A Co Equipment Inventory Database (EID)
12/16/2019
IST 659

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__Project Summary__

By Army regulation, the same individual cannot conduct a sensitive item inventory in consecutive months. Operations Company have 23 different career management fields all with varying equipment needs. Inventorying each sensitive item has become a lengthy process as it is difficult to determine where each piece of equipment is stored, match correct serial numbers and flag which piece of equipment needs a scheduled service. With 800 separate pieces of equipment, 506 being sensitive items, the inventory process takes longer than the allocated 48 hour Inactive Duty for Training Weekend. Given that the same person cannot conduct an inventory each month the ten sections within the company rotate individuals through the inventory each month. The same person seldom gets assigned the inventory so the assigned Soldier does not have familiarity with location and identification of equipment.

How the relevant information is stored is also splintered. Equipment nomenclature, line item number and serial numbers are only found on the equipment sub-hand receipts, the document assigning accountability of section equipment to a specified owner. This database will be utilized to accurately catalog each sensitive item, serial number, section and location. It will also calculate equipment scheduled services.
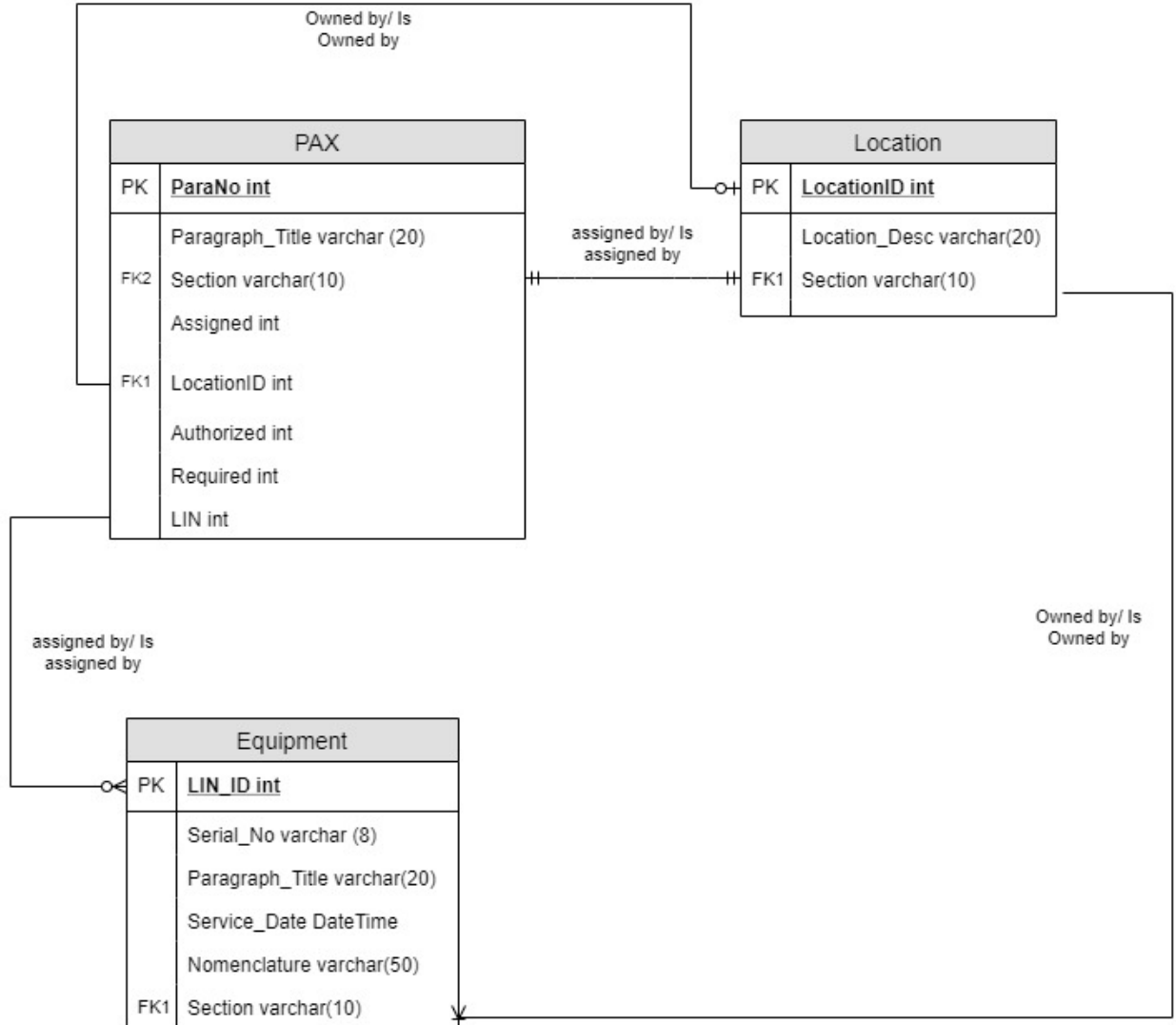
The unit Supply Sergeant can query for the equipment location, serial number and section owner, giving the individual conducting the inventory relevant information to quickly identify and locate section equipment.

