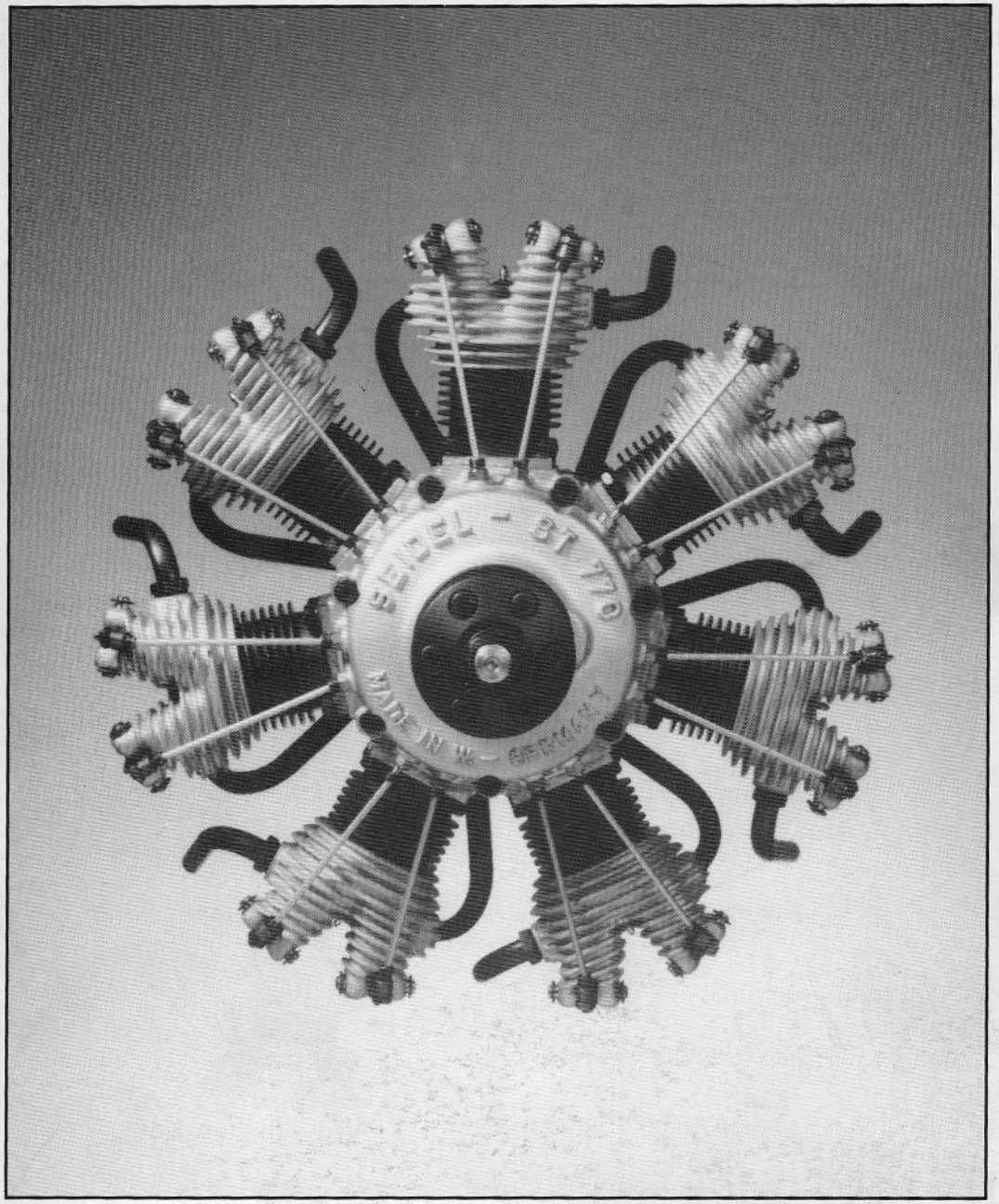
HANDBUCH
OPERATION-MANUAL



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1. INTRODUCTION

ST 7 70
Radial engine 7 cyl. total capacity 70 ccm

The Fourstroke Sevencylinder ST-770 is the logical advancement of experienced units.
The basis and standard for this is the till today unrivalled SEIDEL Radial Engine ST-540.

