APC300
INSTALLATION AND USERS GUIDE

FOR REVISION 2.5 and 2.6 SOFTWARE

NOTICE

The installation, maintenance or removal of antenna systems requires qualified, experienced personnel. Andrew installation instructions have been written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance and condition of equipment.

Andrew disclaims any liability for the results of improper or unsafe installation practices.

PROPRIETARY NOTICE

APC300 STARTUP CHECKLIST

This check list is a suggested aid to determine and enter user variable parameters into the APC300.

*** NOTE: CHECK THE APC300 TO LOCAL MOTOR CONTROL WIRING HAS BEEN INSTALLED IN ACCORDANCE WITH THE INSTALLATION DRAWINGS AND IS FREE OF SHORTED CIRCUITS OR UNDESIRED GROUNDS. DAMAGE TO THE CONTROLLER MAY RESULT IF NOT INSTALLED PROPERLY.**

☐ Check the antenna local motor controller resolver and motor control wiring to the APC300 controller against Manual AE01B-A0334, section 3 and the antenna installation drawings. If the antenna uses manual or circular polarization there will be no polarization resolver to be wired. To satisfy the controller's need to see polarization signals, jumper wires are installed to simulate the missing resolver. Check to be sure these polarity resolver jumpers have been installed. Two methods have been used: adding wire jumpers in the mating connector, P3, to APC300 rear panel resolver signal connector J3:

P3 - 28	to	P3 - 12	(SIN H to SIN L)
P3 - 13	to	P3 - 17	(COS H to REF H)
P3 - 46	to	P3 - 50	(COS L to REF L)

OR at the antenna local motor controller wire jumpers are added at the resolver terminal (TB1) strip to:

*TB1 - 19	to	TB1 - 20	(SIN H to SIN L)
*TB1 - 22	to	TB1 - 25	(COS H to REF H)
*TB1 - 23	to	TB1 - 26	(COS L to REF L)

* Note: Applicable for Local Motor Controllers manufactured later than 10/93. P/N LMKDS as documented drawing number 239969, sheet 2.

☐ After checking antenna motor and limit switch operation with the local handheld motor controller locate and peak the antenna on a geosynchronous satellite. Leave the local handheld motor controller connected to the LMC. This disables remote control. For transportable antennas leave the handheld in **local** control mode.

☐ Press **POWER ON** for the APC300. Place **Remote/Local** switch in **local** position.

APC300 STARTUP CHECKLIST

☐ The factory will set the hemisphere of operation to **Northern**. To verify **Northern Hemisphere** entry or to change to **Southern Hemisphere** the maintenance menu must be accessed. Access is gained by removing the top cover and setting the self-test switch located behind the front panel key pad to the right. When the self-test switch is thrown right the self test menu is displayed. Press **<5>, <ENTER>, <6>, and <ENTER>, North** will be displayed. To change to **Southern** press **<INC>** and **South** will appear. Press **<ENTER>, <CLR>,** and **<CLR>** to return to the self-test menu.

☐ The factory also will set the resolver gearing ratio for 2:1. Antennas 4.6M and smaller may be equipped with 1:1 gearing ratio resolvers. To check the resolver scaling factors press **<6>, <ENTER>**. Pressing **<INC>** will step through the axes. **SCALE AX = 1** is for Azimuth resolver, **SCALE AX = 2** is for Elevation resolver, and **SCALE AX = 3** is for polarity resolver if used. **"M"** is the resolver scale multiplier, **"D"** is the resolver scale divisor, and **"B"** is the resolver scale base starting point for the resolver in degrees.

NOTE: AZ/EL 4 POLE Resolver P/Ns: 2:1 Gearing Andrew P/N 300327
3.6M to 4.6M Resolver Kit P/N RESK5 - 300
5.6M to 9.3M Resolver Kit P/N RESK9 - 300
Vendor: Harowe Servo P/N 11BRCX-310-M-85V
Clifton Precision P/N 11-BHM-19F/F776

AZ/EL 2 POLE Resolver P/Ns: 1:1 Gearing Andrew P/N 208349
3.6M to 4.6M Resolver Kit P/N RESK5
5.6M to 9.3M Resolver Kit P/N RESK9
Vendor: Harowe Servo P/N 11BRCX-310-R-85V
Clifton Precision P/N 11-BHW-46TK/F561
11-BHW-46TK/F817

An Azimuth resolver scale factor for the **Northern Hemisphere** with 2:1 resolvers will be displayed as:

SCALE AX = 1 M = 1 D = 2 B = 90.0

For the **Southern Hemisphere**:

SCALE AX = 1 M = 1 D = 2 B = 270.0

An Elevation resolver scale factor for the 2:1 resolvers will be displayed as:

SCALE AX = 2 M = 1 D = 2 B = 0.1

A Polarization resolver scale factor for the 2:1 resolvers will be displayed as:

SCALE AX = 3 M = 1 D = 2 B = 0.1

* Note: Polarization resolver kit P/N PK9DR provides 2:1 ratio signal. Used on 9.3M, 9.1M, 7.6M and 7.3M antennas.

APC300 STARTUP CHECKLIST (Con't)

☐ If it is necessary to change the resolver gearing factors to 1:1 proceed to the next step, otherwise press **<CLR>** and jump to page 4, VERIFYING MINIMUM SPEED MOTOR TIMEOUTS.

☐ To change the Azimuth resolver scaling factors for 1:1 resolver, press **<INC>** until **SCALE AX = 1** is displayed. The cursor is under the **M = 1**, "1", press **<ENTER>**, cursor steps to **"D"** numerical value "2".
Press **<1> <ENTER>** and **D = 1** is displayed, cursor moves to **"B"** numerical value "90.0". With 1:1 gearing ratio resolvers the entire range of resolve motion is used, therefore the base starting point is set low, 0.1.
Please proceed to next step

☐ Press **<1>** and **<ENTER>** to set the **SCALE AX = 1** for 1:1 resolver base range to 0.1. The **Northern or Southern Hemisphere** azimuth resolver is set to the same base when using 1:1 resolvers.

For Azimuth 1:1 resolver in the **Northern Hemisphere and Southern Hemisphere** the display will appear:

SCALE AX = 1 M = 1 D = 1 B = 0.1

☐ Press **<INC>** and the Elevation resolver scale factor is displayed. Factory settings for the elevation resolver are 2:1. Elevation resolver scale factor:

SCALE AX = 2 M = 1 D = 2 B = 0.1

☐ To change the EL resolver scaling factors for 1:1 resolver, press **<INC>** until **SCALE AX = 2** is displayed. The cursor is under the **M = 1**, "1", press **<ENTER>**, cursor steps to **"D"** numerical value "2".
Press **<1> <ENTER>** and **D = 1** is displayed, cursor moves to **"B"** numerical value "0.1", press **<ENTER>**.

Elevation 1:1 resolver scaling factors display:

SCALE AX = 2 M = 1 D = 1 B = 0.1

Press **<INC>** and the Polarity resolver scale factor is displayed. Factory settings for the polarity resolver are 2:1. POL resolver scale factor display:

SCALE AX = 3 M = 1 D = 2 B = 0.1

APC300 STARTUP CHECKLIST (Con't)

☐ To change the POL resolver scaling factors for 1:1 resolver, press **<INC>** until **SCALE AX = 3** is displayed. The cursor is under the **M = 1**, "1" press **<ENTER>**, cursor steps to **"D"** numerical value "2". Press **<1> <ENTER>** and **D = 1** is displayed, cursor moves to **"B"** numerical value "0.1", press **<ENTER>**. Polarity 1:1 resolver scaling factors display:

SCALE AX = 3 M = 1 D = 1 B = 0.1

Press **<CLR>** to return the display to the self-test menu.

VERIFYING MINIMUM SPEED MOTOR TIMEOUTS

☐ Verify minimum speed motor timeouts by pressing **<5>, <ENTER>, <5>,** and **<ENTER>**. These parameters set the distance and time used to determine motor faults and generate the RESOLVER IMMOBILE fault. The display indicates:

MINSPD AZ = 0.03 EL = 0.03 POL = 0.1

Press **<INC>** and display indicates: **TIME = 60.00**

☐ If different axes distances and time is desired use the **<ENTER>, <numeric keys>,** and **<ENTER>** to select and change value. Trailer, SNG, and other serial axis move antennas require 90 second **TIME**.

Press **<CLR>, <CLR>** to return to main self-test menu.

☐ **Return** the **self-test** switch (behind the key pad) to the **left**, operate position. Current mode status is display.

☐ Press **<MENU>, <3>, <ENTER>, <1>,** and **<ENTER>, ACTPOS** is displayed. Enter the local azimuth, elevation, and polarity pointing angles for the satellite where the antenna has been peaked.

Press **<ENTER>** again to move cursor to azimuth readout, enter the azimuth pointing angle value using the **<numeric keys>**, press **<ENTER>**.

Cursor moves to elevation readout, enter the elevation pointing angle value using the **<numeric keys>**, press **<ENTER>**.

Cursor moves to polarity readout, enter the polarity pointing angle value using the **<numeric keys>**, press **<ENTER>**.

APC300 STARTUP CHECKLIST (Con't)

NOTE: For antennas equipped with manual or circularly polarized feeds jumper wires should have been installed to complete the polarity resolver circuit for the missing resolver. A resolver reading of 90.0 degrees is entered for manual or circularly polarized antenna.

Cursor disappears and display is actual antenna pointing angles. Before pressing **<CLR>** to return to the menu it is suggested to you may wish to record the pointing angles entered into the controller. Please enter the calibration pointing angles below and on page 12. (90 degrees for manual and CP POLARITY)

CAL PNTG ANGLE AZ ———————— **EL** ———————— **POL** ————————

Press **<CLR>** to return to the **PARAMS** menu.

* Note: APC300 Manual P/N AE01B-A0328, Appendix A is a "APC300 Memory Data Sheet" which may be found helpful to record parameters entered into the controller for future reference.

