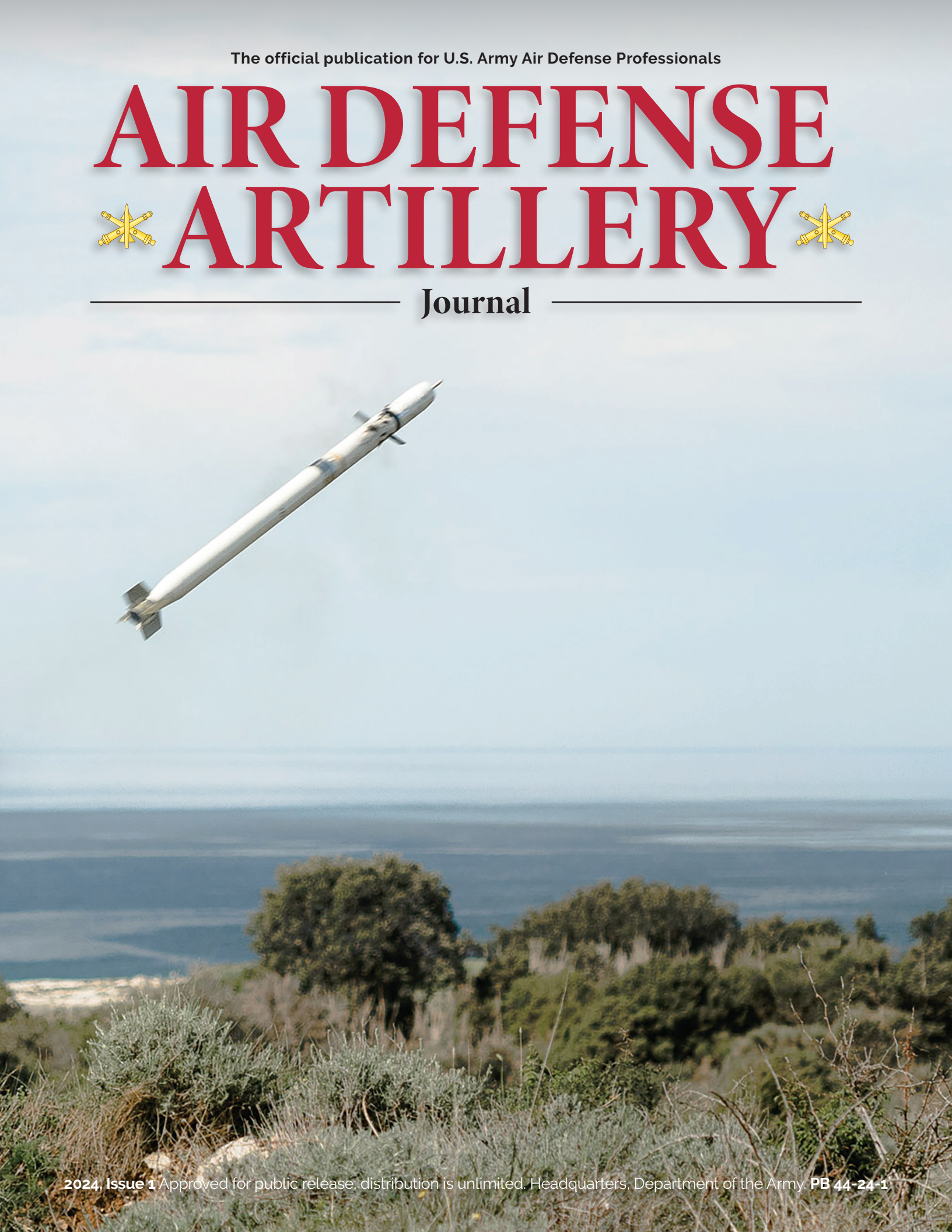
The official publication for U.S. Army Air Defense Professionals

AIR DEFENSE ARTILLERY

Journal



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Air Defense Artillery Journal
Editor & ADA School PAO: Amber Osei
Art Director: David Johnson

Staff can be reached by email at usarmy.sill.fcoe.mbx.bulletins@mail.mil or by phone at (580) 442-1090.

By Order of the Secretary of the Army:

RANDY A. GEORGE
General, United States Army
Chief of Staff

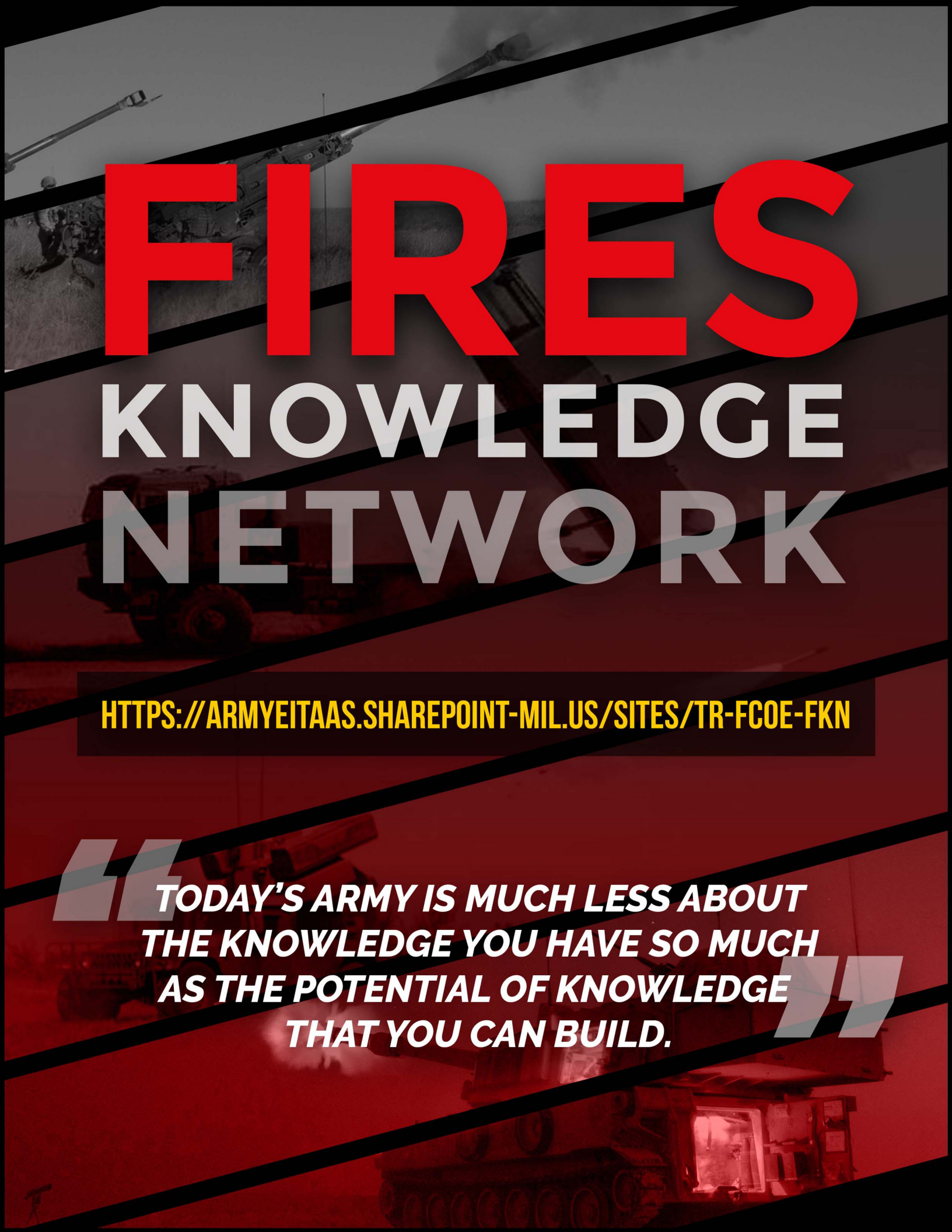
Official:

MARK F. AVERILL
Administrative Assistant
to the Secretary of the Army
2412806

CURTIS W. KING
Colonel, United States Army
Air Defense Artillery School Commandant, Fort Sill, Oklahoma

Purpose
The *Air Defense Artillery Journal* serves as a forum for the discussions of all U.S. Army Air Defense Artillery professionals, Active, Reserves and National Guard; disseminates professional knowledge about progress, development and best use in campaigns; cultivates a common understanding of the power, limitations and application of Fires, both lethal and nonlethal; fosters Fires interdependency among the armed services, all of which contribute to the good of the Army, joint and combined forces and our nation. The *Air Defense Artillery Journal* is pleased to grant permission to reprint; please credit *Air Defense Artillery Journal*, the author(s) and photographers.

Cover
Polish soldiers fire a man-portable air-defense (MANPAD) system to destroy a training flare as part of Exercise Shield 23, April 21, 2023, in Pula, Croatia. Exercise Shield is an annual Croatian air defense exercise that aims at strengthening the execution of air defense tactics against low and medium altitude moving aerial threats. During the exercise units from the United States, Croatia, Poland and Slovenia collectively train on air defense and electronic warfare tactics, techniques and procedures, including air-space control, synchronization, surveillance, threat detection and live fire engagements against flying objects. The exercise strengthens air defense interoperability between NATO allies by combining multiple air defense platforms in the same area of operations. The 173rd Airborne Brigade is the U.S. Army's Contingency Response Force in Europe, providing rapidly deployable forces to the United States European, African and Central Command areas of responsibility. Forward deployed across Italy and Germany, the brigade routinely trains alongside NATO allies and partners to build partnerships and strengthen the alliance. *(U.S. Army photograph by SGT Mariah Y. Gonzalez)*



FIRES KNOWLEDGE NETWORK

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"TODAY'S ARMY IS MUCH LESS ABOUT THE KNOWLEDGE YOU HAVE SO MUCH AS THE POTENTIAL OF KNOWLEDGE THAT YOU CAN BUILD."

AIR DEFENSE ARTILLERY SCHOOL

Regimental Command Sergeant Major

GIANCARLO MACRI

FROM THE RCSM

First to Fire! First and foremost, I want to let the Soldiers, Families, Civilians and Contractors of the Air Defense Artillery (ADA) Branch know that I am honored and humbled to be your Regimental Command Sergeant Major. I take this position and opportunity to make things better for our branch and the people in it seriously. I will listen to you and be your voice, not only for issues that need to be fixed, but for innovative ideas that will make the culture better and enhance our ability to execute our air and missile defense (AMD) mission.

As we move into this unprecedented time of growth and transformation, I need every member of the AMD Team to know that they are important. Not just our Soldiers and Families in Career Management Field (CMF) 14, but every Soldier from each of the CMF's that are in our AMD formations. Without them we would not be able to perform our core air defense tasks. As we struggle to bring people into the Army, it is crucial that every Soldier currently serving understands their importance in the Army's mission of fighting and winning our nation's wars. Let there be no doubt that any war we fight will start with missiles and it is crucial that every Soldier on our Team understands that our branch motto "FIRST TO FIRE" not only sounds cool but is exactly what we will do. Air Defense Artillery will enable victory on the battlefield in every domain!

In the upcoming years we will field the Integrated Air and Missile Defense Battle Command System (IBCS), field and stand up Indirect Fire Protection Capability (IFPC) battalions, grow and modernize our Short Range Air Defense (SHORAD) battalions, continue to develop and integrate Counter-small Unmanned Aircraft Systems (C-sUAS) into the ADA and Army formations and start testing new capabilities like high power microwave (HPW) and high energy lasers (HEL).

As the capabilities and equipment transform and modernize, so must the education of our enlisted Soldiers. There will be a focus on transforming advanced individual training, master gunner courses, advanced and senior leaders' courses in order to ensure that our enlisted Soldiers' knowledge stays relevant. The United States Army Air Defense Artillery School (USAADAS) and Noncommissioned Officer

Academy will SUPPLEMENT and not RETEACH the knowledge learned in the operational domain. Self-development will also be necessary as these courses will no longer be a "check the block" course for promotions. The goal is to produce a more tactical and technical Soldier and leader. This means that the leaders in the units must ensure that they are placing our Soldiers and NCOs in their correct positions and rotating them through a variety of positions throughout their careers in order to gain all the knowledge they need to develop and learn.

We will also start focusing on bringing Noncommissioned officers with relevant knowledge and skills to Fort Sill in order to fill key positions that will be crucial in helping our branch transform and grow. DA Pam 600-25 will go through a revision so that there will be no guessing on how long you need to perform in a career development (CD) position and what broadening assignments will be looked at favorably for promotion. We must incentivize the positions that will enable all parts of doctrine, organization, training, materiel, leadership and education, personnel, facilities and policy (DOTMLPF-P) to transform at a similar pace.

I will continue to regularly update the ADA force through face-to-face engagements, social media and our professional journal. I also encourage feedback and recommendations from the force as you are the people who are executing the largest transformation of our branch since World War II. Thank you for all you do for Soldiers, Families, Civilians, Contractors and our country. "FIRST TO FIRE!"

CSM Macri served in every leadership position from Stinger/Avenger team chief to AAMDC Command Sergeant Major. His stateside assignments include Fort Hood, TX. Fort Bliss, TX and Fort Sill, OK. His overseas assignments include Germany, with deployments to Croatia, North Macedonia, Kosovo, Iraq, Kuwait and Qatar.

CSM Macri's military education includes Basic Leadership Course, Advanced Leadership Course, Drill Sergeant School, Senior Leadership Course, Executive Leaders Course. Battle Staff Course, Military Transition Team Training Course, Sexual Harassment/Assault Response and Prevention (SHARP) Course and the Master Resilience Trainer (MRT) Course. He is also a graduate of the United States Army Sergeants Major Academy (USASMA), Class 66. CSM Macri's civilian education includes an Associate's degree in Applied Science and Technology from Central Texas College, a Bachelor of Professional Studies in Business Management from Excelsior College and a Masters of Art in Leadership and Management with and emphasis in Project Management from Webster University.

CSM Macri's awards and decorations include the Legion of Merit (2nd award), Bronze Star Medal, the Meritorious Service Medal (4rd award), the Army Commendation Medal (6th award), the Army Achievement Medal (10th award), the Good Conduct Medal (6th award), the Military Outstanding Volunteer Service Medal, the Drill Sergeant Badge and the German Armed Forces Proficiency Badge (gold). He is also a member of the prestigious Sergeant Audie Murphy Club and the Ancient Order of Saint Barbara.

Air Defense Artillery School
730 Schimmelpfenning Avenue Bldg. 730
Fort Sill, OK 73503

Financial Readiness

A Teaching Framework *for* Company Grade Leaders

By MAJ(P) Michael D. Pritchard

Soldier readiness is the cornerstone of military effectiveness. A ready force is a lethal force and we are in the business of providing viable military options to our civilian leadership. Leadership at all levels build, maintain and monitor readiness across various dimensions such as training, medical, physical fitness, morale, administration and maintenance.

Financial readiness is often left at the fringes of this system or hastily completed during deployment preparation. Soldiers receive one-on-one guidance on how to fight and correct their equipment, while the average one-on-one financial discussion is typically spawned by an S2 blotter report and a visit by the security manager.

Financial readiness often takes a back seat and becomes a persistent seam in holistic readiness. Closing this seam requires engagement at the company grade level vice large, formal and ultimately ineffectual briefings. Financial

readiness is an ideal subject for short and informal discussions with subordinates, assuming of course one has a framework and a baseline level of knowledge. This article will provide a framework that highlights five positive and five negative (5 x 5) financial behaviors with descriptions of each behavior, footnotes for key context and references and close with implementation recommendations. This 5 x 5 framework is designed to arm company level leadership with the basic tools to engage on this topic and hopefully spur financial self-development. At the very end, a 1-page executive summary is provided.

