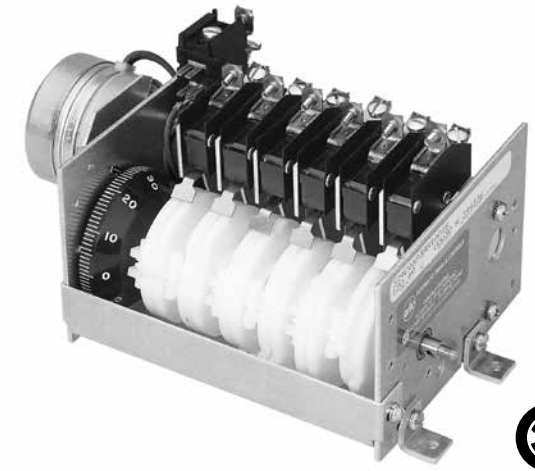

Precision Switch Cam Programmer

E24305

A compact and economical motor-driven cam timer, the 324 precisely controls one to twelve load circuits through easily-set screwdriver adjustable cams. Each timer provides a wide range of cycle times through a set of interchangeable gears.

EASY AND PRECISE CAM ADJUSTMENT: With ATC's unique split-cam design, each side of the cam is separately screwdriver-adjustable in either direction: either side determines the precise instant during the cycle when the switch will actuate, the other side determines how long the switch will remain actuated. Adjustments are easy and precise: 1/4 turn of the adjusting screw equals 0.5% of cycle time. A setting disc, calibrated in 1% increments, facilitates program set-up and indicates cycle progress.

ONE TO TWELVE PRECISION SWITCHES: Whether used as a time or sequence programmer, the 324 can be ordered with any number of cam-operated switches from one to twelve. Each SPDT precision switch is rated at 10 amps, 120 VAC and is 1/3 hp rated at 120 or 240 VAC.

WIDE RANGE OF CYCLE TIMES: The 324 is available with a choice of 12 synchronous motors that provide more than 270 cycle times between 9 SEC and 60 HRS. Each motor provides an adjustable range of 21 cycle times, with a ratio of over 2.5:1, through a set of interchangeable gears. Changing gears is a simple operation that takes only a few minutes.

ACCURACY: The repeat accuracy and setting accuracy of the 324 are both within ± 0.25%. Follower fingers precisely track the contour of the cams, accurately operating the precision switches with quick-break action.

SEQUENCE CONTROL: The 324 can be ordered without a motor and with a 1 inch long shaft extension on either or both ends, for use as a rotary cam limit switch.

SPECIFICATIONS

CYCLE TIMES	Choice of ON-Delay or OFF-Delay operation (not field-convertible). More than 270 cycle times, from 9 SEC to 60 HRS., from a choice of interchangeable motors and gears; each motor provides more than 20 cycle times.	
REPEAT ACCURACY	±0.25% of cycle time.	
SETTING ACCURACY	±0.25% of cycle time.	
FRAME SIZES	3, 6, 9 and 12 cam frame sizes are provided	
CAMS	NUMBER:	1 to 12 (or multiples up to 12, by combining timer assemblies); cams may be factory-set.
	CUT:	Standard or 50% cut, as specified (standard cams allow contact closure adjustment of 1 to 45% or 55 to 99%, 50% cut cams allow contact closure adjustment of 12 to 52% or 48 to 88%; custom cams available with 2, 3, 4 or more cuts.
	CONSTRUCTION:	Two-inch diameter split type; made of Delrin
LIFE EXPECTANCY	MECHANICAL: over 10,000,000 operations	
	CONTACTS:	over 1,000,000 operations at less than 1 amp

LOAD SWITCHES	TYPE:	Precision switches; one for each cam
	CONTACT ACTION:	SPDT (Form C)
	CONTACT RATING:	10 A at 120 VAC (non-inductive). 1/3 HP at 125/250 VAC
	MINIMUM CONTACT ACTUATION TIME:	1% of cycle time
DRIVE MOTORS	SPEED:	choice of 12
	TYPE:	Synchronous; permanently lubricated; integral slip clutch for manual advance; anti-backup to prevent damage to switches
	VOLTAGE:	120 VAC, 50 or 60 cycles; 240 VAC, 50 or 60 cycles.
	POWER CONSUMPTION:	12 watts max
	DUAL DRIVE:	two motors may be used, special applications
	TORQUE-SPEED CAPABILITIES:	At cycle times of 30 SEC or longer, the 324 can drive and switch 12 contacts simultaneously; below 30 SEC, the motor may be limited in its ability to drive or switch a number of contacts simultaneously.
TEMPERATURE RATING	32 to 140°F (0 to 60°C)	
WEIGHT	NET: from 1-1/2 lbs. for the 3 cam unit up to 3-1/2 lbs. for the 12 cam unit	
ENCLOSURES	NEMA 12 molded case for one model 324 with maximum of 3 cams. (See Accessories) (Optional)	