The Tables will be populated via an excel spreadsheet that contains the following Fields:

Paragraph Number	Paragraph Title	Section	Line Number (LIN)
Nomenclature Required	Authorized	Assigned	Service Date
Serial	Number Location	Description	Location ID
NIIN	Equipment Type	Equipment Description	
Key Number			

The majority of the relevant information is the Section, Serial Number, Location, Key Number and service date. Being able to quickly identify this information answers the questions of *Where is the equipment located? Who owns the equipment that is missing? When is the equipment due for service?*

The Conceptual/Logical Model

Owned by/ Is
Owned by

PAX

PK	ParaNo int
	Paragraph_Title varchar (20)
FK2	Section varchar(10)
	Assigned int
FK1	LocationID int
	Authorized int
	Required int
	LIN int

assigned by/ Is
assigned by

Location

PK	LocationID int
	Location_Desc varchar(20)
FK1	Section varchar(10)

Owned by/ Is
Owned by

assigned by/ Is
assigned by

Equipment

PK	LIN_ID int
	Serial_No varchar (8)
	Paragraph_Title varchar(20)
	Service_Date DateTime
	Nomenclature varchar(50)
FK1	Section varchar(10)

Normalized Logical Model

Inventory(<u>ParaNo,</u> Paragraph_Title, <u>Section</u>, <u>LocationID</u>, Location_Desc, Serial_No, Service_Date, Nomenclature)

Equipment(<u>LIN_ID,</u> Serial_Number, Paragraph_Title, Service_Date, Nomenclature, <u>Section)</u>

Location(<u>LocationID</u>, Location_Desc, <u>Section)</u>

User Interface

For ease of the inexperienced user, the front-end user interface would be a MS Access form with various pre-set queries for routine reporting requirements. The form interface option specifies what would need to entered to update the database and provide simple, click button options to generate frequent inquires.

The first part of the form allows the Unit Supply Sergeant to update information as equipment allocation changes. The second part of the form run report specific queries to generate routine inspection requirements.

Sensitive Items

The Sensitive items report would provide the listing of all sensitive items that have to be inventoried each month. The report includes location, key numbers, and assigned section.

Missing Equipment

Assists the Company Executive Officer and Supply Sergeant identify which section owns the missing equipment by entering the serial number when prompted.

Equipment by Location

Provides listing of equipment located in a specific storage unit or location by use of a parameter calling for the location abbreviation.

Due Maintenance Service

Identifies what piece or pieces of equipment are due for service by entering "Immediate" or "Scheduled" in the parameter prompt. The listing would include section owner of equipment, seral number, location and key assigned.

