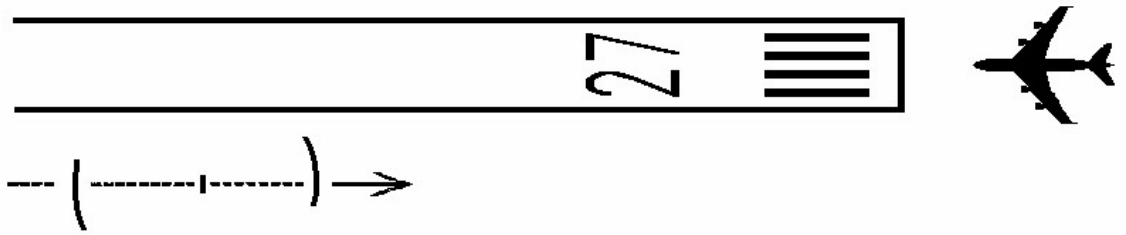
INSTRUCTION BOOK -
MODIFICATION SUPPLEMENT

INSTRUMENT LANDING SYSTEM:
END-FIRE GLIDE SLOPE ANTENNA SUB-SYSTEM

ADDITIONAL ITEMS NEEDED BUT NOT SUPPLIED FOR MODEL 105 AND 106



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REVISIONS

PAGE NUMBER	REVISION LEVEL	REVISION DATE	INSERTION DATE	PURPOSE OF REVISION

RETAIN THIS RECORD IN THE FRONT OF THE MANUAL. ON RECEIPT OF REVISIONS, INSERT THE REVISED PAGES IN THE MANUAL, ENTER THE REVISION NUMBER, REVISION DATE, DATE INSERTED, AND INITIALS.

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SECTION 1. GENERAL INFORMATION AND REQUIREMETS

1.1. INTRODUCTION - This instruction book supplement provides the details for items (Material Equipment Tools etc.) that are needed, but not supplied by WATTS ANTENNA COMPANY for a proper installation of a Model 105 or Model 106 End-Fire Glide Slope (EFGS) Antenna System. These Antenna Systems are manufactured by Watts Antenna Company at its manufacturing facility in The Plains, Ohio, USA.

1.2. PURPOSE – This document is intended to aid our customers in determining the items needed to install and maintain a WATTS ANTENNA COMPANY EFGS Antenna System. We have compiled the various text, tables and lists within our existing documentation which itemizes or otherwise elaborates on the items needed for install of our Model 105 or Model 106 EFGS Antenna Systems. Customers have routinely inquired as to which items would be supplied and which items they would need to purchase to install our product. While this information may be found in our existing documentation, it was conveniently gather together in one easy to find location. This supplement is meant to address this issue and make it more convenient for our customers to have this information provided to them in a much more comprehensive and compact method.

SECTION 2. ITEMS NEEDED BUT NOT SUPPLIED

2.1. INTRODUCTION – This section of this supplement aggregates and presents the various texts and tables within the WATTS Instruction Books (IBs)and other material for the Model 105 and Model 106 EFGS Antenna Systems. It describes the items which are needed install the WATTS antenna systems but are not supplied by WATTS ANTENNA COMPANY.

2.2. MATERIAL NEEDED BUT NOT SUPPLIED – In ***Paragraph 1.3 of the IBs*** it states that …

“There are nine interconnecting semi-rigid air-filled buried cables (not supplied with antenna system), identified as follows:

R	Rear main antenna, feed cable
F	Front main antenna, feed cable
C	Clearance antenna, feed cable
MR	Rear main antenna, integral monitor cable
M	Front main antenna, integral monitor cable
MC	Clearance antenna, integral monitor cable
M1	Field monitor antenna M1, received signal cable
M2	Field monitor antenna M2, received signal cable
M3	Field monitor antenna M3, received signal cable

These cables connect between their respective antennas and the interface unit in the shelter via a junction box on the outside of the shelter wall and short pigtail cables.” THESE CABLES ARE NOT SUPPLIED.

Table 1-3 of the IBs lists additional material required, but are not supplied by Watts Antenna Company, to make the End-Fire system operative. A copy of this table is found below …

Table 1-3. Additional Material Required

QUANTITY	NOMENCLATURE	TYPE/CAT NO. (ANDREW CORPORATION)
3	Connector, 7/8-7/8 EIA male	75AR (Gas Pass)
3	Connector, 7/8-N female	H5PNF
6	Connector, 1/2-7/8 EIA female	74ARG (Gas Pass)
6	Connector, 1/2-N female	H4PNF
*	Cable, RF, semi-rigid, 7/8	HJ5-50 (Phase stabilized)
*	Cable, RF, semi-rigid, 1/2	HJ4-50 (Phase stabilized)

NOTE: See Table 9-3.