3 Points representing the basis of challenge for a perfect aim:

I. **handling without problems and reliable performance**

II. **robust and durable** in its use

III. **appearance to be in harmony with the original**

What makes handling easy and performance reliable?

- The three point connection ensures an easy and reliable fitting of the motor.

- The safety capnut prevents a loosening of the airscrew if the motor stops suddenly.

- The carburettor - centrally rear mounted on the crank compartment - enables a safe adjusting without risk of danger.

Whereby robust and durable ?

- Crankshaft carried on 2 ball-bearings of large dimensions

- Combustion chamber, hemispherical and V-grouping of valves

- Bearings inner cooled by constant new oiling through the carburettor

- Employment, powerful and vibrationless running with high torque at low speeds

Why the pretension of harmony and originality ?

- The proportion between weight and performance complies with up-dated motor designing

- Proportion and look are representative of originality

- The housing elements produced by fine sand castings give to each engine its individual finish.

The ST 770 radial motor is a precision instrument which will have a long life provided that it is taken care of properly and servicing instructions are followed carefully.

2. TECHNICAL DATA

Cylinder capacity total	:	69,58 ccm (7x9.94) = 4.259 cu.in.
Bore/Stroke	:	22.5 / 25 mm = .8858 /.9842 in.
Max. power	:	3 KW / 4 HP
Rev. range	:	1000-6000 RPM
max.speed	:	6300 RPM
Carburettor	:	throttle
External dia. of engine	:	230 mm = 9.055 in.
Total weight with motor carrier	:	2650 gr = 93.63 oz = 5.83 lbs
Recommended prop. sizes	:	2-bladed: 22x10" 22x12" 24x 8" 24x10" 24x12" 26x 8" 26x10" 3-bladed: 22x 8" 22x10" 23x 8"
Recommended glowplugs	:	OS type F 4-stroke glowplugs

Technische Daten

Sternmotor		ST-540	ST-770	ST-996
Zylinder	Stck	5	7	9
Hubraum	ccm	39,8	69,58	96,67
Hubraum/Zyl.	ccm	8,0	9,94	10,73
Bohrung/Hub	mm Ø	22,5x19,8	22,5x25	22,5x27
max.Leistung	KW/PS	2,1/2,8	3,0/4,0	4,0/5,4
Drehzahlber.	U/min	1200-6800	1000-6000	1000-5500
max.zul.Drehz.	U/min	7000	6300	5800
Motor-AußenØ	ca.mm	200	230	262
Gew.kompl.	ca.g	1800	2600	3400
empf.Luft-schrauben 2-Blatt der Fa.Menz	Zoll	18x 8 20x 8 20x10 22x 6	22x10 22x12 24x 8 24x10 24x12 26x 8	22x14 24x12 26x10 26x12 28x 8 28x10
empf.Glühkerzen		OS Typ F 4-Takt Kerzen		

3. MOTOR CARRIER

The supplied motor carrier makes an easy and dependable motor montage possible on the model. The representative three point connection of the motor carrier gives the following advantages:

- Its own weight is low (approx. 70 grms)
- High torsion resistance
- Strut and stay free attachment of motor to model

The crankshaft axis is centre-aligned to the motor carrier. This renders a facility for precise mounting to the radial engine.

4. FITTING THE MOTOR

The motor is fixed to the motor carrier by three- point connection and the motor carrier itself in the same way to the bulkhead. The bulkhead should be at least 12 mm thick plywood.
The centre distance between the intake funnel of the carburettor and the bulkhead must be at least 10 mm!

To make sure a sufficient cooling of the motor, it is extremely important to have the exhaust aperture in the cowling large enough.

A good rule is: The exhaust aperture should have the same size as the air intake.

This, of course, refers only to an installation with engine cowling.

5. FITTING THE TANK

The centre line of the tank should be in line with the centre of the carburettor (needle). A 750ml tank is sufficient for an approx. 20 to 25 minutes
full throttle run.

