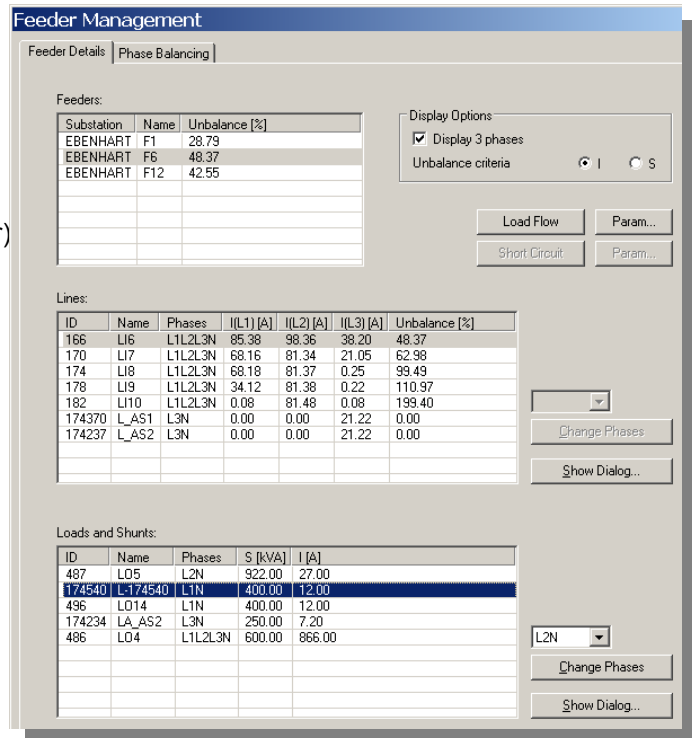


Characteristics

- Phase Swapping allows to reduce the unbalance in the phases by re-phasing single/two phase loads and lines
- Re-phasing can be done to:
 1. Minimize the kW losses,
 2. Minimize kVA Unbalance (apparent power)
 3. Minimize A Unbalance (current).
- Max. number of swapping can be defined
- Re-phasing works feeder-oriented
- Shows the unbalance and losses before and after re-phasing
- Manual re-phasing can be done
- Single-phase load flow can directly be started from Feeder Management



Feeder Management

Feeder Details | Phase Balancing

Feeder Details:

Substation	Name	Unbalance [%]
EBENHART	F1	28.79
EBENHART	F6	48.37
EBENHART	F12	42.55

Display Options:
 Display 3 phases
 Unbalance criteria: I S

Buttons: Load Flow, Param..., Short Circuit, Param...

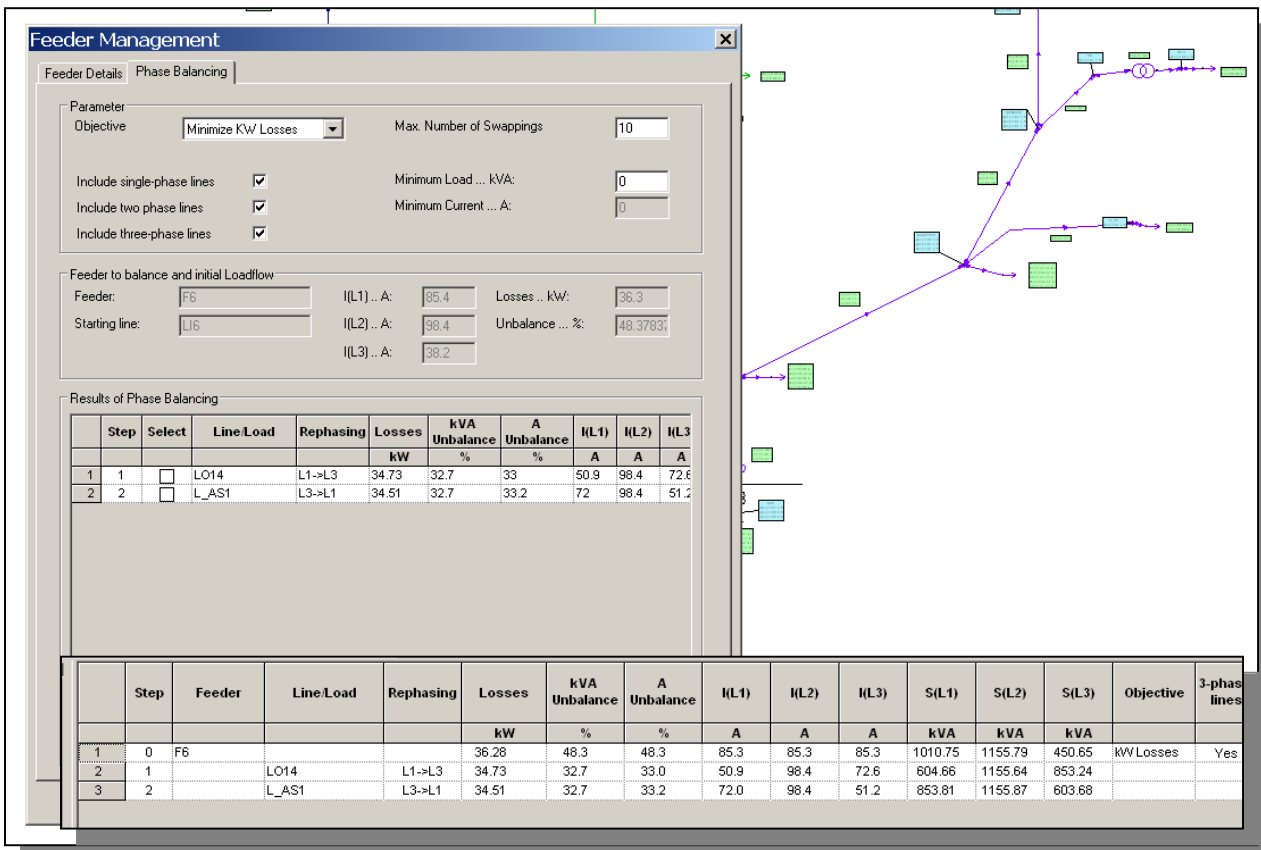
Lines:

ID	Name	Phases	I(L1) [A]	I(L2) [A]	I(L3) [A]	Unbalance [%]
166	LI6	L1L2L3N	85.38	98.36	38.20	48.37
170	LI7	L1L2L3N	68.16	81.34	21.05	62.98
174	LI8	L1L2L3N	68.18	81.37	0.25	99.49
178	LI9	L1L2L3N	34.12	81.38	0.22	110.97
182	LI10	L1L2L3N	0.08	81.48	0.08	199.40
174370	L_AS1	L3N	0.00	0.00	21.22	0.00
174237	L_AS2	L3N	0.00	0.00	21.22	0.00

Loads and Shunts:

ID	Name	Phases	S [kVA]	I [A]
487	LO5	L2N	922.00	27.00
174540	L-174540	L1N	400.00	12.00
496	LO14	L1N	400.00	12.00
174234	LA_AS2	L3N	250.00	7.20
486	LO4	L1L2L3N	600.00	866.00

Results



Feeder Management

Feeder Details | Phase Balancing

Parameter:
 Objective: Minimize kW Losses | Max. Number of Swappings: 10

Include single-phase lines:
 Include two phase lines:
 Include three-phase lines:

Minimum Load ... kVA: 0
 Minimum Current ... A: 0

Feeder to balance and initial Loadflow:
 Feeder: F6 | I(L1) .. A: 85.4 | Losses .. kW: 36.3
 Starting line: LI6 | I(L2) .. A: 98.4 | Unbalance ... %: 48.3783
 I(L3) .. A: 38.2

Results of Phase Balancing

Step	Select	Line Load	Rephasing	Losses	kVA Unbalance	A Unbalance	I(L1)	I(L2)	I(L3)
				kW	%	%	A	A	A
1	1	LO14	L1->L3	34.73	32.7	33	50.9	98.4	72.6
2	2	L_AS1	L3->L1	34.51	32.7	33.2	72	98.4	51.2

Step	Feeder	Line Load	Rephasing	Losses	kVA Unbalance	A Unbalance	I(L1)	I(L2)	I(L3)	S(L1)	S(L2)	S(L3)	Objective	3-phases lines
				kW	%	%	A	A	A	kVA	kVA	kVA		
1	0	F6		36.28	48.3	48.3	85.3	85.3	85.3	1010.75	1155.79	450.65	kW Losses	Yes
2	1	LO14	L1->L3	34.73	32.7	33.0	50.9	98.4	72.6	604.66	1155.64	853.24		
3	2	L_AS1	L3->L1	34.51	32.7	33.2	72.0	98.4	51.2	853.81	1155.87	603.68		