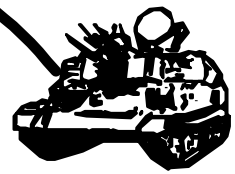
FIRE CONTROL SYSTEM FIELD ARTILLERY AN/GYK-37

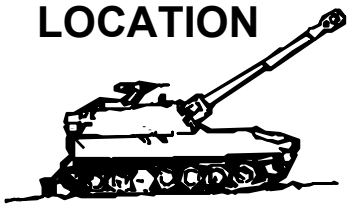
THE BATTERY COMPUTER SYSTEM (BCS)

FIVE REQUIREMENTS FOR ACCURATE PREDICTED FIRE

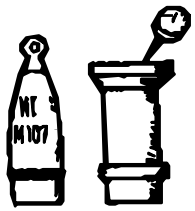
4
ACCURATE MET INFO



2
ACCURATE BATTERY LOCATION



3
ACCURATE AMMO & WPN INFO



1
ACCURATE TARGET LOCATION AND SIZE

5
ACCURATE COMPUTATIONAL PROCEDURES

USAFAS

GUNNERY DEPARTMENT

Manual Solution vs. BCS Solution

• Fm 6-40, FM 6-30, FM 6-50	Weapon Ind. Program
• TFT, GFT, GST, MVCT	Weapon Dep. Program
• GDU Commo	SYS;SETUP
• Radio Nets, Secure/NonSecure	SYS;COMM
• SOI	SYS;SBT
• Firing Chart, Sitmap	AFU;MAP
• COB, ORSTA, AOF	AFU;UPDATE
• Piece Locations	BCS;PIECES
• Ammo Status Board	AFU;AMMO
• XO's Min QE	AFU;MASK
• M90 Readout AVE.	BCS;MVD
• MV Logbook, Historical MVV's	BCS;MVV
• FSCM's	SPRT;BGEOM,SPRT;ZNE
• OBS Location/PRF Codes	FM;OBCO
• TGT List/ Known Points	FM;CFF (RAT)
• Ballistic Met	MET;CM

USAFAS

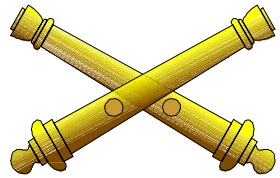
BCS COMPUTES INDIVIDUAL PIECE FIRING DATA USING:

- INDIVIDUAL PIECE LOCATION
- INDIVIDUAL PIECE AIMPOINT
- INDIVIDUAL PIECE MVVs
- INDIVIDUAL PIECE BALLISTIC TRAJECTORIES

MAJOR BCS HARDWARE COMPONENTS

Page 1-1

	QTY
• LIGHTWEIGHT COMPUTER UNIT (LCU)	1
• PRINTER	1
• AC/DC CONVERTER CHARGER	1
• EXTERNAL TACTICAL COMMUNICATIONS INTERFACE MODULE (TCIM)	1
• GUN DISPLAY UNIT (GDU)	1-12



BCS PERFORMANCE CHARACTERISTICS

Page 1-4

- CONDUCT OF AREA FIRE MISSIONS
- LOCATION OF TARGETS USING GRID, POLAR, LASER POLAR, AND SHIFT FROM A KNOWN POINT
- COMPUTATION OF FIRING DATA FOR ALL CURRENT PROJECTILES
- CONDUCTS PRECISION, HB/MPI, AND RADAR REGISTRATION MISSIONS
- CONDUCTS LASER MISSIONS
- CONDUCTS OBSERVER LOCATION PROCESSING (RESECTION, TRILATERATION, AND TRIANGULATION)
- EXECUTES FIRE PLANS
- CORRECTS FOR NON-STANDARD CONDITIONS

BCS PERFORMANCE CHARACTERISTICS

- CONDUCTS TOT MISSIONS AND EXECUTES FIRE PLANS
- PERFORMS ZONE TO ZONE TRANSFORMATION AND REPLOT
- CONDUCTS 3 ACTIVE AND 2 PRIORITY MISSIONS
- OPERATES WITH IFSAS OR AUTONOMOUSLY
- CONDUCTS RELAY OF MESSAGES BETWEEN TWO SUBSCRIBERS
- CONDUCTS/CONTROLS MASSING FOR UP TO 5 OTHER UNITS (BCSs)

BCS CAN STORE

Page 1-5

- 12 HOWITZER LOCATIONS
- 120 TARGETS/KNOWN POINTS (MAXIMUM OF 99 KNOWN POINTS)
- 30 OBSERVER LOCATIONS
- 12 FSCMs
  - MAXIMUM 10 RFAs (CIRCULAR NO FIRE AREAS)
  - ONE, 3 TO 30 POINT, ZONE OF RESPONSIBILITY
  - ONE, 2 TO 30 POINT, FORWARD LINE OF TROOPS(FLOT)
- 24 MASKS (MAXIMUM OF 8 PER HOWITZER)
- 8 SETS OF REGISTRATION CORRECTIONS

