

IEEE 300-BUS MODIFIED TEST SYSTEM DATA

Nomenclature

| | |
|----------------|---|
| Rated MVA | Machine-rated MVA; base MVA for impedances |
| Rated kV | Machine-rated terminal voltage in kV; base kV for impedances |
| H | Inertia constant in s |
| D | Machine load damping coefficient |
| r_a | Armature resistance in p.u. |
| x_d | Unsaturated d axis synchronous reactance in p.u. |
| x_q | Unsaturated q axis synchronous reactance in p.u. |
| x'_d | Unsaturated d axis transient reactance in p.u. |
| x'_q | Unsaturated q axis transient reactance in p.u. |
| x''_d | Unsaturated d axis subtransient reactance in p.u. |
| x''_q | Unsaturated q axis subtransient reactance in p.u. |
| x_l or x_p | Leakage or Potier reactance in p.u. |
| T'_{d0} | d axis transient open circuit time constant in s |
| T'_{q0} | q axis transient open circuit time constant in s |
| T''_{d0} | d axis subtransient open circuit time constant in s |
| T''_{q0} | q axis subtransient open circuit time constant in s |
| $S(1.0)$ | Machine saturation at 1.0 p.u. voltage in p.u. |
| $S(1.2)$ | Machine saturation at 1.2 p.u. voltage in p.u. |
| T_r | Regulator input filter time constant in s |
| K_a | Regulator gain (continuous acting regulator) in p.u. |
| T_a | Regulator time constant in s |
| V_{Rmax} | Maximum regulator output, starting at full load field voltage in p.u. |
| V_{Rmin} | Minimum regulator output, starting at full load field voltage in p.u. |
| K_e | Exciter self-excitation at full load field voltage in p.u. |
| T_e | Exciter time constant in s |
| K_f | Regulator stabilizing circuit gain in p.u. |
| T_f | Regulator stabilizing circuit time constant in s |
| E_1 | Field voltage value,1 in p.u. |
| $SE(E_1)$ | Saturation factor at E_1 |
| E_2 | Field voltage value,2 in p.u. |
| $SE(E_2)$ | Saturation factor at E_2 |
| P_{max} | Maximum turbine output in p.u. |
| R | Turbine steady-state regulation setting or droop in p.u. |
| T_1 | Control time constant (governor delay) in s |
| T_2 | Hydro reset time constant in s |
| T_3 | Servo time constant in s |
| T_4 | Steam valve bowl time constant in s |
| T_5 | Steam reheat time constant in s |
| F | Shaft output ahead of reheater in p.u. |

TABLE I (1)
IEEE 300-BUS MODIFIED TEST SYSTEM MACHINE DATA

| Type Operation | GENROU Sync. Gen. | GENROU Sync. Gen. | GENROU Sync. Gen. |
|------------------------------------|--------------------------|--------------------------|----------------------|
| Default Unit no. (New Unit no.) | 8(10000), 10(10001) | 84(10005), 152(10019) | 91(10006) |
| | 20(10002), 63(10003) | 190(10029), 198(10031) | 108(10009) |
| | 76(10004), 125(10012) | 221(10034), 230(10037) | 149(10018) |
| | 156(10021), 171(10023) | 7001(10045), 7012(10049) | 177(10025) |
| | 9002(10064), 9055(10068) | 7017(10050), 7024(10052) | 220(10033) |
| | | 7039(10053), 7049(10055) | 243(10045) |
| Rated power (MVA) | 25 | 835 | 270 |
| Rated voltage (kV) | 13.80 | 20 | 18 |
| Rated pf | 0.80 | 0.9 | 0.85 |
| H (s) | 5.015 | 2.6419 | 4.1296 |
| D | 2.00 | 2.00 | 2.000 |
| r_a (p.u) | 0.0014 | 0.0019 | 0.0016 |
| x_d (p.u) | 1.250 | 2.183 | 1.700 |
| x_q (p.u) | 1.220 | 2.157 | 1.620 |
| x'_d (p.u) | 0.232 | 0.413 | 0.256 |
| x'_q (p.u) | 0.715 | 1.285 | 0.245 |
| x''_d (p.u) | 0.120 | 0.339 | 0.185 |
| x''_q (p.u) | 0.120 | 0.339 | 0.185 |
| x_l or x_p (p.u) | 0.119 | 0.246 | 0.155 |
| T'_{d0} (s) | 4.750 | 5.690 | 4.800 |
| T'_{q0} (s) | 1.500 | 1.500 | 0.500 |
| T''_{d0} (s) | 0.060 | 0.041 | 0.010 |
| T''_{q0} (s) | 0.210 | 0.144 | 0.0007 |
| $S(1.0)$ | 0.279 | 0.134 | 0.125 |
| $S(1.2)$ | 0.886 | 0.617 | 0.450 |

