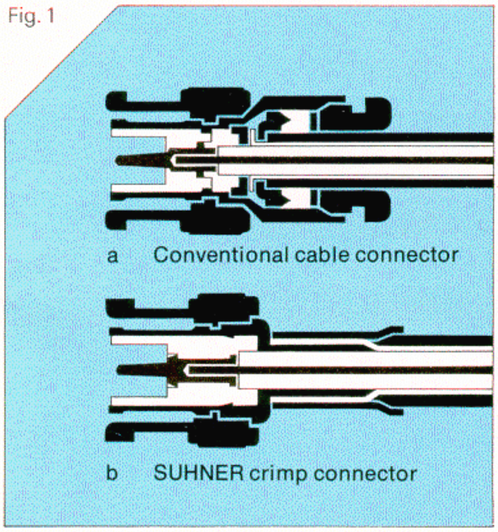
The demand for an improved connecting technique

Conventional connecting techniques require soldered inner connections, while the screen contact depends on a pressure joint (Fig. 1).
The soldering requires skill and practice. Excessive heat damages the cable dielectric and can cause eccentricity of the cable's inner conductor. Unacceptable reflections result.
A satisfactory pressure joint of the cable's outer conductor is achieved with several components. This means complicated stripping, awkward assembly, and possibly assembly mistakes.

Fig. 1



The requirements for a better connecting technique are accordingly:

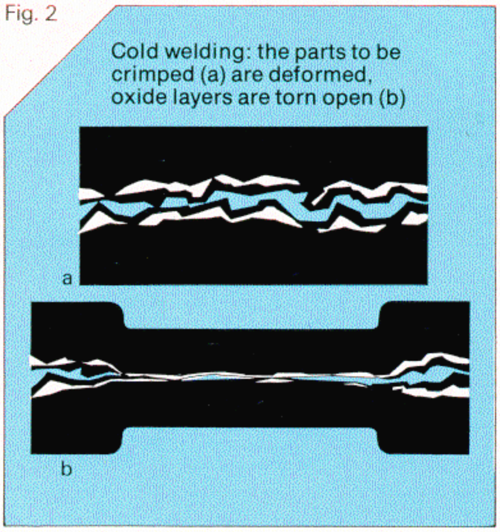
- simple assembly, shorter assembly time
- no heat effect
- less components
- increased reproducibility, i.e. quality independent of the skill of the assembly personnel

A reliable contact and sufficient mechanical strength must obviously be maintained.

Cold welding replaces soldering

Object of the crimping process is the achievement of a positive mechanical compression and cold welded connection. The effect of the force applied by the crimping tool on the contact components must be maintained after crimping.
This is the case when the originally soft connector parts harden during the crimping process and are thereby permanently deformed.
The crimp action should result in a high degree of cold welding between connector parts and cable. For this the metal parts to be connected must be brought within atomic spacing. They are then held by the occurring van der

Fig. 2



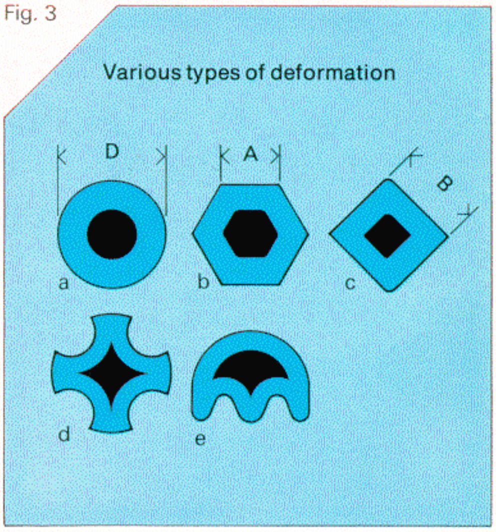
Waal forces (dispersion forces) and partly form a continuous metal structure.
An approach to the required spacing is only possible through deformation of the components. Thereby the surface is smoothed (Fig. 2) and the oxide and impurity layers are torn open.
Good cold welding and high contact pressure require accordingly:

- largest possible deformation
- use of soft materials
- clean, oxide- and grease-free surfaces

Crimping inner conductor

Excessive deformation of the contact parts leads to a mechanical weakness, embrittlement and cracking of the crimped joint. With coaxial connectors the effect is aggravated, in that, for reasons of impedance matching, much deviation from the circular form is not possible.
Hence only type b and c of the deformations shown in Fig. 3 are suitable for RF connectors. Moreover, soft materials (e.g. copper) cannot be used for contact pins and contact sockets.
Tests made with square and hexagonal crimpings prove that unacceptable embrittlement or formation of cracks occurs, as soon as the circumference of

Fig. 3



the crimped part becomes smaller than that of the uncrimped part.
The basis for dimensioning crimp joints with maximum acceptable deformation is: $D\pi = 6A = 4B$.
Assuming this law of equal periphery, the cross-sectional area of a square is 78.6% of the original circle area (area deformation degree), but is still 90.5% for a hexagon.
The area reduction for square crimping is accordingly 2.25 times as large as for the hexagonal crimping!