Significance of the Database

Unit leadership could leverage this database to accurately identify the location, section owner, assigned keys etc. to the unit equipment. The database could also be used to determine when a piece of equipment is due for immediate or scheduled service. See queries with sample results below:

Find specific type of equipment

```
145
146    ---Find Where all AN/PSC-5 Radio sets are located and which sections own them
147
148  SELECT s.Section
149          ,e.Nomenclature
150          ,a.Serial_Number
151          ,l.Location_Desc
152   From dbo.Sections s
153   JOIN dbo.Storage_Loc l ON l.LIN = s.LIN
154   JOIN dbo.Unit_Equipment e ON e.LIN = s.LIN
155   JOIN dbo.Allocations a ON a.LIN = s.LIN
156   Where e.Equipment_DESC = 'AN/PSC-5'
157
158
159  |
160
```

Results   Messages

Section	Nomenclature	Serial_Number	Location_Desc
G3_CUOPS	RADIO SET: AN/PSC-5	873675474	BUILDING 4 CAGE 20
AVIATION	RADIO SET: AN/PSC-5	875406334	BUILDING 4 CAGE 20
AVIATION	RADIO SET: AN/PSC-5	877396823	BUILDING 4 CAGE 20
FIRES	RADIO SET: AN/PSC-5	882762489	BUILDING 4 CAGE 20
PROTECTION	RADIO SET: AN/PSC-5	888128155	BUILDING 4 CAGE 20
AMD	RADIO SET: AN/PSC-5	889685929	BUILDING 4 CAGE 20
PROTECTION	RADIO SET: AN/PSC-5	891157160	BUILDING 4 CAGE 20
G3_CUOPS	RADIO SET: AN/PSC-5	896090111	BUILDING 4 CAGE 20
AVN	RADIO SET: AN/PSC-5	897907514	BUILDING 4 CAGE 20
FIRES	RADIO SET: AN/PSC-5	900763433	BUILDING 4 CAGE 20
PROTECTION	RADIO SET: AN/PSC-5	902407750	BUILDING 4 CAGE 20

Identify which equipment is stored where and is owned by which section

```sql
179
180     --Which equipment is in BUILDING 4, CAGE 8, who owns it and when is it due for service?
181
182   ⊟SELECT se.Section
183        ,se.Nomenclature
184        ,se.Serial_Number
185        ,e.Service_Date
186        ,se.NIIN
187        ,l.key_number
188     FROM dbo.Section_Equipment se
189     JOIN dbo.Unit_Equipment e ON e.LIN = se.LIN
190     JOIN dbo.Storage_Loc l ON l.LIN = se.LIN
191     Join dbo.ACO_EQUIPMENT_DETAILS d ON d.LIN = se.LIN
192     WHERE d.LOCATION_Abv = 'C8'
193
194
195
```

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⊞ Results ⬚ Messages

	Section	Nomenclature	Serial_Number	Service_Date	NIIN	key_number
1	G3_CUOPS	WORKSTATION PORTABLE MULTIFUNCTION: AN/TYQ-93(V)	878954597	2019-05-13 00:00:00.000	A35329	A133
2	AMD	ANTENNA GROUP: OE-254()/GRC	902840465	2020-02-13 00:00:00.000	A79381	A409
3	G3_CUOPS	DISTRIBUTION SYSTEM ELEC: 120/208V 3PH 40AMP	872896587	2019-03-04 00:00:00.000	F55485	A63
4	G3_CUOPS	DISTRIBUTION SYSTEM ELEC: 120/208V 3PH 40AMP	895397767	2019-11-19 00:00:00.000	F55485	A323
5	G3_CUOPS	JOINT CHMCL AGENT: DETECTOR	895484310	2019-11-20 00:00:00.000	J00697	A324
6	PROTECTION	JOINT CHMCL AGENT: DETECTOR	901715406	2020-01-31 00:00:00.000	J00697	A396
7	PROTECTION	RADIAC SET: AN/VDR-2	887868526	2019-08-24 00:00:00.000	R20684	A236
8	PROTECTION	RADIAC SET: AN/UDR-13	887955069	2019-08-25 00:00:00.000	R31061	A237
9	ENGINEERS	RADIAC SET: AN/VDR-2	899119116	2020-01-01 00:00:00.000	R20684	A366
10	ENGINEERS	RADIAC SET: AN/UDR-13	899205659	2020-01-02 00:00:00.000	R31061	A367
11	PROTECTION	RADIAC SET: AN/VDR-2	902148121	2020-02-05 00:00:00.000	R20684	A401
12	PROTECTION	RADIAC SET: AN/UDR-13	902234664	2020-02-06 00:00:00.000	R31061	A402
13	G3_CUOPS	TAPE READER GENERAL PURPOSE: KOI-18/TSEC	874108189	2019-03-18 00:00:00.000	T40405	A77
14	AVIATION	TAPE READER GENERAL PURPOSE: KOI-18/TSEC	875839049	2019-04-07 00:00:00.000	T40405	A97
15	FIRES	TAPE READER GENERAL PURPOSE: KOI-18/TSEC	883195204	2019-07-01 00:00:00.000	T40405	A182
16	G3_CUOPS	TAPE READER GENERAL PURPOSE: KOI-18/TSEC	896436283	2019-12-01 00:00:00.000	T40405	A335
17	G3 CUOPS	UTILITY RECEPTACLE:	874281275	2019-03-20 00:00:00.000	U89185	A79