☐ Press **<2>, <ENTER>** resolver units **OFFSETS** are displayed. Record the offsets for the actual pointing angles generated by the controller in the "APC300 Memory Data Sheet" and below for future reference. Press **<CLR>** to return to **PARAMS** menu. Press **<POS>, <ENTER>** to obtain the current position display.

RES OFFSETS AZ ———————— **EL** ———————— **POL** ————————

☐ At the antenna using the handheld controller operate the azimuth motor until the East hardware limit is reached. Operate the elevation motor until the Down hardware limit is reached. Operate the polarity motor (if applicable) until the fully counter clockwise limit is reached.

☐ Return to the APC300 which should be in a faulted condition due to the manual operation of the antenna at the local motor controller. Momentarily flip the Remote/Local switch to the remote position then back to the local position. The elevation and polarity resolver readings should have become smaller. **Northern** Hemisphere **East** Azimuth limit should have **decreased**. **Southern** Hemisphere **East** Azimuth limit resolver should have **increased**. Hint: In the Southern Hemisphere the North resolver reading is zero ("0.0") degrees. If the resolver readings did not change as indicated the resolver installation must be checked. Record these resolver readings for future reference:

HRDWR LMTS EAST AZ ———————— **MIN EL** ———————— **MIN POL** ————————

APC300 STARTUP CHECKLIST (Con't)

☐ At the antenna using the handheld controller operate the azimuth motor until the West hardware limit is reached. Operate the elevation motor until the Up hardware limit is reached. Operate the polarity motor (if applicable) until the fully clockwise limit is reached.

☐ Return to the APC300 which should again be in a faulted condition due to the manual operation of the antenna at the local motor controller. Momentarily flip the Remote/Local switch to the remote position then back to the local position. The elevation and polarity resolver readings should have become greater. Northern Hemisphere West Azimuth limit resolver reading should have increased. Southern Hemisphere West Azimuth limit resolver should have decreased. Hint: In the Southern Hemisphere the North resolver reading is zero ("0.0") degrees. Record these resolver readings for future reference:

HRDWR LMTS WEST AZ ———— **MAX EL** ———— **MAX POL** ————

*** NOTE:** For the **NORTHERN** Hemisphere **WEST** azimuth limit is entered as the **"AZ MAX"** limit. **EAST = "AZ MIN"**.

For the **SOUTHERN** Hemisphere **WEST** azimuth limit is entered as the **"AZ MIN"** limit. **EAST = "AZ MAX"**.

☐ Press **<MENU>**, **<3>**, **<ENTER>**, **<3>**, and **<ENTER>** azimuth software **LIMITS** are displayed. Add one (1) degree to the azimuth hardware limit: for **NORTHERN HEMISPHERE** use the **EAST** limit recorded on page 5, for **SOUTHERN HEMISPHERE** use the **WEST** limit recorded on this page, this will be entered as **MINIMUM AZIMUTH HARDWARE LIMIT:**

MIN AZ HRDWR LMT + 1 = ————————

☐ Press **<ENTER>** and cursor will appear under minimum azimuth limit. Using the **<numeric keys>** enter the computed value. Press **<ENTER>** and the cursor moves to the maximum azimuth limit. Subtract one (1) degree from the the azimuth hardware limit: for **NORTHERN HEMISPHERE** use the **WEST** limit recorded on this page, for **SOUTHERN HEMISPHERE** use the **EAST** recorded on page 5, enter as **MAXIMUM AZIMUTH HARDWARE LIMIT:**

MAX AZ HRDWR LMT - 1 = ————————

APC300 STARTUP CHECKLIST (Con't)

☐ Using the **<numeric keys>** enter the computed value. Press **<ENTER>** and the cursor moves to the minimum elevation limit. Add one (1) degree to the minimum elevation hardware limit recorded on page 5:

MIN EL HRDWR LMT + 1 = _____

☐ Using the **<numeric keys>** enter the computed value. Press **<ENTER>** and the cursor moves to the maximum elevation limit. Subtract one (1) degree from the maximum elevation hardware limit recorded on page 6:

MAX EL HRDWR LMT - 1 = _____

☐ Using the **<numeric keys>** enter the computed value. Press **<ENTER>** and the cursor moves to the minimum polarization limit. Add one (1) degree to the minimum polarization hardware limit recorded on page 5:

MIN POL HRDWR LMT + 1 = _____

☐ Using the **<numeric keys>** enter the computed value. Press **<ENTER>** and the cursor moves to the maximum polarization limit. Subtract one (1) degree from the maximum polarization hardware limit recorded on page 6:

MAX POL HRDWR LMT - 1 = _____

☐ Using the **<numeric keys>** enter the computed value for the maximum polarization limit. Press **<ENTER>** and the cursor disappears, display returns to azimuth limits. Press **<CLR>** and **PARAMS** sub-menu returns. Press **<POS>, <ENTER>** and current position is displayed.

☐ At the antenna using the handheld controller operate the azimuth motor until the antenna is approximately in the center of travel range. Operate the elevation motor until the antenna is approximately forty-five (45) degree elevation. Operate the polarization motor until the feed rotation is approximately center range. Remove the handheld unit from the local motor controller.

***NOTE:** **REMOTE CONTROL COMMANDS ARE ENABLED WHEN HANDHELD UNIT IS DISCONNECTED.**

APC300 STARTUP CHECKLIST (Con't)

☐ Return to the APC300 which should be in a faulted condition due to the manual operation of the antenna at the local motor controller. Momentarily flip the Remote/Local switch to the remote position then back to the local position. The azimuth, elevation, and polarity resolver readings should be approximately center range.

☐ For the next test if you can not see the antenna move from your location obtain assistance from another person. The second person will act as a safety observer to view the antenna motion while you jog it from the APC300.

☐ Press **<JOG>** the current mode display changes to jog mode. While observing the antenna use the APC300 manual jog switches to verify the proper movement of the three axes. Reminder: AZ WEST in Northern Hemisphere, AZ EAST in Southern Hemisphere, EL UP, and POL CW have increasing resolver readout.

☐ **AZ WEST**

☐ **AZ EAST**

☐ **EL UP**

☐ **EL DOWN**

☐ **POL CW**

☐ **POL CCW**

* Note: Fast motor operation will not be invoked with the APC300 manual motor operate switches (jog switches). Fast motor operation will be invoked when the APC300 is requested to make a **POSITION** move that is farther away than the fast motor coefficient **STP** (stop) parameter. If the elevation **STP** parameter is set for 0.6 degrees. Then for any elevation position move needing more than 0.6 degrees of travel the APC300 will invoke fast motor operation.

APC300 STARTUP CHECKLIST (Con't)

SETTING MOTOR SPEED COEFFICIENTS

* Note: **AXIS = 1** is **AZIMUTH**, **AXIS = 2** is **ELEVATION**, and **AXIS = 3** is **POLARITY**.

☐ Press **<MENU>**, **<3>**, **<ENTER>**, **<4>**, and **<ENTER>** the **COEFF**icient **AXIS = 1** prompt is displayed. Press **<ENTER>** and the "1" begins to blink on and off. Press **<ENTER>** and the **COEFF AXIS 1** first line of sub-menu is displayed. Two (2) coefficient parameters are displayed on each line. There are three (3) lines to display a total of six (6) parameters for each axis.

On the first line the slow motor **OVR**shoot and destination **TOL**erance are displayed. Pressing **<INC>** steps through the lines or permits viewing two (2) parameters at a time. Pressing **<ENTER>** activates the cursor and permits stepping through the parameters one (1) at a time. To change any one (1) of the six (6) parameters all six (6) parameters must be entered.

☐ Press **<INC>** and **COEFF AXIS 1** line two (2) will be displayed. Line two is the **PUL**sing to position parameter and the fast motor **STP** (STOP) coefficient.

☐ Press **<INC>** and **COEFF AXIS 1** line three (3) will be displayed. Line three is the number of **TRY**s to position the controller will make and motor pause **TIM**e after each try or "hunt".

☐ Press **<ENTER>** and **COEFF AXIS 1** line one (1) will be displayed. The cursor will be at the slow motor **OVR**shoot parameter. Using the **<numeric keys>** enter 0.03 degrees. Press **<ENTER>** and the cursor will move to the destination position **TOL**erance limit.

☐ Using the **<numeric keys>** enter 0.02 degrees for **TOL**. Press **<ENTER>** the cursor will move to **PUL**se time for tries or "hunts".

☐ Using the **<numeric keys>** enter 0.50 seconds for the **PUL**se time for tries and depress **<ENTER>**. The cursor moves to the fast motor **STP** (stop) distance.

APC300 STARTUP CHECKLIST (Con't)

* Note: **AXIS = 1** is **AZIMUTH**, **AXIS = 2** is **ELEVATION**, and **AXIS = 3** is **POLARITY**.

☐ Using the **<numeric keys>** enter 0.6 degrees for the fast motor **STP** distance and press **<ENTER>**. The cursor moves to the **TRY** parameter.

☐ Using the **<numeric keys>** enter 2 tries for the number of hunting position attempts and depress **<ENTER>**. The cursor moves to the **TIM** parameter.

☐ Using the **<numeric keys>** enter 2.0 seconds for the motor pause time after each try or hunt. Press **<ENTER>**, line 1 is displayed, cursor is extinguished. If desired the **<INC>** key may be used to review the changes made by **<INC>**ing through the **COEFF AXIS 1** sub-menu. Press **<CLR>** and **COEFF AXIS = 1** is displayed. Press **<ENTER>** and the "1" begins to blink on and off. Press **<2>** and a "2" replaces the "1".

☐ Press **<ENTER>** and **COEFF AXIS 2** line one (1) will be displayed. Press **<ENTER>** the cursor will be at the slow motors **OVR**shoot parameter. Using the **<numeric keys>** enter 0.03 degrees. Press **<ENTER>** and the cursor will move to the destination position **TOL**erance limit.

☐ Using the **<numeric keys>** enter 0.02 degrees for **TOL**. Press **<ENTER>** the cursor will move to **PUL**se time for tries or "hunts".

