

0177	0092	FF85	000D	CALL	*FIX:	
0178	0093	B78C	0007	LDA	*ACC1	
0179	0094	493B		SEN	7, 3	
0180	0095	F601	0094	JMP	\$-1	
0181	0096	6C38		OTA	7, 0	
0182	0097	493B		SEN	7, 3	
0183	0098	F601	0097	JMP	\$-1	
0184	0099	F796	0003	ERROR JMP	*POP:	
0185	009A	7FFF		MASK1 DATA	: 7FFF	INVERT 15 BITS
0186	009B	0800		PATCH1 ENT		
0187	009C	C080		CAI	: 80	
0188	009D	F702	009B	RTN	PATCH1	
0189	009E	C08A		CAI	: 8A	
0190	009F	F704	009B	RTN	PATCH1	
0191	00A0	0000		RES	10, 0	
0192	00AA	DE0F	009B	IMS	PATCH1	
0193	00AB	F710	009B	RTN	PATCH1	
0194				END		

We claim :

1. Target apparatus, comprising:
 - a framework;
 - at least one sheet of material, capable of being penetrated by a projectile, covering said framework to form a chamber;
 - a plurality of transducers for detecting shock or pressure waves in said chamber caused upon penetration of said at least one sheet of material by said projectile, said transducers being positioned at respective spaced-apart locations within said chamber and lying on only a portion of an arc of a circle lying in a region where said transducers are protected from being hit by said projectile;
 - means responsive to said transducers for measuring time differences between instants of detection of a shock or pressure wave by said transducers; and
 - means responsive to said time difference measuring means for determining and indicating a location at which said projectile penetrated said at least one sheet of material.
2. Target apparatus according to claim 1, wherein three said transducers are provided.
3. Target apparatus according to claim 1, further comprising a bull's-eye or aiming mark located relative to said sheet of material, wherein said bull's-eye or aiming mark is aligned with a center point of said circle.
4. Target apparatus according to claim 1, wherein said location determining means further comprise means for measuring the propagation velocity of sound in air within said chamber.
5. Target apparatus according to claim 4, wherein said propagation velocity measuring means comprises:
 - means for transmitting a sound pulse;
 - means spaced from said transmitting means for detecting said sound pulse; and
 - means responsive to said sound pulse detecting means for measuring a time taken for said sound pulse to travel a known distance and for determining therefrom the propagation velocity of sound in air within said chamber.
6. Target apparatus according to claim 5, wherein said detecting means comprises a pair of transducers spaced at said known distance from one another.
7. Target apparatus according to claim 5, wherein said detecting means comprises a transducer spaced at said known distance from said sound pulse transmitting means.
8. The target apparatus of claim 5, wherein said means for transmitting a sound pulse consists of a spark gap discharge means for generating a fast rise time airborne pressure wave.
9. The target apparatus of claim 8, wherein said means for transmitting a sound pulse further comprises a high voltage pulse generator connected to said spark gap discharge means, said high voltage pulse generator consisting of:
 - an optical coupler;
 - an electric current control means connected to receive input signals from said optical coupler;
 - a high voltage impulse transformer for connecting said electric current control means to said spark gap discharge means.
10. The target apparatus of claim 5, wherein said means for detecting said sound pulse consists of:
 - an outer housing;
 - a coaxial connecting cable extending into an opening in said housing;
 - a piezoelectric disk positioned in a recess formed in said housing;
 - a finge gauge conductive wire connecting said piezoelectric disk to said coaxial connecting cable.
11. The target apparatus of claim 5, wherein each of said plurality of transducers has an associated low-noise, wide-band amplifier positioned proximate to its associated transducer.
12. The target apparatus of claim 5, wherein said means for transmitting a sound pulse and said means spaced from said transmitting means are positioned in a sensor support beam, said sensor support beam extending along a lower portion of said target chamber.
13. The target apparatus of claim 5, wherein said means responsive to said sound pulse detecting means includes means for amplifying, filtering and detecting signals from said sound pulse detecting means.
14. Target apparatus according to claim 4, wherein said propagation velocity measuring means comprises:
 - means for measuring the temperature and relative humidity or air within said chamber, and
 - means responsive to said means for measuring the temperature and relative humidity or air within said chamber, for calculating a value representing the propagation velocity of sound in air within said chamber.
15. Target apparatus according to one of claims 1 or 4, wherein said transducer locations vary with temperature, and said location determining and indicating