

Cavalero's New High Pressure Regulator

By Jim Hall

American divers seldom get a glimpse of the equipment popular in other parts of the world. Surprisingly, our country has not been the trend setter in recent years. For example, in Europe, the standard "72" scuba tank is considered low pressure. On the Continent, where scuba diving began, tanks are routinely filled to 5000 or even 6000 psi. European regulators have abandoned the familiar yoke arrangement and have adopted a universal screw-in fitting known as the DIN (for German industrial standard) valve.

If you own a Poseidon or AGA regulator, you are already familiar with the DIN valve fitting. This arrangement was developed through a mutual engineering effort by the European manufacturers to provide a safe and dependable way of attaching regulators to super high pressure scuba tanks. Until the introduction of the DIN fitting, most regulators in Europe used a yoke arrangement similar or identical to the one used by domestic brands. However, with the advent of 5000 plus cylinders several problems arose. Yokes made of brass could not withstand the stresses of sealing against that kind of pressure. O-rings would ooze past their seats and blow loudly.

The answer to these and other high pressure problems was the DIN fitting. This solution replaces the yoke arrangement on the regulator first stage with a short shaft that employs a

captive O-ring on one end, directly behind which is a free-spinning wheel that screws into a special valve and seats the O-ring deep inside. First introduced about seven years ago, it has gradually become the standard regulator/valve fitting for the Common Market. Indeed, it is hard to find a regulator in Europe today that has not been designed with 5000 psi or greater service in mind.

The first regulator made in the United States that employs the DIN fitting is the Cavalero CCS-20. It is the forerunner of a new style of domestic regulators that will use similar fittings for the higher pressure cylinders soon to be available. Simultaneously, U.S. Cavalero has introduced a valve and adapter for standard tanks to make their equipment completely compatible with standard scuba systems.

The CCS-20 is a logical variation of a time-proven design. Its total concept is a firm and cautious step into diving's future. The basic design engineering of the CCS-20 was done by the president of U.S. Cavalero, Sam Lecocq (pronounced le-coke). Lecocq's career spans almost the history of American diving. In 1958, while with another company, he designed the first commercially available, single hose regulator and the first tank valve for diving. Later that year he also introduced the submersible pressure gauge to our industry. The CCS-20 is the

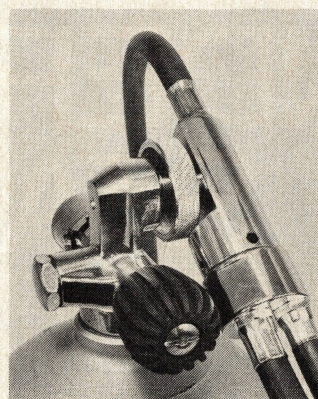
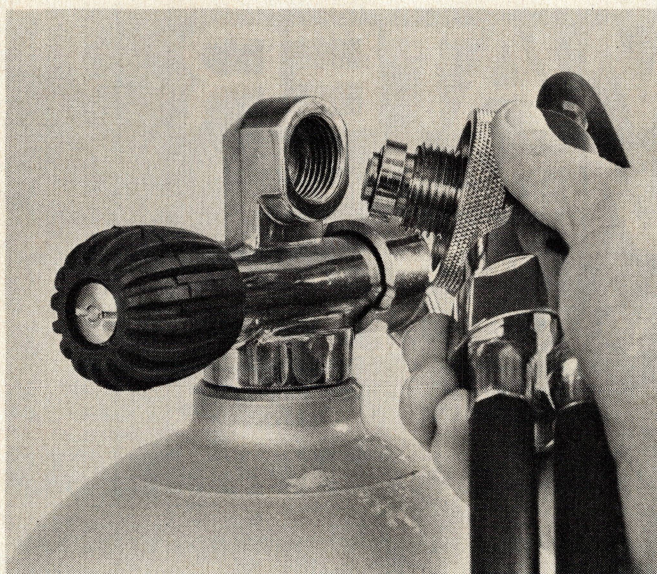
first single hose regulator produced by Cavalero, which has previously limited its production to two hose regulators available only in Europe.