Table 9-3 of the IB's lists more cable information in terms of type, number of linear feet, and minimum bend radius. A copy of this table is provided below.

Table 9-3. Cable Information

NOMENCLATURE	TYPE	FEET	MIN BEND RADIUS
REAR FEED, R	7/8 DIA., HJ5-50	240-270	10 in.
FRONT FEED, F	7/8 DIA., HJ5-50	SEE NOTES 11, 12	10 in.
CLEARANCE FEED, C	7/8 DIA., HJ5-50	80-140	10 in.
FIELD MONITOR, M1	1/2 DIA., HJ4-50	600-635	5 in.
FIELD MONITOR, M2	1/2 DIA., HJ4-50	620-670	5 in.
FIELD MONITOR, M3	1/2 DIA., HJ4-50	635-700	5 in.
INTEGRAL MONITOR REAR, MR	1/2 DIA., HJ4-50	280-320	5 in.
INTEGRAL MONITOR FRONT, MF	1/2 DIA., HJ4-50	SEE NOTES 11, 12	5 in.
INTEGRAL MONITOR CLEARANCE, MC	1/2 DIA., HJ4-50	80-140	5 in.
OBST.LT., R, F, MR, MF, M1, M3 (RWY END)	#12-3UF	———	———

Our technical team is looking into new cabling for the end-fire.

Current bidders should quote the Andrew HJ 5-50A 7/8 air dielectric cable w/associated connectors, phase stabilized if they can get it, at least for the front and rear antennas and the associated monitor lines. It should also be noted that the Andrew Company has been bought out by a company called CommScope.

The clearance antenna and the monitors do not need phase stabilized cable, but we still currently recommend using the HJ5-50 cable at the moment. The entire system with the HJ5-50. If the contractor bids this cable, then any changes to the cabling due to our research will result in a reduction in the cost of the cable. The dehydrator we recommend is the Andrew-CommScope MT-050 in its current version. The current version as of today is the MT-050C.

We are currently looking into cable from Radio Frequency Systems (RFS). They have cabling that appears to be a suitable replacement for all the cables we currently are supplied by Andrew-CommScope and have an alternative to the ½ cable (HJ4-50) that Andrew-CommScope quit supplying. They have a "low loss" 3/8ths cable that has the same loss from the antenna system monitors that the Andrew-CommScope HJ4-50 cable ½ cable had. Both cables that RFS can supply have better bend radius specifications then the Andrew-CommScope so things look promising.

Several options exist for cabling the system. We have a significant history and positive experience with the Andrew-CommScope cable, so I am reluctant to change the phase sensitive part of the system which is the cables to the front and rear antennas, however, changing the monitor cables to the 3/8th inch would result with a cost savings to the customer and would be easier to install and interconnect. We are in discussions with RFS at the present time and I will advise you when we make a final decision. At the current time I would recommend that contractors quote the Andrew-CommScope HJ5-50 cable.

2.3. EQUIPMENT NEED BUT NOT SUPPLIED – This section lists additional equipment required to make the End-Fire system operative that are not supplied with the antenna system manufactured by Watts Antenna Company. Starting off this list is the **ANDREW CORPORATION's Dehydrator.** Currently, the recommended model is the MT-050C (NOTE: In the past a model MT300 had been recommended, but this has been replaced with the recommendation for the MT-050C model). Additionally, Watts Antenna Company recommends a secondary dehydrator as a backup for the primary dehydrator and a battery backup for the primary dehydrator. ***Table 1-4 of the IB's*** lists additional equipment required but not supplied with the antenna system. A copy of this table is found below …

Table 1-4 Additional Equipment Required

QUANTITY	NOMENCLATURE	Part Number**
1	Two-frequency Transmitting Electronics with Monitor Electronics and Power Supply	**
1	Glide Slope Clearance Detector *	**
3	Integral Detector *	**
1	End-Fire Glide Slope Interface Kit*	**

* NOTE 1. Some equipment manufacturers may have specialized detectors and/or an EFGS interface kit to connect with the antenna system.

