -0.1970172161D+00  0.9112987356D+00  
-0.7511670156D+00  0.1196598218D-01 -0.5628676197D-03  
 0.1612670641D-01  0.1839752005D-01  0.9374981533D-02  
 0.1739834428D-01  0.1293845340D+00 -0.5150149989D+00  
 0.7703823053D-01 -0.9614091935D-02  0.1396011272D-02  
 0.3607695324D-01  0.3156486537D-01  0.2623146677D-02  
 0.8239249750D+00 -0.5512274206D+00 -0.2251411317D+00  
-0.3645307836D-01  0.2274511976D-02  0.1156646078D-02  
-0.2811997387D-01 -0.1533800296D+00  0.8311359798D-02  
-0.6939090921D+00  0.5358656414D+00  0.1612298575D+00  
0  
-----
```

This data except the first and the final lines is the intermediate output of fpec.exe.

(11) mulspe.exe

```
>mulspe.exe mulspe.dat [/M:mulspe.out] [/O:mulspe.prn]
```

Input Data Format

LAGH(Format (15))

(Power and cross spectrum is calculated at frequency  $i \cdot (\text{Nyquist Frequency} / \text{NLAGH})$   
for  $i = 0$  to lagh)

N, LAGH0, IPO(Format(315))

N: Data length

LAGH0: Maximum Lag of Autocovariance and Crosscovariance

IPO: Dimension o data

Do  $i = 1$  to IPO

Do  $j = 1$  to IPO

I(ID of X), J(ID of Y)(Format (215))

Autocovariance or Crosscovariance(Format (4D20.10))

(Crosscovariance : Time of X is later than time of Y)

End do

End do

Sample(mulspe.dat)

-----  
20

500 20 3

1 1

0.4543687840D+03	0.4483745776D+03	0.4342487551D+03	0.4149777007D+03
0.3924902223D+03	0.3685055118D+03	0.3447791854D+03	0.3220428190D+03
0.3003288365D+03	0.2796980861D+03	0.2603217597D+03	0.2425878572D+03

(several lines are skipped)

2 3

0.3308204800D+02	0.1945187610D+02	0.3790708419D+02	0.8049483629D+02
0.1254377524D+03	0.1495573205D+03	0.1505497206D+03	0.1427445367D+03
0.1507989368D+03	0.1702300889D+03	0.1921139930D+03	0.2033290651D+03
0.2144521372D+03	0.2233272092D+03	0.2422342813D+03	0.2664656094D+03
0.2856077695D+03	0.2992630976D+03	0.3071060097D+03	0.3174100898D+03
0.3296177539D+03			

-----

This data except the first line is the intermediate output of mulcor.exe.  
The intermediate output(e.g. mulspe.out) can be used for an input file to  
mulfrf.exe.

(12) optdes.exe

```
>optdes.exe optdes.dat [/M:optdes.out] [/O:optdes.prn]
```

Input Data Format

IR, L, NS(Format (315))

IR: NUMBER OF CONTROLLED VARIABLES

L : NUMBER OF MANIPULATED VARIABLES

NS: NUMBER OF D.P. STAGES

Q1(Format(8F10.4))

do i = 1,ir

q1(i,j), j= 1,i

end do

R(Format(8F10.4))

do i = 1,l

r(i,j), j= 1,i

end do

N, MO(Format (215))

N : Data lenght

M : AR order determined by FPEC

Prediction error covariance matrix of Controlled Variables(GR)(Format (4D20.0))

Coefficient matrices(AR Coefficeints)(Format (4D20.0))

Sample(optdes.dat)

```
-----  
      2      1      20  
0.160866970.0  
0.0          0.09281384  
0.00100712  
500      4      2      1  
  0.6217151975D+01  -0.9488110670D-01  
 -0.9488110670D-01  0.1077570348D+02  
  0.1682052578D+01  -0.6741535327D-03  0.2408007008D-02  
 -0.2651143957D-01  0.1090027555D+01  -0.6372213092D-02  
 -0.7511670156D+00  0.1196598218D-01  -0.5628676197D-03  
  0.1612670641D-01  0.1839752005D-01  0.9374981533D-02  
  0.7703823053D-01  -0.9614091935D-02  0.1396011272D-02  
  0.3607695324D-01  0.3156486537D-01  0.2623146677D-02  
 -0.3645307836D-01  0.2274511976D-02  0.1156646078D-02  
 -0.2811997387D-01  -0.1533800296D+00  0.8311359798D-02  
-----
```

This data except the first 4 lines is the intermediate output(fpec2.out) of fpec.exe(Input data is fpec2.dat).

(13) optsim.exe

>optsim.exe optsim.dat [/O:optsim.prn]

Input Data Format

NS, INTP(Format (215))

NS: NUMBER OF STEPS OF SIMULATION

INTP=1: TO SUPPRESS HISTORY OUTPUT

INTP=2: TO PRINT OUT THE HISTORY

the intermediate output of optdes.exe

(e.g. /programs//timsac/quickwin/card/optdes.out)

the left IR columns of the intermediate output of wnoise.exe

(e.g. /programs//timsac/quickwin/card/wnoise.out)

Sample(optsim.dat)

-----  
20 2  
500 4 2 1 20  
0.1608669700D+00 0.0000000000D+00  
0.0000000000D+00 0.9281384000D-01  
0.1007120000D-02  
0.1682052578D+01 -0.6741535327D-03  
-0.2651143957D-01 0.1090027555D+01  
-0.7511670156D+00 0.1196598218D-01

(several lines are skipped)

0.222D+01 -0.189D+00  
0.474D+01 -0.182D+01  
-0.335D+00 0.244D+01  
0.200D+01 0.467D+01  
0.339D+00 -0.182D+01  
-0.154D+01 0.157D+01  
-----

(14) raspec.exe