BCS CAN STORE

- 2 COMPUTER MET MESSAGES AND 1 STANDARD COMPUTER MET
- 4 FIRE PLANS WITH TOTAL MAXIMUM 78 FIRE PLAN TARGETS
- 72 SUBSCRIBERS
- MVVs STORED BY HOWITZER, PROJECTILE FAMILY, AND PROPELLANT TYPE, 2 MVVs PER PROJECTILE FAMILY/PROPELLANT TYPE MATCH
- BATTERY AMMUNITION STATUS (UP TO 26 PROJECTILES, 9 PROPELLANTS, AND 26 FUZES)
- MAP INFORMATION
- RECEIVED MESSAGES

BCS LIMITATIONS

- ONLY ONE FIRING UNIT AND ONE AZIMUTH OF FIRE ~>

  TECHNICAL FIRE DIRECTION ONLY

- ENVIRONMENTAL CONCERNS

- LANGUAGE/ACCEPTABILITY ~> DOS/WINDOWS 95 VS SCO UNIX

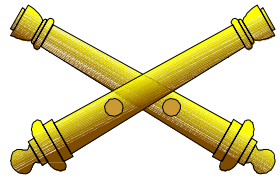
BCS TERMINOLOGY AND DEFINITIONS

BCS UPPER DISPLAY

Page 6-22

DISPLAYS STATUS INFO FOR A MAX OF 3 ACTIVE FIRE MSNS AND 2 CPH PRIORITY MSNS OR ONE CPH PRIORITY TGT AND ONE FPF MSN

KEY	TARGET	OB	MSN	P	PHASE	STATUS	1	2	3	4
1	BN1046	21	AREA		FFE	WR		A		
2	AJ4506	22	REG		TIME	AMC	A			
3	BN1047	71	AREA		ADJ	WR			A	
4	AB1000	70	CPH	5	AA2388	71 FPF	4	5	5	5



BCS MIDDLE DISPLAY

DISPLAYS MESSAGE INDICATOR, CURRENT SYSTEM TIME AND DATE, HOWITZER STATUS, DATA BASE FILES STATUS, INPUT QUEUE STATUS, NUMBER OF SYSTEM WARNINGS, AND SYSTEM DISK UNIT (DU) ACCESS

```
CHK   FIRE:        DATE        TIME        :  DATA/ACK
FIRE  MSN:      01/JAN/89   00:00:00       :  POLL/READY
MSG RCVD:  SW IQ FP TKP OB FC DU            :  FIRE/SHOT
        :   2   4      3                    :  RDS CMPLT
```

BCS LOWER DISPLAY

DISPLAYS CURRENT INDEX OR MESSAGE FORMAT

SYS;SETUP;C:UN ;CALIBR:155MM ;MODEL:Ml09A3;

TIME: / / ;DATE: / / ;TGTNO: / ;

METUSE: ;METUPD: ;METDEL: ;

ATP: ;MPOLL: ;PRINT: / ;SCREEN: ;BEEP: ;ALMVOL: ;DRI: ;

ATHFM: ;ATHDB: ;MTOTMR: ;

CPHVTI: ;RPTAMO: / / / / ;FSOXMIT: / / / / ;

COMMAD: ;COMMRS: ;GDUCOMM: / ;GDUPREAM: ;

INDEX

Page 1-5

- LIST OF DISPLAY OPTIONS THAT IS PRESENTED BY THE BCS
- USED TO SELECT THE MESSAGE FORMAT OR INDEX TO BE DISPLAYED

```
SYS;INDEX;C:---;
  1:INPUT QUEUE
  2:MESSAGE SKELETONS
  3:DATA BASE
  4:FIRE PLANS                    - OF 4
  5:SYSTEM SETUP/SUBSCRIBERS     -- OF 72
  6:SYSTEM WARNINGS              -- OF 12
  7:FIRE PLAN GROUP ENTRY
  LAST DATA BASE RECORDING       --/---/-- --/--/-- (-)
  TARGET NUMBER BLOCK            ------/----
  NEXT TARGET NUMBER             ------
SELECT:--;
```

BCS MESSAGE FORMATS

ALLOWS THE BCS OPERATOR TO ENTER DATA INTO THE BCS FOR DATABASE OR FIRE MSNS

SYS;SETUP;C:__;CALIBR:_____;MODEL:_____;
TIME:__/__/__;DATE:__/__/__;TGTNO:_____/____;
METUSE:_;METUPD:_;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:_/_/_/__/___;FSOXMIT: / / / / ;
COMMAD:_;COMMRS:__;GDUCOMM:_/_;GDUPREAM:___;

FIELD

- LOCATION IN WHICH INFORMATION IS ENTERED OR DISPLAYED
- BEGINS WITH ITS NAME AND ENDS WITH A SEMICOLON (;)

ADDR:_;

SUBFIELD

- DATA ITEM THAT PROVIDES SPECIFIC INFORMATION ABOUT ITS FIELD
- A FIELD MAY HAVE SEVERAL SUBFIELDS SEPARATED BY SLASHES (/)

POLAR:____/____/_____;