Identify which equipment have completed scheduled service maintenance

```
170
171    --How many masks have completed scheduled services?
172  □Select se.Section
173        ,count(se.Serial_Number) as total_masks
174
175    From dbo.Section_Equipment se
176    JOIN dbo.Unit_Equipment e ON e.LIN = se.LIN
177    Where se.NIIN = 'M12986' and e.Service_Type ='COMPLETED'
178    Group By Section
179
180    |
181
```

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⊞ Results   📄 Messages

	Section	total_masks
1	AMD	1
2	AVIATION	4
3	AVN	2
4	C2	6
5	CO_HQ	1
6	ENGINEERS	2
7	FIRES	6
8	G3_CUOPS	4
9	G5_FUOPS	2
10	PROTECTION	6

Provide list of all sensitive items

```sql
198  SELECT *
199  From dbo.Section_Equipment
200  Where left([NIIN],1) in ('A','M','R','P')
201
202
203
204
205
206
207
```

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Results | Messages

	PARNO	Section	Serial_Number	LIN	Location_Desc	Key_Number	Nomenclature	Equipment_Type	NIIN
1	2011	CO_HQ	867530921	A867530921	BUILDING 4 CAGE 2	A1	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
2	2101	G3_CUOPS	878954597	A878954597	BUILDING 4 CAGE 8	A133	WORKSTATION PORTABLE MULTIFUNCTION: AN/TYQ-93(V)	WORKSTATION PORTABLE MULTIFUNCTION	A35329
3	2191	PROTECTION	885185693	A885185693	BUILDING 4 CAGE 3	A205	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
4	2231	AMD	888993585	A888993585	BUILDING 4 CAGE 4	A249	AIR DEFENSE SYSTEM INTEGRATOR: AN/MSQ-214	AIR DEFENSE SYSTEM INTEGRATOR	A05021
5	2321	G3_CUOPS	894359251	A894359251	BUILDING 4 CAGE 4	A311	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
6	2351	ENGINEERS	898167143	A898167143	BUILDING 4 CAGE 5	A355	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
7	2361	FIRES	899638374	A899638374	BUILDING 4 CAGE 6	A372	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
8	2371	PROTECTION	901282691	A901282691	BUILDING 4 CAGE 7	A391	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
9	2381	AMD	902840465	A902840465	BUILDING 4 CAGE 8	A409	ANTENNA GROUP: OE-254()/GRC	ANTENNA GROUP	A79381
10	20114	CO_HQ	868655980	M868655980	VAULT 1	A14	MOUNT MACHINE GUN: 40MM MK93	MOUNT MACHINE GUN	M12647
11	20115	CO_HQ	868742523	M868742523	BUILDING 7	A15	MASK CHEMICL BIOLOGICL JOINT SERVICE GENERAL PURP...	MASK CHEMICL BIOLOGICL JOINT SERVICE GENERAL PURP...	M12986
12	20116	CO_HQ	868829066	M868829066	VAULT 1	A16	MACHINE GUN: LIGHT 5.56MM M249	MACHINE GUN	M39263
13	20117	CO_HQ	868915609	M868915609	VAULT 1	A17	MACHINE GUN: CALIBER 50	MACHINE GUN	M39331
14	20118	CO_HQ	869002152	M869002152	VAULT 1	A18	MOUNT TRIPOD MACH GUN 7.62MM:	MOUNT TRIPOD MACH GUN 7.62MM	M60256
15	20119	CO_HQ	869088695	M869088695	VAULT 1	A19	MOUNT GUN: RING CAL .50	MOUNT GUN	M74364
16	20120	CO_HQ	869175238	M869175238	VAULT 1	A20	MOUNT TRIPOD MACHINE GUN: HEAVY CALIBER 50	MOUNT TRIPOD MACHINE GUN	M75577
17	20121	CO_HQ	869261781	M869261781	VAULT 1	A21	MACHINE GUN GRENADE 40MM: MK19 MOD III	MACHINE GUN GRENADE 40MM	M92362

