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.22 CALIBER FIRING PIN IMPRESSION FILE

FRED R. RYMER

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Included in our population is a vast "army" of hunters, plinkers, experimenters, and gun lovers. In fact, this "army" has been estimated to comprise approximately sixteen percent of our population who are either interested directly or indirectly in firearms or shooting. A great deal of this interest is in the urge of the chase, and for this reason, hunting restricted to a season in which a shooter may kill only one deer or fire only one shot does not suffice. This urge has given rise to the varmint or plinker who is not restricted by a license or a season, but may pursue his shooting the year around. No firearm renders itself better to this need than does the .22 caliber rifle, pistol, or revolver. In addition, the .22 is the best "beginner's" rifle for all ages and is available at low prices in any area of our country. Therefore, we find more .22's of various types in circulation than any other caliber of firearm. It then follows that since there is a preponderance of .22 caliber firearms, many are going to become involved in the commission of a crime. In many instances the .22 caliber bullet will either pass through the victim or, if recovered, be mutilated or distorted to such an extent that no definite opinion as to the make of the gun used to fire the bullet can be given. We must then attempt, if possible, to examine the firing pin impression on the rim of the fired case or cases, if recovered, and attempt to determine the make of gun used to fire this case.

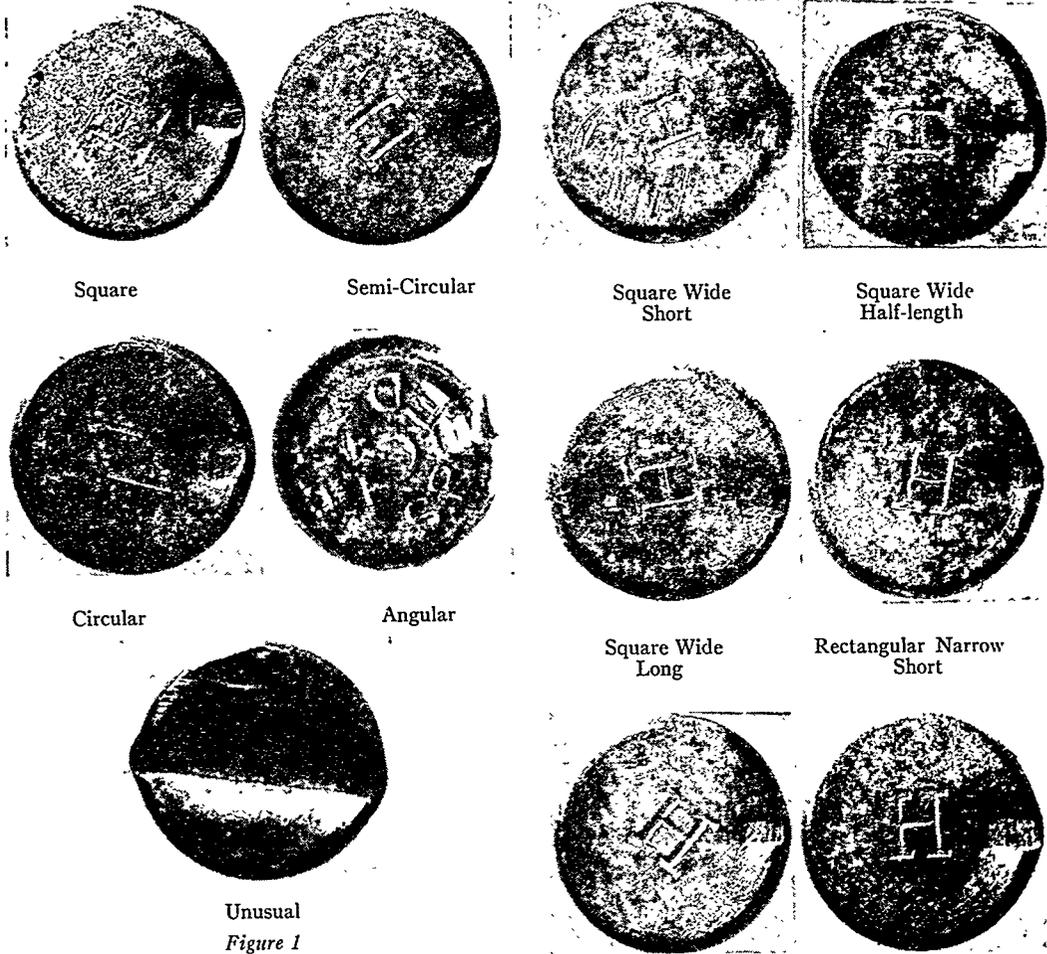
Usually, a firearms technician has available to him a reference file ranging from a very few specimens to one hundred or several hundred fired .22 caliber cartridge cases. Due to the many different shapes and types of firing pin impressions found on the many different makes and models of .22 caliber firearms, it is impossible for the firearms technician to keep in mind each shape or size of each of these models or makes. It then is a most painstaking, time consuming and many times a

fruitless procedure for the technician to remove each test specimen from his file and compare the firing pin impression with the evidence impression.