Before diving into the 5 x 5 framework – two key terms must be discussed: money and wealth. Money is liquid[1], easily convertible and is the primary mean of exchange. You can save money, but it is not wealth as it loses value as inflation[2] eats away purchasing power,[3] and by itself it does not generate more money. Wealth is an asset that generates money or grows in value in cash denominated terms.[4] A rental home that generates income and grows in value is wealth, a stock that pays a dividend or increases in value as future cash flow projections improve is wealth. A car is not wealth and generally decreases in value each day, nor are items like TVs, clothes, or jewelry actual wealth.[5] Speculative assets like bitcoin, altcoins, NFTs, Stanley Cups are not wealth.[6] Wealth generation requires delaying consumption now to create greater opportunities for consumption in the future by investing. You can have one thing now or two things later, assuming you invest your money into an appreciating asset. Time and consistent behavior are the two biggest drivers of wealth creation. The next section will highlight positive financial behaviors associated with wealth creation.

The 5x Dos

Have a cash management strategy. How you manage cash plays a big role on how much you should invest. Understanding your overall cash-flow will illuminate if you cash-positive (growth)

1 Liquid or Liquidity refers to the ability to spend or use the currency. US Dollars are highly liquid and may be spent almost anywhere at any time without bartering. US Savings Bonds are not as liquid and cannot be readily traded for gasoline or used to pay rent.

2 Inflation is "the broad rising of prices over time in an economy in a manner that erodes purchasing power of the currency over a given time period" (McKinsey). There are several theories of why inflation occurs. The two primary theories state that inflation is caused by the ratio of currency to production, or due to systemic price increases in the supply chain. The US Federal Reserve target inflation rate is 2% per year. This target broadly illustrates that some level of inflation is desirable in an economy as it encourages spending and reduces the overall cost of debt over time. The opposite of inflation, deflation, is a dangerous economic 'death-spiral' in which currency increases in purchase power over time and individuals and firms stop spending in order to maximize value, thus halting an economy. Visit the following link at McKinsey.com for more information: http://tinyurl.com/33hk6tat.

3 The reduction of purchase power due to inflation compounds over time. If you assume a consistent 2% inflation rate (i.e. prices increase across the economy by 2% per year) for 20 years, a $1 item today would cost $1.49, which is a 50% decrease in purchase power of that $1. This is important to consider when saving money as the value of every uninvested dollar will decrease each year. Understanding inflation is also important in order to accurately judge investment opportunities. If rates of return are at or near the inflation, such as with Certificates of Deposit (CDs), then you are protecting purchasing power or at least minimizing the effects of inflation, but you are not growing wealth. Individuals may be hesitant to invest due to the inherent market risks; however, not investing carries a minimum loss of 2% per year.

4 Gold is a store of wealth – not actual wealth since it does not generate an income or future positive cash flows. Gold's performance since 1990 is around 330% while the SP500's performance is around 991%. Some individuals may seek to buy or hold gold as means to hedge against inflation, but keep in mind if you don't physically have control of the gold, you basically own a claim paper (which is an older version of currency) and if you do own physical gold, you will have issues converting it into currency, especially in large amounts. See the link at Investopedia.com for more information: http://tinyurl.com/mr2e8rt4.

5 Cars, clothing, jewelry and luxury houses are often confused with wealth or perhaps even thought of as signs of wealth. These are not wealth – they are signs of consumption. Greater wealth means you may consume more without going into debt; however, true signs of wealth are assets that produce positive cash flows.

6 Speculative assets are items people buy in hopes of selling them at a higher cost in the future and the items do not have any intrinsic value nor do they generate positive cash flows. See the link at SoFi.com for more information: http://tinyurl.com/ckwa34f2.

or cash-negative (loss). A common cash strategy is to lump cash into a checking account and a portion to savings without any further thought. For those in a cash-positive position this leads to excess cash holdings in a low-interest account and leads to cash losing at least 2% of purchase power per year due to inflation. For those in a cash-negative position, they might not perceive that outflows are eating into savings – especially if the negative out-flow of cash is low. A more optimal method is to allocate portions of each paycheck to three distinct tiers: an emergency fund in a high yield savings account, a savings account and a checking account. The emergency fund tier should ideally contain six months' worth of expenses or at least have that as an eventual goal. Leveraging a high yield account reduces the impact of inflation while maintaining immediate access to the funds. A certificate of deposit or market fund are not as accessible and thus not suited for emergencies. The savings account tier should be used to save cash for defined future uses. If you are sitting on a pile of cash (this is a good problem to have), it is better to invest a portion of it than let it lose value. Set a benchmark that corresponds to a future objective like a down payment or vacation, then invest any extra dollars above that. The checking tier is simple – after balancing or least approximating the balance of your account, leave a 'float' amount of cash that serves as both a buffer for unexpected expenses and fees from not balancing your checkbook correctly. If one is unable to allocate to each tier or must regularly pull money from a non-checking account – there is likely a cash flow problem that needs to be analyzed.

Plan for Retirement. Saving for retirement at the earliest possible moment is highly recommended. In a perfect world one would start a retirement account the day they become eligible. These types of accounts maximize the growth of investments, especially if assets are growing for 40 years. The time it takes for an asset's value to double is 72 divided by the whole number growth rate. For example, if an investment account averages a 10% annual return, then the doubling time is 7.2 years. $1000 saved today would be worth about $38,000 in 42 years assuming 2% inflation and a 10% annual return. At some point in life income from work will drop to zero, unfortunately expenses will not. The two main vehicles to save for retirement are a 401K (TSP – Blended Retirement Plan) account and a Roth IRA account.[7] The 401K Plan for military members is a portion of the Blended Retirement Plan called the Thrift Savings Plan (Roth-TSP).[8] All Soldiers are automatically enrolled in the program with a free 1% of base pay contribution made by the government. Members are automatically enrolled to contribute 5% of their base pay and after 2-years of service the government will match an additional 4% of base pay – resulting in a 10% total contribution of base pay. The Soldier's contribution of 5% in this case would also lower their taxable income by 5%, so as contributions increase, the overall tax bill will be lower.[9] Of course, when funds are withdrawn later in life (typically after 59 ½ years of age) taxes must be paid on the capital gains. This program is an outstanding way to build wealth over a career. For example, if a new enlistee just did the minimum contribution and retired at 20 years as an E-7, the TSP benefit would be worth $1.2 million at age 60. I encourage leaders to council their Soldiers not to stop contributing to this program and even increase contributions if possible. The Roth Individual Retirement Account (Roth-IRA) is another investment tool with some key differences from the Roth-TSP. The IRA is funded with after-tax dollars, but the withdrawals are not taxed in the future. There are yearly caps to how much can invested (2024 limit is $6,500 per person with some caveats).[10] If one started today and maxed out contributions for 40 years, the future value would be close $3.5 million (worth about $1.5 million in 2024 dollars) tax free.[11] This

7 See the link at MyArmybenefits.com for more information about TSP: http://tinyurl.com/4vcywc6b

8 See the link at Military.com for more information about the blended retirement plan: http://tinyurl.com/3hj2bzs9.

9 Maximum reduction in taxable income is currently $22,500.

10 See IRS Website for more information on contribution limits: http://tinyurl.com/4pvhxkvj.

11 This is a great example of the impact of inflation on purchasing power. While your investment approaches $3.5 million in raw dollar terms, the purchasing power of those dollars has decreased over time as inflation compounds. To estimate the impact inflation, you need to 'deflate' future money into today's money purchasing power. The formula is Future

is a great tool to avoid huge taxes in the future as investments are cashed out.

Manage Credit. A credit card is the optimal tool to make purchases due to their consumer finance protections, which are far superior to debit cards.[12] The trick here is to pay the credit card bill in full each pay period. That simple. Do not carry any credit card debt! As a credit profile improves, companies will begin to offer additional cards with or without an annual fee to get a client to spend more and eventually carry a balance. Leverage this opportunity to apply for superior credit cards but remember the key task: pay the bill in full every month. Chase and American Express are ideal vendors to research for obtaining credit cards. They have a liberal reading of the Service Members Civil Relief Act and the Military Relief Act and will often waive the annual fees to their credit cards.[13] In the end, credit card management is about keeping it simple: don't carry a balance, don't stack up multiple annual fees, don't stack up so many cards you lose track of due dates. Other aspects of credit management are not so simple. Many businesses and credit card companies offer payment plans for large purchases, sometimes with or without a finance fee. Utilizing too many of these types of plans will consume monthly cash flow and inhibit investing. The combination of a car payment, house payment, installment payment, credit card payment and student loans can quickly eat up every last dollar. A way to avoid this trap is to set a savings and investment benchmark and of course some classic discipline. A savings and investing benchmark of around 30-45% gross income is a fair target. Anything over 50% starts getting into quite spartan living and may not be sustainable over the long term – especially if you have a family. The discipline to not spend takes time to build. The goal is to have the act of investing feel better than spending.

Invest for a Better Quality of Life. There are other reasons to invest besides retirement. Delaying spending now to have more money to spend later, let's say to travel, buy a house, start a business, requires investing into assets that grow in value. A simple way to do this is to set up a taxable brokerage account (Schwab, Vanguard, etc.) and periodically invest into the stock market. Real Estate is another method, but for the sake of simplicity this article will focus on the stock market. The absolute simplest, proven, risk-prudent and peer-reviewed method to invest into the market is with a total market exchange traded fund (ETF).[14] ETFs are index funds that are comprised of stocks that make up markets such as the SP500, DOW, US Markets, or even total world markets. These ETFs diversify investments across multiple markets, geographic areas and product types and deliver historically the best returns over any actively managed funds. Active management (Mutual Funds) and day-trading (to include options) statistically perform far worse than passive ETFs.[15] There are many reasons for this, but the two most important reasons active funds perform worse than passive funds: active trades incur taxes on every transaction and nobody has any idea what will happen in the market – or in other terms, active investing is having investments taxed to pay for the privilege of people guessing about the market. Like retirement

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Amount of Money/(1+Inflation Rate)^N, where 'N' is the number of years in the future. For Example, deflating $3.5 million dollars in 2064 would be $3,500,000/((1+.02)^40), which simplifies to $3,500,000/2.21. There are numerous free calculators online that can do this for you as well. Keep in mind, the Federal Reserve's target inflation rate is 2%. The actual rate can be much higher as we all learned 2019-2024.

12 Credit cards typically provide additional warranty coverage and fraud protection, while also improving your overall credit history. See link at Investopdeia.com for more information: http://tinyurl.com/4kvpstta.

13 The waiving of annual fees is not guaranteed and is at the discretion of the credit card companies.

14 The goal of an index fund is to replicate the overall performance of a market index in a passive manner. This type of fund assumes the stock market is 'efficient' in that all players have roughly the same information. A mutual fund uses an active investing strategy and tries to beat the market. These funds have higher expense ratios (fees) and generate taxes due to constant transactions.

15 Options Trading is basically betting that a stock or investment product will either increase or decrease in price in the near future and you buy a right to buy/sell that item at an advantageous price. This is a risky investment method that becomes an outright gamble when combined with 'leverage' in the form of a margin loan. People sell options (calls/puts) to make money. People buy them to make money – somebody must lose. I highly recommend staying away from these products.

investing, set a goal, invest each month, then cash out at some point in the future. To invest in a child's education, start a 529 College savings plan to pay for private school and college16. These plans are managed by states and often reduce state taxable income. The DOD also just started flex accounts for child-care, which allows pre-tax income to be set aside for expenses like the Child Development Center.[17] While this isn't exactly a long-term investment, utilizing it does require some of the same behaviors. Investing for a better future also means investing in oneself. Learning a new language, continuing education, certifications, promotions, are all forms of self-investment that lead to greater earning potential.

Make and Revise a Plan. None of these positive wealth generation behaviors will pan out if you don't make a basic plan. Start with analyzing monthly pay and expenses. How much is spent and saved? There are dozens of free budget calculators that can help get a grip on cash flow. Think about mid to long-terms plans such as buying a car, getting married, or having children. A majority of those events will cost between $5-10 thousand dollars. Practicing backwards planning from key purchase objectives and life events is critical to saving an adequate amount of money. Learning how to plan takes time and it is okay to refine and revise plans over time. Consider retirement planning, a reasonable plan requires an estimate how much income is needed per year from retirement until death. Think about health costs, housing costs, travel and hobbies, food, for a month. Take that number and multiply it by 2.2 (this accounts for inflation for 40 years) and that is how much will be needed for a month in retirement. From here, research annuity and retirement calculators to determine how much you must invest over time to support your monthly needs. If you have ever seen a synchronization matrix, quarterly training brief, training schedule – you have seen a plan to manage resources and this process no different. Build an estimate of when major events will occur and then backwards plan savings to support those events. Project out permanent change of station (PCS) moves, starting/finishing school, promotions, separation, having kids, buying a house and align those events to age and projected income. This type of forecasting may be difficult, especially if the current financial position is dire – but practice and consistent behavior will make it easier over time. In the meantime, get the cash management plan set up, invest in retirement, manage credit and save today to have fun tomorrow. The next section will provide an overview of common negative wealth generating behaviors.

The 5x Don'ts

Carrying a Credit Card Balance. One of the most common financial mistakes is carrying a credit card balance. A $5,000 credit debt will cost $120 a month in interest alone…as in not one cent of this payment will lower the balance. The behaviors that lead to large balances do not stop just because an entire paycheck is going to payments. Pathological spending behavior is difficult to reign in, especially when cash is not being physically used. While it is ideal to use a credit card to buy everything for the consumer protections and rewards programs, the entire balance must be paid off every month. If unable pay it off that month, save until able to do so. When counseling Soldiers, curing and preventing credit card debt will need to be addressed. Getting out of credit card debt is challenging – you must change spending behaviors and aggressively pay down each card. The Debt Snowball method is very effective in this instance, but it requires focus and discipline.[18] Preventing the problem is vastly less expensive than curing it. Encourage your Soldiers to think about the positive financial behaviors when making purchases. Encourage a habit of though that considers cash flow, retirement savings and future financial objectives.

Investing in Speculative High-Risk Assets. Investing is based on the premise that one takes a measure of risk to earn a measure of reward. In the

16 529-Plans are state managed investment vehicles to allow for tax-exempt growth of investments to fund your child's education. Rules vary state by state, but generally withdrawals for school tuition or other needs are tax exempt and an account may be used for multiple beneficiaries. Left over funds may be removed, but they will be taxed. See SEC Link about 529 Plans for more info: https://tinyurl.com/mtrend65.

