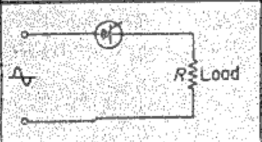
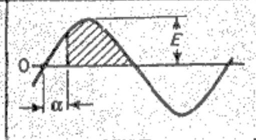
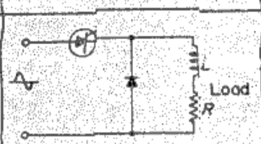
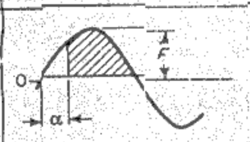
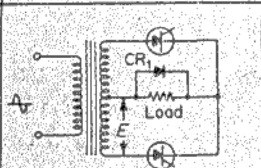
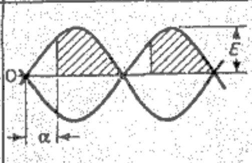
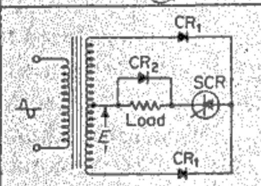
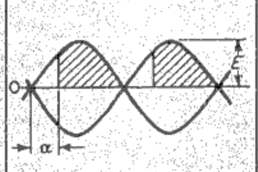
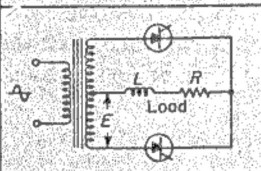
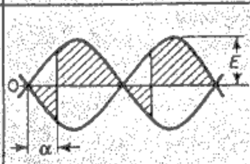
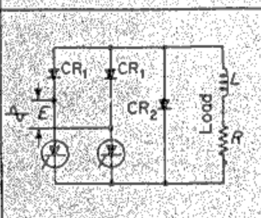
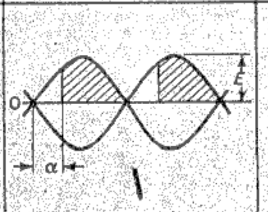
Circuit: (a) Name	Circuit: (b) Connections	(c) Load voltage waveforms	(d) Peak forward voltage on SCR	Peak reverse voltage: (e) On SCR	Peak reverse voltage: (f) On diode	(g) Max. load voltage ($\alpha = 0$); E_D = average d-c value; E_a = RMS a-c value	(h) Load voltage vs trigger delay angle α	(j) Trigger angle range full ON to full OFF	Max. steady-state current in SCR: (k) Average amp	Max. steady-state current in SCR: (l) Cond. angle	Max. steady-state current in diode rectifier: (m) Average amp	Max. steady-state current in diode rectifier: (n) Cond. angle for max. current	(p) Ability to pumpback inductive load energy to supply line	(q) Fundamental frequency of load voltage (f = supply frequency)	(r) Notes and comments
(1) Half-wave resistive load			E	E	—	$E_D = \frac{E}{\pi}$ $E_a = \frac{E}{2}$	$E_D = \frac{E}{2\pi}(1+\cos\alpha)$ $E_a = \frac{E}{2\sqrt{\pi}}(\pi - \alpha + \frac{1}{2}\sin 2\alpha)^{1/2}$	180°	$\frac{E}{\pi R}$	180°	—	—	—	f	
(2) Half-wave inductive load with free-wheeling rectifier			E	E	E	$E_D = \frac{E}{\pi}$	$E_D = \frac{E}{2\pi}(1+\cos\alpha)$	180°	$\frac{E}{2\pi R}$ (load highly inductive)	180°	$0.54\left(\frac{E}{\pi R}\right)$	210°	No	f	
(3) Centertap with resistive load, or inductive load with free-wheeling rectifier			E (possibly $2E$ if load open)	$2E$	E	$E_D = \frac{2E}{\pi}$	$E_D = \frac{E}{\pi}(1+\cos\alpha)$	180°	$\frac{E}{\pi R}$	180°	$0.26\left(\frac{2E}{\pi R}\right)$	148°	No	$2f$	
(4) Centertap with resistive or inductive load—SCR in d-c circuit			E	0	$2E$ on CR_1 E on CR_2	$E_D = \frac{2E}{\pi}$	$E_D = \frac{E}{\pi}(1+\cos\alpha)$	180°	$\frac{2E}{\pi R}$	360°	$CR_1 = \frac{E}{\pi R}$ $CR_2 = 0.26\left(\frac{2E}{\pi R}\right)$ with highly inductive load	180° 148°	No	$2f$	CR_2 necessary when load is not purely resistive. Frequency limited by recovery characteristics of rectifiers and SCR.
(5) Centertap with inductive load (no free-wheeling rectifier)			$2E$	$2E$	—	$E_D = \frac{2E}{\pi}$	$E_D = \frac{2E}{\pi}\cos\alpha$ (assuming continuous current in load)	180°	$\frac{E}{\pi R}$	180°	—	—	Yes	$2f$	
(6) Single-phase bridge with 2 SCR's with common anode or cathode. Resistive load, or inductive load with free-wheeling rectifier			E	E	E (CR_1 and CR_2)	$E_D = \frac{2E}{\pi}$	$E_D = \frac{E}{\pi}(1+\cos\alpha)$	180°	$\frac{E}{\pi R}$	180°	$CR_1 = \frac{E}{\pi R}$ $CR_2 = 0.26\left(\frac{2E}{\pi R}\right)$	180° 148°	No	$2f$	Without CR_2, SCR's may be unable to turn off an inductive load. Also, CR_2 relieves SCR's from free-wheeling duty. See Sec. 8.5.

† Assumes zero forward drop in semiconductors when conducting, and zero current when blocking; also zero a-c line and source reactance. Inductive d-c loads have pure d-c current.