After many such time consuming examinations, the thought occurred: would the impressions lend themselves to classification? If so, why not separate the impressions into some type of file. Understandably, the purpose of this file would be to enable the technician to determine the type of impression, classify it, and by checking through the file, quickly eliminate all classifications except the one involved. No one who has ever attempted to set up a file has been able to escape problems. It was determined that the impressions found on fired .22 caliber cartridge cases may be easily divided into some five classifications, which are illustrated in figure 1.

This is a large general breakdown, and at least one of the classifications must have several sub-classifications. Many impressions may be also cross referenced as falling into more than one group. The first group referred to as square will comprise the largest group of impressions. In fact, this classification represents approximately 75% of the total impressions in our file.

The variations range from wide, short, and square; small and square; to long, narrow, and square. It is possible to establish some sub-classifications for this group. Such a sub-classification is illustrated in figure 2, short and wide, half-length and wide, long and wide, short and narrow, half-length and narrow, and long and narrow. The sub-classification or extension of this file will be governed to a great extent by the number of specimens, the amount of time available, and the need by the technician for its maintenance. In our laboratory, at present, we are maintaining a file using the large five classification breakdown. The semi-circular, circular, angular, and unusual



impressions will generally have so few impressions that a sub-classification would be unnecessary.

There have been several attempts to establish a .22 caliber impression file besides our own of which we know of at present. Mr. Burton D. Munhall, Manager, H. P. White Laboratory, has done a great deal toward the establishment of a file, as well as has Mr. Stanton O. Berg of Minneapolis, Minnesota. In fact, both Mr. Munhall and Mr. Berg have been interested in the study of .22 caliber impressions for some time. We have heard of others in this field interested in the development of such a file, but we have had no direct communication with them nor with their work.

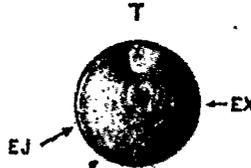
After having decided upon the classification headings, the second problem of how the impressions should be prepared for filing must be solved.

In our laboratory a microtessar shot of the base of each individual cartridge case showing the firing pin impression enlarged for easy examination is made and clipped to a 4 x 6 card showing the make and model of firearm used to secure the impression. The cards are then filed under the appropriate classification heading. At present we are not measuring the width nor length of the firing pin impression, but compare only the general size and shape. After having arrived at several possibilities, the appropriate test specimens are removed from the file and compared with the evidence impression; however, we are now in the

CARTRIDGE CASE IMPRESSION, RIM FIRE

5810 - 4

Class: Rectangular Approx. Size, A: .034 B: .098
 Extractor Width:
 Cartridge: .22 Short R. F.
 Weapon: Colt Semi--Automatic Pistol
 Model: Junior Colt Conversion Unit
 Make: Colt's Patent Fire Arms Mfg. Co. (See remarks)
 Remarks: Manufactured in Spain to Colt specifications.



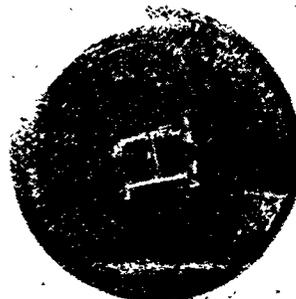
H. P. WHITE LABORATORY, BEL AIR, MD.

Munhall (H. P. White) Firearms Service Card

FIRED CARTRIDGE CASE & BREECH FACE REFERENCE CARD		
<u>Imp. Type :</u>		<u>Case Dent :</u>
<u>Width Imp :</u>		<u>Case Swell:</u>
<u>Length Imp:</u>		<u>O. of Round:</u>
<u>Width Hole:</u>		<u>Breech Markings:</u>
<u>F.P. Drag :</u>		
<u>Extractor :</u>		
<u>Ejector :</u>		
<u>Date Obtained:</u>	<u>Appearance:</u>	
<u>Caliber:</u>	<u>Reference #:</u>	<u>Serial #:</u>
<u>Make & Model:</u>		
<u>NOTES:</u>		

Berg-Personally designed file card

MAKE: COLT
 MODEL: WOODSMAN MATCH TARGET
 WIDTH:
 LENGTH:



Texas DPS Laboratory File Card

Figure 3

process of beginning a trial system of firing pin impression measurements to determine whether or not they will prove of additional value to us. Mr. Munhall has included as a portion of his firearms service a most useful card for this information which includes an enlarged photograph of the base of the cartridge case, the classification, the approximate size, the extractor location and width, prime cartridge, weapon model and make, and includes a space for remarks. We feel that this card does show a great deal more information than the cards used in our laboratory and lends itself to the classification filing as do the cards in our laboratory files. Mr. Stanton O. Berg utilizes drawings rather than photographs, but does include the classification, width, and length of impressions plus more detailed information than on either ours or the Munhall cards. In figure 3, we see all types of cards.