☐ Using the **<numeric keys>** enter 0.25 seconds for the **PUL**se time for tries and depress **<ENTER>**. The cursor moves to the fast motor **STP** (stop) distance.

☐ Using the **<numeric keys>** enter 0.6 degrees for the fast motor **STo**P distance and press **<ENTER>**. The cursor moves to the **TRY** parameter.

☐ Using the **<numeric keys>** enter 2 tries for the number of hunting position attempts and depress **<ENTER>**. The cursor moves to the **TIM** parameter.

APC300 STARTUP CHECKLIST (Con't)

* Note: **AXIS = 1** is **AZIMUTH**, **AXIS = 2** is **ELEVATION**, and **AXIS = 3** is **POLARITY**.

☐ Using the **<numeric keys>** enter 2.0 seconds for the motor pause time after each try or hunt. Press **<ENTER>**, line 1 is displayed, cursor is extinguished. If desired the **<INC>** key may be used to review the changes made by **<INC>**ing through the **COEFF AXIS 2** sub-menu. Press **<CLR>** and **COEFF AXIS = 2** is displayed. Press **<ENTER>** and the "2" begins to blink on and off. Press **<3>** and a "3" replaces the "2".

☐ Press **<ENTER>** and **COEFF AXIS 3** line one (1) will be displayed. Press **<ENTER>** the cursor will be at the slow motor **OVR**shoot parameter. Using the **<numeric keys>** enter 3.0 degrees. Press **<ENTER>** and the cursor will move to the destination position **TOL**erance limit.

☐ Using the **<numeric keys>** enter 2.0 degrees for **TOL**. Press **<ENTER>** the cursor will move to **PUL**se time for tries or "hunts".

☐ Using the **<numeric keys>** enter 0.0 seconds for the **PUL**se time for tries and depress **<ENTER>**. The cursor moves to the fast motor **STP** (stop) distance.

☐ Using the **<numeric keys>** enter 0.0 degrees for the fast motor **STP** distance and press **<ENTER>**. The cursor moves to the **TRY** parameter.

☐ Using the **<numeric keys>** enter 2 tries for the number of hunting position attempts and depress **<ENTER>**. The cursor moves to the **TIM** parameter.

☐ Using the **<numeric keys>** enter 2.0 seconds for the motor pause time after each try or hunt. Press **<ENTER>**, line 1 is displayed, cursor is extinguished. If desired the **<INC>** key may be used to review the changes made by **<INC>**ing through the **COEFF AXIS 3** sub-menu. Press **<CLR>** and **COEFF AXIS = 3** is displayed. Press **<CLR>** and the display returns to the **PARAMS** sub-menu.

☐ Press **<5>**, the cursor will move to **ERRLIM**it parameter. The error limits set how far the antenna may move without APC300 control before a fault is generated. Press **<ENTER>**, the default error limits are displayed. Use **<ENTER>**, **<numeric keys>**, and **<ENTER>** keys if you wish to change the default limits. These limits caused the faults seen when operating the antenna positioning motors at the local motor controller instead of the APC300. If no change is desired, press **<CLR>** to return to the **PARAMS** menu.

APC300 STARTUP CHECKLIST (Con't)

☐ Press **<7>**, the cursor will move to **BOXLIMit** parameter. The Box limits set how far the antenna may move from the **BOX LIMIT ENABLE** point before the azimuth and elevation motion is inhibited. This parameter is used to prevent or reduce operator errors. Press **<ENTER>**, box limits are displayed. If inclined orbit box limit operation is desired the azimuth and elevation limits should be expanded to the size of satellite travel box range. For example if the satellite box is 2.0 degrees by 2.0 degrees then the entered **BOX LIMit** should be at least an azimuth of 2.0 degrees and elevation of 2.0 degrees. Some inclined satellites travel as much as plus or minus nine degrees in elevation. The elevation in this case would be set to at least 18 degrees (18 degree box height). A typical inclined orbit box might be an azimuth of 4 degrees with an elevation of 18 degrees.

The box limit must be larger than the anticipated antenna travel to track the satellite of interest.

Press **<ENTER>**, the cursor moves to the azimuth box limit parameter. Use the **<numeric keys>** to set the new azimuth limit. Press **<ENTER>** and the cursor moves to elevation limit. Use the **<numeric keys>** to set the new elevation limit. Press **<ENTER>** to complete entry. Press **<CLR>**, **<CLR>**, **<CLR>** to return to main menu.

☐ Enter calibrating pointing angles from page 5 below: Reminder: 90 degrees for manual and CP POLARITY.

CAL PNTG ANGLE AZ _____ **EL** _____ **POL** _____

* Note: In the next step a geosynchronous satellite antenna **POSITION** will be entered into the APC300 controller. The position will be "11". Positions 1 - 10 are used by **Smartrack®** for inclined orbit satellites. Positions 11 - 40 are reserved for geosynchronous (stationary) satellites.

☐ Press **<1>**, **<ENTER>** the **POS EDIT** (position edit) prompt changes to **EDT**. Press **<1,1>**, **<ENTER>** and satellite position 11 is ready to be edited. Press **<ENTER>**, the cursor moves to azimuth. Enter the azimuth for the satellite pointing angle the antenna was originally positioned using the **<numeric keys>**. Press **<ENTER>** the cursor moves to elevation parameter, using the **<numeric keys>** and **<ENTER>** finish entering the elevation and polarity parameters. After the polarity parameter has been entered press **<CLR>** and the **EDT** prompt will appear.

APC300 STARTUP CHECKLIST (Con't)

☐ Determine a second position set of pointing angles from a satellite pointing table for your site location or simply create a position at least ten degrees away from the current azimuth, elevation, and polarity position. This second pointing angle set will be entered into position 12. Record these pointing angles below:

POS 12 PNTG ANGLE AZ ———— **EL** ———— **POL** ————

☐ Press **<1,2>**, **<ENTER>**. Position 12 display appears. Press **<ENTER>** and use the **<numeric keys>** to enter the position "12" azimuth. Press **<ENTER>** the cursor moves to elevation parameter, using the **<numeric keys>** and **<ENTER>** finish entering the elevation and polarity parameters. After the polarity parameter has been entered press **<CLR>**, **<CLR>** and **1 POS EDIT** appears.

* Note: Only the slow motor APC300 operation has been verified. A move to position will invoke fast motor movement. The antenna hardware limits and the APC300 will protect against improper fast motor movement.

☐ Press **<POS>**, **<ENTER>** and the current mode display appears. Press **<POS>**, **<1,2>**, and **<ENTER>**. Position 12 pointing angles are displayed. Press **<ENTER>** and the current position pointing angles are displayed with the **MOVRDY** prompt. Press **<POS>**, the **IN MOT** prompt appears as long as motor driving signals are sent to the antenna local motor controller. The antenna is positioned when **IN MOT** is replaced by **IN POS** prompt and position "12" is indicated. If the antenna controller does not position properly then some adjustment of the coast coefficients are required.

* Note: Momentarily flipping the Remote/Local switch to the remote position then back to the local position will clear a failure to position.

Record the actual position where the antenna stopped:

ANT STP POS AZ ———— **EL** ———— **POL** ————

Determine the error from the desired position by subtracting the actual stopping position from the position "12" requested position entered in the controller table.

SAT POS 12 AZ ———— **EL** ———— **POL** ————

POS ERROR AZ ———— **EL** ———— **POL** ————

APC300 STARTUP CHECKLIST (Con't)

☐ Azimuth and elevation should have stopped within 0.02 degrees of the desired pointing angle. Polarity should have stopped within 1.1 degrees of the desired pointing angle. In the next steps you will be instructed to use the **<POS>**, **<1,1>**, **<1,2>**, and **<ENTER>** keys to move the antenna between controller satellite table position 12 and position 11. This will further aid you in determining if stopping pointing angles are within tolerance. Page 9 is the beginning of the instructions for **SETTING MOTOR SPEED COEFFICIENTS** you may wish to refer to this instruction for review of how to enter the various parameters.

* Note: Momentarily flipping the Remote/Local switch to the remote position then back to the local position will clear a failure to position.

☐ Press **<POS>**, **<ENTER>** and the current mode display appears. Press **<POS>**, **<1,1>**, and **<ENTER>**. Position 11 pointing angles are displayed. Press **<ENTER>** and the current position pointing angles are displayed with the **MOVRDY** prompt. Press **<POS>**, the **IN MOT** prompt appears as long as motor driving signals are sent to the antenna local motor controller. The antenna is positioned when **IN MOT** is replaced by **IN POS** prompt and position "11" is indicated. If the antenna controller does not position properly then some adjustment of the coast coefficients are required.

☐ Page 9 is the beginning of the instructions for **SETTING MOTOR SPEED COEFFICIENTS** you may wish to refer to this instruction for review of how to enter the various parameters. Some suggestions on what to adjust are on page 15. After adjustments retest by moving between position 11 and position 12.

APC300 STARTUP CHECKLIST (Con't)

What to adjust:

The **PUL**se parameter is used in the position try or hunting attempts. If it should be set too large the antenna would appear to stop on destination then move off! Turning this parameter off by setting it to zero (0.0) helps in trouble shooting. Hint: If setting pulse is a problem run the axis causing the problem in jog mode for about thirty seconds. Note the antenna position at start and and finish. Determine how many degrees the antenna axis traveled and divide by the travel time. That will provide the average degrees travelled per second for that axis. A good pulse starting parameter would be the time it takes for the antenna to travel 0.006 to 0.011 degrees. Example: Elevation travels 0.03 average degrees per second yields a pulse time range from 0.2 to 0.37 seconds. Actual pulse time will tend to be a little larger because of the contactor closure time (the motor isn't turning until the relay closes).

If the antenna stops short of the desired destination the slow motor **OVR** parameter should be made **SMALLER**.

If the antenna travels past the desired destination the fast motor **STP** parameter and the slow motor **OVR** parameter may both need adjustment. The problem is the fast motor may not shut off soon enough to allow the slow motor parameters to have an effect. Adjust the fast motor **STP** parameter a little larger first, a tenth or two of a degree, then if the results are the same adjust the slow motor **OVR** parameter a hundredth or two (.01-.02) of a degree larger.