** NOTE 2. Consult the preferred equipment manufacturer for part numbers and interface instructions.

2.4. TOOLS NEED BUT NOT SUPPLIED – This section lists additional tools required to make the End-Fire Antenna System operative that are not supplied. ***Sections 7.2.2.1, 7.2.2.4, and 7.2.2.7 of the IBs*** deals with Main, Clearance, and Monitor Antennas and their Cable VSWR Fault Isolation. - This procedure requires the following additional pieces that are needed but not supplied to carry out this procedure:

1) Bird Thru-line Directional Wattmeter Model 43 modified with Qty (2) QC-type “Quick Change” 7/8 EIA flange adapters, Bird part number 4240-002, connectors on each end of the internal through line body, or equivalent;

2) Qty (1) Andrew Type N-female Adapter (7/8 EIA flange to N-female) type 2260B, or equivalent

3) Qty (1) 5 Watt Dummy Load (N-male);

4) Qty (1) 5 Watt Dummy Load (N-female)

In addition, ***Section 9.4 ANTENNA INSTALLATION of the IBs***, states …

“In addition to common hand tools, the following tools are necessary for antenna assembly:

1 open end wrench, 1-1/2 inch
1 open end wrench, 1 inch
1 open end wrench, 3/4 inch
1 steel measuring tape, 200 foot, divided into feet and inches
1 battery powered 3/8 inch drill with a #2 phillips screwdriver bit
1 #2 phillips screwdriver
1 1/4 inch slotted screwdriver
1 post level
1 megger (for checking cable)
1 Soldering torch
1 Roll of emery-cloth sandpaper
1 Tin of soldering paste
1 Roll of solder

SECTION 3.0 RECOMMENDATIONS

3.1. INTRODUCTION - In addition to being thoroughly familiar with the complete Chapter 9 **Installation and Tune-up** from the Instruction Book (available online from our website), Watts Antenna Company has the following recommendations:

3.2. SPECIFIC RECOMMENDATIONS – The following recommendations are made by Watts Antenna Company

1.) High resolution ground check points be provided at 1 degree intervals near the threshold, consistent with Figure A1-3 Model 105 Optimization/High Resolution Ground Check Points identified in Appendix A, page A1-5 of the FAA TI 6750.196 INSTRUCTION BOOK INSTRUMENT LANDING SYSTEM END-FIRE GLIDE SLOPE ANTENNA SUB-SYTEM MODEL 105 TYPE FA-10029. These high-resolution ground points are also recommended to be provided at 1 degree intervals near the threshold consistent with Figure A1-3 Model 106 Optimization/High Resolution Ground Check Points identified in Appendix A, page A1-5 of the FAA TI 6750.197 INSTRUCTION BOOK INSTRUMENT LANDING SYSTEM END-FIRE GLIDE SLOPE ANTENNA SUB-SYTEM MODEL 106 TYPE FA-10029/A

