INSTRUCTION MANUAL

MODEL J - CLASS C



TYPE ENGINE — 2 CYCLE, 2 PORT, DUAL ROTARY VALVES

ATWOOD & ADAMS MFG. CO.

732 NORTH LAKE ST. BURBANK, CALIF.

Breaking In and Operation

FEATURES OF THE SUPER CHAMPION

This engine is produced of the finest quality materials obtainable and constructed by skilled craftsmen, who, during the war, were engaged in building precision aircraft instrument parts.

All castings such as the crankcase, rear cover, head, etc., are made of the highest quality aluminum by the high pressure die cast process, and all mating surfaces accurately machined to insure the best possible alignments and 'fits.'

The cylinder is turned from a single piece of high quality alloy steel with fins integral and is ground and honed to the nearest one tenth of one thousandth of an inch inside and out in order to secure $\boldsymbol{\alpha}$ perfect seal with the crankcase and piston. This gains the highest possible efficiency in compression throughout. A special aluminum alloy, with low heat expansion properties and heat treated for long life, is used in the construction of the piston. Each piston is fitted with two alloy cast iron rings, made by experts specializing in piston ring manufacture, and are individually cast and ground. An oiless type of bronze and graphite main bearing, which permits a lower coefficient of friction and closer running fit than ordinary bearings without seizing, is cast integral with the crankcase. Each crankshaft and wrist pin is constructed of the highest quality steel, hardened and ground to insure long life. The connecting rod is of forged dural to give maximum strength under severe operating conditions. In addition to the rotary valve in the rankshoft, there is also provided a rear rotary valve of ficiency of the ankcase intake. All of these features, plus the extra large cylinder intake and exhaust ports, go to make the new Super Champion.

FUEL TANK & MIXTURES

The fuel tank should be situated as close as possible to the needle valve with as short a fuel line as practical to use. Take care that there are no sharp bends in fuel line for they will restrict the normal flow of fuel. The fuel line should be 1/16 to 3/32 inch inside diameter and placed so that it just clears the bottom of tank about 1/16 inch. In the case of control line models it should extend to the outboard rear corner of tank. For example: if your airplane is to fly in a counter-clockwise direction, the fuel line will start from the lower right hand rear corner. NOTE: THE FUEL TANK SHOULD ALWAYS BE LOCATED COMPLETE.

YABOVE OR COMPLETELY BELOW NEEDLE VALVE LEVEL. NEVER
HAVE FUEL LEVEL PARTLY ABOVE AND PARTLY BELOW NEEDLE

VALVE AS MIXTURE SETTING WILL CHANGE WHEN FUEL GOES FROM A GRAVITY TO A SUCTION FEED. It is a good policy to always have fuel line to needle valve coming through top of tank, especially when using gravity feed. Be sure to provide a breather hole or tube in tank in addition to filler tube.

FUELS FOR BREAKING IN: Use two parts white gasoline to one part of No. 70 Valvoline motor oil or equivalent. Power Mist 'Blue Blazer' with 20% Power Mist 'Fortified' oil added is also a good break-

in combination.

FUELS FOR GENERAL AND HIGH SPEED RUNNING:

3 parts gasoline to 1 part No. 70 Valvoline motor oil;

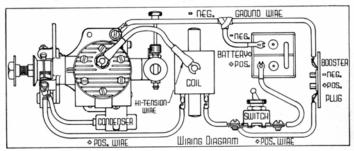
3 parts gasoline to 1 part castor oil and ½ oz. ether per pint;

2½ parts alcohol to 1 part castor oil and 1 oz. ether per pint; Power Mist 'Blue Blazer' with 15% Power Mist 'Fortified' oil.

It is wise to strain all fuels through a piece of silk stocking or fine mesh strainer in order to gain most consistant engine performance.