17 See Defense.Gov article on childcare benefit: https://tinyurl.com/5fyeutwe.

18 See David Ramsey's overview of the Debt Snowball Technique: https://tinyurl.com/yck9b5z2.

stock market, that risk is the loss of an investment if a company goes bankrupt or if the market tanks. By diversifying in an Exchange Traded Fund, the majority of risk aside from systemic market risk (the risk of basically being alive on earth) is mitigated. In this case the reward of 7-10% return per year is commensurate with the residual risk. It is not uncommon to hear Soldiers talk about crypto currency, options trading and RobinHood accounts. It is very likely those Soldiers are risking a lot of money to make a large gain. If somebody is making a lot of money in a day, that also means a lot of people are losing money that day. Odds are that most people are in the 'losing money' category. New financial application (Apps) interfaces make it easier to access financial products; however, these Apps encourage addictive and dangerous behaviors and do not provide any real financial education about what they are doing.[19] These Apps enable Soldiers to take large risks using complex financial products in the hope of making a massive return. Social media exacerbates this trend by highlighting the success stories (survivorship bias) and downplaying the overwhelming mass of people who lose money. Listen to what Soldiers are saying and see if they are using these apps and making outrageous bets on the market – intervention might save somebody from a life altering financial catastrophe. Crypto currency (they are not currencies but actually speculative assets) trading is another common financial trend. There is a lot to unpack with crypto (Fiat Money, Inflation, Scarcity, Trust), but the bottom line is that they do not generate income, nor do they have intrinsic value. Crypto markets are predicated on a buyer paying more than a seller previously paid. To get an idea of where this leads, read about the great Tulip Bust in the Netherlands.

Live only for Today (YOLO). Sounds great – buy that business class ticket to Spain or go to Best Buy in a new sports car to get a PS5. Spend $150 every weekend at the bar. Or maybe it's the opposite, the bills are due and once again there is not enough money. You save and scrimp but ends do not meet and the idea of next month is terrifying. Both of these situations are examples of financial situations that drive short-term thinking, albeit one is more fun than the other. The feeling of endless youth and time to save later has inspired 1,000 books and every 3rd series on Netflix. Well, it's wrong and it will hurt like hell when reality hits. If you spend all your money now, then you won't have any in the future. If you never learn how to save and invest you will likely face significant financial challenges in the future. The friends you spend money with now will not be there in the future to give you money. The other side of living in the moment is much darker and difficult to navigate.[20] When money is tight for months if not years on end, your desire and ability to plan diminishes. The idea of next month or next year is too stressful and distant to think about, so you close your mind to it. Financial decisions end up being made that satisfy this week or month but will cost you dearly over time. In this place leaders must help instill courage to build a plan to make a better future. It is likely that this situation will require connection to tangible support resources to mitigate current issues; however, it is critical to shape financial behaviors, or the situation is likely to repeat itself. Sometimes buying things is the only coping mechanism we have left. Other times, buying things outside of our range just seems like the default setting.

Live beyond your Means. Credit Cards and Loans allow individuals to live beyond their means for a reasonable amount of time before all the cards come crashing down. Financing a car that is that is more than 30% of your salary is overspending on a depreciating asset. Buying an excessively large house just because you have a pre-approved VA Loan is not a wise decision when you consider taxes, annual maintenance, 10% transaction costs and utilities. Attending a high-cost college when a lower cost state option exists for a career that makes the median wage is not an optimal decision. Constantly buying status symbols such as new clothes, electronics, jewelry and designer makeup will also inhibit wealth generation and leave you poor in the end.

As your Soldiers and junior officers make more in salary they will be exposed to new risks with overspending. They might be able to make the financing payments, but are they able to pay for the maintenance, insurance and cleaning of the item?

19 See NBC Article on the addictive nature of RobinHood: https://tinyurl.com/5bhd2fh6.

20 *Some Consequences of Having Too Little, Science*, 2 November 2012: Vol. 338 no. 6107 pp. 682-685. DOI: 10.1126/science.1222426

These sustainment costs are often overlooked when making purchase decisions. Capitalism is not consumption; it is about the generation of wealth (capital). Bad financial decisions add up until all of your income is devoted to paying off debt or you at the point of declaring bankruptcy. This process may take years to unfold. The delayed 'flash to bang' of overspending makes it a difficult lesson to learn. If financing prevents you from maintaining a 30%+ savings rate of gross income while also meeting all of your required expenses – you are likely spending too much.

Embrace Mental Money Traps. There are many prevalent fallacies about money, credit, wealth generation and risk. These Mental Money Traps lead people with the best of intentions to make a series of bad financial decisions. One of the most prevalent fallacies is stating a large purchase is an investment. An investment is buying something that generates a positive cash-flow over time. Buying new $450 boots for $400 is not an investment – it is spending $400 on a depreciating asset that has some level of utility value. Returning an item to the store does not magically give you money, it just undoes prior spending. Stating an item is "just $1.50 a day for a year and I can afford it" is wrong. The item is $547.50 right now and it is very unlikely you will earn an extra $1.50 a day to pay for it. Another insidious trap is stating "I can afford this If I trim here for a bit." A majority of people do not have the discipline to maintain that, nor do they track changes in spending.[21] This is going to sound counter-intuitive but thinking "I can just save more" reinforces poor spending habits and decreases the odds you will commit resources to increasing your earning potential. The path to building wealth is more than just saving, as I stated earlier you must also invest in yourself and make more money while also not dramatically increasing spending. Making more and spending more is called 'Lifestyle Creep' and will silently eat away your potential investment funds. The final trap I want to highlight is the nihilistic mindset that either the world is about to end, or something is going to happen that 'crashes the whole system'. It is unlikely you will be able to talk the particular individual out of their deeply held belief; however, you may tactfully explain to other Soldiers that odds are the world isn't ending.[22] Overcoming these various mental traps requires a measure of critical thinking.[23] Critical financial decision making is about slowing down and thinking about the purchase from multiple angles, researching alternatives and classic patience. In short, "Do I want to spend a large portion of my income now or do I want the ability easily make this purchase in the future?"

There is obviously more to finance than what I provided in this article. The complexity of the subject is often off-putting; however, focusing on key behaviors will help scope your development and the education of your Soldiers. Financial training is best executed as 1:1 informal events or small-group sessions. The idea is to get engagement on a personal level and help connect these concepts to their daily lives.

Focus on behaviors and avoid going on diatribes about former Soldiers wasting vast sums of money. As you engage with a Soldier, ask them about their 3-5 year plan and if they don't have one – help them frame one out. The idea is to connect the present to the future. Avoid shaming them for past actions, they cannot be undone but you can help them overcome them with planning. I also recommend not to oversaturate your Soldiers with this topic, spread it out over time and reinforce

21 The "Rebound Effect" is common in the technology field, but it also occurs in complex systems with finite resources – of which a household economy falls into. In essence, you balance saving behavior in one area such as clothing, with higher spending in another such as dining out because you feel you have 'earned it'. See this Wikipedia.org article for a brief overview of the effect: https://tinyurl.com/3fwy77x9.

22 1/3 of the population of Europe died in the 14th century, the Taiping Rebellion in China cost 20 million lives and lasted 14 years and most of Europe and South-East Asia was reduced to rubble in the early 20th century; and the world kept on going.

23 I highlight recommend reading *Thinking Fast and Slow* by Daniel Kahneman to learn more about critical thinking. The main empirical methods to compare financial options against each other are called opportunity cost analysis and net present value. These are useful for large financial decisions such as buying or renting a house, buying land, doing a remodel or investing in an index fund. Smaller purchase decisions are about utility value today vice wealth/money in the future and are more subjective as it is often worth more not to spend.

key ideas like managing cash, paying off credit cards and saving for retirement. Increased engagement on this subject will also lead you to cultivate your financial literacy. Improving your financial skills is easily within reach; the majority of this information may be learned for free at the library.[24] A few words of caution though: avoid the financial personalities that write books about getting rich, schemes that advertise generating massive wealth today, or anything that doesn't sound like a lot of hard work over a long period of time. If making money was easy it would not be worth anything. I also discourage you from making specific investment recommendations. We are not licensed financial planners – give them the knowledge and let them take action.

Major (Promotable) Michael D. Pritchard is an Active-Duty Air Defense Officer currently assigned to Human Resources Command as the Lieutenant Colonel Career Manager and Branch Executive Officer. Major Pritchard previously served as a battalion S3/XO, division deputy G35, AAMDC G3 Forward, Missile Defense Battery Commander and Patriot Battery Commander. He holds degrees from the Northeastern University D'Amore-McKim School of Business (MBA), the Advanced Military Studies Program (MAMO) and Oklahoma State University (B.Sc. Psychology). He can be reached at Michael.d.pritchard10.mil@army.mil

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24 I recommend the following books/resources:

- *Essentials of Investments, 12th Edition* by By Zvi Bodie, Alex Kane and Alan Marcus. ISBN10: 1260772160. This textbook will teach you basic to intermediary information about investing.
- *Corporate Finance*, 11th edition by Stephen A. Ross, Randolph W. Westerfield, Jeffrey F. Jaffe and Bradford D. Jordan. ISBN 978-0077861759. This book teaches how to make opportunity cost decisions and compare financial options.
- **The Rational Reminder Podcast** by Benjamin Felix. Benjamin is a portfolio manager with PWL Capital Inc (Canada). His material focuses on empirically sound financial strategies and is a great source to understand market behaviors based on sound peer-reviewed research.

The US Government provides free resources such as:

- **MoneySmart** at FDIC.GOV: https://tinyurl.com/k5c8fa54.
- **Financial Literacy Overview** at OCC.GOV: https://tinyurl.com/4jv9ub4y.

EXECUTIVE SUMMARY

The 5 Positive Financial Behaviors "The Dos"

Have a Cash Management Strategy. Establish Checking, Savings and Emergency fund accounts; cash should flow in the checking up to a basic surplus amount, then into savings and then into the emergency fund. If you are depleting savings or the emergency fund for routine spending- you are spending too much!

Plan for Retirement. Maximize the government matching contribution to Roth-TSP and fund a Roth IRA. Fund retirement accounts first.

Manage Credit. Use Credit Cards for purchases to maximize consumer protections but never carry a balance; avoid opening multiple lines of credit that prevent you from saving at least 30% of gross income.

Invest for a Better Quality of Life. Save today to have more tomorrow – the objective is for saving to feel better than spending; invest in yourself, the path to wealth is making more not just saving more.

Make and Revise Your Plan. Establish a basic plan and make initial goals. Leverage what you know (age, promotion, PCS timeline, school) to arrange events in time and backwards plan savings goals. Update the plan as you learn more and make progress.

The 5 Negative Behaviors "The Don'ts"

Do not Carry a Credit Card Balance. Avoid carrying a credit card balance at all costs! Finance charges ass up and will devour all of your cash before you know it.

Avoid Investing in Speculative Assets. A great reward carries a great risk and every story of instant wealth requires a lot of other people to lose money. Go with the proven means of generating wealth.

Do not Live Only for Today (YOLO). Living the good life without a thought for tomorrow will lead to pain, likewise, avoiding planning for tomorrow due twwo stress will not help your financial situation.

Do not Live Beyond your Means. Spending all of your cash on meaningless status symbols and depreciating assets will lead to poverty or diminished wealth. Low APR loans and installment plans are not there to save you money.

Do not embrace mental money traps. Critically think about your financial behaviors. Spending less is not making more, offsetting a splurge here with savings there doesn't work; and lifestyle creep will devour your hard-earned gains. Deliberately weigh the costs of your decisions.

Why Apply to TWI?

A 140A/140K Existential Analysis

By CW3 Jesus "Manny" Arellano & CW3 Wesley Scott

The Training with Industry (TWI) Program was initiated in the 1970s in response to the Army's critical need for officers with state-of-the-art skills in industrial practices and procedures not available through military or civil education programs. Today, the Air Defense Artillery branch supports the TWI program with Warrant Officers at two different locations. The Air & Missile Defense Tactician (140K) and the Air & Missile Defense Systems Integrator (140A) are hosted at Redstone Arsenal, AL and during their one year tour, they are integrated with Development Command (DEVCOM) Aviation & Missile Center (AvMC) and Program Executive Office (PEO) Missiles and Space (M&S) The Air & Missile Defense Technician (140L) is hosted at Letterkenny Army Depot in Chambersburg, PA embedded with the logistical and sustainment operations supporting Air & Missile Defense equipment.

Application and acceptance into TWI programs result in an Additional Service Obligation (ADSO) of three years. As Air Defenders, this ADSO directly supports the Fires Center of Excellence (FCoE). Post-TWI students receive a primary utilization tour within the FCoE portfolio including Warrant Officer Education System (WOES) Instructors, Army Capability Managers (ACM), or positions within the Directorate of Training and Doctrine (DOTD). This is a mutually beneficial utilization of the TWI student's knowledge gained after working with governmental agencies and industry partners and allows the selected candidates the opportunity to share their experiences and knowledge with the next generation of Warrant Officers. The TWI positions at Redstone Arsenal expose the student to the science and technology that leads to developmental testing as well as the PEO M&S portfolio conducting operational tests and fielding of new equipment. In addition to the previous lines of effort, TWI students are uniquely placed to observe the acquisitions processes and work with

*Training with Industry students will gain a thorough understanding of capability development from science and technology engineering through the fielding and the sustainment of AMD systems.

the Air & Missile Defense Cross Functional Team (AMD CFT) on experimental efforts in support of Army Futures Command (AFC).

Arriving at Redstone Arsenal and being exposed to DEVCOM AvMC and PEO M&S is an overwhelming experience for those who have primarily served in traditional Army elements. Navigating the intricate web of interrelated agencies, the nuance of governmental employee and contractual employees, and understanding your role as a TWI student presents an information overload. During our tenure we worked closely with agencies within AvMC and PEO daily and this gave us an opportunity to share our operational knowledge with the teams that support system development as we learned their processes and lexicon. We gained perspective to the challenges in bringing a new Air Defense system from inception to fielding and the sustainment challenges that inherently follow as well as crash courses in acquisition language and programmatic management.

Being a local active-duty Air Defense Warrant Officer gave us an incredible opportunity to work with the AMD CFT and the Army Capability Manager - Army Air and Missile Defense Command (ACM-AAMDC). We often coordinated efforts to support their initiatives such as Program Increments (PIs) which serve as the basis for Agile development and provided us with multiple perspectives from the expert civilian and military members who manage these herculean programs. In addition to our own national efforts in Air Defense we supported multiple TDY's to partner nations in support of Foreign Military Sales (FMS) that gave insight to how the program supports the sale, fielding, training, and sustainment of partner nation military hardware and software. Building these relationships with partner nations is crucial to the long-term success of our programs and these opportunities allowed us to share our subject matter expertise with foreign military members.

Along with the opportunities that are available while serving as a TWI student, you will also have the time for personal and professional development. You are in control of your schedule which allows you to complete your civilian degree and professional Military Education (PME) goals. We both were able to complete college credits and graduated from Warrant Officer Intermediate Level Education (WOILE) during our tenure. Working in the nexus of the Air & Missile Defense military industrial complex also provided ample opportunities to attend conferences, working groups, and symposiums related to the current and future state of the branch.

Huntsville, Alabama and is a true melting pot community and most people that live here are transplants from different areas of the world. With many people supporting the thriving industry within the city, it's no wonder that Huntsville is referred to as the "Rocket City". The city itself has many opportunities for entertainment ranging from concerts, sporting events, multiple outdoor activities, night life, and craft food and drink restaurants.

This past year has exposed us to massive work that goes into how we design, acquire, develop, deliver, and sustain capabilities to the Air Defense branch. We have gained the tools necessary to enhance ourselves as instructors and benefit the branch during our utilization tours. We encourage that you take the challenge and apply for the Training with Industry program. The selection process is competitive, but if selected, you will be left with a rewarding experience that will catapult your career opportunities both in and out of uniform.

