how we fight, tempered by threats, and by how the enemy fights."
Collins says that the Army and the USAF agree on Air Land Battle doctrine. He stresses that night-fighting ability is essen-tial, and he leaps towards a high-speed CAS aircraft because of the need to group together rapidly for a massed attack.
The key lies in combined arms warfare. "Consider the impact of being able to deliver precise support together with artillery, heli-copters, and direct fire. This presents the enemy with a huge problem." Collins wants to see CAS synchronised with other lethal systems. "It's the most efficient way of deliv-ering decisive firepower," he says.
Responsiveness is central to CAS effec-tiveness, says Collins. "The USAF must be able to deliver what we need in a timely manner." Timeliness comes in two forms: immediate, and pre-planned. "Immediate means taking the opportunity to decisively strike a blow, or to pull us out of hot water." Responsiveness concerns not just the aircraft, says Collins, "but the network that ensures successful communication between air and ground forces". The principal component of this is the Army/ USAF air-ground operations system. "There's a habitual relationship between USAF and Army ground/air liaison officers," says Collins. This includes the USAF-owned forward air controllers, who direct operations from above, often in response to information received from the Army. Another element is the automatic target handoff system that enables an air vehicle—be it an Army Apache, or OH-58D, or a USAF fixed-wing attack aircraft—to transfer instantly the co-ordinates of one target from one aircraft to another.

Multiple weapons-carrying ability is another essential. "A CAS aircraft limited to just one or two weapons systems is no good," says Collins. CAS/BAI aircraft will be called upon to deal with a multitude of different targets (artillery positions, dug-in troops, command bunkers, supply columns, and so on), each requiring different, specific weap-ons. The A-10 today has a 16,0001b mixed-weapons load, plus the 4,200 rounds /min GAU-8 / A seven-barrelled cannon, while the A-7F can carry up to 17,3801b of varied ordnance. The F-16A/B, limited to 5g manoeuvre, is good for 20,4501b, although the ordnance mix is less variable. At 9g, the F-16 can take 11,9501b.

The US Army deputy chief of staff for doctrine, Brig Gen Rudolf Ostovich, is care-ful not to get involved in the aircraft contro-versy. He told Flight: "The Army couldn't care less what arrives over the battlefield. I simply want ordnance put down where I ask for it." As to the a-10's survivability: "Give me a scenario, and I'll tell you. But let me say this. The Army intends to fight day or night, good weather or bad. If I'm going to reap the benefits of close air support, things will probably have to change." C

New life for the A-7
LTV began modifying two A-7s in May 1987 under a $133-6 million contract. The first prototype YA-7F will fly next April, and both aircraft will be delivered to the USAF next
year for evaluation.
In an unusual contractual arrangement, LTV hands over the YA-7F data package to the USAF after completing development so that subsequent production contracts can be competed for. Planning (which is subject, as ever, to Congressional funding) calls for about 337 Air National Guard single- and dual-seat A-7Ds and A-7Ks to be included in the upgrading programme.
The A-7 upgrade is extensive, but will, in LTV's words, "give the USAF a powerful close air support tool at around half the cost of a new F-16—around $6-5 million".
A single 26,0001b-thrust Pratt & Whitney F100-220 will nearly double the A-7's avail-able power and will increase acceleration almost fivefold. Added to this, the bigger engine gives the A-7 Plus a 7g turn capability

and much better performance with heavy payloads.
Modifications to the rear fuselage provide for the larger engine, while the fuselage is stretched 29- 5in aft and 18in forward of the wing, to improve balance and make space for extra avionics. A pair of forward wing strakes and a new vertical fin will improve high angle-of-attack performance, as well as improving wing-lift by some ten per cent. Wing improvements also include LTV's augmented flap system and automatic spoil-ers, to reduce ground roll.

The principal avionics improvement lies in the addition of the LTV-developed low-altitude night-attack package. This comprises a Texas Instruments forward-looking infrared receiver, Singer-Kearfott
navigation weapons delivery computer, and
GEC Avionics wide-angle headup display.
Automatic terrain following will be achieved
by integrating Lana with the A-7's radar and
automatic flight control system.

The USAF is concerned about the BAI part of the mission; all the Army wants is the ordnance on t

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