```
>raspec.exe raspec.dat [/O:raspec.prn]
```

Input Data Format

Maximum length of response(ML)(Format (I5))

N, MO, IP(Format (3I5))

N : Data length

MO: AR order determined by fpeaut.exe

Prediction error covariance (Format (D20.0))

AR Coefficients(Format (4D20.0))

K(Format (I5))

K : MA order

If K is not equal to 0 then

MA Coefficients(Format (4D20.0))

else

end if

Sample(raspec.dat)

-----  
20

114 11

0.4273583627D+05

0.1138076928D+01 -0.5060717229D+00 0.2098384027D+00 -0.2671978812D+00

0.1111599708D+00 -0.1246135285D+00 0.6926155008D-01 -0.4190127279D-01

0.1365600909D+00 0.1827682118D+00 -0.3101264506D+00

0  
-----

This data except the first and the last line is the intermediate output of fpeaut.exe.

(15) sglfrf.exe

>sglfrf.exe sglfrf.dat [/0:sglfrf.prn]

Input Data Format

INP, IOUT(Format (2I5))

INP : input varibale specification

IOUT : output varibale specification

N, LAGH, IPO(Format (3I5))

N : Data Length

LAGH : Power and cross spectrum is calculated at frequency

$i \cdot (\text{Nyquist Frequency} / \text{NLAGH})$  for  $i = 0$  to  $\text{lagh}$

IPO : Dimension of of the observation vector

Power spectrum or cross spectrum

Sample(sglfrf.dat)

```
-----  
  1  2  
500 20  3  
  0.6976681545D+04  0.0000000000D+00  0.0000000000D+00  
  0.2967691002D+04  0.1305355146D+05  0.0000000000D+00  
  0.7031307937D+04  0.1863090044D+04  0.9127019854D+04  
  0.4298865871D+04 -0.4663336938D+03  0.4561509902D+03
```

(several lines are skipped)

```
  0.5278074850D+00 -0.2130675163D-05  0.4083569075D-05  
-0.4932331920D-01  0.2324152750D+01  0.8871356709D-05  
-0.1932995653D+01  0.6640654577D+01  0.2713229862D+03  
-----
```

This data except the first two lines is the intermediate ouput of mulspe.exe.



(16) wnoise.exe

>wnoise.exe wnoise.dat [/M:wnoise.out] [/O:wnoise.prn]

Input Data Format

NRA(Format (I5))

NRA: Length of white noise record to be generated

N, MO, IP(Format (3I5))

N : Data length

MO: AR order determined by FPEC

IP: Number of variables

Prediction error covariance matrix(OSD)(Format (4D20.0))

Coefficient matrices(AR Coefficients)(Format (4D20.0))

Sample(wnoise.dat)

```
-----  
20  
500  4  3  0  
0.6217151975D+01 -0.9488110670D-01 -0.1679087774D+01  
-0.9488110670D-01 0.1077570348D+02 0.2152877129D+00  
-0.1679087774D+01 0.2152877129D+00 0.9929282191D+03  
0.1682052578D+01 -0.6741535327D-03 0.2408007008D-02  
-0.2651143957D-01 0.1090027555D+01 -0.6372213092D-02  
0.5731420795D+00 -0.1970172161D+00 0.9112987356D+00  
-0.7511670156D+00 0.1196598218D-01 -0.5628676197D-03  
0.1612670641D-01 0.1839752005D-01 0.9374981533D-02  
0.1739834428D-01 0.1293845340D+00 -0.5150149989D+00  
0.7703823053D-01 -0.9614091935D-02 0.1396011272D-02  
0.3607695324D-01 0.3156486537D-01 0.2623146677D-02  
0.8239249750D+00 -0.5512274206D+00 -0.2251411317D+00  
-0.3645307836D-01 0.2274511976D-02 0.1156646078D-02  
-0.2811997387D-01 -0.1533800296D+00 0.8311359798D-02  
-0.6939090921D+00 0.5358656414D+00 0.1612298575D+00  
-----
```

This data except the first line is the intermediate output of fpec.exe.  
The intermediate output(e.g. wnoise.out) can be used for an input file  
to optsim.exe.