CW3 Jesus M. Arellano began his career as a 14T Patriot Launcher Operator/Maintainer and served in all positions across the globe to include duties as a 14T AIT instructor and a later a Launcher Platoon Sergeant before applying to become a 140E. As a AMD Tactician, he has served as a Tactical Control Officer in 2-1 ADA and a Tactical Director and Standardization Officer in 2-43 ADA. He contributed to AMD developmental testing at WSMR in 3-6 ADA prior to his selection to the 140K Training with Industry program. He will soon begin his duties as the incoming ADAFCO Course Manager.

CW3 Wesley Scott is a 140A and his previous assignments include 1st SBCT, 1st Armored Division at Fort Bliss, Texas. He then deployed as the III Corps 140A and served as the Combine Joint Task Force – Operation Inherent Resolve Counter-UAS C2 Systems Integrator. Upon returning from this deployment CW3 Scott returned to the 1st SBCT, 1st Armored Division and subsequently served as the interim 1st AD C2 Systems Integrator. CW3 Scott was assigned to the 14th Missile Defense Battery, 38th ADA BDE in Kyogamisaki, Japan. CW3 Scott's last operational assignment was with 5-5 ADA BN, 31st ADA BDE at Fort Sill, Oklahoma. CW3 Scott is currently serving as the FY24 140A Training with Industry student in Huntsville, AL.

The Case for Multi-National Air Defense Brigades *in* NATO

By LTC Pete Bier and Lt Col Garrett O'Leary

Members of United Kingdom's 32 Royal Artillery Regiment take part in exercise Steadfast Defender in the spring of 2024.

Photos above and next page: During Steadfast Jupiter in October 2023, members of NATO's Allied Rapid Reaction Corps trained on their ability to implement multiple Air Defense Battalions into Corps-wide operations.

Steadfast Jupiter 23 was a Multinational NATO exercise that took place over the course of 10 days in October 2023 and encompassed echelons ranging from Supreme Headquarters Allied Powers Europe (SHAPE) to multiple Divisional staffs, all arrayed across Eastern Europe. The Allied Rapid Reaction Corps (ARRC), a Multinational NATO Corps headquarters, deployed from the United Kingdom to Romania and took part in the exercise.

Under the exercise scenario, the ARRC had two subordinate Divisions assigned, the 1st Canadian Division, which included a Battalion of Skyguard, and the ACQUI Division, which included a Battalion of SAMP-T. Furthermore, the ARRC had Corps Air Defense (AD) troops assigned. This assigned Brigade consisted of three notional Battalions, one Italian, one British, and one American, with each Battalion comprised of one Patriot Battery, one Hawk Battery, one C-RAM Battery, and one Avenger Section. This task organization and command relationship existed only for this exercise. In reality, the ARRC, and any NATO Corps for that matter, do not currently have specific Divisions or Corps troops, such as Air Defense or Field Artillery Brigades assigned. The task organization changes for each operation or exercise.

The United States, and NATO as a whole, have begun the shift to focus on countering near-peer threats, and that includes reincorporating Air Defense into maneuver Units. Over the course of planning for and executing Steadfast Jupiter 23, the Air and Missile Defense (AMD) cell within the ARRC identified poignant issues that must be addressed when incorporating Multinational Air Defense into the Corps maneuver battlespace. The solution to these issues lies in the establishment of Multinational Air Defense Brigades, with dedicated Battalions, aligned with specific NATO Corps.

The first issue reared its head in May of 2023 when the ARRC was going through the Corps Planning Process for Steadfast Jupiter 23. Although the process of creating a Corps Prioritized Critical Asset List was rather straightforward, the process of creating an initial defense design proved much more difficult. The intricacies of the capabilities

and limitations dictate that a subject matter expert participate in the defense design process in order to develop a quality product. With the ARRC AMD cell consisting of an Officer from the US, an Officer from Italy, and an NCO from the UK, expertise existed for some of the weapon systems involved, but certainly not all of them.

Implementing a Multinational Air Defense Brigade dedicated to the Corps would immediately rectify this issue. The Brigade staff would contain subject matter experts to whom the Corps AMD planners could refer to answer any questions regarding capabilities and limitations. Those same subject matter experts within the Brigade could also be relied upon to further refine and fine-tune the Corps AMD plan. It cannot be expected that the system of establishing ad hoc Brigades as needed will contain the necessary subject matter experts. Furthermore, the Multinational Air Defense Brigade would have dedicated Battalions with specific weapon systems. Hence, the Corps AMD cell could focus their efforts on developing a knowledge of those specific weapon systems, rather than a knowledge base of every Air Defense system across the 31 NATO countries.

The subsequent issue appeared during the execution of Steadfast Jupiter 23 in October of 2023. For exercise purposes, members of the British 16 Royal Artillery and 7 Air Defense Group acted as the Corps AD Brigade. With a structure focused on commanding and controlling their own weapon systems, the Sky Sabre and the High-Velocity Missile, they lacked the ability, in terms of personnel, knowledge base, and systems, to command and control the Units and weapon systems assigned to them during the exercise. This was of no fault of their own, because they were never intended to command and control such Units. They don't have Air Defense Artillery Fire Control Officers (ADAFCOs) that can bridge the gap between the Army and Air Force because they don't have Patriot Battalions under their command.

The issue of command and control extends beyond Units operating above the coordinating altitude. The United States Army is generally comfortable with High to Medium Air Defense (HIMAD) operating under centralized control while Short Range Air Defense operates under decentralized control. This paradigm does not exist across all NATO partners and their various weapon systems. During the exercise,

During Steadfast Defender 24, the United Kingdom's 32 Royal Artillery Regiment rehearsed SHORAD operations as part of a Corps battle plan.

participants struggled with establishing a command and control structure across the various weapon systems, incorporating the various entities, whether it be the AD Brigade, the Corps Joint Air Ground Integration Center (JAGIC), or the Air Component Command. This issue did not arise as the result of a flawed exercise which incorporated myriad Nations and weapon systems. This command structure could very likely exist in real-world NATO operations.

Establishment of a Corps-aligned Multi-National Air Defense Brigades with specified Battalions and weapon systems would solve this problem. The Brigades could man and equip themselves with appropriate personnel and systems that would allow them appropriately command and control their subordinate formations. They could also develop the applicable tactics, techniques, and procedures (TTPs) that would allow them to control their fire units, deconflict engagements, and ensure protection of friendly aircraft as appropriate. However, and quite possibly most importantly, the Brigades would be able to train these TTPs with their subordinates and superiors. Rather than spending the exercise muddling through what command and control TTPs are applicable under the given scenario, as we did in Steadfast Jupiter 23, the Multi-National Air Defense Brigades could spend time training and perfecting their TTPs in anticipation of the coming conflict.

The Commander of NATO's Allied Rapid Reaction Corps, LTG Sir Nick Borton, discusses operations during exercise Steadfast Jupiter, which took place in Romania in October 2023.

The final issue warranting consideration stems directly from the command and control issue discussed previously, and that is the issue of connectivity and interoperability. Since Steadfast Jupiter 23 was conducted via simulation below the Corps level, participants did not directly experience interoperability issues, but they discussed such issues at length. How would so many different systems from so many different countries pass data from one to another? How could early warning be disseminated across the battlefield? Who would maintain the recognized air picture? Does everyone have the same access to Link 16? If this problem set of connecting different weapon system was mono-national, an experienced 140A could readily solve it with time and resources. However, introducing Multi-National weapon systems, which is now NATO will fight, presents many more interoperability challenges ranging from data sharing permissions to the physical linking of systems.

Creating standing Multi-National Air Defense Brigades rather than ad hoc Brigades for specific exercises or mission would greatly alleviate this problem. It would give communication architecture experts the necessary time and resources needed to establish reliable interoperability. Once established, Units will not have to spend time on exercises solving the same problem of interoperability. Rather than focusing on how they communicate, they can focus on what they communicate and to whom. This will allow AD Units within NATO to move from the crawl phase of conducting AMD operations into the walk and run phases. Furthermore, solving interoperability issues will ensure more successful AD operation in the future.

LTC Pete Bier is a US Air Defense Artillery Officer currently serving in the NATO Allied Rapid Reaction Corps as the air and missile defense planner. He previously served as the battalion operations officer and battalion executive officer for 3-2nd Air Defense Artillery, the commander for C Battery, 3-43rd ADA, and the commander for HHB, 94th AAMDC. Bier deployed to the CENTCOM AOR twice and holds master's degrees in Leadership Studies, Soil Science, and Operational Studies. He has also served on the faculty at West Point as an assistant professor in the department of geography and environmental engineering.

Lt Col Garrett O'Leary is a British Royal Artillery officer currently serving in the Army Headquarters' Programme's Directorate as the Medium Range Air Defence Programme Manager. Immediately before this role, he served alongside LTC Bier in HQ Allied Rapid Reaction Corps (HQ ARRC) as the Joint Fires Operations Officer. He has commanded 30 Bty RA and served as the Second in Command of 16 Regt RA, the British Army's General Support Air Defence Regiment. He is a Ground Based Air Defence Instructor and has served as the requirements manager for Land GBAD weapon systems in the UK's complex weapons operating centre. Operationally, O'Leary has deployed to Afghanistan, Iraq and on a United Nations' mission in Cyprus. O'Leary has previously served as Joint Planning and Execution staff officer a NATO's Joint Force Training Centre in Poland, concentrating on the regeneration of NATO's Warfighting Corps.

Pearl Harbor and the Growth of a Branch

By MSG Carl J. Johnson

Japan attacked Pearl Harbor, Hawaii on December 7, 1941. The President of the United States of America, Franklin Roosevelt, said this was a day "which will live in infamy," (Chan, 2023). This attack brought the United States into World War II and would culminate in the bombings of Hiroshima and Nagasaki. At the time of the attack, located at Pearl Harbor was the Army, Army Air Force, and Navy (Roblin, 2019). These three branches of the military at the time, did not work together to prevent the attack by the Japanese, but they certainly failed as a team. Overall, Army early warning air defenses were successful in detection, but failed in communication with the other branches and with the War Department in Washington, D.C. (Roblin, 2019). Today, Air Defense Artillery is one of the most critical and deployed assets in the United States Army (Wiggins, 2019). While devastating and tragic, the events of Pearl Harbor and lessons learned revealed to ADA its need to develop command and control, deployment capabilities, interoperability, and communication.

Command and Control

While the Navy was the overwhelming presence at Pearl Harbor, the Army was also there and took a protective posture to defend the harbor and more specifically the Navy. However, at this time, each command had their own plans of deploying defenses and it was not until October of 1941 that they came together to develop a unified plan (Conn et al, 2000). In a multi-domain combat environment, command and control is critical to the success of the United States military's defense and ensures a well-protected defensive posture.

At the time, Pearl Harbor was a disjointed and individualized deployment of American forces. The morning of the attack, the Aircraft Warning Service (AWS) was at minimum staffing with newly trained personnel, on new equipment, and a command structure that was dismissive of warnings and efforts given by the two privates on duty (Jewel, 1996). All factors combined, the AWS failed in executing command and control (C2) while succeeding to contribute to the overall events of the day. Exercising leadership in the absence thereof, is a staple of military C2. Without command and control there is no unity of action on the battlefield and the events of Pearl Harbor become prevalent across all military actions. An example of this concept is the Supreme Allied Commander created during World War I. At the time, French, British, and American commanders struggled to direct operations, command and control, without a unified commander that would ensure unity of effort across all forces on the battlefield (Chandler, 2023).

Today, Air Defense Artillery is striving to become one of the most integrated branches through the development of the Integrated Air and Missile Defense Battle Command System (IBCS) (Suits, 2020). The new system will integrate multiple weapons systems and sensors into one network capable of communicating across the battlefield with other branches in a unified defensive effort. Having applied lessons learned over the decades, the ADA garnered learning opportunities from the failures of command and control at Pearl Harbor and applied those concepts to help achieve their current modernization status in the Army. Some of the issues were C2 and a lack of pre-deployment of Air Defense assets (Jewel, 1996). Today, well-established is the C2 of ADA assets as prescribed by combatant commands and assets deployed according to the Secretary of Defense's Operations Book (SDOB).

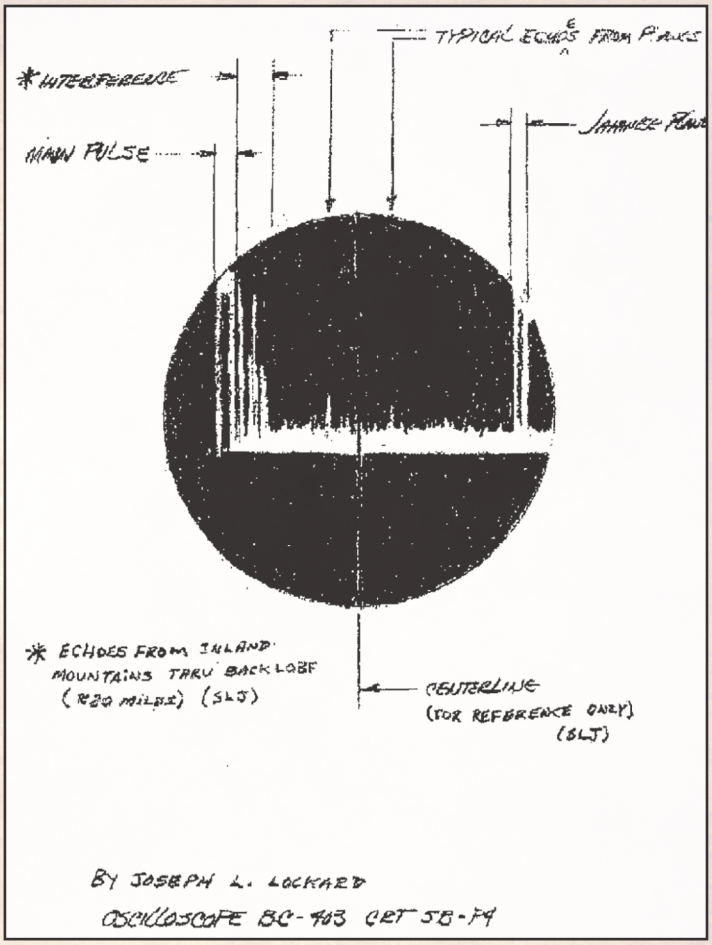
Deployment Capabilities

Radar was a new capability at the time of the attack on Pearl Harbor and could be mobile in temporary locations or installed in permanent locations (Jewel, 1996). Known as the Pearl Harbor Radar, the Signal Corps Radio (SCR)-270 was one of the first functioning wartime radars in use for the military. "The device could consistently track individual aircraft out to 125km, and formations out to 240km. As was common with most air-search radars of the time, the 270 could not provide altitude information for any contacts, but an experienced crew operating a well-calibrated set could provide a reasonable estimate based on the 'fade zones' caused by ground reflections of the radar pulses," (Matt, 2019). Prior to the Japanese attack, there was a period of cross-training between the Army and Navy personnel on

radar instructions since this was the first combat application of the radar, but the Navy failed at providing a liaison to the Army in the Information Center (McHale, 2017).

While this was the first use of radar on the battlefield, and the personnel trained were brand new Soldiers, the AWS radar and its crews were effective in the deployment and usage of the new non-combat tested equipment. At the time of the attack, the Army did not permanently emplace any of the five radar stations. Demonstrating successful application of training and use of equipment, the one station that was active, detected the Japanese force 132 miles from the Opana Radar Station located in northern Oahu (Jewel, 1996). However, while the Soldiers and equipment performed their duties in the manner trained the officer in charge disregarded that training and dismissed the Soldiers as well as the equipment and its readings. "At 0715, his information center received a call from the Opana Radar Station in the northern part of Oahu. The two privates working the radar that morning told Tyler they just saw the biggest radar blip they've ever seen…Tyler told the privates not to worry about the blip. Around 40 minutes later, the attack on Pearl Harbor began," (unknown, 2021).