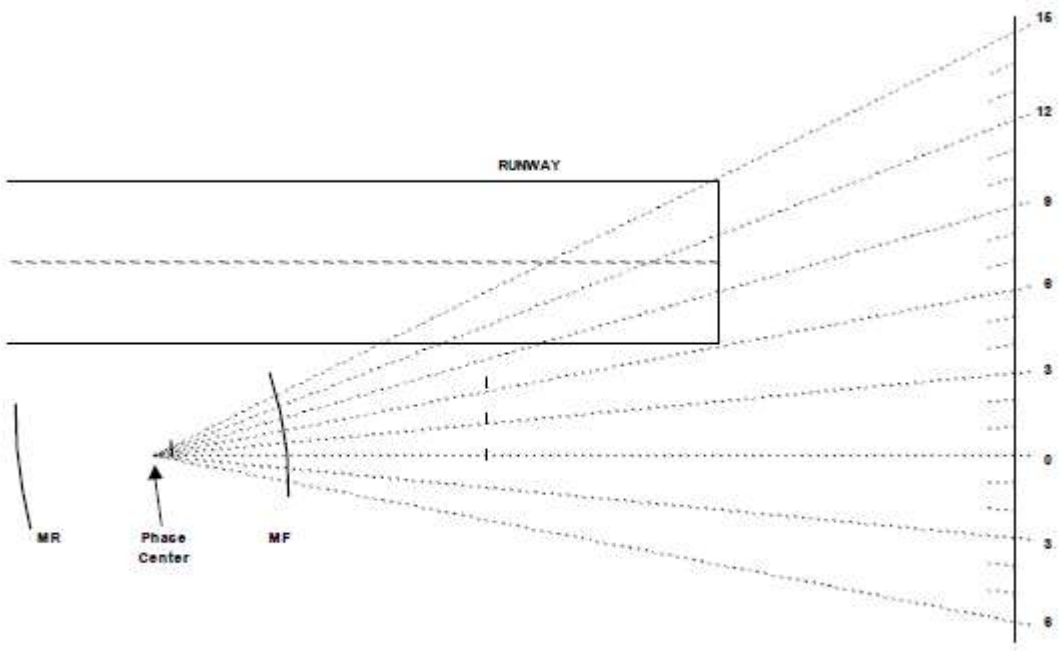

Figure A1-3. Model 105 Optimization/High Resolution Ground Check Points

The figure above is copied from the Model 105 Instruction Book while the figure below is copied from the Model 106 Instruction Book. Both figures depict the High-Resolution Ground-Check Points at 1 degree intervals near the threshold.

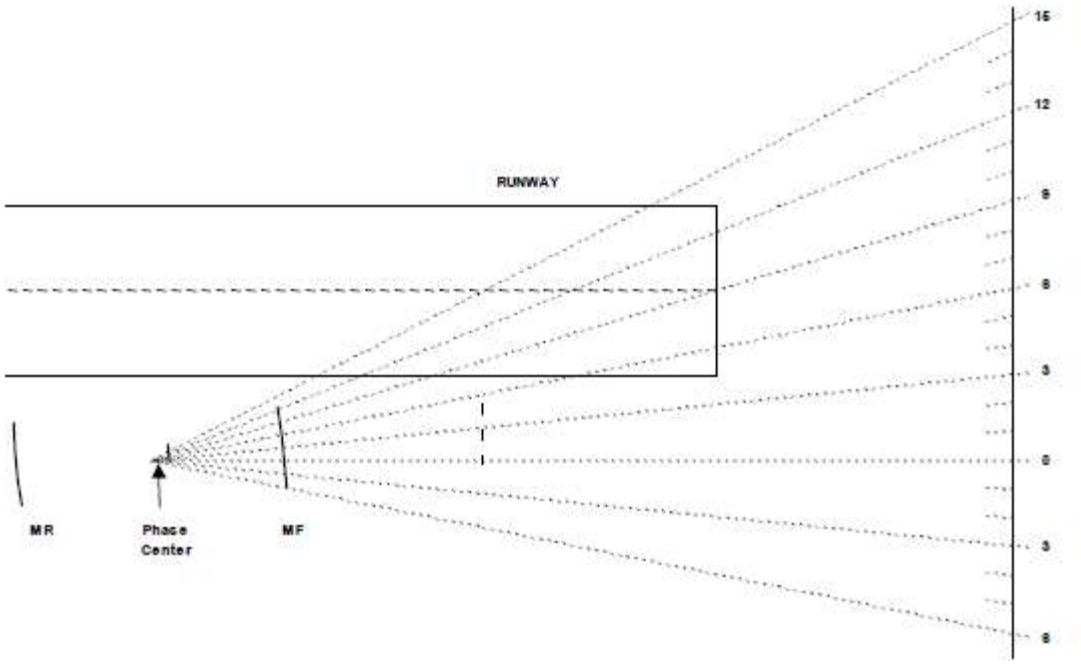

Figure A1-3. Model 106 Optimization/High Resolution Ground Check Points

2.) We no longer support the use of individual concrete pilings. Watts Antenna Company recommends the use of continuous form concrete foundations to increase the stability of the system, to insure continuity of service and to prevent damage to the system in all climates. The money spent in the additional concrete will be greatly offset by reduced costs associated with installation, maintenance, optimization and tune-up.

3.) A six foot perimeter of gravel be distributed around all foundations supporting the antenna system to prevent inadvertent damage to the system or cabling.

4.) Antenna system cables should protrude through the concrete foundation near the antenna system connection points and should be encased in a flexible protective sleeve

5.) The size of the shelter's external junction box should be assessed to ensure that sufficient vertical height exists within the box to facilitate installation of the antenna system feed cable connectors and interconnection with the EF-9 Interface Unit.

NOTE: Installation of the antenna system must be installed by or observed by an individual or organization having a current Watts Antenna Company Manufacturer's End-Fire Certification in order to preserve the manufacturer's system warranty.