Due to the lack of equipment and time available to the average firearms technician it is felt that drawings, which are equally as useful as the photographs, would be of more value due to the ease and quickness of reproduction. The method of reproduction, however, will depend upon the individual technician. However, the more additional information secured and placed on the card, including the shape and size of the impression, the more successful and more useful this file will prove to be.

The third problem presents itself only to those technicians who desire to further sub-divide the impressions by actually measuring the length and

width of the impression, or the diameter if a circular impression is under examination. This problem is the same faced by the technicians in measuring the width of lands and grooves on fired bullets. Are the impressions to be measured across the bottom, across the top, or at some point between? Figure 4 shows the various points of measurements.

If the technician does not intend to exchange information, he may use his own discretion and determine where the measurement should be made for his own file. However, should he attempt to exchange this information, a standardization of measurement points must be established by all technicians exchanging this information and engaged in this work before the information would be of value. A misunderstanding of measurement from different points might well lead to an exchange of erroneous information.

While we feel that this file has much merit in it, certainly it is not without the possibility of error. Its purpose is to shorten the lengthy search required without its establishment and does on many occasions enable the technician to pin point the make and model of the firearm used in a crime. Why is this file not to be considered infallible? First, it is necessary to have a great many test impressions in this file. It is necessary to have specimens fired from a large cross section of the various makes, both obsolete and currently manufactured. In addition, a great many specimens of each make and model must be measured so that a definite set of shape and size characteristics for each make and model may be established. Equally to be considered are the manufacturing differences in models within a certain make. Recently we had an occasion to check two .22 caliber rifles of the same make and model, one of which had been manufactured some two years previous to the other. The firing pin impressions were entirely different. Besides the change in firing pin impressions there is also a certain tolerance in the manufacturing process which causes variation. During the manufacturing, some firing pins have the ends polished by a hand held operation which would also tend to make for variation within some makes and models. Still another reason is the individual wear on the nose of the firing pin in the gun. Due to this wear, it is possible for the size to be altered to such an extent that the impressions will become a "borderline" case, so to speak, and would fall within the tolerances of one or several other

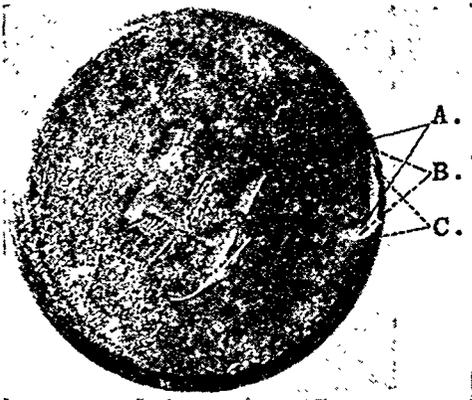


Figure 4

- A. Represents the measurement across the bottom.
- B. Represents the measurement at a point between the top and bottom.
- C. Represents the measurement across the top.

makes of firearms. We must also keep in mind the possibility of a replacement firing pin which would also cause error. There is one other factor which we have not had the opportunity to test, but have only heard it discussed. That is the possibility of the difference in the size of the impressions caused by the gun being held at various angles. The particular situation discussed was that there was found a difference in the size of the impression when the gun was held parallel to the ground as opposed to the impression found when the gun was held with the muzzle pointed directly upward. We have no information as to the extent of the difference nor have we had opportunity to conduct experiments to confirm this statement. The citing of these facts is not an effort to discredit this file, but rather to stimulate the thinking of those technicians interested in an effort to cope with this problem and further sub-divide the file. For the reasons set forth we feel that a file consisting of either the drawings or photographs of the base of the case, with the shape of the impression available for classification plus as much additional information concerning

the firearm tested would be of more value to the average firearm technician who does not have the time and in some instances the equipment necessary to measure adequately the length, width, or diameter of the impression.

This paper was not written or presented as a panacea for the problem of the identification of the make of a .22 caliber firearm from an examination of the impression on the fired case, but to offer as a suggestion to others involved in this field an aid in this particular phase of their work. We also hope to stimulate thinking among other people engaged in this work. As proof of the value of this file, we have, in our laboratory, been able to establish the definite make and model of a firearm involved in an unsolved case and have materially shortened the search of the investigating officers who have been able to eliminate many makes of firearms not involved in this case. It must be further kept in mind that for this file to be successful, new specimens must be continually added and especially must test specimens be secured from new makes and models about which we have little or no information.