To be successful in the modern deployment of an Air Defense Artillery unit, crew members and batteries, train, evaluate, and certify in the successful march order and emplacement of battery-collective equipment (Department of the Army, 2020). An example of this concept is 3rd battalion, 2nd Air Defense Artillery and their preparation for an upcoming deployment from Fort Sill, OK to Southwest Asia in 2018. "Patriot mobility is a complex choreographed task to tactically mobilize more than 15 pieces of rolling stock [non-Patriot equipment vehicles] and the Patriot missile system. There are many things happening at the same time, so this requires agility in all aspects and requires every Soldier skill and tactical equipment capability that builds on the multi-echelon training concept," said 1st. Lt. Cristian Salazar, a 3-2nd ADA tactical director (Samuel, 2018). Two guiding principles of Army training are to train as you fight and train to sustain. 3-2 ADA is a part of 11th ADA BDE, the largest and most deployed ADA unit in the world (Imperial Brigade, n.d.). When Soldiers work together to achieve a collective mission, the possibility of success increases with every training opportunity.



Pearl Harbor Picture - At 7:20, the reported blip of what would eventually be known as Japanese planes, was dismissed by a lieutenant as a returning squadron of B-17 Flying Fortresses *(photo of the first wave of Japanese planes taken from www.pearl-harbor.com).*

Patriot Launching Station Picture – Patriot Launching Stations of 5-52 ADA emplaced and ready to defend their asset in Southwest Asia *(photo taken by author during the establishment of a new Patriot Site).*

The lesson to learn from Pearl Harbor is not just training on the equipment, but also trusting in that training and ensuring those in charge do not faulter in their responsibility to support their subordinates. Temporarily emplaced radar units at Pearl Harbor had to face no-notice application of their training, as compared to today's ADA, where units may face no-notice deployments but prepare to immediately positions themselves for operations upon arrival. A formerly long-standing Army Air and Missile Division Command (AAMDC) training event, Roving Sands, reignited in 2018. Conducted on McGregor Range, this exercise tests logistics, Large-Scale Combat Operations (LSCO), and ADA tasks. During Roving Sands, units simulate how to defend against asymmetric threats, search and evaluate for patterns and trends in enemy attacks, and improve their ability defend their tactical site (Lacdan, 2018). With the modernization of ADA and employment of the IBCS, the branch finds itself in the same situation as Pearl Harbor. There is a need to develop units that can quickly train on the new equipment, leverage the experience of others, and work with other branches on the battlefield (Henke, 2023).

Interoperability

Interoperability is the activity of the Army to operate effectively as an element of a joint force across a broad range of military operations (Fogg et al., 2020). Pearl Harbor saw a complete breakdown of interoperability leading up to and on the day of the attack. The systems in place had no continuity between Naval intelligence confirmation and notification, Army Anti-Aircraft Artillery (AAA) weapons manning and ammunition storage and distribution, and no pre-deployment of air assets by the Army Air Force (Jewel, 1996). When systems designed to work together, all work independently of the other, the failure is comprehensive, whole, and devastating. Separate from the failed radar warning, the AAA weapons had no ammunition, would have to go over a mile to retrieve the rounds from the Navy ammunition depot, and then because of storage, would have to link each round individually (Jewel, 1996). The displacement of ammunition only led to the prolonging of AAA weapons employment against the enemy.

Air Defense Artillery today, utilizes on site Missile Storage Areas (MSAs) and close vicinity Missile Storage Facilities (MSFs) to increase response and meet time requirements in support of air defense missions (Andrews, 2021). Critical to learning from Pearl Harbor, when separating necessary defense measures by time, distance, and bureaucracy, success of the mission is incredibly reduced, if not eliminated. Military operations across the globe today, regardless of the branch of service, include the storage of ammunition on site or traveling with the element. When necessary, as units support one another and even joint forces, communication is paramount to the success of interoperability and mission accomplishment.

Communications

At Pearl Harbor, there was no lack of warnings for the attack. Communication was active, but it was the response to the warnings that led to the failing defense of Pearl Harbor. Rear Admiral Husband Kimmel and Lieutenant General Walter Short received and acknowledged the intelligence from Washington, and their communication to lower echelons and Washington, was that of preparation for local and internal danger (Frank, 2021). To be successful, any organization must be able to communicate in a fluid manner that goes both up and down the rank structure. The attack on Pearl Harbor comes from the dismissal of information, as well as omittance of the same; both acts of miscommunication contributed to the overall success of the Japanese attack.

Across the battlefield in the modern Army, communication is the first thing that leads to the ability of a Soldier to visualize, describe, and understand the mission and battlefield to ensure success. In ADA, without communication during a mission there can be no defense of an asset. Communication is vital to identify, engage, and destroy enemy air and missile threats. The Army General and Navy Admiral at Pearl Harbor did not communicate within their own organizations and did not communicate effectively with one another. The lessons of Pearl Harbor carry over to the modernization of Air Defense in both internal and external organizations. The ability of IBCS to communicate internally with multiple ADA assets and to joint forces across the battlefield eliminates ambiguity and increases situational awareness across the combat zone. This joint and multidomain communication is the application of lessons learned from the Japanese attack and

leans to prevent this same type of disaster from happening in the future. Communication finds itself as the bridge across all areas of failure at Pearl Harbor and connects all the concepts of lessons learned in the current and future application of Air Defense Artillery.

Conclusion

The Japanese attack of Pearl Harbor on December 7, 1941, was shocking and catastrophic for the United States Army and Navy. The procedures put in place to prevent the attack, only helped the enemy achieve the desired decimation. The development of Air Defense Artillery today, comes from the lessons learned across military history. The development of the IBCS is a testimony to the understanding of past events, and enemy actions. It is the application of the necessary combat power that wholly integrates the concepts of command and control, deployment capabilities, interoperability, and communication so that the future does not imitate the past.

Master Sergeant (MSG) Carl Johnson is a 14Z currently enrolled in the Sergeants Major Academy. Throughout his tenure in the Army, he has served as a Patriot Launching Station crewmember, team and squad leader, platoon sergeant, operations sergeant, instructor (AIT and SHARP), VA and SARC, and first sergeant. He is a graduate of all levels NCOPDS through Master Leaders Course, CDR/1SG Course, Patriot Master Gunner Course, SARC/VA Career Course, SHARP Trainer Course, Equal Opportunity, Master Fitness Trainer course, Army Basic Instructor Course and Cadre Training Course. He also has a M.A.in Theological Studies. His unit in Okinawa was awarded the Knox Award and is a member of the Honorable Order of St Barbara and the Sergeant Audie Murphy Club.

References

Andrews, Daniel. (2021). *New patriot missile storage facility unveiled in Okinawa.* U.S. Army. https://www.army.mil/article/246723/new_patriot_missile_storage_facility_unveiled_in_okinawa

Chan, M. (2023). *Franklin Roosevelt infamy speech:* Pearl Harbor Transcript. Time. https://time.com/4593483/pearl-harbor-franklin-roosevelt-infamy-speech-attack/

Chandler, G. (2023). *Unity of command or unity of effort? Rethinking a fundamental principle of war.* Modern War Institute at West Point. https://mwi.westpoint.edu/unity-of-command-or-unity-of-effort-rethinking-a-fundamental-principle-of-war/

Conn, S., Engleman, R. C., & Fairchild, B. (2000). *Guarding the United States and its outposts*. Chapter VII: The Pearl Harbor Attack. https://history.army.mil/books/wwii/Guard-US/ch7.htm

Department of the Army. (2020). *Air defense artillery patriot gunnery program* (TC 3-01.86). https://armypubs.army.mil/epubs/DR_pubs/DR_d/pdf/web/ARN22286_TC_3-01x86_FINAL_WEB.pdf

Fogg, R., Heritage, S., Balga, T., & Stuart, Ma. (2020). *Interoperability: Embrace it or fail!* U.S. Army. https://www.army.mil/article/231653/interoperability_embrace_it_or_fail

Frank, R. B. (2021). *The three missed tactical warnings that could have made a difference at Pearl Harbor*. The National WWII Museum | New Orleans. https://www.nationalww2museum.org/war/articles/pearl-harbor-missed-tactical-warnings

Henke, G. (2023). *Once more unto the breach: Air defense artillery support to maneuver forces in large-scale combat operations*. Army University Press. https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/March-April-2023/Once-More/

Imperial Brigade. (n.d.). U.S. Army. https://home.army.mil/bliss/units-tenants/11th-ada-bde

Jewel, L. W. (Ed.). (1996). *Report of Army Pearl Harbor board. Status of the principal Hawaiian defenses in 1941*. https://www.ibiblio.org/pha/pha/army/chap_3d.html

Lacdan, J. (2018). *Revived Roving Sands exercise teaches air defense units mobility, expeditionary warfare*. U.S. Army. https://www.army.mil/article/202263/revived_roving_sands_exercise_teaches_air_defense_units_mobility_expeditionary_warfare

Matt, PE. (2019). *SCR-270/SCR-271 radar*. Pacific Eagles. https://pacificeagles.net/scr-270-scr-271-radar/

McHale, J. (2017). *Radar's role at Pearl Harbor. Military embedded systems*. https://militaryembedded.com/radar-ew/signal-processing/radars-role-at-pearl-harbor

Roblin, S. (2019). *Pearl Harbor fact: a handful of American fighter pilots took on hundreds of Japanese warplanes*. The National Interest. https://nationalinterest.org/blog/buzz/pearl-harbor-fact-handful-american-fighter-pilots-took-hundreds-japanese-warplanes-103092

Samuel, S. (2018). *3-2nd ADA trains for emerging threats*. U.S. Army. https://www.army.mil/article/212965/3_2nd_ada_trains_for_emerging_threats

Suits, D. (2020). *Army gets closer to fielding new air defense systems*. U.S. Army. https://www.army.mil/article/237878/army_gets_closer_to_fielding_new_air_defense_systems

unknown. (2021). *What happened to the officer who ignored the radar warning at Pearl Harbor*. We Are the Mighty. https://www.wearethemighty.com/mighty-history/what-happened-to-the-officer-who-ignored-the-radar-warning-at-pearl-harbor/

Wiggins, V. (2019). *First to fire*. The Company Leader. https://companyleader.themilitaryleader.com/2018/05/17/air-defense-artillery/

Historical Vignette:

June 7th, 1944: D-Day + 1,
the 413th Antiaircraft Artillery Battalion at Omaha Beach

By CPT Peter Neil

On June 7th, 1944, the 413th Antiaircraft Artillery (AAA) Battalion made a harrowing landing on Omaha Beach as part of the Allied invasion of Normandy. Their arrival was met with intense enemy resistance, including attacks from enemy aircraft, emplaced land mines, artillery, mortar fire, and shore obstacles. Despite sustaining heavy losses in personnel and equipment during this treacherous landing, the highly trained soldiers of the 413th demonstrated remarkable resourcefulness. They managed to cobble together enough equipment to operate a single firing battery of guns, initiating crucial air defense measures.

Due to the absence of field artillery units on the beach, the 413th was assigned not only to their distinctive antiaircraft mission but also to provide surface to surface fires. On June 9th, 1944, they played a pivotal role in supporting the 2nd Infantry Division during their attack on Traviers and Cerisy Forest. Their effective direct fires significantly contributed to securing a foothold in Nazi-occupied France.

MG C. R. Huebner, the V Corps Commander, aptly summarized their contribution:

"This organization, functioning with remarkable efficiency and unflagging enthusiasm, assisted materially in bolstering the infantry's attack, enabling it to gain a strong foothold on enemy-occupied France, thus contributing to the allied effort."

The 413th AA Battalion's legacy serves as a testament to courage, resourcefulness, and unwavering commitment. Their story reminds us that true heroism lies not only in the face of danger but also in the ability to adapt and serve in multifaceted roles. In multi-domain operations (MDO) against near-peer adversaries, we will inevitably be asked to do more than provide air defense coverage and must be ready to adapt to the ever-changing complexities of modern warfare.

Teaching point: While being great air defenders is a key part of our mission, we must not lose sight of being flexible and adaptable. In multi-domain operations (MDO) against near-peer adversaries, we will inevitably be asked to do more than provide air defense coverage and must be ready to rise to the occasion as demonstrated by the 413th AA BN.

Source: Huebner, Clarence R., Unit Citation, Subject: 413th Anti-Aircraft Artillery Battalion Colleville-Sur-Mer, France June 27, 1944.

Five members of the 413th AAA Gun Battalion on break between shifts near Omaha Beach, June 12th 1944 (D+6)

THAAD and Patriot Integration:

From Operational Need to Operationalizing

By 1LT Michael J. McTiernan

Missile defenses, as stated in the 2022 Missile Defense Review, remains essential to the top priority of the National Defense Strategy: the defense of the homeland and deterring attacks against the United States of America.[1] Integrated Air and Missile Defense (IAMD), which is nested within the broader missile defeat approach, is the "integration of capabilities and overlapping operations to defend the homeland."[2] Integration for AMD, accomplished mainly by modernization and subsequent validation through flight tests, remains critical to the lethality and credibility of the Air Defense Artillery branch. One recent advancement in integration that has the potential to revolutionize how we fight gravitates around the historic successes of B-2 ADA (THAAD) during Flight Test THAAD-21 at White Sands Missile Range in New Mexico. Here, the unit tested and validated software and hardware upgrades to the Terminal High Altitude Area Defense (THAAD) weapon system that demonstrated the ability to fire PAC-3 MSE Interceptors from a Patriot M-903 Launcher using the Army-Navy Transportable Radar Surveillance (AN/TPY-2) sensor. The advancements made through this flight test are now being operationalized worldwide and may pave the way for greater integration into the Army's Integrated Air and Missile Defense Battle Command System (IBCS) architecture. The following provides an overview of the THAAD weapon system, Flight Test THAAD-21, and the global impact of these modernization efforts.

L-R: SFC Lajuan Bailey, Current B-2 ADA (THAAD) First Sergeant; 1LT Michael J. McTiernan, Former B-2 ADA (THAAD) Platoon Leader and Tactical Control Officer; SFC (WO1) Luis M. Aviles-Diaz; Former B-2 ADA (THAAD) First Sergeant.