ITERATION

- DESCRIBES MULTIPLE ENTRIES OF SIMILAR INFORMATION IN A SINGLE FIELD
- A FIELD MAY HAVE SEVERAL ITERATIONS SEPARATED BY COMMAS (,)

PLOT:_____/_/____,_____/_/____,_____/_/____;

DEFAULT

- A PREDETERMINED VALUE ASSIGNED TO A SPECIFIC FIELD OR SUBFIELD
- IF NO OTHER ENTRY IS MADE IN THE FIELD OR SUBFIELD, THE COMPUTER ASSIGNS THE DEFAULT VALUE

MNEMONIC

- AN ABBREVIATED FORM OF A WORD OR GROUP OF WORDS
- MOST COMMONLY USED FOR AMMUNITION (APPENDIX B)

FIELD ENTRIES

- REQUIRED ENTRY - Describes a data area that requires an entry by the operator for processing to take place
- OPTIONAL ENTRY - Describes a data area that does not require an entry by the operator for processing to take place
- CONDITIONAL ENTRY - Describes a data area where an entry is made or not made, depending on the entry in another data area
- PROTECTED FIELD - A field which is reserved for the BCS, the operator is prevented from making an entry

BCS DATABASE CONSTRUCTION

POWER UP PROCEDURES

- ENSURE ALL ATTACHED PERIPHERALS ARE OFF
- TURN ON AND ADJUST RADIOS AND AMPLIFIER/POWER SUPPLY GROUP
- IF AVAILABLE, TURN ON PRINTER
- IF TO BE USED, TURN ON KY-57 AND COMSEC
- TURN ON TCIM
- ENSURE HARD DISK DRIVE IS INSTALLED PROPERLY AND NO FLOPPY DISK IS INSTALLED
- SET ON/OFF SWITCH ON LCU TO ON

SYSTEM WEAPONS INDEX

Page 4-2

- Used to initialize the system
- Select weapon system to construct a new database or database number/flexible disk to restore a previously saved database

```
SYS;WEAPONS;C:___;        VERSION 10.022 - XXXXXXXX


1:155MM/M109A2             8:105MM/M102
2:155MM/M109A3             9:105MM/M119
3:155MM/M109A5/A6         10:8IN/M110A2
4:155MM/M114A1            11:14.5MM/M31
5:155MM/M114A2            12:DATABASE1  __/___/__ __/__/__ ______/______
6:155MM/M198              13:DATABASE2  __/___/__ __/__/__ ______/______
7:105MM/M101A1             14:FLEXIBLE DISK UNIT DATABASE


SELECT:__;
```

LINKED MESSAGES

Page 4-3

- BCS requires the operator to enter the minimum information needed to establish/restore a database
- BCS displays required MSG formats in sequence
- After completion of linked messages the BCS has the minimum amount of information needed to conduct Fire Missions
- New database = Seven linked messages
- Restored database = Three linked messages

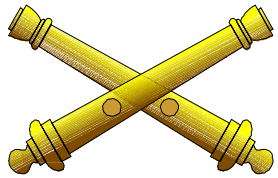
SYS; SETUP

Page 4-3 to 4-6

Used to set BCS operating parameters: Hardware setup, GDU communications, etc.

SYS;SETUP;C:__;CALIBR:_____;MODEL:_____;
TIME:__/__/__;DATE:__/__/__;TGTNO:_____/____;
METUSE:_;METUPD:_;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:_/_/_/__/___;FSOXMIT: / / / / ;
COMMAD:_;COMMRS:__;GDUCOMM:_/_;GDUPREAM:___;

GUNNERY DEPARTMENT



SYS;SETUP;C:__;CALIBR:155MM_;MODEL:M198;
TIME:__/__/__;DATE:__/__/__;TGTNO:**AB1000/1100**;
METUSE:_;METUPD:**1**;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:**_/_/_/3_/10_**;FSOXMIT: / / / / ;
COMMAD:**5**;COMMRS:__;GDUCOMM:**2/W**;GDUPREAM:___;

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GUNNERY DEPARTMENT

SYS;SETUP;C:__;CALIBR:155MM_;MODEL:M198;
TIME:__/__/__;DATE:__/__/__;TGTNO:**AB1000/1100**;
METUSE:**1**;METUPD:**2**;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:**_/_/_/3_/10_**;FSOXMIT: / / / / ;
COMMAD:**5**;COMMRS:__;GDUCOMM:**2/W**;GDUPREAM:___;

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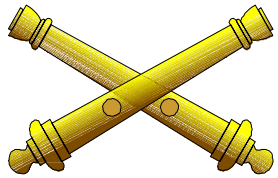
GUNNERY DEPARTMENT



SYS;SETUP;C:__;CALIBR:155MM_;MODEL:M198;
TIME:__/__/__;DATE:__/__/__;TGTNO:**AB1000/1100**;
METUSE:**2**;METUPD:**1**;METDEL:**1**;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:**_/_/_/3_/10_**;FSOXMIT: / / / / ;
COMMAD:**5**;COMMRS:__;GDUCOMM:**2/W**;GDUPREAM:___;