TOLerance determines the acceptable amount of error or "how far off" the antenna is from a target destination. For most applications the tolerance for positioning may be reduced to 0.01 degrees. This may require additional **TRY**s or hunt attempts to reach the target pointing angle destination. That means more motor operation.

☐ The APC300 (after re-adjustment) should have stopped the antenna within 0.01 degrees of the desired pointing angle for AZ and EL. Polarity should have stopped within 0.5 degrees of the desired pointing angle. If you were unable to obtain this kind of performance the motor mechanisms should be double checked for proper brake operation and jack screw travel.

APC300 STARTUP CHECKLIST (Con't)

* Note: It is important that the controller can properly position the antenna. It must for any mode of tracking to be satisfactory.

SETTING STEPTRACKING PARAMETERS

☐ Before setting parameters it is a good idea to be sure the signals are of the proper level to steptrack and later smartrack. Verify the beacon receiver signal or video receiver AGC signal is a positive voltage between one (1) and eight (8) volts. A DB25 socket type connector is used to input the tracking signal at J2. Two inputs may be connected to the APC300. The primary signal connects to J2 pins 1 and 2, 2 is negative ground. The secondary to J2 pins 3 and 4, 4 is negative ground.

☐ Press **<MENU>**, **<2>**, **<ENTER>**, **<7>**, **<ENTER>**, **<2>**, **<ENTER>**, **<INC>**, **<3>**, and **<ENTER>**. These steps get us through the **TRACK** sub-menu to **BEACON** automatic enable/disable and which beacon signal is selected. You just disabled automatic switching of the beacon signal and selected the primary beacon signal. Press **<CLR>** and **<CLR>**.

* Note: The next step requires that the antenna be peaked on the inclined satellite that is to be tracked. Best results are obtained if periodically the antenna is re-peaked on the desired inclined orbit satellite.

☐ Using **<JOG>** and **<motor control switches>** to peak on the desired signal. Press **<POS>**, **<ENTER>**, **<JOG>**, and **<INC>**. The display should indicate the input signal level, azimuth, and elevation of the desired satellite. Use the jog switches to peak on the signal. If the signal level appears to change very slowly the **FILT**er parameter may be set too large.

☐ Press **<MENU>**, **<2>**, **<ENTER>**, **<6>**, **<ENTER>**, and **<ENTER>**. The cursor will be under the **STP PAR** sub-menu **DIST** parameter. As was the case with the coefficient parameter sub-menu all parameters must be entered for any one to be changed.
Press **<ENTER>** and the cursor moves to the **DETECT** parameter. Press **<ENTER>** again and the cursor moves to the **FILT**er parameter. The **FILT**er acts like a battery that can be charged or discharged at a variable rate, a rate the user may select. What the effect is upon the received signal is to lessen the noise and variations the controller sees. Too much filter and the signal doesn't drop off, too little and the steptrack can't detect a change as the controller moves the antenna.

APC300 STARTUP CHECKLIST (Con't)

Set the filter between 1 to 1.65 seconds using the **<numeric keys>**. Use the **<ENTER>** key to enter the filter value and then **<ENTER>** through the remaining steptrack parameters until the **DIST** parameter appears again and the cursor is extinguished. **<INC>** may be used to scroll through the steptrack parameter sub-menu. Press **<CLR>** and **<CLR>** to get back to the main menu.

☐ Press **<POS>**, **<ENTER>**, **<JOG>**, and **<INC>**. The display should indicate the input signal level, azimuth, and elevation of the desired satellite. Again use the jog switches to peak on the stationary satellite signal.

☐ The **optimum** signal **level** is **eight (8)** volts. The display should indicate the input signal close to eight (8) volts when the satellite is peaked. Many video receivers can not supply the optimum level and many beacon receivers provide too great a signal. The APC300 has an amplifier built in for just this purpose. Take the top cover off the APC300 and look to the rear panel. At J2 is the dual amplifier input module. Locate variable resistor R14, it is a multi-turn potentiometer located just to the left of IC U1. Slowly adjust R14 until eight (8) volts is obtained while peaked upon the desired satellite.

If too much signal is the problem and adjusting R14 doesn't bring the level within the eight (8) volt range, R18 is the primary signal input voltage divider. It may be used to reduce large signals up to 15 volts.

* Note: Next step is to calibrate a second beacon source. If you do not have a second beacon skip to page 18.

☐ To use a secondary beacon signal it may also be adjusted at this time. To select the secondary beacon signal. Press **<MENU>**, **<2>**, **<ENTER>**, **<7>**, **<ENTER>**, **<2>**, **<ENTER>**, **<INC>**, **<4>**, and **<ENTER>**. That selects beacon secondary signal. Pressing **<POS>**, **<ENTER>**, **<JOG>**, and **<INC>** gets you back to the signal display and in the jog mode for continued peaking if needed.

☐ To adjust secondary beacon signal on the dual amp. Locate variable resistor R13, it is a multi-turn potentiometer located just to the right of IC U1. Slowly adjust R13 until eight (8) volts is obtained while peaked upon the desired satellite.

If too much signal is the problem and adjusting R13 doesn't bring the level within the eight (8) volt range, R11 is the secondary signal input voltage divider. It may be used to reduce large signals up to 15 volts.

APC300 STARTUP CHECKLIST (Con't)

☐ After setting the beacon signal level it is necessary to get a feel for what **DETECT** voltage will do the best job. The **DETECT** voltage determines when the APC-300 has found the peak signal. If set too low, such that the noise component is more than half the total **DETECT** level, it will not be reliable. Observe the signal for about a minute, determine approximately how much it varies. With a **FILT**er set to 1 - 1.65 seconds a good solid beacon signal may vary about 0.01 to 0.02 volts. Therefore a **DETECT** signal from 0.05 to 0.06 should work well. If the noise is greater, say 0.04 volts, the **DETECT** should not be set below 0.08 volts. At the point where the noise begins to effect how well the controller may track then the **FILT**er parameter may require a little increase in filtering time.

APPROXIMATE VARIATION OF BEACON SIGNAL ———— VOLTS

☐ Press **<MENU>**, **<2>**, and **<ENTER>**. Display is **TRACK** sub-menu line one (1). **<INC>** will permit you to scroll through all four (4) lines to access a total of eight (8) steptrack parameters. The **<number key>** and **<ENTER>** will call up the parameter. For example: **<5>** and **<ENTER>** brings up **SCINT** (scintillation) enable. Press **<5>** and **<ENTER>**, to toggle scintillation on or off press **<INC>** to select then **<ENTER>**. Scintillation is enabled for Ku-Band satellites. It helps compensate for sudden signal drop-out common in the Ku-Band. Therefore if you are using Ku-Band scintillation should be enabled. Press **<CLR>** to return to **TRACK** menu.

☐ Press **<2>** and **<ENTER>**. **CYCLE** parameter is displayed. **CYCLE** allows steptracking to be invoked on a timed basis. When first testing the controller a short **CYCLE** time is handy to force steptrack scans into starting when none may be needed.

* Note: If you use this technique remember to set **CYCLE** to a more realistic value for the application or turn it off by setting to "0" when through testing. For testing purposes press **<ENTER>**, **<3>**, and **<ENTER>** for a 3 minute **CYCLE** period. Press **<CLR>** to return to **TRACK** menu.

APC300 STARTUP CHECKLIST (Con't)

☐ Press **<4>** and **<ENTER>**. **ERROR** parameter is displayed. **ERROR** is the signal level that suspends steptracking. It should be set above the antenna first sidelobe signal level, but not so large that it prevents proper coarse steptracking detection. A simple yet effective way to adjust this level is to move and peak the antenna on the first sidelobe. Determine the signal level and add a couple tenths of a volt and set the **ERROR** voltage for that level. For more demanding applications the 3 to 5 dB down point signal level of the main beam may be used. If a smaller level change is needed other parameters may require optimization to provide satisfactory tracking. For our "test" we will use the first sidelobe level plus a little more for the **ERROR** signal level.

Press **<CLR>**, **<JOG>**, and **<INC>**. Jog mode with signal level is displayed. Using the motor control switches move the antenna and peak the signal on a first sidelobe. Record the first sidelobe peak signal level.

FIRST SIDELOBE SIGNAL LEVEL ———— **+ 0.2 =** ———

☐ Jog and peak antenna back to the main beam signal.

☐ Press **<MENU>**, **<2>**, **<ENTER>**, **<4>**, **<ENTER>**, and **<ENTER>**. The cursor is under the **ERROR** level voltage display. Use the **<numeric keys>** and **<ENTER>** to enter the value determined above. Press **<CLR>**.

☐ Press **<6>** and **<ENTER>**. **STP PAR** sub-menu line 1 is displayed. Press **<ENTER>**. The cursor is under the **DIST** parameter. From the next page, page 20, or from factory data determine the 3 dB beam width of the antenna.

3 dB BEAM WIDTH OF ANTENNA ———— **DEGREES-**

APC300 STARTUP CHECKLIST (Con't)

3 dB BEAM WIDTH OF VARIOUS ANDREW ANTENNAS

		Receive	(Transmit)
9.3M and 9.1M	C - Band	0.51	(0.34)
7.6M	KU- Band	0.22	(0.18)
	C - Band	0.58	(0.39)
5.6M	KU- Band	0.28	(0.23)
4.6M	KU- Band	0.34	(0.29)
	C - Band	0.92	(0.63)
Prime Focus 4.5M	KU- Band	0.40	(0.32)
	C - Band	1.22	(0.85)
3.7M	KU- Band	0.42	(0.36)
Prime Focus 3.6M	KU- Band	0.46	(0.39)
	C - Band	1.40	(0.89)
Offset Fed 2.4	KU- Band	0.61	(0.54)
	C - Band	2.30	(1.49)

APC300 STARTUP CHECKLIST (Con't)

☐ Divide the 3 dB beam width of the antenna by ten (10). This will be the distance in degrees for the steptrack **DIST** step size. Example: antenna has a 3 dB beam width of 0.28 degrees divided by ten yields a result of 0.028. Set the **DIST** parameter to 0.02 or 0.03 degrees using the **<numeric keys>** and **<ENTER>**. Cursor moves to the **DETECT** parameter. This parameter signal variation was determined on page 15.