MODEL NUMBER

MODEL NUMBER	324C

NUMBER OF SWITCHES

1 Switch , 3 Cams	01
2 Switches, 3 Cams	02
3 Switches, 3 Cams	03
4 Switches, 6 Cams	04
5 Switches, 6 Cams	05
6 Switches, 6 Cams	06
7 Switches, 9 Cams	07
8 Switches, 9 Cams	08
9 Switches, 9 Cams	09
10 Switches, 12 Cams	10
11 Switches, 12 Cams	11
12 Switches, 12 Cams	12

CYCLE TIME MOTOR SPEED

No Motor	0
5 rpm	A
150 rph	B
1/2 rpm	D
15 rph	E
5 rph	F
2.5 rph	G
1 rph	H
1/2 rph	J
1/6 rph	L
1/24 rph	N

CYCLE TIME MOTOR PINION

No Motor	0
24 Teeth (300-495-01-00)	1
30 Teeth (300-495-02-00)	2
40 Teeth (300-495-03-00)	3

CYCLE TIME CAM SHAFT GEAR

No Motor	0
30 Teeth (300-495-11-00)	A
36 Teeth (300-495-12-00)	B
40 Teeth (300-495-13-00)	C
45 Teeth (300-495-14-00)	D
50 Teeth (300-495-17-00)	E
55 Teeth (300-495-15-00)	F
60 Teeth (300-495-16-00)	G

OPERATION

Repeat Cycle/Stop Cycle Dynamic Brake[1]	R
Eternal Drive by user, no motor	E
Special	K

MOTORS

1 Motor (add $12 for 15 RPM motor Type Q. $2 for motors J thru N)	1
2 motors (add $5 for motor codes J thru N)	2
No motor	3
Special	0

VOLTAGE & FREQUENCY

120/60	A
240/60*	B
120/50	C
240/50*	D
No motor	X

OPTIONS

None	01
1/4" dia. x 1" long shaft extension right end (Units with one or no motor)	02
1/4" dia. x 1" long shaft extension left end (Units with one or no motor)	03
1/4" dia. x 1" long shaft extension both ends (On motorless units only)	04
Special	00

FEATURES

Standard (other than cam settings) (Blades)	X
Special	K

NOTES

CAMS

Factory setting cams to 0.25% tolerance, 50% cams allow 12 to 52% or 48 to 88% adjustment of switch actuation. 2, 3, or 4 cuts equally spaced. Have limited adjustability. (Does not include 50% cams with multiple cuts) Multiple cuts, unequally spaced. Multiple cuts over 4. Specially cut or specially molded cams.

LUGS

Bag of 50 push-on terminal lugs uninsulated
Part No. 300-260-59-00

BRAKE

Diode brake assembly Part. No. 300-260-56-00

CONTACT SWITCH

Switch with Bracket 324-260-82-00

[1]For Stop Cycle, or Brake operation, specify a 324 with one more switch than you need for your load circuits. (Do not exceed 12 switches total!) You interwire this switch to the motor according to the installation instruction for the unit.

[2] Be sure to specify shaft extension under OPTIONS

For prices and further information, consult factory.

TIME CYCLE ORDERING CODES

Select Time Cycle from table; if it is available with more than one motor and gearing combination, pick the combination which would best accommodate potential future speed changes. 3 Digit Speed Code identifies motor.

* 240 V option limited to availability

	Cam Shaft Gear	5 RPM Motor–A						150 RPH Motor–B					
		Time		Time		Time		Time		Time		Time	
		Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE	Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE
SECONDS resulting speed at 60 cycles	30	9	A3A	12	A2A	15	A1A	18	B3A	24	B2A	30	B1A
	36	10.8	A3B	14.4	A2B	18	A1B	21.6	B3B	28.8	B28	36	B1B
	40	12	A3C	16	A2C	20	A1C	24	B3C	32	B2C	40	B1C
	45	13.5	A3D	18	A2D	22.5	A1D	27	B3D	36	B2D	45	B1D
	50	15	A3E	20	A2E	25	A1E	30	B3E	40	B2E	50	B1E
	55	16.5	A3F	22	A2F	27.5	A1F	33	B3F	44	B2F	55	B1E
	60	18	A3G	24	A2G	30	A1G	36	B3G	48	B2G	60	B1G
SECONDS resulting speed at 50 cycles	30	10.8	A3A	14.4	A2A	18	A1A	21.6	B3A	28.8	B2A	36	B1A
	36	12.96	A3B	17.28	A2B	21.6	A1B	25.92	B3B	34.56	B2B	43.2	B1B
	40	14.4	A3C	19.2	A2C	24	A1C	28.8	B3C	38.4	B2C	48	B1C
	45	16.2	A3D	21.6	A2D	27	A1D	32.4	B3D	43.2	B2D	54	B1D
	50	18	A3E	24	A2E	30	A1E	36	B3E	48	B2E	60	B1E
	55	19.8	A3F	26.4	A2F	33	A1F	39.6	B3F	52.8	B2F	66	B1F
	60	21.6	A3G	28.8	A2G	36	A1G	43.2	B3G	57.6	B2G	72	B1G