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SYS; COMM

Page 4-6 to 4-8

- Used to set BCS external communication parameters: 1 Channel for GDUs, 3 Channels for external communications
- No entries can be made in the channel specified for GDU communication
- All other channels require entries

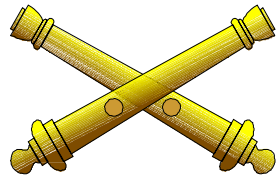
SYS;COMM:C:__;SYSTAT:__;FU:_/_/_/_/__;AUTH: ;
CH1:ADDR:_;DELAY:__;PREAM:__;RATE:__;MODE:_;FSK:_;CD:___;COMOVR:_;
CH2:ADDR:_;DELAY:__;PREAM:__;RATE:__;MODE:_;FSK:_;CD:___;COMOVR:_;
CH3:ADDR:_;DELAY:__;PREAM:__;RATE:__;MODE:_;FSK:_;CD:___;COMOVR:_;
CH4:ADDR:_;DELAY:__;PREAM:__;RATE:__;MODE:_;FSK:_;CD:___;COMOVR:_;

SYS; SBT

Page 4-8 to 4-11

- Used to list all units that the BCS can communicate with on the 3 external communications channels
- Up to 72 subscribers
- 10 per format ~> new format displayed after entry

GUNNERY DEPARTMENT



SYS;SBT;C:UN;

01CA:_/_;L;_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

02CA;_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

03CA;_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

04CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

05CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

06CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

07CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

08CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

09CA:_/_;L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

10CA:_/_:L:_/_/_/__/___:D:_;T:_;S:_____/_____;RLY:_;

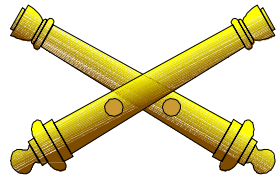
USAFAS

SPRT; MAP

Page 4-11 to 4-17
GZ (determined from legend of military map fig. 4-9)
SPHERE (appendix A, table A-10)

- Used to define BCS geographic area of operations (i.e. its an electronic firing chart!)
- If the SPRT; MAP is entered correctly most other coordinates in BCS can be entered as 5 X 5 grids
- Fig. 4-10, page 4-15
  - » Inside base GZ & map mod = 5 X 5 coords w/o GZ
  - » Inside base GZ but outside map mod = 6 X 8 coords w/o GZ
  - » Outside base GZ but inside map mod = 5 X 5 coords w/ GZ
  - » Outside base GZ & map mod = 6 X 8 coords w/ GZ

GUNNERY DEPARTMENT



SPRT;MAP;EAST:_____/_____;NORTH:_____/_____;GZ:___;SPHERE:_;
LATD:_/__/__/__._/__/__/__._;LONGD:_/__/__/__._/__/__/__/__._;
MAJX:___._;MINX:___._GD:__;

USAFAS

AFU; UPDATE

Page 4-17 to 4-20

- **Used to store information about the firing unit that is needed by the BCS for technical fire direction**
- **Also used to update higher elements on unit status**

AFU;UPDATE;FU:_/_/_/__/___;WPN:155MM;MODEL:M198;MSN:___;ZONE:_____;
CORD:_____/_____/_____;GZ:___;DTG:__/__/__;
APL:_/_/_;WSTR:__ ;AZ:____;RT:_;RS:_;TIME0:___;TRAVLR:____/____;
MINRNG:_____;MAXRNG:_/_____,_/_____,_/_____,_/_____,_/_____;
READY:_;OUTTIL:__/__/__;
PTEMP:____;MAXEL:____;ST:_;DF:____;FULAT:___._;
ORSTA:_____/_____/_____;ORSTBGZ:___;
ORSTB:_____/_____/_____;ORSTAGZ:___;

BCS; PIECES

Page 4-21 to 4-24

- Used to store howitzer locations, operational & commo status, and groupings of up to 12 guns
- Applies Requirement #2
- Howitzers can be located using 1 of 3 methods:
  - Grid coordinates
  - Polar from an aiming circle
  - Polar from another gun (reciprocal laying)
- Azimuth (NOT Deflection) entered for polar data
- Math step (page 4-22, paragraph b):

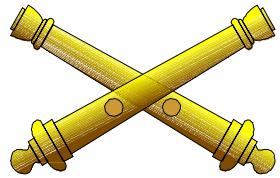
  Azimuth of Lay
  + Final Lay Deflection
  = Azimuth to Howitzer

BCS; PIECES

Page 4-21 to 4-24

- **Key Fields:**
  - OK (operational status)
    - » Used to determine if gun can fire during mission
    - » Used to determine if BCS can xmit digital messages to gun
    - » Used to track ammunition (page 4-25)
      - Digital Commo = BCS subtracts rounds after GDU response
      - Voice Commo = BCS subtracts rounds after F1 is pressed
    - » Used to select the guns to fire a CPHD mission (“C” or “W”)
    - » Used to delete guns (“D”)
  - GROUP (required entry)
  - GRID (either grid or polar required)
  - FG (defaults to ORSTA)
  - POLAR (Azimuth, Distance, VA [not required])