6. FUEL

As glow ignition fuel we recommend a usual fuel in trade containing a nitromethane portion of 0-10 %

Using fuels in trade during the running-in period and for flights:

Running-in period: for approx. 2 hours use fuel with 0 - 5% nitromethane portion

For flights use: glow ignition fuel usual in trade containing 0 - 10 % nitromethane

More convenient with regard to costs is to mix up the fuel by yourself. Doing so, then please conform exactly to the following table:

TABLE OF FUEL COMPOSITION

	Metanol	Synth.Oil	Nitro	Oil	Addmixtures
Running-in period					
1st hour	880 ml	120 ml	0	12%	0
2nd hour	900 ml	100 ml	0	10%	0
Permanent run and on/flight without ad mixtures					
	920 ml	80 ml	0	8%	0
	930 ml	70 ml	0	7%	0
Permanent run and on flight with admixtures					
	870 ml	80 ml	50 ml	8%	5%
	815 ml	85 ml	100 ml	8%	10%

ATTENTION

Too much oil is as bad as too little,
**** i.e.minimum 7% but maximum 8% ****

7. GLOWPLUG

For a reliable running of the radial engine it is a decisive fact that only hot glowplugs are used.

We recommend: OS type F
4-stroke plug,
-obtainable in each good special shop-

Attention:

To avoid damaging engine NEVER USE DIFFERENT MAKES OF PLUGS or DIFFERENT CALORIFIC VALUE PLUGS even if the latter are the same make !

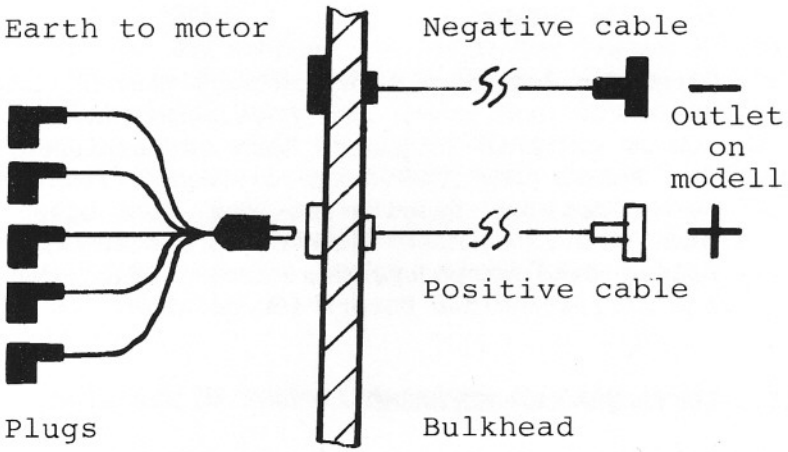
Change your plugs after 15 - 20 hours use or at least every flight season.

8. GLOWPLUG CABLING

The radial engine is equipped with a complete glow harness. The new developed glowplug contacts enable a sure installation of the motor under a closed cover.

Suggestion for the cable connections:

- see following sketch -



9. SOURCE OF CURRENT

The use of a loaded battery of 2 Volts approx. 10 Ah guarantees a sure start of the motor.

Please use short and lowresistent junction cables between battery and connection socket of the model.

10. A SPECIAL RECOMMENDATION

It makes no difference which multi-cylinder four-stroke motor you apply. Anyway, the best insurance for your beautiful and precious model is an additional glowing.

If during the flight it appears that the motor might be adjusted too rich or too lean, for the four-stroke motor the following risk is given when throttling:

Due to the exhaust stroke of the piston to the upper dead point and the intake stroke of the piston to the lower dead point it may happen that the coil of the glowplug goes out. Thereby, the fresh fuel cannot get fire from the coil during the next working cycle. The result would be an unround and powerless run of the engine which could even lead to stopping the motor.

11. RETAINER OF PROPELLER DRIVER

The ST 770 is equipped with a safety locking device. This retainer of propeller driver prevents the release of the propeller during a sudden stop of the motor so that wounding of persons and/or damage of the motor are avoided.

A further advantage and additional safety offers the central locking nut of the locking device which must not be loosened any more when changing the airscrew. So it is just enough to loosen and retighten the 6 internal hexagon screws.

Should, however, a retightening of the central locking nut become necessary, so please use the enclosed spanner for this purpose.

Attention: Prior to each start be aware of the safety ring before the hexagon fixing nut.
If the safety ring is missing, PLEASE DON'T START THE MOTOR.

12. PROPELLER

The choice of propeller depends on the model. To obtain the maximum torque in the corresponding speed we recommend to use airscrews not smaller than 24x10" 2-bladed.