TABLE I (2)
IEEE 300-BUS MODIFIED TEST SYSTEM MACHINE DATA

| Type Operation | GENROU Sync. Gen. | GENROU Sync. Gen. | GENROU Sync. Gen. |
|------------------------------------|--------------------------|--------------------------|----------------------|
| Default Unit no. (New Unit no.) | 92(10007), 124(10011) | 119(10010), 138(10013) | 98(10008) |
| | 141(10014), 147(10017) | 143(10015), 186(10027) | 146(10016) |
| | 153(10020), 170(10022) | 187(10028), 191(10030) | 7044(10054) |
| | 176(10024), 185(10026) | 236(10039), 239(10041) | 7055(10056) |
| | 222(10035), 238(10040) | 241(10042), 7002(10046) | 9051(10065) |
| | 242(10043), 7011(10048) | 7003(10047), 7130(10061) | 9053(10066) |
| | 7023(10051), 7057(10057) | 7139(10062), 7166(10063) | 9054(10067) |
| Rated power (MVA) | 410 | 911 | 125 |
| Rated voltage (kV) | 24 | 26 | 15.5 |
| Rated pf | 0.9 | 0.9 | 0.85 |
| H (s) | 3.704 | 2.4862 | 4.768 |
| D | 2.000 | 2.00 | 2 |

| | | | |
|----------------------|--------|--------|--------|
| r_a (p.u) | 0.0019 | 0.0010 | 0.004 |
| x_d (p.u) | 1.7668 | 2.040 | 1.220 |
| x_q (p.u) | 1.7469 | 1.960 | 1.160 |
| x'_d (p.u) | 0.2738 | 0.266 | 0.174 |
| x'_q (p.u) | 1.0104 | 0.262 | 0.250 |
| x''_d (p.u) | 0.2284 | 0.193 | 0.134 |
| x''_q (p.u) | 0.2284 | 0.193 | 0.134 |
| x_l or x_p (p.u) | 0.1834 | 0.154 | 0.0078 |
| T'_{d0} (s) | 0.8418 | 6.000 | 8.970 |
| T'_{q0} (s) | 0.8676 | 0.900 | 0.500 |
| T''_{d0} (s) | 0.035 | 0.004 | 0.033 |
| T''_{q0} (s) | 0.035 | 0.004 | 0.070 |
| $S(1.0)$ | 0.2632 | 0.340 | 0.1026 |
| $S(1.2)$ | 0.5351 | 1.120 | 0.432 |

TABLE I (3)
IEEE 300-BUS MODIFIED TEST SYSTEM MACHINE DATA

| | |
|----------------------|------------|
| Type | GENROU |
| Operation | Sync. Gen. |
| Default Unit no. | 213(10032) |
| (New Unit no.) | 227(10036) |
| | 233(10038) |
| Rated power (MVA) | 512 |
| Rated voltage (kV) | 24 |
| Rated pf | 0.9 |
| H (s) | 2.631 |
| D | 2.000 |
| r_a (p.u) | 0.004 |
| x_d (p.u) | 1.700 |
| x_q (p.u) | 1.650 |
| x'_d (p.u) | 0.270 |
| x'_q (p.u) | 0.470 |
| x''_d (p.u) | 0.200 |
| x''_q (p.u) | 0.200 |
| x_l or x_p (p.u) | 0.160 |
| T'_{d0} (s) | 3.800 |
| T'_{q0} (s) | 0.480 |
| T''_{d0} (s) | 0.010 |
| T''_{q0} (s) | 0.0007 |
| $S(1.0)$ | 0.090 |
| $S(1.2)$ | 0.400 |

