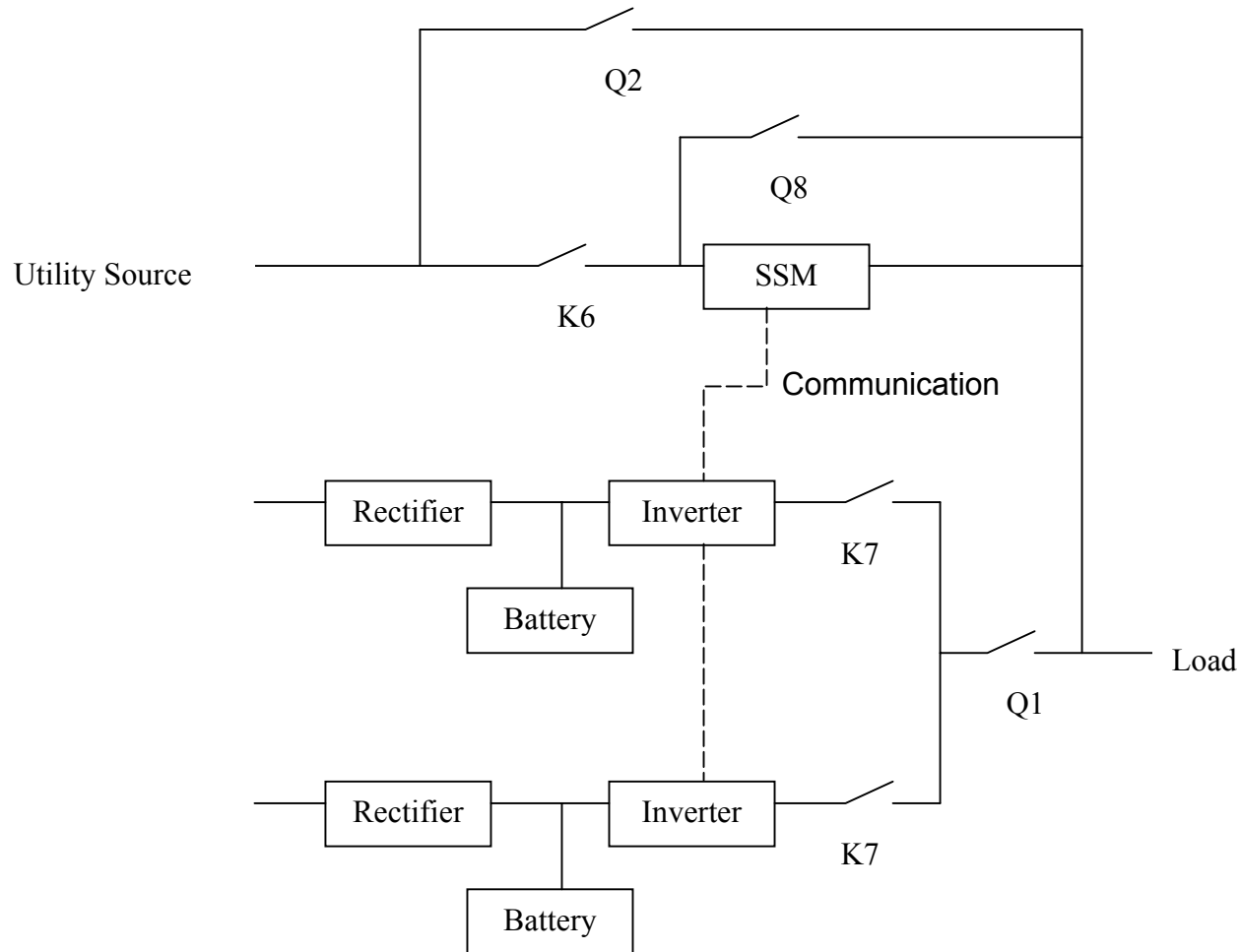


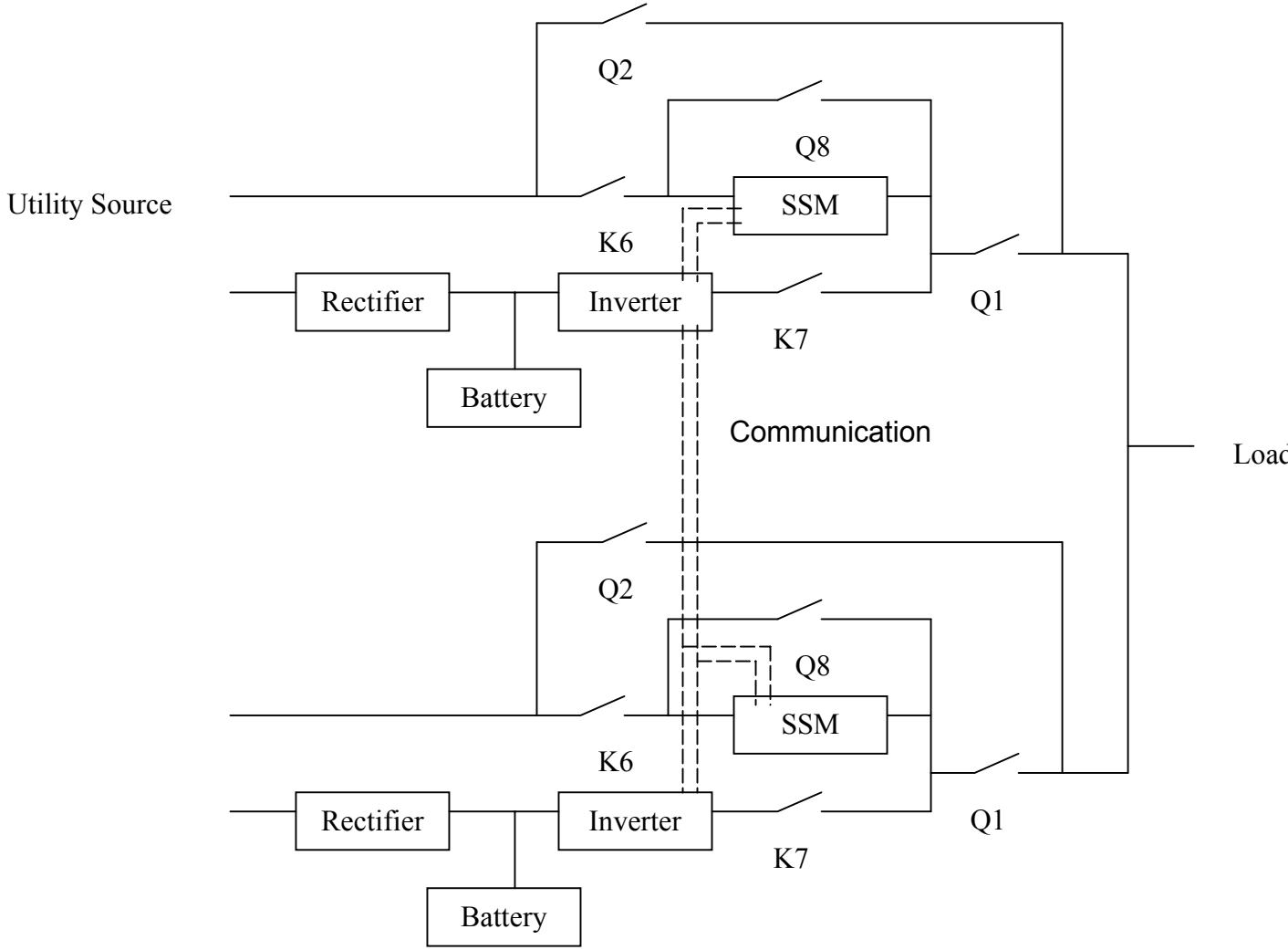


# Reliability Of Redundant UPS Systems

# Multi-module UPS With Centralized Bypass



# Multi-module UPS With Decentralized Bypass



# UPS System Reliability

## Mean Time Between Failure Assumptions:

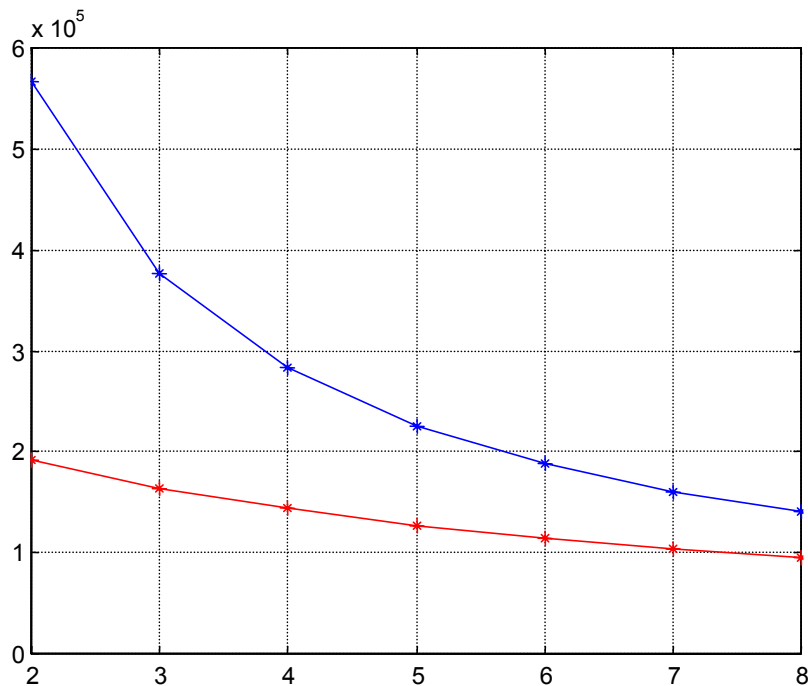
Component	MTBF	Description
RBI	25000	Rectifier, Inverter & Battery (combined)
BUS	150000	Communication Bus
K7	700000	Inverter Output Disconnect
Mains	50	Bypass Power Source