The optimum power ratio can be obtained by using:

2-bladed propellers:	22x10"	3-bladed propellers:	22x8"
	22x12"		22x10"
	24x8"		23x8"
	24x10"		23x9"
	24x12"		
	26x8"		

Please use only balanced airscrews.
This is prior condition to get a low vibration run of the radial engine.

13. ADJUSTING THE CARBURETTOR

The carburettor is pre-adjusted and should only be re-adjusted after the engine has been run-in.

Main needle valve (grooved screw)
Full throttle setting:
by means of the grooved screw.
Basic setting to be opened by approx. 1.5 to 2 revolutions. For fine setting -during engine running - the grooved screw should not be varied more than 1 to 2 notches at once, until the maximum revolution is reached. Then richen mixture by opening two clicks (counter clockwise) to avoid overheating.

Idle running setting:
The idler adjusting screw is the slotted excenter screw on the left below the grooved screw.
It can be adjusted as follows:
1/4 rev. to the right clockwise,
forked plate upwards, poor mixture
1/4 rev. to the left counter clockwise,
forked plate downwards,rich mixture

So the rule of thumb says:
plate upwards - poor
plate downwards - rich

Already when fitting the motor, please take care that good access for servicing of the carburettor is possible and that a **minimum distance of 10 mm** between the intake funnel of the carburettor and the bulkhead is observed.

14. ADJUSTING THE VALVE GAPS

Prior to delivery of the motor the valve gaps are set a little bigger for the running-in period.
The range is between 0.05 - 0.1 mm on a cold motor.After each 1 or 2 hours working the gap should be testet and, if appropriate, adjusted with the enclosed tools.

Only adjust on a cold motor!

Make sure **both** rocker arms and tappet push rods of the cylinder which is to be tested have float before adjusting.

Adjust the valve gap to allow the 0.05 mm gauge to clear and the 0.1 mm gauge to have a little resistance.

15. STARTING THE MOTOR

a) Before each new start, turn motor approx. 3 or 4 turns **in a clockwise direction** to check whether there is oil residue in the bottom cylinders.

   If any difficulty is found, do not use force, but remove the two bottom glowplugs and let the oil drip out if required.

b) Ignition **OFF** (disconnect the current cable)

c) Fill fuel pipe to carburettor

d) Throttle valve to be open wide

e) Inject some fuel through the carburettor or keep the carburettor filter shut with one of your fingers.

f) Turn the engine (by airscrew) 3 to 4 turns in turning direction (counter clockwise) until some unburnt fuel spills from the exhaust pipes.

g) Open the throttle a little more than tick over.

h) Ignition **ON** (connect current cable)

i) Start the motor by means of the airscrew manually

The motor should run now.

Attention:

If the motor will not turn, too much fuel has been absorbed. In this case, **stop the starting procedure immediately.**

TURN OFF ignition and turn propeller **clockwise** 3 or 4 times by hand.

New starting procedure:

Ignition **ON**,
heat glowplugs approx. 30 seconds and start again the engine.

After the motor starts heat glowplugs a further 10 - 15 seconds then disconnect the current.

16. RUNNING CHECK

Run motor at about 2000 r.p.m. - (approx. 1/4 throttle).

To find out if all the 7 cylinders work check all exhausts emit hot gases.

If the motor does not accept gas well or if not all 7 cylinders are working this means the carburettor is set too lean or too rich. (Please refer to the rule given at the end of this chapter!)

So cut off the gas, reconnect the glowplugs and adjust the mixture needle valve to get a richer or a leaner mixture respectively.
Now open again the throttle and disconnect the glowplugs.

If this does not cure the problem, stop the engine and remove the appropriate glowplug(s) to check its operation.

Rule No. 1:

If one or more exhaust pipes emit only slightly warmed air it means the adjustment is too lean;
- mixture needle valve to be opened a little (counter clockwise direction)

If one or more exhaust pipes emit unburnt mixture it means the adjustment is too rich;
- mixture needle valve to be closed a little (in clockwise direction)

Rule No. 2:

Avoid additional glowing at full throttle.Otherwise the result could be burning out or overheating the glow winding.

17. Exhaust Collector Ring

Attention
Please start the motors equipped with an exhaust collector ring only by using an electrostarter.