☐ Default **DETECT** parameter is 0.08 volts. The lower the **DETECT** voltage may be made the better, but the tracking reliability will be determined by overall system noise performance. If the signal variation changed approximately 0.02 volts a **DETECT** of 0.05 to 0.06 volts is possible. Using the **<numeric keys>** enter the **DETECT** signal level. Some operators use the default values until they get a feel for the system. It is not good practice to set **DETECT** too tight. Press **<ENTER>**.

☐ Cursor moves to **FILT** parameter. Press **<ENTER>** this parameter has already been entered once before. Cursor moves to **PAUSE** parameter. **PAUSE** is the amount of time the controller waits to read the signal level after making a step **DIST**ance during the scanning cycle. **PAUSE** is ideally set two to three times the **FILT**er parameter. Average times are 2 to 6 seconds. Faster moving inclined satellites will tend to use **FILT**er times of 1 to 3 seconds with **PAUSE** times of 2.5 to 8 seconds. A time of 2.5 seconds is good for the 1.3 second **FILT**er. Use the **<numeric keys>** and enter a **PAUSE** time of 2.5 seconds. Press **<ENTER>** and the cursor is displayed under **STOL**.

☐ **STOL** (steptrack tolerance) is the distance in degrees to which the controller attempts to position the antenna within the detected peak signal. 0.01 to 0.02 degrees are typical values. The tighter the tolerance the more the antenna motors are operated. Use the **<numeric keys>** enter 0.02 degrees for antennas to 4.6M size **or** 0.01 degrees for 5.6M antennas and larger. Press **<ENTER>** and the cursor moves to the **REPEAT** parameter.

☐ **REPEAT** is how many steptrack cycles will be completed during one operation. Use the **<numeric keys>** and enter a repeat value of 2. Press **<ENTER>** and the cursor moves to **BEDLY**.

APC300 STARTUP CHECKLIST (Con't)

☐ **BEDLY** how many seconds the automatic beacon signal switch is delayed before changing to the backup beacon source. Works only if **AUTO** is enabled. If you have only one beacon source press **<ENTER>**. If two beacon sources are available and a change is desired use the **<numeric keys>** to enter the delay in seconds. Press **<ENTER>** and the cursor advances to **BS DLY**.

☐ **BS DLY** how many seconds the automatic beacon signal reading is delayed after a switch has been made. Works only if **AUTO** is enabled. If you have only one beacon source press **<ENTER>**. If two beacon sources are available and a change is desired use the **<numeric keys>** to enter the delay in seconds. Press **<ENTER>**, the first line parameters appear and the cursor is extinguished. Press **<CLR>**.

☐ Press **<8>** and **<ENTER>**. **PRIORITY** parameter is displayed. Press **<INC>** to toggle between Steptrack and Smartrack®. Select Steptrack then **<ENTER>**. Press **<CLR>** and **<CLR>** to return to the main menu.

☐ Press **<POS>**, **<ENTER>**, **<JOG>**, and **<INC>**. The display should indicate the input signal level, azimuth, and elevation of the desired satellite. Again use the jog switches to peak on the signal.

☐ Press **<MENU>**, **<2>**, **<ENTER>**, **<1>**, and **<ENTER>**. The cursor will be under the steptrack **DISABLE/ ENABLE** parameter. Use **<INC>** to choose **ENABLE**. Press **<ENTER>**, **<POS>**, and **<ENTER>**, the current position mode display will appear. When a steptrack cycle is started the **STEP** prompt will be displayed.

☐ Steptrack is now enabled and will start a scanning cycle every three (3) minutes or whenever the default **THRESHOLD** value of 0.2 volts change is detected in the present signal level. After checking the operation remember to change the current cycle time of three (3) minutes or zero ("0") to turn it off. A **CYCLE** value of 60 to 240 minutes is typical depending upon tracking application. Tracking may be stopped when the **Remote/ local** switch is in **Local** by pressing **<JOG> <JOG>**.

* Note: If the **BOX LIMITS** were not set previously please refer to page 12 to enter them.

☐ Press **<MENU>** and **<7>**,the last line of the main menu is displayed. Press **<ENTER>**, **BX ENA DISABLED/ ENABLE** parameter is shown. Use **<INC>** to choose **ENABLE**. Press **<ENTER>**, **<POS>**, and **<ENTER>**, the current position mode display will appear. Whenever a steptrack cycle is started the **STEP** prompt will be displayed.

APC300 STARTUP CHECKLIST (Con't)

Steptrack parameters are some what interdependent. Setting the filter time a little too large or a detect level a bit too small reduces the optimum performance or might prevent successful tracking. Should the pulse or the step size be set without consideration of motor speed tracking may become erratic and unreliable.

Noise is a system factor that is probably the hardest to do anything about accept at the initial design phase.

Whether a beacon or video receiver is used to determine the signal change there will be a limit as to how small the detect level may be made or how large the filter time may be set. The issue is how large does one make the filter value, reducing the noise effect, therefore permitting a lower detect level setting. Increasing the filter value also requires the pause time to be made larger. The best rule to remember is the detect function will not be reliable once the noise is greater than one-half the detect level setting.

Larger filter and pause times are possible when tracking nearly stationary satellites with smaller aperture antennas, 4.5M and below. Large or no cycle times are useful when tracking slightly inclined satellites as well. After the initial testing is completed the cycle time is usually set to the operator's preference. That may vary from a low of sixty minutes to no cycle at all. Zero cycle utilizes only a change in signal level, the threshold delta, to invoke a steptrack scanning cycle.

To improve upon the tracking errors and reduce antenna motor mechanism operating time the **Smartrack®** program was developed. Smartrack® uses the steptrack as a tool to decide how well it predicted a move.

The operator enters the first satellite pointing angles and expected signal strength for a given time into one of ten Smartrack® tables. Once the Smartrack® has made a steptrack scan cycle it will predict and direct the next move. It will continue moving the antenna from prediction until the move proves to be out of the user acceptance level. It will then invoke another steptrack scan cycle to locate the peak signal it failed to predict.

After approximately twenty-three hours the predicted positions and steptrack scan cycle tasks will have generated a table of points that Smartrack® may use to track the satellite with a complete loss of beacon signal.

APC300 STARTUP CHECKLIST (Con't)

SMARTRACK® SETUP PROCEDURE

Smartrack® keeps time of satellite movements with a special clock, the SIDEREAL CLOCK. This clock has a day based on the movement of the stars. Our daily time is determined from the Earth's rotation around the Sun. To keep track of our daily time another clock is available, the Greenwich Mean Time (GMT) clock. It is suggested you take a look at the clocks, but **do not change** them:

☐ When delivered the two clocks (GST and GMT) have been set by the factory. To check, press **<MENU>** then **<3>, <ENTER>, <6>, <ENTER>**. GST, **G**reenwich **S**idereal **T**ime is displayed. Press **<INC>** to display GMT, **G**reenwich **M**ean **T**ime. * * Pressing **<ENTER>**, **<numeric keys>**, and **<ENTER>** are used to change time. As **<ENTER>** is pressed the cursor will move to hours, minutes, and seconds. Entering seconds completes change. Press **<POS>** then **<ENTER>** to restore current position display.

* Note: The Greenwich Sidereal Time (GST) clock will be different time from the Greenwich Mean Time (GMT).

* * In manual AE01B-A0334 REV B, Appendix B is a listing of the APC300 Utilities. These utilities (P/N AE01M-B0284) maybe run on IBM compatible with DOS version 3.3 or higher. This utility package is very handy for saving and reloading the various parameters. One of these utility programs is used to compute the Sidereal time. The **SIDTIME** (Sidereal time) program allows for local site determination of the GST parameter by running a simple user friendly program. Load the APC300 Utilities disk and at the DOS prompt type: **"SIDTIME"**. Then follow the directions on the screen.

☐ Press **<MENU>, <3>, <ENTER>, <8>,** and **<ENTER>** the **Smartrack®** sub-menu line one (1) is displayed. Press **<INC>** scrolls through the lines. Two (2) Smartrack® parameters are displayed on each line. There are three (3) lines to display a total of six (6) parameters.

APC300 STARTUP CHECKLIST (Con't)

☐ On the first line the **1 SMRT TAB** (Smartrack® Table) and **2 POL PARM** (Polarity Parameter) are accessed. Pressing **<INC>** steps through the lines and permits accessing any one (1) of the two (2) parameters. Pressing **<ENTER>** activates the cursor and permits changing the selected parameter. After an entry **<CLR>** will return the display to the menu selection.

* Note: In the next step the Satellite Position "01" table will be cleared of any entry.

☐ Press **<1>**, **<ENTER>** and the **1 SMRT TAB** is selected. On left side of the display is **SAT 00** with the cursor under the "00". Pres **<1> <ENTER>**, satellite position 01 is shown on the left side of the line and the cursor moves to the current sidereal time. Press **<ENTER>**, **<ENTER>**, and **<ENTER>** the first line of satellite table "01" is displayed. Cursor is under the hours position for the sidereal time entry. Press **<9>**, **<8>**, and **<ENTER>** the **SAT 01 TIME (HH=MM=SS)** with current sidereal time line is displayed again. Press **<ENTER>**, **<ENTER>**, **<ENTER>**, and **<ENTER>** the first line of satellite table "01" is again displayed. Cursor is under the hours position. The "98" entered into the hours position of the satellite table insured there are no other entries in the satellite position "01" table. Entering a "99" in the displayed line clears just that line. Press **<CLR>** and **<CLR>**. After entering through the time line, **<INC>** maybe used to scroll through any Smartrack® table entries.

* Note: The next entered parameter, polarity, is handy feature, but many operators rarely use it due to the coordination required with the satellite operator.