GUNNERY DEPARTMENT



G01;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G02;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G03;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G04;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G05;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G06;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G07;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G08;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G09;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G10;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G11;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;
G12;OK:_;GRP:_;CORD:_____/_____/_____;FG:__;POLAR:____/____/_____;

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AFU; AMMO

Page 4-24 to 4-26

- Used to store information about the firing units ammunition (type, lot, weight, & quantity)
- Stored by firing unit <u>not</u> by individual piece
- Updated automatically based on GDU status
- Uses mnemonics (appendix B)

AFU;AMMO;_;FU:_/_/_/__/___;DTG:__/__/__;
PROJA:___/_/___._/____,___/_/___._/____,___/_/___._/____;
PROJB:___/_/___._/____,___/_/___._/____,___/_/___._/____;
PLOT:_____/_/____,_____/_/____,_____/_/____;
FZES:____/____,____/____,____/____,____/____,____/____,____
MMQ:____/__/___,____/__/____,___/___/__,____/___/___

ADDITIONAL DATABASE FORMATS

Page 4-26

- AFU; AMMO ends the seven linked messages
- SYS; INDEX is displayed (BCS MAIN INDEX)
- BCS has minimum information needed to conduct a Fire Mission
- Additional database formats add information to BCS databases that enhance Fire Mission processing
  - Safety Data
  - Fire Support Coordination Measures/Planned TGTS/KN PTS
  - Non-standard conditions/5 RFAPF
- Not every one is required (METT-T dependent)
- Not Linked ~> Must display each message format from Message Skeletons or BCS; DBSUM

BCS MAIN INDEX

Page 3-12

Main point for entering the system

```
SYS;INDEX;C:---;
  1:INPUT QUEUE
  2:MESSAGE SKELETONS
  3:DATA BASE
  4:FIRE PLANS                    - OF 4
  5:SYSTEM SETUP/SUBSCRIBERS     -- OF 72
  6:SYSTEM WARNINGS              -- OF 12
  7:FIRE PLAN GROUP ENTRY
  LAST DATA BASE RECORDING       --/---/-- --/--/-- (-)
  TARGET NUMBER BLOCK            ------/----
  NEXT TARGET NUMBER             ------
SELECT:--;
```

MESSAGE SKELETONS

Page 3-15 to 3-16

Allows the operator to select a blank format

SYS;MSGSUM;C:---;

1:FM;CHECK
2:FM;OFF
3:FM;SUBS
4:FM;NUKE
5:FM;INTM
6:FM;QF
7:FM;FOOMD
8:FM;OBOO
9:FM;MTO
10:AFU;AMMO
11:AFU;MASK
12:AFU;REG
13:BCS;MMD
14:BCS;COMD
15:SPRT;BGEOM
16:SPRT;ZNE
17:SPRT;LOC
18:NNFP;OFF
19:MET;OM
20:HOW;UPDATE
21:HOW;AMOUP
22:HOW;REQUST
23:HOW;MOVE
24:HOW;OBSR
25:ATI;AZR
26:ATI;ODR
27:ATI;SHR
28:SYS;PTM
29:SYS;RING

SELECT:--;

BCS DATABASE SUMMARY

Page 3-1 to 3-2

Main point for reviewing or selection for entry of database information

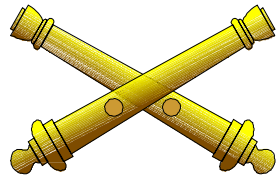
```
BCS;DBSUM;
  1:MAP MOD                          5:MET1
  2:UPDATE/PIECES   -- OF 12         6:MET2
  3:AMMO                             7:OBSERVERS        -- OF  30
      SHELLS        -- OF 26         8:TARGETS/KNPTS    --- OF 120
      POWDERS        - OF  9         9:GEOMETRY         -- OF  12
      FUZES         -- OF 26        10:MAV
  4:MASKS           -- OF 24        11:REGISTRATIONS     - OF   8

SELECT:--;
```

AFU; MASK

Page 4-26 to 4-28

- Similar to XO's MIN QE, Checks to ensure trajectory clears any immediate crests
- Performs check using howitzer's computed trajectory on each set of Firing Data
- Warning displayed on BCS if violated, BCS will not stop you from firing the mission!
- 8 per howitzer, 24 total for all howitzers
- Key Fields:
  - MASKA (mask #, L AZ or DF, R AZ or DF, RNG, site to crest)
  - GUN (required entry, only 1 gun per format!)
  - MASK:1/ (AZ or DF, defaults to AZ)

GUNNERY DEPARTMENT



AFU;MASK;FU:_/_/_/__/___;DELETE:_;
MASKA:_/____/____/____/_____;
MASKB:_/____/____/____/_____;
MASKC:_/____/____/____/_____;
MASKD:_/____/____/____/_____;
MASKE:_/____/____/____/_____;
MASKF:_/____/____/____/_____;
MASKG:_/____/____/____/_____;
MASKH:_/____/____/____/_____;
GUN:__;MASK:1/__,2/__,3/__,4/__,5/__,6/__,7/__,8/__;