The second stage body of the CCS-20 is molded from Nylon 11 and has some features not present in other second stages. Weighing one-fifth that of a brass second stage, the Nylon 11 used in the CCS-20 is corrosion-free and has superior resistance to hydrocarbons, especially those found in lubricating sprays. Nylon 11 also has more elasticity which prevents stress cracking near the hose fitting during improper service.

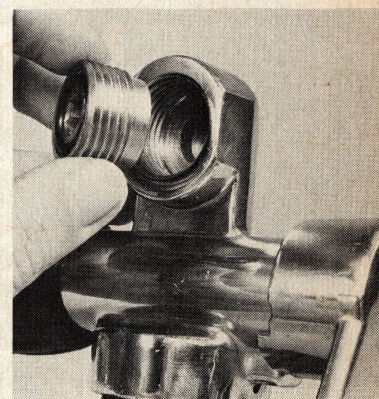
Breathing resistance has been minimized by the internal configuration of the second stage case and liberal use of Teflon on moving parts. The case is shaped in such a way that air entering from the demand valve is deflected away from the diaphragm and into the user's mouth. Both the demand lever

hole in its face. Closer inspection shows it to be heavier and thicker than any other valve, a concession to the higher pressure for which it is designed. To convert it for normal use, it is necessary to use an adapter which screws into the DIN orifice with a hex wrench. Once installed, the Cavalero DIN valve is virtually indistinguishable from other valves.

As convenient as the DIN adapter may be, it and the CCS-20 presents a new area of responsibility and concern. It is conceivable that an adapter could be used to convert the soon-to-be-available Cavalero 5000 psi system to a standard yoke arrangement. If you are a diver prone to experimentation, don't yield to temptation. Chances are that your domestic regulator and yoke were not designed to take the higher pressure. The Cavalero CCS-20 is a specially designed piece of breathing equipment and will not blow a seat, crack the case



photography by Geri Murphy



The DIN valve fitting was developed by European manufacturers to provide a safe and dependable way of attaching regulators to higher pressure (5000 to 6000 psi) scuba tanks. Cavalero has introduced a valve and adapter (above right) so its equipment is compatible with standard U.S. scuba systems.

Forerunner of a new concept in American regulator design.

and valve stem are Teflon-coated. This not only reduces friction during use, but prevents sticking during storage periods.

The difference between the CCS-20 regulator and others available on the market becomes more apparent with examination of the first stage. Because the CCS-20 is designed for 5000 psi service, it is beefed up considerably over similar regulators. The first stage weighs over two pounds and has a four-to-one safety factor before it will burst. Three low pressure ports are angled sharply to the right — an adapter is needed to allow a BC inflator hose to come over the left shoulder without undue stress. The piston is balanced for maximum airflow at greater depths and delivers a good 28 cfm to the second stage. This design has been widely copied in recent years and is a testimony to its reliability.

Where you would expect to find the yoke, there is the DIN fitting — a moderately large, knurled wheel that seats the O-ring. This knob is large enough to be easily worked while wearing heavy gloves. The regulator can be seated into its valve with about four turns. Once attached, it has a remarkably clean profile that should greatly reduce snagging associated with conventional yokes.

The valve to which the DIN first stage is attached resembles most of those available today — except for the large threaded

or lock up a diaphragm as is possible with other regulators.

Steps are already being taken to prevent the abuse of high pressure by careless divers. The filler yoke for the new cylinders will have an extended tube beyond the captive O-ring which will prevent it from seating in DIN valves meant for lower pressure regulators and cylinders. The valves themselves will be designed to be incompatible with the necks of lower pressure tanks and their introduction will be preceded by a vigorous campaign to produce diver awareness. Only self-regulation will prevent this advance from being abused.

The CCS-20 performed well in our test dives off of Palos Verdes, California. The large, wide-bite silicone mouthpiece (standard) was extremely comfortable. Inhalation and exhalation resistance was as good or better than other regulators of similar design. We recommend that you invest in some hose protectors to prolong the life of your low pressure hoses — the right angle arrangement of low-pressure air sources is the only real disadvantage with this regulator.

The CCS-20 is a good, forthright regulator with a place in the future of sport diving. It is obvious from the introduction of the DIN fitting and valve that there is still room for evolution in first stage design. If you want to be prepared for what we think is the trend in equipment the CCS-20 is for you. ➤