☐ Press **<2>**, **<ENTER>** and the Polarity Parameter is displayed. This Smartrack® feature is used to correct for polarization changes during the tracking period. If it is desired to use this parameter the amount of polarity inclination and time is determined by contacting the satellite operator. Use the **<ENTER>**, **<numeric keys>**, and **<ENTER>** keys to change the maximum inclination in degrees and the sidereal time of occurrence. Because this change is usually small and many operators do not wish to add more parameters the default values of **"0.00"** and **"00=00=00"** are used and **<ENTER>**ed in the **POL PARM**. After entering the polarity Sidereal time press **<CLR>**.

APC300 STARTUP CHECKLIST (Con't)

☐ **3 SMT CNTL** (Smartrack® Control) and **4 ACCEPT** parameters may be accessed through this line, line 2. Press **<3> <ENTER>**, the Smartrack® control line is displayed. **SAT NO** (satellite number) is to the left side of the line. The **SAT NO** are one (1) through ten (10) and correspond to the first ten (10) satellite positions. This line allows for enabling or disabling of the Smartrack® option for the first ten positions. Press **<INC>** to scroll through the satellite position numbers. **<INC>** to position "01", press **<ENTER>**, cursor moves to **DISABLED**.

☐ Press **<INC>**, the **DISABLED** is replaced with **<ENABLED>**, press **<ENTER>**. The cursor moves back to satellite position "01". Satellite position "01" will automatically begin Smartrack® whenever **<POS> <1>** is selected.

* Note: Once the satellite position number has been selected and the cursor shifts to the **DISABLED/ENABLED** field either an **ENABLED** or **DISABLED** must be **<ENTER>**ed to clear the field and return to satellite position.

☐ Press **<CLR>**, **<4>**, and **<ENTER>**. **4 ACCEPT** percentage parameter is displayed. **ACCEPT** percentage is how much change in the previously entered signal will Smartrack® call good before invoking a steptrack scan cycle to a new peak and possibly create a new table line entry. The previously entered signal was either by manual entry or by automatic Smartrack® table line entry.

The greater the accept percent is made the more often Smartrack® will invoke steptrack scanning cycles. For most applications a 95% to 97% accept level is used.

* Note: A popular satellite beacon receiver is specified to have a 0.3 volt/dB + or - 15% over a + or - 3 dB range. If it is assumed the 15% tolerance works against us the 0.3 volt/dB becomes 0.255 volt/dB.

APC300 STARTUP CHECKLIST (Con't)

1 dB is to be the desired tracking tolerance.

Peak beacon signal is 8.0 volts with the APC300 input amplifier set at unity gain.

Conditions: Beacon Signal level (8.0 volts) minus quantity of dB change in volts (0.255) times the APC300 amplifier gain (1) = the signal change for 1 dB or 7.745 volts.

8.0 - (0.255 X 1) = 7.745

Therefore dividing the signal change of 7.745 volts by 8.0 volts = 0.9681 or approximately 97%.

If a video receiver is used the AGC voltage at the desired signal is 2.4 volts. The APC300 wants to see 8.0 volts. The APC300's amplifier gain is adjusted to provide a signal level of 8.0 volts. That translates to an amplification gain of 3.333 times.

When using a video receiver instead of a beacon receiver it is often easier to determine the volts per dB by comparison. Tune in a beacon on a spectrum analyzer measure the signal change by jogging the antenna off the satellite until the desired change in dB may be measured both on the analyzer and signal voltage by the APC300.

☐ Press **<9>**, **<7>**, and **<ENTER>**. **ACCEPT** percentage parameter 97 is displayed. Press **<CLR>** and **<INC>** the **5 TRK DLY** (Steptrack Delay) and **6 MIN MOV** (Minimum Move) may be accessed through this line, line 3. Press **5 <ENTER>**, the Steptrack delay line is displayed. The first value, **DELAY** is the time that Smartrack® waits before invoking steptrack scanning cycle. If the invoked cycle fails to find a peak better than Smartrack®, Smartrack® rejects it and starts the **RESET** time counter. **RESET** is the minimum time before another steptrack scanning cycle is permitted by Smartrack®. The default values of **"0"** and **"10"** minutes have proven to be effective in most applications. New values maybe entered using the **<numeric keys>** and **<ENTER>**. It is suggested to use these values and leave this field by pressing **<CLR>**.

APC300 STARTUP CHECKLIST (Con't)

☐ Press **<6>** and **<ENTER>**, the **MIN**imum **MOV**e parameter is displayed. This parameter determines if a step move will be permitted to happen. If the step fits within this distance then Smartrack® will not invoke a move. Smartrack® permits a minimum distance tolerance to "0" with this parameter. A zero parameter would cause an increased amount of hunting and is recommended only for Ku-Band 5.6M antennas and larger applications. It is suggested to use the same parameter already entered in the steptrack parameters sub-menu, 0.02 or 0.01. If not done so use the **<numeric keys>** and **<ENTER>** to enter a Smartrack® steptrack tolerance of "0.01". Press **<CLR>** or **<INC>** to leave this field.

☐ Press **<POS>** and **<ENTER>**, the antenna current is displayed. Use the **<MENU>**, **<numeric keys>** and **<ENTER>** edit satellite **POSITION 1** with the **POS EDIT** menu selection. Place into **POS**ition **1** the approximate pointing angles for the desired inclined orbit satellite. Press **<JOG> <INC>** and the signal voltage, azimuth, and elevation will be displayed. Use the manual motor control jog switches to peak on the inclined satellite.

* Note: The next step adjusts the cross polarization if a manual or circular feed is used this APC300 step is skipped. The manual feed will require manual adjustment and should be done at this time.

☐ Press **<INC>** and the signal voltage will disappear. Azimuth, elevation, and polarity will be displayed. Press **<JOG>** and adjust cross polarity (if applicable) for inclined satellite. Record the polarity for satellite to be tracked as satellite position 1.

SAT POS 1 POLARITY ———— (90 degrees circular or manual feed.)

☐ Press **<INC>** and repeak on the inclined satellite. Record the signal voltage, azimuth, and elevation for voltage, azimuth, and elevation for the inclined satellite to be tracked as satellite position 1

SAT POS 1 SIG ———— **AZ** ———————— **EL** ————

APC300 STARTUP CHECKLIST (Con't)

☐ Press <POS> and **<ENTER>**, the antenna current is displayed. Use the **<MENU>**, **<numeric keys>** and **<ENTER>** edit satellite **POSITION 1** with the **POS EDIT** menu selection. Place into **POS**ition **1** the recorded pointing angles for the desired inclined orbit satellite.

☐ Press **<MENU>**, **<3>**, **<ENTER>**, **<8>**, and **<ENTER>** the **Smartrack®** sub-menu line one (1) is displayed. Press **<1>** **<ENTER>** the **1 SMRT TAB** is selected. On left side of the display is **SAT 00** with the cursor under the "00". Pres **<1>** **<ENTER>**, satellite position 01 is shown on the left side of the line and the cursor moves to the current sidereal time. Record the current Sidereal time:

CURRENT SIDEREAL TIME _____

☐ Press **<ENTER>**, **<ENTER>**, and **<ENTER>** the first line of satellite table "01" is displayed. Cursor is under the hours position for the sidereal time entry. Enter the Sidereal time using the **<numeric keys>** and **<ENTER>**. Cursor moves to the azimuth field, enter the recorded azimuth. Cursor moves to elevation field, enter the recorded elevation. Cursor moves to the expected signal level field, enter the recorded signal level. After entering the signal voltage the current sidereal time line appears.

☐ Press **<POS>**, **<1>**, and **<ENTER>**, Satellite Position 1 pointing angles are shown. Press **<ENTER>** and the current position and **MOVRDY** prompt is displayed. Press **<POS>** and the APC300 shows **IN MOT**ion as antenna is positioned and Smartrack® starts. After arriving in position the controller will show the **SMRT** prompt. If the Smartrack® is making a move by a prediction an * will be displayed to the right of **SMRT**. If the Smartrack® is making a move by invoking a steptrack scanning cycle a + will be displayed to the right of **SMRT**.

☐ Press **<8>** and **<ENTER>**. **PRIORITY** parameter is displayed. Press **<INC>** to toggle between Steptrack and Smartrack®. Select Smartrack® then **<ENTER>**. Press **<CLR>** and **<CLR>** to return to the main menu. Tracking may be stopped when the **Remote/local** switch is in **Local** by pressing **<JOG>** **<JOG>**.

* Note: After approximately twenty-three hours Smartrack® will have completed a table that may be used for periods as long as ten days without benefit of a tracking signal.

OPTIONAL USE OF IBM COMPATIBLE WITH APC300 UTILITIES AND REMOTE COMMUNICATIONS PORT PROTOCOL.

The APC300 Operation and Maintenance Manual AE01B-A0334 REV B, Appendix B lists the APC300 Utilities. These utilities (P/N AE01M-B0284) maybe run on IBM compatible with DOS version 3.3 or higher. This utility package is very handy for saving and reloading the various parameters, computing Sidereal time, and loading Intelsat program track information. **APCSAVE** and **APCLOAD** programs upload and download all parameters, satellite positions, satellite labels, and tables except the actual time.

Many users have found the **ACULOG** program to be good evaluation tool. The program monitors the sidereal time, azimuth, elevation, and signal level making an entry each second. It graphically displays the actual track of the antenna. A full day logging requires approximately 300K to 400K of memory storage.

To use the **ACULOG** program a VGA or VGA compatible monochrome monitor is needed. To connect to a laptop a DB9 to DB25 "AT" type adapter is required for the computer end.

DUMB terminal program allows simple remote control of the APC300 as well as the capability to label the forty satellite positions.

LDPRGTRK allows for the use of Intelsat IESS-412 based date to create the Smartrack® table.

Running the utility programs automatically set the communications port 1 to the APC300 default requirements. Therefore it is **not** usually necessary to set the computers serial communications port parameters to work with the APC300 utilities. The utilities will set the computer to operate with the APC300 serial definition of 1200 baud, even parity, 7 data bits, 1 stop bit, and 1 start bit. If you manually wished to set the communications port, under DOS 5.0 for example, the command would be **MODE COM1:12,E,7,1** for com port 2:**MODE COM2:12,E,7,1**.