The Terminal High Altitude Area Defense (THAAD) Weapon System

The THAAD weapon system is a globally-transportable, rapidly-deployable capability that intercepts ballistic missiles during their terminal, or final, phase of flight.[3] It is an incredibly effective, combat-proven defense against short, medium, and intermediate-range ballistic missiles threats. It can conduct engagements both inside and outside the atmosphere using hit-to-kill technology, whereby the interceptor's kinetic energy destroys the incoming threat.[4] A standard THAAD battery is comprised of four primary components: (1) the AN/TPY-2, (2) the Fire Control unit, (3) the Launchers, and (4) the Interceptors.[5] Of all these components, the uniqueness of the AN/TPY-2 differentiates THAAD from all other Air Defense weapon systems, as it is the largest air-transportable X-band radar in the world with incredibly high-resolution that allows for both tracking targets from a considerable distance and cueing other missile defense weapon systems.[6] In fact, the sensor has the ability to operate in two separate modes to support these functions: (1) Forward Based Mode (FBM) and (2) Terminal Mode (TM).[7] FBM is typically used when emplacing the radar in close proximity to potential adversary launch areas to provide missile tracking and discrimination information to other weapon systems.[8] In this

mode, the AN/TPY-2 is not collocated with the other primary components of a traditional THAAD battery and thus cannot conduct engagements. Conversely, TM is used when the AN/TPY-2 is collocated with a THAAD battery and enables the detection and engagement of incoming threats by providing data to guide interceptors.[9]

The first THAAD battery, A Battery, 4th Air Defense Artillery Regiment, 11th Air Defense Artillery Brigade, activated nearly fifteen years ago in May of 2008.[10] There are now twelve AN/TPY-2 radars in the U.S. arsenal, with one more expected to complete production in 2025.[11] To own or possess this capability actually extends beyond just U.S. interests. For example, the United Arab Emirates procured two AN/TPY-2 radars in 2011 through U.S. Foreign Military Sales (FMS) channels.[12] The Kingdom of Saudi Arabia also purchased seven radars in 2018, with fielding to begin in 2024, also through FMS channels.[13] With its unique capabilities and worldwide demand, THAAD is, and will remain to be, a strategic consideration for friendly and adversary forces for the foreseeable future.

Operational Need to Integrate THAAD and Patriot

If THAAD is such an advanced weapon system, why then does it need frequent upgrades? Not only does modernization typically make a weapon system more lethal, but these efforts often are in response to a Joint Emergent Operational Need (JEON). A JEON is something that arises when a Combatant Commander identifies gaps in capability that must be acted upon to prevent loss of life and/or critical mission failure. A JEON can drive the test community to innovate solutions to bridge these gaps and, in the world of Air Defense, typically results in flight tests dedicated to validating the new advancements. Regarding the THAAD weapon system, a JEON from United States Forces Korea (USFK) directed the need to integrate PAC-3 MSE capability into THAAD. The intention of this being to expand the overall battlespace for THAAD by combining the kinematic capability of the PAC-3 MSE with the range of the AN/TPY-2.[14] This integration would allow for opportunities to engage in both the upper-tier and lower-tier and enable the warfighter to use the right interceptor for the given threat.

Flight Test THAAD-21

To address the concerns of USFK, the Missile Defense Agency (MDA), in partnership with the U.S. Army Program Executive Office Missiles and Space, U.S. Army Space and Missile Defense Command, and Ballistic Missile Defense System Operational Test Agency, set conditions to conduct Flight Test THAAD-21 (FTT-21) at White Sands Missile Range (WSMR) in New Mexico.[15] B-2 ADA (THAAD), 11th Air Defense Artillery Brigade, served as the operational unit for this flight test. In order to assume mission, the unit first had to conduct required system upgrades, especially to their organic AN/TPY-2, and receive new equipment training, or NET, to familiarize themselves with the software and hardware upgrades. Additionally, since the flight test required the integration of the Patriot M-903 Launchers, Soldiers whose technical and tactical expertise were specialized to the THAAD weapon system had to re-learn the Patriot equipment. This is especially the case for all the Soldiers on launcher crews who had not conducted Prepare for Movement and Emplacement (PM&E), Hot Crew, Alert State Assumption (ASA), or Missile Reload drills on Patriot launchers in several years.

Upon the completion of NET, B-2 ADA (THAAD) conducted roughly 100 miles of tactical movement from Fort Bliss, TX to WSMR, NM in August of 2021 in order to emplace their equipment. After arrival, they rapidly certified on all respective Air Defense Gunnery Tables (ADGTs) on both the THAAD weapon system and Patriot Launchers to confirm their ability to participate in the live fire exercises. Although FTT-21 is seen as the ultimate milestone for the mission, there were two additional phases executed prior to: (1) Controlled Test Vehicle-01 (CTV-01) and (2) the Cooperative Vulnerability and Penetration Assessment & Adversarial Assessment (CVPA/AA). CTV-01 served as an opportunity to demonstrate the ability to fire MSE interceptors against simulated targets, which verified the concept of a THAAD MSE Integration, or TMI, firing solution. Despite this phase not conducting a live intercept, it proved the system could communicate with the M-903 Launchers and could control MSE Interceptors while in flight. Following this, CVPA/AA intended to identify security vulnerabilities in the weapon system for future software upgrades and analyze how operational organizations react to cyber-related events. With these phases successfully completed,

FTT-21 served as an operational test that would assess the TMI firing solution on its ability to intercept a re-entry vehicle that mirrored the kinematics and flight profile of a short-range ballistic missile. In March of 2022, B-2 ADA (THAAD) successfully completed this phase by conducting a no-notice engagement of a Black Dagger target, marking the critical milestone of integration between the THAAD and Patriot weapon systems. With this historic achievement, B-2 ADA (THAAD) completed their mission at WSMR and verified the ability to provide necessary upgrades to all U.S. AN/TPY-2 sensors.

Operationalizing the Success of Flight Test THAAD-21

With the success of FTT-21 comes the inherent responsibility to implement the advancements in capability to our THAAD batteries worldwide. As the flight test originated from a USFK JEON, it is only natural that U.S. THAAD assets in South Korea receive the desired upgrades in a timely fashion. In fact, by October of 2022, USFK delivered the equipment necessary to facilitate the upgrades that will, in the words of the South Korean Ministry of National Defense, "protect the South Korean people from North Korea's missile threats."[16] These upgrades, delivered only seven months after the completion of FTT-21, will provide U.S. forces increased battlespace and will allow the operator to choose the right interceptor for the right threat.

Although PAC-3 MSE integration served as a primary objective for FTT-21, B-2 ADA (THAAD) also tested another capability that was under development for multiple years, known as the THAAD remote kit. Already proven in a prior flight test, this capability would allow operators to remotely fire interceptors from forward located THAAD Launchers while the rest of battery, to include the AN/TPY-2, remain postured further behind.[17] The purpose of this being to allow interceptors more sitting options and increase the area it can defend, as well as increasing the total number of launchers a THAAD system is capable of operating.[18] This concept is also currently being utilized in South Korea, as U.S. forces remotely fired from the THAAD weapon system in March of 2023 during a large-scale military exercise.[19] This advancement in capability, compounded with USFK's adoption of the TMI firing solution, clearly demonstrates how revolutionary the successes of FTT-21 are. The efforts of B-2 ADA (THAAD) during this flight test bridged gaps in capability that are now resulting in operational impacts for forces around the world, making Air Defense more lethal and prepared to defend against the threats of adversaries.

The Future of THAAD Integration

THAAD is, and will remain, a strategic-level asset that is crucial to the defense of the homeland and U.S. interests. Through the dedication and monumental success of B-2 ADA (THAAD), U.S. forces around the world now have the capability to better protect their forces and their defended assets through a TMI firing solution. However, modernization must continue well past these efforts if there will truly be integration between all Air Defense weapon systems. In fact, there is already roughly $30 billion of the President's Fiscal Year 2024 Defense Budget expected to be dedicated to "Missile Defeat and Defense" to support the overarching concept of "Integrated Deterrence."[20] Two of the larger investments into this idea of Missile Defeat and Defense include (1) integrating THAAD into the Army's Integrated Air and Missile Defense Battle Command System (IBCS) and (2) continuing production of the eighth operational THAAD battery.[21] With B-2 ADA (THAAD) already paving the way for THAAD and Patriot integration, it will only be a matter of time before THAAD becomes nested within IBCS architecture and provides the operator a greater air defense capability under the "any sensor, best shooter" concept. In a similar fashion to FTT-21, it should be the hope of all Air Defenders that this operational need to integrate THAAD into IBCS is tested through designated flight tests and rapidly operationalized to forces worldwide.

CPT Michael J. McTiernan is currently deployed to the United States Central Command (USCENTCOM) Area of Responsibility (AOR) in support of Op. SPARTAN SHIELD and serves as the Brigade Adjutant for the 11th Air Defense Artillery "Imperial" Brigade. He is a former THAAD Platoon Leader and the first Tactical Control Officer (TCO) in history to fire a PAC-3 MSE Interceptor using data provided by an AN/TPY-2. CPT McTiernan commissioned from the United States Military Academy at West Point in 2020 and holds a Bachelor's degree in Business Management.

Endnotes

1 U.S. Department of Defense. "2022 Missile Defense Review." https://media.defense.gov/2022/Oct/27/ 2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF.

2 Ibid.

3 U.S. Department of Defense Missile Defense Agency. "MDA - Terminal High Altitude Area Defense (THAAD)." Accessed April 17, 2023. https://www.mda.mil/system/thaad.html.

4 Lockheed Martin. "Lockheed Martin To Produce Eighth THAAD Battery For The US Government," April 28, 2022. https://www.lockheedmartin.com/en-us/news/features/2022/lockheed-martin-to-produce-eighth-thaad-battery-for-the-us-government.html.

5 Missile Defense Advocacy Alliance. "Terminal High Altitude Area Defense (THAAD)." Accessed April 17, 2023. https://missiledefenseadvocacy.org/defense-systems/terminal-high-altitude-area-defense-thaad/.

6 "MDA - Terminal High Altitude Area Defense (THAAD)."

7 Missile Threat. "Terminal High Altitude Area Defense (THAAD)." Accessed April 17, 2023. https://missilethreat.csis.org/system/thaad/.

8 Ibid.

9 Ibid.

10 Lockheed Martin. "Fast Facts – Terminal High Altitude Area Defense (THAAD)," October 2020. https://lockheedmartin.com/en-us/products/thaad.html.

11 Missile Defense Agency. "Fact Sheet – Terminal High Altitude Area Defense." July 2022. https://www.mda.mil/global/documents/pdf/thaad.pdf.

12 Missile Defense Agency. "Fact Sheet – Terminal High Altitude Area Defense."

13 Ibid.

14 Lockheed Martin. "Key Missile Defense Systems Integrated to Increase Capability for Customers," April 25, 2022. https://www.lockheedmartin.com/en-us/news/features/2022/lockheed-martin-integrates-key-missile-defense-systems-to-increase-capability-and-flexibility-for-customers.html.

15 U.S. Department of Defense Missile Defense Agency. "Missile Defense Agency and U.S. Army Test Integration of THAAD and Patriot Missile Defense Systems." March 29, 2022. https://www.mda.mil/news/22news0004.html.

16 Stars and Stripes. "U.S. Military Delivers Upgrades for THAAD Missile-Defense System in South Korea." October 7, 2022. https://www.stripes.com/theaters/asia_pacific/2022-10-07/thaad-missile-defense-south-korea-7605349.html.

17 Missile Defense Advocacy Alliance. "Terminal High Altitude Area Defense (THAAD)."

18 Stars and Stripes. "US Troops Test THAAD Missile-Defense System's Remote Control during South Korea Drill." March 24, 2023. https://www.stripes.com/theaters/asia_pacific/2023-03-24/thaad-missile-defense-south-korea-9590580.html.

19 Ibid.

20 U.S. Department of Defense. "Department of Defense Releases the President's Fiscal Year 2024 Defense Budget." Accessed April 17, 2023. https://www.defense.gov/News/Releases/Release/Article/3326875/ department-of-defense-releases-the-presidents-fiscal-year-2024-defense-budget/https%3A%2F%2F www.defense.gov%2FNews%2FReleases%2FRelease%2FArticle%2F3326875%2Fdepartment-of-defense-releases-the-presidents-fiscal-year-2024-defense-budget%2F.

21 Ibid.

RETURN OF Tactical AAA

By 2LT Benjamin Phocas & MAJ Peter Mitchell

As the war in Ukraine has unfolded over the past two years, a seemingly endless series of videos have emerged from the battlefield, depicting drones—of various shapes and configurations—targeting and destroying personnel and equipment on both sides. Often, these systems are used at the microtactical level, to target individual soldiers and vehicles, and thus cannot realistically be defeated by current air defense systems. At the same time, across Iraq, Syria, Jordan, and the Red Sea, we are seeing the proliferation of one-way suicide drones being used against US, allied, and partner forces. To engage and destroy these drones, US forces are mostly reliant on two tools—shipborne weapons from a family known as Standard Missiles and Close-In Weapon Systems, which are essentially gatling guns attached to radars that throw up a wall of lead to defeat closing aerial threats.

The Phalanx Close-In Weapon System, with a maximum effective range of 1,500 meters and firing seventy-five rounds per second, has proved effective in countering modern drones. Its land-based variant, the well-known C-RAM, was similarly effective during the Afghanistan War against a variety of indirect fire. However, it is confined to a stationary defensive role, guarding warships and bases. On the modern battlefield, where drones are becoming prolific, there is a major gap that needs to be filled in counterdrone weapons systems.

The current US systems, and those in development, are effective under some conditions, but with the increased proliferation of drone swarms, having a system that can engage rapidly with lethal accuracy, in an extremely short period of time, is critical to defeating multiple fast-moving targets in close proximity.

The US Army should invest in modernizing and increasing the size of its air defense artillery forces, to include dedicated antiaircraft artillery (AAA) batteries that are capable of defeating the threat posed by small unmanned aircraft systems (sUAS). On top of the eight planned Sergeant Stout M-SHORAD battalions, the service should reintroduce legacy-style gatling gun systems and work to field new systems rooted in the proven concept of the wall of lead. The Joint Counter-small Unmanned Aircraft Systems (C-sUAS) University (JCU) at Fort Sill should be expanded to provide training teams at all AIT and BOLC locations. Additionally, a new battle drill specifically for troops reacting to small drone attack must be immediately implemented in training to increase passive protection.

The sUAS Threat

Many of the sUAS already present on today's battlefield are so small that they can be carried in one hand by their operators. In Ukraine, drone operators are working in advanced hunter-killer swarms, where one reconnaissance drone identifies targets for a team of attack drones to swarm and destroy. In a not-so-distant future, these swarms could operate semiautonomously, with a human only in the loop to approve targets prior to engagement, or even entirely autonomously of human operators. Many of the drones currently being weaponized are commercial, off-the-shelf systems designed for civilian use, and importantly,

Illustration created with AI software.

some are designed specifically for racing. These racing drones are extremely fast and nimble, often mounted with multiple rotors allowing them to rapidly move omnidirectionally. They are extremely hard to pinpoint and target, as they can move in an unpredictable, nearly insect-like manner in order to close with their prey.

After closing the distance, these deceptively small drones are capable of dealing devastating damage. Whether individual soldiers hiding out in craters and trenches or heavily armored T-series tanks, a single drone can find, fix, and finish targets with precision and efficiency.

Neither side of the Russo-Ukraine conflict has created a fully successful counter to this threat. Jamming systems have been effective, but often require a line of sight to cut or control the signals between a drone and its operator. In several documented instances however, these drones have been successfully downed by shotguns, machine-gun fire, and in at least one instance, a homemade gatling gun composed of a dozen AK-74s. The Gepard AAA system, given to the Ukrainians by Germany, has been highly effective in downing larger drones, such as the Iranian Shahed series that Russia has purchased and is now producing itself.

What this means is that on both sides of the war in Ukraine, the combatants have been forced to improvise and adapt under austere conditions—and have found success in simply throwing up walls of lead to down sUAS. This discovery has implications for the Army, the US armed service that will most likely face the brunt of the sUAS threat in a future large-scale combat environment. Put simply, it does not currently maintain a system that can effectively defeat these drones along the front lines.