TABLE II (1)
IEEE 300-BUS MODIFIED TEST SYSTEM EXCITER DATA

| Type | IEEET1 | IEEET1 | IEEET1 |
|------------------------------------|--------------------------|--------------------------|------------|
| Default Unit no. (New Unit no.) | 8(10000), 10(10001) | 84(10005), 152(10019) | 91(10006) |
| | 20(10002), 63(10003) | 190(10029), 198(10031) | 108(10009) |
| | 76(10004), 125(10012) | 221(10034), 230(10037) | 149(10018) |
| | 156(10021), 171(10023) | 7001(10045), 7012(10049) | 177(10025) |
| | 9002(10064), 9055(10068) | 7017(10050), 7024(10052) | 220(10033) |
| | | 7039(10053), 7049(10055) | 243(10045) |
| Rated power (MVA) | 25 | 835 | 270 |
| Rated voltage (kV) | 13.80 | 20 | 18 |
| T_r (s) | 0.000 | 0.000 | 0.000 |
| K_a (p.u) | 0.050 | 400 | 30 |
| T_a (s) | 20 | 0.020 | 0.400 |
| V_{Rmax} (p.u) | 6.812 | 18.300 | 4.590 |
| V_{Rmin} (p.u) | 1.395 | -18.300 | -4.590 |
| K_e (p.u) | 1.000 | 1.000 | -0.020 |
| T_e (s) | 0.700 | 0.942 | 0.560 |
| K_f (p.u) | 0.000 | 0.030 | 0.050 |
| T_f | 0.040 | 1.000 | 1.300 |
| E_1 | 2.675 | 3.765 | 2.5875 |
| $SE(E_1)$ | 0.4135 | 0.8147 | 0.7298 |
| E_2 | 3.567 | 5.020 | 3.450 |
| $SE(E_2)$ | 0.907 | 2.6756 | 1.3496 |

TABLE II (2)
IEEE 300-BUS MODIFIED TEST SYSTEM EXCITER DATA

| Type | IEEET1 | IEEET1 | IEEET1 |
|------------------------------------|--------------------------|--------------------------|-------------|
| Default Unit no. (New Unit no.) | 92(10007), 124(10011) | 119(10010), 138(10013) | 98(10008) |
| | 141(10014), 147(10017) | 143(10015), 186(10027) | 146(10016) |
| | 153(10020), 170(10022) | 187(10028), 191(10030) | 7044(10054) |
| | 176(10024), 185(10026) | 236(10039), 239(10041) | 7055(10056) |
| | 222(10035), 238(10040) | 241(10042), 7002(10046) | 9051(10065) |
| | 242(10043), 7011(10048) | 7003(10047), 7130(10061) | 9053(10066) |
| | 7023(10051), 7057(10057) | 7139(10062), 7166(10063) | 9054(10067) |
| Rated power (MVA) | 410 | 911 | 125 |
| Rated voltage (kV) | 24 | 26 | 15.5 |
| T_r (s) | 0.000 | 0.000 | 0.060 |
| K_a (p.u) | 400 | 50 | 25 |
| T_a (s) | 0.020 | 0.060 | 0.200 |
| V_{Rmax} (p.u) | 5.270 | 1.000 | 1.000 |
| V_{Rmin} (p.u) | -5.270 | -1.00 | -1.000 |
| K_e (p.u) | 1.000 | -0.0393 | -0.0601 |
| T_e (s) | 0.920 | 0.440 | 0.6758 |
| K_f (p.u) | 0.030 | 0.070 | 0.108 |
| T_f | 1.000 | 1.000 | 0.350 |

| | | | |
|-----------|--------|--------|---------|
| E_1 | 2.4675 | 3.375 | 2.4975 |
| $SE(E_1)$ | 0.4351 | 0.0644 | 0.0949 |
| E_2 | 3.290 | 4.5 | 3.330 |
| $SE(E_2)$ | 0.6001 | 0.2363 | 0.37026 |

TABLE II (3)
IEEE 300-BUS MODIFIED TEST SYSTEM EXCITER DATA

| Type | IEEET1 |
|--------------------|------------|
| Default Unit no. | 213(10032) |
| (New Unit no.) | 227(10036) |
| | 233(10038) |
| Rated power (MVA) | 512 |
| Rated voltage (kV) | 24 |
| T_r (s) | 0.000 |
| K_a (p.u) | 200 |
| T_a (s) | 0.395 |
| V_{Rmax} (p.u) | 3.840 |
| V_{Rmin} (p.u) | -3.840 |
| K_e (p.u) | 1.000 |
| T_e (s) | 0.008 |
| K_f (p.u) | 0.0635 |
| T_f | 1.000 |
| E_1 | 2.880 |
| $SE(E_1)$ | 0.000 |
| E_2 | 3.840 |
| $SE(E_2)$ | 0.000 |