IGNITION AND WIRING

It is advisable to use a coil with at least $2\sqrt{2}$ 3 volts capacity and preferably 4 volts for best results. NOTE: NEVER ENCLOSE BODY OF COIL WITH A METAL STRAP WHEN MOUNTING since this will break down the lines of force in the field and result in a weak spark. A fiber strap is excellent for this purpose. A condenser of .1 - 400 V type is suitable and the small size auto-type condenser with metal mounting bracket (ground) is ideal. Ground wires from battery and condenser can be conveniently connected to the engine by means of any of the four mounting bolts. Solder coil and condenser lead wires to timer lead clip (H-19), and also, wires leading in and out of coil. For 'running' clip (H-19), and also, whee leading in and out of con. For luming battery cut-off, use good toggle or sliding switch which in most cases are provided with screw attachments. Best power and performance can be obtained by using a 4 volt wet battery producing 25 to 35 amps output although two large flashlight dry cells will give satisfactory results. When using a wet battery, some form of quick disconnect type of clip should be soldered to 'lead-in' wires making certain that there is plenty of surface for engagement of clips to terminals since corrosion takes place at a rapid rate and in tura causes a 'short-out' between connections. If, however, dry cells are used, the wires should be soldered directly to the battery box connections. Even though it is not absolutely necessary to use booster batteries to start engine it is still wise to do so from the standpoint of saving the regular 'running' battery. variety of good booster plugs can be purchased and when used should have soldered connections to the wiring leading from it.



SPARK PLUG AND POINTS

Peak engine performance depends to a very large extent upon the spark plug and ignition points being in 'tip top' condition.

The spark plug should be kept clean and free of carbon by scraping

and washing with gasoline occasionally. Always make sure the porcelain is not chipped or broken. Electrodes of plug should be set at .010"

Maintain breaker point gap opening at .010 to .012" for normal engine operation and .008" for high speed and racing. Keep points sen tot frequently to exact and oil. Sometimes points will burn or oxidize, preventing ignition firing or causing spasmodic running of engine. To remedy this trouble, hone each point to a bright new finish. A good 'trick' to prevent oil from clogging points so readily is to hone each one to a slight convex shape. DO NOT ATTEMPT TO USE A LARGER DIAMETER SCREW

THROUGH THE FIBRE WASHERS FOR CONNECTING BREAKER ARM SPRING AS THE SPARK MAY ARC BETWEEN SCREW AND TIMER FRAME. Always make sure that screw is centered in hole on timer frame and also insulated from frame by the two fiber washers.

NOTE: Timer and cam may be rotated 180° , if desired, for inverted operation.

BREAKING IN

All Super Champion engines are bench run and tested at the factory to insure everything being in perfect working order, however, the new engine requires additional breaking in. For this purpose mount engine and accessories upon a wood block of at least one-half inch thickness and clamp assembly to a 'saw horse' or similar device. NEVER CLAMP ENGINE DIRECTLY INTO A VICE. A propellor 12" to 14 inches in diamenter should be used for breaking in purposes. Operate engine (four cycling) for the first hour with the needle valve set rich and spark retarded. It is a good policy to inject a few drops of castor oil into the carburetor intake occasionally during this time. Spark may then be advanced gradually at various intervals as engine begins to 'free up.' (See FUELS FOR BREAKING IN.)

NOTE: Check timer cam position (H-21) before operating the first time since cam may have been jarred off during shipment. Points should open 1/16 inch before top dead center with timer in retarded position.

STARTING & OPERATION

No two engines will start and run exactly alike, so discretion will have to be used in learning the 'pet pranks' of your own particular engine. In general the following procedure for starting will apply assuming that the fuel tank is full and everything else set and ready.

1. Set spark (timer arm) to retard position (in line with letter 'S' on crankcase.) Arm location will be approximately 60° to left of cylinder

when viewing front of engine in upright position.

2. Open needle valve approximately $2\frac{1}{2}$ to 3 turns by turning in a counter-clockwise direction.

3. Flip propeller briskly two or three times (in a counter-clockwise direction) while holding finger over carburetor air intake venturi. This will prime engine for starting. When inverted, it will be necessary to inject several drops of fuel into the exhaust port for priming in addition to the above mentioned procedure.

Connect booster batteries or close switch and crank engine briskly until it starts.

Turn needle valve slowly in α clockwise direction until best running position is attained. Take care not to adjust needle too fast as engine will lean out and quit.

6. Next, advance timer arm (clockwise when facing engine) until highest R. P. M. is reached. If timer is advanced too far, engine will slow down and sound as though it is working against itself and should be retarded.