K6	700000	Backfeed Protection Device
Byp	500000	Static Bypass Switch
Master	750000	Master Control
K8	700000	Bypass wrap-around Device

## Mean Time To Repair Assumptions:

Component	MTTR	Description
RBI	6	Rectifier, Inverter & Battery (combined)
Mains	0.1	Bypass Power Source

# Topology – Centralized vs. Decentralized Bypass

(Single Communication Bus)

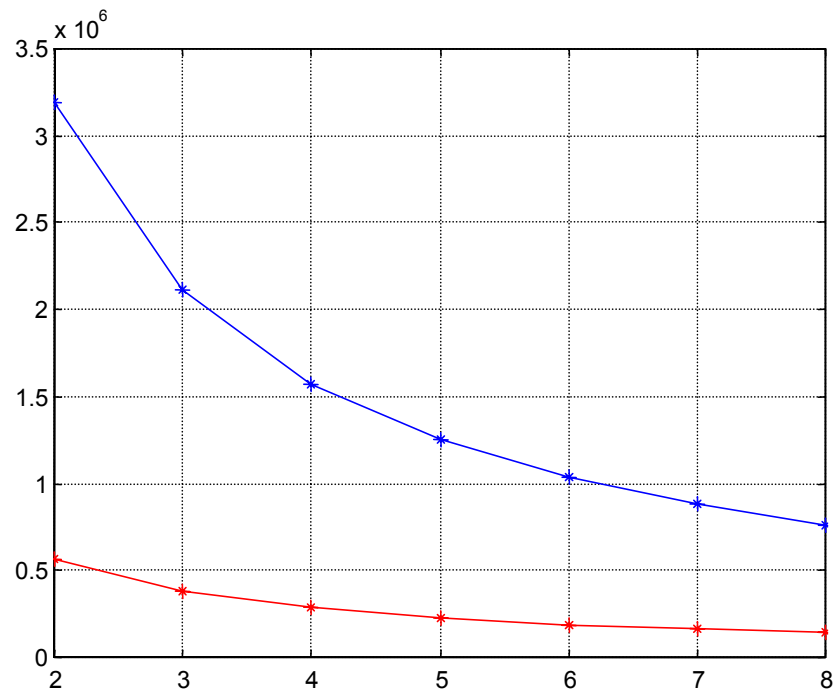


Red = Centralized Bypass  
Blue = Decentralized Bypass

Influence Of Bypass Configuration		
Number Of UPS Modules	Centralized Bypass	Decentralized Bypass
2	193000	566000
3	164000	377000
4	144000	282000
5	127000	226000
6	114000	188000
7	104000	161000
8	95000	141000

# Communication Bus – Single vs. Redundant

(Decentralized Bypass)



Red = Single Communication Bus  
Blue = Redundant Communication Bus

Number Of UPS Modules	Non-Redundant Communication	Redundant Communication
2	566000	<b>3187000</b>
3	377000	2109000
4	282000	1570000
5	226000	1247000
6	188000	1031000
7	161000	878000
8	141000	762000