Identify which section owns the missing equipment

```sql
202    ---Who owns the missing equipment?
203  ⊟SELECT PARNO, Section, Serial_Number
204    FROM dbo.Section_Equipment se
205    Where se.Serial_Number in
206    ('877223737'
207    ,'877742995'
208    ,'878175710'
209    ,'878694968'
210    ,'879214226'
211    ,'879820027'
212    ,'880512371'
213    ,'881464344'
214    ,'882329774')
215
216
```

110 %

Results | **Messages**

	PARNO	Section	Serial_Number
1	2066	AVIATION	877223737
2	2073	AVIATION	877742995
3	2084	ENGINEERS	878175710
4	2094	ENGINEERS	878694968
5	2104	G3_CUOPS	879214226
6	2115	G5_FUOPS	879820027
7	2126	G5_FUOPS	880512371
8	2134	FIRES	881464344
9	2148	FIRES	882329774

SQL Code

```
/*Please note that the data in this table is fictional and does not represent the actual capability of a particular
unit*/

--CREATE Base Table Structure
CREATE TABLE Unit_Equipment
        (LIN varchar(20) Not Null,
                Nomenclature varchar(100) Not Null,
                Service_Date DATETIME Not Null,
        CONSTRAINT Unit_Equipment_PK PRIMARY KEY (LIN));

CREATE TABLE SECTIONS
        (PARNO INT Not NULL,
                PARTITLE varchar(100) Not Null,
                SECTION varchar(20) Not Null,
                LIN varchar(20) Not Null,
         CONSTRAINT SECTIONS_PK PRIMARY KEY (PARNO),
         CONSTRAINT SECTIONS_FK1 FOREIGN KEY (LIN) References UNIT_Equipment(LIN));

CREATE TABLE Storage_Loc
        (LocationID varchar(20) Not Null,
        Location_Desc varchar(50) Not Null,
                Key_Number varchar(5) Not Null,
        CONSTRAINT Storage_Loc_PK PRIMARY KEY (LocationID));


CREATE TABLE ALLOCATIONS
        (LIN varchar(20) Not Null,
                PARNO int Not Null,
                REQ int Not Null,
                AUTH int Not Null,
                Assigned int Not Null,
                Serial_Number int Not Null,
        CONSTRAINT AllocationS_PK PRIMARY KEY (LIN));

--Add columns to Equipment Table Describing equipment

ALTER TABLE dbo.Unit_Equipment
ADD Equipment_Type varchar(100) Not Null;

ALTER TABLE dbo.Unit_Equipment
ADD Equipment_DESC varchar(100);

--INSERT Data from imported equipment CSV file
INSERT INTO dbo.Unit_Equipment  (LIN,Nomenclature,Equipment_Type,Equipment_Desc,Service_Date)
SELECT DISTINCT(a.LIN)
                ,a.Nomenclature
                ,a.Equipment_Type
                ,a.Equipment_Desc
                ,a.Service_Date
FROM dbo.ACO_EQUIPMENT_DETAILS a;

INSERT INTO dbo.SECTIONS  (PARNO,PARTITLE,SECTION,LIN)
SELECT a.PARNO
                ,a.PARATITLE
                ,a.SECTION
                ,a.LIN
```

```sql
FROM dbo.ACO_EQUIPMENT_DETAILS a;

--Add additional columns to tables for more filtering options
ALTER TABLE dbo.Storage_Loc
ADD LIN varchar(20) Not Null;

ALTER TABLE dbo.Sections
ADD NIIN varchar(20);

INSERT INTO dbo.Storage_Loc (LocationID, Location_Desc, Key_Number,LIN)
SELECT a.LocationID
        ,a.Location_DESC
        ,a.Key_Number
        ,a.LIN
FROM dbo.ACO_EQUIPMENT_DETAILS a;

INSERT INTO dbo.Allocations (LIN,PARNO,REQ,AUTH,Assigned,Serial_Number)
SELECT a.LIN
        ,a.PARNO
        ,a.REQ
        ,a.AUTH
        ,a.Assigned
        ,a.Serial_Number
FROM dbo.ACO_EQUIPMENT_DETAILS a;

--CREATE VIEW of Section Equipment

CREATE VIEW [Section_Equipment]
AS
Select s.PARNO
                ,s.Section