M-SHORAD and Avenger Systems: Gaps in the Air Defense Inventory

The two current tactical air defense systems fielded by the US Army are the AN/TWQ-1 Avenger, which is mounted on a Humvee, and the new M-SHORAD (Maneuver-Short Range Air Defense) system mounted on the Stryker armored fighting vehicle. However, neither is suited for tactical and operational air defense in support of maneuver elements on the battlefield.

The first and most obvious issue is that both of these systems rely primarily on surface-to-air missiles to defeat targets. For targeting small, cheaply produced and converted sUAS, expensive missiles are simply not a cost-effective method of destruction. Additionally, these systems can only fire a small number of missiles (single digits for both platforms) before they are required to reload.

The M-SHORAD also mounts a single-barrel, 30-millimeter chain gun, similar to that on the Apache gunship. Even this weapon, though, is not suited to tracking and targeting small, fast-moving objects mounted with hand grenades, for example, or converted warheads for rocket-propelled grenades. It does not have the rate of fire to be able to throw up the mass of bullets necessary to defeat the aerial maneuvers of a drone, and certainly not if there are several of them. Footage in Ukraine shows that soldiers on both sides have attempted to use their rifles to defeat these drones, and they are rarely successful. It is simply too hard to hit such a small target with single accurate rounds.

Furthermore, these assets were not designed to be operated on or near front lines. Enemy drones operating in a swarm, with some dedicated to conducting suppression of enemy air defenses, could easily defeat an Avenger mounted on a Humvee or an M-SHORAD mounted on a thin-skinned Stryker. Neither could withstand drones that have demonstrated the capability to destroy Russian tanks.

Additionally, as both these systems are wheeled, rather than tracked, they lack the same maneuverability and mobility of tracked vehicles, particularly in muddy terrain—like that found in Eastern Europe in the spring and in the Indo-Pacific region during rainy seasons.

It is important to note that these systems are both extremely valuable air defense assets that should continue to serve in rear-area aerial security roles. However, they do not offer the capability and protection required to counter the growing threat from sUAS. Nothing in the current US air defense arsenal has the protection necessary to operate near the front line and the fires capability to destroy swarms of cheap drones.

What's Old is New Again

The US Army was not always in such a

Illustration created with AI software.

predicament. In fact, until the mid-2000s, the service maintained an armored vehicle that could provide air defense along the forward line of troops. The M6 Linebacker was a modified Bradley Fighting Vehicle that simply replaced its turret-mounted TOW missile launcher with a launcher that carried Stinger missiles. The M6 also kept the Bradley's organic 25-millimeter chain gun for additional air and ground targeting capability. The M6 was fully capable of operating in a mechanized formation as an armored air guard that could maneuver and provide constant overhead protection simultaneously. However, similar to the M-SHORAD system, the M6 was also only equipped with a single-barrel cannon that fires too slowly to make it effective against small drones.

Thus, we must look further back into history to the predecessor of the M6, the M163 Vulcan Air Defense System. The M163 VADS was an unsubtle bullet hose. It was little more than an M113 armored personnel carrier with a 20-millimeter Vulcan rotary cannon, similar to those mounted on the F-16 and A-10, inelegantly slapped onto the top. It was capable of firing a whopping three thousand rounds per minute in burst mode or one thousand rounds a minute cyclic mode, with rounds set to detonate at 1,800 meters.

The M163 was sold to the Israel Defense Forces, who naturally modified the design, and created the improved Machbet variant, which added four Stinger missile launch tubes to the Vulcan cannon for targeting a variety of threats.

The M163 had its major drawbacks too. It lacked an organic radar system and relied on human gunnery to acquire and target enemy air assets. The M113 vehicle it was based on is also limited, primarily in the fact that it is a personnel carrier, not designed to withstand heavy fire. A new system based on the M48 Patton tank chassis, the Sergeant York, was planned for development in the 1970s and early 1980s, but the program was a debacle and was scrapped in 1985.

Both of these systems once in the US Army inventory, the M6 and the M163, offered something missing today. They both had the advantage of being tracked vehicles, for instance. But each also had its deficiencies. The M6 had the armor but not the right firepower, while the M163 lacked the armor but packed the right punch, particularly in later variants. If the strengths of these two systems could be married, however, there could be an air defense vehicle with both the armor and firepower to operate alongside maneuver formations and able to defeat both sUAS and larger threats such as helicopters.

The Solution

The US Army must invest in a mobile air defense system with the capability to effectively defeat the enemy sUAS threat, while also retaining the protection and maneuverability to operate in frontline areas.

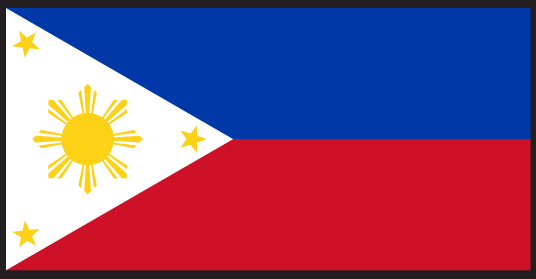
The solution does not need to be a revolutionary system. Nor should it be. The threat from sUAS is here now, and a project that spends the next decade in research and development will not counter the present threat. The relatively simple and much more low-cost solution is to use older-model Bradley Fighting Vehicles no longer in active US service—of which two thousand are sitting in storage—and convert them to basic but functional AAA systems. These conversions would not require the invention of an entirely new vehicle platform and would only require an off-the-shelf existing system such as the Close-In Weapon System or the development of a similar, but more tailored, AAA system. Having such a system mounted on a vehicle that can withstand the impact of one of the drones it is hunting, could be the difference between life and death for US soldiers in a conflict in the very near future.

Without such a system available, US ground forces will be vulnerable to attack from sUAS and will have no effective defense other than firing wildly into the air as an untold number of now deceased combatants in Ukraine did, to no avail.

2LT Benjamin Phocas is an Armor Officer and recent graduate of the Strategic Studies Program at USMA.

Maj. Peter Mitchell is an Air Defense Officer and Strategic Studies instructor at USMA.

This is an updated version of an article originally published in March 2024 by the Modern War Institute. The views expressed are those of the author and do not reflect the official policy or position of USMA, the US Army, or the Department of Defense.



PACAF facilitates Integrated Air Missile Defense SMEE during Balikatan 24

By MSG John Reeves

The Pacific Air Force's Pacific Integrated Air & Missile Defense Center, with support from the U.S. Marine Corps, U.S. Air Force, U.S. Army, and the Philippine Air Force facilitated an inaugural multilateral and joint service subject matter expert exchange in preparation for Balikatan24 at Clark Air Base, Luzon City, Philippines April 22 through 26.

The classes taught during the exchange centered on the facilitation and universal understanding of IAMD. The USINDOPACOM mission of IAMD calls for the United States to seamlessly integrate with allies to enable freedom of maneuver and power projection to maintain a free and open Indo-Pacific. To do so, IAMD uses a network of interconnected systems to augment surface-to-air defenses and effectively complement kinetic fire solutions.

In late March 2024, the PIC led and conducted a Defense Design Working Group for 52 joint members of the Armed Forces of the Philippines geared towards developing an IAMD-centric exercise plan for Balikatan 24. The result was a list of what the attendees deemed critical to protect the defense of their nation. The methodology was based on how each asset selected was necessary, how vulnerable, susceptible, and recuperable it was to an attack, and finally, how likely a specific nomination is to attack.

The PIC then hosted USSPACECOM's Joint Ballistic Missile Training and Education Center to present its 4-day Joint IAMD Course, which provided attendees with the basic concepts and understanding of IAMD in multi-domain operations. A second 4-hour course focused on decision-making processes for AFP and U.S. senior leaders in the IAMD enterprise. Both course groups comprised leaders from the U.S. Marine Corps, U.S. Army, U.S. Air Force, Philippine Air Force, Philippine Navy, and Philippine Army.

Finally, using the recent Iranian attacks on Israel as a baseline for a multilateral and joint IAMD architecture, the PIC brought together a diverse audience of 175 multilateral attendees with members of each US Service, members of each Philippine service, along with the Royal Australian Air Force, and observation from three members of the Japanese Air Self Defense Force, to provide insight on how their particular service and capabilities play a significant role in the IAMD defense architecture and enterprise.

The attendees also got an up-close look at the US Army's PATRIOT weapon system. The 1st Battalion, 1st Air Defense Artillery Regiment, provided a tour and answered questions for the attendees at their deployed site on Clark Air Base.

The overall intent of the 3-week event was a means to coordinate, integrate, and synchronize IAMD capabilities to protect what the Joint Forces Commanders deem as his most critical assets, along with a complex communication plan constructed between all of the attending units during the LVC portion of BK 39-24. The C2 dynamic, broken down by regions and sectors, relies primarily on passing critical information through lateral and vertical units with the net result of delegating authorities to execute possible threats. This concept is being exercised for the first time in a US-Philippine bilateral architecture.

"From ballistic missiles to cruise missiles to one-way attack drones to quadcopters, IAMD is a more complex and challenging problem than ever before," said U.S. Air Force Lt. Col. Keegan Dale, the 13th Fighter Squadron Commander, who is serving as the Commander of BK's 13th Air Expeditionary Group. "Every country and service bring unique IAMD capabilities to bear. We must integrate and learn from each other in training if we expect success in combat."

Balikatan 24:

Joint Integrated Air & Missile Defense Exchange

Location: Clark Air Base, Philippines

Service members from the Armed Forces of the Philippines, U.S. Military, and Japan Air Self-Defense Force stand in front of the Patriot M903 Launching Station belonging to Bravo Battery, 1-1 Air Defense Artillery, as part of the week-long Joint Integrated Air And Missile Defense exchange during Exercise Balikatan 24 at Clark Air Base, Philippines, April 25, 2024. BK 24 is an annual exercise between the Armed Forces of the Philippines and the U.S. military designed to strengthen bilateral interoperability, capabilities, trust, and cooperation built over decades of shared experiences. *(U.S. Army photo by Maj. Trevor Wild)*

U.S. Army Capt. Rishad Readus, assistant operations officer, 38th Air Defense Artillery Brigade, speaks to the multilateral attendees of the Joint Integrated Air And Missile Defense exchange during Exercise Balikatan 24 at Clark Air Base, Philippines, April 25, 2024. BK 24 is an annual exercise between the Armed Forces of the Philippines and the U.S. military designed to strengthen bilateral interoperability, capabilities, trust, and cooperation built over decades of shared experiences. *(U.S. Army photo by Maj. Trevor Wild)*

U.S. Army 1st Lt. Christian de Jong, Bravo Battery, 1-1 Air Defense Artillery, 38th Air Defense Brigade, explains the capabilities of the AN/MPQ-65 Radar to the multilateral attendees of the Joint Integrated Air And Missile Defense exchange during Exercise Balikatan 24 at Clark Air Base, Philippines, April 25, 2024. BK 24 is an annual exercise between the Armed Forces of the Philippines and the U.S. military designed to strengthen bilateral interoperability, capabilities, trust, and cooperation built over decades of shared experiences. *(U.S. Army photo by Maj. Trevor Wild)*

Royal Australian Air Force FLGOFF Ash Johnston, an air battle manager with 2 Squadron, Royal Australian Air Force, discusses Integrated Air & Missile Defense systems with U.S., Australian, and Philippine service members during Exercise Balikatan 24 at Clark Air Base, Angeles, Philippines, April 22, 2024. BK 24 is an annual exercise between the Armed Forces of the Philippines and the U.S. military designed to strengthen bilateral interoperability, capabilities, trust, and cooperation built over decades of shared experiences. *(U.S. Marine Corps photo by Cpl. Nayomi Koepke)*

How We Fight -

1st Cavalry Division, Divisional Air and Missile Defense

By MAJ Joe Van Valkenburg & MAJ Matt Covalt

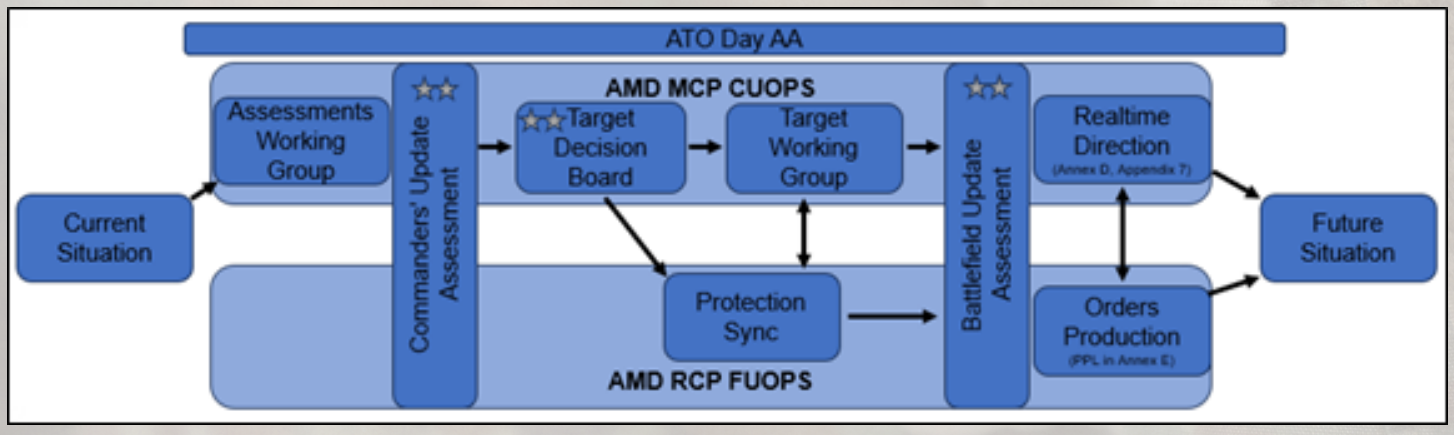
The 1st Cavalry Division is the first division to stand up a co-located maneuver short-range air defense battalion to provide air defense to the division. The successful employment of this capability requires synchronization and integration between the division and battalion staff.

The current modified table of organization and equipment for Divisional Air and Missile Defense Team is designed around the Joint Air Ground Integration Center with a minimal footprint of personnel serving in the main command post and rear command post. Preparing for operations against a peer threat in contested airspace required the division air and missile defense cell to revamp the current personnel layout. The required adjustment will ensure the six warfighting functions are synchronized regarding enemy capabilities and friendly protection. Command Post Exercise 2: Remagen Ready, served as the test bed to enable current operations and future operations to achieve a shared understanding and effectively tie into all warfighting functions.

A consistent question that the 1st Cavalry Division, Divisional Air and Missile Defense Team asked during our military decision-making process was which warfighting function does the divisional air and missile defense team fall under fires or protection? Our answer: the Divisional Air and Missile Defense Team belongs to both. We recommend a structure of personnel that allows the rear command post to focus on future operations while the main command post focuses on current operations.

Rear command post (air and missile defense future operations and protection warfighting functions): The rear command post air and missile defense element served as the lead officer in charge for the protection warfighting functions, adjacent division coordination, III Armored Corps integration, and future operations planning.

Within the protection warfighting functions, divisional air and missile defense developed the division protection priority list in conjunction with the provost marshal office, chemical, biological,



Divisional Air and Missile Defense conducted the planning process each air tasking order day based on this construct.

1CD Commanding General poses with sentinel team after receiving a radar brief during Remagen Ready at Fort Cavazos, Texas, November 7, 2023.

radiological, nuclear, and high yield explosives, and division engineer. The cell also planned for the employment of air and missile defense assets primarily, 6th Battalion, 56th Air Defense Artillery Regiment- M-SHORAD, across the division area of operation.