*** Why? ***

If too much fuel flows into the engine when starting by hand and if it gathers as unburnt fuel in the exhaust collector ring, in this case the engine easily tends to run backwards at highest rev. speed which means top danger for the starter by hand!

18. STOPPING THE MOTOR

Important!
When stopping the RADIAL ENGINE ST-770 it is verry important to proceed as follows because of its mixture intake through the crank compartement:

I. Run the motor - after a preceding longer idle run - for approx. a 1/2 minute at approx. 3000 r.p.m..
II. Set the carburettor to idle position and trimming to zero.

The motor must stop immediately.

Attention!
If however the motor continues to run at low speed, so the throttle of carburettor does not shut completely. Such an idle rev. speed coming up in this way is too low, the result of which is that each cylinder will be overflowed and will stop one after the other. Wet glowplugs and unround run will be the consequence at a new start.

When stopping the motor after an air display please proceed as follows:

I. Run the motor for approx .1/2 minute at 3000 r.p.m.
II. Now set the carburettor a little over idle run position to approx. 2000 r.p.m. and switch-on additional glowing.
III. At running motor interrupt fuel supply an let the engine run out.
So fuel rests are sucked off the crank com partment through the cylinders and only preservation oil remains inside the engine.

19. RUNNING-IN THE MOTOR

Exceptional care and observation during the running-in period will give a good foundation for maximum engine life and performance of the ST 770.

It is suggested that the engine should be run-in on a test stand in order to become acquainted with the characteristic of this motor.
Under no circumstances should the included motor support be used for this purpose.

For running-in the motor, please follow exactly the instructions according to item 15 - starting the motor -.

Additional points during the Running-in Period:

- Needle valve is set correctly on delivery of the motor.
  Basic set for the running-in period:
  open needle valve approx. 2-3 turns.

- Open throttle approx. 1/4.

- Carry on according to item 15 - Starting the motor - a) to i).

- Do not turn off the ignition.

- Set revolutions of the motor at approx. 2000 to 2500/min by throttle of carburettor and run for about 10 minutes. Whilst doing this, the ignition should be off and on so that the exhausts can be checked for hot gases.

- After approx. 10 minutes the motor may be speeded up for short periods and then slowed again by regulating the carburettor. Gradually extend the faster runs up to 1 or 2 hours total

running time whilst switching on and off the ignition respectively and check the exhausts for hot gases sometimes.

- After a total running of 1 or 2 hours the motor may now be fitted into the model.

It is recommended to set the carburettor as rich as possible during the first flights. For every following start you may set the mixture needle valve leaner and continue in this way until the motor achieves its maximum power.

20. MAINTENANCE

Please pay particular attention to this section - especially point b); the motor will thank you for it with a long life.

a) From time to time oil - a few drops only - the valve stems, rocker arms and both ends of the push rods.

b) **Generally it is necessary** to always preserve the inside of the motor thoroughly with oil after the last run of the motor before a long rest period, proceeding as follows:

Fill the carburettor with approx. 3-4 ccm of oil from the little bottle supplied and turn hereby the airscrew in rotating direction (anticlockwise) by hand. Doing this **only use castor oil or acid free oil**, respectively that oil which you use for your fuel composition.

Warning! When starting from new follow point 15 - starting the motor - to the letter!

20. REPAIRS

A Seven-Cylinder Fourstroke Radial Engine with its many parts makes a high demand with regard to technical know-how.

Therefore, smaller repairs should only be undertaken by a well versed motor mechanic.

In case of large damage or repairs becoming necessary, forward the motor to the manufacturer without fail.

The guarantee of the manufacturer is IMMEDIATELY declared invalid as soon as the ST 540 is opened up, dismantled or treated in an unprofessional manner.

During the development and production of the ST 540 a maximum of active and passive saftey was taken as a basis. This, however, does not exclude that due to unprofessional handling and operation of the motor it may be caused personal hurt and material damage which the manufacturer cannot assume any responsibility for.