                ,a.Serial_Number
                ,s.LIN
                ,l.Location_Desc
                ,l.Key_Number
                ,e.Nomenclature
                ,e.Equipment_Type
                ,d.NIIN
From dbo.SECTIONS s
Join dbo.ALLOCATIONS a on s.PARNO = a.PARNO
JOIN dbo.Storage_Loc l on l.lin = s.lin
Join dbo.Unit_Equipment e on e.lin = s.lin
JOIN dbo.ACO_EQUIPMENT_DETAILS d on d.parno = s.parno;


---CREATE PROCEDURE For all Equipment under a Specific NIIN

CREATE PROCEDURE Select_SerialNumbers @NIIN nvarchar(20)
AS
SELECT * FROM dbo.Section_Equipment WHERE NIIN = @NIIN
GO;

Execute Select_SerialNumbers @NIIN = 'N05482'

--Selects all equipment, serial numbers, and locations for a specific section
CREATE PROCEDURE Select_Section @Section varchar(20)
AS
SELECT * FROM dbo.Section_Equipment WHERE Section = @Section
GO;
```

```sql
Execute Select_Section @Section = 'Co_HQ'

---Add maintenance requirements info
Alter Table dbo.Unit_Equipment
Add Service_Type varchar(50)

Alter Table dbo.Unit_Equipment
Add Due varchar(50)

--Identify when a piece of equipment is due for service

UPDATE dbo.Unit_Equipment
SET Service_Type = 'COMPLETED'
WHERE datediff(d,GetDate(),Service_Date)<1

UPDATE dbo.Unit_Equipment
SET Service_Type = 'IMMEDIATE'
WHERE datediff(d,GetDate(),Service_Date) between 1 and 60

UPDATE dbo.Unit_Equipment
SET Service_Type = 'SCHEDULED'
WHERE datediff(d,GetDate(),Service_Date)>60

UPDATE dbo.Unit_Equipment
SET Due = 'YES'
WHERE datediff(d,GetDate(),Service_Date) between 1 and 60

UPDATE dbo.Unit_Equipment
SET Due = 'NO'
WHERE datediff(d,GetDate(),Service_Date)>60 or Service_Type = 'COMPLETED'

Select * From dbo.Unit_Equipment

---Find Where all AN/PSC-5 Radio sets are located and which sections own them

SELECT s.Section
                ,e.Nomenclature
                ,a.Serial_Number
                ,l.Location_Desc
From dbo.Sections s
JOIN dbo.Storage_Loc l ON l.LIN = s.LIN
JOIN dbo.Unit_Equipment e ON e.LIN = s.LIN
JOIN dbo.Allocations a ON a.LIN = s.LIN
Where e.Equipment_DESC = 'AN/PSC-5'


--Identify how many Night Vision Goggles each section owns


Select se.Section
            ,count(se.Serial_Number) as total_NVGs

From dbo.Section_Equipment se

Where se.NIIN = 'N05482'
Group By Section
```

```sql
--How many masks have completed scheduled services?
Select se.Section
        ,count(se.Serial_Number) as total_masks

From dbo.Section_Equipment se
JOIN dbo.Unit_Equipment e ON e.LIN = se.LIN
Where se.NIIN = 'M12986' and e.Service_Type ='COMPLETED'
Group By Section

--Which equipment is in BUILDING 4, CAGE 8, who owns it and when is it due for service?

SELECT se.Section
        ,se.Nomenclature
        ,se.Serial_Number
        ,e.Service_Date
        ,se.NIIN
        ,l.key_number
FROM dbo.Section_Equipment se
JOIN dbo.Unit_Equipment e ON e.LIN = se.LIN
JOIN dbo.Storage_Loc l ON l.LIN = se.LIN
Join dbo.ACO_EQUIPMENT_DETAILS d ON d.LIN = se.LIN
WHERE d.LOCATION_Abv = 'C8'
--Which pieces of equipment are sentitive items?
SELECT *
From dbo.Section_Equipment
Where left([NIIN],1) in ('A','M','R','P')

---Who owns the missing equipment?
SELECT PARNO, Section, Serial_Number
FROM dbo.Section_Equipment se
Where se.Serial_Number in
('877223737'
,'877742995'
,'878175710'
,'878694968'
,'879214226'
,'879820027'
,'880512371'
,'881464344'
,'882329774')
```