USAFAS

BCS MVV STORAGE

Page 4-28

- BCS stores an individual MVV file for each howitzer, part of Requirement #3
- Up to 12 MVV files in Database
- Gun # in BCS; PIECES = MVV file #
- Storage criteria (page 5-15):
  - By gun #
  - By projectile family
  - By propellant type
  - By charge group combination

    (2 charges per projectile lot/propellant type combination)
- MVVs can be entered as Historical or M90 data
- MVVs are applied to subsequent Fire Mission if application criteria met

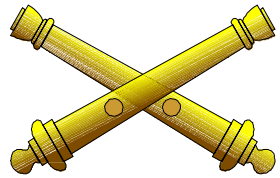
BCS; MVD

Page 4-30 to 4-31

- Used to enter M90 chronograph data into database
- Converts M90 Readout AVE into a Calibrated MV based on projectile square weight and prop temp
- Calculates MVV based on programmed STD MV

BCS;MVD;GUN:**1** ;CHG:**4**;LOT:**A/G**;FZE:**PDA_**;PTEMP:**80___**;
M90;MV:**317.6**;

GUNNERY DEPARTMENT



BCS;MVV:GUN:1_;
MVV1:HEA/M3A1__/4/__***1.2/M***,HEA/M4A2__/6/__0.0/_,HEA/M119A1/8/__0.0/_;
MVV2:HEA/M119A2/8/__0.0/_,HEL/M3A1__/4/__0.0/_,HEL/M4A2__/6/__0.0/_;
MVV3:HEL/M119A1/8/__0.0/_,HEL/M119A2/8/__0.0/_,HER/M4A2__/7/__0.0/_;
MVV4:HER/M119A1/8/__0.0/_,HER/M119A2/8/__0.0/_,CPH/M3A1__/4/__0.0/_;
MVV5:CPH/M4A2__/6/__0.0/_,CPH/M119A1/8/__0.0/_,CPH/M119A2/8/__0.0/_;
MVV6:HEM/M4A2__/7/__0.0/_,HEM/M119A1/8/__0.0/_,HEM/M119A2/8/__0.0/_;
MVV7:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV8:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV9:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;

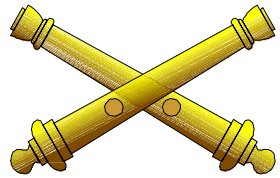
USAFAS

BCS; MVV

Page 4-28 to 4-30

- Used to store MVV data for a specific howitzer or to enter Historical MV data into database
- List all legal projectile family/prop type combinations
- Can use to enter historical data using blank iterations
- Key Fields:
  - MVV
    - » Projectile Family ~> lists head of family, HEF converted to HEL
    - » Propellant Type ~> no Propellant Lot
    - » Calibrated Charge ~> 2 per proj family/prop type combination
    - » Calibrated MV/MVV ~> Stored data = MVV
      Entered data = Calibrated MV or MVV
    - » Type of MVV data ~> M, H, or D

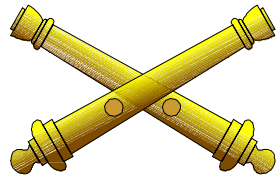
GUNNERY DEPARTMENT



BCS;MVV:GUN:1_;
MVV1:HEA/M3A1__/4/__1.2/M,HEA/M4A2__/6/__0.0/_,HEA/M119A1/8/__0.0/_;
MVV2:HEA/M119A2/8/__0.0/_,HEL/M3A1__/4/__0.0/_,HEL/M4A2__/6/__0.0/_;
MVV3:HEL/M119A1/8/__0.0/_,HEL/M119A2/8/__0.0/_,HER/M4A2__/7/__0.0/_;
MVV4:HER/M119A1/8/__0.0/_,HER/M119A2/8/__0.0/_,CPH/M3A1__/4/__0.0/_;
MVV5:CPH/M4A2__/6/__0.0/_,CPH/M119A1/8/__0.0/_,CPH/M119A2/8/__0.0/_;
MVV6:HEM/M4A2__/7/__0.0/_,HEM/M119A1/8/__0.0/_,HEM/M119A2/8/__0.0/_;
MVV7:**HEF/M3A1__/4/_-1.8/H**,___/_____/_/___._/_,___/_____/_/___._/_;
MVV8:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV9:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;

USAFAS

GUNNERY DEPARTMENT



BCS;MVV:GUN:1_;
MVV1:HEA/M3A1__/4/__1.2/M,HEA/M4A2__/6/__0.0/_,HEA/M119A1/8/__0.0/_;
MVV2:HEA/M119A2/8/__0.0/_,HEL/M3A1__/4/_***-1.8/H***,HEL/M4A2__/6/__0.0/_;
MVV3:HEL/M119A1/8/__0.0/_,HEL/M119A2/8/__0.0/_,HER/M4A2__/7/__0.0/_;
MVV4:HER/M119A1/8/__0.0/_,HER/M119A2/8/__0.0/_,CPH/M3A1__/4/__0.0/_;
MVV5:CPH/M4A2__/6/__0.0/_,CPH/M119A1/8/__0.0/_,CPH/M119A2/8/__0.0/_;
MVV6:HEM/M4A2__/7/__0.0/_,HEM/M119A1/8/__0.0/_,HEM/M119A2/8/__0.0/_;
MVV7:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV8:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV9:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;