APC300 version 2.5 and above software supports 1200, 2400, 9600, and 19200 baud remote communications port rates. These are user selectable through the local front panel keypad when the APC300 is in the maintenace menu mode. 1200 baud is the software default value and all current supplied utilities operate at this rate.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

Provided in the APC300 Utilities Kit, P/N AE01K - B0508 is a cable, (P/N AE01C-C0683) to connect the APC300 RS-232 port J1 to the computer. The cable ends are marked for clarity. APC300 plug is unique, it has a jumper between pins 4 and 5 of the DB25 connector. For the computer end the "AT" type communication port (DB9 connector) configuration is supplied. To use the utilities kit follow the check list:

☐ Connect Andrew cable P/N AE01C-C0683 to the APC300 remote RS232 port, J1. Be sure to check the DB25 socket connector labeled APC300 is connected to J1. Connect the other DB9 connector to the computer "AT" type serial port com1. Com2 may be used, but the program must be told by adding a space and typing a "2" after the program execute command. Example: **C:>DUMB 2**.

☐ If equipped with hard disk make a directory, APC300. Load APC300 Utilities program Andrew P/N AE01M-B0284 into the APC300 directory. 3-1/2" disk supplied in the kit contains all the ulitity files and a copy of IESS412.

* Note: APC300 parameters may be saved using the **APCSAVE** program with the **remote/local** switch in the **remote** or **local** position. **APCLOAD** program will reload all parameters saved in the specified file by the **APCSAVE** program only with the **remote/local** switch in the **remote** position.

☐ Place the APC300 **REMOTE/LOCAL** switch in the **REMOTE** position.

☐ Change directories to the APC300 at the prompt, type **APCSAVE TST.PAR**. Press **ENTER** on the computer. The program should execute and the computer screen will indicate how many responses have been received from the APC300. A file labelled **TST.PAR** will be created within the APC300 directory. The program will provide a screen prompt when the save is completed.

☐ From the DOS prompt type **ACULOG TST.LOG**. Press **ENTER** on the computer and the program should execute. The computer screen will indicate the antenna position and signal voltage level with a Sidereal time update each second. Approximately 300K of memory is required for each day of logging. **<ESC> <ESC>** terminates program.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

☐ From the DOS prompt type **DUMB**. The computer is now in the "DUMB" terminal mode. From this mode the APC300 may be remote controlled. The APC300 Operation and Maintenance Manual AE01B-A0334 REV B, Section 4, Appendix C, and pages 32 through 36 lists the APC300 Data Entry Commands. Capital (**UPPER CASE**) letters are used to generate the commands. **<CTRL, Z>** and **<ENTER>** exits the "DUMB" terminal mode.

* Note: APC300 will only accept DATA ENTRY commands when in the **REMOTE/LOCAL** switch is in the **REMOTE** position.

☐ The satellite positions may be labelled by invoking the **ENAM** command. For example label the position "01" satellite. At the computer, in the following format type the satellite label with up to twenty characters. ENAM is the command, ss is the position number, and cccc... is the up to twenty character label:

Format = **ENAMsscccccccccccccccccc**

Example = **ENAM01GSTAR 3 97w**

Pressing **<ENTER>** transmits the command. The APC300 does not give a response. On the APC300 the position when active will display the label.

REMOTE CONTROL PROTOCOL COMMANDS WHICH MAY BE USED THROUGH THE "DUMB" TERMINAL PROGRAM. APC300 MUST BE IN REMOTE MODE!

COMMAND	TO CONTROLLER	FROM CONTROLLER
Position Move	P Aaaaaa Eeeeee Ppppp CR	
Location Move	L nn CR	
Stop All Axes	X CR	
Steptrack Enable	S E CR	
Steptrack Disable	S D CR	
Box Limit Enable	B E CR	
Box Limit Disable	B D CR	

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

COMMAND	TO CONTROLLER	FROM CONTROLLER
Present Position Request	R P CR	LF P Aaaaaa Eeeeee Ppppp CR
Present Satellite Position Request	R L CR	LF L ss CR
Satellite Position Coord. Request	R S n n CR	SAaaaaa Eeeeee
Position Error Request	R E CR	E Aaaaaa Eeeeee Ppppp
Beacon Receiver Select	PRI LF T P CR SEC LF T S CR AUTO LF T A CR	
Tracking Signal Level Request	R T CR	** TP vvv CR ** TS vvv CR
Bit Status Request	R B (or R C) CR	B bs (or bsm) CR
Reset Error Fault	F CR	

** Reply depends on beacon receiver select

* Note: Spaces between characters are shown for clarity, no spaces are used in the actual command.

LF - Line Feed
CR - Carriage Return
ss - Satellite Position, 01 - 40 (Coordinates stored in memory)
aaaaa - Azimuth angle or error, two decimal places implied.
eeeee - Elevation angle or error, two decimal places implied.
pppp - Polarization position or error, one decimal place implied.
vvv - Tracking signal level in volts, two decimal places implied

SYSTEM STATUS	STEPTRACK STATUS	MOTION STATUS SEE NOTE
b6=Always set=1	s6=Always set=1	m6=Always set=1
b5=Local Mode=1	s5=Steptrack Enabled=1	m5=NA
b4=Remote Mode=1	s4=Box Limit Enabled=1	m4=NA
b3=Local Jog Mode=1	s3=Steptrack PRI Select=1	m3=NA
b2=Travel Limit enabled (SOFTWARE)=1	s2=Steptrack SEC Select=1	m2=Smartrack Sat. Selected=1
b1=Position Error=1	s1=Steptrack AUTO Select=1	m1=Steptrack Cycle In Progress=1
b0=Fault (SUM ALM)=1	s0=LO Tracking Signals=1 (STEPTRK AUTO DISABLE)	m0=Motion (ANT) Commanded=1

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

Note: Motion status is the third character generated upon receipt of a 'RC' command (3 status bytes returned). Upon receipt of a 'RB' command only the system and steptrack status characters are generated (2 status bytes returned). The other bits of the motion status byte are set to zero the status shown on the front panel display (when there are no faults) as follows:

@	01000000	INPOS	A	01000001	INMOT
B	01000010	STEP	C	01000011	STEP
D	01000100	SMRT	E	01000101	SMRT*
F	01000110	SMRT+	G	01000111	SMRT+

Protocol commands are defined as follows:

Note: Refer to APC300 manual AE01B - A0371, Chapter 7 "SMARTRACK®" for SMARTRACK® operating procedures.

POSITION MOVE - Moves antenna to position defined by coordinates.

NOTE: Position move command must contain all three axis coordinates. If only one or two axes require change, the coordinate for the axis currently in position must also be transmitted.

LOCATION MOVE - Moves antenna to specified location number. Coordinates for up to 40 satellite locations are stored in memory.

NOTE: Disable box limits before initiating position move. After move is completed, enable box limits before enabling Steptrack.

STOP ALL AXES - Aborts axis motion. SMARTRACK® must be disabled prior to use.

STEPTRACK ENABLE - Enables steptrack function.

STEPTRACK DISABLE - Disables steptrack function. Must be used before initiating a move command.

PRESENT POSITION REQUEST - Indicates current axis positions of antenna.

SATELLITE LOCATION COORD. REQUEST - Returns location coordinates of specified satellite (1-40).

POSITION ERROR REQUEST - Indicates absolute angle difference between command position and current position.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

BEACON RECEIVER SELECT - designates beacon channel source as being primary (PRI) or secondary (SEC). Command also enables automatic switching between the two should tracking signal drop below programmed error level.

TRACKING SIGNAL LEVEL REQUEST - monitors signal level output from beacon receiver. The APC300 replies with "P" (primary) or "S" (secondary) indicating which signal is selected for tracking. To monitor alternate beacon signal strength, disable steptrack function. Switch to alternate tracking signal and issue level request.

BIT STATUS REQUEST - monitors system and steptracking operating status.

RESET ERROR FAULT - Resets faults and restart APC300 as a power on condition.

Data Entry Commands

Each Data Entry Command has a corresponding Data **DUMP** command. These commands begin with the letter **D** rather than **E**, and do not contain any data except a Satellite Number, if the number is part of the command. Each Dump command invokes its corresponding Entry command as a response. For example, DSAS02 might invoke ESAS02A14589E2725P0900, while DTE could generate ETE450. Commands maybe used with the APC 'DUMB' program. Upper case letters are used for commands.

The order of data for Axis commands is always Az, El, and Pol. Pol Axis is not specified in all commands. The number of lowercase digits used indicates the number of digits in the command/response.

aaaaa	Azimuth angle in hundredths of a degree
ccc...	Characters (for a Satellite name)
dddd	Angular distance in hundredths of a degree
eeee	Elevation angle in hundredths of a degree
nnnn	Numeric value
hh	Hex value

*** Note: Spaces are required, as shown, in commands that pertain to more than one axis.**

DATA ENTRY COMMANDS

EHEMz	0 = Northern Hemisphere 1 = Southern Hemisphere
ERSA1MnnnnDnnnnBnnnn	Azimuth resolver ratio
ERSA2MnnnnDnnnnBnnnn	Elevation resolver ratio
ERSA3MnnnnDnnnnBnnnn	Polarity resolver ratio
ETCnnn	Track Cycle Time (in minutes)
ETEvvv	Track Error Level
ETTvvv	Track Threshold

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

ESEz	0 = Scintillation enabled 1 = Scintillation disabled
EEDnnn	Beacon Error Detect Time (in tenths of seconds)
ESDnnn	Beacon Switchover time (in tenths of seconds)
ETDdddd	Steptrack Distance
EDLvvv	Steptrack Detect Level
ETFttttt	Track Signal Filter
ETPssss	Steptrack Pause Time
ETLdddd	Steptrack Tolerance
ETRnnnnn	Steptrack Repeat Count
EPRz	1 = SMARTRACK® 0 = Steptrack SMARTRACK® has priority over Steptrack
ECTtttt	Resolver Checktime
ESRnnnnn	SMARTRACK® Reset time in minutes
ESTddd	SMARTRACK® Minimum Move
EBOXdddd dddd	Box Limits
ESPDddd ddd ddd	Resolver Check Distance
EOFFnnnnn nnnnn nnnnn	Axis Offsets
EMINaaaaa eeee pppp	Axis Minimums
EMAXaaaaa eeee pppp	Axis Maximums
EOVRdddd dddd dddd	Axis Overshoot Distances
ETOLdddd dddd dddd	Axis Tolerances
EPULtttt tttt tttt	Axis Pulse Times
ESTPdddd dddd dddd	Axis Stop (rampdown) Distances
ETRYnnnnn nnnnn nnnnn	Axis Try Counts
ETIMtttt tttt tttt	Axis Pause Times
EERRdddd dddd dddd	Axis Error Maximums
ERCFhh nnnn nnnn nnnn	Resolver Correction Factor
ESASssAaaaaaEeeeePpppp	Satellite Position
ENAMsscccccccccccccccccc	Satellite Name
ESMSssFz	Satellite SMARTRACK® Enable 0 = Enabled 1 = Disabled

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

Listening to the communication port is the highest priority within the APC300, answering is not. Upon receipt of a remote status command the APC300 may or may not respond immediately. The request(s) will be held in a first requested first answered prioritization (FIFO). If the APC300 is in the process of attending the antenna positioning the response will be delayed until the activity is completed.