	Cam Shaft Gear	1/2 RPM Motor–D						15 RPH Motor–E					
		Time		Time		Time		Time		Time		Time	
		Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE	Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE
SECONDS resulting speed at 60 cycles	30	90	D3A	120	D2A	150	D1A	180	E3A	240	E2A	300	E1A
	36	108	D3B	144	D2B	180	D1B	216	E3B	288	E2B	360	E1C
	40	120	D3C	160	D2C	200	D1C	240	E3C	320	E2C	400	E1C
	45	135	D3D	180	D2D	225	D1D	270	E3D	360	E2D	450	E1D
	50	150	D3E	200	D2E	250	D1E	300	E3E	400	E2E	500	E1E
	55	165	D3F	220	D2F	275	D1F	330	E3F	440	E2F	550	E1F
	60	180	D3G	240	D2G	300	D1G	360	E3G	480	E2G	600	E1G
SECONDS resulting speed at 50 cycles	30	108	D3A	144	D2A	180	D1A	216	E3A	288	E2A	360	E1A
	36	129.6	D3B	172.8	D2B	216	D1B	259.2	E3B	345.6	E2B	432	E1B
	40	144	D3C	192	D2C	240	D1C	288	E3C	384	E2C	480	E1C
	45	162	D3D	216	D2D	270	D1D	324	E3D	432	E2D	540	E1D
	50	180	D3E	240	D2E	300	D1E	360	E3E	480	E2E	600	E1E
	55	198	D3F	264	D2F	330	D1F	396	E3F	528	E2F	660	E1F
	60	216	D3G	288	D2G	360	D1G	432	E3G	576	E2G	720	E1G

Time Cycle (SEC)		MAXIMUM NUMBER OF CONTACTS SWITCHING TOGETHER											
		Total Number of Contacts											
Two Motors	One Motor	1	2	3	4	5	6	7	8	9	10	11	12
–	5		1	–	–	–	–	–	–	–	–	–	–
3	6			1	1	1	–	–	–	–	–	–	–
3.5	7			2	2	1	1	–	–	–	–	–	–
4	8			2	2	2	1	1	–	–	–	–	–
4.5	9				3	2	2	1	1	–	–	–	–
5	10				3	3	2	2	1	1	–	–	–
7.5	15						5	4	4	3	3	3	2
10	20								7	6	6	5	5
12.5	25									8	7	7	7
15	30												10
17.5	35												
20	40												
all slower cycles													

Time Cycle SEC One Motor	THIS TABLE APPLIES TO Q MOTOR ONLY MAXIMUM NUMBER OF CONTACTS SWITCHING TOGETHER												
	Total Number of Contacts												
	1	2	3	4	5	6	7	8	9	10	11	12
3.0								6	5	4	3	2
3.6									8	7	6	5
4.0										9	8	7
4.5												10
4.8												11
5.0												
all slower cycles listed for this motor												

15 RPM Motor –Q– High torque permanent magnet. No brake diode required on stop cycle units.

	Cam Shaft Gear	5 RPH Motor–F						2.5 RPH Motor–G					
		Time		Time		Time		Time		Time		Time	
		Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE	Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE
MINUTES resulting speed at 60 cycles	30	9	F3A	12	F2A	15	F1A	18	G3A	24	G2A	30	G1A
	36	10.8	F3B	14.4	F2B	18	F1B	21.6	G3B	28.8	G2B	36	G1B
	40	12	F3C	16	F2C	20	F1C	24	G3C	32	G2C	40	G1C
	45	13.5	F3D	18	F2D	22.5	F1D	27	G3D	36	G2D	45	G1D
	50	15	F3E	20	F2E	25	F1E	30	G3E	40	G2E	50	G1E
	55	16.5	F3F	22	F2F	27.5	F1F	33	G3F	44	G2F	55	G1F
	60	18	F3G	24	G2G	30	F1G	36	G3G	48	G2G	60	G1G
MINUTES resulting speed at 50 cycles	30	10.8	F3A	14.4	F2A	18	F1A	21.6	G3A	28.8	G2A	36	G1A
	36	12.96	F3B	17.28	F2B	21.6	F1B	25.92	G3B	34.56	G2B	43.2	G1B
	40	14.4	F3C	19.2	F2C	24	F1C	28.8	G3C	38.4	G2C	48	G1C
	45	16.2	F3D	21.6	F2D	27	F1D	32.4	G3D	43.2	G2D	54	G1D
	50	18	F3E	24	F2E	30	F1E	36	G3E	48	G2E	60	G1E
	55	19.8	F3F	26.4	F2F	33	F1F	39.6	G3F	52.8	G2F	66	G1F
	60	21.6	F3G	28.8	F2G	36	F1G	43.2	G3G	57.6	G2G	72	G1G