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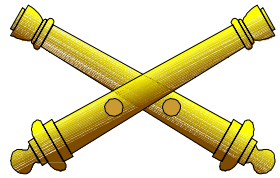
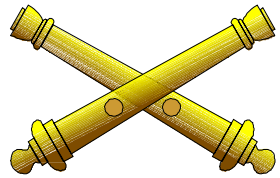
GUNNERY DEPARTMENT



BCS;MVV:GUN:2_;
MVV1:HEA/M3A1__/4/__***2.8/M***,HEA/M4A2__/6/__0.0/_,HEA/M119A1/8/__0.0/_;
MVV2:HEA/M119A2/8/__0.0/_,HEL/M3A1__/4/__0.0/_,HEL/M4A2__/6/__0.0/_;
MVV3:HEL/M119A1/8/__0.0/_,HEL/M119A2/8/__0.0/_,HER/M4A2__/7/__0.0/_;
MVV4:HER/M119A1/8/__0.0/_,HER/M119A2/8/__0.0/_,CPH/M3A1__/4/__0.0/_;
MVV5:CPH/M4A2__/6/__0.0/_,CPH/M119A1/8/__0.0/_,CPH/M119A2/8/__0.0/_;
MVV6:HEM/M4A2__/7/__0.0/_,HEM/M119A1/8/__0.0/_,HEM/M119A2/8/__0.0/_;
MVV7:**HEF/M3A1__/4/298.3/H**,___/_____/_/___._/_,___/_____/_/___._/_;
MVV8:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV9:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;

USAFAS

GUNNERY DEPARTMENT



BCS;MVV:GUN:2_;
MVV1:HEA/M3A1__/4/__2.8/M,HEA/M4A2__/6/__0.0/_,HEA/M119A1/8/__0.0/_;
MVV2:HEA/M119A2/8/__0.0/_,HEL/M3A1__/4/__***0.3/H***,HEL/M4A2__/6/__0.0/_;
MVV3:HEL/M119A1/8/__0.0/_,HEL/M119A2/8/__0.0/_,HER/M4A2__/7/__0.0/_;
MVV4:HER/M119A1/8/__0.0/_,HER/M119A2/8/__0.0/_,CPH/M3A1__/4/__0.0/_;
MVV5:CPH/M4A2__/6/__0.0/_,CPH/M119A1/8/__0.0/_,CPH/M119A2/8/__0.0/_;
MVV6:HEM/M4A2__/7/__0.0/_,HEM/M119A1/8/__0.0/_,HEM/M119A2/8/__0.0/_;
MVV7:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV8:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;
MVV9:___/_____/_/___._/_,___/_____/_/___._/_,___/_____/_/___._/_;

USAFAS

BCS MVV APPLICATION

How FDO should apply MVVs:

- Same gun
- Same proj family
- Same prop lot
- Same charge or to other charges according to an order of preference:
  - » Down 1 chg
  - » Up 1 Chg
  - » Down 2 chgs
  - » Up 2 chgs
  - » To any other prefered chg
  - » From a prefered to a restricted chg

How the BCS will apply MVVs:

- Same gun
- Same proj family
- Same prop type
- Same charge or to other charges according to an order of preference:
  - > Down 1 chg
  - > Up 1 Chg
  - > Down 2 chgs
  - > Up 2 chgs
  - > Down 3 chgs
  - > Up 3 chgs

BCS <u>will</u> transfer a restricted chg!

NEVER transfer a restricted chg!

FM; OBCO

Page 4-31 to 4-32

- **Used to enter observer information into database**
- **Helps meet Requirement #1**

FM;OBCO;CAKKEY:__;OB:__;CLDHT:___;GLLDCO:___;VISIB:__;
CORD:_____/_____/_____;GZ:___;SPHERE:_;DTG:__/__/__
ECRD:_____/_____;EDT:__/___/_;EOB:____;

SPRT; BGEOM

Page 4-33 to 4-34

- Used to store an RFA or FLOT in database
- Performs check using howitzer's computed trajectory on initial set of Firing Data only
- Warning displayed on BCS if violated ~> BCS will not stop you from firing the mission!
- RFA = 1 grid w/radius, FLOT = 2 to 30 grid (L to R)

SPRT;BGEOM;___ /_____;DELETE: ;EDTG:__/__/__;_/_/_/__/___;
WIDTH:____;FCORD:_____;APL:_/_/_;
CORD1:__/_____/_____/_____,__/_____/_____/_____;
CORD2:__/_____/_____/_____,__/_____/_____/_____;
CORD3:__/_____/_____/_____,__/_____/_____/_____;
GZ:___;SPHERE:__;AP:_

SPRT; ZONE

Page 4-34 to 4-36

- **Used to store a ZONE of operations in database**
- **Performs check using howitzer's computed trajectory on <u>initial set of Firing Data only</u>**
- **Warning displayed on BCS if violated ~> BCS will not stop you from firing the mission!**
- **At least 3 points required**
- **AP (used if over 12 points in ZONE ~> displays new blank format)**

SPRT;ZNE;NAME:_____;DELETE:_;DTG:__/__/__;
CORD1:__/_____/_____,__/_____/_____,__/_____/_____;
CORD2:__/_____/_____,__/_____/_____,__/_____/_____;
CORD3:__/_____/_____,__/_____/_____,__/_____/_____;
CORD4:__/_____/_____,__/_____/_____,__/_____/_____;
GZ:___;SPHERE:__;AP:_

FM; CFF

Page 4-38 to 4-40

- Used to store a TGT or KN PT in database
- Also used to process Fire Missions!