Reflection

This project helped me understand the meticulous and detail-oriented requirements in building a simple database. Having previous experience with MS SQL Server, I was able to get through most of the sections with ease however I made various novice mistakes that would set me back in moving forward with completing the database. The first area that gave me some difficulty was realizing that primary keys could not be duplicates when inserting the data into the columns that were designated as Primary or Foreign Keys. I could not use the actual LIN numbers as multiple pieces of equipment are categorized under one LIN number. I created a fictional 'NIIN' to use as the LIN number and assigned the LIN number unique yet sequential identifier. Similar actions were taken with the PARNO and Location ID so they could not be used as Primary or Foreign Keys.

I learned to be careful of how many characters you list for when identifying a varchar data type. I ran into variation truncation errors when trying to insert my data into tables. I made the initial mistake of deleting columns that did not work, thinking that the special characters might have had something to do with it. But after researching the error message I saw that it was a simple misrepresentation of the number of characters in the string and updated the data type. *(i.e. Nomenclature varchar(100) vice Nomenclature varchar(20)).* Ironically the stored procedures were the easiest scripting of this project; when I was a contractor for the National Guard Bureau I struggled creating or modifying stored procedures.

One the major time savers for this project was the ability to import a flat file of the data so that I could use that table to insert data into my base tables. But I learned that there must be some caution observed with this step. You have to be careful that you import the data in the correct data type; that column spellings matched those used to construct the base tables and that you list the appropriate number of characters in the string for the varchar data type.

Overall this project prepared me to read schemas and understand the basics behind database development. It will be useful when having to review enterprise solutions presented by contract vendors or assist me in proposing changes to existing databases.

GLOSSARY

Assigned- total number of positions or equipment provided

Authorized- total number of positions or equipment allowed

Equipment Type- Main category of equipment

Equipment DESC- Sub-component of equipment

Line Number (LIN)- Line item specific number assigned to each piece of equipment

Location Description- Description of where equipment is stored

Location ID- alphanumeric code where equipment is stored

New Information Identity Number (NIIN)- six-character alphanumeric identification of the generic nomenclature assigned to identify nonexpendable and type classified expendable or durable items of equipment during their life cycle authorization and supply management.

Nomenclature – name designation

Paragraph Number (PARNO) - Numeric identification of Soldier or Equipment position

Paragraph Title – identification of position specific section and warfighting function

Required- total number of positions or equipment needed

Section- Subpart of warfighting function

Serial Number- a number showing the position of an item in a series, especially one printed on paper currency or on a manufactured article for the purposes of identification

Service Date- date equipment due for maintenance services