If engine 'belches' flame through the exhaust and fires weakly occasionally, it indicates being flooded. To remedy this, close needle valve and crank engine until excess fuel is burnt out. The spark plug will generally foul up under this condition and should be removed and cleaned. Starting procedure may then be repeated.

SPECIFICATIONS

Bore940"
Stroke
Displacement
H. P
Compression Ratio 8 to 1
Bare Weight (less tank, coil and condenser) 12 oz.
Type, 2 Cycle, 2 Port-Dual Rotary Valves

Type, 2 Cycle, 2 Port-Dual Rotary Valves Carburetion, Single Suction Throat, Dual Intakes.

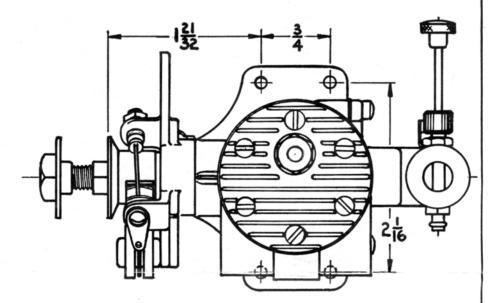
Ignition, Adjustable Auto Type High Speed Timer with Tungsten Points.

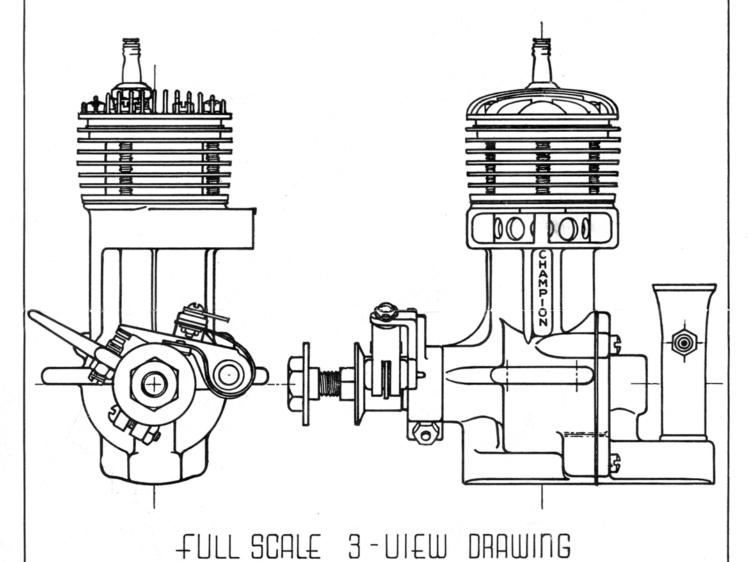
Sparkplug, Champion No. VR-2, recommended.

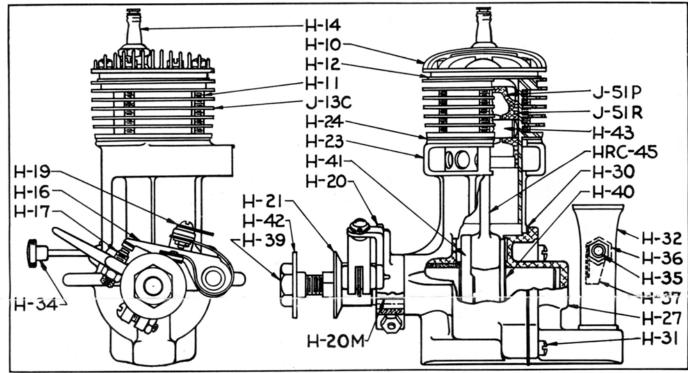
Main Bearing, 7/16, Diameter x 1 3/16 Long.

Rear Bearing, (Rotary Valve) 7/18 Dia.

Direction of Rotation—Counter-clockwise only.