FM;CFF:_;TGT:_____;KNPT:__;CORD:**65500_/42280___/375__**;GZ:___;RV:___;
OB:__;FST:__;DIR:____/__;DIST:____;SHIFT:_/____/_/____/_/____;
LAS:____;TYPE:_____/_____;DOP:_____;SIZE:____/____;ATT:____;
CONT:____/____;ME:____/___;TIME:__/__;MIS:_;PRI:_;PTM:_____;
ASF:___/____;SH:**SMA/___**;FZ:**PDA_/____**;RDS:__;VOL:__;STR:____;
EOM:**X**;RAT:**K**;ASNFPF:_;UFFE:_/_/_/__/___,_/_/_/__/___
LOT:_/_;CHG:_;LOTS:_/_/_/_;CHGS:_/_;FIRINT:___;
PTF:____;SPTF:__/__/__/__;SHTF:_/_/_/_/_/_/_/_;
PFFE:____;SHFFE:_/_/_/_/_/_/_/_;
HOB:____;RG:_____;TOF:___._;MAXORD:_____;
SHEAF:____;VOLCMD:_;CSLOAD:_;RPT:_;

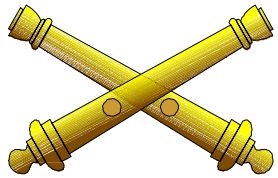
MET; CM

Page 4-36 to 4-37

- Used to store a Computer MET message in database
- Up to 2 MET MSG on file (BCS always has STD MET)
- BCS applies MET data to correct firing data, covers Requirement #4
- Must have number in METUPD to store in DB
- Must perform MET update procedures after entry (page 4-38)

```
MET;CM;Q:_;POSI:_____;DTI:__/__._/_;HGT:___;ATMS:___;
LINEA:__/___/___/___._/____,__/___/___/___._/____,__/___/___/___._/____;
LINEB:__/___/___/___._/____,__/___/___/___._/____,__/___/___/___._/____;
LINEC:__/___/___/___._/____,__/___/___/___._/____,__/___/___/___._/____;
LINED:__/___/___/___._/____,__/___/___/___._/____,__/___/___/___._/____;
LINEE:__/___/___/___._/____,__/___/___/___._/____,__/___/___/___._/____;
```

GUNNERY DEPARTMENT



SYS;SETUP;C:__;CALIBR:155MM_;MODEL:M198;
TIME:__/__/__;DATE:__/__/__;TGTNO:**AB1000/1100**;
METUSE:**1**;METUPD:**2**;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:_;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:**_/_/_/3_/10_**;FSOXMIT: / / / / ;
COMMAD:**5**;COMMRS:__;GDUCOMM:**2/W**;GDUPREAM:___;

U
S
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S

DATABASE RECORDING PROCEDURES

Page 4-40 to 4-41

- **Save database immediately after completion**
- **DRI field in SYS; SETUP used**
- **X = Overwrite oldest database on hard drive**
  1 = Write to database file #1
  2 = Write to database file #2
  F = Write to floppy disk

SYS;SETUP;C:__;CALIBR:155MM_;MODEL:M198;
TIME:__/__/__;DATE:__/__/__;TGTNO:**AB1000/1100**;
METUSE:**1**;METUPD:**2**;METDEL:_;
ATP_;MPOLL_;PRINT:_/_;SCREEN:_;BEEP:_;ALMVOL:_;DRI:X;
ATHFM:_;ATHDB:_;MTOTMR:__;
CPHVTI:__;RPTAMO:_/_/_/**3**_/**10**_;FSOXMIT: / / / / ;
COMMAD:**5**;COMMRS:__;GDUCOMM:**2**/**W**;GDUPREAM:___;

POWER DOWN PROCEDURES

- RETURN TO MAIN INDEX AND SELECT “7” (SYSTEM SHUTDOWN)
- FOLLOW INSTRUCTIONS ON BCS SCREEN
- TURN OFF PERIPHERAL EQUIPMENT FIRST
- TURN OFF MAIN BCS POWER SWITCH

CONDUCT OF PE

- Known data HO on page 113 of OAC Phasebook
- Blank message formats on page 117
- Follow step-action drills in CH 4 (Minimum keystrokes)
- Highlight default values and required entries
- Work in groups
- Take breaks as needed
- Answer key in back of room
- FT Sill map in back of room
- Save DB before shutdown (you will need it for MP)
- You can leave when you're finished!