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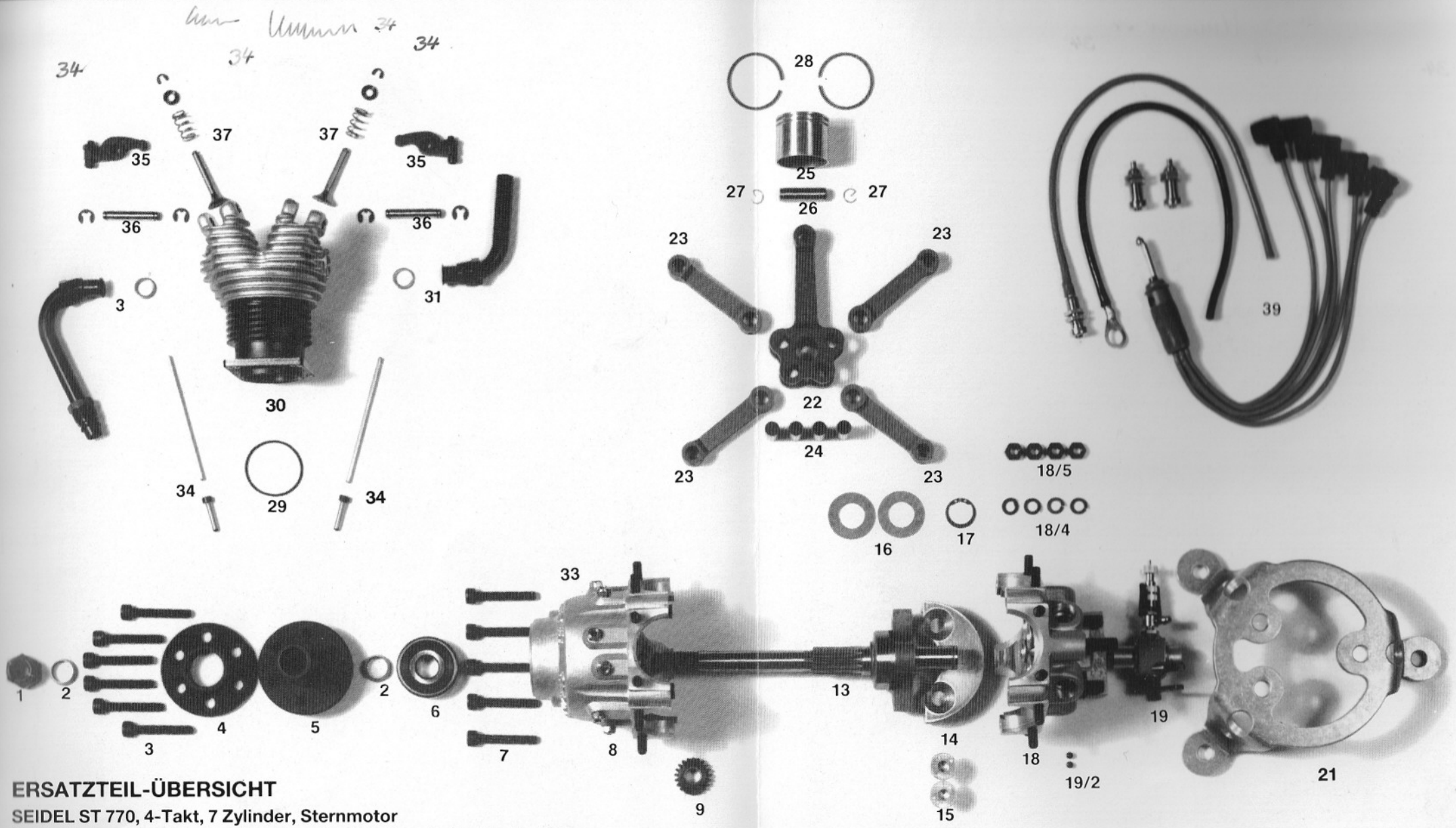
I wish you much pleasure and success with your new propellant force.

W. SEIDEL



ERSATZTEIL-ÜBERSICHT

SEIDEL ST 770, 4-Takt, 7 Zylinder, Sternmotor

Bei Bestellung eines Ersatzteils geben Sie bitte die vollständige Bestellnummer an, d. h. 770-und die Ziffer des gewünschten Bauteils.

DIGEST of SPARE PARTS

SEIDEL ST 770, 4-stroke, 7-cylindre RADIAL ENGINE

When ordering a spare part please indicate complete identification number, i.e. 770 - plus the figure of the part required