TABLE III (1)
IEEE 300-BUS MODIFIED TEST SYSTEM GOVERNOR DATA

| Type | BPA_GG | BPA_GG | BPA_GG |
|--------------------|--------------------------|--------------------------|-------------|
| | | 84(10005), 152(10019) | 91(10006) |
| | 8(10000), 10(10001) | 190(10029), 198(10031) | 108(10009) |
| Default Unit no. | 20(10002), 63(10003) | 221(10034), 230(10037) | 149(10018) |
| (New Unit no.) | 76(10004), 125(10012) | 7001(10045), 7012(10049) | 177(10025) |
| | 156(10021), 171(10023) | 7017(10050), 7024(10052) | 220(10033) |
| | 9002(10064), 9055(10068) | 7039(10053), 7049(10055) | 243(10045) |
| | | 7061(10058), 7062(10059) | 7071(10060) |
| Rated power (MVA) | 25 | 835 | 270 |
| Rated voltage (kV) | 13.80 | 20 | 18 |
| P_{max} (p.u) | 0.900 | 0.9177 | 0.8518 |
| R (p.u) | 0.200 | 0.006 | 0.01852 |
| T_1 (s) | 0.200 | 0.180 | 0.100 |
| T_2 (s) | 0.000 | 0.030 | 0.000 |
| T_3 (s) | 0.300 | 0.200 | 0.259 |
| T_4 (s) | 0.090 | 0.000 | 0.100 |
| T_5 (s) | 0.000 | 8.000 | 10.000 |
| F | 1.000 | 0.300 | 0.272 |

TABLE III (2)
IEEE 300-BUS MODIFIED TEST SYSTEM GOVERNOR DATA

| Type | BPA_GG | BPA_GG | BPA_GG |
|------------------------------------|--------------------------|--------------------------|-------------|
| Default Unit no. (New Unit no.) | 92(10007), 124(10011) | 119(10010), 138(10013) | 98(10008) |
| | 141(10014), 147(10017) | 143(10015), 186(10027) | 146(10016) |
| | 153(10020), 170(10022) | 187(10028), 191(10030) | 7044(10054) |
| | 176(10024), 185(10026) | 236(10039), 239(10041) | 7055(10056) |
| | 222(10035), 238(10040) | 241(10042), 7002(10046) | 9051(10065) |
| | 242(10043), 7011(10048) | 7003(10047), 7130(10061) | 9053(10066) |
| | 7023(10051), 7057(10057) | 7139(10062), 7166(10063) | 9054(10067) |
| Rated power (MVA) | 410 | 911 | 125 |
| Rated voltage (kV) | 24 | 26 | 15.5 |
| P_{max} (p.u) | 0.8951 | 0.9001 | 1.056 |
| R (p.u) | 0.0122 | 0.00548 | 0.040 |
| T_1 (s) | 0.180 | 0.100 | 0.083 |
| T_2 (s) | 0.000 | 0.000 | 0.000 |
| T_3 (s) | 0.040 | 0.200 | 0.200 |
| T_4 (s) | 0.250 | 0.100 | 0.050 |
| T_5 (s) | 8.000 | 8.720 | 5.000 |
| F | 0.267 | 0.300 | 0.280 |

TABLE III (3)
IEEE 300-BUS MODIFIED TEST SYSTEM GOVERNOR DATA

| Type | BPA_GG |
|------------------------------------|------------|
| Default Unit no. (New Unit no.) | 213(10032) |
| | 227(10036) |
| | 233(10038) |
| Rated power (MVA) | 512 |
| Rated voltage (kV) | 24 |
| P_{max} (p.u) | 0.898 |
| R (p.u) | 0.0098 |
| T_1 (s) | 0.150 |
| T_2 (s) | 0.050 |
| T_3 (s) | 0.300 |
| T_4 (s) | 0.260 |
| T_5 (s) | 8.000 |
| F | 0.270 |