The rear command post establishes and maintains the protection priority list with a current battlefield framework provided by the main command post, through the assessment working group and coordinated adjustments during the division protection sync. The rear command post facilitated and ran the division protection sync where division staff and subordinate units coordinated the current protection overview based on assessments from the warfighting functions and unit combat postures. This overview produced: risks to mission, risks to force, and mitigation criteria which were considered in the development of the protection priority list by air tasking order day. The recommended protection priority list was then produced for approval at the battle update assessment to the division commander. This information was additionally compiled into request for forces and request for information and the rear command post served as the coordination point with the III Armored Corps protection cell during the corps protection working group.

Command Post Exercise 2: Allowed the opportunity to conduct a unique experiment with the addition of a 14G, air defense battle management system operator, in the rear command post. This soldier served as an air and missile defense workstation operator providing a current air picture to the deputy commanding general- support. Conducting terrain analysis to develop future locations for radar position areas and assessed enemy air avenues of approach to anticipate gaps in coverage within the division area of operation and adjacent divisions. This capability allowed the rear command post to provide detailed planning considerations in the daily published division fragmentary orders and provided the M-SHORAD battalion the ability to focus on current operations while providing a jumpstart for future operations planning.

Main command post (air and missile defense current operations & fires warfighting functions): The main command post element served in the Joint Air Ground Integration Center, the current operations cell, branch and sequel operation

planning with the G35/G5, the assessments working group and participated in the target working group, and target decision board.

The advanced working group initiates the critical path for the air tasking order day with the current situation based on data from the division operations research and systems analysis and G2. The air and missile defense cell validated current statuses of ada assets with the operations research and systems analysis and whether the division can protect items on the pre-planned launch with air and missile defense assets against aerial threats. It is equally important to assess what is affecting combat power in the division and how we can protect the force against these threats. The outputs from the advanced working group provide the inputs for the training working group and protection sync and drives the remainder of planning events for that air tasking order day.

The air and missile defense cell in the main command post is split between the Joint Air Ground Integration Center and current operations integration cell. The Joint Air Ground Integration Center oversees all air and missile defense operations, maintains situational awareness of enemy aircraft, assists identification of unknown aircraft in coordination with the air support operations center and airspace command and control, maintains the tactical air picture, via the air and missile defense workstation, to protect friendly forces and preserve combat power. The air and missile defense Joint Air Ground Integration Center monitors and updates all battle drills, two specifically pertaining to air and missile defense operations, tactical ballistic missiles affecting the division area of responsibility, and aerial threat (fixed wing, rotary wing, and unmanned aircraft systems). The air and missile defense and G2 sections collaborate to provide enemy air avenue of approach assessments to the help prioritize intelligence assets and array air defense assets. Based on these air track trends, they were able to assist the G3 fires section in targeting and destroying enemy airfields, forward arming and refueling points, and ground control stations. This process enabled the first team to proactively protect the division from aerial threats by neutralizing them on the ground through fires.

In the training working group, the air and missile defense cell discuss what aerial threats are operating in the area of operations and which anti-aircraft artillery the enemy is utilizing or assessed to utilize to attack high value targets. Additionally, the training working group is used to make recommendations for changes in the division high-payoff target list and the pre-planned launch based on the current air tasking order cycle. In the training de-brief, the air and missile defense cell brief the outputs from the training working group and protection synchronization to the commanding general on the arrayment of air and missile defense assets across the battlefield and how we anticipate the enemy will fight and risks to mission and risk to forces from aerial threats. This information is compiled and codified into the orders process through the division field artillery fighting document along with any changes to Annex D (Fires), Appendix 7 (Air Defense) or Annex E (Protection).

Shortfalls: We fought through several challenges captured in our after-action review and are sharing with the Center for Army Lesson's Learned, but overall, we saw success with the adjusted military table of organization and equipment configuration. There are two primary adjustments identified during Command Post Exercise 2 that the air and missile defense cell is looking to modify in the future.

Divisional tactical command post operations: Although the unit established and exercised the division tactical command post multiple times throughout the Command Post Exercise, the Joint Air Ground Integration Center was not exercised in the same manner. When the main command post exercised their ability to jump to an alternate location, the Joint Air Ground Integration Center Cell co-located with Division Artillery until conditions were met at the main command post to regain control of the Joint Air Ground Integration Center. This worked well but showed the benefit of the current military table of organization and equipment structure as well as the current equipment requirement.

Joint Air Ground Integration Center: Not discussed in this paper is beyond line-of-sight surface-to-air systems (i.e. Coyote Interceptor). Will the Joint Air Ground Integration Center chief remain the approving authority for all fires, or will the deputy air and missile defense chief be required to approve surface-to-air engagements? If the

latter, our current concept of how the divisional air and missile defense fights is no longer feasible with current manning. We will provide our thoughts on the best way to integrate this process into an already established identification and kill chain in a later paper.

Conclusion: The importance of air and missile defense in division combat operations is not going away while preparing for operations against a peer threat in a contested airspace with unmanned aircraft systems, rotary wing, fixed wing, and tactical ballistic missile threats. Air and missile defense operations must remain flexible and continue to adapt based on the experiences seen in recent conflicts (Ukraine/Russia or Israel/Hamas) to provide capability to protect friendly combat forces. The air and missile defense cell's integration with all warfighting functions is required and a layered and weighted air defense posture must be maintained when possible.

MAJ Joe Van Valkenburg serves as the Deputy AMD Chief for 1ST Cavalry Division, Fort Cavazos, TX. Previous experiences include Avenger and Patriot positions at the Battery and Battalion level and as an Instructor in the Department of Military Instruction at the United States Military Academy. His military schools include the Air Defense Artillery Basic Officer Leadership Course, Captains Career Course, and the Command and General Staff Officer Course. He holds a bachelor's degree from Texas A&M University and master's degrees from the University of Texas at El Paso and the Command and General Staff College.

MAJ Matt Covalt serves as the Deputy AMD Chief for 1ST Cavalry Division, Fort Cavazos, TX. Previous experiences include MANPAD and Patriot positions at the Battery and Battalion level and has served as an OC/T at the National Training Center. His military schools include the Air Defense Artillery Basic Officer Course, the Marine Expeditionary Warfare School, and the Command and General Officer Course. He holds a bachelor's degree from Virginia Military Institute.

"Air and missile defense operations must remain flexible and continue to adapt based on the experiences seen in recent conflicts."

IBCS: Any Sensor, Best Shooter

By Michael Whetston / Air and Missile Defense Cross-Functional Team

As one of the key signature efforts supporting the Army's Air and Missile Defense (AMD) community, Army Integrated Air and Missile Defense (AIAMD) is the cornerstone of AMD modernization within the U.S. Army. The Integrated Battle Command System is the materiel solution for the AIAMD enterprise that integrates sensors and effectors onto the Integrated Fire Control Network (IFCN) and compounds overall AMD effectiveness by dramatically enhancing the ability to identify, track, engage, and defend against diverse threats.

As part of Project Convergence Capstone 4 (PC-C4), taking place in February and March at locations along the West Coast, the Air and Missile Defense Cross-Functional Team (AMD CFT) is participating in experimentation meant to transform how the Joint forces fight in the future.

According to Chris Wehmeier of the AMD CFT, "Project Convergence is the ideal environment to experiment with, and grow, AMD capabilities in the years to come." Wehmeier went on to say that this is the third experimentation capstone event in which IBCS has participated. "PC 21 saw IBCS expand into the realm of Joint interoperability. By linking our integrated fire control network with our joint partners' composite tracking networks, we learned that technology is catching up to concept, creating an expansive, effective, and robust air defense capability that leverages the best of all services."

In PC 22, experiment design expanded the distances between sensors and shooters to extend the battlespace, added additional nodes to the network to increase the load, and used tactical communications systems rather than commercial systems to provide greater realism. PC-C4 will continue to increase the scope and scale of the network to produce data that can be used to inform future experiments as well as future acquisition and development decisions.

AIAMD combines current and future AMD sensors and weapons into a common integrated fire control capability that allows the warfighter to fully integrate AMD capabilities across all echelons. AIAMD replaces multiple disparate command and control systems, enabling better coordinated engagements, positive control of sensors and weapons, friendly protection, and shared situational understanding.

AIAMD enhances battlefield awareness contributing to improved command and control and integration of systems to produce desired effects. The system's improved awareness and performance combine to provide Soldiers and formations that are more lethal and survivable.

"This is the greatest and most complex modernization of our air and missile defense capability since the Cold War, centered on connecting sensors, shooters and a common

LTAMDS is a new, advanced sensor developed to integrate into the Army Integrated Air and Missile Defense (AIAMD) architecture and will replace the current Patriot radar. The IBCS provides a common mission command and sensor/weapon integration network for all Army AMD echelons that improves protection against threats in complex integrated attack scenarios. *(U.S. Army photos by Nathaniel Pierce)*

"AIAMD/IBCS is more than just a mission command node, it is an integral component of AMD weapon systems."

mission command system," said Col. Bill Parker, Director of the Army Futures Command's Air and Missile Defense Cross Functional Team. "Ultimately, it is about giving our warfighters capabilities sooner and increasing the options available in order to keep pace with our adversaries, making their challenges more complex."

IBCS is envisioned as the direct replacement for the mission command nodes for the Patriot weapon system, the Terminal High Altitude Area Defense (THAAD) weapon system, Army Air and Missile Defense Command (AAMDC) Headquarters, Air Defense Artillery Brigade Headquarters, and Air Defense Airspace Management (ADAM) cells. It enables rapid convergence of sensors, shooters, and mission command components on an integrated fire control network.

Integration efforts of both legacy and developmental sensors/shooters will provide the force with capabilities to defeat emerging threats in a variety of scenarios. These capabilities allow the force commander to form operational air defense task forces, tailored to a specific mission profile and able to integrate with joint and multinational partners.

IBCS achieved Initial Operational Capability and was approved for Full-Rate Production in early 2023.

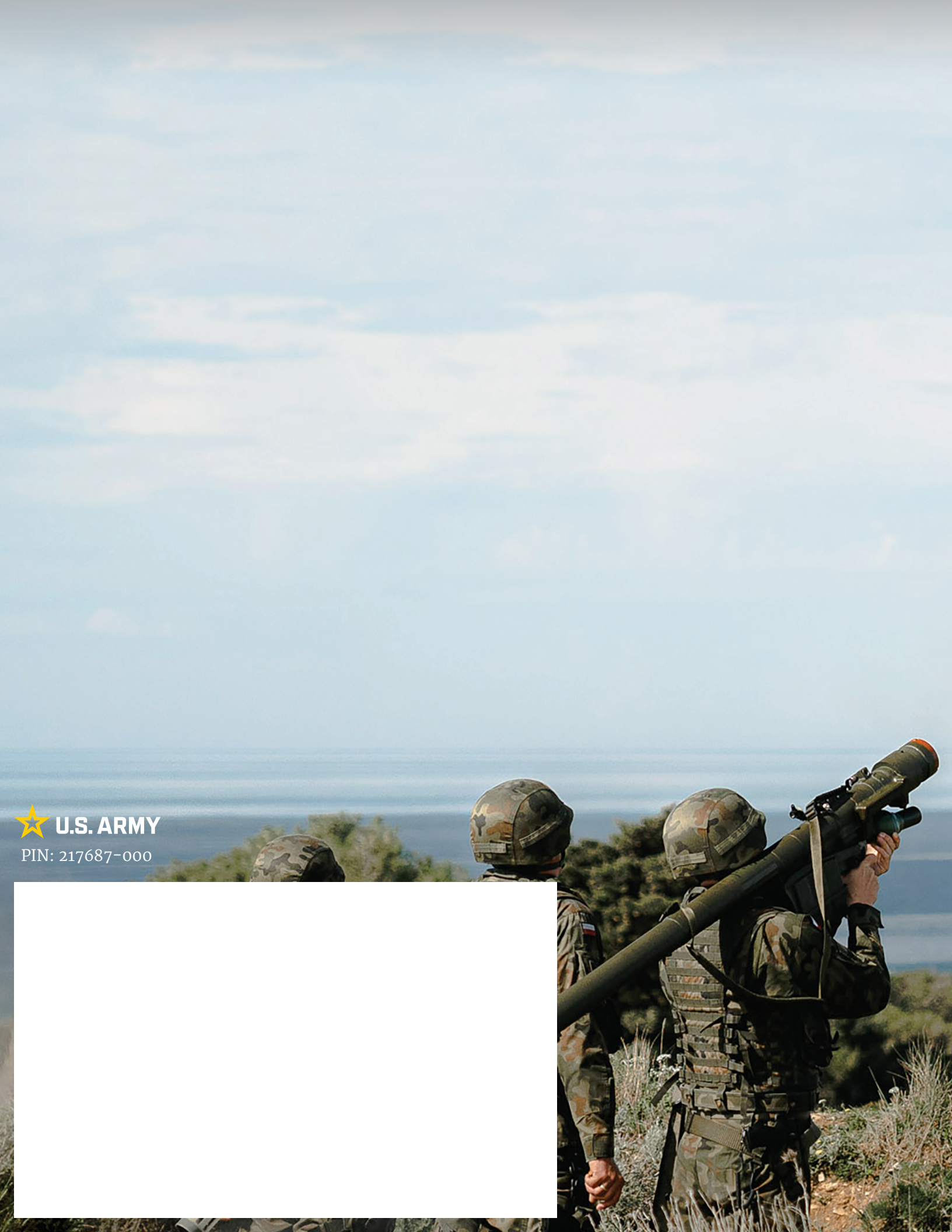
"Achieving IOC for AIAMD/IBCS was a team effort and represented both an accomplishment of monumental magnitude for the Army and a first critical achievement in transforming Army integrated AMD forces to support joint and multinational forces in future operations," according to Parker. "It is the cornerstone of integrated AMD capabilities as we build the Army of 2030 and it lays the foundation for designing integrated AMD forces for the Army of 2040."

Once fully fielded, IBCS will allow AMD forces to be tailored and scaled appropriately to meet the given threat. The quantity and mix of capabilities can be dynamically re-tasked into a formation with an inherent, integrated mission command system to build tiered and layered defenses.

The program will field common mission command nodes for Army AMD forces to defend against manned aircraft, unmanned aerial systems, air-to-ground missiles, tactical ballistic missiles, cruise missiles, and rocket and mortar attacks. IBCS will operate with air surveillance and fire control capabilities across Army, multiservice, and multinational AMD capabilities throughout all echelons.

"Going forward, the Air and Missile Defense Cross-Functional Team, teaming with our military and industry partners, continues to build momentum for AIAMD through testing as part of the Integrated Fires Test Campaign in 2024 and beyond," Parker noted. "AIAMD/IBCS is more than just a mission command node, it is an integral component of AMD weapon systems. It remains our top AMD priority and is an essential part of not only delivering the Army of 2030, but designing the Army of 2040."

Mike Whetston is the Director of Communication for the Air and Missile Defense Cross Functional Team at Fort Sill, Okla. He retired from the Army in 2012 as a field artillery/public affairs officer with 30 years of service. He continued to serve the military during last 12 years as a Department of Defense civilian in a variety of assignments including U.S. Army Africa in Vicenza, Italy; Headquarters, U.S. Army Corps of Engineers in Washington, D.C.; and the 341st Missile Wing at Malmstrom AFB, Mont. before relocating to Fort Sill.



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