	Cam Shaft Gear	1 RPH Motor–H						1/2 RPH Motor–J					
		Time		Time		Time		Time		Time		Time	
		Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE	Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE
MINUTES resulting speed at 60 cycles	30	45	H3A	60	H2A	75	H1A	90	J3A	120	J2A	150	J1A
	36	54	H3B	72	H2B	90	H1B	108	J3B	144	J2B	180	J1B
	40	60	H3C	80	H2C	100	H1C	120	J3C	160	J2C	200	J1C
	45	67.5	H3D	90	H2D	112.5	H1D	135	J3D	180	J2D	225	J1D
	50	75	H3E	100	H2E	125	H1E	150	J3E	200	J2E	250	J1E
	55	82.5	H3F	110	H2F	137.5	H1F	165	J3F	220	J2F	275	J1F
	60	90	H3G	120	H2G	150	H1G	180	JEG	240	J2G	300	J1G
MINUTES resulting speed at 50 cycles	30	H3A	72	H2A	90	H1A	108	J3A	144	J2A	180	J1A	
	36	64.8	H3B	86.4	H2B	108	H1B	129.6	J3B	172.8	J2B	216	J1B
	40	72	H3C	96	H2C	120	H1C	144	J3C	192	J2C	240	J1C
	45	81	H3D	108	H2D	135	H1D	162	J3D	216	J2D	270	J1D
	50	90	H3E	120	H2E	150	H1E	180	J3E	240	J2E	300	J1E
	55	99	H3F	132	H2F	165	HIF	198	J3F	264	J2F	330	J1F
	60	108	H3G	144	H2G	180	H1G	216	J3G	288	J2G	360	J1G

TORQUE—SPEED CAPABILITIES

The ability of the 324C to trip a number of load contacts simultaneously is determined in the chart below. Pick the vertical column that corresponds to the total number of contacts you need and proceed down the column that corresponds to the fastest time cycle you intend to use. If the intersection of the two columns is in the gray, there is no limitation to the 324's ability to trip contacts simultaneously; if not, the limit is noted in the intersected square.

	Cam Shaft Gear	1/6 RPH Motor–L						1/24 RPH Motor–N					
		Time		Time		Time		Time		Time		Time	
		Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE	Motor Pinion 3, 40 Tooth	CODE	Motor Pinion 2, 30 Tooth	CODE	Motor Pinion 1, 24 Tooth	CODE
HOURS resulting speed at 60 cycles	30	4.5	L3A	6	L2A	7.5	L1A	18	N3A	24	N2A	30	N1A
	36	5.4	L3B	7.2	L2B	9	L1B	21.6	N3B	28.8	N2B	36	N1B
	40	6	L3C	8	L2C	10	L1C	24	N3C	32	N2C	40	N1C
	45	6.75	L3D	9	L2D	11.25	L1D	27	N3D	36	N2D	45	N1D
	50	7.5	L3E	10	L2E	12.5	L1E	30	N3E	40	N2E	50	N1E
	55	8.25	L3F	11	L2F	13.75	L1F	33	N3F	44	N2F	55	N1F
	60	9	L3G	12	L2G	15	L1G	36	N3G	48	N2G	60	N1G
HOURS resulting speed at 50 cycles	30	5.4	L3A	7.2	L2A	9	L1A	21.6	N3A	28.8	N2A	36	N1A
	36	6.48	L3B	8.64	L2B	10.8	L1B	25.92	N3B	34.56	N2B	43.2	N1B
	40	7.2	L3C	9.6	L2C	12	L1C	28.8	N3C	38.4	N2C	48	N1C
	45	8.1	L3D	10.8	L2D	13.5	L1D	32.4	N3D	43.2	N2D	54	N1D
	50	9	L3E	12	L2E	15	L1E	36	N3E	48	N2E	60	N1E
	55	9.9	L3F	13.2	L2F	16.5	L1F	39.6	N3F	52.8	N2F	66	N1F
	60	10.8	L3G	14.4	L2G	18	L1G	43.2	N3G	57.6	N2G	72	N1G