The Above Drawing is a Convenience When Selecting Parts

MODEL J PARTS & PRICE LIST

ORDER BY PART NUMBER

Part 1	No. NAME P	rice	Part 1		Price	Part N	lo. Na	AME	Price
H-10	Cylinder Head\$	1.50	H-20M	(Marcel (Timer Adjusting Spring)	.10	H-37	Needle Valve	Spring Clip	.10
H-11	Cylinder Bolt Assembly	.15	H-21	Timer Cam	75				
	(includes 3 long and 3 short)		H-23	Crankcase (with integral cast		H-39	Propeller Nut		.20
H-12		.10		bearing)	. 3.00	H-40	Rear Rotary V	/alve	1.75
J-13C	Cylinder		H-24	Base Gasket (for cylinder)		H-41	Crankshaft		3.25
H-14	Spark Plug (choice of VR-2 or V-2)	.50	H-27	Crankcase Cover		H-42	Propeller Was	sher	.15
H-15	Flywheel	1.50	H-30	Rear Cover Gasket	.15				
H-16	Spring Loaded Breaker Arm	.60	H-31	Rear Cover Bolt Assembly		H-43	Wrist Pin (with	end pads)	.75
H-17	Adjustable Timer Point with Nut	.25		(includes 4 bolts)	.05	HRC-45	Forged Dural	Connecting Rod	1.50
H-19	Timer Insulated Lead Assembly	.20	H-32	Carburetor Venturi		J-51P	Aluminum Pist	ton (less rings)	2.00
	(includes clip lead, bolt, nut and		H-34	Needle Adjustment Assembly		T.51R	Rings (2 requir	red per piston), ea.	50
	2 fibre washers)			(with ratchet and knurled knob)		J-011t	itings (2 requir	ed per pision, ed.	.00
H-20	Timer Frame Assembly (with lock		H-35	Needle Valve Body	.75	H-50	Complete set	of 3 Engine	
	screw and nut)	1.00	H-36	Needle Valve Body Nut	05		Gaskets		.25

TROUBLE SHOOTING

Check these items if engine will not start or run consistantly.

- 1. Make sure there is fuel in tank. A clogged needle valve will necessitate opening valve an excess number of turns and also prevent proper adjustment while running. To eliminate obstacle, remove needle and blow or inject gasoline through valve.
- Remove high tension wire and hold it about 3/16 inch from cylinder to check ignition for firing, turning engine over briskly while doing so. Undoubtedly spark plug is fouled or bad if ignition fires regularly when doing this. If, however, ignition will not 'fire' check electrical system further.
- Test amount of 'juice' in battery. Use only fully charged wet batteries or fresh dry cells. When testing with meter, only touch terminals momentarily or battery will be instantly 'drained'.
- Check electrical system and wiring for proper hook-up and solid connections.
- 5. Fouled points can be detected by instantaneous grounding of a screw driver across 'open' breaker arm and timer frame while holding high tension wire away from cylinder as mentioned above. If spark will jump by this method, then clean points as mentioned in article on "Points."
- Investigate proper installation of timer cam. (See Breaking In Instructions.)

CARE OF ENGINE

Regardless of how careful one may be in operating an engine from the field, it will be advantageous to occasionally dismantle it for cleaning. A certain amount of dust and dirt are bound to enter the engine and not go through and out exhaust. Of course this dirt causes an ab-

rasive action which is very detrimental to running parts. Each part should be washed thoroughly with gasoline and brush, and all surfaces running against one another given a coat of castor oil or No. 70 Valvoline motor oil before reassembling.

Following are a few points to consider in dismantling and assembly of engine.

- 1. Do not attempt to remove venture (H-32) from rear cover (H-27); or small round plugs from bottom of crankcase and rear cover. These are permanent installations and need not be removed for cleaning.
- Pistons must be dismantled from connecting rod before removing rod from crankshaft. Remove rod through back of crankcase when crankshaft is at bottom of dead center.
- 3. Tighten cylinder and back cover screws evenly and uniformly. Do not tighten one screw at a time all the way since this causes distortion. Screws only need be snug and not to the point of stretching or stripping of threads.
- Narrow side of baffle on piston must be installed to side of transfer port in cylinder.
- Make sure the needle valve jet opening points straight into venturi tube.
- 6. Always be sure timer arm spring is insulated from frame as explained under article entitled "Points."

GUARANTEE: The Super Champion engine is fully guaranteed against defects in material and workmanship for 30 days from date of purchase and will be repaired or replaced free of charge, provided the engine is exactly as manufactured and no parts have been altered, damaged or mutilated. The engine must be returned to factory prepaid.