The host computer program should incorporate sufficient delay for the APC300 to respond to status or informational commands. For example APC300 Aculog utility requests sidereal time, azimuth, elevation, and signal strengthen once a second while the SMARTRACK® mode is active to insure adequate response time.

SMARTRACK® **must be disabled** before remote stop command is generated. This is handled as a DATA ENTRY command or SMARTRACK® disable command for satellite positions one (1) through ten (10) and is position sensitive. Example: **ESMS01F1 or MD01 = SMARTRACK®** position 1 is **DISABLED**.

APC300 version 2.5 and above software supports local front panel user selection for remote communications rates of 1200, 2400, 9600, and 19200 baud. These are user selected through the local front panel keypad when the APC300 is in the maintenance menu mode. All currently supplied APC300 utilities operate at 1200 baud. 1200 baud is the software default value. The 1200 baud was chosen to prevent the character rate from becoming a problem for either the APC300 or the host computer. Please note: Increased baud rate does not insure increased data throughput.

ALL REMOTE MOVE COMMANDS ARE EXECUTED UPON RECEIPT.

MOTION STATUS IS REQUESTED THROUGH THE "RC" COMMAND AND IS THE THIRD CHARACTER GENERATED UPON RECEIPT OF THE COMMAND.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

RESOLVER CORRECTION FACTORS

A table of THIRTY-TWO (32) **R**esolver **C**orrection **F**actors (RCF) are supported for the azimuth (axis 1), elevation (axis 2), and polarity (axis 3). Each RCF corresponds to the adjustment, plus or minus, that should be made to a raw resolver reading. This resolver reading's five most significant bits correspond to the index into the RCF table and have all other resolver bits zeroed. For raw resolver readings whose least significant bits are not zeros, the correction applied is determined from an interpolation between the preceding and following RCF table elements.

RCF's may be entered either from the front panel or via the RS-232 remote link. To enter RCF;s from the front panel select ANDW and then CALIBR while the unit is in TEST Mode. The APC first requests the Axis Number. After the axis is specified the display shows:

AX n RAW xxxx UNC uuu.uu COR ccc.cc

n is the axis entered in the previous step. xxxx is the raw hex unfiltered resolver reading for the axis.

uuu.uu is the uncorrected unfiltered angular reading corresponding to this reading and ccc.cc is the averaged corrected angular reading.

At this point **BEFORE** the Enter key is hit, the antenna can be moved just as in Jog Mode and the display updates. Once the enter key is hit the user has an opportunity to edit the corrected value.

When a new corrected value is entered, either one of two RCF's are adjusted depending upon whether the Raw value being corrected is close to an RCF table point relatively in the middle of two points. For some points the new corrected value following entry may differ slightly from the entered value. This is due to the interpolation algorithm and should be considered normal. Also it should be noted that if corrections are entered for two angles close to one another, the second entry may affect the first.

The RS-232 interface supports three new commands:

1. ECLR
2. ERCFxx aaaa eeee pppp
3. DRCFxx

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

1. Causes the APC battery-backed RAM to be restored to the default values. All Smartrack tables are erased, resolver correction factors are set to zero, etc.

2. Enters a resolver correction factor for each axis. xx is a hex number which specifies which of the 32 factors is being updated. aaaa is a hex 2's complement number specifying the RCF's for elevation and polarization axes respectively.

3. Dumps the RCF's for each axis for the hex index specified by xx. The response has the same format as item 2 above.

The APCSAVE utility has been updated to dump the RCF's. It first checks for a response to the command DRCF00. If a response occurs the RCF's are dumped; otherwise it assumes that the APC has the old software and does not attempt to dump the RCF's.

The APCLOAD utility now supports the /C option. This tells the program to clear the APC RAM before restoring from the SAVE file. The user is asked to confirm that he wants to clear the memory before the ECLR command is sent.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

SMARTRACK® COMMANDS

Enter SMARTRACK® Table Data Point	M L Aaaaaa Eeeee Ggg Thhmmss Snn
Enable SMARTRACK®	M E nn
Disable SMARTRACK®	M D nn
Set Polarity Maximum Inclination Sidereal Time	M A Thhmmss Snn
Set Polarity Maximum Inclination in degrees	M I Iiiii Snn
Set Accept Percentage	M P App
Set GMT and GST	M T Mhhmmss Shhmmss

	COMMAND	RESPONSE
Request SMARTRACK® Data Point	R M Thhnnss Snn	Aaaaaa Eeeee Sgg
Request Sidereal Time	R M GS	hhmmss
Request GMT	R M GM	hhmmss
Request Polarity Maximum Inclination Sidereal Time	R M A Snn	hhmmss
Request Polarity Maximum Inclination in degrees	R M I Snn	Iiiii
Request Accept Percentage	R M P	Ppp

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

USING IESS-412

IESS-412 describes the INTELSAT method Earth station operators may use to compute the pointing direction from any Earth station to any selected INTELSAT spacecraft. Usage is described in INTELSAT EARTH STATION STANDARDS (IESS), Document IESS-412 (Rev. 1), "EARTH STATION POINTING DATA".

Additional information regarding the INTELSAT IESS-412 document and programs may be obtaining through your country's signatory to INTELSAT. For example: USA is COMSAT.

The **LDPGMTRK** program uses the POINT program explained in IESS-412. It is used to load an APC300 with ephemeris data for the 24 hour period following the running of the program.

POINT is the IESS-412 program that is invoked to generate the INTELSAT table. POINT40A is the recommended POINT program to use whether an 80x87 math coprocessor is present or not. To use the POINT40A IESS-412 program the following four data files must be present:

EPHEM.DAT	ephemeris data for a particular satellite
REPORT.DAT	specifies interval between points and number of days following epoch time for which calculations will be valid
STATION.DAT	specifies latitude, longitude, and altitude of antenna site
SATELLIT.DAT	center of box and box size; neither is relevant when loading the APC300

IESS-412 CHECKLIST

☐ First step to building the table is to access the "APC300" or the directory in which the APC300 Utilities were loaded. After the DOS prompt type, IESS412.

Example: **C:>IESS412 <ENTER>**

☐ After the program has started follow the instructions and enter the eleven ephemeris data parameters provided by INTELSAT. Complete the station, satellite, and report data entries.

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

The POINT program is run as a part of the INTELSAT POINT program. **POINT may take more than two minutes to execute on slower PCs while only a few seconds may be required on a 386 machine.** No message is displayed while POINT is running.

The program must be run on DOS 3.3 or greater with files parameter, in config.sys, set to 10 or greater.

The computer date and time must be in agreement with the INTELSAT ephemeris data date and time, within the twenty-four hour period for which the table is being generated.

☐ Once the four IESS-412 data files have been entered, **LDPGMTRK** may be invoked to load the selected satellite position table.

LDPGMTRK needs to know:

1. the APC300 satellite number to be programmed
2. the complete path and name of the POINT program
3. the number of hours the PC's clock is ahead or behind GMT

The three items must be specified on the command line or through an environment variable. Command line arguments override environment variable settings.

The interval between points specified is six (6) minutes for up to seven (7) days. IESS-412 REPORT must include times within the following twenty-four hour to load into the APC300 table.

All points generated by the POINT programs that have a date/time value occurring in the following 23 hours 56 minutes (sidereal) are downloaded to the APC300. The PC's time must be correct and GMTDELTA correctly specified.

*** Note: This program converts solar time (GMT) to sidereal time by using the APC300's sidereal clock as a reference. If the APC300's sidereal clock is adjusted, then program track data must be updated.**

APC300 UTILITIES AND PROTOCOL USER CHECKLIST

LGPGMTRK may be run at intervals shorter than 24 hours without any negative effect. After several days the satellite's drift will cause the program track data to become inaccurate. The APC300 using SMARTRACK® follows the drift of a satellite and updates the table as necessary.

Usage:

LDPGMTRK [/POINTPGM=\path\exename] [/APCSAT=n] [/GMTDELTA=hrs] [/COM2]

EXAMPLE:

C:>LDPGMTRK /POINTPGM=C:\APC300\POINT40A /APCSAT=1 /GMTDELTA=5

In the example **LDPGMTRK** will use the IESS-412, POINT40A program to complete the satellite position "01" table. It will be looking for the POINT40A program on drive "C:" within directory "APC300". The computers clock is "5" hours behind **G**reenwich **M**ean **T**ime (GMT). Because no communications port was specified the default com1 will be used. APC300 must be in **REMOTE** to use the **LDPMGTRK** program.

After POINT is complete, the data generated is interpreted and displayed as a running count of the number of points sent to the APC300.